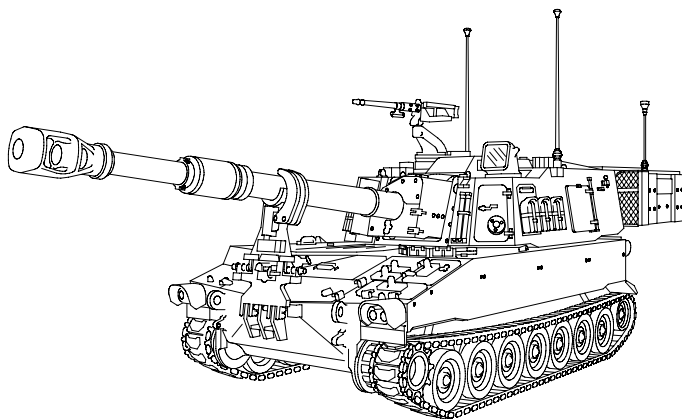


**UNIT MAINTENANCE MANUAL  
FOR  
CAB SYSTEMS  
AND  
COMPONENTS**



**HOWITZER, MEDIUM,  
SELF-PROPELLED:  
155MM, M109A6  
(NSN 2350-01-305-0028)  
(EIC:3FC)**

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### **CARBON MONOXIDE POISONING CAN BE DEADLY**

Carbon monoxide is a colorless, odorless, deadly poisonous gas, which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air contaminated with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, or coma. Permanent brain damage or death can result from severe exposure.

Carbon monoxide occurs in the exhaust fumes of fuel-burning heaters and internal-combustion engines and becomes dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to insure the safety of personnel whenever the personnel heater, main or auxiliary engine of any vehicle is operated for maintenance purposes or tactical use.

Do not operate heater or engine of vehicle in an enclosed area unless the area is adequately ventilated.

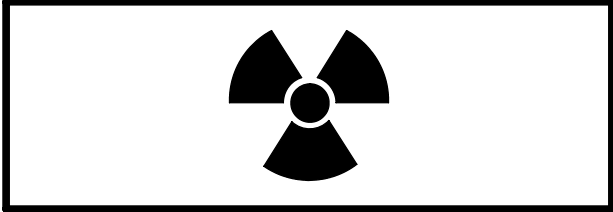
Do not drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.

Be alert at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, immediately ventilate personnel compartments. If symptoms persist, remove affected personnel from vehicle and treat as follows: expose to fresh air; keep warm; do not permit physical exercise; if necessary, administer artificial respiration.

**THE BEST DEFENSE AGAINST CARBON MONOXIDE  
POISONING IS ADEQUATE VENTILATION**

**WARNING**

**RADIOACTIVE MATERIAL(S)**



**TRITIUM (HYDROGEN-3) GAS**

Tritium gas is an ionizing radiation hazard. The beta radiation emitted by tritium is an internal hazard and considered carcinogenic. Tritium can enter the body through inhalation, ingestion or skin absorption.

- If a tritium lamp is broken, tritium gas will oxidize resulting in contamination of the device, personnel and surrounding work areas. Ventilate area immediately with outside air and contact the Local Radiation Safety Officer (LRSO) to determine the extent of contamination to personnel and work areas.
- Prior to maintenance (or if equipment is damaged), check for illumination of the device in a dark room environment. If illumination is not present, notify LRSO. Do not attempt to repair the device.
- Refer to the Safety, Care and Handling section for further guidance.

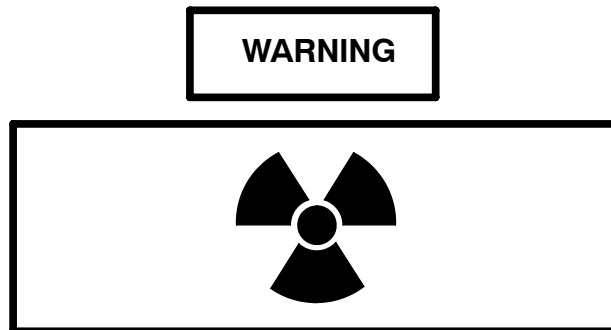
**SAFETY, CARE AND HANDLING PROCEDURES FOR TRITIUM FIRE CONTROL DEVICES WITH RADIOACTIVE TRITIUM GAS ( $^3\text{H}_2$ )**

1. Purpose and Scope: This procedure implements mandatory license requirements for use and maintenance of tritium radioluminous fire control devices used on howitzers, mortars, tanks, and rifles. Control of Nuclear Regulatory Commission (NRC) licensed radioactive material is mandated by federal law. This procedure is applicable to all personnel working with tritium devices, including general support, direct support and unit maintenance and operator levels.
2. Emergency procedures: In the event the radioluminous source is broken, cracked, or there is no illumination, immediately wrap device in plastic bag (item 17, Appx C) and notify the local RSO. Contact the base safety office for the name and telephone number of your local RSO:

LOCAL RSO: \_\_\_\_\_ TELEPHONE: \_\_\_\_\_

- a. If a tritium source breaks, inform other personnel to vacate the area or move upwind. If skin contact is made with any area contaminated with tritium, wash immediately with nonabrasive soap and water. Report the incident to the local RSO. Actions below will be taken under supervision or direction of the local RSO. The local RSO will contact the licensee as indicated in paragraph 6.c.

- b. Personnel handling the tritium device should wear rubber or latex gloves (item 51, Appx C). Device must be immediately double wrapped in clear plastic bags, sealed with tape (item 90, Appx C), and marked as "Broken Tritium Device – Do Not Open" per RSO direction. Dispose of used gloves as radioactive waste, per instructions from local RSO and wash hands immediately after bagging device.
  - c. Personnel who may have been exposed to the broken tritium device should report to health clinic for tritium bioassay. Optimum bioassay sample is at least 4 hours after exposure.
  - d. Broken tritium sources indoors may result in tritium contamination in the area, such as work bench or table. The area must be cordoned off, restricted until wipe tests indicate no contamination.
  - e. Immediately report any suspected lost or damaged items to your Radiation Safety Officer (RSO). If your RSO cannot be reached, contact the TACOM-LCMC-Rock Island Safety Office.
3. Safety precautions:
- a. Check for illumination prior to use or service in low light or darkroom. If not illuminated, do not repair. Wrap the entire device in plastic bag (item 17, Appx C) and notify the local RSO.
  - b. Local RSO will perform a leak test to determine if the device is contaminated with tritium.
  - c. No eating, drinking, or smoking will be allowed in tritium device work areas.
4. Pre-Maintenance Check:



## RADIATION HAZARD

Fire control instruments containing Tritium are used as a part of a backup system for manual firing. Loss of illumination may indicate that leakage has occurred. Do not attempt to repair a non-illuminated device.

- a. Prior to taking any maintenance action on fire control devices (e.g., purging or charging M1A1 Collimator), check for broken/cracked reticle or loss of illumination as follows:
  - (1) Place device in the dark for at least four hours to prevent exterior light from activating the phosphor.
  - (2) Check for cracks/illumination in a low light environment after allowing sufficient time to accustom eyes to the dark.

- b. If illumination is not observed, or illuminated but cracks are observed, take following actions:
    - (1) Personnel handling the device should wear rubber or plastic gloves (item 51, Appx C).
    - (2) Seal entire device in two plastic bags (item 17, Appx C).
    - (3) Mark the outer bag as "Broken Tritium Device - Do Not Open."
    - (4) Dispose of used gloves as radioactive waste as per instructions from local Radiation Safety Officer (RSO). Wash well with nonabrasive soap and water.
  - c. If illumination is observed, maintenance actions may proceed.
5. Depot Level Maintenance. Activities performing depot level repair (removing tritium lamps from modules) must obtain a Special Repair Authorization (SRA) from TACOM - Rock Island Safety Office.
6. Further information.
- a. Requirements for safe handling and maintenance are located in TM 9-254, General Maintenance Procedures for Fire Control Materiel.
  - b. The following rules and regulations are available from TACOM-LCMC RSO, ATTN: AMSMC-CS-CZR, Rock Island, IL 61299-7630. Copies may be requested or further information obtained by contacting the TACOM-LCMC RSO/licensee.
    - (1) Title 10 CFR Part 19 - Notices, Instructions, and Reports to Workers.
    - (2) Title 10 CFR Part 20 - Standards for Protection Against Radiation.
    - (3) Title 10 CFR Part 21 - Reporting of Defects and Noncompliance.
    - (4) NRC License, License Conditions, and License Application.
  - c. If assistance is needed, contact your local or major command (MACOM) safety office(s) for information on safe handling, shipping, storage, maintenance, or disposal of radioactive devices.
  - d. The TACOM-LCMC RSO/licensee may be contacted by calling: DSN 793-2965/6499, Commercial (309) 782-2965/6499. After duty hours, call the Rock Island Operation Center at DSN 793-7380.

**WARNING**

- Do not purge and charge any instrument containing a radioluminous source if there is no illumination in the assembly. The local Radiation Safety Officer (RSO) must be notified, and the defective unit will be replaced by a serviceable one.
- Do not use mineral spirits or paint thinner to clean the howitzer. Mineral spirits and paint thinners are highly toxic and combustible. Prolonged breathing can cause dizziness, nausea, and even death. Do not use these materials.
- Avoid prolonged contact with cleaning solvents and adhesives. To prevent damage to eyes, skin, and lungs, always use cleaning solvents and adhesives in a well-ventilated area. Do not permit smoking. Do not use near open flame. Avoid contact with skin. Wear gloves and eye protection.
- When removing and installing heavy items, make sure to have sufficient personnel and adequate lifting equipment. Equipment can cause serious injury if dropped.
- Ensure traverse area is clear prior to turning on hydraulic power.

**WARNING**

- Never torque hydraulic lines or fittings when hydraulic system is pressurized. Damage to tubes and fittings could result in injury to personnel.
- Do not drop tank of compressed nitrogen gas. Do not tap nitrogen tank. Tank can explode when tapped or dropped. When using in confined areas, use extreme care; gas could cause suffocation.
- High pressure gas is used in charging the accumulators and fire control equipment. Do not exceed recommended psi when charging these components. Keep face and body clear of release valves. Failure to observe safety precautions may result in injury or death.
- Failure to align reticle of alignment device M140/M140A1 with reticles of M117A2 using boresighting procedure could result in projectiles landing outside target area. Injury or death of friendly forces can result from firing with misaligned fire control equipment.
- Failure to align the Dynamic Reference Unit Hybrid (DRUH) to the gun tube using the AFCS fire control alignment procedures could result in a projectile landing outside the target area. Injury or death of friendly forces can result from firing with improper boresight angle offsets.
- Refer to FM 4-25.11, First Aid For Soldiers, for correct procedures to be taken if personnel are injured. For hazardous materials, refer to the label or Material Safety Data Sheet (MSDS).
- Always wear safety glasses when working on hydraulic system. If fluid gets in eyes, flush immediately with water and notify medical personnel.

**WARNING**

- Fire extinguisher cylinders can discharge and cause frostbite or eye injury. Wear protective clothing and goggles to avoid contact.
- Fire extinguisher cylinders are under high pressure (750 psi at 70° F) and can explode if dropped, struck, or exposed to open flame.

**WARNING**

High levels of radio frequency radiation can be damaging. Stay at least 2 feet away from the antenna of any operating radio transmitter.

**WARNING**

Adhesive burns easily and gives off harmful vapors. To avoid injury, keep away from open fire and use in a well ventilated space.

**WARNING**

Remove all jewelry and wristwatches before working on electrical circuits. Electrical arcing or shock could occur, causing injury to personnel.

**WARNING**

**ALKALINE BATTERIES**

Caustic potassium hydroxide gas may be released from leaking or ruptured batteries. Avoid eye or skin contact and inhalation of vapors. Increase ventilation. Wear safety glasses and rubber gloves when handling leaking batteries. Dispose in accordance with local regulation. Refer to TB 43-0134, Batteries, Disposition and Disposal for additional information.



CHANGE  
NO. 6

TECHNICAL MANUAL  
UNIT MAINTENANCE MANUAL  
FOR  
CAB SYSTEMS AND COMPONENTS  
HOWITZER, MEDIUM,  
SELF-PROPELLED: 155MM M109A6  
(NSN 2350-01-305-0028) (EIC: 3FC)

TM 9-2350-314-20-2-1, 8 February 1999, is changed as follows:

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Remove Pages

A through D  
i and ii  
3-1 and 3-2  
3-13 and 3-14  
3-236.103/ (3-236.104 blank)  
None

Insert Pages


A through D  
i and ii  
3-1 and 3-2  
3-13 and 3-14  
3-236.103 and 3-236.104  
3-236.105 through 3-236.119/ (3-236.120 blank)

4. File this change in front of the publication.

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By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.  
*General, United States Army*  
*Chief of Staff*

Official:  
  
JOYCE E. MORROW  
*Administrative Assistant to the*  
*Secretary of the Army*  
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**CHANGE  
NO. 5**

**TECHNICAL MANUAL  
UNIT MAINTENANCE MANUAL  
FOR  
CAB SYSTEMS AND COMPONENTS  
HOWITZER, MEDIUM,  
SELF-PROPELLED: 155MM M109A6  
(NSN 2350-01-305-0028) (EIC: 3FC)**

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Remove Pages

a through g/(h blank)  
A through D  
i and ii  
1-1 through 1-4  
1-7 and 1-8  
2-1 through 2-4  
2-11 through 2-16  
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None  
3-67 and 3-68  
3-68.1/(3-68.2 blank)  
None  
3-69 and 3-70  
3-72.15 and 3-72.16  
3-83 through 3-92  
3-236.43 and 3-236.44  
3-236.55 through 3-236.96  
None  
3-319 and 3-320  
3-333 and 3-334  
3-347 and 3-348  
None  
3-349 and 3-350  
None

Insert Pages

a through h  
A through D  
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3-66.17 and 3-66.18  
3-67 and 3-68  
3-68.1 and 3-68.2  
3-68.3 through 3-68.7/(3-68.8 blank)  
3-69/(3-70 blank)  
3-72.15 and 3-72.16  
3-83 through 3-92  
3-236.43 and 3-236.44  
3-236.55 through 3-236.96  
3-236.97 through 3-236.103/(3-236.104 blank)  
3-319 and 3-320  
3-333 and 3-334  
3-347 and 3-348  
3-348.1 through 3-348.10  
3-349 and 3-350  
3-350.1 and 3-350.2

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Remove Pages

3-351 and 3-352  
4-1 and 4-2  
4-21 and 4-22  
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5-101 through 5-106  
6-1 through 6-4  
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8-6.1 and 8-6.2  
8-25 and 8-26  
8-67 and 8-68  
8.1-1 and 8.1-2  
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8.1-89 through 8.1-90  
Index-1 through Index-8  
DA Form 2028-2 Sample  
DA Form 2028-2 (3)  
Measurement/PIN  
Front Cover/(blank)


Insert Pages

3-351 and 3-352  
4-1 and 4-2  
4-21 and 4-22  
4-35 and 4-36  
4-77 through 4-84  
5-101 through 5-106  
6-1 through 6-4  
7-23 through 7-25/(7-26 blank)  
8-6.1 and 8-6.2  
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8-67 and 8-68  
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8.1-45 and 8.1-46  
8.1-51 through 8.1-54  
8.1-57 through 8.1-60  
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None  
8.1-89 through 8.1-90  
Index-1 through Index-8  
DA Form 2028 Sample Part1/2  
DA Form 2028 (2)  
Measurement/PIN  
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*General, United States Army*  
*Chief of Staff*

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*Administrative Assistant to the*  
*Secretary of the Army*  
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**TECHNICAL MANUAL  
UNIT MAINTENANCE MANUAL  
FOR  
CAB SYSTEMS AND COMPONENTS  
HOWITZER, MEDIUM,  
SELF-PROPELLED: 155MM M109A6  
(NSN 2350-01-305-0028) (EIC: 3FC)**

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Remove Pages

A through F  
i and ii  
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3-68.1/(3-68.2 blank)  
3-73 and 3-74  
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None  
8.1-85 and 8.1-86  
Measurement page/Back cover (PIN)

Insert Pages


A through F  
i and ii  
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3-11 through 3-16  
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3-26.1 and 3-26.2  
3-31 and 3-32  
3-33 and 3-34  
3-53 and 3-54  
3-68.1/(3-68.2 blank)  
3-73 and 3-74  
3-236.3 and 3-236.4  
3-236.27 through 3-236.30  
3-236.41 and 3-236.42  
3-236.49 and 3-236.50  
3-236.65 and 3-236.66  
3-236.81 and 3-236.82  
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8-57 and 8-58  
8-61/(8-62 blank)  
8-62.1 through 8-62.4  
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8.1-83/(8.1-84 blank)  
8.1-84.1 through 8.1-84.4  
8.1-85 and 8.1-86  
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Official:

  
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PETER J. SCHOOMAKER  
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Chief of Staff*

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Remove Pages

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A through D  
i and ii  
1-3 and 1-4  
1-7 and 1-8  
1-11 and 1-12  
2-3 and 2-4  
2-11 and 2-12  
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none  
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3-68.1/(3-68.2 blank)  
3-73 and 3-74  
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3-105 and 3-106  
none  
3-107 and 3-108  
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Insert Pages

g/(h blank)  
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i and ii  
1-3 and 1-4  
1-7 and 1-8  
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2-3 and 2-4  
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3-139 through 3-150  
3-163 and 3-164  
none  
3-171 and 3-172  
3-181 and 3-182  
none  
3-237 and 3-238  
3-245 through 3-250  
none  
3-251 and 3-252  
3-317 and 3-318  
none  
3-319 through 3-3-322  
3-339 through 3-344  
4-7 and 4-8  
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5-61 and 5-62  
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5-137 through 5-140  
8-5 through 8-8  
8-39 through 8-42  
8-51 and 8-52  
none  
Index-1 through Index-7/(Index-8 blank)  
Measurement page/Back cover (PIN)  
Front cover/Blank

Insert Pages

3-139 through 3-150  
3-163 and 3-164  
3-164-1 through 3-164.4  
3-171 and 3-172  
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8-51 and 8-52  
8.1-1 through 8.1-97/(8.1-98 blank)  
Index-1 through Index-8  
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Front cover/Blank

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NO. 2

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Remove Pages

a through f

A through D

i and ii

1-3 and 1-4

1-7 through 1-10

2-3 and 2-4

2-9 through 2-12

2-15 and 2-16

2-23 and 2-24

2-29 and 2-30

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3-197 and 3-198

3-339 through 3-342

3-347 through 3-350

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Remove Pages

3-355/(3-356 blank)  
none  
4-17 and 4-18  
5-5 through 5-8  
5-45 and 5-46  
6-1 and 6-2  
6-5 through 6-8  
6-11 and 6-12  
6-15/(6-16 blank)  
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4. File this change in front of the publication.

CHANGE  
NO.1

**TECHNICAL MANUAL  
UNIT MAINTENANCE MANUAL  
FOR  
CAB SYSTEMS AND COMPONENTS  
HOWITZER, MEDIUM,  
SELF-PROPELLED: 155MM M109A6  
(NSN 2350-01-305-0028) (EIC: 3FC)**

TM 9-2350-314-20-2-1, February 1999, is changed as follows:

1. The purpose of this change is to update TM 9-2350-314-20-2-1.
2. New or changed material is indicated by a vertical bar in the outside margin of text changes and by a hand symbol beside illustration changes.
3. Remove the old page and insert the new page as indicated below:

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4. File this change in front of the publication.

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**LIST OF EFFECTIVE PAGES**

Note: The portion of the text affected by the changes is indicated by a vertical line in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

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- Change ..... 3 ..... 1 September, 2004
- Change ..... 4 ..... 15 July, 2005
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TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 1,960 CONSISTING OF THE FOLLOWING:

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TECHNICAL MANUAL  
 No. 9-2350-314-20-2-1  
 Volume 1

HEADQUARTERS  
 DEPARTMENT OF THE ARMY  
 Washington, D.C. 8 February 1999

**UNIT MAINTENANCE MANUAL  
 FOR  
 CAB SYSTEMS AND COMPONENTS,  
 HOWITZER, MEDIUM, SELF-PROPELLED,  
 155MM, M109A6  
 (2350-01-305-0028) (EIC: 3FC)**

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this publication. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms) through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <https://aeprs.ria.army.mil>. The DA Form 2028 is located under the Public Applications section in the AEPS Public Home Page. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quickly to your comments and better manage the DA Form 2028 program. You may also mail, e-mail, or fax your comments or DA Form 2028 directly to the U.S. Army TACOM Life Cycle Management Command. The postal mail address is U.S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LC-LMPP / TECH PUBS, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The e-mail address is [tacomlcmc.da-form2028@us.army.mil](mailto:tacomlcmc.da-form2028@us.army.mil). The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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## HOW TO USE THIS MANUAL

### This manual consists of:

1. Instructions for Unit Maintenance (battery and battalion) on the M109A6, 155MM, Self-propelled Medium Howitzer cab systems and components.
2. Location description and basic operation characteristics of the M109A6 cab systems and components.
3. Cab systems/components maintenance procedures to:
  - a. Prepare the M109A6 for service upon receipt.
  - b. Perform operational checks for systems/components.
  - c. Perform preventive maintenance on systems/components.
  - d. Perform troubleshooting of malfunctioning systems/components (isolation of malfunction causes).
  - e. Removal, repair, and installation of cab system/components.
4. Appendixes for detailed listings of:
  - Appendix A. References applicable to M109A6 vehicle, including supply manuals, forms, and other M109A6 publications.
  - Appendix B. Maintenance policy, definition of terms. Maintenance Allocation Chart (MAC).
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### Indexing

Five major indexing procedures are used in this manual to help the technicians locate information rapidly.

1. Cover Index: Lists sections of text and page number. Includes Index Mark which lines up with Index Marks on the actual page of reference.

Example: Troubleshooting. 3-1

## HOW TO USE THIS MANUAL - CONTINUED

2. Table of Contents: pages i through ii.
3. Chapter and section indexes listing data/information covered within the chapter and section.
4. Troubleshooting symptoms index identifies system malfunction and provides:
  - (1) Page references for specific troubleshooting procedures.
  - (2) Identification of those problems/symptoms which are the responsibility of Direct Support Maintenance.
5. Index: INDEX-1 through INDEX-6, Alphabetical listing of information.

## Maintenance Procedures and Illustrations (Chapters 4 through 28)

1. Maintenance procedures are to be performed in the sequence shown in the text and illustrations. Step 1 must be performed before Step 2. Procedure A must be performed before Procedure B, and so on.
2. Equipment illustrations use numbers to identify parts of the system/components.

Example:

- 1 Remove both wiring harnesses (1 and 2).
- 2 Remove four screws (3), four flat washers (4), four lockwashers (5), and four nuts (6).

# CHAPTER 1 INTRODUCTION

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## GENERAL

This chapter provides a general introduction to the purpose, safe use, and capabilities of the howitzer. Section I describes procedures for destroying equipment to prevent enemy use, references to other technical manuals, and forms to recommend improvements. Sections II and III familiarize the mechanic with equipment data and operating principles of the howitzer's systems.

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## Section I. GENERAL INFORMATION

### 1-1 SCOPE.

Type of manual: Unit maintenance

Model number and equipment name: M109A6, Howitzer, Medium, Self-propelled, 155MM. This manual deals with maintenance of the cab and associated components. TM 9-2350-314-20-1-1 and -2 deal with maintenance of the hull and associated components.

Purpose of Equipment: The howitzer cab, containing the 155MM cannon M284 and secondary armament caliber .50 machine gun M2, provides the firepower for the howitzer. The cab components also provide the fire control for the 155MM cannon.

### 1-2 MAINTENANCE FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 750-8, The Army Maintenance Management System (TAMMS) as contained in Maintenance Management Update.

### 1-3 DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Refer to TM 750-244-6 for procedures on how to destroy the self-propelled howitzer. You will find procedures for destruction of munitions in TM 750-244-5-1 (conventional ammo) or TM 43-0002-33 (improved conventional munitions). Procedures for destruction of chemical munitions are outlined in TM 3-250.

Below are some general guidelines to follow in destruction of equipment to prevent enemy use.

Destruction of the vehicle, armament, and equipment, when subject to capture or abandonment in a combat zone, will be undertaken only when the unit commander decides such action is necessary in accordance with orders of, or policy established by, the Army commander.

In general, destruction of essential parts, followed by burning, will usually be sufficient to render the vehicle, armament, and equipment useless. Time is usually critical.

Materiel must be damaged so that it cannot be restored to usable condition by either repair or cannibalization. If a lack of time or personnel prevents destruction of all parts, give priority to destruction of parts hardest to replace. It is important that the same parts be destroyed on all units to prevent construction of one complete unit from several damaged ones.

All items of sighting and fire control instruments and equipment, especially telescopes, gunner's quadrants, and binoculars, are costly and difficult to replace. They should be conserved whenever possible. If you cannot carry them with you, destroy them by smashing with your sledgehammer, pick, or mattock. Throw the pieces in all directions.

When time is short, a method of destroying the equipment with materials at hand is as follows:

Retrieve or smash sighting and fire control equipment.

Load cannon with projectile and full powder charge. Attach a 50-foot (15.2 M) or longer lanyard to firing mechanism. Disconnect recoil cylinder lines and fire the weapon.

Take a sledgehammer and bend the end of the counter recoil buffer rod.

A second method is to close the breechblock and toss several thermite grenades down the tube. Elevate the tube so that the grenades will fall against the breechblock. This will melt the breech and the powder chamber, causing them to fuse together.



## 1-4 PREPARATION FOR STORAGE OR SHIPMENT.

Instructions on proper storage and shipment of the howitzer are covered in Chapter 29 of this manual, PREPARATION FOR STORAGE AND SHIPMENT.

## 1-5 QUALITY ASSURANCE (QA).

No particular quality assurance manual pertains specifically to the M109A6 howitzer.

Defective material received through the supply system should be reported on Quality Deficiency Report (QDR) SF368. Instructions for preparing QDRs are provided in AR 702-7, Reporting of Quality Deficiency Data. QDRs should be mailed directly to:

Department of the Army  
U.S. Army Tank-automotive and Armaments Command  
Armament Research, Development and Engineering Center  
ATTN: AMSTA-AR-QAW-C  
Rock Island, IL 61299-7300

We will send you a reply.

## 1-6 NOMENCLATURE CROSS-REFERENCE LIST.

Nomenclature in this manual was chosen in accordance with the terms used for provisioning as they appear in the Repair Parts and Special Tools List (RPSTL) and Maintenance Allocation Chart (MAC) for unit maintenance.

A few tools and cab components are, however, referred to by names more common than those in the RPSTL. In many cases the more common name is a shorter name for the same component.

### OFFICIAL PROVISIONING NOMENCLATURE

Cab ammunition rack  
Cable assembly  
Caliber .50 machine gun M2  
Electrical arm  
Electrical contact race ring  
(or race ring segment)  
Elevating cylinder  
  
Gage rod  
Howitzer M182A1 gun mount  
Infinity aiming reference collimator M1A1/M1A2  
Intercommunications power harness  
Intercommunications system  
M284 cannon assembly  
155MM medium self-propelled howitzer  
M109A6  
Panoramic telescope M117A2  
Safety wire  
Socket head screw key  
Spindle assembly  
  
Telescope mount M145A1  
Tube assembly

### MORE COMMON NAME

Ammo rack  
Wiring harness  
.50 cal.  
Contact arm assembly  
Slip ring segment board  
  
Equilibrated elevating  
cylinder  
Dipstick, bayonet gage  
M182A1 gun mount  
Collimator  
Intercom wiring harness  
Intercom system  
Cannon  
Howitzer (Modified 155MM)  
  
PANTEL, telescope M117A2  
Lockwire  
Hex key  
Obturator group or bump  
spindle  
Mount M145A1, PANTEL mount  
Cannon tube

## 1-7 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS.

If your howitzer needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about our equipment. Let us know why you don't like the design. Put it on a SF 368 (Quality Deficiency Report). Mail it directly to:

Department of the Army  
U.S. Army Tank-automotive and Armaments Command  
ATTN: AMSTA-LC-LPIT  
1 Rock Island Arsenal, Rock Island, IL 61299-7630

We'll send you a reply.

## 1-8 WARRANTY INFORMATION.

The M109A6 is not warranted.

The following Paladin Digital Fire Control System (PDFCS) components are warranted for a period of 5 years. Upon receipt of the following items, identify in the table below the applicable information for record:

Nomenclature	NSN	Part No.*	CAGEC
PDCU	7010-01-524-8672	12999106	19200
KEYPAD	7025-01-524-8671	12999112	19200
PCU-2	6130-01-524-8673	12999108	19200
PMVS	5895-01-524-8674	12999115	19200

\* - Part number of component with container

Should any of the PDFCS components listed above require repair or replacement, refer to TB 9-2350-314-20-2-3 for detailed information on shipping and equipment requisition.

## 1-9 CORROSION PREVENTION AND CONTROL (CPC)

For CPC instructions refer to Appendix H.

### Section II. EQUIPMENT DESCRIPTION AND DATA

## 1-10 EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

### 1-10.1 Characteristics.

The cab receives electrical power from the vehicle batteries and transmits the electrical power to components throughout the 6400 mils traverse by means of eight contact arm assemblies. The AFCS batteries provide power to the AFCS and the radio when the vehicle batteries lose power. The cab hydraulic powerpack provides hydraulic power.

The cab supplies elevation and azimuth control for the 155MM cannon. (Refer to TM 9-2350-314-10 for operator's instructions.)

### 1-10.2 Capabilities and Features.

An electrically-driven hydraulic pump supplies power for the elevation and depression of the cannon, for operation of the projectile rammer, and for traversing the cab. The elevation and cab traversing systems also have manual backup capabilities.

The primary armament for the howitzer is a 155MM cannon. The secondary armament is a caliber .50 machine gun.

## 1-11 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

Refer to TM 9-2350-314-10 for location of major components inside the howitzer cab. Refer to para 1-11.2 for location of major components on the outside of the cab.

## 1-11 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED

### 1-11.1 Location and Description of Major Internal Components.

a. Cab configuration.

For location and description of major components, see TM 9-2350-314-10.

b. Automatic Fire Control System.

For location and description of AFCS components, see TM 9-2350-314-10.

### 1-11.2 Location and Description of Major External Components.

#### MOUNT AND HOWITZER ASSEMBLY (1)

155MM cannon

Central bore mounted

Gas operated bore evacuator

Muzzle brake

Interrupted screw breechblock

Counterrecoil activated breech mechanism with provision for manual operation

Variable recoil

Fired mechanically

Tube temperature sensor

#### CALIBER .50 MACHINE GUN M2 (2)

Automatic, recoil operated, link belt fed

Air cooled, heavy barrel

Flexible type configuration

Fired manually

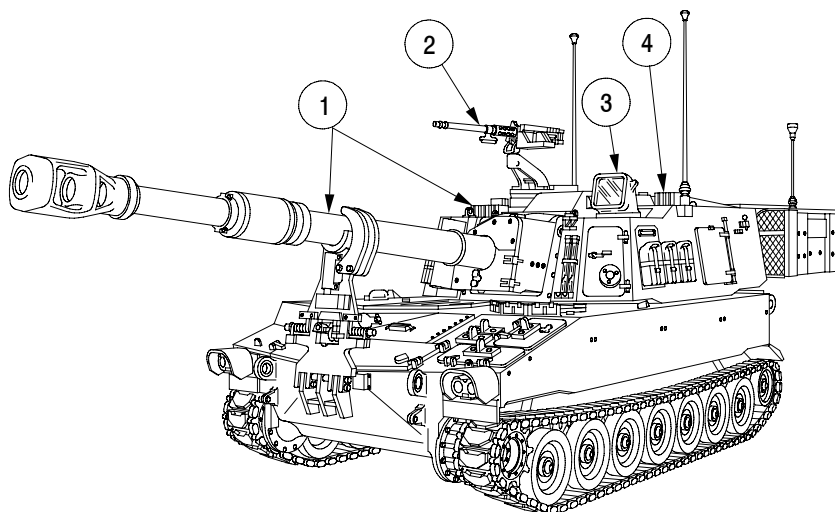
#### BALLISTIC COVER ASSEMBLY (3)

2400 mils traverse

Provides clear field of view for M117A2 panoramic telescope (PANTEL)

#### MICROCLIMATE CONDITIONING SYSTEM (4)

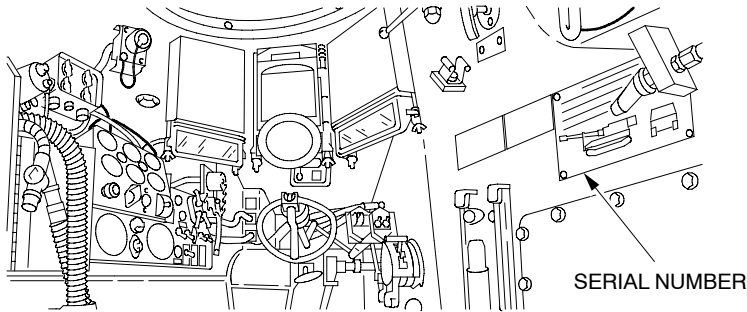
Provides conditioned air to crewmembers



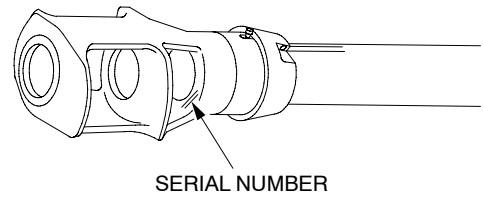
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1-11 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED

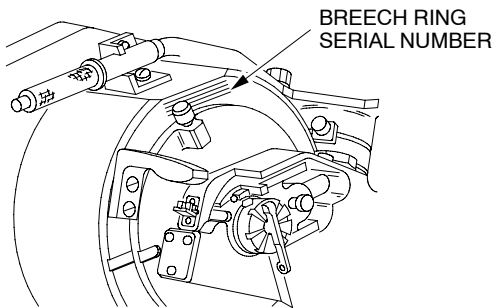
1-11.3 Serial Number Locations.



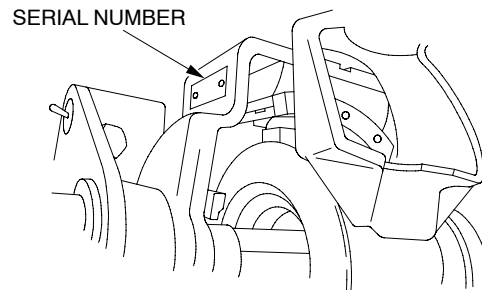
VEHICLE - On vehicle data plate right of driver's seat.



TUBE - On tip of tube.



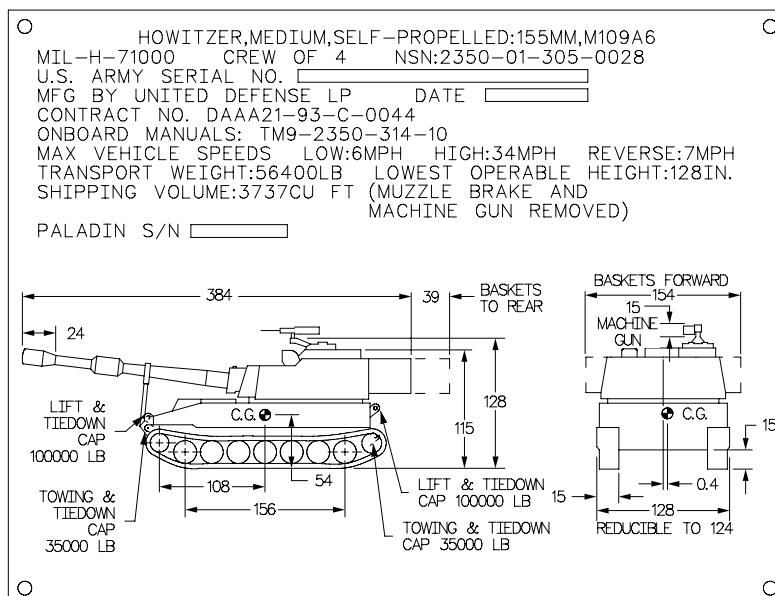
BREECH - On rear of breech ring.



M145A1 MOUNT - Upper left side.

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The equipment data plate provides a space to enter the vehicle serial number.



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# 1-11 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED

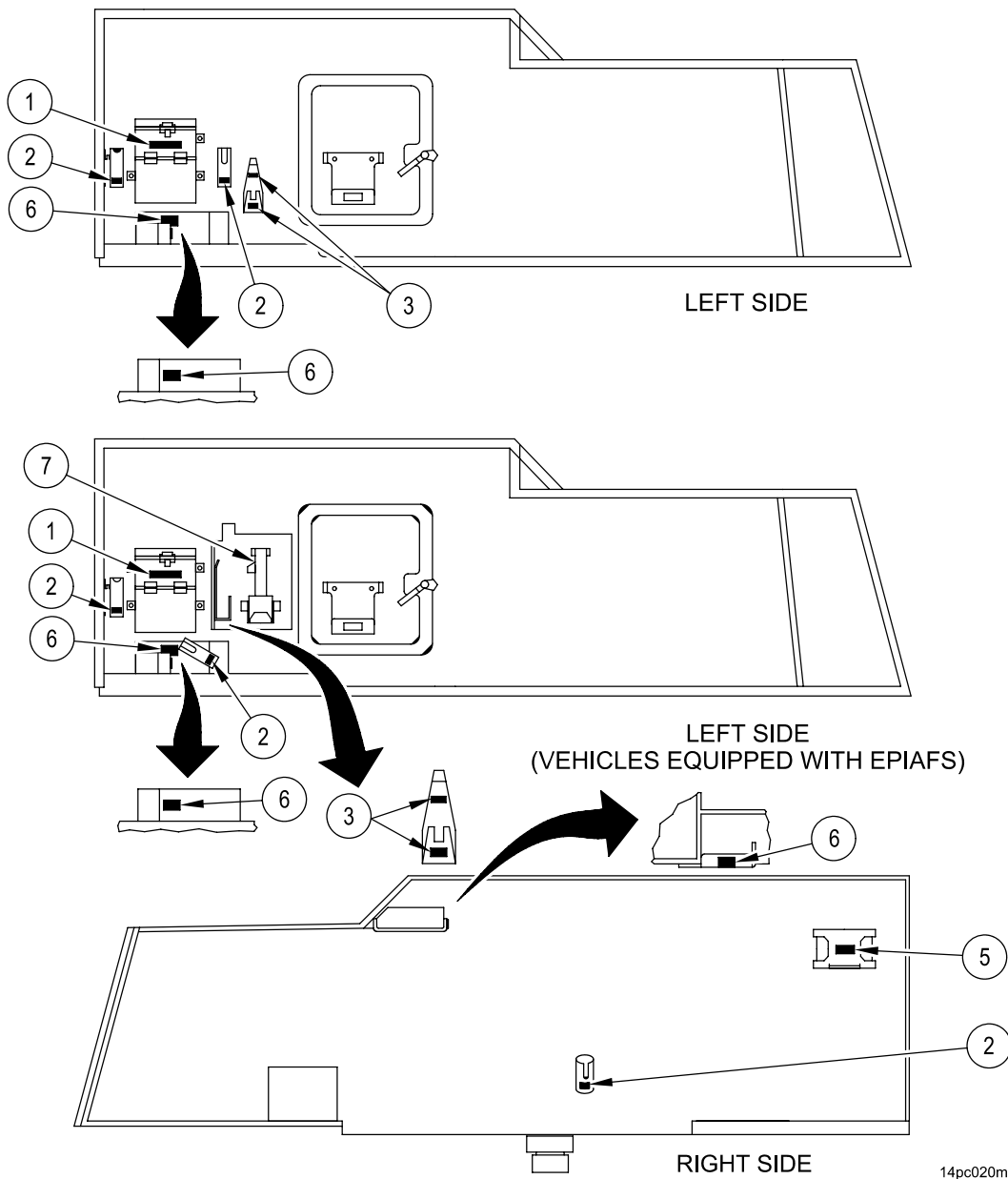
## 1-11.4 Decal Locations (Interior).

### Legend

- 1 M27 periscope
- 2 Flashlight
- 3 M35 fuze setter and M18 fuze wrench
- 4 Item deleted
- 5 First aid kit
- 6 Oddment
- 7 Inductive fuze setter

### How To Apply Decals

Instructions on how to apply decals are located in para 2-8.



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**1-11 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED**

**1-11.5 Stencil Location (Interior and Exterior).**

Legend

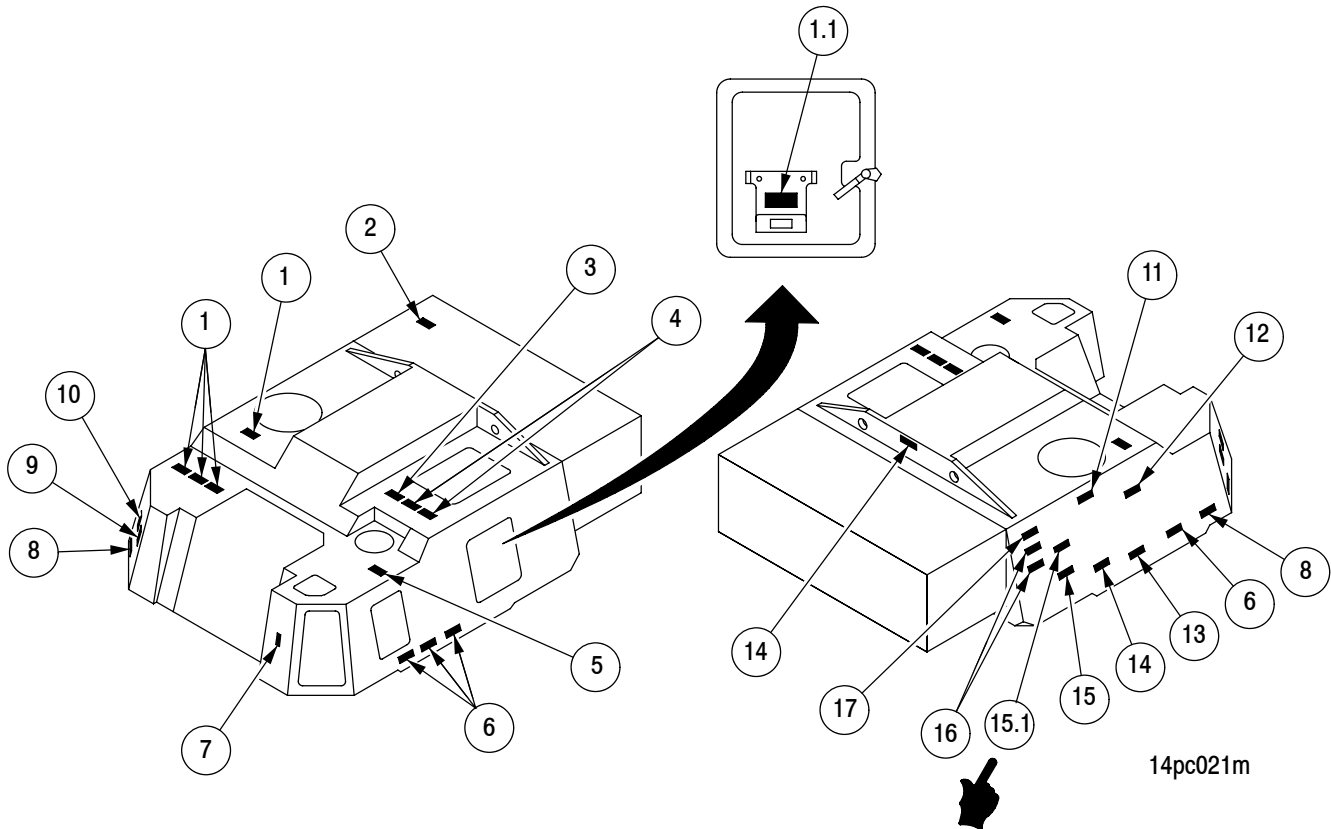
- |     |                             |      |   |
|-----|-----------------------------|------|---|
| 1   | .50 cal. ammo               | 9    | Pick                                    |
| 1.1 | M140 aiming device and case | 10   | Mattock                                 |
| 2   | Tow cable                   | 11   | Crow bar                                |
| 3   | Signal flares               | 12   | .50 cal. barrel                         |
| 4   | M16 ammo                    | 13   | M13 decontamination kit                 |
| 5   | Sledge                      | 14   | Shovel                                  |
| 6   | Water can                   | 15   | Rammer staff                            |
| 7   | Track fixture               | 15.1 | PMVS Stowage (When equipped with PDFCS) |
| 8   | Oil can                     | 16   | Handle                                  |
|     |                             | 17   | Axe                                     |

How To Apply Stencils

- Before applying stencils, clean and prime metal.
- Letters must be black.
- Letters must be 1/10 in. (2.5 mm) x 1/2 in. (12.7 mm) high.
- Spacing between lines must be 1/4 in. (6.4mm).

Restenciling Vehicle Markings

When required to ensure legibility, restencil in accordance with the instructions given.



**1-12 DIFFERENCES BETWEEN MODELS.**

There is only one model of the M109A6.

**1-13 EQUIPMENT DATA.**

HYDRAULIC SYSTEM CAPACITY .....	10 gal. (37.9 lit)
ELECTRICAL SYSTEM .....	24 V dc, 650 amps
PRIMARY ARMAMENT	
Cannon designation .....	M284
Bore size .....	155 MM
Projectile travel in tube .....	200 in. (5.08 m)
Rifling .....	(one turn in 20 calibers; uniform right-hand twist, 48 grooves)
Length:	
Without muzzle brake .....	238.05 in. (6.05 m)
With muzzle brake .....	262.61 in. (6.67 m)
Muzzle brake, double baffle .....	weight 350 lb (159 kg)
Mount designation .....	M182A1
Type of mount .....	hydropneumatic recoil
Recoil length .....	27 to 36 in. (69 to 91 cm)
Elevation .....	+1333 mils
Depression .....	-53 mils
Traverse (left or right) .....	6400 mils
SECONDARY ARMAMENT	
Machine gun .....	caliber .50, M2, heavy barrel, flexible
AMMUNITION	
155MM conventional .....	39 rounds
.50 cal .....	500 rounds
SIGHTING AND FIRE CONTROL EQUIPMENT	
Panoramic Telescope M117A2: (PANTEL)	
Power .....	4X
Field of view .....	170 mils
Movement:	
Azimuth .....	.400 mils
Incremental reading (azimuth) .....	1/4 mil
Correction (azimuth) .....	± 50 mils
Elevation .....	± 300 mils
Weight .....	15 lb. (6.8 kg)
Mount M145A1:	
Length .....	21 in. (53.3 cm)
Width (with attaching bolts) .....	20-1/2 in. (52 cm)
Height .....	20-1/2 in. (52 cm)
Weight (including linkage assembly) .....	127 lb. (58 kg)

**1-13 EQUIPMENT DATA - CONTINUED**

SIGHTING AND FIRE CONTROL EQUIPMENT - CONTINUED

Movement:

Elevation . . . . .	-3 to +1333 mils
Incremental reading (counters) . . . . .	1 mil
Correction (elevation) . . . . .	±50 mils
Cross-level adjustment . . . . .	±177 mils
Pitch adjustment . . . . .	±177 mils

■ Infinity Aiming Reference Collimator M1A1/M1A2:

Field of view (total) . . . . .	200 mils
Clear aperture . . . . .	3 in. (7.6 cm)
Weight (with cover) . . . . .	24-1/4 lb (11 kg)

■ Alignment Device M140/M140A1:

Height . . . . .	11 in. (27.9 cm)
Weight . . . . .	1.5 lb. (0.68 kg)
Movement . . . . .	0

AUTOMATIC FIRE CONTROL SYSTEM

DU:

Weight . . . . .	25 lb (11.4 kg)
Height . . . . .	16.18 in. (41.1 cm)
Length . . . . .	12.88 in. (32.7 cm)
Width . . . . .	4.25 in. (10.8 cm)
Input voltage . . . . .	18-32 V dc 2.75 - 1.15 A

ACU:

Weight . . . . .	44 lb (20 kg)
Height . . . . .	20 in. (50.8 cm)
Length . . . . .	8.5 in (21.6 cm)
Width . . . . .	10.5 in. (26.7 cm)
Input voltage . . . . .	18-32 V dc

PCU:

Weight . . . . .	40 lb (18.2 kg)
Height . . . . .	14.58 in. (37.0 cm)
Length . . . . .	11.75 in. (29.8 cm)
Width . . . . .	6.75 in. (17.1 cm)
Input Voltage . . . . .	18-32 V dc

PDIU:

Weight . . . . .	30 lb (13.6 kg)
Height . . . . .	8.8 in. (22.4 cm)
Length . . . . .	12.8 in. (32.5 cm)
Width . . . . .	11 in. (27.9 cm)
Input Power . . . . .	18-32 V dc, 28 V dc nominal

Battery . . . . .	3.7 A (normal operational max)
-------------------	--------------------------------



**1-13 EQUIPMENT DATA - CONTINUED**

PALADIN DIGITAL FIRE CONTROL SYSTEM

PDU:

Weight .....	7.0 lb (3.18 kg)
Height .....	9.00 in. (228.6 mm)
Length .....	13.06 in. (331.72 mm)
Width .....	1.68 in. (42.67 mm)
Input voltage .....	18-32 V dc 2.75 - 1.15 A

PDCU:

Weight .....	49.75 lb (22.58 kg)
Height .....	18.75 in. (476.25 mm)
Length .....	8.5 in (215.9 mm)
Width .....	10.5 in. (266.7 mm)
Input voltage .....	18-32 V dc

PCU - 2:

Weight .....	33.25 lb (15.09 kg)
Height .....	14.58 in. (370.33 mm)
Length .....	11.75 in. (298.45 mm)
Width .....	8.8 in. (223.52 mm)
Input voltage .....	18-32 V dc

Battery ..... 3.7 A (normal operational max)

Keypad

Weight .....	8.2 lb (3.72 kg)
Height .....	6.8 in. (172.72 mm)
Length .....	3.3 in. (83.82 mm)
Width .....	13.2 in. (335.28 mm)
Input voltage .....	18-32 V dc

**Section III. PRINCIPLES OF OPERATION**

**1-14 GENERAL INFORMATION.**

The purpose of Section III is to familiarize the mechanic with the basic operating capabilities of the howitzer cab. The systems covered in this section are the armament, elevating, rammer, traversing, AFCS, PDFCS and NBC systems and related components.

This section will provide information needed to understand instructions on how to service, test, and maintain the cab systems. The functions of each system are presented separately. However, information is also given on how the different cab systems work together so that the mechanic can understand equipment operation. Separate explanations are given for cab systems which require both electrical and hydraulic power to operate. Functional diagrams are included to show how the components of each cab system work together.

**1-15 EQUIPMENT OPERATION AND DESCRIPTION.**

**1-15.1 General.**

The major equipment groups described in this section are:

- a. Mount and Howitzer Assembly
- b. Elevating System
- c. Rammer Hydraulic System
- d. Cab Traversing System
- e. AFCS or PDFCS
- f. NBC System

## 1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED

### 1-15.2 Mount and Howitzer Assembly.

M284, 155MM Cannon is the primary armament for the M109A6 howitzer.

a. Characteristics:

Loaded and fired manually.

Elevated and depressed either manually or hydraulically.

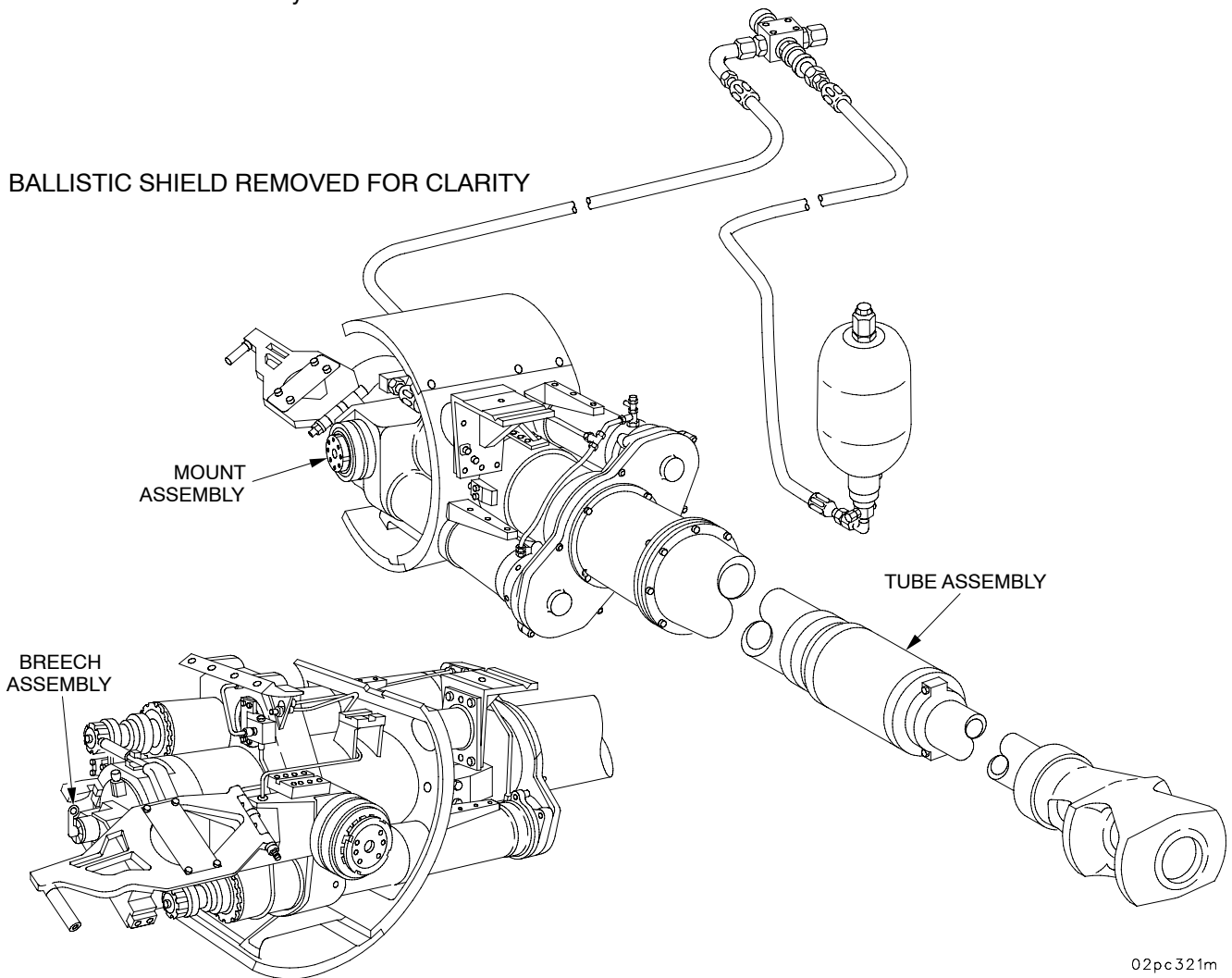
Traversed 6400 mils by traversing the cab. Traversing is accomplished either hydraulically or manually.

b. Major Components:

Tube Assembly

Breech Assembly

Mount Assembly



## 1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED

### 1-15.2.1 Tube Assembly.

**CANNON TUBE:** Serves as the chamber for the projectile. Rifled bore ensures accurate projectile trajectory. Tube mounts on inside of breech ring. Cannon tube locks inside breech ring band by means of interrupted threads and breech ring key.

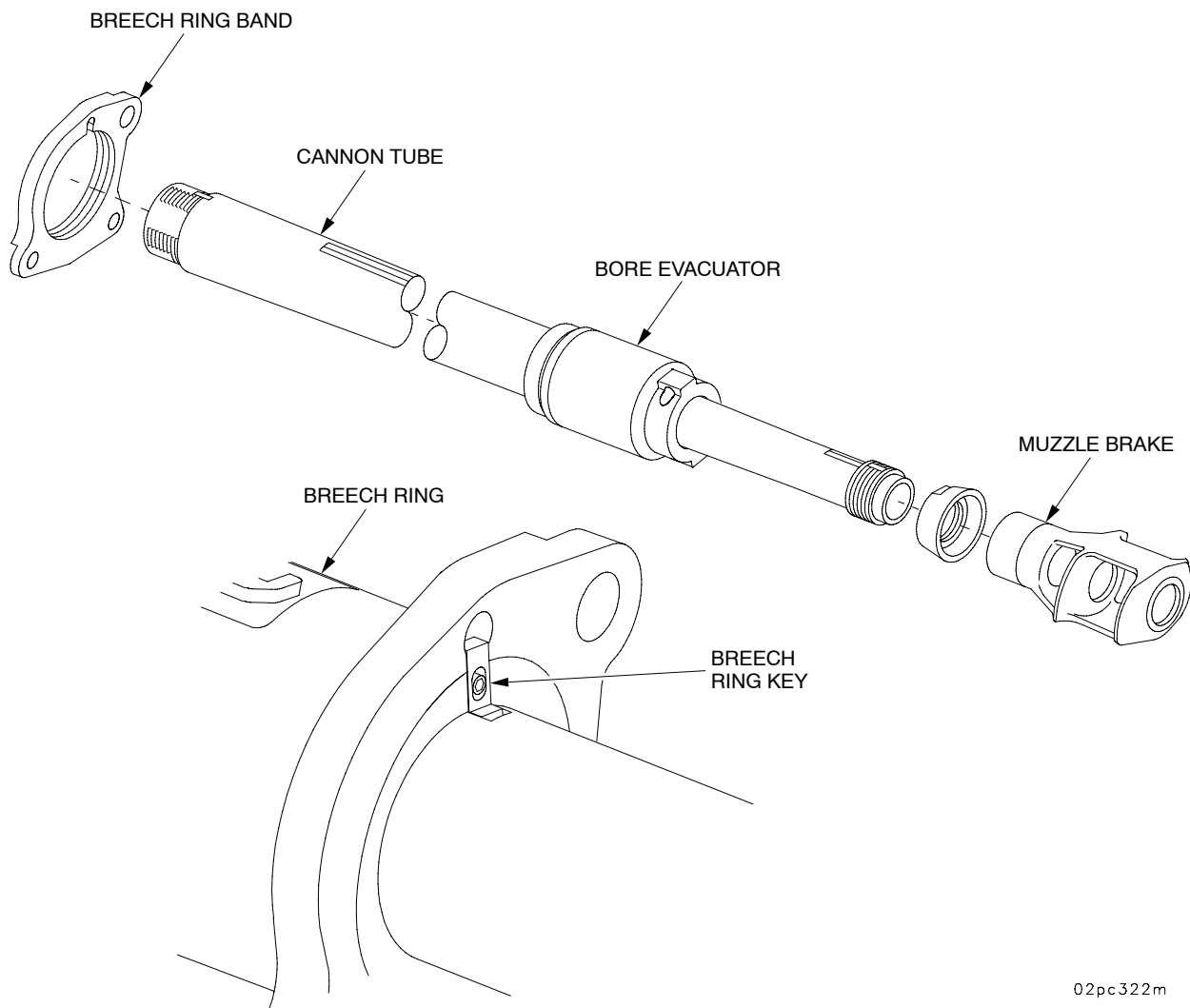
**BREECH RING BAND:** Locks the tube assembly in place along with the breech ring key.

**BREECH RING KEY:** Holds cannon tube in correct position on breech ring. The key prevents the tube from turning and unlocking from interrupted threads.

**BREECH RING:** Internal interrupted threads hold the tube assembly in place.

**BORE EVACUATOR:** Helps clear the tube of gases after firing, minimizing the contamination of the air within the cab.

**MUZZLE BRAKE:** Reduces the force of recoil and forward flash, and deflects gases away from the cab.



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## 1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED

### 1-15.2.2 Breech Assembly.

CHAMBER: Holds powder charge.

OPERATING HANDLE: Use to open the breech manually.

The breech opening mechanism consists of the:

- Breech operating cam
- Operating handle
- Carrier

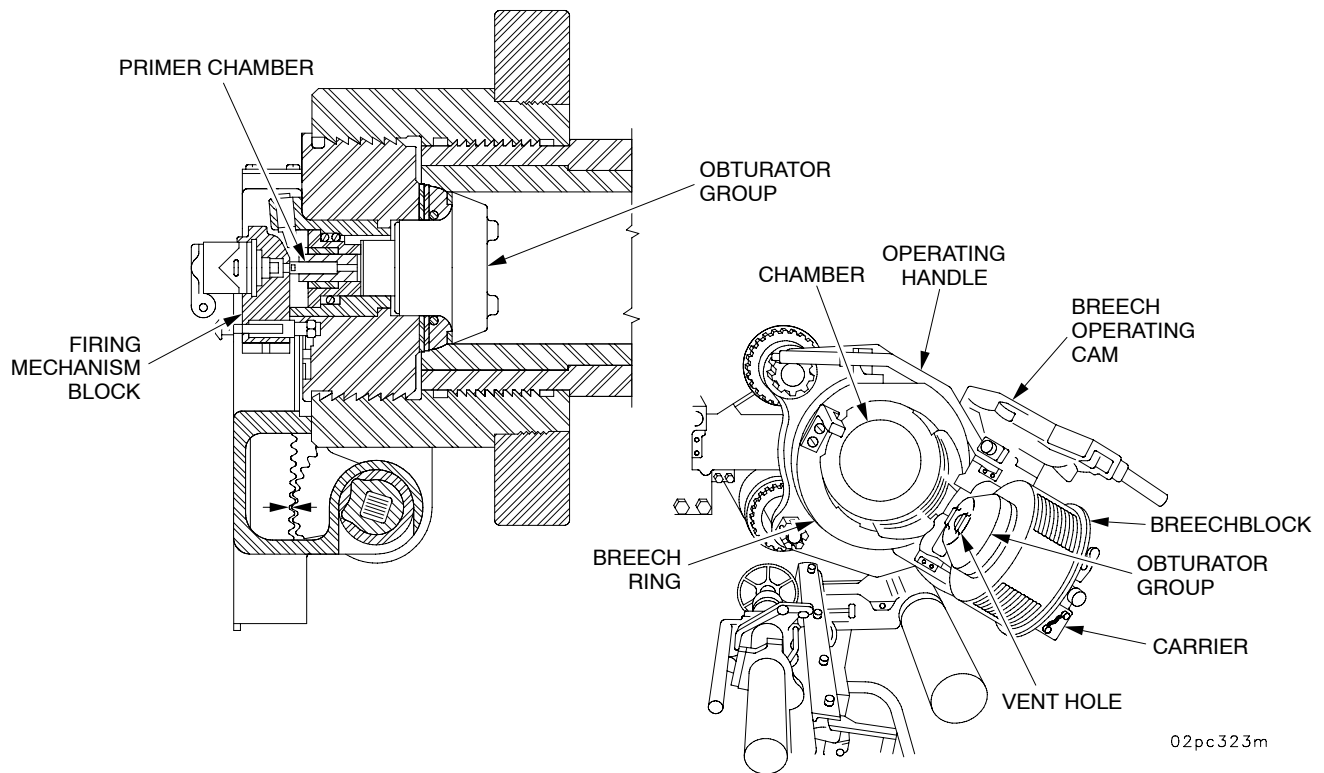
As the cannon returns to battery, the combined operations of the operating handle, the breech operating cam, and the carrier open the breechblock.

BREECHBLOCK: Locks into place behind the chamber holding the powder charge. On closing, the breechblock threads engage with the threads of the breech ring. When these threads are engaged, they lock the breechblock in place.

OBTURATOR GROUP: Seals the powder chamber to prevent escape of gases into the cab.

VENT HOLE: Directs the primer blast against the base of the powder charge.

FIRING MECHANISM BLOCK: Slides over the primer and positions the firing mechanism for firing.



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## 1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED

### 1-15.2.3 Mount Assembly.

The mount serves as a fulcrum for the elevation and depressing of the cannon. The breech ring band (para 1-15.2.1) connects to the M182A1 mount by means of recoil cylinder rods.

**VARIABLE RECOIL MECHANISM:** Absorbs and reduces the recoil force of the cannon.

**ACCUMULATOR REPLENISHER:** Maintains hydraulic fluid pressure in the variable recoil mechanism.

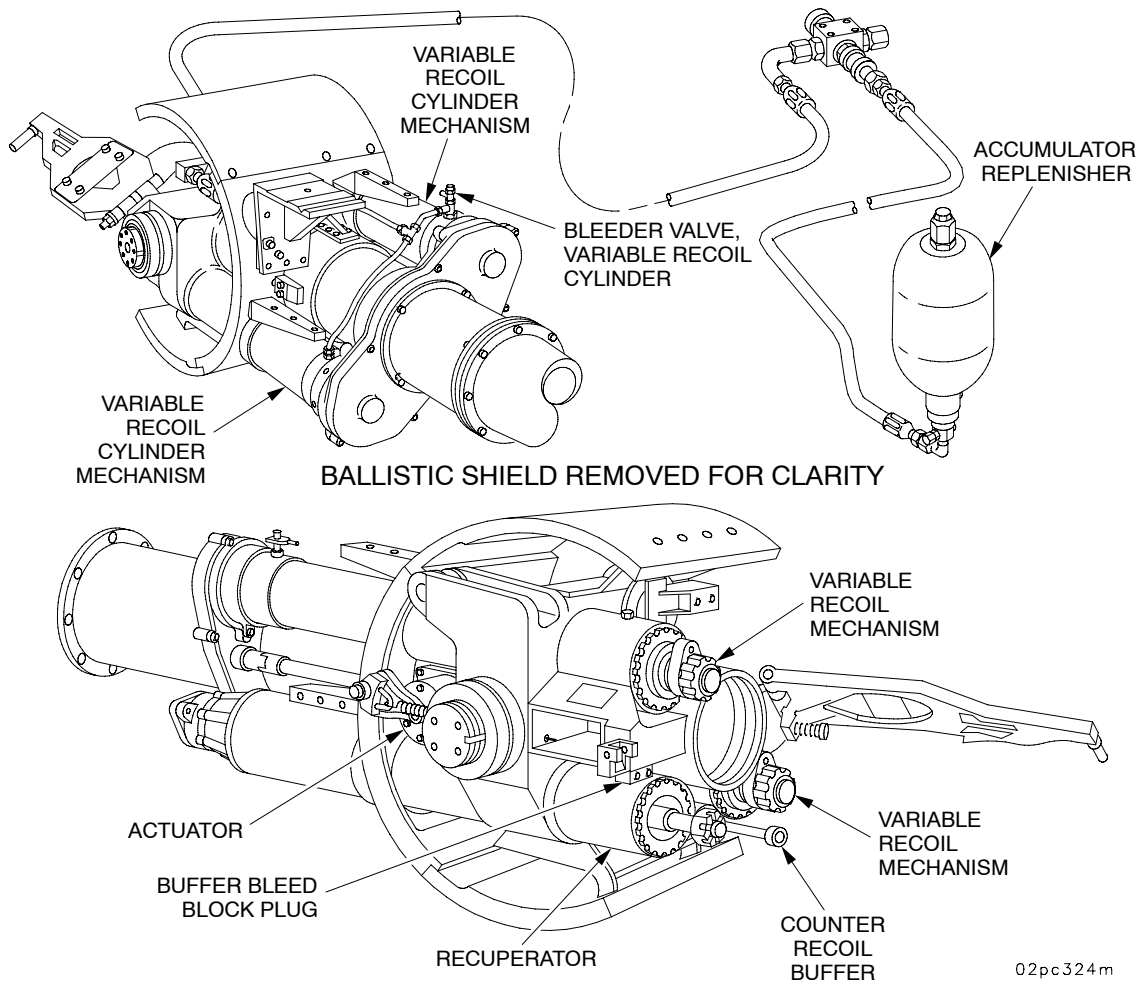
**RECUPERATOR:** Returns the cannon tube to battery after firing.

**COUNTER RECOIL BUFFER:** Absorbs shock: slows and cushions the cannon as it returns to battery.

**ACTUATOR:** Adjusts recoil orifices depending on cannon elevation. Allows 36 inch (91 cm) recoil below 45 degrees (-3 degrees) elevation and up to 27 inches (69 cm) recoil above 45 degrees (+3 degrees) elevation.

**BLEEDER VALVE, VARIABLE RECOIL CYLINDER:** Use to purge air from the recoil system.

**BUFFER BLEED BLOCK PLUG:** Use to purge counter-recoil buffer.



## 1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED

### 1-15.3 Elevating System.

**HYDRAULIC CONTROL BOX:** Has control positions for either power or manual elevation of cab.

**POWERPACK ASSEMBLY:** Delivers hydraulic power to cab components through a network of lines and control valves.

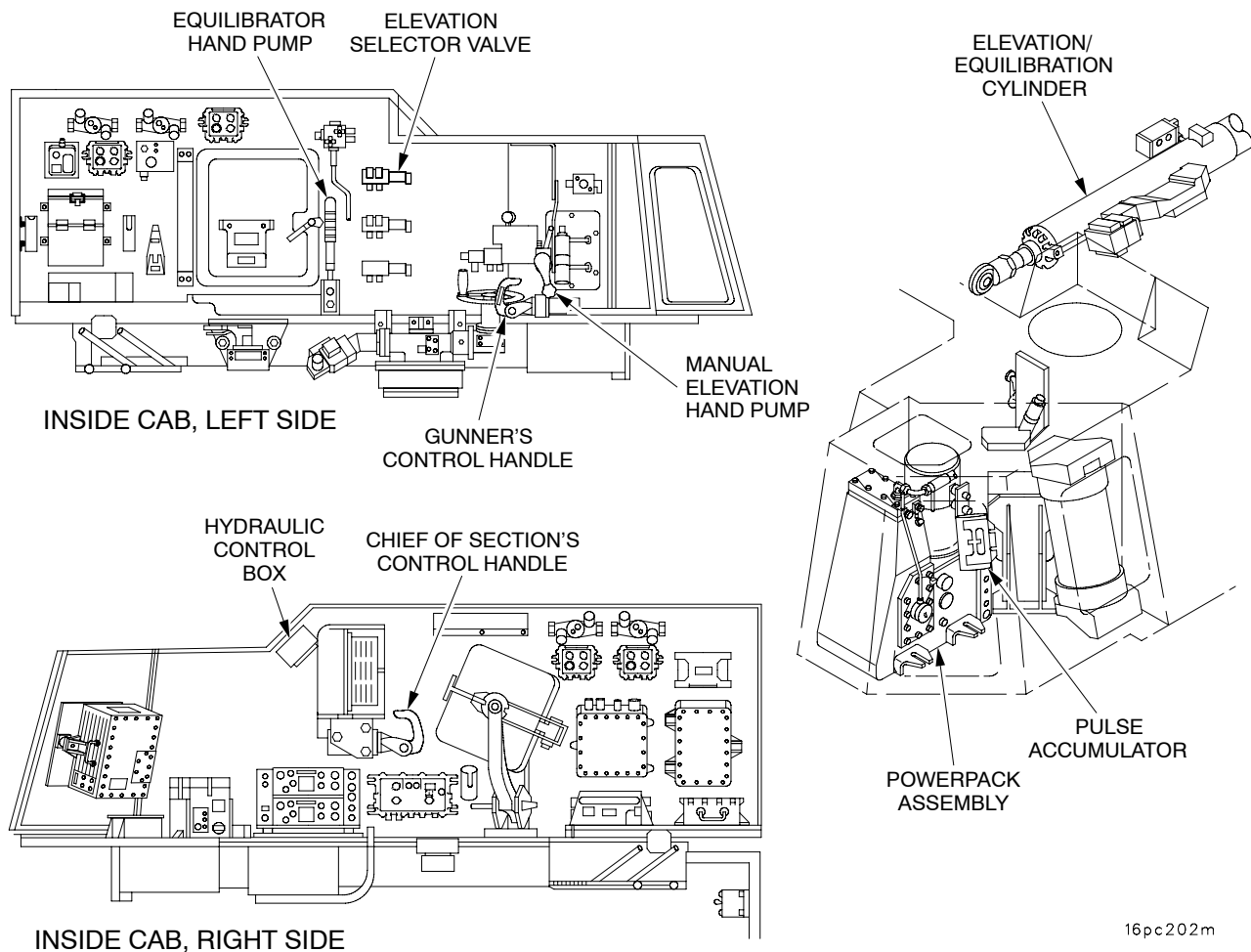
**PULSE ACCUMULATOR:** Assists in the functioning of velocity fuses should a hydraulic line rupture.

**ELEVATION SELECTOR VALVE:** Directs hydraulic flow from either the gunner's or chief of section's control handle to the elevation cylinder.

**CHIEF OF SECTION'S AND GUNNER'S CONTROL HANDLES:** Receives and controls hydraulic power from powerpack to elevate or depress the cannon.

**MANUAL ELEVATION/HAND PUMP:** Hand pump directs hydraulic flow to elevate and depress the cannon manually.

**ELEVATION/EQUILIBRATION CYLINDER:** Elevates, depresses, and balances cannon; compensates for uneven distribution of weight of cannon tube. The other component of the equilibration system is the hand pump (equilibrator).



16pc202m

## 1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED

### 1-15.4 Loader Rammer Hydraulic System.

**LOADER RAMMER:** Used for loading and ramming the projectile into the tube. Hydraulic power from the powerpack flows through the rammer actuating valve to the rammer cylinder which uses hydraulic pressure to ram the projectile into position.

**RAMMER ACTUATING VALVE:** Controls the inflow of hydraulic oil for the ramming operation and outflow of hydraulic oil for the retraction of the rammer after use.

**TRAY:** Holds the projectile in position for ramming.

**RAMMER CYLINDER:** Contains the rammer cylinder head and piston which rams the projectile into the gun chamber.

**MAIN RELEASE HANDLE:** Releases the locking mechanism so that the rammer may be moved into "RAM" position, and also back into "STOW" position.

**CYLINDER HANDLE:** Provides a handhold for rotating the rammer cylinder into ramming position.

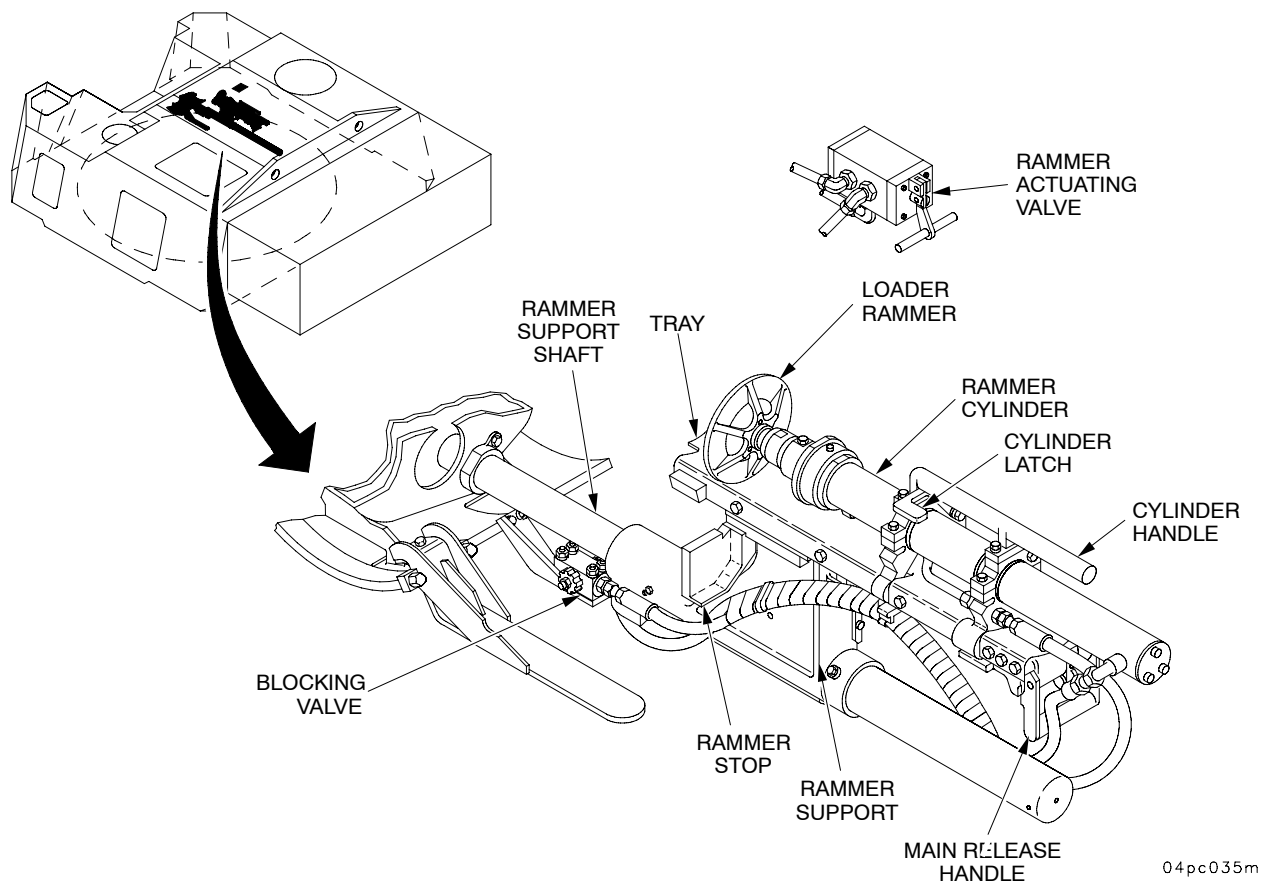
**CYLINDER LATCH:** Locks the rammer cylinder into position on the tray.

**BLOCKING VALVE:** Prevents accidental ramming of rammer in stowed position.

**RAMMER SUPPORT:** Supports the rammer assembly tray.

**RAMMER SUPPORT SHAFT:** Provides support to the rammer support.

**RAMMER STOP:** Protects the rammer from damage during an accidental rammer actuation.



## 1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED

### 1-15.5 Cab Traversing System.

**HYDRAULIC CONTROL BOX:** Has control positions for either power or manual traverse of cab.

**POWERPACK ASSEMBLY:** Delivers hydraulic power to cab components through a network of lines and control valves.

**TRAVERSE LIMIT VALVE:** Stops the flow of hydraulic fluid to the traverse mechanism when the traverse limit is reached.

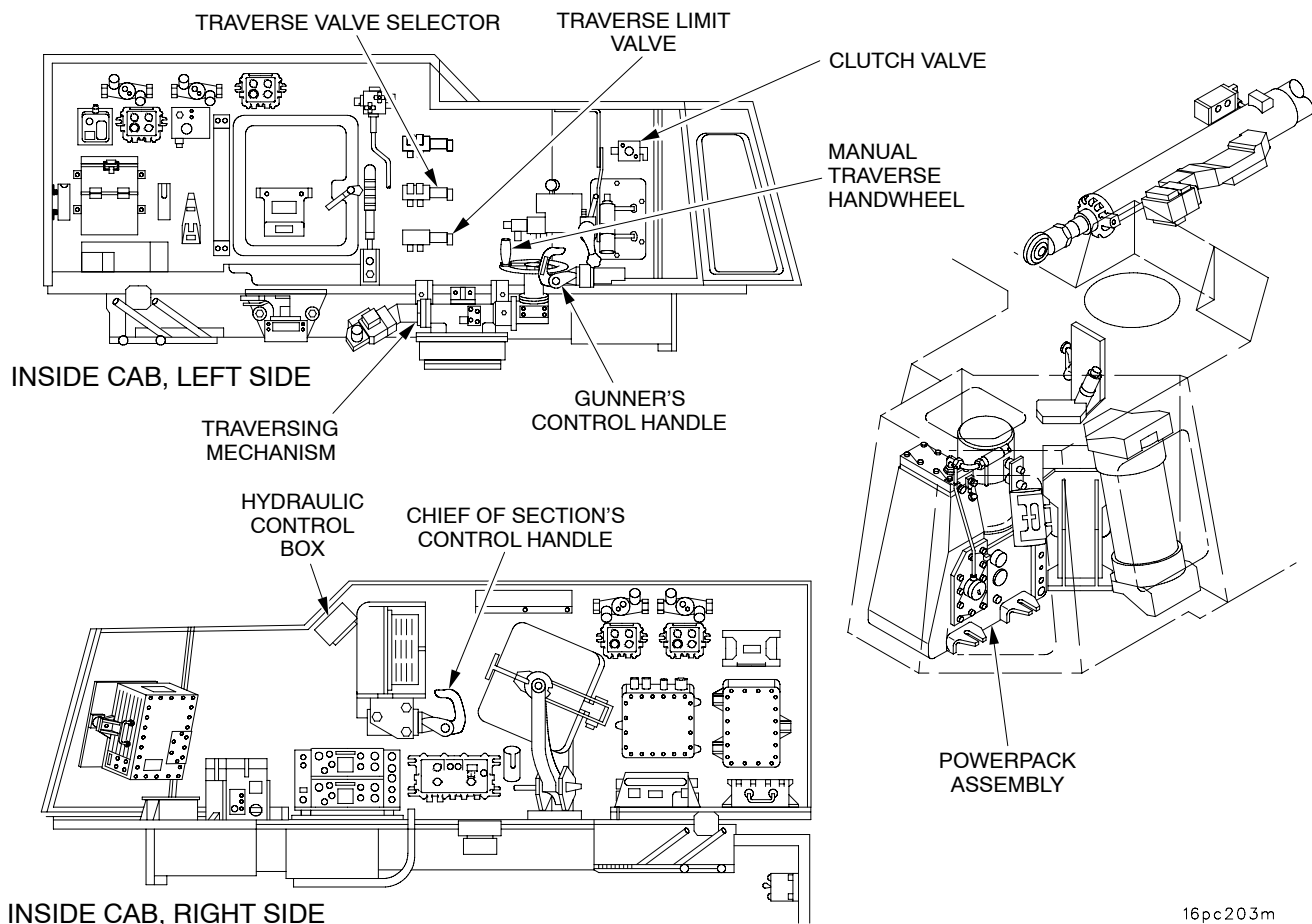
**TRAVERSE VALVE SELECTOR:** Directs hydraulic flow to allow manual or power traversing.

**CLUTCH VALVE:** Operated by an electrical solenoid that, when activated, allows hydraulic pressure to engage the hydraulic clutch. The clutch valve has a handle that can be used to operate the valve manually. This allows the cab to be traversed during an electrical failure.

**TRAVERSING MECHANISM:** Traverses the cab by hydraulic power or mechanical energy. Clutch mechanism is controlled by hydraulic pressure coming through the clutch valve. Without hydraulic pressure, the hydraulic clutch is disengaged, allowing the manual gears to be crew operated during a hydraulic failure.

**CHIEF OF SECTION AND GUNNER'S CONTROL HANDLES:** Receive and control hydraulic power from powerpack to traverse the cab.

**MANUAL TRAVERSE HANDWHEEL:** Allows manual traverse of cab.



16pc203m



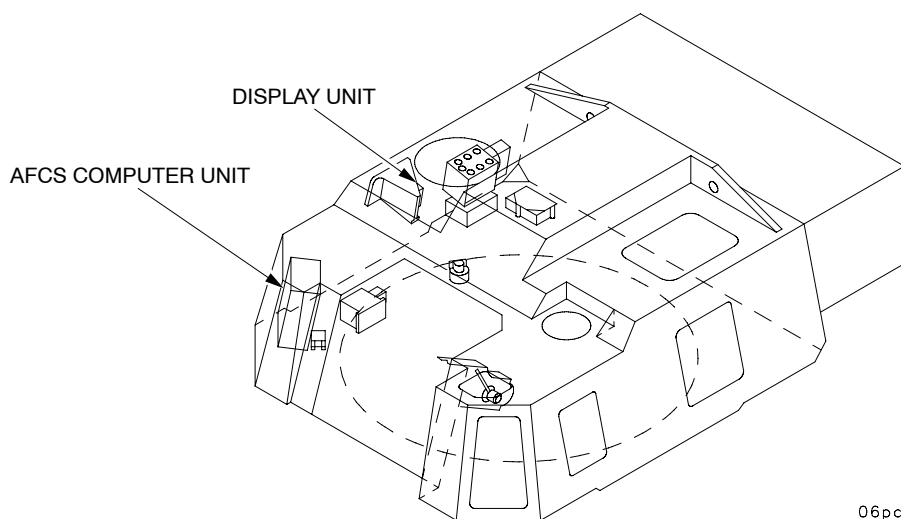
## 1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED

### 1-15.6 Description of AFCS and Associated Items.

- a. Display Unit (DU). Functions as primary operator interface and system control mechanism. It uses a flat electroluminescent panel (EL Panel ) as primary means of displaying information. Data, menus and message displays are in alphanumeric characters. It has keypad and four soft keys for entering and retrieving data.
- b. AFCS Computer Unit (ACU). Stores data which is displayed/entered on DU. It acts as an interface for navigational device (MAPS/DRU). Continuous position orientation data is provided to AFCS for navigational purposes and gun positioning. It determines heading and radial distance to a destination entered by communication from FDC or COS.

The ACU performs ballistic computations and weapon control. It generates firing data for all projectiles and computes minimum quadrant elevation. The ACU computes ballistic solutions (elevation/deflection) required to hit a given target location in UTM coordinates. In addition, it evaluates round inventory. It utilizes stored ballistic tables to calculate tube positioning data for a given target and gun emplacement. The ACU provides weapon servo control to gun automatically (to a determined azimuth and elevation). This is done by command from COS via GUN SERVO switch on DU. The following servo components are controlled by the ACU: elevation servo valve, azimuth servo valve, hydraulic solenoid valve, azimuth bypass valve, and clutch valve.

The ACU also has communication processing. This is an input/output switching system to connect AFCS to all internal and external command, control, communications, and fire control systems. This communications system automatically initializes to its stored settings when you power up AFCS. Settings may be changed during initialization using menus shown on EL panel.

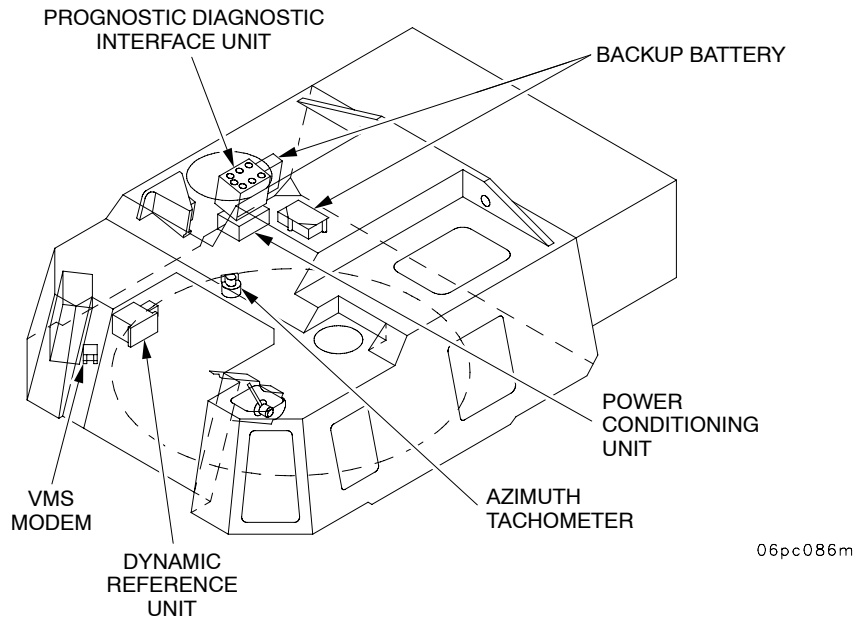


06pc085m

**1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED**

**1-15.6 Description of AFCS and Associated Items - Continued**

- c. Power Conditioning Unit (PCU). The AFCS is designed to run off vehicle power for its operation. The PCU is an electrical support system. It isolates AFCS equipment from vehicle power transients, provides EMI/RFI filtering and backup battery power in event of power interruption. It also monitors vehicle power status. Power distribution is via dual cables with individual power bus connections. The PCU has ten circuit breakers which provide a system protection measure. They are checked during PMCS and/or during troubleshooting.
- d. Backup Batteries (two sets). Provide electrical power necessary to support AFCS during power dropout or when vehicle output power falls below 20 volts. These batteries are of a sealed and vented lead acid type (no maintenance required).
- e. Azimuth Tachometer (Az Tach). Measures angular velocity of cab during traverse and provides this information to ACU. The ACU then uses this data to control azimuth servo valve assembly.
- f. VMS Modems (1-cab/1-hull). Transmit electronic signals/data from Vehicle Motion Sensors (VMS). The hull VMS modem receives its data from VMS connected to transmission. It then transmits its data to cab VMS modem through slip ring. The cab VMS modem transmits its data to navigational device (MAPS-DRUH).
- g. Dynamic Reference Unit Hybrid (DRUH). Provides navigation information to AFCS.
- h. Prognostic/Diagnostic Interface Unit (PDIU). Aids in predictions and determination of equipment failure.



## 1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED

### 1-15.7 NBC System.

The NBC system consists of microclimate conditioning system (MCS), MCS control panel, distribution and heating system and mission oriented protective posture (MOPP) suit (with vest) and M25A1 protective mask for each crewmember.

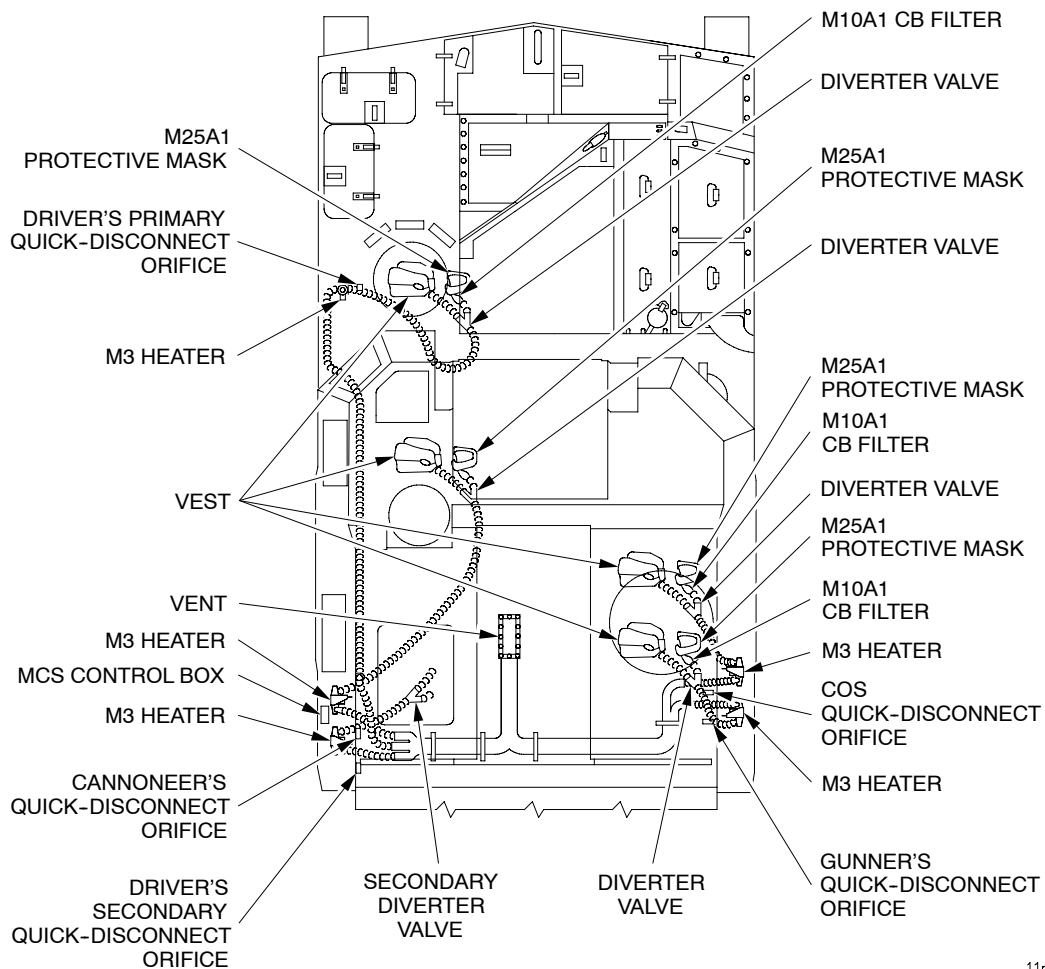
The MCS is a self-contained air filtering system located on the cab roof. Air output is vented through the cab roof and to the M3 heaters.

The distribution lines connect to M3 heaters, one near each workstation. Each heater outputs through a quick-disconnect orifice.

From each orifice a flexible hose connects, via a diverter valve, to a vest and M25A1 protective mask.

The NBC equipment insulates the crewmembers from nuclear, biological and chemical agents.

For further information on the MOPP equipment, refer to FM 21-40.



11pc158m

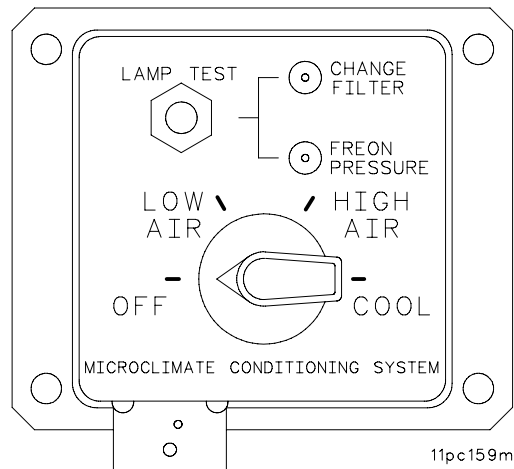
## 1-15 EQUIPMENT OPERATION AND DESCRIPTION - CONTINUED

### 1-15.8 NBC System - Continued

The MCS control panel provides the crew interface to select MCS operating modes. Modes are: low or high air flow without cooling; or high air flow with cooling.

Two warning lights are provided.

- CHANGE FILTER - filter is clogged enough to cause a critical restriction of air flow and must be changed.
- FREON PRESSURE - refrigerant pressure in air conditioner section of MCS is outside design limits. MCS must be serviced.



## CHAPTER 2 GENERAL MAINTENANCE

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### GENERAL

The purpose of this chapter is to provide information needed before the mechanic is ready to undertake repairs of specific cab systems and components. Information is provided on tools and repair parts. The chapter details actions which must be taken when the equipment is received or installed.

The final section prescribes Preventive Maintenance Checks and Services (PMCS) for the unit level.

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## Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

### 2-1 COMMON TOOLS AND EQUIPMENT.

For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

### 2-2 SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

Special tools required for unit maintenance of the cab are listed in Section III of Appendix B, the Maintenance Allocation Chart.

Special tools can be ordered using the information contained in the Repair Parts and Special Tools List (RPSTL) (TM 9-2350-314-24P-2).

### 2-3 REPAIR PARTS.

Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL) (TM 9-2350-314-24P-2) covering Unit Maintenance for this equipment. Mandatory replacement parts are listed in Appendix F of this manual.

## Section II. SERVICE UPON RECEIPT

### 2-4 SERVICE UPON RECEIPT.

#### 2-4.1 General.

### WARNING

Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

Armament parts are coated with rust-preventive compound when received from storage. These parts should be thoroughly cleaned with rags or a brush saturated with dry-cleaning solvent MIL-PRF-680 (item 75, Appx C).

After complete removal of the compound, lubricate as specified in TM 9-2350-314-10. Component parts of each weapon should be cleaned separately where practicable. Although like parts are interchangeable, the parts originally assembled work best together.

Whenever possible, the vehicle crew will help to perform these services. This section may provide material which is duplicated in TM 9-2350-314-20-1-1 and -2 (Howitzer hull manuals). However, this duplication is limited to activities which require crew and maintenance mechanic joint effort.

**2-4 SERVICE UPON RECEIPT - CONTINUED****2-4.2 Service Upon Receipt Checklist - Howitzer Cab.**

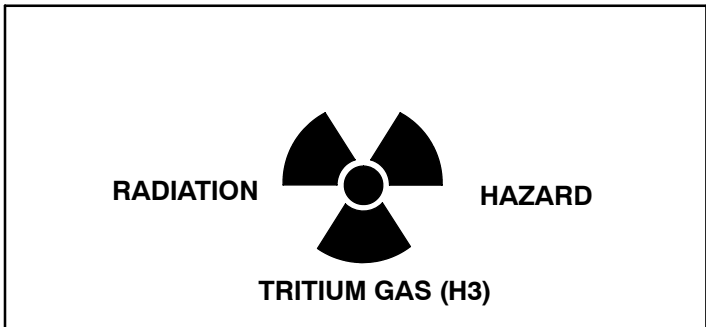
LOCATION	ITEM	ACTION	REMARKS/REFERENCES
M109A6	Unpacking	Remove closure kit Remove COEI and BII	para 2-4.3
Cab M109A6	Armament Cannon 155MM, M284	Clean surface to remove rust- preventive compounds	para 2-4.1
	Surfaces Interior/ Exterior	Inspect for rust or damage which could render the unit unserviceable	PMCS Table 2-1
	Ballistic Cover	Uncrate and install	para 7-3
	Panoramic Telescope Mount M145A1	Check counter box area for evidence of moisture; purge if required. Check for illumination. Check synchronization	para 28-4 TM 9-2350-314-10 para 7-1
	Automatic Fire Control System	Check for security of cable mounting, physical damage, and operation	TM 9-2350-314-10
	Telescope, Panoramic M117A2	Check main telescope and counter box area for evidence of moisture; purge and charge if required. Check for illumination	TM 750-116 TM 9-2350-314-10
	Cab Hydraulic System	Check hydraulic oil level and system pressure	TM 9-2350-314-10
	Cab Traverse, Howitzer Elevation and Rammer Systems	Check operations	TM 9-2350-314-10

**2-4 SERVICE UPON RECEIPT - CONTINUED**

**2-4.2 Service Upon Receipt Checklist - Howitzer Cab - Continued**

LOCATION	ITEM	ACTION	REMARKS/REFERENCES
Cab M109A6 - Continued	Buffer Rod	Inspect forward section of counter-recoil buffer rod. Clean off all foreign matter	para 2-10.5 (PMCS)
	Basic Issue Items (Stowed Items)	Uncrate and install or stow	TM 9-2350-314-10

**WARNING**



The alignment device M140 and collimator M1A1 are radioactively illuminated. Check for presence of illumination in a low light environment. If illumination is not present, notify radiation safety office. Do not attempt to repair.

Alignment Device M140/M140A1	Check for evidence of moisture; purge and charge if required. Check for illumination	TM 750-116 TM 9-2350-314-10
Collimator M1A1/M1A2	Check for evidence of moisture; purge and charge if required. Check M1A1/M1A2 for illumination	TM 750-116 TM 9-2350-314-10

**NOTE**

Establish preventive maintenance schedule and record (DD Form 314) for required cab components and fire control items (DA PAM 750-8).

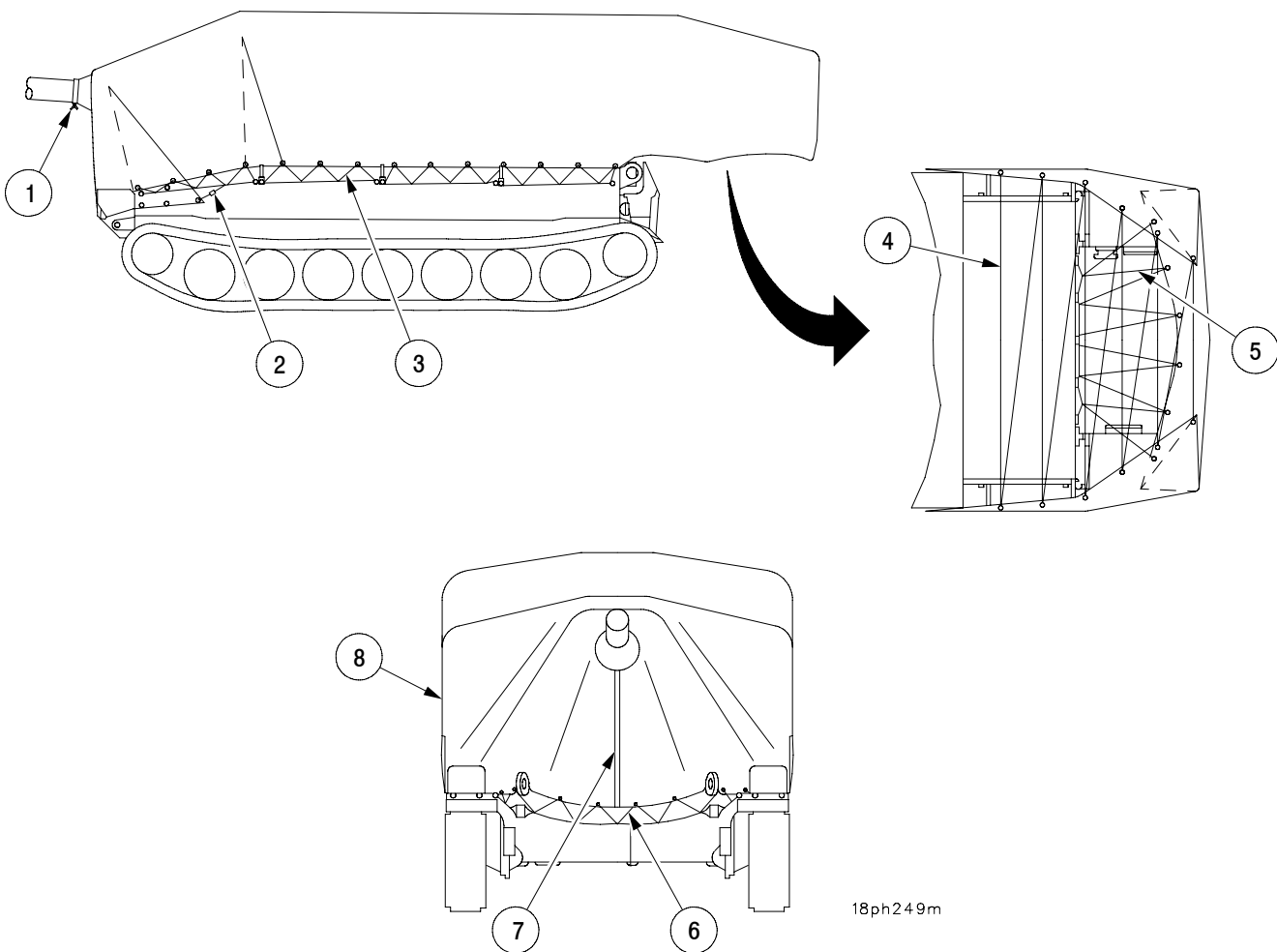


## 2-4 SERVICE UPON RECEIPT - CONTINUED

### 2-4.3 Unpacking.

#### 2-4.3.1 Unpacking - Closure Kit Removal.

- a. Untie rope (1).
- b. Remove two ropes (2) from left and right sides of vehicle.
- c. Remove two ropes (3) from left and right sides of vehicle.
- d. Remove ropes (4 and 5) from rear of vehicle.
- e. Remove rope (6) from front of vehicle.
- f. Unzip fastener (7).
- g. Remove cover (8).



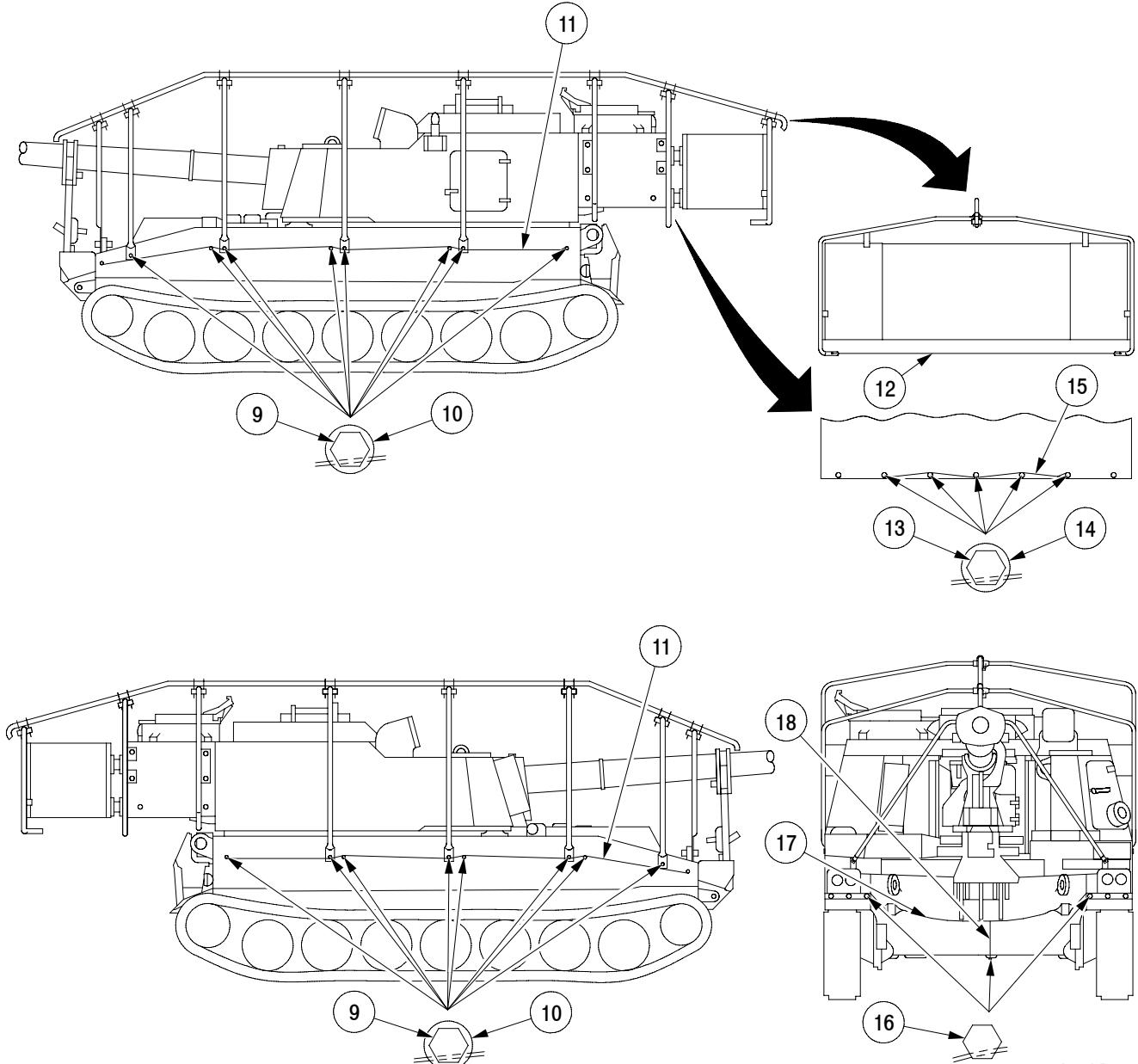
18ph249m

## 2-4 SERVICE UPON RECEIPT - CONTINUED

### 2-4.3 Unpacking - Continued

#### 2-4.3.1 Unpacking - Closure Kit Removal - Continued

- h. Loosen 16 screws (9) and 16 flat washers (10). Remove two wires (11), one from the left and one from the right side of the vehicle. Discard wires.
- i. Remove wire (12). Discard wire.
- j. Loosen five screws (13), five flat washers (14), and wire (15).
- k. Loosen three screws (16). Remove wires (17 and 18). Discard wires.



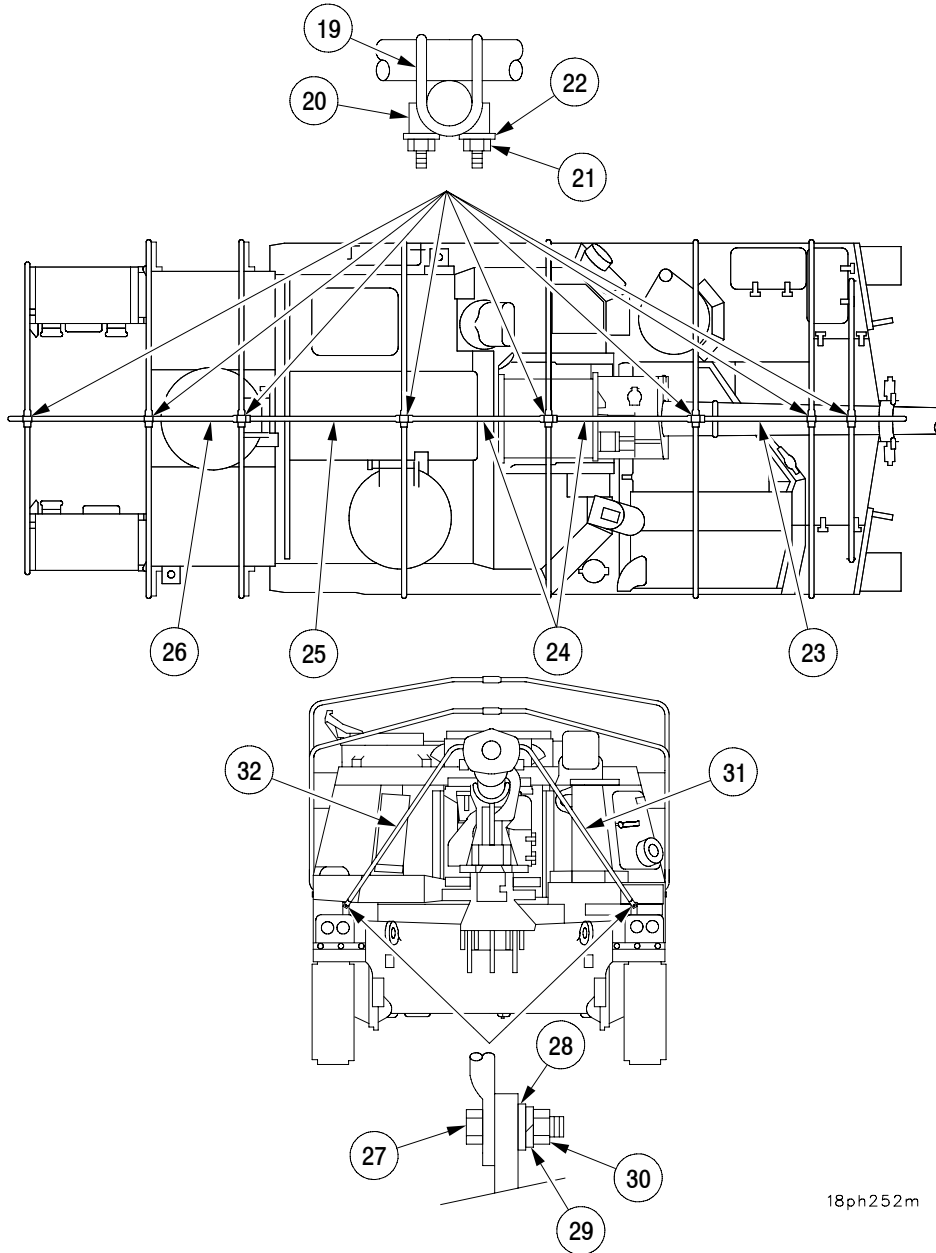
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## 2-4 SERVICE UPON RECEIPT - CONTINUED

### 2-4.3 Unpacking - Continued

#### 2-4.3.1 Unpacking - Closure Kit Removal - Continued

- l. Remove eight clamps (19), eight saddles (20), 16 nuts (21), and 16 lockwashers (22). Discard lockwashers.
- m. Remove bow (23), two bows (24), and two bows (25 and 26).
- n. Remove two screws (27), two flat washers (28), two lockwashers (29), two nuts (30), and two bows (31 and 32).



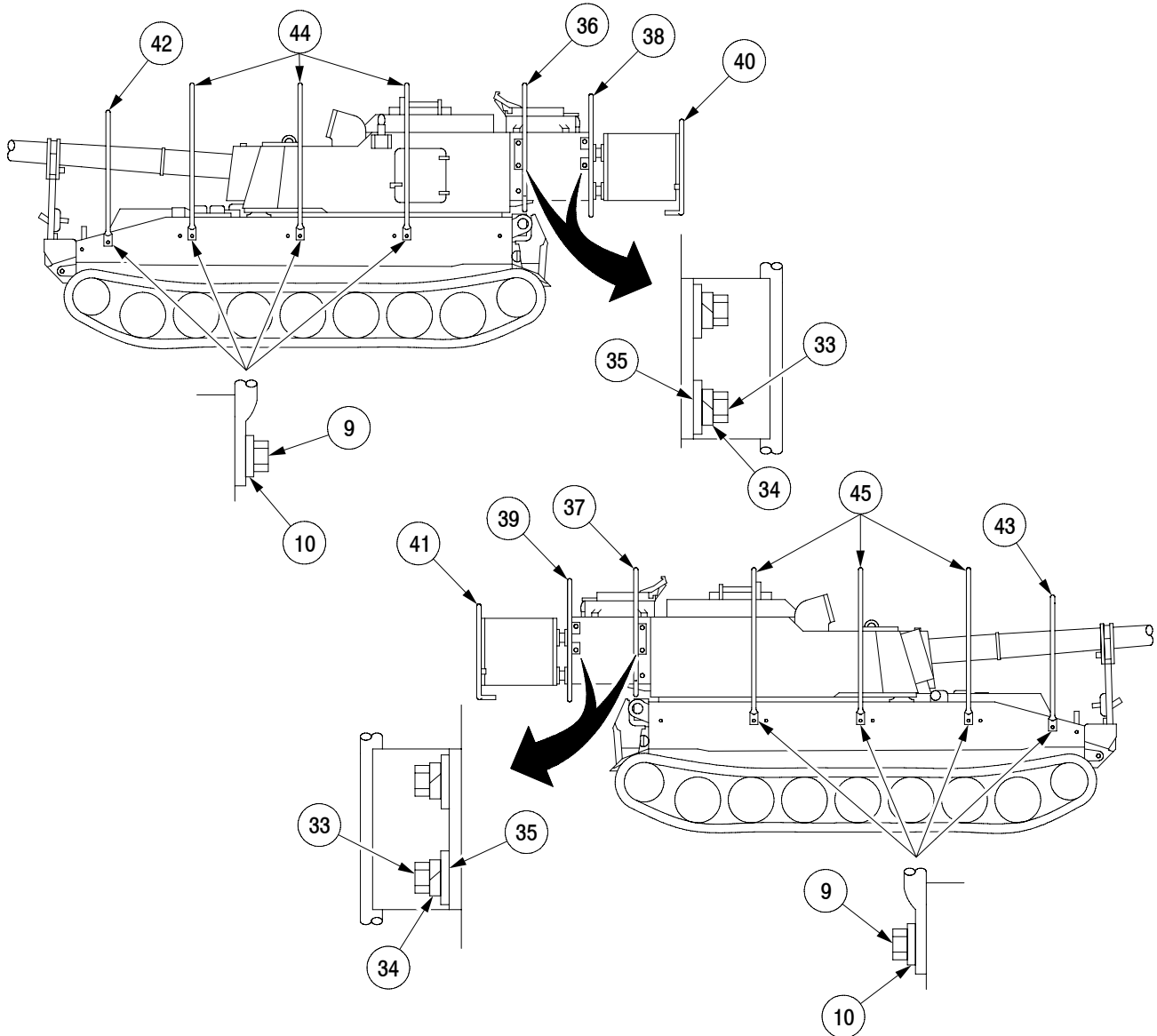
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## 2-4 SERVICE UPON RECEIPT - CONTINUED

### 2-4.3 Unpacking - Continued

#### 2-4.3.1 Unpacking - Closure Kit Removal - Continued

- o. Remove four screws (33), four lockwashers (34), four flat washers (35), and two bows (36 and 37). Discard lockwashers.
- p. Remove four screws (33), four lockwashers (34), four flat washers (35), and two bows (38 and 39). Discard lockwashers.
- q. Remove two bows (40 and 41).
- r. Remove eight screws (9), eight flat washers (10), bow (42), bow (43), and three bows (44 and 45).



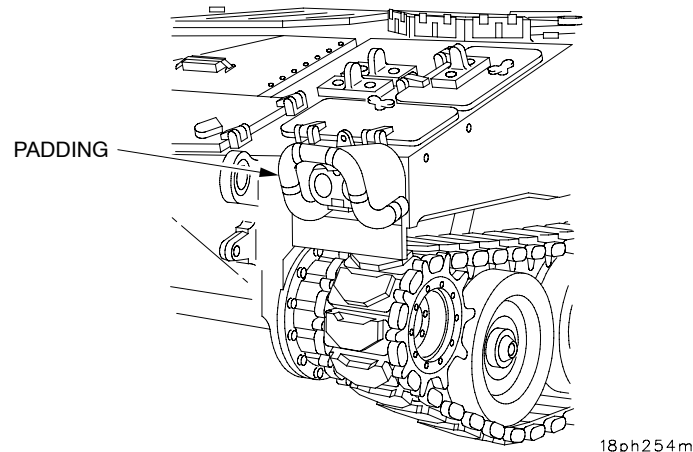
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## 2-4 SERVICE UPON RECEIPT - CONTINUED

### 2-4.3 Unpacking - Continued

#### 2-4.3.1 Unpacking - Closure Kit Removal - Continued

- s. Remove padding from extend points.



#### 2-4.3.2 Unpacking - Basic Issue Item Boxes.

Remove basic issue item box, uncrate, inventory, and stow as per TM 9-2350-314-10.

#### 2-4.3.3 Checking Unpacked Equipment.

- a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF Form 364, Report of Discrepancy.
- b. Check the equipment against the packing slip to make sure the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-750.
- c. Check to see whether the equipment has been modified.

#### 2-4.3.4 Deprocessing Unpacked Equipment.

- a. Install fire control and sighting equipment.
- b. Clean all other tools and equipment.
- c. Store all basic issue items in their respective vehicle storage facility as indicated in TM 9-2350-314-10.
- d. Remove rust-preventive compound from vehicle and components (para 2-4.1).

**2-5 INSTALLATION INSTRUCTIONS.**

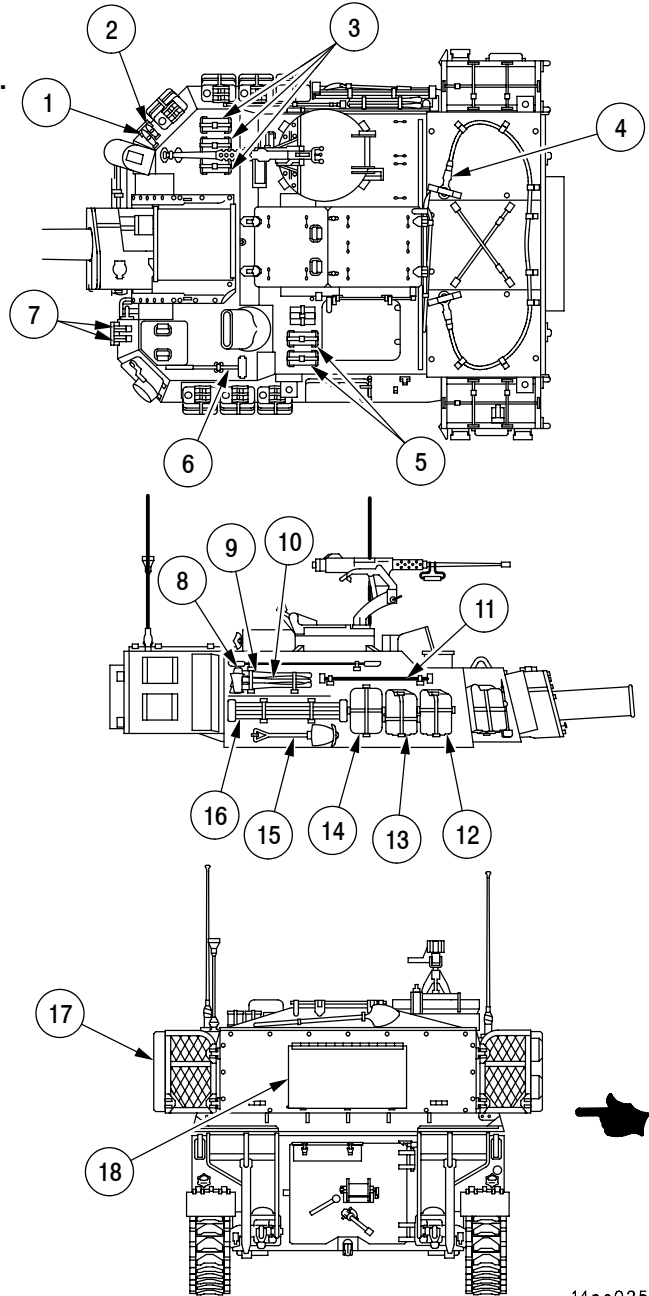
The following items were not installed for shipping purposes. Install as follows:

- a. Commander's Cupola (para 14-1).
- b. Caliber .50 machine gun mount support (para 14-3).
- c. Ballistic cover (para 7-3).

**2-5.1 Stowed Items - Location Index (Cab Exterior).**

Legend

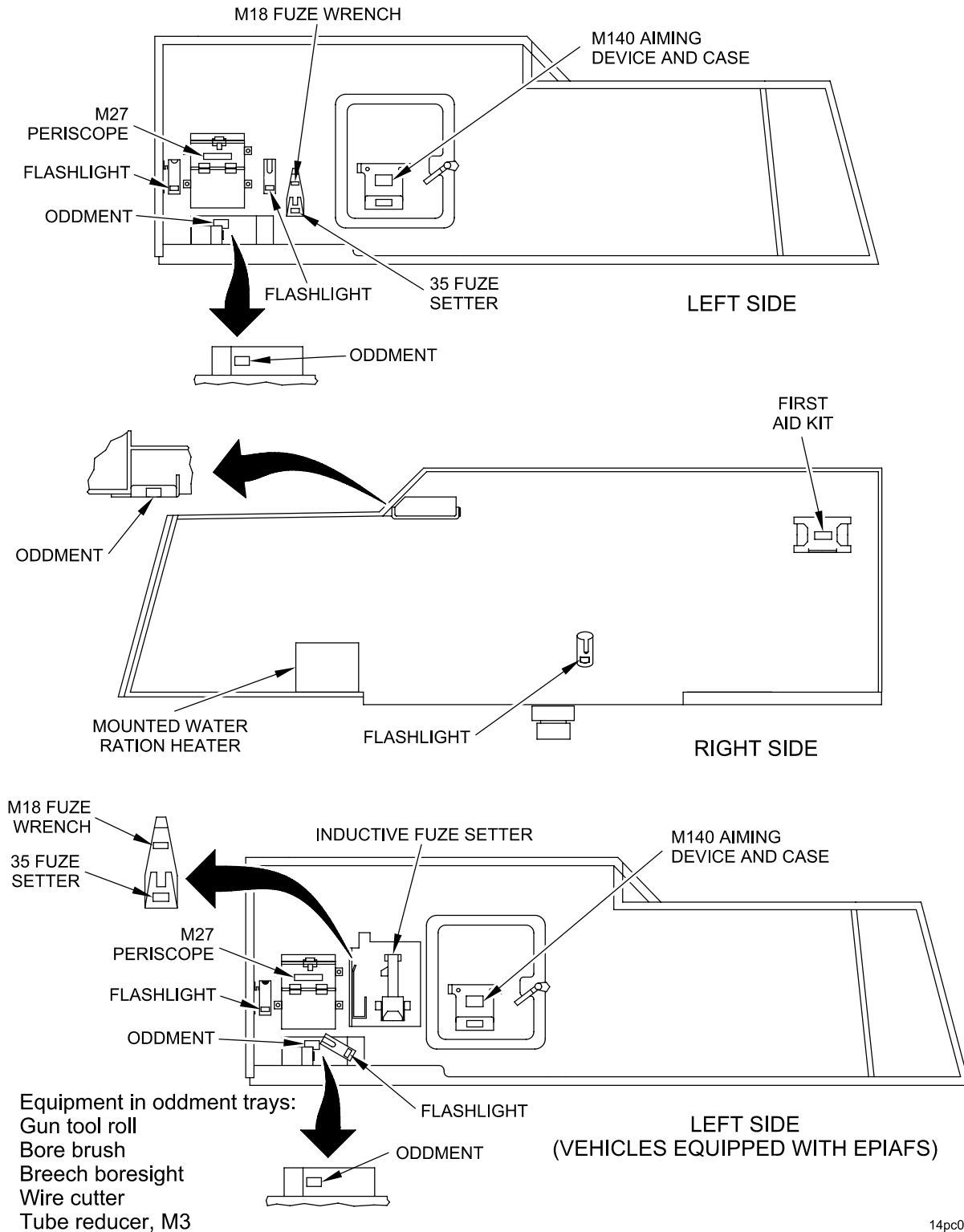
- 1 Pick
- 2 Mattock
- 3 .50 cal ammo
- 4 Tow cable
- 5 M16 ammo
- 6 Sledge
- 7 Track fixture
- 8 Crow bar
- 9 Axe
- 10 Handles
- 11 Handle
- 12 Oil can
- 13 Water can (4)
- 14 M13 decontamination kit
- 15 Shovel
- 16 Rammer staffs
- 17 Stowage baskets
  - a. Lubrication gun M3
  - b. Hatchet
  - c. Signal markers
  - d. Cooking stove
  - e. Hand pump
  - f. Hydraulic hose (Recuperator/Replenisher)
- 18 AT4 rocket launcher



14pc025m

## 2-5 INSTALLATION INSTRUCTIONS - CONTINUED

### 2-5.2 Stowed Items - Location Index (Cab Interior).



14pc029m

## 2-6 PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT.

### 2-6.1 Electrical Connections.

All electrical interconnections will have an overall inspection accomplished. This is to include wiring harnesses, connectors and groundings. These are discussed in Chapter 5, Cab Electrical System.

### 2-6.2 Fluid and Pressure Checks.

Certain checks must be accomplished before the system may be considered operational.

#### NOTE

Park vehicle on level ground if possible when performing this check.

- a. Cab Hydraulic Powerpack. Check fluid level (TM 9-2350-314-10).
- b. Cab Traverse. Operate and check for hydraulic leaks (TM 9-2350-314-10).
- c. 155mm Cannon Tube Elevation/Depression. Operate and check ease of operation (smooth tube travel up-down) and hydraulic leaks (TM 9-2350-314-10).
- d. Projectile Loader Rammer. Check for hydraulic leaks (TM 9-2350-314-10).
- e. Rammer Reliability Checks (TM 9-2350-314-10).

### 2-6.3 Fire Control.

- a. Check and perform fire control alignment test in accordance with TM 9-2350-314-10 on the following instruments:

Telescope M117A2  
Mount M145A1  
Automatic Fire Control System  
Gunner's Quadrant M1A1  
Infinity Aiming Reference Collimator M1A1/M1A2  
Alignment Device M140/M140A1

- b. Make sure collimator M1A1/M1A2 is still illuminated.

### 2-6.4 Lubrication.

Refer to para 2-10.2 and TM 9-2350-314-10.



## 2-7 CAB STOWAGE STENCIL LOCATION (EXTERIOR).

### 2-7.1 Cab Stowage Stenciling.

**WARNING**

Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

- a. Clean surface to be stenciled.

#### **NOTE**

- All letters must be black.
  - All letters must be 1/10 in. (2.5 mm) x 1/2 in. (12.7 mm) high.
  - All spacing between lines must be 1/4 in. (6.4 mm).
- b. Position stencil on surface to be stenciled.
  - c. Apply paint to letters on stencil.

### 2-7.2 Stencil Location.

For cab stencil locations, refer to para 1-11.4.a and 1-11.5.

## 2-8 DECALS, LABELS, IDENTIFICATION PLATES, AND INSTRUCTION SIGNS.

---

This task covers:          a. Removal                                  b. Installation

---

### **INITIAL SETUP**

#### Tools

Artillery and turret mechanic's tool kit  
■ (CL 5180-95-A12)

#### Materials/Parts

Decal  
Label  
Instruction sign  
Dry cleaning solvent (item 75, Appx C)

---

#### **a. Removal.**

#### **NOTE**

- For location of decals, labels, identification plates, and instruction signs contained in this chapter see illustrations on pages 2-16 and 2-17.
- All decals, labels, identification plates, and instruction signs with adhesive backing are removed/installed using the same procedure.

Scrape label (1) from mounting surface (2) of cab. Discard label.

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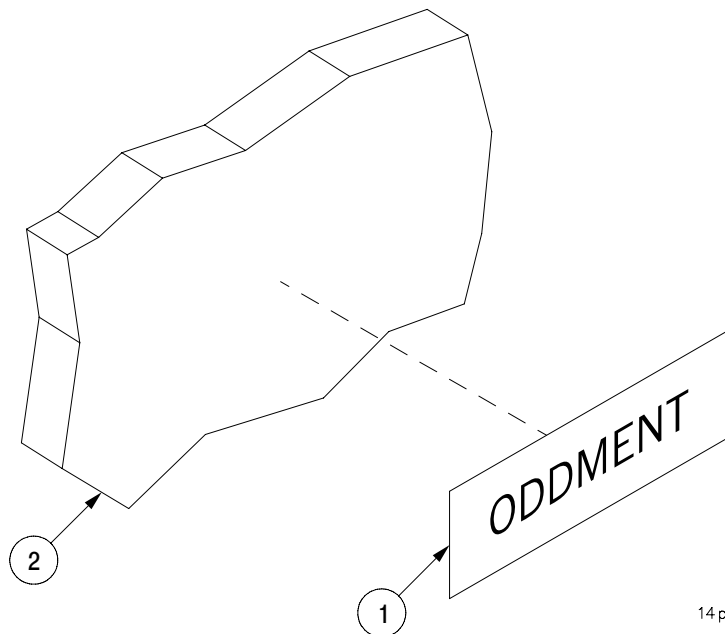
**2-8 DECALS, LABELS, IDENTIFICATION PLATES, AND INSTRUCTION SIGNS - CONTINUED**

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**b. Installation.****WARNING**

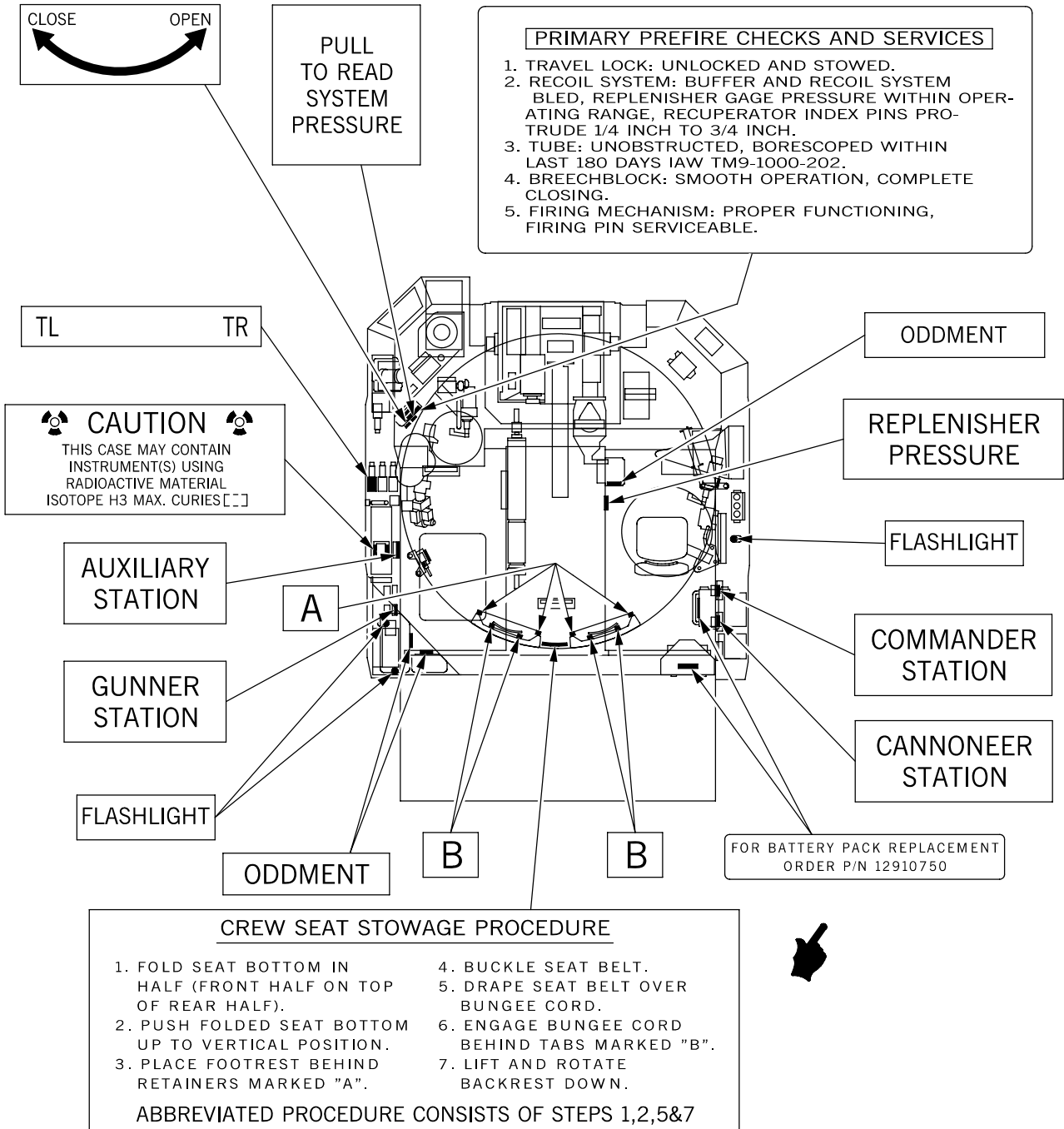
Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

- 1 Clean mounting surface using dry-cleaning solvent.
- 2 Remove paper backing from new label (1) and position in place on mounting surface (2).
- 3 Press label (1) firmly to remove air bubbles from under label (1).



14pc022m

2-8 DECALS, LABELS, IDENTIFICATION PLATES, AND INSTRUCTION SIGNS - CONTINUED



14pc023m

## 2-8 DECALS, LABELS, IDENTIFICATION PLATES, AND INSTRUCTION SIGNS - CONTINUED

**CHECKING FLUID LEVEL**  
PER TM 9-2350-314-10

1. REMOVE DUST CAP.
2. THREAD DIPSTICK RETAINER COMPLETELY INTO BELLOWS BOSS.
3. SLIDE DIPSTICK IN UNTIL IT BOTTOMS OUT.
4. PUSH DIPSTICK INTO RESERVOIR WHILE OPENING BLEED VALVE AT THE TOP OF RESERVOIR TO BLEED AIR OUT. CLOSE VALVE WHEN ALL AIR HAS BEEN BLED OUT.
5. READ TEMPERATURE ON DIPSTICK.
6. COMPARE DIPSTICK TEMPERATURE READING TO RESERVOIR READING. IF DIFFERENCE IS LESS THAN 10°F, GO TO STEP 7. IF DIFFERENCE IS GREATER THAN 10°F, ADJUST FLUID LEVEL PER TM9-2350-314-10.
7. REMOVE AND STOW DIPSTICK.
8. RE-INSTALL DUST CAP.

**HYDRAULIC  
FILTER ACCESS**

M825A1. NEAR ↑ LOCK. PIN HOLE  
M83A1. M107+SPACER. FAR HOLE

THIS SIDE OUT FOR ALL PROJECTILES

↑ M864. THIS LOCKING PIN HOLE

M549A1. ↑ THIS LOCKING PIN HOLE

**R134A  
ONLY**

**CAUTION**  
HIGH INTENSITY NOISE  
HEARING PROTECTION  
REQUIRED

**CAUTION**  
TURN OFF ALL  
COMMUNICATION  
EQUIPMENT BEFORE  
STARTING OR STOPPING  
ENGINE

**CAUTION**  
HIGH INTENSITY NOISE  
HEARING PROTECTION  
REQUIRED

← LOCKED

UNLOCKED →

M-18  
WRENCH

M-35  
SETTER

**M-27 PERISCOPE**

SEAT  
RELEASE

**FIRST AID  
KIT**

**VIS  
M109A6 PALADIN**

CREW STATION (FFCS) ASSIGNMENTS	
1 - CHIEF OF SECTION	4 - AUXILIARY
2 - CANNONEER	5 - EXTERNAL
3 - GUNNER	6 - DRIVER

14pc024m

## 2-9 WIRING HARNESS AND CABLE REPAIR.

---

This task covers:      a. Disassembly                      b. Assembly

---

### **INITIAL SETUP**

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Heat gun (item 21, Appx G)  
Electrical connector repair tool kit (item 44, Appx G)

#### References

TB SIG 222

#### Materials/Parts

Electrical tape (black) (item 88, Appx C)

---

### **NOTE**

- Before proceeding, see detailed instructions on soldering and solder (TB SIG 222).
- Cable identifiers are attached to cables. These tags are embossed with the cable identification number. Cable identifier numbers are shown on the systems wiring diagram.
- Wire identifiers are embossed with the same individual wire number. Wire identifier numbers are also shown on systems wiring diagram.
- If cables or wires are replaced, remove tags from old wire and place them on new wire.

---

## 2-9 WIRING HARNESS AND CABLE REPAIR - CONTINUED

---

### 2-9.1 Heat Shrink Insulation Sleeving

#### a. Disassembly

Cut and discard insulation sleeving.

#### b. Assembly

#### NOTE

Insulation sleeving tubing should be twice the diameter of the part over which it will be shrunk.

- 1 Slide sleeving over wire and terminal.

#### NOTE

Remove thermal heat gun from sleeving as soon as sleeving forms to shape of wire and terminal.

- 2 Hold thermal heat gun 4 or 5 inches away from sleeving and apply heat for about 30 seconds.
- 3 Let sleeving cool 30 seconds before handling.

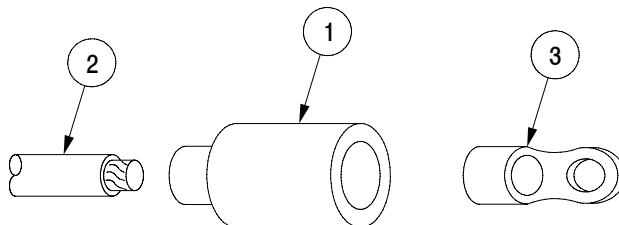
### 2-9.2 Terminal-Type Cable Connectors

#### a. Disassembly

Cut and discard connector.

#### b. Assembly

- 1 Strip cable insulation equal to depth of terminal well.
- 2 Slide insulator (1) over cable (2).
- 3 Insert cable (2) into terminal well (3) and crimp.
- 4 Slide insulator (1) over crimped end of terminal (3).



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## 2-9 WIRING HARNESS AND CABLE REPAIR - CONTINUED

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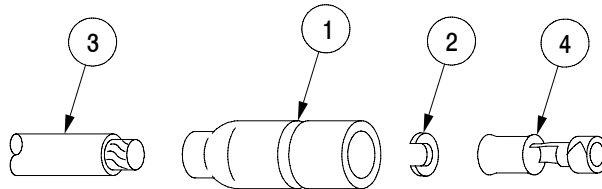
### 2-9.3 Female Cable Connector with Washer

#### a. Disassembly

Cut and discard connector.

#### b. Assembly

- 1 Strip cable insulation approximately 1/8 inch (3.2 mm).
- 2 Slide shell (1) and washer (2) over cable (3).
- 3 Place cable (3) in cylinder end of terminal (4) and crimp.
- 4 Slide shell (1) and washer (2) over terminal (4).



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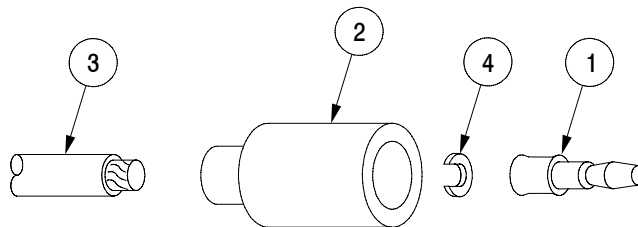
### 2-9.4 Male Cable Connector with Washer

#### a. Disassembly

Cut and discard connector.

#### b. Assembly

- 1 Strip cable insulation equal to depth of terminal (1) well.
- 2 Slide shell (2) over cable.
- 3 Insert cable (3) into terminal well and crimp.
- 4 Place washer (4) over cable (3) at crimped junction and slide shell (2) over washer (4) and terminal.



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## 2-9 WIRING HARNESS AND CABLE REPAIR - CONTINUED

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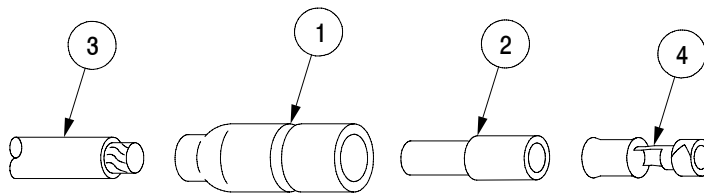
### 2-9.5 Female Cable Connector with Sleeve

#### a. Disassembly

Cut and discard connector.

#### b. Assembly

- 1 Strip cable insulation approximately 1/8 inch (3.2 mm).
- 2 Slide shell (1) and sleeve (2) over cable (3).
- 3 Place cable (3) in cylinder end of terminal (4) and crimp.
- 4 Slide shell (1) and sleeve (2) over terminal (4).



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## Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

### 2-10 GENERAL.

Preventive maintenance is the step-by-step care, inspection, and service of equipment to maintain it in good condition and to find problems before extensive and time consuming repairs or replacements are needed. Record any malfunctions or failures on DA Form 2404, Equipment Inspection and Maintenance Worksheet. Refer to DA PAM 750-8, The Army Maintenance Management System (TAMMS), as contained in Maintenance Management Update.

This section has the procedures and instructions needed to perform unit preventive checks and services. These services are done by unit level maintenance personnel with the help of the vehicle crew.

#### 2-10.1 Intervals.

Preventive maintenance service interval at unit maintenance level is quarterly, annually, after shooting a specified number of rounds, and at 750 miles or 75 hours, whichever comes first. This is scheduled on DD Form 314 in accordance with DA PAM 750-8.

After operation in water, mud, and loose sand, the vehicle should be cleaned as soon as possible. Lubricate without waiting for the next scheduled service.

#### 2-10.2 Lubrication Instructions.

Detailed lubrication steps and instructions covering locations, intervals, and the right lubricants for M109A6 are listed in Table 2-1. Lubrication instructions are to be performed by unit maintenance personnel.

Intervals (on-condition or hard time) are based on normal operation. On-Condition (OC) oil sample intervals shall be applied unless changed by the Army Oil Analysis Program (AOAP) laboratory. Change the hard time interval if your lubricants are contaminated or if you are operating the equipment under adverse operating conditions, including longer than usual operating hours. The hard time interval may be extended during periods of low activity. If extended, adequate preservation precautions must be taken. Hard time intervals will be applied in the event AOAP laboratory support is not available.

Engine oil/transmission oil/hydraulic fluids must be sampled at 25 hours of operation or 60 days, whichever occurs first, as prescribed by TB 43-0211.

When AOAP analysis service is available, change oil and filters at the direction of the AOAP laboratory.

When AOAP analysis service is not available, change oil and filters at 75 hours or 750 miles of operation.

Always use the Expected Temperature Lubrication Table to determine seasonal lubrication requirements. When changing engine and transmission oil due to seasonal requirements, always change the oil filters.

Sound maintenance practice dictates that AOAP is not a maintenance substitute, but is used as an effective maintenance diagnostic tool. Therefore, if 12 months have elapsed since the last AOAP or seasonally directed oil and filter change, the oil and filters will be changed.

Clean parts with solvent, dry-cleaning (MIL-PRF-680) (item 75, Appx C).

**2-10.2 Lubrication Instructions - Continued****WARNING**

Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

Before you start your lube service, observe the following:

**NEVER**

- a. Use wrong type lubricant.
- b. Use too much lubricant.
- c. Use hydraulic fluid (FRH) MIL-H-46170 in the hydraulic systems.

**ALWAYS**

- a. Clean grease fittings before lubrication.
- b. Use TM 9-2350-314-10 as your guide.
- c. Check for lubricant and fuel leaks along with daily services.

After water fording, you have to lubricate.

Make sure vehicle is level when checking oil levels: If it isn't, you'll get incorrect readings on dipsticks and sight gages.

Oil filters shall be serviced/cleaned/changed as applicable, when:

- a. They are known to be contaminated or clogged;
- b. Service is recommended by AOAP laboratory analysis; or
- c. At prescribed hardtime intervals.

**NOTE**

Under emergency conditions only, OHA hydraulic fluid may be used in the hydraulic system.

OHT	Hydraulic Fluid, Petroleum Base, Preservative, Hydraulic Equipment (MIL-PRF-6083)
OHA	Hydraulic Fluid, Petroleum Base, Aircraft Missile and Ordnance (MIL-H-5606)
GGP	Grease, General Purpose (MIL-G-23549)
GMD	Grease, Molybdenum Disulfide (MIL-G-21164)
GAA	Grease, Automotive and Artillery (MIL-PRF-10924)

LUBRICANT/COMPONENT	CAPACITIES	Above +5°F (Above -15°C)	+5°F to -65°F (-15°C to -54°C)	LUBRICANT FOR EXPECTED TEMPERATURE			INTER- VALS
				Above +15°F (Above -9°C)	+40°F to -15°F (+4°C to -26°C)	+40° to -65° F (+4°C -54°C)	
GAA (MIL-PRF-10924) Grease, Automotive and Artillery							For arctic operation, refer to FM 9-207
LOMD (NATO-S-1735) Lubricating Oil, Molybdenum Disulfide							
GMD (MIL-G-21164) Grease, Molybdenum Disulfide							
GGP (MIL-G-23549) Grease, General Purpose							
<u>Mount Cradle Bearing and Torque Key</u>	As Req.			GMD	GGP	GAA (G-403)	
Muzzle Brake Evacuator	As Req.			GMD (353)			
OHT (MIL-PRF-6083) Hydraulic Fluid, Petroleum Base for Preservation and Operation							
<u>Hydraulic Powerpack &amp; Equilibrator</u>	46 Qts. (43.51 LI)			OHT	OHT	OHT	
<u>Gun Mount &amp; Replenisher</u>	30 Qts. (28.38 LI)						

**2-10.3 Procedures.**

- a. Routine Application. This publication contains maintenance instructions which the unit mechanic must use to perform specified duties.
- b. Crew Participation. The crew will accompany the vehicle and help the unit mechanics in doing the unit level services.
- c. Vehicle Cleanliness. The crew should bring the vehicle for a scheduled preventive maintenance service in a reasonably clean condition. It should be dry and not caked with mud. Washing the vehicle should not be done just before an inspection. Some defects, such as loose parts and oil leaks, may not be noticed immediately after washing.



Do not direct a stream of water or steam against the opening between the hull, cab, grilles, exhaust deflectors, fire control, and armament openings or inside the vehicle.

## 2-10 GENERAL - CONTINUED

### 2-10.4 General Checks.

- a. Electrical Connectors/Wires. Check connectors; if loose, tighten. Check for open insulation cracks on wires. Repair with electrical tape or replace. Complete cab wiring diagram, harnesses and connectors are described in detail in Chapter 5 of this manual.

**WARNING**

Never tighten hydraulic lines or fittings when hydraulic system is pressurized. Damage to tubes and fittings could result in injury to personnel.

- b. Hydraulic Connectors/Lines and Hoses. Check connectors; if loose or if stained by hydraulic fluid, tighten. Check lines and hoses for cracks, loose clamps or stains from hydraulic fluid. Repair or replace lines and tubes that are damaged.
- c. Seals. Check for leaks (fluid stains). Check condition of gasket material. Replace if deteriorated. Check door/hatch seals for deteriorations, cracks and tears.
- d. Loose Bolts. Although a loose bolt can be difficult to spot without actually applying a wrench, you can often tell by loose or chipped paint around the bolt head and bare metal or rust present at the base of the bolt head.
- e. Welds. Many items are attached to the cab with welds. Damaged welds may be detected by rust or chipped paint where cracks occur.

### 2-10.5 Services.

Unit service is defined by, and limited to, the following general procedures. Approval to perform higher category services must be given by the supporting maintenance unit.

- a. Adjust. Make all needed adjustments using instructions in this manual and/or technical bulletins.
- b. Clean. Clean the unit to remove old lubricant, dirt, and other foreign matter. Special cleaning instructions are given as needed.
- c. Special Lubrication. Special lubrication applies either to lubrication operations that do not appear in TM 9-2350-314-10 or to items that do appear, but which should be done with the annual service.
- d. Tighten. All tightening operations should be done according to specified torque readings where noted in this manual. When torque isn't specified, care should be taken not to strip or distort threads by overtightening. Use a torque-indicating wrench where specified. Tightening includes the correct installation of lockwasher, nut, lock wire, or cotter pin needed to secure the tightened nut or bolt in place.

## 2-10 GENERAL - CONTINUED

### 2-10.5 Services - Continued

- e. Repair. Restore an item to a serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening. Refer to Appendix B for authorized crew and unit maintenance level repair, replace and adjusting functions on the M109A6.
- f. DA Form 2404. Equipment Inspection and Maintenance Worksheet is used by the mechanic to record all faults found and actions taken.

The item number on the 2404 must correspond to the item number of the preventive maintenance check.

Specific items to be checked are found in Table 2-1. The PMCS Table specifies the intervals for performing each PMCS. Before you begin to check specific items, remember that there are things to be checked that are common in all areas to be inspected as shown in the following illustrations.

### 2-10.6 Corrosion Prevention Control (CPC).

Refer to Appendix H.

### 2-10.7 Classification of Fluid Leaks.

The following definitions concern types/classes of fluid leakage. Each crewmember must be familiar with these definitions in order to determine whether or not the vehicle is mission capable.



Equipment operation is allowable with minor leakage (Class I or II). Consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor. When operating with Class I or Class II leaks, continue to check fluid levels as required in your PMCS. Class III leaks should be reported to unit maintenance supervisor.

Class I: Seepage of fluid (indicated by wetness or discoloration) not great enough to form drops.

Class II: Leakage of fluid great enough to form drops but not enough to cause drops to drip from an item being checked /inspected.

Class III: Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

### 2-10.8 Warnings and Cautions.

Always observe the WARNINGS and CAUTIONS appearing in your PMCS table. Warnings and cautions appear before applicable procedures. You must observe these WARNINGS and CAUTIONS to prevent serious injury to yourself and others or prevent your equipment from being damaged.

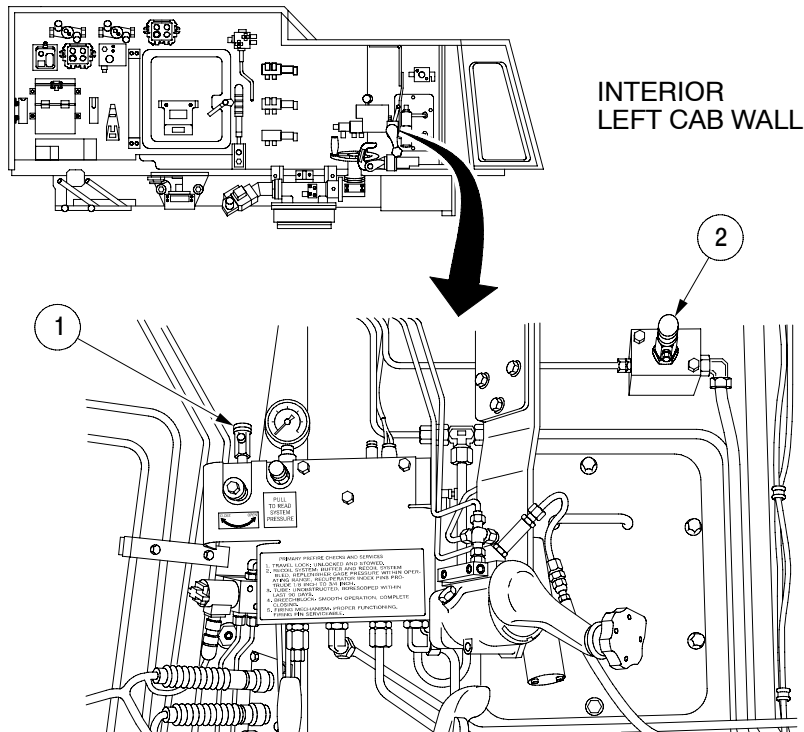
## 2-10 GENERAL - CONTINUED

### 2-10.9 Explanation of Table Entries.

- a. Item Number column. Numbers in this column are for reference. When completing DA Form 2404 (Equipment Inspection and Maintenance Worksheet), include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.
- b. Interval column. This column tells you when you must do the procedure listed in the procedure column. SEMIANNUAL procedures must be done every 6 months, or 1500 miles, or 150 hours of vehicle operation. ANNUAL procedures must be done every 12 months, or 3000 miles, or 300 hours, of vehicle operation.
- c. Location, Item to Check/Service column. This column provides the location and the item to be checked or serviced. The item location is underlined.
- d. Procedure column. This column gives the procedure you must do to check or service the item listed in the Check/Service column to know if the equipment is ready or available for its intended mission or for operation. You must do the procedure at the time stated in the interval column.
- e. Not Fully Mission Capable if: column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make check and service procedures that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
1	MONTHLY	Hydraulic System Oil	<p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>Refer to Army Oil Analysis Program (AOAP) TB 43-0211.</li> <li>Samples must be taken with engine running and hydraulic system power ON (TM 9-2350-314-10).</li> </ul> <p>Replace when oil analysis program at Army installation indicates contaminated hydraulic fluid (OHT) (para 18-2). If fluid is contaminated, notify support maintenance.</p> <p>System sampling can be accomplished at sampling valve (1) on the pressure manifold and valve (2) on return manifold.</p> <p>Sampling from the return manifold requires that either the Gunner's or the Chief of Section control handle is rotated to full right or full left with the power/handwheel switch set to HANDWHEEL.</p>	



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**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES  
FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

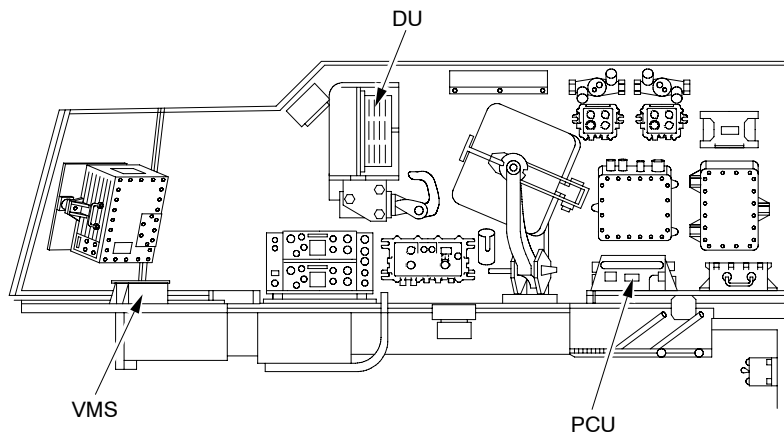
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
2	QUARTERLY	Hydraulic Powerpack	<p>Perform zero pressure check as follows:</p> <ol style="list-style-type: none"> <li>a. Park vehicle on level ground, if possible.</li> <li>b. Place gun tube in stowed position (TM 9-2350-314-10).</li> <li>c. Turn MASTER power and hydraulic control box power switches ON to charge system.</li> <li>d. Observe reading of pressure gage. Normal operating pressure is <math>1925 \pm 50</math> psi.</li> <li>e. Set cab traversing lock.</li> <li>f. Turn MASTER power and hydraulic control box power switches OFF.</li> <li>g. Displace Chief of Section control handles to right and left (as in traversing cab) while observing pressure gage needle drop from approximately 1925 psi to <math>900 \pm 50</math> psi then to zero pressure.</li> <li>h. Check hydraulic system sight gage to determine if system fluid level is correct. If not, add or drain fluid.</li> <li>i. Check hydraulic compartment for leaks with hydraulic fittings and lines.</li> <li>j. Check hydraulic cooling fan for accumulation of sand or dust. Use air and air hose to remove sand and dust from fan.</li> <li>k. Check electrical connections for damage.</li> <li>l. Check hydraulic system reservoir for leaks.</li> <li>m. Check pulse accumulator and equilibrators for hydraulic or nitrogen leaks.</li> <li>n. Service pulse accumulator (para 28-9) as required.</li> <li>o. Service equilibrator accumulator (para 28-7) as required.</li> </ol>	<p>Class III leaks</p> <p>Class III leaks</p>
3	QUARTERLY	Lubrication	Perform all lubrication required by TM 9-2350-314-10.	
4	QUARTERLY	Mount M145A1	Check synchronization (para 7-1).	
5	QUARTERLY	Telescope M117A2 Collimator M1A1/M1A2 Alignment Device M140/M140A1	Purge quarterly (TM 750-116). If moisture is found in units before quarterly service date, purge immediately.	

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
6	QUARTERLY	Fire Control Instruments	<div style="border: 2px solid black; padding: 5px; text-align: center; margin-bottom: 10px;"><b>WARNING</b></div> <ul style="list-style-type: none"> <li>● Failure to align reticle of the M117A2 telescope to the M140/M140A1 alignment device reticle could result in projectiles landing outside target area. Injury or death of friendly forces can result from firing with misaligned fire control equipment.</li> <li>● Failure to align the Dynamic Reference Unit Hybrid (DRUH) to the gun tube using the AFCS Fire Control Alignment procedures could result in a projectile landing outside the target area. Injury or death of friendly forces can result from firing with improper boresight angle offsets.</li> </ul> <p>Perform boresighting on target board, aligning reticles of M117A2 on test target board. Next, install the M140/M140A1 alignment device in front of M117A2. Ensure the reticles of the M117A2 are aligned with the reticle of the M140/M140A1 alignment device. This check must be performed to ensure accuracy of the M117A2 telescope.</p>	
7	QUARTERLY	Microclimate Conditioning System (MCS)	<p style="text-align: center;"><b>NOTE</b></p> <p>Before a visual inspection can be performed, access to the MCS pack must be achieved by opening the ballistic access cover (TM 9-2350-314-10).</p> <ol style="list-style-type: none"> <li>a. Inspect Freon lines for punctures, fractures, and leaks.</li> <li>b. Inspect drive belt for breaks or cracks.</li> <li>c. Inspect scavenger duct flex hose for tears or weakness.</li> <li>d. Inspect compressor for signs of leakage.</li> <li>e. Inspect filter area for damage.</li> <li>f. Inspect wires for tears or frays.</li> <li>g. Check air particle separator for clogging (para 13-8).</li> </ol>	

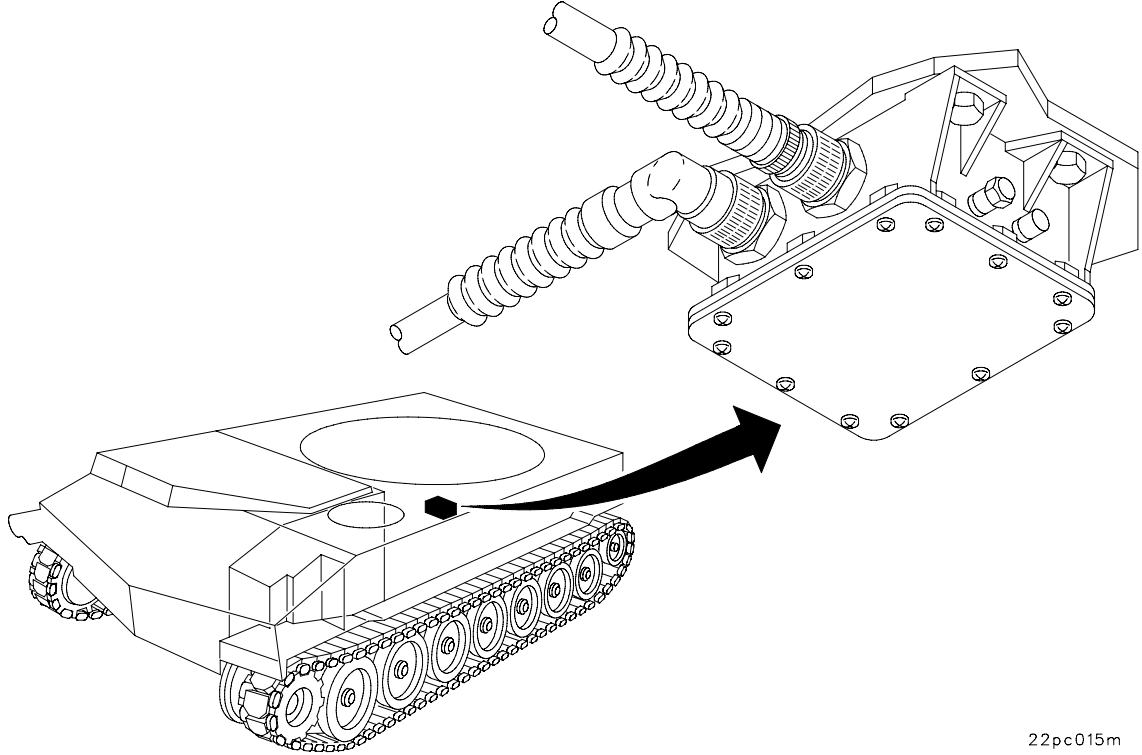
**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
8	QUARTERLY	Display Unit (DU)	Purge quarterly (para 28-1).	
9	QUARTERLY	Power Conditioner Unit (PCU)	Purge quarterly (para 28-2).	
10	QUARTERLY	Vehicle Motion Sensor (VMS) Modem Cab Side	Purge quarterly (para 28-3).	



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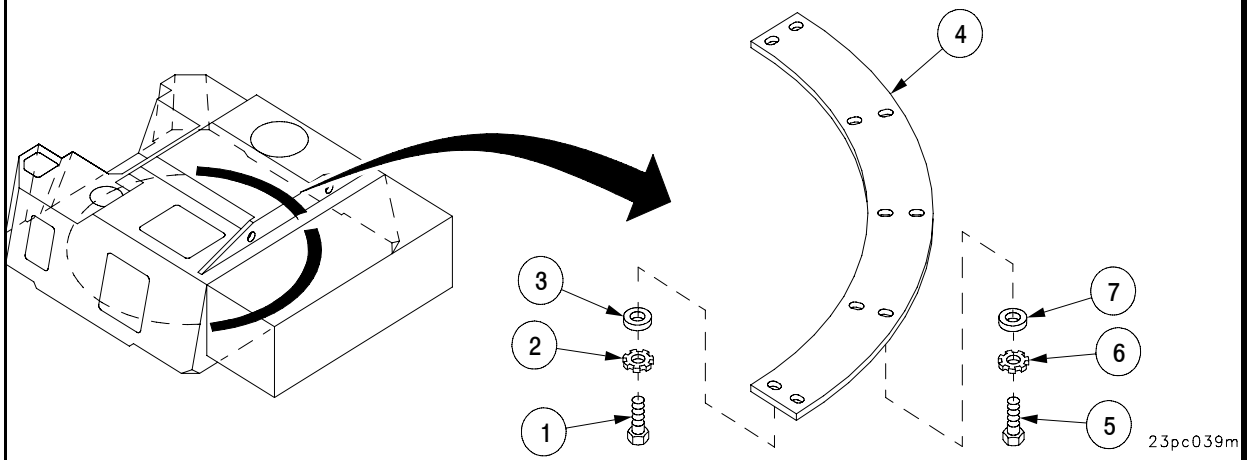
**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
11	QUARTERLY	Vehicle Motion Sensor (VMS) Modem Hull Side	Purge quarterly (para 28-3).	
				
12	QUARTERLY	Cab Bearing Assembly	Check cab bearing mounting bolts, both cab and hull side. Ensure bolts are torqued to 340-380 lb-ft (461-515 N·m) on both sides (cab side and hull side).	Bolts or inserts stripped or cracked.
13	QUARTERLY	Segment Board Assemblies	Clean quarterly (para 23-3).	

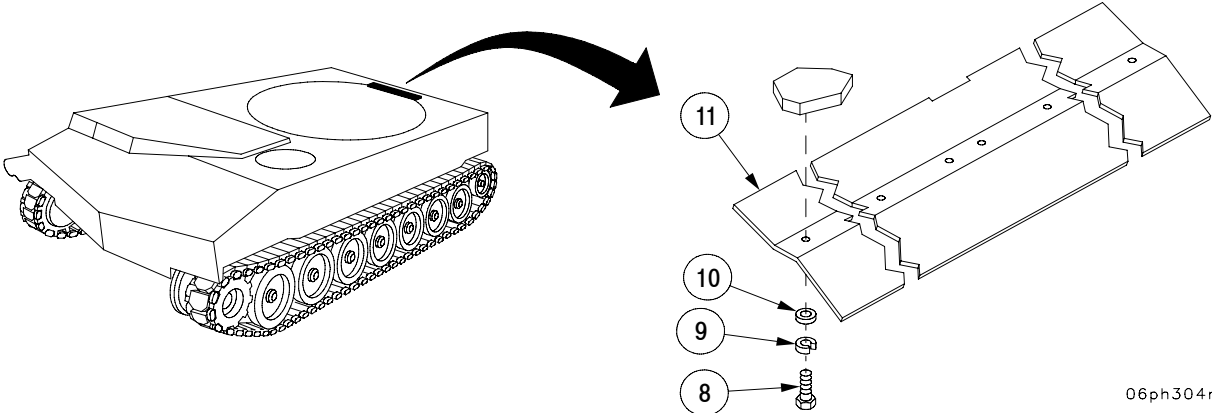
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**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

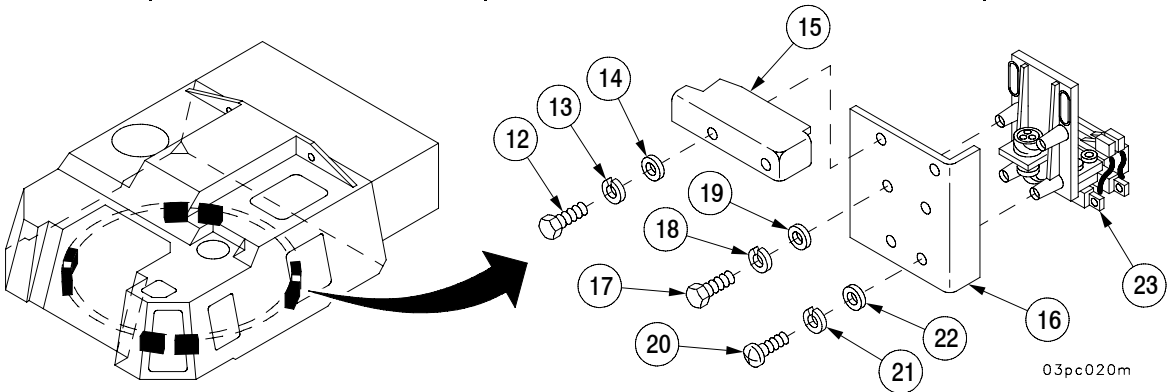
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
14	QUARTERLY	Brush Block Assembly	<p>Clean as follows:</p> <div style="border: 1px solid black; padding: 5px; text-align: center; margin: 10px 0;"><b>WARNING</b></div> <p>Be sure all personnel are clear of traversing area and bustle storage baskets are closed and secure.</p> <ol style="list-style-type: none"> <li>a. Remove gun tube from travel lock (TM 9-2350-314-10).</li> <li>b. Unlock cab traverse lock (TM 9-2350-314-10).</li> </ol> <div style="border: 1px solid black; padding: 5px; text-align: center; margin: 10px 0;"><b>WARNING</b></div> <p>Make sure MASTER switch is OFF and disconnect battery cables.</p> <ol style="list-style-type: none"> <li>c. Turn vehicle MASTER switch OFF (TM 9-2350-314-10) and disconnect battery cables (TM 9-2350-314-20-1-2).</li> <li>d. Remove four screws (1), four lock-washers (2), and four flat washers (3) securing cover (4). Discard lock-washers.</li> <li>e. Remove final six screws (5), six lock-washers (6), and six flat washers (7) securing cover (4). Discard lock-washers.</li> </ol>	Communication cables are inoperative or if gun tube cannot be removed from travel lock.



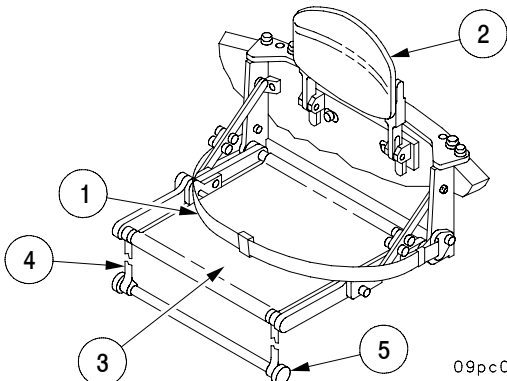
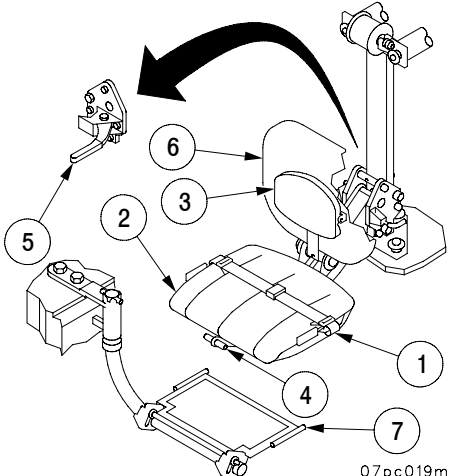
**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
14	QUARTERLY	Brush Block Assembly - Continued	<p>f. Remove six screws (8), six lock-washers (9), six flat washers (10), and guard (11). Discard lockwashers.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">06ph304m</p>	
			<p style="text-align: center;"><b>NOTE</b></p> <p>There are eight brush block covers and lids. The removal and installation procedures are identical for all eight. This procedure covers only one brush block cover and lid.</p> <p>g. Remove two screws (12), two lock-washers (13), two flat washers (14), and lid (15) from contact arm assembly cover (16). Discard lock-washers.</p> <p>h. Remove two screws (17), two lock-washers (18), and two flat washers (19) securing contact arm assembly cover (16) to brush block (23). Discard lockwashers.</p> <p>i. Remove two screws (20), two lock-washers (21), two flat washers (22), and contact arm assembly cover (16) from brush block (23). Discard lock-washers.</p>	

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
14	QUARTERLY	Brush Block Assembly - Continued	 <p data-bbox="771 871 1250 1144">j. Manually traverse cab until cab electrical contact arm assembly (brush blocks) to be cleaned is located at rear of vehicle. This assures that brushes are clear of slip ring segment board and provides access to arm assembly. When brush block is located at the rear of vehicle, segment board will be accessible at position where cover was removed.</p> <div data-bbox="873 1165 1153 1239" style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>WARNING</b></p> </div> <p data-bbox="803 1249 1234 1732">Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause <b>SERIOUS INJURY</b>. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (ref FM 4-25.11).</p> <p data-bbox="771 1732 1234 1837">k. Using dry-cleaning solvent (item 75, Appx C), clean contact arm assembly (brush blocks). Allow surfaces to dry before installing shields.</p>	

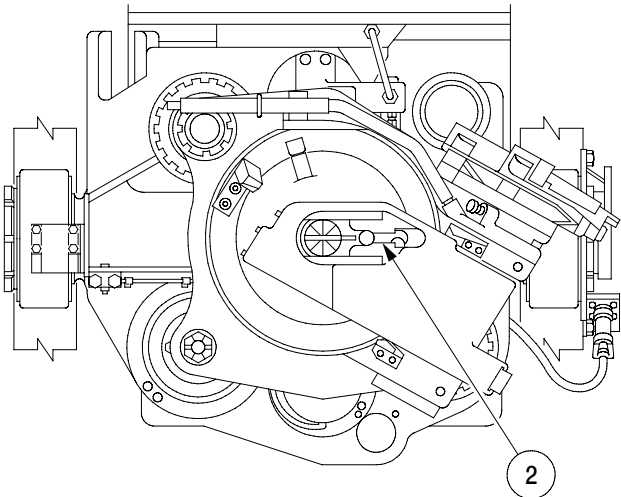
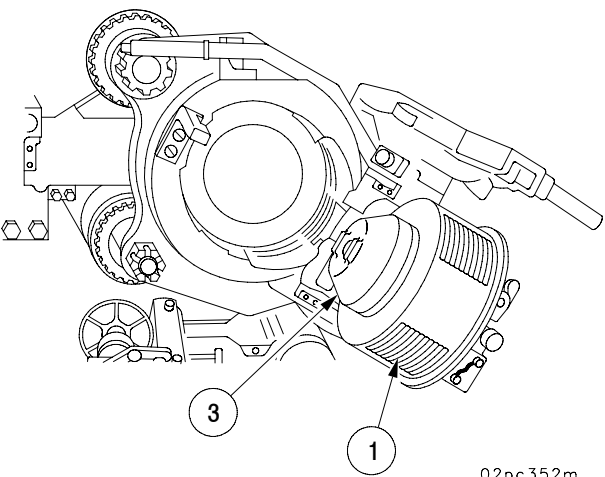
**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
15	QUARTERLY	Crew Seats	<p>Inspect seatbelt (1), backrest (2), seat (3), and footrest straps (4) for deterioration. Ensure seatbelt (1) mounting brackets are securely attached, and buckle/end plate engages securely. Open and restore backrest (2), seat (3), and footrest (5). Check for binding, loose, or missing mounting hardware.</p>  <p style="text-align: right;">09pc001m</p>	
16	QUARTERLY	COS Seat and Footrest	<p>Inspect seatbelt (1), seat cushion (2), and backrest pad (3) for deterioration. Ensure seatbelt (1) buckle and end plate engage securely. Ensure seat adjustment levers (4 and 5) securely lock seat in all positions. Ensure seat backrest/stand (6) folds and unfolds without binding. Check footrest (7) in all positions for free rotation and locking. Check for loose, missing, or broken mounting hardware.</p>  <p style="text-align: right;">07pc019m</p>	



**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

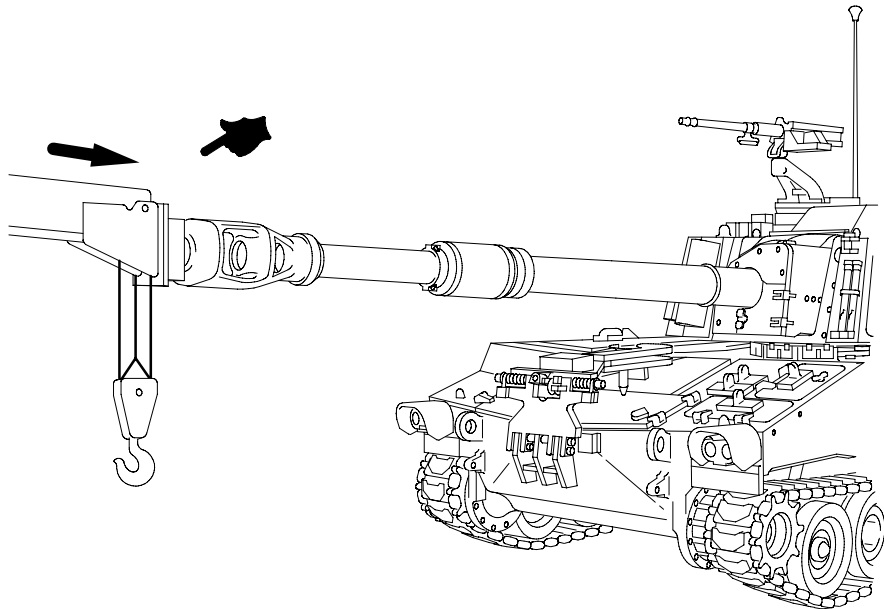
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
17	QUARTERLY	Breech Assembly	<p><u>Breechblock (1)</u>: Check for cracks, ruined/damaged locking threads and ease/smoothness of operation.</p> <p><u>Firing Block Assembly (2)</u>: Check for rust, deterioration of firing pin, and condition of firing block.</p> <p><u>Obturator (3)</u>: Check for correct alignment of front and rear split rings, and corrosion/deterioration/pitting of rings/assembly.</p>	Breechblock is cracked, has damaged threads, rusted firing block, fouled firing pin, corroded rings, or split rings not aligned.

02pc352m

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

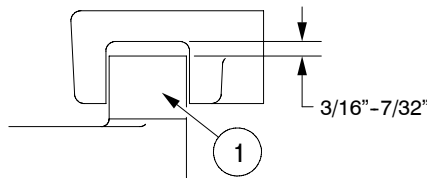
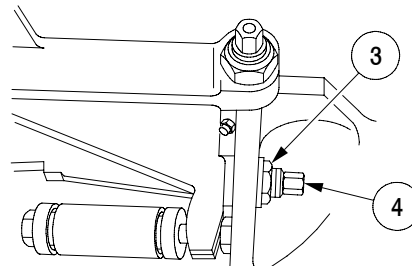
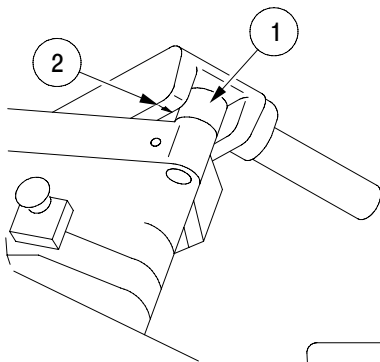
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
18	QUARTERLY	Breech Operating Cam	<p>Requires check and adjustment when torque key is checked or replaced (para 4-6).</p> <p>Check cam for ease of rolling and for flat spots. Check and adjust operating cam and roller as follows:</p> <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p><b>CAUTION</b></p> </div> <p>Operators should be in both vehicles to keep brakes fully applied to prevent movement of either vehicle while tube is being pushed out of battery.</p> <ol style="list-style-type: none"> <li>a. Back a wrecker in front of howitzer with wrecker boom aligned with cannon tube.</li> </ol> <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p><b>NOTE</b></p> </div> <p>Information on fabrication of bracket installed on the wrecker boom is found in Appx D.</p> <ol style="list-style-type: none"> <li>b. Elevate cannon tube to mate with exercising bracket.</li> <li>c. Step deleted.</li> </ol>	Breech cam cannot be adjusted.



02pc357m

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

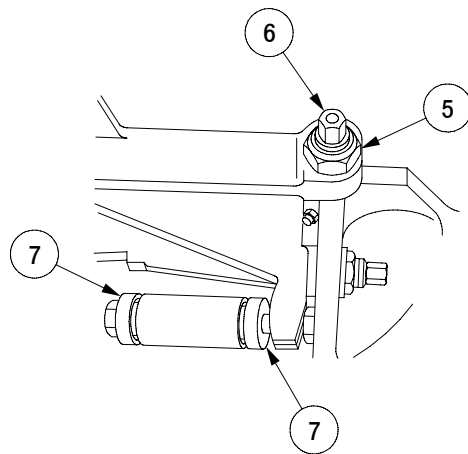
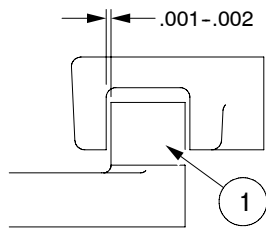
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
18	QUARTERLY	Breech Operating Cam - Continued	<div style="border: 2px solid black; padding: 5px; text-align: center; margin-bottom: 10px;"><b>WARNING</b></div> <p>When working on mount and cannon breech components with cannon pushed out of battery, block cannon with suitable blocking, or chain tube to hull to prevent accidental elevation of cannon resulting in injury to personnel or damage to equipment.</p> <p>d. Use boom to push tube slowly out of battery until breechblock opening roller (1) is positioned opposite arrow on bottom of breech mechanism operation cam (2).</p> <p>e. Measure clearance between top of roller (1) and top of cam path. Clearance must be at least 3/16 inch (4.8 mm), but not more than 7/32 inch (5.6 mm). If not, proceed to step f.</p> <p>f. Loosen locknut (3) and rotate operating cam stop (4) clockwise to increase clearance, or counterclockwise to decrease clearance. When you get the correct clearance, hold operating cam stop (4) with a wrench and tighten locknut (3).</p>	



02pc365m

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

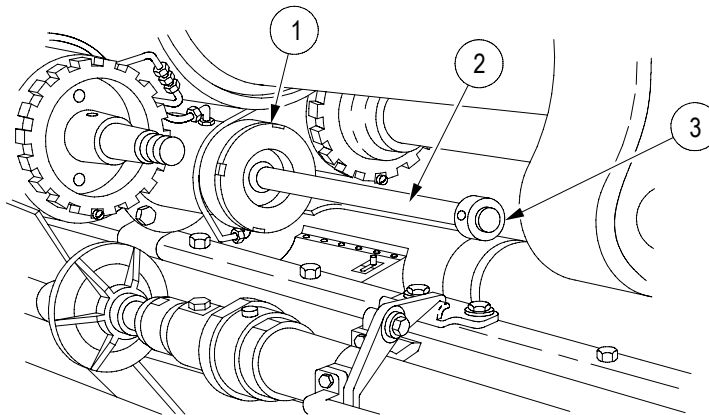
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
18	QUARTERLY	Breech Operating Cam - Continued	<p>g. Using thickness gage, measure clearance between opening roller (1) and cam path at arrow. Clearance should be at least 0.001 inch (0.025 mm), but not more than 0.002 inch (0.050 mm). If not, proceed to step h.</p> <p>h. Loosen locknut (5) and rotate hinge pin (6) clockwise to increase clearance or counterclockwise to decrease clearance. When you get the correct clearance, hold hinge pin (6) with wrench and tighten locknut (5).</p> <p>i. Adjust distance between spring cap ends (7) to 4 inches (101 mm) for correct cam tension.</p> <p>j. Prior to returning tube to battery, perform buffer inspection.</p>	



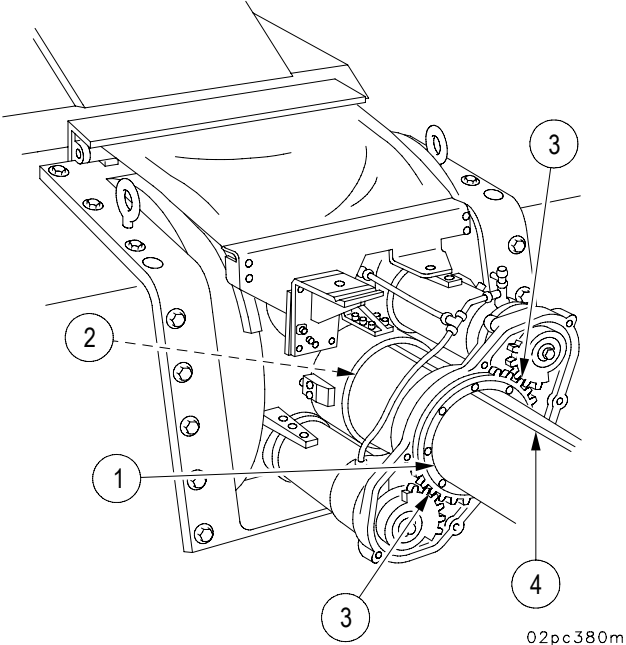
02pc368m

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
19	QUARTERLY	Buffer Counter Recoil Assembly	<p>a. Inspect counter recoil buffer (1) for leaks.</p> <div style="border: 2px solid black; padding: 5px; text-align: center; margin: 10px 0;"> <p><b>CAUTION</b></p> </div> <p>If buffer rod does not extend when cannon tube is pushed out of battery, inspect forward section of buffer rod for paint or foreign matter.</p> <p>b. Inspect buffer piston rod (2) for:</p> <ul style="list-style-type: none"> <li>(1) Extension of approximately 13 inches (33 cm).</li> <li>(2) Spring tension: Attempt to push rod in. If rod can be pushed in easily, buffer is defective.</li> <li>(3) Scratches, gouges, and other defects.</li> </ul> <p>c. Inspect piston rod bumper (3) for damage or deterioration.</p> <p>d. If buffer is damaged or bumper deteriorated, notify support maintenance.</p> <p>e. Slowly return the cannon tube to battery.</p> <p>f. Step deleted.</p>	

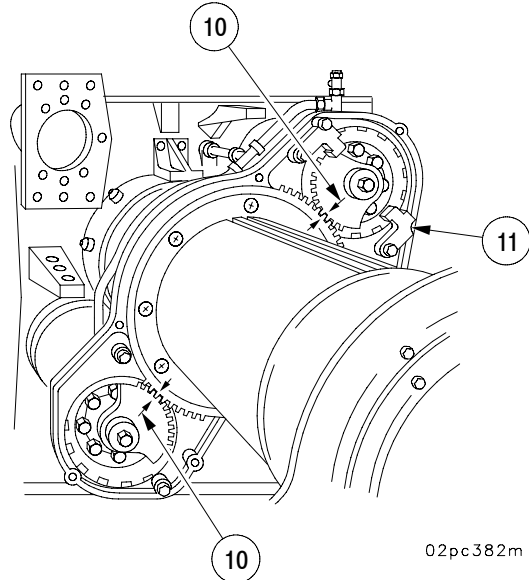
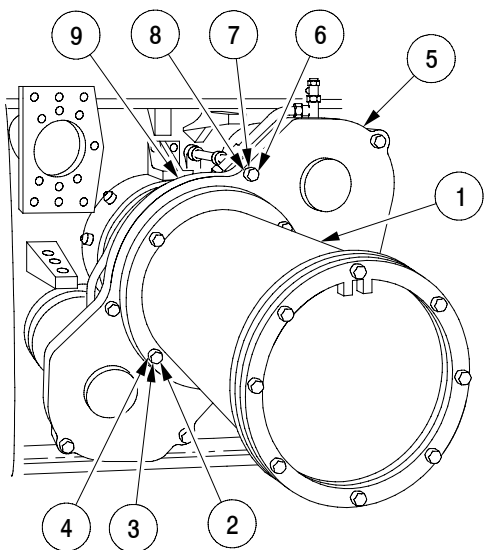


**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
20	SEMI-ANNUALLY	Variable Recoil Housing	<p>Remove dust cover, dust shield retainers (para 4-10), and variable recoil cover (para 4-11). Check operation of variable recoil mechanism (1). Examine dust shield seals (2) for tears and remove excess grease and dirt. Check for dirt, water, and rust on gears (3) and torque key grooves (4). Lube with GMD or GGP. Replace covers and retainers.</p> <p style="text-align: center;"><b>NOTE</b></p> <p>For sustained operation at 0° temperature or below, change grease to GAA.</p> <div style="text-align: center;">  <p>02pc380m</p> </div> <p style="text-align: center;"><b>NOTE</b></p> <p>Gun mount ballistic shield removed for clarity.</p>	

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

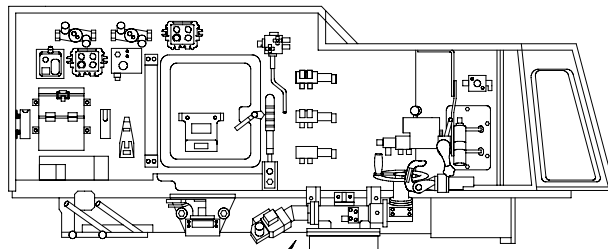
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
21	SEMI-ANNUALLY	Variable Recoil	<p>Inspect and service as follows:</p> <ol style="list-style-type: none"> <li>Remove ballistic shield front cover (para 4-12).</li> <li>Remove dust shield (1) by removing four screws (2), four lockwashers (3), and four flat washers (4). Discard lockwashers.</li> <li>Remove variable recoil housing (5) by removing six screws (6), six lockwashers (7), six flat washers (8), and gasket (9). Discard lockwashers and gasket.</li> <li>Elevate cannon to check operation of variable recoil components.</li> <li>By 750 mils, index arrows (10) should begin to separate.</li> <li>Check for dirt/water accumulation and rust on recoil gears and torque key groove (11).</li> <li>Lubricate per TM 9-2350-314-10.</li> </ol>	Arrows do not separate, notify support maintenance for repair.
21.1	SEMI-ANNUALLY	Variable Recoil	<p>If your howitzer has been in a non-firing status for more than 180 days the recoil must be exercised using the information in TB 9-1000-234-13 or by using the Recoil Exerciser Kit NSN 1015-01-410-8087 P/N 12940961.</p>	



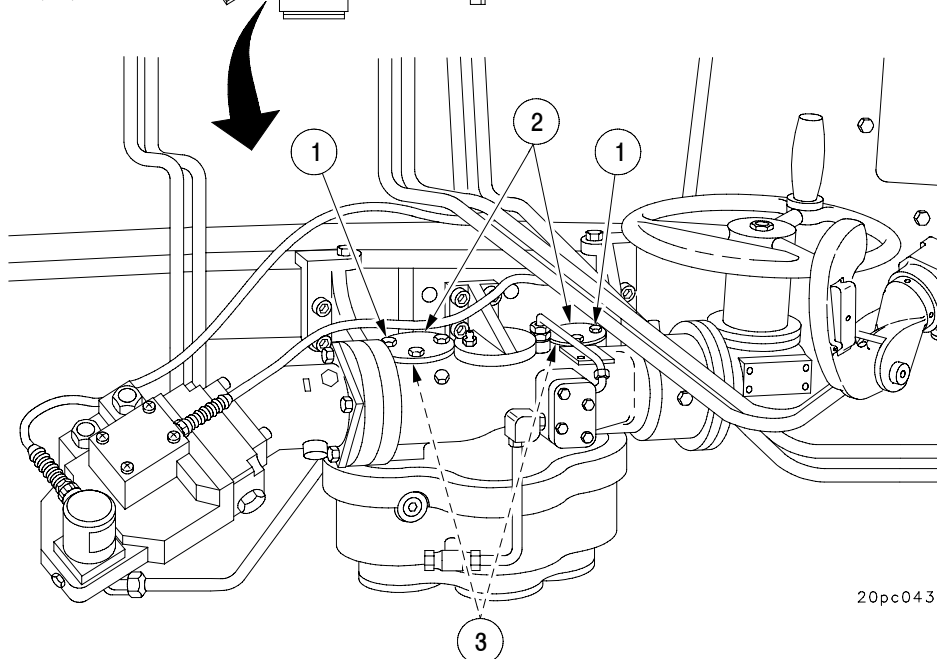
02pc382m

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
22	ANNUALLY	Decals, Instruction Plates, Stencil Markings, and Paint	a. Refer to TM 9-2350-314-10 for stencil locations. b. Replace decals and instruction plates (para 2-8). c. Restencil markings which are not legible (para 2-7).	
23	ANNUALLY	Cab Traversing Ring Gear and Traversing Mechanism Output Drive Gear	<div style="border: 2px solid black; padding: 5px; text-align: center; margin-bottom: 10px;"><b>CAUTION</b></div> Don't overlube. Too much lubricant will drip out onto slip ring segments and brush holders, causing electrical failure.  Remove six screws (1), two cover plates (2), and two gaskets (3). If lubricant is contaminated (black or gritty), clean and coat sparingly with GAA. Reinstall new gaskets, plates, and screws.	



INTERIOR LEFT CAB WALL



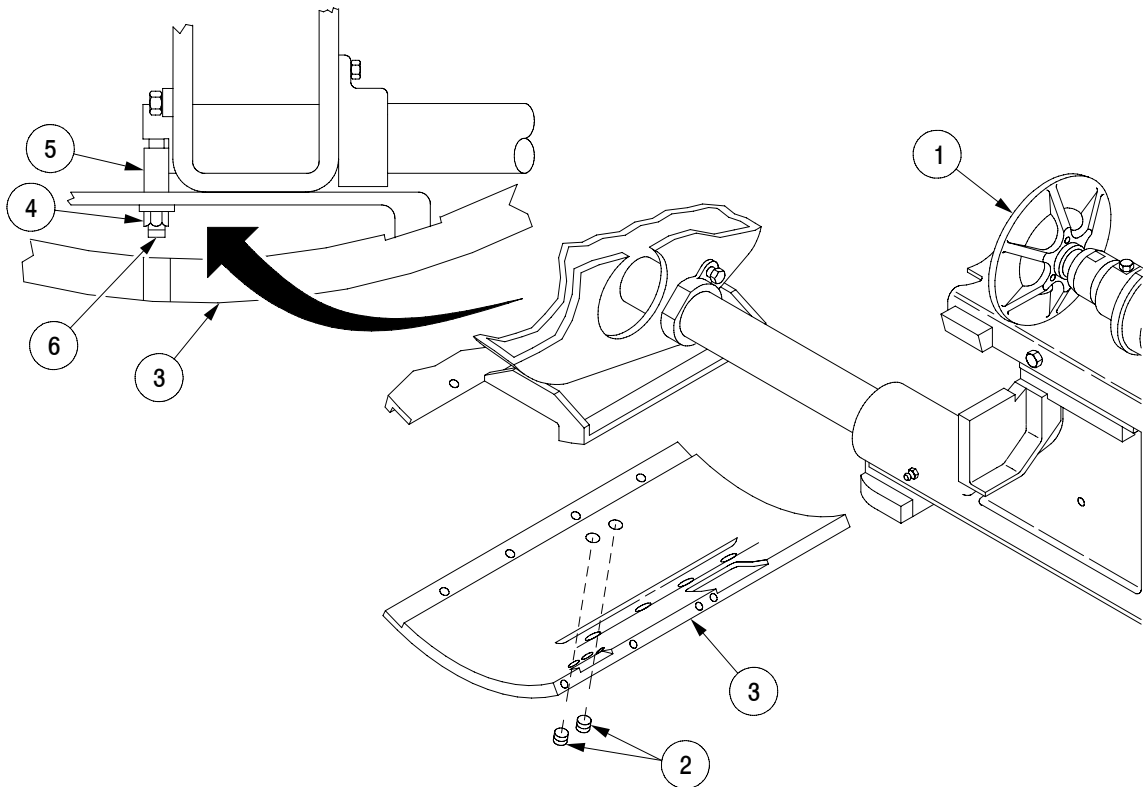
**NOTE**  
Step plate removed for clarity.

20pc043m



**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

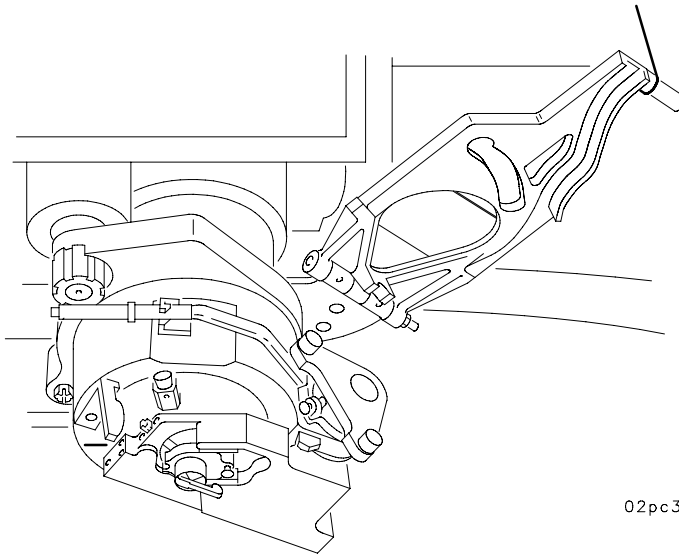
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
24	500 ACTUAL ROUNDS	Rammer	<p style="text-align: center;"><b>NOTE</b></p> <p>The following lubrications are not based on any calendar period. They are to be performed when indicated.</p> <ol style="list-style-type: none"> <li>a. Actuate rammer (1) into gun tube. If rammer (1) is not centered in gun tube, then rammer must be adjusted.</li> <li>b. Remove two plugs (2) from lower gun shield (3).</li> <li>c. Loosen two jam nuts (4) from rammer positioning block (5).</li> <li>d. Adjust two setscrews (6) until rammer (1) is centered in cannon.</li> <li>e. Hold setscrews (6) while tightening jam nuts (4).</li> </ol>	



04pc036m

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
25	750 ROUNDS	Breech Assembly	<p>Replace the following parts after 750 rounds (this is actual rounds, not EFC):</p> <p>Handle Assembly:                      Clutch 8765139                      Spring pin MS16562-133                      Spring pin MS39086-229</p> <p>Housing Assembly:                      Extractor 11578080                      Spring pin MS171572</p> <p>Block Assembly:                      Follower assembly 11580153                      Spring pin MS16562-129                      Retaining clip 11580634</p> <p>Carrier Assembly:                      Detent plunger 11577203                      Spring 7229627                      Spring pin MS39086-173                      Plunger (gear rack) 11578346                      Spring MS24585-1063</p>	



02pc383m

**Table 2-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF-PROPELLED HOWITZER - CONTINUED**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
26	1,000 ACTUAL ROUNDS	Torque Key and Gun Tube Keyway	<p style="text-align: center;"><b>NOTE</b></p> <p>Do not mix grease. If changing between GGP, GMD, and GAA, wipe key and keyway clean before using new grease.</p> <p>After firing 1,000 actual rounds, notify direct support maintenance.</p> <p style="text-align: center;"><b>NOTE</b></p> <p>Gun mount ballistic shield removed for clarity.</p>	

TORQUE KEY AND GUN TUBE KEYWAY

02pc393m



## CHAPTER 3 TROUBLESHOOTING

### 3-1 GENERAL.

This chapter presents information needed to correct equipment malfunctions of the M109A6 howitzer at the unit maintenance level.

#### 3-1.1 Initial Setup.

Before starting any troubleshooting, refer to TM 9-2350-314-10. Make sure that the gun tube is clear and no primer is installed in the firing mechanism. Park the vehicle on a level surface. If the troubleshooting requires movement of the gun tube and traversing the cab, park the vehicle in an area to allow for enough clearance for these movements and that a ground guide is posted when required. Ensure transmission is in NEUTRAL and the parking brake is set and blocks placed in front and rear of the tracks. Each troubleshooting tree will indicate the requirements needed to support that particular task, i.e. engine running, position of the MASTER and other LRUs and component switches during the troubleshooting procedures. Tools, materials/parts, and any conditions necessary to complete a troubleshooting task will be listed at the beginning of each troubleshooting tree. Several AFCS/PDFCS troubleshooting tasks will require the use of the Paladin's "SOLDIERS PORTABLE ON-SYSTEM REPAIR TOOL" (SPORT) or the "MAINTENANCE SUPPORT DEVICE" (MSD), with a Digital Multimeter (DMM) PCMCIA card installed.

The following accessory kits are available when performing AFCS/PDFCS Troubleshooting Tasks. Refer to the applicable TB or PN listed below when performing troubleshooting:

#### NOTE

- All AFCSs or PDFCSs with version 11 software need to be upgraded to version 7 or 7P.
- Refer to the CD label for the compatible version of troubleshooting software.

#### SPORT Accessory Kit

#### AFCS Troubleshooting Software

TB 9-2350-314-20-2-1, Version 7

13021661-1, Version 2

#### MSD Accessory Kit

#### PDFCS Troubleshooting Software

TB 9-2350-314-20-2-2, Version 7P

13021662-1, Version 2P

When these components are required, the applicable TB or CD PN will be listed with the Fault Symptoms for that system/component and in the "Initial Setup" at the beginning of each task. Remember, troubleshooting should always be performed with common sense and with two personnel. Adhere to all Notes, Cautions and Warnings and other safety guidelines while performing the task.

#### 3-1.2 Contents of Quick Guide to Troubleshooting.

The troubleshooting chapter begins with a QUICK GUIDE TO TROUBLESHOOTING WITH FAULT SUMMARY INDEX FOR AFCS PDIU and PDFCS PDI MAINTENANCE MODE. The QUICK GUIDE lists the items to check, possible symptoms with each item, the PDIU/PDI message (if any), and directions to a paragraph where a corrective action for the problem can be found. AFCS PDIU and PDFCS PDI diagnostic test (TM 9-2350-314-10) should be completed before troubleshooting. If the PDIU/PDI displays a fault summary, use the FAULT SUMMARY INDEX as your primary guide to proper troubleshooting. If there is no fault summary displayed, use the QUICK GUIDE TO TROUBLESHOOTING.

### 3-2 QUICK GUIDE TO TROUBLESHOOTING.

This chapter contains troubleshooting, test, and repair information for repairing the howitzer. In the troubleshooting procedures, circuit and block diagrams are given as reference guides. Make sure the problem is real; be sure electrical and/or hydraulic power is on when needed.

**WARNING**

Remove all jewelry and wristwatches before working on electrical circuits. Electrical arcing or shock could occur causing injury to personnel.

#### NOTE

When the hydraulic system is used the engine must be running with the idle speed set between 1000 and 1200 RPMs.

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

##### 3-2.1 AFCS Fault Summary Index.

This index provides cross-references between PDIU fault message codes and the Quick Guide to Troubleshooting. When the PDIU displays a fault code on the DU, find the appropriate troubleshooting tree by looking up the fault code in the FAULT SUMMARY INDEX and turning to the paragraph listed after it.

<u>CODE</u>	<u>PDIU FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
001	P2 EQUILIBRATION SYSTEM...EQA, ELHP, ELTRUN	3-99	3-3.d(1)	A
002	P2 EQUILIBRATION SYSTEM...EQMANIFOLD	18-129	18-32	
003	P2 EQUILIBRATION SYSTEM...EQA, EQHP, EQACC	3-99	3-3.d(1)	A
004	P2 EQUILIBRATION SYSTEM...EQA, EQMANIFOLD	3-99	3-3.d(1)	A
005	P2 EQUILIBRATION SYSTEM...EQMANIFOLD	18-129	18-32	
006	P1 EQUILIBRATION SYSTEM...EQACC	3-99	3-3.d(1)	H
007	P1 AUTO WPN CTRL...ACU, AZ/EL TACHS, CBLS	3-68.1	3-3.a(17)	A
008	P3 GUN SERVO LAMP...ACU, DU, W1A	3-68.1	3-3.a(17)	A
009	P1 AUTO WEAPON CONTROL...ELSV		Notify DS	
010	P1 AUTO WEAPON CONTROL...TRSV		Notify DS	
011	P2 AUTO WEAPON CONTROL...ELSV, TRSV		Notify DS	
012	P1 AUTO ELEVATION WPN CTRL...ACU	8-40	8-14	
013	P1 AUTO ELEVATION WPN CTRL...ACU	8-40	8-14	
014	P3 PDIU SYSTEM TEST...ACU, PDIU, W65	3-315	3-3.n(18)	A
015	P2 AUTO ELEVATION WPN CTRL...ELSV		Notify DS	
016	P2 AUTO ELEVATION WPN CTRL...ACU	8-40	8-14	
017	P2 AUTO ELEVATION WPN CTRL...ACU	8-40	8-14	
018	P2 AUTO ELEVATION WPN CTRL...ELSV		Notify DS	
019	P1 AUTO WEAPON CONTROL...ELSV		Notify DS	
020	P1 AUTO WEAPON CONTROL...ELSV		Notify DS	
021	P1 AUTO WPN CTRL...ACU, MSL, MSV, W7, W64, W52	3-68.1	3-3.a(17)	A
022	P1 AUTO TRAVERSE WEAPON CTRL...ACU	8-40	8-14	
023	P1 AUTO TRAVERSE WEAPON CTRL...TRSV		Notify DS	
024	P2 AUTO TRAVERSE WEAPON CTRL...TRSV		Notify DS	
025	P2 AUTO TRAVERSE CONTROL...ACU	8-40	8-14	
026	P2 AUTO TRAVERSE CONTROL...ACU	8-40	8-14	
027	P2 AUTO TRAVERSE WEAPON CTRL...TRSV		Notify DS	
028	P2 AUTO TRAVERSE WEAPON CTRL...TRSV		Notify DS	
029	P1 AUTO WEAPON CONTROL...ELSV		Notify DS	
030	P1 AUTO WEAPON CONTROL...AZTACH, ACU, W7	3-34	3-3.a(6)	A
031	P3 PDIU SYSTEM TEST...ACU, PDIU, W65	3-315	3-3.n(18)	A
032	P1 AUTO WEAPON CONTROL...ACU, ELTACH, W7	3-34	3-3.a(6)	A
033	P3 PDIU SYSTEM TEST...ACU, PDIU, W65	3-315	3-3.n(18)	A

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<u>CODE</u>	<u>PDIU FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
034	P2 PDIU SYSTEM TEST...FLOM, W51, W65, PDIU	3-141	3-3.f(4)	A
035	P2 HYDRAULIC WARMUP SYSTEM...WTV, WTSL, W52	3-171	3-3.g(2)	A
036	P2 HYD WARMUP SYSTEM...WTSW, W52, W64, HCB	3-177	3-3.g(5)	A
037	P3 HYDRAULIC FILTERS...FILA, PDIU, W51, W65	3-142	3-3.f(5)	B
038	P3 HCB LAMPS...HCB, W64, W52	3-169	3-3.g(1)	A
039	P2 HYD POWER...HCB, OLSN, HYPR, HYM, PDIU, CBLS	3-164	3-3.f(11)	A
040	P2 HYDRAULIC POWER...HYPR	5-10	5-5	
041	P2 PDIU SYSTEM TEST...W51, W65, PDIU	3-164	3-3.f(11)	A
042	P2 PDIU SYSTEM TEST...W51	5-138	5-36	
043	P2 PDIU SYSTEM TEST...W65	5-52	5-17	
044	P2 PDIU SYSTEM TEST...PDIU	3-145	3-3.f(6)	A
045	P2 PDIU SYSTEM TEST...W51, W65, PDIU	3-164	3-3.f(11)	A
046	P2 PDIU SYSTEM TEST...W65, PDIU	3-164	3-3.f(11)	B
047	P2 PDIU SYSTEM TEST...W65	5-52	5-17	
048	P2 PDIU SYSTEM TEST...PDIU	3-164	3-3.f(11)	A
049	P2 PDIU SYSTEM TEST...TSN, W51, W65, PDIU	3-145	3-3.f(6)	A
050	P2 PDIU SYSTEM TEST...TSN	5-58	5-19	
051	P2 PDIU SYSTEM TEST...PDIU	3-145	3-3.f(6)	A
052	P2 PDIU SYSTEM TEST...W51	5-138	5-36	
053	P2 PDIU SYSTEM TEST...W65	5-52	5-17	
054	P2 PDIU SYSTEM TEST...PXDCR, W51, W65, PDIU	3-147	3-3.f(7)	A
055	P2 PDIU SYSTEM TEST...PXDCR	18-54	18-13	
056	P2 PDIU SYSTEM TEST...PDIU	3-147	3-3.f(7)	A
057	P2 PDIU SYSTEM TEST...W51	5-138	5-36	
058	P2 PDIU SYSTEM TEST...W65	5-52	5-17	
059	P2 PDIU SYSTEM TEST...PXDCR	18-54	18-13	
060	P3 PDIU SYSTEM TEST...HCB, W65, PDIU	3-315	3-3.n(18)	A
061	P1 HYDRAULIC POWER...BB2, HCB, W64	3-150	3-3.f(9)	A
062	P2 PDIU SYSTEM TEST...W51, W65, PDIU	3-164	3-3.f(11)	A
063	P1 HYDRAULIC POWER...OLSN, HCB, W64, W52	3-150	3-3.f(9)	A
064	P1 HYDRAULIC POWER...HYM, W54	3-150	3-3.f(9)	T
065	P1 HYDRAULIC POWER PACK...HYM		Notify DS	
066	P1 HYD PWR...HYPR, CRSH, BB6, BB7, W53, W54, W55	3-150	3-3.f(9)	L
067	P1 POWER...W59, FLUSN, HYDRAULIC LEAKAGE	3-150	3-3.f(9)	Q
068	P1 HYD POWER...CLASS III LEAKAGE	18-3	18-1	

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<u>CODE</u>	<u>PDIU FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
069	P1 HYD POWER...LOW HYDRAULIC FLUID	18-3	18-1	
070	P1 HYD POWER...W59, FLUSN	3-150	3-3.f(9)	Q
071	P1 HYDRAULIC POWER PACK...HYM, HYP		Notify DS	
072	P1 HYD PWR...HYPR, OLSN, HYM, CRSH, BB6, BB7, CBLS	3-164	3-3.f(11)	A
073	P1 HYD POWER...HULL CHARGING SYSTEM		See Hull 20-1 TM	
074	P2 PDIU SYSTEM TEST...PXDCR, W51, W65, PDIU	3-147	3-3.f(7)	A
075	P2 HYDRAULIC POWER...HYP AND FILA	18-54	18-13	
076	P3 PDIU SYSTEM TEST...TSN, W51, W65, PDIU	3-145	3-3.f(6)	C
077	P1 HYDRAULIC WARMUP SYSTEM...HCB, W52, W64	3-174	3-3.g(4)	A
078	P1 HYDRAULIC WARMUP SYSTEM...HCB, W64	3-174	3-3.g(4)	A
079	P1 HYDRAULIC WARMUP SYSTEM...W52	5-134	5-35	
080	P1 HYDRAULIC WARMUP SYSTEM...WTSL, WTV		Notify DS	
081	P2 HYDRAULIC POWER...FILA	18-54	18-13	
082	P2 HYD FILTER...FILA, SFIL, RFIL, PDIU, W51, W65	3-142	3-3.f(5)	B
083	P2 HYD FILTER...FILA, SFIL	18-54	18-13	
084	P2 HYD FILTER...RFIL, FILA	18-54	18-13	
085	P2 HYD FILTER...W51, W65, PDIU, FILA	3-143	3-3.f(5)	C
086	P3 PDIU SYSTEM TEST...W51, W65, PDIU	3-164	3-3.f(11)	A
087	P3 PDIU SYSTEM TEST...W51, W65, PDIU	3-164	3-3.f(11)	A
088	P3 HCB LAMPS...HCB	5-62	5-20	
089	P2 HYDRAULIC COOLING...CFN, W53, W55	3-126	3-3.e(2)	N
090	P2 HYDRAULIC COOLING...HCB, W64, W52	3-120	3-3.e(2)	B
091	P2 HYDRAULIC COOLING...CTSW, HCB, W64, W52	3-120	3-3.e(2)	A
092	P3 HCB LAMPS...HCB	3-118	3-3.e(1)	B
093	P2 HYDRAULIC COOLING...HCB	3-120	3-3.e(2)	A
094	P3 HYD COOLING...CTSW, HCB, PDIU, W52, W64, W65	3-120 3-145	3-3.e(2) 3-3.f(6)	A
095	P3 HYD COOLING...CTSW	5-58	5-19	
096	P3 HYD COOLING...HCB, W64	3-145	3-3.f(6)	A
097	P3 HYD COOLING...PDIU	3-120	3-3.e(2)	A
098	P3 HYD COOLING...PDIU	3-145	3-3.f(6)	A
099	P3 HYD COOLING...W52	5-134	5-35	
101	P3 HYD COOLING...W65	5-52	5-17	
102	P3 HYD COOLING...W65	5-52	5-17	
103	P3 PDIU SYSTEM TEST...W51, W65, PDIU	3-315	3-3.n(18)	A
104	P3 PDIU SYSTEM TEST...HCB, W65, PDIU	3-315	3-3.n(18)	A



### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<u>CODE</u>	<u>PDIU FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
105	P1 HYDRAULIC POWER PACK...HYM, HYP		Notify DS	
106	P2 TRAVERSE CONTROL...TRDM		Notify DS	
107	P3 TRAVERSE CONTROL...CLSL, CLV	3-250.2	3-3.l(3)	H
108	P2 TRAVERSE CONTROL...TRDM OR TRAV GEAR		Notify DS	
109	P2 COS TRAVERSE CONTROL...HCB, W64, W65, PDIU	3-250.2	3-3.l(2)	G
110	P2 COS TRAVERSE CONTROL...HCB	5-78	5-21	
111	P2 COS TRAVERSE CONTROL...W64	5-122	5-31	
112	PS COS TRAVERSE CONTROL...W65	5-52	5-17	
113	P2 COS TRAVERSE CONTROL...PDIU	3-136	3-3.f(2)	A
114	P3 TRAVERSE CONTROL...HCB, W64, W65, PDIU	3-247	3-3.l(3)	E
115	P3 TRAVERSE CONTROL...HCB	5-78	5-21	
116	P3 TRAVERSE CONTROL...W64	5-122	5-31	
117	P3 TRAVERSE CONTROL...W65	5-52	5-17	
118	P3 TRAVERSE CONTROL...PDIU	3-139	3-3.f(3)	A
119	P2 COS TRAVERSE CONTROL...COSCH	18-126	18-31	
120	P1 TRAVERSE CONTROL...TRLSW, W64, HCB	3-266	3-3.l(9)	A
121	P2 COS TRAVERSE CONTROL...TRSL, TRV	18-166	18-45	
122	P1 TRAVERSE CONTROL...HCB	3-250.2	3-3.l(3)	G
123	P3 PDIU SYSTEM TEST...HCB, W65, PDIU	3-315	3-3.n(18)	A
124	P3 TRAV CTRL...HCB, W64, CLSL, CLV, TRDM, VLF	3-250.2	3-3.l(3)	G
125	P3 TRAV CTRL...CLV	18-129	18-32	
126	P3 TRAV CTRL...CLUTCH VELOCITY FUSE	18-71	18-15	
127	P3 TRAV CTRL...TRDM		Notify DS	
128	P3 TRAV CTRL...HCB, W64, CLSL	3-250.2	3-3.l(3)	G
129	P2 GUNNER TRAVERSE CONTROL...HCB	3-269	3-3.l(10)	G
130	P2 GUNNER TRAVERSE CONTROL...GCH	18-126	18-31	
131	P3 PDIU SYSTEM TEST...HCB, W65, PDIU	3-315	3-3.n(18)	A
132	P2 TRAVERSE LIMIT SYS...HCB, W64, TRLSL, TRLV	3-273	3-3.l(11)	B
133	P2 TRAVERSE LIMIT SYSTEM...HCB, W64, TRLSW	3-273	3-3.l(11)	D
134	P3 HCB LAMPS...HCB	3-186	3-3.i(1)	A
135	P1 TRAVERSE CONTROL...BPV, BPSL, W64, HCB	3-253	3-3.l(5)	C
136	P3 TRAVERSE CONTROL...BPV, BPSL		Notify DS	
137	P2 COS TRAVERSE CONTROL...COSCH	18-126	18-31	
138	P2 GUNNER TRAVERSE CONTROL...GCH	18-126	18-31	
139	P1 AUTO WPN CTRL...AZTACH, W7, PDCU, W65, PDIU	3-68.1	3-3.a(17)	A
140	P2 GNR TRAV CONTROL...TRSL, TRV, W64, HCB, VLF	3-269	3-3.l(10)	C
141	P1 TRAVERSE CONTROL...TRDM OR TRAV GEAR		Notify DS	

**3-3. TROUBLESHOOTING CHART - CONTINUED**

**3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED**

<b>CODE</b>	<b>PDIU FAULT SUMMARY SCREEN MESSAGE</b>	<b>PAGE</b>	<b>PARAGRAPH</b>	<b>STEP</b>
142	P2 COS ELEVATION CTRL...HCB, W64, W65, PDIU	3-107	3-3.d(3)	E
143	P2 COS ELEVATION CTRL...HCB	5-78	5-21	
144	P2 COS ELEVATION CTRL...W64	5-122	5-31	
145	P2 COS ELEVATION CTRL...W65	5-52	5-17	
146	P2 COS ELEVATION CTRL...PDIU	3-106.1	3-3.d(3)	C
147	P3 PDIU SYSTEM TEST...HCB, W65, PDIU	3-315	3-3.n(18)	A
148	P2 COS ELEVATION CONTROL...COSCH	18-126	18-31	
149	P1 HANDLE CONTROLS...MSL, MSV, PDCU, CBLS	3-103	3-3.d(2)	E
150	P2 TRAVERSE CONTROL...TRL SL, TRLV	18-160	18-43	
151	P1 AUTO WPN CTRL...ELTACH, W7, PDCU, W65, PDIU	3-68.1	3-3.a(17)	A
152	P2 COS ELEVATION CONTROL...ELSL, ELV	18-154	18-41	
153	P1 ELEVATION CONTROL...EQA, EQMANIFOLD	3-99	3-3.d(1)	A
154	P2 GNR ELEVATION CTRL...ELSL, ELV, W64, HCB	3-108	3-3.d(4)	A
155	P2 GUNNER ELEVATION CONTROL...HCB	3-108	3-3.d(4)	C
156	P2 GUNNER ELEVATION CONTROL...GCH	18-126	18-31	
157	P2 COS CONTROL...COSCH VLF	18-71	18-15	
158	P2 ELEVATION CONTROL...EQA		Notify DS	
167	P3 HYD WARMUP SYSTEM...WTSW, HCB, W52, W64	3-172	3-3.g(3)	A
168	P3 HYD WARMUP SYSTEM...WTSW	5-58	5-19	
169	P3 HYD WARMUP SYSTEM...HCB, W64	3-172	3-3.g(3)	A
170	P3 HYD WARMUP SYSTEM...W52	5-134	5-35	
171	P3 HCB LAMPS...HCB	3-171	3-3.g(1)	A
172	P3 HYD COOLING...HCB, PDIU, W51, W52, W64, W65	3-26 3-145	3-3.a(2) 3-3.f(6)	A
173	P3 HYD COOLING...HCB, W64	3-120	3-3.e(2)	A
174	P3 HYD COOLING...PDIU	8-52	8-19	
175	P3 HYD COOLING...PDIU	3-145	3-3.f(6)	A
176	P3 HYD COOLING...W51	5-138	5-36	
177	P3 HYD COOLING...W52	5-134	5-35	
179	P3 HYD COOLING...W65	5-52	5-17	
180	P3 HYD COOLING...W65	5-52	5-17	
181	P2 PDIU SYSTEM TEST...TSN, W51, W65, PDIU	3-145 3-315	3-3.f(6) 3-3.n(18)	A
182	P2 PDIU SYSTEM TEST...PXDCR, W51, W65, PDIU	3-147 3-315	3-3.f(7) 3-3.n(18)	A
183	P2 TRAVERSE CONTROL...TRDM		Notify DS	
184	P2 TRAVERSE CONTROL...TRDM		Notify DS	

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<u>CODE</u>	<u>PDIU FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
185	P2 TRAVERSE CONTROL...TRLSL, TRLV, GCH, VLF		Fix GCH Fault first & Rerun	
186	P2 TRAVERSE CONTROL...TRLSL, TRLV, COSCH, VLF		Fix COS Fault first & Rerun	
187	P3 PDIU SYS...FLOM, PDIU, PXDCR, TSN, W51, W65	3-141 3-147 3-315 3-320 5-58 8-52	3-3.f(4) 3-3.f(7) 3-3.n(18) 3-3.n(20) 5-19 8-19	A
188	P3 PDIU SYS...FLOM	18-44	18-10	
189	P3 PDIU SYS...PDIU	8-52	8-19	
190	P3 PDIU SYS...PXDCR	18-44	18-10	
191	P3 PDIU SYS...TSN	5-56	5-18	
192	P3 PDIU SYS...W51	5-138	5-36	
193	P3 PDIU SYS...W65	5-52	5-17	
194	P3 TUBE TEMPERATURE...PDCU, TTSN, W7, TTCBL	3-34	3-3.a(6)	A
195	P1 ACU...PDCU	8-40	8-14	
196	P1 AUTO WEAPON CONTROL...PDCU	8-40	8-14	
197	P1 AUTO WEAPON CONTROL...PDCU, ELTACH, W7	3-34	3-3.a(6)	A
198	P1 AUTO WEAPON CONTROL...AZTACH, PDCU, W7	3-34	3-3.a(6)	A
199	P1 AUTO WEAPON CONTROL...PDCU, ELSV, W7	3-34	3-3.a(6)	A
200	P1 AUTO WEAPON CONTROL...PDCU, TRSV, W7	3-34	3-3.a(6)	A
204	P1 COMMO...PCU	8-45	8-16	
205	P1 COMMO...PDCU, PCU, RR, W26, COMMO CABLES	3-53	3-3.a(13)	A
206	P3 PDIU SYSTEM TEST...PCU, PDIU, W65	3-315	3-3.n(18)	A
210	P1 NAV...PDCU, DRU, W17	3-58	3-3.a(16)	G
211	P1 NAV...DRU, PCU, W27	3-58	3-3.a(16)	A
212	P1 NAV...DRU	22-14	22-8	
213	P3 POWER LAMP...DRU	22-14	22-8	
214	P3 BIT LAMP...DRU	22-14	22-8	
215	P3 NAV...PDCU, DRU, SR, VMS, VMSC, VMSH, CABLES	3-58	3-3.a(16)	M
216	P3 NAV...SR, VMSC, W62A, BB2	3-58	3-3.a(16)	K
217	P3 NAV...SR, VMSH, W111A	3-58	3-3.a(16)	O
218	P1 NAV...PDCU	3-58	3-3.a(16)	
219	P3 POWER LAMP...PDCU	3-42	3-3.a(7)	A
220	P3 BIT LAMP...PDCU	3-43	3-3.a(8)	
221	P1 COMMO...PDCU	8-40	8-14	
237	P3 BIT LAMP...DU	3-42	3-3.a(7)	A

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<u>CODE</u>	<u>PDIU FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
238	P3 BIT LAMP...PDIU	3-58	3-3.a(8)	A
239	P3 POWER LAMP...PDIU	3-42	3-3.a(7)	A
242	P3 PDIU SYSM TEST...PCU, PDIU, W65	3-315	3-3.n(18)	A
243	P1 NAV...PCU	8-45	8-16	
244	P3 POWER LAMP...VMSC	3-42	3-3.a(7)	A
245	P3 POWER LAMP...VMSH	3-42	3-3.a(7)	A
246	P3 AUXILIARY POWER...AUXA, AUXB, PCU, W25	3-49	3-3.a(11)	A
247	P3 PDIU SYSTEM...AUXA, AUXB, PCU, PDIU, W25, W65	3-315	3-3.n(18)	A
248	P3 AUXILIARY POWER...AUXA, PCU, W25	3-49	3-3.a(11)	A
249	P3 AUXILIARY POWER...AUXB, PCU, W25	3-49	3-3.a(11)	A
250	P2 VEHICLE POWER...HULL CHARGING SYSTEM		See Hull 20-1-1 TM	
251	P2 VEHICLE POWER...HULL CHARGING SYSTEM		See Hull 20-1-1 TM	
252	P3 PDIU SYSTEM TEST...PCU, PDIU, W65	3-315	3-3.n(18)	A
253	P3 PDIU SYSTEM TEST...PCU, PDIU, W65	3-315	3-3.n(18)	A
254	P2 AUXILIARY POWER...AUXA	8-6	8-3	
255	P2 AUXILIARY POWER...AUXB	8-6	8-3	
256	P2 AUXILIARY POWER...AUXA, PCU, W25	3-49	3-3.a(11)	A
257	P2 AUXILIARY POWER...AUXA AND AUXB	8-6	8-3	
258	P2 AUXILIARY POWER...PCU	8-45	8-16	
259	P2 AUXILIARY POWER...AUXA, AUXB, PCU	3-49	3-3.a(11)	A
260	P3 PDIU SYSTEM TEST...PCU, PDIU, W65	3-58	3-3.a(16)	A
261	P3 POWER...PCU	8-45	8-16	
262	P1 COMMO...PCU, RR, W26	3-55	3-3.a(14)	B
263	P1 COMMO...PCU	8-45	8-16	
264	P1 COMMO...RR		Notify COM- MO Maint	
265	P1 COMMO...W26	21-15	21-7	
266	P3 POWER LAMP...PCU	3-42	3-3.a(7)	A
267	P3 POWER LAMP...PCU	3-42	3-3.a(7)	A
270	P1 NAV...DRU, PCU, W27	3-58	3-3.a(16)	C
271	P1 NAV...DRU	22-14	22-8	
272	P1 NAV...PCU	8-45	8-16	
273	P1 NAV...W27	8-32	8-11	
293	P3 HYD WARMUP SYSTEM...WTSW, HCB, W52, W64	3-172	3-3.g(3)	A
294	P2 PDIU SYSTEM TEST...W65, PDIU	3-145	3-3.f(6)	D
295	P2 PDIU SYSTEM TEST...W51, W65, PDIU	3-145	3-3.f(6)	C

**3-3. TROUBLESHOOTING CHART - CONTINUED**

**3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED**

<b>CODE</b>	<b>PDIU FAULT SUMMARY SCREEN MESSAGE</b>	<b>PAGE</b>	<b>PARAGRAPH</b>	<b>STEP</b>
296	P2 PDIU SYSTEM TEST...W65, PDIU	3-147	3-3.f(7)	B
297	P2 PDIU SYSTEM TEST...W51, W65, PDIU	3-147	3-3.f(7)	A
298	P2 HYDRAULIC...HYP		Notify DS	
299	P3 EQUILIBRATION SYSTEM...EQ CHARGE VALVE	18-47	18-11	
300	MUZZLE VELOCITY SENSOR...MVS		See TM 9-2350-314-10	
301	P3 1553 BUS...MVS, W92, W93A	3-45	3-3.a(9)	K
302	P3 NAV...PLGR, BAT, CBL	3-348	3-3.o(1)	A
303	P3 NAV...PLGR		See TM 11-5825-291-1 3	
304	P3 NAV...PLGR, ANT, CBL		See TM 11-5825-291-1 3	
305	P3 NAV...PLGR, DRU, W17A		See TM 11-5825-291-1 3	
306	P1 ACU...PDCU	8-40	8-14	
307	P3 DISPLAY UNIT...DU	8-40	8-17	

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2.1.1 PDFCS Fault Summary Index.

This index provides cross-references between PDI fault message codes and the Quick Guide to Troubleshooting. When the PDI displays a fault code on the PDU, find the appropriate troubleshooting tree by looking up the fault code in the FAULT SUMMARY INDEX and turning to the paragraph listed after it.

#### NOTE

If AFCS Display Unit (DU) or PDFCS Display Unit (PDU) is installed, screen messages/software relating to PDU will be displayed as DU.

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING

<u>CODE</u>	<u>PDI FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
001	P2 EQUILIBRATION SYSTEM...EQA, ELHP, ELTRUN	3-99	3-3.d(1)	A
002	P2 EQUILIBRATION SYSTEM...EQMANIFOLD	18-129	18-32	
003	P2 EQUILIBRATION SYSTEM...EQA, EQHP, EQACC	3-99	3-3.d(1)	A
004	P2 EQUILIBRATION SYSTEM...EQA, EQMANIFOLD	3-99	3-3.d(1)	A
005	P2 EQUILIBRATION SYSTEM...EQMANIFOLD	18-129	18-32	
006	P1 EQUILIBRATION SYSTEM...EQACC	3-99	3-3.d(1)	H
007	P1 AUTO WPN CTRL...PDCU, AZ/EL PLUGS, CBLS	3-236.82	3-3.k.1(13)	A
008	P3 GUN SERVO LAMP...PDCU, KEYPAD, W1B	3-236.82	3-3.k.1(13)	A
009	P1 AUTO WEAPON CONTROL...ELSV		Notify DS	
010	P1 AUTO WEAPON CONTROL...TRSV		Notify DS	
011	P2 AUTO WEAPON CONTROL...ELSV, TRSV		Notify DS	
012	P1 AUTO ELEVATION WPN CTRL...PDCU	8.1-46	8.1-16	
013	P1 AUTO ELEVATION WPN CTRL...PDCU	8.1-46	8.1-16	
014	P3 PDI SYSTEM TEST...PDCU	8.1-46	8.1-16	
015	P2 AUTO ELEVATION WPN CTRL...ELSV		Notify DS	
016	P2 AUTO ELEVATION WPN CTRL...PDCU	8.1-46	8.1-16	
017	P2 AUTO ELEVATION WPN CTRL...PDCU	8.1-46	8.1-16	
018	P2 AUTO ELEVATION WPN CTRL...ELSV		Notify DS	
019	P1 AUTO WEAPON CONTROL...ELSV		Notify DS	
020	P1 AUTO WEAPON CONTROL...ELSV		Notify DS	
021	P1 AUTO WPN CTRL...PDCU, MSL, MSV, W7, W64, W52	3-236.82	3-3.k.1(13)	A
022	P1 AUTO TRAVERSE WEAPON CTRL...PDCU	8.1-46	8.1-16	
023	P1 AUTO TRAVERSE WEAPON CTRL...TRSV		Notify DS	
024	P2 AUTO TRAVERSE WEAPON CTRL...TRSV		Notify DS	
025	P2 AUTO TRAVERSE CONTROL...PDCU	8.1-46	8.1-16	
026	P2 AUTO TRAVERSE CONTROL...PDCU	8.1-46	8.1-16	
027	P2 AUTO TRAVERSE WEAPON CTRL...TRSV		Notify DS	
028	P1 AUTO TRAVERSE WEAPON CTRL...TRSV		Notify DS	
029	P2 AUTO WEAPON CONTROL...ELSV		Notify DS	
034	P2 PDI SYSTEM TEST...FLOM, W51, W65A, PDCU	3-141	3-3.f(4)	A
035	P2 HYDRAULIC WARMUP SYSTEM...WTV, WTSL, W52	3-171	3-3.g(2)	A

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<b>CODE</b>	<b>PDI FAULT SUMMARY SCREEN MESSAGE</b>	<b>PAGE</b>	<b>PARAGRAPH</b>	<b>STEP</b>
036	P2 HYD WARMUP SYSTEM...WTSW, W52, W64, HCB	3-177	3-3.g(5)	A
037	P3 HYDRAULIC FILTERS...FILA, PDCU, W51, W65A	3-142	3-3.f(5)	B
038	P3 HCB LAMPS...HCB, W64, W52	3-169	3-3.g(1)	A
039	P2 HYD POWER...HCB, OLSN, HYPR, HYM, PDCU, CBL5	3-164	3-3.f(11)	A
040	P2 HYDRAULIC POWER...HYPR	5-10	5-5	
041	P2 PDI SYSTEM TEST...W51, W65A, PDCU	3-164	3-3.f(11)	A
042	P2 PDI SYSTEM TEST...W51, W65A, PDCU	3-164	3-3.f(11)	A
043	P2 PDI SYSTEM TEST...W65A, PDCU	3-164	3-3.f(11)	A
044	P2 PDI SYSTEM TEST..PDCU	3-164	3-3.f(11)	A
045	P2 PDI SYSTEM TEST...W51, W65A, PDCU	3-164	3-3.f(11)	A
046	P2 PDI SYSTEM TEST...W65A, PDCU	3-164	3-3.f(11)	A
048	P2 PDI SYSTEM TEST....PDCU	3-164	3-3.f(11)	A
049	P2 PDI SYSTEM TEST....TSN, W51, W65A, PDCU	3-145	3-3.f(6)	A
050	P2 PDI SYSTEM TEST....TSN	5-56	5-18	
051	P2 PDI SYSTEM TEST....PDCU	3-145	3-3.f(6)	A
054	P2 PDI SYSTEM TEST...PXDCR, W51, W65A, PDCU	3-147	3-3.f(7)	A
055	P2 PDI SYSTEM TEST...PXDCR	18-54	18-13	
056	P2 PDI SYSTEM TEST...PDCU	3-147	3-3.f(7)	A
059	P2 PDI SYSTEM TEST...PXDCR	18-54	18-13	
060	P3 PDI SYSTEM TEST...HCB, W65A, PDCU	3-318	3-3.n(18.1)	A
061	P1 HYD POWER...BB2, HCB, W64, HPR, BB6, BB7, CBL5	3-150	3-3.f(9)	A
062	P2 PDI SYSTEM TEST...W51, W65A, PDCU	3-164	3-3.f(11)	A
063	P1 HYDRAULIC POWER...OLSN, HCB, W64, W52	3-150	3-3.f(9)	A
064	P1 HYDRAULIC POWER...HYM, W54	3-150	3-3.f(9)	T
065	P1 HYDRAULIC POWER PACK...HYM		Notify DS	
066	P1 HYD PWR...HYPR, CRSH, BB6, BB7, W53, W54, W55	3-150	3-3.f(9)	L
067	P1 POWER...W59, FLUSN, HYDRAULIC LEAKAGE	3-150	3-3.f(9)	Q
068	P1 HYD POWER...CLASS III LEAKAGE	18-3	18-1	
069	P1 HYD POWER...LOW HYDRAULIC FLUID	18-3	18-1	
070	P1 HYD POWER...W59, FLUSN	3-150	3-3.f(9)	Q
071	P1 HYDRAULIC POWER PACK...HYM, HYP		Notify DS	
072	P1 HYD PWR...HYPR, OLSN, HYM, CRSH, BB6, BB7, CBL5	3-164	3-3.f(11)	A
073	P1 HYD POWER...HULL CHARGING SYSTEM		See Hull 20-1 TM	
074	P2 PDI SYSTEM TEST...PXDCR, W51, W65A, PDCU	3-147	3-3.f(7)	A
075	P2 HYDRAULIC POWER...HYP AND FILA	18-54	18-13	
076	P3 PDI SYSTEM TEST...TSN, W51, W65A, PDCU	3-145	3-3.f(6)	C

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<u>CODE</u>	<u>PDI FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
077	P1 HYDRAULIC WARMUP SYSTEM...HCB, W52, W64	3-174	3-3.g(4)	A
078	P1 HYDRAULIC WARMUP SYSTEM...HCB, W64	3-174	3-3.g(4)	A
079	P1 HYDRAULIC WARMUP SYSTEM...W52	5-134	5-35	
080	P1 HYDRAULIC WARMUP SYSTEM...WTSL, WTV		Notify DS	
081	P2 HYDRAULIC POWER...FILA	18-54	18-13	
082	P2 HYD FILTER...FILA, SFIL, RFIL, PDCU, W51, W65A	3-142	3-3.f(5)	B
083	P2 HYD FILTER...FILA, SFIL	18-54	18-13	
084	P2 HYD FILTER...RFIL, FILA	18-54	18-13	
085	P2 HYD FILTER...W51, W65A, PDCU, FILA	3-143	3-3.f(5)	C
086	P3 PDI SYSTEM TEST...W51, W65A, PDCU	3-164	3-3.f(11)	A
087	P3 PDI SYSTEM TEST...W51, W65A, PDCU	3-164	3-3.f(11)	A
088	P3 HCB LAMPS...HCB	5-62	5-20	
089	P2 HYDRAULIC COOLING...CFN, W53, W55	3-126	3-3.e(2)	N
090	P2 HYDRAULIC COOLING...HCB, W64, W52	3-120	3-3.e(2)	B
091	P2 HYDRAULIC COOLING...CTSW, HCB, W64, W52	3-120	3-3.e(2)	A
092	P3 HCB LAMPS...HCB	3-118	3-3.e(1)	B
093	P2 HYDRAULIC COOLING...HCB	3-120	3-3.e(2)	A
094	P3 HYD COOLING...CTSW, HCB, PDCU, W52, W64, W65A	3-145	3-3.f(6)	A
095	P3 HYD COOLING...CTSW	5-58	5-19	
096	P3 HYD COOLING...HCB, W64, W65A, PDCU	3-145	3-3.f(6)	A
097	P3 HYD COOLING...W65A, PDCU	3-145	3-3.f(6)	A
099	P3 HYD COOLING...W52	5-134	5-35	
103	P3 PDI SYSTEM TEST...W51, W65A, PDCU	3-318.1	3-3.n(18.1)	A
104	P3 PDI SYSTEM TEST...HCB, W65, PDCU	3-318.1	3-3.n(18.1)	A
105	P1 HYDRAULIC POWER PACK...HYM, HYP		Notify DS	
106	P2 TRAVERSE CONTROL...TRDM		Notify DS	
107	P3 TRAVERSE CONTROL...CLSL, CLV	3-250.1	3-3.l(3)	F
108	P2 TRAVERSE CONTROL...TRDM OR TRAV GEAR		Notify DS	
109	P2 COS TRAVERSE CONTROL...HCB, W64, W65A, PDCU	3-247	3-3.l(2)	E
110	P2 COS TRAVERSE CONTROL...HCB, W65A, PDCU	3-245	3-3.l(2)	A
111	P2 COS TRAVERSE CONTROL...W64, HCB, W65A, PDCU	3-245	3-3.l(2)	A
112	PS COS TRAVERSE CONTROL...W65A, PDCU	3-245	3-3.l(2)	A
113	P2 COS TRAVERSE CONTROL...PDCU	3-136	3-3.f(2)	A
114	P3 TRAVERSE CONTROL...HCB, W64, W65A, PDCU	3-250	3-3.l(3)	C
115	P3 TRAVERSE CONTROL...HCB, W65A, PDCU	3-249	3-3.l(3)	A
116	P3 TRAVERSE CONTROL...W64, HCB, W65A, PDCU	3-249	3-3.l(3)	A
117	P3 TRAVERSE CONTROL...W65A, PDCU	3-249	3-3.l(3)	A



### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<u>CODE</u>	<u>PDI FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
118	P3 TRAVERSE CONTROL...PDCU	3-139	3-3.f(3)	A
119	P2 COS TRAVERSE CONTROL...COSCH	18-126	18-31	
120	P1 TRAVERSE CONTROL...TRL SW, W64, HCB	3-266	3-3.l(9)	A
121	P2 COS TRAVERSE CONTROL...TRSL, TRV	3-245	3-3.l(2)	
122	P1 TRAVERSE CONTROL...HCB	3-250.1	3-3.l(3)	E
123	P3 PDI SYSTEM TEST...HCB, W65A, PDCU	3-318.1	3-3.n(18.1)	A
124	P3 TRAV CTRL...HCB, W64, CLSL, CLV, TRDM, VLF	3-250.1	3-3.l(3)	E
125	P3 TRAV CTRL...CLV	18-113	18-28	
126	P3 TRAV CTRL...CLUTCH VELOCITY FUSE	18-169	18-46	
127	P3 TRAV CTRL...TRDM		Notify DS	
128	P3 TRAV CTRL...HCB, W64, CLSL	3-248	3-3.l(3)	E
129	P2 GUNNER TRAVERSE CONTROL...HCB	3-269	3-3.l(10)	G
130	P2 GUNNER TRAVERSE CONTROL...GCH	18-126	18-31	
131	P3 PDI SYSTEM TEST...HCB, W65A, PDCU	3-318.1	3-3.n(18.1)	A
132	P2 TRAVERSE LIMIT SYS...HCB, W64, TRLSL, TRLV	3-273	3-3.l(11)	B
133	P2 TRAVERSE LIMIT SYSTEM...HCB, W64, TRLSW	3-273	3-3.l(11)	D
134	P3 HCB LAMPS...HCB	3-186	3-3.i(1)	A
135	P1 TRAVERSE CONTROL...BPV, BPSL, W64, HCB	3-253	3-3.l(5)	C
136	P3 TRAVERSE CONTROL...BPV, BPSL		Notify DS	
137	P2 COS TRAVERSE CONTROL...COSCH	18-126	18-31	
138	P2 GUNNER TRAVERSE CONTROL...GCH	18-126	18-31	
140	P2 GNR TRAV CONTROL...TRSL, TRV, W64, HCB, VLF	3-269	3-3.l(10)	C
141	P1 TRAVERSE CONTROL...TRDM OR TRAV GEAR		Notify DS	
142	P2 COS ELEVATION CTRL...HCB, W64, W65A, PDCU	3-107	3-3.d(3)	E
143	P2 COS ELEVATION CTRL...HCB, W65A, PDCU	3-106	3-3.d(3)	A
144	P2 COS ELEVATION CTRL...W64, HCB, W65A, PDCU	3-106	3-3.d(3)	A
145	P2 COS ELEVATION CTRL...W65A, PDCU	3-106	3-3.d(3)	A
146	P2 COS ELEVATION CTRL...PDCU	3-106	3-3.d(3)	A
147	P3 PDI SYSTEM TEST...HCB, W65A, PDCU	3-318.1	3-3.n(18.1)	A
148	P2 COS ELEVATION CONTROL...COSCH	18-126	18-31	
149	P1 HANDLE CONTROLS...MSL, MSV, PDCU, CBLS	3-103	3-3.d(2)	E
150	P2 TRAVERSE CONTROL...TRLSL, TRLV	18-160	18-43	
152	P2 COS ELEVATION CONTROL...ELSL, ELV	18-154	18-41	
153	P1 ELEVATION CONTROL...EQA, EQMANIFOLD	3-99	3-3.d(1)	A
154	P2 GNR ELEVATION CTRL...ELSL, ELV, W64, HCB	3-108	3-3.d(4)	A
155	P2 GUNNER ELEVATION CONTROL...HCB	3-108	3-3.d(4)	C
156	P2 GUNNER ELEVATION CONTROL...GCH	18-126	18-31	

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<u>CODE</u>	<u>PDI FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
157	P2 COS CONTROL...COSCH VLF	18-71	18-15	
158	P2 ELEVATION CONTROL...EQA		Notify DS	
167	P3 HYD WARMUP SYSTEM...WTSW, HCB, W52, W64	3-172	3-3.g(3)	A
168	P3 HYD WARMUP SYSTEM...WTSW	5-58	5-19	
169	P3 HYD WARMUP SYSTEM...HCB, W64	3-172	3-3.g(3)	A
170	P3 HYD WARMUP SYSTEM...W52	5-134	5-35	
171	P3 HCB LAMPS...HCB	3-169	3-3.g(1)	A
172	P3 HYD COOLING...HCB, PDCU, W51, W52, W64, W65A	3-145	3-3.f(6)	A
173	P3 HYD COOLING...HCB, W64, W65A, PDCU	3-120	3-3.e(2)	A
174	P3 HYD COOLING...W65A, PDCU	3-120	3-3.e(2)	A
176	P3 HYD COOLING...W51	5-138	5-36	
177	P3 HYD COOLING...W52	5-134	5-35	
183	P2 TRAVERSE CONTROL...TRDM		Notify DS	
184	P2 TRAVERSE CONTROL...TRDM		Notify DS	
187	P3 PDI SYS...PDCU	8.1-46	8.1-16	
188	P3 PDI SYS...FLOM	18-44	18-10	
189	P3 PDI SYS...PDCU	8.1-46	8.1-16	
190	P3 PDI SYS...PXDCR	18-44	18-10	
191	P3 PDI SYS...TSN	5-56.4	5-18	
192	P3 PDI SYS...W51	5-138	5-36	
193	P3 PDI SYS...W65A	5-56	5-17.1	
194	P3 TUBE TEMPERATURE...PDCU, TTSN, W7, TTCBL	3-236.26	3-3.k.1(2)	A
195	P1 PDCU...PDCU	8-40	8-14	
196	P1 AUTO WEAPON CONTROL...PDCU	8-40	8-14	
199	P1 AUTO WEAPON CONTROL...PDCU, ELSV, W7	3-236.30	3-3.k.1(4)	A
200	P1 AUTO WEAPON CONTROL...PDCU, TRSV, W7	3-236.30	3-3.k.1(4)	A
204	P1 COMMO...PCU-2	8.1-51	8.1-18	
205	P1 COMMO...PDCU, PCU, RR, W26, COMMO CABLES	3-236.50	3-3.k.1(9)	A
206	P3 PDI SYSTEM TEST...PCU, PDCU, W65A	3-318.1	3-3.n(18.1)	A
210	P1 NAV...PDCU, DRU, W17	3-236.57	3-3.k.1(12)	G
211	P1 NAV...DRU, PCU, W27	3-236.55	3-3.k.1(12)	A
212	P1 NAV...DRU	22-14	22-8	
213	P3 POWER LAMP...DRU	22-14	22-8	
214	P3 BIT LAMP...DRU	22-14	22-8	
215	P3 NAV...PDCU, DRU, SR, VMS, VMSC, VMSH, CABLES	3-236.60	3-3.k.1(12)	M
216	P3 NAV...SR, VMSC, W62A, BB2	3-236.59	3-3.k.1(12)	K
217	P3 NAV...SR, VMSH, W111A	3-236.60	3-3.k.1(12)	O

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<u>CODE</u>	<u>PDI FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
218	P1 NAV...PDCU	3-236.55	3-3.k.1(12)	
219	P1 POWER LAMP...PDCU	3-236.39	3-3.k.1(5)	A
220	P1 BIT LAMP...PDCU	3-236.55	3-3.k.1(12)	
221	P1 COMMO...PDCU	8.1-46	8.1-16	
237	P1 BIT LAMP...KEYPAD	3-236.39	3-3.k.1(5)	A
238	P1 BIT LAMP...PDCU	3-236.55	3-3.k.1(12)	A
242	P3 PDI SYSM TEST...PCU, PDCU, W65A	3-318.1	3-3.n(18.1)	A
243	P1 NAV...PCU	8.1-49	8.1-18	
244	P3 POWER LAMP...VMSC	3-236.39	3-3.k.1(5)	A
245	P3 POWER LAMP...VMSH	3-236.39	3-3.k.1(5)	A
246	P3 AUXILIARY POWER...AUXA, AUXB, PCU, W25	3-236.47	3-3.k.1(8)	A
247	P3 PDI SYSTEM...AUXA, AUXB, PCU, PDCU, W25, W65A	3-318.1	3-3.n(18.1)	A
248	P3 AUXILIARY POWER...AUXA, PCU, W25	3-236.47	3-3.k.1(8)	A
249	P3 AUXILIARY POWER...AUXB, PCU, W25	3-236.47	3-3.k.1(8)	A
250	P2 VEHICLE POWER...HULL CHARGING SYSTEM		See Hull 20-1-1 TM	
251	P2 VEHICLE POWER...HULL CHARGING SYSTEM		See Hull 20-1-1 TM	
252	P3 PDI SYSTEM TEST...PCU, PDCU, W65A	3-318.1	3-3.n(18.1)	A
253	P3 PDI SYSTEM TEST...PCU, PDCU, W65A	3-318.1	3-3.n(18.1)	A
254	P2 AUXILIARY POWER...AUXA	8.1-4	8.1-5	
255	P2 AUXILIARY POWER...AUXB	8.1-4	8.1-5	
256	P2 AUXILIARY POWER...AUXA, PCU, W25	3-236.47	3-3.k.1(8)	A
257	P2 AUXILIARY POWER...AUXA AND AUXB	8.1-4	8.1-5	
258	P2 AUXILIARY POWER...PCU	8-1-49	8.1-18	
259	P2 AUXILIARY POWER...AUXA, AUXB, PCU	3-236.47	3-3.k.1(8)	A
260	P3 PDI SYSTEM TEST...PCU, PDCU, W65A	3-318.1	3-3.n(18.1)	A
261	P3 POWER...PCU	8.1-49	8.1-18	
262	P1 COMMO...PCU, RR, W26	3-236.54	3-3.k.1(11)	B
263	P1 COMMO...PCU	8.1-49	8.1-18	
264	P1 COMMO...RR		Notify COM- MO Maint	
265	P1 COMMO...W26	21-15	21-7	
266	P3 POWER LAMP...PCU	3-236.39	3-3.k.1(5)	A
270	P1 NAV...DRU, PCU, W27	3-236.55	3-3.k.1(12)	C
271	P1 NAV...DRU	22-14	22-8	
272	P1 NAV...PCU	8.1-49	8.1-18	
273	P1 NAV...W27	8.1-33	8.1-12	

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

<u>CODE</u>	<u>PDI FAULT SUMMARY SCREEN MESSAGE</u>	<u>PAGE</u>	<u>PARAGRAPH</u>	<u>STEP</u>
293	P3 HYD WARMUP SYSTEM...WTSW, HCB, W52, W64	3-172	3-3.g(3)	A
294	P2 PDI SYSTEM TEST...W65A, PDCU	3-145	3-3.f(6)	D
295	P2 PDI SYSTEM TEST...W51, W65A, PDCU	3-145	3-3.f(6)	C
296	P2 PDI SYSTEM TEST...W65A, PDCU	3-147	3-3.f(7)	B
297	P2 PDI SYSTEM TEST...W51, W65A, PDCU	3-147	3-3.f(7)	A
298	P2 HYDRAULIC POWER...HYP		Notify DS	
299	P2 EQUILIBRATION SYSTEM...EQ CHARGE VALVE	18-47	18-11	
300	P3 MUZZLE VELOCITY SENSOR...MVS		See TM 9-2350-314-10	
301	P3 RS-422...MVS, W92A, WP3B	3-236.42	3-3.k.1(7)	A
302	P3 NAV...PLGR, BAT, CBL	3-348	3-3.o(1)	A
303	P3 NAV...PLGR		See TM 11-5825-291-13	
304	P3 NAV...PLGR, ANT, CBL		See TM 11-5825-291-13	
305	P3 NAV...PLGR, DRU, W17A		See TM 11-5825-291-13	
306	P1 PDCU...PDCU	8.1-44	8.1-16	
307	P3 DISPLAY UNIT...DU	8.1-52	8.1-19	
308	P3 PDI SYS...PDCU, TSN, W51, W65A	3-145	3-3.f(6)	
309	P3 PDI SYS...FLOM, PDCU, W51, W65A	3-141	3-3.f(4)	
310	P3 PDI SYS...PDCU, PXDCR, W51, W65A	3-147	3-3.f(7)	

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

##### 3-2.2 Fault Symptoms.

To effectively troubleshoot the M109A6 howitzer, follow these steps:

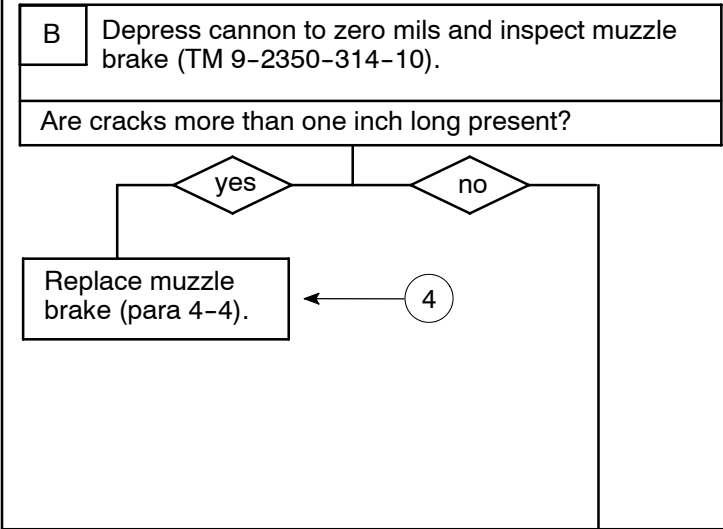
- 1 Determine the symptom.
- 2 Locate the symptom (1) in the Quick Guide to Troubleshooting.
- 3 Locate the troubleshooting page and paragraph (2) for your symptom.
- 4 Turn to the procedure (3) identified in the Quick Guide to Troubleshooting.
- 5 Study the function description, pictorial view and/or schematic located at the beginning of each troubleshooting section.
- 6 Perform the corrective action (4) as required by troubleshooting procedure.
- 7 Verify that the corrective action eliminated the symptom.

If any problem is not listed or will not correct through troubleshooting, notify support maintenance.

<b>3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED</b>			
<u>ITEM</u>	① →	<u>SYMPTOM</u>	<u>PAGE</u> <u>PARAGRAPH</u>
CANNON		JERKY RECOIL	3-83      para 3-3.c (1) ← ②

#### 3-3 TROUBLESHOOTING CHART - CONTINUED

c. CANNON - CONTINUED ← ③ →      (1) JERKY RECOIL - CONTINUED





**3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED**

<u>ITEM</u>	<u>SYMPTOM</u>	<u>PAGE</u>	<u>PARAGRAPH</u>
AFCS	AFCS WILL NOT POWER UP. (Use TB 9-2350-314-20-2-1 to troubleshoot system)	3-21	3-3.a(1)
	PDIU OUT ON SYSTEM POWER UP.	3-26	3-3.a(2)
	COMMO DEGRADED OR OUT.	8-40	para 8-14
	PCU WILL NOT POWER UP.	3-30	3-3.a(4)
	DCU DEGRADED ON POWER UP. (Use TB 9-2350-314-20-2-1 to troubleshoot system)	3-32	3-3.a(5)
	WPN DEGRADED OR OUT. (Use TB 9-2350-314-20-2-1 to troubleshoot system)	3-34	3-3.a(6)
	AFCS POWER LAMPS DO NOT LIGHT ON POWER UP.	3-42	3-3.a(7)
	BIT LAMPS DO NOT LIGHT ON POWER UP.	3-43	3-3.a(8)
	1553 DATA BUS DEGRADED OR OUT.	3-45	3-3.a(9)
	POWER BUS CIRCUIT BREAKER WILL NOT STAY ON.	3-21	3-3.a(1)
	AFCS POWERS DOWN WHEN VEHICLE POWER REMOVED (NO BACKUP).	3-49	3-3.a(11)
	NO DISPLAY ON DU.	3-21	3-3.a(1)
	AFCS WILL NOT KEY RADIO OR TRANSMIT DIGITAL.	3-53	3-3.a(13)
	RADIOS WILL NOT POWER UP.	3-55	3-3.a(14)
	NO INTERCOM AUDIBLE CREW ALERT.	3-57	3-3.a(15)
	NAVIGATION SUBSYSTEM DEGRADED OR OUT.	3-58	3-3.a(16)
	TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. Power traverse and elevation are normal. (Use TB 9-2350-314-20-2-1 to troubleshoot system)	3-68.1	3-3.a(17)
CANNON DRIFTS IN AZIMUTH AFTER SERVOS HAVE BEEN USED TO LAY, LOAD, OR STOW. (Use TB 9-2350-314-20-2-1 to troubleshoot system)	3-74	3-3.a (18)	
BREECH MECHANISM	BREECH DOES NOT OPEN MANUALLY.	3-78	3-3.b(1)
	BREECH DOES NOT CLOSE COMPLETELY.	3-80	3-3.b(2)
CANNON	JERKY RECOIL.	3-83	3-3.c(1)
	EXCESSIVE RECOIL FORCE.	3-86	3-3.c(2)
	EXCESSIVE RECOIL TRAVEL.	3-89	3-3.c(3)
CANNON	CANNON DOES NOT RETURN TO BATTERY.	3-91	3-3.c(4)
	PRIMER DOES NOT FIRE, PRIMER NOT INDENTED.	3-94	3-3.c(5)

**3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED**

<u>ITEM</u>	<u>SYMPTOM</u>	<u>PAGE</u>	<u>PARAGRAPH</u>
ELEVATION SYSTEM	CANNON WILL ONLY MOVE A FEW MILS OR WILL NOT ELEVATE OR DEPRESS.	3-99	3-3.d(1)
	CANNON WILL ONLY ELEVATE A FEW MILS OR ELEVATES SLOWLY.	3-103	3-3.d(2)
	CANNON WILL NOT ELEVATE USING COS CONTROL HANDLE (GUNNER IS NORMAL). Elevation switch is set to COS.	3-106	3-3.d(3)
	CANNON WILL NOT ELEVATE USING GUNNER'S CONTROL HANDLE (COS IS NORMAL). Elevation switch is set to GUNNER.	3-108	3-3.d(4)
	CANNON DRIFTS. Inability to hold in power mode.	3-111	3-3.d(5)
HYDRAULIC COOLING SYSTEM	HYDRAULIC COOLING INDICATOR LIGHT DOES NOT COME ON WHEN HYDRAULIC COOLING SWITCH IS IN THE ON POSITION.	3-118	3-3.e(1)
	HYDRAULIC COMPARTMENT FAN DOES NOT OPERATE WHEN HYDRAULIC COOLING SWITCH IS IN THE AUTO POSITION AT HIGH RESERVOIR TEMPERATURES.	3-120	3-3.e(2)
HYDRAULIC SYSTEM	LOW HYDRAULIC PRESSURE - PRESSURE BELOW 1500 PSI WITH HYDRAULIC PUMP DC MOTOR OPERATING AND NO LOAD ON SYSTEM.	3-132	3-3.f(1)
	NO HYDRAULIC PRESSURE. Hydraulic pump dc motor is operating properly.	3-136	3-3.f(2)
	NO CLOGGED FILTER INDICATION ON DISPLAY UNIT. Mechanical return or supply clogged filter indication is present.	3-139	3-3.f(3)
	FLOWMETER/HARNESS WARNING.	3-141	3-3.f(4)
	CLOGGED HYDRAULIC FILTER. No mechanical indication.	3-142	3-3.f(5)
	DISPLAY UNIT (DU) DISPLAYS HYDRAULIC TEMPERATURE GREATER THAN 200°F. Hydraulic cooling fan not operating.	3-145	3-3.f(6)
	PRESSURE SENSOR/TEST HARNESS PROBLEM DISPLAYED ON DISPLAY UNIT.	3-147	3-3.f(7)
	LOW RESERVOIR FLUID LEVEL ON DISPLAY UNIT.	3-148	3-3.f(8)
	HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON.	3-150	3-3.f(9)
	HYDRAULIC PRESSURE GREATER THAN 1975 PSI.	3-163	3-3.f(10)
	HYDRAULIC PUMP MOTOR CONTINUES TO OPERATE WHEN HYDRAULIC POWER SWITCH IS OFF.	3-164	3-3.f(11)
	ZEROING PRESSURE CHECK FAILS TEST.	3-165	3-3.f(12)



**3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED**

<u>ITEM</u>	<u>SYMPTOM</u>	<u>PAGE</u>	<u>PARAGRAPH</u>
HYDRAULIC WARMUP SYSTEM	HYDRAULIC WARMUP INDICATOR LIGHT DOES NOT ILLUMINATE WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS BELOW WARMUP SYSTEM NORMAL.	3-169	3-3.g(1)
	HYDRAULIC WARMUP SOLENOID IS DE-ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION WITH LIGHT ILLUMINATED.	3-171	3-3.g(2)
	HYDRAULIC WARMUP SOLENOID IS ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS ABOVE OPERATING TEMPERATURE.	3-172	3-3.g(3)
	HYDRAULIC WARMUP SOLENOID IS ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS OFF.	3-174	3-3.g(4)
	HYDRAULIC WARMUP SOLENOID IS DE-ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS BELOW OPERATING TEMPERATURE.	3-177	3-3.g(5)
INTERCOM SYSTEM	INTERCOM SYSTEM DOES NOT OPERATE PROPERLY.	3-182	3-3.h(1)
LIGHTS	TRAVERSE LIMIT LIGHT DOES NOT COME ON WHEN CAB TRAVERSES 45° OR MORE. Cab stops traversing and POWER ON light illuminates.	3-186	3-3.i(1)
	DOME LIGHT FAILS TO OPERATE. All other lights operate.	3-188	3-3.i(2)
LOADER RAMMER	RAMMER DOES NOT OPERATE (EXTEND OR RETRACT). Traverse and elevate are normal.	3-194	3-3.j(1)
MCS	MCS DOES NOT OPERATE IN ANY MODE.	3-198	3-3.k(1)
	MCS HAS NO OUTPUT TO CREW STATION WHEN IN HI MODE.	3-203	3-3.k(2)
	MCS HAS NO OUTPUT TO CREW STATION WHEN IN LO MODE.	3-207	3-3.k(3)
	MCS HAS NO COOL AIR OUTPUT WHEN IN COOL MODE.	3-211	3-3.k(4)
	MCS VANEAXIAL FAN DOES NOT OPERATE.	3-218	3-3.k(5)
	MCS CONTROL PANEL "CHANGE FILTER" LIGHT CONTINUOUSLY ON.	3-227	3-3.k(6)
	ALL M3 HEATERS FAIL TO OPERATE.	3-228	3-3.k(7)
	M3 HEATERS 1 AND 2 FAIL TO OPERATE. M3 HEATERS 3 AND 4 OPERATE.	3-230	3-3.k(8)
	M3 HEATERS 3 AND 4 FAIL TO OPERATE. M3 HEATERS 1 AND 2 OPERATE.	3-233	3-3.k(9)
	M3 HEATERS (1, 2, 3, OR 4) FAIL TO OPERATE. All other heaters operate.	3-236	3-3.k(10)

**3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED**

<u>ITEM</u>	<u>SYMPTOM</u>	<u>PAGE</u>	<u>PARAGRAPH</u>
PDFCS	PDFCS WILL NOT POWER UP, WILL NOT STAY POWERED-UP, OR NO PDU DISPLAY.	3-236.3	3-3.k.1(1)
	PCU-2 WILL NOT POWER UP.	3-236.26	3-3.k.1(2)
	KEYPAD OUT OR FAULT LAMP BLINKING.	3-236.28	3-3.k.1(3)
	WPN DEGRADED OR OUT.	3-236.30	3-3.k.1(4)
	POWER LAMPS DO NOT LIGHT ON POWER UP.	3-236.39	3-3.k.1(5)
	DRUH BIT LAMPS DO NOT LIGHT ON POWER UP.	3-236.41	3-3.k.1(6)
	MVS OUT.	3-236.42	3-3.k.1(7)
	PDFCS POWERS DOWN WHEN VEHICLE POWER REMOVED (NO BACKUP).	3-236.47	3-3.k.1(8)
	PDFCS WILL NOT KEY SINGGARS RADIO OR TRANSIT DIGITAL.	3-236.50	3-3.k.1(9)
	RADIOS WILL NOT POWER UP.	3-236.52	3-3.k.1(10)
	NO INTERCOM AUDIBLE CREW ALERT.	3-236.54	3-3.k.1(11)
	NAVIGATION SUBSYSTEM DEGRADED OR OUT.	3-236.55	3-3.k.1(12)
	TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY.	3-236.82	3-3.k.1(13)
	IFS SUBSYSTEM NOT OK.	3-236.105	3-3.k.1(14)
TRAVERSE	SLOW TRAVERSE - DOES NOT TRAVERSE FROM 0° TO 45° IN LESS THAN 7 SECONDS IN POWER AND LESS THAN 12 SECONDS IN AFCS OPERATION ON LEVEL GROUND. Manual traverse is normal and elevation of cannon is normal. Cab may stop in AFCS operation.	3-239	3-3.l(1)
	INABILITY TO TRAVERSE WITH COS CONTROL HANDLE. Gunner's control handle and AFCS normal.	3-245	3-3.l(2)
	INABILITY TO MANUALLY TRAVERSE. Traverse under POWER and AFCS normal.	3-248	3-3.l(3)
	CAB WILL NOT POWER TRAVERSE WITH TRAVERSE CONTROL SWITCH SET TO POWER. AFCS operates normally.	3-252	3-3.l(4)
	CAB WILL NOT TRAVERSE IN POWER OR AFCS OPERATION.	3-253	3-3.l(5)
	INABILITY TO POWER TRAVERSE IN ONE DIRECTION (RIGHT OR LEFT) USING EITHER CONTROL HANDLE. AFCS operates normally.	3-258	3-3.l(6)
	CAB DRIFTS. Inability to hold in POWER and AFCS modes.	3-260	3-3.l(7)
	CAB WILL NOT TRAVERSE BEYOND 45° WITH TRAVERSE LIMIT SWITCH HELD IN OVERRIDE POSITION.	3-264	3-3.l(8)

**3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED**

<u>ITEM</u>	<u>SYMPTOM</u>	<u>PAGE</u>	<u>PARAGRAPH</u>
TRAVERSE (CONTINUED)	INABILITY TO POWER TRAVERSE BEFORE 45° LIMIT. Traverse limit light is on.	3-266	3-3.l(9)
	INABILITY TO TRAVERSE WITH GUNNER'S CONTROL HANDLE. COS traverse control is available and AFCS control is normal.	3-269	3-3.l(10)
	CAB TRAVERSES PAST 45° LIMIT USING COS AND GUNNER'S CONTROL.	3-273	3-3.l(11)
	HANDWHEEL ROTATES WHEN CAB IS TRAVERSED IN POWER.	3-277	3-3.l(12)
CAB POWER	NO POWER TO CAB.	3-280	3-3.m(1)
PRECISION LIGHTWEIGHT GLOBAL POSITIONING SYSTEM RECEIVER	NO POWER TO PRECISION LIGHTWEIGHT GPS (GLOBAL POSITIONING SYSTEM) RECEIVER (PLGR).	3-348	3-3.o(1)
MUZZLE VELOCITY SENSOR (AFCS ONLY)	NO POWER TO MUZZLE VELOCITY SENSOR WIRING HARNESS W93A.	3-350	3-3.p(1)
	NO POWER TO MUZZLE VELOCITY SENSOR 1553 TERMINATION CONNECTOR.	3-352	3-3.p(2)
MOUNTED WATER RATION HEATER	MOUNTED WATER RATION HEATER (MWRH) WILL NOT OPERATE.	3-354	3-3.q(1)
WINTERIZATION KIT, MCS	NO HEAT OR LOW HEAT FROM PREHEATER	3-356	3-3.r(1)

### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

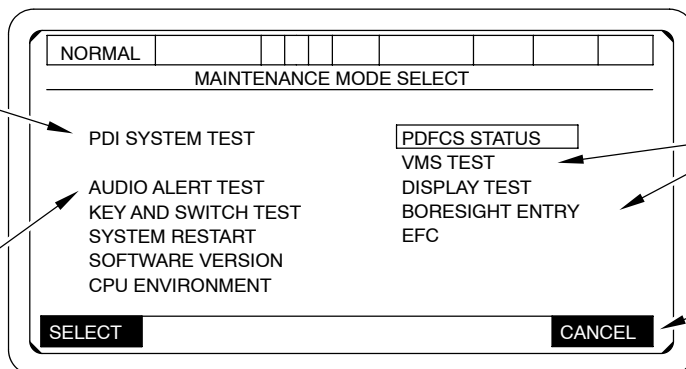
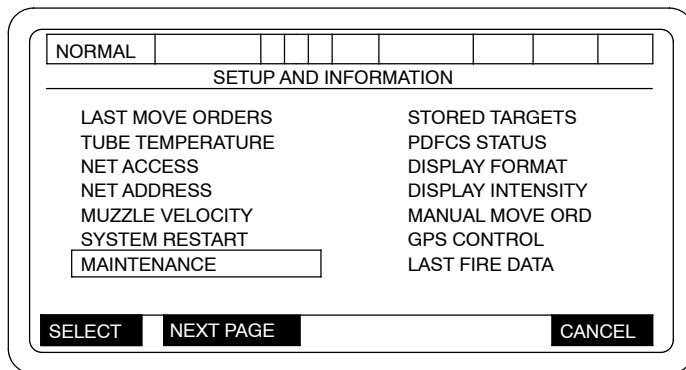
#### 3-2.3 AFCS BIT STATUS Test.

The AFCS STATUS menu will display the various subsystem faults. Using this fault list (showing Degraded Mode of each subsystem), you will be able to determine if Degraded Mode is acceptable depending on mission requirements.

Certain degraded subsystems will not interfere with AFCS operation or mission capability. It is important to know, however, which subsystem is degraded (and which BIT item has failed). Knowing which failure to compensate for/correct will allow you to carry on with your mission. The various LRUs communicate/send messages periodically within AFCS. Whenever an LRU has not sent a message within a certain amount of time, the LRU timer sends an LRU FAILED message. In the event you get an LRU FAILED message, go into MAINTENANCE menu, and check AFCS STATUS.

The AFCS STATUS menu is used by unit maintenance personnel as well as by the operator. The operator must notify unit maintenance of any subsystem listed with a status of degraded or out, when no faults within that subsystem are indicated. Look at each subsystem carefully. Determine whether any subsystem displays a status other than zero. If so, then mission completion using the fully automated system is questionable. Select the subsystem in question. Further information will be displayed to help determine where the fault lies.

To enter the AFCS STATUS menu, select MAINTENANCE from the SETUP AND INFORMATION menu and the MAINTENANCE MODE SELECT menu will appear. Select AFCS STATUS and the AFCS STATUS menu will appear. The following three menus display the above selection process.



BLANK IF PDCU LRU NOT OPERATIONAL

BLANK IF CP NOT OPERATIONAL

BLANK IF NAV SUBSYSTEM NOT OPERATIONAL

ONLY PRESENT IF ENTERED FROM NORMAL OPERATIONAL MODE

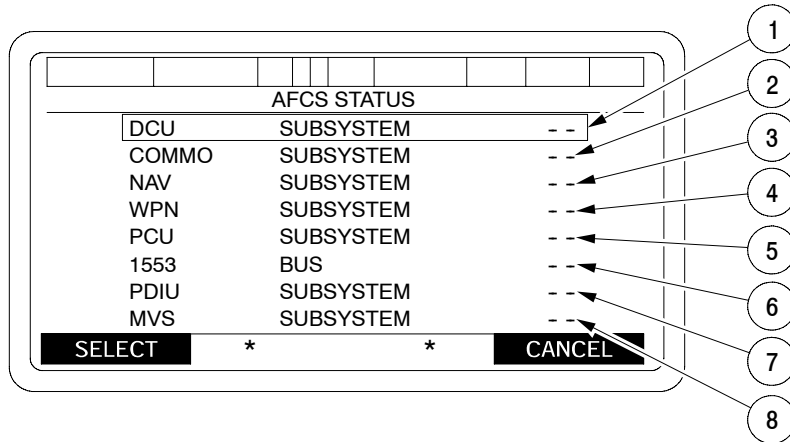
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### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

#### 3-2.3 AFCS BIT STATUS Test - Continued

#### NOTE

Selection box will normally be around DCU. Up/down Cursor keys will be active to move selection box to desired SUBSYSTEM.



- ① = (OK, DEGRADED, OUT)
- ② = (OK, DEGRADED, OUT)
- ③ = (OK, DEGRADED, OUT)
- ④ = (OK, DEGRADED, OUT)
- ⑤ = (OK, DEGRADED)
- ⑥ = (OK, DEGRADED, OUT)
- ⑦ = (OK, OUT)
- ⑧ = (OK, OUT, --) Where -- indicates that the AFCS could not connect to the MVS

**SELECT** = SELECT A SUBSYSTEM

**CANCEL** = CANCEL and return to SETUP AND INFORMATION menu or INTERNAL MAINTENANCE menu

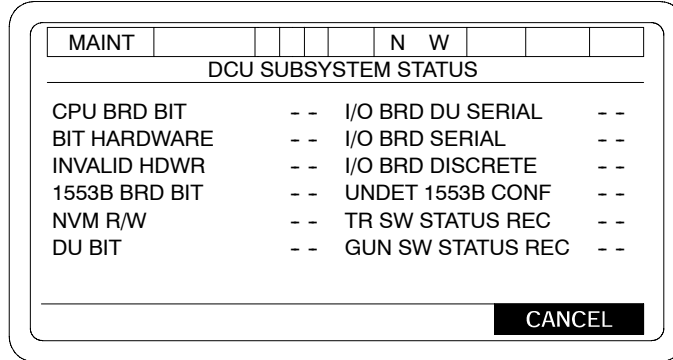
\* = No test appears for these softkeys. Pressing FUNCTION KEY 2 or 3 will clear ET SIMULATED FAILURES

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### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

#### 3-2.3 AFCS BIT STATUS Test - Continued

Select the desired SUBSYSTEM and that SUBSYSTEM STATUS menu will be displayed as indicated in the example below.



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-- = (OK, FAIL)

**CANCEL** = Return to the AFCS STATUS display

#### 3-2.3.1 PDFCS BIT STATUS Test.

The PDFCS STATUS menu will display the various subsystem faults. Using this fault list (showing Degraded Mode of each subsystem), you will be able to determine if Degraded Mode is acceptable depending on mission requirements.

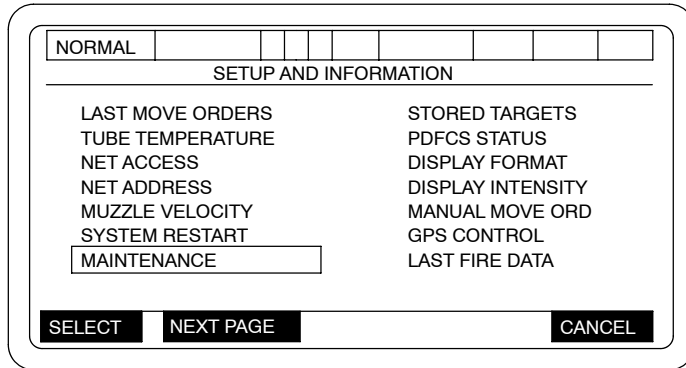
Certain degraded subsystems will not interfere with PDFCS operation or mission capability. It is important to know, however, which subsystem is degraded (and which BIT item has failed). Knowing which failure to compensate for/correct will allow you to carry on with your mission. The various LRUs communicate/send messages periodically within PDFCS. Whenever an LRU has not sent a message within a certain amount of time, the LRU timer sends an LRU FAILED message. In the event you get an LRU FAILED message, go into MAINTENANCE menu, and check PDFCS STATUS.

The PDFCS STATUS menu is used by unit maintenance personnel as well as by the operator. The operator must notify unit maintenance of any subsystem listed with a status of degraded or out, when no faults within that subsystem are indicated. Look at each subsystem carefully. Determine whether any subsystem displays a status other than zero. If so, then mission completion using the fully automated system is questionable. Select the subsystem in question. Further information will be displayed to help determine where the fault lies.

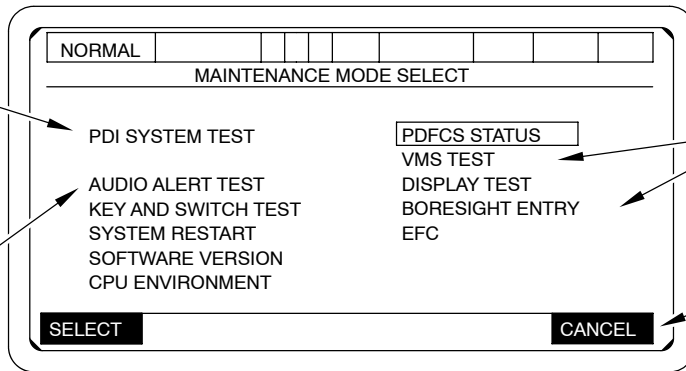
### 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

#### 3-2.3.1 PDFCS BIT STATUS Test - Continued

To enter the PDFCS STATUS menu select MAINTENANCE from the SETUP AND INFORMATION menu and the MAINTENANCE MODE SELECT menu will appear. Select PDFCS STATUS and the PDFCS STATUS menu will appear. The following three menus display the above selection process.



BLANK IF PDCU LRU NOT OPERATIONAL



BLANK IF CP NOT OPERATIONAL

BLANK IF NAV SUBSYSTEM NOT OPERATIONAL

ONLY PRESENT IF ENTERED FROM NORMAL OPERATIONAL MODE

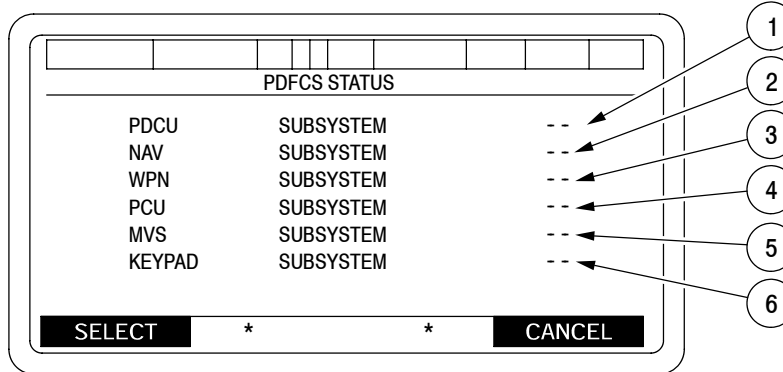
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**3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED**

**3-2.3.1 PDFCS BIT STATUS Test - Continued**

**NOTE**

Selection box will normally be around PDCU.  
Up/down Cursor keys will be active to move selection box to desired SUBSYSTEM.



- ① = (OK, DEGRADED, OUT)
- ② = (OK, DEGRADED, OUT)
- ③ = (OK, DEGRADED, OUT)
- ④ = (OK, DEGRADED, OUT)
- ⑤ = (OK, DEGRADED)
- ⑥ = (OK, DEGRADED, OUT)

- SELECT** = SELECT A SUBSYSTEM
- CANCEL** = CANCEL and return to SETUP AND INFORMATION menu or INTERNAL MAINTENANCE menu
- \* = No test appears for these softkeys. Pressing FUNCTION KEY 2 or 3 will clear ET SIMULATED FAILURES

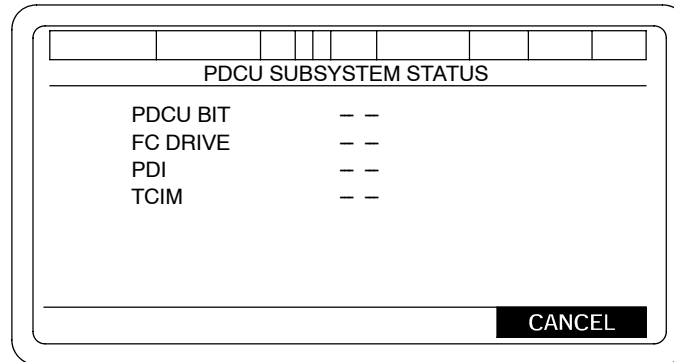
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## 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

### 3-2.3.1 PDFCS BIT STATUS Test - Continued

Select the desired SUBSYSTEM and that SUBSYSTEM STATUS menu will be displayed as indicated in the example below.



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### 3-2.4 AFCS Troubleshooting Fire Command.

There are AFCS troubleshooting trees that require entering a Fire Command to complete a step. To enter the Fire Command for these trees, the following steps must be performed:

- a. Turn vehicle MASTER power switch ON. Start vehicle and idle at 1000-1200 RPM (TM 9-2350-314-10).
- b. Power up the AFCS (TM 9-2350-314-10).
- c. Select Normal Operations with soft key pad.
- d. Enter information for items identified on DU by an asterisk with Use All key and answer all questions on screen.
- e. Enter Date Time Group.
- f. Select Fire Command and answer all questions on screen.
- g. Enter deflection (make sure a difference of 150 mils exists between Actual (ACTL) deflection and Command (CMD) deflection).

After completion of these steps, the AFCS troubleshooting tree (para 3-3.a) can be successfully completed. ■

## 3-2 QUICK GUIDE TO TROUBLESHOOTING - CONTINUED

### 3-2.4.1 PDFCS Troubleshooting Fire Command.

There are PDFCS troubleshooting trees that require entering a Fire Command to complete a step. To enter the Fire Command for these trees, the following steps must be performed:

- a. Turn vehicle MASTER power switch ON. Start vehicle and idle at 1000-1200 RPM (TM 9-2350-314-10).
- b. Power up the PDFCS (TM 9-2350-314-10).
- c. Select Normal Operations with soft key pad.
- d. Enter information for items identified on PDU by an asterisk with Use All key and answer all questions on screen.
- e. Enter Date Time Group.
- f. Select Fire Command and answer all questions on screen.
- g. Enter deflection (make sure a difference of 150 mils exists between Actual (ACTL) deflection and Command (CMD) deflection).

After completion of these steps, the PDFCS troubleshooting tree (para 3-3.k.1) can be successfully completed.

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### a. AFCS

The Automatic Fire Control System (AFCS) consists of the following major assemblies: AFCS Computer Unit (ACU), Power Conditioner Unit (PCU), Display Unit (DU), Backup Batteries, Azimuth Tachometer (Az Tach), Elevation Tachometer (EI Tach), Vehicle Motion Sensor (VMS) modem, Tube Temperature Sensor (TTS), Elevation Servo Valve, Azimuth Servo Valve, hydraulic components, Dynamic Reference Unit Hybrid (DRUH), and associated wiring. The relationship of these components is shown in the diagram below.

When the MASTER power switch is ON, 24 V dc is supplied to the slip ring, which passes it on to the PCU. The PCU augments the 24 V dc with power from the AFCS backup batteries, if required, and supplies the 24 V dc to the PDIU, ACU, DRUH, and radio rack connector.

The ACU provides 24 V dc to the VMS modem, the DRUH and the DU when the MASTER POWER switch is ON and the DU POWER switch is ON. With the DU POWER switch ON, the AFCS will power up and automatically perform its built-in test (BIT) and the AFCS STATUS will be displayed on the DU.

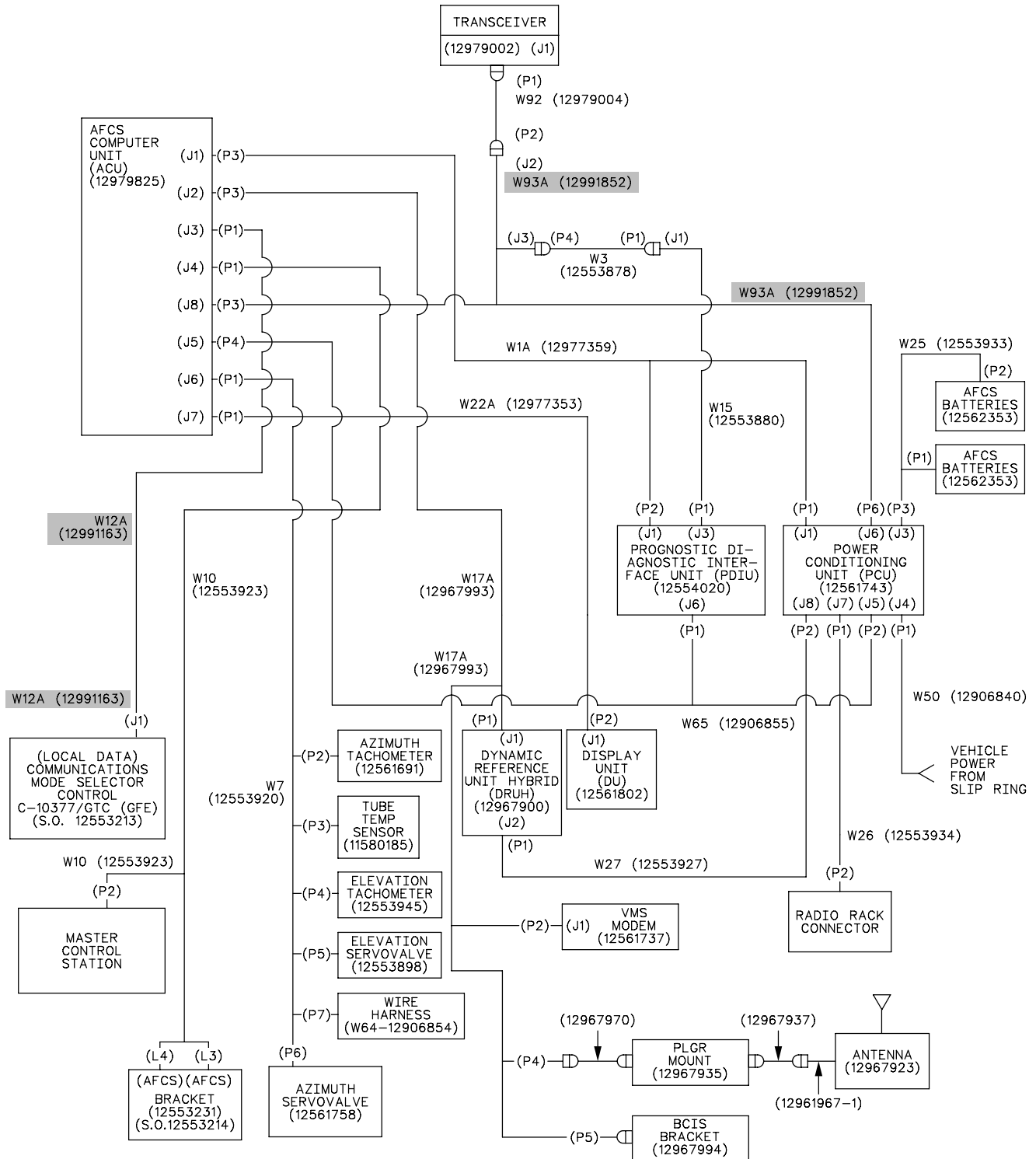
With the AFCS operating, the ACU supplies 24 V dc to the Az Tach, EI Tach, TTS, EI Servo Valve and Az Servo Valve. The Az Tach provides cab position feedback to the ACU while traversing to control the AZ SERVO valve. The EI Tach provides gun position feedback to the ACU while elevating the gun to control the EI Servo valve. The TTS provides gun tube temperature to the ACU.

With the AFCS operating, the ACU processes the incoming and outgoing messages from the Audio Frequency Amplifier and the Communications Mode Selector Control.

# 3-3. TROUBLESHOOTING CHART - CONTINUED

## a. AFCS - CONTINUED

**Figure A. AFCS Electrical Wiring Diagram**



### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.

<p><u>INITIAL SETUP</u></p> <p style="text-align: center;"><b>NOTE</b></p> <p>When performing AFCS troubleshooting use only the SPORT for the Paladin M109A6 which includes a Digital Multimeter (DMM), and the PCMCIA Card, P/N 710833-1.</p> <p><b>For vehicles with W1-W13-W1E power harness configuration -</b> Run TB 9-2350-314-20-2-1 M109A6 Accessory Software, "AFCS TROUBLESHOOTING", Single test "AFCS Power problem/DU Out". (W1-W13-W1E Configuration)</p>	<p><b>For vehicles with W1A power harness configuration -</b> Run TB 9-2350-314-20-2-1 M109A6 Accessory Software, "AFCS TROUBLESHOOTING" Single test "AFCS Power problem/DU Out". (W1A Configuration)</p> <p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)              Multimeter (item 24, Appx G)              TA1 probe kit (item 42, Appx G)              Sport accessory kit (item 57, Appx G)              AN/PSM-95 Electronic system test set (Sport) (item 58, Appx G)</p>
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**NOTE**

Some vehicles have a power cable harness configuration that consists of W1, W13, and W1E.

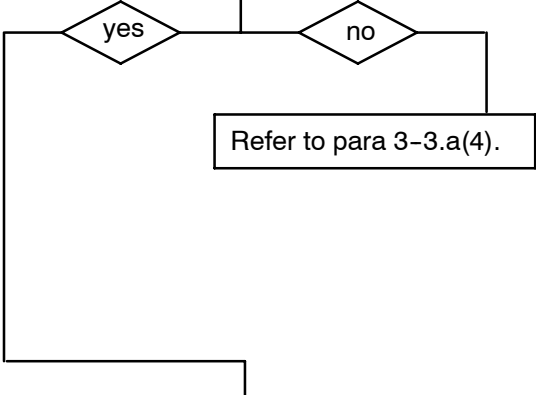
Other vehicles have a power cable harness configuration that consists of W1A.

Be sure to follow the correct steps during these procedures.

**A**

1. Turn vehicle MASTER power switch on (TM 9-2350-314-10).
2. Make sure all PCU circuit breakers are in the on position (TM 9-2350-314-10).

Is the PCU VEHICLE POWER lamp ON?



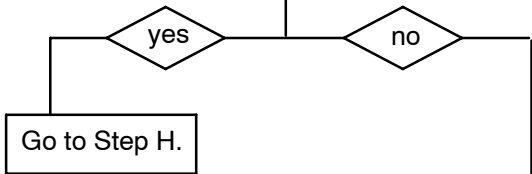
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

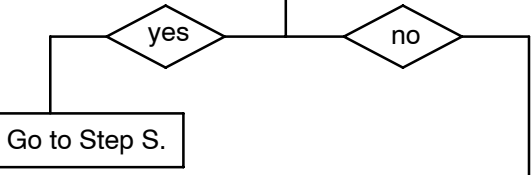
a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP A

**B** Attempt to turn DU POWER switch ON (TM 9-2350-314-10).  
Does the DU POWER switch stay in the ON position?

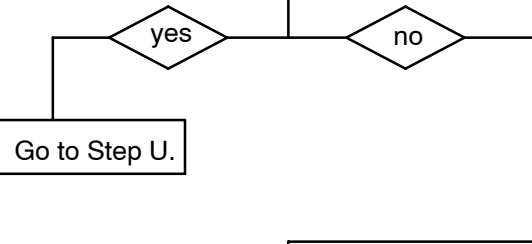


**C** Observe the green POWER lamp on the ACU.  
Does the green POWER lamp on the ACU come ON for approximately 45 seconds and then go OFF?

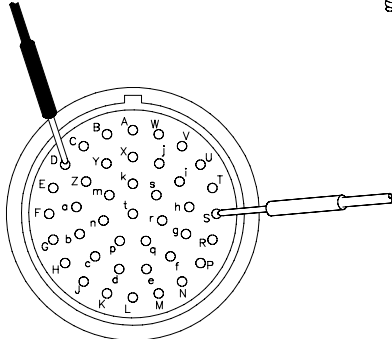
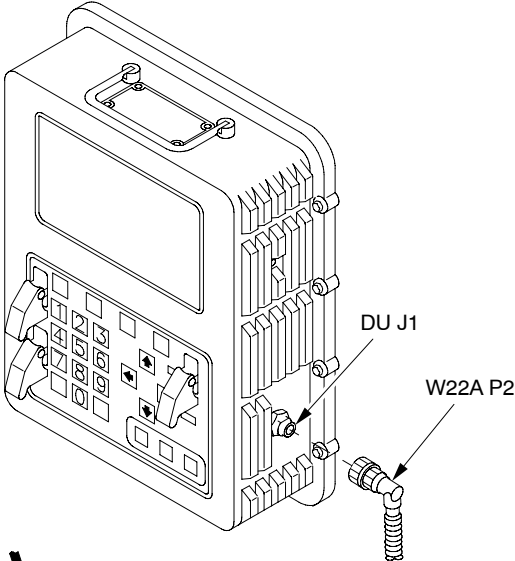


**D** 1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).  
2. Disconnect harness W22A connector P2 at DU connector J1.  
3. Place multimeter red lead in harness W22A connector P2 socket S and black lead in harness W22A connector P2 socket D.  
4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).  
5. Measure the DC Voltage (V dc).

Is the voltage greater than 18 V dc?



CONTINUED ON NEXT PAGE



W22A  
CONNECTOR P2  
SOCKET S  
SOCKET D

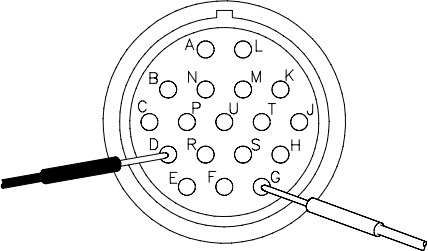
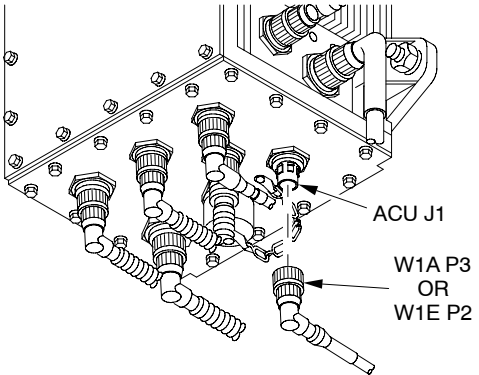
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP D

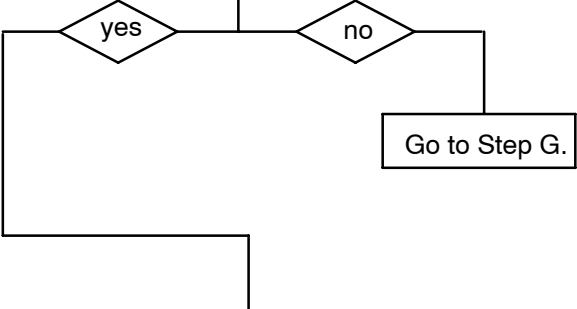
- E** **For vehicles with W1-W13-W1E harness configuration:**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W1E connector P2 at ACU connector J1.
  3. Place multimeter red lead in harness W1E connector P2 socket G and black lead in harness W1E connector P2 socket D.
  4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  5. Measure the DC Voltage (V dc).
- For vehicles with W1A harness configuration:**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W1A connector P3 at ACU connector J1.
  3. Place multimeter red lead in harness W1A connector P3 socket G and black lead in harness W1A connector P3 socket D.
  4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  5. Measure the DC voltage (V dc).



W1A CONNECTOR P3 OR W1E P2  
SOCKET G and D

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Is the voltage greater than 18 V dc?



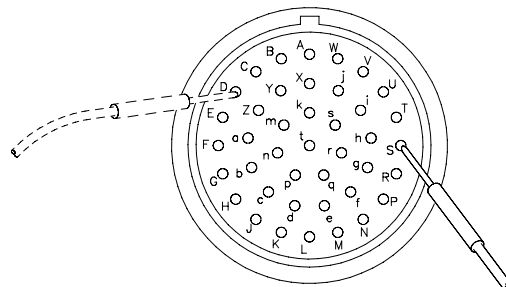
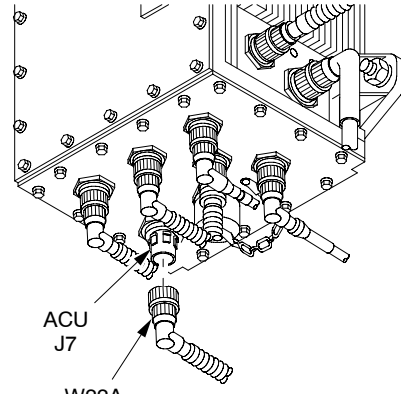
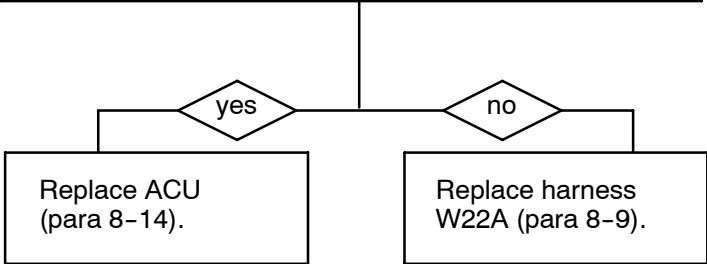
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

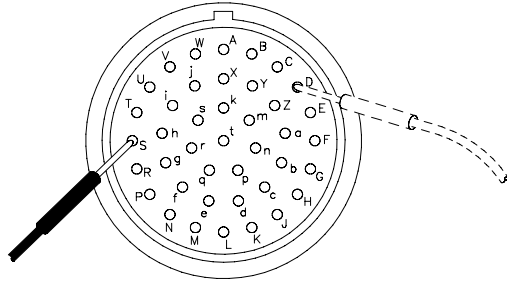
a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP E

<b>F</b>	<ol style="list-style-type: none"> <li>1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>2. Disconnect harness W22A connector P1 at ACU connector J7.</li> <li>3. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>						
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Point A</td> <td style="width: 50%; text-align: center;">Point B</td> </tr> <tr> <td style="padding: 2px 5px;">Connector P2 socket S</td> <td style="padding: 2px 5px;">Connector P1 pin S</td> </tr> <tr> <td style="padding: 2px 5px;">Connector P2 socket D</td> <td style="padding: 2px 5px;">Connector P1 pin D</td> </tr> </table>	Point A	Point B	Connector P2 socket S	Connector P1 pin S	Connector P2 socket D	Connector P1 pin D
Point A	Point B						
Connector P2 socket S	Connector P1 pin S						
Connector P2 socket D	Connector P1 pin D						
<p style="text-align: center;">Is there continuity at both points (resistance less than 10 ohms)?</p>							



W22A  
CONNECTOR P2  
SOCKET S  
(SOCKET D)



W22A  
CONNECTOR P1  
PIN S  
(PIN D)

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CONTINUED ON NEXT PAGE



### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP E

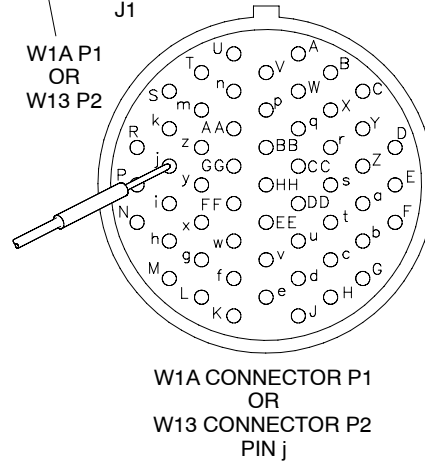
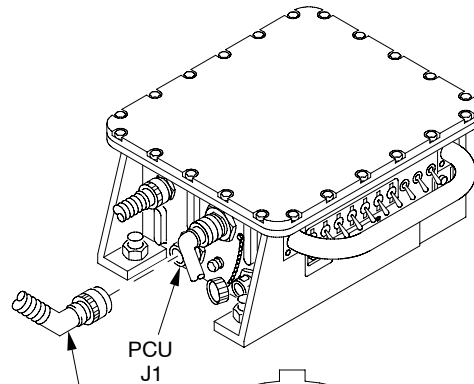
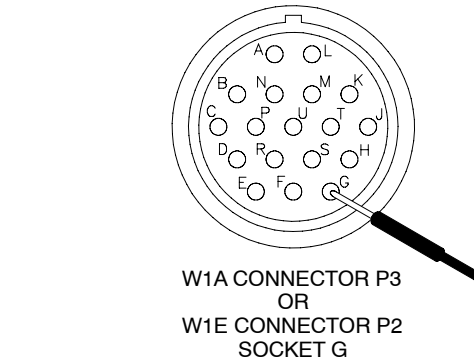
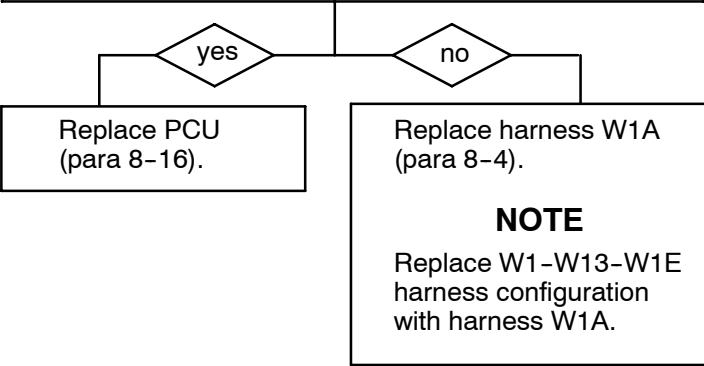
**G** For vehicles with W1-W13-W1E harness configuration:

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W13 connector P2 at PCU connector J1.
3. Place one multimeter lead in harness W1E connector P2 socket G and other lead in harness W13 connector P2 pin j.
4. Check for continuity.

For vehicles with W1A harness configuration:

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W1A connector P1 at PCU connector J1.
3. Place one multimeter lead in harness W1A connector P3 socket G and other lead in harness W1A connector P1 pin j.
4. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



06pc052t

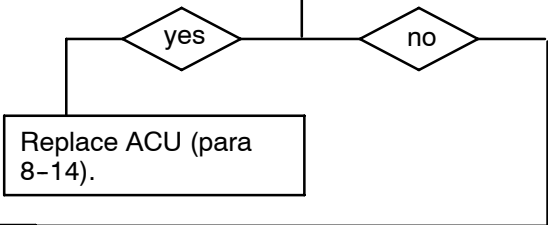
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP B

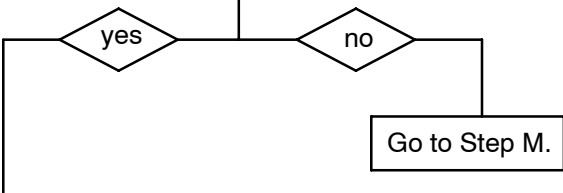
**H** Observe the DU POWER switch for at least 45 seconds.

Does the DU POWER switch trip after approximately 45 seconds?



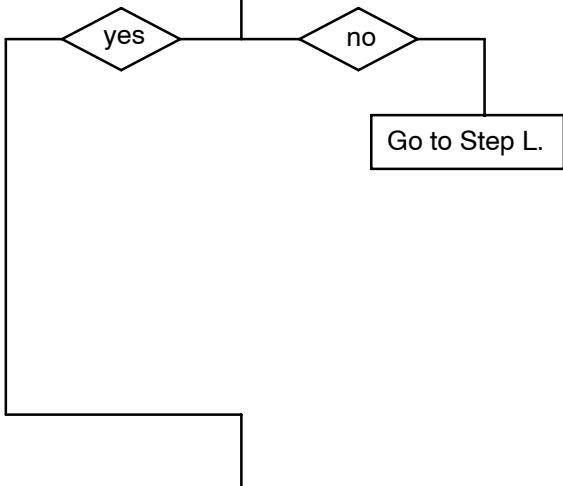
**I** Check PCU BUS A lamp.

Is the PCU BUS A lamp ON?



**J** Check ACU green POWER lamp.

Is the ACU green POWER lamp ON?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

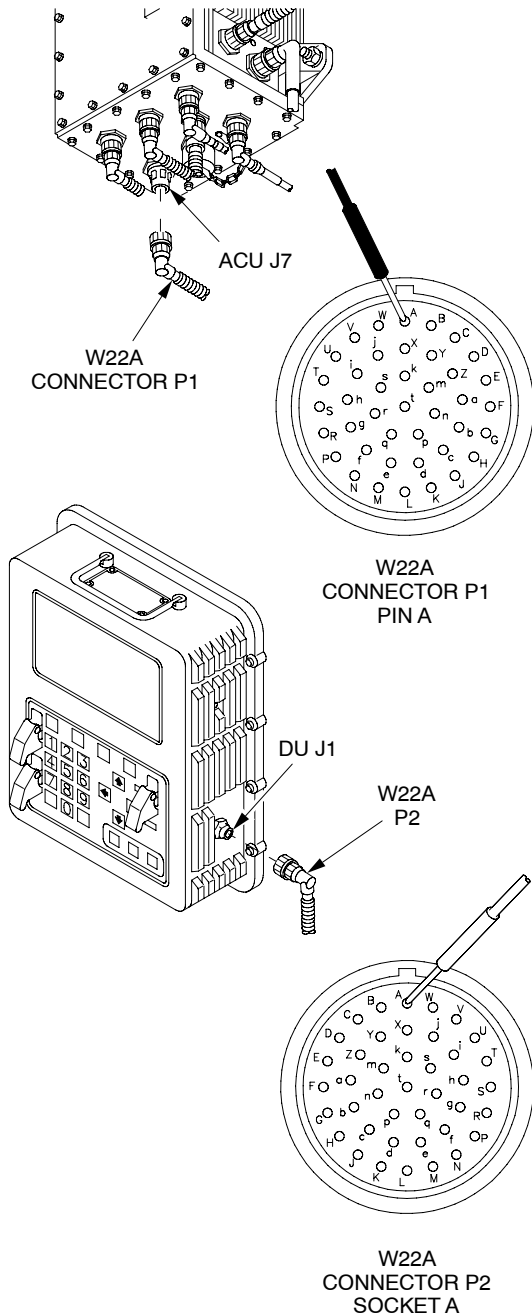
CONTINUED FROM STEP J

**K**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W22A connector P1 at ACU connector J7.
3. Disconnect harness W22A connector P2 at DU connector J1.
4. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P1 pin A	Connector P2 socket A
Connector P1 pin B	Connector P2 socket B
Connector P1 pin C	Connector P2 socket C
Connector P1 pin D	Connector P2 socket D
Connector P1 pin G	Connector P2 socket G
Connector P1 pin H	Connector P2 socket H
Connector P1 pin J	Connector P2 socket J
Connector P1 pin K	Connector P2 socket K

Is there continuity at all points (resistance less than 10 ohms)?



yes
no

**NOTE**

Running the Automated Diagnostic Tests will isolate this failure to one LRU automatically.

1. Replace ACU (para 8-14).
2. After re-testing the AFCS if the problem still occurs replace DU (para 8-17).

Replace harness W22A (para 8-9).

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP J

**L For vehicles with W1-W13-W1E harness configuration:**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W13 connector P2 at PCU connector J1.
3. Disconnect harness W1E connector P2 at ACU connector J1.
4. Check harness W1, W13, W1E for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A

Point B

W1E Connector P2 socket A	W13 Connector P2 pin d
W1E Connector P2 socket B	W13 Connector P2 pin e
W1E Connector P2 socket C	W13 Connector P2 pin f
W1E Connector P2 socket D	W13 Connector P2 pin g
W1E Connector P2 socket E	W13 Connector P2 pin h
W1E Connector P2 socket F	W13 Connector P2 pin i

**For vehicles with W1A harness configuration:**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W1A connector P1 at PCU connector J1.
3. Disconnect harness W1A connector P3 at ACU connector J1.
4. Check harness W1A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A

Point B

W1A Connector P3 socket A	W1A Connector P1 pin d
W1A Connector P3 socket B	W1A Connector P1 pin e
W1A Connector P3 socket C	W1A Connector P1 pin f
W1A Connector P3 socket D	W1A Connector P1 pin g
W1A Connector P3 socket E	W1A Connector P1 pin h
W1A Connector P3 socket F	W1A Connector P1 pin i

Is there continuity at all points (resistance less than 10 ohms)?

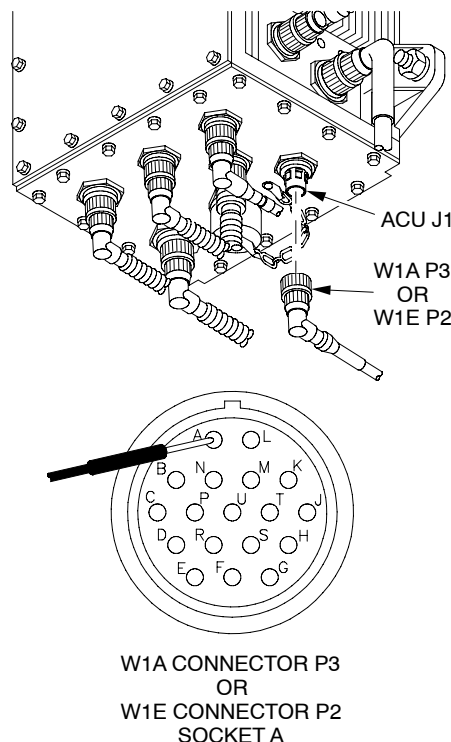
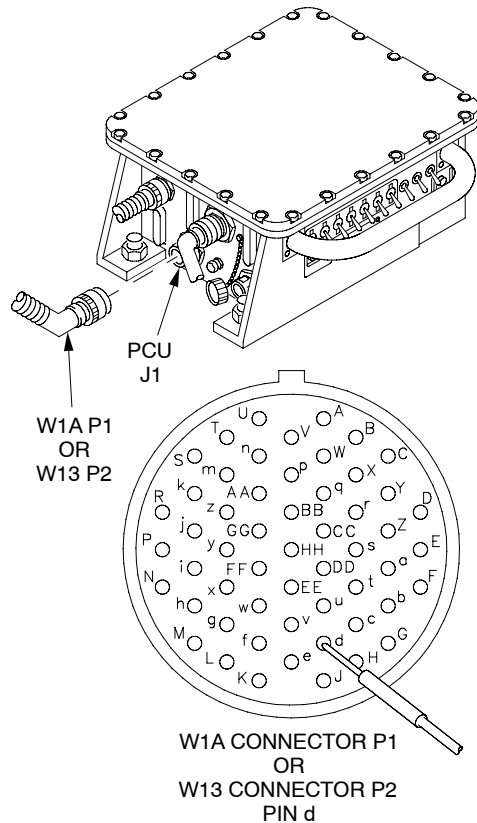
yes

no

Replace ACU (para 8-14).

**NOTE**

Replace W1-W13-W1E harness configuration with harness W1A.  
Replace harness W1A (para 8-4).



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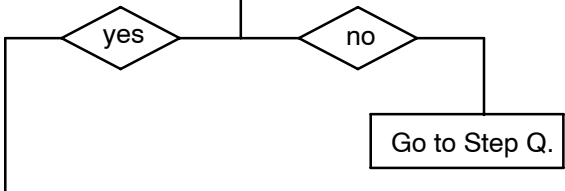
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP I

**M** Check PCU BUS A circuit breaker.

Did the PCU BUS A circuit breaker (CB10) trip?



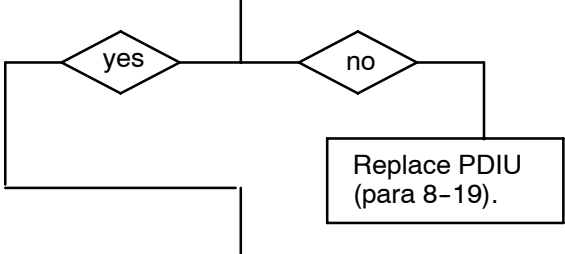
**N** **For vehicles with W1-W13-W1E harness configuration:**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W13 connector P1 at PDIU connector J1.
3. Turn PCU BUS A circuit breaker (CB10) ON (TM 9-2350-314-10).
4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
5. Turn DU POWER switch ON (TM 9-2350-314-10).

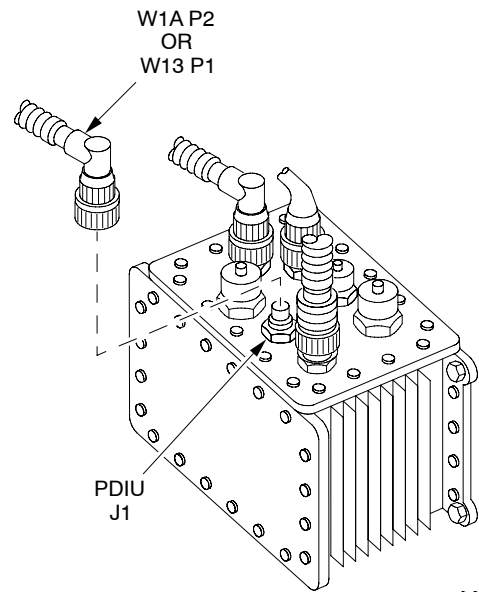
**For vehicles with W1A harness configuration:**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W1A connector P2 at PDIU connector J1.
3. Turn PCU BUS A circuit breaker (CB10) ON (TM 9-2350-314-10).
4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
5. Turn DU POWER switch ON (TM 9-2350-314-10).

Did the PCU BUS A circuit breaker (CB10) trip?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP N

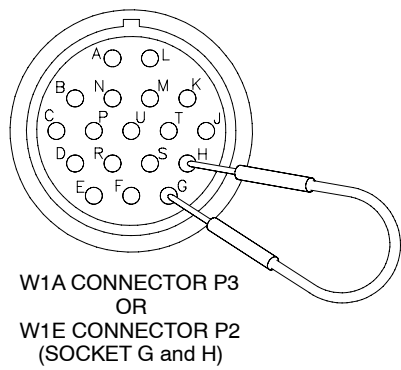
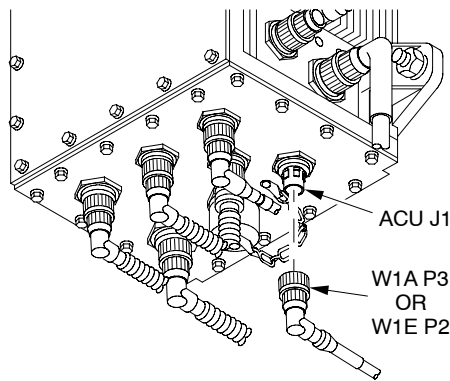
**O** **For vehicles with W1-W13-W1E harness configuration:**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W1E connector P2 at ACU connector J1.
3. Connect jumper wire between harness W1E connector P2 sockets G and H.
4. Turn PCU BUS A circuit breaker (CB10) ON (TM 9-2350-314-10).
5. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).

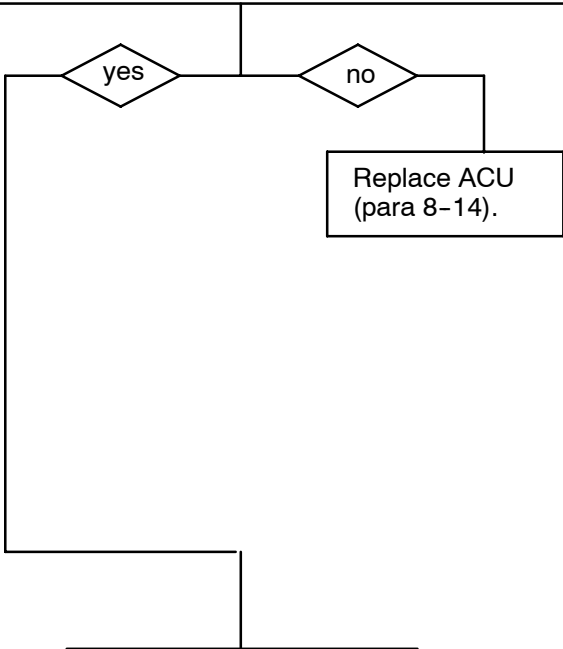
**For vehicles with W1A harness configuration:**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W1A connector P3 at ACU connector J1.
3. Connect jumper wire between harness W1A connector P3 sockets G and H.
4. Turn PCU BUS A circuit breaker (CB10) ON (TM 9-2350-314-10).
5. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).

Did the PCU BUS A circuit breaker (CB10) trip?



06pc058t



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP O

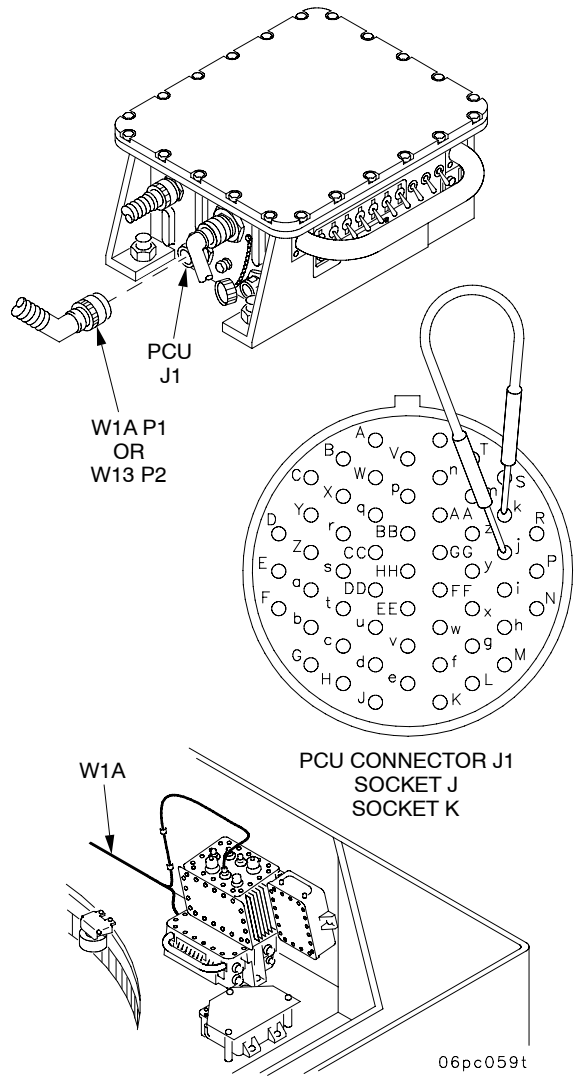
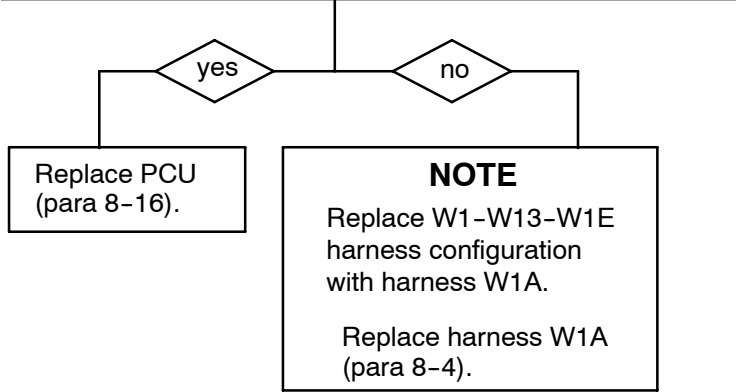
**P** **For vehicles with W1-W13-W1E harness configuration:**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect jumper wire from between harness W1E connector P2 sockets G and H.
3. Disconnect harness W13 connector P2 at PCU connector J1.
4. Connect jumper wire between PCU connector J1 sockets j and k.
5. Turn PCU BUS A circuit breaker (CB10) ON (TM 9-2350-314-10).
6. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).

**For vehicles with W1A harness configuration:**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect jumper wire from between harness W1A connector P3 sockets G and H.
3. Disconnect harness W1A connector P1 at PCU connector J1.
4. Connect jumper wire between PCU connector J1 sockets j and k.
5. Turn PCU BUS A circuit breaker (CB10) ON (TM 9-2350-314-10).
6. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).

Did the PCU BUS A circuit breaker (CB10) trip?



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**3-3. TROUBLESHOOTING CHART - CONTINUED**

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP M

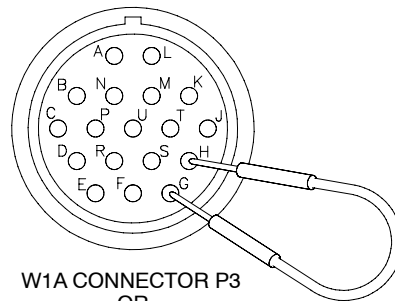
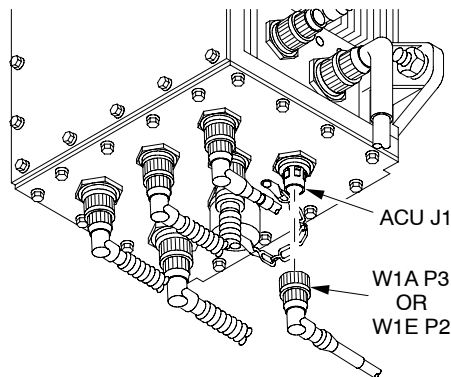
**Q** For vehicles with W1-W13-W1E harness configuration:

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W1E connector P2 at ACU connector J1.
3. Connect jumper wire between harness W1E connector P2 sockets G and H.
4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).

**For vehicles with W1A harness configuration:**

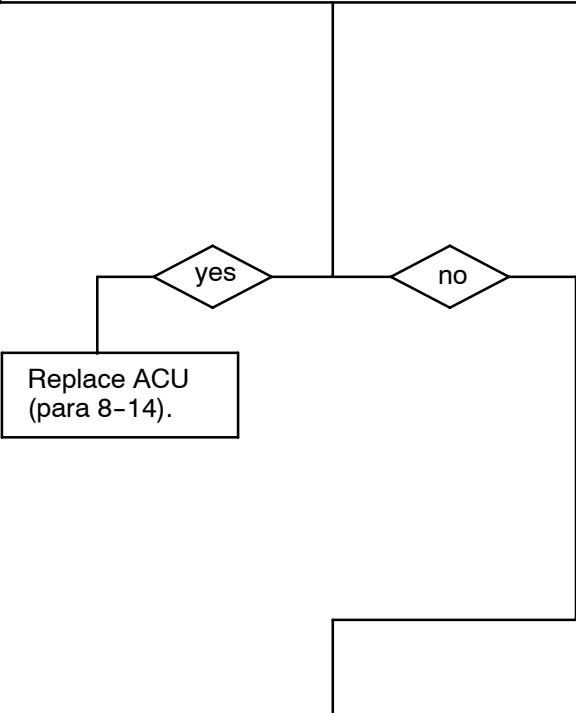
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W1A connector P3 at ACU connector J1.
3. Connect jumper wire between harness W1A connector P3 sockets G and H.
4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).

Is the PCU BUS A lamp ON?



W1A CONNECTOR P3 OR W1E CONNECTOR P2 (SOCKET G and H)

06pc058t



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP Q

**R** **For vehicles with W1-W13-W1E harness configuration:**

1. Turn vehicle MASTER power switch OFF.
2. Disconnect jumper wire between harness W1E connector P2 sockets G and H.
3. Disconnect harness W13 connector P2 at PCU connector J1.
4. Check harness W1, W13, W1E for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

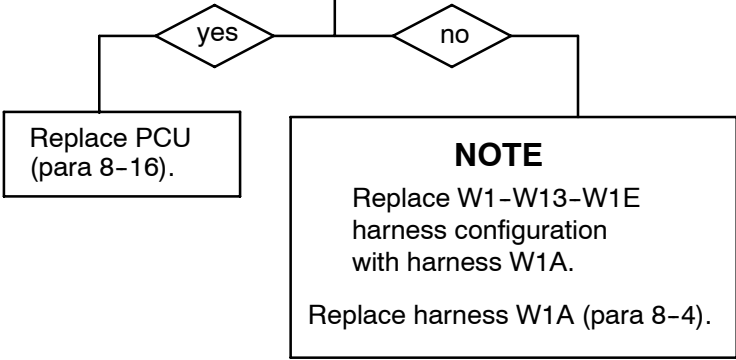
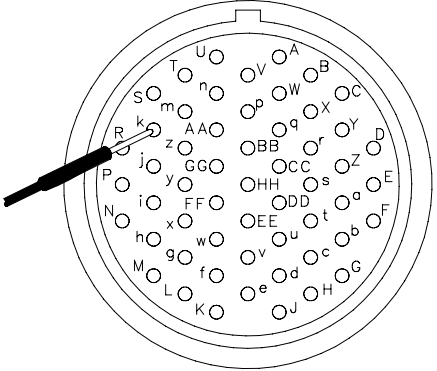
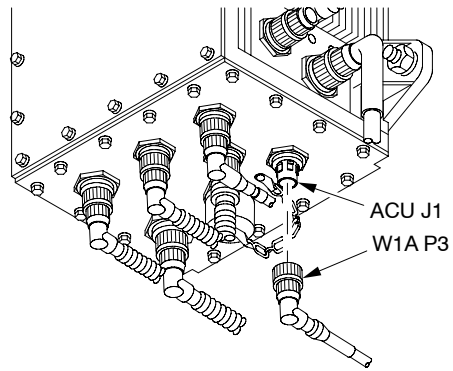
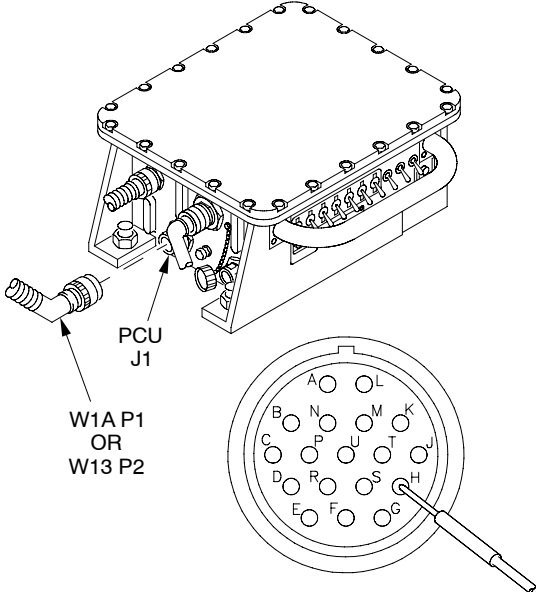
Point A Point B  
W1E Connector P2 socket H W13 Connector P2 pin k

**For vehicles with W1A harness configuration:**

1. Turn vehicle MASTER power switch OFF.
2. Disconnect jumper wire between harness W1A connector P3 sockets G and H.
3. Disconnect harness W1A connector P1 at PCU connector J1.
4. Check harness W1A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A Point B  
W1A Connector P3 socket H W1A Connector P1 pin k

Is there continuity at all points (resistance less than 10 ohms)?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

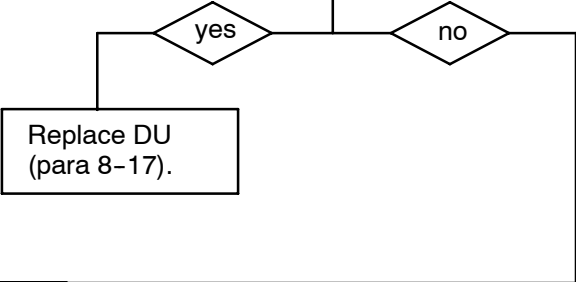
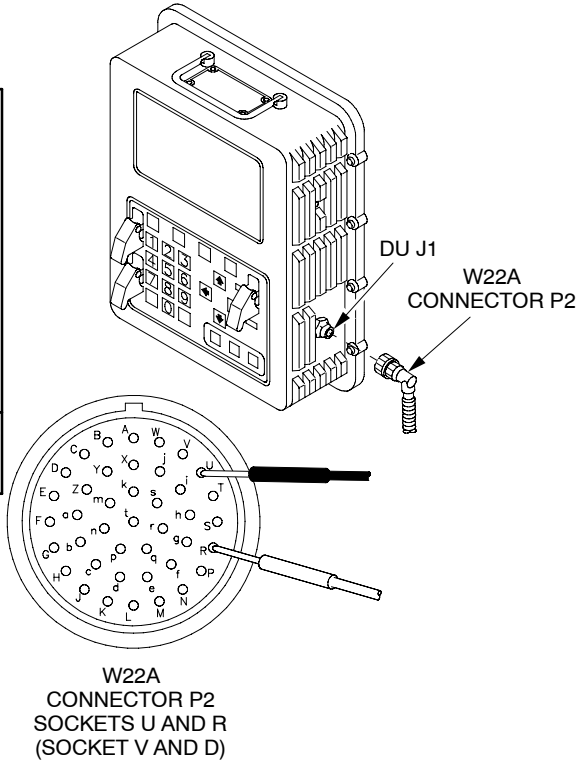
CONTINUED FROM STEP C

**S**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W22A connector P2 at DU connector J1.
3. Check for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W22A Connector P2 socket U	W22A Connector P2 pin R
W22A Connector P2 socket V	W22A Connector P2 pin D

Is there continuity at all points (resistance less than 10 ohms)?

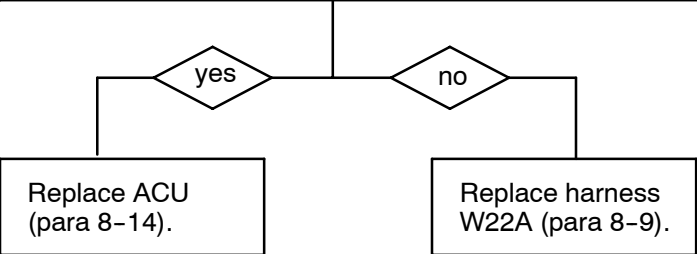
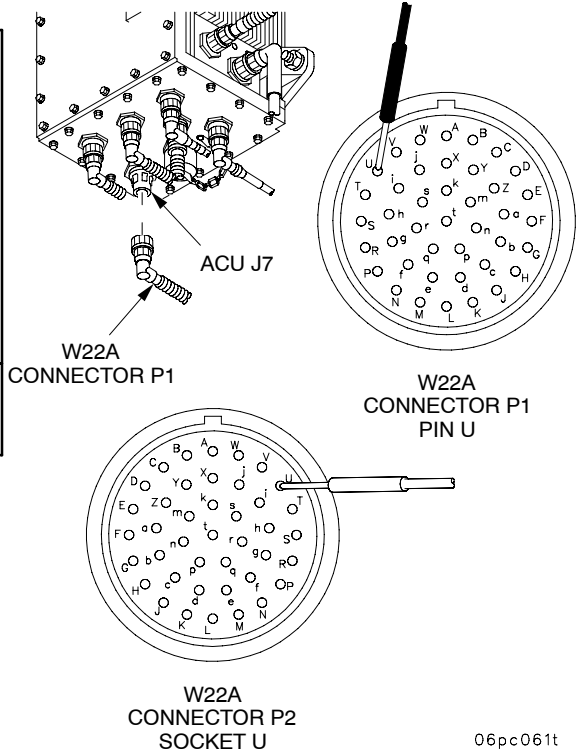


**T**

1. Disconnect harness W22A connector P1 at ACU connector J7.
2. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W22A Connector P2 socket U	W22A Connector P1 pin U
W22A Connector P2 socket R	W22A Connector P1 pin R
W22A Connector P2 socket V	W22A Connector P1 pin V
W22A Connector P2 socket D	W22A Connector P1 pin D

Is there continuity at all points (resistance less than 10 ohms)?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

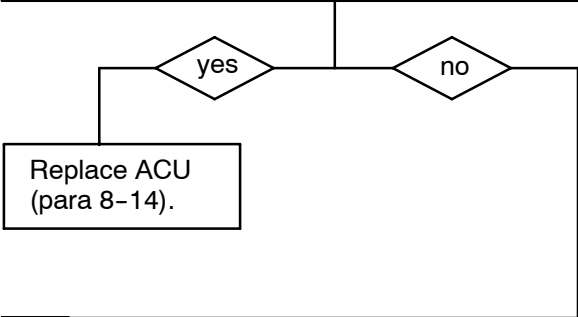
a. AFCS - CONTINUED (1) AFCS WILL NOT POWER UP, AFCS WILL NOT STAY POWERED UP, OR NO DU DISPLAY.- CONTINUED

CONTINUED FROM STEP D

**U**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Connect harness W22A connector P2 to DU connector J1.
3. Disconnect harness W22A connector P1 at ACU connector J7.
4. Place one multimeter lead in harness W22A P1 connector pin S and other lead in harness W22A P1 connector pin R.
5. Turn ON and HOLD ON the DU POWER switch.
6. Check for continuity.

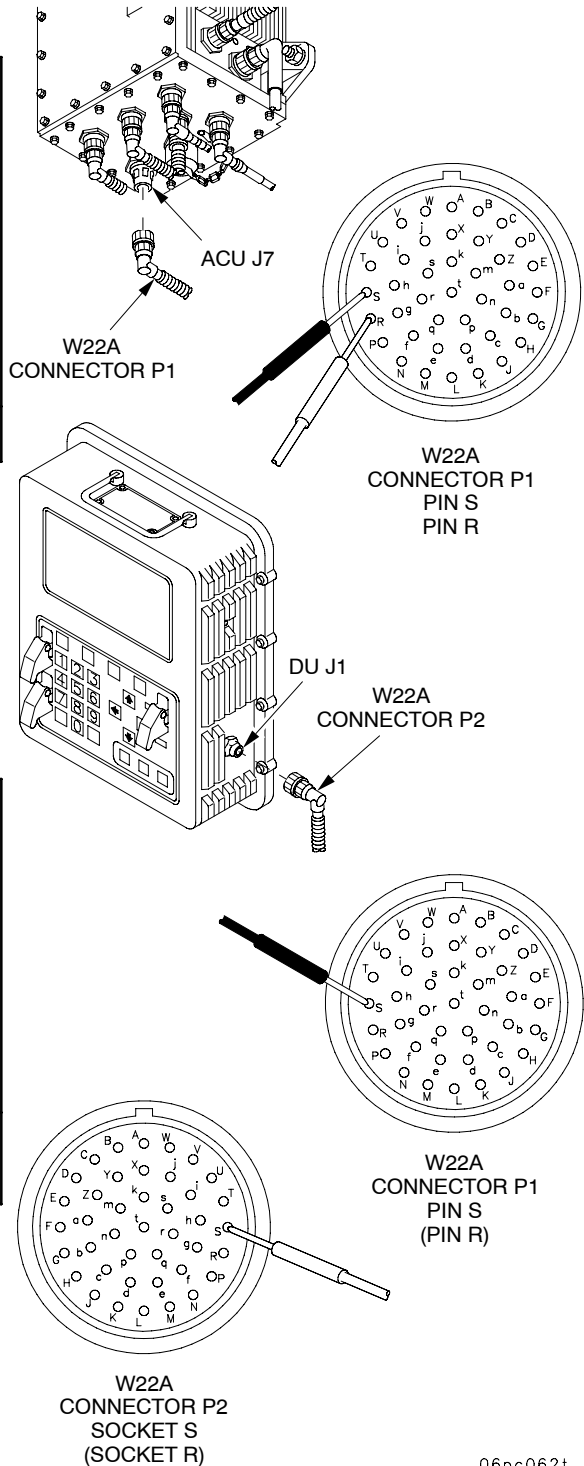
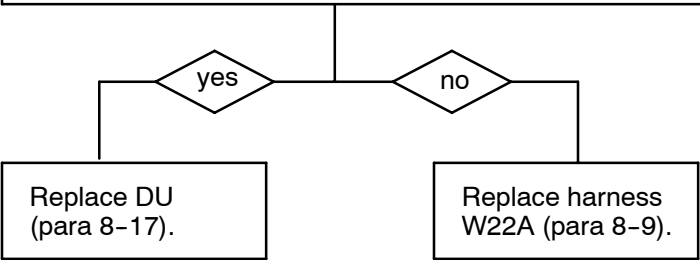
Is there continuity (resistance less than 10 ohms)?



**V**

1. Disconnect harness W22A connector P2 at DU connector J1.
2. Place one multimeter lead in harness W22A connector P2 socket S and other lead in harness W22A connector P1 pin S.
3. Check for continuity.
4. Place one multimeter lead in harness W22A connector P2 socket R and other lead in harness W22A connector P1 pin R.
5. Check for continuity.

Is there continuity at all points (resistance less than 10 ohms)?



06pc062t

**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (2) PDIU OUT ON SYSTEM POWER UP.

**INITIAL SETUP**

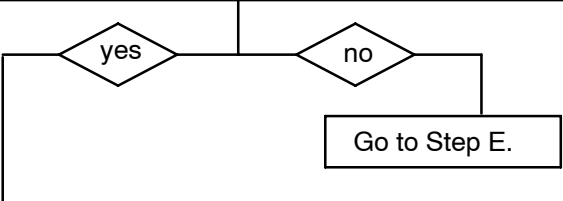
Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

- Some vehicles have a power cable harness configuration that consists of W1, W13, and W1E.
- Other vehicles have a power cable harness configuration that consists of W1A.
- Be sure to follow the correct steps during these procedures.

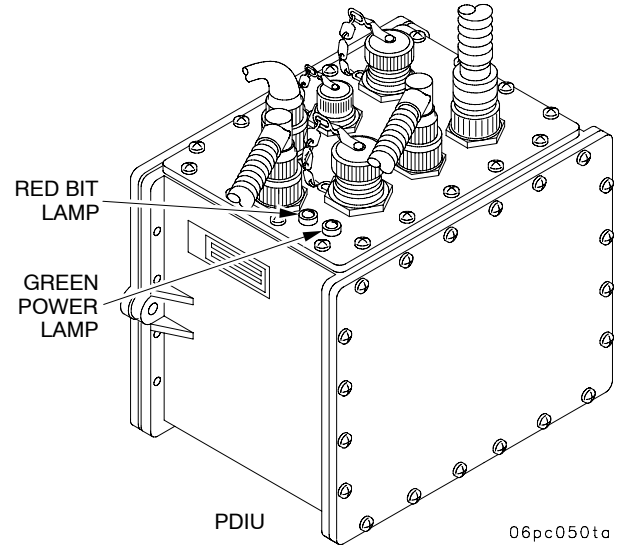
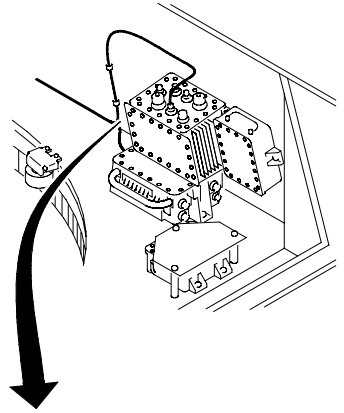
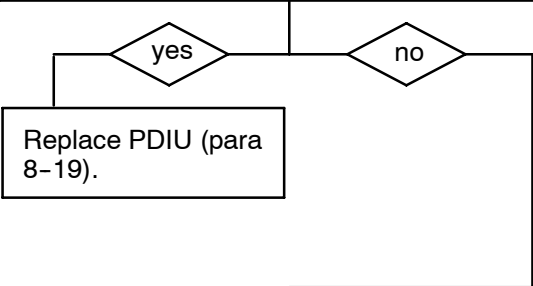
- A**
1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  2. Make sure all PCU circuit breakers are in the ON position (TM 9-2350-314-10).
  3. Turn DU POWER switch ON (TM 9-2350-314-10).

Is the PDIU green POWER lamp ON?



**B** Check lamps on PDIU.

Is the PDIU red BIT lamp lit?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

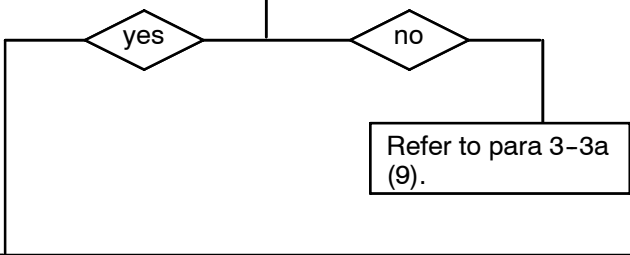
a. AFCS - CONTINUED (2) PDIU OUT ON SYSTEM POWER UP. - CONTINUED

CONTINUED FROM STEP B

**C** Check lamps on PDIU.

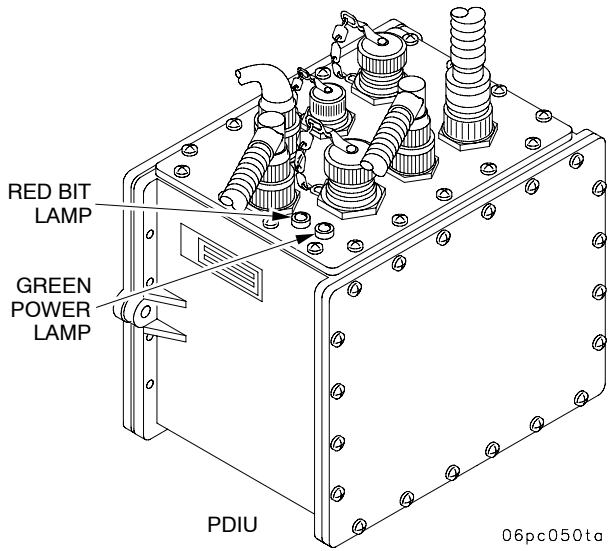
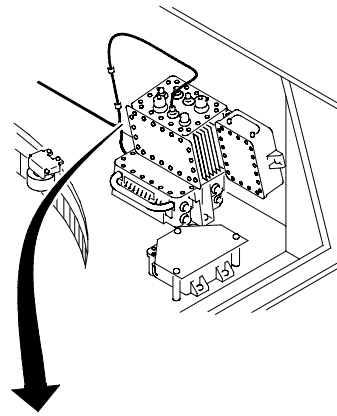
---

Is the PDIU red bit lamp blinking?



**D**

1. Perform PDIU Reprogramming Procedures (TB 9-2350-314-20-2-1, M109A6 Software CD)
2. Re-verify failure.
3. If failure still occurs, replace PDIU (para 8-19).



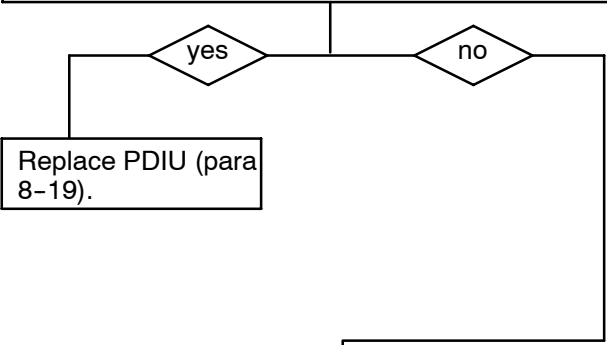
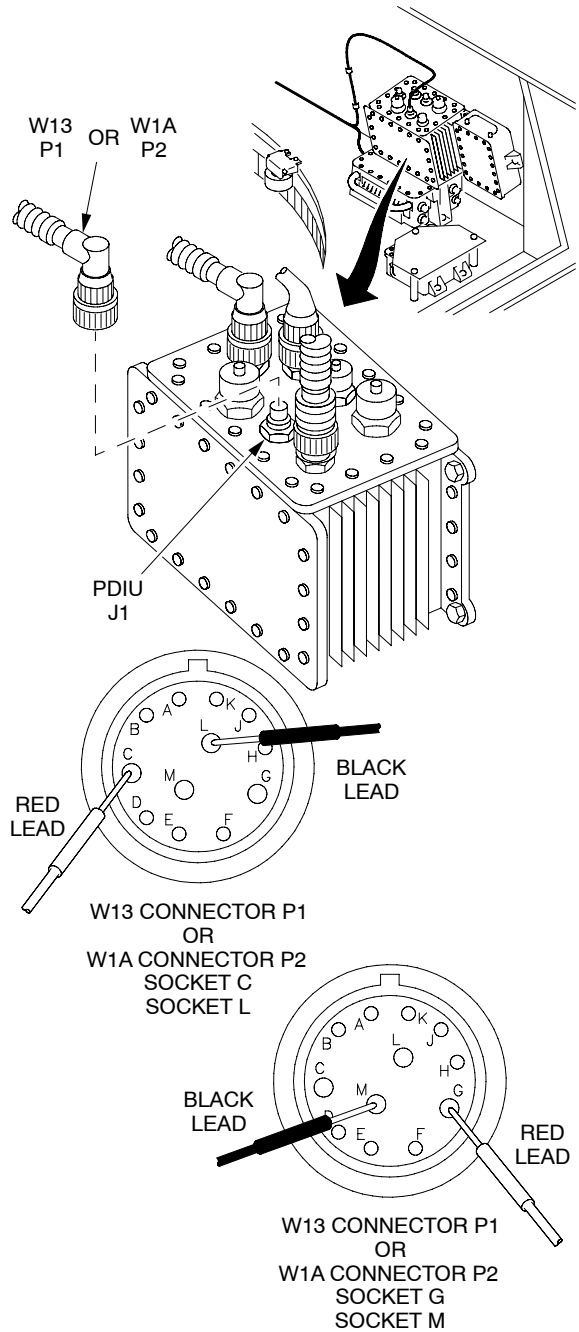
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (2) PDIU OUT ON SYSTEM POWER UP. - CONTINUED

CONTINUED FROM STEP A

- E For vehicles with W1-W13-W1E configuration:**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W13 connector P1 at PDIU connector J1.
  3. Turn vehicle MASTER power switch and DU POWER switch ON (TM 9-2350-314-10).
  4. Place multimeter red lead in harness W13 connector P1 socket C and black lead in harness W13 connector P1 socket L.
  5. Measure the DC Voltage (V dc).
  6. Place multimeter red lead in harness W13 connector P1 socket G and black lead in harness W13 connector P1 socket M.
  7. Measure the DC Voltage (V dc).
- For vehicles with W1A configuration:**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W1A connector P2 at PDIU connector J1.
  3. Turn vehicle MASTER power switch and DU POWER switch ON (TM 9-2350-314-10).
  4. Place multimeter red lead in harness W1A connector P2 socket C and black lead in harness W1A connector P2 socket L.
  5. Measure the DC Voltage (V dc).
  6. Place multimeter red lead in harness W1A connector P2 socket G and black lead in harness W1A connector P2 socket M.
  7. Measure the DC Voltage (V dc).
- Is the voltage at all points greater than 18 V dc?



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (2) PDIU OUT ON SYSTEM POWER UP. - CONTINUED

CONTINUED FROM STEP E

**F** For vehicles with W1-W13-W1E configuration:

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W13 connector P2 at PCU connector J1.
3. Check harness W13 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

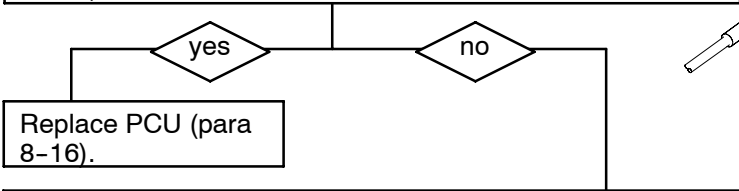
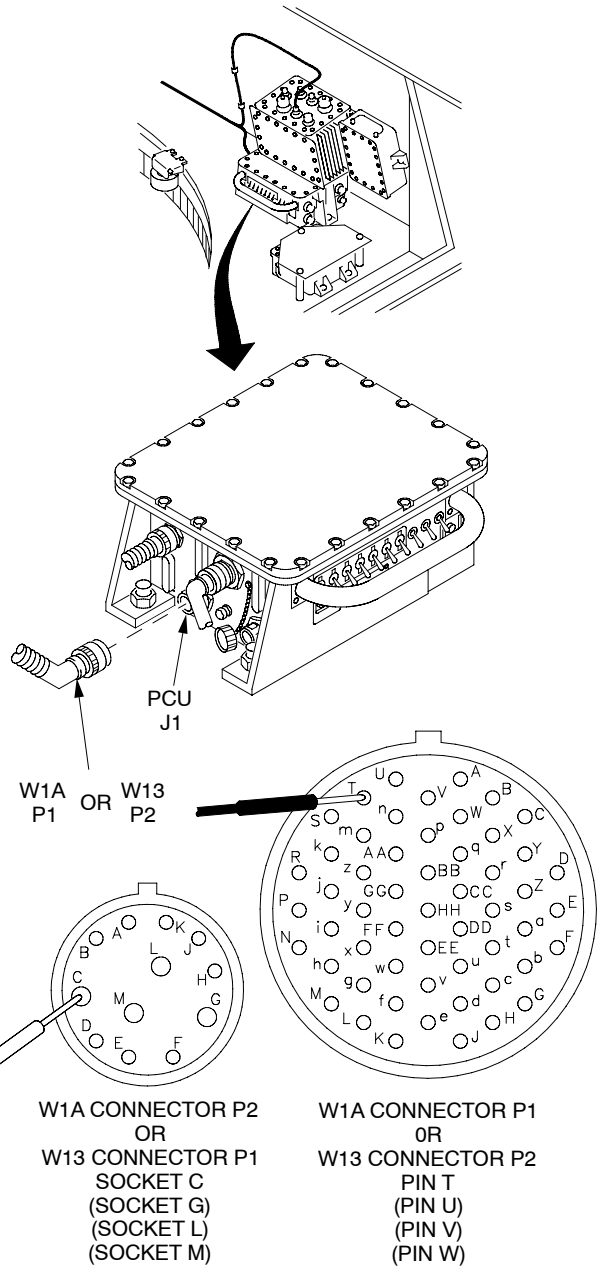
Point A	Point B
W13 Connector P1 socket C	W13 Connector P2 pin T
W13 Connector P1 socket G	W13 Connector P2 pin U
W13 Connector P1 socket L	W13 Connector P2 pin V
W13 Connector P1 socket M	W13 Connector P2 pin W

**For vehicles with W1A configuration:**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W1A connector P1 at PCU connector J1.
3. Check harness W1A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W1A Connector P2 socket C	W1A Connector P1 pin T
W1A Connector P2 socket G	W1A Connector P1 pin U
W1A Connector P2 socket L	W1A Connector P1 pin V
W1A Connector P2 socket M	W1A Connector P1 pin W

Is there continuity at all points (resistance less than 10 ohms)?



**NOTE**

Replace W1-W13-W1E harness configuration with harness W1A.

Replace harness W1A (para 8-4).

**END OF TASK**

**3-3. TROUBLESHOOTING CHART - CONTINUED**

**DELETED**



**3-3. TROUBLESHOOTING CHART - CONTINUED**

**DELETED**

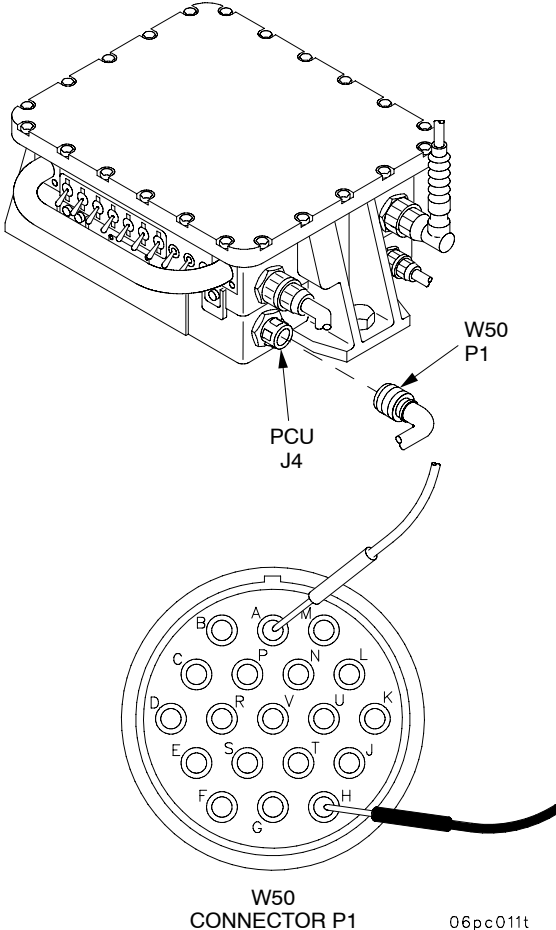
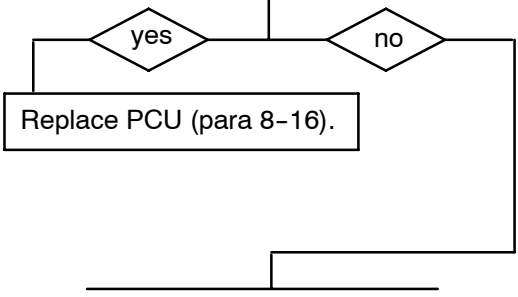
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (4) PCU WILL NOT POWER UP.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

- A**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W50 connector P1 from PCU connector J4.
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  4. Check harness W50 for voltage by placing multimeter red lead on Point 1 and black lead on Point 2.
- | Point 1  | Point 2  |
|----------|----------|
| Socket A | Socket H |
| Socket B | Socket J |
| Socket C | Socket K |
| Socket D | Socket L |
| Socket E | Socket M |
| Socket F | Socket N |
| Socket G | Socket P |
5. Check for DC voltage (V dc).
- Is voltage greater than 18 V dc at all points?



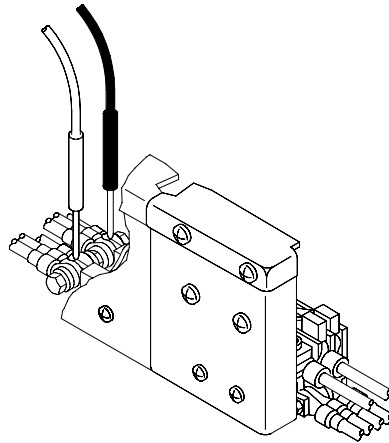
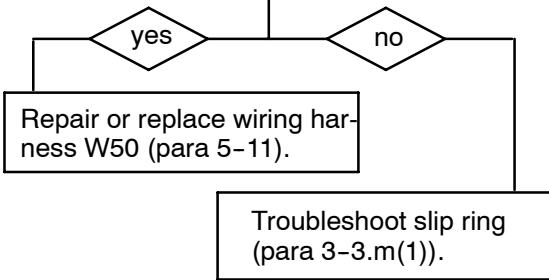
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**3-3. TROUBLESHOOTING CHART - CONTINUED**

a. AFCS - CONTINUED (4) PCU WILL NOT POWER UP. - CONTINUED

CONTINUED FROM STEP A

<b>B</b>	<ol style="list-style-type: none"> <li>1. Remove shields below brush blocks 3 and 4 (para 23-1).</li> <li>2. Check harness W50 for voltage by placing multimeter red lead on harness W50 lead 100 at connection to brush block 3 and black lead on harness W50 lead 70 at the connection to brush block 3.</li> <li>3. Check for DC voltage (V dc).</li> </ol>
<p>Is voltage greater than 18 V dc?</p>	



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**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (5) DCU DEGRADED ON POWER UP.

<p><b>INITIAL SETUP</b></p> <p style="text-align: center;"><b>NOTE</b></p> <p>When performing AFCS troubleshooting use only the SPORT for the Paladin M109A6 which includes a Digital Multimeter (DMM), and the PCMCIA Card, P/N 710833-1.</p> <p>Run TB 9-2350-314-20-2-1 M109A6 Accessory Software, "AFCS TROUBLESHOOTING," single test "DCU DEGRADED on Power Up." Run PDIU AFCS Tests.</p>	<p><b>Tools</b></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)                  AN/PSM-95 Electronic system test set (Sport) (item 58, Appx G)                  Sport accessory kit (item 57, Appx G)</p>
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**NOTE**

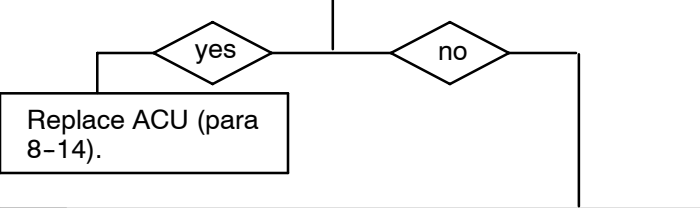
If no BIT positions are set and DU fault lamp is ON, replace ACU when mission allows.

**A** Turn vehicle MASTER power switch PCU circuit breakers, and DU POWER switch ON (TM 9-2350-314-10).

Enter Maintenance mode and select the AFCS STATUS screen and select the DCU SUBSYSTEM STATUS.

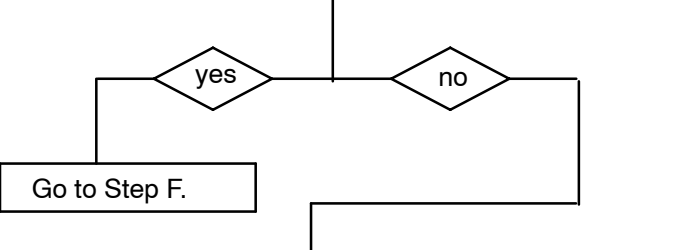
Are any of the following items FAILED ?

CPU BOARD BIT BIT HARDWARE INVALID HDWR 1553 BOARD BIT	NVM R/W I/O BD DISCRTE I/O BOARD SERIAL UNDET 1553B CONF
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**B** Continue checking the DCU SUBSYSTEM STATUS.

Is the TR SW STATUS REC FAILED ?



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**3-3. TROUBLESHOOTING CHART - CONTINUED**

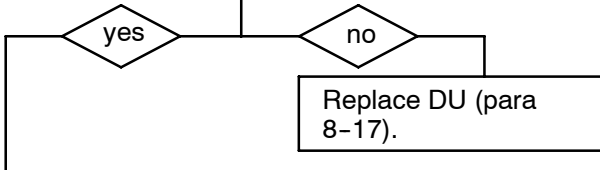
a. AFCS - CONTINUED

(5) DCU DEGRADED ON POWER UP. - CONTINUED

CONTINUED FROM STEP B

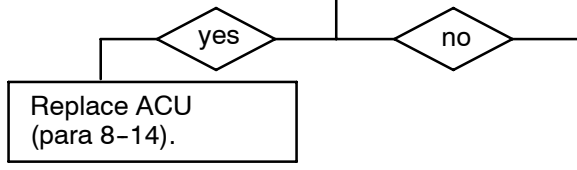
**C** Continue checking the DCU SUBSYSTEM STATUS.

Is the GUN SW STATS REC FAILED ?



- D**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W22A connector P1 from ACU connector J7.
  3. Turn DU GUN switch ON (TM 9-2350-314-10).
  4. Place one multimeter lead in harness W22A connector P1 pin N and other lead in harness W22A connector P1 pin P.
  5. Check for continuity.

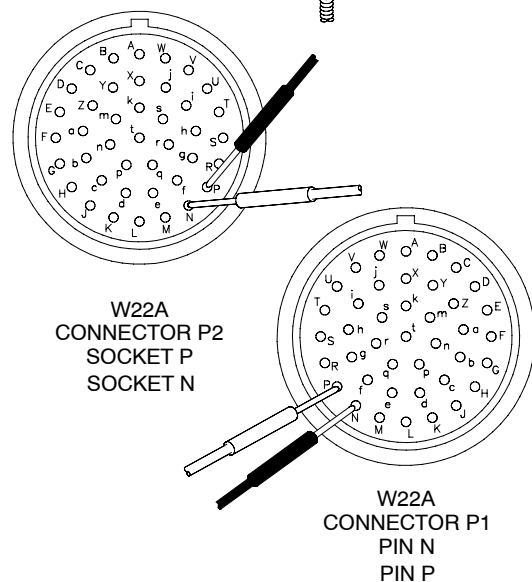
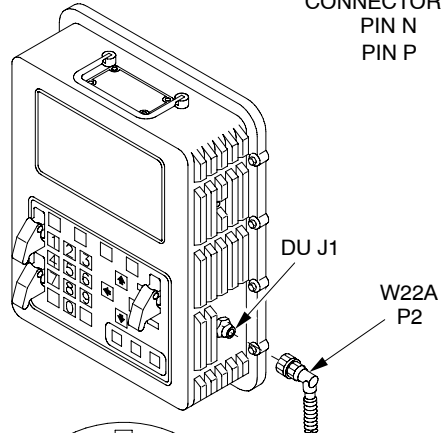
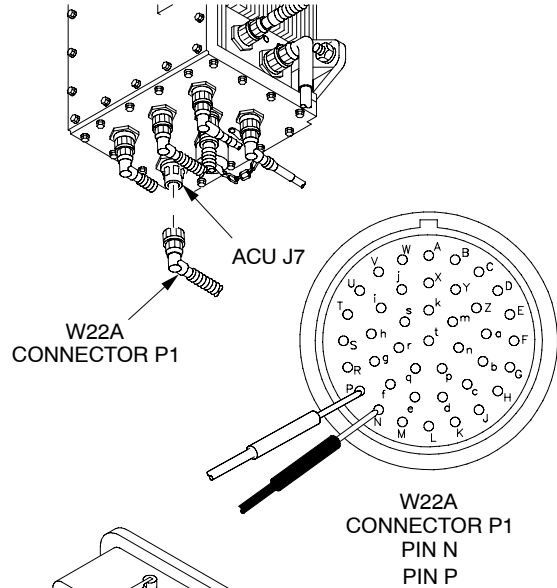
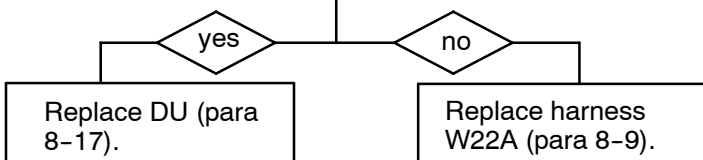
Is there continuity (resistance less than 10 ohms)?



- E**
1. Disconnect harness W22A connector P2 from DU connector J1.
  2. Check harness W22A for continuity by placing one multimeter lead on point A and other multimeter lead on point B.

Point A	Point B
W22A Connector P2 socket N	W22A Connector P1 pin N
W22A Connector P2 socket P	W22A Connector P1 pin P

Is there continuity at all points (resistance less than 10 ohms)?



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (5) DCU DEGRADED ON POWER UP. - CONTINUED

CONTINUED FROM STEP B

- F**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W22A connector P1 from ACU connector J7.
  3. Turn DU Training Switch ON (TM 9-2350-314-10).
  4. Place one multimeter lead in harness W22A connector P1 pin L and other lead in harness W22A connector P1 pin M.
  5. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



Replace ACU  
(para 8-14).

- G**
1. Disconnect harness W22A connector P2 from DU connector J1.
  2. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A Point B

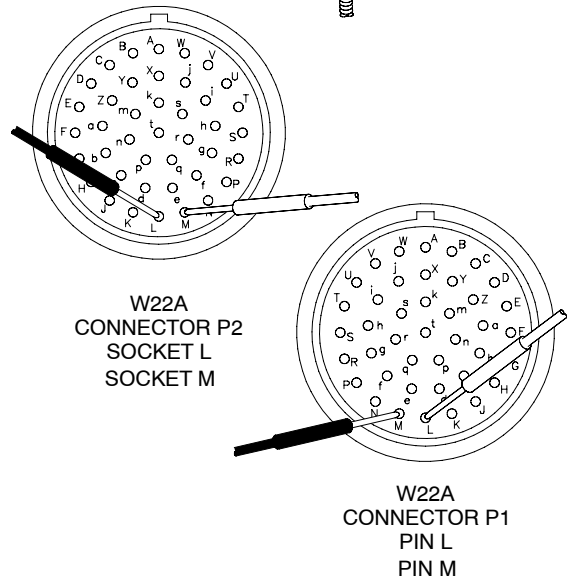
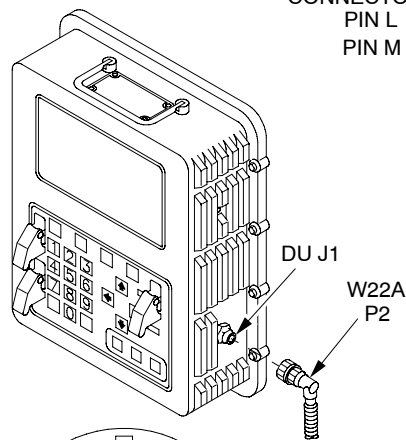
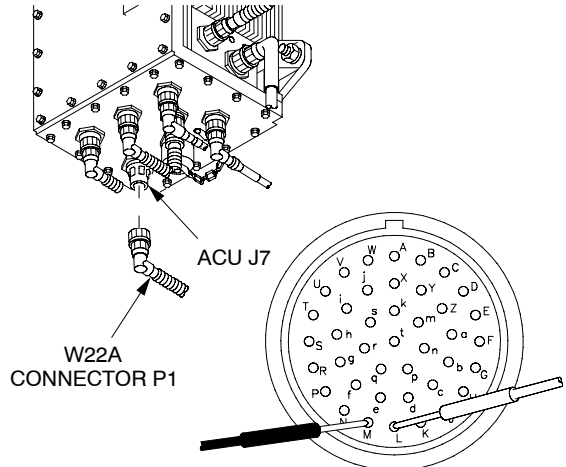
W22A Connector P2 socket L    W22A Connector P1 pin L  
W22A Connector P2 socket M    W22A Connector P1 pin M

Is there continuity at all points (resistance less than 10 ohms)?



Replace DU  
(para 8-17).

Replace harness  
W22A (para 8-9).



**END OF TASK**

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT.

**INITIAL SETUP**

**NOTE**

When performing AFCS troubleshooting use only the SPORT for the Paladin M109A6 which includes a Digital Multimeter (DMM), and the PCMCIA Card, P/N 710833-1.

Run TB 9-2350-314-20-2-1 M109A6 Accessory Software, "AFCS TROUBLESHOOTING," single test "Weapon Degraded or Out."

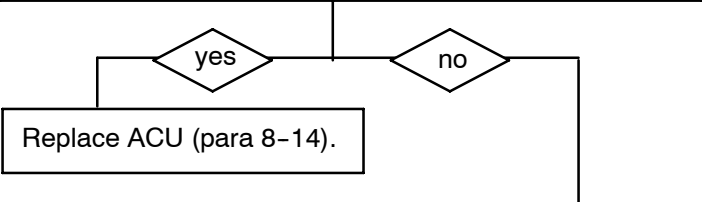
Tools

Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)  
 AN/PSM-95 Electronic system test set (Sport) (item 58, Appx G)  
 Sport accessory kit (item 57, Appx G)

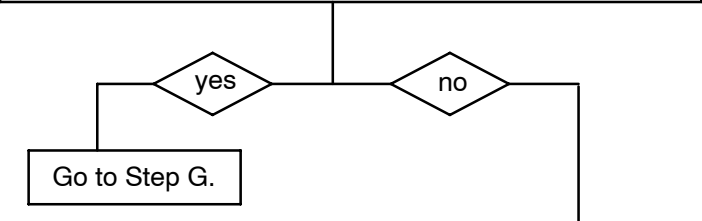
- A**
1. Turn vehicle MASTER power switch and DU POWER switch ON (TM 9-2350-314-10).
  2. Enter MAINTENANCE MODE and select the AFCS STATUS screen and select the WPN SUBSYSTEM STATUS.

Are any of the following items FAILED?

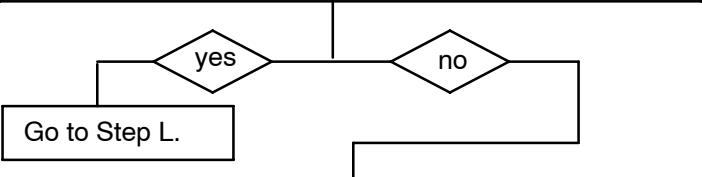
BIT RECEIVED  
 NVM R/W  
 ADC BIT



- B** Continue checking the WPN SUBSYSTEM STATUS.
- Is the TUBE TEMP BIT FAILED?



- C** Continue checking the WPN SUBSYSTEM STATUS.
- Are the AZ VOLT or AZ CURRENT FAILED?



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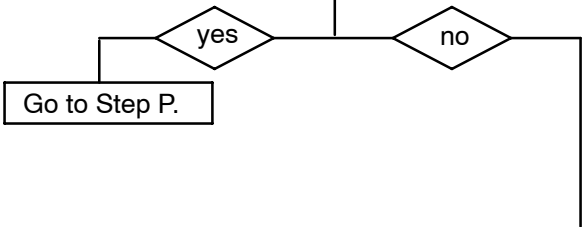


### 3-3. TROUBLESHOOTING CHART - CONTINUED

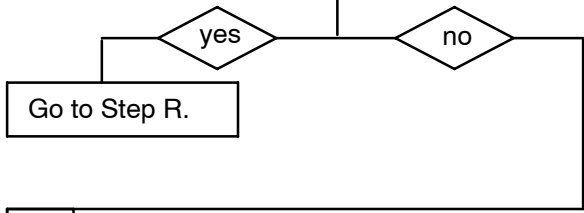
a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP C

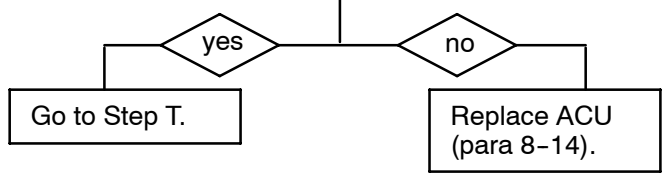
<b>D</b>	Continue checking the WPN SUBSYSTEM STATUS.
Are the EL VOLT or EL CURRENT FAILED?	



<b>E</b>	Continue checking the WPN SUBSYSTEM STATUS.
Is the AZ TACH FAILED?	



<b>F</b>	Continue checking the WPN SUBSYSTEM STATUS.
Is the EL TACH FAILED?	



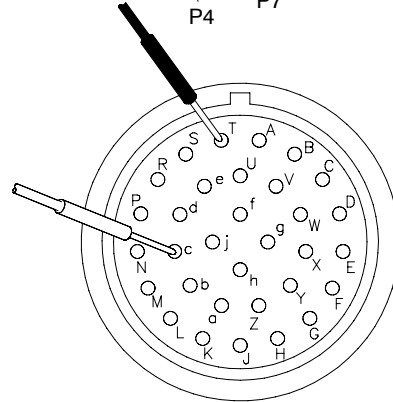
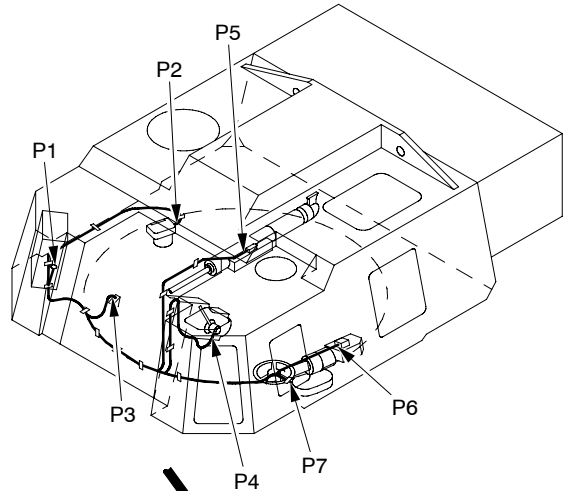
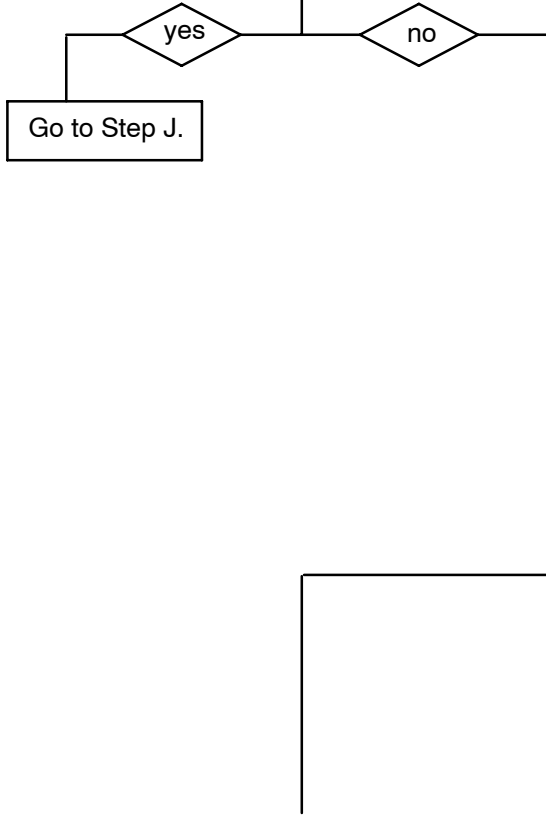
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP B

<b>G</b>	<ol style="list-style-type: none"> <li>1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>2. Disconnect harness W7 connector P1 from ACU connector J6.</li> <li>3. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>						
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Point A</td> <td style="width: 50%; text-align: center;">Point B</td> </tr> <tr> <td style="text-align: center;">W7 Connector P1 pin T</td> <td style="text-align: center;">W7 Connector P1 pin c</td> </tr> <tr> <td style="text-align: center;">W7 Connector P1 pin U</td> <td style="text-align: center;">W7 Connector P1 pin d</td> </tr> </table>	Point A	Point B	W7 Connector P1 pin T	W7 Connector P1 pin c	W7 Connector P1 pin U	W7 Connector P1 pin d
Point A	Point B						
W7 Connector P1 pin T	W7 Connector P1 pin c						
W7 Connector P1 pin U	W7 Connector P1 pin d						
	<p>Is there continuity at all points (resistance less than 10 ohms)?</p>						



W7  
CONNECTOR P1  
PIN T and PIN c  
(PIN U and PIN d)

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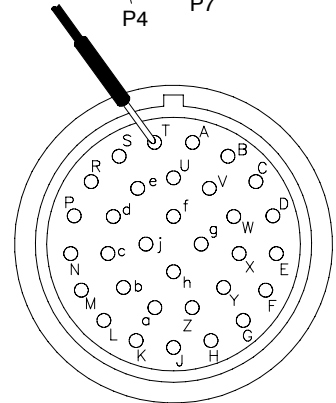
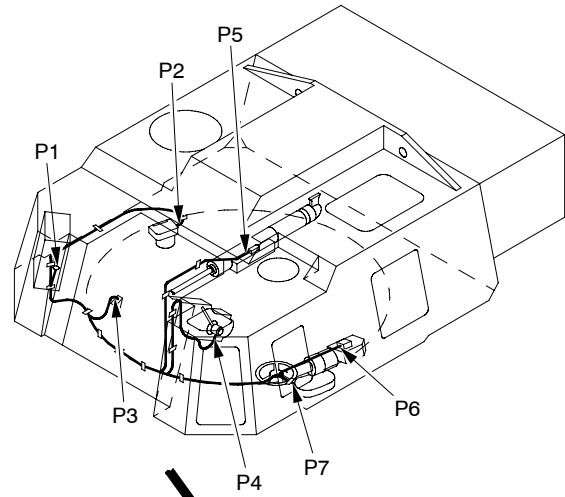
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# 3-3. TROUBLESHOOTING CHART - CONTINUED

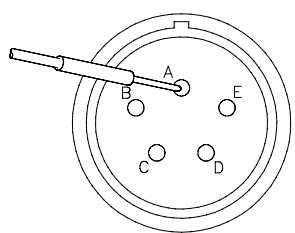
a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP G

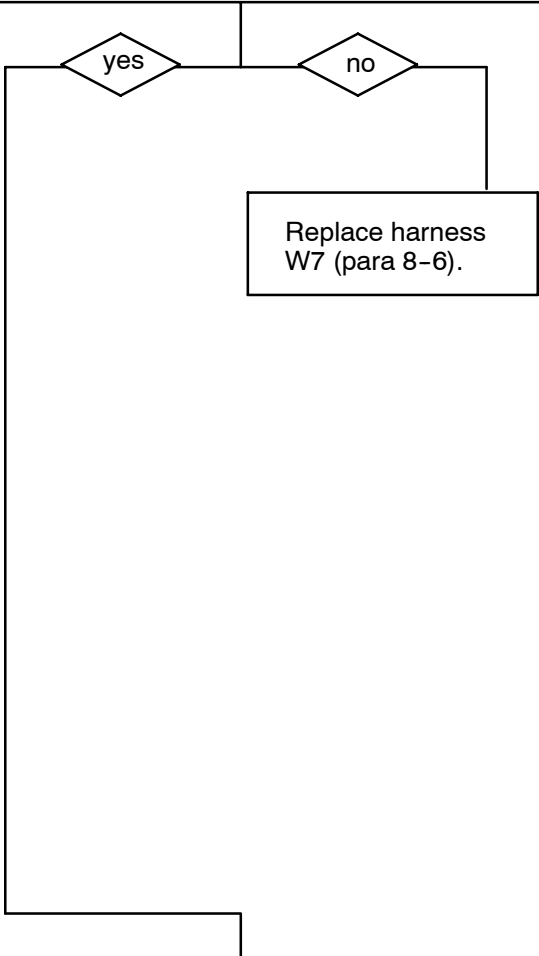
<b>H</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W7 connector P3 from harness 12576092 (tube temperature sensor connector).</li> <li>2. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>										
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Point A</td> <td style="width: 50%; text-align: center;">Point B</td> </tr> <tr> <td style="border: none;">W7 Connector P1 pin T</td> <td style="border: none;">W7 Connector P3 socket A</td> </tr> <tr> <td style="border: none;">W7 Connector P1 pin U</td> <td style="border: none;">W7 Connector P3 socket B</td> </tr> <tr> <td style="border: none;">W7 Connector P1 pin c</td> <td style="border: none;">W7 Connector P3 socket D</td> </tr> <tr> <td style="border: none;">W7 Connector P1 pin d</td> <td style="border: none;">W7 Connector P3 socket E</td> </tr> </table>	Point A	Point B	W7 Connector P1 pin T	W7 Connector P3 socket A	W7 Connector P1 pin U	W7 Connector P3 socket B	W7 Connector P1 pin c	W7 Connector P3 socket D	W7 Connector P1 pin d	W7 Connector P3 socket E
Point A	Point B										
W7 Connector P1 pin T	W7 Connector P3 socket A										
W7 Connector P1 pin U	W7 Connector P3 socket B										
W7 Connector P1 pin c	W7 Connector P3 socket D										
W7 Connector P1 pin d	W7 Connector P3 socket E										
	<p>Is there continuity at all points (resistance less than 10 ohms)?</p>										



W7  
CONNECTOR P1  
PIN T  
(PIN U)  
(PIN c)  
(PIN d)



W7  
CONNECTOR P3  
SOCKET A  
(SOCKET B)  
(SOCKET D)  
(SOCKET E)



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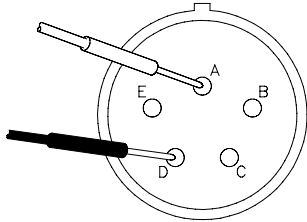
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

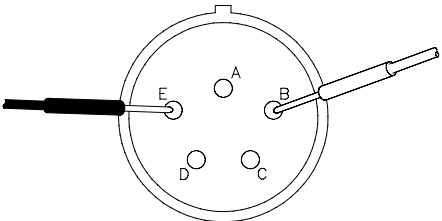
a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP H

<b>I</b>	Check harness 12576092 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.	
	Point A	Point B
	12576092 Connector P1 pin A	12576092 Connector P1 pin D
	12576092 Connector P1 pin B	12576092 Connector P1 pin E
Is there continuity at all points (resistance less than 10 ohms)?		

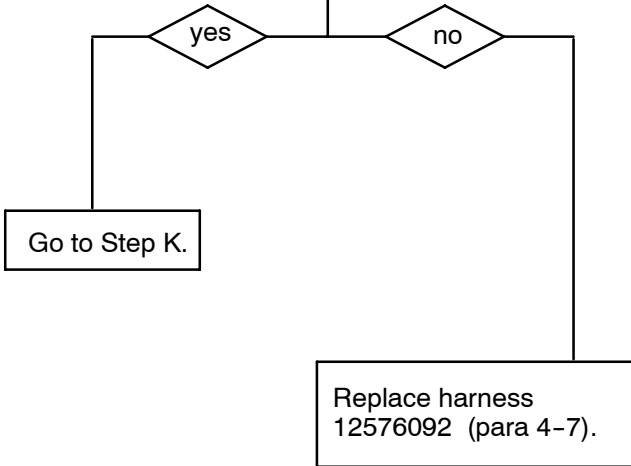


12576092  
CONNECTOR  
PIN A  
PIN D



12576092  
CONNECTOR  
PIN B  
PIN E

06pc065t



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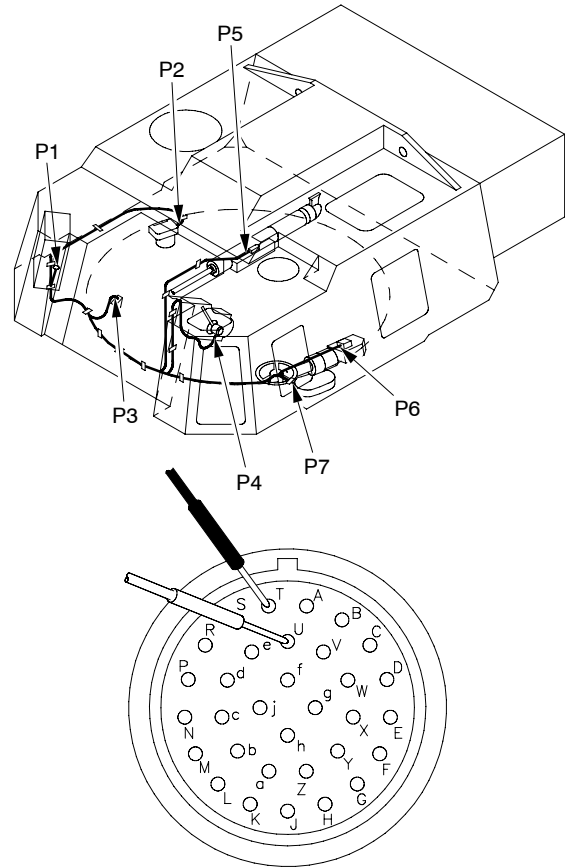
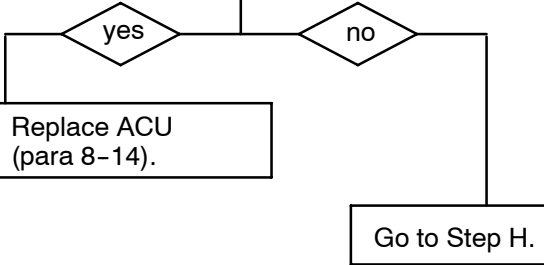
# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM G

**J** 1. Place one multimeter lead in harness W7 connector P1 pin T and other lead in harness W7 connector P1 pin U.  
 2. Measure the resistance (ohms).

Is the resistance between 80 and 180 ohms?



W7  
CONNECTOR P1  
PIN T  
PIN U

06pc066t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

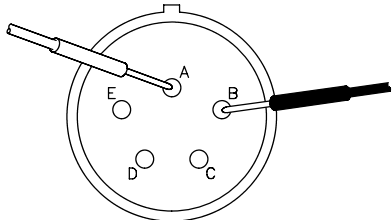
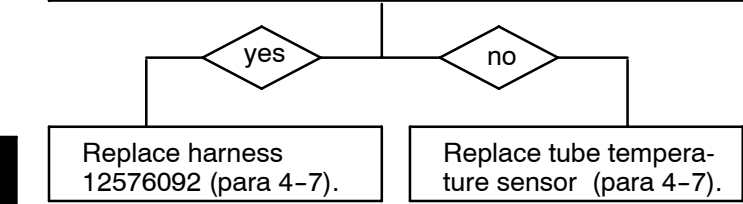
a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP I

**K**

1. Place one multimeter lead in harness 12576092 connector P1 pin A and other lead in harness 12576092 connector P1 pin B.
2. Measure the resistance (ohms).

Is the resistance between 80 and 180 ohms?



12576092  
CONNECTOR  
PIN A  
PIN B

06pc067t

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# 3-3. TROUBLESHOOTING CHART - CONTINUED

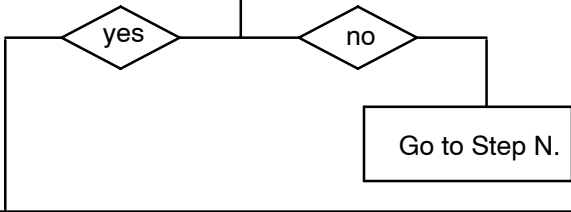
a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP C

**L**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W22A connector P1 from ACU connector J7.
3. Place one multimeter lead in harness W22A connector P1 pin N and other lead in harness W22A connector P1 pin P.
4. Check for continuity.

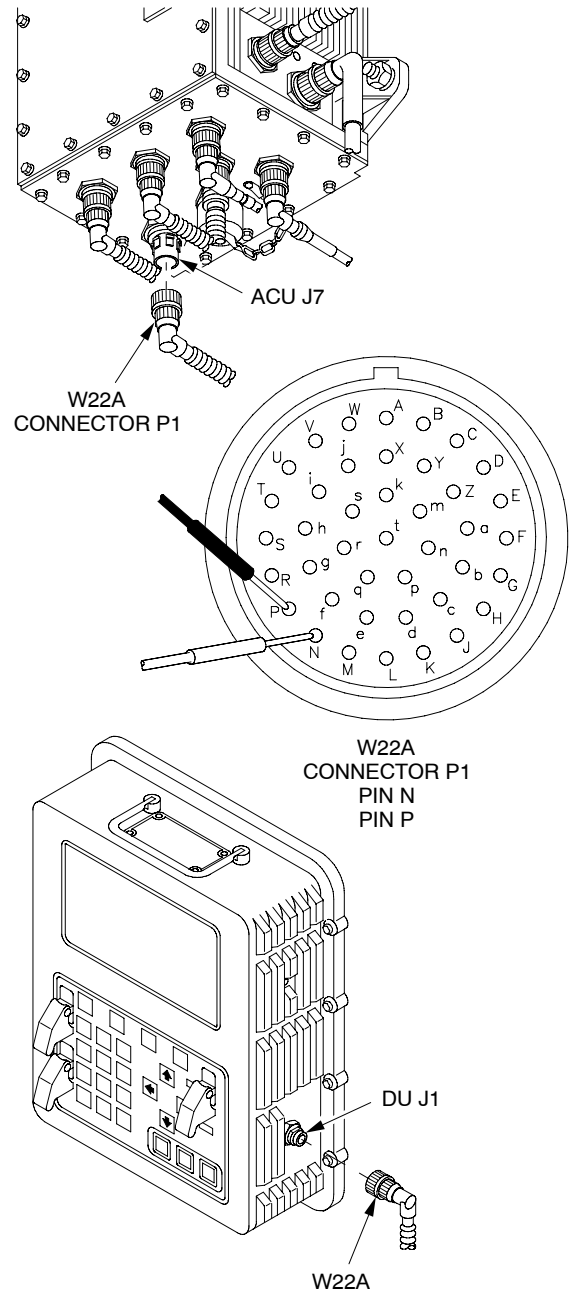
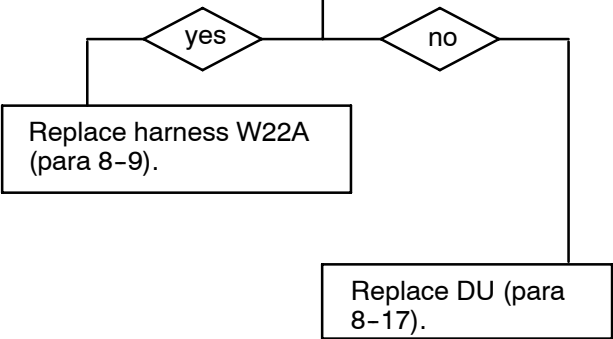
Is there continuity (resistance less than 10 ohms)?



**M**

1. Disconnect harness W22A connector P2 from DU connector J1.
2. Place one multimeter lead in harness W22A connector P1 pin N and other lead in harness W22A connector P1 pin P.
3. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



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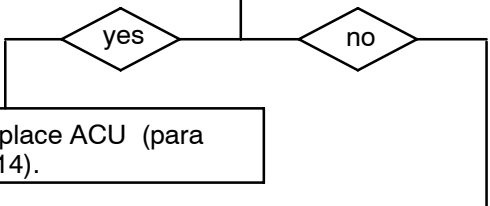
# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP L

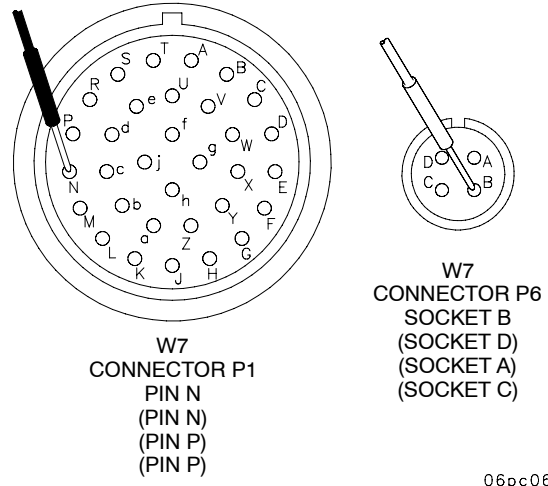
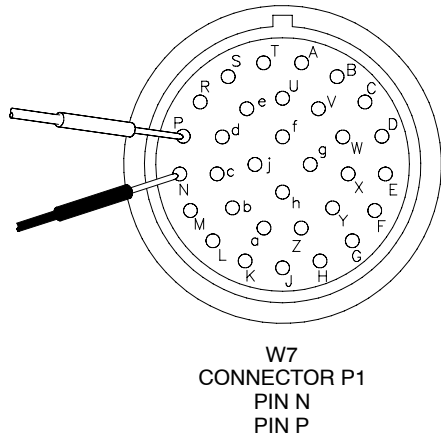
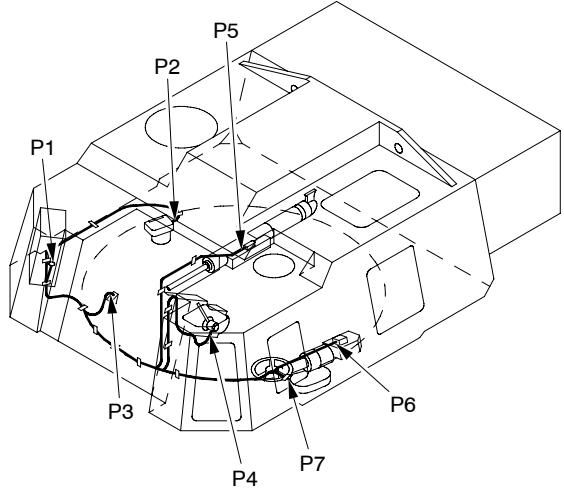
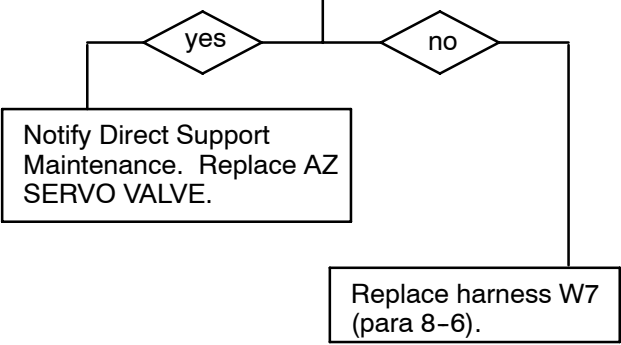
- N**
1. Disconnect harness W7 connector P1 from ACU connector J6.
  2. Place one multimeter lead in harness W7 connector P1 pin N and other lead in harness W7 connector P1 pin P.
  3. Measure the resistance.

Is the resistance between 27 and 900 ohms?



- O**
1. Disconnect harness W7 connector P6 from AZ SERVO VALVE.
  2. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.
- |                       |                          |
|-----------------------|--------------------------|
| Point A               | Point B                  |
| W7 Connector P1 pin N | W7 Connector P6 socket B |
| W7 Connector P1 pin N | W7 Connector P6 socket D |
| W7 Connector P1 pin P | W7 Connector P6 socket A |
| W7 Connector P1 pin P | W7 Connector P6 socket C |

Is there continuity at all points (resistance less than 10 ohms)?



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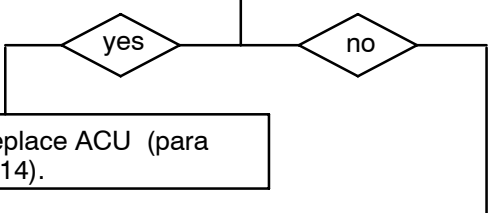
# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP D

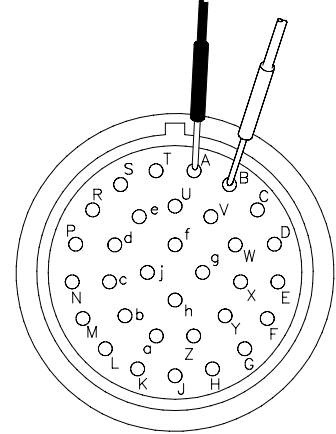
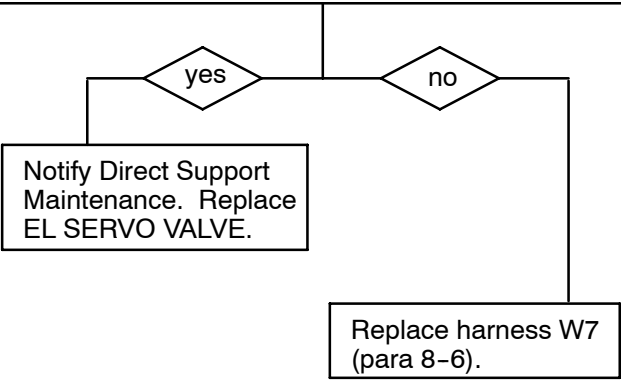
- P**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W7 connector P1 from ACU connector J6.
  3. Place one multimeter lead in harness W7 connector P1 pin A and other lead in harness W7 connector P1 pin B.
  4. Measure the resistance.

Is the resistance between 27 and 900 ohms?

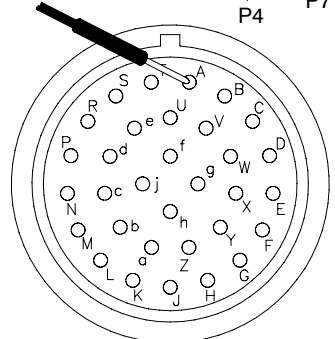
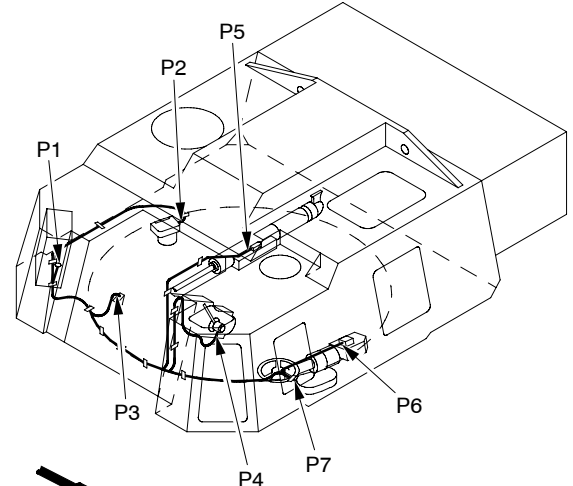


- Q**
1. Disconnect harness W7 connector P5 from EL SERVO VALVE.
  2. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.
- |                       |                          |
|-----------------------|--------------------------|
| Point A               | Point B                  |
| W7 Connector P1 pin A | W7 Connector P5 socket B |
| W7 Connector P1 pin A | W7 Connector P5 socket D |
| W7 Connector P1 pin B | W7 Connector P5 socket A |
| W7 Connector P1 pin B | W7 Connector P5 socket C |

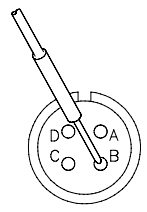
Is there continuity at all points (resistance less than 10 ohms)?



W7  
CONNECTOR P1  
PIN A  
PIN B



W7  
CONNECTOR P1  
PIN A  
(PIN A)  
(PIN B)  
(PIN B)



W7  
CONNECTOR P5  
SOCKET B  
(SOCKET D)  
(SOCKET A)  
(SOCKET C)

06pc070t

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# 3-3. TROUBLESHOOTING CHART - CONTINUED

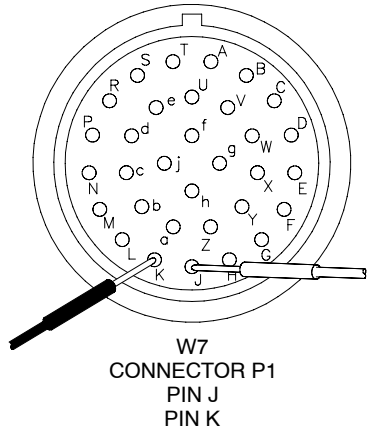
a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP E

**R**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W7 connector P1 from ACU connector J6.
3. Place one multimeter lead in harness W7 connector P1 pin J and other lead in harness W7 connector P1 pin K.
4. Measure the resistance.

Is the resistance between 27 and 600 ohms?



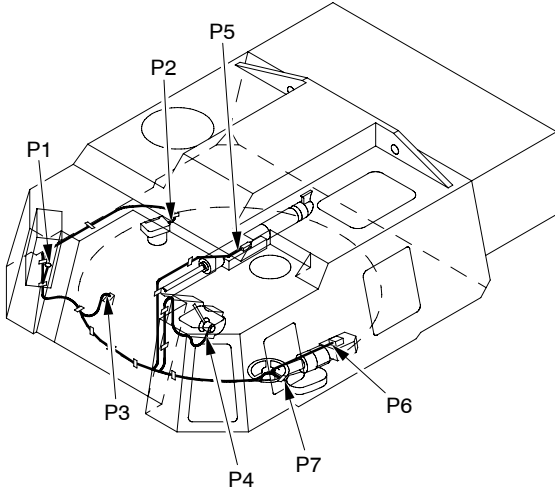
Replace ACU (para 8-14).

**S**

1. Disconnect harness W7 connector P2 from AZ TACH.
2. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

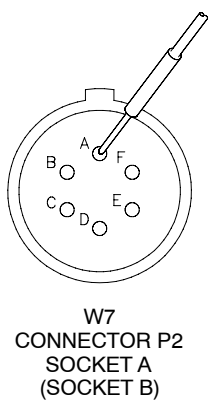
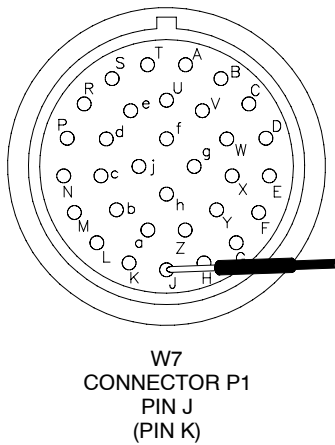
Point A	Point B
W7 Connector P1 pin J	W7 Connector P2 socket A
W7 Connector P1 pin K	W7 Connector P2 socket B

Is there continuity at all points (resistance less than 10 ohms)?



Replace azimuth tachometer (para 8-2).

Replace harness W7 (para 8-6).



06pc071t

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# 3-3. TROUBLESHOOTING CHART - CONTINUED

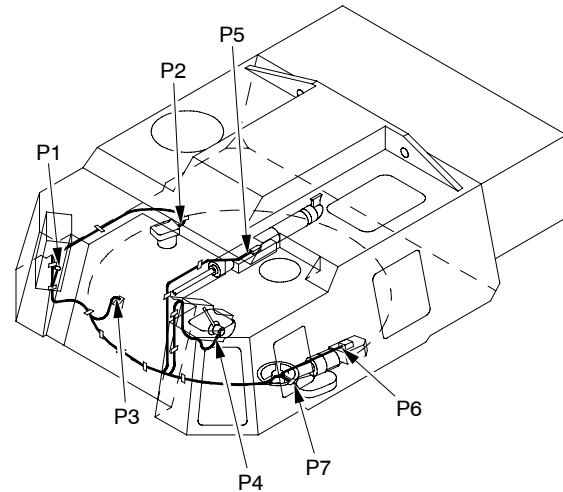
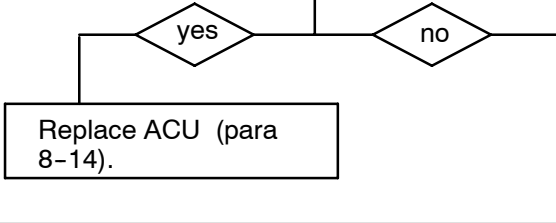
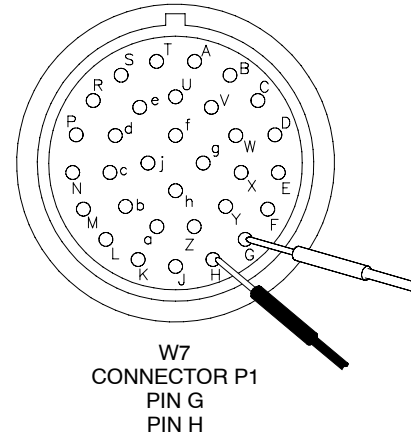
a. AFCS - CONTINUED (6) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP F

**T**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W7 connector P1 from ACU connector J6.
3. Place one multimeter lead in harness W7 connector P1 pin G and other lead in harness W7 connector P1 pin H.
4. Measure the resistance.

Is the resistance between 27 and 600 ohms?

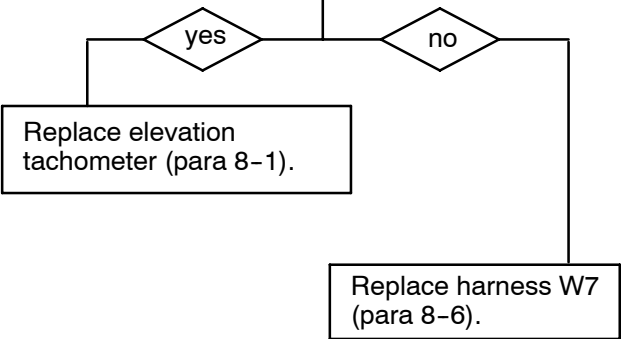
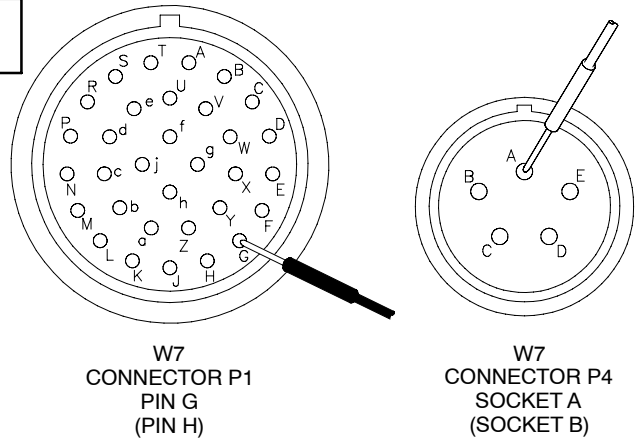


**U**

1. Disconnect harness W7 connector P4 from EL TACH.
2. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W7 Connector P1 pin G	W7 Connector P4 socket A
W7 Connector P1 pin H	W7 Connector P4 socket B

Is there continuity at all points (resistance less than 10 ohms)?



**END OF TASK**

06pc072t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (7) AFCS POWER LAMPS DO NOT LIGHT ON POWER UP.

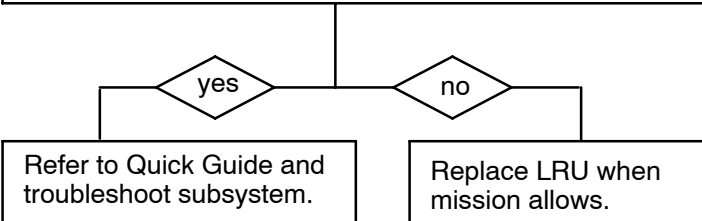
<p><u>INITIAL SETUP</u></p> <p>Run PDIU AFCS and CAB ELECTRICAL Tests.</p>	<p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>
--	---

**NOTE**

For ACU and PDIU power lamps, go to step A.  
 For VMS power lamp, go to step B.  
 For PCU power lamp, go to step D.

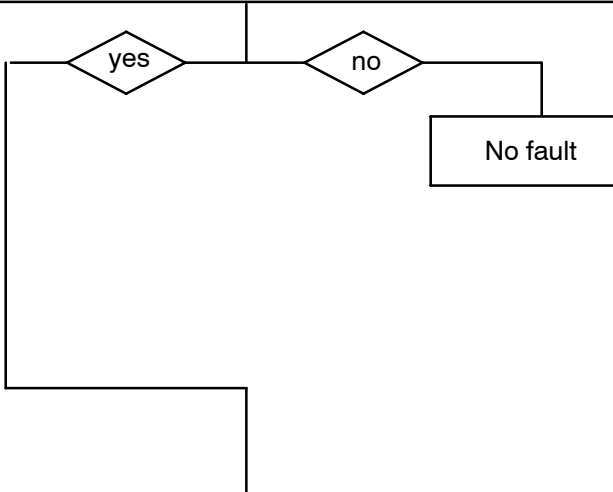
**A** 1. Turn vehicle MASTER power switch and DU POWER switch ON (TM 9-2350-314-10).  
 2. Check AFCS POWER UP STATUS on DU screen (TM 9-2350-314-10).

Is subsystem with faulty lamp degraded or out?



**B** Check VMS power lamp.

Is VMS green power lamp out?

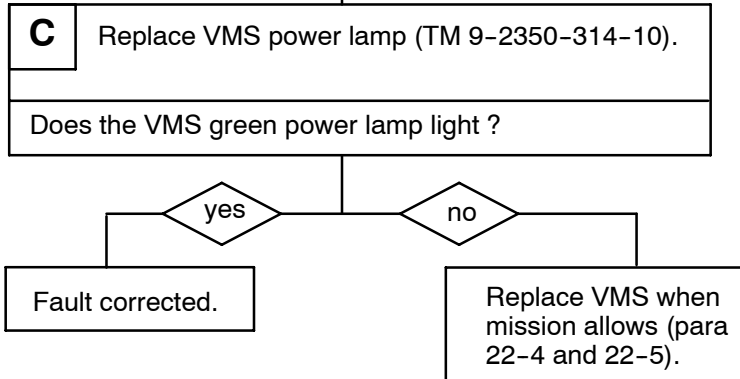


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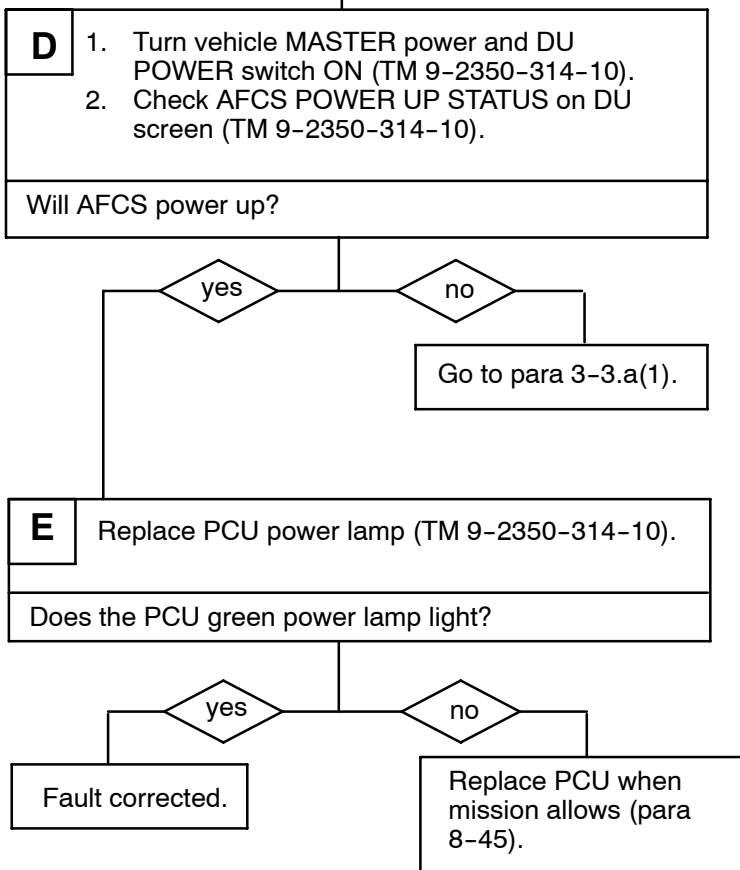
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (7) AFCS POWER LAMPS DO NOT LIGHT ON POWER UP. - CONTINUED

CONTINUED FROM STEP B



CONTINUED FROM NOTE



**END OF TASK**



### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (8) BIT LAMPS DO NOT LIGHT ON POWER UP.

INITIAL SETUP

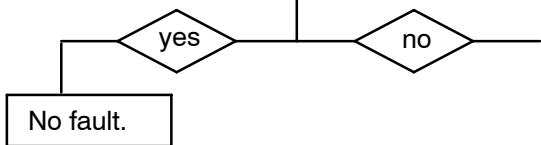
Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

- DRUH BIT lamp is ON during normal operation. DRUH BIT lamp goes OUT when there is a bit failure.
- Two personnel are required to observe all BIT lamps during power up.

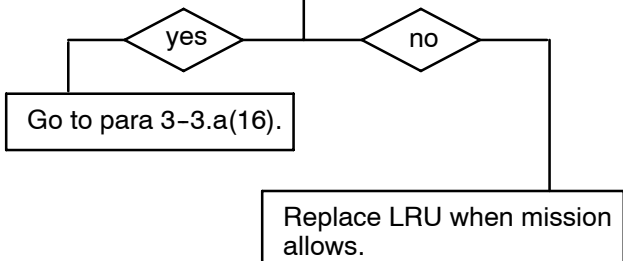
**A** 1. Remove three screws and cover from DRUH to observe lamp.  
 2. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).  
 3. Power up AFCS and observe BIT lamps (TM 9-2350-314-10).

Do BIT lamps light?



**B** Check AFCS POWER UP STATUS (TM 9-2350-314-10).

Is NAVIGATION system degraded or out?



**END OF TASK**

**3-3. TROUBLESHOOTING CHART - CONTINUED**

**DELETED**



### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT.

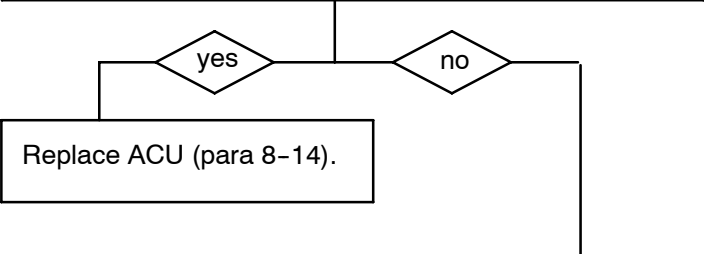
<p><u>INITIAL SETUP</u></p> <p>Connect the MVS system, if it is disconnected. Run PDIU AFCS Tests.</p>	<p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12) Multimeter (item 24, Appx G) TA1 probe kit (item 42, Appx G)</p>
--	---

**A**

1. Turn vehicle MASTER power switch ON and power up AFCS (TM 9-2350-314-10) and ensure PCU circuit breakers are ON.
2. Enter MAINTENANCE MODE and select the AFCS STATUS screen and select the 1553 BUS STATUS.

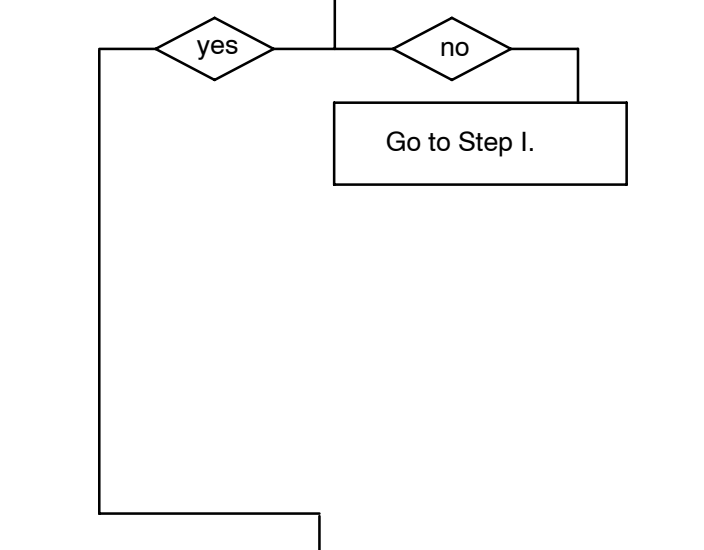
Are either of the following items FAILED?

BIT HARDWARE  
1553 BOARD BIT



**B** Continue checking the 1553 BUS STATUS.

Are both the DCU TO PDIU CONNECT FAILED and the DCU TO MVS CONNECT FAILED?



CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

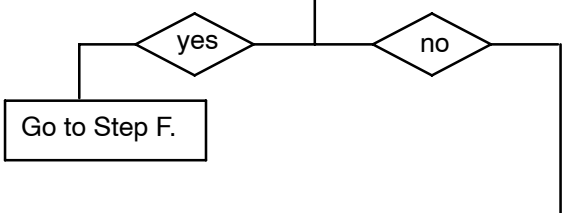
a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP B

**C**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W93A connector P3 from ACU connector J8.
3. Place one multimeter lead in harness W93A connector P3 socket E and other lead in harness W93A connector P3 socket F.
4. Measure the resistance (ohms).

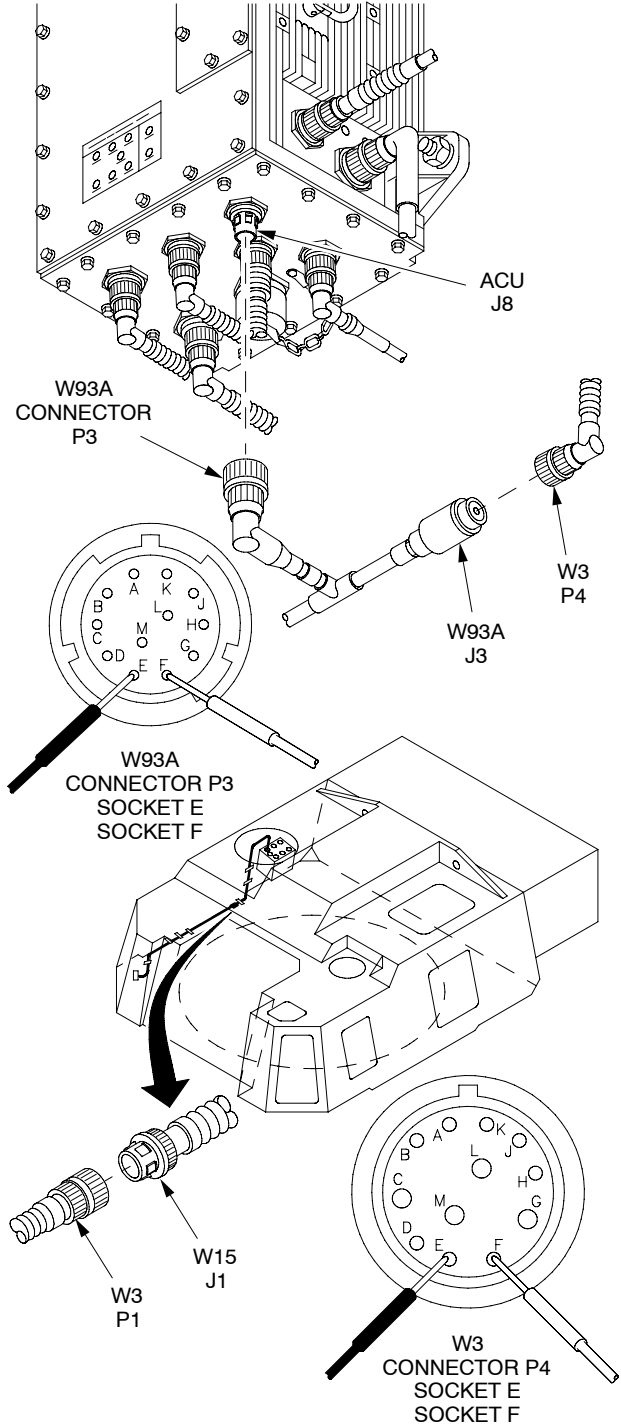
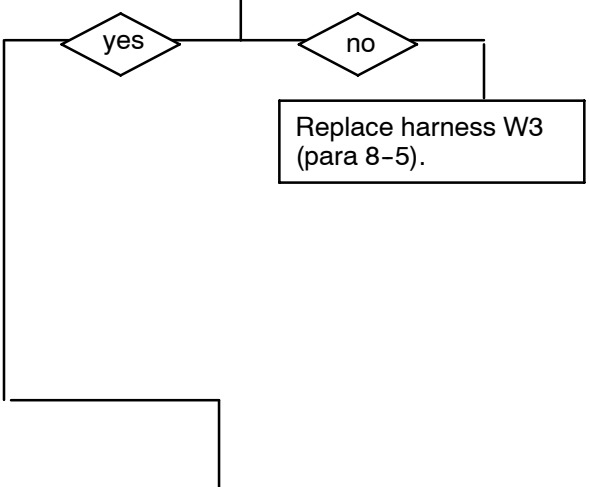
Is the resistance between 14 and 34 ohms?



**D**

1. Disconnect harness W93A connector J3 from harness W3 connector P4.
2. Disconnect harness W3 connector P1 from harness W15 connector J1.
3. Place one multimeter lead in harness W3 connector P4 socket E and the other lead in harness W3 connector P4 socket F.
4. Measure the resistance (ohms).

Is the resistance between 55 and 95 ohms?



06pc090tc

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

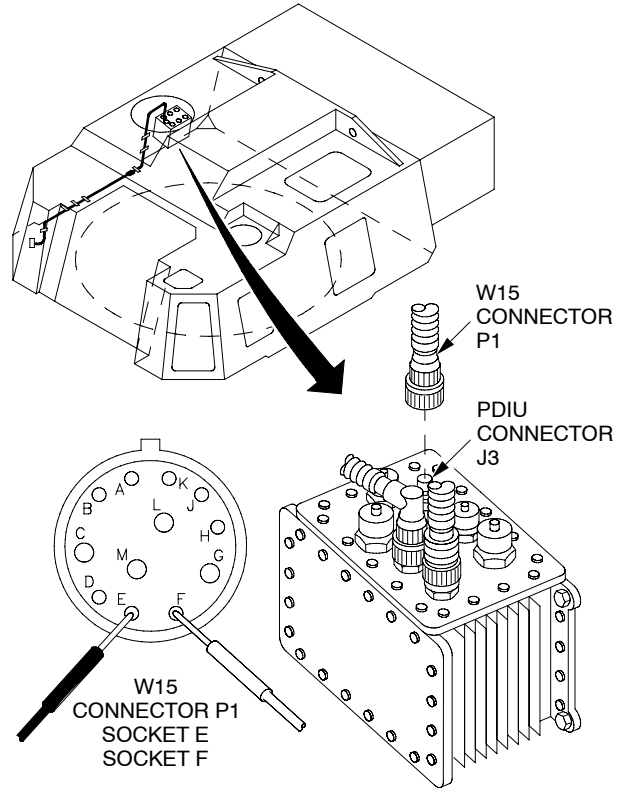
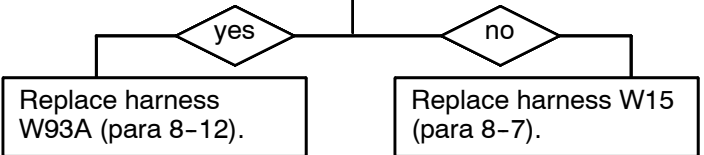
a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP D

**E**

1. Disconnect harness W15 connector P1 from PDIU connector J3.
2. Place one multimeter lead in harness W15 connector P1 socket E and the other lead in harness W15 connector P1 socket F.
3. Measure the resistance (ohms).

Is the resistance between 55 and 95 ohms?

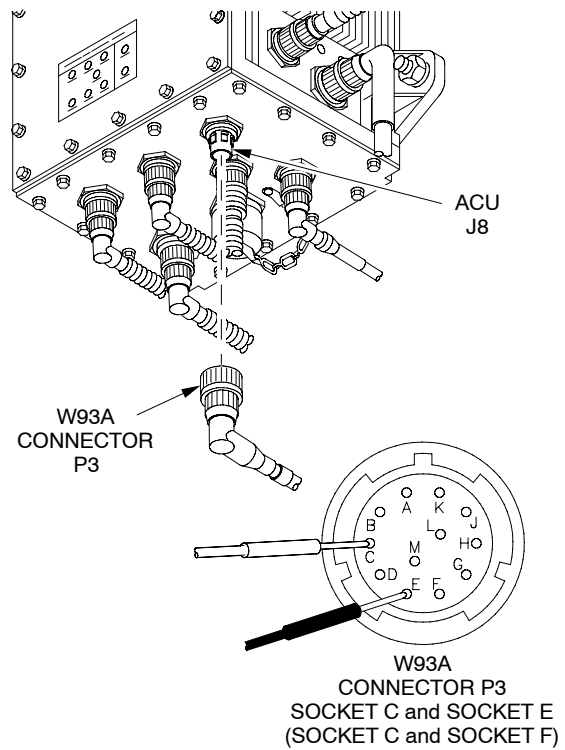
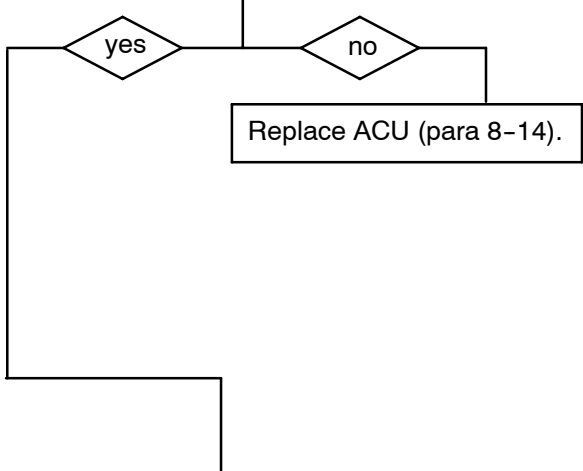


CONTINUED FROM STEP C

**F** Check 1553 harness for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W93A Connector P3 socket C	W93A Connector P3 socket E
W93A Connector P3 socket C	W93A Connector P3 socket F

Are there any shorts?



CONTINUED ON NEXT PAGE

# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT. - CONTINUED

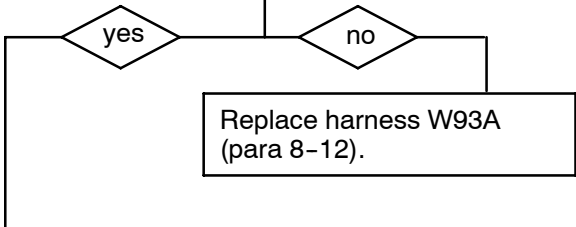
CONTINUED FROM STEP F

**G**

1. Disconnect harness W93A connector J3 from harness W3 connector P4.
2. Check 1553 harness for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W3 Connector P4 socket C	W3 Connector P4 socket E
W3 Connector P4 socket C	W3 Connector P4 socket F

Are there any shorts?

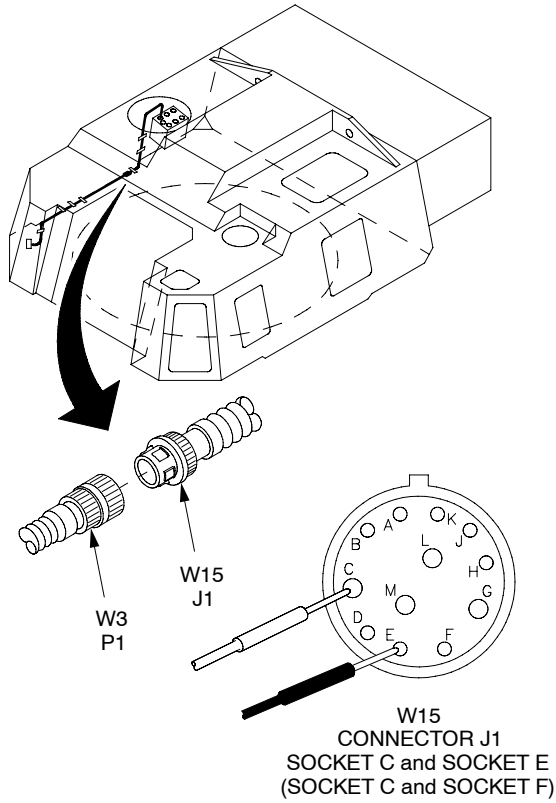
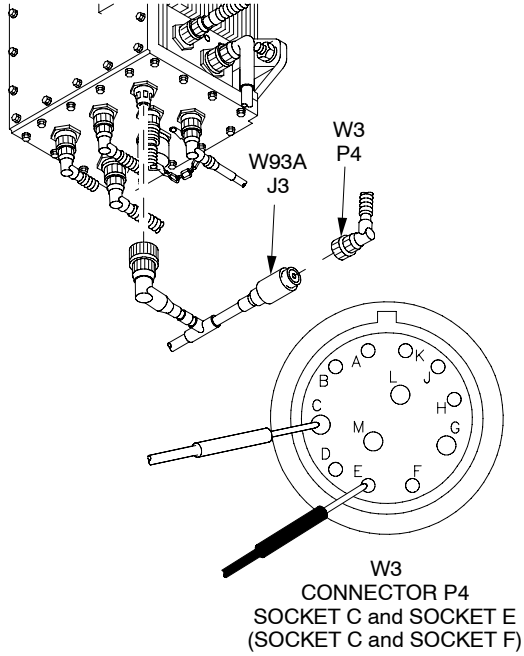
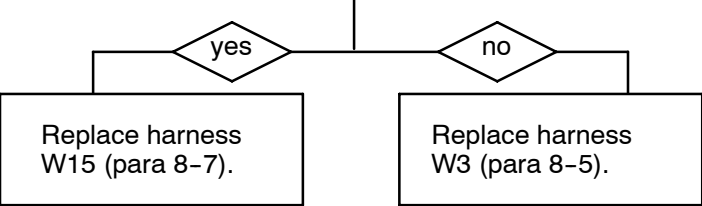


**H**

1. Disconnect harness W3 connector P1 from harness W15 connector J1.
2. Check W15 harness for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W15 Connector J1 socket C	W15 Connector J1 socket E
W15 Connector J1 socket C	W15 Connector J1 socket F

Are there any shorts?



CONTINUED ON NEXT PAGE

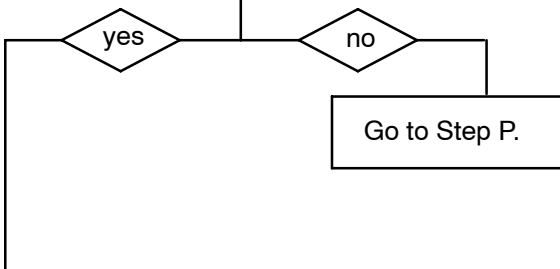
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP B

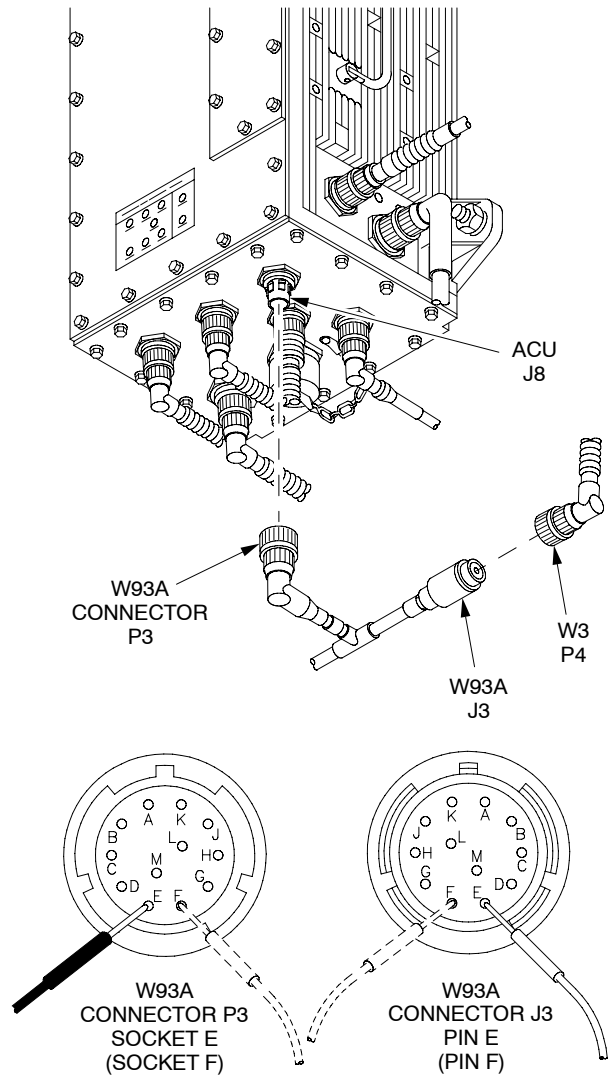
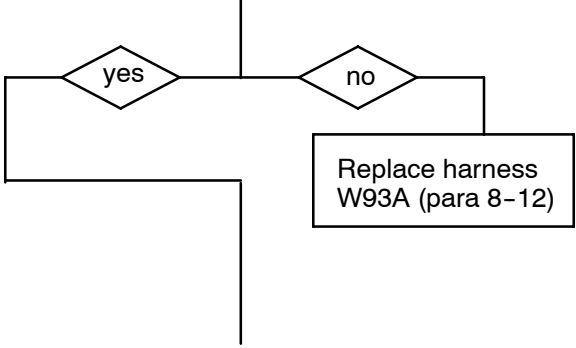
**I** Continue checking the 1553 BUS STATUS.

Are either of the following items FAILED?  
 DCU TO PDIU CONNECT  
 DCU TO PDIU BUS



- J**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W93A connector P3 from ACU connector J8.
  3. Disconnect harness W93A connector J3 from harness W3 connector P4.
  4. Check harness W93A for continuity by placing one multimeter lead on point A and the other multimeter lead on point B as shown in this table.
- |   |   |
|---|---|
| <p><b>Point A</b></p> <p>W93A connector P3 socket E<br/>                 W93A connector P3 socket F</p> | <p><b>Point B</b></p> <p>W93A connector J3 pin E<br/>                 W93A connector J3 pin F</p> |
|---|---|

Is there continuity at all points (resistance less than 10 ohms)?



06pc093ta

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

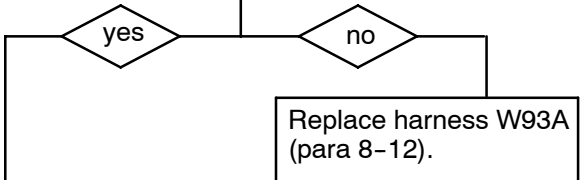
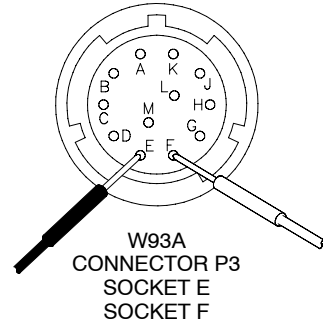
a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP J

**K**

1. Place one multimeter lead in harness W93A connector socket E and the other lead in harness W93A connector P3 socket F.
2. Measure the resistance (ohms).

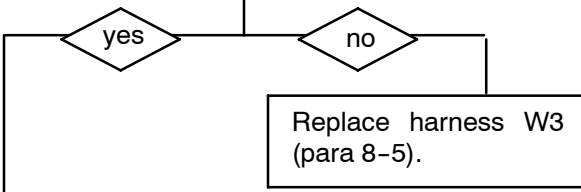
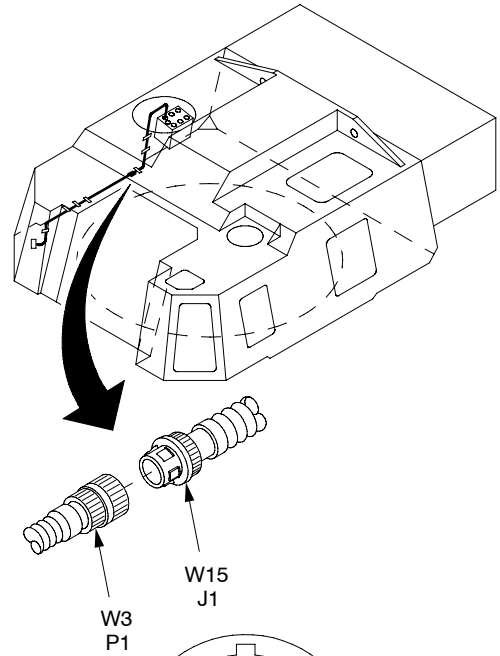
Is the resistance between 90 and 140 ohms?



**L**

1. Disconnect W3 connector P1 from harness W15 connector J1.
2. Place one multimeter lead in harness W3 connector P4 socket E and the other lead in harness W3 connector P4 socket F.
3. Measure the resistance (ohms).

Is the resistance between 55 and 95 ohms?



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06pc094ta

### 3-3. TROUBLESHOOTING CHART - CONTINUED

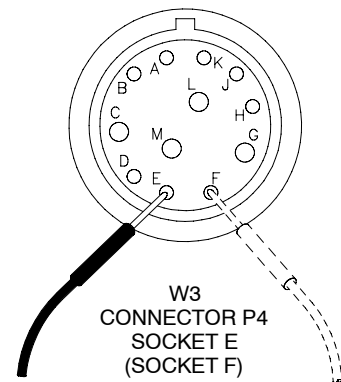
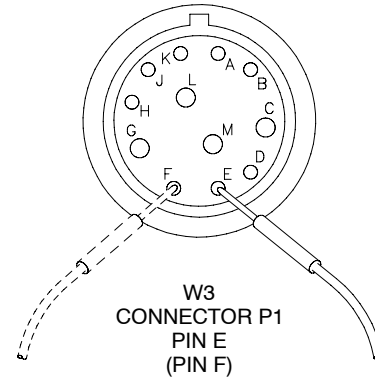
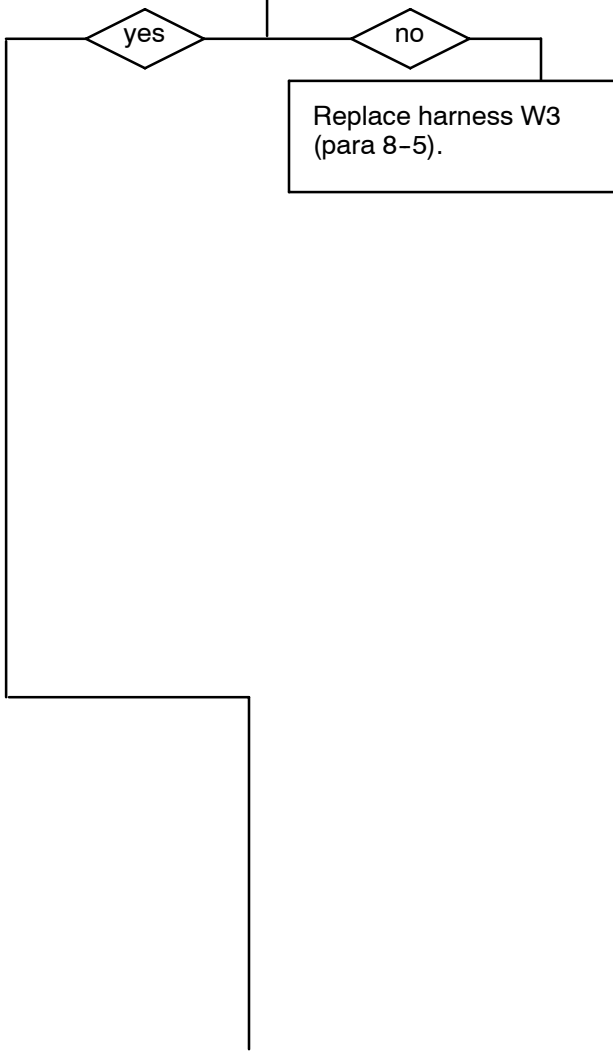
a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP L

**M** Check harness W3 for continuity by placing one multimeter lead on point A and other lead on point B, as shown in this table.

Point A	Point B
W3 Connector P1 pin E	W3 Connector P4 socket E
W3 Connector P1 pin F	W3 Connector P4 socket F

Is there continuity at all points (resistance less than 10 ohms)?



06pc095ta

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

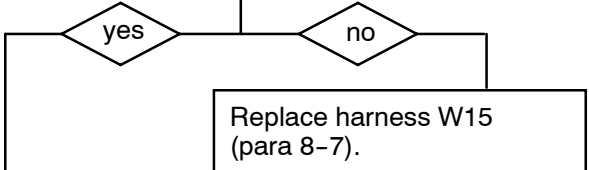
a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP M

**N**

1. Disconnect harness W15 connector P1 from PDIU connector J3.
2. Place one multimeter lead in harness W15 connector P1 socket E and the other lead in harness W15 connector P1 socket F.
3. Measure the resistance (ohms).

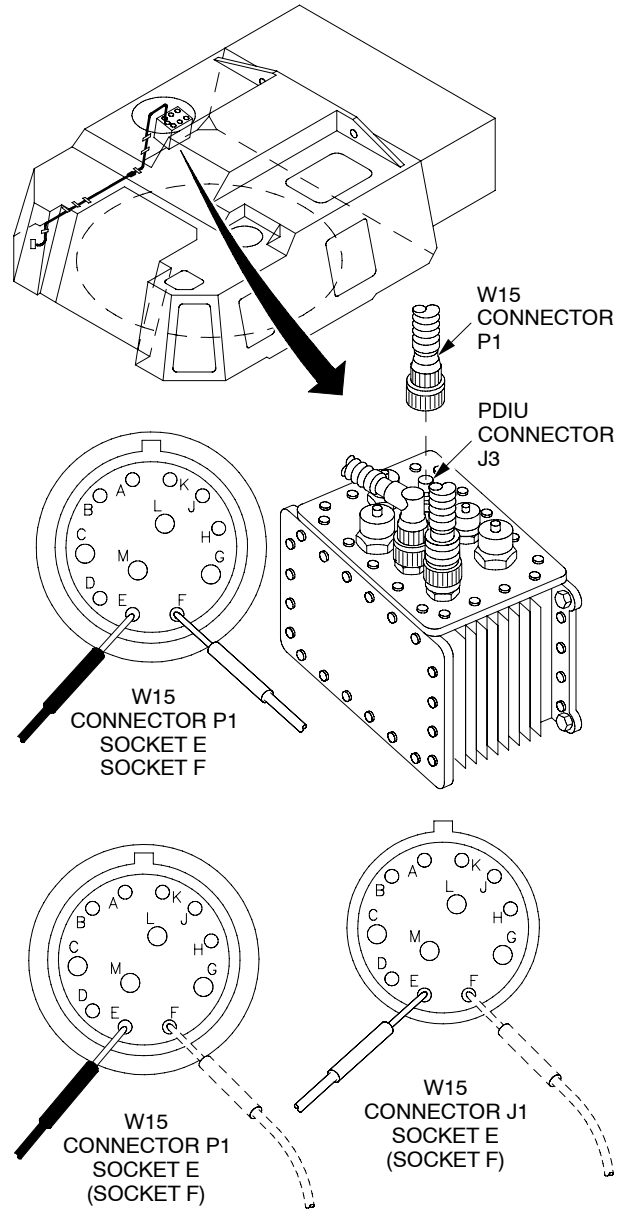
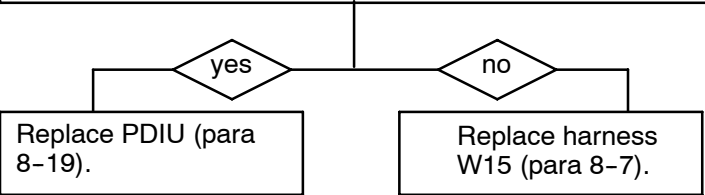
Is the resistance between 55 and 95 ohms?



**O** Check harness W15 connectors for continuity by placing one multimeter lead on point A and other lead on point B as shown in this table:

Point A	Point B
W15 Connector P1 socket E	W15 Connector J1 socket E
W15 Connector P1 socket F	W15 Connector J1 socket F

Is there continuity at all points (resistance less than 10 ohms)?



06pc096ta

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

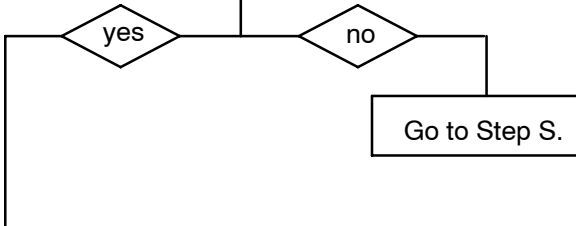
a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP I

**P**

1. Turn DU POWER switch OFF and wait for AFCS to power down (TM 9-2350-314-10).
2. Disconnect harness W92 connector P1 from MVS connector J1.
3. Place one multimeter lead in harness W92 connector P1 socket A and other lead in harness W92 connector P1 socket B.
4. Turn DU POWER switch ON (TM 9-2350-314-10).
5. Measure the DC voltage (V dc).

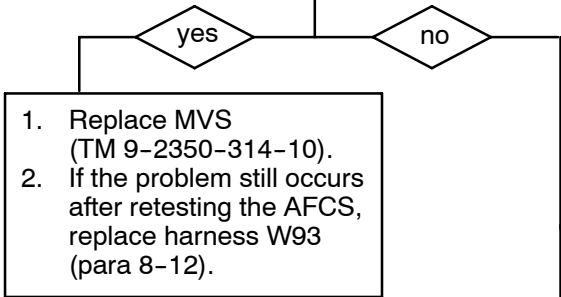
Is the voltage greater than 18 V dc?



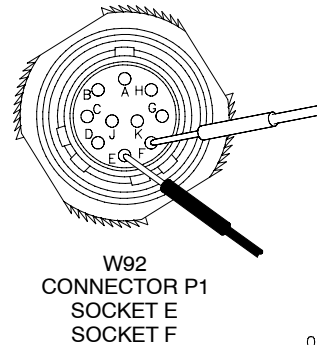
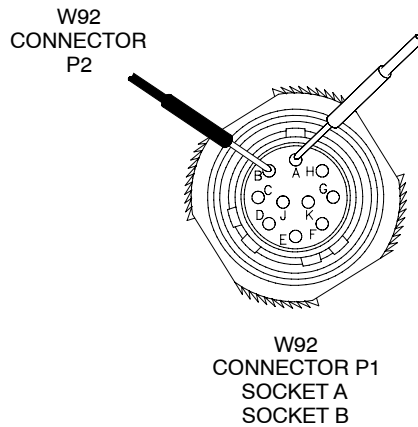
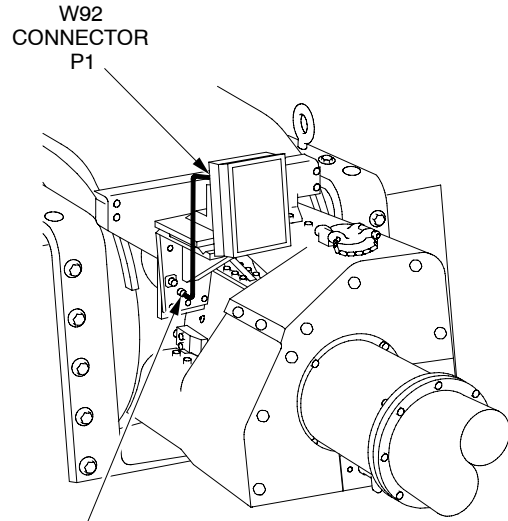
**Q**

1. Turn DU POWER switch OFF and wait for AFCS to power down (TM 9-2350-314-10).
2. Place one multimeter lead in harness W92 connector P1 socket E and other lead in harness W92 connector P1 socket F.
3. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



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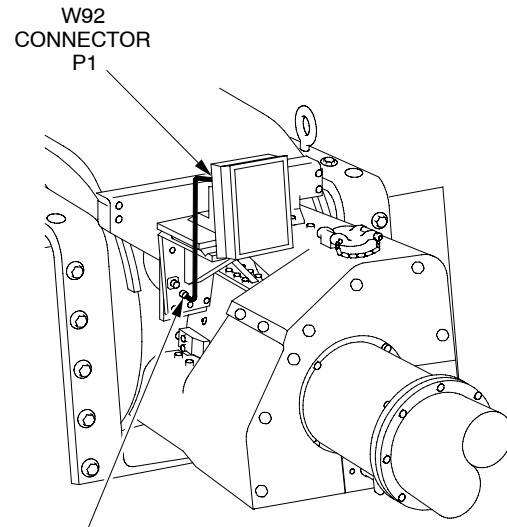
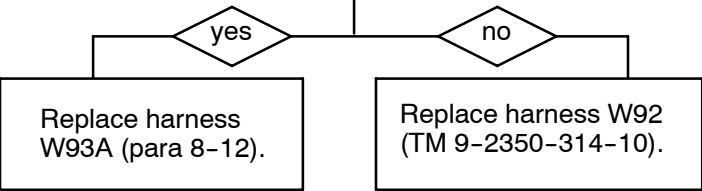
06pc094t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

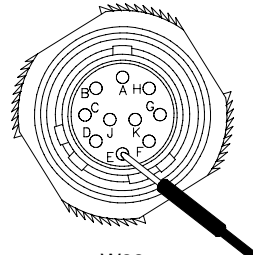
a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP Q

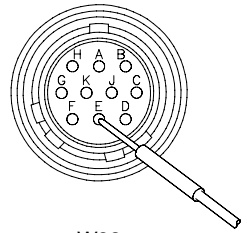
<b>R</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W92 connector P2 from harness W93A connector J2.</li> <li>2. Check harness W92 for continuity by placing one multimeter lead on point A and other multimeter lead on point B.</li> </ol>						
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center; border: none;">Point A</td> <td style="width: 50%; text-align: center; border: none;">Point B</td> </tr> <tr> <td style="border: none;">W92 Connector P1 socket E</td> <td style="border: none;">W92 Connector P2 pin E</td> </tr> <tr> <td style="border: none;">W92 Connector P1 socket F</td> <td style="border: none;">W92 Connector P2 pin F</td> </tr> </table>	Point A	Point B	W92 Connector P1 socket E	W92 Connector P2 pin E	W92 Connector P1 socket F	W92 Connector P2 pin F	<p>Is there continuity at all points (resistance less than 10 ohms)?</p>
Point A	Point B						
W92 Connector P1 socket E	W92 Connector P2 pin E						
W92 Connector P1 socket F	W92 Connector P2 pin F						



W92  
CONNECTOR  
P2



W92  
CONNECTOR P1  
SOCKET E  
(SOCKET F)



W92  
CONNECTOR P2  
PIN E  
(PIN F)

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CONTINUED ON NEXT PAGE

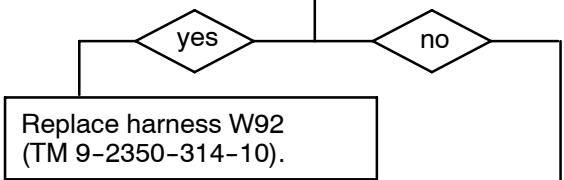
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (9) 1553 DATA BUS DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP P

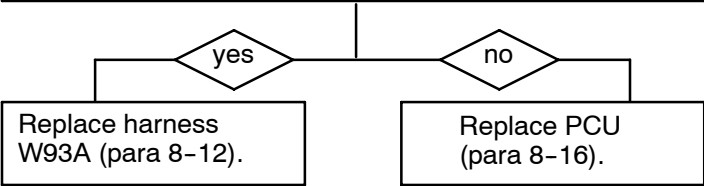
- S**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W92 connector P2 from harness W93A connector J2.
  3. Place one multimeter lead in harness W93 connector J2 socket A and other lead in harness W93A connector J2 socket B.
  4. Turn vehicle MASTER power and DU POWER switches ON (TM 9-2350-314-10).
  5. Measure the DC voltage (V dc).

Is the voltage greater than 18 V dc?

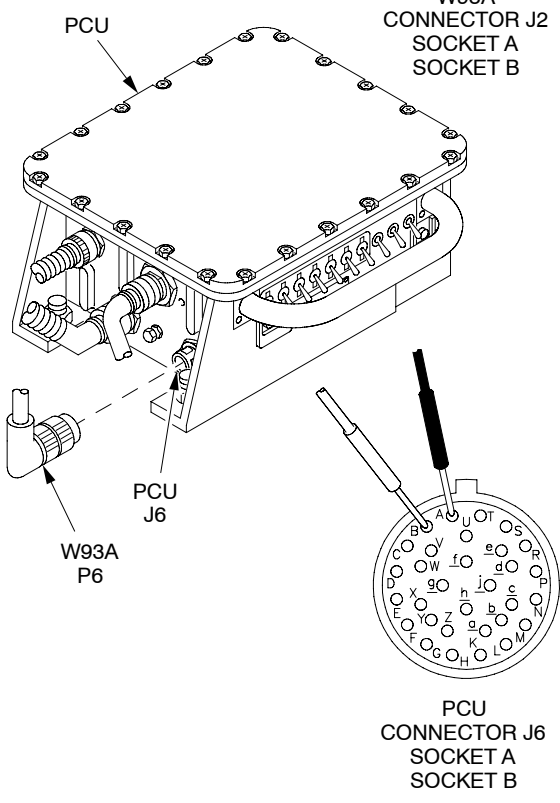
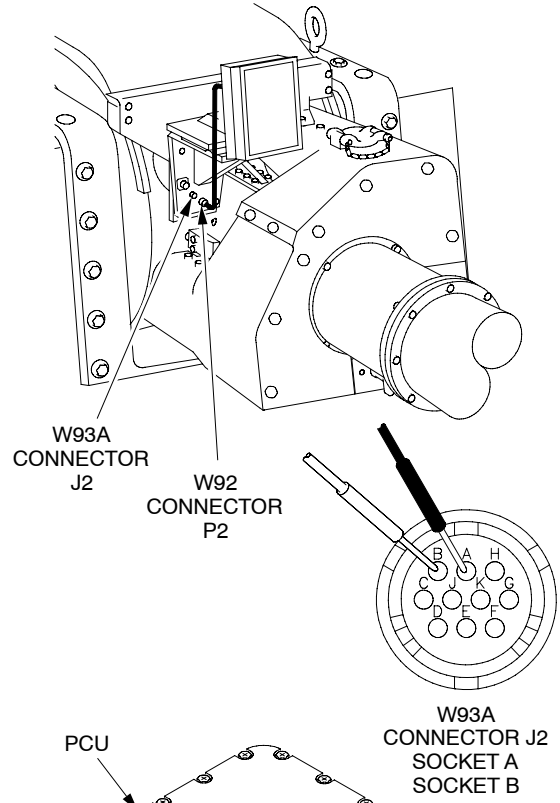


- T**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W93A connector P6 from PCU connector J6.
  3. Place one multimeter lead in PCU connector J6 socket A and other lead in PCU connector J6 socket B.
  4. Turn vehicle MASTER power and DU POWER switches ON (TM 9-2350-314-10).
  5. Measure the DC voltage (V dc).

Is the voltage greater than 18 V dc?



**END OF TASK**



06pc096t



**3-3. TROUBLESHOOTING CHART - CONTINUED**

**DELETED**

**3-3. TROUBLESHOOTING CHART - CONTINUED**

**DELETED**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (11) AFCS POWERS DOWN WHEN VEHICLE POWER REMOVED (NO BACKUP).

<p><b>INITIAL SETUP</b></p> <p>Start engine to ensure backup batteries are charged and run PDIU CAB ELECTRICAL Test.</p>	<p><b>Tools</b></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>
--	---

**NOTE**

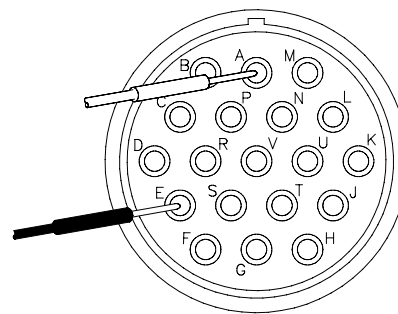
- AFCS cannot be powered up from backup batteries.
- Make sure PCU circuit breakers 1 and 2 are in ON position.

**A**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W25 connector P3 from PCU connector J3.
3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
4. Place multimeter red lead in harness W25 connector P3 point 1 socket and black lead in harness W25 connector P3 point 2 socket as follows:

Point 1	Point 2
A	E
B	F
C	G
D	H
J	N
K	P
L	R
M	S

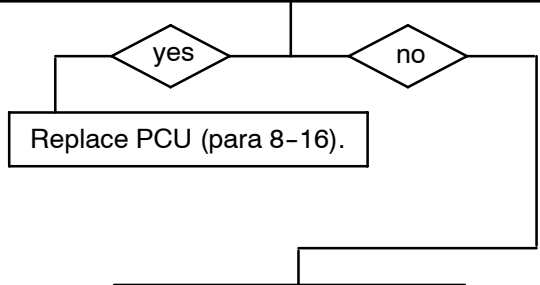
5. Measure the DC Voltage (V dc).



W25  
CONNECTOR P3  
TO PCU J3  
SOCKET A  
SOCKET E

06pc024t

Is the voltage between 10 and 14 V dc for all points?



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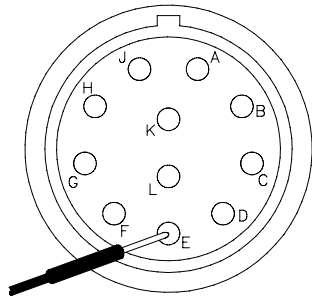
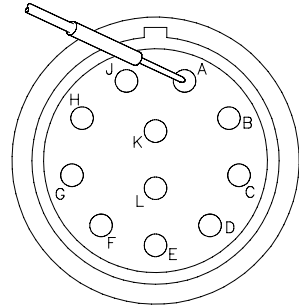
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (11) AFCS POWERS DOWN WHEN VEHICLE POWER REMOVED (NO BACKUP). - CONTINUED

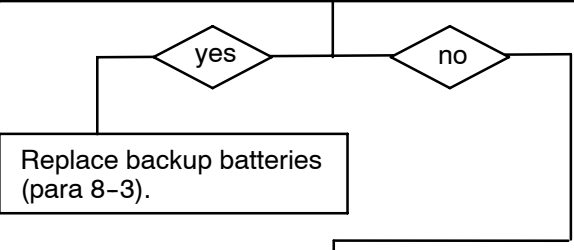
CONTINUED FROM STEP A

**NOTE**  
PCU must be receiving greater than 25 V dc from vehicle power to do this step.

- B**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Reconnect harness W25 connector P3 to PCU connector J3.
  3. Remove the cover mounted over the backup battery (para 8-3).
  4. Disconnect harness W25 connectors P1 and P2 from backup batteries.
  5. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  6. Turn FBCB2 system ON IAW TM 11-7010-326-10 or FBCB2 Pocket Guide.
  7. Turn DU POWER switch ON (TM 9-2350-314-10) and wait for "SELECT OPERATIONAL MODE" screen to appear.
  8. Check the PCU battery charging DC voltage by placing the multimeter red lead at point A and the black lead at point B as follows:
- | Point A            | Point B            |
|--------------------|--------------------|
| <u>Harness W25</u> | <u>Harness W25</u> |
| Connector P1 pin A | Connector P2 pin E |
| Connector P1 pin B | Connector P2 pin F |
| Connector P1 pin C | Connector P2 pin G |
| Connector P1 pin D | Connector P2 pin H |
| Connector P2 pin A | Connector P1 pin E |
| Connector P2 pin B | Connector P1 pin F |
| Connector P2 pin C | Connector P1 pin G |
| Connector P2 pin D | Connector P1 pin H |
9. Measure the DC Voltage (V dc).



Is the voltage between 19.4 and 21.4 V dc for all points?



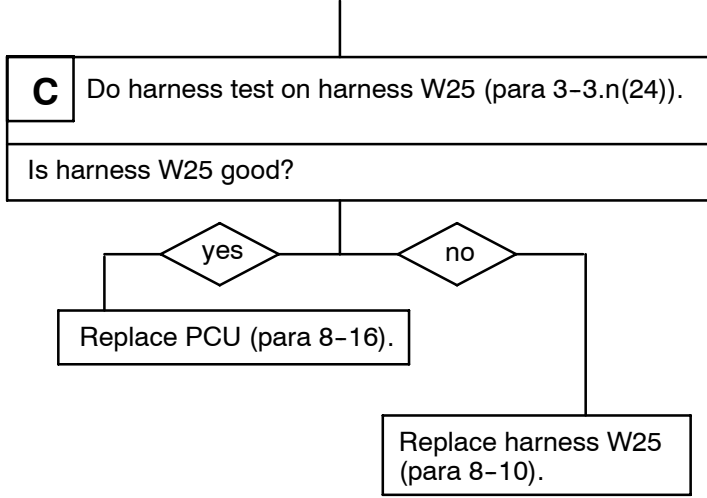
06pc026t



### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (11) AFCS POWERS DOWN WHEN VEHICLE POWER REMOVED (NO BACKUP). - CONTINUED

CONTINUED FROM STEP B



END OF TASK

**3-3. TROUBLESHOOTING CHART - CONTINUED**

**DELETED**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

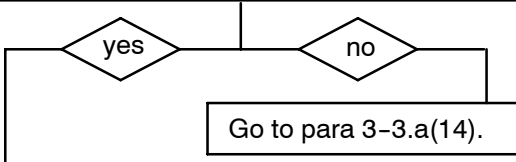
a. AFCS - CONTINUED (13) AFCS WILL NOT KEY RADIO OR TRANSMIT DIGITAL.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

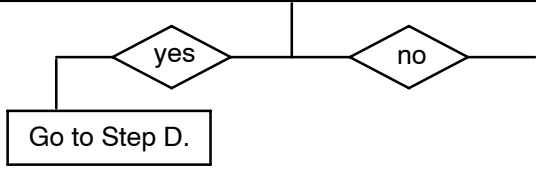
- A**
1. Turn vehicle MASTER power switch and DU POWER switch ON (TM 9-2350-314-10).
  2. Check radios for power.

Do radios power up?



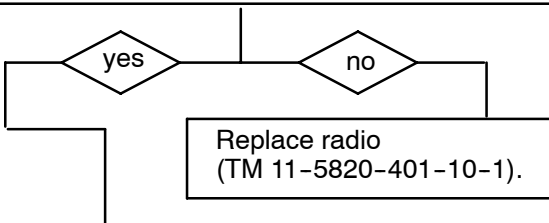
- B**
- To transmit data with AFCS and listen for digital tone:
1. Power up AFCS and SELECT "BCS DATA TRANSFER" from the SETUP AND INFORMATION menu.
  2. Select "GET INITIALIZATION" from BCS DATA TRANSFER.
  3. Set both radios to the same frequency.
  4. Place the LOUDSPEAKER selector on the MASTER CONTROL STATION to RADIO.
  5. Check radio tone scale bar for movement to the right and listen for digital tones.

Does radio key?



- C**
1. Place a known good microphone on audio jack of radio.
  2. Press the push to talk switch on microphone.

Does radio key and transmit?

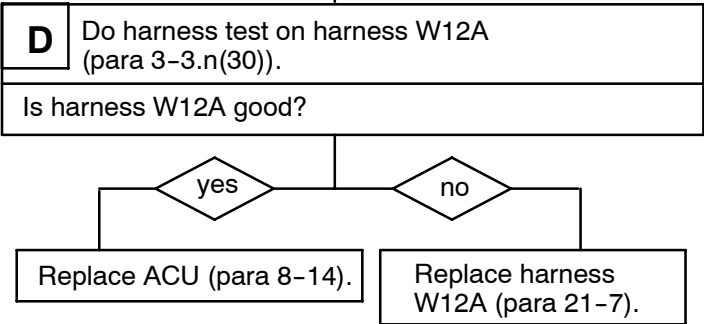


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

a. AFCS - CONTINUED (13) AFCS WILL NOT KEY RADIO OR TRANSMIT DIGITAL. - CONTINUED

CONTINUED FROM STEP B OR C



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (14) RADIOS WILL NOT POWER UP.

INITIAL SETUP

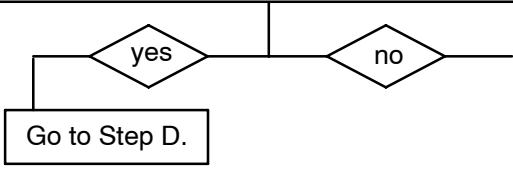
Run PDIU CAB Electrical Tests.

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A**

1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
2. Turn circuit breaker 4 (RADIO RACK) on PCU ON (TM 9-2350-314-10). Verify all circuit breakers are in the ON position.

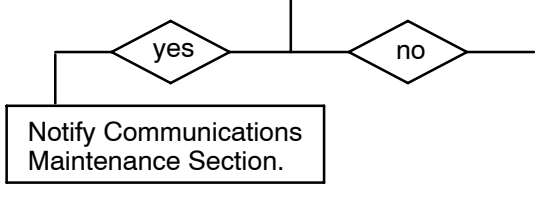
Does CB4 stay in the ON position?



**B**

1. Disconnect harness W26 connector P2 from radio rack connector.
2. Reset CB4 on the PCU.

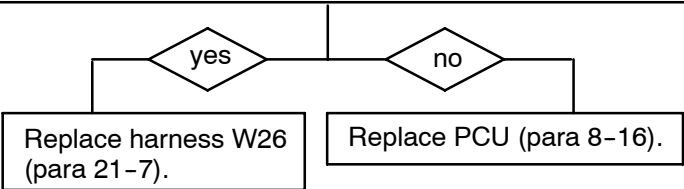
Does CB4 stay in the ON position?



**C**

1. Disconnect harness W26 connector P1 from PCU connector J7.
2. Reset CB4 on the PCU.

Does CB4 stay in the ON position?



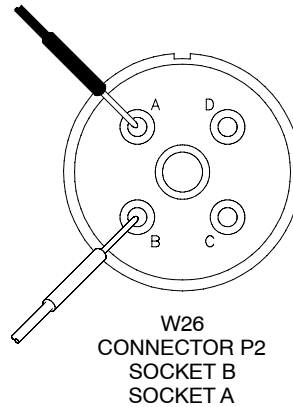
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

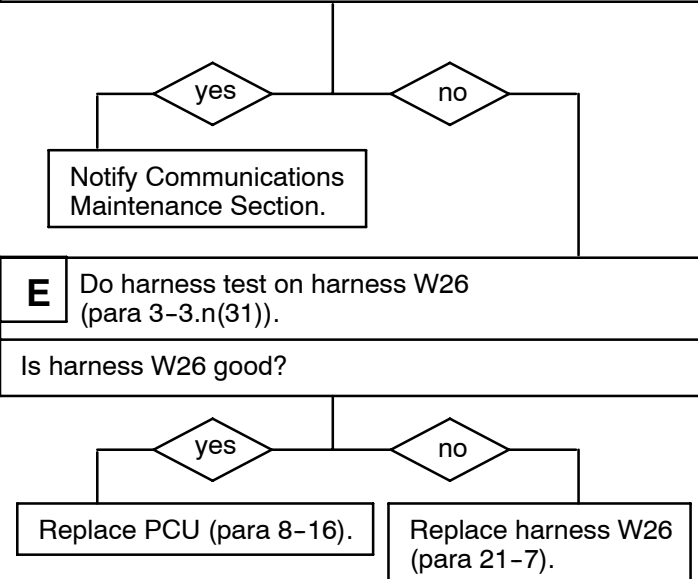
a. AFCS - CONTINUED (14) RADIOS WILL NOT POWER UP. - CONTINUED

CONTINUED FROM STEP A

<b>D</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W26 connector P2 from radio rack connector.</li> <li>2. Place multimeter red lead in harness W26 connector P2 socket B and black lead in harness W26 connector P2 socket A.</li> <li>3. Measure voltage (V dc).</li> </ol>
Is voltage greater than 18 V dc?	



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**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

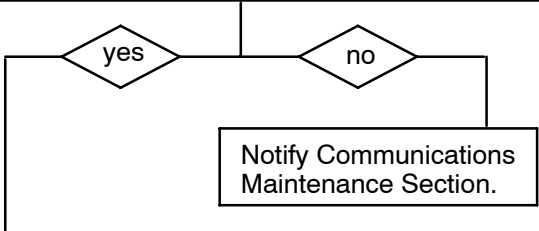
a. AFCS - CONTINUED (15) NO INTERCOM AUDIBLE CREW ALERT.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

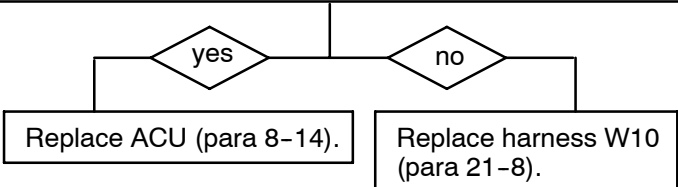
**A** 1. Turn vehicle MASTER power switch and MASTER CONTROL STATION power switch ON (TM 9-2350-314-10).  
 2. Test vehicle intercom at any two positions.

Does intercom operate properly?



**B** Do harness test on harness W10 (para 3-3.n(32)).

Is harness W10 good?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT.

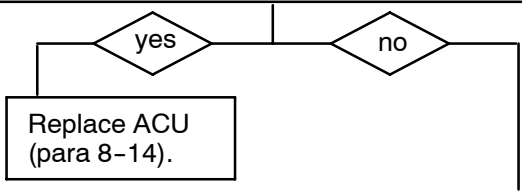
**INITIAL SETUP**

Run PDIU AFCS Tests.

Tools  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

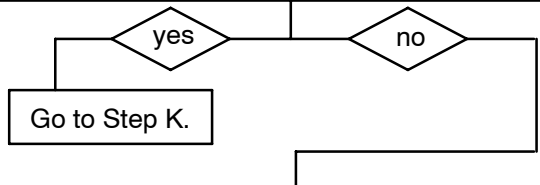
**A** Turn vehicle MASTER power and DU POWER switches ON and POWER UP AFCS. Enter MAINTENANCE MODE and select the AFCS STATUS screen and select the NAV SUBSYSTEM STATUS.

Are either of the following items FAILED?  
 NAV IF BIT  
 I/O BOARD SDLC BIT



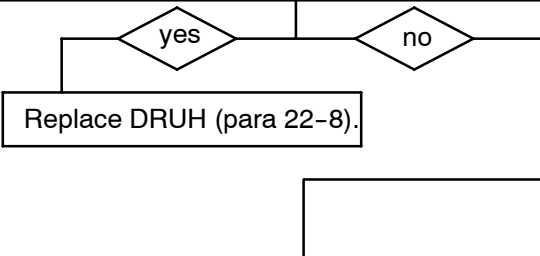
**B** Continue checking the NAV SUBSYSTEM STATUS.

Is the DRU CONNECT item FAILED?



**C** Continue checking the NAV SUBSYSTEM STATUS.

Are any of the following items FAILED?  
 BIT RECEIVED  
 DRU BIT  
 DRU INERTIAL



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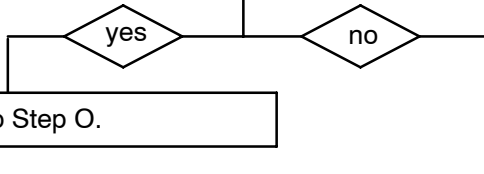


### 3-3. TROUBLESHOOTING CHART - CONTINUED

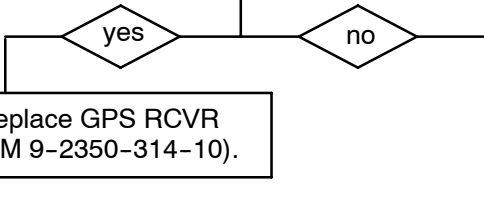
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP C

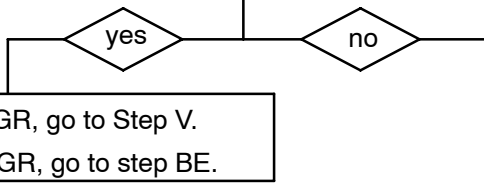
**D** Continue checking the NAV SUBSYSTEM STATUS.  
Is the VMS BIT FAILED?



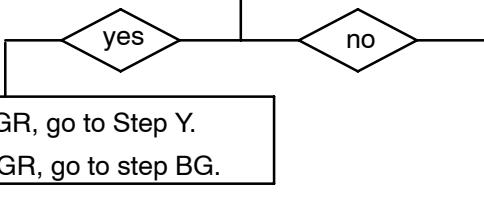
**E** Continue checking the NAV SUBSYSTEM STATUS.  
Is the GPS BIT FAILED?



**F** Continue checking the NAV SUBSYSTEM STATUS.  
Is the GPS ANTENNA FAILED?



**G** Check the display screen on the GPS RCVR.  
Is there text displayed on the GPS RCVR Display Screen?



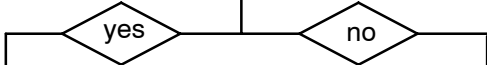
CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP G

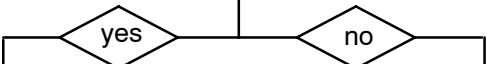
**H** Is the vehicle equipped with a PLGR?



If vehicle is equipped with DAGR, go to Step BA.

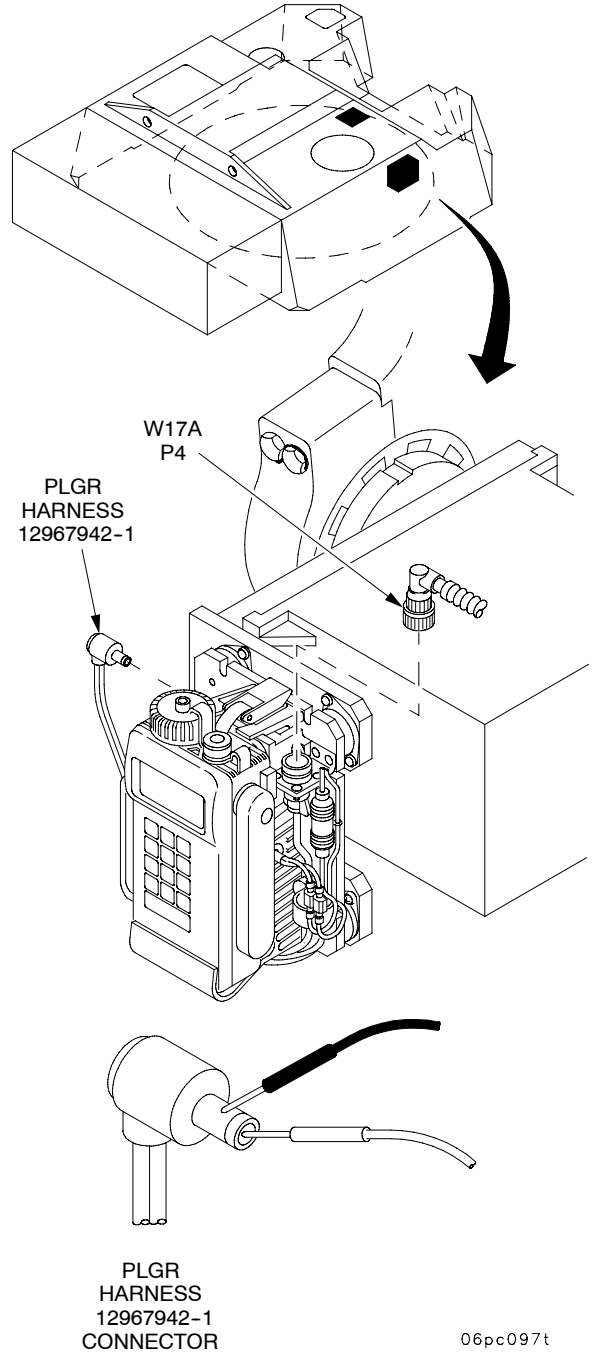
- I**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect PLGR power harness 12967942-1 from PLGR connector J4.
  3. Disconnect harness W17A connector P4 from PLGR harness W141 connector P1.
  4. Verify that the PLGR is securely latched to its mount (this is to ensure that the micro-switch on the mount is closed).
  5. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  6. Place multimeter red lead in the center of PLGR power harness 12967942-1 connector and black lead on outside of PLGR power harness 12967942-1 connector.
  7. Measure the DC voltage (V dc).

Is the voltage greater than 18 V dc?



Replace PLGR (TM 9-2350-314-10).

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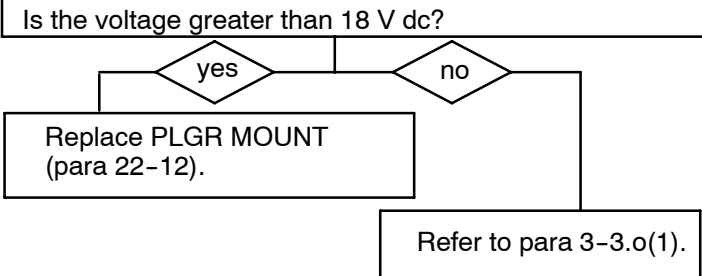
06pc097t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

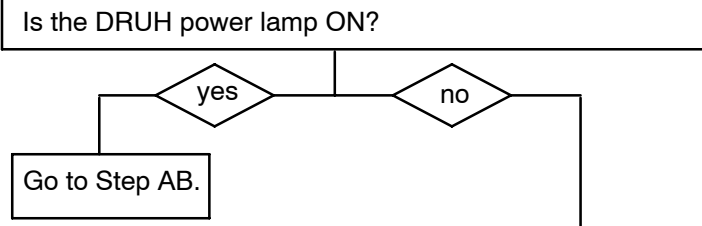
CONTINUED FROM STEP I

- J**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect spade lug on wire coming out of the fuse holder on PLGR power harness 12967942-1 from spade lug on wire coming from the PLGR mount.
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  4. Place multimeter red lead in the spade lug of PLGR power harness 12967942-1 and black lead on outside of PLGR power harness 12967942-1 connector.
  5. Measure the DC voltage (V dc).

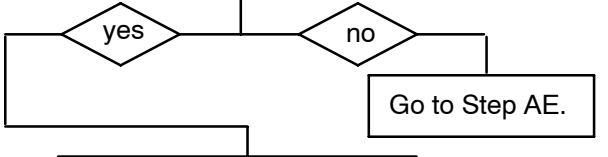


CONTINUED FROM STEP B

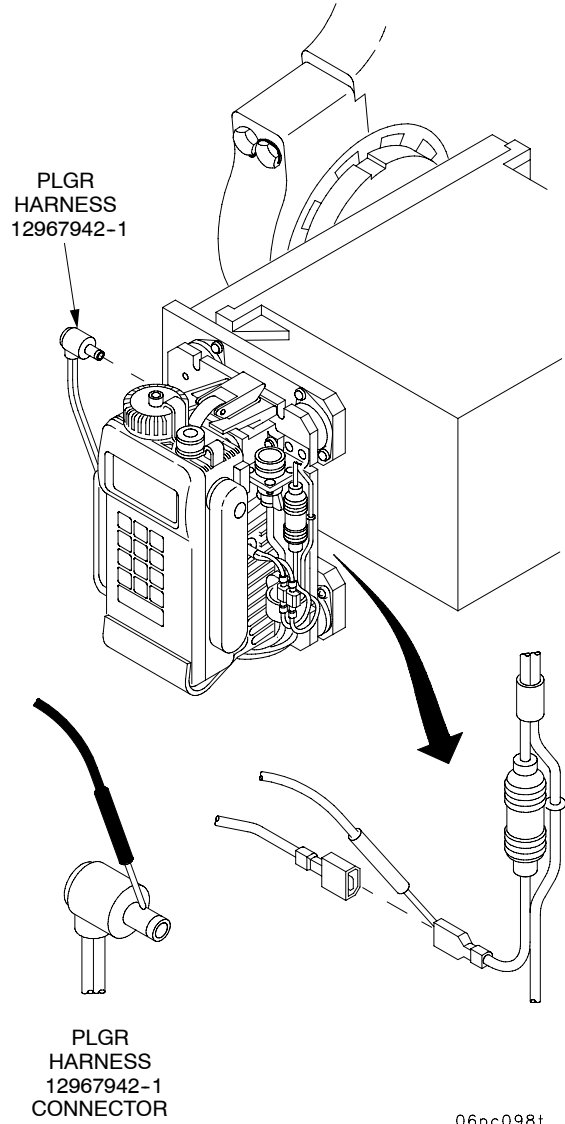
- K**
1. Remove 3 screws securing plate covering DRUH lamps and remove the plate.
  2. Check DRUH power lamp.



- L**
- Check circuit breakers NAV1 and NAV2 on the PCU and reset them if they have tripped.
- Do the circuit breakers stay ON?



CONTINUED ON NEXT PAGE



### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

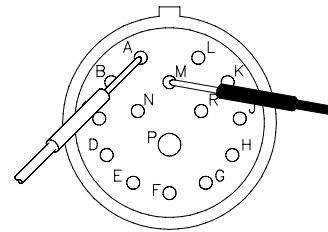
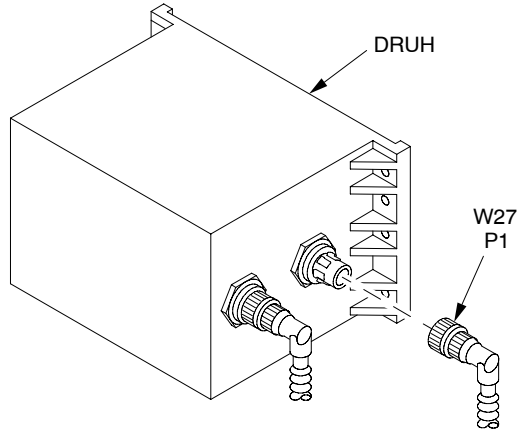
CONTINUED FROM STEP L

**M**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W27 connector P1 from DRUH connector J2.
3. Turn vehicle MASTER power and DU POWER switch ON (TM 9-2350-314-10).
4. Check harness W27 for DC voltage (V dc) by placing the red multimeter lead on Point A and the black multimeter lead on Point B.

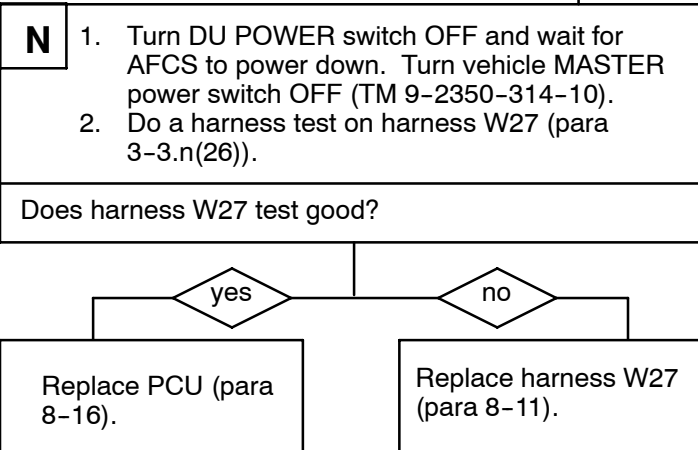
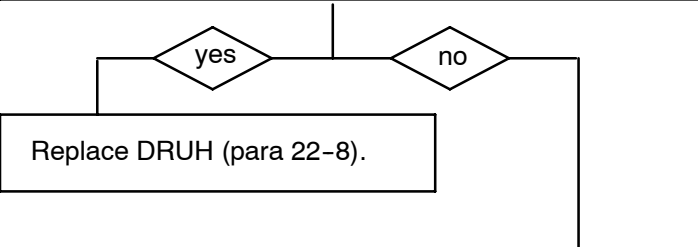
Point A	Point B
W27 Connector P1 socket A	W27 Connector P1 socket M
W27 Connector P1 socket B	W27 Connector P1 socket N
W27 Connector P1 socket J	W27 Connector P1 socket G
W27 Connector P1 socket K	W27 Connector P1 socket H
W27 Connector P1 socket L	W27 Connector P1 socket R

Is the voltage greater than 18 V dc at all points?



W27  
CONNECTOR P1  
TO DRU  
SOCKET A and SOCKET M  
(SOCKET B and SOCKET N)  
(SOCKET J and SOCKET G)  
(SOCKET K and SOCKET H)  
(SOCKET L and SOCKET R)

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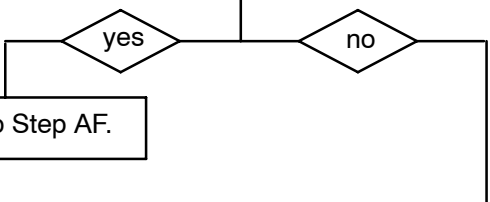
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

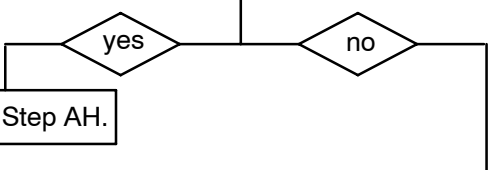
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEPS D AND J

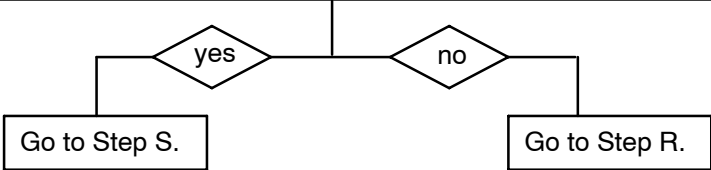
<b>O</b>	<ol style="list-style-type: none"> <li>1. Ensure segment boards are clean before running VMS test. If necessary, clean segment boards (para 23-3).</li> <li>2. Enter MAINTENANCE MODE. Select and run the VMS TEST (TM 9-2350-314-10).</li> </ol>
Is the result CAB SIDE VMS MODEM BAD?	



<b>P</b>	Check results of VMS tests from Step O.
Is the result CHASSIS SIDE VMS MODEM BAD?	



<b>Q</b>	Check results of VMS tests from Step O.
Is the result VMS BAD?	



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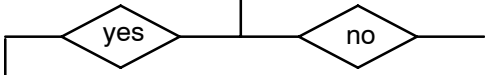
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP Q

- R**
1. Turn AFCS power switch on the keyboard to OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  3. Perform harness test on harness W17A (para 3-3.n(27)) between connectors P1, P2, and P3.

Does harness W17A test good?



1. Replace VMS cab side modem (para 22-5).
2. After re-testing the AFCS if the problem still occurs replace the DRUH (para 22-8).

Replace harness W17A (para 8.1-9).

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

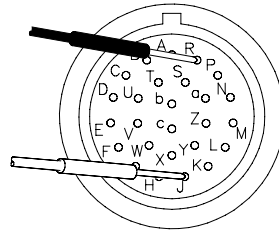
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP Q

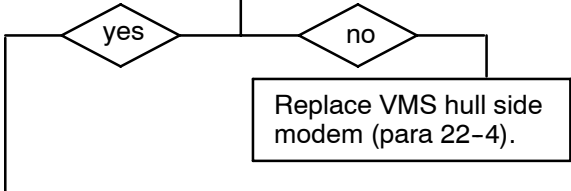
**S**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W21 connector P2 at VMS hull side modem connector J1.
3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
4. Place multimeter red lead on VMS hull side modem connector J1 socket J and black lead on VMS hull side modem connector J1 socket R.
5. Measure the DC voltage (V dc).
6. Place multimeter red lead on VMS hull side modem connector J1 socket K and black lead on VMS hull side modem connector J1 socket S.
7. Measure the DC voltage (V dc).

Are both voltages greater than 5 V dc?

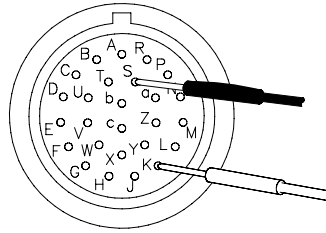


VMS MODEM  
CONNECTOR J1  
SOCKET J  
SOCKET R

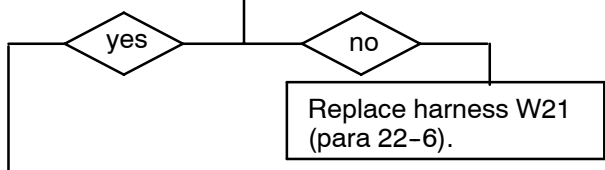


**T** Turn vehicle MASTER power switch OFF (TM 9-2350-314-10). Do harness test on harness W21 (para 3-3.n(28)).

Is harness W21 good?

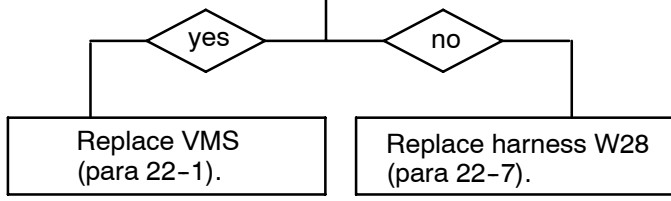


VMS MODEM  
CONNECTOR J1  
SOCKET K  
SOCKET S



**U** Do harness test on harness W28 (para 3-3.n(29)).

Is harness W28 good?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

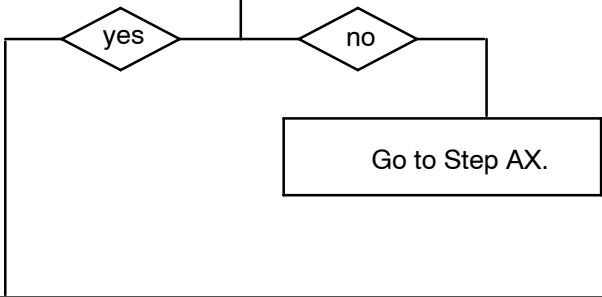
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP F

**V**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect PLGR power harness 12967942-1 from PLGR connector J4.
3. Disconnect PLGR antenna harness 12967937 from PLGR connector J3.
4. Connect one lead of multimeter to the center wire of antenna harness 12967937 (PLGR) connector and the other lead to the outside wire shield of antenna harness 12967937 connector (brass fingers).
5. Measure the resistance (ohms).

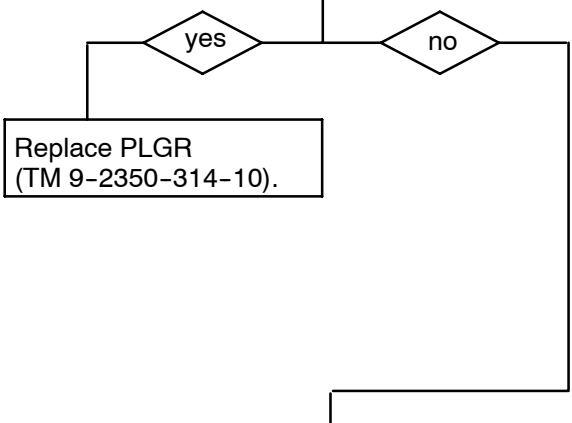
Is the resistance between 80 and 280 ohms?



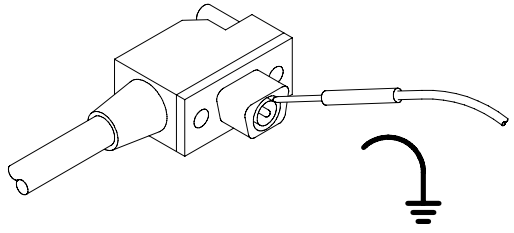
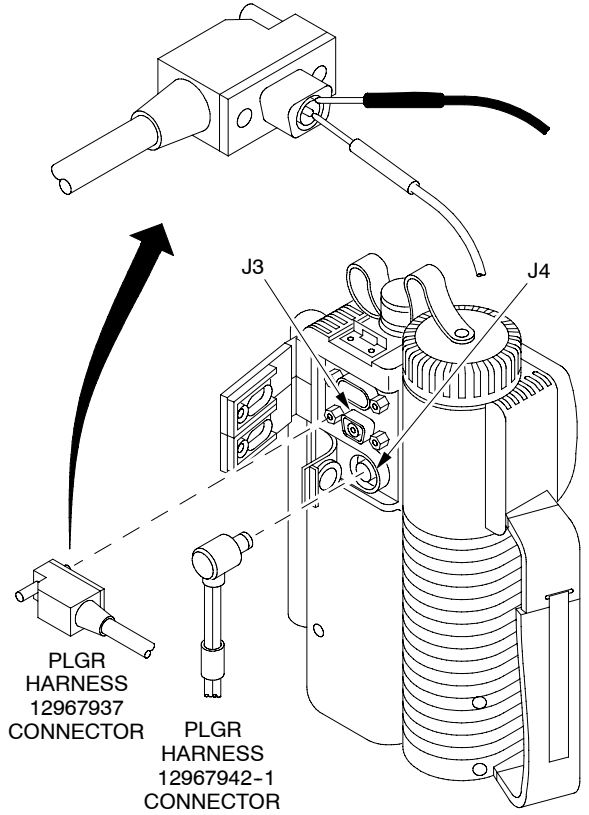
**W**

1. Connect one lead of multimeter to the outside wire shield of antenna harness 12967937 connector and the other lead to chassis ground.
2. Measure the resistance (ohms).

Is the resistance greater than 1000 ohms?



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06pc100t



### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP W

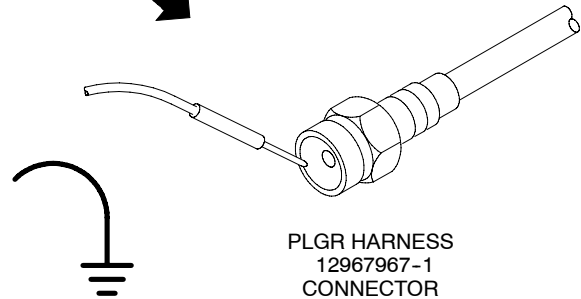
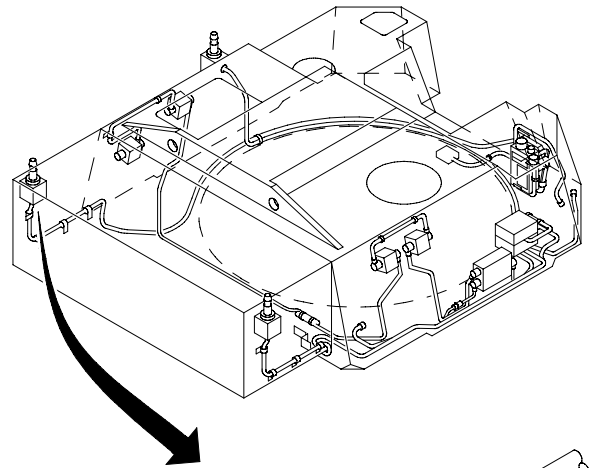
- |          |   |
|----------|---|
| <b>X</b> | <ol style="list-style-type: none"> <li>1. Disconnect PLGR antenna harness 12967967-1 from PLGR antenna on the outside of the vehicle.</li> <li>2. Connect one lead of multimeter to the outside wire shield of antenna harness 12967967-1 connector and the other lead to chassis ground.</li> <li>3. Measure the resistance (ohms).</li> </ol> |
|----------|---|

Is the resistance greater than 1000 ohms?
---



Replace PLGR antenna harness 12967967-1 (para 22-11).
---

Replace PLGR antenna 12967923 (para 21-10).
---



PLGR HARNESS  
12967967-1  
CONNECTOR

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# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP G

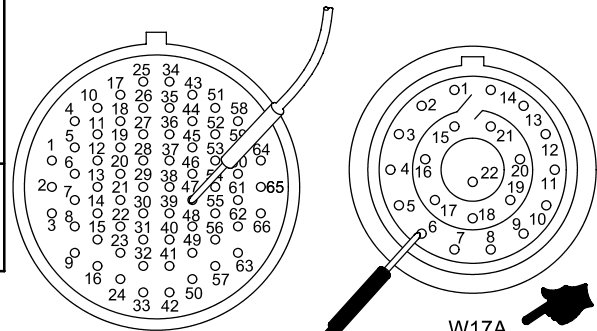
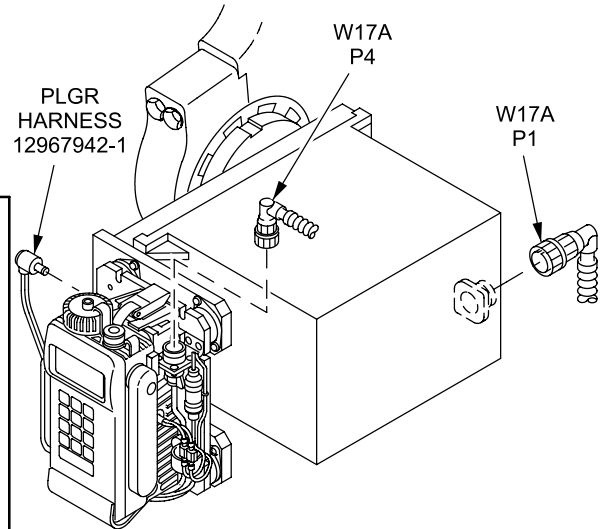
**Y**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect PLGR power harness 12967942-1 from PLGR connector J4.
3. Disconnect harness W17A connector P1 from DRUH connector J1.
4. Check harness W17A for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A Point B

W17A Connector P1 pin 47 W17A Connector P4 socket 06  
 W17A Connector P1 pin 20 W17A Connector P4 socket 13  
 W17A Connector P1 pin 51 W17A Connector P4 socket 04  
 W17A Connector P1 pin 43 W17A Connector P4 socket 05

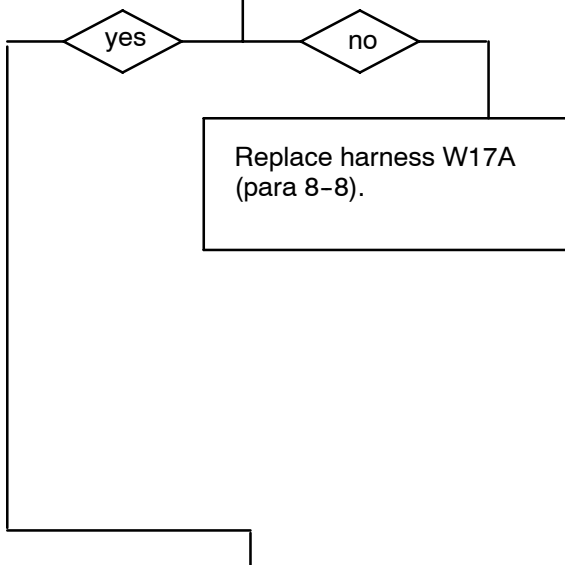
Is there continuity at all points (resistance less than 10 ohms)?



W17A  
CONNECTOR P1  
TO DRUH J1  
PIN 47  
(PIN 20)  
(PIN 51)  
(PIN 43)

W17A  
CONNECTOR P4  
TO PLGR HARNESS  
W141  
SOCKET 06  
(SOCKET 13)  
(SOCKET 04)  
(SOCKET 05)

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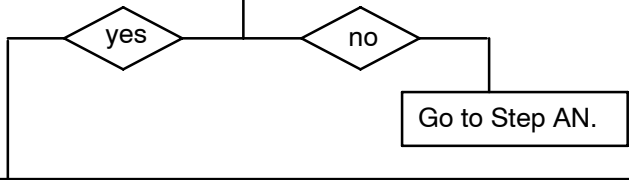
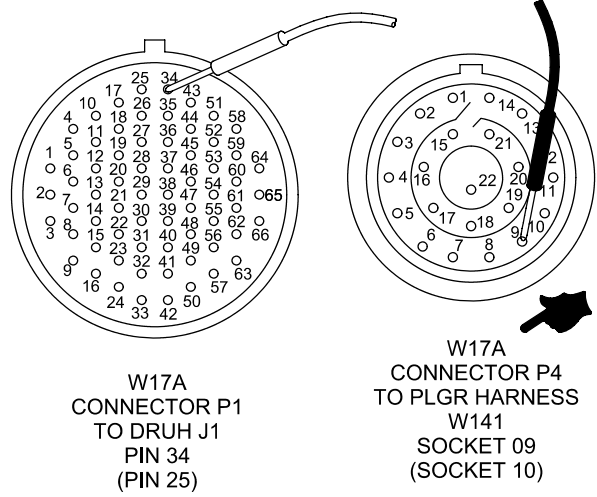
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

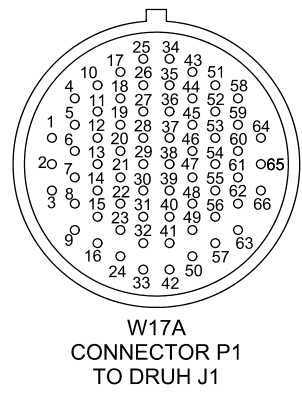
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP Y

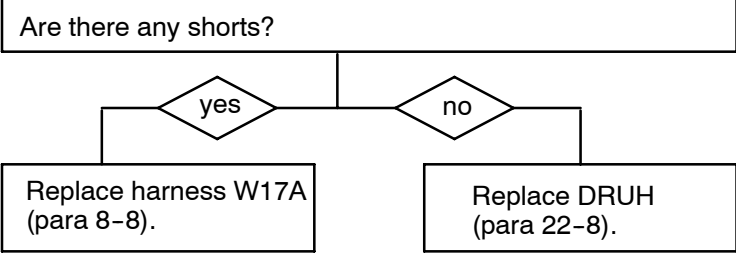
<b>Z</b>	Check harness W17A for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.
Point A	Point B
W17A Connector P1 pin 34	W17A Connector P4 socket 09
W17A Connector P1 pin 25	W17A Connector P4 socket 10
Is there continuity at all points (resistance less than 10 ohms)?	



<b>AA</b>	Check harness W17A for shorts by placing the one multimeter lead on Point A and the other multimeter lead on Point B.
Point A	Point B
Connector P1 pin 20	Connector P1 pin 25
Connector P1 pin 20	Connector P1 pin 34
Connector P1 pin 20	Connector P1 pin 43
Connector P1 pin 20	Connector P1 pin 47
Connector P1 pin 20	Connector P1 pin 51
Connector P1 pin 25	Connector P1 pin 34
Connector P1 pin 25	Connector P1 pin 43
Connector P1 pin 25	Connector P1 pin 47
Connector P1 pin 25	Connector P1 pin 51
Connector P1 pin 34	Connector P1 pin 43
Connector P1 pin 34	Connector P1 pin 47
Connector P1 pin 34	Connector P1 pin 51
Connector P1 pin 43	Connector P1 pin 47
Connector P1 pin 43	Connector P1 pin 51
Connector P1 pin 47	Connector P1 pin 51



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

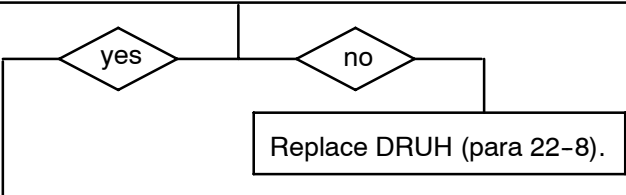
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP K

**AB** Check DRUH BIT lamp.

**NOTE**  
DRUH BIT Lamp is ON during normal operation. DRUH BIT lamp goes OUT when there is a BIT failure.

Is the BIT lamp ON?

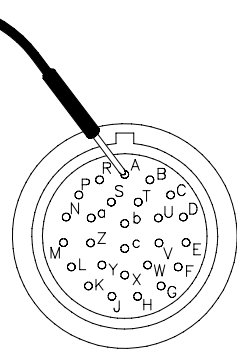
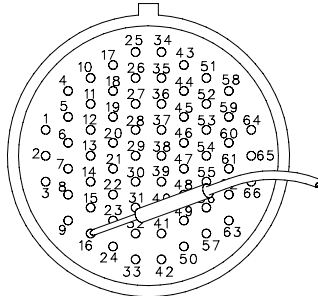
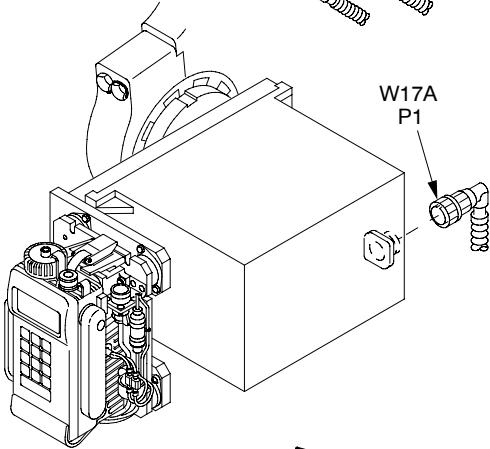
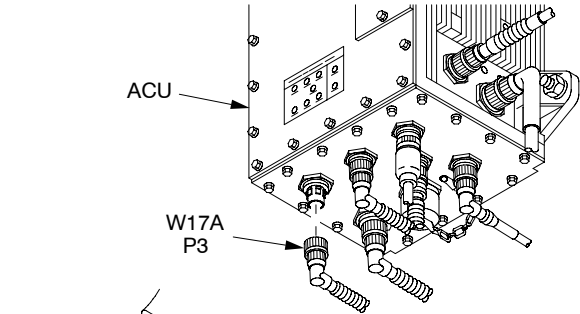
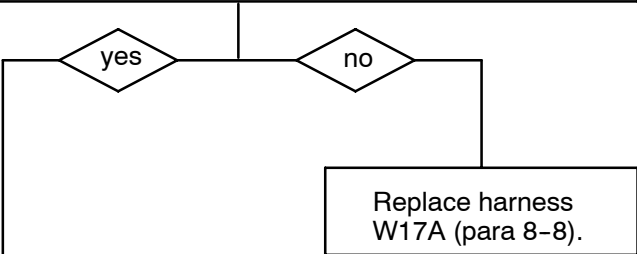


**AC**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W17A connector P1 from DRUH connector J1.
3. Disconnect harness W17A connector P3 from ACU connector J2.
4. Check harness W17A for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
W17A Connector P1 pin 16	W17A Connector P3 pin A
W17A Connector P1 pin 24	W17A Connector P3 pin B
W17A Connector P1 pin 08	W17A Connector P3 pin C
W17A Connector P1 pin 09	W17A Connector P3 pin D

Is there continuity at all points (resistance less than 10 ohms)?



**W17A  
CONNECTOR P1  
TO DRUH J1**  
PIN 16  
(PIN 24)  
(PIN 08)  
(PIN 09)

**W17A  
CONNECTOR P3  
TO ACU J2**  
PIN A  
(PIN B)  
(PIN C)  
(PIN D)

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

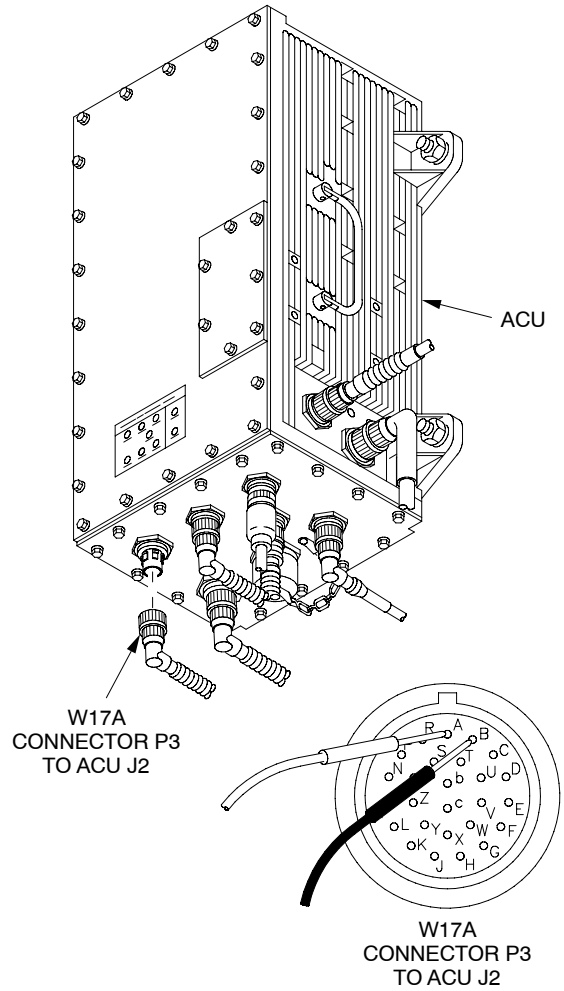
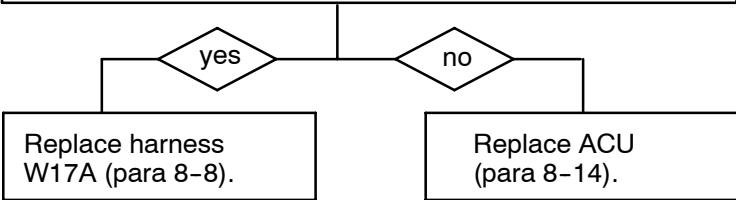
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AC

**AD** Check harness W17A for shorts by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
W17A Connector P3 pin A	W17A Connector P3 pin B
W17A Connector P3 pin A	W17A Connector P3 pin C
W17A Connector P3 pin A	W17A Connector P3 pin D
W17A Connector P3 pin A	W17A Connector P3 pin U
W17A Connector P3 pin B	W17A Connector P3 pin C
W17A Connector P3 pin B	W17A Connector P3 pin D
W17A Connector P3 pin B	W17A Connector P3 pin U
W17A Connector P3 pin C	W17A Connector P3 pin D
W17A Connector P3 pin C	W17A Connector P3 pin U
W17A Connector P3 pin D	W17A Connector P3 pin U

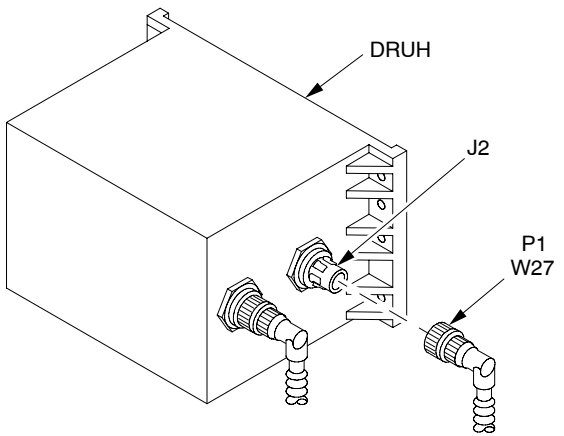
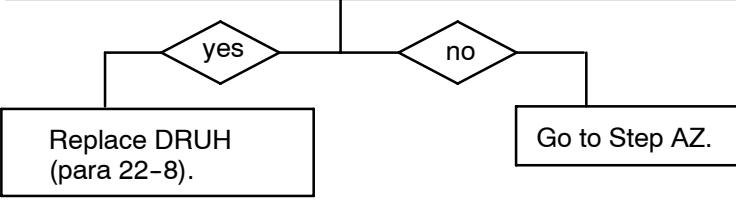
Are there any shorts?



CONTINUED FROM STEP L

**AE** 1. Disconnect harness W27 connector P1 from DRUH connector J2.  
2. Reset the tripped circuit breakers.

Do the circuit breakers stay ON?



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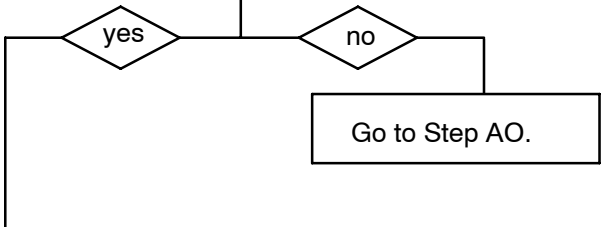
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP O

**AF** Check the power lamp on the VMS cab side modem.

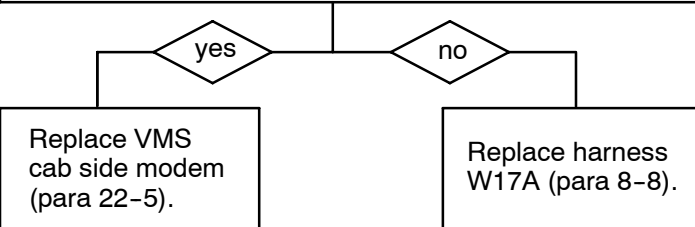
Is the power lamp ON?



**AG**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Do a harness test on harness W17A (para 3-3.n(27)) between connectors P1, P2, and P3.

Does harness W17A test good?



CONTINUED ON NEXT PAGE

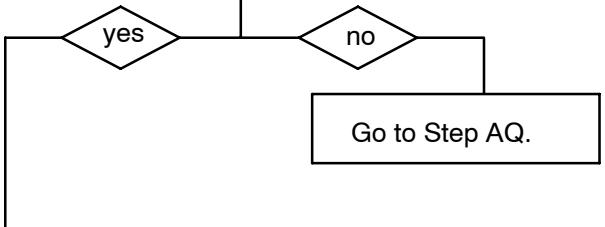
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP P

**AH** Check the power lamp on the VMS hull side modem.

Is the power lamp ON?

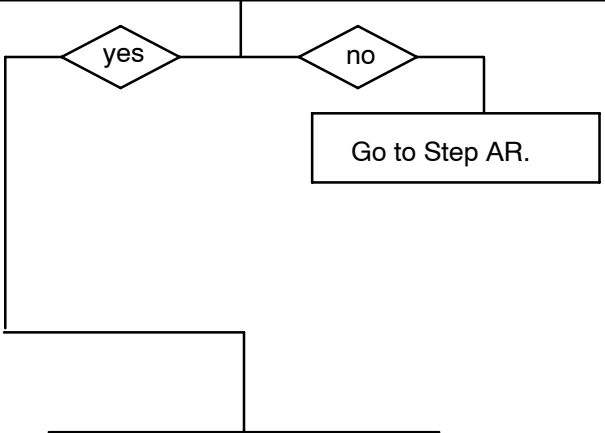


**AI**

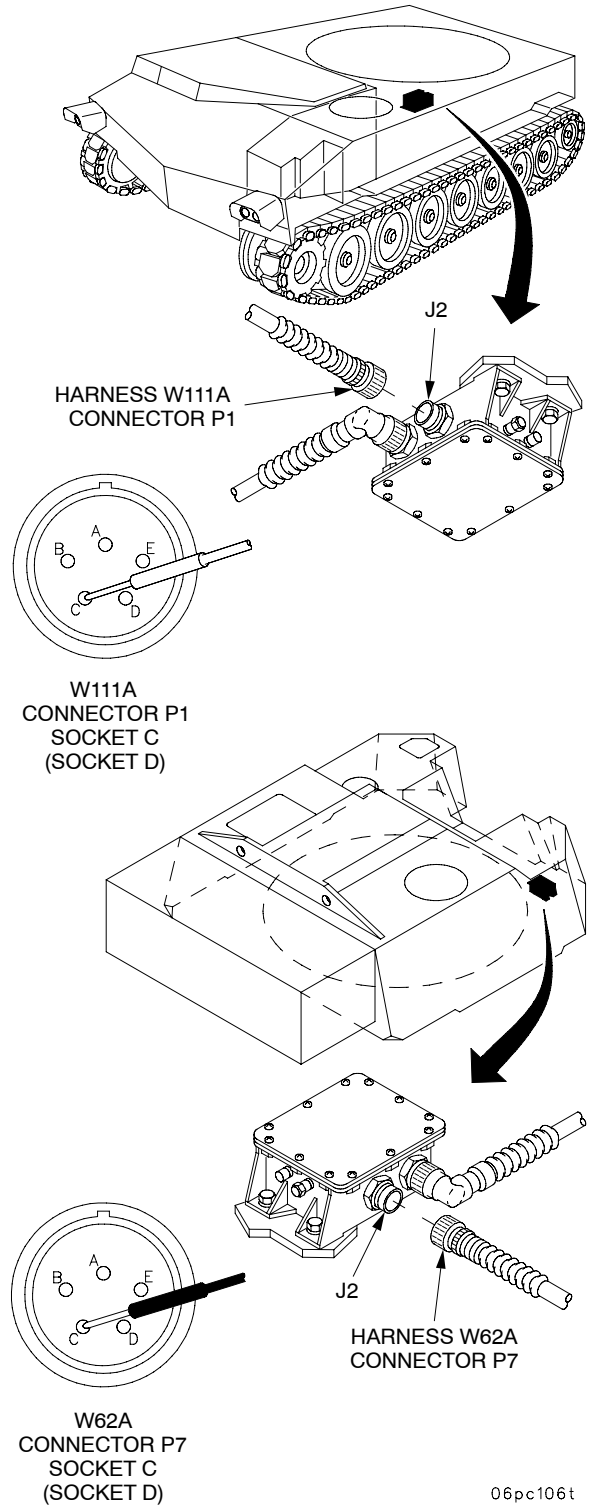
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W111A connector P1 at VMS hull side modem connector J2.
3. Disconnect harness W62A connector P7 at VMS cab side modem connector J2.
4. Check for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
W111A Connector P1 socket C	W62A Connector P7 socket C
W111A Connector P1 socket D	W62A Connector P7 socket D

Is there continuity at all points (resistance less than 10 ohms)?



CONTINUED ON NEXT PAGE



06pc106t

# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

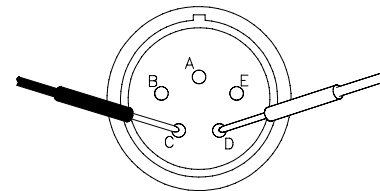
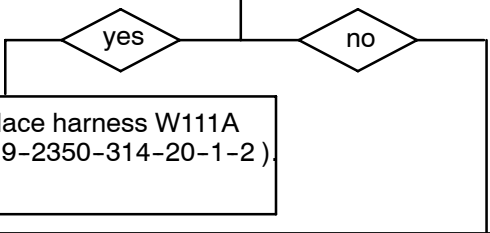
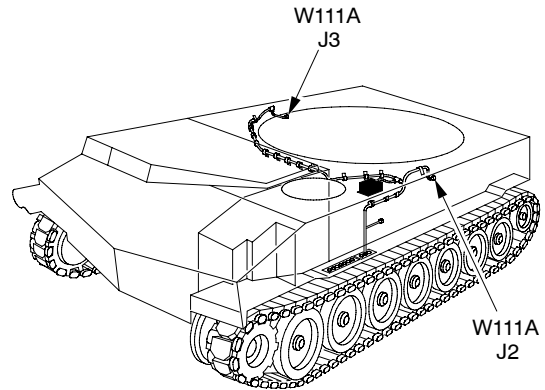
CONTINUED FROM STEP AI

**AJ**

1. Disconnect harness W111A connector J2 from left slip ring connector.
2. Disconnect harness W111A connector J3 from right slip ring connector.
3. Check harness W111A for shorts by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
Connector P1 socket C	Connector P1 socket D
Connector P1 socket C	Connector P1 socket E
Connector P1 socket D	Connector P1 socket E

Are there any shorts?



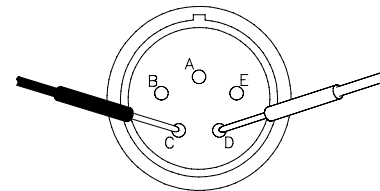
**W111A**  
CONNECTOR P1  
SOCKET C and SOCKET D  
(SOCKET C and SOCKET E)  
(SOCKET D and SOCKET E)

**AK**

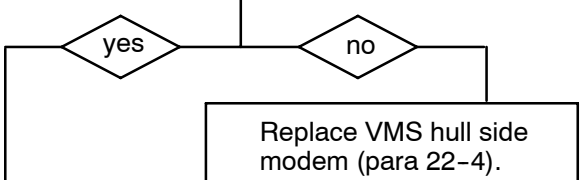
Check harness W62A for shorts by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
Connector P7 socket C	Connector P7 socket D
Connector P7 socket C	Connector P7 socket E
Connector P7 socket D	Connector P7 socket E

Are there any shorts?



**W62A**  
CONNECTOR P7  
SOCKET C and SOCKET D  
(SOCKET C and SOCKET E)  
(SOCKET D and SOCKET E)



CONTINUED ON NEXT PAGE

06pc107t



# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

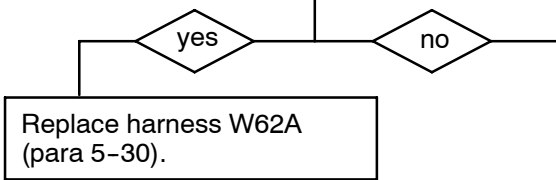
CONTINUED FROM STEP AK

**AL**

1. Disconnect harness W62A connector P1 from harness W61A connector J1.
2. Disconnect harness W62A connector J1 from harness W61A connector P1.
3. Disconnect harness W62A connectors P2, P3, P4, P5 from Brush Blocks #1, #2, #3, #4.
4. Check harness W62A for shorts by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
Connector P7 socket C	Connector P7 socket D
Connector P7 socket C	Connector P7 socket E
Connector P7 socket D	Connector P7 socket E

Are there any shorts?

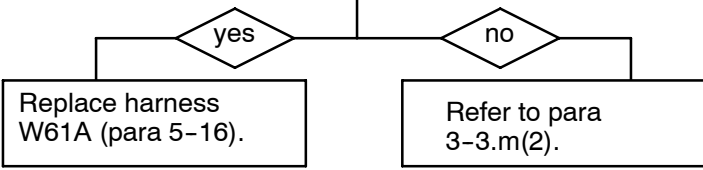


**AM**

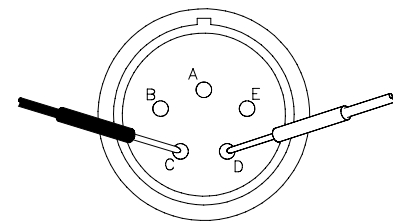
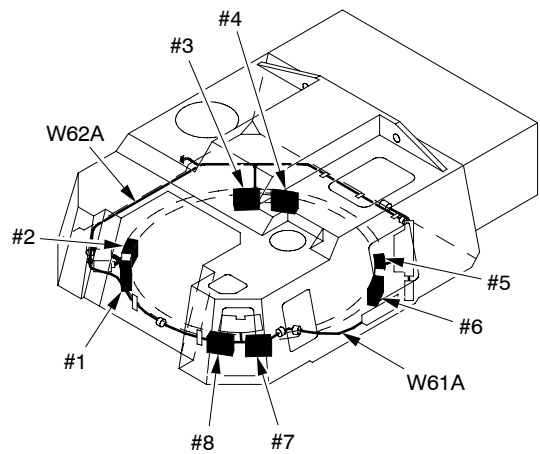
1. Disconnect harness W61A connectors P2, P3, P4, P5 from Brush Blocks #5, #6, #7, #8.
2. Check harness W61A for shorts by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
Connector J1 pin G	Connector J1 pin H

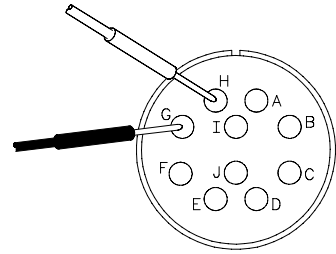
Are there any shorts?



**NOTE:**  
 Brush Blocks #s 1,2,3,& 4, connected to W62A Wiring Harness  
 Brush Blocks #s 5,6,7,& 8, connected to W61A Wiring Harness



**W62A  
 CONNECTOR P7  
 SOCKET C and SOCKET D  
 (SOCKET C and SOCKET E)  
 (SOCKET D and SOCKET E)**



**W61A  
 CONNECTOR J1  
 PIN G and PIN H**

06pc108t

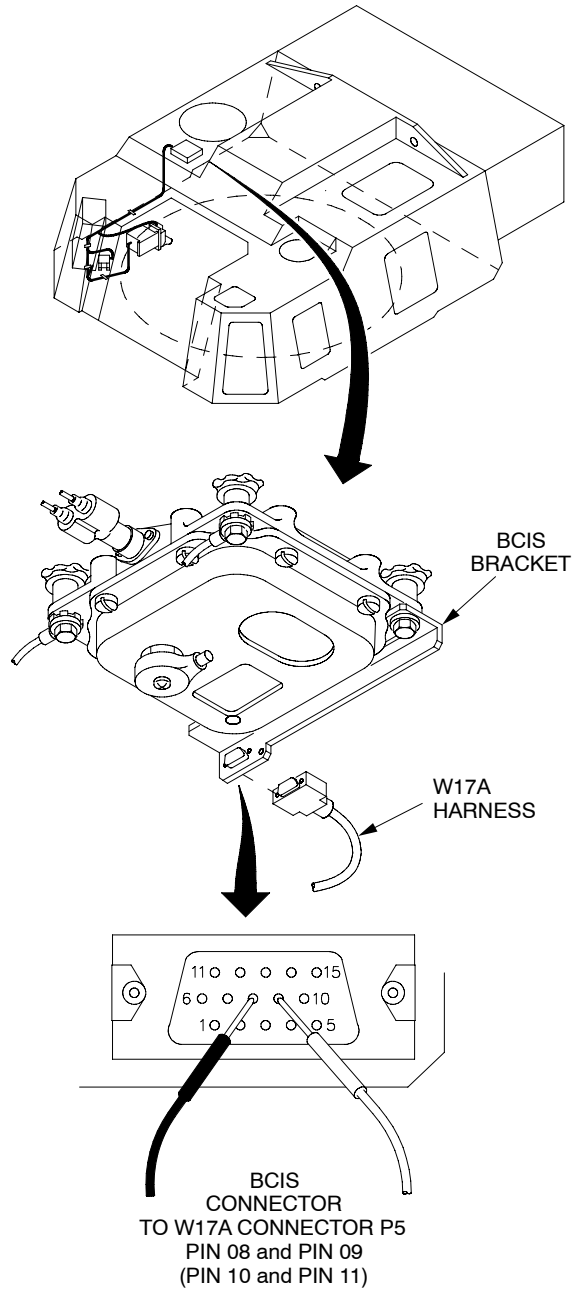
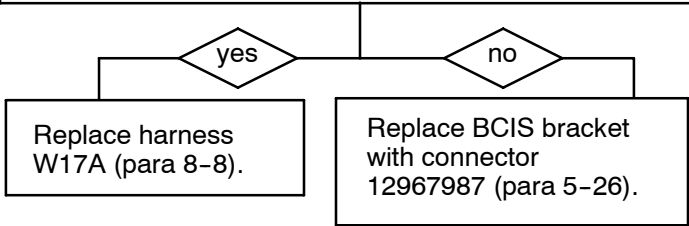
CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP Z

<b>AN</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W17A connector P5 from BCIS shorting plug connector 12967987 and mounting bracket 12967994.</li> <li>2. Check shorting plug connector 12967987 for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.</li> </ol>
Point A	Point B
Connector pin 08	Connector pin 09
Connector pin 10	Connector pin 11
Is there continuity at all points (resistance less than 10 ohms)?	



06pc110ta

CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

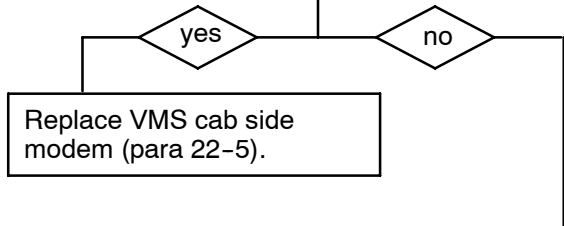
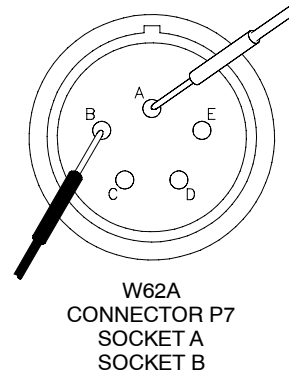
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AF

**AO**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W62A connector P7 from VMS cab side modem connector J2.
3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
4. Place multimeter Red lead in harness W62A connector P7 socket A and black lead in harness W62A connector P7 socket B.
5. Measure the DC voltage (V dc).

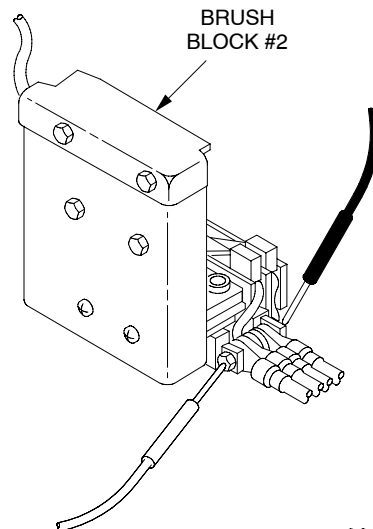
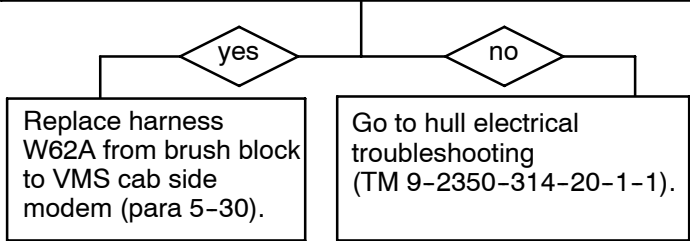
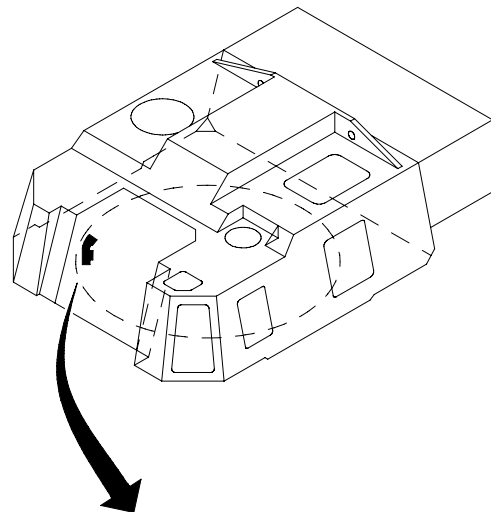
Is the voltage greater than 18 V dc?



**AP**

1. Place multimeter red lead on Brush Block #2 positive (100) terminal and black lead on Brush Block #2 negative (70) terminal.
2. Measure the DC voltage (V dc).

Is the voltage greater than 18 V dc?



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06pc111t

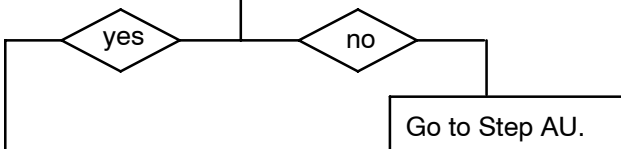
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

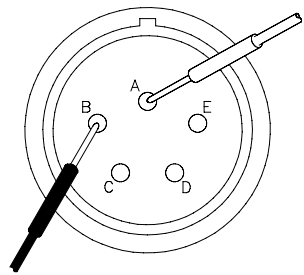
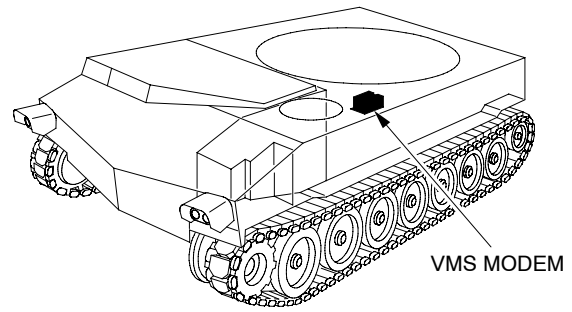
CONTINUED FROM STEP AH

- AQ**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W111A connector P1 at VMS hull side modem connector J2.
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  4. Place multimeter red lead in harness W111A connector P1 socket A and black lead in harness W111A connector P1 socket B.
  5. Measure the DC voltage (V dc).

Is the voltage greater than 18 V dc?



Replace VMS hull side modem (para 22-4).



W111A  
CONNECTOR P1  
SOCKET A  
SOCKET B

06pc112t

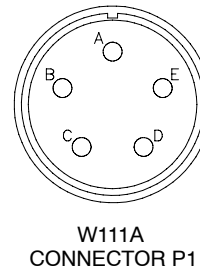
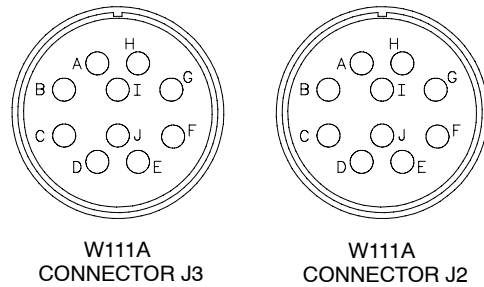
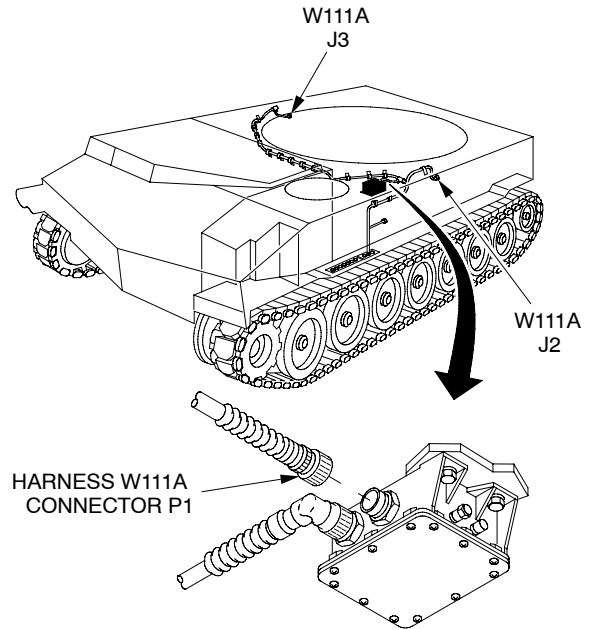
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

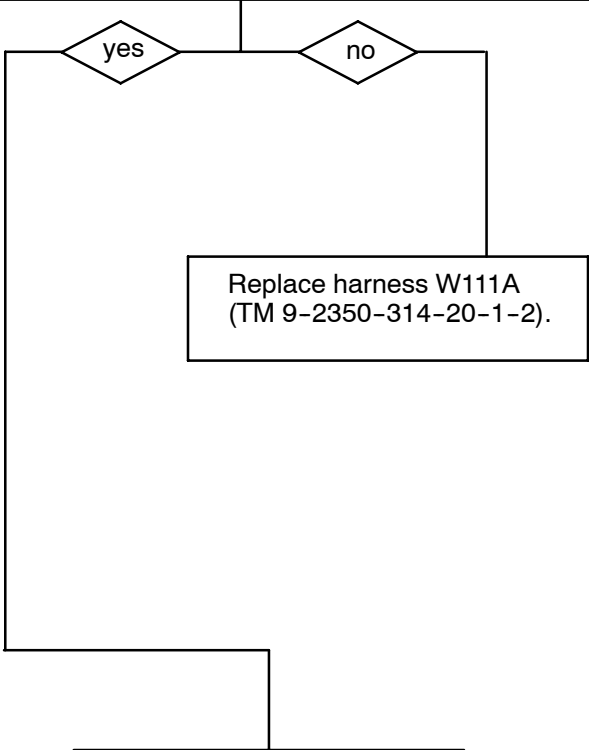
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP A1

<b>AR</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W111A connector J2 from VIS cable A3206130-10 connector P3.</li> <li>2. Disconnect harness W111A connector J3 from right slip ring connector.</li> <li>3. Check harness W111A for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.</li> </ol>										
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Point A</td> <td style="width: 50%; text-align: center;">Point B</td> </tr> <tr> <td style="border: none;">W111A Connector P1 socket C</td> <td style="border: none;">W111A Connector J2 socket H</td> </tr> <tr> <td style="border: none;">W111A Connector P1 socket C</td> <td style="border: none;">W111A Connector J3 socket H</td> </tr> <tr> <td style="border: none;">W111A Connector P1 socket D</td> <td style="border: none;">W111A Connector J2 socket G</td> </tr> <tr> <td style="border: none;">W111A Connector P1 socket D</td> <td style="border: none;">W111A Connector J3 socket G</td> </tr> </table>	Point A	Point B	W111A Connector P1 socket C	W111A Connector J2 socket H	W111A Connector P1 socket C	W111A Connector J3 socket H	W111A Connector P1 socket D	W111A Connector J2 socket G	W111A Connector P1 socket D	W111A Connector J3 socket G
Point A	Point B										
W111A Connector P1 socket C	W111A Connector J2 socket H										
W111A Connector P1 socket C	W111A Connector J3 socket H										
W111A Connector P1 socket D	W111A Connector J2 socket G										
W111A Connector P1 socket D	W111A Connector J3 socket G										
Is there continuity at all points (resistance less than 10 ohms)?											



06pc113t



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AR

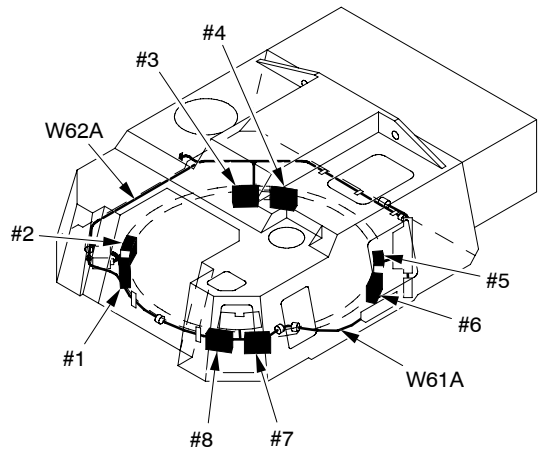
**AS**

1. Disconnect harness W62A connector P1 from harness W61A connector J1.
2. Disconnect harness W62A connector J1 from harness W61A connector P1.
3. Disconnect harness W62A connectors P2, P3, P4, P5 from Brush Blocks #1, #2, #3, #4.
4. Check harness W62A for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

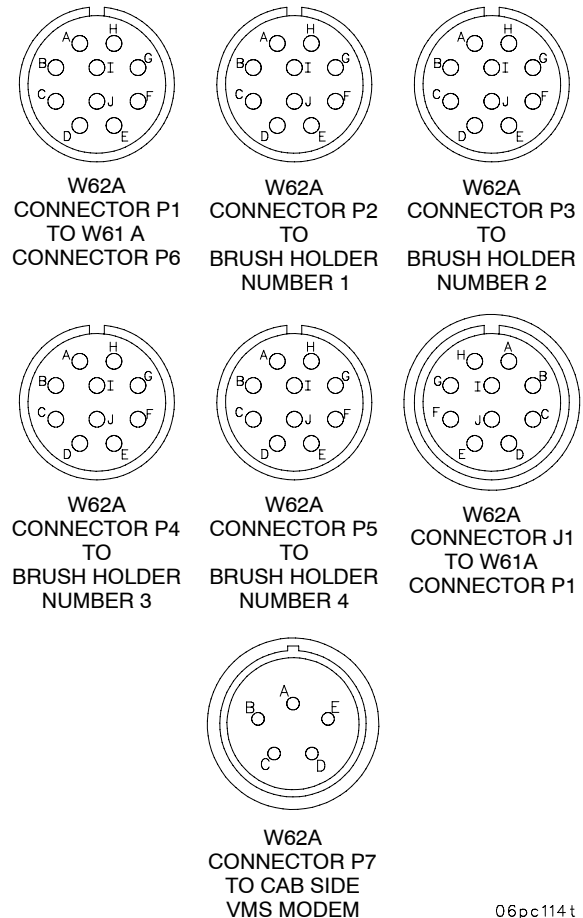
NOTE:

Brush Blocks #s 1,2,3,& 4, connected to W62A Wiring Harness

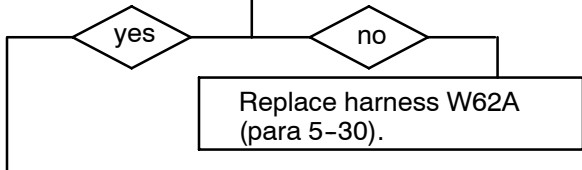
Brush Blocks #s 5,6,7,& 8, connected to W61A Wiring Harness



Point A	Point B
W62A Connector P7 socket C	W62A Connector J1 pin G
W62A Connector P7 socket D	W62A Connector J1 pin H
W62A Connector P7 socket C	W62A Connector P1 socket G
W62A Connector P7 socket D	W62A Connector P1 socket H
W62A Connector P7 socket C	W62A Connector P2 socket G
W62A Connector P7 socket D	W62A Connector P2 socket H
W62A Connector P7 socket C	W62A Connector P3 socket G
W62A Connector P7 socket D	W62A Connector P3 socket H
W62A Connector P7 socket C	W62A Connector P4 socket G
W62A Connector P7 socket D	W62A Connector P4 socket H
W62A Connector P7 socket C	W62A Connector P5 socket G
W62A Connector P7 socket D	W62A Connector P5 socket H



Is there continuity at all points (resistance less than 10 ohms)?



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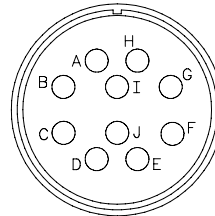
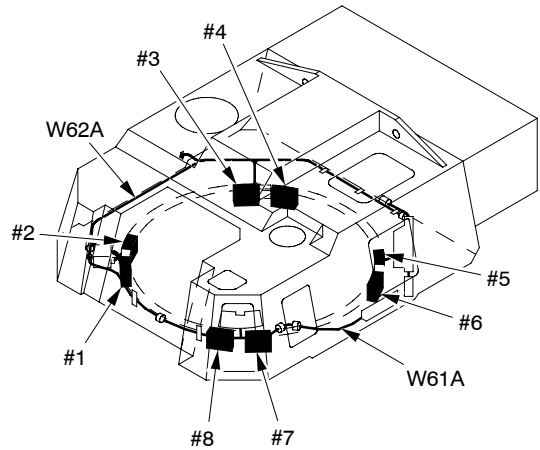
# 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

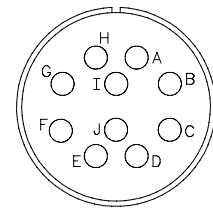
CONTINUED FROM STEP AS

<b>AT</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W61A connectors P2, P3, P4, P5 from Brush Blocks #5, #6, #7, #8.</li> <li>2. Check harness W61A for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.</li> </ol>
Point A	Point B
W61A Connector P1 socket G	W61A Connector J1 pin G
W61A Connector P1 socket H	W61A Connector J1 pin H
W61A Connector P1 socket G	W61A Connector P2 socket G
W61A Connector P1 socket H	W61A Connector P2 socket H
W61A Connector P1 socket G	W61A Connector P3 socket G
W61A Connector P1 socket H	W61A Connector P3 socket H
W61A Connector P1 socket G	W61A Connector P4 socket G
W61A Connector P1 socket H	W61A Connector P4 socket H
W61A Connector P1 socket G	W61A Connector P5 socket G
W61A Connector P1 socket H	W61A Connector P5 socket H
Is there continuity at all points (resistance less than 10 ohms)?	

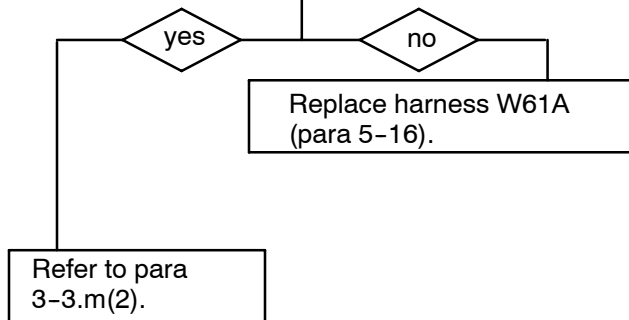
NOTE:  
 Brush Blocks #s 1,2,3,& 4, connected to W62A Wiring Harness  
 Brush Blocks #s 5,6,7,& 8, connected to W61A Wiring Harness



W61A  
 CONNECTOR P1  
 CONNECTOR P2  
 CONNECTOR P3  
 CONNECTOR P4  
 CONNECTOR P5



W61A  
 CONNECTOR J1



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

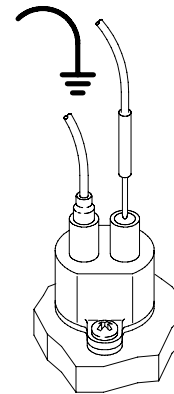
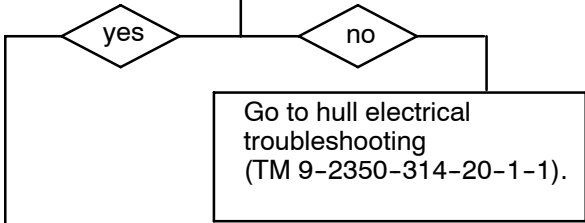
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AQ

**AU**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W111A lead 48 at circuit breaker CB9 in driver's compartment.
3. Turn vehicle MASTER power and DU POWER switch ON (TM 9-2350-314-10).
4. Place multimeter red lead in CB9 connector and black lead to chassis ground.
5. Measure the DC voltage (V dc).

Is the voltage greater than 18 V dc?

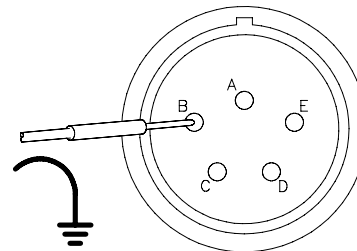
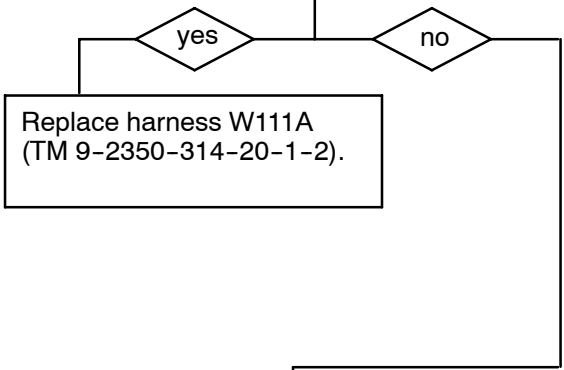


CIRCUIT  
BREAKER NO. 9

**AV**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Place one multimeter lead in harness W111A connector P1 socket B and other lead to chassis ground.
3. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



W111A  
CONNECTOR P1  
SOCKET B

06pc116t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

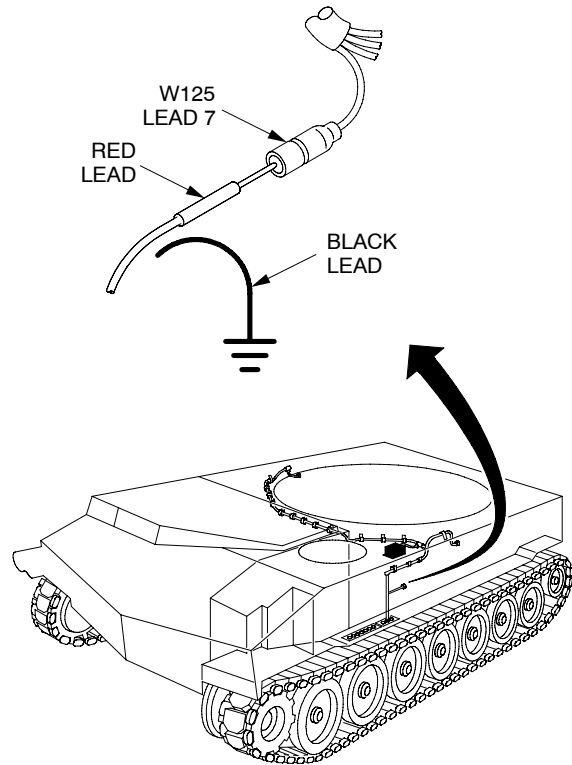
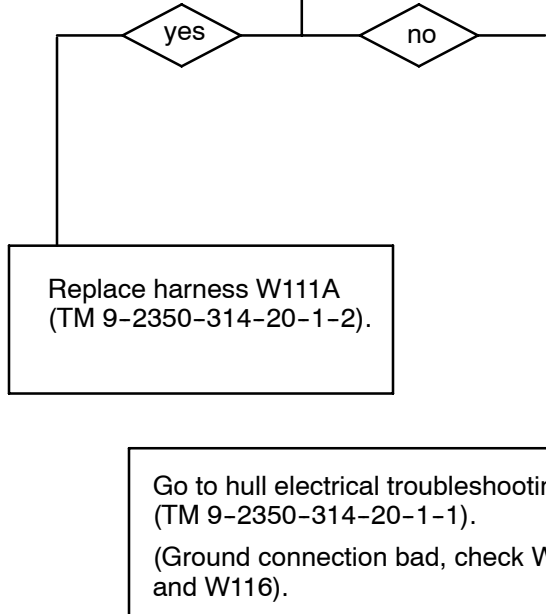
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AV

**AW**

1. Disconnect harness W111A lead 7 from harness W125 lead 7 in driver's compartment.
2. Place one multimeter lead in harness W125 lead 7 and other lead to chassis ground.
3. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



06pc117t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

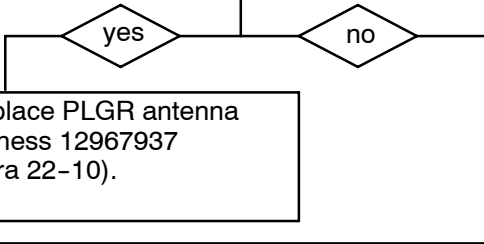
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP V

**AX**

1. Disconnect PLGR antenna harness 12967937 from PLGR antenna harness W140.
2. Connect one lead of multimeter to the center wire of antenna harness W140 connector and the other lead to the outside wire shield of antenna harness W140 connector.
3. Measure the resistance (ohms).

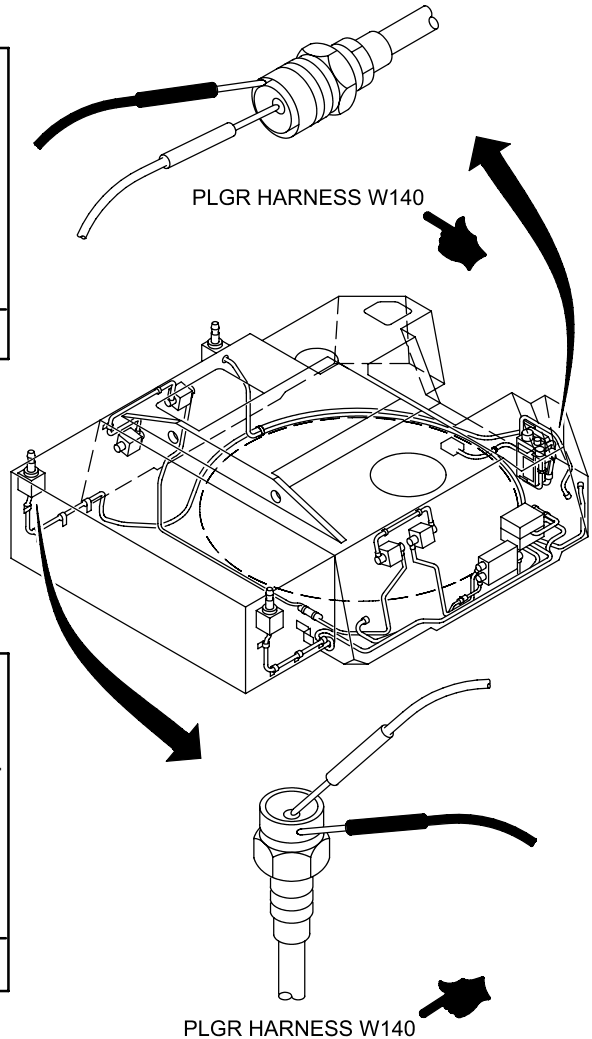
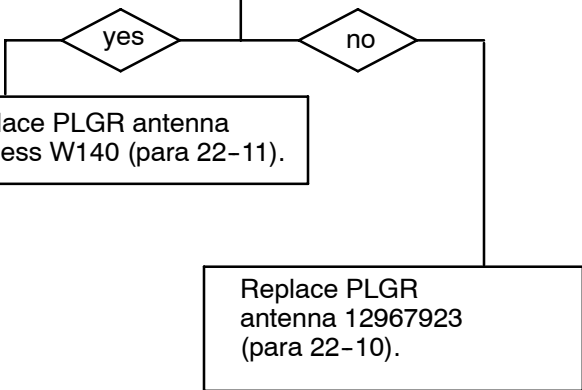
Is the resistance between 80 and 280 ohms?



**AY**

1. Disconnect PLGR antenna harness W140 from PLGR antenna on the outside of the vehicle.
2. Connect one lead of multimeter to the center wire of PLGR antenna connector and the other lead to the outside shield threads of PLGR antenna connector.
3. Measure the resistance (ohms).

Is the resistance between 80 and 280 ohms?



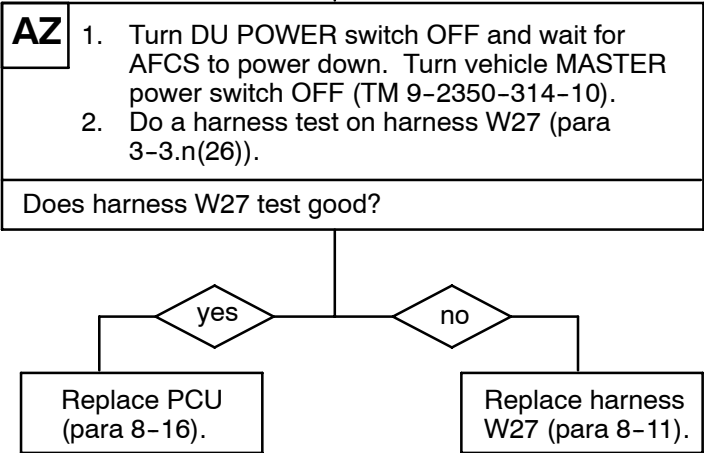
06pc109t

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**3-3. TROUBLESHOOTING CHART - CONTINUED**

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AE



CONTINUED ON NEXT PAGE

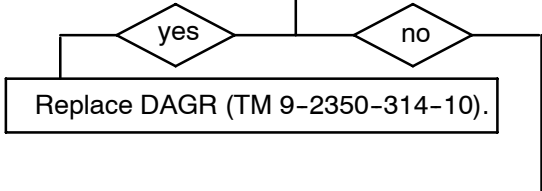
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP H

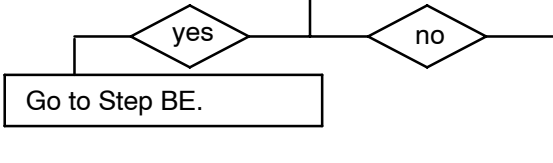
**BA** Continue checking the NAV SUBSYSTEM STATUS.

Is the GPS BIT FAILED?



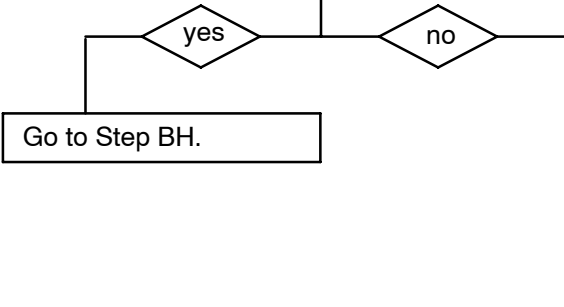
**BB** Continue checking the NAV SUBSYSTEM STATUS.

Is the GPS ANTENNA FAILED?



**BC** Check the display screen on the DAGR.

Is there text displayed on the DAGR Display Screen?



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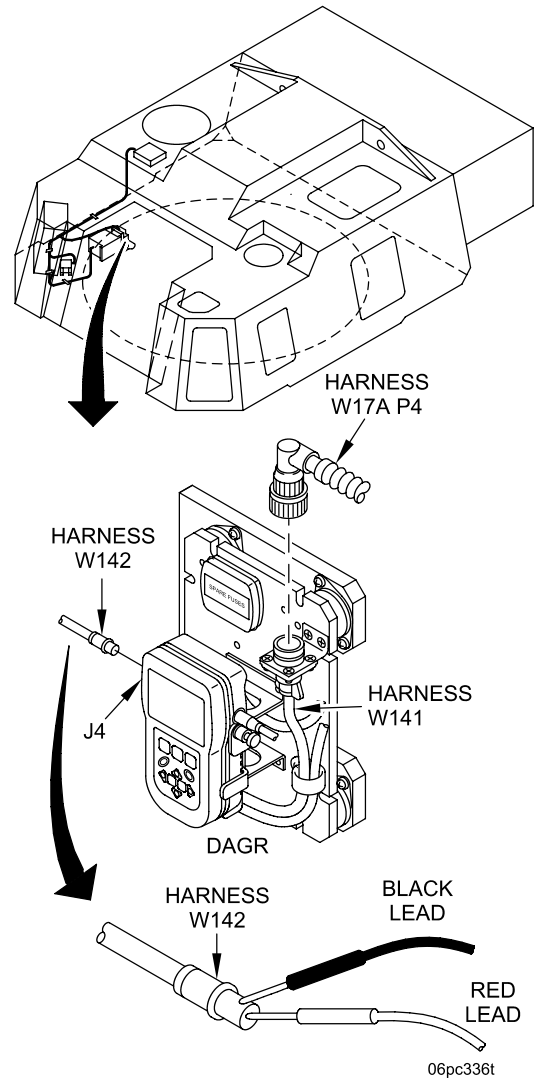
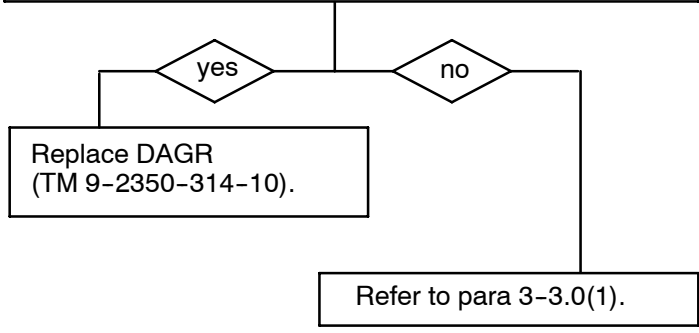
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP BC

- BD**
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect DAGR power harness W142 from DAGR connector J4.
  3. Disconnect harness W17A connector P4 from DAGR harness W141 connector P1.
  4. Verify that the DAGR is securely latched to its mount.
  5. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  6. Place multimeter red lead in the center of DAGR power harness W142 connector and black lead on outside of DAGR power harness W142 connector.
  7. Measure the DC voltage (V dc).

Is the voltage greater than 18 V dc?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

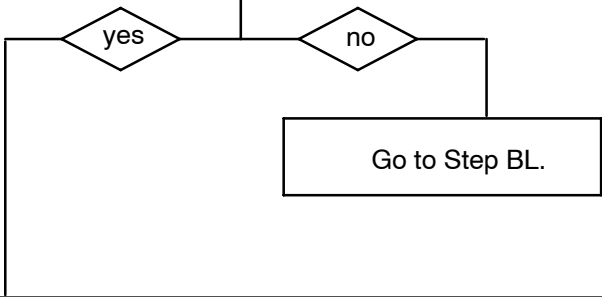
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEPS F AND BB

**BE**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect DAGR power harness W142 from DAGR connector J4.
3. Disconnect DAGR antenna harness W143 from DAGR connector J3.
4. Connect one lead of multimeter to the center wire of antenna harness W143 (DAGR) connector and the other lead to the outside wire shield of antenna harness W143 connector (brass fingers).
5. Measure the resistance (ohms).

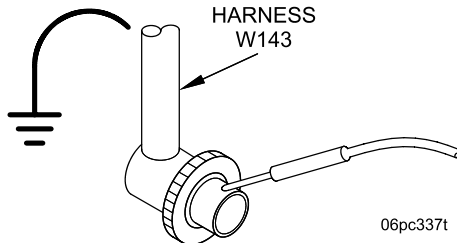
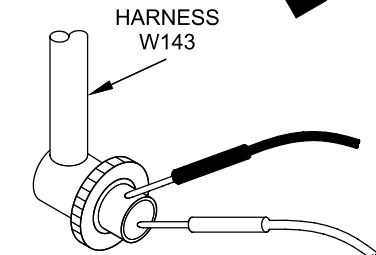
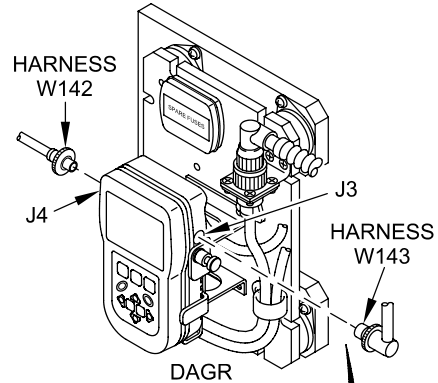
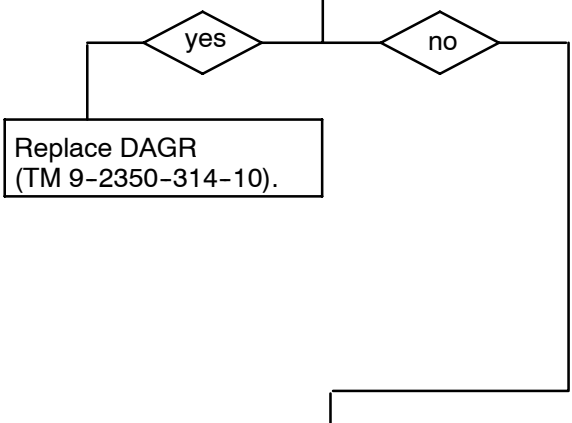
Is the resistance between 80 and 280 ohms?



**BF**

1. Connect one lead of multimeter to the outside wire shield of antenna harness W143 connector and the other lead to chassis ground.
2. Measure the resistance (ohms).

Is the resistance greater than 1000 ohms?



06pc337t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

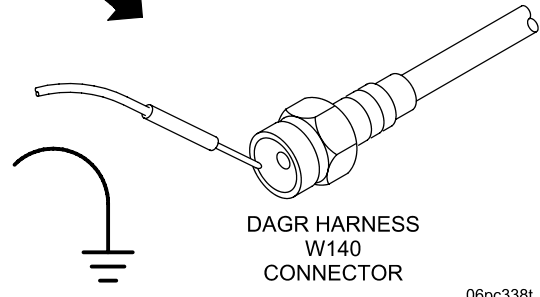
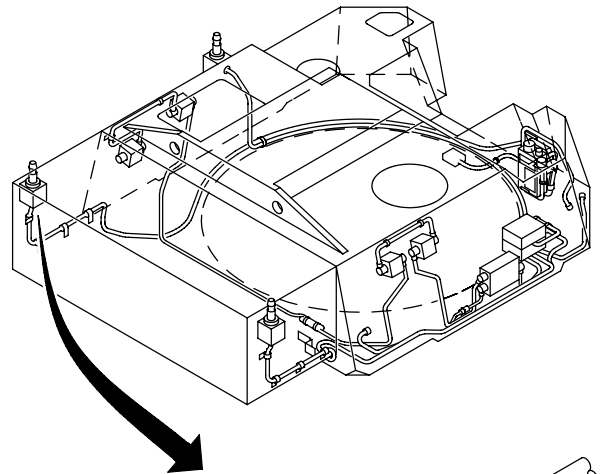
CONTINUED FROM STEPS G AND BF

<b>BG</b>	<ol style="list-style-type: none"> <li>1. Disconnect DAGR antenna harness W140 from DAGR antenna on the outside of the vehicle.</li> <li>2. Connect one lead of multimeter to the outside wire shield of antenna harness W140 connector and the other lead to chassis ground.</li> <li>3. Measure the resistance (ohms).</li> </ol>
Is the resistance greater than 1000 ohms?	



Replace DAGR antenna harness W140 (para 22-13).

Replace DAGR antenna (para 21-10).



06pc338t

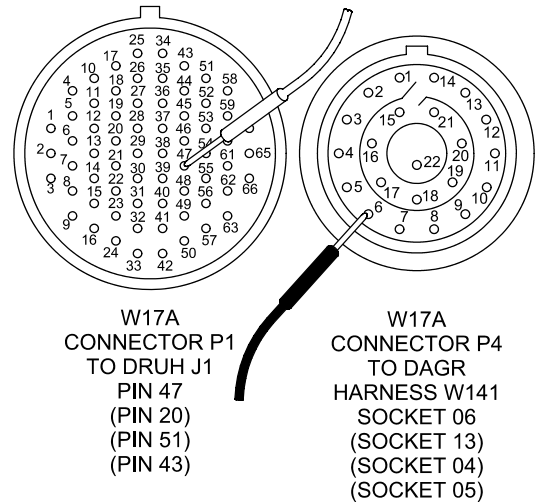
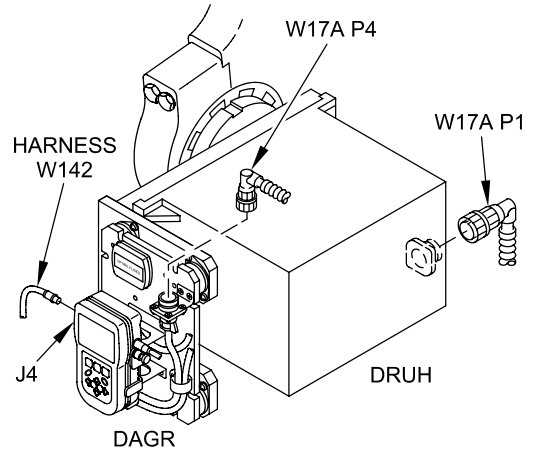
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

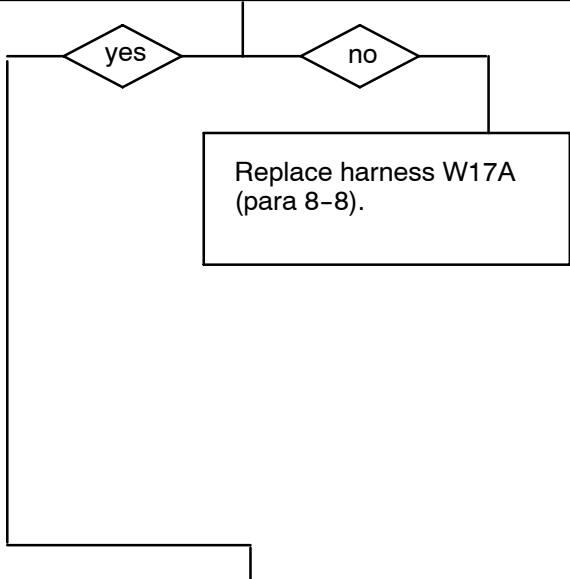
a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP BC

<b>BH</b>	<ol style="list-style-type: none"> <li>1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>2. Disconnect DAGR power harness W142 from DAGR connector J4.</li> <li>3. Disconnect harness W17A connector P1 from DRUH connector J1.</li> <li>4. Check harness W17A for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.</li> </ol>
	<div style="display: flex; justify-content: space-between;"> <span>Point A</span> <span>Point B</span> </div>
	<p>W17A Connector P1 pin 47    W17A Connector P4 socket 06</p> <p>W17A Connector P1 pin 20    W17A Connector P4 socket 13</p> <p>W17A Connector P1 pin 51    W17A Connector P4 socket 04</p> <p>W17A Connector P1 pin 43    W17A Connector P4 socket 05</p>
	<p>Is there continuity at all points (resistance less than 10 ohms)?</p>



06pc339t



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED

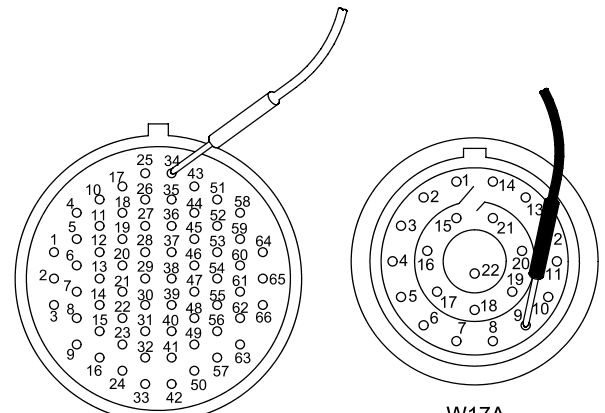
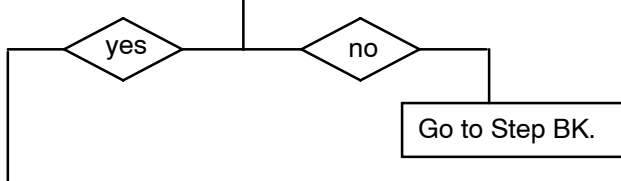
(16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP BH

**BI** Check harness W17A for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
W17A Connector P1 pin 34	W17A Connector P4 socket 09
W17A Connector P1 pin 25	W17A Connector P4 socket 10

Is there continuity at all points (resistance less than 10 ohms)?

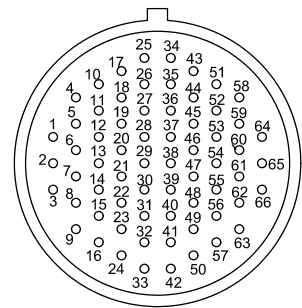
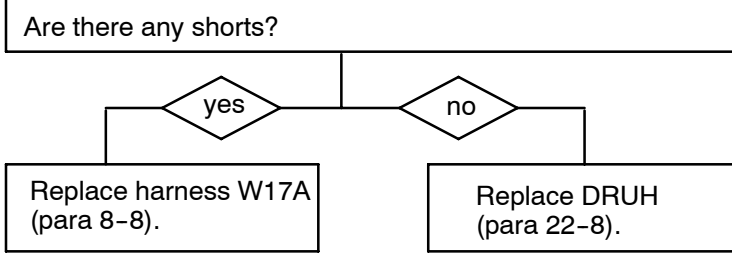


W17A  
CONNECTOR P1  
TO DRUH J1  
PIN 34  
(PIN 25)

W17A  
CONNECTOR P4  
TO DAGR  
HARNESS 12967970  
SOCKET 09  
(SOCKET 10)

**BJ** Check harness W17A for shorts by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
Connector P1 pin 20	Connector P1 pin 25
Connector P1 pin 20	Connector P1 pin 34
Connector P1 pin 20	Connector P1 pin 43
Connector P1 pin 20	Connector P1 pin 47
Connector P1 pin 20	Connector P1 pin 51
Connector P1 pin 25	Connector P1 pin 34
Connector P1 pin 25	Connector P1 pin 43
Connector P1 pin 25	Connector P1 pin 47
Connector P1 pin 25	Connector P1 pin 51
Connector P1 pin 34	Connector P1 pin 43
Connector P1 pin 34	Connector P1 pin 47
Connector P1 pin 34	Connector P1 pin 51
Connector P1 pin 43	Connector P1 pin 47
Connector P1 pin 43	Connector P1 pin 51
Connector P1 pin 47	Connector P1 pin 51



W17A  
CONNECTOR P1  
TO DRUH J1

06pc340t

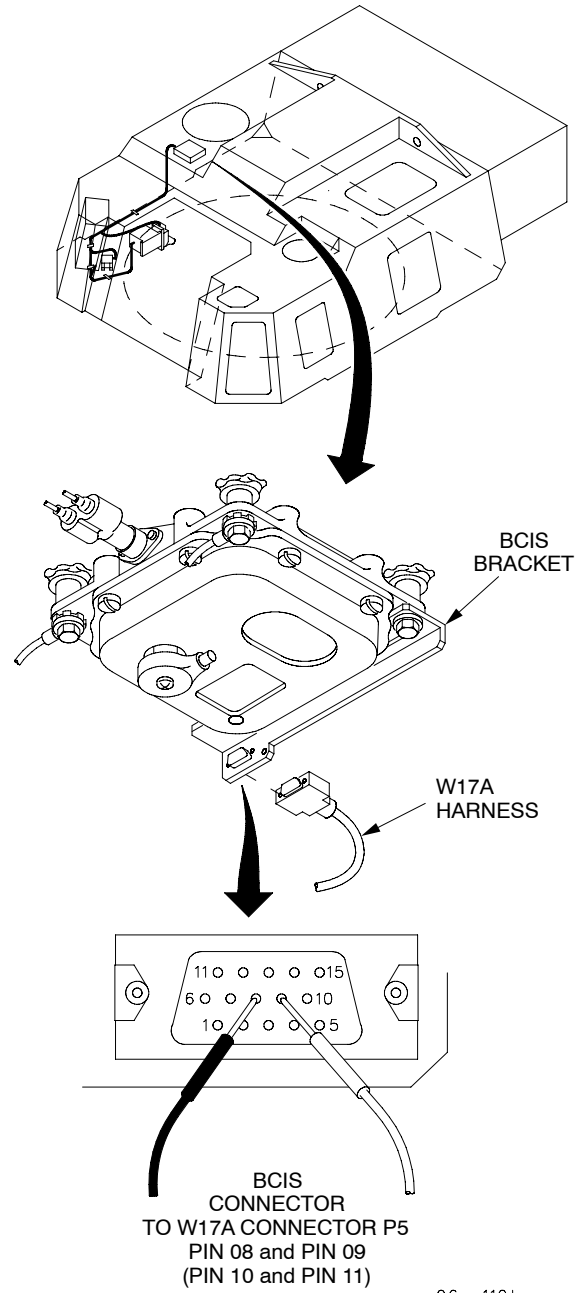
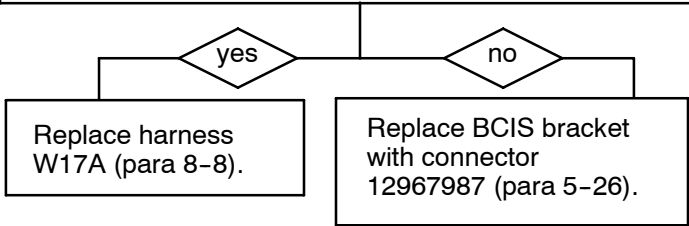
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP BI

<b>BK</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W17A connector P5 from BCIS shorting plug connector 12967987 and mounting bracket 12967994.</li> <li>2. Check shorting plug connector 12967987 for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.</li> </ol>						
<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; width: 50%;">Point A</td> <td style="text-align: center; width: 50%;">Point B</td> </tr> <tr> <td style="padding-left: 20px;">Connector pin 08</td> <td style="padding-left: 20px;">Connector pin 09</td> </tr> <tr> <td style="padding-left: 20px;">Connector pin 10</td> <td style="padding-left: 20px;">Connector pin 11</td> </tr> </table>	Point A	Point B	Connector pin 08	Connector pin 09	Connector pin 10	Connector pin 11	
Point A	Point B						
Connector pin 08	Connector pin 09						
Connector pin 10	Connector pin 11						
Is there continuity at all points (resistance less than 10 ohms)?							



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED

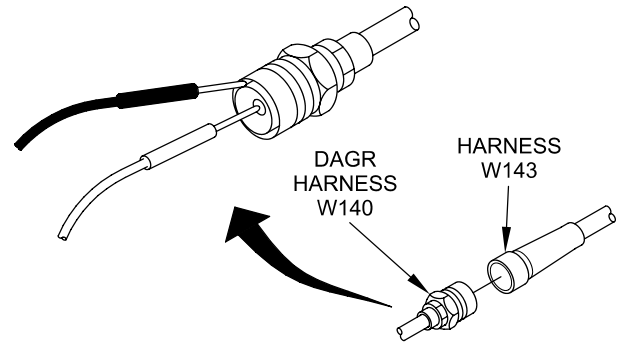
(16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP BE

**BL**

1. Disconnect DAGR antenna harness W143 from DAGR antenna harness W140.
2. Connect one lead of multimeter to the center wire of antenna harness W140 connector and the other lead to the outside wire shield of antenna harness W140 connector.
3. Measure the resistance (ohms).

Is the resistance between 80 and 280 ohms?



yes

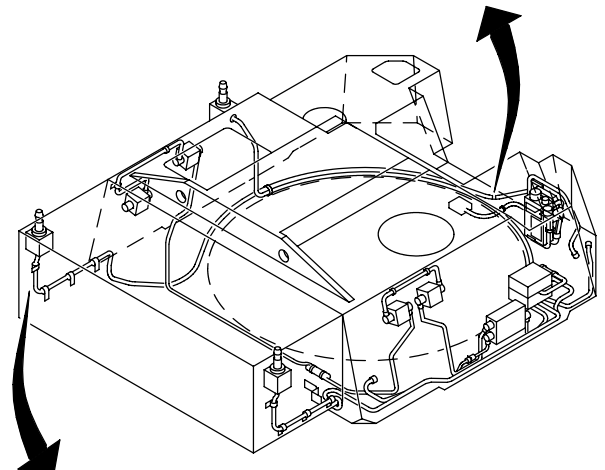
no

Replace DAGR antenna harness W140 (para 22-13).

**BM**

1. Disconnect DAGR antenna harness W140 from DAGR antenna on the outside of the vehicle.
2. Connect one lead of multimeter to the center wire of DAGR antenna connector and the other lead to the outside shield threads of DAGR antenna connector.
3. Measure the resistance (ohms).

Is the resistance between 80 and 280 ohms?

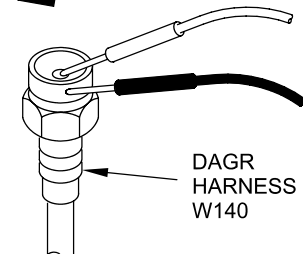


yes

no

Replace DAGR antenna harness W140 (para 22-13).

Replace DAGR antenna (para 21-10).



06pc341t

END OF TASK



### 3-3. TROUBLESHOOTING CHART - CONTINUED

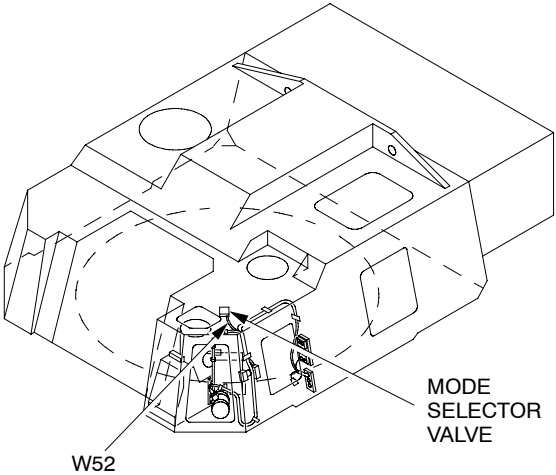
a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY.

<p><b>INITIAL SETUP</b></p> <p style="text-align: center;"><b>NOTE</b></p> <p>When performing AFCS troubleshooting use only the SPORT for the Paladin M109A6 which includes a Digital Multimeter (DMM), and the PCMCIA Card, P/N 710833-1.</p> <p>Run TB 9-2350-314-20-2-1 M109A6 Accessory Software, "AFCS TROUBLESHOOTING," single test "TRAVERSE or ELEVATION ABNORMAL." Run PDIU HYDRAULICS and GUN POSITIONING Tests.</p>	<p><b>Tools</b></p> <p>Artillery and turret mechanic's tool kit (CL 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)                  AN/PSM-95 Electronic system test set (Sport) (item 58, Appx G)                  Sport accessory kit (item 57, Appx G)</p>
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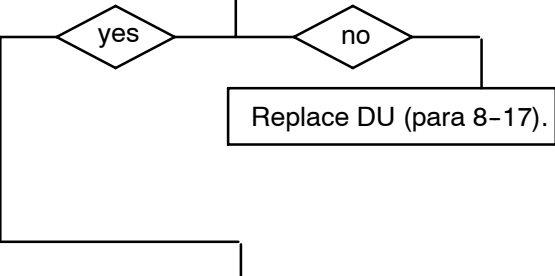
**NOTE**

Prior to starting this tree, ensure that the velocity fuse is reset (para 18-46).

<b>A</b>	<ol style="list-style-type: none"> <li>1. Turn vehicle MASTER power switch and the DU POWER switch ON (TM 9-2350-314-10).</li> <li>2. Initialize AFCS and enter MAINTENANCE MODE SELECT menu. Select and run the KEY AND SWITCH TEST for GUN SERVO SWITCH and the LOAD, LAY and STOW keys.</li> </ol>
<p>Do the DU LOAD, LAY, and STOW keys function properly?</p>	



06pc073t



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

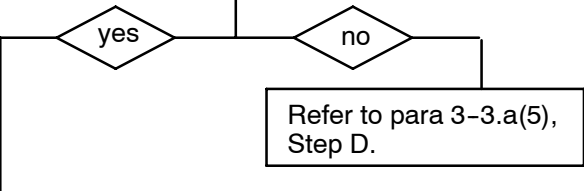
a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP A

**B** Check results of Key and Switch Test.

---

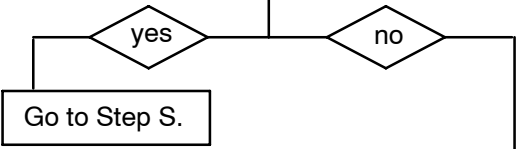
Does the DU GUN SERVO switch function properly?



**C** Note results of PDIU test and cannon symptoms.

---

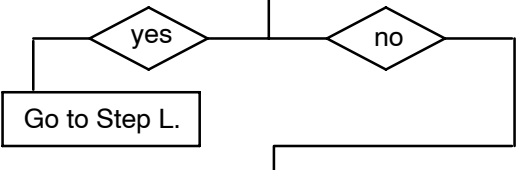
Did the PDIU Tests indicate Fault Code 007, "P1 AUTO WPN CTRL...ACU, AZ/EL TACHS, CBLS"  
OR  
Did the cannon fail to move in both the TRAVERSE and ELEVATION directions when under automatic AFCS control?



**D** Note results of PDIU test and cannon symptoms.

---

Did the PDIU Tests indicate Fault Code 008, "P3 GUN SERVO LAMP...ACU, DU, W1A"  
OR  
Is the DU "GUN SERVO" Lamp OFF when the cannon functions normally?



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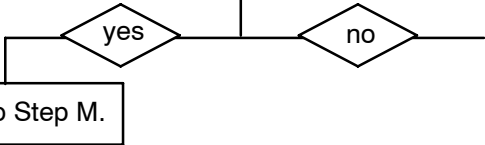
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP D

**E** Note cannon symptoms.

Does the cannon FAIL to operate normally in the TRAVERSE direction?

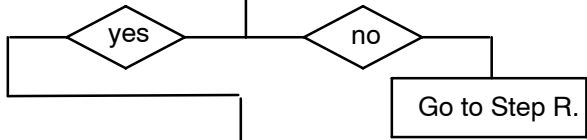


**WARNING**

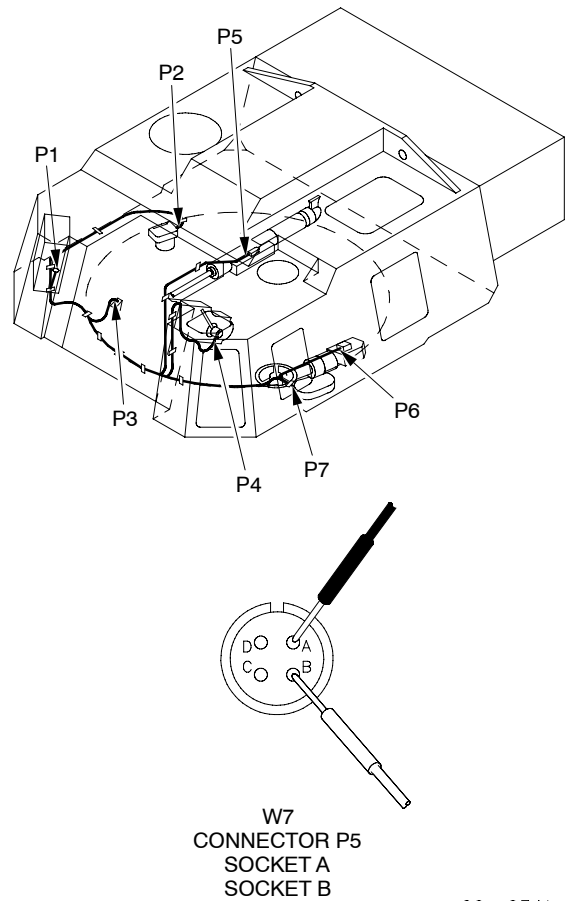
Make sure elevation and traverse paths are clear.

- F**
1. Turn DU POWER switch OFF and wait for AFCS to power down (TM 9-2350-314-10).
  2. Turn DU POWER switch ON (TM 9-2350-314-10).
  3. Initialize AFCS (TM 9-2350-314-10) and enter FIRE COMMAND (para 3-2.4). Determine the ACTL QUAD (Actual Quadrant) and then select EOM (End of Mission).
  4. Enter FIRE COMMAND (para 3-2.4) with a quadrant of at least 200 mils GREATER THAN the actual quadrant.
  5. Ensure HYDRAULIC POWER SWITCH is OFF.
  6. Disconnect harness W7 connector P5 from elevation servo valve.
  7. Place multimeter red lead in W7 connector P5 socket B and black lead in W7 connector P5 socket A.
  8. Turn DU GUN SERVO switch ON (TM 9-2350-314-10).
  9. Press and hold DU LAY key.
  10. Measure the DC Voltage (V dc).
- NOTE**
- Voltage will only be present for about 5 to 15 seconds.

Is the voltage between -8.5 and -10.0 V dc?



CONTINUED ON NEXT PAGE



06pc074t



### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP F

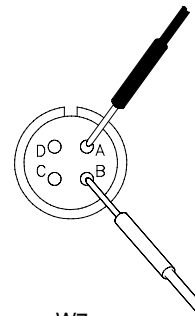
G

1. Select EOM (End of Mission).
2. Enter FIRE COMMAND with a quadrant of at least 200 mils LESS THAN the original actual quadrant.
3. Ensure HYDRAULIC POWER switch is OFF.
4. Place multimeter red lead in W7 connector P5 socket B and black lead in W7 connector P5 socket A.
5. Press and hold DU LAY key.
6. Measure the DC Voltage (V dc).

NOTE

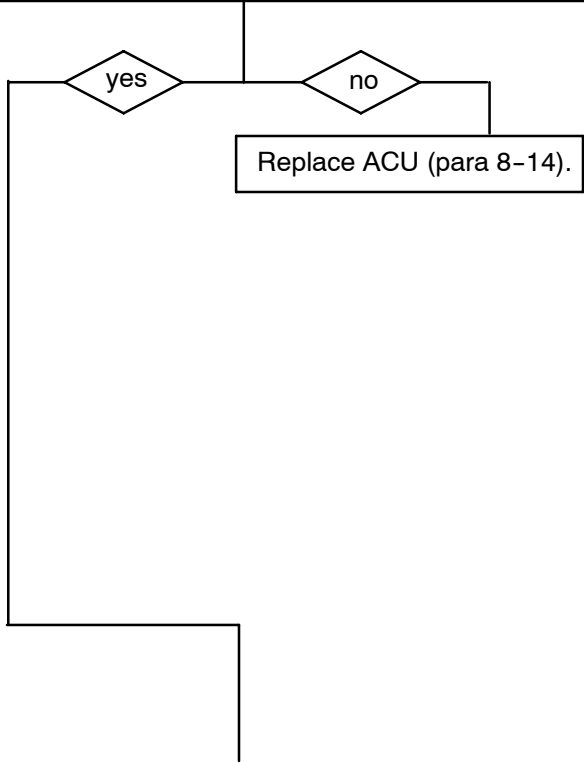
Voltage will only be present for about 5 to 15 seconds.

Is the voltage greater than 8.5 V dc?



W7  
CONNECTOR P5  
SOCKET A  
SOCKET B

06pc075t



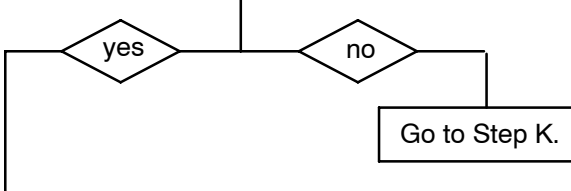
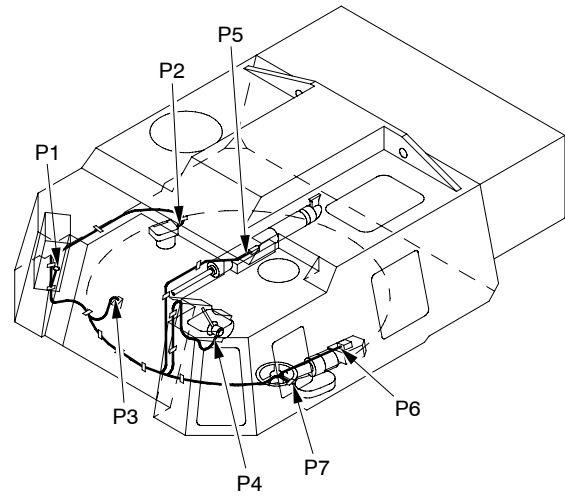
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

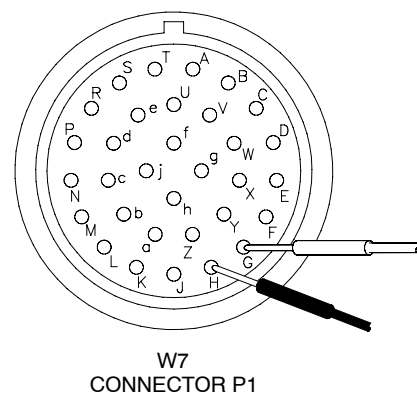
a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP G

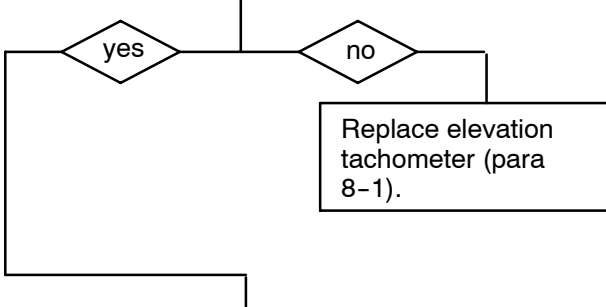
- H**
1. Turn GUN SERVO and DU POWER switches OFF and wait for AFCS to power down (TM 9-2350-314-10).
  2. Disconnect harness W7 connector P1 at ACU connector J6.
  3. Connect harness W7 connector P5 to elevation servo valve.
  4. Start engine and idle between 1000 and 1200 RPMs.
  5. Turn CAB LOCK to unlock.
  6. Turn the HYDRAULIC POWER switch to ON, unlock travel lock, raise cannon, and lower travel lock (TM 9-2350-314-10).
  7. Place multimeter red lead in W7 connector P1 pin G and black lead in W7 connector P1 pin H.
  8. Power elevate the cannon (TM 9-2350-314-10) at full speed.
  9. Measure the DC Voltage (V dc).
- Is the voltage greater than 0.20 V dc?



- I**
1. Place multimeter red lead in W7 connector P1 pin G and black lead in W7 connector P1 pin H.
  2. Using power lower the cannon (TM 9-2350-314-10) at full speed.
  3. Measure the DC Voltage (V dc).
- Is the voltage between -0.20 and -0.5 V dc?



06pc076t



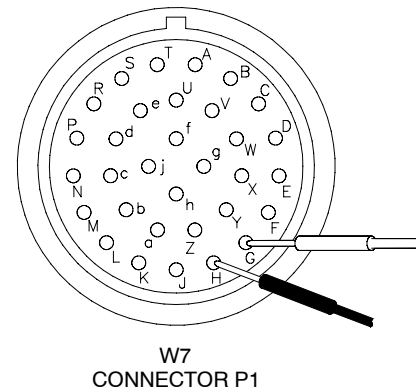
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

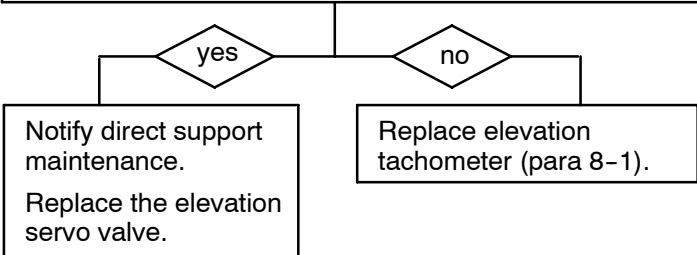
a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP I

<b>J</b>	<b>NOTE</b>
<p>This test is checking that the elevation tachometer outputs a constant (or near constant) voltage as it rotates. There should be no voltage drops or spikes to zero as long as the cannon is moving.</p> <ol style="list-style-type: none"> <li>1. Place multimeter red lead in W7 connector P1 pin G and black lead in W7 connector P1 pin H.</li> <li>2. Set the multimeter to measure V dc.</li> <li>3. Slowly power elevate the cannon (TM 9-2350-314-10) approximately 45 degrees in elevation at a constant speed.</li> <li>4. Observe the multimeter during the elevation operation, and look for the voltage to drop to zero during the operation.</li> </ol>	
<p>Was there a constant or near constant voltage level observed?</p>	



06pc077t



CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

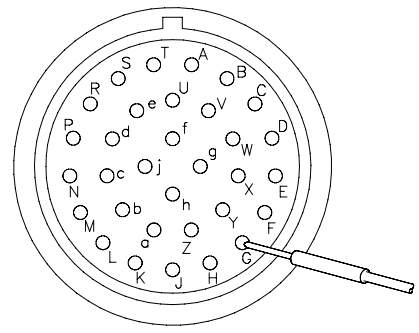
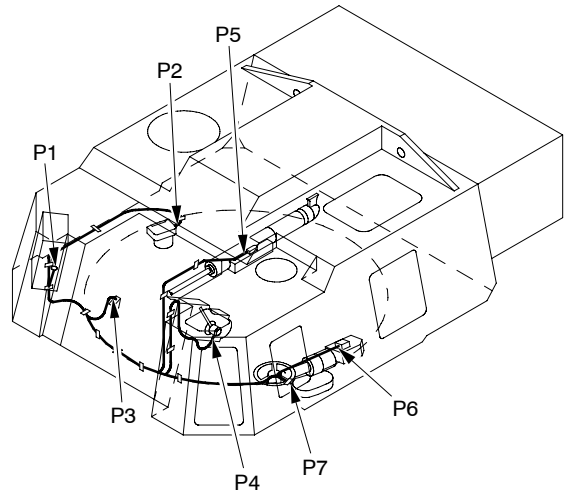
CONTINUED FROM STEP H

**K**

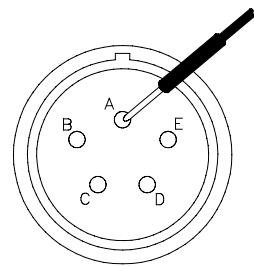
1. Turn HYDRAULIC POWER and vehicle MASTER power switches OFF (TM 9-2350-314-10).
2. Disconnect harness W7 connector P4 from the elevation tachometer.
3. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P1 pin G	Connector P4 socket A
Connector P1 pin H	Connector P4 socket B

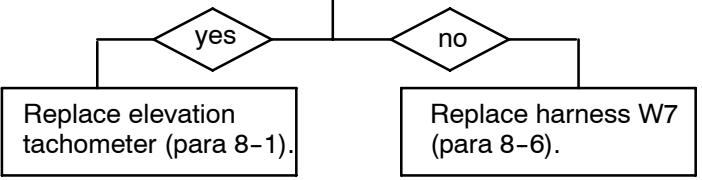
Is there continuity (resistance less than 10 ohms)?



W7  
CONNECTOR P1  
PIN G  
(PIN H)



W7  
CONNECTOR P4  
SOCKET A  
(SOCKET B)



CONTINUED ON NEXT PAGE

06pc078t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED

(17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP D

**L**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W22A connector P1 from ACU connector J7.
3. Disconnect harness W22A connector P2 from DU connector J1.
4. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A

Point B

W22A Connector P1 pin b  
socket b

W22A Connector P2  
socket b

W22A Connector P1 pin c

W22A Connector P2  
socket c

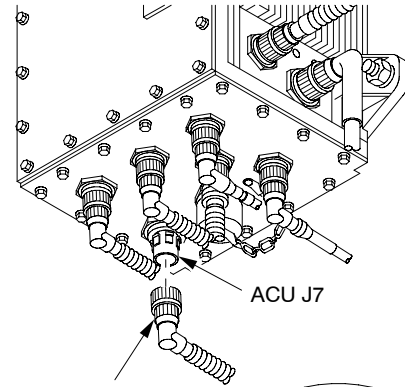
Is there continuity at all points (resistance less than 10 ohms)?

yes

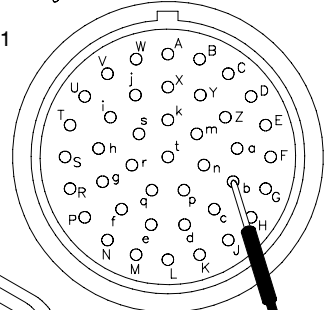
no

1. Replace ACU (para 8-14).
2. If the problem still occurs after re-testing the AFCS, replace DU (para 8-17).

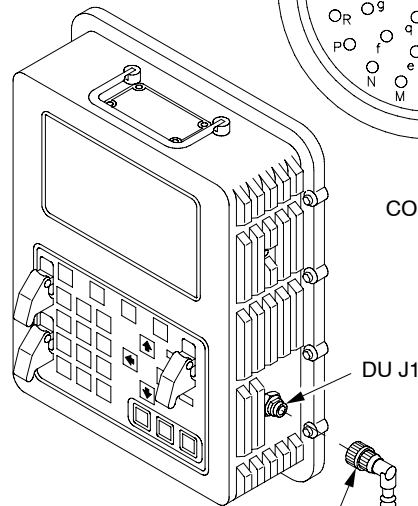
Replace harness W22A (para 8-9).



W22A  
CONNECTOR P1

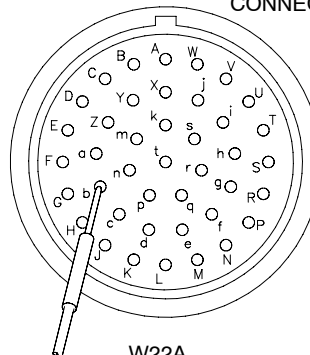


W22A  
CONNECTOR P1  
PIN b  
(PIN c)



DU J1

W22A  
CONNECTOR P2



W22A  
CONNECTOR P2  
SOCKET b  
(SOCKET c)

CONTINUED ON NEXT PAGE

06pc079t

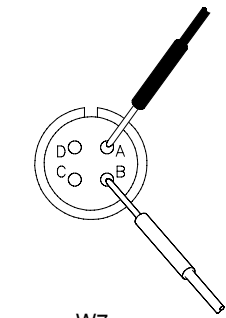
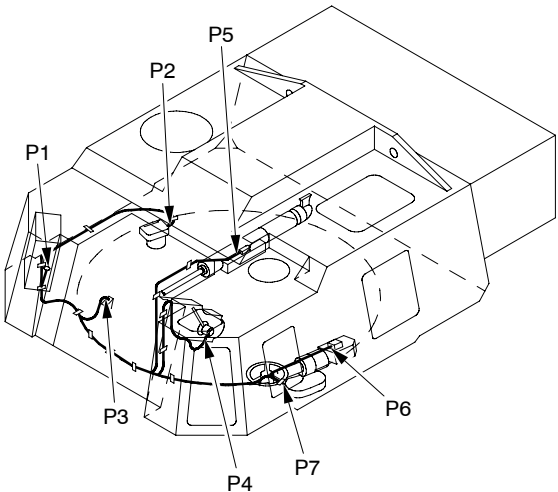
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

**WARNING**  
Make sure elevation and traverse paths are clear.

CONTINUED FROM STEP E

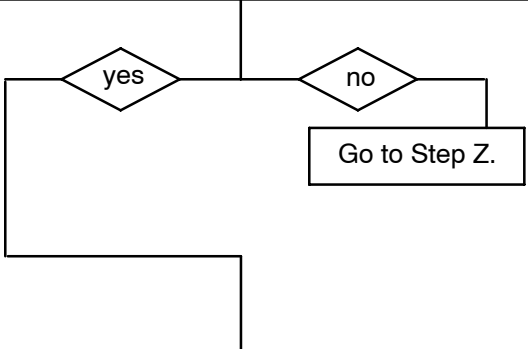
- M**
1. Turn DU POWER switch OFF and wait for AFCS to power down (TM 9-2350-314-10).
  2. Turn DU POWER switch ON (TM 9-2350-314-10).
  3. Initialize AFCS (TM 9-2350-314-10) and enter FIRE COMMAND (para 3-2.4). Determine the ACTL DEFL (Actual Deflection) and then select EOM (End of Mission).
  4. Enter FIRE COMMAND (para 3-2.4) with a deflection of at least 200 mils GREATER THAN the actual deflection.
  5. Ensure the HYDRAULIC POWER switch is OFF.
  6. Disconnect harness W7 connector P6 from azimuth servo valve.
  7. Place multimeter red lead in W7 connector P6 socket B and black lead in W7 connector P6 socket A.
  8. Turn DU GUN SERVO switch ON (TM 9-2350-314-10).
  9. Press and hold DU LAY key.
  10. Measure the DC Voltage (V dc).
- NOTE**
- Voltage will only be present for about 5 to 15 seconds.



W7  
CONNECTOR P6  
SOCKET A  
SOCKET B

06pc080t

Is the voltage between -8.5 and -10.0 V dc?



CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP M

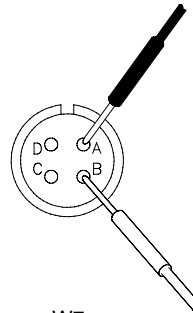
N

1. Select EOM (End of Mission).
2. Enter FIRE COMMAND with a deflection of at least 200 mils LESS THAN the original actual deflection.
3. Ensure HYDRAULIC POWER switch is OFF.
4. Place multimeter red lead in W7 connector P6 socket B and black lead in W7 connector P6 socket A.
5. Turn DU GUN SERVO switch ON.
6. Press and hold DU LAY key.
7. Measure the DC Voltage (V dc).

NOTE

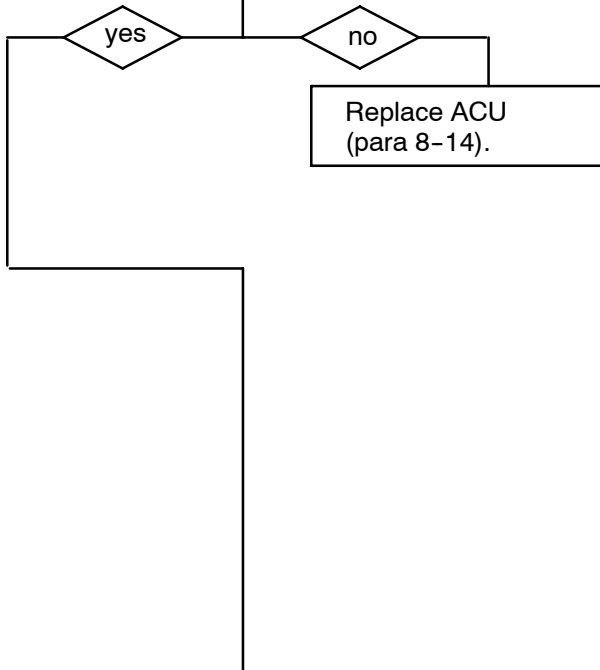
Voltage will only be present for about 5 to 15 seconds.

Is the voltage greater than 8.5 V dc?



W7  
CONNECTOR P6  
SOCKET A  
SOCKET B

06pc081t



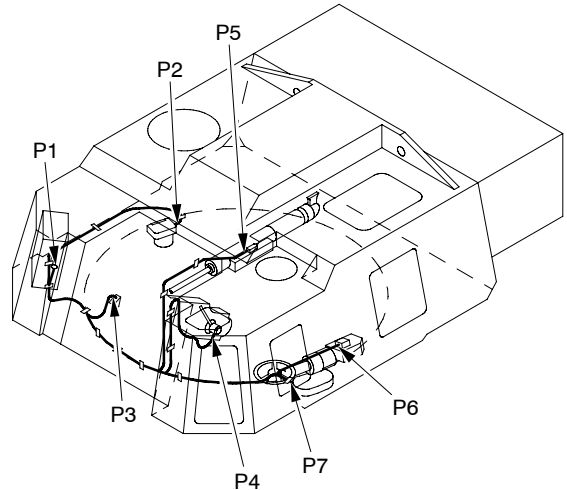
CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

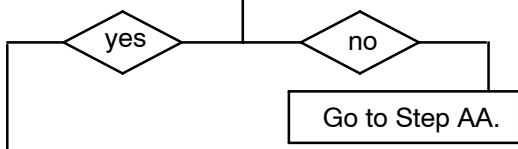
a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP N

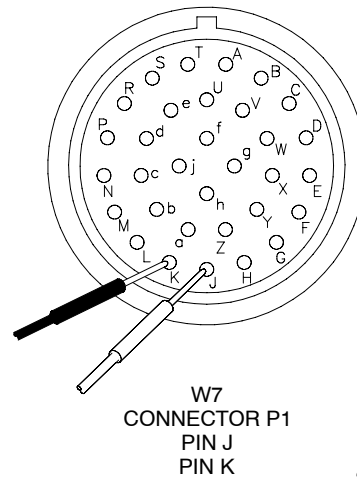
- O**
1. Turn DU POWER switch OFF and wait for AFCS to power down (TM 9-2350-314-10).
  2. Disconnect harness W7 connector P1 at ACU connector J6.
  3. Connect harness W7 connector P6 to azimuth servo valve.
  4. Start engine and idle between 1000 and 1200 RPMs.
  5. Turn CAB LOCK to unlock.
  6. Turn the HYDRAULIC POWER switch to ON, unlock travel lock, raise cannon, and lower travel lock (TM 9-2350-314-10).
  7. Place multimeter red lead in W7 connector P1 pin J and black lead in W7 connector P1 pin K.
  8. Power traverse the cannon right (TM 9-2350-314-10) at full speed.
  9. Measure the DC Voltage (V dc).



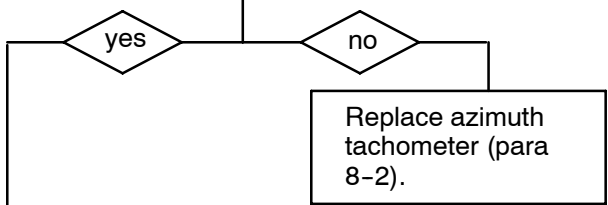
Is the voltage greater than 1.5 V dc?



- P**
1. Place multimeter red lead in W7 connector P1 pin J and black lead in W7 connector P1 pin K.
  2. Power traverse the cannon left (TM 9-2350-314-10) at full speed.
  3. Measure the DC Voltage (V dc).



Is the voltage between -1.5 and -5.0 V dc?



CONTINUED ON NEXT PAGE

06pc082t

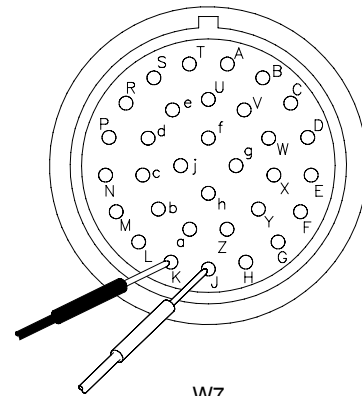


### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

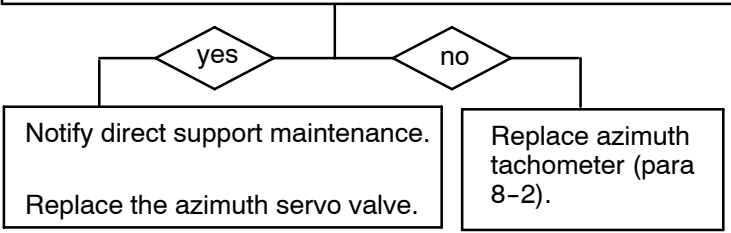
CONTINUED FROM STEP P

<b>Q</b>	<b>NOTE</b>
<p>This test is checking that the azimuth tachometer outputs a constant (or near constant) voltage as it rotates. There should be no voltage drops or spikes to zero as long as the cannon is moving.</p> <ol style="list-style-type: none"> <li>1. Place multimeter red lead in W7 connector P1 pin J and black lead in W7 connector P1 pin K.</li> <li>2. Set the multimeter to measure V dc.</li> <li>3. Slowly power traverse the cannon right (TM 9-2350-314-10) approximately 180 degrees in rotation at a constant speed.</li> <li>4. Observe the multimeter during the traverse operation, and look for the voltage to drop to zero during the operation.</li> </ol>	
<p>Was there a constant or near constant voltage level observed?</p>	



W7  
CONNECTOR P1  
PIN J  
PIN K

06pc083t



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

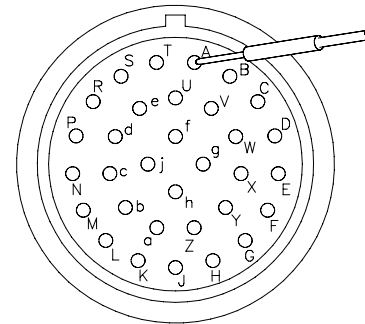
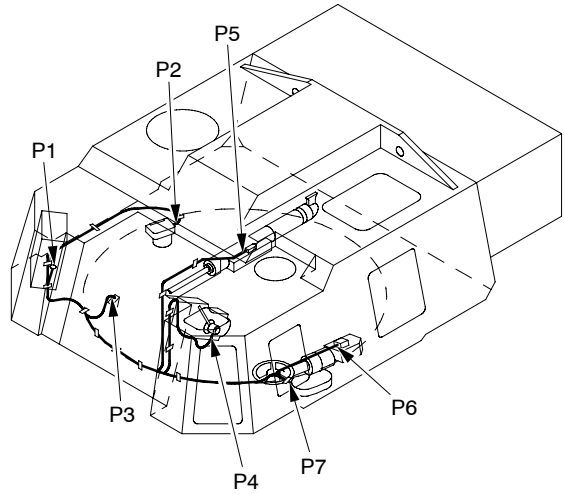
CONTINUED FROM STEP F

**R**

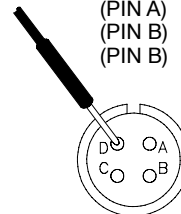
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W7 connector P1 at ACU connector J6.
3. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P1 pin A	Connector P5 socket D
Connector P1 pin A	Connector P5 socket B
Connector P1 pin B	Connector P5 socket A
Connector P1 pin B	Connector P5 socket C

Is there continuity (resistance less than 10 ohms)?



W7  
CONNECTOR P1  
PIN A  
(PIN A)  
(PIN B)  
(PIN B)



W7  
CONNECTOR P5  
SOCKET D  
(SOCKET B)  
(SOCKET A)  
(SOCKET C)

06pc084t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

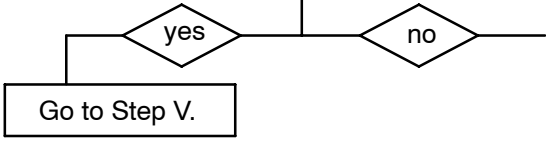
a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP C

**S**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W7 connector P1 from ACU connector J6.
3. Place one multimeter lead on W7 connector P1 pin R and other lead on W7 connector P1 pin S.
4. Check for continuity.

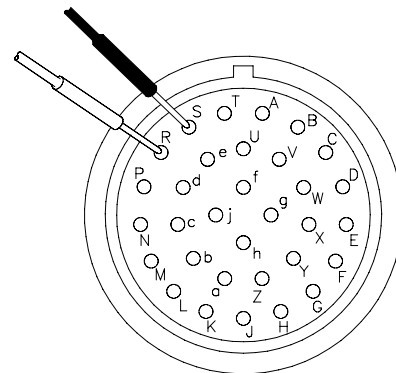
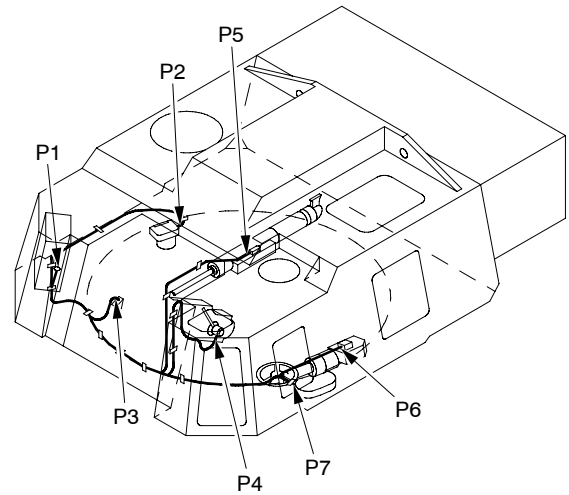
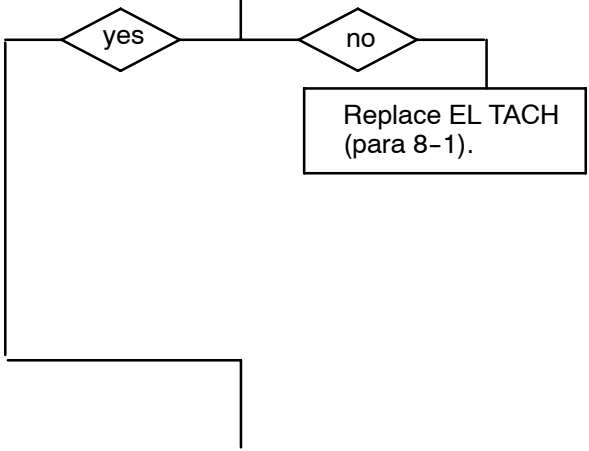
Is there continuity (resistance less than 10 ohms)?



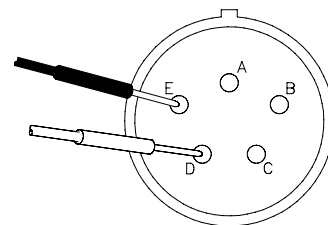
**T**

1. Reconnect harness W7 connector P1 to ACU connector J6.
2. Disconnect harness W7 connector P4 from EL TACH.
3. Place one multimeter lead on EL TACH connector pin D and other lead on EL TACH pin E.
4. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



W7 CONNECTOR P1



EL TACH CONNECTOR

06pc034t

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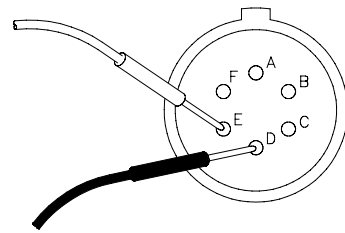
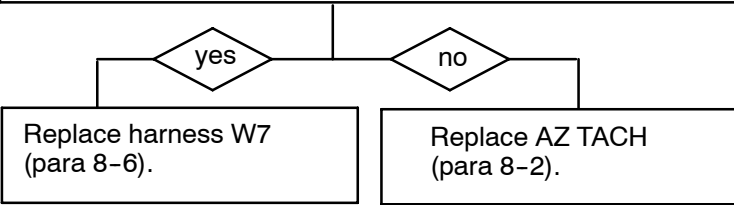
### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP T

- |          |   |
|----------|---|
| <b>U</b> | <ol style="list-style-type: none"> <li>1. Reconnect harness W7 connector P4 to EL TACH.</li> <li>2. Disconnect harness W7 connector P2 from AZ TACH.</li> <li>3. Place one multimeter lead on AZ TACH connector pin D and other lead on AZ TACH pin E.</li> <li>4. Check for continuity.</li> </ol> |
|----------|---|

Is there continuity (resistance less than 10 ohms)?
---



06pc035t

AZ TACH CONNECTOR

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP S

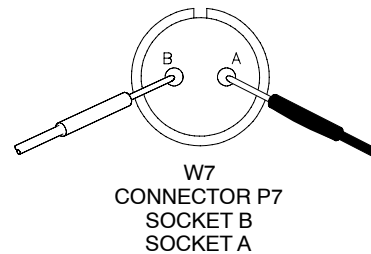
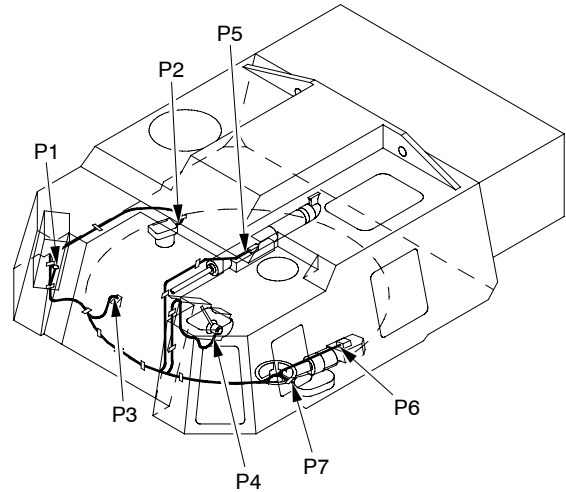
**V**

1. Reconnect harness W7 connector P1 to ACU connector J6.
2. Turn vehicle MASTER power switch and DU POWER switch ON (TM 9-2350-314-10).
3. Initialize AFCS (TM 9-2350-314-10) and enter FIRE COMMAND (para 3-2.4).
4. Ensure HYDRAULIC POWER switch is OFF.
5. Turn DU GUN SERVO switch ON (TM 9-2350-314-10).
6. Disconnect harness W7 connector P7 from harness W64 connector J1.
7. Place multimeter red lead in W7 connector P7 socket B and black lead in W7 connector P7 socket A.
8. Press and hold DU LAY key.
9. Measure the DC Voltage (V dc).

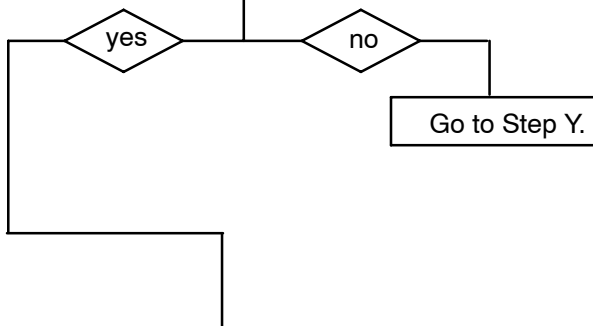
**NOTE**

Voltage will only be present for about 5 to 15 seconds.

Is the voltage greater than 18 V dc?



06pc085t



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP V

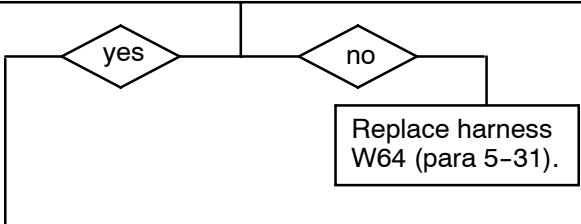
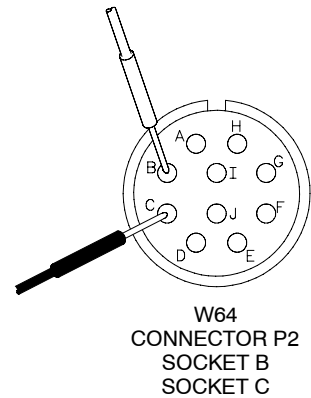
**W**

1. Reconnect harness W7 connector P7 to harness W64 connector J1.
2. Disconnect harness W64 connector P2 from the hydraulic compartment bulkhead.
3. Place multimeter red lead in W64 connector P2 socket B and black lead in W64 connector P2 socket C.
4. Press and hold DU LAY key.
5. Measure the DC Voltage (V dc).

**NOTE**

Voltage will only be present for about 5 to 15 seconds.

Is the voltage greater than 18 V dc?



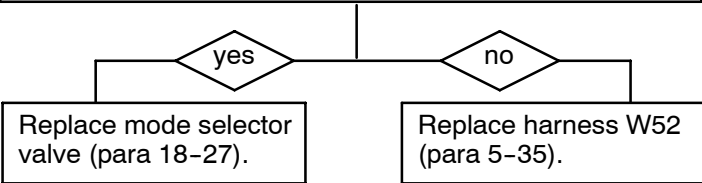
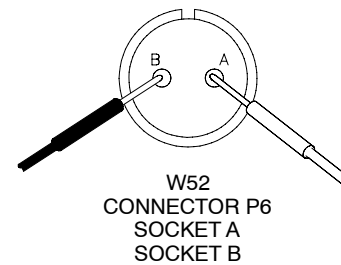
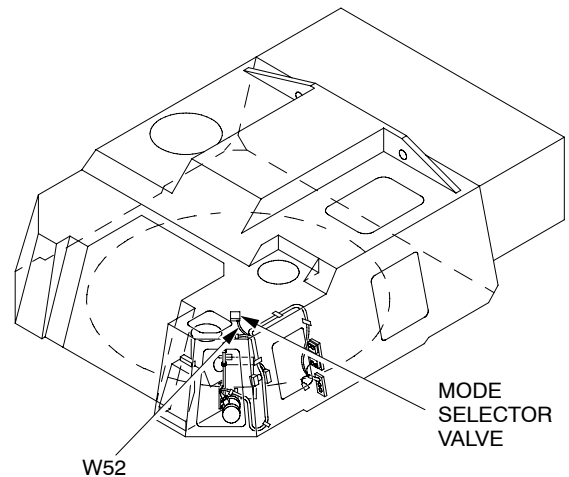
**X**

1. Reconnect harness W64 connector P2 to the hydraulic compartment bulkhead.
2. Disconnect harness W52 connector P6 from the mode selector valve.
3. Place multimeter red lead in W52 connector P6 socket A and black lead in W52 connector P6 socket B.
4. Press and hold DU LAY key.
5. Measure the DC Voltage (V dc).

**NOTE**

Voltage will only be present for about 5 to 15 seconds.

Is the voltage greater than 18 V dc?



06pc086t

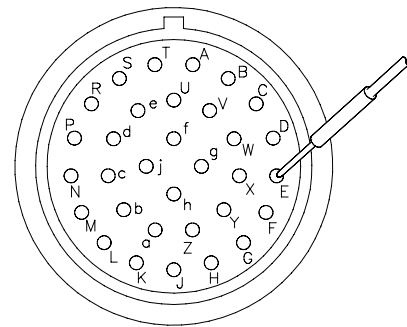
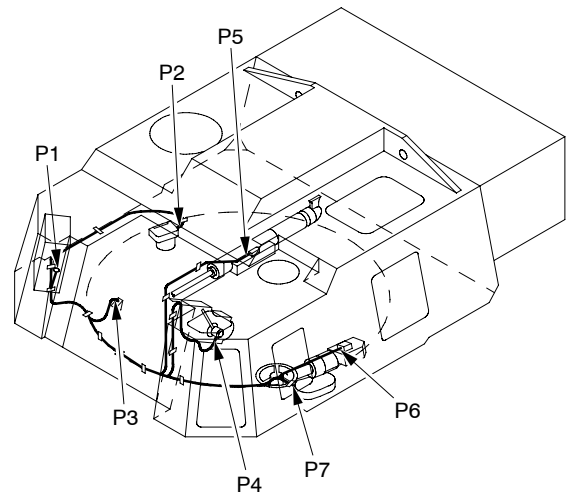
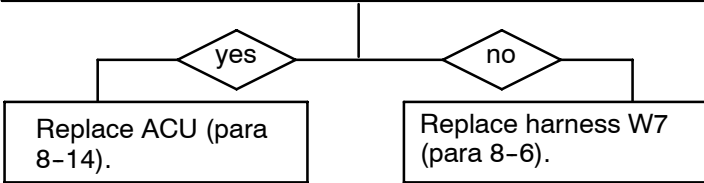
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

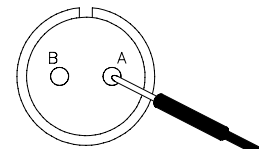
a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP V

<b>Y</b>	<ol style="list-style-type: none"> <li>1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>2. Disconnect harness W7 connector P1 at ACU connector J6.</li> <li>3. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>						
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Point A</td> <td style="width: 50%; text-align: center;">Point B</td> </tr> <tr> <td style="text-align: center;">Connector P1 pin E</td> <td style="text-align: center;">Connector P7 socket A</td> </tr> <tr> <td style="text-align: center;">Connector P1 pin F</td> <td style="text-align: center;">Connector P7 socket B</td> </tr> </table>	Point A	Point B	Connector P1 pin E	Connector P7 socket A	Connector P1 pin F	Connector P7 socket B
Point A	Point B						
Connector P1 pin E	Connector P7 socket A						
Connector P1 pin F	Connector P7 socket B						
Is there continuity (resistance less than 10 ohms)?							



W7  
CONNECTOR P1  
PIN E  
(PIN F)



W7  
CONNECTOR P7  
SOCKET A  
(SOCKET B)

06pc087t

CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

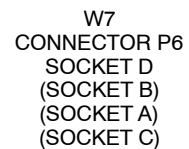
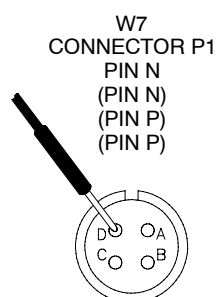
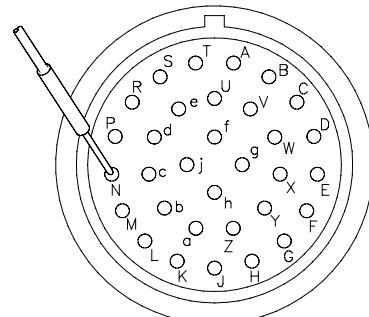
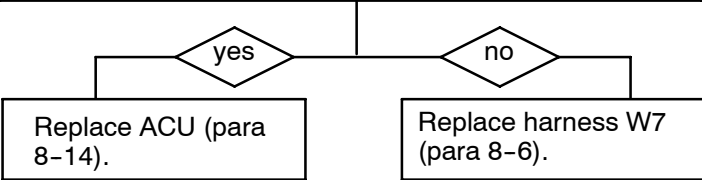
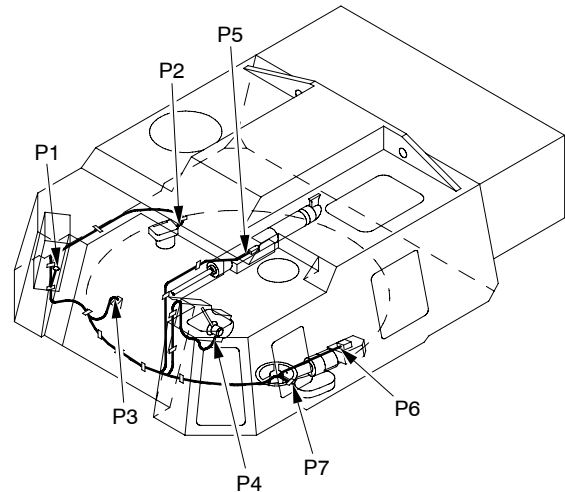
CONTINUED FROM STEP M

**Z**

1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W7 connector P1 at ACU connector J6.
3. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P1 pin N	Connector P6 socket D
Connector P1 pin N	Connector P6 socket B
Connector P1 pin P	Connector P6 socket A
Connector P1 pin P	Connector P6 socket C

Is there continuity (resistance less than 10 ohms)?



06pc088t

CONTINUED ON NEXT PAGE

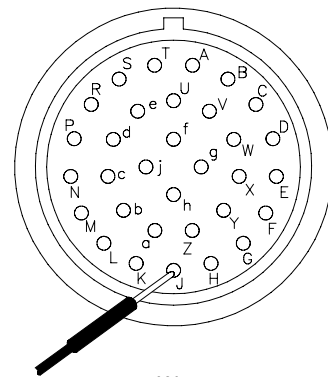
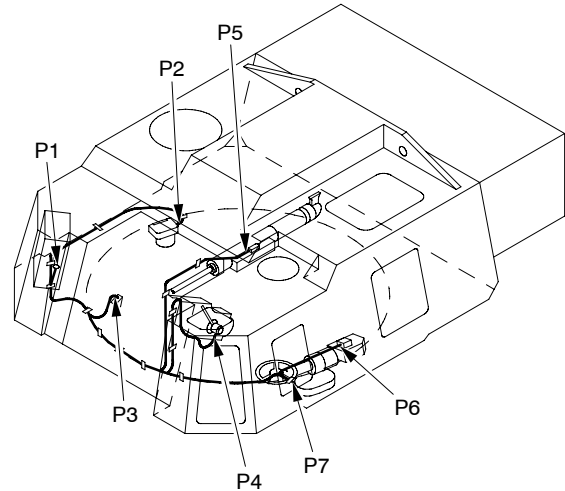
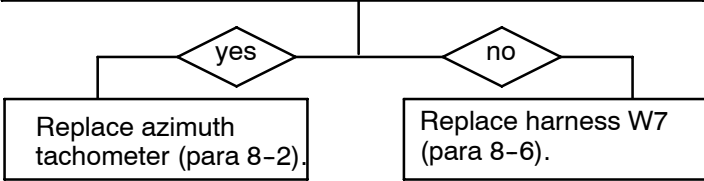


### 3-3. TROUBLESHOOTING CHART - CONTINUED

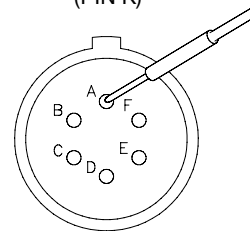
a. AFCS - CONTINUED (17) TRAVERSE AND/OR ELEVATION OF CANNON BY AFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP O

<b>AA</b>	<ol style="list-style-type: none"> <li>1. Turn HYDRAULIC POWER switch OFF and shut down engine.</li> <li>2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>3. Disconnect harness W7 connector P2 from the azimuth tachometer.</li> <li>4. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>						
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Point A</td> <td style="width: 50%; text-align: center;">Point B</td> </tr> <tr> <td style="text-align: center;">Connector P1 pin J</td> <td style="text-align: center;">Connector P2 socket A</td> </tr> <tr> <td style="text-align: center;">Connector P1 pin K</td> <td style="text-align: center;">Connector P2 socket B</td> </tr> </table>	Point A	Point B	Connector P1 pin J	Connector P2 socket A	Connector P1 pin K	Connector P2 socket B
Point A	Point B						
Connector P1 pin J	Connector P2 socket A						
Connector P1 pin K	Connector P2 socket B						
Is there continuity (resistance less than 10 ohms)?							



W7  
CONNECTOR P1  
PIN J  
(PIN K)



W7  
CONNECTOR P2  
SOCKET A  
(SOCKET B)

06pc089t

**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

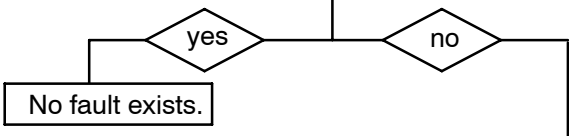
a. AFCS - CONTINUED (18) CANNON DRIFTS IN AZIMUTH AFTER SERVOS HAVE BEEN USED TO LAY, LOAD, OR STOW.

<p><b>INITIAL SETUP</b></p> <p>Run TB 9-2350-314-20-2-1 M109A6 Accessory Software, "AFCS TROUBLESHOOTING," single test "CANNON DRIFTS IN AZIMUTH." Run PDIU HYDRAULICS and GUN POSITIONING Tests.</p>	<p><b>Tools</b></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12) Multimeter (item 24, Appx G) TA1 probe kit (item 42, Appx G) AN/PSM-95 Electronic system test set (Sport) (item 58, Appx G) Sport accessory kit (item 57, Appx G)</p>
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**WARNING**  
Make sure elevation and traverse paths are clear.

- A**
1. Turn MASTER power and DU POWER switch ON (TM 9-2350-314-10).
  2. Initialize AFCS (TM 9-2350-314-10) and enter FIRE COMMAND (para 3-2.4). Determine the ACTL DEFL (Actual Deflection) and then select EOM (End of Mission).
  3. Enter FIRE COMMAND (para 3-2.4) with a deflection of at least 200 mils GREATER THAN the actual deflection.
  4. Start engine and idle between 1000 and 1200 RPMs.
  5. Turn CAB LOCK to UNLOCK.
  6. Turn the HYDRAULIC POWER switch to ON, unlock travel lock, raise cannon, and lower travel lock (TM 9-2350-314-10).
  7. Turn DU GUN SERVO switch ON (TM 9-2350-314-10).
  8. Press and hold DU LAY key until LAY is highlighted on FIRE MISSION screen.
  9. Observe the cannon in the LAY position for 10 minutes.

Is the cannon still in the LAY position with LAY highlighted on the fire mission screen?



- B**
1. Select EOM (End of Mission).
  2. Enter FIRE COMMAND with a deflection of at least 200 mils LESS THAN the original actual deflection.
  3. Press and hold DU LAY key until LAY is highlighted on fire mission screen.
  4. Observe the cannon in the LAY position for 10 minutes.

**NOTE**

When the AFCS has laid the gun and the LAY key is highlighted the gun must stay within -0.5 to +0.5 mils of the commanded deflection.

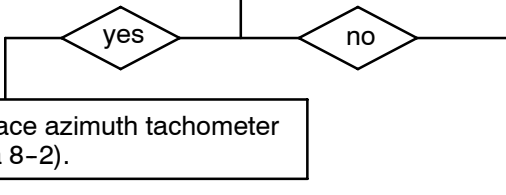
Is the cannon still in the LAY position with LAY highlighted on the fire mission screen?

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

a. AFCS - CONTINUED (18) CANNON DRIFTS IN AZIMUTH AFTER SERVOS HAVE BEEN USED TO LAY, LOAD, OR STOW. - CONTINUED

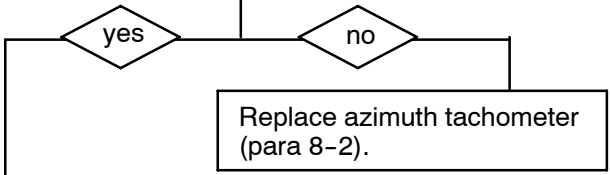
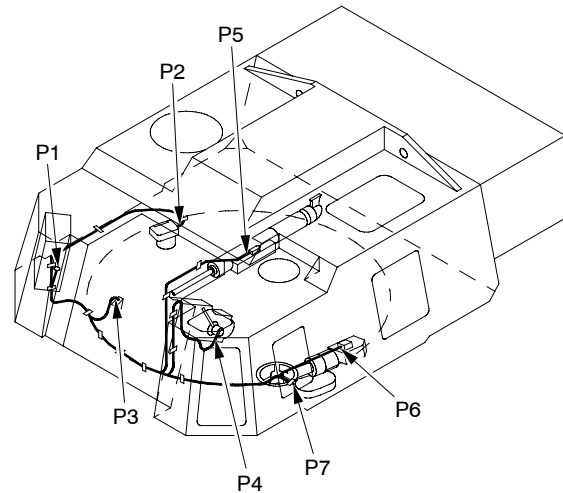
CONTINUED FROM STEP B



**C**

1. Turn HYDRAULIC POWER switch OFF and shut down engine.
2. Turn DU POWER switch OFF and wait for AFCS to power down.
3. Disconnect harness W7 connector P1 at ACU connector J6.
4. Connect harness W7 connector P6 to azimuth servo valve.
5. Place multimeter red lead in W7 connector P1 pin J and black lead in W7 connector P1 pin K.
6. Start engine and idle between 1000 and 1200 RPMs.
7. Turn HYDRAULIC POWER switch ON.
8. Power traverse the cannon right (TM 9-2350-314-10) at full speed.
9. Measure the DC Voltage (V dc).

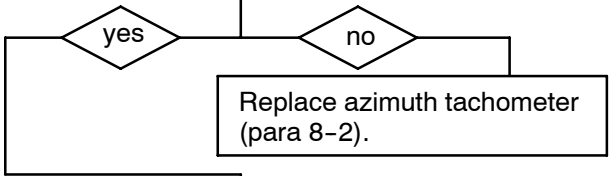
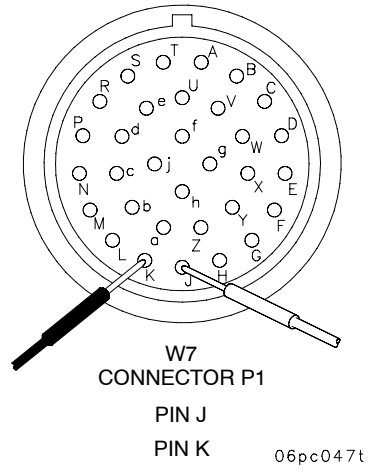
Is the voltage greater than 1.5 V dc?



**D**

1. Place multimeter red lead in W7 connector P1 pin J and black lead in W7 connector P1 pin K.
2. Power traverse the cannon left (TM 9-2350-314-10) at full speed.
3. Measure the DC voltage (V dc).

Is the voltage between -1.5 and -5.0 V dc?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

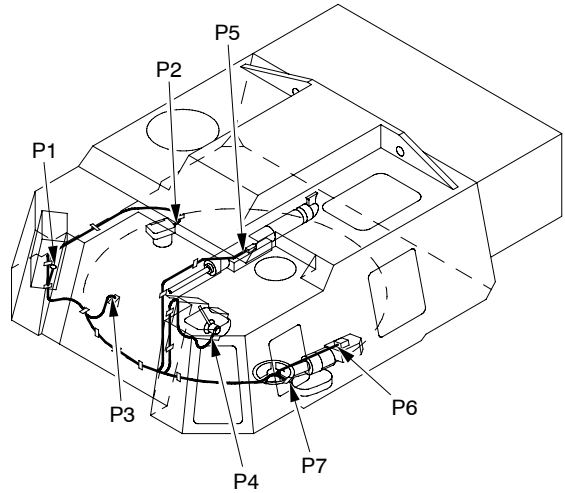
a. AFCS - CONTINUED (18) CANNON DRIFTS IN AZIMUTH AFTER SERVOS HAVE BEEN USED TO LAY, LOAD, OR STOW. - CONTINUED

CONTINUED FROM STEP D

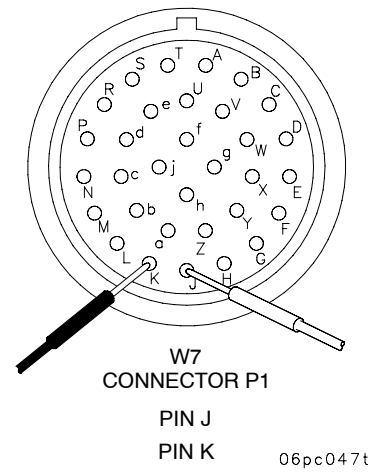
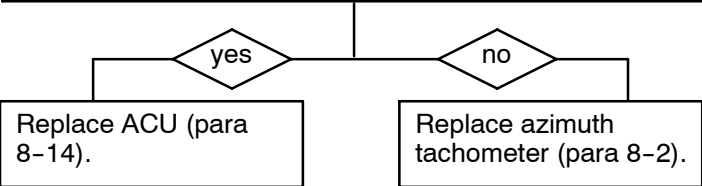
**E** **NOTE**

This test is checking that the azimuth tachometer outputs a constant (or near constant) voltage as it rotates. There should be no voltage drops or spikes to zero as long as the cannon is moving.

1. Place multimeter red lead in W7 connector P1 pin J and black lead in W7 connector P1 pin K.
2. Set the multimeter to measure V dc.
3. Slowly power traverse the cannon right (TM 9-2350-314-10) approximately 180 degrees in rotation at a constant speed.
4. Observe the multimeter during the traverse operation, and look for the voltage to drop to zero during the operation.



Was there a constant or near constant voltage level observed?



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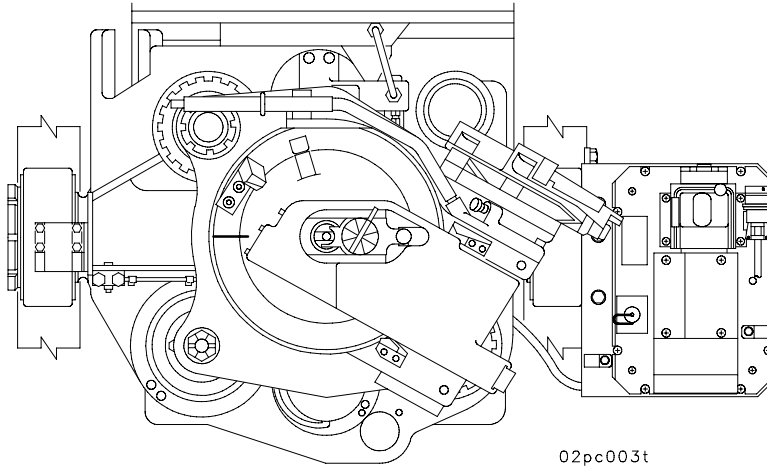
**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### b. BREECH MECHANISM

The breech mechanism consists of the breech operating handle with detent plunger, cradle cam, clutch pin, firing mechanism block assembly with firing mechanism, and spring pack. Below is a pictorial view of the cannon from the rear. The breech is shown in the closed position.

The breech operating handle is used to open the breech. The cradle cam is used to close the breech. The firing mechanism is used to fire the cannon when a primer is installed.

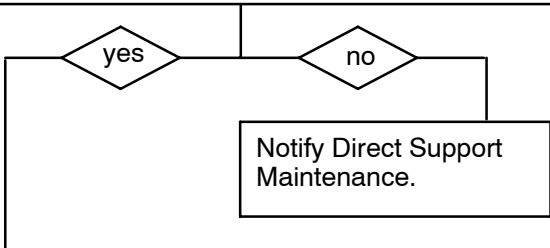


### 3-3. TROUBLESHOOTING CHART - CONTINUED

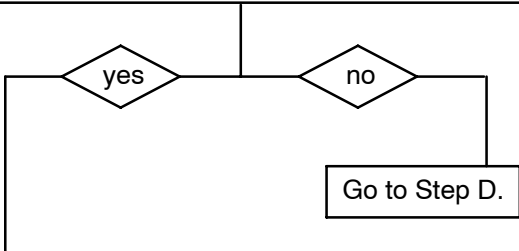
b. BREECH MECHANISM - CONTINUED (1) BREECH DOES NOT OPEN MANUALLY.

INITIAL SETUP  
Tools  
 Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)

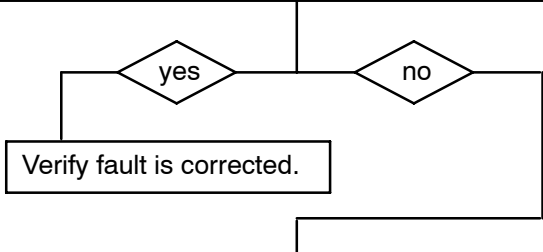
**A** Check the operating handle plunger and operating handle clutch for proper operation (TM 9-2350-314-10).  
 Do they operate properly?



**B** 1. Place firing mechanism block in the OPEN position (right) (TM 9-2350-314-10).  
 2. Place plunger at first step position (para 4-15).  
 3. Check obturator spindle nut for looseness.  
 Is obturator spindle nut loose?



**C** 1. Tighten spindle nut using spanner wrench (para 4-15).  
 2. Return plunger to initial position (para 4-15).  
 3. Attempt to open breech (TM 9-2350-314-10).  
 Does breech open?



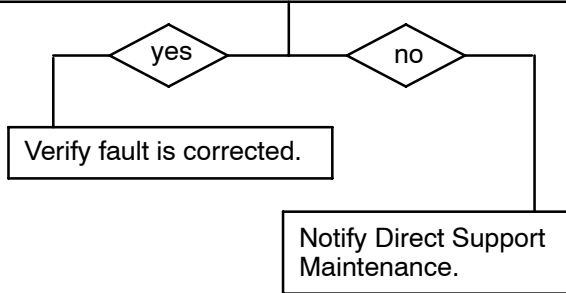
CONTINUED ON NEXT PAGE

**3-3. TROUBLESHOOTING CHART - CONTINUED**

b. BREECH MECHANISM - CONTINUED (1) BREECH DOES NOT OPEN MANUALLY. - CONTINUED

CONTINUED FROM STEP B OR C

<b>D</b>	<ol style="list-style-type: none"> <li>1. Place firing mechanism block in the firing position. Attempt to open breech (TM 9-2350-314-10).</li> <li>2. If breech does not open, remove firing mechanism (para 4-13).</li> <li>3. Remove firing mechanism block and firing mechanism housing (para 4-16).</li> <li>4. Remove end follower from block (para 4-16).</li> <li>5. Inspect follower for bent or damaged roller. If damaged, replace (para 4-16).</li> <li>6. Install firing mechanism housing, block, and mechanism (para 4-13 and 4-16). Attempt to open breech (TM 9-2350-314-10).</li> </ol>
Does breech open?	



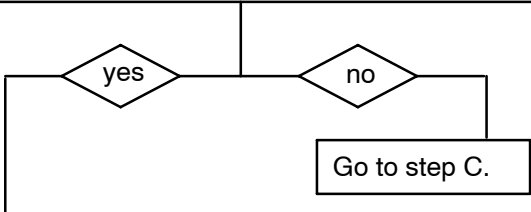
**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

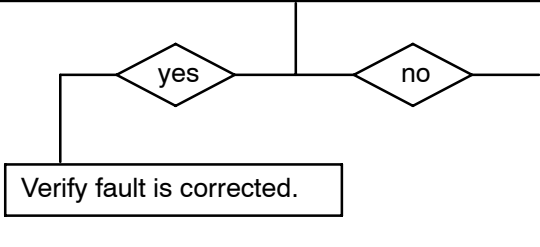
b. BREECH MECHANISM - CONTINUED (2) BREECH DOES NOT CLOSE COMPLETELY.

INITIAL SETUP  
Tools  
 Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)

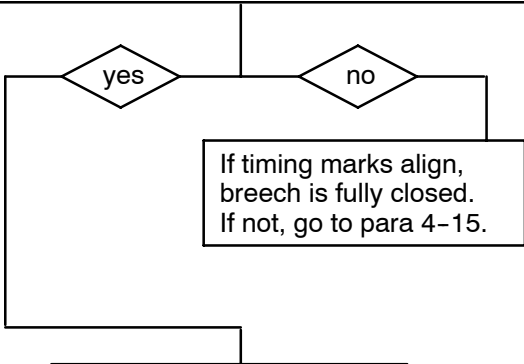
**A** 1. Clean breech block and breech ring threads (TM 9-2350-314-10).  
 2. Inspect threads for burrs (TM 9-2350-314-10).  
 Are threads burred?



**B** 1. File threads smooth and lubricate them (TM 9-2350-314-10).  
 2. Attempt to close breech (TM 9-2350-314-10).  
 Does breech close completely?



**C** Adjust closing spring tension at leaf spring adjuster (para 4-15).  
 Does adjuster rotate past last notch?



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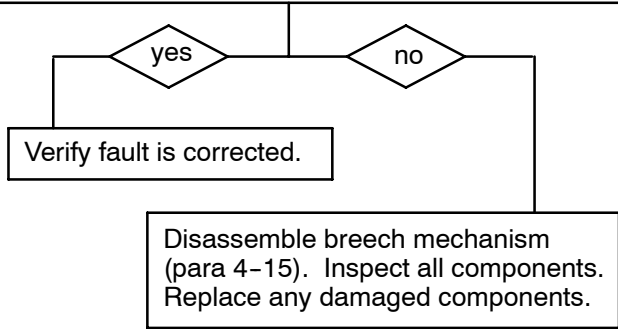


**3-3. TROUBLESHOOTING CHART - CONTINUED**

b. BREECH MECHANISM - CONTINUED (2) BREECH DOES NOT CLOSE COMPLETELY. - CONTINUED

CONTINUED FROM STEP C

<b>D</b>	<ol style="list-style-type: none"> <li>1. Remove and inspect leaf springs (para 4-15).</li> <li>2. Replace damaged or fatigued leaf springs (para 4-15).</li> <li>3. Attempt to close breech (TM 9-2350-314-10).</li> </ol>
Does breech close completely?	

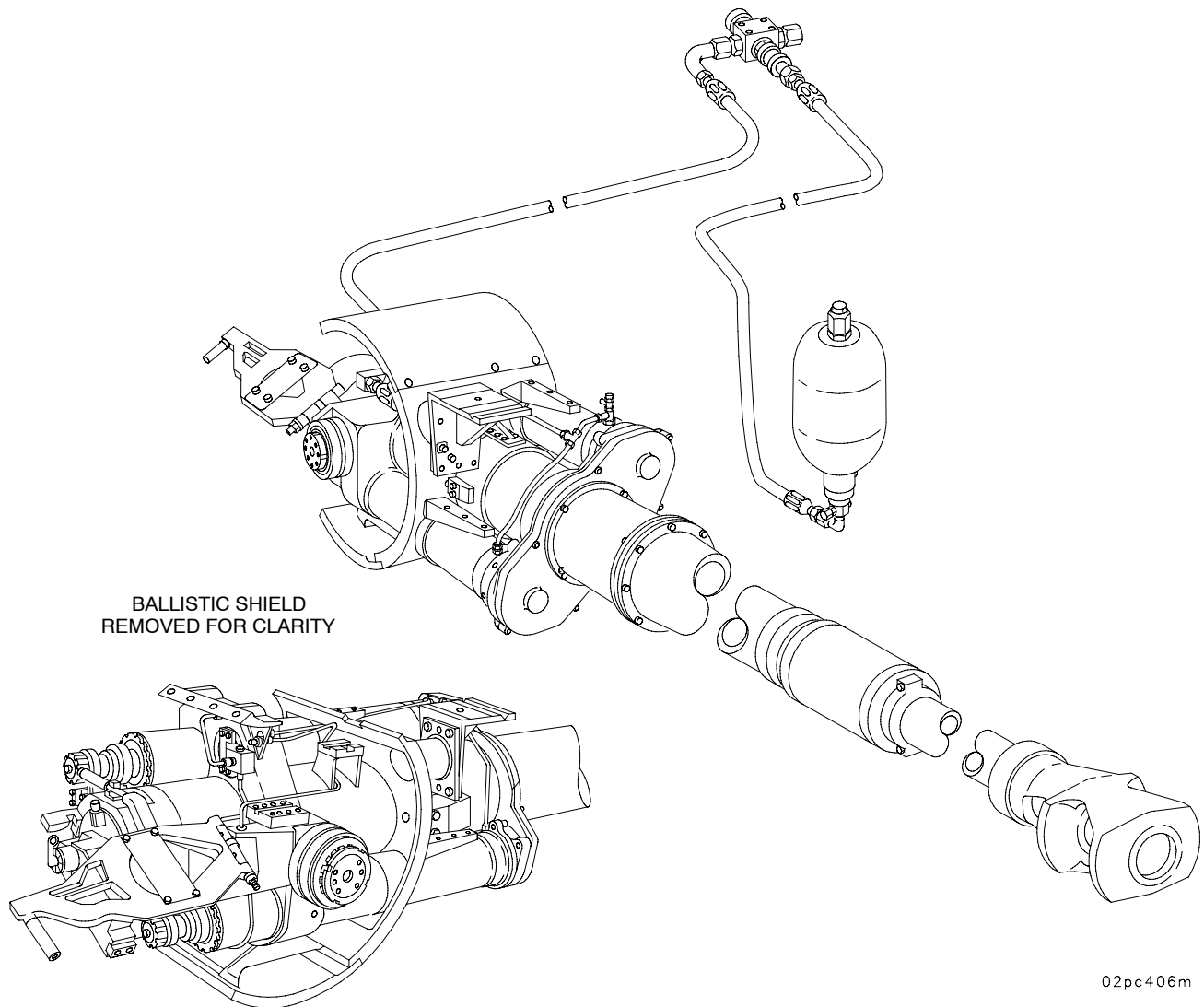


**END OF TASK**



**3-3. TROUBLESHOOTING CHART - CONTINUED****c. CANNON**

The cannon consists of the muzzle, brake, barrel, evacuator, mount, recoil mechanism, breech assembly, and firing mechanism. Below is a pictorial view of the cannon with all the major assemblies installed. The muzzle brake and recoil mechanism reduce and absorb the recoil of the barrel during the firing sequence. The breech assembly houses the projectile and propellant during a firing. The firing mechanism is used to fire the cannon.

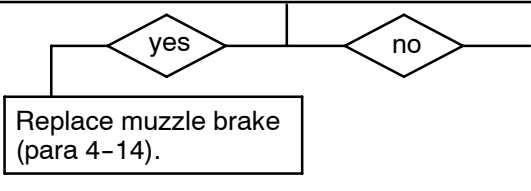


### 3-3. TROUBLESHOOTING CHART - CONTINUED

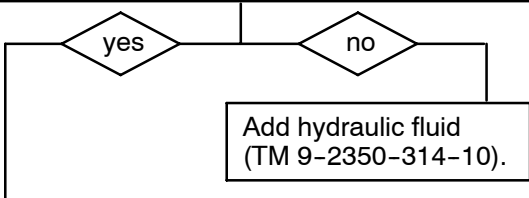
c. CANNON - CONTINUED (1) JERKY RECOIL.

INITIAL SETUP  
Tools  
 Artillery and turret mechanic's tool kit  
 (CL 5180-95-A12)

**A** Depress cannon to zero mils and inspect muzzle brake (TM 9-2350-314-10).  
 Are cracks more than one inch long present?



**B** Check replenisher accumulator pressure after mount has cooled. Pressure should be between 17 and 24 psi (TM 9-2350-314-10).  
 Is replenisher accumulator pressure at least 17-24 psi?



**C**

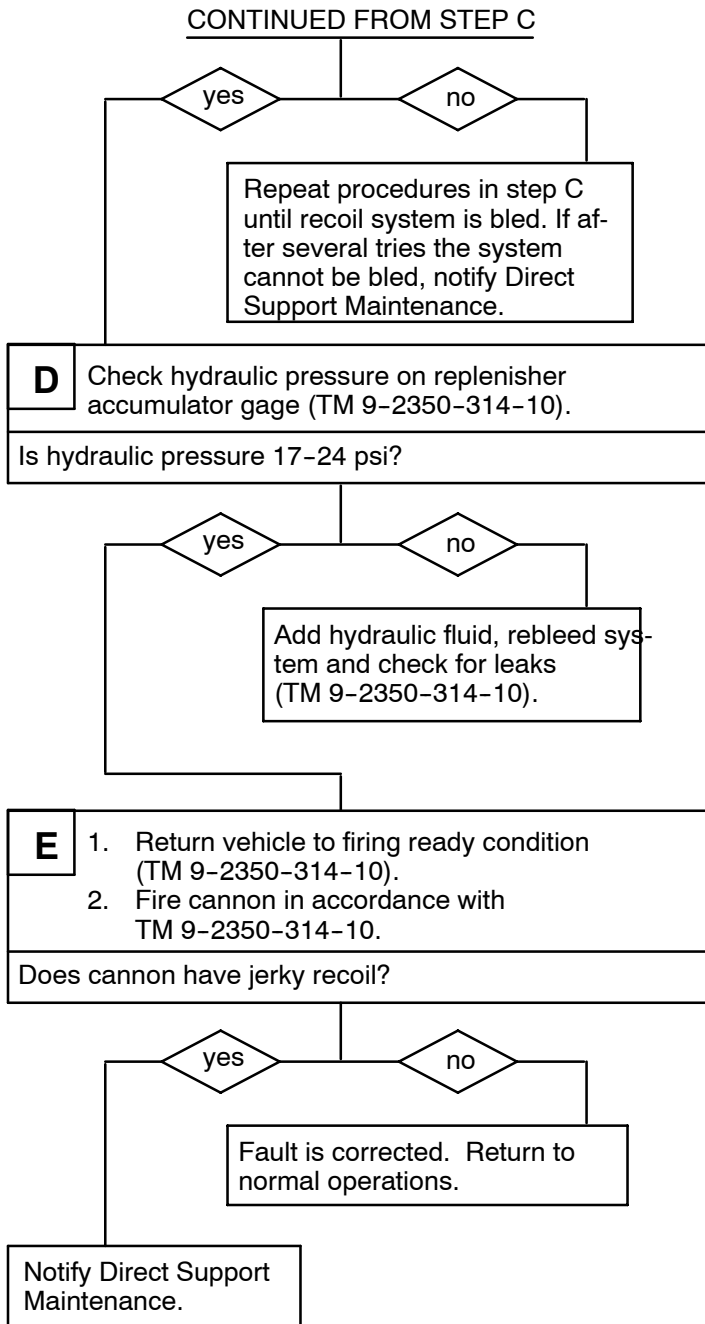
1. Using manual elevation handle, depress cannon tube to maximum depression.
2. Loosen right-hand bleed plug and bleed trapped air from rear of buffer. Tighten plug when air-free fluid flows.
3. Using manual elevation handle, elevate cannon tube to 50 mils.
4. Loosen left-hand bleed plug and bleed trapped air from front buffer. Tighten plug when air-free fluid flows.
5. Using manual elevation handle, elevate cannon tube to 180 mils.
6. Loosen bleed plug on bleeder tee and bleed trapped air until air-free fluid flows. Tighten plug.

Does air-free fluid flow?

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

c. CANNON - CONTINUED (1) JERKY RECOIL. - CONTINUED



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

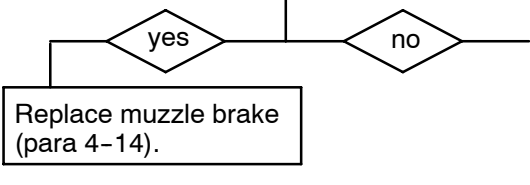
c. CANNON - CONTINUED (2) EXCESSIVE RECOIL FORCE.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit  
 (CL 5180-95-A12)

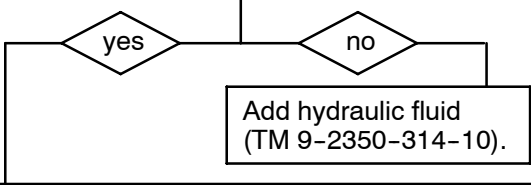
**A** Depress cannon to zero mils and inspect muzzle brake (TM 9-2350-314-10).

Are cracks more than one inch long present?



**B** Check replenisher accumulator pressure after mount has cooled. Pressure should be between 17 and 24 psi (TM 9-2350-314-10).

Is replenisher accumulator pressure 17-24 psi?



**C**

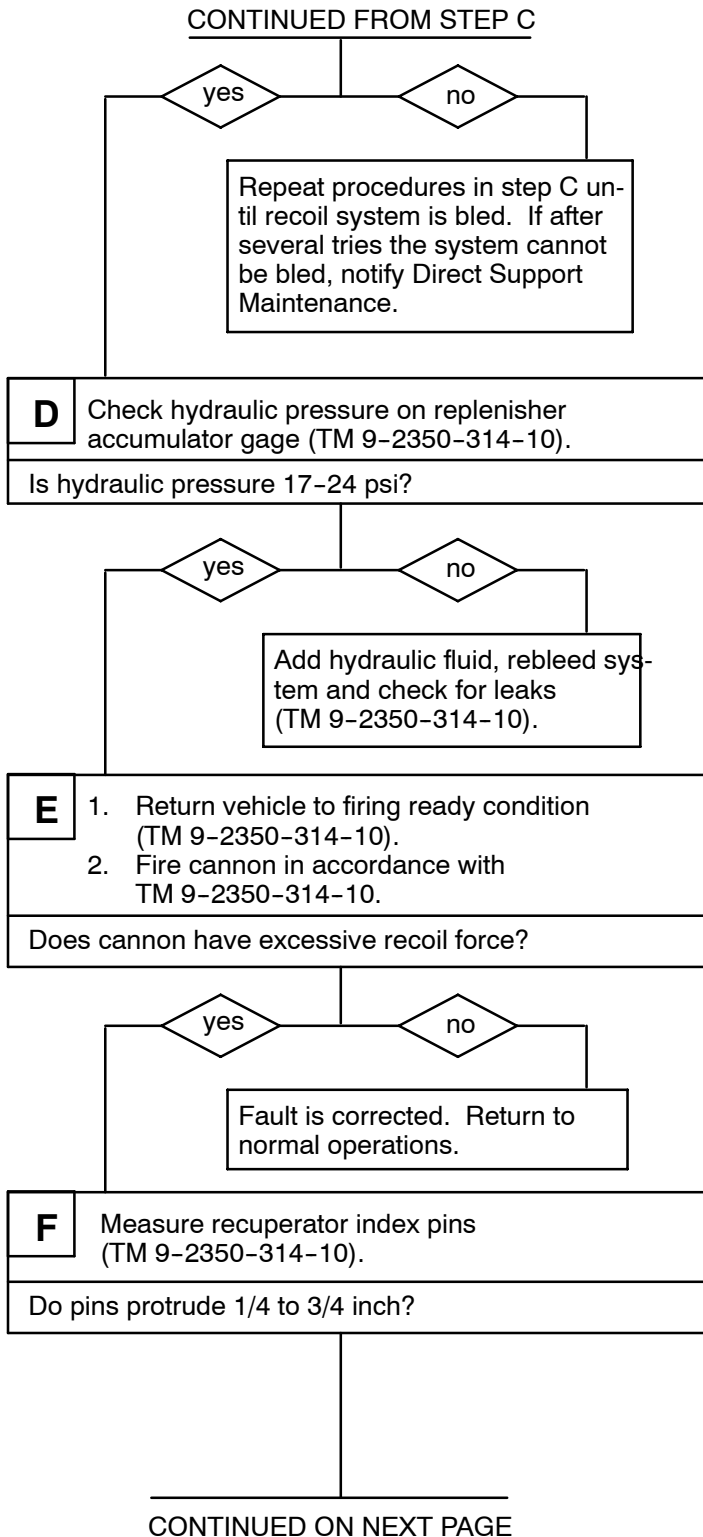
1. Using manual elevation handle, depress cannon tube to maximum depression.
2. Loosen right-hand bleed plug and bleed trapped air from rear of buffer. Tighten plug when air-free fluid flows.
3. Using manual elevation handle, elevate cannon tube to 50 mils.
4. Loosen left-hand bleed plug and bleed trapped air from front of buffer. Tighten plug when air-free fluid flows.
5. Using manual elevation handle, elevate cannon tube to 180 mils.
6. Loosen plug on bleeder tee and bleed trapped air until air-free fluid flows. Tighten plug.

Does air-free fluid flow?

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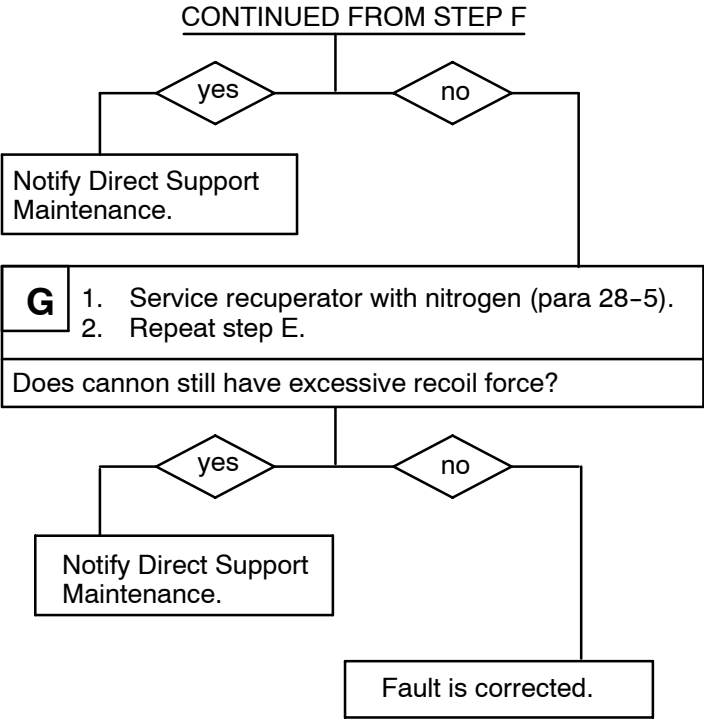
### 3-3. TROUBLESHOOTING CHART - CONTINUED

c. CANNON - CONTINUED (2) EXCESSIVE RECOIL FORCE. - CONTINUED



### 3-3. TROUBLESHOOTING CHART - CONTINUED

c. CANNON - CONTINUED (2) EXCESSIVE RECOIL FORCE. - CONTINUED



END OF TASK

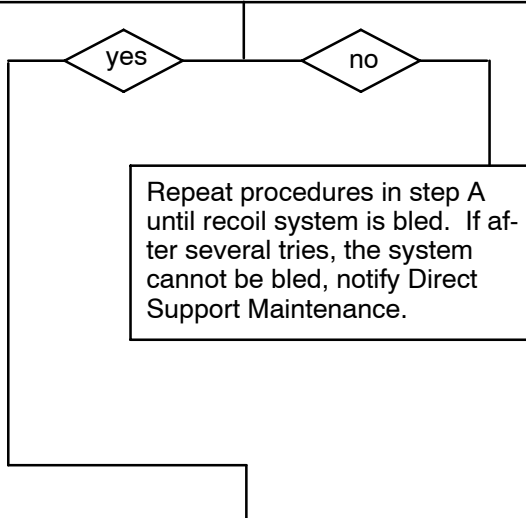


### 3-3. TROUBLESHOOTING CHART - CONTINUED

c. CANNON - CONTINUED (3) EXCESSIVE RECOIL TRAVEL.

INITIAL SETUP  
Tools  
 Artillery and turret mechanic's tool kit  
 (CL 5180-95-A12)

- A**
1. Using manual elevation handle, depress cannon tube to maximum depression.
  2. Loosen right-hand bleed plug and bleed trapped air from rear of buffer. Tighten plug when air-free fluid flows.
  3. Using manual elevation handle, elevate cannon tube to 50 mils.
  4. Loosen left-hand bleed plug and bleed trapped air from front of buffer. Tighten plug when air-free fluid flows.
  5. Using manual elevation handle, elevate cannon tube to 180 mils.
  6. Loosen plug on bleeder tee and bleed trapped air until air-free fluid flows. Tighten plug.
- Is all air bled from recoil system?

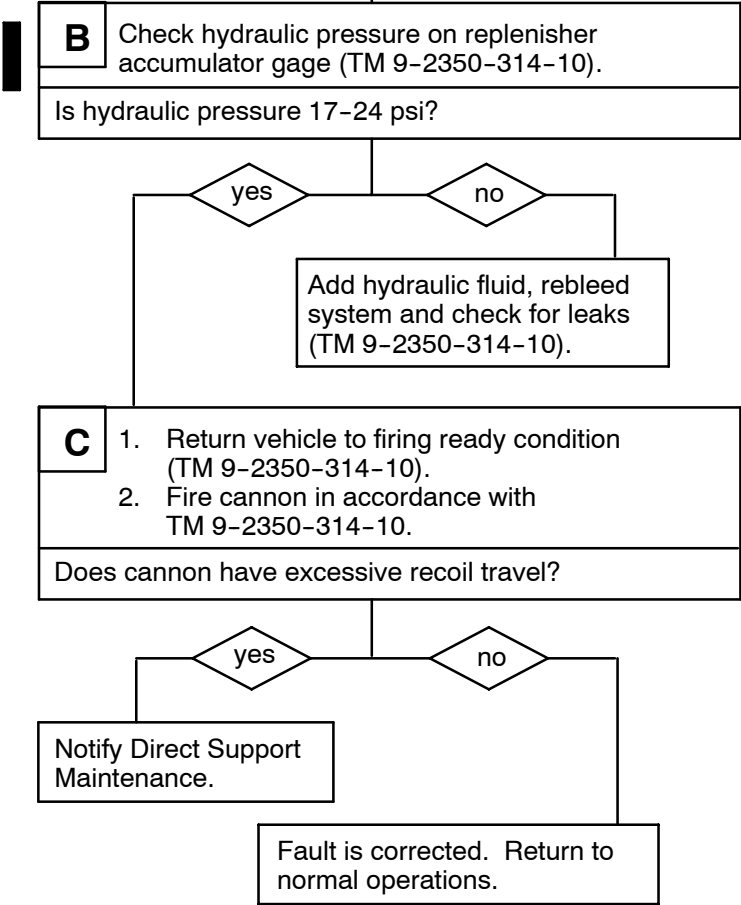


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### 3-3. TROUBLESHOOTING CHART - CONTINUED

c. CANNON - CONTINUED (3) EXCESSIVE RECOIL TRAVEL. - CONTINUED

CONTINUED FROM STEP A



END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

c. CANNON - CONTINUED (4) CANNON DOES NOT RETURN TO BATTERY.

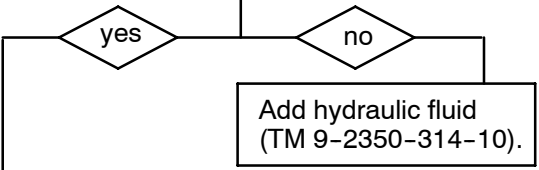
INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit  
 (CL 5180-95-A12)  
 Nitrogen charging kit (item 23, Appx G)

**A** Check replenisher accumulator pressure after mount has cooled (TM 9-2350-314-10).

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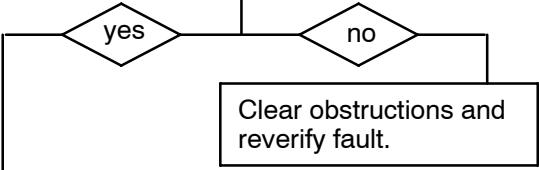
Is pressure at least 17-24 psi?



**B** Check cannon for obstructions (TM 9-2350-314-10).

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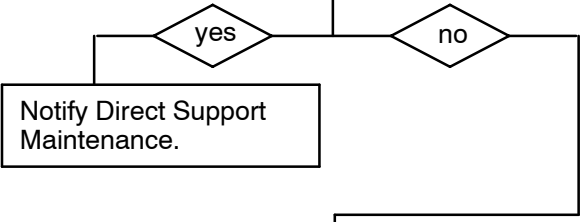
Is cannon free from obstructions?



**C** Inspect recoil and counter recoil for bends or gouges.

---

Is recoil and/or counter recoil damaged?



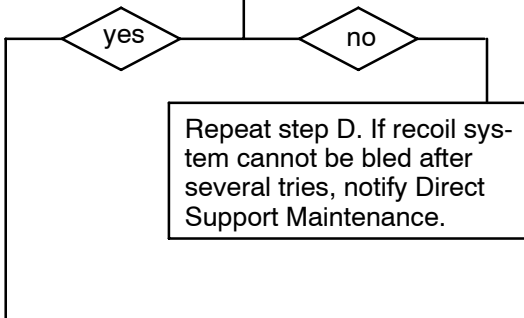
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

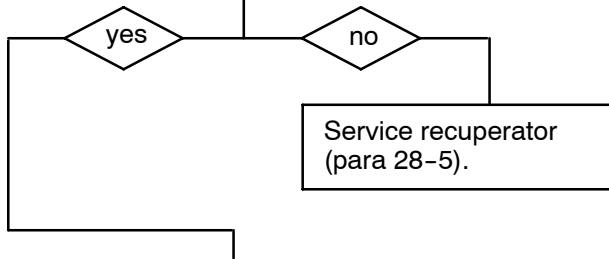
c. CANNON - CONTINUED (4) CANNON DOES NOT RETURN TO BATTERY. - CONTINUED

CONTINUED FROM STEP C

<b>D</b>	<ol style="list-style-type: none"> <li>1. Using manual elevation handle, depress cannon tube to maximum depression.</li> <li>2. Loosen right-hand bleed plug and bleed trapped air from rear of buffer. Tighten plug when air-free fluid flows.</li> <li>3. Using manual elevation handle, elevate cannon tube to 50 mils.</li> <li>4. Loosen left-hand bleed plug and bleed trapped air from front of buffer. Tighten plug when air-free fluid flows.</li> <li>5. Using manual elevation handle, elevate cannon tube to 180 mils.</li> <li>6. Loosen plug on bleeder tee and bleed trapped air until air-free fluid flows.</li> </ol>
Is all air bled from recoil system?	



<b>E</b>	Attach gages of nitrogen charging kit to recuperator and check recuperator pressure (para 28-5).
Is recuperator pressure $700 \pm 50$ psi?	



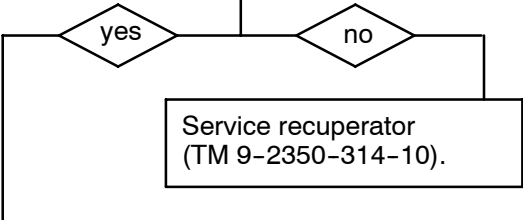
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

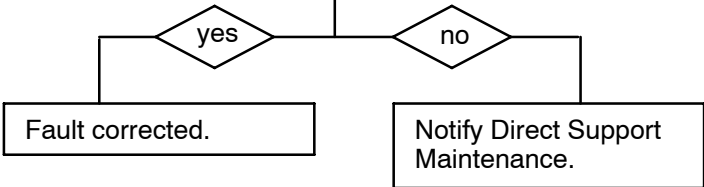
c. CANNON - CONTINUED (4) CANNON DOES NOT RETURN TO BATTERY. - CONTINUED

CONTINUED FROM STEP E

**F** Measure recuperator pins (inside and outside) (TM 9-2350-314-10).  
Do all recuperator pins protrude 1/8 to 3/4 inch?



**G** 1. Return vehicle to firing ready condition (TM 9-2350-314-10).  
2. Fire cannon in accordance with TM 9-2350-314-10.  
Does cannon return to battery?



END OF TASK

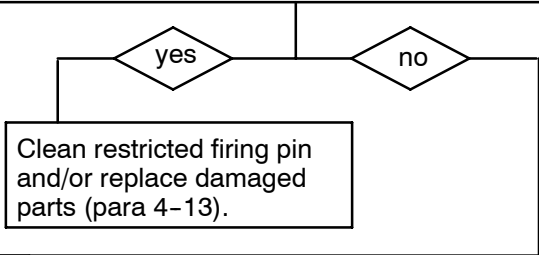
### 3-3. TROUBLESHOOTING CHART - CONTINUED

c. CANNON - CONTINUED (5) PRIMER DOES NOT FIRE - PRIMER NOT INDENTED.

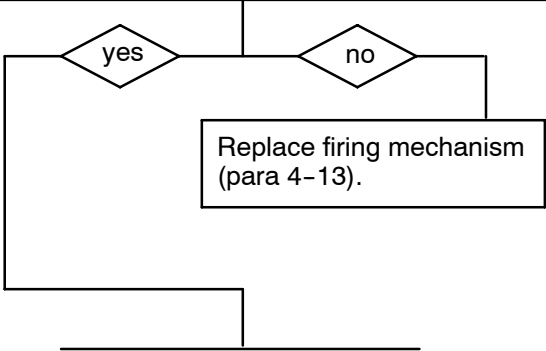
INITIAL SETUP  
Tools  
Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

**WARNING**  
Follow misfire instructions before opening breech block (TM 9-2350-314-10).

- A**
1. Remove and disassemble M49 firing mechanism (para 4-13).
  2. Remove firing pin and inspect it for mushrooming, breakage, burrs or burned-on carbon deposits (TM 9-2350-314-10).
- Is firing pin damaged or have burned-on carbon deposits that may restrict firing?



- B** Reassemble and test mechanism.
- Does firing mechanism function properly?



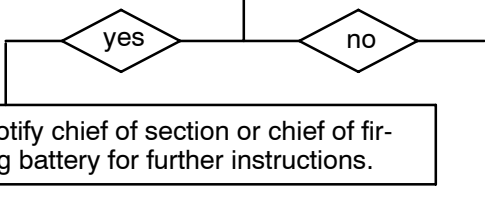
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

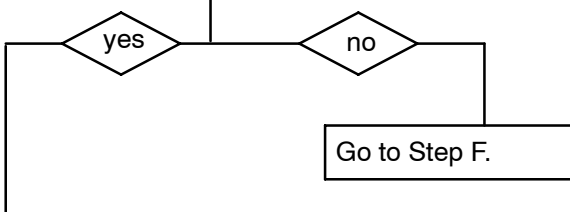
c. CANNON - CONTINUED (5) PRIMER DOES NOT FIRE - PRIMER NOT INDENTED. - CONTINUED

CONTINUED FROM STEP B

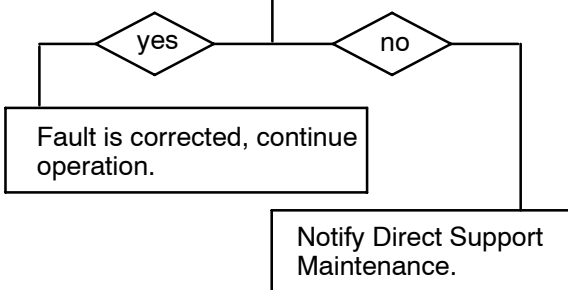
<b>C</b>	<ol style="list-style-type: none"> <li>1. Place firing mechanism back into firing block (TM 9-2350-314-10).</li> <li>2. Insert primer and attempt to fire (TM 9-2350-314-10).</li> </ol>
If primer does not fire, is it indented?	



<b>D</b>	<ol style="list-style-type: none"> <li>1. Remove firing mechanism housing (para 4-16), block (para 4-16) and spring (para 4-15).</li> <li>2. Check thread inside obturator spindle nut for cross-threading caused by carbon deposits (para 4-15).</li> </ol>
Is obturator nut cross threaded?	



<b>E</b>	<ol style="list-style-type: none"> <li>1. Replace obturator spindle nut (para 4-15) and reassemble firing mechanism (TM 9-2350-314-10).</li> <li>2. Attempt to fire (TM 9-2350-314-10).</li> </ol>
Does primer fire?	

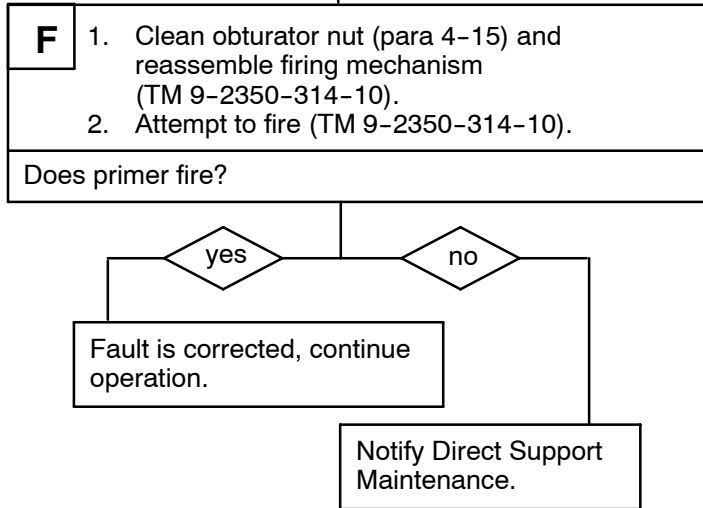


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

c. CANNON - CONTINUED (5) PRIMER DOES NOT FIRE - PRIMER NOT INDENTED. - CONTINUED

CONTINUED FROM STEP D



**END OF TASK**



### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### d. ELEVATION SYSTEM

- The elevation system consists of the following:
- Hydraulic control box
- Hydraulic motor and pump flow meter
- Filter assembly
- Mode selector valve
- Pulse accumulator
- Fuse assembly
- COS and gunner control handles
- Elevation selector valve
- Elevation servo valve
- Relief valve
- Locking valve assembly
- Manual elevation assembly
- Elevation accumulator
- Elevation/equilibration cylinder
- Equilibration manifold equilibration hand pump
- Equilibration accumulator

The diagram on the following page shows the relationship of these components.

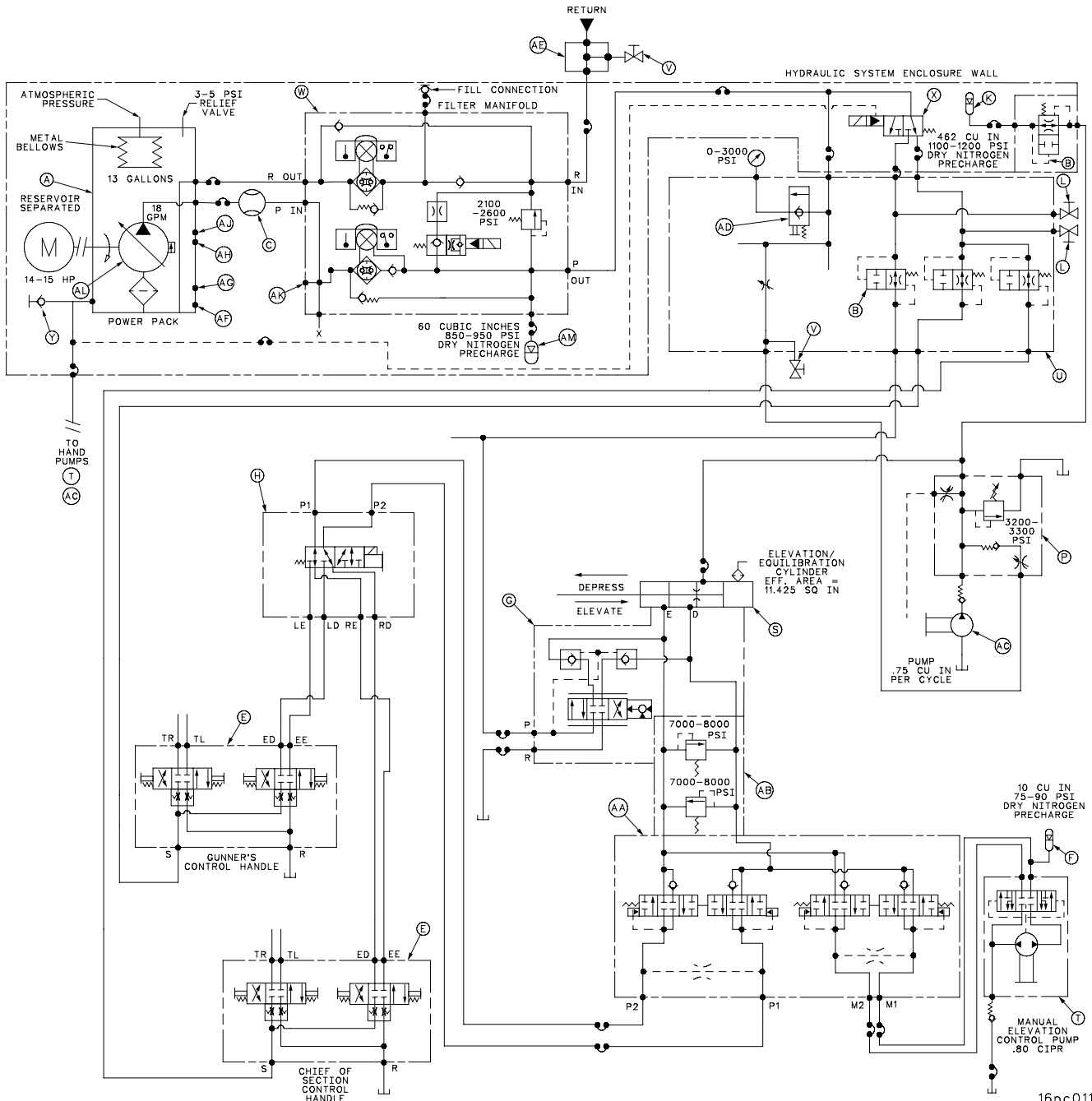
With the engine running and the hydraulic power switch (S1), on the hydraulic control box, in the ON position, the hydraulic system will power up. Hydraulic pressure is supplied by the pump through the flowmeter and filter assembly to the mode selector valve. The mode selector valve is controlled by the AFCS/PDFCS. When in AFCS/PDFCS mode, hydraulic pressure is supplied to the elevation cylinder through the pulse accumulator, fuse assembly, and elevation servo valve. In power mode, pressure is supplied through the fuse assembly to the COS and gunner control handles. The elevation selector valve is controlled by the COS/GUNNER ELEVATE CONTROL switch (S4) on the hydraulic control box. The elevation selector valve allows hydraulic pressure from either the COS or gunner control handle to pass to the locking valve assembly and relief valves to elevate or depress the elevation cylinder. The cannon may also be elevated manually using the manual elevation control pump. This provides hydraulic pressure to the elevation cylinder via the locking valve assembly and relief valves.

The equilibration hand pump, manifold, velocity fuse, and accumulator work together to provide hydraulic pressure to the elevation cylinder for a smooth rate of elevation or depression.

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### d. ELEVATION SYSTEM

ITEM	DESCRIPTION	PART NO.	ITEM	DESCRIPTION	PART NO.	ITEM	DESCRIPTION	PART NO.
A	POWERPACK	12553355	T	EL ASSY., MANUAL	12563247	AF	COOLING TEMP. SWITCH	M24236/25AGJBA
B	VELOCITY FUSE	12553425	U	MANIFOLD, FUSE	12553540	AG	TEMP. TRANSDUCER	12554015
C	FLOW METER	12562735	V	SAMPLING BLEED VALVE	M81940/1-2	AH	LEVEL SENSOR	12934603
E	GUNNER'S CONTROL	10922902	W	FILTER ASSY.	12553354	AJ	WARM UP TEMP. SWITCH	M24236/2A8DUCS
F	ACCUMULATOR	7974982	X	MODE SELECTOR VALVE	12561784	AK	PRESSURE TRANSDUCER	12554014
G	EL SERVOVALVE ASSY.	12553898	Y	QUICK DISC. CPL. & HALF	12910614-1	AL	HYDRAULIC PUMP	12553353
H	SELECTOR VALVE	12553595	AA	LOCKING VALVE ASSY.	11784023	AM	ACCUMULATOR	11665003
K	ACCUMULATOR,EQUILIBRATION	12553726	AB	RELIEF VALVE	7738814			
L	BLEED VALVE	11783927	AC	EQUILIBRATION HANDPUMP	7382992			
P	EQUILIBRATION MANF.	11636342	AD	MANUAL PULL VALVE	12948159			
S	EL/EQUILIBRATOR CYL.	12553710	AE	RETURN MANIFOLD	12553564			



16pc011t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

d. ELEVATION SYSTEM - CONTINUED (1) CANNON WILL ONLY MOVE A FEW MILS OR WILL NOT ELEVATE OR DEPRESS.

INITIAL SETUP

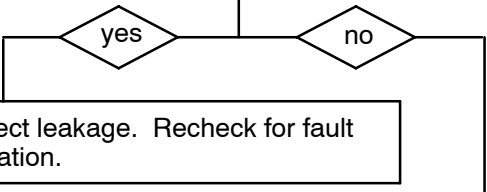
<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Nitrogen charging kit (item 23, Appx G)</p>	<p><u>Equipment Conditions</u>                  Gun tube out of travel lock (TM 9-2350-314-10)</p>
---	--

**NOTE**

Prior to starting this tree, ensure that the velocity fuse is reset (para 18-46).

**A** Inspect cab and hydraulic compartment for leakage (TM 9-2350-314-10).

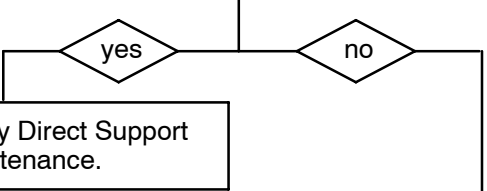
Is leakage present?



**B**

1. Make sure cannon tube is not obstructed (TM 9-2350-314-10).
2. Inspect cannon mount, elevation cylinder for damage or binding (TM 9-2350-314-10).

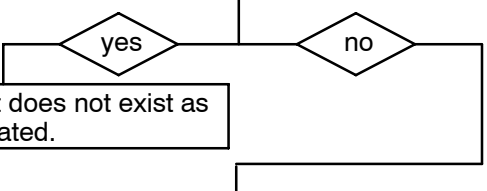
Is damage and/or binding present?



**C**

1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
2. Using elevation hand pump, attempt to raise cannon tube (TM 9-2350-314-10).

Does cannon elevate?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

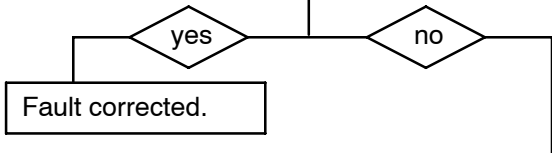
d. ELEVATION SYSTEM (1) CANNON WILL ONLY MOVE A FEW MILS OR WILL NOT ELEVATE OR DEPRESS. - CONTINUED

CONTINUED FROM STEP C

**D**

1. Equilibrate the cannon (TM 9-2350-314-10).
2. Attempt to elevate cannon using the manual elevation hand pump.

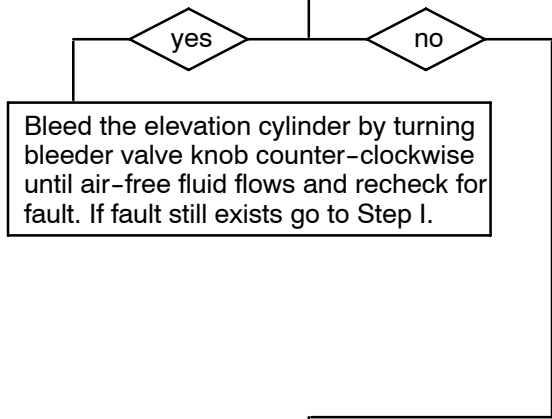
Does cannon elevate?



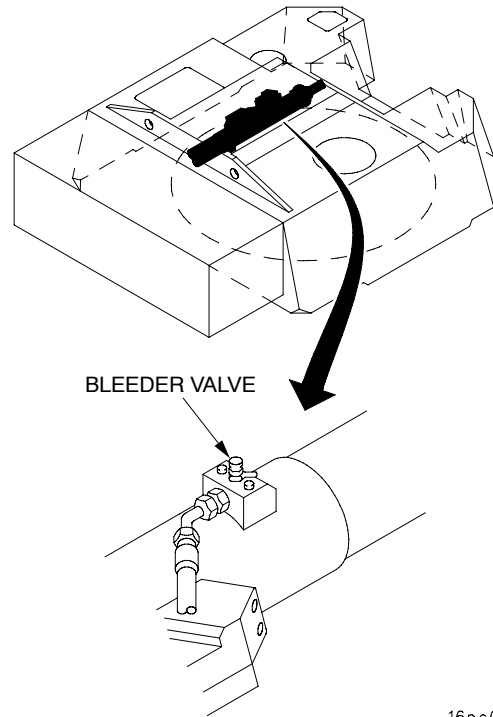
**E**

1. Start vehicle engine (TM 9-2350-314-10).
2. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
3. Turn GUNNER CONTROL switch to GUNNER position (TM 9-2350-314-10).
4. Pull back and hold gunner's control handle while pumping equilibration hand pump (TM 9-2350-314-10).

Does cannon elevate?



CONTINUED ON NEXT PAGE



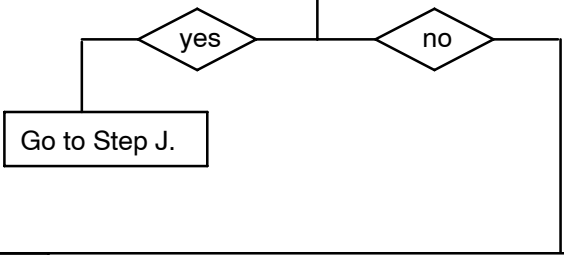
16pc037t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

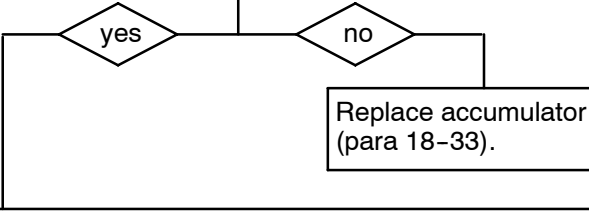
d. ELEVATION SYSTEM (1) CANNON WILL ONLY MOVE A FEW MILS OR WILL NOT ELEVATE OR DEPRESS. - CONTINUED

CONTINUED FROM STEP E

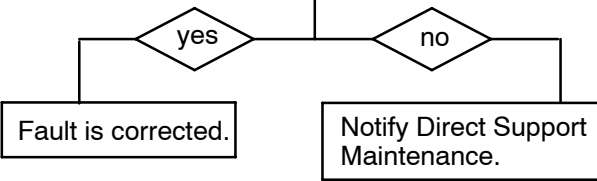
<b>F</b>	<ol style="list-style-type: none"> <li>1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).</li> <li>2. Turn engine OFF (TM 9-2350-314-10).</li> <li>3. Turn vehicle MASTER POWER switch OFF (TM 9-2350-314-10).</li> <li>4. Check the equilibration accumulator nitrogen pressure (para 28-7).</li> </ol>
Is nitrogen pressure between 1100 and 1200 psi?	



<b>G</b>	Charge equilibration accumulator (para 28-7).
Does equilibration accumulator pressure stay between 1100 and 1200 psi?	



<b>H</b>	Attempt to elevate cannon tube using manual mode (TM 9-2350-314-10).
Does cannon elevate?	



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

d. ELEVATION SYSTEM (1) CANNON WILL ONLY MOVE A FEW MILS OR WILL NOT ELEVATE OR DEPRESS. - CONTINUED

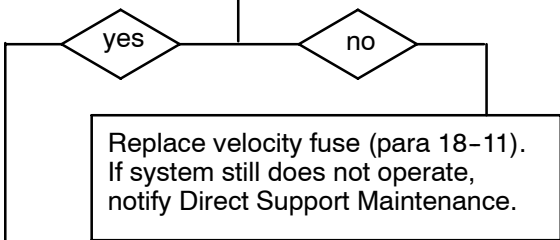
CONTINUED FROM STEP E

**WARNING**

The line between the elevation velocity fuse and the elevation accumulator has residual pressure in it. Open line slowly and slowly bleed residual pressure to avoid injury to personnel and damage to equipment.

- I**
1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
  2. Shut vehicle engine OFF (TM 9-2350-314-10).
  3. Turn vehicle MASTER POWER switch OFF (TM 9-2350-314-10).
  4. Remove hydraulic exterior access panel (para 24-3).
  5. Bleed system pressure to zero (para 18-1).
  6. Bleed off pressure at control handle bleeder valve (para 18-1).
  7. Listen to and feel for elevation velocity fuse to reset.

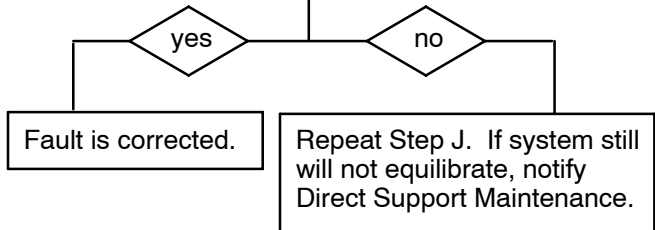
Did velocity fuse reset?



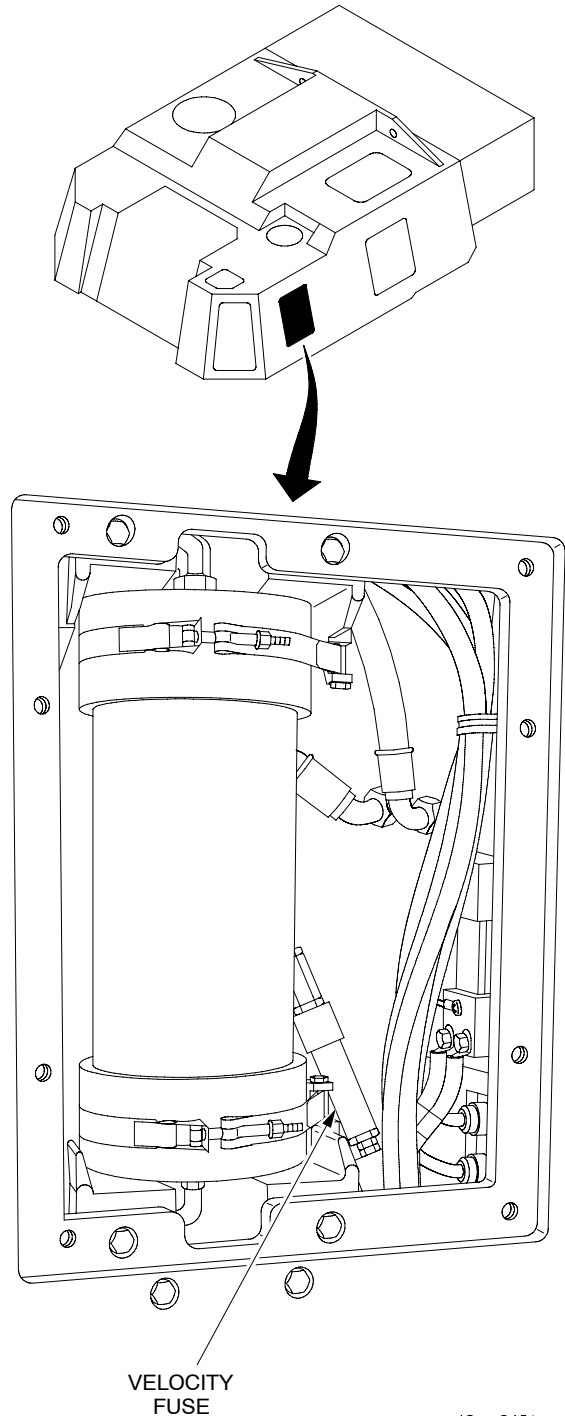
CONTINUED FROM STEP F

**J** Attempt to equilibrate the system (TM 9-2350-314-10).

Will system equilibrate?



**END OF TASK**



16pc016t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

d. ELEVATION SYSTEM - CONTINUED (2) CANNON WILL ONLY ELEVATE A FEW MILS OR ELEVATES SLOWLY.

INITIAL SETUP

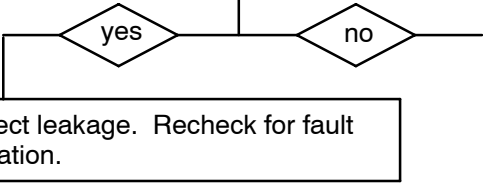
Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimer (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

Prior to starting this tree, ensure that the velocity fuse is reset (para 18-46).

**A** Inspect cab and hydraulic compartment for leakage (TM 9-2350-314-10).

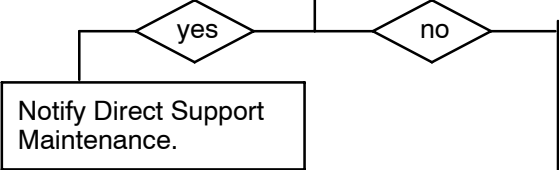
Does leakage exist?



**B**

1. Make sure cannon tube is not obstructed (TM 9-2350-314-10).
2. Inspect cannon mount, elevation cylinder for visible damage or binding (TM 9-2350-314-10).

Is damage and/or binding present?



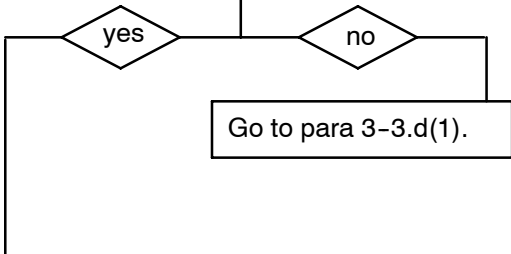
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

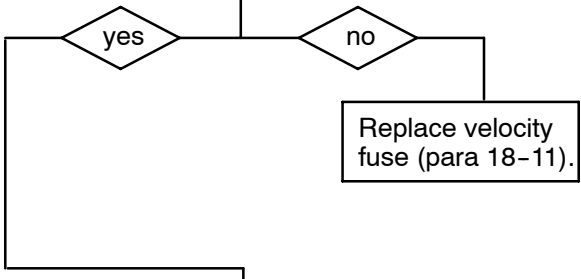
d. ELEVATION SYSTEM - CONTINUED (2) CANNON WILL ONLY ELEVATE A FEW MILS OR ELEVATES SLOWLY. - CONTINUED

CONTINUED FROM STEP B

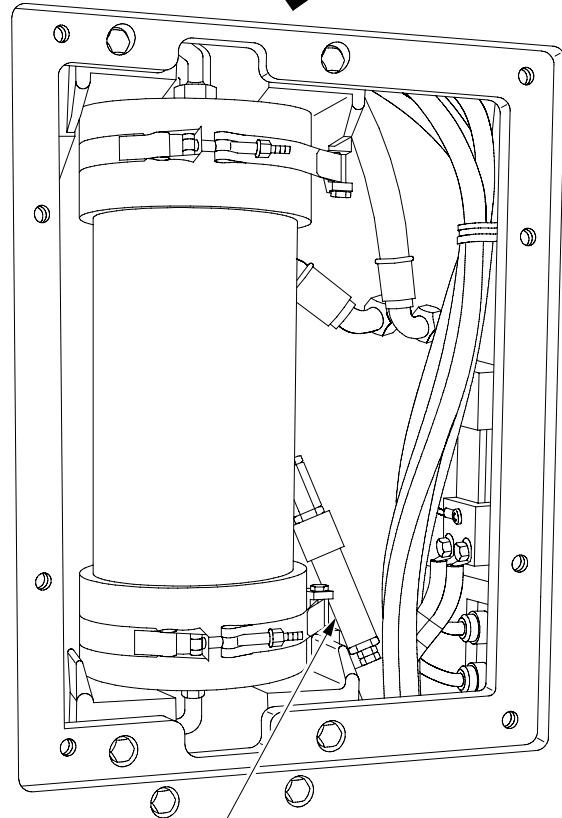
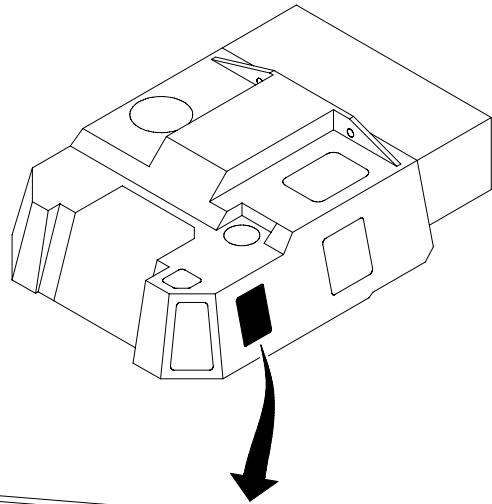
<b>C</b>	<ol style="list-style-type: none"> <li>1. Release travel lock (TM 9-2350-314-10).</li> <li>2. Manually attempt to raise cannon tube (hand pump) (TM 9-2350-314-10).</li> <li>3. Manually attempt to lower cannon tube (hand pump) (TM 9-2350-314-10).</li> </ol>
Does cannon elevate and depress?	



<b>D</b>	<ol style="list-style-type: none"> <li>1. Remove hydraulic exterior access panel (para 24-3).</li> <li>2. Bleed system pressure to zero (para 18-1).</li> <li>3. Listen to and feel for elevation velocity fuse to reset.</li> </ol>
Did the velocity fuse reset?	



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VELOCITY FUSE

16pc016t



### 3-3. TROUBLESHOOTING CHART - CONTINUED

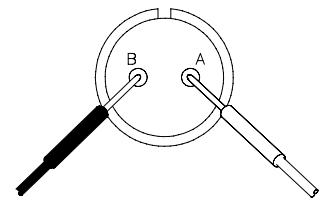
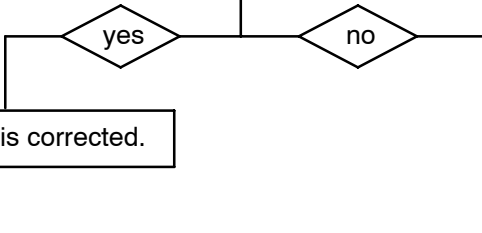
d. ELEVATION SYSTEM - CONTINUED (2) CANNON WILL ONLY ELEVATE A FEW MILS OR ELEVATES SLOWLY. - CONTINUED

CONTINUED FROM STEP D

**E**

1. Turn vehicle MASTER power switch and HYDRAULIC POWER switch ON (TM 9-2350-314-10).
2. Try to elevate gun tube to maximum elevation (TM 9-2350-314-10).

Does gun tube elevate properly?



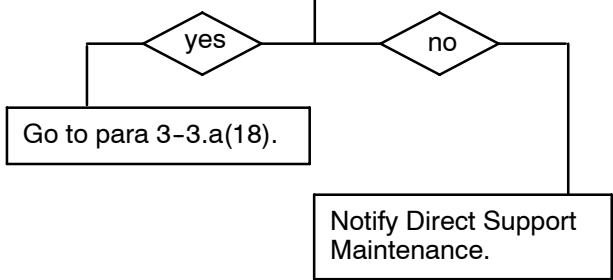
W52  
CONNECTOR P6  
SOCKET A  
SOCKET B

03pc080t

**F**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W52 connector P6 from the mode selector valve.
3. Place multimeter red lead in harness W52 connector P6 socket A and black lead in harness W52 connector P6 socket B.
4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
5. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
6. Check for voltage.

Is voltage present?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

d. ELEVATION SYSTEM - CONTINUED (3) CANNON WILL NOT ELEVATE USING COS CONTROL HANDLE (Gunner is normal). Elevation switch is set to COS.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

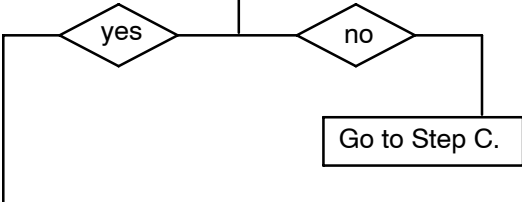
**NOTE**

For vehicles equipped with AFCS, go to Step C.  
 For vehicles equipped with PDFCS, do Step A.

**A** Note results of PDI system tests, and the actual operation of the COS control handle.

---

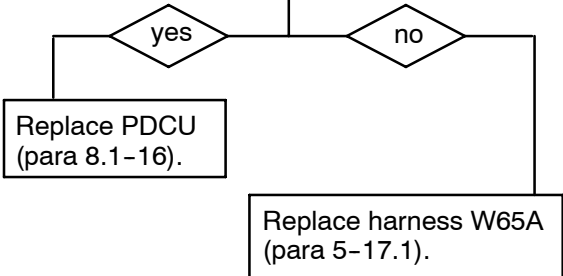
Did the PDI system tests indicate a failure, but the operation of the COS control handle is normal?



**B** Do a harness check on harness W65A (para 3-3.n(18.1)).

---

Is harness W65A good?



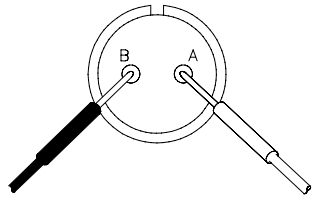
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

d. ELEVATION SYSTEM - CONTINUED (3) CANNON WILL NOT ELEVATE USING COS CONTROL HANDLE (Gunner is normal). Elevation switch is set to COS.

**NOTE**  
Prior to starting this tree, ensure that the velocity fuse is reset (para 18-46).

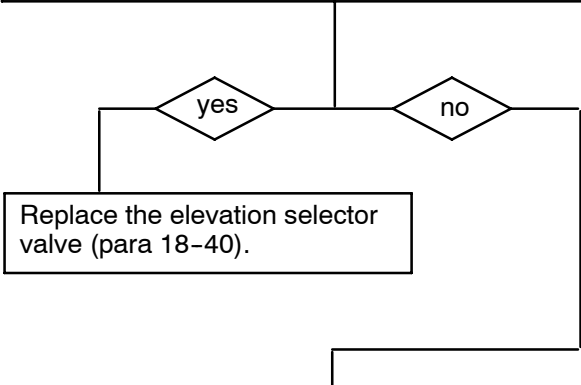
- C**
1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Disconnect harness W64 connector P4 from solenoid of elevation selector valve.
  4. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  5. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  6. Make sure ELEVATION switch is set to COS (TM 9-2350-314-10).
  7. Check harness W64 for voltage by placing multimeter red lead in harness W64 connector P4 socket A and placing black lead in harness W64 connector P4 socket B.



W64  
CONNECTOR P4  
SOCKET A  
SOCKET B

03pc085t

Is voltage present?



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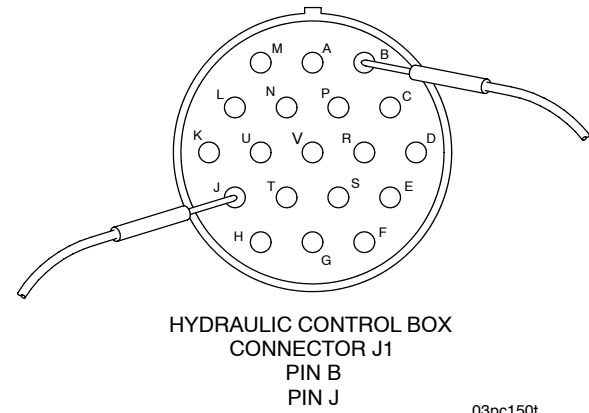
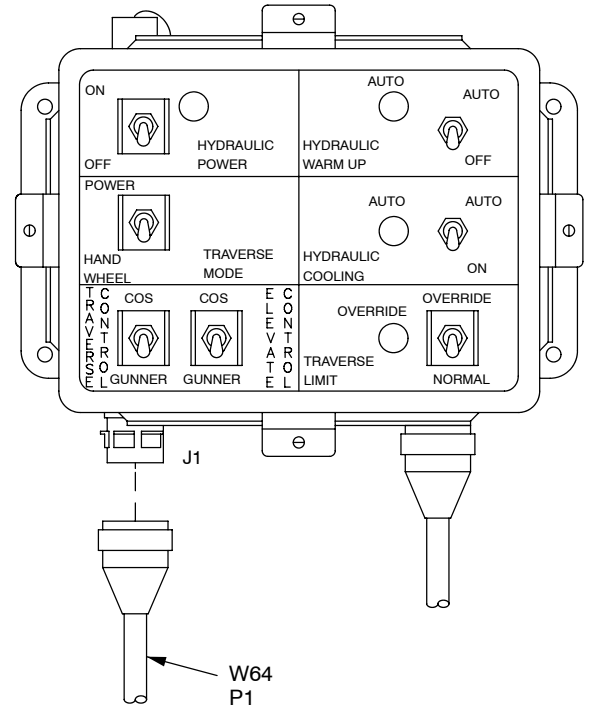
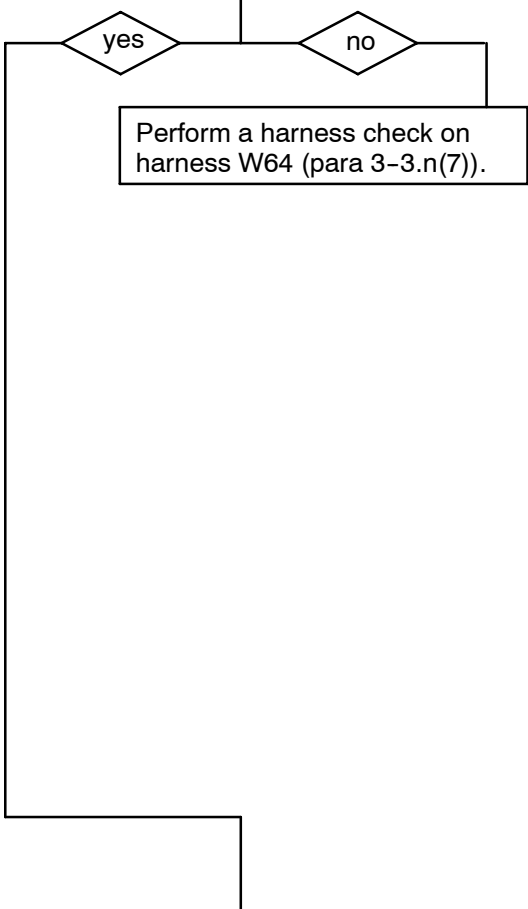
### 3-3. TROUBLESHOOTING CHART - CONTINUED

d. ELEVATION SYSTEM - CONTINUED (3) CANNON WILL NOT ELEVATE USING COS CONTROL HANDLE (Gunner is normal). Elevation switch is set to COS. - CONTINUED

CONTINUED FROM STEP C

- D**
1. Turn HYDRAULIC POWER switch OFF and shut off engine (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
  4. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  5. Make sure ELEVATION switch is set to COS (TM 9-2350-314-10).
  6. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and placing the other lead on hydraulic control box connector J1 pin J.

Is continuity present?



03pc150t

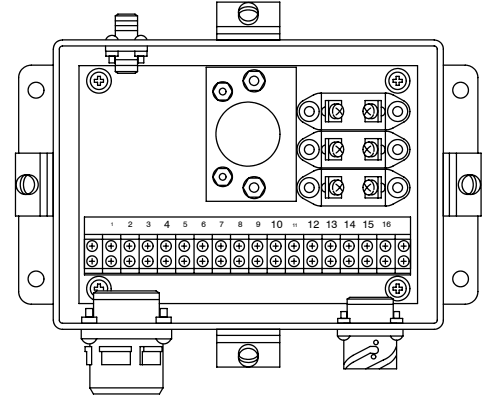
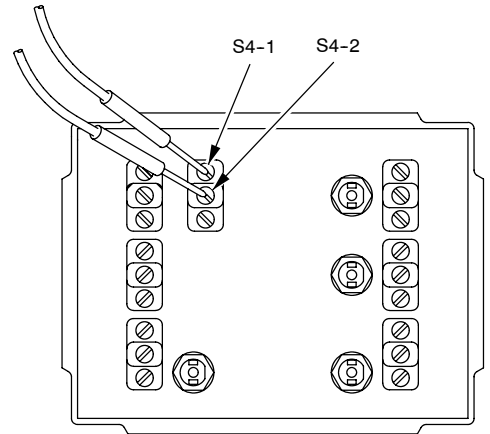
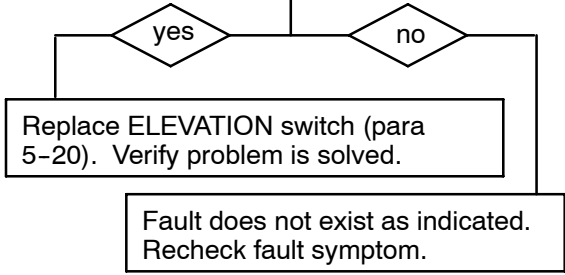
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

d. ELEVATION SYSTEM - CONTINUED (3) CANNON WILL NOT ELEVATE USING COS CONTROL HANDLE (Gunner is normal). Elevation switch is set to COS. - CONTINUED

CONTINUED FROM STEP D

- |                        |  |
|------------------------|--|
| <b>E</b>               | <ol style="list-style-type: none"> <li>1. Remove cover from hydraulic control box (para 5-20).</li> <li>2. Disconnect wire 12934657-5 from TB1-8 (para 5-21).</li> <li>3. Make sure ELEVATION switch is set to COS (TM 9-2350-314-10).</li> <li>4. Check the elevation switch for continuity by placing one multimeter lead on elevation switch terminal 2 (S4-2) and placing the other lead on elevation switch terminal 1 (S4-1).</li> </ol> |
| Is continuity present? |  |



HYDRAULIC CONTROL BOX OPENED

03pc081t

END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

d. ELEVATION SYSTEM - CONTINUED (4) CANNON WILL NOT ELEVATE USING GUNNER'S CONTROL HANDLE (COS is normal). ELEVATION switch is set to GUNNER.

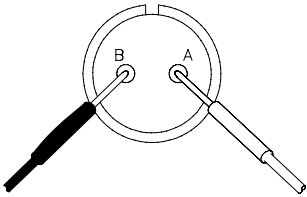
**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

Prior to starting this tree, ensure that the velocity fuse is reset (para 18-46).

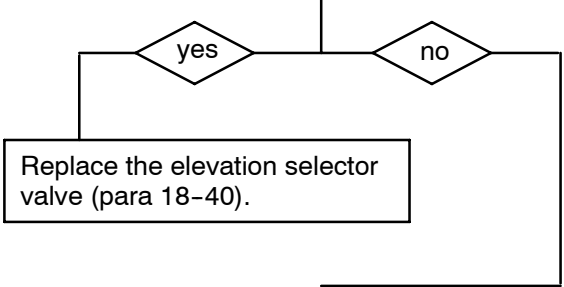
- A**
1. Disconnect harness W64 connector P4 from solenoid of elevation selector valve.
  2. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  3. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  4. Make sure ELEVATION switch is set to GUNNER (TM 9-2350-314-10).
  5. Check harness W64 for voltage by placing multimeter red lead in harness W64 connector P4 socket A and black lead in harness W64 connector P4 socket B.



W64  
 CONNECTOR P4  
 SOCKET A  
 SOCKET B

03pc085t

Is voltage present?



CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

d. ELEVATION SYSTEM - CONTINUED (4) CANNON WILL NOT ELEVATE USING GUNNER'S CONTROL HANDLE (COS is normal). ELEVATION switch is set to GUNNER. - CONTINUED

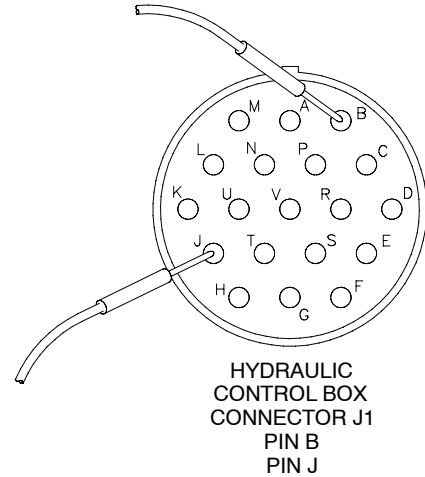
CONTINUED FROM STEP A

**B**

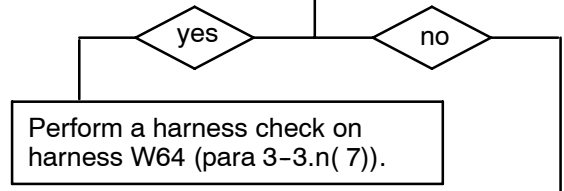
1. Turn HYDRAULIC POWER switch OFF and shut off engine (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
3. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
4. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
5. Make sure ELEVATION switch is set to GUNNER (TM 9-2350-314-10).
6. Check the hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and placing the other lead on hydraulic control box connector J1 pin J.

---

Is continuity present?



03pc086t

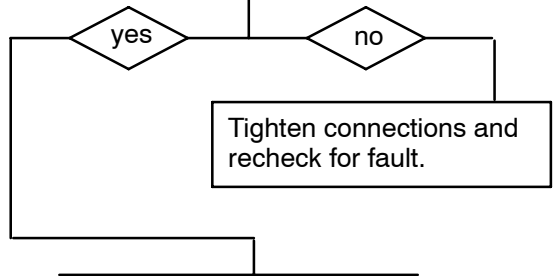


**C**

1. Remove cover from hydraulic control box (para 5-20).
2. Check screw connections on TB1 for tightness (para 5-20).

---

Are connections to TB1 tight?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

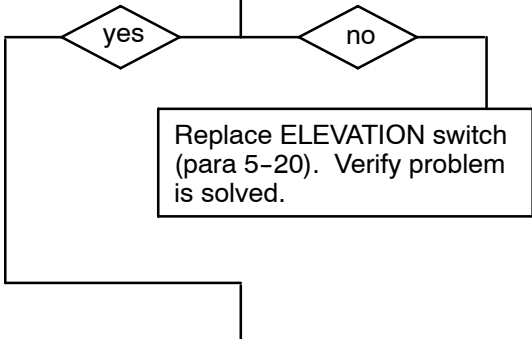
d. ELEVATION SYSTEM - CONTINUED (4) CANNON WILL NOT ELEVATE USING GUNNER'S CONTROL HANDLE (COS is normal). ELEVATION switch is set to GUNNER. - CONTINUED

CONTINUED FROM STEP C

**D**

1. Disconnect lead 12934657-5 from TB1-8.
2. Make sure ELEVATION switch is set to GUNNER (TM 9-2350-314-10).
3. Check the elevation switch for continuity by placing one multimeter lead on elevation switch terminal 2 (S4-2) and placing the other lead on elevation switch terminal 3 (S4-3).

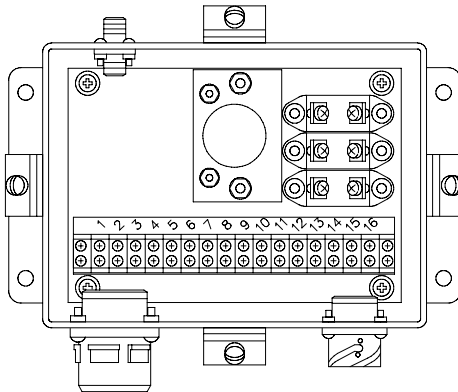
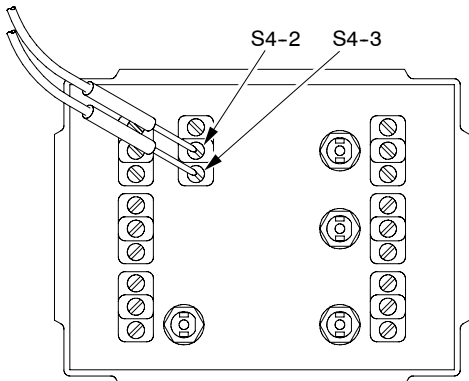
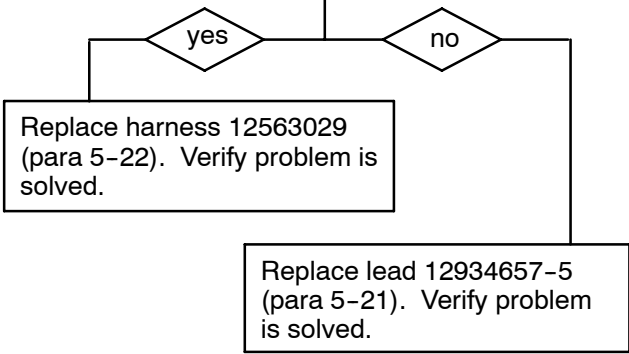
Is continuity present?



**E**

Check lead 12934657-5 for continuity by placing one multimeter lead on loose end of lead 12934657-5 and placing the other lead on elevation switch terminal 3 (S4-3).

Is continuity present?



03pc064t

**END OF TASK**

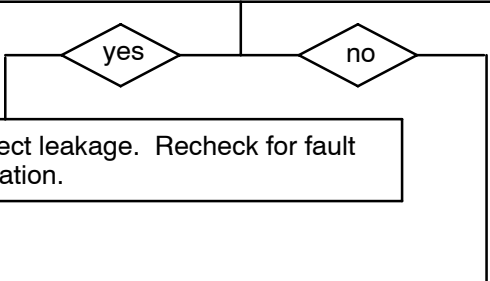


### 3-3. TROUBLESHOOTING CHART - CONTINUED

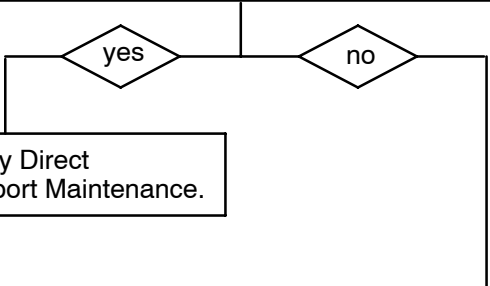
d. ELEVATION SYSTEM - CONTINUED (5) CANNON DRIFTS. Inability to hold in power mode.

INITIAL SETUP  
Tools  
 Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)

**A** 1. Make sure vehicle MASTER power switch is OFF (TM 9-2350-314-10).  
 2. Inspect cab for hydraulic fluid leakage (TM 9-2350-314-10).  
 Does leakage exist?



**B** Inspect cannon mount and elevation cylinder for damage (TM 9-2350-314-10).  
 Is cannon mount or elevation cylinder damaged?



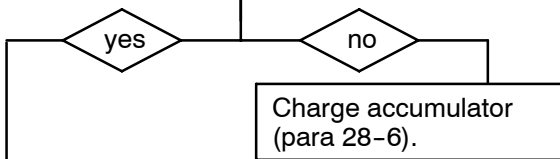
**C** Check accumulator nitrogen pressure (para 28-7).  
 Does nitrogen gage read 1100-1200 psi?

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

d. ELEVATION SYSTEM - CONTINUED (5) CANNON DRIFTS. Inability to hold in power mode. - CONTINUED

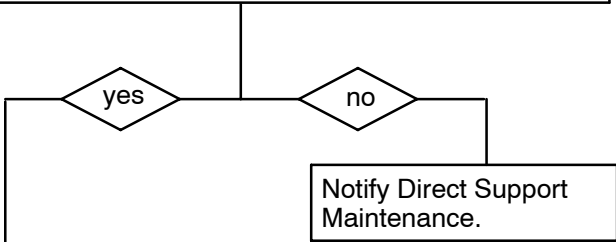
CONTINUED FROM STEP C



**NOTE**

Step D tests for the relief valve opening prematurely. Listen for rushing hydraulic fluid, when cannon reaches minimum elevation, as an indication of a faulty relief valve.

<b>D</b>	<ol style="list-style-type: none"> <li>1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).</li> <li>2. Unlock and lower travel lock (TM 9-2350-314-10).</li> <li>3. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).</li> <li>4. Raise cannon to max elevation.</li> <li>5. Lower cannon at full speed to minimum elevation (see Note above).</li> <li>6. Raise cannon to 533 mils.</li> <li>7. Elevate and depress cannon using manual elevation handle (TM 9-2350-314-10).</li> </ol>
<p>Does cannon elevate and depress with equal force and speed?</p>	



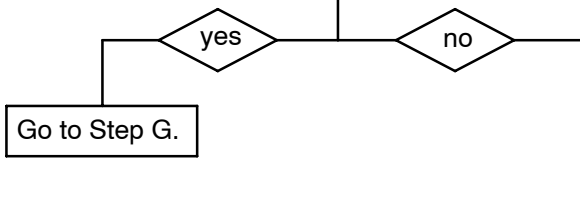
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

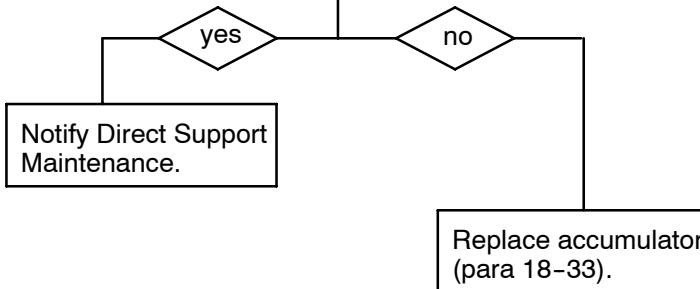
d. ELEVATION SYSTEM - CONTINUED (5) CANNON DRIFTS. Inability to hold in power mode. - CONTINUED

CONTINUED FROM STEP D

<b>E</b>	<ol style="list-style-type: none"> <li>1. Raise cannon to maximum elevation.</li> <li>2. Lower cannon to 800 mils (or 45 deg).</li> <li>3. Turn HYDRAULIC POWER switch OFF. Observe cannon for about 5 minutes.</li> </ol>
Does cannon hold position?	

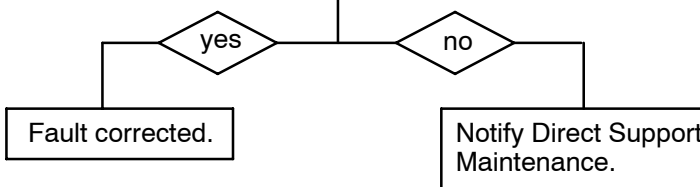


<b>F</b>	Recheck accumulator nitrogen pressure (para 28-7).
Does nitrogen gage read 1100-1200 psi?	



CONTINUED FROM STEP E

<b>G</b>	Turn HYDRAULIC POWER switch ON. Observe cannon for about 5 minutes.
Does cannon hold position?	



**END OF TASK**



### 3-3. TROUBLESHOOTING CHART - CONTINUED

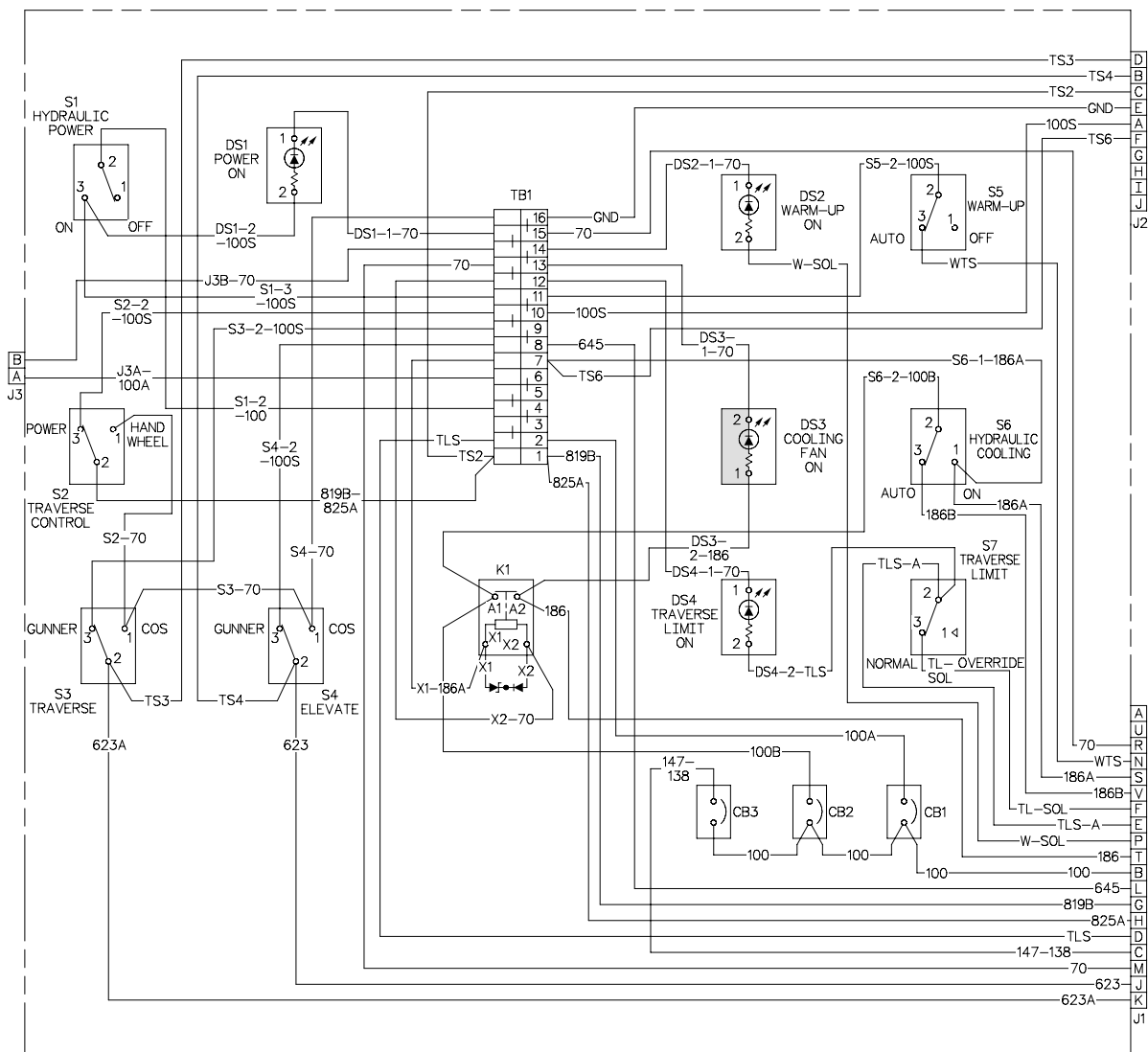
#### e. HYDRAULIC COOLING SYSTEM

The hydraulic cooling system consists of the hydraulic control box, cooling temperature switch, hydraulic cooling fan, and associated wiring.

The schematics that follow show the relationship between the components.

When the MASTER power switch is ON, 24 V dc and ground is supplied through brush block #7 to the hydraulic control box. Ground is also supplied through one side of the current shunt to the hydraulic cooling fan.

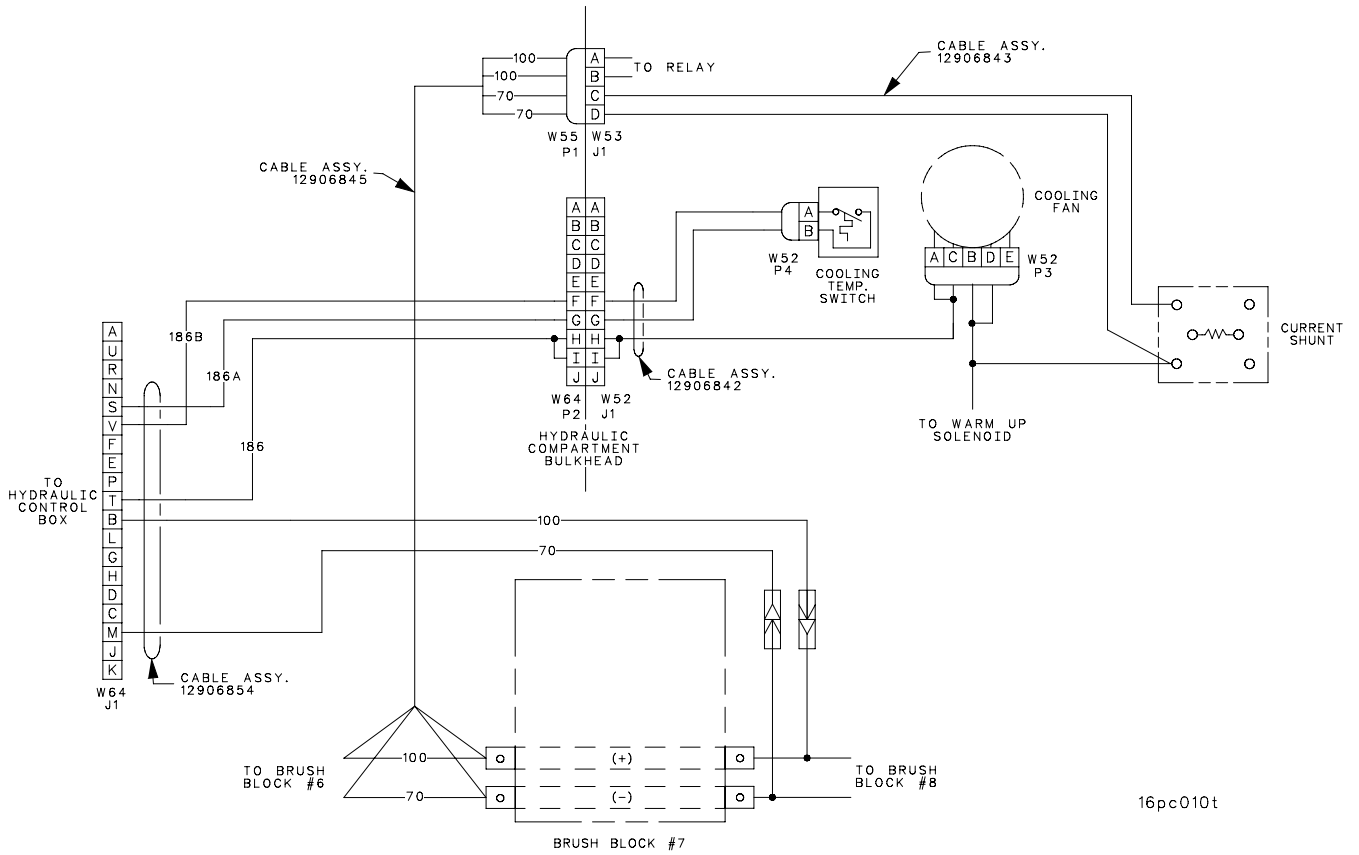
When the hydraulic cooling switch (S6) in the hydraulic control box is set to ON, 24 V dc is supplied to the hydraulic cooling fan to energize it. When S6 is set to AUTO, 24 V dc is supplied to the hydraulic cooling fan only when the temperature of the hydraulic fluid is high enough to close the cooling temperature switch.



16pc001t

# 3-3. TROUBLESHOOTING CHART - CONTINUED

## e. HYDRAULIC COOLING SYSTEM - CONTINUED

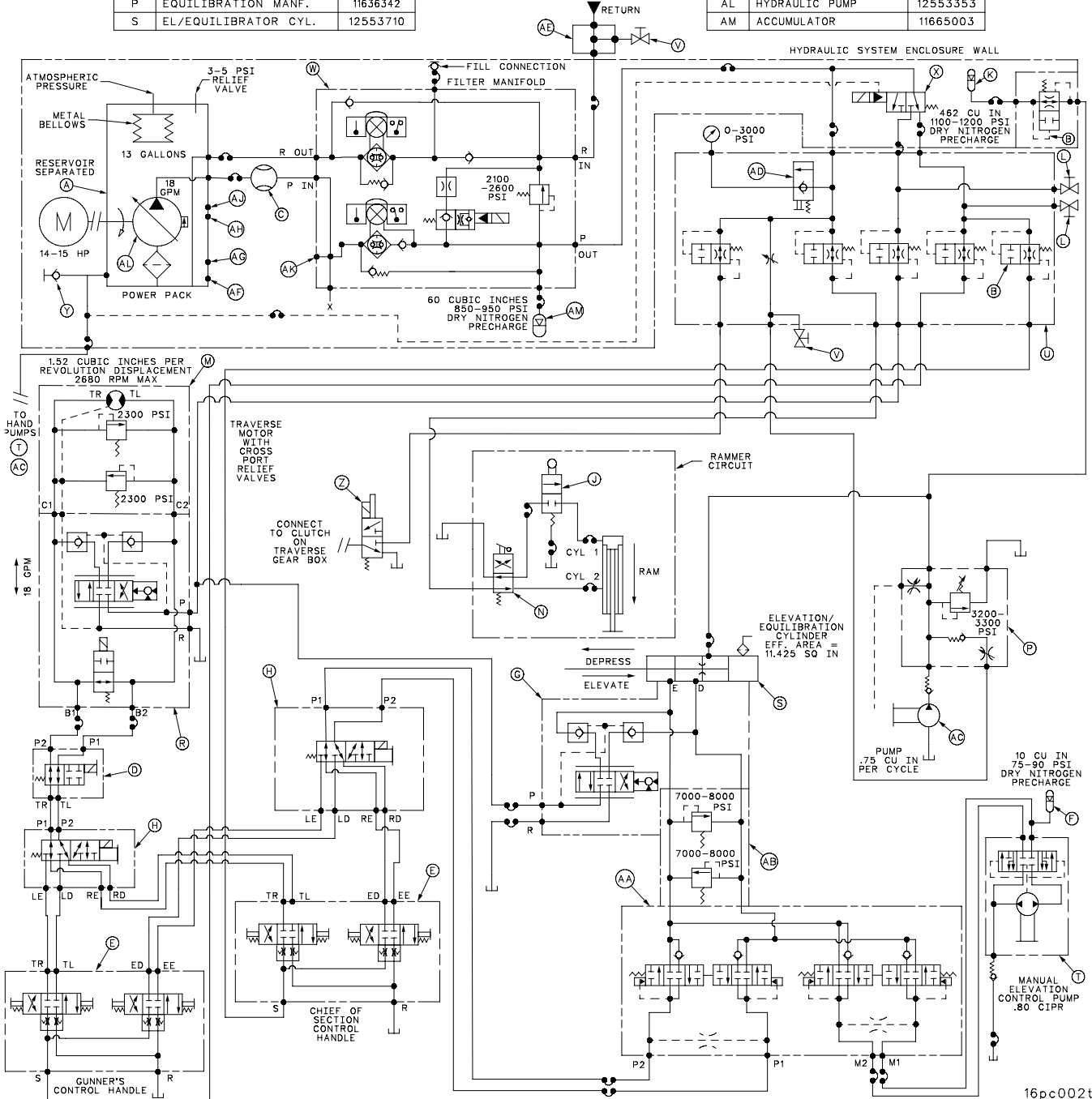


16pc010t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### e. HYDRAULIC COOLING SYSTEM - CONTINUED

ITEM	DESCRIPTION	PART NO.	ITEM	DESCRIPTION	PART NO.	ITEM	DESCRIPTION	PART NO.
A	POWERPACK	12927783	T	EL ASSY., MANUAL	12563247	AD	MANUAL PULL VALVE	12948159
B	VELOCITY FUSE	12553425	U	MANIFOLD, FUSE	12553540	AE	RETURN MANIFOLD	12553564
C	FLOW METER	12562735	V	SAMPLING BLEED VALVE	M81940/1-2	AF	COOLING TEMP. SWITCH	M24236/ 25AGJBA
E	GUNNER'S CONTROL	12927680	W	FILTER ASSY.	12553354	AG	TEMP. TRANSDUCER	12554015
F	ACCUMULATOR	7974982	X	MODE SELECTOR VALVE	12561784	AH	LEVEL SENSOR	12934603
G	EL SERVOVALVE ASSY.	12553898	Y	QUICK DISC. CPL. & HALF	12910614-1	AJ	WARM UP TEMP. SWITCH	M24236/ 2A8DUCS
H	SELECTOR VALVE	12553595	AA	LOCKING VALVE ASSY.	11784023	AK	PRESSURE TRANSDUCER	12554014
K	ACCUMULATOR,EQUILIBRATION	12553726	AB	RELIEF VALVE	9399024	AL	HYDRAULIC PUMP	12553353
L	BLEED VALVE	11783927	AC	EQUILIBRATION HANDPUMP	7382992	AM	ACCUMULATOR	11665003
P	EQUILIBRATION MANF.	11636342						
S	EL/EQUILIBRATOR CYL.	12553710						



16pc002t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

e. HYDRAULIC COOLING SYSTEM - CONTINUED (1) HYDRAULIC COOLING INDICATOR LIGHT DOES NOT COME ON WHEN HYDRAULIC COOLING SWITCH IS IN THE ON POSITION.

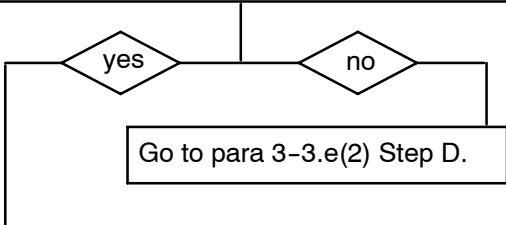
**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A**

1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
2. Turn HYDRAULIC COOLING switch ON (TM 9-2350-314-10).

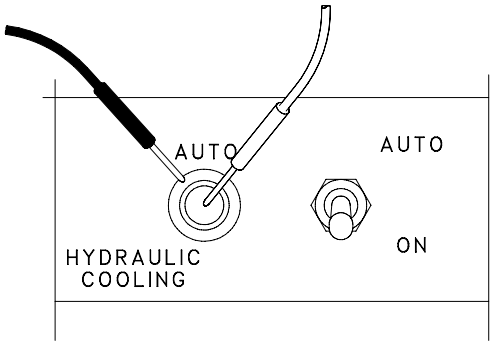
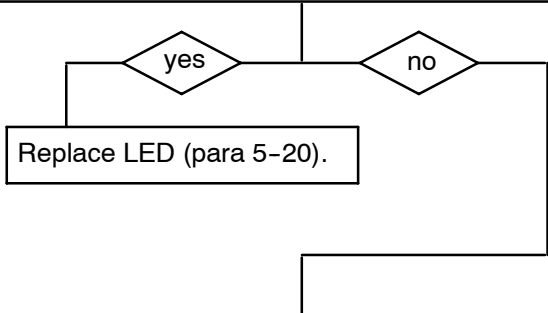
Does hydraulic cooling fan come on?



**B**

1. Turn HYDRAULIC COOLING switch OFF (TM 9-2350-314-10).
2. Turn MASTER power switch OFF (TM 9-2350-314-10).
3. Remove lens and LED from hydraulic cooling indicator light (para 5-20).
4. Turn MASTER power switch ON (TM 9-2350-314-10).
5. Turn HYDRAULIC COOLING switch ON (TM 9-2350-314-10).
6. Check hydraulic cooling indicator light socket for voltage by placing multimeter red lead in center socket of hydraulic cooling indicator light and black lead on socket threads.

Is voltage present?



16pc012t

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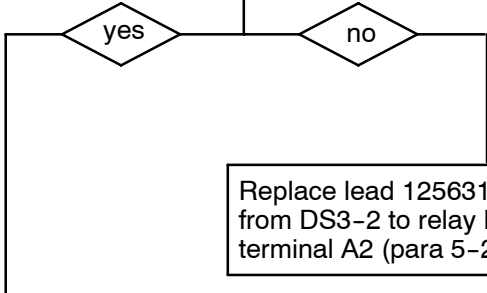
### 3-3. TROUBLESHOOTING CHART - CONTINUED

e. HYDRAULIC COOLING SYSTEM - CONTINUED (1) HYDRAULIC COOLING INDICATOR LIGHT DOES NOT COME ON WHEN HYDRAULIC COOLING SWITCH IS IN THE ON POSITION. - CONTINUED

CONTINUED FROM STEP B

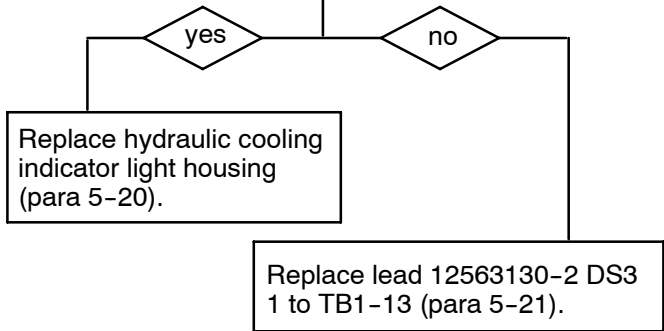
- C**
1. Turn HYDRAULIC COOLING switch OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Remove cover from hydraulic control box (para 5-20).
  4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  5. Turn HYDRAULIC COOLING switch ON (TM 9-2350-314-10).
  6. Check lead 12563130-6 for voltage by placing multimeter red lead on DS3-2 and the black lead to ground.

Is voltage present?

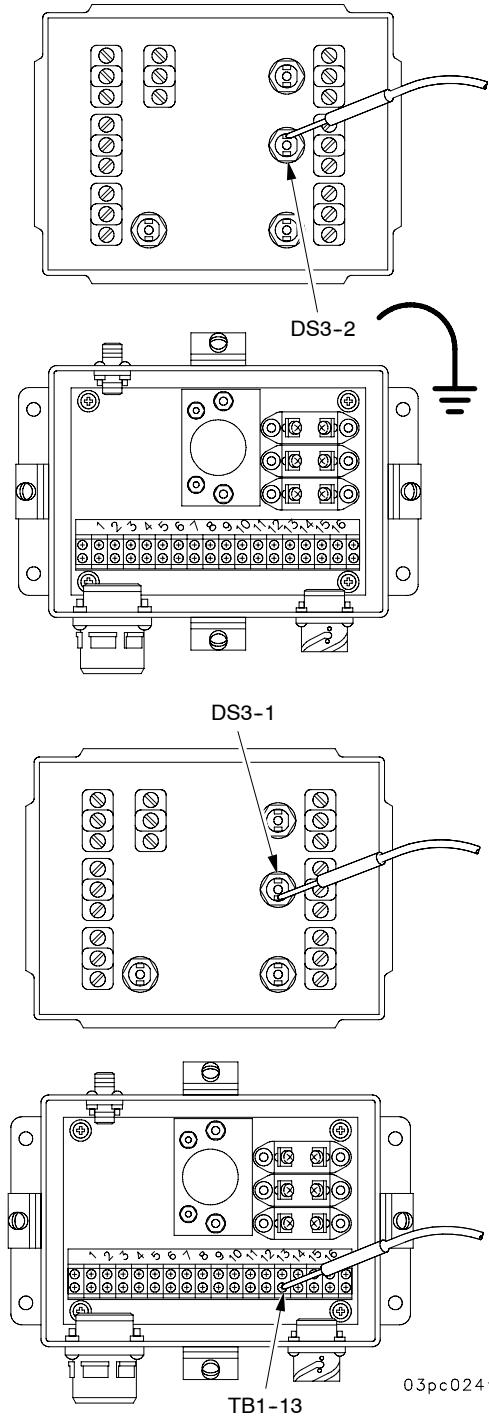


- D**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Check lead 12563130-2 for continuity by placing one multimeter lead on DS3-1 and placing the other lead on terminal board 1 terminal 13 (TB1-13).

Is continuity present?



**END OF TASK**



### 3-3. TROUBLESHOOTING CHART - CONTINUED

e. HYDRAULIC COOLING SYSTEM - CONTINUED	(2) HYDRAULIC COMPARTMENT FAN DOES NOT OPERATE WHEN HYDRAULIC COOLING SWITCH IS IN THE AUTO POSITION AT HIGH RESERVOIR TEMPERATURES.
---	--

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

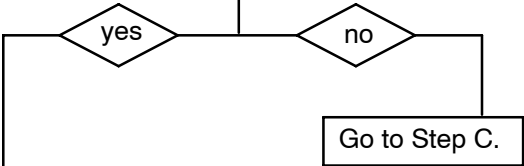
**NOTE**

For vehicles equipped with AFCS, go to Step C.  
 For vehicles equipped with PDFCS, do Step A.

**A** Note results of PDI system tests, and the actual operation of the hydraulic compartment fan.

---

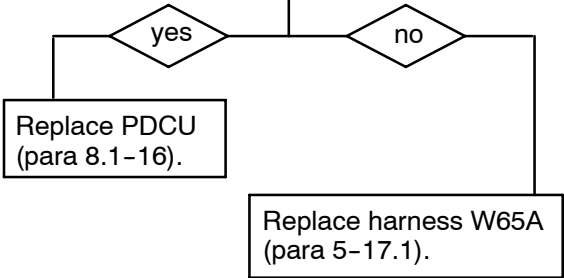
Did the PDI system tests indicate a failure, but the hydraulic compartment fan is working properly?



**B** Do a harness check on harness W65A (para 3-3.n(18.1)).

---

Is harness W65A good?

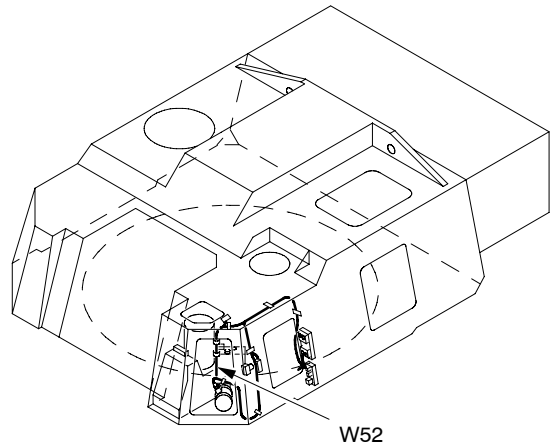
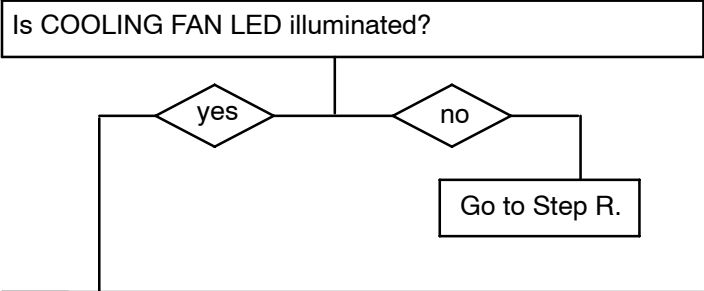


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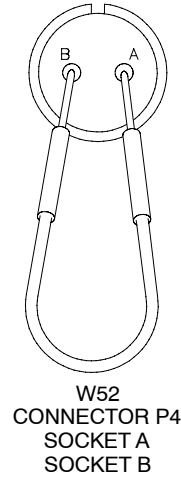
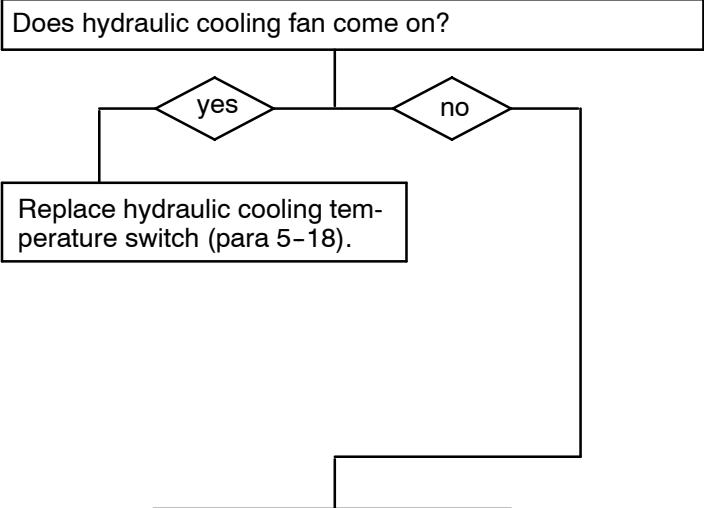
### 3-3. TROUBLESHOOTING CHART - CONTINUED

e. HYDRAULIC COOLING SYSTEM - CONTINUED (2) HYDRAULIC COMPARTMENT FAN DOES NOT OPERATE WHEN HYDRAULIC COOLING SWITCH IS IN THE AUTO POSITION AT HIGH RESERVOIR TEMPERATURES. - CONTINUED

- C**
1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  2. Turn HYDRAULIC COOLING switch ON (TM 9-2350-314-10).
  3. Check that the COOLING FAN LED on the hydraulic control box is illuminated.



- D**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W52 connector P4 from the hydraulic cooling temperature switch.
  3. Place a jumper in harness W52 connector P4 between sockets A and B.
  4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  5. Turn HYDRAULIC COOLING switch to AUTOMATIC (TM 9-2350-314-10).



03pc025t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

e. HYDRAULIC COOLING SYSTEM - CONTINUED (2) HYDRAULIC COMPARTMENT FAN DOES NOT OPERATE WHEN HYDRAULIC COOLING SWITCH IS IN THE AUTO POSITION AT HIGH RESERVOIR TEMPERATURES. - CONTINUED

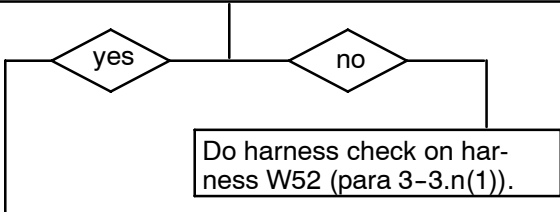
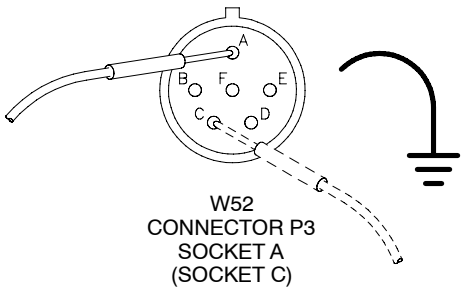
CONTINUED FROM STEP D

**E**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Reconnect harness W52 connector P4 to hydraulic cooling temperature switch.
3. Disconnect harness W52 connector P3 from cooling fan.
4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
5. Place multimeter red lead in harness W52 connector P3 sockets A and C (one at a time) while holding black lead to ground. Check for voltage.

---

Is voltage present?

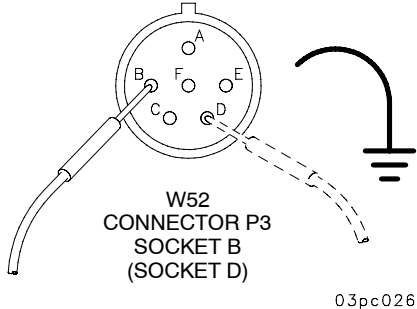


**F**

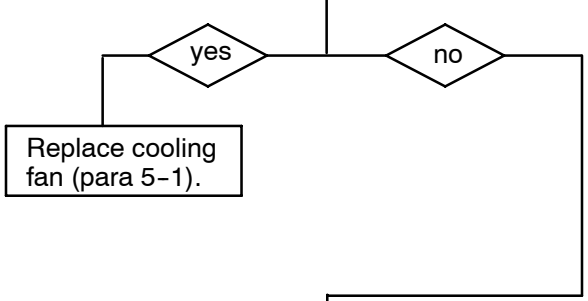
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Place multimeter red lead in harness W52 connector P3 sockets B and D (one at a time) while holding black lead to ground. Check for continuity.

---

Is continuity present?



03pc026t



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

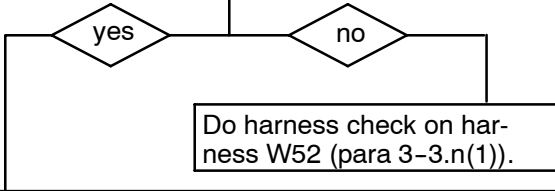
e. HYDRAULIC COOLING SYSTEM - CONTINUED (2) HYDRAULIC COMPARTMENT FAN DOES NOT OPERATE WHEN HYDRAULIC COOLING SWITCH IS IN THE AUTO POSITION AT HIGH RESERVOIR TEMPERATURES. - CONTINUED

CONTINUED FROM STEP F

**G**

1. Connect harness W52 connector P3 to cooling fan.
2. Disconnect harness W64 connector P2 from harness W52 bulkhead connector J1.
3. Check harness W52 for continuity by placing one multimeter lead on harness W52 bulkhead connector J1 pin F and other lead on harness W52 bulkhead connector J1 pin G.

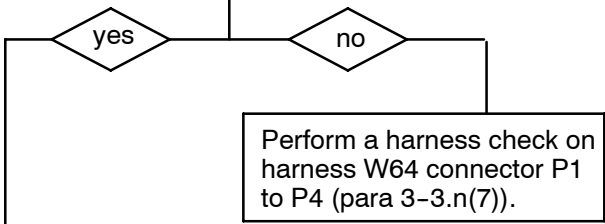
Is continuity present?



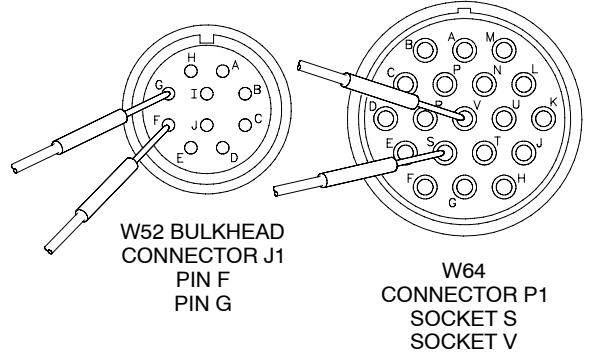
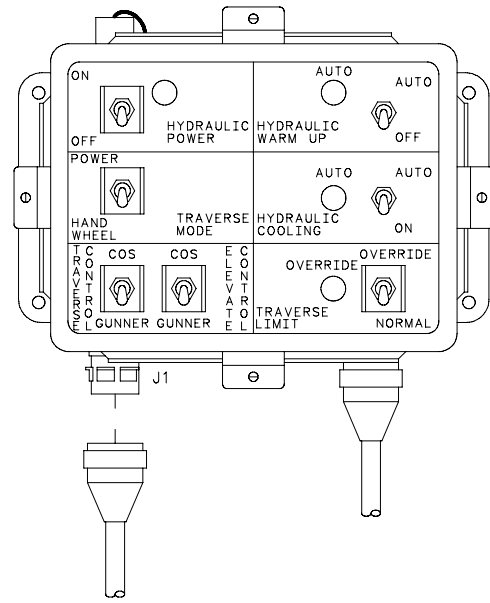
**H**

1. Reconnect harness W64 connector P2 to harness W52 bulkhead connector J1.
2. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
3. Check lead 186 A and B for continuity by placing one multimeter lead in harness W64 connector P1 socket S and other lead in harness W64 connector P1 socket V.

Is continuity present?



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03pc027t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

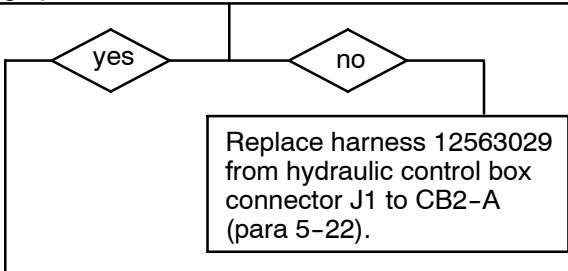
e. HYDRAULIC COOLING SYSTEM - CONTINUED (2) HYDRAULIC COMPARTMENT FAN DOES NOT OPERATE WHEN HYDRAULIC COOLING SWITCH IS IN THE AUTO POSITION AT HIGH RESERVOIR TEMPERATURES. - CONTINUED

CONTINUED FROM STEP H

**I**

1. Reconnect W64 connector P1 to hydraulic control box J1.
2. Remove hydraulic control box cover (para 5-20).
3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
4. Check lead 100 for voltage by placing multimeter red lead on circuit breaker 2 terminal A (CB2-A) and black lead to ground.

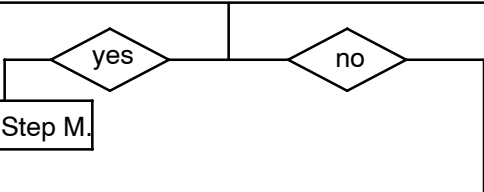
Is voltage present?



**J**

Check lead 100 for voltage by placing multimeter red lead on hydraulic cooling switch terminal 2 (S6-2) and placing the black lead to ground.

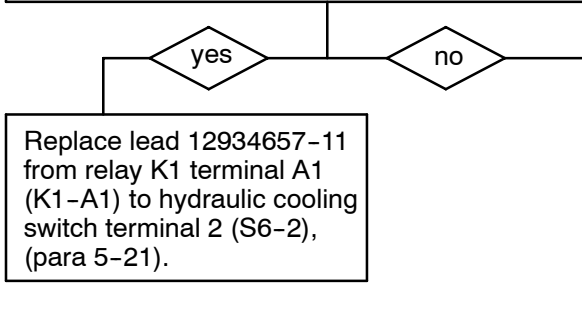
Is voltage present?



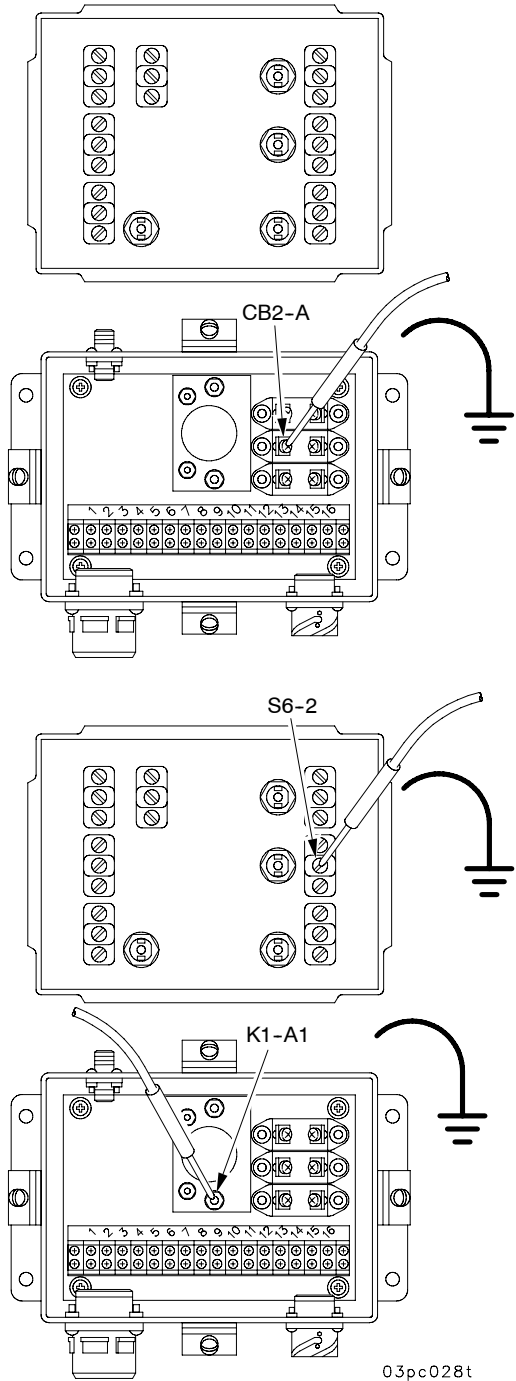
**K**

Check lead 100 for voltage by placing multimeter red lead on relay K1 terminal A1 (K1-A1) and placing the black lead to ground.

Is voltage present?



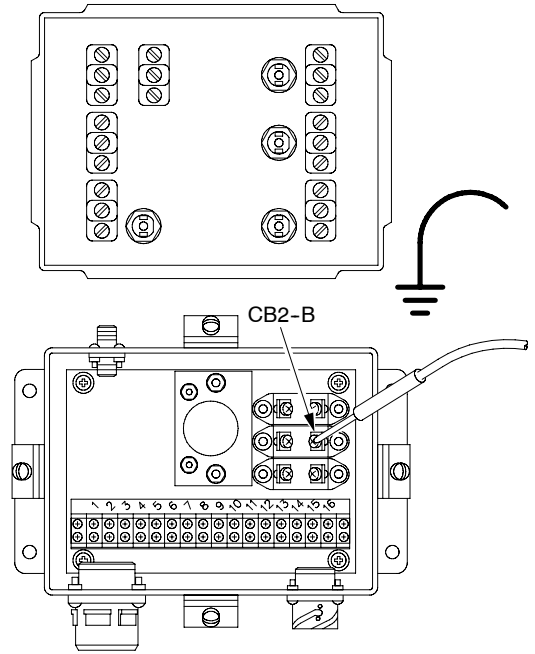
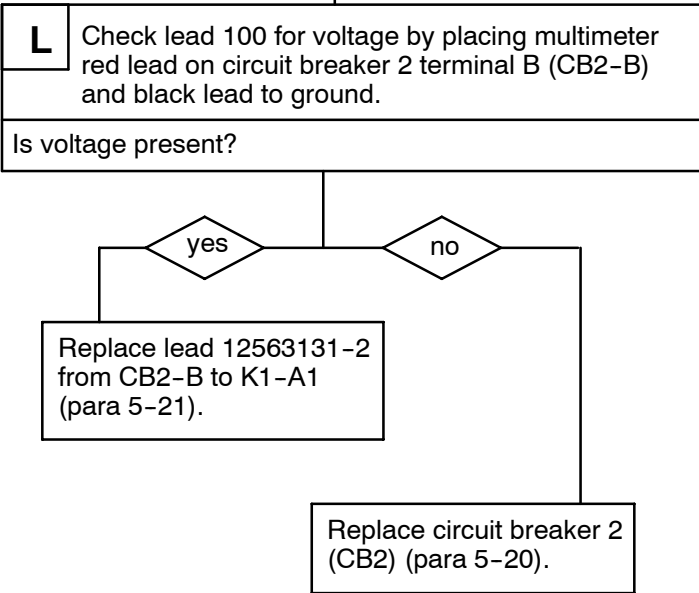
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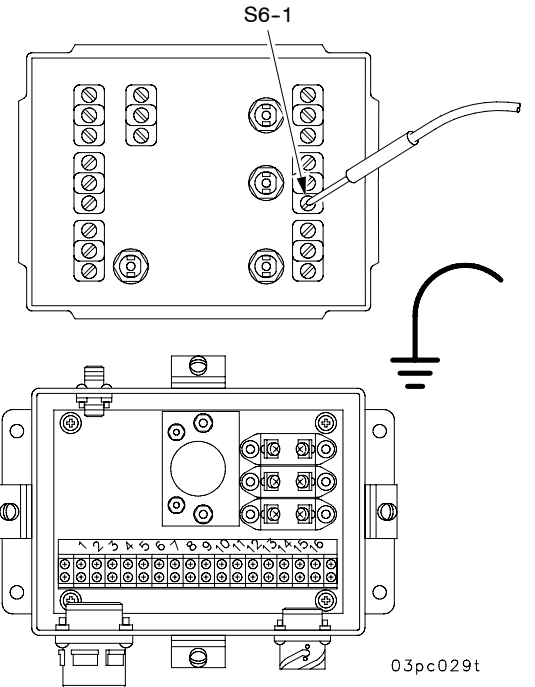
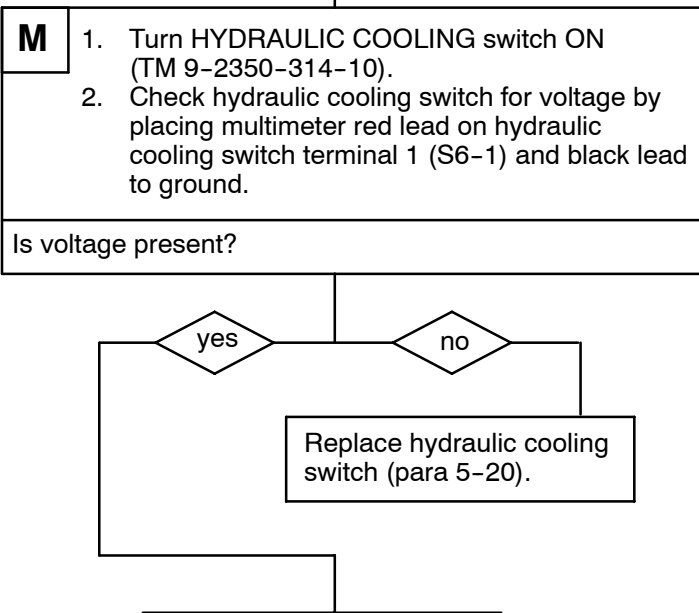
### 3-3. TROUBLESHOOTING CHART - CONTINUED

e. HYDRAULIC COOLING SYSTEM - CONTINUED (2) HYDRAULIC COMPARTMENT FAN DOES NOT OPERATE WHEN HYDRAULIC COOLING SWITCH IS IN THE AUTO POSITION AT HIGH RESERVOIR TEMPERATURES. - CONTINUED

CONTINUED FROM STEP K



CONTINUED FROM STEP J



03pc029t

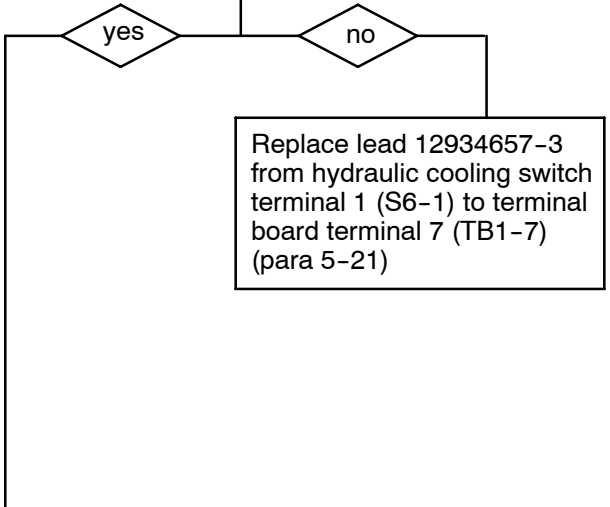
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

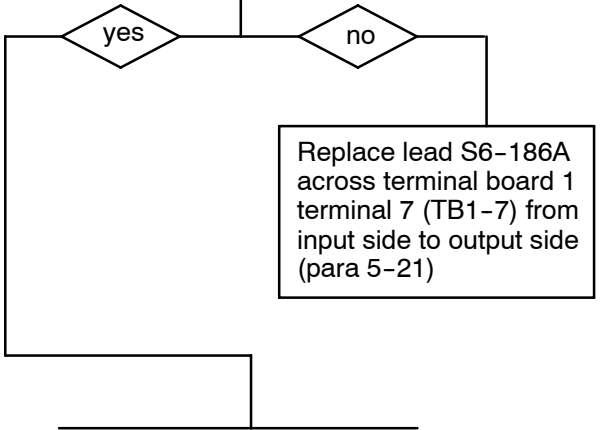
e. HYDRAULIC COOLING SYSTEM - CONTINUED (2) HYDRAULIC COMPARTMENT FAN DOES NOT OPERATE WHEN HYDRAULIC COOLING SWITCH IS IN THE AUTO POSITION AT HIGH RESERVOIR TEMPERATURES. - CONTINUED

CONTINUED FROM STEP M

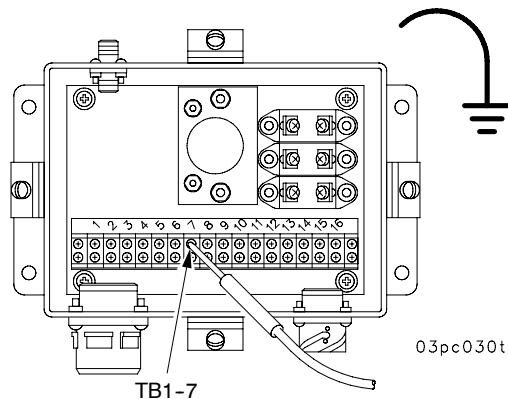
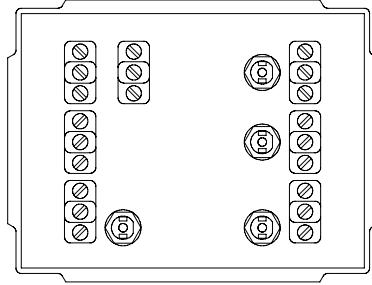
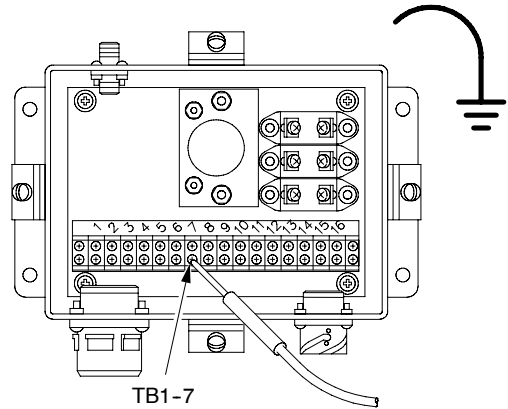
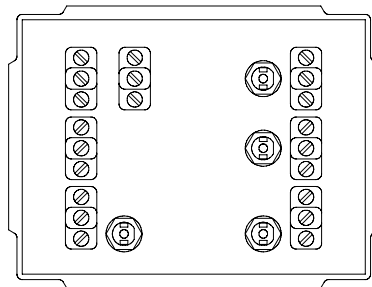
**N** Check for voltage by placing multimeter red lead on terminal board 1 terminal 7 (TB1-7) and black lead to ground.  
Is voltage present?



**O** Check for voltage by placing multimeter red lead on terminal board 1 terminal 7 (TB1-7) output side and black lead to ground.  
Is voltage present?



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03pc030t



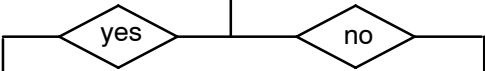
### 3-3. TROUBLESHOOTING CHART - CONTINUED

e. HYDRAULIC COOLING SYSTEM - CONTINUED	(2) HYDRAULIC COMPARTMENT FAN DOES NOT OPERATE WHEN HYDRAULIC COOLING SWITCH IS IN THE AUTO POSITION AT HIGH RESERVOIR TEMPERATURES. - CONTINUED
---	--

CONTINUED FROM STEP O

**P** Check for voltage by placing multimeter red lead on relay K-1 terminal X-1 (K1-X1) and black lead to ground.

Is voltage present?



Replace lead 12934657-10 from terminal board 1 terminal 7 (TB1-7) to K1-X1 (para 5-21).

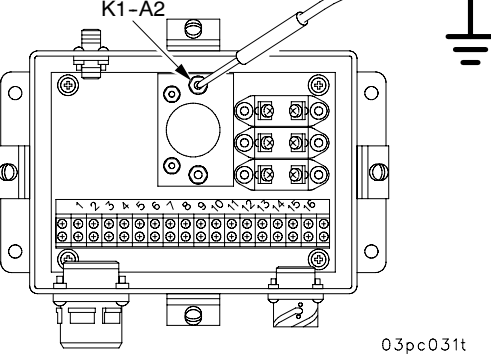
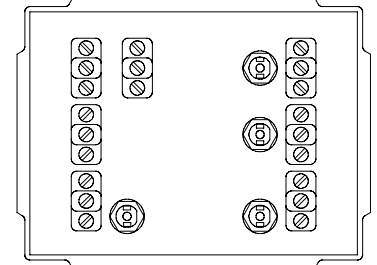
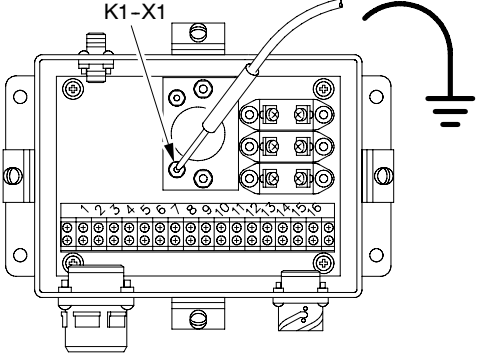
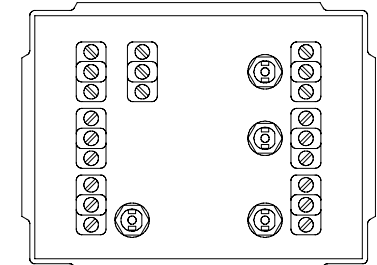
**Q** Check relay K1 for voltage by placing multimeter red lead on relay K1 terminal A2 (K1-A2) and black lead to ground.

Is voltage present?



Repair or replace wire from K1 relay terminal X2 to terminal board 1 terminal 12 (para 5-21).

Replace relay K1 (para 5-20).



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03pc031t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

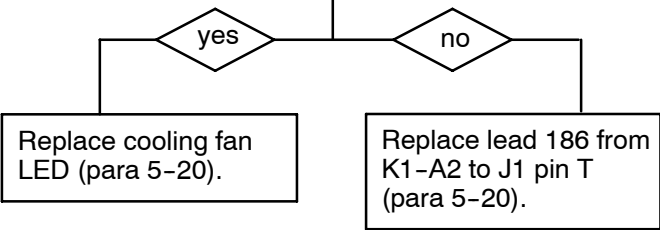
e. HYDRAULIC COOLING SYSTEM - CONTINUED (2) HYDRAULIC COMPARTMENT FAN DOES NOT OPERATE WHEN HYDRAULIC COOLING SWITCH IS IN THE AUTO POSITION AT HIGH RESERVOIR TEMPERATURES. - CONTINUED

CONTINUED FROM STEP C

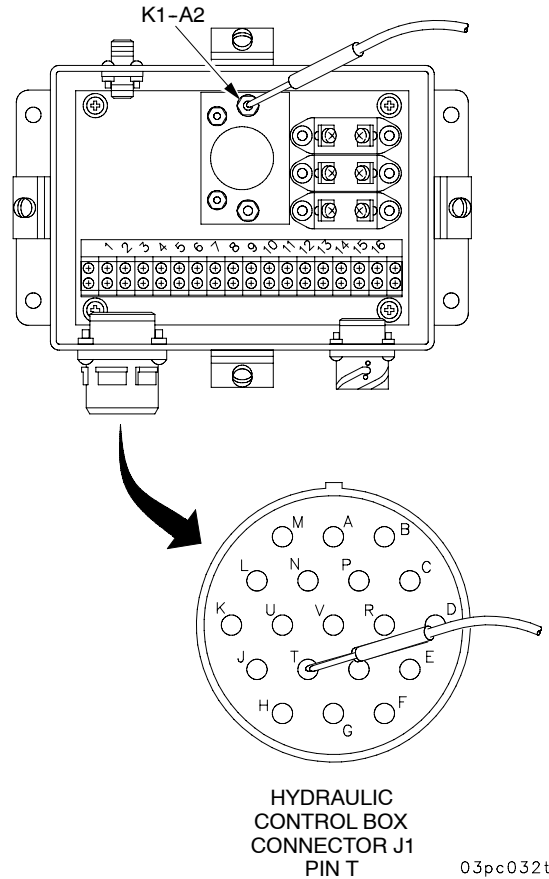
**R**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
3. Check lead 186 for continuity by placing one multimeter lead on relay K1 terminal A2 (K1-A2) and other lead on hydraulic control box connector J1 pin T.

Is continuity present?



**END OF TASK**



03pc032t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### f. HYDRAULIC SYSTEM

The hydraulic system consists of five major subsystems: hydraulic compartment components, traverse components, elevation components, equilibration components, and the loader/rammer components. The diagram on the following pages shows the relationship of these components.

The hydraulic compartment components are used by each of the other four subsystems and consist of the powerpack (hydraulic motor, pump, reservoir, warmup temperature sensor, cooling temperature sensor, level sensor, and temperature transducer), filter assembly, mode selector valve, velocity fuse, equilibration accumulator, and pulse accumulator.

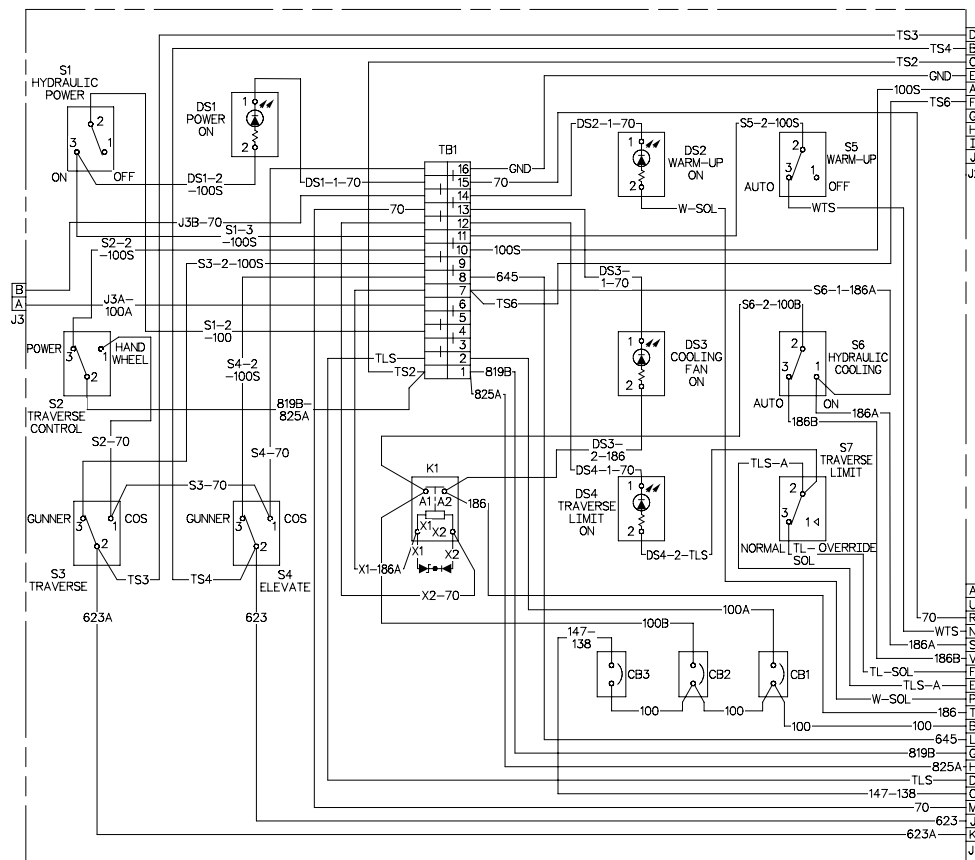
The traverse components are used during a cab traverse and consist of velocity fuses, clutch valve, gunner and COS control handles, traverse selector valve, traverse limit solenoid valve, azimuth servo valve assembly, and hydraulic motor.

The elevation components are used for cannon elevation and consist of velocity fuses, gunner and COS control handles, elevation selector valve, locking valve assembly, relief valves, elevation servo valve assembly, elevation/equilibration cylinder, manual elevation hand pump assembly, and accumulator.

The equilibration components provide a constant rate of cannon elevation/depression and consist of the equilibration hand pump and the equilibration manifold.

The loader/rammer components are used in loading the projectile into the cannon and consist of the velocity fuse, loader/rammer valve, loader valve, and ram cylinder.

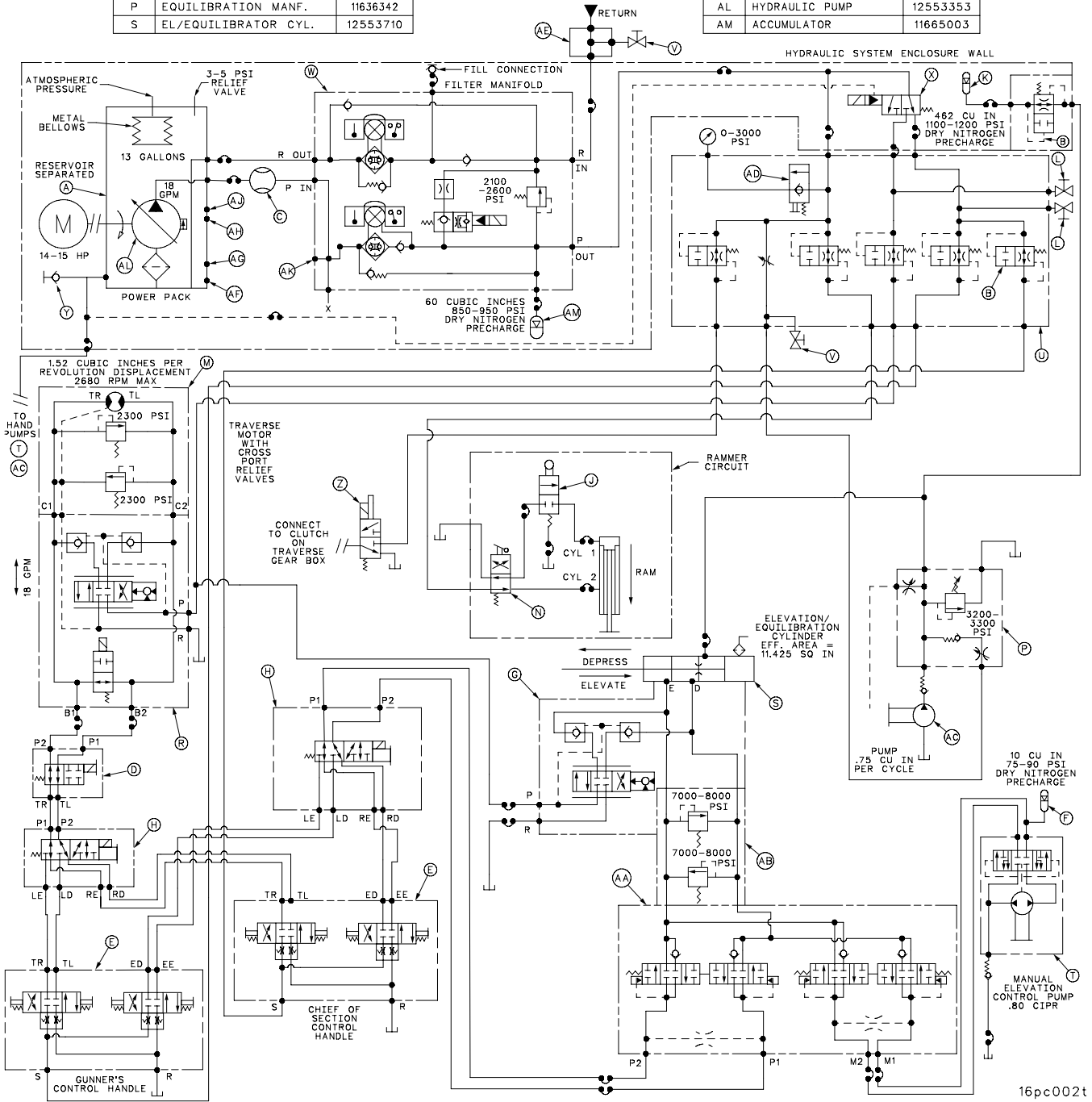
With the MASTER power switch ON, 24 V dc is supplied through the brush blocks to the hydraulic control panel. When HYDRAULIC POWER switch (S1) on the hydraulic control box is ON, 24 V dc is applied to energize the hydraulic motor, which in turn provides hydraulic pressure to the system. The hydraulic system is controlled through the hydraulic control box. The hydraulic control box schematic is shown below.



16pc013t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

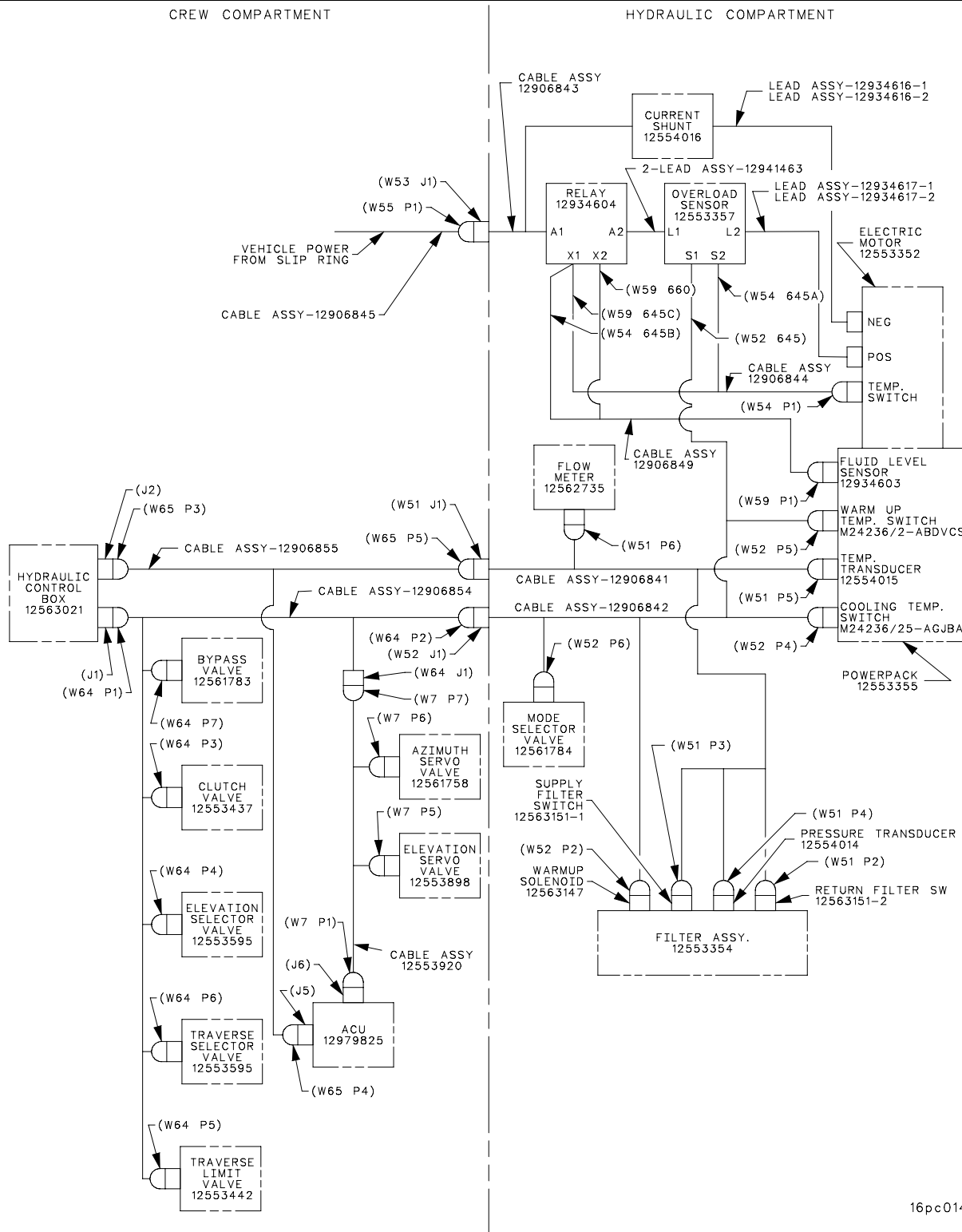
ITEM	DESCRIPTION	PART NO.	ITEM	DESCRIPTION	PART NO.	ITEM	DESCRIPTION	PART NO.
A	POWERPACK	12927783	T	EL ASSY., MANUAL	12563247	AD	MANUAL PULL VALVE	12948159
B	VELOCITY FUSE	12553425	U	MANIFOLD, FUSE	12553540	AE	RETURN MANIFOLD	12553564
C	FLOW METER	12562735	V	SAMPLING BLEED VALVE	M81940/1-2	AF	COOLING TEMP. SWITCH	M24236/ 25AGJBA
E	GUNNER'S CONTROL	12927680	W	FILTER ASSY.	12553354	AG	TEMP. TRANSDUCER	12554015
F	ACCUMULATOR	7974982	X	MODE SELECTOR VALVE	12561784	AH	LEVEL SENSOR	12934603
G	EL SERVOVALVE ASSY.	12553898	Y	QUICK DISC. CPL. & HALF	12910614-1	AJ	WARM UP TEMP. SWITCH	M24236/ 2A8DUCS
H	SELECTOR VALVE	12553595	AA	LOCKING VALVE ASSY.	11784023	AK	PRESSURE TRANSDUCER	12554014
K	ACCUMULATOR,EQUILIBRATION	12553726	AB	RELIEF VALVE	9399024	AL	HYDRAULIC PUMP	12553353
L	BLEED VALVE	11783927	AC	EQUILIBRATION HANDPUMP	7382992	AM	ACCUMULATOR	11665003
P	EQUILIBRATION MANF.	11636342						
S	EL/EQUILIBRATOR CYL.	12553710						



16pc002t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### f. HYDRAULIC SYSTEM - CONTINUED



16pc014t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (1) LOW HYDRAULIC PRESSURE - PRESSURE BELOW 1500 PSI WITH HYDRAULIC PUMP DC MOTOR OPERATING AND NO LOAD ON SYSTEM.

**INITIAL SETUP**

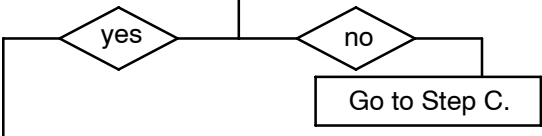
Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

Prior to starting this tree, ensure that the velocity fuse is reset (para 18-46).

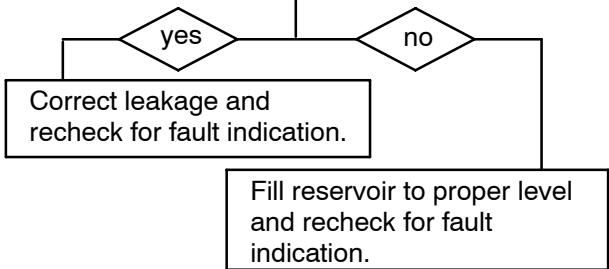
**A** Check hydraulic fluid at reservoir sight gage (TM 9-2350-314-10).

Is hydraulic fluid level low at reservoir sight gage?



**B** Check hydraulic compartment and cab interior for leakage (TM 9-2350-314-10).

Does leakage exist?

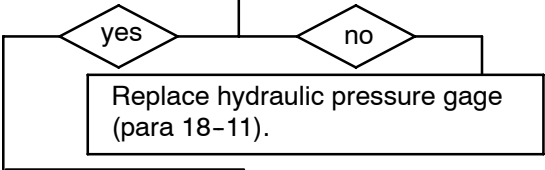


CONTINUED FROM STEP A

**C**

1. Turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
2. Run PDIU system test (TM 9-2350-314-10).

Does PDIU system test show low hydraulic pressure?

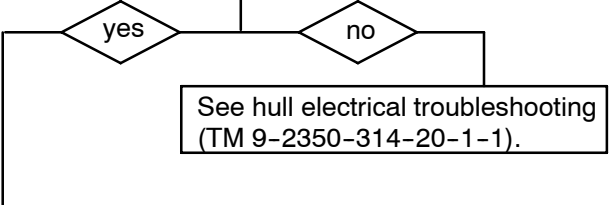


### 3-3. TROUBLESHOOTING CHART - CONTINUED

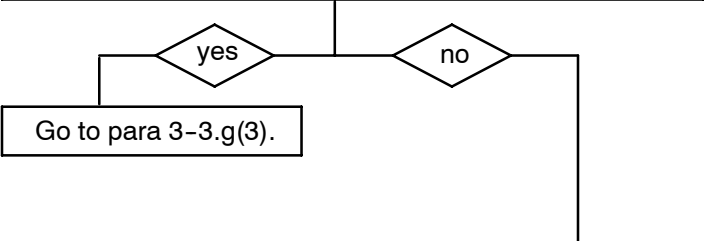
f. HYDRAULIC SYSTEM - CONTINUED (1) LOW HYDRAULIC PRESSURE - PRESSURE BELOW 1500 PSI WITH HYDRAULIC PUMP DC MOTOR OPERATING AND NO LOAD ON SYSTEM. - CONTINUED

CONTINUED FROM STEP C

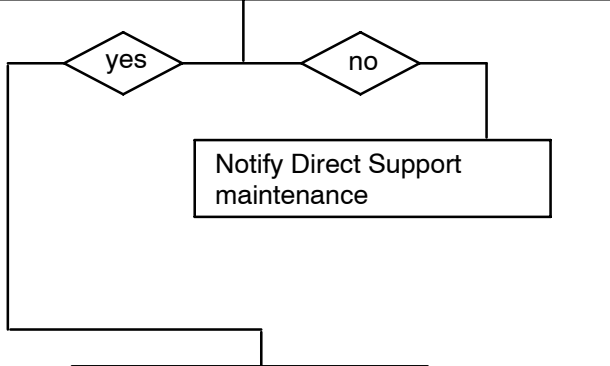
**D** With engine running, observe driver's panel voltmeter battery/generator gage (TM 9-2350-314-10).  
Is driver's panel voltmeter battery/generator in green area 24-30 V dc?



**E** 1. Operate motor for approximately 10 minutes.  
2. Listen for hydraulic warmup solenoid to energize.  
Is hydraulic warmup solenoid energized after 10 minutes?



**F** Listen to hydraulic pump dc motor.  
Is motor turning slowly or making unusual sounds?



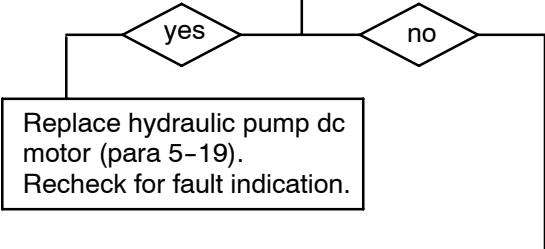
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

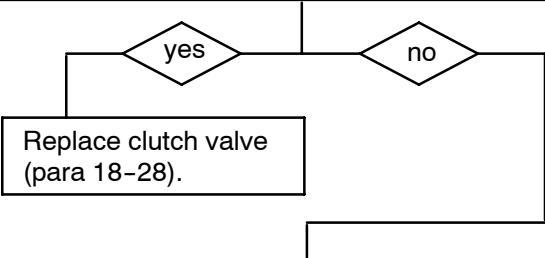
f. HYDRAULIC SYSTEM - CONTINUED (1) LOW HYDRAULIC PRESSURE - PRESSURE BELOW 1500 PSI WITH HYDRAULIC PUMP DC MOTOR OPERATING AND NO LOAD ON SYSTEM. - CONTINUED

CONTINUED FROM STEP F

<b>G</b>	<ol style="list-style-type: none"> <li>1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).</li> <li>2. Bleed pressure at hydraulic fuse manifold (para 18-1).</li> <li>3. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).</li> </ol>
Does motor turn slowly or still make unusual sounds?	



<b>H</b>	<ol style="list-style-type: none"> <li>1. Turn HYDRAULIC POWER, engine, and MASTER power switch OFF (TM 9-2350-314-10).</li> <li>2. Disconnect hydraulic tube from velocity fuse manifold at clutch valve (para 18-3).</li> <li>3. Drain hydraulic tube into suitable container.</li> </ol> <p style="text-align: center;"><b>NOTE</b></p> <p>Velocity fuse should trip immediately. If it doesn't, shut system down immediately.</p> <ol style="list-style-type: none"> <li>4. With tube in container, turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).</li> </ol>
When velocity fuse trips, does hydraulic pressure go above 1500 psi?	



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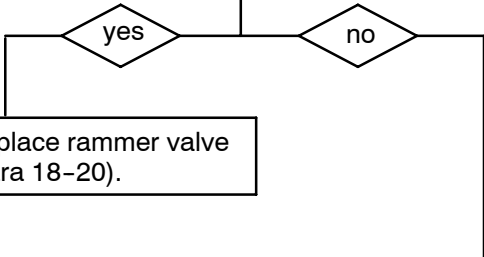
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (1) LOW HYDRAULIC PRESSURE - PRESSURE BELOW 1500 PSI WITH HYDRAULIC PUMP DC MOTOR OPERATING AND NO LOAD ON SYSTEM. - CONTINUED

CONTINUED FROM STEP H

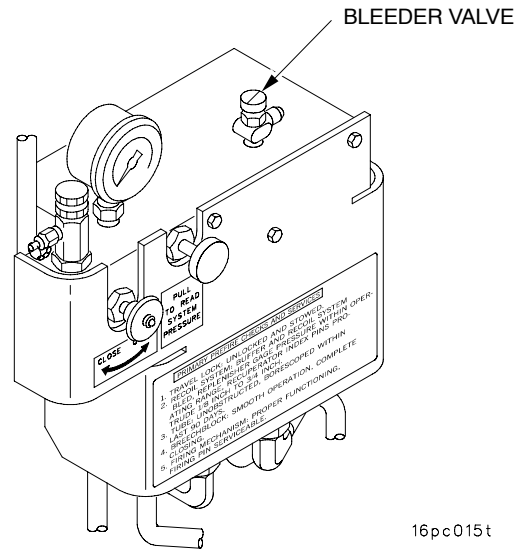
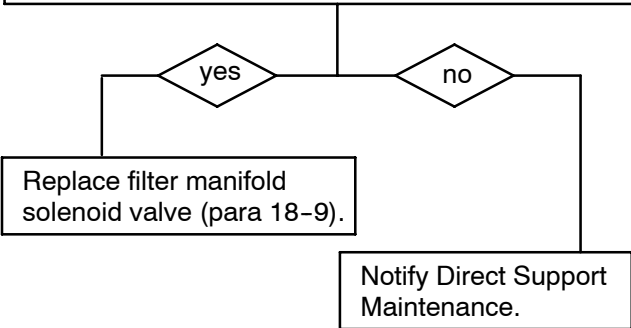
- I**
1. Turn HYDRAULIC POWER, engine, and vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Reconnect hydraulic tube at clutch valve (para 18-3).
  3. Disconnect hydraulic tube from velocity fuse manifold at rammer actuating valve (para 18-42).
  4. Drain hydraulic tube into suitable container.
  5. With tube in container, turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).

When velocity fuse trips, does hydraulic pressure go above 1500 psi?



- J**
1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
  2. Bleed pressure at velocity fuse manifold using bleed valve (para 18-11).
  3. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).

Does gage read above 1500 psi?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

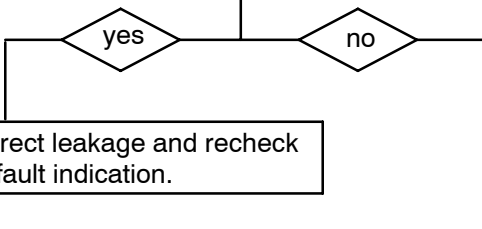
f. HYDRAULIC SYSTEM - CONTINUED (2) NO HYDRAULIC PRESSURE. Hydraulic pump dc motor is operating properly.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

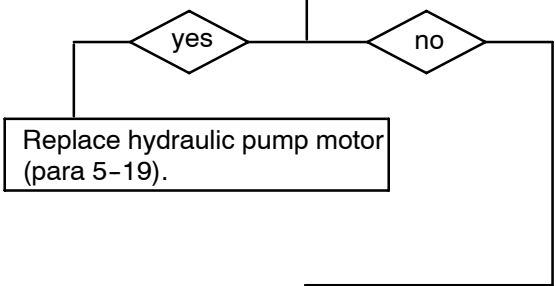
**A** Inspect hydraulic compartment and cab interior for leakage (TM 9-2350-314-10).

Does leakage exist?



**B** 1. Turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).  
 2. Listen to hydraulic pump dc motor operation.

Is hydraulic pump dc motor making unusual sounds?



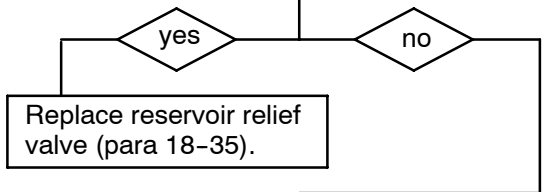
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

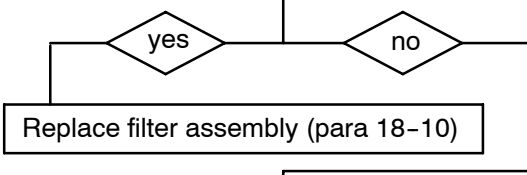
f. HYDRAULIC SYSTEM - CONTINUED (2) NO HYDRAULIC PRESSURE. Hydraulic pump dc motor is operating properly. - CONTINUED

CONTINUED FROM STEP B

<b>C</b>	<ol style="list-style-type: none"> <li>1. Turn HYDRAULIC POWER, engine, and vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>3. Disconnect hydraulic return line at hydraulic reservoir (para 18-15).</li> <li>4. Drain fluid into an appropriate container.</li> <li>5. Reconnect return line to reservoir (para 18-15).</li> <li>6. Turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).</li> <li>7. Turn HYDRAULIC POWER, engine, and vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>8. Disconnect hydraulic return line at hydraulic reservoir (para 18-15).</li> </ol>
Does any fluid drain?	



<b>D</b>	<ol style="list-style-type: none"> <li>1. Reconnect return line to reservoir.</li> <li>2. Disconnect pressure-in line to filter assembly (para 18-10).</li> <li>3. Drain fluid into a suitable container.</li> <li>4. Reconnect pressure-in line (para 18-10).</li> <li>5. Turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).</li> <li>6. Turn engine, vehicle MASTER power switch, and HYDRAULIC POWER switch OFF (TM 9-2350-314-10).</li> <li>7. Disconnect pressure-in line to filter assembly (para 18-10).</li> </ol>
Does any fluid drain?	



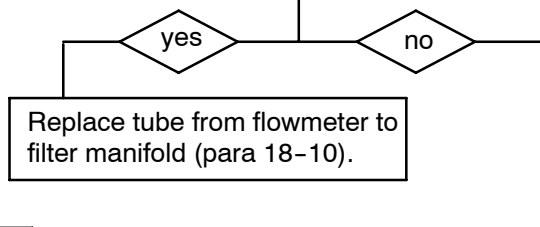
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

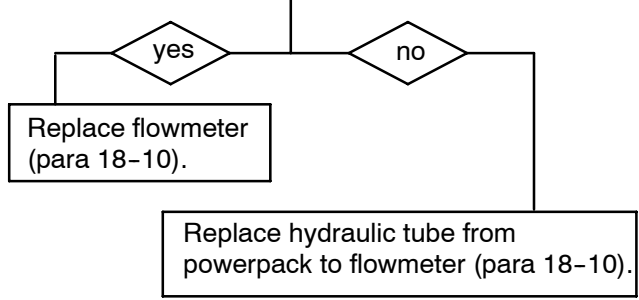
f. HYDRAULIC SYSTEM - CONTINUED (2) NO HYDRAULIC PRESSURE. Hydraulic pump dc motor is operating properly. - CONTINUED

CONTINUED FROM STEP D

<b>E</b>	<ol style="list-style-type: none"> <li>1. Reconnect pressure-in line to filter assembly.</li> <li>2. Disconnect hydraulic tube at flowmeter to filter manifold (para 18-10).</li> <li>3. Drain fluid into a suitable container.</li> <li>4. Reconnect tube at flowmeter (para 18-10).</li> <li>5. Turn vehicle MASTER switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).</li> <li>6. Shut off engine, turn vehicle MASTER power switch OFF, and turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).</li> <li>7. Disconnect tube at flowmeter to filter manifold (para 18-10).</li> </ol>
Does any fluid drain?	



<b>F</b>	<ol style="list-style-type: none"> <li>1. Reconnect tube at flowmeter.</li> <li>2. Disconnect hydraulic tube from hydraulic powerpack at flowmeter (para 18-10).</li> <li>3. Drain fluid into a suitable container.</li> <li>4. Reconnect tube at flowmeter (para 18-10).</li> <li>5. Turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).</li> <li>6. Shut off engine, turn vehicle MASTER power switch OFF, and turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).</li> <li>7. Disconnect tube from powerpack at flowmeter (para 18-15).</li> </ol>
Does any fluid drain?	



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (3) NO CLOGGED FILTER INDICATION ON DISPLAY UNIT. Mechanical return or supply clogged filter indication is present.

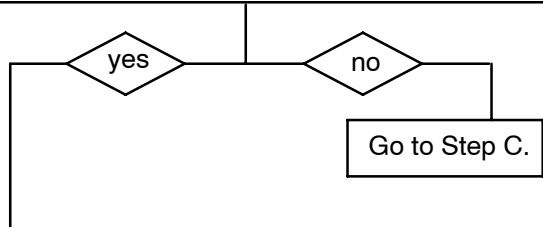
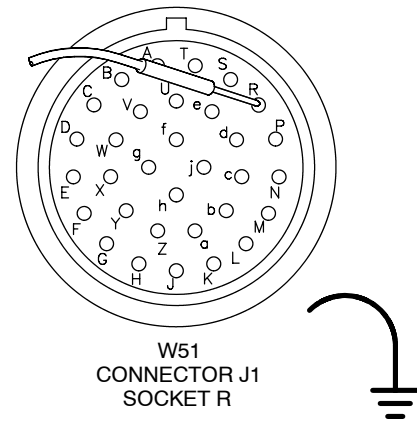
**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A**

1. Disconnect harness W65 (AFCS) or W65A (PDFCS) connector P5 from harness W51 connector J1.
2. Check harness W51 for voltage by placing multimeter red lead in harness W51 connector J1 socket R and place the black lead to ground.
3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
4. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).

Does AFCS/PDFCS WARNING MESSAGE MENU indicate high hydraulic temperature?

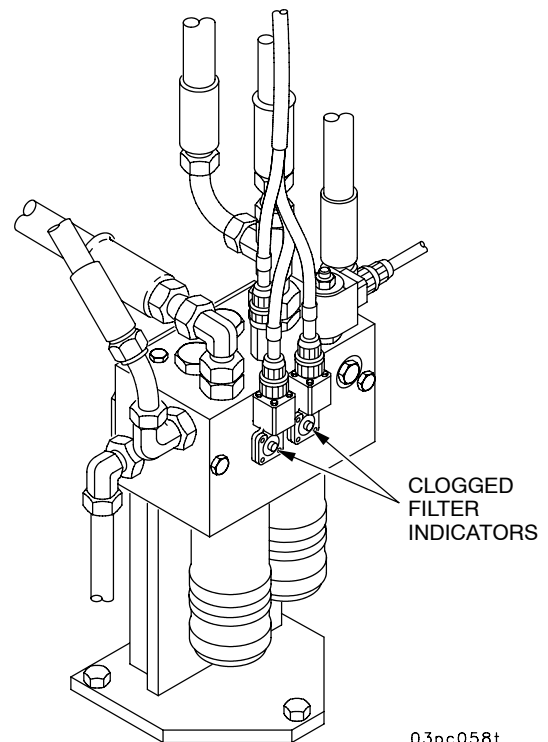


**B** Perform a harness check on harness W51 (para 3-3.n(20)).

Is harness W51 good?

yes: Notify Direct Support Maintenance.

no: Replace harness W51 (para 5-36).

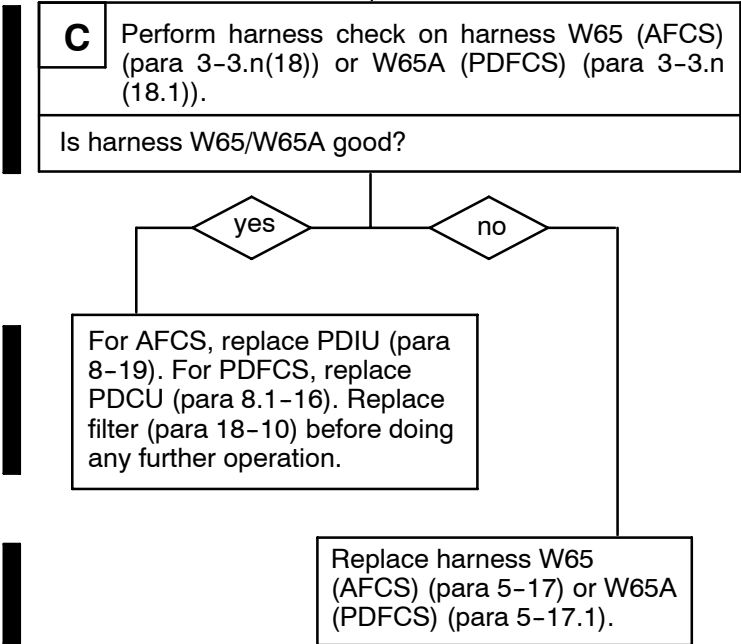


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### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (3) NO CLOGGED FILTER INDICATION ON DISPLAY UNIT. Mechanical return or supply clogged filter indication is present. - CONTINUED

CONTINUED FROM STEP A



END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

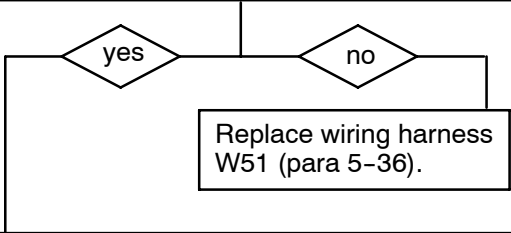
f. HYDRAULIC SYSTEM - CONTINUED (4) FLOWMETER/HARNESS WARNING.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

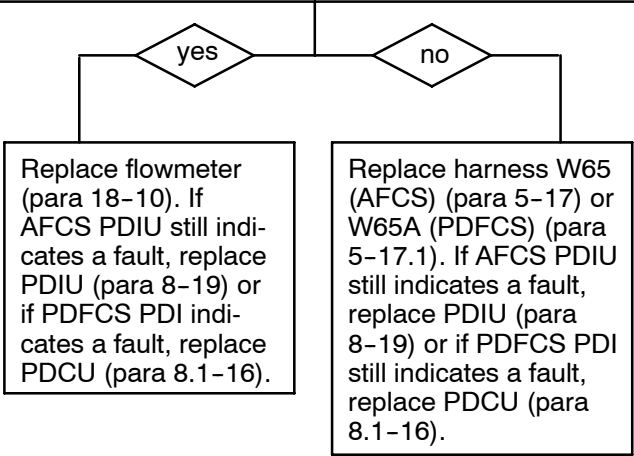
**A** Perform a harness check on harness W51 between connectors J1 and P6 (para 3-3.n(20)).

Is harness W51 good?



**B** Perform a harness check on harness W65 (AFCS) (para 3-3.n(18)) or W65A (PDFCS) (para 3-3.n(18.1)) connector P5 sockets E, F, and G).

Is harness W65 good?



**END OF TASK**

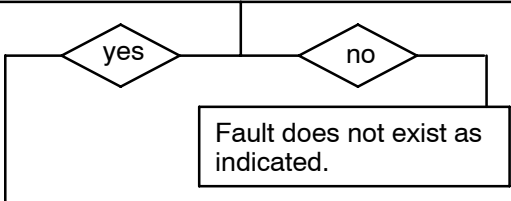
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (5) CLOGGED HYDRAULIC FILTER. No mechanical indication.

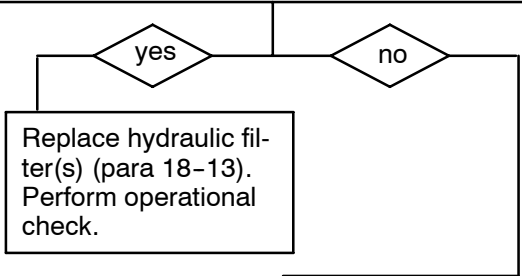
INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

- A**
1. Turn TRAVERSE AND ELEVATION switches to the GUNNER position (TM 9-2350-314-10).
  2. Remove access cover to hydraulic filters (para 24-2).
  3. Turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  4. Exercise cannon (TM 9-2350-314-10).
  5. Bring hydraulic oil to operating temperature.
  6. Check AFCS/PDFCS WARNING MESSAGE MENU.
- Does AFCS/PDFCS WARNING MESSAGE MENU indicate a clogged hydraulic filter?



- B** Check hydraulic filter pop-out indicators (para 18-13).
- Are any indicators popped out?



CONTINUED ON NEXT PAGE



### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (5) CLOGGED HYDRAULIC FILTER. No mechanical indication. - CONTINUED

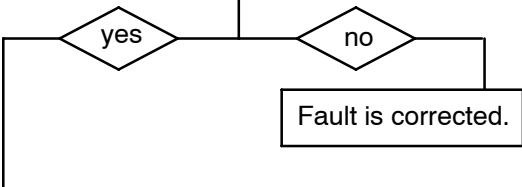
CONTINUED FROM STEP B

**C**

1. Check harness W51 for loose connectors. Tighten as necessary (TM 9-2350-314-10).
2. Perform a system operational check (TM 9-2350-314-10).

---

Is fault message still present?

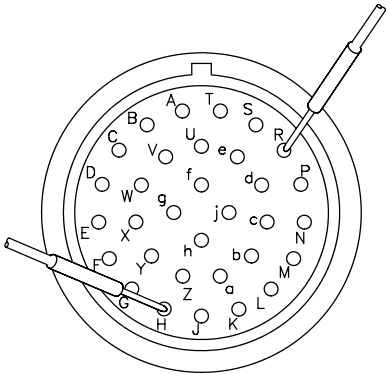
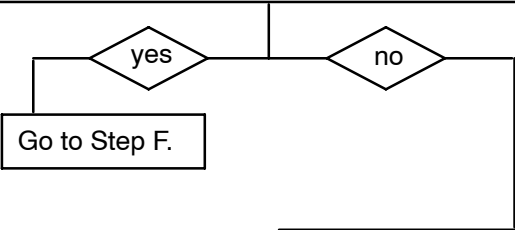


**D**

1. Turn HYDRAULIC POWER switch OFF and shut engine off (TM 9-2350-314-10).
2. Turn the vehicle MASTER power switch OFF (TM 9-2350-314-10).
3. Disconnect harness W65 (AFCS)/W65A (PDFCS) connector P5 from harness W51 connector J1.
4. Check harness W51 for continuity by placing one multimeter lead in harness W51 connector J1 socket R and by placing the other lead in harness W51 connector J1 socket H.

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Is continuity present?



W51  
CONNECTOR J1  
SOCKET R  
SOCKET H

03pc059t

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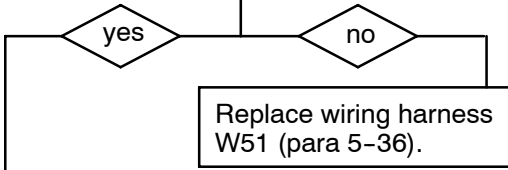
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (5) CLOGGED HYDRAULIC FILTER. No mechanical indication. - CONTINUED

CONTINUED FROM STEP D

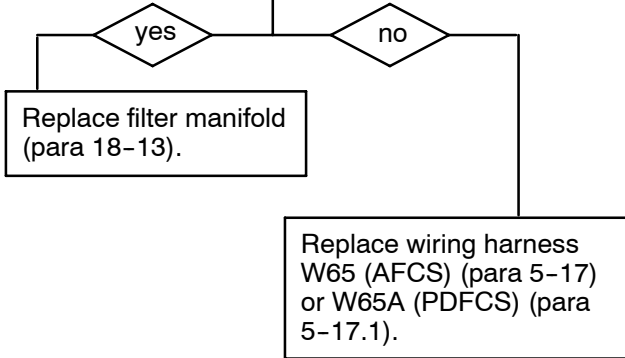
**E** Perform a harness test on harness W51 connectors J1 to P2, J1 to P3 and J1 to P2 (para 3-3.n(20)).

Is harness W51 good?



**F** Perform a harness test on harness W65 (AFCS) connectors P1 and P5 (para 3-3.n(18)) or W65A (PDFCS) connectors P4 and P5 (para 3-3.n(18.1)).

Is harness W65/W65A good?



END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

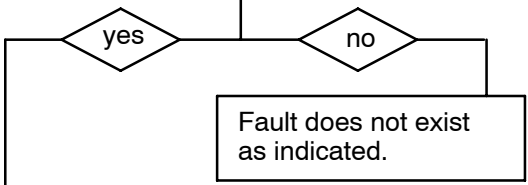
f. HYDRAULIC SYSTEM - CONTINUED (6) DISPLAY UNIT (DU) DISPLAYS HYDRAULIC TEMPERATURE GREATER THAN 200°F. Hydraulic cooling fan not operating.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

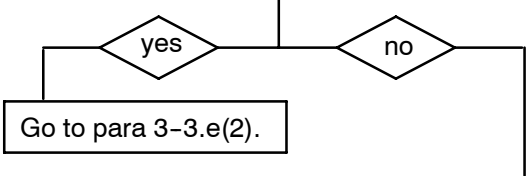
- A**
1. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  2. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  3. Check AFCS WARNING MESSAGE MENU (TM 9-2350-314-10).

Does AFCS/PDFCS WARNING MESSAGE MENU indicate high hydraulic temperature?



- B** Check hydraulic reservoir fluid temperature gage (TM 9-2350-314-10).

Is temperature greater than 200° F?



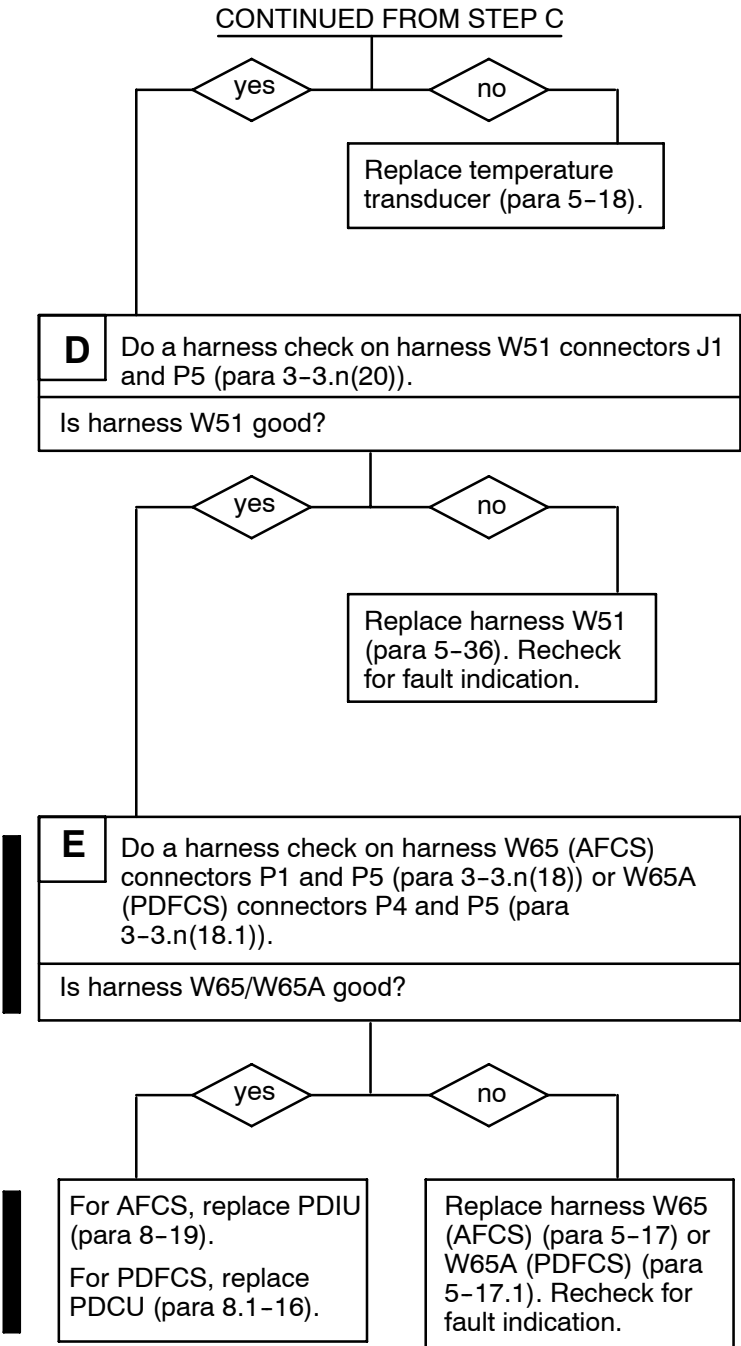
- C**
1. Disconnect harness W51 connector P5 from the temperature transducer.
  2. Check display unit.

Is high temperature warning still on display?

CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (6) DISPLAY UNIT (DU) DISPLAYS HYDRAULIC TEMPERATURE GREATER THAN 200°F. Hydraulic cooling fan not operating. - CONTINUED



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

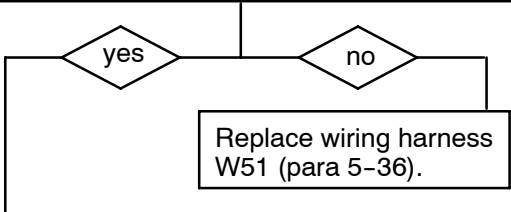
f. HYDRAULIC SYSTEM - CONTINUED (7) PRESSURE SENSOR/TEST HARNESS PROBLEM DISPLAYED ON DISPLAY UNIT.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

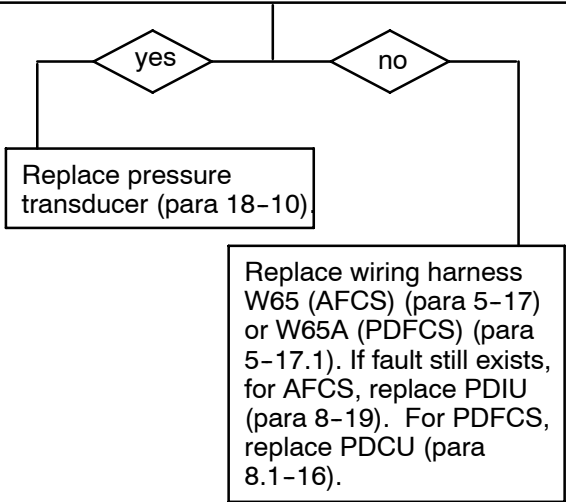
**A** Perform a harness check on harness W51 connectors J1 and P4 (para 3-3.n(20)).

Is harness W51 good?



**B** Perform a harness check on harness W65 (AFCS) connectors P1 and P5 (para 3-3.n(18)) or W65A (PDFCS) connectors P4 and P5 (para 3-3.n(18.1)).

Is harness W65/W65A good?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (8) LOW RESERVOIR FLUID LEVEL ON DISPLAY UNIT.

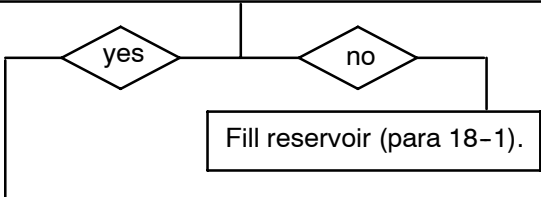
**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

Equipment Conditions  
 Hydraulic pump motor circuit breaker cover removed (para 5-6)

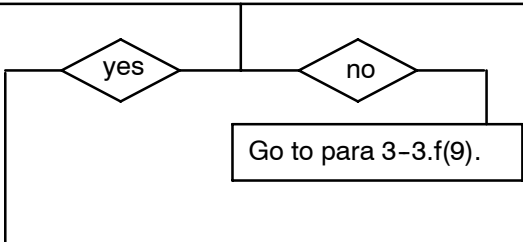
**A** Check hydraulic fluid level gage on hydraulic reservoir (TM 9-2350-314-10).

Is gage sight glass full?



**B** Perform an operational check on the cab hydraulic system (TM 9-2350-314-10).

Does hydraulic pump dc motor operate?

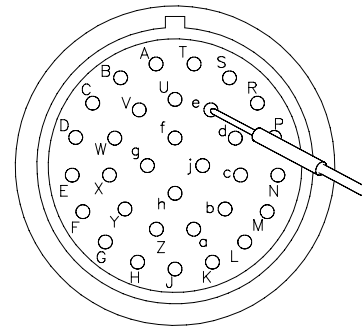


**C**

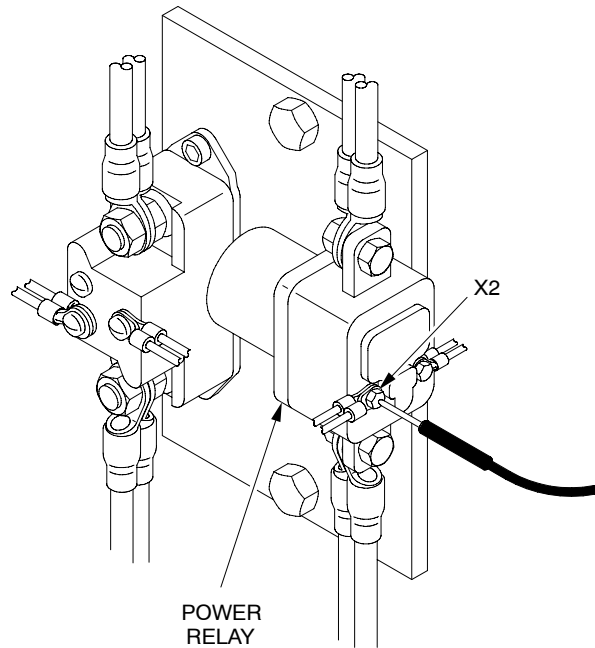
1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
3. Disconnect harness W65 connector P5 from bulkhead connector.
4. Check harness W51 for continuity by placing one multimeter lead on harness W51 connector J1 socket e and placing the other multimeter lead on power relay terminal X2 lead 775.

Is continuity present?

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W51  
CONNECTOR J1  
SOCKET e

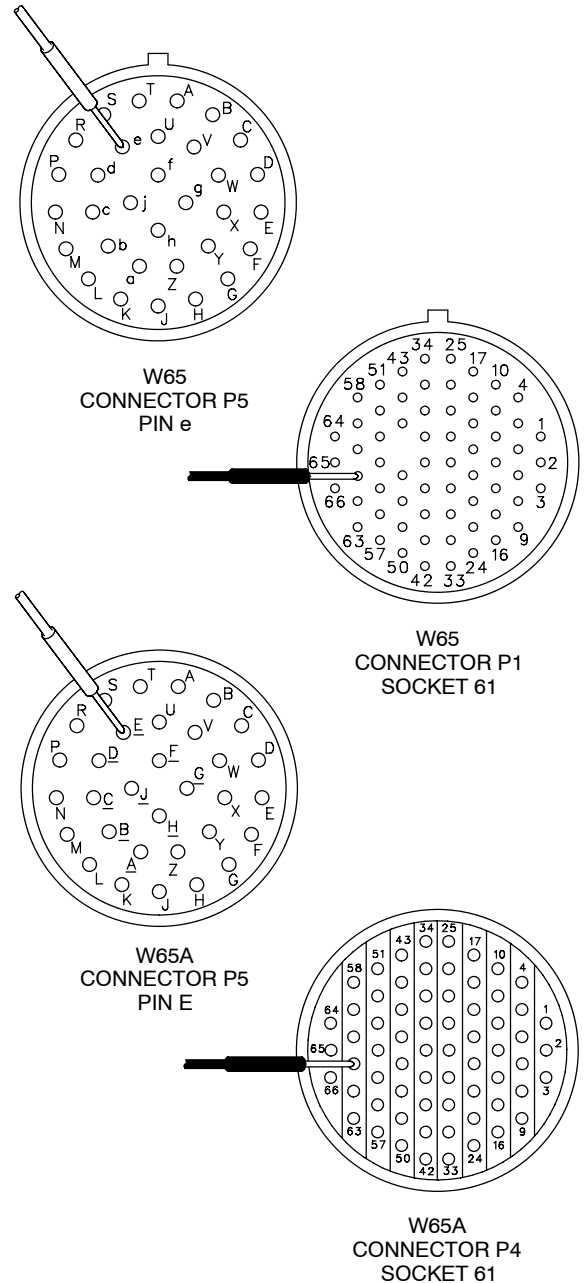
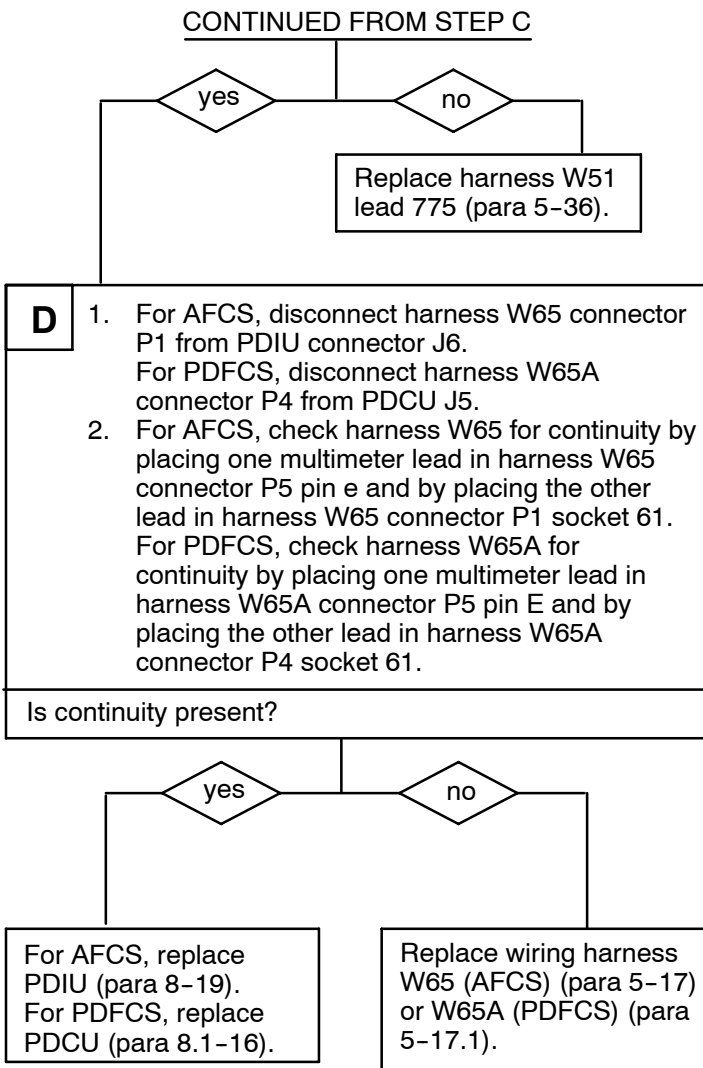


POWER  
RELAY

03pc060t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (8) LOW RESERVOIR FLUID LEVEL ON DISPLAY UNIT. - CONTINUED



**END OF TASK**

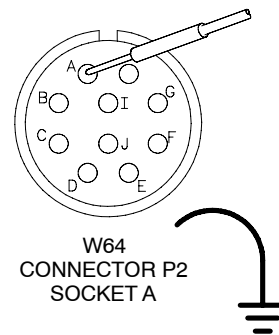
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON.

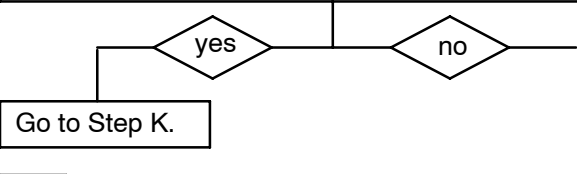
<p><b>INITIAL SETUP</b></p> <p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Conditions</u>                  Hydraulic pump motor circuit breaker cover removed (para 5-6)</p>
---	---

- A**

  1. Turn HYDRAULIC POWER switch and vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W64 connector P2 from bulkhead connector.
  3. Turn vehicle MASTER power switch and HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  4. Check harness W64 for voltage by placing multimeter red lead in harness W64 connector P2 socket A and placing the black lead to ground.

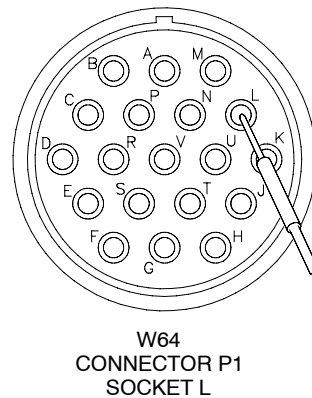


Is voltage present?

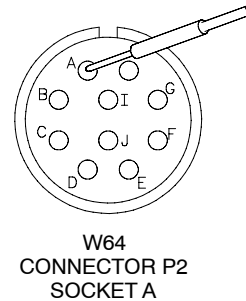
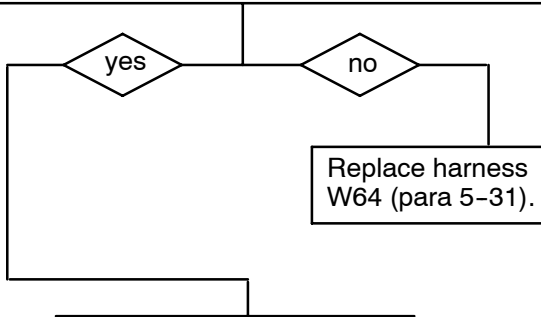


- B**

  1. Turn HYDRAULIC POWER switch and vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
  3. Place one multimeter lead in harness W64 connector P1 socket L and other lead in harness W64 connector P2 socket A.
  4. Check for continuity.



Is continuity present?



03pc062t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

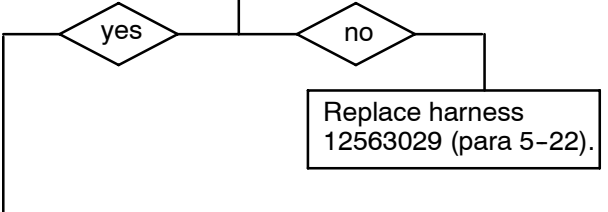
f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON. - CONTINUED

CONTINUED FROM STEP B

**C**

1. Open hydraulic control box.
2. Place one multimeter lead on hydraulic control box connector J1 pin L and other lead on terminal board 1 terminal 8.
3. Check for continuity.

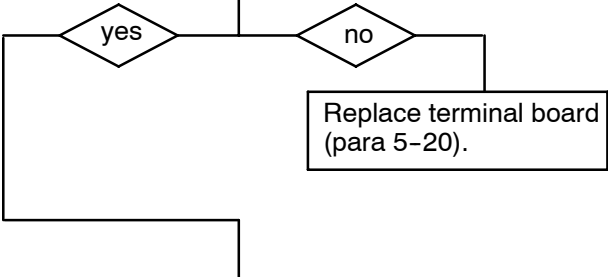
Is continuity present?



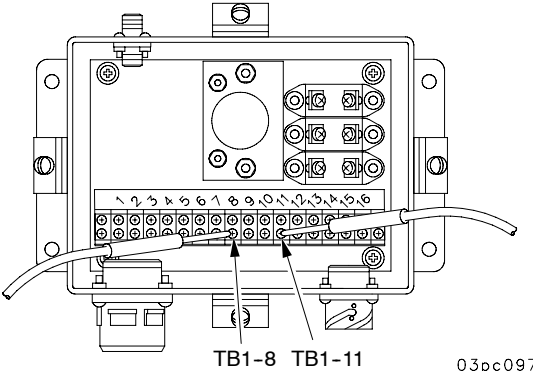
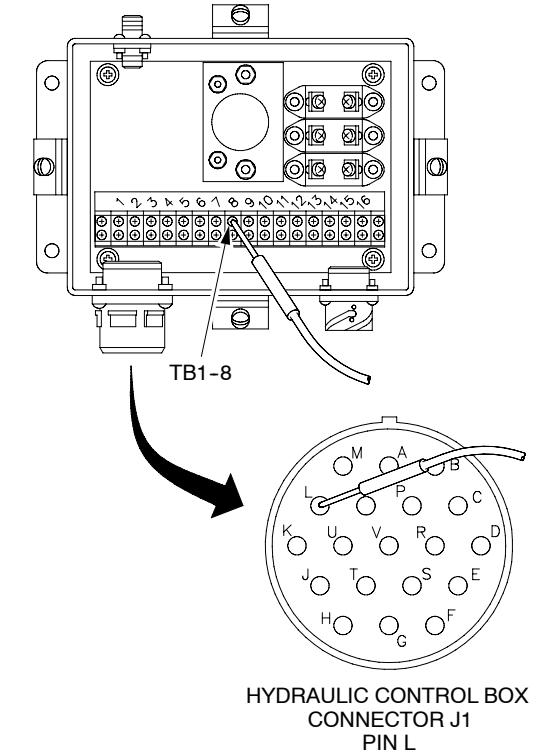
**D**

Check terminal board 1 for continuity by placing one multimeter lead on terminal board 1 terminal 11 (TB1-11) and placing the other lead on terminal board 1 terminal 8 (TB1-8).

Is continuity present?



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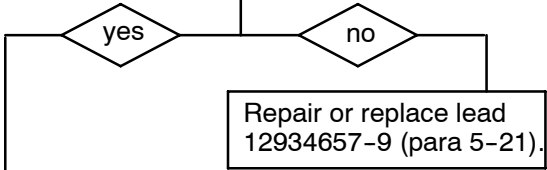
03pc097t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

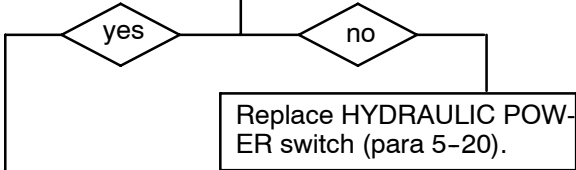
f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON. - CONTINUED

CONTINUED FROM STEP D

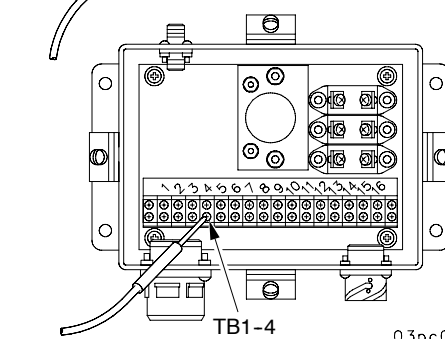
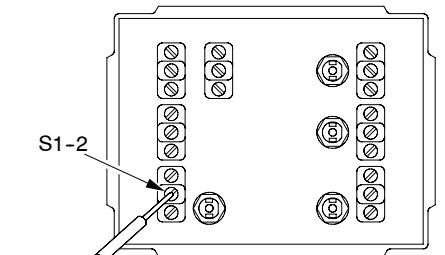
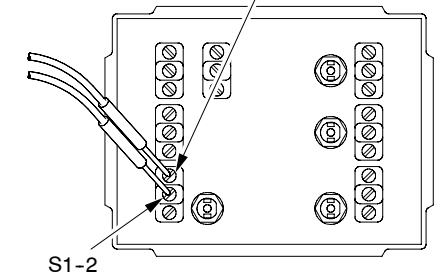
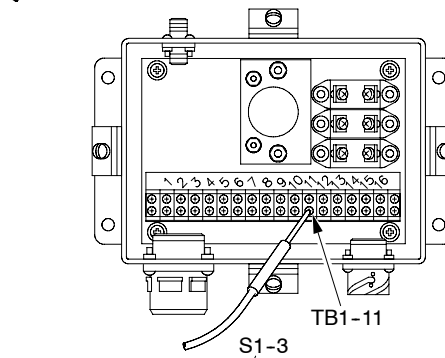
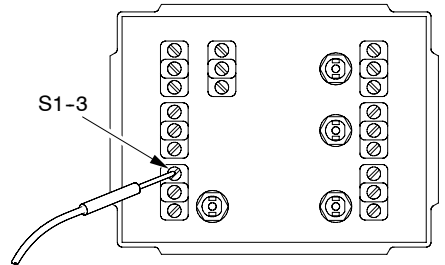
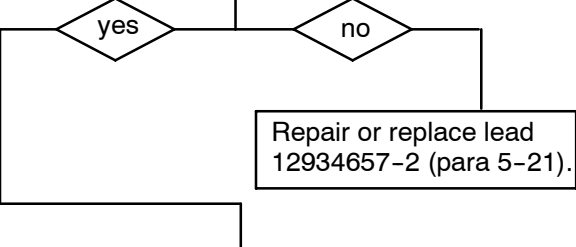
**E** Check lead 12934657-9 for continuity by placing one multimeter lead on HYDRAULIC POWER switch terminal 3 (S1-3) and placing the other lead on terminal board 1 terminal 11 (TB1-11).  
Is continuity present?



**F** 1. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).  
2. Check HYDRAULIC POWER switch for continuity by placing one multimeter lead on HYDRAULIC POWER switch terminal 2 (S1-2) and placing the other lead on HYDRAULIC POWER switch terminal 3 (S1-3).  
Is continuity present?



**G** Check lead 12934657-2 for continuity by placing one multimeter lead on terminal board 1 terminal 4 (TB1-4) and placing the other lead on the HYDRAULIC POWER switch terminal 2 (S1-2).  
Is continuity present?



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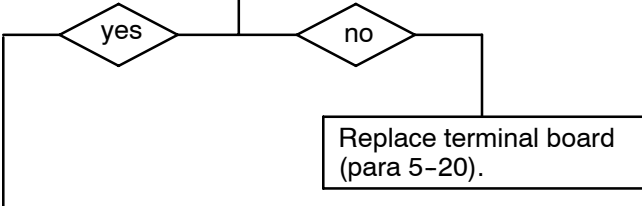
03pc039t

# 3-3. TROUBLESHOOTING CHART - CONTINUED

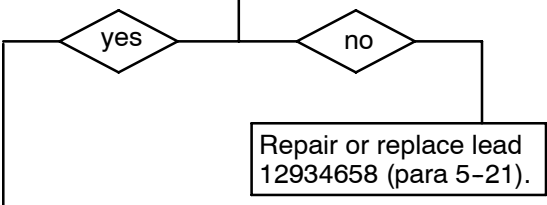
f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON. - CONTINUED

CONTINUED FROM STEP G

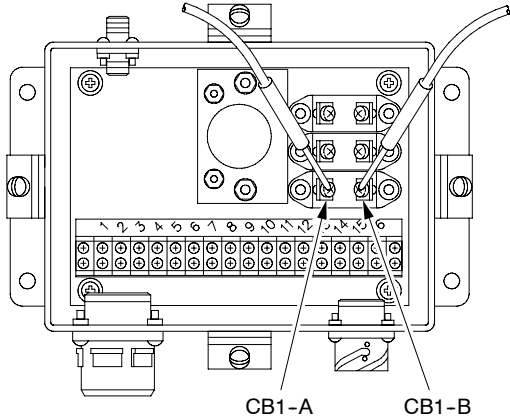
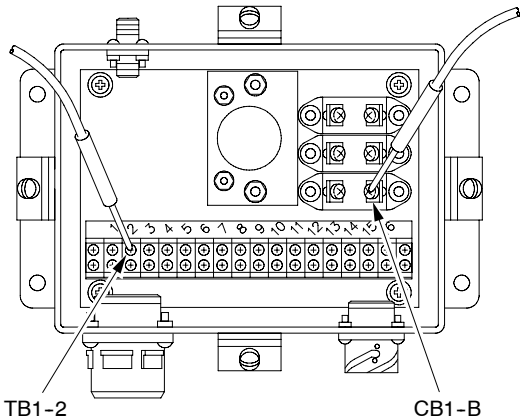
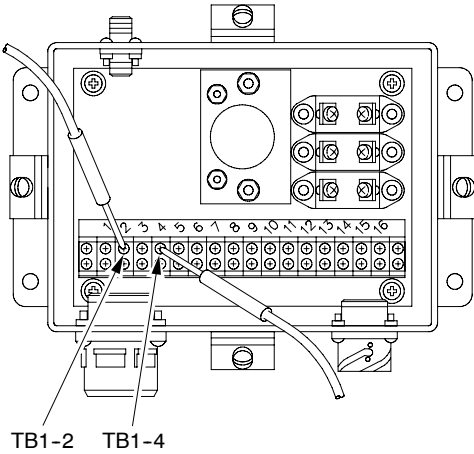
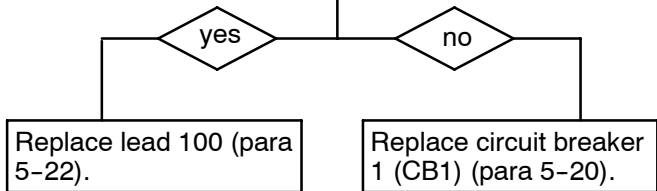
**H** Check terminal board 1 (TB 1) for continuity by placing one multimeter lead on terminal board 1 terminal 2 (TB1-2) and placing the other lead on terminal board 1 terminal 4 (TB1-4).  
Is continuity present?



**I** Check lead 12934658 for continuity by placing one multimeter lead on circuit breaker 1 terminal B (CB1-B) and placing the other lead on terminal board 1 terminal 2 (TB1-2).  
Is continuity present?



**J** Check circuit breaker 1 (CB1) for continuity by placing one multimeter lead on circuit breaker 1 terminal A (CB1-A) and placing the other lead on circuit breaker 1 terminal B (CB1-B).  
Is continuity present?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

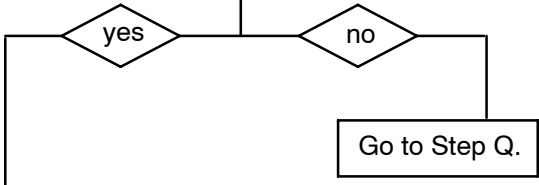
f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DEENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON - CONTINUED

CONTINUED FROM STEP A

**K**

1. Turn HYDRAULIC POWER switch and vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Reconnect harness W64 connector P2 to bulkhead connector.
3. Turn vehicle MASTER power switch and HYDRAULIC POWER switch ON (TM 9-2350-314-10).
4. Place multimeter red lead on lead 100 terminal of hydraulic pump dc motor and black lead to ground.
5. Check for voltage.

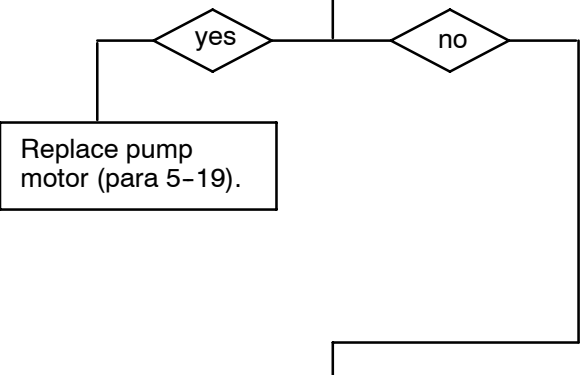
Is voltage present?



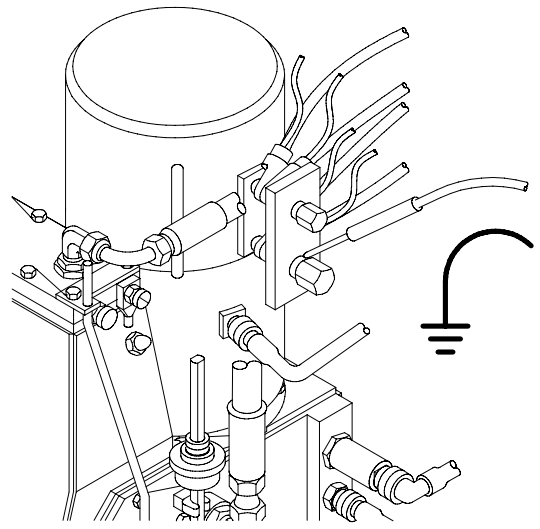
**L**

1. Turn HYDRAULIC POWER switch and vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Place one multimeter lead on lead 70 terminal of hydraulic power dc motor and other lead to ground.
3. Check for continuity.

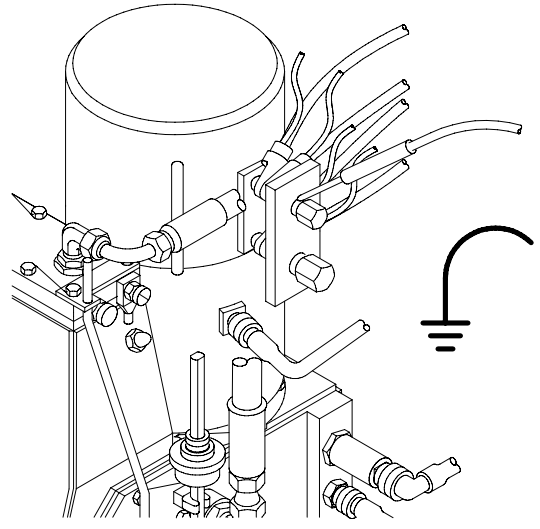
Is continuity present?



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HYDRAULIC PUMP MOTOR



HYDRAULIC PUMP MOTOR

03pc006t

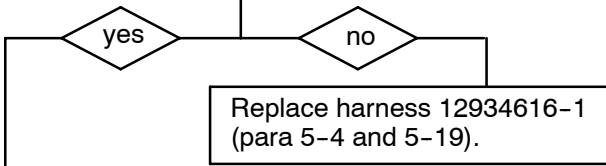
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON - CONTINUED

CONTINUED FROM STEP L

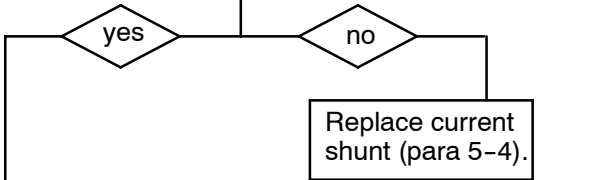
**M** Check harness 12934616-1 for continuity by placing one multimeter lead on lead 70 at the hydraulic pump motor ground terminal and placing the other lead on lead 70 at the current shunt.

Is continuity present?



**N** Check current shunt for continuity by placing one multimeter lead on top lead 70 and placing the other lead on bottom lead 70 on current shunt.

Is continuity present?

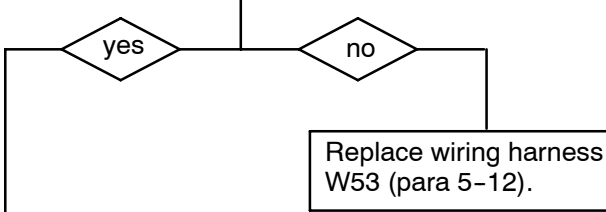


**O**

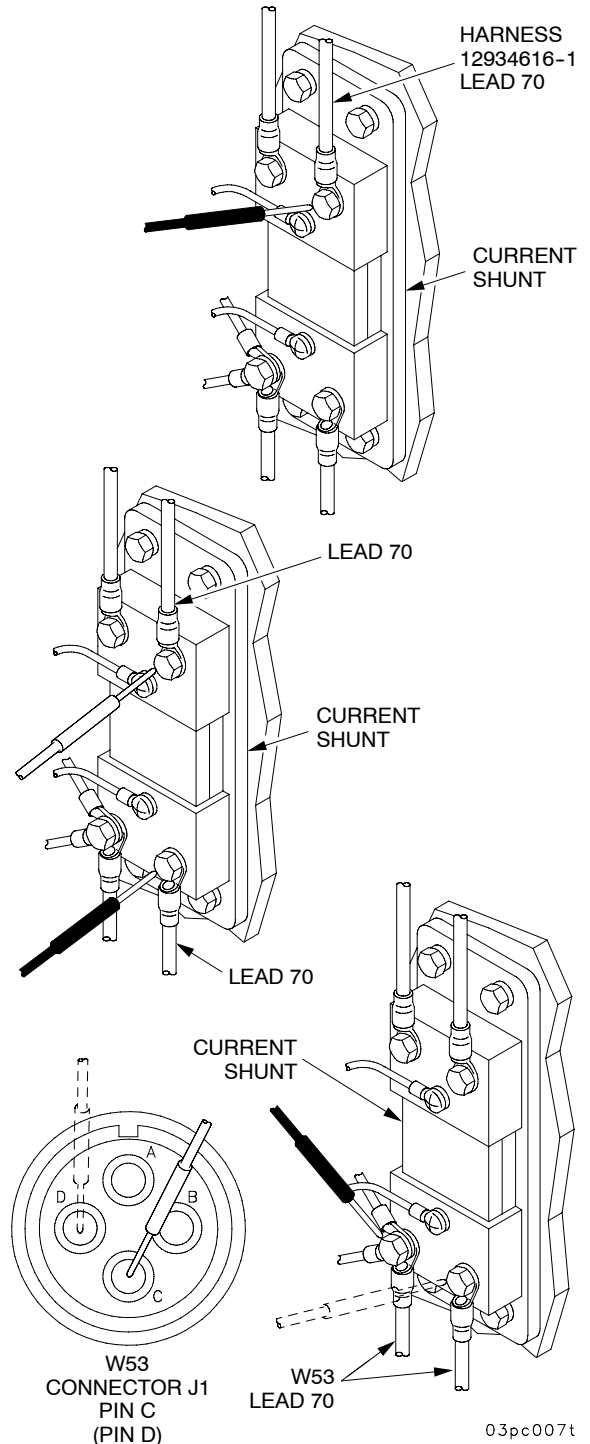
1. Disconnect harness W53 connector J1 from bulkhead (para 5-12).
2. Check harness W53 connector J1 for continuity by placing one multimeter lead on point 1 and placing the other lead on point 2:

<p><u>Point 1</u></p> <p>Connector J1 pin C</p> <p>Connector J1 pin D</p>	<p><u>Point 2</u></p> <p>harness W53 lead 70 at current shunt</p> <p>harness W53 lead 70 at current shunt</p>
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Does multimeter show approximately zero ohms?



CONTINUED ON NEXT PAGE



### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON - CONTINUED

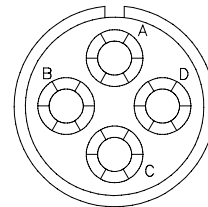
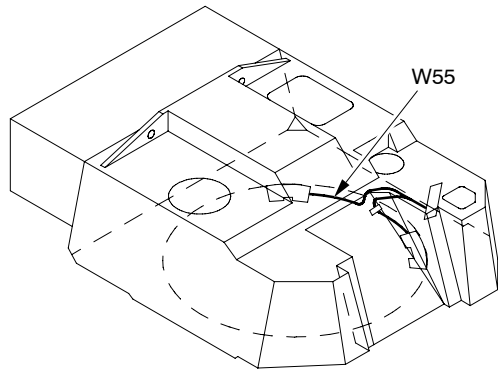
CONTINUED FROM STEP O

**P** Do a shorts test on harness W55 (para 3-3.n(10)).

Are there any shorts?



Replace harness W55 (para 5-13).



W55 CONNECTOR P1

CONTINUED FROM STEP K

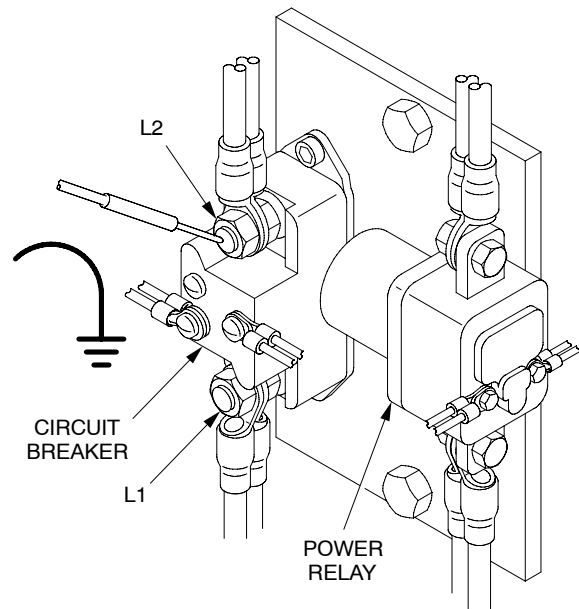
**Q**

1. Reconnect harness W55.
2. Turn vehicle MASTER power switch and HYDRAULIC POWER switch ON (TM 9-2350-314-10).
3. Check circuit breaker for voltage by placing multimeter red lead on circuit breaker terminal L2 and placing black lead to ground.

Is voltage present?



Replace leads 12934617-1 and -2 (para 5-6).



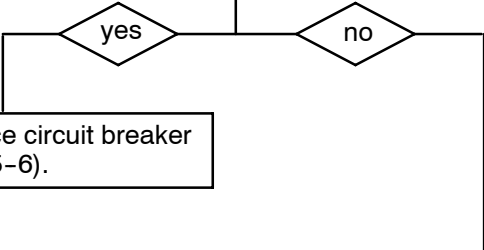
CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

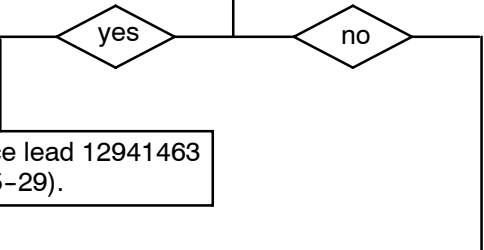
f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON - CONTINUED

CONTINUED FROM STEP Q

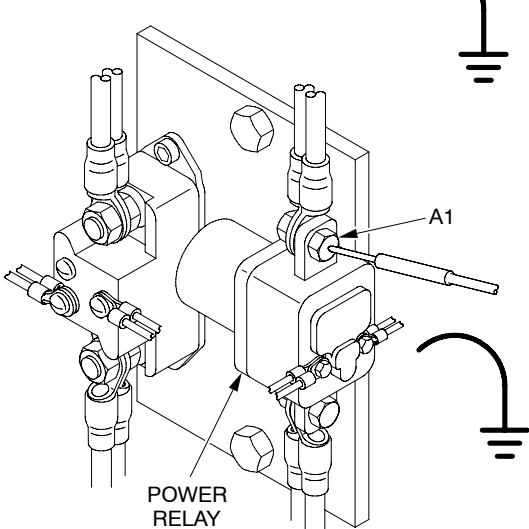
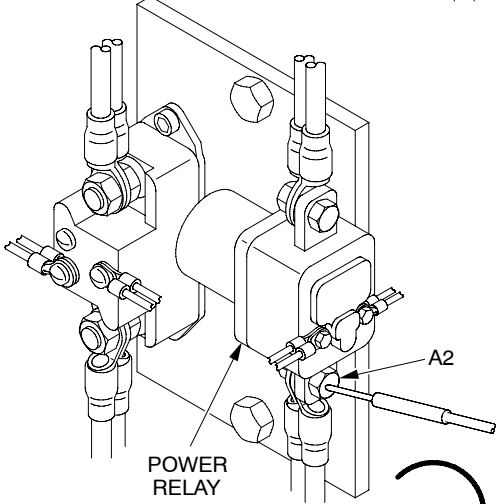
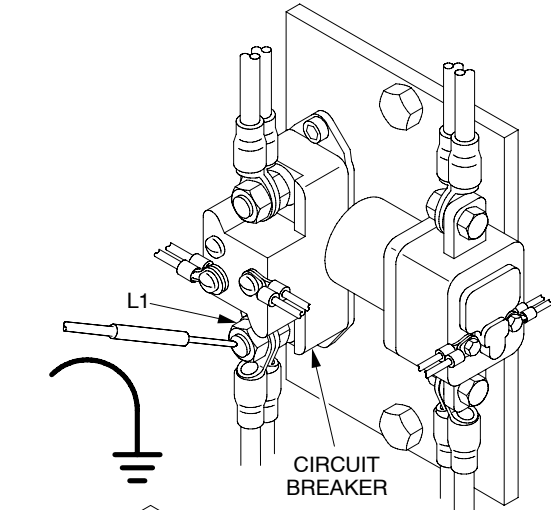
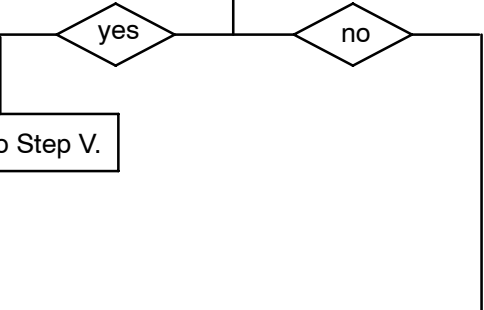
**R** Check circuit breaker for voltage by placing multimeter red lead on circuit breaker terminal L1 and placing the black lead to ground.  
Is voltage present?



**S** Check power relay for voltage by placing multimeter red lead on power relay terminal A2 and placing the black lead to ground.  
Is voltage present?



**T** Check power relay for voltage by placing multimeter red lead on power relay terminal A1 and placing the black lead to ground.  
Is voltage present?



CONTINUED ON NEXT PAGE

03pc040t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON - CONTINUED

CONTINUED FROM STEP T

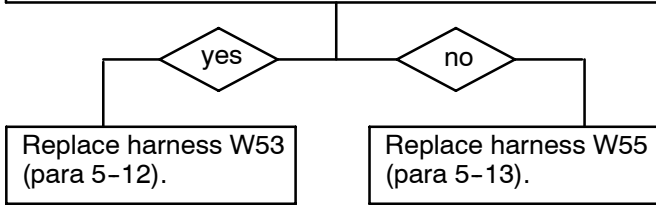
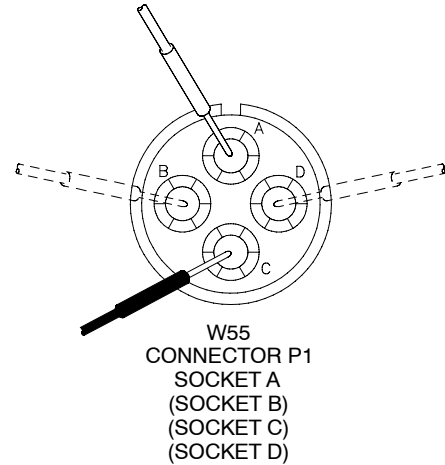
**U**

1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
3. Disconnect harness W55 connector P1 from harness W53 connector J1.
4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
5. Check harness W55 connector P1 for voltage by placing multimeter red lead in point 1 and placing the black lead in point 2:

<u>Point 1</u>	<u>Point 2</u>
socket A	socket C
socket B	socket D

---

Is voltage present?



CONTINUED FROM STEP T

**V**

Place red lead on X1 terminal of power relay and black lead to ground.

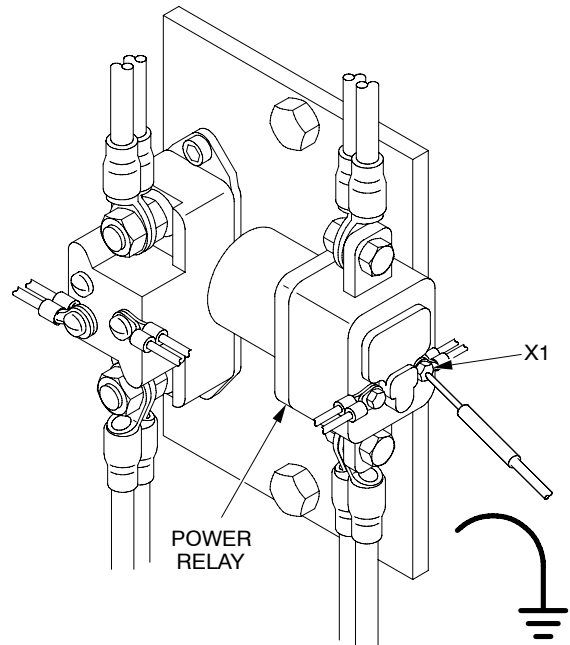
---

Is voltage present?

yes

Go to Step AA.

no



03pc044t



### 3-3. TROUBLESHOOTING CHART - CONTINUED

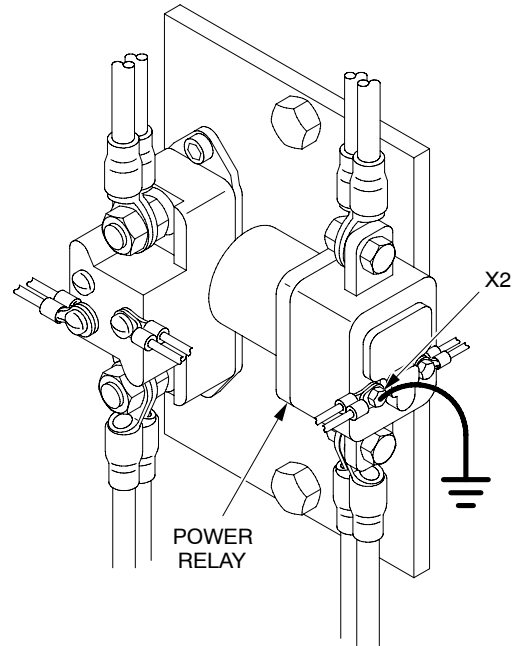
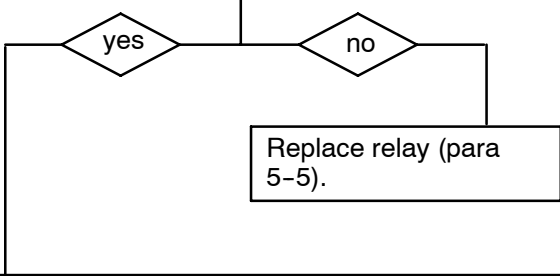
f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON - CONTINUED

CONTINUED FROM STEP V

**W**

1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
3. Place jumper wire from X2 terminal on power relay to ground.
4. Turn vehicle MASTER power switch ON.
5. Start engine and turn HYDRAULIC POWER switch ON.

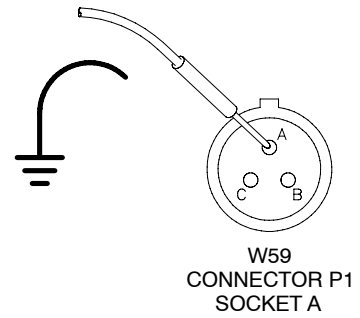
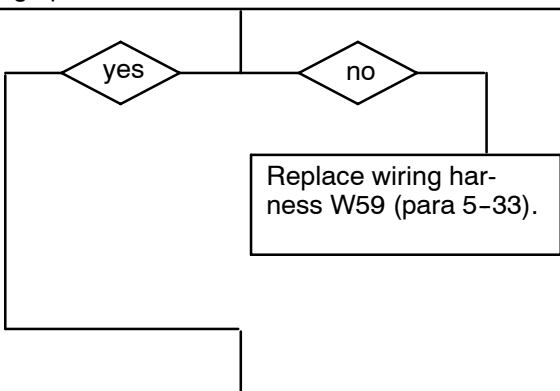
Does hydraulic pump dc motor come on?



**X**

1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
3. Disconnect harness W59 connector P1 from level sensor.
4. Turn vehicle MASTER power switch and HYDRAULIC POWER switch ON (TM 9-2350-314-10).
5. Check harness W59 connector P1 for voltage by placing one multimeter lead on harness W59 connector P1 socket A and black lead to ground.

Is voltage present?



03pc045m

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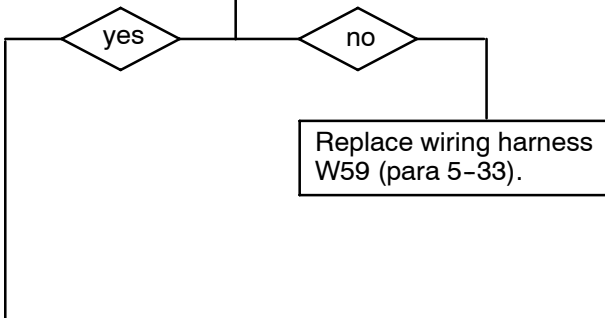
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON - CONTINUED

CONTINUED FROM STEP X

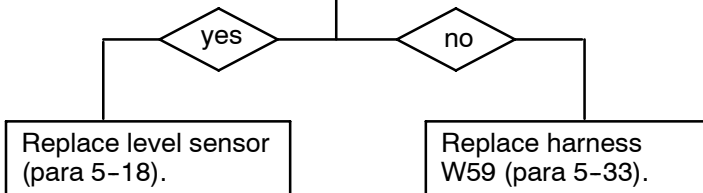
**Y** 1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).  
 2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).  
 3. Check harness W59 for continuity by placing one multimeter lead in harness W59 connector P1 socket B and placing the other lead on power relay terminal X2.

Is continuity present?

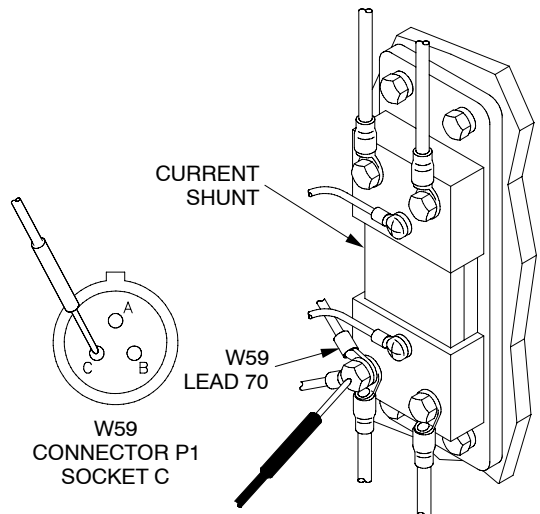
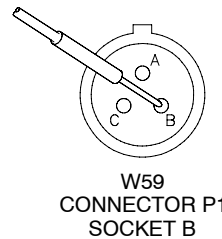
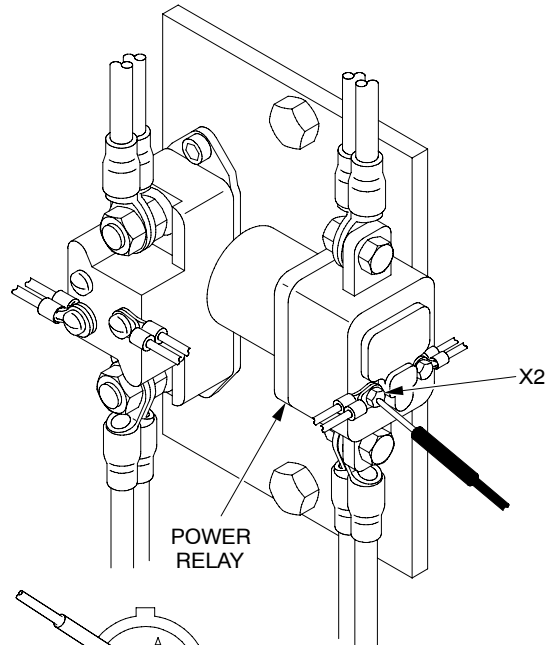


**Z** Check harness W59 for continuity by placing one multimeter lead in harness W59 connector P1 socket C and placing the other lead on harness W59 lead 70 at the current shunt.

Is continuity present?



CONTINUED ON NEXT PAGE



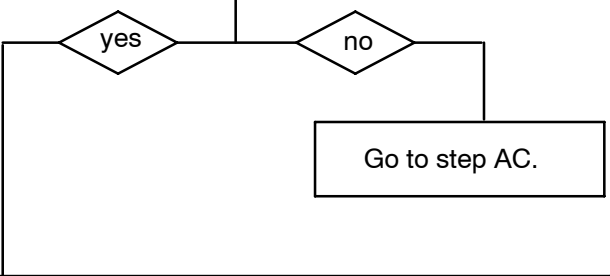
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON - CONTINUED

CONTINUED FROM STEP V

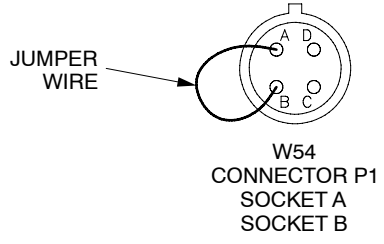
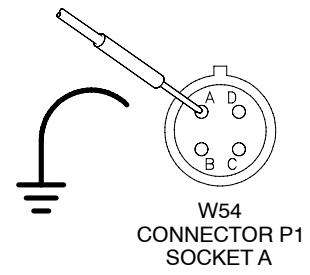
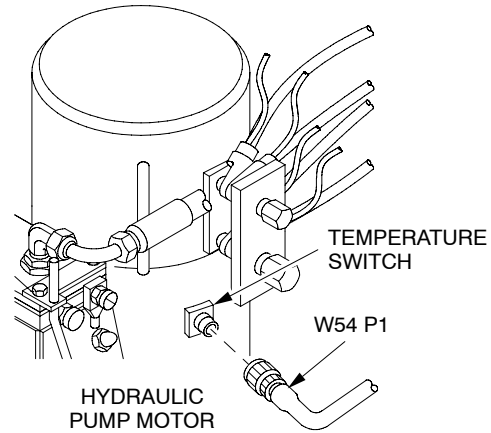
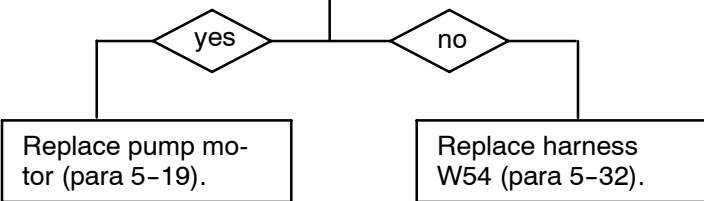
- AA**
1. Disconnect harness W54 connector P1 from hydraulic pump motor temperature switch.
  2. Turn vehicle MASTER power switch and HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  3. Place one multimeter lead on harness W54 connector P1 socket A and other lead to ground.
  4. Check for voltage.

Is voltage present?



- AB**
1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Place jumper wire between socket A and B of harness W54 connector P1.
  4. Turn vehicle MASTER power switch and HYDRAULIC POWER switch ON (TM 9-2350-314-10).

Does hydraulic pump motor energize?



03pc047t

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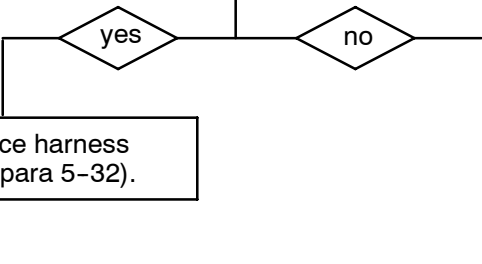
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (9) HYDRAULIC PUMP MOTOR IS DE-ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON - CONTINUED

CONTINUED FROM STEP AA

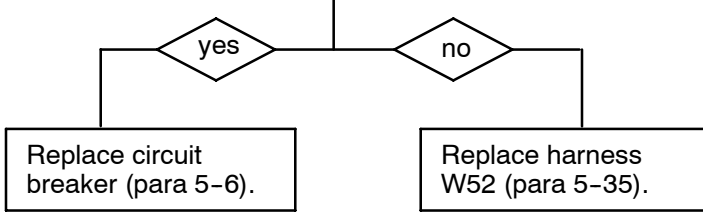
**AC** 1. Place red multimeter lead on terminal S2 of circuit breaker and black lead to ground.  
2. Check for voltage.

Is voltage present?

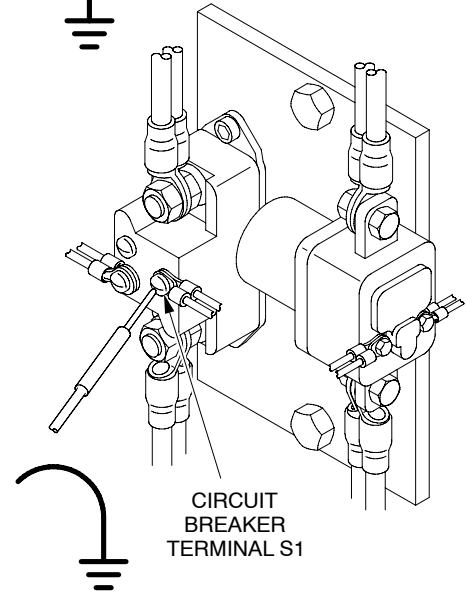
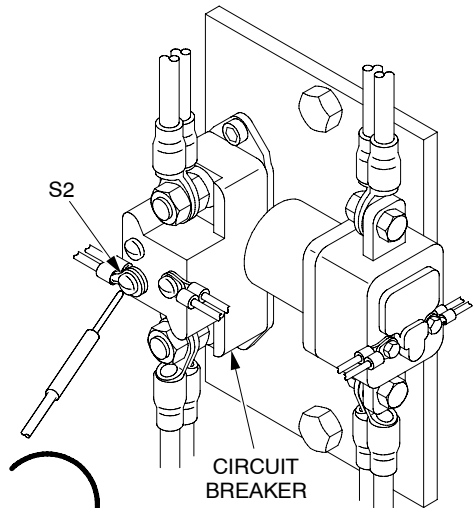


**AD** Check for voltage by placing red multimeter lead on S1 of circuit breaker and black lead to ground.

Is voltage present?



**END OF TASK**



03pc048t

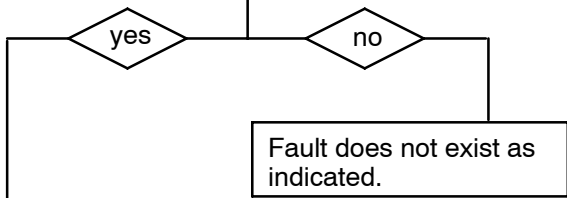
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (10) HYDRAULIC PRESSURE GREATER THAN 1975 PSI.

INITIAL SETUP  
Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)

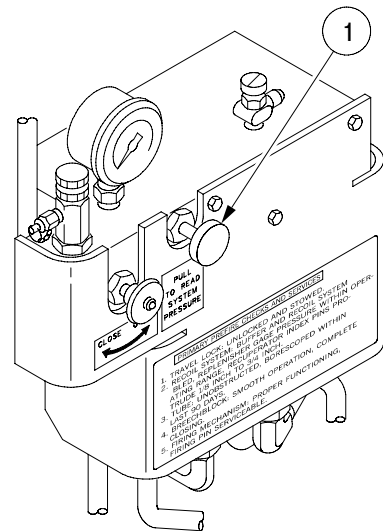
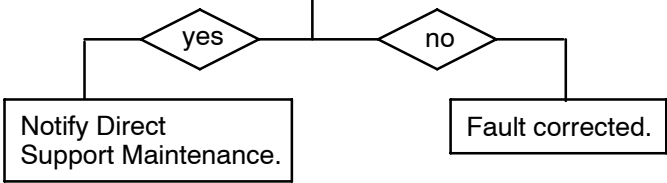
- A**
1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  2. Start engine (TM 9-2350-314-10).
  3. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  4. Pull valve (1) OPEN.

Does pressure gage read greater than 1975 PSI?



- B**
1. Turn HYDRAULIC POWER switch OFF and shut off engine (TM 9-2350-314-10).
  2. Bleed hydraulic pressure by moving COS handle to traverse position (para 18-1).
  3. Replace pressure gage (para 18-11).
  4. Start engine following proper procedures (TM 9-2350-314-10).
  5. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  6. Pull valve (1) OPEN.

Does pressure gage read greater than 1975 PSI?



16pc003t

**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (11) HYDRAULIC PUMP MOTOR CONTINUES TO OPERATE WHEN HYDRAULIC POWER SWITCH IS OFF or PDI SYSTEM TEST INDICATES FAILURE.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

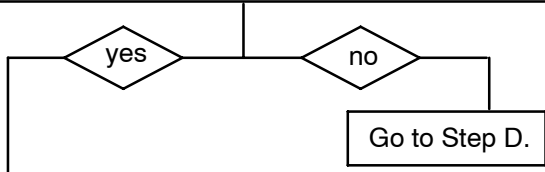
**NOTE**

For vehicles equipped with AFCS, go to Step H. For vehicles equipped with PDFCS, do Step A.

**A** Note results of PDI system tests.

---

Did the PDI tests indicate Fault Code 041, 042, 043, 044, 045, 046, 048, 062, 086, or 087?

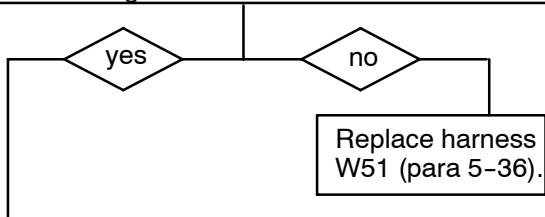


**B**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Do a harness check on harness W51 (para 3-3.n(20)).

---

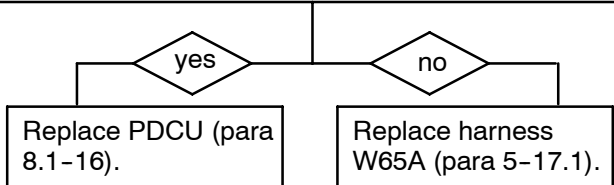
Is harness W51 good?



**C** Do a harness check on harness W65A (para 3-3.n(18.1)).

---

Is harness W65A good?



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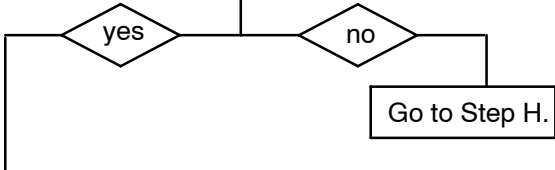
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (11) HYDRAULIC PUMP MOTOR CONTINUES TO OPERATE WHEN HYDRAULIC POWER SWITCH IS OFF or PDI SYSTEM TEST INDICATES FAILURE. - CONTINUED

CONTINUED FROM STEP A

**D** Note results of PDI system tests.

Did the PDI tests indicate Fault code 072?

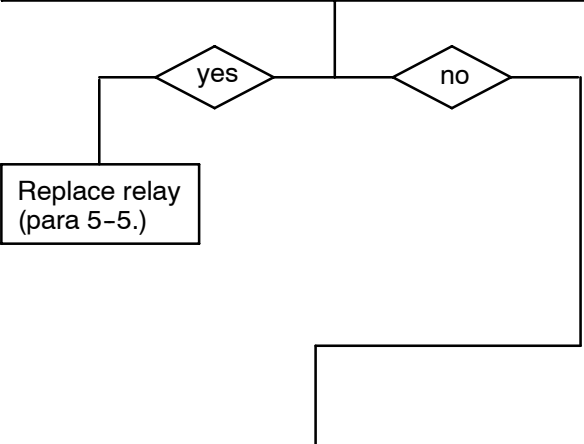


**E** **NOTE**

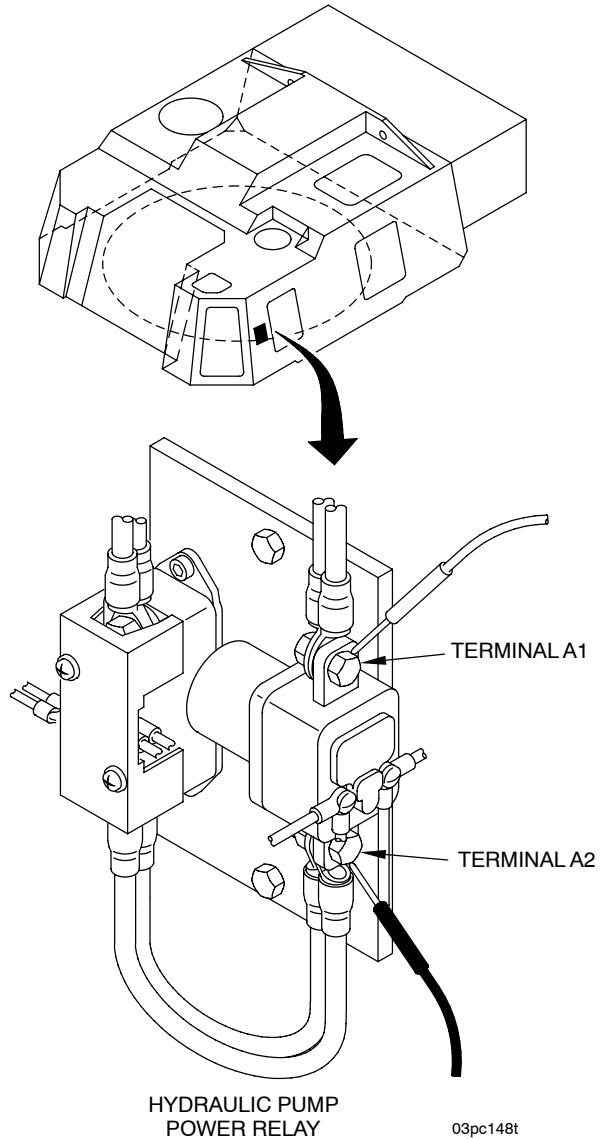
An excessive amount of voltage is being lost in the hydraulic pump motor current path. Possible failures are: Hydraulic Power Relay, Overload Sensor, Current Shunt, Hydraulic Motor, Brush Blocks #6 & #7, W53, and W55. The following tests will attempt to locate the excessive voltage drop.

1. Turn vehicle MASTER power switch and HYDRAULIC POWER switch ON (TM 9-2350-314-10).
2. Place multimeter red lead on power relay terminal A1 and black lead to power relay terminal A2.
3. Check for DC voltage drop.

Is voltage drop greater than 1 V dc?



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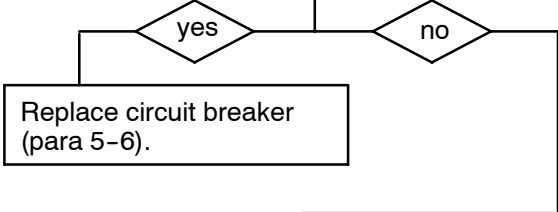
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (11) HYDRAULIC PUMP MOTOR CONTINUES TO OPERATE WHEN HYDRAULIC POWER SWITCH IS OFF or PDI SYSTEM TEST INDICATES FAILURE. - CONTINUED

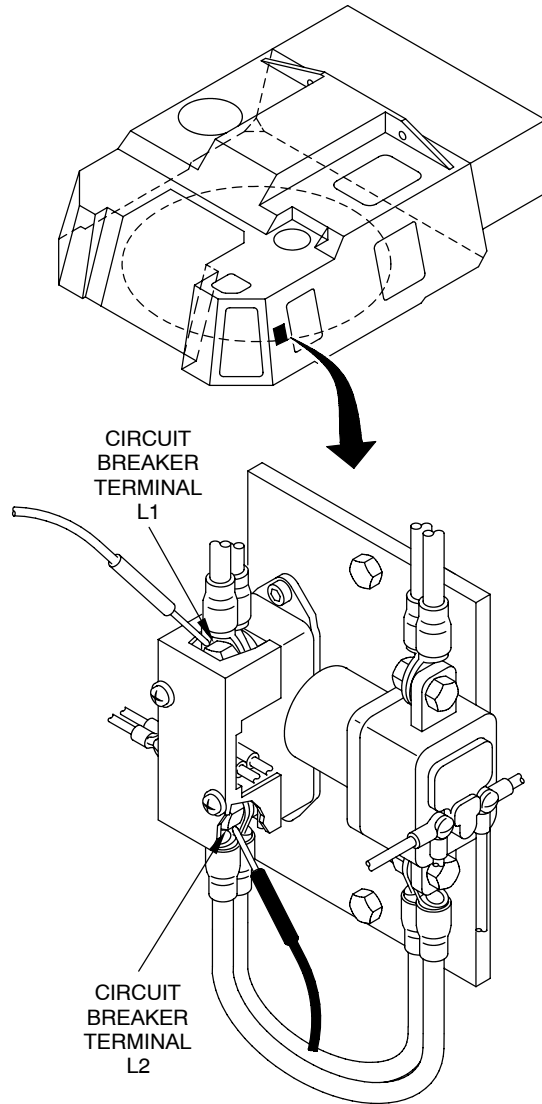
CONTINUED FROM STEP E

- |          |   |
|----------|---|
| <b>F</b> | <ol style="list-style-type: none"> <li>1. Place multimeter red lead on circuit breaker terminal L1 and black lead to circuit breaker terminal L2.</li> <li>2. Check for DC voltage drop.</li> </ol> |
|----------|---|

Is voltage drop greater than 1 V dc?
--------------------------------------



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HYDRAULIC PUMP  
CIRCUIT BREAKER

03pc148ta



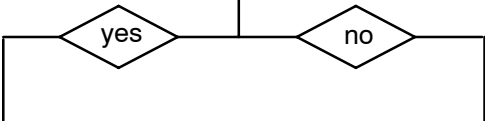
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (11) HYDRAULIC PUMP MOTOR CONTINUES TO OPERATE WHEN HYDRAULIC POWER SWITCH IS OFF or PDI SYSTEM TEST INDICATES FAILURE. - CONTINUED

CONTINUED FROM STEP F

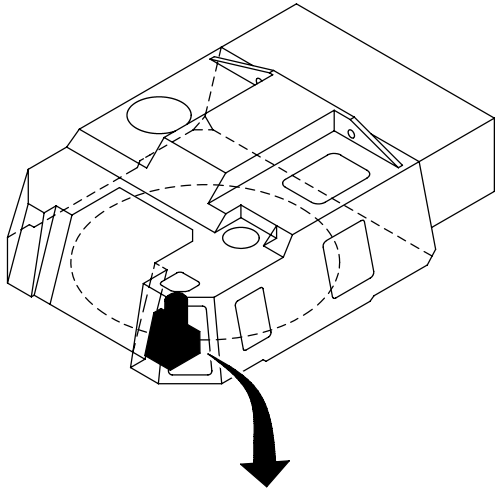
- G**
1. Place multimeter red lead on hydraulic pump motor terminal 70 and black lead to ground.
  2. Check for DC voltage drop.

Is voltage drop greater than 1 V dc?

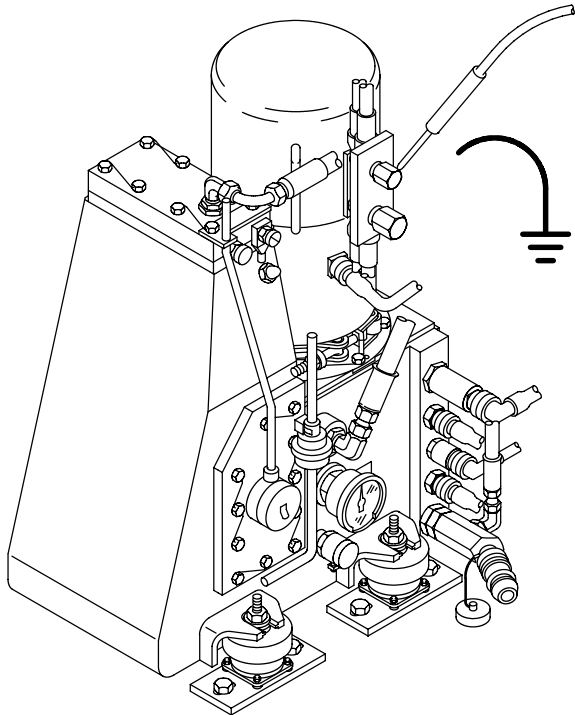


Replace current shunt (para 5-4).

Replace pump motor (para 5-19).



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HYDRAULIC PUMP MOTOR

03pc149t

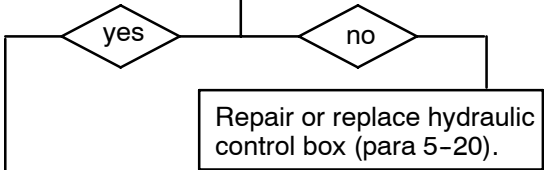
### 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (11) HYDRAULIC PUMP MOTOR CONTINUES TO OPERATE WHEN HYDRAULIC POWER SWITCH IS OFF or PDI SYSTEM TEST INDICATES FAILURE. - CONTINUED

CONTINUED FROM STEP D

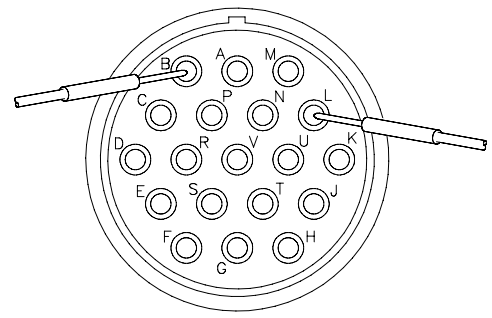
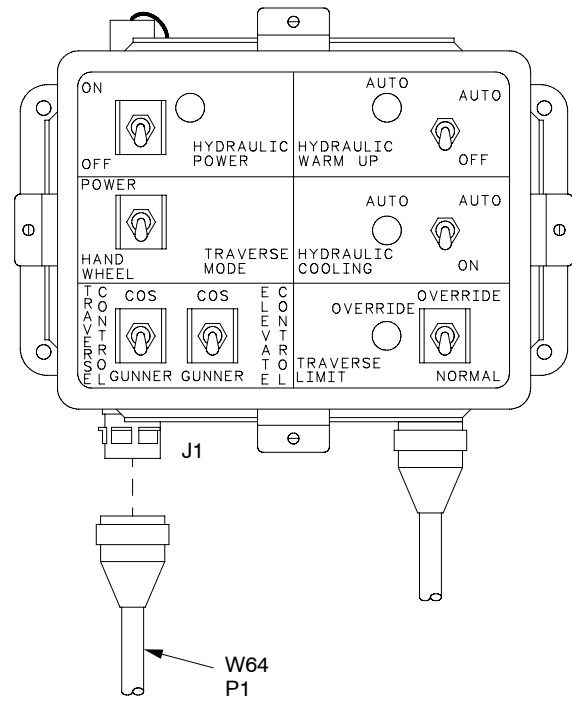
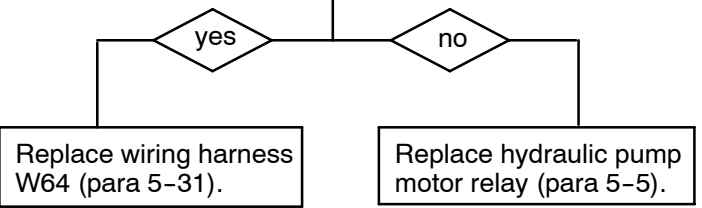
- |          |   |
|----------|---|
| <b>H</b> | <ol style="list-style-type: none"> <li>1. Disconnect wiring harness W64 connector P1 from hydraulic control box.</li> <li>2. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).</li> </ol> |
|----------|---|

Does hydraulic pump motor operate?



- |          |  |
|----------|--|
| <b>I</b> | <ol style="list-style-type: none"> <li>1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>2. Place one multimeter lead in wiring harness W64 connector P1 socket B and place other multimeter lead in wiring harness W64 connector P1 socket L.</li> <li>3. Check for continuity.</li> </ol> |
|----------|--|

Is continuity present?



W64  
CONNECTOR P1  
SOCKET B  
SOCKET L

**END OF TASK**

# 3-3. TROUBLESHOOTING CHART - CONTINUED

f. HYDRAULIC SYSTEM - CONTINUED (12) ZEROING PRESSURE CHECK FAILS TEST

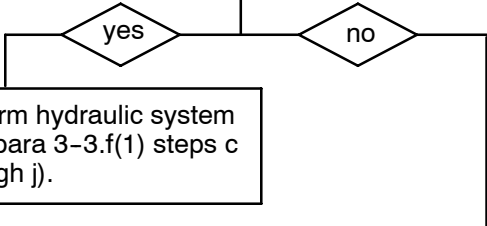
INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)  
 Nitrogen charging kit  
 (Item 23, Appx G)

**A**

1. Attach nitrogen charging kit to pulse accumulator (para 28-9).
2. Check for 850 to 950 psi on pressure gage.

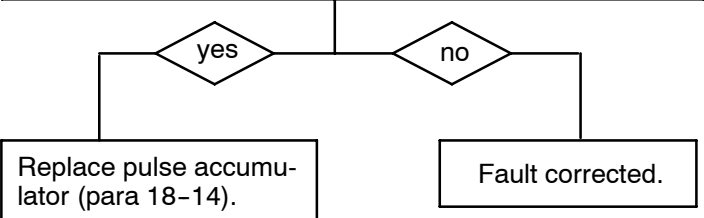
Is 850 to 950 psi present?



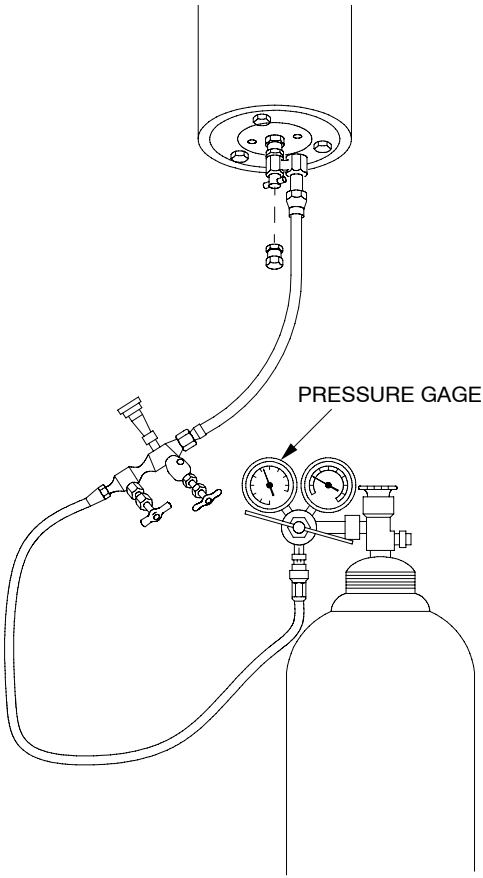
**B**

1. Charge pulse accumulator to 850 to 950 psi (para 28-9).
2. Check for nitrogen leak by watching gages.

Is pressure leaking?



**END OF TASK**



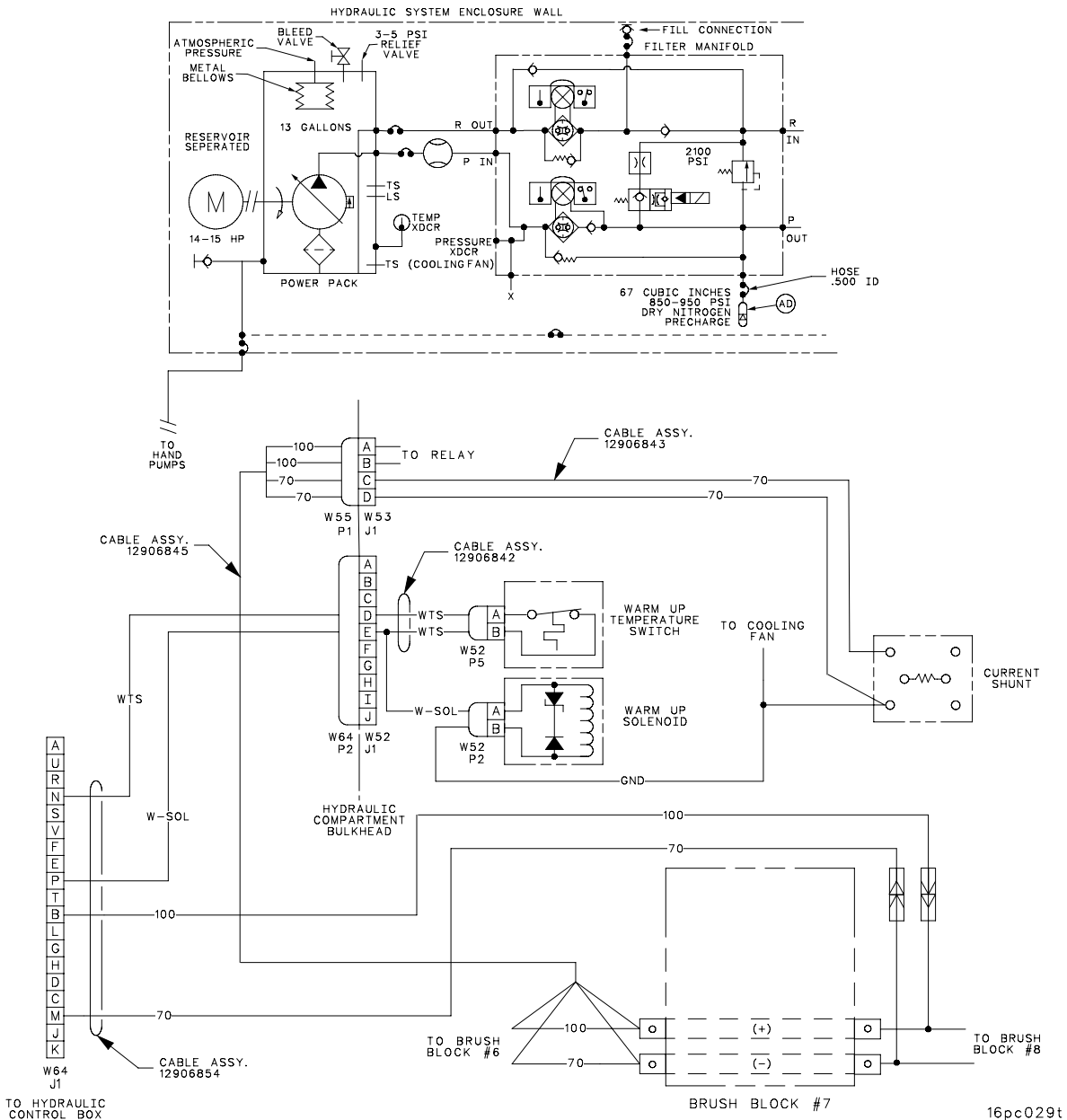
16pc034 t



# 3-3. TROUBLESHOOTING CHART - CONTINUED

## g. HYDRAULIC WARMUP SYSTEM

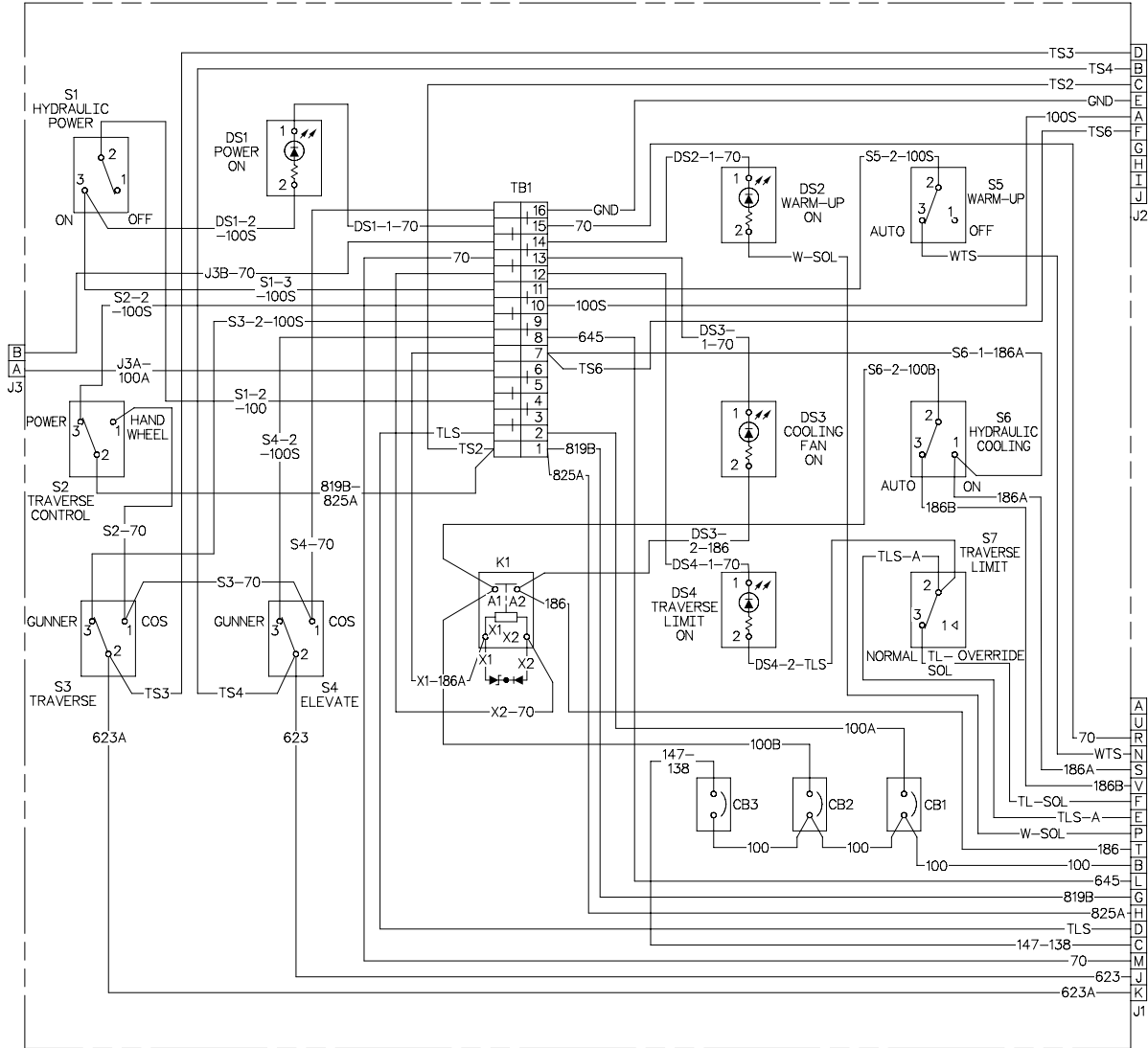
The hydraulic warm-up system consists of the hydraulic control box, warm-up temperature switch, and warm-up temperature solenoid. The schematic below shows the relationship between these components. When the MASTER power switch is ON, 24 V dc and ground are supplied through the brush blocks to the hydraulic control box. With HYDRAULIC POWER switch (S1) set to ON and WARM-UP switch (S5) set to AUTO position, the hydraulic system is energized and 24 V dc is supplied through the warm-up temperature switch to energize the warm-up solenoid and illuminate the WARM-UP ON LAMP. The hydraulic fluid cycles through the filter manifold until it reaches operating temperature. When operating temperature is reached, the WARM-UP TEMPERATURE switch opens which de-energizes the warm-up solenoid and extinguishes the WARM-UP ON lamp.



16pc029t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### g. HYDRAULIC WARMUP SYSTEM - CONTINUED



16pc001t

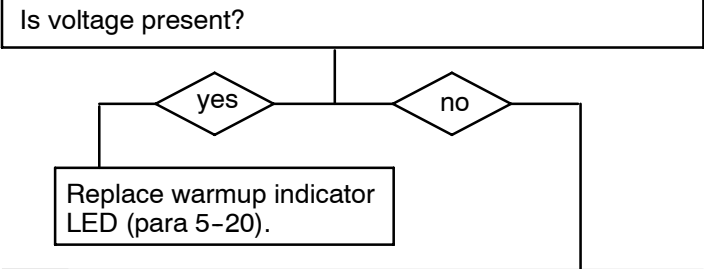
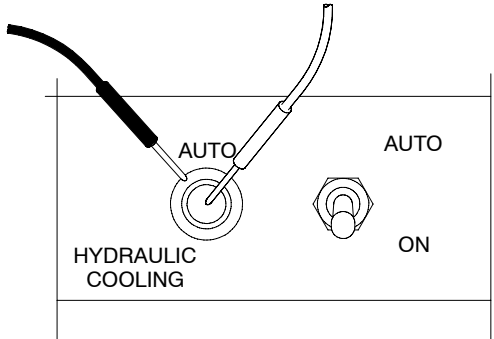
### 3-3. TROUBLESHOOTING CHART - CONTINUED

g. HYDRAULIC WARMUP SYSTEM - CONTINUED	(1) HYDRAULIC WARMUP INDICATOR LIGHT DOES NOT ILLUMINATE WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS BELOW WARMUP SYSTEM NORMAL.
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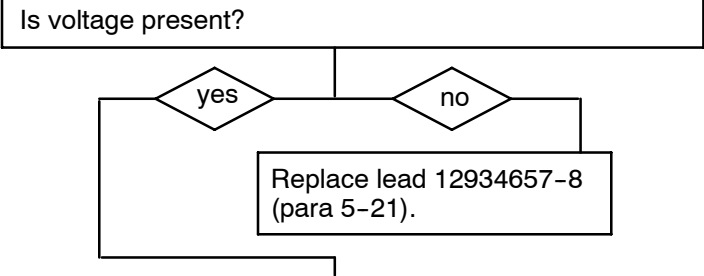
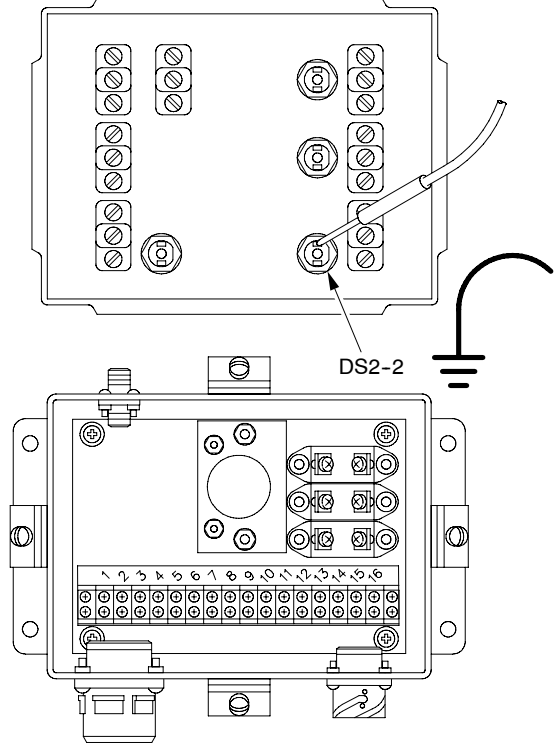
**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

- A**
1. Remove lens and LED from hydraulic warmup indicator light (para 5-20).
  2. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  3. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  4. Place multimeter red lead on contact in center of light socket and black lead on socket threads. Check for voltage.



- B**
1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF and shut off engine (TM 9-2350-314-10).
  3. Remove cover from hydraulic control box (para 5-20).
  4. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  5. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  6. Place multimeter red lead on DS2-2 and black lead to ground. Check for voltage.



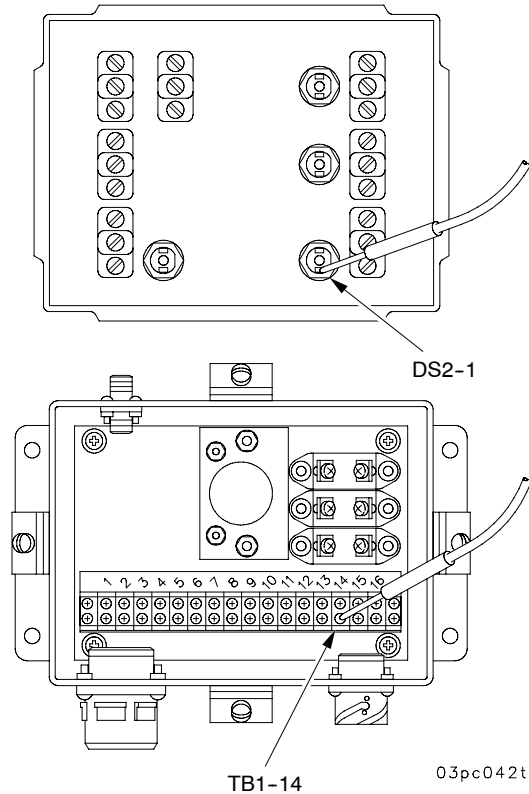
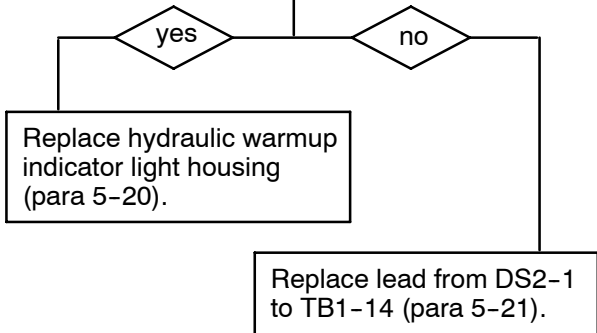
03pc041t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

g. HYDRAULIC WARMUP SYSTEM - CONTINUED (1) HYDRAULIC WARMUP INDICATOR LIGHT DOES NOT ILLUMINATE WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS BELOW WARMUP SYSTEM NORMAL. - CONTINUED

CONTINUED FROM STEP B

- C**
1. Turn vehicle MASTER power switch OFF and shut off engine (TM 9-2350-314-10).
  2. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
  3. Check lead 12563130-3 for continuity by placing one multimeter lead on DS2-1 and placing the other lead on terminal board 1 terminal 14 (TB1-14).
- Is continuity present?



**END OF TASK**



### 3-3. TROUBLESHOOTING CHART - CONTINUED

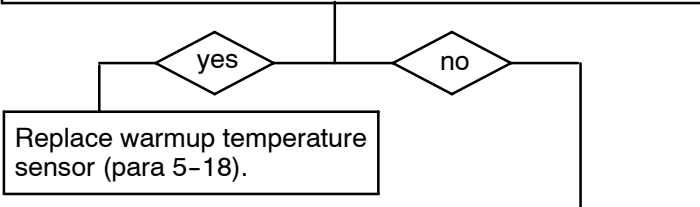
g. HYDRAULIC WARMUP SYSTEM - CONTINUED (2) HYDRAULIC WARMUP SOLENOID IS DE-ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION WITH LIGHT ILLUMINATED.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

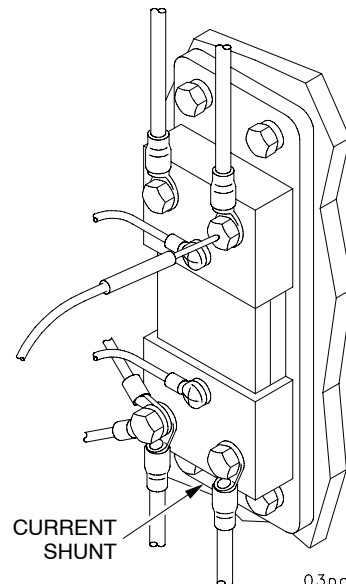
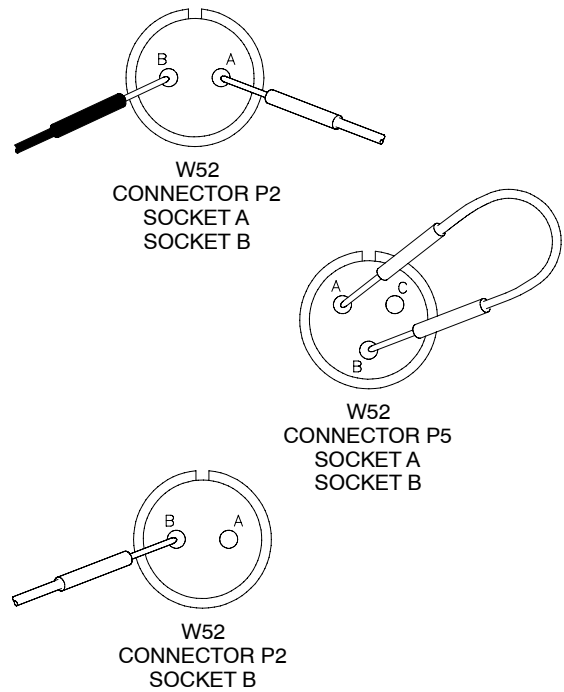
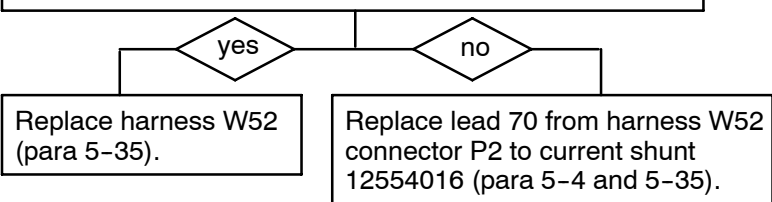
- A**
1. Turn vehicle MASTER power and HYDRAULIC POWER switches OFF (TM 9-2350-314-10).
  2. Disconnect harness W52 connector P5 from warmup temperature sensor.
  3. Place a jumper lead between harness W52 connector P5 socket A and harness W52 connector P5 socket B.
  4. Disconnect harness W52 connector P2 at warmup solenoid.
  5. Place multimeter red lead in harness W52 connector P2 socket A and black lead in harness W52 connector P2 socket B.
  6. Turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).

Is voltage present?



- B**
1. Turn vehicle MASTER power switch OFF, shut off engine, and turn HYDRAULIC POWER switch OFF position (TM 9-2350-314-10).
  2. Check harness W52 for continuity by placing one multimeter lead in harness W52 connector P2 socket B and placing the other lead on shunt circuit 70.

Is continuity present?



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**END OF TASK**

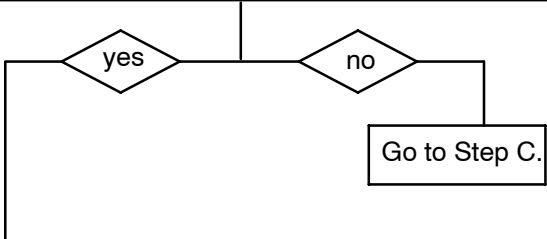
### 3-3. TROUBLESHOOTING CHART - CONTINUED

g. HYDRAULIC WARMUP SYSTEM - CONTINUED	(3)	HYDRAULIC WARMUP SOLENOID IS ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS ABOVE OPERATING TEMPERATURE.
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**INITIAL SETUP**

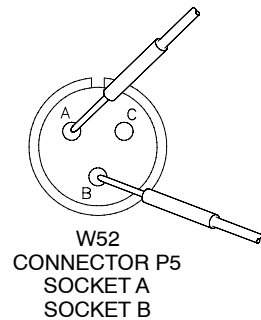
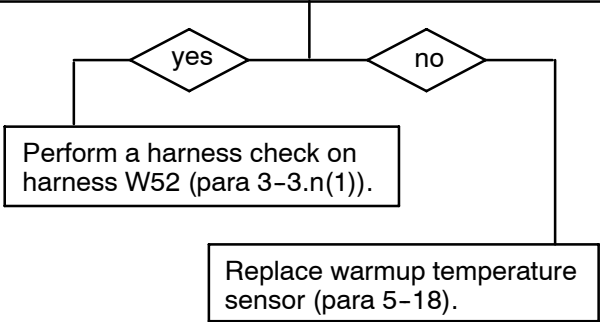
Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

<b>A</b>	<ol style="list-style-type: none"> <li>1. Turn vehicle MASTER power switch and HYDRAULIC POWER switch ON (TM 9-2350-314-10).</li> <li>2. Power up AFCS/PDFCS and run PDIU/PDI system test (TM 9-2350-314-10).</li> </ol>
Does PDIU/PDI systems test show a faulty temperature sensor?	



<b>B</b>	<ol style="list-style-type: none"> <li>1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>2. Disconnect harness W52 connector P5 from the warmup temperature sensor.</li> <li>3. Check harness W52 for continuity by placing one multimeter lead in harness W52 connector P5 socket A and other lead in harness W52 connector P5 socket B.</li> </ol>
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Is continuity present?



03pc036t

CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

g. HYDRAULIC WARMUP SYSTEM - CONTINUED (3) HYDRAULIC WARMUP SOLENOID IS ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS ABOVE OPERATING TEMPERATURE. - CONTINUED

CONTINUED FROM STEP A

**C**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W64 connector P2 from harness W52 connector J1.
3. Check harness W64 for continuity by placing one multimeter lead in harness W64 connector P2 socket D and placing other lead in harness W64 connector P2 socket E.

Is continuity present?

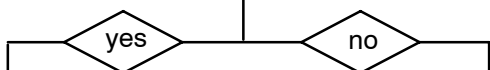


Do harness check on harness W64 (para 3-3.n(7)).

**D**

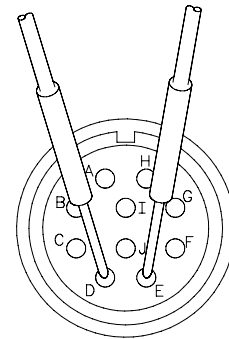
1. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
2. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
3. Turn HYDRAULIC WARM UP switch to AUTO (TM 9-2350-314-10).
4. Check harness 12563029 for continuity by placing one multimeter lead on hydraulic control box connector J1 pin N and placing the other lead on hydraulic control box connector J1 pin P.

Is continuity present?

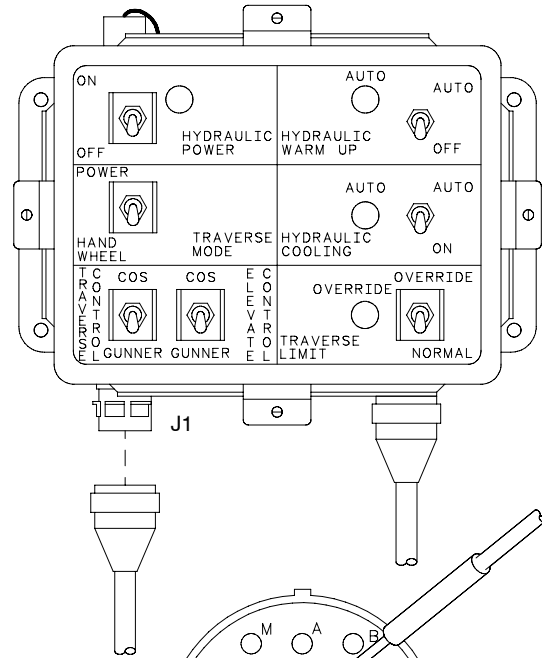


Replace hydraulic warmup switch (para 5-20).

Replace harness 12563029 (para 5-22).



W64  
CONNECTOR P2  
SOCKET D  
SOCKET E



HYDRAULIC CONTROL BOX  
CONNECTOR J1  
PIN N  
PIN P

**END OF TASK**

03pc037t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

g. HYDRAULIC WARMUP SYSTEM - CONTINUED (4) HYDRAULIC WARMUP SOLENOID IS ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS OFF.

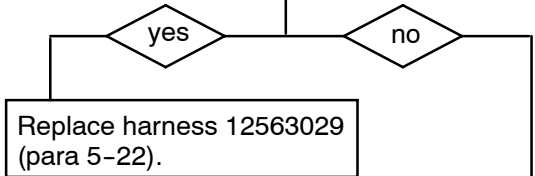
**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A**

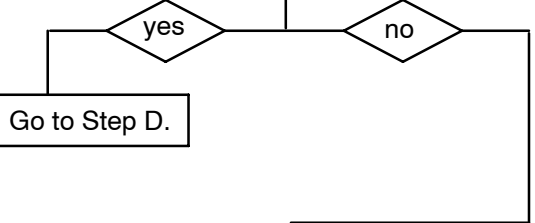
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W64 connector P1 from the hydraulic control box connector J1.
3. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
4. Turn HYDRAULIC WARM UP switch OFF (TM 9-2350-314-10).
5. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin L and placing the other on hydraulic control box connector J1 pin P.

Is continuity present?

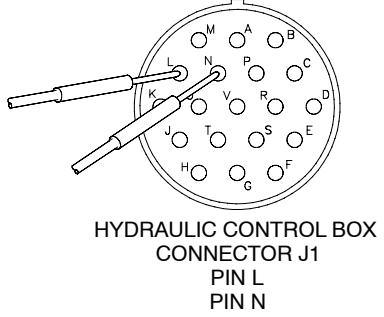
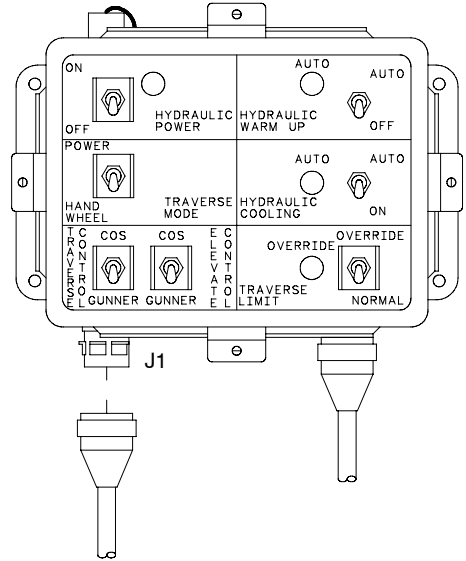
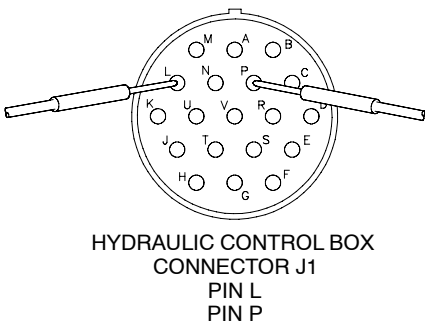


**B** Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin L and placing the other lead on hydraulic control box connector J1 pin N.

Is continuity present?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

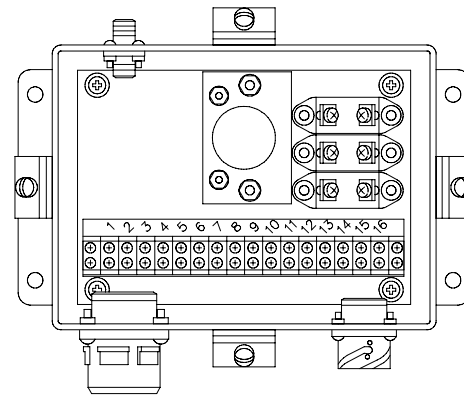
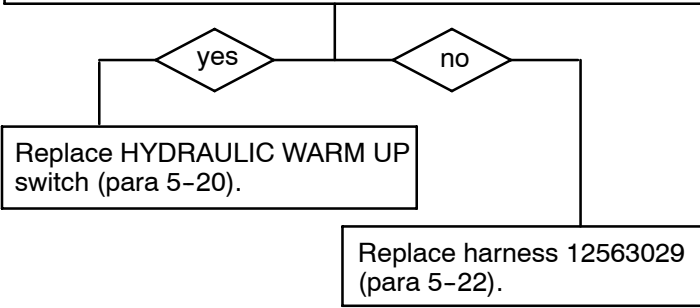
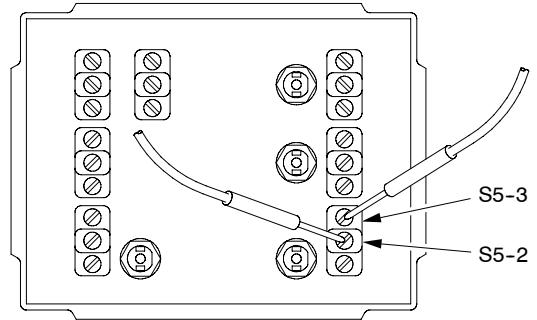
g. HYDRAULIC WARMUP SYSTEM - CONTINUED (4) HYDRAULIC WARMUP SOLENOID IS ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS OFF. - CONTINUED

CONTINUED FROM STEP B

**C**

1. Remove cover from hydraulic control box (para 5-20).
2. Disconnect lead 12934657-8 from HYDRAULIC WARM UP switch terminal 2 (S5-2).
3. Check HYDRAULIC WARM UP switch for continuity by placing one multimeter lead on HYDRAULIC WARM UP switch terminal 2 (S5-2) and placing the other lead on HYDRAULIC WARM UP switch terminal 3 (S5-3).

Is continuity present?

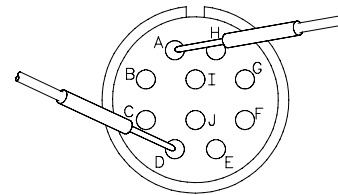


CONTINUED FROM STEP B

**D**

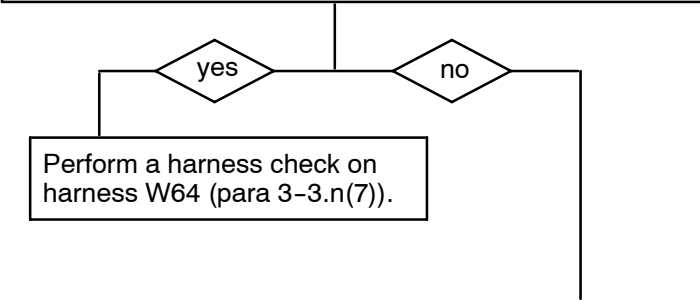
1. Disconnect harness W64 connector P2 from bulkhead connector.
2. Check harness W64 for continuity by placing one multimeter lead in harness W64 connector P2 socket A and placing the other lead in harness W64 connector P2 socket D.

Is continuity present?



W64  
CONNECTOR P2  
SOCKET A  
SOCKET D

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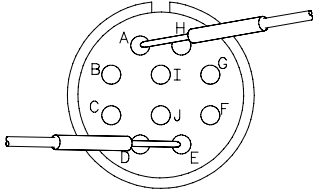
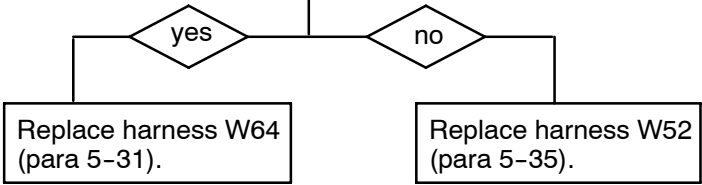
**3-3. TROUBLESHOOTING CHART - CONTINUED**

g. HYDRAULIC WARMUP SYSTEM - CONTINUED (4) HYDRAULIC WARMUP SOLENOID IS ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS OFF. - CONTINUED

CONTINUED FROM STEP D

**E** Check harness W64 for continuity by placing one multimeter lead in harness W64 connector P2 socket A and the other lead in harness W64 connector P2 socket E. Check for continuity.

Is continuity present?



W64  
CONNECTOR P2  
SOCKET A  
SOCKET E

03pc043t

**END OF TASK**

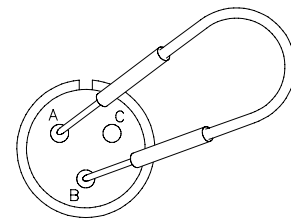
### 3-3. TROUBLESHOOTING CHART - CONTINUED

g. HYDRAULIC WARMUP SYSTEM - CONTINUED (5) HYDRAULIC WARMUP SOLENOID IS DE-ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS BELOW OPERATING TEMPERATURE.

**INITIAL SETUP**

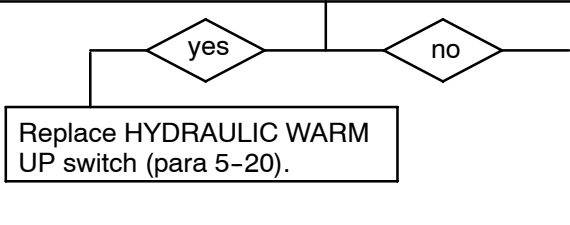
Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

- A**
1. Disconnect harness W52 connector P5 from the warmup temperature switch at hydraulic reservoir.
  2. Place a jumper wire between sockets A and B of harness W52 connector P5.
  3. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  4. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  5. Turn HYDRAULIC WARM UP switch to AUTO (TM 9-2350-314-10).



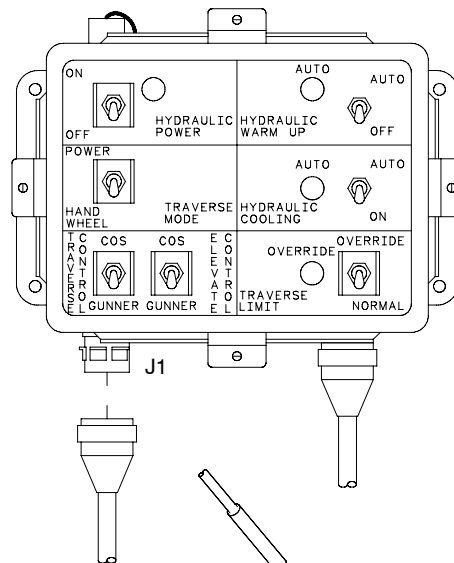
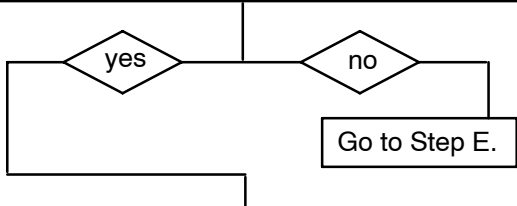
W52  
CONNECTOR P5  
SOCKET A  
SOCKET B

Does hydraulic warmup indicator light come on and solenoid energize?



- B**
1. Turn vehicle MASTER power switch OFF and shut off engine (TM 9-2350-314-10).
  2. Disconnect harness W64 connector P1 from hydraulic control box connector J1 .
  3. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and placing the other lead on hydraulic control box connector J1 pin N.

Is continuity present?



HYDRAULIC CONTROL BOX  
CONNECTOR J1  
PIN B  
PIN N

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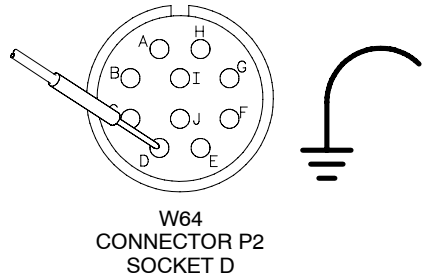
03pc077t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

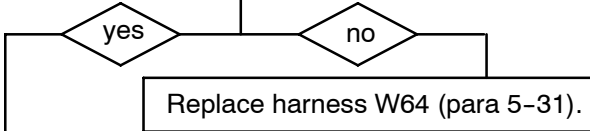
g. HYDRAULIC WARMUP SYSTEM - CONTINUED (5) HYDRAULIC WARMUP SOLENOID IS DE-ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS BELOW OPERATING TEMPERATURE. - CONTINUED

CONTINUED FROM STEP B

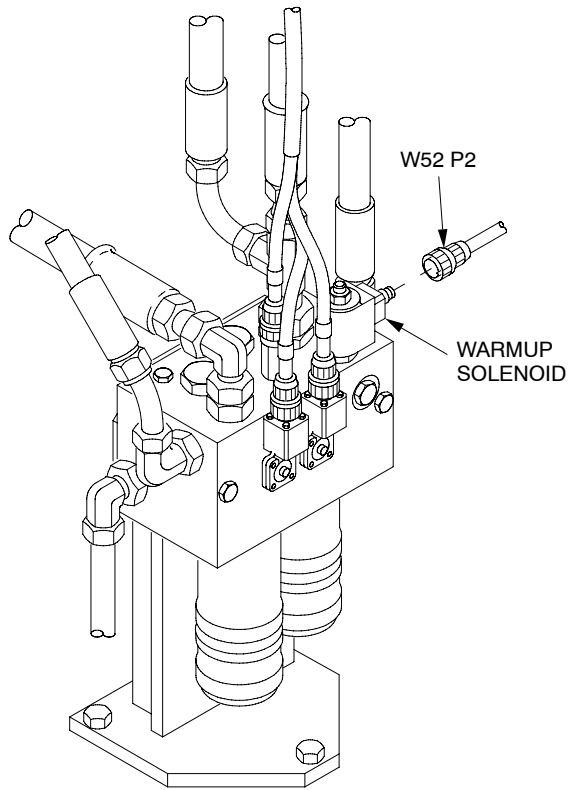
- C**
1. Turn HYDRAULIC POWER switch and HYDRAULIC WARM UP switch OFF (TM 9-2350-314-10).
  2. Reconnect harness W64 connector P1 to hydraulic control box connector J1.
  3. Disconnect harness W64 connector P2 from harness W52 connector J1 at hydraulic compartment bulkhead.
  4. Turn vehicle MASTER power switch ON, start engine, turn HYDRAULIC POWER switch and HYDRAULIC WARM UP switch ON (TM 9-2350-314-10).
  5. Place multimeter red lead in harness W64 connector P2 socket D and black lead to ground. Check for voltage.



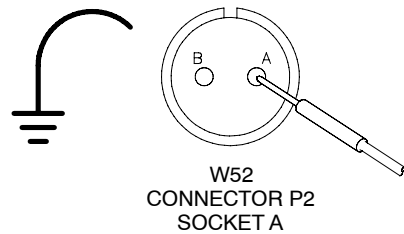
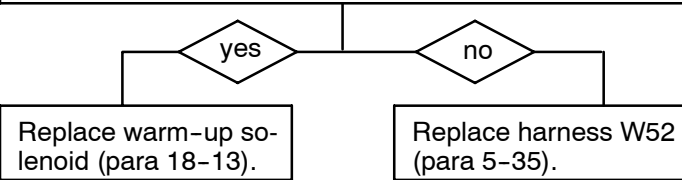
Is voltage present?



- D**
1. Shut engine OFF (TM 9-2350-314-10).
  2. Turn HYDRAULIC POWER switch, vehicle MASTER power switch, and HYDRAULIC WARM UP switch OFF (TM 9-2350-314-10).
  3. Reconnect harness W64 connector P2 to bulkhead connector.
  4. Disconnect harness W52 connector P2 from warm-up solenoid.
  5. Turn vehicle MASTER power switch ON, start engine, turn HYDRAULIC POWER switch ON and turn HYDRAULIC WARM UP switch ON (TM 9-2350-314-10).
  6. Place multimeter red lead in harness W52 connector P2 socket A and black lead to ground.
  7. Check for voltage.



Is voltage present?



03pc078t



### 3-3. TROUBLESHOOTING CHART - CONTINUED

g. HYDRAULIC WARMUP SYSTEM - CONTINUED (5) HYDRAULIC WARMUP SOLENOID IS DE-ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS BELOW OPERATING TEMPERATURE. - CONTINUED

CONTINUED FROM STEP B

**E** Remove cover from hydraulic control box (para 5-20).

Are all connections to terminal board 1 (TB1) tight?

yes

no

Go to Step G.

**F** 1. Tighten loose connections at terminal board 1 (TB1) (para 5-20).  
2. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and placing the other lead on hydraulic control box connector J1 pin N.

Is continuity present?

yes

no

Fault is corrected.

CONTINUED FROM STEP E

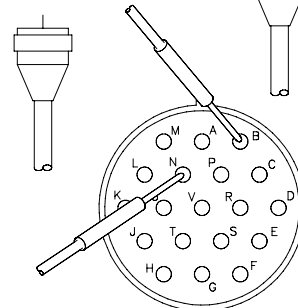
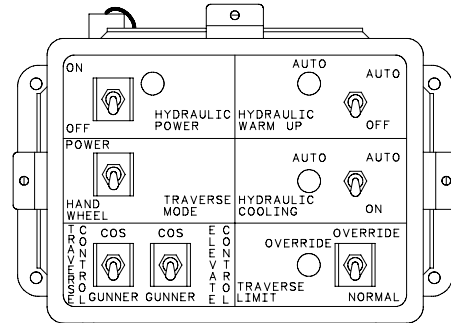
**G** Check lead 12934657-8 for continuity by placing one multimeter lead on terminal board 1 terminal 11 (TB1-11) and placing the other lead on the HYDRAULIC WARM UP switch S5 terminal 2 (S5-2).

Is continuity present?

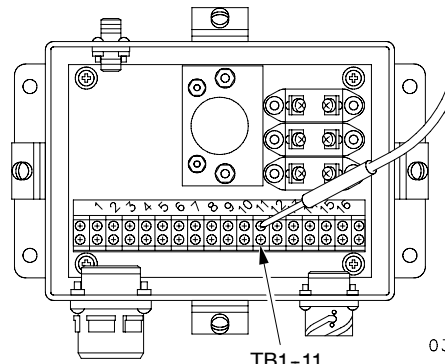
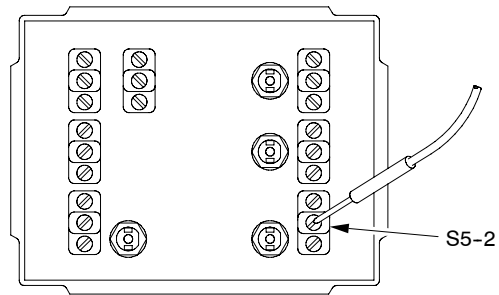
yes

no

Replace lead 12934657-8 (para 5-21).



HYDRAULIC CONTROL BOX  
CONNECTOR J1  
PIN B  
PIN N

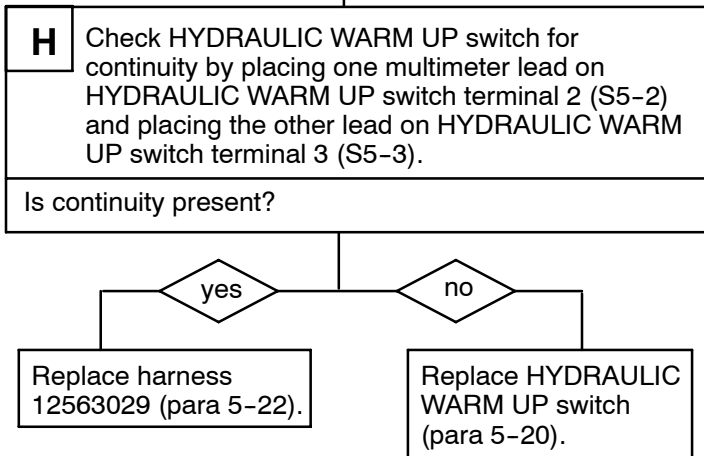


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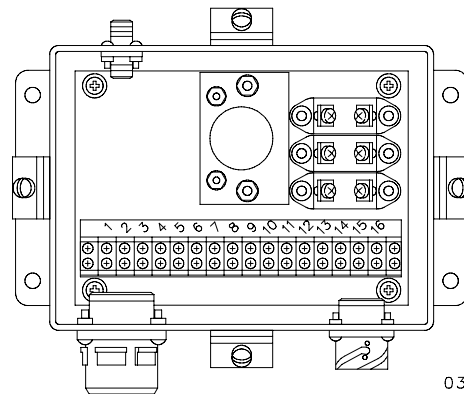
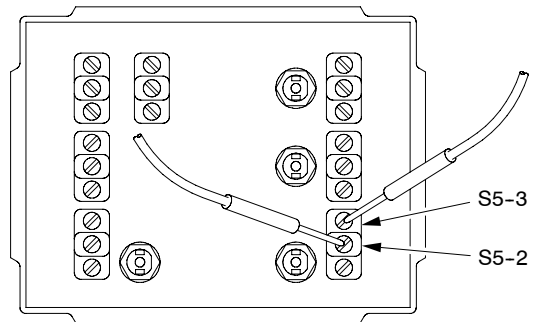
### 3-3. TROUBLESHOOTING CHART - CONTINUED

g. HYDRAULIC WARMUP SYSTEM - CONTINUED (5) HYDRAULIC WARMUP SOLENOID IS DE-ENERGIZED WHEN HYDRAULIC WARMUP SWITCH IS IN AUTOMATIC POSITION AND HYDRAULIC FLUID TEMPERATURE IS BELOW OPERATING TEMPERATURE. - CONTINUED

CONTINUED FROM STEP G



**END OF TASK**



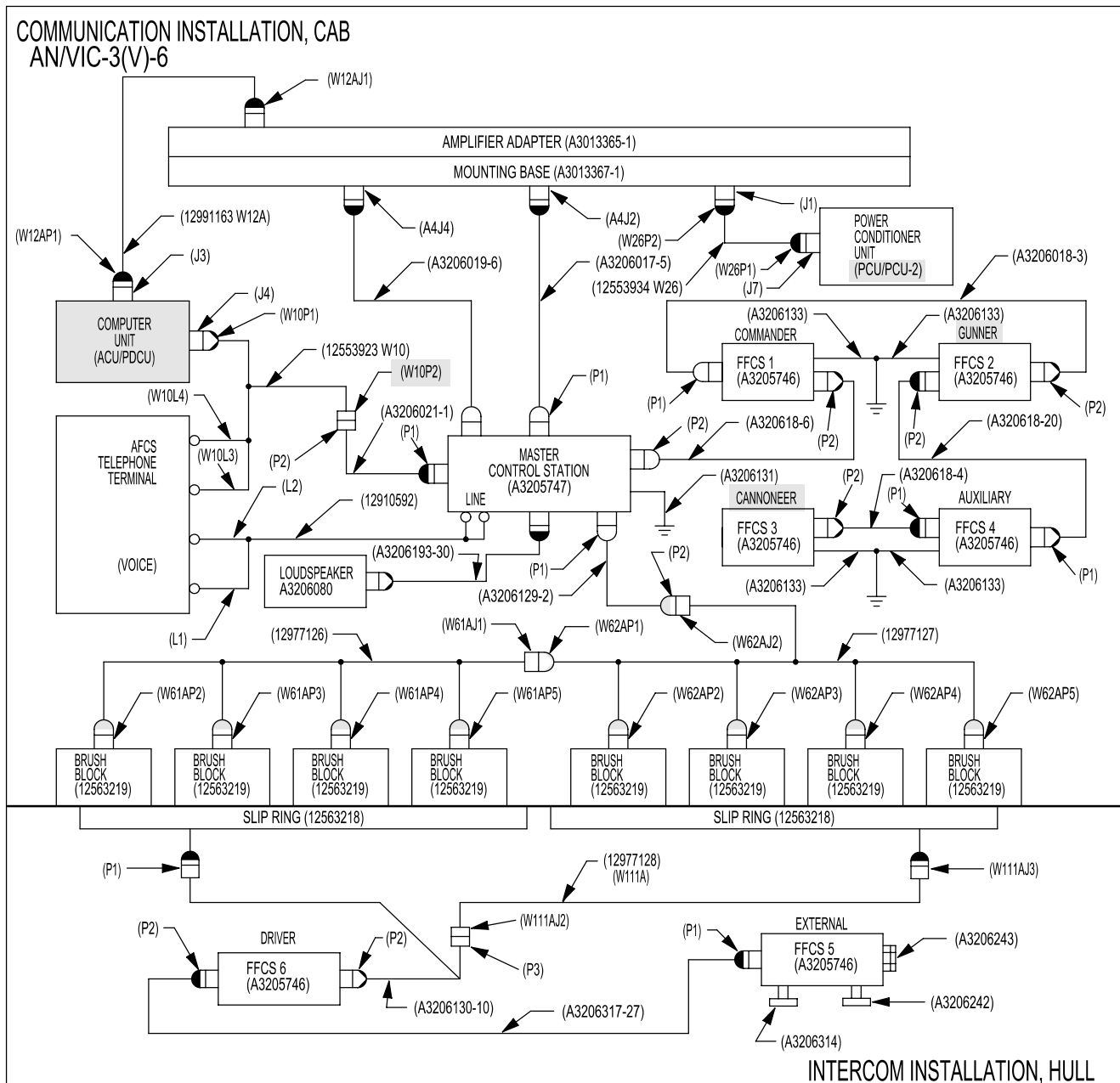
03pc087t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### h. INTERCOM SYSTEM

The AN/VIC-3(V)-6 intercom system provides internal communication between the six intercom stations and the telephone terminal. The AN/VIC-3(V)-6 intercom system consists of a master control station and six full function crew stations (commander, cannoneer, gunner, driver, auxiliary, and exterior) and a filter. The two diagrams below show the relationship of these components.

Upon powering up the Vehicular Intercommunication System (VIS) AN/VIC-3(V)-6, the master control station performs built-in test (BIT) routine on itself and other connected units. After startup BIT finishes, the master control station goes into continuous performance monitoring (CPM) of the system. If a failure occurs during BIT or CPM, the master control station displays an error message on the alphanumeric display. Refer to TM 11-5820-263-10 for further descriptions of components and error messages.



21pc001t

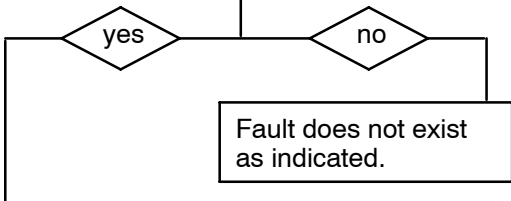
### 3-3. TROUBLESHOOTING CHART - CONTINUED

h. INTERCOM SYSTEM - CONTINUED (1) INTERCOM SYSTEM DOES NOT OPERATE PROPERLY.

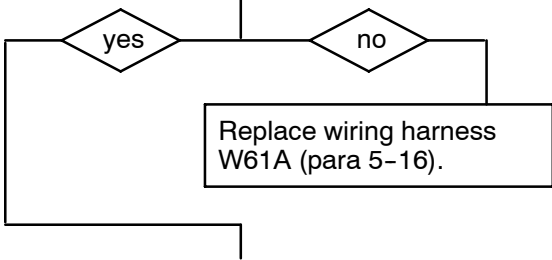
INITIAL SETUP  
Tools  
Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
Multimeter (item 24, Appx G)  
TA1 probe kit (item 42, Appx G)

**NOTE**  
Make sure segment boards are clean before running VMS test. If necessary clean boards (para 23-3).

**A** Perform an operational check of the intercom system (TM 11-5830-263-10).  
Is there a communication failure between any of the crew and driver station intercoms?



**B** Perform a harness test on harness W61A (para 3-3.n(12)).  
Is harness W61A good?

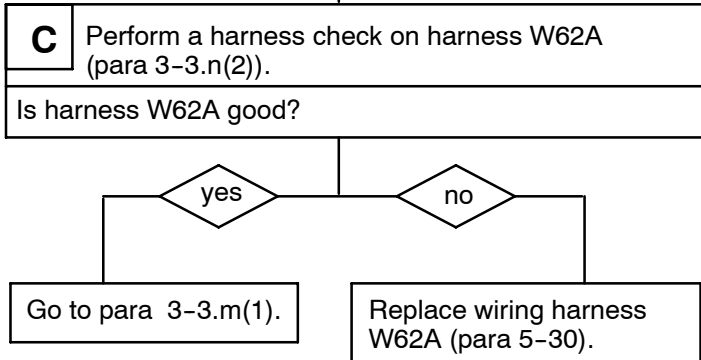


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

h. INTERCOM SYSTEM - CONTINUED (1) INTERCOM SYSTEM DOES NOT OPERATE PROPERLY - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

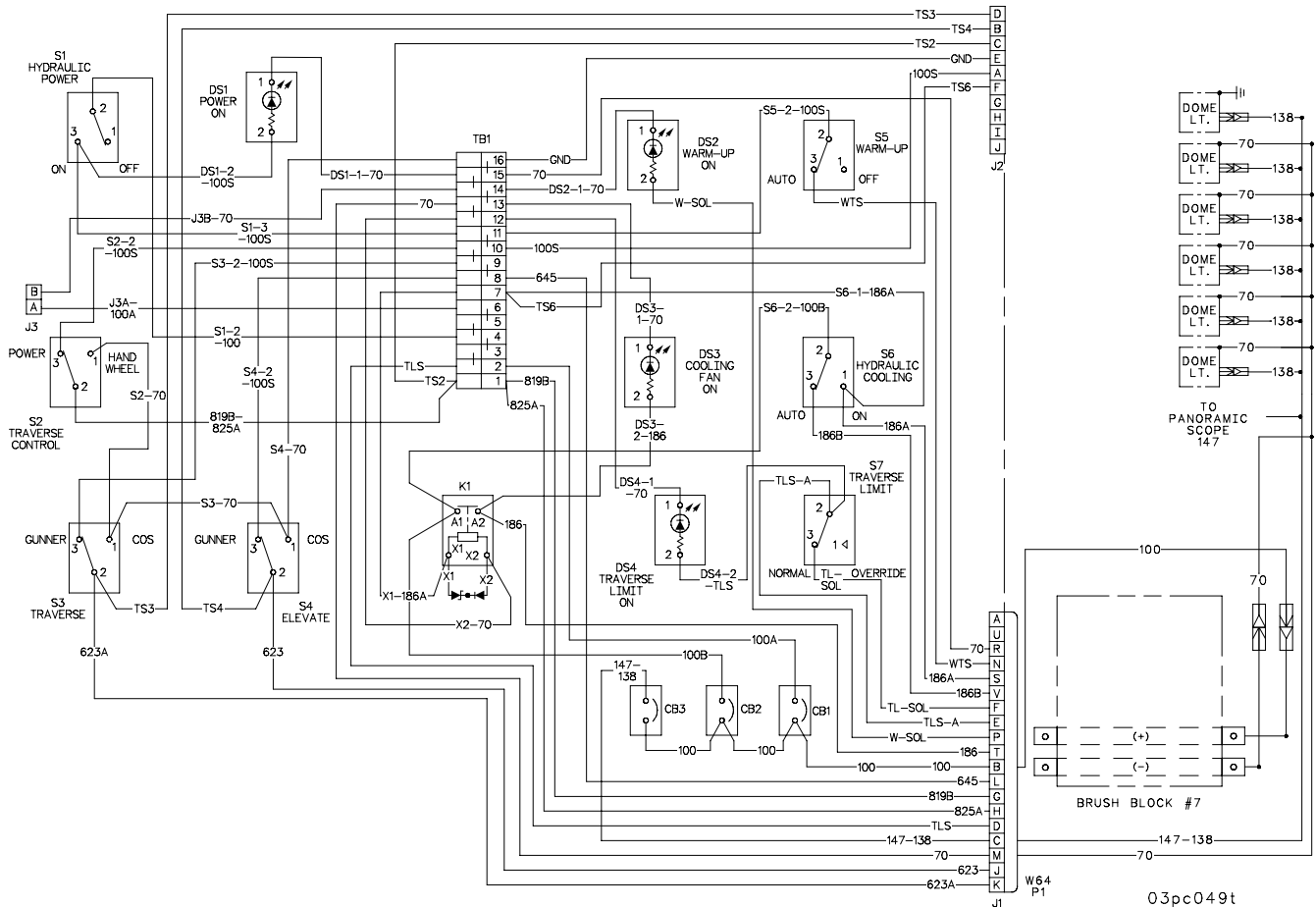


### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### i. LIGHTS

The lights consist of the dome lights, hydraulic control box, and associated wiring. The diagram below shows the relationship between these components.

When the MASTER power switch is ON, 24 V dc is supplied through the slip ring brush blocks to circuit breaker 3 (CB3) in the hydraulic control box. From CB3 the voltage is applied to each dome light. Activation of the dome light switch illuminates either the white light or blackout lamp.



### 3-3. TROUBLESHOOTING CHART - CONTINUED

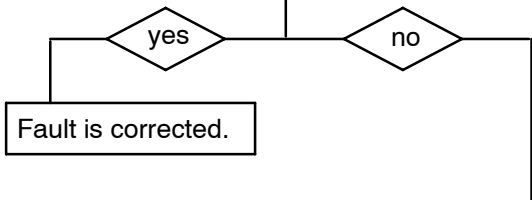
i. LIGHTS - CONTINUED (1) TRAVERSE LIMIT LIGHT DOES NOT COME ON WHEN CAB TRAVERSES 45° OR MORE. Cab stops traversing and POWER ON light illuminates.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

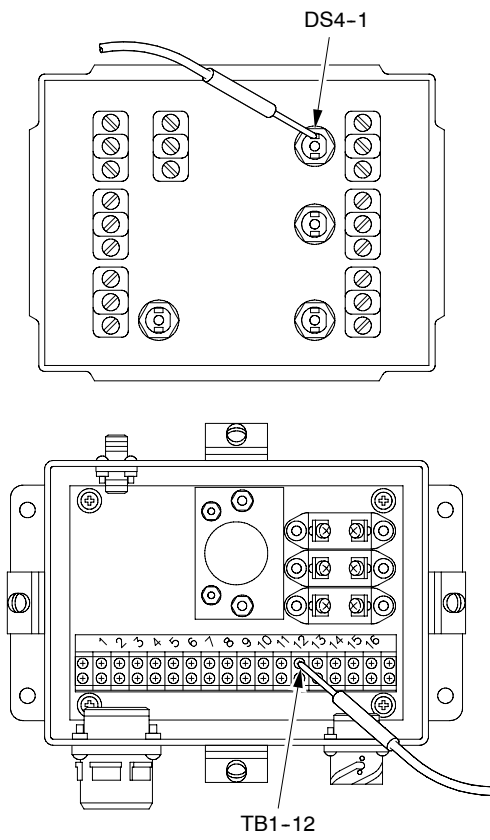
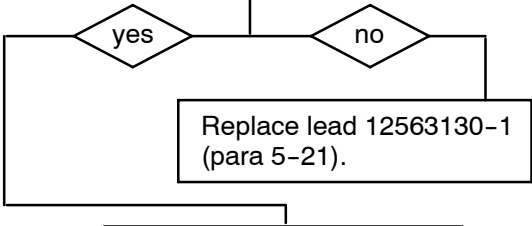
- A**
1. Replace TRAVERSE LIMIT light with good LED (para 5-20).
  2. Make sure cab is traversed 45° or more (TM 9-2350-314-10).
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  4. Check TRAVERSE LIMIT light for normal operation (TM 9-2350-314-10).

Is TRAVERSE LIMIT light ON?



- B**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Remove cover of hydraulic control box (para 5-20).
  3. Disconnect harness W64 connector P1 from control box J1.
  4. Make sure all screws on TB1 are tight.
  5. Check lead 12563130-1 for continuity by placing one multimeter lead on terminal 12 of TB1 and placing the other lead on DS4-1.

Is there continuity?



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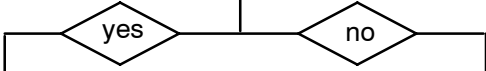


### 3-3. TROUBLESHOOTING CHART - CONTINUED

i. LIGHTS - CONTINUED (1) TRAVERSE LIMIT LIGHT DOES NOT COME ON WHEN CAB TRAVERSES 45° OR MORE. Cab stops traversing and POWER ON light illuminates. - CONTINUED

CONTINUED FROM STEP B

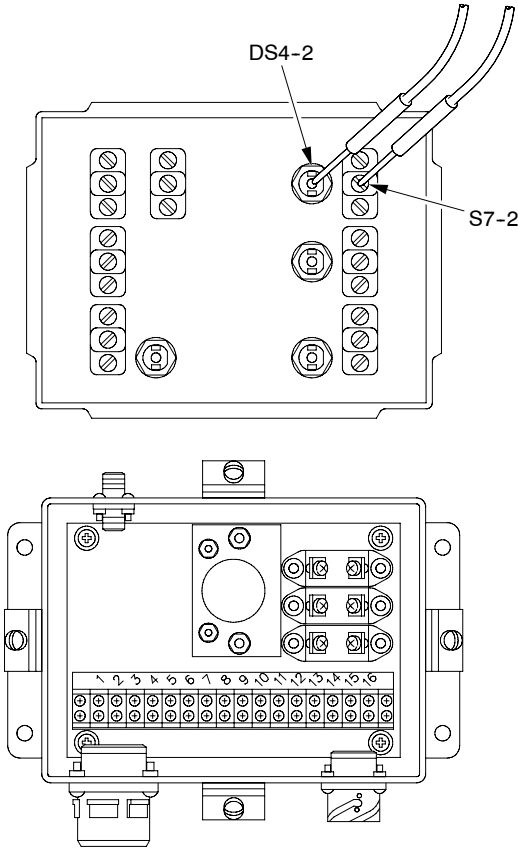
**C** Check for continuity by placing one multimeter lead on DS4-2 and placing the other lead on traverse limit switch S7 terminal 2 (S7-2).  
Is there continuity?



Replace DS4 light housing (para 5-20).

Replace lead 12563130-7 (para 5-21).

END OF TASK



03pc051t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

i. LIGHTS - CONTINUED (2) DOME LIGHT FAILS TO OPERATE. All other lights operate.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

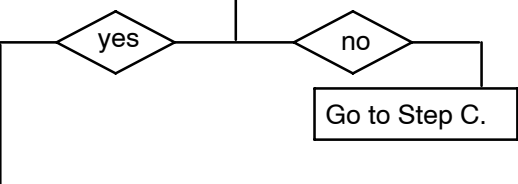
All cab dome lights are identical. Use this tree to troubleshoot any or all dome lights that do not operate.

**NOTE**

Move dome light switch to both positions. If dome light comes on in one position, go to Step J.

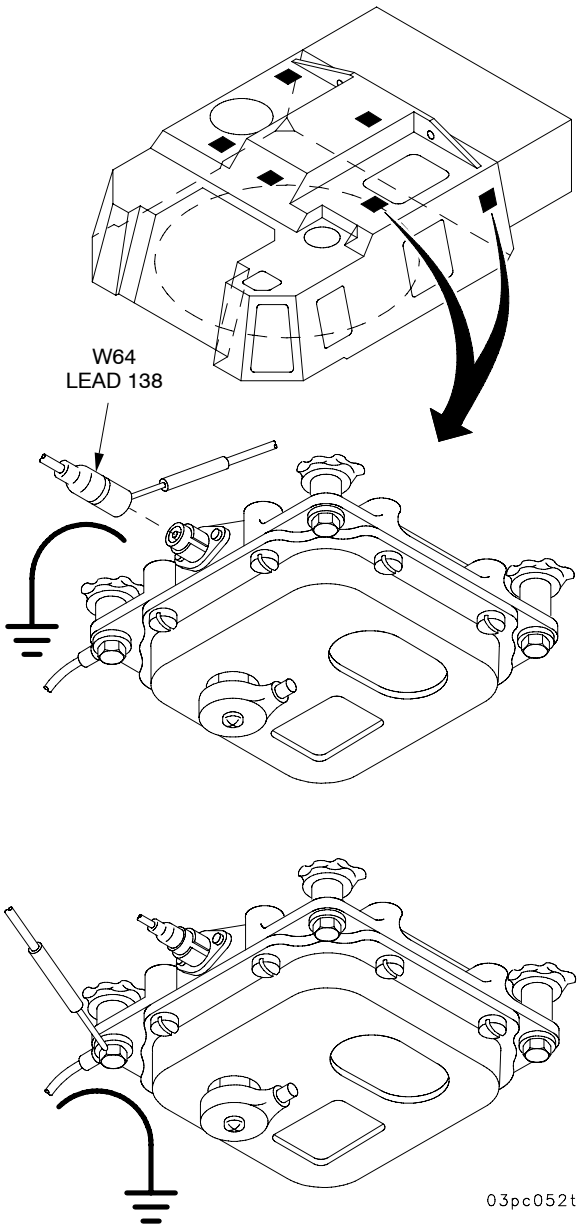
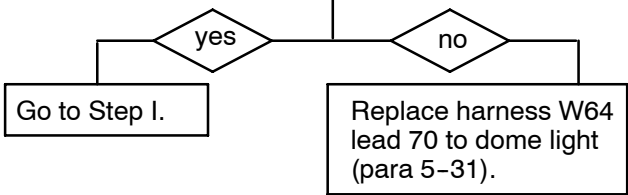
- A**
1. Disconnect harness W64 lead 138 connector from dome light.
  2. Place multimeter red lead in lead 138 connector socket and black lead on ground.
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10) and check for voltage.

Is voltage present?



- B**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Place one multimeter lead on dome light ground connector and other lead on vehicle ground.
  3. Check for continuity.

Is continuity present?



03pc052t

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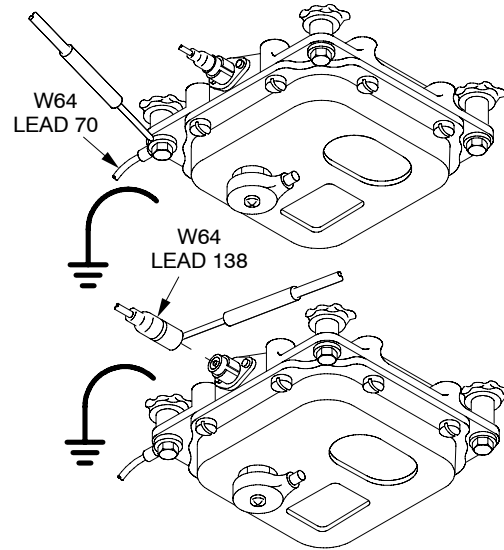
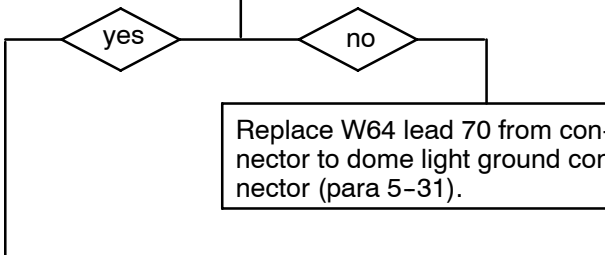
# 3-3. TROUBLESHOOTING CHART - CONTINUED

i. LIGHTS - CONTINUED (2) DOME LIGHT FAILS TO OPERATE. All other lights operate. - CONTINUED

CONTINUED FROM STEP A

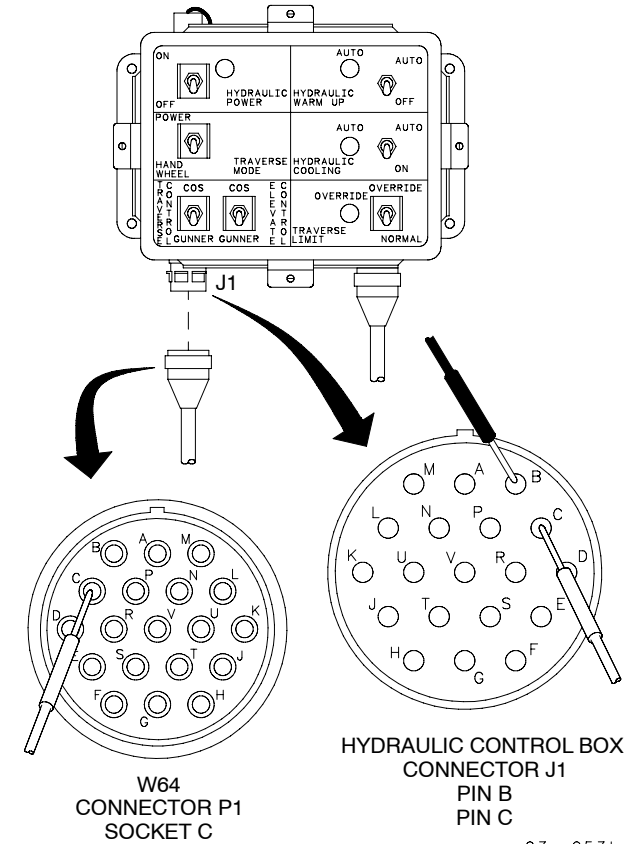
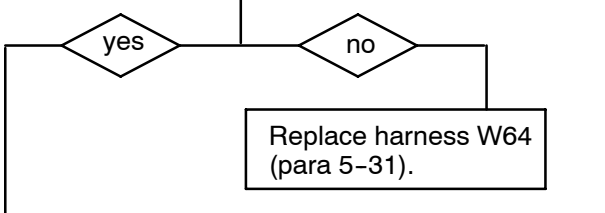
**C** 1. Place one multimeter lead on W64 lead 70 connector and other lead on vehicle ground.  
2. Check for continuity.

Is continuity present?



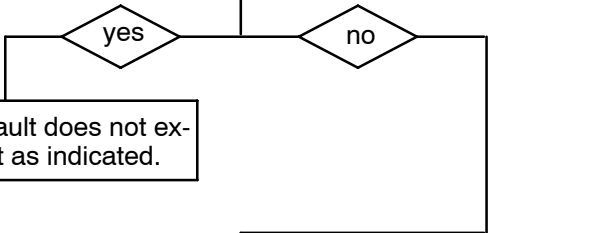
**D** 1. Make sure vehicle MASTER power switch is OFF (TM 9-2350-314-10).  
2. Disconnect harness W64 connector P1 from hydraulic control box connector J1.  
3. Place one multimeter lead in harness W64 connector P1 socket C and other lead in harness W64 lead 138 connector socket.  
4. Check for continuity.

Is continuity present?



**E** 1. Place one multimeter lead in hydraulic control box connector J1 pin C and other lead in hydraulic control box connector J1 pin B.  
2. Check for continuity.

Is continuity present?



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03pc053t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

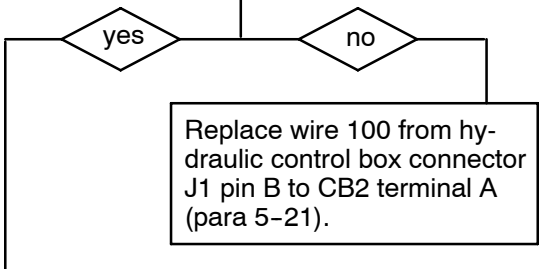
i. LIGHTS - CONTINUED (2) DOME LIGHT FAILS TO OPERATE. All other lights operate. - CONTINUED

CONTINUED FROM STEP E

**F**

1. Remove hydraulic control box cover (para 5-21).
2. Place one multimeter lead in hydraulic control box connector J1 pin B and other lead on circuit breaker 2 (CB2) terminal A.
3. Check for continuity.

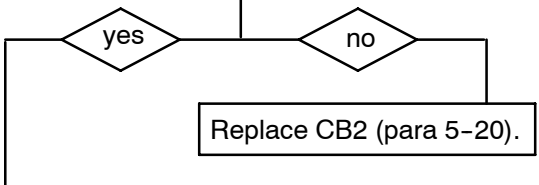
Is continuity present?



**G**

1. Place one multimeter lead on CB2 terminal A and place other multimeter lead on CB2 terminal B.
2. Check for continuity.

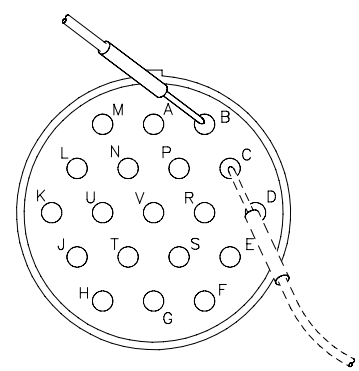
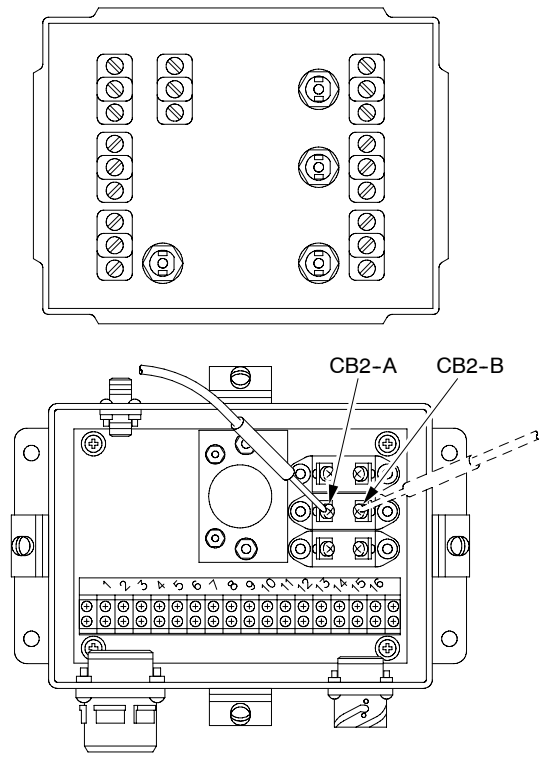
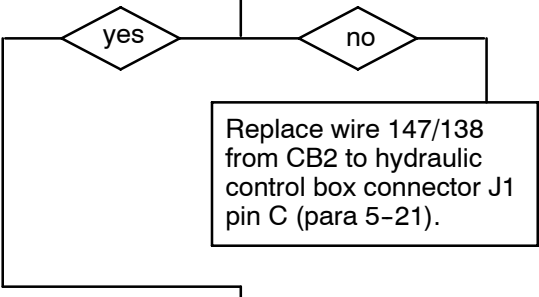
Is continuity present?



**H**

1. Place one multimeter lead on CB2 terminal B and other multimeter lead in hydraulic control box connector J1 pin C.
2. Check for continuity.

Is continuity present?



HYDRAULIC CONTROL BOX  
CONNECTOR J1  
PIN B  
(PIN C)

03pc054t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

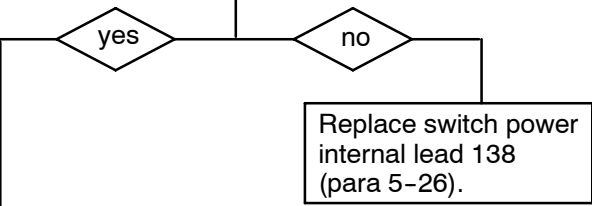
i. LIGHTS - CONTINUED (2) DOME LIGHT FAILS TO OPERATE. All other lights operate. - CONTINUED

CONTINUED FROM STEP B AND H

**I**

1. Remove dome light cover (para 5-26).
2. Turn vehicle MASTER power switch ON (TM 9-2350-314-10) and check for voltage.
3. Place multimeter red lead on switch power-in lead and black lead on ground.

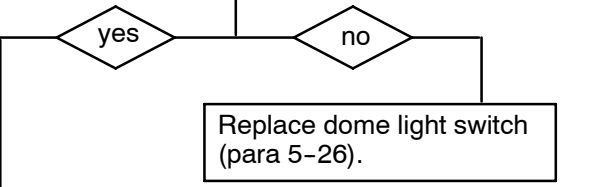
Is voltage present?



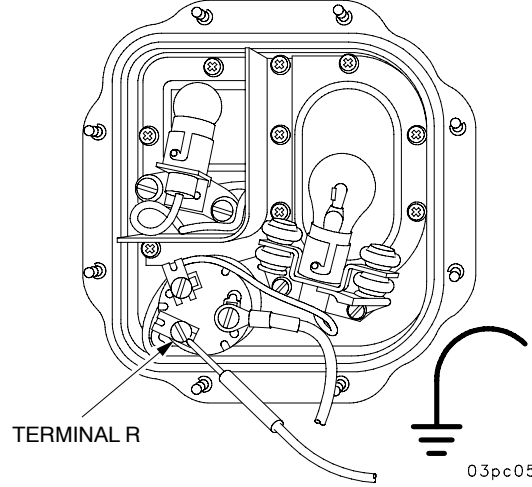
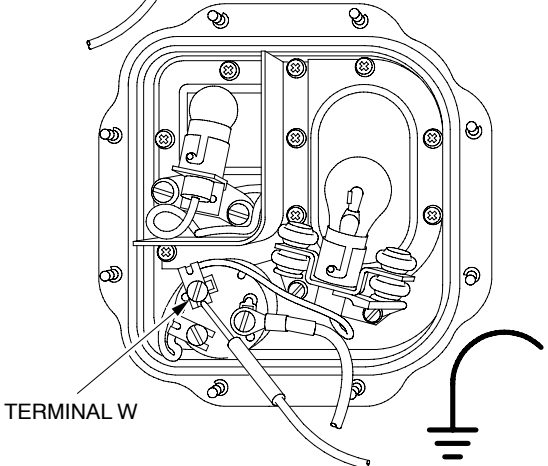
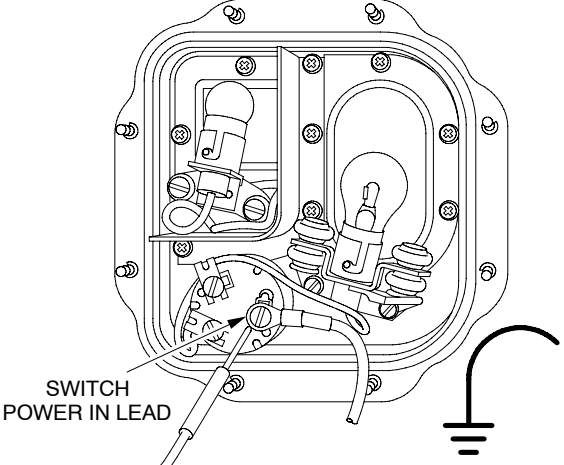
**J**

1. Turn dome light switch to white light position (TM 9-2350-314-10).
2. Place multimeter red lead on switch terminal W and black lead on ground. Check for voltage.
3. Turn dome light switch to BO light position (TM 9-2350-314-10).
4. Place multimeter red lead on switch terminal R and black lead on ground. Check for voltage.

Is voltage present?



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03pc055t

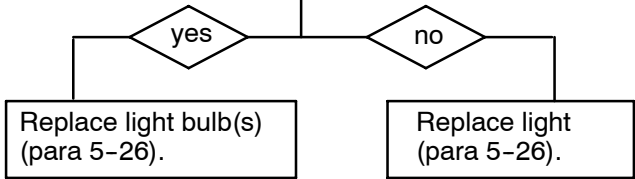
### 3-3. TROUBLESHOOTING CHART - CONTINUED

i. LIGHTS - CONTINUED (2) DOME LIGHT FAILS TO OPERATE. All other lights operate. - CONTINUED

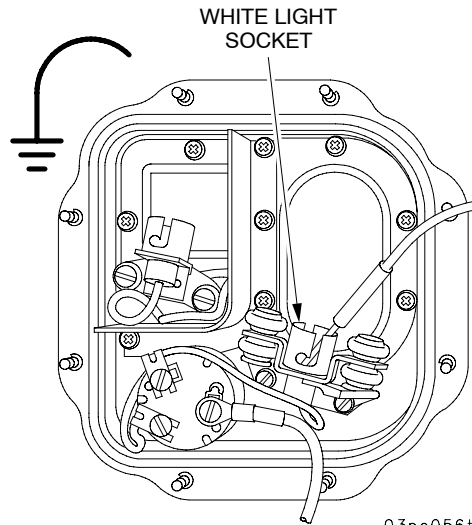
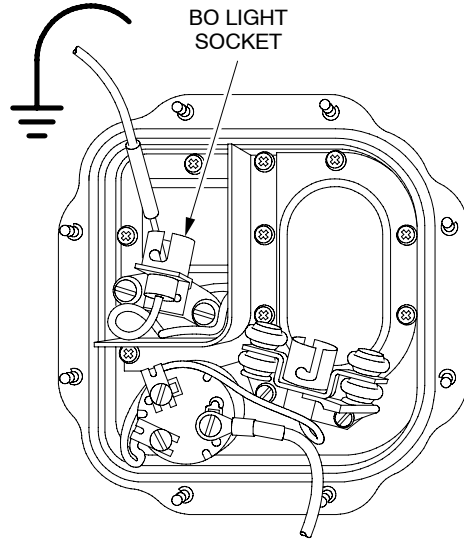
CONTINUED FROM STEP J

- |          |   |
|----------|---|
| <b>K</b> | <ol style="list-style-type: none"> <li>1. Turn dome light switch OFF (TM 9-2350-314-10).</li> <li>2. Remove bulbs from BO and white light sockets.</li> <li>3. Place multimeter red lead on light socket center contact of BO light and black lead on ground.</li> <li>4. Turn dome light switch to BO and check for voltage (TM 9-2350-314-10).</li> <li>5. Place multimeter red lead on light socket center contact of white light and black lead on ground.</li> <li>6. Turn dome light switch to white light and check for voltage (TM 9-2350-314-10).</li> </ol> |
|----------|---|

Is voltage present?



**END OF TASK**



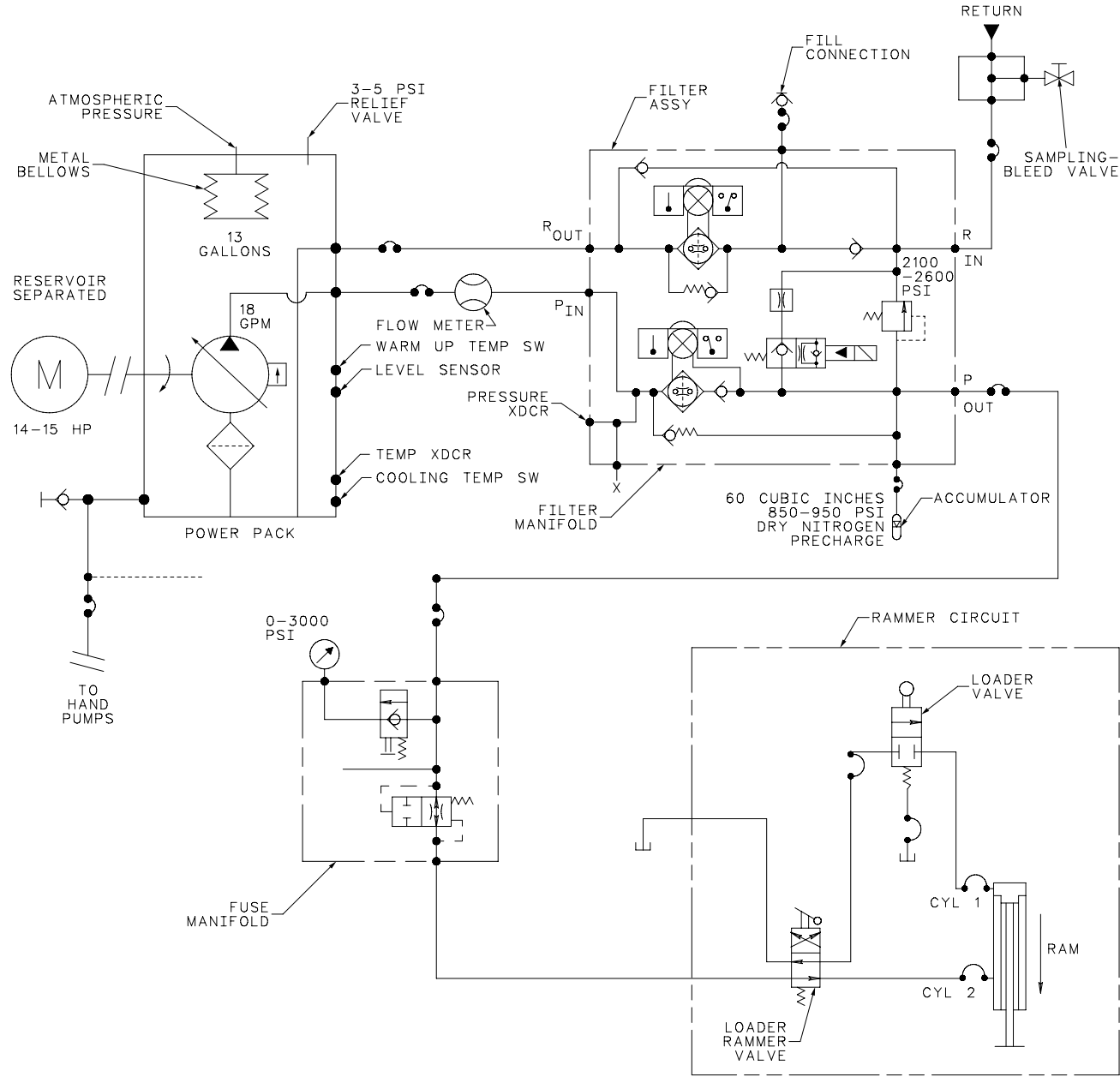
03pc056t

# 3-3. TROUBLESHOOTING CHART - CONTINUED

## j. LOADER RAMMER

The loader rammer system consists of the powerpack (hydraulic motor, pump, reservoir), filter assembly, fuse manifold, loader rammer valve, loader valve, and ram cylinder. The diagram below shows the relationship between these components.

With MASTER power switch and HYDRAULIC POWER switch set to ON, 24 V dc is applied to the hydraulic motor which energizes the hydraulic system. The loader rammer valve and loader valve operate the ram cylinder for loading a projectile.



16pc033t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

j. LOADER RAMMER - CONTINUED (1) RAMMER DOES NOT OPERATE (EXTEND OR RETRACT). Traverse and elevate are normal.

**INITIAL SETUP**

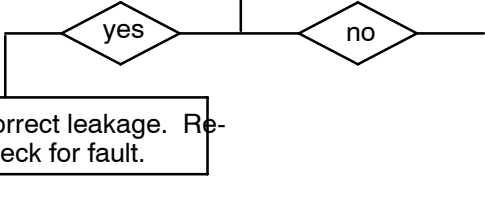
Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

Prior to starting this tree, ensure that the velocity fuse is reset.

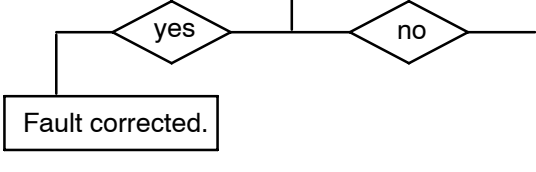
**A** Inspect cab interior and rammer for hydraulic fluid leakage (TM 9-2350-314-10).

Does leakage exist?



**B** Do an operational check on rammer (TM 9-2350-314-10).

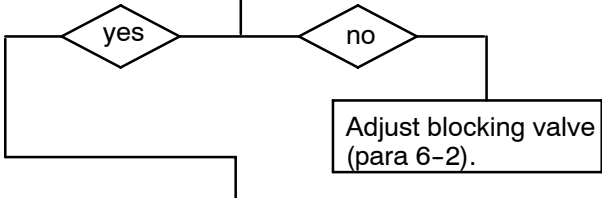
Does rammer operate smoothly and properly?



**C**

1. Turn HYDRAULIC POWER switch, engine, and vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Examine blocking valve to be sure the plunger on the blocking valve is being actuated by the ramp on the rammer (para 6-2).

Is the ramp engaging the plunger?



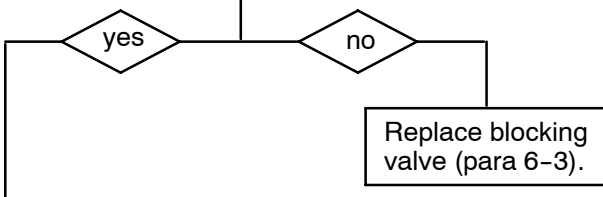


### 3-3. TROUBLESHOOTING CHART - CONTINUED

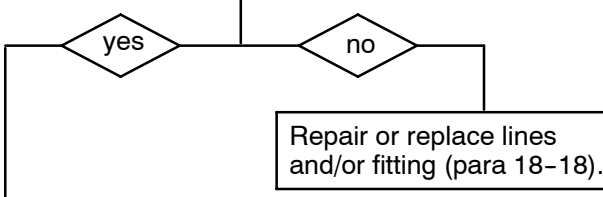
j. LOADER RAMMER - CONTINUED (1) RAMMER DOES NOT OPERATE (EXTEND OR RETRACT). Traverse and elevate are normal. - CONTINUED

CONTINUED FROM STEP C

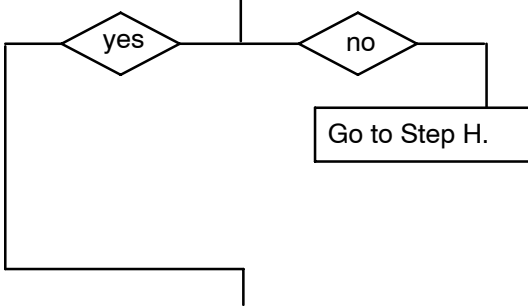
<b>D</b>	<ol style="list-style-type: none"> <li>1. Push main release handle to unlatch rammer (TM 9-2350-314-10).</li> <li>2. Extend rammer fully rearward and down (TM 9-2350-314-10).</li> <li>3. Push in blocking valve plunger (para 6-2).</li> </ol>
Does blocking valve plunger push in?	



<b>E</b>	Check lines and fitting for any restrictions or leakage.
Are lines and fitting good?	



<b>F</b>	<ol style="list-style-type: none"> <li>1. Make sure rammer is in the ram position (TM 9-2350-314-10).</li> <li>2. While holding the rammer hydraulic supply line, activate the rammer (TM 9-2350-314-10).</li> </ol>
Did the line move and could you feel the fluid moving through the line?	



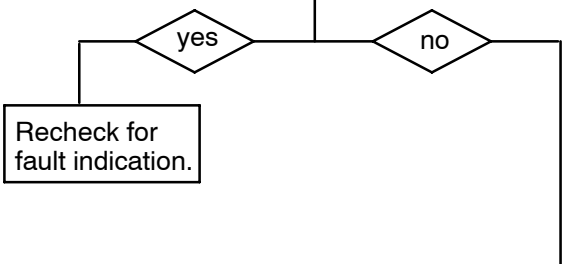
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

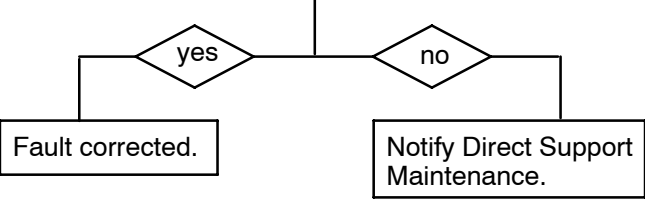
j. LOADER RAMMER - CONTINUED (1) RAMMER DOES NOT OPERATE (EXTEND OR RETRACT). Traverse and elevate are normal. - CONTINUED

CONTINUED FROM STEP F

<b>G</b>	<ol style="list-style-type: none"> <li>1. Open equilibration shutoff valve (TM 9-2350-314-10).</li> <li>2. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).</li> <li>3. Shut off engine and turn vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>4. Zero hydraulic system pressure (para 18-1).</li> <li>5. Remove fuse manifold cover (para 18-11) and hold onto the loader's velocity fuse and bleed off static pressure at the bleed/sampling valve on the pressure manifold (para 18-1).</li> </ol>
<p>Could you hear or feel the velocity fuse reset?</p>	



<b>H</b>	<ol style="list-style-type: none"> <li>1. Replace the velocity fuse (para 18-11).</li> <li>2. Do an operational check on rammer (TM 9-2350-314-10).</li> </ol>
<p>Does rammer extend and retract?</p>	



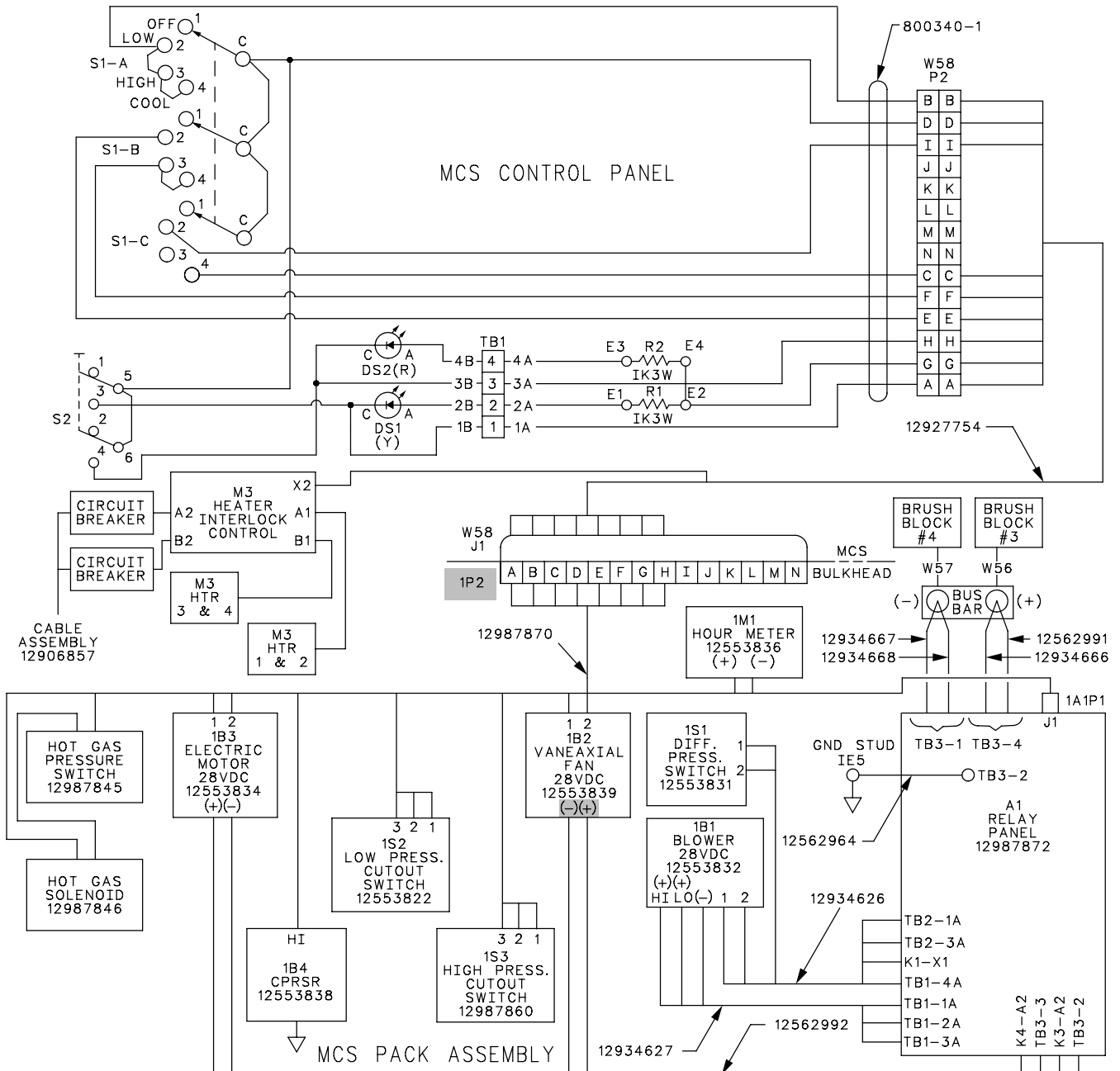
**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### k. MCS

The Microclimate Conditioning System (MCS) consists of the MCS control panel, MCS assembly (hourmeter, relay panel, differential pressure switch, blower, vaneaxial fan, motor, compressor, low pressure cutout switch, high pressure cutout switch, and associated wiring. The diagram below shows the relationship between these components.

With MASTER power switch ON, 24 V dc is supplied through slip ring brush blocks and bus bar to the MCS assembly and MCS control panel. Switch S1 on the MCS control panel enables the MCS assembly to provide low speed air, high speed air, or cool conditioned air to the crew.



11pc001t

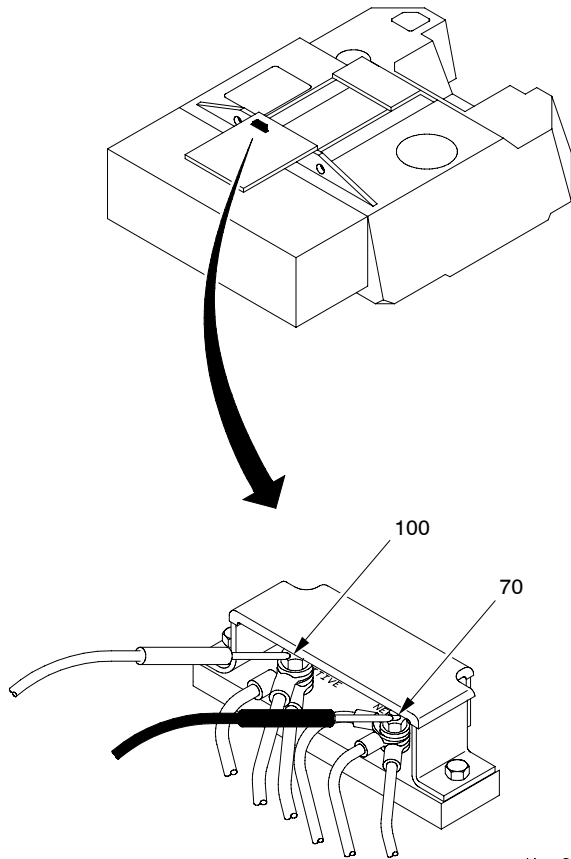
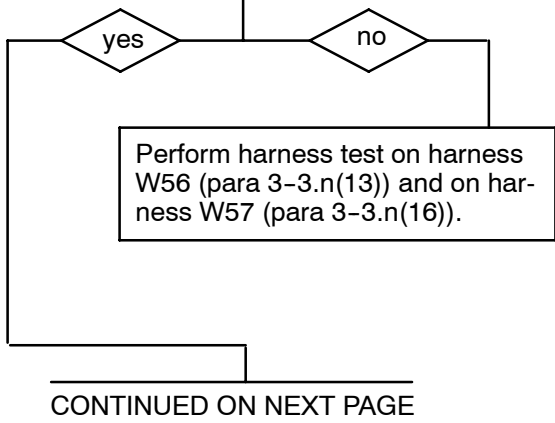
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (1) MCS DOES NOT OPERATE IN ANY MODE.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

- A**
1. Open MCS doors (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  3. Check MCS for voltage by placing multimeter red lead on bus bar 100 and black lead on bus bar 70.
- Is voltage present?



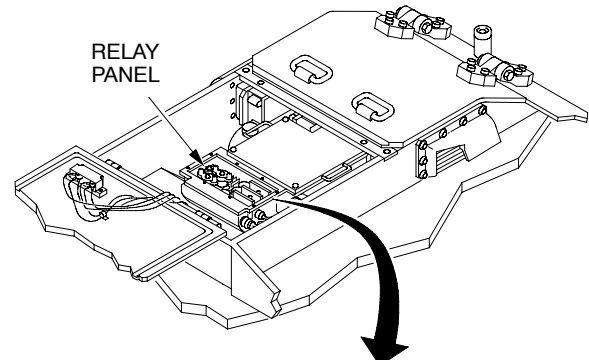
11pc010t

# 3-3. TROUBLESHOOTING CHART - CONTINUED

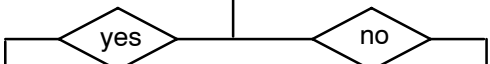
k. MCS - CONTINUED (1) MCS DOES NOT OPERATE IN ANY MODE. - CONTINUED

CONTINUED FROM STEP A

- B**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Remove MCS relay panel cover (para 13-12).
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  4. Place multimeter red lead on terminal SB-E4 of TB3 and black lead on terminal SB-E1 of TB3.
  5. Check for voltage.

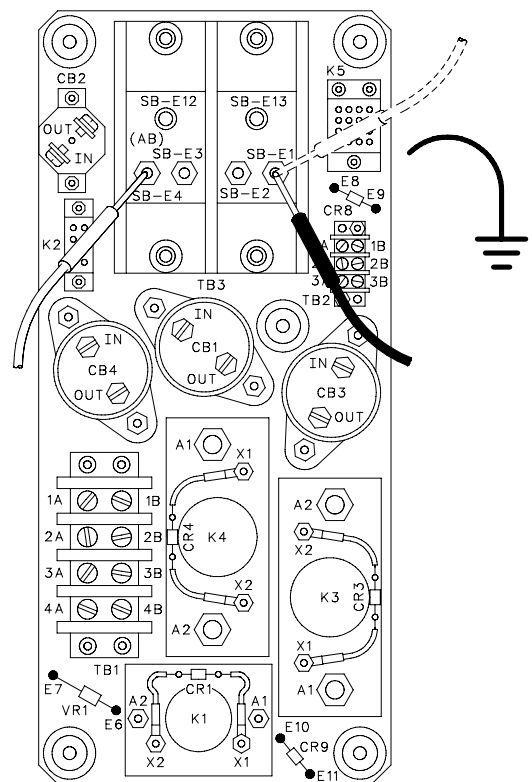


Is voltage present?



Go to Step D.

- C**
1. Place multimeter red lead on terminal SB-E1 of TB3 and black lead on ground.
  2. Check for voltage.



Is voltage present?



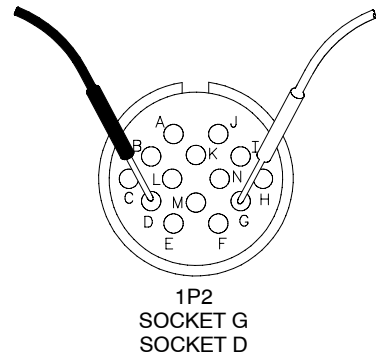
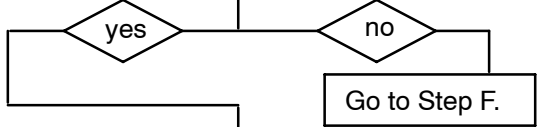
Repair or replace lead 70 from TB3 to bus bar 70 of MCS (para 13-27).

Repair or replace lead 100 from TB3 to bus bar 100 of MCS (para 13-26).

CONTINUED FROM STEP B

- D**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect wire 1P2 from harness W58 connector J1 at MCS and CAB bulkhead.
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  4. Place multimeter red lead in socket G of wire 1P2 and black lead in socket D of wire 1P2.

Is voltage present?



CONTINUED ON NEXT PAGE

11pc011t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

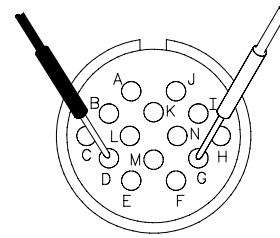
k. MCS - CONTINUED (1) MCS DOES NOT OPERATE IN ANY MODE. - CONTINUED

CONTINUED FROM STEP D

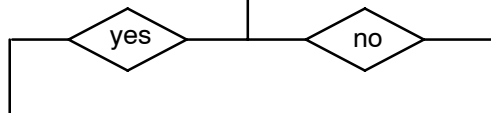
E

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Reconnect wire 1P2 to harness W58 connector J1.
3. Disconnect harness W58 connector P2 from MCS control box connector J1.
4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
5. Place multimeter red lead in socket G of harness W58 connector P2 and black lead in socket D of harness W58 connector P2.

Is voltage present?



W58  
CONNECTOR P2  
SOCKET G  
SOCKET D



Replace MCS control box (para 13-35).

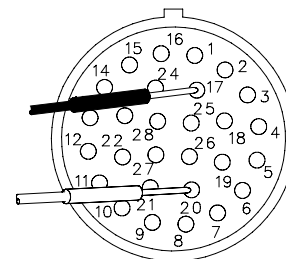
Repair or replace harness W58 (para 5-15).

CONTINUED FROM STEP D

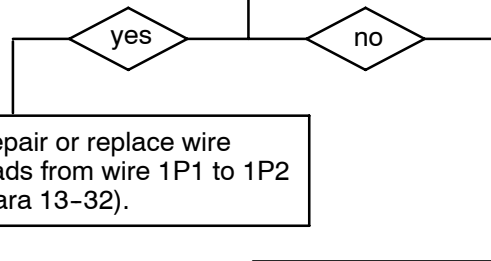
F

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect wire 1P1 from relay panel connector J1.
3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
4. Place multimeter red lead on relay panel connector J1 pin 20 and black lead on relay panel connector J1 pin 17.

Is voltage present?



RELAY PANEL  
CONNECTOR J1  
PIN 20  
PIN 17



Repair or replace wire leads from wire 1P1 to 1P2 (para 13-32).

CONTINUED ON NEXT PAGE

11pc012t

# 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (1) MCS DOES NOT OPERATE IN ANY MODE. - CONTINUED

CONTINUED FROM STEP F

**G** Place multimeter red lead on relay panel connector J1 pin 20 and black lead on ground.

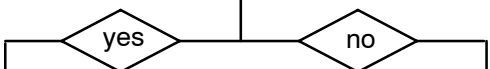
Is voltage present?



Repair or replace ground lead from relay panel connector J1 pin 17 to terminal SB-E3 of TB3 (para 13-32 ).

**H** Place multimeter red lead inside of CB2 and black lead on ground.

Is voltage present?



Notify Direct Support Maintenance.

**I** Place multimeter red lead on outside of CB2 and black lead on ground.

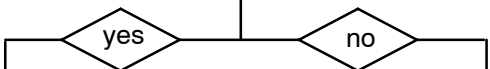
Is voltage present?



Notify Direct Support Maintenance.

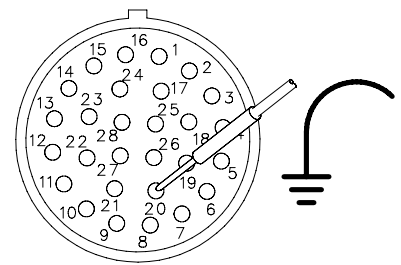
**J** Place multimeter red lead on relay K2 terminal B2 and black lead on ground.

Is voltage present?

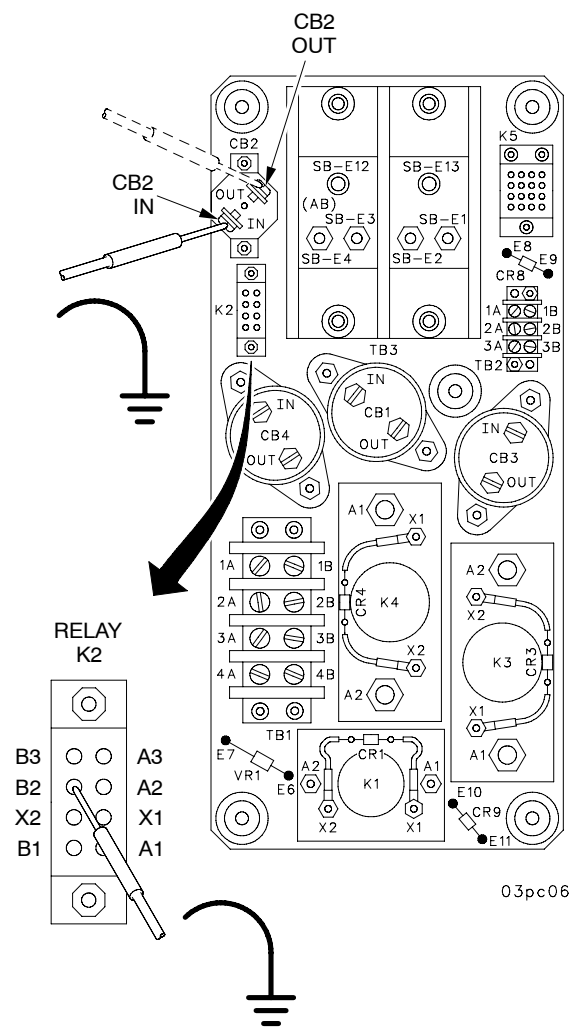


Notify Direct Support Maintenance.

CONTINUED ON NEXT PAGE



RELAY PANEL CONNECTOR J1 PIN 20



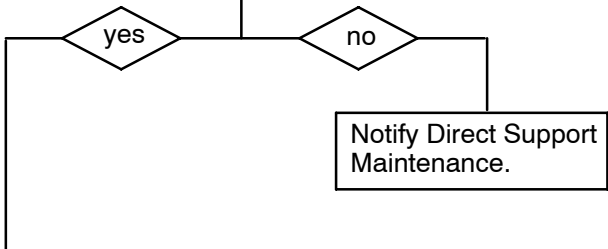
03pc063t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

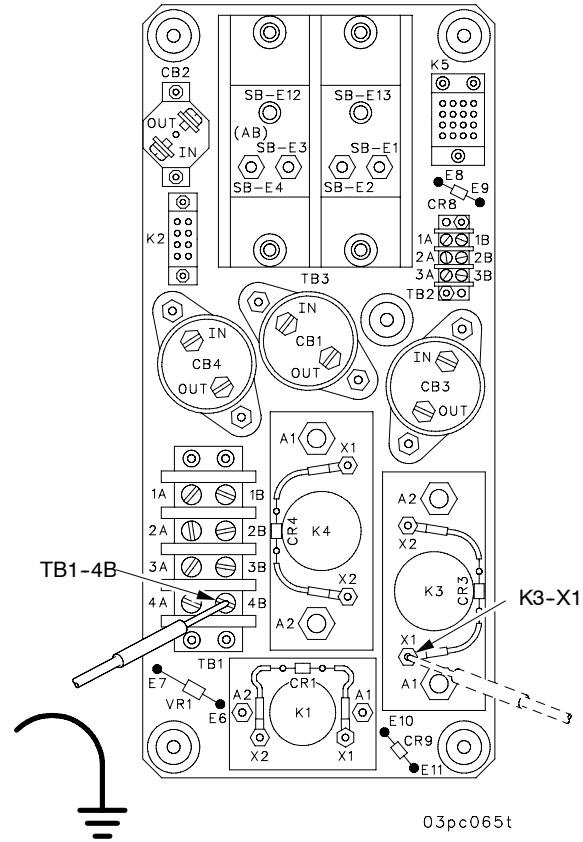
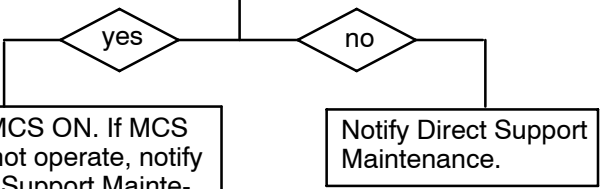
k. MCS - CONTINUED (1) MCS DOES NOT OPERATE IN ANY MODE. - CONTINUED

CONTINUED FROM STEP J

**K** Place multimeter red lead on terminal 4B of TB1 and black lead on ground.  
Is voltage present?



**L** Place multimeter red lead on relay K3 terminal X1 and black lead on ground.  
Is voltage present?



**END OF TASK**



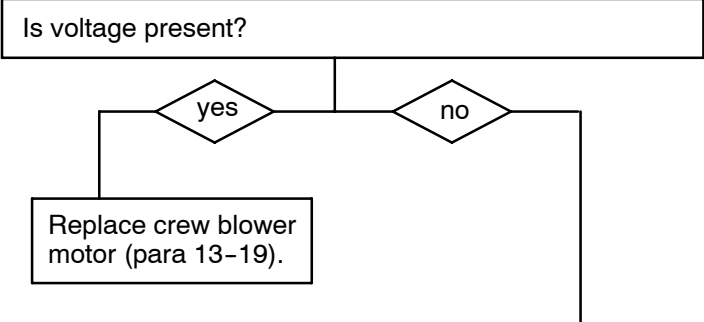
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (2) MCS HAS NO OUTPUT TO CREW STATION WHEN IN HI MODE.

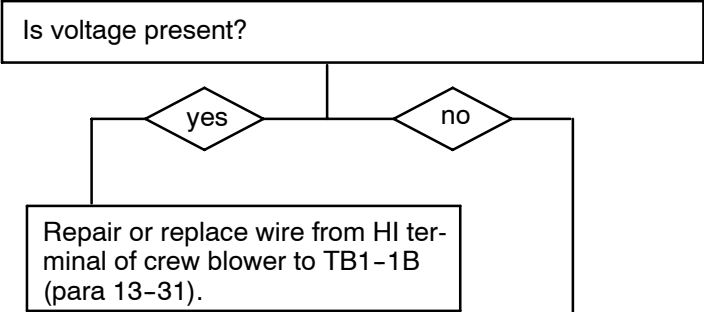
INITIAL SETUP

<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Conditions</u>                  Ballistic cover opened (TM 9-2350-314-10)                  Filter cover removed (para 13-11)</p>
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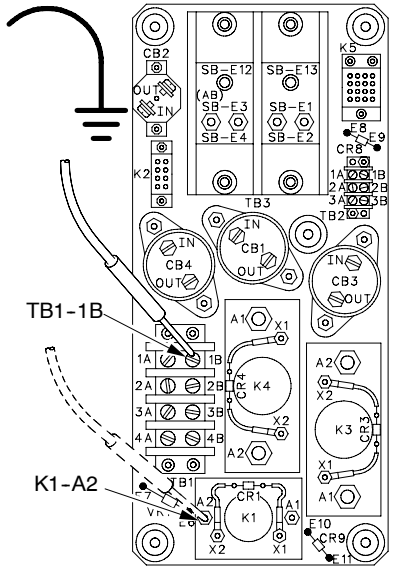
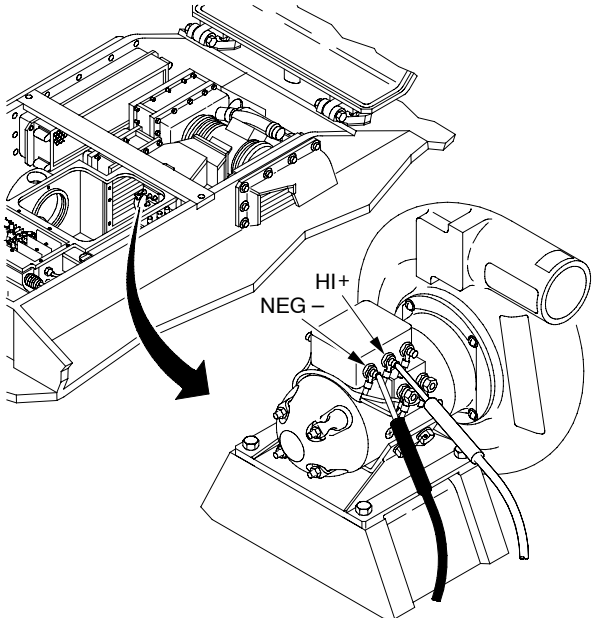
- A**
1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  2. Place MCS control box selector on HI (TM 9-2350-314-10).
  3. Check for voltage by placing multimeter red lead on the HI terminal (+) of blower and black lead on return terminal (-).



- B**
1. Place multimeter red lead on terminal 1B of TB1 and black lead on ground.
  2. Check for voltage.



- C**
1. Place multimeter red lead on terminal A2 of relay K1 and black lead on ground.
  2. Check for voltage.



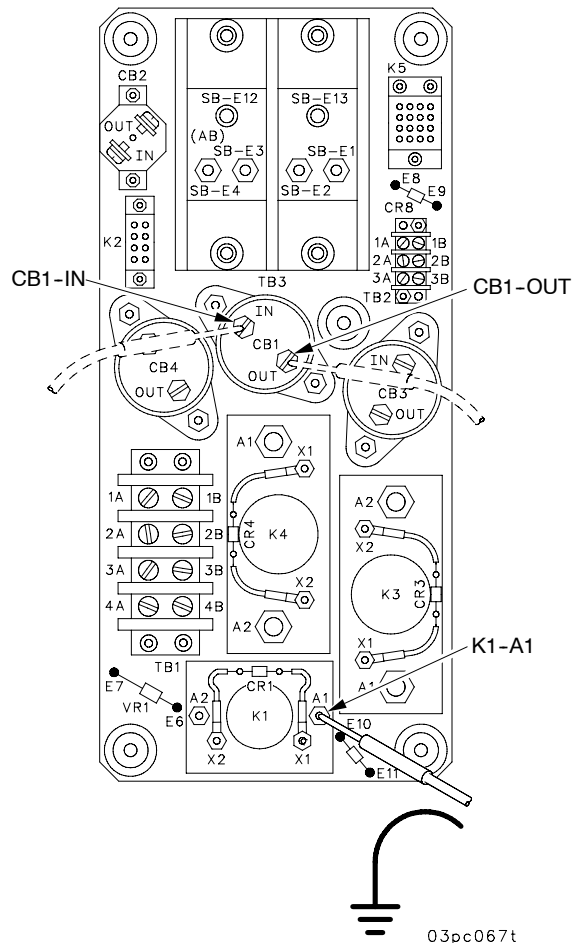
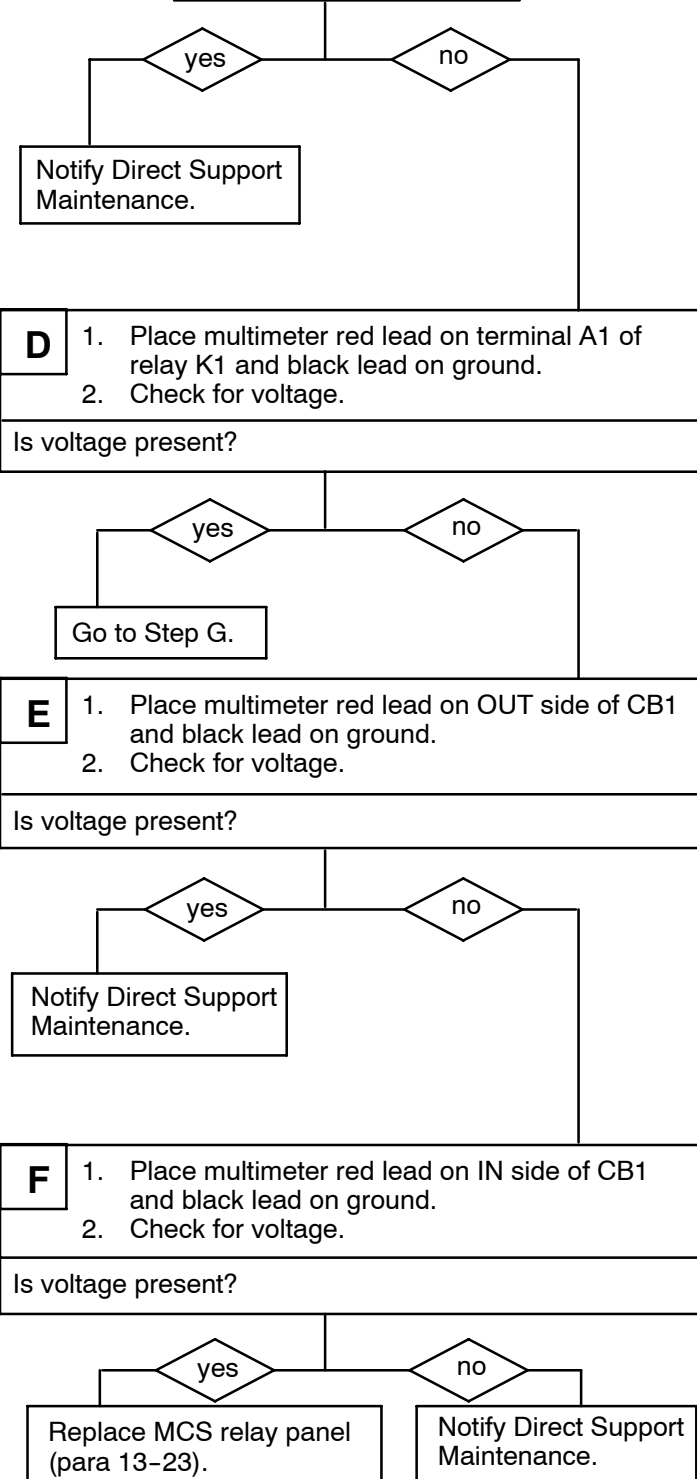
03pc066t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (2) MCS HAS NO OUTPUT TO CREW STATION WHEN IN HI MODE. - CONTINUED

CONTINUED FROM STEP C



CONTINUED ON NEXT PAGE

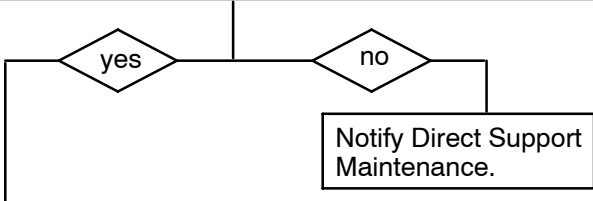
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (2) MCS HAS NO OUTPUT TO CREW STATION WHEN IN HI MODE. - CONTINUED

CONTINUED FROM STEP D

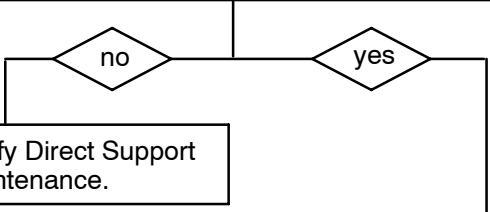
- G**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect wire from terminal X1 of relay K1.
  3. Place one multimeter lead on terminal X1 of relay K1 and other lead on terminal X2 of relay K1.
  4. Test for continuity.

Is continuity present?



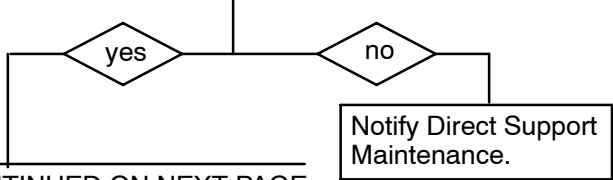
- H**
1. Disconnect harness 1P1 from J1 on the MCS relay panel.
  2. Place one multimeter lead on terminal X2 of relay K1 and other lead on connector J1 pin 19.
  3. Check for continuity.

Is continuity present?

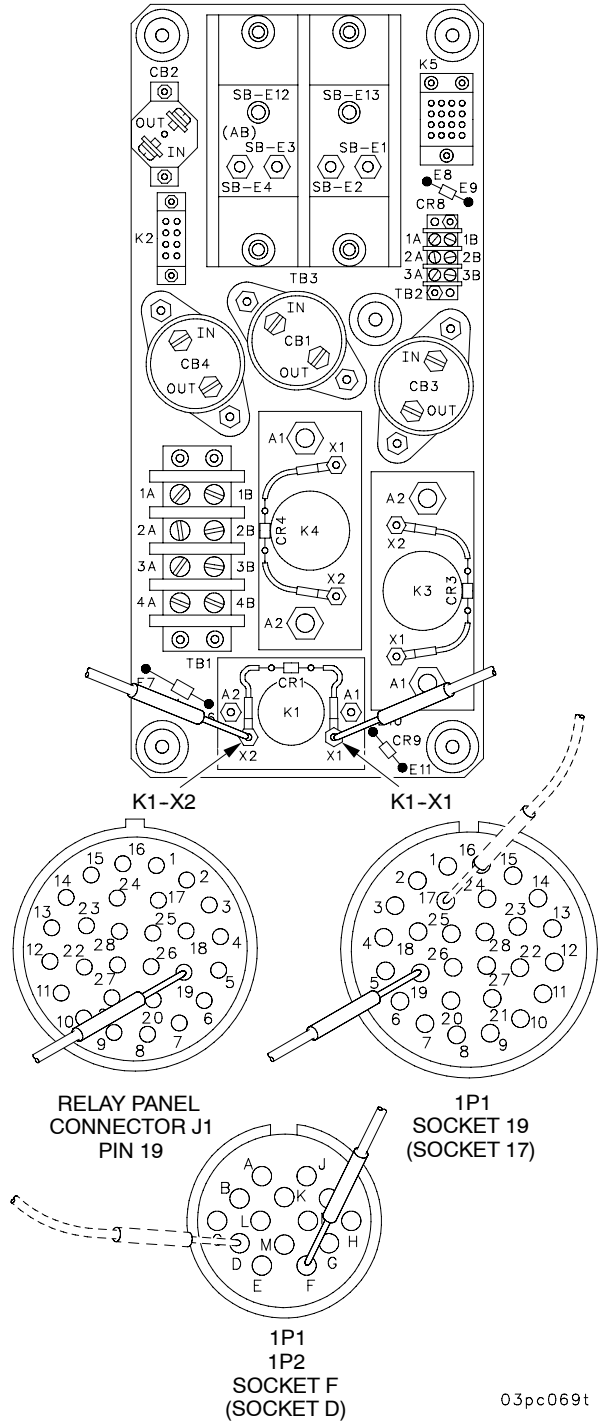


- I**
1. Disconnect harness 1P2 from MCS bulkhead connector.
  2. Disconnect harness 1P1 from J1 connector on the MCS relay panel.
  3. Place one multimeter lead on 1P1 socket 19 and the other lead on 1P2 socket F.
  4. Place one multimeter lead on 1P1 Socket 17 and the other lead on 1P2 Socket D.
  5. Check for continuity.

Is continuity present at both points?



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03pc069t

# 3-3. TROUBLESHOOTING CHART - CONTINUED

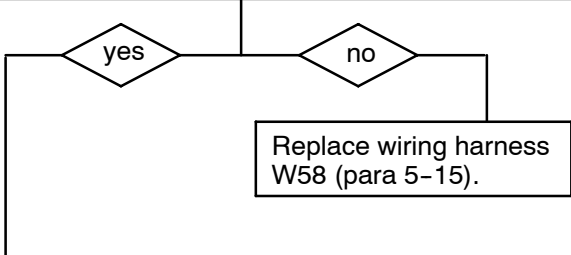
k. MCS - CONTINUED (2) MCS HAS NO OUTPUT TO CREW STATION WHEN IN HI MODE. - CONTINUED

CONTINUED FROM STEP I

- J**
1. Disconnect W58 connector J1 from MCS bulkhead connector.
  2. Disconnect W58 connector P2 from MCS control box.
  3. Place one lead of multimeter in position 1 and other lead in position 2.
 

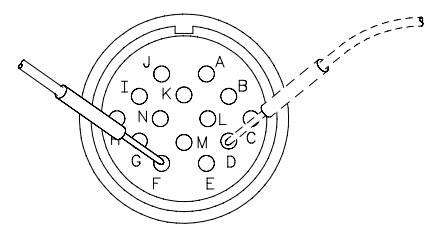
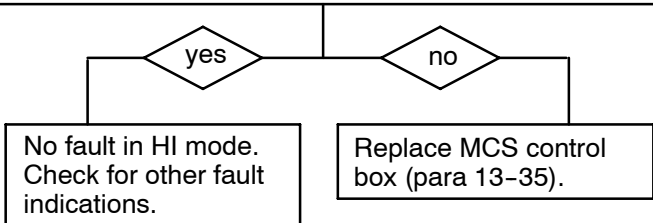
<u>Position 1</u>	<u>Position 2</u>
W58 J1 pin F	W58 P2 socket F
W58 J1 pin D	W58 P2 socket D
  4. Check for continuity.

Is continuity present?

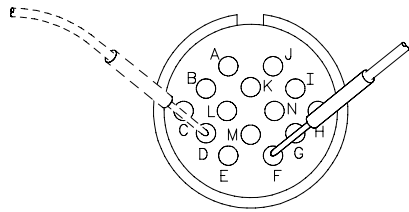


- K**
1. Turn MCS control box selector to HI (TM 9-2350-314-10).
  2. Place one multimeter lead on MCS control panel pin D and other lead on MCS control panel pin F.
  3. Check for continuity.

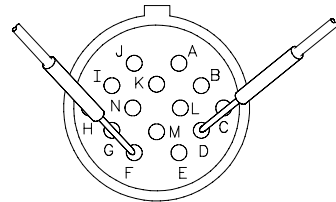
Is continuity present?



W58  
CONNECTOR J1  
PIN F  
(PIN D)



W58  
CONNECTOR P2  
SOCKET F  
(SOCKET D)



MCS CONTROL PANEL  
CONNECTOR J1  
PIN D  
PIN F

03pc070t

**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED

(3) MCS HAS NO OUTPUT TO CREW STATION WHEN IN LO MODE.

#### INITIAL SETUP

##### Tools

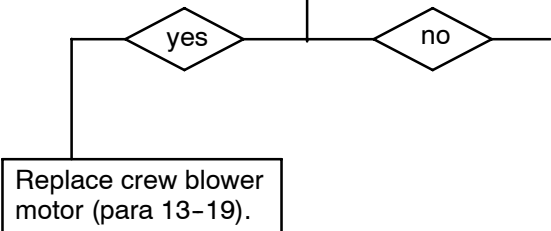
Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

##### Equipment Conditions

Ballistic cover open (TM 9-2350-314-10)  
 Filter cover removed (para 13-11)

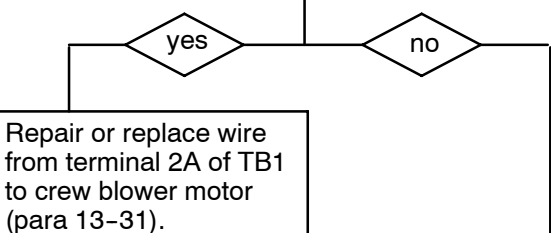
- A**
1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  2. Turn MCS control box selector to LO (TM 9-2350-314-10).
  3. Place multimeter red lead on LO terminal of crew blower motor and black lead on negative (-) terminal of crew blower motor.
  4. Check for voltage.

Is voltage present?



- B**
1. Place multimeter red lead on terminal 2B of TB1 and black lead on ground.
  2. Check for voltage.

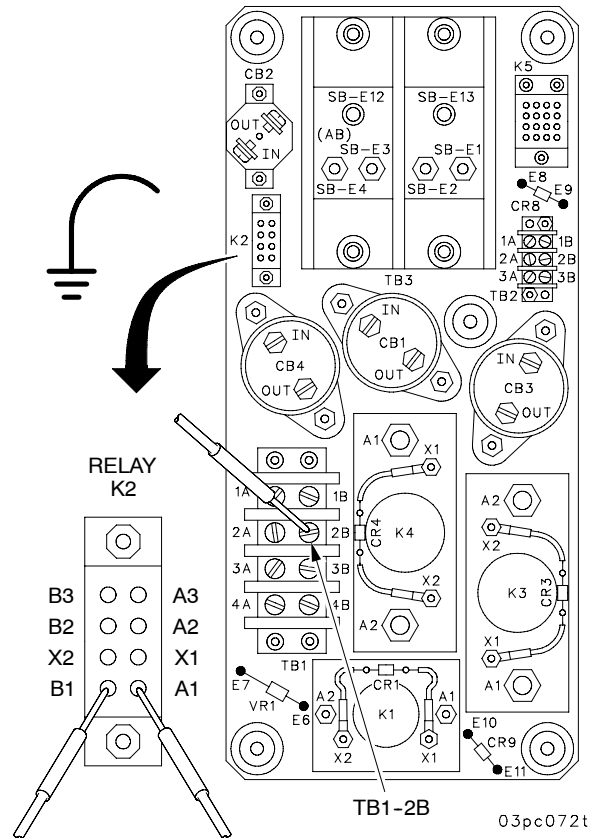
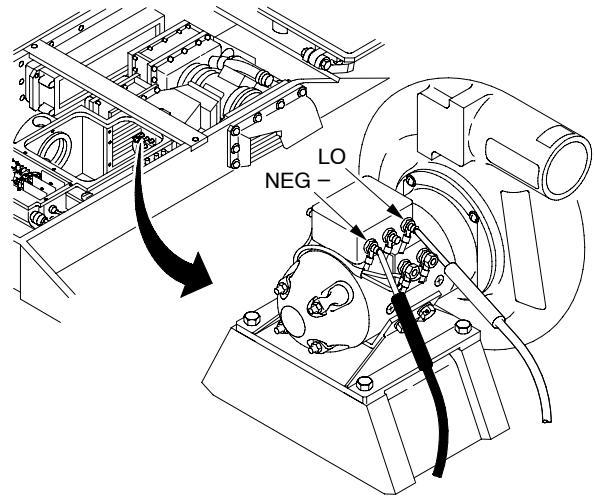
Is voltage present?



- C**
1. Place multimeter red lead on terminal A2 or B1 of relay K2 and black lead on ground.
  2. Check for voltage.

Is voltage present?

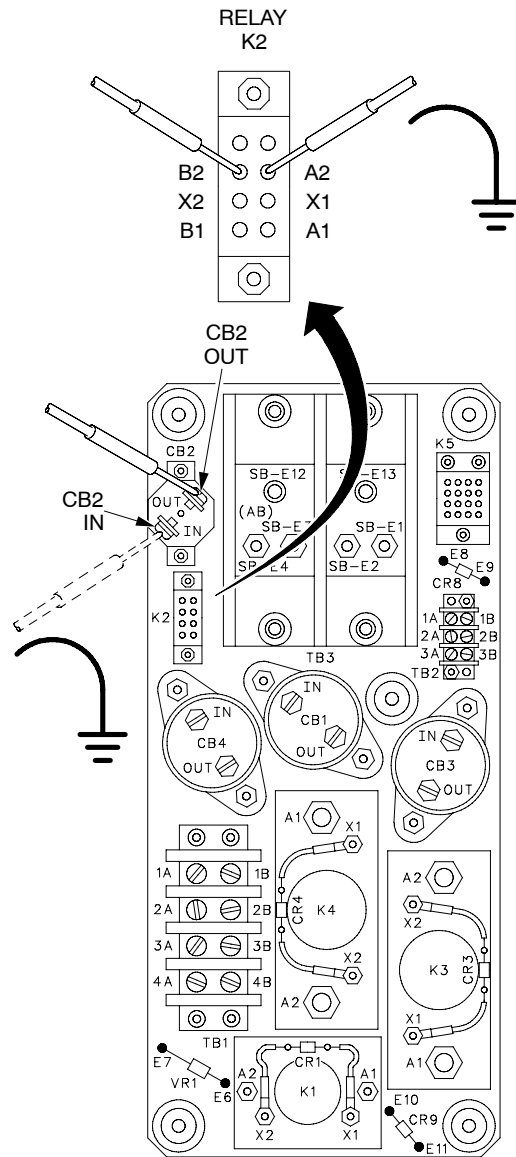
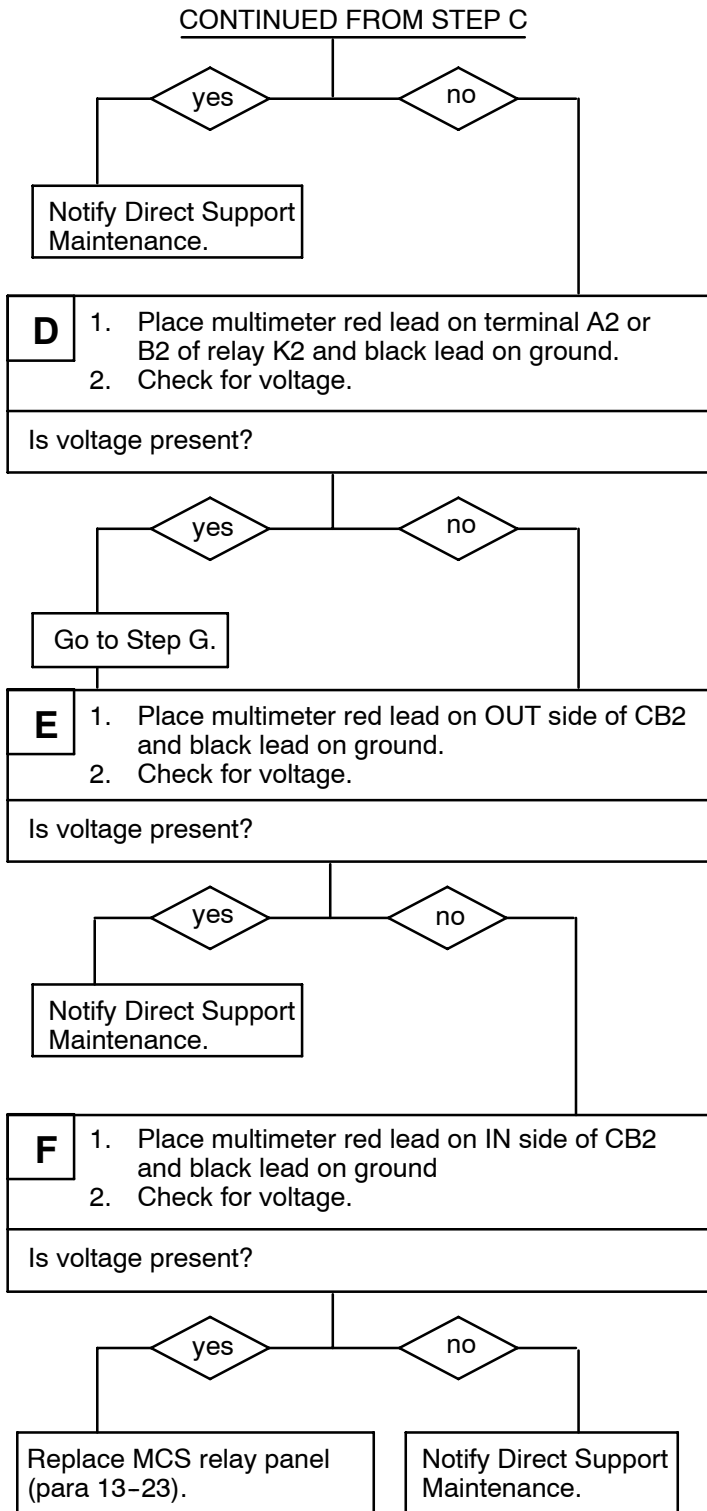
CONTINUED ON NEXT PAGE



03pc072t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (3) MCS HAS NO OUTPUT TO CREW STATION WHEN IN LO MODE. - CONTINUED



03pc074t

# 3-3. TROUBLESHOOTING CHART - CONTINUED

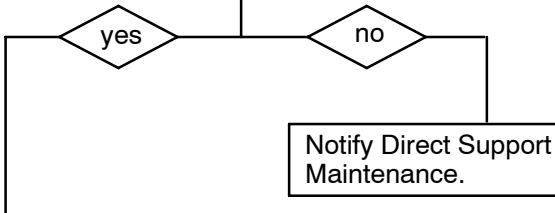
k. MCS - CONTINUED (3) MCS HAS NO OUTPUT TO CREW STATION WHEN IN LO MODE. - CONTINUED

CONTINUED FROM STEP D

**G**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect wire from terminal X2 of relay K2.
3. Place one multimeter lead on terminal X1 of relay K2 and other lead on terminal X2 of relay K2.
4. Check for continuity.

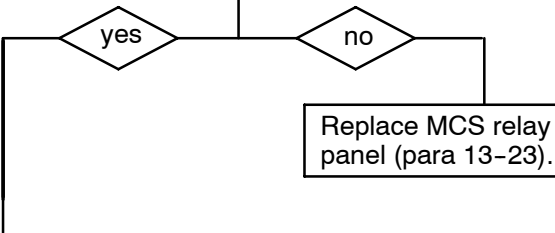
Is continuity present?



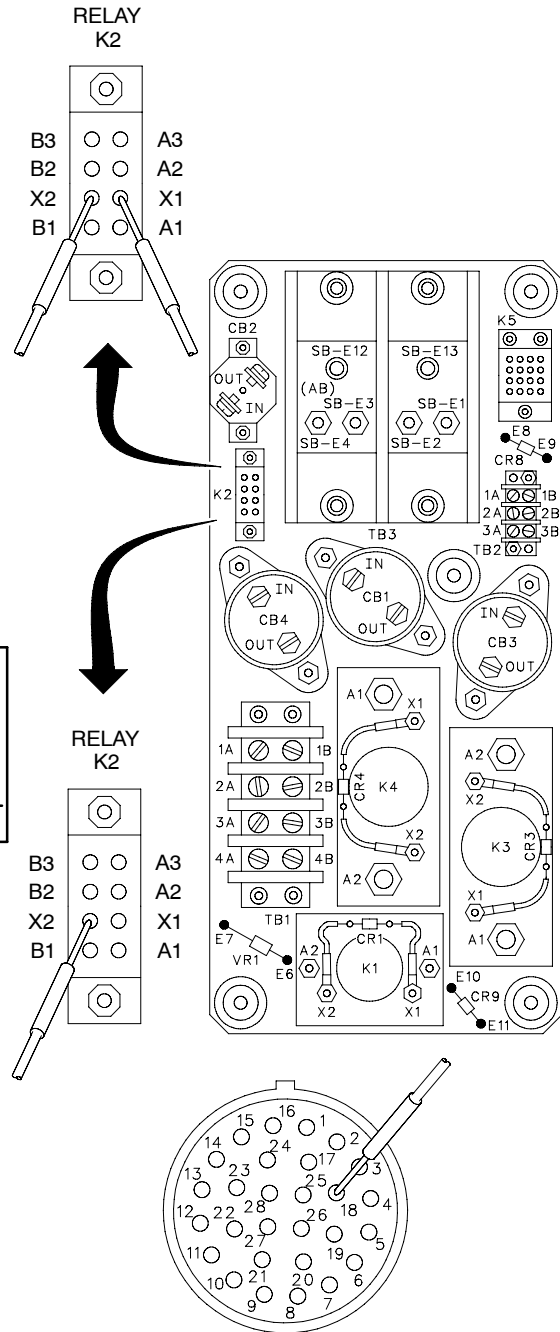
**H**

1. Reconnect wire to relay K2 terminal X2.
2. Place one multimeter lead on terminal X2 of relay K2 and other lead in pin 18 of connector J1.
3. Check for continuity.

Is continuity present?



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MCS RELAY PANEL  
CONNECTOR J1  
PIN 18

03pc101t

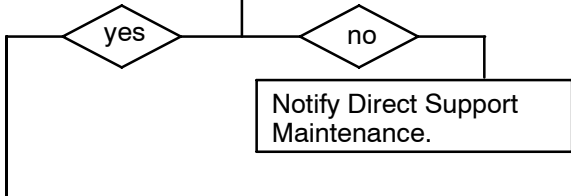
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (3) MCS HAS NO OUTPUT TO CREW STATION WHEN IN LO MODE. - CONTINUED

CONTINUED FROM STEP H

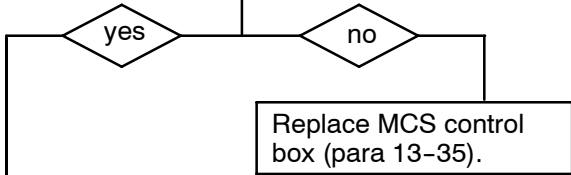
- I**
1. Disconnect wiring harness 1P2 from MCS bulkhead connector.
  2. Disconnect wiring harness 1P1 from MCS relay panel connector J1.
  3. Place one lead of multimeter on 1P1 Socket 17 and the other lead on 1P2 Socket D.
  4. Place one multimeter lead on 1P1 Socket 18 and other lead on 1P2 Socket E.
  5. Check for continuity.

Is continuity present at both points?



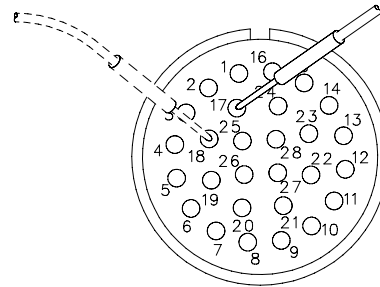
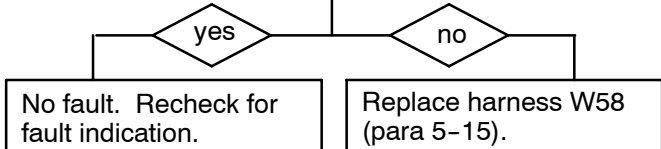
- J**
1. Disconnect wiring harness W58 connector P2 from the MCS control box.
  2. Place one multimeter lead on pin D and the other lead on pin E of the MCS control box.
  3. Check for continuity.

Is continuity present?

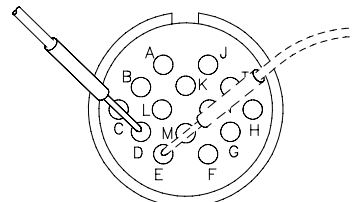


- K**
1. Disconnect wiring harness W58 connector J1 from the MCS bulkhead connector.
  2. Place MCS control box selector on LO (TM 9-2350-314-10).
  3. Place one multimeter lead on pin D of W58 connector J1 and other lead on pin E of W58 connector J1.
  4. Check for continuity.

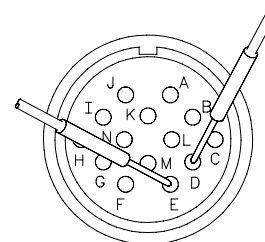
Is continuity present?



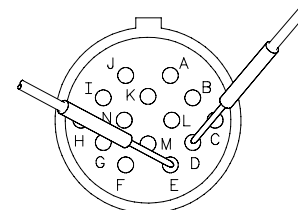
1P1  
SOCKET 17  
(SOCKET 18)



1P2  
SOCKET D  
(SOCKET E)



W58  
CONNECTOR J1  
PIN D  
PIN E



MCS CONTROL PANEL  
CONNECTOR J1  
PIN D  
PIN E

03pc102t



### 3-3. TROUBLESHOOTING CHART - CONTINUED

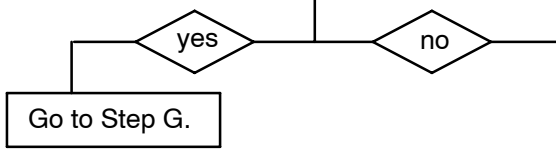
k. MCS - CONTINUED (4) MCS HAS NO COOL AIR OUTPUT WHEN IN COOL MODE.

**INITIAL SETUP**

<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Conditions</u>                  Ballistic cover open (TM 9-2350-314-10)</p>
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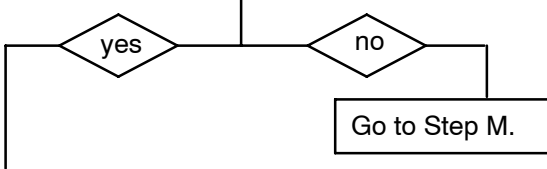
- A**
1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  2. Place the MCS control box selector in COOL position (TM 9-2350-314-10).
  3. Check compressor motor.

Is compressor motor operating?



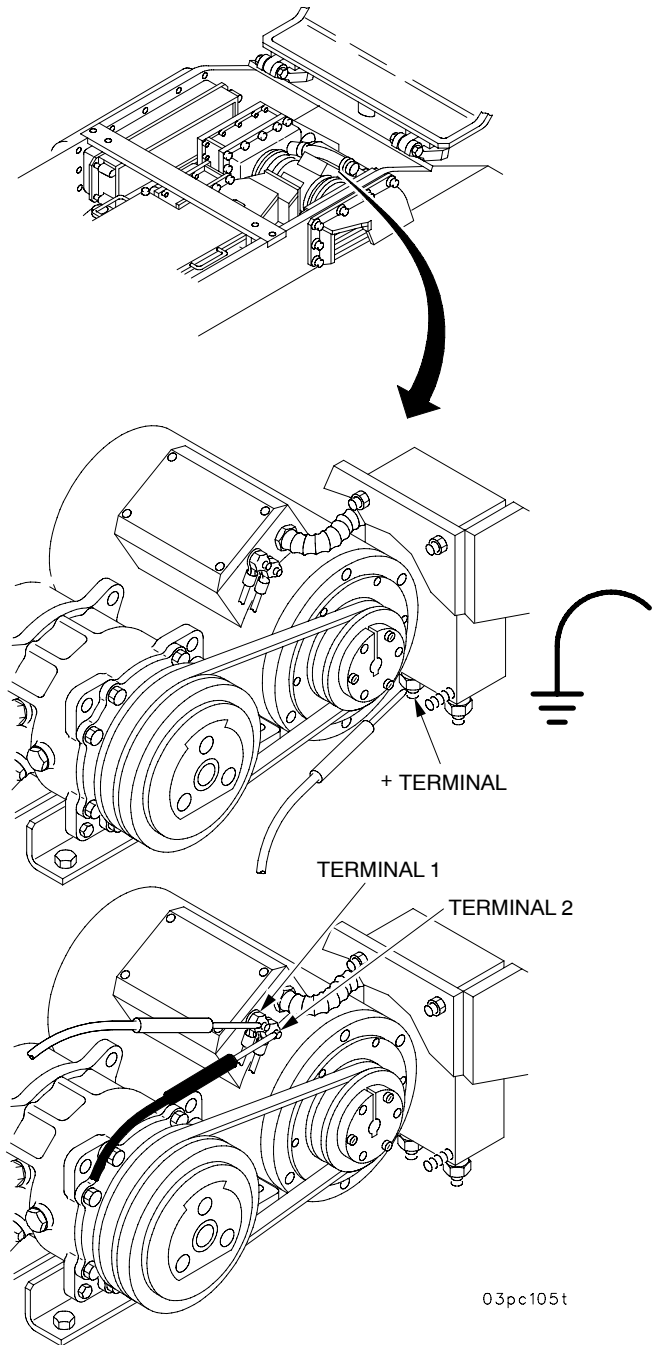
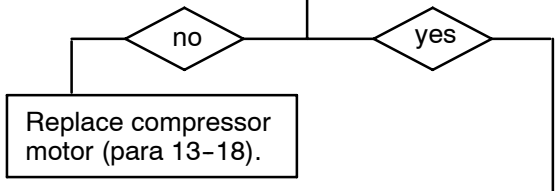
- B**
1. Place multimeter red lead on positive (+) terminal of compressor motor and black lead on ground.
  2. Check for voltage.

Is voltage present?



- C**
1. Turn MCS control box selector OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Place one multimeter lead on terminal 1 of compressor motor and other lead on terminal 2 of compressor motor.
  4. Check for continuity.

Is continuity present?



03pc105t

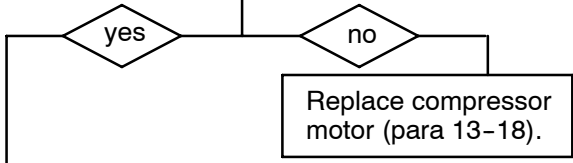
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (4) MCS HAS NO COOL AIR OUTPUT WHEN IN COOL MODE. - CONTINUED

CONTINUED FROM STEP C

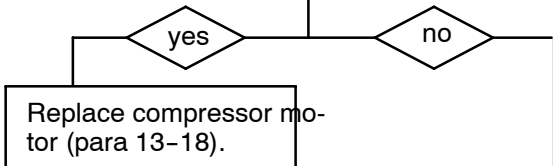
**D** 1. Place one multimeter lead on positive (+) terminal of compressor motor and other lead on negative (-) terminal of compressor motor.  
2. Check for continuity.

Is continuity present?



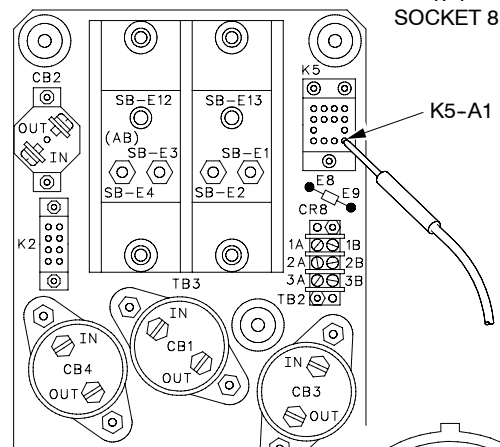
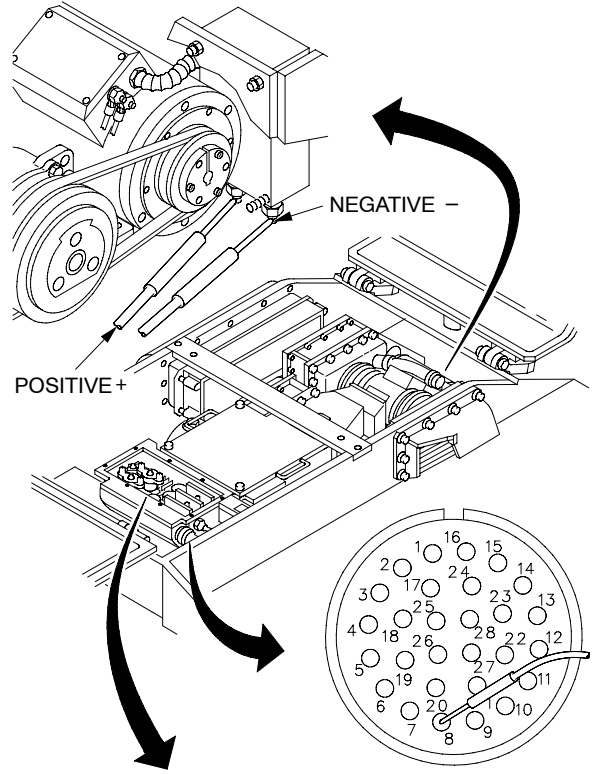
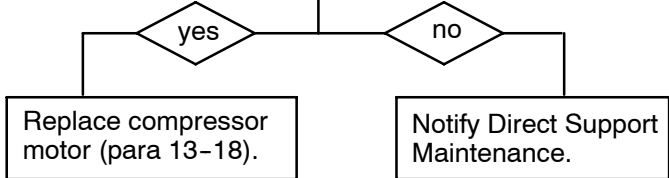
**E** 1. Disconnect harness 1P1 from MCS relay panel connector J1.  
2. Disconnect connector on negative (-) terminal of compressor motor.  
3. Place one multimeter lead on connector to negative (-) terminal of compressor motor and other lead on socket 8 of harness 1P1.  
4. Check for continuity.

Is continuity present?

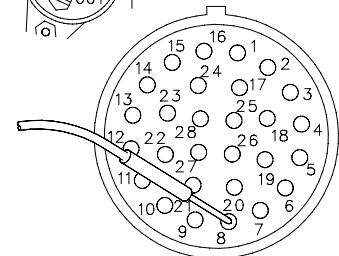


**F** 1. Place one multimeter lead on connector J1 pin 8 and other lead on relay K5 terminal A1.  
2. Check for continuity.

Is continuity present?



RELAY PANEL



RELAY PANEL CONNECTOR J1 PIN 8

CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

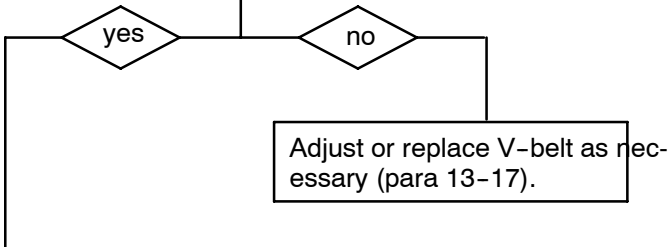
k. MCS - CONTINUED (4) MCS HAS NO COOL AIR OUTPUT WHEN IN COOL MODE. - CONTINUED

CONTINUED FROM STEP A

**G**

1. Turn MCS control box selector to OFF (TM 9-2350-314-10).
2. Check compressor V-belt for proper adjustment and serviceability (para 13-17).

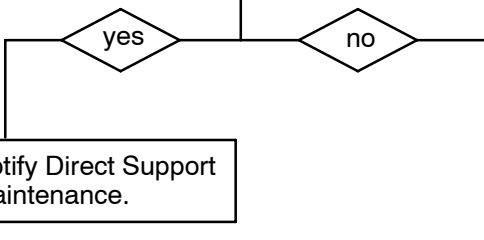
Is V-belt adjusted to proper tension and is it serviceable?



**H**

1. Turn MCS control box selector to COOL (TM 9-2350-314-10).
2. Listen for compressor clutch to engage (clutch should engage from 30 seconds to 1 minute).

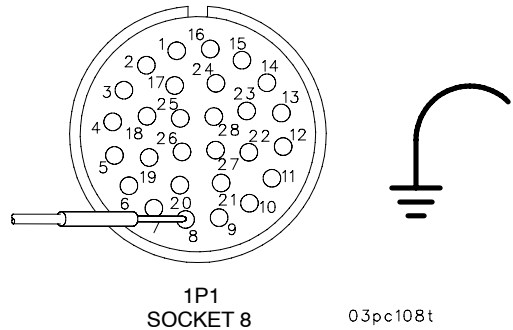
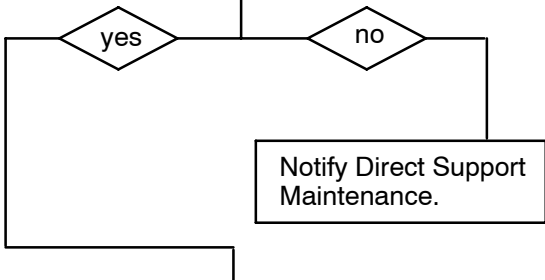
Does compressor clutch engage?



**I**

1. Disconnect wiring harness 1P1 at MCS relay panel.
2. Place one multimeter lead on 1P1 socket 8 (compressor clutch) and other lead on ground.
3. Check for continuity.

Is continuity present?



CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

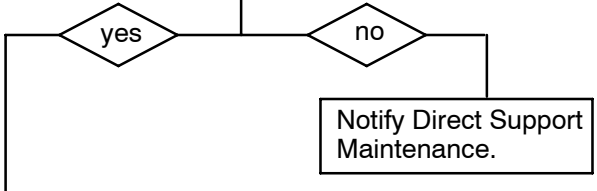
k. MCS - CONTINUED (4) MCS HAS NO COOL AIR OUTPUT WHEN IN COOL MODE. - CONTINUED

CONTINUED FROM STEP I

**J** 1. Place one multimeter lead on terminal A1 of relay K5 and other lead on pin 8 of MCS relay panel connector J1.

2. Check for continuity.

Is continuity present?

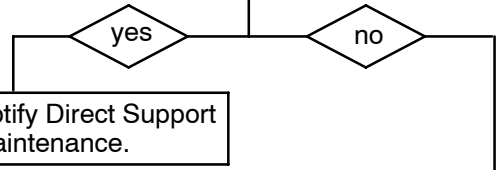


**K** 1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).

2. Place multimeter red lead on terminal A2 of relay K5 and black lead on ground.

3. Check for voltage.

Is voltage present?

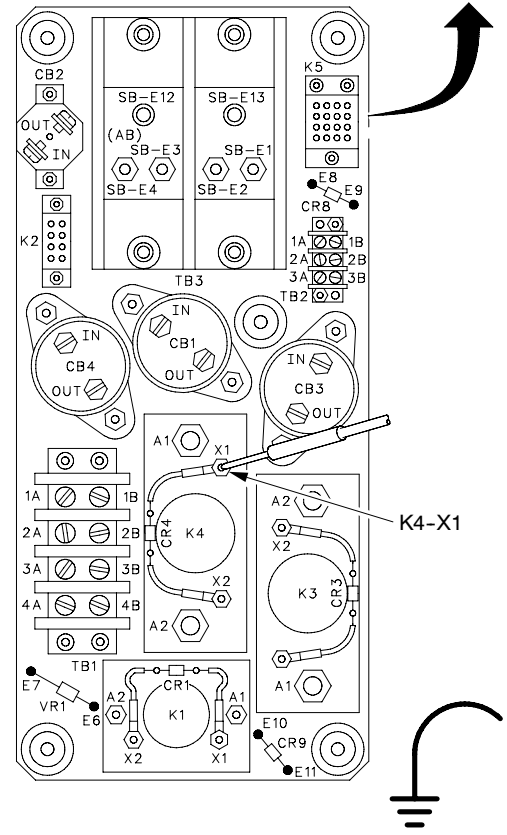
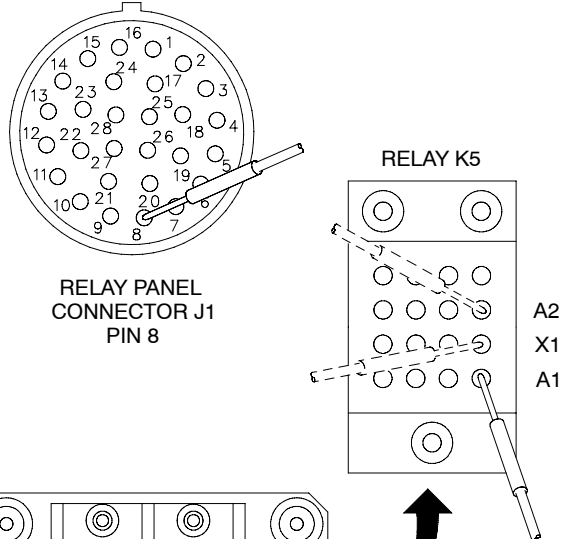
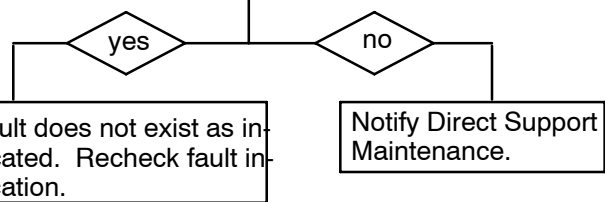


**L** 1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).

2. Place one multimeter lead on terminal X1 of relay K4 and other lead on terminal X1 of relay K5.

3. Check for continuity.

Is continuity present?



03pc111t

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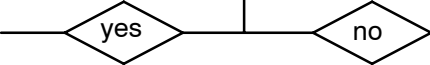
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (4) MCS HAS NO COOL AIR OUTPUT WHEN IN COOL MODE. - CONTINUED

CONTINUED FROM STEP B

**M** 1. Place multimeter red lead on terminal A2 of relay K4 and black lead on ground.  
 2. Check for voltage.

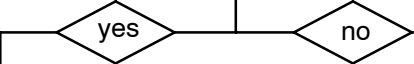
Is voltage present?



Repair or replace wire from terminal A2 of relay K4 to positive (+) terminal of compressor motor (para 13-18 and 13-23).

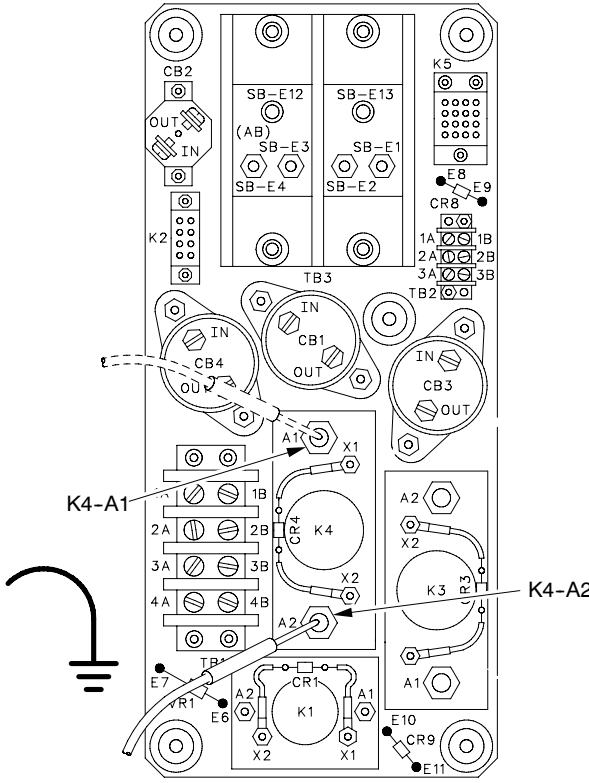
**N** 1. Place multimeter red lead on terminal A1 of relay K4 and black lead on ground.  
 2. Check for voltage.

Is voltage present?



Notify Direct Support Maintenance.

CONTINUED ON NEXT PAGE



03pc112t

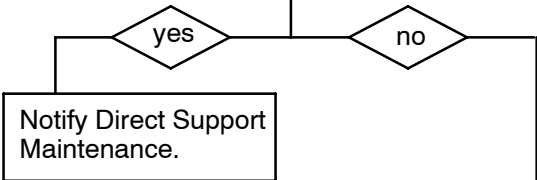
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (4) MCS HAS NO COOL AIR OUTPUT WHEN IN COOL MODE. - CONTINUED

CONTINUED FROM STEP N

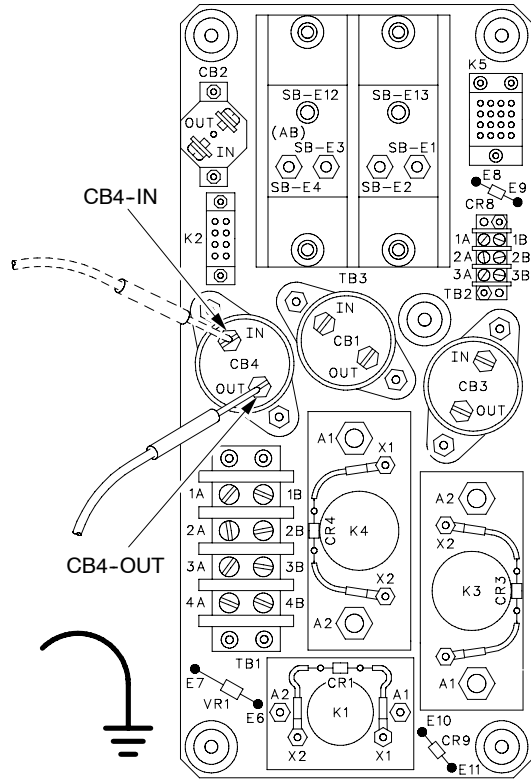
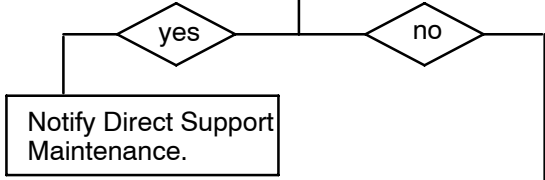
**O** 1. Place multimeter red lead on voltage OUT terminal of circuit breaker 4 (CB4) and black lead to ground.  
2. Check for voltage.

If voltage present?



**P** 1. Place multimeter red lead on voltage IN terminal of circuit breaker 4 (CB4) and black lead on ground.  
2. Check for voltage.

Is voltage present?



03pc116t

CONTINUED ON NEXT PAGE

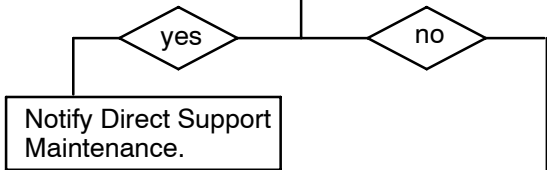
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (4) MCS HAS NO COOL AIR OUTPUT WHEN IN COOL MODE. - CONTINUED

CONTINUED FROM STEP P

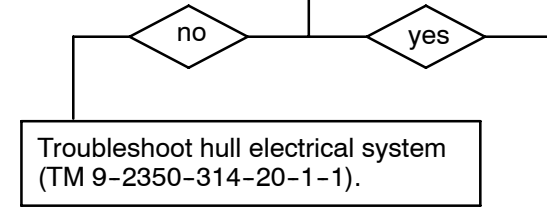
**Q** 1. Place multimeter red lead on terminal SB-E2 of terminal board 3 (TB3) and black lead on ground.  
2. Check for voltage.

Is voltage present?



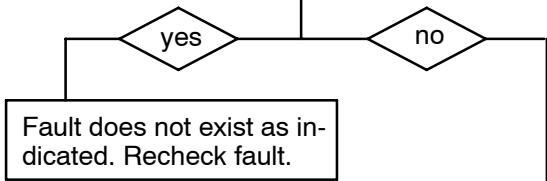
**R** Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).

Does hydraulic motor come on?

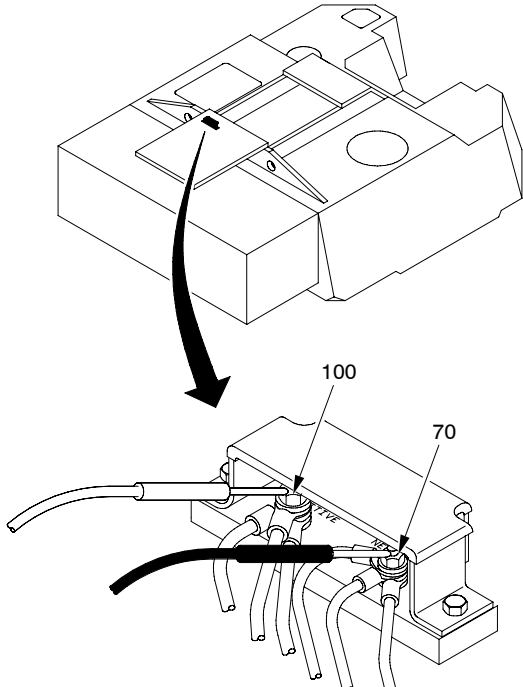
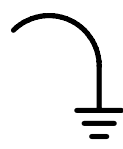
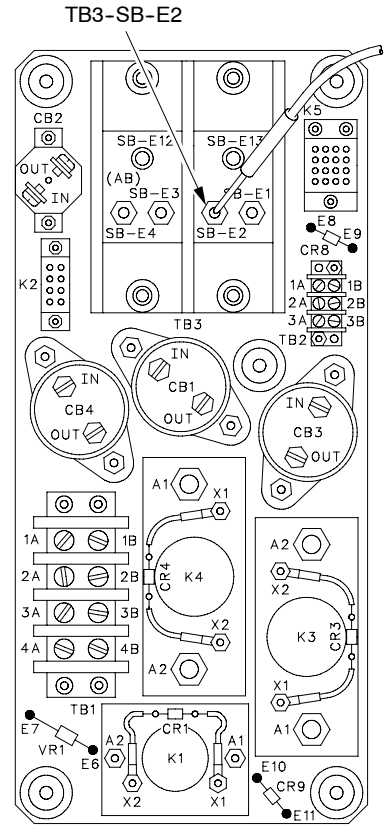


**S** 1. Place multimeter red lead on bus bar 100 and black lead on bus bar 70.  
2. Check for voltage.

Is voltage present?



Do harness test on harness W56 (para 3-3.n(13)) and harness W57 (para 3-3.n(16)).



**END OF TASK**

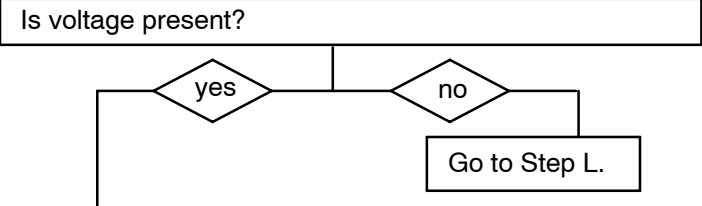
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (5) MCS VANEAXIAL FAN DOES NOT OPERATE.

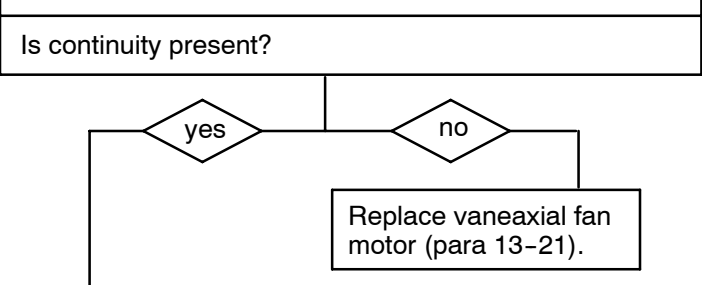
**INITIAL SETUP**

<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Conditions</u>                  Ballistic cover open (TM 9-2350-314-10)</p>
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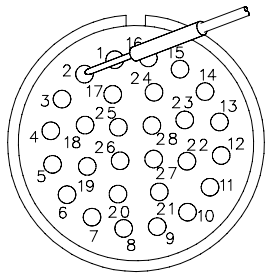
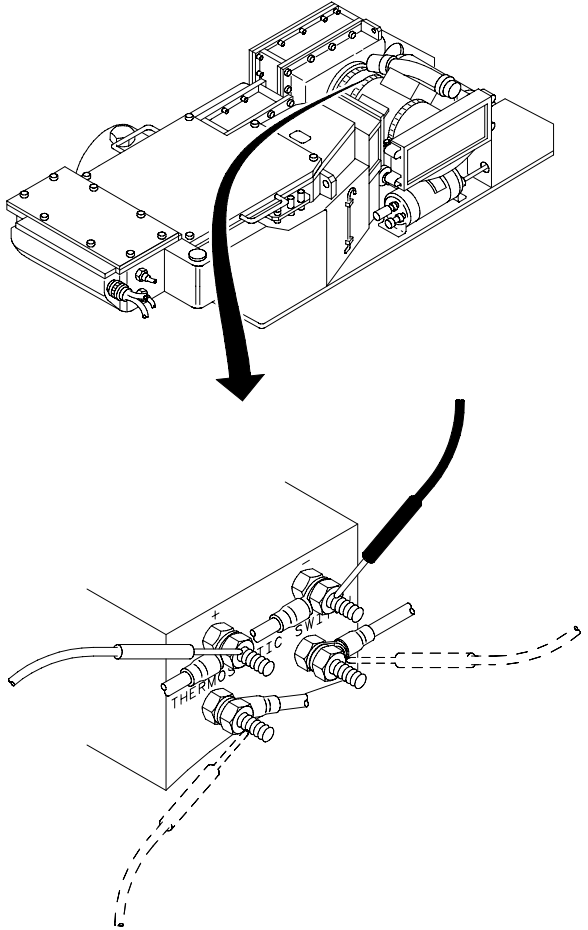
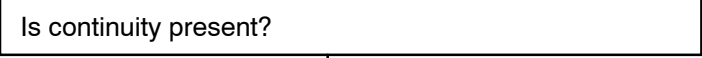
- A**
1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  2. Remove MCS relay panel cover (para 13-12).
  3. Turn MCS control box selector switch to LO or HI mode (TM 9-2350-314-10).
  4. Place multimeter red lead on vaneaxial fan positive (+) terminal and black lead on vaneaxial fan negative (-) terminal.
  5. Check for voltage.



- B**
1. Turn MCS control box selector switch OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Disconnect wiring harness 1P1 from J1 on the MCS relay panel.
  4. Place one multimeter lead on fan motor terminal 1 and other lead on fan motor terminal 2.
  5. Check for continuity.



- C**
1. Place one multimeter lead on terminal 1 of vaneaxial fan motor and other lead in socket 2 of harness 1P1.
  2. Check for continuity.



1P1  
SOCKET 2

03pc073t

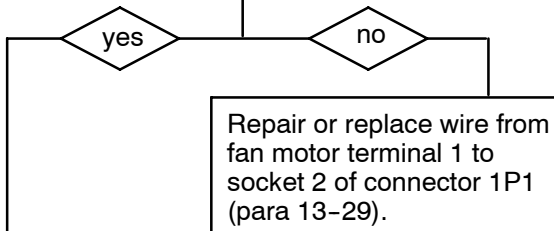
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

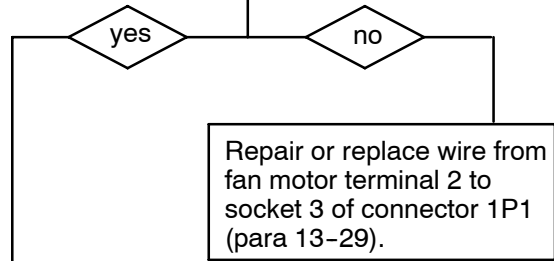
k. MCS - CONTINUED (5) MCS VANEAXIAL FAN DOES NOT OPERATE. - CONTINUED

CONTINUED FROM STEP C



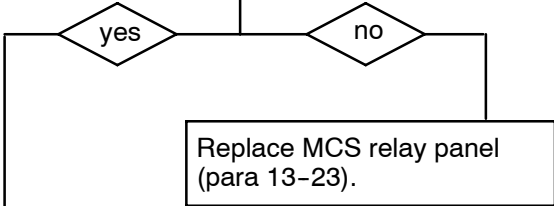
**D** 1. Place one multimeter lead on terminal 2 of vaneaxial fan motor and other lead in socket 3 of 1P1.  
2. Check for continuity.

Is continuity present?



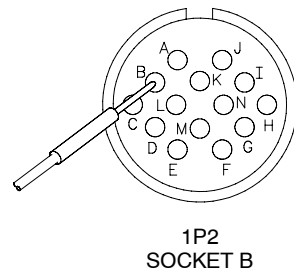
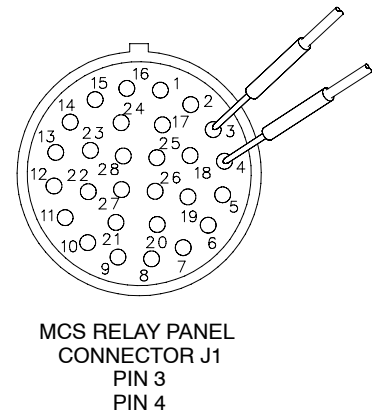
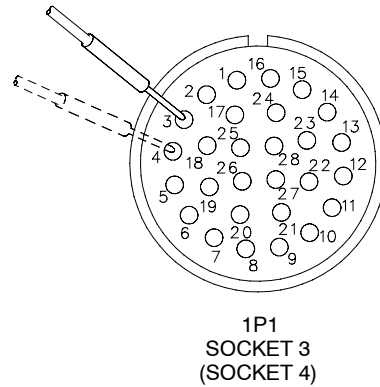
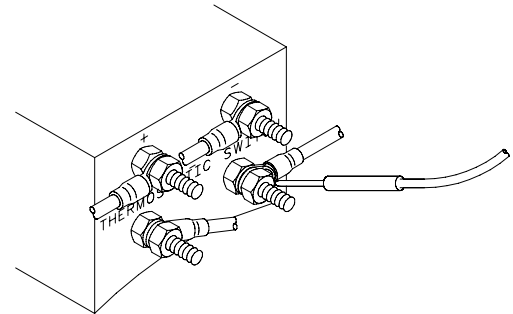
**E** 1. Place one multimeter lead on pin 3 of relay panel connector J1 and other lead on pin 4 of connector J1.  
2. Check for continuity.

Is continuity present?



**F** 1. Disconnect harness 1P1 from relay panel.  
2. Disconnect harness 1P2 from MCS bulkhead.  
3. Place one multimeter lead in socket 4 of 1P1 and other lead in socket B of 1P2.  
4. Check for continuity.

Is continuity present?



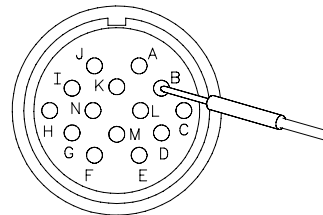
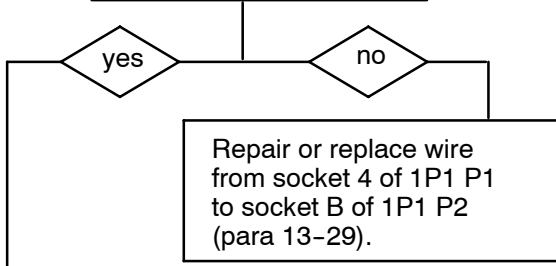
03pc075t

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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (5) MCS VANEAXIAL FAN DOES NOT OPERATE. - CONTINUED

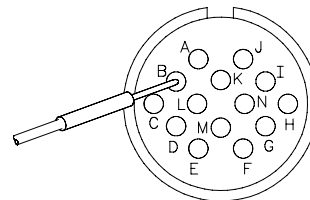
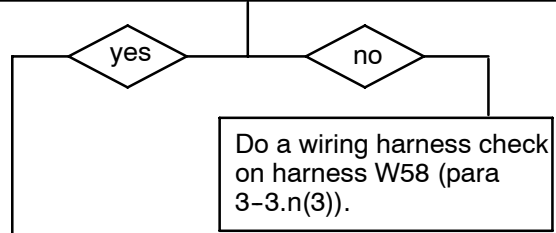
CONTINUED FROM STEP F



W58  
CONNECTOR J1  
PIN B

- G**
1. Disconnect wiring harness W58 P2 from MCS control panel.
  2. Place one multimeter lead in pin B of wiring harness W58 J1 and other lead in socket B of W58 P2.
  3. Check for continuity.

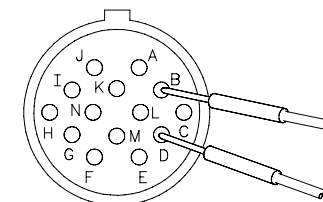
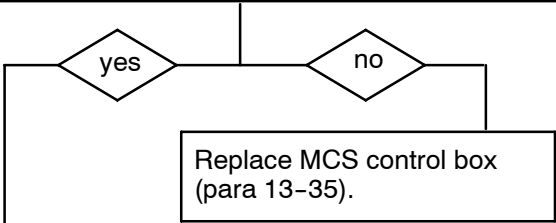
Is continuity present?



W58  
CONNECTOR P2  
SOCKET B

- H**
1. Place one multimeter lead on pin B of MCS control box connector J1 and other lead on pin D of MCS control box connector J1.
  2. Turn MCS control box selector switch to LO mode (TM 9-2350-314-10). Check continuity.
  3. Turn MCS control box selector switch to HI mode (TM 9-2350-314-10). Check continuity.
  4. Turn MCS control box selector switch to COOL mode (TM 9-2350-314-10). Check continuity.

Is continuity present in all modes?



MCS CONTROL PANEL  
CONNECTOR J1  
PIN B  
PIN D

03pc076t

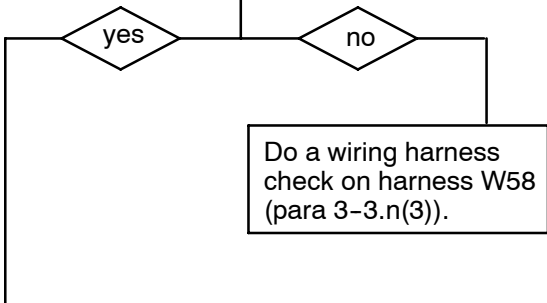
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (5) MCS VANEAXIAL FAN DOES NOT OPERATE. - CONTINUED

CONTINUED FROM STEP H

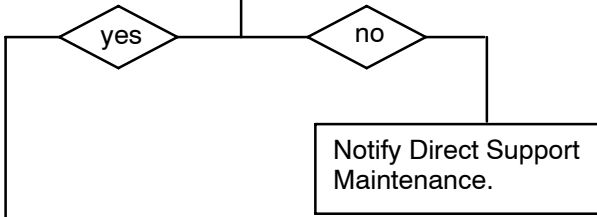
**I** 1. Place one multimeter lead in socket D of wiring harness W58 P2 and other lead in pin D of W58 J1.  
2. Check for continuity.

Is continuity present?



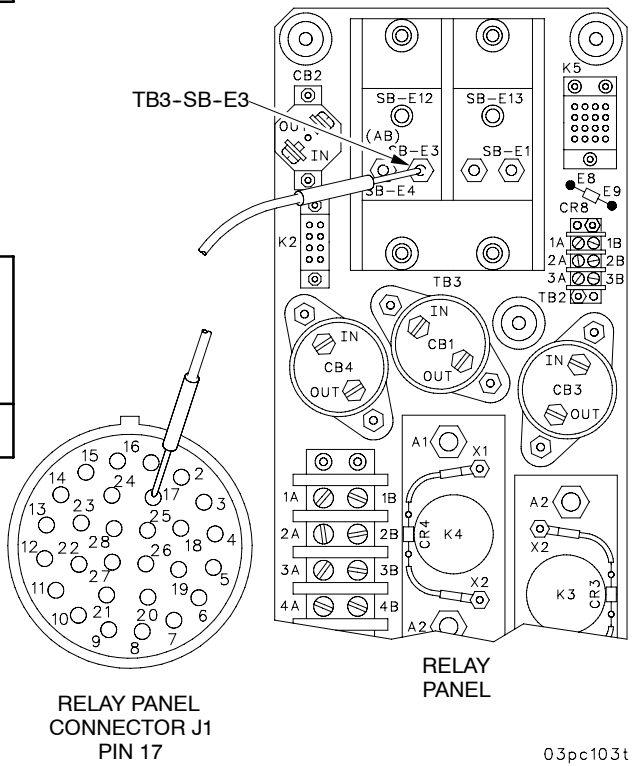
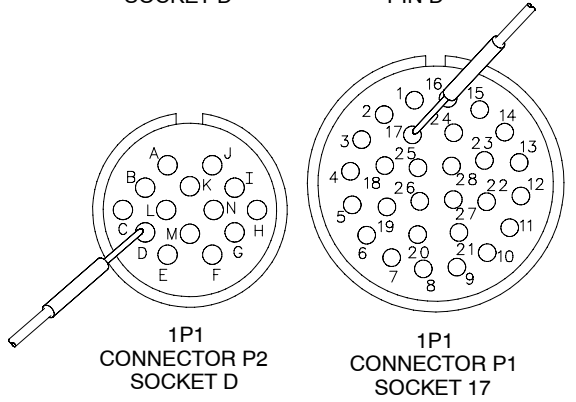
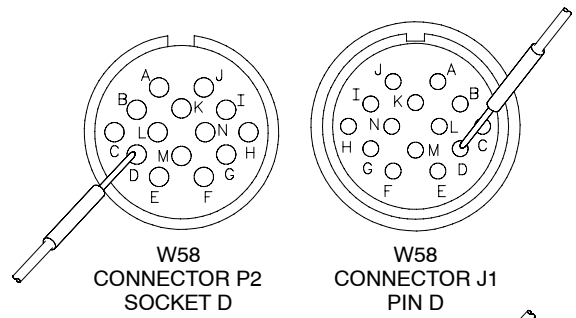
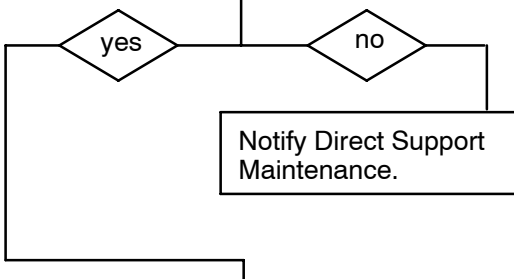
**J** 1. Place one multimeter lead in socket D of 1P1 P2 and other lead in socket 17 1P1 P1.  
2. Check for continuity.

Is continuity present?



**K** 1. Place one multimeter lead on pin 17 of relay panel connector J1 and other lead on terminal SB-E3 of terminal board 3 (TB3).  
2. Check for continuity.

Is continuity present?



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03pc103t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

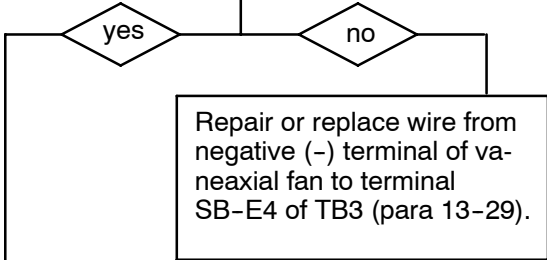
k. MCS - CONTINUED (5) MCS VANEAXIAL FAN DOES NOT OPERATE. - CONTINUED

CONTINUED FROM STEP A or K

**L**

1. Make sure vehicle MASTER power switch is OFF (TM 9-2350-314-10).
2. Place one multimeter lead on negative (-) terminal of vaneaxial fan and other lead on terminal SB-E4 of terminal board 3 (TB3).
3. Check for continuity.

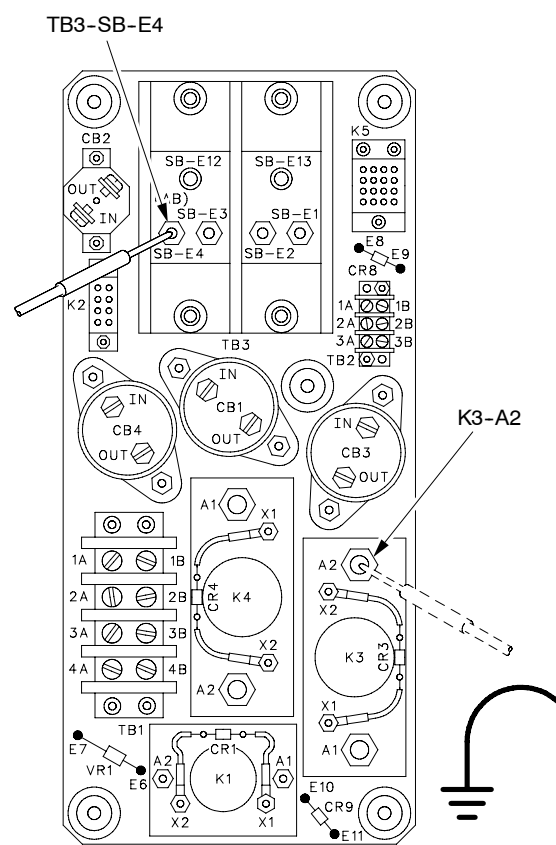
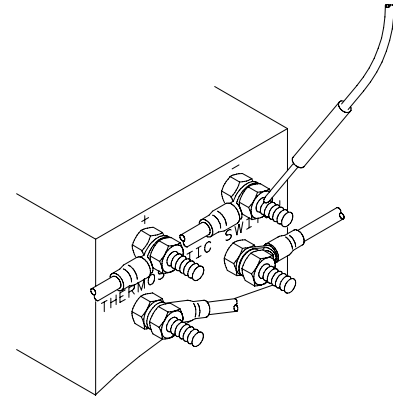
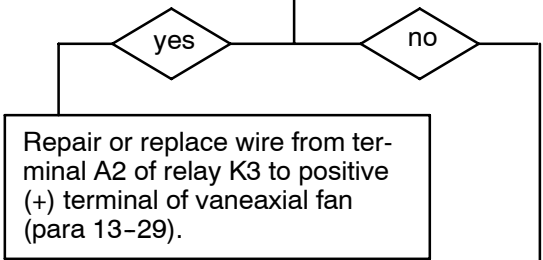
Is continuity present?



**M**

1. Connect any loose connectors.
2. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
3. Turn MCS control box selector to LO or HI mode (TM 9-2350-314-10).
4. Place multimeter red lead on terminal A2 of relay K3 and black lead on ground.
5. Check for voltage.

Is voltage present?



03pc107t

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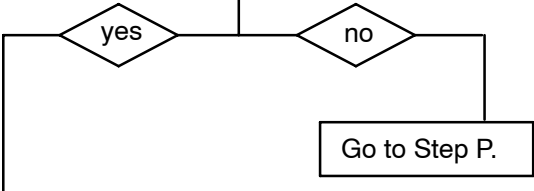
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (5) MCS VANEAXIAL FAN DOES NOT OPERATE. - CONTINUED

CONTINUED FROM STEP M

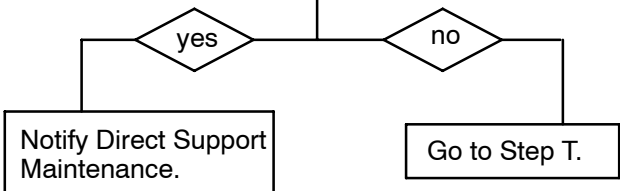
**N** 1. Place multimeter red lead on terminal A1 of relay K3 and black lead on ground.  
 2. Check for voltage.

Is voltage present?

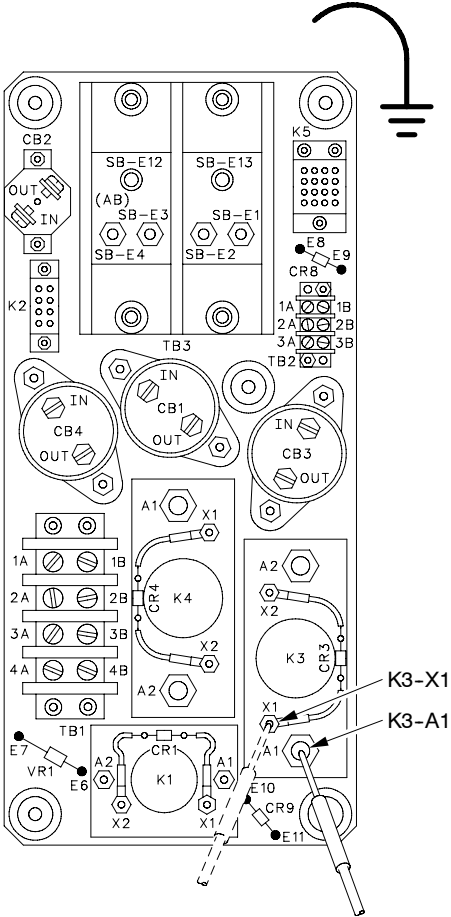


**O** 1. Place multimeter red lead on terminal X1 of relay K3 and black lead on ground.  
 2. Check for voltage.

Is voltage present?



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03pc109t

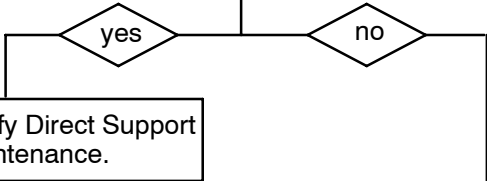
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (5) MCS VANEAXIAL FAN DOES NOT OPERATE. - CONTINUED

CONTINUED FROM STEP N

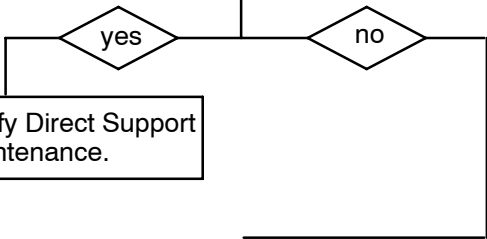
**P** 1. Place multimeter red lead on OUT terminal of circuit breaker 3 (CB3) and black lead on ground.  
2. Check for voltage.

Is voltage present?

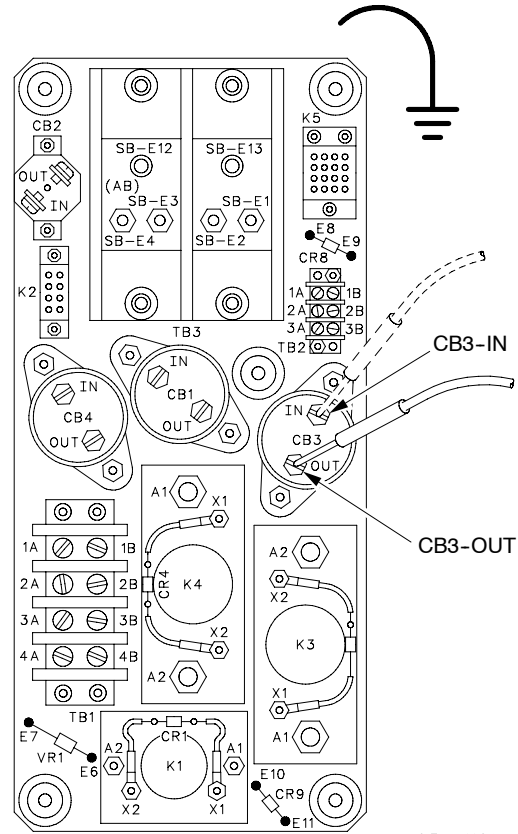


**Q** 1. Place multimeter red lead on IN terminal of CB3 and black lead on ground.  
2. Check for voltage.

Is voltage present?



CONTINUED ON NEXT PAGE



03pc110t

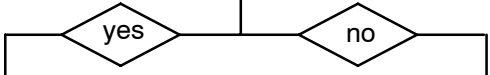
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (5) MCS VANEAXIAL FAN DOES NOT OPERATE. - CONTINUED

CONTINUED FROM STEP Q

**R** 1. Place multimeter red lead on terminal SB-E1 of terminal board 3 (TB3) and black lead on ground.  
2. Check for voltage.

Is voltage present?



Notify Direct Support Maintenance.

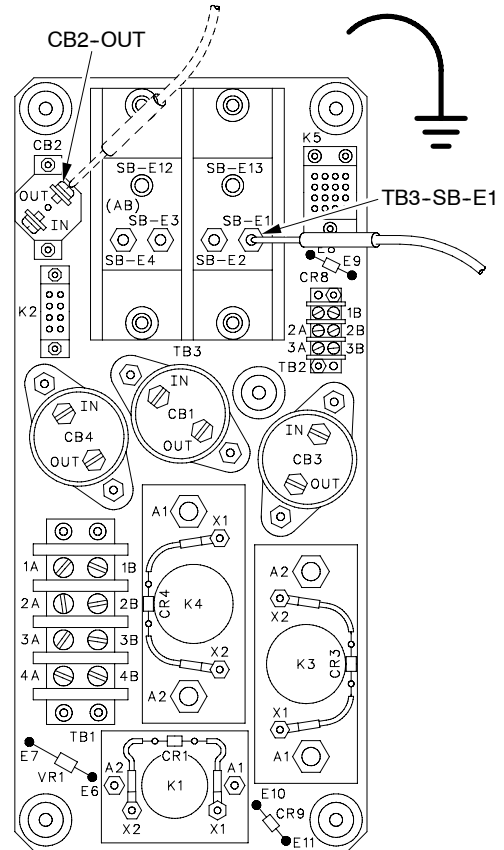
**S** 1. Place multimeter red lead on bus bar 100 and black lead on bus bar 70.  
2. Check for voltage.

Is voltage present?



Fault does not exist as indicated. Recheck fault.

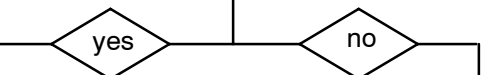
Do harness test on harness W56 (para 3-3.n(13)) and harness W57 (para 3-3.n(16)).



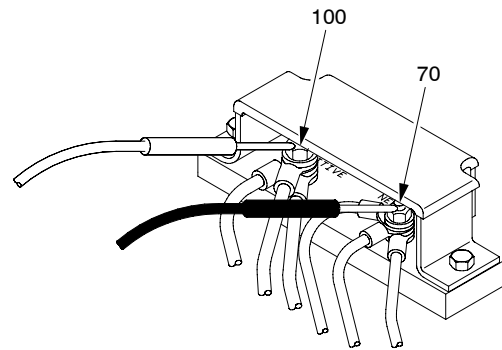
CONTINUED FROM STEP O

**T** 1. Place multimeter red lead on OUT terminal of circuit breaker 2 (CB2) and black lead on ground.  
2. Check for voltage.

Is voltage present?



Notify Direct Support Maintenance.



03pc113t

CONTINUED ON NEXT PAGE

# 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (5) MCS VANEAXIAL FAN DOES NOT OPERATE. - CONTINUED

CONTINUED FROM STEP T

**U** 1. Place multimeter red lead on IN terminal of CB2 and black lead on ground.  
2. Check for voltage.

Is voltage present?



Notify Direct Support Maintenance.

**V** 1. Place multimeter red lead on terminal SB-E2 of TB3 and black lead on ground.  
2. Check for voltage.

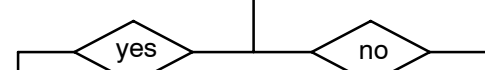
Is voltage present?



Notify Direct Support Maintenance.

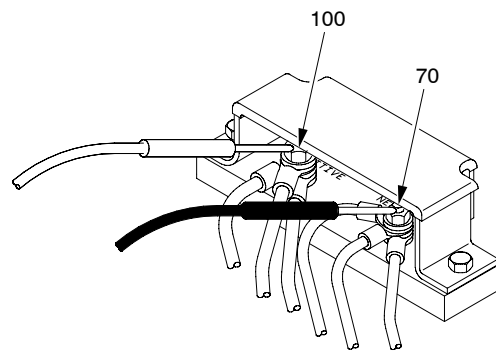
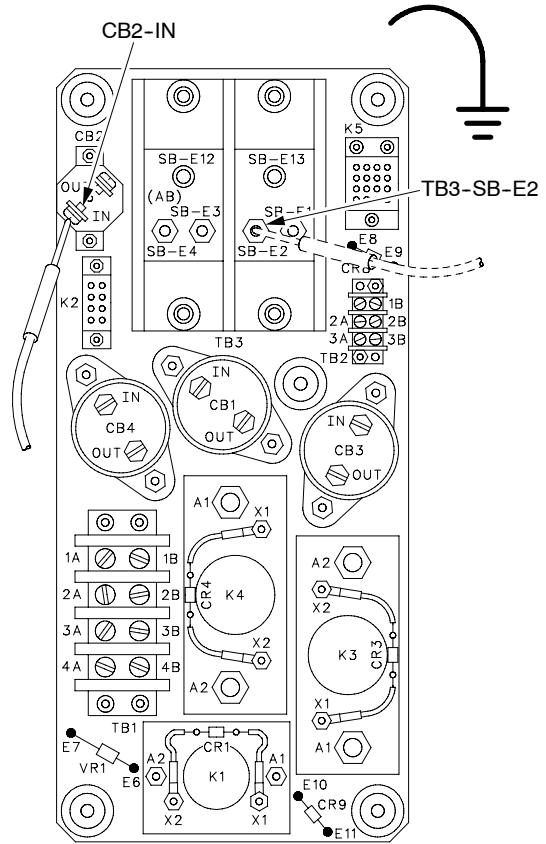
**W** 1. Place multimeter red lead on bus bar 100 and black lead on bus bar 70.  
2. Check for voltage.

Is voltage present?



Fault does not exist as indicated. Recheck fault.

Do harness test on harness W56 (para 3-3.n(13)) and harness W57 (para 3-3.n(16)).



03pc114t

**END OF TASK**



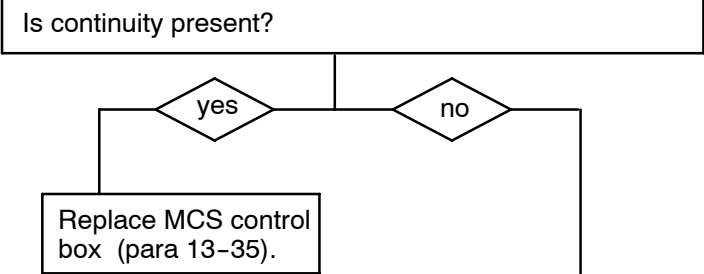
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (6) MCS CONTROL PANEL "CHANGE FILTER" LIGHT CONTINUOUSLY ON.

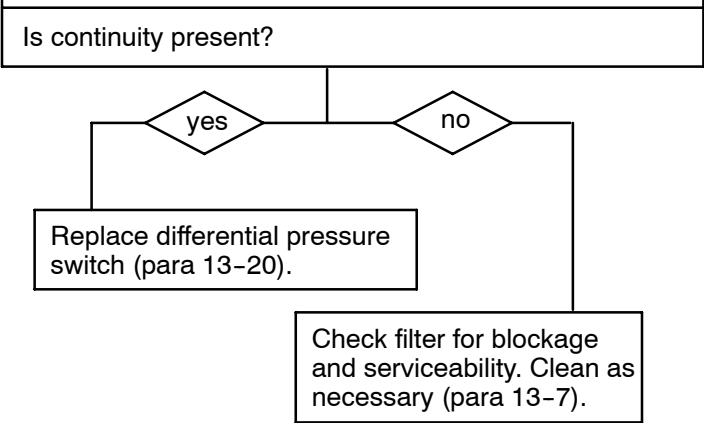
**INITIAL SETUP**

<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Conditions</u>                  Ballistic cover open                  (TM 9-2350-314-10)</p>
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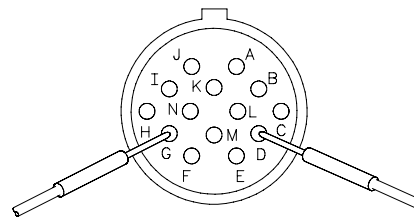
- A**
1. Disconnect harness W58 connector P2 from connection J1 of MCS control box.
  2. Place one multimeter lead on pin G of connector J1 and other lead on pin D of connector J1.
  3. Check for continuity.



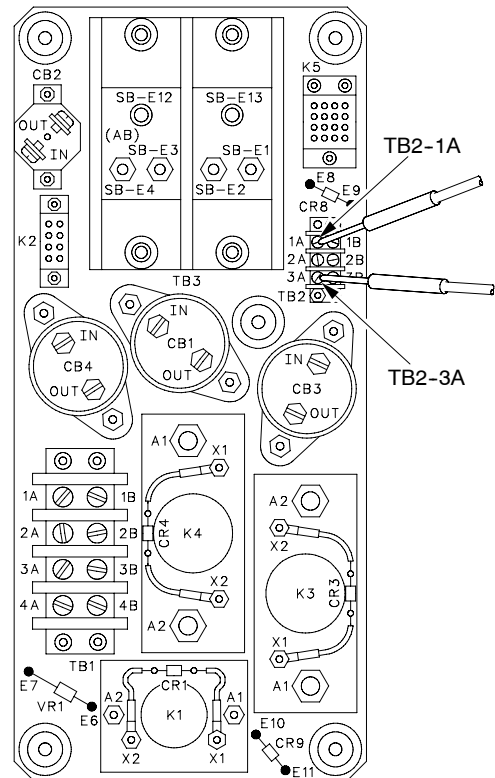
- B**
1. Remove MCS relay panel cover (para 13-23).
  2. Place one multimeter lead on terminal 1A of TB2 and other lead on terminal 3A of TB2.
  3. Check for continuity.



**END OF TASK**



MCS CONTROL PANEL  
CONNECTOR J1  
PIN G  
PIN D



03pc115t

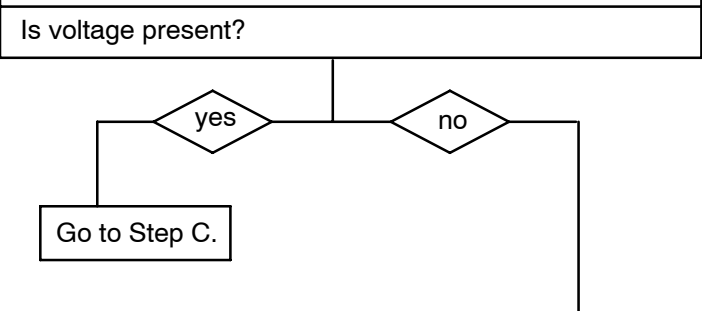
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (7) ALL M3 HEATERS FAIL TO OPERATE.

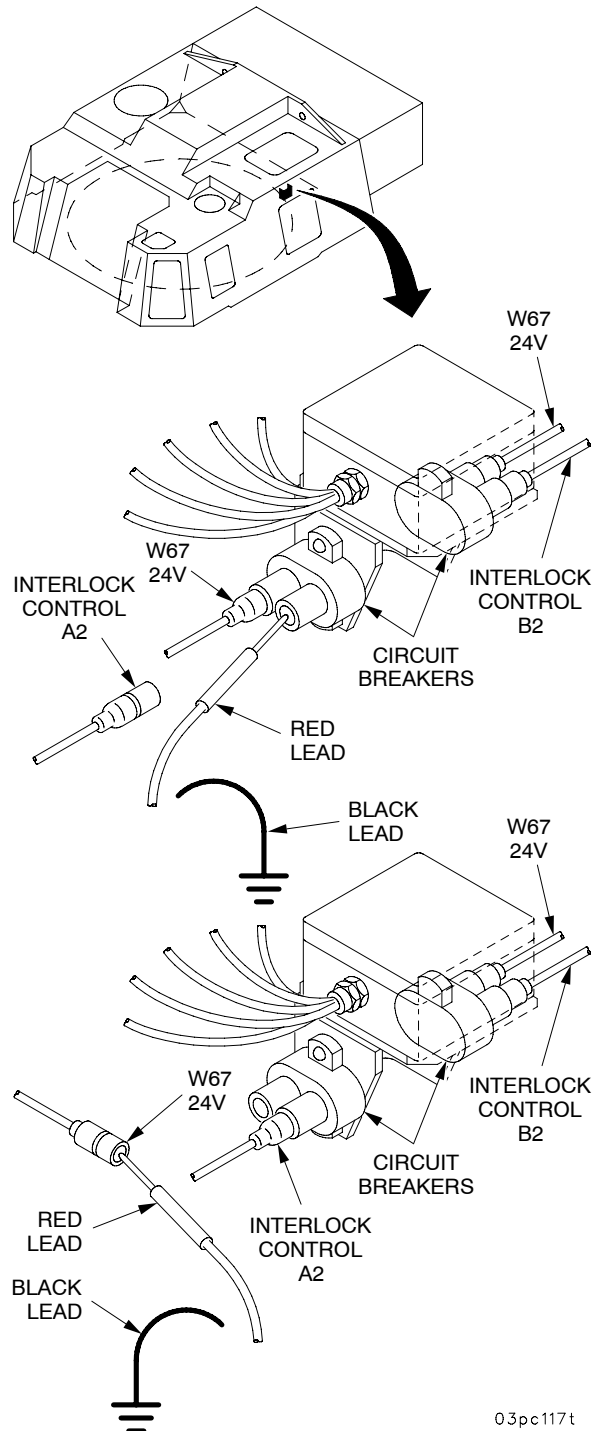
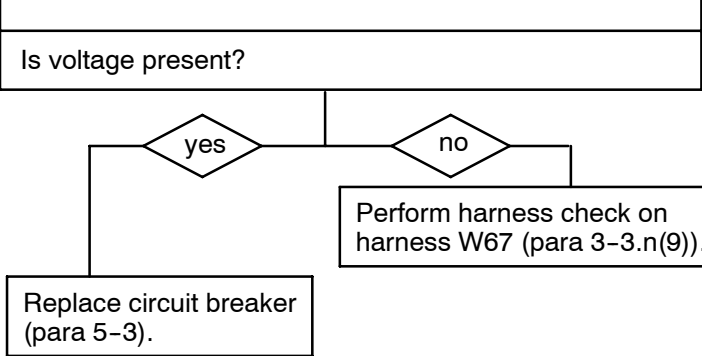
**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)

- A**
1. Make sure vehicle MASTER power switch is OFF (TM 9-2350-314-10).
  2. Disconnect interlock control lead A2 from circuit breaker.
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  4. Place red multimeter lead in circuit breaker and black lead to ground.
  5. Check for voltage.



- B**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W67 24V lead from circuit breaker.
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  4. Place red multimeter lead in harness W67 24V connector and black lead to ground.
  5. Check for voltage.

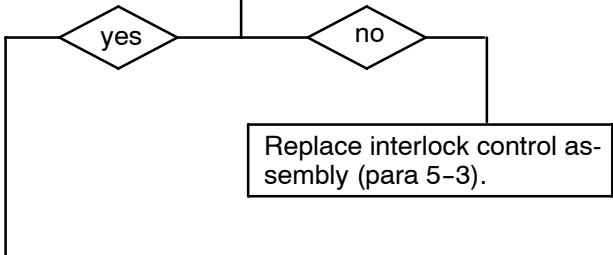


### 3-3. TROUBLESHOOTING CHART - CONTINUED

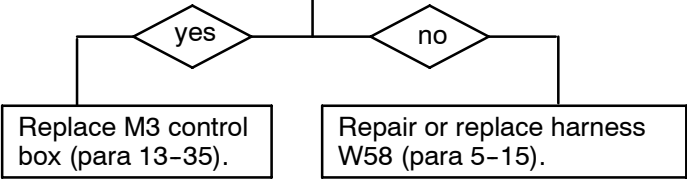
k. MCS - CONTINUED (7) ALL M3 HEATERS FAIL TO OPERATE. - CONTINUED

CONTINUED FROM STEP A

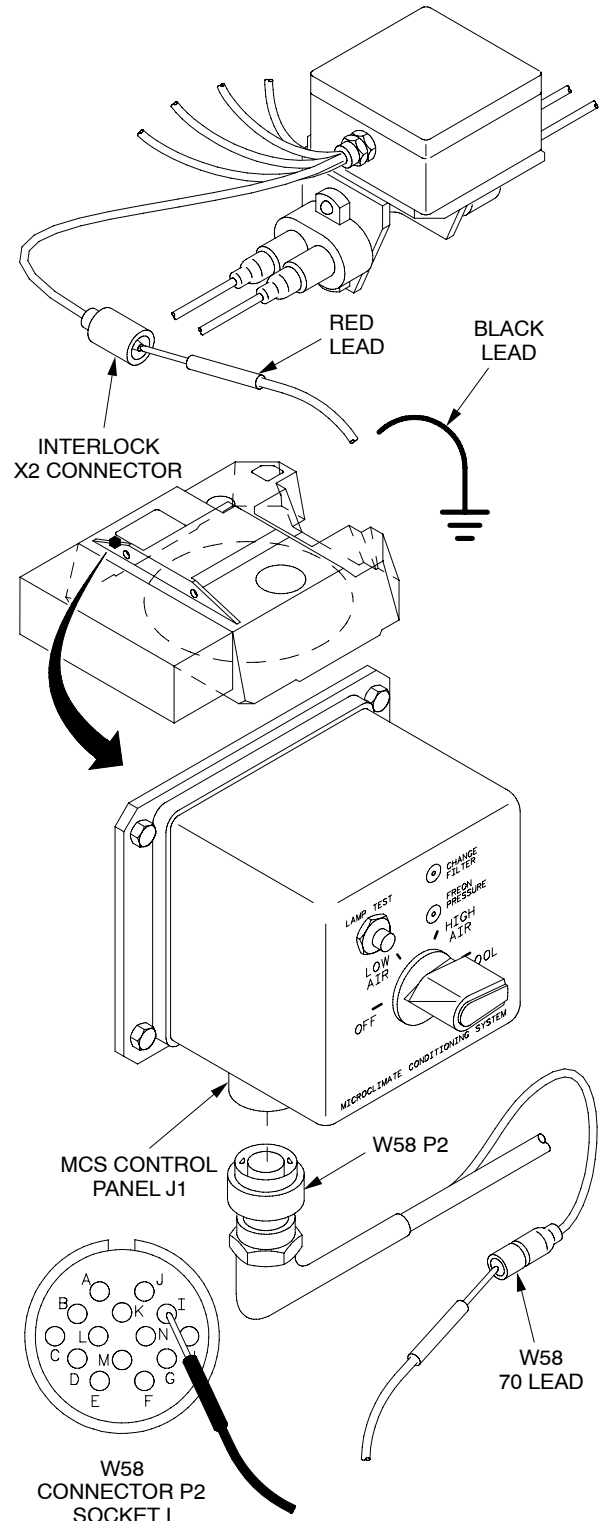
- C**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Reconnect all connectors.
  3. Disconnect W58 70 lead from interlock X2 connector.
  4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  5. Place red multimeter lead in X2 connector and black lead to ground.
  6. Check for voltage.
- Is voltage present?



- D**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W58 P2 from MCS control panel J1.
  3. Place one multimeter lead on socket I of harness W58 connector P2 and other lead in W58 70 lead connector.
  4. Check for continuity.
- Is continuity present?



**END OF TASK**



### 3-3. TROUBLESHOOTING CHART - CONTINUED

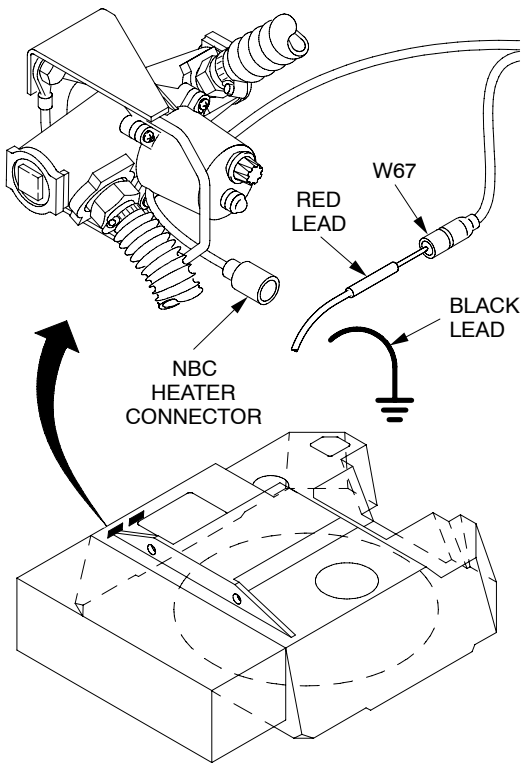
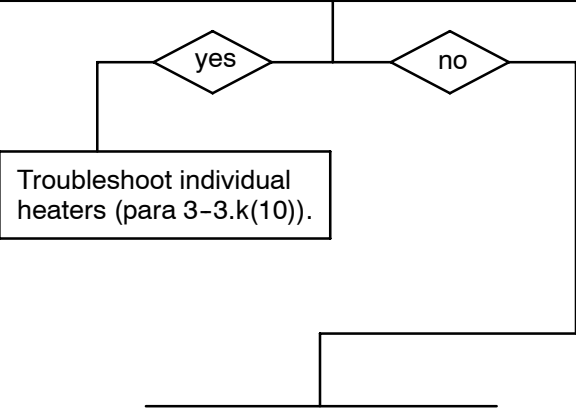
k. MCS - CONTINUED (8) M3 HEATERS 1 AND 2 FAIL TO OPERATE.  
M3 HEATERS 3 AND 4 OPERATE.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)

- A**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W67 HTR 1 & 2 lead from either heater 1 or 2.
  3. Turn vehicle MASTER power switch ON and turn MCS control panel switch to LOW (TM 9-2350-314-10).
  4. Place red multimeter lead in harness W67 connector and black lead to ground.
  5. Check for voltage.

Is voltage present?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

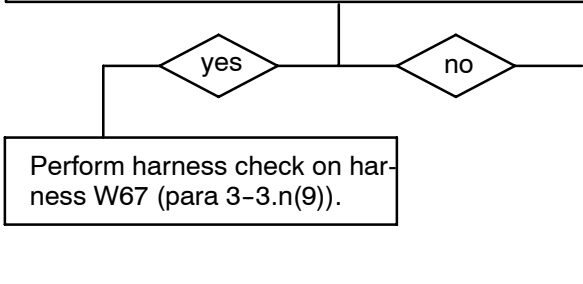
k. MCS - CONTINUED (8) M3 HEATERS 1 AND 2 FAIL TO OPERATE.  
M3 HEATERS 3 AND 4 OPERATE. - CONTINUED

CONTINUED FROM STEP A

**B**

1. Turn vehicle MASTER power switch and MCS control panel switch OFF (TM 9-2350-314-10).
2. Disconnect harness W67 HTR 1 & 2 lead from interlock control lead A1.
3. Turn vehicle MASTER power switch ON and turn MCS control panel switch to LOW (TM 9-2350-314-10).
4. Place red multimeter lead in interlock control A1 lead connector and black lead to ground.
5. Check for voltage.

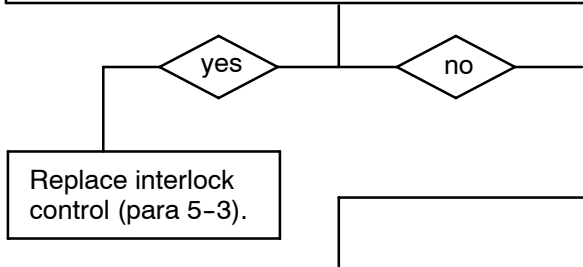
Is voltage present?



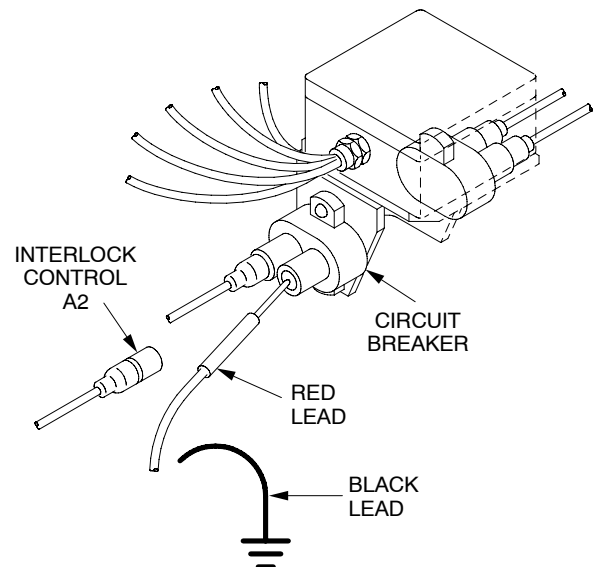
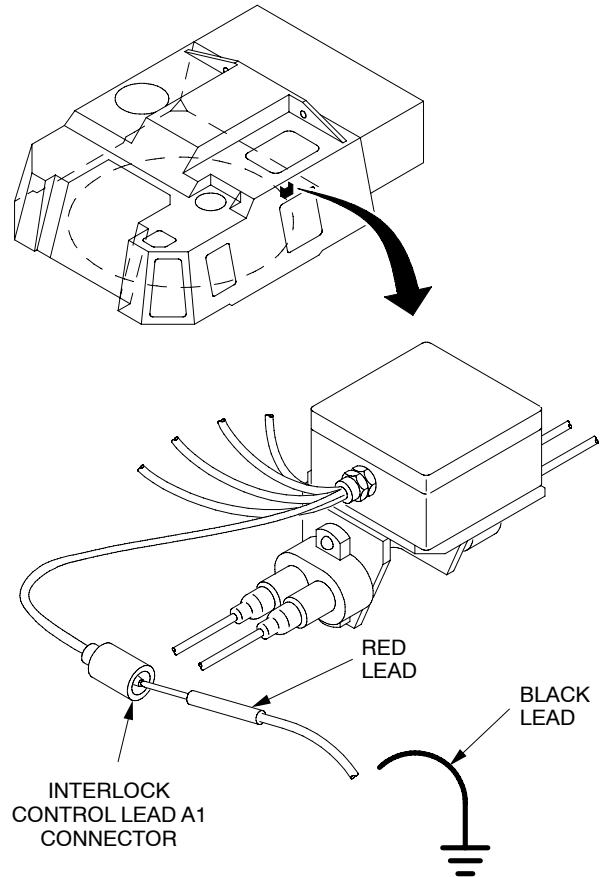
**C**

1. Turn vehicle MASTER power switch and MCS control panel switch OFF (TM 9-2350-314-10).
2. Disconnect interlock control A2 lead from circuit breaker.
3. Turn vehicle MASTER power switch ON and turn MCS control panel switch to LOW (TM 9-2350-314-10).
4. Place red multimeter lead in circuit breaker and black lead to ground.
5. Check for voltage.

Is voltage present?



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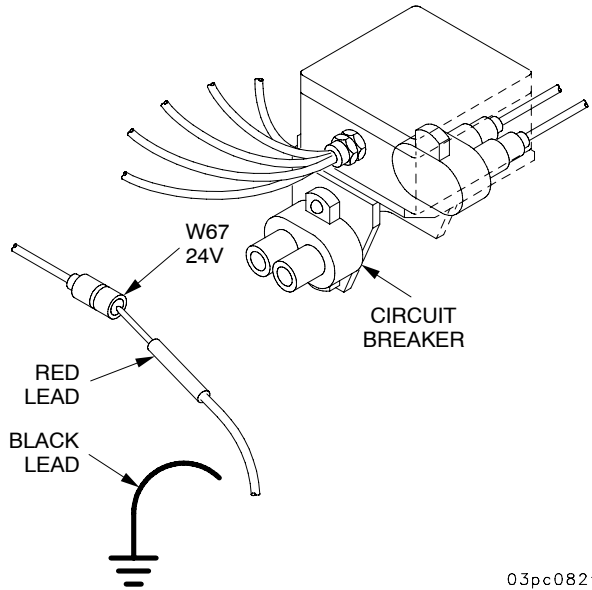
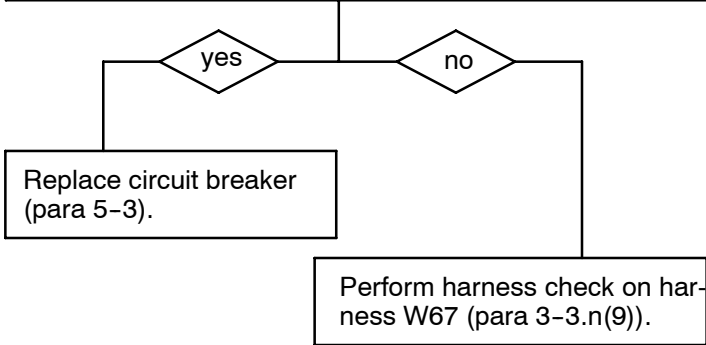
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (8) M3 HEATERS 1 AND 2 FAIL TO OPERATE.  
M3 HEATERS 3 AND 4 OPERATE. - CONTINUED

CONTINUED FROM STEP C

- |          |   |
|----------|---|
| <b>D</b> | <ol style="list-style-type: none"> <li>1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>2. Disconnect harness W67 24V lead from circuit breaker.</li> <li>3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).</li> <li>4. Place red multimeter lead in harness W67 24V connector and black lead to ground.</li> <li>5. Check for voltage.</li> </ol> |
|----------|---|

Is voltage present?



03pc082t

**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

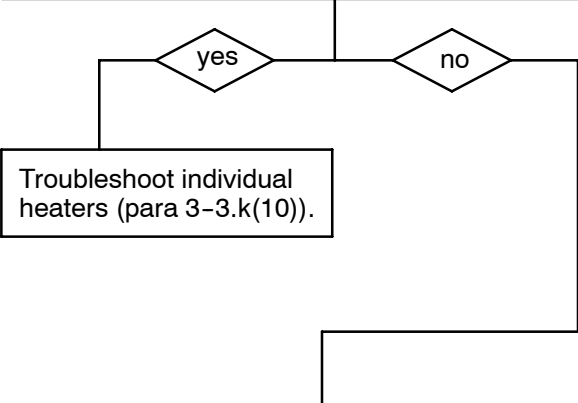
k. MCS - CONTINUED (9) M3 HEATERS 3 AND 4 FAIL TO OPERATE.  
M3 HEATERS 1 AND 2 OPERATE.

INITIAL SETUP

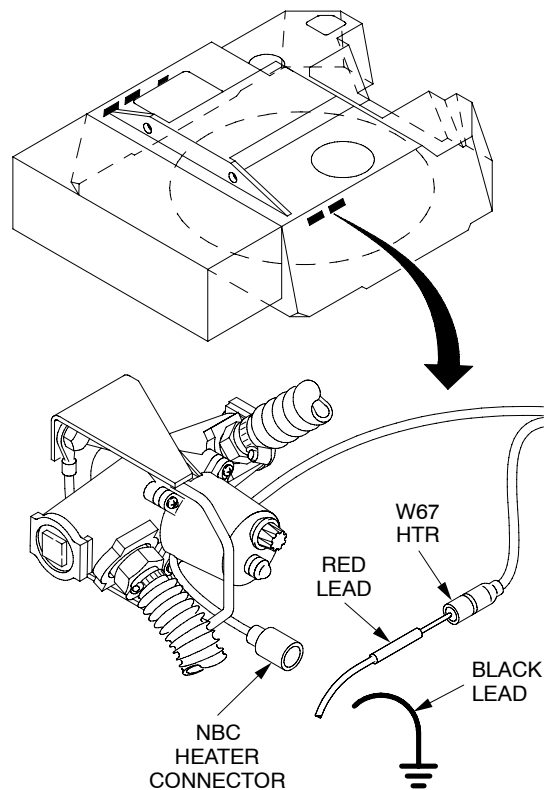
Tools  
 Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)

- A**
1. Make sure vehicle MASTER power switch is OFF (TM 9-2350-314-10).
  2. Disconnect harness W67 HTR 3 & 4 lead from either heater 3 or 4.
  3. Turn vehicle MASTER power switch ON and turn MCS control panel switch to LOW (TM 9-2350-314-10).
  4. Place red multimeter lead in harness W67 connector and black lead to ground.
  5. Check for voltage.

Is voltage present?



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11pc013t

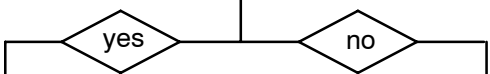
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (9) M3 HEATERS 3 AND 4 FAIL TO OPERATE.  
M3 HEATERS 1 AND 2 OPERATE. - CONTINUED

CONTINUED FROM STEP A

- B**
1. Turn vehicle MASTER power switch and MCS control panel switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W67 HTR 3 & 4 lead from interlock control lead B1.
  3. Turn vehicle MASTER power switch ON and turn MCS control panel switch to LOW (TM 9-2350-314-10).
  4. Place red multimeter lead in interlock control B1 lead connector and black lead to ground.
  5. Check for voltage.

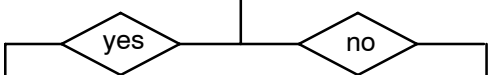
Is voltage present?



Perform harness check on harness W67 (para 3-3.n(9)).

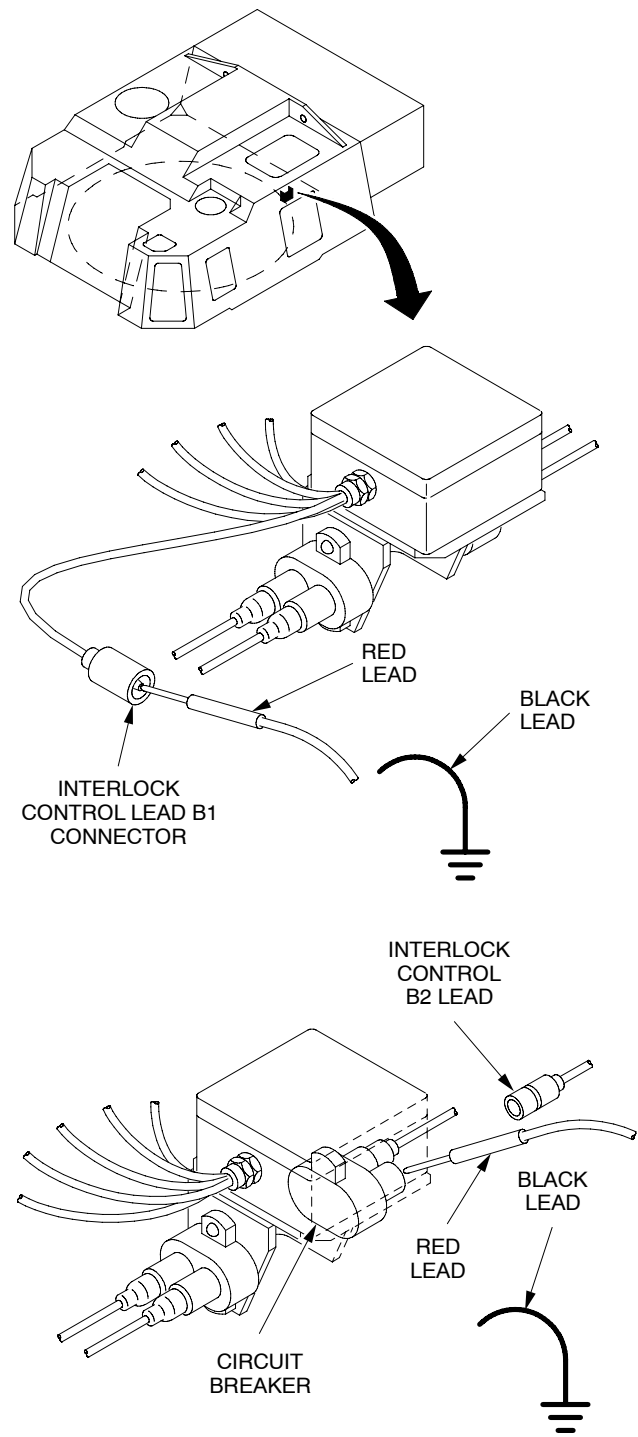
- C**
1. Turn vehicle MASTER power switch and MCS control panel switch OFF (TM 9-2350-314-10).
  2. Disconnect interlock control B2 lead from circuit breaker.
  3. Turn vehicle MASTER power switch ON and turn MCS control panel switch to LOW (TM 9-2350-314-10).
  4. Place red multimeter lead in circuit breaker and black lead to ground.
  5. Check for voltage.

Is voltage present?



Replace interlock control (para 5-3).

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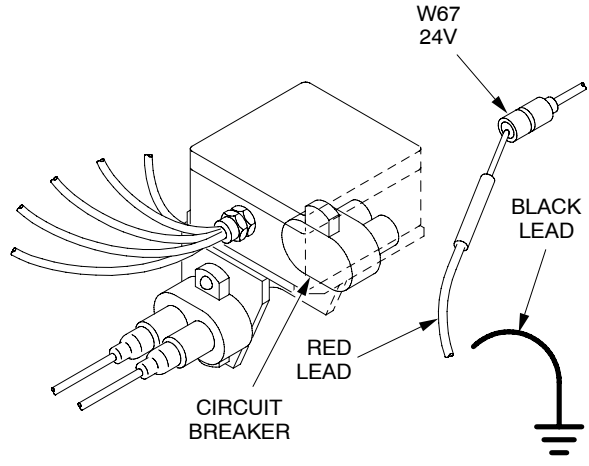
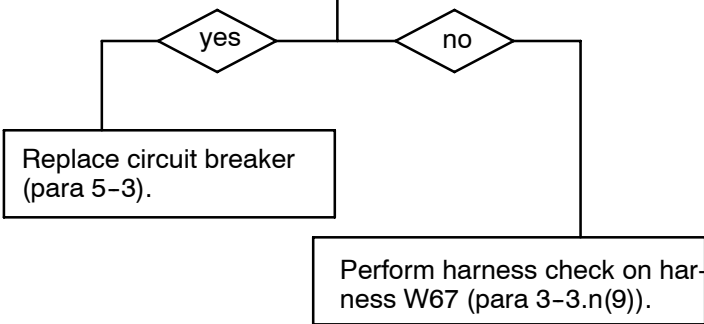
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k. MCS - CONTINUED (9) M3 HEATERS 3 AND 4 FAIL TO OPERATE. M3 HEATERS 1 AND 2 OPERATE. - CONTINUED

CONTINUED FROM STEP C

- D**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W67 24V lead from circuit breaker.
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  4. Place red multimeter lead in harness W67 24V connector and black lead to ground.
  5. Check for voltage.

Is voltage present?



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END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

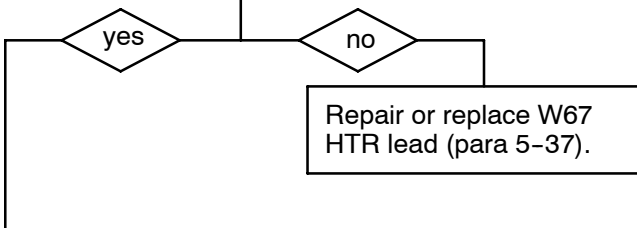
k. MCS - CONTINUED (10) M3 HEATERS (1, 2, 3, OR 4) FAIL TO OPERATE.  
All other heaters operate.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)

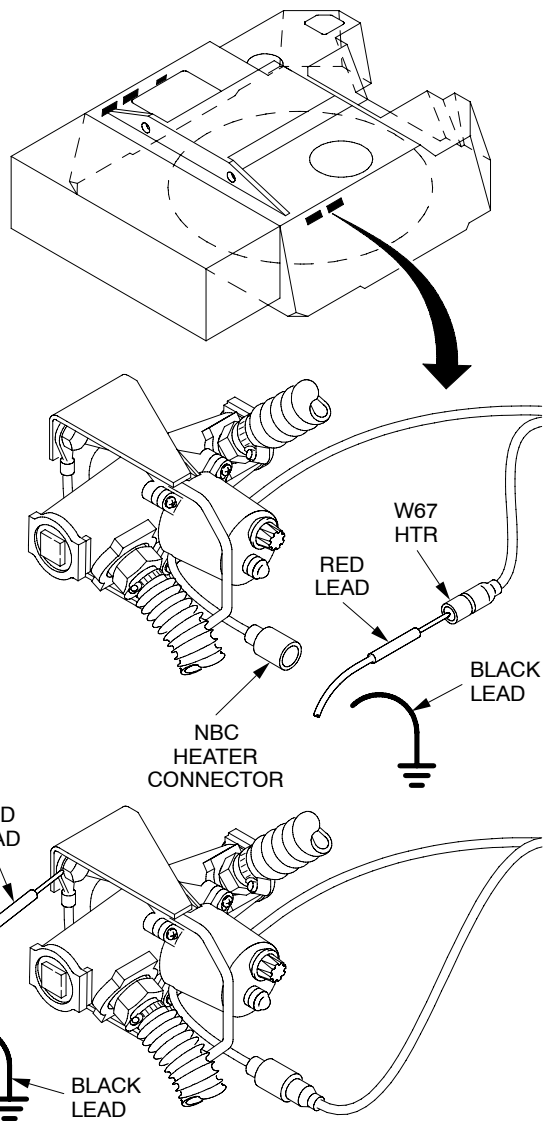
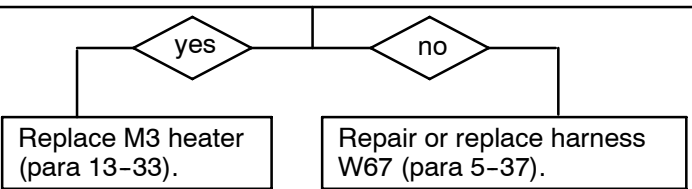
- A**
1. Make sure vehicle MASTER power switch is OFF (TM 9-2350-314-10).
  2. Disconnect HTR (1, 2, 3, or 4) from failed M3 heater connector.
  3. Turn vehicle MASTER power switch ON and turn MCS control panel switch to LOW (TM 9-2350-314-10).
  4. Place red multimeter lead on HTR lead and black lead to ground.
  5. Check for voltage.

Is voltage present?



- B**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Make sure heater ground lead is tight and making contact.
  3. Place one multimeter lead on heater ground lead and other lead to ground.
  4. Check for continuity.

Is continuity present?



11pc014 t

**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### k.1. PDFCS

The Paladin Digital Fire Control System (PDFCS) consists of the following major assemblies:

- PDFCS Computer Unit (PDCU)
- Power Conditioner Unit (PCU-2)
- PDFCS Display Unit (PDU)
- Backup Batteries
- Azimuth Shorting Plug
- Elevation Shorting Plug
- Vehicle Motion Sensor (VMS) modem
- Tube Temperature Sensor (TTS)
- Elevation Servo Valve
- Azimuth Servo Valve
- Hydraulic components
- Dynamic Reference Unit Hybrid (DRUH)
- Associated wiring
- Keypad

The relationship of these components is shown in Figure A.

When the MASTER power switch is ON, 24 V dc is supplied to the slip ring, which passes it on to the PCU-2. The PCU-2 augments the 24 V dc with power from the PDFCS backup batteries, if required, and supplies the 24 V dc to the PDCU, DRUH, and radio rack connector.

The PDCU provides control signals to the VMS Modem, the DRUH and the PDU as well as power to the PDU when the MASTER POWER switch is ON and the KEYPAD POWER switch is ON. With the KEYPAD POWER switch ON, the PDFCS will power up and automatically perform its built-in test (BIT) and the PDFCS STATUS will be displayed on the PDU.

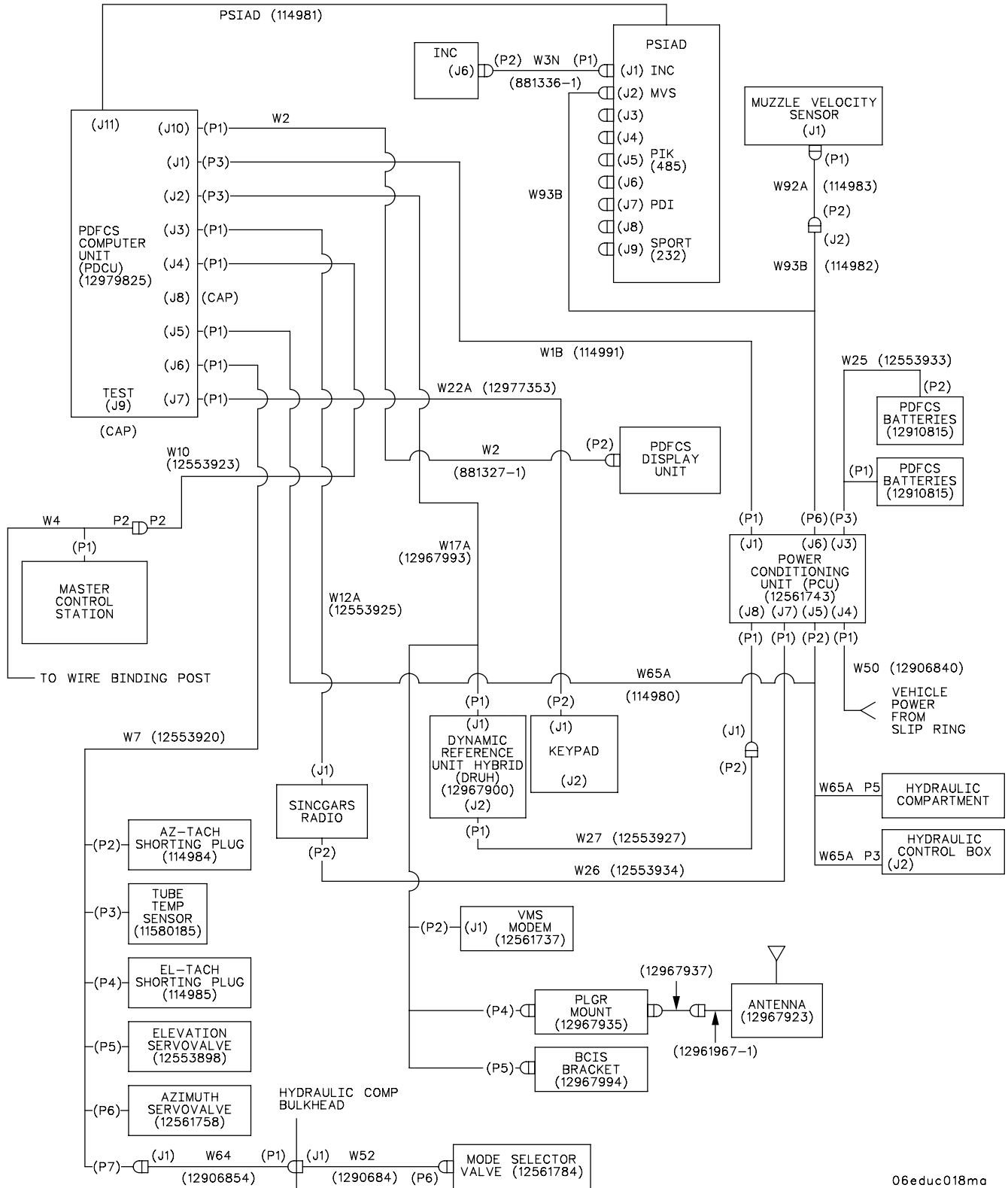
With the PDFCS operating, the PDCU supplies control signals to the Az Tach Shorting Plug, El Tach Shorting Plug, TTS, El Servo Valve, and Az Servo Valve. The TTS provides gun tube temperature to the PDCU.

With the PDFCS operating, the PDCU processes the incoming and outgoing messages from the Audio Frequency Amplifier and the Communications Mode Selector Control.

# 3-3. TROUBLESHOOTING CHART - CONTINUED

## k.1. PDFCS - CONTINUED

**Figure A. PDFCS Electrical Wiring Diagram**



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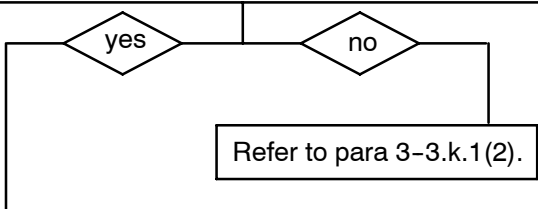
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness).

<p><b>INITIAL SETUP</b></p> <p style="text-align: center;"><b>NOTE</b></p> <p>When performing PDFCS troubleshooting, use only the SPORT or MSD for the Paladin M109A6.</p> <p>Perform TB 9-2350-314-20-2-2 M109A6 Accessory Software, "PDFCS TROUBLESHOOTING", single test "PDFCS Power problem/No PDU Display (either Fire Control (FC) or Situation Awareness display (SA))".</p>	<p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)                  PDFCS Sport/MSD Accessory Kit (item 61, Appx G)</p>
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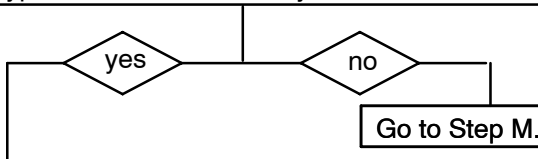
**A** 1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).  
 2. Make sure all PCU circuit breakers are in the ON position (TM 9-2350-314-10).

Is the PCU-2 VEHICLE POWER lamp ON?



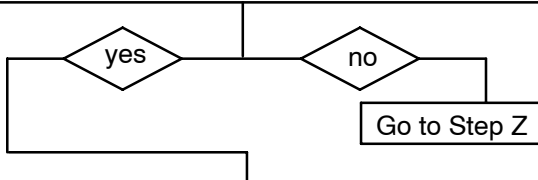
**B** 1. Try to turn keypad switch to ON position (TM 9-2350-314-10).  
 2. Monitor keypad POWER switch to make sure switch stays ON at least 5 seconds.

Did keypad POWER switch stay ON at least 5 seconds?



**C** Monitor PCU-2 BUS A lamp.

Is PCU-2 BUS A lamp ON?



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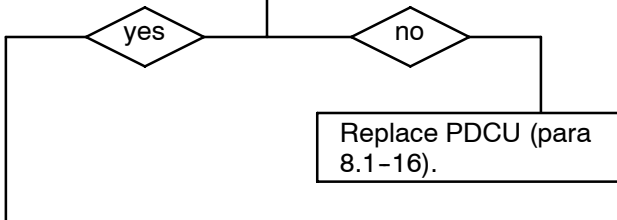
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP C

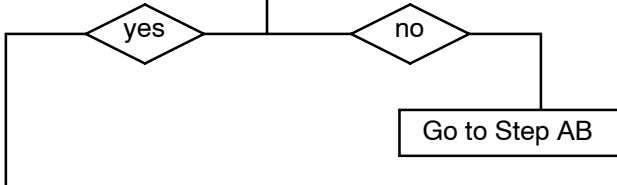
**D** Monitor keypad POWER switch to make sure switch stays ON at least 45 seconds (from when keypad POWER switch was turned ON in Step B).

Did keypad POWER switch stay ON at least 45 seconds?



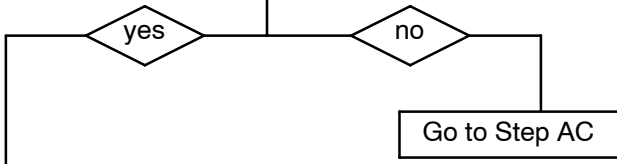
**E** Monitor PDCU green POWER lamp.

Is PDCU POWER lamp ON?



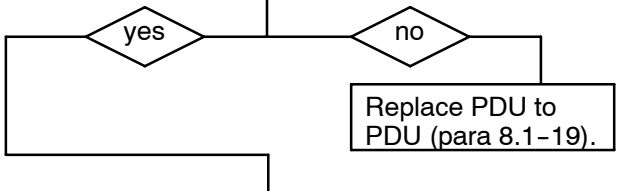
**F** Monitor PDU green PWR category LED (Light Emitting Diode).

Is PDU green PWR category LED ON?



**G** Monitor PDU green DISP category LED.

Is PDU green DISP category LED ON?



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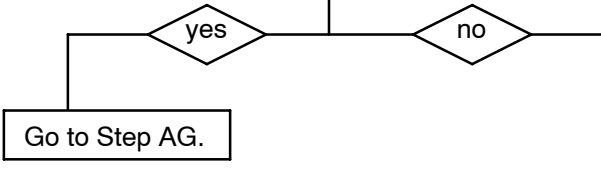
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP G

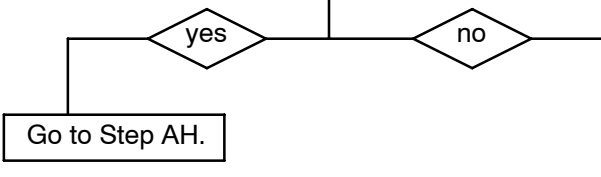
**H** Monitor all PDU CPU category LEDs.

Is one of PDU CPU category LEDs blinking?



**I** Monitor PDU display.

Is PDU display blank? (PDFCS FC or FBCB2 SA screens are not visible.)

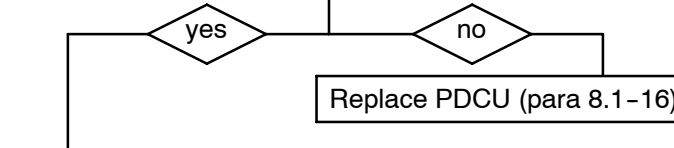


**J** Monitor PDU display.

**NOTE**

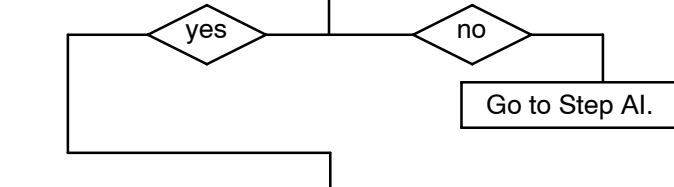
PDFCS FC screen must be displayed, unless keypad FC/SA switch has not been pushed.

Is PDFCS FC screen displayed?



**K** 1. Press keypad FC/SA switch.  
2. Monitor PDU display.

Did PDU screen switch to FBCB2 Situational Awareness screen?

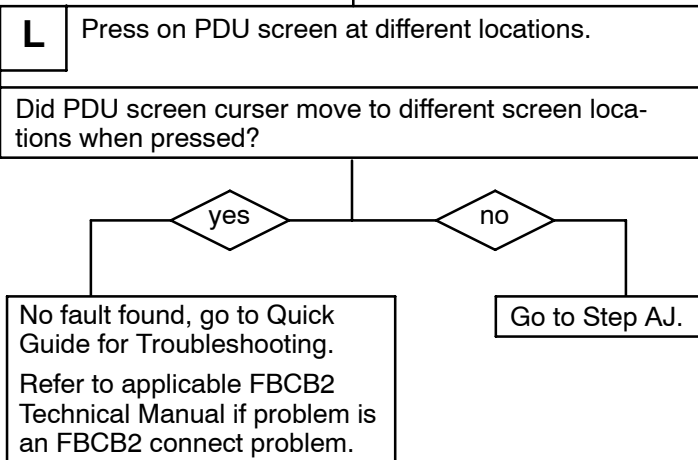


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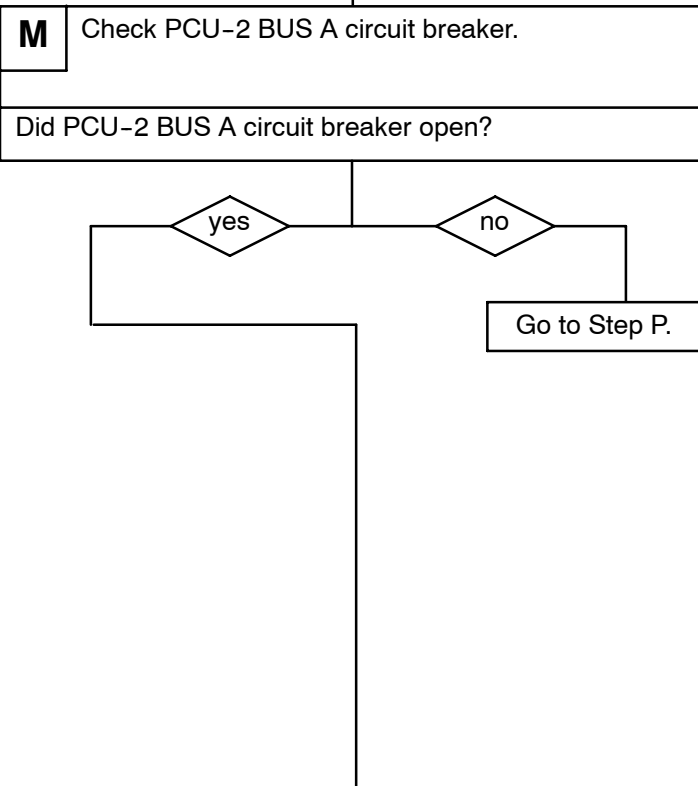
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP K



CONTINUED FROM STEP B



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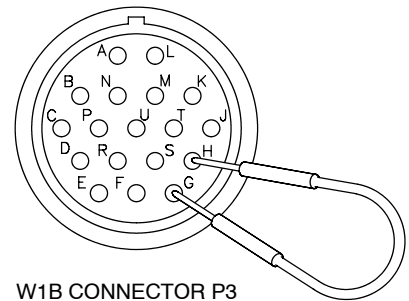
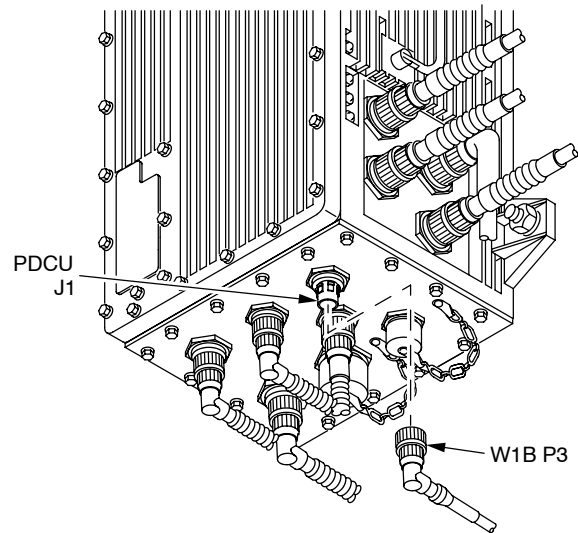
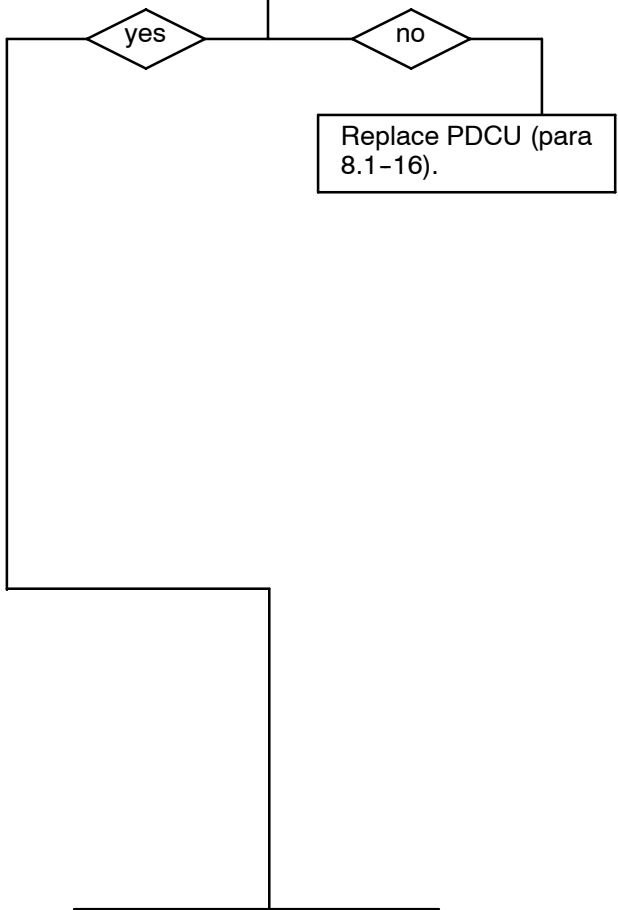
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (either Fire Control or Situation Awareness). - CONTINUED

CONTINUED FROM STEP M

- N**
1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  2. Disconnect harness W1B connector P3 at PDCU connector J1.
  3. Connect jumper wire between harness W1B connector P3 sockets G and H.
  4. Turn PCU-2 BUS A circuit breaker to ON (TM 9-2350-314-10).
  5. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).

Did PCU-2 BUS A circuit breaker open?



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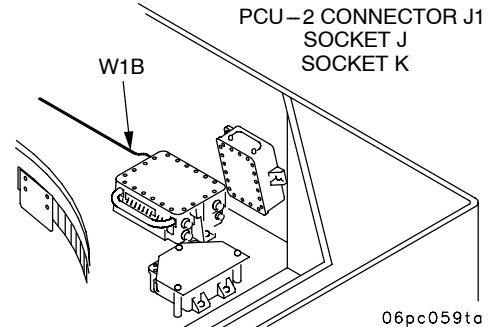
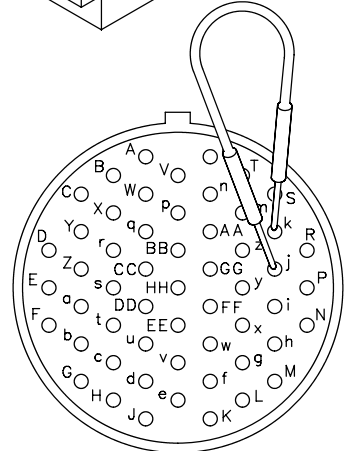
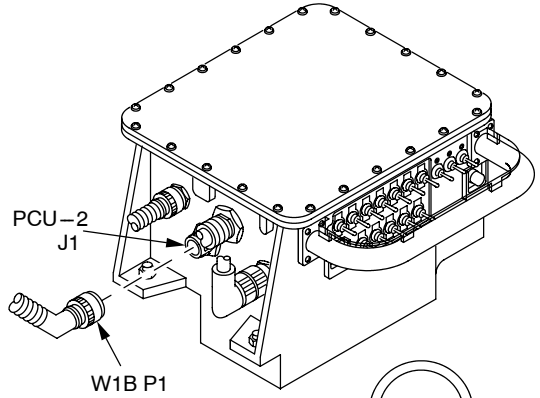
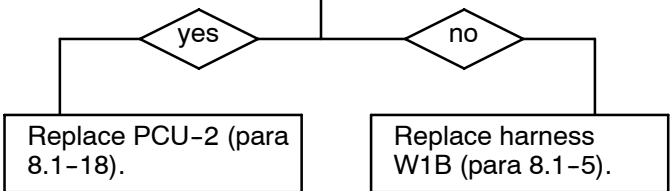
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (either Fire Control or Situation Awareness). - CONTINUED

CONTINUED FROM STEP N

- |          |   |
|----------|---|
| <b>O</b> | <ol style="list-style-type: none"> <li>1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li> <li>2. Disconnect harness W1B connector P1 at PCU-2 connector J1.</li> <li>3. Connect jumper wire between harness PCU-2 connector P1 sockets <u>j</u> and <u>k</u>.</li> <li>4. Turn PCU BUS A circuit breaker to ON (TM 9-2350-314-10).</li> <li>5. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).</li> </ol> |
|----------|---|

Did PCU-2 BUS A circuit breaker open?



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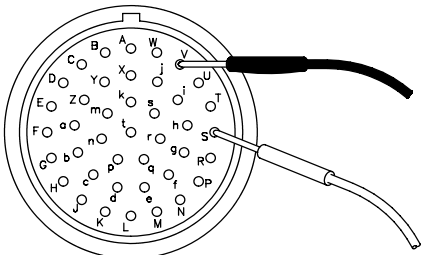
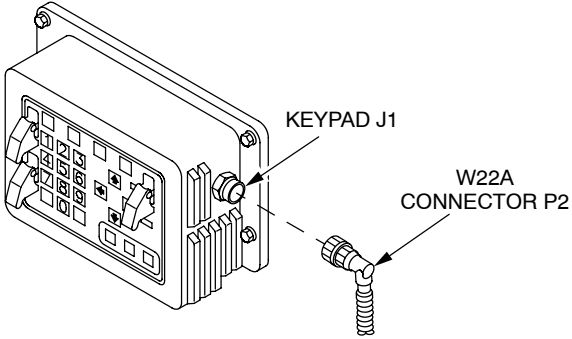
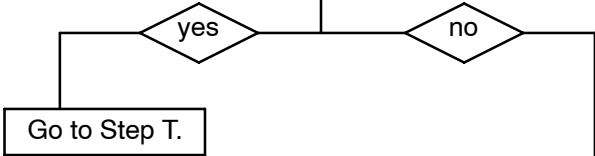
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (either Fire Control or Situation Awareness). - CONTINUED

CONTINUED FROM STEP M

- P**
1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  2. Disconnect harness W22A connector P2 at keypad connector J1.
  3. Place multimeter red lead in harness W22A connector P2 socket S and black lead in harness W22A connector P2 socket V.
  4. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  5. Measure DC voltage (V dc).

Is voltage greater than 18 V dc?



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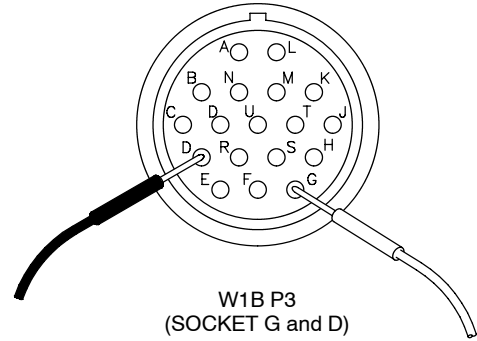
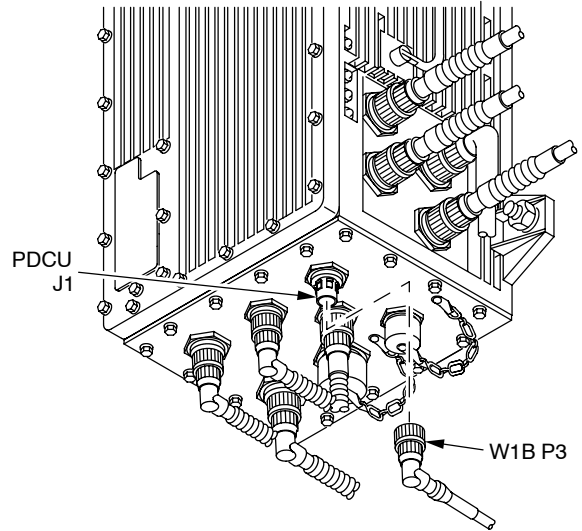
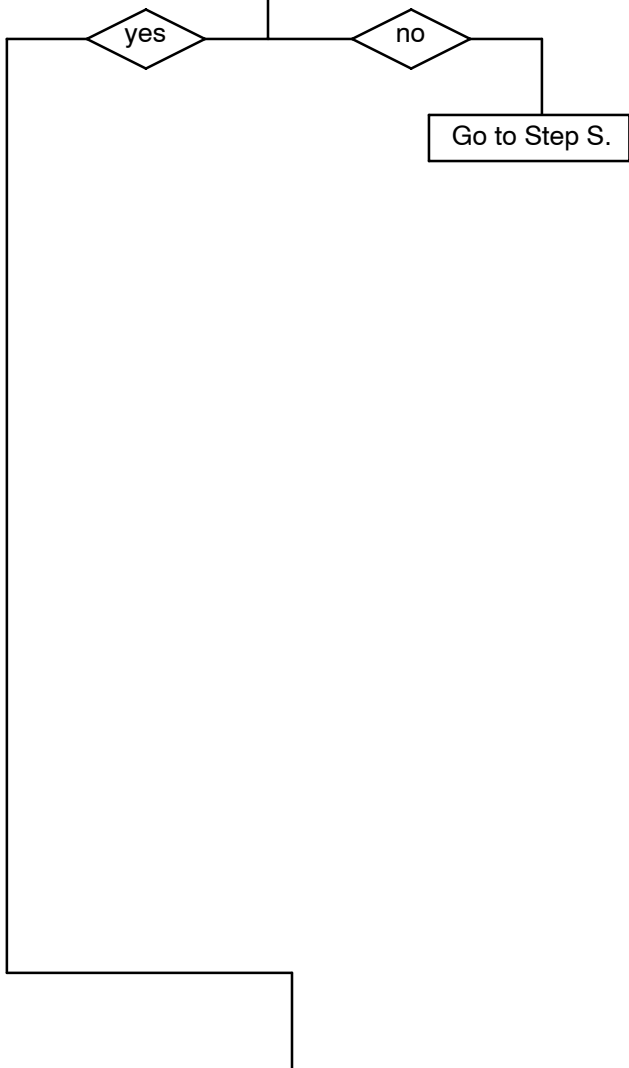
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (either Fire Control or Situation Awareness). - CONTINUED

CONTINUED FROM STEP P

- Q**
1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  2. Disconnect harness W1B connector P3 at PDCU connector J1.
  3. Place multimeter red lead in harness W1B connector P3 socket G and black lead in harness W1B connector P3 socket D.
  4. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  5. Measure DC voltage (V dc).

Is voltage greater than 18 V dc?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED

(1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (either Fire Control or Situation Awareness). - CONTINUED

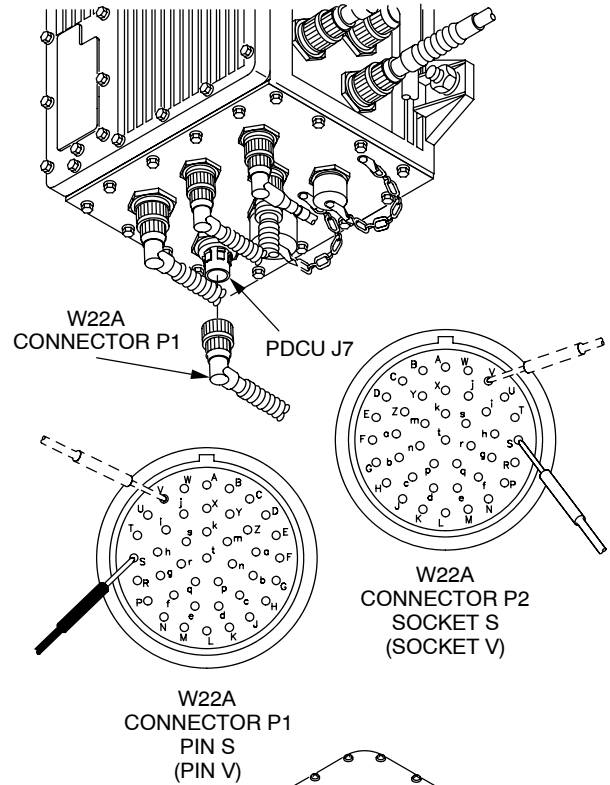
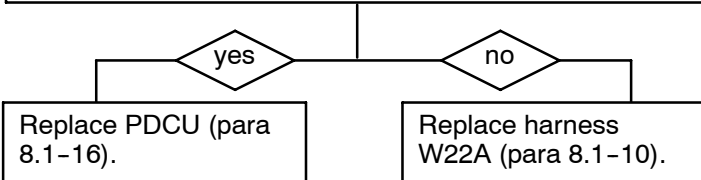
CONTINUED FROM STEP Q

**R**

1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
2. Disconnect harness W22A connector P1 at PDCU connector J7.
3. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P2 socket S	Connector P1 pin S
Connector P2 socket V	Connector P1 pin V

Is there continuity at both points (resistance less than 10 ohms)?

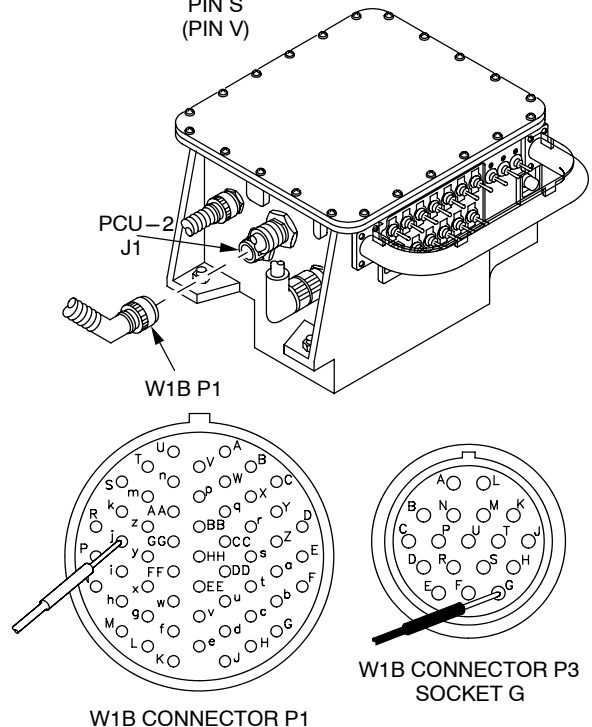
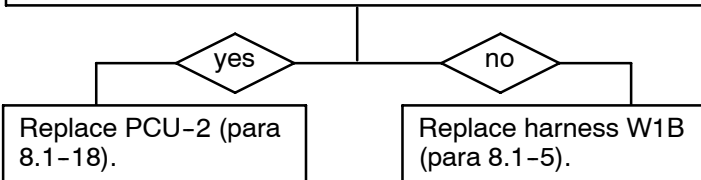


CONTINUED FROM STEP Q

**S**

1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
2. Disconnect harness W1B connector P1 at PCU-2 connector J1.
3. Place one multimeter lead in harness W1B connector P3 socket G and other lead in harness W1B connector P1 pin j.
4. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

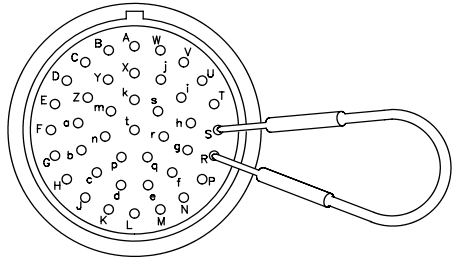
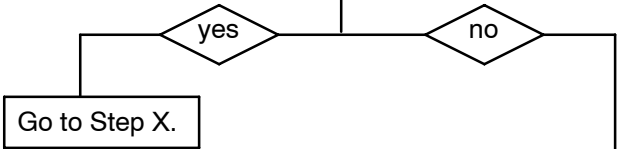
k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (either Fire Control or Situation Awareness). - CONTINUED

CONTINUED FROM STEP P

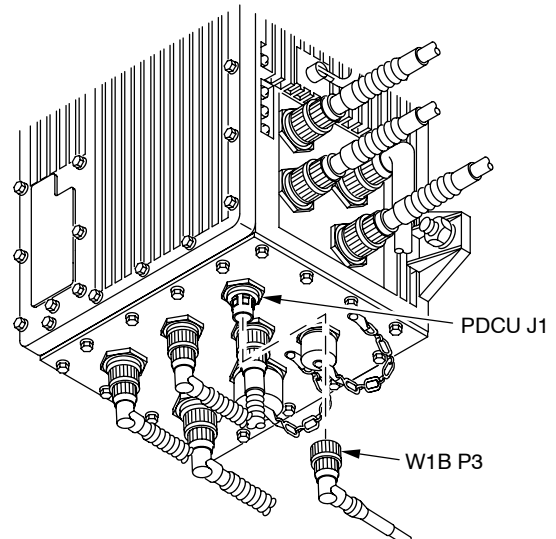
**T**

1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
2. Connect jumper wire between harness W22 connector P2 sockets S and R.
3. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
4. Monitor green PCU-2 BUS A lamp for at least 5 seconds.

Did PCU-2 BUS A lamp stay on for at least 5 seconds?



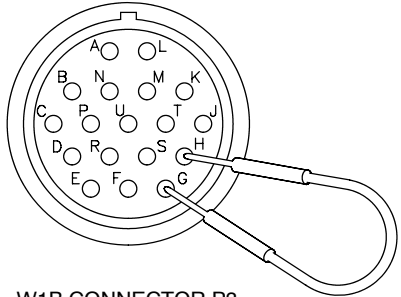
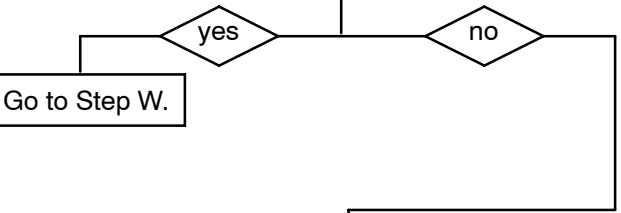
W22A  
CONNECTOR P2  
SOCKET S  
(SOCKET R)



**U**

1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
2. Disconnect harness W1B connector P3 at PDCU connector J1.
3. Connect jumper wire between harness W1B connector P3 sockets G and H.
4. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
5. Monitor green PCU-2 BUS A lamp for at least 5 seconds.

Did PCU-2 BUS A lamp stay on for at least 5 seconds?



W1B CONNECTOR P3  
(SOCKET G and H)

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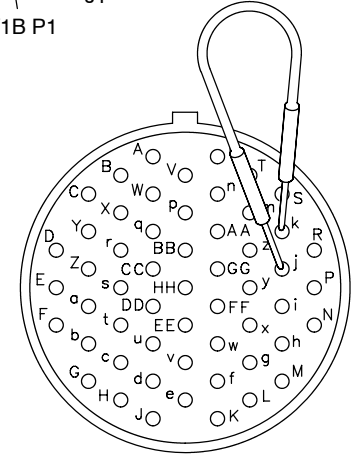
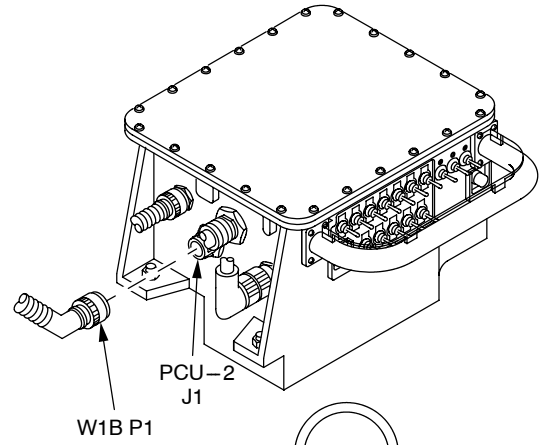
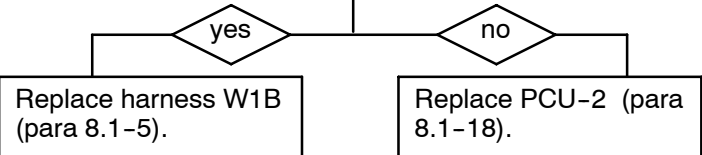
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP U

- |  |   |
|--|---|
| <b>V</b>   | <ol style="list-style-type: none"> <li>1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li> <li>2. Disconnect harness W1B connector P1 at PCU-2 connector J1.</li> <li>3. Connect jumper wire between PCU-2 connector P1 sockets <u>j</u> and <u>k</u>.</li> <li>4. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).</li> <li>5. Monitor green PCU-2 BUS A lamp for at least 5 seconds.</li> </ol> |
| Did PCU-2 BUS A lamp stay on for at least 5 seconds? |   |



PCU-2 CONNECTOR J1  
SOCKET J  
SOCKET K

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

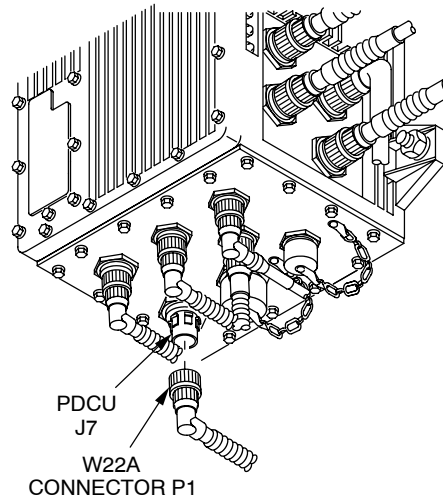
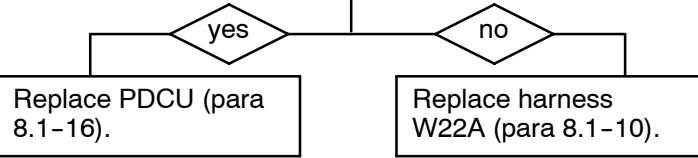
CONTINUED FROM STEP U

**W**

1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
2. Disconnect harness W22A connector P1 at PDCU connector J7.
3. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P2 socket U	Connector P1 pin U
Connector P2 socket R	Connector P1 pin R

Is there continuity at all points (resistance less than 10 ohms)?

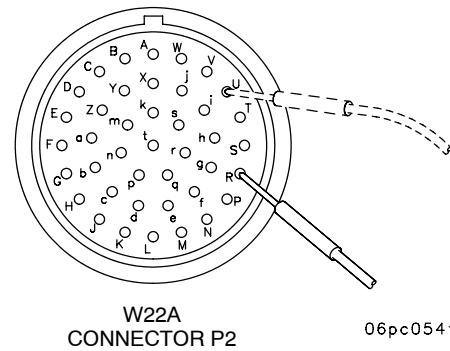
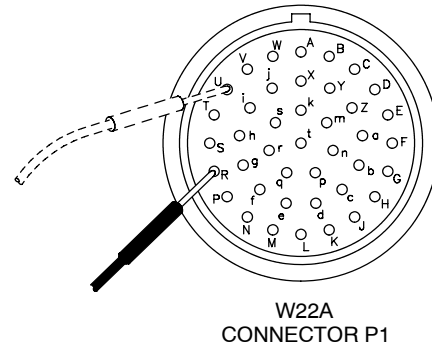
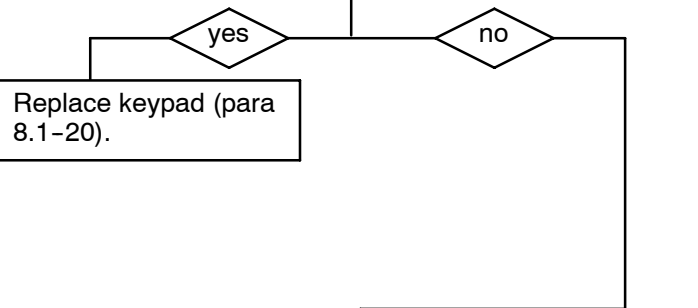


CONTINUED FROM STEP T

**X**

1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
2. Place one multimeter lead in harness W22A P2 connector socket U and other lead in harness W22A P2 connector socket R.
3. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



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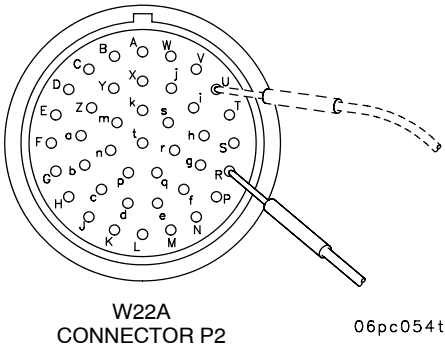
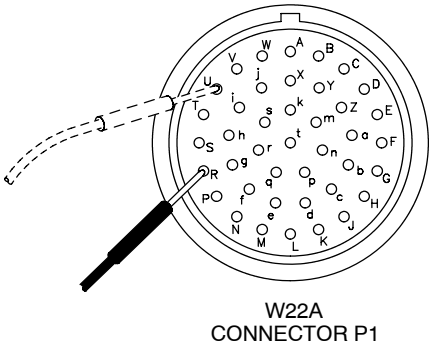
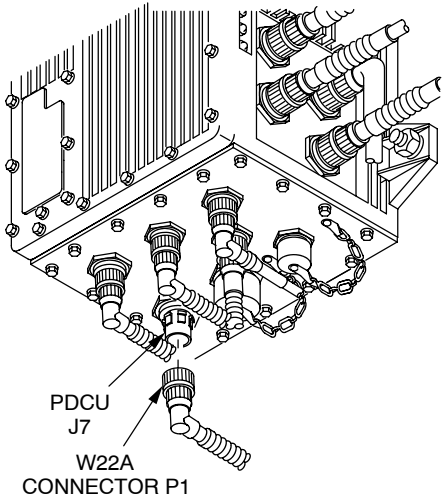
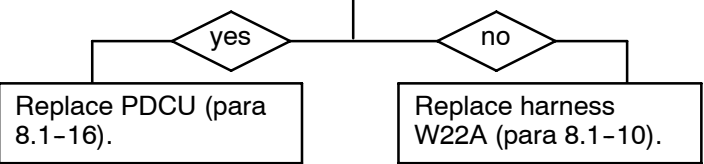


### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP X

- Y**
1. Disconnect harness W22A connector P1 at PDCU connector J7.
  2. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.
- | Point A               | Point B            |
|-----------------------|--------------------|
| Connector P2 socket U | Connector P1 pin U |
| Connector P2 socket R | Connector P1 pin R |
- Is there continuity at all points (resistance less than 10 ohms)?



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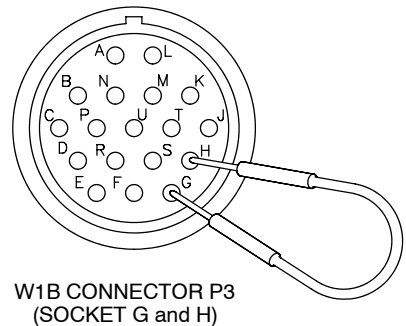
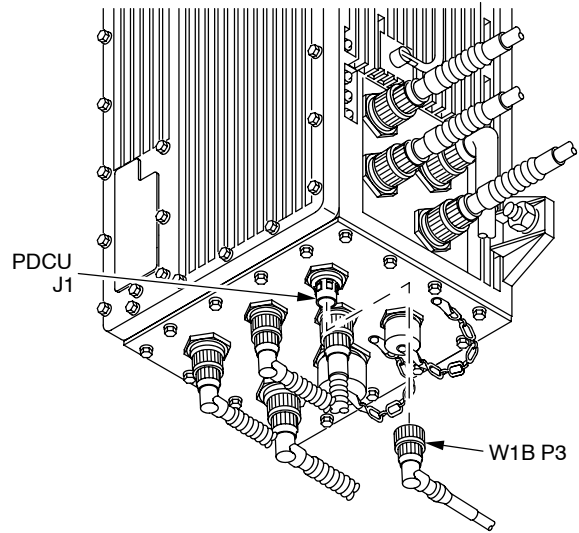
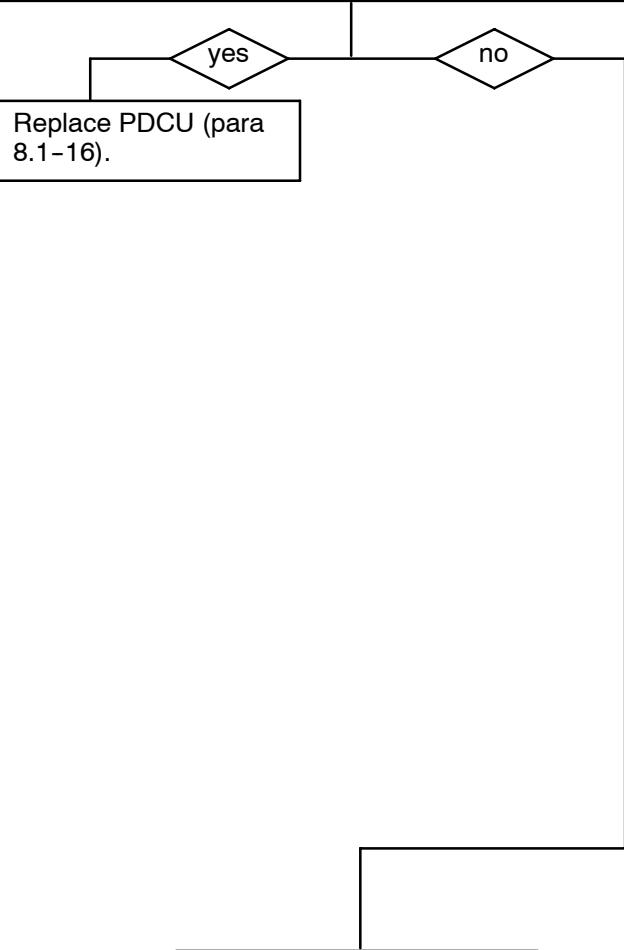
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP C

- Z**
1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  2. Disconnect harness W1B connector P3 at PDCU connector J1.
  3. Connect jumper wire between harness W1B connector P3 sockets G and H.
  4. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).

Is PCU-2 BUS A lamp ON?



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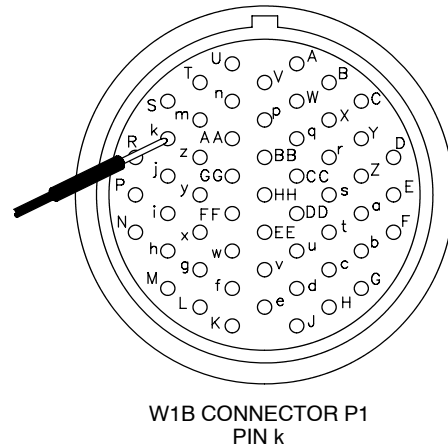
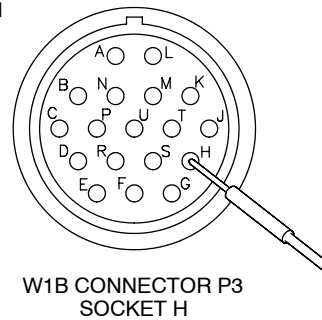
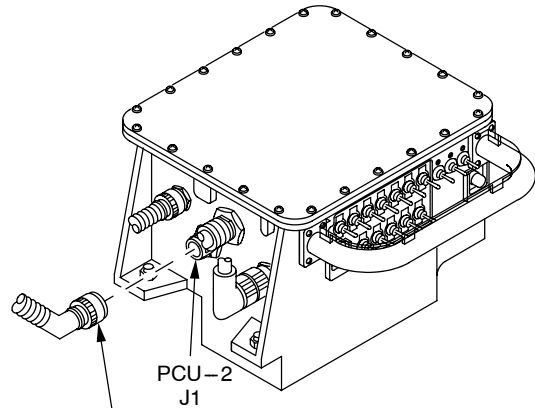
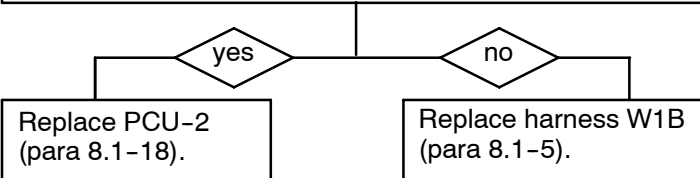
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP Z

- AA**
1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  2. Disconnect jumper wire between harness W1B connector P3 sockets G and H.
  3. Disconnect harness W1B connector P1 at PCU-2 connector J1.
  4. Place one multimeter lead in harness W1B connector P3 socket H and other lead in harness W1B connector P1 pin k.
  5. Check for continuity.
- Is there continuity (resistance less than 10 ohms)?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

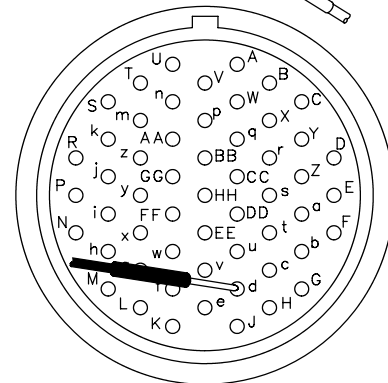
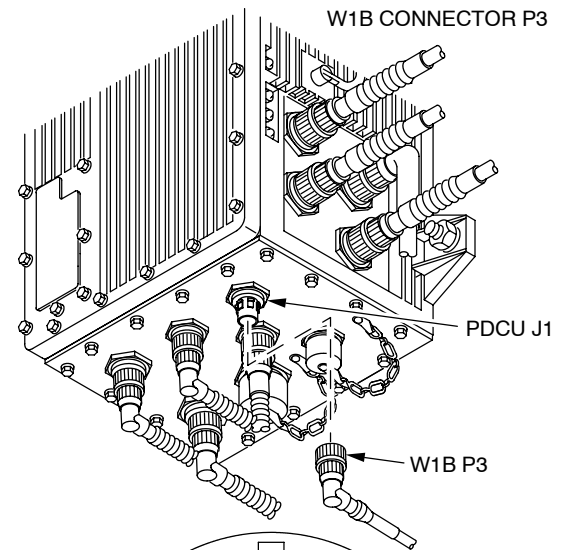
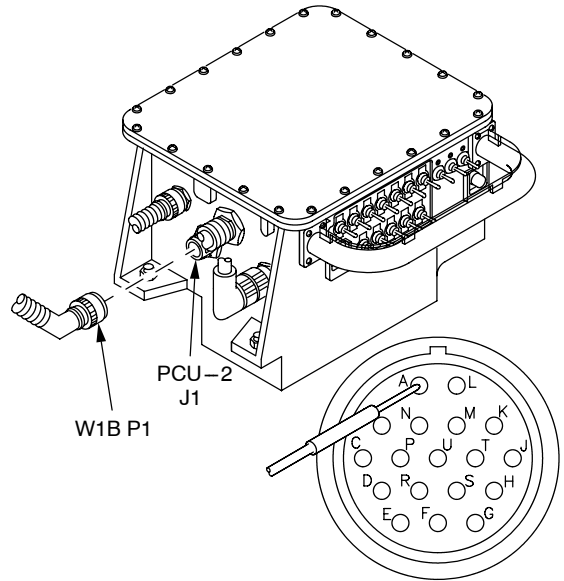
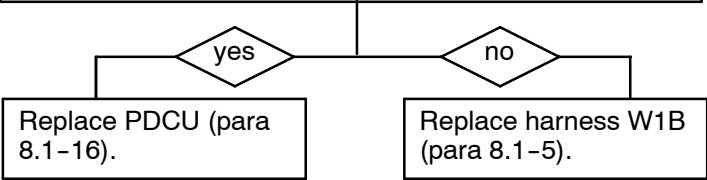
CONTINUED FROM STEP E

**AB**

1. Turn PDFCS power switch on keypad to OFF.
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W1B connector P1 at PCU-2 connector J1.
4. Disconnect harness W1B connector P3 at PDCU connector J1.
5. Check harness W1B for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P3 socket A	Connector P1 pin <u>d</u>
Connector P3 socket B	Connector P1 pin <u>e</u>
Connector P3 socket C	Connector P1 pin <u>f</u>
Connector P3 socket D	Connector P1 pin <u>g</u>
Connector P3 socket E	Connector P1 pin <u>h</u>
Connector P3 socket F	Connector P1 pin <u>i</u>
Connector P3 socket N	Connector P1 pin <u>V</u>
Connector P3 socket P	Connector P1 pin <u>T</u>

Is there continuity at all points (resistance less than 10 ohms)?



W1B CONNECTOR P1

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP F

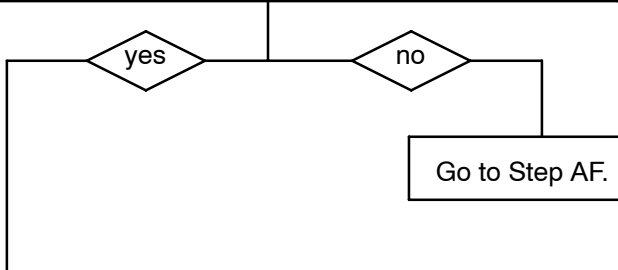
**AC**

1. Turn PDFCS power switch on keypad to OFF.
2. Disconnect harness W2 connector P2 at PDU connector J1.
3. Turn keypad power switch to ON.
4. Place multimeter red lead to harness W2 connector P2 point A socket and black lead to harness W2 connector P2 point B socket as follows:

Point A	Point B
21	24
22	25
23	26

5. Measure DC voltage (V dc).

Is voltage between 6 and 4 V dc for all points?



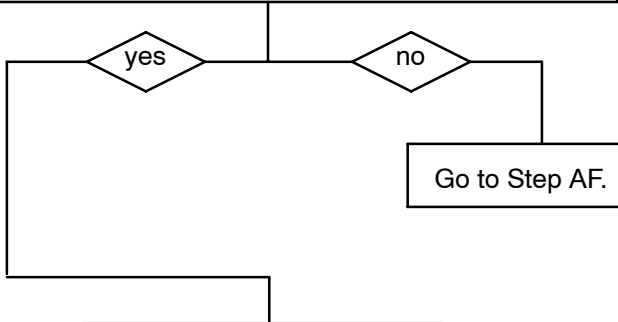
**AD**

1. Place multimeter red lead to harness W2 connector P2 point A socket and black lead to harness W2 connector P2 point B socket as follows:

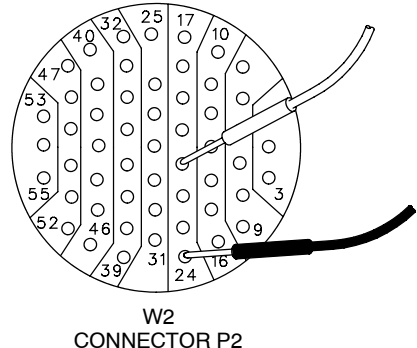
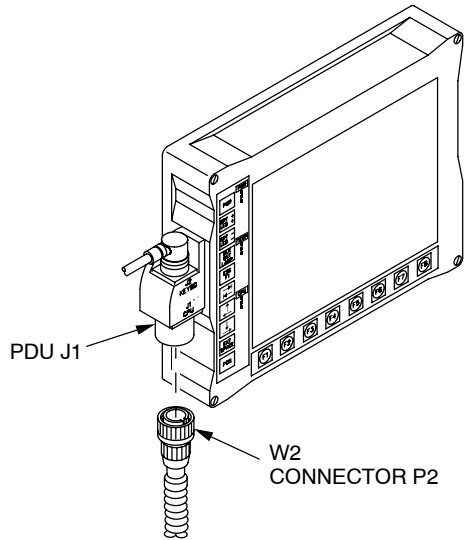
Point A	Point B
27	30
28	31
29	31

2. Measure DC voltage (V dc).

Is voltage between 13 and 11 V dc for all points?



CONTINUED ON NEXT PAGE



06pc232t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

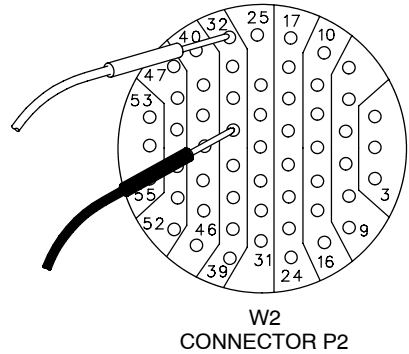
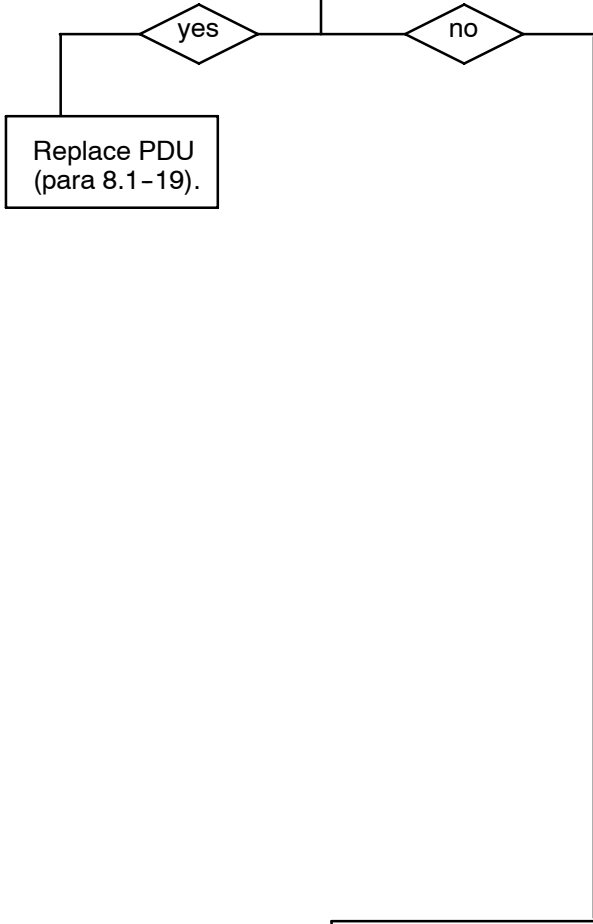
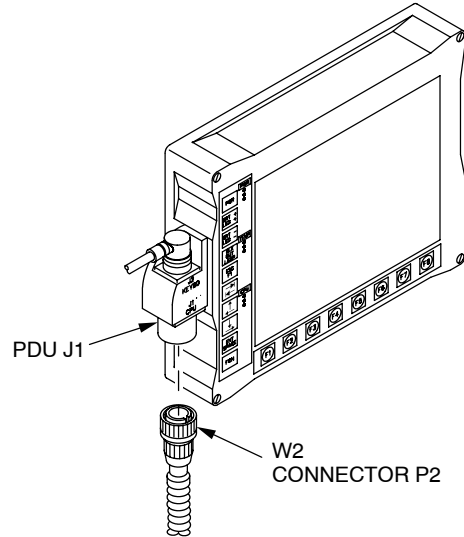
CONTINUED FROM STEP AD

**AE** 1. Place multimeter red lead to harness W2 connector P2 point A socket and black lead to harness W2 connector P2 point B socket as follows:

Point A	Point B
32	35
33	36
34	36

2. Measure DC voltage (V dc).

Is voltage between 4 and 2 V dc for all points?



06pc232ta

# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

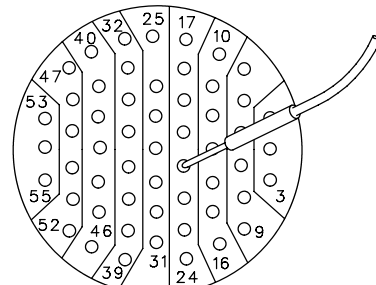
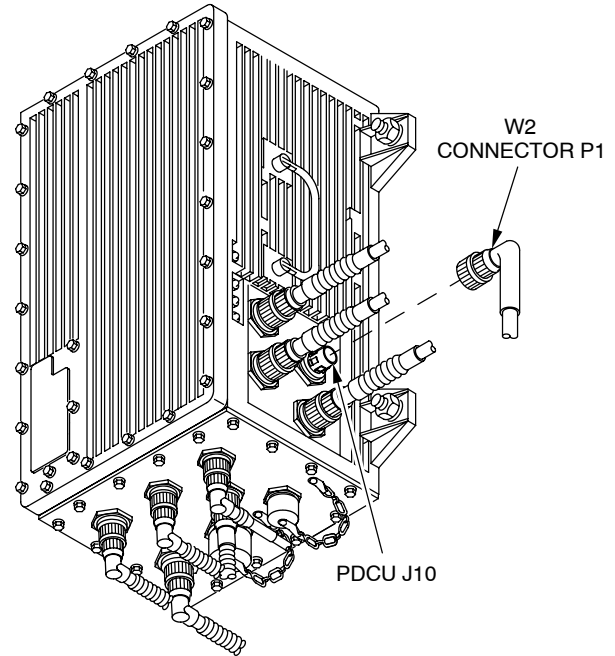
CONTINUED FROM STEP AC, AD, AE

**AF**

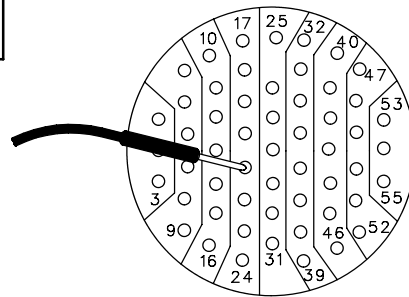
1. Turn PDFCS power switch on keypad to OFF.
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W2 connector P1 at PDCU connector J10.
4. Check harness W2 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P2 socket 21	Connector P1 pin 21
Connector P2 socket 22	Connector P1 pin 22
Connector P2 socket 23	Connector P1 pin 23
Connector P2 socket 24	Connector P1 pin 24
Connector P2 socket 25	Connector P1 pin 25
Connector P2 socket 26	Connector P1 pin 26
Connector P2 socket 27	Connector P1 pin 27
Connector P2 socket 28	Connector P1 pin 28
Connector P2 socket 28	Connector P1 pin 29
Connector P2 socket 30	Connector P1 pin 30
Connector P2 socket 31	Connector P1 pin 31
Connector P2 socket 32	Connector P1 pin 32
Connector P2 socket 33	Connector P1 pin 33
Connector P2 socket 34	Connector P1 pin 34
Connector P2 socket 35	Connector P1 pin 35
Connector P2 socket 36	Connector P1 pin 36

Is there continuity at all points (resistance less than 10 ohms)?

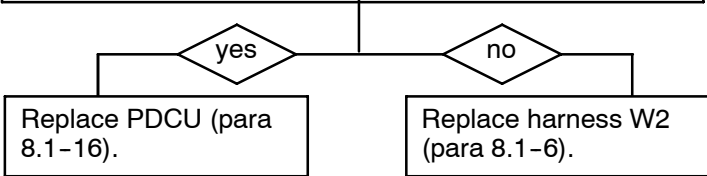


W2  
CONNECTOR P2



W2  
CONNECTOR P1

06pc233t



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP H

- AG**
1. Turn PDFCS power switch on keypad to OFF.
  2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  3. Disconnect harness W2 connector P2 at PDU connector J1.
  4. Disconnect harness W2 connector P1 at PDCU connector J10.
  5. Check harness W2 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P2 socket 10	Connector P1 pin 10
Connector P2 socket 11	Connector P1 pin 11
Connector P2 socket 12	Connector P1 pin 12
Connector P2 socket 13	Connector P1 pin 13

Is there continuity at all points (resistance less than 10 ohms)?

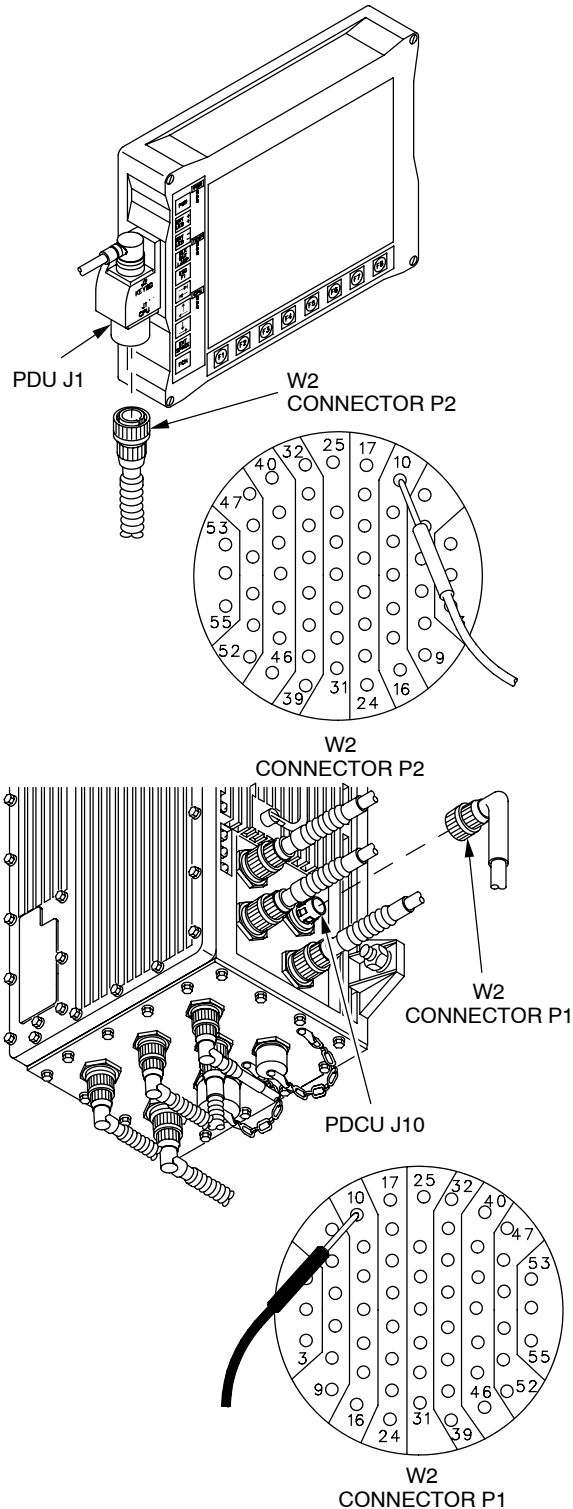


**NOTE**

Performing Automated Diagnostic Test will isolate failure to one LRU.

1. Replace PDU (para 8.1-19).
2. Retest PDFCS. If problem remains, replace PDCU (para 8.1-16).

Replace harness W2 (para 8.1-6).



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED

(1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP I

**AH**

1. Turn PDFCS power switch on keypad to OFF.
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W2 connector P2 at PDU connector J1.
4. Disconnect harness W2 connector P1 at PDCU connector J10.
5. Check harness W2 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A

Point B

Connector P2 socket 37	Connector P1 pin 37
Connector P2 socket 38	Connector P1 pin 38
Connector P2 socket 40	Connector P1 pin 40
Connector P2 socket 41	Connector P1 pin 41
Connector P2 socket 42	Connector P1 pin 42
Connector P2 socket 43	Connector P1 pin 43
Connector P2 socket 44	Connector P1 pin 44
Connector P2 socket 45	Connector P1 pin 45

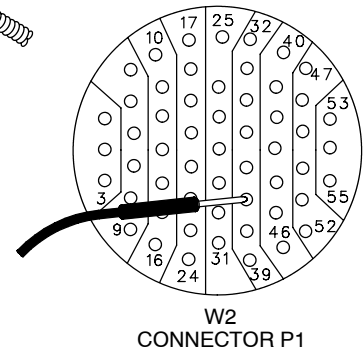
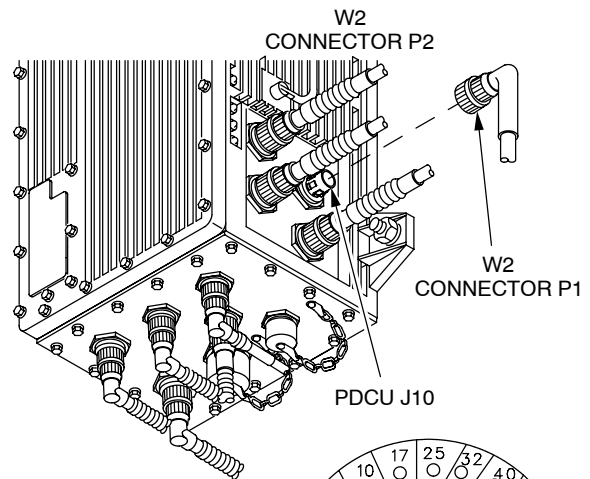
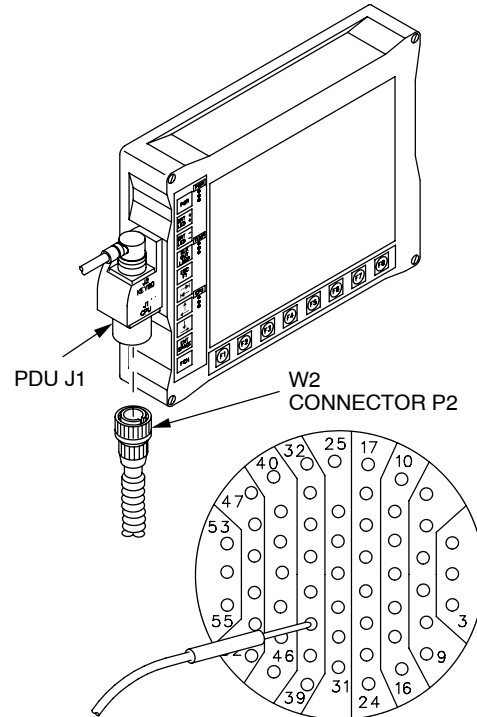
Is there continuity at all points (resistance less than 10 ohms)?

yes

no

Replace PDU  
(para 8.1-19).

Replace harness  
W2 (para 8.1-6).



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06pc234t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

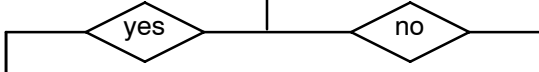
CONTINUED FROM STEP K

**AI**

1. Turn PDFCS power switch on keypad to OFF.
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W22A connector P2 at keypad connector J1.
4. Disconnect harness W22A connector P1 at PDCU connector J7.
5. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

<p>Point A</p> <p>Connector P2 socket C</p> <p>Connector P2 socket D</p>	<p>Point B</p> <p>Connector P1 pin C</p> <p>Connector P1 pin D</p>
--	--

Is there continuity at all points (resistance less than 10 ohms)?

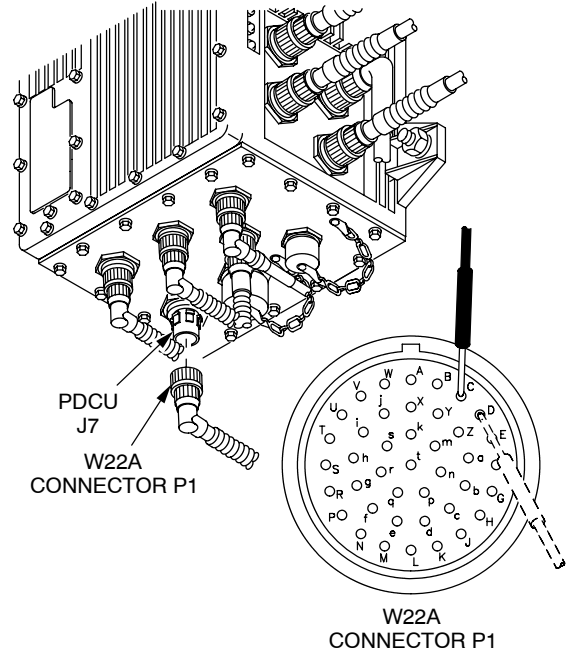
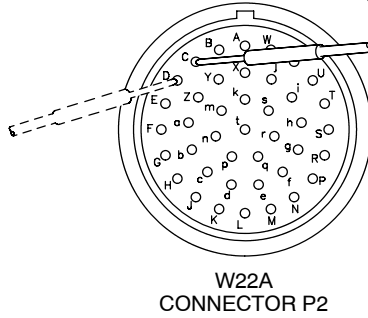
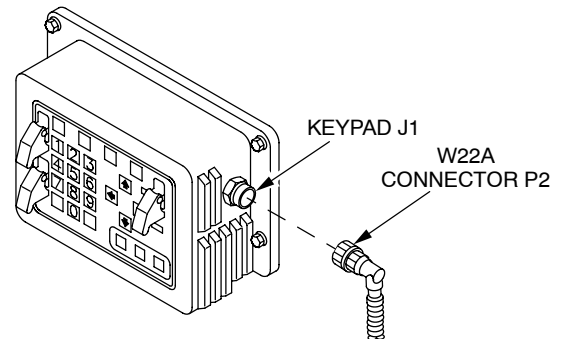


**NOTE**

Performing Automated Diagnostic Test will isolate failure to one LRU.

1. Replace keypad (para 8.1-20).
2. Retest PDFCS. If problem remains, replace PDCU (para 8.1-16).

Replace harness W22A (para 8.1-10)



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (1) PDFCS WILL NOT POWER UP, PDFCS WILL NOT STAY POWERED UP, AND NO PDU DISPLAY (EITHER Fire Control OR Situation Awareness). - CONTINUED

CONTINUED FROM STEP K

**AJ**

1. Turn PDFCS power switch on keypad to OFF.
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W2 connector P2 at PDU connector J1.
4. Disconnect harness W2 connector P1 at PDCU connector J10.
5. Check harness W2 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P2 socket 14	Connector P1 pin 14
Connector P2 socket 15	Connector P1 pin 15
Connector P2 socket 17	Connector P1 pin 17
Connector P2 socket 18	Connector P1 pin 18

Is there continuity at all points (resistance less than 10 ohms)?

yes

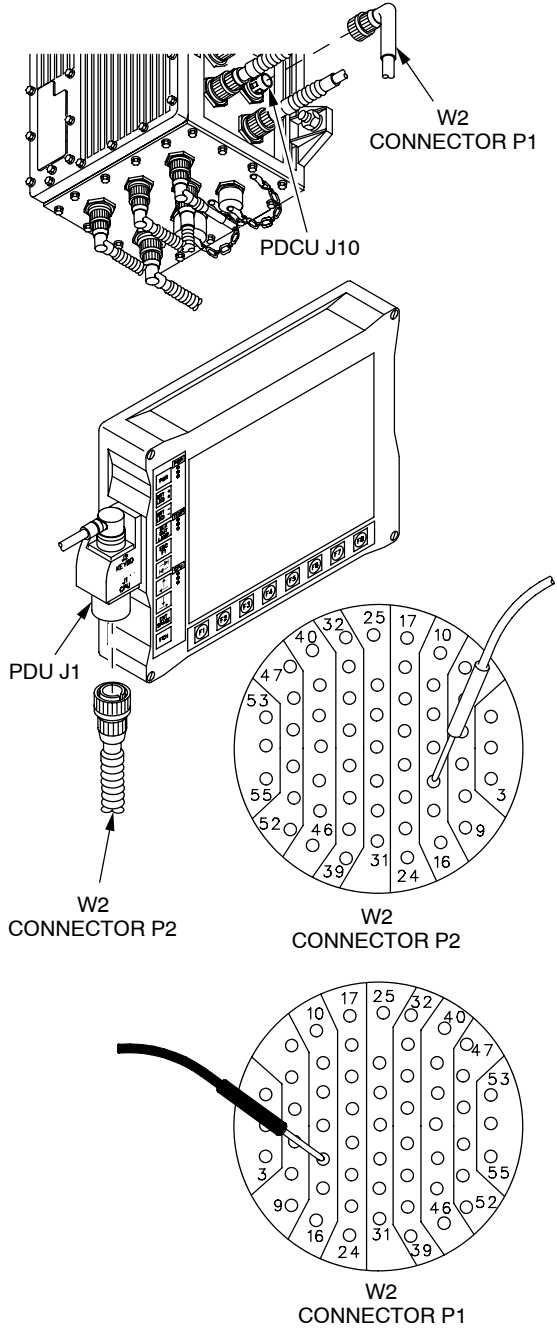
no

**NOTE**

Performing Automated Diagnostic Test will isolate failure to one LRU.

1. Replace PDU (para 8.1-19).
2. Retest PDFCS. If problem remains, replace PDCU (para 8.1-16).

Replace harness W2 (para 8.1-6).



**END OF TASK**

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

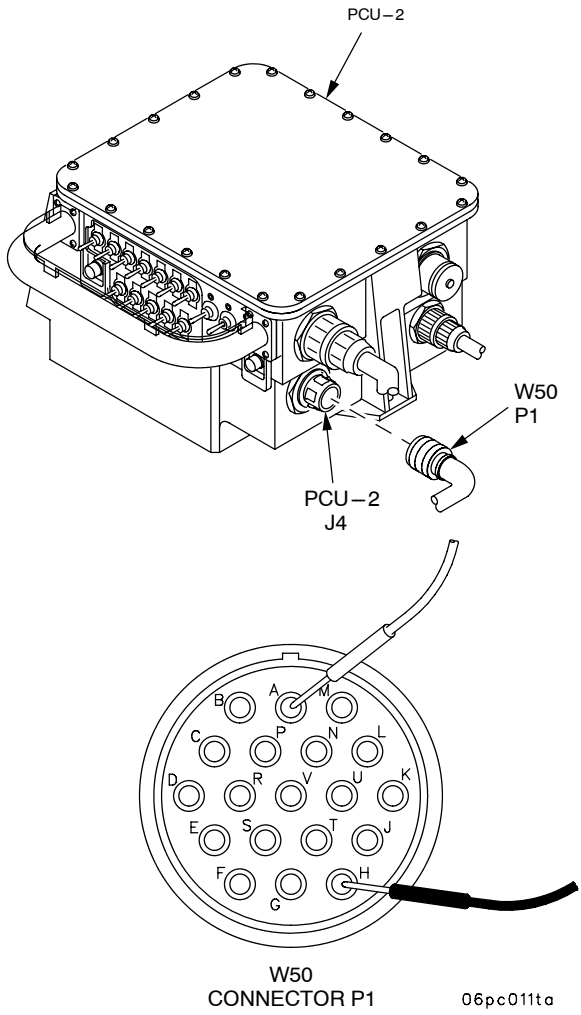
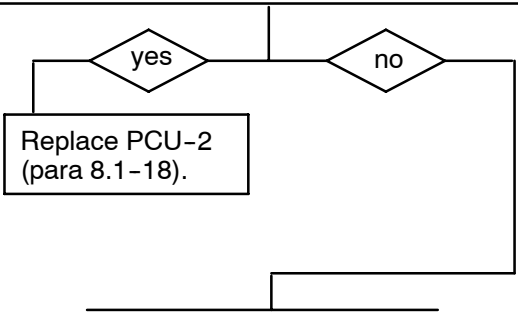
k.1. PDFCS - CONTINUED (2) PCU-2 WILL NOT POWER UP.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

- A**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W50 connector P1 from PCU-2 connector J4.
  3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  4. Check harness W50 for voltage by placing multimeter red lead on Point A and black lead on Point B.
- | Point A  | Point B  |
|----------|----------|
| Socket A | Socket H |
| Socket B | Socket J |
| Socket C | Socket K |
| Socket D | Socket L |
| Socket E | Socket M |
| Socket F | Socket N |
| Socket G | Socket P |
5. Check for DC voltage (V dc).

Is voltage greater than 18 V dc at all points?



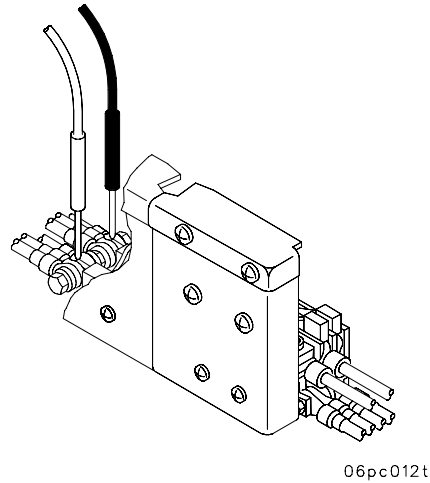
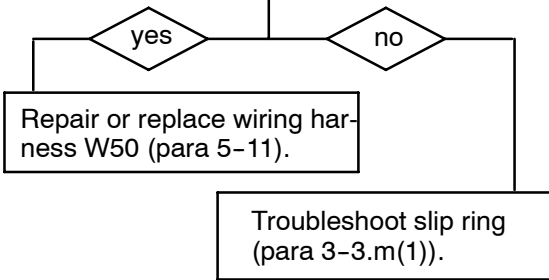
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**3-3. TROUBLESHOOTING CHART - CONTINUED**

k.1. PDFCS - CONTINUED (2) PCU-2 WILL NOT POWER UP. - CONTINUED

CONTINUED FROM STEP A

- B**
1. Remove shields below brush blocks 3 and 4 (para 23-1).
  2. Check harness W50 for voltage by placing multimeter red lead on harness W50 lead 100 at connection to brush block 3 and black lead on harness W50 lead 70 at the connection to brush block 3.
  3. Check for DC voltage (V dc).
- Is voltage greater than 18 V dc?



**END OF TASK**

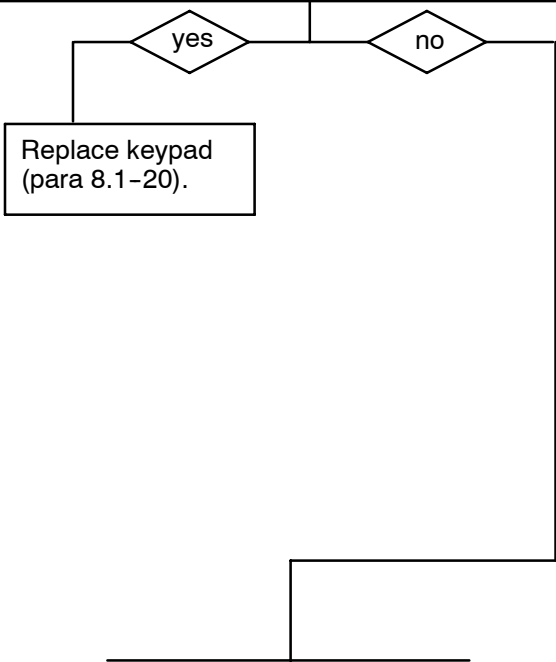
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (3) KEYPAD OUT OR FAULT LAMP BLINKING.

<p><u>INITIAL SETUP</u></p> <p><b>NOTE</b></p> <p>When performing PDFCS troubleshooting use only the SPORT or MSD for the Paladin M109A6.</p> <p>Perform TB 9-2350-314-20-2-2 M109A6 Accessory Software, "PDFCS TROUBLESHOOTING", single test "KEYPAD OUT OR FAULT LAMP BLINKING".</p>	<p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)</p> <p>Multimeter (item 24, Appx G)</p> <p>TA1 probe kit (item 42, Appx G)</p> <p>PDFCS Sport/MSD Accessory Kit (item 61, Appx G)</p>
--	--

- A**
1. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  2. Turn keypad power switch to ON (TM 9-2350-314-10).
  3. Power up PDFCS (TM 9-2350-314-10).
  4. Make sure all PCU-2 circuit breakers are set to ON.
  5. Observe FAULT lamp on keypad.

Is FAULT lamp blinking?



CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED

(3) KEYPAD OUT OR FAULT LAMP BLINKING. - CONTINUED

CONTINUED FROM STEP A

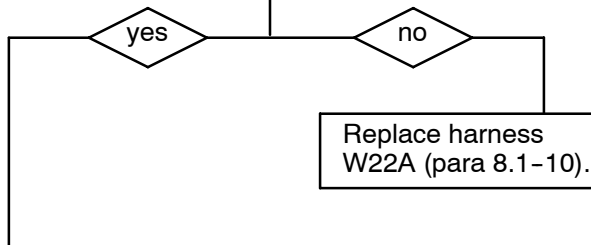
- B**
1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  3. Disconnect harness W22A connector P1 from PDCU connector J7.
  4. Disconnect harness W22A connector P2 from keypad connector J1.
  5. Check harness W22A for continuity by placing one multimeter lead on Point A and the other multimeter lead on Point B.

Point A

Point B

- |                         |                            |
|-------------------------|----------------------------|
| W22A Connector P1 pin G | W22A Connector P2 socket G |
| W22A Connector P1 pin H | W22A Connector P2 socket H |
| W22A Connector P1 pin J | W22A Connector P2 socket J |
| W22A Connector P1 pin K | W22A Connector P2 socket K |
| W22A Connector P1 pin W | W22A Connector P2 socket W |
| W22A Connector P1 pin X | W22A Connector P2 socket X |
| W22A Connector P1 pin Y | W22A Connector P2 socket Y |
| W22A Connector P1 pin Z | W22A Connector P2 socket Z |

Is there continuity at all points (resistance less than 10 ohms)?

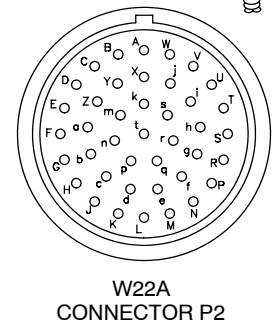
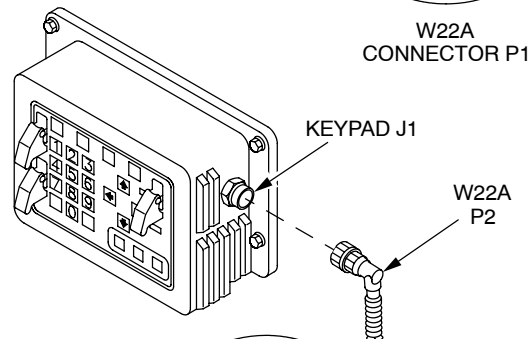
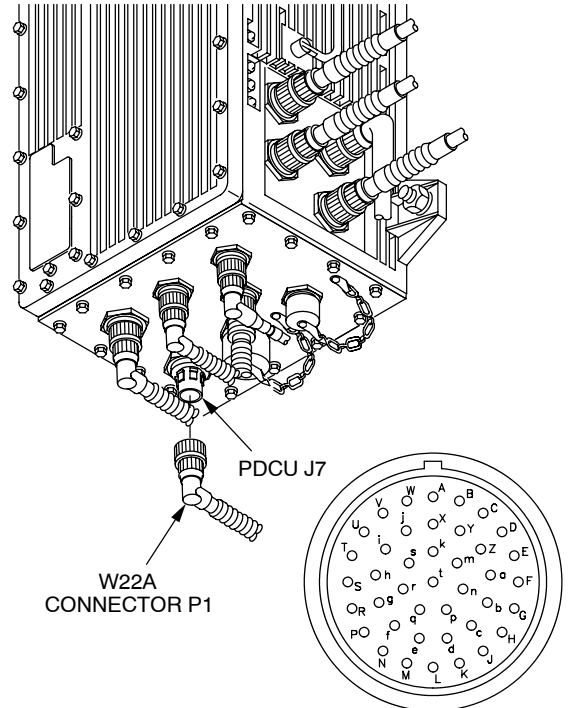


**C**

**NOTE**

Performing Automated Diagnostic Test will isolate failure to one LRU.

1. Replace keypad (para 8.1-20).
2. Retest PDFCS. If problem remains, replace PDCU (para 8.1-16).



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END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1 PDFCS - CONTINUED (4) WPN DEGRADED OR OUT.

INITIAL SETUP

**NOTE**

When performing PDFCS troubleshooting use only the SPORT or MSD for the Paladin M109A6.

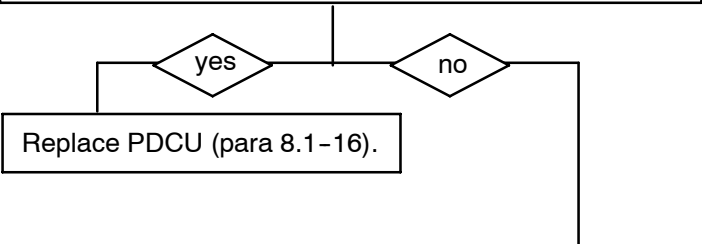
Perform TB 9-2350-314-20-2-2 M109A6 Accessory Software, "PDFCS TROUBLESHOOTING," single test "Weapon Degraded or Out."

Tools

Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)  
 PDFCS Sport/MSD Accessory Kit (item 61, Appx G)

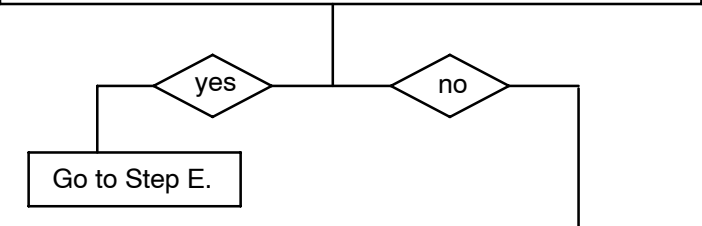
- A**
1. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  2. Turn keypad power switch to ON (TM 9-2350-314-10).
  3. Enter MAINTENANCE MODE.
  4. Select PDFCS STATUS screen.
  5. Select WPN SUBSYSTEM STATUS.

Is the PDCU item FAILED?



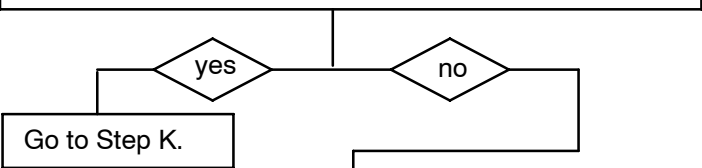
**B** Continue checking WPN SUBSYSTEM STATUS.

Is the TUBE TEMP BIT FAILED?



**C** Continue checking WPN SUBSYSTEM STATUS.

Are AZ VOLT or AZ CURRENT FAILED?



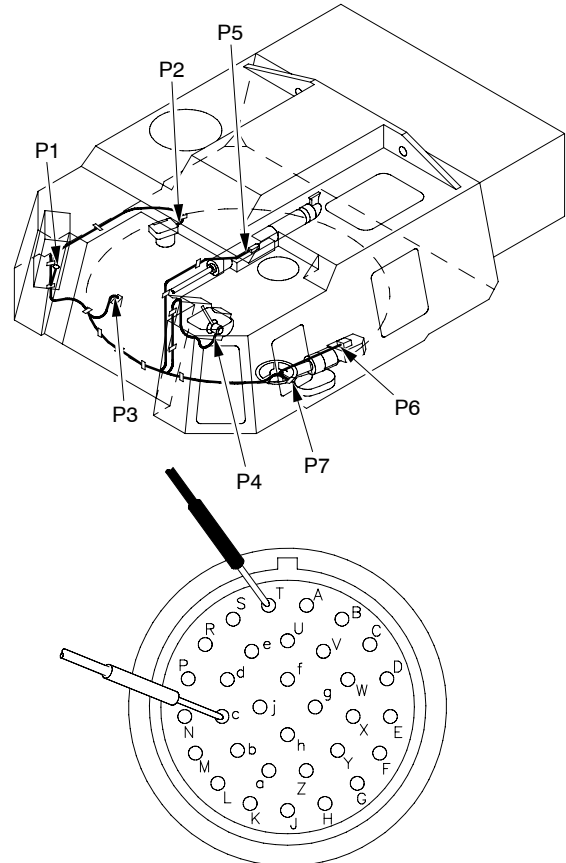
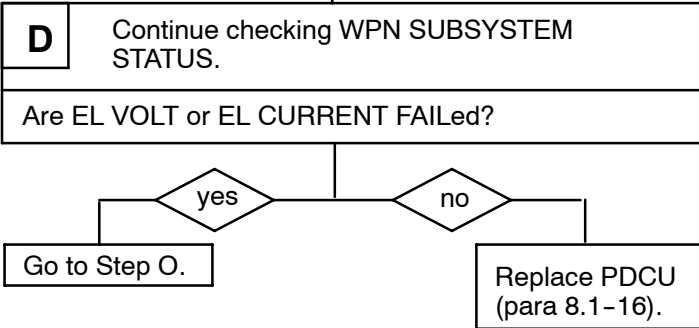
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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1 PDFCS - CONTINUED (4) WPN DEGRADED OR OUT. - CONTINUED

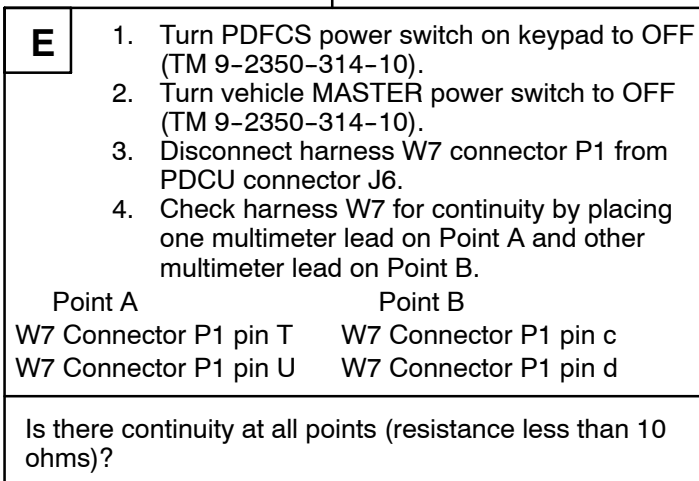
CONTINUED FROM STEP C



**W7  
CONNECTOR P1  
PIN T and PIN c  
(PIN U and PIN d)**

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CONTINUED FROM STEP B



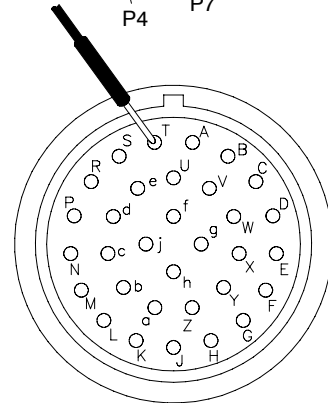
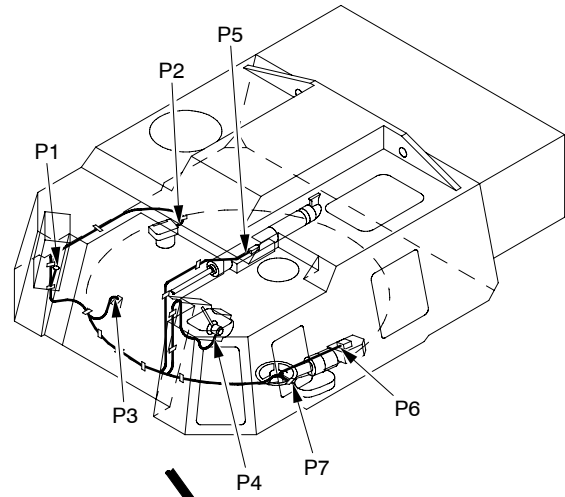
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

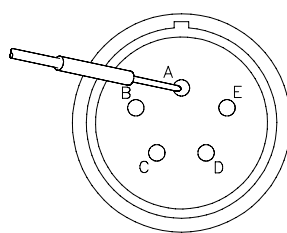
k.1 PDFCS - CONTINUED (4) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP E, H

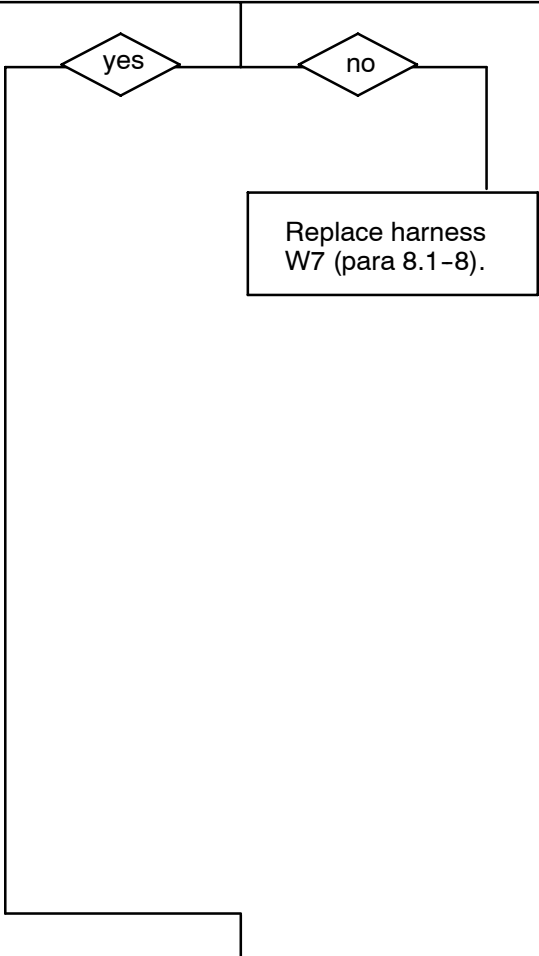
<b>F</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W7 connector P3 from harness 12576092 (tube temperature sensor connector).</li> <li>2. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>										
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Point A</td> <td style="width: 50%; text-align: center;">Point B</td> </tr> <tr> <td style="border: none;">W7 Connector P1 pin T</td> <td style="border: none;">W7 Connector P3 socket A</td> </tr> <tr> <td style="border: none;">W7 Connector P1 pin U</td> <td style="border: none;">W7 Connector P3 socket B</td> </tr> <tr> <td style="border: none;">W7 Connector P1 pin c</td> <td style="border: none;">W7 Connector P3 socket D</td> </tr> <tr> <td style="border: none;">W7 Connector P1 pin d</td> <td style="border: none;">W7 Connector P3 socket E</td> </tr> </table>	Point A	Point B	W7 Connector P1 pin T	W7 Connector P3 socket A	W7 Connector P1 pin U	W7 Connector P3 socket B	W7 Connector P1 pin c	W7 Connector P3 socket D	W7 Connector P1 pin d	W7 Connector P3 socket E
Point A	Point B										
W7 Connector P1 pin T	W7 Connector P3 socket A										
W7 Connector P1 pin U	W7 Connector P3 socket B										
W7 Connector P1 pin c	W7 Connector P3 socket D										
W7 Connector P1 pin d	W7 Connector P3 socket E										
	<p>Is there continuity at all points (resistance less than 10 ohms)?</p>										



W7  
CONNECTOR P1  
PIN T  
(PIN U)  
(PIN c)  
(PIN d)



W7  
CONNECTOR P3  
SOCKET A  
(SOCKET B)  
(SOCKET D)  
(SOCKET E)



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

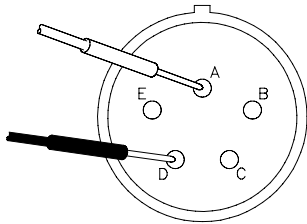
k.1 PDFCS - CONTINUED (4) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP F

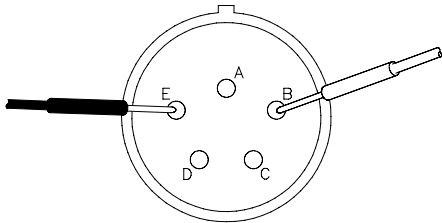
**G** Check harness 12576092 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
12576092 Connector P1 pin A	12576092 Connector P1 pin D
12576092 Connector P1 pin B	12576092 Connector P1 pin E

Is there continuity at all points (resistance less than 10 ohms)?

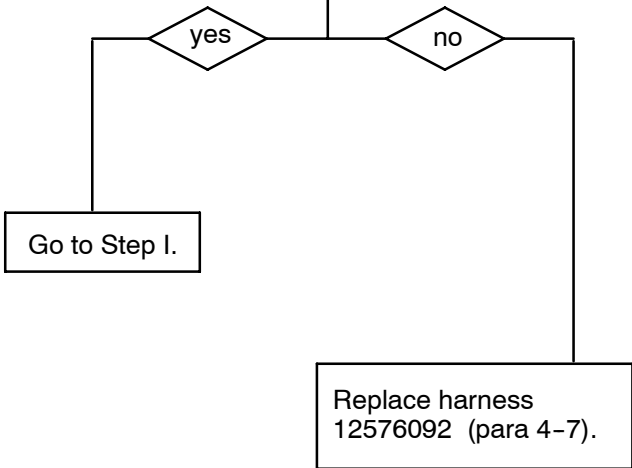


12576092  
CONNECTOR  
PIN A  
PIN D



12576092  
CONNECTOR  
PIN B  
PIN E

06pc065t



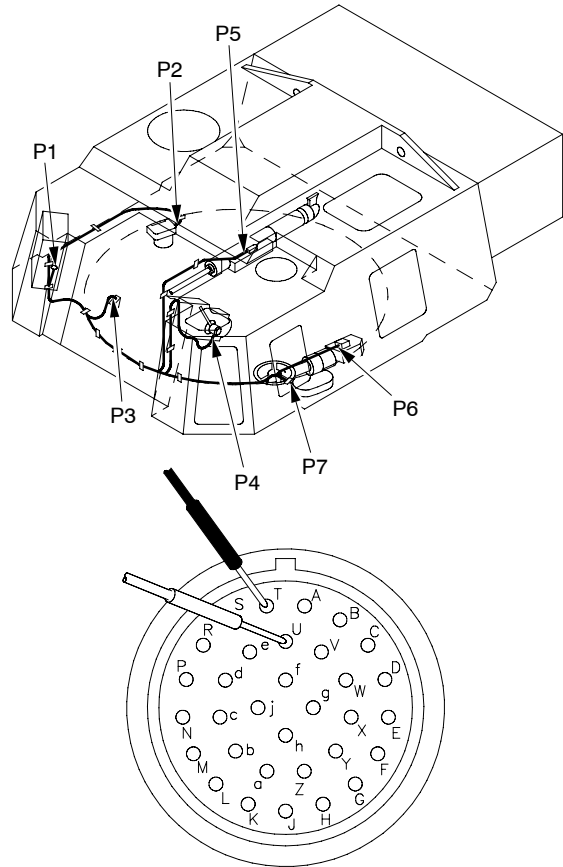
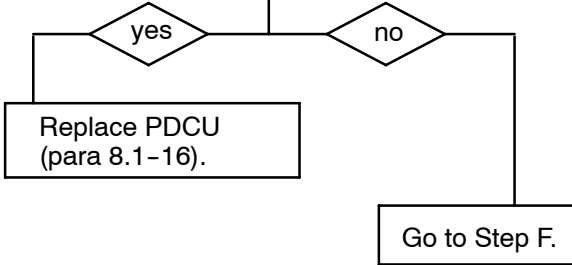
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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1 PDFCS - CONTINUED (4) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM E

- |  |   |
|--|---|
| <b>H</b>                               | <ol style="list-style-type: none"> <li>1. Place one multimeter lead in harness W7 connector P1 pin T and other lead in harness W7 connector P1 pin U.</li> <li>2. Measure resistance (ohms).</li> </ol> |
| Is resistance between 80 and 180 ohms? |   |



06pc066t

CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

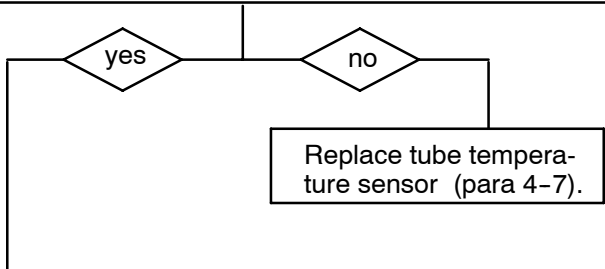
k.1 PDFCS - CONTINUED (4) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP G

I

1. Place one multimeter lead in harness 12576092 connector P1 pin A and other lead in harness 12576092 connector P1 pin B.
2. Measure resistance (ohms).

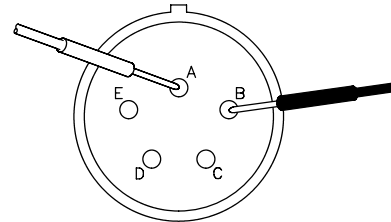
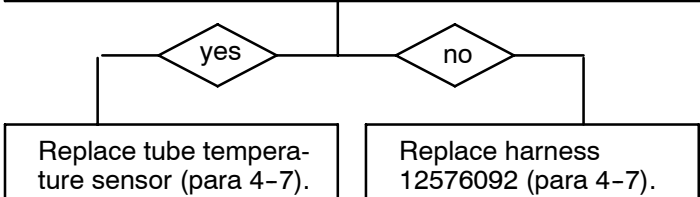
Is resistance between 80 and 180 ohms?



J

1. Place one multimeter lead in harness 12576092 connector P1 pin A and other lead in harness 12576092 connector P1 pin C.
2. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



12576092  
CONNECTOR  
PIN A  
PIN B

06pc067t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

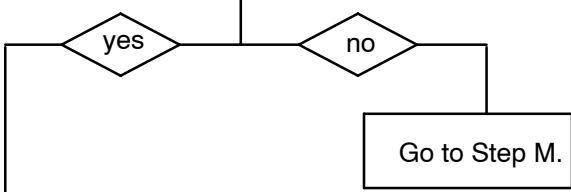
k.1 PDFCS - CONTINUED (4) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP C

**K**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W22A connector P1 from PDCU connector J7.
4. Place one multimeter lead in harness W22A connector P1 pin N and other lead in harness W22A connector P1 pin P.
5. Check for continuity.

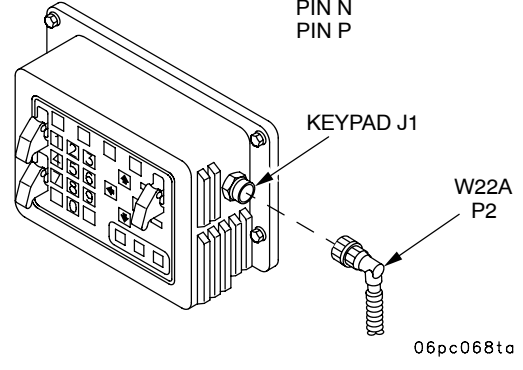
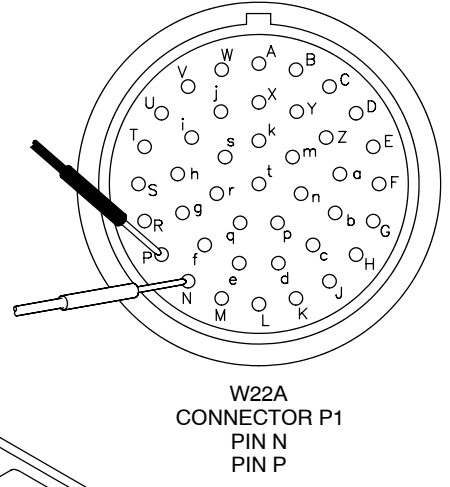
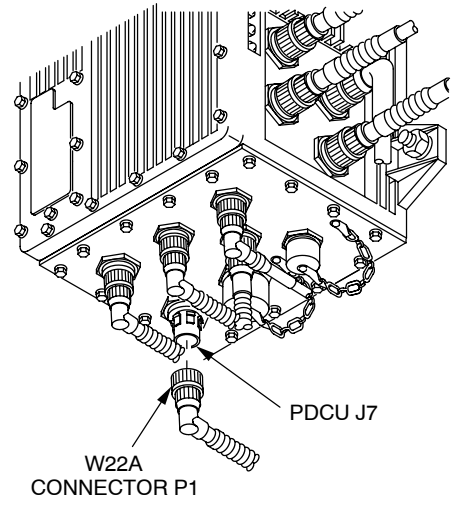
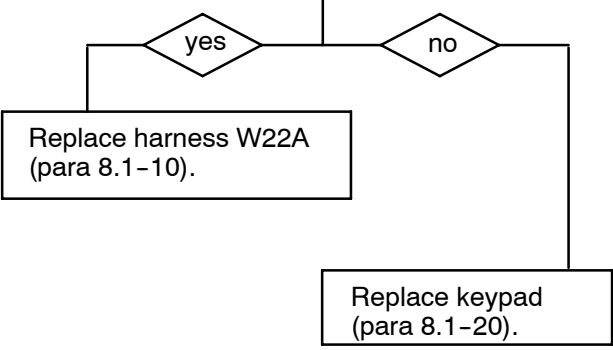
Is there continuity (resistance less than 10 ohms)?



**L**

1. Disconnect harness W22A connector P2 from keypad connector J1.
2. Place one multimeter lead in harness W22A connector P1 pin N and other lead in harness W22A connector P1 pin P.
3. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



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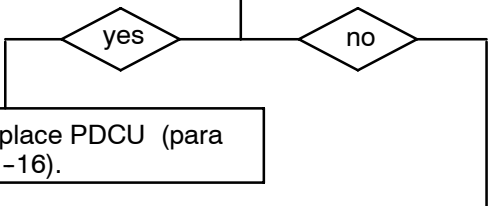
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1 PDFCS - CONTINUED (4) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP K

- M**
1. Disconnect harness W7 connector P1 from PDCU connector J6.
  2. Place one multimeter lead in harness W7 connector P1 pin N and other lead in harness W7 connector P1 pin P.
  3. Measure resistance (ohms).

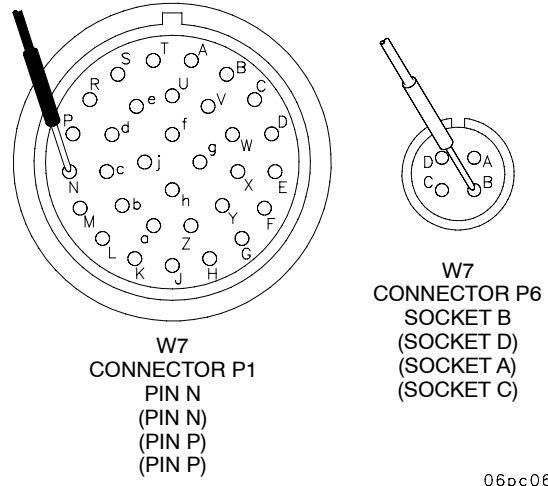
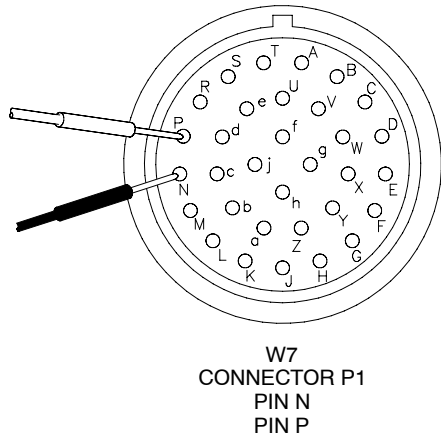
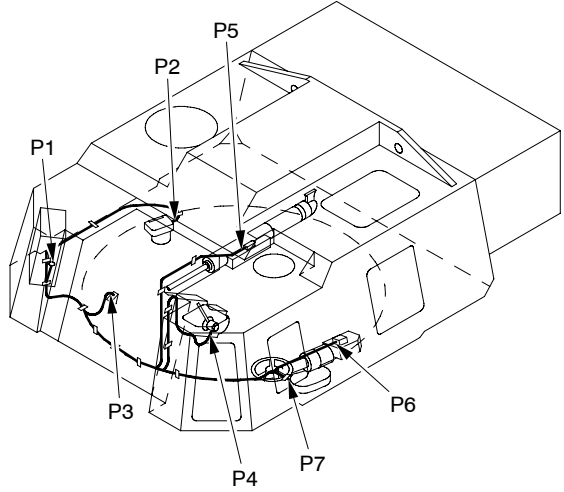
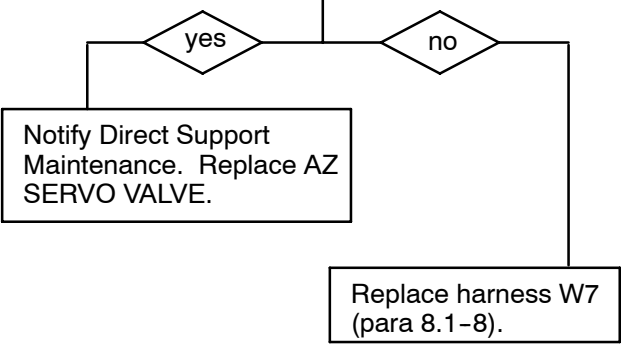
Is resistance between 27 and 900 ohms?



- N**
1. Disconnect harness W7 connector P6 from AZ SERVO VALVE.
  2. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W7 Connector P1 pin N	W7 Connector P6 socket B
W7 Connector P1 pin N	W7 Connector P6 socket D
W7 Connector P1 pin P	W7 Connector P6 socket A
W7 Connector P1 pin P	W7 Connector P6 socket C

Is there continuity at all points (resistance less than 10 ohms)?



CONTINUED ON NEXT PAGE

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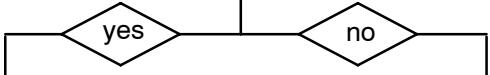
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1 PDFCS - CONTINUED (4) WPN DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP D

- O**
1. Turn PDFCS POWER switch on keypad to OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  3. Disconnect harness W7 connector P1 from PDCU connector J6.
  4. Place one multimeter lead in harness W7 connector P1 pin A and other lead in harness W7 connector P1 pin B.
  5. Measure resistance.

Is resistance between 27 and 900 ohms?



Replace PDCU (para 8.1-16).

- P**
1. Disconnect harness W7 connector P5 from EL SERVO VALVE.
  2. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

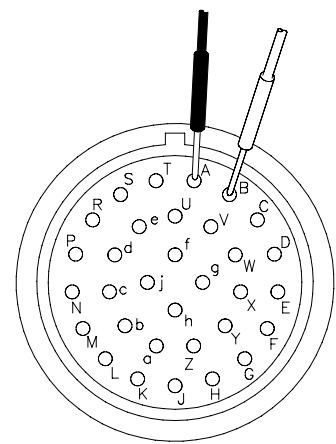
Point A	Point B
W7 Connector P1 pin A	W7 Connector P5 socket B
W7 Connector P1 pin A	W7 Connector P5 socket D
W7 Connector P1 pin B	W7 Connector P5 socket A
W7 Connector P1 pin B	W7 Connector P5 socket C

Is there continuity at all points (resistance less than 10 ohms)?

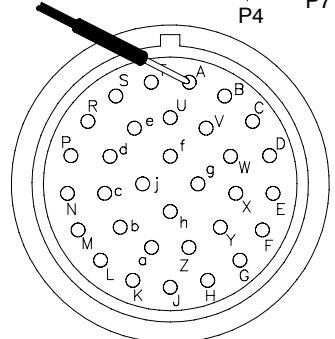
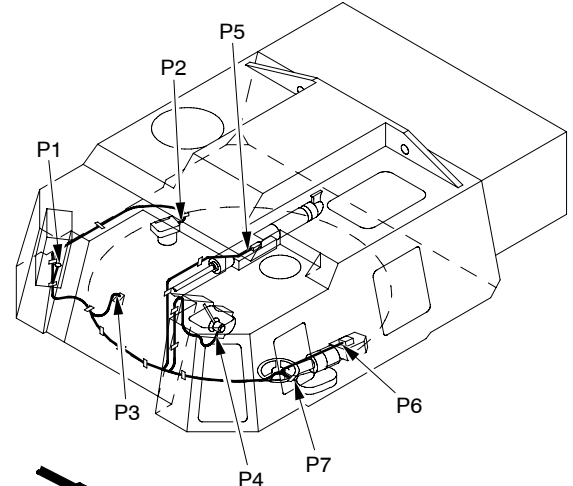


Notify Direct Support Maintenance. Replace EL SERVO VALVE.

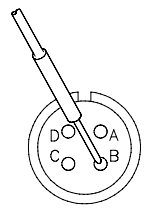
Replace harness W7 (para 8.1-8).



W7  
CONNECTOR P1  
PIN A  
PIN B



W7  
CONNECTOR P1  
PIN A  
(PIN A)  
(PIN B)  
(PIN B)



W7  
CONNECTOR P5  
SOCKET B  
(SOCKET D)  
(SOCKET A)  
(SOCKET C)

**END OF TASK**

06pc070t



### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (5) POWER LAMPS DO NOT LIGHT ON POWER UP.

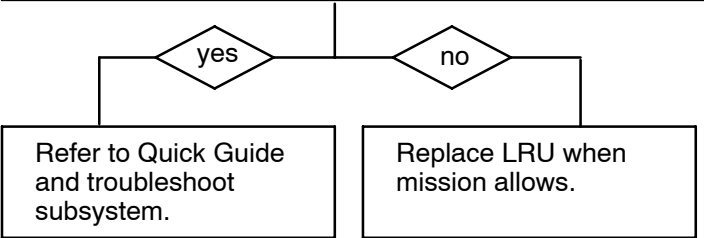
<p><b>INITIAL SETUP</b></p> <p>Perform PDCU, PDFCS and CAB ELECTRICAL Tests.</p>	<p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>
--	---

**NOTE**

For PDCU and PCU-2 power lamps, go to step A. For VMS power lamp, go to step B.

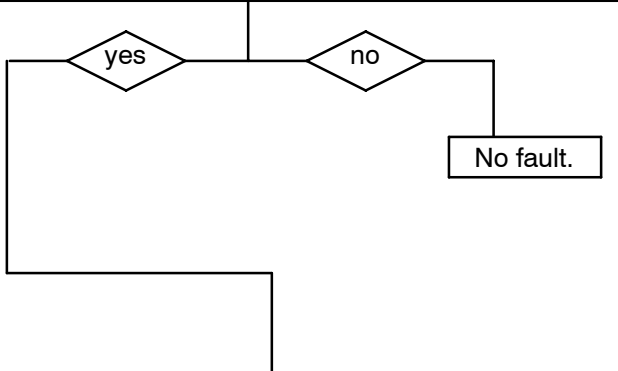
- A**
1. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  2. Turn PDFCS power switch on keypad to ON (TM 9-2350-314-10).
  3. Monitor PDFCS POWER UP STATUS on PDU screen (TM 9-2350-314-10).

Is subsystem with faulty lamp degraded or out?



**B** Monitor VMS modem power lamp(s).

Is VMS modem green power lamp(s) out?

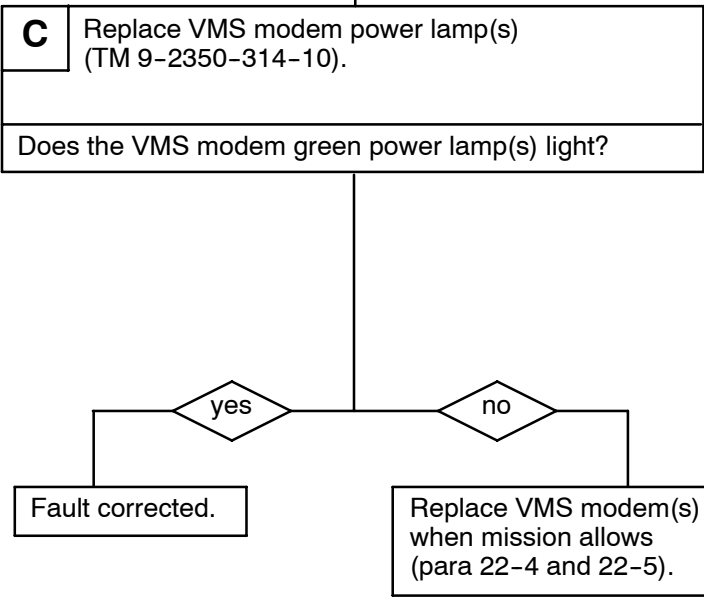


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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (5) POWER LAMPS DO NOT LIGHT ON POWER UP. - CONTINUED

CONTINUED FROM STEP B



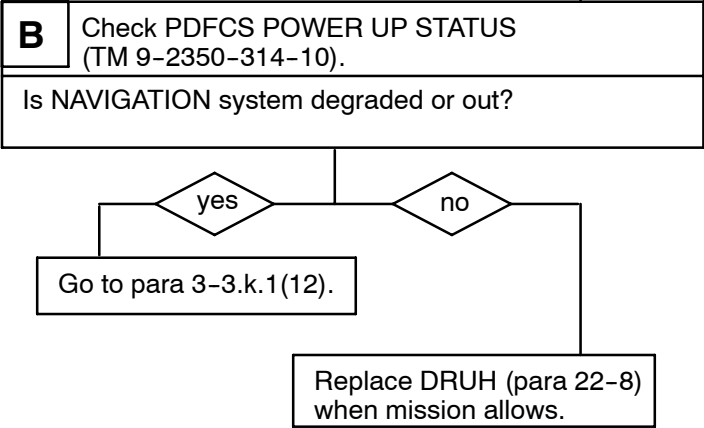
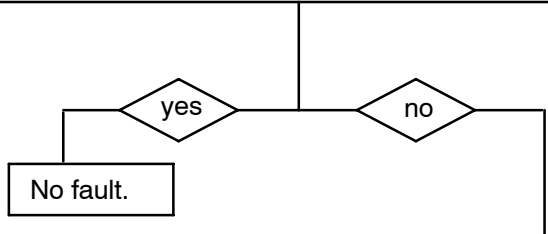
**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (6) DRUH BIT LAMPS DO NOT LIGHT ON POWER UP.

<p><u>INITIAL SETUP</u></p> <p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>● DRUH BIT lamp is ON during normal operation. DRUH BIT lamp is OUT when there is a BIT failure.</li> <li>● Two personnel are required to observe all BIT lamps during power up.</li> </ul>	<p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>
---	---

- |                     |  |
|---------------------|--|
| <b>A</b>            | <ol style="list-style-type: none"> <li>1. Remove three screws and cover from DRUH.</li> <li>2. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).</li> <li>3. Power up PDFCS (TM 9-2350-314-10).</li> <li>4. Monitor DRUH BIT lamps (TM 9-2350-314-10).</li> </ol> |
| Do BIT lamps light? |  |



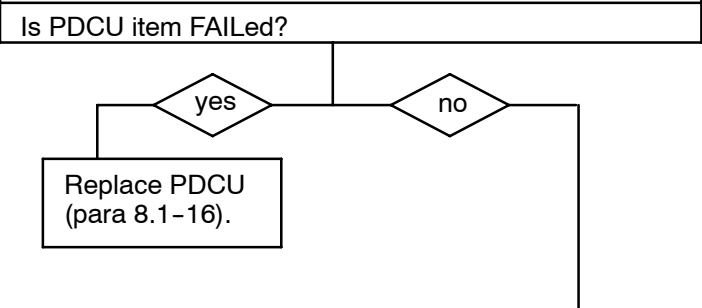
**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

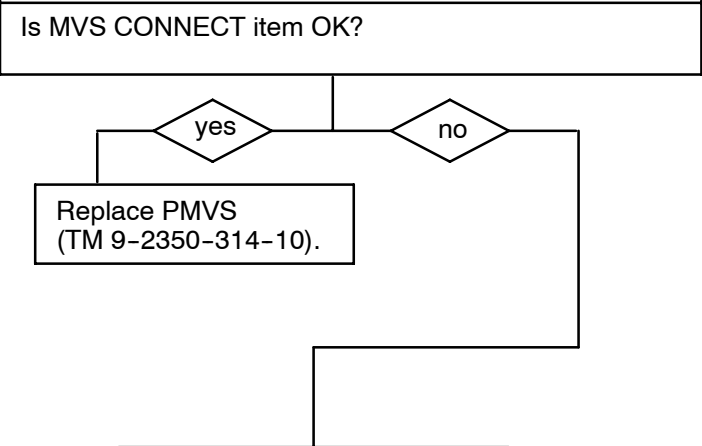
k.1. PDFCS - CONTINUED (7) MVS OUT.

<p><u>INITIAL SETUP</u></p> <p style="text-align: center;"><b>NOTE</b></p> <p>When performing PDFCS troubleshooting, use only SPORT or MSD for Paladin M109A6.</p> <p>Perform TB 9-2350-314-20-2-2 M109A6 Accessory Software, "PDFCS TROUBLESHOOTING," single test "MVS OUT".</p> <p>Perform PDI PDFCS Tests.</p>	<p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)</p> <p>Multimeter (item 24, Appx G)</p> <p>TA1 probe kit (item 42, Appx G)</p> <p>PDFCS Sport/MSD Accessory Kit (item 61, Appx G)</p>
---	--

- A**
1. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  2. Turn keypad power switch to ON (TM 9-2350-314-10).
  3. Power up PDFCS (TM 9-2350-314-10).
  4. Make sure all PCU circuit breakers are ON.
  5. Enter MAINTENANCE MODE.
  6. Select PDFCS STATUS screen.
  7. Select MVS SUBSYSTEM STATUS screen.



**B** Continue monitoring MVS SUBSYSTEM STATUS.



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

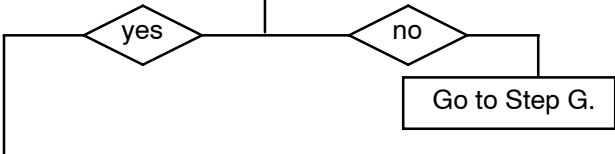
k.1. PDFCS - CONTINUED (7) MVS OUT. - CONTINUED

CONTINUED FROM STEP B

**C**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W92A connector P1 from PMVS connector J1.
4. Place multimeter red lead in harness W92A connector P1 socket R and black lead in harness W92A connector P1 socket K.
5. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
6. Turn keypad POWER switch to ON (TM 9-2350-314-10).
7. Measure DC voltage (V dc).

Is voltage greater than 18 V dc?



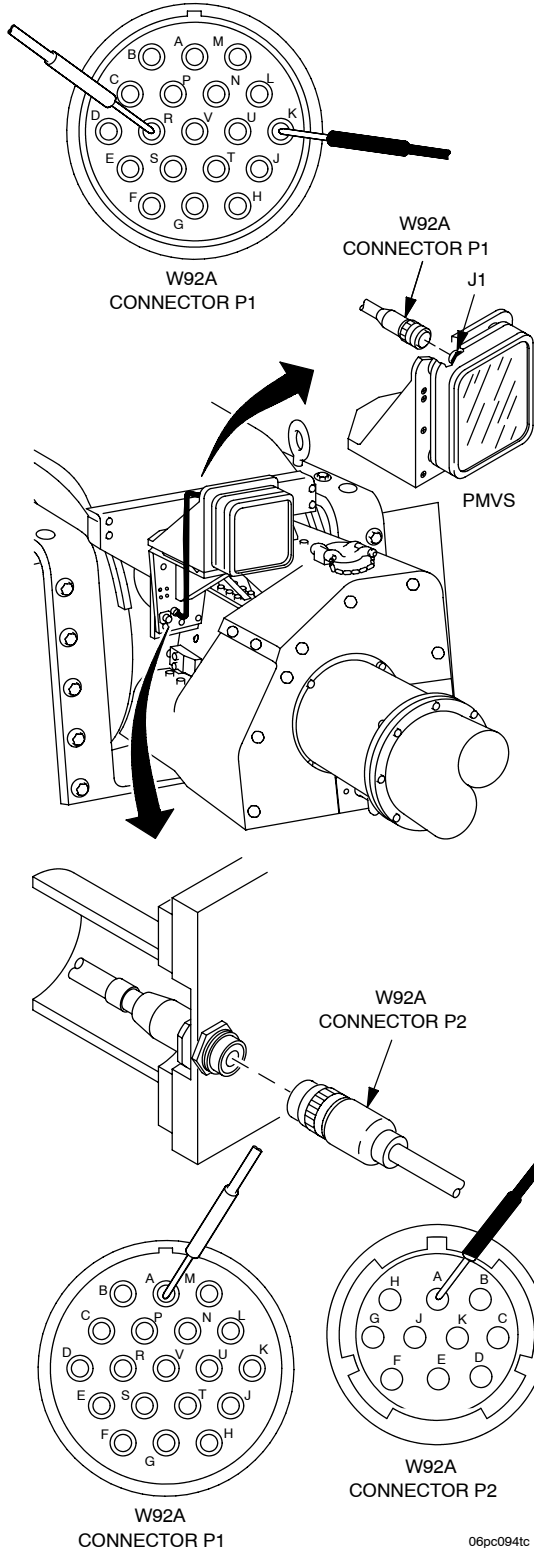
**D**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Remove harness W92A connector P2 from gun (para 8.1-13).
4. Check harness W92A for continuity by placing one multimeter lead on point A and the other multimeter lead on point B.

Point A	Point B
Connector P1 socket A	Connector P2 socket C
Connector P1 socket B	Connector P2 socket D
Connector P1 socket C	Connector P2 socket A
Connector P1 socket D	Connector P2 socket B
Connector P1 socket R	Connector P2 socket E
Connector P1 socket K	Connector P2 socket F
Connector P1 socket E	Connector P1 socket G
Connector P1 socket F	Connector P1 socket H

Is there continuity at all points (resistance less than 10 ohms)?

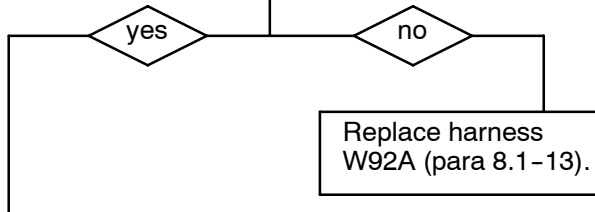
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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (7) MVS OUT. - CONTINUED

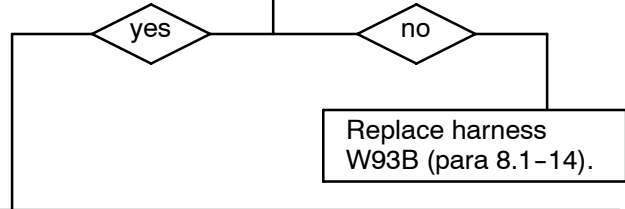
CONTINUED FROM STEP D



**E**

1. Disconnect harness W93B connector P3 from harness PSIAD connector J2.
2. Check jumper between harness W93B connector J2 sockets A and B.
3. Place one multimeter lead in harness W93B connector P3 pin 3 and other lead in harness W93B connector P3 pin 4.
4. Check for continuity.
5. Disconnect jumper between harness W93B connector J2 sockets A and B.
6. Connect jumper between harness W93B connector J2 sockets C and D.
7. Place one multimeter lead in harness W93B connector P3 pin 5 and other lead in harness W93B connector P3 pin 6.
8. Check for continuity.

Is there continuity at both points (resistance less than 10 ohms)?



**F**

1. Disconnect harness PSIAD connector P1 from PDCU connector J11.
2. Check harness PSIAD for continuity by placing one multimeter lead on point A and other multimeter lead on point B.

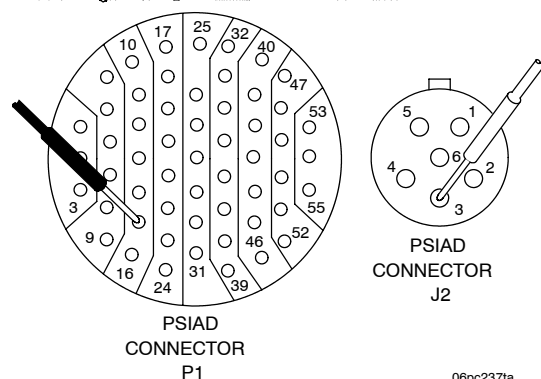
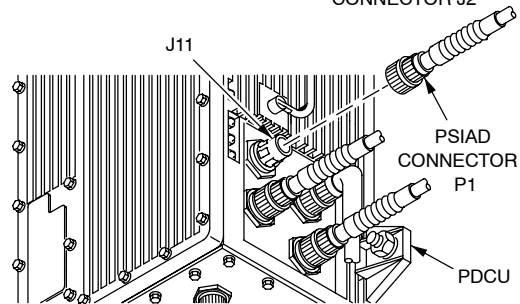
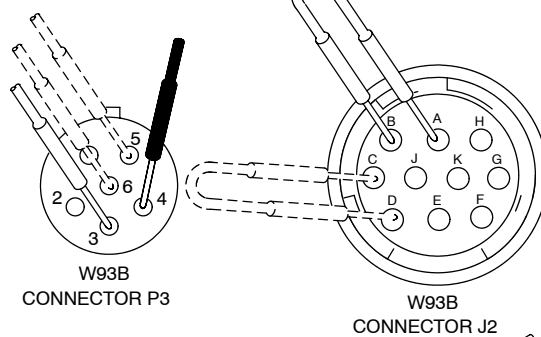
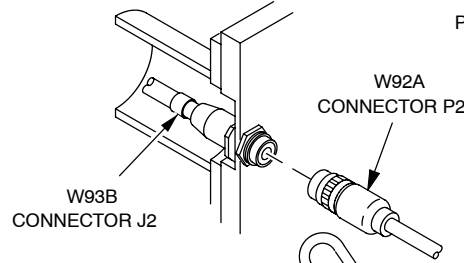
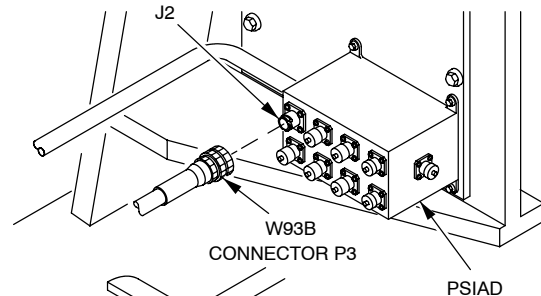
Point A

Point B

Connector P1 pin 15	Connector J2 pin 3
Connector P1 pin 22	Connector J2 pin 4
Connector P1 pin 23	Connector J2 pin 5
Connector P1 pin 27	Connector J2 pin 6

Is there continuity at all points (resistance less than 10 ohms)?

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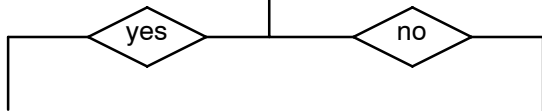


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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (7) MVS OUT - CONTINUED

CONTINUED FROM STEP F

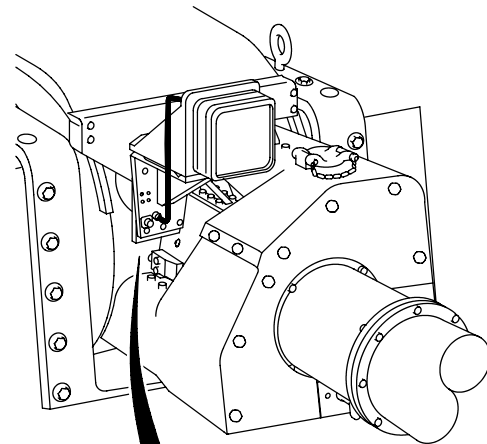


**NOTE**

Performing Automated Diagnostic Tests will isolate failure to one LRU.

1. Replace PMVS (TM 9-2350-314-10).
2. Retest PDFCS. If problem remains, replace PDCU (para 8.1-16).

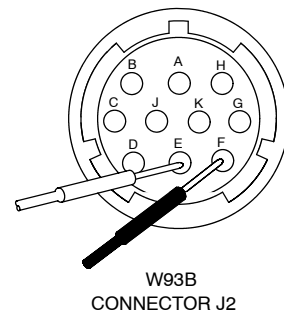
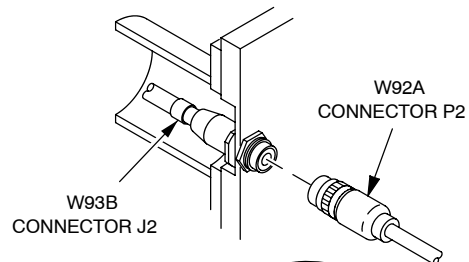
Replace PSIAD (para 8.1-23).



**G**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W92A connector P2 from harness W93B connector J2.
4. Place multimeter red lead in harness W93B connector J2 socket E and black lead in harness W93B connector J2 socket F.
5. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
6. Turn keypad POWER switch to ON (TM 9-2350-314-10).
7. Measure DC voltage (V dc).

Is voltage greater than 18 V dc?



06pc236t



Replace harness W92A (para 8.1-13).

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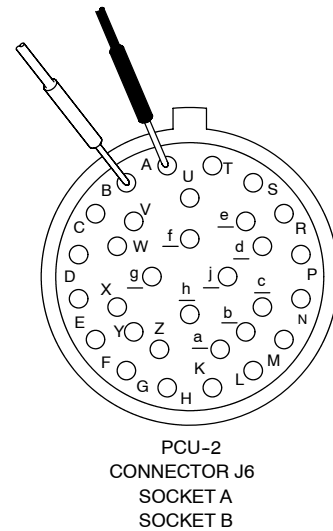
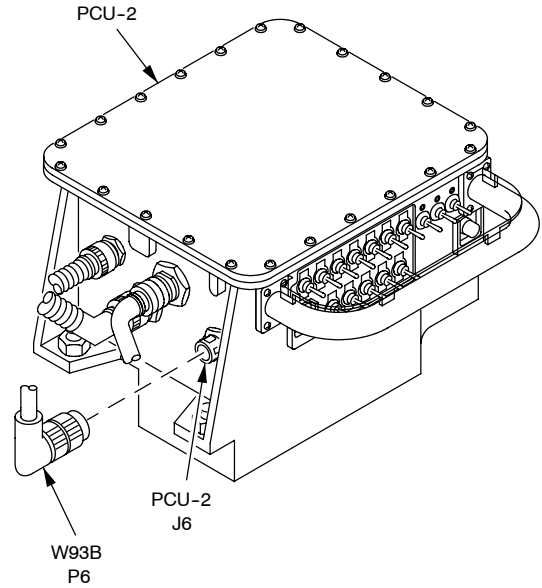
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (7) MVS OUT - CONTINUED

CONTINUED FROM STEP G

- |          |  |
|----------|--|
| <b>H</b> | <ol style="list-style-type: none"> <li>1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).</li> <li>2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li> <li>3. Disconnect harness W93B connector P6 from PCU-2 connector J6.</li> <li>4. Place multimeter red lead in PCU-2 connector J6 socket A and black lead in PCU-2 connector J6 socket B.</li> <li>5. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).</li> <li>6. Turn keypad POWER switch to ON (TM 9-2350-314-10).</li> <li>7. Measure DC voltage (V dc).</li> </ol> |
|----------|--|

Is voltage greater than 18 V dc?



Replace harness W93B (para 8.1-14).

Replace PCU-2 (para 8.1-18).

**END OF TASK**

06pc096tb



### 3-3. TROUBLESHOOTING CHART - CONTINUED

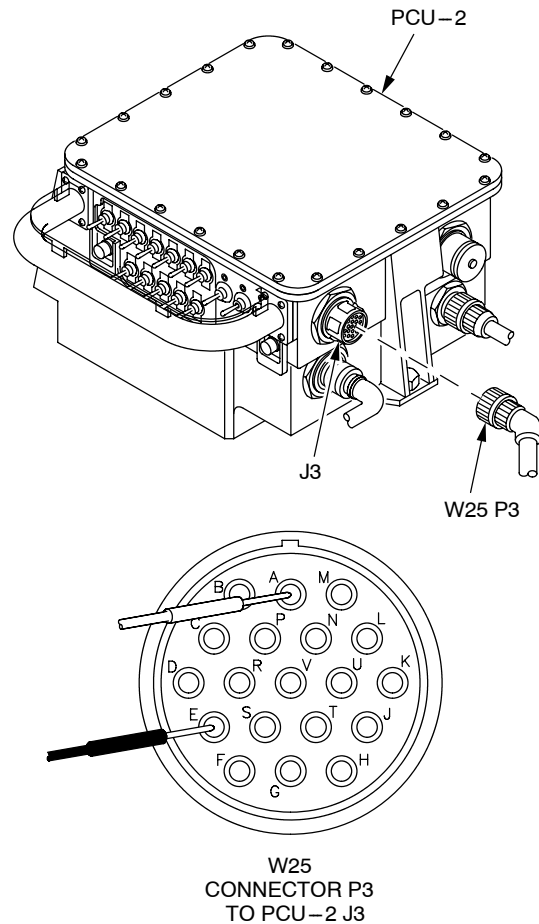
k.1. PDFCS - CONTINUED (8) PDFCS POWERS DOWN WHEN VEHICLE POWER REMOVED (NO BACKUP).

<p><b>INITIAL SETUP</b></p> <p>Start engine to make sure backup batteries are charged. Run PDI CAB ELECTRICAL test.</p>	<p><b>Tools</b></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>
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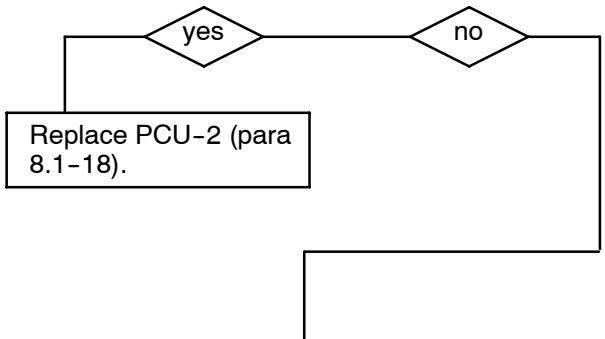
**NOTE**

- PDFCS cannot power up from backup batteries.
- Make sure PCU-2 circuit breakers 1 and 2 are in ON position.

<b>A</b>	<ol style="list-style-type: none"> <li>1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).</li> <li>2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li> <li>3. Disconnect harness W25 connector P3 from PCU-2 connector J3.</li> <li>4. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).</li> <li>5. Place multimeter red lead in harness W25 connector P3 point 1 socket and black lead in harness W25 connector P3 point 2 socket as follows:</li> </ol> <table style="margin-left: 40px; border: none;"> <thead> <tr> <th style="text-align: left;">Point 1</th> <th style="text-align: left;">Point 2</th> </tr> </thead> <tbody> <tr><td>A</td><td>E</td></tr> <tr><td>B</td><td>F</td></tr> <tr><td>C</td><td>G</td></tr> <tr><td>D</td><td>H</td></tr> <tr><td>J</td><td>N</td></tr> <tr><td>K</td><td>P</td></tr> <tr><td>L</td><td>R</td></tr> <tr><td>M</td><td>S</td></tr> </tbody> </table> <ol style="list-style-type: none"> <li>6. Measure DC Voltage (V dc).</li> </ol>	Point 1	Point 2	A	E	B	F	C	G	D	H	J	N	K	P	L	R	M	S
Point 1	Point 2																		
A	E																		
B	F																		
C	G																		
D	H																		
J	N																		
K	P																		
L	R																		
M	S																		
<p>Is voltage between 10 and 14 V dc for all points?</p>																			



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (8) PDFCS POWERS DOWN WHEN VEHICLE POWER REMOVED (NO BACKUP). - CONTINUED

CONTINUED FROM STEP A

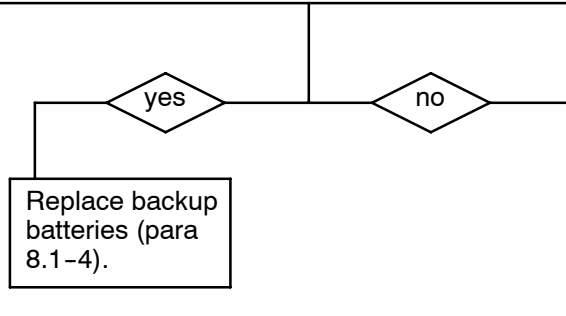
**NOTE**

PCU-2 must be receiving greater than 25 V dc from vehicle power to perform this step.

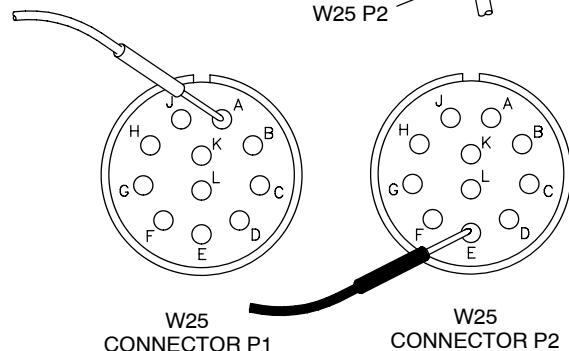
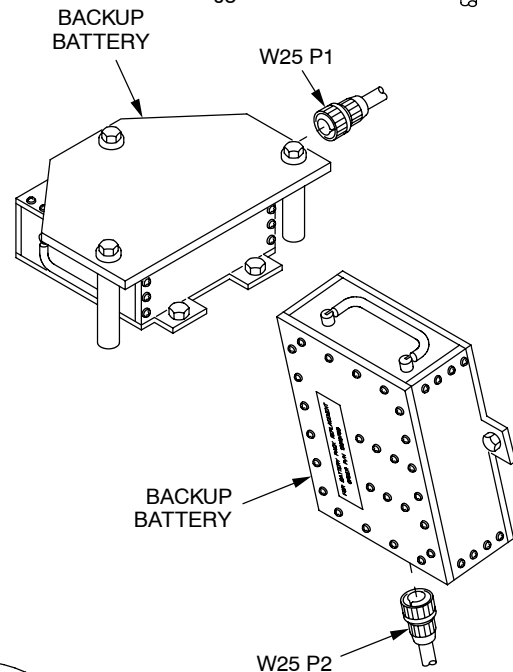
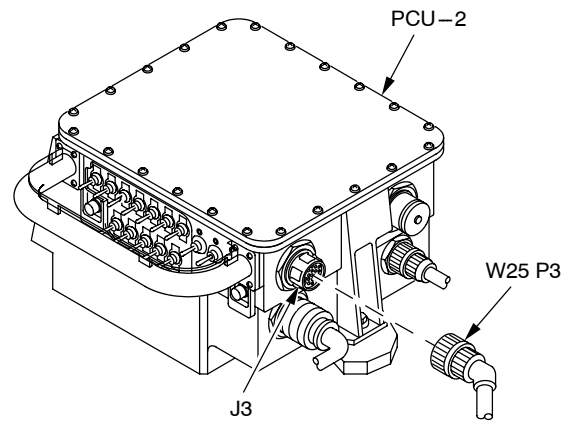
- B**
1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  2. Reconnect harness W25 connector P3 to PCU-2 connector J3.
  3. Remove cover mounted over the backup battery (para 8.1-4).
  4. Disconnect harness W25 connectors P1 and P2 from backup batteries.
  5. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  6. Turn keypad POWER switch to ON (TM 9-2350-314-10) and wait for "SELECT OPERATIONAL MODE" screen to appear.
  7. Check PCU-2 battery charging DC voltage by placing multimeter red lead at point A and the black lead at point B as follows:

Point A	Point B
Connector P1 pin A	Connector P2 pin E
Connector P1 pin B	Connector P2 pin F
Connector P1 pin C	Connector P2 pin G
Connector P1 pin D	Connector P2 pin H
Connector P2 pin A	Connector P1 pin E
Connector P2 pin B	Connector P1 pin F
Connector P2 pin C	Connector P1 pin G
Connector P2 pin D	Connector P1 pin H

Is voltage between 19.4 and 21.4 V dc for all points?



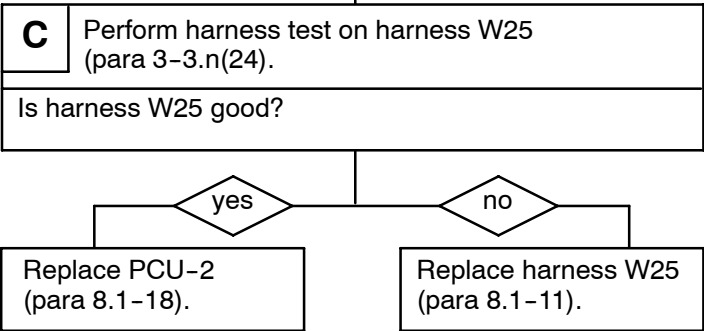
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**3-3. TROUBLESHOOTING CHART - CONTINUED**

k.1. PDFCS - CONTINUED (8) PDFCS POWERS DOWN WHEN VEHICLE POWER REMOVED (NO BACKUP). - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (9) PDFCS WILL NOT KEY SINCGARS RADIO OR TRANSMIT DIGITAL.

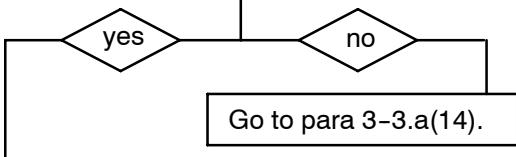
INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A**

1. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
2. Turn keypad power switch to ON (TM 9-2350-314-10).
3. Check radios for power.

Do radios power up?

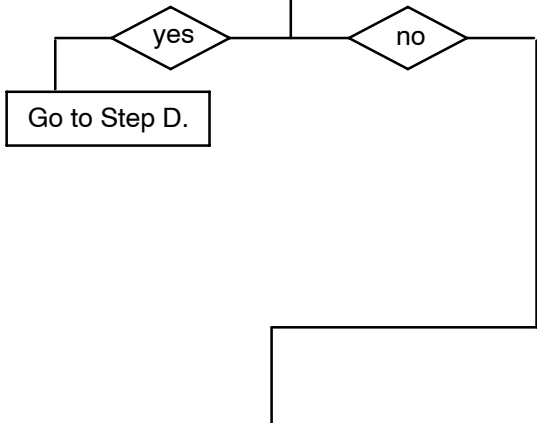


**B**

To transmit data with PDFCS and listen for digital tone:

1. Power up PDFCS (TM 9-2350-314-10).
2. SELECT "BCS DATA TRANSFER" from SETUP AND INFORMATION menu.
3. Select "GET INITIALIZATION" from BCS DATA TRANSFER.
4. Set both radios to the same frequency.
5. Place the LOUDSPEAKER selector on the MASTER CONTROL STATION to RADIO.
6. Check radio tone scale bar for movement to the right and listen for digital tones.

Does radio key?

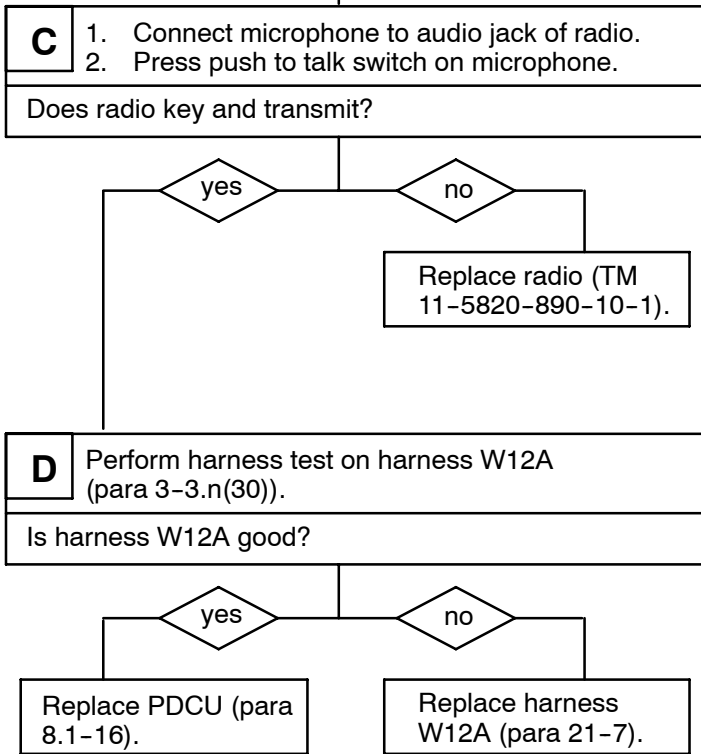


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

k.1. PDFCS - CONTINUED (9) PDFCS WILL NOT KEY SINGGARS RADIO OR TRANSMIT DIGITAL. - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

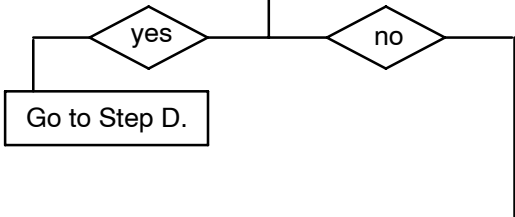
k.1. PDFCS - CONTINUED (10) RADIOS WILL NOT POWER UP.

<p><u>INITIAL SETUP</u></p> <p>Perform PDI CAB Electrical Tests.</p>	<p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>
--	---

**A**

1. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
2. On PCU-2, turn circuit breaker 4, (RADIO RACK) to ON (TM 9-2350-314-10).
3. Make sure all circuit breakers are in ON position.

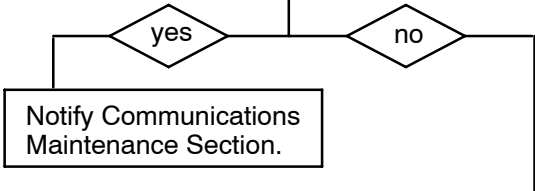
Does CB4 stay in ON position?



**B**

1. Disconnect harness W26 connector P2 from radio rack connector.
2. Reset PCU-2 CB4 to ON.

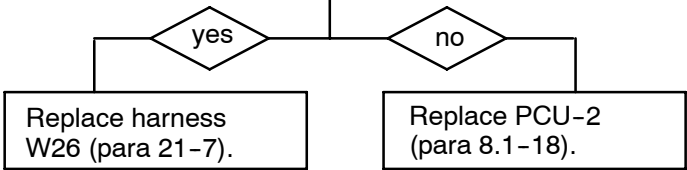
Does PCU-2 CB4 stay ON?



**C**

1. Disconnect harness W26 connector P1 from PCU-2 connector J7.
2. Reset PCU-2 CB4 to ON.

Does PCU-2 CB4 stay ON?



CONTINUED ON NEXT PAGE

# 3-3. TROUBLESHOOTING CHART - CONTINUED

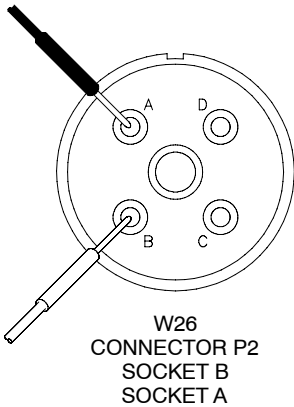
k.1. PDFCS - CONTINUED (10) RADIOS WILL NOT POWER UP. - CONTINUED

CONTINUED FROM STEP A

**D**

1. Disconnect harness W26 connector P2 from radio rack connector.
2. Place multimeter red lead in harness W26 connector P2 socket B and black lead in harness W26 connector P2 socket A.
3. Measure voltage (V dc).

Is voltage greater than 18 V dc?



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yes

no

Notify Communications Maintenance Section.

**E**

Do harness test on harness W26 (para 3-3.n(31)).

Is harness W26 good?

yes

no

Replace PCU-2 (para 8.1-18).

Replace harness W26 (para 21-7).

END OF TASK

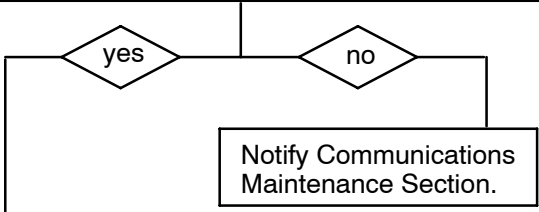
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (11) NO INTERCOM AUDIBLE CREW ALERT.

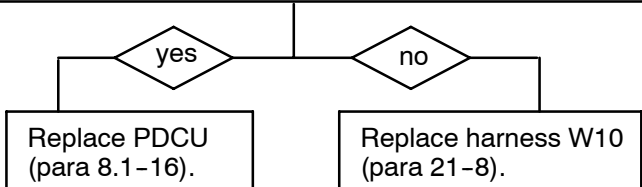
INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

- A**
1. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  2. Turn MASTER CONTROL STATION power switch to ON (TM 9-2350-314-10).
  3. Test vehicle intercom at any two positions.
- Does intercom operate properly?



- B** Perform harness test on harness W10 (para 3-3.n(32)).
- Is harness W10 good?



**END OF TASK**

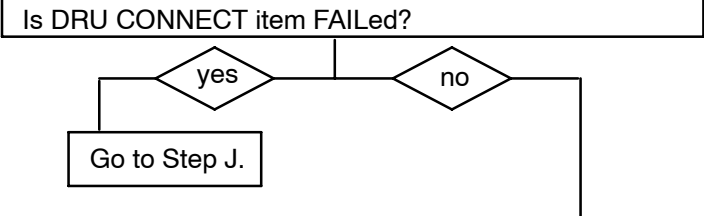


### 3-3. TROUBLESHOOTING CHART - CONTINUED

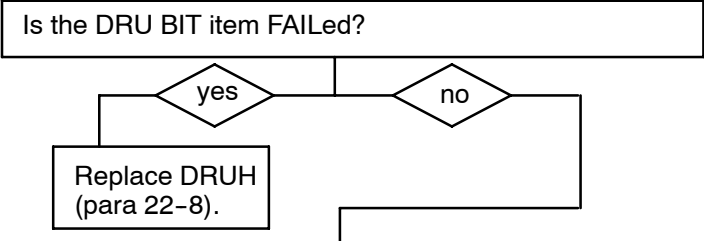
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT.

<p><u>INITIAL SETUP</u></p> <p style="text-align: center;"><b>NOTE</b></p> <p>When performing PDFCS troubleshooting, use only SPORT or MSD for Paladin M109A6.</p> <p>Run PDI PDFCS Tests.</p>	<p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (CL 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)                  PDFCS Sport/MSD Accessory Kit (item 61, Appx G)</p>
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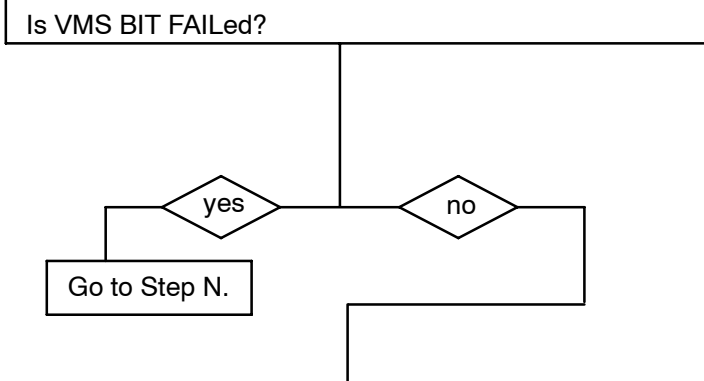
- A**
1. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  2. Turn keypad power switch to ON (TM 9-2350-314-10).
  3. Enter MAINTENANCE MODE.
  4. Select PDFCS STATUS screen.
  5. Select NAV SUBSYSTEM STATUS.



- B** Continue monitoring the NAV SUBSYSTEM STATUS.



- C** Continue monitoring the NAV SUBSYSTEM STATUS.



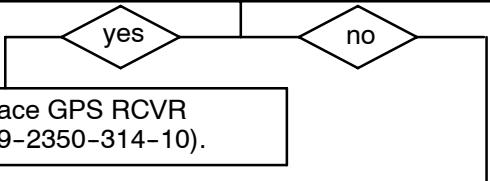
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

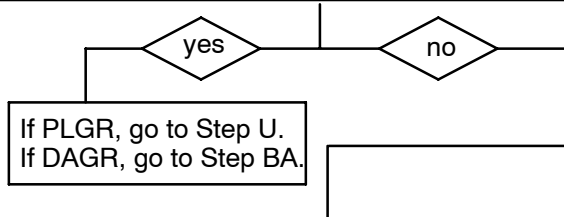
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP C

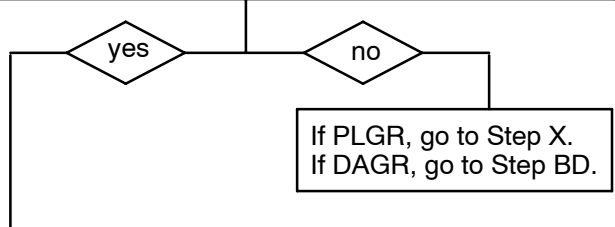
**D** Continue monitoring the NAV SUBSYSTEM STATUS.  
Is the GPS BIT FAILED?



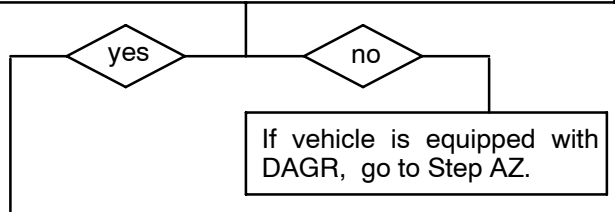
**E** Continue monitoring the NAV SUBSYSTEM STATUS.  
Is the GPS ANTENNA FAILED?



**F** Monitor display screen on GPS RCVR.  
Is the GPS RCVR display screen blank?



**G** Is the vehicle equipped with a PLGR?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP G

**H**

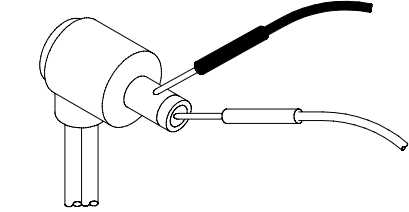
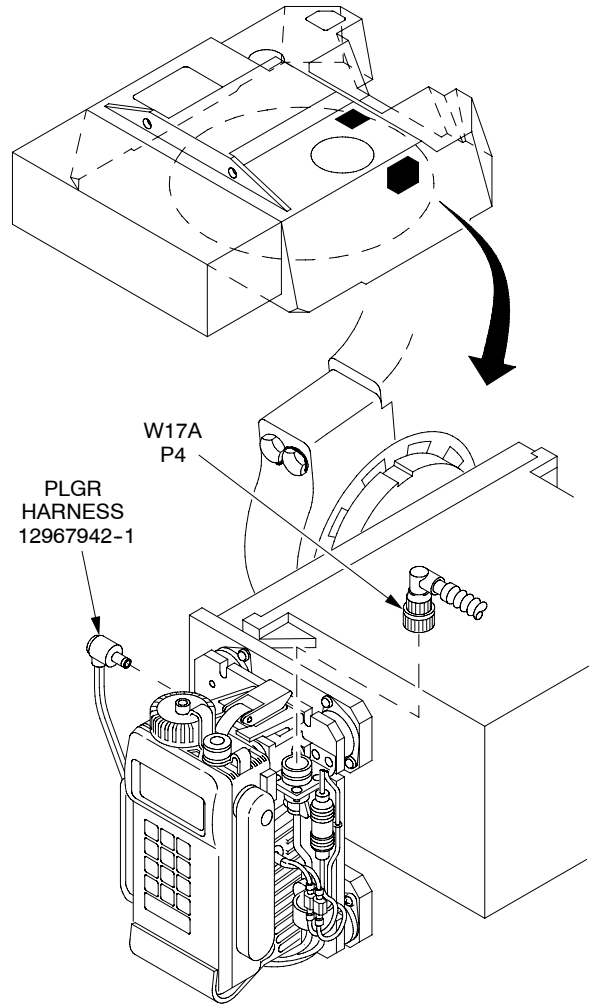
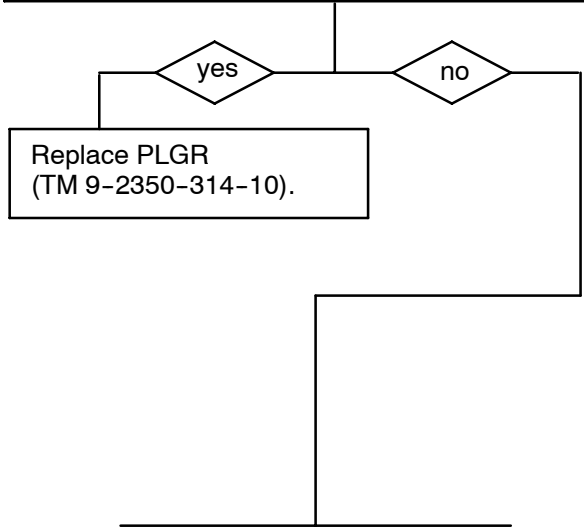
1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect PLGR power harness 12967942-1 from PLGR connector J4.
4. Disconnect harness W17A connector P4 from PLGR harness W141 connector P1.
5. Make sure PLGR is securely latched in mount.

**NOTE**

This is to make sure micro-switch on mount is closed.

6. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
7. Place multimeter red lead in the center of PLGR power harness 12967942-1 connector and black lead on outside of PLGR power harness 12967942-1 connector.
8. Measure DC voltage (V dc).

Is the voltage greater than 18 V dc?



PLGR HARNESS 12967942-1 CONNECTOR

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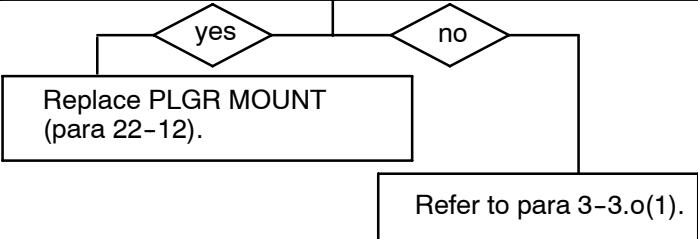
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP H

- I**
1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  2. Disconnect spade lug on wire coming out of the fuse holder on PLGR power harness 12967942-1 from spade lug on wire coming from PLGR mount.
  3. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  4. Place multimeter red lead in the spade lug of PLGR power harness 12967942-1 and black lead on outside of PLGR power harness 12967942-1 connector.
  5. Measure the DC voltage (V dc).

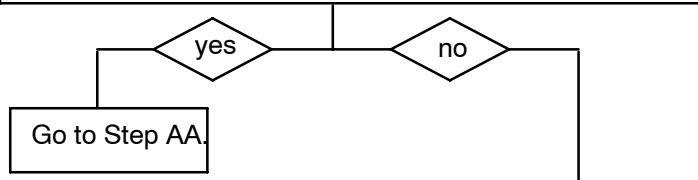
Is voltage greater than 18 V dc?



CONTINUED FROM STEP A

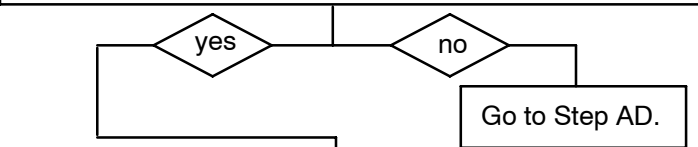
- J**
1. Remove 3 screws securing plate covering DRUH lamps and remove plate.
  2. Monitor DRUH power lamp.

Is DRUH power lamp ON?

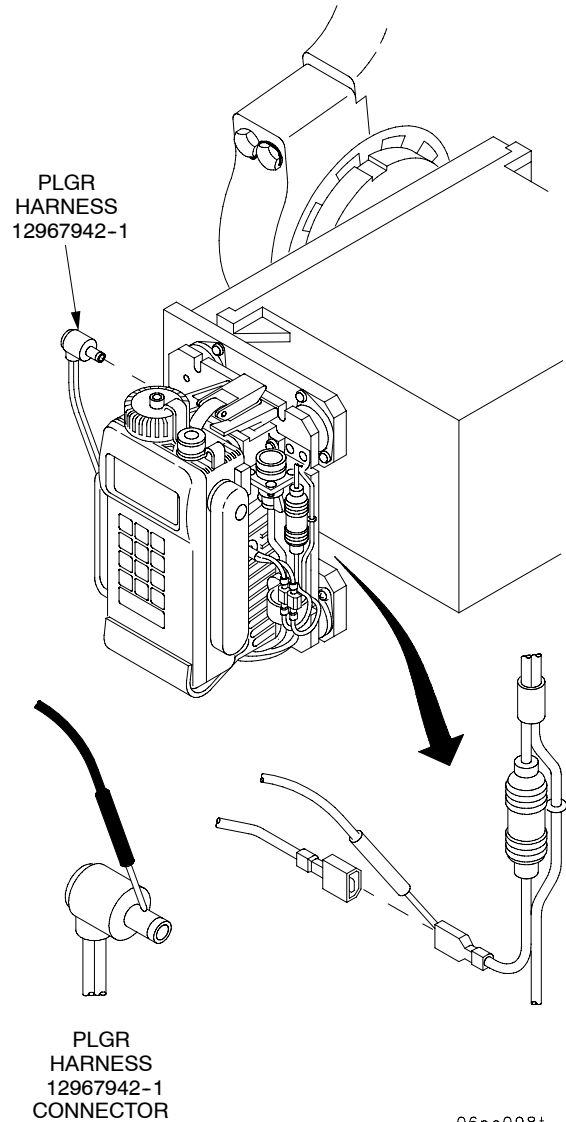


- K**
- Make sure circuit breakers NAV1 and NAV2 on the PCU-2 are ON. If not, reset them to the ON position.

Did circuit breakers stay ON?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

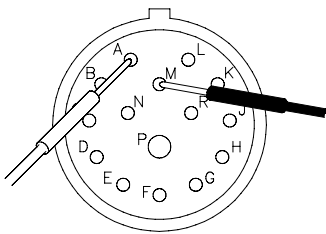
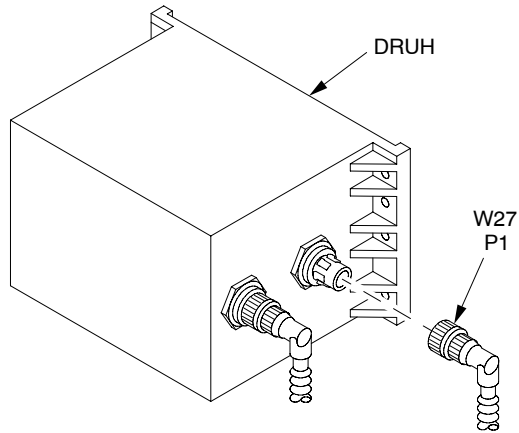
CONTINUED FROM STEP K

**L**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W27 connector P1 from DRUH connector J2.
4. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
5. Turn keypad power switch to ON (TM 9-2350-314-10).
6. Check harness W27 for DC voltage (V dc) by placing red multimeter lead on Point A and black multimeter lead on Point B.

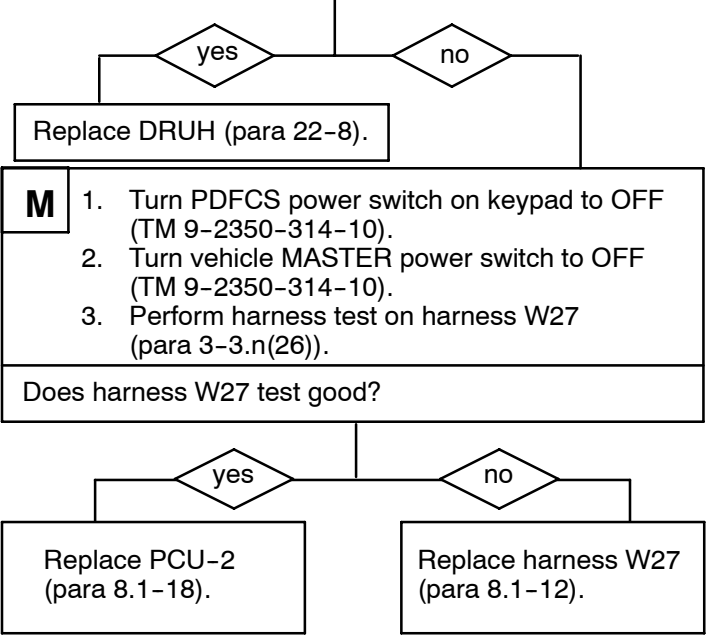
Point A	Point B
W27 Connector P1 socket A	W27 Connector P1 socket M
W27 Connector P1 socket B	W27 Connector P1 socket N
W27 Connector P1 socket J	W27 Connector P1 socket G
W27 Connector P1 socket K	W27 Connector P1 socket H
W27 Connector P1 socket L	W27 Connector P1 socket R

Is voltage greater than 18 V dc at all points?



W27  
CONNECTOR P1  
TO DRU  
SOCKET A and SOCKET M  
(SOCKET B and SOCKET N)  
(SOCKET J and SOCKET G)  
(SOCKET K and SOCKET H)  
(SOCKET L and SOCKET R)

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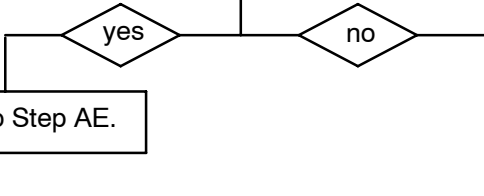
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP C

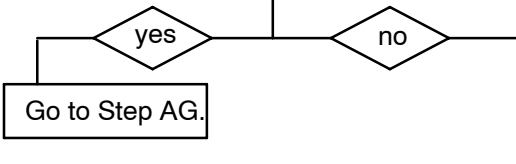
**N** 1. Make sure segment boards are clean before running VMS test. If necessary, clean segment boards (para 23-3).  
2. Enter MAINTENANCE MODE.  
3. Perform VMS TEST (TM 9-2350-314-10).

Is result of CAB SIDE VMS MODEM BAD?



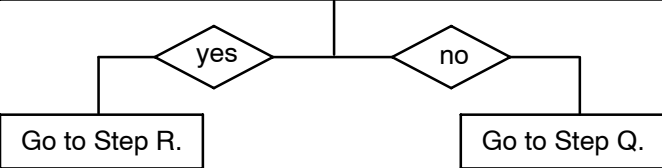
**O** Check results of VMS tests from Step N.

Is result of CHASSIS SIDE VMS MODEM BAD?



**P** Check results of VMS tests from Step N.

Is result of VMS BAD?



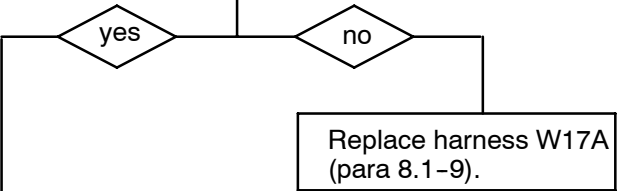
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**3-3. TROUBLESHOOTING CHART - CONTINUED**

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP P

<b>Q</b>	<ol style="list-style-type: none"> <li>1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).</li> <li>2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li> <li>3. Perform harness test on harness W17A (para 3-3.n(27)) between connectors P1, P2, and P3.</li> </ol>
Does harness W17A test good?	



<ol style="list-style-type: none"> <li>1. Replace VMS cab side modem (para 22-5).</li> <li>2. After re-testing the PDFCS if the problem still occurs replace DRUH (para 22-8).</li> </ol>
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

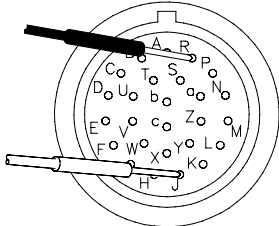
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP P

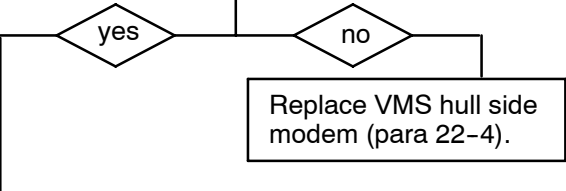
**R**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W21 connector P2 at VMS hull side modem connector J1.
4. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
5. Place multimeter red lead on VMS hull side modem connector J1 socket J and black lead on VMS hull side modem connector J1 socket R.
6. Measure the DC voltage (V dc).
7. Place multimeter red lead on VMS hull side modem connector J1 socket K and black lead on VMS hull side modem connector J1 socket S.
8. Measure DC voltage (V dc).

Are both voltages greater than 5 V dc?



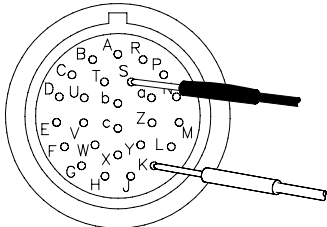
VMS MODEM  
CONNECTOR J1  
SOCKET J  
SOCKET R



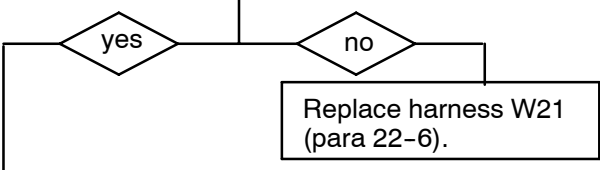
**S**

Turn vehicle MASTER power switch OFF (TM 9-2350-314-10). Do harness test on harness W21 (para 3-3.n(28)).

Is harness W21 good?



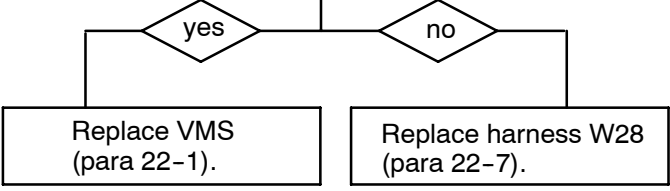
VMS MODEM  
CONNECTOR J1  
SOCKET K  
SOCKET S



**T**

Perform harness test on harness W28 (para 3-3.n(29)).

Is harness W28 good?



22pc002t

CONTINUED ON NEXT PAGE



### 3-3. TROUBLESHOOTING CHART - CONTINUED

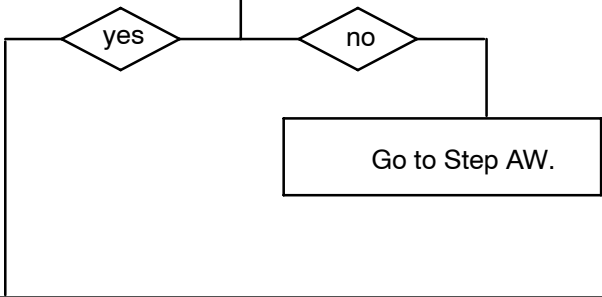
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP E

**U**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect PLGR power harness 12967942-1 from PLGR connector J4.
4. Disconnect PLGR antenna harness 12967937 from PLGR connector J3.
5. Connect one lead of multimeter to the center wire of antenna harness 12967937 (PLGR) connector and the other lead to the outside wire shield of antenna harness 12967937 connector (brass fingers).
6. Measure the resistance (ohms).

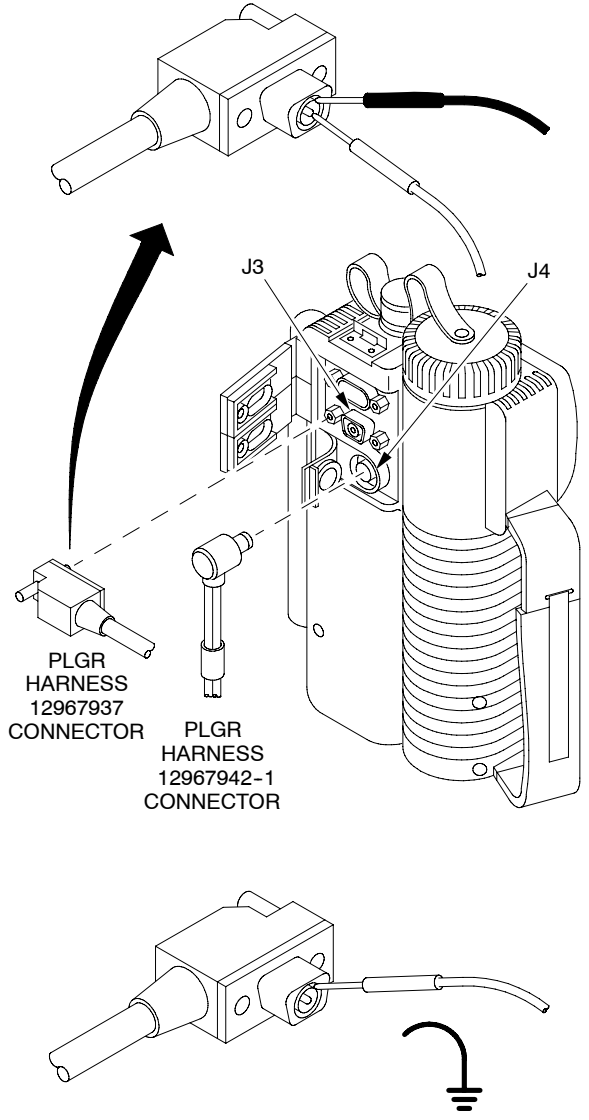
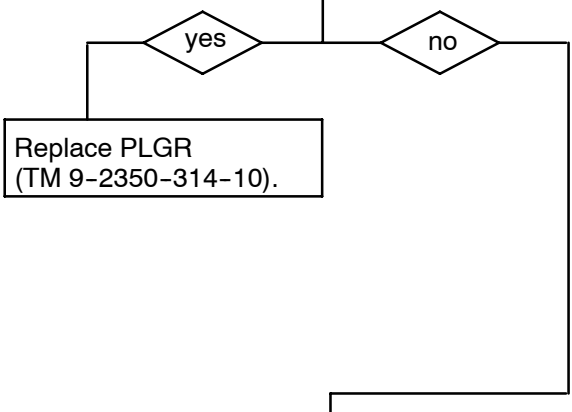
Is resistance between 80 and 280 ohms?



**V**

1. Connect one lead of multimeter to outside wire shield of antenna harness 12967937 connector and other lead to chassis ground.
2. Measure resistance (ohms).

Is resistance greater than 1000 ohms?



06pc100t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

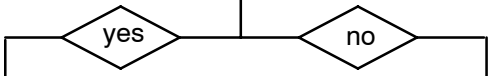
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP V

**W**

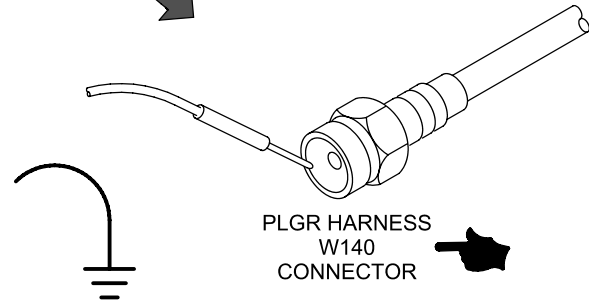
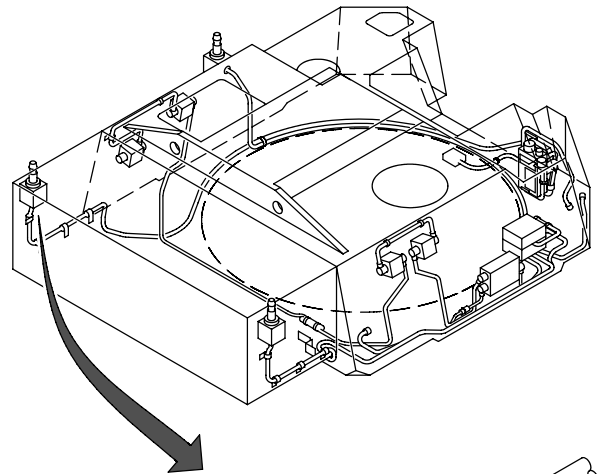
1. Disconnect PLGR antenna harness W140 from PLGR antenna on the outside of the vehicle.
2. Connect one lead of multimeter to the outside wire shield of antenna harness W140 connector and the other lead to chassis ground.
3. Measure the resistance (ohms).

Is resistance greater than 1000 ohms?



Replace PLGR antenna harness W140 (para 22-11).

Replace PLGR antenna (para 21-10).



06pc101t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

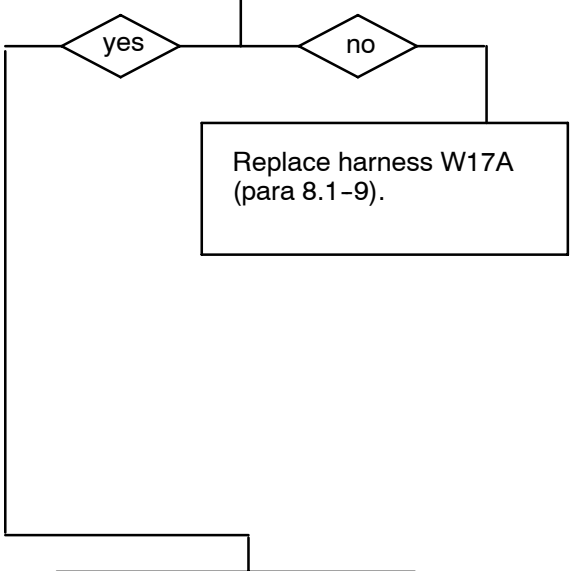
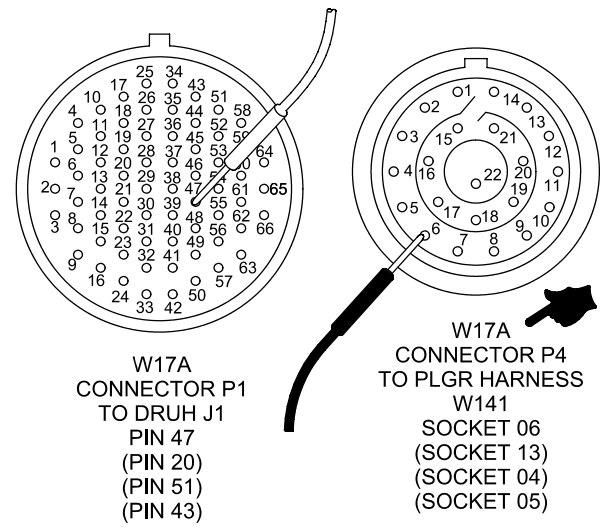
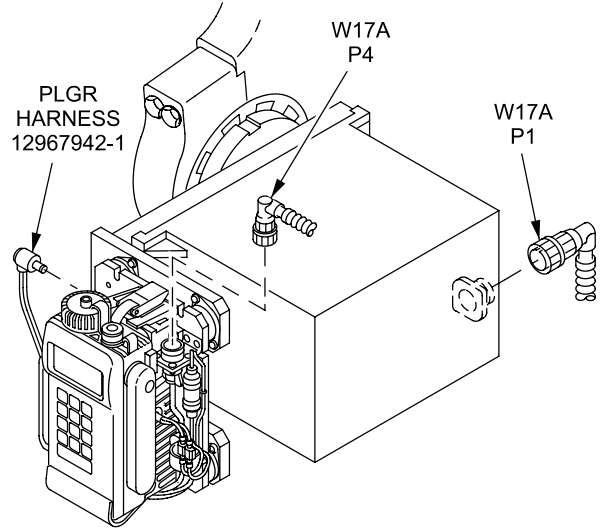
CONTINUED FROM STEP F

**X**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect PLGR power harness 12967942-1 from PLGR connector J4.
4. Disconnect harness W17A connector P1 from DRUH connector J1.
5. Check harness W17A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W17A Connector P1 pin 47	W17A Connector P4 socket 06
W17A Connector P1 pin 20	W17A Connector P4 socket 13
W17A Connector P1 pin 51	W17A Connector P4 socket 04
W17A Connector P1 pin 43	W17A Connector P4 socket 05

Is there continuity at all points (resistance less than 10 ohms)?



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06pc102t

# 3-3. TROUBLESHOOTING CHART - CONTINUED

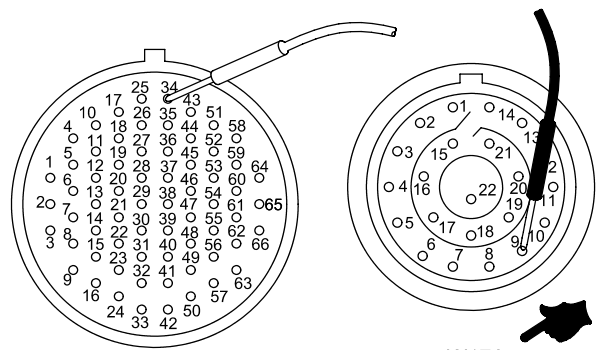
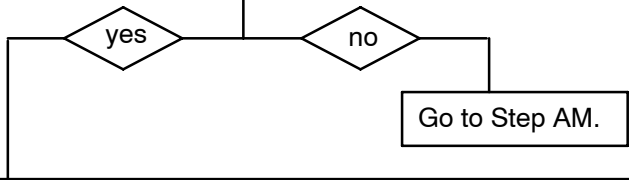
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP X

**Y** Check harness W17A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W17A Connector P1 pin 34	W17A Connector P4 socket 09
W17A Connector P1 pin 25	W17A Connector P4 socket 10

Is there continuity at all points (resistance less than 10 ohms)?

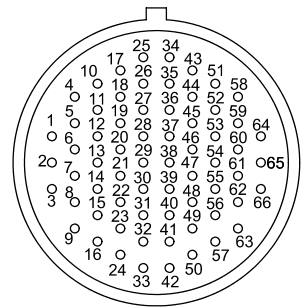


W17A  
CONNECTOR P1  
TO DRUH J1  
PIN 34  
(PIN 25)

W17A  
CONNECTOR P4  
TO PLGR HARNESS  
W141  
SOCKET 09  
(SOCKET 10)

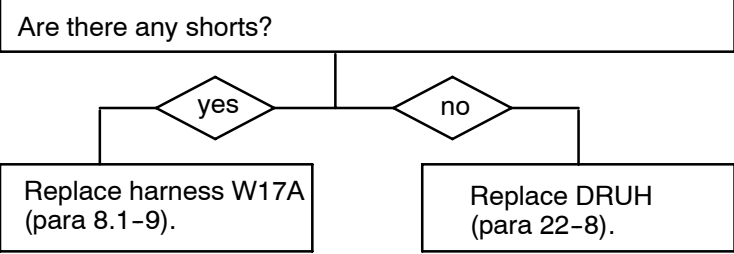
**Z** Check harness W17A for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P1 pin 20	Connector P1 pin 25
Connector P1 pin 20	Connector P1 pin 34
Connector P1 pin 20	Connector P1 pin 43
Connector P1 pin 20	Connector P1 pin 47
Connector P1 pin 20	Connector P1 pin 51
Connector P1 pin 25	Connector P1 pin 34
Connector P1 pin 25	Connector P1 pin 43
Connector P1 pin 25	Connector P1 pin 47
Connector P1 pin 25	Connector P1 pin 51
Connector P1 pin 34	Connector P1 pin 43
Connector P1 pin 34	Connector P1 pin 47
Connector P1 pin 34	Connector P1 pin 51
Connector P1 pin 43	Connector P1 pin 47
Connector P1 pin 43	Connector P1 pin 51
Connector P1 pin 47	Connector P1 pin 51



W17A  
CONNECTOR P1  
TO DRUH J1

06pc103t



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

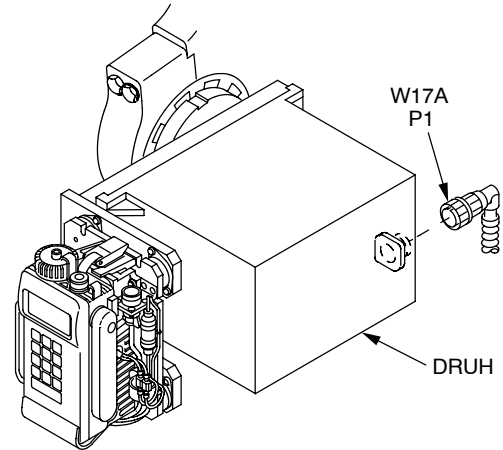
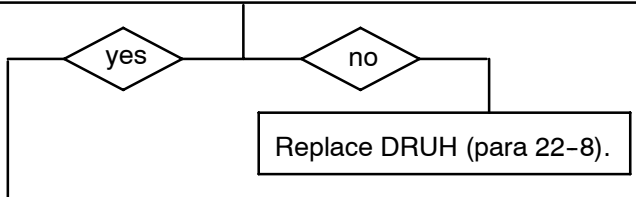
CONTINUED FROM STEP J

**AA** Check DRUH BIT lamp.

**NOTE**

DRUH BIT Lamp is ON during normal operation and OUT when a BIT fails.

Is BIT lamp ON?



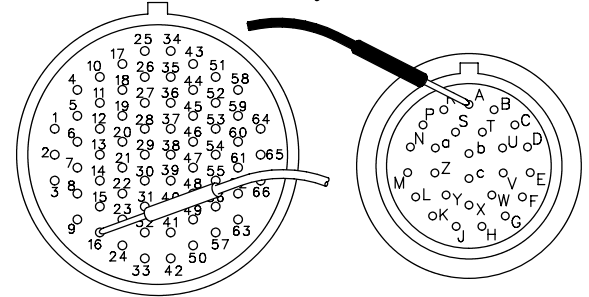
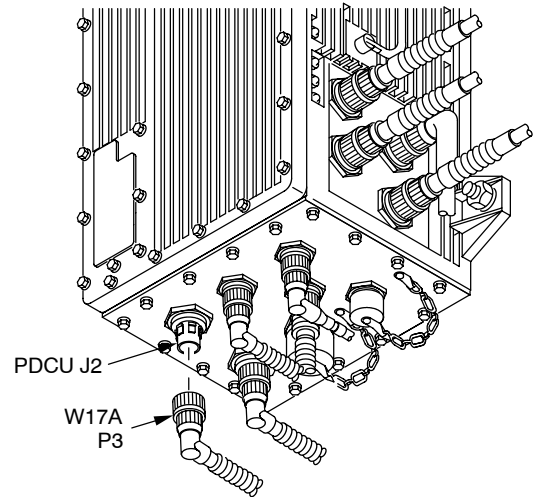
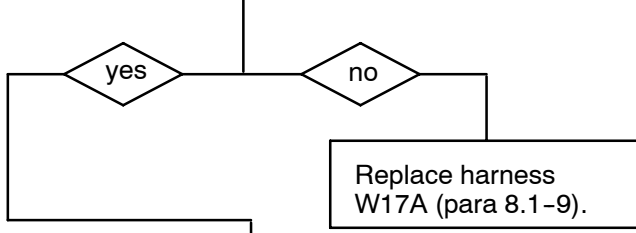
**AB** **NOTE**

Perform TB 9-2350-314-20-2-2 M109A6 Accessory Software, "PDFCS TROUBLESHOOTING", single test "DRU CONNECT ITEM FAILED" (to isolate to a single item) or continue as follows:

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W17A connector P1 from DRUH connector J1.
4. Disconnect harness W17A connector P3 from PDCU connector J2.
5. Check harness W17A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

<p>Point A</p> <p>W17A Connector P1 pin 16</p> <p>W17A Connector P1 pin 24</p> <p>W17A Connector P1 pin 08</p> <p>W17A Connector P1 pin 09</p>	<p>Point B</p> <p>W17A Connector P3 pin A</p> <p>W17A Connector P3 pin B</p> <p>W17A Connector P3 pin C</p> <p>W17A Connector P3 pin D</p>
--	--

Is there continuity at all points (resistance less than 10 ohms)?



W17A CONNECTOR P1 TO DRUH J1  
PIN 16  
(PIN 24)  
(PIN 08)  
(PIN 09)

W17A CONNECTOR P3 TO PDCU J2  
PIN A  
(PIN B)  
(PIN C)  
(PIN D)

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

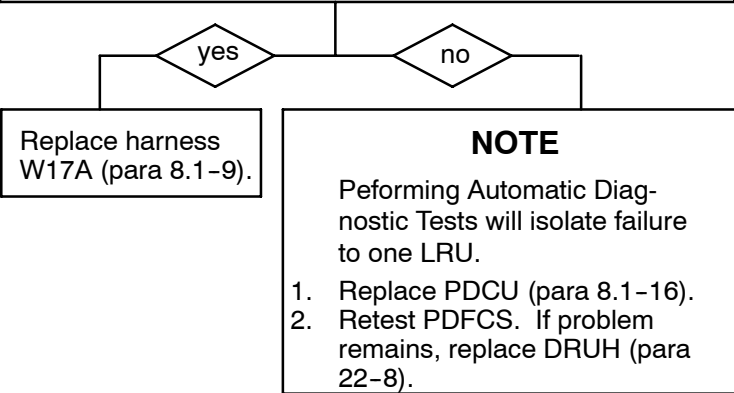
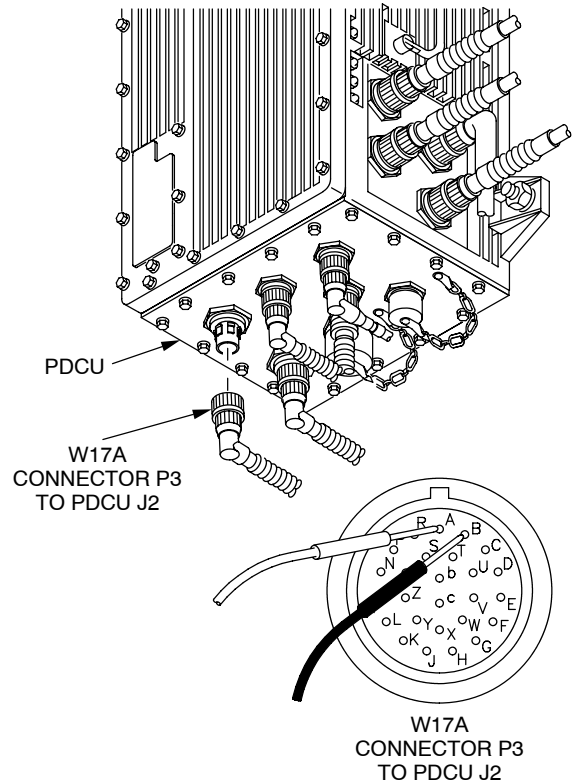
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AB

**AC** Check harness W17A for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W17A Connector P3 pin A	W17A Connector P3 pin B
W17A Connector P3 pin A	W17A Connector P3 pin C
W17A Connector P3 pin A	W17A Connector P3 pin D
W17A Connector P3 pin A	W17A Connector P3 pin U
W17A Connector P3 pin B	W17A Connector P3 pin C
W17A Connector P3 pin B	W17A Connector P3 pin D
W17A Connector P3 pin B	W17A Connector P3 pin U
W17A Connector P3 pin C	W17A Connector P3 pin D
W17A Connector P3 pin C	W17A Connector P3 pin U
W17A Connector P3 pin D	W17A Connector P3 pin U

Are there any shorts?



CONTINUED FROM STEP K

**AD** 1. Disconnect harness W27 connector P1 from DRUH connector J2.  
2. Reset open circuit breakers.

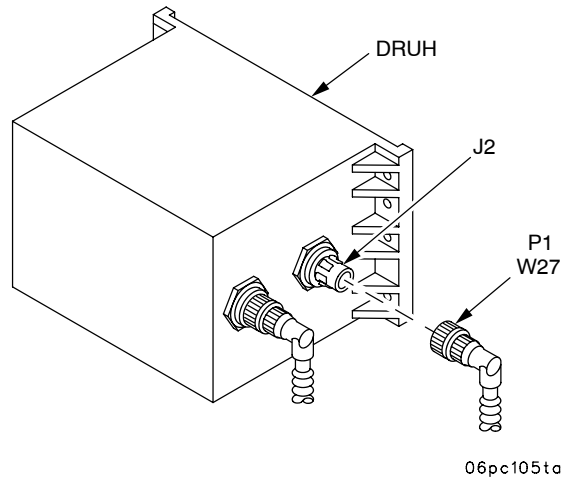
Did circuit breakers stay ON?

yes

Replace DRUH (para 22-8).

no

Go to Step AY.



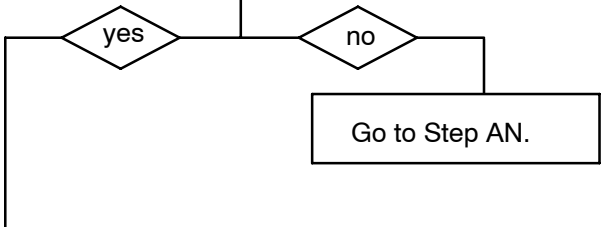
CONTINUED ON NEXT PAGE

**3-3. TROUBLESHOOTING CHART - CONTINUED**

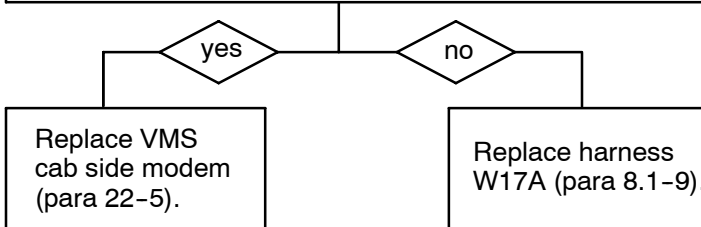
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP N

<b>AE</b>	Monitor the power lamp on the VMS cab side modem.
Is power lamp ON?	

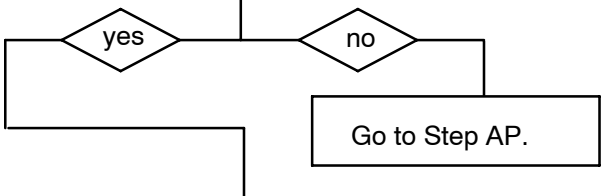


<b>AF</b>	<ol style="list-style-type: none"> <li>1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).</li> <li>2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li> <li>3. Perform harness test on harness W17A (para 3-3.n(27)) between connectors P1, P2, and P3.</li> </ol>
Does harness W17A test good?	



CONTINUED FROM STEP O

<b>AG</b>	Monitor power lamp on VMS hull side modem.
Is power lamp ON?	



CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

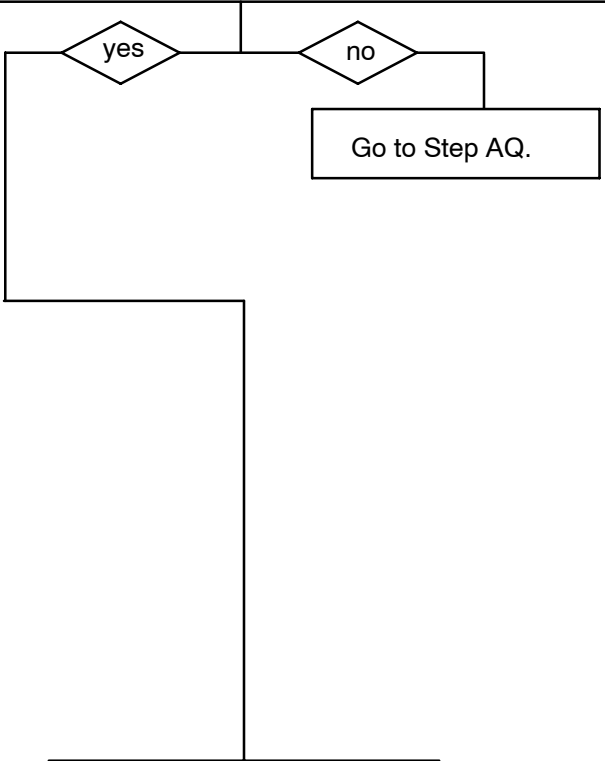
CONTINUED FROM STEP AG

**AH**

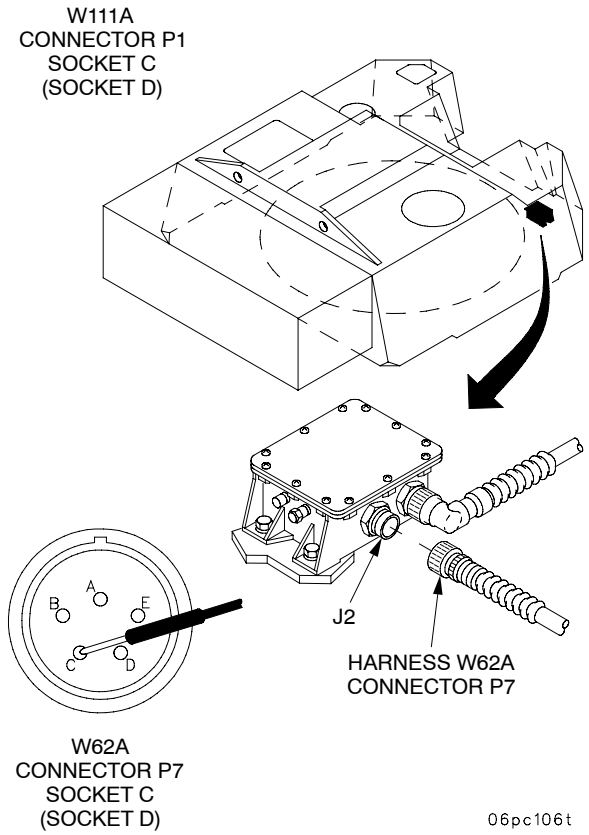
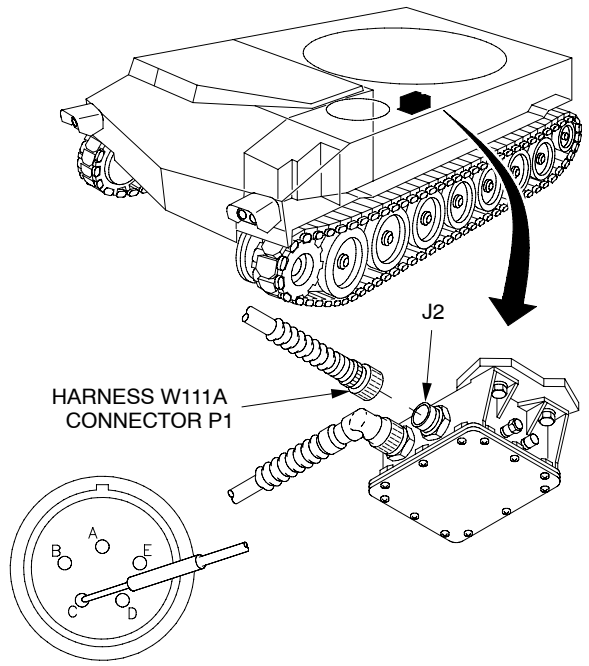
1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W111A connector P1 at VMS hull side modem connector J2.
4. Disconnect harness W62A connector P7 at VMS cab side modem connector J2.
5. Check for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W111A Connector P1 socket C	W62A Connector P7 socket C
W111A Connector P1 socket D	W62A Connector P7 socket D

Is there continuity at all points (resistance less than 10 ohms)?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

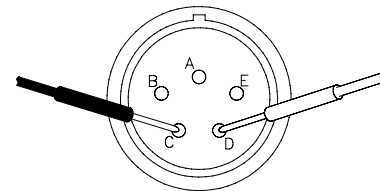
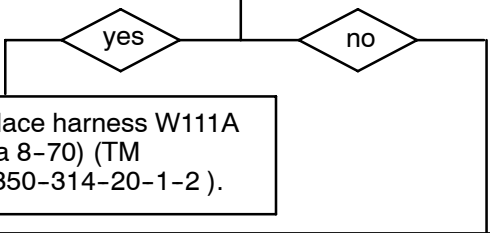
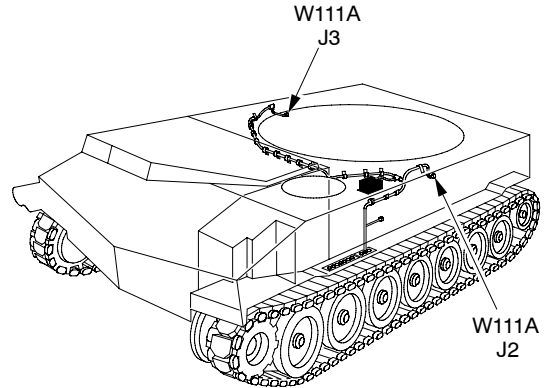
CONTINUED FROM STEP AH

**AI**

1. Disconnect harness W111A connector J2 from left slip ring connector.
2. Disconnect harness W111A connector J3 from right slip ring connector.
3. Check harness W111A for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P1 socket C	Connector P1 socket D
Connector P1 socket C	Connector P1 socket E
Connector P1 socket D	Connector P1 socket E

Are there any shorts?



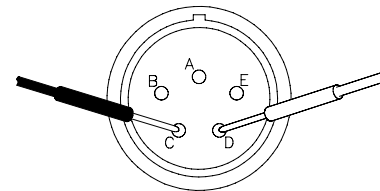
W111A  
CONNECTOR P1  
SOCKET C and SOCKET D  
(SOCKET C and SOCKET E)  
(SOCKET D and SOCKET E)

**AJ**

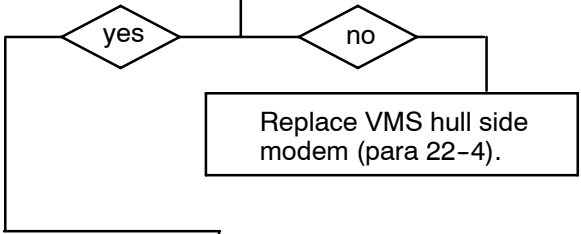
Check harness W62A for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector P7 socket C	Connector P7 socket D
Connector P7 socket C	Connector P7 socket E
Connector P7 socket D	Connector P7 socket E

Are there any shorts?



W62A  
CONNECTOR P7  
SOCKET C and SOCKET D  
(SOCKET C and SOCKET E)  
(SOCKET D and SOCKET E)



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AJ

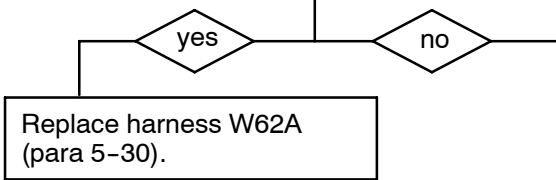
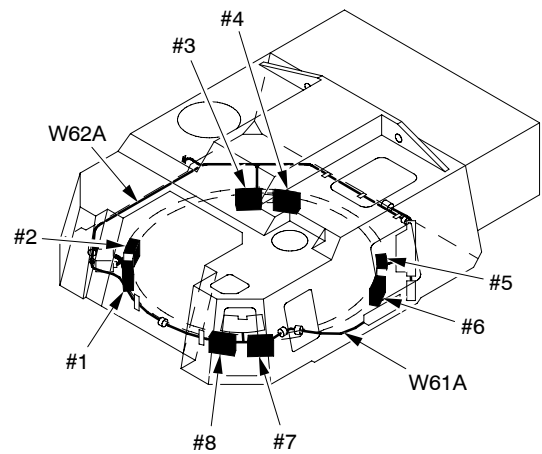
**AK**

1. Disconnect harness W62A connector P1 from harness W61A connector J1.
2. Disconnect harness W62A connector J1 from harness W61A connector P1.
3. Disconnect harness W62A connectors P2, P3, P4, P5 from Brush Blocks #1, #2, #3, #4.
4. Check harness W62A for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

<p>Point A</p> <ul style="list-style-type: none"> <li>Connector P7 socket C</li> <li>Connector P7 socket C</li> <li>Connector P7 socket D</li> </ul>	<p>Point B</p> <ul style="list-style-type: none"> <li>Connector P7 socket D</li> <li>Connector P7 socket E</li> <li>Connector P7 socket E</li> </ul>
--	--

Are there any shorts?

NOTE:  
 Brush Blocks #s 1,2,3,& 4, connected to W62A Wiring Harness  
 Brush Blocks #s 5,6,7,& 8, connected to W61A Wiring Harness

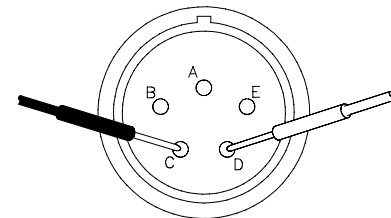


**AL**

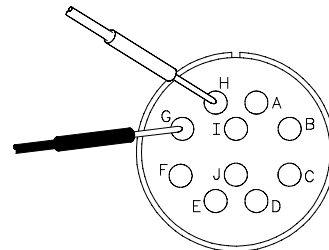
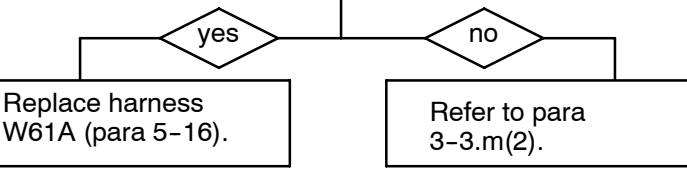
1. Disconnect harness W61A connectors P2, P3, P4, P5 from Brush Blocks #5, #6, #7, #8.
2. Check harness W61A for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

<p>Point A</p> <ul style="list-style-type: none"> <li>Connector J1 pin G</li> </ul>	<p>Point B</p> <ul style="list-style-type: none"> <li>Connector J1 pin H</li> </ul>
---	---

Are there any shorts?



W62A  
 CONNECTOR P7  
 SOCKET C and SOCKET D  
 (SOCKET C and SOCKET E)  
 (SOCKET D and SOCKET E)



W61A  
 CONNECTOR J1  
 PIN G and PIN H

CONTINUED ON NEXT PAGE

# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

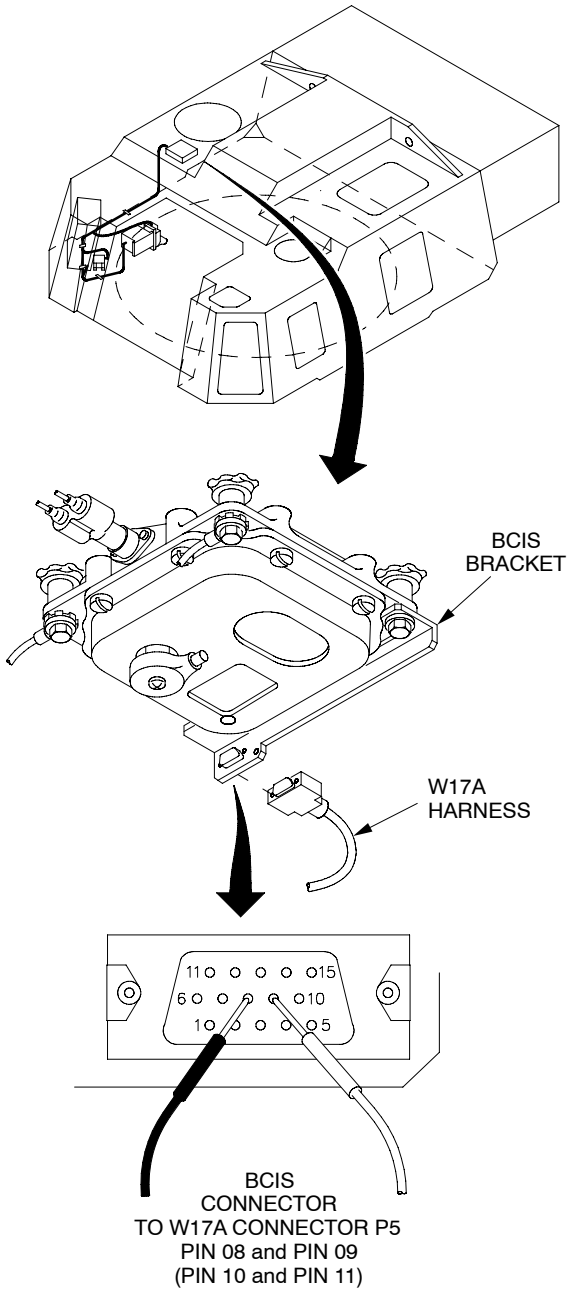
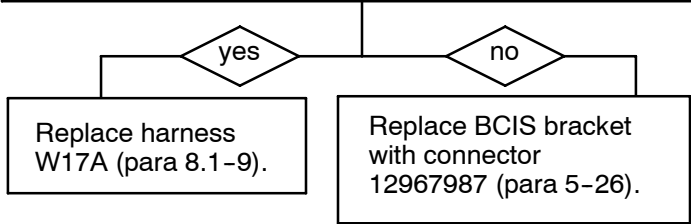
CONTINUED FROM STEP Y AND BE

**AM**

1. Disconnect harness W17A connector P5 from BCIS shorting plug connector 12967987 and mounting bracket 12967994.
2. Check shorting plug connector 12967987 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
Connector pin 08	Connector pin 09
Connector pin 10	Connector pin 11

Is there continuity at all points (resistance less than 10 ohms)?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

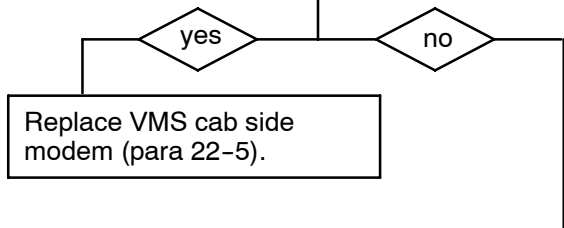
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AE

**AN**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W62A connector P7 from VMS cab side modem connector J2.
4. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
5. Place multimeter red lead in harness W62A connector P7 socket A and black lead in harness W62A connector P7 socket B.
6. Measure DC voltage (V dc).

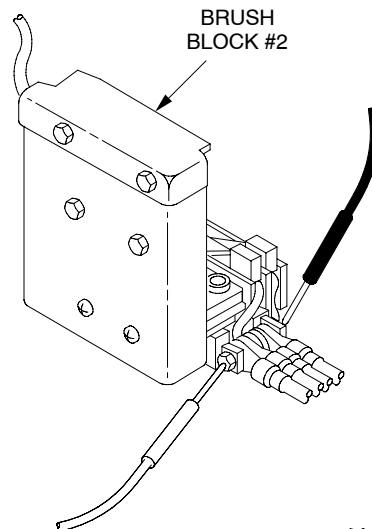
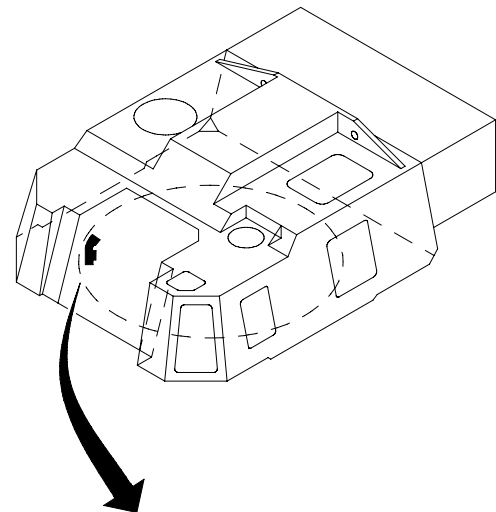
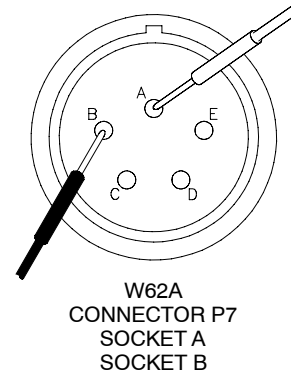
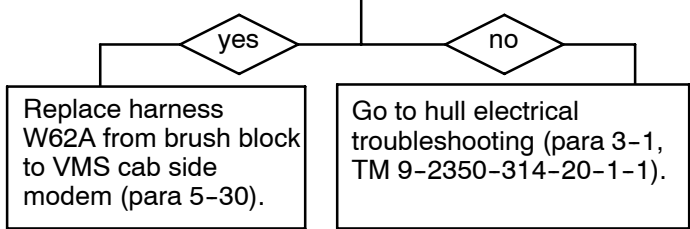
Is voltage greater than 18 V dc?



**AO**

1. Place multimeter red lead on Brush Block #2 positive (100) terminal and black lead on Brush Block #2 negative (70) terminal.
2. Measure DC voltage (V dc).

Is voltage greater than 18 V dc?



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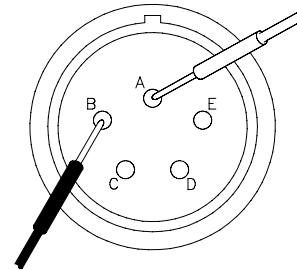
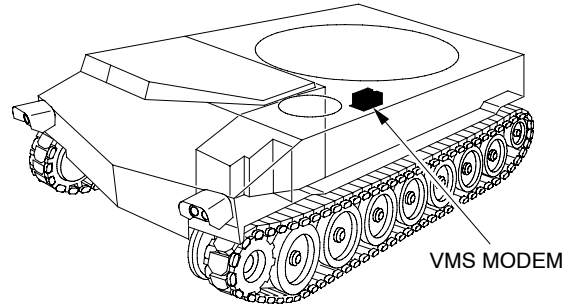
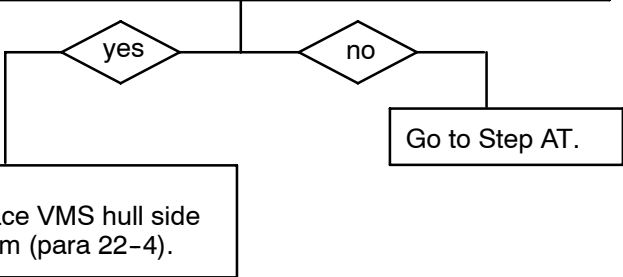
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AG

- AP**
1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  3. Disconnect harness W111A connector P1 at VMS hull side modem connector J2.
  4. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  5. Place multimeter red lead in harness W111A connector P1 socket A and black lead in harness W111A connector P1 socket B.
  6. Measure DC voltage (V dc).

Is voltage greater than 18 V dc?



W111A  
CONNECTOR P1  
SOCKET A  
SOCKET B

06pc112t

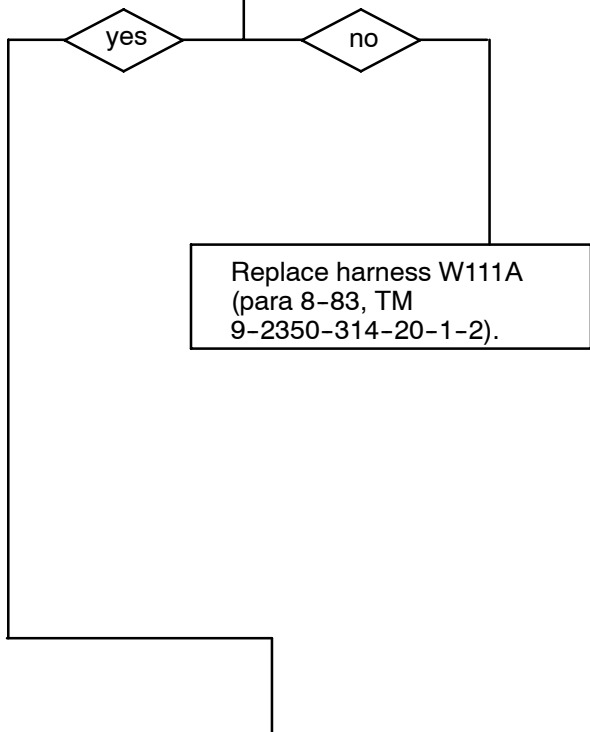
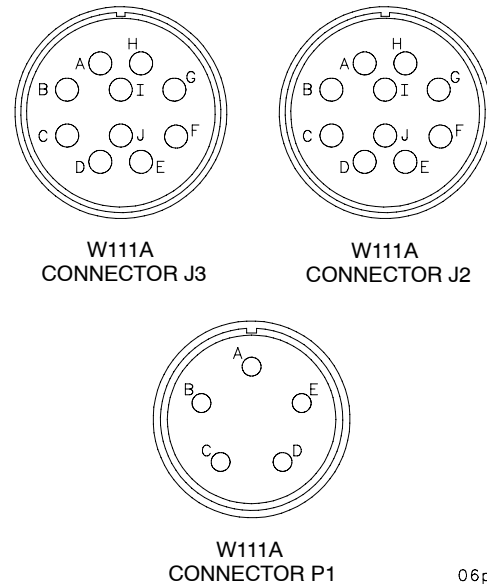
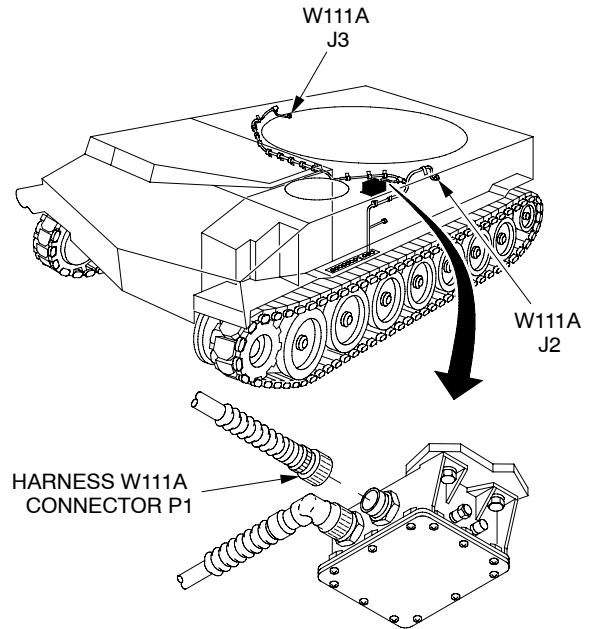
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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AH

<b>AQ</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W111A connector J2 from VIS cable A3206130-10 connector P3.</li> <li>2. Disconnect harness W111A connector J3 from right slip ring connector.</li> <li>3. Check harness W111A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>										
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Point A</td> <td style="width: 50%; text-align: center;">Point B</td> </tr> <tr> <td style="border: none;">W111A Connector P1 socket C</td> <td style="border: none;">W111A Connector J2 socket H</td> </tr> <tr> <td style="border: none;">W111A Connector P1 socket C</td> <td style="border: none;">W111A Connector J3 socket H</td> </tr> <tr> <td style="border: none;">W111A Connector P1 socket D</td> <td style="border: none;">W111A Connector J2 socket G</td> </tr> <tr> <td style="border: none;">W111A Connector P1 socket D</td> <td style="border: none;">W111A Connector J3 socket G</td> </tr> </table>	Point A	Point B	W111A Connector P1 socket C	W111A Connector J2 socket H	W111A Connector P1 socket C	W111A Connector J3 socket H	W111A Connector P1 socket D	W111A Connector J2 socket G	W111A Connector P1 socket D	W111A Connector J3 socket G
Point A	Point B										
W111A Connector P1 socket C	W111A Connector J2 socket H										
W111A Connector P1 socket C	W111A Connector J3 socket H										
W111A Connector P1 socket D	W111A Connector J2 socket G										
W111A Connector P1 socket D	W111A Connector J3 socket G										
	<p>Is there continuity at all points (resistance less than 10 ohms)?</p>										



CONTINUED ON NEXT PAGE

06pc113t

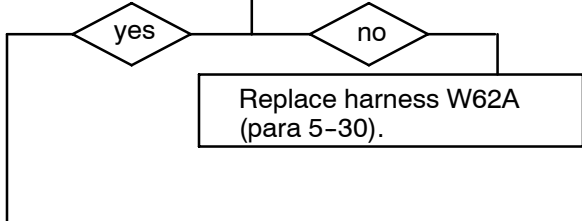
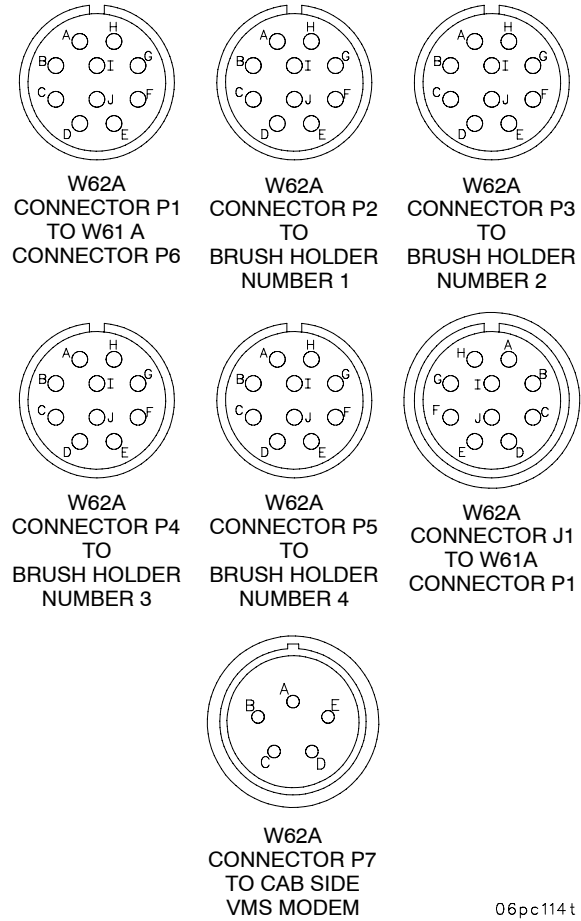
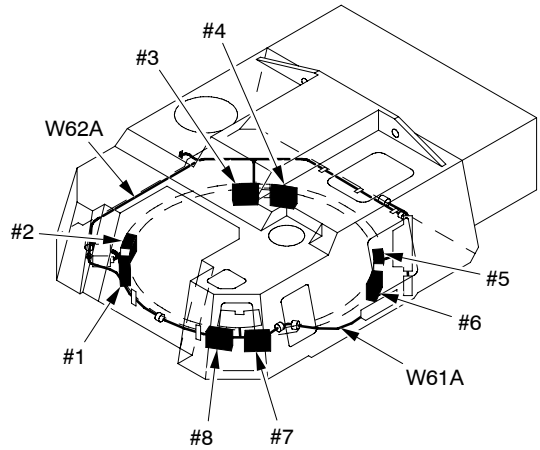
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AQ

<b>AR</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W62A connector P1 from harness W61A connector J1.</li> <li>2. Disconnect harness W62A connector J1 from harness W61A connector P1.</li> <li>3. Disconnect harness W62A connectors P2, P3, P4, P5 from Brush Blocks #1, #2, #3, #4.</li> <li>4. Check harness W62A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>
	<div style="width: 45%;"> <p style="text-align: center;">Point A</p> <p>W62A Connector P7 socket C</p> <p>W62A Connector P7 socket D</p> <p>W62A Connector P7 socket C</p> <p>W62A Connector P7 socket D</p> <p>W62A Connector P7 socket C</p> <p>W62A Connector P7 socket D</p> <p>W62A Connector P7 socket C</p> <p>W62A Connector P7 socket D</p> <p>W62A Connector P7 socket C</p> <p>W62A Connector P7 socket D</p> <p>W62A Connector P7 socket C</p> <p>W62A Connector P7 socket D</p> <p>W62A Connector P7 socket C</p> <p>W62A Connector P7 socket D</p> </div> <div style="width: 45%;"> <p style="text-align: center;">Point B</p> <p>W62A Connector J1 pin G</p> <p>W62A Connector J1 pin H</p> <p>W62A Connector P1 socket G</p> <p>W62A Connector P1 socket H</p> <p>W62A Connector P2 socket G</p> <p>W62A Connector P2 socket H</p> <p>W62A Connector P3 socket G</p> <p>W62A Connector P3 socket H</p> <p>W62A Connector P4 socket G</p> <p>W62A Connector P4 socket H</p> <p>W62A Connector P5 socket G</p> <p>W62A Connector P5 socket H</p> </div>
	<p>Is there continuity at all points (resistance less than 10 ohms)?</p>

NOTE:  
 Brush Blocks #s 1,2,3,& 4, connected to W62A Wiring Harness  
 Brush Blocks #s 5,6,7,& 8, connected to W61A Wiring Harness



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED
(12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

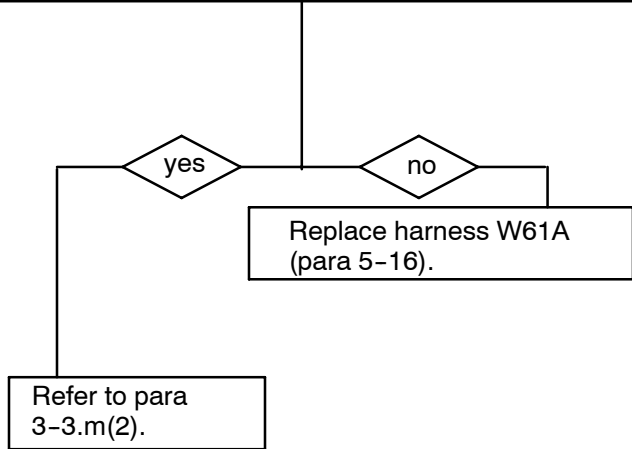
CONTINUED FROM STEP AR

**AS**

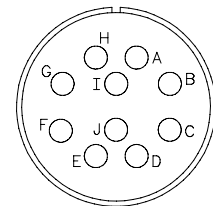
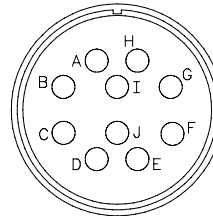
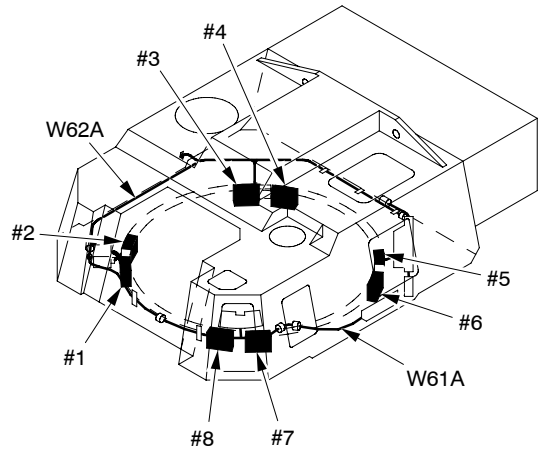
1. Disconnect harness W61A connectors P2, P3, P4, P5 from Brush Blocks #5, #6, #7, #8.
2. Check harness W61A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W61A Connector P1 socket G	W61A Connector J1 pin G
W61A Connector P1 socket H	W61A Connector J1 pin H
W61A Connector P1 socket G	W61A Connector P2 socket G
W61A Connector P1 socket H	W61A Connector P2 socket H
W61A Connector P1 socket G	W61A Connector P3 socket G
W61A Connector P1 socket H	W61A Connector P3 socket H
W61A Connector P1 socket G	W61A Connector P4 socket G
W61A Connector P1 socket H	W61A Connector P4 socket H
W61A Connector P1 socket G	W61A Connector P5 socket G
W61A Connector P1 socket H	W61A Connector P5 socket H

Is there continuity at all points (resistance less than 10 ohms)?



**NOTE:**  
 Brush Blocks #s 1,2,3,& 4, connected to W62A Wiring Harness  
 Brush Blocks #s 5,6,7,& 8, connected to W61A Wiring Harness



**W61A**  
 CONNECTOR P1  
 CONNECTOR P2  
 CONNECTOR P3  
 CONNECTOR P4  
 CONNECTOR P5

**W61A**  
 CONNECTOR J1

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

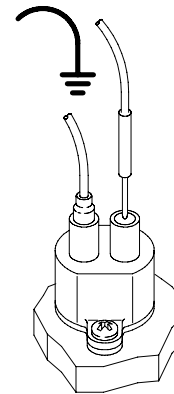
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AP

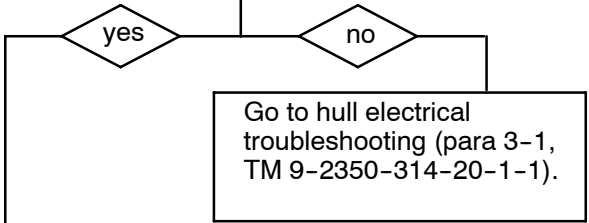
**AT**

1. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
2. Disconnect harness W111A lead 48 at circuit breaker CB9 in driver's compartment.
3. Turn keypad power switch to ON (TM 9-2350-314-10).
4. Place multimeter red lead in CB9 connector and black lead to chassis ground.
5. Measure DC voltage (V dc).

Is voltage greater than 18 V dc?



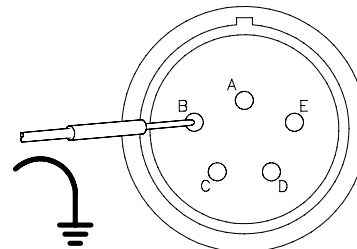
CIRCUIT  
BREAKER NO. 9



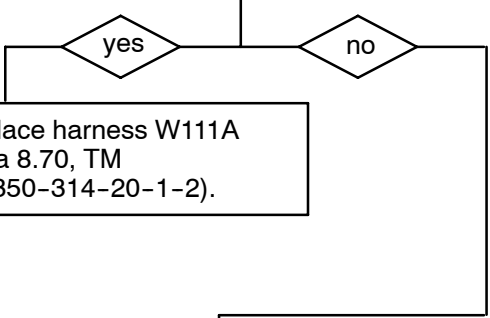
**AU**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Place one multimeter lead in harness W111A connector P1 socket B and other lead to chassis ground.
4. Check for continuity.

Is there continuity (resistance less than 10 ohms)?



W111A  
CONNECTOR P1  
SOCKET B



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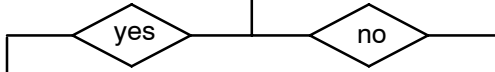
06pc116t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

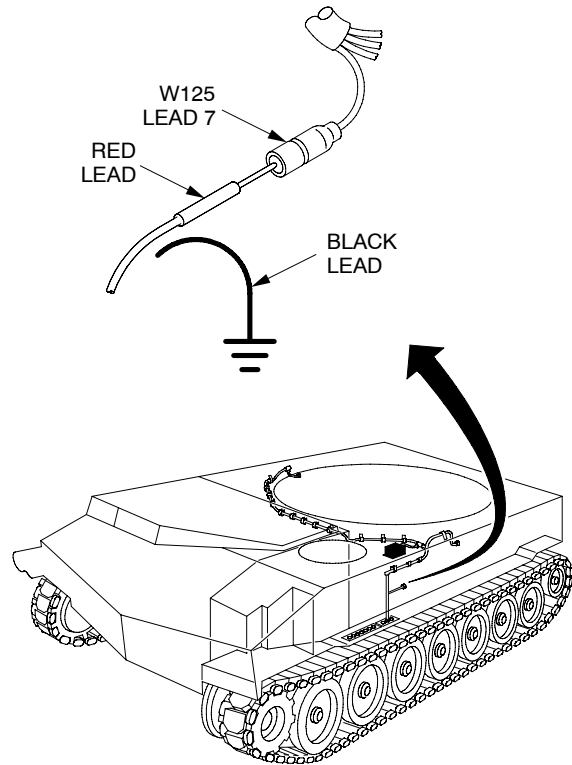
CONTINUED FROM STEP AU

<b>AV</b>	<ol style="list-style-type: none"> <li>1. Disconnect harness W111A lead 7 from harness W125 lead 7 in driver's compartment.</li> <li>2. Place one multimeter lead in harness W125 lead 7 and other lead to chassis ground.</li> <li>3. Check for continuity.</li> </ol>
<p>Is there continuity (resistance less than 10 ohms)?</p>	



Replace harness W111A  
 (para 8-70, TM  
 9-2350-314-20-1-2).

1. Go to hull electrical troubleshooting (para 3-1, TM 9-2350-314-20-1-1).
2. (Ground connection bad, check W125 (para 8-83, TM 9-2350-314-20-1-1) and W116 (para 8-75, TM 9-2350-314-20-1-1)).



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

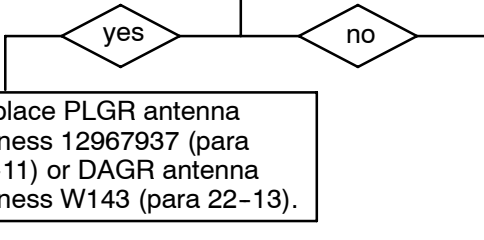
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP U AND BA

**AW**

1. Disconnect DAGR antenna harness W143 or PLGR antenna harness 12967937 from GPS antenna harness W140.
2. Connect one lead of multimeter to the center wire of antenna harness W140 connector and other lead to the outside wire shield of antenna harness W140 connector.
3. Measure the resistance (ohms).

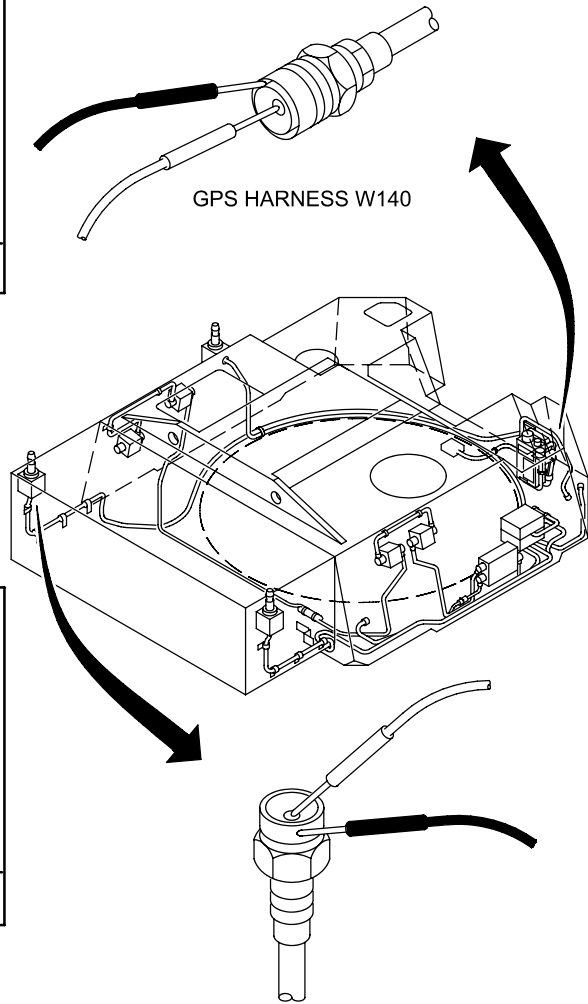
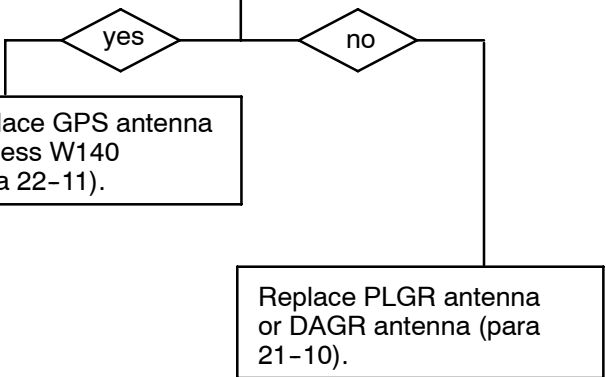
Is resistance between 80 and 280 ohms?



**AX**

1. Disconnect PLGR antenna harness W140 from PLGR antenna on the outside of the vehicle.
2. Connect one lead of multimeter to center wire of PLGR antenna connector and other lead to the outside shield threads of PLGR antenna connector.
3. Measure resistance (ohms).

Is resistance between 80 and 280 ohms?



GPS HARNESS W140 06pc109ta

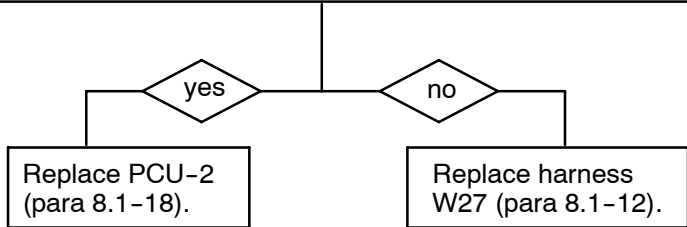
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP AD

<b>AY</b>	<ol style="list-style-type: none"><li>1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).</li><li>2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li><li>3. Disconnect harness W111A lead 48 at circuit breaker CB9 in driver's compartment.</li></ol>
	Did harness W27 test good?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP G

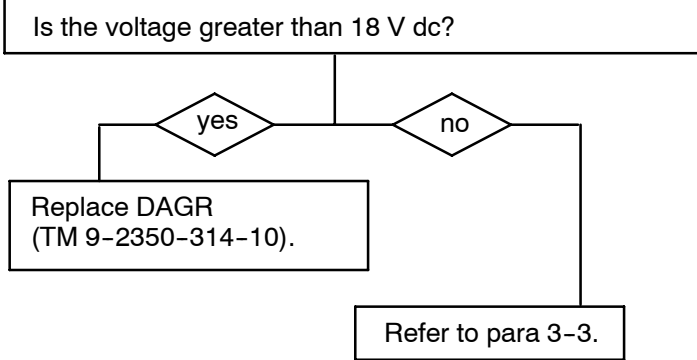
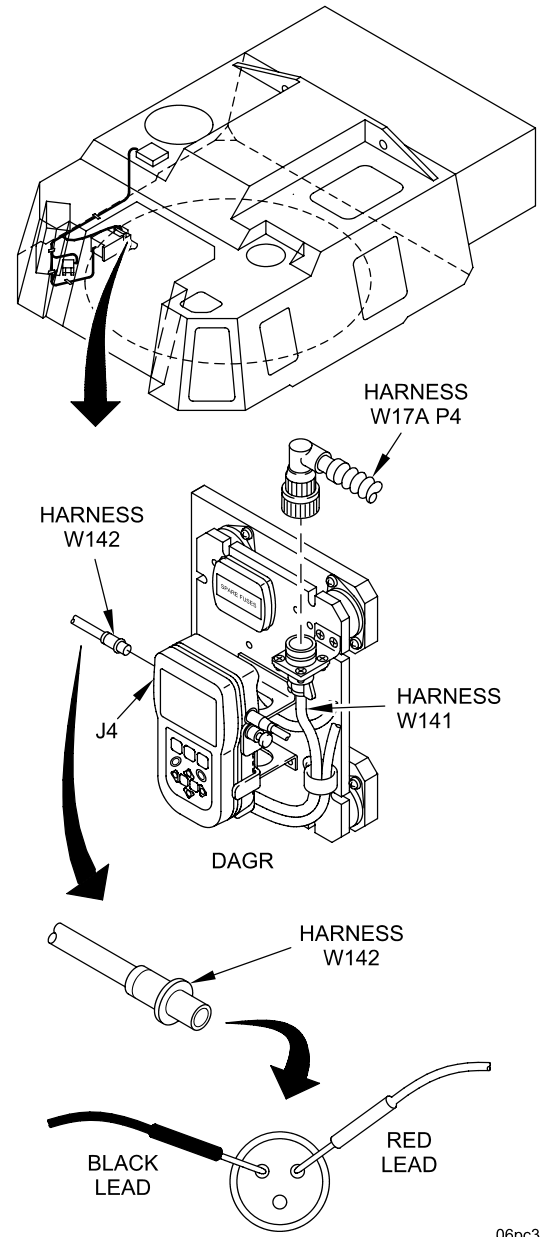
**AZ**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect DAGR power harness W142 from DAGR connector J4.
4. Disconnect harness W17A connector P4 from DAGR harness W141 connector P1.
5. Make sure DAGR is securely latched in mount.

**NOTE**

This is to make sure micro-switch on mount is closed.

6. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
7. Place multimeter red lead in the right DAGR power harness W142 connector socket and black lead in left DAGR power harness W142 connector socket.
8. Measure DC voltage (V dc).



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

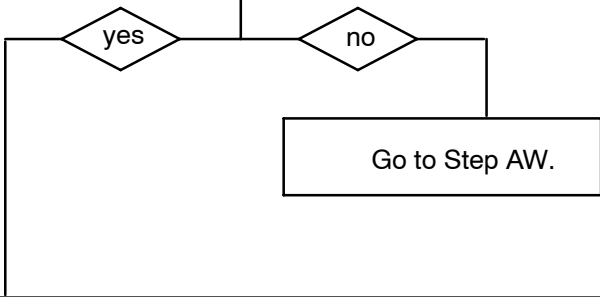
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP E

**BA**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect DAGR power harness W142 from DAGR connector J4.
4. Disconnect DAGR antenna harness W143 from DAGR connector J3.
5. Connect one lead of multimeter to the center wire of antenna harness W143 (DAGR) connector and the other lead to the outside wire shield of antenna harness W143 connector.
6. Measure the resistance (ohms).

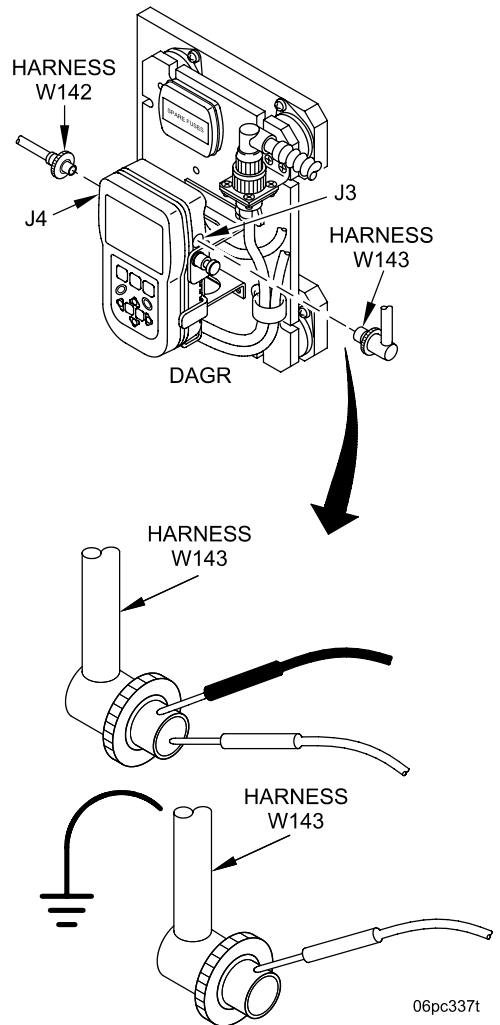
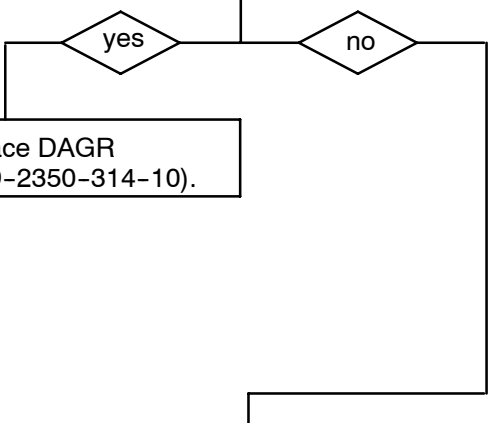
Is resistance between 80 and 280 ohms?



**BB**

1. Connect one lead of multimeter to outside wire shield of antenna harness W143 connector and other lead to chassis ground.
2. Measure resistance (ohms).

Is resistance greater than 1000 ohms?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

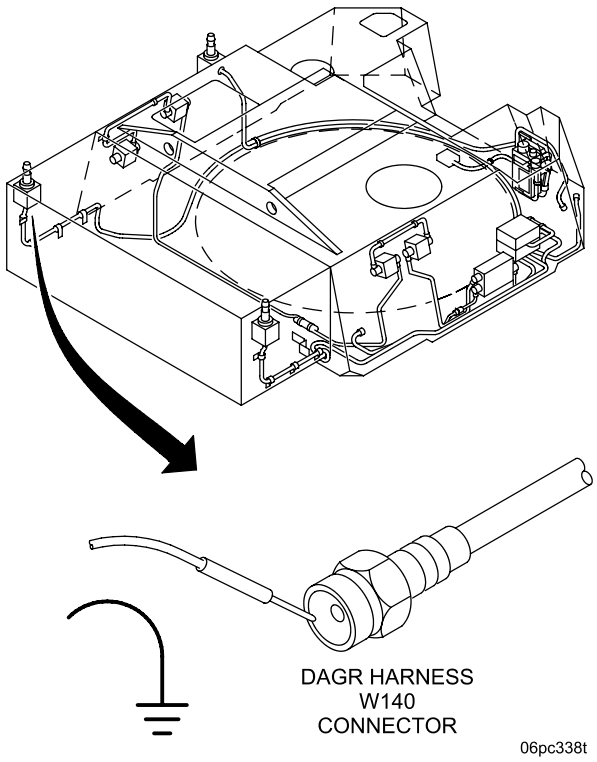
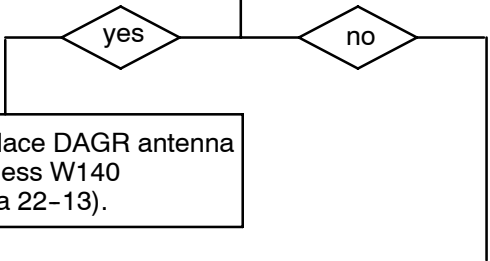
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP BB

**BC**

1. Disconnect DAGR antenna harness W140 from DAGR antenna on the outside of the vehicle.
2. Connect one lead of multimeter to the outside wire shield of antenna harness W140 connector and the other lead to chassis ground.
3. Measure the resistance (ohms).

Is resistance greater than 1000 ohms?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

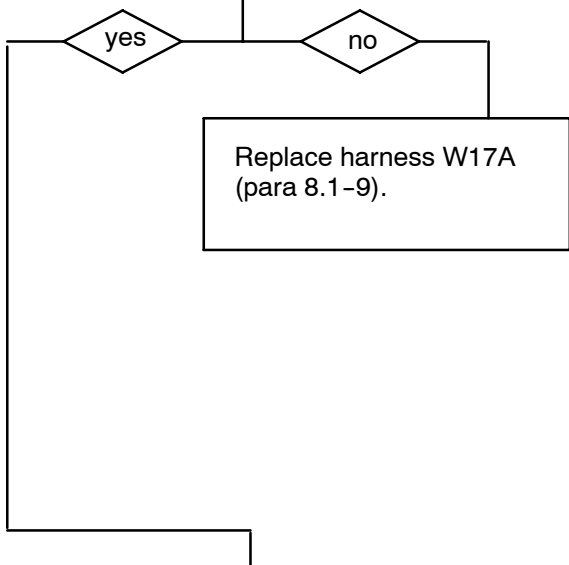
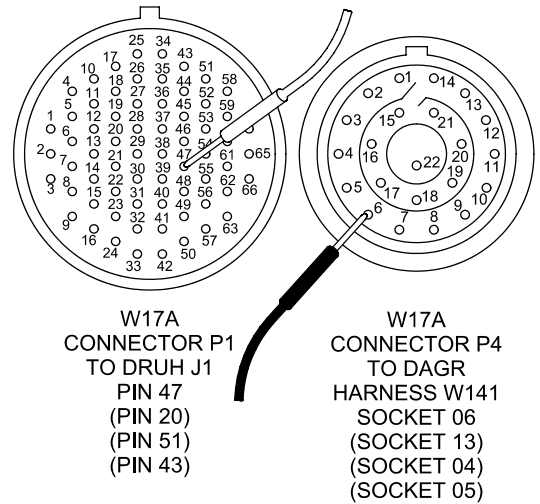
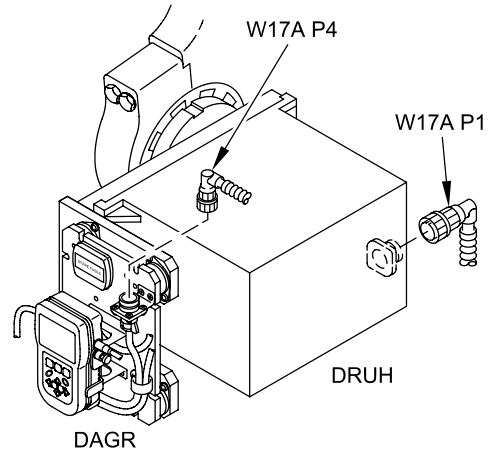
CONTINUED FROM STEP F

**BD**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W17A connector P4 from DAGR bracket.
4. Disconnect harness W17A connector P1 from DRUH connector J1.
5. Check harness W17A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
W17A Connector P1 pin 47	W17A Connector P4 socket 06
W17A Connector P1 pin 20	W17A Connector P4 socket 13
W17A Connector P1 pin 51	W17A Connector P4 socket 04
W17A Connector P1 pin 43	W17A Connector P4 socket 05

Is there continuity at all points (resistance less than 10 ohms)?



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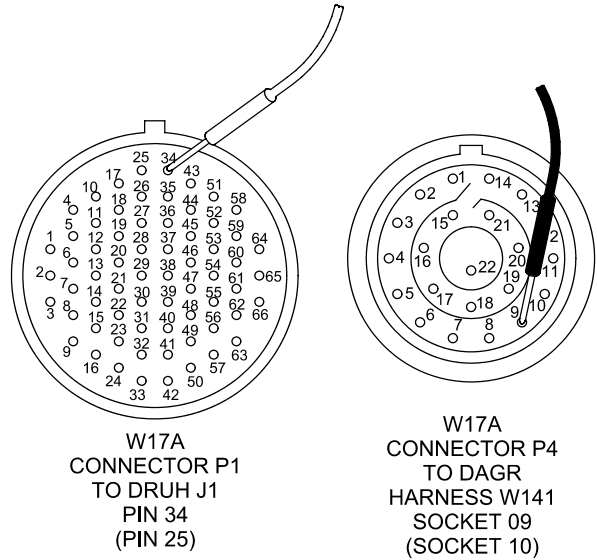
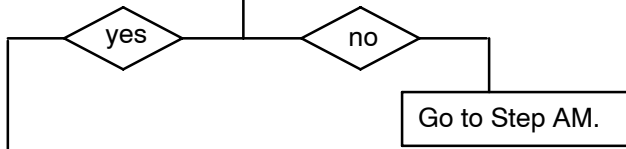


### 3-3. TROUBLESHOOTING CHART - CONTINUED

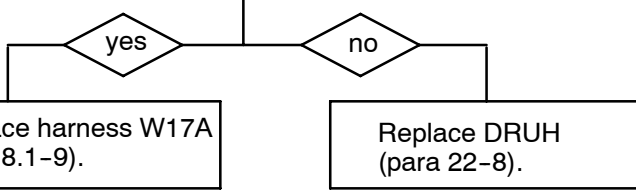
k.1. PDFCS - CONTINUED (12) NAVIGATION SUBSYSTEM DEGRADED OR OUT. - CONTINUED

CONTINUED FROM STEP BD

<b>BE</b>	Check harness W17A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.
Point A W17A Connector P1 pin 34 W17A Connector P1 pin 25	Point B W17A Connector P4 socket 09 W17A Connector P4 socket 10
Is there continuity at all points (resistance less than 10 ohms)?	



<b>BF</b>	Check harness W17A for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.	
Point A Connector P1 pin 20 Connector P1 pin 20 Connector P1 pin 20 Connector P1 pin 20 Connector P1 pin 20 Connector P1 pin 25 Connector P1 pin 25 Connector P1 pin 25 Connector P1 pin 25 Connector P1 pin 34 Connector P1 pin 34 Connector P1 pin 34 Connector P1 pin 34 Connector P1 pin 43 Connector P1 pin 43 Connector P1 pin 43 Connector P1 pin 47	Point B Connector P1 pin 25 Connector P1 pin 34 Connector P1 pin 43 Connector P1 pin 47 Connector P1 pin 51 Connector P1 pin 34 Connector P1 pin 43 Connector P1 pin 47 Connector P1 pin 51 Connector P1 pin 43 Connector P1 pin 47 Connector P1 pin 51 Connector P1 pin 47 Connector P1 pin 51 Connector P1 pin 51	
Are there any shorts?		



**END OF TASK**



### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY.

**INITIAL SETUP**

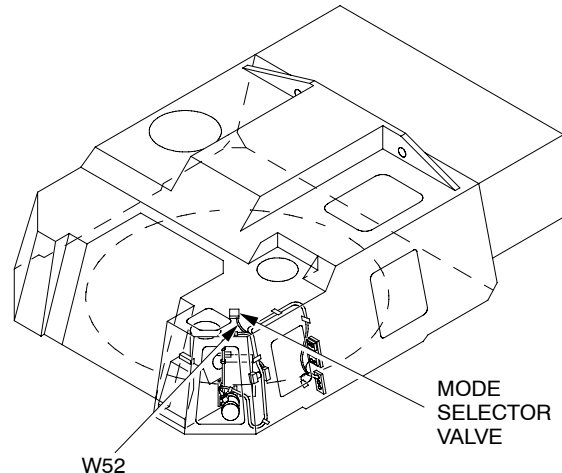
**NOTE**

- When performing PDFCS troubleshooting use only SPORT for Paladin M109A6 which includes a Digital Multimeter (DMM), and PCMCIA Card, P/N 710833-1.
- Before performing this test, make sure velocity fuse is reset (para 18-46).

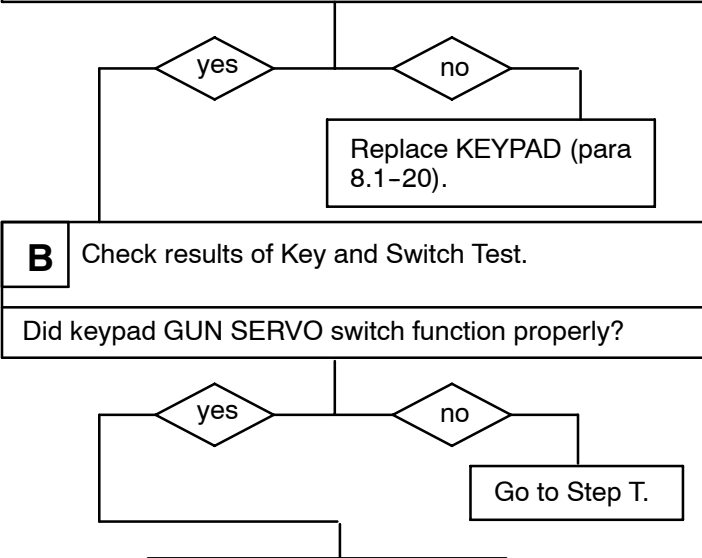
Run TB 9-2350-314-20-2-2 M109A6 Accessory Software, "PDFCS TROUBLESHOOTING," single test "TRAVERSE or ELEVATION ABNORMAL." Run PDI, Hydraulics and Gun positioning tests.

**Tools**  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)  
 PDFCS Sport/MSD Accessory Kit (item 61, Appx G)

- A**
- Disconnect harness W52 connector P6 at mode selector valve.
  - Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  - Turn keypad power switch to ON (TM 9-2350-314-10).
  - Initialize PDFCS.
  - Enter MAINTENANCE MODE SELECT menu.
  - Select and perform KEY AND SWITCH TEST for GUN SERVO SWITCH and LOAD, LAY and STOW keys.
- Did keypad LOAD, LAY, and STOW keys function correctly?



06pc073t



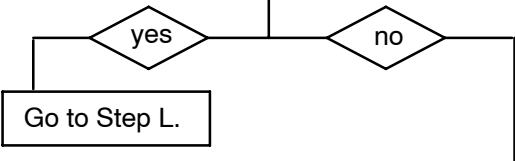
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

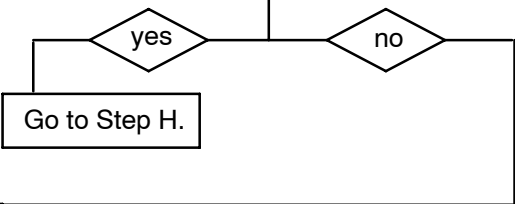
k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP B

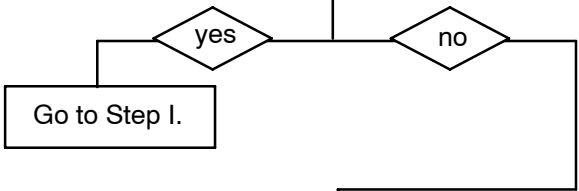
<b>C</b>	Check results of PDI test and cannon symptoms.
Did PDI Tests indicate Fault Code 007, "P1 AUTO WPN CTRL...PDCU, AZ/EL PLUGS, CBLs". OR Did cannon fail to move in TRAVERSE and ELEVATION directions when under automatic PDFCS control?	



<b>D</b>	Check results of PDI test and cannon symptoms.
Did PDI Tests indicate Fault Code 008, "P3 GUN SERVO LAMP...PDCU, KEYPAD, W1B" OR Is keypad "GUN SERVO" lamp OFF when cannon functions normally?	



<b>E</b>	Note cannon symptoms.
Does cannon FAIL to operate normally in TRAVERSE direction?	



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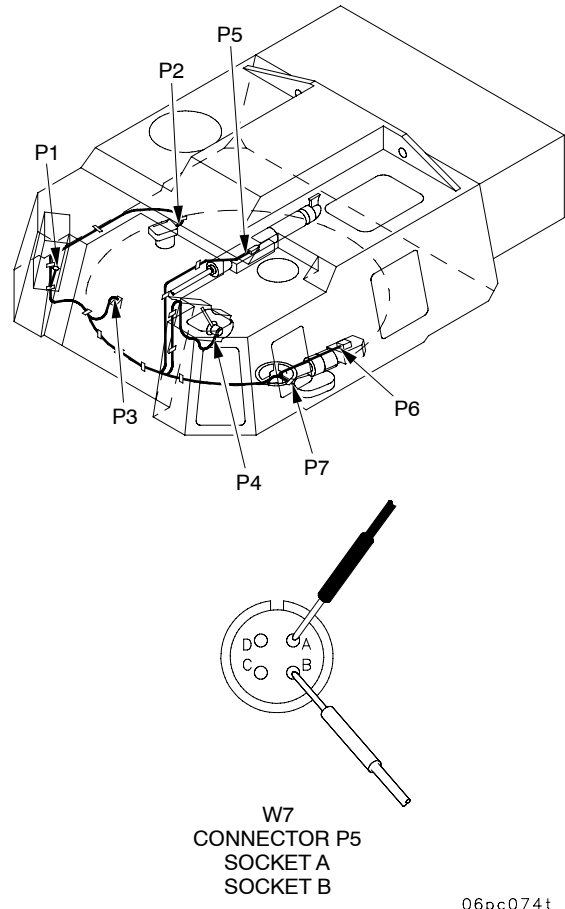
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

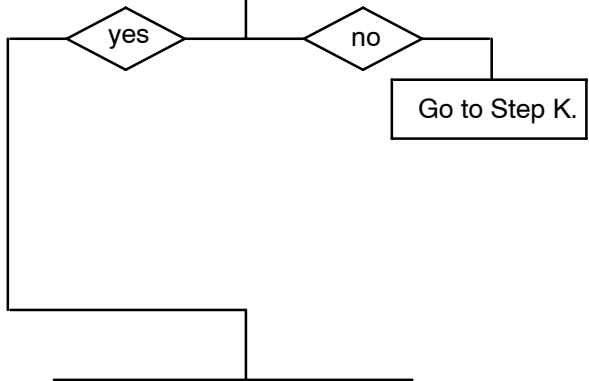
CONTINUED FROM STEP E

**WARNING**  
Make sure elevation and traverse paths are clear.

- F**
1. Turn keypad POWER switch to OFF and wait for PDFCS to power down (TM 9-2350-314-10).
  2. Turn keypad POWER switch to ON (TM 9-2350-314-10).
  3. Initialize PDFCS and enter FIRE COMMAND (para 3-2.4.1) (TM 9-2350-314-10).
  4. Determine the ACTL QUAD (Actual Quadrant).
  5. Select EOM (End of Mission).
  6. Enter FIRE COMMAND (para 3-2.4.1) with a quadrant of at least 200 mils GREATER THAN the actual quadrant.
  7. Ensure HYDRAULIC POWER SWITCH is OFF.
  8. Disconnect harness W7 connector P5 from elevation servo valve.
  9. Place multimeter red lead in W7 connector P5 socket B and black lead in W7 connector P5 socket A.
  10. Turn keypad GUN SERVO switch to ON (TM 9-2350-314-10).
  11. Press and hold keypad LAY key.
  12. Measure DC Voltage (V dc).
- NOTE**
- Voltage is only present for about 5 to 15 seconds.
- Is the voltage between -8.5 and -10.0 V dc?



06pc074t



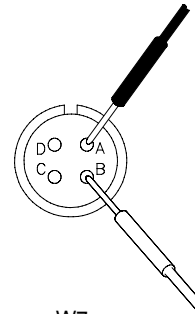
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

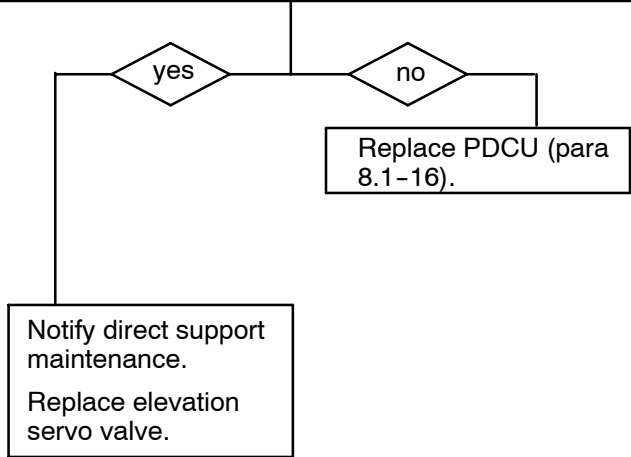
CONTINUED FROM STEP F

<b>G</b>	<ol style="list-style-type: none"> <li>1. Select EOM (End of Mission).</li> <li>2. Enter FIRE COMMAND with a quadrant of at least 200 mils LESS THAN the original actual quadrant.</li> <li>3. Make sure HYDRAULIC POWER switch is OFF.</li> <li>4. Place multimeter red lead in W7 connector P5 socket B and black lead in W7 connector P5 socket A.</li> <li>5. Press and hold keypad LAY key.</li> <li>6. Measure the DC Voltage (V dc).</li> </ol> <p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">Voltage will be there for approximately 5 to 15 seconds.</p>
Is the voltage greater than 8.5 V dc?	



W7  
CONNECTOR P5  
SOCKET A  
SOCKET B

06pc075t



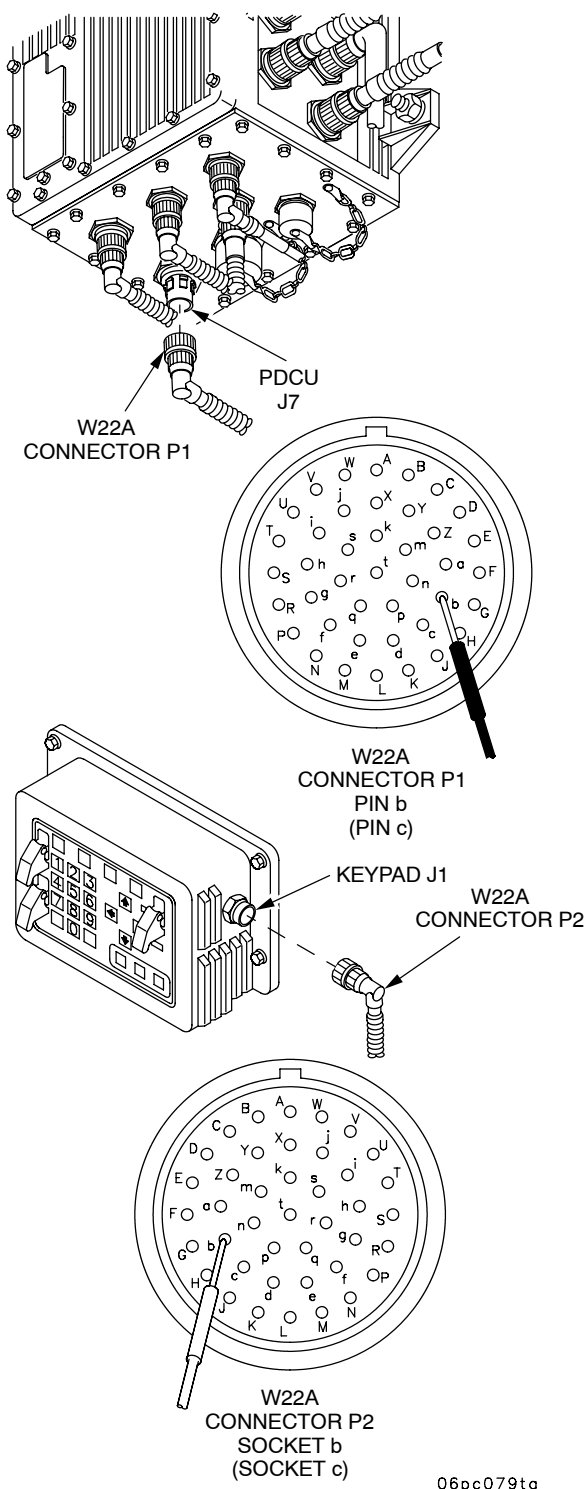
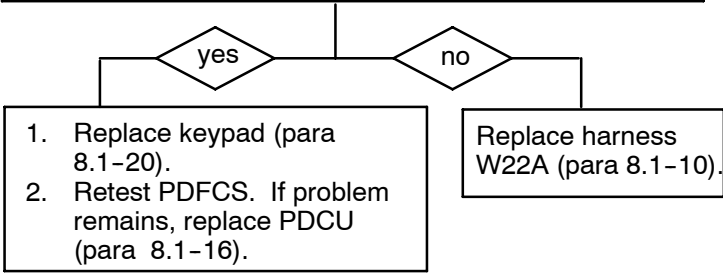
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP D

<b>H</b>	<ol style="list-style-type: none"> <li>1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).</li> <li>2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li> <li>3. Disconnect harness W22A connector P1 from PDCU connector J7.</li> <li>4. Disconnect harness W22A connector P2 from keypad connector J1.</li> <li>5. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>						
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Point A</td> <td style="width: 50%; text-align: center;">Point B</td> </tr> <tr> <td style="border: none;">W22A Connector P1 pin b</td> <td style="border: none;">W22A Connector P2 socket b</td> </tr> <tr> <td style="border: none;">W22A Connector P1 pin c</td> <td style="border: none;">W22A Connector P2 socket c</td> </tr> </table>	Point A	Point B	W22A Connector P1 pin b	W22A Connector P2 socket b	W22A Connector P1 pin c	W22A Connector P2 socket c
Point A	Point B						
W22A Connector P1 pin b	W22A Connector P2 socket b						
W22A Connector P1 pin c	W22A Connector P2 socket c						
Is there continuity at all points (resistance less than 10 ohms)?							



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

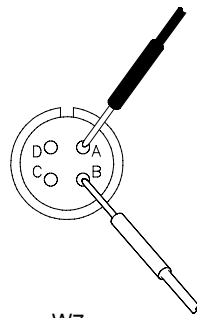
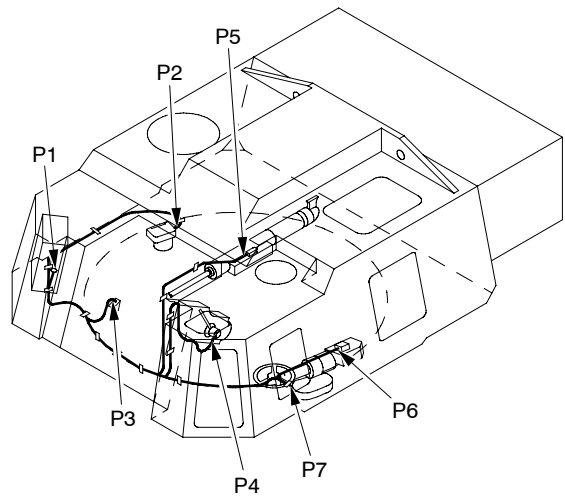
k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

**WARNING**

Make sure elevation and traverse paths are clear.

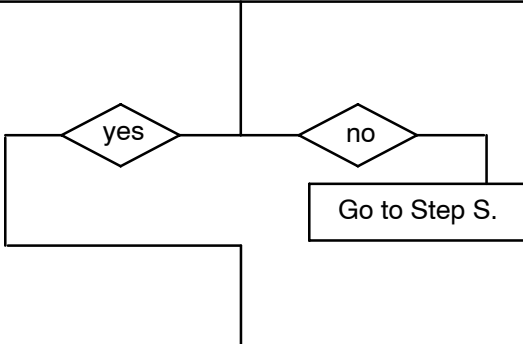
CONTINUED FROM STEP E

- I**
1. Turn keypad POWER switch to OFF and wait for PDFCS to power down (TM 9-2350-314-10).
  2. Turn keypad POWER switch to ON (TM 9-2350-314-10).
  3. Initialize PDFCS (TM 9-2350-314-10).
  4. Enter FIRE COMMAND (para 3-2.4.1).
  5. Determine the ACTL DEFL (Actual Deflection).
  6. Select EOM (End of Mission).
  7. Enter FIRE COMMAND (para 3-2.4.1) with a deflection of at least 200 mils GREATER THAN the actual deflection.
  8. Make sure the HYDRAULIC POWER switch is OFF.
  9. Disconnect harness W7 connector P6 from azimuth servo valve.
  10. Place multimeter red lead in W7 connector P6 socket B and black lead in W7 connector P6 socket A.
  11. Turn keypad GUN SERVO switch to ON (TM 9-2350-314-10).
  12. Press and hold keypad LAY key.
  13. Measure DC Voltage (V dc).
- NOTE**
- Voltage will be there for approximately 5 to 15 seconds.
- Is the voltage between -8.5 and -10.0 V dc?



W7  
CONNECTOR P6  
SOCKET A  
SOCKET B

06pc080t



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP I

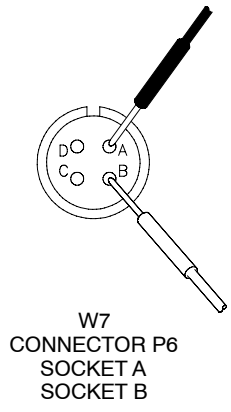
J

1. Select EOM (End of Mission).
2. Enter FIRE COMMAND with a quadrant of at least 200 mils LESS THAN the original actual deflection.
3. Make sure HYDRAULIC POWER switch is OFF.
4. Place multimeter red lead in W7 connector P6 socket B and black lead in W7 connector P6 socket A.
5. Turn keypad GUN SERVO switch to ON.
6. Press and hold keypad LAY key.
7. Measure the DC voltage (V dc).

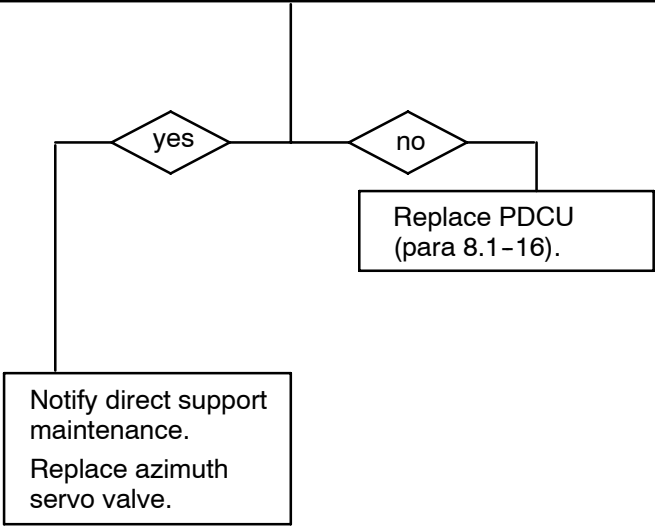
NOTE

Voltage will be there for approximately 5 to 15 seconds.

Is voltage greater than 8.5 V dc?



06pc081t



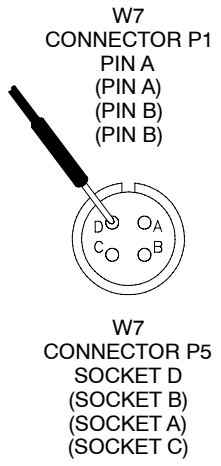
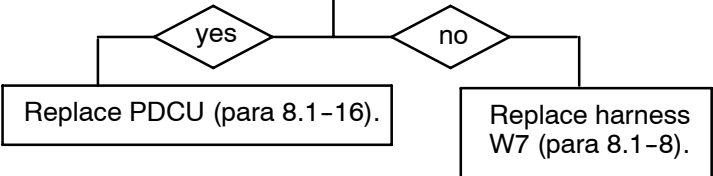
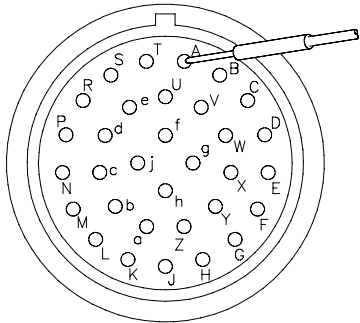
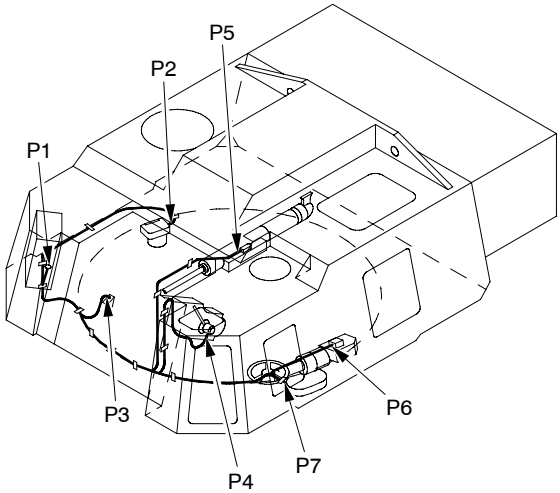
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# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP F

<b>K</b>	<ol style="list-style-type: none"> <li>1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).</li> <li>2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li> <li>3. Disconnect harness W7 connector P1 at PDCU connector J6.</li> <li>4. Connect harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>		
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <p style="text-align: center;">Point A</p> <p>Connector P1 pin A</p> <p>Connector P1 pin A</p> <p>Connector P1 pin B</p> <p>Connector P1 pin B</p> </td> <td style="width: 50%; border: none;"> <p style="text-align: center;">Point B</p> <p>Connector P5 socket D</p> <p>Connector P5 socket B</p> <p>Connector P5 socket A</p> <p>Connector P5 socket C</p> </td> </tr> </table>	<p style="text-align: center;">Point A</p> <p>Connector P1 pin A</p> <p>Connector P1 pin A</p> <p>Connector P1 pin B</p> <p>Connector P1 pin B</p>	<p style="text-align: center;">Point B</p> <p>Connector P5 socket D</p> <p>Connector P5 socket B</p> <p>Connector P5 socket A</p> <p>Connector P5 socket C</p>
<p style="text-align: center;">Point A</p> <p>Connector P1 pin A</p> <p>Connector P1 pin A</p> <p>Connector P1 pin B</p> <p>Connector P1 pin B</p>	<p style="text-align: center;">Point B</p> <p>Connector P5 socket D</p> <p>Connector P5 socket B</p> <p>Connector P5 socket A</p> <p>Connector P5 socket C</p>		
	<p>Is there continuity at all points (resistance less than 10 ohms)?</p>		



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

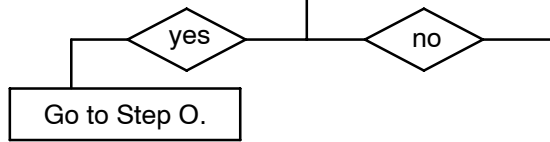
k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP C

**L**

1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
3. Disconnect harness W7 connector P1 from PDCU connector J6.
4. Place one multimeter lead on W7 connector P1 pin R and other lead on W7 connector P1 pin S.
5. Check for continuity.

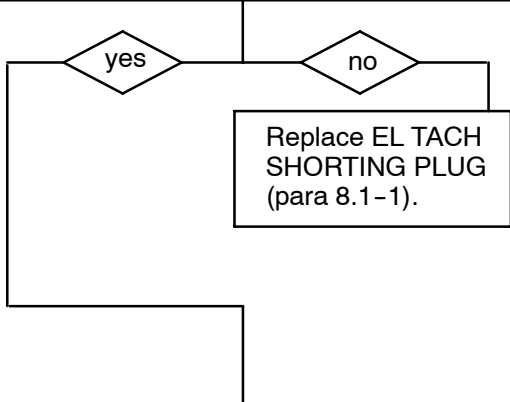
Is there continuity at all points (resistance less than 10 ohms)?



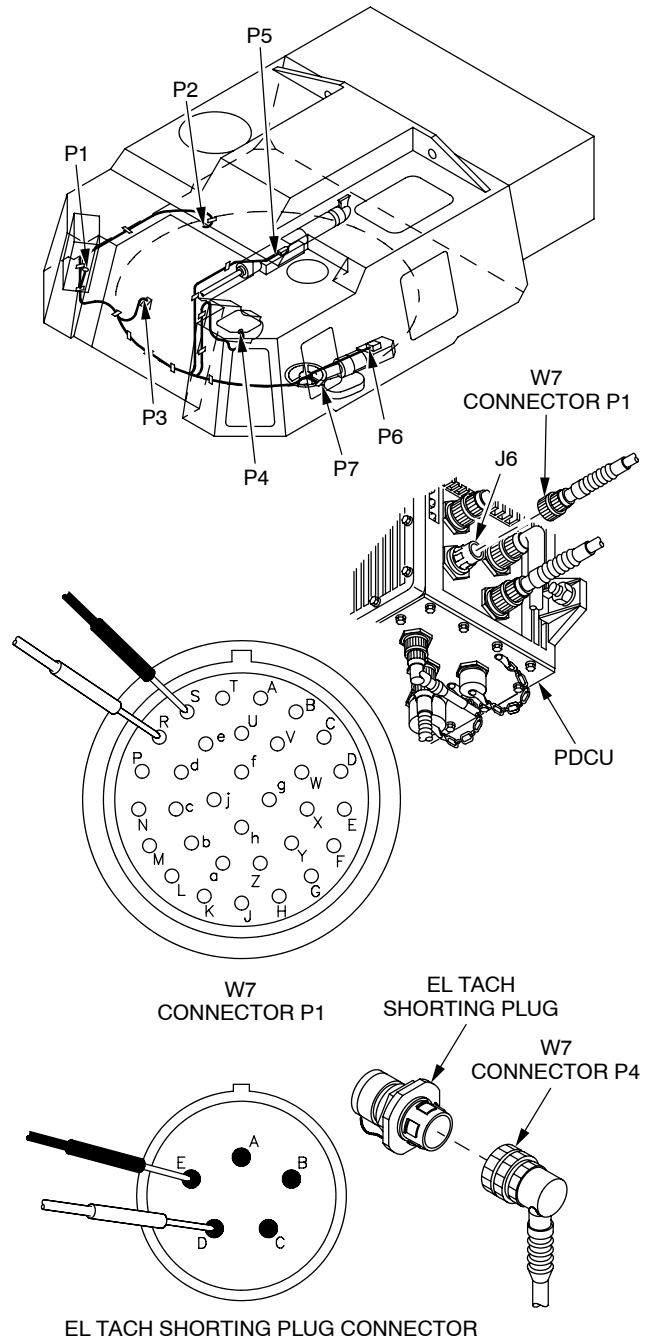
**M**

1. Connect harness W7 connector P1 to PDCU connector J6.
2. Disconnect harness W7 connector P4 from EL Shorting Plug.
3. Place one multimeter lead on EL TACH SHORTING PLUG connector pin D and other lead on EL SHORTING PLUG pin E.
4. Check for continuity.

Is there continuity at all points (resistance less than 10 ohms)?



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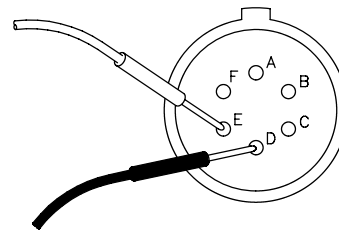
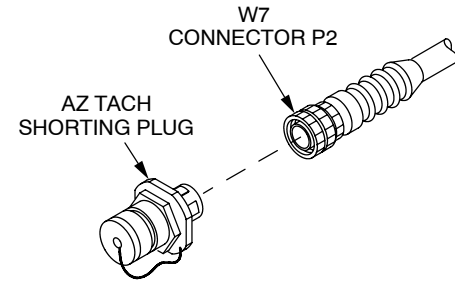
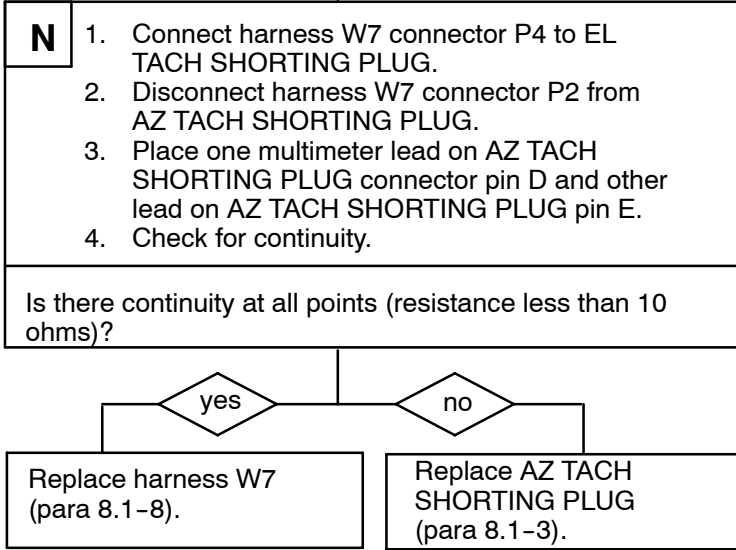


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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP M



AZ TACH SHORTING PLUG CONNECTOR

06pc035ta

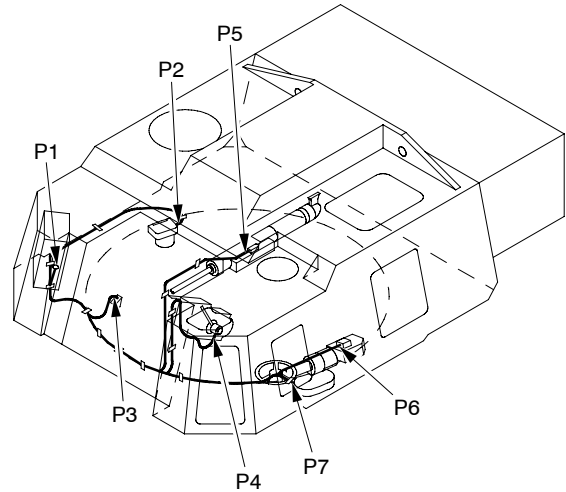
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

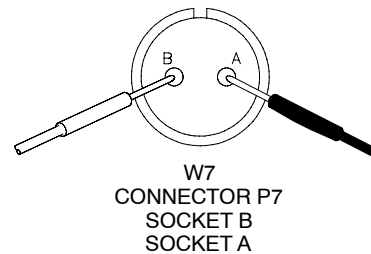
k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP L

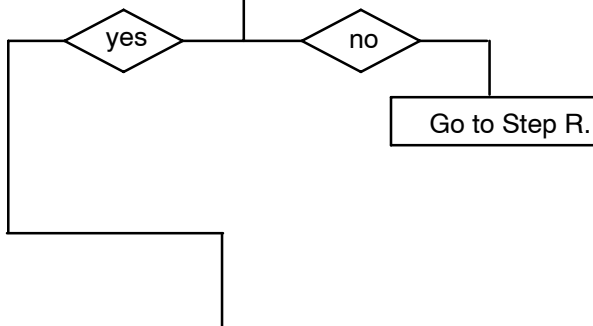
- O**
1. Connect harness W7 connector P1 to PDCU connector J6.
  2. Turn vehicle MASTER power switch to ON (TM 9-2350-314-10).
  3. Turn keypad power switch to ON (TM 9-2350-314-10)
  4. Initialize PDFCS (TM 9-2350-314-10) and enter FIRE COMMAND (para 3-2.4).
  5. Make sure HYDRAULIC POWER switch is OFF.
  6. Turn keypad GUN SERVO switch ON (TM 9-2350-314-10).
  7. Disconnect harness W7 connector P7 from harness W64 connector J1.
  8. Place multimeter red lead in W7 connector P7 socket B and black lead in W7 connector P7 socket A.
  9. Press and hold keypad LAY key.
  10. Measure DC Voltage (V dc).
- NOTE**
- Voltage will only be present for about 5 to 15 seconds.



Is voltage greater than 18 V dc?



06pc085t



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

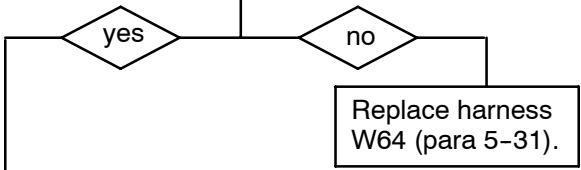
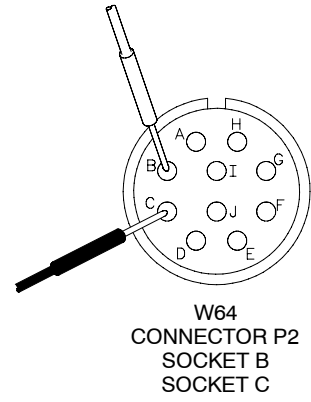
k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP O

**P**

1. Connect harness W7 connector P7 to harness W64 connector J1.
2. Disconnect harness W64 connector P2 from the hydraulic compartment bulkhead.
3. Place multimeter red lead in W64 connector P2 socket B and black lead in W64 connector P2 socket C.
4. Press and hold keypad LAY key.
5. Measure DC Voltage (V dc).

Is voltage greater than 18 V dc?



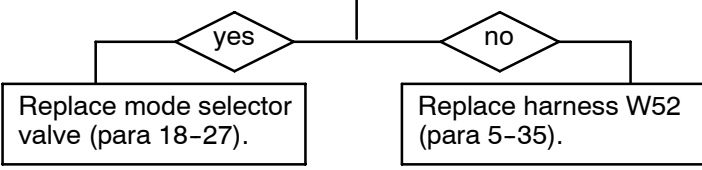
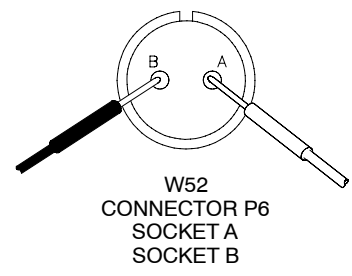
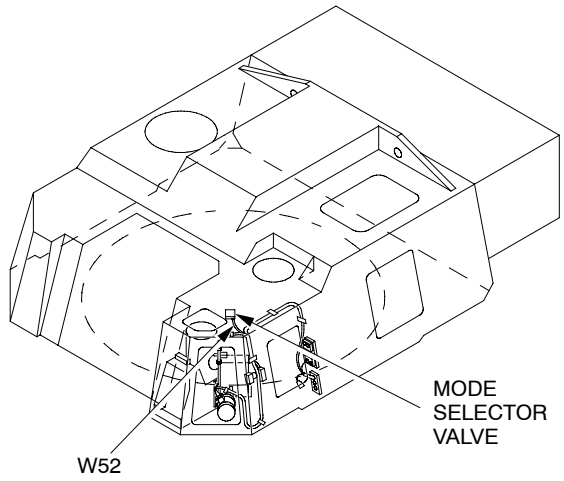
**Q**

1. Connect harness W64 connector P2 to hydraulic compartment bulkhead.
2. Disconnect harness W52 connector P6 from mode selector valve.
3. Place multimeter red lead in W52 connector P6 socket A and black lead in W52 connector P6 socket B.
4. Press and hold keypad LAY key.
5. Measure DC Voltage (V dc).

**NOTE**

Voltage will only be present for about 5 to 15 seconds.

Is voltage greater than 18 V dc?



06pc086t

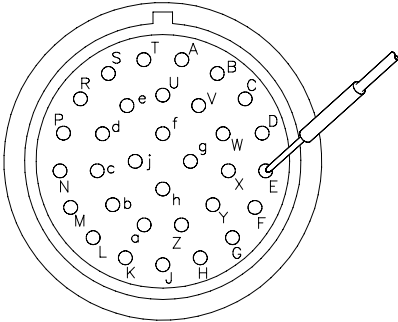
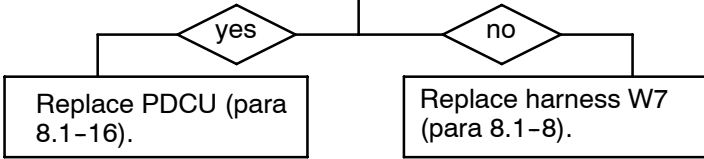
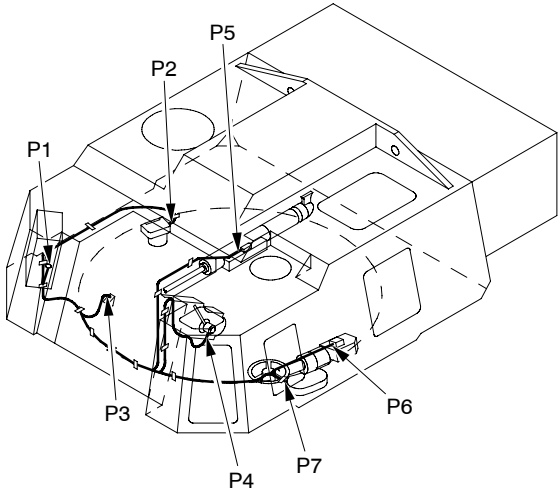
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# 3-3. TROUBLESHOOTING CHART - CONTINUED

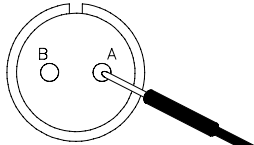
k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP O

<b>R</b>	<ol style="list-style-type: none"> <li>1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).</li> <li>2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li> <li>3. Disconnect harness W7 connector P1 at PDCU connector J6.</li> <li>4. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>						
	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border: none;">Point A</td> <td style="text-align: center; border: none;">Point B</td> </tr> <tr> <td style="border: none;">Connector P1 pin E</td> <td style="border: none;">Connector P7 socket A</td> </tr> <tr> <td style="border: none;">Connector P1 pin F</td> <td style="border: none;">Connector P7 socket B</td> </tr> </table>	Point A	Point B	Connector P1 pin E	Connector P7 socket A	Connector P1 pin F	Connector P7 socket B
Point A	Point B						
Connector P1 pin E	Connector P7 socket A						
Connector P1 pin F	Connector P7 socket B						
Is there continuity at all points (resistance less than 10 ohms)?							



W7  
CONNECTOR P1  
PIN E  
(PIN F)



W7  
CONNECTOR P7  
SOCKET A  
(SOCKET B)

06pc087t

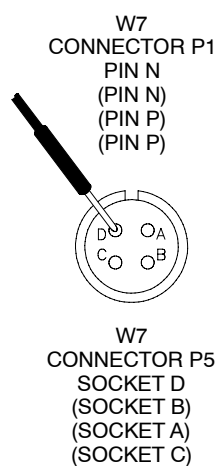
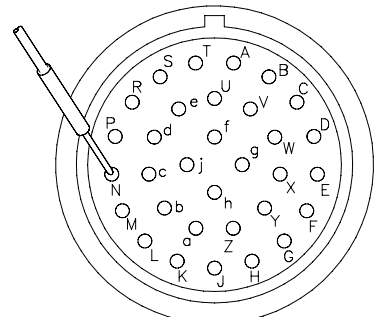
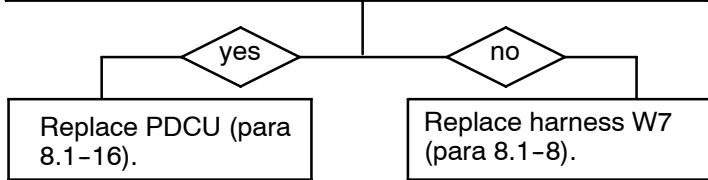
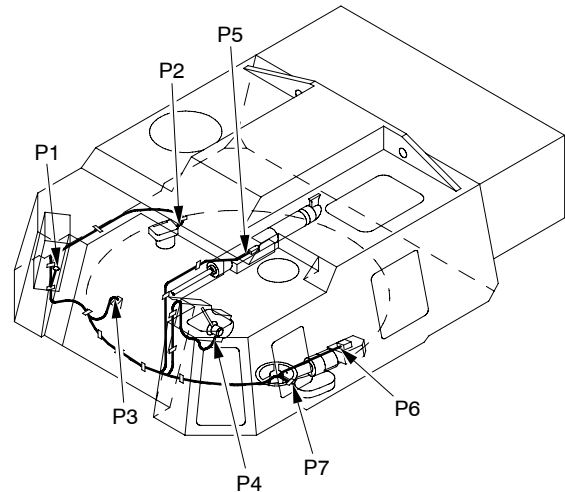
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP I

<b>S</b>	<ol style="list-style-type: none"> <li>1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).</li> <li>2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).</li> <li>3. Disconnect harness W7 connector P1 at PDCU connector J6.</li> <li>4. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.</li> </ol>										
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Point A</td> <td style="width: 50%; border: none;">Point B</td> </tr> <tr> <td style="border: none;">Connector P1 pin N</td> <td style="border: none;">Connector P6 socket D</td> </tr> <tr> <td style="border: none;">Connector P1 pin N</td> <td style="border: none;">Connector P6 socket B</td> </tr> <tr> <td style="border: none;">Connector P1 pin P</td> <td style="border: none;">Connector P6 socket A</td> </tr> <tr> <td style="border: none;">Connector P1 pin P</td> <td style="border: none;">Connector P6 socket C</td> </tr> </table>	Point A	Point B	Connector P1 pin N	Connector P6 socket D	Connector P1 pin N	Connector P6 socket B	Connector P1 pin P	Connector P6 socket A	Connector P1 pin P	Connector P6 socket C
Point A	Point B										
Connector P1 pin N	Connector P6 socket D										
Connector P1 pin N	Connector P6 socket B										
Connector P1 pin P	Connector P6 socket A										
Connector P1 pin P	Connector P6 socket C										
	Is there continuity at all points (resistance less than 10 ohms)?										



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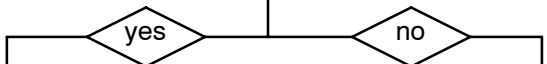
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (13) TRAVERSE AND/OR ELEVATION OF CANNON BY PDFCS (LOAD, LAY, STOW) DOES NOT FUNCTION NORMALLY. - CONTINUED

CONTINUED FROM STEP B

- T**
1. Turn PDFCS power switch on keypad to OFF (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch to OFF (TM 9-2350-314-10).
  3. Disconnect harness W22A connector P1 at PDCU connector J7.
  4. Turn keypad GUN switch to ON (TM 9-2350-314-10).
  5. Place one multimeter lead in harness W22A connector P1 pin N and other lead in harness W22A connector P1 pin P.
  6. Check for continuity.

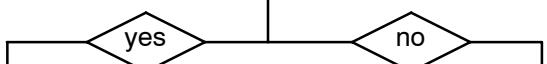
Is there continuity (resistance less than 10 ohms)?



Replace PDCU (para 8.1-16).

- U**
1. Disconnect harness W22A connector P2 at keypad connector J1.
  2. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.
- |                       |                       |
|-----------------------|-----------------------|
| Point A               | Point B               |
| Connector P2 socket N | Connector P1 socket N |
| Connector P2 socket P | Connector P1 socket P |

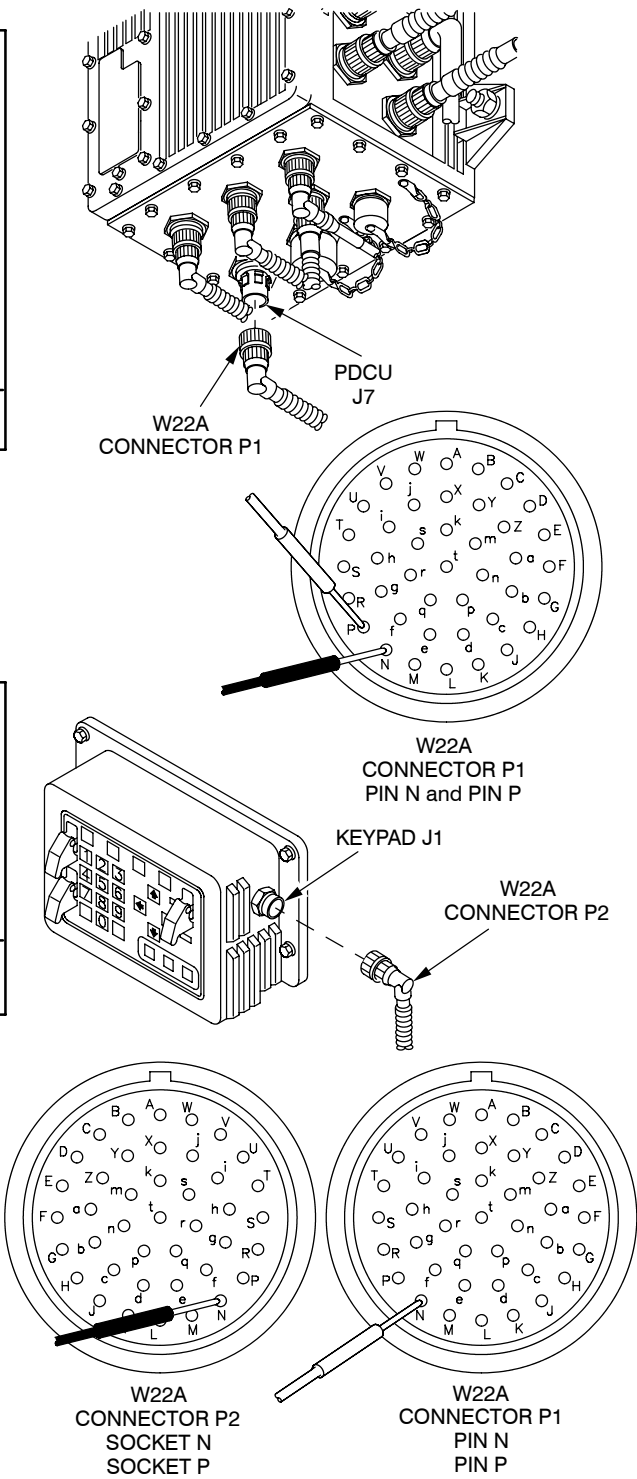
Is there continuity at all points (resistance less than 10 ohms)?



Replace keypad (para 8.1-20).

Replace harness W22A (para 8.1-10).

**END OF TASK**



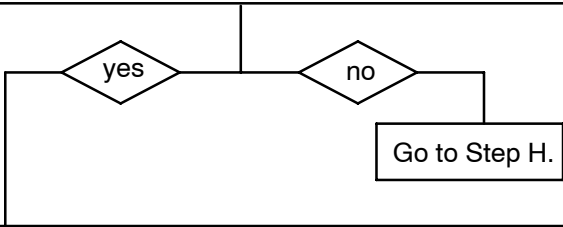
06pc053tc

### 3-3. TROUBLESHOOTING CHART - CONTINUED

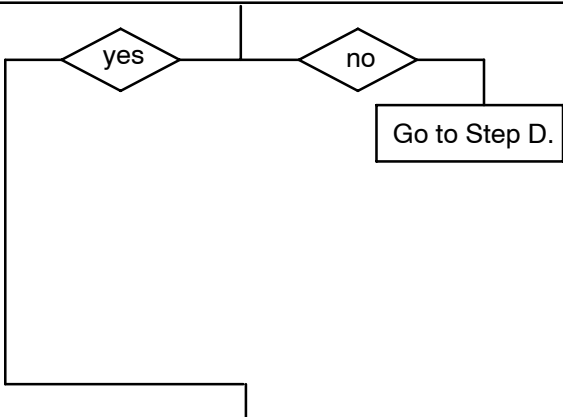
k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK.

<p><b>INITIAL SETUP</b></p> <p style="text-align: center;"><b>NOTE</b></p> <p>When performing PDFCS troubleshooting use only SPORT or MSD for the Paladin M109A6.</p> <p>Run TB 9-2350-314-20-2-2 or CD PN 13021662-1 M109A6 Accessory Software, "PDFCS TROUBLESHOOTING," single test "IFS SUBSYSTEM not OK."</p>	<p><u>Tools</u></p> <p>Artillery and turret mechanic's tool kit (CL 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)                  PDFCS Sport/MSD Accessory Kit (item 61, Appx G)</p>
---	--

- A**
1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  2. Turn Keypad power switch ON (TM 9-2350-314-10).
  3. Make sure all PCU-2 circuit breakers are ON.
  4. Make sure PIA circuit breaker is ON.
  5. Power up PDFCS (TM 9-2350-314-10)
  6. Enter MAINTENANCE MODE and select the PDFCS STATUS screen and then select the IFS SUBSYSTEM STATUS screen.
- Is the PIK Operational item YES ?



- B** Continue checking IFS SUBSYSTEM STATUS.
- Is the SETTER Operational item DISC ?

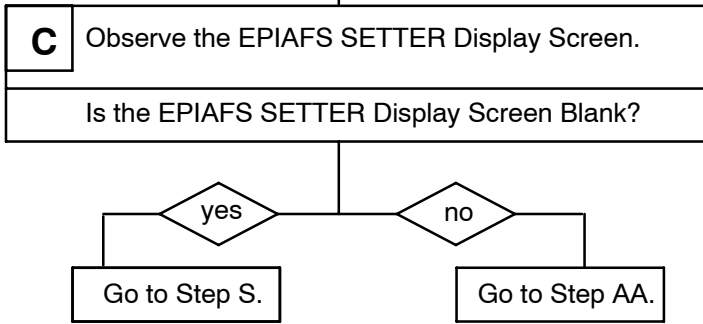


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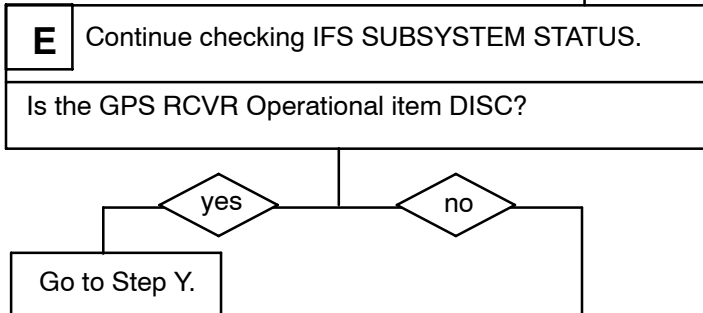
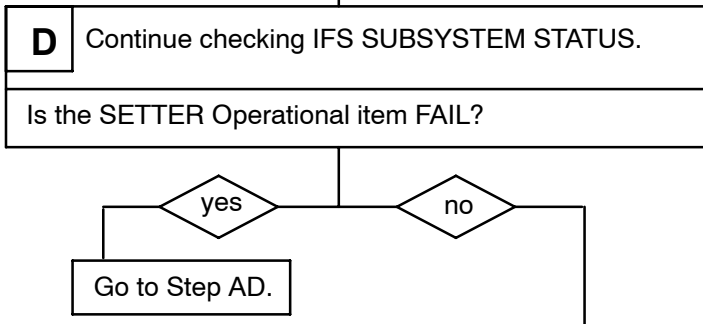
**3-3. TROUBLESHOOTING CHART - CONTINUED**

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP B



CONTINUED FROM STEP B



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP E

**F** Continue checking IFS SUBSYSTEM STATUS.  
Is the GPS RCVR Operational item FAIL?



Replace DAGR  
(TM 9-2350-314-10).

**G** Continue checking IFS SUBSYSTEM STATUS.  
Is the GPS SIGNAL item DISC?



Refer to paragraph  
3.3.k.1(12) step AX.

Replace PIK  
(para 22-22).

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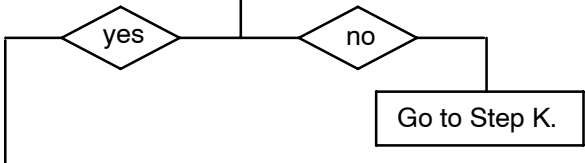
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP A

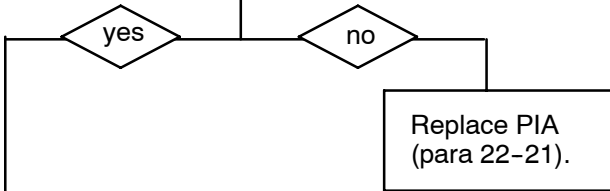
**H** Observe the NAV 3 circuit breaker on the PCU-2.

Is the circuit breaker tripped?



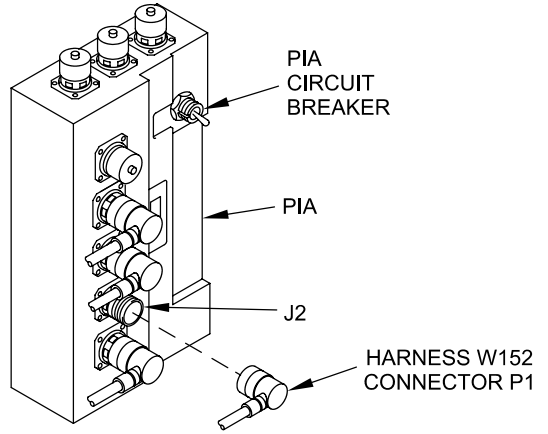
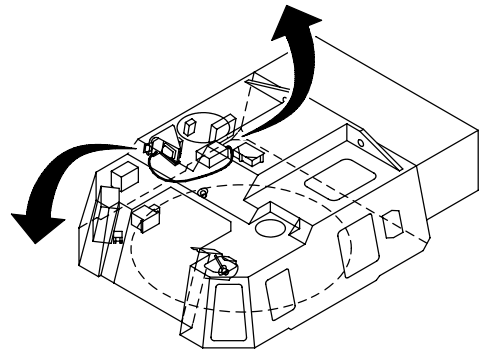
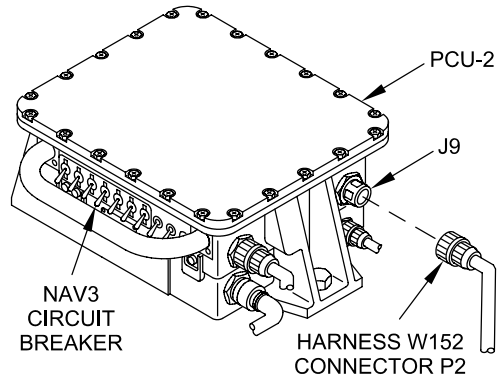
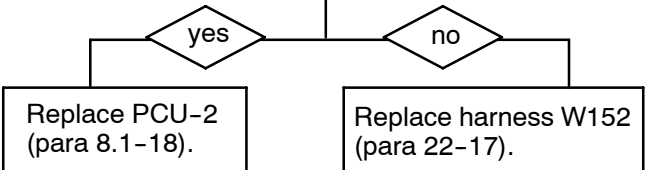
**I** 1. Disconnect harness W152 connector P1 from PIA connector J2.  
2. Reset the NAV 3 circuit breaker on the PCU-2.  
3. Observe the NAV 3 circuit breaker on the PCU-2.

Is the circuit breaker tripped?



**J** 1. Disconnect harness W152 connector P2 from PCU-2 connector J9.  
2. Reset the NAV 3 circuit breaker on the PCU-2.  
3. Observe the NAV 3 circuit breaker on the PCU-2.

Is the circuit breaker tripped?



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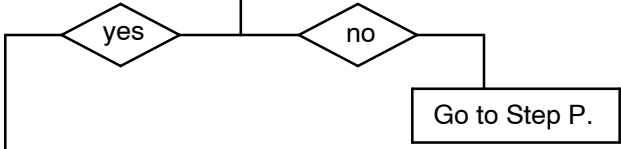
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP H

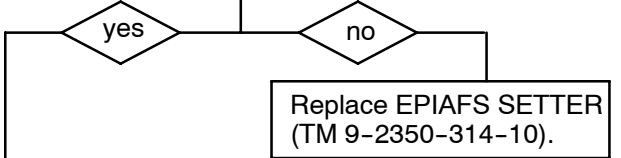
**K** Observe the circuit breaker on the PIA.

Is the circuit breaker tripped?



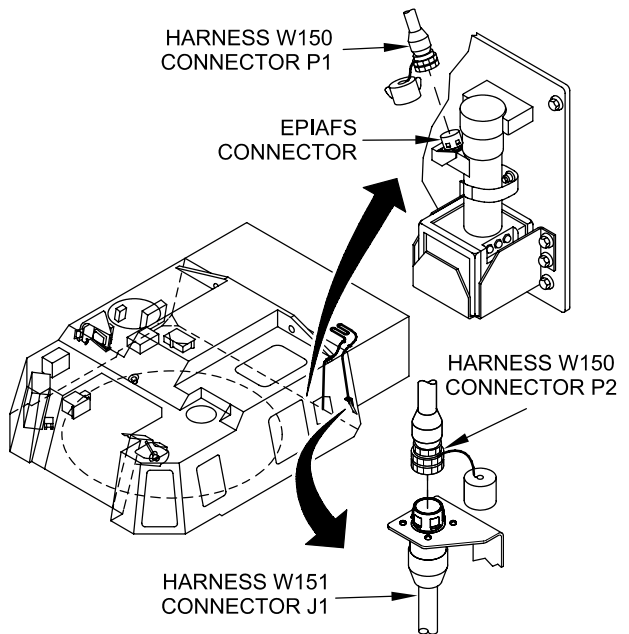
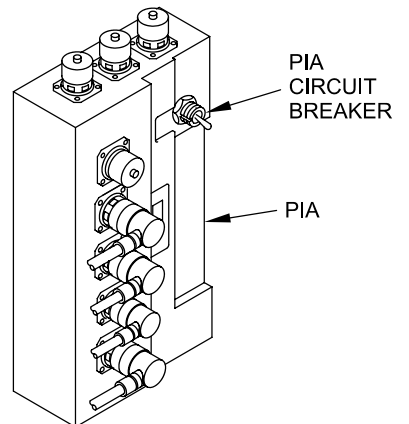
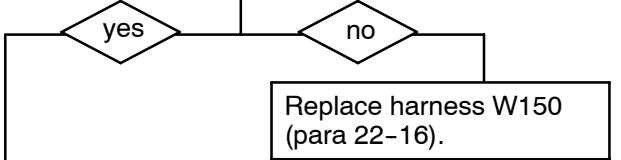
**L** 1. Disconnect harness W150 connector P1 from EPIAFS SETTER connector.  
2. Reset the PIA circuit breaker.  
3. Observe the circuit breaker on the PIA.

Is the circuit breaker tripped?



**M** 1. Disconnect harness W150 connector P2 from harness W151 connector J1 bracket.  
2. Reset the PIA circuit breaker.  
3. Observe the circuit breaker on the PIA.

Is the circuit breaker tripped?



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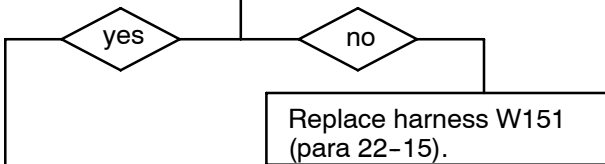
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP M

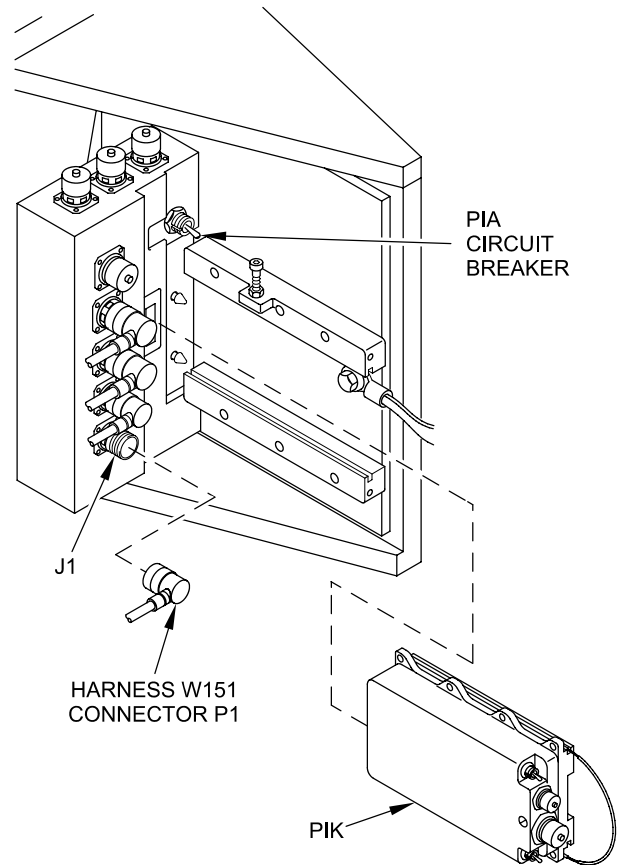
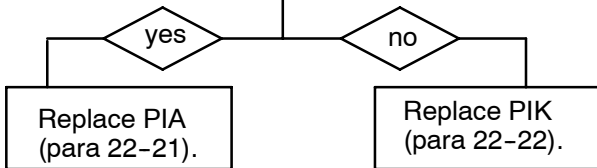
**N** 1. Disconnect harness W151 connector P1 from PIA connector J1.  
 2. Reset the PIA circuit breaker.  
 3. Observe the circuit breaker on the PIA.

Is the circuit breaker tripped?



**O** 1. Disconnect PIK from PIA connector.  
 2. Reset the PIA circuit breaker.  
 3. Observe the circuit breaker on the PIA.

Is the circuit breaker tripped?



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

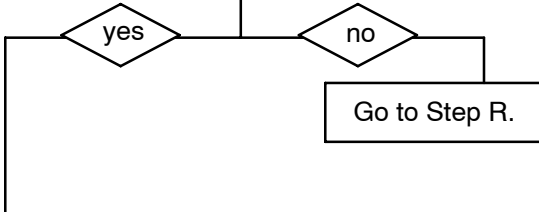
k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP K

**P**

1. Disconnect harness W152 connector P1 at PIA connector J2.
2. Place multimeter red lead in harness W152 connector P1 socket A and black lead in harness W152 connector P1 socket B.
3. Measure the DC Voltage (V dc).

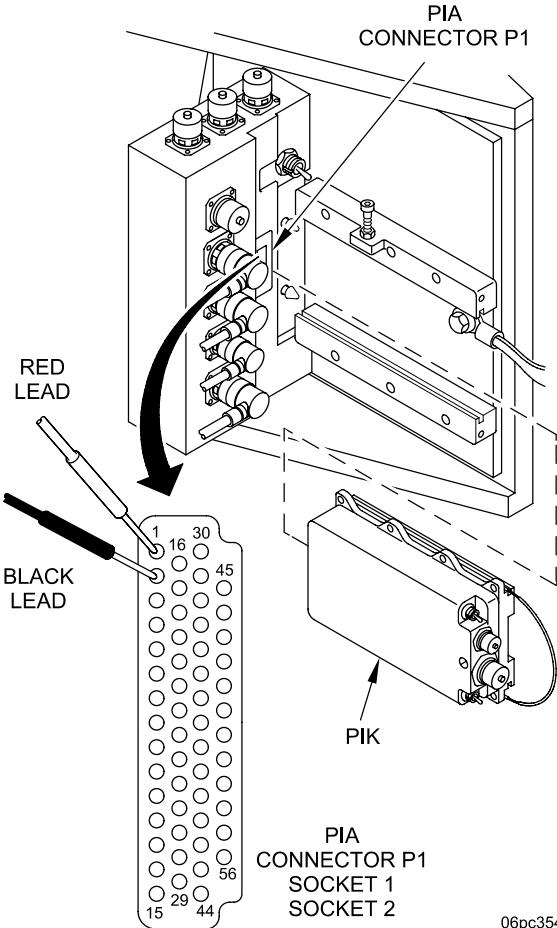
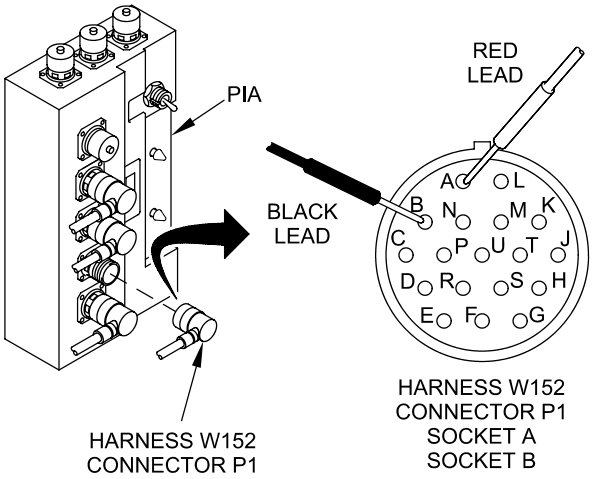
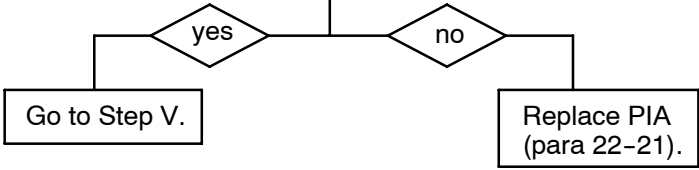
Is the voltage greater than 18 V dc?



**Q**

1. Connect harness W152 connector P1 to PIA connector J2.
2. Disconnect PIK from PIA connector.
3. Place multimeter red lead in PIA connector P1 socket 1 and black lead in harness PIA connector P1 socket 2.
4. Measure the DC Voltage (V dc).

Is the voltage greater than 18 V dc?



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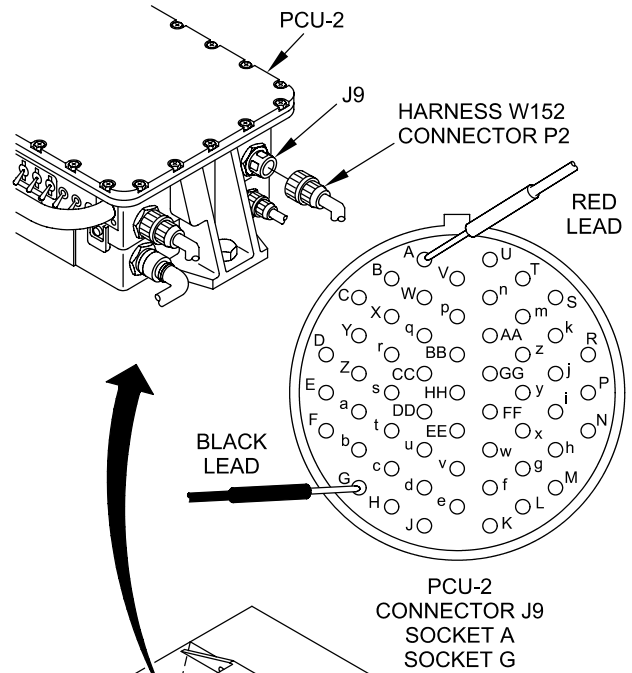
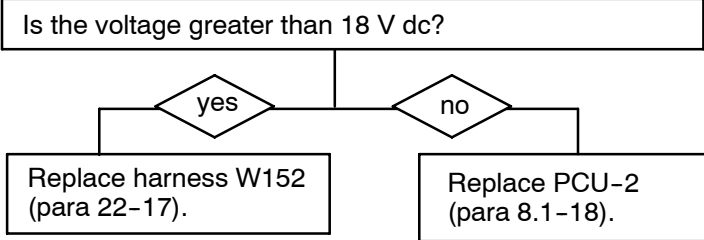


# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

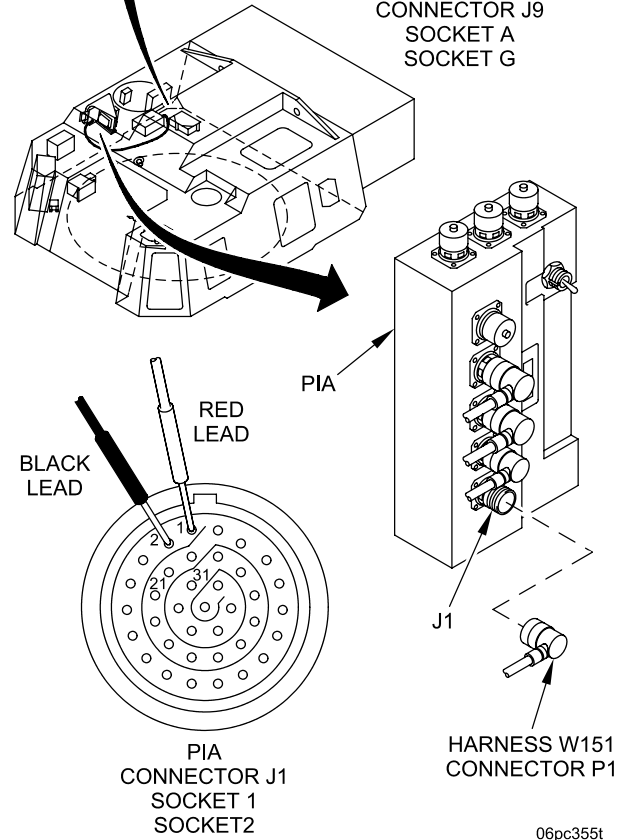
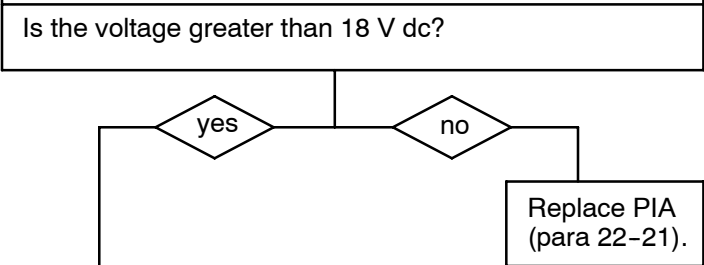
CONTINUED FROM STEP P

- R**
1. Disconnect harness W152 connector P2 at PCU-2 connector J9.
  2. Place multimeter red lead in PCU-2 connector J9 socket A and black lead in harness PCU-2 connector J9 socket G.
  3. Measure the DC Voltage (V dc).



CONTINUED FROM STEP C

- S**
1. Disconnect harness W151 connector P1 at PIA connector J1.
  2. Place multimeter red lead in PIA connector J1 socket 1 and black lead in PIA connector J1 socket 2.
  3. Measure the DC Voltage (V dc).



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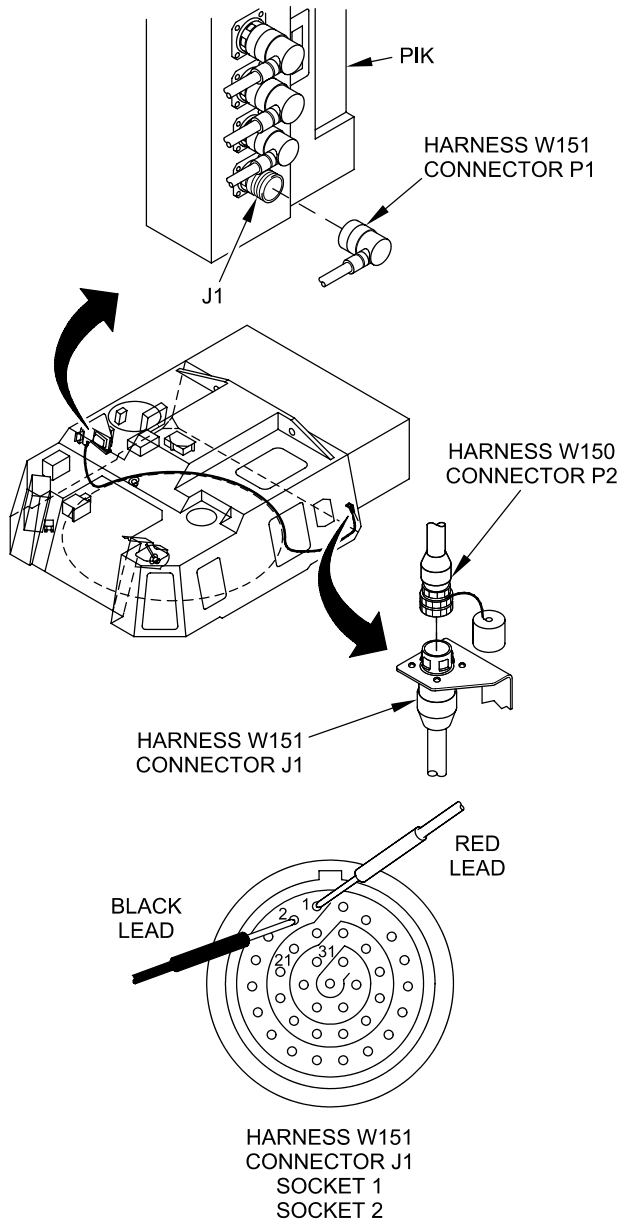
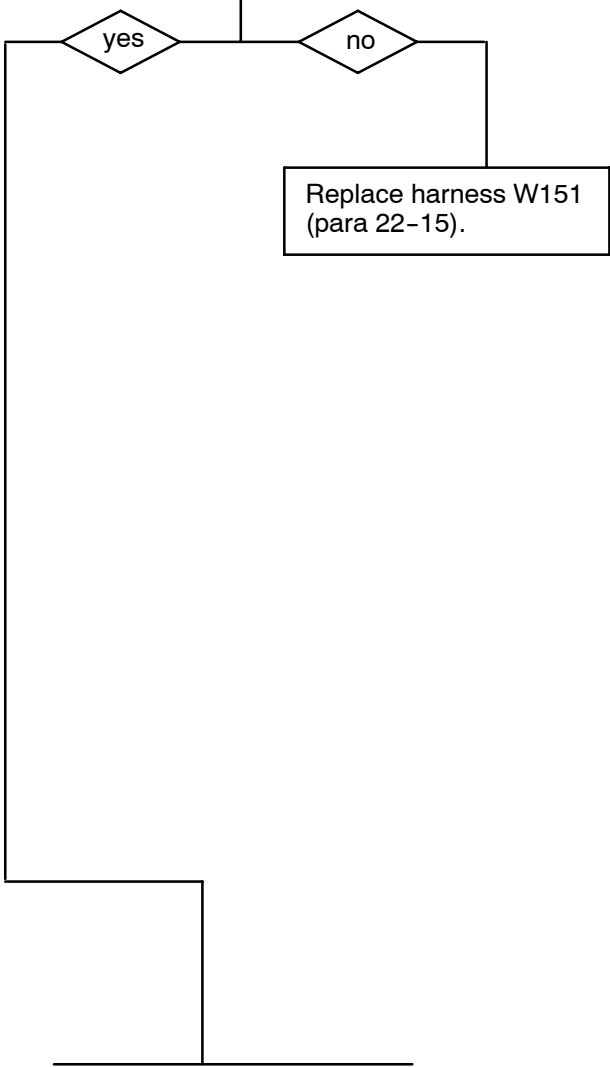
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP S

- |          |   |
|----------|---|
| <b>T</b> | <ol style="list-style-type: none"> <li>1. Connect harness W151 connector P1 to PIA connector J1.</li> <li>2. Disconnect harness W150 connector P2 at harness W151 connector J1 bracket.</li> <li>3. Place multimeter red lead in harness W151 connector J1 socket 1 and black lead in harness W151 connector J1 socket 2.</li> <li>4. Measure the DC Voltage (V dc).</li> </ol> |
|----------|---|

Is the voltage greater than 18 V dc?



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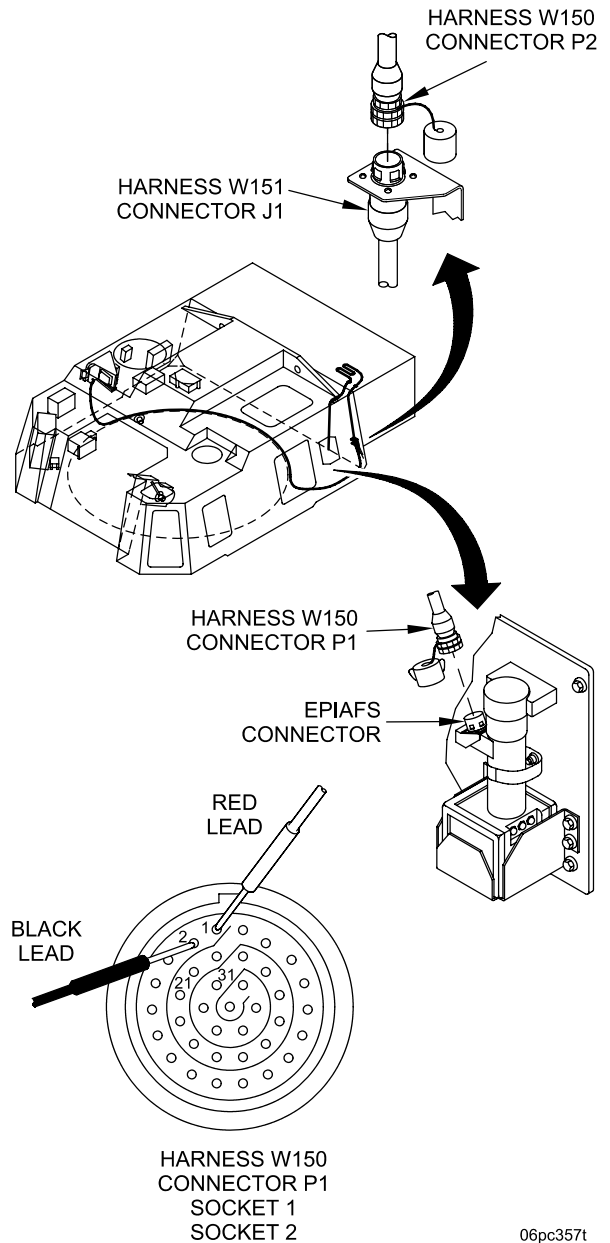
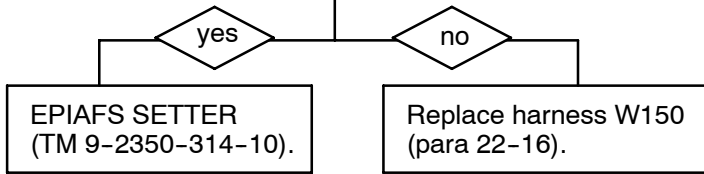
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP T

- U**
1. Connect harness W150 connector P2 to harness W151 connector J1 bracket.
  2. Disconnect harness W150 connector P1 at EPIAFS SETTER.
  3. Place multimeter red lead in harness W150 connector P1 socket 1 and black lead in harness W150 connector P1 socket 2.
  4. Measure the DC Voltage (V dc).

Is the voltage greater than 18 V dc?



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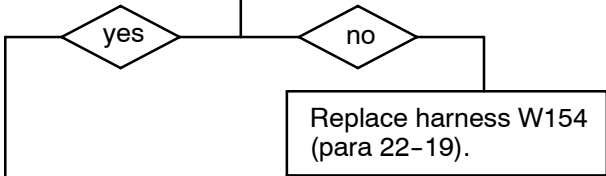
### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP Q

- V**
1. Turn PDFCS power switch on Keypad OFF.
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Check harness W154 for continuity (para n.36)

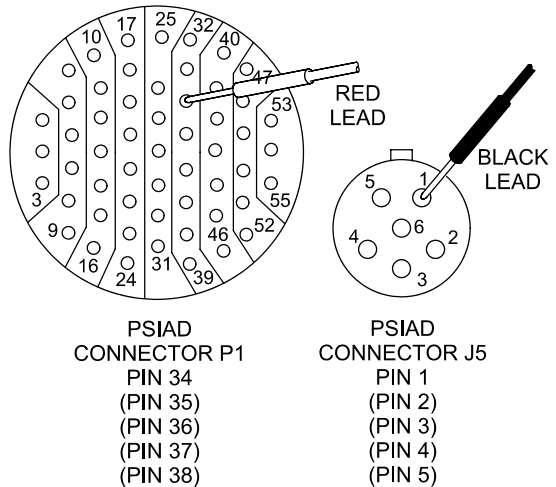
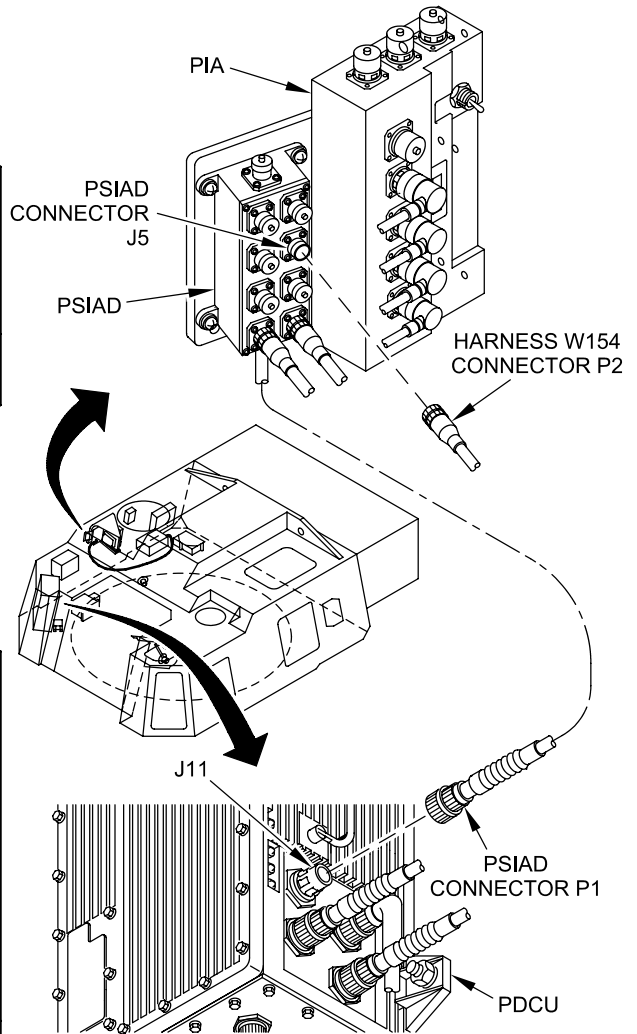
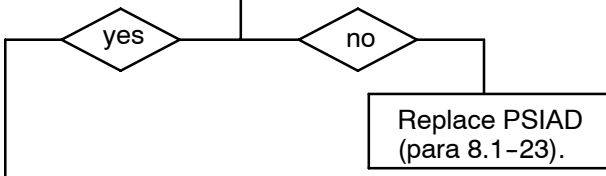
Is there continuity at all points (resistance less than 10 ohms)?



- W**
1. Disconnect harness PSIAD connector P1 from PDCU connector J11.
  2. Check harness PSIAD for continuity by placing one Multimeter lead on point A and other Multimeter lead on point B.

Point A	Point B
PSIAD Connector P1 pin 34	PSIAD Connector J5 pin 1
PSIAD Connector P1 pin 35	PSIAD Connector J5 pin 2
PSIAD Connector P1 pin 36	PSIAD Connector J5 pin 3
PSIAD Connector P1 pin 37	PSIAD Connector J5 pin 4
PSIAD Connector P1 pin 38	PSIAD Connector J5 pin 5

Is there continuity at all points (resistance less than 10 ohms)?



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

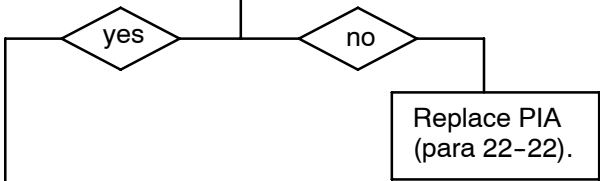
k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP W

**X** 1. Disconnect PIK from PIA connector P1.  
 2. Check PIA for continuity by placing one Multimeter lead on point A and other Multimeter lead on point B.

Point A	Point B
PIA Connector P1 socket 35	PIA Connector J4 pin 1
PIA Connector P1 socket 36	PIA Connector J4 pin 2
PIA Connector P1 socket 37	PIA Connector J4 pin 3
PIA Connector P1 socket 38	PIA Connector J4 pin 4
PIA Connector P1 socket 39	PIA Connector J4 pin 5

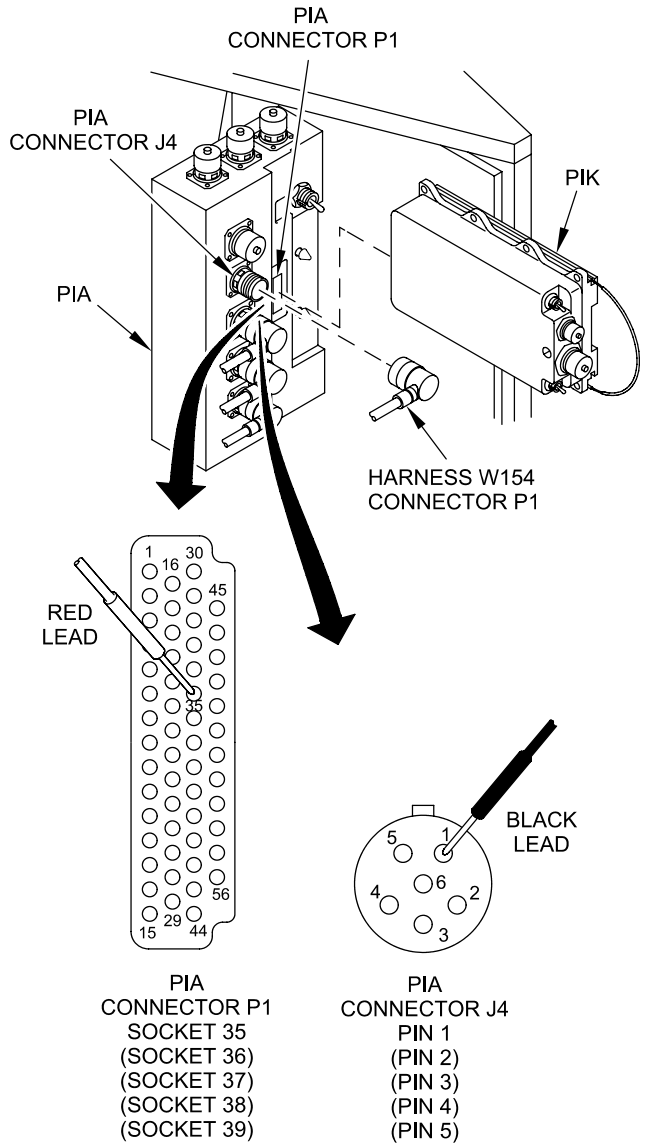
Is there continuity at all points (resistance less than 10 ohms)?



**NOTE**

Running the Automated Diagnostic Tests will isolate this failure to one LRU automatically.

1. Replace PIK (para 22-21).
2. If the problem still occurs after re-testing the PDFCS, replace PDCU (para 8.1-16).



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

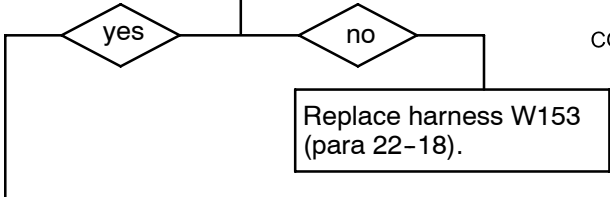
k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP E

**Y**

1. Turn PDFCS power switch on Keypad OFF.
2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
3. Check harness W153 for continuity (para n.34)

Is there continuity at all points (resistance less than 10 ohms)?

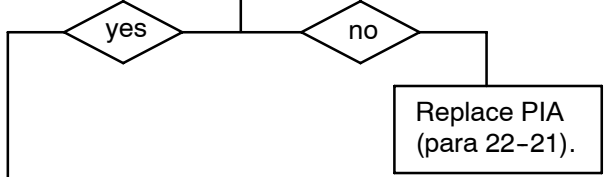


**Z**

1. Disconnect PIK from PIA connector P1.
2. Check PIA for continuity by placing one Multimeter lead on point A and other Multimeter lead on point B.

Point A	Point B
PIA Connector P1 socket 41	PIA Connector J3 socket 4
PIA Connector P1 socket 42	PIA Connector J3 socket 12
PIA Connector P1 socket 43	PIA Connector J3 socket 13
PIA Connector P1 socket 45	PIA Connector J3 socket 6

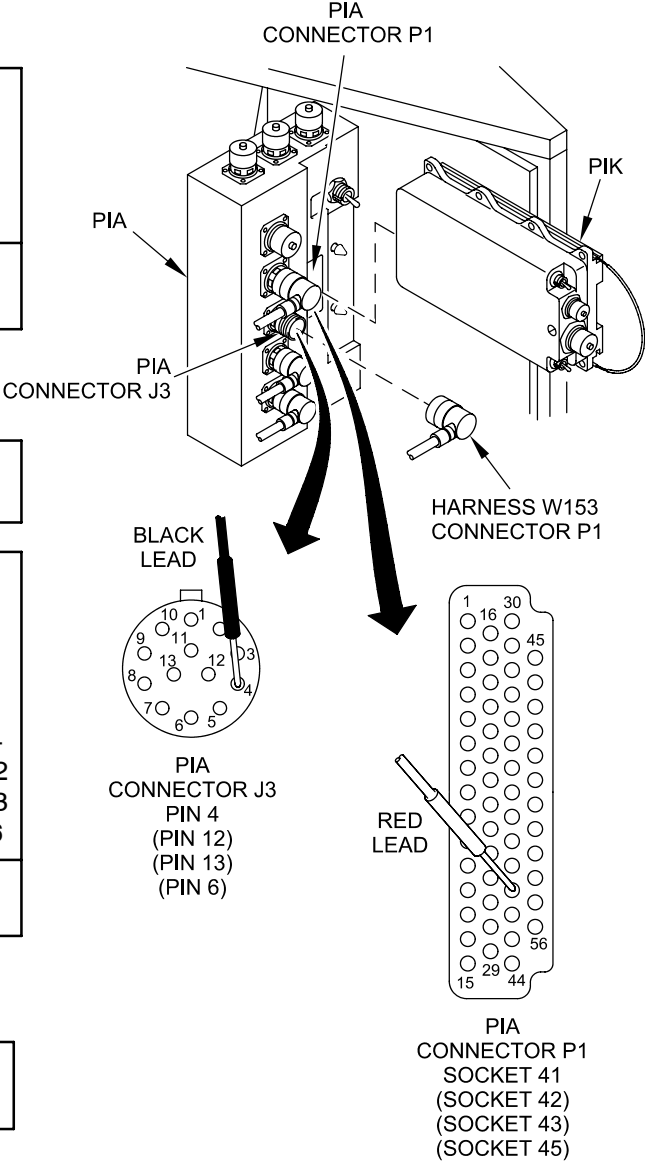
Is there continuity at all points (resistance less than 10 ohms)?



**NOTE**

Running the Automated Diagnostic Tests will isolate this failure to one LRU automatically.

1. Replace PIK (para 22-22).
2. If the problem still occurs after re-testing the PDFCS, replace DAGR (TM 9-2350-314-10).



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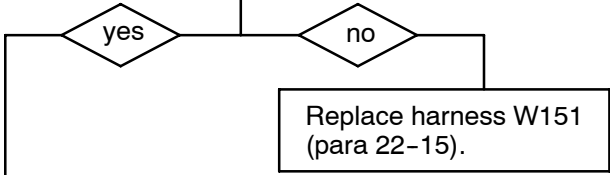
# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP C

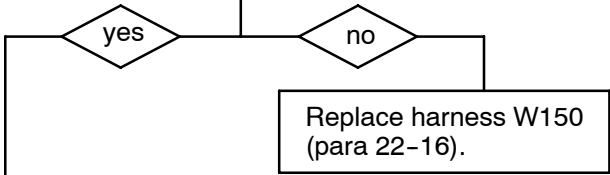
**AA** 1. Turn PDFCS power switch on Keypad OFF.  
 2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).  
 3. Check harness W151 for continuity (para n.37).

Is there continuity at all points (resistance less than 10 ohms)?



**AB** Check harness W150 for continuity (para n.38).

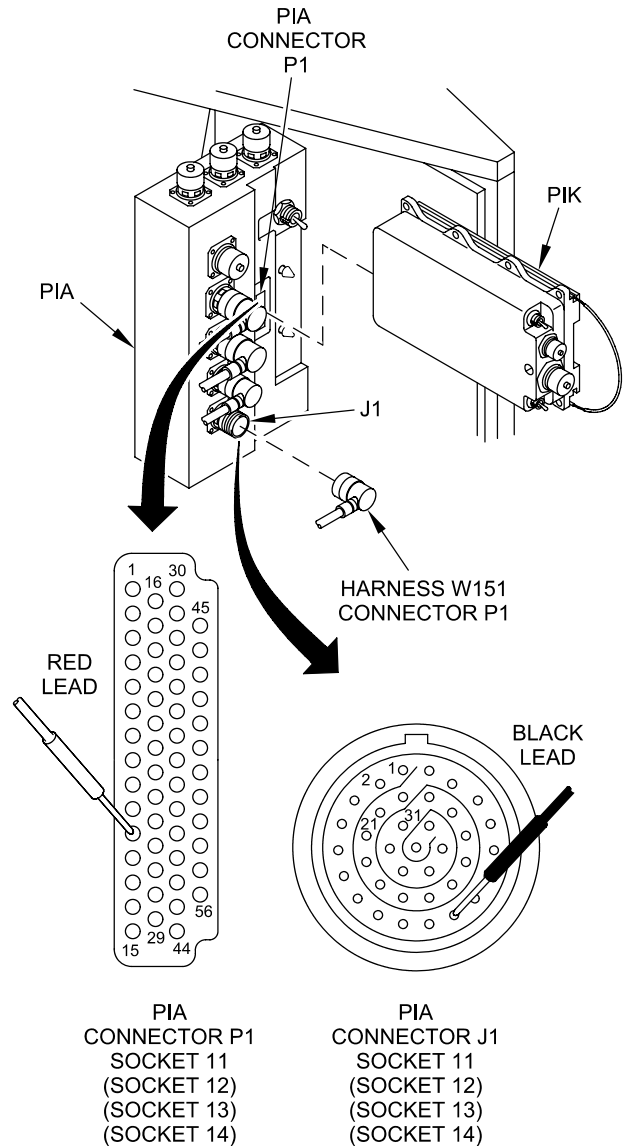
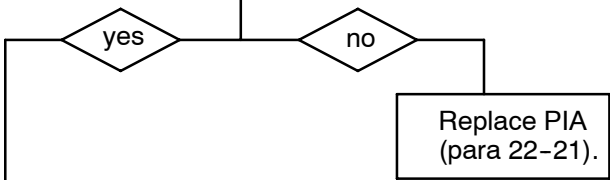
Is there continuity at all points (resistance less than 10 ohms)?



**AC** 1. Disconnect PIK from PIA connector P1.  
 2. Check PIA for continuity by placing one Multimeter lead on point A and other Multimeter lead on point B.

Point A	Point B
PIA Connector P1 socket 11	PIA Connector J1 socket 11
PIA Connector P1 socket 12	PIA Connector J1 socket 12
PIA Connector P1 socket 13	PIA Connector J1 socket 13
PIA Connector P1 socket 14	PIA Connector J1 socket 14

Is there continuity at all points (resistance less than 10 ohms)?



06pc361t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP AC

**NOTE**

Running the Automated Diagnostic Tests will isolate this failure to one LRU automatically.

1. Replace EPIAFS SETTER (TM 9-2350-314-10).
2. If the problem still occurs after re-testing the PDFCS, replace PIK (para 22-22).

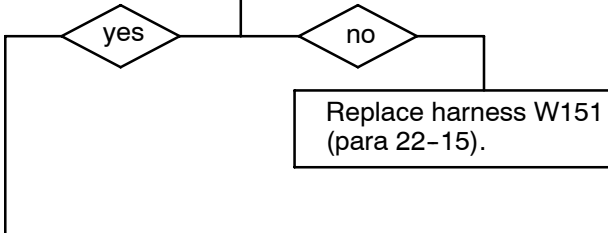
CONTINUED FROM STEP D

**AD**

1. Turn PDFCS power switch on Keypad OFF.
2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
3. Check harness W151 for continuity (para n.37).

---

Is there continuity at all points (resistance less than 10 ohms)?

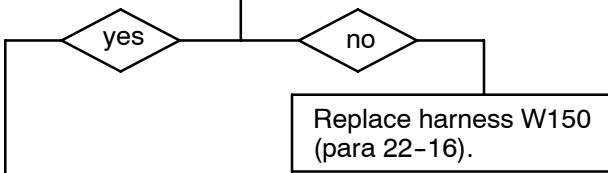


**AE**

1. Check harness w150 for continuity (para n.38).

---

Is there continuity at all points (resistance less than 10 ohms)?



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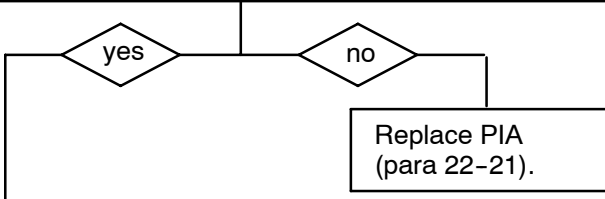


# 3-3. TROUBLESHOOTING CHART - CONTINUED

k.1. PDFCS - CONTINUED (14) IFS SUBSYSTEM NOT OK. - CONTINUED

CONTINUED FROM STEP AE

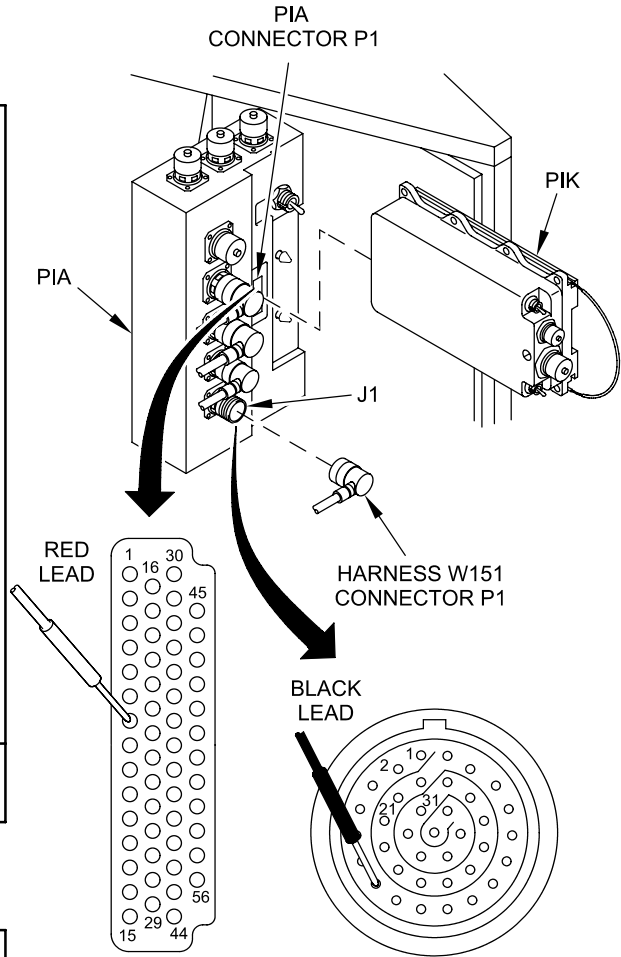
<b>AF</b>	<ol style="list-style-type: none"> <li>1. Disconnect PIK from PIA connector P1.</li> <li>2. Check PIA for continuity by placing one Multimeter lead on point A and other Multimeter lead on point B.</li> </ol>
<p style="text-align: center;">Point A</p> <ul style="list-style-type: none"> <li>Connector P1 socket 7</li> <li>Connector P1 socket 8</li> <li>Connector P1 socket 15</li> <li>Connector P1 socket 16</li> <li>Connector P1 socket 17</li> <li>Connector P1 socket 18</li> <li>Connector P1 socket 19</li> <li>Connector P1 socket 20</li> <li>Connector P1 socket 21</li> <li>Connector P1 socket 22</li> <li>Connector P1 socket 23</li> <li>Connector P1 socket 24</li> <li>Connector P1 socket 25</li> <li>Connector P1 socket 26</li> </ul>	<p style="text-align: center;">Point B</p> <ul style="list-style-type: none"> <li>Connector J1 socket 7</li> <li>Connector J1 socket 8</li> <li>Connector J1 socket 15</li> <li>Connector J1 socket 16</li> <li>Connector J1 socket 17</li> <li>Connector J1 socket 18</li> <li>Connector J1 socket 19</li> <li>Connector J1 socket 20</li> <li>Connector J1 socket 21</li> <li>Connector J1 socket 22</li> <li>Connector J1 socket 23</li> <li>Connector J1 socket 24</li> <li>Connector J1 socket 25</li> <li>Connector J1 socket 26</li> </ul>
<p>Is there continuity at all points (resistance less than 10 ohms)?</p>	



**NOTE**

Running the Automated Diagnostic Tests will isolate this failure to one LRU automatically.

1. Replace EPIAFS SETTER (TM 9-2350-314-10).
2. If the problem still occurs after re-testing the PDFCS, replace PIK (22-22).



- |  |  |
|--|--|
| <p style="text-align: center;">PIA<br/>CONNECTOR P1</p> <ul style="list-style-type: none"> <li>SOCKET 7</li> <li>(SOCKET 8)</li> <li>(SOCKET 15)</li> <li>(SOCKET 16)</li> <li>(SOCKET 17)</li> <li>(SOCKET 18)</li> <li>(SOCKET 19)</li> <li>(SOCKET 20)</li> <li>(SOCKET 21)</li> <li>(SOCKET 22)</li> <li>(SOCKET 23)</li> <li>(SOCKET 24)</li> <li>(SOCKET 25)</li> <li>(SOCKET 26)</li> </ul> | <p style="text-align: center;">PIA<br/>CONNECTOR J1</p> <ul style="list-style-type: none"> <li>SOCKET 7</li> <li>(SOCKET 8)</li> <li>(SOCKET 15)</li> <li>(SOCKET 16)</li> <li>(SOCKET 17)</li> <li>(SOCKET 18)</li> <li>(SOCKET 19)</li> <li>(SOCKET 20)</li> <li>(SOCKET 21)</li> <li>(SOCKET 22)</li> <li>(SOCKET 23)</li> <li>(SOCKET 24)</li> <li>(SOCKET 25)</li> <li>(SOCKET 26)</li> </ul> |
|--|--|

06pc362t

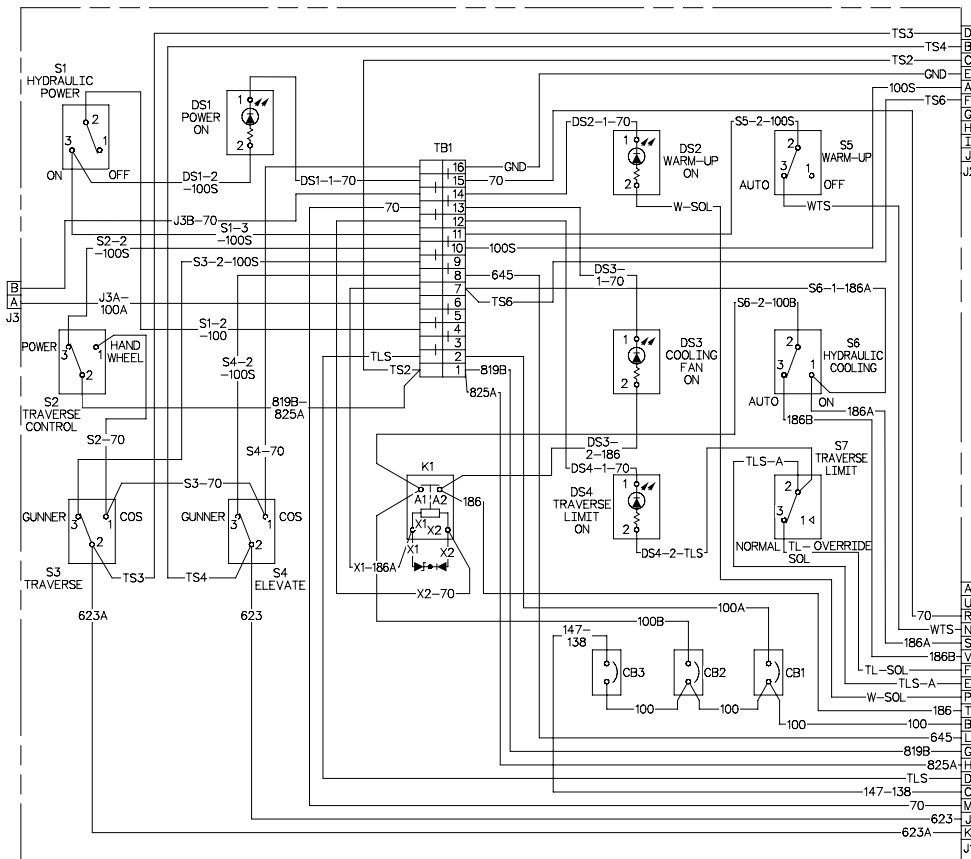


### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### I. TRAVERSE

The traverse system consists of the powerpack (hydraulic motor, pump, reservoir), filter assembly, mode selector valve, fuse manifold, gunner and COS control handles, selector valve, traverse limit solenoid valve, azimuth servo valve assembly, hydraulic motor, clutch valve, and hydraulic control box. The diagram on the facing page shows the relationship of these components. The diagram below is a schematic for the hydraulic control box.

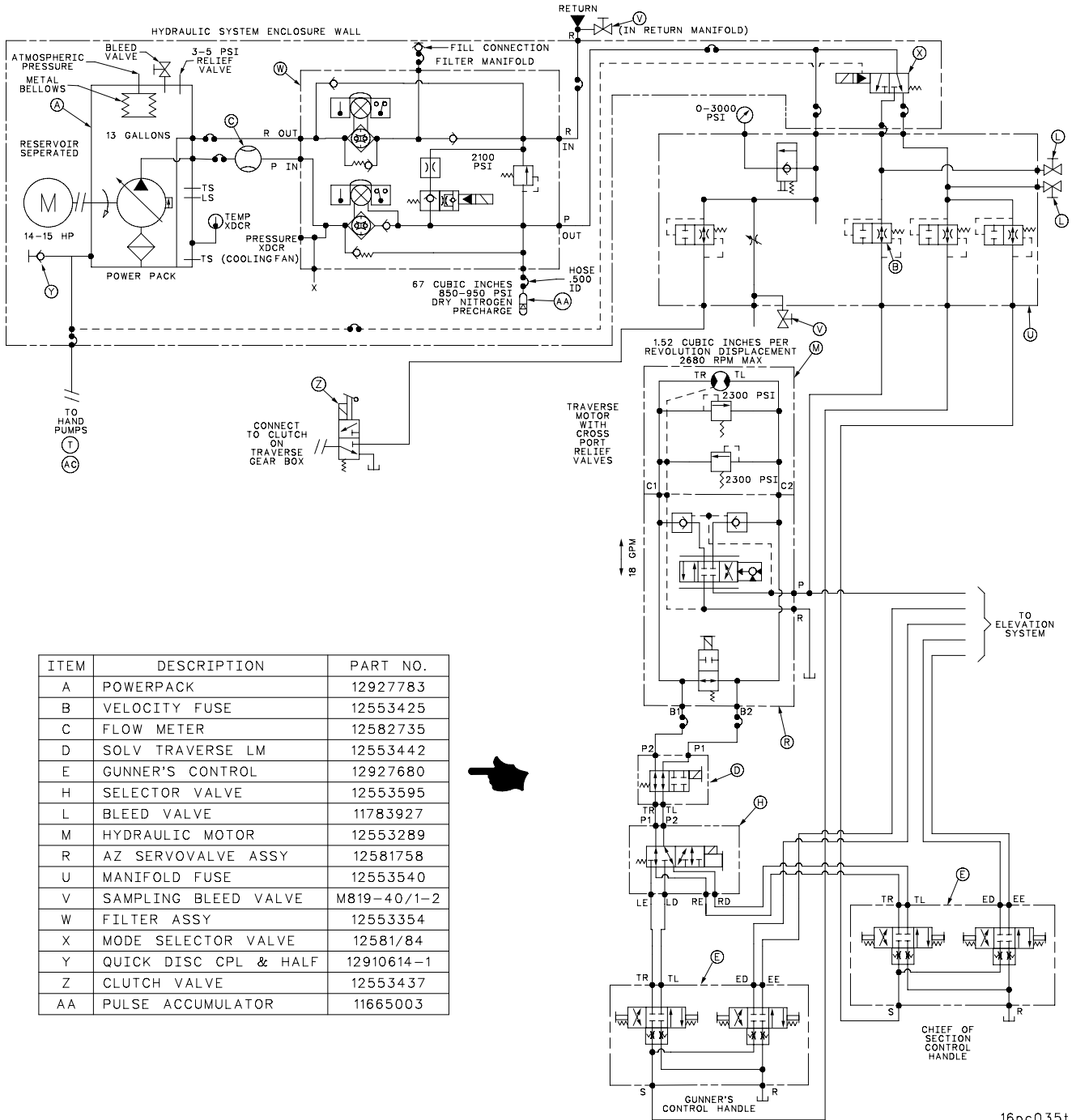
When the MASTER power switch and the HYDRAULIC power switch (S1) on the hydraulic motor box are both set to ON, 24 V dc is applied through the slip ring brush blocks and hydraulic control box to energize the powerpack. Hydraulic pressure is applied through the filter assembly to the mode selector valve. If AFCS/PDFCS is enabled, the mode selector valve applies the hydraulic pressure through the azimuth servo valve assembly to the hydraulic motor to traverse the cab. If power mode is enabled, the mode select valve applies pressure to the gunner and COS control handles. The selector valve determines which control handle will apply its pressure through the traverse solenoid valve and azimuth servo valve assembly, to cause the hydraulic motor to traverse the cab. If manual mode is selected on the hydraulic control box, the clutch valve relieves hydraulic pressure on the clutch, allowing use of the handwheel for traversing the cab.



16pc013t

# 3-3. TROUBLESHOOTING CHART - CONTINUED

## I. TRAVERSE - CONTINUED



16pc035t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

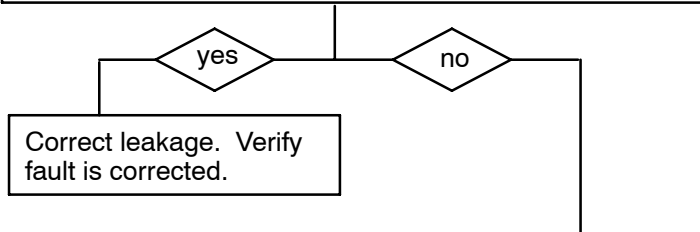
I. TRAVERSE - CONTINUED (1) SLOW TRAVERSE - DOES NOT TRAVERSE FROM 0° TO 45° IN LESS THAN 7 SECONDS IN POWER AND LESS THAN 12 SECONDS IN AFCS OPERATION ON LEVEL GROUND. Manual traverse is normal and elevation of cannon is normal. Cab may stop in AFCS operation.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Inspect cab interior for hydraulic fluid leakage (TM 9-2350-314-10).

Are leaks present?

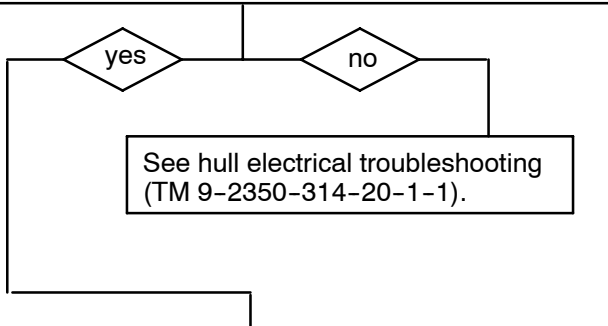


**WARNING**  
 If cab drifts, immediately place TRAVERSE CONTROL switch in HANDWHEEL position. Failure to comply may result in injury or death to personnel.

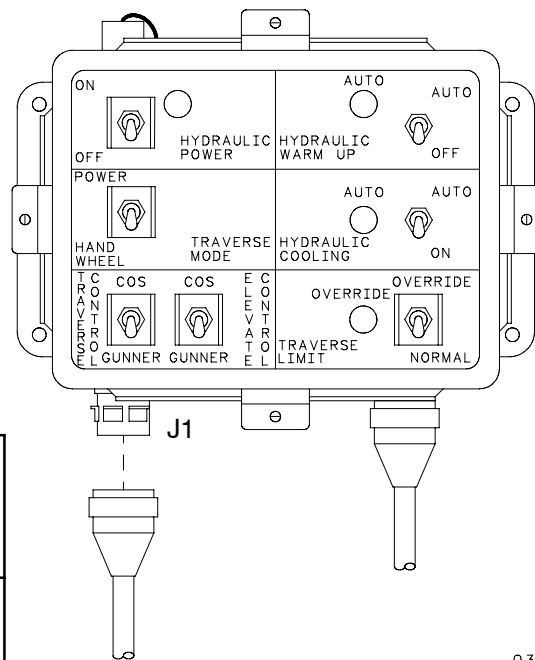
**B**

1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
2. Start engine using proper procedures (TM 9-2350-314-10).

Does driver's panel voltmeter battery/generator gage read in the green area?



CONTINUED ON NEXT PAGE



03pc128t

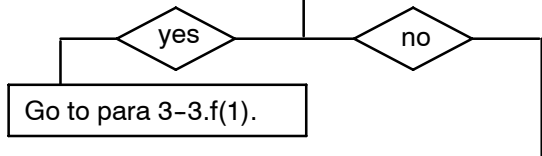
### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (1) SLOW TRAVERSE - DOES NOT TRAVERSE FROM 0° TO 45° IN LESS THAN 7 SECONDS IN POWER AND LESS THAN 12 SECONDS IN AFCS OPERATION ON LEVEL GROUND. Manual traverse is normal and elevation of cannon is normal. Cab may stop in AFCS operation. - CONTINUED

CONTINUED FROM STEP B

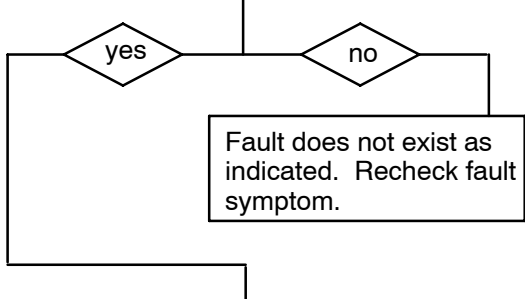
- C**
1. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  2. Pull and hold test valve on top of pressure manifold (para 18-1).

Does hydraulic pressure gage read less than 1500 psi?



- D**
1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
  2. Discharge system pressure (para 18-1).
  3. Open bleed valve on pressure manifold and bleed static hydraulic pressure from system (para 18-1).
  4. Close bleed valve (para 18-1).
  5. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  6. Release travel lock and manually raise cannon.
  7. Place travel lock in stowed position.
  8. Place TRAVERSE LOCK in the UNLOCKED position.
  9. Make sure traverse gear and cannon are clear of obstructions.
  10. Turn TRAVERSE CONTROL switch to POWER position.
  11. Turn TRAVERSE SELECTOR switch to GUNNER position.
  12. Move GUNNER'S control handle to full traverse position (right or left)

Does cab traverse slowly?



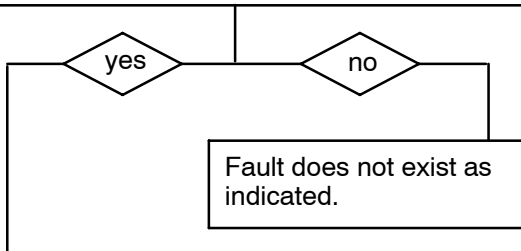
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

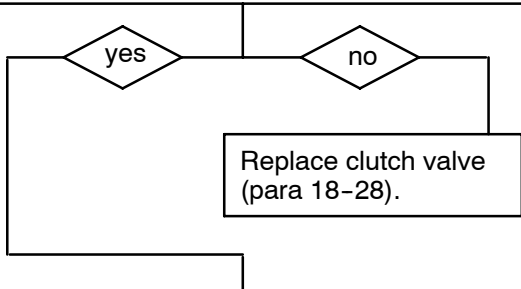
I. TRAVERSE - CONTINUED (1) SLOW TRAVERSE - DOES NOT TRAVERSE FROM 0° TO 45° IN LESS THAN 7 SECONDS IN POWER AND LESS THAN 12 SECONDS IN AFCS OPERATION ON LEVEL GROUND. Manual traverse is normal and elevation of cannon is normal. Cab may stop in AFCS operation. - CONTINUED

CONTINUED FROM STEP D

<b>E</b>	<ol style="list-style-type: none"> <li>1. Turn on DU (TM 9-2350-314-10).</li> <li>2. Select NORMAL OPERATION from the SELECT OPERATIONS MENU (TM 9-2350-314-10).</li> <li>3. Initialize system (TM 9-2350-314-10).</li> <li>4. Select FIRE COMMAND from the SETUP and INFORMATION MENU screen (TM 9-2350-314-10).</li> <li>5. Use the DU to enter a deflection of 3600 (to traverse left) or 2600 (to traverse right) (TM 9-2350-314-10).</li> <li>6. When MISSION SCREEN appears on DU, make sure cab is clear of obstructions and turn the GUN SERVO switch ON (TM 9-2350-314-10).</li> <li>7. Press and hold LAY KEY until gun stops moving (TM 9-2350-314-10).</li> </ol>
Does cab traverse slowly or traverse slowly and stop?	



<b>F</b>	<ol style="list-style-type: none"> <li>1. Turn TRAVERSE CONTROL switch to HANDWHEEL position (TM 9-2350-314-10).</li> <li>2. Flip lever on clutch valve to depress MANUAL OVERRIDE button (TM 9-2350-314-10).</li> </ol>
Can override button be depressed?	



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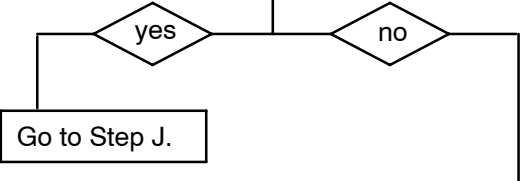
### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (1) SLOW TRAVERSE - DOES NOT TRAVERSE FROM 0° TO 45° IN LESS THAN 7 SECONDS IN POWER AND LESS THAN 12 SECONDS IN AFCS OPERATION ON LEVEL GROUND. Manual traverse is normal and elevation of cannon is normal. Cab may stop in AFCS operation. - CONTINUED

CONTINUED FROM STEP F

**G** With MANUAL OVERRIDE button depressed, traverse cab using gunner's control (TM 9-2350-314-10).

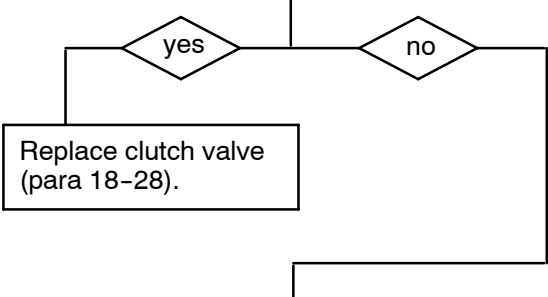
Does cab traverse slowly?



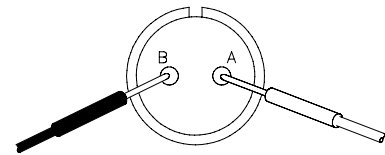
**H**

1. Turn HYDRAULIC POWER switch OFF.
2. Stop engine.
3. Turn vehicle MASTER power switch OFF.
4. Disconnect harness W64 connector P3 from clutch valve solenoid J1.
5. Turn vehicle MASTER power switch ON.
6. Start engine.
7. Turn HYDRAULIC POWER switch ON.
8. Make sure the TRAVERSE CONTROL switch is in POWER position.
9. Check harness W64 connector P3 for voltage by placing multimeter red lead in harness W64 connector P3 socket A and placing the black lead in harness W64 connector P3 socket B.

Is voltage present?



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W64  
CONNECTOR P3  
SOCKET A  
SOCKET B

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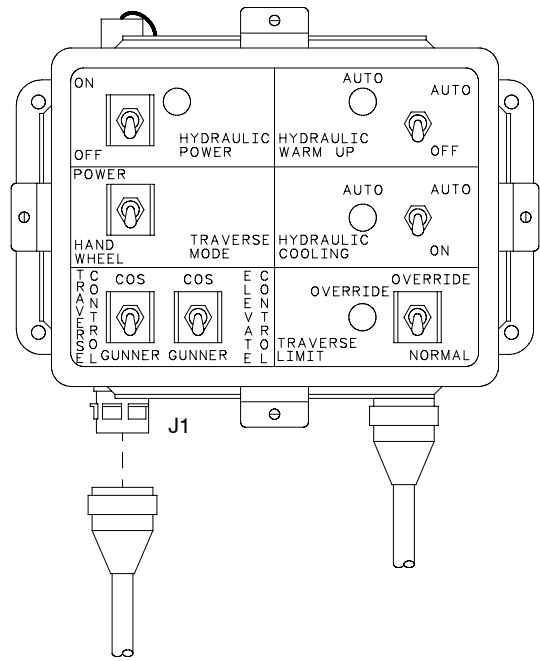
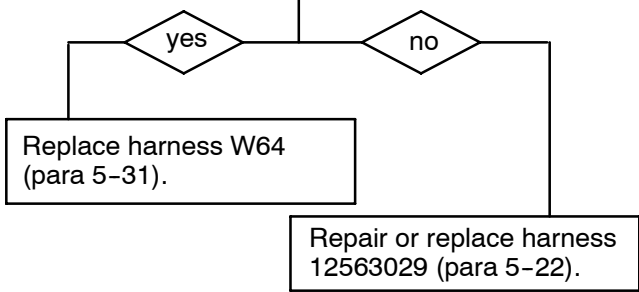


### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (1) SLOW TRAVERSE - DOES NOT TRAVERSE FROM 0° TO 45° IN LESS THAN 7 SECONDS IN POWER AND LESS THAN 12 SECONDS IN AFCS OPERATION ON LEVEL GROUND. Manual traverse is normal and elevation of cannon is normal. Cab may stop in AFCS operation. - CONTINUED

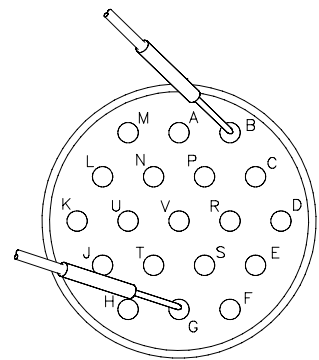
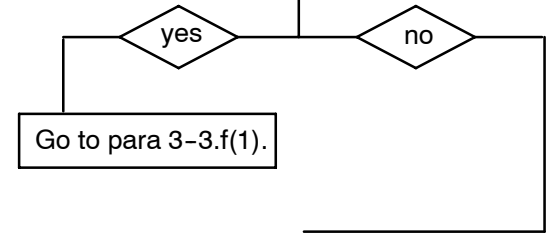
CONTINUED FROM STEP H

- I**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
  3. Make sure HYDRAULIC POWER switch is ON position (TM 9-2350-314-10).
  4. Check lead 819B of the hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and placing the other lead on hydraulic control box connector J1 pin G.
- Is continuity present?



CONTINUED FROM STEP G

- J**
1. Engage cab traverse lock (TM 9-2350-314-10).
  2. Place and hold gunner's control handle in traverse position (right or left) (TM 9-2350-314-10).
- Does hydraulic pressure gage drop and not maintain a minimum of 1100 psi?



HYDRAULIC CONTROL BOX  
CONNECTOR J1  
PIN B  
PIN G

03pc089t

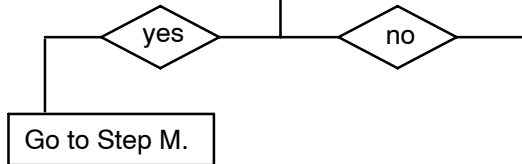
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

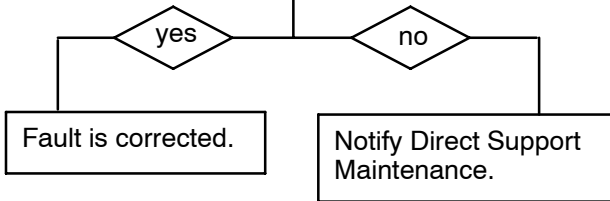
I. TRAVERSE - CONTINUED (1) SLOW TRAVERSE - DOES NOT TRAVERSE FROM 0° TO 45° IN LESS THAN 7 SECONDS IN POWER AND LESS THAN 12 SECONDS IN AFCS OPERATION ON LEVEL GROUND. Manual traverse is normal and elevation of cannon is normal. Cab may stop in AFCS operation. - CONTINUED

CONTINUED FROM STEP J

<b>K</b>	<ol style="list-style-type: none"> <li>1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).</li> <li>2. Discharge hydraulic system pressure (para 18-1).</li> <li>3. Open the equilibration shut off valve.</li> <li>4. Open the bleeder sampling valve on the top of the pressure manifold.</li> </ol>
Did you hear or feel the clutch valve fuse reset?	

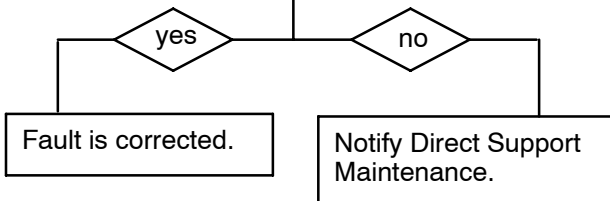


<b>L</b>	Replace the clutch valve fuse (para 18-11).
Does cab traverse normally?	



CONTINUED FROM STEP K

<b>M</b>	Traverse cab left and right using either control handle and AFCS.
Does cab traverse normally?	



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (2) INABILITY TO TRAVERSE WITH COS CONTROL HANDLE. Gunner's control handle and AFCS normal.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

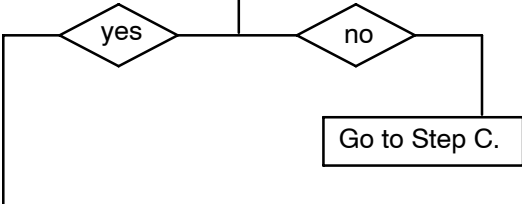
**NOTE**

For vehicles equipped with AFCS, go to Step C.  
 For vehicles equipped with PDFCS, do Step A.

**A** Note results of PDI system tests, and the actual operation of the COS control handle.

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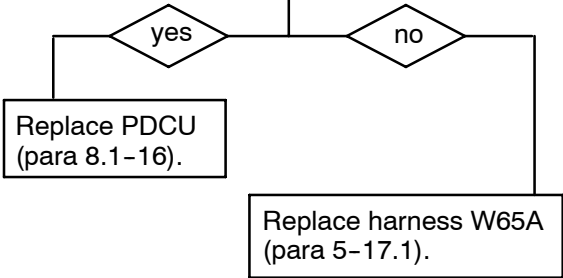
Did the PDI system tests indicate a failure, but the COS control handle is normal?



**B** Do a harness check on harness W65A (para 3-3.n(18.1)).

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Is harness W65A good?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

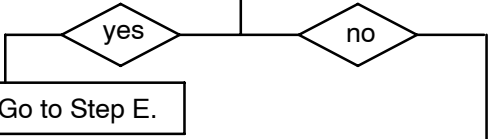
I. TRAVERSE - CONTINUED (2) INABILITY TO TRAVERSE WITH COS CONTROL HANDLE. Gunner's control handle and AFCS normal. - CONTINUED

**NOTE**  
Prior to starting this tree, ensure that the velocity fuse is reset (para 18-46).

**C**

1. Make sure vehicle MASTER power switch is OFF (TM 9-2350-314-10).
2. Disconnect harness W64 connector P6 from traverse selector valve.
3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
4. Start engine (TM 9-2350-314-10).
5. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
6. Turn TRAVERSE CONTROL switch to COS and TRAVERSE MODE switch to POWER (TM 9-2350-314-10).
7. Push in and release override button on traverse select valve (TM 9-2350-314-10).
8. Rotate COS handle left and right (TM 9-2350-314-10).

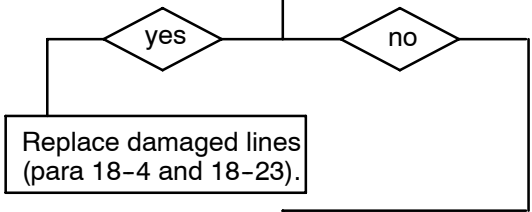
Does cab traverse?



**D**

Check all lines from COS control handle to traverse selector valve for damage (para 18-4 and 18-23).

Are any lines kinked or damaged?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

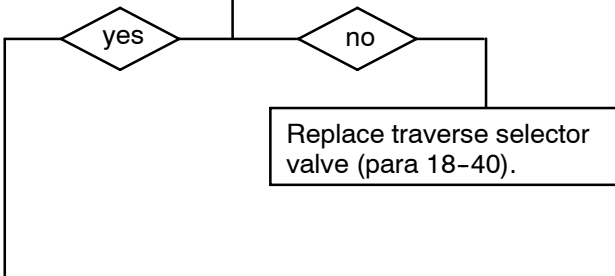
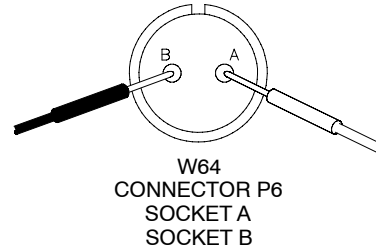
I. TRAVERSE - CONTINUED (2) INABILITY TO TRAVERSE WITH COS CONTROL HANDLE. Gunner's control handle and AFCS normal. - CONTINUED

CONTINUED FROM STEP C

**E**

1. Make sure TRAVERSE CONTROL switch is set to COS (TM 9-2350-314-10).
2. Check harness W64 for voltage by placing multimeter red lead in harness W64 connector P6 socket A and placing multimeter black lead in harness W64 connector P6 socket B.

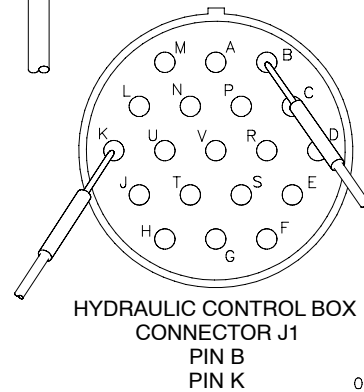
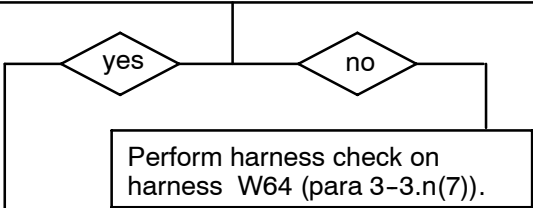
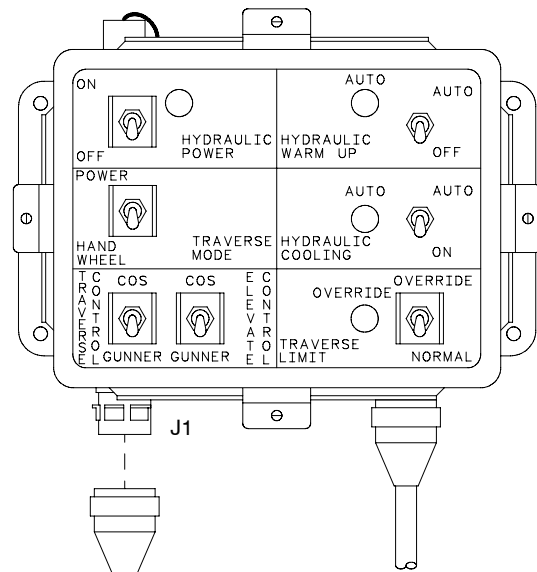
Is voltage present?



**F**

1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
2. Disconnect harness W64 connector P1 from hydraulic control box connector J1 (para 5-21).
3. Make sure HYDRAULIC POWER switch is ON (TM 9-2350-314-10).
4. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and placing the other lead on hydraulic control box connector J1 pin K.

Is there continuity?



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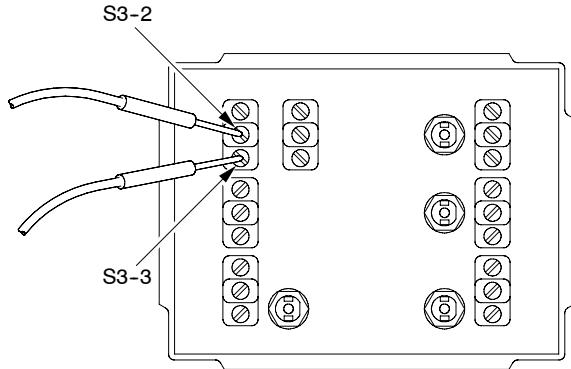
### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (2) INABILITY TO TRAVERSE WITH COS CONTROL HANDLE. Gunner's control handle and AFCS normal. - CONTINUED

CONTINUED FROM STEP F

- G**

  1. Remove cover from hydraulic control box (para 5-20).
  2. Disconnect wire leads from TRAVERSE CONTROL switch terminal 2 (S3-2) and TRAVERSE CONTROL switch terminal 3 (S3-3).
  3. Check TRAVERSE CONTROL switch for continuity by placing one multimeter lead on traverse switch terminal 2 (S3-2) and placing the other lead on traverse switch terminal 3 (S3-3).



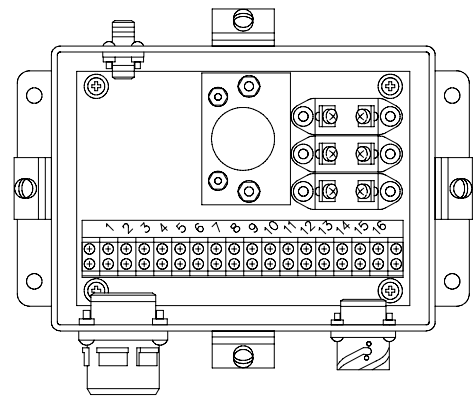
Is there continuity?



Replace TRAVERSE CONTROL switch S3 (para 5-20).

Replace harness 12563029 (para 5-22). Recheck for fault indication

**END OF TASK**



03pc091t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (3) INABILITY TO MANUALLY TRAVERSE. Traverse under POWER and AFCS normal.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

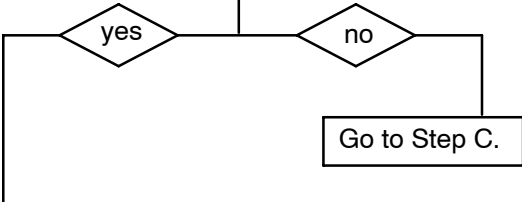
**NOTE**

For vehicles equipped with AFCS, go to Step C.  
 For vehicles equipped with PDFCS, do Step A.

**A** Note results of PDI system tests, and the actual operation of the manual traverse.

---

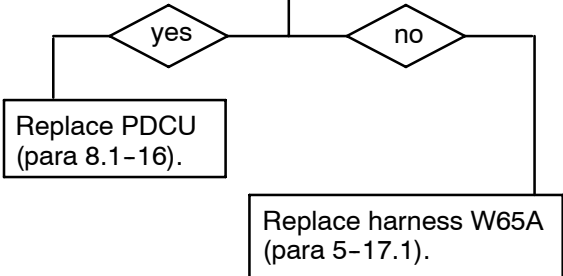
Did the PDI system tests indicate a failure, but the manual traverse is normal?



**B** Do a harness check on harness W65A (para 3-3.n(18.1)).

---

Is harness W65A good?

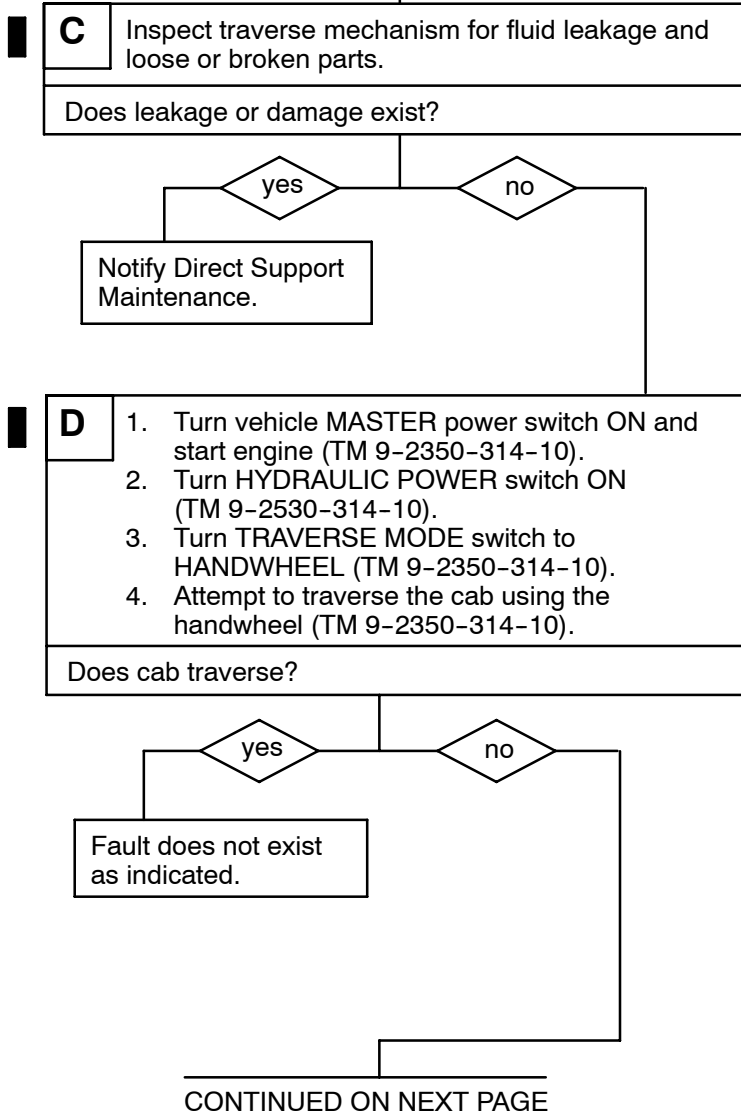


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### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (3) INABILITY TO MANUALLY TRAVERSE. Traverse under POWER and AFCS normal. - CONTINUED

CONTINUED FROM STEP A





### 3-3. TROUBLESHOOTING CHART - CONTINUED

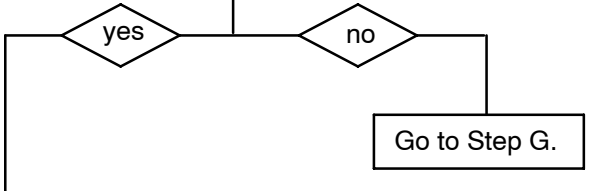
I. TRAVERSE - CONTINUED (3) INABILITY TO MANUALLY TRAVERSE. Traverse under POWER and AFCS normal. - CONTINUED

CONTINUED FROM STEP D

**E**

1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
2. Shut down engine (TM 9-2350-314-10).
3. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
4. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
5. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
6. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and placing the other lead on hydraulic control box connector J1 pin G or H.

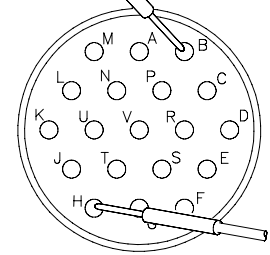
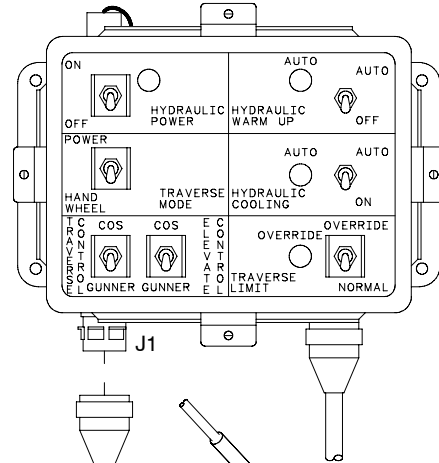
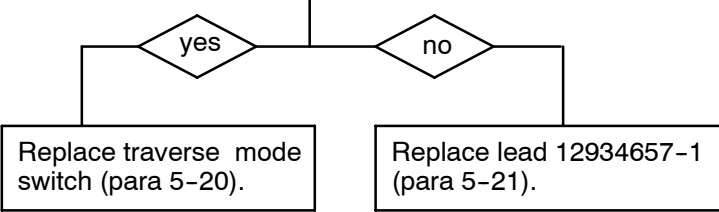
Is continuity present?



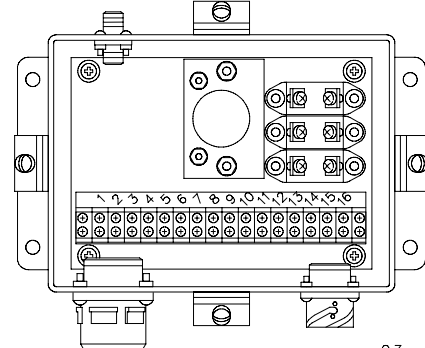
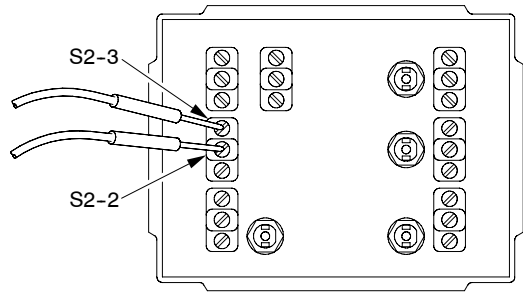
**F**

1. Remove hydraulic control box cover (para 5-20).
2. Disconnect lead 12934657-7 from TRAVERSE MODE switch terminal 2 (S2-2).
3. Disconnect lead 12934657-1 from TRAVERSE MODE switch terminal 3 (S2-3).
4. Check TRAVERSE MODE switch for continuity by placing one multimeter lead on the TRAVERSE MODE switch terminal 2 (S2-2) and placing the other lead on TRAVERSE MODE switch terminal 3 (S2-3).

Is continuity present?



HYDRAULIC CONTROL BOX  
CONNECTOR J1  
PIN B  
PIN H



03pc093t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

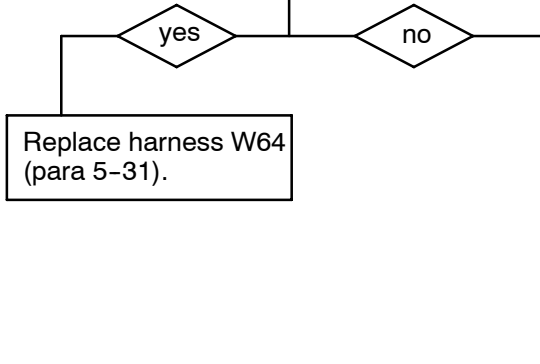
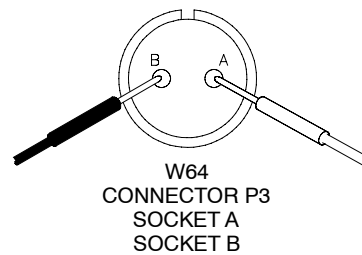
I. TRAVERSE - CONTINUED (3) INABILITY TO MANUALLY TRAVERSE. Traverse under POWER and AFCS normal. - CONTINUED

CONTINUED FROM STEP E

**G**

1. Disconnect harness W64 connector P3 from clutch valve.
2. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
3. Place multimeter red lead in harness W64 connector P3 socket A and black lead in harness W64 connector P3 socket B. Check for voltage.

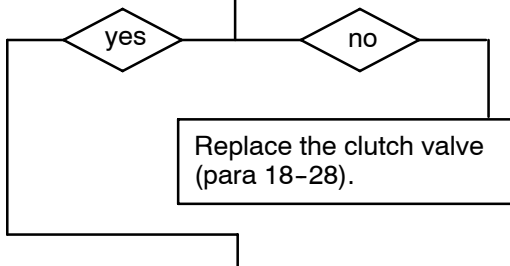
Is voltage present?



**H**

1. Pull CLUTCH VALVE manual override lever (TM 9-2350-314-10).
2. Listen to hear clutch valve disengage.

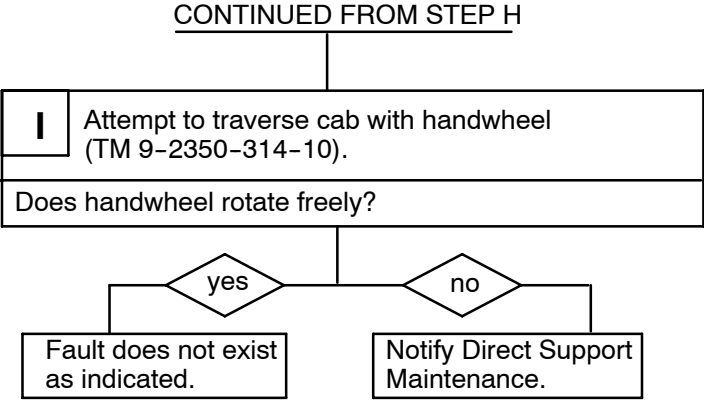
Did you hear clutch valve disengage?



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**3-3. TROUBLESHOOTING CHART - CONTINUED**

I. TRAVERSE - CONTINUED (3) INABILITY TO MANUALLY TRAVERSE. Traverse under POWER and AFCS normal. - CONTINUED



**END OF TASK**

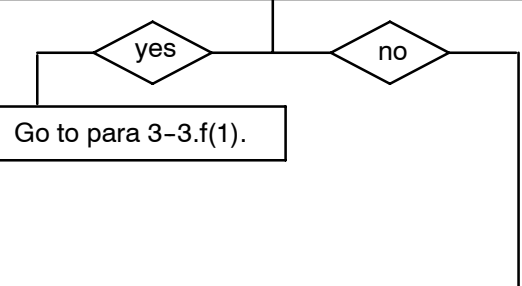
**3-3. TROUBLESHOOTING CHART - CONTINUED**

I. TRAVERSE - CONTINUED (4) CAB WILL NOT POWER TRAVERSE WITH TRAVERSE CONTROL SWITCH SET TO POWER. AFCS operates normally.

INITIAL SETUP  
Tools  
Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
Multimeter (item 24, Appx G)  
TA1 probe kit (item 42, Appx G)

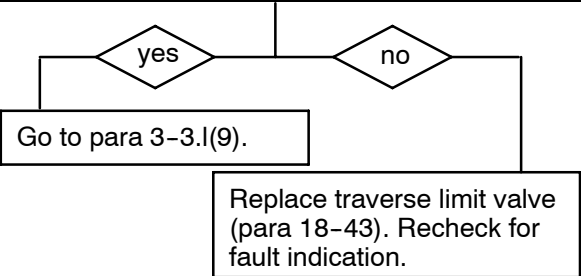
- A**
1. Turn MASTER POWER switch ON (TM 9-2350-314-10).
  2. Start engine (TM 9-2350-314-10).
  3. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  4. Check hydraulic pressure gage (TM 9-2350-314-10).

Does gage read below 1500 psi?



**B** Check traverse limit LED (TM 9-2350-314-10).

Is LED lit?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (5) CAB WILL NOT TRAVERSE IN POWER OR AFCS OPERATION.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

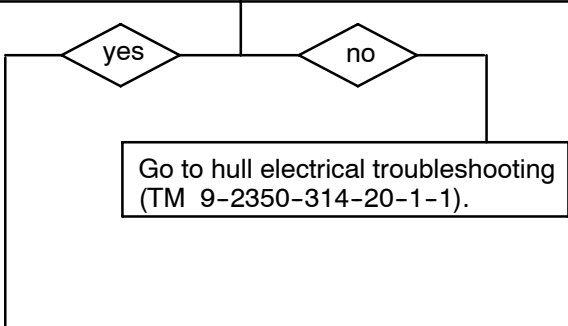
**NOTE**

Prior to starting this tree, ensure that the velocity fuse is reset (para 18-46).

**A**

1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
2. Start engine (TM 9-2350-314-10).
3. Check driver's control panel BATTERY/GENERATOR voltmeter (TM 9-2350-314-10).

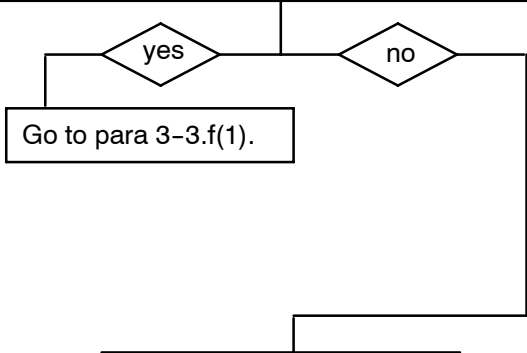
Is voltmeter reading in the green area?



**B**

1. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
2. Check hydraulic pressure gage (TM 9-2350-314-10).

Does gage read below 1500 psi?



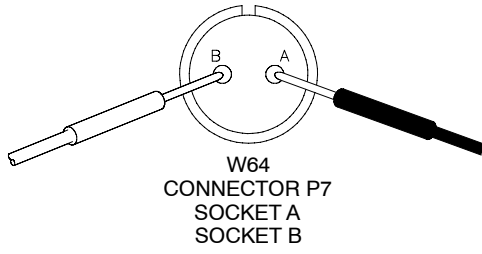
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

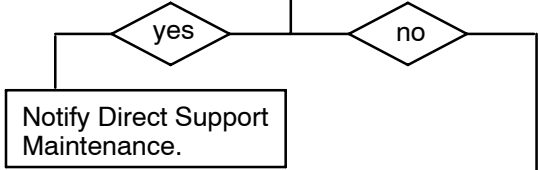
I. TRAVERSE - CONTINUED (5) CAB WILL NOT TRAVERSE IN POWER OR AFCS OPERATION. - CONTINUED

CONTINUED FROM STEP B

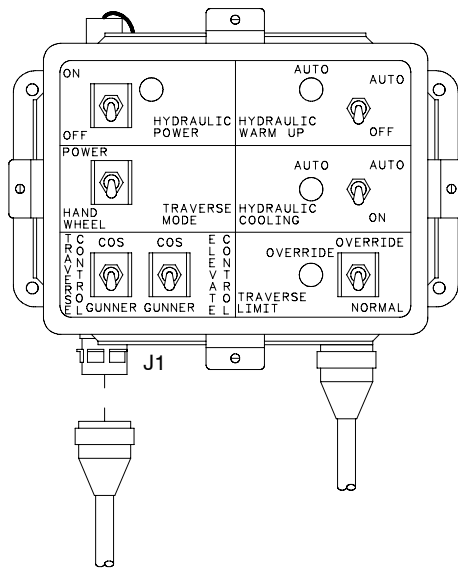
- C**
1. Turn engine, HYDRAULIC POWER, and vehicle MASTER power switches OFF (TM 9-2350-314-10).
  2. Disconnect harness W64 connector P7 from hydraulic bypass valve.
  3. Turn TRAVERSE MODE switch to POWER (TM 9-2350-314-10).
  4. Place multimeter red lead in harness W64 connector P7 socket B and black lead in harness W64 connector P7 socket A.
  5. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  6. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).



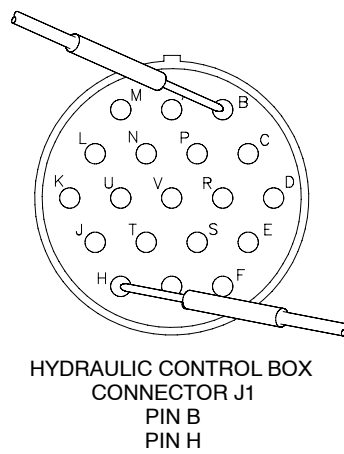
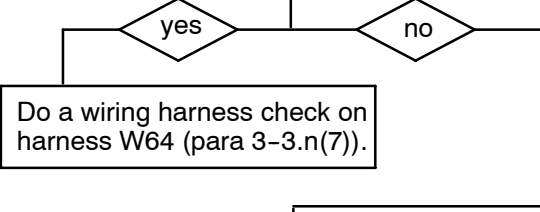
Is voltage present?



- D**
1. Turn HYDRAULIC POWER switch OFF and shut off engine (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Connect harness W64 connector P7 to hydraulic bypass valve.
  4. Disconnect harness W64 connector P1 from hydraulic control box connector J1 .
  5. Turn TRAVERSE MODE switch to POWER and turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  6. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and placing the other lead on hydraulic control box connector J1 pin H.



Is continuity present?



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# 3-3. TROUBLESHOOTING CHART - CONTINUED

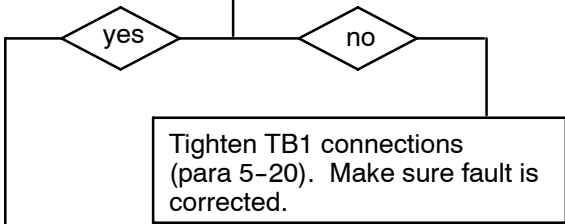
I. TRAVERSE - CONTINUED (5) CAB WILL NOT TRAVERSE IN POWER OR AFCS OPERATION. - CONTINUED

CONTINUED FROM STEP D

**E**

1. Remove hydraulic control box cover (para 5-20).
2. Check terminal board 1 (TB1) connectors for loose connections (para 5-20).

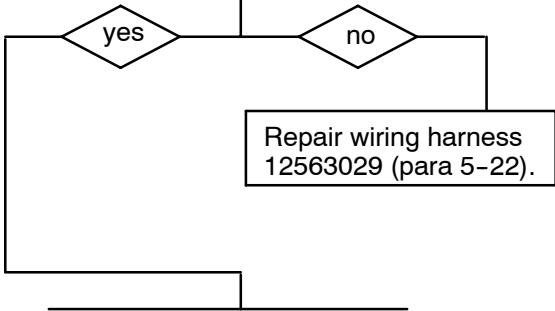
Are TB1 connections tight?



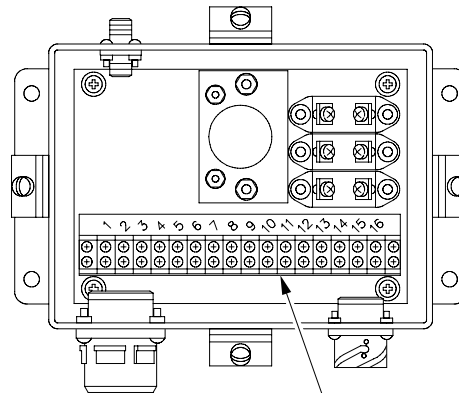
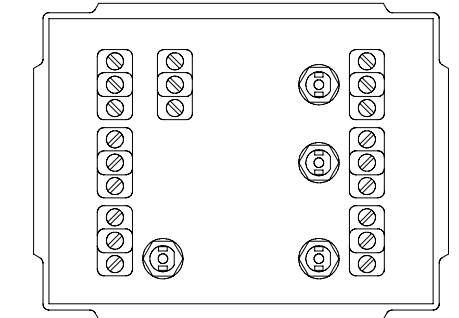
**F**

1. Make sure TRAVERSE MODE switch is set on POWER and HYDRAULIC POWER switch is ON (TM 9-2350-314-10).
2. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and placing the other lead on hydraulic control box connector J1 pin G.

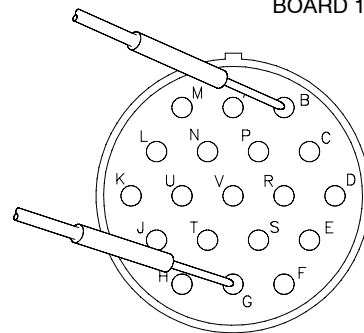
Is continuity present?



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TERMINAL BOARD 1



HYDRAULIC CONTROL BOX  
CONNECTOR J1  
PIN B  
PIN G

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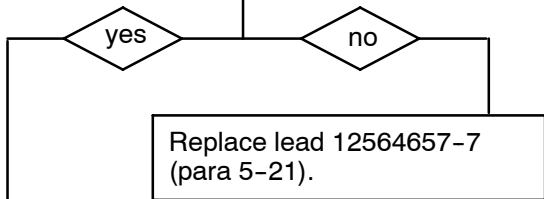
### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (5) CAB WILL NOT TRAVERSE IN POWER OR AFCS OPERATION. - CONTINUED

CONTINUED FROM STEP F

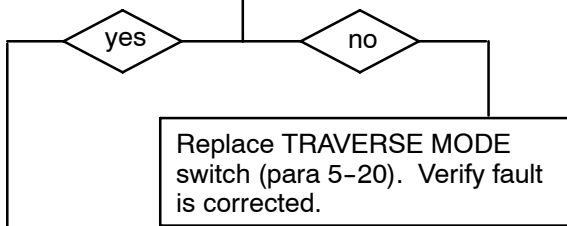
**G** Check terminal board 1 for continuity by placing one multimeter lead on terminal board 1 terminal 10 (TB1-10) and placing the other lead on TRAVERSE MODE switch terminal 3 (S2-3).

Is continuity present?

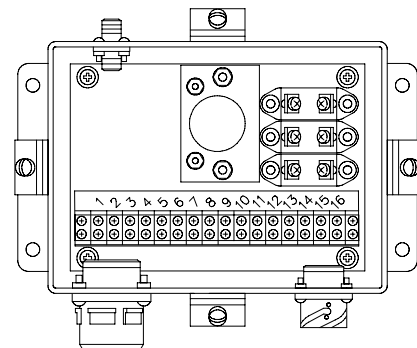
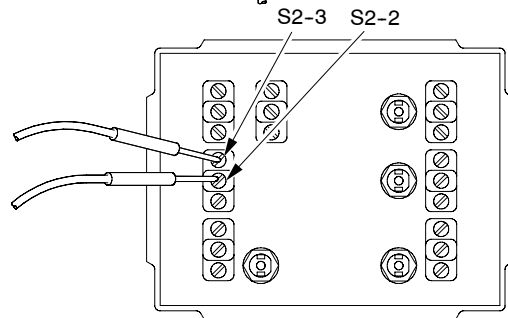
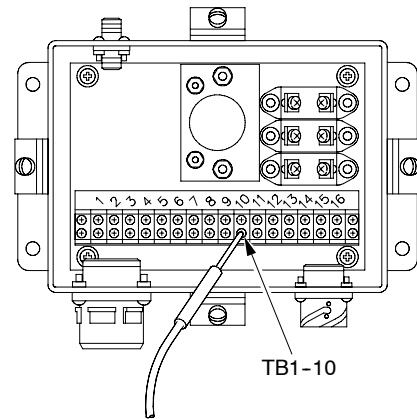
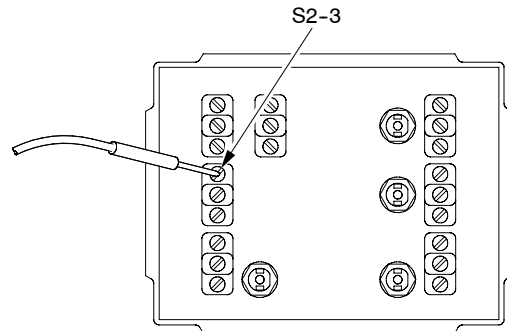


**H** Check TRAVERSE MODE switch for continuity by placing one multimeter lead on TRAVERSE MODE switch terminal 2 (S2-2) and placing the other lead on TRAVERSE MODE switch terminal 3 (S2-3).

Is continuity present?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (5) CAB WILL NOT TRAVERSE IN POWER OR AFCS OPERATION. - CONTINUED

CONTINUED FROM STEP H

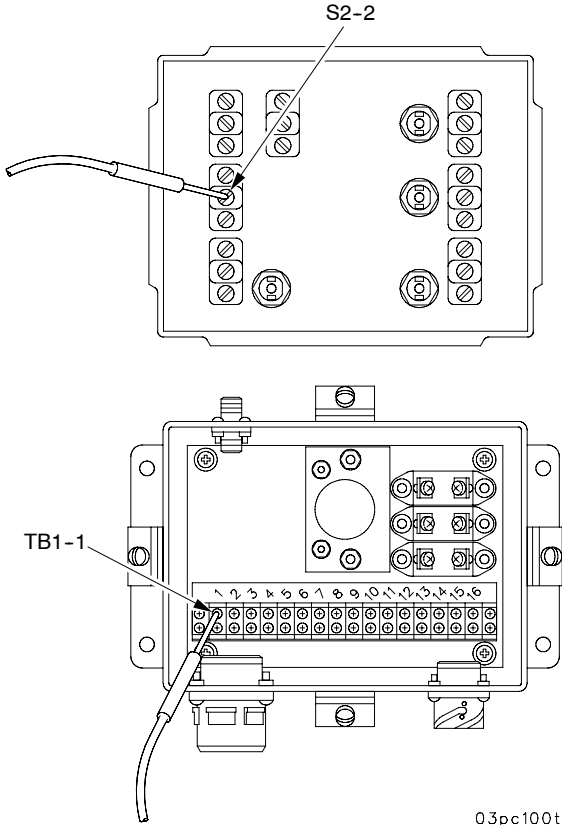
I Check harness 12563029 for continuity by placing one multimeter lead on TRAVERSE MODE switch terminal 2 (S2-2) and placing the other lead on terminal board 1 terminal 1 (TB1-1).  
Is continuity present?



Replace harness 12563029 (para 5-22). Verify fault is corrected.

Replace lead 12934657-1 (para 5-21). Verify fault is corrected.

END OF TASK



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

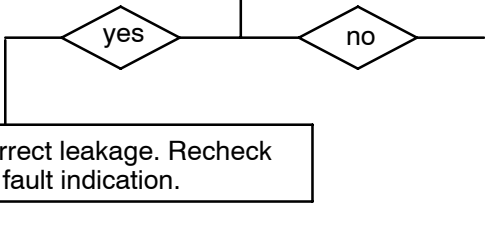
I. TRAVERSE - CONTINUED (6) INABILITY TO POWER TRAVERSE IN ONE DIRECTION (RIGHT OR LEFT) USING EITHER CONTROL HANDLE. AFCS operates normally.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Inspect cab interior for hydraulic fluid leakage (TM 9-2350-314-10).

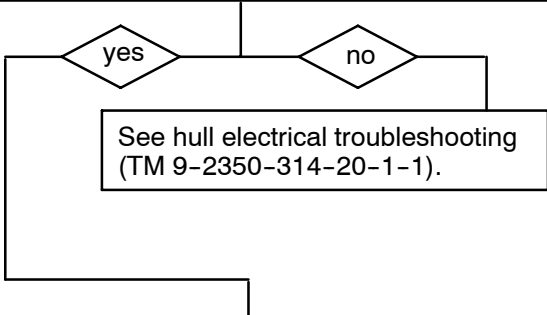
Does leakage exist?



**B**

1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
2. Start engine following proper procedures (TM 9-2350-314-10).
3. Release gun travel lock. Raise cannon manually and lower travel lock. Release traverse lock (TM 9-2350-314-10).
4. Make sure cab traverse gear and cannon tube are not obstructed (TM 9-2350-314-10).

Is driver control panel battery/generator voltmeter in the green area (TM 9-2350-314-10)?

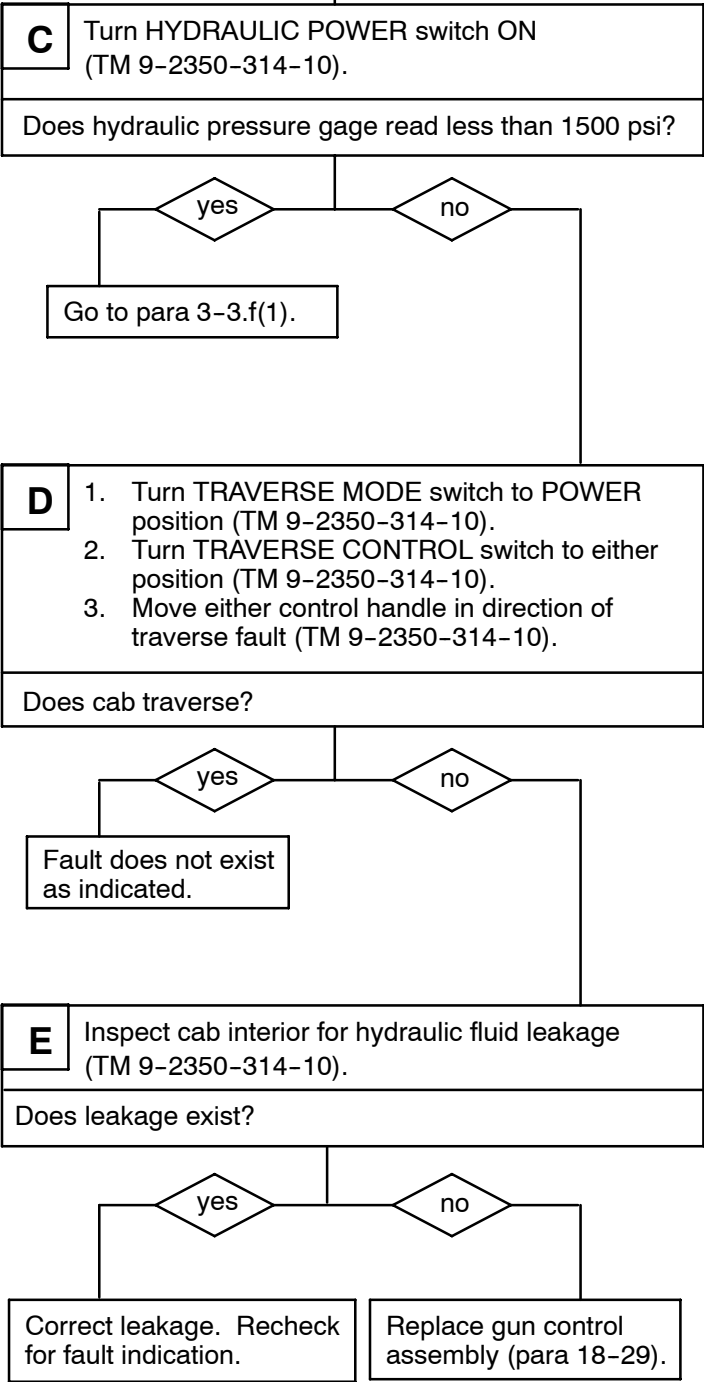


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### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (6) INABILITY TO POWER TRAVERSE IN ONE DIRECTION (RIGHT OR LEFT) USING EITHER CONTROL HANDLE. AFCS operates normally. - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

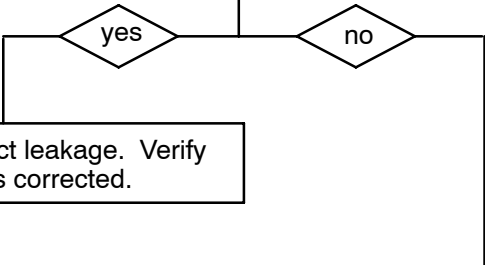
I. TRAVERSE - CONTINUED (7) CAB DRIFTS. Inability to hold in POWER and AFCS modes.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Inspect cab interior for hydraulic fluid leakage (TM 9-2350-314-10).

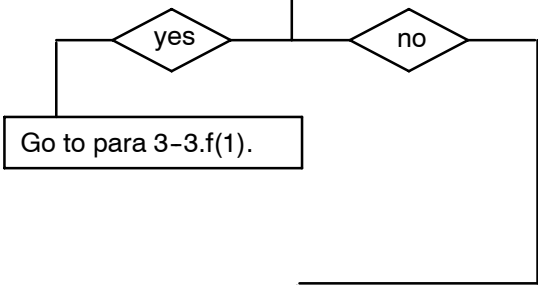
Does leakage exist?



**B**

1. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10)
2. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
3. Pull test valve on top of pressure manifold (para 18-1).

Does hydraulic pressure gage read less than 1500 psi?



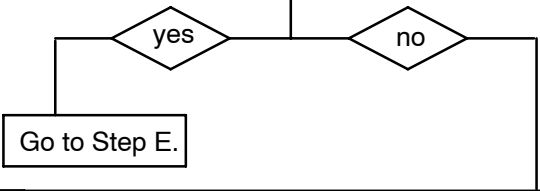
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

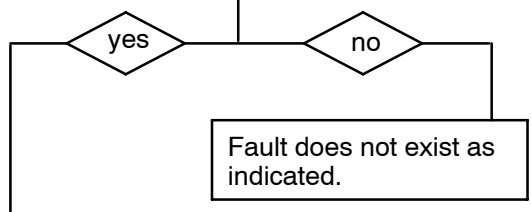
I. TRAVERSE - CONTINUED (7) CAB DRIFTS. Inability to hold in POWER and AFCS modes. - CONTINUED

CONTINUED FROM STEP B

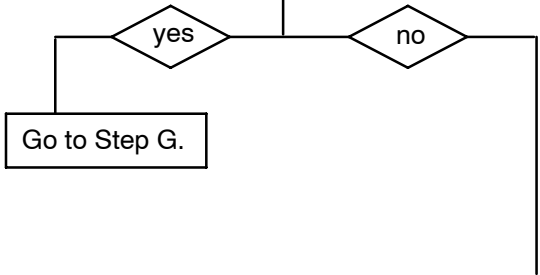
<b>C</b>	<ol style="list-style-type: none"> <li>1. Release travel lock and raise cannon.</li> <li>2. Place travel lock in stowed position.</li> <li>3. Unlock cab traverse lock.</li> <li>4. Make sure cab traverse gear and cannon are free of obstructions.</li> <li>5. Turn TRAVERSE MODE switch to POWER position (TM 9-2350-314-10).</li> <li>6. Turn TRAVERSE CONTROL switch to COS.</li> <li>7. Use COS control handle and traverse right and left, then return handle to center position.</li> </ol>
Does cab drift when COS position is selected?	



<b>D</b>	Repeat step C with vehicle on a 10° slope.
Does cab drift?	



<b>E</b>	Use gunner's control handle and traverse right and left, then return handle to center position (TM 9-2350-314-10).
Does cab drift?	



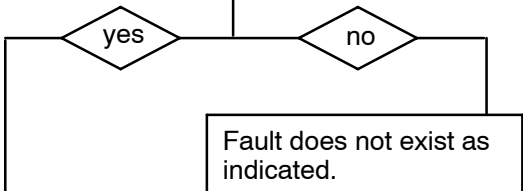
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (7) CAB DRIFTS. Inability to hold in POWER and AFCS modes. - CONTINUED

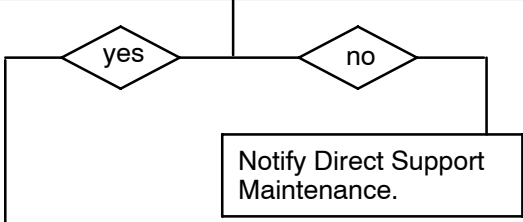
CONTINUED FROM STEP C AND E

**F** Repeat step E with vehicle on a 10° slope.  
Does cab drift?



CONTINUED FROM STEP E

**G** 1. Turn DU power switch ON and select NORMAL OPERATION from Select Operational Menu Screen (TM 9-2350-314-10).  
2. Initialize system (TM 9-2350-314-10).  
3. Select FIRE COMMAND (para 3-2.4).  
4. When Mission Screen appears, make sure cab is clear of obstructions, then turn Gun Servo Drive ON (TM 9-2350-314-10).  
5. Press and hold LAY key until gun stops moving (TM 9-2350-314-10).  
Does cab drift?



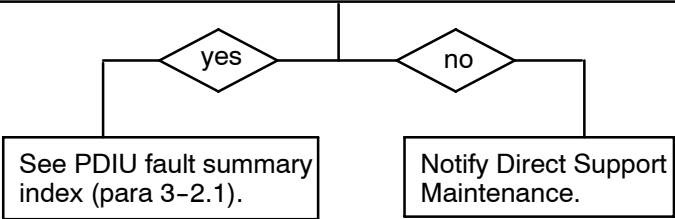
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (7) CAB DRIFTS. Inability to hold in POWER and AFCS modes. - CONTINUED

CONTINUED FROM STEP G

<b>H</b>	<ol style="list-style-type: none"><li>1. Use arrows on display control panel until the word MAINTENANCE is enclosed by brackets (TM 9-2350-314-10).</li><li>2. Press illuminated soft key beneath SELECT to enter maintenance mode master menu (TM 9-2350-314-10).</li></ol> <p style="text-align: center;"><b>NOTE</b></p> <p>Perform setup for vehicle test in accordance with Appendix F in TM 9-2350-314-10.</p> <ol style="list-style-type: none"><li>3. Use arrows on display control panel until the words SYSTEM TEST are enclosed by brackets (TM 9-2350-314-10).</li><li>4. Press illuminated soft key beneath SELECT (TM 9-2350-314-10).</li><li>5. Press illuminated soft key beneath GO.</li><li>6. Answer all questions and perform all tasks that appear on screen (TM 9-2350-314-10).</li></ol>
Does screen show any faults?	



END OF TASK

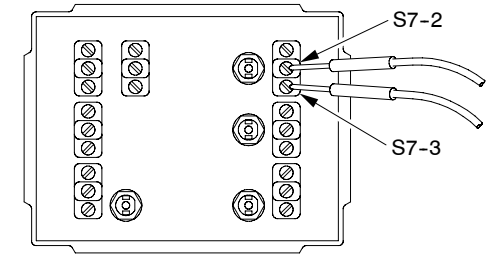
### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (8) CAB WILL NOT TRAVERSE BEYOND 45° WITH TRAVERSE LIMIT SWITCH HELD IN OVERRIDE POSITION.

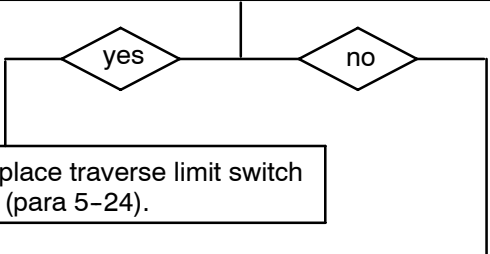
**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

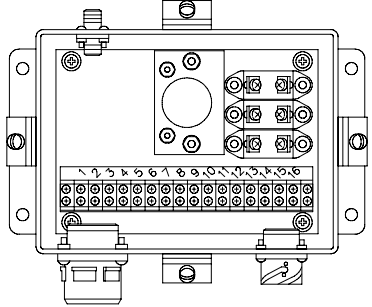
- A**
1. Remove cover from hydraulic control box (para 5-20).
  2. Disconnect TLS-SOL from S7-3.
  3. Disconnect TLS-A from S7-2.
  4. Check for continuity by placing one multimeter lead on terminal S7-2 and place the other lead on terminal S7-3 while holding the traverse limit switch in override position.



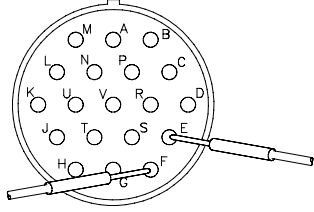
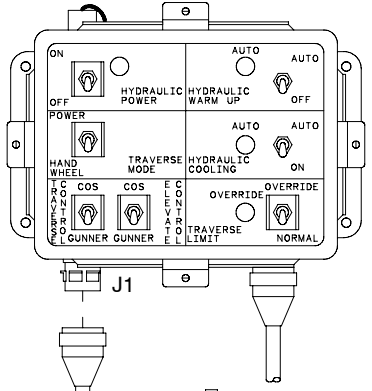
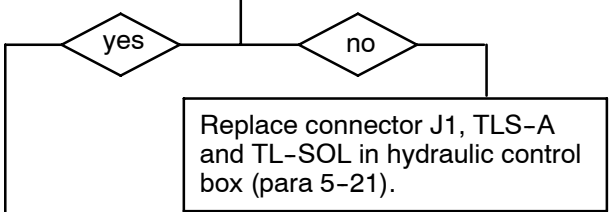
Is continuity present?



- B**
1. Disconnect harness W64 connector P1 from connector J1 of hydraulic control box.
  2. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin E and placing the other lead on hydraulic control box connector J1 pin F.



Is continuity present?



HYDRAULIC CONTROL BOX  
CONNECTOR J1  
PIN E  
PIN F

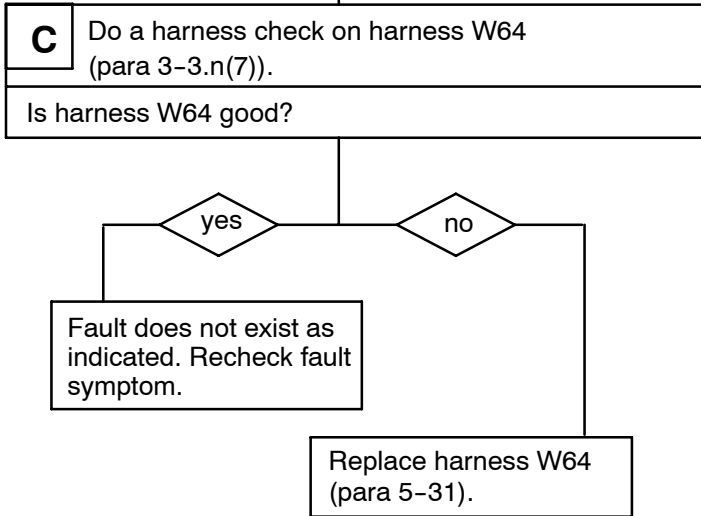
CONTINUED ON NEXT PAGE



**3-3. TROUBLESHOOTING CHART - CONTINUED**

I. TRAVERSE - CONTINUED (8) CAB WILL NOT TRAVERSE BEYOND 45° WITH TRAVERSE LIMIT SWITCH HELD IN OVERRIDE POSITION.

CONTINUED FROM STEP B



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

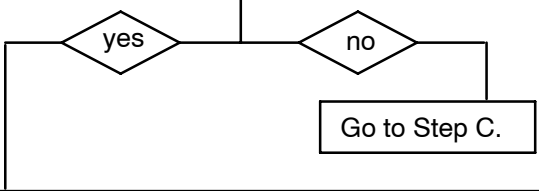
I. TRAVERSE - CONTINUED (9) INABILITY TO POWER TRAVERSE BEFORE 45° LIMIT. Traverse limit light is on.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

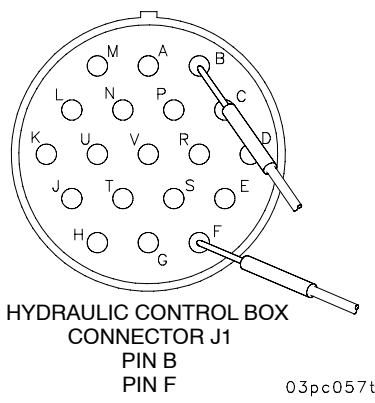
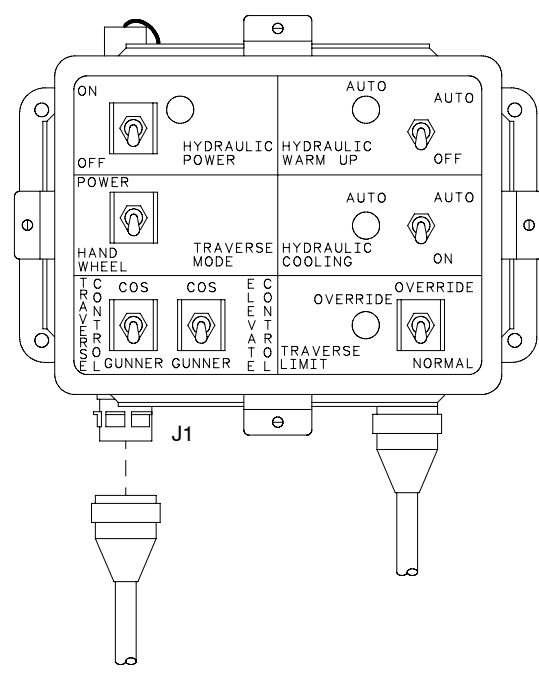
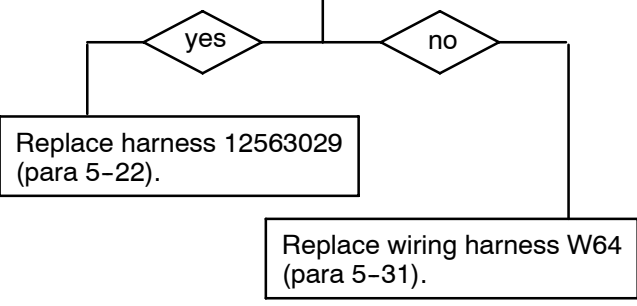
- A**
1. Turn MASTER power switch ON and start engine (TM 9-2350-314-10).
  2. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  3. Watch TRAVERSE LIMIT light while pushing TRAVERSE LIMIT OVERRIDE switch (TM 9-2350-314-10).

Does TRAVERSE LIMIT light go OFF?



- B**
1. Turn HYDRAULIC POWER switch OFF and shut off engine (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Disconnect harness W64 connector P1 from hydraulic control box connector J1 (para 5-20).
  4. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  5. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and other lead on hydraulic control box connector J1 pin F while pressing traverse limit override switch.

Is continuity present?



03pc057t

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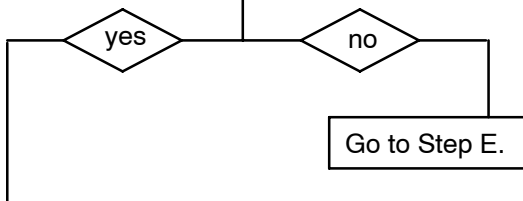
## 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (9) INABILITY TO POWER TRAVERSE BEFORE 45° LIMIT. Traverse limit light is on. - CONTINUED

CONTINUED FROM STEP A

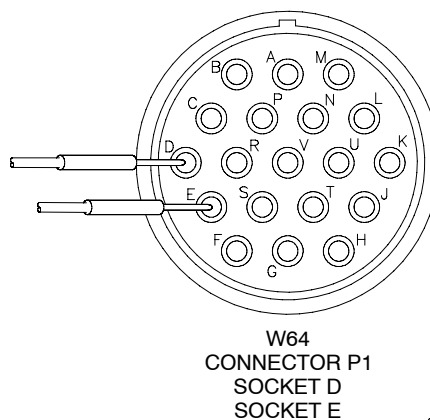
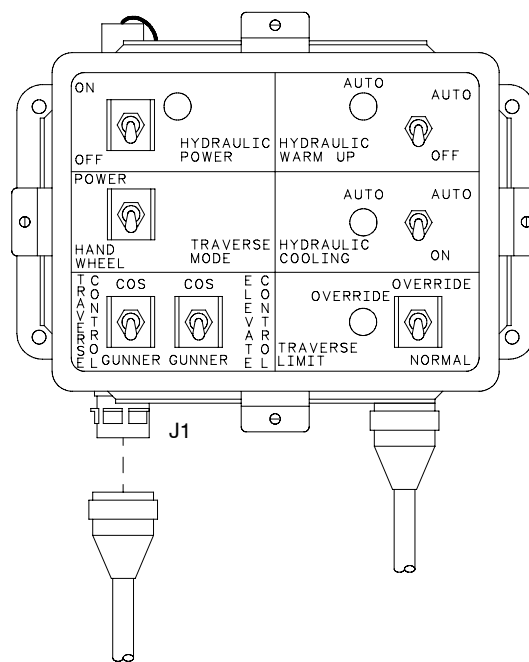
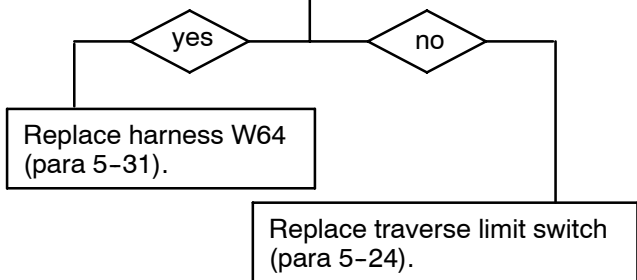
- C**
1. Turn HYDRAULIC POWER switch OFF (TM 9-2350-314-10).
  2. Shut off engine and place vehicle MASTER power switch in the OFF position (TM 9-2350-314-10).
  3. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
  4. Check harness W64 for continuity by placing one multimeter lead in harness W64 connector P1 socket D and other lead in harness W64 connector P1 socket E.

Is continuity present?



- D**
1. Disconnect wires TLS and TLS-A at the traverse limit switch.
  2. Check harness W64 for continuity by placing one multimeter lead of harness W64 connector P1 socket D and placing the other lead in harness W64 connector P1 socket E.

Is continuity present?



03pc068t

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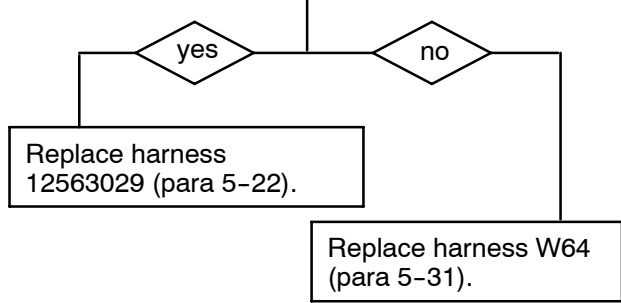
### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (9) INABILITY TO POWER TRAVERSE BEFORE 45° LIMIT. Traverse limit light is on. - CONTINUED

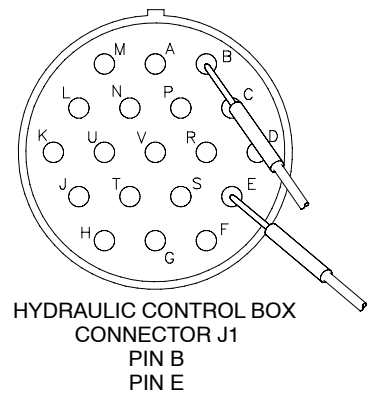
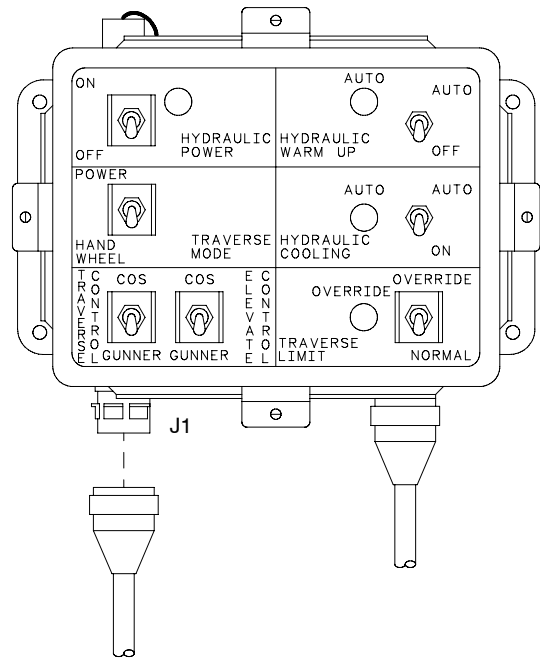
CONTINUED FROM STEP C

**E** Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and other lead on hydraulic control box connector J1 pin E.

Is continuity present?



END OF TASK



HYDRAULIC CONTROL BOX  
CONNECTOR J1  
PIN B  
PIN E

03pc099t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (10) INABILITY TO TRAVERSE WITH GUNNER'S CONTROL HANDLE. COS traverse control is available and AFCS control is normal.

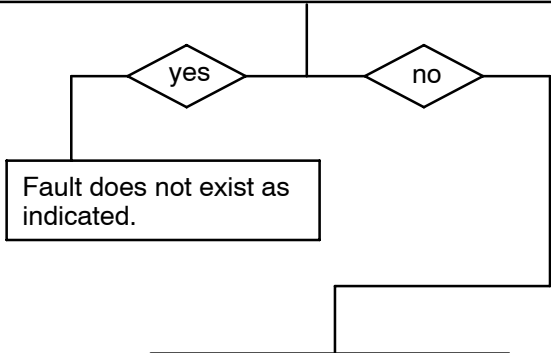
INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

Prior to starting this tree, ensure that the velocity fuse is reset (para 18-46).

- A**
1. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  2. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  3. Turn TRAVERSE MODE switch to the POWER position (TM 9-2350-314-10).
  4. Turn TRAVERSE CONTROL switch to the GUNNER position (TM 9-2350-314-10).
  5. Move GUNNER'S control handle left and right (TM 9-2350-314-10).
- Does cab traverse left or right?



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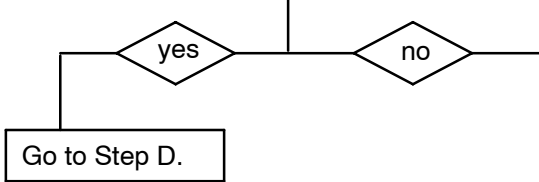
### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (10) INABILITY TO TRAVERSE WITH GUNNER'S CONTROL HANDLE. COS traverse control is available and AFCS control is normal. - CONTINUED

CONTINUED FROM STEP A

**B** Press and hold traverse selector valve override pushbutton while moving gunner's handle left and right (TM 9-2350-314-10).

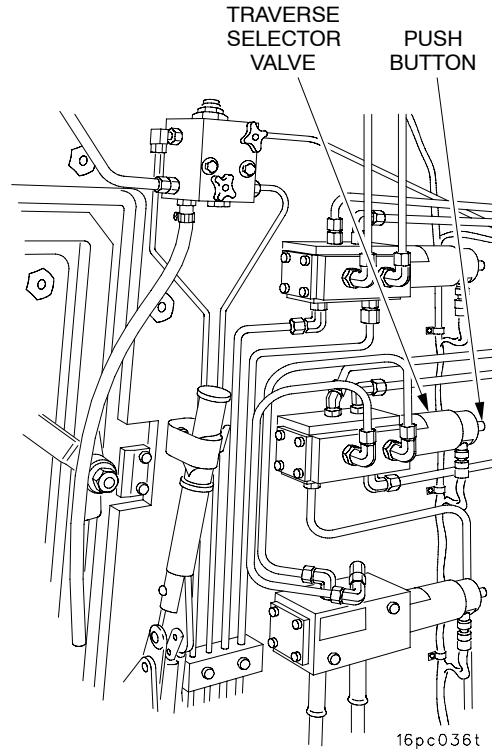
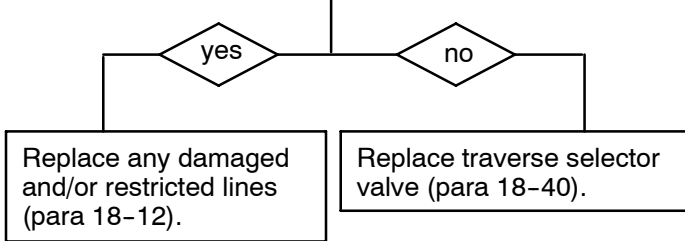
Does cab traverse?



**C**

1. Inspect hydraulic line from TR port on gunner's control to LE port of traverse selector manifold for restriction and/or damage (para 18-12).
2. Inspect hydraulic line 12563077B from TL port on gunner's control to LD port of traverse selector manifold for restriction and/or damage (para 18-12).

Are any lines damaged and/or restricted?



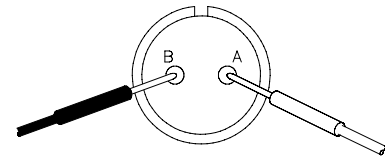
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

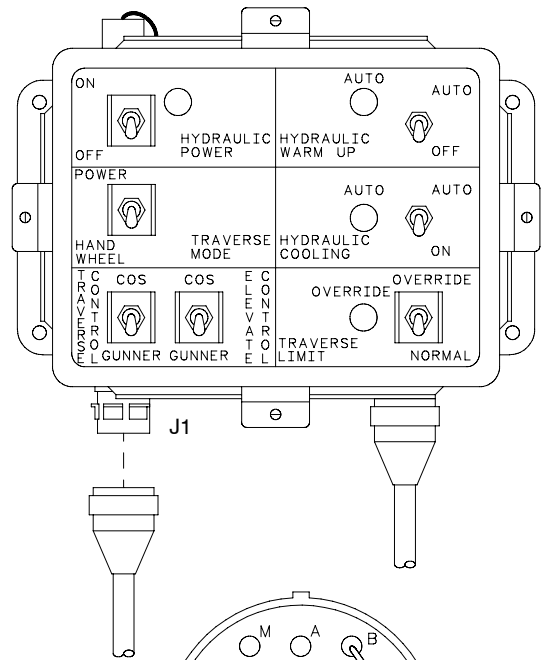
I. TRAVERSE - CONTINUED (10) INABILITY TO TRAVERSE WITH GUNNER'S CONTROL HANDLE. COS traverse control is available and AFCS control is normal. - CONTINUED

CONTINUED FROM STEP B

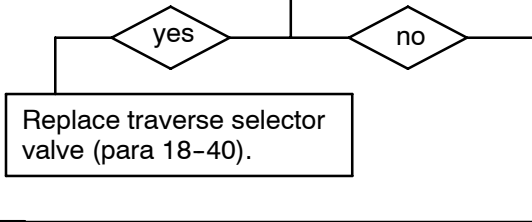
- D**
1. Turn HYDRAULIC POWER switch OFF and shut off engine (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Disconnect harness W64 connector P6 from the traverse selector valve.
  4. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  5. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  6. Turn TRAVERSE CONTROL switch to the GUNNER position (TM 9-2350-314-10).
  7. Check harness W64 for voltage by placing multimeter red lead in harness W64 connector P6 socket A and black lead in harness W64 connector P6 socket B.
  8. Check for voltage.



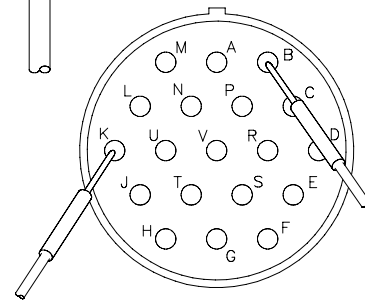
W64  
CONNECTOR P6  
SOCKET A  
SOCKET B



Is voltage present?



- E**
1. Turn HYDRAULIC POWER switch OFF and shut off engine (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
  4. Turn HYDRAULIC POWER switch ON and turn TRAVERSE CONTROL switch to GUNNER position (TM 9-2350-314-10).
  5. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and other lead on hydraulic control box connector J1 pin K.



HYDRAULIC CONTROL BOX  
CONNECTOR J1  
PIN B  
PIN K

03pc090t

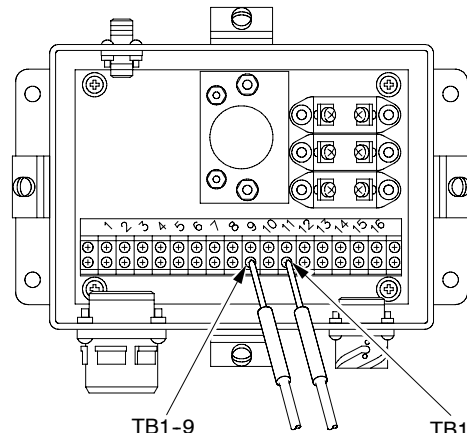
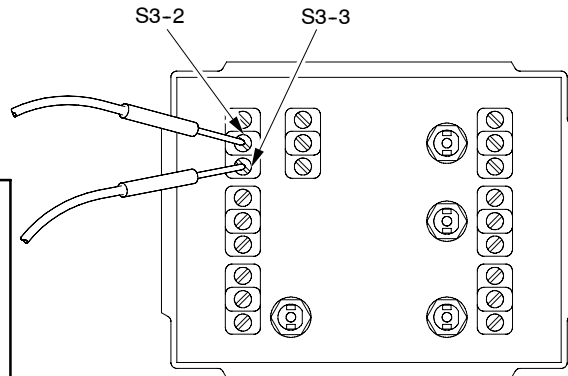
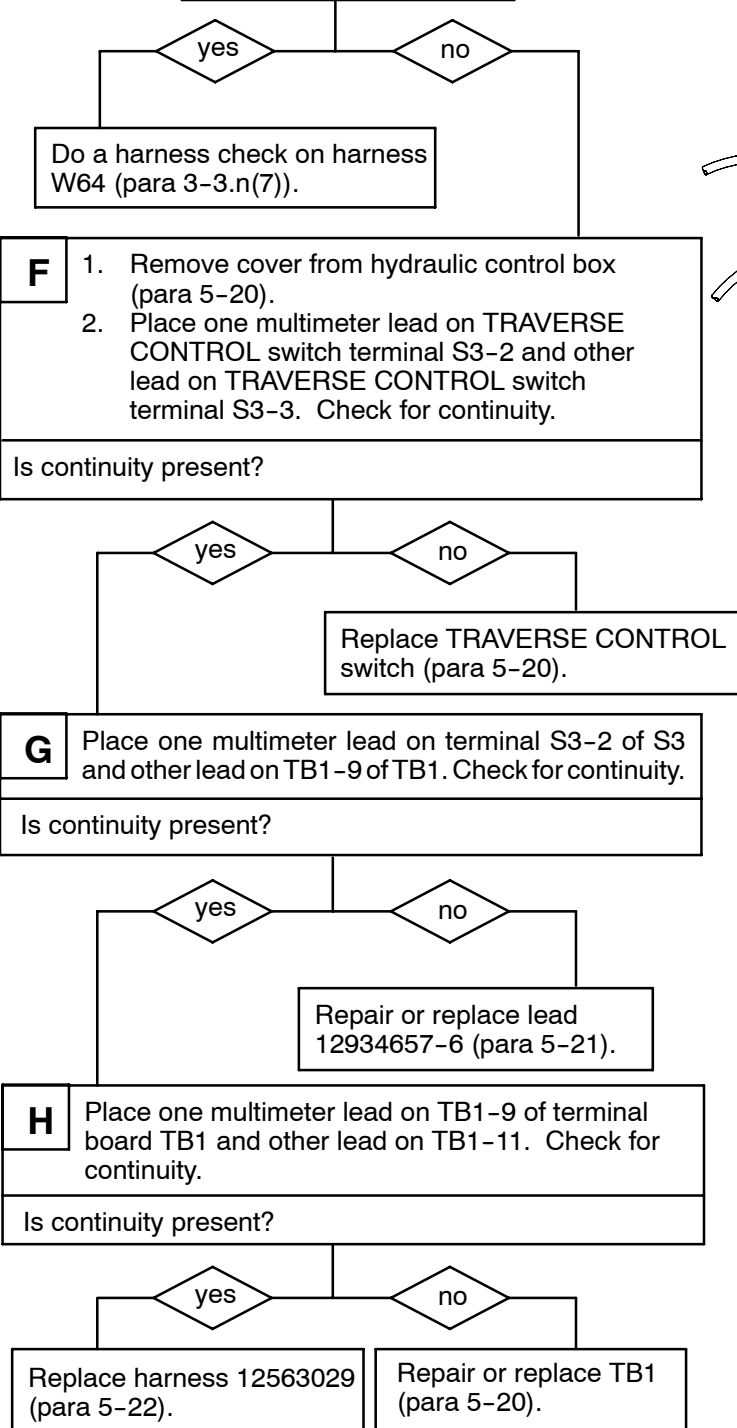
Is continuity present?

CONTINUED ON NEXT PAGE

# 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (10) INABILITY TO TRAVERSE WITH GUNNER'S CONTROL HANDLE. COS traverse control is available and AFCS control is normal. - CONTINUED

CONTINUED FROM STEP E



03pc104t

**END OF TASK**



### 3-3. TROUBLESHOOTING CHART - CONTINUED

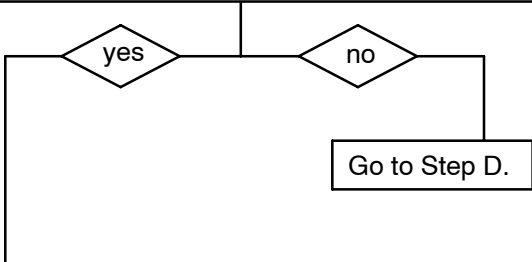
I. TRAVERSE - CONTINUED (11) CAB TRAVERSES PAST 45° LIMIT USING COS AND GUNNER'S CONTROL.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

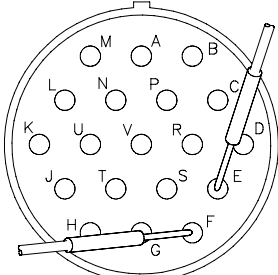
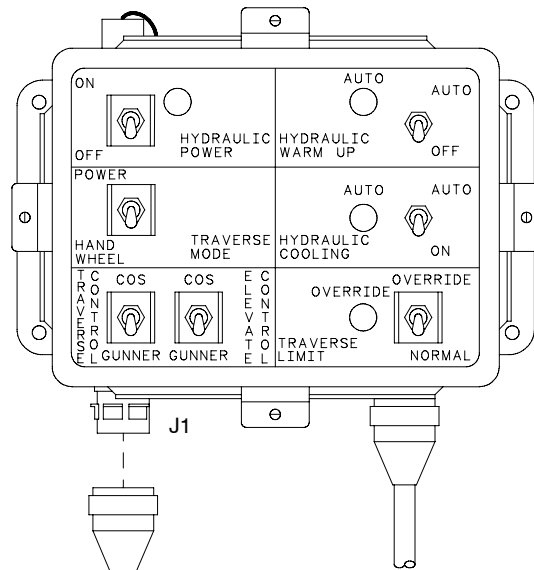
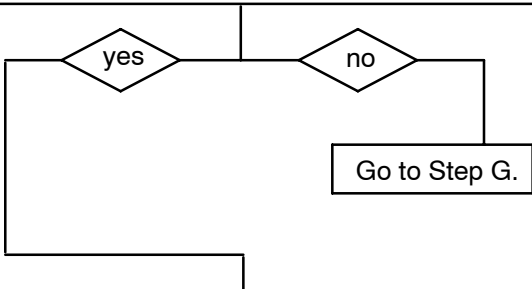
- A**
1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  2. Start engine (TM 9-2350-314-10).
  3. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  4. Take cannon out of travel lock and unlock cab traverse lock (TM 9-2350-314-10).
  5. Traverse cab past 45° limit.

Is traverse limit lamp lit?



- B**
1. Turn HYDRAULIC POWER switch OFF and shut off engine (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
  4. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin E and other lead on hydraulic control box connector J1 pin F.

Is continuity present?



HYDRAULIC CONTROL BOX  
 CONNECTOR J1  
 PIN E  
 PIN F

03pc118t

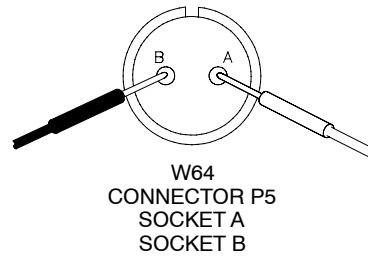
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

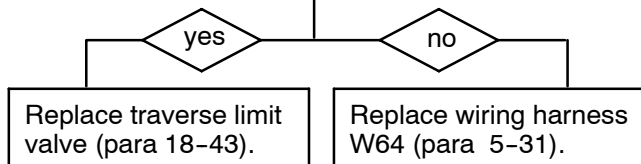
I. TRAVERSE - CONTINUED (11) CAB TRAVERSES PAST 45° LIMIT USING COS AND GUNNER'S CONTROL. - CONTINUED

CONTINUED FROM STEP B

- C**
1. Reconnect harness W64 connector P1 to hydraulic control box connector J1.
  2. Disconnect harness W64 connector P5 from traverse limit solenoid.
  3. Check harness W64 for voltage by placing multimeter red lead on harness W64 connector P5 socket A and black lead in harness W64 connector P5 socket B.
  4. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  5. Turn HYDRAULIC POWER switch ON (TM 9-2350-314-10).
  6. Check for voltage.

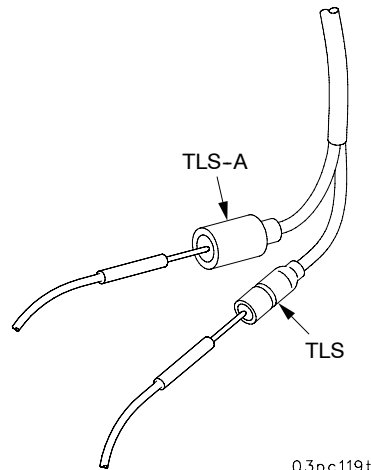


Is voltage present?

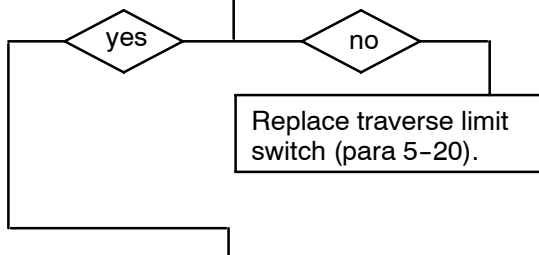


CONTINUED FROM STEP A

- D**
1. Turn HYDRAULIC POWER switch OFF and shut off engine (TM 9-2350-314-10).
  2. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  3. Disconnect harness W64 connectors TLS and TLS-A from traverse limit switch.
  4. Check traverse limit switch for continuity by placing one multimeter lead in traverse limit switch terminal TLS lead and by placing the other lead in traverse limit switch terminal TLS-A lead.



Is continuity present?



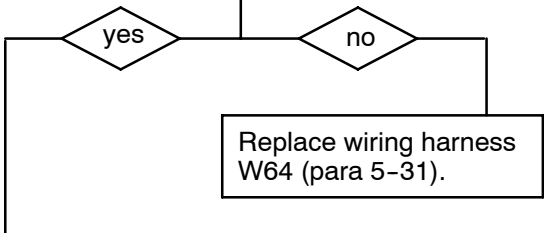
# 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (11) CAB TRAVERSES PAST 45° LIMIT USING COS AND GUNNER'S CONTROL. - CONTINUED

CONTINUED FROM STEP D

**E** Perform a harness check on harness W64 (para 3-3.n(7)).

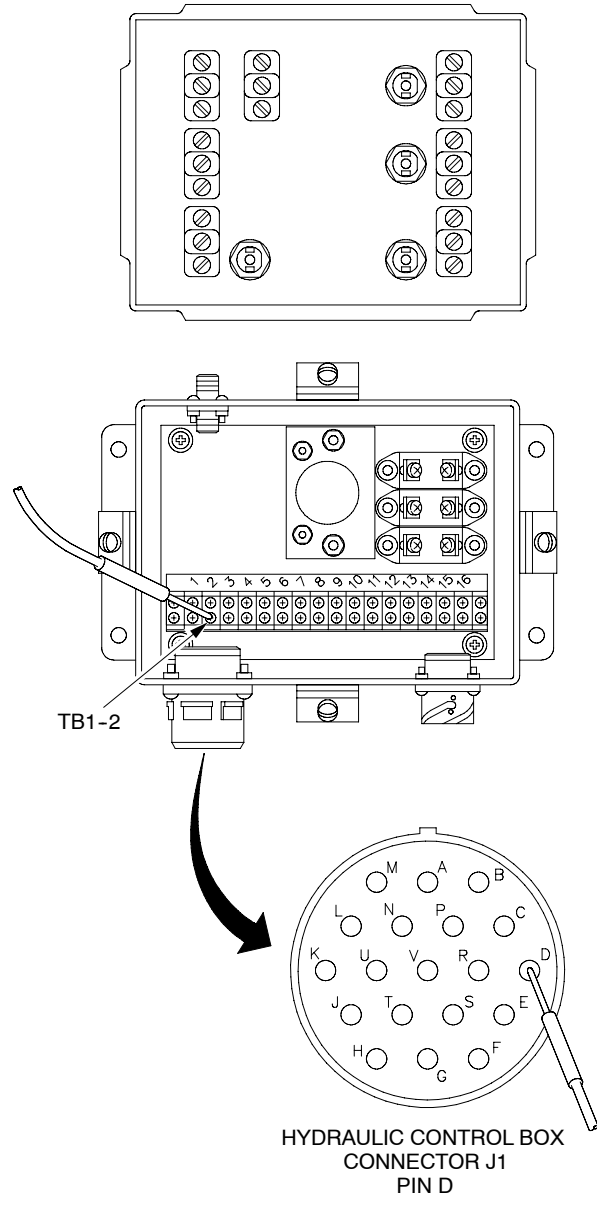
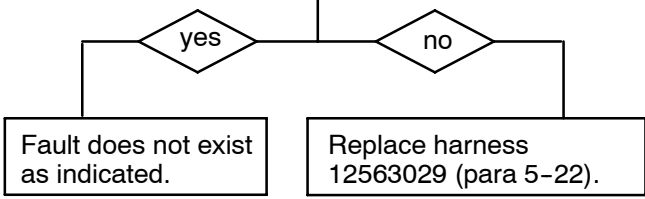
Is harness W64 good?



**F**

1. Remove cover from hydraulic control box (para 5-20).
2. Make sure all screws on terminal board 1 (TB1) are tight.
3. Check harness 12563029 for continuity by placing one multimeter lead on hydraulic control box connector J1 pin D and other lead on terminal board 1 terminal 2 TLS connector (TB1-2).

Is continuity present?



CONTINUED ON NEXT PAGE

03pc121t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

I. TRAVERSE - CONTINUED (11) CAB TRAVERSES PAST 45° LIMIT USING COS AND GUNNER'S CONTROL. - CONTINUED

CONTINUED FROM STEP B

**G** 1. Remove cover from hydraulic control box (para 5-20).  
 2. Check lead TLS-A for continuity by placing one multimeter lead on hydraulic control box connector J1 pin E and other lead on switch 7 terminal 2 (S7-2).

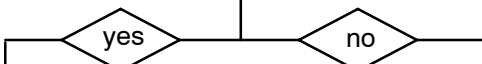
Is continuity present?



Repair or replace lead TLS-A in harness 12563029 (para 5-22).

**H** Check lead TL-SOL for continuity by placing one multimeter lead on hydraulic control box connector J1 pin F and other lead on switch 7 terminal 3 (S7-3).

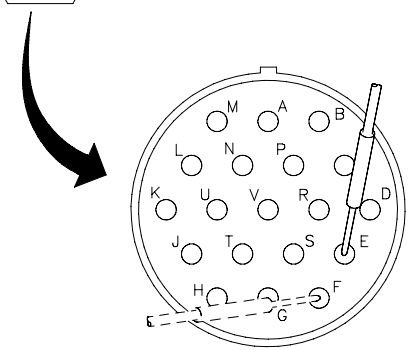
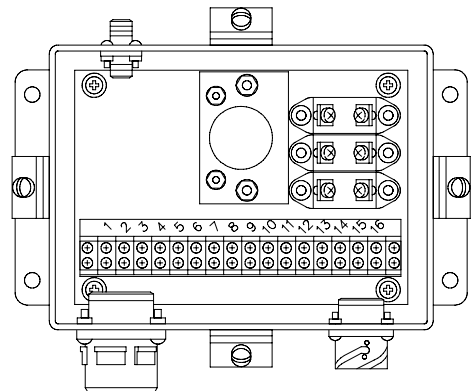
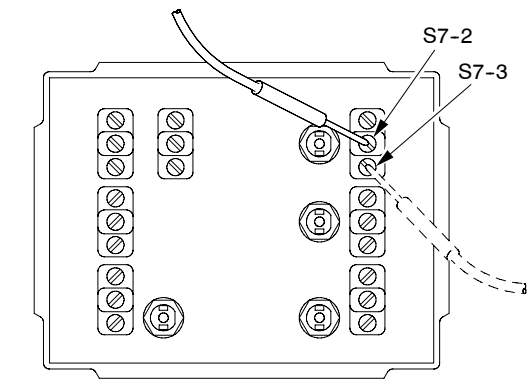
Is continuity present?



Replace traverse limit switch S7 (para 5-20).

Repair or replace lead TL-SOL in harness 12563029 (para 5-22).

**END OF TASK**



HYDRAULIC CONTROL BOX  
 CONNECTOR J1  
 PIN E  
 (PIN F)

03pc123t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

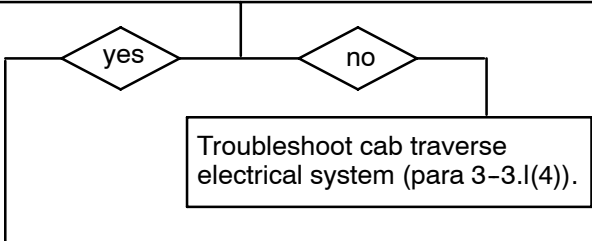
I. TRAVERSE - CONTINUED (12) HANDWHEEL ROTATES WHEN CAB IS TRAVERSED IN POWER.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

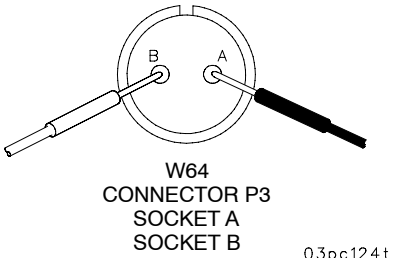
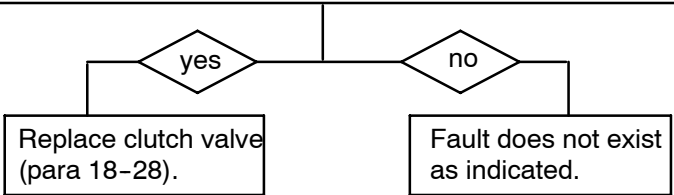
- A**
1. Disconnect harness W64 connector P3 at clutch valve solenoid (para 5-31).
  2. Turn vehicle MASTER power switch ON and start engine (TM 9-2350-314-10).
  3. Turn TRAVERSE MODE switch to POWER (TM 9-2350-314-10).
  4. Place multimeter red lead on harness W64 connector P3 socket B and black lead on harness W64 connector P3 socket A.
  5. Turn HYDRAULIC POWER switch ON and check for voltage (TM 9-2350-314-10).
  6. Remove cannon from travel lock and place cab traverse lock in unlock position (TM 9-2350-314-10).

Is voltage present?



- B**
1. Turn TRAVERSE MODE switch to COS (TM 9-2350-314-10).
  2. Press manual override switch on clutch valve in and traverse cab using COS control handle (TM 9-2350-314-10).

Does handwheel rotate?



**END OF TASK**

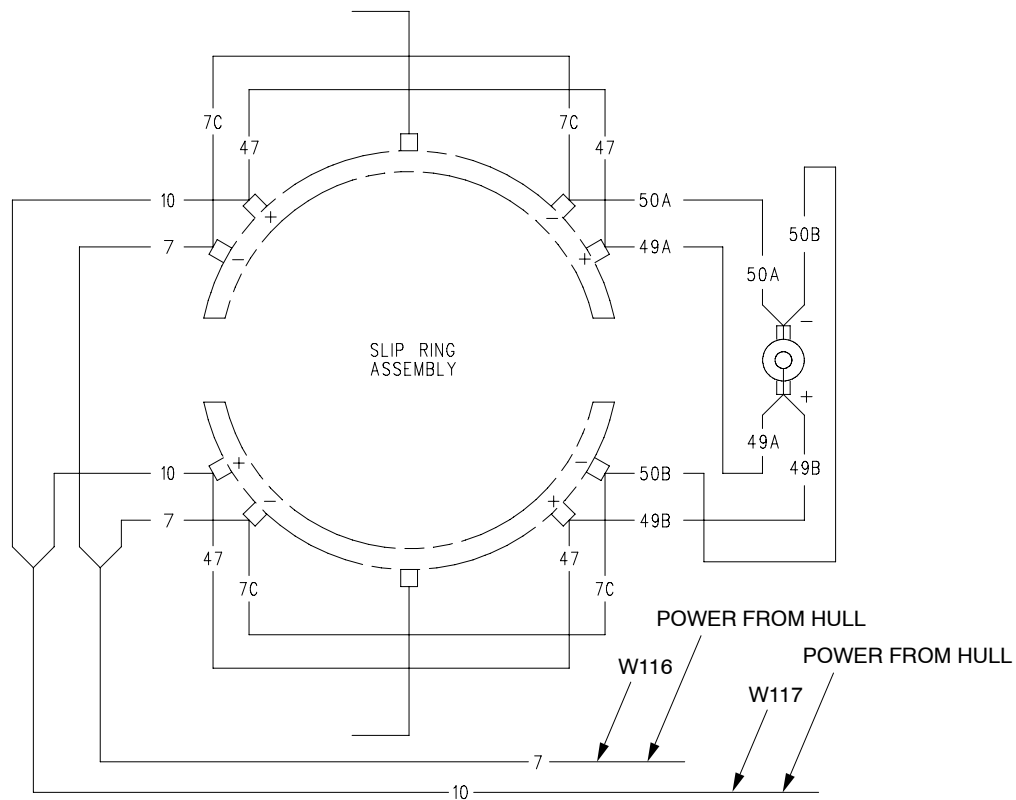


### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### m. CAB POWER

The cab power circuit consists of the vehicle batteries, the master relay, MASTER switch, front and rear NATO slave receptacles, circuit breaker 2, hull slip ring assembly, and related electrical wiring. The diagram below shows the relationship of these components.

When the MASTER switch is on, 24 V dc is supplied from the batteries through the master relay to the hull slip ring providing power to the cab. The cab can also receive power from another vehicle by connecting a slave cable to both vehicle's NATO slave receptacles and turning on the other vehicle's MASTER switch.



03pc120t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

m. CAB POWER - CONTINUED (1) NO POWER TO CAB.

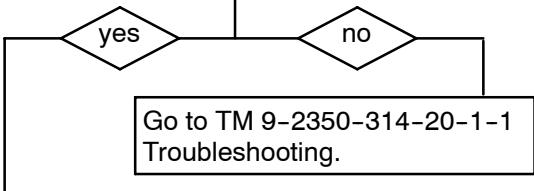
**INITIAL SETUP**

Tools  
 General mechanic's tool kit  
 (SC 5180-90-N26)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A**

1. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
2. Check left segment board for voltage by placing multimeter red lead on harness W117 lead 10 terminal (E5-E6) and black lead on harness W116 lead 7 terminal (E5-E6).

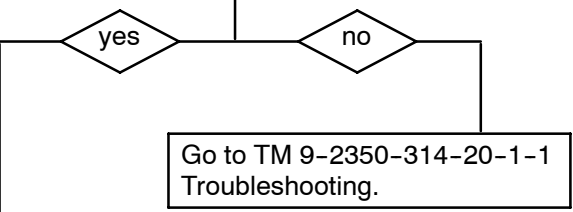
Is voltage present?



**B**

Check the right segment board for voltage by placing multimeter red lead on harness W117 lead 10 terminal (E7-E8) and black lead on harness W116 lead 7 terminal (E7-E8).

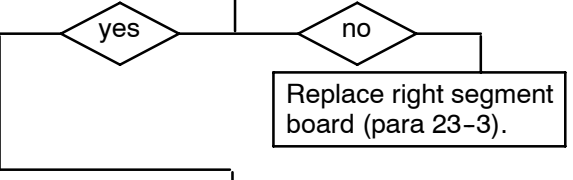
Is voltage present?



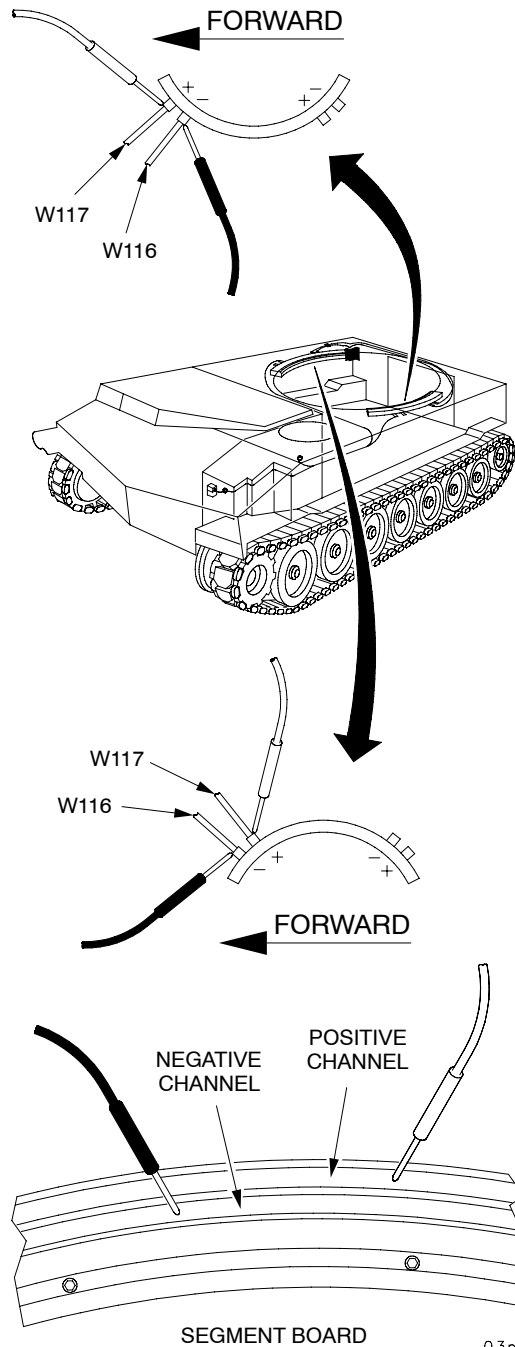
**C**

Check the right segment board power channel for voltage by placing multimeter red lead on positive channel and black lead on negative channel.

Is voltage present?



CONTINUED ON NEXT PAGE





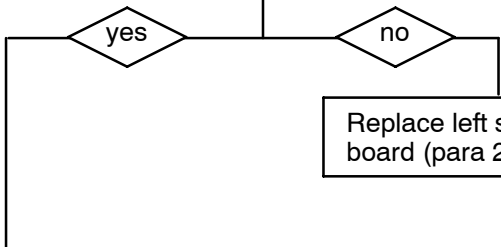
### 3-3. TROUBLESHOOTING CHART - CONTINUED

m. CAB POWER - CONTINUED (1) NO POWER TO CAB. - CONTINUED

CONTINUED FROM STEP C

**D** Check left segment board power channel for voltage by placing multimeter red lead on positive channel and black lead on negative channel.

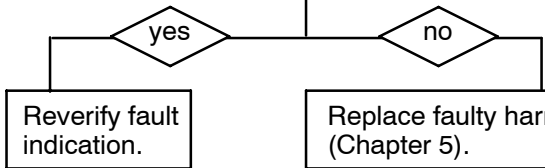
Is voltage present?



Replace left segment board (para 23-3).

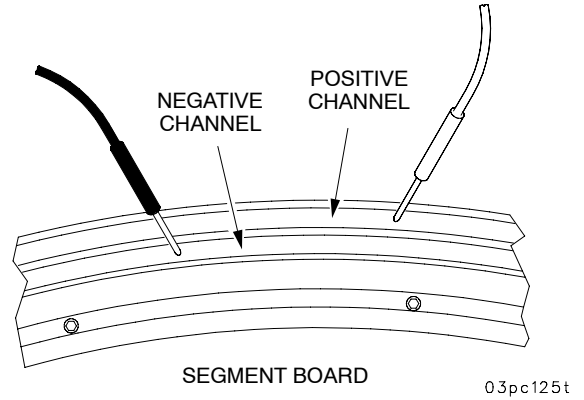
**E** Do a harness check on harnesses W50, W56, W61A, and W62A (paras 3-3.n(15), (13), (12), and (2)).

Are all harnesses good?



Reverify fault indication.

Replace faulty harness(es) (Chapter 5).



END OF TASK



### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### n. WIRING HARNESS SHORTS TEST

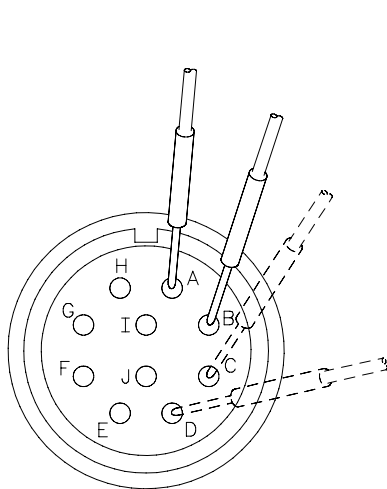
When doing a shorts test, make sure all connectors and/or leads are disconnected from their components. Probe the pins or sockets with a multimeter. This is done by placing the red lead on pin or socket A or 1 and then placing the black lead on the next pin or socket in ascending order. Probe every pin or socket on the connector or lead with the black lead of the multimeter.

When this probing has been completed, place the red lead on the second pin or connector and do the probing with the black lead in order again. Do this until every pin has been probed with the red lead of the multimeter. Then place the black lead of the multimeter on the connector and place the red lead on each pin or socket on the connector.

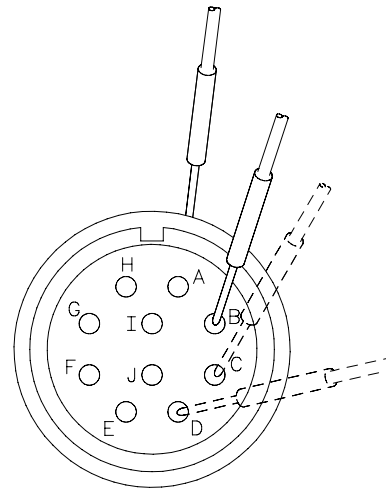
If continuity is present between any two points during probing, a short exists. Shorts must be repaired to continue any operation.

If instructed in a procedure to skip a pin or socket during a shorts test, that is because that pin or socket is not used or is shielded. Those pins or sockets will be covered in separate troubleshooting.

When a repair or replacement of a lead or harness has been done, do the shorts test again to make sure the problem has been corrected.



PIN TO PIN (SOCKET TO SOCKET)  
HARNESS SHORTS TEST



CONNECTOR TO PIN (SOCKET)  
HARNESS SHORTS TEST

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# 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK (1) WIRING HARNESS W52.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

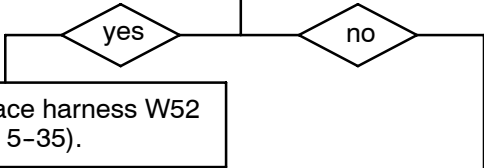
Equipment Conditions  
 Hydraulic compartment door open (TM 9-2350-314-10)

**NOTE**

For harness connector locations, refer to para 5-35.

**A** Visually inspect harness W52 for any cuts, breaks, kinks, or missing segments.

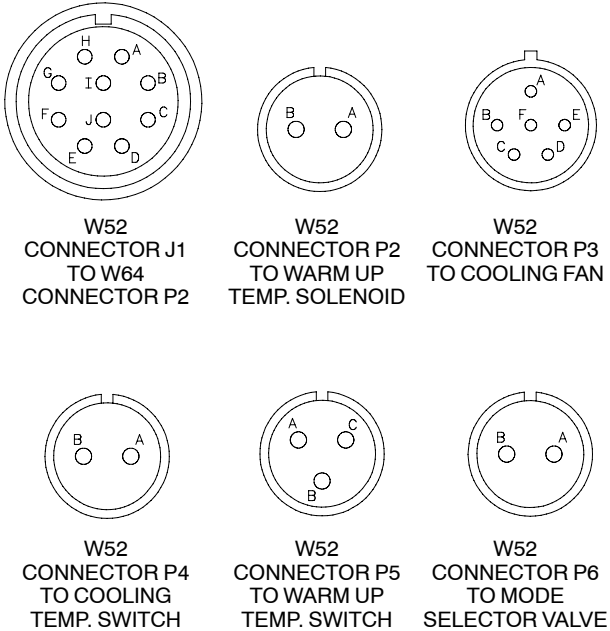
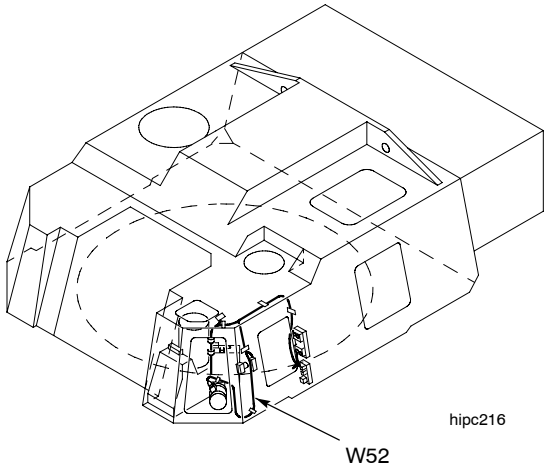
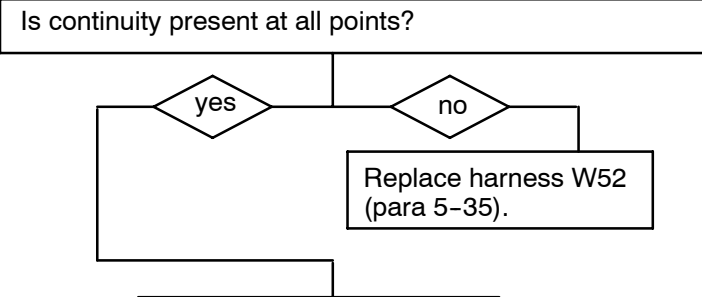
Are there any cuts, breaks, kinks, or missing segments?



**B**

1. Disconnect all leads and connectors of harness W52.
2. Check harness W52 for continuity by placing one multimeter lead on point 1 and other lead on points 2 and 3 (one at a time), as shown in this table.

Point 1	Point 2	Point 3
connector J1 socket A	lead 645	-
connector J1 socket B	connector P6 socket A	-
connector J1 socket C	connector P6 socket B	-
connector J1 socket D	connector P5 socket A	-
connector J1 socket E	connector P5 socket B	connector P2 socket A
connector J1 socket F	connector P4 socket A	
connector J1 socket G	connector P4 socket B	
connector J1 socket H	connector P3 socket A	lead terminal 738
connector J1 socket I	connector P3 socket A	lead terminal 738
connector P2 socket B	GND	-
connector P3 socket B	GND	-

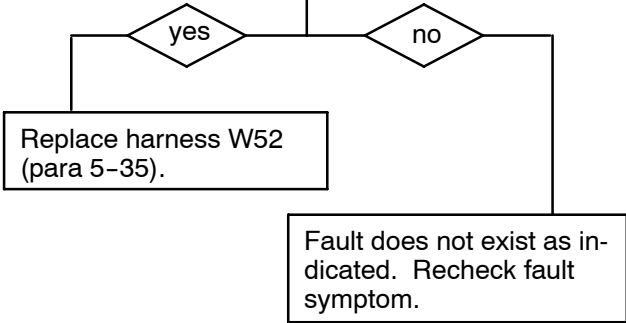


**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (1) WIRING HARNESS W52. - CONTINUED

CONTINUED FROM STEP B

**C** Do a shorts test on harness W52 (para 3-3.n) on all sockets except:  
J1-H, J, I ;  
P3-All.  
Are there any shorts?



**END OF TASK**

# 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (2) WIRING HARNESS W62A.

**INITIAL SETUP**

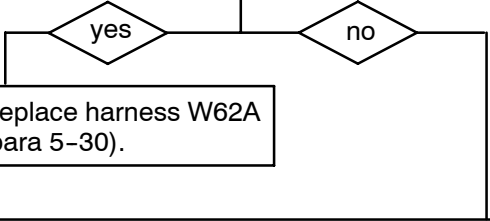
<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Conditions</u>                  Covers for brush blocks 1, 2, 3, and 4 removed (para 23-2)                  Lower shield assembly removed (para 23-1)</p>
---	---

**NOTE**

For harness connector locations, refer to para 5-30.

**A** Visually inspect harness W62A for any cuts, breaks, kinks, or missing segments.

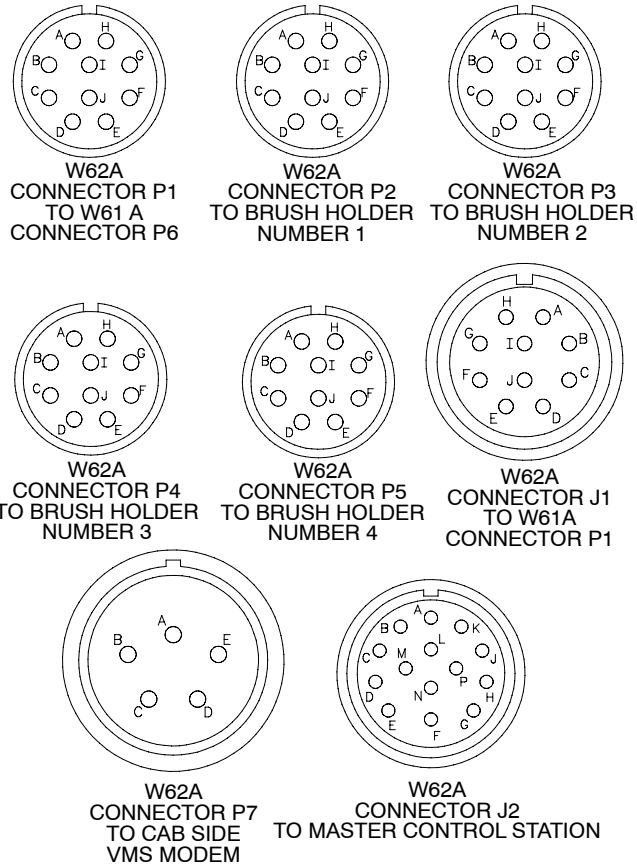
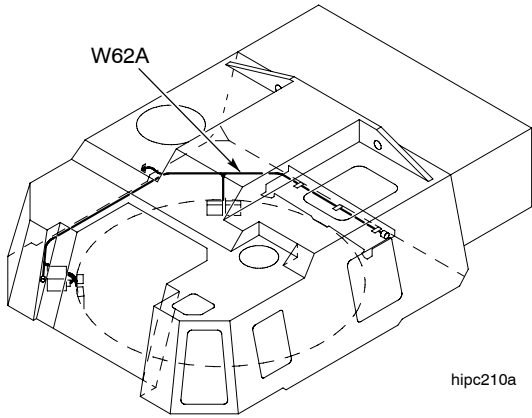
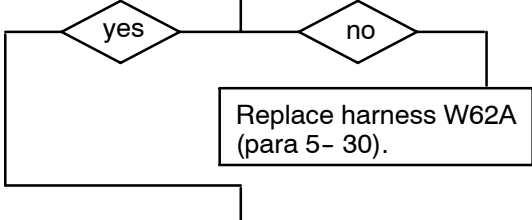
Are there any cuts, breaks, kinks, or missing segments?



**B** Disconnect all harness W62A leads. Check harness W62A for continuity by placing one multimeter lead on point 1 and other lead on points 2 through 7 (one at a time), as shown on this table.

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7
P1-A	P2-A	P3-A	P4-A	P5-A	J1-A	J2-B
-	-	P3-C	-	P5-C	J1-C	J2-A
-	-	P3-E	-	P5-E	J1-E	J2-C
P1-G	P2-G	P3-G	P4-G	P5-G	J1-G	P7-C
P1-H	P2-H	P3-H	P4-H	P5-H	J1-H	P7-D
J2-N	LEAD 70	P7-B	-	-	-	-
P7-A	LEAD 100	-	-	-	-	-

Is continuity present at all points?

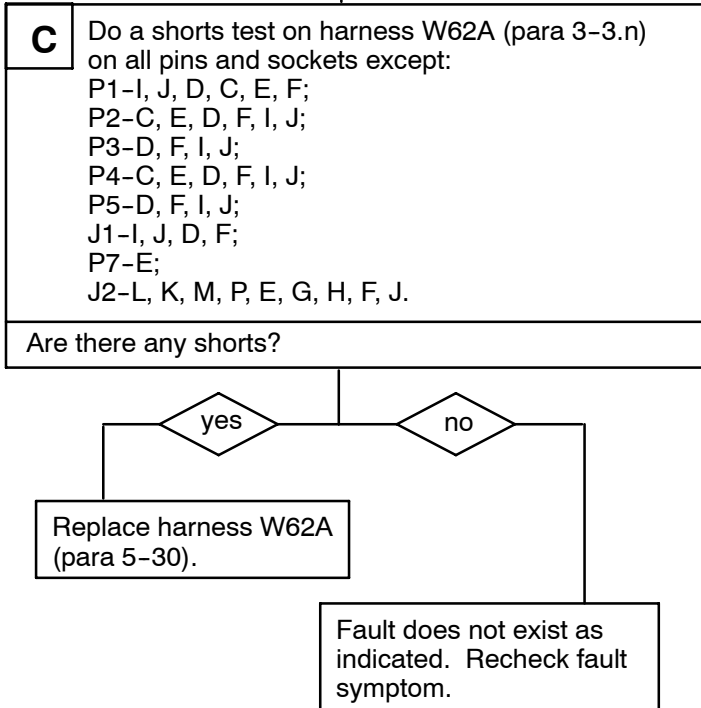


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (2) WIRING HARNESS W62A. - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (3) WIRING HARNESS W58.

**INITIAL SETUP**

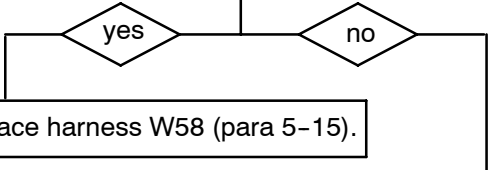
<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  MCS compartment open (TM 9-2350-314-10)</p>
---	--

**NOTE**

For harness connector locations, refer to para 5-15.

**A** Visually inspect harness W58 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

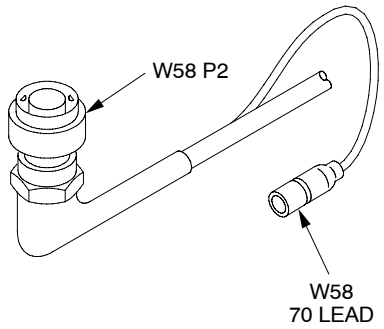
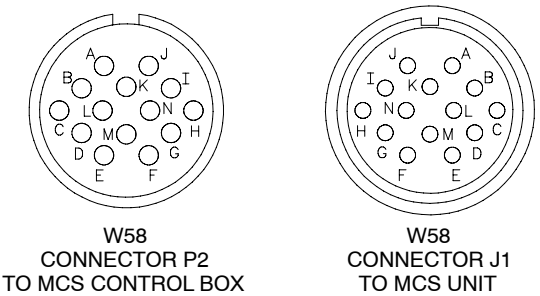
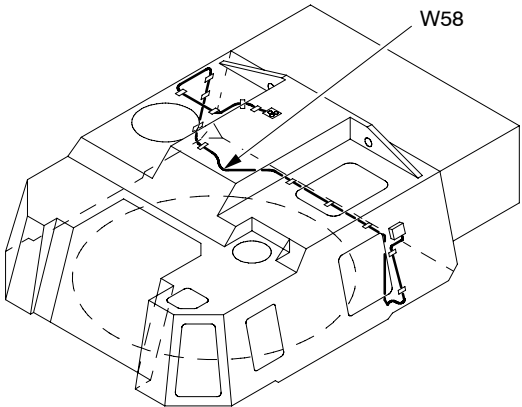
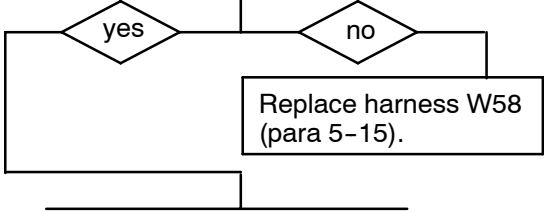


**B**

1. Disconnect all harness W58 connectors (J1 and P2).
2. Check harness W58 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector J1 pin A	connector P2 socket A
connector J1 pin B	connector P2 socket B
connector J1 pin C	connector P2 socket C
connector J1 pin D	connector P2 socket D
connector J1 pin E	connector P2 socket E
connector J1 pin F	connector P2 socket F
connector J1 pin G	connector P2 socket G
connector J1 pin H	connector P2 socket H
connector J1 pin I	lead 70 connector

Is continuity present?



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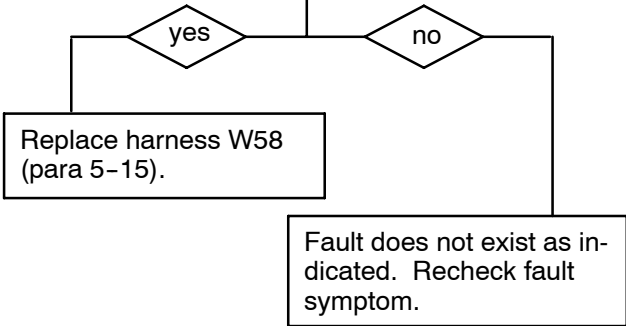
**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (3) WIRING HARNESS W58. - CONTINUED

CONTINUED FROM STEP B

**C** Do a shorts test on harness W58 (para 3-3.n) on all leads, pins and sockets except:  
J1-J, K, L, M, N;  
P2-J, K, L, M, N.

Are there any shorts?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (4) WIRING HARNESS W53.

**INITIAL SETUP**

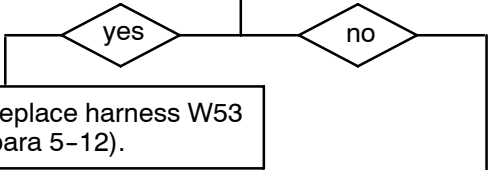
<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  Hydraulic compartment door open (TM 9-2350-314-10)                  Hydraulic compartment access panel removed (TM 9-2350-314-10)</p>
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**NOTE**

For harness connector locations, refer to para 5-12.

**A** Visually inspect harness W53 for any cuts, breaks, kinks, or missing segments.

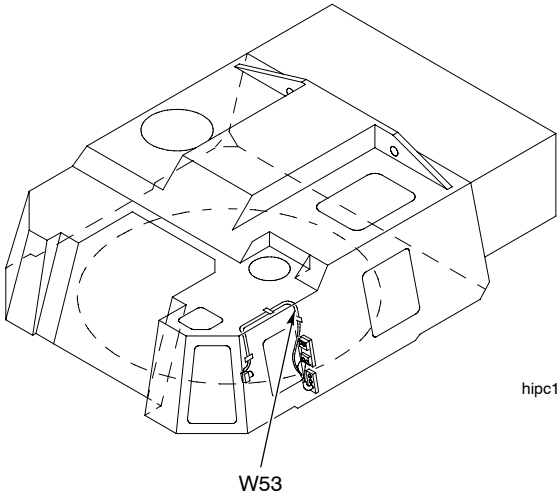
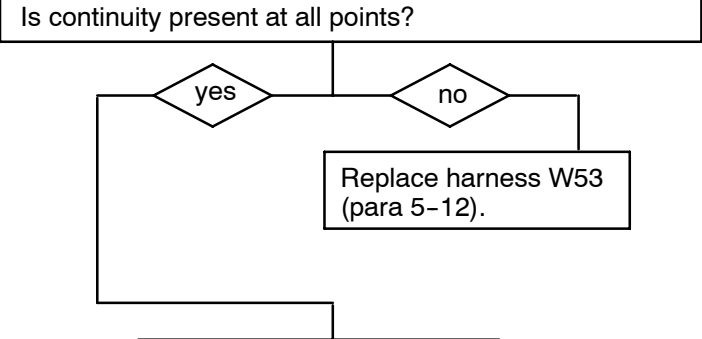
Are there any cuts, breaks, kinks, or missing segments?



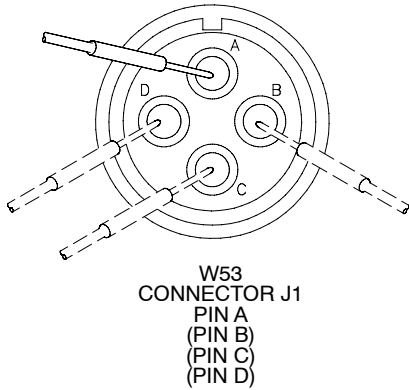
**B**

1. Disconnect all harness W53 leads and connectors.
2. Check harness W53 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector J1 pin A	lead terminal 100
connector J1 pin B	lead terminal 100
connector J1 pin C	lead terminal 70
connector J1 pin D	lead terminal 70



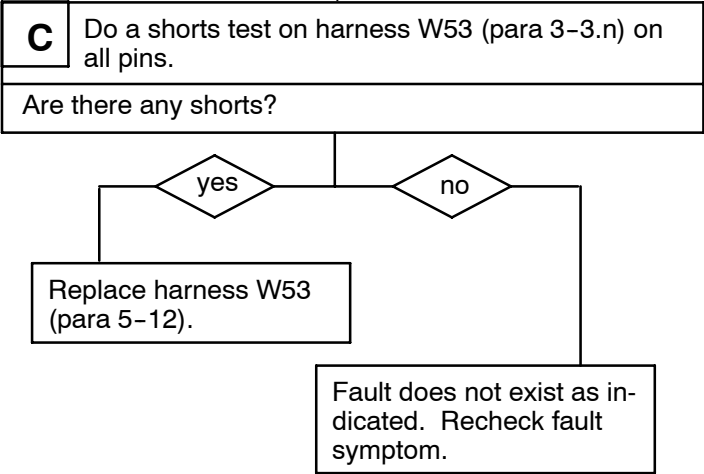
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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (4) WIRING HARNESS W53. - CONTINUED

CONTINUED FROM STEP B



END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (5) WIRING HARNESS W60.

**INITIAL SETUP**

<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  Hydraulic compartment door open (TM 9-2350-314-10)</p>
---	---

**NOTE**

For harness connector locations, refer to para 5-34.

**A** Visually inspect harness W60 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?



Replace harness W60 (para 5-34).

**B**

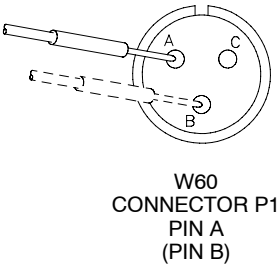
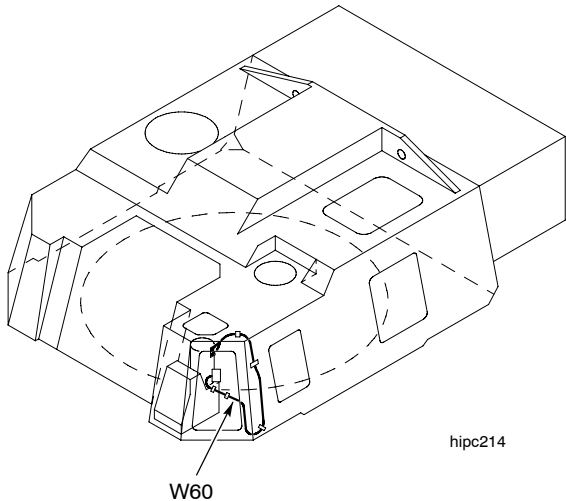
1. Disconnect all harness W60 leads and connectors.
2. Check harness W60 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector P1 pin A	lead terminal 135
connector P1 pin B	lead terminal 136

Is continuity present at all points?



Replace harness W60 (para 5-34).

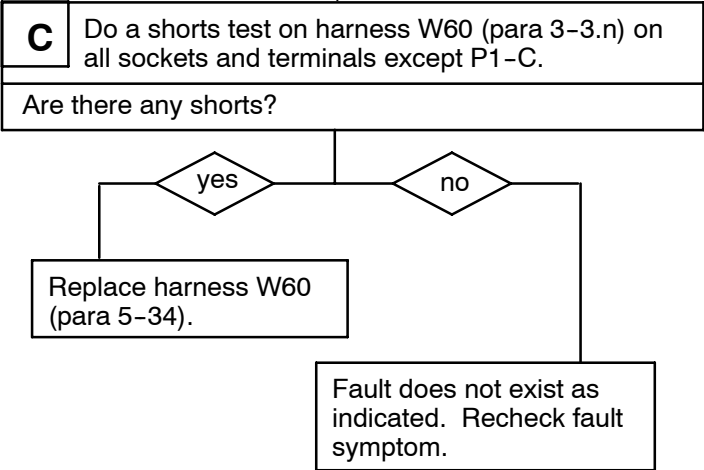


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (5) WIRING HARNESS W60. - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (6) WIRING HARNESS W59.

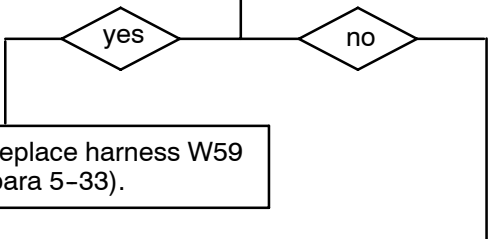
<p><b>INITIAL SETUP</b></p> <p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  Hydraulic compartment door open (TM 9-2350-314-10)                  Hydraulic compartment side access panel removed (TM 9-2350-314-10)</p>
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**NOTE**

For harness connector locations, refer to para 5-33.

**A** Visually inspect harness W59 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

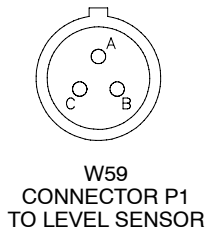
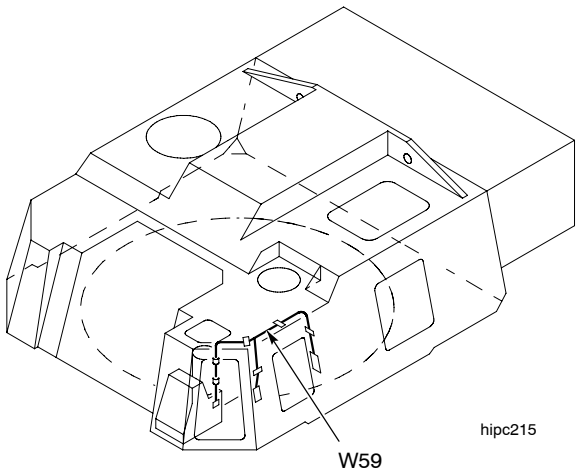
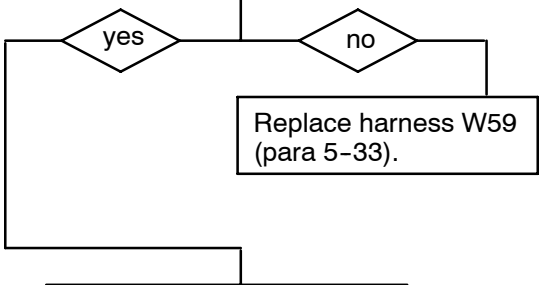


**B**

1. Disconnect all harness W59 leads and connectors.
2. Check harness W59 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table:

<u>Point 1</u>	<u>Point 2</u>
connector P1 pin A	lead terminal 645C
connector P1 pin B	lead terminal 660
connector P1 pin C	lead terminal 70

Is continuity present at all points?

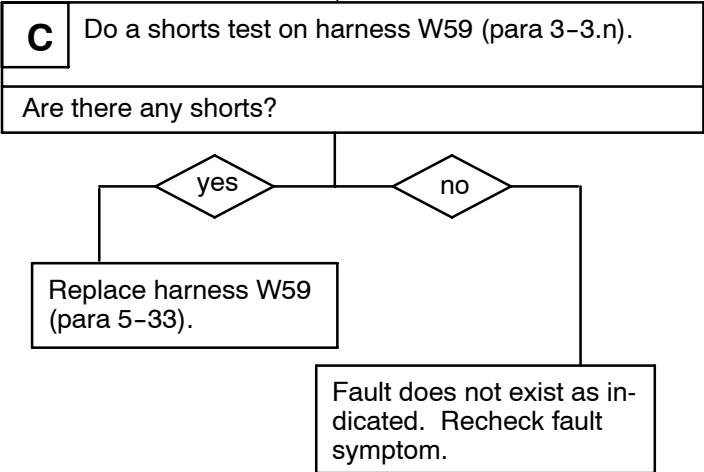


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (6) WIRING HARNESS W59. - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

# 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (7) WIRING HARNESS W64.

**INITIAL SETUP**

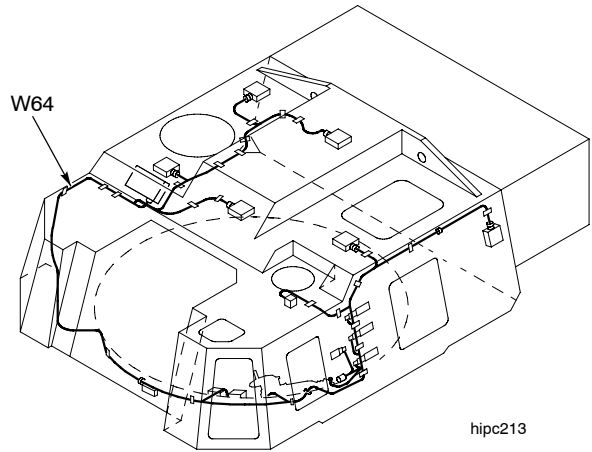
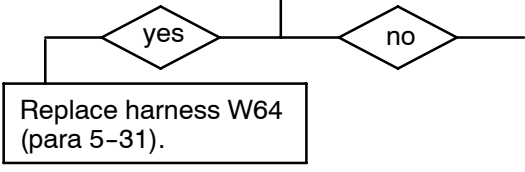
Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

For harness connector locations, refer to para 5-31.

**A** Visually inspect harness W64 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

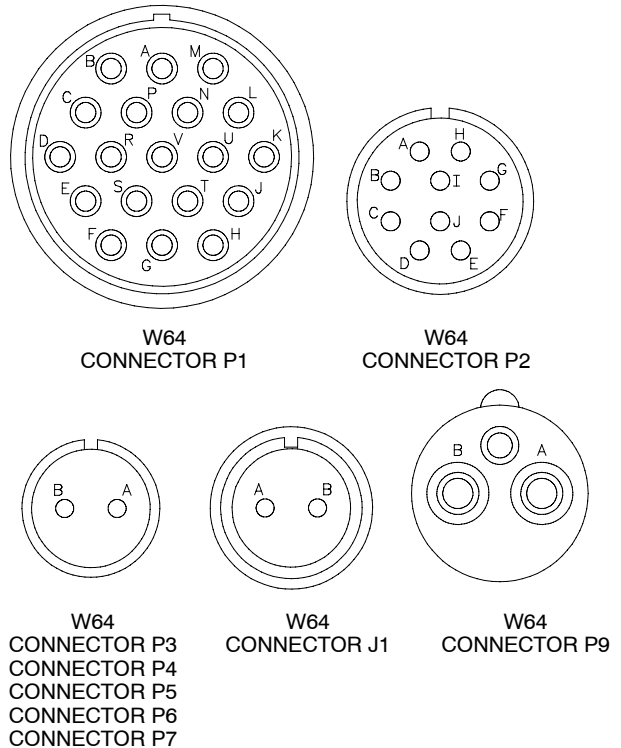


**B** Disconnect all harness W64 connections and check harness W64 for continuity by placing one multimeter lead on point 1 and other lead on points 2 thru 7 (one at a time) as shown in this table.

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7
P1-L	P2-A	-	-	-	-	-
P1-N	P2-D	-	-	-	-	-
P1-P	P2-E	-	-	-	-	-
P1-S	P2-F	-	-	-	-	-
P1-V	P2-G	-	-	-	-	-
P1-T	P2-I	P2-H	-	-	-	-
P1-G	P3-B	-	-	-	-	-
P1-R	P3-A	P7-A	-	-	-	-
P1-H	P7-B	-	-	-	-	-
P1-C	*138	panoramic scope	-	-	-	-
P1-M	**GND	***	**70	P6-B	P5-B	P4-B
P1-J	P4-A	-	-	-	-	-
P1-F	P5-A	-	-	-	-	-
P1-K	P6-A	-	-	-	-	-
P1-E	TLS-A	-	-	-	-	-
P1-D	TLS	-	-	-	-	-
P1-B	**100	-	-	-	-	-
P2-C	J1-A	-	-	-	-	-
P2-B	J1-B	-	-	-	-	-

\*=Disconnect at all six dome lights.  
 \*\*=Disconnect at brush block #8.  
 \*\*\*=Panoramic scope and all six dome lights.

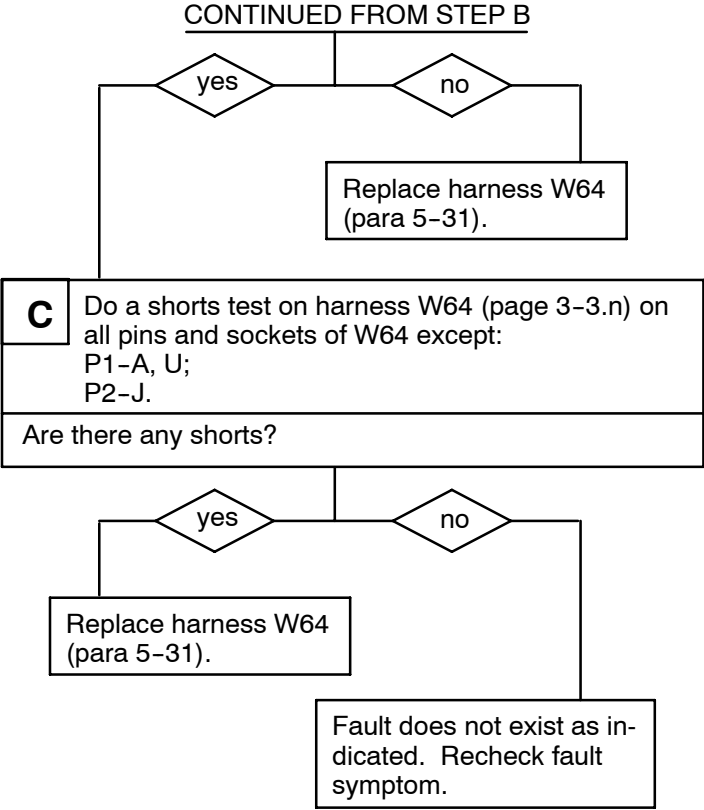
Is continuity present at all points?





**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (7) WIRING HARNESS W64. - CONTINUED



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (8) WIRING HARNESS W54.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

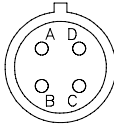
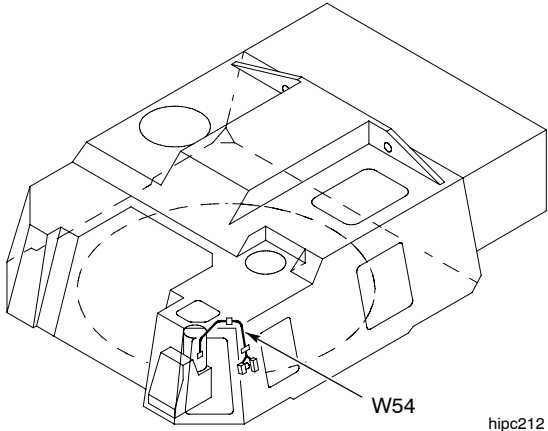
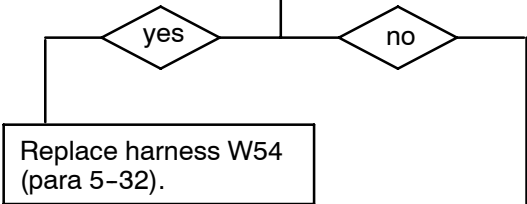
Equipment Condition  
 Hydraulic compartment top access cover removed (TM 9-2350-314-10)  
 Hydraulic compartment access door open (TM 9-2350-314-10)

**NOTE**

For harness connector locations, refer to para 5-32.

**A** Visually inspect harness W54 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

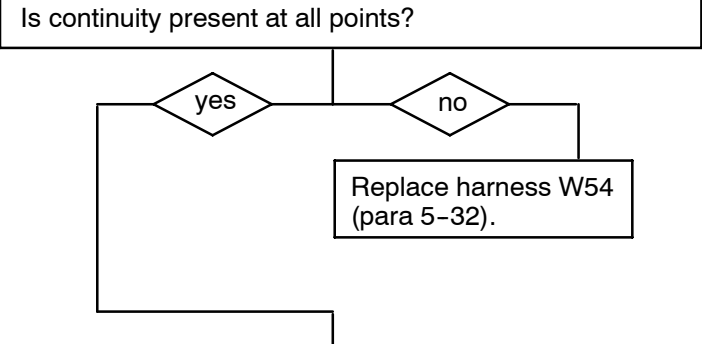


W54  
 CONNECTOR P1  
 TO HYDRAULIC PUMP  
 DC MOTOR

**B**

1. Disconnect all harness W54 leads and connectors.
2. Check harness W54 for continuity by placing one multimeter lead on point 1 and other lead on points 2 and 3 (one at a time), as shown in this table.

Point 1	Point 2	Point 3
connector P1 pin A connector P1 pin B	lead terminal 645A lead terminal 645B	lead terminal 780

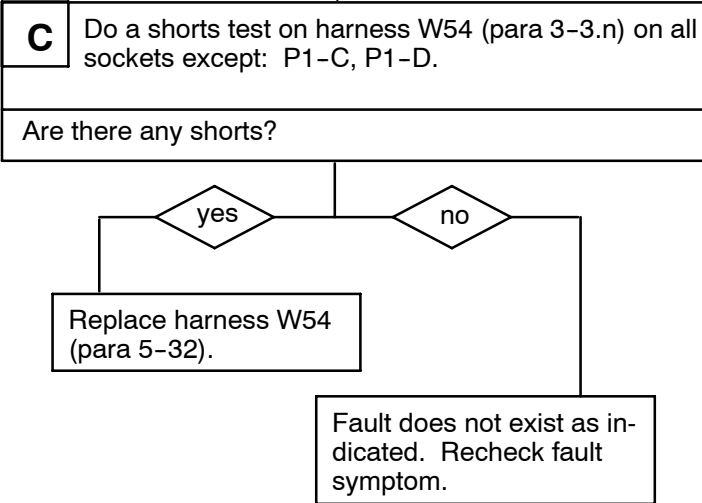


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (8) WIRING HARNESS W54. - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

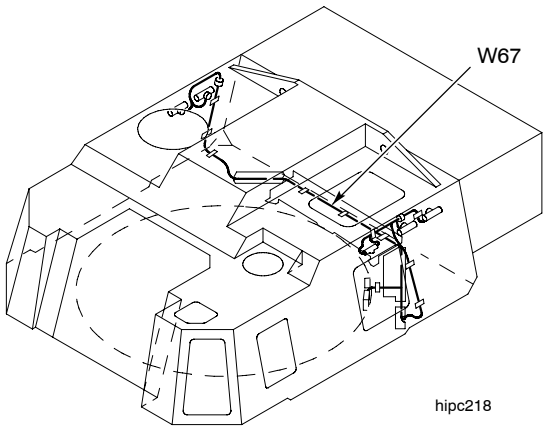
n. WIRING HARNESS CHECK - CONTINUED (9) WIRING HARNESS W67.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

For harness connector locations, refer to para 5-37.



**A** Visually inspect harness W67 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?



Replace harness W67 (para 5-37).

**B**

1. Disconnect harness W67 leads from the NBC heaters, brushblock #5, circuit breaker #1, and circuit breaker #2.
2. Check harness W67 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

<u>Point 1</u>	<u>Point 2</u>
brush block #6 wire 24	circuit breaker #1 wire 24
brush block #6 wire 24	circuit breaker #2 wire 24
interlock control A1 HTR1S2	heater #1 HTR1
interlock control A1 HTR1S2	heater #2 HTR2
interlock control B1 HTR3S4	heater #3 HTR3
interlock control B1 HTR3S4	heater #4 HTR4
brush block #6 wire 70	heater #1 wire 70
brush block #6 wire 70	heater #2 wire 70
brush block #6 wire 70	heater #3 wire 70
brush block #6 wire 70	heater #4 wire 70

Is continuity present at all points?



Fault does not exist as indicated. Recheck fault symptom.

Replace harness W67 (para 5-37).

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (10) WIRING HARNESS W55.

**INITIAL SETUP**

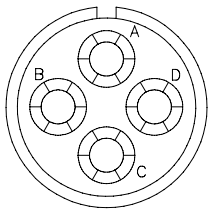
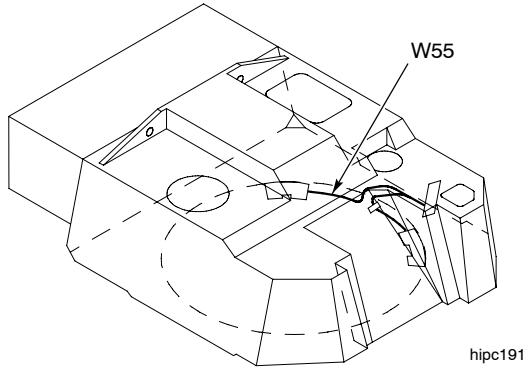
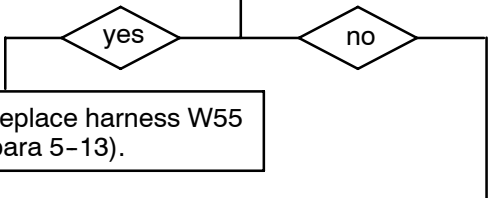
<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  Shields removed from brush holders 7 and 8 (para 23-2)                  Harness W55 connector P1 disconnected from harness W53 connector P1 (para 5-13)</p>
---	--

**NOTE**

For harness connector locations, refer to para 5-13.

**A** Visually inspect harness W55 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

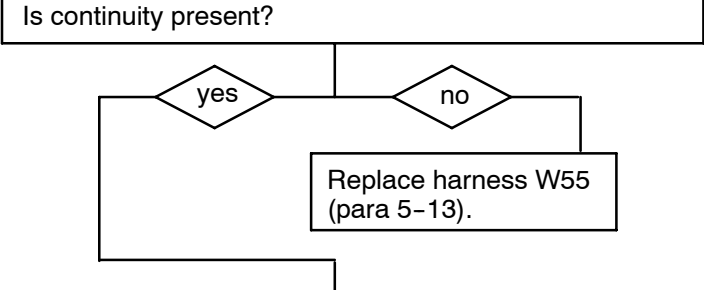


W55  
CONNECTOR P1  
SOCKET A  
(SOCKET B)  
(SOCKET C)  
(SOCKET D)

**B** 1. Disconnect the following harness W55 connections:  
 W55-100 at brush block 7  
 W55-70 at brush block 7  
 W55-100 at brush block 6  
 W55-70 at brush block 6

2. Check harness W55 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

<u>Point 1</u>	<u>Point 2</u>
connector P1 socket A	lead terminal 100 brush holder 7
connector P1 socket B	lead terminal 100 brush holder 6
connector P1 socket C	lead terminal 70 brush holder 7
connector P1 socket D	lead terminal 70 brush holder 6

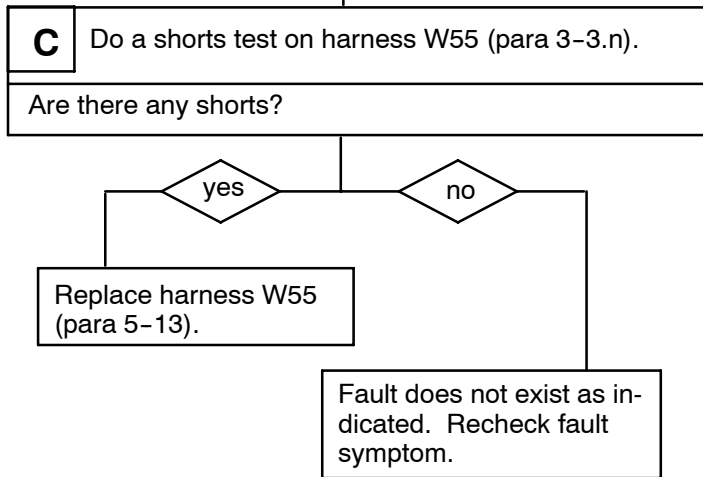


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (10) WIRING HARNESS W55. - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (11) WIRING HARNESS 12563029.

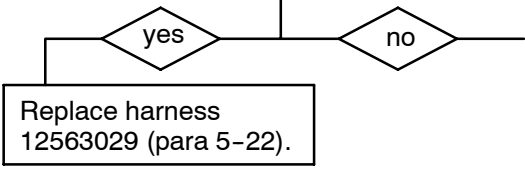
<u>INITIAL SETUP</u>	
<u>Tools</u> Artillery and turret mechanic's tool kit (SC 5180-95-A12) Multimeter (item 24, Appx G) TA1 probe kit (item 42, Appx G)	<u>Equipment Condition</u> Hydraulic control box removed (para 5-20) Hydraulic control box cover removed (para 5-20)

**NOTE**

For harness connector locations, refer to para 5-22.

**A** Visually inspect harness 12563029 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

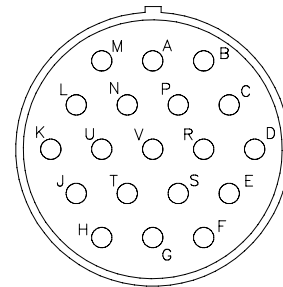


**B**

1. Disconnect harness 12563029 connectors: 100, 147-138, TLS, 819B, 825A, 645, 70, 70, 186, TLS socket A, TL-SOL, 623, 623A, WTS, 186A, 186B and W-SOL (desolder).
2. Check harness 12563029 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
Connector J1 Pin B	Lead terminal 100
Connector J1 Pin C	Lead terminal 147-138
Connector J1 Pin D	Lead terminal TLS
Connector J1 Pin E	Lead terminal TLS-A
Connector J1 Pin F	Lead terminal TL-SOL
Connector J1 Pin G	Lead terminal 819B
Connector J1 Pin H	Lead terminal 825A
Connector J1 Pin J	Lead terminal 623
Connector J1 Pin K	Lead terminal 623A
Connector J1 Pin L	Lead terminal 645
Connector J1 Pin M	Lead terminal 70
Connector J1 Pin N	Lead terminal WTS
Connector J1 Pin P	Lead terminal WSOL
Connector J1 Pin R	Lead terminal GND
Connector J1 Pin S	Lead terminal 186A
Connector J1 Pin T	Lead terminal 186
Connector J1 Pin V	Lead terminal 186B

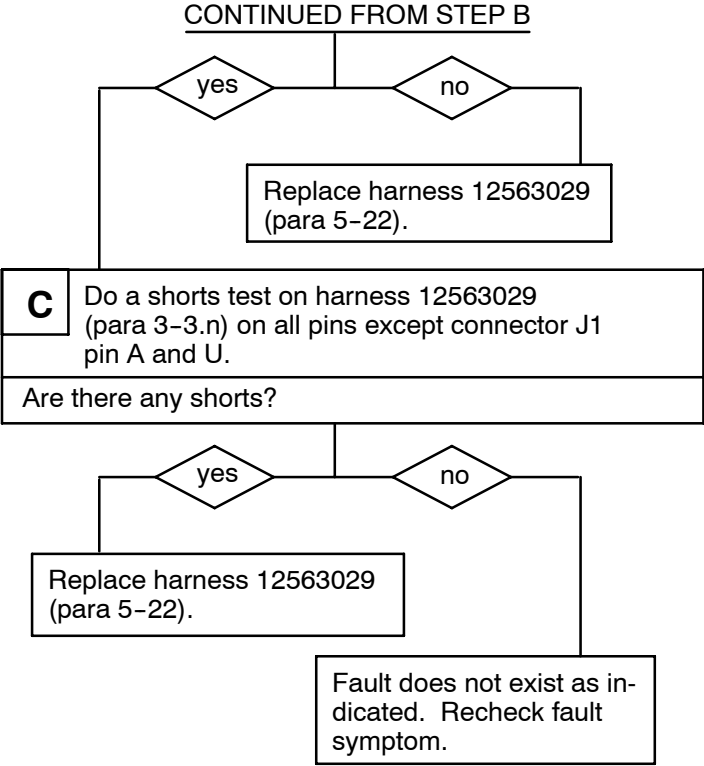
Is continuity present at all points?



HYDRAULIC CONTROL BOX CONNECTOR J1

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (11) WIRING HARNESS 12563029. - CONTINUED



END OF TASK



### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (12) WIRING HARNESS W61A.

**INITIAL SETUP**

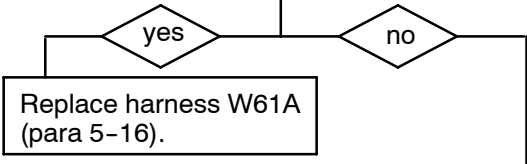
<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  Rear cable protection panel removed (para 5-16)                  Step plate at oddment tray removed (para 16-6)                  Shield assembly and brush block shields removed at brush blocks 5, 6, 7, and 8 (para 23-2)</p>
---	--

**NOTE**

For harness connector locations, refer to para 5-16.

**A** Visually inspect harness W61A for any cuts, breaks, kinks, or missing segments.

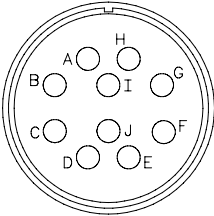
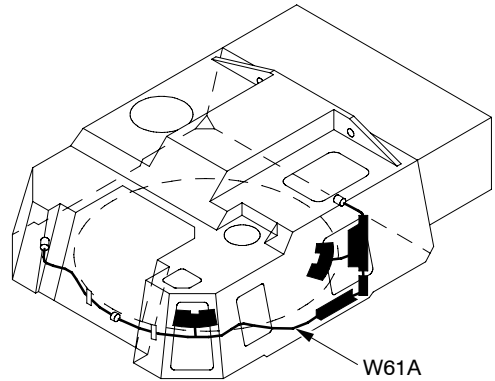
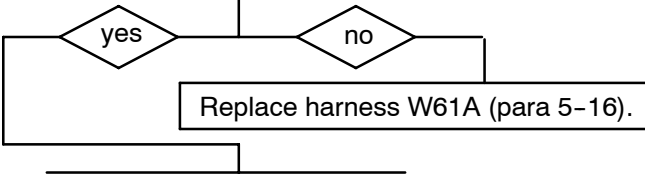
Are there any cuts, breaks, kinks, or missing segments?



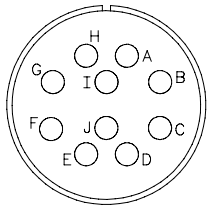
**B** Disconnect all harness W61A connectors. Check harness W61A for continuity by placing one multimeter lead on point 1 and other lead on points 2 through 6 (one at a time), as shown on this table:

Point 1	Point 2	Point 3
connector P1 socket C	-	connector P3 socket C
connector P1 socket A	connector P2 socket A	connector P3 socket A
connector P1 socket E	-	connector P3 socket E
connector P1 socket G	connector P2 socket G	connector P3 socket G
connector P1 socket H	connector P2 socket H	connector P3 socket H
connector P1 socket B	connector P2 socket B	connector P3 socket B
Point 4	Point 5	Point 6
-	connector P5 socket C	-
connector P4 socket A	connector P5 socket A	connector J1 pin A
-	connector P5 socket E	-
connector P4 socket G	connector P5 socket G	connector J1 pin G
connector P4 socket H	connector P5 socket H	connector J1 pin H
connector P4 socket B	connector P5 socket B	connector J1 pin B

Is continuity present at all points?



**W61A**  
 CONNECTOR P1  
 CONNECTOR P2  
 CONNECTOR P3  
 CONNECTOR P4  
 CONNECTOR P5



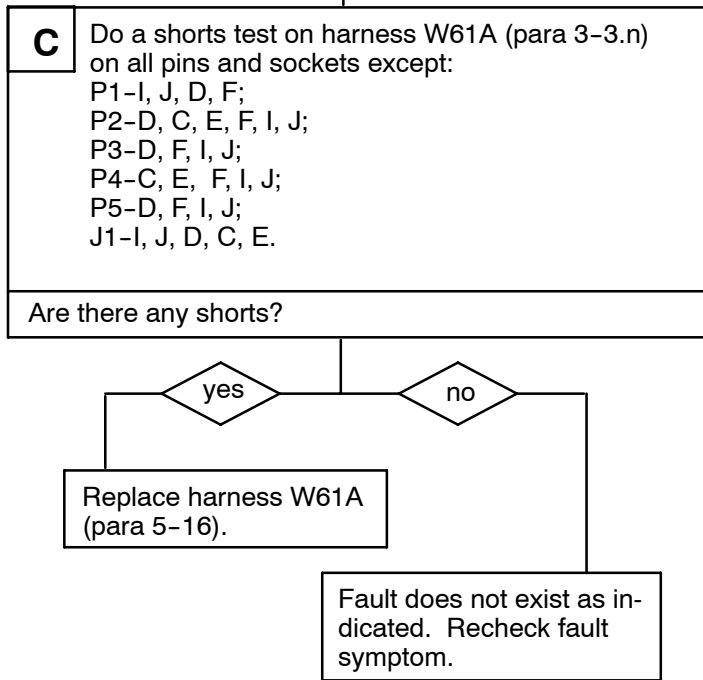
**W61A**  
 CONNECTOR J1

03pc015t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (12) WIRING HARNESS W61A. - CONTINUED

CONTINUED FROM STEP B



END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

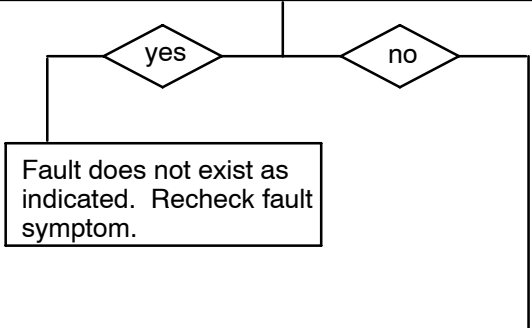
n. WIRING HARNESS CHECK - CONTINUED (13) WIRING HARNESS W56.

<p><u>INITIAL SETUP</u></p> <p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  MCS compartment door open (TM 9-2350-314-10)</p>
---	---

- A**

  1. Remove four screws and bus bar cover.
  2. Disconnect harness W56 from MCS positive bus bar.
  3. Check MCS positive bus bar for continuity by placing one multimeter lead on the harness W56 bus bar terminal and other lead on a common ground.

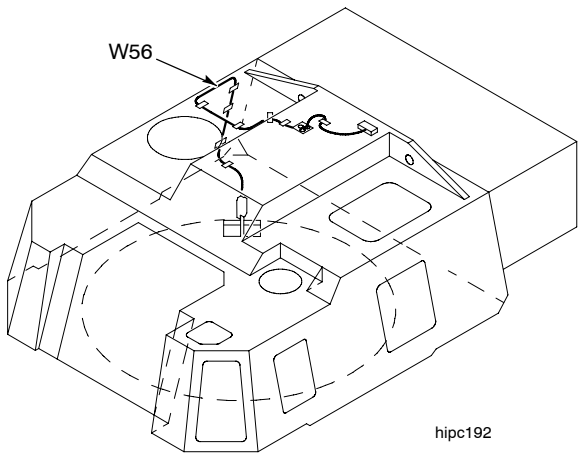
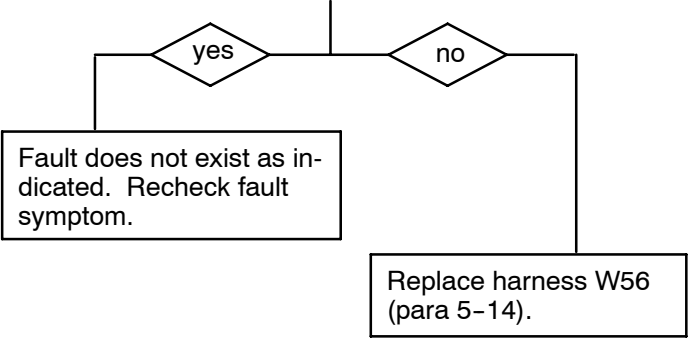
Is continuity present?



- B**

  1. Disconnect harness W56 terminal at brush block no. 3.
  2. Check harness W56 for continuity by placing one multimeter lead on harness W56 terminal at the MCS and other lead on harness W56 terminal at brush holder 3.

Is continuity present?



**END OF TASK**

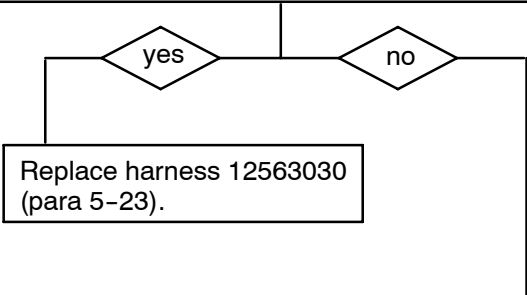
### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (14) WIRING HARNESS 12563030.

<b>INITIAL SETUP</b>	
<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  Hydraulic control box removed (para 5-20)                  Hydraulic control box cover removed (para 5-20)</p>

**A** Visually inspect harness 12563030 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

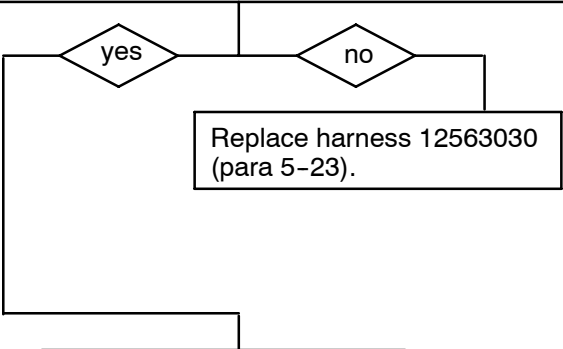
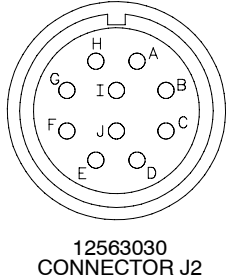


**B**

1. Disconnect harness 12563030 connections: TS2, GND, TS6, TS4, TS3, and 100S.
2. Check harness 12563030 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table:

<u>Point 1</u>	<u>Point 2</u>
connector J2 pin A	lead terminal
connector J2 pin B	+28S
connector J2 pin C	lead terminal TS4
connector J2 pin D	lead terminal TS2
connector J2 pin E	lead terminal TS3
connector J2 pin F	lead terminal
	GND
	lead terminal TS6

Is continuity present at all points?

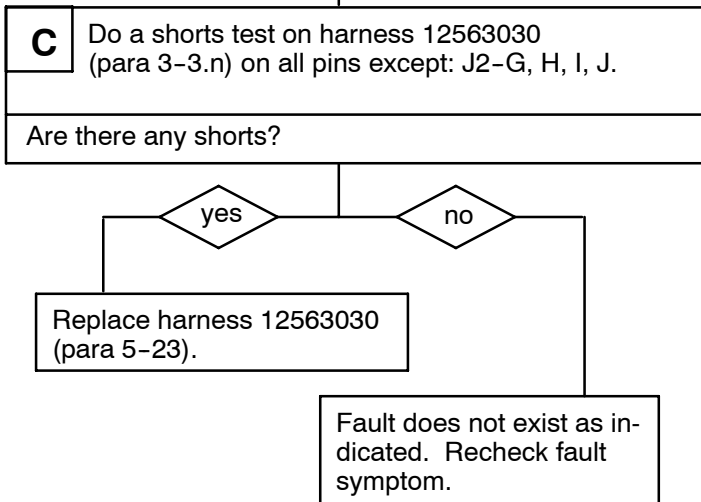


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (14) WIRING HARNESS 12563030. - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

# 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (15) WIRING HARNESS W50.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

For harness connector locations, refer to para 5-11.

**A** Visually inspect harness W50 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

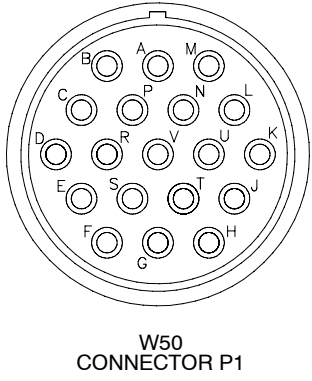
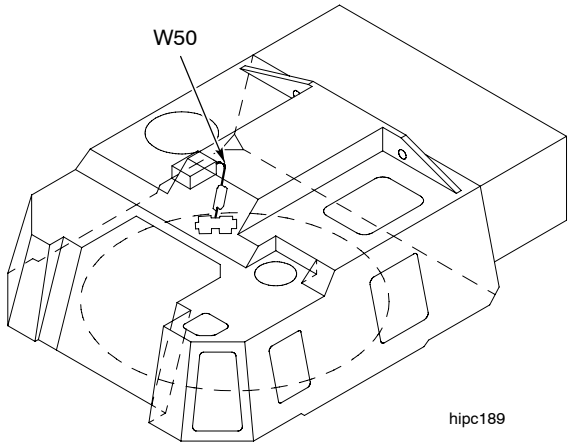


Replace harness W50 (para 5-11).

- B**
1. Disconnect harness W50 connector P1 from connector J4 of the PCU and disconnect leads 100 and 70 from brush block 4.
  2. Check harness W50 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

<u>Point 1</u>	<u>Point 2</u>
connector P1 socket A	lead terminal 100
connector P1 socket B	lead terminal 100
connector P1 socket C	lead terminal 100
connector P1 socket D	lead terminal 100
connector P1 socket E	lead terminal 100
connector P1 socket F	lead terminal 100
connector P1 socket G	lead terminal 100
connector P1 socket H	lead terminal 70
connector P1 socket J	lead terminal 70
connector P1 socket K	lead terminal 70
connector P1 socket L	lead terminal 70
connector P1 socket M	lead terminal 70
connector P1 socket N	lead terminal 70
connector P1 socket P	lead terminal 70

Is continuity present at all points?

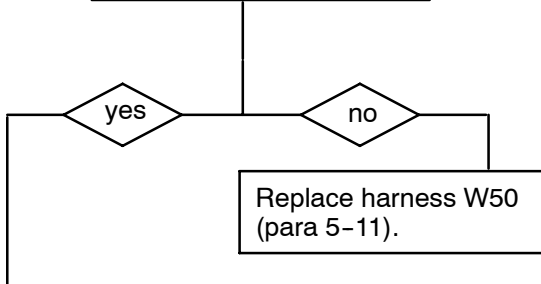


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**3-3. TROUBLESHOOTING CHART - CONTINUED**

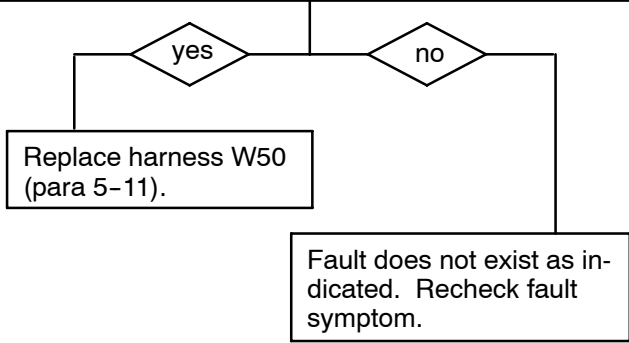
n. WIRING HARNESS CHECK - CONTINUED (15) WIRING HARNESS W50. - CONTINUED

CONTINUED FROM STEP B



**C** Do a shorts test on harness W50 (para 3-3.n) by placing multimeter red lead in socket A of connector P1 and the black lead on the shield of connector P1 and to sockets H, J, K, L, M, N, and P (in that order). Then do the same thing again, but put the red lead in socket B. Keep doing this until you have put the red lead in sockets A, B, C, D, E, F, and G (in that order). Sockets R, S, T, U, and V are not used for shorts test.

Are there any shorts?



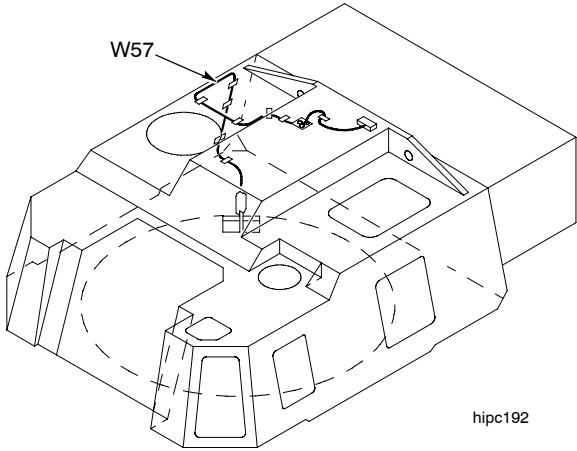
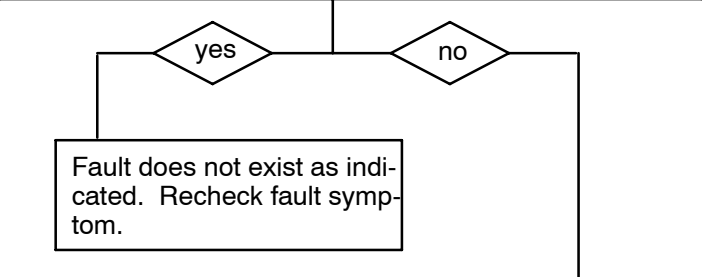
**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

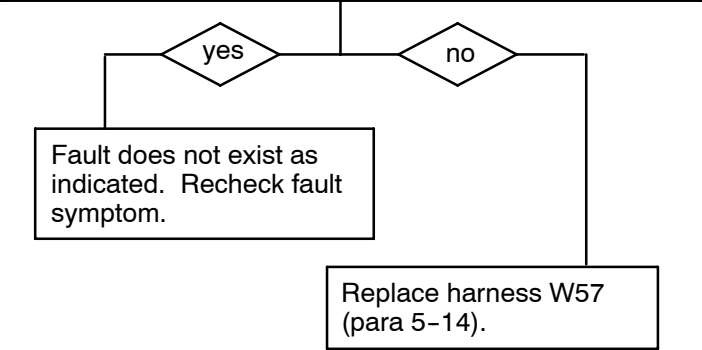
n. WIRING HARNESS CHECK - CONTINUED (16) WIRING HARNESS W57.

**INITIAL SETUP**  
Tools  
Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
Multimeter (item 24, Appx G)  
TA1 probe kit (item 42, Appx G)

- A**
1. Disconnect harness W57 from MCS negative bus bar.
  2. Check harness W57 for continuity by placing one multimeter lead on harness W57 terminal end and other lead on a common ground.



- B**
1. Disconnect harness W57 terminal at brush block no. 4.
  2. Check harness W57 for continuity by placing one multimeter lead on harness W57 terminal at MCS and other lead on harness W57 terminal at brush holder 4.





# 3-3. TROUBLESHOOTING CHART - CONTINUED

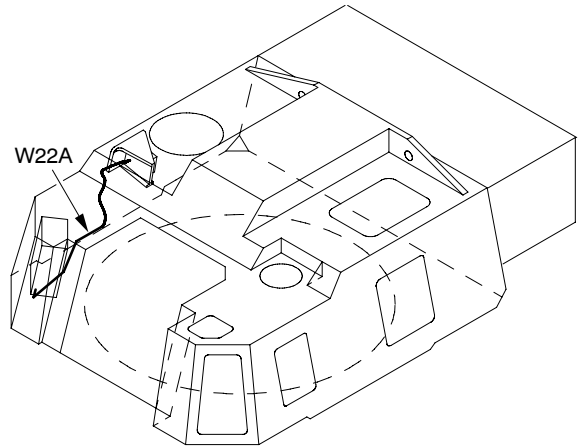
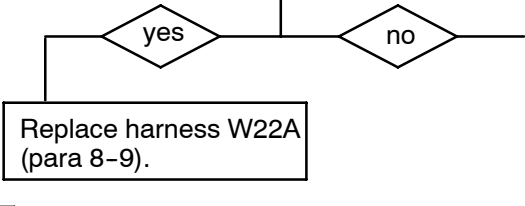
n. WIRING HARNESS CHECK - CONTINUED (17) WIRING HARNESS W22A.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W22A for cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

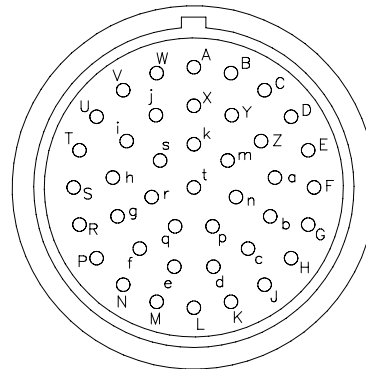


**B**

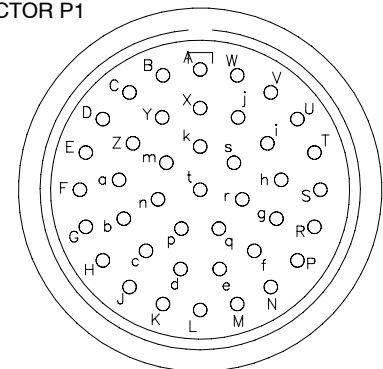
1. Disconnect harness W22A connector P2 from DU connector J1 and connector P1 at ACU connector J7.
2. Check harness W22A for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector P1 pin A	connector P2 socket A
connector P1 pin B	connector P2 socket B
connector P1 pin C	connector P2 socket C
connector P1 pin D	connector P2 socket D
connector P1 pin E	connector P2 socket E
connector P1 pin F	connector P2 socket F
connector P1 pin G	connector P2 socket G
connector P1 pin H	connector P2 socket H
connector P1 pin J	connector P2 socket J
connector P1 pin K	connector P2 socket K
connector P1 pin L	connector P2 socket L
connector P1 pin M	connector P2 socket M
connector P1 pin N	connector P2 socket N
connector P1 pin P	connector P2 socket P
connector P1 pin R	connector P2 socket R
connector P1 pin S	connector P2 socket S
connector P1 pin T	connector P2 socket T
connector P1 pin U	connector P2 socket U
connector P1 pin V	connector P2 socket V
connector P1 pin W	connector P2 socket W
connector P1 pin X	connector P2 socket X
connector P1 pin Y	connector P2 socket Y
connector P1 pin Z	connector P2 socket Z
connector P1 pin a	connector P2 socket a
connector P1 pin b	connector P2 socket b
connector P1 pin c	connector P2 socket c
connector P1 pin h	connector P2 socket h
connector P1 pin i	connector P2 socket i

Is continuity present at all points?



W22A  
CONNECTOR P1

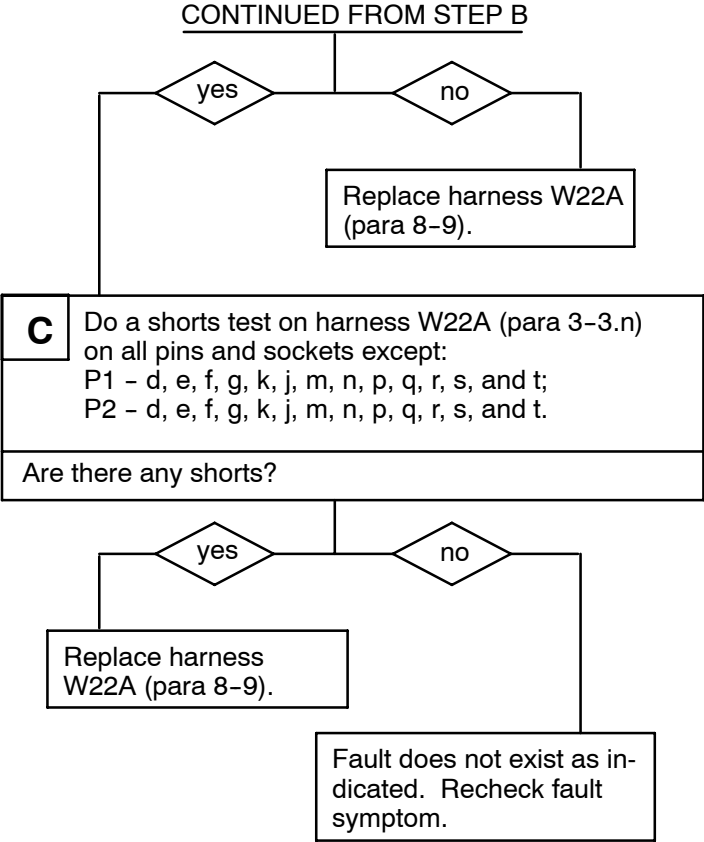


W22A  
CONNECTOR P2

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (17) WIRING HARNESS W22A. - CONTINUED



END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK -  
CONTINUED

(18) WIRING HARNESS W65.

**INITIAL SETUP**

Tools

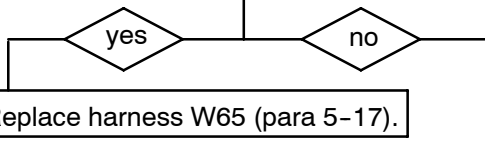
Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Multimeter (item 24, Appx G)  
TA1 probe kit (item 42, Appx G)

**NOTE**

- If DU displayed a code for PDIU fault summary, check connector P1 socket 58 to connector P2 pin D and connector P1 socket 43 to connector P3 socket E. In addition, check connectors in step B with TM codes listed.
- For harness connector locations refer to paragraph 5-17.

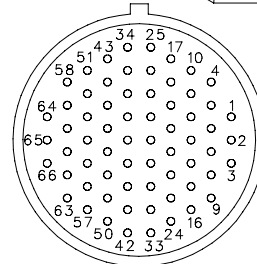
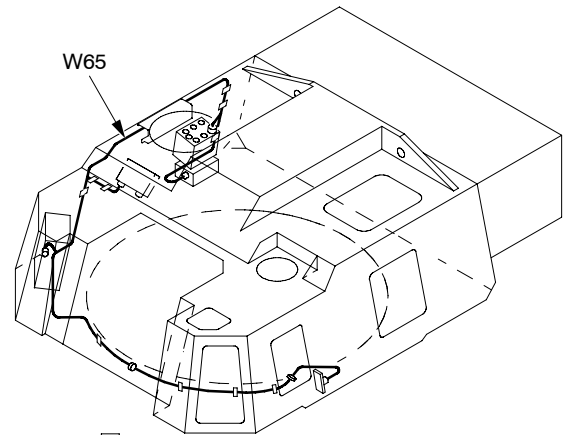
**A** Visually inspect harness W65 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

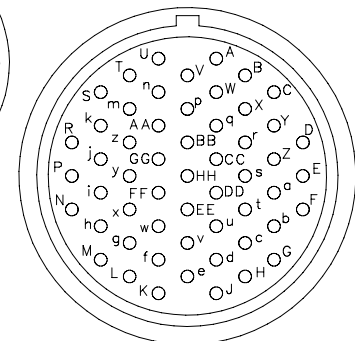


- B**
1. Disconnect harness W65 connectors P1, P2, P3, P4, and P5.
  2. Check harness W65 for continuity by placing one multimeter on point 1 and other lead on point 2, as shown in this table.

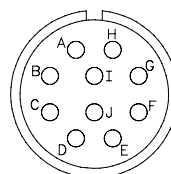
Point 1	Point 2	TM Code
connector P1 socket 38	connector P2 pin T	247, 253
connector P1 socket 35	connector P2 pin X	252
connector P1 socket 50	connector P2 pin U	
connector P1 socket 39	connector P2 pin a	
connector P1 socket 52	connector P2 pin f	
connector P1 socket 51	connector P2 pin e	
connector P1 socket 59	connector P2 pin d	
connector P1 socket 41	connector P2 pin c	242
connector P1 socket 40	connector P2 pin b	206
connector P1 socket 62	connector P2 pin Y	
connector P1 socket 37	connector P2 pin Z	
connector P1 socket 42	connector P2 pin W	260
connector P1 socket 58	connector P2 pin D	104
connector P1 socket 34	connector P2 pin B	104
connector P1 socket 33	connector P3 socket F	131
connector P1 socket 43	connector P3 socket E	123
connector P1 socket 32	connector P3 socket D	147
connector P1 socket 30	connector P3 socket C	60
connector P1 socket 31	connector P3 socket B	14
connector P1 socket 29	connector P3 socket A	14
connector P1 socket 36	connector P4 pin b	13, 21
connector P1 socket 44	connector P4 pin c	33
connector P1 socket 20	connector P4 pin d	33
connector P1 socket 16	connector P4 pin e	
connector P1 socket 21	connector P4 pin f	



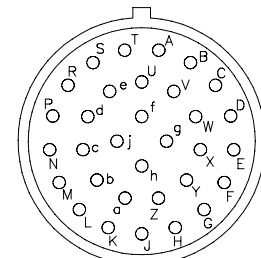
W65  
CONNECTOR P1



W65  
CONNECTOR P2  
CONNECTOR P4



W65  
CONNECTOR P3



W65  
CONNECTOR P5

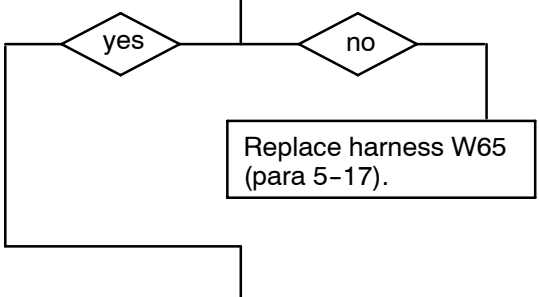
03pc017t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (18) WIRING HARNESS W65. - CONTINUED

<b>B - CONTINUED</b>		
<u>Point 1</u>	<u>Point 2</u>	<u>TM Code</u>
connector P1 socket 28	connector P4 pin j	
connector P1 socket 23	connector P4 pin k	
connector P1 socket 26	connector P4 pin g	22
connector P1 socket 60	connector P4 pin h	31
connector P1 socket 25	connector P4 pin i	22, 31
connector P1 socket 54	connector P4 pin m	
connector P1 socket 53	connector P4 pin n	
connector P1 socket 57	connector P5 pin Z	
connector P1 socket 61	connector P5 pin e	66
connector P1 socket 56	connector P5 pin R	82
connector P1 socket 48	connector P5 pin f	103
connector P1 socket 46	connector P5 pin d	87
connector P1 socket 45	connector P5 pin H	86
connector P1 socket 55	connector P5 pin T	61
connector P1 socket 47	connector P5 pin S	61
connector P1 socket 11	connector P5 pin K	46
connector P1 socket 10	connector P5 pin J	46
connector P1 socket 8	connector P5 pin F	187
connector P1 socket 7	connector P5 pin E	187
connector P1 socket 49	connector P5 pin G	34
connector P1 socket 5	connector P5 pin D	187
connector P1 socket 4	connector P5 pin C	187
connector P1 socket 14	connector P5 pin M	181
connector P1 socket 13	connector P5 pin L	181
connector P1 socket 2	connector P5 pin B	187
connector P1 socket 1	connector P5 pin A	187
connector P1 socket 18	connector P5 pin P	182
connector P1 socket 17	connector P5 pin N	182

Is continuity present at all points?



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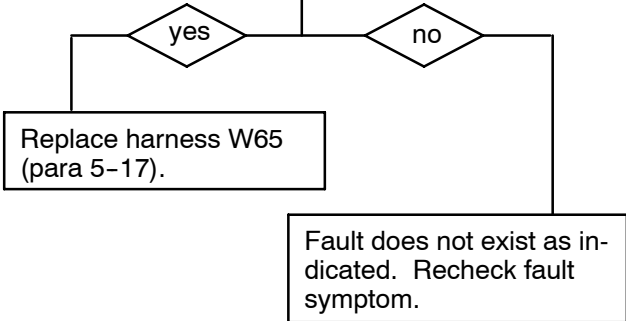
**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (18) WIRING HARNESS W65. - CONTINUED

CONTINUED FROM STEP B

**C** Do a shorts test on harness W65 (para 3-3.n) on all pins and sockets except:  
P1-36, 22, 27, 19, 3, 15, 6, 9, 12, 24, 63, 64, 65, 66;  
P5-a, X, W, b, V and c.

Are there any shorts?



**END OF TASK**

# 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (18.1) WIRING HARNESS W65A.

**INITIAL SETUP**

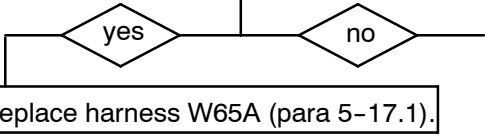
Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

- If DU displayed a code for PDI fault summary, check connector P1 socket 58 to connector P2 pin D and connector P1 socket 43 to connector P3 socket E. In addition, check connectors in step B with TM codes listed.
- For harness connector locations refer to paragraph 5-17.1.

**A** Visually inspect harness W65A for any cuts, breaks, kinks, or missing segments.

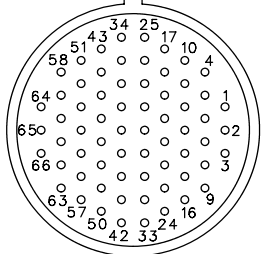
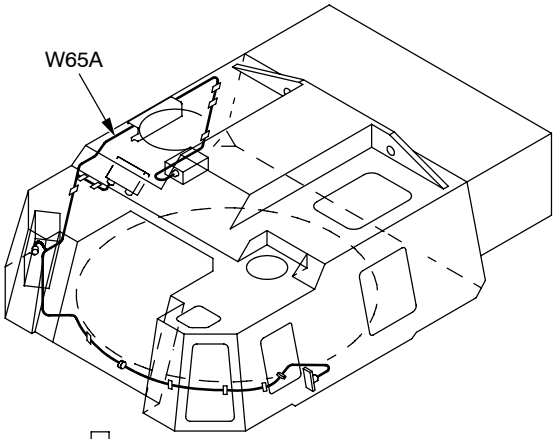
Are there any cuts, breaks, kinks, or missing segments?



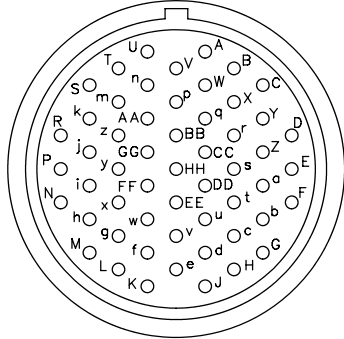
**B**

1. Disconnect harness W65A connectors P2, P3, P1, and P5.
2. Check harness W65A for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

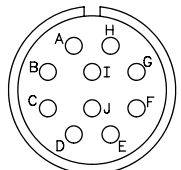
Point 1	Point 2	TM Code
connector P4 socket 38	connector P2 pin T	
connector P4 socket 35	connector P2 pin X	247, 253
connector P4 socket 50	connector P2 pin U	252
connector P4 socket 39	connector P2 pin a	
connector P4 socket 51	connector P2 pin e	
connector P4 socket 59	connector P2 pin d	
connector P4 socket 41	connector P2 pin c	
connector P4 socket 40	connector P2 pin b	
connector P4 socket 62	connector P2 pin Y	
connector P4 socket 37	connector P2 pin Z	242
connector P4 socket 42	connector P2 pin W	206
connector P4 socket 58	connector P2 pin D	
connector P4 socket 34	connector P2 pin B	260
connector P4 socket 33	connector P3 socket F	94, 96, 97, 104, 172, 173, 174
connector P4 socket 43	connector P3 socket E	94, 96, 97, 104
connector P4 socket 32	connector P3 socket D	109, 110, 111, 112, 136
connector P4 socket 30	connector P3 socket C	114, 115, 116, 117, 123
connector P4 socket 31	connector P3 socket B	142, 143, 144, 145, 147
connector P4 socket 29	connector P3 socket A	60



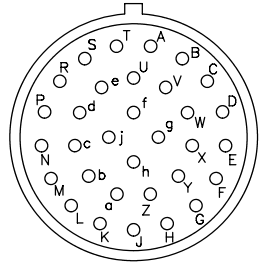
W65A  
CONNECTOR P4



W65A  
CONNECTOR P2



W65A  
CONNECTOR P3



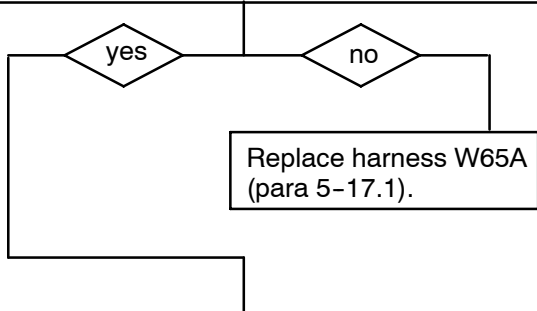
W65A  
CONNECTOR P5

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (18.1) WIRING HARNESS W65A. - CONTINUED

<b>B - CONTINUED</b>		
<u>Point 1</u>	<u>Point 2</u>	<u>TM Code</u>
connector P4 socket 61	connector P5 pin e	61
connector P4 socket 56	connector P5 pin R	37, 82, 85
connector P4 socket 48	connector P5 pin f	103, 294, 295
connector P4 socket 46	connector P5 pin d	87
connector P4 socket 45	connector P5 pin H	37, 82, 85, 86
connector P4 socket 55	connector P5 pin T	41, 42, 43, 44, 62
connector P4 socket 47	connector P5 pin S	41, 42, 43, 44, 62
connector P4 socket 11	connector P5 pin K	45, 46, 48
connector P4 socket 10	connector P5 pin J	45, 46, 48
connector P4 socket 8	connector P5 pin F	34, 309
connector P4 socket 7	connector P5 pin E	34, 309
connector P4 socket 49	connector P5 pin G	34, 309
connector P4 socket 5	connector P5 pin D	49, 50, 51, 76, 187, 308
connector P4 socket 4	connector P5 pin C	49, 50, 51, 76, 187, 308
connector P4 socket 14	connector P5 pin M	49, 50, 51, 76, 187, 308
connector P4 socket 13	connector P5 pin L	49, 50, 51, 76, 187, 308
connector P4 socket 2	connector P5 pin B	54, 55, 56, 74, 187, 296, 297, 310
connector P4 socket 1	connector P5 pin A	54, 55, 56, 74, 187, 296, 297, 310
connector P4 socket 18	connector P5 pin P	54, 55, 56, 74, 187, 296, 297, 310
connector P4 socket 17	connector P5 pin N	54, 55, 56, 74, 187, 296, 297, 310

Is continuity present at all points?



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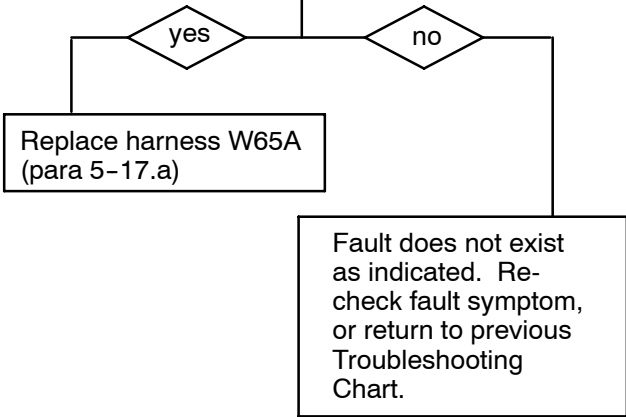
### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (18.1) WIRING HARNESS W65A. - CONTINUED

CONTINUED FROM STEP B

**C** Do a shorts test on harness W65A (para 3-3.n) on all pins and sockets except:  
P4-36, 22, 27, 19, 3, 15, 6, 9, 12, 24, 63, 64, 65, 66,  
44, 20, 16, 21, 28, 23, 26, 60, 25, 52, 53, 54;  
P2-f; P5-Z, a, X, W, b, V, and C.

Are there any shorts?



END OF TASK



### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK -  
CONTINUED

(19) WIRING HARNESS W7.

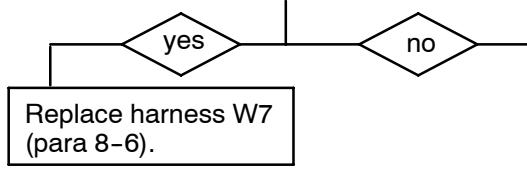
#### INITIAL SETUP

##### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Multimeter (item 24, Appx G)  
TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W7 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?



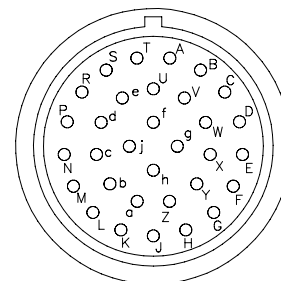
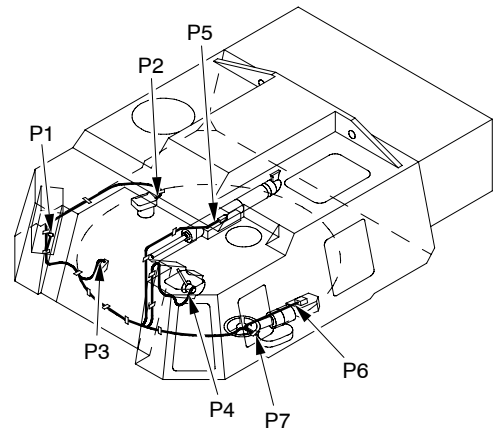
**B** 1. Disconnect the following harness W7 connectors:

- For AFCS:  
W7-P1 from ACU  
W7-P2 from AZ TACH  
W7-P3 from TTS  
W7-P4 from EL TACH  
W7-P5 from EL SERVO VALVE  
W7-P6 from AZ SERVO VALVE  
W7-P7 from W64-J1  
For PDFCS:  
W7-P1 from PDCU  
W7-P2 from AZ SHORTING PLUG  
W7-P4 from EL SHORTING PLUG  
W7-P3 from TTS  
W7-P5 from EL SERVO VALVE  
W7-P6 from AZ SERVO VALVE  
W7-P7 from W64-J1

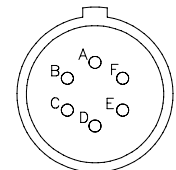
2. Check harness W7 for continuity by placing one multimeter lead on point 1 and other lead on point 2 and point 3, as shown in this table.

Point 1	Point 2	Point 3
connector P1 pin K	connector P2 socket B	-
connector P1 pin J	connector P2 socket A	-
connector P1 pin S	connector P2 socket E	-
connector P1 pin c	connector P3 socket D	-
connector P1 pin d	connector P3 socket E	-
connector P1 pin T	connector P3 socket A	-
connector P1 pin U	connector P3 socket B	-

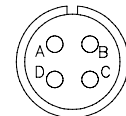
Is continuity present at all points?



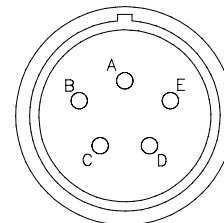
W7  
CONNECTOR P1



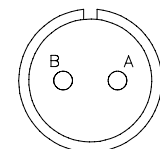
W7  
CONNECTOR P2



W7  
CONNECTOR P5  
CONNECTOR P6



W7  
CONNECTOR P3  
CONNECTOR P4



W7  
CONNECTOR P7

**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (19) WIRING HARNESS W7. - CONTINUED

<b>B - CONTINUED</b>		
<u>Point 1</u>	<u>Point 2</u>	<u>Point 3</u>
connector P1 pin G	connector P4 socket A	-
connector P1 pin H	connector P4 socket B	-
connector P1 pin R	connector P4 socket D	-
connector P1 pin A	connector P5 socket D	connector P5 socket B
connector P1 pin B	connector P5 socket C	connector P5 socket A
connector P1 pin N	connector P6 socket D	connector P6 socket B
connector P1 pin P	connector P6 socket C	connector P6 socket A
connector P1 pin E	connector P7 socket A	-
connector P1 pin F	connector P7 socket B	-
connector P2 socket D	connector P4 socket E	-

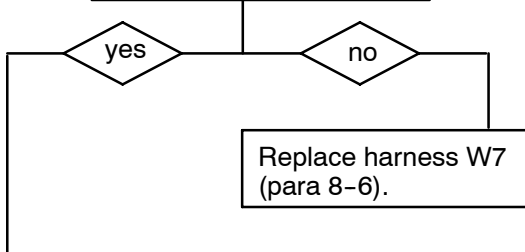
Is continuity present at all points?

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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (19) WIRING HARNESS W7. - CONTINUED

CONTINUED FROM STEP B

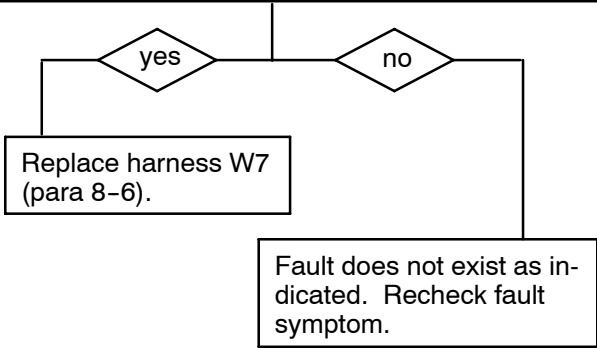


**C** Do a shorts test on harness W7 (para 3-3.n) on all pins and sockets except:  
 P1-C, D, L, M, W, X, b, e, f, g, h, j, V, a, Y, Z;  
 P2-C;  
 P3-C;  
 P4-C;  
 Also check sockets of P5 and P6 to the connector shield and then check the same connectors from pins A to D, A to B, and B to C.

**NOTE**

There should not be any continuity.

Are there any shorts?



**END OF TASK**

# 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (20) WIRING HARNESS W51.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

- If DU displayed a code for PDIU/PDI fault summary, check connectors in step B with TM codes listed.
- For harness connector locations, refer to para 5-36.

**A** Visually inspect harness W51 for any cuts, breaks, kinks, or missing segments.

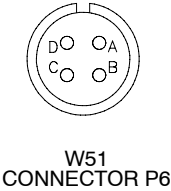
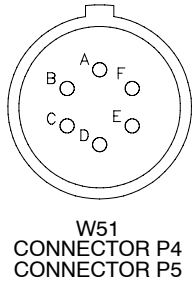
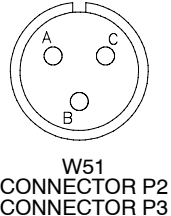
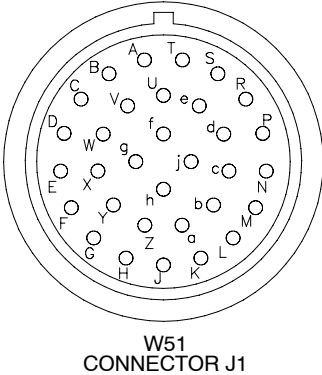
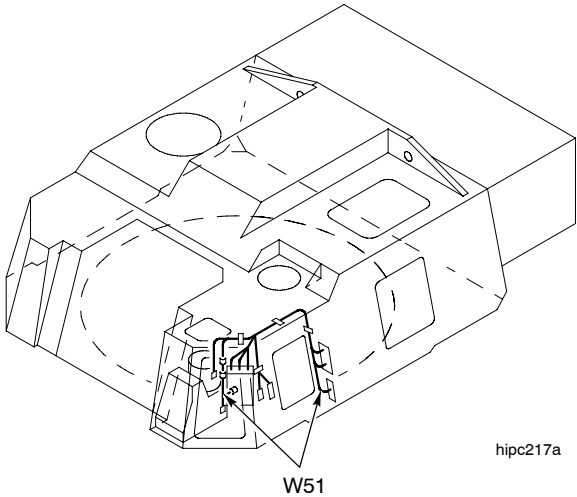
Are there any cuts, breaks, kinks, or missing segments?



Replace harness W51 (para 5-36).

**B** Disconnect leads of harness W51. Check harness W51 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

<u>Point 1</u>	<u>Point 2</u>	<u>TM Code</u>	
		<u>AFCS</u>	<u>PDFCS</u>
connector J1 socket f	lead terminal AWG16 783		103, 294, 295
connector J1 socket K	lead terminal AWG16 782		45, 46, 48
connector J1 socket J	lead terminal AWG16 781		45, 46, 48
connector J1 socket H	lead terminal AWG16 779		37, 82, 85, 86
connector J1 socket d	lead terminal AWG16 780		87
connector J1 socket S	lead terminal 100		41, 42, 43, 44, 62
connector J1 socket T	lead terminal 70		41, 42, 43, 44, 62
connector J1 socket R	connector P3 socket C		37, 82, 85
connector J1 socket N	connector P4 socket A	182	54, 55, 56, 74, 187, 296, 297, 310
connector J1 socket P	connector P4 socket B	182	54, 55, 56, 74, 187, 296, 297, 310
connector J1 socket A	connector P4 socket C	187	54, 55, 56, 74, 187, 296, 297, 310



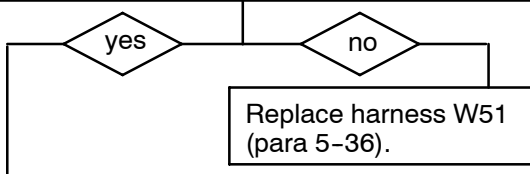
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### 3-3. TROUBLESHOOTING CHART - CONTINUED

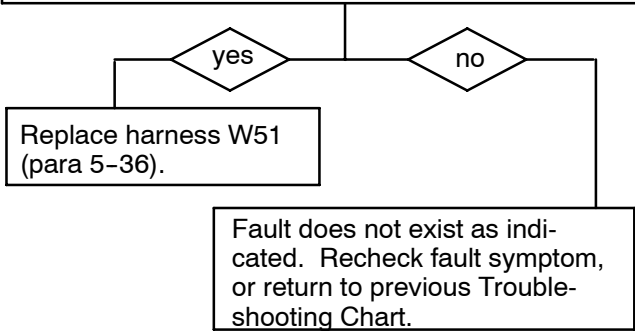
n. WIRING HARNESS CHECK - CONTINUED (20) WIRING HARNESS W51. - CONTINUED

<b>B - CONTINUED</b>		TM Code	
<u>Point 1</u>	<u>Point 2</u>	<u>AFCS</u>	<u>PDFCS</u>
connector J1 socket B	connector P4 socket D	187	54, 55, 56, 74, 187, 296, 297, 310
connector J1 socket L	connector P5 socket A	181	49, 50, 51, 76, 187, 308
connector J1 socket M	connector P5 socket B	181	49, 50, 51, 76, 187, 308
connector J1 socket C	connector P5 socket C	187	49, 50, 51, 76, 187, 308
connector J1 socket D	connector P5 socket D	181	49, 50, 51, 76, 187, 308
connector J1 socket G	connector P6 socket A	34	309
connector J1 socket E	connector P6 socket B	187	309
connector J1 socket F	connector P6 socket C	187	309
connector J1 socket e	lead terminal AWG16 775		61
connector P3 socket B	connector P2 socket C		37, 82, 85
connector P2 socket B	lead terminal AWG16 778		37, 82, 85

Is continuity present at all points?



<b>C</b>
Do a shorts test on harness W51 (para 3-3.n) on all pins, sockets and leads except: J1-Z, Y, U, j, h, g; P2-A; P3-A; P4-E, F; P5-E, F; P6-D.
Are there any shorts?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (21) WIRING HARNESS W3.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W3 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?



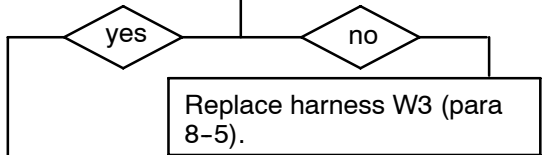
Replace harness W3 (para 8-5).

**B**

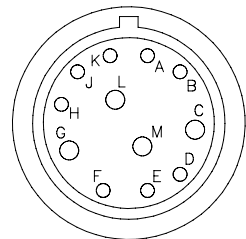
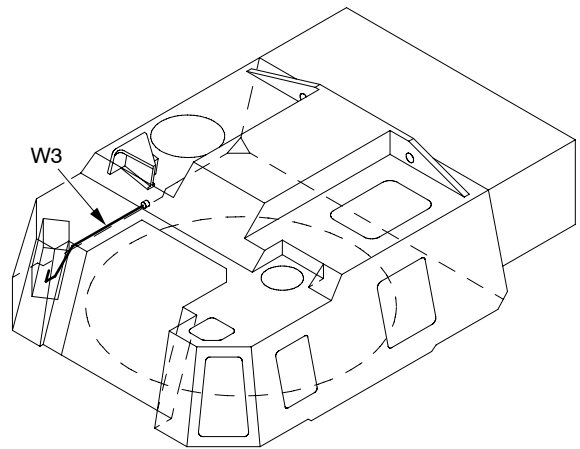
1. Disconnect the following harness W3 connectors:  
 W3 P1 from harness W15 J1,  
 W3 P4 from W93 J3.
2. Check harness W3 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
Connector P1 pin E	Connector P4 socket E
Connector P1 pin F	Connector P4 socket F

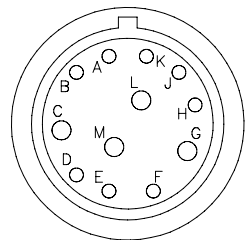
Is continuity present at all points?



CONTINUED ON NEXT PAGE



W3  
CONNECTOR P1  
TO W15 J1



W3  
CONNECTOR P4  
TO W93 J3

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**3-3. TROUBLESHOOTING CHART - CONTINUED**

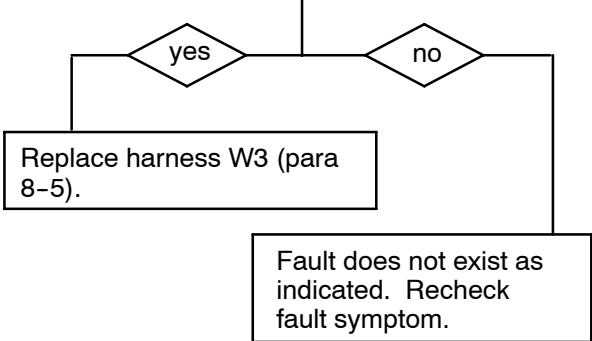
n. WIRING HARNESS CHECK - CONTINUED (21) WIRING HARNESS W3. - CONTINUED

CONTINUED FROM STEP B

**C**

1. Do a shorts test on harness W3 (page 3-3.n) on all pins and sockets except;  
P1-A, B, C, D, G, H, J, K, L, M;  
P4-A, B, C, D, G, H, J, K, L, M.
2. Some continuity should be present on sockets E and F on connectors P1 and P4. It should be 75 ohms  $\pm$  5.

Are there any shorts?



**END OF TASK**

# 3-3. TROUBLESHOOTING CHART - CONTINUED

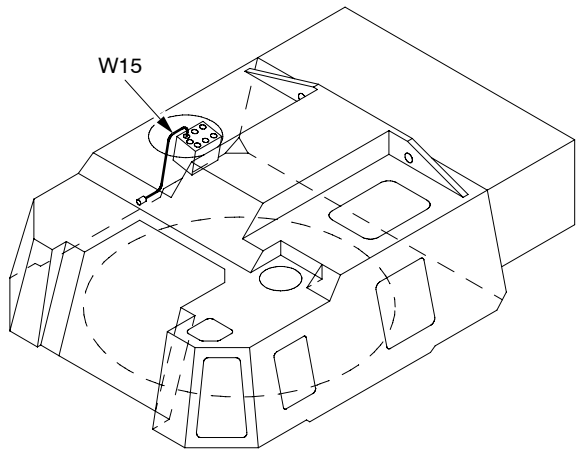
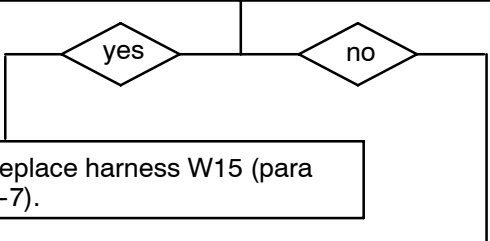
n. WIRING HARNESS CHECK - CONTINUED (22) WIRING HARNESS W15.

**INITIAL SETUP**

<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Conditions</u>                  Harness guard removed (para 8-12)</p>
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**A** Visually inspect harness W15 for any cuts, breaks, kinks, or missing segments.

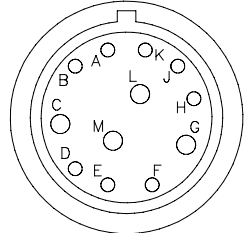
Are there any cuts, breaks, kinks, or missing segments?



**B**

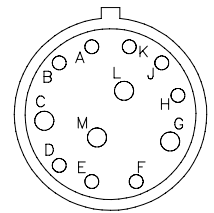
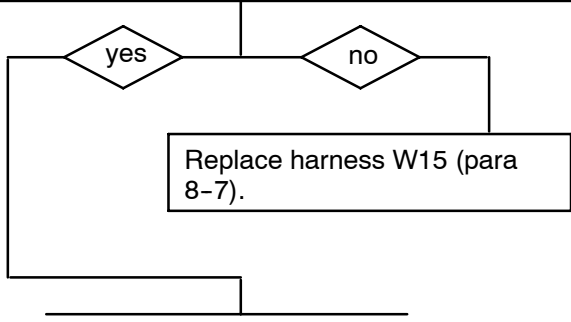
1. Disconnect the following harness W15 connectors:  
 W15 P1 from PDIU J3  
 W15 J1 from W3 P1.
2. Check harness W15 connectors for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table:

<u>Point 1</u>	<u>Point 2</u>
Connector P1 socket E	Connector J1 socket E
Connector P1 socket F	Connector J1 socket F



W15  
CONNECTOR P1  
TO PDIU J3

Is continuity present at all points?



W15  
CONNECTOR J1  
TO W3 P1

CONTINUED ON NEXT PAGE

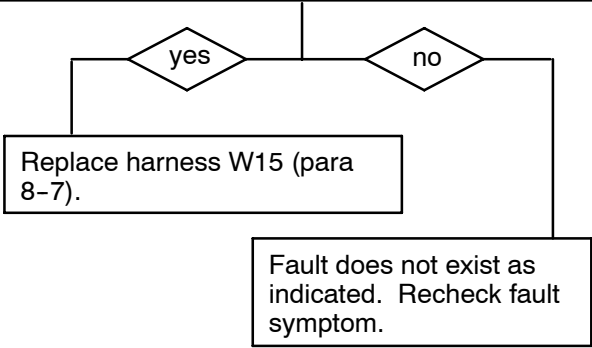


**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (22) WIRING HARNESS W15. - CONTINUED

CONTINUED FROM STEP B

<b>C</b>	<ol style="list-style-type: none"> <li>1. Do a shorts test on W15 (para 3-3.n) on all sockets except; P1 A, B, C, D, G, H, J, K, L, M; P2 A, B, C, D, G, H, J, K, L, M.</li> <li>2. Some continuity will exist between P1 E and F and J1 E and F. It should be <math>77.0 \pm .10</math> ohms.</li> </ol>
Are there any shorts?	



**END OF TASK**

# 3-3. TROUBLESHOOTING CHART - CONTINUED

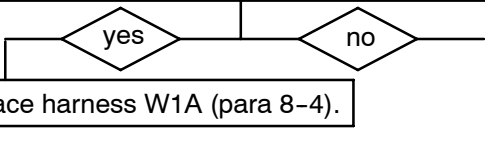
n. WIRING HARNESS CHECK - CONTINUED (23) WIRING HARNESS W1A.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W1A for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

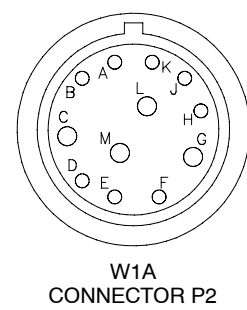
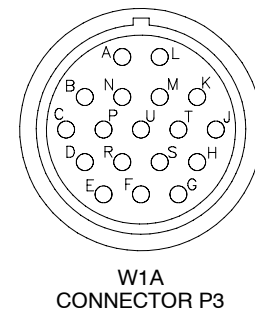
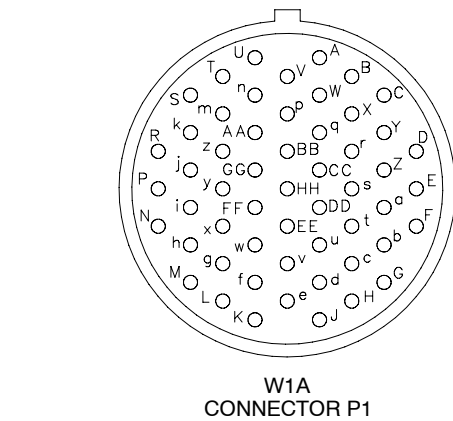
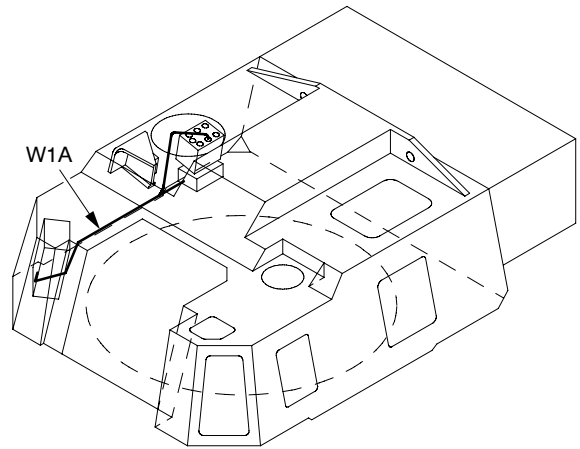


**B**

1. Disconnect the following harness W1A connectors:  
 P1 from PCU,  
 P2 from PDIU,  
 P3 from ACU.
2. Check connectors for continuity by placing one multimeter lead on point 1 and other lead on point 2 as shown in this table.

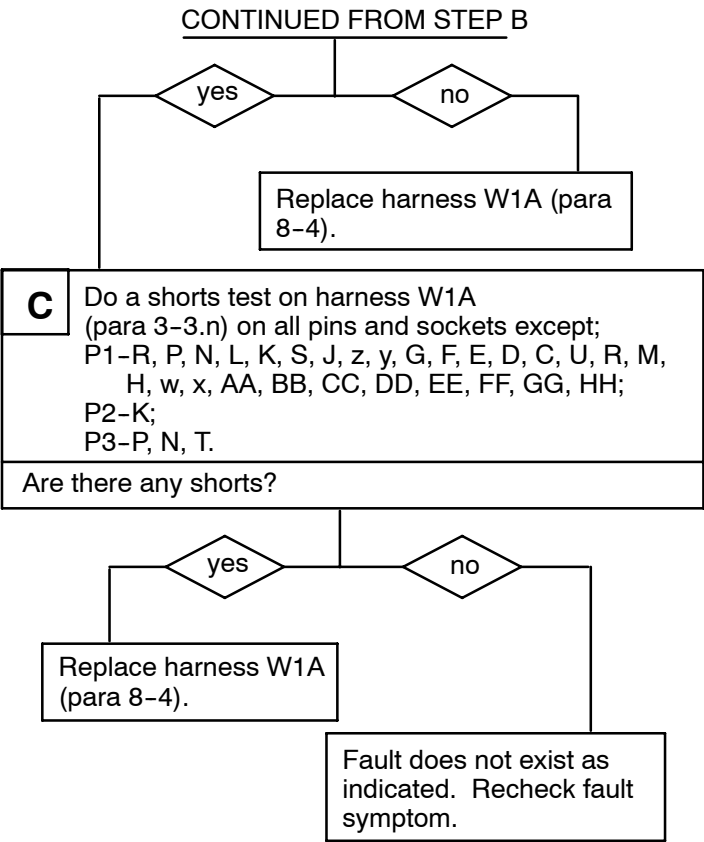
<u>Point 1</u>	<u>Point 2</u>
connector P1 pin d	connector P3 socket A
connector P1 pin e	connector P3 socket B
connector P1 pin f	connector P3 socket C
connector P1 pin g	connector P3 socket D
connector P1 pin h	connector P3 socket E
connector P1 pin i	connector P3 socket F
connector P1 pin j	connector P3 socket G
connector P1 pin k	connector P3 socket H
connector P1 pin m	connector P3 socket K
connector P1 pin n	connector P3 socket J
connector P1 pin p	connector P3 socket R
connector P1 pin q	connector P3 socket S
connector P1 pin r	connector P3 socket U
connector P1 pin s	connector P3 socket L
connector P1 pin t	connector P3 socket M
connector P1 pin T	connector P2 socket C
connector P1 pin U	connector P2 socket G
connector P1 pin V	connector P2 socket L
connector P1 pin W	connector P2 socket M
connector P1 pin X	connector P2 socket B
connector P1 pin Y	connector P2 socket D
connector P1 pin Z	connector P2 socket E
connector P1 pin a	connector P2 socket F
connector P1 pin b	connector P2 socket H
connector P1 pin c	connector P2 socket J
connector P1 pin y	connector P2 socket A

Is continuity present at all points?



**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (23) WIRING HARNESS W1A. - CONTINUED



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

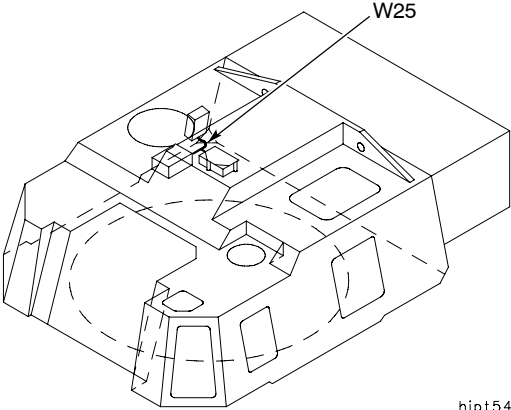
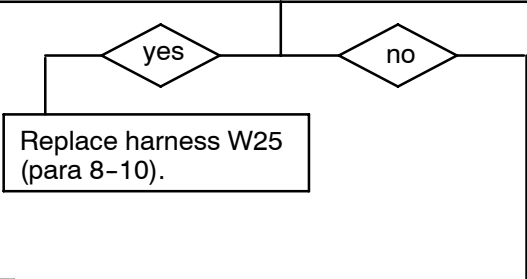
n. WIRING HARNESS CHECK - CONTINUED (24) WIRING HARNESS W25.

**INITIAL SETUP**

<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  PCU power switch OFF                  (TM 9-2350-314-10)</p>
---	---

**A** Visually inspect harness W25 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?



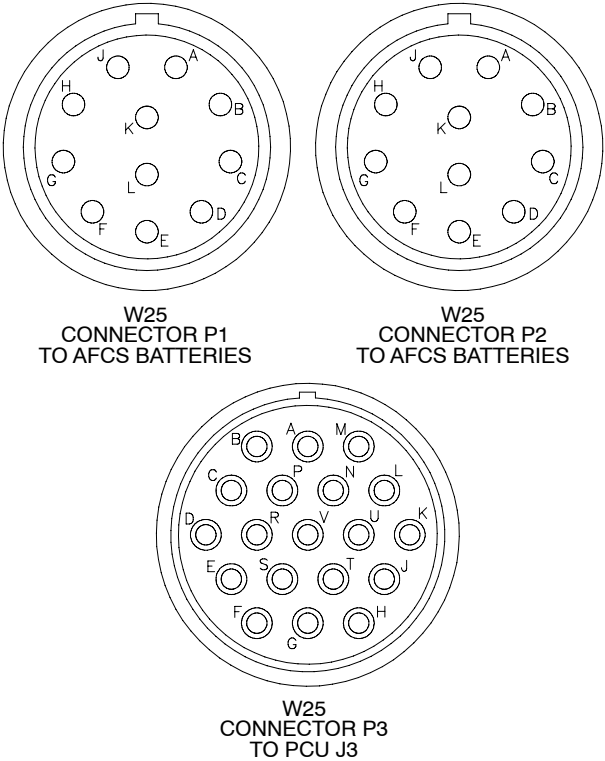
hipt541

**B**

1. Disconnect harness W25 leads.
2. Check harness W25 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector P3 socket A	connector P1 pin A
connector P3 socket E	connector P1 pin E
connector P3 socket B	connector P1 pin B
connector P3 socket F	connector P1 pin F
connector P3 socket C	connector P1 pin C
connector P3 socket G	connector P1 pin G
connector P3 socket D	connector P1 pin D
connector P3 socket H	connector P1 pin H
connector P3 socket J	connector P2 pin A
connector P3 socket N	connector P2 pin E
connector P3 socket K	connector P2 pin B
connector P3 socket P	connector P2 pin F
connector P3 socket L	connector P2 pin C
connector P3 socket R	connector P2 pin G
connector P3 socket M	connector P2 pin D
connector P3 socket S	connector P2 pin H
connector P3 socket T	connector P2 pin J
connector P3 socket U	connector P2 pin K

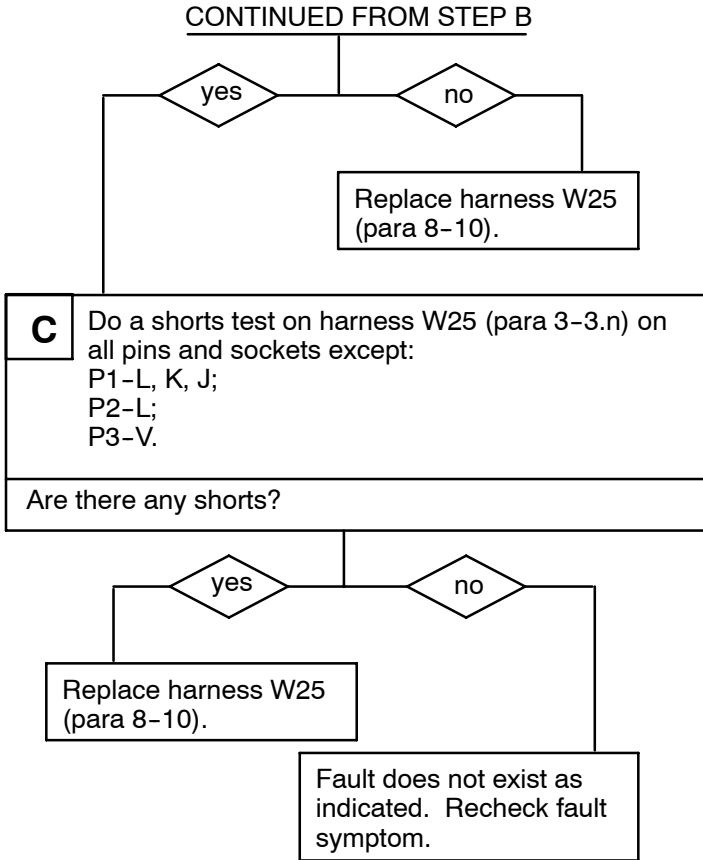
Is continuity present at all points?



CONTINUED ON NEXT PAGE

**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (24) WIRING HARNESS W25. - CONTINUED



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

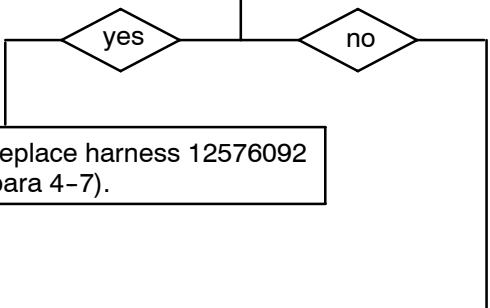
n. WIRING HARNESS CHECK - CONTINUED (25) WIRING HARNESS 12576092.

**INITIAL SETUP**

<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  TTS block removed (para 4-3)                  TTS removed from block (para 4-3)                  TTS disconnected (para 4-3) at cannon mount bracket (para 8-6)                  Harness 12576092 connector removed from bracket (para 4-7)</p>
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**A** Visually inspect harness 12576092 for any cuts, breaks, kinks, or missing segments.

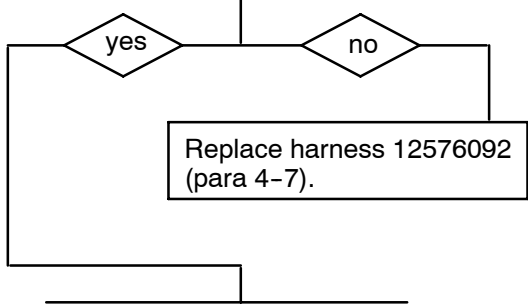
Are there any cuts, breaks, kinks, or missing segments?



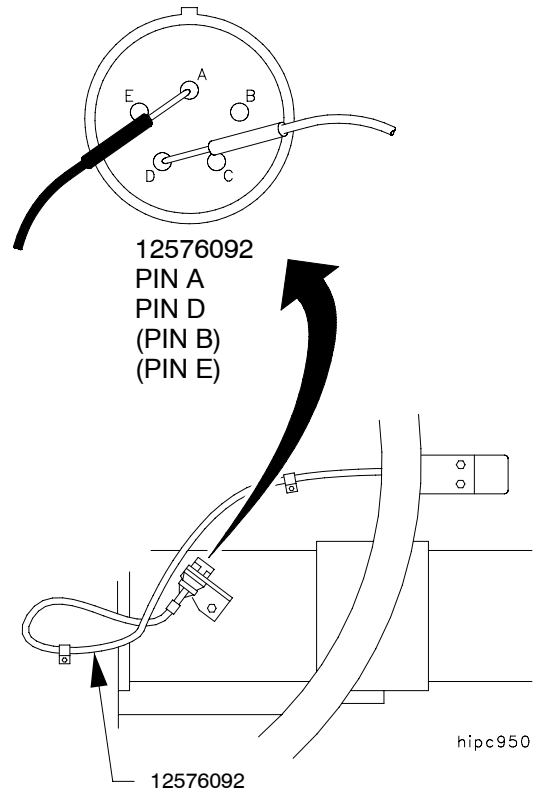
**B** Check harness 12576092 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table:

Point 1	Point 2
Pin A	Pin D
Pin B	Pin E

Is continuity present at all points?



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**3-3. TROUBLESHOOTING CHART - CONTINUED**

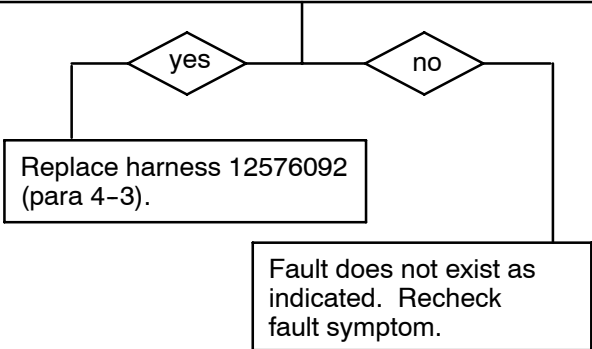
n. WIRING HARNESS CHECK - CONTINUED (25) WIRING HARNESS 12576092. - CONTINUED

CONTINUED FROM STEP B

**C** 1. Do a shorts test on harness 12576092 (para 3-3.n) by checking for continuity with one multimeter lead on pin A and the other lead on pin B. Then place one lead on pin D and the other lead on pin E. Next, place one lead of multimeter on red connector lead and the other multimeter lead on the black connector lead.

2. If continuity is present on any of these, then there is a short.

Are there any shorts?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

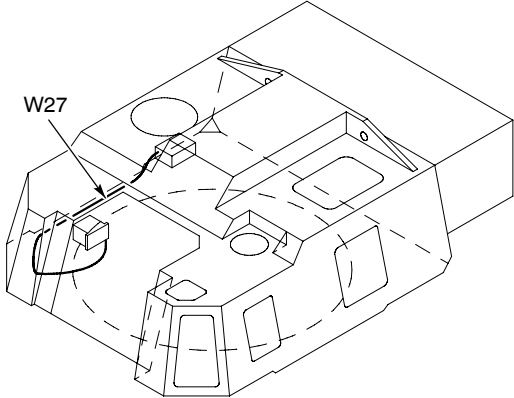
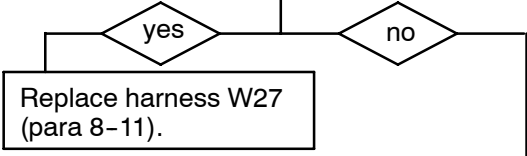
n. WIRING HARNESS CHECK - CONTINUED (26) WIRING HARNESS W27.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W27 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

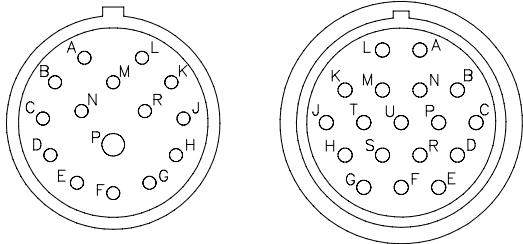


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**B**

1. Disconnect the following harness W27 connectors:  
 P1 from DRUH  
 P2 from PCU.
2. Check harness W27 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table:

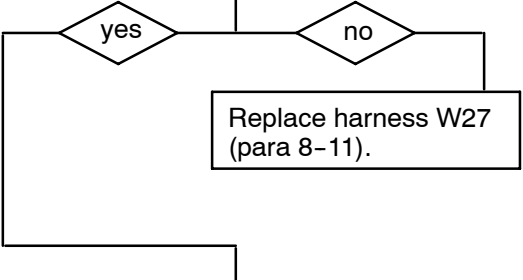
<u>Point 1</u>	<u>Point 2</u>
connector P1 socket A	connector P2 pin A
connector P1 socket B	connector P2 pin B
connector P1 socket M	connector P2 pin M
connector P1 socket N	connector P2 pin N
connector P1 socket G	connector P2 pin G
connector P1 socket H	connector P2 pin H
connector P1 socket R	connector P2 pin R
connector P1 socket J	connector P2 pin J
connector P1 socket K	connector P2 pin K
connector P1 socket L	connector P2 pin L
connector P1 socket P	connector P2 pin P



W27  
CONNECTOR P1  
TO DRUH

W27  
CONNECTOR P2  
TO PCU

Is continuity present at all points?



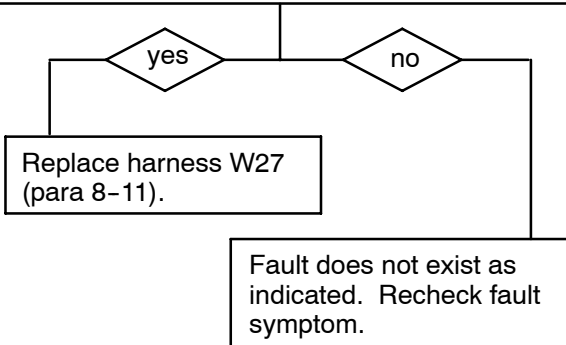


**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (26) WIRING HARNESS 27. - CONTINUED

CONTINUED FROM STEP B

<b>C</b>	Do a shorts test on harness W27 (para 3-3.n) on all pins and sockets except: P1-C, D, E, F; P2-C, D, E, F, S, T, U.
Are there any shorts?	



**END OF TASK**

# 3-3. TROUBLESHOOTING CHART - CONTINUED

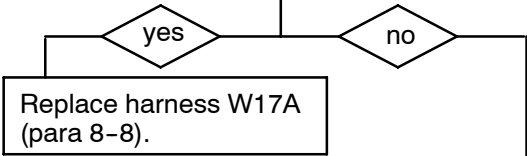
n. WIRING HARNESS CHECK - CONTINUED (27) WIRING HARNESS W17A.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W17A for any cuts, breaks, kinks, or missing segments.

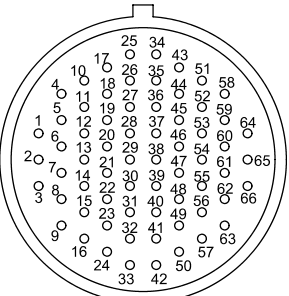
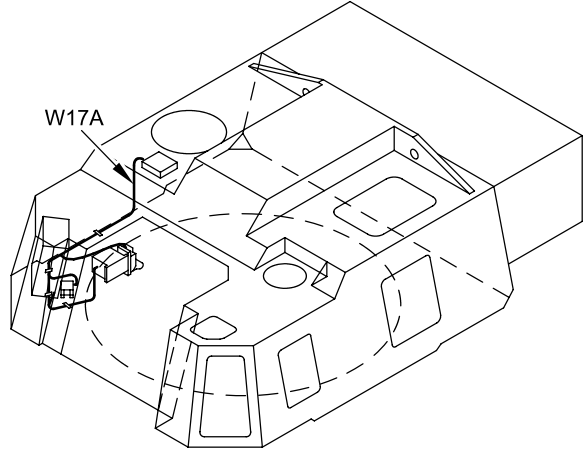
Are there any cuts, breaks, kinks, or missing segments?



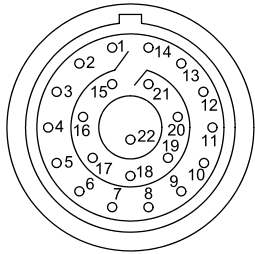
**B**

1. Disconnect the following harness W17A connectors:  
 P1 from DRUH J1,  
 P2 from VMS modem cab side J1,  
 P3 from ACU J2,  
 P4 from PLGR or DAGR harness W141,  
 P5 from BCIS.
2. Check harness W17A connectors for continuity by placing one multimeter lead on point 1 and other lead on point 2, 3, 4, or 5 (one at a time), as shown in this table.

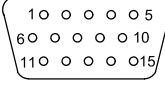
Point 1	Point 2	Point 3
connector P1 pin 56	connector P1 pin 44	-
connector P1 pin 49	connector P2 pin A	-
connector P1 pin 50	connector P2 pin B	-
connector P1 pin 57	connector P2 pin C	-
connector P1 pin 63	connector P2 pin D	-
connector P1 pin 17	connector P3 pin Y	-
connector P1 pin 18	connector P3 pin Z	-
connector P1 pin 54	connector P3 pin H	connector P2 pin Y
connector P1 pin 53	connector P3 pin G	connector P2 pin X
connector P1 pin 65	connector P3 pin F	connector P2 pin W
connector P1 pin 64	connector P3 pin E	connector P2 pin V
connector P1 pin 39	connector P3 pin T	-
connector P1 pin 16	connector P3 pin A	-
connector P1 pin 24	connector P3 pin B	-
connector P1 pin 8	connector P3 pin C	-
connector P1 pin 9	connector P3 pin D	-



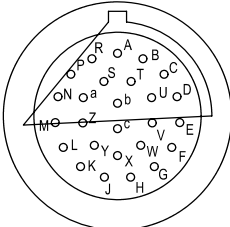
W17A CONNECTOR P1 TO DRUH J1



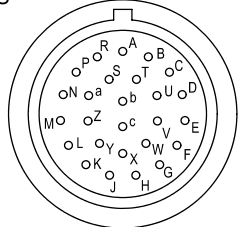
W17A CONNECTOR P4 TO DAGR OR PLGR HARNESS W141



W17A CONNECTOR P5 TO BCIS



W17A CONNECTOR P2 TO VMS CAB MODEM J1



W17A CONNECTOR P3 TO ACU J2

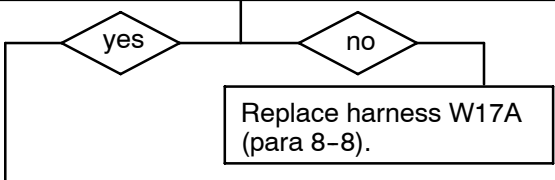
06pc342t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (27) WIRING HARNESS W17A. - CONTINUED

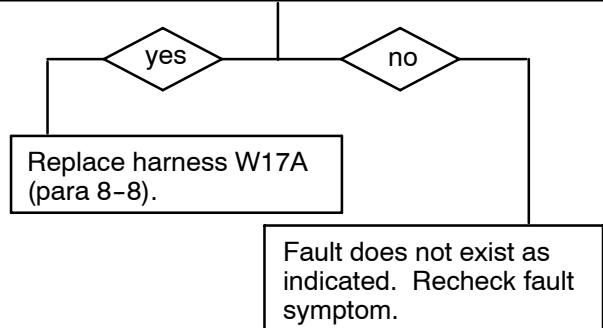
Point 1	Point 2	Point 3	Point 4	Point 5
connector P1 pin 47	-	-	connector P4 pin 6	-
connector P1 pin 20	-	-	connector P4 pin 13	-
connector P1 pin 34	-	-	-	connector P5 pin 8
connector P1 pin 25	-	-	-	connector P5 pin 11
connector P1 pin 51	-	-	connector P4 pin 4	connector P5 pin 4
connector P1 pin 43	-	-	connector P4 pin 5	connector P5 pin 5
-	-	-	connector P4 pin 9	connector P5 pin 9
-	-	-	connector P4 pin 10	connector P5 pin 10
connector P2 pin c	connector P3 pin S	-	-	-
connector P2 pin b	connector P3 pin R	-	-	-
connector P2 pin a	connector P3 pin P	-	-	-
connector P2 pin Z	connector P3 pin N	-	-	-
connector P2 pin P	connector P3 pin M	-	-	-
connector P2 pin N	connector P3 pin L	-	-	-
connector P2 pin M	connector P3 pin K	-	-	-
connector P2 pin L	connector P3 pin J	-	-	-
-	-	-	connector P4 pin 3	connector P5 pin 3
-	-	-	connector P4 pin 7	connector P5 pin 7
-	-	-	connector P4 pin 1	connector P5 pin 1
-	-	-	connector P4 pin 14	connector P5 pin 14
-	-	-	connector P4 pin 15	connector P5 pin 15

Is continuity present at all points?



**C** Do a shorts test on harness W17A (para 3-3.n) on the following pins:  
 P1-8, 9, 16, 17, 18, 24, 39, 49, 50, 53, 54, 57, 58, 63, 64, 65;  
 P2-A, B, C, D, L, M, N, P, V, W, X, Y, Z, a, b, c;  
 P3-A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, T, X, Y, Z.

Are there any shorts?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

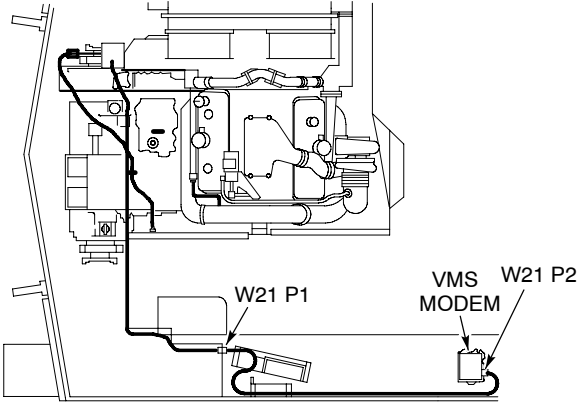
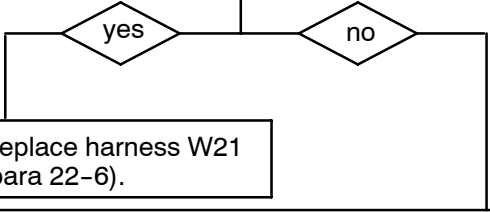
n. WIRING HARNESS CHECK - CONTINUED (28) WIRING HARNESS W21.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W21 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

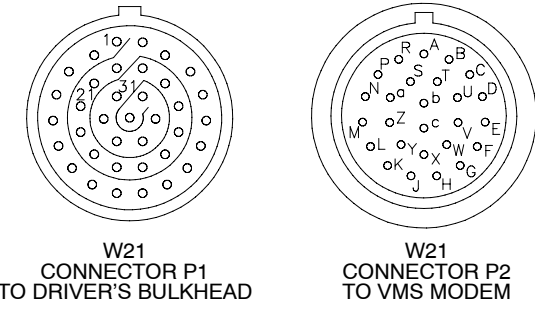


22hip182

- B**
1. Disconnect the following harness W21 connectors:  
 P1 from driver's bulkhead connector  
 P2 from VMS modem J1 hull side.
  2. Check harness W21 for continuity by placing one multimeter lead on point 1 and other lead on point 2 and point 3 (one at a time), as shown in this table.

<u>Point 1</u>	<u>Point 2</u>	<u>Point 3</u>
connector P1 socket 5	connector P2 pin A	-
connector P1 socket 6	connector P2 pin B	-
connector P1 socket 3	connector P2 pin C	-
connector P1 socket 4	connector P2 pin D	-
connector P1 socket 9	connector P2 pin E	connector P2 pin L
connector P1 socket 10	connector P2 pin F	connector P2 pin M
connector P1 socket 11	connector P2 pin G	connector P2 pin N
connector P1 socket 12	connector P2 pin H	connector P2 pin P
connector P1 socket 18	connector P2 pin R	-
connector P1 socket 28	connector P2 pin J	-
connector P1 socket 29	connector P2 pin K	-
connector P1 socket 30	connector P2 pin S	-
connector P2 pin T	connector P2 pin Z	connector P2 pin b
connector P2 pin U	connector P2 pin a	connector P2 pin c

Is continuity present at all points?

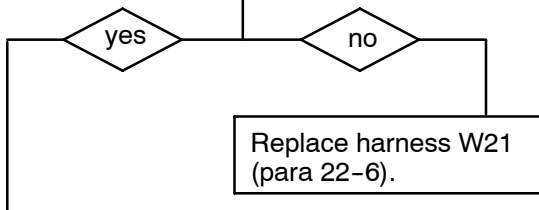


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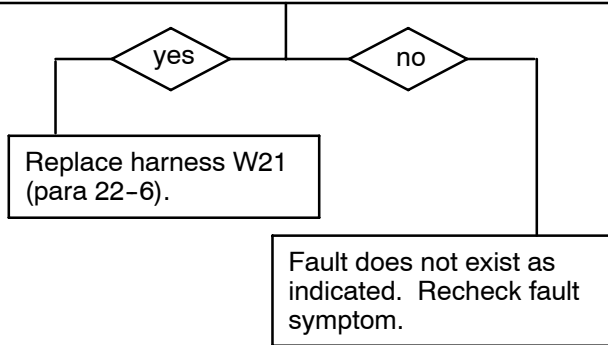
**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (28) WIRING HARNESS W21. - CONTINUED

CONTINUED FROM STEP B



<b>C</b>	<ol style="list-style-type: none"> <li>1. Do a shorts test on harness W21 (para 3-3.n) on all pins and sockets except:              P1-1, 2, 7, 8, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 35, 36, 37;              P2-W, X, Y.</li> <li>2. Continuity should be present when probing P2-E and L, F and M, G and N, H and P, T, Z, b, and U, a and c.</li> </ol>
Are there any shorts?	



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

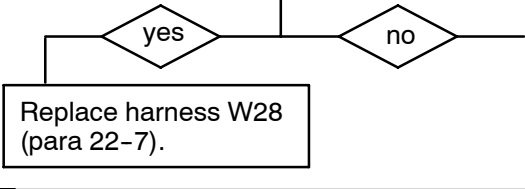
n. WIRING HARNESS CHECK - CONTINUED (29) WIRING HARNESS W28.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

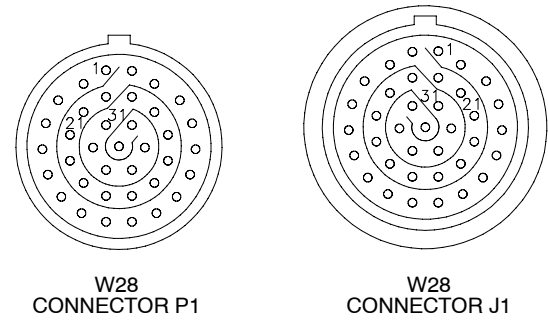
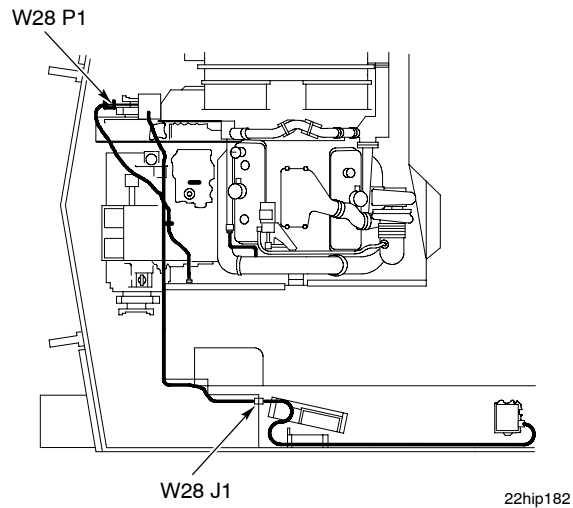
**A** Visually inspect harness W28 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?



- B**
1. Disconnect the following harness W28 connectors:  
 P1 from VMS  
 J1 from battery compartment bulkhead connector.
  2. Check harness W28 for continuity by placing one multimeter lead on point 1 and other lead on point 2 as shown in this table:
- | <u>Point 1</u>         | <u>Point 2</u>        |
|------------------------|-----------------------|
| connector P1 socket 3  | connector J1 pin 3    |
| connector P1 socket 4  | connector J1 pin 4    |
| connector P1 socket 5  | connector J1 pin 5    |
| connector P1 socket 6  | connector J1 pin 6    |
| connector P1 socket 9  | connector J1 pin 9    |
| connector P1 socket 10 | connector J1 pin 10   |
| connector P1 socket 11 | connector J1 pin 11   |
| connector P1 socket 12 | connector J1 pin 12   |
| connector P1 socket 16 | connector J1 pin 16   |
| connector P1 socket 17 | connector J1 pin 17   |
| connector P1 socket 18 | connector J1 pin 18   |
| connector P1 socket 28 | connector J1 pin 28   |
| connector P1 socket 29 | connector J1 pin 29   |
| connector P1 socket 30 | connector J1 pin 30   |
| connector P1 socket 7  | connector P1 socket 8 |

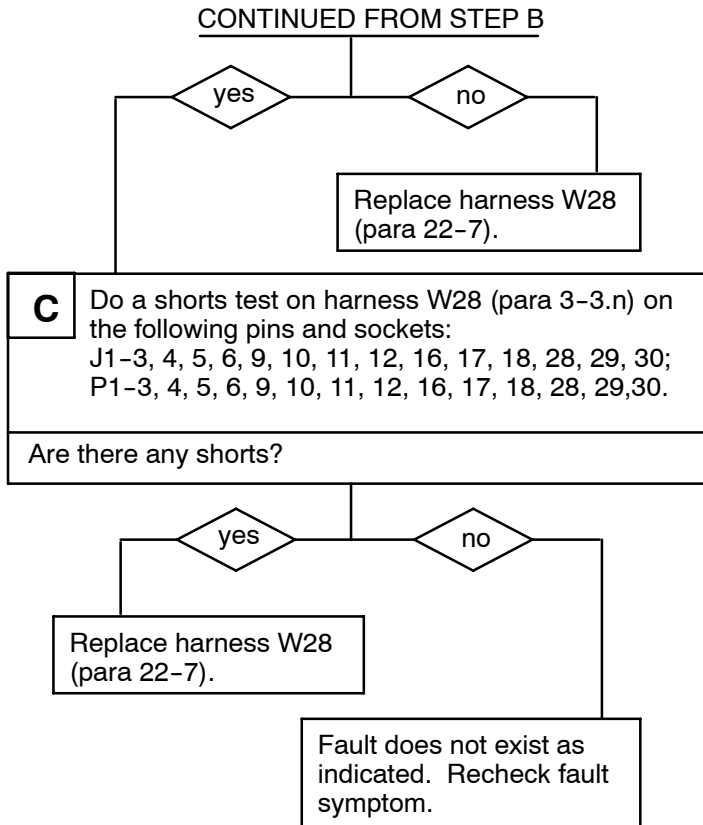
Is continuity present at all points?



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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (29) WIRING HARNESS W28. - CONTINUED



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

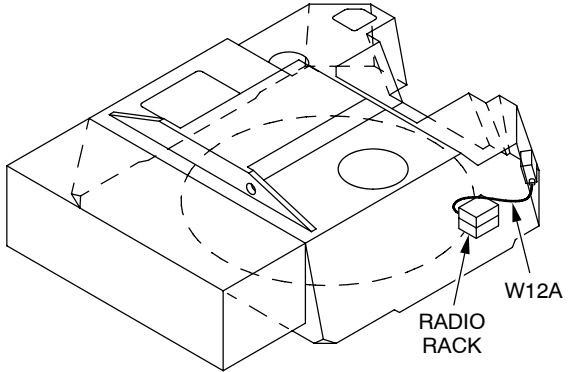
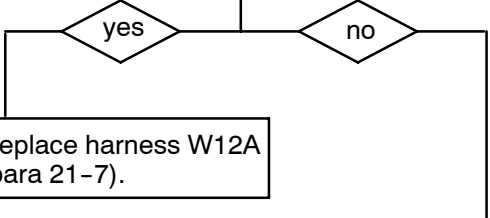
n. WIRING HARNESS CHECK - CONTINUED (30) WIRING HARNESS W12A.

INITIAL SETUP

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W12A for any cuts, breaks, kinks, or missing segments.

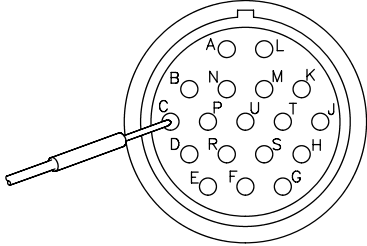
Are there any cuts, breaks, kinks, or missing segments?



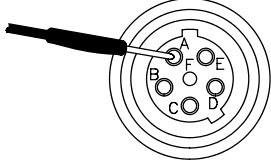
**B**

1. Disconnect the following harness W12A connectors:  
 For AFCS: W12A P1 from ACU J3  
 For PDFCS: W12A P1 from PDCU J3  
 W12A J1 from Radio Rack
2. Check harness W12A for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

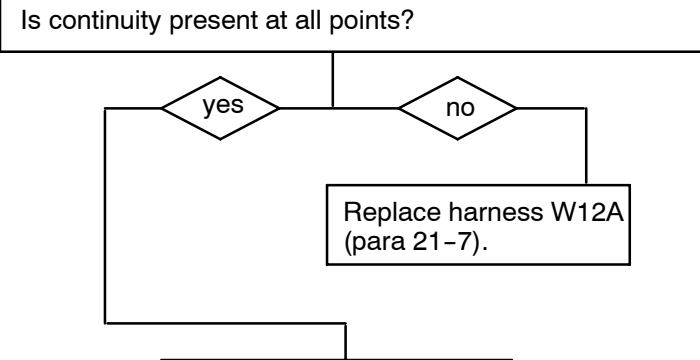
<u>Point 1</u>	<u>Point 2</u>
connector P1 socket C	connector J1 socket A
connector P1 socket A	connector J1 socket B
connector P1 socket D	connector J1 socket C
connector P1 socket B	connector J1 socket D



W12A CONNECTOR P1  
 SOCKET C  
 (SOCKET A)  
 (SOCKET D)  
 (SOCKET B)



W12A CONNECTOR J1  
 SOCKET A  
 (SOCKET B)  
 (SOCKET C)  
 (SOCKET D)



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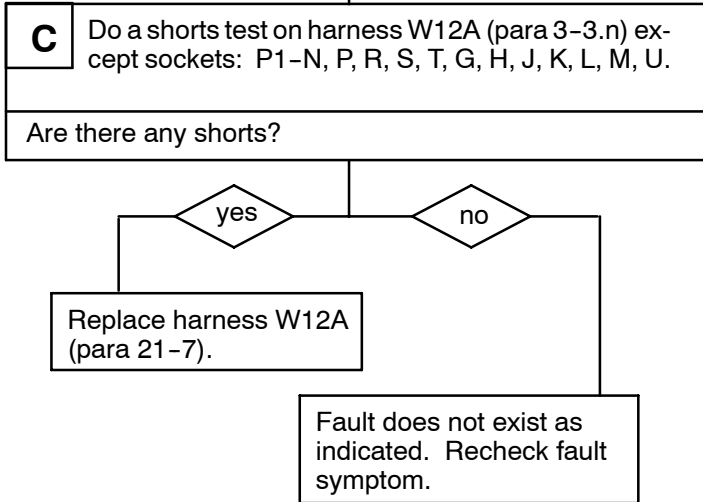
06pc010t



**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (30) WIRING HARNESS W12A. - CONTINUED

CONTINUED FROM STEP B



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

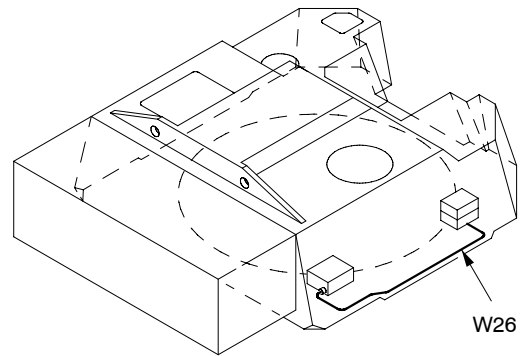
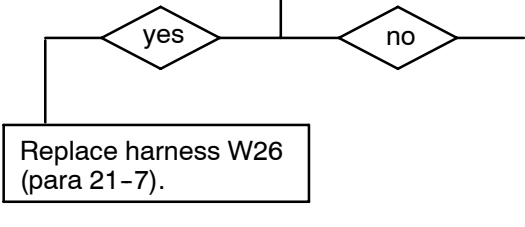
n. WIRING HARNESS CHECK - CONTINUED (31) WIRING HARNESS W26.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W26 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

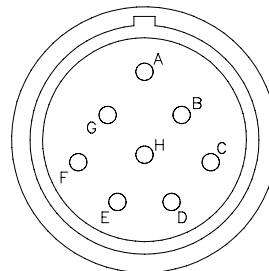


hipt543a

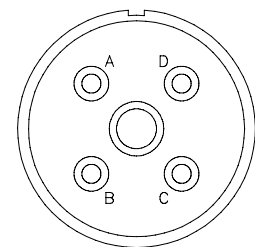
**B**

1. Disconnect the following harness W26 connectors:  
 For AFCS: W26 P1 from PCU J7  
 For PDFCS: W26 P1 from PCU-2 J7  
 W26 P2 from Radio Rack
2. Check harness W26 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector P1 socket A	connector P2 socket B
connector P1 socket B	connector P2 socket A
connector P1 socket C	connector P2 socket B
connector P1 socket D	connector P2 socket A

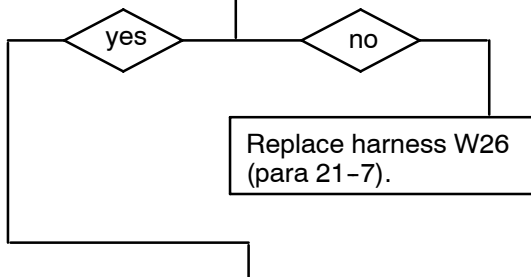


W26  
CONNECTOR P1



W26  
CONNECTOR P2

Is continuity present at all points?

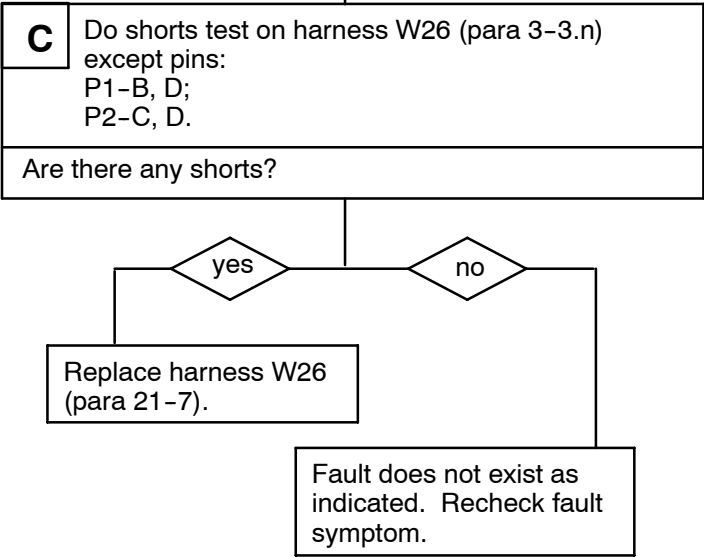


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### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (31) WIRING HARNESS W26. - CONTINUED

CONTINUED FROM STEP B



END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

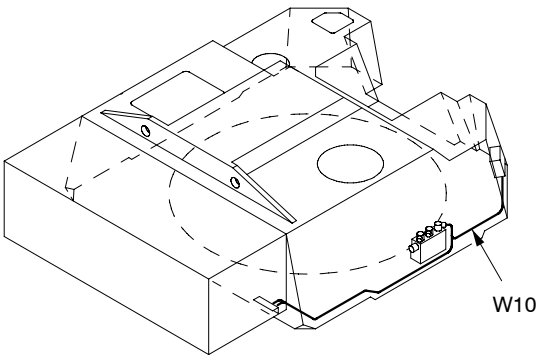
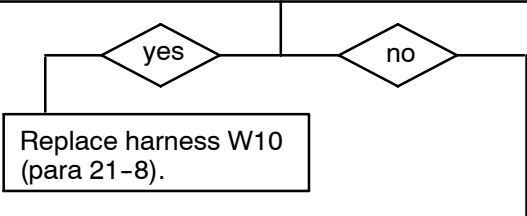
n. WIRING HARNESS CHECK - CONTINUED (32) WIRING HARNESS W10.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W10 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

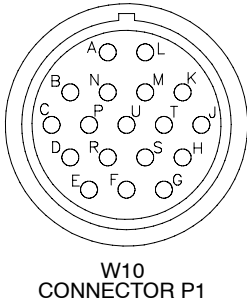
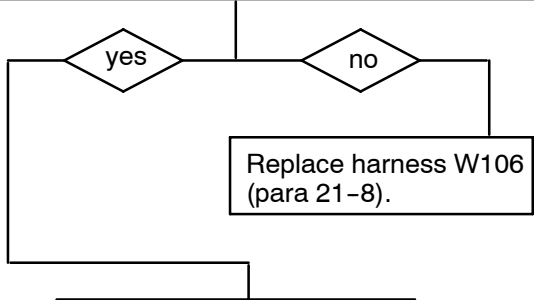


**B**

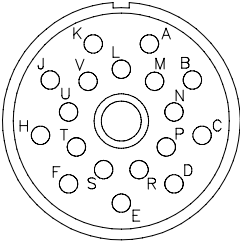
1. Disconnect the following harness W26 connectors:  
 For AFCS: W10 P1 from ACU J4  
 For PDFCS: W10 P1 from PDCU J4  
 W10 P2 from Intercom
2. Check harness W10 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

<u>Point 1</u>	<u>Point 2</u>
connector P1 socket D	connector P2 socket K
connector P1 socket F	connector P2 socket A
connector P1 socket H	connector P2 socket H
connector P1 socket K	connector P2 socket D

Is continuity present at all points?



W10  
CONNECTOR P1



W10  
CONNECTOR P2

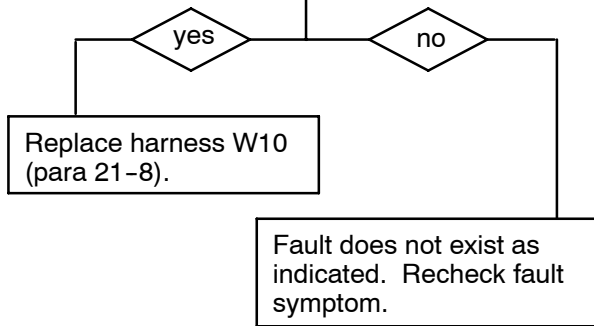
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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (32) WIRING HARNESS W10. - CONTINUED

CONTINUED FROM STEP B

<b>C</b>	Do shorts test on harness W10 (para 3-3.n) except sockets/pins: P1-A, B, C, G, L, M, N, P, R, S, T, J, E, U; P2-F, B, C, E, G, J, L, M, N, P, R, S, T, U.
Are there any shorts?	



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (33) WIRING HARNESS 12940911.

**INITIAL SETUP**

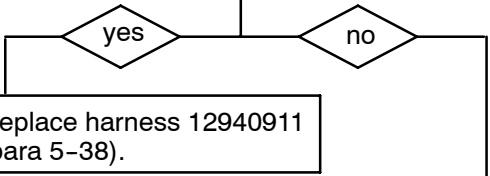
<p><u>Tools</u>                  Artillery and turret mechanic's tool kit (SC 5180-95-A12)                  Multimeter (item 24, Appx G)                  TA1 probe kit (item 42, Appx G)</p>	<p><u>Equipment Condition</u>                  Cover for brush block 2 removed (para 23-2)</p>
---	--

**NOTE**

For harness connector locations refer to paragraph 5-38.

**A** Visually inspect harness 12940911 for any cuts, breaks, kinks, or missing segments.

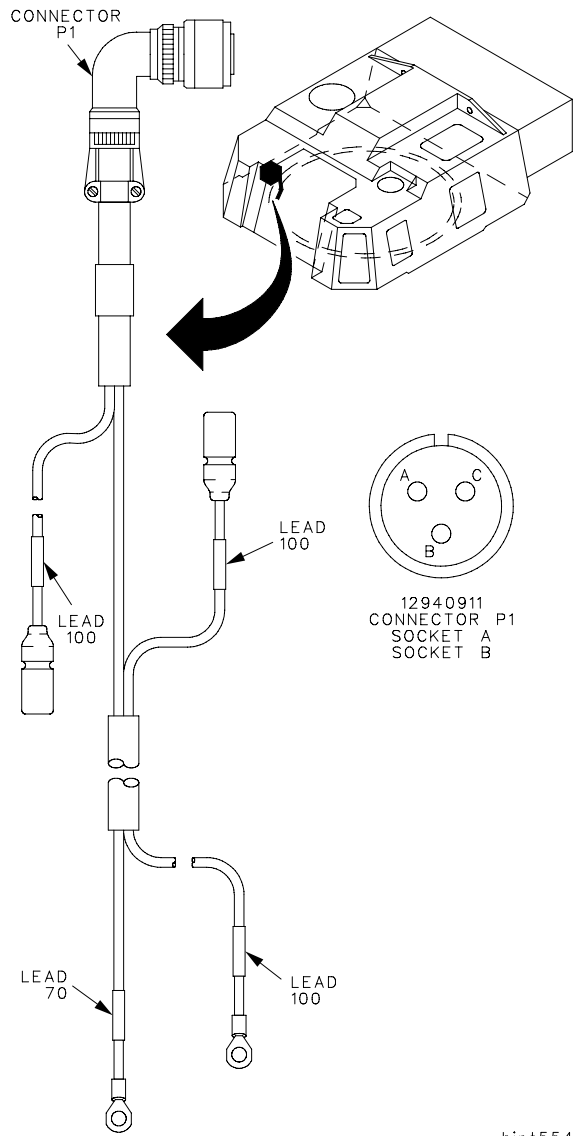
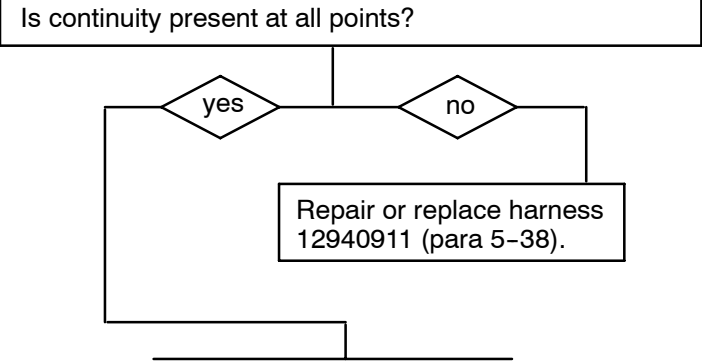
Are there any cuts, breaks, kinks, or missing segments?



**B**

1. Disconnect all harness 12940911 connectors and leads.
2. Check harness 12940911 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
Socket A	Lead 100
Socket B	Lead 70
Lead 100	Lead 100



hipt554

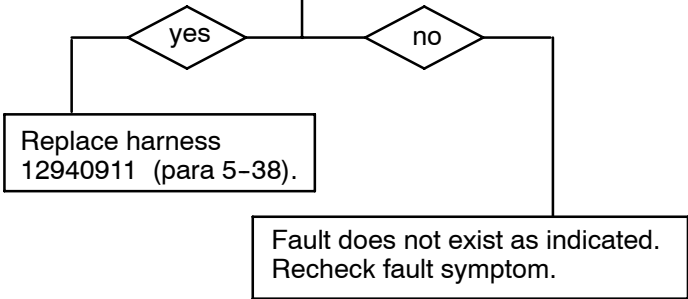
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**3-3. TROUBLESHOOTING CHART - CONTINUED**

n. WIRING HARNESS CHECK - CONTINUED (33) WIRING HARNESS 12940911. - CONTINUED

CONTINUED FROM STEP B

<b>C</b>	1. Do a shorts test on harness 12940911 connector P1 (para 3-3.n) except socket c.
	2. If continuity is present on any of these, then there is a short.
Are there any shorts?	



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED

(34) WIRING HARNESS W153.

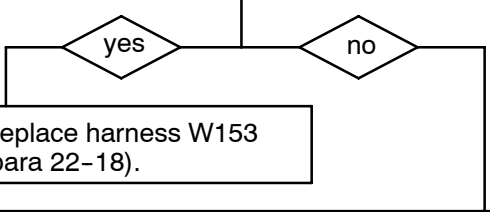
**INITIAL SETUP**

Tools

- Artillery and turret mechanic's tool kit (CL 5180-95-A12)
- Multimeter (item 24, Appx G)
- TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W153 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

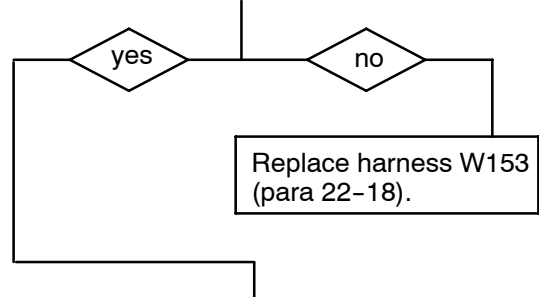


**B**

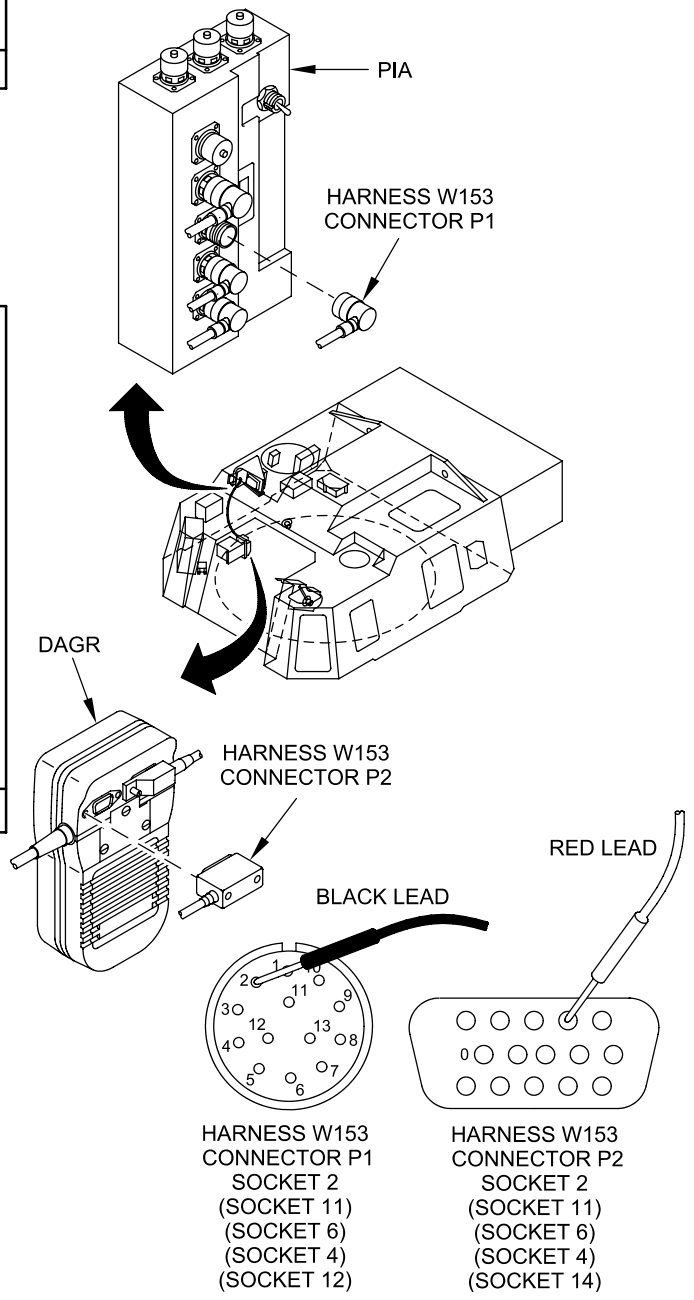
1. Disconnect the following harness W153 connectors:  
W153 P1 from J3 of PIA.  
W153 P2 from J1 of DAGR.
2. Check harness W153 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector P1 socket 2	connector P2 socket 2
connector P1 socket 11	connector P2 socket 11
connector P1 socket 6	connector P2 socket 6
connector P1 socket 4	connector P2 socket 4
connector P1 socket 12	connector P2 socket 14
connector P1 socket 13	connector P2 socket 15

Is continuity present at all points?



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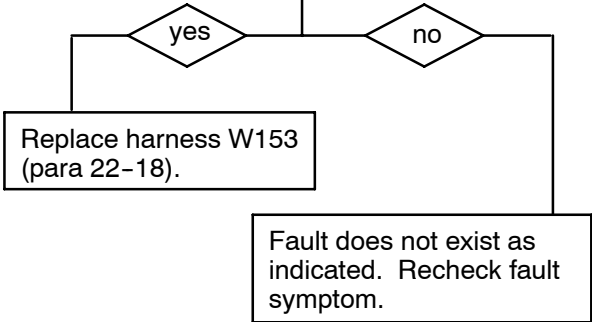


# 3-3. TROUBLESHOOTING CHART - CONTINUED

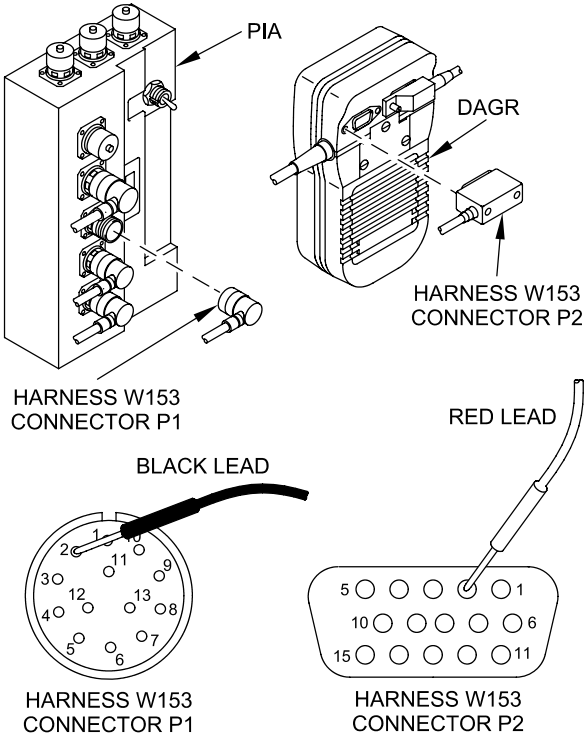
n. WIRING HARNESS CHECK - CONTINUED (34) WIRING HARNESS W153. - CONTINUED

CONTINUED FROM STEP B

<b>C</b>	Do shorts test on harness W153 (para 22-18) except sockets/pins: P1-1, 3, 10, 5, 7, 8, 9; P2-1, 3, 10, 5, 7, 8, 9, 12, 13.
Are there any shorts?	



END OF TASK



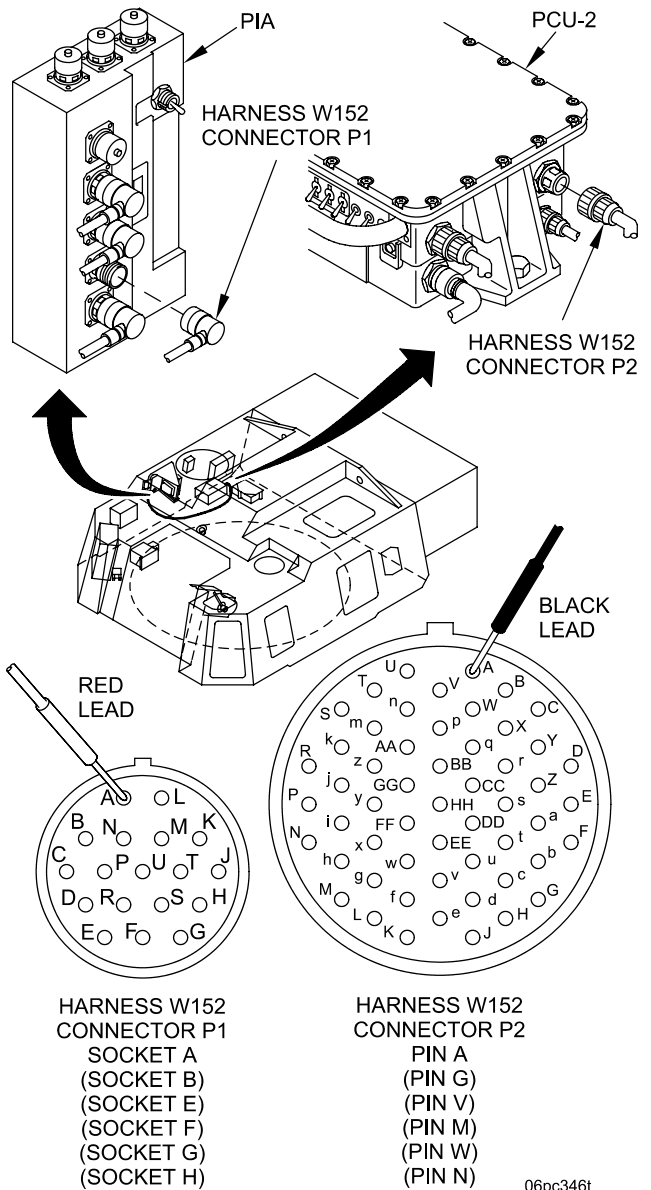
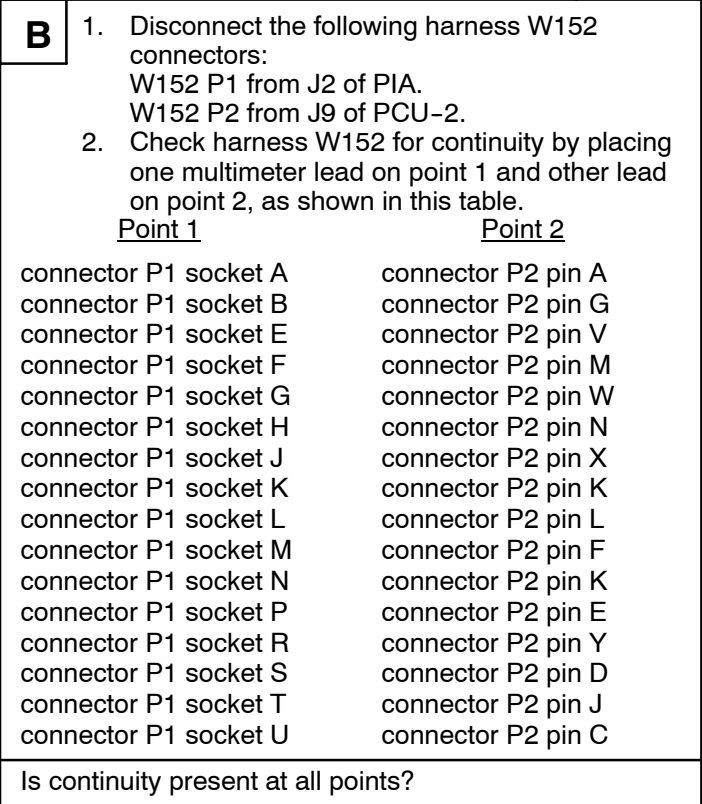
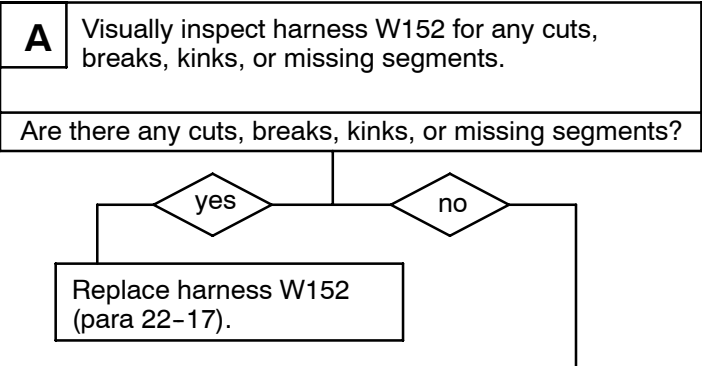
06pc345ta

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (35) WIRING HARNESS W152.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

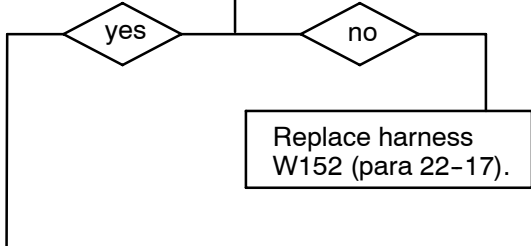


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# 3-3. TROUBLESHOOTING CHART - CONTINUED

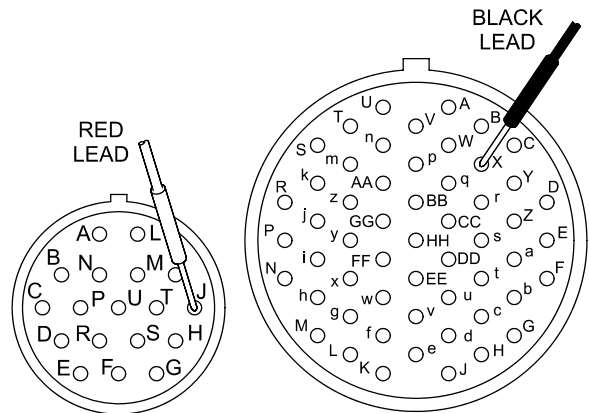
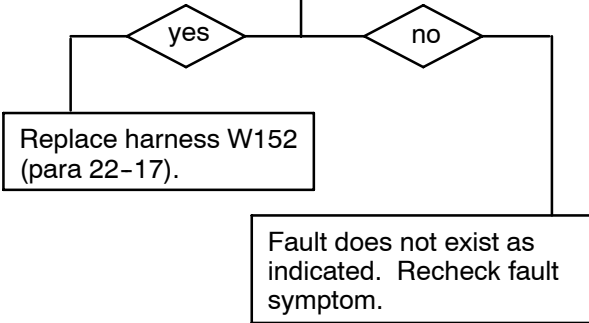
n. WIRING HARNESS CHECK - CONTINUED (35) WIRING HARNESS W152. - CONTINUED

CONTINUED FROM STEP B



**C** Do shorts test on harness W152 (para 22-17) except sockets/pins:  
 P1-C, D;  
 P2-B, H, P, R, S, T, U, Y, Z, a, b, c, d, e, f, h, h, i, j, m, n, p, q, r, s, t, u, w, x, y, z, AA, BB, CC, DD, EE, FF, GG, HH.

Are there any shorts?



- HARNESS W152 CONNECTOR P1
- SOCKET J
  - (SOCKET K)
  - (SOCKET L)
  - (SOCKET M)
  - (SOCKET N)
  - (SOCKET P)
  - (SOCKET R)
  - (SOCKET S)
  - (SOCKET T)
  - (SOCKET U)

- HARNESS W152 CONNECTOR P2
- PIN X
  - (PIN K)
  - (PIN L)
  - (PIN F)
  - (PIN K)
  - (PIN E)
  - (PIN Y)
  - (PIN D)
  - (PIN J)
  - (PIN C)

06pc346ta

END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

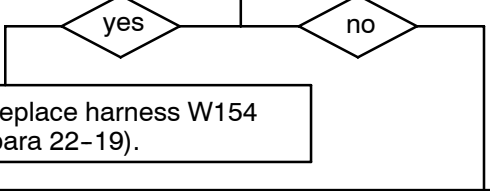
n. WIRING HARNESS CHECK - CONTINUED (36) WIRING HARNESS W154.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit  
 (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W154 for any cuts, breaks, kinks, or missing segments.

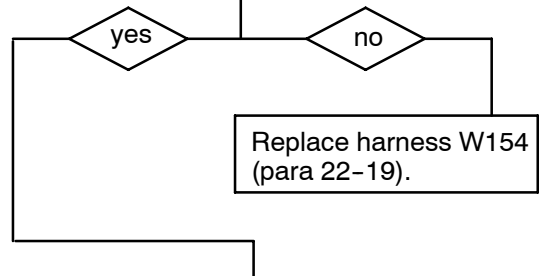
Are there any cuts, breaks, kinks, or missing segments?



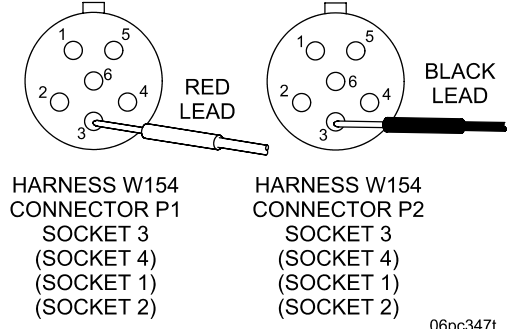
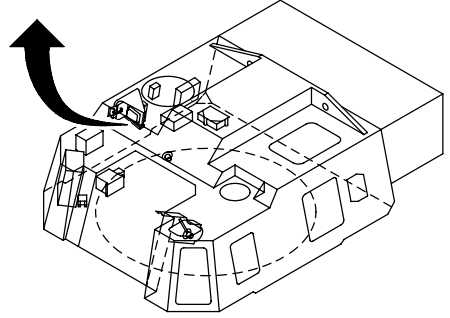
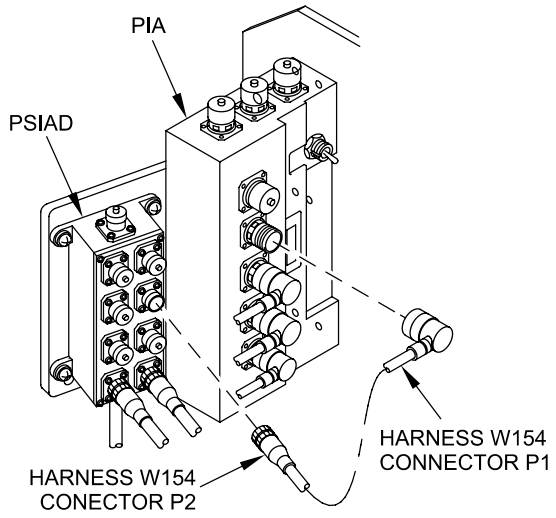
- B**
1. Disconnect the following harness W154 connectors:  
 W154 P1 from J4 of PIA.  
 W154 P2 from J5 of PSIAD.
  2. Check harness W154 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector P1 socket 3	connector P2 socket 3
connector P1 socket 4	connector P2 socket 4
connector P1 socket 1	connector P2 socket 1
connector P1 socket 2	connector P2 socket 2
connector P1 socket 5	connector P2 socket 5

Is continuity present at all points?



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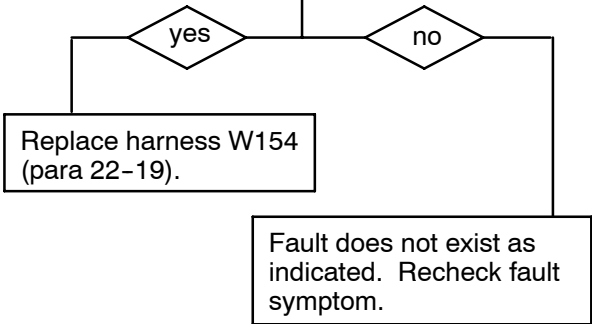
06pc347t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (36) WIRING HARNESS W154. - CONTINUED

CONTINUED FROM STEP B

**C** Do shorts test on harness W154 (para 22-19) except sockets/pins:  
P1-6;  
P2-6  
Are there any shorts?



END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (37) WIRING HARNESS W151.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit  
 (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W151 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

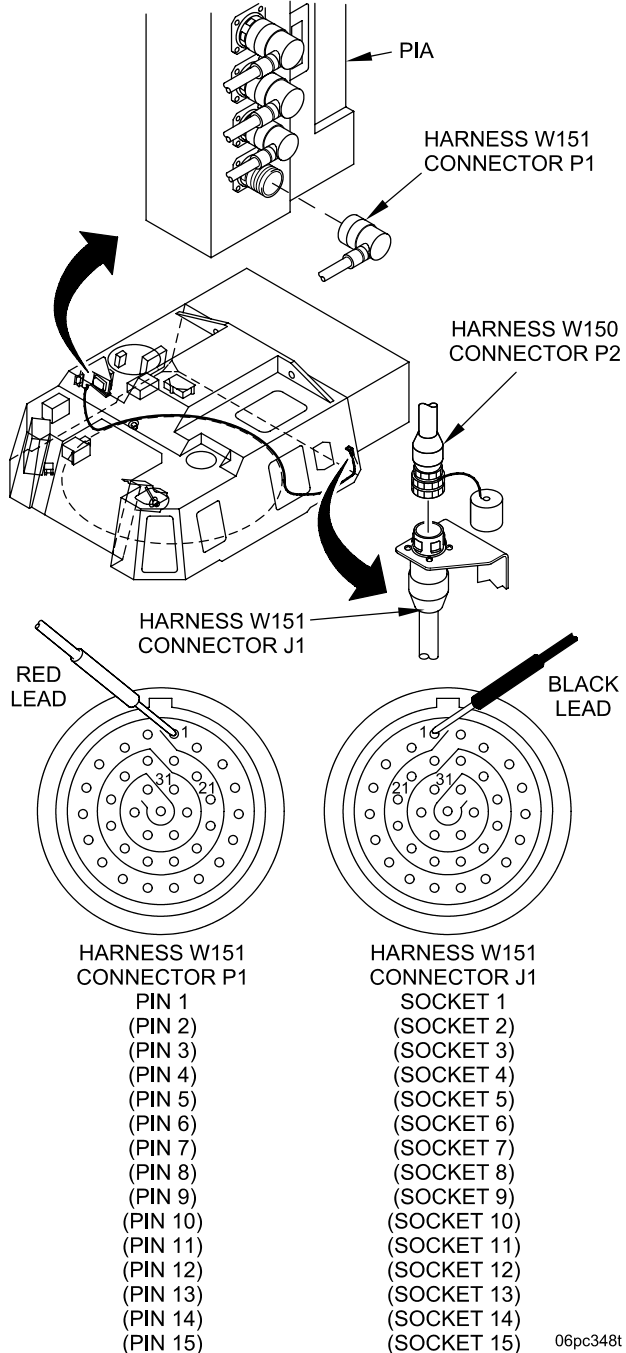


Replace harness W151 (para 22-15).

**B**

1. Disconnect the following harness W151 connectors:  
 W151 P1 from J1 of PIA.  
 W151 J1 from P2 of harness W150.
2. Check harness W151 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector P1 socket 1	connector J1 socket 1
connector P1 socket 2	connector J1 socket 2
connector P1 socket 3	connector J1 socket 3
connector P1 socket 4	connector J1 socket 4
connector P1 socket 5	connector J1 socket 5
connector P1 socket 6	connector J1 socket 6
connector P1 socket 7	connector J1 socket 7
connector P1 socket 8	connector J1 socket 8
connector P1 socket 9	connector J1 socket 9
connector P1 socket 10	connector J1 socket 10
connector P1 socket 11	connector J1 socket 11
connector P1 socket 12	connector J1 socket 12
connector P1 socket 13	connector J1 socket 13
connector P1 socket 14	connector J1 socket 14
connector P1 socket 15	connector J1 socket 15



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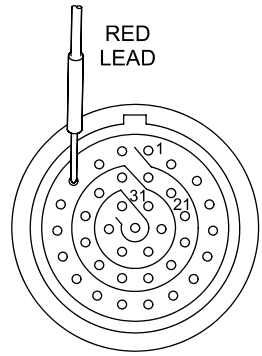
### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (37) WIRING HARNESS W151. - CONTINUED

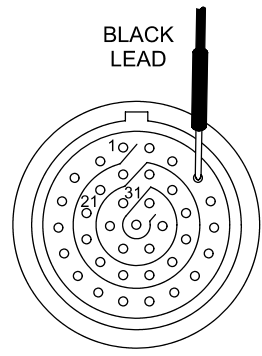
CONTINUED FROM STEP B

Point 1	Point 2
connector P1 socket 16	connector J1 socket 16
connector P1 socket 17	connector J1 socket 17
connector P1 socket 18	connector J1 socket 18
connector P1 socket 19	connector J1 socket 19
connector P1 socket 20	connector J1 socket 20
connector P1 socket 21	connector J1 socket 21
connector P1 socket 22	connector J1 socket 22
connector P1 socket 23	connector J1 socket 23
connector P1 socket 24	connector J1 socket 24
connector P1 socket 25	connector J1 socket 25
connector P1 socket 26	connector J1 socket 26
connector P1 socket 27	connector J1 socket 27
connector P1 socket 28	connector J1 socket 28
connector P1 socket 29	connector J1 socket 29
connector P1 socket 30	connector J1 socket 30
connector P1 socket 31	connector J1 socket 31
connector P1 socket 32	connector J1 socket 32
connector P1 socket 33	connector J1 socket 33
connector P1 socket 34	connector J1 socket 34

Is continuity present at all points?

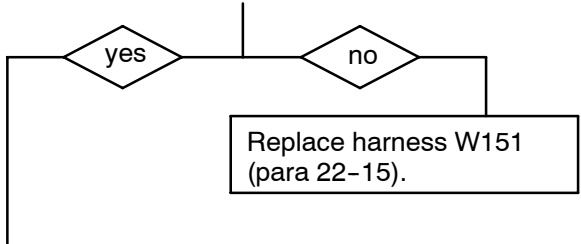


- HARNESS W151  
CONNECTOR P1
- PIN 16
  - (PIN 17)
  - (PIN 18)
  - (PIN 19)
  - (PIN 20)
  - (PIN 21)
  - (PIN 22)
  - (PIN 23)
  - (PIN 24)
  - (PIN 25)
  - (PIN 26)
  - (PIN 27)
  - (PIN 28)
  - (PIN 29)
  - (PIN 30)
  - (PIN 31)
  - (PIN 32)
  - (PIN 33)
  - (PIN 34)



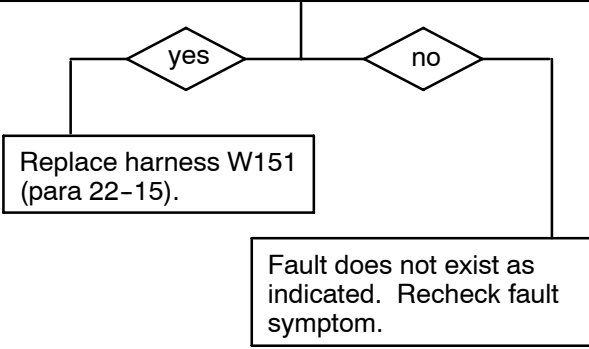
- HARNESS W151  
CONNECTOR J1
- SOCKET 16
  - (SOCKET 17)
  - (SOCKET 18)
  - (SOCKET 19)
  - (SOCKET 20)
  - (SOCKET 21)
  - (SOCKET 22)
  - (SOCKET 23)
  - (SOCKET 24)
  - (SOCKET 25)
  - (SOCKET 26)
  - (SOCKET 27)
  - (SOCKET 28)
  - (SOCKET 29)
  - (SOCKET 30)
  - (SOCKET 31)
  - (SOCKET 32)
  - (SOCKET 33)
  - (SOCKET 34)

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**C** Do shorts test on harness W151 (para 22-15) except sockets/pins:  
P1-35, 36, 37;  
P2-35, 36, 37.

Are there any shorts?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (38) WIRING HARNESS W150.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**A** Visually inspect harness W150 for any cuts, breaks, kinks, or missing segments.

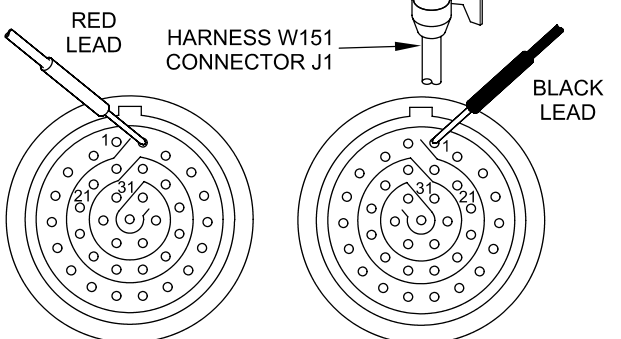
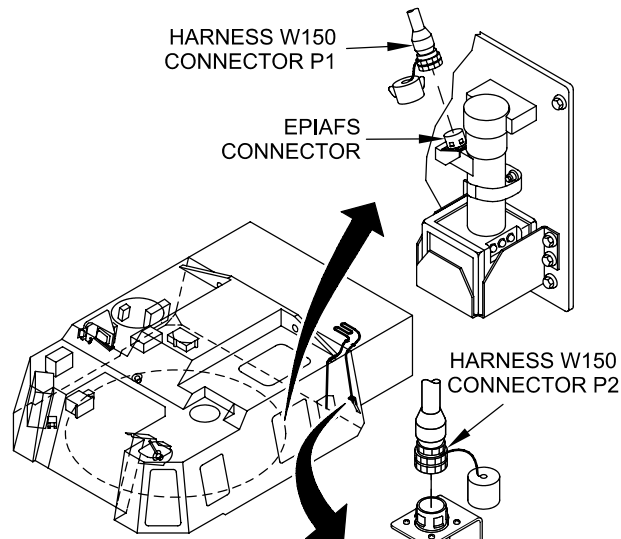
Are there any cuts, breaks, kinks, or missing segments?



Replace harness W150 (para 22-16).

- B**
1. Disconnect W150 P1 from EPIAFS and W150 P2 from PIA.
  2. Check harness W150 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector P1 socket 1	connector P2 pin 1
connector P1 socket 2	connector P2 pin 2
connector P1 socket 3	connector P2 pin 3
connector P1 socket 4	connector P2 pin 4
connector P1 socket 5	connector P2 pin 5
connector P1 socket 6	connector P2 pin 6
connector P1 socket 7	connector P2 pin 7
connector P1 socket 8	connector P2 pin 8
connector P1 socket 9	connector P2 pin 9
connector P1 socket 10	connector P2 pin 10
connector P1 socket 11	connector P2 pin 11
connector P1 socket 12	connector P2 pin 12
connector P1 socket 13	connector P2 pin 13
connector P1 socket 14	connector P2 pin 14
connector P1 socket 15	connector P2 pin 15
connector P1 socket 16	connector P2 pin 16
connector P1 socket 17	connector P2 pin 17



- HARNESS W150 CONNECTOR P1**
- SOCKET 1
  - (SOCKET 2)
  - (SOCKET 3)
  - (SOCKET 4)
  - (SOCKET 5)
  - (SOCKET 6)
  - (SOCKET 7)
  - (SOCKET 8)
  - (SOCKET 9)
  - (SOCKET 10)
  - (SOCKET 11)
  - (SOCKET 12)
  - (SOCKET 13)
  - (SOCKET 14)
  - (SOCKET 15)
  - (SOCKET 16)
  - (SOCKET 17)

- HARNESS W150 CONNECTOR P2**
- PIN 1
  - (PIN 2)
  - (PIN 3)
  - (PIN 4)
  - (PIN 5)
  - (PIN 6)
  - (PIN 7)
  - (PIN 8)
  - (PIN 9)
  - (PIN 10)
  - (PIN 11)
  - (PIN 12)
  - (PIN 13)
  - (PIN 14)
  - (PIN 15)
  - (PIN 16)
  - (PIN 17)

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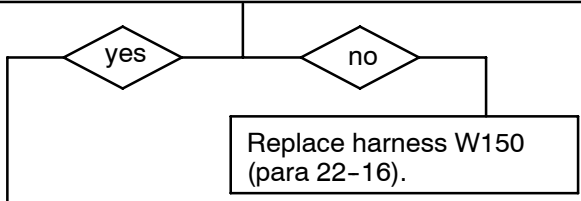
### 3-3. TROUBLESHOOTING CHART - CONTINUED

n. WIRING HARNESS CHECK - CONTINUED (38) WIRING HARNESS W150. - CONTINUED

CONTINUED FROM STEP B

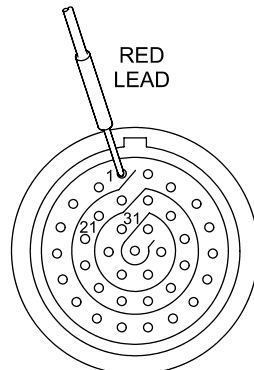
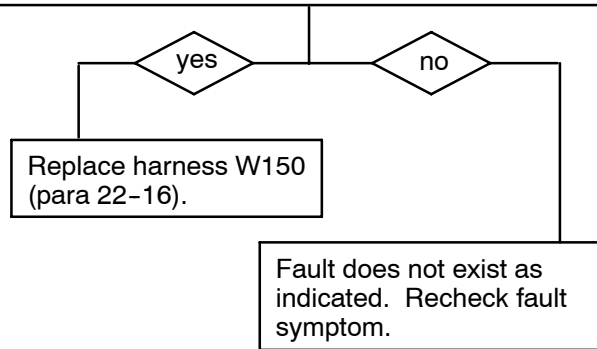
Point 1	Point 2
connector P1 socket 18	connector P2 pin 18
connector P1 socket 19	connector P2 pin 19
connector P1 socket 20	connector P2 pin 20
connector P1 socket 21	connector P2 pin 21
connector P1 socket 22	connector P2 pin 22
connector P1 socket 23	connector P2 pin 23
connector P1 socket 24	connector P2 pin 24
connector P1 socket 25	connector P2 pin 25
connector P1 socket 26	connector P2 pin 26
connector P1 socket 27	connector P2 pin 27
connector P1 socket 28	connector P2 pin 28
connector P1 socket 29	connector P2 pin 29
connector P1 socket 30	connector P2 pin 30
connector P1 socket 31	connector P2 pin 31
connector P1 socket 32	connector P2 pin 32
connector P1 socket 33	connector P2 pin 33
connector P1 socket 34	connector P2 pin 34

Is continuity present at all points?

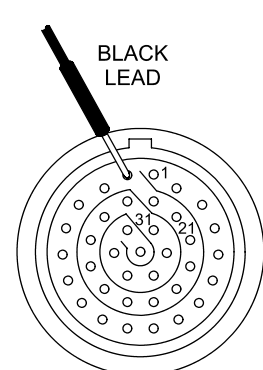


**C** Do shorts test on harness W150 (para 22-16) except sockets/pins:  
 P1-35, 36, 37;  
 P2-35, 36, 37.

Are there any shorts?



- HARNESS W150  
CONNECTOR P1
- SOCKET 18
  - (SOCKET 19)
  - (SOCKET 20)
  - (SOCKET 21)
  - (SOCKET 22)
  - (SOCKET 23)
  - (SOCKET 24)
  - (SOCKET 25)
  - (SOCKET 26)
  - (SOCKET 27)
  - (SOCKET 28)
  - (SOCKET 29)
  - (SOCKET 30)
  - (SOCKET 31)
  - (SOCKET 32)
  - (SOCKET 33)
  - (SOCKET 34)



- HARNESS W150  
CONNECTOR P2
- PIN 18
  - (PIN 19)
  - (PIN 20)
  - (PIN 21)
  - (PIN 22)
  - (PIN 23)
  - (PIN 24)
  - (PIN 25)
  - (PIN 26)
  - (PIN 27)
  - (PIN 28)
  - (PIN 29)
  - (PIN 30)
  - (PIN 31)
  - (PIN 32)
  - (PIN 33)
  - (PIN 34)

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**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

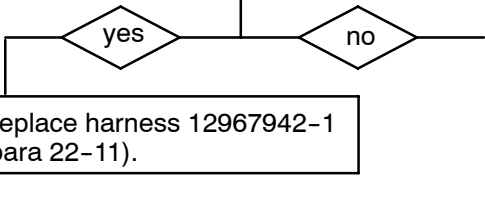
o. PRECISION LIGHTWEIGHT GPS (PLGR) (1) NO POWER TO PRECISION LIGHTWEIGHT GPS (GLOBAL POSITIONING SYSTEM) RECEIVER (PLGR).

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

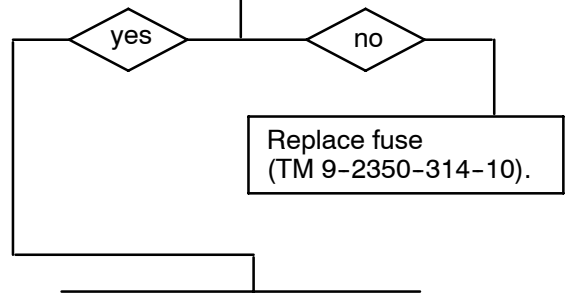
**A** Visually inspect harness 12967942-1 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

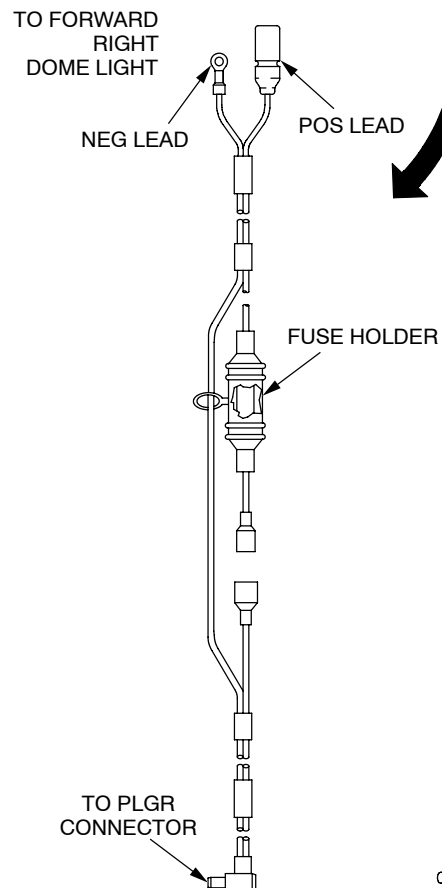
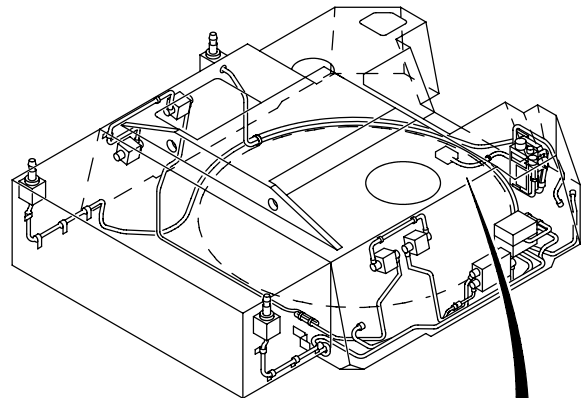


**B** Open fuse holder, remove fuse and check continuity of fuse by placing one multimeter lead on one end of fuse and other multimeter lead on another end.

Is continuity present?



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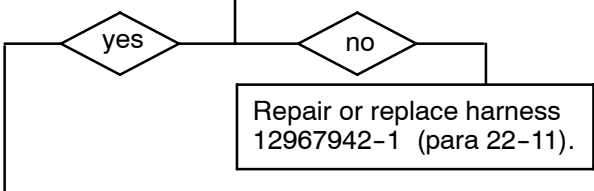
### 3-3. TROUBLESHOOTING CHART - CONTINUED

o. PRECISION LIGHTWEIGHT GPS (PLGR) - CONTINUED (1) NO POWER TO PRECISION LIGHTWEIGHT GPS (GLOBAL POSITIONING SYSTEM) RECEIVER (PLGR). - CONTINUED

CONTINUED FROM STEP B

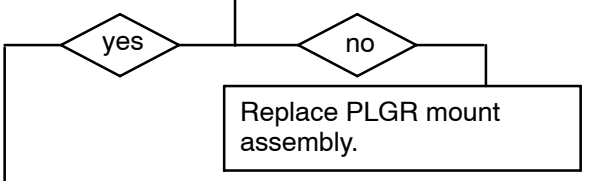
- C**
1. Disconnect harness 12967942-1 connector and leads.
  2. Check harness for continuity by placing one multimeter lead on point one and the other lead on point two, as shown in this table.
- | Point 1 | Point 2  |
|---------|----------|
| A       | B        |
| C       | Pos Lead |
| D       | Neg lead |

Is continuity present at all points?



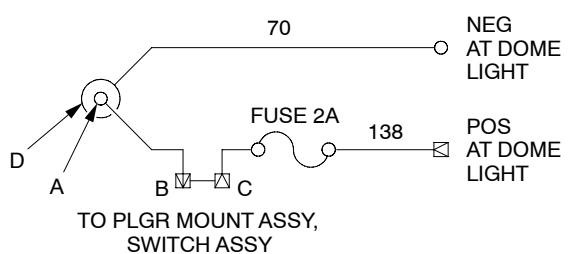
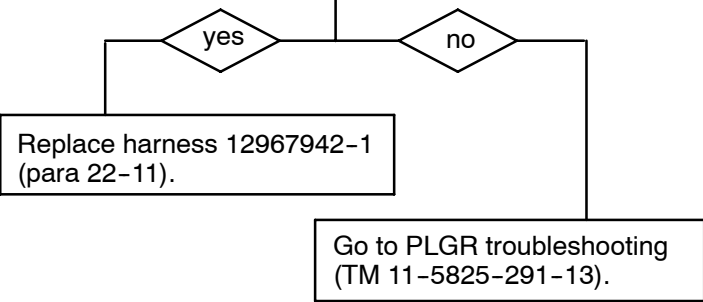
- D**
- Check PLGR mount assembly switch for continuity by placing one multimeter at point A and the other lead at point B of the PLGR mount assembly leads, then press the PLGR mount assembly switch completely.

Is continuity present?

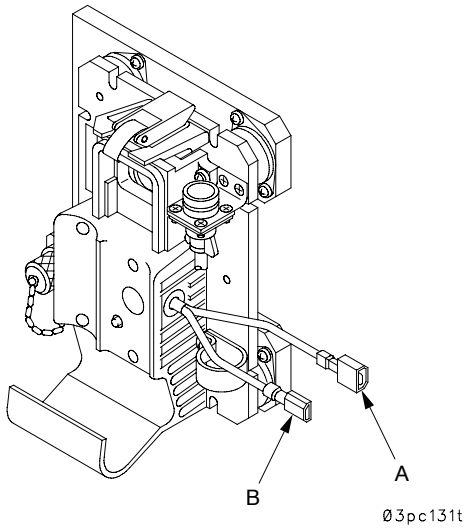


- E**
1. Do shorts test on harness 12967942-1 (para 3-3.n).
  2. If continuity is present on any of these, then there is a short.

Are there any shorts?



SCHEMATIC



END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

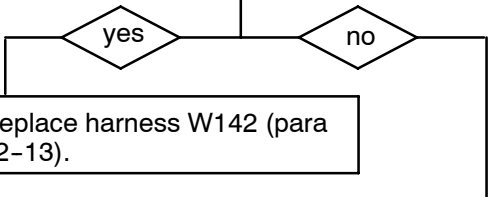
o.1 DEFENSE ADVANCED GPS RECEIVER (DAGR)	(1) NO POWER TO DEFENSE ADVANCED GPS (GLOBAL POSITIONING SYSTEM) RECEIVER (DAGR).
--	---

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

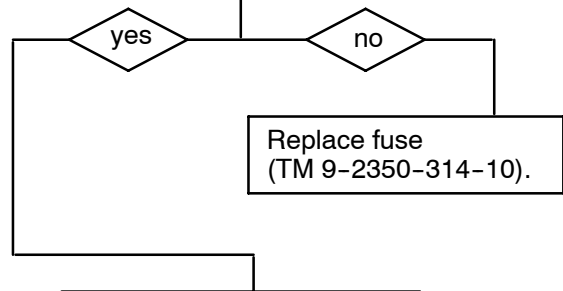
**A** Visually inspect harness W142 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

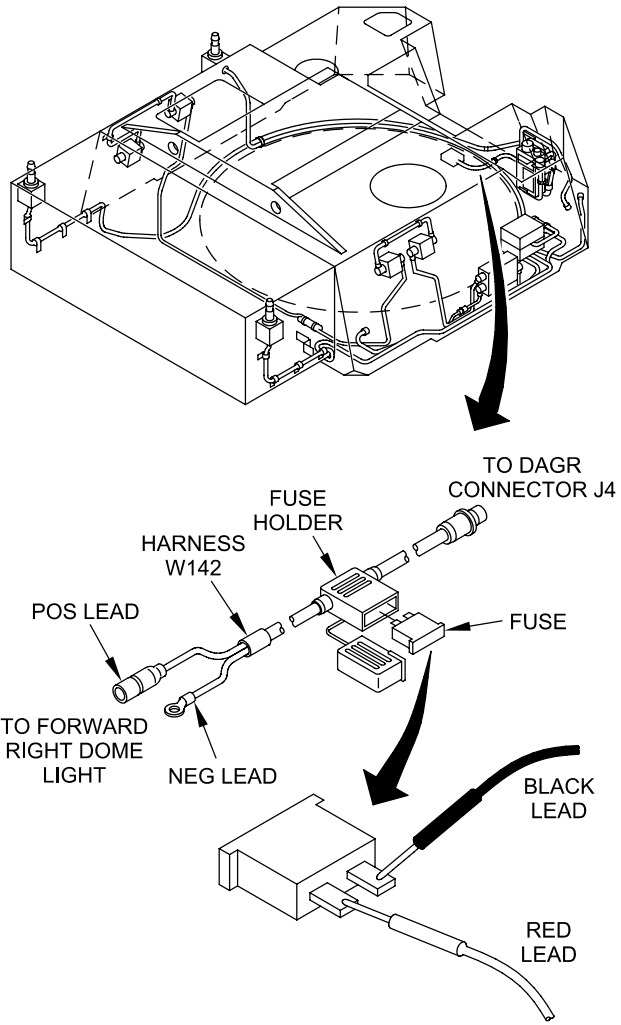


**B** Open fuse holder, remove fuse and check continuity of fuse by placing one multimeter lead on one end of fuse and other multimeter lead on another end.

Is continuity present?



CONTINUED ON NEXT PAGE



06pc343t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

o.1 DEFENSE ADVANCED GPS RECEIVER (DAGR) - CONTINUED (1) NO POWER TO DEFENSE ADVANCED GPS (GLOBAL POSITIONING SYSTEM) RECEIVER (DAGR). - CONTINUED

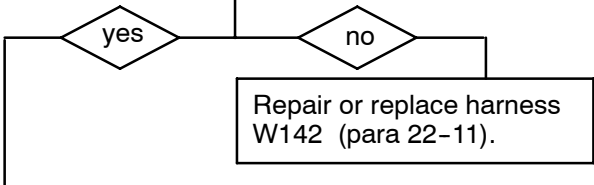
CONTINUED FROM STEP B

**C**

1. Disconnect harness W142 connector and leads.
2. Check harness for continuity by placing one multimeter lead on point one and the other lead on point two, as shown in this table.

Point 1	Point 2
A	Pos Lead
B	Neg lead

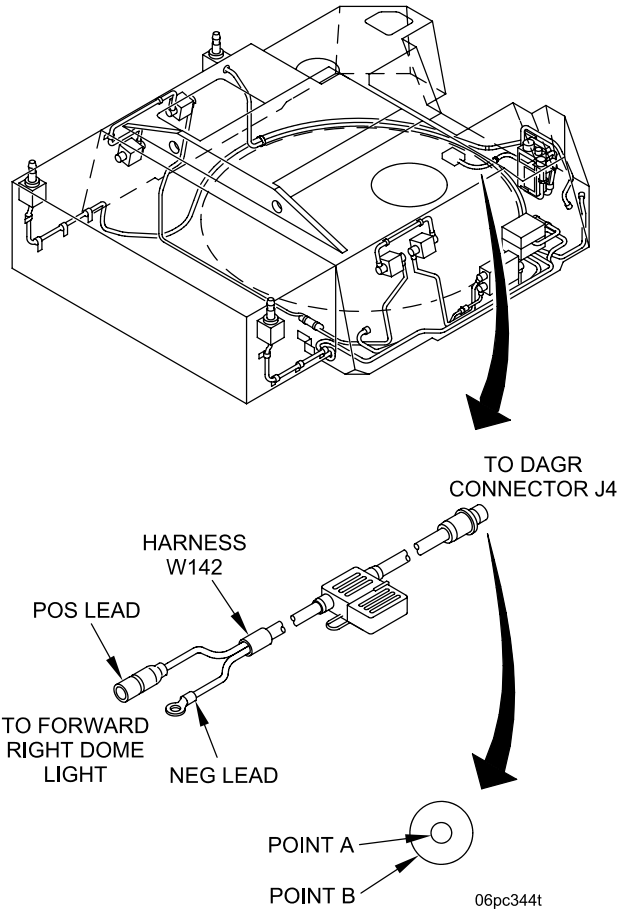
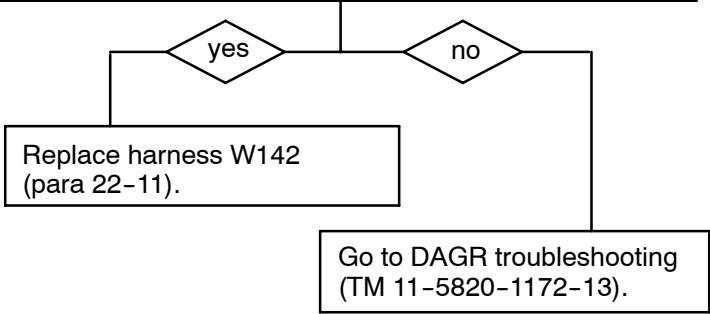
Is continuity present at all points?



**D**

1. Do shorts test on harness W142 (para 3-3.n).
2. If continuity is present on any of these, then there is a short.

Are there any shorts?



END OF TASK

### 3-3. TROUBLESHOOTING CHART - CONTINUED

p. MUZZLE VELOCITY SENSOR (1) NO POWER TO MUZZLE VELOCITY SENSOR WIRING HARNESS W93A.

**INITIAL SETUP**

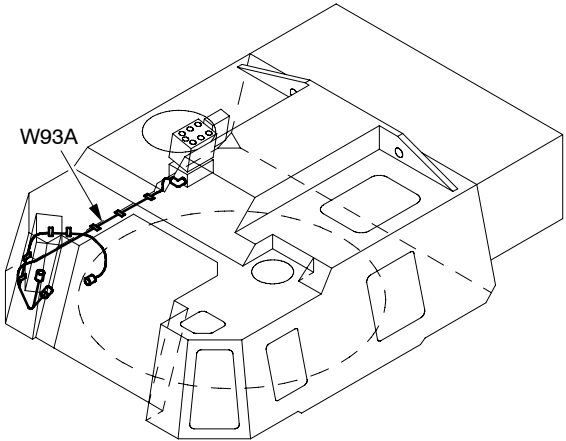
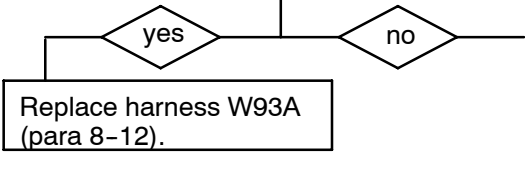
Tools  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

**NOTE**

Prior to troubleshooting W93A wiring harness, troubleshoot 1553 termination connector (para 3-3.p(2)).

**A** Visually inspect harness W93A for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

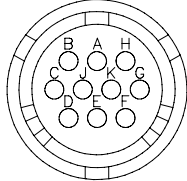
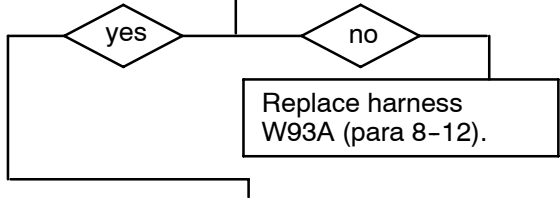


**B** 1. Disconnect the following harness W93A connectors:  
 W92 P2 or 1553 termination connector from W93A J2  
 W93A P6 from PCU J6  
 W93A P3 from ACU J8  
 W93A J3 from W3 P4

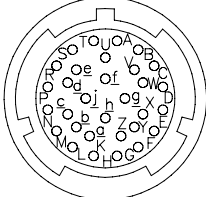
2. Check harness W93A for continuity by placing one multimeter lead on point 1 and other lead on points 2, 3, and 4 (one at a time), as shown in this table.

<p>Point 1</p> <p>Connector J2 pin A                  Connector J2 pin B                  Connector J2 pin E                  Connector J2 pin F</p> <p>Point 3</p> <p>-                  Connector P3 socket E                  Connector P3 Socket F</p>	<p>Point 2</p> <p>Connector P6 socket A                  Connector P6 socket B                  -                  -</p> <p>Point 4</p> <p>-                  -                  Connector J3 socket E                  Connector J3 socket F</p>
--	---

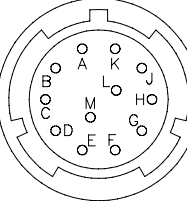
Is continuity present at all points?



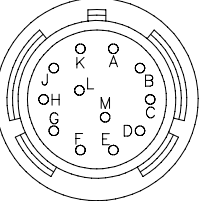
W93A  
CONNECTOR J2  
TO W92 P2 OR  
1553 TERMINATION  
CONNECTOR



W93A  
CONNECTOR P6  
TO PCU J6



W93A  
CONNECTOR P3  
TO ACU J8



W93A  
CONNECTOR J3  
TO W3 P4

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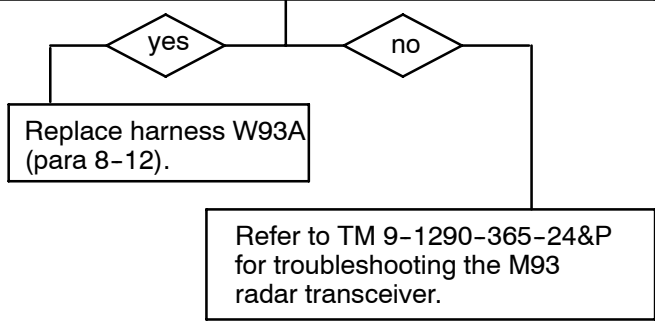
CONTINUED ON NEXT PAGE

**3-3. TROUBLESHOOTING CHART - CONTINUED**

p. MUZZLE VELOCITY SENSOR - CONTINUED (1) NO POWER TO MUZZLE VELOCITY SENSOR WIRING HARNESS W93A. - CONTINUED

- C**
1. Do a shorts test on harness W93A (para 3-3.n) on all pins and sockets except:  
 J2-C, D, G, H, J, K, L, N, P, R, S, T, U, V, W, X, Y, Z;  
 P6-C, D, G, H, J, K, L, M;  
 P3-A, B, C, D, G, H, J, K, L, M;  
 J3-A, B, C, D, G, H, J, K, L, M.
  2. Some continuity should be present on sockets E and F on connectors J2 (3.5 ohms), J3 (115.9 ohms), and P3 (115.9 ohms).

Are any shorts found?



**END OF TASK**

### 3-3. TROUBLESHOOTING CHART - CONTINUED

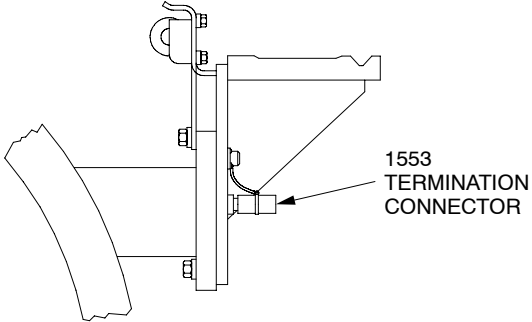
p. MUZZLE VELOCITY SENSOR - CONTINUED (2) NO POWER TO MUZZLE VELOCITY SENSOR. 1553 TERMINATION CONNECTOR.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (CL 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

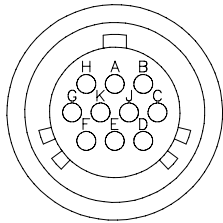
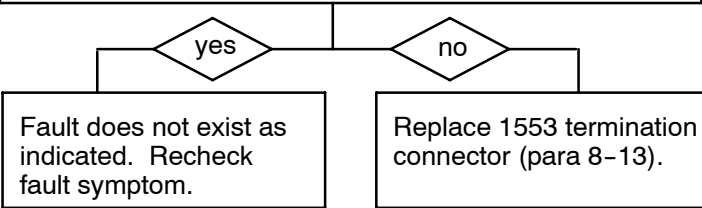
**NOTE**

- If the M93 radar transceiver is not installed, ensure the 1553 termination connector was installed on wiring harness W93A J2 connector.
- If the M93 radar transceiver is installed and wiring harness W92 P2 connector was installed, troubleshoot W92 wiring harness in accordance with TM 9-1290-365-24&P.



1. Disconnect 1553 termination connector P1 from W93A J2.
2. Some continuity should be present on sockets E and F on connector P1. It should be 75 ohms  $\pm$  5.

Is continuity present?



1553 TERMINATION CONNECTOR P1

**END OF TASK**

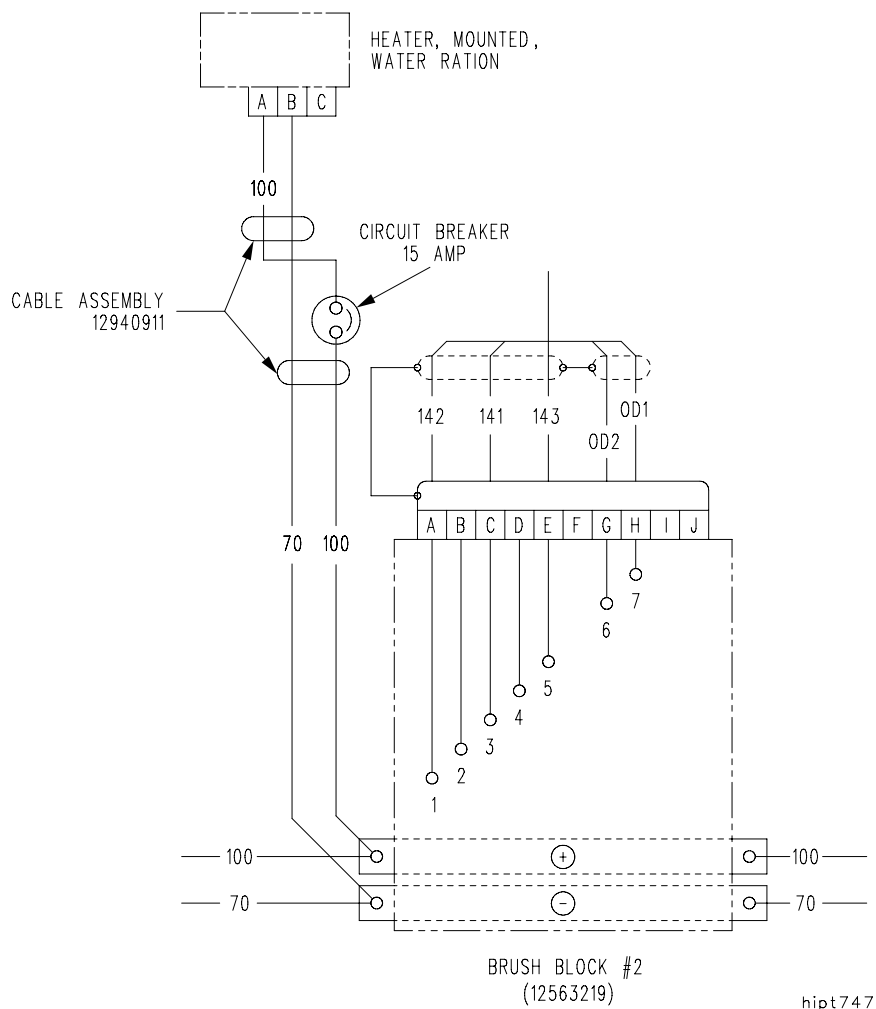


### 3-3. TROUBLESHOOTING CHART - CONTINUED

#### q. MOUNTED WATER RATION HEATER CIRCUIT

The Mounted Water Ration Heater consists of a water heater, wiring harness, and a 15 amp circuit breaker. The diagram below shows the relationship between these components.

When vehicle MASTER power switch is turned ON, 24 V dc is applied through the slip ring on brush block #2 and 15 amp circuit breaker to the heater.



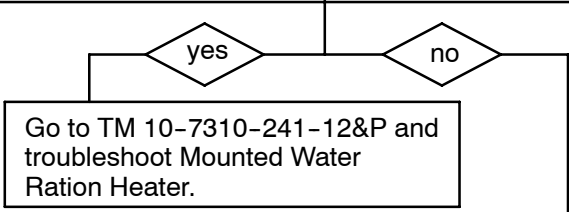
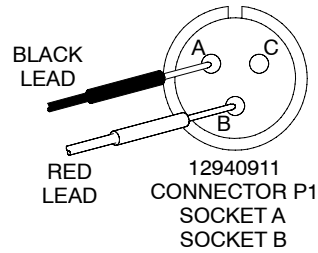
### 3-3. TROUBLESHOOTING CHART - CONTINUED

q. MOUNTED WATER RATION HEATER - CONTINUED (1) MOUNTED WATER RATION HEATER (MWRH) WILL NOT OPERATE.

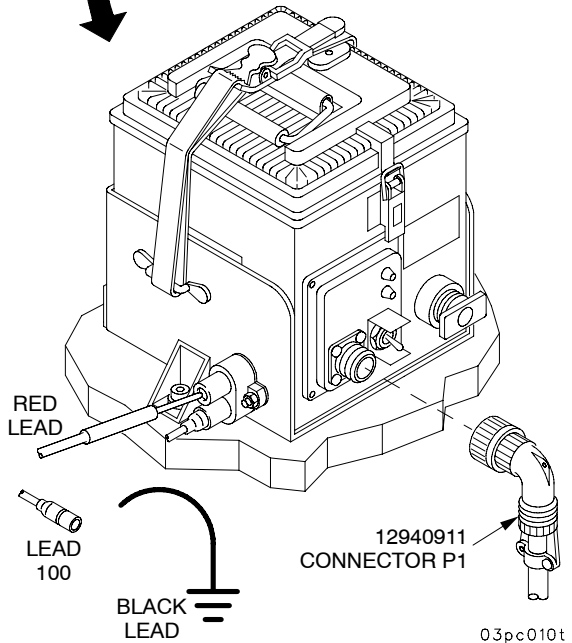
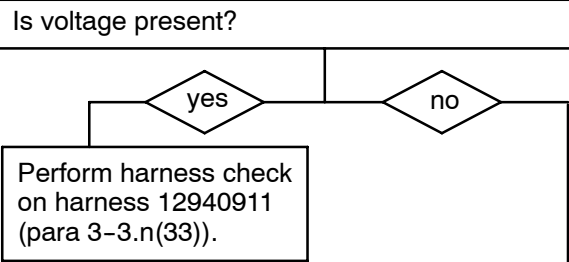
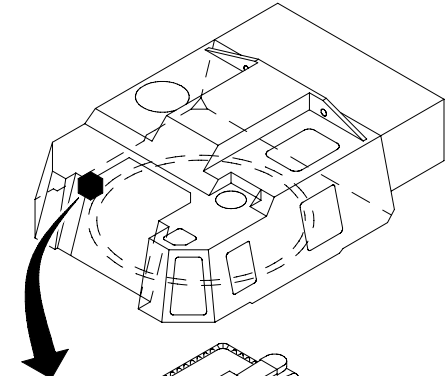
**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)  
 TA1 probe kit (item 42, Appx G)

- A**
1. Disconnect harness 12940911 connector P1 at heater (para 5-38).
  2. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  3. Place multimeter red lead on harness 12940911 connector P1 socket B and black lead on harness connector P1 socket A.
  4. Check for voltage.
- Is voltage present?



- B**
1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).
  2. Connect harness 12940911 connector P1 at heater (para 5-38).
  3. Disconnect harness lead 100 at circuit breaker.
  4. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).
  5. Place red multimeter lead in circuit breaker and black lead to ground.
  6. Check for voltage.
- Is voltage present?



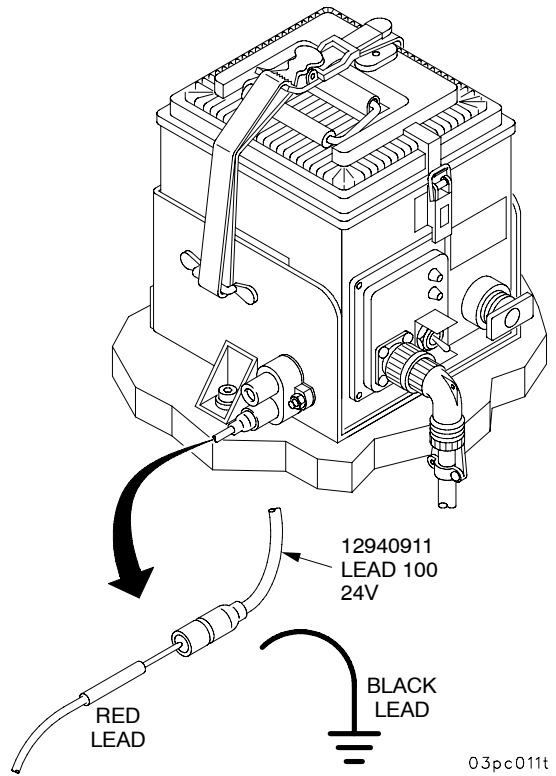
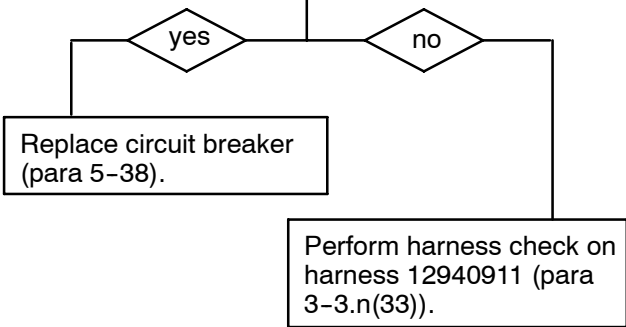
CONTINUED ON NEXT PAGE

### 3-3. TROUBLESHOOTING CHART - CONTINUED

q. MOUNTED WATER RATION HEATER - CONTINUED (1) MOUNTED WATER RATION HEATER (MWRH) WILL NOT OPERATE. - CONTINUED

CONTINUED FROM STEP B

- |                     |  |
|---------------------|--|
| <b>C</b>            | <ol style="list-style-type: none"> <li>1. Turn vehicle MASTER power switch OFF (TM 9-2350-314-10).</li> <li>2. Disconnect harness 12940911 (24V) lead 100 from circuit breaker.</li> <li>3. Turn vehicle MASTER power switch ON (TM 9-2350-314-10).</li> <li>4. Place red multimeter lead in harness 12940911 (24V) connector lead 100 and black lead to ground.</li> <li>5. Check for voltage.</li> </ol> |
| Is voltage present? |  |

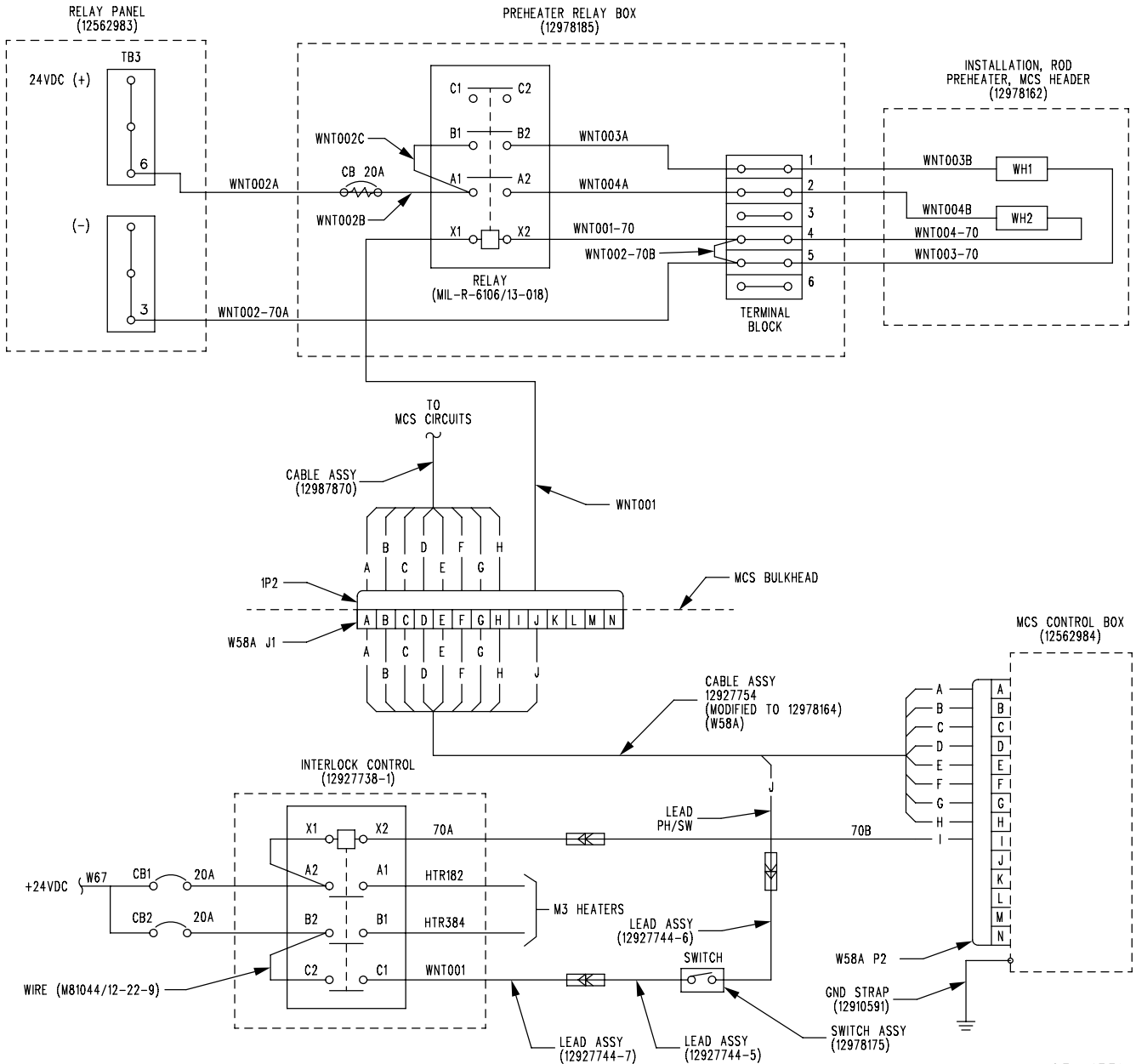


**END OF TASK**

# 3-3. TROUBLESHOOTING CHART - CONTINUED

## r. WINTERIZATION KIT, MCS

For vehicles with the MCS winterization kit installed, a preheater is added to the MCS to provide a heating capability when the MCS operates in the LOW AIR mode. When the MCS control switch is set to LOW AIR position and the preheater switch is set to ON, the preheater relay box supplies 24 V dc and return signals to evaporator header preheater rods to produce heated air for the crew via the MCS. The relationship of the various assemblies and the interface to the MCS is shown in the following diagram.



03pc133t

### 3-3. TROUBLESHOOTING CHART - CONTINUED

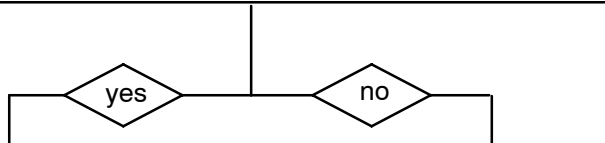
r. WINTERIZATION KIT, MCS - CONTINUED (1) NO HEAT OR LOW HEAT FROM PREHEATER.

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
 Multimeter (item 24, Appx G)

- A**
1. Turn vehicle MASTER POWER switch OFF (TM 9-2350-314-10).
  2. Open MCS doors (TM 9-2350-314-10).
  3. Remove relay panel cover (para 13-12).
  4. Turn vehicle MASTER POWER switch ON and start engine (TM 9-2350-314-10).
  5. Place multimeter red lead on terminal SB-E1 of TB3 and black lead on terminal SB-E3 of TB3.
  6. Measure voltage.

Is voltage present?

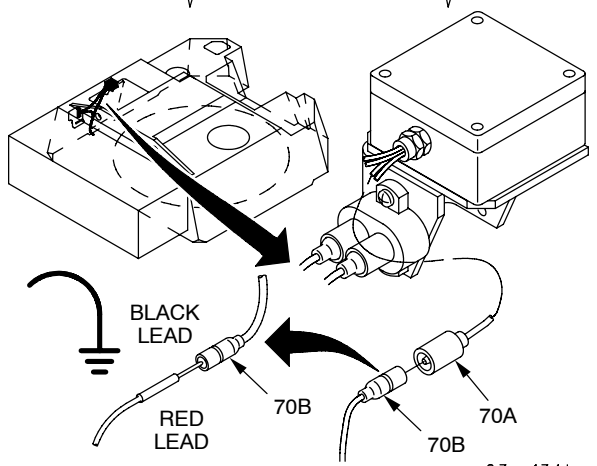
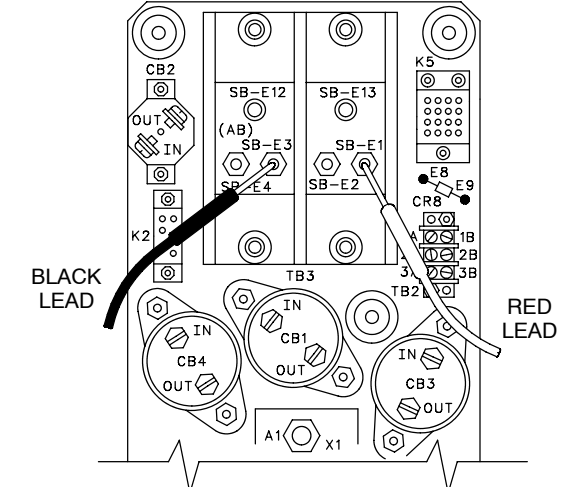
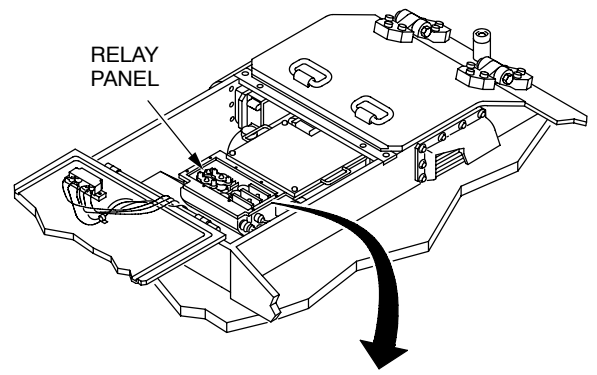


Go to troubleshooting chart 3-3.k(1) MCS DOES NOT OPERATE IN ANY MODE.

- B**
1. Shut down engine and turn vehicle MASTER POWER switch OFF (TM 9-2350-314-10).
  2. Disconnect wires at the junction of wire 70A and wire 70B.
  3. Set MCS control box switch to LOW AIR position (TM 9-2350-314-10).
  4. Place multimeter red lead on wire 70B and black lead on ground.
  5. Measure continuity.

Is continuity present?

CONTINUED ON NEXT PAGE

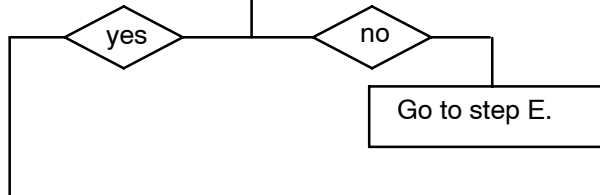


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### 3-3. TROUBLESHOOTING CHART - CONTINUED

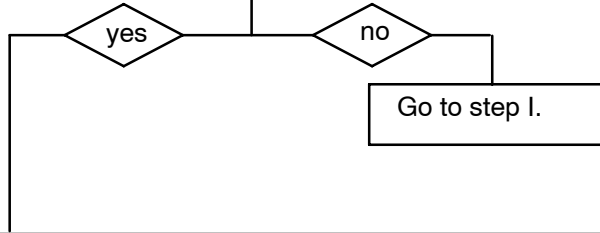
r. WINTERIZATION KIT, MCS - CONTINUED (1) LOW HEAT OR NO HEAT FROM PREHEATER. - CONTINUED

CONTINUED FROM STEP B



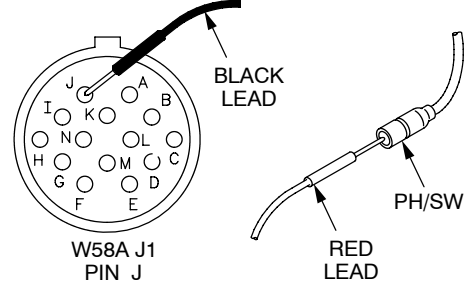
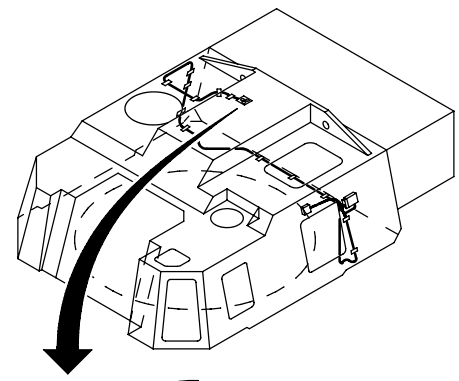
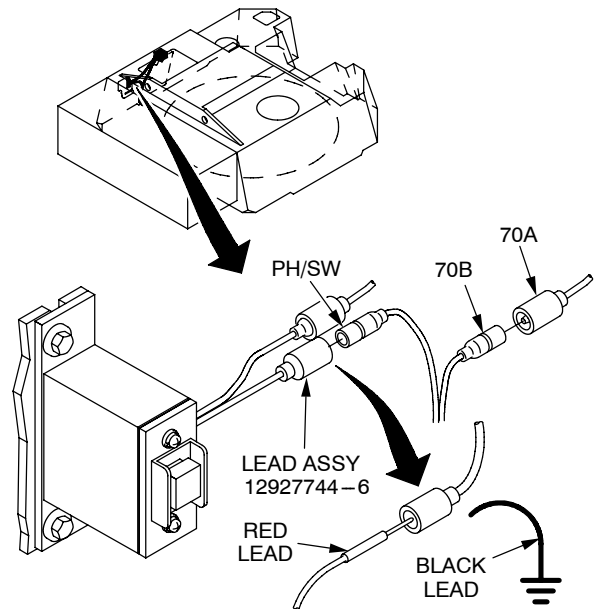
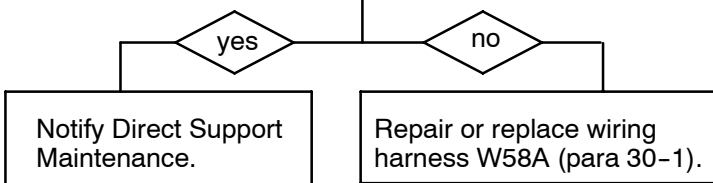
- C**
1. Reconnect wires 70A and 70B.
  2. Disconnect wires at the junction of lead 12927744-6 and lead PH/SW.
  3. Turn vehicle MASTER POWER switch ON and start engine (TM 9-2350-314-10).
  4. Turn preheater switch ON (TM 9-2350-314-10).
  5. Place multimeter red lead on lead 12927744-6 and black lead on ground.
  6. Measure voltage.

Is voltage present?



- D**
1. Shut down engine and turn vehicle MASTER POWER switch OFF (TM 9-2350-314-10)
  2. Disconnect connector 1P2 from W58A receptacle J1.
  3. Place multimeter red lead on lead PH/SW and black lead on W58A receptacle J1 pin J.
  4. Measure continuity.

Is continuity present?



03pc135t

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### 3-3. TROUBLESHOOTING CHART - CONTINUED

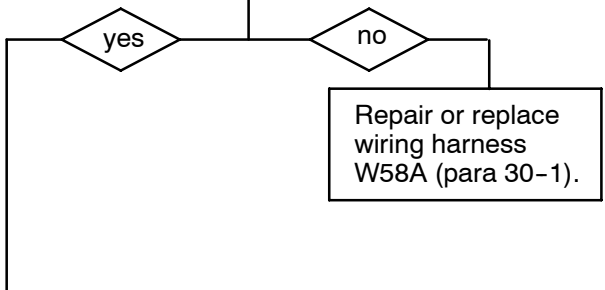
r. WINTERIZATION KIT, MCS - CONTINUED (1) LOW HEAT OR NO HEAT FROM PREHEATER. - CONTINUED

CONTINUED FROM STEP B

**E**

1. Disconnect W58A connector P2 from receptacle J1 on the MCS control box.
2. Place multimeter red lead on wire 70B and black lead on W58A connector P2 socket I.
3. Measure continuity.

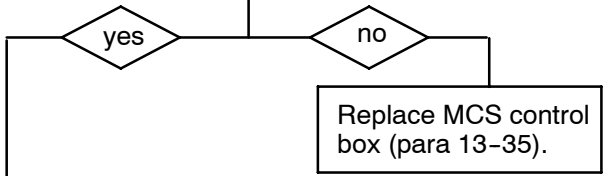
Is continuity present?



**F**

1. At the MCS control box, place multimeter red lead on receptacle J1 pin I and the black lead on receptacle J1 pin D.
2. Measure continuity.

Is continuity present?

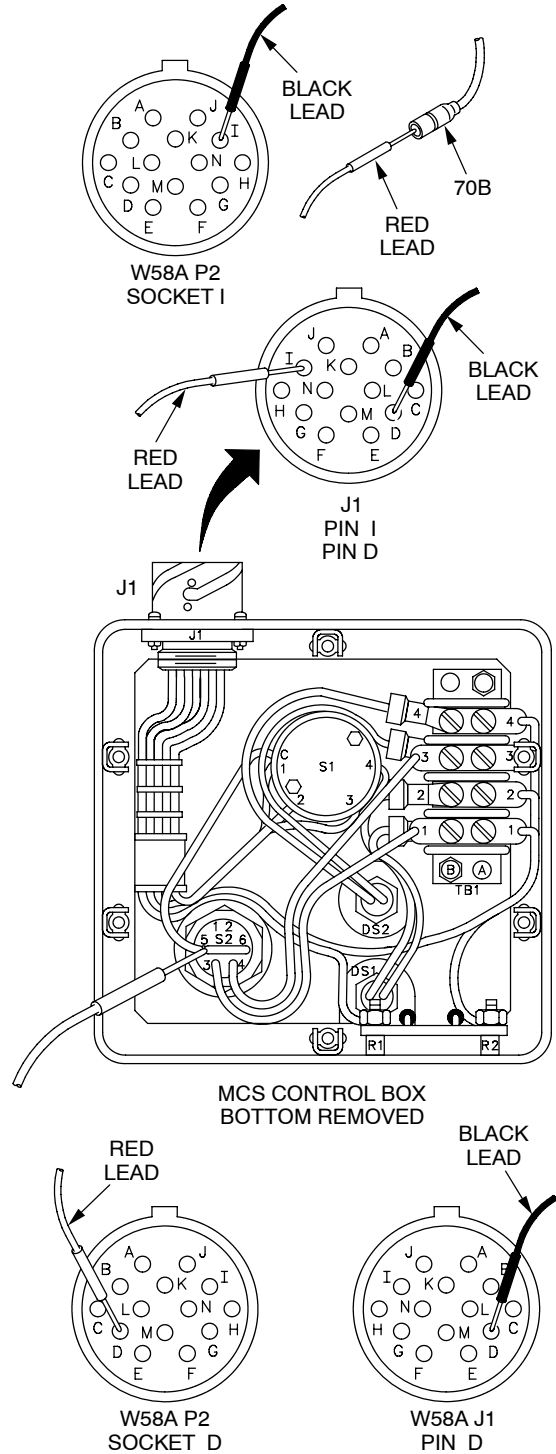


**G**

1. Disconnect connector 1P2 from W58A receptacle J1.
2. Place multimeter red lead on W58A connector P2 socket D and black lead on W58A receptacle J1 pin D.
3. Measure continuity.

Is continuity present?

CONTINUED ON NEXT PAGE

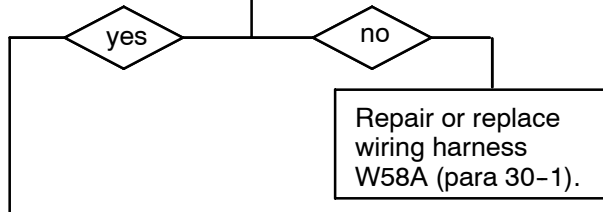


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### 3-3. TROUBLESHOOTING CHART - CONTINUED

r. WINTERIZATION KIT, MCS - CONTINUED (1) LOW HEAT OR NO HEAT FROM PREHEATER. - CONTINUED

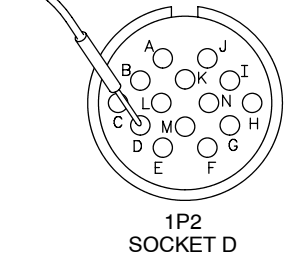
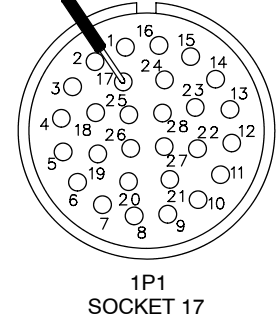
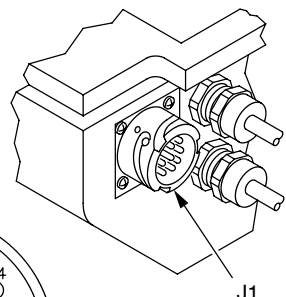
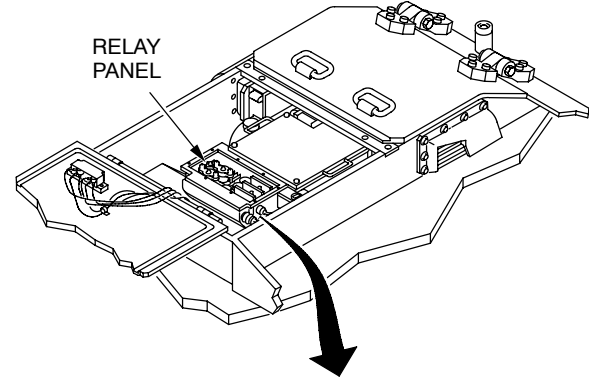
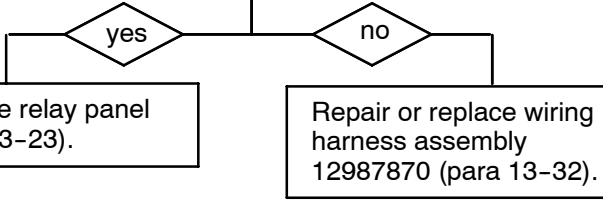
CONTINUED FROM STEP G



**H**

1. Disconnect connector 1P1 from receptacle J1 on the relay panel.
2. Place multimeter red lead on connector 1P2 socket D and the black lead on connector 1P1 socket 17.
3. Measure continuity.

Is continuity present?

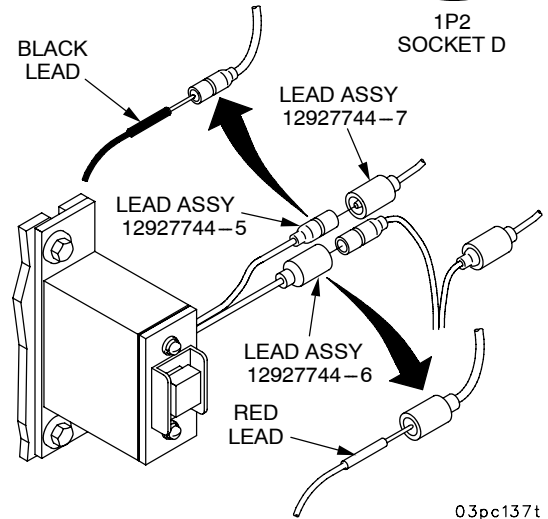
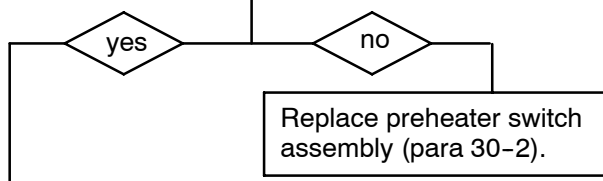


CONTINUED FROM STEP C

**I**

1. Shut down engine and turn vehicle MASTER POWER switch OFF (TM 9-2350-314-10).
2. Disconnect wires at the junction of lead 12927744-7 and lead 12927744-5.
3. Place multimeter red lead on lead 12927744-6 and black lead on lead 12927744-5.
4. Measure continuity.

Is continuity present?



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### 3-3. TROUBLESHOOTING CHART - CONTINUED

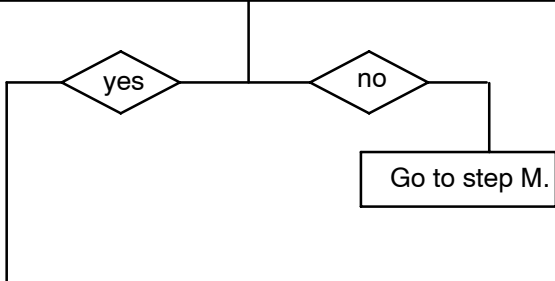
r. WINTERIZATION KIT, MCS - CONTINUED (1) LOW HEAT OR NO HEAT FROM PREHEATER. - CONTINUED

CONTINUED FROM STEP I

**J**

1. Disconnect interlock lead A2 from circuit breaker CB1.
2. Turn vehicle MASTER POWER switch ON and start engine (TM 9-2350-314-10).
3. Place multimeter red lead in circuit breaker CB1 and black lead to ground.
4. Measure voltage.

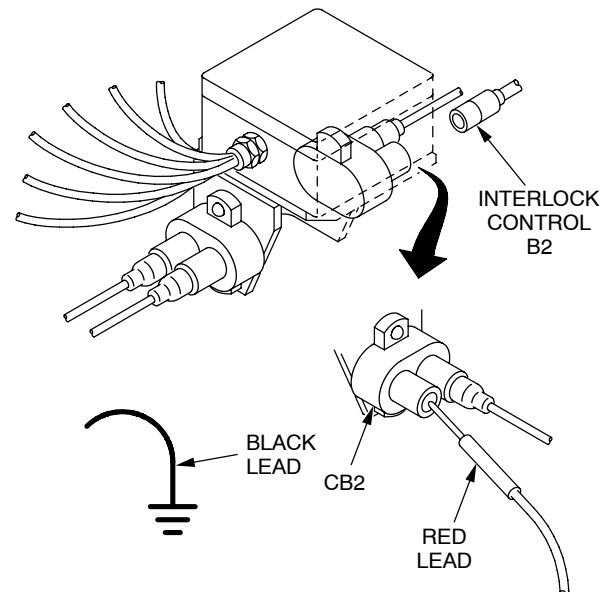
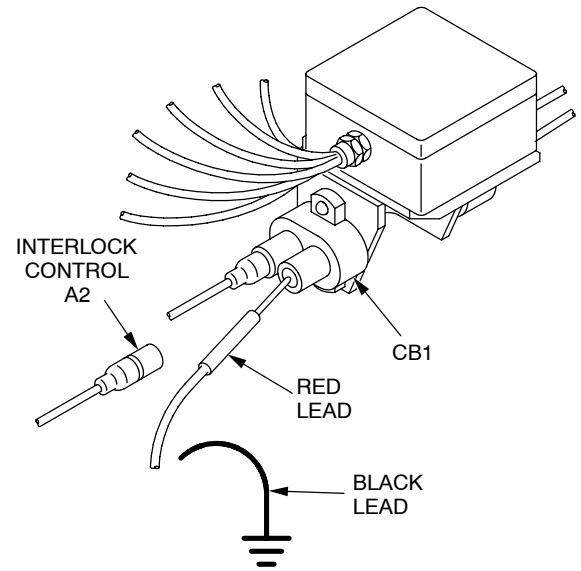
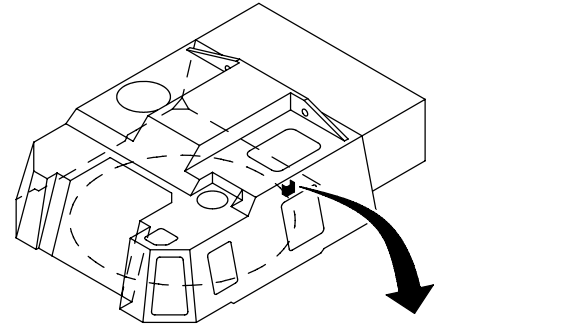
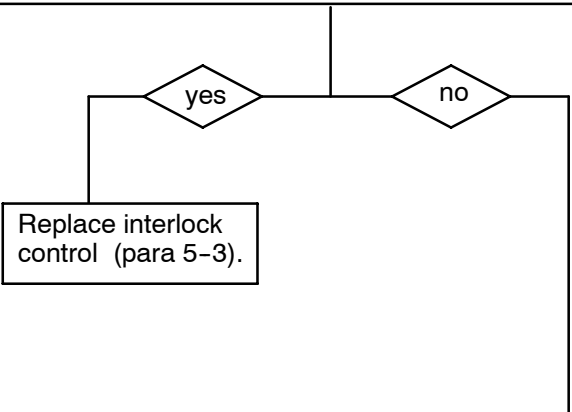
Is there at least 24 V dc present?



**K**

1. Shut down engine and turn vehicle MASTER POWER switch OFF (TM 9-2350-314-10).
2. Disconnect interlock control lead B2 from circuit breaker CB2.
3. Turn vehicle MASTER POWER switch ON and start engine (TM 9-2350-314-10).
4. Place multimeter red lead in circuit breaker CB2 and black lead to ground.
5. Measure voltage.

Is there at least 24 V dc present?



03pc138t

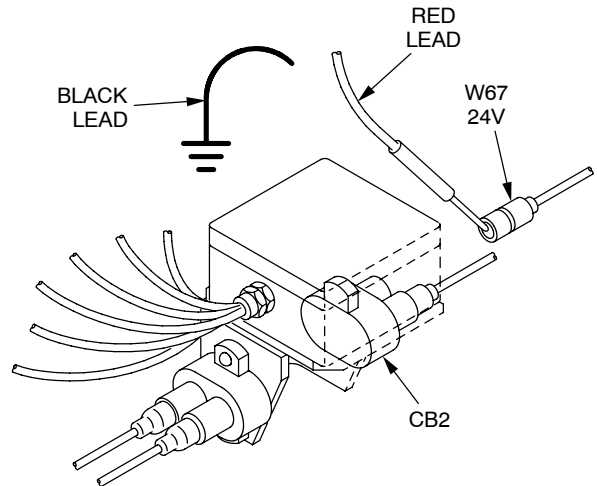
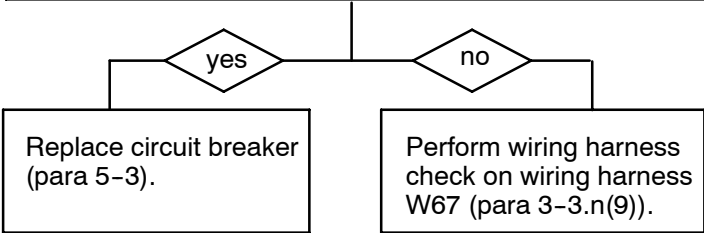
### 3-3. TROUBLESHOOTING CHART - CONTINUED

r. WINTERIZATION KIT, MCS - CONTINUED (1) LOW HEAT OR NO HEAT FROM PREHEATER. - CONTINUED

CONTINUED FROM STEP K

- L**
1. Shut down engine and turn vehicle MASTER POWER switch OFF (TM 9-2350-314-10).
  2. Disconnect 24 volt lead of wiring harness W67 from circuit breaker CB2.
  3. Turn vehicle MASTER POWER switch ON and start engine (TM 9-2350-314-10).
  4. Place multimeter red lead in 24 volt lead of wiring harness W67 and black lead to ground.
  5. Measure voltage.

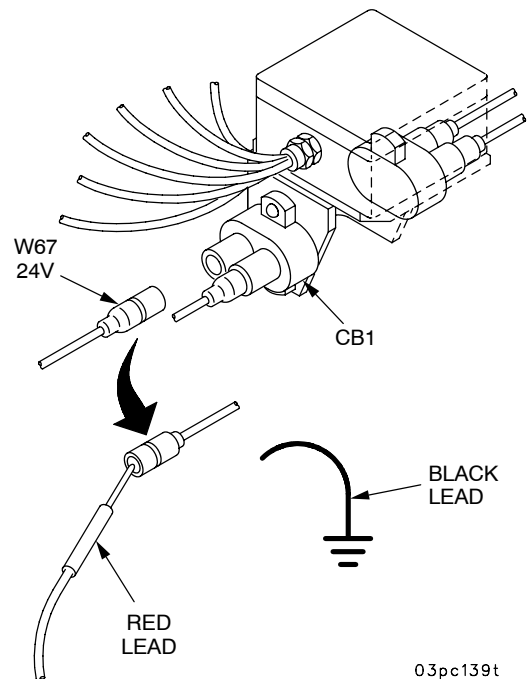
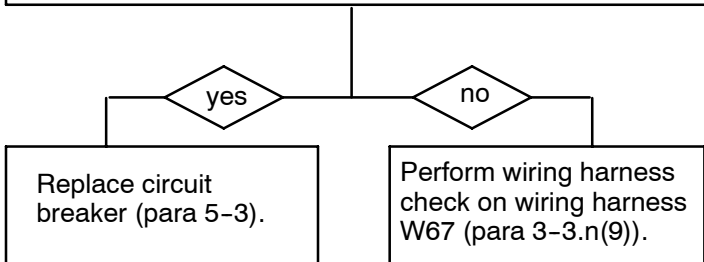
Is there at least 24 V dc present?



CONTINUED FROM STEP J

- M**
1. Shut down engine and turn vehicle MASTER POWER switch OFF (TM 9-2350-314-10).
  2. Disconnect 24 volt lead of wiring harness W67 from circuit breaker CB1.
  3. Turn vehicle MASTER POWER switch ON and start engine (TM 9-2350-314-10).
  4. Place multimeter red lead in 24 volt lead of wiring harness W67 and black lead to ground.
  5. Measure voltage.

Is there at least 24 V dc present?



03pc139t

**END OF TASK**

## CHAPTER 4 CANNON AND MOUNT

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### GENERAL

This chapter provides maintenance instructions for the 155MM howitzer cannon M284 and the cannon mount M182A1.

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## 4-1 REPLENISHER ACCUMULATOR SHIELD, COVER, AND EYEBOLT.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

#### Materials/Parts

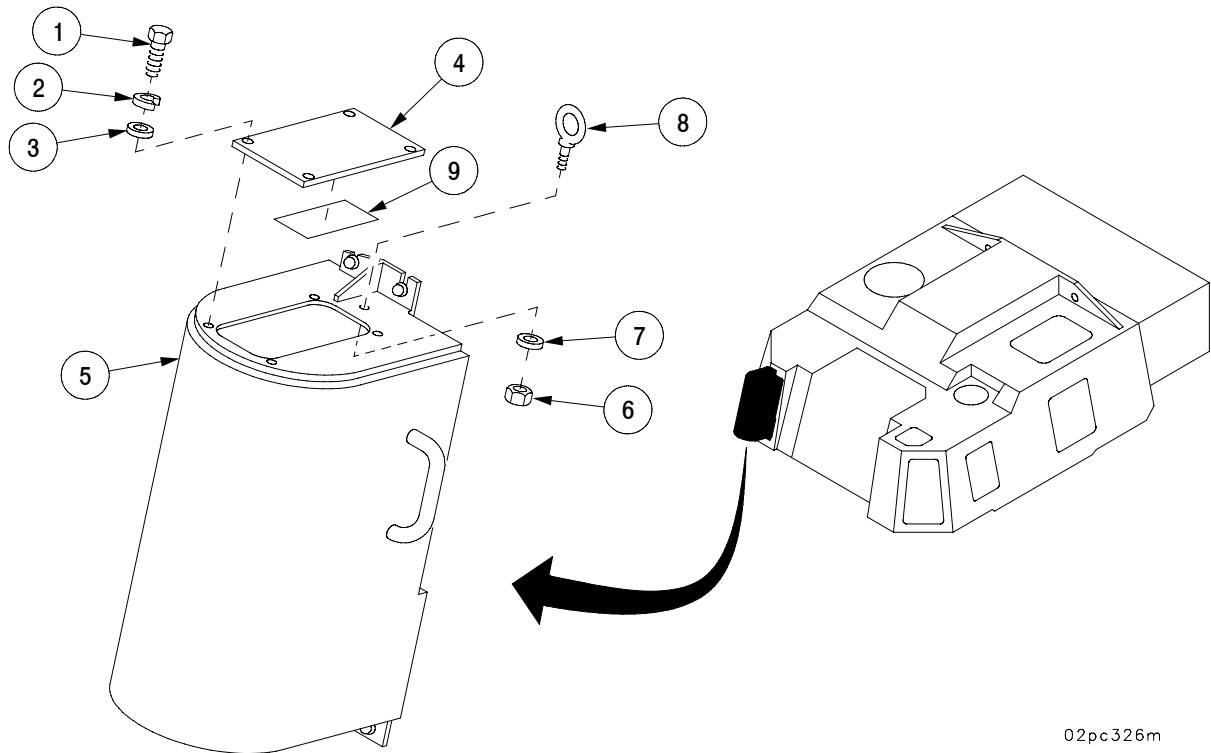
Lockwashers (4) (item 130, Appx F)

#### a. Removal.

- 1 Remove four screws (1), four lockwashers (2), four flat washers (3), and cover (4) from shield (5). Discard lockwashers.
- 2 Remove nut (6), flat washer (7), and eyebolt (8) from shield (5).
- 3 Remove label (9), if damaged (para 2-8).

#### b. Installation.

- 1 Install eyebolt (8) on shield (5) with flat washer (7) and nut (6).
- 2 Install new label (9), if removed (para 2-8).
- 3 Install cover (4) on shield (5) with four flat washers (3), four new lockwashers (2), and four screws (1).



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## 4-2 REPLENISHER ACCUMULATOR ASSEMBLY - CONTINUED

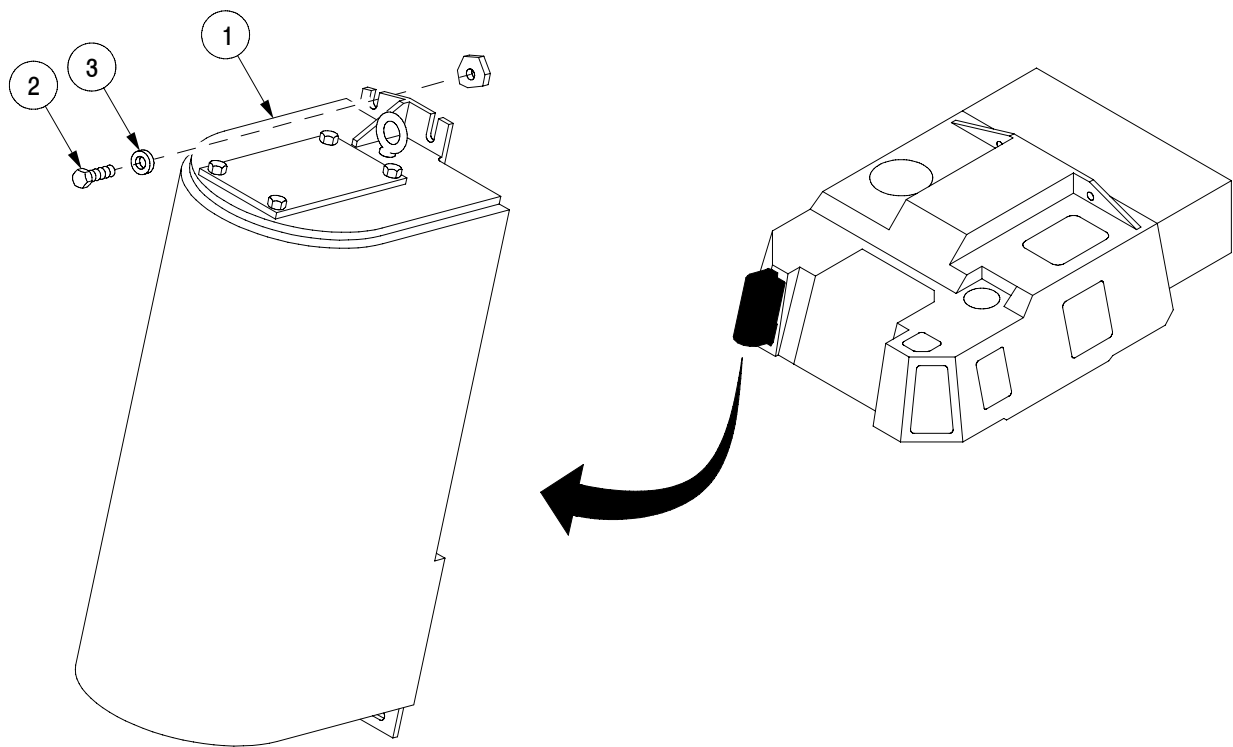
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### a. Removal - Continued

#### NOTE

Replenisher accumulator procedures can be performed while mount and cannon are installed in vehicle.

- 1 Hold shield (1) in position while removing four screws (2) and four flat washers (3).
- 2 Lift shield (1) out of way.



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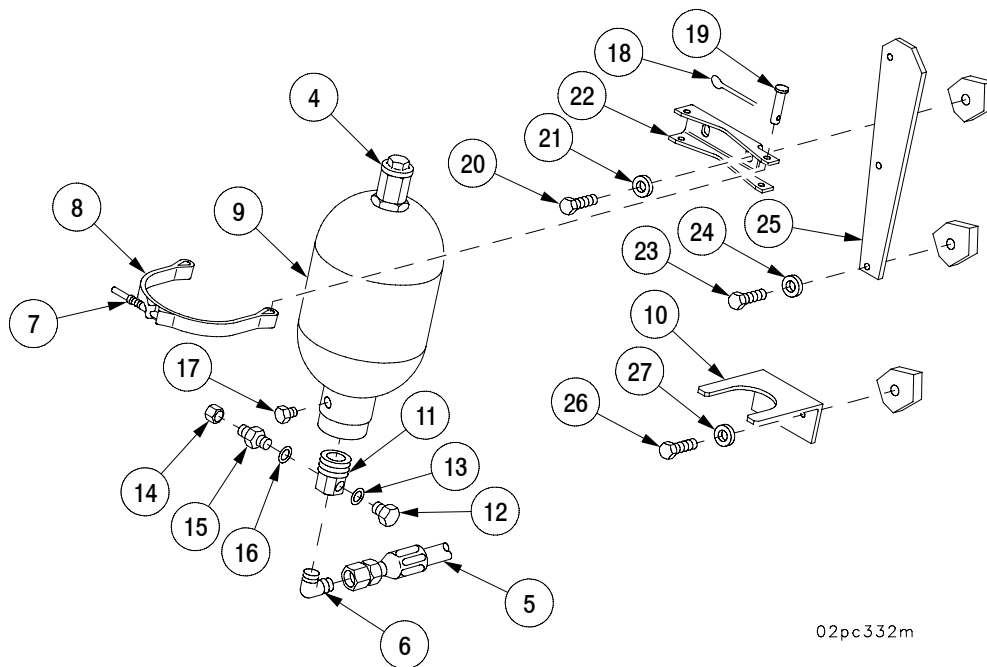
## 4-2 REPLENISHER ACCUMULATOR ASSEMBLY - CONTINUED

### a. Removal - Continued

#### WARNING

Replenisher accumulator contains pressurized nitrogen. Do not remove until all pressure is relieved.

- 3 Remove protective cap (4) and valve cap (not shown). Release nitrogen pressure and reinstall caps.
- 4 Place drain pan under replenisher. Disconnect hose (5) from elbow (6).
- 5 Loosen two nuts (7), open two strap assemblies (8), and remove replenisher accumulator (9) from mounting bracket (10).
- 6 Remove elbow (6) from adapter (11).
- 7 Remove plug (12) and packing (13) from adapter (11). Discard packing.
- 8 Remove cap (14), valve (15), and packing (16) from adapter (11). Discard packing.
- 9 Remove adapter (11) from replenisher accumulator (9).
- 10 Remove plug (17) from replenisher accumulator (9).
- 11 Remove four cotter pins (18), four pins (19), and two strap assemblies (8). Discard cotter pins.
- 12 Remove four screws (20), four flat washers (21), and two strap assembly brackets (22).
- 13 Remove three screws (23), three flat washers (24), and plate (25).
- 14 Remove three screws (26), three flat washers (27), and mounting bracket (10).



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## 4-2 REPLENISHER ACCUMULATOR ASSEMBLY - CONTINUED

### b. Installation.

- 1 Apply sealing compound (item 42, Appx C) to three screws (26). Apply sealing compound (item 46.1, Appx C) to mounting bracket (10). Install mounting bracket (10) with three flat washers (27) and three screws (26).
- 2 Apply sealing compound (item 42, Appx C) to three screws (23). Install plate (25) with three flat washers (24) and three screws (23).
- 3 Apply sealing compound (item 42, Appx C) to four screws (20). Install two strap assembly brackets (22) with four flat washers (21) and four screws (20). Torque screws to 20–25 lbs-in (2–2.8 N•m).
- 4 Install two strap assemblies (8), four pins (19), and four new cotter pins (18).
- 5 Install plug (17) on replenisher accumulator (9).
- 6 Apply primer to threads of adapter (11) and allow to dry. Then apply sealing compound (item 42, Appx C) to threads.
- 7 Install adapter (11) on replenisher accumulator (9).

#### NOTE

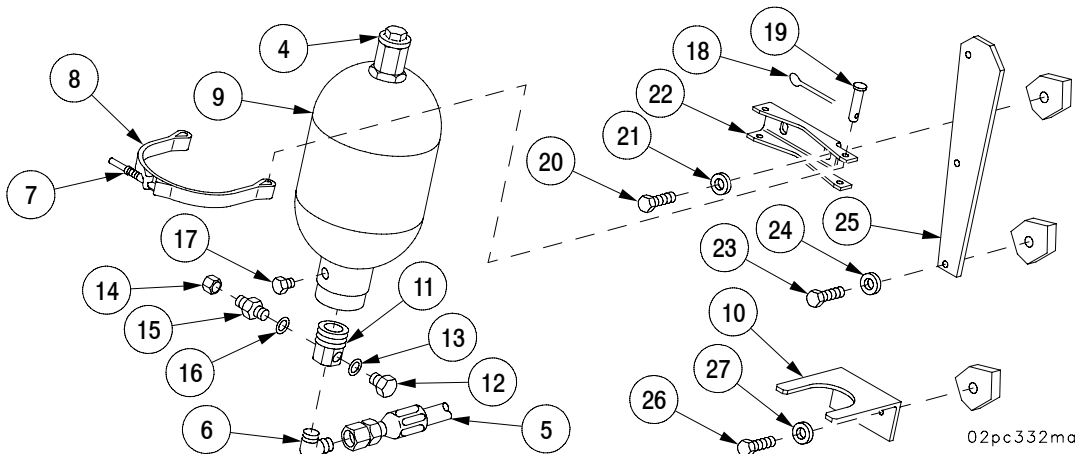
A thin even coat of clean hydraulic fluid must be applied to all new packing material to form a good seal between hydraulic components during installation.

- 8 Install new packing (13) and plug (12) on adapter (11).
- 9 Install new packing (16), valve (15), and cap (14) on adapter (11).
- 10 Apply primer to threads of elbow (6) and allow to dry, then apply sealing compound (item 42, Appx C) to threads.
- 11 Install elbow (6) on adapter (11). Position elbow (6) 180 degrees  $\pm$  90 degrees from valve (15).

#### NOTE

Prior to installation of new or repaired replenisher accumulator, perform steps 12 and 13 with replenisher held in inverted position with hose at top. Filling the replenisher this way better removes trapped air from the replenisher.

- 12 Connect hose (5) to elbow (6).
- 13 Install replenisher accumulator (9) on mounting bracket (10). Close two strap assemblies (8), and tighten two nuts (7).





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**4-2 REPLENISHER ACCUMULATOR ASSEMBLY - CONTINUED**

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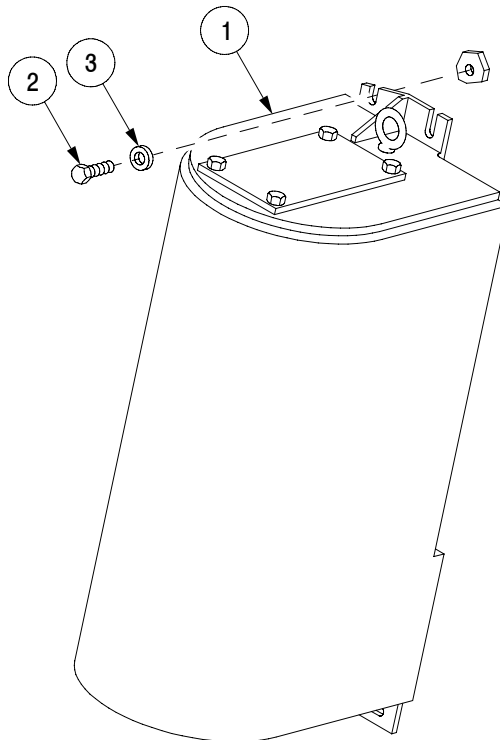
**b. Installation - Continued**

- 14 Charge replenisher accumulator (9) with low pressure nitrogen (para 28-6).
- 15 Fill replenisher at check/fill valve (15) using M3 oil gun until replenished pressure gage reads 17 to 24 psi.
- 15.1 Apply sealing compound (item 46.1, Appx C) to aluminum/steel interface of shield (1).

**WARNING**

Replenisher accumulator shield is heavy. Use caution when positioning shield to avoid personnel injury.

- 16 Position shield (1) over replenisher accumulator (9).
- 17 Apply sealing compound to four screws (2). Secure shield (1) with four flat washers (3) and four screws (2).



02pc345m

**4-3 HOWITZER MOUNT M182A1 COMPONENTS (BRACKET ASSEMBLY).**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwashers (5) (item 132, Appx F)  
Lockwashers (4) (item 116, Appx F)

Equipment Conditions

Gun tube stowed in travel lock  
(TM 9-2350-314-10)  
Cab traverse lock locked  
(TM 9-2350-314-10)  
PMVS antenna and bracket  
removed (para 8.1-26)  
PDFCS PMVS dummy connector removed  
(para 8.1-15)

**a. Removal.**

**NOTE**

- For AFCS perform steps 1, 2, and 3.
- For PDFCS perform steps 2 and 3.

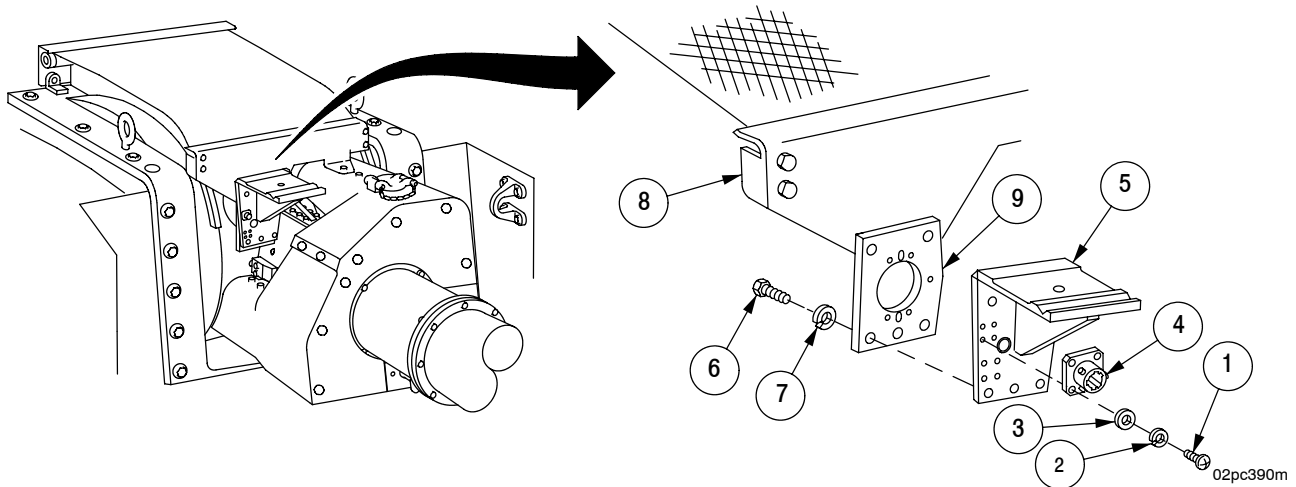
- 1 Remove four screws (1), four lockwashers (2), four flat washers (3), and dummy connector (4) from bracket assembly (5). Discard lockwashers.
- 2 Remove five screws (6) and five lockwashers (7) securing bracket assembly (5) to curtain support (8) and mount (9). Discard lockwashers.
- 3 Remove bracket assembly (5).

**b. Installation.**

**NOTE**

- For AFCS perform steps 1 and 2.
- For PDFCS perform steps 1 and 3.

- 1 Install bracket assembly (5) to curtain support (8) and mount (9) with five screws (6) and five new lockwashers (7).
- 2 Install dummy connector (4) to bracket assembly (5) with four screws (1), four new lockwashers (2), and four flat washers (3).
- 3 Install PDFCS PMVS dummy connector (para 8.1-15), if applicable.



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## 4-4 HOSE ASSEMBLY.

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This task covers:    a. Removal                    b. Disassembly                    c. Assembly                    d. Installation

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### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Drain pan (item 26, Appx G)

#### Materials/Parts

Lockwashers (2) (item 105, Appx F)  
Hydraulic fluid (item 50, Appx C)  
Sealing compound (item 41, Appx C)  
Preformed packing (item 86, Appx F)  
Preformed packing (item 87, Appx F)  
Preformed packing (item 88, Appx F)  
Dust protective cap (item 24, Appx C)  
Swabbing brush (item 20, Appx C)  
Marking tags (item 87, Appx C)  
Dust protective plug (item 63, Appx C)

#### Equipment Conditions

Hydraulic pressure discharged  
(TM 9-2350-314-10)  
Replenisher accumulator shield removed  
(para 4-2)

#### References

TM 9-2350-314-10

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### WARNING

Always wear safety glasses when working on hydraulic system. If fluid gets in eyes, flush immediately with water and notify medical personnel.

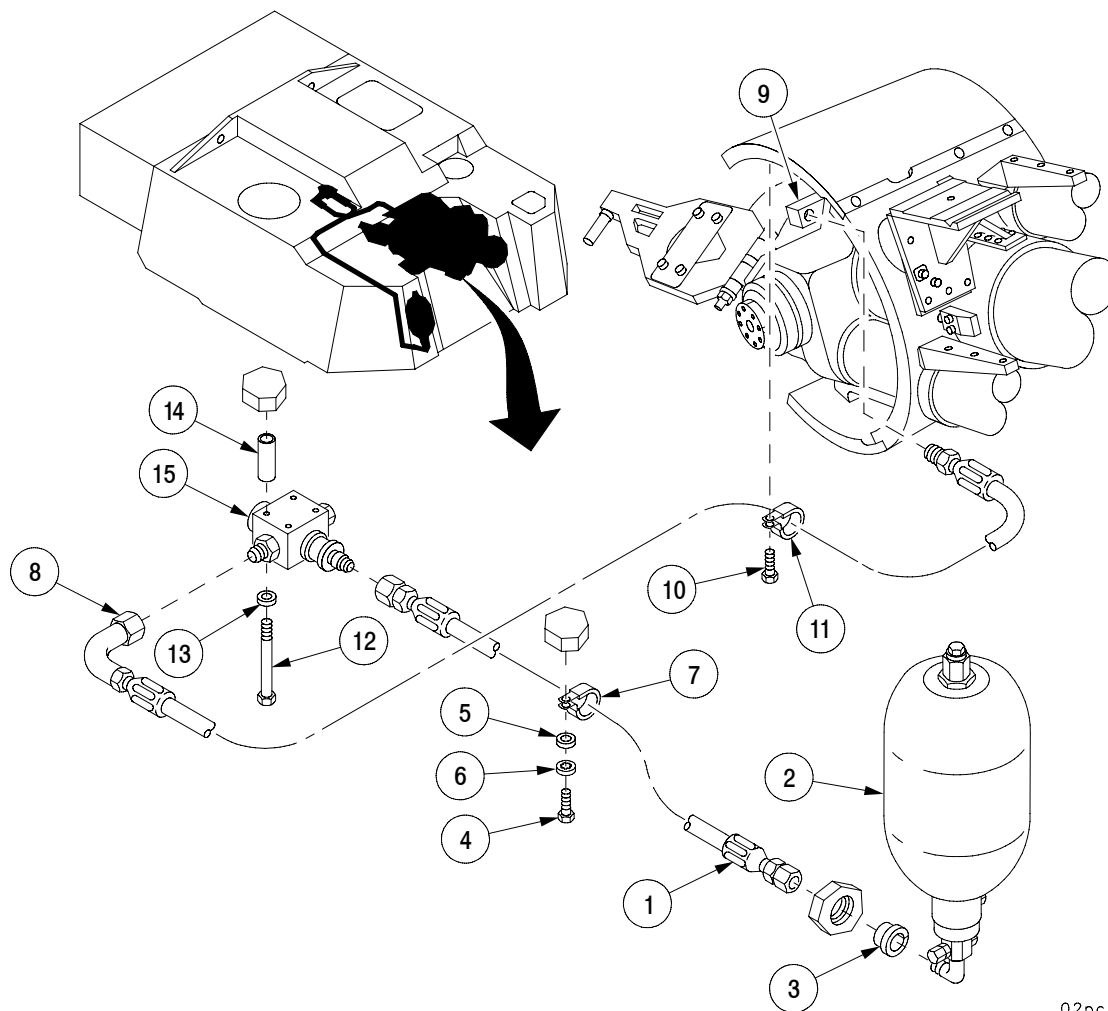
### CAUTION

All hydraulic lines and ports must be capped to prevent contaminants from entering the hydraulic system and causing internal damage to hydraulic components.

## 4-4 HOSE ASSEMBLY - CONTINUED

### a. Removal.

- 1 Disconnect hose (1) from replenisher accumulator (2).
- 2 Remove grommet (3) from cab wall and hose (1).
- 3 Feed hose (1) through cab wall.
- 4 Remove two screws (4), two flat washers (5), two lockwashers (6), and two clamps (7) securing hose (1) to cab roof. Discard lockwashers.
- 5 Disconnect hose (8) from manifold (9).
- 6 Remove screw (10) and clamp (11) securing hose (8) to gun mount.
- 7 Remove four screws (12), four flat washers (13), four spacers (14), and manifold (15).



02pc351m

## 4-4 HOSE ASSEMBLY - CONTINUED

### b. Disassembly.

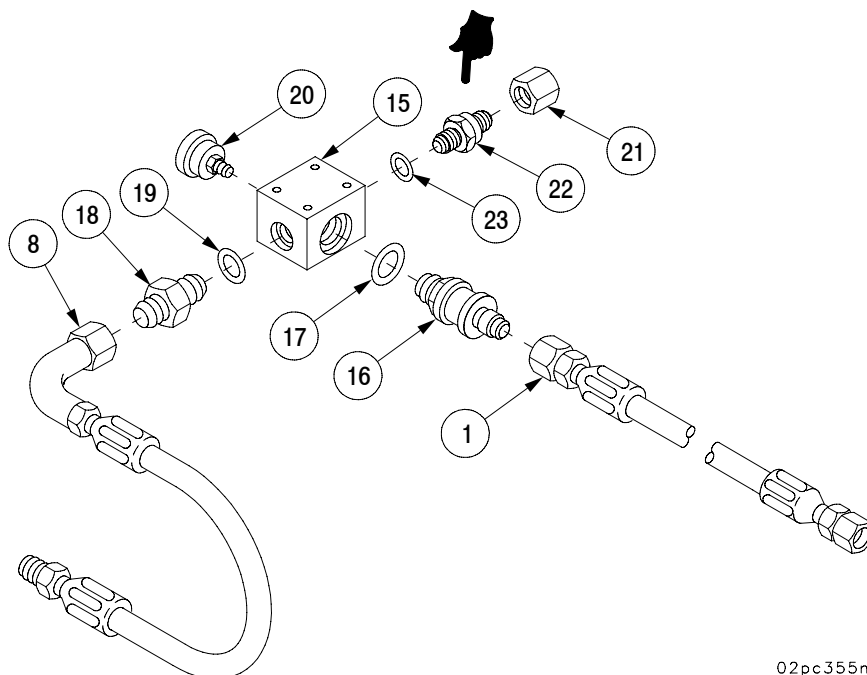
- 1 Disconnect hose (1) from coupling assembly (16).
- 2 Remove coupling assembly (16) and packing (17) from manifold (15). Discard packing.
- 3 Remove hose (8) from adapter (18).
- 4 Remove adapter (18) and packing (19) from manifold (15). Discard packing.
- 5 Remove gage (20) from manifold (15).
- 6 Remove cap (21), check valve (22), and packing (23) from manifold (15). Discard packing.

### c. Assembly.

#### NOTE

A thin even coat of clean hydraulic fluid must be applied to all new packing material to form a good seal between hydraulic components during installation.

- 1 Install new packing (23), check valve (22), and cap (21) in manifold (15).
- 2 Install gage (20) in manifold (15).
- 3 Install new packing (19) and adapter (18) in manifold (15).
- 4 Connect hose (8) to adapter (18).
- 5 Install new packing (17) and coupling assembly (16) in manifold (15).
- 6 Connect hose (1) to coupling assembly (16).

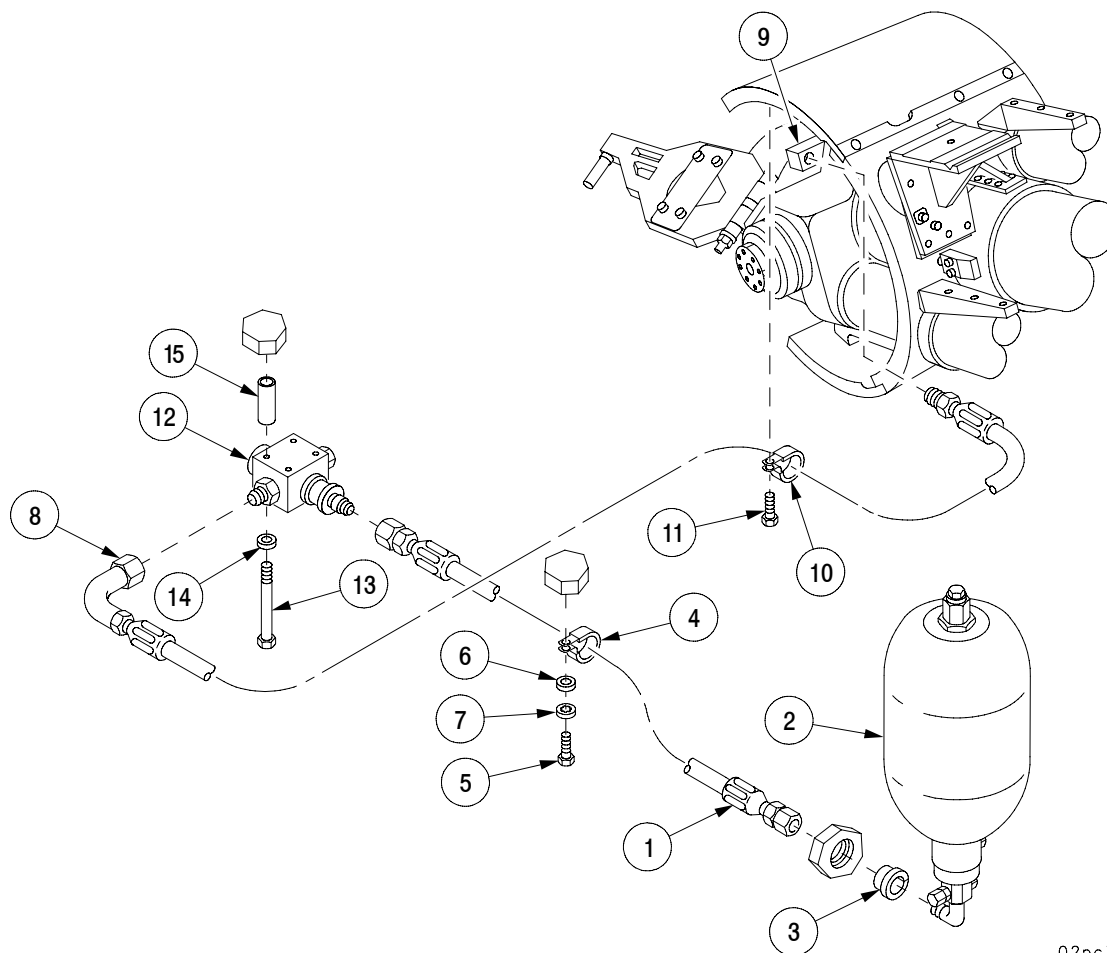


02pc355m

## 4-4 HOSE ASSEMBLY - CONTINUED

### d. Installation.

- 1 Apply sealing compound to threads of four screws (12).
- 2 Install manifold (15) to cab roof with four spacers (14), four flat washers (13), and four screws (12).
- 3 Secure hose (8) to gun mount with clamp (11) and screw (10).
- 4 Connect hose (8) to manifold (9).
- 5 Secure hose (1) to cab roof with two clamps (7), two new lockwashers (6), two flat washers (5) and two screws (4).
- 6 Feed hose (1) through cab wall.
- 7 Install grommet (3) on hose (1), and insert grommet (3) in cab wall.
- 8 Connect hose (1) to replenisher accumulator (2).
- 9 Service replenisher accumulator (TM 9-2350-314-10).
- 10 Install replenisher accumulator shield (para 4-2).



02pc358m

**4-5 CAM DAMPER ASSEMBLY.**

This task covers:    a. Removal                    b. Disassembly                    c. Inspection                    d. Assembly  
                                  e. Installation                    f. Adjustment

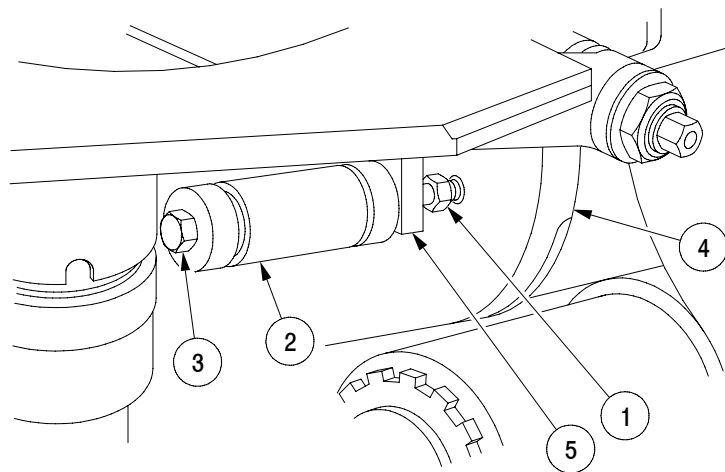
**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)

**a. Removal.**

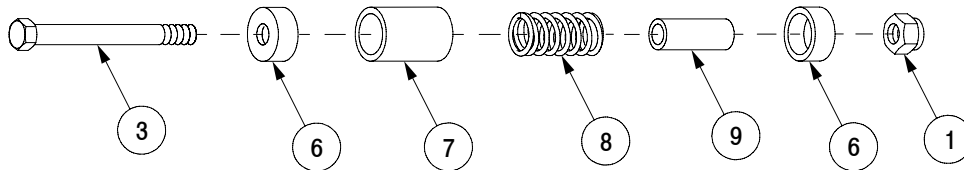
- 1 Loosen jamnut (1) of cam damper assembly (2).
- 2 Loosen screw (3) until tension on cam damper assembly (2) is released.
- 3 Remove screw (3) from cradle assembly (4).
- 4 Remove cam damper assembly (2) from cam assembly (5).



02pc325m

**b. Disassembly.**

Remove jamnut (1), two seats (6), limit stop (7), helical spring (8), and spacer (9) from screw (3).

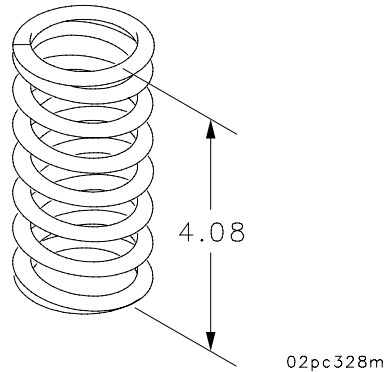


02pc329m

**4-5 CAM DAMPER ASSEMBLY - CONTINUED**

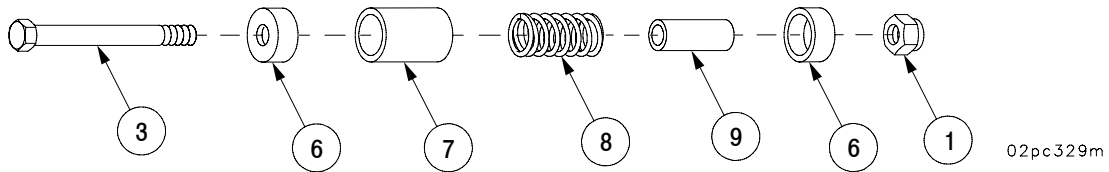
**c. Inspection.**

Measure height of helical spring (8). Replace spring if height is less than 4.08 inches (103.63 mm).



**d. Assembly.**

Assemble seat (6), limit stop (7), helical spring (8), spacer (9), seat (6) and jamnut (1) onto screw (3).

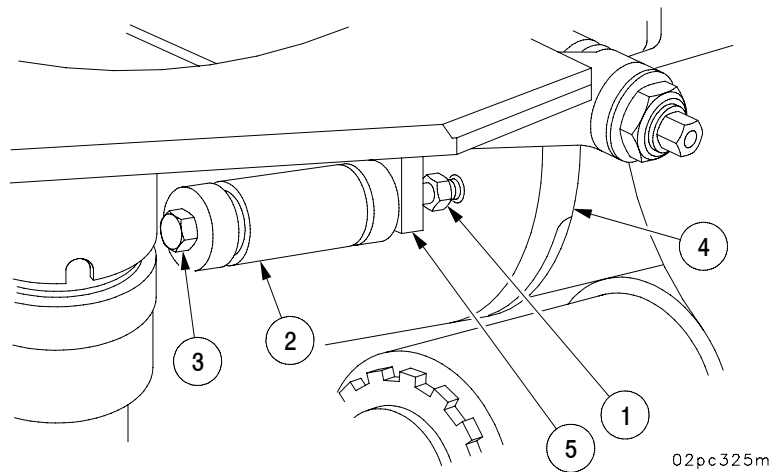


**e. Installation.**

Position cam damper assembly (2) on cam assembly (5) and install screw (3) in cradle assembly (4).

**f. Adjustment.**

- 1 Tighten screw (3) until seat to seat length of cam damper assembly (2) is 4.0 inches (101.60 mm).
- 2 Tighten jamnut (1) to secure cam damper assembly (2) to cradle assembly (4).





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## 4-6 BREECH CAM.

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This task covers: Adjustment

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### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Wrecker

Fabricated bracket (Appx D)

#### Materials/Parts

Cotter pin (item 84, Appx F)

Wood, 4x4 (item 100, Appx C)

#### Equipment Conditions

Cannon - 0° elevation  
(TM 9-2350-314-10)

Breech mechanism closed  
(TM 9-2350-314-10)

Cab traverse lock locked  
(TM 9-2350-314-10)

#### Personnel

Five

#### References

TM 9-2350-314-10

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### Adjustment.

#### WARNING

When working on mount and cannon breech components, with cannon pushed out of battery, block cannon breech with suitable blocking, or chain tube to hull to prevent accidental elevation of cannon and injury to personnel or damage to equipment.

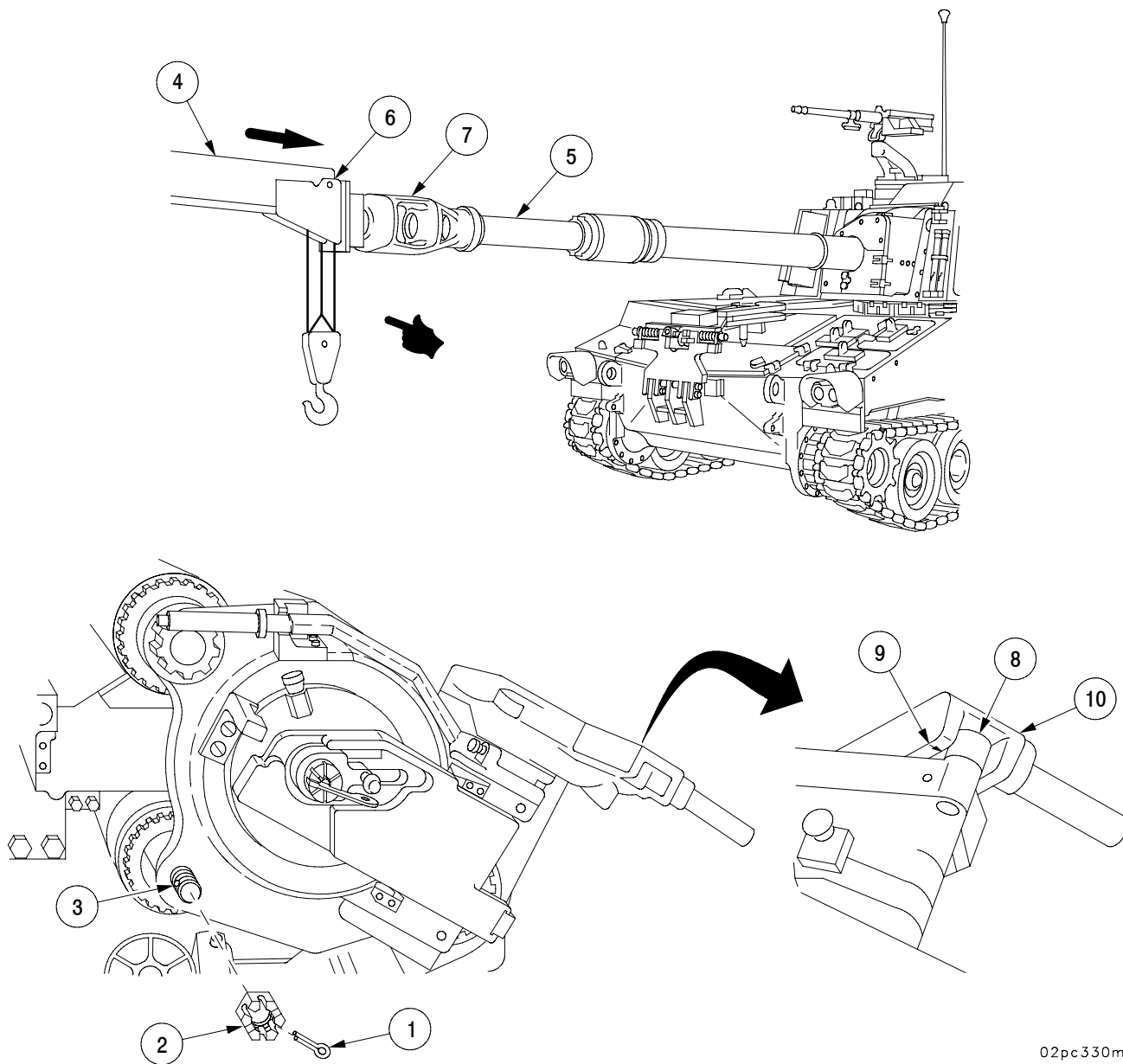
#### CAUTION

Operators should remain in both vehicles to keep brakes fully applied to prevent movement of either vehicle while cannon tube is being pushed out of battery.

## 4-6 BREECH CAM - CONTINUED

### Adjustment - Continued

- 1 Remove cotter pin (1) and nut (2) from recuperator rod (3). Discard cotter pin.
- 2 Position wrecker directly in front of howitzer. Align wrecker boom (4) with cannon tube (5).
- 3 Install fabricated bracket (6) on wrecker boom (4).
- 4 Extend wrecker boom (4) until fabricated bracket (6) touches muzzle brake (7). Slowly extend wrecker boom pushing cannon out of battery until opening roller (8) is positioned opposite arrow (9) on bottom of cam assembly (10).



02pc330m

## 4-6 BREECH CAM - CONTINUED

### Adjustment - Continued

- 5 Measure vertical clearance between top of opening roller (8) and top of cam path in cam assembly (10). Clearance must be  $3/16'' - 7/32''$  (4.762-5.557 mm).

#### NOTE

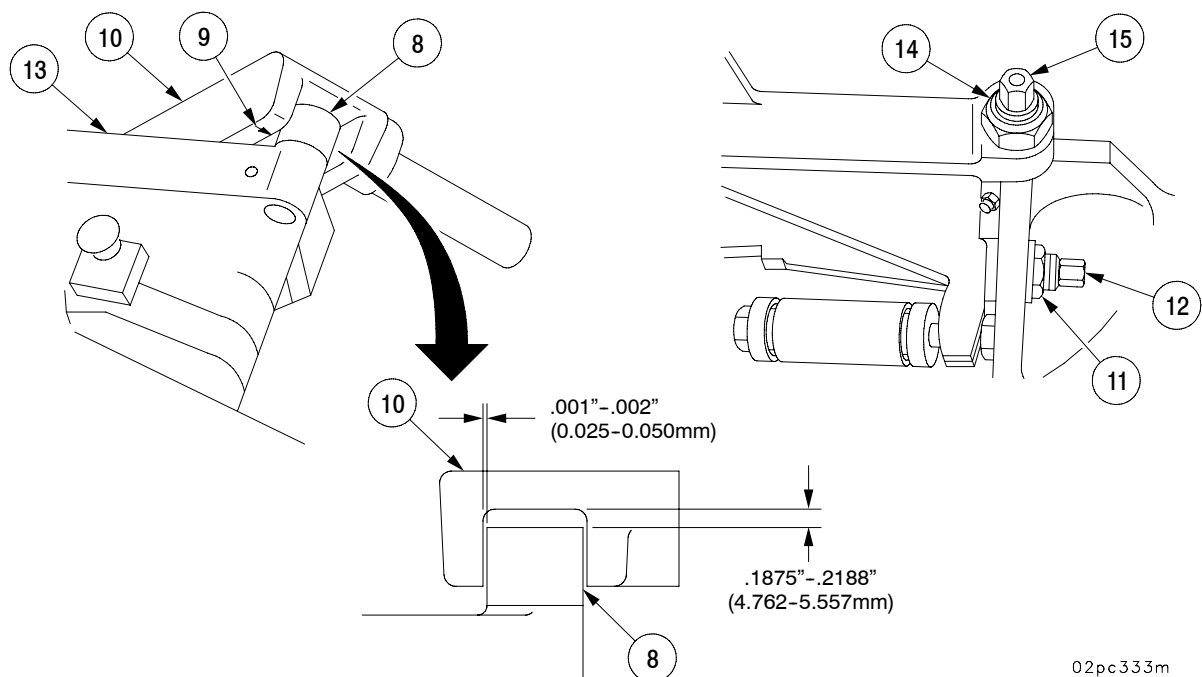
If vertical clearance is correct, go to step 9. If clearance is not correct, go to step 6.

- 6 Loosen locknut (11).
- 7 Turn cradle cam stop (12) clockwise to increase clearance, counterclockwise to decrease clearance.
- 8 Tighten locknut (11) while holding cradle cam stop (12).
- 9 Rotate crank (13) counterclockwise as far as it will go and hold in position.
- 10 Measure horizontal clearance between opening roller (8) and side of cam path assembly (10) at arrow (9). Clearance must be 0.001-0.002 inches (0.025-0.050 mm).

#### NOTE

If horizontal clearance is correct, go to step 14. If clearance is not correct, go to step 11.

- 11 Loosen locknut (14).
- 12 Turn breech cam pin (15) clockwise to increase clearance, counterclockwise to decrease clearance.
- 13 Tighten locknut (14) while holding breech cam pin (15).

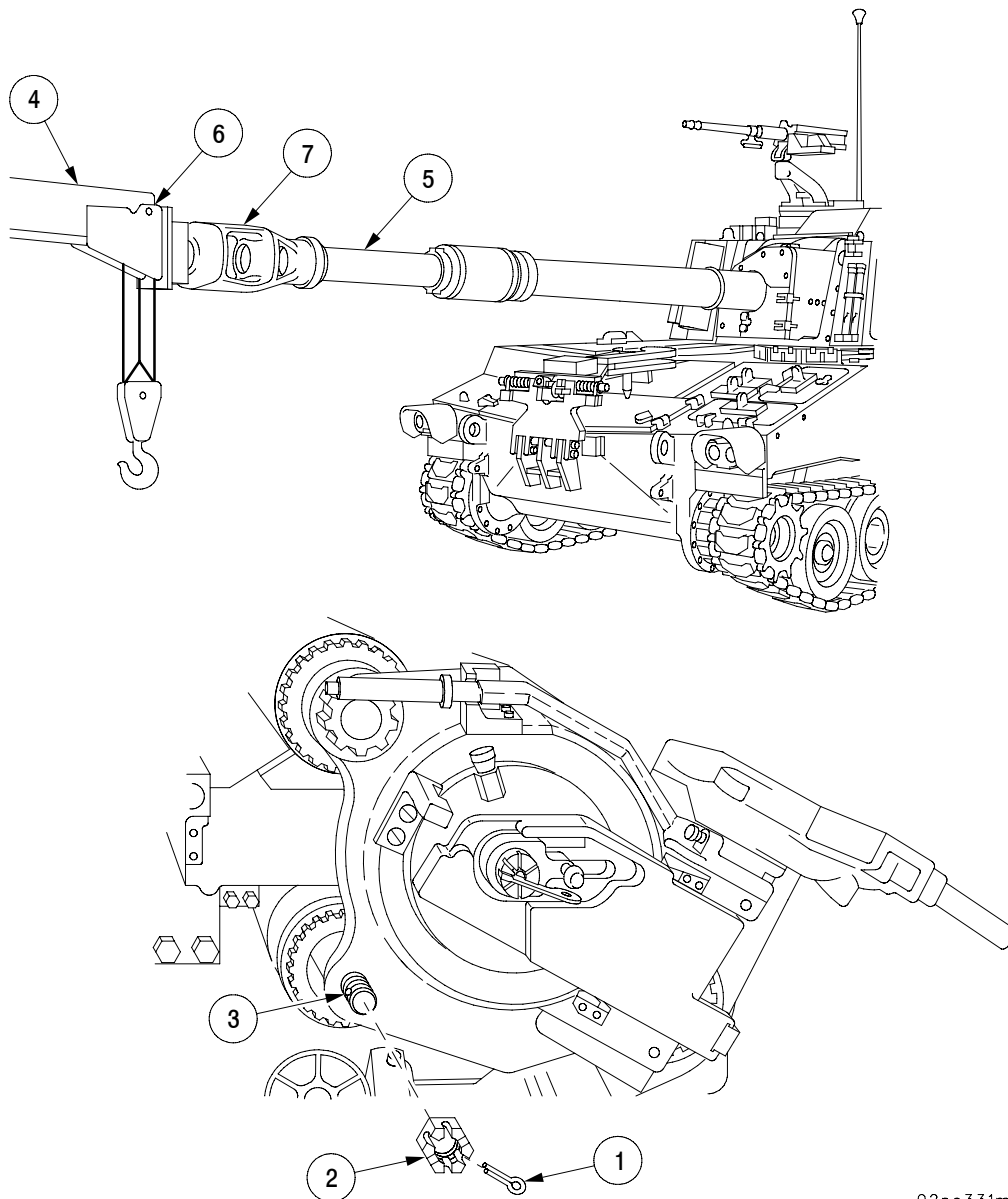


02pc333m

## 4-6 BREECH CAM - CONTINUED

### Adjustment - Continued

- 14 Install and tighten nut (2) until nut and collar on rod touch breech ring adapter band.
- 15 Slowly retract wrecker boom (4) allowing cannon tube (5) to return to battery.
- 16 Loosen nut 1/6 to 1/3 turns to align nut (2) with hole in recuperator rod (3). Install new cotter pin (1).
- 17 Adjust cam damper assembly (para 4-5).
- 18 Remove fabricated bracket (6) from wrecker boom (4).



02pc331m

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## 4-7 WIRE, COVER, BLOCK ASSEMBLIES, AND TEMPERATURE SENSOR.

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This task covers:      a. Removal    b. Installation

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### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Heat gun (item 21, Appx G)

#### Materials/Parts

Dry-cleaning solvent (item 75, Appx C)  
Silicone adhesive (item 10, Appx C)  
Lockwashers (2) (item 150, Appx F)  
Cover assembly (item 193, Appx F)  
Lockwashers (2) (item 128, Appx F)  
Lockwashers (4) (item 124, Appx F)  
Lockwasher (item 132, Appx F)  
Self-locking screws (2) (item 98, Appx F)  
Gasket (item 194, Appx F)  
Marking tags (AR) (item 87, Appx C)

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#### Equipment Conditions

Remove gun tube from travel lock  
(TM 9-2350-314-10)  
Cab traverse lock locked  
(TM 9-2350-314-10)  
AFCS power off  
(TM 9-2350-314-10)  
P-3 connector of wire W7 disconnected  
from tube sensor (para 8-6)

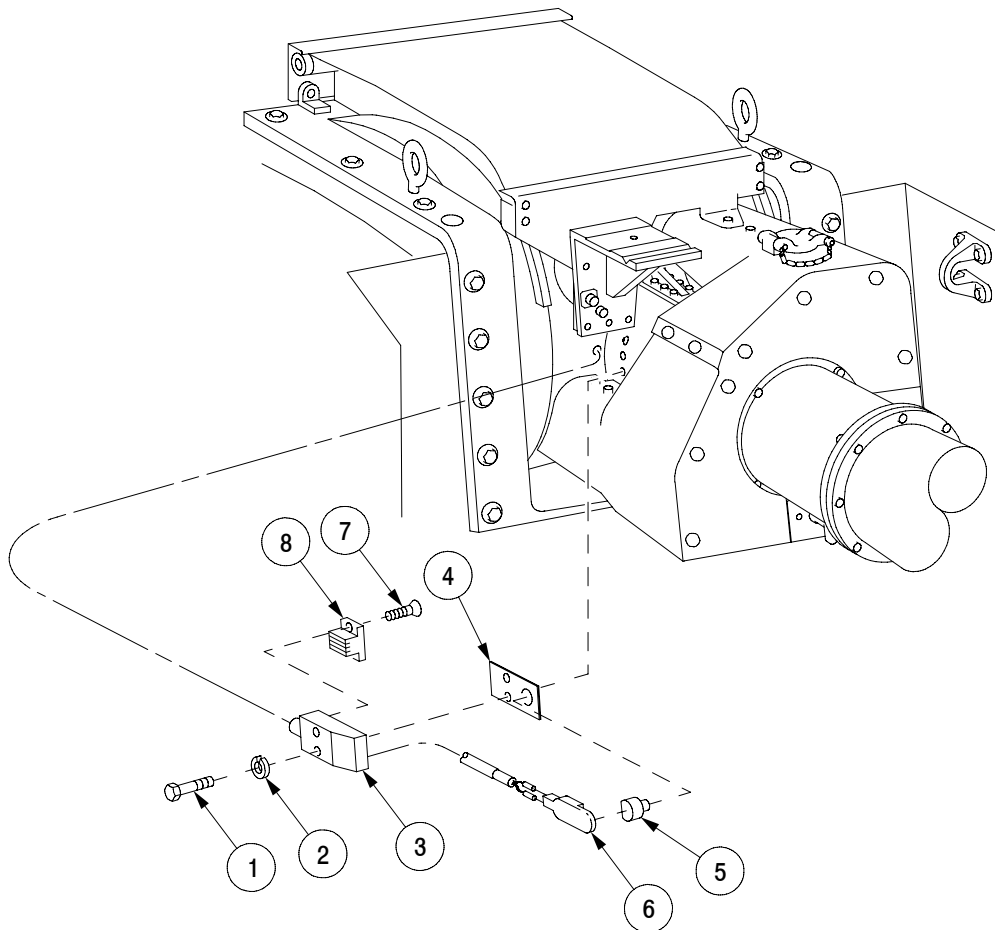
### WARNING

Ensure that cab traverse lock is engaged or personnel injury may result.

## 4-7 WIRE, COVER, BLOCK ASSEMBLIES, AND TEMPERATURE SENSOR - CONTINUED

### a. Removal.

- 1 Remove two screws (1), two lockwashers (2), block assembly (3), and gasket (4). Discard lockwashers and gasket.
- 2 Remove temperature sensor (5) from cover assembly (6).
- 3 Remove two self-locking screws (7) and block clamp (8) from block assembly (3). Discard self-locking screws.



02pc334m

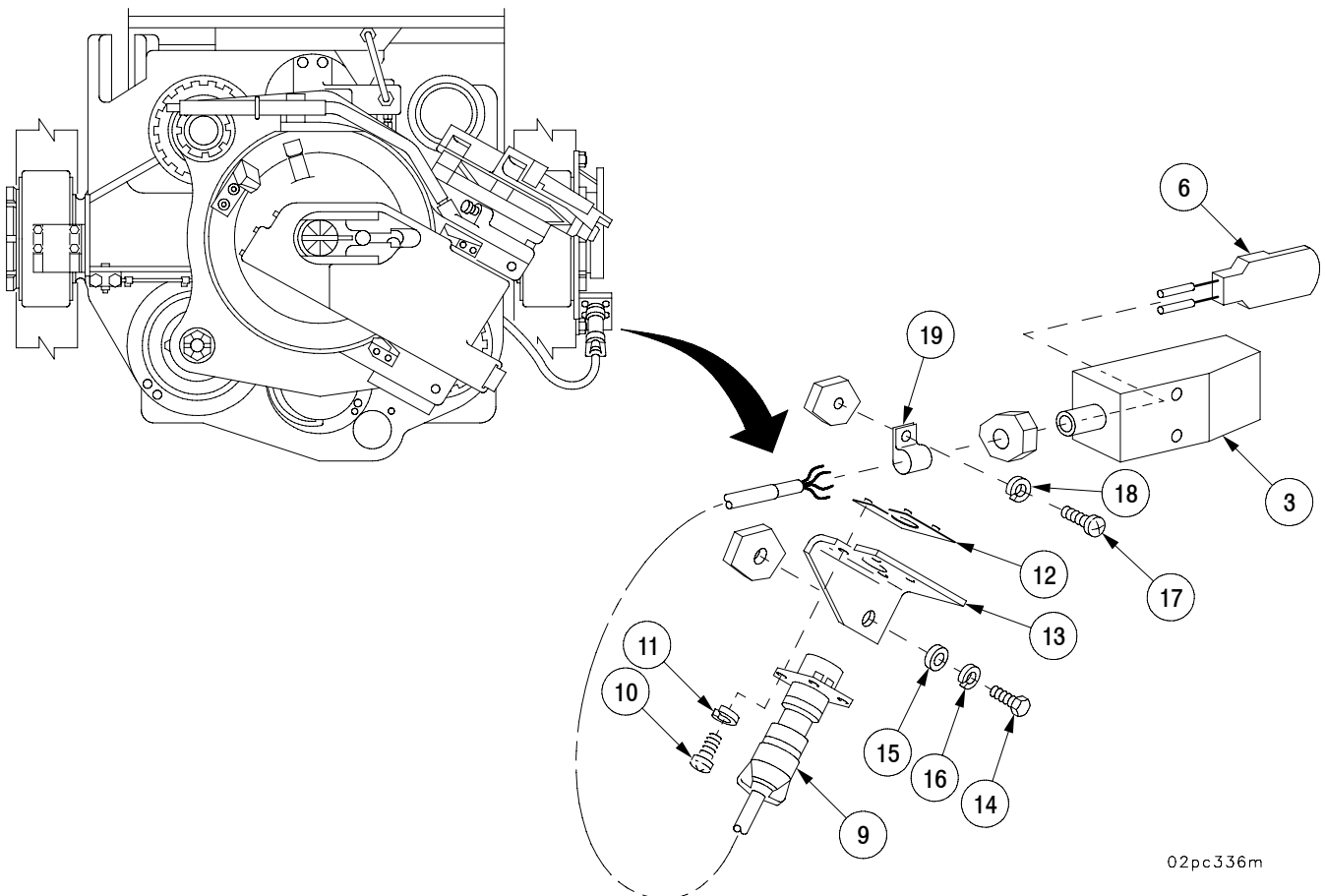
## 4-7 WIRE, COVER, BLOCK ASSEMBLIES, AND TEMPERATURE SENSOR - CONTINUED

### a. Removal - Continued

#### NOTE

- Tag all electrical connections for identification during assembly.
- Elevation of tube may be required to gain access to wiring harness.

- 4 Cut wires of wire assembly (9) at splice of cover assembly (6). Remove cover assembly (6) and block assembly (3). Discard cover assembly.
- 5 Remove four screws (10), four lockwashers (11), mounting flange (12), and wire assembly (9) from bracket (13). Discard lockwashers.
- 6 Inspect bracket (13) for damage. If bracket requires replacement, remove screw (14), flat washer (15), lockwasher (16), and bracket (13). Discard lockwasher.
- 7 Remove two screws (17), two lockwashers (18), two clamps (19), and wire assembly (9). Discard lockwashers.



02pc336m

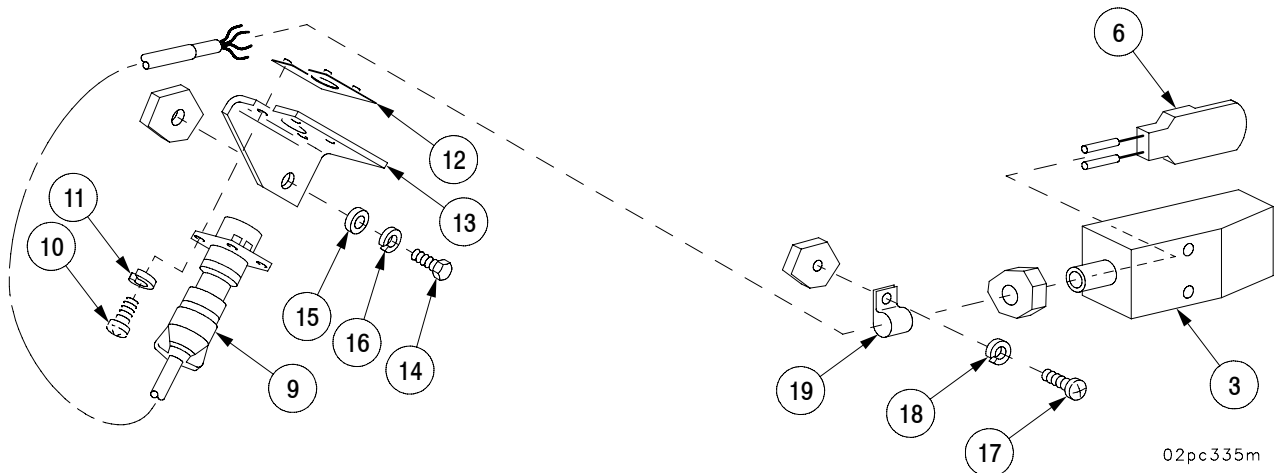
**4-7 WIRE, COVER, BLOCK ASSEMBLIES, AND TEMPERATURE SENSOR - CONTINUED**

**b. Installation.**

**WARNING**

Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

- 1 Use dry-cleaning solvent to clean residue of sealant from cradle.
- 2 Position wire assembly (9) and secure by installing two clamps (19), two new lockwashers (18), and two screws (17).
- 3 Position bracket (13), if removed, and secure by installing screw (14), flat washer (15), and new lockwasher (16).
- 4 Position connector of wiring assembly (9) to bracket (13) and secure by installing mounting flange (12), four new lockwashers (11) and four screws (10).
- 5 Feed wire assembly (9) through cradle and seal cavity using silicone sealant.
- 6 Feed wire (9) through block assembly (3).
- 7 Connect wire assembly (9) to new cover assembly (6), being sure to fully insulate connections using heat-shrink tubing provided with cover assembly (6).





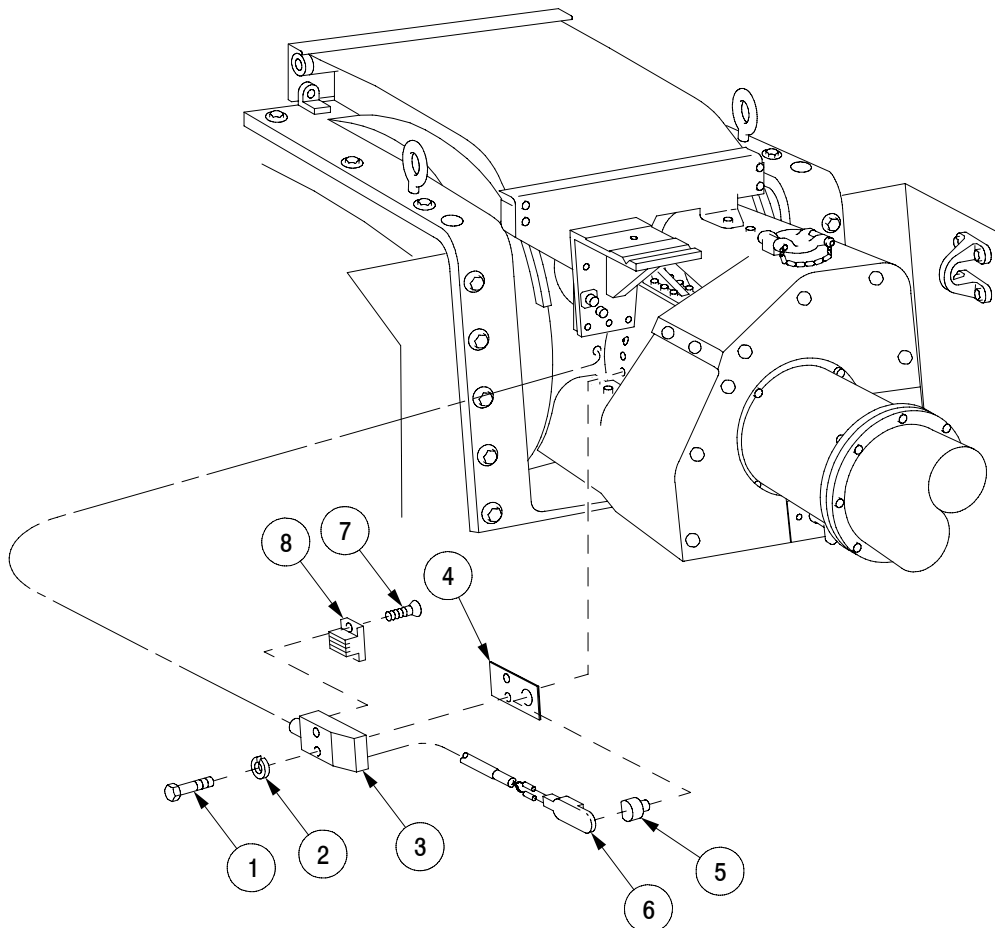
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## 4-7 WIRE, COVER, BLOCK ASSEMBLIES, AND TEMPERATURE SENSOR - CONTINUED

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### b. Installation - Continued

- 8 Install block clamp (8) to block assembly (3) using two new self-locking screws (7).
- 9 Connect temperature sensor (5) to cover assembly (6).
- 9.1 Apply silicone sealant under temperature sensor (5) lip where it contacts with cradle assembly.
- 10 Install cover assembly (6) in block assembly (3).
- 11 Install new gasket (4) and block assembly (3) using two new lockwashers (2) and two screws (1).



02pc334m

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## 4-8 DIRECT FIRE RANGE PLATE.

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This task covers:      a    Removal                                      b.    Installation

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### **INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

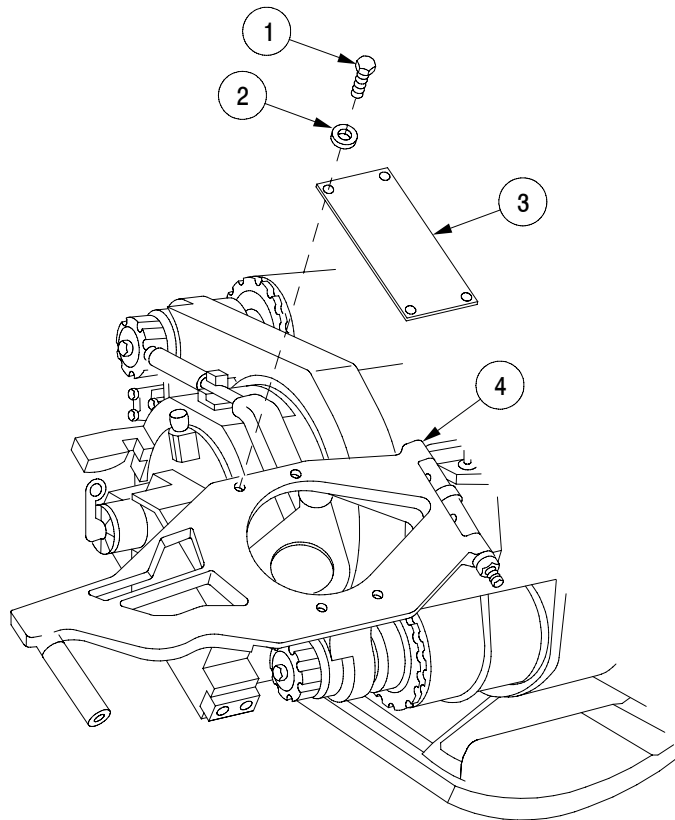
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#### **a. Removal.**

Remove four screws (1), four flat washers (2), and plate (3) from cam assembly (4).

#### **b. Installation.**

Position plate (3) to cam assembly (4) and secure by installing four flat washers (2) and four screws (1).



02pc337m

## 4-9 DUST SHIELD.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Self-locking nuts (8) (item 63, Appx F)  
Lockwashers (4) (item 129, Appx F)

#### Equipment Conditions

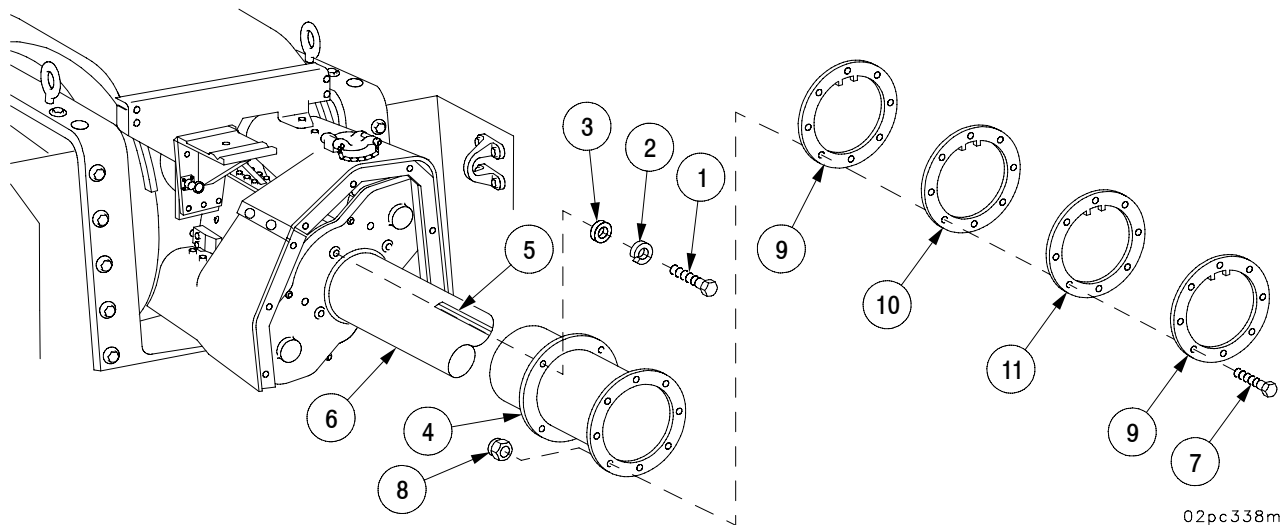
Vehicle parked on level surface  
with parking brake applied  
(TM 9-2350-314-10)  
Muzzle brake removed  
(TM 9-2350-314-10)  
Bore evacuator removed  
(TM 9-2350-314-10)  
Gun mount ballistic shield front cover removed  
(para 4-12)

### a. Removal.

#### NOTE

Dust shield, retainers, and seal do not have to be removed as an assembly.

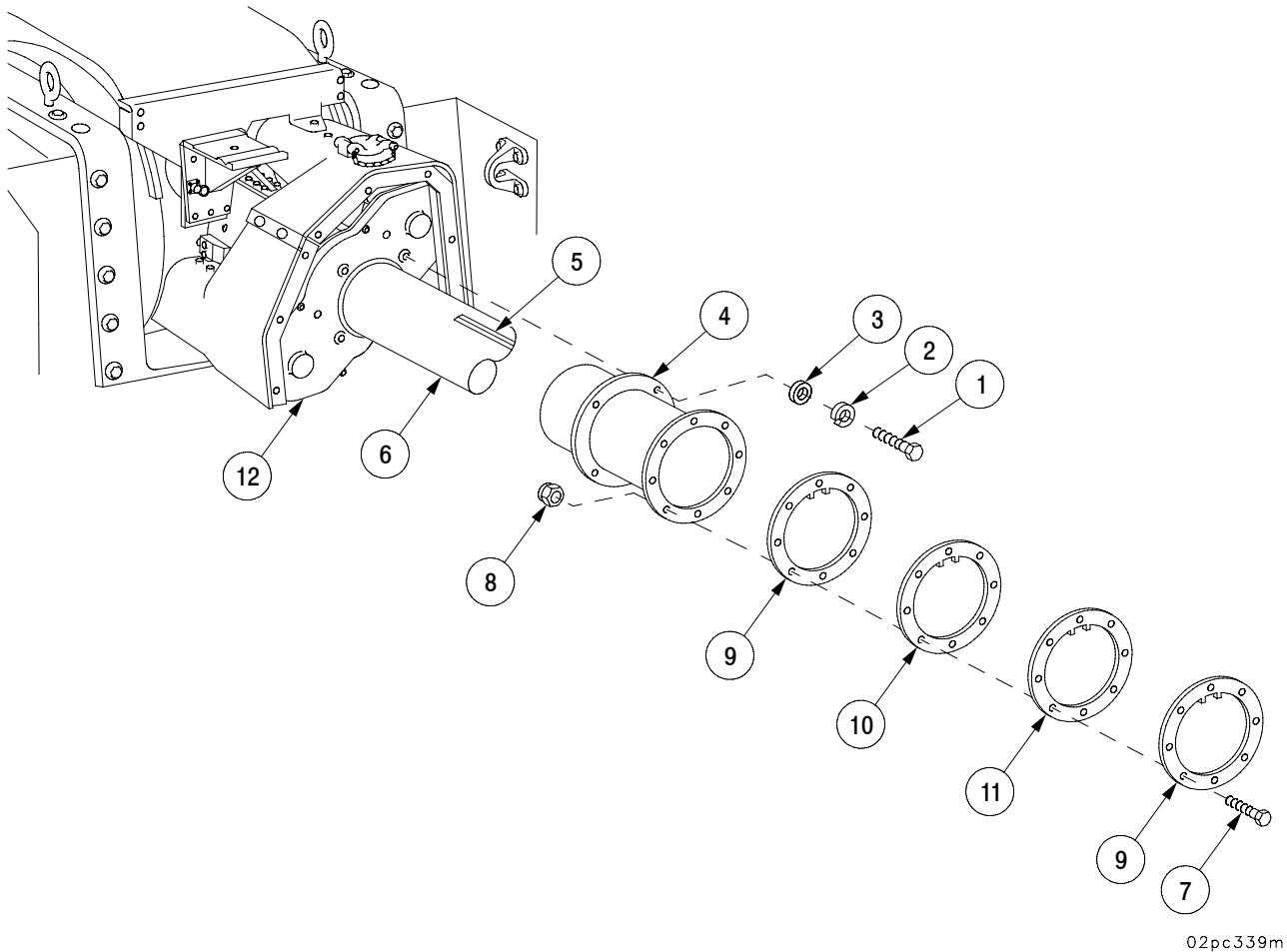
- 1 Remove four screws (1), four lockwashers (2) and four flat washers (3) to loosen dust shield (4). Discard lockwashers.
- 2 Slide dust shield (4) forward along cannon keyway (5) until tabs on dust shield are free of cannon keyway.
- 3 Remove dust shield (4) from cannon tube (6).
- 4 Remove eight screws (7), eight self-locking nuts (8) and separate shield (4), two retainers (9), and two seals (10 and 11). Discard self-locking nuts.



## 4-9 DUST SHIELD - CONTINUED

### b. Installation.

- 1 Position retainer (9), seal (10), seal (11), and retainer (9) to dust shield (4) with all tabs aligned and secure with eight screws (7) and eight new self-locking nuts (8).
- 2 Slide dust shield (4) onto cannon tube (6) with tabs inserted in cannon keyway (5) and position shield to cradle assembly (12).
- 3 Secure dust shield (4) to cradle assembly (12) by installing four screws (1), four new lockwashers (2), and four flat washers (3).



02pc339m

## 4-10 VARIABLE RECOIL ASSEMBLY - HOUSING COVER.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

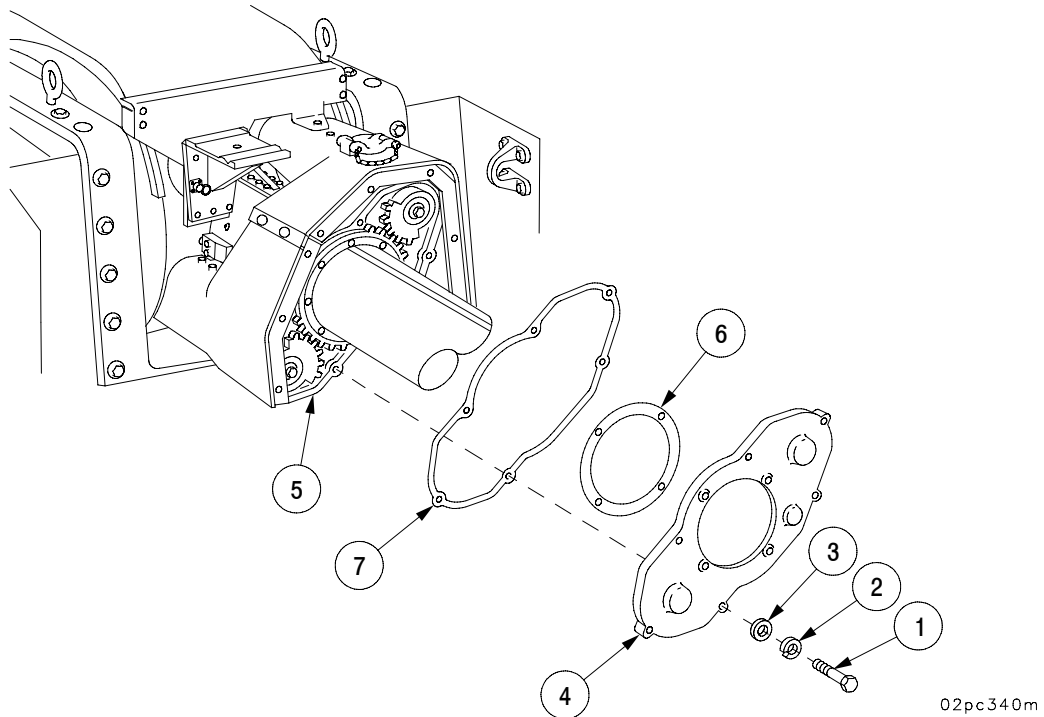
Gasket (item 162, Appx F)  
Lockwashers (8) (item 129, Appx F)  
Sealing compound (item 37, Appx C)  
Gasket (item 163, Appx F)

#### Equipment Conditions

Gun tube at 0 mils elevation  
(TM 9-2350-314-10)  
Dust shield removed (para 4-9)  
Gun mount ballistic shield front cover removed  
(para 4-12)

#### a. Removal.

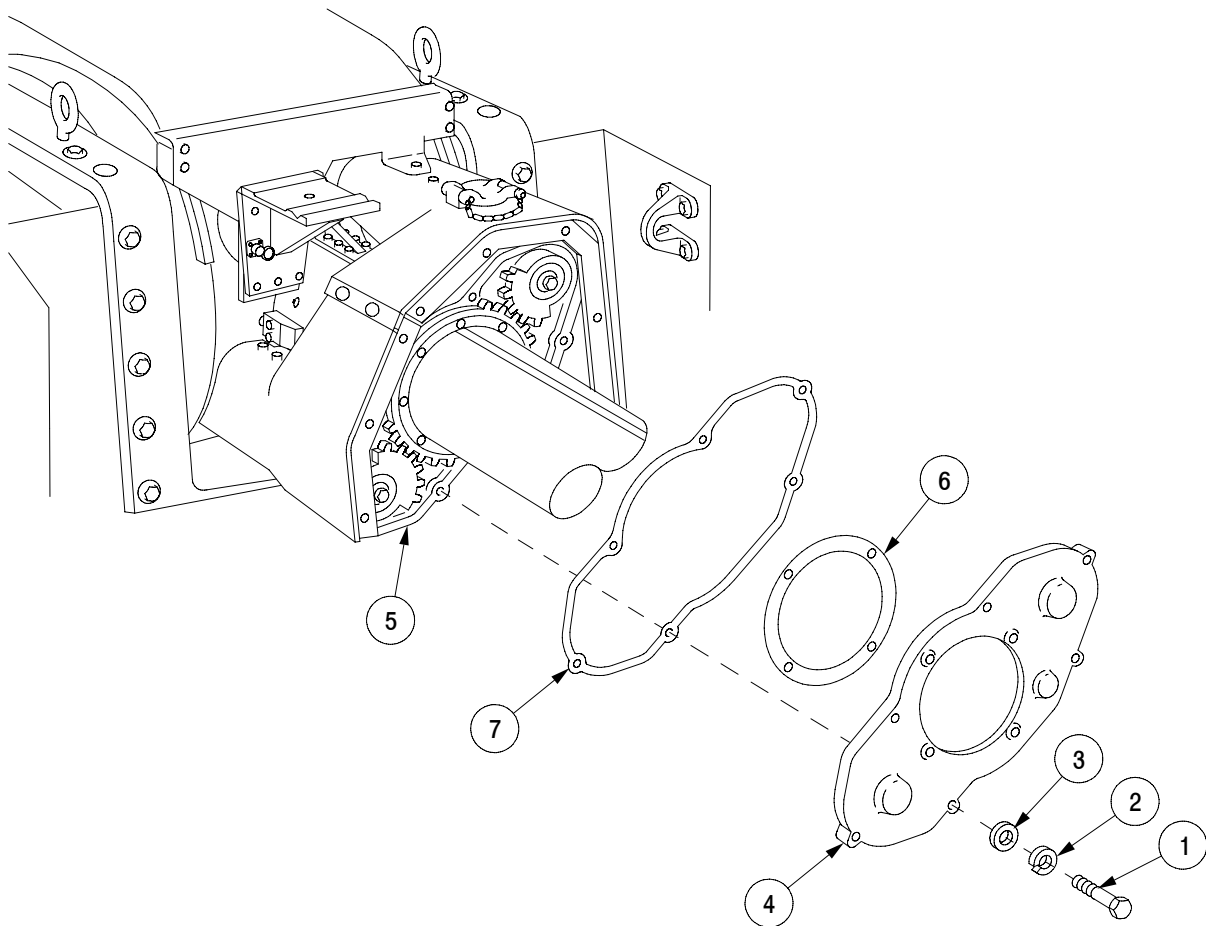
- 1 Remove six screws (1), six lockwashers (2), six flat washers (3), and cover (4) from housing (5). Discard lockwashers.
- 2 Remove gasket (6) from cover (4) and gasket (7) from housing (5). Discard gaskets.



## 4-10 VARIABLE RECOIL ASSEMBLY - HOUSING COVER - CONTINUED

### b. Installation.

- 1 Apply sealing compound to housing (5) and install new gasket (7) to housing (5).
- 2 Apply sealing compound to cover (4) and install new gasket (6) to cover (4).
- 3 Position cover (4) to housing (5) and secure by installing six screws (1), six new lockwashers (2), and six flat washers (3).



02pc341m

**4-11 VARIABLE RECOIL ASSEMBLY.**

This task covers:       a. Removal                                       b. Installation

**INITIAL SETUP**Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Equipment Conditions

Gun mount ballistic shield open  
(TM 9-2350-314-10)

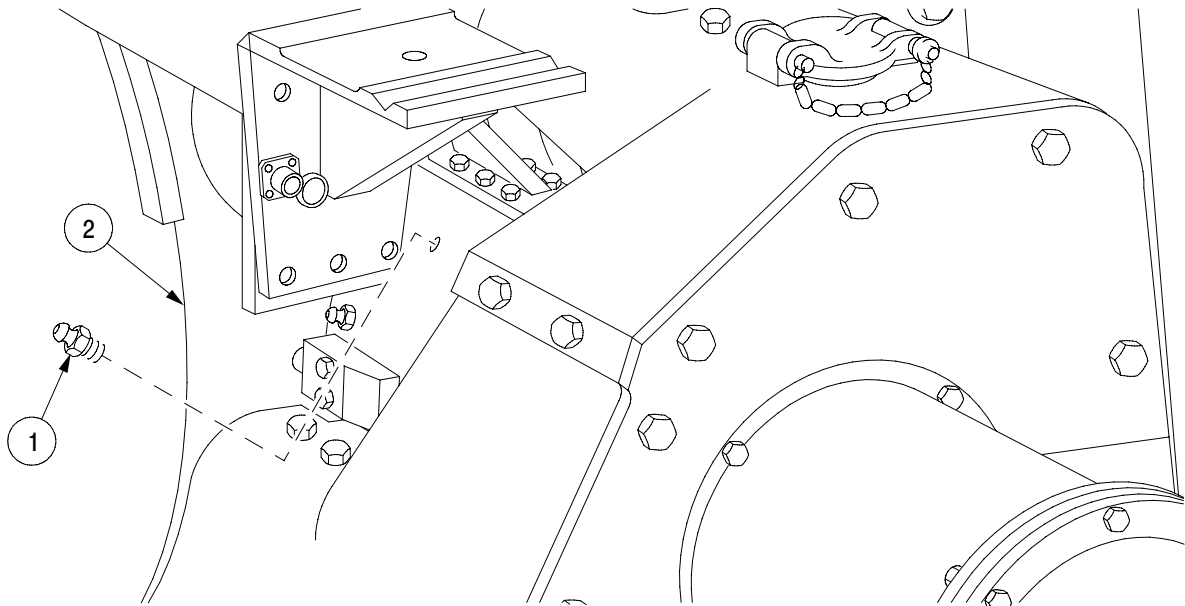
Materials/Parts

Automotive grease (item 52, Appx C)

**a. Removal.****NOTE**

There are eleven grease fittings on the variable recoil assembly cradle, six on the inside and five on the outside. The procedures are the same for all grease fittings. This procedure covers one of these fittings.

- 1 Clean area around grease fitting with rag.
- 2 Remove grease fitting (1) from cradle (2).



02pc342m

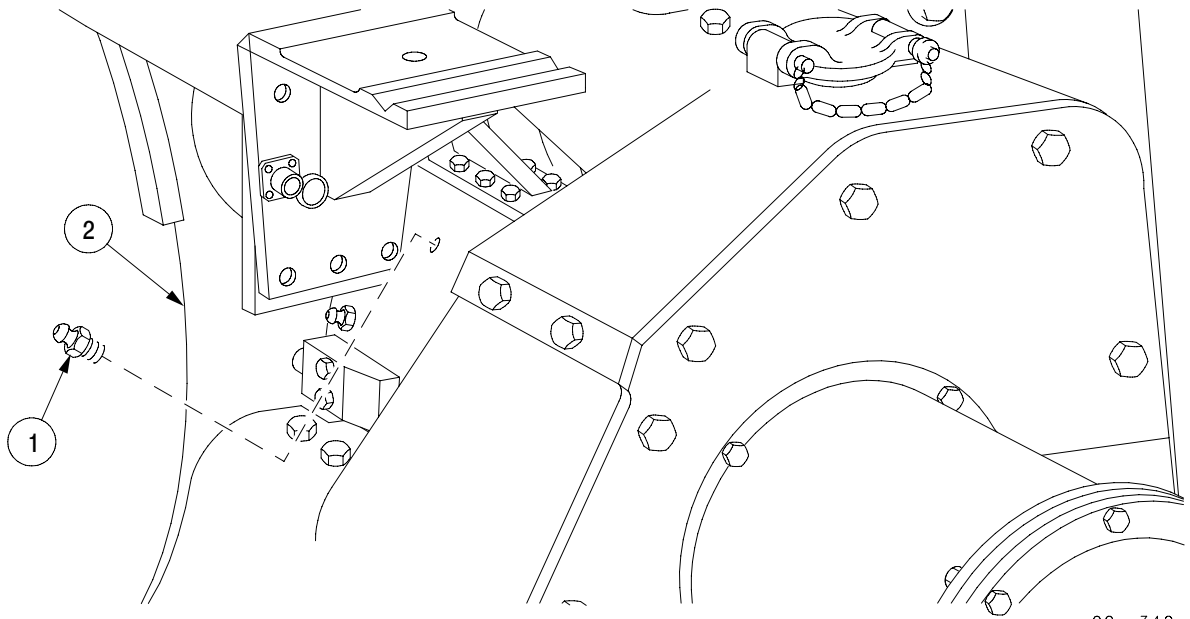
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## 4-11 VARIABLE RECOIL ASSEMBLY - CONTINUED

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### b. Installation.

- 1 Install grease fitting (1) onto cradle (2).
- 2 Lubricate in accordance with TM 9-2350-314-10.



02pc342m



## 4-12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY

This task covers:    a. Removal                      b. Disassembly                      c. Repair                      d. Assembly  
                                  e. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)  
 Torque wrench (item 53, Appx G)

#### Personnel Required

Two

#### Materials/Parts

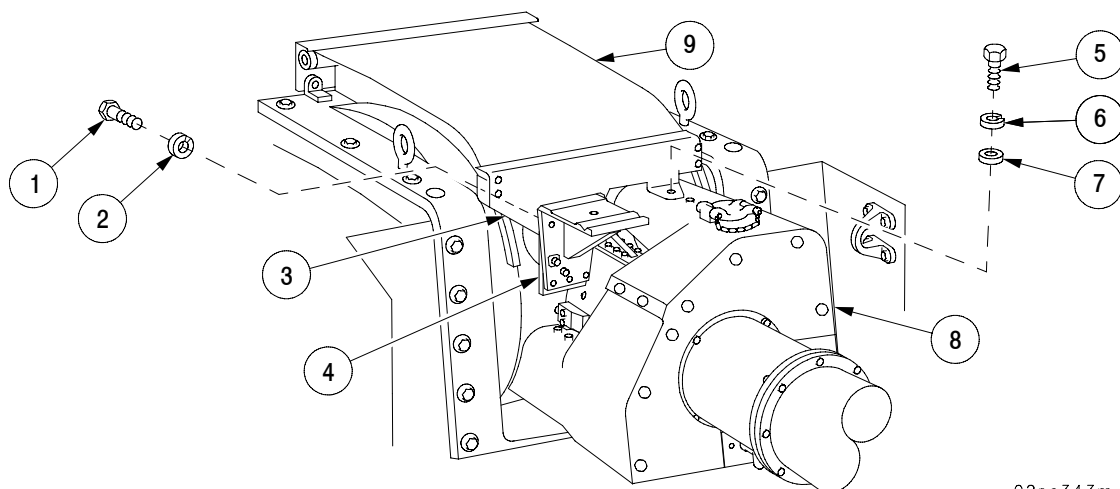
Lockwashers (2) (item 132, Appx F)  
 Lockwashers (9) (item 131, Appx F)  
 Lockwashers (10) (item 130, Appx F)  
 Spring pin (item 171, Appx F)  
 Cotter pin (2) (item 73, Appx F)  
 Self-locking nut (item 215, Appx F)  
 Dry-cleaning solvent (item 75, Appx C)  
 Adhesive (item 5, Appx C)  
 Cotter pins (2) (item 227, Appx F)

#### a. Removal.

### CAUTION

Do not allow roller assembly curtain to retract automatically when the attaching hardware is removed from the mount as the curtain may tear or the roller assembly could be damaged.

- 1 Remove two screws (1) and two lockwashers (2) securing curtain support (3) to mount (4). Discard lockwashers.
- 2 Remove screw (5), lockwasher (6), and flat washer (7) securing curtain support (3) to left composite cover (8) and manually retract curtain (9). Discard lockwashers.



02pc343m

## 4-12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY - CONTINUED

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### a. Removal - Continued

**WARNING**

Use extreme care when removing composite covers. Composite covers are heavy and may cause injury to personnel if dropped.

- 3 Remove quick-release pin (10). Open top access cover (11) and disconnect transfer tube (12) from bleeder valve (13).
- 4 Unscrew T-handle (14) and open front access cover (15).
- 5 Remove two cotter pins (16), two pins (17), and front access cover (15) from left composite cover (8). Discard cotter pins.
- 6 Remove seven screws (18), seven lockwashers (19), seven flat washers (20), and front composite cover (21). Discard lockwashers.
- 7 Remove two screws (22), two lockwashers (23), and two flat washers (24) securing left composite cover (8) to right composite cover (25). Discard lockwashers.
- 8 Remove three screws (26), three lockwashers (27), and three flat washers (28) from left composite cover (8). Discard lockwashers.

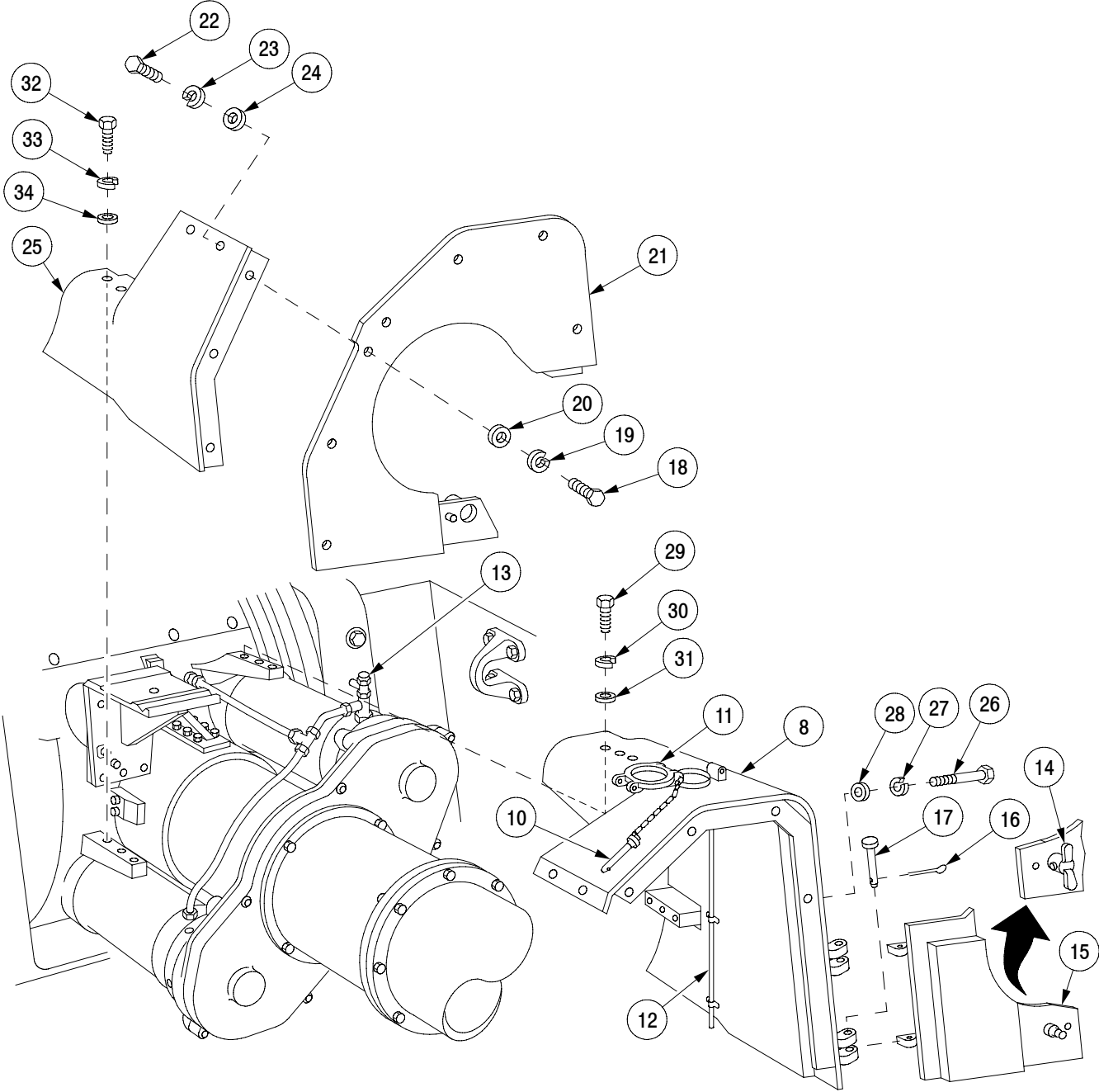
### NOTE

There are three holes in left composite cover and in bracket it is attached to. Only two screws, two lockwashers, and two flat washers secure cover to bracket. Note location of unused hole for proper installation.

- 9 Remove two screws (29), two lockwashers (30), two flat washers (31), and left composite cover (8). Discard lockwashers.
- 10 Remove three screws (32), three lockwashers (33), three flat washers (34), and right composite cover (25). Discard lockwashers.

4-12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY - CONTINUED

a. Removal - Continued

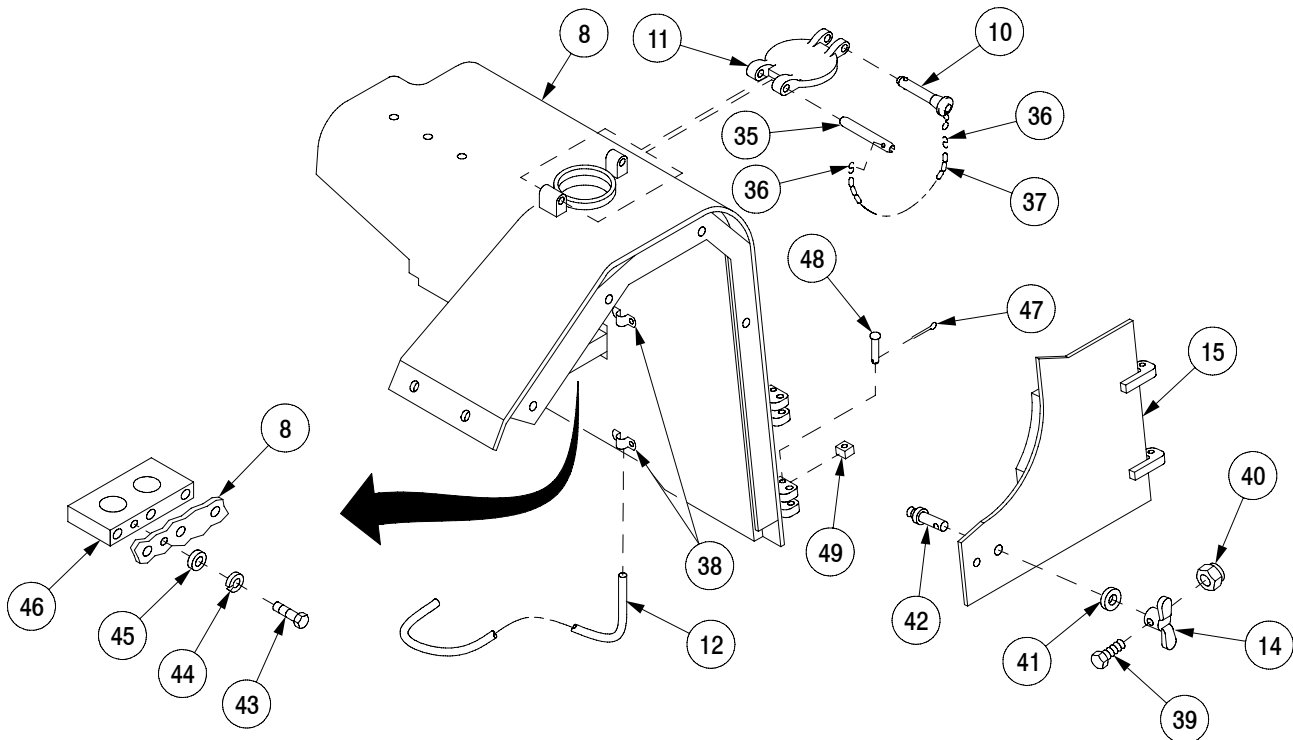


02pc344m

## 4-12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY - CONTINUED

### b. Disassembly.

- 1 Remove quick-release pin (10) from access cover (11).
- 2 Remove spring pin (35) from access cover (11).
- 3 Remove access cover (11) from left composite cover (8).
- 4 Remove two hooks (36) and chain (37) from quick-release pin (10) and spring pin (35). Discard spring pin.
- 5 Slide transfer tube (12) from four straps (38) inside left composite cover (8).
- 6 Remove screw (39) and self-locking nut (40) from handle (14) on front of access door (15). Discard self-locking nut.
- 7 Remove handle (14), flat washer (41) and stud (42) from front access door (15).
- 8 Remove screw (43), lockwasher (44), flat washer (45), and spacer mount (46) from left composite cover (8). Discard lockwashers.
- 9 Remove two cotter pins (47), two straight pins (48), and two bumpers (49). Discard cotter pins.



02pc346m

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**4-12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY - CONTINUED**

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**c. Repair.****NOTE**

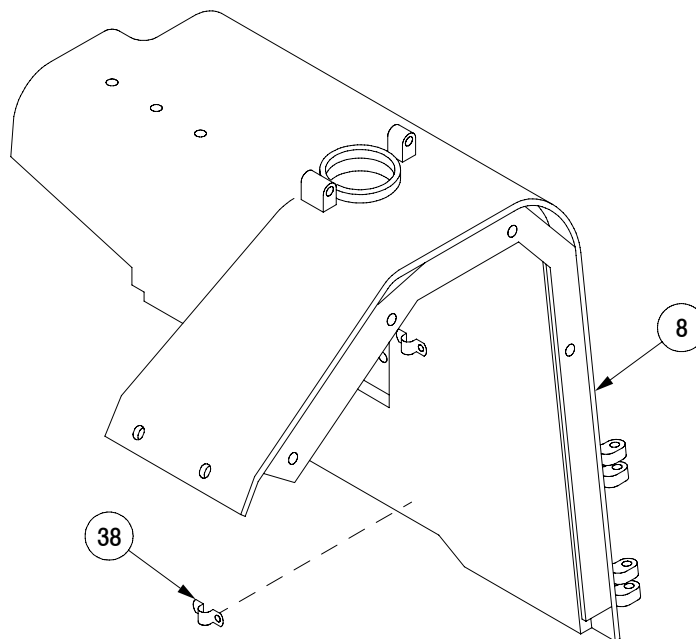
Left composite cover must be removed to repair straps.

- 1 Remove four straps (38) from inside left composite cover (8).

**WARNING**

Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

- 2 Clean strap mounting area with cleaning solvent.
- 3 Apply adhesive to strap mounting area and install four straps (38).

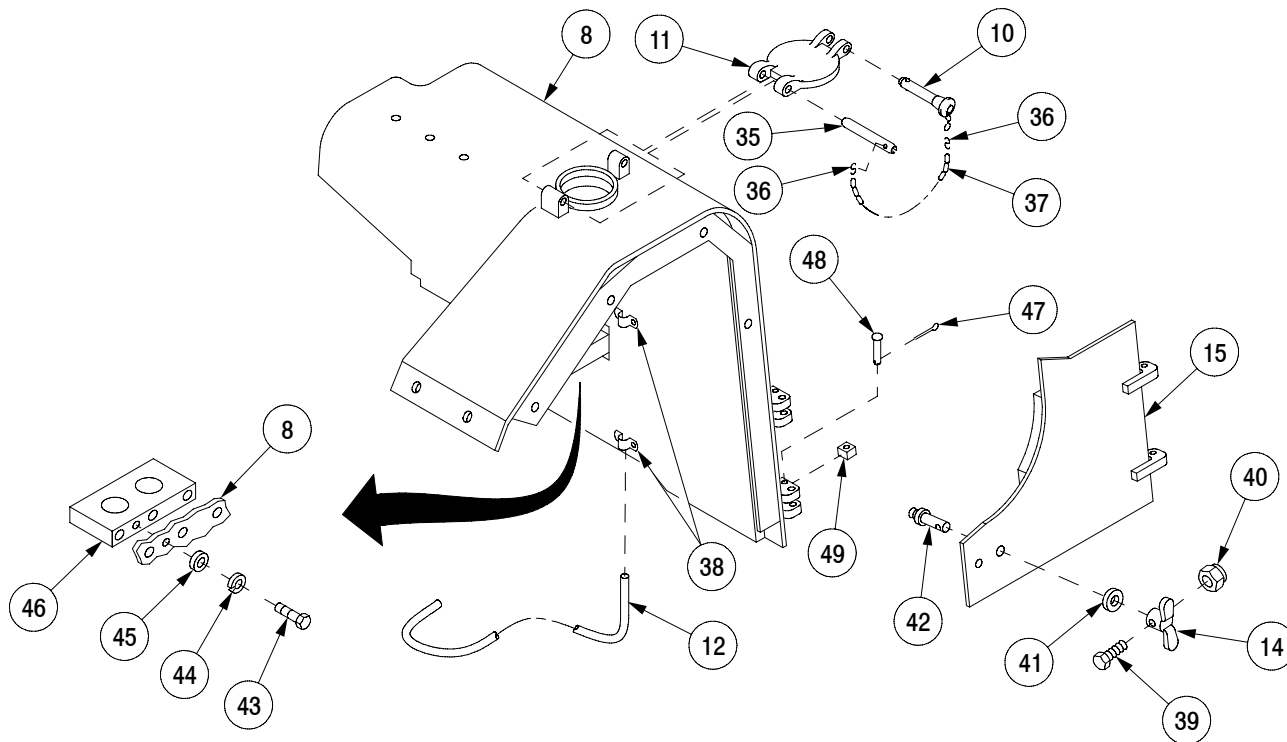


02pc347m

## 4-12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY - CONTINUED

### d. Assembly.

- 1 Install two bumpers (49), two straight pins (48), and two new cotter pins (47).
- 2 Install spacer mount (46), flat washer (45), new lockwasher (44), and screw (43) onto left composite cover (8). Torque screw (43) to 30-35 ft-lbs (41-48 N·m).
- 3 Install stud (42) and flat washer (41) on front access cover (15).
- 4 Install handle (14) and secure with screw (39) and new self-locking nut (40).
- 5 Slide transfer tube (12) through four straps (38) inside left composite cover (8).
- 6 Install chain (37) and two hooks (36) on new spring pin (35) and quick-release pin (10).
- 7 Install access cover (11) on left composite cover (8) with new spring pin (35).
- 8 Install quick-release pin (10).



02pc346m

## 4-12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY - CONTINUED

### e. Installation.

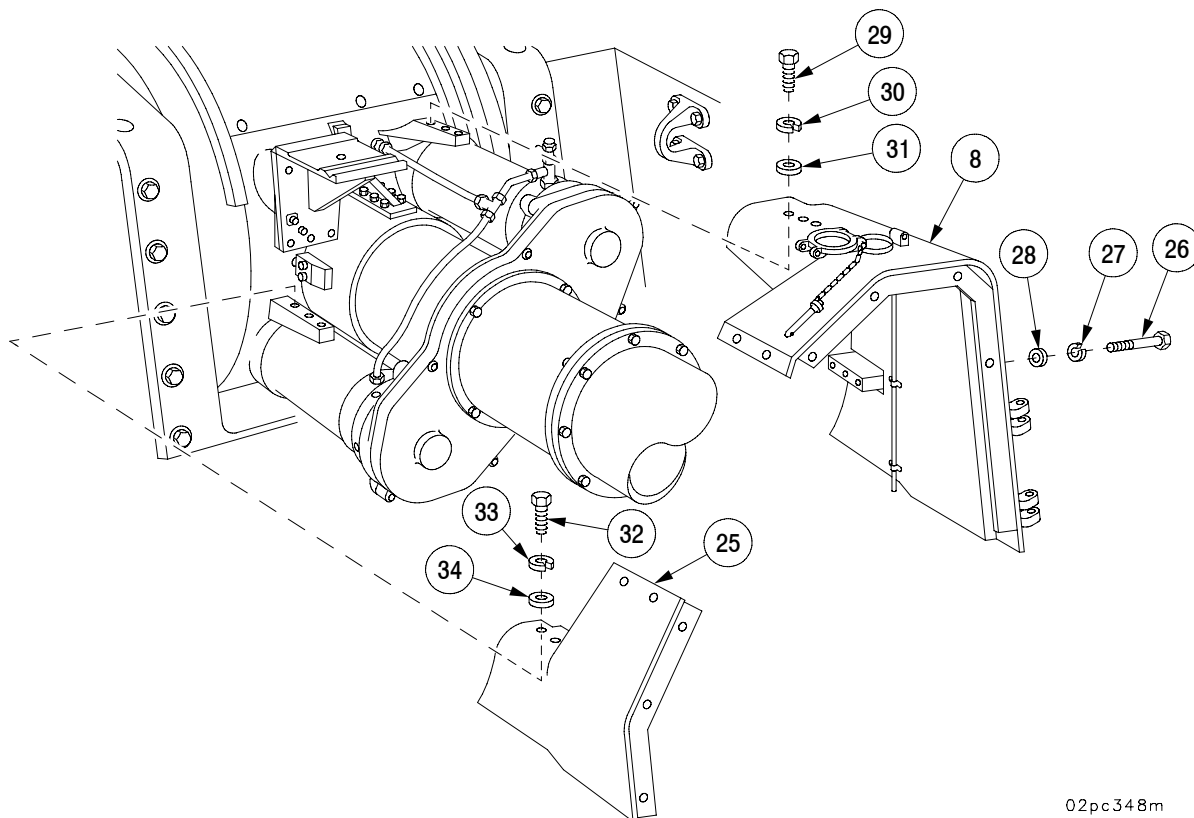
#### WARNING

Use extreme care when installing composite covers. Composite covers are heavy and may cause injury to personnel if dropped.

#### NOTE

Install composite covers leaving hardware loose to allow for adjustment and proper fit.

- 1 Install right composite cover (25) with three screws (32), three new lockwashers (33), and three flat washers (34).
- 2 Install left composite cover (8) with two screws (29), two new lockwashers (30), and two flat washers (31).
- 3 Install three screws (26), three new lockwashers (27), and three flat washers (28) in left composite cover (8).



02pc348m

## 4-12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY - CONTINUED

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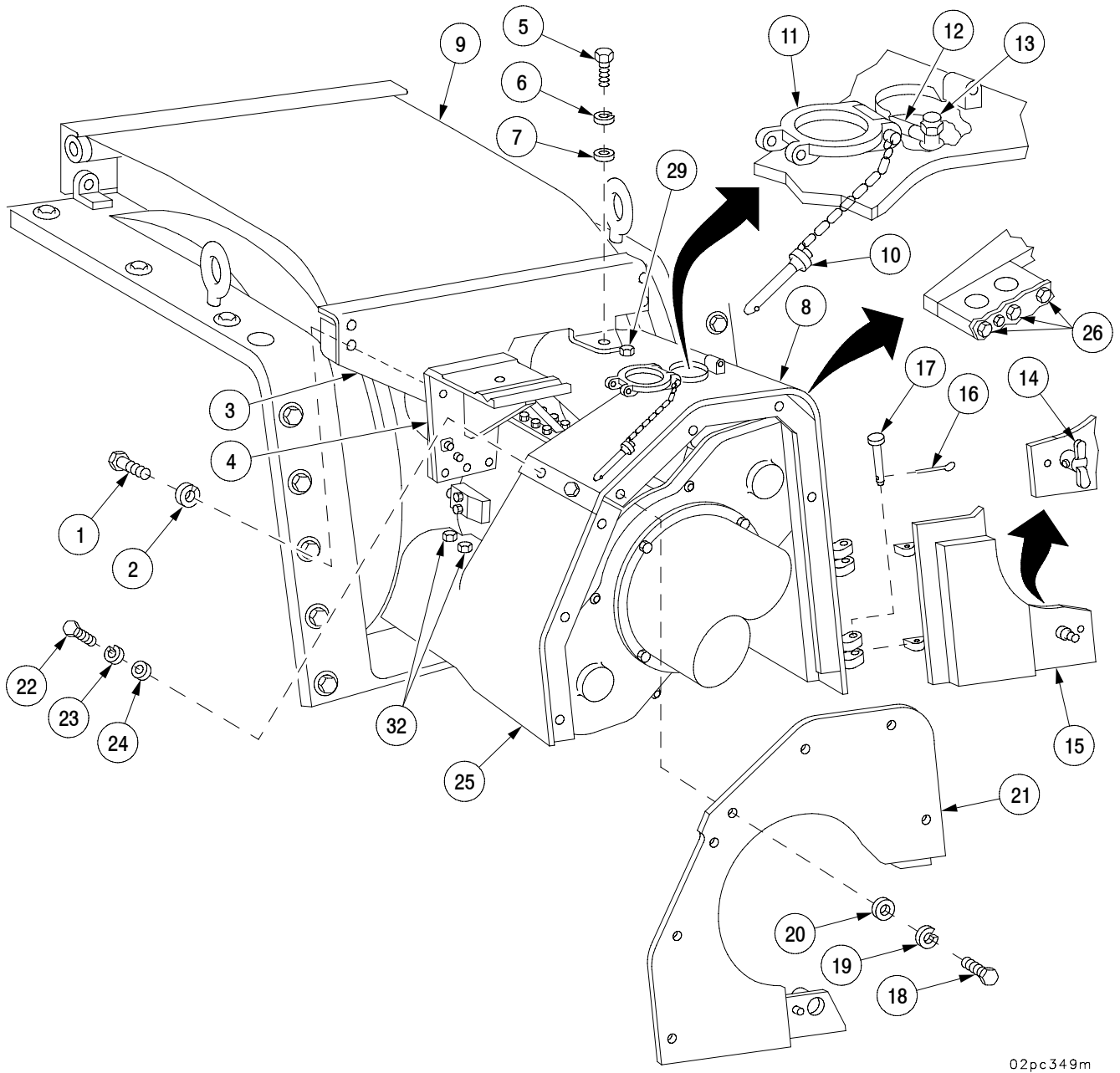
### e. Installation - Continued

- 4 Secure left composite cover (8) to right composite cover (25) with two screws (22), two new lockwashers (23), and two flat washers (24).
- 5 Install front composite cover (21) with seven screws (18), seven new lockwashers (19), and seven flat washers (20).
- 6 Connect transfer tube (12) to bleeder valve (13), and close access cover (11) and insert quick-release pin (10) to secure access cover (11).
- 7 Adjust left composite cover (8) for proper fit and torque screws (18 and 22) to 30–35 ft-lbs (41–48 N·m).
- 8 Torque screws (26, 29, and 32) to 50–55 ft-lbs (68–75 N·m).
- 9 Install front access door (15) on left composite cover (8) with two pins (17) and two new cotter pins (16). Close front access door (15) and secure with T-handle (14).
- 10 Extend curtain (9) and install curtain support (3) to left composite cover (8) with screws (5), new lockwasher (6), and flat washer (7). Torque screw (5) to 50 to 55 ft-lbs (68–75 N·m).
- 11 Secure curtain support (3) to mount (4) with two screws (1) and two new lockwashers (2).



## 4-12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY - CONTINUED

### e. Installation - Continued



## 4-13 FIRING MECHANISM.

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This task covers:    a. Removal                    b. Disassembly                    c. Assembly                    d. Installation

---

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
M18 fuze setter wrench (BII)

#### References

TM 9-2350-314-10

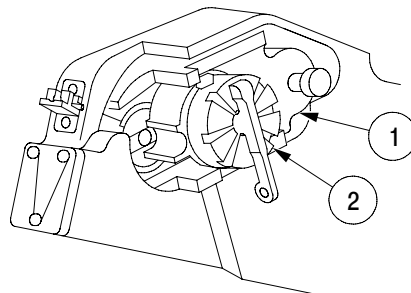
#### Materials/Parts

Automotive grease (item 52, Appx C)  
Lubricant cleaner (item 32, Appx C)

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#### a. Removal.

- 1 Move firing block assembly (1) to center position. Push firing mechanism (2) into firing block assembly (1) and rotate clockwise to remove.



02pc354m

## 4-13 FIRING MECHANISM - CONTINUED

### b. Disassembly.

- 1 Place firing mechanism on solid flat surface with follower (3) end up.
- 2 Place fuze setter wrench over follower (3) and depress follower until pin (4) can be removed from lever (5) and yoke (6). Remove pin and lever.

### WARNING

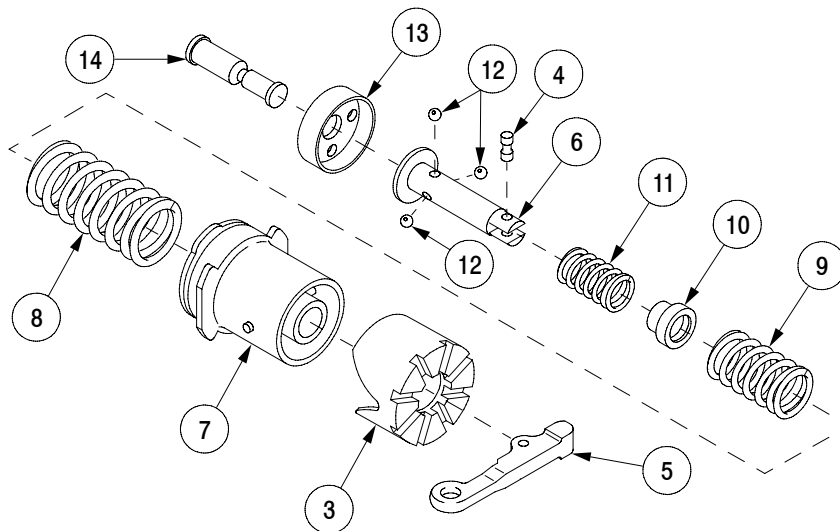
Springs are under compression. Raise fuze setter wrench, follower, and case assembly slowly or personnel injury may result.

- 3 Raise fuze setter wrench and remove fuze setter wrench, follower (3), and case assembly (7).

### NOTE

Firing mechanism contains three balls. Be careful that balls are not lost during disassembly.

- 4 Remove spring (8), spring (9), sleeve (10), and spring (11).
- 5 Separate yoke (6), three balls (12), cup (13), and hammer (14).
- 6 Inspect all parts and replace defective parts as required.



02pc353m

## 4-13 FIRING MECHANISM - CONTINUED

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### c. Assembly.

- 1 Clean and lubricate firing mechanism components before assembly (TM 9-2350-314-10).
- 2 Install cup (13) and hammer (14).
- 3 Install yoke (6) on hammer (14).
- 4 Align three holes in yoke (6) with groove in hammer (14).

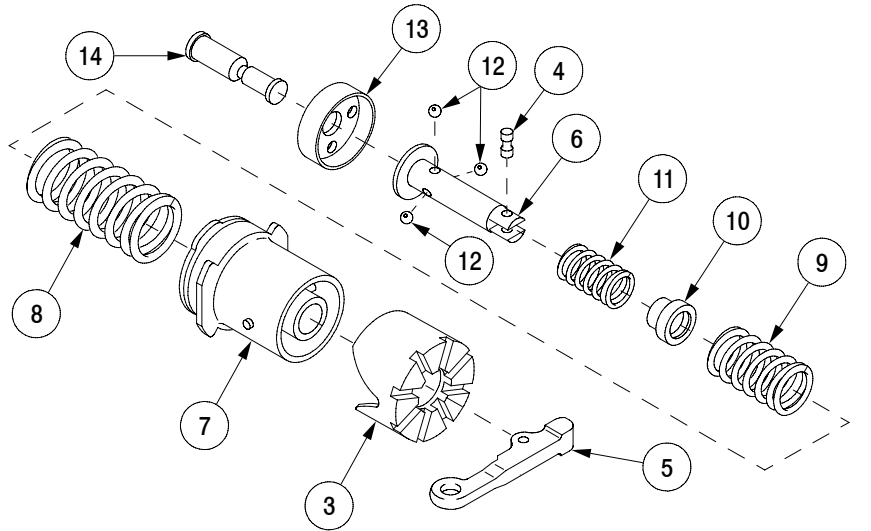
#### **NOTE**

Apply GAA to holes in yoke prior to installing balls for ease of assembly.

- 5 Install spring (11) and sleeve (10) on yoke (6).
- 6 Install three balls (12) into holes in yoke (6) between coils of spring (11).
- 7 Slide sleeve (10) against spring (11) until spring is fully compressed against cup (13).
- 8 Pull hammer (14) from yoke (6) until sleeve (10) locks in place.
- 9 Place yoke and hammer assembly on socket wrench socket so that hammer swings freely inside socket.
- 10 Install spring (9) and spring (8) over yoke (6).
- 11 Install case assembly (7) over spring (8).
- 12 Install follower (3) over case assembly (7) aligning cutouts of follower with pins on case assembly.
- 13 Place fuze setter wrench over follower (3) and depress to compress springs until lever (5) can be inserted in yoke (6).
- 14 Install pin (4) in lever (5) and yoke (6).
- 15 Push hammer (14) against solid surface to seat assembly.

**4-13 FIRING MECHANISM - CONTINUED**

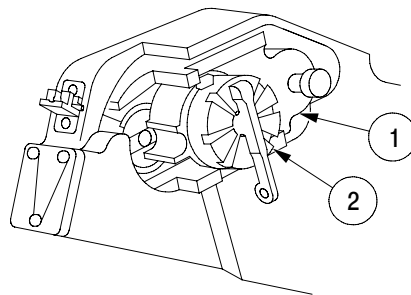
**c. Assembly - Continued**



02pc353m

**d. Installation.**

- 1 With firing block assembly (1) in center position, insert firing mechanism (2) and rotate counterclockwise until locked.



02pc354m

## 4-14 MUZZLE BRAKE, THRUST COLLAR, AND BORE EVACUATOR.

This task covers: a. Removal b. Disassembly c. Assembly d. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Torque wrench (item 53, Appx G)

#### References

TM 9-2350-314-10

#### Materials/Parts

Lubricant cleaner (item 32, Appx C)

#### a. Removal.

- 1 Remove muzzle brake and thrust collar (TM 9-2350-314-10).
- 2 Remove bore evacuator thrust collar assembly (TM 9-2350-314-10).

#### b. Disassembly.

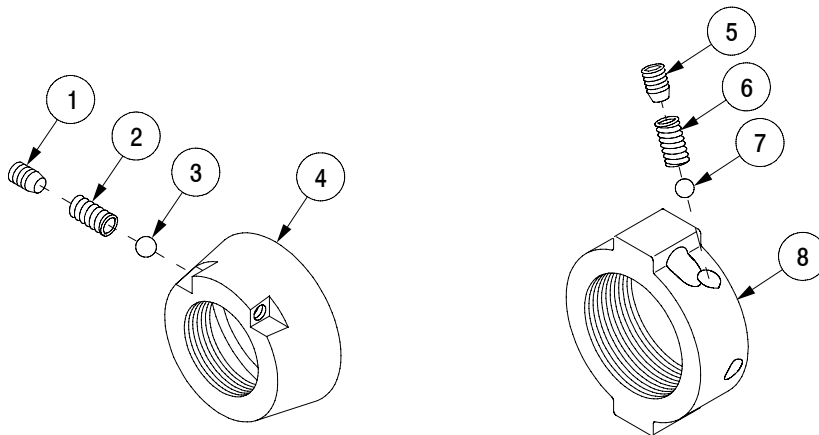
### NOTE

Setscrews for both thrust collars are staked in three places on the side with spring and detent ball only.

- 1 Remove setscrew (1), spring (2), and detent ball (3) from muzzle brake thrust collar (4).
- 2 Remove setscrew (5), spring (6), and detent ball (7) from bore evacuator assembly thrust collar (8).

#### c. Assembly.

- 1 Install detent ball (7), spring (6), and setscrew (5) in bore evacuator assembly thrust collar (8). Stake setscrew in three places.
- 2 Install detent ball (3), spring (2), and setscrew (1) in muzzle brake thrust collar (4). Stake setscrew in three places.



02pc350m

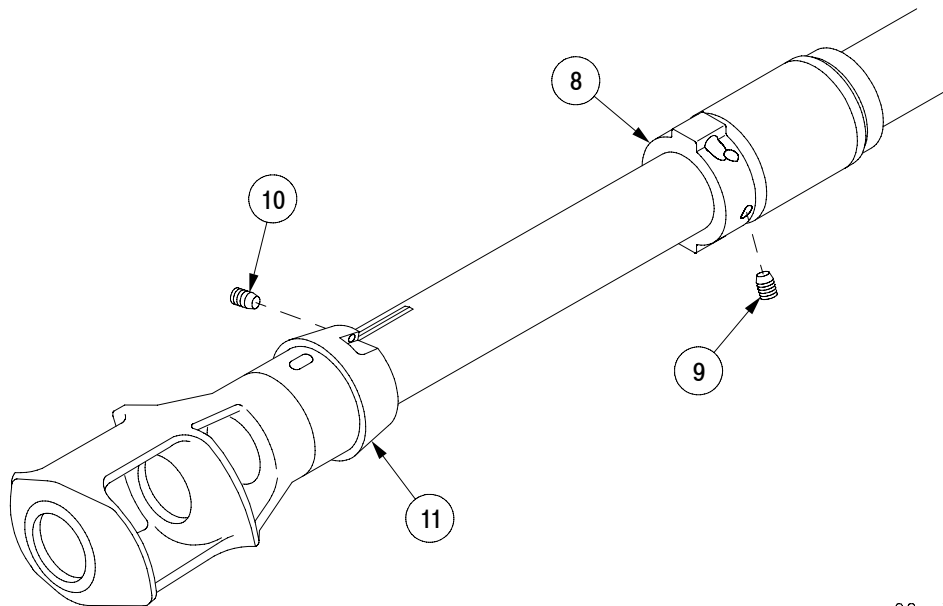
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**4-14 MUZZLE BRAKE, THRUST COLLAR, AND BORE EVACUATOR - CONTINUED**

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**d. Installation.**

- 1 Clean threads of both thrust collars with lubricant cleaner prior to installation.
- 2 Install bore evacuator assembly thrust collar (8) on cannon tube (TM 9-2350-314-10).
- 3 Install setscrew (9) into bore evacuator thrust collar (8). Torque setscrew to 30-35 ft-lb (41-47 N•m).
- 4 Install muzzle brake thrust collar assembly and muzzle brake on cannon tube (TM 9-2350-314-10).
- 5 Install setscrew (10) into muzzle brake thrust collar (11). Torque setscrew to 30-35 lb-ft (41-47 N•m).



02pc356m

## 4-15 BREECH MECHANISM.

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This task covers:    a. Disassembly            b. Inspection            c. Assembly

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### **INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Spanner wrench (item 50, Appx G)  
Spanner wrench (item 51, Appx G)

Materials/Parts

Automotive grease (item 52, Appx C)  
Masking tape (item 89, Appx C)

Equipment Conditions

Breechblock closed  
(TM 9-2350-314-10)  
Cannon - 0° elevation  
(TM 9-2350-314-10)  
Cab traverse lock locked  
(TM 9-2350-314-10)

Personnel Required

Two

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### a. Disassembly.

### **WARNING**

Only remove breechblock operator rack springs when breechblock is in closed position. Springs are under heavy pressure and may cause serious injury to personnel.

- 1 Depress plunger (1) with punch and slide rack plate (2) rearward until rack plate disengages from plunger.

### **NOTE**

When rack plate is moved rearward, stop plate and rack springs will pop out of carrier assembly. A clean rag should be held over the stop plate as rack plate is driven rearward to catch stop plate and rack springs.

- 2 Drive rack plate (2) rearward with hammer until plunger (1) engages in second hole in rack plate. Catch stop plate (3) and two rack springs (4) in clean rag.



## 4-15 BREECH MECHANISM - CONTINUED

### a. Disassembly - Continued

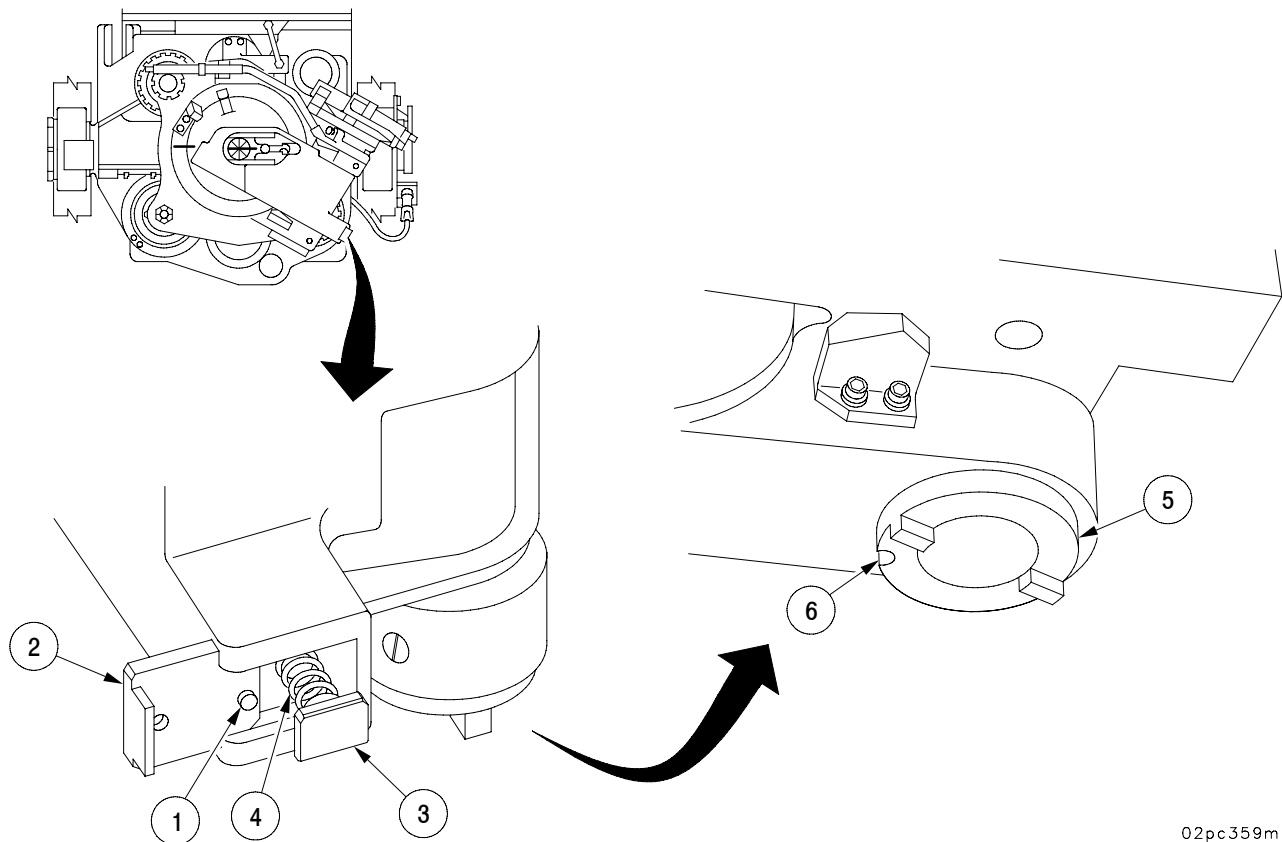
#### WARNING

Make sure breechblock is in closed position. Springs of breechblock are under 130 lb-ft (176 N·m) load pressure. Use extreme care to avoid serious injury to personnel when removing components of the breech mechanism.

#### NOTE

There are two types of adjusters. Some have holes for a spanner wrench. Others have lugs for an adjustable wrench.

- 3 Release pre-load on closing spring. Apply clockwise pressure on adjuster (5) and depress adjuster plunger (6). Rotate adjuster slowly counterclockwise until all torque has been relieved.



02pc359m

## 4-15 BREECH MECHANISM - CONTINUED

### a. Disassembly - Continued

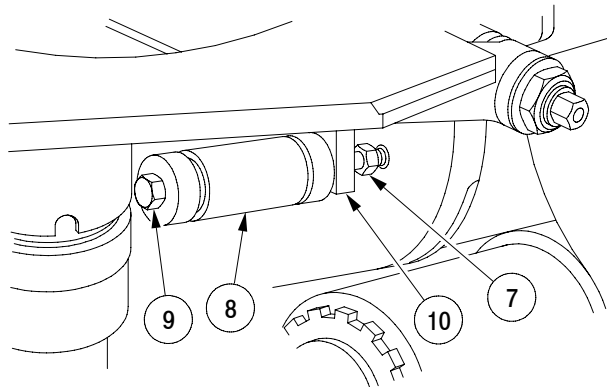
#### NOTE

Cannon must be elevated to 175 mils for accessibility.

- 4 Loosen jamnut (7) of cam damper assembly (8).
- 5 Loosen screw (9) until tension on cam damper assembly (8) has been released.
- 6 Remove screw (9), jamnut (7) and remaining parts of cam damper assembly (8) from breech mechanism operating cam (10).

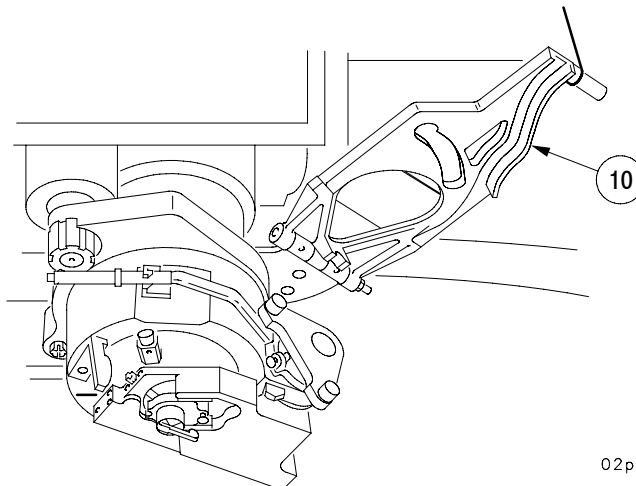
#### NOTE

For disassembly of cam damper assembly, refer to para 4-5.



02pc364m

- 7 Raise breech mechanism operating cam (10) and secure it to cab roof with strap.

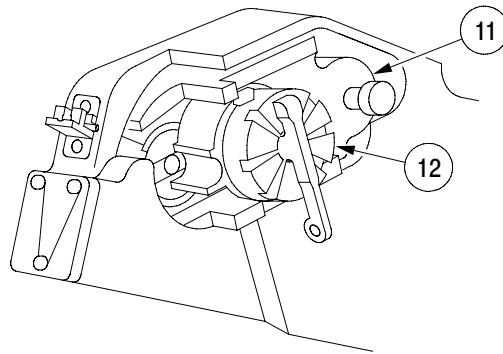


02pc038m

## 4-15 BREECH MECHANISM - CONTINUED

### a. Disassembly - Continued

- 8 Move firing block assembly (11) to center position. Push firing mechanism (12) into firing block assembly (11) and rotate clockwise to remove.

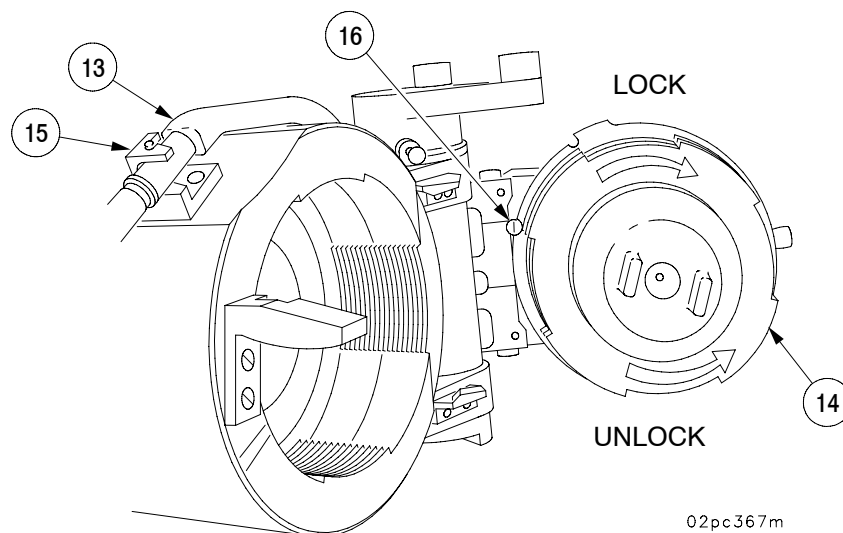


02pc041m

### CAUTION

Since all spring tension has been released, be extra careful when opening breechblock. Use operating handle and support breechblock as it is being opened. Otherwise, carrier will slam open and may be damaged.

- 9 With one mechanic supporting breechblock (14), use breech operating handle (13) to open breechblock (14).
- 10 Return breech operating handle (13) to stop (15).
- 11 Depress carrier detent plunger (16) with drive punch and rotate breech block (14) counterclockwise to the UNLOCK position.



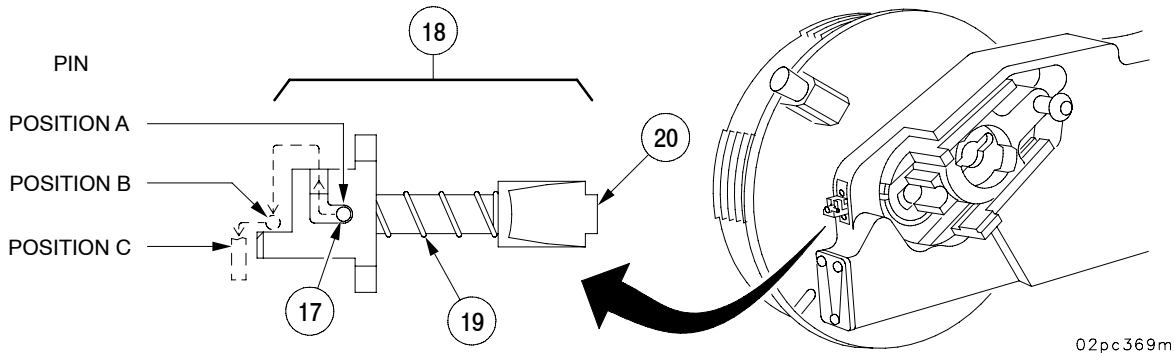
02pc367m

**4-15 BREECH MECHANISM - CONTINUED**

**a. Disassembly - Continued**

**NOTE**

- When the plunger is pulled out and locked in position B, the obturator nut and spindle assembly can be removed. If the firing block assembly and housing are being removed, move plunger assembly to position C.
- If the plunger cannot be easily pulled out, a screw driver or pry tool can be inserted between plunger lip and spindle nut. Applying leverage will free plunger.



- 12 Move pin (17) located on top of plunger assembly (18), against spring (19) from position A to position B. The pin in position B, now allows for removal of the spindle nut. Once the spindle nut is removed, the obturator group can be inspected and removed if necessary.

**NOTE**

This position will allow for removal of the obturator group without the firing housing and firing block detachment.

- 13 In order to remove the firing mechanism housing and firing mechanism block, move the pin (17) to position C. The plunger shaft (20) is now clear of the firing mechanism housing which will facilitate the firing train's (firing mechanism housing and firing mechanism block) removal.

**NOTE**

Position C allows for removal of both the obturator group and firing train (firing mechanism housing and firing mechanism block).

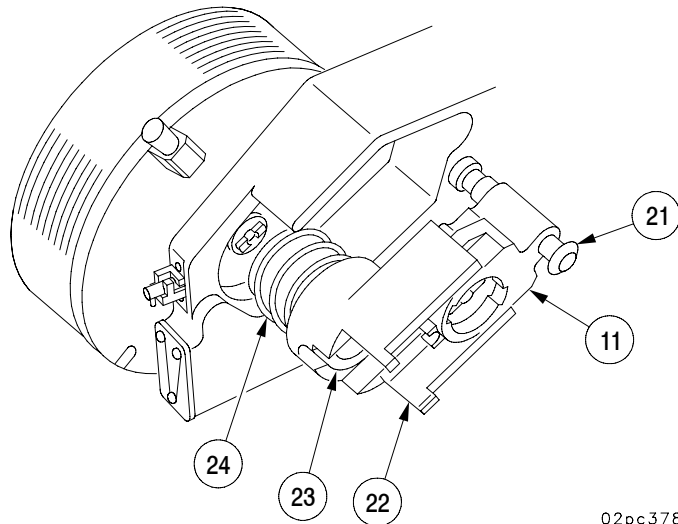
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## 4-15 BREECH MECHANISM - CONTINUED

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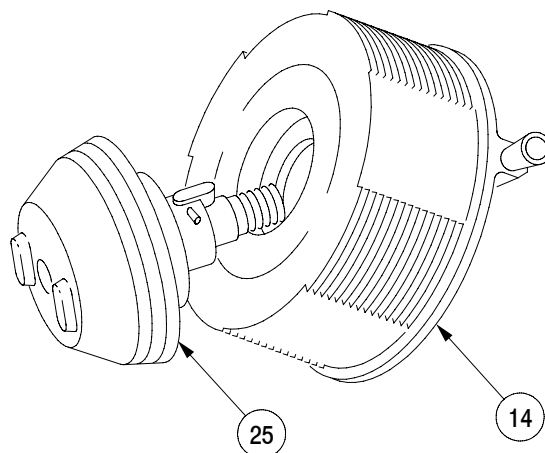
### a. Disassembly - Continued

- 14 Pull out on follower knob (21) and slide firing block assembly (11) to extreme right position.
- 15 Support firing block assembly (11) and firing mechanism housing (22) while removing obturator nut (23) with spanner wrench.
- 16 Remove firing block assembly (11), firing mechanism housing (22), and obturator spindle spring (24).



02pc378m

- 17 Remove spindle assembly (25) from breechblock (14).



02pc048m

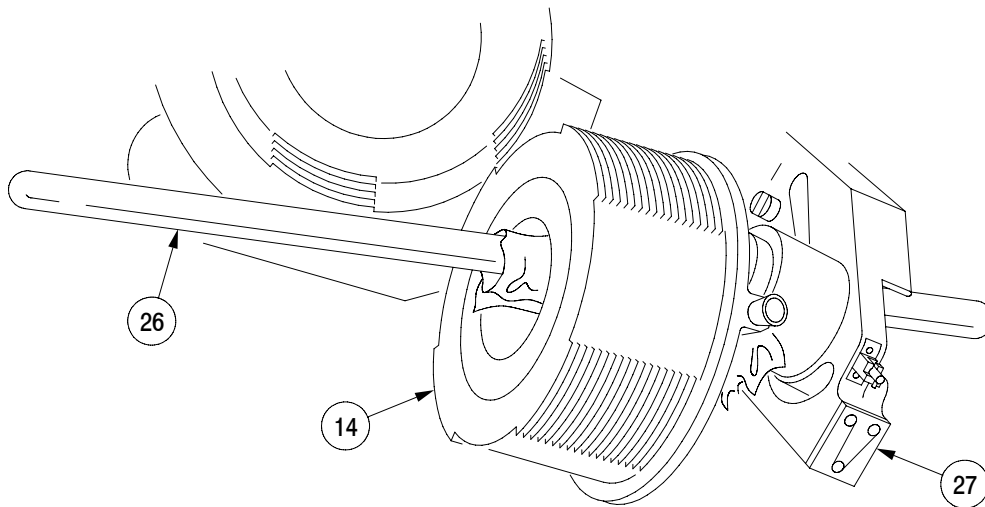
## 4-15 BREECH MECHANISM - CONTINUED

### a. Disassembly - Continued

#### WARNING

Breechblock weighs approximately 125 lbs (57 kg). Two persons are needed to remove the breechblock in order to prevent injury to personnel. Insert cleaning staff wrapped with rags through breechblock and carrier to prevent breechblock from sliding and injury to personnel.

- 18 To remove breechblock (14), position 24-inch cleaning staff (26) wrapped with rags through spindle hole of breechblock and carrier assembly (27).
- 19 While supporting both ends of cleaning staff (26), lift and slide breechblock (14) off carrier assembly (27).



02pc044m

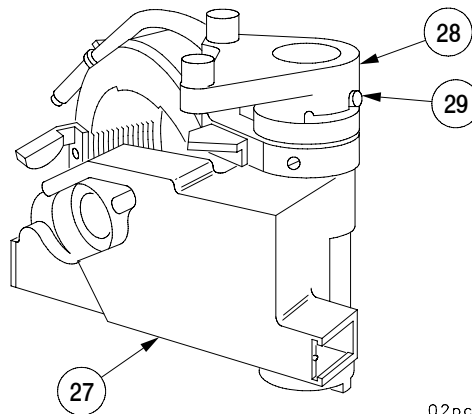
## 4-15 BREECH MECHANISM - CONTINUED

### a. Disassembly - Continued

#### NOTE

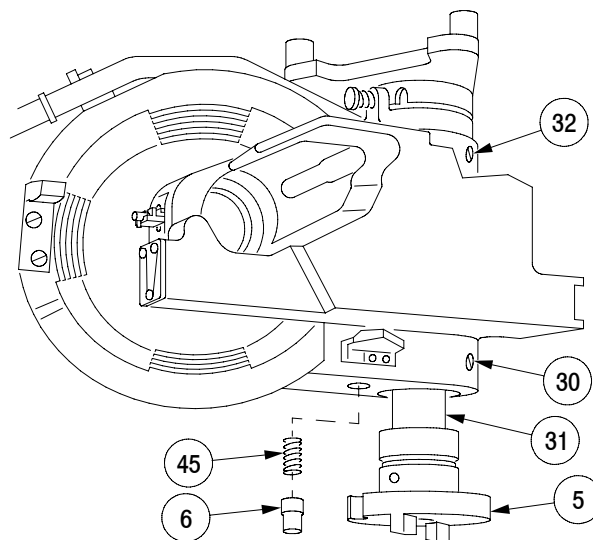
If rammer is installed, cannon must be pushed out of battery until adjuster clears end of rammer to allow removal of adjuster and leaf springs. If rammer is not installed, skip step 20.

- 20 Push cannon out of battery (para 4-6).
- 21 Close carrier assembly (27) and rotate operating crank assembly (28) clockwise as far as it will go.
- 22 Remove leaf spring torsion pin (29).



02pc379m

- 23 Remove adjuster detent (30) while supporting adjuster (5) and leaf spring pack (31).
- 24 Remove adjuster (5) and leaf spring pack (31).
- 25 Remove closing mechanism adjusting plunger (6) and spring (45).
- 26 Remove operating crank detent (32).



02pc381m

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## 4-15 BREECH MECHANISM - CONTINUED

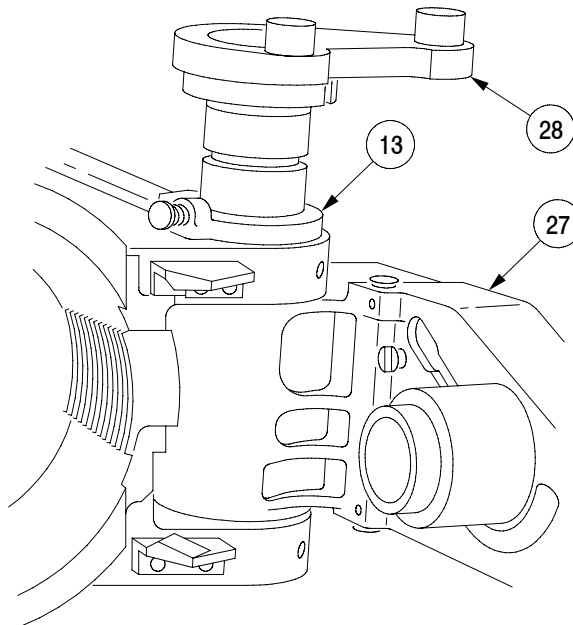
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### a. Disassembly - Continued

**WARNING**

Ensure that carrier assembly is supported when operating crank assembly is removed. Failure to do so may result in personnel injury and/or equipment damage.

- 27 Open support carrier assembly (27) and remove operating crank assembly (28).
- 28 Remove carrier assembly (27) and breech operating handle (13).



02pc384m



## 4-15 BREECH MECHANISM - CONTINUED

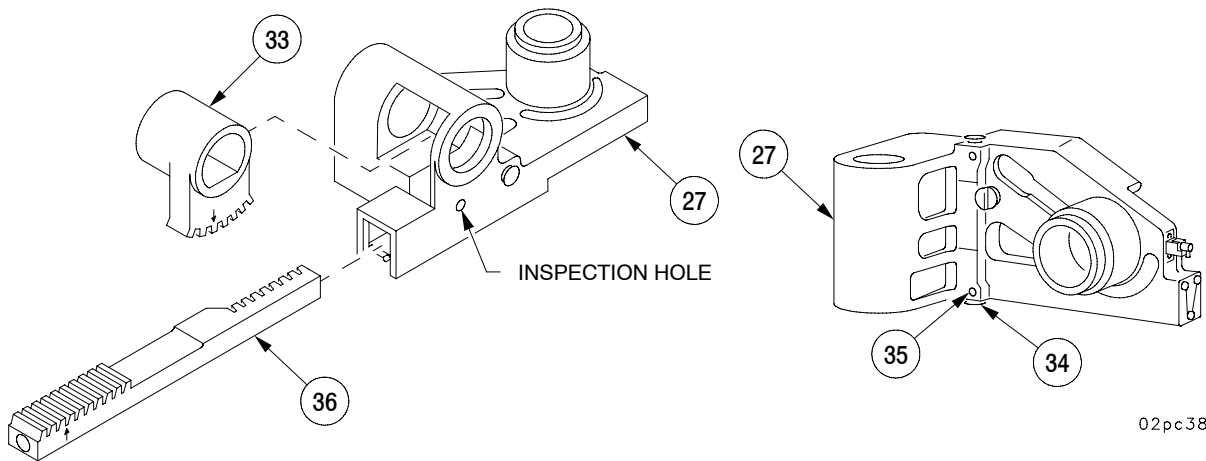
### a. Disassembly - Continued

29 Remove spur gear (33) from carrier assembly (27).

#### NOTE

The carrier assembly is marked next to the plunger hole with "L" for left and "R" for right.

30 Place carrier assembly (27) on a flat surface with left plunger (34) down. Press down on carrier assembly to compress plunger spring and remove left plunger detent (35) and rack (36).

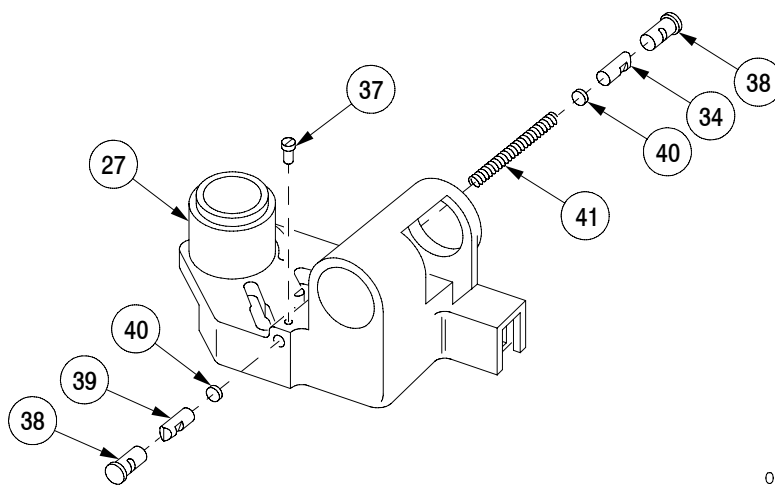


02pc385m

31 Place carrier assembly (27) on front. Remove right plunger detent (37), two bushings (38), right plunger (39), left plunger (34), two disks (40), and spring (41).

#### NOTE

For disassembly of carrier assembly, see para 4-17.

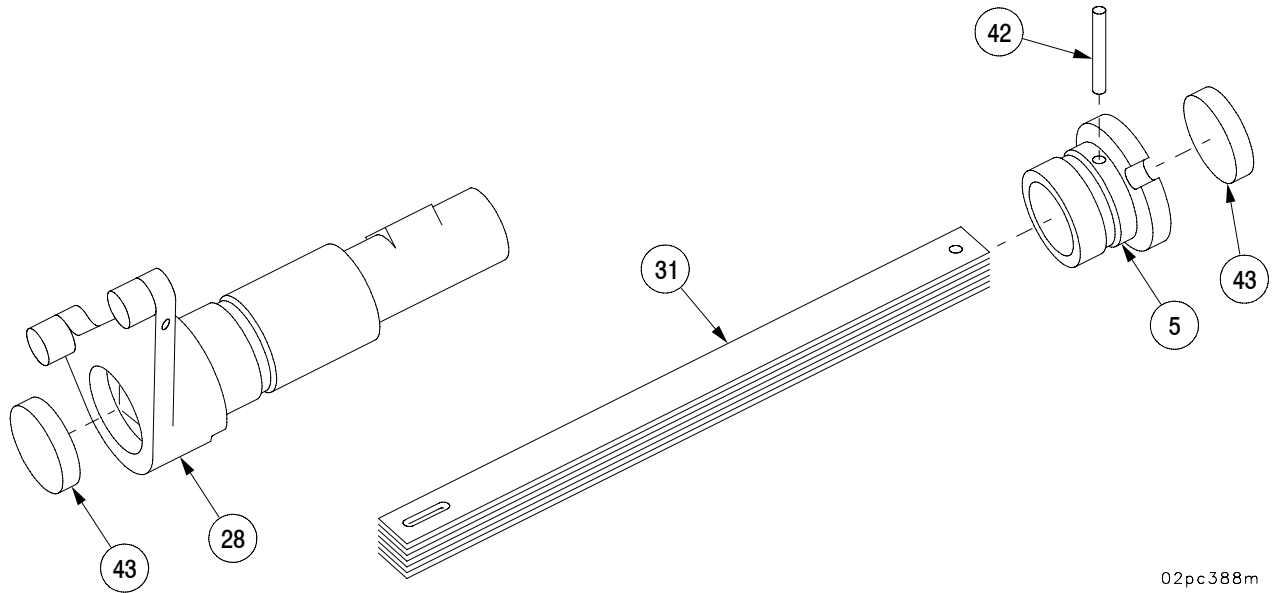


02pc387m

## 4-15 BREECH MECHANISM - CONTINUED

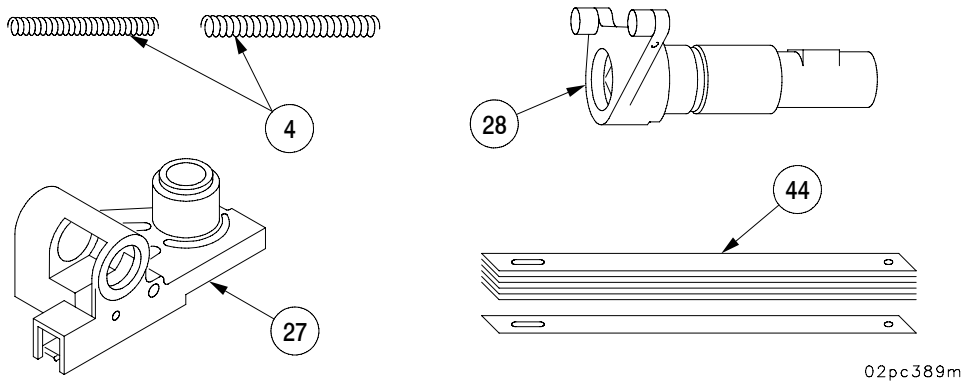
### a. Disassembly - Continued

- 32 Remove straight headless pin (42) and leaf spring pack (31) from adjuster (5).
- 33 Remove expansion plugs (43) from adjuster (5) and operating crank assembly (28) only if damaged.



### b. Inspection.

- 1 Inspect two rack springs (4) for cracks and distortion. Replace if cracked or distorted.
- 2 Inspect operating crank assembly (28) for visible cracks. Replace if cracked.
- 3 Inspect carrier assembly (27) for cracks and distortion. Replace if cracked or distorted.
- 4 Inspect leaf springs (44) for damage and distortion. Replace if damaged or distorted.



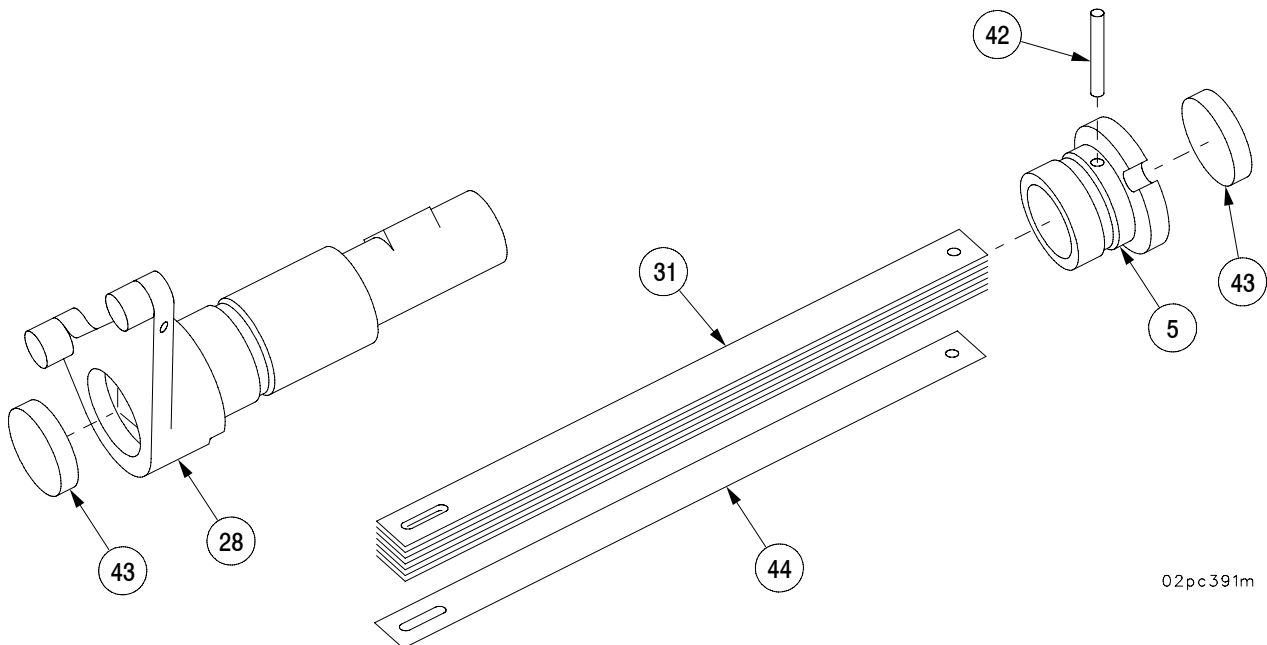
## 4-15 BREECH MECHANISM - CONTINUED

### c. Assembly.

- 1 Install expansion plugs (43), if removed, in operating crank assembly (28) and adjuster (5).
- 2 Apply a light coat of grease to each leaf spring (44).

#### NOTE

- When installing springs, always install as many springs as necessary to fill adjuster completely. Leaf spring packs will vary from 48 to 50 springs.
  - Ends of leaf springs with round hole are installed in adjuster.
- 3 Assemble leaf spring pack (31) and wrap masking tape around spring pack near bottom end to prevent separation.
  - 4 Insert leaf spring pack (31) into adjuster (5) and install straight headless pin (42). Remove masking tape.



02pc391m

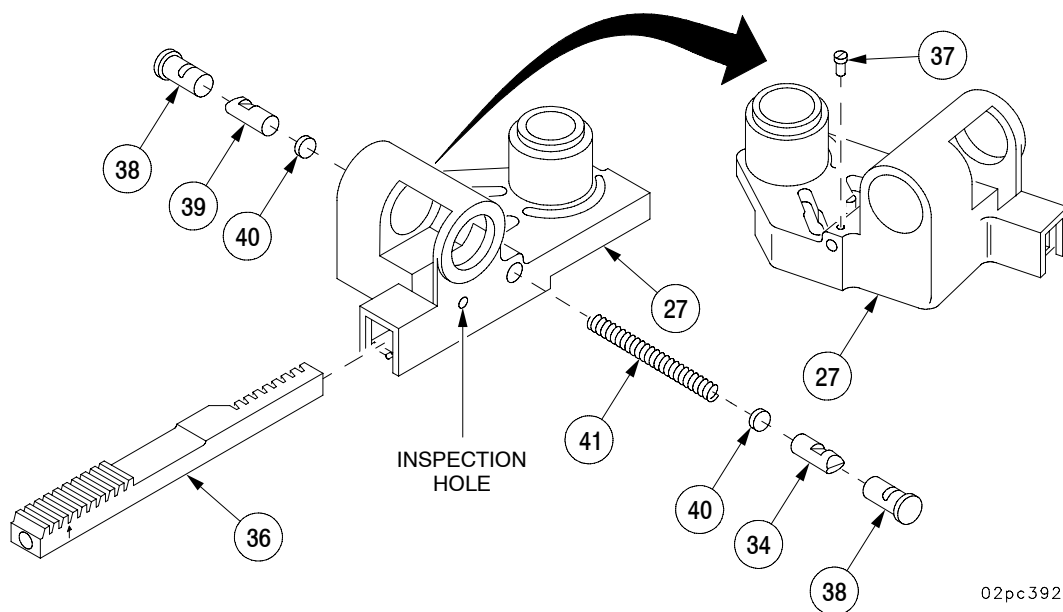
## 4-15 BREECH MECHANISM - CONTINUED

### c. Assembly - Continued

#### NOTE

The left and right plungers are stamped on the flat (inside) ends with "L" for left and "R" for right. These correspond to the same markings on the carrier assembly next to each plunger hole.

- 5 Install spring (41), disk (40), right plunger (39), and bushing (38) into carrier assembly (27).
- 6 Install right plunger detent (37) in carrier assembly (27).
- 7 Install rack (36) in carrier assembly (27) so that arrow on rack is visible through inspection hole in carrier assembly.
- 8 Install disk (40) into left plunger (34) and bushing (38) into carrier assembly (27).



02pc392m

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**4-15 BREECH MECHANISM - CONTINUED**

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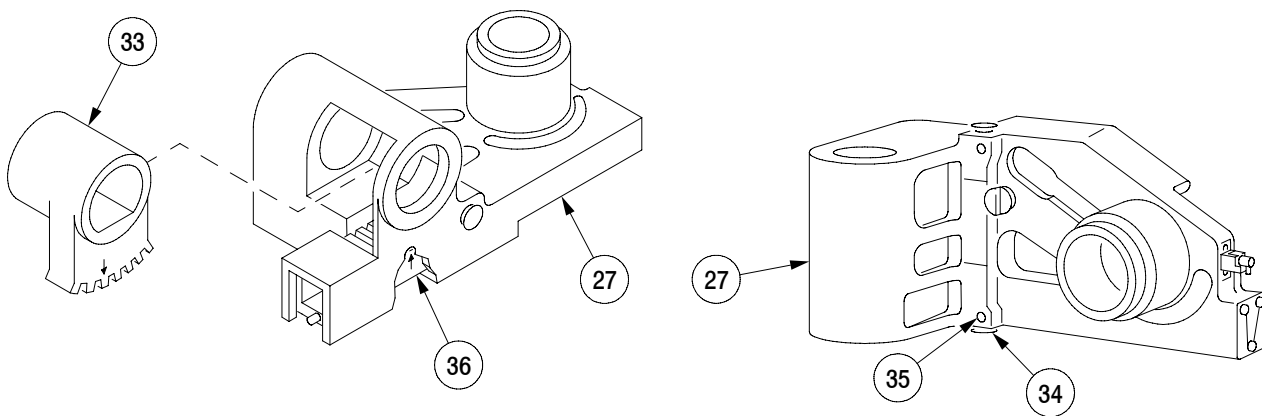
**c. Assembly - Continued**

- 9 Place carrier assembly (27) on a flat surface with left plunger (34) down. Press down on carrier assembly to compress spring and install left plunger detent (35).

**NOTE**

The spur gear and rack are marked with arrows for alignment during assembly. If arrows are not visible, scribe arrow on third tooth from left of spur gear and on third root from end of rack.

- 10 Install spur gear (33) in carrier assembly (27). Make sure arrow on spur gear is aligned with arrow on rack (36).



02pc394m

## 4-15 BREECH MECHANISM - CONTINUED

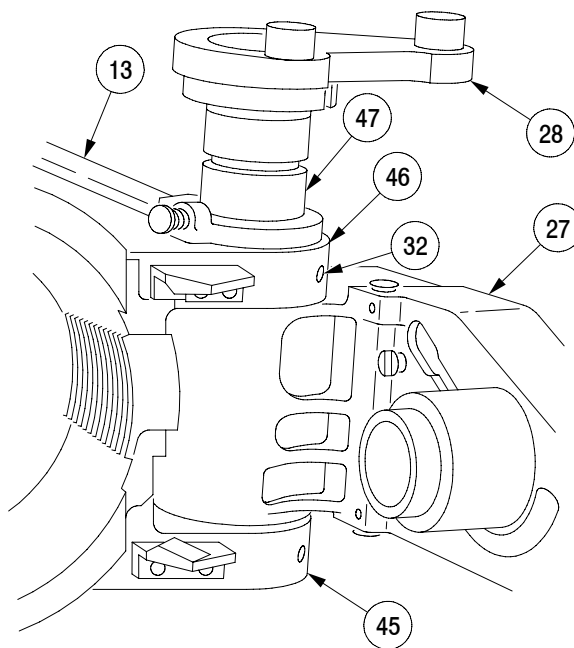
### c. Assembly - Continued

- 11 Place carrier assembly (27) between lower breech ring lug (45) and upper breech ring lug (46) and align operating crank assembly holes.
- 12 Position breech operating handle (13) on top of upper breech ring lug (46). Install operating crank assembly (28) through breech operating handle, upper breech ring lug (46), carrier assembly (27) and lower breech ring lug (45).

### CAUTION

The operating crank detent is stamped with a "U".  
The adjuster detent is stamped with an "L". These parts are not interchangeable.

- 13 Install operating crank detent (32) engaging annular groove (47) of operating crank assembly (28).

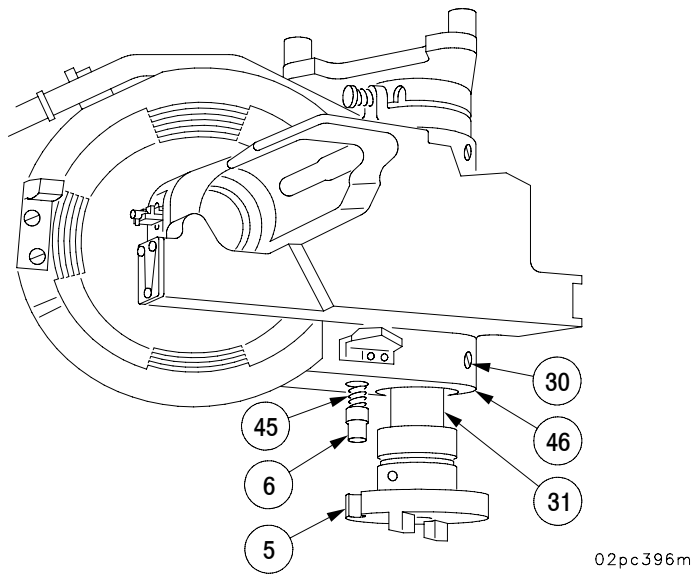


02pc395m

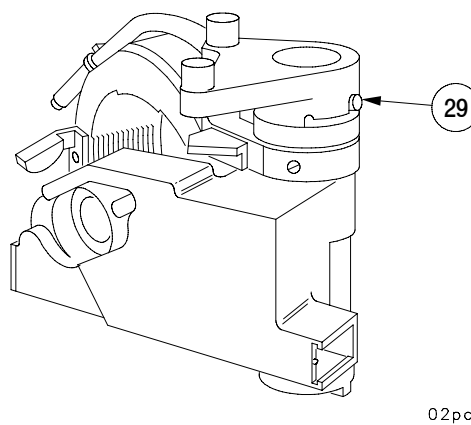
## 4-15 BREECH MECHANISM - CONTINUED

### c. Assembly - Continued

- 14 Insert and hold spring (45) and adjuster plunger (6) in lower breech ring lug (46). Insert and hold leaf spring pack (31) and adjuster (5). Install adjuster detent (30) in lower breech ring lug (46).



- 15 Install leaf spring torsion pin (29).



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## 4-15 BREECH MECHANISM - CONTINUED

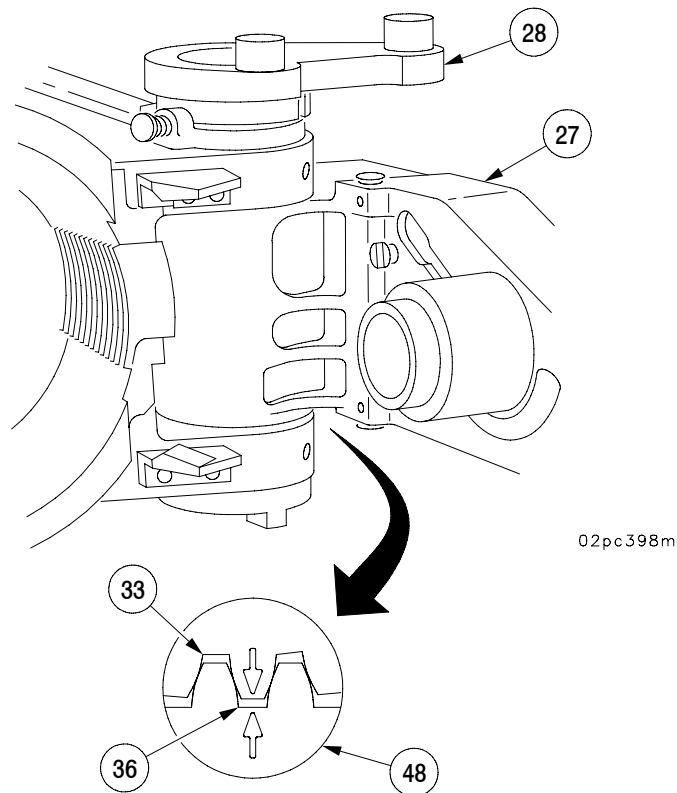
---

### c. Assembly - Continued

#### NOTE

If cannon was not pushed out of battery during disassembly, skip step 16.

- 16 Return cannon to battery (para 4-6).
- 17 Open carrier assembly (27) and rotate operating crank assembly (28) to move spur gear (33) and rack (36) arrows to the center of the inspection hole (48) in carrier assembly.





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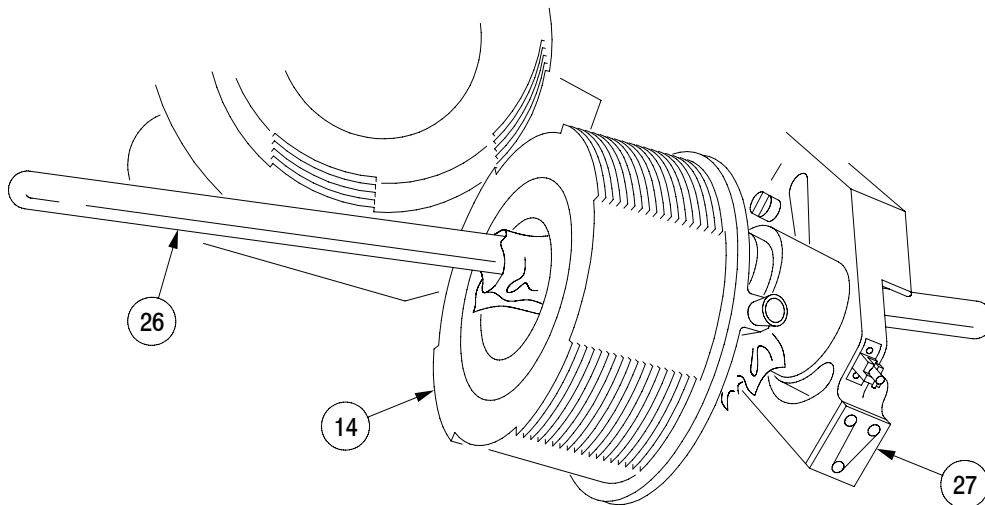
**4-15 BREECH MECHANISM - CONTINUED**

---

**c. Assembly - Continued****WARNING**

Breechblock weighs approximately 125 lbs (57 kg). Two persons are needed to remove the breechblock in order to prevent injury to personnel. Insert cleaning staff wrapped with rags through breechblock and carrier to prevent breechblock from sliding and injury to personnel.

- 18 Insert cleaning staff (26) wrapped with rags through breechblock (14).
- 19 With carrier assembly (27) in fully open position, lift breechblock (14) and insert one end of cleaning staff (26) into carrier assembly.
- 20 Slide breechblock (14) down cleaning staff (26) onto carrier assembly (27). Remove cleaning staff (26) from breechblock and carrier assembly.

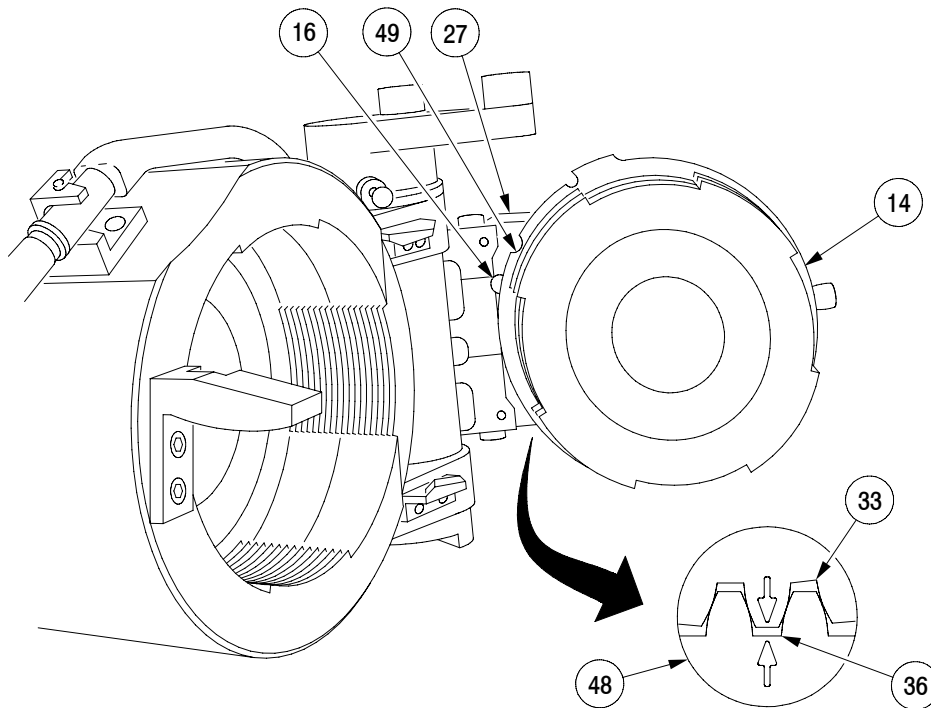


02pc044m

## 4-15 BREECH MECHANISM - CONTINUED

### c. Assembly - Continued

- 21 With carrier assembly (27) in fully open position, align closing lug (49) with detent plunger (16). With arrows on spur gear (33) and rack (36) aligned in center of inspection hole (48), slide breechblock (14) completely onto carrier assembly. Recheck alignment marks.

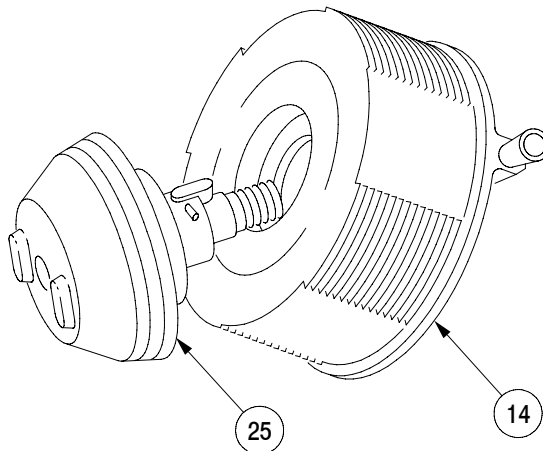


02pc399m

### NOTE

Make sure split rings on the spindle assembly are aligned 180° apart.

- 22 Install spindle assembly (25) into breechblock (14).



02pc048m

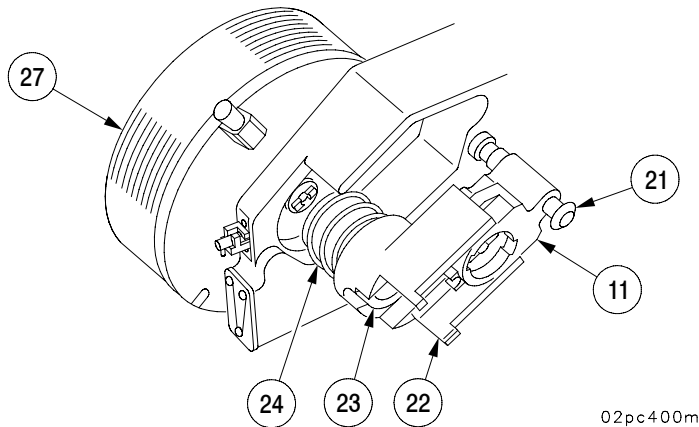
**4-15 BREECH MECHANISM - CONTINUED**

**c. Assembly - Continued**

**WARNING**

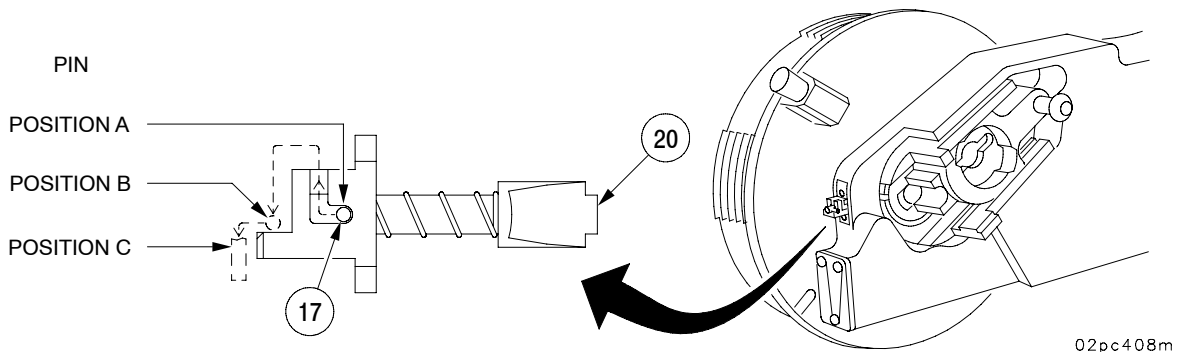
The follower group has a safety interlock which keeps the block from moving to the firing position until breechblock is fully closed. The follower must be in good working condition and properly assembled in firing mechanism to make sure safety works.

- 23 Install obturator spindle spring (24), firing mechanism housing (22), and firing block assembly (11) into carrier assembly (27).
- 24 Move firing block assembly (11) to extreme right position by pulling knob (21) and sliding to right.
- 25 Support firing block assembly (11) and firing mechanism housing (22). Install obturator nut (23) with spanner wrench.
- 26 Rotate plunger pin (17) from position C to position A to seat plunger tip (20) into narrow slot of obturator nut (23).



**NOTE**

Ensure that plunger tip seats in narrow slot of obturator nut (23).



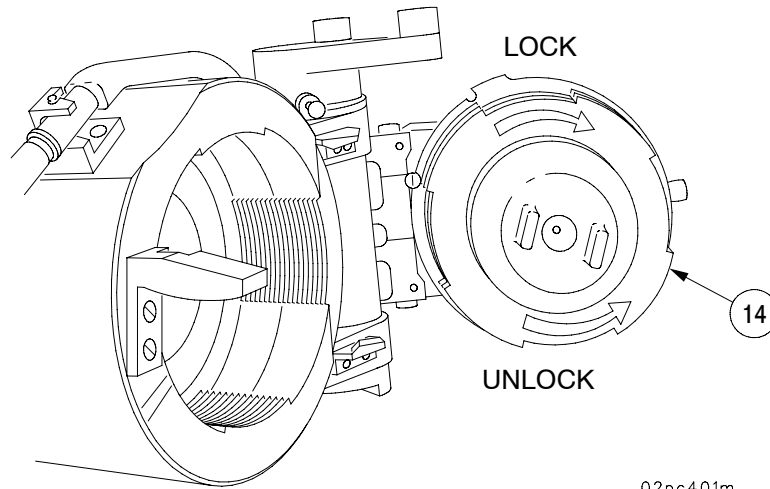
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## 4-15 BREECH MECHANISM - CONTINUED

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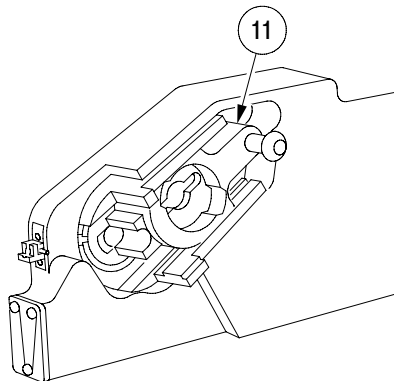
### c. Assembly - Continued

27 Rotate breechblock (14) clockwise to the LOCK position. Make sure carrier detent plunger is extended.



02pc401m

28 Slide firing block assembly (11) to center position.



02pc057m

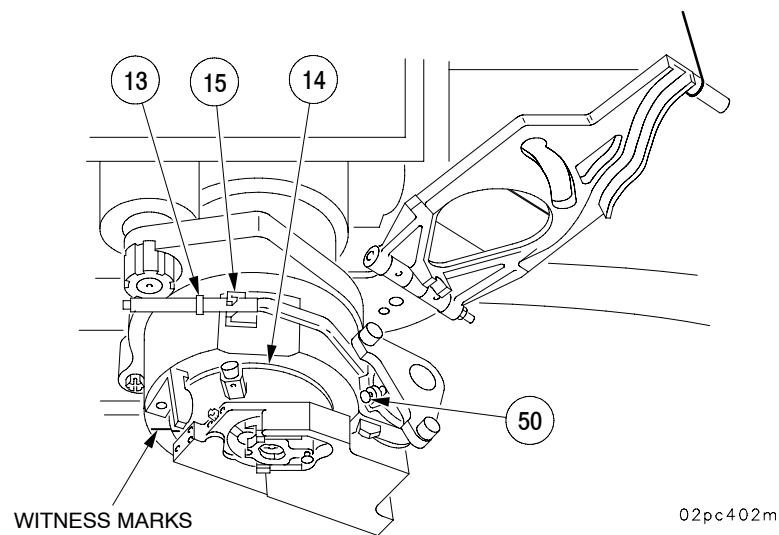
## 4-15 BREECH MECHANISM - CONTINUED

### c. Assembly - Continued

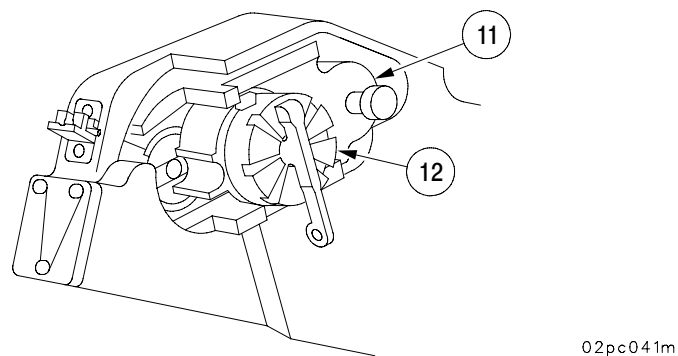
- 29 Disengage breech operating handle (13) from stop (15) and engage clutch pin (50). With one mechanic supporting breechblock (14), close breechblock with breech operating handle.
- 30 Return breech operating handle (13) to stop (15).

#### NOTE

Witness marks must be aligned when breechblock is closed. If witness marks are not aligned, breechblock may be out of time. Remove and reinstall breechblock.



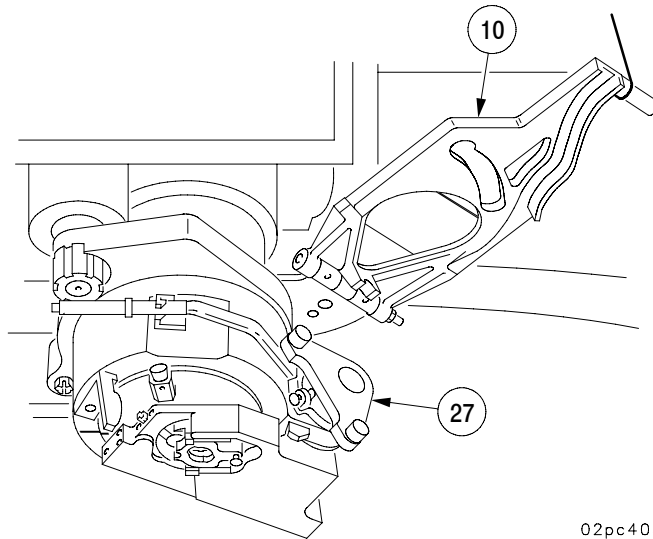
- 31 With firing block assembly (11) in center position, insert firing mechanism (12) and rotate counterclockwise until locked.



## 4-15 BREECH MECHANISM - CONTINUED

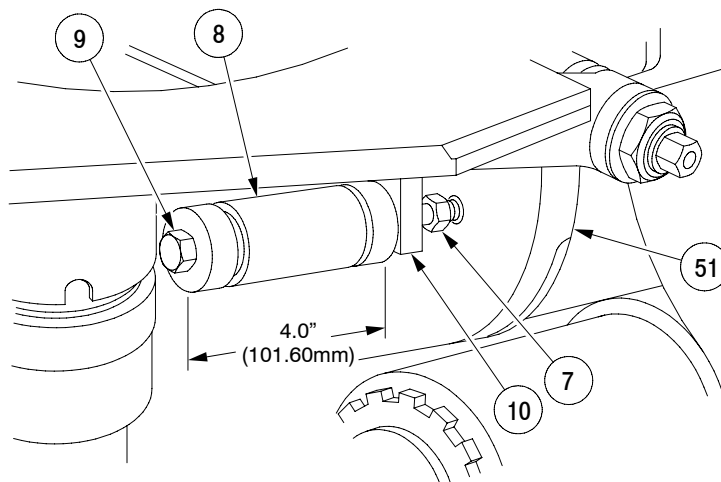
### c. Assembly - Continued

- 32 Remove strap and lower breech mechanism operating cam (10) onto operating crank assembly (27).



02pc403m

- 33 Position cam damper assembly (8) on breech mechanism operating cam (10) and install screw (9) in cradle assembly (51).
- 34 Tighten screw (9) until seat to seat length of cam damper assembly (8) is 4.0 inches (101.60 mm).
- 35 Tighten jamnut (7) to secure cam damper assembly (8) to cradle assembly (51).



02pc404m

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**4-15 BREECH MECHANISM - CONTINUED**

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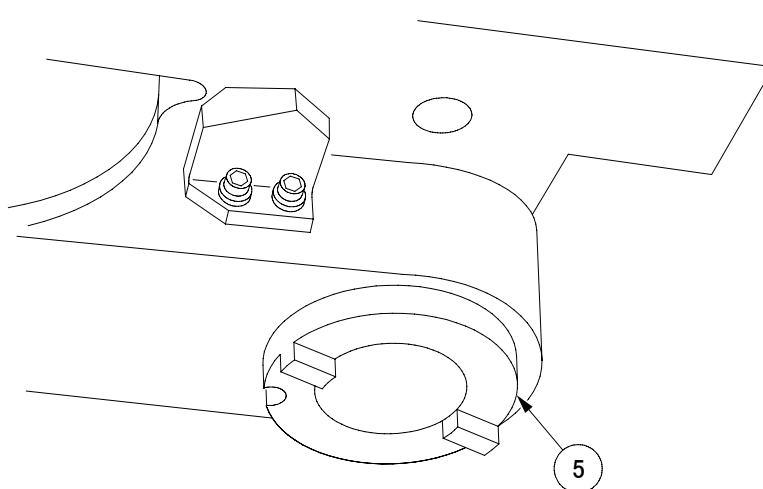
**c. Assembly - Continued****CAUTION**

The notches in the adjuster provide graduations of adjustment. Do NOT apply more pre-load than is necessary to close the breechblock securely at the loading elevation (less than 300 mils). Use of final notch setting reduces the life of the leaf springs and should be used only if necessary (if breech does not close at loading elevation). Unnecessary use of a higher setting can cause damage to the breechblock detent plunger and breechblock stop surface.

**NOTE**

- There are two types of adjusters. Some have holes for a spanner wrench. Others have lugs for an adjustable wrench.
- Adjuster may have only two graduations.

36 Apply pre-load tension on breech mechanism closing springs by turning adjuster (5) clockwise.



02pc405m

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## 4-15 BREECH MECHANISM - CONTINUED

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### c. Assembly - Continued

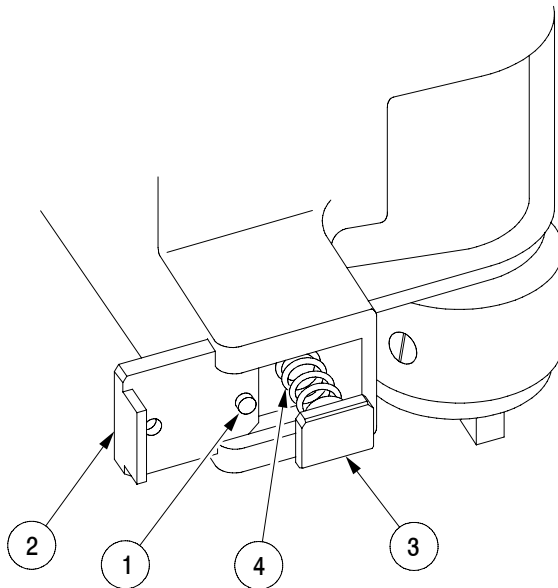
**WARNING**

Failure to insure proper installation of rack springs and plates could cause injury to personnel during operation of breechblock.

#### NOTE

- The following steps require two people.
- If stop plate has an arrow on it, be sure it points to muzzle end.

- 37 Install two rack springs (4) and stop plate (3). Apply pressure to stop plate and rack springs with wood hammer handle or suitable wooden dowel.
- 38 Depress plunger (1) with punch and slide rack plate (2) over stop plate (3). Ensure that plunger engages in rearward hole of rack plate.



02pc029ma



## 4-16 FIRING MECHANISM HOUSING, FIRING BLOCK ASSEMBLY, AND SPINDLE ASSEMBLY.

This task covers:      a. Disassembly                      b. Assembly

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Spring pin (item 17, Appx F)  
Spring pin (item 18, Appx F)  
Spring pin (item 20, Appx F)  
Spring pin (item 51, Appx F)  
General purpose detergent (item 48, Appx C)

#### Equipment Conditions

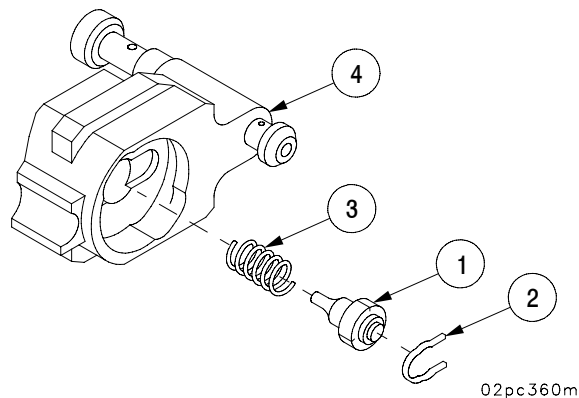
Firing block assembly removed  
(para 4-15)  
Firing mechanism housing removed  
(para 4-15)  
Spindle assembly removed  
(para 4-15)

### a. Disassembly

#### CAUTION

The firing pin is under pressure and can spring out when retainer is moved back. Hold firing pin during disassembly to prevent loss or damage.

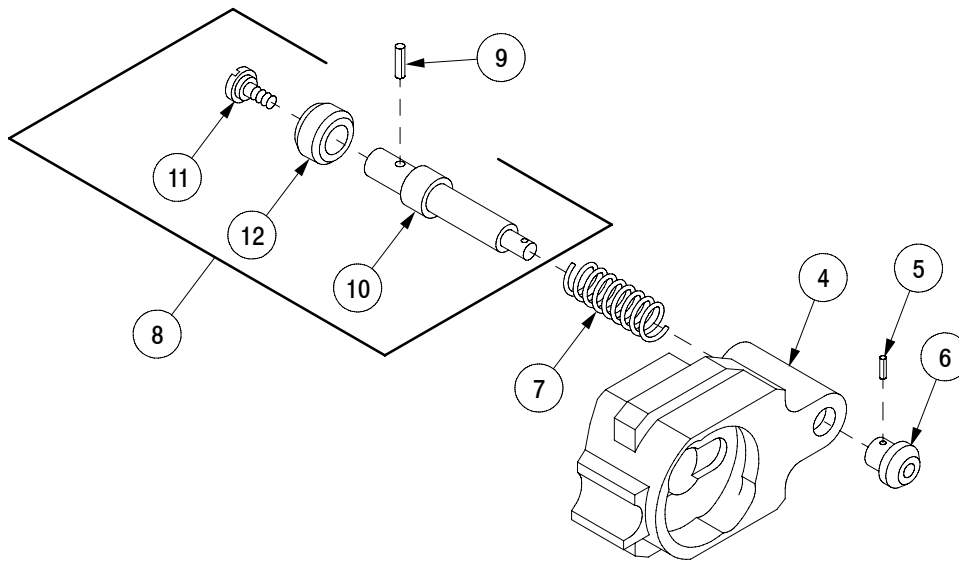
- 1 Depress firing pin (1) and move retainer (2) away from firing pin.
- 2 Remove firing pin (1), spring (3) and retainer (2), from firing block (4).



## 4-16 FIRING MECHANISM HOUSING, FIRING BLOCK ASSEMBLY, AND SPINDLE ASSEMBLY - CONTINUED

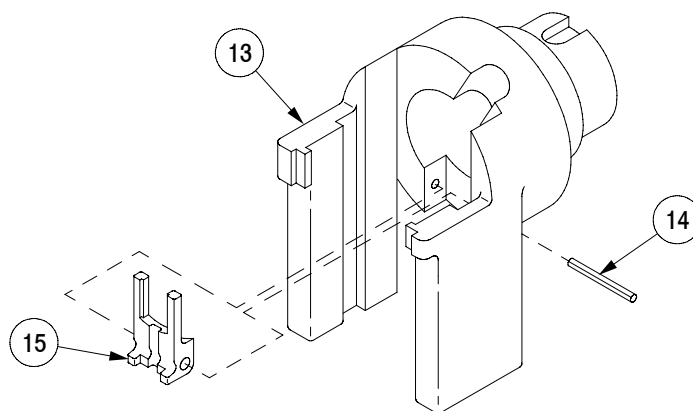
### a. Disassembly - Continued

- 3 Remove spring pin (5) from knob (6). Discard spring pin.
- 4 Remove knob (6), spring (7), and follower assembly (8) from firing block (4).
- 5 Remove spring pin (9) from shaft (10). Discard spring pin.
- 6 Remove screw (11) and roller (12) from shaft (10).



02pc361m

- 7 Place housing (13) on solid surface.
- 8 Remove spring pin (14). Discard spring pin.
- 9 Remove extractor (15).



02pc362m

## 4-16 FIRING MECHANISM HOUSING, FIRING BLOCK ASSEMBLY, AND SPINDLE ASSEMBLY - CONTINUED

### a. Disassembly - Continued

- 10 Remove disk (16), rear split ring (17), inner ring (18), obturator pad (19) and front split ring (20) from spindle assembly (21).

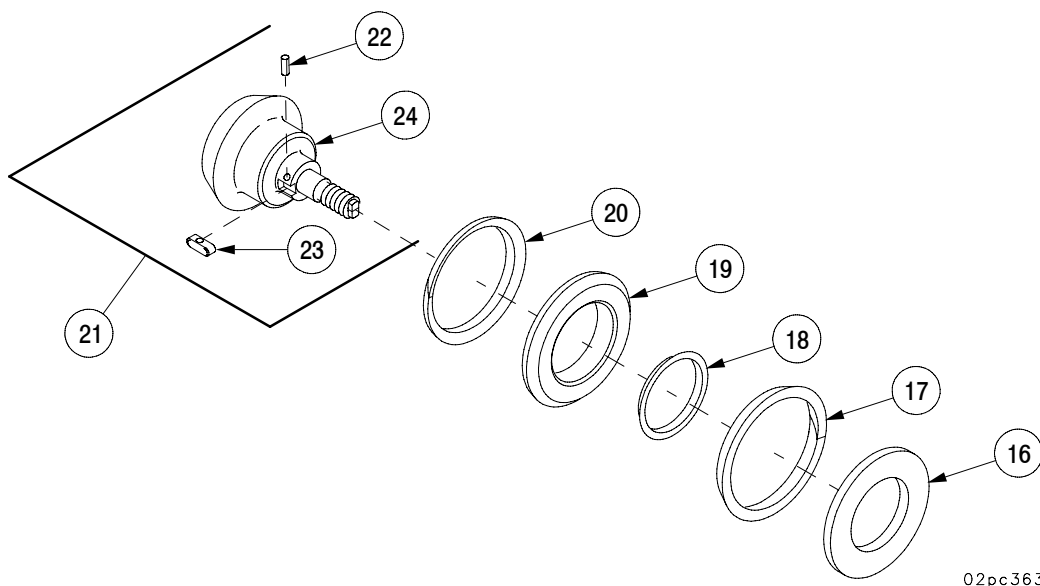
### CAUTION

Do not apply oil or cleaning solvent to pad. Clean with soap and water.

- 11 Clean pad (19) with soap and water. Dry with clean rags.
- 12 Remove spring pin (22) from key (23) and spindle shaft (24). Discard spring pin.
- 13 Remove key (23) from spindle shaft (24).

### b. Assembly.

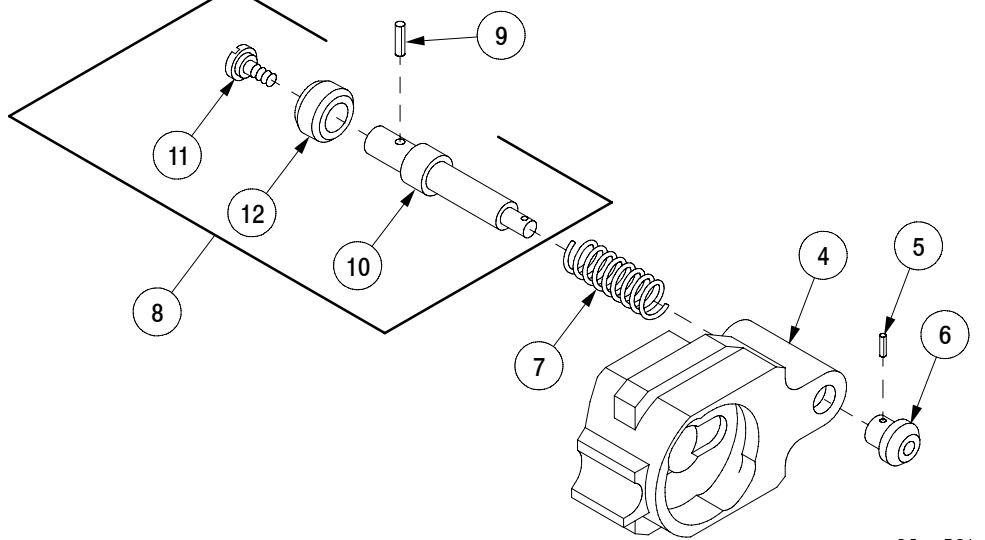
- 1 Install key (23) and new spring pin (22) in spindle shaft (24).
- 2 Install the front split ring (20), obturator pad (19), inner ring (18), rear split ring (17) and disk (16) on spindle assembly (21). Make sure that split rings (20 and 17) are aligned 180° apart as shown.



## 4-16 FIRING MECHANISM HOUSING, FIRING BLOCK ASSEMBLY, AND SPINDLE ASSEMBLY - CONTINUED

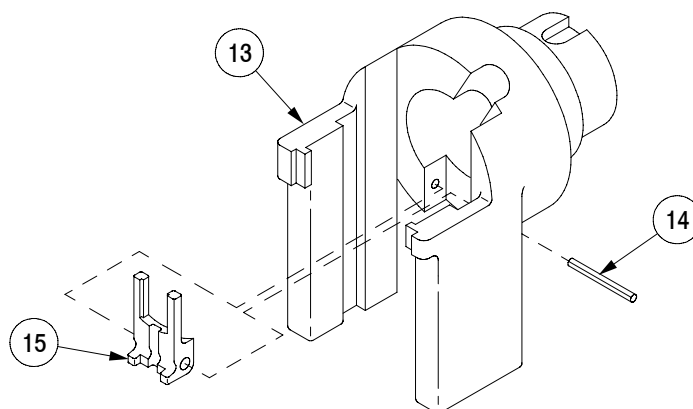
### b. Assembly - Continued

- 3 Install extractor (15) in housing (13).
- 4 Install new spring pin (14).



02pc361m

- 5 Install roller (12) and screw (11) onto shaft (10).
- 6 Install new spring pin (9) into shaft (10).
- 7 Install follower assembly (8), spring (7), and knob (6) onto firing block (4).
- 8 Install new spring pin (5) into knob (6).



02pc362m

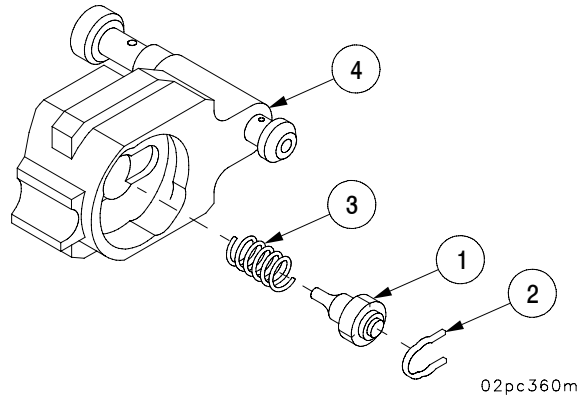
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## 4-16 FIRING MECHANISM HOUSING, FIRING BLOCK ASSEMBLY, AND SPINDLE ASSEMBLY - CONTINUED

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### b. Assembly - Continued

- 9 Install spring (3) and firing pin (1) in firing block (4).
- 10 Depress firing pin (1) and install retainer (2).
- 11 Install spindle assembly, firing mechanism housing, and firing block assembly in breech mechanism (para 4-15).



## 4-17 CARRIER AND PLUNGER ASSEMBLIES.

---

This task covers:    a. Removal                    b. Disassembly                    c. Assembly                    d. Installation

---

### **INITIAL SETUP**

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Equipment Conditions

Carrier assembly removed  
- detent plunger only (para 4-15)

#### Materials/Parts

Spring pin (item 142, Appx F)  
Retaining ring (item 22, Appx F)  
Non-electrical wire (item 97, Appx C)

---

#### **a. Removal.**

- 1 Remove locking wire (1), two screws (2), and plunger assembly (3) from carrier housing (4). Discard locking wire.
- 2 Remove spring pin (5), detent plunger (6), and spring (7) from carrier housing (4). Discard spring pin.

#### **b. Disassembly.**

- 1 Remove retaining ring (8) and lever (9) from plunger (10). Discard retaining ring.
- 2 Remove plunger (10) and spring (11) from plunger stop (12).
- 3 Remove spring (11) from plunger (10).
- 4 Check plunger (6) for wear by placing a machinist's rule on cut-away end of plunger (6) and measure for excess wear. Replace if plunger measures less than 31/32 inch (24.6 mm) at any point.

#### **c. Assembly.**

- 1 Install spring (11) on plunger (10).
- 2 Install spring (11) and plunger (10) on plunger stop (12) and secure with lever (9) and new retaining ring (8).

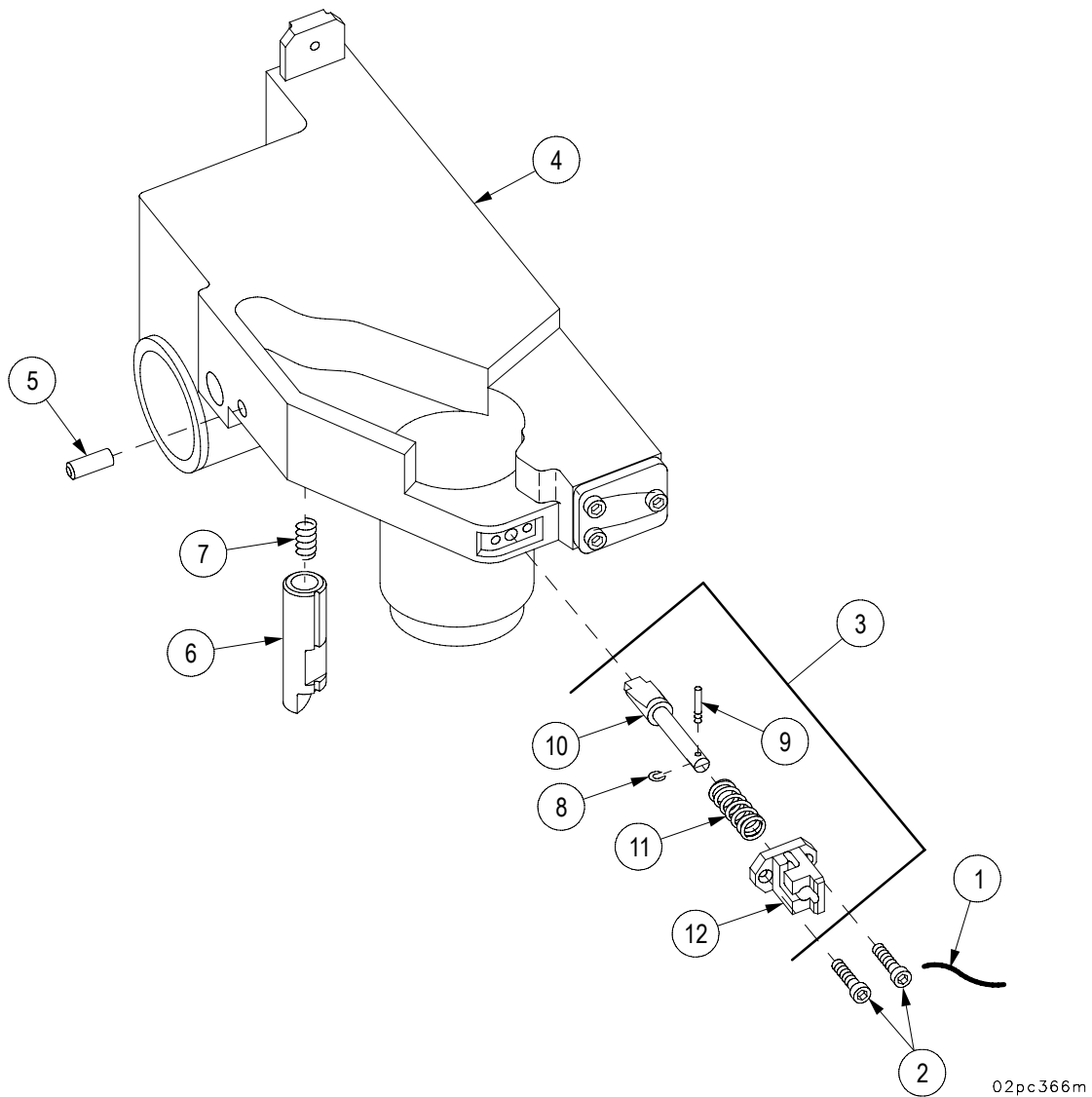
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**4-17 CARRIER AND PLUNGER ASSEMBLIES - CONTINUED**

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**d. Installation.**

- 1 Install spring (7), detent plunger (6), and new spring pin (5) in carrier housing (5). Be sure that detent plunger is free to move after spring pin is installed.
- 2 Install plunger assembly (3) in carrier housing (4) with two screws (2).
- 3 Secure screws with new locking wire (1).
- 4 Install carrier assembly (para 4-15).



## 4-18 CURTAIN ROLLER ASSEMBLY.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

#### Materials/Parts

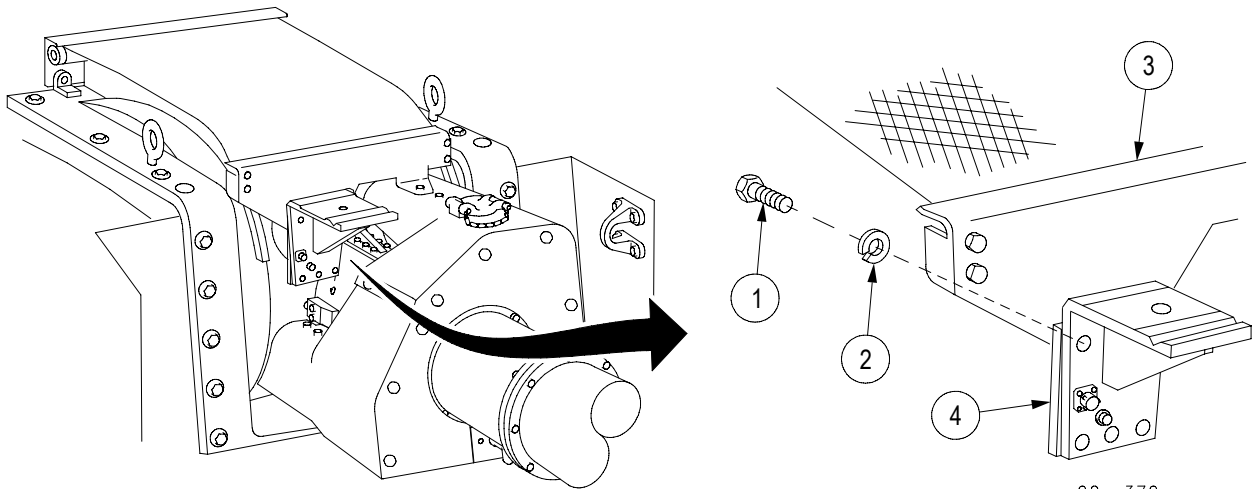
Lockwashers (4) (item 129, Appx F)  
Lockwashers (2) (item 132, Appx F)

#### a. Removal.

### CAUTION

Do not allow roller assembly curtain to retract automatically when the attaching hardware is removed from the mount as the curtain may tear or the roller assembly could be damaged.

- 1 Remove two screws (1) and two lockwashers (2) securing curtain support (3) to mount (4). Discard lockwashers.

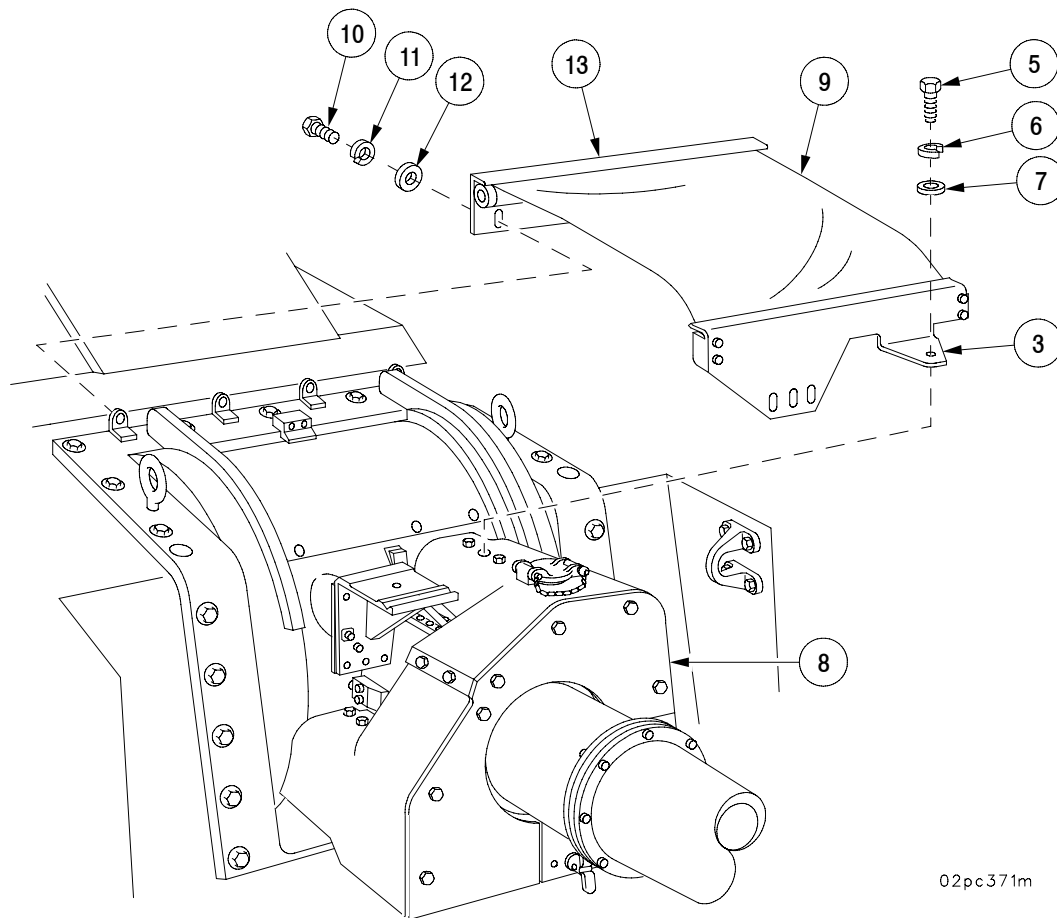




## 4-18 CURTAIN ROLLER ASSEMBLY - CONTINUED

### a. Removal - Continued

- 2 Remove screw (5), lockwasher (6), and flat washer (7) securing curtain support (3) to gun shield (8) and manually retract curtain (9). Discard lockwasher.
- 3 Remove four screws (10), four lockwashers (11), four flat washers (12), and curtain roller assembly (13). Discard lockwashers.



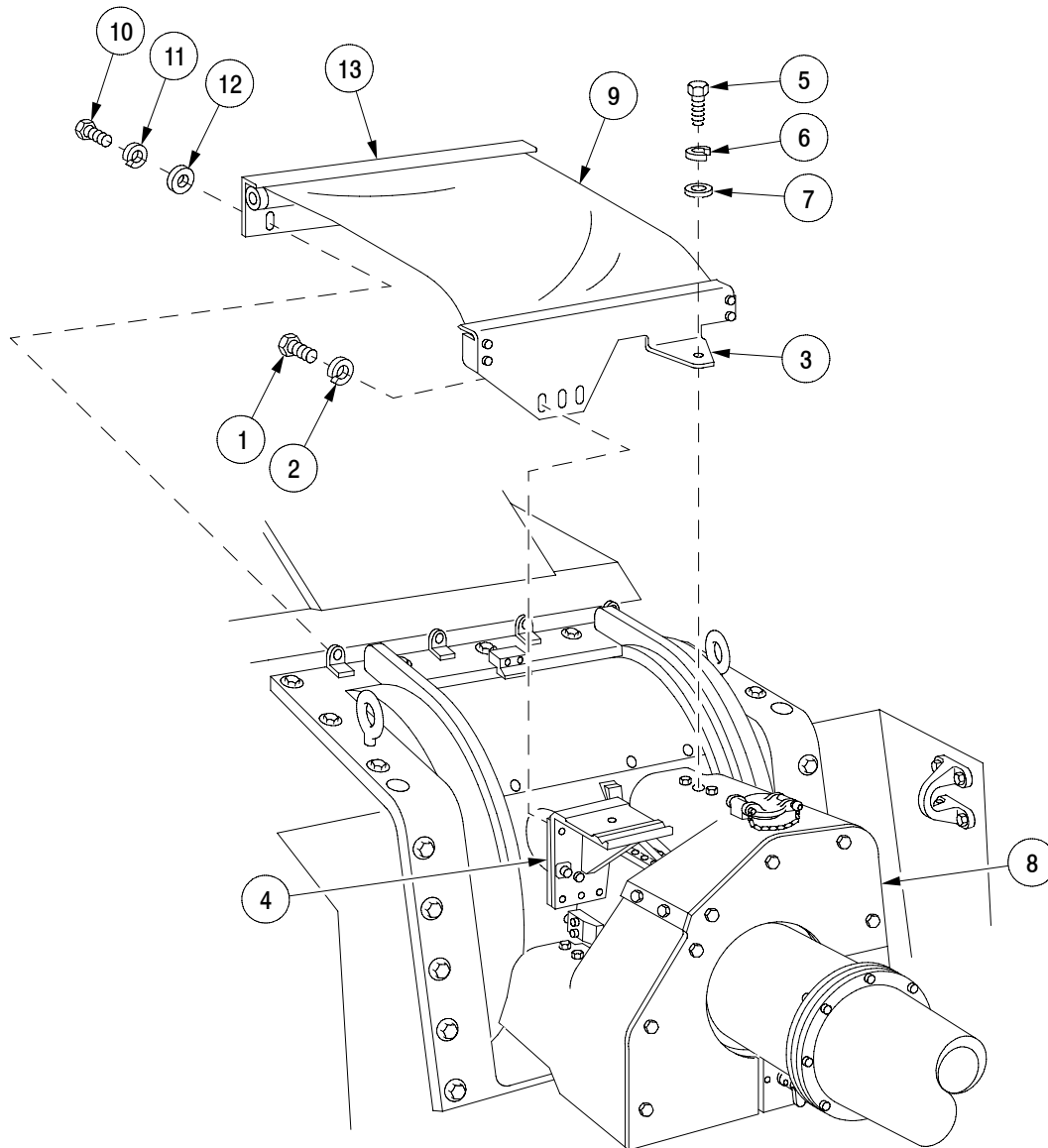
02pc371m

Note: Pages 4-80 through 4-83 deleted.

## 4-18 CURTAIN ROLLER ASSEMBLY - CONTINUED

### ■ b. Installation.

- 1 Install curtain roller assembly (13) with four flat washers (12), four new lockwashers (11), and four screws (10).
- 2 Extend curtain (9) to gun shield (8) and secure curtain support (3) with flat washer (7), new lockwasher (6), and screw (5).
- 3 Install two new lockwashers (2) and two screws (1) to secure curtain support (3) to mount (4).



02pc375m



## 4-20 RECUPERATOR COVER ASSEMBLY.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Equipment Condition

Gun mount ballistic shield open  
(TM 9-2350-314-10)

#### Materials/Parts

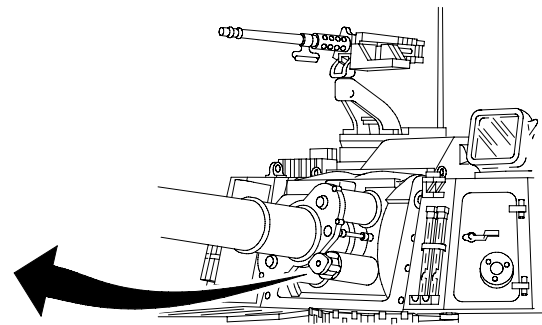
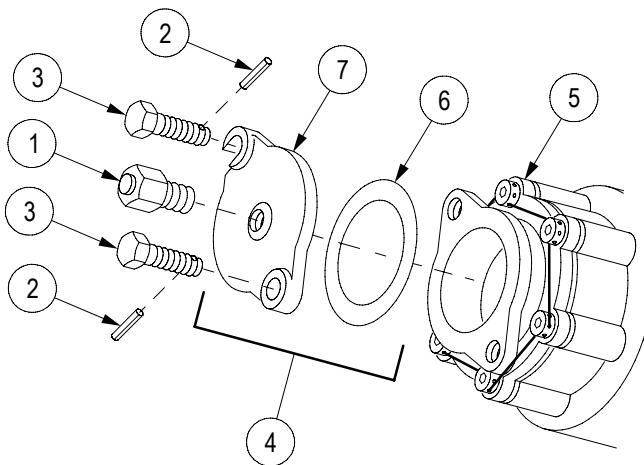
Spring pins (2) (item 218, Appx F)  
Gasket (item 219, Appx F)  
Adhesive (item 4, Appx C)

#### a. Removal.

- 1 Remove safety relief valve (1).
- 2 Remove two spring pins (2) from two screws (3). Discard spring pins.
- 3 Remove two screws (3) and cover assembly (4) from cover adapter (5).
- 4 Remove gasket (6) from cover (7). Discard gasket.

#### b. Installation.

- 1 Apply adhesive to new gasket (6) and cover (7) mating surfaces.
- 2 Install gasket (6) to cover (7).
- 3 Install cover assembly (4) on cover adapter (5) with two screws (3) and two new spring pins (2).
- 4 Install safety relief valve (1).



02pc376m

## CHAPTER 5 CAB ELECTRICAL SYSTEM

### GENERAL

This chapter describes unit level maintenance procedures for the cab electrical system. Step-by-step procedures are provided for maintaining electrical leads and harnesses, electrical components, and the intercommunications system.

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## 5-1 HYDRAULIC COMPARTMENT COOLING FAN.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

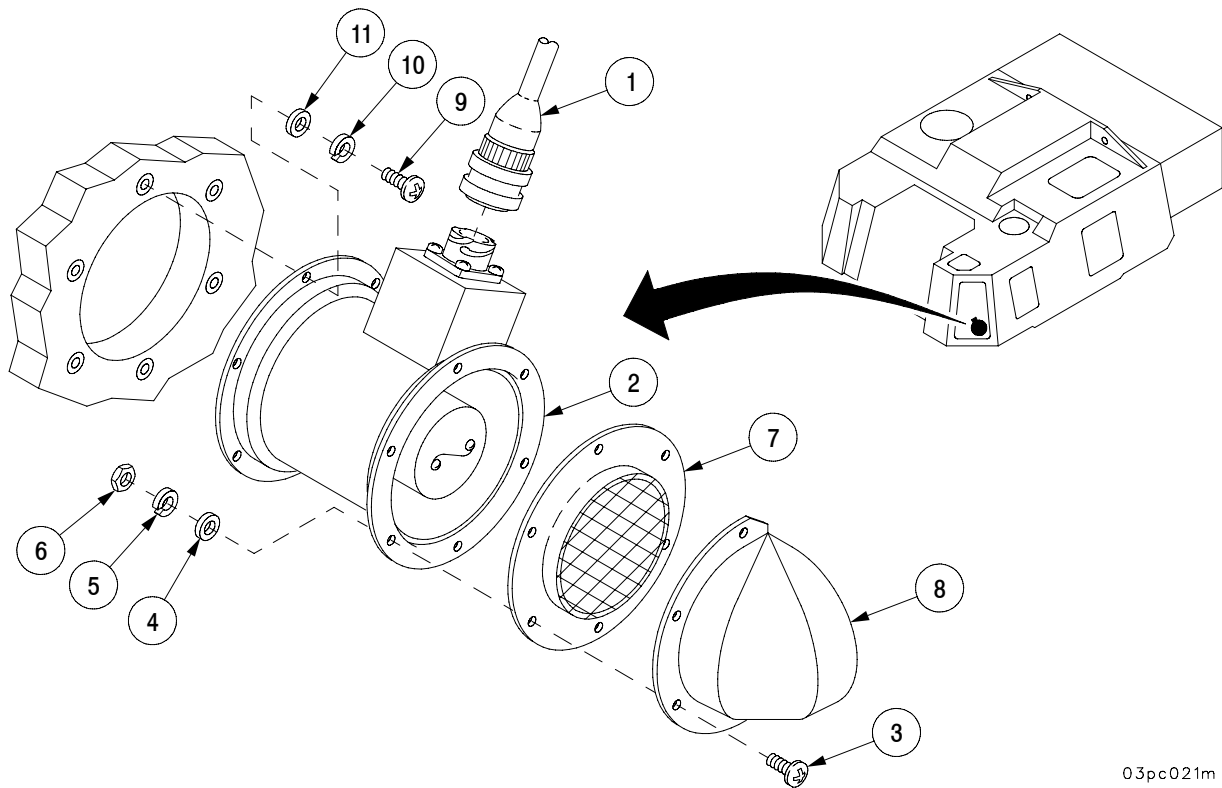
Lockwashers (12) (item 127, Appx F)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic access door opened  
(TM 9-2350-314-10)

### a. Removal.

- 1 On inside of door, disconnect wiring harness W52 P3 (1) from blower (2).
- 2 Remove six screws (3), six flat washers (4), six lockwashers (5), six nuts (6), screen (7), and duct (8) from blower (2). Discard lockwashers.
- 3 Remove six screws (9), six lockwashers (10), six flat washers (11), and blower (2) from door. Discard lockwashers.

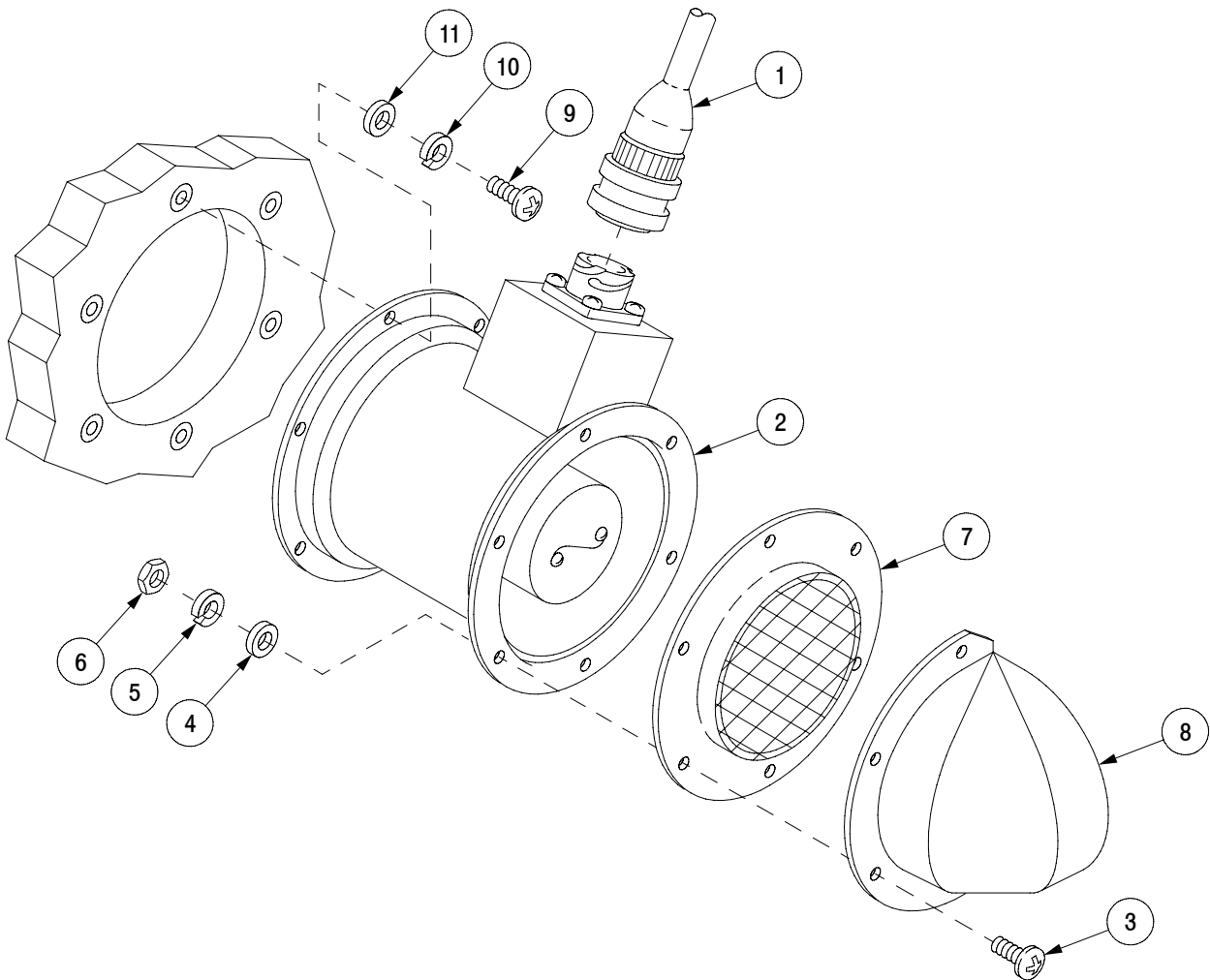


03pc021m

## 5-1 HYDRAULIC COMPARTMENT COOLING FAN - CONTINUED

### b. Installation.

- 1 Install blower (2) on door with six screws (9), six new lockwashers (10), and six flat washers (11).
- 2 Install screen (7) and duct (8) on blower (2) with six screws (3), six flat washers (4), six new lockwashers (5), and six nuts (6).
- 3 Connect wiring harness W52 P3 (1) to blower (2).



03pc022m



## 5-2 HYDRAULIC COMPARTMENT COOLING FAN TIME METER.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Lockwashers (4) (item 129, Appx F)

#### Equipment Conditions

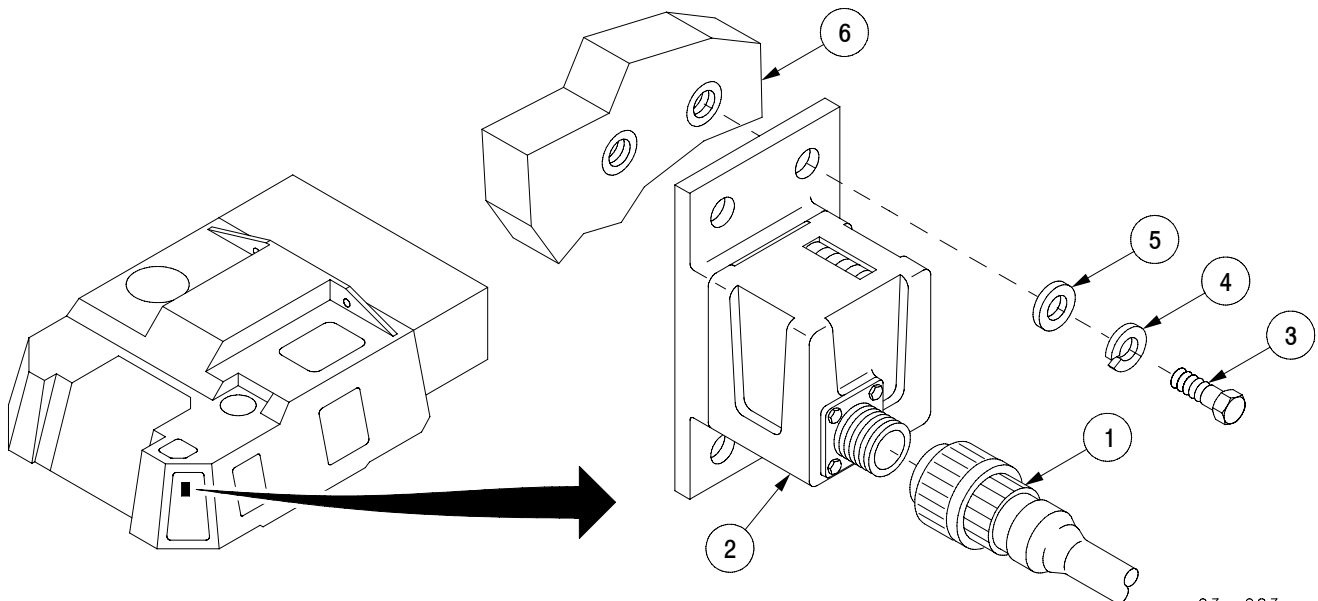
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment door open  
(TM 9-2350-314-10)

#### a. Removal.

- 1 Disconnect wiring harness W60 P1 (1) from time meter (2).
- 2 Remove four screws (3), four lockwashers (4), and four flat washers (5) securing time meter (2) to door (6). Discard lockwashers.
- 3 Remove time meter (2).

#### b. Installation.

- 1 Position time meter (2) on door (6).
- 2 Secure time meter (2) to door (6) with four screws (3), four new lockwashers (4), and four flat washers (5).
- 3 Connect wiring harness W60 P1 (1) to time meter (2).



**5-3 M3 HEATER CIRCUIT BREAKERS AND INTERLOCK CONTROL.**

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This task covers:      a. Removal                                      b. Installation

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**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit (SC 5180-95-A12)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

Materials/Parts

Lockwashers (4) (item 126, Appx F)  
Lockwashers (2) (item 128, Appx F)  
Marking tag (AR) (item 87, Appx C)

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**NOTE**

- Tag leads before disconnecting to aid in installation.
- There are two versions of the interlock control box. The old version is to be replaced by attrition or by installation of the MCS Winterization Kit. The new version has an extra lead, WNT001, and has a shell and a plug installed if the Winterization Kit is not installed in the vehicle.

**a. Removal.**

- 1 Disconnect two interlock control leads (1) and two wiring harness W67 leads (2) from two circuit breakers (3).
- 2 Disconnect two interlock control leads A1 and B1 (4) from wiring harness W67 and interlock control lead 70 (5) from wiring harness W58.
- 3 Remove four nuts (6), four lockwashers (7), four flat washers (8), four screws (9), and two circuit breakers (3) from interlock control (10). Discard lockwashers.
- 4 Remove two screws (11), two lockwashers (12), two flat washers (13), and interlock control (10) from cab. Discard lockwashers.

**NOTE**

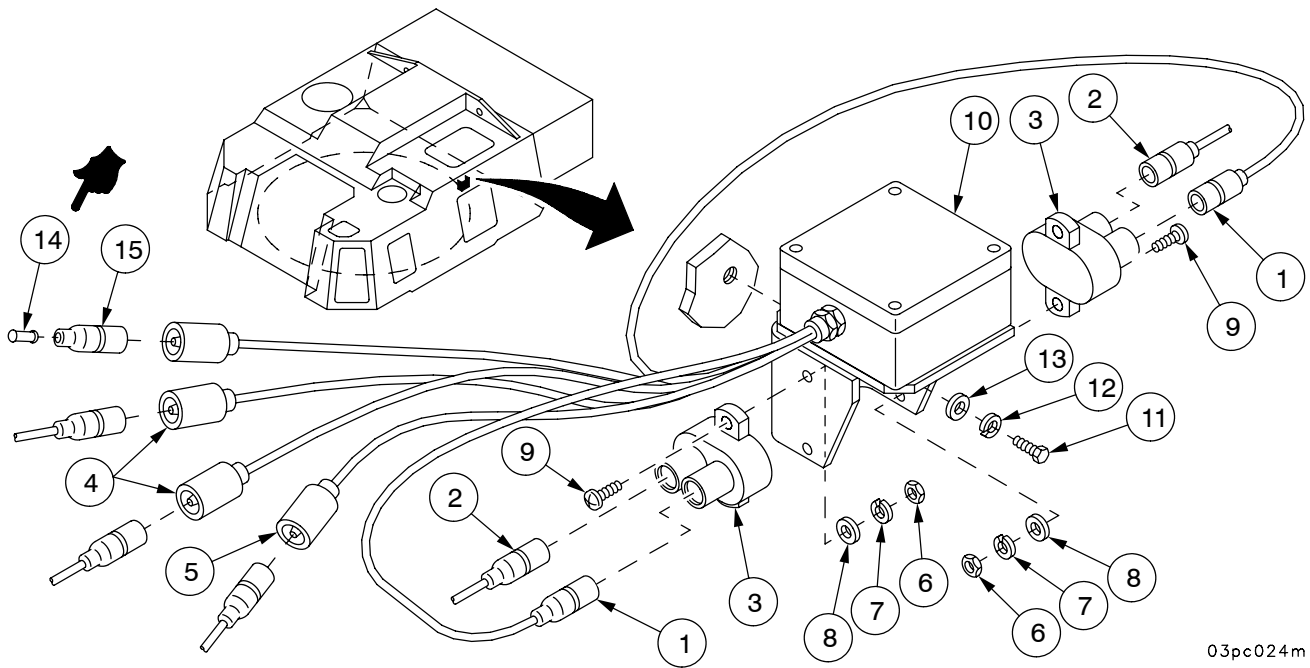
Perform Removal step 5 and Installation step 1.1 only if MCS Winterization Kit is not installed and plug and shell are damaged.

- 5 Remove plug (14) and shell (15) from WNT001.
- 6 Disconnect WNT001 from wiring harness W58A, if installed (para 30-1).

**5-3 M3 HEATER CIRCUIT BREAKERS AND INTERLOCK CONTROL - CONTINUED**

**b. Installation.**

- 1 Connect WNT001 to wiring harness W58A, if installed (para 30-1).
- 1.1 Install shell (15) and plug (14) to WNT001.
- 1.2 Install interlock control (10) in cab with two screws (11), two new lockwashers (12), and two flat washers (13).
- 2 Install two circuit breakers (3) on interlock control (10) with four screws (9), four flat washers (8), four new lockwashers (7), and four nuts (6).
- 3 Connect two interlock control leads A1 and B1 (4) to wiring harness W67 and interlock control lead 70 (5) to wiring harness W58.
- 4 Connect two interlock control leads (1) and two wiring harness W67 leads (2) to two circuit breakers (3).



03pc024m

## 5-4 INSTRUMENT GROUND SHUNT.

This task covers:      a. Removal                      b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Marking tag (AR) (item 87, Appx C)  
Lockwashers (4) (item 115, Appx F)  
Lockwashers (2) (item 113, Appx F)  
Lockwashers (4) (item 128, Appx F)

#### Equipment Conditions

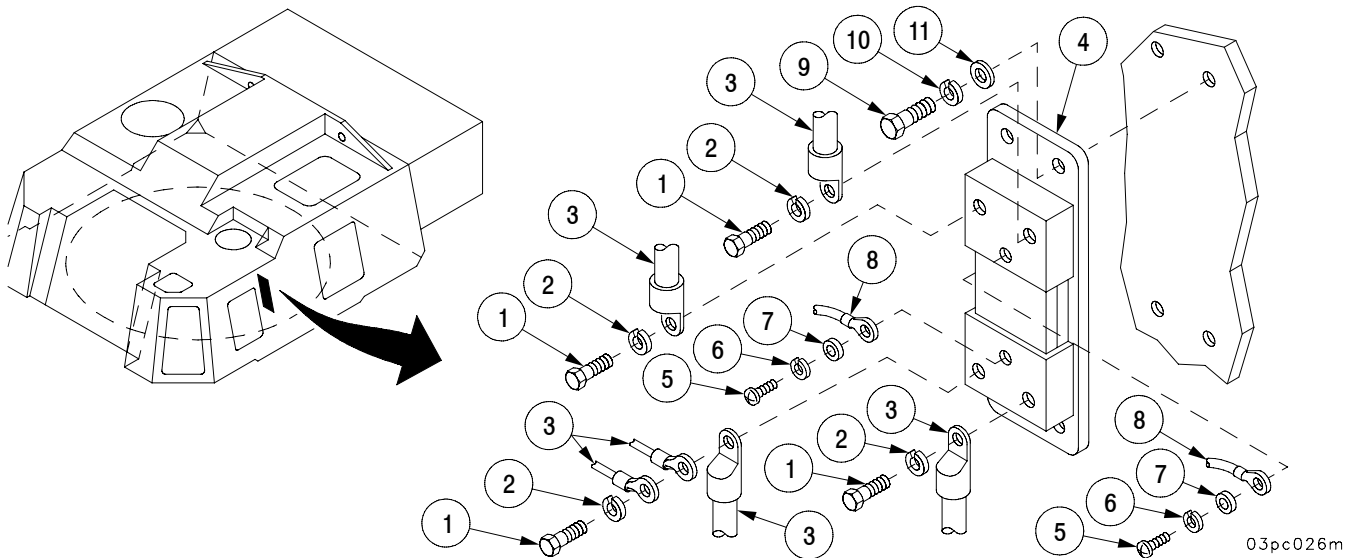
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment access cover removed  
(para 19-2)

#### a. Removal.

#### NOTE

Tag leads before disconnecting to aid in installation.

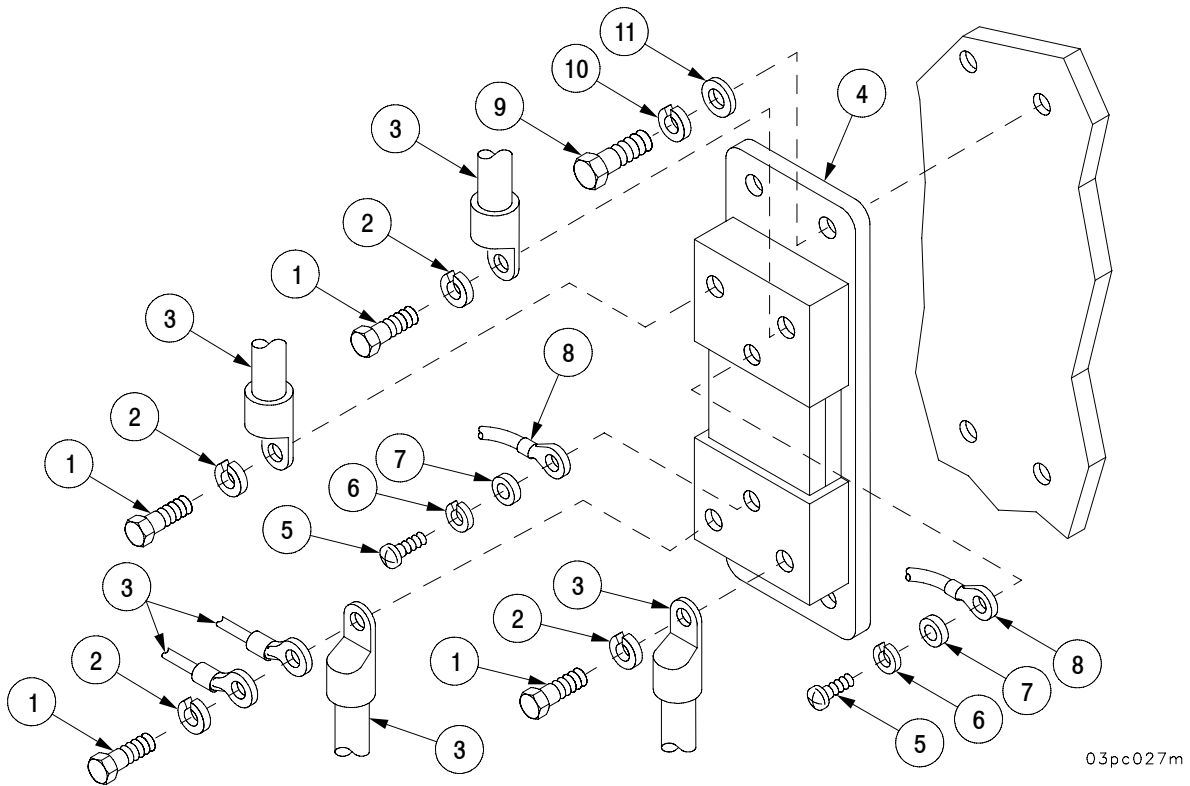
- 1 Remove four screws (1) and four lockwashers (2) securing six leads (3) to shunt (4). Discard lockwashers.
- 2 Remove two screws (5), two lockwashers (6), and two flat washers (7) securing two leads 781 and 782 (8) to shunt (4). Discard lockwashers.
- 3 Remove four screws (9), four lockwashers (10), and four flat washers (11) securing shunt (4) to cab.
- 4 Remove shunt (4) from cab.



## 5-4 INSTRUMENT GROUND SHUNT - CONTINUED

### b. Installation.

- 1 Position shunt (4) in cab.
- 2 Secure shunt (4) to cab with four screws (9), four new lockwashers (10), and four flat washers (11).
- 3 Connect leads 781 and 782 (8) to shunt (4) with two screws (5), two new lockwashers (6), and two flat washers (7).
- 4 Connect six leads (3) to shunt (4) with four screws (1) and four new lockwashers (2).



## 5-5 HYDRAULIC PUMP MOTOR RELAY.

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This task covers:      a. Removal                              b. Installation

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### INITIAL SETUP

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Self-locking nuts (2) (item 68, Appx F)  
Lockwashers (2) (item 127, Appx F)  
Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment access door open  
(TM 9-2350-314-10)

---

#### a. Removal.

#### NOTE

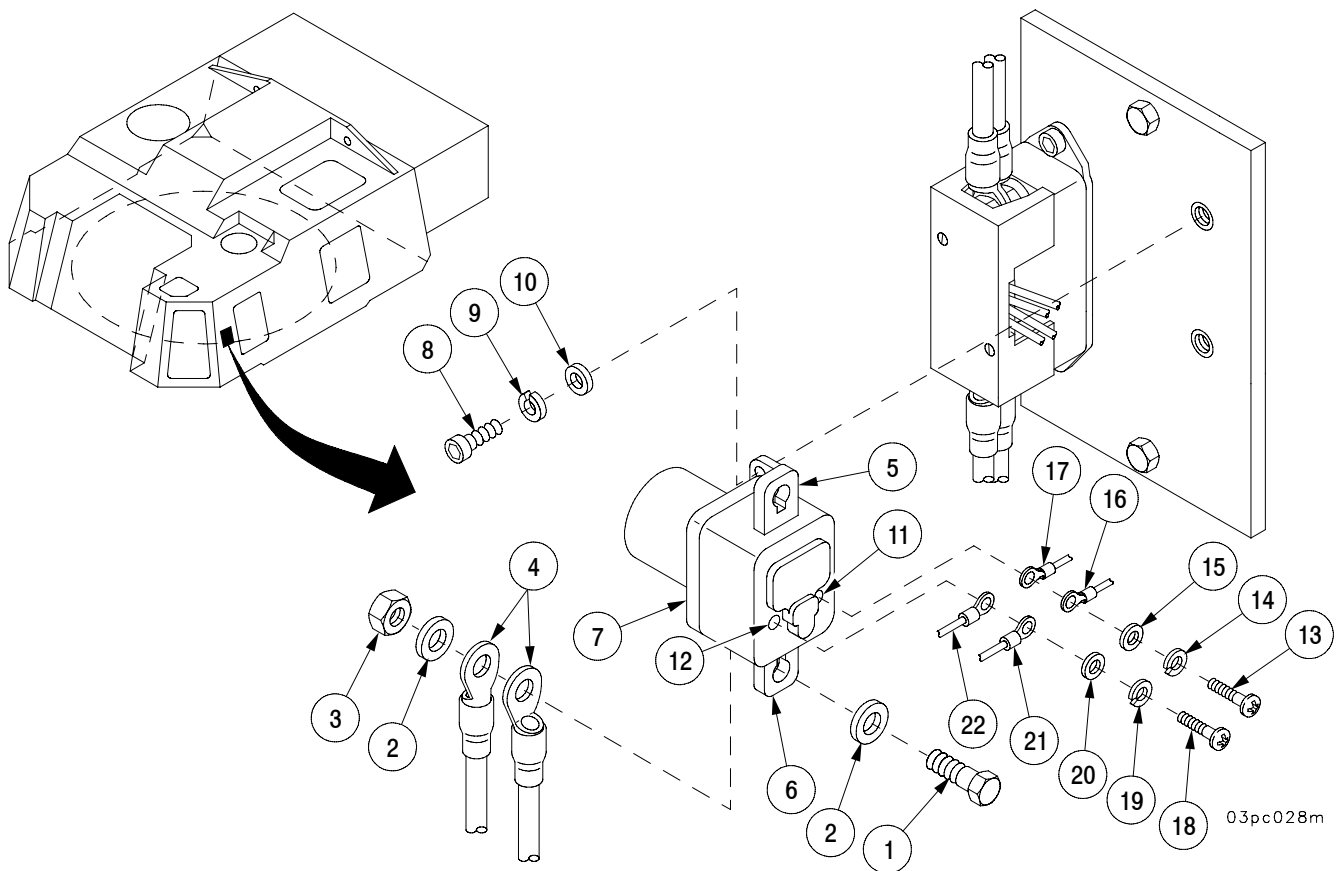
Tag leads before disconnecting to aid in installation.

- 1 Remove two screws (1), four flat washers (2), and two self-locking nuts (3) securing two leads 100 (4) to terminals A1 (5) and two leads 100 (4) to terminals A2 (6) of power relay (7). Discard self-locking nuts.
- 2 Remove two screws (8), two lockwashers (9), and two flat washers (10) securing power relay (7) to cab. Discard lockwashers.
- 3 Pull relay (7) far enough out of mounting position to gain access to terminals X1 (11) and X2 (12).
- 4 Remove screw (13), lockwasher (14), and flat washer (15) securing leads 645B (16) and 645C (17) to terminal X1 (11) (screw, lockwasher, and flat washer supplied with power relay).
- 5 Remove screw (18), lockwasher (19), and flat washer (20) securing leads 660 (21) and 775 (22) to terminal X2 (12) (screw, lockwasher, and flat washer supplied with power relay).
- 6 Remove power relay (7) from cab.

## 5-5 HYDRAULIC PUMP MOTOR RELAY - CONTINUED

### b. Installation.

- 1 Position power relay (7) in hydraulic compartment.
- 2 Connect leads 660 (21) and 775 (22) to terminal X2 (12) with screw (18), new lockwasher (19), and flat washer (20) (screw, lockwasher, and flat washer supplied with power relay).
- 3 Connect leads 645B (16) and 645C (17) to terminal X1 (11) with screw (13), new lockwasher (14), and flat washer (15) (screw, lockwasher, and flat washer supplied with power relay).
- 4 Position relay (7) in mounting position.
- 5 Secure power relay (7) in hydraulic compartment with two screws (8), two new lockwashers (9), and two flat washers (10).
- 6 Secure two leads 100 (4) to terminal A2 (6) with screw (1), two flat washers (2), and new self-locking nut (3).
- 7 Secure two leads 100 (4) to terminal A1 (5) of power relay (7) with screw (1), two flat washers (2), and new self-locking nut (3).



## 5-6 HYDRAULIC PUMP MOTOR CIRCUIT BREAKER.

This task covers:      a. Removal                                  b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

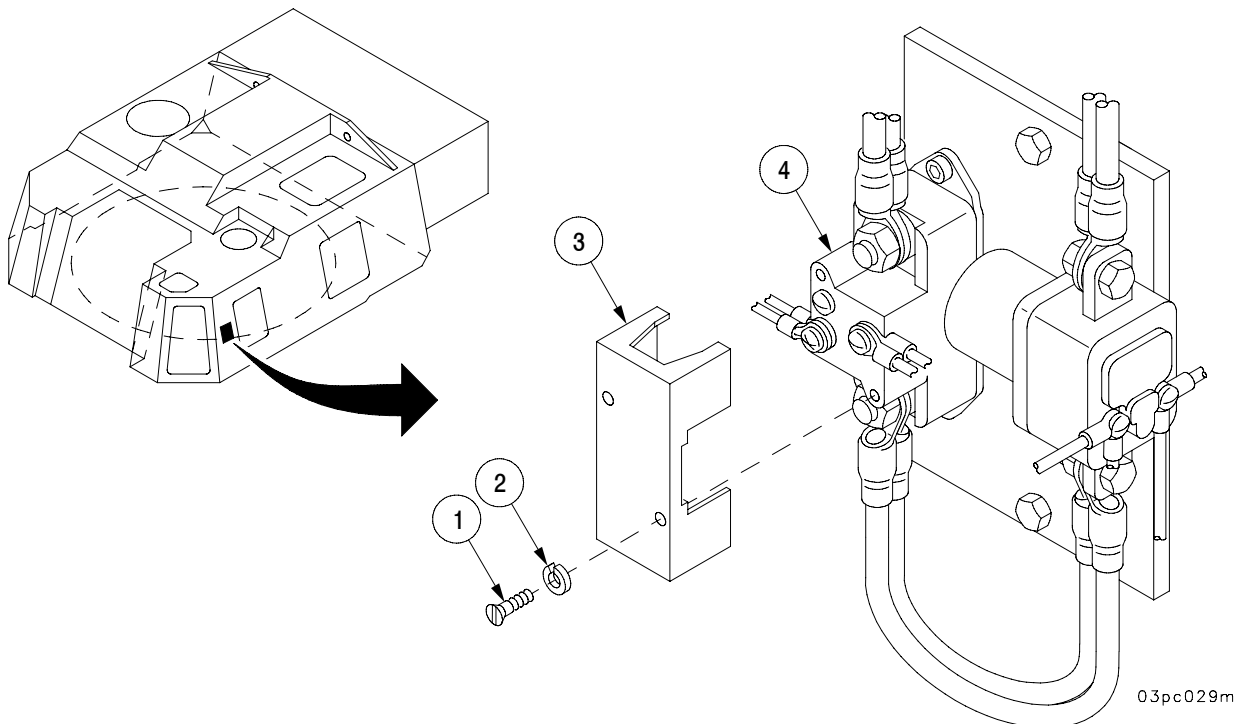
Lockwashers (2) (item 125, Appx F)  
Marking tag (AR) (item 87, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment access door open  
(TM 9-2350-314-10)  
Hydraulic compartment access cover removed  
(para 19-2)

#### a. Removal.

- 1 Remove two screws (1), two lockwashers (2), and cover (3) from circuit breaker (4) (screws, lockwashers, and cover supplied with circuit breaker).





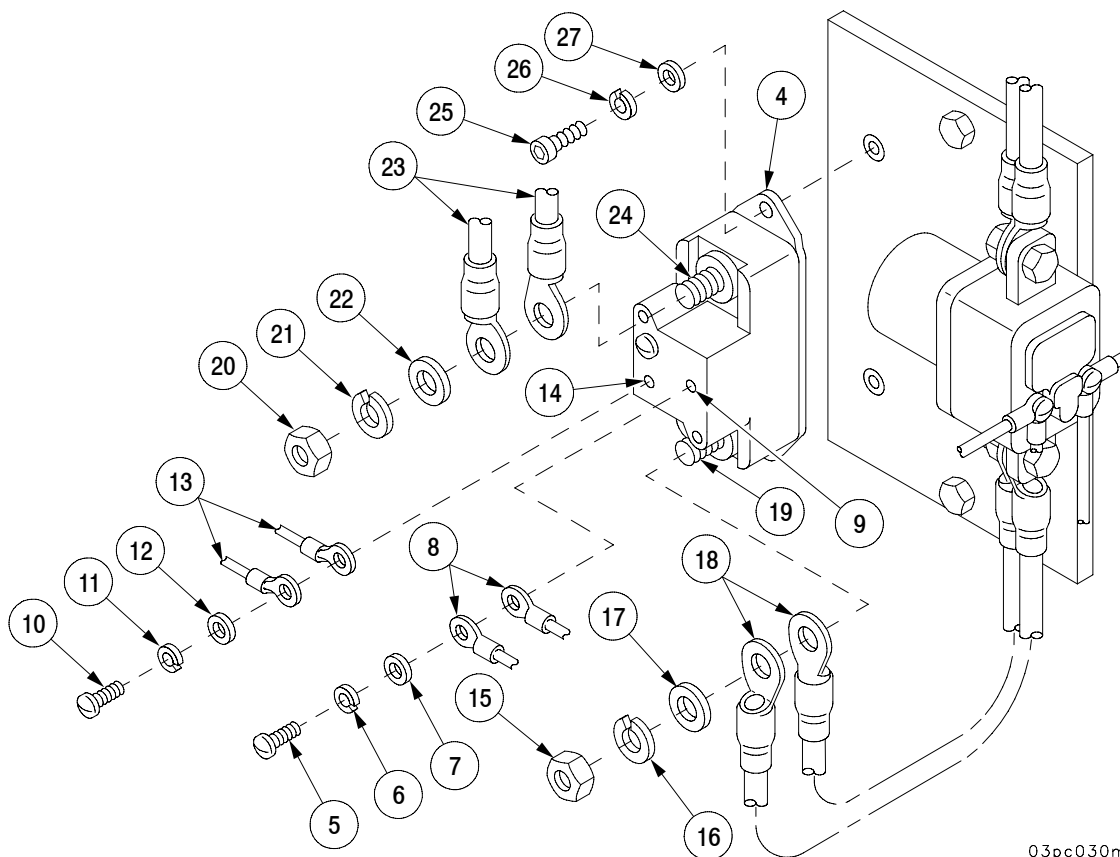
## 5-6 HYDRAULIC PUMP MOTOR CIRCUIT BREAKER - CONTINUED

### a. Removal - Continued

#### NOTE

Tag leads before disconnecting to aid in installation.

- 2 Remove screw (5), lockwasher (6), and flat washer (7) securing leads, 645 and 778 (8), to terminal S1 (9) (screw, lockwasher, and flat washer supplied with circuit breaker).
- 3 Remove screw (10), lockwasher (11), and flat washer (12) securing leads 779 and 645A (13) to terminal S2 (14) (screw, lockwasher, and flat washer supplied with circuit breaker).
- 4 Remove nut (15), lockwasher (16), and flat washer (17) securing two leads 100 (18) to terminal L1 (19) (to power relay) (nut, lockwasher, and flat washer supplied with circuit breaker).
- 5 Remove nut (20), lockwasher (21), and flat washer (22) securing two leads 100 (23) to terminal L2 (24) (to motor) (nut, lockwasher, and flat washer supplied with circuit breaker).
- 6 Remove two screws (25), two lockwashers (26), two flat washers (27), and circuit breaker (4) from cab. Discard lockwashers.

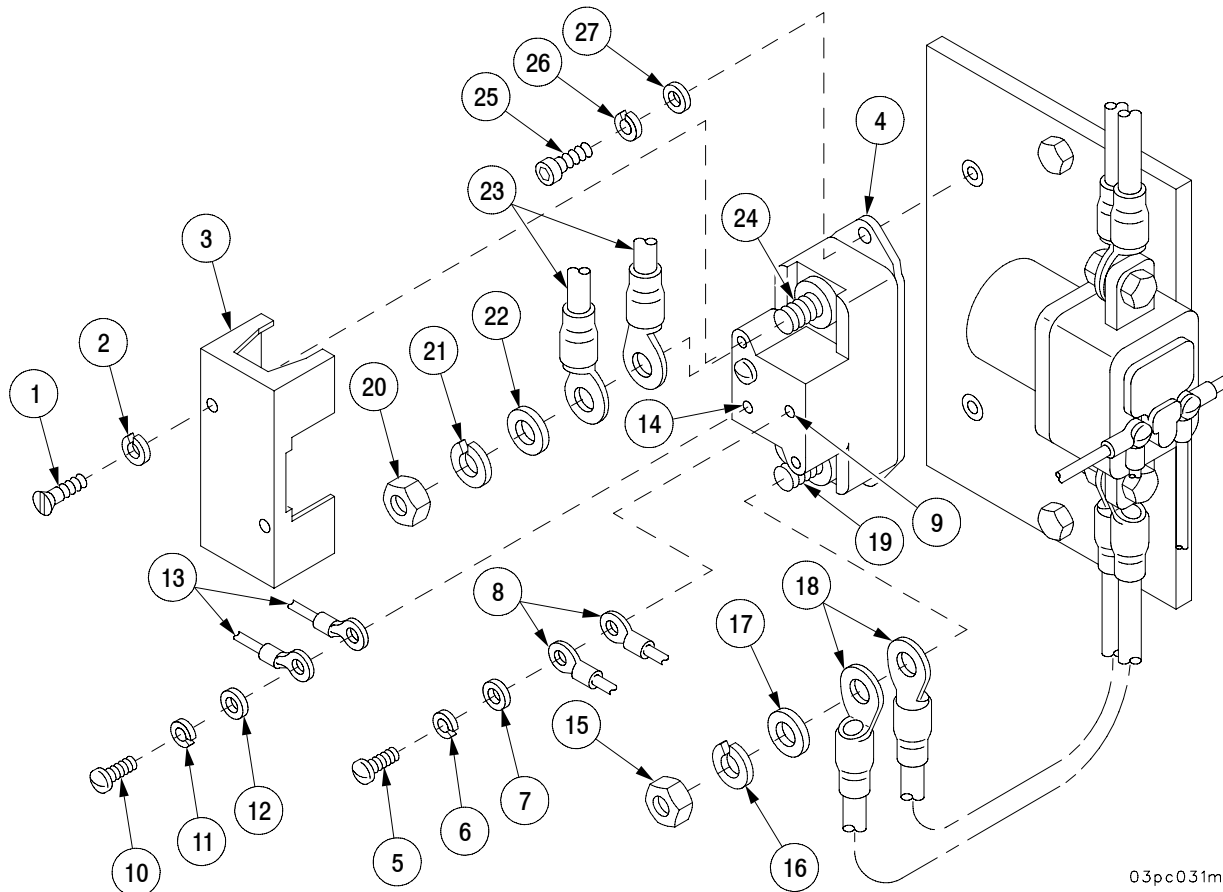


03pc030m

## 5-6 HYDRAULIC PUMP MOTOR CIRCUIT BREAKER - CONTINUED

### b. Installation.

- 1 Install circuit breaker (4) in hydraulic compartment with two screws (25), two new lockwashers (26), and two flat washers (27).
- 2 Connect two leads 100 (23) to terminal L2 (24) (to motor) with nut (20), lockwasher (21), and flat washer (22) supplied with circuit breaker.
- 3 Connect two leads 100 (18) to terminal L1 (19) (to power relay) with nut (15), lockwasher (16), and flat washer (17) supplied with circuit breaker.
- 4 Connect two leads 779 and 645A (13) to terminal S2 (14) of circuit breaker (4) with screw (10), lockwasher (11), and flat washer (12) supplied with circuit breaker.
- 5 Connect leads 645 and 778 (8) to terminal S1 (9) of circuit breaker (4) with screw (5), lockwasher (6), and flat washer (7) supplied with circuit breaker.
- 6 Install two screws (1), two lockwashers (2), and cover (3) to circuit breaker (4) (screws, lockwashers, and cover supplied with circuit breaker).



03pc031m

## 5-7 HYDRAULIC PUMP MOTOR RELAY TO HYDRAULIC PUMP MOTOR CIRCUIT BREAKER LEADS.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

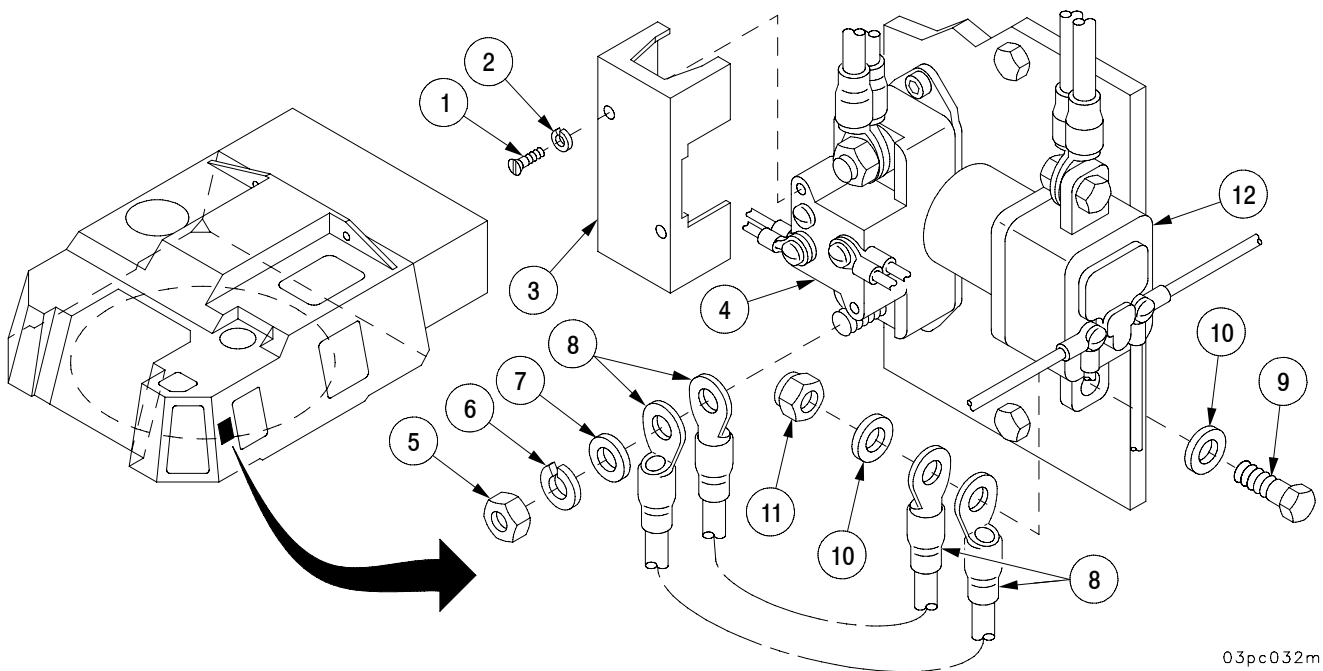
Self-locking nut (item 68, Appx F)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment door open  
(TM 9-2350-314-10)  
Hydraulic compartment access cover removed  
(para 19-2)

#### a. Removal.

- 1 Remove two screws (1), two lockwashers (2), and cover (3) from circuit breaker (4) (screws, lockwashers, and cover supplied with circuit breaker).
- 2 Remove nut (5), lockwasher (6), flat washer (7), and two leads 100 (8) from circuit breaker (4) (nut, lockwasher, and flat washer supplied with circuit breaker).
- 3 Remove screw (9), two flat washers (10), self-locking nut (11), and two leads 100 (8) from power relay (12). Discard self-locking nut.

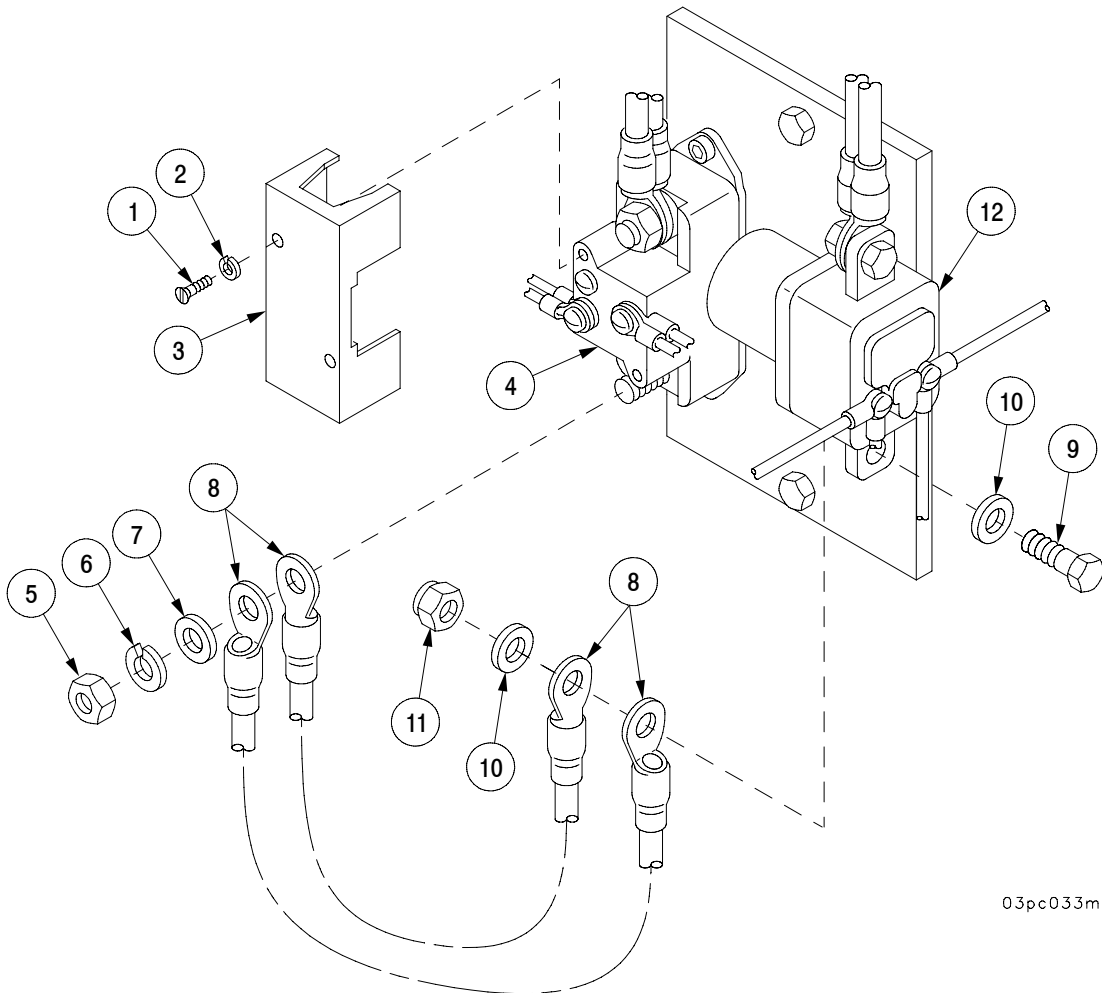


03pc032m

## 5-7 HYDRAULIC PUMP MOTOR RELAY TO HYDRAULIC PUMP MOTOR CIRCUIT BREAKER LEADS - CONTINUED

### b. Installation.

- 1 Install two leads 100 (8), screw (9), two flat washers (10), and new self-locking nut (11) to power relay (12).
- 2 Install two leads 100 (8) with nut (5), lockwasher (6), and flat washer (7) to circuit breaker (4) (nut, lockwasher, and flat washer supplied with circuit breaker).
- 3 Install two screws (1), two lockwashers (2), and cover (3) from circuit breaker (4) (screws, lockwashers, and cover supplied with circuit breaker).



03pc033m

**5-8 BRUSH BLOCK NO. 2 GROUND LEAD.**

This task covers:      a. Removal                                      b. Installation

**INITIAL SETUP**Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Torque wrench (item 53, Appx G)

Materials/Parts

Tiedown straps (2) (item 77, Appx C)  
Lockwashers (3) (item 146, Appx F)  
Marking tag (AR) (item 87, Appx C)

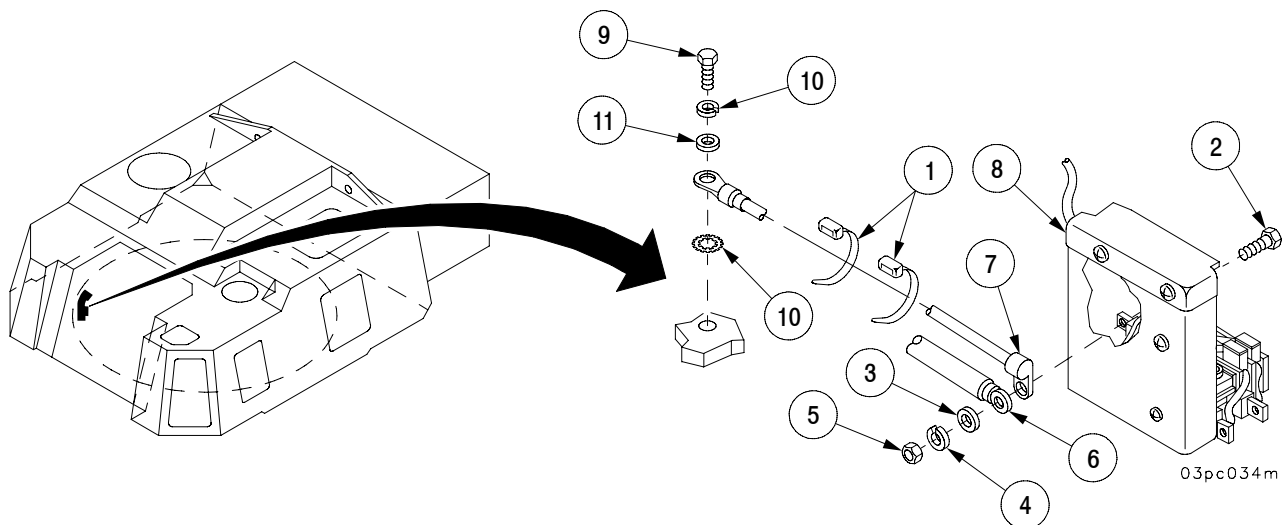
Equipment Conditions

Necessary slip ring cover (brush  
blocks 1 & 2) removed (para 23-1)  
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

**a. Removal.****NOTE**

Tag leads before disconnecting to aid in installation.

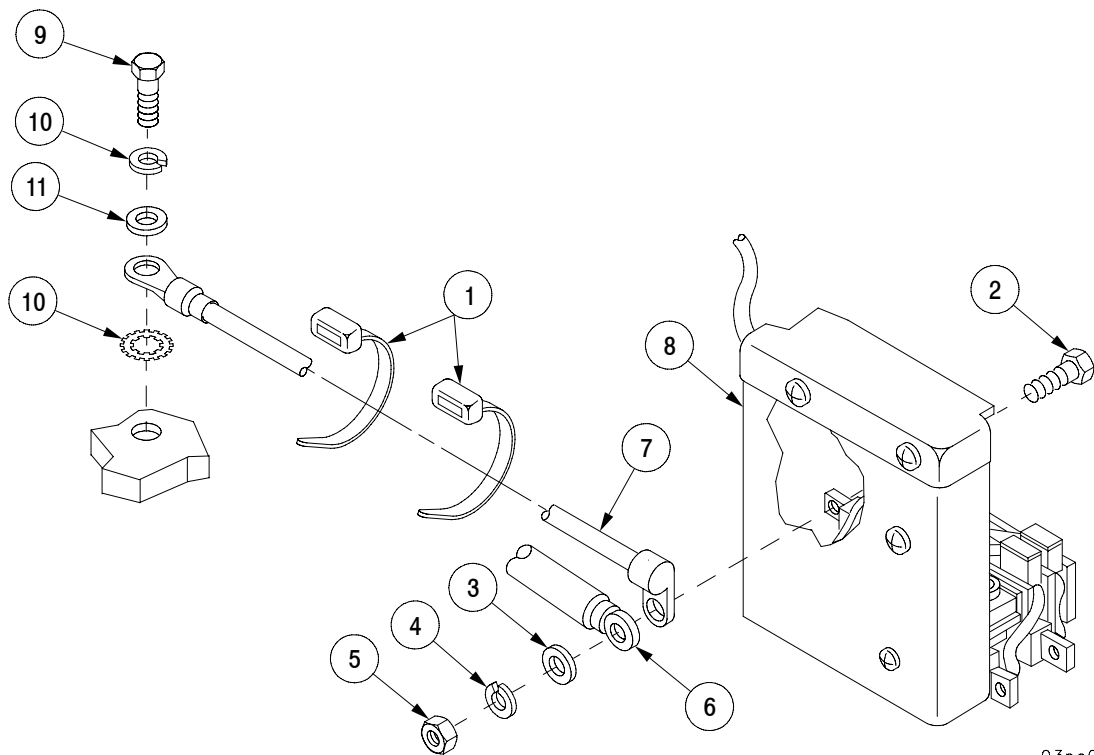
- 1 Cut and discard two tiedown straps (1).
- 2 Remove screw (2), flat washer (3), lockwasher (4), nut (5), lead (6), and lead assembly (7) from brush block (8). Discard lockwasher.
- 3 Remove screw (9), two lockwashers (10), flat washer (11), and lead assembly (7) from cab wall. Discard lockwashers.



## 5-8 BRUSH BLOCK NO. 2 GROUND LEAD - CONTINUED

### b. Installation.

- 1 Install lead assembly (7) to cab wall with screw (9), two new lockwashers (10), and flat washer (11).
- 2 Install lead assembly (7) and lead (6) to brush block (8) with screw (2), flat washer (3), new lockwasher (4), and nut (5). Torque nut to 25-30 lb-ft (34-41 N·m).
- 3 Install two new tiedown straps (1).



03pc035m

**5-9 LEAD ASSEMBLIES BETWEEN BRUSH BLOCKS 1 & 2, 3 & 4, 5 & 6, 7 & 8**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
Torque wrench (item 53, Appx G)

Materials/Parts

Tiedown straps (3) (item 79, Appx C)  
Lockwashers (4) (item 130, Appx F)  
Lockwashers (4) (item 132, Appx F)  
Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF (TM 9-2350-314-10)  
Battery ground leads disconnected (TM 9-2350-314-20-1-2)  
Necessary slip ring covers removed (para 23-1)

**NOTE**

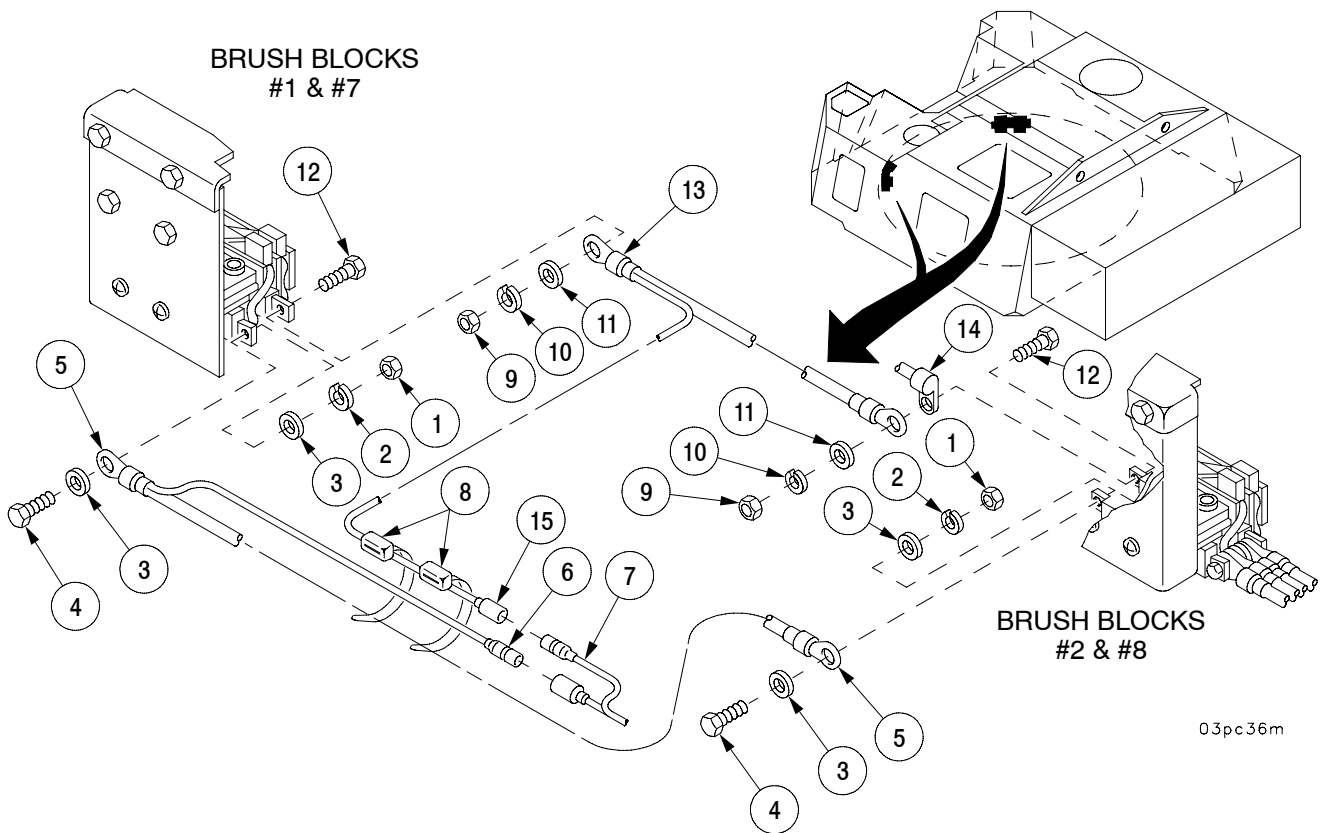
- Tag leads before disconnecting to aid in installation.
- There are eight leads. Refer to the following matrix for specific steps and figure to use.

Lead	Brush Block	Steps	
		Removal	Installation
12934620	1 to 2	1-3	9-11
12934619	1 to 2	4 and 6	7-8
12910373-2	3 to 4	7-8	4-5
12910373-1	3 to 4	10	2
12910373-2	5 to 6	9	3
12910373-1	5 to 6	11	1
12934620	7 to 8	1-3	9-11
12934619	7 to 8	5-6	6 and 8

**5-9 LEAD ASSEMBLIES BETWEEN BRUSH BLOCKS 1 & 2, 3 & 4, 5 & 6, 7 & 8 - CONTINUED**

**a. Removal.**

- 1 Remove two nuts (1), two lockwashers (2), four flat washers (3), two screws (4), and lead 12934620 (5) from brush blocks 1 and 2 or 7 and 8 positive terminals. Discard lockwashers.
- 2 Disconnect plug (6) of lead 12934620 (5) from wiring harness W62 or W64 (7).
- 3 Cut two tiedown straps (8) and remove lead 12934620 (5). Discard straps.
- 4 Remove two nuts (9), two lockwashers (10), two flat washers (11), two screws (12), and leads 12934619 (13) and 12361825-2 (14) from brush blocks 1 and 2 negative terminals. Discard lockwashers.
- 5 Remove two nuts (9), two lockwashers (10), two flat washers (11), two screws (12), and lead 12934619 (13) from brush blocks 7 and 8 negative terminals. Discard lockwashers.
- 6 Disconnect plug (15) of lead 12934619 (13) from wiring harness W62 or W64 (7) and remove lead 12934619 (13).



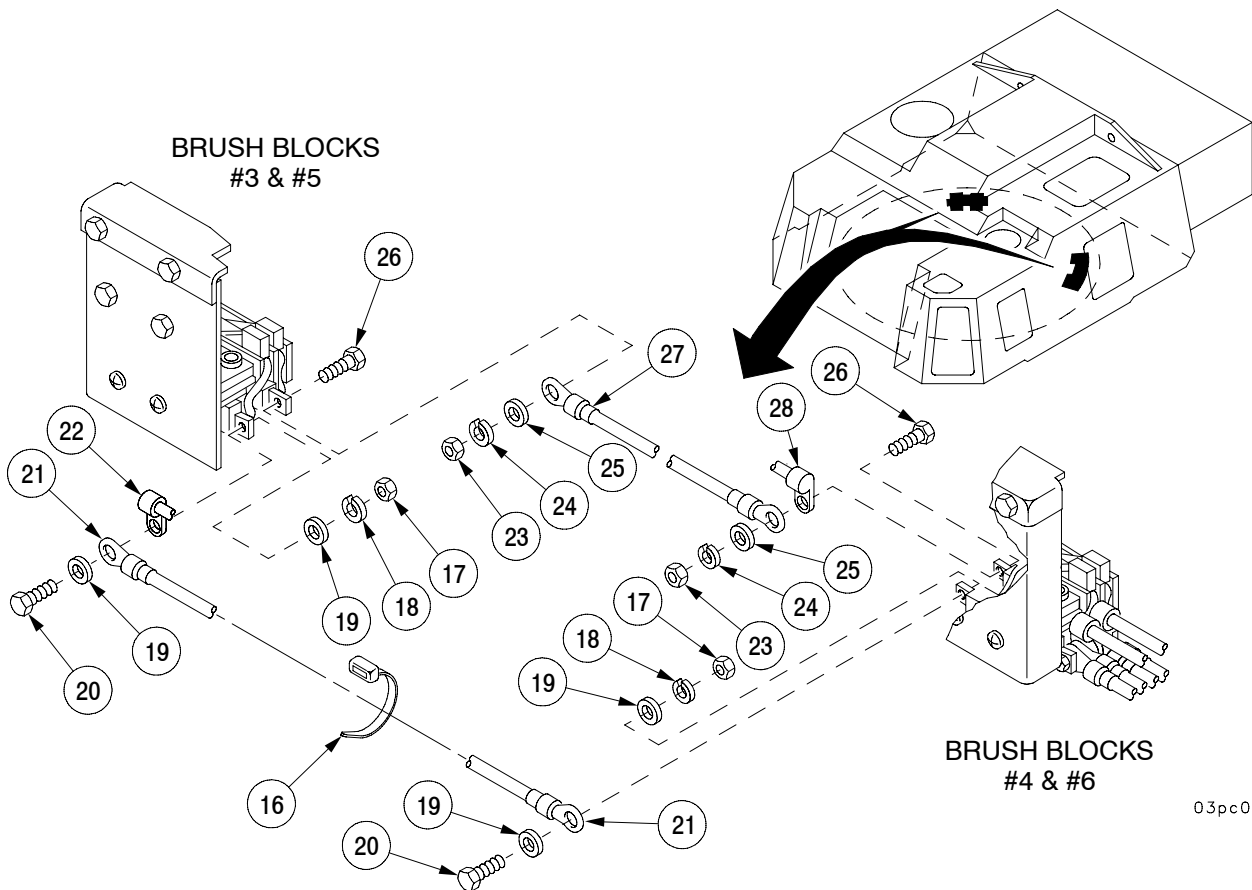
03pc36m



**5-9 LEAD ASSEMBLIES BETWEEN BRUSH BLOCKS 1 & 2, 3 & 4, 5 & 6, 7 & 8 - CONTINUED**

**a. Removal - Continued**

- 7 Cut and discard tiedown strap (16).
- 8 Remove two nuts (17), two lockwashers (18), four flat washers (19), two screws (20), and leads 12910373-2 (21) and W56 (22) from brush blocks 3 and 4 positive terminals. Discard lockwashers.
- 9 Remove two nuts (17), two lockwashers (18), four flat washers (19), two screws (20) and lead 12910373-2 (21) from brush blocks 5 and 6 positive terminals. Discard lockwashers.
- 10 Remove two nuts (23), two lockwashers (24), two flat washers (25), two screws (26), and leads 12910373-1 (27) and W57 (28) from brush blocks 3 and 4 negative terminals. Discard lockwashers.
- 11 Remove two nuts (23), two lockwashers (24), two flat washers (25), two screws (26), and lead 12910373-1 (27) from brush blocks 5 and 6 negative terminals. Discard lockwashers.

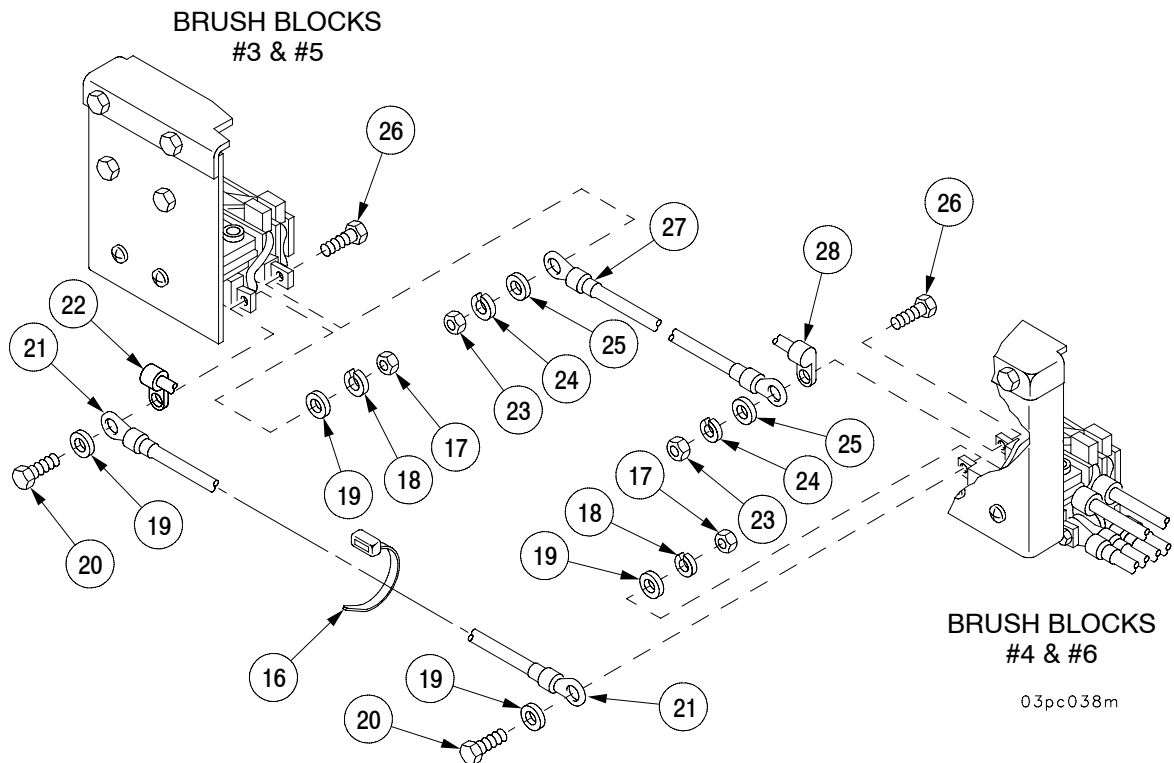


03pc037m

## 5-9 LEAD ASSEMBLIES BETWEEN BRUSH BLOCKS 1 & 2, 3 & 4, 5 & 6, 7 & 8 - CONTINUED

### b. Installation.

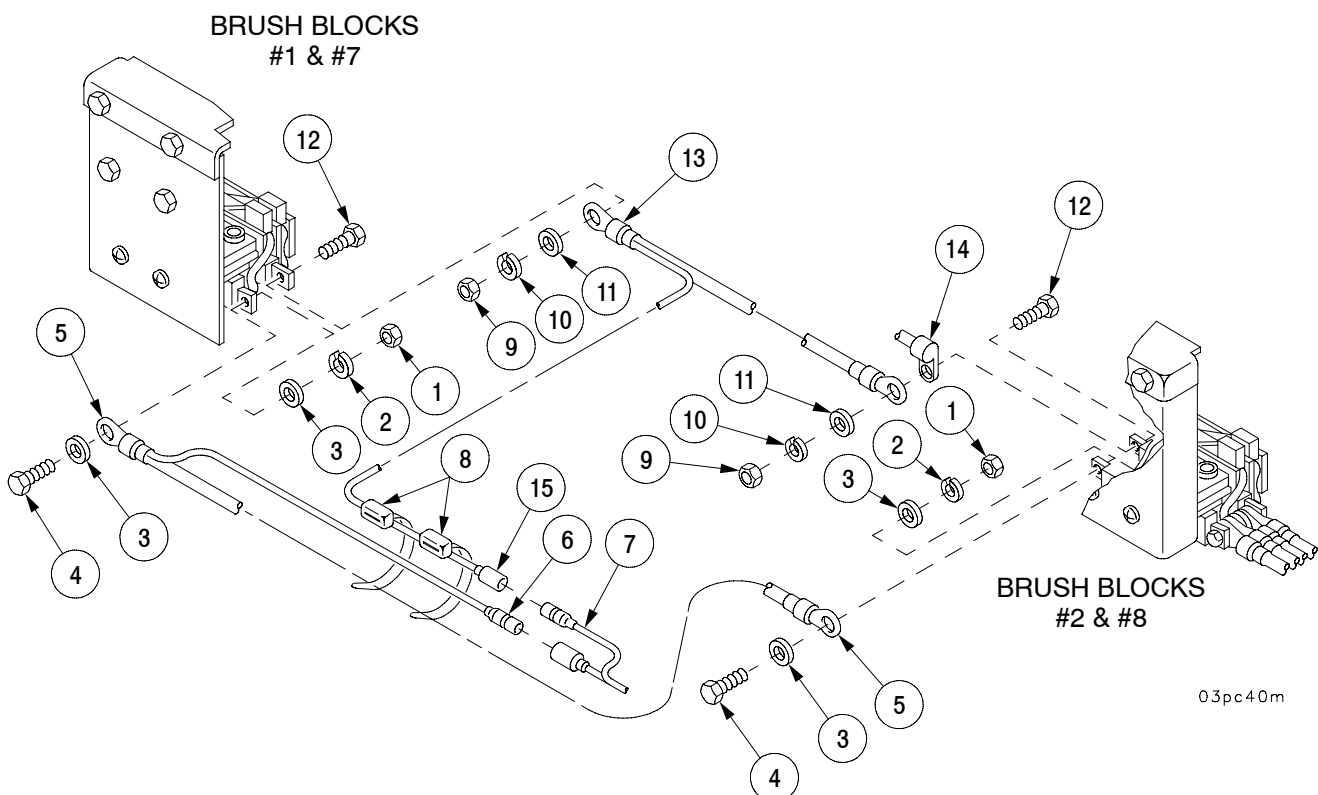
- 1 Connect lead 12910373-1 (27) to brush blocks 5 and 6 negative terminals with two screws (26), two flat washers (25), two new lockwashers (24), and two nuts (23). Torque nuts to 25-30 lb-ft (34-41 N•m).
- 2 Connect leads W57 (28) and 12910373-1 (27) to brush blocks 3 and 4 negative terminals with two screws (26), two flat washers (25), two new lockwashers (24), and two nuts (23). Torque nuts to 25-30 lb-ft (34-41 N•m).
- 3 Connect lead 12910373-2 (21) to brush blocks 5 and 6 positive terminals with two screws (20), four flat washers (19), two new lockwashers (18), and two nuts (17). Torque nuts to 25-30 lb-ft (34-41 N•m).
- 4 Connect leads W56 (22) and 12910373-2 (21) to brush blocks 3 and 4 positive terminals with two screws (20), two flat washers (19), two new lockwashers (18), and two nuts (17). Torque nuts to 25-30 lb-ft (34-41 N•m).
- 5 Install new tiedown strap (16).



## 5-9 LEAD ASSEMBLIES BETWEEN BRUSH BLOCKS 1 & 2, 3 & 4, 5 & 6, 7 & 8 - CONTINUED

### b. Installation - Continued

- 6 Connect lead 12934619 (13) to brush blocks 7 and 8 negative terminals with two screws (12), two flat washers (11), two lockwashers (10), and two nuts (9). Torque nuts to 35-40 lb-ft (41-47 N•m).
- 7 Connect leads 12361825-2 (14) and 12934619 (13) to brush blocks 1 and 2 negative terminals with two screws (12), two flat washers (11), two new lockwashers (10), and two nuts (9). Torque nuts to 35-40 lb-ft (41-47 N•m).
- 8 Connect plug (15) of lead 12934619 (13) to wiring harness W62 or W64 (7).
- 9 Connect lead 12934620 (5) to brush blocks 1 and 2 or 7 and 8 positive terminals with two screws (4), four flat washers (3), two lockwashers (2), and two nuts (1). Torque nuts to 25-30 lb-ft (34-41 N•m).
- 10 Connect plug (6) of lead 12934620 (5) to wiring harness W62 or W64 (7).
- 11 Install two new tiedown straps (8).



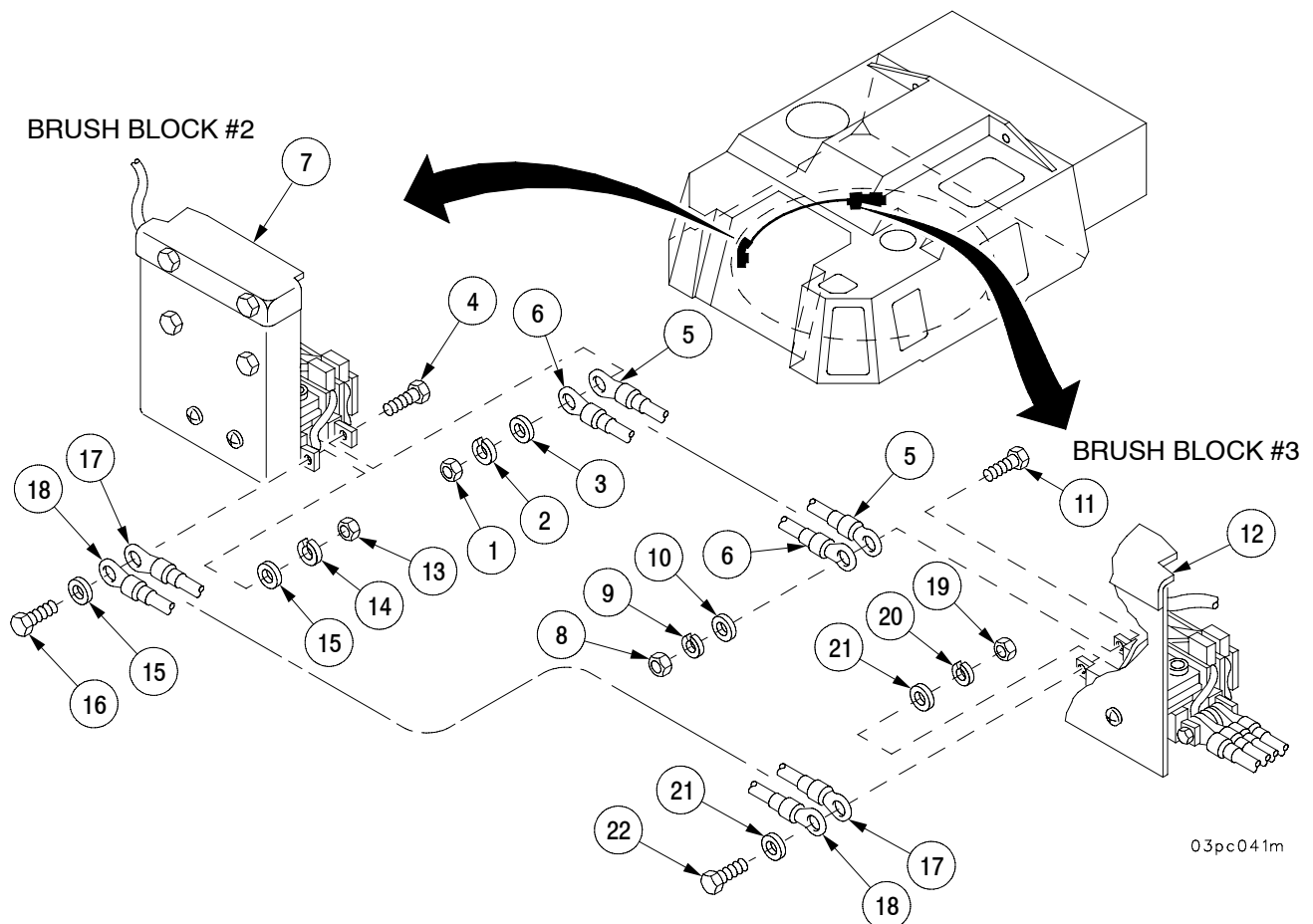
03pc40m



## 5-10 LEAD ASSEMBLIES BETWEEN BRUSH BLOCK SETS - CONTINUED

### a. Removal (Leads between brush blocks 2 and 3).

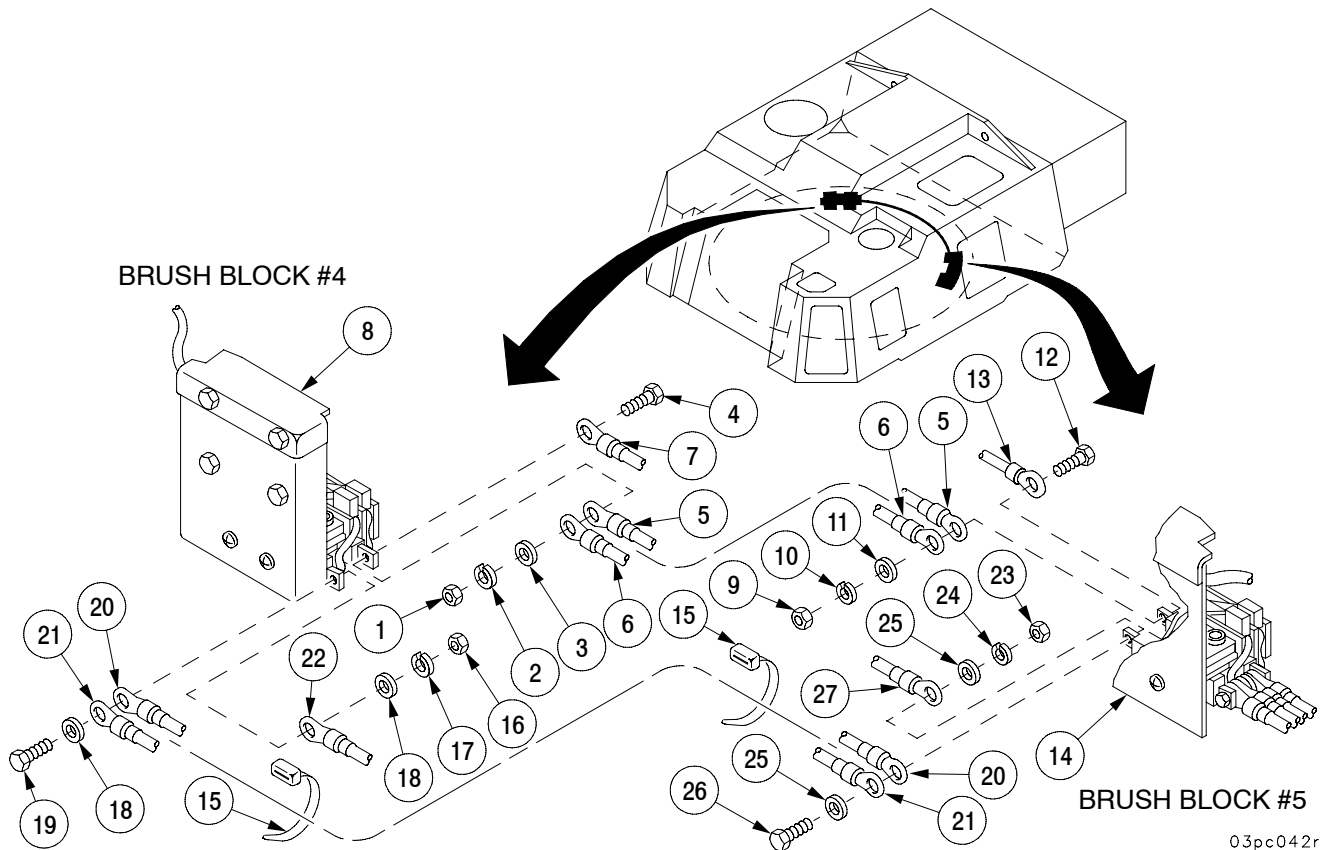
- 1 Remove nut (1), lockwasher (2), flat washer (3), screw (4), lead 12934614-1 (5), and lead 12934614-2 (6) from brush block 2 (7). Discard lockwasher.
- 2 Remove nut (8), lockwasher (9), flat washer (10), screw (11), lead 12934614-1 (5), and lead 12934614-2 (6) from brush block 3 (12). Discard lockwasher.
- 3 Remove lead 12934614-1 (5) and lead 12934614-2 (6) from cab.
- 4 Remove nut (13), lockwasher (14), two flat washers (15), screw (16), lead 12934614-3 (17), and lead 12934614-4 (18) from brush block 2 (7). Discard lockwasher.
- 5 Remove nut (19), lockwasher (20), two flat washers (21), screw (22), lead 12934614-3 (17), and lead 12934614-4 (18) from brush block 3 (12). Discard lockwasher.
- 6 Remove lead 12934614-3 (17) and lead 12934614-4 (18) from cab.



## 5-10 LEAD ASSEMBLIES BETWEEN BRUSH BLOCK SETS - CONTINUED

### a. Removal (Leads between brush blocks 4 and 5).

- 7 Remove nut (1), lockwasher (2), flat washer (3), screw (4), lead 12934614-1 (5), lead 12934614-2 (6), and wiring harness W50 lead 70 (7) from brush block 4 (8). Discard lockwasher.
- 8 Remove nut (9), lockwasher (10), flat washer (11), screw (12), lead 12934614-1 (5), lead 12934614-2 (6), and wiring harness W67 lead 70 (13) from brush block 5 (14). Discard lockwasher.
- 9 Remove lead 12934614-1 (5) and lead 12934614-2 (6) from cab.
- 10 Cut and discard two tiedown straps (15).
- 11 Remove nut (16), lockwasher (17), two flat washers (18), screw (19), lead 12934614-3 (20), lead 12934614-4 (21), and wiring harness W50 lead 100 (22) from brush block 4 (8). Discard lockwasher.
- 12 Remove nut (23), lockwasher (24), two flat washers (25), screw (26), lead 12934614-3 (20), lead 12934614-4 (21), and wiring harness W67 lead (27) from brush block 5 (14). Discard lockwasher.
- 13 Remove lead 12934614-3 (20) and lead 12934614-4 (21) from cab.

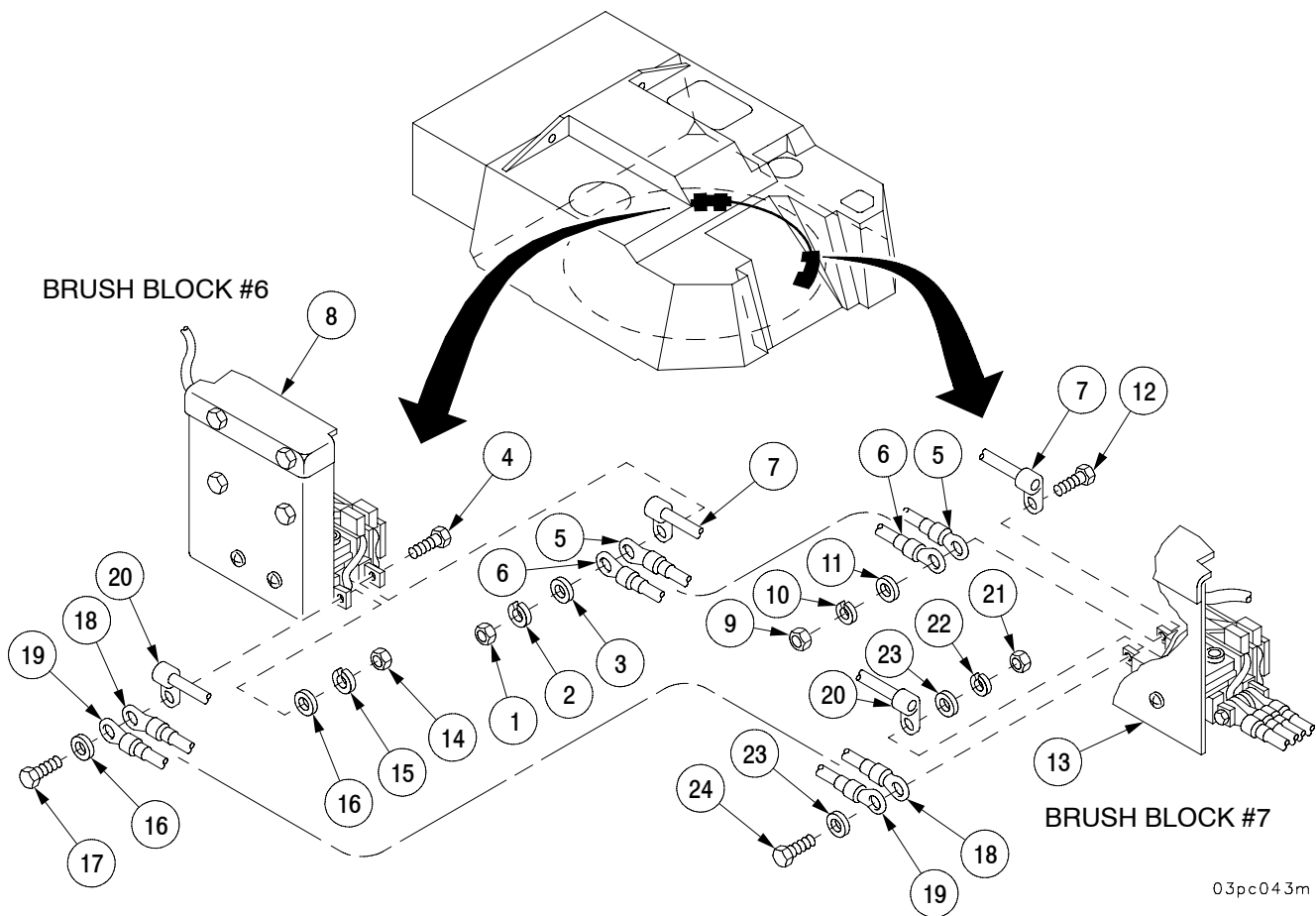


03pc042r

## 5-10 LEAD ASSEMBLIES BETWEEN BRUSH BLOCK SETS - CONTINUED

### a. Removal (Leads between brush blocks 6 and 7).

- 14 Remove nut (1), lockwasher (2), flat washer (3), screw (4), lead 12934614-1 (5), lead 12934614-2 (6) and wiring harness W55 lead 70 (7) from brush block 6 (8). Discard lockwasher.
- 15 Remove nut (9), lockwasher (10), flat washer (11), screw (12), lead 12934614-1 (5), lead 12934614-2 (6), and wiring harness W55 lead 70 (7) from brush block 7 (13). Discard lockwasher.
- 16 Remove lead 12934614-1 (5) and lead 12934614-2 (6) from cab.
- 17 Remove nut (14), lockwasher (15), two flat washers (16), screw (17), lead 12934614-3 (18), lead 12934614-4 (19), and wiring harness W55 lead 100 (20) from brush block 6 (8). Discard lockwasher.
- 18 Remove nut (21), lockwasher (22), two flat washers (23), screw (24), lead 12934614-3 (18), lead 12934614-4 (19), and wiring harness W55 lead 100 (20) from brush block 7 (13). Discard lockwasher.
- 19 Remove lead 12934614-3 (18) and lead 12934614-4 (19) from cab.

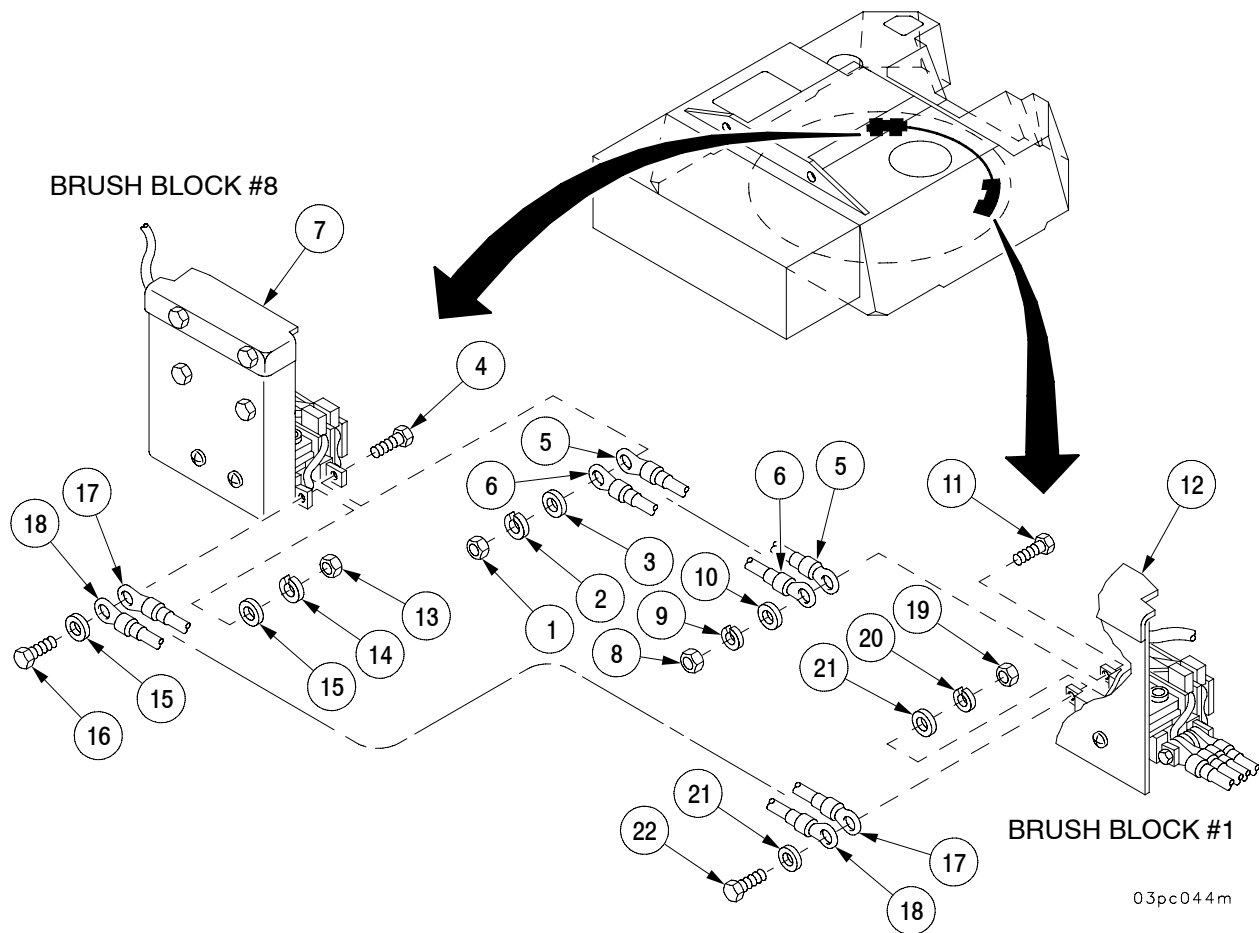


03pc043m

**5-10 LEAD ASSEMBLIES BETWEEN BRUSH BLOCK SETS - CONTINUED**

**a. Removal (Leads between brush blocks 8 and 1).**

- 20 Remove nut (1), lockwasher (2), flat washer (3), screw (4), lead 12934614-1 (5), and lead 12934614-2 (6) from brush block 8 (7). Discard lockwasher.
- 21 Remove nut (8), lockwasher (9), flat washer (10), screw (11), lead 12934614-1 (5), and lead 12934614-2 (6) from brush block 1 (12). Discard lockwasher.
- 22 Remove lead 12934614-1 (5) and lead 12934614-2 (6) from cab.
- 23 Remove nut (13), lockwasher (14), two flat washers (15), screw (16), lead 12934614-3 (17), and lead 12934614-4 (18) from brush block 8 (7). Discard lockwasher.
- 24 Remove nut (19), lockwasher (20), two flat washers (21), screw (22), lead 12934614-3 (17), and lead 12934614-4 (18) from brush block 1 (12). Discard lockwasher.
- 25 Remove lead 12934614-3 (17) and lead 12934614-4 (18) from cab.

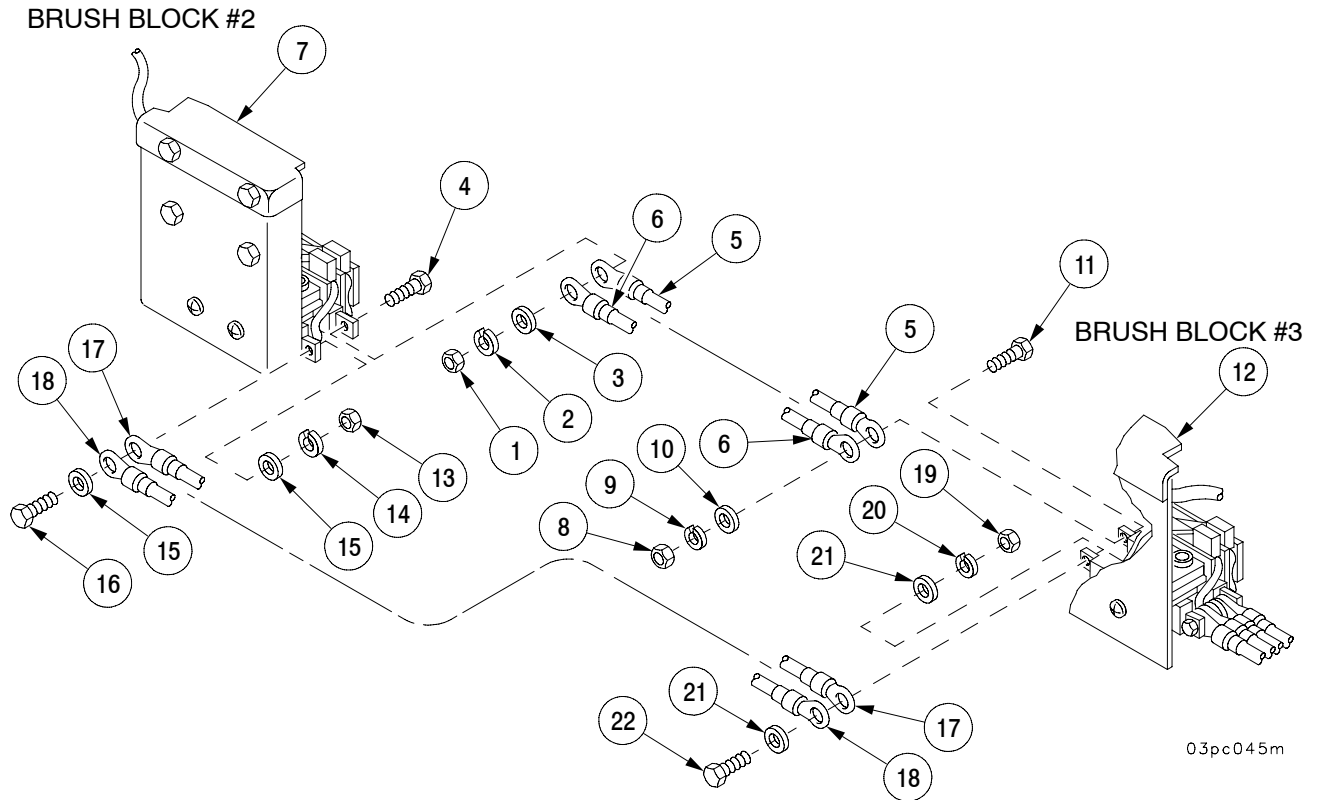




**5-10 LEAD ASSEMBLIES BETWEEN BRUSH BLOCK SETS - CONTINUED**

**b. Installation (Leads between brush blocks 2 and 3).**

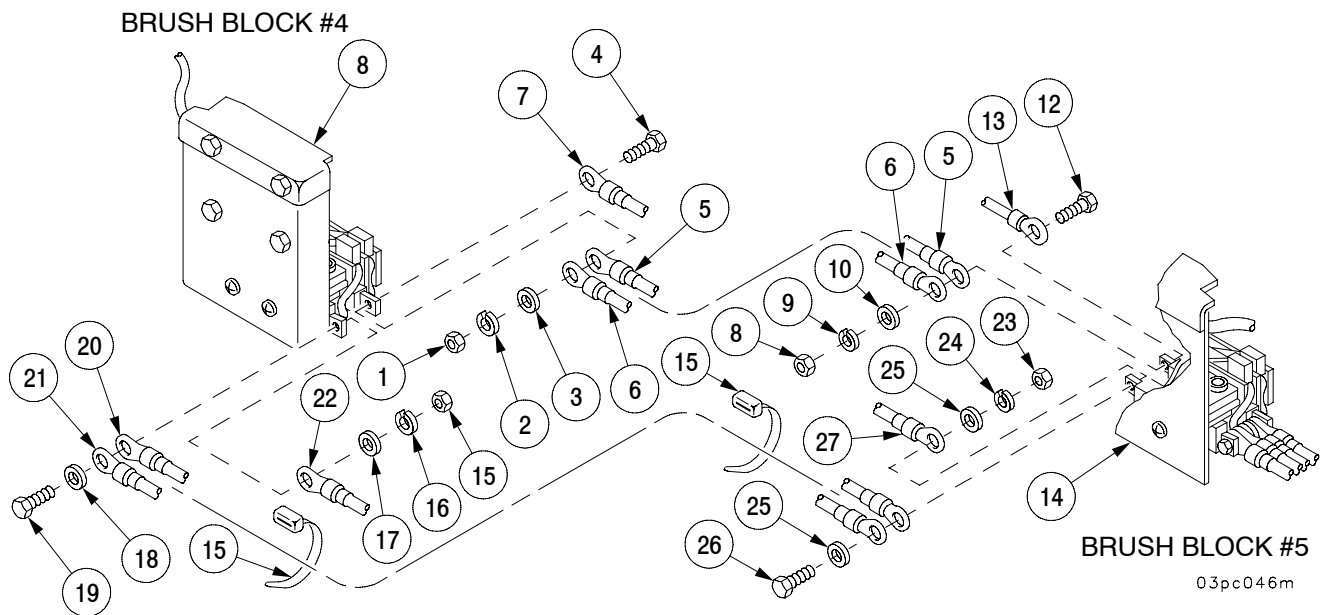
- 1 Connect leads 12934614-1 (5) and 12934614-2 (6) to brush block 3 (13) with nut (8), new lockwasher (9), flat washer (10), and screw (11). Torque nut to 25-30 lb-ft (34-41 N·m).
- 2 Connect leads 12934614-1 (5) and 12934614-2 (6) to brush block 2 (7) with nut (1), new lockwasher (2), flat washer (3), and screw (4). Torque nut to 25-30 lb-ft (34-41 N·m).
- 3 Connect leads 12934614-3 (17) and 12934614-4 (18) to brush block 3 (12) with nut (19), new lockwasher (20), two flat washers (21), and screw (22). Torque nut to 30-35 lb-ft (41-47 N·m).
- 4 Connect leads 12934614-3 (17) and 12934614-4 (18) to brush block 2 (7) with nut (13), new lockwasher (14), two flat washers (15), and screw (16). Torque nut to 30-35 lb-ft (41-47 N·m).



## 5-10 LEAD ASSEMBLIES BETWEEN BRUSH BLOCK SETS - CONTINUED

### b. Installation (Leads between brush blocks 4 and 5).

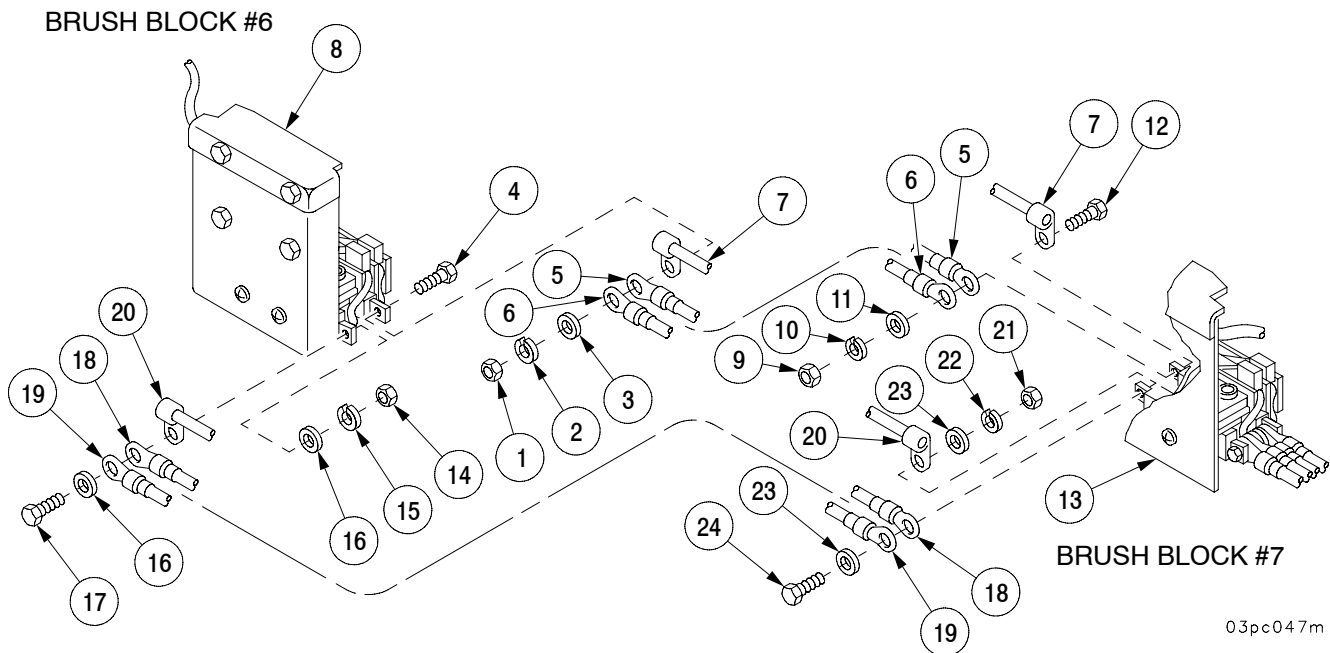
- 5 Connect leads 12934614-1 (5) and 12934614-2 (6) and wiring harness W67 lead 70 (13) to brush block 5 (14) with nut (9), new lockwasher (10), flat washer (11), and screw (12). Torque nut to 25-30 lb-ft (34-41 N·m).
- 6 Connect leads 12934614-1 (5) and 12934614-2 (6) and wiring harness W50 lead 70 (7) to brush block 4 (8) with nut (1), new lockwasher (2), flat washer (3), and screw (4). Torque nut to 25-30 lb-ft (34-41 N·m).
- 7 Connect leads 12934614-3 (20) and 12934614-4 (21) and wiring harness W67 lead (27) to brush block 5 (14) with nut (23), new lockwasher (24), two flat washers (25), and screw (26). Torque nut to 30-35 lb-ft (41-47 N·m).
- 8 Connect leads 12934614-3 (20) and 12934614-4 (21) and wiring harness W50 lead 100 (22) to brush block 4 (8) with nut (16), new lockwasher (17), two flat washers (18), and screw (19). Torque nut to 30-35 lb-ft (41-47 N·m).
- 9 Install two new tiedown straps (15).



**5-10 LEAD ASSEMBLIES BETWEEN BRUSH BLOCK SETS - CONTINUED**

**b. Installation (Leads between brush blocks 6 and 7).**

- 10 Connect leads 12934614-1 (5) and 12934614-2 (6) and wiring harness W55 lead 70 (7) to brush block 7 (13) with nut (9), new lockwasher (10), flat washer (11), and screw (12). Torque nut to 25-30 lb-ft (34-41 N·m).
- 11 Connect leads 12934614-1 (5) and 12934614-2 (6) and wiring harness W55 lead 70 (7) to brush block 6 (8) with nut (1), new lockwasher (2), flat washer (3), and screw (4). Torque nut to 25-30 lb-ft (34-41 N·m).
- 12 Connect leads 12934614-3 (18) and 12934614-4 (19) and wiring harness W55 lead 100 (20) to brush block 7 (13) with nut (21), new lockwasher (22), two flat washers (23), and screw (24). Torque nut to 30-35 lb-ft (41-47 N·m).
- 13 Connect leads 12934614-3 (18) and 12934614-4 (19) and wiring harness W55 lead 100 (20) to brush block 6 (8) with nut (14), new lockwasher (15), two flat washers (16), and screw (17). Torque nut to 30-35 lb-ft (41-47 N·m).

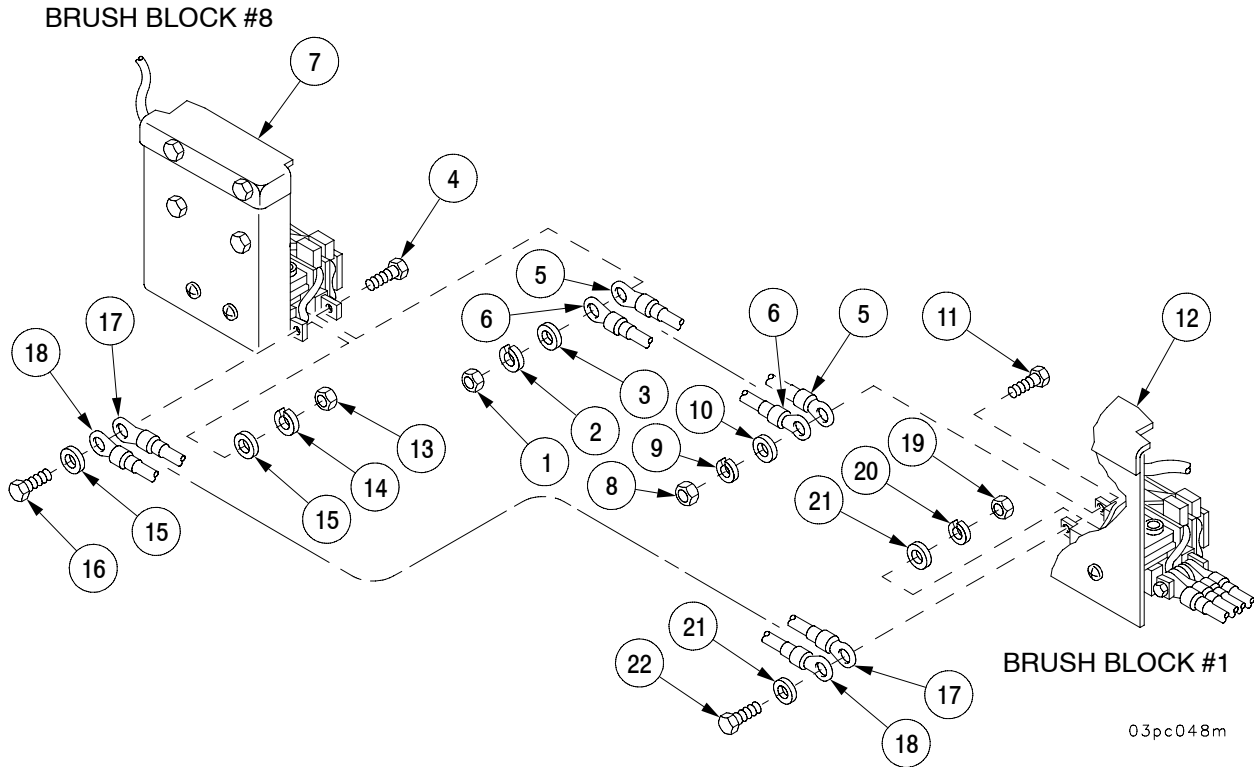


03pc047m

**5-10 LEAD ASSEMBLIES BETWEEN BRUSH BLOCK SETS - CONTINUED**

**b. Installation (Leads between brush blocks 8 and 1).**

- 14 Connect leads 12934614-1 (5), and 12934614-2 (6) to brush block 1 (12) with nut (8), new lockwasher (9), flat washer (10), and screw (11). Torque nut to 25-30 lb-ft (34-41 N·m).
- 15 Connect leads 12934614-1 (5) and 12934614-2 (6) to brush block 8 (7) with nut (1), new lockwasher (2), flat washer (3), and screw (4). Torque nut to 25-30 lb-ft (34-41 N·m).
- 16 Connect leads 12934614-3 (17) and 12934614-4 (18) to brush block 1 (12) with nut (19), new lockwasher (20), two flat washers (21), and screw (22). Torque nut to 30-35 lb-ft (41-47 N·m).
- 17 Connect leads 12934614-3 (17) and 129346114-4 (18) to brush block 8 (7) with nut (13), new lockwasher (14), two flat washers (15), and screw (16). Torque nut to 30-35 lb-ft (41-47 N·m).



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**5-11 WIRING HARNESS W50.**

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This task covers:          a. Removal                                  b. Installation

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**INITIAL SETUP**Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Torque wrench (item 53, Appx G)

Materials/Parts

Lockwashers (4) (item 129, Appx F)  
Lockwasher (item 132, Appx F)  
Lockwasher (item 130, Appx F)  
Tiedown strap (Item 79, Appx C)  
Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Slip ring cover removed (para 23-1)  
Loudspeaker removed (TM 9-2350-314-10)

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**a. Removal.****NOTE**

Tag leads before disconnecting to aid in installation.  
Four additional leads must be removed/installed  
during this task.

**5-11 WIRING HARNESS W50 - CONTINUED**

**a. Removal.**

- 1 Remove four screws (1), two lockwashers (2), two flat washers (3), bracket (4), and guard (5). Discard lockwashers.
- 2 Disconnect wiring harness (6) and attaching hardware at the following points: Discard lockwashers.

Item No.	W50 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
7	70	Brush block 4	Slip ring - rear of cab behind COS station.
8	100	Brush block 4	Slip ring - rear of cab behind COS station.
9	W50 P1	PCU	Cab bulkhead.

- 3 Remove and discard tiedown strap.
- 4 Remove wiring harness (6) from vehicle.

**b. Installation.**

- 1 Install wiring harness (6) with new lockwashers and attaching hardware in vehicle at the following points:

Item No.	W50 Connector/Lead/Wire	To Connector/Lead/Wire/Component	Location
9	W50 P1	PCU	Cab bulkhead.
*8	100	Brush block 4	Slip ring - rear of cab behind COS station.
**7	70	Brush block 4	Slip ring - rear of cab behind COS station.

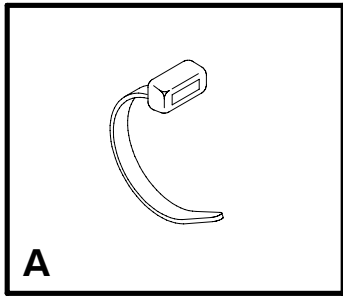
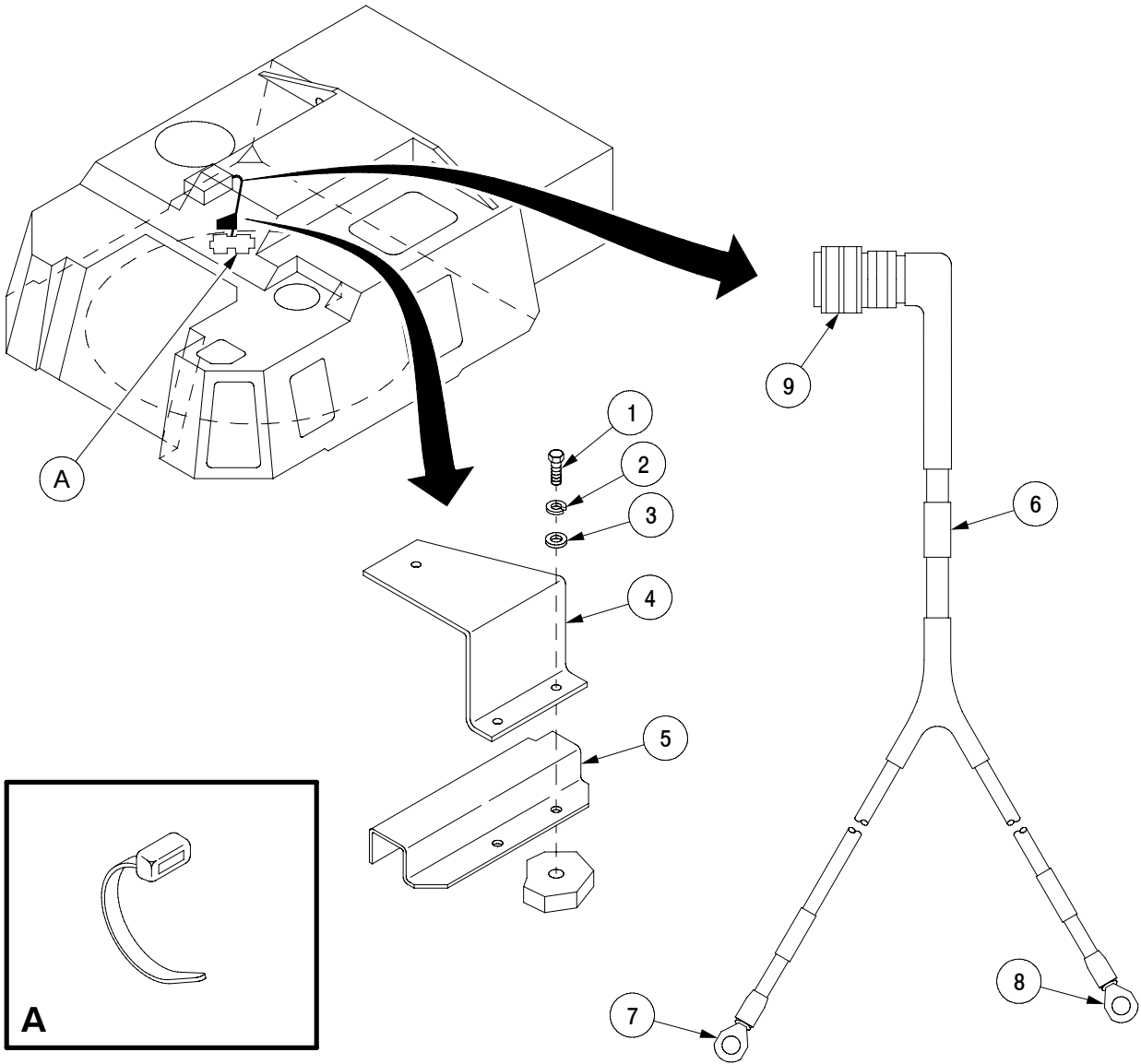
- 2 Install new tiedown strap to wiring harness (6) and attached leads.
- 3 Install guard (5) and bracket (4) with two flat washers (3), two new lockwashers (2), and two screws (1).

\* Torque nut to 30-35 lb-ft (41-47 N·m).

\*\* Torque nut to 25-30 lb-ft (34-41 N·m).

5-11 WIRING HARNESS W50 - CONTINUED

b. Installation - Continued



03pc049m

**5-12 WIRING HARNESS W53.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwashers (4) (item 103, Appx F)  
Self-locking nut (item 68, Appx F)  
Lockwashers (2) (item 115, Appx F)  
Lockwashers (3) (item 128, Appx F)  
Gasket (item 177, Appx F)  
Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment access door open  
(TM 9-2350-314-10)  
Hydraulic compartment exterior access panel  
removed (para 24-3)  
Wiring harness W55 connector P1 disconnected  
(para 5-13)

**a. Removal.**

**NOTE**

Tag leads before disconnecting to aid in installation.  
Two additional leads must be removed/installed  
during this task.

- 1 Disconnect wiring harness (1) and attaching hardware at the following points:

Item No.	W53 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
2	70	Current shunt	Rear of hydraulic compartment on bulkhead.
3	100	Power relay	Center bulkhead of hydraulic compartment between compartment door and access panel.
4	W53 J1	W55 P1/bulkhead connector	Rear of hydraulic compartment on bulkhead.

- 2 Remove clamps and attaching hardware securing wiring harness (1) to vehicle. Discard lockwashers.
- 3 Remove wiring harness (1).

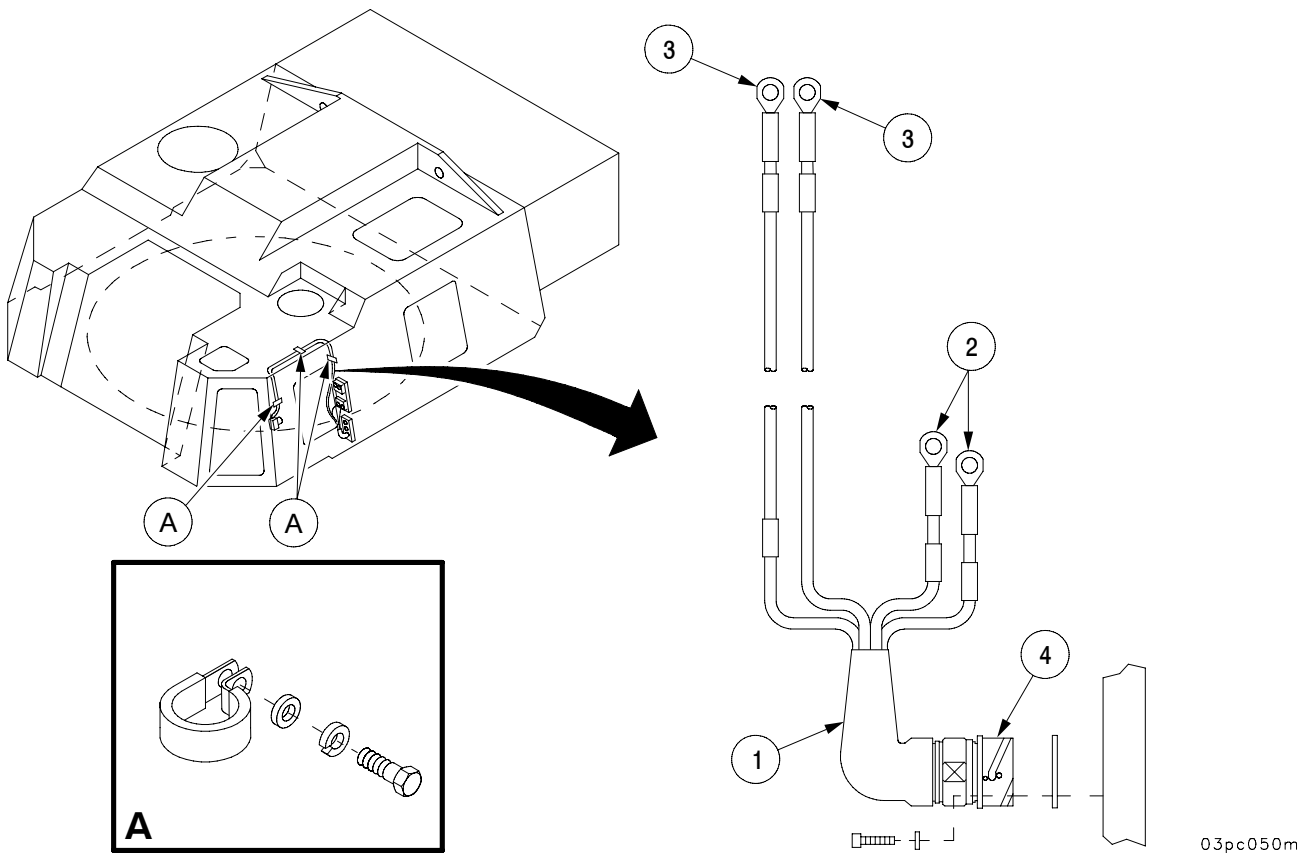


**5-12 WIRING HARNESS W53 - CONTINUED**

**b. Installation**

- 1 Install wiring harness (1) in vehicle with clamps and attaching hardware and new lockwashers.
- 2 Connect wiring harness (1) and attaching hardware at the following points:

Item No.	W53 Connector/Lead/Wire	To Connector/Lead/Wire/Component	Location
4	W53 J1	W55 P1/bulkhead connector	Rear of hydraulic compartment on bulkhead.
3	100	Power relay	Center bulkhead of hydraulic compartment between compartment door and access panel.
2	70	Current shunt	Rear of hydraulic compartment on bulkhead.





**5-13 WIRING HARNESS W55 - CONTINUED**

**b. Installation**

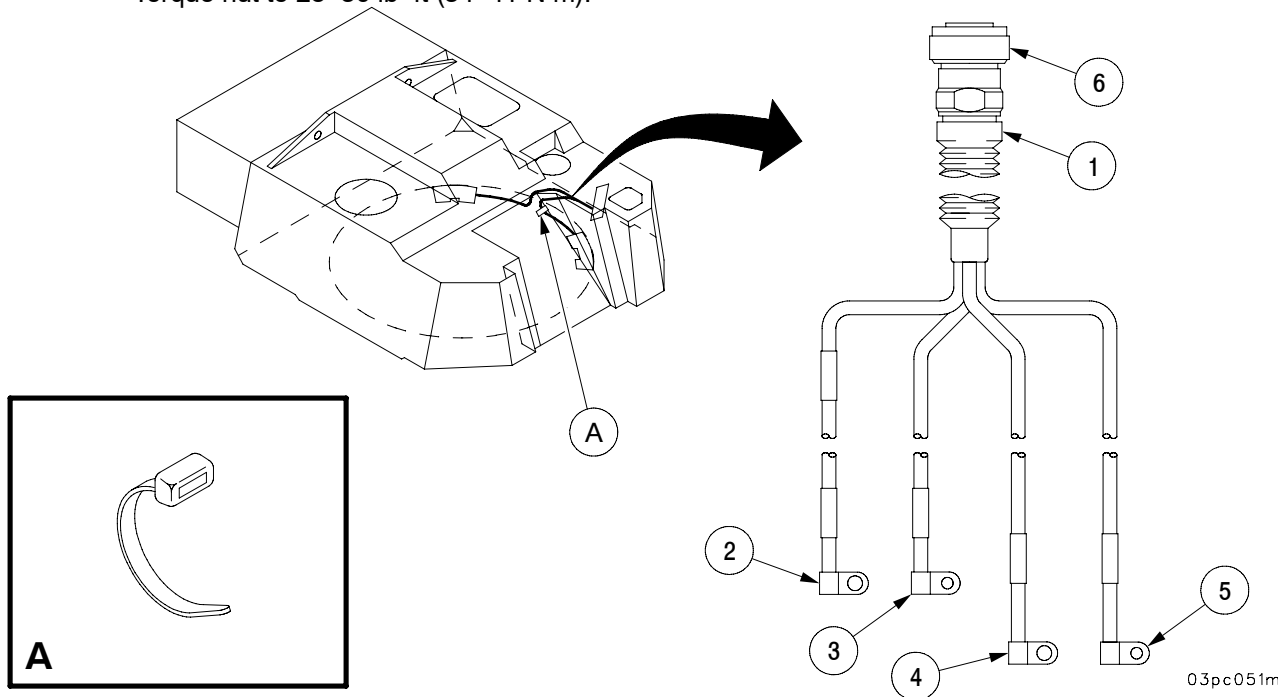
- 1 Install wiring harness (1) in vehicle.
- 2 Connect wiring harness (1) and attaching hardware and new lockwashers at the following points:

Item No.	W55 Connector/Lead/Wire	To Connector/Lead/Wire/Component	Location
6	W55 P1	Hydraulic bulkhead connector	Forward cab bulkhead to hydraulic compartment.
*5	100	Brush block 7	Slip ring - rear of cab behind Gunner's station.
**4	70	Brush block 7	Slip ring - rear of cab behind Gunner's station.
*3	100	Brush block 6	Slip ring - rear of cab behind Gunner's station.
**2	70	Brush block 6	Slip ring - rear of cab behind Gunner's station.

- 3 Install new tiedown strap on wiring harness (1).

\* Torque nut to 30-35 lb-ft (41-47 N·m).

\*\* Torque nut to 25-30 lb-ft (34-41 N·m).



03pc051m

**5-14 WIRING HARNESS W56 AND W57.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit (SC 5180-95-A12)  
Torque wrench (item 53, Appx G)

Materials/Parts

Lockwashers (7) (item 128, Appx F)  
Lockwashers (4) (item 129, Appx F)  
Lockwashers (1) (item 132, Appx F)  
Marking tag (AR) (item 87, Appx C)  
Lockwashers (3) (item 130, Appx F)  
Tiedown straps (3) (item 79, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF (TM 9-2350-314-10)  
Battery ground leads disconnected (TM 9-2350-314-20-1-2)  
Slip ring cover (brush blocks 3 & 4) removed (para 23-1)  
MCS rear door opened (TM 9-2350-314-10)  
MCS bus cover removed (para 13-5)  
Loudspeaker removed (TM 9-2350-314-10)

**a. Removal.**

**NOTE**

The removal and installation procedures for wiring harnesses W56 and W57 are identical except harness W57 is the negative lead. This task covers only harness W56. Tag leads before disconnecting to aid in installation. Two additional leads at brush block must be removed/installed during this task.

- 1 Remove two screws (1), two lockwashers (2), two flat washers (2), bracket (4), and guard (5).
- 2 Disconnect wiring harness (6), tiedown straps, and attaching hardware at the following points: Discard lockwashers and tiedown straps.

<b>Item No.</b>	<b>W56 Connector/Lead/Wire</b>	<b>From Connector/Lead/Wire/Component</b>	<b>Location</b>
7	W56	Brush block 3	Slip ring - rear of cab behind COS station.
8	W56	MCS bus bar positive terminal	Roof of cab on MCS compartment door.

- 3 Pull lead (8) through conduit (9).
- 4 Push wiring harness (6) through roof into cab.
- 5 Remove wiring harness (6) from vehicle.

**5-14 WIRING HARNESS W56 AND W57 - CONTINUED**

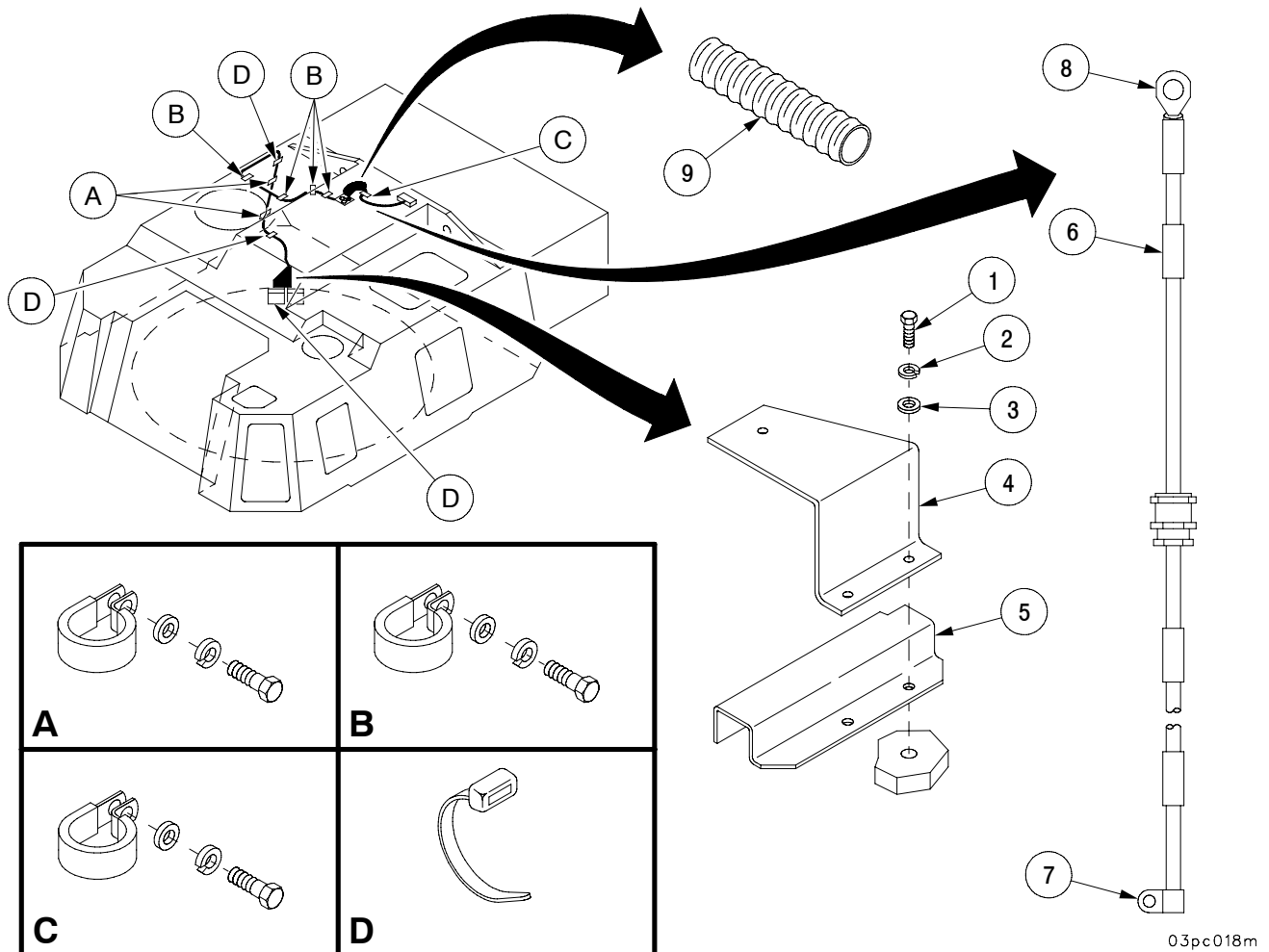
**b. Installation.**

- 1 Push wiring harness (6) from cab through roof.
- 2 Thread lead (8) through conduit (9).
- 3 Connect wiring harness (6), new tiedown straps, new lockwashers and clamps with attaching hardware at the following points:

Item No.	W56 Connector/Lead/Wire	To Connector/Lead/Wire/Component	Location
8	W56	MCS bus bar positive terminal	Roof of cab on MCS compartment door.
*7	W56	Brush block 3	Slip ring - rear of cab behind COS station.

- 4 Install guard (5), bracket (4) with two flat washers (3), two new lockwashers (2) and two screws (1).

\* Torque nut to 30-35 lb-ft (41-47 N·m).



03pc018m

## 5-15 WIRING HARNESS W58.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Lockwashers (4) (item 124, Appx F)  
Lockwashers (15) (item 130, Appx F)  
Gasket (item 14, Appx F)  
Tiedown straps (2) (item 79, Appx C)  
Marking tag (AR) (item 87, Appx C)  
Lockwashers (11) (item 128, Appx F)  
Lockwashers (5) (item 129, Appx F)  
Tiedown straps (4) (item 81, Appx C)

#### Equipment Conditions

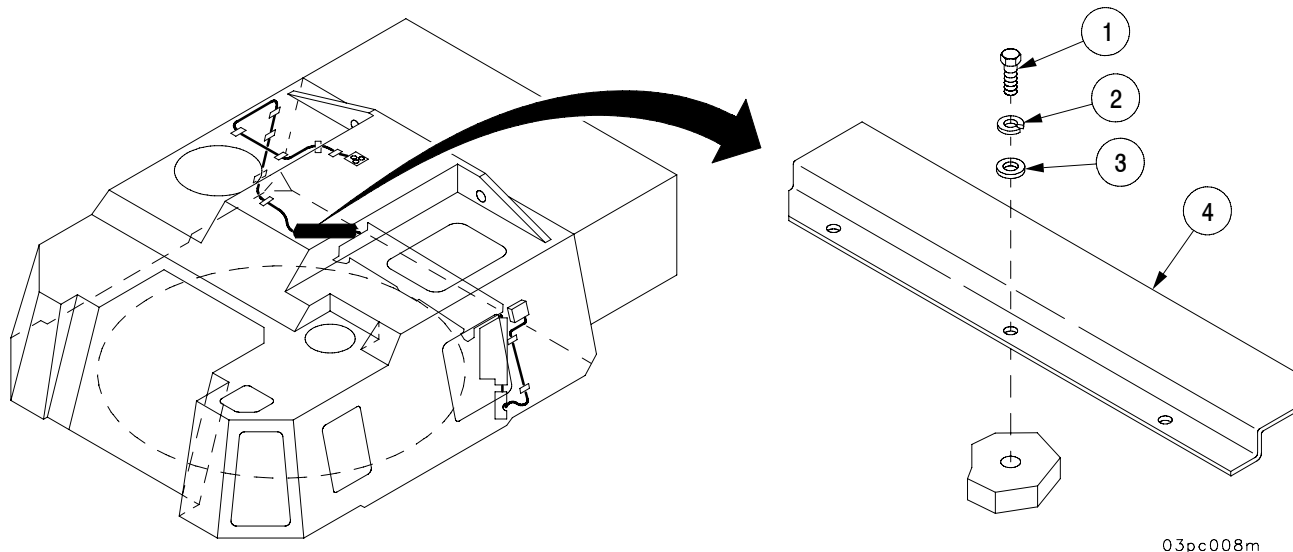
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

#### NOTE

Tag leads before disconnecting to aid in installation.

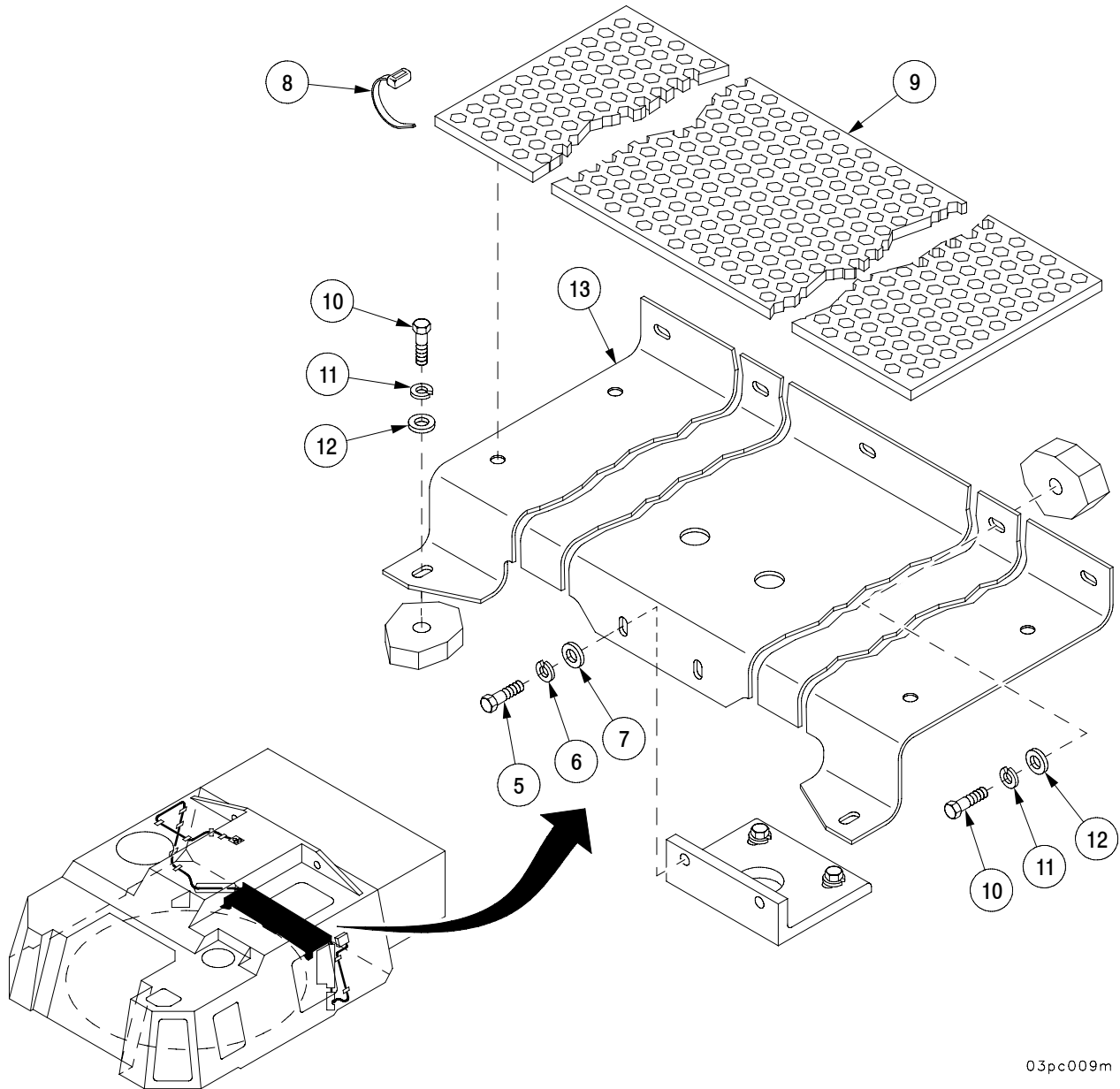
- 1 Remove three screws (1), three lockwashers (2), three flat washers (3), and cover (4). Discard lockwashers.



## 5-15 WIRING HARNESS W58 - CONTINUED

### a. Removal - Continued

- 2 Remove two screws (5), two lockwashers (6), and two flat washers (7). Discard lockwashers.
- 3 Remove four tiedown straps (8) and mat (9). Discard tiedown straps.
- 4 Remove seven screws (10), seven lockwashers (11), seven flat washers (12), and guard (13). Discard lockwashers.

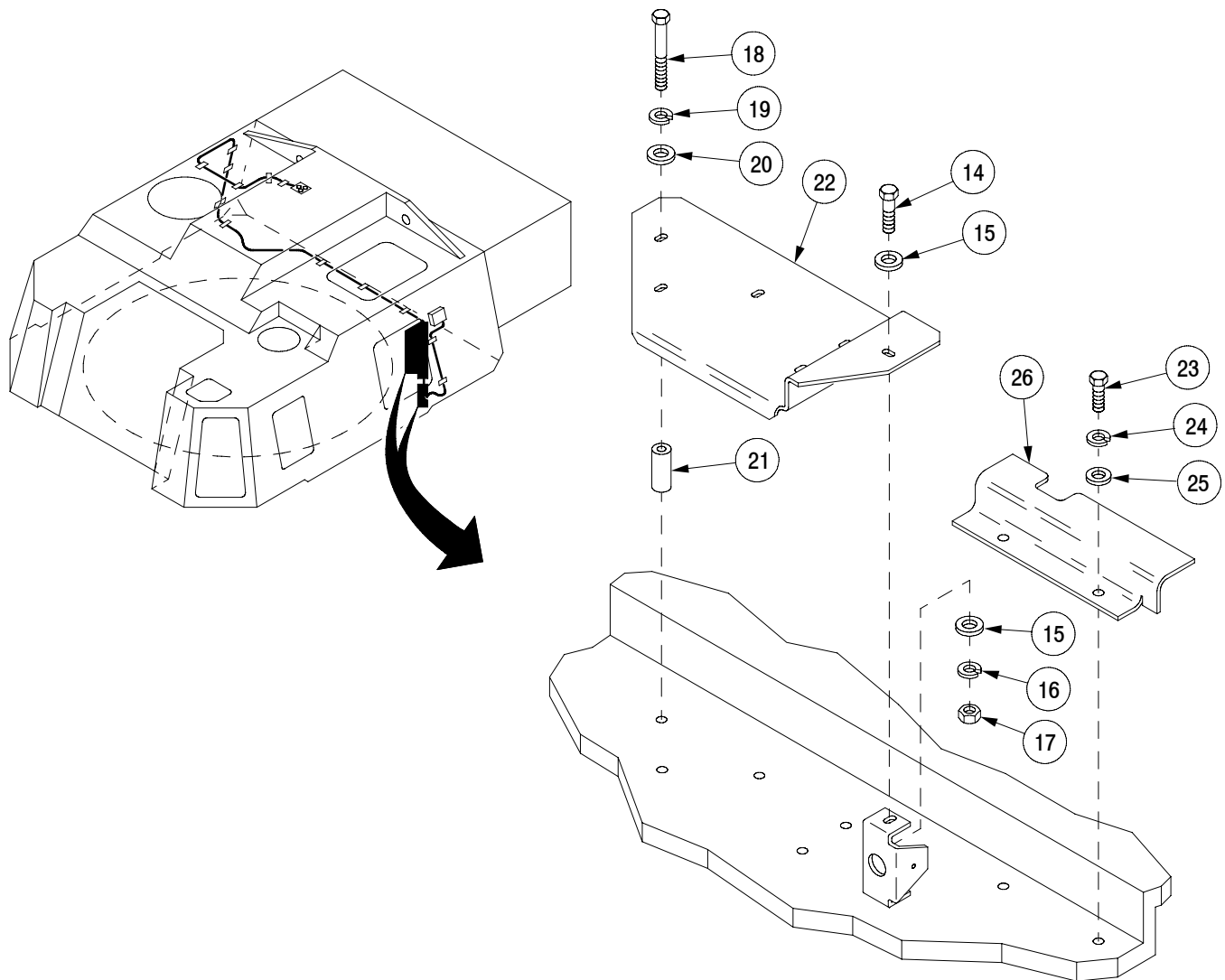


03pc009m

**5-15 WIRING HARNESS W58 - CONTINUED**

**a. Removal - Continued**

- 5 Remove screw (14), two flat washers (15), lockwasher (16), and nut (17). Discard lockwasher.
- 6 Remove five screws (18), five lockwashers (19), five flat washers (20), five spacers (21), and cover (22). Discard lockwashers.
- 7 Remove two screws (23), two lockwashers (24), two flat washers (25), and guard (26). Discard lockwashers.



03pc010m



**5-15 WIRING HARNESS W58 - CONTINUED**

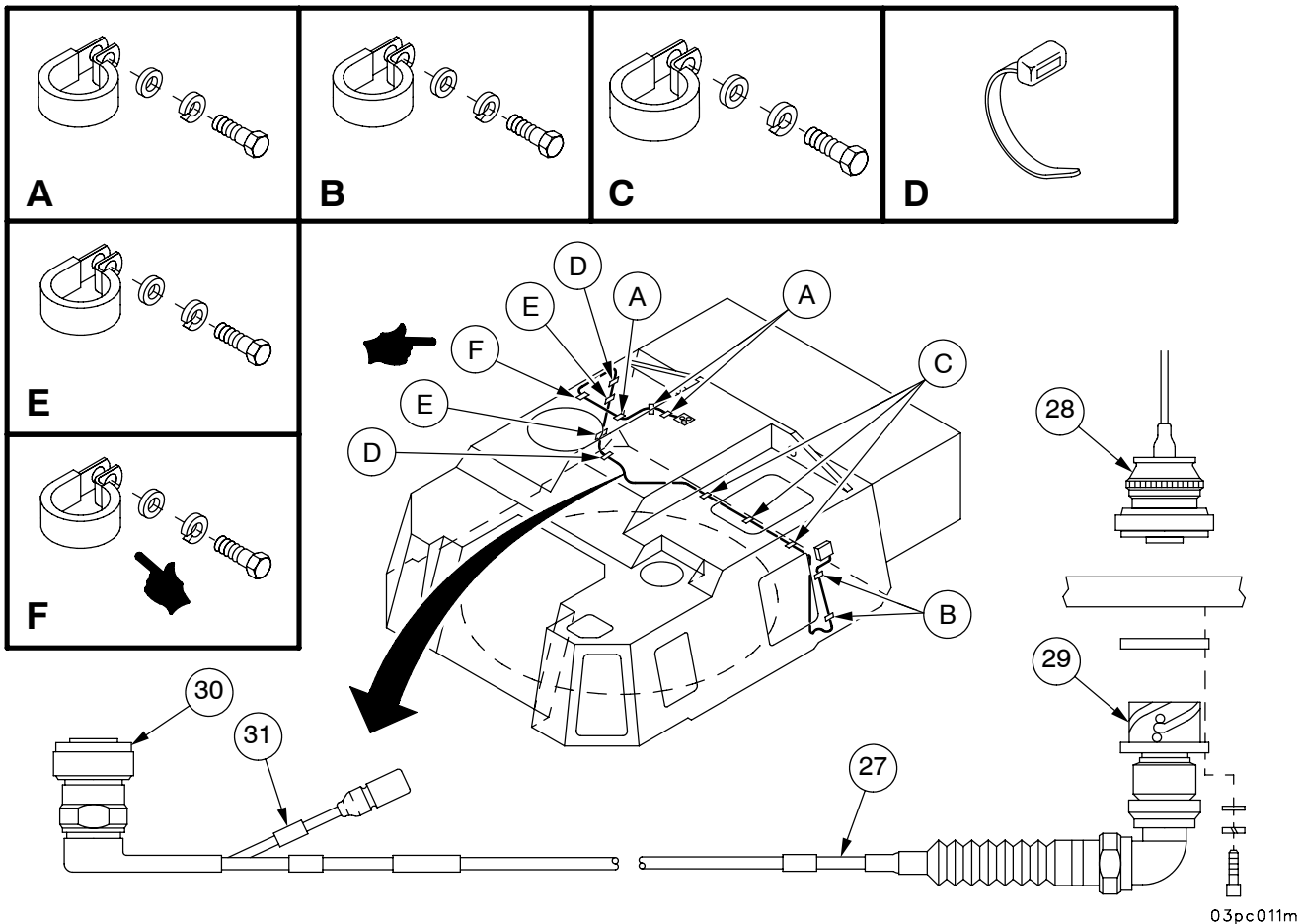
**a. Removal - Continued**

8 Disconnect wiring harness W58 (27) and attaching hardware at the following points:

Item No.	W58 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
28	MCS harness	1P1	Cab roof in MCS compartment.
29	W58 J1	Cab overhead	Rear of cab - center, forward of bustle. To MCS compartment.
30	W58 P2	MCS control panel	Rear of cab - center beside cab side door.
31	W58 70	Interlock control 70	Above side door

9 Remove clamps, tiedown straps and attaching hardware securing wiring harness W58 (27) to vehicle. Discard lockwashers and tiedown straps.

10 Remove wiring harness W58 (27) from vehicle.

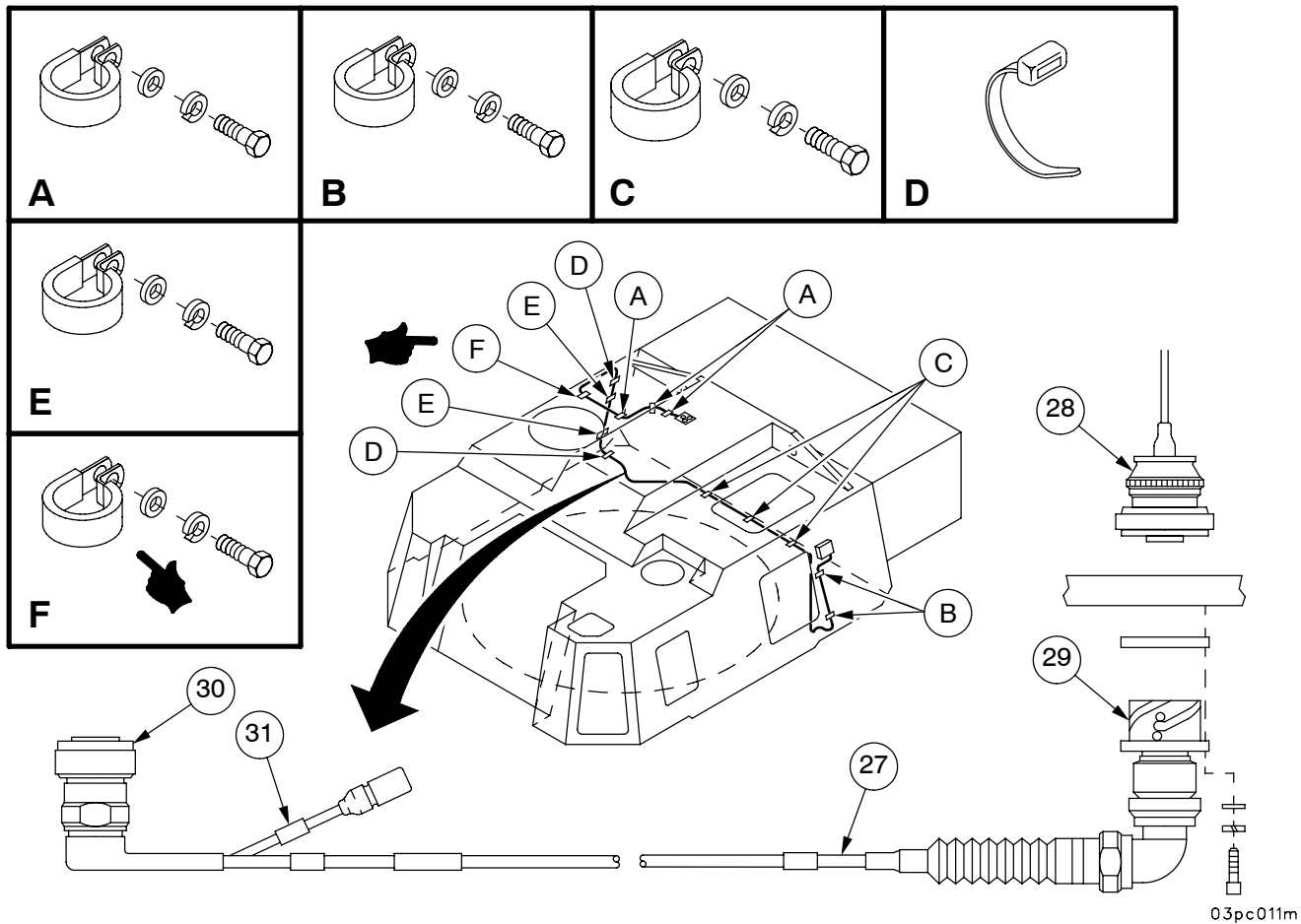


**5-15 WIRING HARNESS W58 - CONTINUED**

**b. Installation.**

- 1 Install wiring harness W58 (27) in vehicle with clamps, new tiedown straps, new lockwashers, and attaching hardware.
- 2 Connect wiring harness W58 (27) and attaching hardware at the following points:

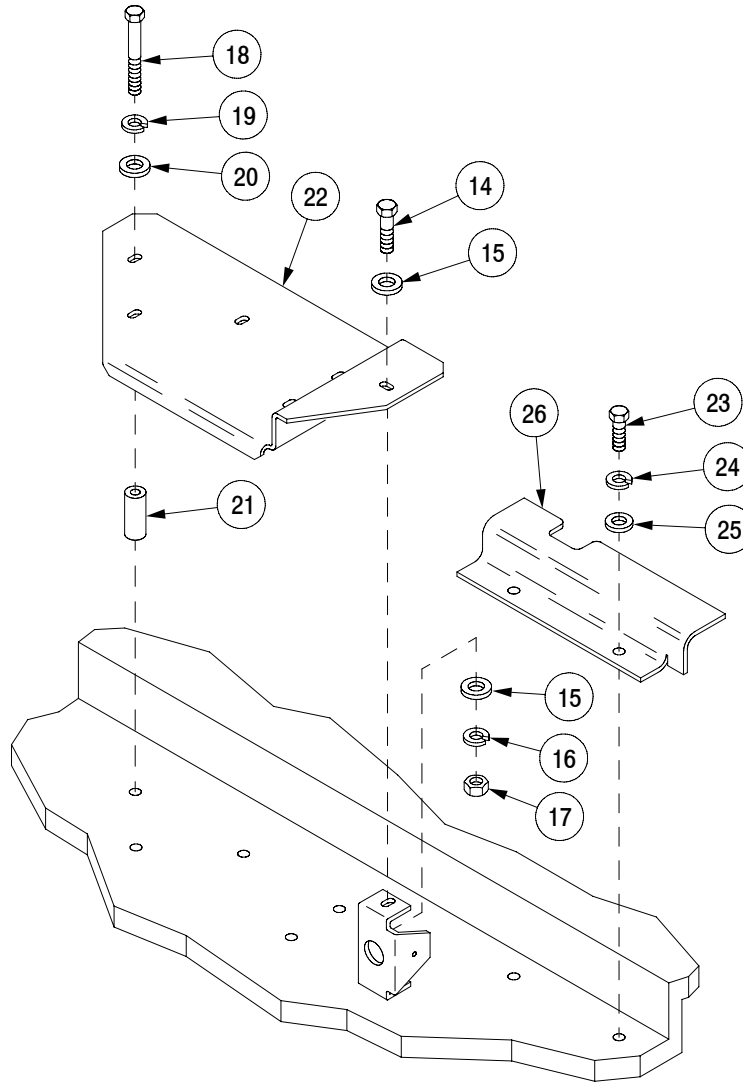
Item No.	W58 Connector/Lead/Wire	To Connector/Lead/Wire/Component	Location
31	W58 70	Interlock control 70	Above side door
30	W58P2	MCS control panel	Rear of cab - center beside cab side door.
29	W58 J1	Cab overhead	Rear of cab - center, forward of bustle. To MCS compartment.
28	MCS harness	1P1	Cab roof in MCS compartment.



**5-15 WIRING HARNESS W58 - CONTINUED**

**b. Installation - Continued**

- 3 Install guard (26) with two screws (23), two new lockwashers (24), and two flat washers (25).
- 4 Install cover (22) with five screws (18), five new lockwashers (19), five flat washers (20), and five spacers (21).
- 5 Install screw (14), two flat washers (15), new lockwasher (16), and nut (17).

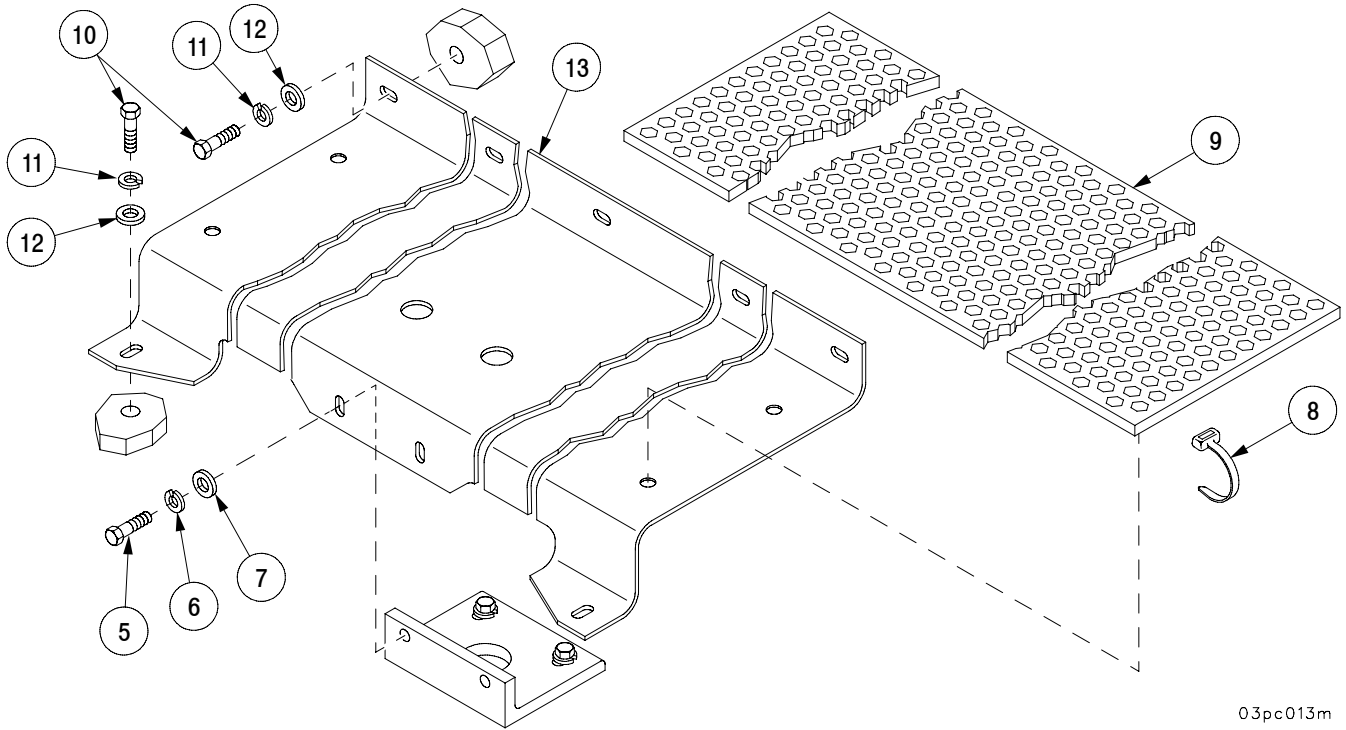


03pc012m

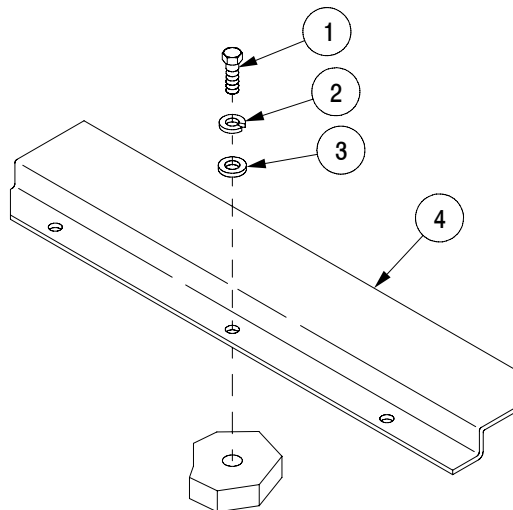
## 5-15 WIRING HARNESS W58 - CONTINUED

### b. Installation - Continued

- 6 Install guard (13) with seven screws (10), seven new lockwashers (11), and seven flat washers (12).
- 7 Install mat (9) with four new tiedown straps (8).
- 8 Install two screws (5), two new lockwashers (6), and two flat washers (7).



- 9 Install cover (4) with three screws (1), three new lockwashers (2), and three flat washers (3).



**5-16 WIRING HARNESS W61A.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

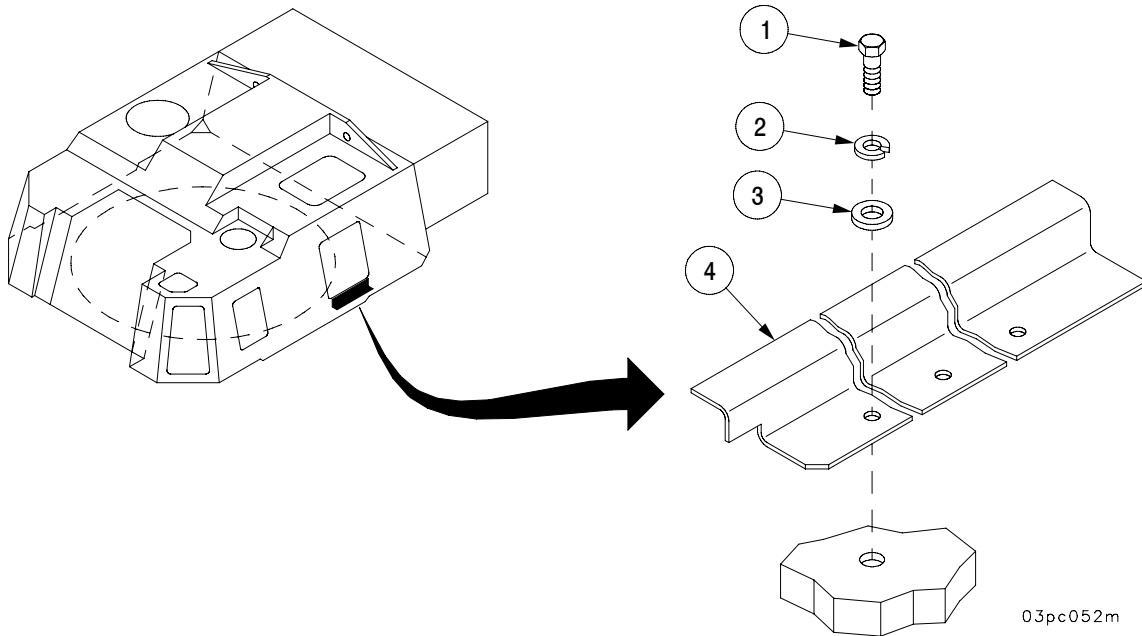
Lockwashers (5) (item 129, Appx F)  
Lockwashers (6) (item 130, Appx F)  
Lockwashers (2) (item 127, Appx F)  
Tiedown straps (3) (item 76, Appx C)  
Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Covers removed from brush blocks 5, 6,  
7, and 8 (para 23-1)  
Cover and guard removed  
(para 5-15)

**a. Removal.**

- 1 Remove three screws (1), three lockwashers (2), three flat washers (3) and cover (4) in front of brush block 5 and brush block 6. Discard lockwashers.



**5-16 WIRING HARNESS W61A - CONTINUED**

**a. Removal - Continued**

Item No.	W61A Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
6	W61A P2	Brush block 5	Left side of cab behind Gunner's station.
7	W61A P3	Brush block 6	Left side of cab behind Gunner's station.
8	W61A P4	Brush block 7	Left side of cab in front of Gunner's station.
9	W61A P5	Brush block 8	Left side of cab in front of Gunner's station.
10	W61A J1	W62A P1	Right side of cab in front of COS station.
11	W61A P1	W62A J1	Rear of cab above cab rear door.

- 3 Remove clamps, tiedown straps, and attaching hardware securing wiring harness W61A (5) from vehicle. Discard lockwashers and tiedown straps.
- 4 Remove wiring harness W61A (5) from vehicle.

**b. Installation.**

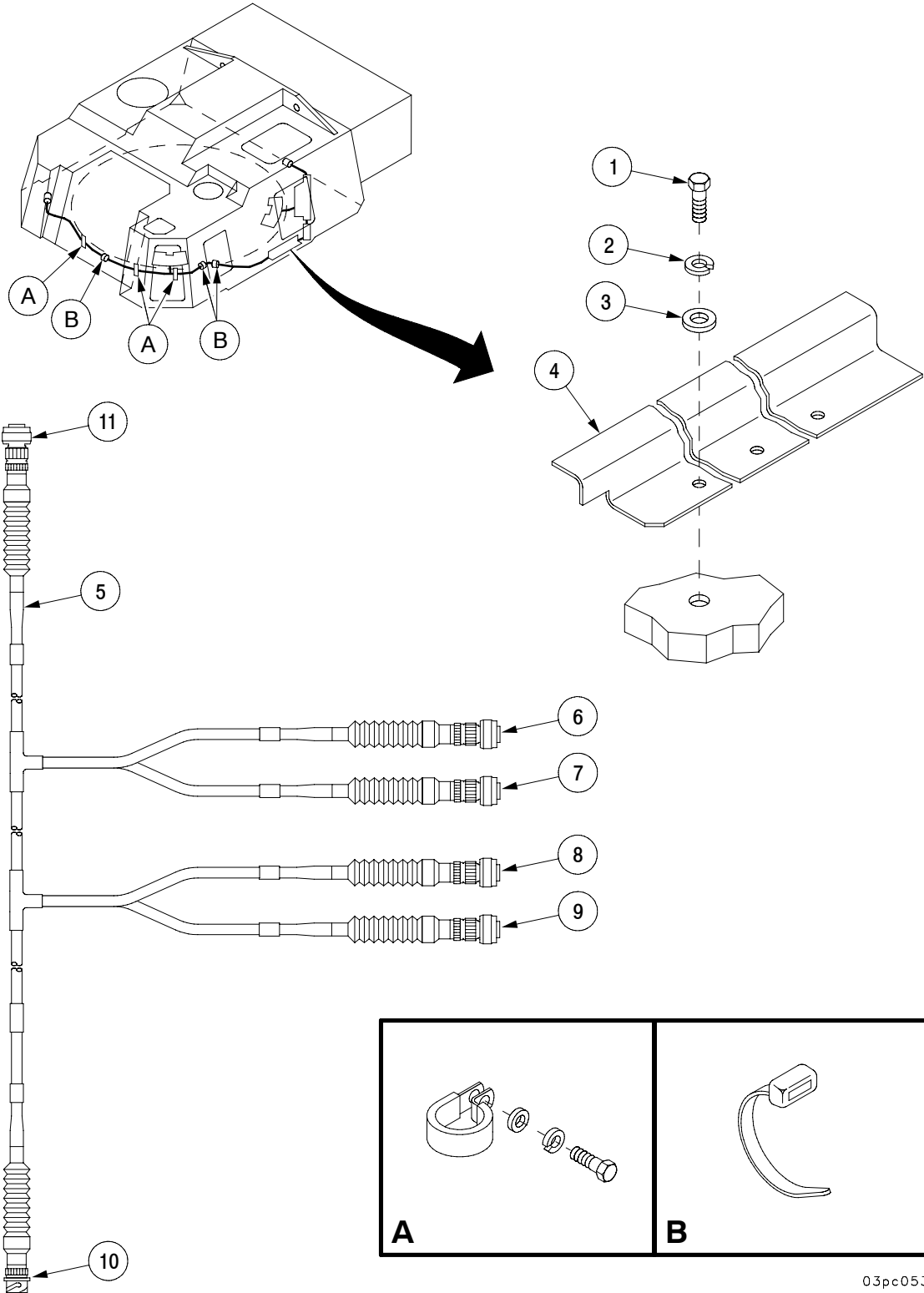
- 1 Install wiring harness W61A (5) in vehicle with clamps, new tiedown straps, new lockwashers and attaching hardware.
- 2 Connect wiring harness W61A (5) at the following points:

Item No.	W61A Connector/Lead/Wire	To Connector/Lead/Wire/Component	Location
11	W61A P1	W62A J1	Rear of cab above cab rear door.
10	W61A J1	W62A P1	Right side of cab in front of COS station.
9	W61A P5	Brush block 8	Left side of cab in front of Gunner's station.
8	W61A P4	Brush block 7	Left side of cab in front of Gunner's station.
7	W61A P3	Brush block 6	Left side of cab behind Gunner's station.
6	W61A P2	Brush block 5	Left side of cab behind Gunner's station.

- 3 Install three screws (1), three new lockwashers (2), and three flat washers (3) to secure cover (4).

5-16 WIRING HARNESS W61A - CONTINUED

b. Installation - Continued



03pc053m

**5-17 WIRING HARNESS W65.**

This task covers:      a. Removal    b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic’s tool kit  
(SC 5180-95-A12)

Equipment Conditions

Vehicle MASTER power switch OFF  
Battery ground leads disconnected  
Radios removed (TM 11-5330-890-10)

Materials/Parts

Lockwashers (11) (item 128, Appx F)  
Tiedown straps (4) (item 76, Appx C)  
Marking tag (AR) (item 87, Appx C)

**a. Removal.**

**NOTE**

Tag leads before disconnecting to aid in installation.

- 1 Remove three screws (1), three lockwashers (2), three flat washers (3) and cover (4). Discard lockwashers.
- 2 Disconnect wiring harness W65 (5) at the following points.

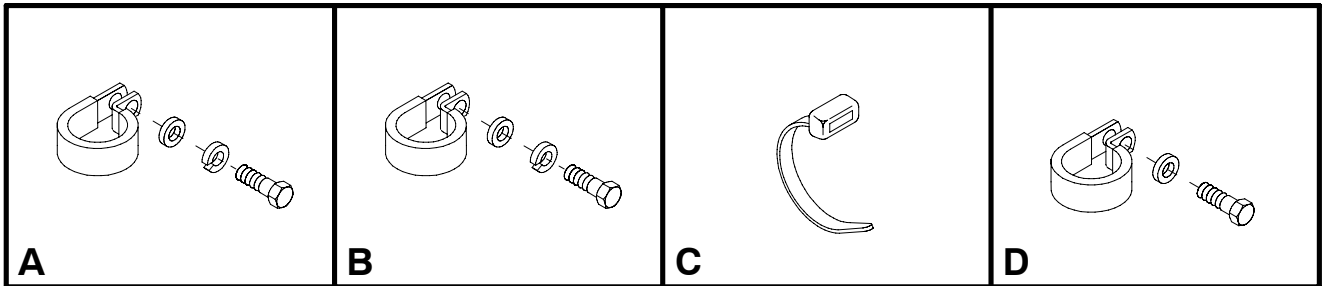
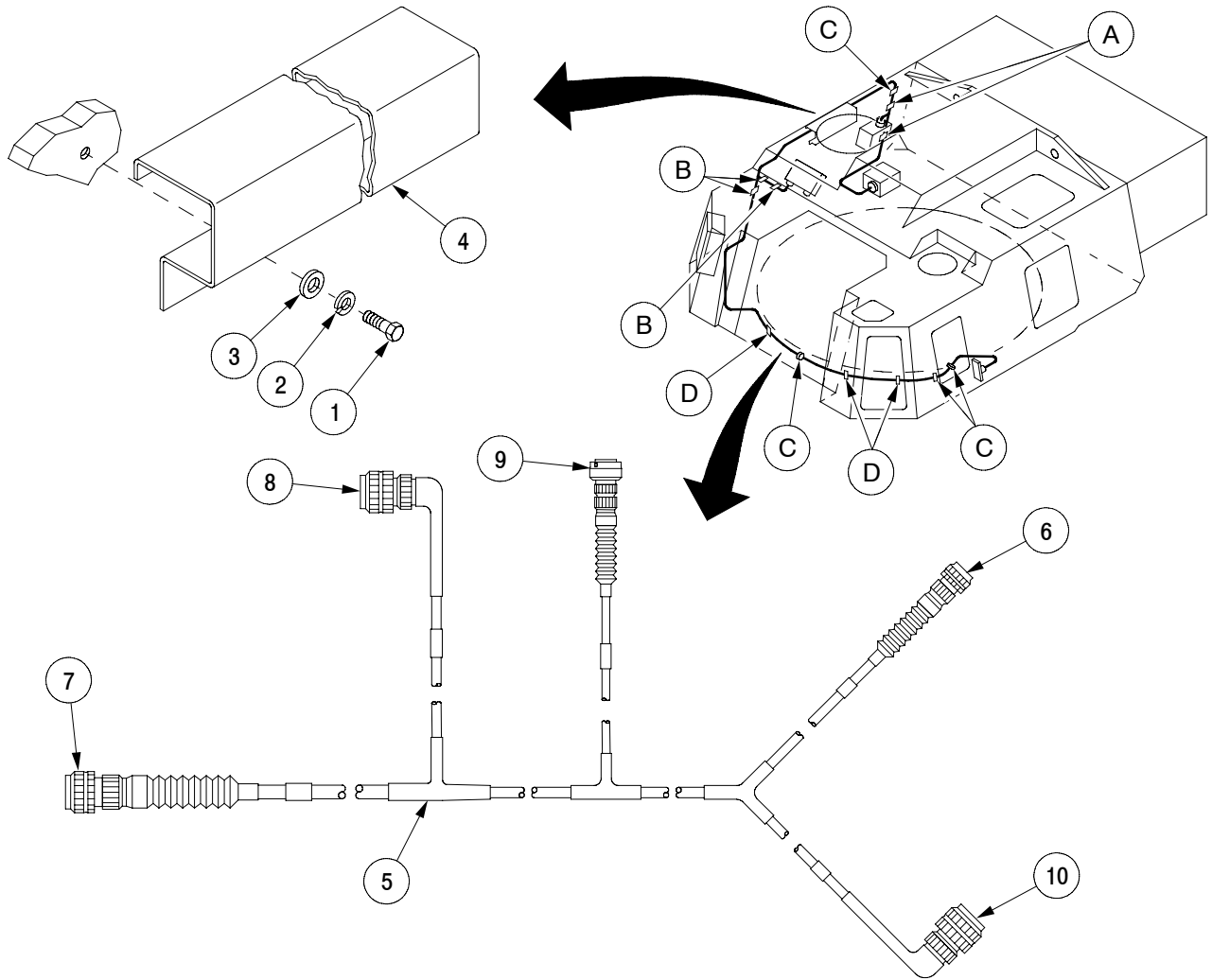
Item No.	W65 Connector/Lead/Wire	From Connector/ Lead/Wire/Component	Location
6	W65 P5	Hydraulic compartment bulkhead connector	On bulkhead separating cab and hydraulic compartment at Gunner’s station.
7	W65 P1	PDIU connector J6	Right side rear cab on shelf behind COS station.
8	W65 P2	PCU connector J5	Right side center cab on bulkhead at COS station.
9	W65 P3	Hydraulic control box	At COS station below cupola on overhead.
10	W65 P4	ACU connector J5	Right front cab on right bulkhead.

- 3 Remove clamps, tiedown straps and attaching hardware securing wiring harness W65 (5) from vehicle. Discard tiedown straps and lockwashers.
- 4 Remove wiring harness W65 (5) from vehicle.



### 5-17 WIRING HARNESS W65 - CONTINUED

#### a. Removal - Continued



03pc054m

**5-17 WIRING HARNESS W65 - CONTINUED**

**b. Installation.**

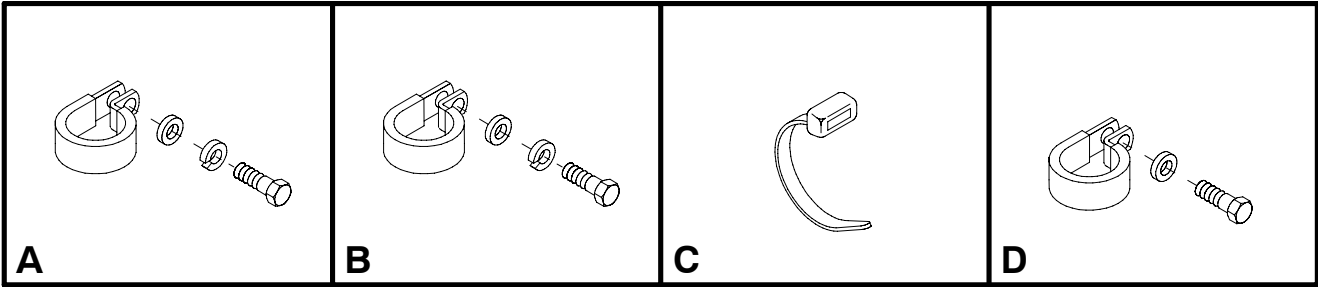
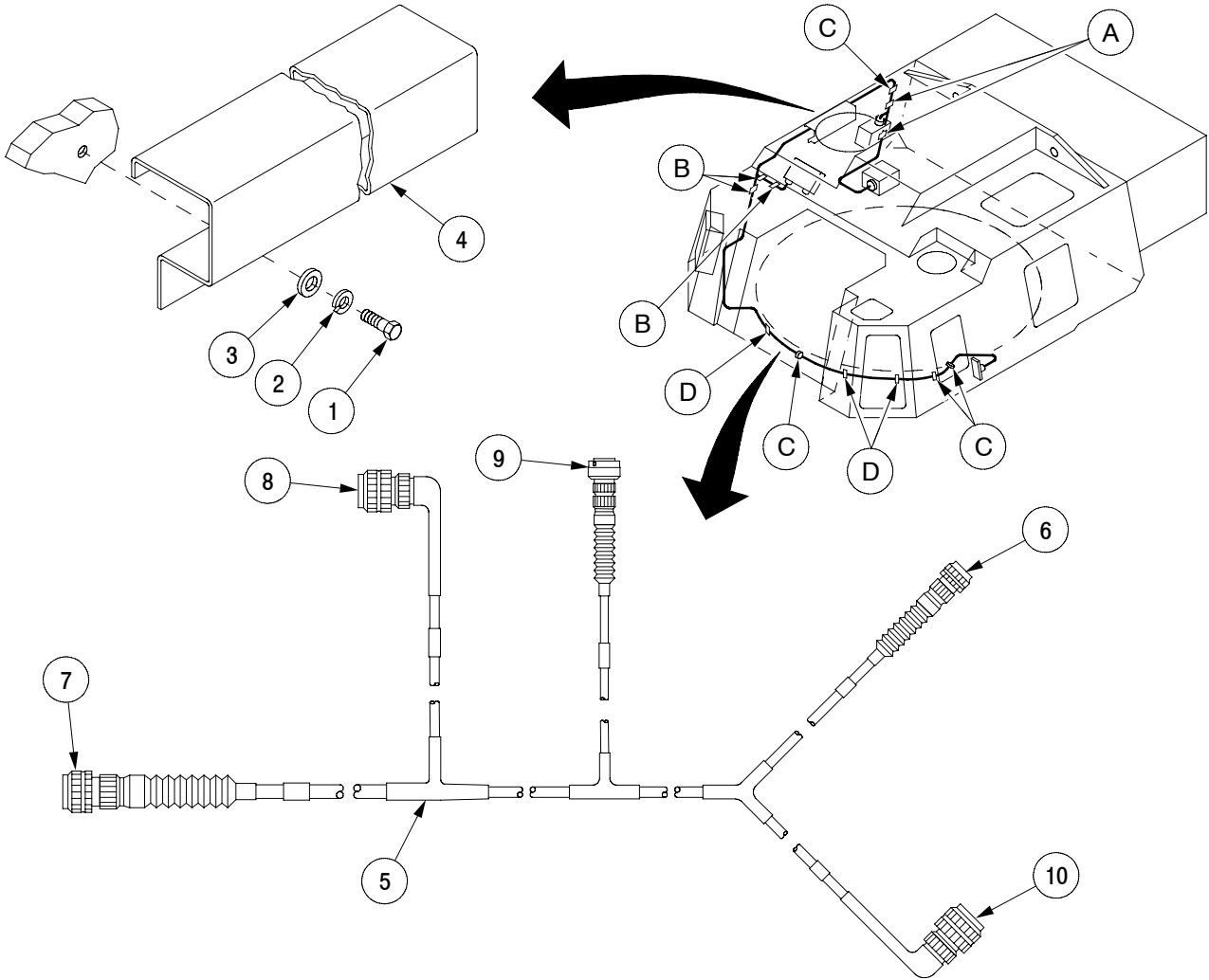
- 1 Install wiring harness W65 (5) in vehicle with clamps, new tiedown straps, new lockwashers, and attaching hardware.
- 2 Connect wiring harness W65 (5) at the following points:

<b>Item No.</b>	<b>W65 Connector/Lead/Wire</b>	<b>To Connector/Lead/Wire/Component</b>	<b>Location</b>
10	W65 P4	ACU connector J5	Right front cab on right bulkhead.
9	W65 P3	Hydraulic control box	At COS station below cupola on overhead.
8	W65 P2	PCU connector J5	Right side center cab on bulkhead at COS station.
7	W65 P1	PDIU connector J6	Right side rear cab on shelf behind COS station.
6	W65 P5	Hydraulic compartment bulkhead connector	On bulkhead separating cab and hydraulic compartment at Gunner's station.

- 3 Install cover (4) with three flat washers (3), three new lockwashers (2), and three screws (1).

5-17 WIRING HARNESS W65 - CONTINUED

b. Installation - Continued



03pc054m

### 5-17.1 WIRING HARNESS W65A.

This task covers:        a. Removal                                b. Installation

#### **INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwashers (8) (item 128, Appx F)  
Tiedown straps (4) (item 76, Appx C)  
Marking tags (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Radios removed  
(TM 11-5830-890-10)

**a. Removal.**

**NOTE**

Tag leads before disconnecting to aid in installation.

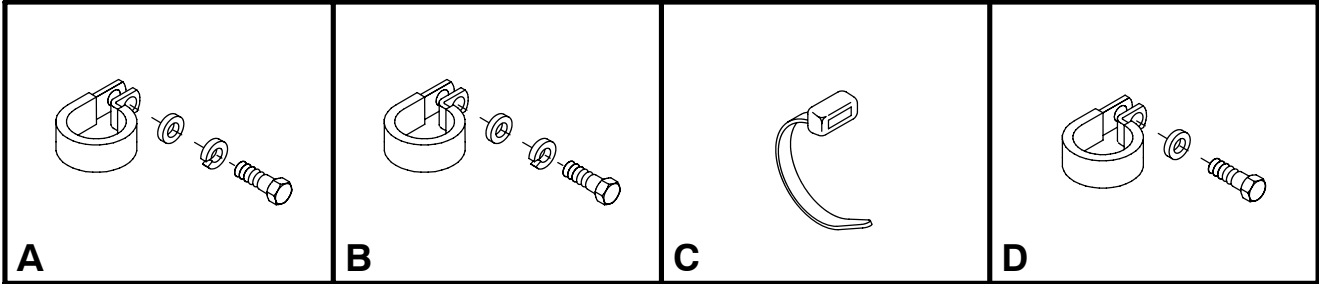
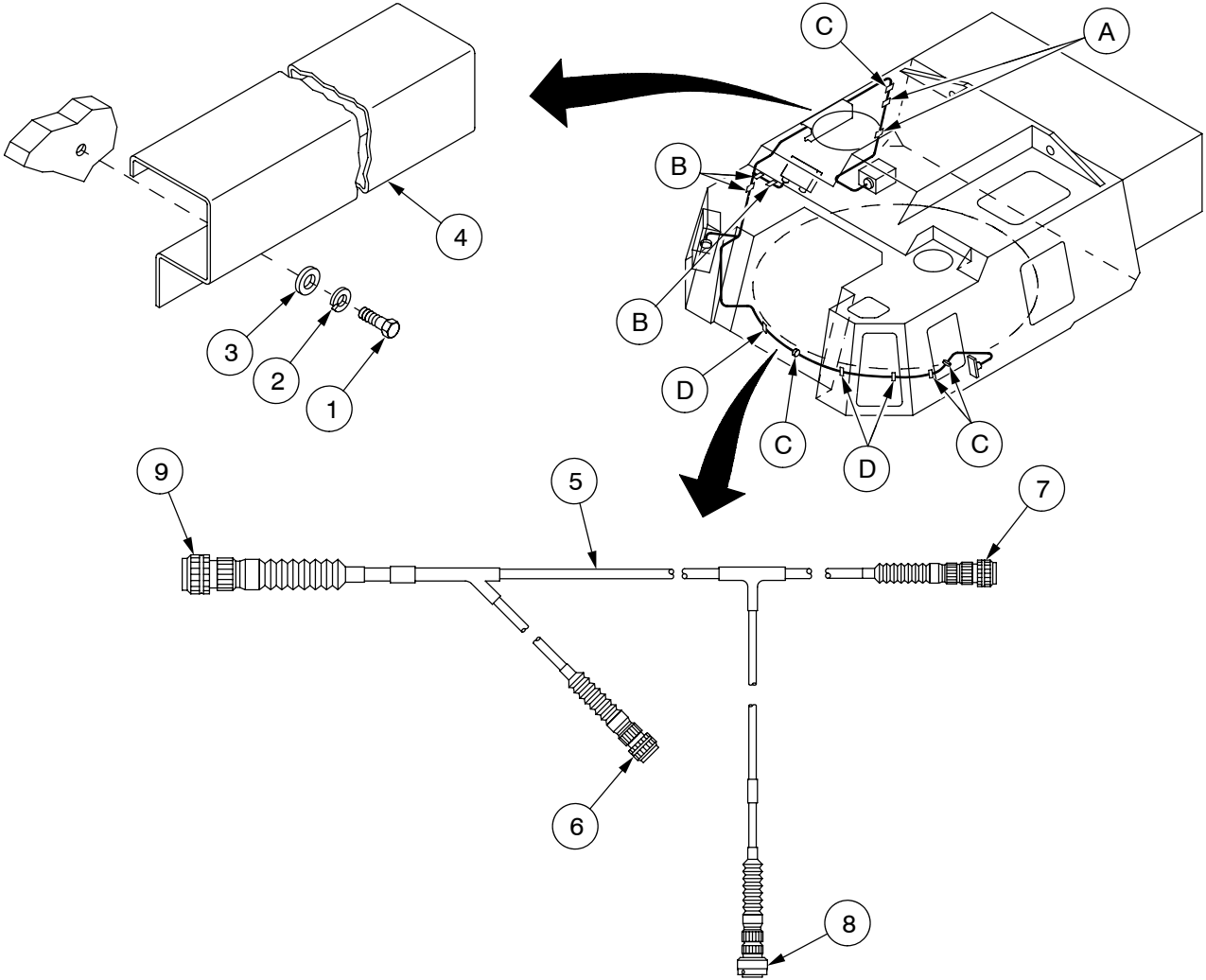
- 1 Remove three screws (1), three lockwashers (2), three flat washers (3) and cover (4). Discard lockwashers.
- 2 Disconnect wiring harness W65A (5) at the following points.

Item No.	W65 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
6	W65A P5	Hydraulic compartment bulkhead connector	On bulkhead separating cab and hydraulic compartment at Gunner's station.
7	W65A P2	PCU-2 connector J5	Right side center cab on bulkhead at COS station.
8	W65A P3	Hydraulic control box J2	At COS station below cupola on overhead.
9	W65A P4	PDCU connector J5	Right front cab on right bulkhead.

- 3 Remove clamps, tiedown straps and attaching hardware securing wiring harness W65A (5) from vehicle. Discard tiedown straps and lockwashers.
- 4 Remove wiring harness W65A (5) from vehicle.

5-17.1 WIRING HARNESS W65A - CONTINUED

a. Removal - Continued



03pc054ma

**5-17.1 WIRING HARNESS W65A - CONTINUED**

**b. Installation.**

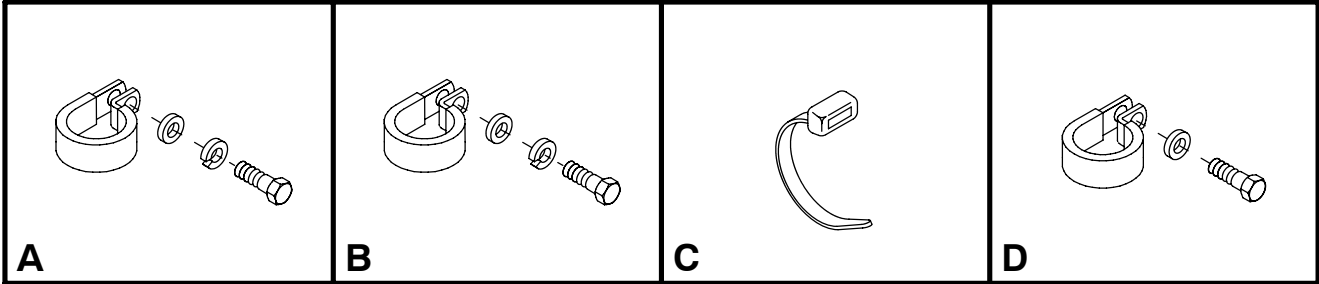
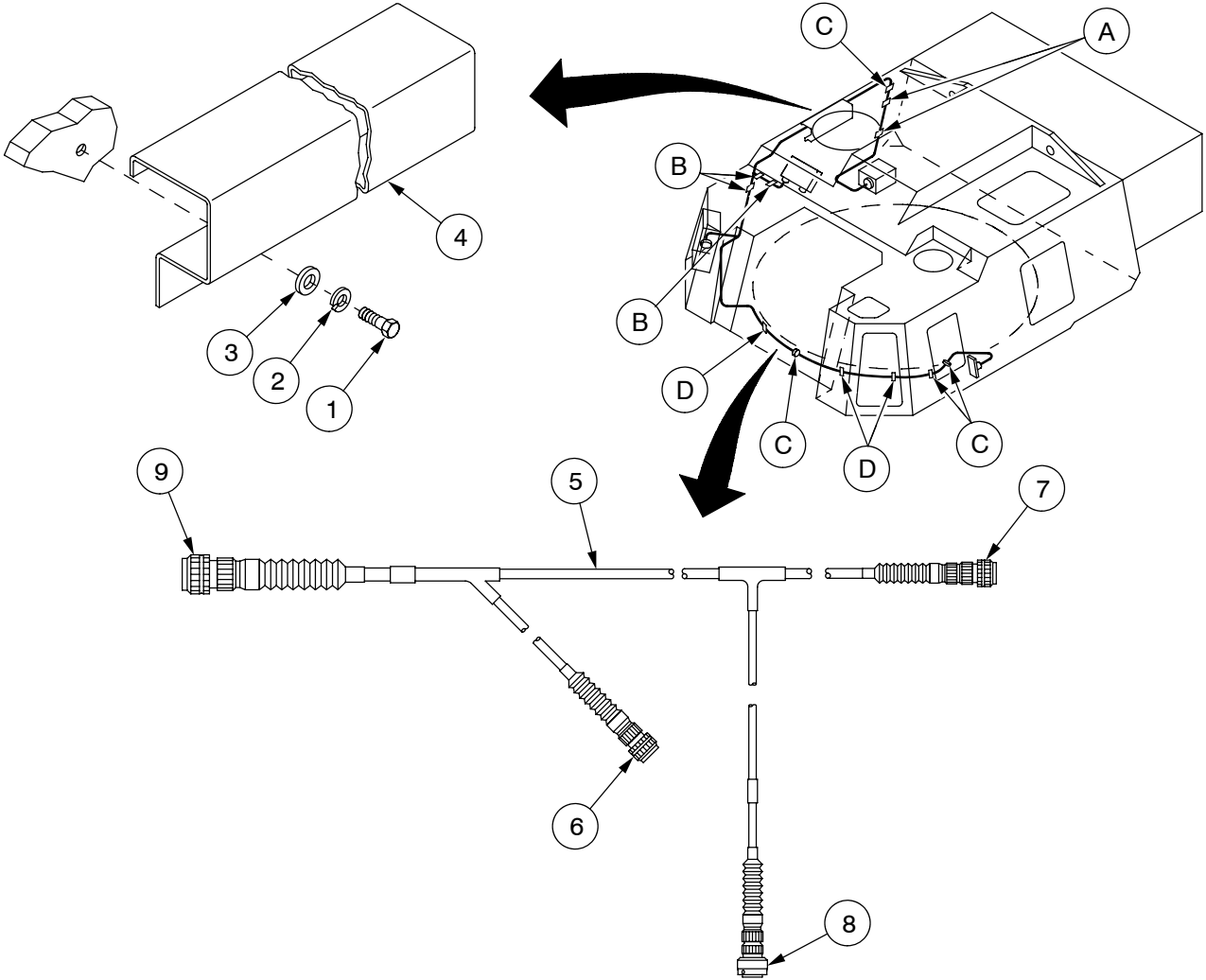
- 1 Install wiring harness W65A (5) in vehicle with clamps, new tiedown straps, new lockwashers, and attaching hardware.
- 2 Connect wiring harness W65A (5) at the following points:

<b>Item No.</b>	<b>W65 Connector/Lead/Wire</b>	<b>From Connector/Lead/Wire/Component</b>	<b>Location</b>
9	W65A P4	PDCU connector J5	Right front cab on right bulkhead.
8	W65A P3	Hydraulic control box J2	At COS station below cupola on overhead.
7	W65A P2	PCU-2 connector J5	Right side center cab on bulkhead at COS station.
6	W65A P5	Hydraulic compartment bulkhead connector	On bulkhead separating cab and hydraulic compartment at Gunner's station.

- 3 Install cover (4) with three flat washers (3), three new lockwashers (2), and three screws (1).

5-17.1 WIRING HARNESS W65A - CONTINUED

b. Installation - Continued



03pc054ma

## 5-18 HYDRAULIC SENSORS.

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This task covers: a. Removal b. Installation

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### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Torque wrench (item 54, Appx G)  
Crowfoot attachment (item 5, Appx G)  
Crowfoot attachment (item 6, Appx G)  
Crowfoot attachment (item 7, Appx G)  
Crowfoot attachment (item 8, Appx G)

#### Equipment Conditions

Hydraulic fluid drained (para 18-1)  
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment door opened  
(TM 9-2350-314-10)

#### Materials/Parts

Preformed packings (3) (item 90, Appx F)  
Hydraulic fluid (item 50, Appx C)  
Preformed packing (item 88, Appx F)

---

#### a. Removal.

### NOTE

This task applies to removing/installing the low level switch, temperature switch-cooling fan, temperature switch-warmup, or temperature transducer, all located on the hydraulic reservoir.

- 1 Disconnect electrical lead (1, 2, 3, or 4) from sensor (5, 6, 7, or 8) (low liquid level switch, temperature switch-warmup, temperature switch-cooling fan, or temperature transducer).
- 2 Remove sensor (5, 6, 7, or 8) (low level switch, temperature switch-cooling fan, temperature switch-warmup, or temperature transducer) and preformed packing (9 or 10). Discard preformed packing.
- 3 Remove six screws (9), six lockwashers (10), six flat washers (11), and blower (2) from door. Discard lockwashers.

#### b. Installation.

- 1 Lubricate new preformed packing (9 or 10) with hydraulic fluid.
- 2 Install new preformed packing (9 or 10) on sensor (5, 6, 7, or 8) (low level switch, temperature switch-cooling fan, temperature switch-warmup, or temperature transducer).
- 3 Install sensor (5, 6, 7, or 8) (low level switch, temperature switch-cooling fan, temperature switch-warmup, or temperature transducer) in hydraulic reservoir.



**5-18 HYDRAULIC SENSORS - CONTINUED**

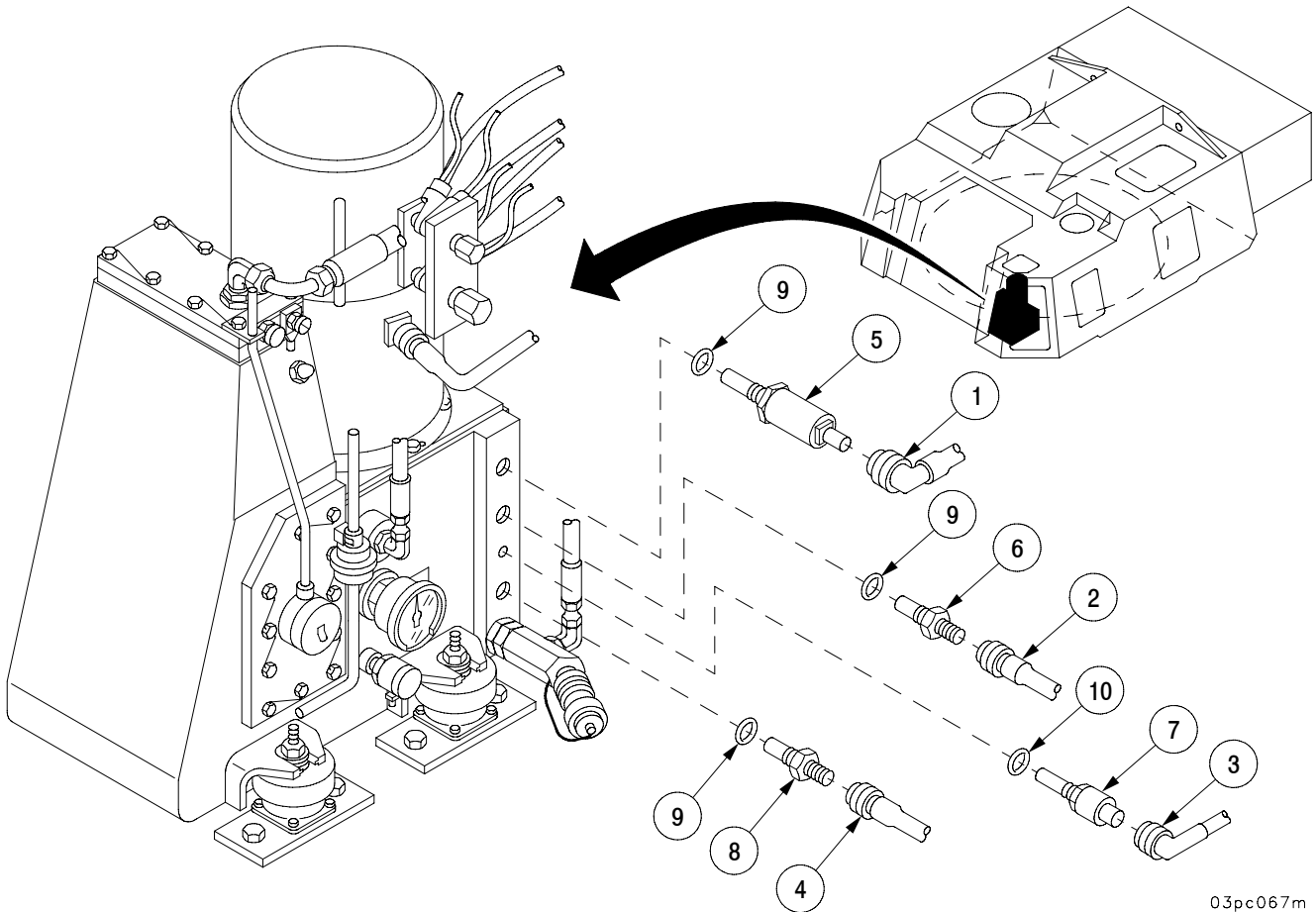
**b. Installation - Continued**

**NOTE**

Torque sensors as follows:

Sensor	Torque
Low Liquid Level (5)	230-260 lb-in. (26-29 N·m)
Warm Up Temperature (6)	150-175 lb-in. (17-20 N·m)
Temperature Transducer (7)	150-175 lb-in. (17-20 N·m)
Cooling Temperature (8)	150-175 lb-in. (17-20 N·m)

4 Connect electrical lead (1, 2, 3, or 4) to sensor (5, 6, 7, or 8).



03pc067m

## 5-19 HYDRAULIC PUMP MOTOR.

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This task covers:        a. Removal                                b. Installation

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<b>INITIAL SETUP</b>
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Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Manila rope (item 70, Appx C)  
Lockwasher (item 132, Appx F)  
Lockwasher (item 130, Appx F)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment door open  
(TM 9-2350-314-10)  
Hydraulic compartment access  
cover removed from top of cab (para 19-2)

Personnel Required

Two

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**a. Removal.**

- 1 Loosen nut (1) on coupling clamp (2).
- 2 Remove two plastic nuts (3) and pad (4).

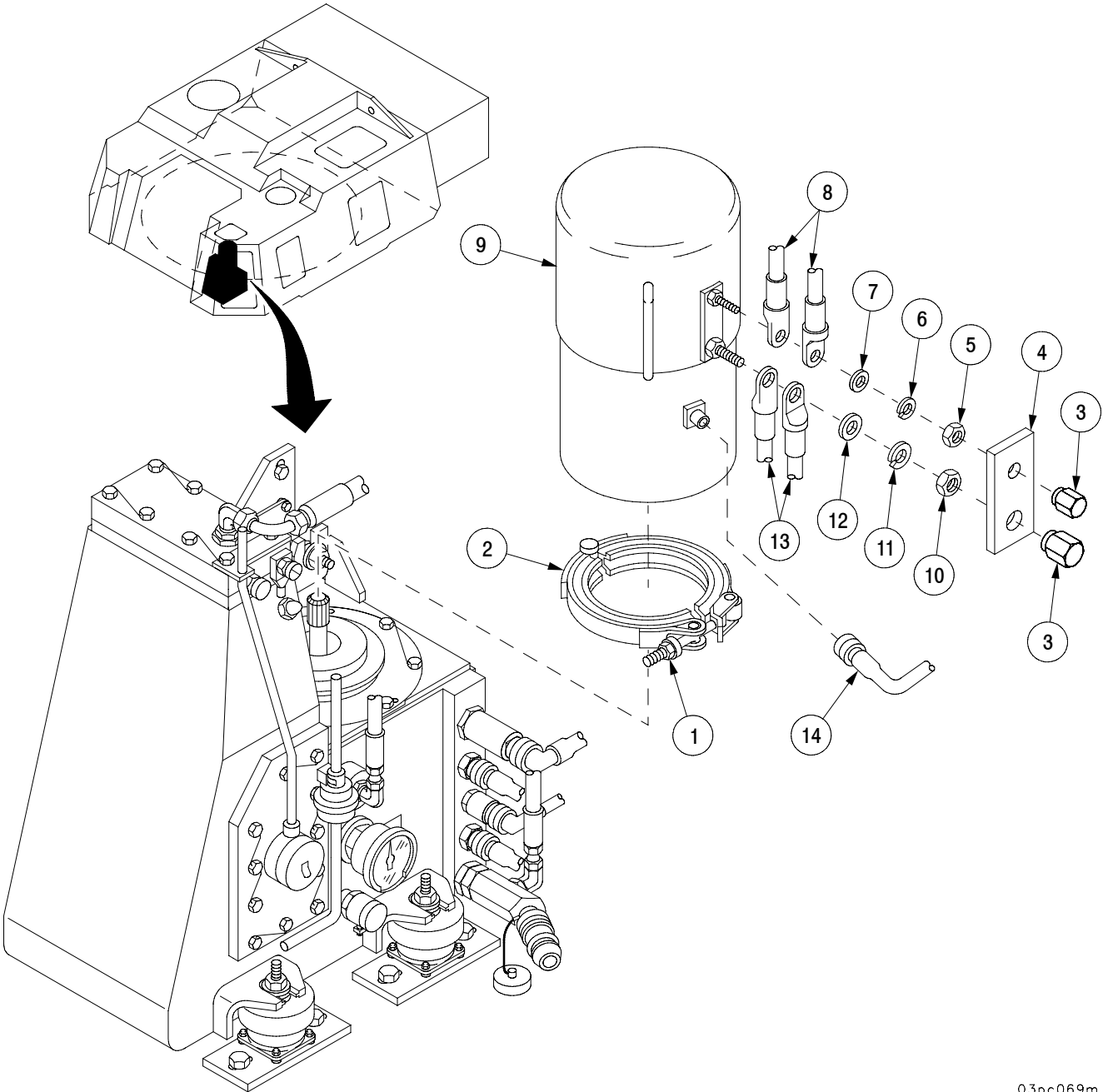
**NOTE**

Tag leads before disconnecting to aid in installation.

- 3 Remove nut (5), lockwasher (6), flat washer (7), and two leads 70 (8) from electric motor (9). Discard lockwasher.
- 4 Remove nut (10), lockwasher (11), flat washer (12), and two leads 100 (13) from electric motor (9). Discard lockwasher.
- 5 Disconnect connector (14) from motor (9).

5-19 HYDRAULIC PUMP MOTOR - CONTINUED

a. Removal - Continued



03pc069m

## 5-19 HYDRAULIC PUMP MOTOR - CONTINUED

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### a. Removal - Continued

**WARNING**

Electric motor is very heavy. Use care when removing, or installing the motor to prevent injury to personnel and/or equipment damage.

**CAUTION**

Use care when removing electric motor to prevent damage to involute spline.

- 6 Remove electric motor (9) through hydraulic access opening. Use manila rope through two lifting brackets on electric motor (9) for lift assist.
- 7 Remove coupling clamp (2).

### b. Installation.

- 1 Install coupling clamp (2). Do not tighten clamp.

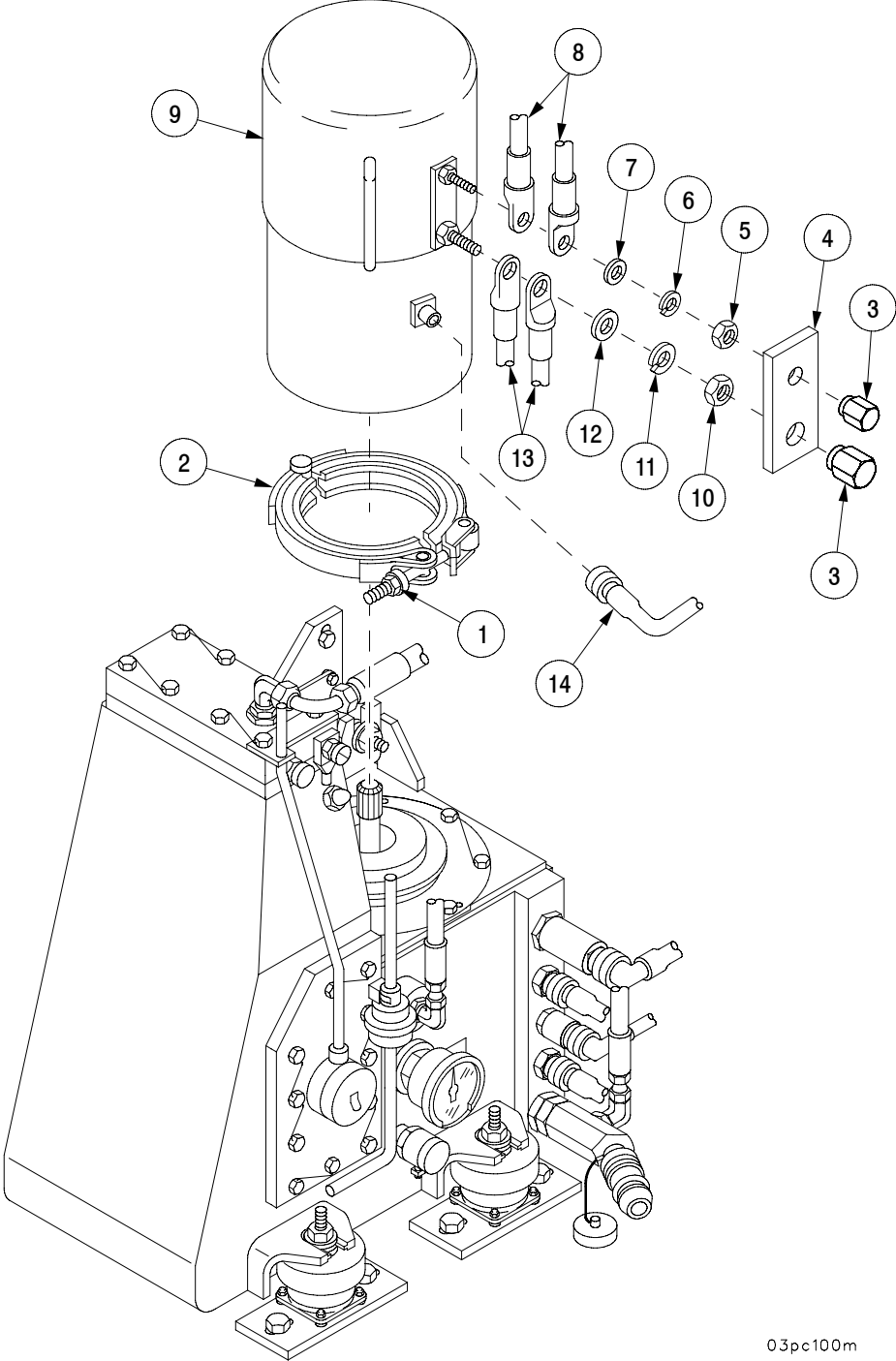
**CAUTION**

Be sure involute spline is in place on pump shaft and motor shaft to prevent damage to spline.

- 2 Lower electric motor (9) through hydraulic access opening. Use manila rope through lifting brackets on motor (9) for lift assist.
- 3 Connect connector (14) to motor (9).
- 4 Install two leads 100 (13) to positive post on motor (9) with flat washer (12), new lockwasher (11), and nut (10).
- 5 Install two leads 70 (8) to negative post on electric motor (9) with flat washer (7), new lockwasher (6), and nut (5).
- 6 Install pad (4) and two plastic nuts (3).
- 7 Tighten nut (1) on coupling clamp (2).

5-19 HYDRAULIC PUMP MOTOR - CONTINUED

b. Installation - Continued



03pc100m

## 5-20 HYDRAULIC CONTROL BOX.

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This task covers:    a. Removal                    b. Disassembly                    c. Assembly                    d. Installation

---

### **INITIAL SETUP**

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Electric soldering gun (item 38, Appx G)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads  
disconnected (TM 9-2350-314-20-1-2)

#### Materials/Parts

Lockwashers (4) (item 128, Appx F)  
Seals (7) (item 172, Appx F)  
Lockwasher (item 144, Appx F)  
Lockwasher (item 147, Appx F)  
Gasket (item 12, Appx F)  
Lockwashers (4) (item 102, Appx F)  
Lockwashers (6) (item 104, Appx F)  
Lockwashers (10) (item 103, Appx F)  
Lockwashers (2) (item 100, Appx F)  
Faceplate (item 192, Appx F)  
Solder (AR) (item 74, Appx C)  
Markings tags (AR) (item 87, Appx C)  
■ Silicone compound (item 102, Appx C)

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#### **a. Removal.**

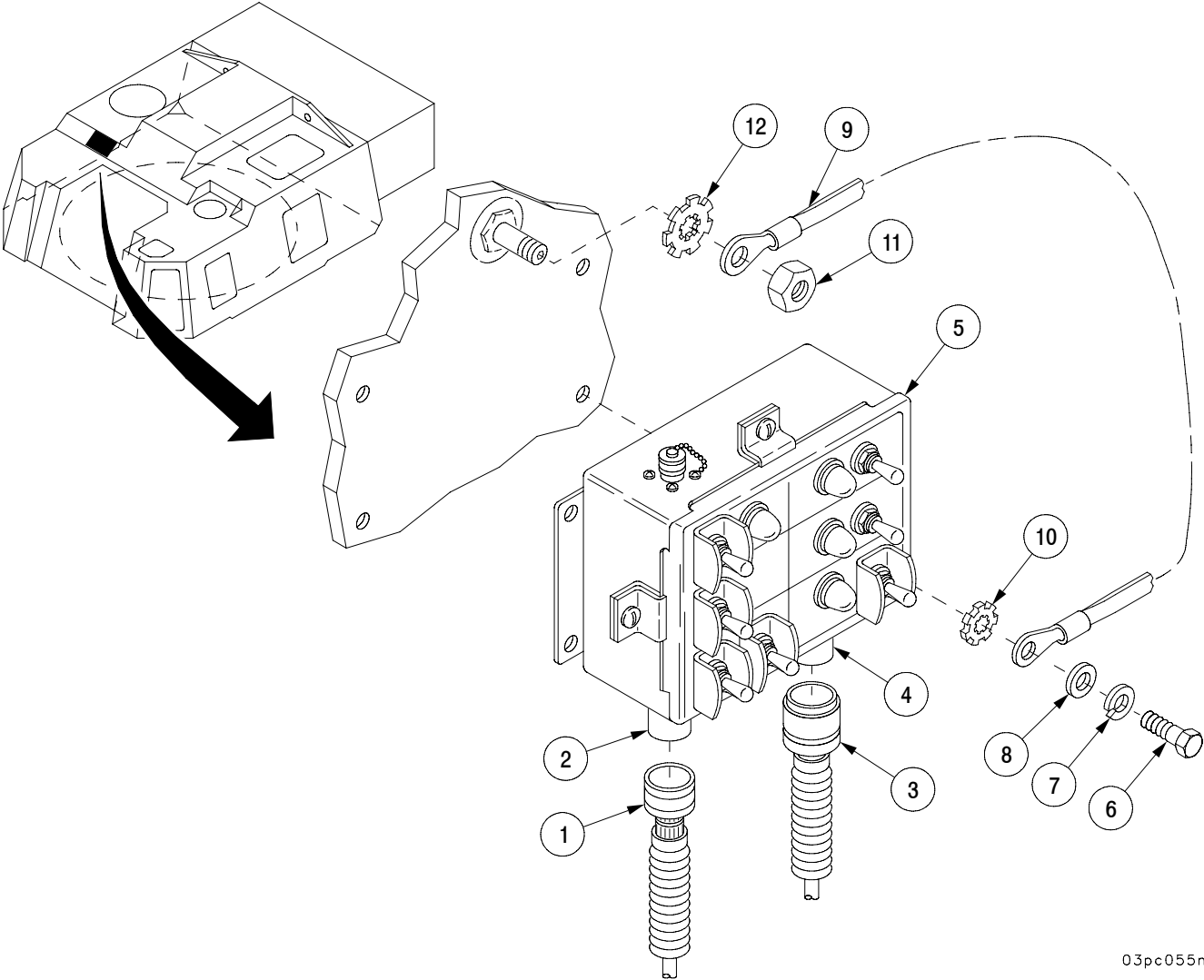
### **NOTE**

Tag leads before disconnecting to aid in installation.

- 1 Disconnect wiring harness W65 P3 (1) from connector J1 (2) and wiring harness W64 P1 (3) from connector J2 (4) of hydraulic control box (5).
- 2 Remove four screws (6), four lockwashers (7), four flat washers (8), and ground lead (9) and lockwasher (10) securing hydraulic control box (5). Discard lockwashers.
- 3 Remove hydraulic control box (5).
- 4 Remove nut (11), ground lead (9), and lockwasher (12). Discard lockwasher.

5-20 HYDRAULIC CONTROL BOX - CONTINUED

a. Removal - Continued



03pc055m

## 5-20 HYDRAULIC CONTROL BOX - CONTINUED

### b. Disassembly.

#### CAUTION

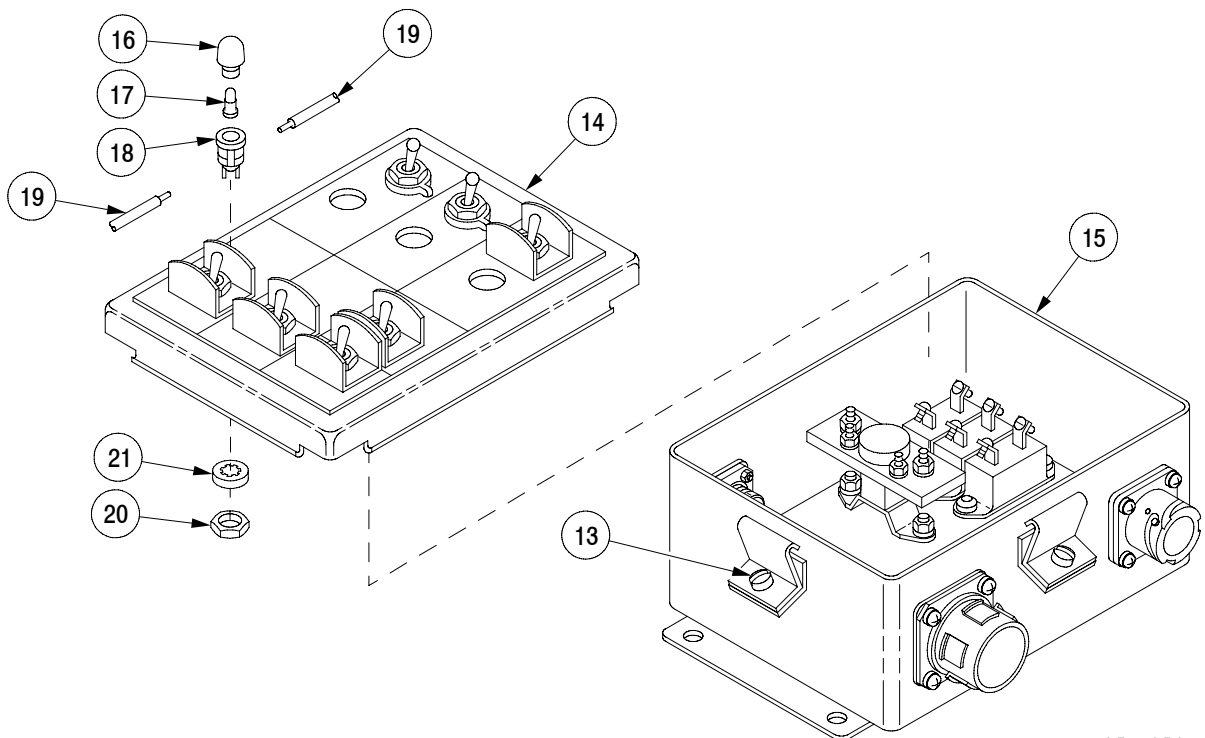
Cover is attached to leads in box. Use caution when separating cover from box to avoid breaking leads from components.

- 1 Loosen four screws (13) and separate cover (14) from box (15).

#### NOTE

Tag any leads that are missing the identifying band markers prior to removal.

- 2 Remove four lenses (16) and four LEDs (17) from four LED housings (18).
- 3 Desolder two leads (19) each from four LED housings (18).
- 4 Remove four LED housings (18) by removing four nuts (20) and four lockwashers (21) (nut and lockwasher supplied with LED housing).



03pc056m

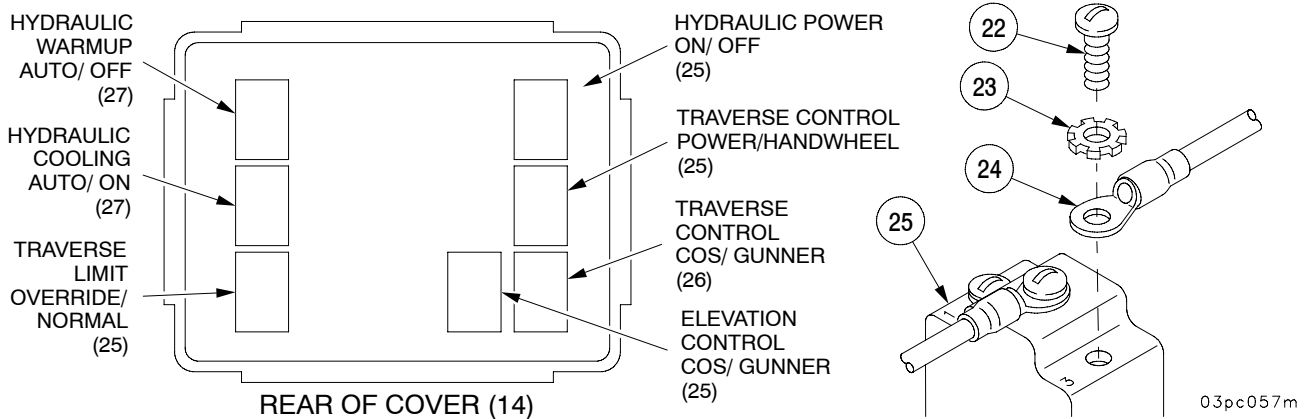


**5-20 HYDRAULIC CONTROL BOX - CONTINUED**

**b. Disassembly - Continued**

- 5 Remove two screws (22) (three for HYDRAULIC COOLING switch), two lockwashers (23) (screw and lockwasher supplied with switch), and the following leads (24) from the indicated switches (25, 26, and 27).

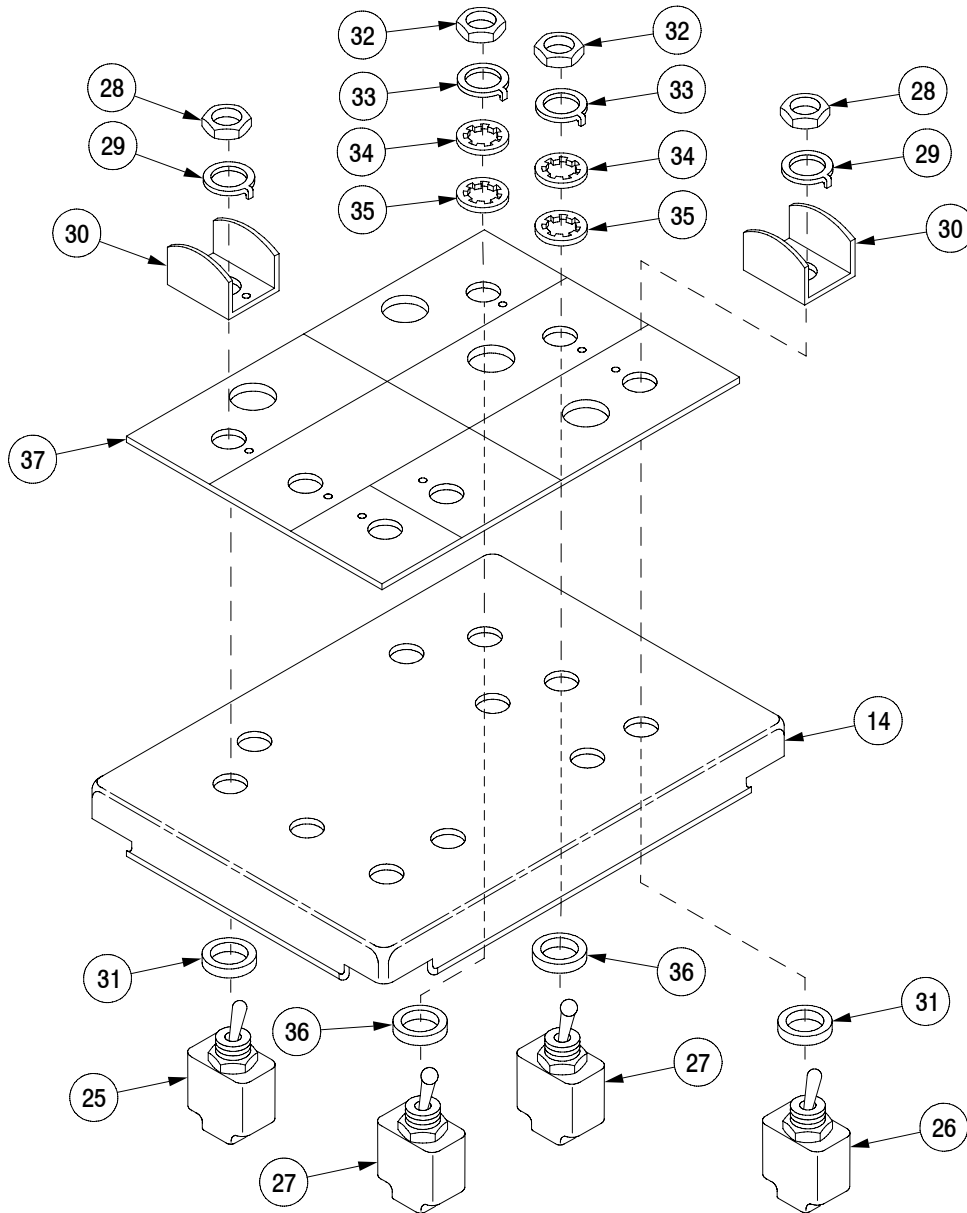
Switch	Terminal	Lead
Hydraulic Power On/Off	2	S1-2-100
	3	DS1-2-100S
	3	S1-3-100S
Traverse Control Power/Handwheel	2	S2-2-100S
	1	Lead 70
	3	819B-825A
Traverse Control COS/Gunner	3	S3-2-100S
	2	TS3
	1	Lead 70 (2 each)
	2	623A
Elevation Control COS/Gunner	3	S4-2-100S
	1	Lead 70 (2 each)
	2	TS4
	2	623
Hydraulic Warmup Auto/Off	2	S5-2-100S
	3	WTS
Hydraulic Cooling Auto/On	2	S6-2-100B
	1	S6-1-186A
	1	186A
	3	186B
Traverse Limit Override/Normal	2	DS4-2-TLS
	2	TLS-A
	3	TL-SOL



## 5-20 HYDRAULIC CONTROL BOX - CONTINUED

### b. Disassembly - Continued

- 6 Remove five nuts (28), five lockrings (29), five guards (30), five seals (31) (nut and lockring supplied with switch), four switches (25) and switch (26). Discard seals.
- 7 Remove two nuts (32), two lockrings (33), two lockwashers (34), two lockwashers (35), two seals (36) (nut, lockring, and lockwasher (35) supplied with switch), and two switches (27). Discard seals and lockwashers (35).
- 8 Remove faceplate (37) from cover (14). Discard faceplate.



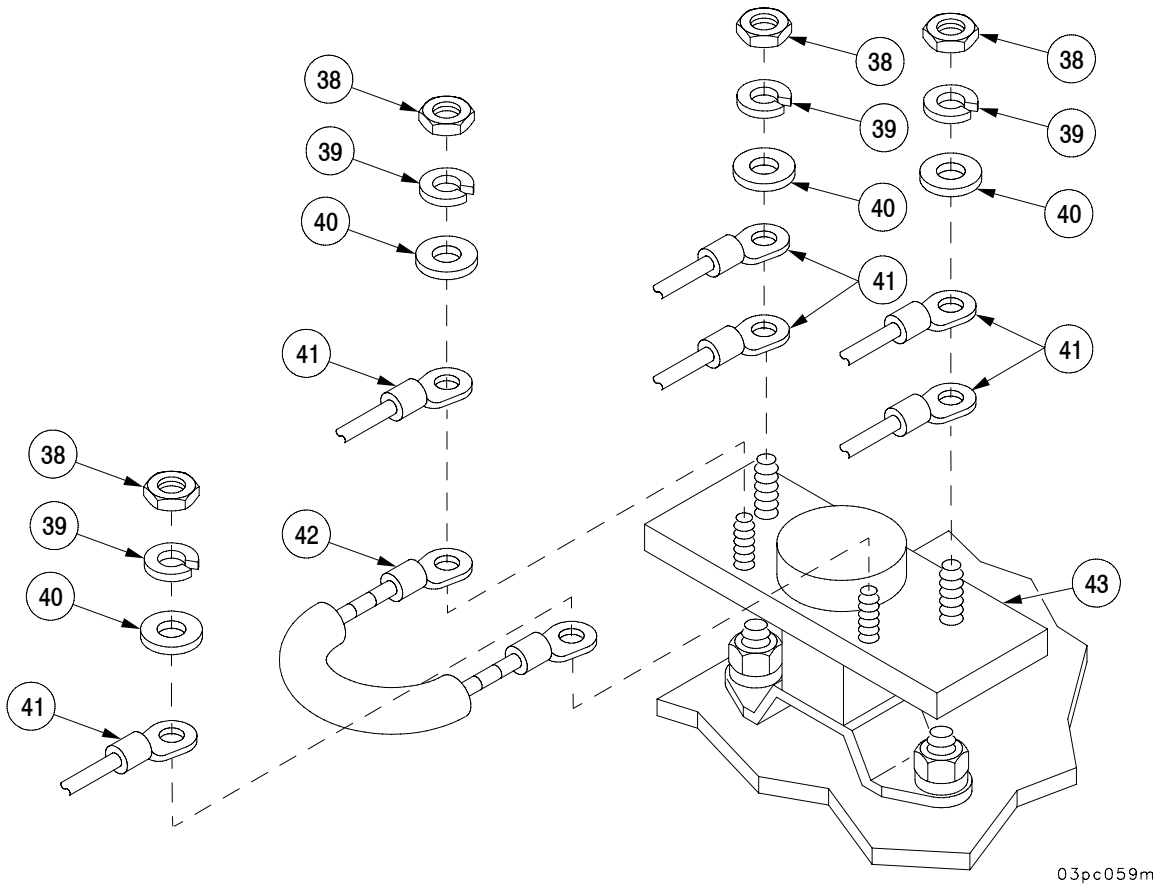
03pc058m

**5-20 HYDRAULIC CONTROL BOX - CONTINUED**

**b. Disassembly - Continued**

- 9 Remove four nuts (38), four lockwashers (39), four flat washers (40) (nut, lockwashers, and flat washer supplied with relay), the following leads (41), and diode assembly (42) from relay (43).

Lead	K1
S6-2-100B	A1
100B	A1
DS3-2-186	A2
186	A2
X2-70	X2
X1-186A	X1
DIODE ASSEMBLY	X1 TO X2

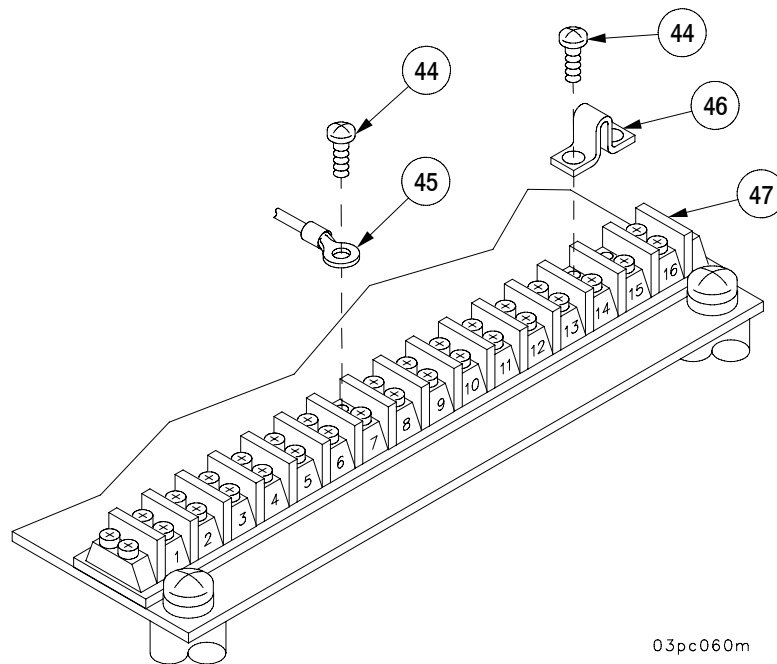


**5-20 HYDRAULIC CONTROL BOX - CONTINUED**

**b. Disassembly - Continued**

10 Remove 31 screws (44) (supplied with terminal board), the following leads (45), and 11 connectors (46) from terminal board (47).

Lead	TB1	Lead	TB1
S4-70	16		
DS1-1-70	15	GND	16
J3B-70	14	70	15
70	13	DS2-1-70	14
X2-70	12	DS3-1-70	13
S1-3-100S	11	DS4-1-70	12
S2-2-100S	10	S5-2-100S	11
S3-2-100S	9	100S	10
S4-2-100S	8	645	8
X1-186A	7	S6-1-186A	7
J3A-100A	6	TS6	7
S1-2-100	4	100A	2
TLS	2	819B	1
TS2	1	825A	1
819B-825A	1		



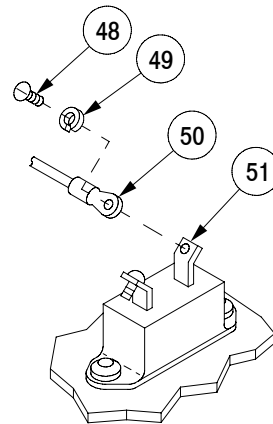
03pc060m

**5-20 HYDRAULIC CONTROL BOX - CONTINUED**

**b. Disassembly - Continued**

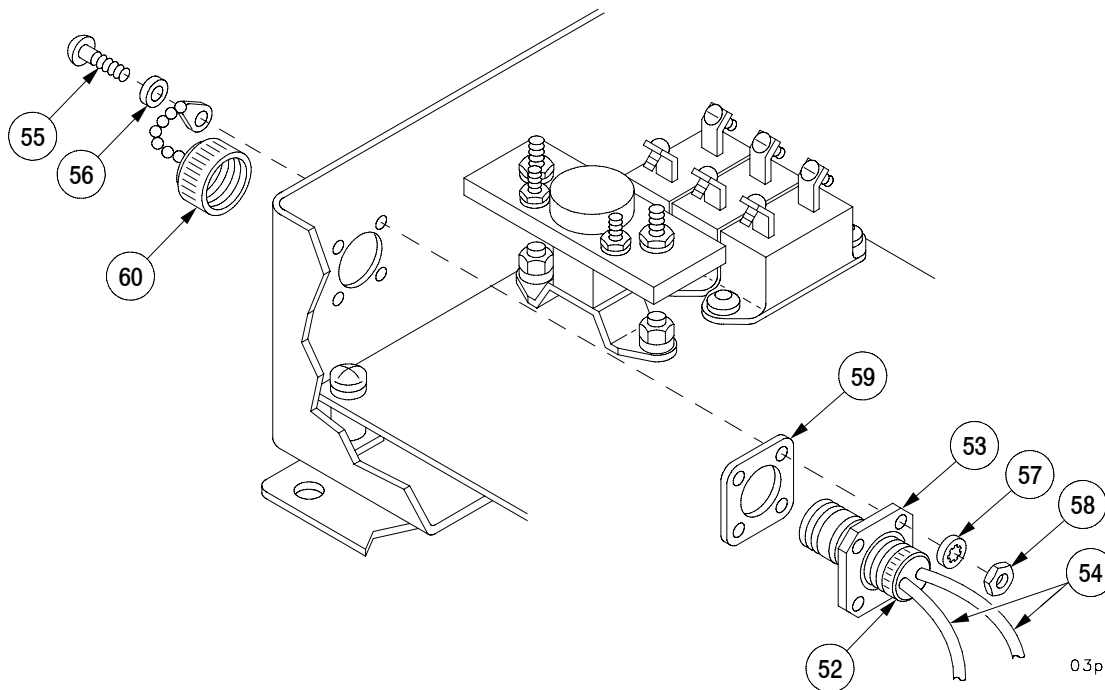
- 11 Remove six screws (48), six lockwashers (49) (screws and lockwasher supplied with circuit breaker), and the following leads (50) from the indicated circuit breaker (51).

Circuit Breaker	Lead
CB1	100A
	100
	100
CB2	100B
	100
CB3	100
	147-138
	100



03pc061m

- 12 Unscrew backshell (52) from connector J3 (53).  
 13 Desolder two leads (54) from connector J3 (53).  
 14 Remove four screws (55), four flat washers (56), four lockwashers (57), four nuts (58), gasket (59), connector J3 (53), and cap (60). Discard gasket and lockwashers.



03pc062m

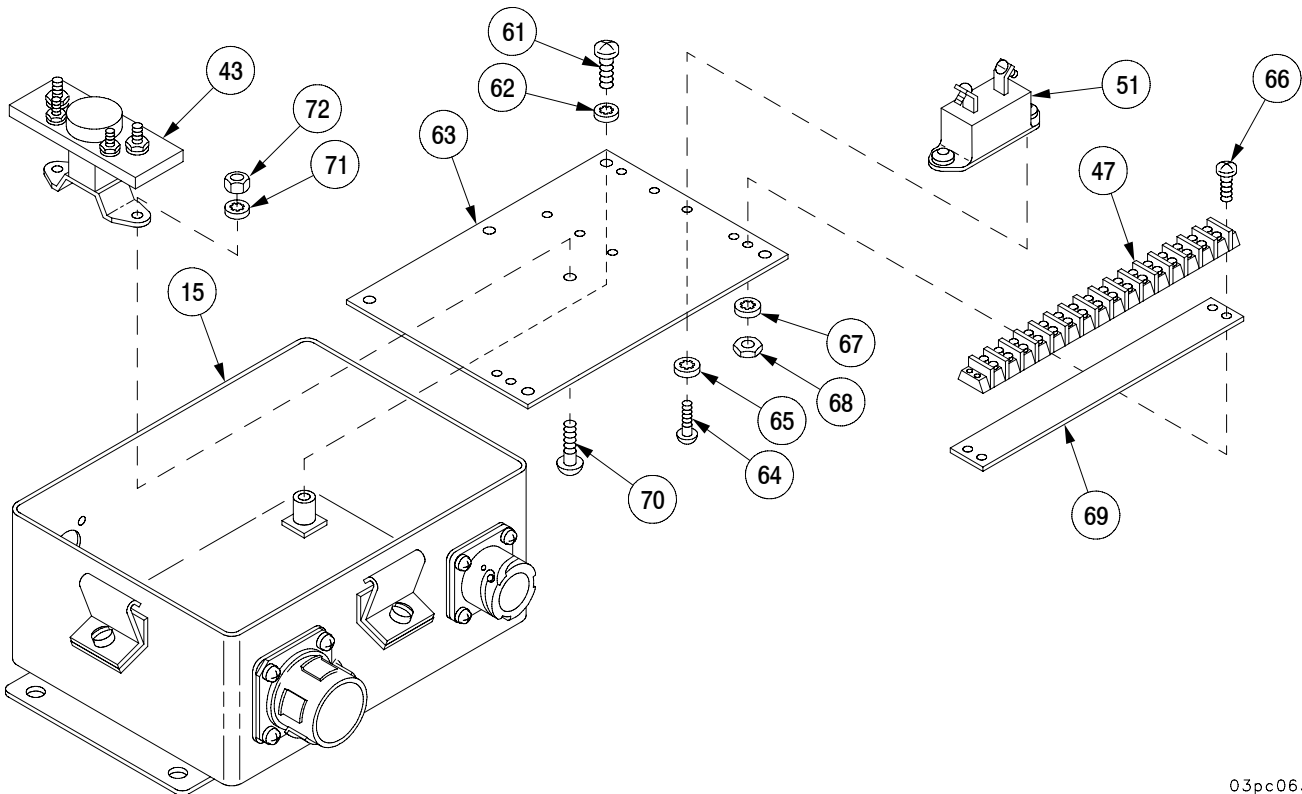
## 5-20 HYDRAULIC CONTROL BOX - CONTINUED

### b. Disassembly - Continued

- 15 Remove four screws (61), four lockwashers (62), and plate (63) with attached components (43, 47, and 51). Discard lockwashers.
- 16 Remove six screws (64), six lockwashers (65), and three circuit breakers (51). Discard lockwashers.
- 17 Remove four screws (66), four lockwashers (67), four nuts (68), terminal board (47), and strip (69). Discard lockwashers.
- 18 Remove two screws (70), two lockwashers (71), two nuts (72), and relay (43). Discard lockwashers.

### c. Assembly.

- 1 Install relay (43) on plate (63) with two screws (70), two new lockwashers (71), and two nuts (72).
- 2 Install terminal board (47) and strip (69) on plate (63) with four screws (66), four new lockwashers (67), and four nuts (68).
- 3 Install three circuit breakers (51) on plate (63) with six screws (64) and six new lockwashers (65).
- 4 Install plate (63) with attached components (43, 47, and 51) in box (15) with four screws (61), and four new lockwashers (62).



03pc063m

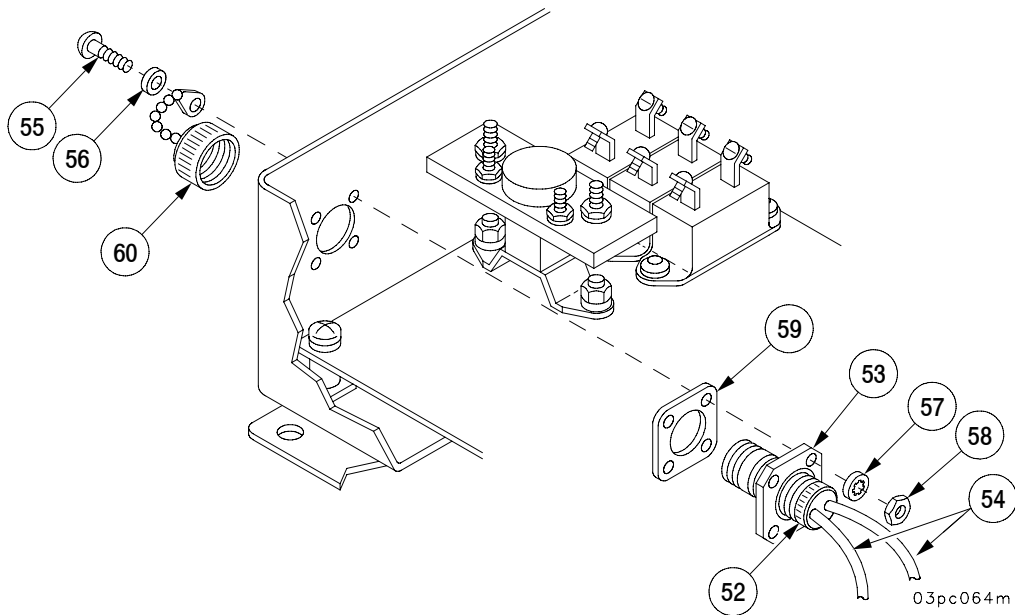
**5-20 HYDRAULIC CONTROL BOX - CONTINUED**

**c. Assembly - Continued**

**NOTE**

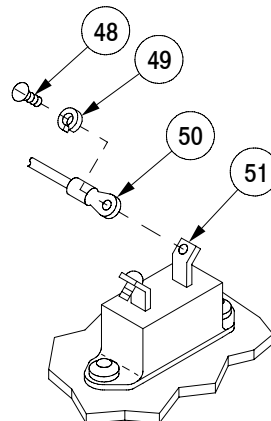
If installing new connector, remove backshell prior to installation.

- 5 Install connector (53) and cap (60) with four screws (55), four flat washers (56), four new lockwashers (57), four nuts (58), and new gasket (59).
- 6 Insert two leads (54) through backshell (52).
- 7 Solder two leads (54) to connector J3 (53).
- 8 Screw on backshell (52) to connector J3 (53).



- 9 Connect the following leads (50) to the indicated circuit breaker (51) with six screws (48) and six lockwashers (49) (screws and lockwashers supplied with circuit breakers).

Circuit Breaker	Lead
CB1	100A
	100
	100
CB2	100B
	100
CB3	100
	147-138
	100

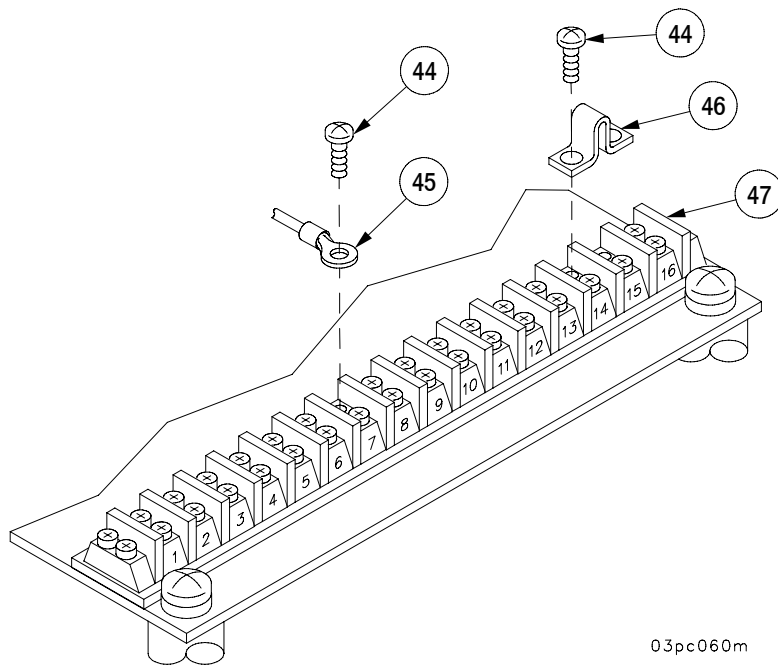


**5-20 HYDRAULIC CONTROL BOX - CONTINUED**

**c. Assembly - Continued**

10 Connect the following leads (45) with 11 connectors (46) to terminal board (47) with 31 screws (44) (supplied with terminal board).

Lead	TB1	Lead	TB1
S4-70	16		
DS1-1-70	15	GND	16
J3B-70	14	70	15
70	13	DS2-1-70	14
X2-70	12	DS3-1-70	13
S1-3-100S	11	DS4-1-70	12
S2-2-100S	10	S5-2-100S	11
S3-2-100S	9	100S	10
S4-2-100S	8	645	8
X1-186A	7	S6-1-186A	7
J3A-100A	6	TS6	7
S1-2-100	4	100A	2
TLS	2	819B	1
TS2	1	825A	1
819B-825A	1		



03pc060m

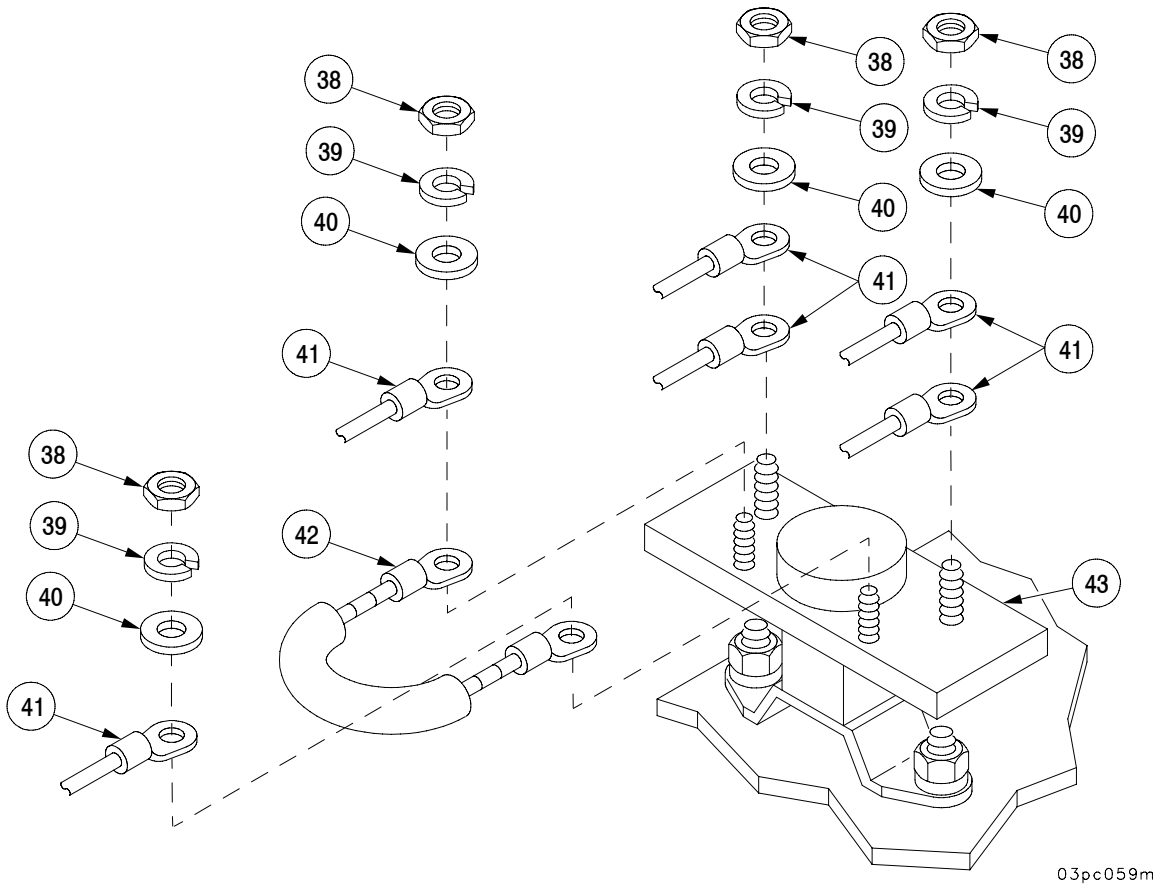


**5-20 HYDRAULIC CONTROL BOX - CONTINUED**

**c. Assembly - Continued**

- 11 Connect the following leads (41) and diode assembly (42) to relay (43) with four nuts (38), four lockwashers (39), and four flat washers (40) (nuts, lockwashers, and flat washers supplied with relay).

Lead	K1
S6-2-100B	A1
100B	A1
DS3-2-186	A2
186	A2
X2-70	X2
X1-186A	X1
DIODE ASSEMBLY	X1 TO X2



## 5-20 HYDRAULIC CONTROL BOX - CONTINUED

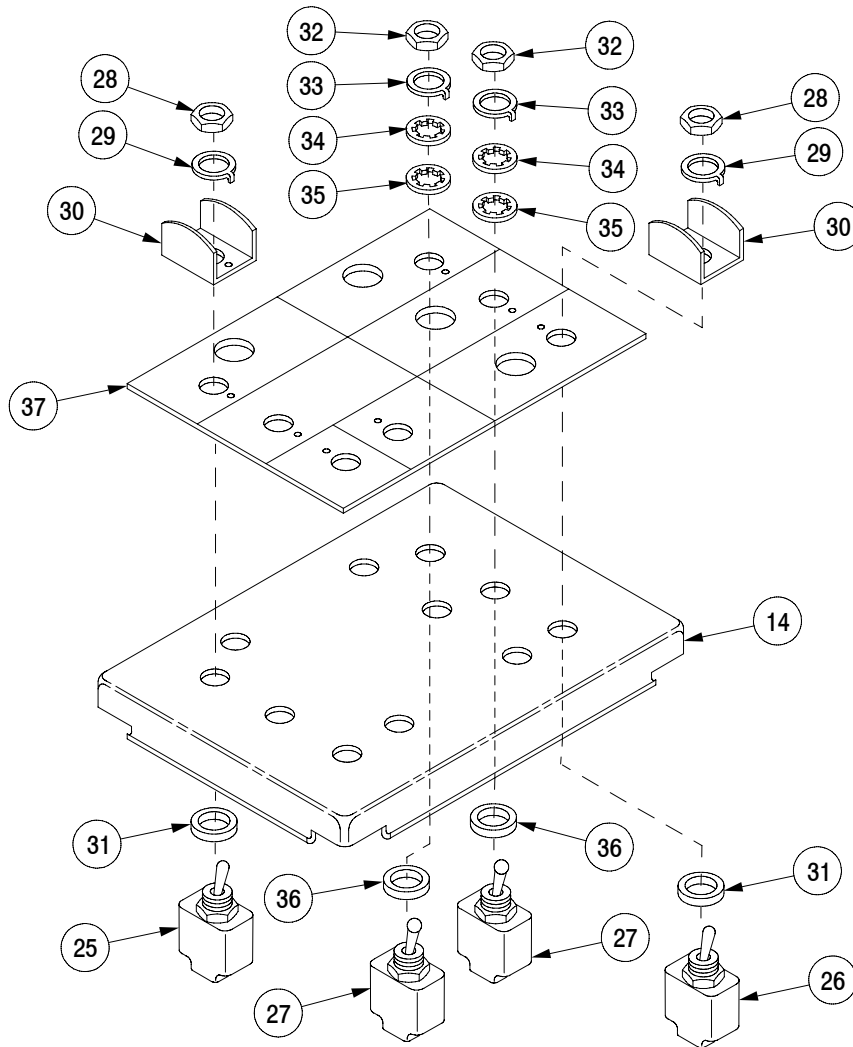
### c. Assembly - Continued

- 12 Remove protective backing and install new faceplate (37) on cover (14).
- 13 Install two switches (27) with two nuts (32), two lockrings (33), two lockwashers (34), two new lockwashers (35), and two new seals (36) (nuts, lockrings, and lockwashers (35) supplied with switches).

### NOTE

Each switch is supplied with a nut, lockring and lockwasher. Remove and discard lockwasher prior to installing switch.

- 14 Install four switches (25), and switch (26) with five nuts (28), five lockrings (29), five guards (30), and five new seals (31).



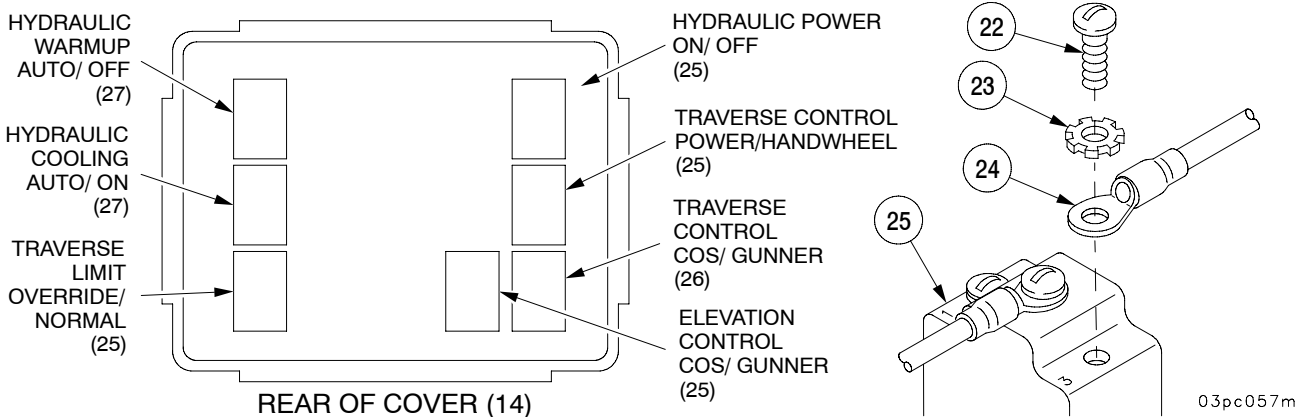
03pc065m

**5-20 HYDRAULIC CONTROL BOX - CONTINUED**

**c. Assembly - Continued**

15 Connect the following leads (24) to the indicated switches (25, 26, and 27) with two screws (22) (three for HYDRAULIC COOLING switch) and two lockwashers (23) for each switch (screws and lockwashers supplied with switches).

Switch	Terminal	Lead
Hydraulic Power On/Off	2	S1-2-100
	3	DS1-2-100S
	3	S1-3-100S
Traverse Control Power/Handwheel	3	S2-2-100S
	1	Lead 70
	2	819B-825A
Traverse Control COS/Gunner	3	S3-2-100S
	2	TS3
	1	Lead 70 (2 each)
Elevation Control COS/Gunner	2	623A
	3	S4-2-100S
	1	Lead 70 (2 each)
Hydraulic Warmup Auto/Off	2	TS4
	2	623
	3	S5-2-100S
Hydraulic Cooling Auto/On	2	WTS
	1	S6-2-100B
	1	S6-1-186A
Traverse Limit Override/Normal	1	186A
	3	186B
	2	DS4-2-TLS
	2	TLS-A
	3	TL-S0L



**5-20 HYDRAULIC CONTROL BOX - CONTINUED**

**c. Assembly - Continued**

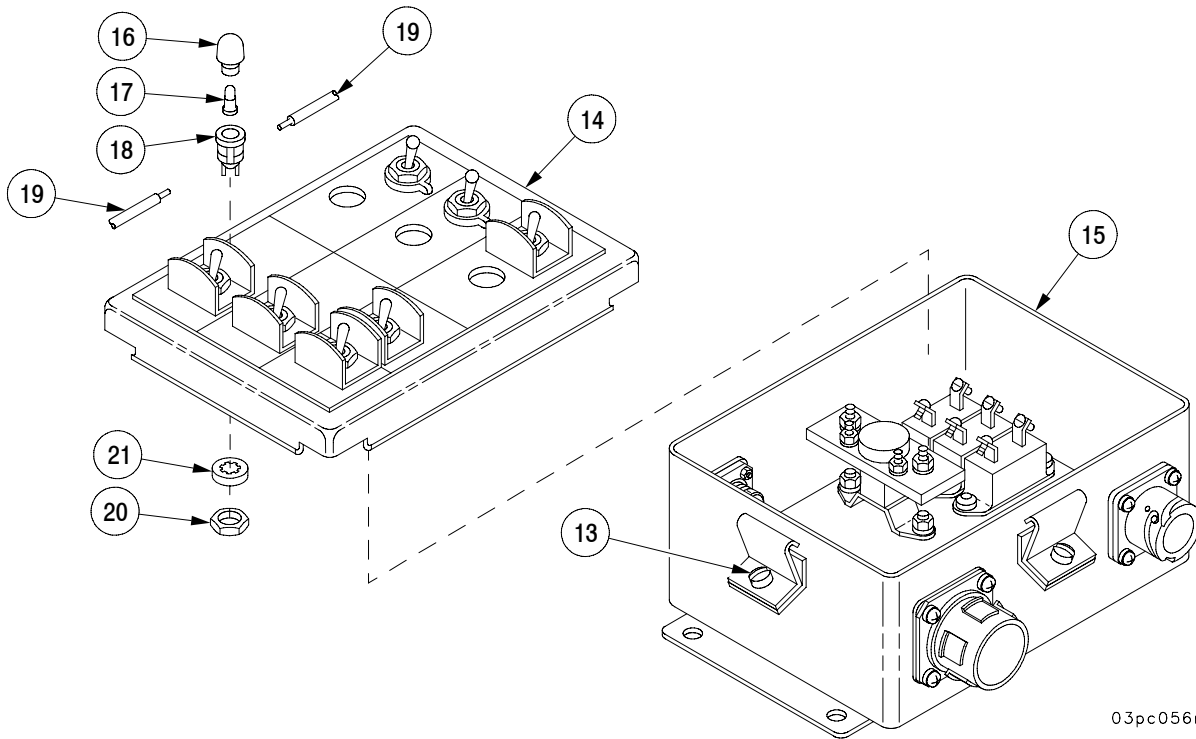
- 16 Install four LED housings (18) with four nuts (20) and four lockwashers (21) (nuts and lockwashers supplied with housing).
- 17 Solder two leads (19) each to the indicated housing (18).

Lead	Housing	Terminal
DS1-1-70	Hydraulic Power On	1
DS1-2-1005		2
DS2-1-70	Hydraulic Warmup On	1
W-SOL		2
DS3-1-70	Hydraulic Cooling On	1
DS3-2-186		2
DS4-1-70	Traverse Limit On	1
DS4-2-TLS		2

17.1 Apply a light coat of anti-corrosion silicone compound to socket.

18 Install four LEDs (17) and four lenses (16) in four LED housings (18).

19 Install cover (14) and tighten four screws (13).

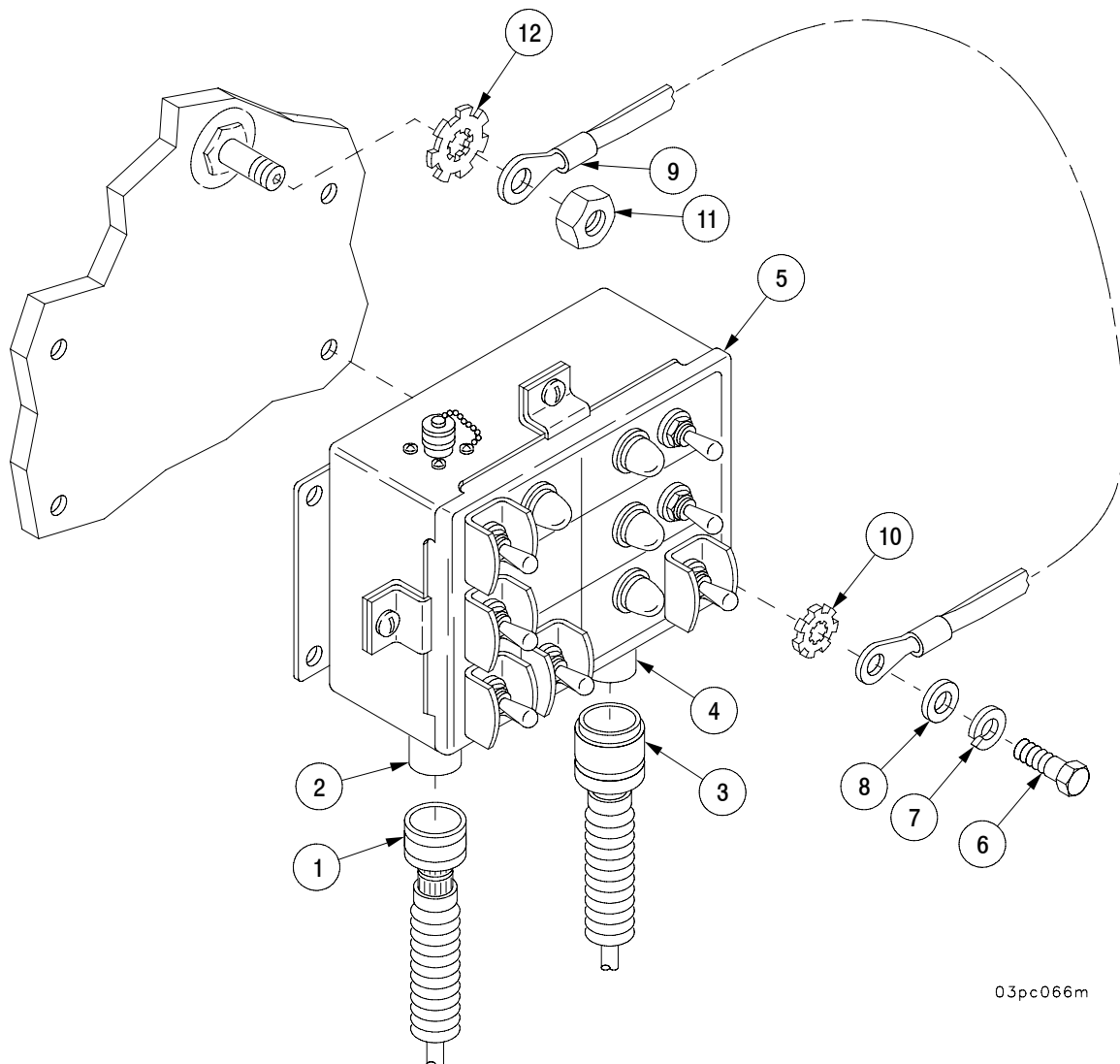


03pc056m

## 5-20 HYDRAULIC CONTROL BOX - CONTINUED

### d. Installation.

- 1 Install hydraulic control box (5) with new lockwasher (10), ground lead (9), four flat washers (8), four new lockwashers (7), and four screws (6).
- 2 Install new lockwasher (12), ground lead (9), and nut (11).
- 3 Reconnect wiring harness W64 P1 (3) to connector J2 (4) and wiring harness W65 P3 (1) to connector J1 (2).



**5-21 HYDRAULIC CONTROL BOX LEAD ASSEMBLIES.**

This task covers:          a. Removal                                  b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Electric soldering gun  
(item 39, Appx G)

Equipment Conditions

Hydraulic control box removed  
(para 5-20)

Materials/Parts

Solder (AR) (item 74, Appx C)  
Tiedown straps (2) (item 85, Appx C)

**a. Removal.**

**NOTE**

Lead assemblies are connected to the following components with the indicated hardware. Hardware is supplied with the component.

Component	Attaching Hardware
All seven switches (1) S1 through S7	Screw (2), lockwasher (3)
Relay (4) K1	Nut (5), lockwasher (6), flat washer (7)
Terminal board (8) TB1	Screw (9)
All three circuit breakers (10) CB1, CB2, CB3	Screw (11), lockwasher (12)
All four LED housings (13) DS1 through DS4	Soldered
Connector J3 (14) J3	Soldered

**5-21 HYDRAULIC CONTROL BOX LEAD ASSEMBLIES - CONTINUED**

**a. Removal - Continued**

**CAUTION**

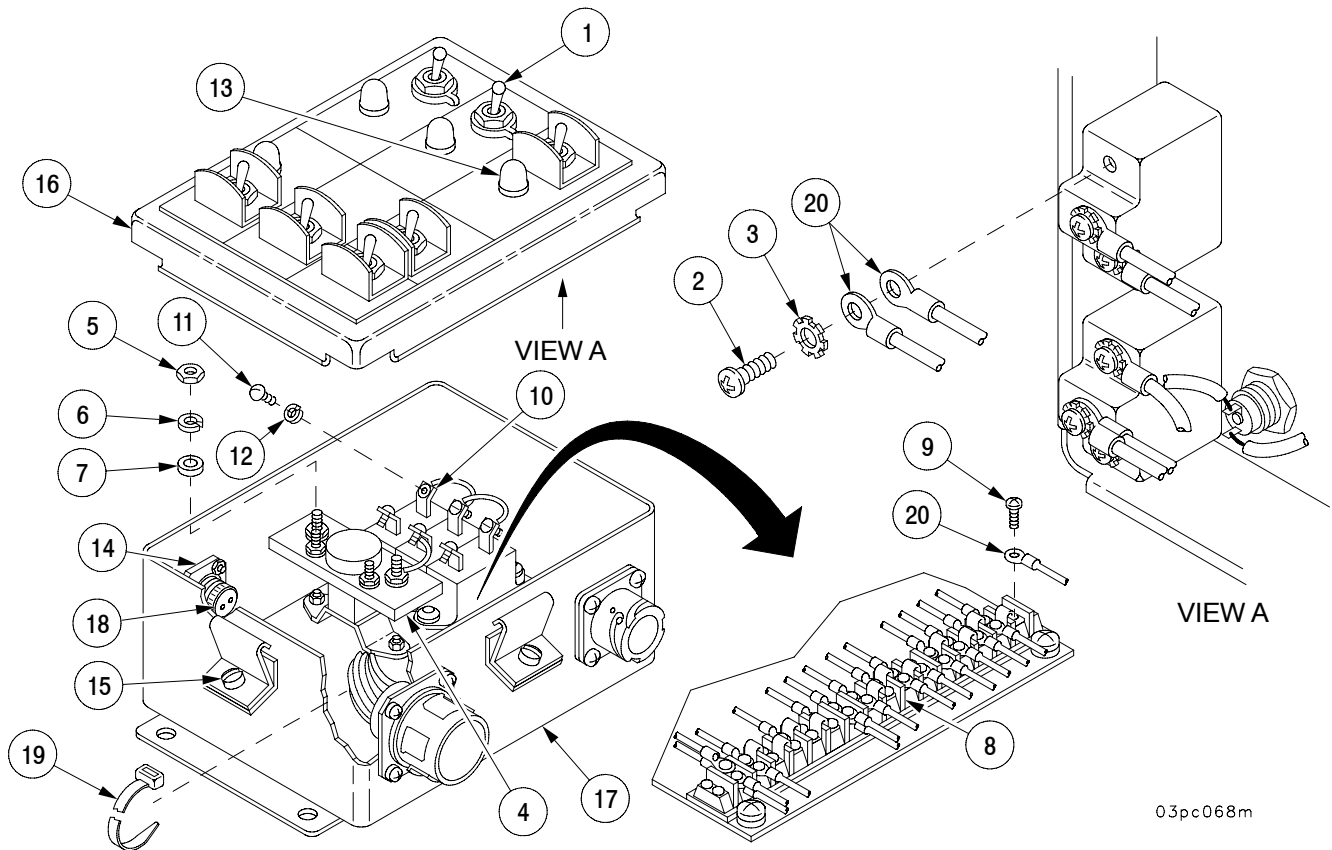
Cover is attached to leads in box. Use caution when separating cover from box to avoid breaking leads from components.

- 1 Loosen four screws (15) and separate cover (16) from control box (17).

**NOTE**

If removing lead from connector J3 (14), remove backshell (18) from connector J3 (14) to gain access to connector pin.

- 2 Remove and discard two tiedown straps (19) bundling the leads running between box (17) and cover (16).
- 3 Remove the following leads (20) from indicated components (1, 4, 8, 10, 13, and 14).

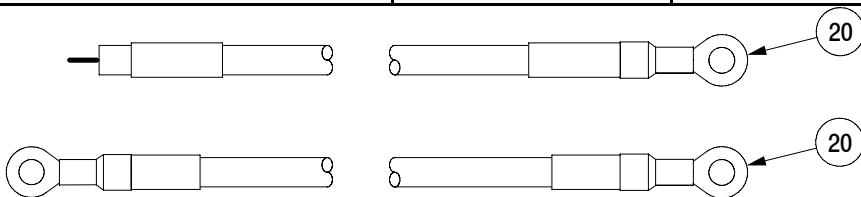


03pc068m

**5-21 HYDRAULIC CONTROL BOX LEAD ASSEMBLIES - CONTINUED**

**a. Removal - Continued**

Lead (20)	END A	END B
S1-2-100	S1-2	TB1-4
S1-3-100S	S1-3	TB1-11
S2-2-100S	S2-3	TB1-10
S2-70	S2-1	S3-1
819B-825A	S2-2	TB1-1
S3-2-100S	S3-3	TB1-9
S3-70	S3-1	S4-1
S4-2-100S	S4-3	TB1-8
S4-70	S4-1	TB1-16
S5-2-100S	S5-2	TB1-11
S6-2-100B	S6-2	K1-A1
S6-1-186A	S6-1	TB1-7
X1-186A	K1-X1	TB1-7
X2-70	K1-X2	TB1-12
100B	K1-A1	CB2
100A	TB1-2	CB1
100	CB3	CB2
100	CB2	CB1
DS1-1-70	DS1-1	TB1-15
DS1-2-100S	S1-3	DS1-2
DS2-1-70	TB1-14	DS2-1
DS3-1-70	TB1-13	DS3-1
DS3-2-186	DS3-2	K1-A2
DS4-1-70	TB1-12	DS4-1
DS4-2-TLS	DS4-2	S7-2
J3B-70	J3-B	TB1-14
J3A-100A	J3-A	TB1-6



03pc070m



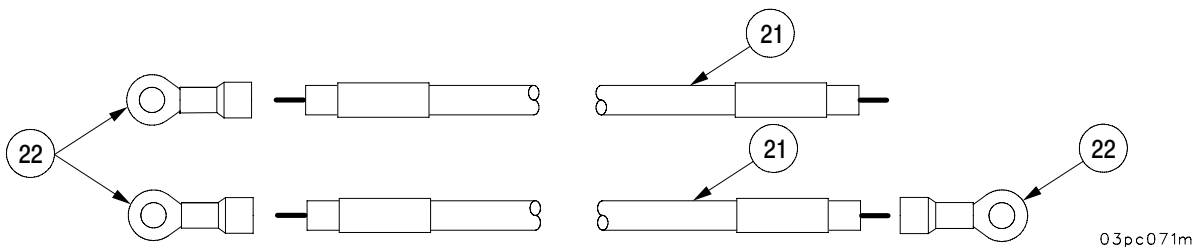
**5-21 HYDRAULIC CONTROL BOX LEAD ASSEMBLIES - CONTINUED**

**b. Installation.**

- 1 Cut wire (21) to length specified for the following leads (20).

Lead (20)	Length (Inches)	Tolerance
S1-2-100	15.50	±.38
S1-3-100S	14.50	±.38
S2-2-100S	13.50	±.38
S2-70	4.50	±.25
819B-825A	16.00	±.38
S3-2-100S	13.50	±.38
S3-70	4.50	±.25
S4-2-100S	12.50	±.38
S4-70	12.50	±.38
S5-2-100S	14.50	±.38
S6-2-100B	13.50	±.38
S6-1-186A	14.00	±.38
X1-186A	4.50	±.25
X2-70	6.00	±.25
100B	4.75	±.25
100A	8.00	±.38
100	4.50	±.25
DS1-1-70	15.00	±.38
DS1-2-100S	4.50	±.25
DS2-1-70	14.00	±.38
DS3-1-70	12.50	±.38
DS3-2-186	15.00	±.38
DS4-1-70	12.00	±.38
DS4-2-TLS	4.50	±.25
J3B-70	8.00	±.38
J3A-100A	6.00	±.25

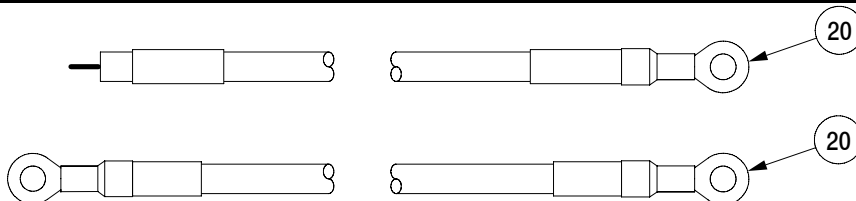
- 2 Install terminals (22).



**5-21 HYDRAULIC CONTROL BOX LEAD ASSEMBLIES - CONTINUED**

**b. Installation - Continued**

Lead (20)	END A	END B
S1-2-100	S1-2	TB1-4
S1-3-100S	S1-3	TB1-11
S2-2-100S	S2-3	TB1-10
S2-70	S2-1	S3-1
819B-825A	S2-2	TB1-1
S3-2-100S	S3-3	TB1-9
S3-70	S3-1	S4-1
S4-2-100S	S4-3	TB1-8
S4-70	S4-1	TB1-16
S5-2-100S	S5-2	TB1-11
S6-2-100B	S6-2	K1-A1
S6-1-186A	S6-1	TB1-7
X1-186A	K1-X1	TB1-7
X2-70	K1-X2	TB1-12
100B	K1-A1	CB2
100A	TB1-2	CB1
100	CB3	CB2
100	CB2	CB1
DS1-1-70	DS1-1	TB1-15
DS1-2-100S	S1-3	DS1-2
DS2-1-70	TB1-14	DS2-1
DS3-1-70	TB1-13	DS3-1
DS3-2-186	DS3-2	K1-A2
DS4-1-70	TB1-12	DS4-1
DS4-2-TLS	DS4-2	S7-2
J3B-70	J3-B	TB1-14
J3A-100A	J3-A	TB1-6



03pc072m

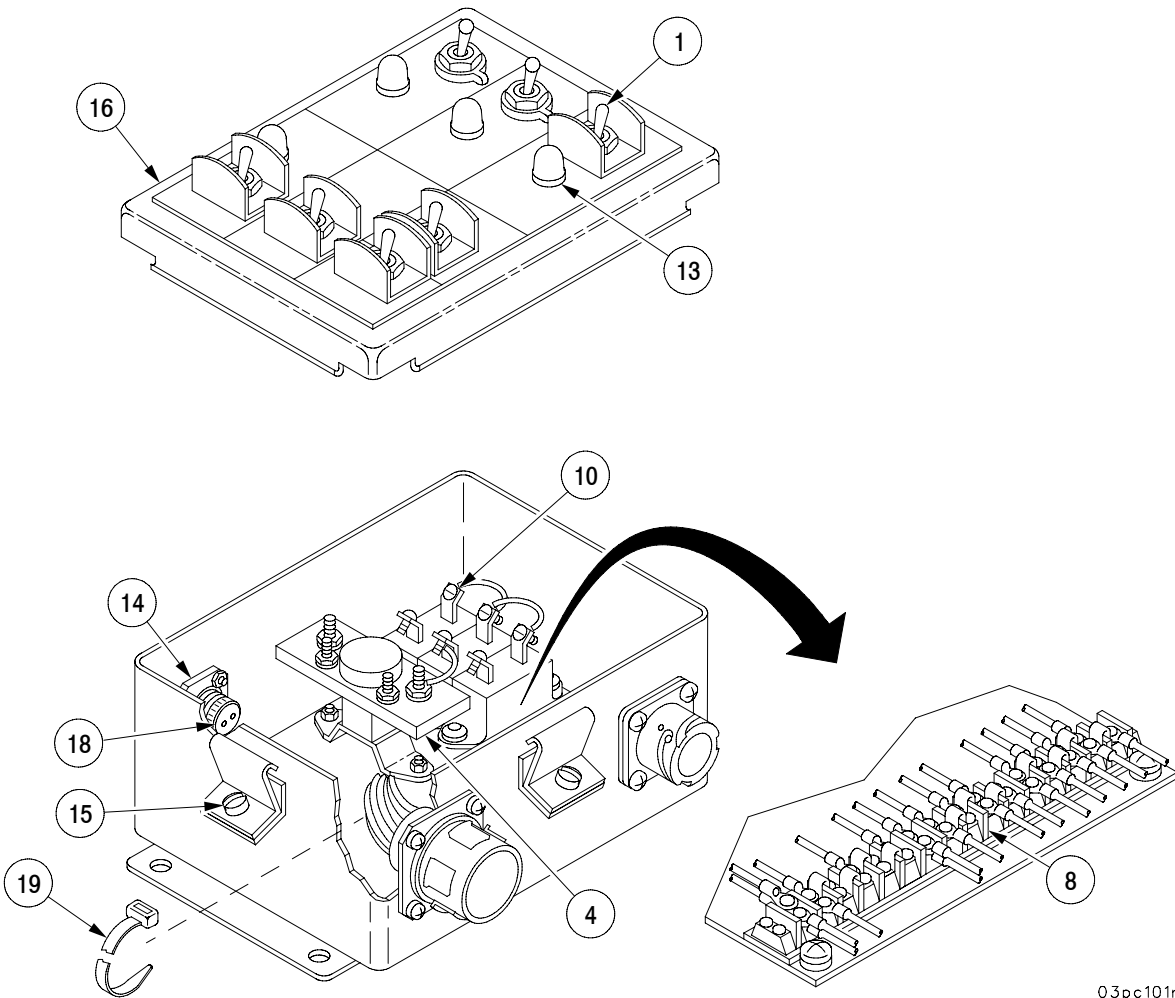
**5-21 HYDRAULIC CONTROL BOX LEAD ASSEMBLIES - CONTINUED**

**b. Installation - Continued**

**NOTE**

If installing lead connected to connector J3 (14), route lead through backshell (18). After connecting lead, install backshell on connector.

- 3 Install the following leads (20) to the indicated components (1, 4, 8, 10, 13, and 14).
- 4 Install two new tiedown straps (19).
- 5 Install cover (16) and tighten four screws (15).



03pc101m

**5-22 HYDRAULIC CONTROL BOX HARNESS 12563029.**

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This task covers:          a. Removal                                  b. Disassembly

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**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Electric soldering gun (item 39, Appx G)

Equipment Conditions

Hydraulic control box removed  
(para 5-20)

Materials/Parts

Gasket (item 15, Appx F)  
Lockwashers (4) (item 103, Appx F)  
Tiedown straps (2) (item 85, Appx C)  
Solder (AR) (item 74, Appx C)  
Marking tag (AR) (item 87, Appx C)

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**a. Removal.**

**CAUTION**

Cover is attached to cable assemblies in box. Use caution when separating cover from body to avoid wire breakage.

**NOTE**

Tag leads before disconnecting to aid in installation.

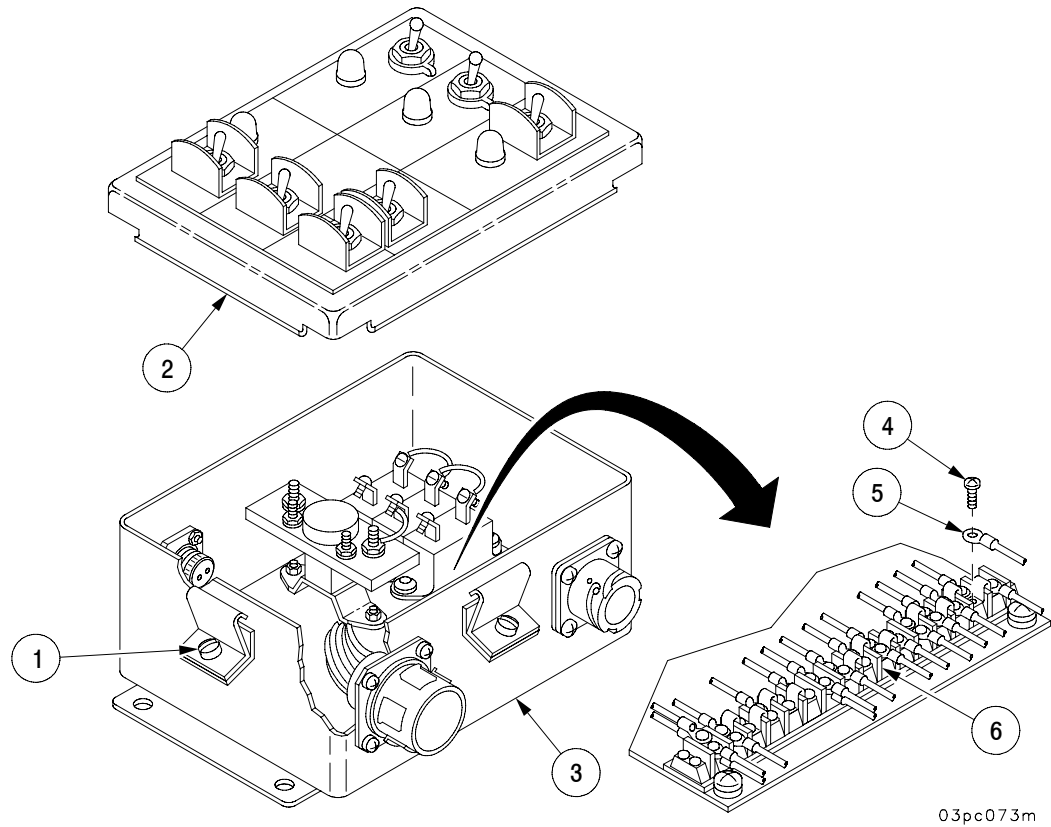
- 1 Loosen four screws (1) and separate cover (2) from control box (3).

**5-22 HYDRAULIC CONTROL BOX HARNESS 12563029 - CONTINUED**

**a. Removal - Continued**

- 2 Remove six screws (4) and the following leads (5) from bus connector (6) (screws supplied with bus connector).

Cable Lead	Bus Connector
819B	TB1-1
825A	TB1-1
TLS	TB1-2
645	TB1-8
70	TB1-13
70	TB1-15



**5-22 HYDRAULIC CONTROL BOX HARNESS 12563029 - CONTINUED**

**a. Removal - Continued**

- 3 Remove seven screws (7), lockwasher (8), and the following leads (9) from indicated switches (10) (screws and lockwasher supplied with switch).

Cable Lead	Switch
623A	S3-2 Traverse Control COS/Gunner
623	S4-2 Elevation Control COS/Gunner
WTS	S5-3 Hydraulic Warmup Auto/Off
186A	S6-1 Hydraulic Cooling Auto/Off
186B	S6-3 Hydraulic Cooling Auto/Off
TS-SOL	S7-3 Traverse Limit Override/Normal
TLS-A	S7-2 Traverse Limit Override/Normal

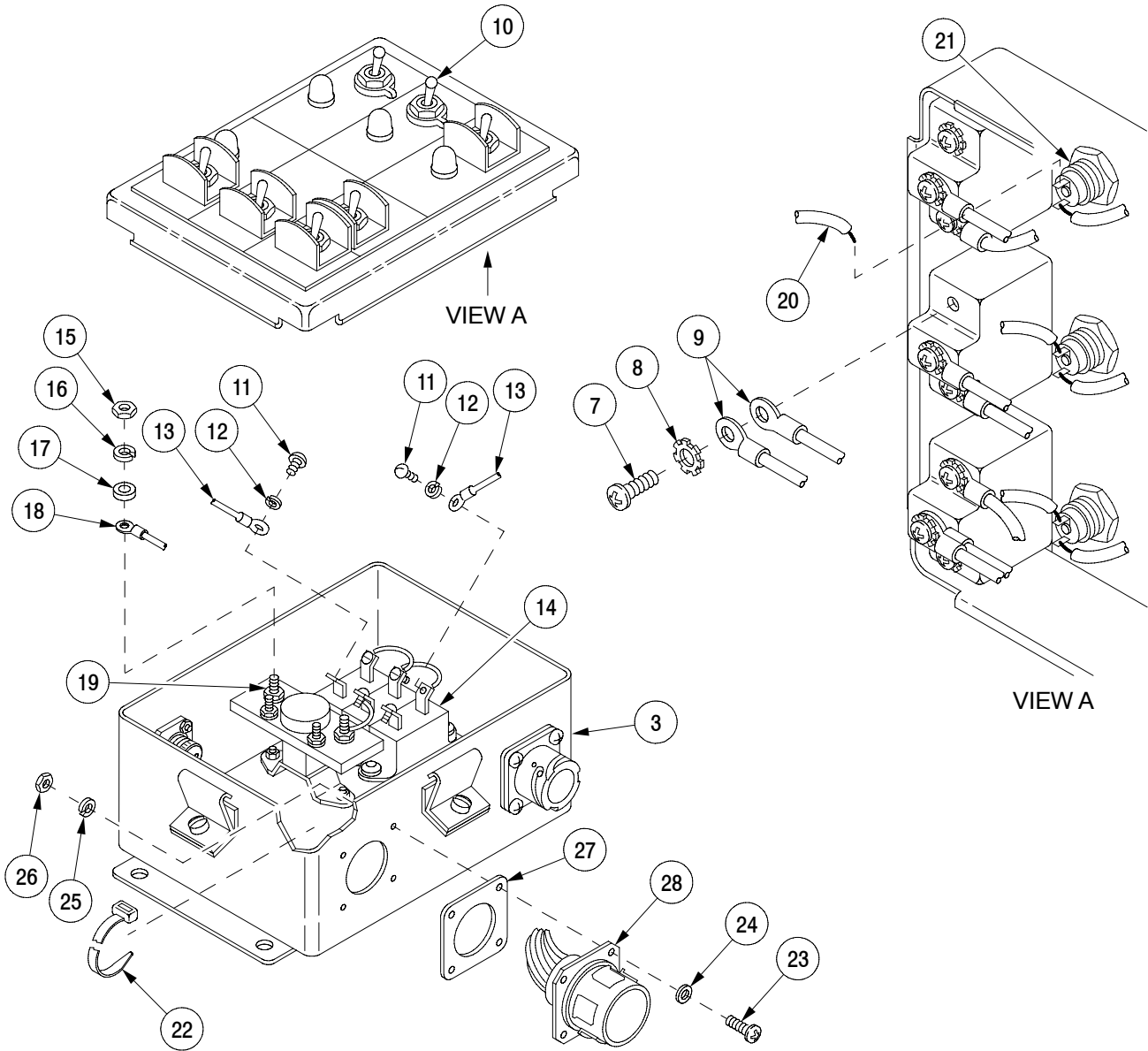
- 4 Remove screw (11), lockwasher (12) and the following leads (13) from indicated circuit breakers (14) (screw and lockwasher supplied with circuit breaker).

Cable Lead	Circuit Breaker
100	CB1
147-138	CB3

- 5 Remove nut (15), lockwasher (16), flat washer (17), and lead 186 (18) from relay K1-A2 (19) (nut, lockwasher, and flat washer supplied with relay).
- 6 Desolder lead W-SOL (20) from HYDRAULIC WARMUP indicator DS2-2 (21).
- 7 Remove and discard two tiedown straps (22).
- 8 Remove four screws (23), four flat washers (24), four lockwashers (25), four nuts (26), gasket (27), and wiring harness (28) from control box (3). Discard gasket and lockwashers.

5-22 HYDRAULIC CONTROL BOX HARNESS 12563029 - CONTINUED

a. Removal - Continued



03pc074m

**5-22 HYDRAULIC CONTROL BOX HARNESS 12563029 - CONTINUED**

**b. Installation.**

- 1 Install wiring harness (28) in control box (3) with four screws (23), four flat washers (24), four new lockwashers (25), four nuts (26), and new gasket (27).
- 2 Install two new tiedown straps (22).
- 3 Solder lead W-SOL (20) to HYDRAULIC WARMUP indicator DS2-2 (21).
- 4 Connect lead 186 (18) to relay K1-A2 (19) with nut (15), lockwasher (16), and flat washer (17) (nut, lockwasher, and flat washer supplied with relay).
- 5 Connect the following leads (13) to indicated circuit breakers (14) with screw (11) and lockwasher (12) for each lead: (screw and lockwasher supplied with circuit breaker)

Cable Lead	Circuit Breaker
100	CB1
147-138	CB3

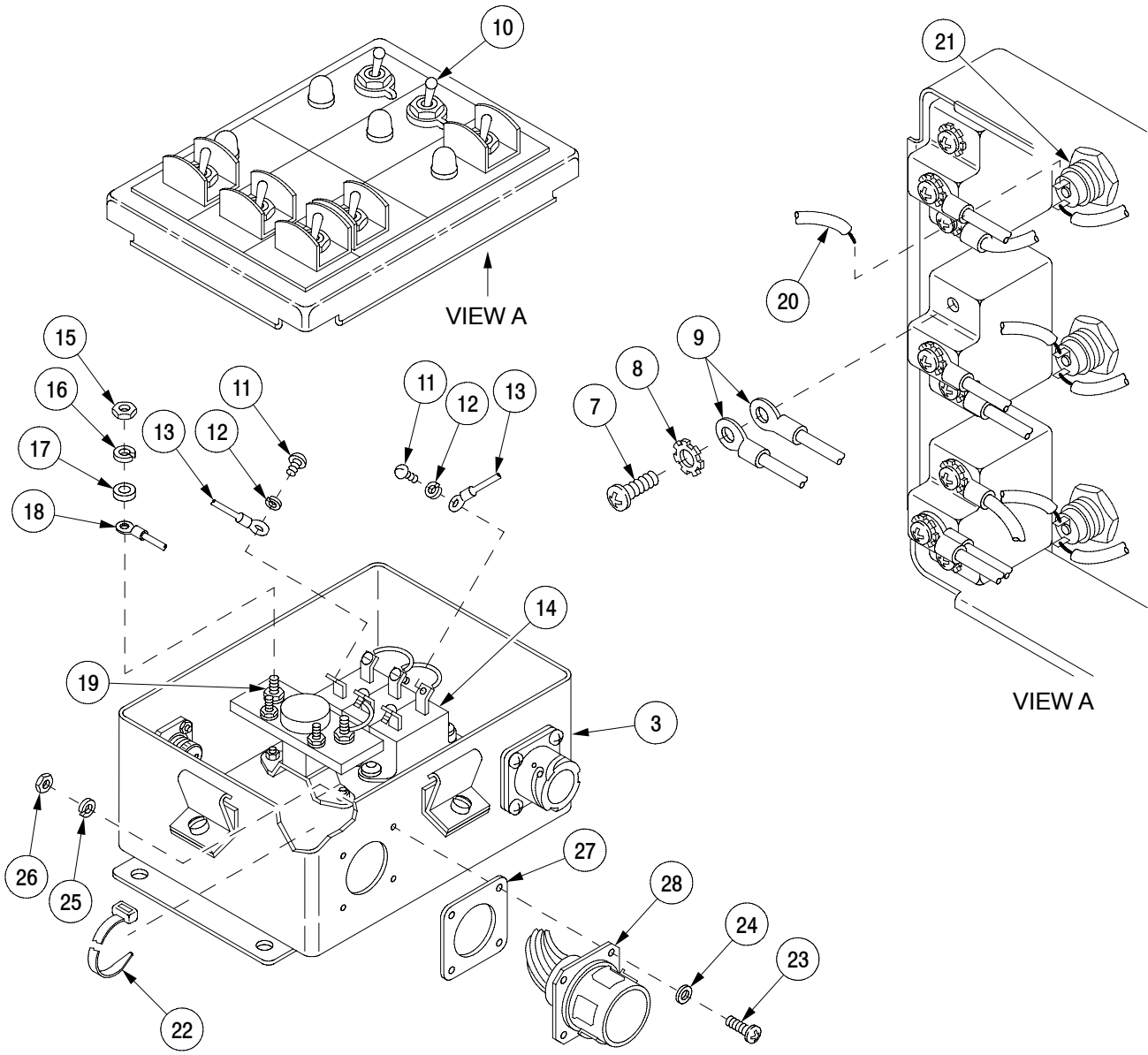
- 6 Connect the following leads (9) to indicated switches (10) with screw (7) and lockwasher (8) for each lead: (screw and lockwasher supplied with switch)

Cable Lead	Switch
623A	S3-2 Traverse Control COS/Gunner
623	S4-2 Elevation Control COS/Gunner
WTS	S5-3 Hydraulic Warmup Auto/Off
186A	S6-1 Hydraulic Cooling Auto/Off
186B	S6-3 Hydraulic Cooling Auto/Off
TS-SOL	S7-3 Traverse Limit Override/Normal
TLS-A	S7-2 Traverse Limit Override/Normal



5-22 HYDRAULIC CONTROL BOX HARNESS 12563029 - CONTINUED

b. Installation - Continued



03pc074m

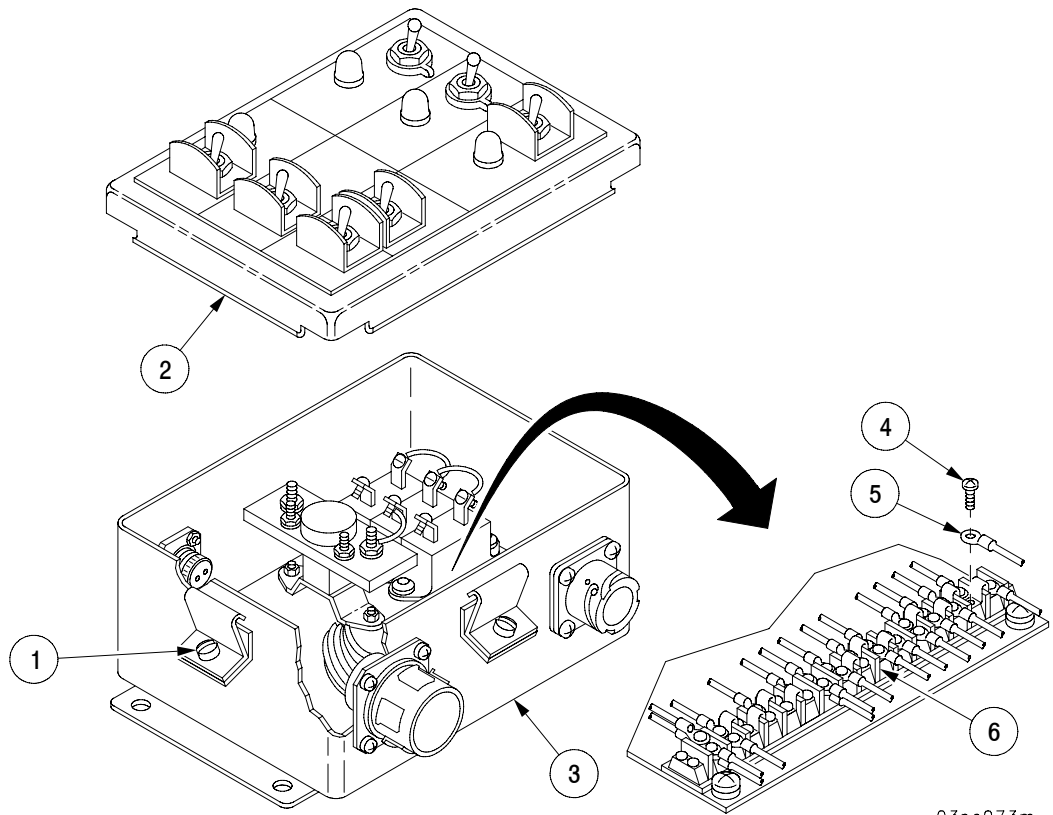
**5-22 HYDRAULIC CONTROL BOX HARNESS 12563029 - CONTINUED**

**b. Installation - Continued**

- 7 Connect the following leads (5) to bus connector (6) with screw (7) for each lead: (screw supplied with bus connector)

Cable Lead	Bus Connector
819B	TB1-1
825A	TB1-1
TLS	TB1-2
645	TB1-8
70	TB1-13
70	TB1-15

- 8 Close cover (2) and tighten four screws (1).



03pc073m

## 5-23 HYDRAULIC CONTROL BOX HARNESS 12563030.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Electric soldering gun (item 39, Appx G)

#### Equipment Conditions

Hydraulic control box removed  
(para 5-20)

#### Materials/Parts

Gasket (item 13, Appx F)  
Lockwashers (4) (item 102, Appx F)  
Tiedown straps (2) (item 85, Appx C)  
Marking tag (AR) (item 87, Appx C)

### a. Removal.

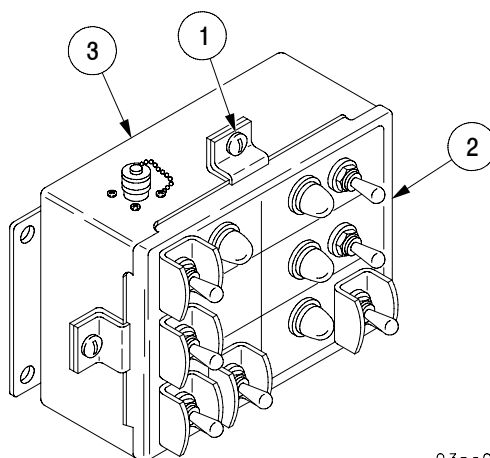
#### CAUTION

Cover is attached to cable assemblies in box. Use caution when separating cover from body to avoid wire breakage.

#### NOTE

Tag leads before disconnecting to aid in installation.

- 1 Loosen four screws (1) and separate cover (2) from control box (3).



03pc098m

## 5-23 HYDRAULIC CONTROL BOX HARNESS 12563030 - CONTINUED

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### a. Removal - Continued

- 2 Remove screw (4), lockwasher (5) (supplied with switch), lead TS3 (6), and lead 623A (7) from TRAVERSE CONTROL COS/GUNNER switch (8) S3-2.
- 3 Remove screw (9), lockwasher (10) (supplied with switch), lead TS4 (11), and lead 623 (12) from ELEVATION CONTROL COS/GUNNER switch (13) S4-2.
- 4 Remove screw (14) (supplied with bus connector), lead TS2 (15), and lead 819B-825A (16) from bus connector (17) TB1-1.
- 5 Remove screw (18) (supplied with bus connector), lead S6-1-186A (19), and lead TS6 (20) from bus connector (17) TB1-7.
- 6 Remove screw (21) (supplied with bus connector) and lead 100S (22) from bus connector (17) TB1-10.
- 7 Remove screw (23) (supplied with bus connector) and lead GND (24) from bus connector (17) TB1-16.
- 8 Remove and discard two tiedown straps (25).
- 9 Remove four screws (26), four flat washers (27), four lockwashers (28), four nuts (29), gasket (30), and wiring harness (31) from hydraulic control box (3). Discard lockwashers and gasket.

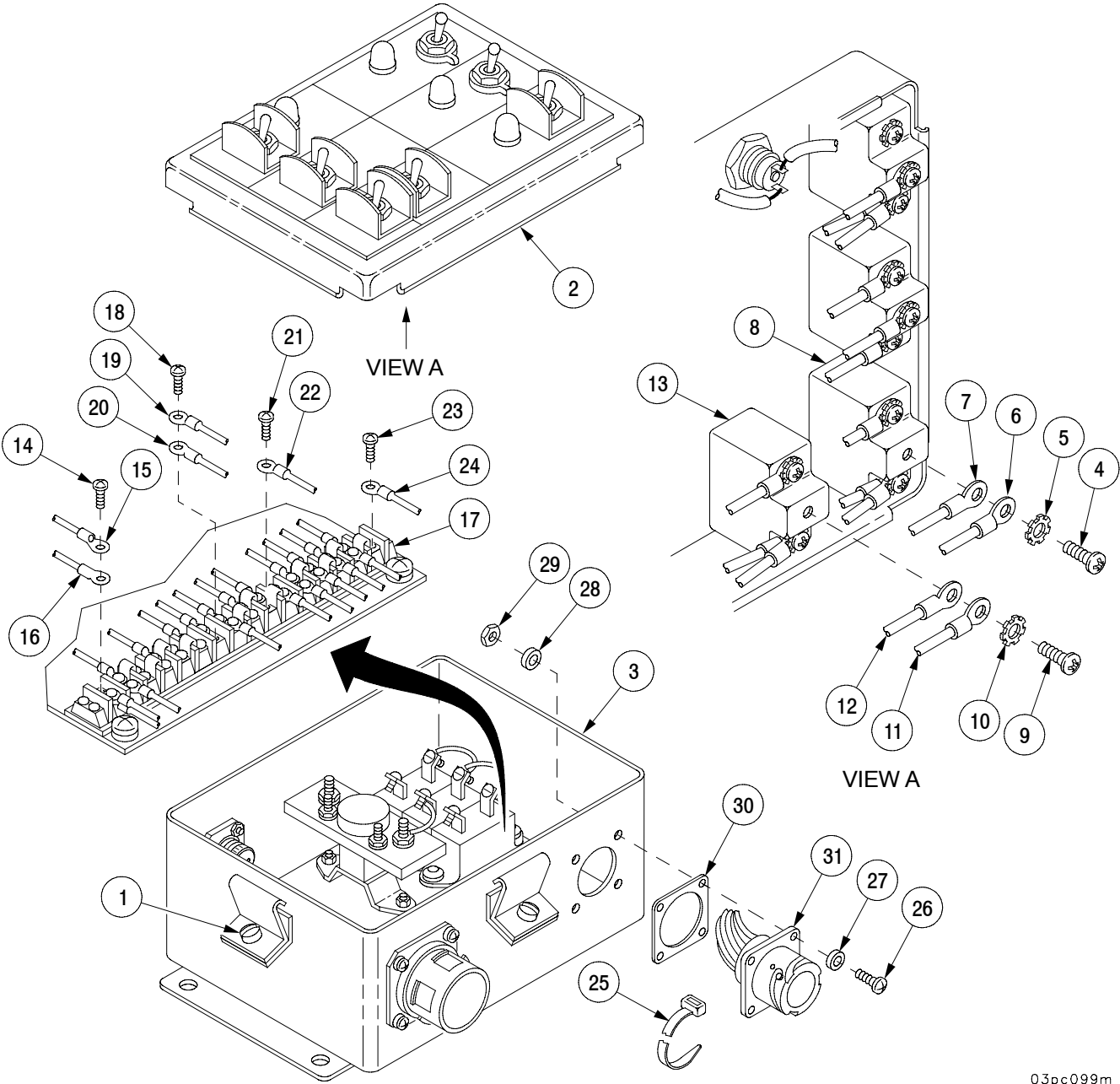
### b. Installation.

- 1 Install wiring harness (31) in hydraulic control box (3) with four screws (26), four flat washers (27), four new lockwashers (28), four nuts (29), and new gasket (30).
- 2 Install two new tiedown straps (25).
- 3 Connect lead GND (24) to bus connector (17) TB1-16 with screw (23) (supplied with bus connector).
- 4 Connect lead 100S (22) to bus connector (17) TB1-10 with screw (21) (supplied with bus connector).
- 5 Connect lead S6-1-186A (19) and lead TS6 (20) to bus connector (17) TB1-7 with screw (18) (supplied with bus connector).
- 6 Connect lead TS2 (15) and lead 819B-825A (16) to bus connector (17) TB1-1 with screw (14) (supplied with bus connector).
- 7 Connect cable lead TS4 (11) and lead 623 (12) to ELEVATION CONTROL COS/GUNNER switch (13) S4-2 with screw (9) and lockwasher (10) (supplied with switch).
- 8 Connect cable lead TS3 (6) and lead 623A (7) to TRAVERSE CONTROL COS/GUNNER switch (8) S3-2 with screw (4) and lockwasher (5) (supplied with switch).

5-23 HYDRAULIC CONTROL BOX HARNESS 12563030 - CONTINUED

b. Installation - Continued

9 Install cover (2) on control box (3) and tighten four screws.



03pc099m

## 5-24 TRAVERSE LIMIT SWITCH.

This task covers: a. Removal b. Disassembly c. Assembly d. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Digital multimeter (item 24, Appx G)

#### Materials/Parts

Cotter pin (item 77, Appx F)  
Self-locking screws (4) (item 45, Appx F)  
Sealing compound (item 42, Appx C)  
Marking tag (AR) (item 87, Appx C)  
Lockwashers (4) (item 128, Appx F)  
Lockwashers (2) (item 108, Appx F)  
Tiedown strap (item 81, Appx C)

#### Equipment Conditions

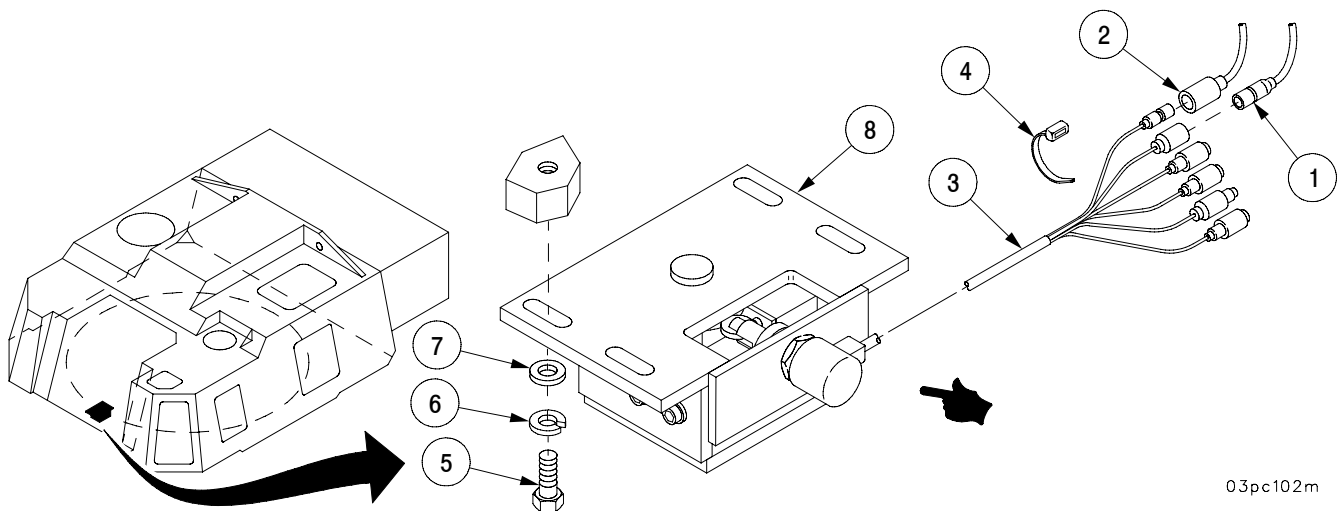
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

#### NOTE

- Tag leads before disconnecting to aid in installation.
- Note the position of the switch prior to removal to ensure that it is installed in the same manner.

- 1 Disconnect wiring harness W64 leads TLS (1) and TLS-A (2) from traverse limit switch wiring harness (3).
- 2 Remove and discard tiedown strap (4).
- 3 Remove four screws (5), four lockwashers (6), and four flat washers (7) securing switch assembly (8). Remove switch assembly (8). Discard lockwashers.

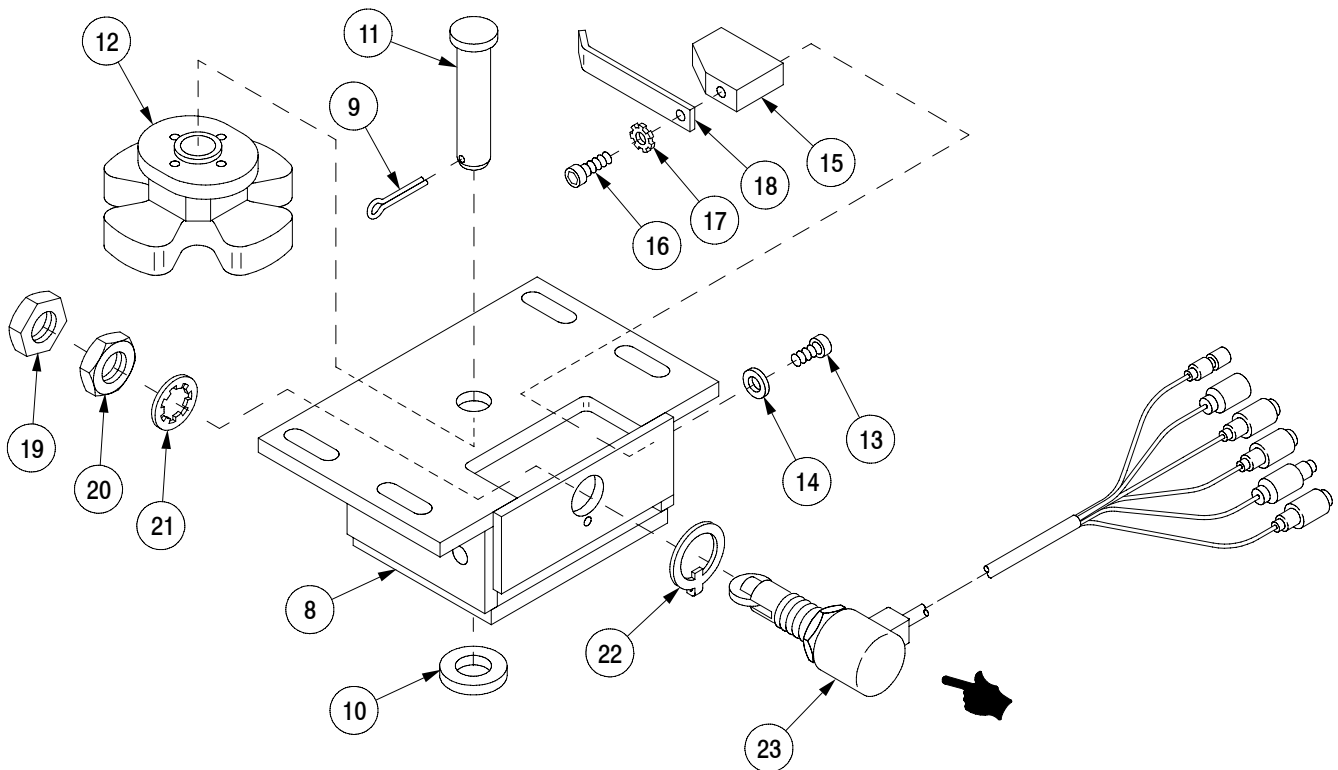


03pc102m

## 5-24 TRAVERSE LIMIT SWITCH - CONTINUED

### b. Disassembly.

- 1 Remove cotter pin (9), flat washer (10), and pin (11) from cam (12) and housing (8). Discard cotter pin.
- 2 Remove cam (12) from housing (8).
- 3 Remove four screws (13), four flat washers (14), and two brackets (15) from housing (8). Discard screws.
- 4 Remove two screws (16), two lockwashers (17), and two springs (18) from two brackets (15). Discard lockwashers.
- 5 Remove azimuth adjustment nut (19), nut (20), lockwasher (21), key washer (22) (adjustment nut, nut, lockwasher, and key washer supplied with switch) and switch (23) from housing (8).

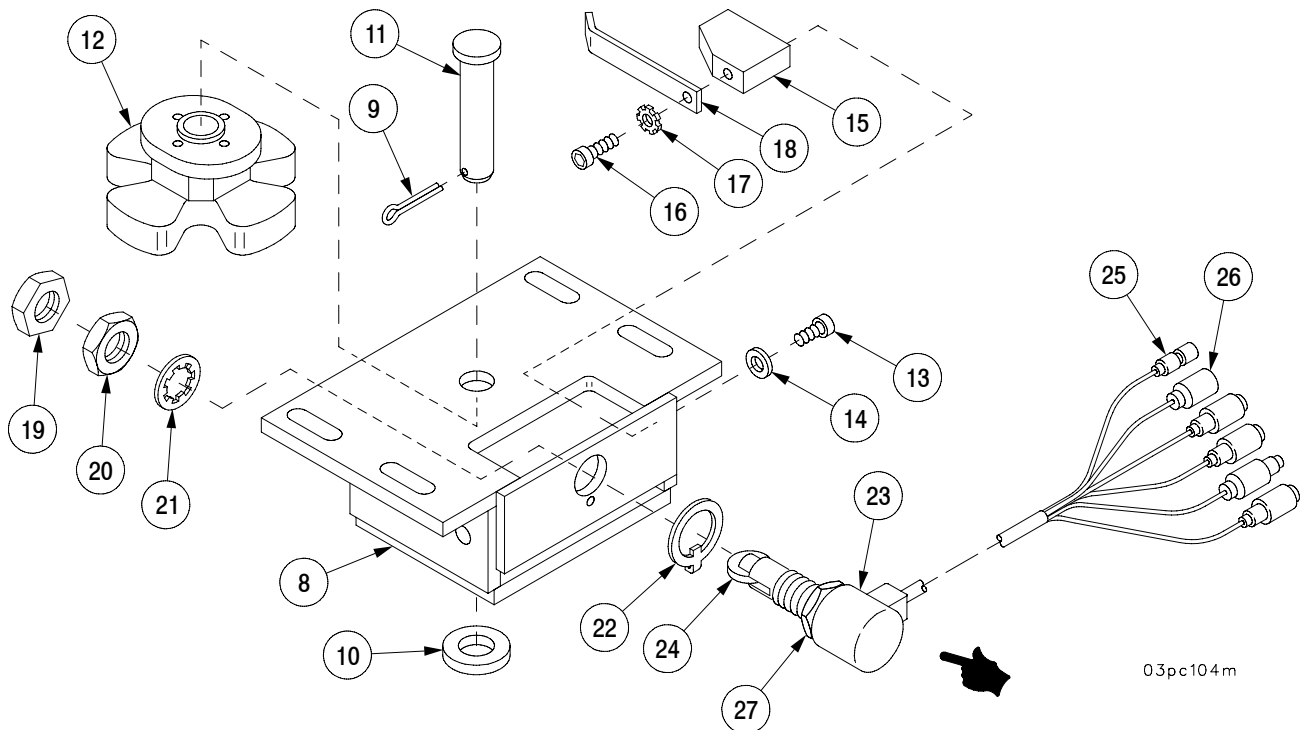


03pc103m

## 5-24 TRAVERSE LIMIT SWITCH - CONTINUED

### c. Assembly.

- 1 Install switch (23) with keywasher (22) (supplied with switch), new lockwasher (21), and nut (20).
- 2 Turn roller plunger (24) so that it is parallel to top of housing (8). Install and tighten azimuth adjustment nut (19).
- 3 Install cam (12) in housing (8).
- 4 Connect multimeter between leads TLS-A (25) and TLS (26). Set multimeter to OHMS.
- 5 Adjust nut (27) so that multimeter reads zero ohms when cam (12) is placed in the high lobe position and infinite ohms when cam (12) is in the low lobe position.
- 6 Remove cam (12) from housing (8).
- 7 Install two springs (18) on two brackets (15) with two screws (16) and two new lockwashers (17).
- 8 Apply sealing compound to threads of screws (13) and install two brackets (15) in housing (8) with four new screws (13) and four flat washers (14).
- 9 Install cam (12) in housing (8) with pin (11), flat washer (10), and new cotter pin (9).





## 5-24 TRAVERSE LIMIT SWITCH - CONTINUED

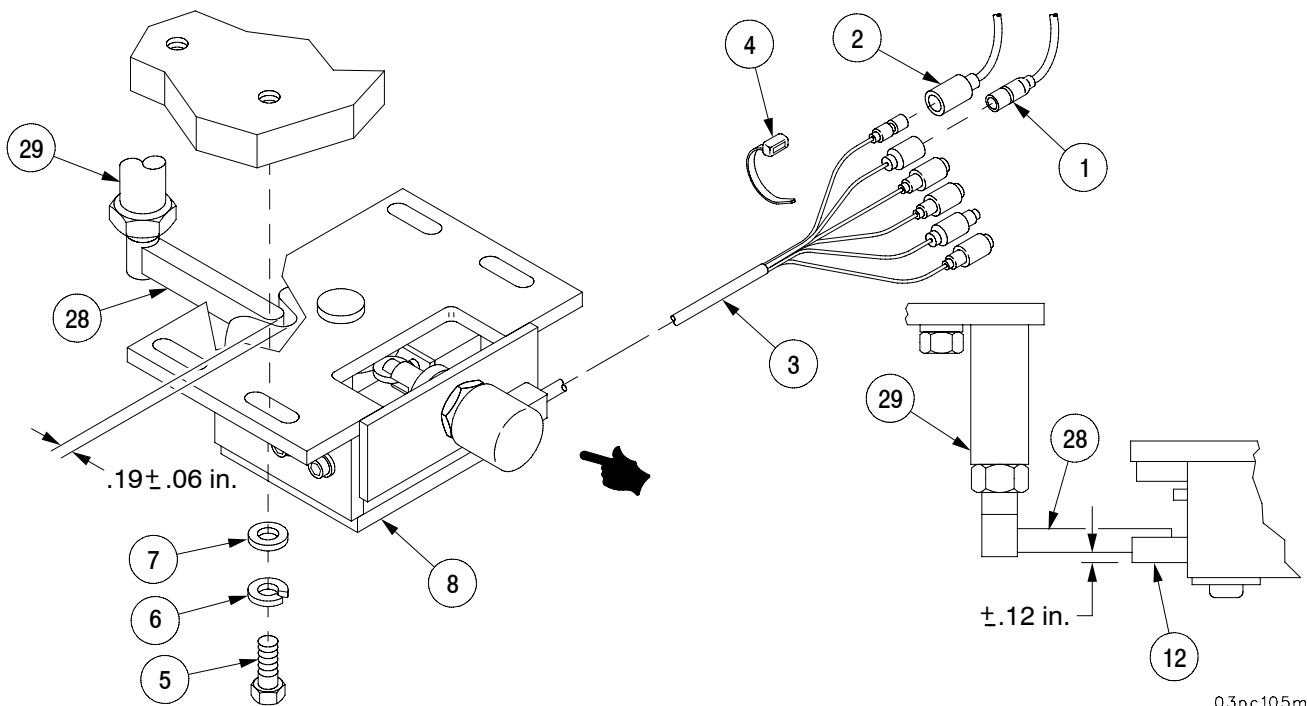
### d. Installation.

- 1 Place cam (12) in the low lobe position.
- 2 Loosely install switch assembly (8) with four screws (5), four new lockwashers (6), and four flat washers (7).

#### NOTE

This procedure is applicable to both switch trips.  
Both sides must be checked/adjusted.

- 3 Manually traverse cab until trip (28) engages low lobe of cam (12).
- 4 Position switch assembly (8) so that the distance between the low lobe of the cam (12) and the trip (28) is  $.19 \pm .06$  inches. If unable to achieve tolerance, adjust trip bracket (29) in or out.
- 5 Tighten four screws (5).
- 6 Check that the trip (28) is flush with the cam (12) within  $\pm .12$  inches. If not, adjust trip (28).
- 7 Connect wiring harness W64 leads TLS (1) and TLS-A (2) to traverse limit switch wiring harness (3).
- 8 Install new tiedown strap (4).



## 5-25 TRAVERSE LIMIT SWITCH STOP MECHANISM.

---

This task covers:    a. Removal                    b. Disassembly                    c. Assembly                    d. Installation

---

### **INITIAL SETUP**

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Non-electrical wire (item 98, Appx C)  
Sealing compound (item 42, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Cab traverse lock locked  
(TM 9-2350-314-10)

---

#### **a. Removal.**

- 1 Remove lockwire (1) from three screws (2). Discard lockwire.
- 2 Remove three screws (2) and three flat washers (3).
- 3 Remove bracket (4) with trip (5).

#### **b. Disassembly.**

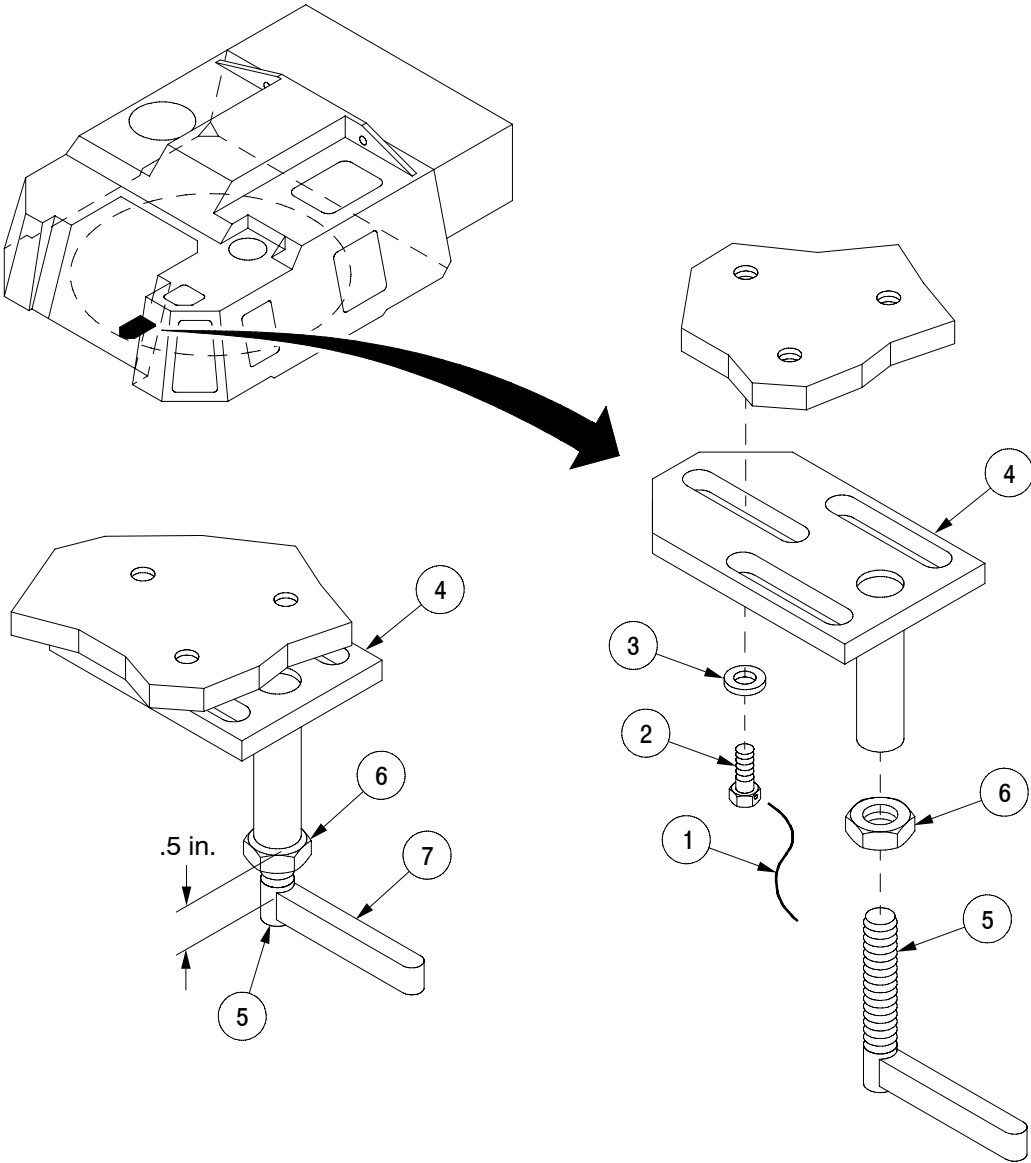
- 1 Loosen nut (6) on trip (5).
- 2 Unscrew trip (5) from bracket (4).

#### **c. Assembly.**

- 1 Apply sealant on threads and install trip (5) in bracket (4). Trip foot (7) must clear bracket by .5 inch and be positioned as shown.
- 2 Loosely snug trip (5) with nut (6).

5-25 TRAVERSE LIMIT SWITCH STOP MECHANISM - CONTINUED

c. Assembly - Continued

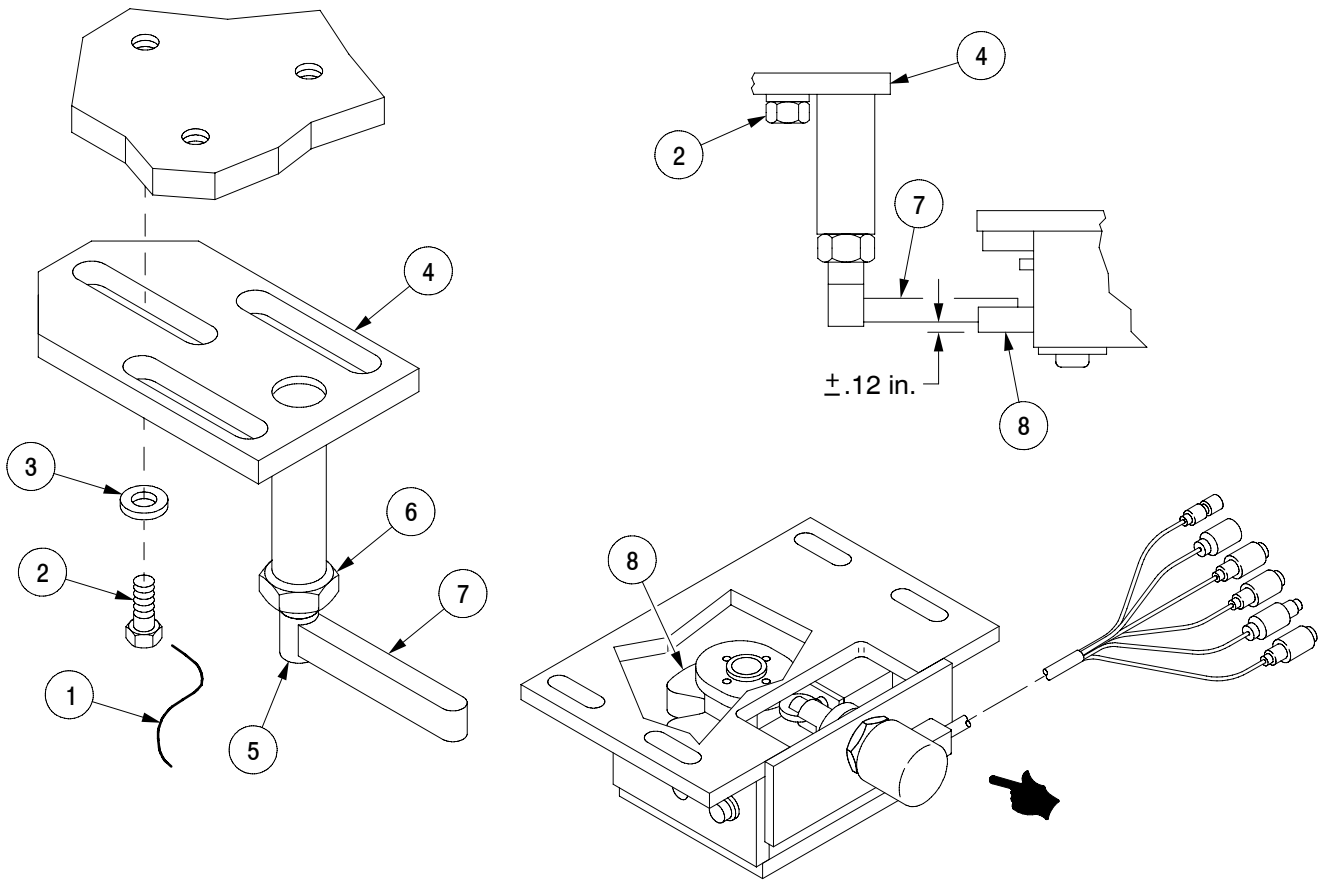


03pc106m

**5-25 TRAVERSE LIMIT SWITCH STOP MECHANISM - CONTINUED**

**d. Installation.**

- 1 Position bracket (4) with trip (5) on hull. Loosely install with three screws (2) and three flat washers (3).
- 2 Point trip foot (7) toward center of cab. Tighten nut (6).
- 3 Move bracket (4) as far from center of cab as adjustment slots permit. Snug down three mounting screws (2).
- 4 Slowly traverse cab manually (TM 9-2350-314-10) while checking clearance between trip foot (7) and cab protrusions. At widest protrusion, loosen three mounting screws (2) and adjust trip foot (7) clearance to 1/4-inch. Tighten three mounting screws (2).
- 5 Slowly traverse cab manually and check trip foot (7) engages switch cam assembly (8) as shown. Surfaces of trip (7) and wheel (8) should be flush within  $\pm .12$  inch.
- 6 Secure three mounting screws (2) with new lockwire (1).



03pc107m

**5-26 DOME LIGHT ASSEMBLIES.**

This task covers: a. Removal b. Disassembly c. Assembly d. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

Materials/Parts

Gasket (item 210, Appx F)  
Lockwashers (4) (item 128, Appx F)  
Lockwashers (5) (item 144, Appx F)

Equipment Conditions

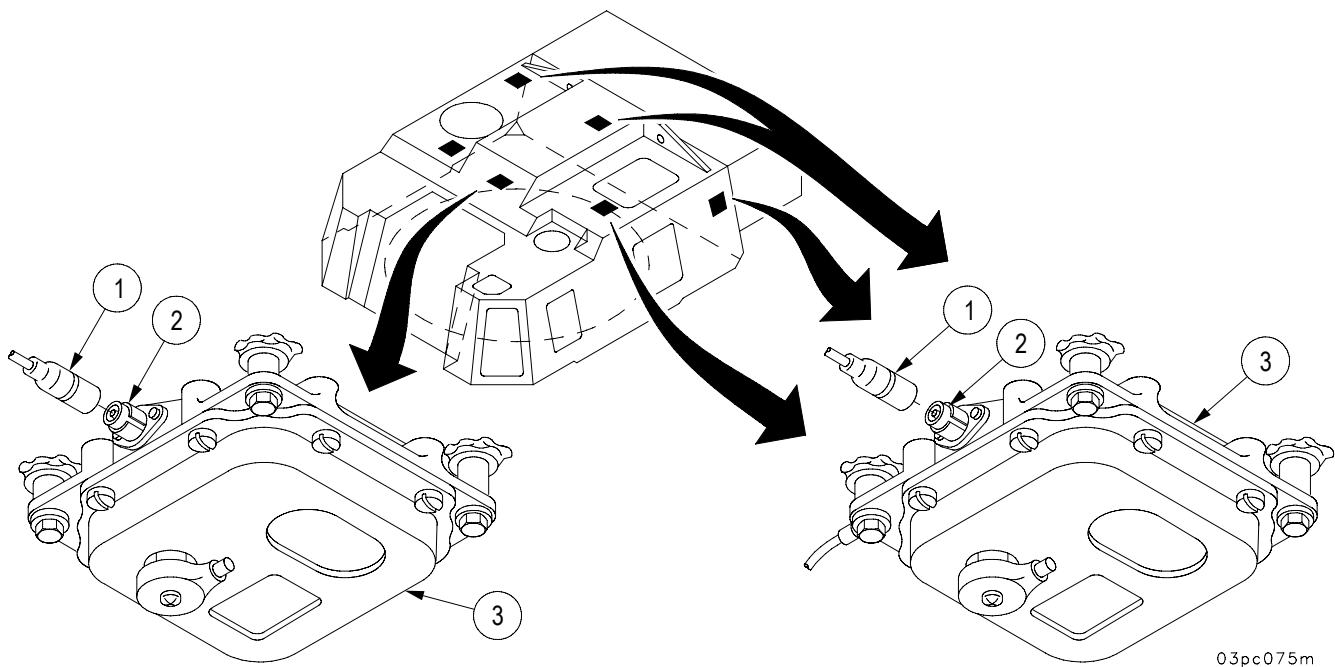
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

**a. Removal.**

**NOTE**

- There are six dome light assemblies. The removal and installation procedures are identical for all six, except as noted.
- Perform steps 4 thru 7 for removal of dome light with PLGR or DAGR cable mounting bracket installed.

1 Disconnect wiring harness W64 lead 138 (1) from connector (2) on dome light (3).



03pc075m

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## 5-26 DOME LIGHT ASSEMBLIES - CONTINUED

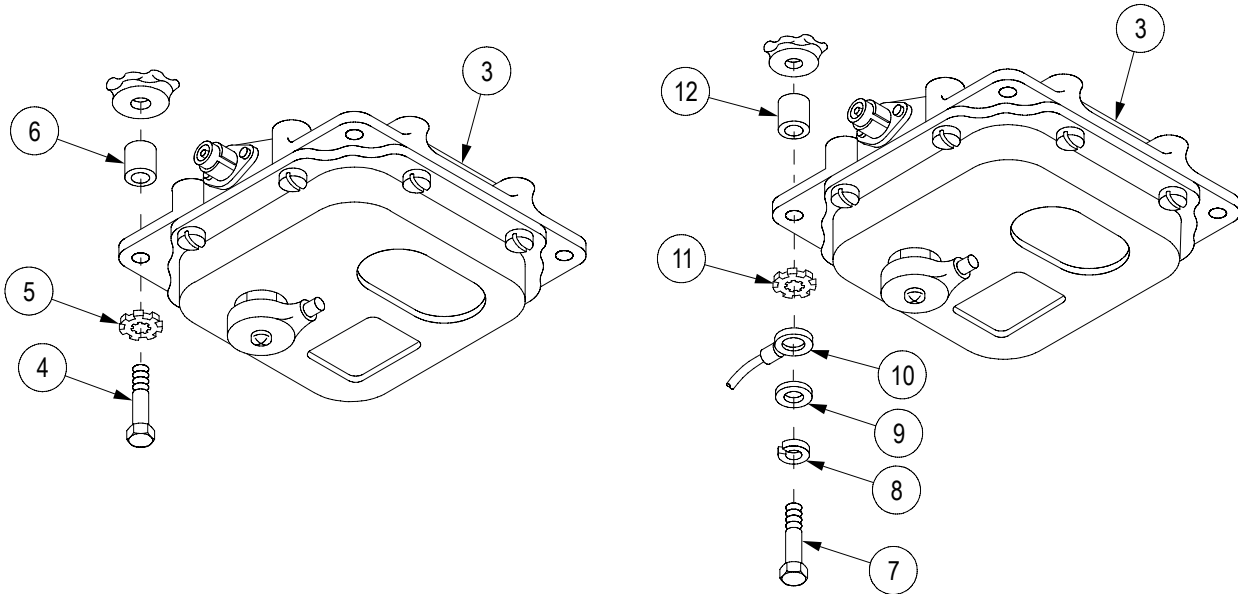
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### a. Removal - Continued

#### NOTE

Perform step 2 for the forward overhead center dome light only. Step 3 for all others.

- 2 Remove four screws (4), four lockwashers (5), and four standoffs (6) and dome light (3). Discard lockwashers.
- 3 Remove four screws (7), four lockwashers (8), four flat washers (9), wiring harness W64 ground lead 70 (10), lockwasher (11), four standoffs (12), and dome light (3). Discard lockwashers.

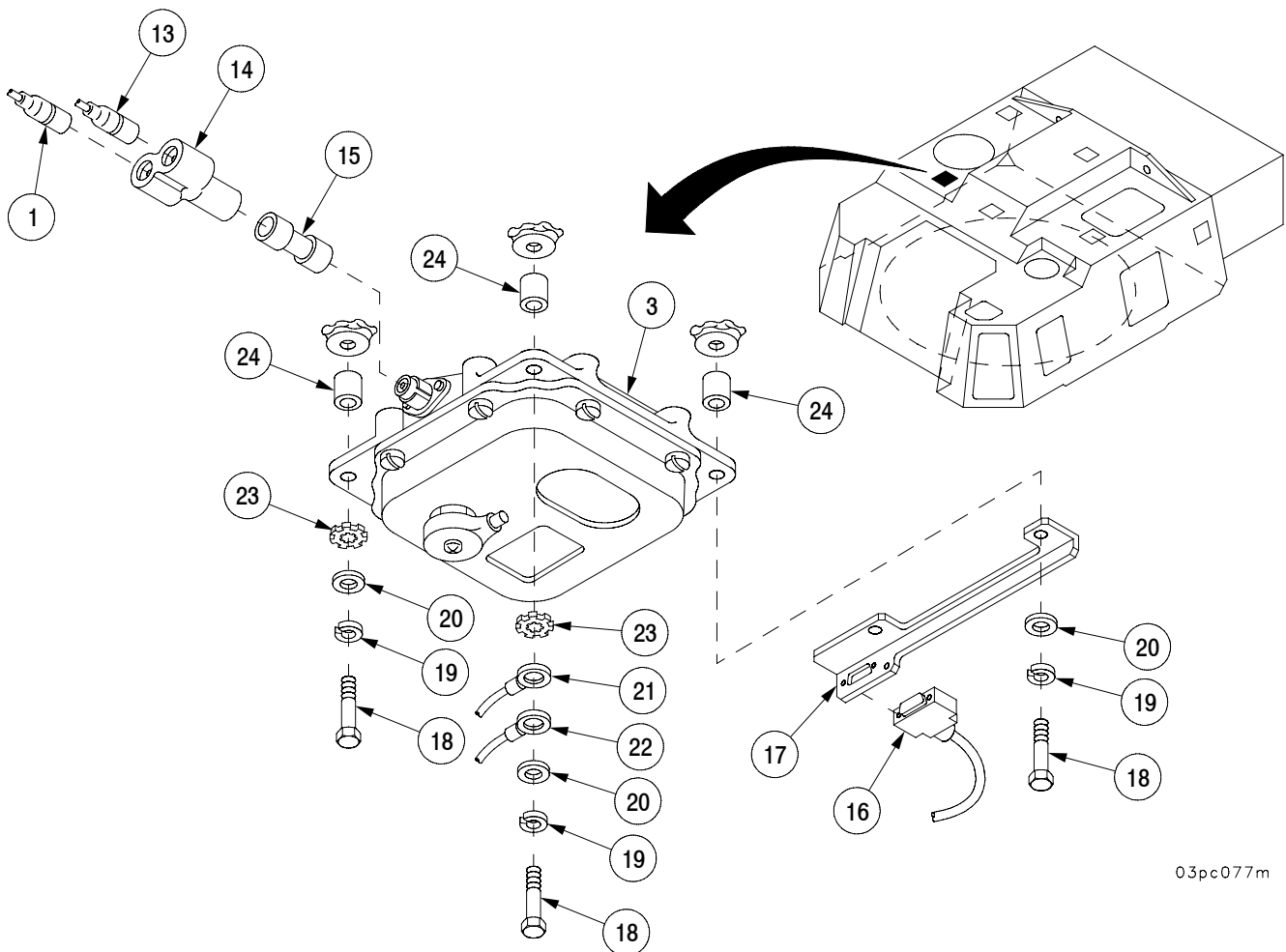


03pc076m

## 5-26 DOME LIGHT ASSEMBLIES - CONTINUED

### a. Removal - Continued

- 4 Disconnect wiring harness W64 lead 138 (1) and PLGR or DAGR power cable assembly (13) from Y-adapter (14) on dome light (3).
- 5 Remove Y-adapter (14) and connector (15) from dome light (3).
- 6 Remove wiring harness W17A lead P5 (16) from bracket (17).
- 7 Remove four screws (18), four lockwashers (19), four flat washers (20), wiring harness W64 ground lead 70 (21), PLGR or DAGR cable ground lead (22), two lockwashers (23), bracket (17), four standoffs (24), and dome light (3). Discard lockwashers.



03pc077m

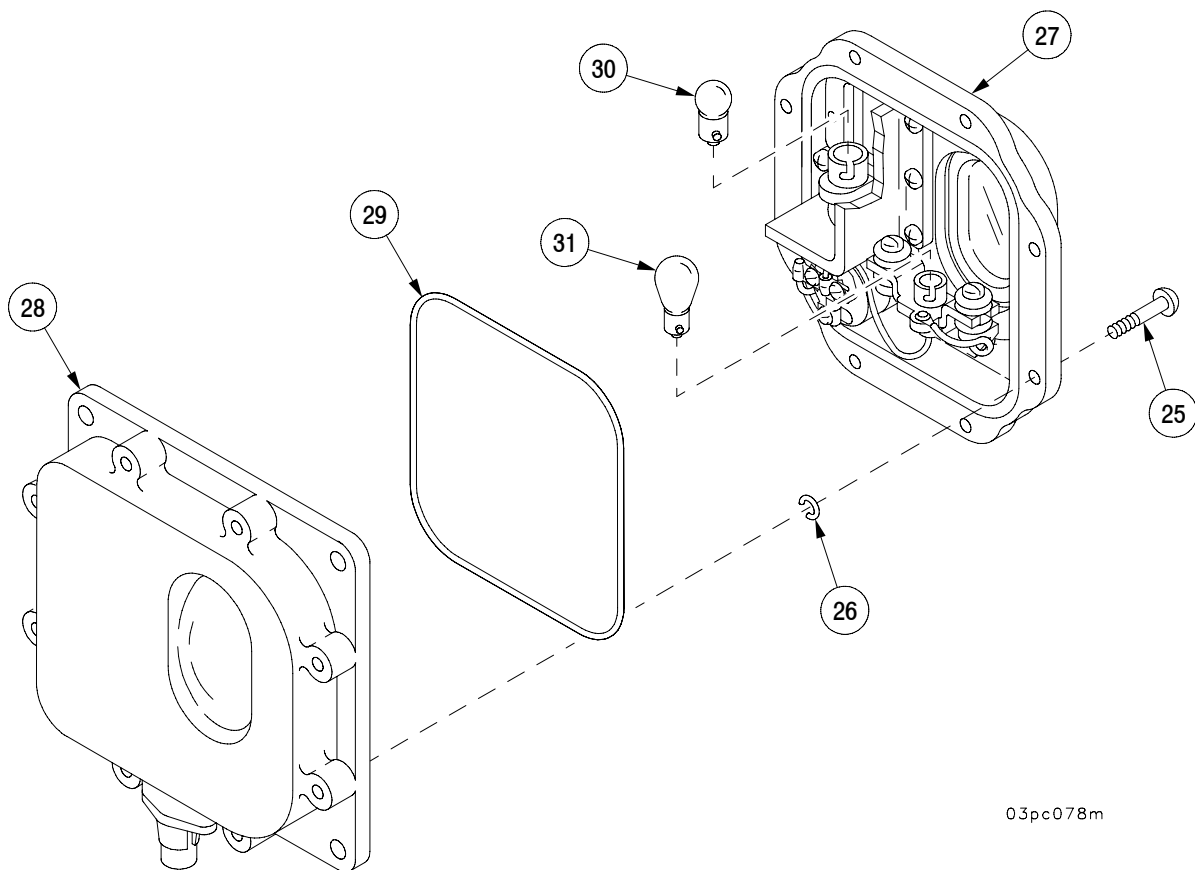
## 5-26 DOME LIGHT ASSEMBLIES - CONTINUED

### b. Disassembly.

- 1 Remove eight screws (25) and eight retaining rings (26). Separate dome light door assembly (27) from dome light body (28).
- 2 Remove and discard gasket (29).
- 3 Remove two bulbs (30) and (31).

### c. Assembly.

- 1 Install two bulbs (30) and (31).
- 2 Install new gasket (29).
- 3 Align dome light door assembly (27) with dome light body (28). Install eight retaining rings (26) and eight screws (25).



03pc078m



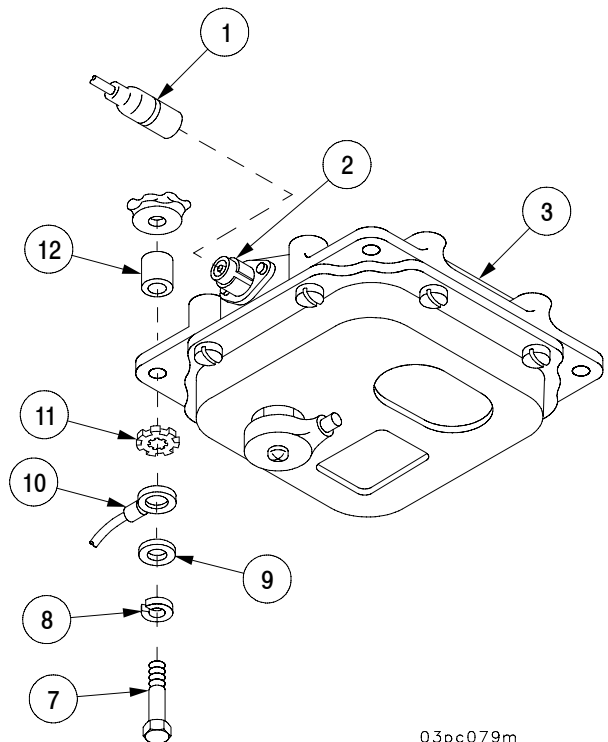
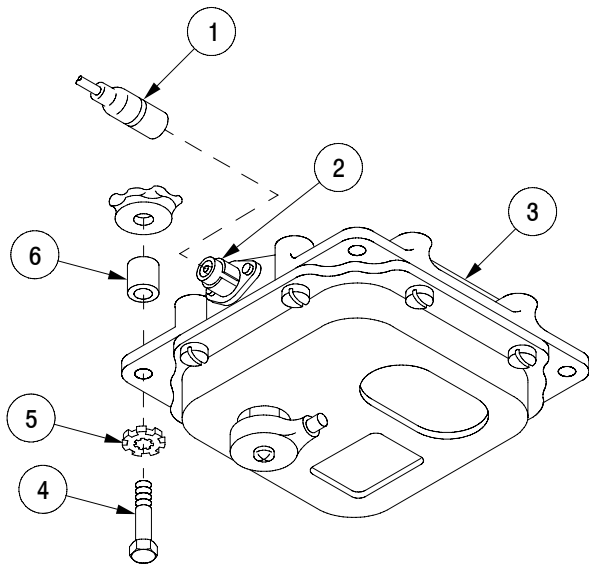
**5-26 DOME LIGHT ASSEMBLIES - CONTINUED**

**d. Installation.**

**NOTE**

- Perform step 1 for the forward overhead center dome light only, and step 2 for four remaining dome lights.
- Perform steps 4 thru 7 if vehicle is equipped with PLGR or DAGR.

- 1 Install dome light (3) with four screws (4), four new lockwashers (5), and four standoffs (6).
- 2 Install dome light (3) with four screws (7), four new lockwashers (8), four flat washers (9), wiring harness W64 ground lead 70 (10), new lockwasher (11), and four standoffs (12).
- 3 Connect wiring harness W64 lead 138 (1) to connector (2) on dome light (3).



03pc079m

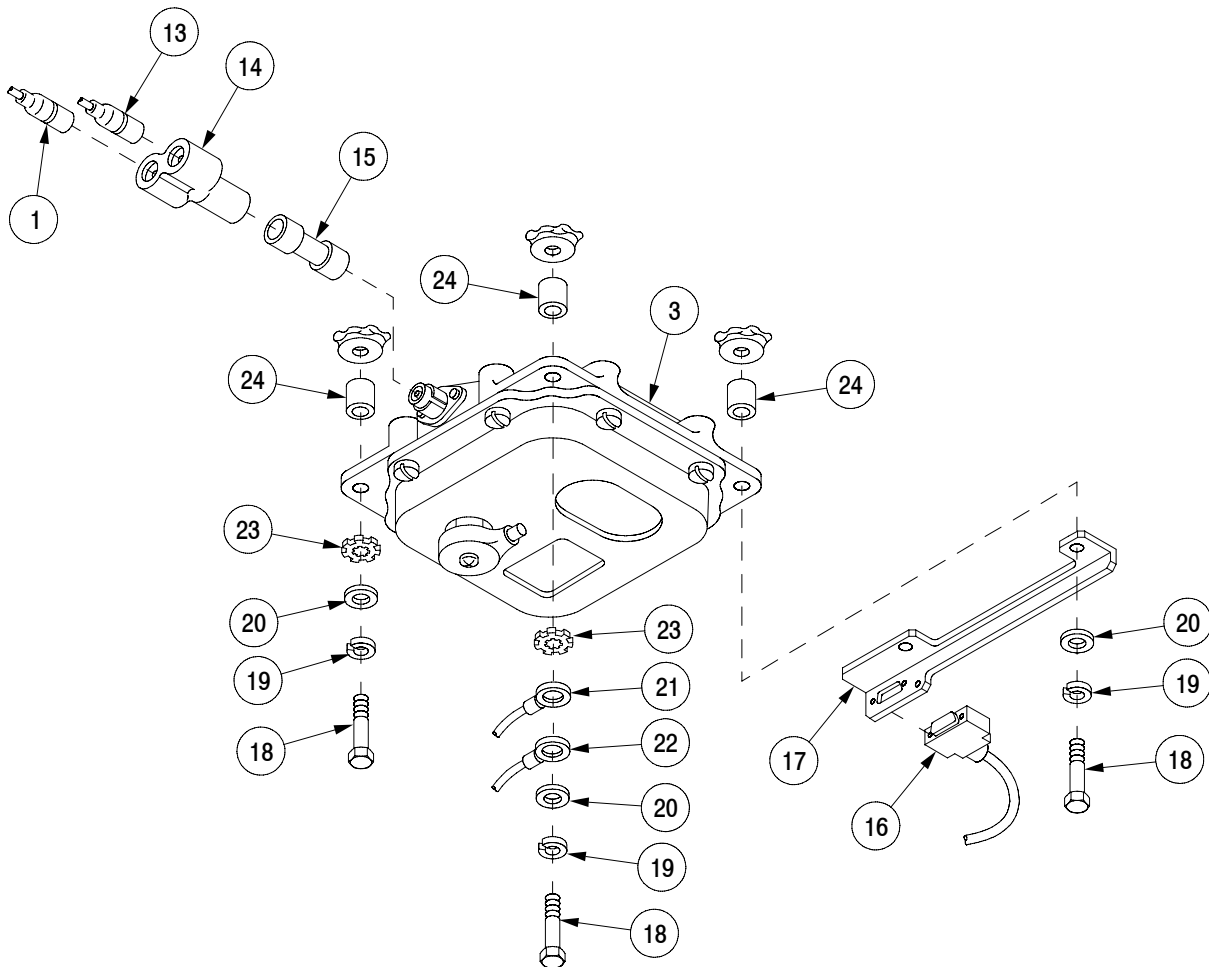
## 5-26 DOME LIGHT ASSEMBLIES - CONTINUED

### d. Installation - Continued

#### NOTE

Insure ground leads, washers and bolts are free of paint prior to installation.

- 4 Install dome light (3) with four standoffs (24), bracket (17), two new lockwashers (23), PLGR or DAGR cable ground lead (22), wiring harness W64 ground lead 70 (21), four flat washers (20), four new lockwashers (19), and four screws (18).
- 5 Install wiring harness W17A lead P5 (16) to bracket (17).
- 6 Install connector (15) and Y-adapter (14).
- 7 Connect wiring harness W64 lead 138 (1) and PLGR or DAGR power cable assembly (13) to Y-adapter (14) on dome light (3).



03pc080m

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**5-27 LEAD ASSEMBLIES, HARNESS W64 TO BRUSH BLOCKS 7 AND 8 OR LEAD ASSEMBLIES, HARNESS W62A TO BRUSH BLOCKS 1 AND 2.**

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This task covers:          a. Removal                                  b. Installation

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**INITIAL SETUP**Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Torque wrench (item 53, Appx G)

Materials/Parts

Lockwashers (2) (item 130, Appx F)

Lockwashers (2) (item 132, Appx F)

Tiedown strap (item 78, Appx C)

Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)

Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

Slip ring cover removed (para 23-1)

Brush block #2 ground lead removed (para 5-8)

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**5-27 LEAD ASSEMBLIES, HARNESS W64 TO BRUSH BLOCKS 7 AND 8 OR LEAD ASSEMBLIES, HARNESS W62A TO BRUSH BLOCKS 1 AND 2 - CONTINUED**

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**a. Removal.**

**NOTE**

There are four sets of brush blocks. The removal and installation procedures are identical. This procedure covers only one set.

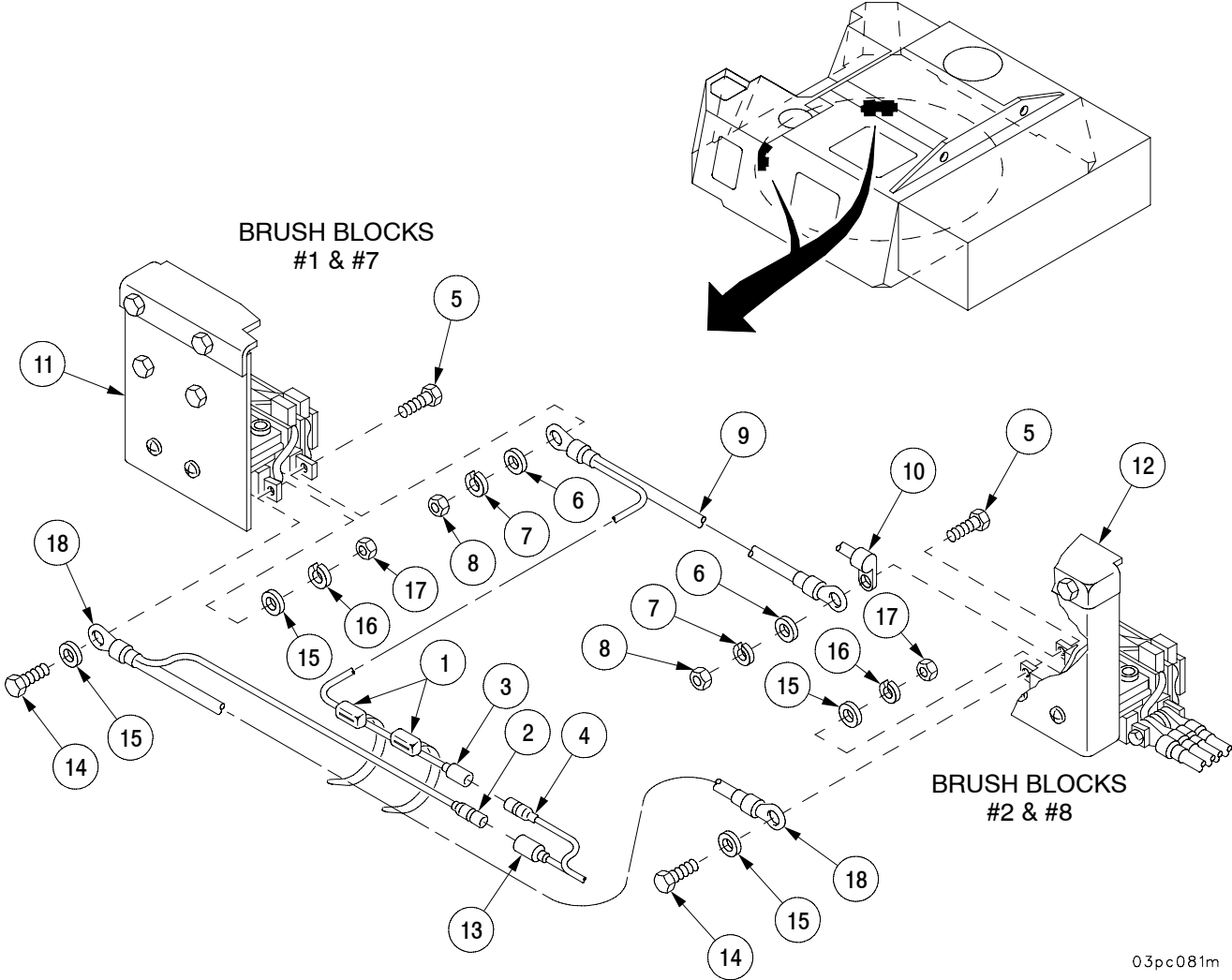
- 1 Remove and discard tiedown straps (1) from lead 100 (2) and lead 70 (3).
- 2 Disconnect lead 70 (3) from wiring harness W64 lead 70 (4).
- 3 Remove two screws (5), two flat washers (6), two lockwashers (7), two nuts (8), lead 70 (9), and lead (10) from brush blocks 1 or 7 (11) and 2 or 8 (12). Discard lockwashers.
- 4 Remove lead 70 (9) from vehicle.
- 5 Disconnect lead 100 (2) from wiring harness W64 lead 100 (13).
- 6 Remove two screws (14), four flat washers (15), two lockwashers (16), two nuts (17), and lead 100 (18) from brush blocks 1 or 7 (11) and 2 or 8 (12). Discard lockwashers.
- 7 Remove lead 100 (18) from vehicle.

**b. Installation.**

- 1 Connect lead 100 (18) to brush blocks 1 or 7 (11) and 2 or 8 (12) with two screws (14), four flat washers (15), two new lockwashers (16), and two nuts (17). Torque nuts to 30–35 lb–ft (41–47 N·m).
- 2 Connect lead 100 (2) to wiring harness W64 lead 100 (13).
- 3 Connect lead 70 (9) and lead (10) to brush blocks 1 or 7 (11) and 2 or 8 (12) with two screws (5), two flat washers (6), two new lockwashers (7), and two nuts (8). Torque nuts to 25–30 lb–ft (34–41 N·m).
- 4 Connect lead 70 (3) to wiring harness W64 lead 70 (4).
- 5 Install new tiedown straps (1) to lead (2) and lead (3).

**5-27 LEAD ASSEMBLIES, HARNESS W64 TO BRUSH BLOCKS 7 AND 8 OR LEAD ASSEMBLIES, HARNESS W62A TO BRUSH BLOCKS 1 AND 2 - CONTINUED**

**b. Installation - Continued**



03pc081m

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## 5-28 LEAD ASSEMBLIES BETWEEN SHUNT AND HYDRAULIC PUMP MOTOR.

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This task covers:      a. Removal                                      b. Installation

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### **INITIAL SETUP**

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Marking tag (AR) (item 87, Appx C)  
Lockwashers (2) (item 115, Appx F)  
Lockwasher (item 130, Appx F)  
Lockwashers (3) (item 128, Appx F)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment access door  
open (TM 9-2350-314-10)  
Hydraulic compartment access cover  
removed (para 19-2)

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#### **a. Removal.**

### **NOTE**

Tag leads before disconnecting to aid in installation.

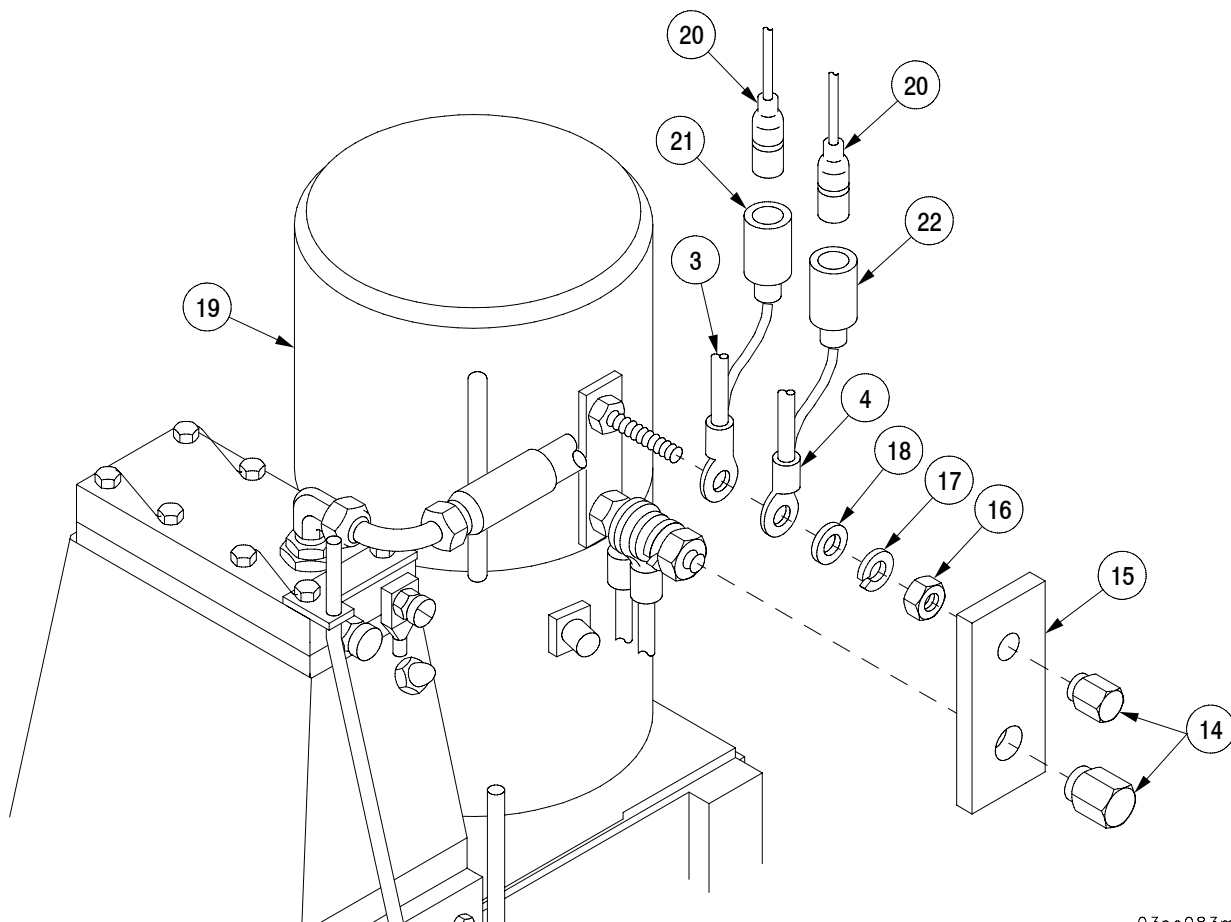
- 1 Remove two screws (1), two lockwashers (2), lead 70 (3), and lead 70 (4) from shunt (5). Discard lockwashers.
- 2 Remove screw (6), lockwasher (7), flat washer (8), and clamp (9). Discard lockwasher.
- 3 Remove two screws (10), two lockwashers (11), two flat washers (12), and two clamps (13). Discard lockwashers.
- 4 Remove two plastic nuts (14), rubber cover (15), nut (16), lockwasher (17), flat washer (18), lead 70 (3), and lead 70 (4) from hydraulic pump motor (19). Discard lockwasher.
- 5 Disconnect two leads (20) (wiring harness W60 lead 136 and wiring harness W51 lead 70) from lead 136 (21) and lead 70 (22).
- 6 Remove lead 70-136 and 70 (3 and 4) from hydraulic compartment.



## 5-28 LEAD ASSEMBLIES BETWEEN SHUNT AND HYDRAULIC PUMP MOTOR - CONTINUED

### b. Installation.

- 1 Position lead 70-136 (3) and lead 70 (4) in hydraulic compartment.
- 2 Connect lead 70 (3) and lead 70 (4) to hydraulic pump motor (19) with two plastic nuts (14), rubber cover (15), nut (16), new lockwasher (17), and flat washer (18).
- 3 Connect wiring harness W60 lead 136 and wiring harness W51 lead 70 (20) to lead 136 (21) and lead 70 (22).



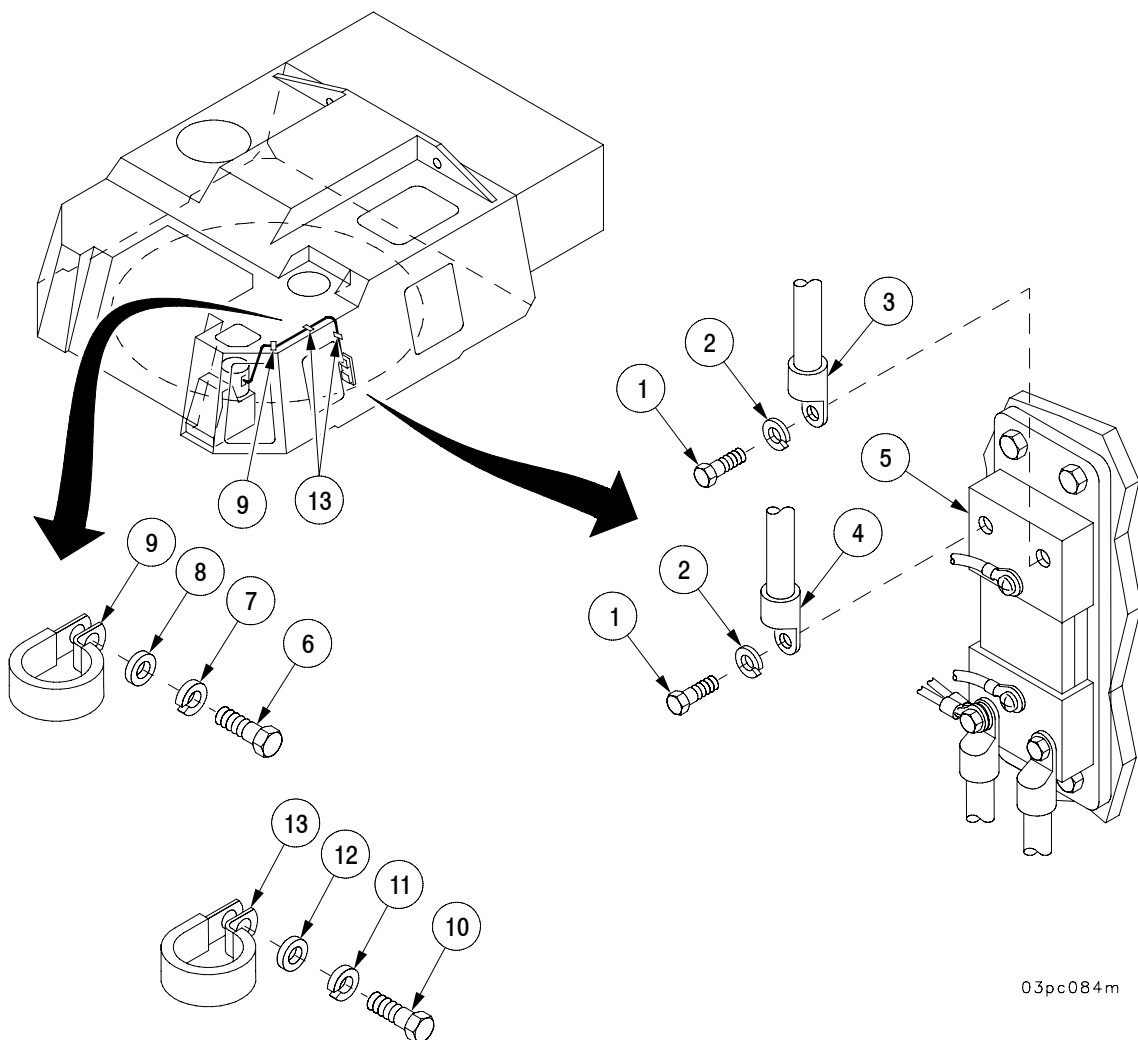
03pc083m



## 5-28 LEAD ASSEMBLIES BETWEEN SHUNT AND HYDRAULIC PUMP MOTOR - CONTINUED

### b. Installation - Continued

- 4 Install two clamps (13) with two screws (10), two new lockwashers (11), and two flat washers (12).
- 5 Install clamp (9) with screw (6), new lockwasher (7), and flat washer (8).
- 6 Connect lead 70 (3) and lead 70 (4) to shunt (5) with two screws (1) and two new lockwashers (2).



## 5-29 LEAD ASSEMBLIES, HYDRAULIC PUMP MOTOR TO CIRCUIT BREAKER.

---

This task covers: a. Removal b. Installation

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### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Lockwashers (2) (item 132, Appx F)  
Lockwashers (2) (item 130, Appx F)  
Marking tag (AR) (item 87, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Hydraulic compartment door open  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

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### NOTE

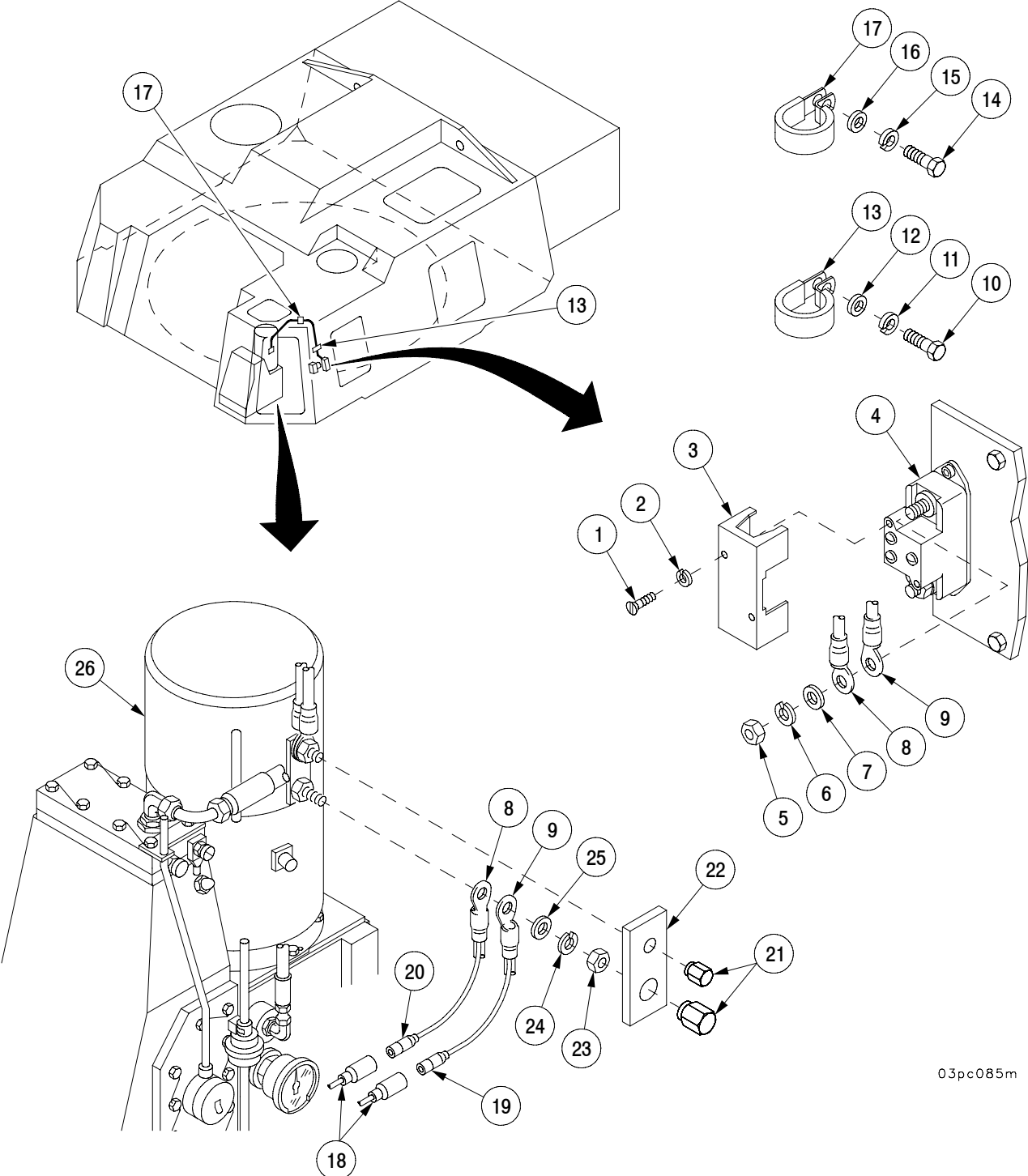
Tag leads before disconnecting to aid in installation.

#### a. Removal.

- 1 Remove two screws (1), two lockwashers (2), and cover (3) from circuit breaker (4) (supplied with circuit breaker).
- 2 Remove nut (5), lockwasher (6), flat washer (7) (supplied with circuit breaker), lead 100 (8), and lead 100 (9) from circuit breaker (4). Discard lockwasher.
- 3 Remove screw (10), lockwasher (11), flat washer (12), and clamp (13). Discard lockwasher.
- 4 Remove screw (14), lockwasher (15), flat washer (16), and clamp (17). Discard lockwasher.
- 5 Disconnect two leads (18) (wiring harness W51 lead 100 and wiring harness W60 lead 135) from lead 100 (19) and lead 135 (20).
- 6 Remove two plastic nuts (21), rubber pad (22), nut (23), lockwasher (24), flat washer (25), lead 100 (8), and lead 100 (9) from motor (26). Discard lockwasher.
- 7 Remove leads 100 and 100 (8 and 9) from hydraulic compartment.

**5-29 LEAD ASSEMBLIES, HYDRAULIC PUMP MOTOR TO CIRCUIT BREAKER - CONTINUED**

**a. Removal - Continued**

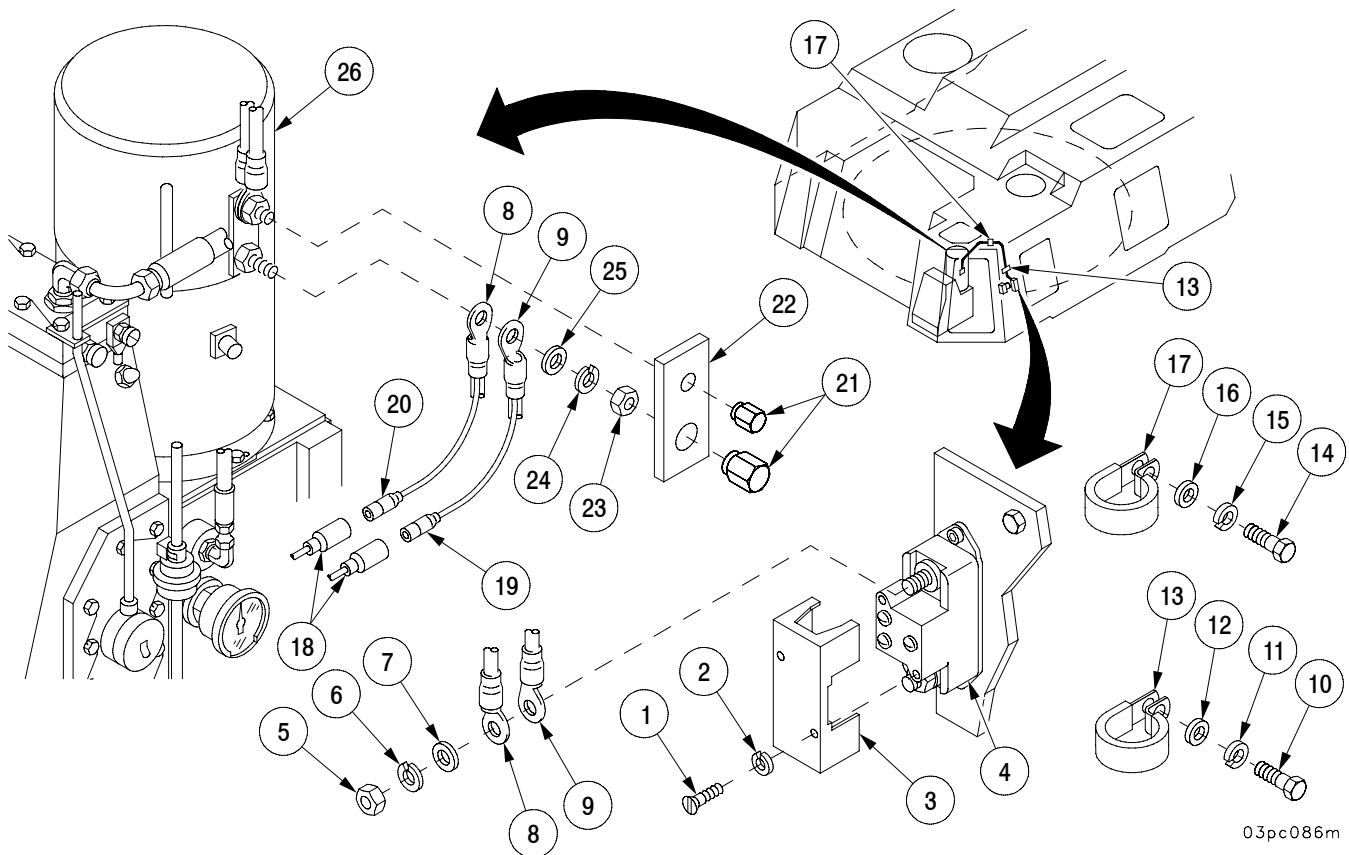


03pc085m

## 5-29 LEAD ASSEMBLIES, HYDRAULIC PUMP MOTOR TO CIRCUIT BREAKER - CONTINUED

### b. Installation.

- 1 Position leads 100 and 135 (19 and 20) in hydraulic compartment.
- 2 Connect lead 100 (8) and lead 100 (9) to motor (26) with two plastic nuts (21), pad (22), nut (23), new lockwasher (24), and flat washer (25).
- 3 Connect two leads (18) (wiring harness W51 lead 100 and wiring harness W60 lead 135) to lead 100 (19) and lead 135 (20).
- 4 Install clamp (17) with screw (14), new lockwasher (15), and flat washer (16).
- 5 Install clamp (13) with screw (10), new lockwasher (11), and flat washer (12).
- 6 Connect two lead 100s (8 and 9) to circuit breaker (4) with nut (5), new lockwasher (6), and flat washer (7).
- 7 Install cover (3) on circuit breaker (4) with two lockwashers (2) and two screws (1) (supplied with circuit breaker).



## 5-30 WIRING HARNESS W62A.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

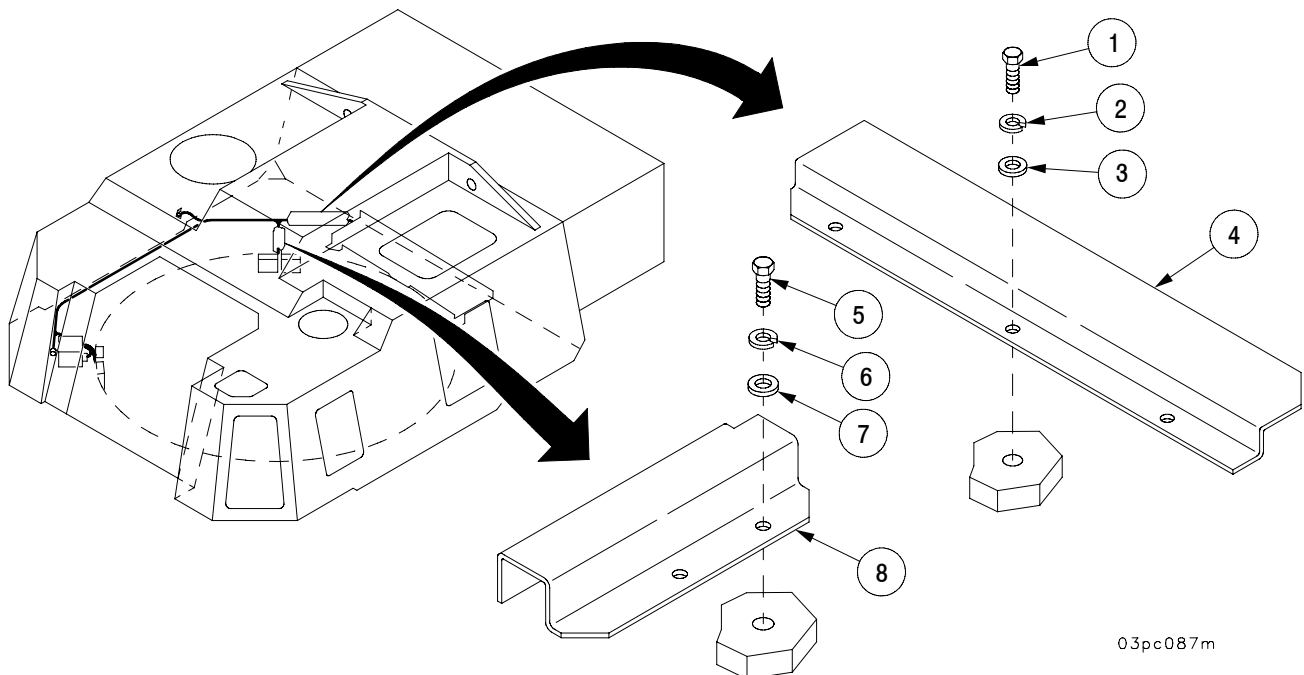
Lockwashers (2) (item 129, Appx F)  
Lockwashers (8) (item 126, Appx F)  
Lockwashers (3) (item 130, Appx F)  
Lockwashers (4) (item 128, Appx F)  
Marking tag (AR) (item 87, Appx C)  
Tiedown straps (4) (item 81, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Brush blocks 1, 2, 3, 4 (covers removed)  
(para 23-1)  
Crew seats removed (para 11-4)  
Loudspeaker removed (TM 9-2350-314-10)

#### a. Removal.

- 1 Remove three screws (1), three lockwashers (2), three flat washers (3), and cover (4). Discard lockwashers.
- 2 Remove two screws (5), two lockwashers (6), two flat washers (7), and cover (8). Discard lockwashers.



**5-30 WIRING HARNESS W62A - CONTINUED**

**a. Removal - Continued**

- 3 Remove two screws (9), two lockwashers (10), and two flat washers (11). Discard lockwashers.
- 4 Remove four tiedown straps (12) and mat (13). Discard tiedown straps.
- 5 Remove seven screws (14), seven lockwashers (15), seven flat washers (16), and guard (17).

**NOTE**

Tag leads before disconnecting to aid in installation.

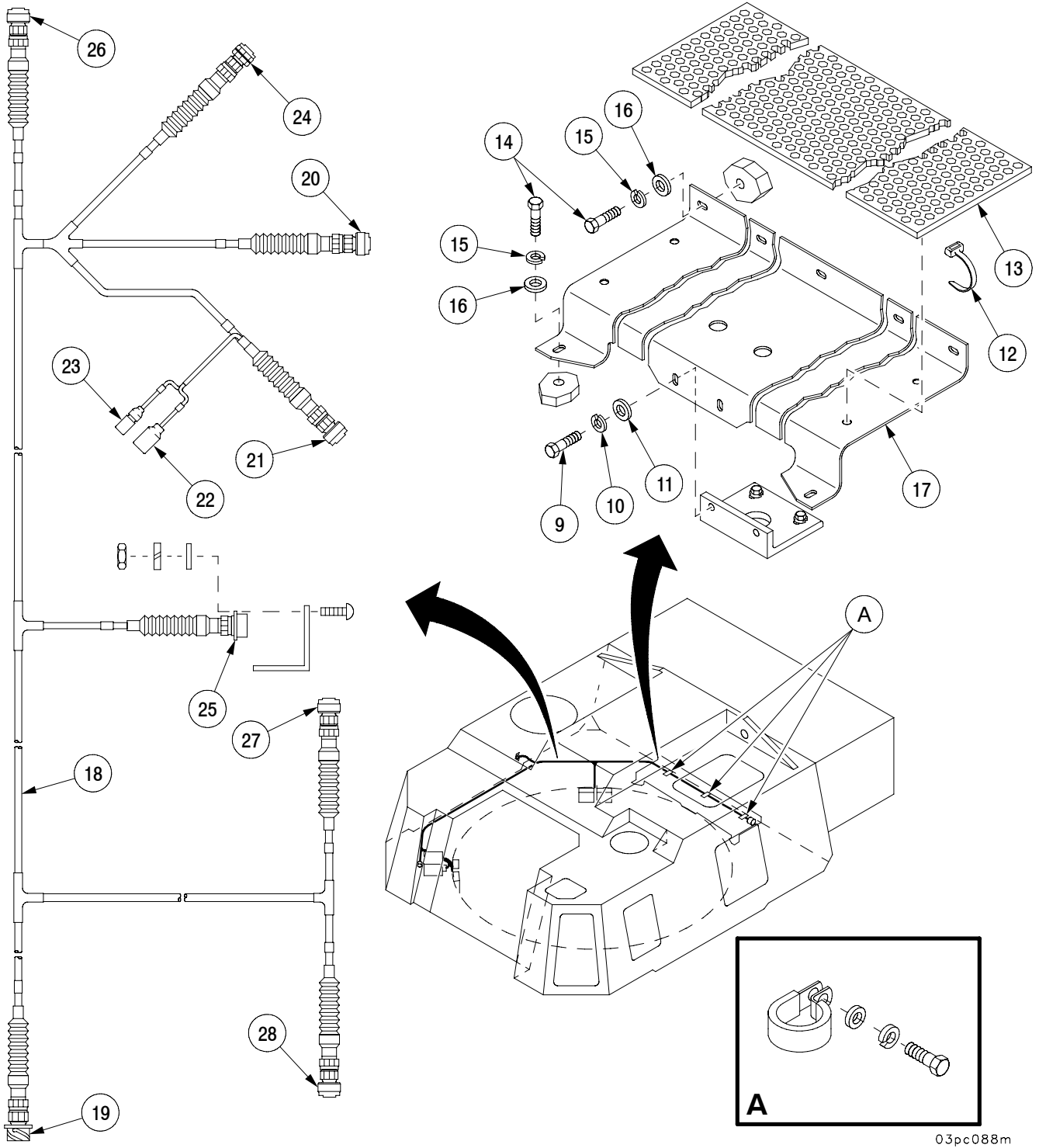
- 6 Disconnect wiring harness W62A (18) and attaching hardware at the following points:

Item No.	W62A Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
19	W62A J1	W61A P1	Rear of cab left side behind left crew seat location.
20	W62A P2	Brush block 1	Right front corner of cab ahead of COS station.
21	W62A P3	Brush block 2	Right front corner of cab ahead of COS station.
22	70	Slip ring	Between brush blocks 1 and 2.
23	100	Slip ring	Between brush blocks 1 and 2.
24	W62A P7	VMS modem	Cab side modem-right front.
25	W62A J2	Communications harness	Cab right side behind radio rack.
26	W62A P1	W61A J1	Right side front cab below navigation system (DRU).
27	W62A P4	Brush block 3	Right rear corner of cab behind COS station.
28	W62A P5	Brush block 4	Right rear corner of cab behind COS station.

- 7 Remove clamps and attaching hardware securing wiring harness W62A (18) to vehicle.
- 8 Remove wiring harness W62A (18) from vehicle.

### 5-30 WIRING HARNESS W62A - CONTINUED

#### a. Removal - Continued



**5-30 WIRING HARNESS W62A - CONTINUED**

**b. Installation.**

- 1 Install wiring harness W62A (18) in vehicle with clamps and attaching hardware.
- 2 Connect wiring harness W62A (18) at the following points:

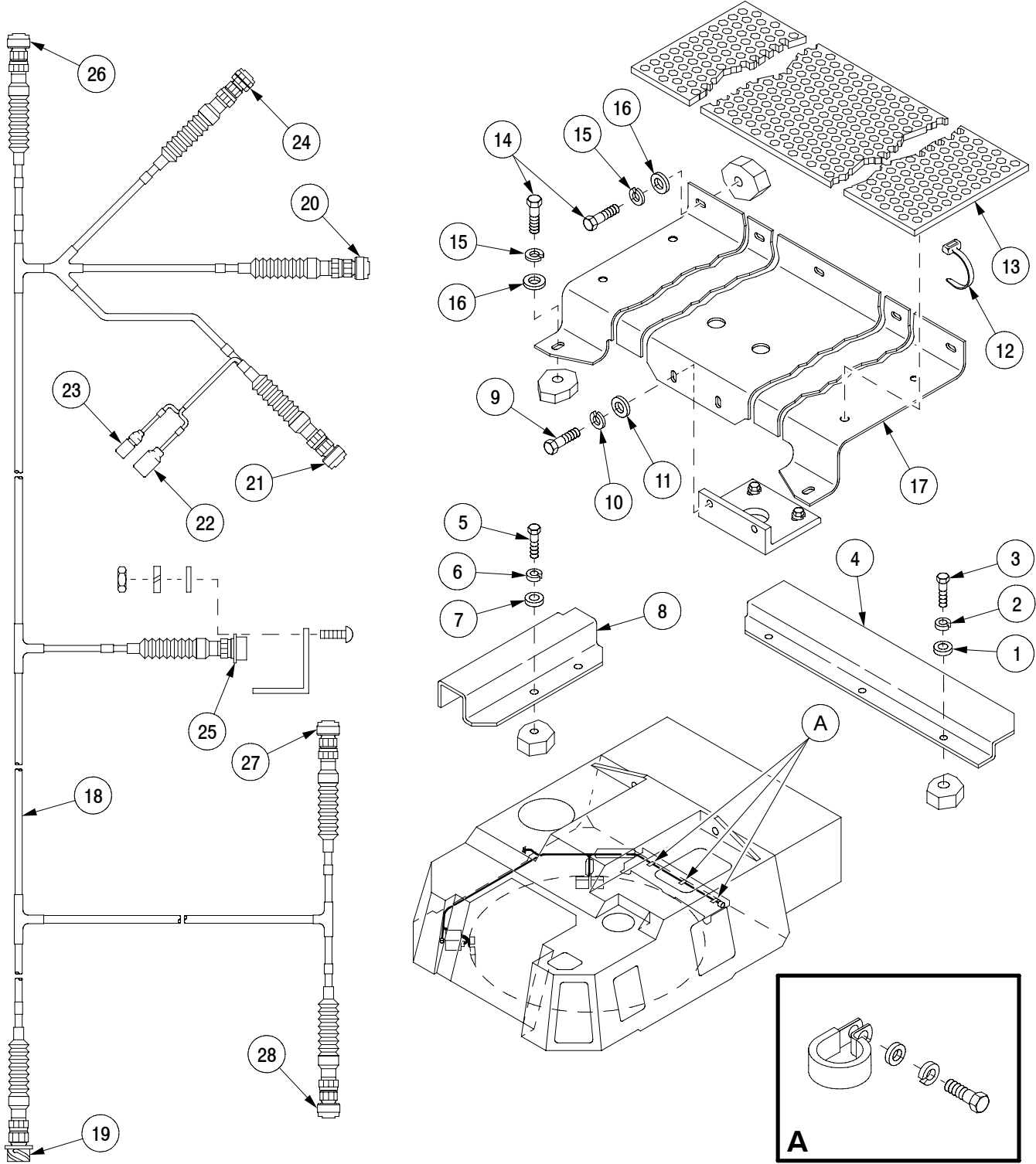
<b>Item No.</b>	<b>W62A Connector/Lead/Wire</b>	<b>To Connector/Lead/Wire/Component</b>	<b>Location</b>
26	W62A P5	Brush block 4	Right rear corner of cab behind COS station.
25	W62A P4	Brush block 3	Right rear corner of cab behind COS station.
24	W62A P1	W61A J1	Right side front cab below navigation system (DRU).
23	W62A J2	Communications harness	Cab right side behind radio rack.
22	W62A P7	VMS modem	Cab side modem-right front.
21	100	Slip ring	Between brush blocks 1 and 2.
20	70	Slip ring	Between brush blocks 1 and 2.
19	W62A P3	Brush block 2	Right front corner of cab ahead of COS station.
18	W62A P2	Brush block 1	Right front corner of cab ahead of COS station.
17	W62A J1	W61A P1	Rear of cab left side behind left crew seat location.

- 3 Install guard (17) with seven screws (14), seven new lockwashers (15), and seven flat washers (16).
- 4 Install mat (13) with four new tiedown straps (12).
- 5 Install two screws (9), two new lockwashers (10), and two flat washers (11).
- 6 Install cover (8) with two screws (5), two new lockwashers (6), and two flat washers (7).
- 7 Install cover (4) with three screws (1), three new lockwashers (2), and three flat washers (3).



5-30 WIRING HARNESS W62A - CONTINUED

b. Installation - Continued



03pc089m

## 5-31 WIRING HARNESS W64.

This task covers: a. Removal b. Installation

### INITIAL SETUP

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwashers (26) (item 128, Appx F)  
Lockwasher (item 126, Appx F)  
Lockwashers (2) (item 127, Appx F)  
Lockwashers (5) (item 144, Appx F)  
Tiedown straps (2) (item 76, Appx C)  
Tiedown straps (3) (item 81, Appx C)  
Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Left radio removed (TM 9-2350-314-10)  
Slip ring cover (brush block 8) removed  
(para 23-1)

**a. Removal.**

### NOTE

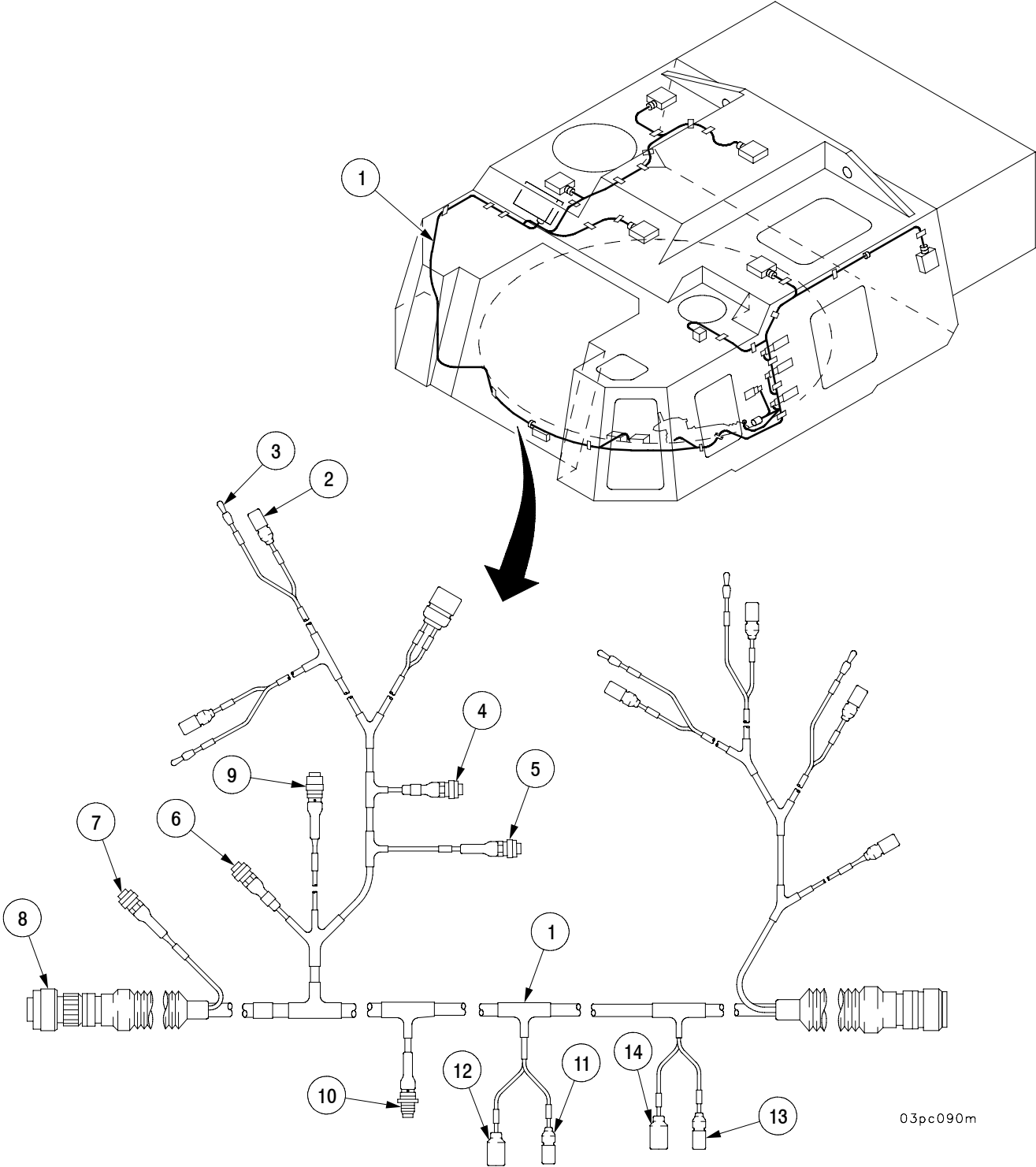
Tag leads before disconnecting to aid in installation.

- 1 Disconnect wiring harness W64 (1) and attaching hardware at the following points:

Item No.	W64 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
2	138	Dome light	Left rear corner of cab overhead.
3	70	Dome light	Left rear corner of cab overhead.
4	W64 P4	Elevation selector valve	Cab left side bulkhead at Gunner's station.
5	W64 P6	Traverse selector valve	Cab left side bulkhead at Gunner's station.
6	W64 P5	Traverse limit solenoid	Cab left side bulkhead at Gunner's station.
7	W64 P3	Clutch valve	Cab left side bulkhead at Gunner's station.
8	W64 P2	Hydraulic compartment bulkhead connector	Cab left side front bulkhead at Gunner's station, bulkhead separating cab from hydraulic compartment.
9	W64 P7	Bypass valve	Cab left side on traverse mechanism.
10	W64 J1	W7 P7	Cab left side next to manual traverse handle.
11	70	12910373-1	Brush block 8 above accessory control box.
12	100	12910372-2	Brush block 8 above accessory control box.
13	TLS-A	Traverse limit switch	Cab front center below cannon mount.
14	TLS	Traverse limit switch	Cab front center below cannon mount.

5-31 WIRING HARNESS W64 - CONTINUED

a. Removal - Continued



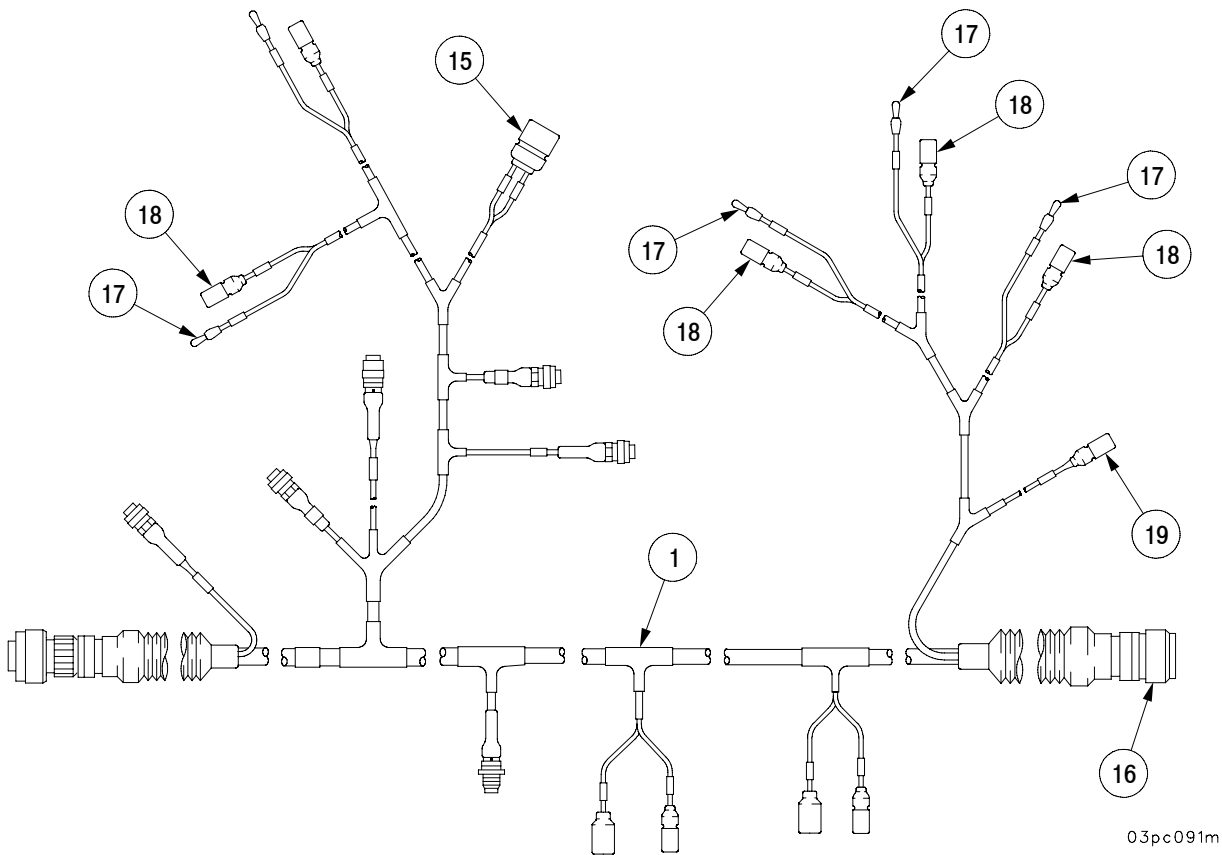
03pc090m

**5-31 WIRING HARNESS W64 - CONTINUED**

**a. Removal - Continued**

Item No.	W64 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
15	70/147	Panoramic scope	Left front cab at Gunner's station on top of scope.
16	W64 P1	Hydraulic control box J1	Cab right side overhead at COS station.
17	138 (quantity 4)	Dome lights (4)	Cab overhead right side (2), center rear (1) and left side front (1).
18	70 (quantity 4)	Dome lights (4)	Cab overhead right side (2), center rear (1) and left side front (1).
19	138	Dome light	Front center cab above cannon mount.

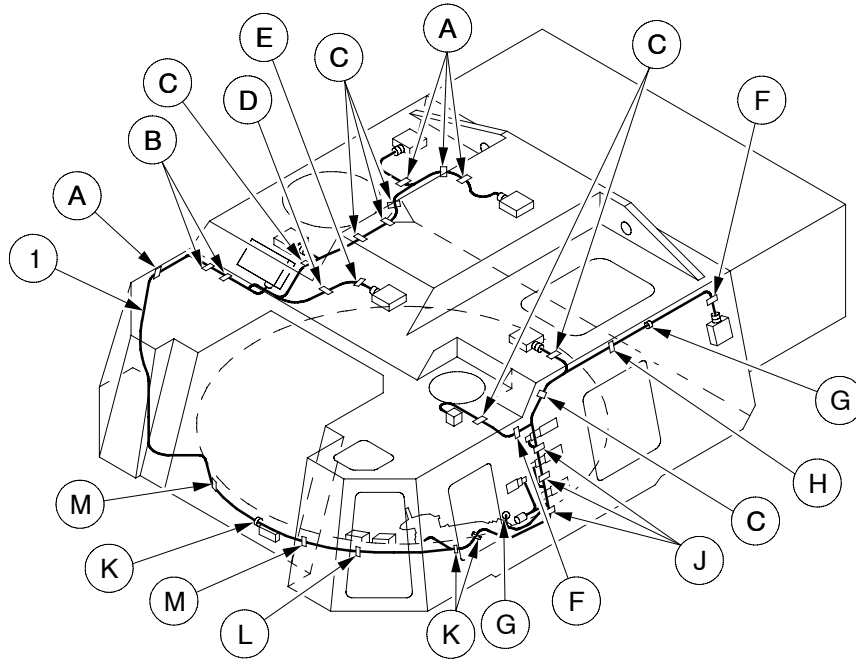
- 2 Remove clamps, tiedown straps and attaching hardware securing wiring harness W64 (1) from vehicle. Discard lockwashers and tiedown straps.
- 3 Remove wiring harness W64 (1) from vehicle.



**5-31 WIRING HARNESS W64 - CONTINUED**

**b. Installation.**

- 1 Install wiring harness W64 (1) in vehicle with clamps and attaching hardware.



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<p><b>A</b></p>	<p><b>B</b></p>	<p><b>C</b></p>	<p><b>D</b></p>
<p><b>E</b></p>	<p><b>F</b></p>	<p><b>G</b></p>	<p><b>H</b></p>
<p><b>J</b></p>	<p><b>K</b></p>	<p><b>L</b></p>	<p><b>M</b></p>

**5-31 WIRING HARNESS W64 - CONTINUED**

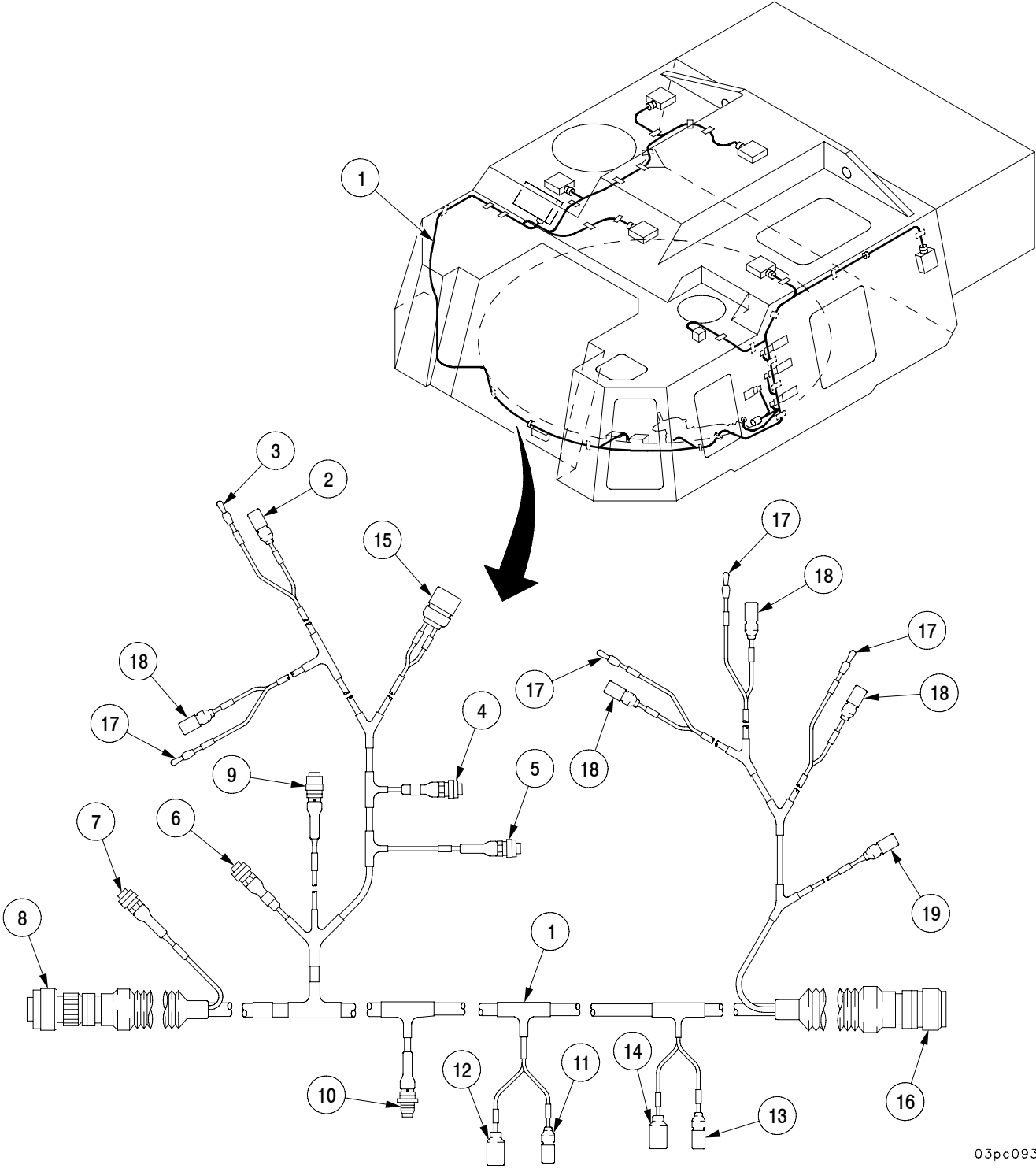
**b. Installation - Continued**

2 Connect wiring harness W64 (1) at the following points:

<b>Item No.</b>	<b>W64 Connector/Lead/Wire</b>	<b>To Connector/Lead/Wire/Component</b>	<b>Location</b>
19	138	Dome light	Front center cab above cannon mount.
18	70 (quantity 4)	Dome lights (4)	Cab overhead right side (2), center rear (1) and left side front (1).
17	138 (quantity 4)	Dome lights (4)	Cab overhead right side (2), center rear (1) and left side front (1).
16	W64 P1	Hydraulic control box J1	Cab right side overhead at COS station.
15	70/147	Panoramic scope	Left front cab at Gunner's station on top of scope.
14	TLS	Traverse limit switch	Cab front center below cannon mount.
13	TLS-A	Traverse limit switch	Cab front center below cannon mount.
12	100	12910373-2	Brush block 8 above accessory control box.
11	70	12910373-1	Brush block 8 above accessory control box.
10	W64 J1	W7 P7	Cab left side next to manual traverse handle.
9	W64 P7	Bypass valve	Cab left side on traverse mechanism.
8	W64 P2	Hydraulic compartment bulkhead connector	Cab left side front bulkhead at Gunner's station, bulkhead separating cab from hydraulic compartment.
7	W64 P3	Clutch valve	Cab left side bulkhead at Gunner's station.
6	W64 P5	Traverse limit solenoid	Cab left side bulkhead at Gunner's station.
5	W64 P6	Traverse selector valve	Cab left side bulkhead at Gunner's station.
4	W64 P4	Elevation selector valve	Cab left side bulkhead at Gunner's station.
3	70	Dome light	Left rear corner of cab overhead.
2	138	Dome light	Left rear corner of cab overhead.

5-31 WIRING HARNESS W64 - CONTINUED

b. Installation - Continued



03pc093m

**5-32 WIRING HARNESS W54.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwashers (3) (item 128, Appx F)  
Lockwasher (item 118, Appx F)  
Lockwasher (item 119, Appx F)  
Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment door open  
(TM 9-2350-314-10)  
Hydraulic compartment access cover  
removed (para 19-2)

**a. Removal.**

**NOTE**

Tag leads before disconnecting to aid in installation.

- 1 Disconnect wiring harness W54 (1) and attaching hardware at the following points:

<b>Item No.</b>	<b>W54 Connector/Lead/Wire</b>	<b>From Connector/ Lead/Wire/Component</b>	<b>Location</b>
2	W54 P1	Hydraulic motor thermo switch	Single connector on hydraulic powerpack at motor in hydraulic compartment.
3	W54 780	W51 780	Inside hydraulic compartment.
4	W54 645A	Overload sensor	Inside hydraulic compartment.
5	W54 645B and C	Power relay	Inside hydraulic compartment.

- 2 Remove clamps and attaching hardware securing wiring harness W54 (1) to vehicle.
- 3 Remove wiring harness W54 (1) from vehicle.

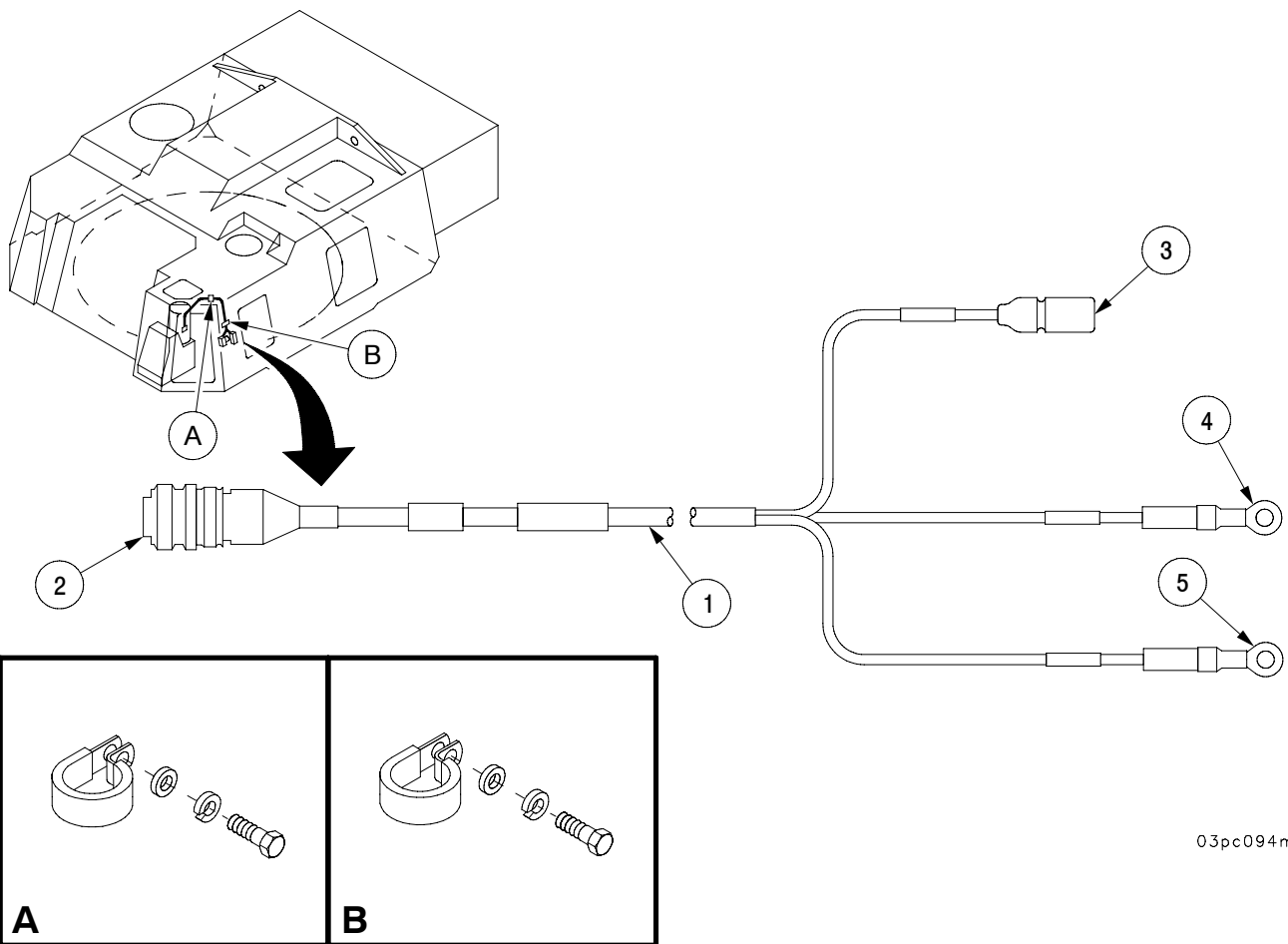


**5-32 WIRING HARNESS W54 - CONTINUED**

**b. Installation.**

- 1 Install wiring harness W54 (1) in vehicle with clamps and attaching hardware.
- 2 Connect wiring harness W54 (1) and attaching hardware at the following points.

Item No.	W54 Connector/Lead/Wire	To Connector/Lead/Wire/Component	Location
5	W54 645B and C	Power relay	Inside hydraulic compartment.
4	W54 645A	Overload sensor	Inside hydraulic compartment.
3	W54 780	W51 780	Inside hydraulic compartment.
2	W54 P1	Hydraulic motor thermo switch	Single connector on hydraulic powerpack at motor in hydraulic compartment.



03pc094m

## 5-33 WIRING HARNESS W59.

This task covers:          a. Removal                                  b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Tiedown straps (2) (item 76, Appx C)  
Lockwashers (3) (item 128, Appx F)  
Marking tag (AR) (item 87, Appx C)  
Lockwashers (2) (item 119, Appx F)  
Lockwasher (item 115, Appx F)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment door open  
(TM 9-2350-314-10)  
Hydraulic access cover removed  
(para 19-2)

**a. Removal.**

**NOTE**

Tag leads before disconnecting to aid in installation.

- 1 Disconnect wiring harness W59 (1) and attaching hardware at the following points:

Item No.	W59 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
2	W59 P1	Fluid level sensor	Hydraulic compartment, top sensor on powerpack.
3	W59 660	Power relay X2	Inside hydraulic compartment.
4	W59 645C	Power relay X1	Inside hydraulic compartment.
5	W59 70	Current shunt	Inside hydraulic compartment.

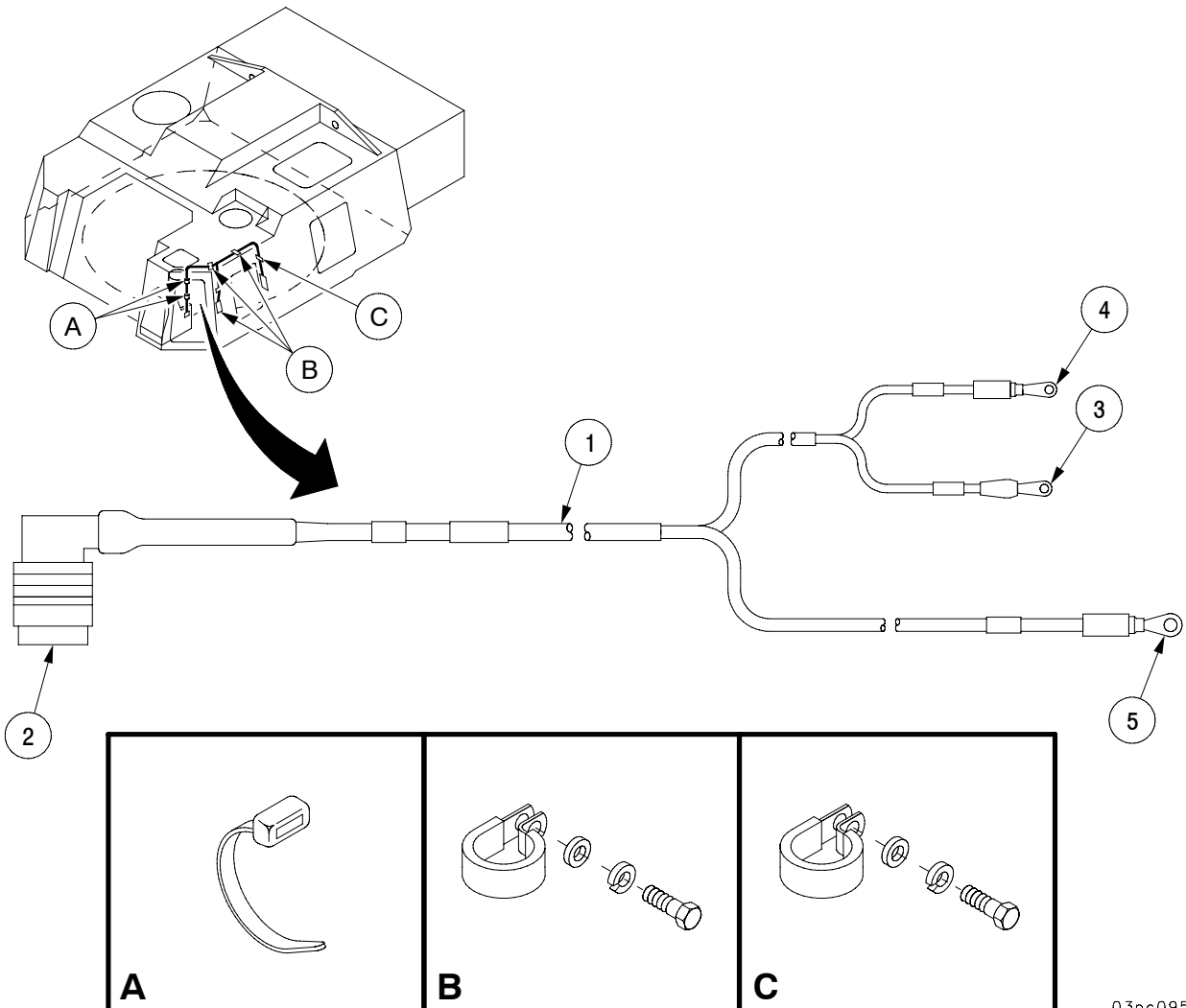
- 2 Remove clamps, tiedown straps, and attaching hardware securing wiring harness W59 (1) to vehicle. Discard lockwashers and tiedown straps.
- 3 Remove wiring harness W59 (1) from vehicle.

**5-33 WIRING HARNESS W59 - CONTINUED**

**b. Installation.**

- 1 Install wiring harness W59 (1) in vehicle with clamps, tiedown straps, and attaching hardware.
- 2 Connect wiring harness W59 (1) and attaching hardware at the following points:

Item No.	W59 Connector/Lead/Wire	To Connector/Lead/Wire/Component	Location
5	W59 70	Current shunt	Inside hydraulic compartment.
4	W59 645C	Power relay X1	Inside hydraulic compartment.
3	W59 660	Power relay X2	Inside hydraulic compartment.
2	W59 P1	Fluid level sensor	Hydraulic compartment, top sensor on powerpack.



03pc095m

**5-34 WIRING HARNESS W60.**

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This task covers: a. Removal b. Installation

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**INITIAL SETUP**

Tools

Artillery and turret mechanic’s tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwashers (5) (item 128, Appx F)  
Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Hydraulic compartment access door open  
(TM 9-2350-314-10)

---

**a. Removal.**

**NOTE**

Tag leads before disconnecting to aid in installation.

- 1 Disconnect wiring harness W60 (1) and attaching hardware at the following points:

Item No.	W60 Connector/Lead/Wire	From Connector/ Lead/Wire/Component	Location
2	W60 P1	Hour meter	In hydraulic compartment, mounted on door.
3	135	Hydraulic motor	Inside hydraulic compartment in front of hydraulic motor.
4	136	Hydraulic motor	Inside hydraulic compartment in front of hydraulic motor.

- 2 Remove clamps and attaching hardware securing wiring harness W60 (1) to vehicle. Discard lockwashers
- 3 Remove wiring harness W60 (1) from vehicle.

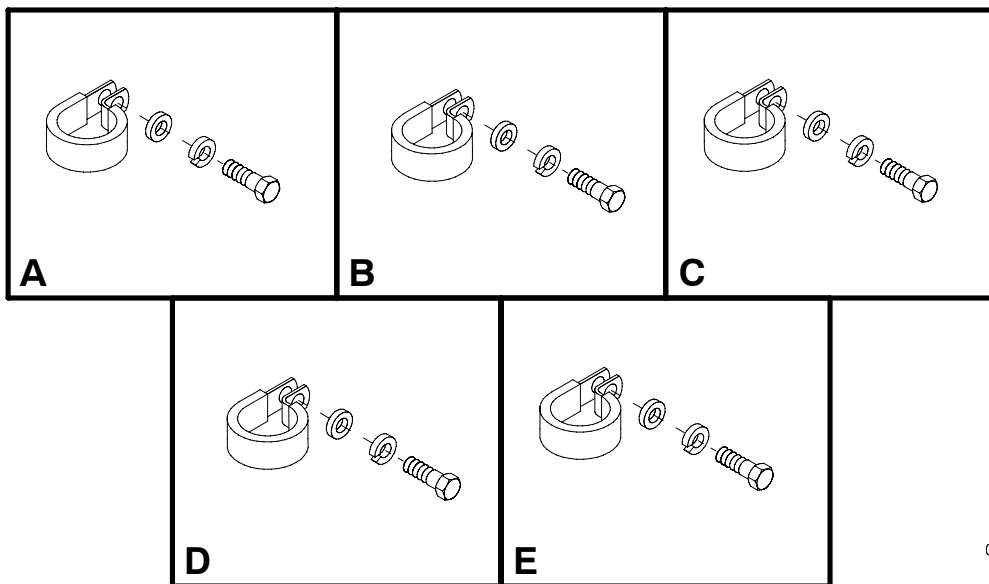
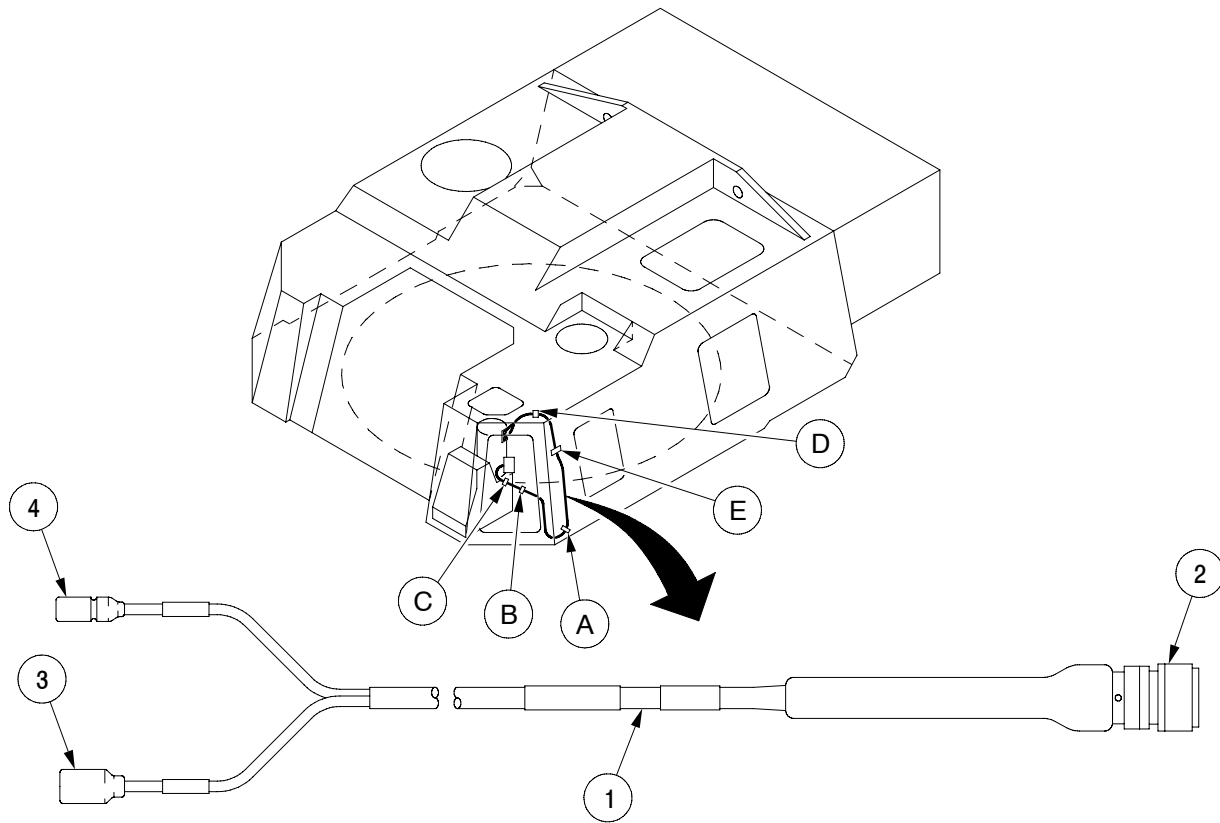
**b. Installation.**

- 1 Install wiring harness W60 (1) in vehicle with clamps, and attaching hardware.
- 2 Connect wiring harness W60 (1) at the following points:

Item No.	W60 Connector/Lead/Wire	To Connector/ Lead/Wire/Component	Location
4	136	Hydraulic motor	Inside hydraulic compartment in front of hydraulic motor.
3	135	Hydraulic motor	Inside hydraulic compartment in front of hydraulic motor.
2	W60 P1	Hour meter	In hydraulic compartment, mounted on door.

5-34 WIRING HARNESS W60 - CONTINUED

b. Installation - Continued



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**5-35 WIRING HARNESS W52.**

This task covers:      a. Removal                      b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic’s tool kit (SC 5180-95-A12)

Materials/Parts

Gasket (item 178, Appx F)  
Lockwashers (4) (item 101, Appx F)  
Lockwasher (item 115, Appx F)  
Lockwashers (6) (item 128, Appx F)  
Lockwasher (item 118, Appx F)  
Marking tag (AR) (item 87, Appx C)  
Tiedown straps (2) (item 76, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF (TM 9-2350-314-10)  
Battery ground leads disconnected (TM 9-2350-314-20-1-2)  
Hydraulic access cover removed (para 19-2)  
Hydraulic compartment access door open (TM 9-2350-314-10)  
Hydraulic compartment interior access panel removed (para 24-2)

**a. Removal.**

**NOTE**

Tag leads before disconnecting to aid in installation.

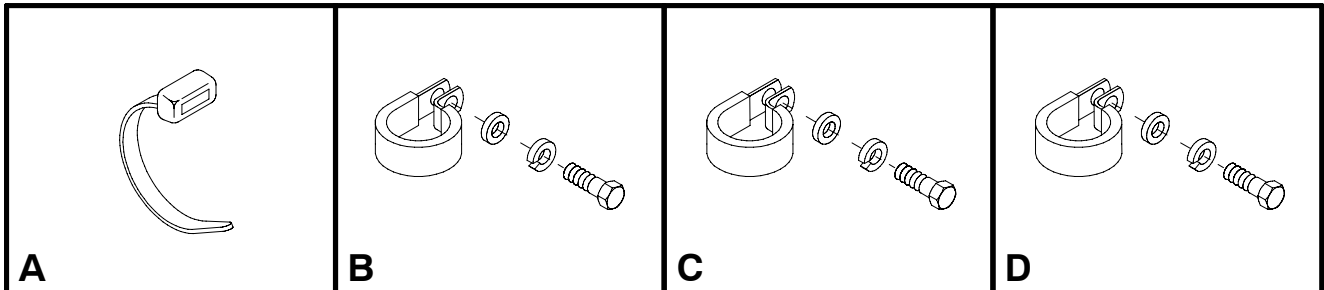
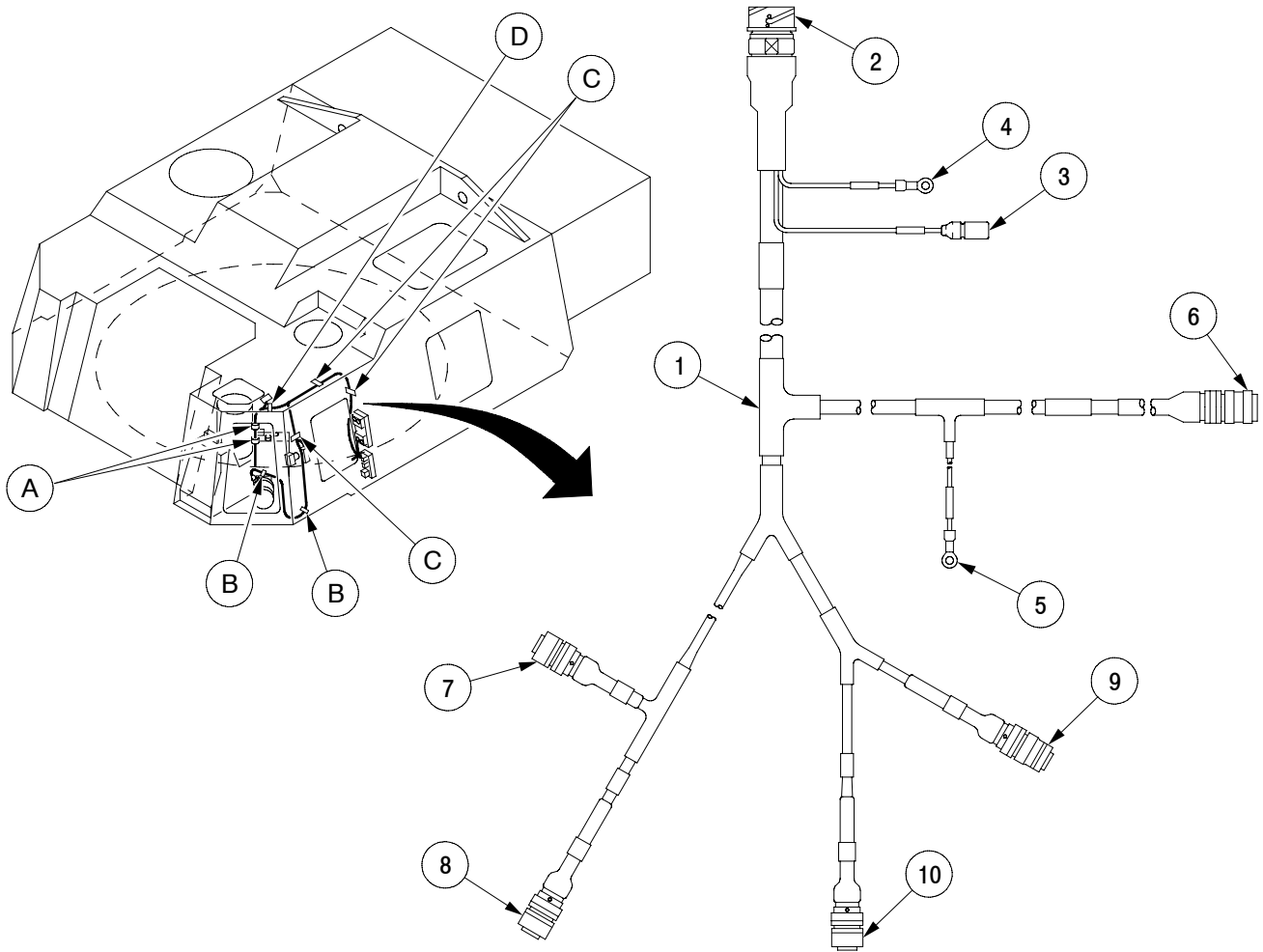
1 Disconnect wiring harness W52 (1) and attaching hardware at the following points:

Item No.	W52 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
2	W52 J1	W64 P2	Inside cab at Gunner’s station on hydraulic compartment bulkhead at opposite side in hydraulic compartment.
3	W52 783	W51 783	Inside hydraulic compartment - single lead off of main harness by bulkhead.
4	W52 lead to ground	Current shunt	Back of hydraulic compartment bulkhead on lower left corner of shunt under two leads 70.
5	W52 645	Overload sensor	Inside hydraulic compartment on bulkhead between compartment door and access panel.
6	W52 P3	Cooling fan	On hydraulic compartment door.
7	W52 P5	Warmup temperature switch	Second connector down on front right hand side of powerpack.
8	W52 P4	Cooling temperature switch	Third connector down on front right hand side of powerpack.
9	W52 P6	Mode selector valve	Left side of cab ahead of Gunner’s station, near overhead.
10	W52 P2	Warmup solenoid	Inside cab on top of hydraulic fuse manifold.

**5-35 WIRING HARNESS W52 - CONTINUED**

**a. Removal - Continued**

- 2 Remove clamps, tiedown straps and attaching hardware securing wiring harness W52 (1) to vehicle. Discard lockwashers and tiedown straps.
- 3 Remove wiring harness W52 (1) from vehicle.



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**5-35 WIRING HARNESS W52 - CONTINUED**

**b. Installation.**

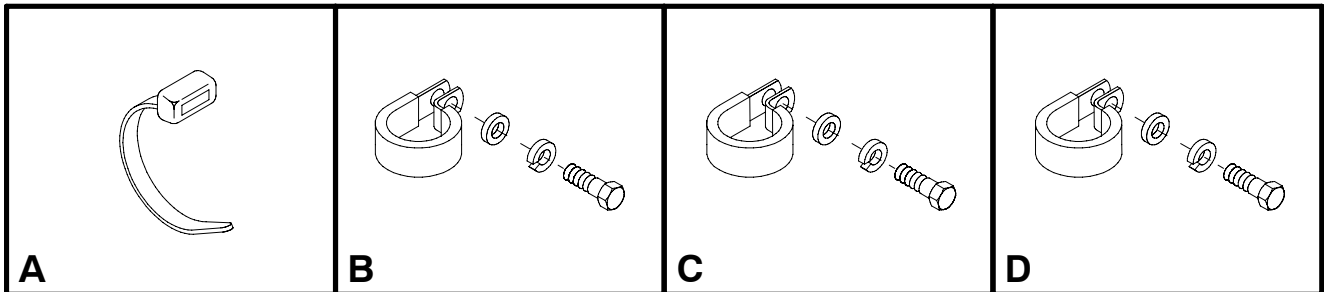
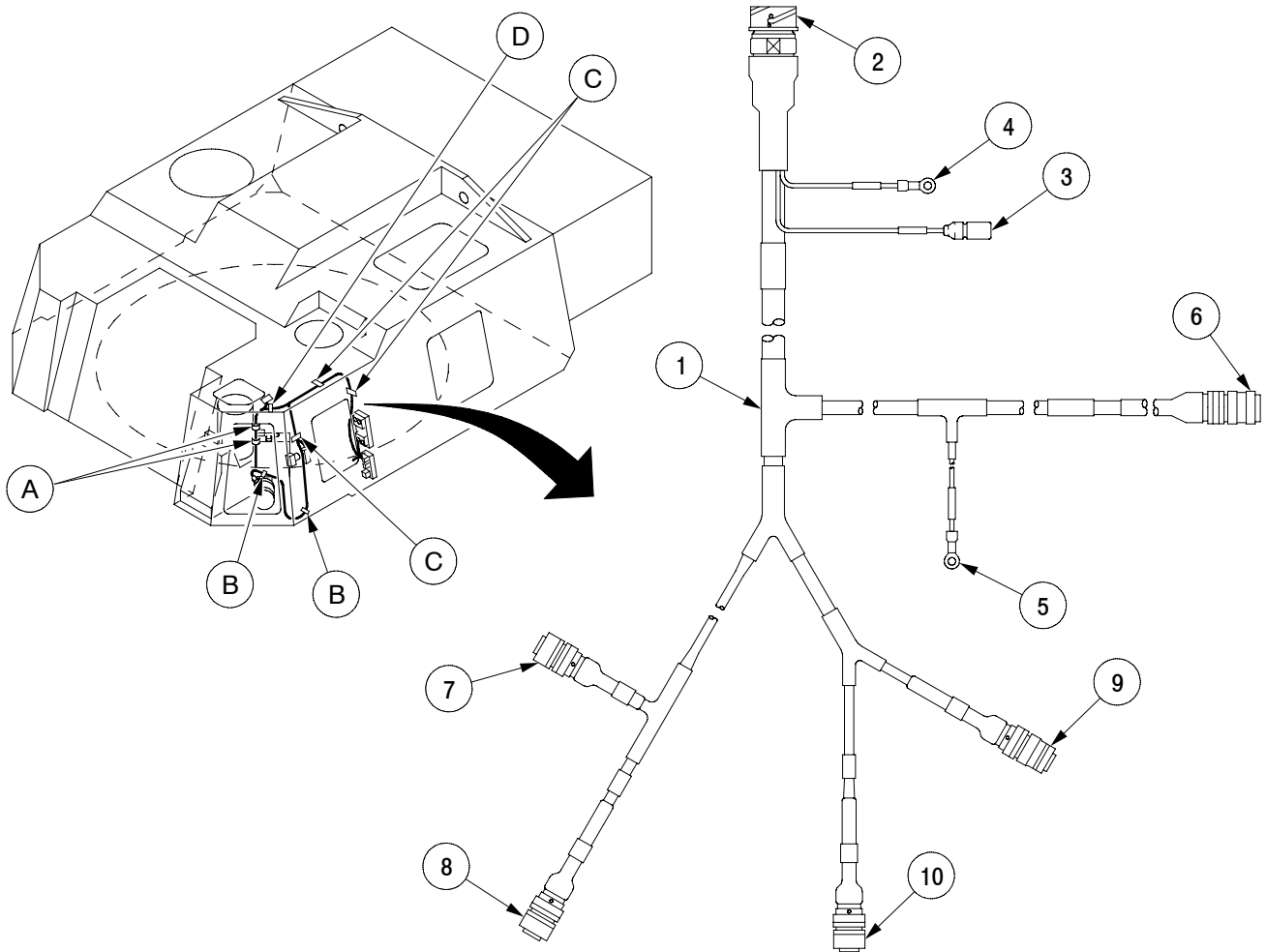
- 1 Install wiring harness W52 (1) in vehicle with clamps, tiedown straps and attaching hardware.
- 2 Connect wiring harness W52 (1) and attaching hardware at the following points:

<b>Item No.</b>	<b>W52 Connector/Lead/Wire</b>	<b>To Connector/Lead/Wire/Component</b>	<b>Location</b>
10	W52 P2	Warmup solenoid	Inside cab on top of hydraulic fuse manifold.
9	W52 P6	Mode selector valve	Left side of cab ahead of Gunner's station, near overhead.
8	W52 P4	Cooling temperature switch	Third connector down on front right hand side of powerpack.
7	W52 P5	Warmup temperature switch	Second connector down on front right hand side of powerpack.
6	W52 P3	Cooling fan	On hydraulic compartment door.
5	W52 645	Overload sensor	Inside hydraulic compartment on bulkhead between compartment door and access panel.
4	W52 lead to ground	Current shunt	Back of hydraulic compartment bulkhead on lower left corner of shunt under two leads 70.
3	W52 783	W51 783	Inside hydraulic compartment - single lead off of main harness by bulkhead.
2	W52 J1	W64 P2	Inside cab at Gunner's station on hydraulic compartment bulkhead at opposite side in hydraulic compartment.



5-35 WIRING HARNESS W52 - CONTINUED

b. Installation - Continued



03pc097m

**5-36 WIRING HARNESS W51.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwashers (4) (item 101, Appx F)  
 Lockwashers (2) (item 113, Appx F)  
 Lockwashers (4) (item 128, Appx F)  
 Lockwashers (2) (item 118, Appx F)  
 Lockwasher (item 119, Appx F)  
 Tiedown straps (2) (item 76, Appx C)  
 Gasket (item 14, Appx F)  
 Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
 Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
 Hydraulic compartment inner access  
cover removed (para 24-2)  
 Hydraulic compartment access door open  
(TM 9-2350-314-10)  
 Hydraulic compartment access cover  
removed (para 19-2)

**a. Removal.**

**NOTE**

Tag leads before disconnecting to aid in installation.

- 1 Disconnect wiring harness W51 (1) and attaching hardware at the following points:

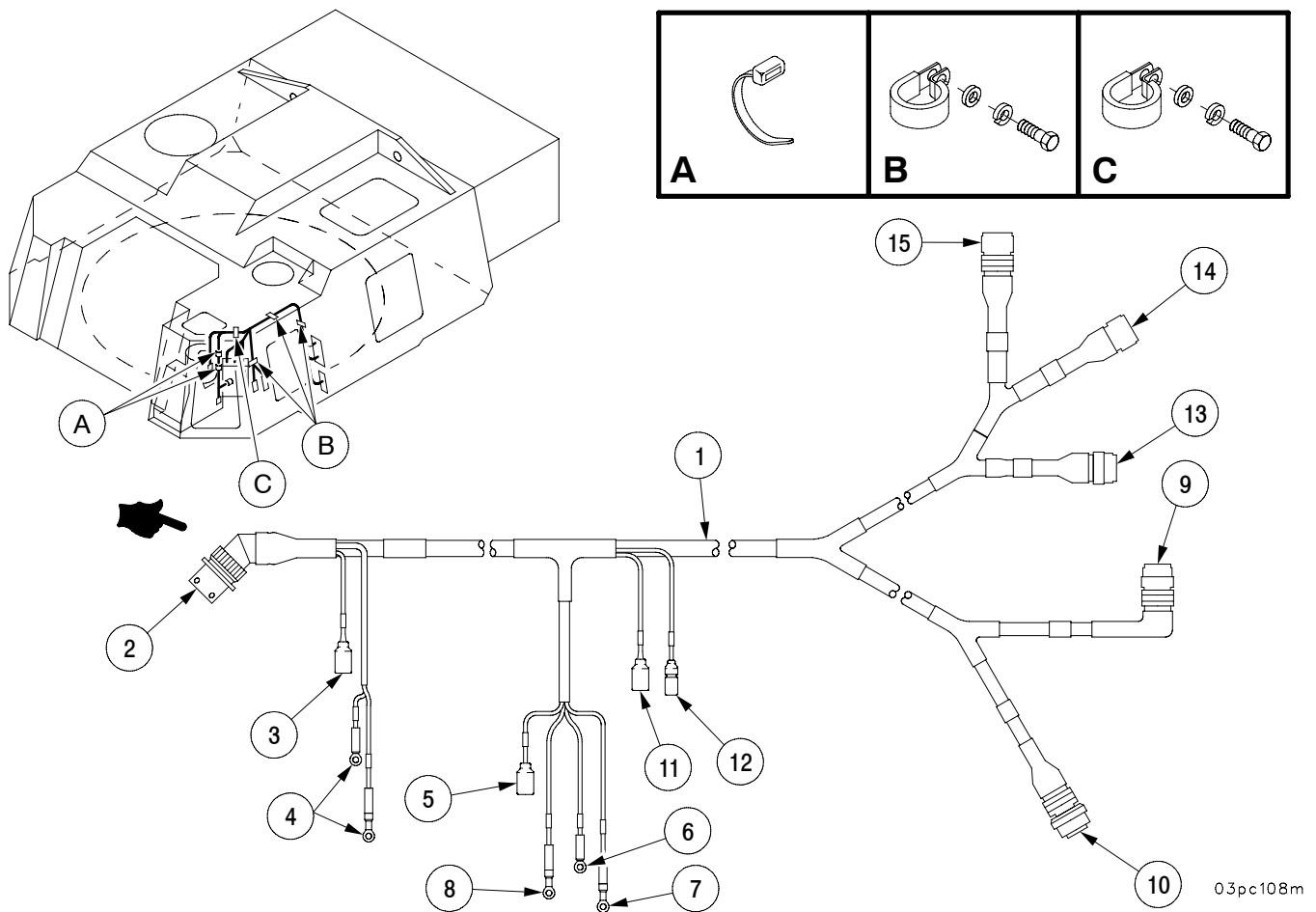
Item No.	W51 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
2	W51 J1	W65 P5 (AFCS) W65A P5 (PDFCS)	Inside cab at Gunner's station on hydraulic compartment bulkhead and at opposite side in hydraulic compartment.
3	W51 783	W52 783	Inside hydraulic compartment - single lead off of main harness by bulkhead.
4	W51 781/W51 782	Current shunt	Back of hydraulic compartment bulkhead both center leads on shunt.
5	W51 780	W54 780	In hydraulic compartment, connector directly above overload sensor and power relay.
6	W51 779	Overload sensor	In hydraulic compartment on bulkhead between compartment door and access panel.
7	W51 778	Overload sensor	In hydraulic compartment on bulkhead between compartment door and access panel.
8	W51 775	Power relay X2	In hydraulic compartment on bulkhead between compartment door and access panel.

**5-36 WIRING HARNESS W51 - CONTINUED**

**a. Removal - Continued**

Item No.	W51 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
9	W51 P5	Temperature transducer	In hydraulic compartment on front right side of powerpack.
10	W51 P6	Flow meter	In hydraulic compartment on back of filter assembly.
11	W51 100	Lead 100	In hydraulic compartment on hydraulic motor.
12	W51 70	Lead 70	In hydraulic compartment on hydraulic motor.
13	W51 P2	Filter assembly	In hydraulic compartment.
14	W51 P3	Filter assembly	In hydraulic compartment.
15	W51 P4	Filter assembly	In hydraulic compartment.

- 2 Remove clamps, tiedown straps and attaching hardware securing wiring harness W51 (1) to vehicle. Discard lockwashers and tiedown straps.
- 3 Remove wiring harness W51 (1) from vehicle.



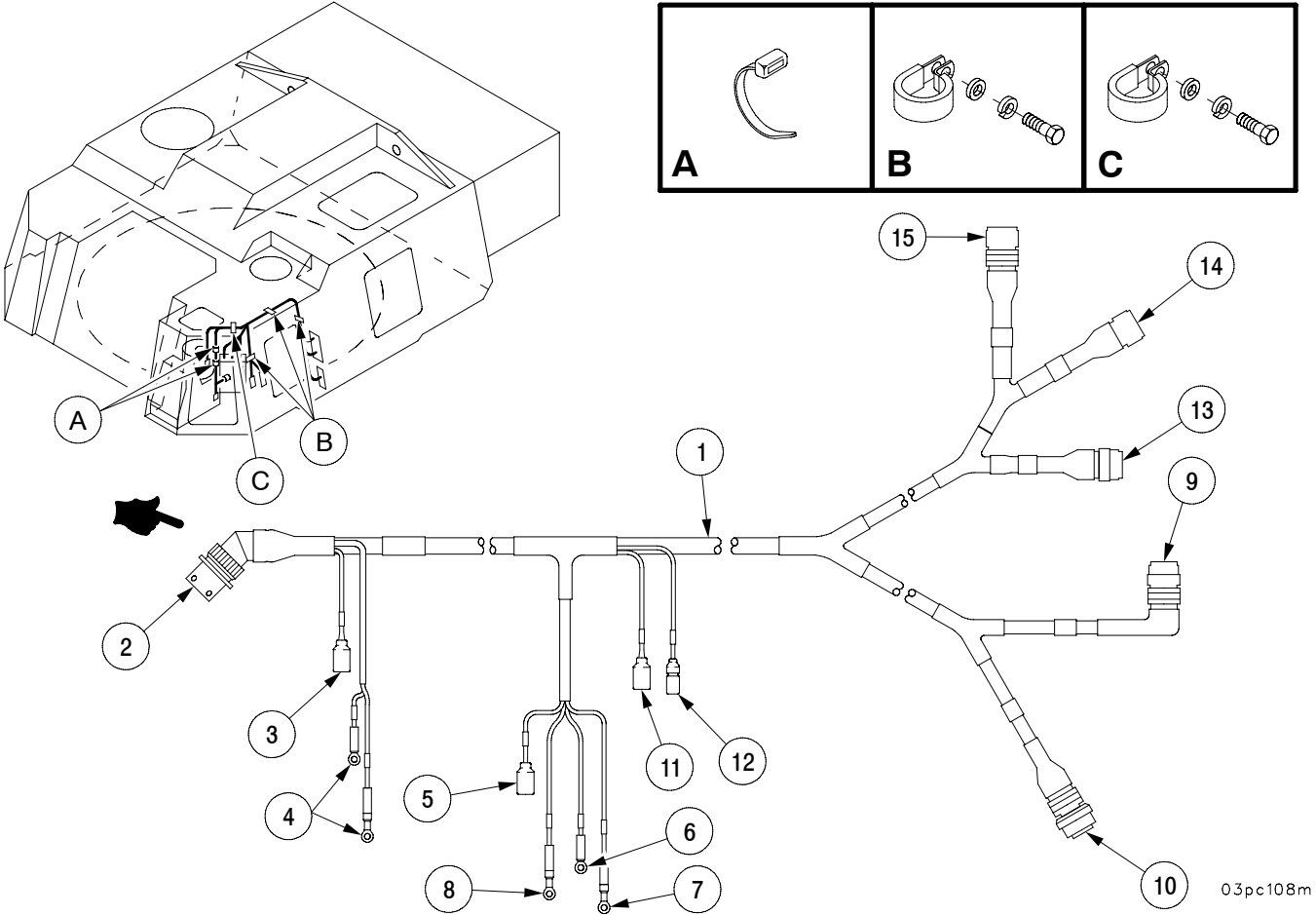
**5-36 WIRING HARNESS W51 - CONTINUED**

**b. Installation.**

- 1 Install wiring harness W51 (1) in vehicle with clamps, tiedown straps and attaching hardware.
- 2 Connect wiring harness W51 (1) and attaching hardware at the following points:

Item No.	W51 Connector/Lead/Wire	To Connector/Lead/Wire/Component	Location
15	W51 P4	Filter assembly	In hydraulic compartment.
14	W51 P3	Filter assembly	In hydraulic compartment.
13	W51 P2	Filter assembly	In hydraulic compartment.
12	W51 70	Lead 70	In hydraulic compartment on hydraulic motor.
11	W51 100	Lead 100	In hydraulic compartment on hydraulic motor.
10	W51 P6	Flow meter	In hydraulic compartment on back of filter assembly.
9	W51 P5	Temperature transducer	In hydraulic compartment on front right side of powerpack.
8	W51 775	Power relay X2	In hydraulic compartment on bulkhead between compartment door and access panel.
7	W51 778	Overload sensor	In hydraulic compartment on bulkhead between compartment door and access panel.
6	W51 779	Overload sensor	In hydraulic compartment on bulkhead between compartment door and access panel.
5	W51 780	W54 780	In hydraulic compartment, connector directly above overload sensor and power relay.
4	W51 781/W51 782	Current shunt	Back of hydraulic compartment bulkhead both center leads on shunt.
3	W51 783	W52 783	Inside hydraulic compartment - single lead off of main harness by bulkhead.
2	W51 J1	W65 P5 (AFCS) W65A P5 (PDFCS)	Inside cab at Gunner's station on hydraulic compartment bulkhead and at opposite side in hydraulic compartment.

5-36 WIRING HARNESS W51 - CONTINUED



## 5-37 WIRING HARNESS W67.

This task covers:      a. Removal                                      b. Installation

<b>INITIAL SETUP</b>
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Tools  
 Artillery and turret mechanic’s tool kit (SC 5180-95-A12)  
 Torque wrench (item 53, Appx G)

Materials/Parts  
 Lockwashers (5) (item 129, Appx F)  
 Lockwashers (18) (item 130, Appx F)  
 Lockwashers (9) (item 128, Appx F)  
 Lockwasher (item 132, Appx F)  
 Marking tag (AR) (item 87, Appx C)  
 Tiedown strap (item 81, Appx C)  
 Tiedown straps (2) (item 76, Appx C)  
 Tiedown straps (2) (item 78, Appx C)

Equipment Conditions  
 Vehicle MASTER power switch OFF (TM 9-2350-314-10)  
 Battery ground leads disconnected (TM 9-2350-314-20-1-2)  
 Slip ring cover removed (para 23-1)  
 Guards and covers removed (para 5-15)

### a. Removal.

### NOTE

Tag leads before disconnecting to aid in installation.

- 1 Disconnect wiring harness W67 (1) and attaching hardware at the following points:

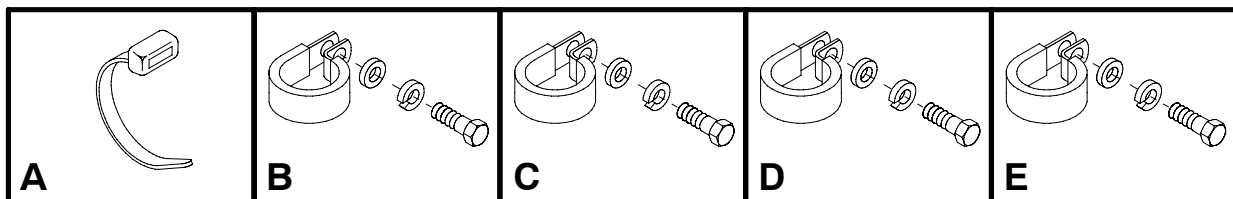
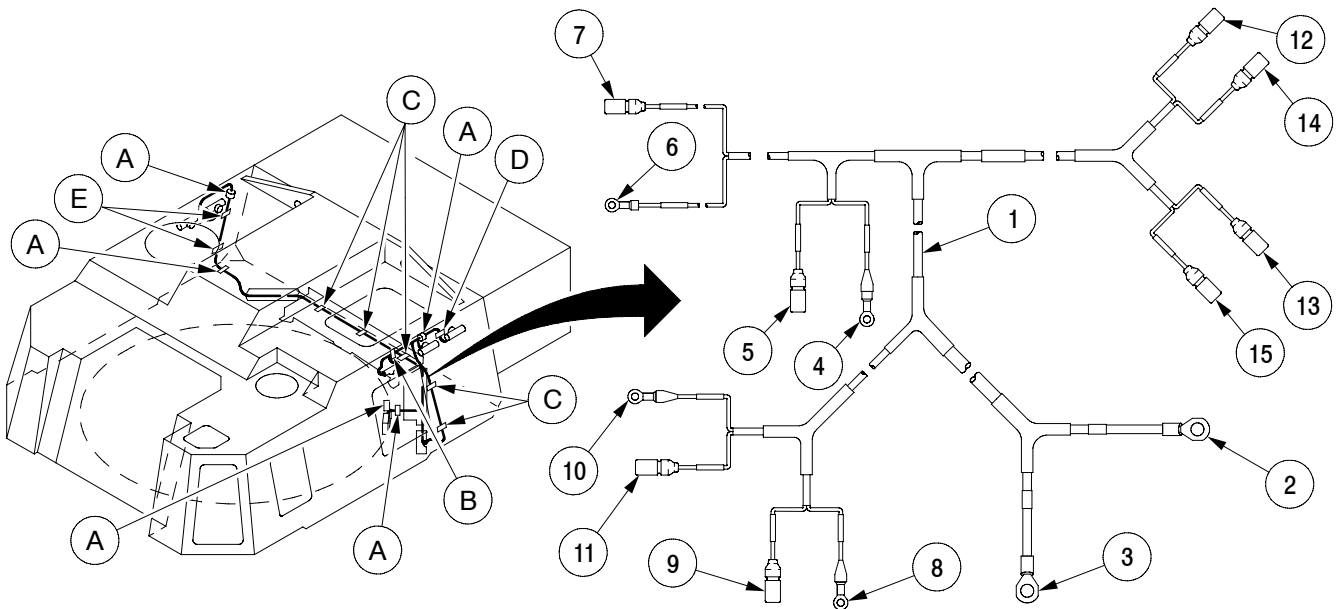
Item No.	W67 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
2	70	Brush block 5	Slip ring between Gunner’s station and crew seats.
3	+24v	Brush block 5	Slip ring between Gunner’s station and crew seats.
4	70	M3 Heater 1	Left rear cab bulkhead between Gunner’s station and crew seats.
5	HTR 1	M3 Heater 1	Left rear cab bulkhead between Gunner’s station and crew seats.
6	70	M3 Heater 2	Left rear cab bulkhead between Gunner’s station and crew seats.
7	HTR 2	M3 Heater 2	Left rear cab bulkhead between Gunner’s station and crew seats.
8	70	M3 Heater 3	Right rear cab bulkhead between COS station and crew seats.

**5-37 WIRING HARNESS W67 - CONTINUED**

**a. Removal - Continued**

Item No.	W67 Connector/Lead/Wire	From Connector/Lead/Wire/Component	Location
9	HTR 3	M3 Heater 3	Right rear cab bulkhead between COS station and crew seats.
10	70	M3 Heater 4	Right rear cab bulkhead between COS station and crew seats.
11	HTR 4	M3 Heater 4	Right rear cab bulkhead between COS station and crew seats.
12	HTR 1 and HTR 2	Interlock control (A1)	Left side cab bulkhead above side door.
13	HTR 3 and HTR 4	Interlock control (B1)	Left side cab bulkhead above side door.
14	+24V	Circuit breaker 1	Left side cab bulkhead above side door.
15	+24V	Circuit breaker 2	Left side cab bulkhead above side door.

- 2 Remove clamps, tiedown straps and attaching hardware securing wiring harness W67 (1) to vehicle.
- 3 Remove wiring harness W67 (1) from vehicle.



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**5-37 WIRING HARNESS W67 - CONTINUED**

**b. Installation.**

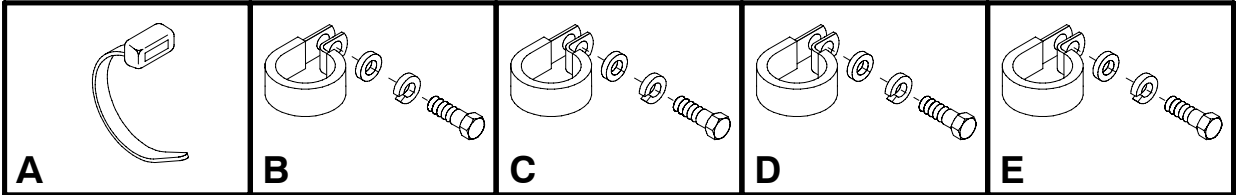
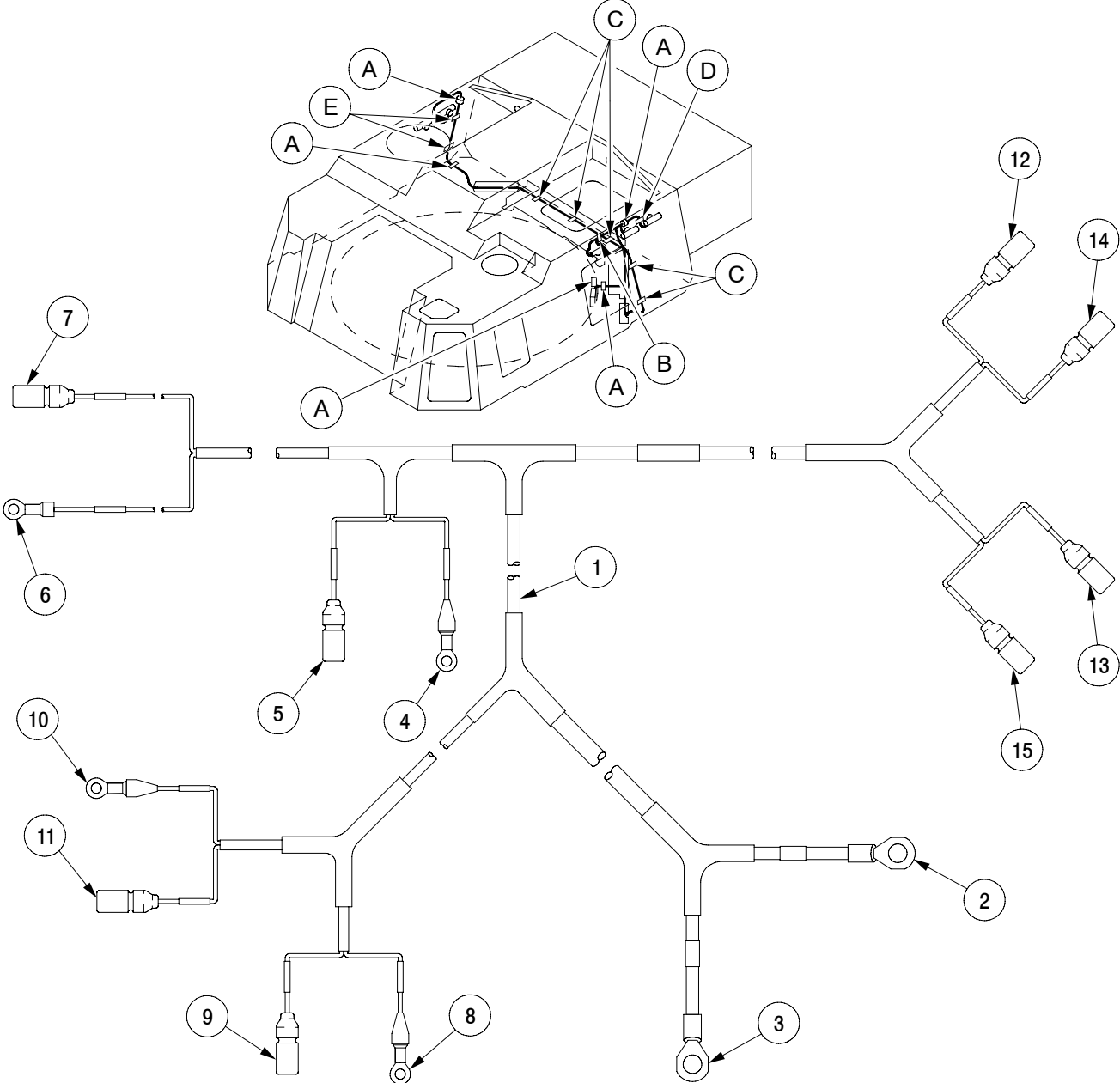
- 1 Install wiring harness W67 (1) in vehicle with clamps, tiedown straps and attaching hardware.
- 2 Connect wiring harness W67 (1) and attaching hardware at the following points:

<b>Item No.</b>	<b>W67 Connector/Lead/Wire</b>	<b>To Connector/Lead/Wire/Component</b>	<b>Location</b>
15	+24V	Circuit breaker 2	Left side cab bulkhead above side door.
14	+24V	Circuit breaker 1	Left side cab bulkhead above side door.
13	HTR 3 and HTR 4	Interlock control (B1)	Left side cab bulkhead above side door.
12	HTR 1 and HTR 2	Interlock control (A1)	Left side cab bulkhead above side door.
11	HTR 4	M3 Heater 4	Right rear cab bulkhead between COS station and crew seats.
10	70	M3 Heater 4	Right rear cab bulkhead between COS station and crew seats.
9	HTR 3	M3 Heater 3	Right rear cab bulkhead between COS station and crew seats.
8	70	M3 Heater 3	Right rear cab bulkhead between COS station and crew seats.
7	HTR 2	M3 Heater 2	Left rear cab bulkhead between Gunner's station and crew seats.
6	70	M3 Heater 2	Left rear cab bulkhead between Gunner's station and crew seats.
5	HTR 1	M3 Heater 1	Left rear cab bulkhead between Gunner's station and crew seats.
4	70	M3 Heater 1	Left rear cab bulkhead between Gunner's station and crew seats.
3	+24v	Brush block 5	Slip ring, between Gunner's station and crew seats.
2	70	Brush block 5	Slip ring, between Gunner's station and crew seats.



5-37 WIRING HARNESS W67 - CONTINUED

b. Installation - Continued



03pc111m

**5-38 MOUNTED WATER RATION HEATER WIRING HARNESS AND CIRCUIT BREAKER.**

---

This task covers:              a. Removal    b. Installation

---

<b>INITIAL SETUP</b>
----------------------

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwashers (2) (item 229, Appx F)  
Marking tag (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Necessary slip ring covers removed  
(para 23-1)

**NOTE**

Heater removed for circuit breaker  
replacement only.

Heater removed (TM 9-2350-314-10)

---

**a. Removal.**

**NOTE**

Tag leads before disconnecting to aid in installation.

1 Disconnect wiring harness 12940911 (1) and attaching hardware at the following points:

Item No.	12940911 Connector/Lead/Wire	From Connector/ Lead/Wire/Component	Location
2	P1	Heater	Cab forward bulkhead.
3	Lead 100	Circuit Breaker	Heater mounting bracket.
4	Lead 100	Circuit Breaker	Heater mounting bracket.
5	Lead 100	Brush block #2	Between brush blocks 1 and 2.
6	Lead 70	Brush block #2	Between brush blocks 1 and 2.

2 Remove wiring harness 12940911 (1) from vehicle.

3 Remove two nuts (7), two lockwashers (8), two flat washers (9), two screws (10), and circuit breaker (11). Discard lockwashers.

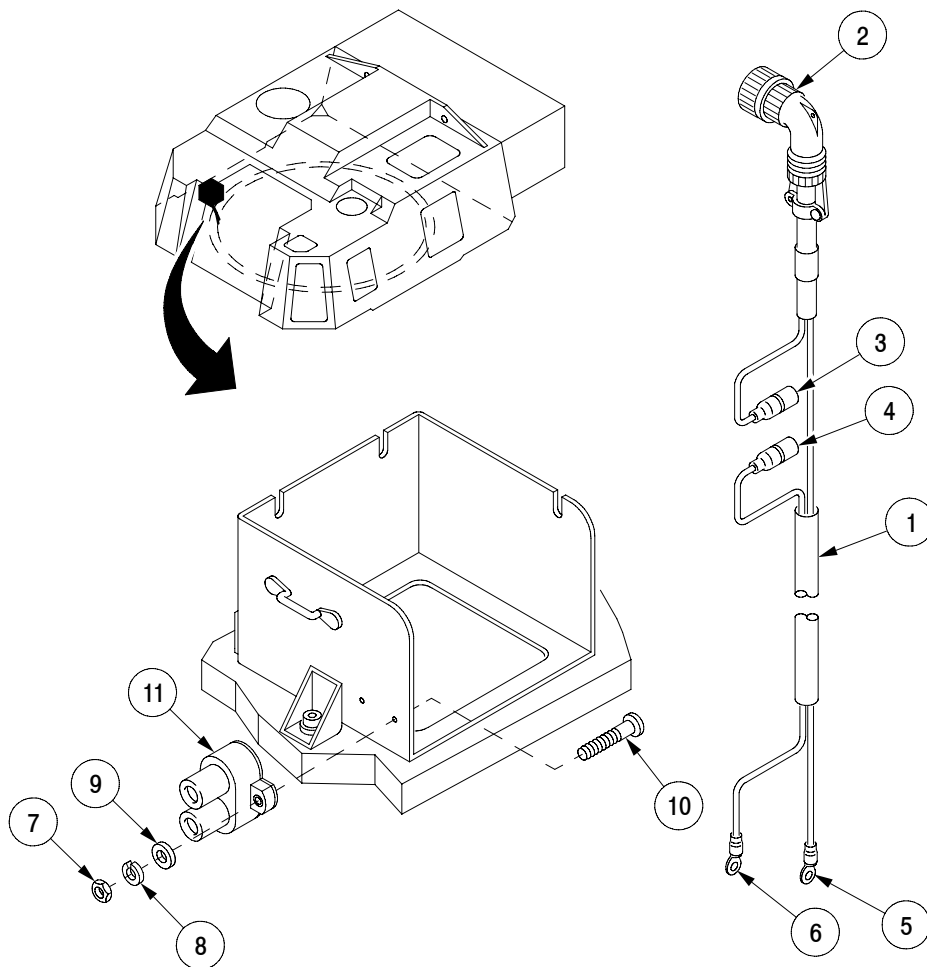
**5-38 MOUNTED WATER RATION HEATER WIRING HARNESS AND CIRCUIT BREAKER  
- CONTINUED**

**b. Installation**

1 Connect wiring harness 12940911 (1) and attaching hardware at the following points:

Item No.	12940911 Connector/Lead/Wire	To Connector/Lead/Wire/Component	Location
6	Lead 70	Brush block #2	Between brush blocks 1 and 2.
5	Lead 100	Brush block #2	Between brush blocks 1 and 2.
4	Lead 100	Circuit Breaker	Heater mounting bracket.
3	Lead 100	Circuit Breaker	Heater mounting bracket.
2	P1	Heater	Cab forward bulkhead.

2 Install circuit breaker (11) with two screws (10), two flat washers (9), two new lockwashers (8), and two nuts (7).



03pc112m



# CHAPTER 6 LOADER RAMMER

---

## GENERAL

This chapter illustrates and describes maintenance procedures for the projectile rammer system. Step-by-step procedures are provided for reliability checks, adjustment, removal, and installation as required for the performance of unit level maintenance.

---

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6-2	BLOCKING VALVE .....	6-5
6-3	BLOCKING VALVE AND SUPPORT BRACKET .....	6-6
6-4	RAMMER ASSEMBLY LATCHING COMPONENTS .....	6-8
6-5	RAMMER ACCESS COVER AND GASKET .....	6-16

## 6-1 PROJECTILE RAMMER STOWAGE BRACKET.

This task covers: a. Removal b. Installation c. Adjustment

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

#### References

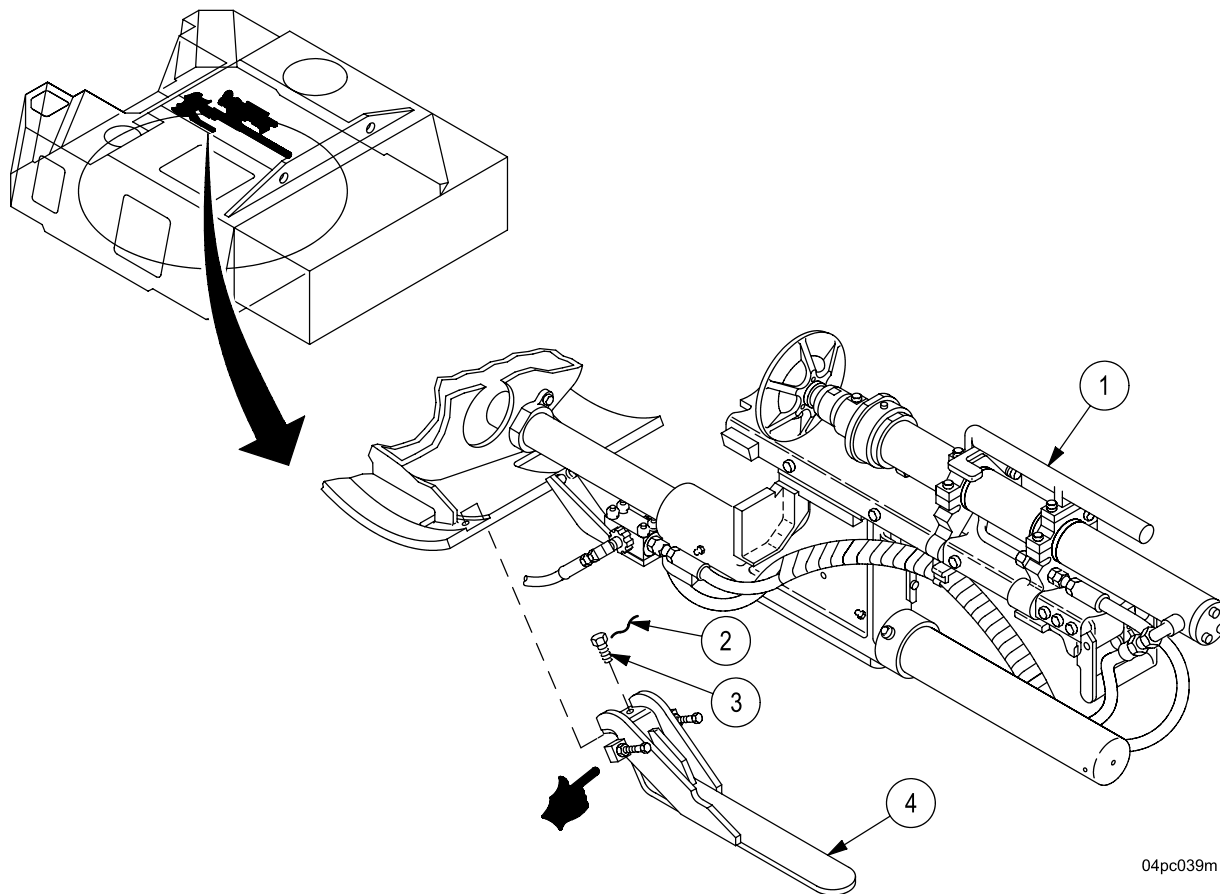
TM 9-2350-314-10

#### Materials/Parts

Nonelectrical wire (2) (item 97, Appx C)

#### a. Removal.

- 1 Set cannon at zero elevation, open breech and rotate rammer (1) to ramming position (TM 9-2350-314-10).
- 2 Remove lockwire (2), two screws (3), and stowage bracket (4). Discard lockwire.

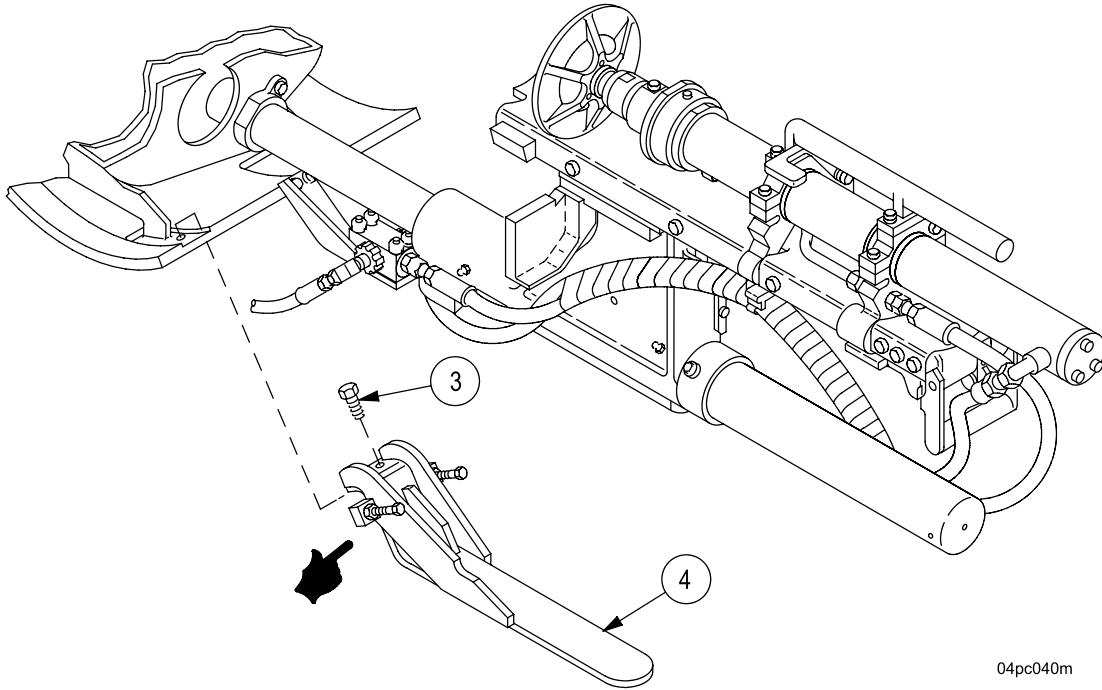


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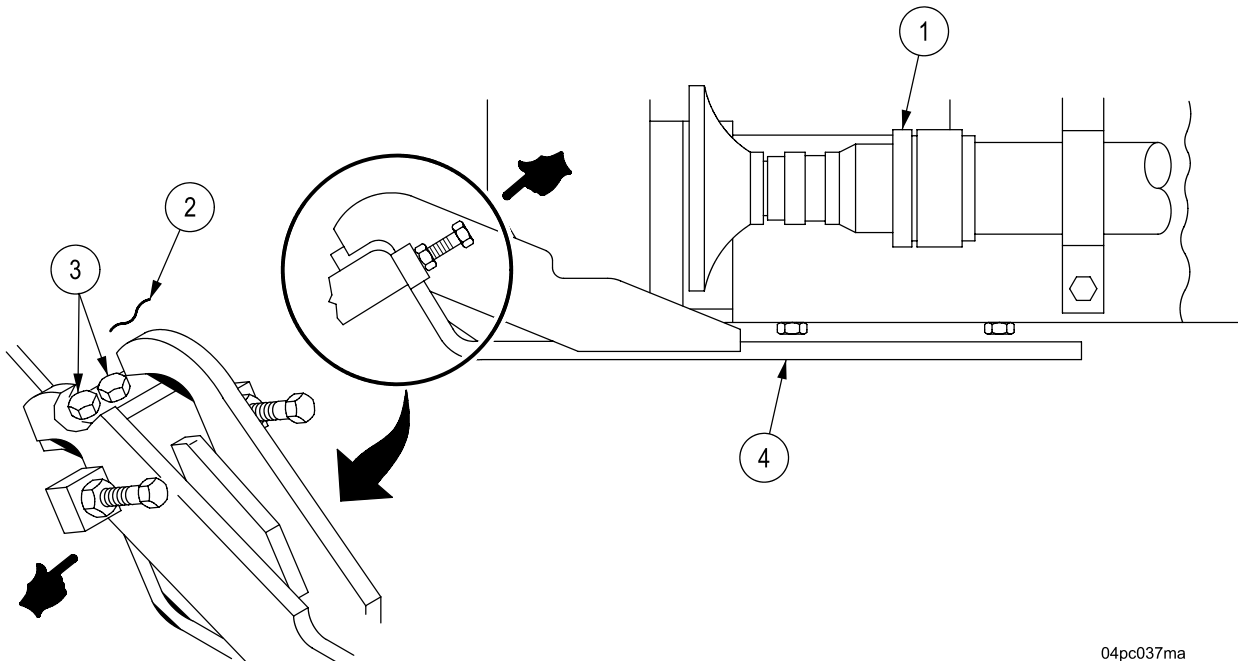
## 6-1 PROJECTILE RAMMER STOWAGE BRACKET - CONTINUED

### b. Installation.

- 1 Position stowage bracket (4) and install with two screws (3).



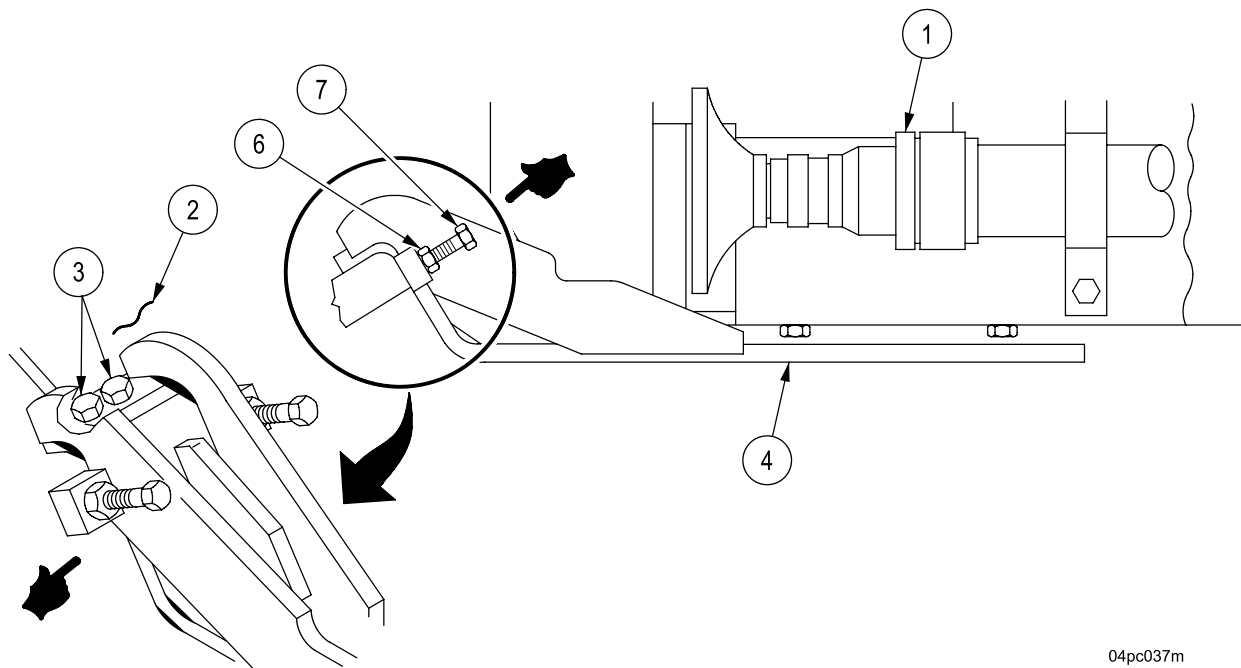
- 2 Rotate rammer (1) to stowed position and ensure that rammer (1) slides freely on stowage bracket (4). If rammer (1) slides freely, install new lockwire (2) on two screws (3). If rammer binds, go to c.



## 6-1 PROJECTILE RAMMER STOWAGE BRACKET - CONTINUED

### c. Adjustment.

- 1 Loosen two nuts (6) until they touch heads of two screws (7).
- 2 Remove lockwire (2) from two screws (3). Discard lockwire.
- 3 Loosen two screws (3).
- 4 Turn two nuts (6) and two screws (7) to adjust stowage bracket (4) until rammer (1) slides freely.
- 5 Tighten two nuts (6).
- 6 Check stowage bracket (4) clearance to make sure rammer (1) slides freely. Adjust if necessary.
- 7 Tighten two screws (3).
- 8 Install new lockwire (2) on two screws (3).



04pc037m



## 6-2 BLOCKING VALVE.

This task covers: Adjustment

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Torque wrench (item 53, Appx G)

#### Materials/Parts

Nonelectrical wire (item 97, Appx C)

#### References

TM 9-2350-314-10

### Adjustment.

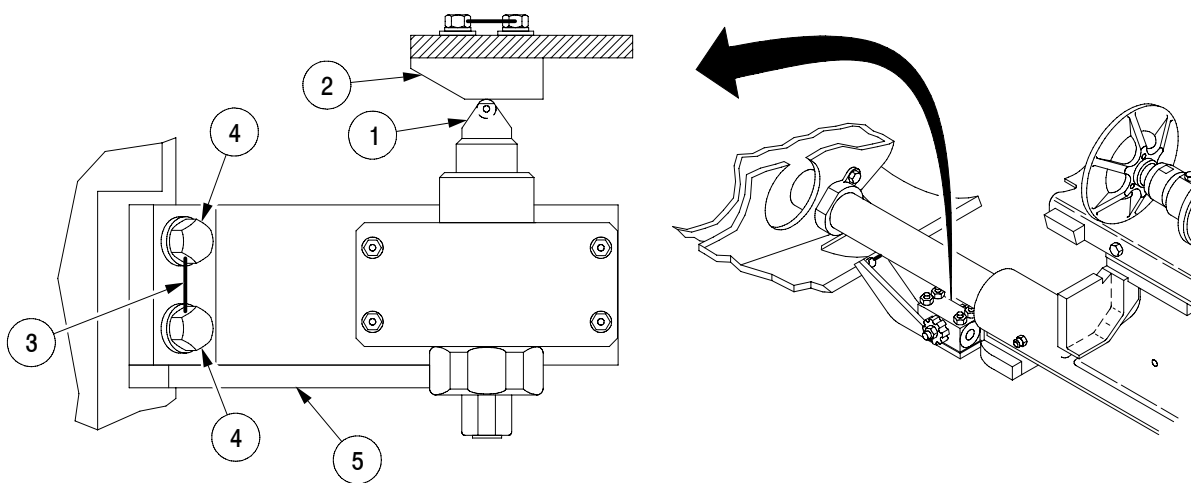
#### CAUTION

- Do not paint plunger or ramp. Lubricate per TM 9-2350-314-10.
- Make sure that rammer actuating valve handle is in out position before placing rammer assembly in upright position.

#### NOTE

Set the rammer in ramming position for this procedure.

Visually check alignment of plunger (1) with ramp (2). If plunger (1) is disengaged from ramp (2) (has not been pushed back inside blocking valve), remove and discard lockwire (3) and loosen two screws (4). Slide bracket (5) in direction required to engage plunger (1) with ramp (2). Tighten two screws (4) and torque to 50-60 lb-ft (68-81 N•m). Install new lockwire (3).



04pc038m

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## 6-3 BLOCKING VALVE AND SUPPORT BRACKET.

---

This task covers:      a. Removal                                      b. Installation

---

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

■ Torque wrench (item 53, Appx G)

#### Equipment Conditions

Hydraulic system discharged (para 18-1)

Blocking valve lines and fittings  
disconnected (para 18-17)

#### Materials/Parts

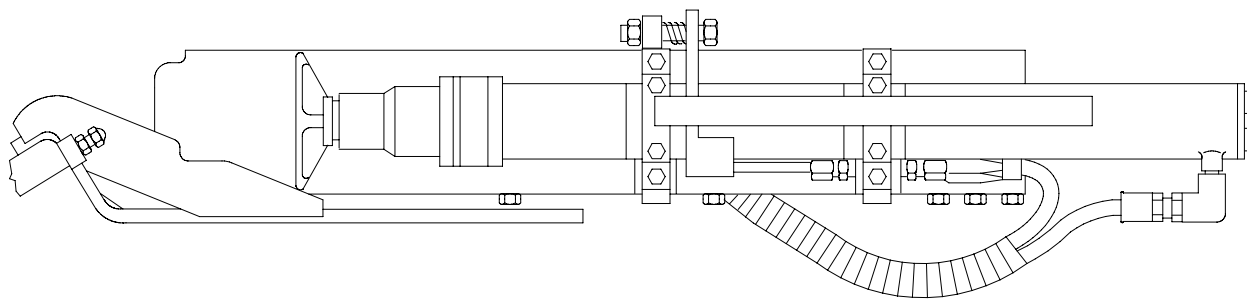
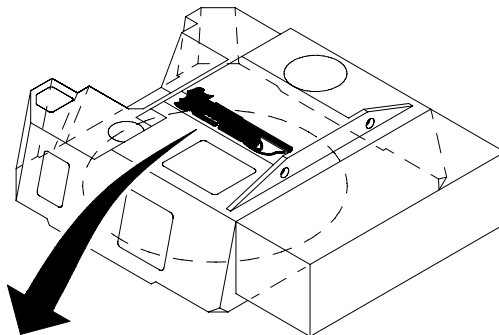
Lockwashers (6) (item 130, Appx F)

Nonelectrical wire (item 97, Appx C)

---

#### a. Removal.

- 1 Set cannon at zero elevation and position rammer assembly in stowed position.



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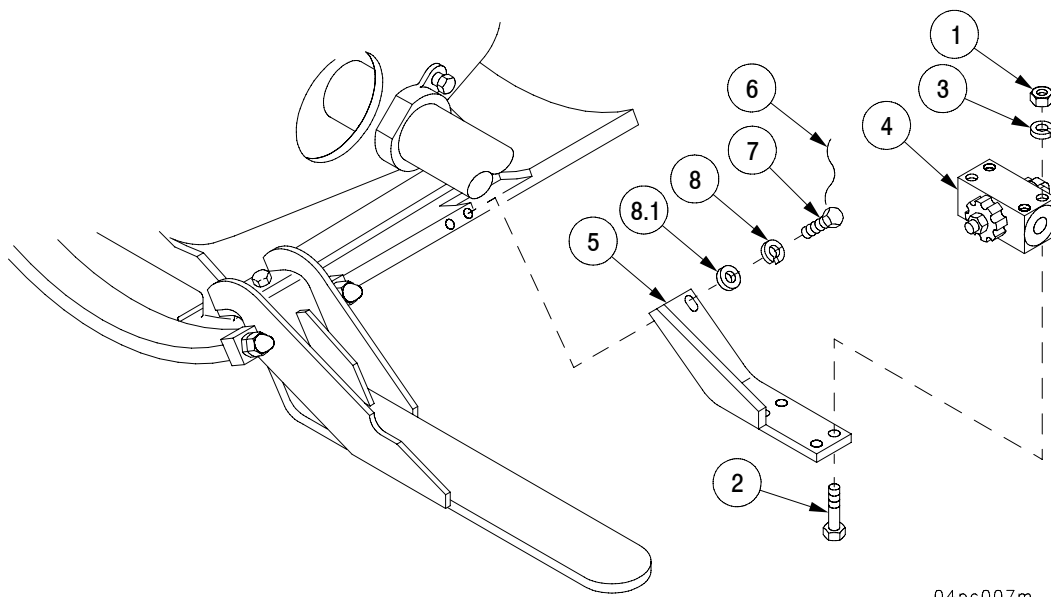
## 6-3 BLOCKING VALVE AND SUPPORT BRACKET - CONTINUED

### a. Removal - Continued

- 2 Remove four nuts (1), four screws (2), four lockwashers (3), and blocking valve (4) from blocking valve support bracket (5). Discard lockwashers.
- 3 Remove lockwire (6), two screws (7), two lockwashers (8), two flat washers (8.1), and blocking valve support bracket (5). Discard lockwire and lockwashers.

### b. Installation.

- 1 Install blocking valve support bracket (5) with two screws (7), two new lockwashers (8), and two flat washers (8.1). Torque screws to 50–60 lb–ft (68–81 N•m). Install new lockwire (6).
- 2 Position blocking valve (4) on blocking valve support bracket (5). Be sure plunger is positioned correctly. Secure valve with four screws (2), four new lockwashers (3), and four nuts (1).
- 3 Reconnect blocking valve hydraulic lines and fittings (para 18–17).
- 4 Check blocking valve plunger alignment with ramp (para 6–1).
- 5 Fill, charge, and bleed hydraulic system (para 18–1).



---

## 6-4 RAMMER ASSEMBLY LATCHING COMPONENTS.

---

This task covers:      a. Disassembly                      b. Assembly

---

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Torque wrench (item 53, Appx G)  
Drill twist, set (item 15, Appx G)  
Electric drill (item 14, Appx G)  
Machinist vise (item 46, Appx G)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)

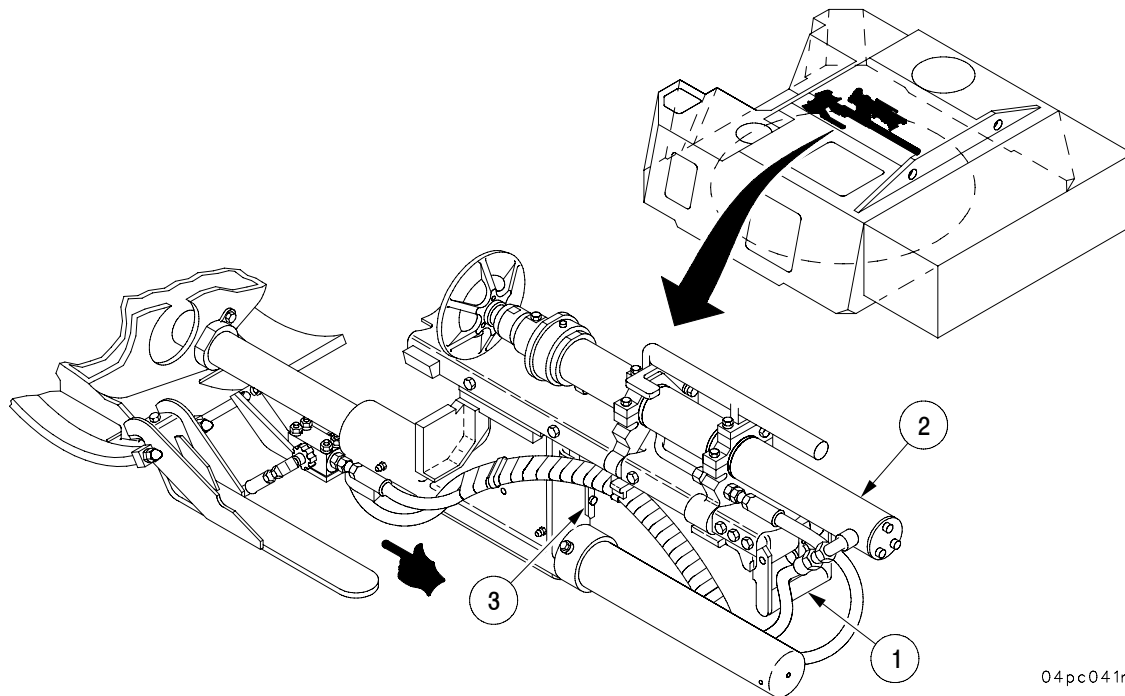
#### Materials/Parts

Spring pin (item 21, Appx F)  
Spring pins (2) (item 25, Appx F)  
Spring pin (item 26, Appx F)  
Cotter pins (3) (item 77, Appx F)  
Sealing compound (item 40, Appx C)

---

#### a. Disassembly.

- 1 Pull switch handle (1) and pull rammer (2) out to access cover (3).

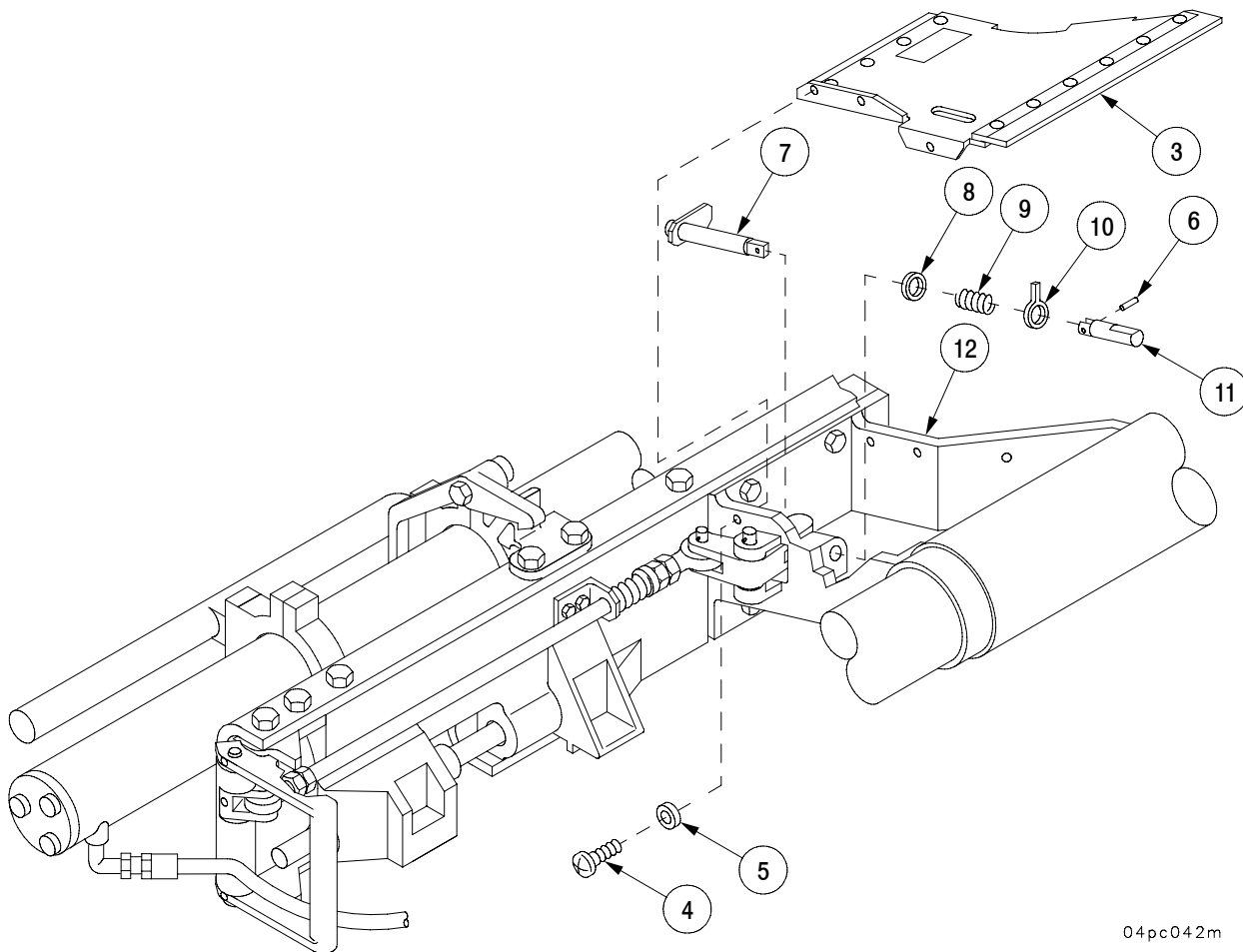


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## 6-4 RAMMER ASSEMBLY LATCHING COMPONENTS - CONTINUED

### a. Disassembly - Continued

- 2 Remove five screws (4), five flat washers (5), and cover (3).
- 3 Remove and discard spring pin (6).
- 4 Remove actuator (7), flat washer (8), spring (9), pointer (10), and shoulder pin (11) from support (12).

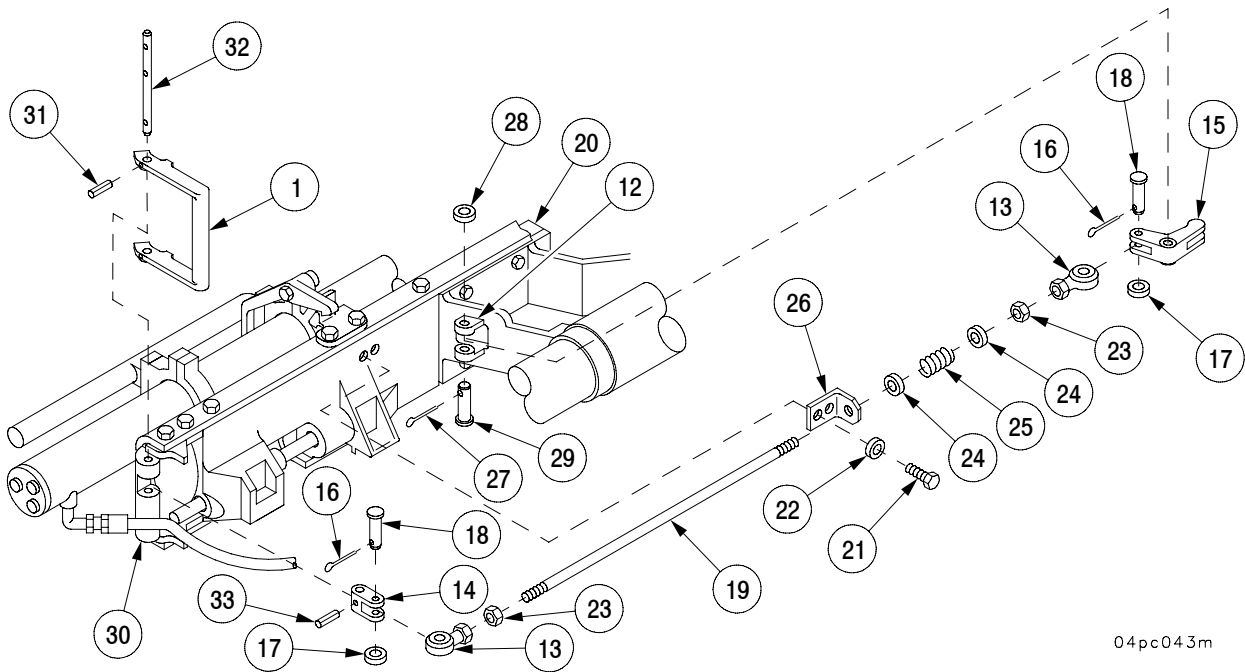


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## 6-4 RAMMER ASSEMBLY LATCHING COMPONENTS - CONTINUED

### a. Disassembly - Continued

- 5 Disconnect two rod ends (13) from two levers (14 and 15) by removing two cotter pins (16), two flat washers (17), and two straight pins (18). Discard cotter pins.
- 6 Remove rod (19) with assembled components from tray (20) by removing two screws (21) and two flat washers (22).
- 7 Remove two rod ends (13), two nuts (23), two flat washers (24), spring (25), and bracket (26) from rod (19).
- 8 Remove lever (15) from support (12) by removing cotter pin (27), flat washer (28), and straight pin (29). Discard cotter pin.
- 9 Remove handle (1) from handle support (30) by removing two spring pins (31), straight pin (32), spring pin (33), and lever (14). Discard spring pins.

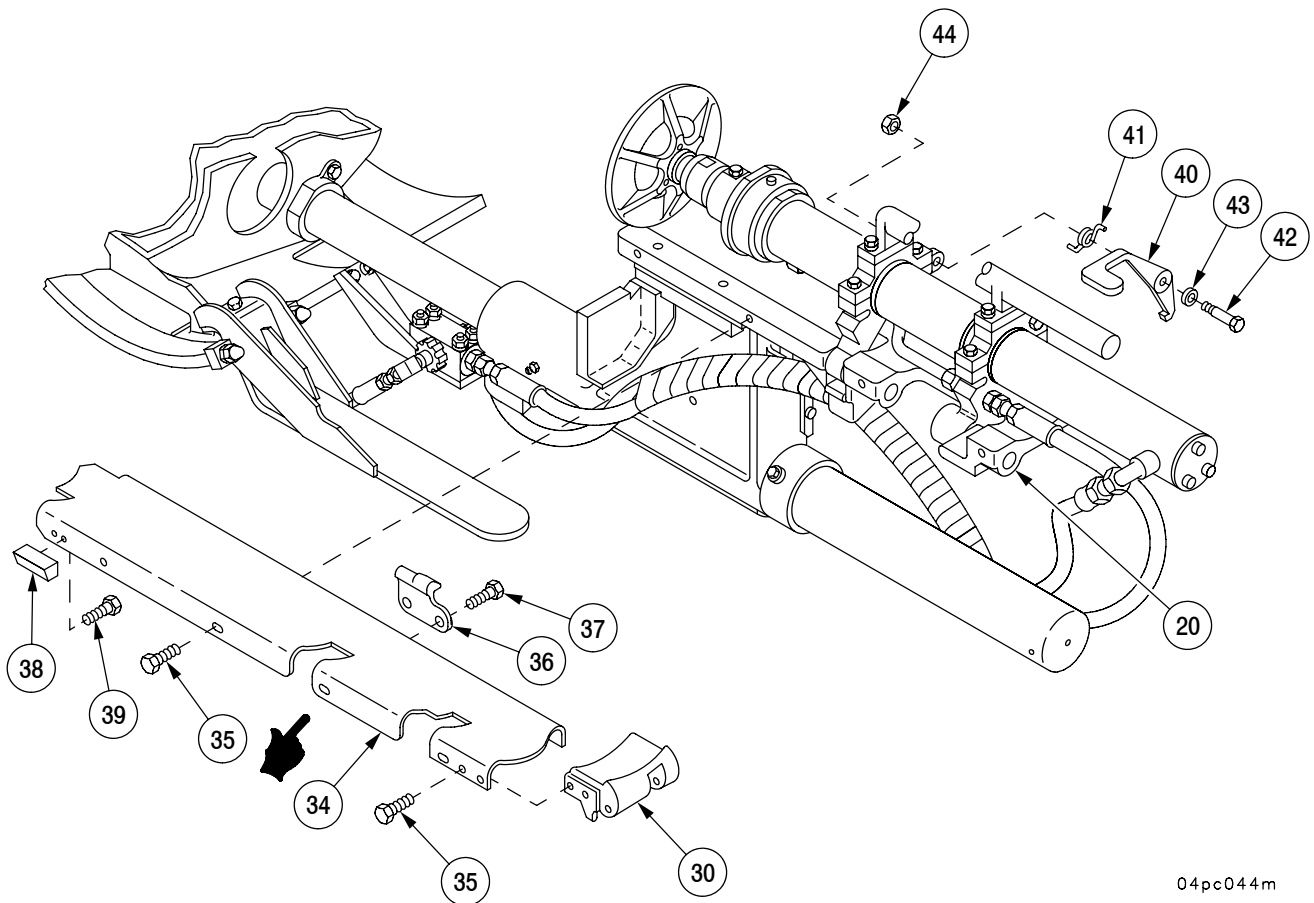


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## 6-4 RAMMER ASSEMBLY LATCHING COMPONENTS - CONTINUED

### a. Disassembly - Continued

- 10 Remove handle support (30) and ammo tray (34) from tray (20) by removing 11 screws (35).
- 11 Remove latch (36) from ammo tray (34) by removing two screws (37).
- 12 Remove block (38) from ammo tray (34) by removing two screws (39).
- 13 Remove lever (40) and spring (41) by removing screw (42), flat washer (43), and nut (44).

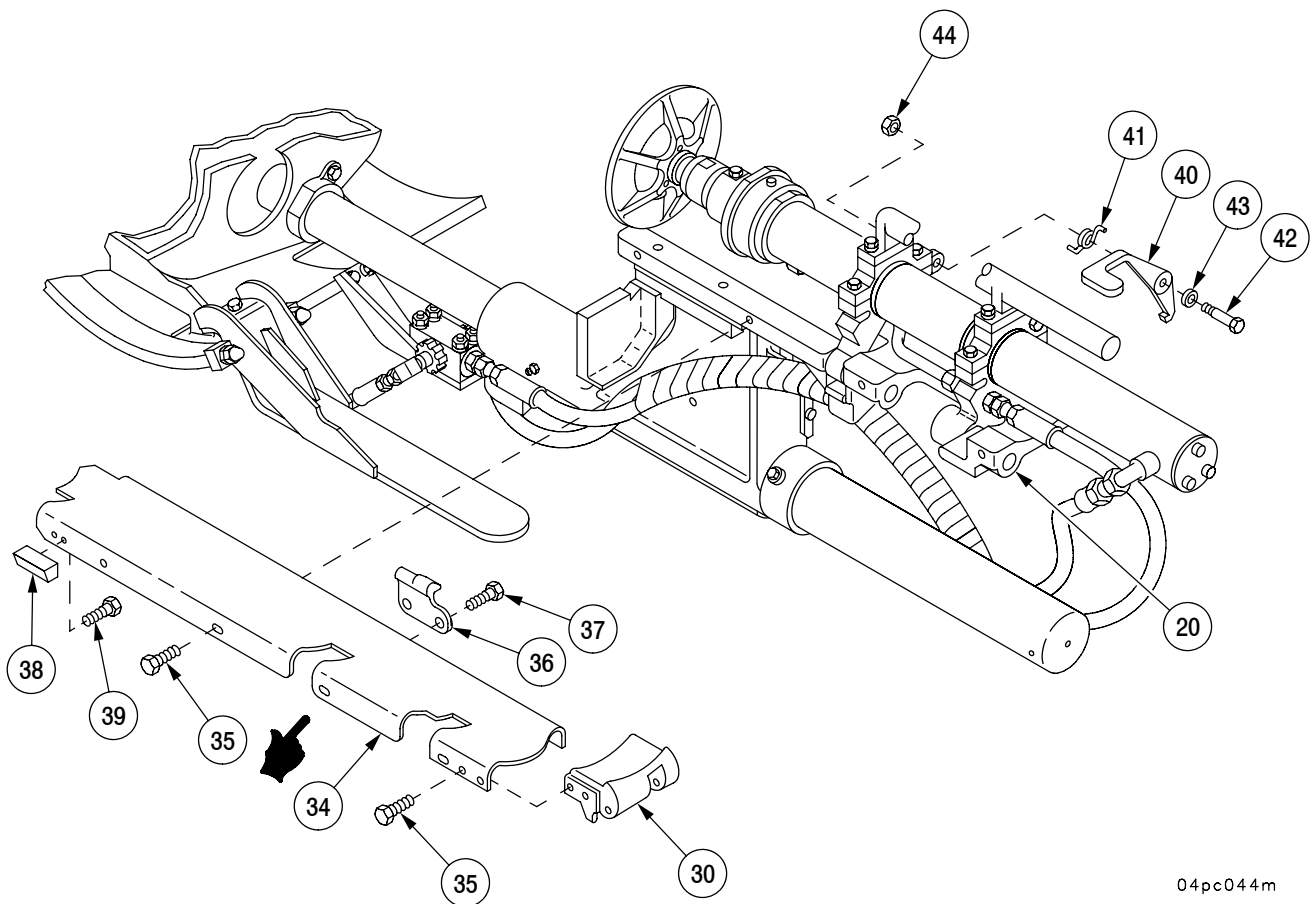


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## 6-4 RAMMER ASSEMBLY LATCHING COMPONENTS - CONTINUED

### b. Assembly.

- 1 Apply sealing compound to threads of nut (44) and screw (42).
- 2 Install lever (40) and spring (41) with screw (42), flat washer (43), and nut (44). Torque nut (44) to 34-42 lb-ft (46-57 N•m).
- 3 Install block (38) on ammo tray (34) with two screws (39).
- 4 Apply sealing compound to threads of two screws (37).
- 5 Install latch (36) on ammo tray (34) with two screws (37). Torque screws (37) to 32-39 lb-ft (43-53 N•m).
- 6 Apply sealing compound to threads of 11 screws (35).
- 7 Install handle support (30) and ammo tray (34) on tray (20) with 11 screws (35). Torque screws (35) to 32-39 lb-ft (43-53 N•m).



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## 6-4 RAMMER ASSEMBLY LATCHING COMPONENTS - CONTINUED

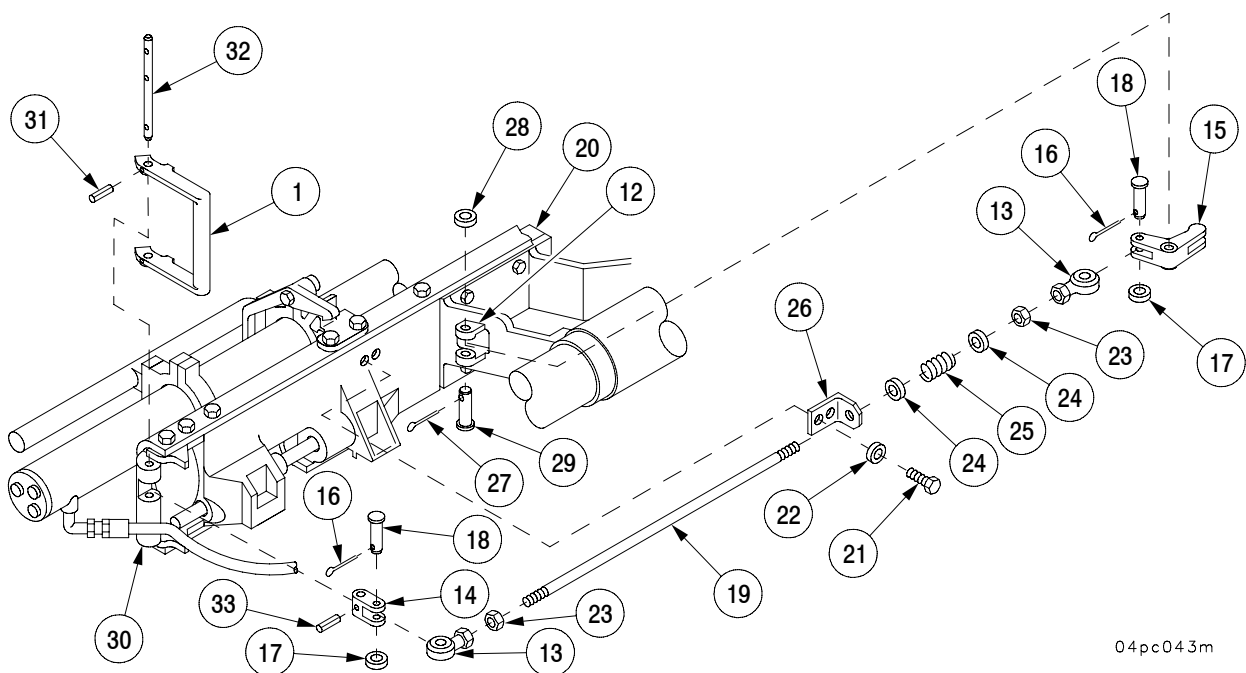
### b. Assembly - Continued

- 8 Install lever (14) in handle support (30).

#### NOTE

If straight headless pin is new from supply, perform step 9.

- 9 Drill 3 holes in straight headless pin (32) using handle (1) and lever (14) for pilot holes. Spring pins inserted through handle (1) require a 1/8 in. (3.2 mm) hole. Spring pins (33) inserted through lever (14) require a 5/32 in. (3.7 mm) hole.
- 10 Install handle (1) on handle support (30) with straight pin (32), two new spring pins (31), and new spring pin (33).
- 11 Install lever (15) in support (12) with straight pin (29), flat washer (28), and new cotter pin (27).
- 12 Apply sealing compound to threads of two screws (21).
- 13 Install bracket (26) with two screws (21) and two flat washers (22). Torque screws (21) to 8-11 lb-ft (11-15 N•m).
- 14 Insert rod (19) through bracket (26) and install two flat washers (24), spring (25), two nuts (23), and two rod ends (13).
- 15 Connect two rod ends (13) to two levers (14 and 15) with two straight pins (18), two flat washers (17), and two new cotter pins (16).

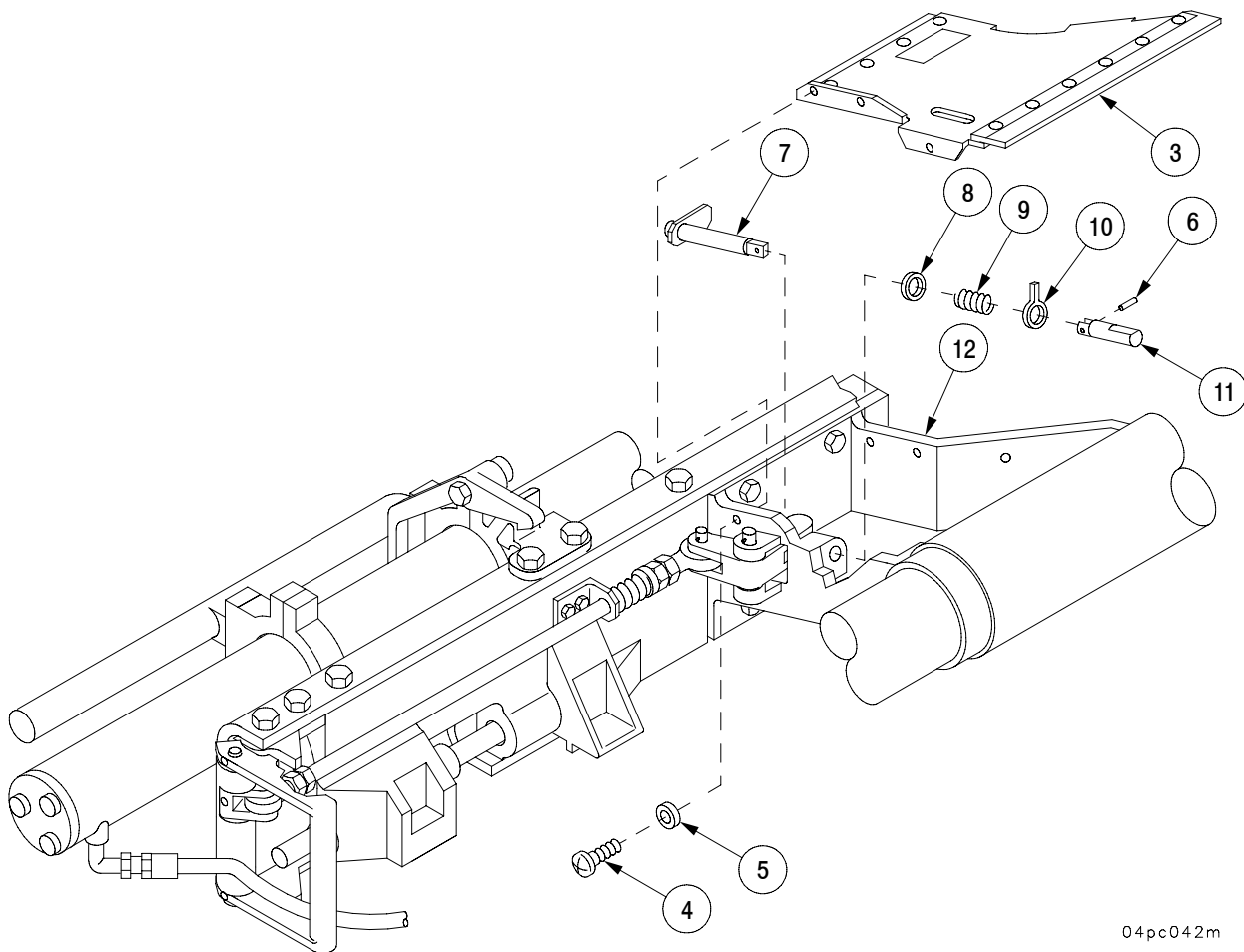


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## 6-4 RAMMER ASSEMBLY LATCHING COMPONENTS - CONTINUED

### b. Assembly - Continued

- 16 Install actuator (7), flat washer (8), spring (9), pointer (10), and shoulder pin (11) in support (12) with new spring pin (6).
- 17 Install cover (3) with five screws (4) and five flat washers (5).



04pc042m

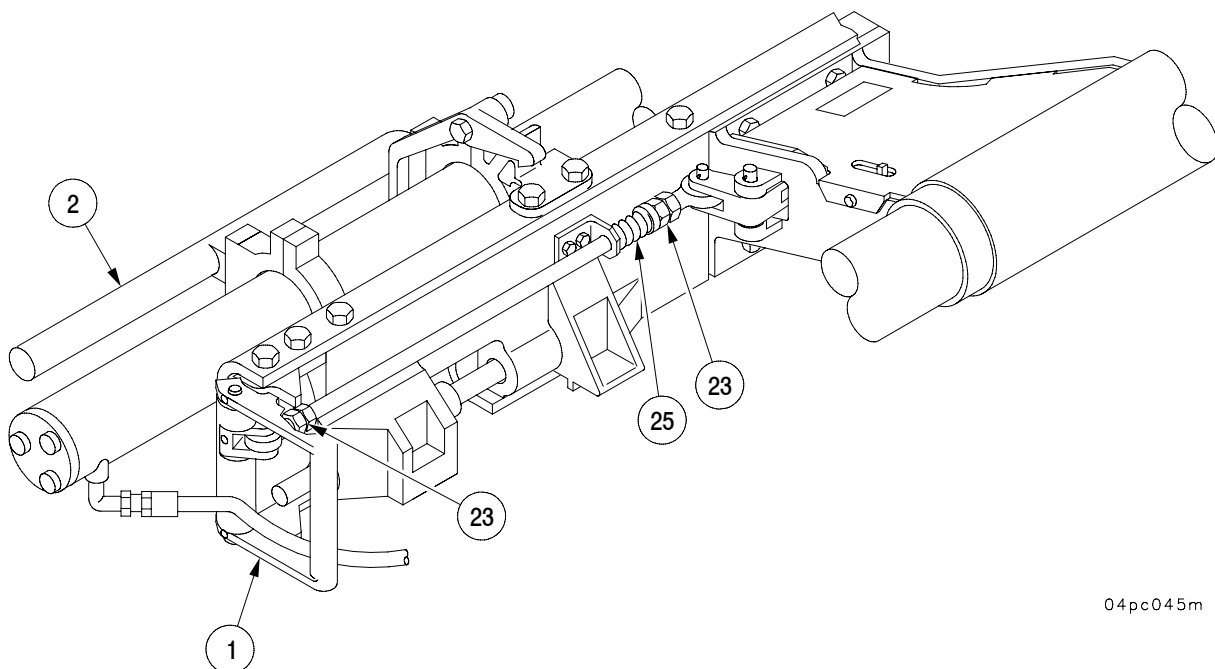
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**6-4 RAMMER ASSEMBLY LATCHING COMPONENTS - CONTINUED**

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**b. Assembly - Continued**

- 18 Place handle (1) in the locked (down) position.
- 19 Adjust rod end nuts (23) so that compressed length of spring (25) measures 1.25 inches (31.75 mm).
- 20 Push rammer (2) into the locked position and verify rammer is locked. Repeat step 19 as required.



04pc045m

## 6-5 RAMMER ACCESS COVER AND GASKET.

This task covers:      a. Removal    b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Torque wrench (item 53, Appx G)  
Adapter, socket wrench (item 2, Appx G)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)

#### Materials/Parts

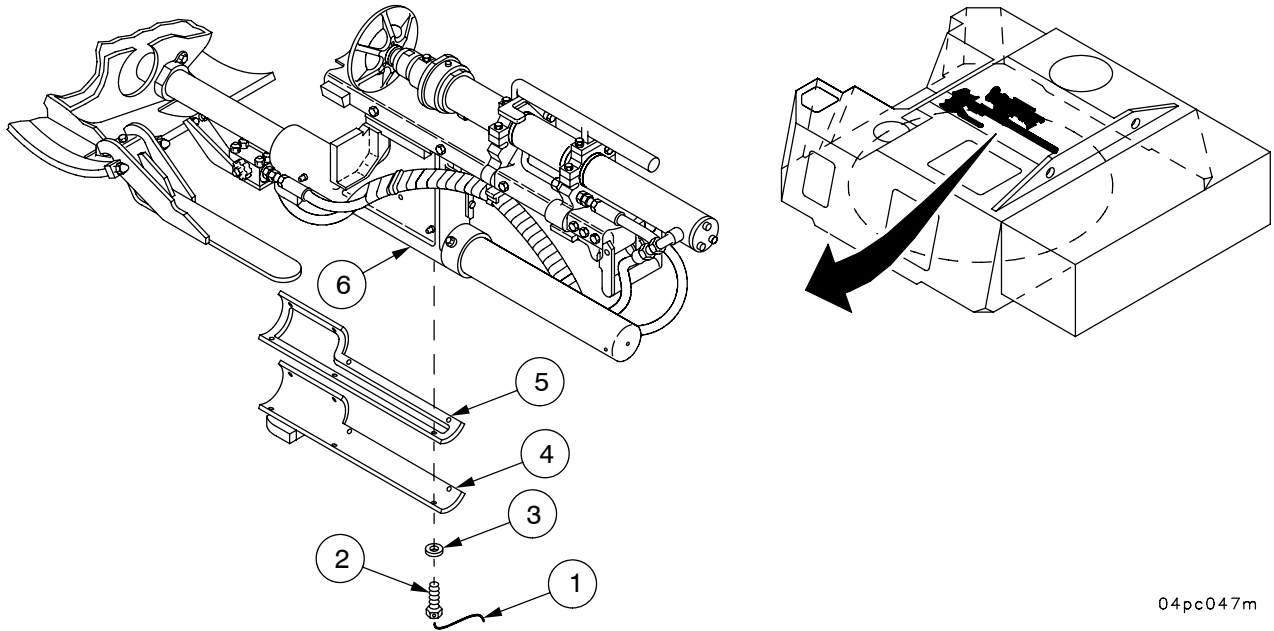
Cover gasket (item 249, Appx F)  
Lockwire (item 95.1, Appx C)  
Sealing compound (item 40, Appx C)

#### **a. Removal.**

Remove lockwire (1), seven screws (2), seven washers (3), cover (4), and cover gasket (5) from rammer support (6). Discard lockwire and cover gasket.

#### **b. Installation.**

- 1 Apply sealing compound to threads of seven screws (2).
- 2 Install new cover gasket (5), cover (4), seven washers (3), and seven screws (2) to rammer support (6).
- 3 Torque seven screws (2) to 8-11 lb-ft. (10-14 N•m) and secure with new lockwire (1).



04pc047m

# CHAPTER 7 SIGHTING EQUIPMENT

## GENERAL

This chapter illustrates and describes maintenance procedures for telescope mount M145A1, linkage assembly, ballistic cover, M140/M140A1 alignment device, and bracket. Step-by-step procedures are provided to remove, repair, adjust, and install as required for unit level maintenance.

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7-4	M140/M140A1 ALIGNMENT DEVICE MOUNT AND BRACKET .....	7-24

## 7-1 M145A1 MOUNT AND LINKAGE.

---

- This task covers:
- |                               |   |
|-------------------------------|---|
| a. Leveling Gun Trunnions     | b. Checking Synchronization of the Mount M145A1 |
| c. Adjusting Shaft Arm        | d. Adjusting Gun Trunnion Arm                   |
| e. Adjusting Eccentric Shaft  | f. Adjusting Mount M145A1 at Zero Elevation     |
| g. Checking Elevation Counter |   |
- 

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Torque wrench (item 53, Appx G)  
Gunner's quadrant (BII)

#### Equipment Conditions

Gun tube leveled and gunner's quadrant end for end test completed and breech corrections applied (TM 9-2350-314-10)

#### References

TM 9-2350-314-10

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### NOTE

- The panoramic telescope mount M145A1 must be synchronized whenever the mount or shaft arm is changed or whenever mount may be out of synchronization.
- Check synchronization of mount M145A1. This checking procedure will pinpoint the assembly requiring adjustment or synchronization.
- Use a gunner's quadrant that is accurate within 0.4 mil (tested by the end-for-end method). Whenever the gunner's quadrant is used, the correction must be applied.
- Frequently check the gun tube for drift during any synchronization procedure to reduce the chance of error due to gun tube drift.
- The panoramic telescope should not be on the M145A1 mount during the synchronization or removal of the mount M145A1.
- The breech correction should be applied to the gunner's quadrant when the gunner's quadrant is being used on the breech ring quadrant seats to measure elevation.
- The breech correction should not be applied to the gunner's quadrant when being used on the breech cross level seats and on the mount M145A1 quadrant seats.

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**7-1 M145A1 MOUNT AND LINKAGE - CONTINUED**

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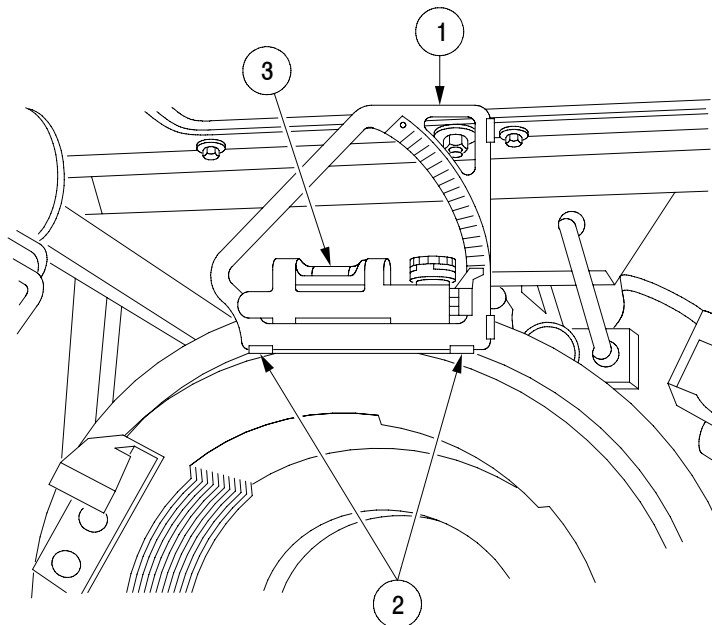
**a. Leveling Gun Trunnions.****NOTE**

All quadrant seats must be wiped clean before positioning gunner's quadrant on them for taking readings.

- 1 Park vehicle on level ground (hard surface if available). Bring cannon to zero elevation, using gunner's quadrant (end-for-end correction applied) on M145A1 quadrant seats.
- 2 Place gunner's quadrant (1) with zero reading (end-for-end correction applied) on cross-level quadrant seats (2) on breech ring.
- 3 Level gun trunnions by traversing cannon tube left or right until bubble (3) in gunner's quadrant (1) is centered.

**NOTE**

This is a field expedient method of leveling the trunnions to correct an angular breech offset. The preferred method is the procedures in TM 9-2350-314-10 for leveling the trunnions for full circle of the cab.



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## 7-1 M145A1 MOUNT AND LINKAGE - CONTINUED

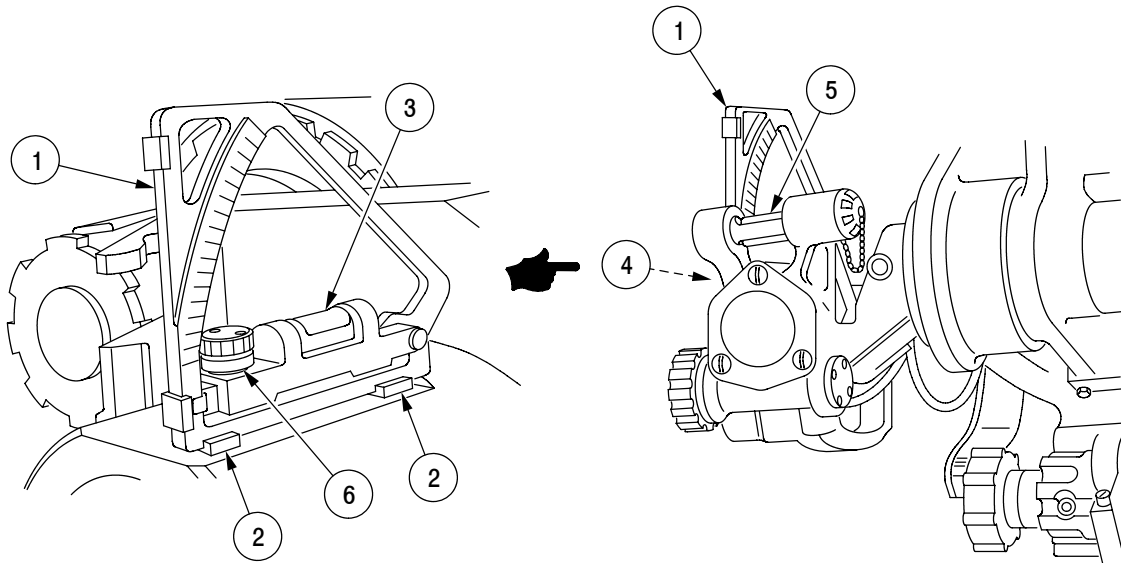
### b. Checking Synchronization of the Mount M145A1.

- 1 Elevate cannon tube to 400 mils using gunner's quadrant (1) (end-for-end and breech correction applied) placed on breech quadrant seats (2).

#### NOTE

With gunner's quadrant on mount M145A1 quadrant seats, the bubble in the gunner's quadrant can be read more accurately by observing gunner's quadrant bubble with inspection mirror.

- 2 Place gunner's quadrant (1) with reading of 400 mils (end-for-end correction applied) on telescope mount M145A1 quadrant seats (4).
- 3 Center cross-level bubble on mount M145A1 cross-level vial (5).
- 4 Bubble (3) on gunner's quadrant (1) should also be centered. If bubble (3) on gunner's quadrant (1) is not centered, turn micrometer knob (6) until bubble (3) on gunner's quadrant (1) is centered.
- 5 Record reading of gunner's quadrant (1).



05pc058m



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**7-1 M145A1 MOUNT AND LINKAGE - CONTINUED**

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**b. Checking Synchronization of the Mount M145A1 - Continued**

- 6 Repeat steps 1 thru 5 for elevations at 800 and 1200 mils.
- 7 Compare elevation readings taken at 400 mils, 800 mils, and 1200 mils.
- (a) If the error at each of the three elevations (all positive or all negative errors) does not exceed  $\pm 0.5$  mils.

NO ADJUSTMENT IS NECESSARY. CHECK READING AT ZERO ELEVATION.

- (b) If error at each elevation exceeds  $\pm 0.5$  mils (all positive or all negative errors).

ADJUST SHAFT ARM ON PANORAMIC TELESCOPE MOUNT M145A1 (para 7-1c.).

- (c) If the difference between the two elevation readings at 400 and 1200 mils is greater or smaller than 800 mils,  $\pm 0.5$  mils, and/or, the errors at 400 and 1200 mils have opposite signs (+ or -).

ADJUST ECCENTRIC SHAFT (para 7-1e.)

**NOTE**

Whenever the readings at the different settings are of unequal values, a bow exists in the parallelogram, and an adjustment must be made to the eccentric shaft to eliminate the bow.

- (d) If error readings taken at 400 and 800 mils differ more than  $\pm 0.5$  mil.

ADJUST THE GUN TRUNNION ARM (para 7-1d.)

## 7-1 M145A1 MOUNT AND LINKAGE - CONTINUED

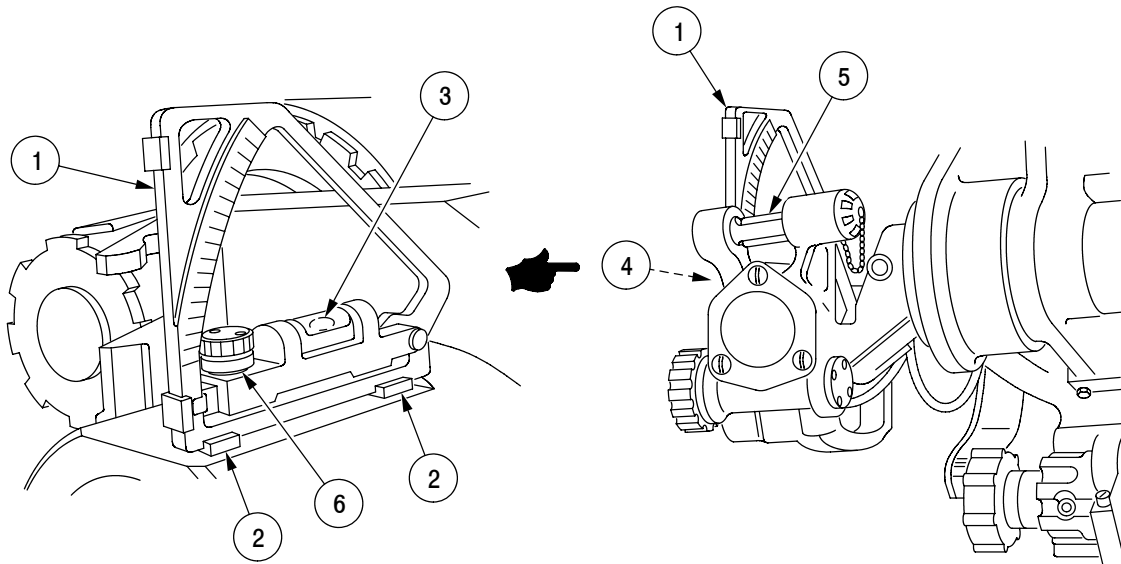
### c. Adjusting Shaft Arm.

- 1 Elevate cannon tube to 800 mils using gunner's quadrant (1) (end-for-end and breech correction applied) placed on breech quadrant seats (2).

#### NOTE

With gunner's quadrant on mount M145A1 quadrant seats, the bubble in gunner's quadrant can be more accurately read by observing gunner's quadrant with an inspection mirror.

- 2 Place gunner's quadrant (1) with reading of 800 mils (end-for-end correction applied) on telescope mount M145A1 quadrant seats (4).
- 3 Center cross-level bubble on mount M145A1 cross-level vial (5).
- 4 If bubble (3) on gunner's quadrant (1) is not centered, turn micrometer knob (6) until bubble is centered. Observe reading on gunner's quadrant.



05pc059m

## 7-1 M145A1 MOUNT AND LINKAGE - CONTINUED

### c. Adjusting Shaft Arm - Continued

#### NOTE

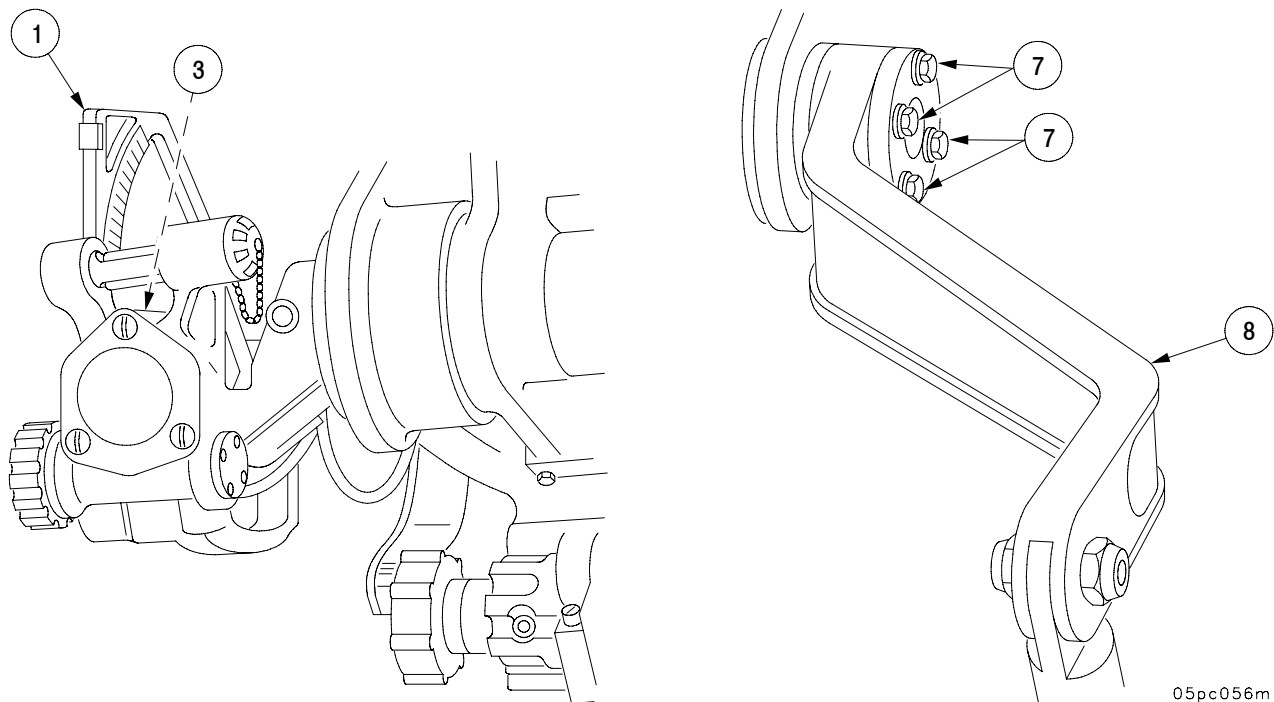
If reading on gunner's quadrant has not changed more than  $\pm 0.5$  mils at 800 mils, skip steps 5 and 6. If reading on gunner's quadrant has changed more than  $\pm 0.5$  mils, turn back micrometer knob on gunner's quadrant to get a reading of 800 mils (end-for-end and breech correction applied). Then follow steps 5 and 6 to adjust the shaft arm.

- 5 Loosen four screws (7) on shaft arm (8).

#### NOTE

It may be necessary to tap shaft arm with a soft hammer to loosen grip-springs. This will allow mount M145A1 to rotate.

- 6 Move mount to rotate shaft until bubble (3) in gunner's quadrant (1) is centered. Tighten four screws (7) on shaft arm (8). Torque screws (7) to 45-55 lb-ft (61.02-74.58 N•m).
- 7 Check synchronization of mount M145A1 at 400 and 1200 mils. If M145A1 mount is synchronized at these elevations, go to para 7-1f. If mount is not synchronized, repeat para 7-1b.



05pc056m

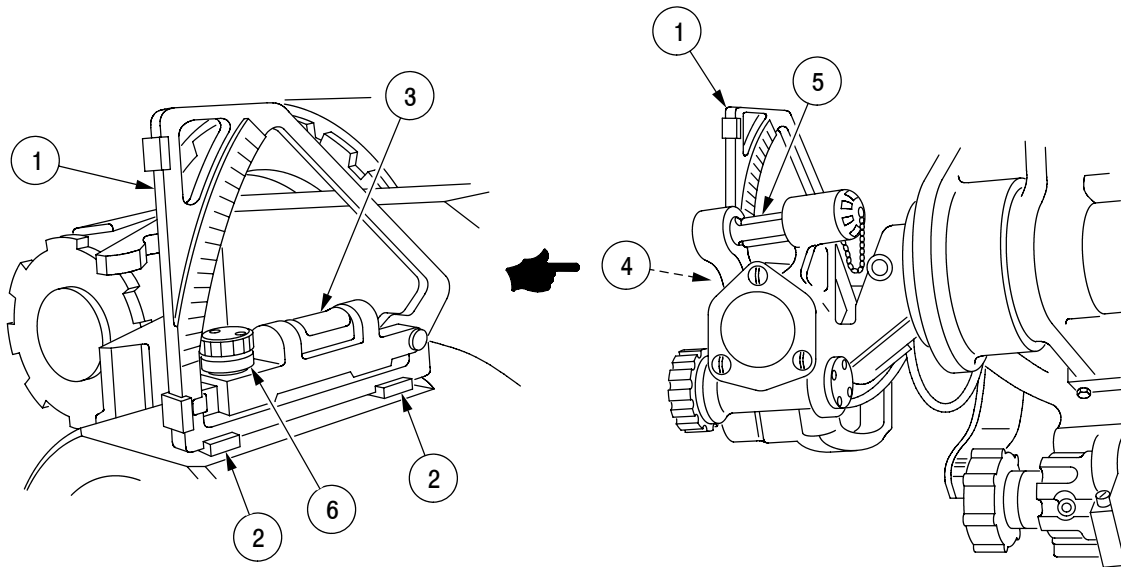
**7-1 M145A1 MOUNT AND LINKAGE - CONTINUED**

**d. Adjusting Gun Trunnion Arm.**

- 1 Depress cannon tube to 400 mils, using gunner's quadrant (1) (end-for-end and breech correction applied) placed on breech quadrant seats (2).
- 2 Place gunner's quadrant (1) with reading of 400 mils (end-for-end correction applied) on telescope mount M145A1 quadrant seats (4).
- 3 Center cross-level bubble on mount M145A1 cross-level vial (5).
- 4 If bubble (3) on gunner's quadrant (1) is not centered, turn micrometer knob (6) on gunner's quadrant (1) until bubble (3) is centered. Observe reading on gunner's quadrant (1).

**NOTE**

If reading on gunner's quadrant has not changed more than  $\pm 0.5$  mils at 400 mils, skip steps 5 and 6. If reading on gunner's quadrant has changed more than  $\pm 0.5$  mils, turn back micrometer knob on gunner's quadrant to get a reading of 400 mils (end-for-end correction applied). Then follow steps 5 and 6 to adjust the trunnion arm.



05pc060m

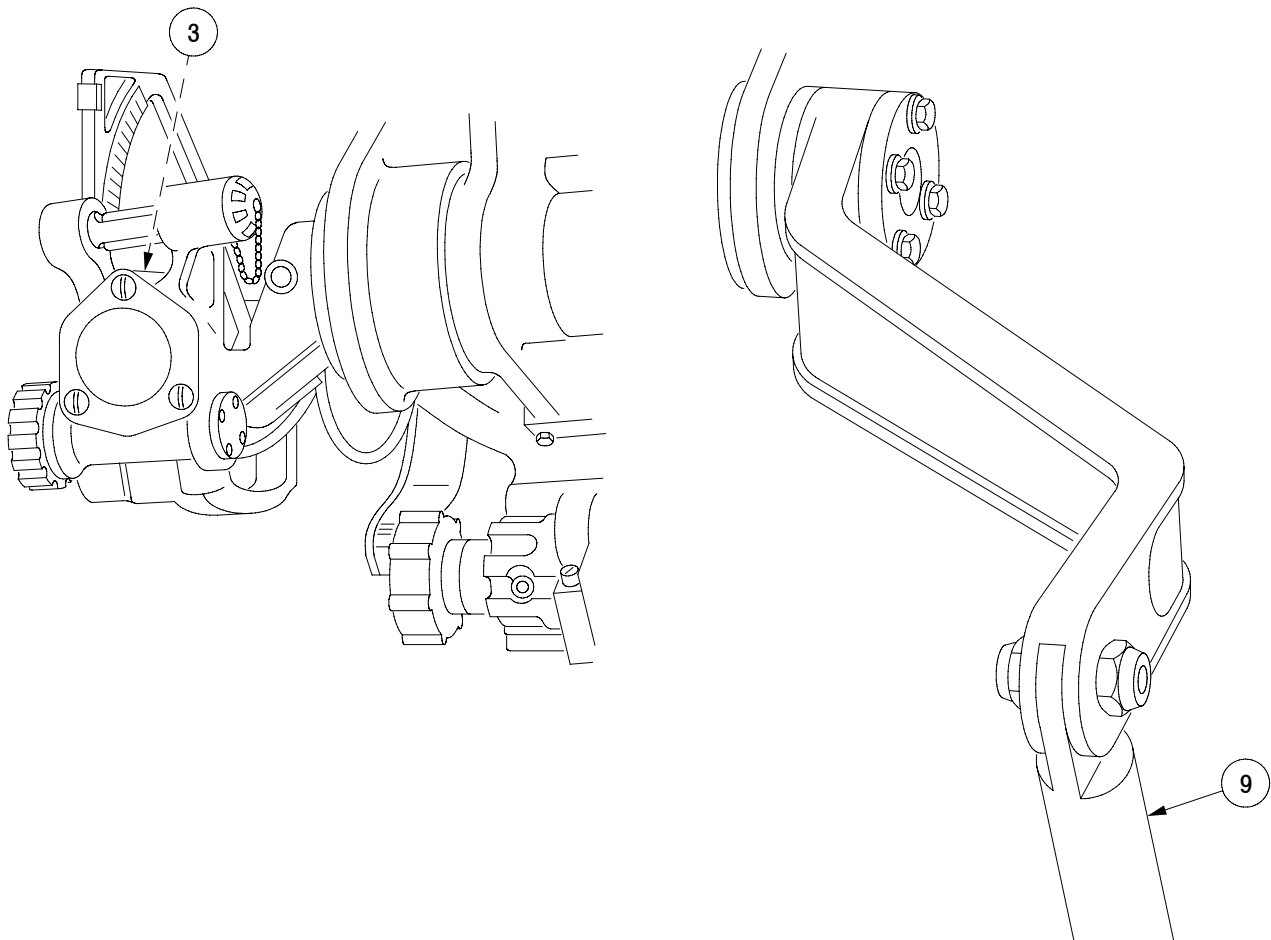
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**7-1 M145A1 MOUNT AND LINKAGE - CONTINUED**

---

**d. Adjusting Gun Trunnion Arm - Continued**

- 5 Loosen clamp screw (not shown) on gun trunnion arm (9).
- 6 Rotate adjustment rod (not shown) until bubble (3) in gunner's quadrant is centered. Tighten clamp screw on gun trunnion arm (9).
- 7 Check synchronization of mount M145A1 at 800 and 1200 mils elevation (steps 1 thru 4). If mount is synchronized at these elevations, go to para 7-1f. If not, repeat all of the above checks until mount is synchronized, then go to para 7-1f.



05pc061m

## 7-1 M145A1 MOUNT AND LINKAGE - CONTINUED

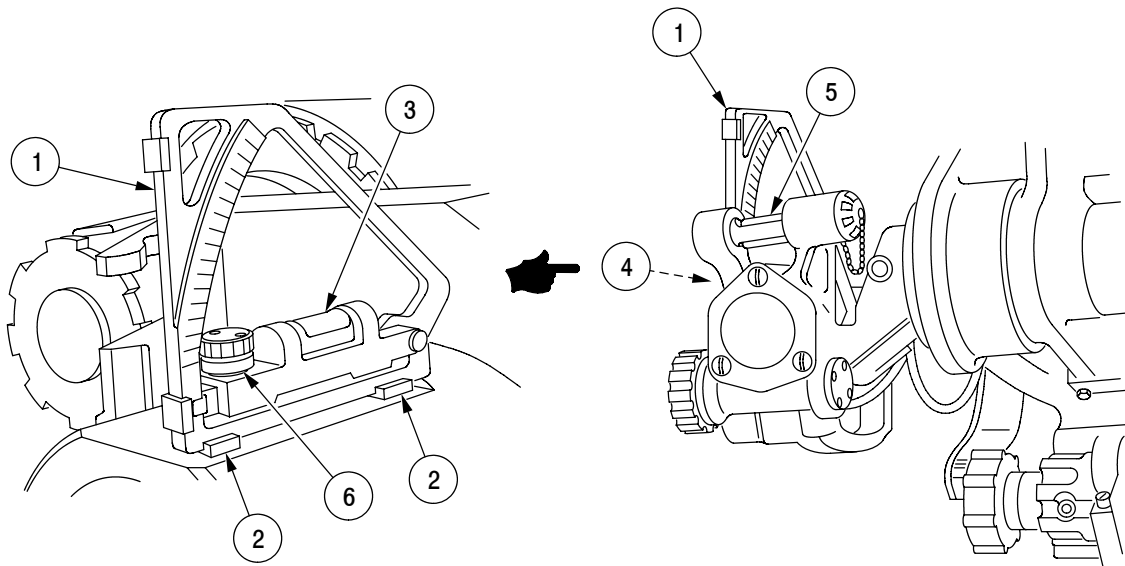
### e. Adjusting Eccentric Shaft.

- 1 Elevate cannon tube to 1200 mils using gunner's quadrant (1) (end-for-end and breech correction applied) placed on breech quadrant seats (2).

#### NOTE

With gunner's quadrant on M145A1 quadrant seats, the bubble in the gunner's quadrant can be read more accurately by observing gunner's quadrant bubble with inspection mirror.

- 2 Place gunner's quadrant (1) with reading of 1200 mils (end-for-end correction applied) on telescope mount M145A1 quadrant seats (4).
- 3 Center cross-level bubble on mount M145A1 cross-level vial (5).
- 4 If bubble (3) on gunner's quadrant (1) is not centered, turn micrometer knob (6) on gunner's quadrant (1) until bubble (3) is centered. Observe reading on gunner's quadrant (1).



05pc058m

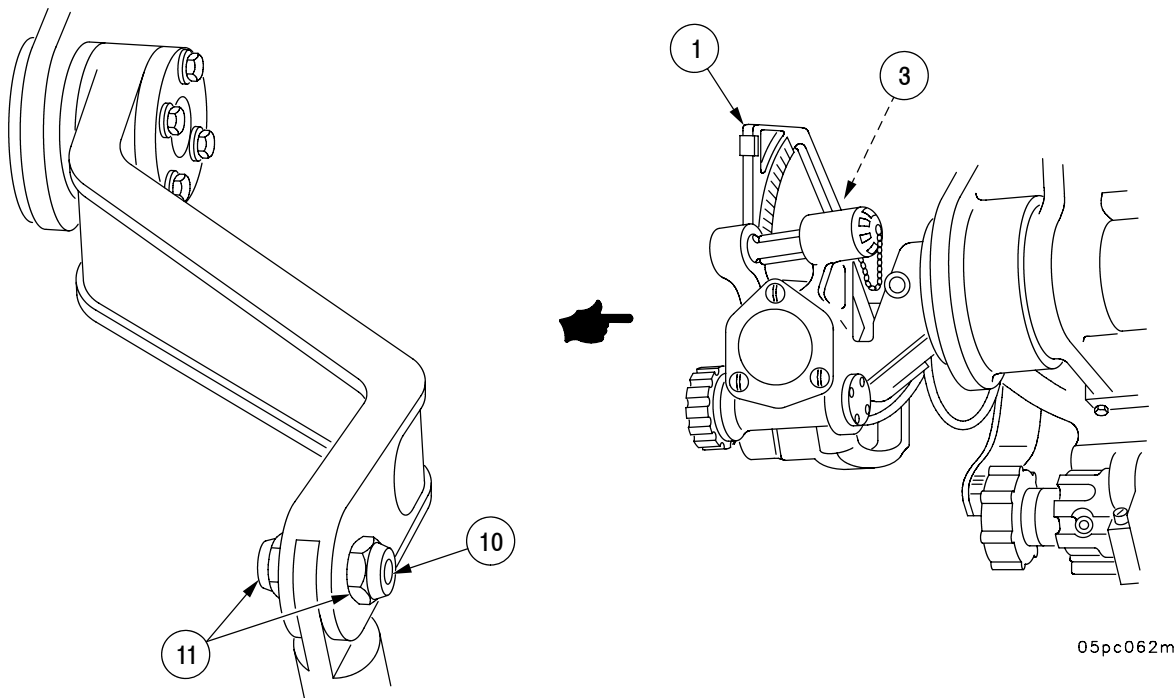
## 7-1 M145A1 MOUNT AND LINKAGE - CONTINUED

### e. Adjusting Eccentric Shaft - Continued

#### NOTE

If reading on gunner's quadrant has not changed more than  $\pm 0.5$  mils at 1200 mils, skip steps 5 thru 7. If reading on gunner's quadrant has changed more than  $\pm 0.5$  mils, turn back micrometer knob on gunner's quadrant to get a reading of 1200 mils (end-for-end correction applied). Then follow steps 5 thru 7 to adjust the eccentric shaft.

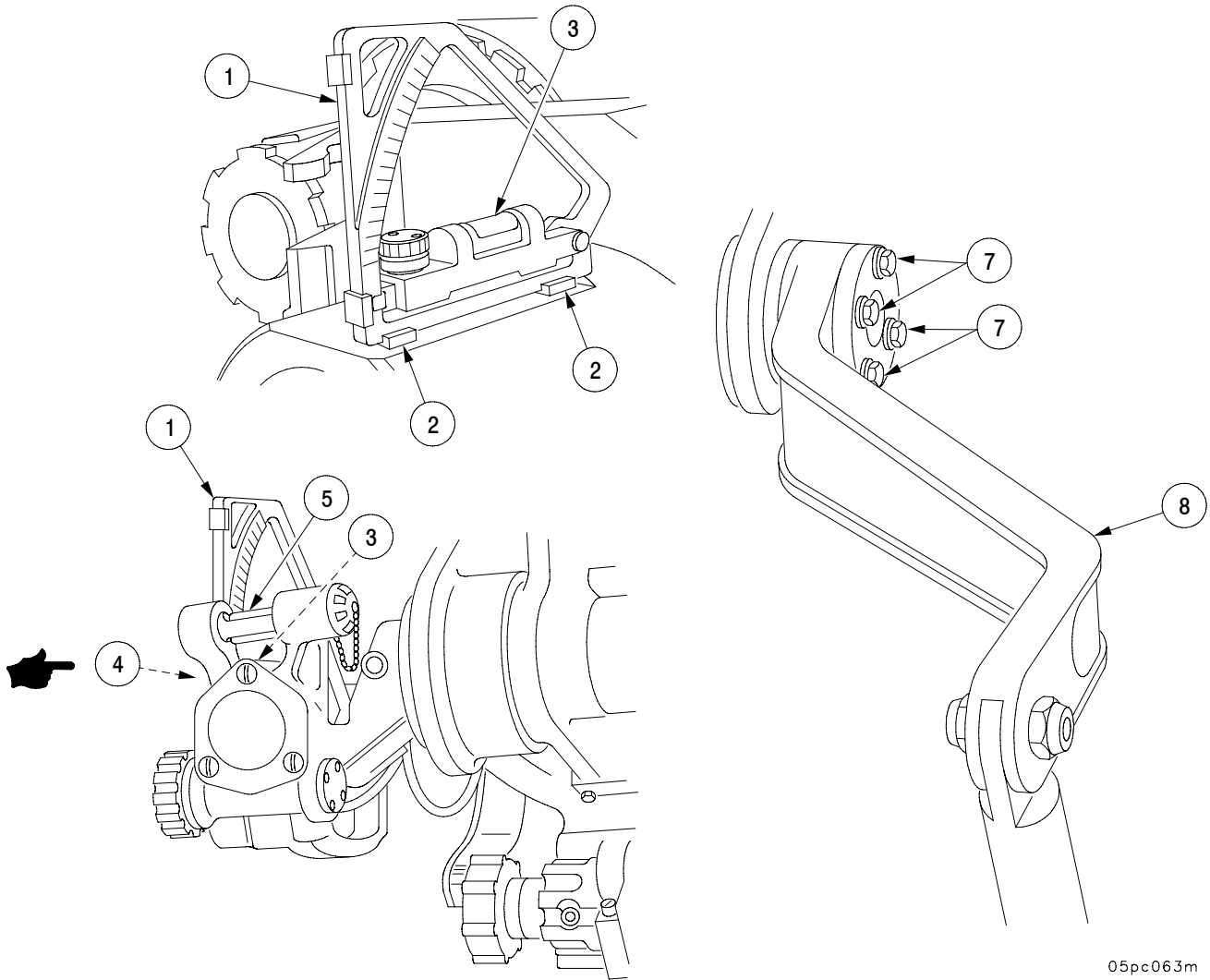
- 5 Hold eccentric shaft (10) in position with hex key and loosen nuts (11) on each side of eccentric shaft (10).
- 6 Rotate eccentric shaft (10) until bubble (3) is centered on gunner's quadrant (1).
- 7 Hold eccentric shaft (10) in position with hex key and tighten nuts (11) on each side of shaft (10).
- 8 Check synchronization of mount M145A1 at 400 and 800 mils elevation (steps 1 thru 4). If mount is synchronized at these elevations, go to para 7-1f. If not, repeat all of the above checks until mount is synchronized, then go to para 7-1f.



**7-1 M145A1 MOUNT AND LINKAGE - CONTINUED**

**f. Adjusting Mount M145A1 at Zero Elevation.**

- 1 Depress cannon tube to zero elevation, using gunner's quadrant (1) (end-for-end and breech correction applied) placed on breech quadrant seats (2).
- 2 Place gunner's quadrant (1) with zero reading (end-for-end correction applied) on telescope mount M145A1 quadrant seats (4).
- 3 Center cross-level bubble on mount M145A1 cross-level vial (5).
- 4 If bubble (3) in gunner's quadrant (1) is centered ( $\pm 0.5$ ), go to step 1 under CHECKING ELEVATION COUNTER (para 7-1g). If bubble (3) is not centered, loosen four screws (7) on telescope mount M145A1 shaft arm (8).



05pc063m



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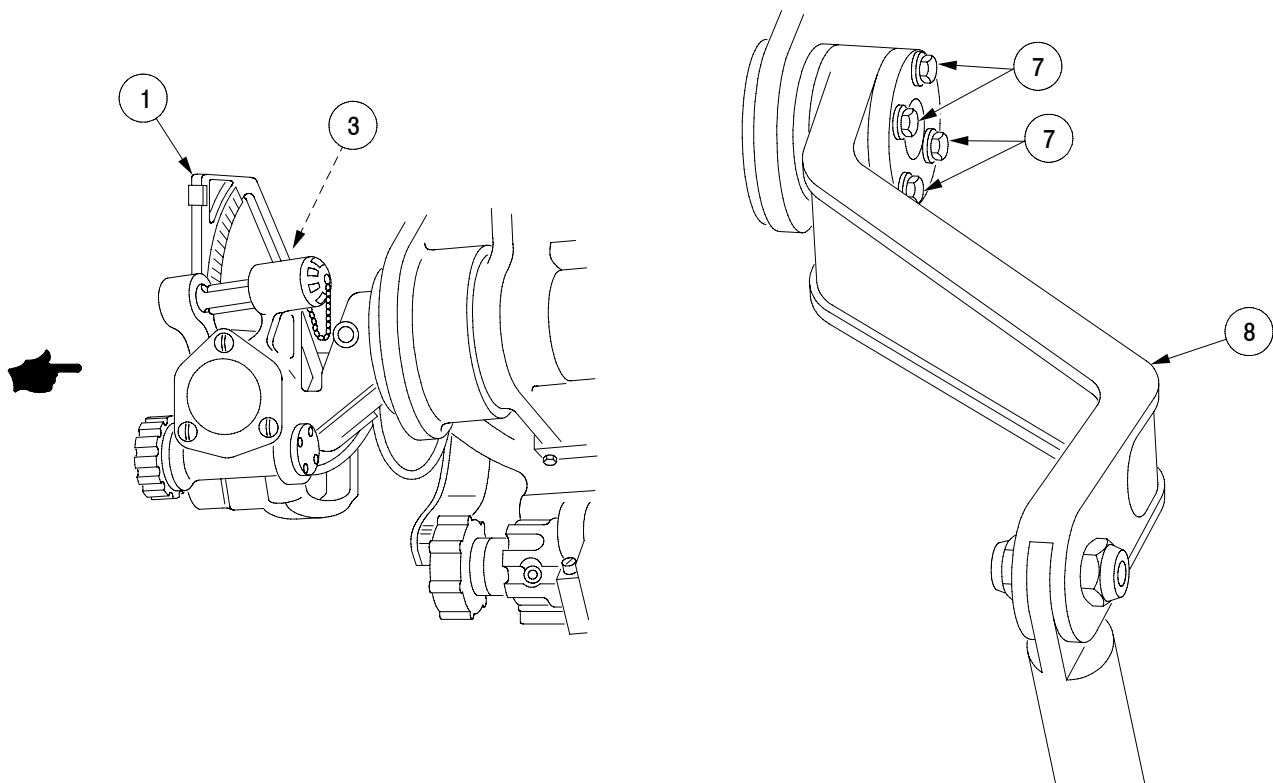
**7-1 M145A1 MOUNT AND LINKAGE - CONTINUED**

---

**f. Adjusting Mount M145A1 at Zero Elevation - Continued****NOTE**

It may be necessary to tap shaft arm with a soft hammer to loosen grip springs so PANTEL mount may be free to rotate.

- 5 Rotate shaft by moving mount until bubble (3) in gunner's quadrant (1) is centered. Tighten four screws (7) on shaft arm (8). Torque screws (7) to 45-55 lb-ft (61.02-74.58 N•m).
- 6 Check synchronization of mount M145A1 at 400, 800, and 1200 mils elevation (para 7-1b). If mount is synchronized at these elevations, go to para 7-1g. If mount is not synchronized, repeat all of the above checks until mount is synchronized. Then go to para 7-1g.

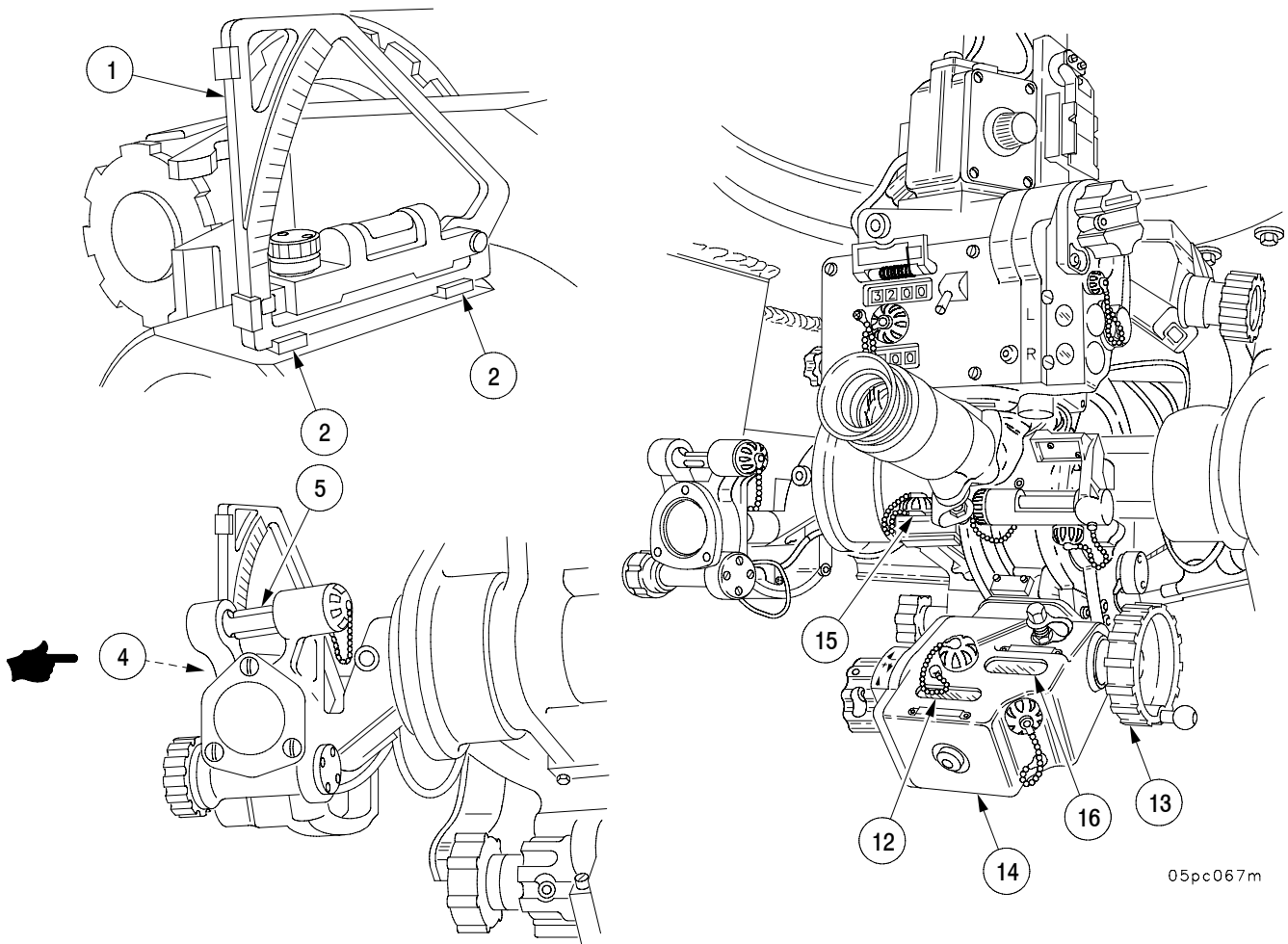


05pc066m

## 7-1 M145A1 MOUNT AND LINKAGE - CONTINUED

### g. Checking Elevation Counter.

- 1 Bring cannon tube to zero elevation, using gunner's quadrant (1) (end-for-end and breech correction applied) placed on breech quadrant seats (2).
- 2 Place gunner's quadrant (1) with zero reading (end-for-end correction applied) on telescope mount M145A1 quadrant seats (4) (not shown).
- 3 Center cross-level bubble on M145A1 quadrant cross-level vial (5).
- 4 Set special correction counter (12) to zero, then turn elevation handwheel (13) on telescope mount M145A1 (14) until bubble in elevation level vial (15) is centered. Elevation counter (16) should read between 9999 and 0001. If elevation counter (16) does not read between 9999 and 0001, notify support maintenance.



---

**7-2 M145A1 MOUNT AND LINKAGE ASSEMBLY AND CONNECTING LINK.**

---

- This task covers:
- |                                  |                             |
|----------------------------------|-----------------------------|
| a. Inspection of Mount, M145A1   | b. Removal of Mount, M145A1 |
| c. Disassembly of Shaft Arm      | d. Assembly of Shaft Arm    |
| e. Installation of Mount, M145A1 |                             |
- 

**INITIAL SETUP**Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Lifting sling (item 36, Appx G)  
Suitable lifting device  
Torque wrench (item 54, Appx G)  
Socket wrench adapter (item 2, Appx G)

Materials/Parts

Lockwashers (8) (item 130, Appx F)  
Lockwashers (4) (item 122, Appx F)  
Lockwasher (item 121, Appx F)  
Self-locking nuts (2) (item 212, Appx F)  
Lockwashers (4) (item 208, Appx F)  
Antiseize (item 15, Appx C)  
Lockwashers (4) (item 132, Appx F)

Equipment Conditions

Telescope cover removed (para 7-3)  
Manual elevation hand pump hydraulic  
lines disconnected (para 18-18)  
PANTEL removed from M145A1 mount  
(TM 9-2350-314-10)

Personnel Required

Two

---

**a. Inspection of Mount, M145A1.**

For inspection, refer to TM 9-2350-314-10.

---

## 7-2 M145A1 MOUNT AND LINKAGE ASSEMBLY AND CONNECTING LINK - CONTINUED

---

### b. Removal of Mount, M145A1.

#### NOTE

Mark lower gun arm caps before removal. Caps must be installed in same position from which they were removed.

#### CAUTION

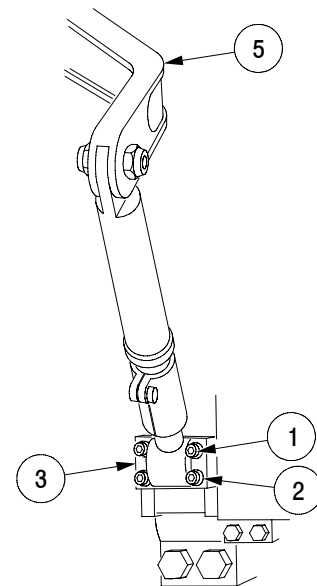
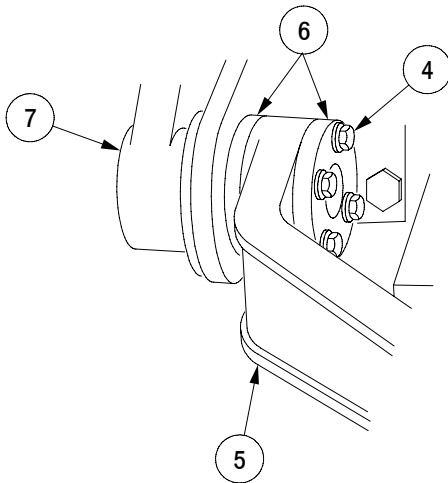
Telescope mount M145A1 weighs 96 pounds (43.5 kg). Use proper equipment for removal and installation of mount.

- 1 Remove four socket head screws (1), four lockwashers (2), and two lower gun arm caps (3). Discard lockwashers.
- 2 Loosen four screws (4).

#### NOTE

After loosening four screws, you may have to tap arm with a soft faced hammer to release grip springs located between plates.

- 3 Remove shaft arm assembly (5) and plates (6) from mount M145A1 (7).



05pc054m

## 7-2 M145A1 MOUNT AND LINKAGE ASSEMBLY AND CONNECTING LINK - CONTINUED

### b. Removal of Mount, M145A1 - Continued

#### NOTE

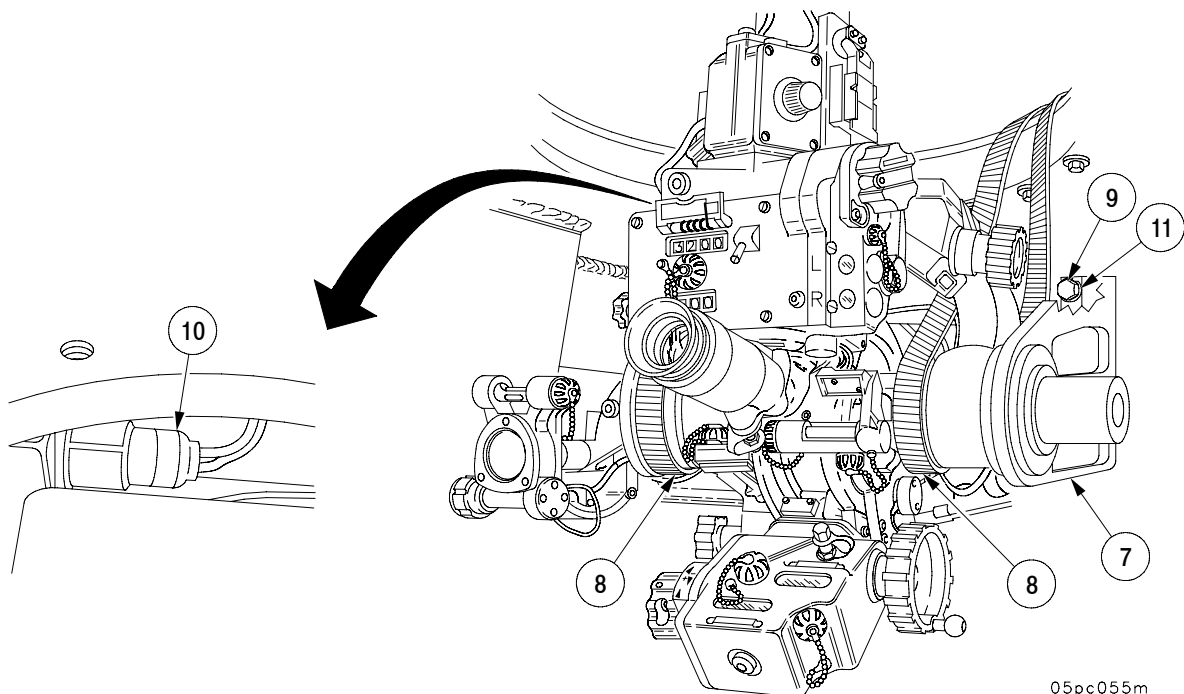
Lifting sling must be used to help hold mount M145A1 in position until all screws are removed.

- 4 From inside cab, reach between mount M145A1 (7) and roof of cab, and disconnect electrical connector (10) located on upper left side of mount.
- 5 Position the lifting sling (8) through the telescope opening and attach to the M145A1 mount assembly (7).
- 6 Loosen four mounting screws (9), but leave enough of the threads holding to support mount M145A1 (7).

#### CAUTION

Telescope mount M145A1 weighs 96 pounds (43.5 kg). The following steps require two personnel.

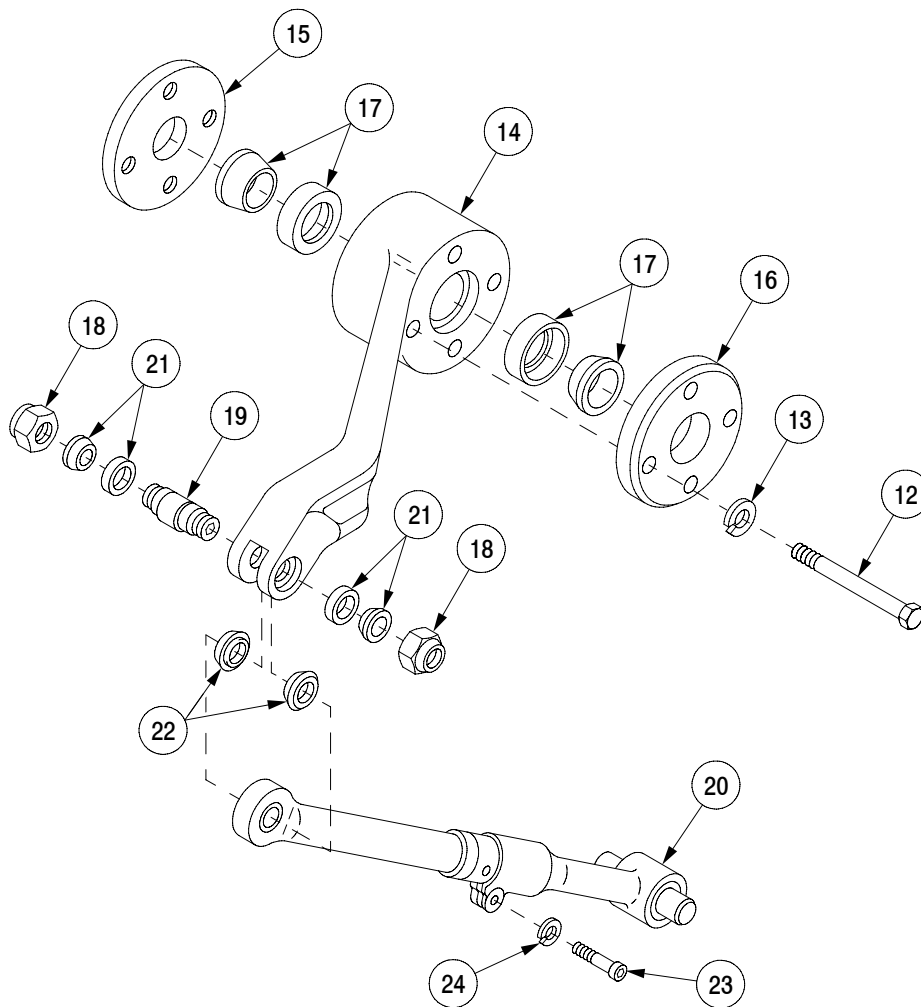
- 7 With lifting sling secured to mount M145A1 (7) and a suitable lifting device, remove four mounting screws (9) and four lockwashers (11). Discard lockwashers.
- 8 Carefully lower mount M145A1 (7) to floor of cab.



## 7-2 M145A1 MOUNT AND LINKAGE ASSEMBLY AND CONNECTING LINK - CONTINUED

### c. Disassembly of Shaft Arm.

- 1 Remove four screws (12) and four lockwashers (13) from shaft arm (14). Discard lockwashers.
- 2 Remove plate (15), plate (16), and two gripspring sets (17).
- 3 Remove two self-locking nuts (18) from shaft (19). Using brass drift and hammer, tap shaft (19) from shaft arm (14). Discard self-locking nuts.
- 4 Separate shaft arm (14) from link (20) and remove two gripspring sets (21) and two thrust washers (22).
- 5 At bottom of link (20), remove screw (23) and lockwasher (24). Discard lockwasher.



05pc068m

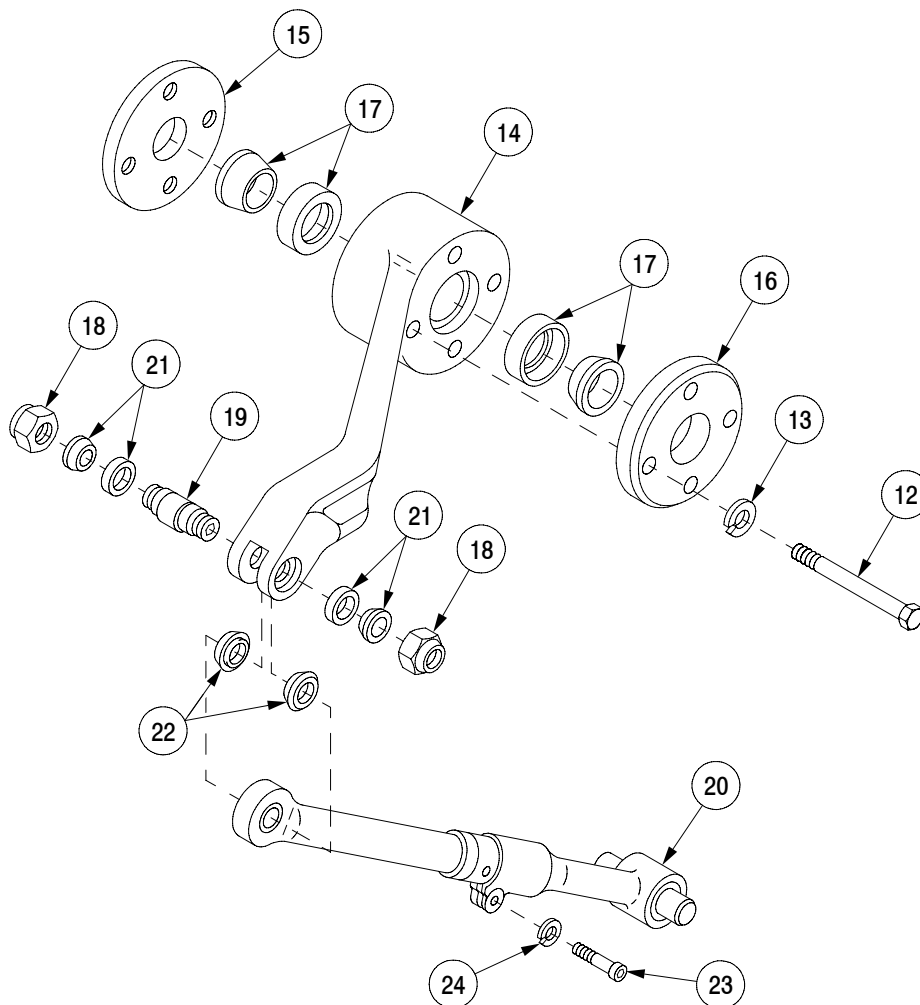
## 7-2 M145A1 MOUNT AND LINKAGE ASSEMBLY AND CONNECTING LINK - CONTINUED

### d. Assembly of Shaft Arm.

- 1 Place one set of grip springs (21) and one washer (22) on each side of link (20) and insert between both sides of shaft arm (14).
- 2 Insert shaft (19) into arm (14) and tap into place using brass drift and hammer. Install two new self-locking nuts (18).
- 3 Install new lockwasher (24) and screw (23) at bottom of link (20).
- 4 Install two gripspring sets (17), plates (15 and 16), four new lockwashers (13), and four screws (12) on shaft arm (14). Apply antiseize compound to screws (12) before installing.

### NOTE

Tighten screws finger tight only. Do not use a wrench to secure screws.



05pc068m

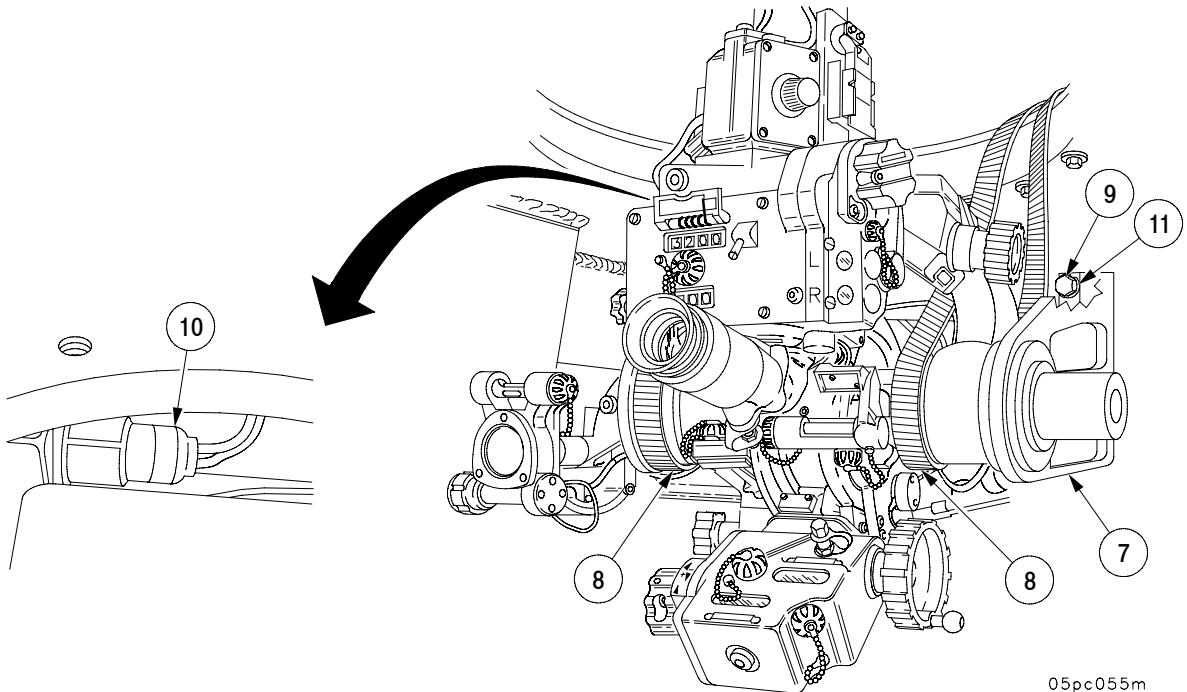
## 7-2 M145A1 MOUNT AND LINKAGE ASSEMBLY AND CONNECTING LINK - CONTINUED

### e. Installation of Mount, M145A1.

- 1 Position lifting sling (8) through telescope cover opening and attach to M145A1 mount (7). Raise and position mount M145A1 to support bracket.

#### NOTE

- Two longer screws go in top holes.
  - After installation, mount must be synchronized (para 7-1).
  - Position linkage assembly on M145A1 mount shaft so connector swings freely into clevis. Tighten four screws and recheck measurements.
- 2 Install four mounting screws (9) and four new lockwashers (11) on mount M145A1 (7) and remove lifting sling (8). Torque screws (9) to 80-90 lb-ft (108-122 N•m).
  - 3 Connect electrical connector (10).



05pc055m



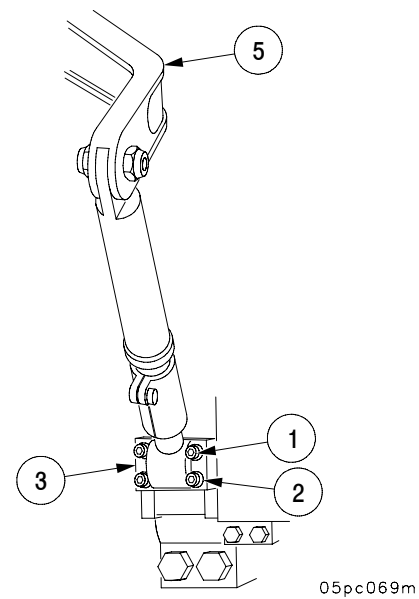
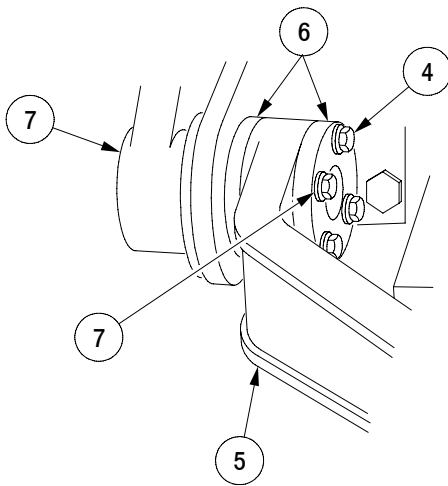
---

## 7-2 M145A1 MOUNT AND LINKAGE ASSEMBLY AND CONNECTING LINK - CONTINUED

---

### e. Installation of Mount, M145A1 - Continued

- 4 Install shaft arm assembly (5) and plates (6) using four socket head screws (4) and four new lockwashers (7). Torque screws (4) to 45-55 lb-ft (61.02-74.58 N•m).
- 5 Install two lower gun trunnion arm caps (3) in the exact position from which they were removed.
- 6 Install four socket head screws (1) and four new lockwashers (2) on two lower gun trunnion arm caps (3).
- 7 Check synchronization of M145A1 mount (para 7-1).



05pc069m



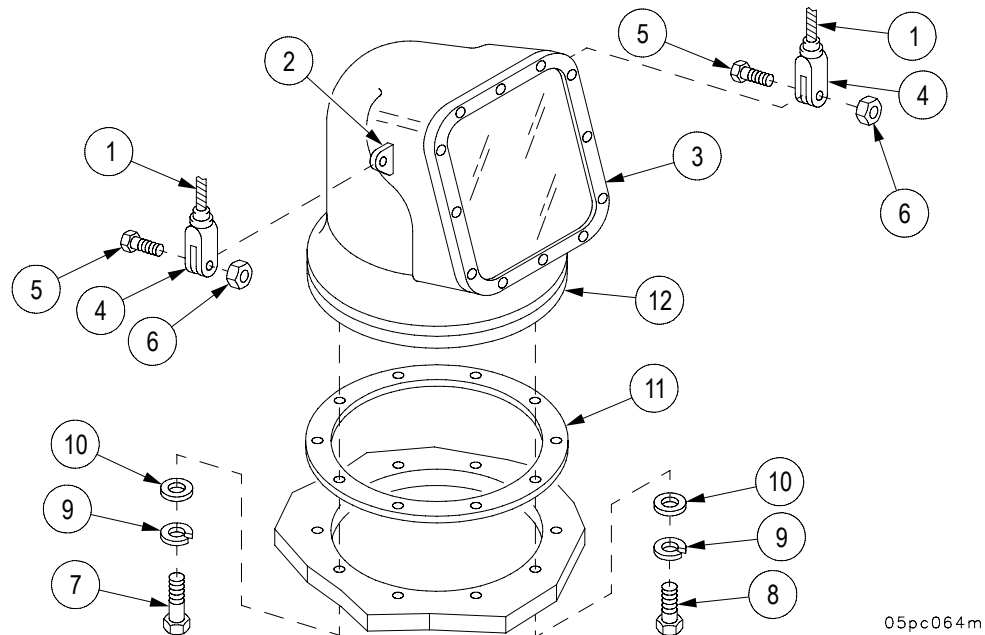
## 7-3 TELESCOPE COVER, OBSERVATION WINDOW, AND RING ASSEMBLY - CONTINUED

### b. Installation.

#### WARNING

Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

- 1 With dry-cleaning solvent, remove all remnants of old gasket (11) from cab roof.
- 2 Install new gasket (11) on cab roof, aligning seal holes with holes in cab roof.
- 3 From inside cab, insert two flat washers (10), two new lockwashers (9), and two long bolts (7) to serve as locators. Hold in position until step 4 below is completed.
- 4 Lower cover (3) onto gasket (11), aligning holes in lower ring (12) with two long bolts (7). Install remaining six flat washers (10), six new lockwashers (9), and six long bolts (7). Install two flat washers (10), two new lockwashers (9), and two short bolts (8) in the two front holes in the roof. Torque all bolts to 72-88 lb-ft (98-119 N•m).



---

## 7-4 M140/M140A1 ALIGNMENT DEVICE MOUNT AND BRACKET.

---

This task covers:      a. Disassembly                      b. Assembly

---

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

#### Materials/Parts

Lockwashers (2) (item 116, Appx F)  
Preformed packing (item 153, Appx F)  
Spring pin (item 24, Appx F)  
Sealing compound (item 37, Appx C)  
Dry-cleaning solvent (item 75, Appx C)  
Decals (2) (item 174, Appx F)

---

#### a. Disassembly.

- 1 Turn latch (1) and open cover (2).
- 2 Remove and discard preformed packing (3).
- 3 Remove spring pin (4), straight pin (5) and cover (2). Discard spring pin.
- 4 Remove two screws (6), two lockwashers (7), and latch (1). Discard lockwashers.
- 5 Remove latch pin (8) and two setscrews (9).
- 6 If required, remove and discard outside decal (10) or inside decal (11).

#### b. Assembly.

### WARNING

Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

### NOTE

Perform steps 1 and 2 if either decal was removed.

- 1 With dry-cleaning solvent, remove any remaining adhesive from cover (2).
- 2 Remove backing from new decal (10 or 11) and attach to cover (2).
- 3 Install latch pin (8) and two setscrews (9).
- 4 Install latch (1), two screws (6), and two new lockwashers (7).

---

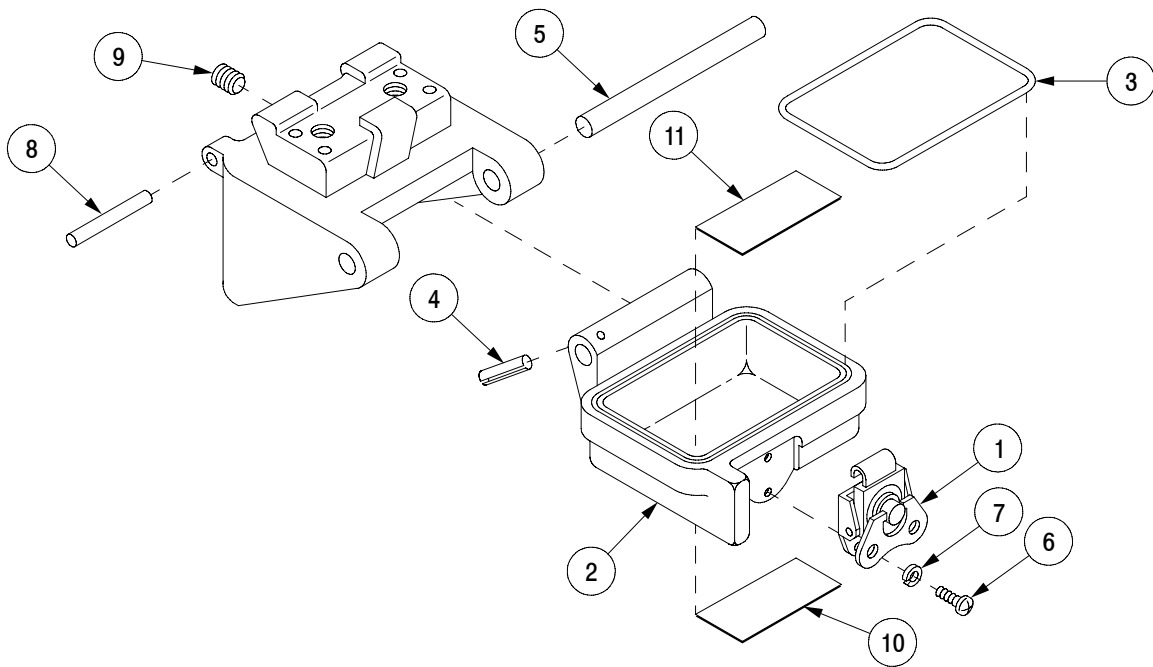
**7-4 M140/M140A1 ALIGNMENT DEVICE MOUNT AND BRACKET - CONTINUED**


---

**WARNING**

Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

- 5 Using dry-cleaning solvent, remove any remaining sealing compound from mounting surface on cover (2).
- 6 Install new preformed packing (3) with sealing compound.
- 7 Install cover (2), straight pin (5), and new spring pin (4).
- 8 Close cover (2) and turn latch (1).



05pc065m



## CHAPTER 8 AUTOMATIC FIRE CONTROL SYSTEM (AFCS)

---

### GENERAL

This chapter illustrates and describes maintenance procedures for the Automatic Fire Control System (AFCS). Step-by-step procedures are provided for maintaining the AFCS components and electrical leads and cables. Maintenance of the AFCS cables connected to the radio is located in Chapter 21, Communications Equipment.

---

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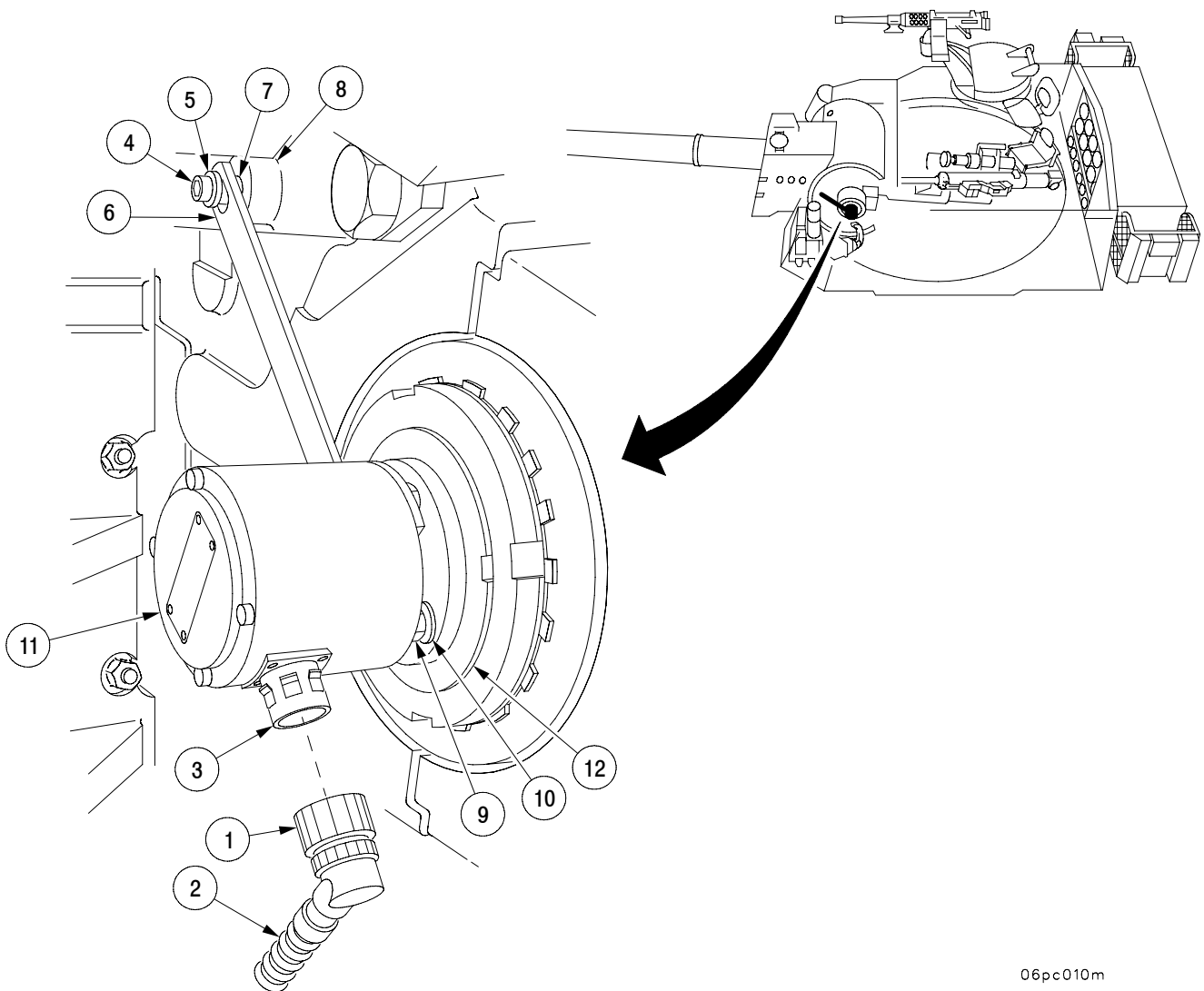
## 8-1 ELEVATION TACHOMETER (EL TACH) - CONTINUED

### b. Installation - Continued

CAUTION

Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.

- 3 Align key and keyway of harness connector (2) with connector of housing (3). Push connector halves together to fully engage. Tighten coupling nut (1).



06pc010m

## 8-2 AZIMUTH TACHOMETER (AZ TACH) AND GUARD.

---

This task covers:        a. Removal                                b. Installation

---

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Gun tube in travel lock  
(TM 9-2350-314-10)  
Cab traverse lock engaged  
(TM 9-2350-314-10)

---

#### a. Removal.

- 1 Remove two screws (1), two flat washers (2), and guard (3) from cab race mounting bracket (4).

A rectangular box with a scalloped, wavy border containing the word "CAUTION" in bold, uppercase letters.

Do not twist or turn harness connector or pins may break.

- 2 Unscrew coupling nut (5). Pull harness connector (6) from housing (7).
- 3 Loosen and remove four socket head screws (8) and four flat washers (9) securing AZ TACH (10) to cab race mounting bracket (4). Remove AZ TACH (10).
- 4 Remove straight pin (11).

**8-2 AZIMUTH TACHOMETER (AZ TACH) AND GUARD - CONTINUED**

**b. Installation.**

- 1 Install straight pin (11).

**NOTE**

Both AZ TACH gears are spring loaded and teeth are offset to each other in the relaxed position. Make sure both gears are pushed together (in tension) so all tooth profiles are aligned prior to installation into cab ring.

- 2 Align four mounting holes of AZ TACH (10) with mounting holes of cab race mounting bracket (4).

**NOTE**

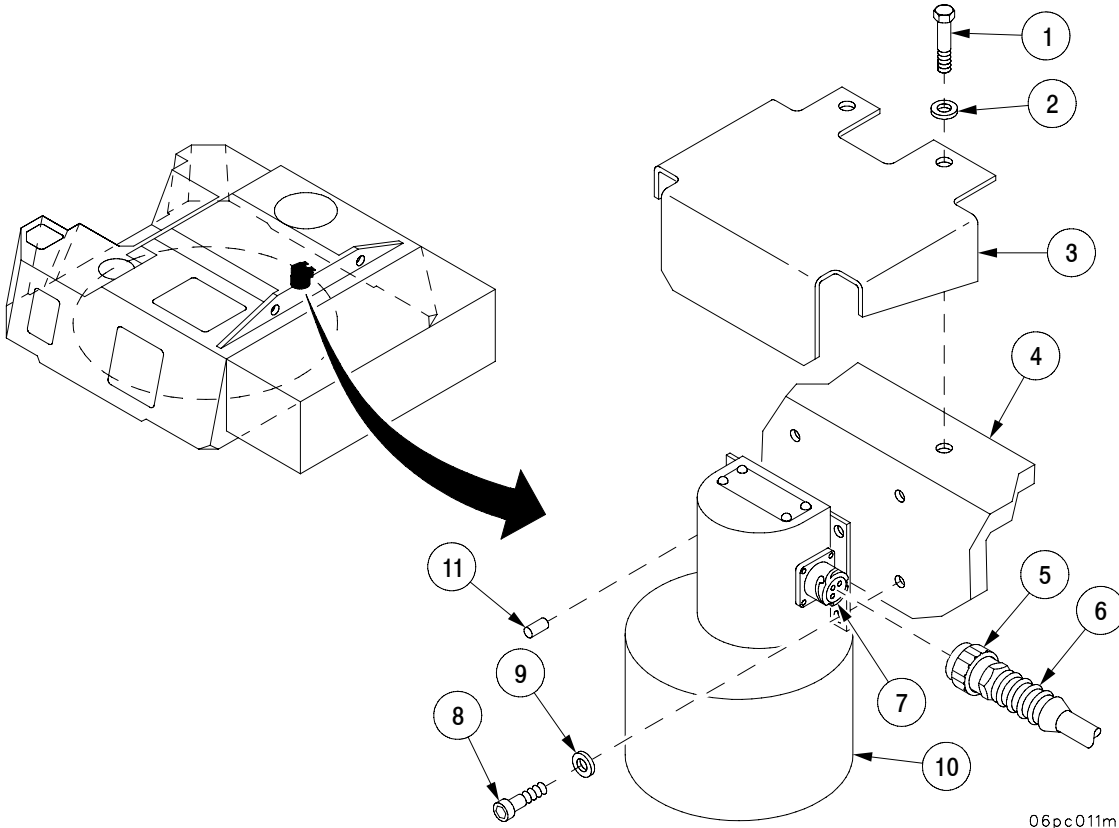
Assure AZ TACH gear teeth mesh fully between/with cab ring gear teeth.

- 3 Secure AZ TACH (10) to cab race mounting bracket (4) with four socket head screws (8) and four flat washers (9). Insure AZ TACH mounting surface is flat against cab race mounting bracket (4).

**CAUTION**

Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.

- 4 Align key and keyway of harness connector (6) with connector of housing (7). Push connector halves together (in a straight linear motion) to fully engage. Hand tighten coupling nut (5).
- 5 Install guard (3) on cab race mounting bracket (4) and secure with two screws (1) and two flat washers (2).



06pc011m

### 8-3 BATTERY BOX ASSEMBLY.

---

This task covers:    a. Removal                    b. Disassembly                    c. Assembly                    d. Installation

---

#### **INITIAL SETUP**

##### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Torque wrench (item 56, Appx G)

##### Materials/Parts

Sealing compound (item 41, Appx C)  
Marking tags (AR) (item 87, Appx C)  
Dry-cleaning solvent (item 75, Appx C)  
Gasket tape (item 87.1, Appx C)  
Sealing compound (item 54.1, Appx C)  
Self-locking nuts (2) (item 257, Appx F)

##### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

##### References

TM 9-6140-200-14

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#### **a. Removal.**

#### **CAUTION**

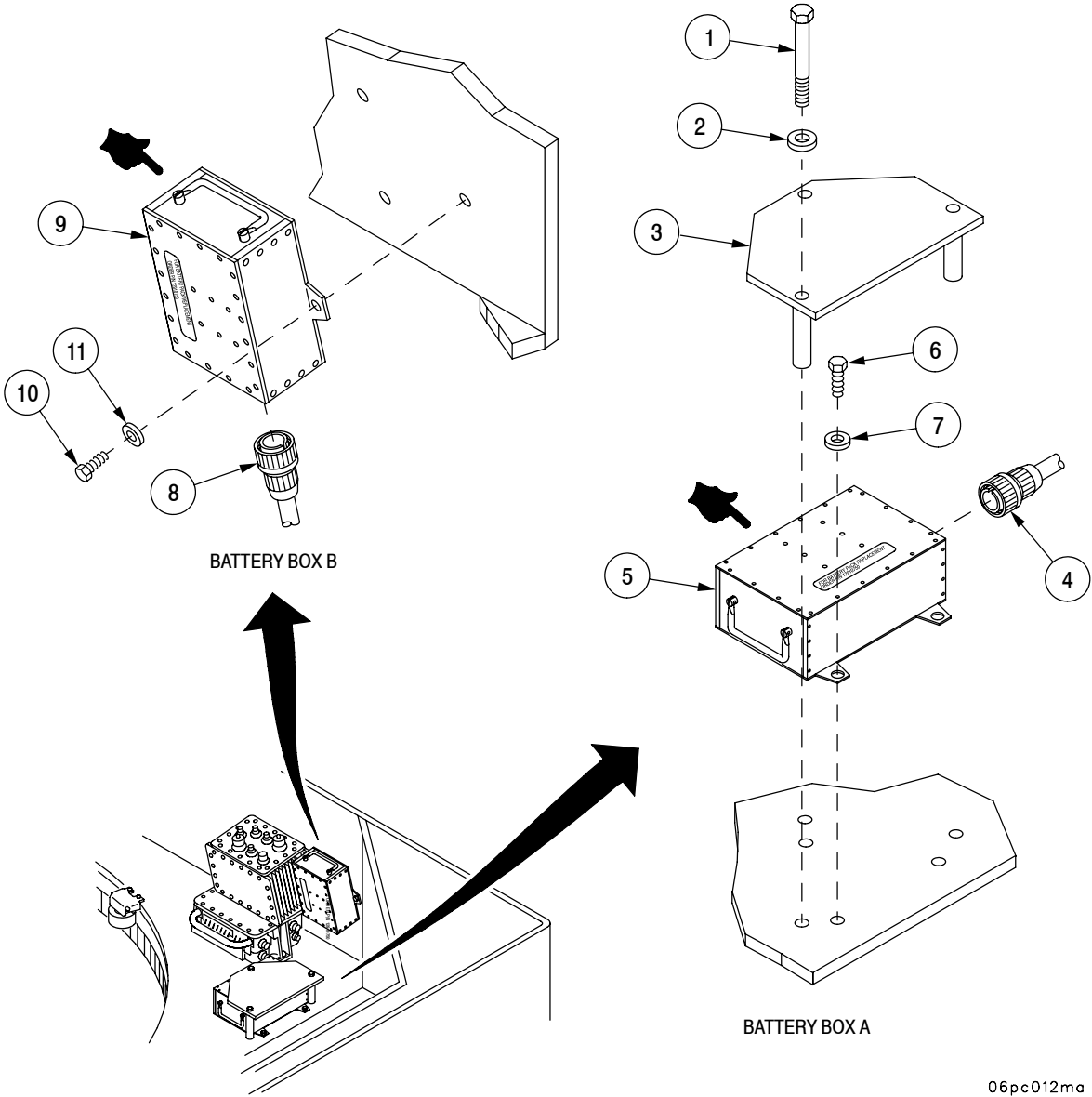
Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### **NOTE**

- Before removal, tag connectors for identification during installation.
  - To remove battery box A, perform steps 1-3.
  - To remove battery box B, perform steps 4 and 5.
  - Document AFCS data prior to removing/replacing battery box assembly.
- 1 Remove three screws (1), three flat washers (2), and cover (3) from cab.
  - 2 Disconnect harness W25 connector P1 (4) at battery box A (5).
  - 3 Remove three screws (6) and three flat washers (7) securing battery box A (5) to cab. Remove battery box A (5).
  - 4 Disconnect harness W25 connector P2 (8) at battery box B (9).
  - 5 Remove three screws (10) and three flat washers (11) that secure battery box B (9) to cab. Remove battery box B (9).

8-3 BATTERY BOX ASSEMBLY - CONTINUED

a. Removal - Continued



06pc012ma

### 8-3 BATTERY BOX ASSEMBLY - CONTINUED

**b. Disassembly.**

**NOTE**

There are two battery boxes. Both battery boxes are disassembled in the same manner. This task disassembles one battery box.

- 1 Remove six screws (12) from cover (13).
- 2 Remove 20 screws (14) and cover (13).
- 3 Remove two self-locking nuts (15), two flat washers (16), and handle (17) from housing (18). Discard self-locking nuts.



When removing battery pack, make sure battery-end furthest from cable assembly connector is removed first. Failure to comply will cause equipment damage.

- 4 Remove nut (19) and cable assembly (20) with battery pack (21) from housing (18).
- 5 Disconnect four cable assembly (20) leads from two batteries (22) in accordance with the following:

Item No	Leads	Terminal
23	A/B, C/D	Positive (+)
24	E/F, G/H	Negative (-)

- 6 Disconnect two cable assembly (20) leads (25) from battery pack (21).

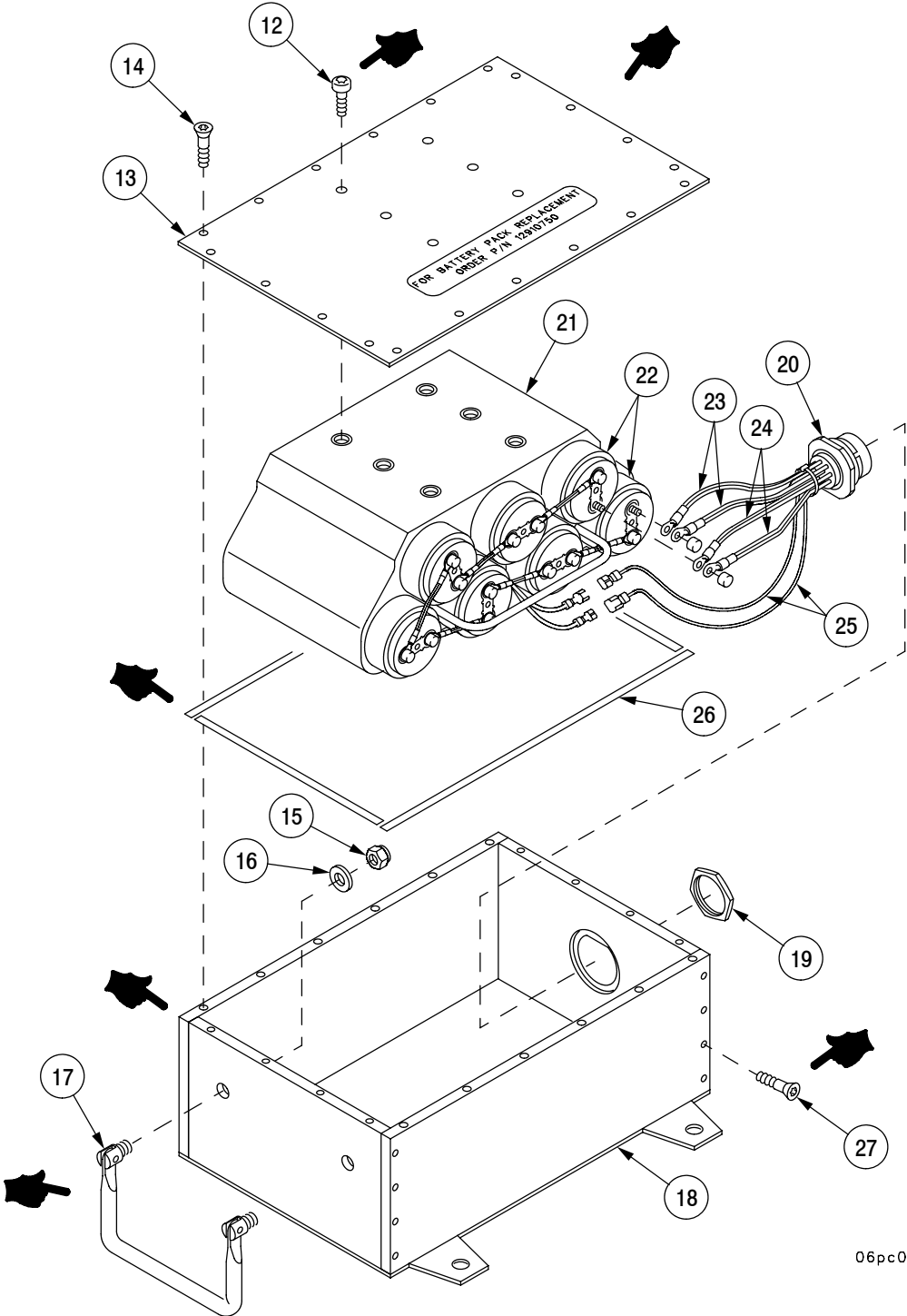


Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause **SERIOUS INJURY**. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

- 7 Peel gasket tape (26) off housing (18) and clean housing (18) with dry-cleaning solvent. Discard gasket tape.
- 8 Dispose of battery pack (21) in accordance with TM 9-6140-200-14.
- 9 Inspect housing (18) for damage or missing screws (27), replace screws (27) as required.

8-3 BATTERY BOX ASSEMBLY - CONTINUED

b. Disassembly - Continued



06pc013mb

### 8-3 BATTERY BOX ASSEMBLY - CONTINUED

**c. Assembly.**

**NOTE**

There are two battery boxes. Both battery boxes are assembled in the same manner. This task assembles one battery box.

- 1 Install screws (27) in housing (18) as required.
  - 1.1 Install new gasket tape (26) on housing (18).
- 2 Connect two cable assembly (20) leads (25) to battery pack (21).
- 3 Connect four cable assembly (20) leads to two batteries (22) in accordance with the following:

Item No	Leads	Terminal
24	E/F, G/H	Negative (-)
23	A/B, C/D	Positive (+)

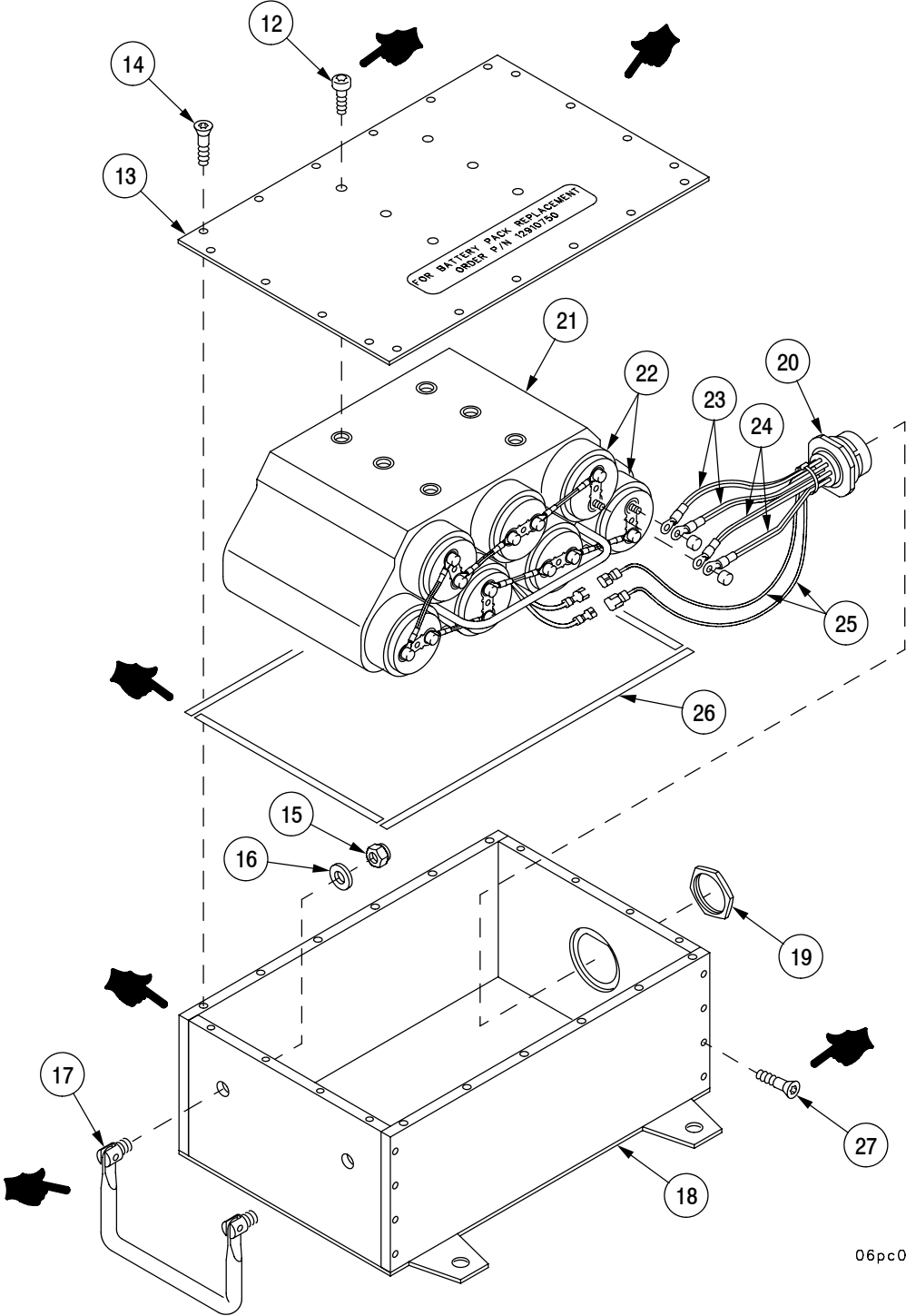
**NOTE**

- Make sure cable assembly connector is inserted through hole in housing prior to installing battery pack in housing.
  - New battery pack is supplied with a handle which must be removed after placing battery pack in housing.
- 4 Install cable assembly (20) with battery pack (21) into housing (18). Secure cable assembly (20) to housing (18) with nut (19).
  - 5 Install handle (17) on housing (18) with two flat washers (16) and two new self-locking nuts (15). Torque nuts to 150-160 in-lbs (16.95-18.08 N•m).
  - 6 Apply sealing compound (item 54.1, Appx C) to 20 screws (14) and six screws (12).
  - 7 Install cover (13) on battery box with 20 screws (14). Torque screws to 14-16 in-lb (1.58-1.80 N•m).
  - 8 Install six screws (12) in battery box. Torque screws to 150-160 in-lbs (16.95-18.08 N•m).



8-3 BATTERY BOX ASSEMBLY - CONTINUED

c. Assembly - Continued



06pc013mb

## 8-3 BATTERY BOX ASSEMBLY - CONTINUED

### d. Installation.

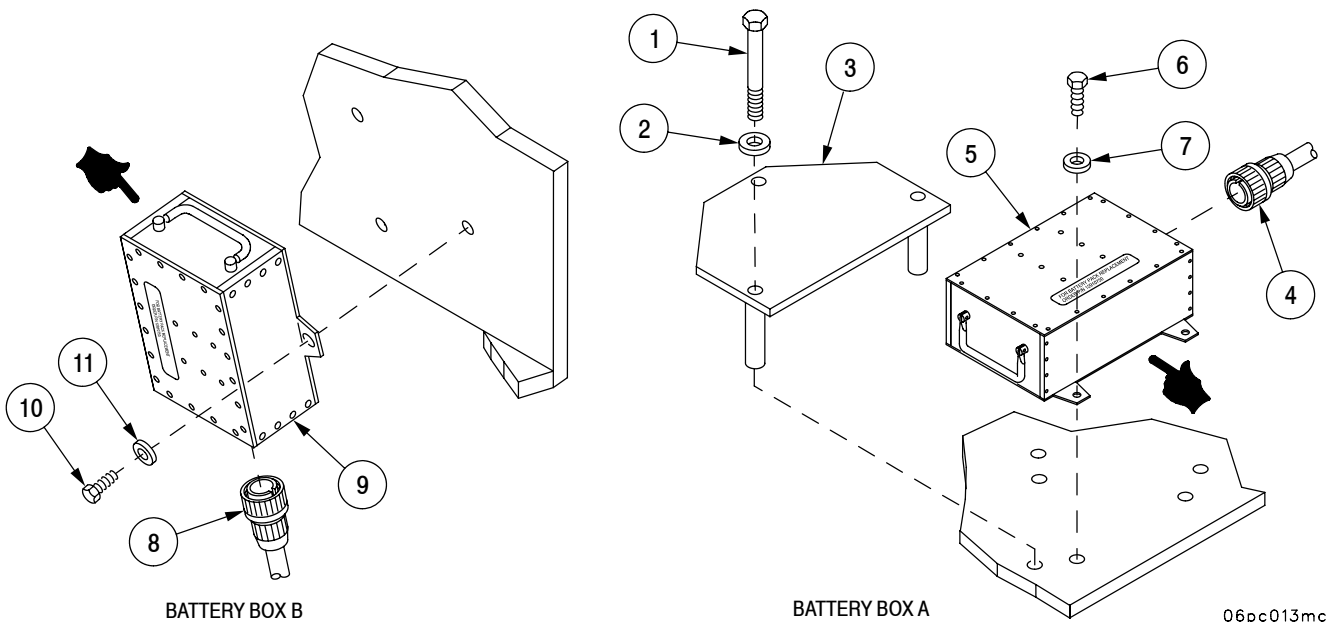
**CAUTION**

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

**NOTE**

- To install battery box B, perform steps 1–3.
- To install battery box A, perform steps 4–7.

- 1 Apply sealing compound (item 41, Appx C) to three screws (10).
- 2 Position battery box B (9) on cab and secure by installing three screws (10) and three flat washers (11).
- 3 Connect harness W25 connector P2 (8) at battery box B (9).
- 4 Apply sealing compound (item 41, Appx C) to three screws (6).
- 5 Position battery box A (5) on cab and secure by installing three screws (6) and three flat washers (7).
- 6 Connect harness W25 connector P1 (4) at battery box A (5).
- 7 Position cover (3) on cab and align mounting holes and secure by installing three screws (1) and three flat washers (2).



## 8-4 AFCS WIRING HARNESS W1A.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Tiedown straps (5) (item 77, Appx C)  
Marking tags (AR) (item 87, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Radio removed (TM 11-5820-890-10-1)

### a. Removal.

### CAUTION

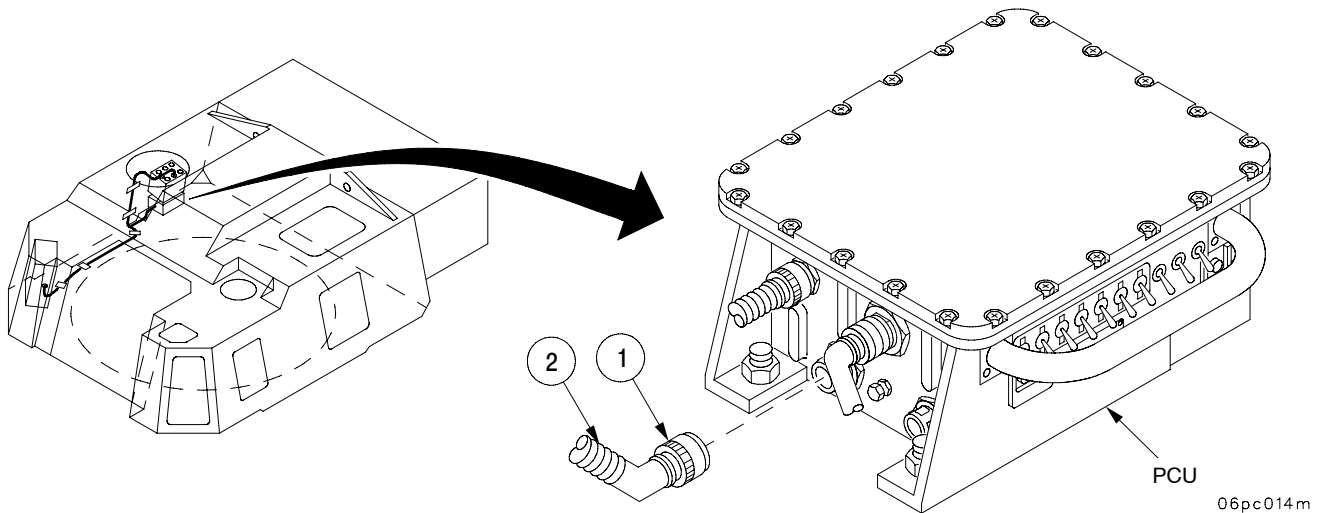
Do not twist or turn harness connector backshell when loosening nuts or pins may break.

### NOTE

Before removal, tag connectors for identification during installation.

1 Unscrew coupling nuts (1) and disconnect the following connectors:

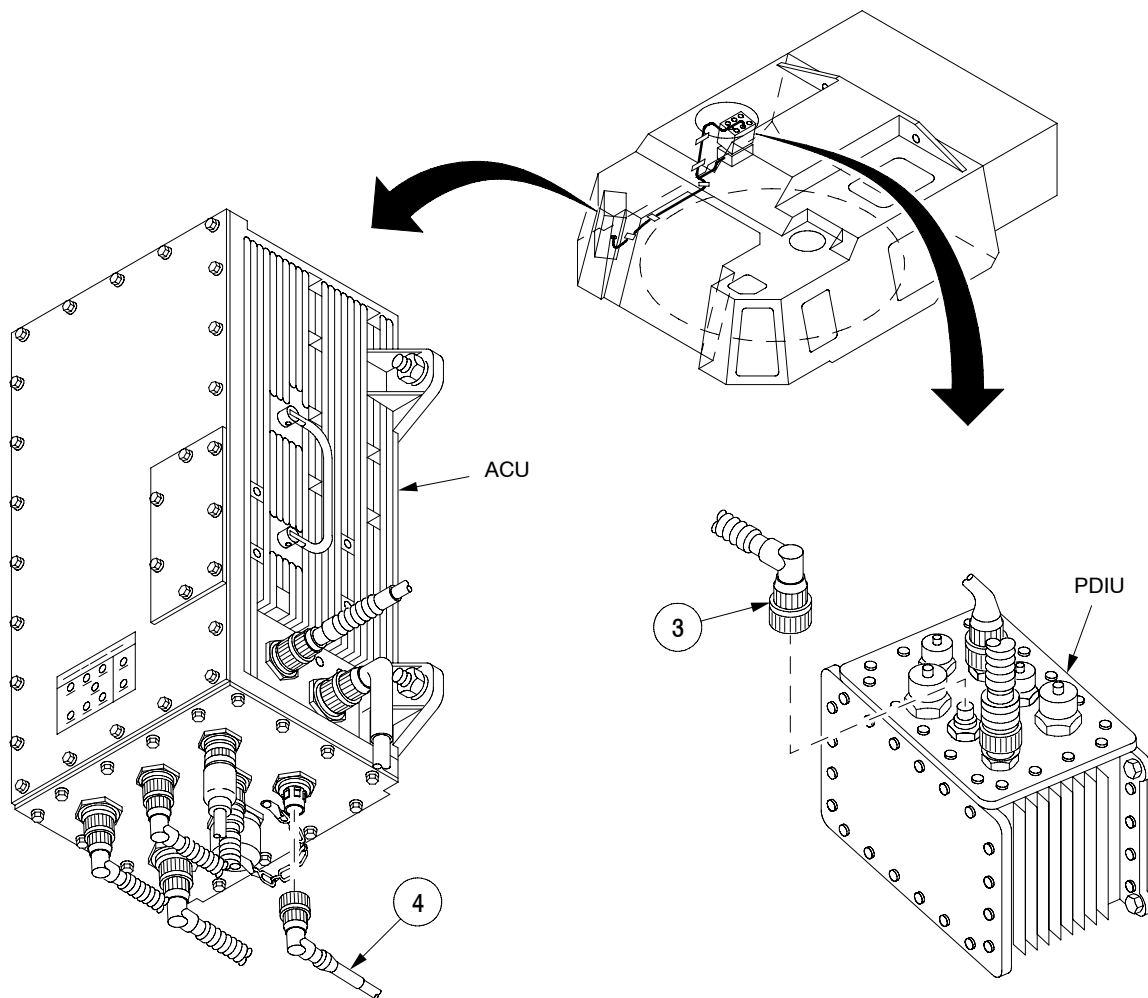
(a) P1 of W1A (2) from connector J1 on PCU.



## 8-4 AFCS WIRING HARNESS W1A - CONTINUED

### a. Removal - Continued

- (b) P2 of W1A (3) from J1 on PDIU.
- (c) P3 of W1A (4) from J1 on ACU.



06pc015m

## 8-4 AFCS WIRING HARNESS W1A - CONTINUED

### a. Removal - Continued

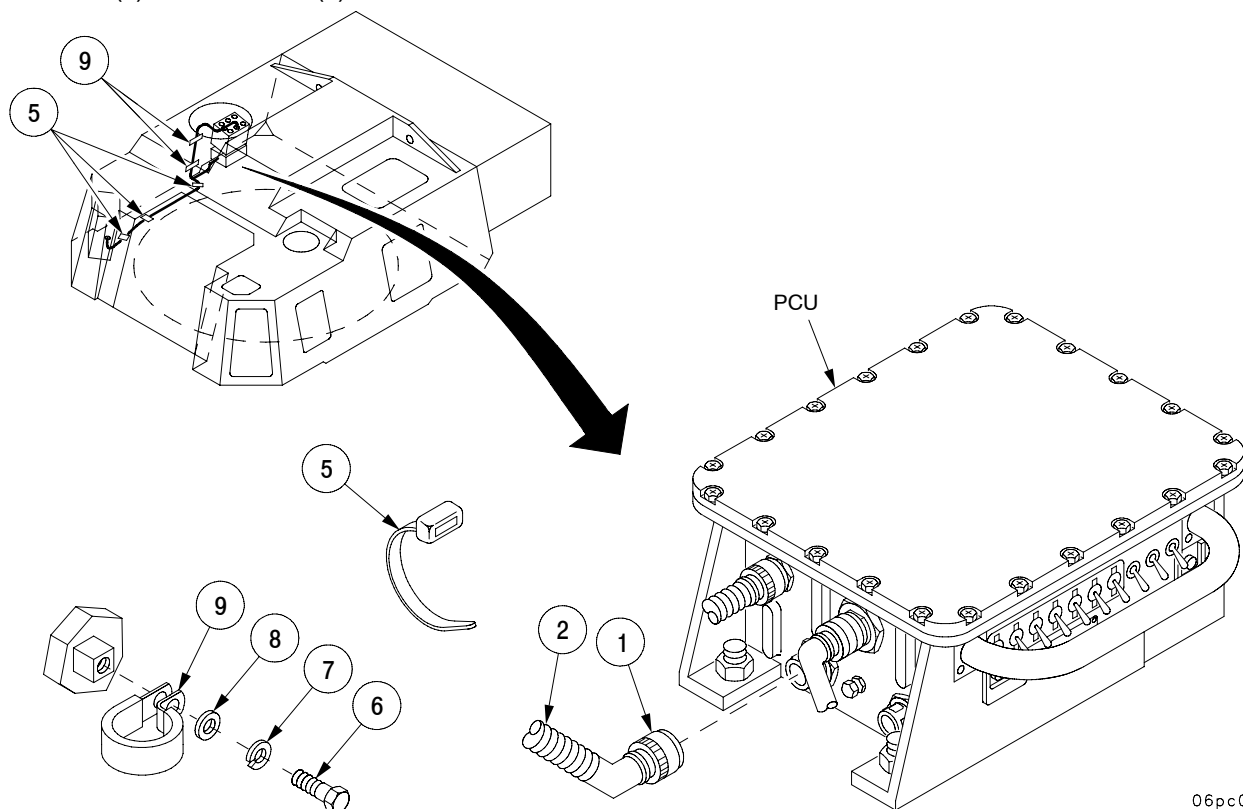
- 2 Remove and discard three tiedown straps (5) securing harness assembly W1A to cab.
- 3 Remove two screws (6), two lockwashers (7), two flat washers (8), and two clamps (9) securing harness assembly W1A to cab. Discard lockwashers.
- 4 Remove harness assembly from cab.

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Make sure key and keyway are aligned before pushing connector halves together or pins may break.

- 1 Position harness assembly in cab.
- 2 Push the following connector halves together and tighten coupling nuts (1):
  - (a) P1 of W1A (2) to connector J1 on PCU.

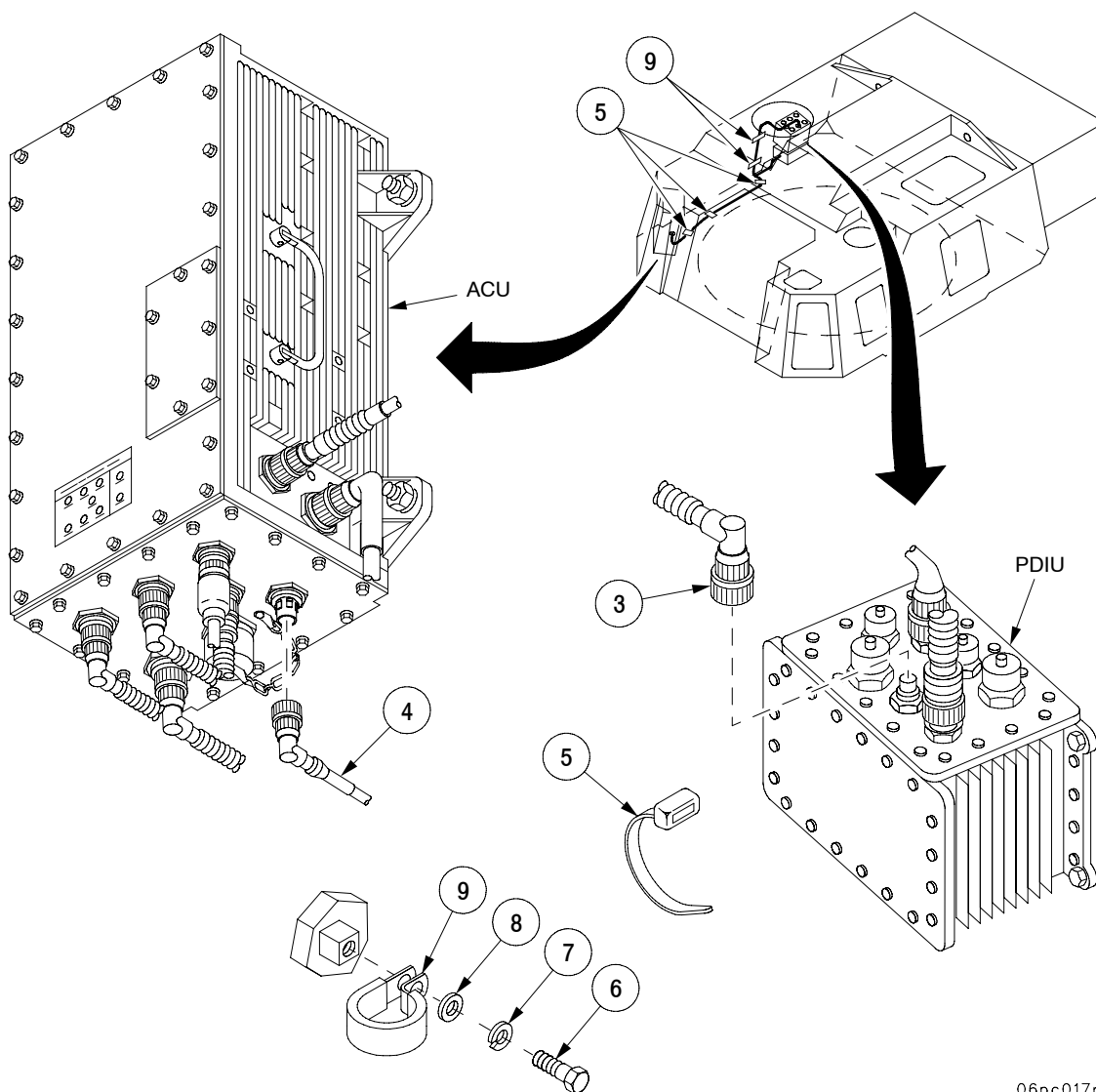


06pc016m

## 8-4 AFCS WIRING HARNESS W1A - CONTINUED

### b. Installation - Continued

- (b) P2 of W1A (3) to J1 on PDIU.
  - (c) P3 of W1A (4) to J1 on ACU.
- 3 Install two clamps (9) with two flat washers (8), two new lockwashers (7), and two screws (6).
  - 4 Secure harness with three new tiedown straps (5).



06pc017m

**8-5 AFCS WIRING HARNESS W3.**

This task covers:      a. Removal                                      b. Installation

**INITIAL SETUP**

Tools  
 Artillery and turret mechanic's tool kit  
 (SC 5180-95-A12)

Materials/Parts  
 Marking tags (AR) (item 87, Appx C)  
 Tiedown straps (2) (item 77, Appx C)

Equipment Conditions  
 Vehicle MASTER power switch OFF  
 (TM 9-2350-314-10)  
 Battery ground leads disconnected  
 (TM 9-2350-314-20-1-2)

**a. Removal.**

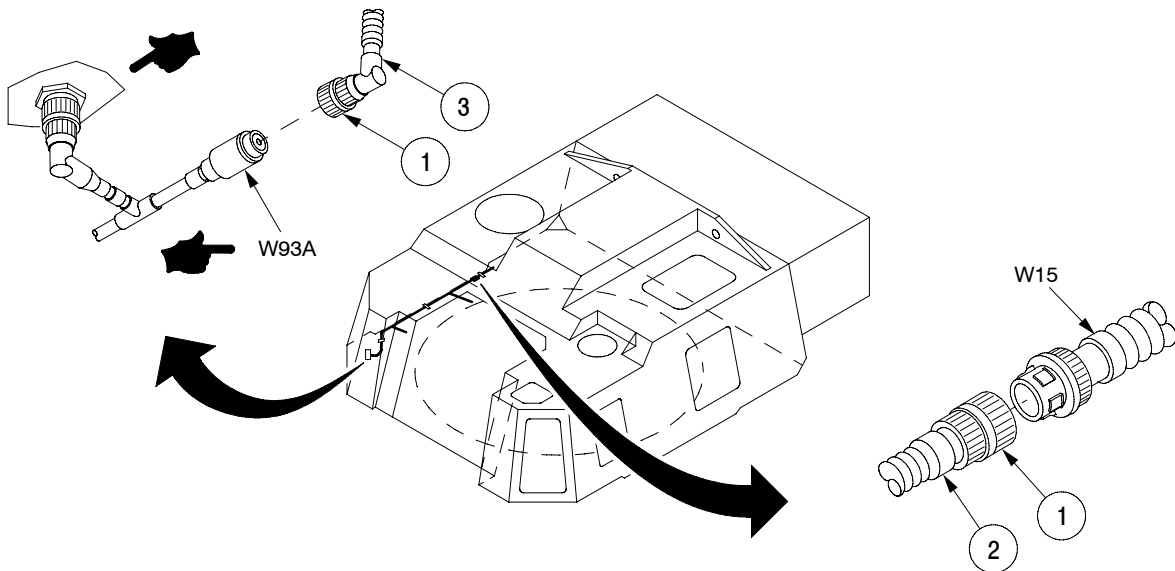
CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

**NOTE**

Before removal, tag connectors for identification during installation.

- 1 Unscrew coupling nuts (1) and disconnect the following connectors:
  - (a) P1 of W3 (2) from connector J1 of harness assembly W15.
  - (b) P4 of W3 (3) from connector J3 of harness assembly W93A.



06pc018m

## 8-5 AFCS WIRING HARNESS W3 - CONTINUED

### a. Removal - Continued

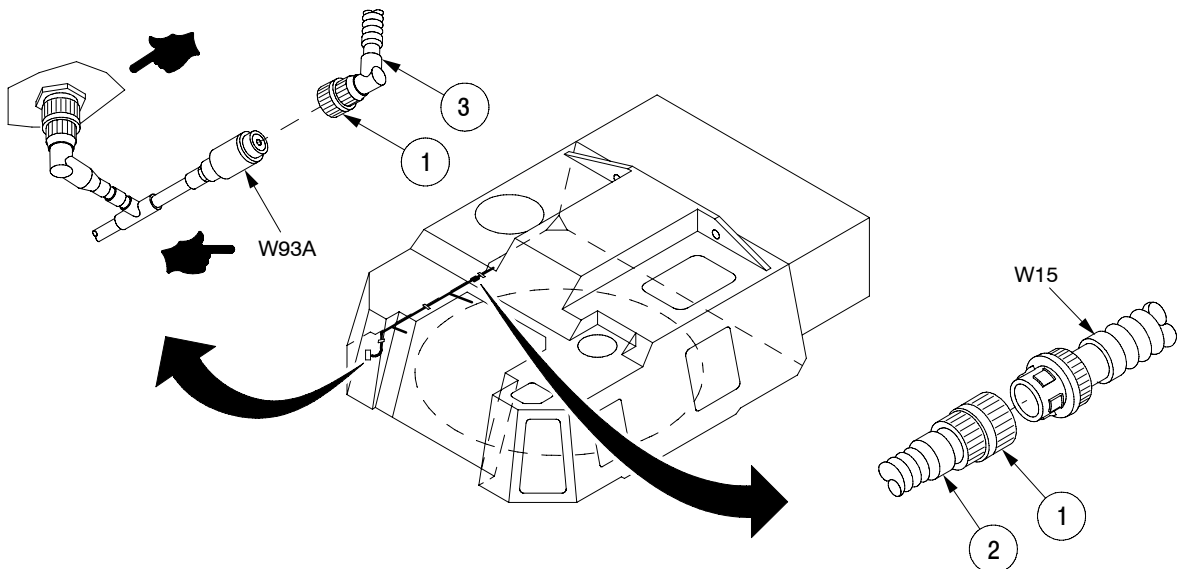
- 2 Remove and discard two tiedown straps (4).
- 3 Remove harness assembly from cab.

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Position harness assembly in cab and secure harness with two new tiedown straps (4).
- 2 Connect the following harness connectors by pushing connector halves together, then tightening coupling nuts (1):
  - (a) P1 of W3 (2) to connector J1 of harness assembly W15.
  - (b) P4 of W3 (3) to connector J3 of harness assembly W93A.



06pc018m



## 8-6 AFCS WIRING HARNESS W7.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Lockwashers (9) (item 126, Appx F)  
Lockwasher (item 109, Appx F)  
Tiedown straps (4) (item 77, Appx C)  
Marking tags (AR) (item 87, Appx C)  
Wire, non-electrical (item 99, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

### CAUTION

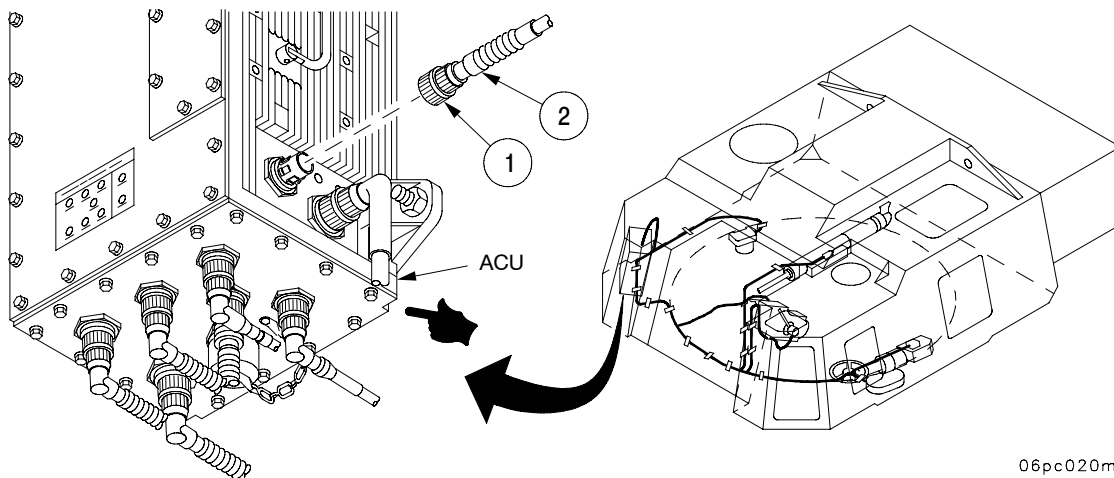
Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

### NOTE

Before removal, tag connectors for identification during installation.

- 1 Unscrew coupling nuts (1) and disconnect the following connectors:

- (a) P1 of W7 (2) from J6 ACU.

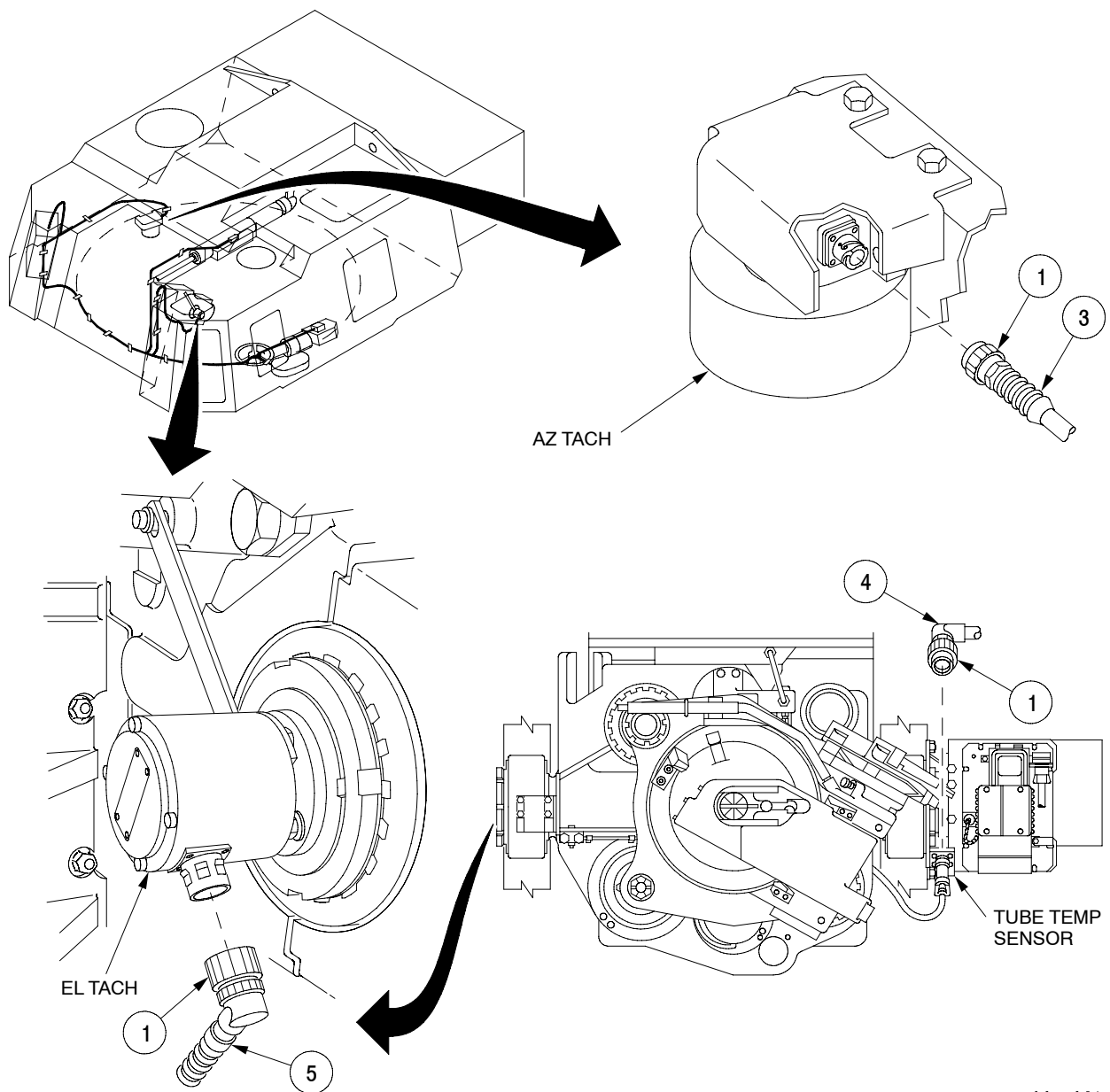


06pc020m

## 8-6 AFCS WIRING HARNESS W7 - CONTINUED

### a. Removal - Continued

- (b) P2 of W7 (3) from AZ TACH.
- (c) P3 of W7 (4) from Tube Temp Sensor.
- (d) P4 of W7 (5) from EL TACH.

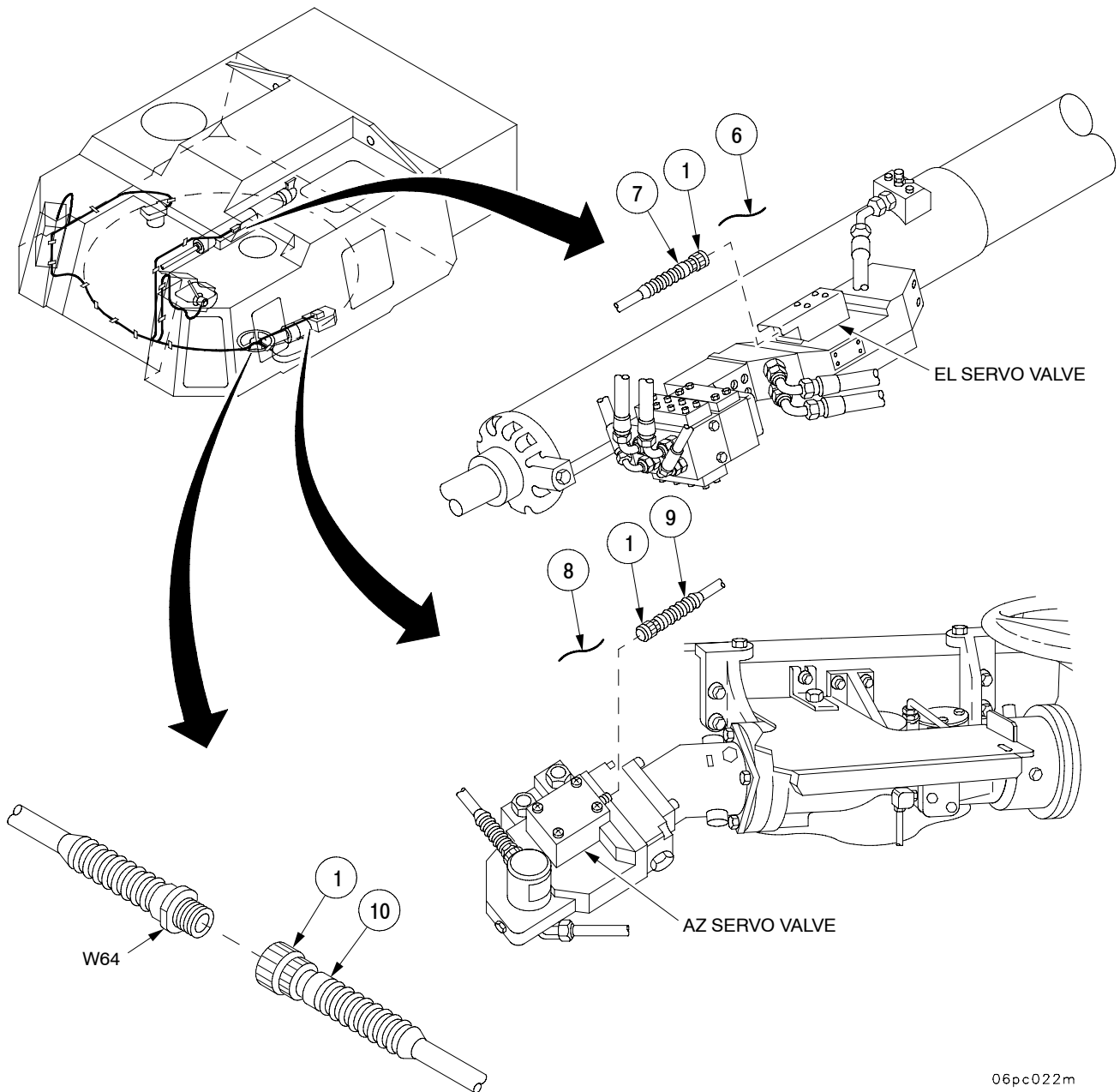


06pc021m

**8-6 AFCS WIRING HARNESS W7 - CONTINUED**

**a. Removal - Continued**

- (e) Remove and discard lockwire (6).
- (f) P5 of W7 (7) from EL Servo Valve.
- (g) Remove and discard lockwire (8).
- (h) P6 of W7 (9) from AZ Servo Valve.
- (i) P7 of W7 (10) to J1 connector of harness assembly W64.

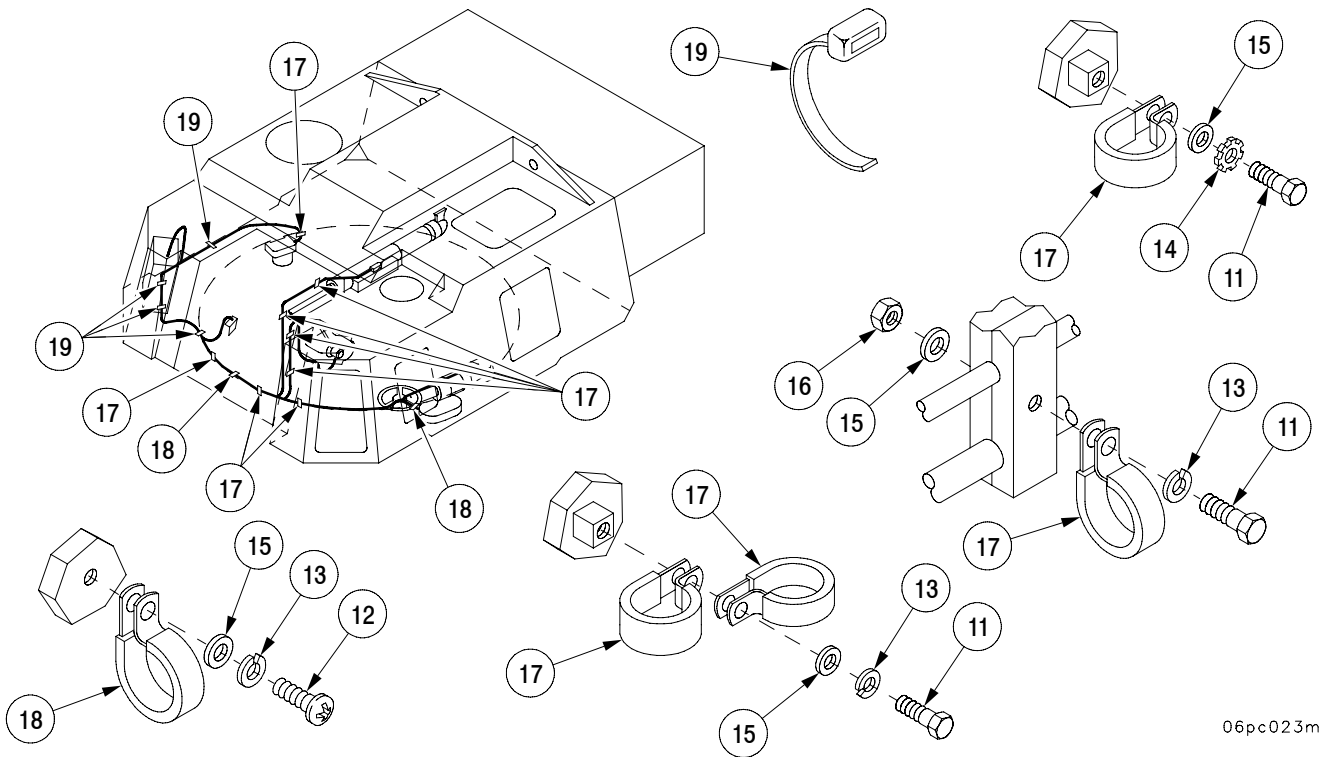


06pc022m

## 8-6 AFCS WIRING HARNESS W7 - CONTINUED

### a. Removal - Continued

- 2 Remove eight screws (11), two screws (12), nine lockwashers (13), lockwasher (14), ten flat washers (15), nut (16), eight clamps (17), and two clamps (18) mounting harness to cab. Discard lockwashers.
- 3 Cut and discard four tiedown straps (19) from harness assembly.
- 4 Remove harness assembly from cab.



06pc023m

### b. Installation.

- 1 Position harness assembly in cab.
- 2 Secure harness to surrounding harness assemblies using four new tiedown straps (19).
- 3 Secure harness with two clamps (17), eight clamps (18), nut (16), ten flat washers (15), new lockwasher (14), nine new lockwashers (13), eight screws (11), and two screws (12).

## 8-6 AFCS WIRING HARNESS W7 - CONTINUED

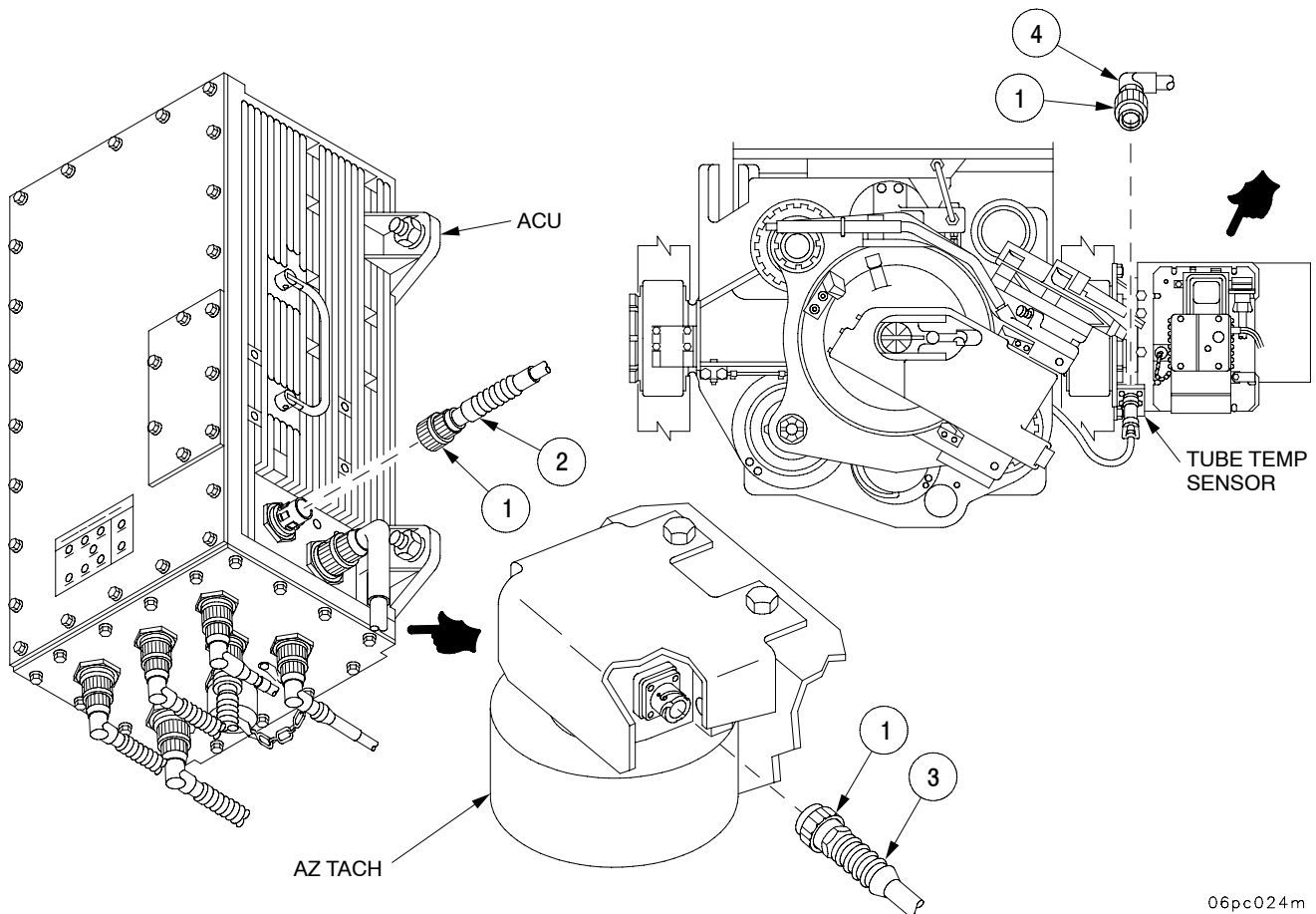
### b. Installation - Continued

#### CAUTION

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

4 Connect the following harness connectors by pushing connector halves together, then tightening coupling nuts (1):

- P1 of W7 (2) to J6 on ACU.
- P2 of W7 (3) to AZ TACH.
- P3 of W7 (4) to Tube Temp Sensor.

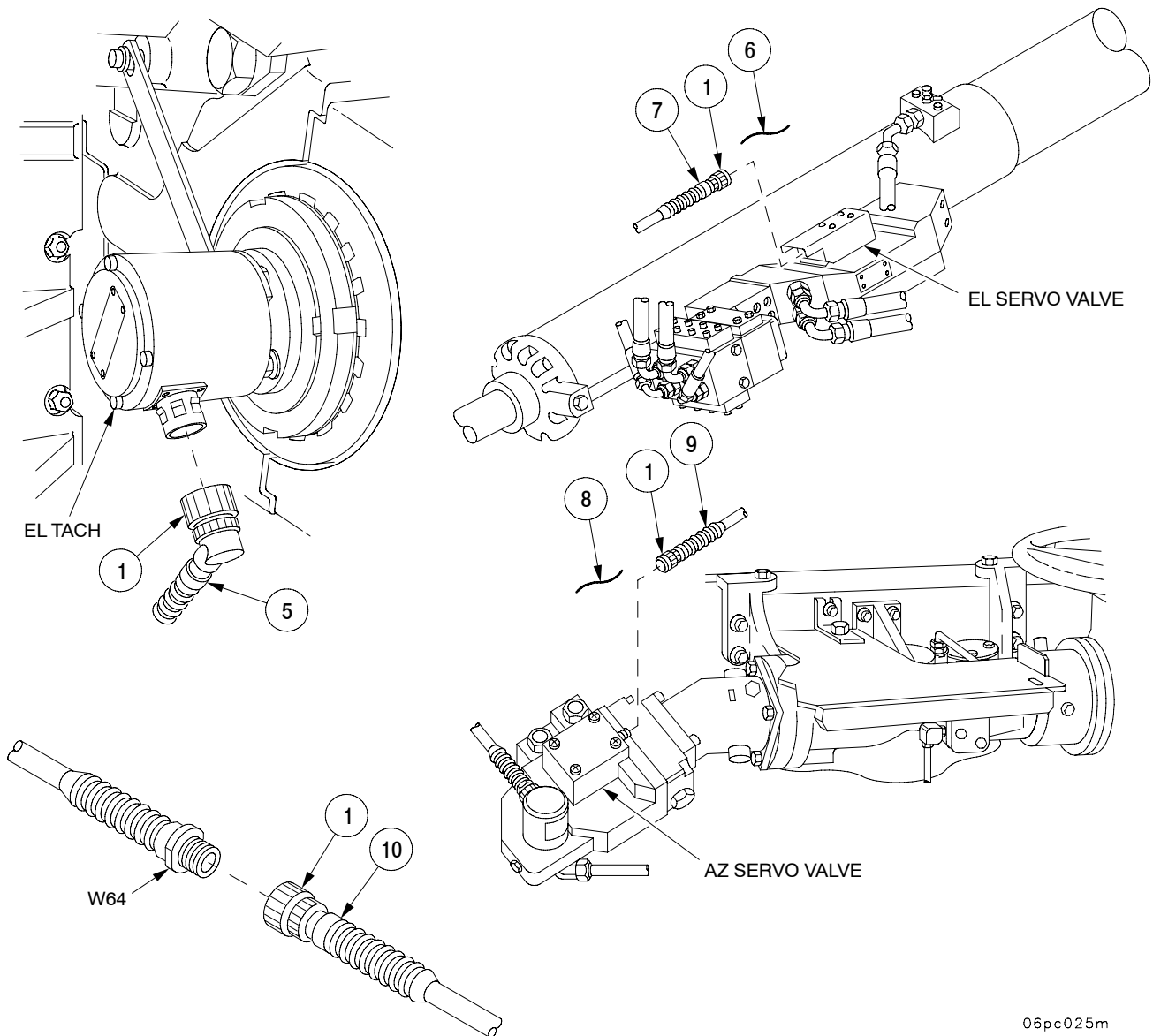


06pc024m

## 8-6 AFCS WIRING HARNESS W7 - CONTINUED

### b. Installation - Continued

- (d) P4 of W7 (5) to EL Tach.
- (e) P5 of W7 (7) to EL Servo Valve and secure with new lockwire (6).
- (f) P6 of W7 (9) to AZ Servo Valve and secure with new lockwire (8).
- (g) P7 of W7 (10) to J1 connector of cable assembly W64.



06pc025m

## 8-7 AFCS WIRING HARNESS W15.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Lockwashers (2) (item 128, Appx F)  
Marking tags (AR) (item 87, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

#### a. Removal.

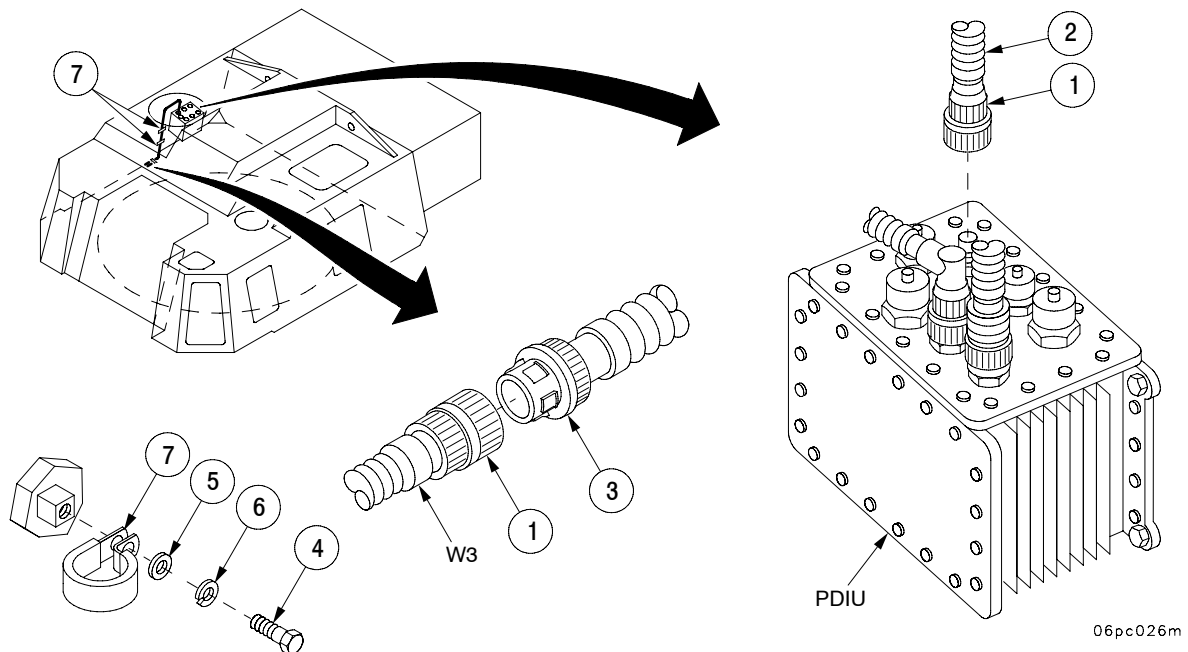
### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

### NOTE

Before removal, tag connectors for identification during installation.

- 1 Unscrew coupling nuts (1) and disconnect the following connectors:
  - (a) P1 of W15 (2) from J3 on PDIU.
  - (b) J1 of W15 (3) from P1 connector of harness assembly W3.
- 2 Remove two screws (4), two flat washers (5), two lockwashers (6), two clamps (7), and harness assembly from cab. Discard lockwashers.



06pc026m

## 8-7 AFCS WIRING HARNESS W15 - CONTINUED

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### b. Installation.

- 1 Position harness assembly in vehicle.
- 2 Secure harness assembly in cab with two clamps (7), two new lockwashers (6), two flat washers (5), and two screws (4).

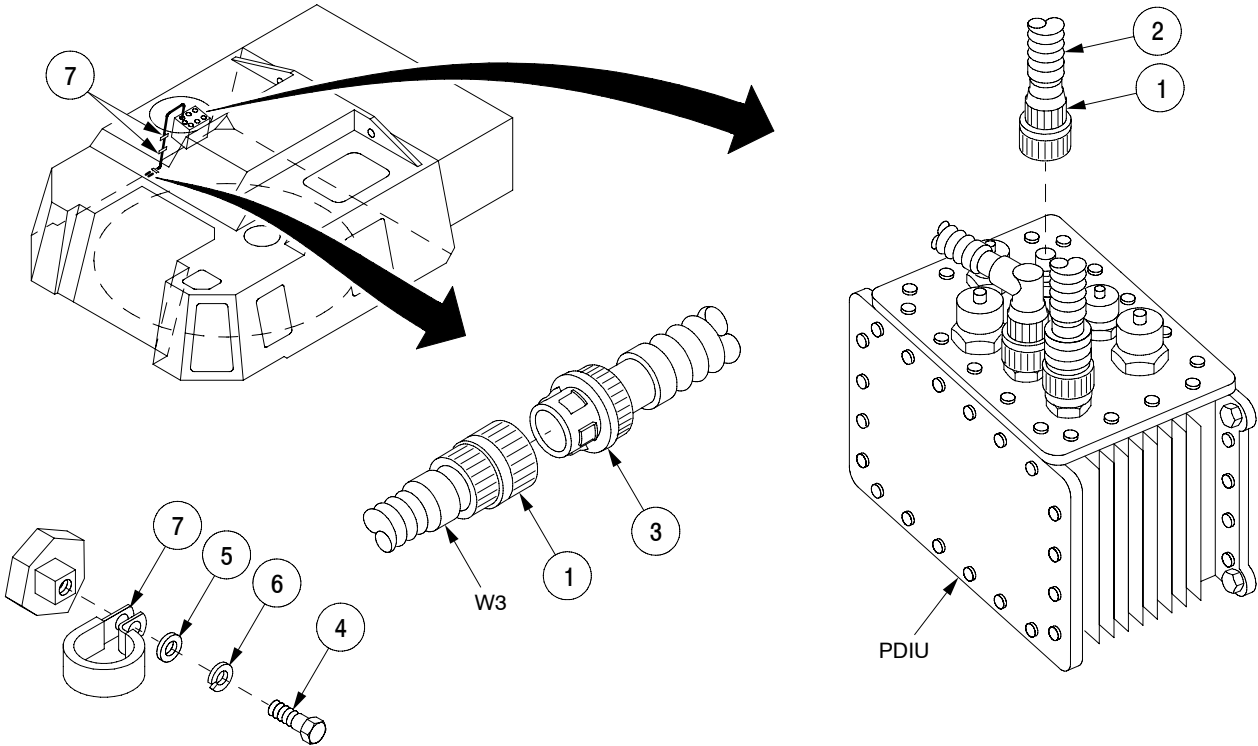


- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
  - Align key and keyway of harness connectors before pushing connector halves together or pins may break.
- 3 Connect the following harness connectors by pushing connector halves together, then tightening coupling nuts (1):
    - (a) P1 of W15 (2) to J3 on PDIU.
    - (b) J1 of W15 (3) to P1 connector of harness assembly W3.



8-7 AFCS WIRING HARNESS W15 - CONTINUED

b. Installation - Continued



06pc026m

## 8-8 AFCS WIRING HARNESS W17A.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Tiedown straps (4) (item 77, Appx C)  
Marking tags (AR) (item 87, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

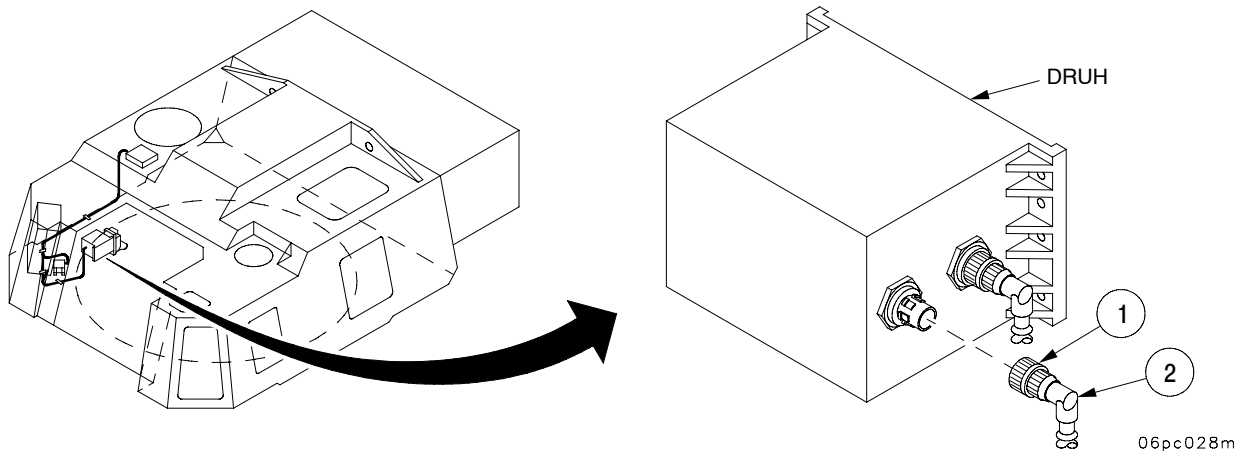
### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

### NOTE

Before removal, tag connectors for identification during installation.

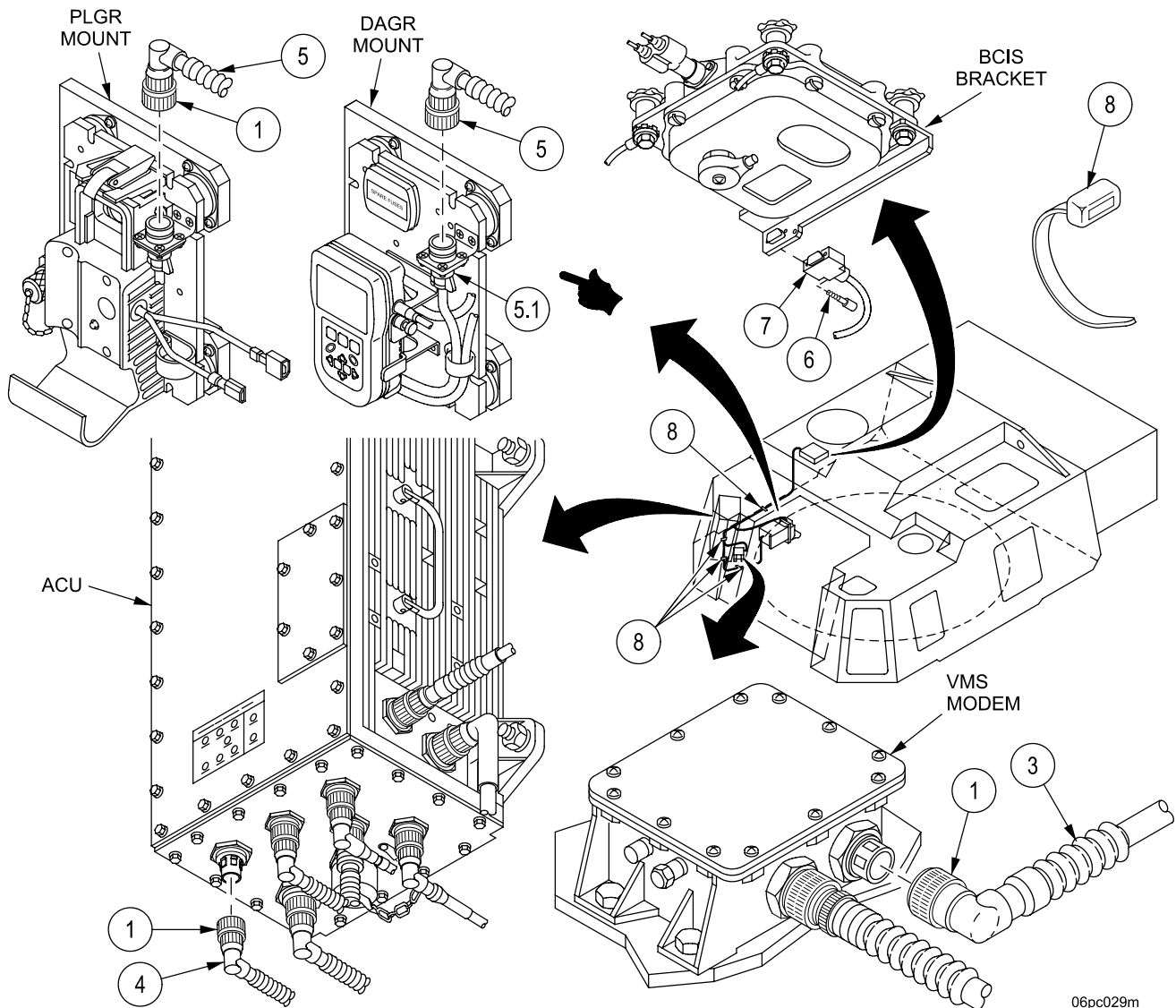
- 1 Unscrew coupling nuts (1) and disconnect the following connectors:
  - (a) P1 of W17A (2) from J1 on DRUH.



## 8-8 AFCS WIRING HARNESS W17A - CONTINUED

### a. Removal - Continued

- (b) P2 of W17A (3) from J1 on VMS modem.
  - (c) P3 of W17A (4) from J2 on ACU.
  - (d) P4 of W17A (5) from PLGR mount or disconnect from cable assembly W141 (5.1) if equipped with DAGR.
  - (e) Loosen two screws (6) and remove P5 of W17A (7) from BCIS bracket.
- 2 Cut and discard four tiedown straps (8) securing harness assembly W17A to cab.
  - 3 Remove harness assembly W17A from cab.



06pc029m

8-8 AFCS WIRING HARNESS W17A - CONTINUED

b. Installation.

**CAUTION**

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Make sure key and keyway are aligned before pushing connector halves together or pins may break.

1 Position harness assembly W17A to cab and secure by installing four new tiedown straps (8).

2 Push the following halves together, then hand tighten coupling nuts (1):

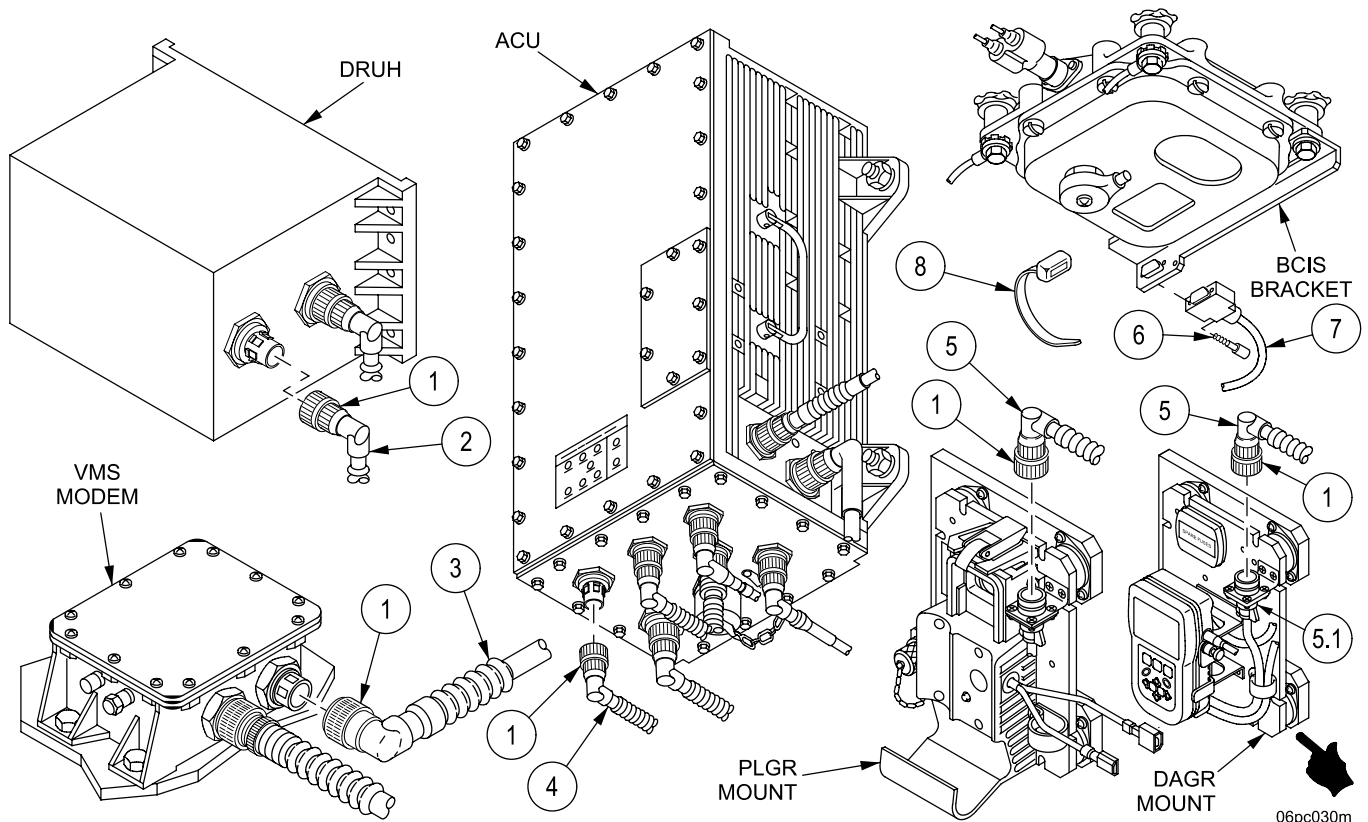
(a) P1 of W17A (2) to J1 on DRUH.

(b) P2 of W17A (3) to J1 on VMS modem.

(c) P3 of W17A (4) to J2 on ACU.

(d) P4 of W17A (5) to PLGR mount or connect to assembly W141 (5a) if equipped with DAGR.

(e) Install P5 of W17A (7) to BCIS bracket with two screws (6).



06pc030m

## 8-9 AFCS WIRING HARNESS W22A.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Lockwasher (item 128, Appx F)  
Marking tags (AR) (item 87, Appx C)  
Tiedown straps (2) (item 76, Appx)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

#### CAUTION

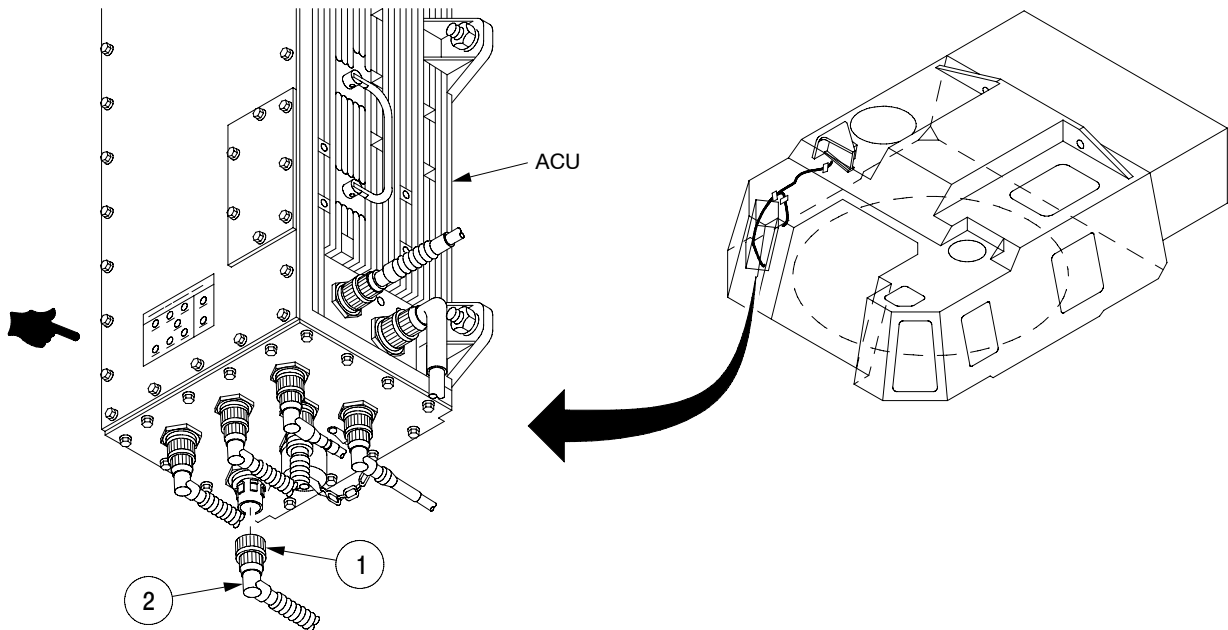
Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### NOTE

Before removal, tag connectors for identification during installation.

1 Unscrew coupling nuts (1) and disconnect the following connectors:

(a) P1 of W22A (2) from J7 on ACU.



06pc031m

## 8-9 AFCS WIRING HARNESS W22A - CONTINUED

### a. Removal - Continued

(b) P2 of W22A (3) from J1 on DU.

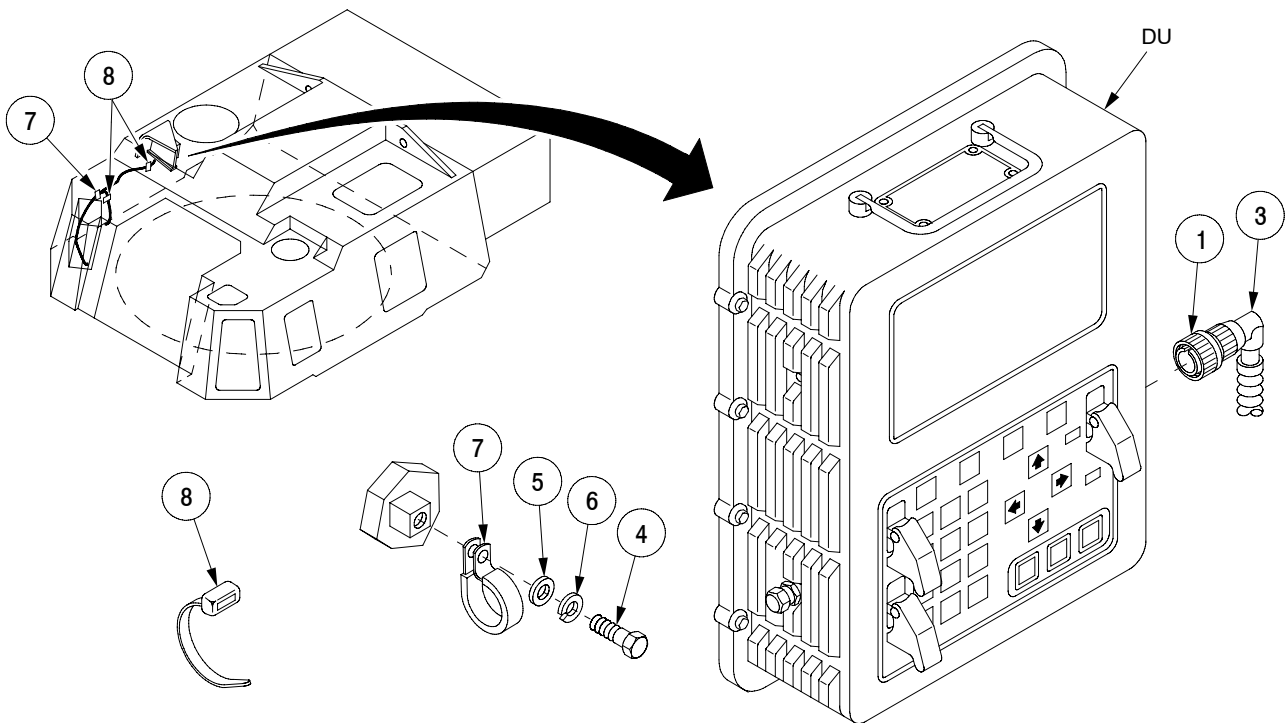
- 2 Remove screw (4), flat washer (5), lockwasher (6), and clamp (7), cut and discard two tiedown straps (8), and remove harness assembly from cab. Discard lockwashers.

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Position harness assembly in cab.
- 2 Secure harness assembly in cab with two new tiedown straps (8), clamp (7), flat washer (5), new lockwasher (6), and screw (4).

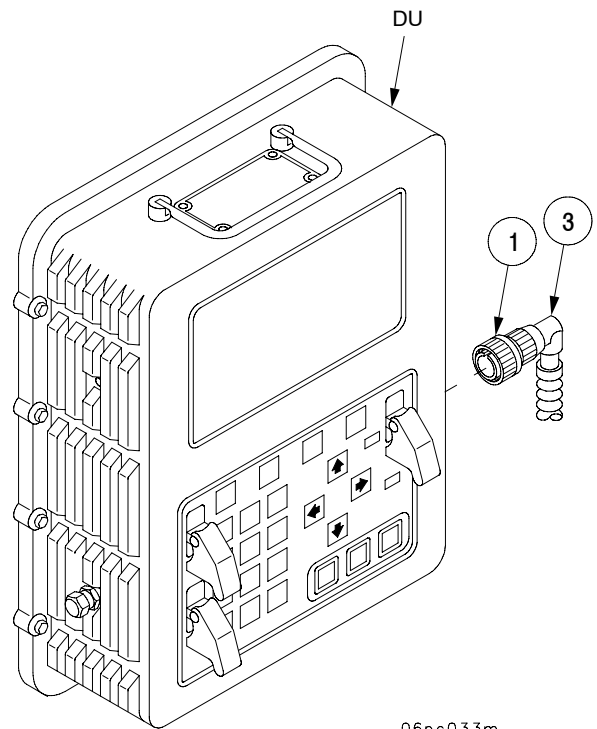
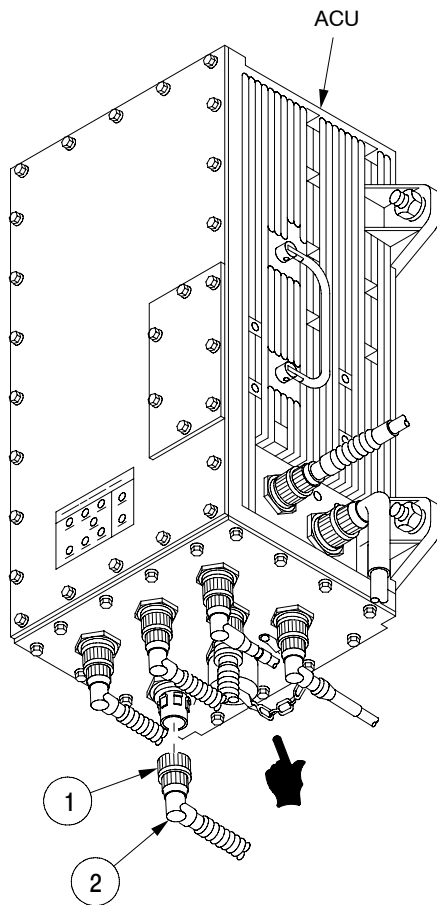


06pc032m

**8-9 AFCS WIRING HARNESS W22A - CONTINUED**

**b. Installation - Continued**

- 3 Connect the following harness connectors by pushing connector halves together, then tightening coupling nuts (1):
  - (a) P1 of W22 (2) to J7 on ACU.
  - (b) P2 of W22 (3) to J1 on DU.



06pc033m

## 8-10 AFCS WIRING HARNESS W25.

---

This task covers:      a. Removal                                      b. Installation

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### **INITIAL SETUP**

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Marking tags (AR) (item 87, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

---

### a. Removal.

### **CAUTION**

Do not twist or turn connector backshell when loosening coupling nuts or pins may break.

### **NOTE**

Before removal, tag connectors for identification during installation.

Disconnect the following connectors by unscrewing coupling nuts (1) and pulling connector halves apart:

- (a) P1 of W25 (2) from battery box B.
- (b) P2 of W25 (3) from battery box A.
- (c) P3 of W25 (4) from J3 on PCU.



**8-10 AFCS WIRING HARNESS W25 - CONTINUED**

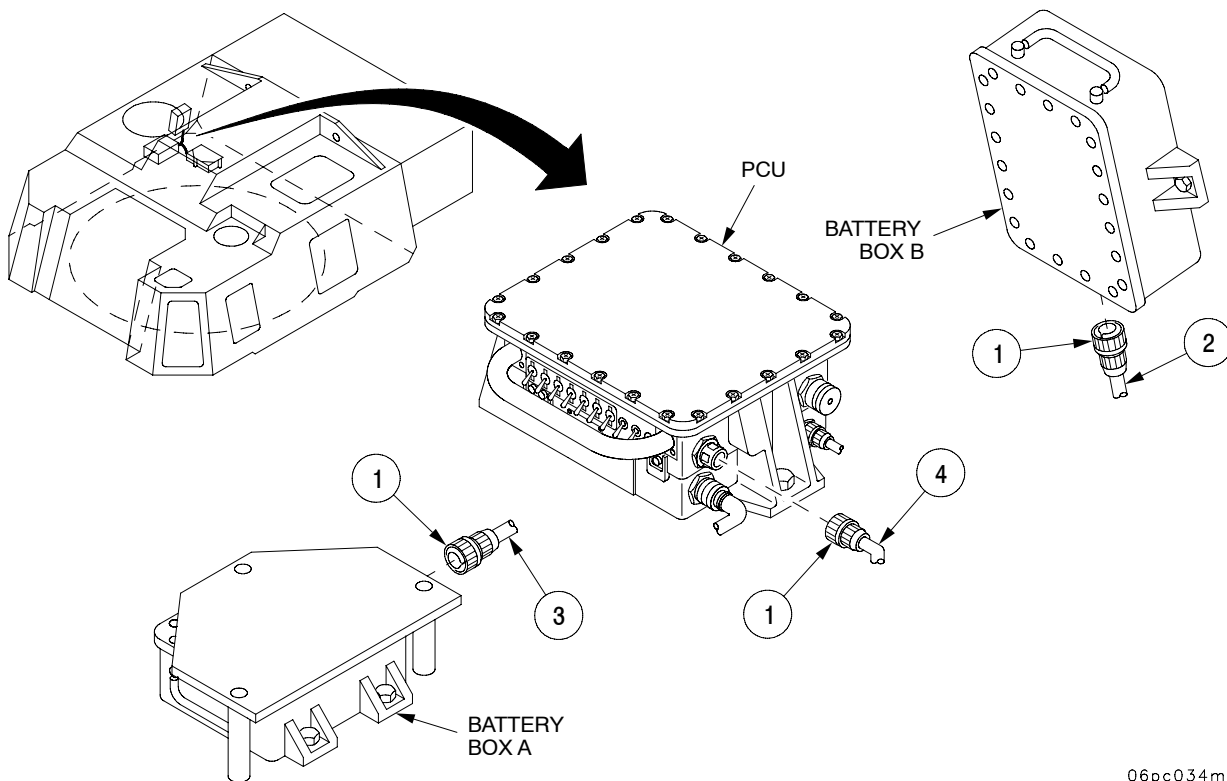
**b. Installation.**

**CAUTION**

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Make sure key and keyway are aligned before pushing connector halves together or pins may break.

Push the following connector halves together and hand tighten coupling nuts (1):

- (a) P1 of W25 (2) to battery box B.
- (b) P2 of W25 (3) to battery box A.
- (c) P3 of W25 (4) to J3 on PCU.



06pc034m

## 8-11 AFCS WIRING HARNESS W27.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Tiedown straps (5) (item 76, Appx C)  
Marking tags (AR) (item 87, Appx C)

#### Equipment Conditions

Master control station and mounts  
removed (para 21-1)  
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

### CAUTION

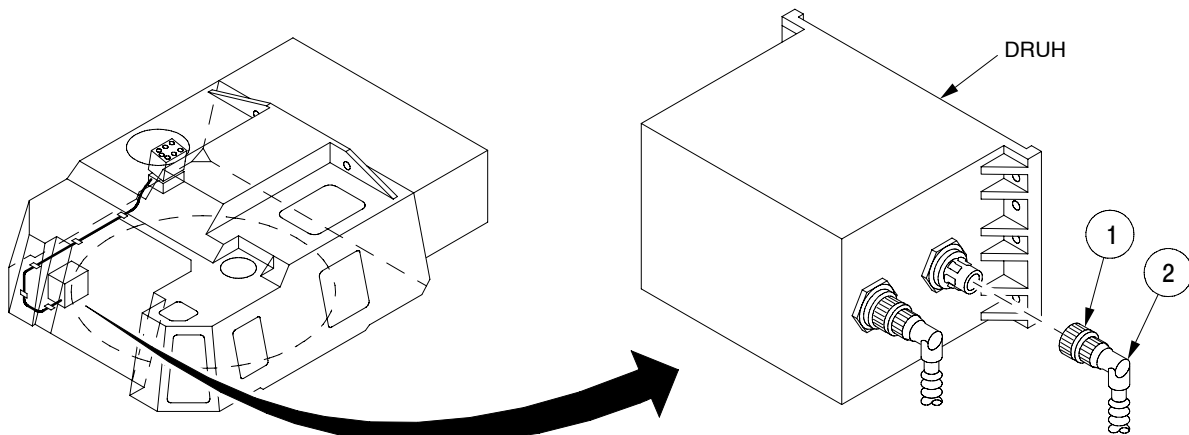
Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

### NOTE

Before removal, tag connectors for identification during installation.

1 Unscrew coupling nuts (1) and disconnect the following connectors:

- (a) P1 of W27 (2) from J2 on DRUH.

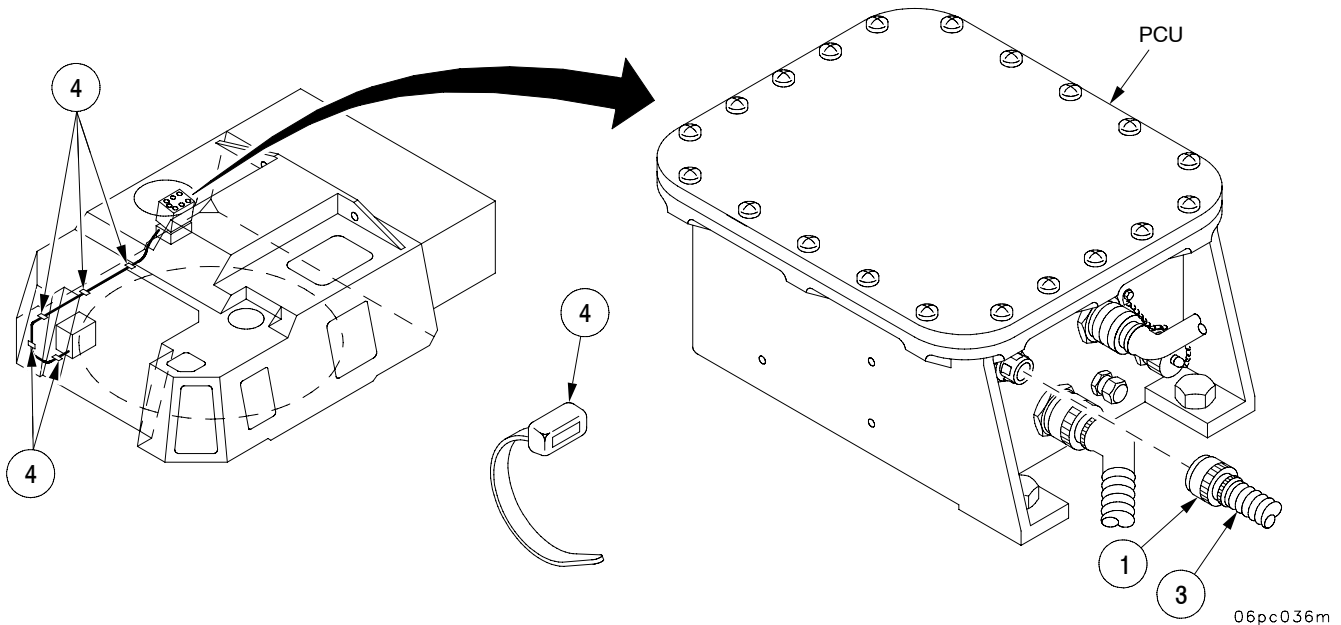


06pc035m

## 8-11 AFCS WIRING HARNESS W27 - CONTINUED

### a. Removal - Continued

(b) P2 of W27 (3) from J8 on PCU.



- 2 Cut and discard five tiedown straps (4) securing harness W27 to other harnesses.
- 3 Remove harness assembly from cab.

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when tightening coupling nuts.
  - Make sure key and keyway are aligned before pushing connector halves together.
- 1 Position harness assembly in vehicle and secure to other harness assemblies by installing five new tiedown straps (4).
  - 2 Push the following connector halves together and hand tighten coupling nuts (1):
    - (a) P1 of W27 (2) to J2 on DRUH.
    - (b) P2 of W27 (3) to J8 on PCU.

## 8-12 AFCS WIRING HARNESS W93A.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Tiedown straps (5) (item 76, Appx C)  
Marking tags (AR) (item 87, Appx C)  
Lockwashers (2) (item 105, Appx F)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)

#### Personnel Required

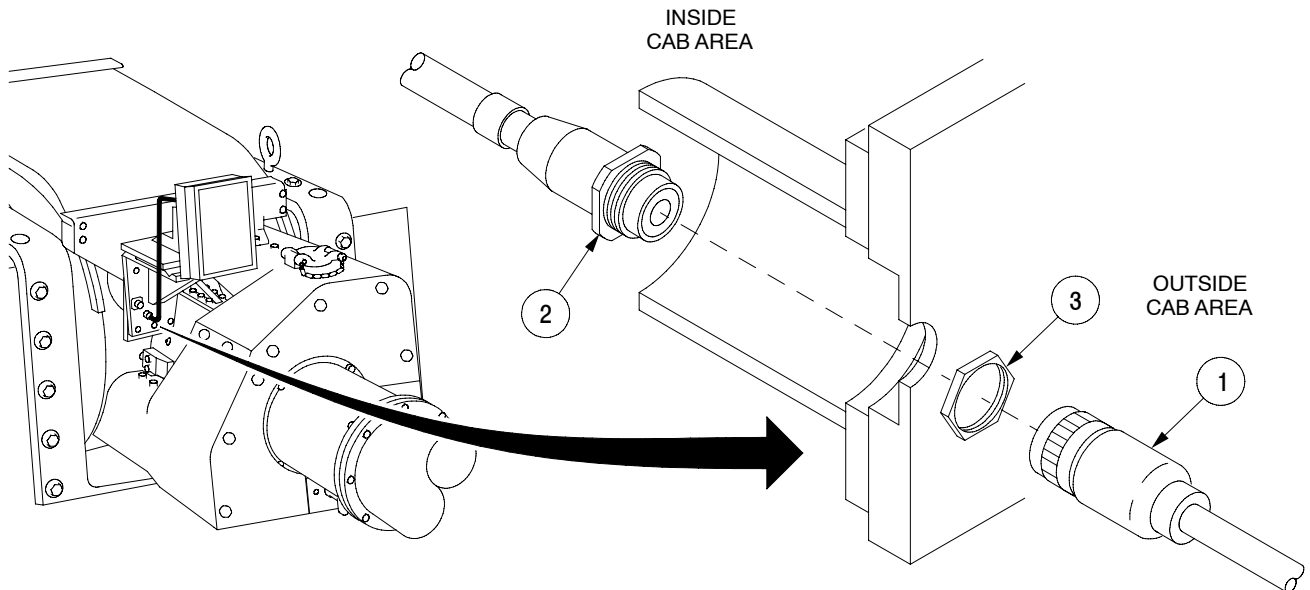
Two

### a. Removal.

#### NOTE

- If the M93 radar chronograph is installed, the following procedures apply.
- If the M93 radar chronograph is not installed, the 1553 termination connector must be disconnected.

- 1 Disconnect wiring harness W92 P2 (1) from wiring harness W93A J2 connector (2).
- 2 Remove lock nut (3) from wiring harness W93A J2 connector (2).



06pc037m

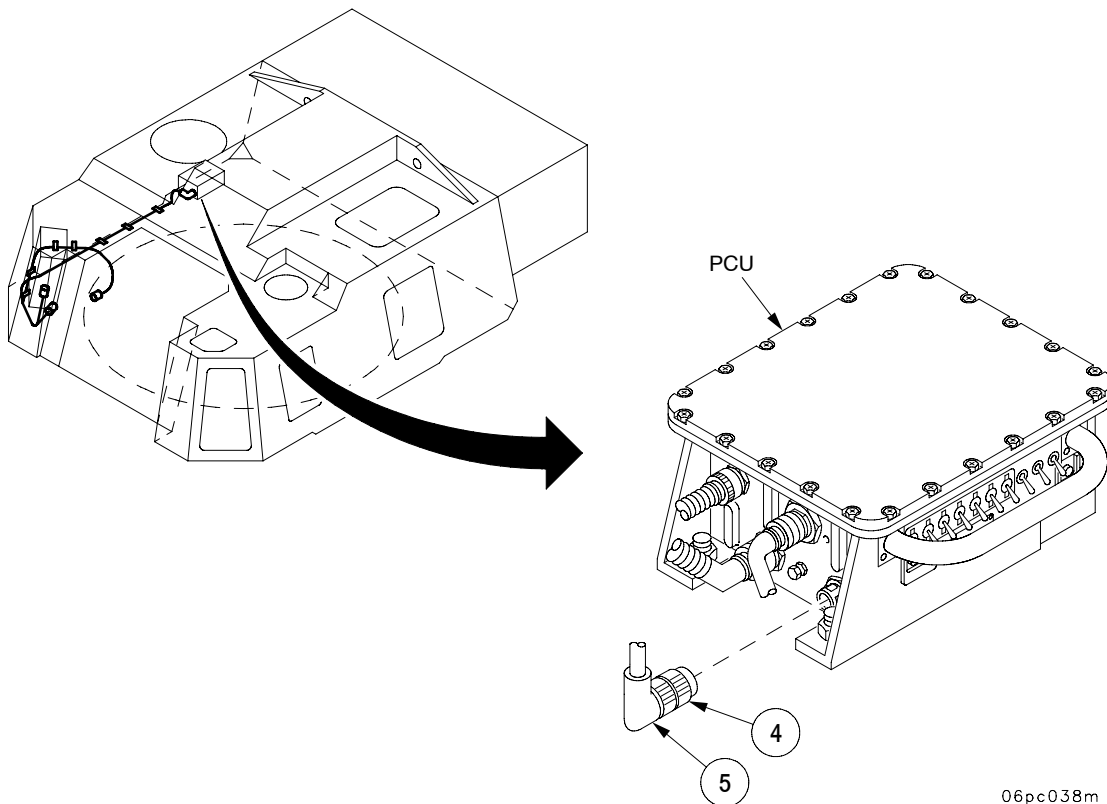
**8-12 AFCS WIRING HARNESS W93A - CONTINUED****a. Removal - Continued****CAUTION**

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

**NOTE**

Before removal, tag connectors for identification during installation.

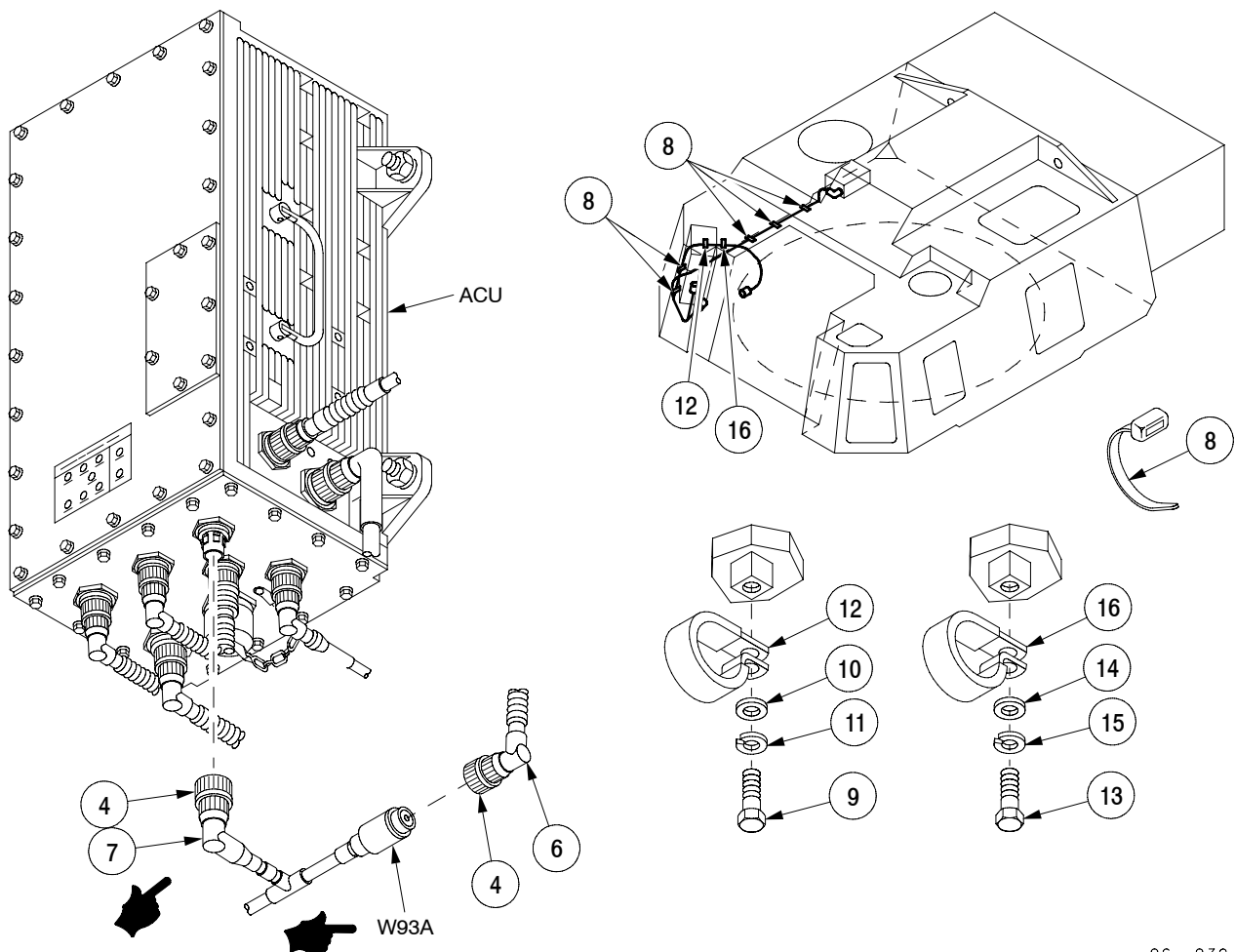
- 3 Unscrew coupling nuts (4) and disconnect the following connectors:
  - (a) P6 of W93A (5) from J6 on PCU.



## 8-12 AFCS WIRING HARNESS W93A - CONTINUED

### a. Removal - Continued

- (b) P2 of W3 (6) from W93A J3.
  - (c) P3 of W93A (7) from J8 of ACU.
- 4 Cut and discard five tiedown straps (8) securing harness W93A to other harnesses.
  - 5 Remove screw (9), flat washer (10), lockwasher (11), and clamp (12). Discard lockwasher.
  - 6 Remove screw (13), flat washer (14), lockwasher (15), and clamp (16). Discard lockwasher.
  - 7 Remove harness from cab.



06pc039m

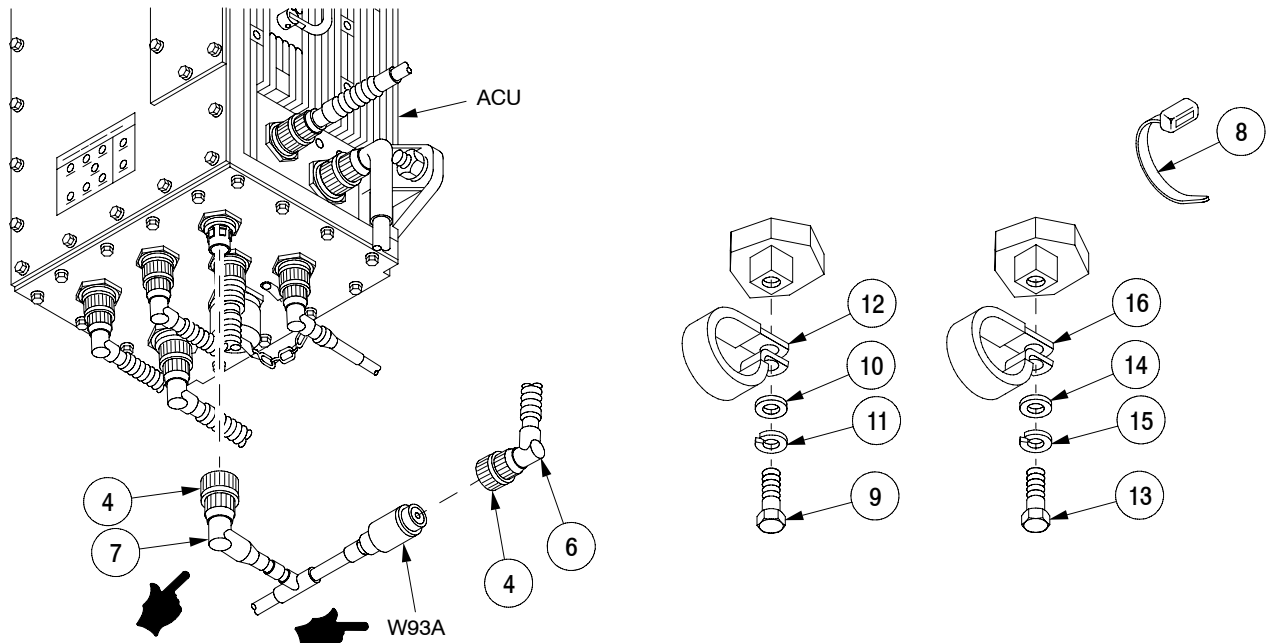
**8-12 AFCS WIRING HARNESS W93A - CONTINUED**

**b. Installation**

- 1 Position harness assembly in cab.
- 2 Secure harness assembly in cab with clamp (16), new lockwasher (15), flat washer (14), screw (13), and clamp (12), new lockwasher (11), flat washer (10), and screw (9).
- 3 Secure to other harness assemblies by installing five new tiedown straps (8).

**CAUTION**

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
  - Align key and keyway of harness connectors before pushing connector halves together or pins may break
- 4 Connect the following harness connectors by pushing connector halves together, then tightening coupling nuts (4):
    - (a) P3 of W93A (7) on J8 of ACU.
    - (b) P2 of W3 (6) on W93A J3.

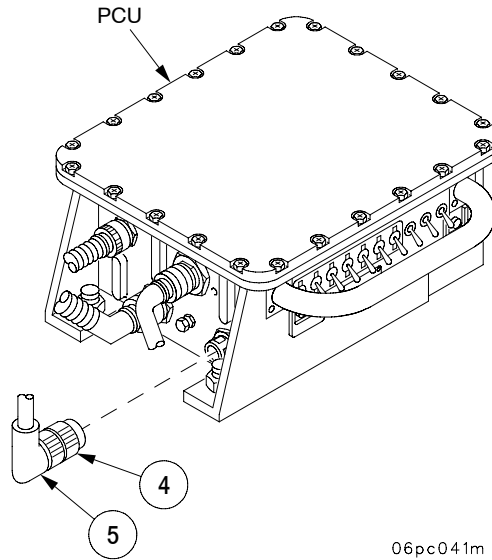


06pc040m

## 8-12 AFCS WIRING HARNESS W93A - CONTINUED

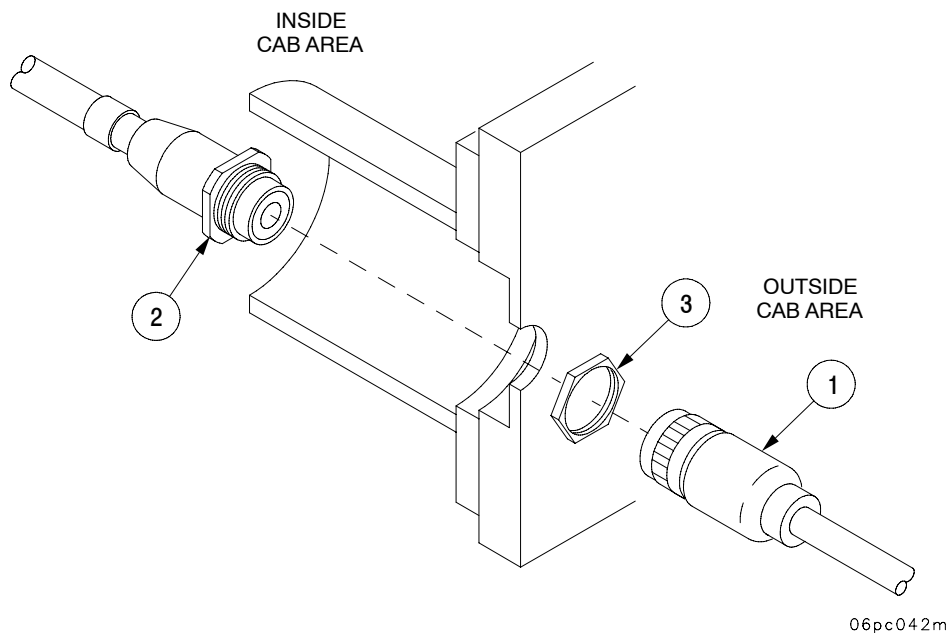
### b. Installation - Continued

- (c) P6 of W93A (5) on J6 of PCU.



06pc041m

- 5 Have assistant position wiring harness W93A J2 connector (2) through gun mount shield and install lock nut (3) on W93A J2 connector (2).
- 6 Connect wiring harness W92 P2 (1) on wiring harness W93A J2 connector (2).



06pc042m



**8-13 1553 TERMINATION CONNECTOR.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwasher (1) (item 116, Appx F)

Equipment Conditions

Gun tube stowed in travel lock  
(TM 9-2350-314-10)  
Cab traverse lock locked  
(TM 9-2350-314-10)

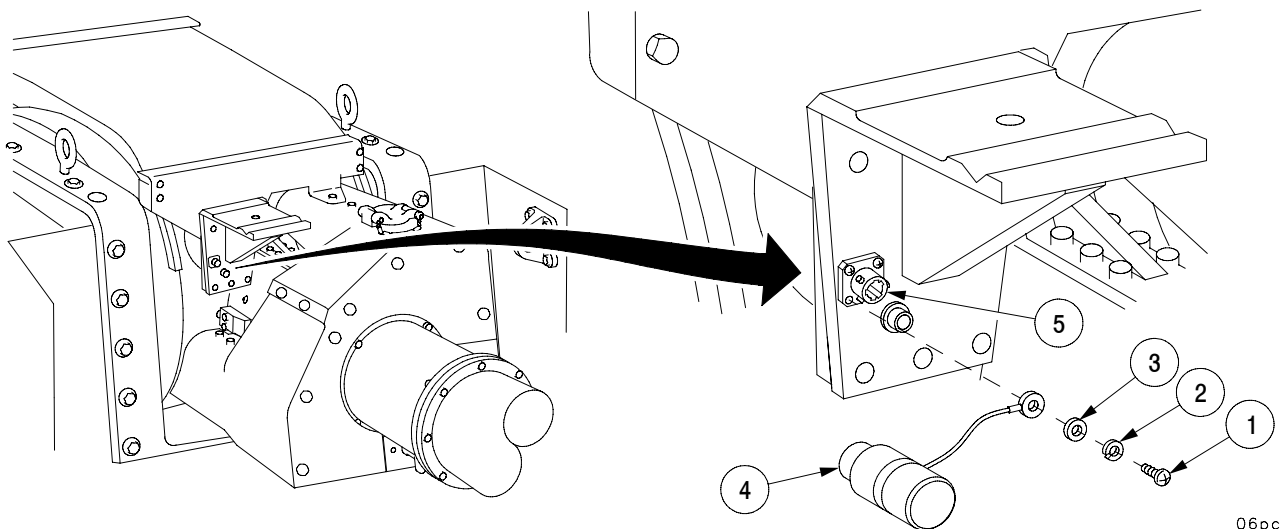
**a. Removal.**

- 1 Remove screw (1), lockwasher (2), flat washer (3), and connector (4) from dummy connector (5). Discard lockwasher.
- 2 Disconnect connector (4) from dummy connector (5).

**b. Installation.****NOTE**

If the M93 radar transceiver is not installed, the 1553 termination connector should be installed on wiring harness W93A J2 connector.

- 1 Connect connector (4) on dummy connector (5).
- 2 Install connector (4) on dummy connector (5) with flat washer (3), new lockwasher (2), and screw (1).



06pc043m

## 8-14 AFCS COMPUTER UNIT (ACU).

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This task covers:      a. Removal                                      b. Installation

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### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
AN/PSM-95 Electronic system test set (Sport)  
(item 58, Appx G)  
Sport accessory kit (item 57, Appx G)

#### Materials/Parts

Marking tags (AR) (item 87, Appx C)  
Lockwashers (3) (item 120, Appx F)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Mounted water ration heater removed  
(TM 9-2350-314-10)

#### Personnel Required

Two

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### a. Removal.

#### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### NOTE

- Document AFCS and MAPMOD data prior to removing/replacing ACU.
  - Before removal, tag connectors for identification during installation.
- 1 Remove the following connectors from the ACU by unscrewing coupling nuts (1) and pulling connectors apart:
    - (a) P4 of W65 (2) from J5 on ACU.
    - (b) P1 of W7 (3) from J6 on ACU.
    - (c) P3 of W93A (4) from J8 on ACU.
    - (d) P1 of W12A (5) from J3 on ACU.
    - (e) P3 of W17A (6) from J2 on ACU.
    - (f) P1 of W22A (7) from J7 on ACU.
    - (g) P3 of W1A (8) from J1 on ACU.
    - (h) P1 of W10 (9) from J4 on ACU.

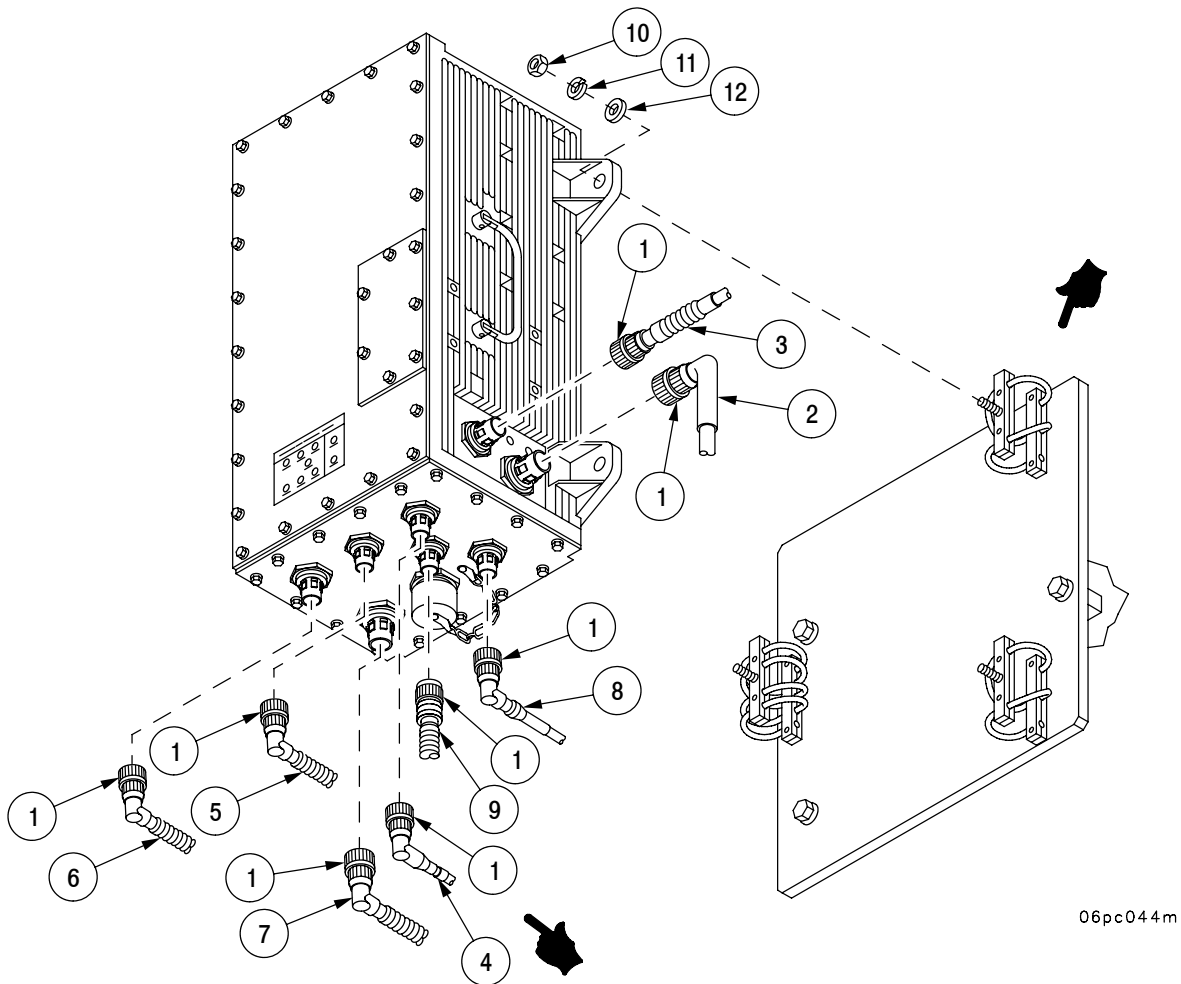
#### CAUTION

ACU weighs 44 lbs. Assistant should support box during removal to avoid damage to equipment.

- 2 Remove three nuts (10), three lockwashers (11), and three flat washers (12). Discard lockwashers.
- 3 Carefully lift ACU box assembly from three mounting studs on shock isolation plate.

**8-14 AFCS COMPUTER UNIT (ACU) - CONTINUED**

**a. Removal - Continued**



06pc044m

**b. Installation.**

**CAUTION**

ACU weighs 44 lbs. Assistant should support box during installation to avoid damage to equipment.

- 1 Align three mounting holes of ACU box assembly with three mounting studs on shock isolation plate and position ACU onto plate.
- 2 Secure box assembly to mounting studs with three flat washers (12), three new lockwashers (11), and three nuts (10).

**8-14 AFCS COMPUTER UNIT (ACU) - CONTINUED**

**b. Installation - Continued**

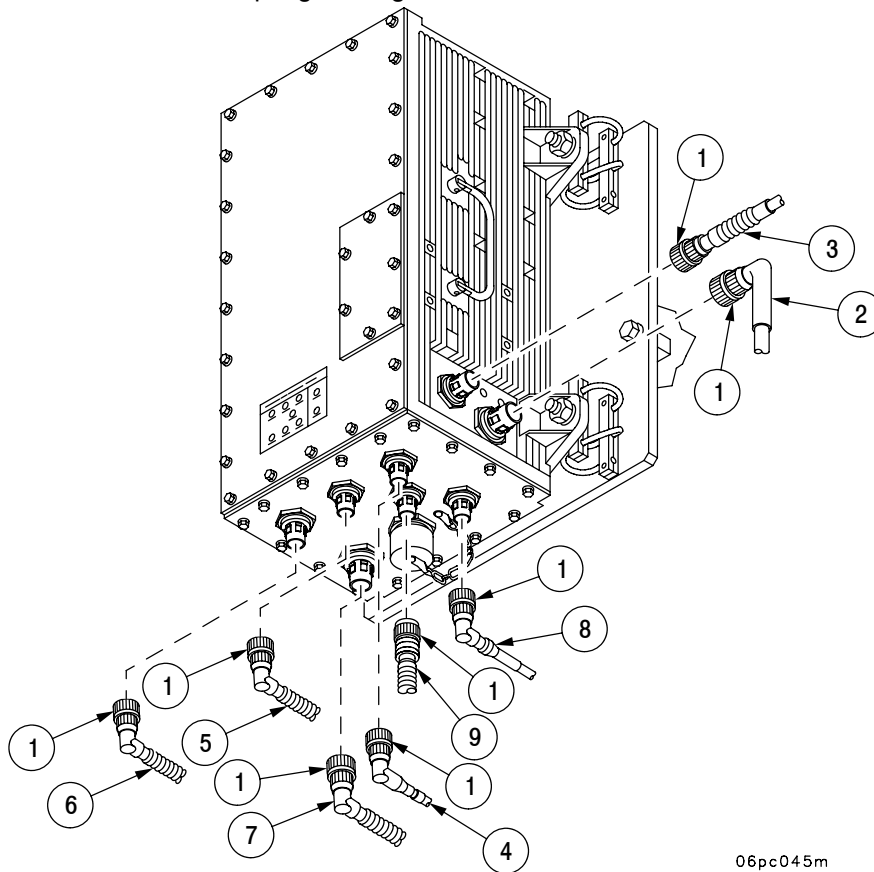
**CAUTION**

Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 3 Push the following connector halves together, then hand tighten coupling nuts (1).
  - (a) P1 of W10 (9) to J4 on ACU.
  - (b) P3 of W1A (8) to J1 on ACU.
  - (c) P1 of W22A (7) to J7 on ACU.
  - (d) P3 of W17A (6) to J2 on ACU.
  - (e) P1 of W12A (5) to J3 on ACU.
  - (f) P3 of W93A (4) to J8 on ACU.
  - (g) P1 of W7 (3) to J6 on ACU.
  - (h) P4 of W65 (2) to J5 on ACU.
  
- 4 Check ACU for correct version of software (TM 9-2350-314-10). If reprogramming of software is required use the SPORT, accessory kit and TB 9-2350-314-20-2-1 (CD).

Record AFCS data in ACU from DA Form 2408-4 located in vehicle log book.

Record MAPMOD data before attempting a navigation alignment.



06pc045m

**8-15 ACU SHOCK ISOLATION PLATE ASSEMBLY.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Sealing compound (item 44, Appx C)  
Lockwashers (2) (item 119, Appx F)

Equipment Conditions

AFCS computer unit removed (para 8-14)

Personnel Required

Two

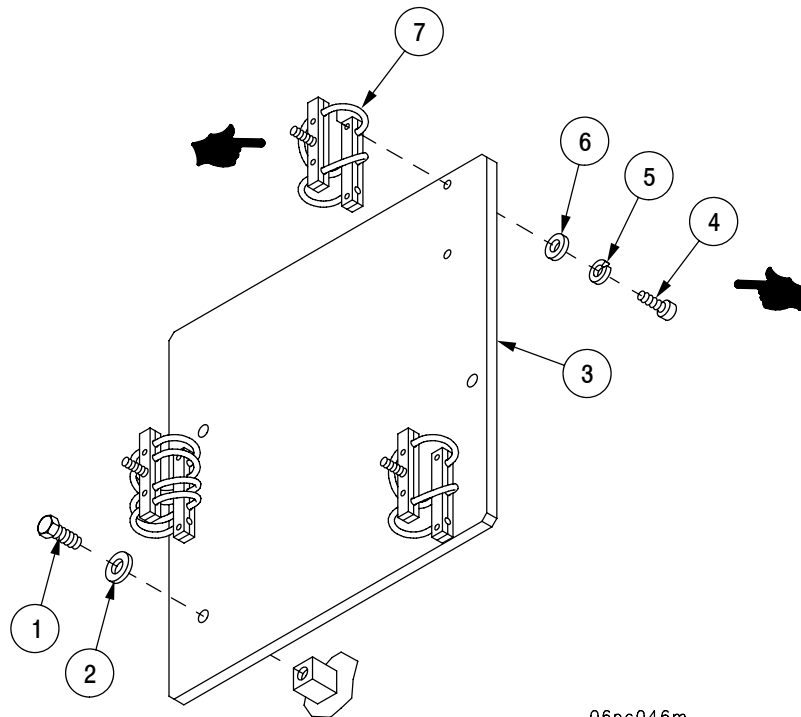
**a. Removal.**

- 1 Remove three screws (1), three flat washers (2), and shock isolation plate (3) from mounting pads.

**NOTE**

There are three isolation shock mounts on the shock isolation plate assembly. All are removed and replaced in the same manner.

- 2 Remove two screws (4), two lockwashers (5), two washers (6), and isolation shock mount (7) from shock isolation plate (3). Discard lockwashers.



06pc046m

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## 8-15 ACU SHOCK ISOLATION PLATE ASSEMBLY - CONTINUED

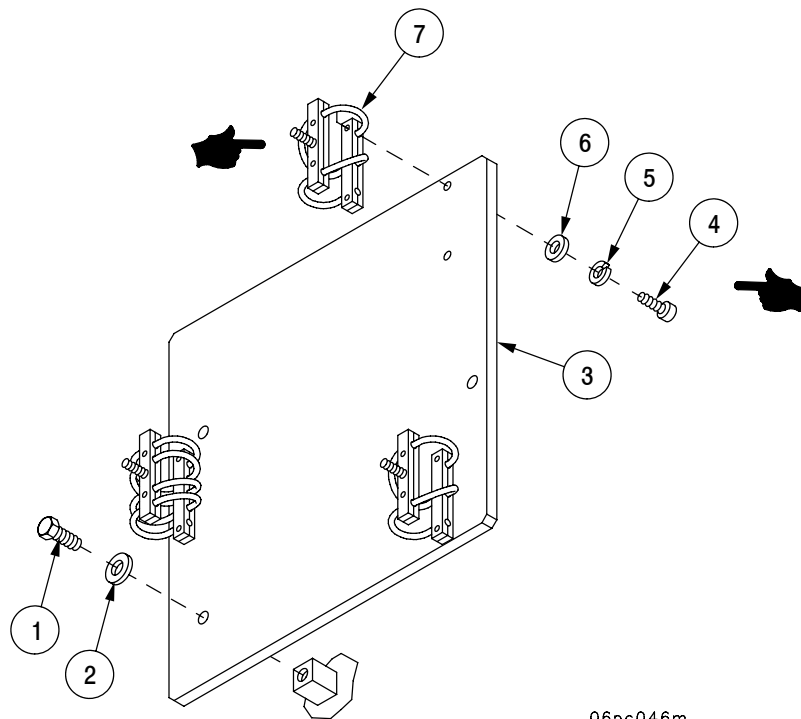
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### b. Installation.

#### NOTE

There are three isolation shock mounts on the shock isolation plate assembly. All are removed and replaced in the same manner.

- 1 Install isolation shock mount (7) to shock isolation plate (3) with two washers (6), two new lockwashers (5), and two screws (4).
- 2 Apply sealing compound to threads of three screws (1).
- 3 Align shock isolation plate mounting holes with holes in mounting pads and install shock isolation plate (3) with three flat washers (2) and three screws (1).



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## 8-16 POWER CONDITIONING UNIT (PCU).

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This task covers:      a. Removal                                  b. Installation

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### **INITIAL SETUP**

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Sealing compound (item 41, Appx C)  
Marking tags (AR) (item 87, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Prognostic/Diagnostic Interface Unit (PDIU)  
removed (para 8-19)

#### Personnel Required

Two

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### a. Removal.

#### **CAUTION**

- PCU box weighs 45 lbs (20.4 kg). Assistant should support box during removal to prevent damage to equipment.
- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

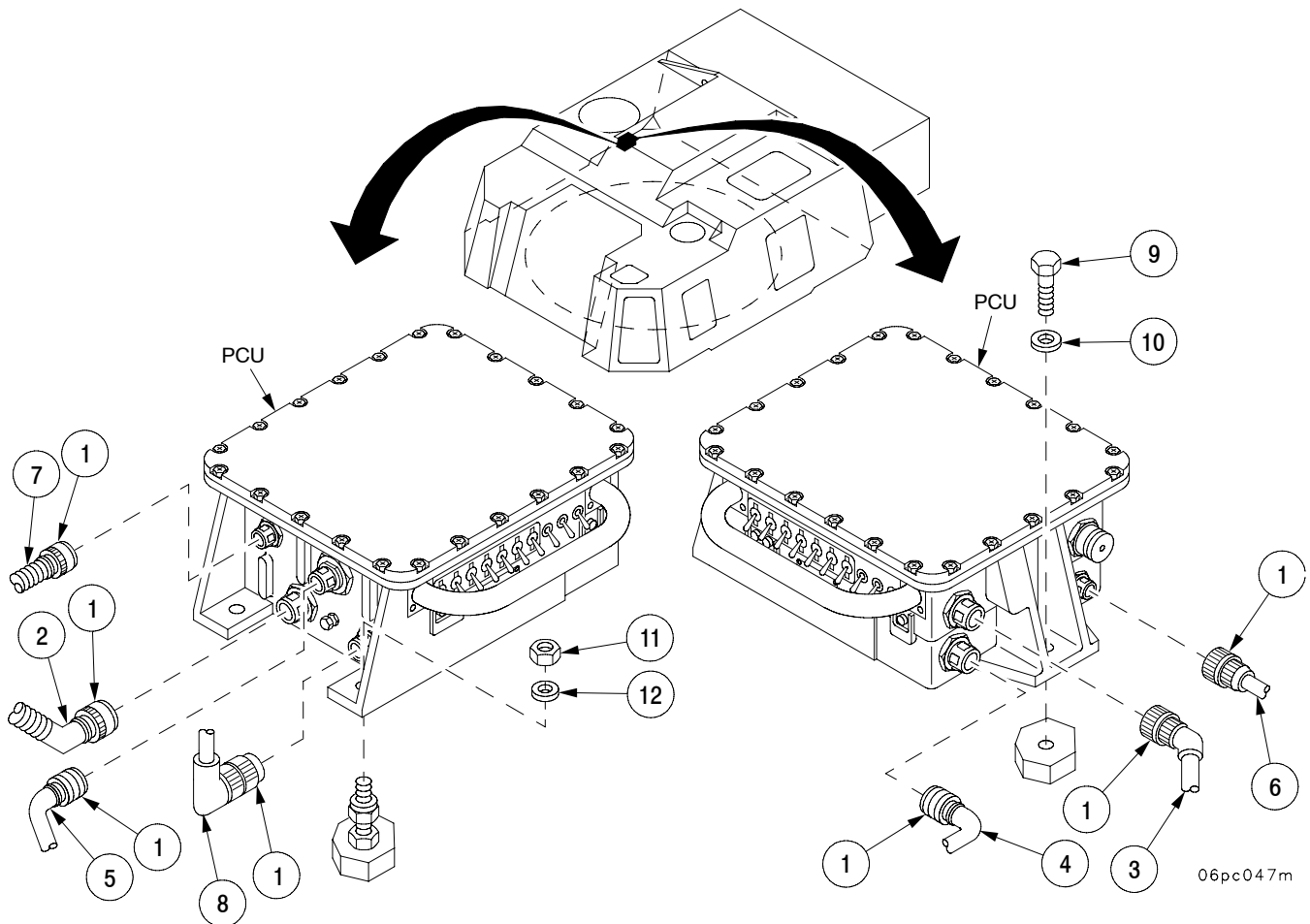
#### **NOTE**

- Before removal, tag connectors for identification during installation.
- Document AFCS data prior to removing/replacing PCU box.

**8-16 POWER CONDITIONING UNIT (PCU) - CONTINUED**

**a. Removal - Continued**

- 1 Remove the following connectors from the PCU by unscrewing coupling nuts (1) and pulling connectors apart:
  - (a) P1 of W1A (2) from J1 on PCU.
  - (b) P3 of W25 (3) from J3 on PCU.
  - (c) P1 of W50 (4) from J4 on PCU.
  - (d) P2 of W65 (5) from J5 (if connected) on PCU.
  - (e) P1 of W26 (6) from J7 on PCU.
  - (f) P2 of W27 (7) from J8 on PCU.
  - (g) P6 of W93A (8) from J6 on PCU.
  
- 2 Remove screw (9), flat washer (10), two nuts (11), two flat washers (12), and PCU from cab.



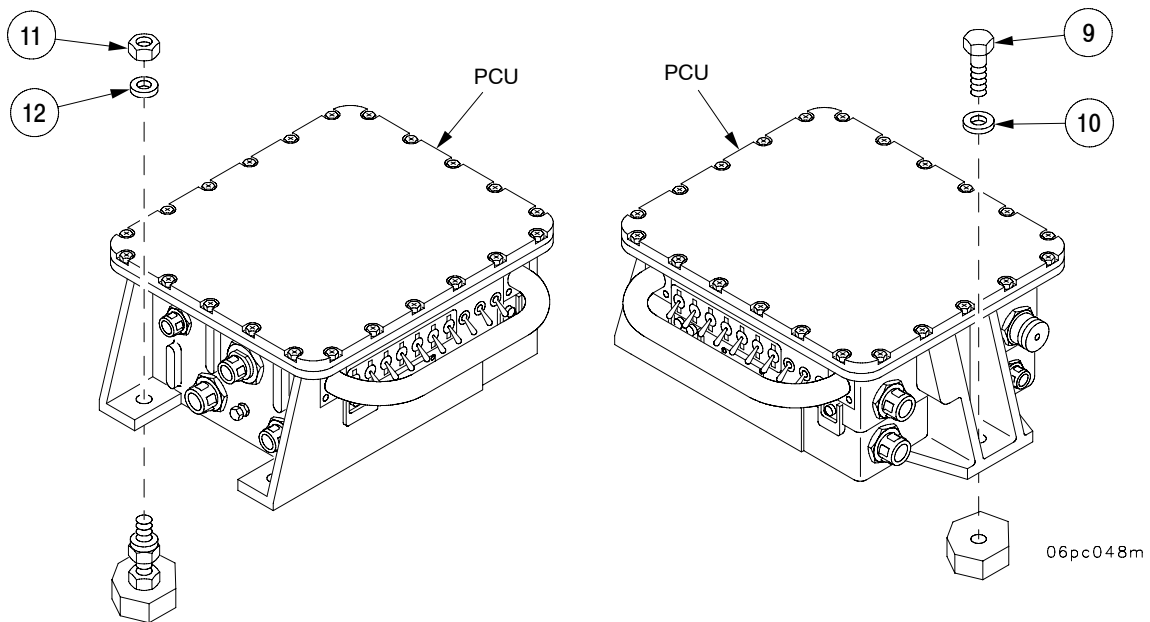
06pc047m



## 8-16 POWER CONDITIONING UNIT (PCU) - CONTINUED

### b. Installation.

- 1 Apply sealing compound to screw (9).
- 2 Install PCU in cab and secure with two flat washers (12), two nuts (11), flat washer (10), and screw (9).



**8-16 POWER CONDITIONING UNIT (PCU) - CONTINUED**

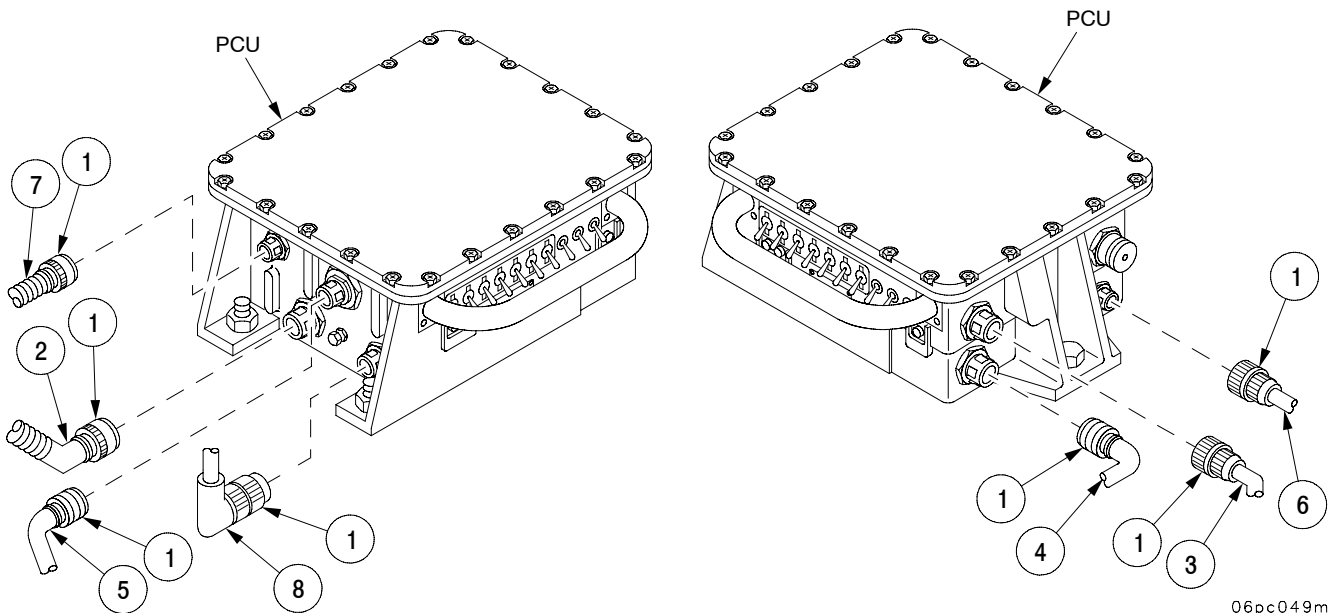
**b. Installation - Continued**

**CAUTION**

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

3 Push the following connector halves together, then hand tighten coupling nuts (1):

- (a) P1 of W1A (2) to J1 on PCU.
- (b) P3 of W25 (3) to J3 on PCU.
- (c) P1 of W50 (4) to J4 on PCU.
- (d) P2 of W65 (5) to J5 on PCU (if connected).
- (e) P1 of W26 (6) to J7 on PCU.
- (f) P2 of W27 (7) to J8 on PCU.
- (g) P6 of W93A (8) to J6 on PCU.



06pc049m

## 8-17 DISPLAY UNIT (DU).

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

#### a. Removal.

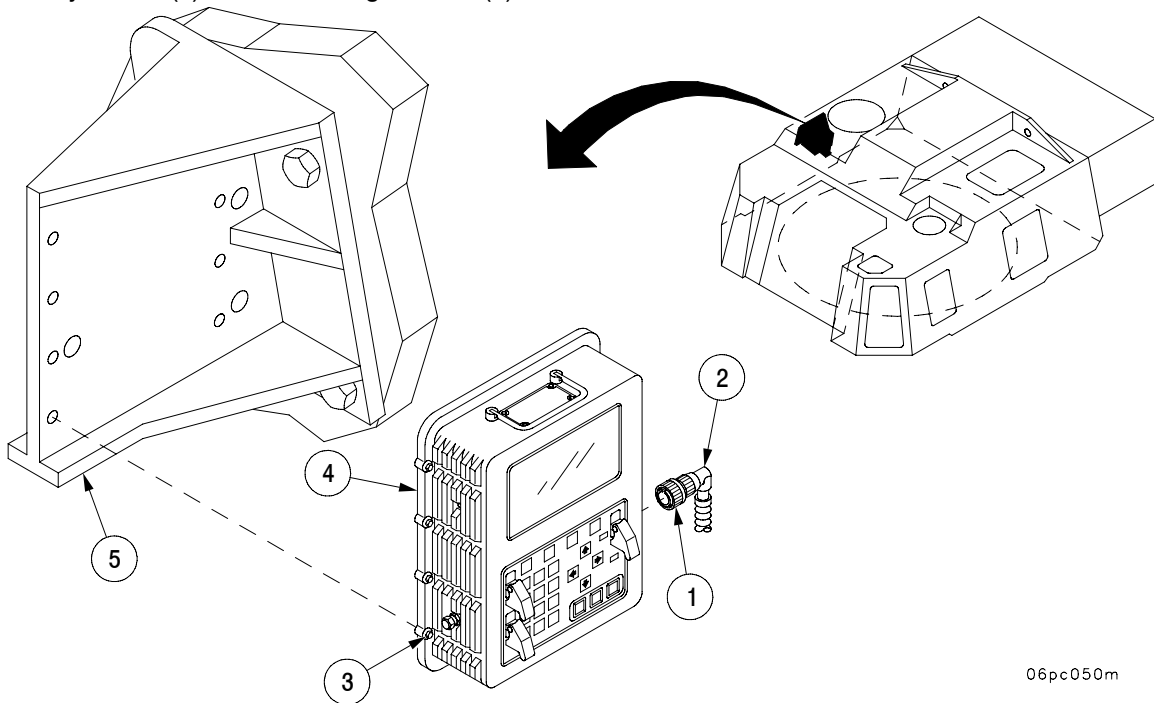
#### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### NOTE

Document AFCS data prior to removing/replacing DU box.

- 1 Remove connector from the CU by unscrewing coupling nut (1) and pulling connector P2 of W22A (2) apart from J1 on DU.
- 2 Loosen 8 captive screws (3) securing DU (4) to mounting bracket (5).
- 3 Carefully lift DU (4) from mounting bracket (5).



06pc050m

## 8-17 DISPLAY UNIT (DU) - CONTINUED

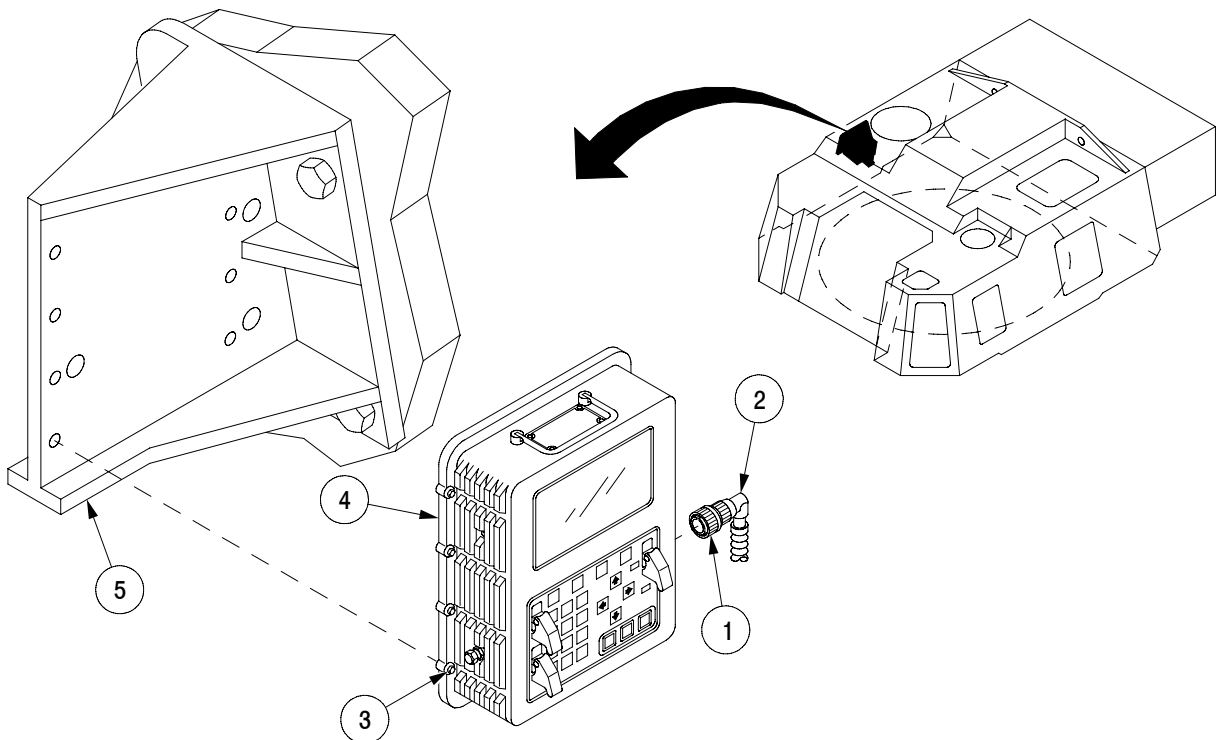
### b. Installation.

- 1 Position DU (4) on mounting bracket (5) and align mounting holes.
- 2 Secure DU (4) to mounting bracket (5) with 8 captive screws (3).

### CAUTION

Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 3 Push the connector halves P2 of W22A (2) to J1 on DU together, then hand tighten coupling nut (1).



06pc050m

## 8-18 DU BRACKET ASSEMBLY.

This task covers:      a. Removal                              b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Socket wrench (item 49, Appx G)  
Torque wrench (item 54, Appx G)

#### Equipment Conditions

Display unit removed (para 8-17)  
COS control handle removed  
(para 18-29)

#### Materials/Parts

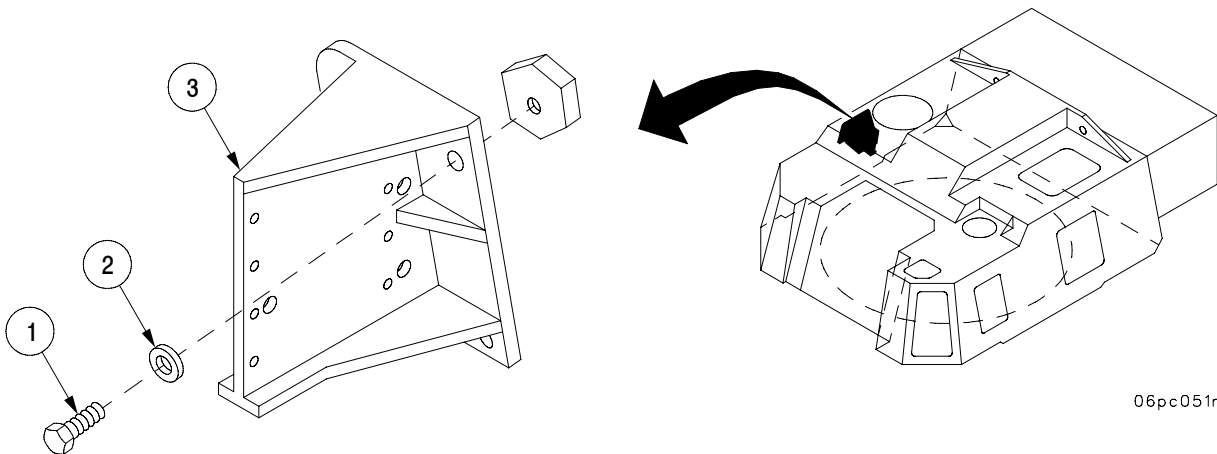
Sealing compound (item 41, Appx C)

#### a. Removal.

Remove four mounting bolts (1), four flat washers (2), and bracket assembly (3).

#### b. Installation.

- 1 Apply sealing compound to mounting bolts (1).
- 2 Position bracket assembly (3) on cab wall and secure with four mounting bolts (1) and four flat washers (2). Torque bolts to 190-210 lb-ft (257-284 N·m).



06pc051m



**8-19 PROGNOSTIC/DIAGNOSTIC INTERFACE UNIT (PDIU) - CONTINUED**

**b. Installation.**

**CAUTION**

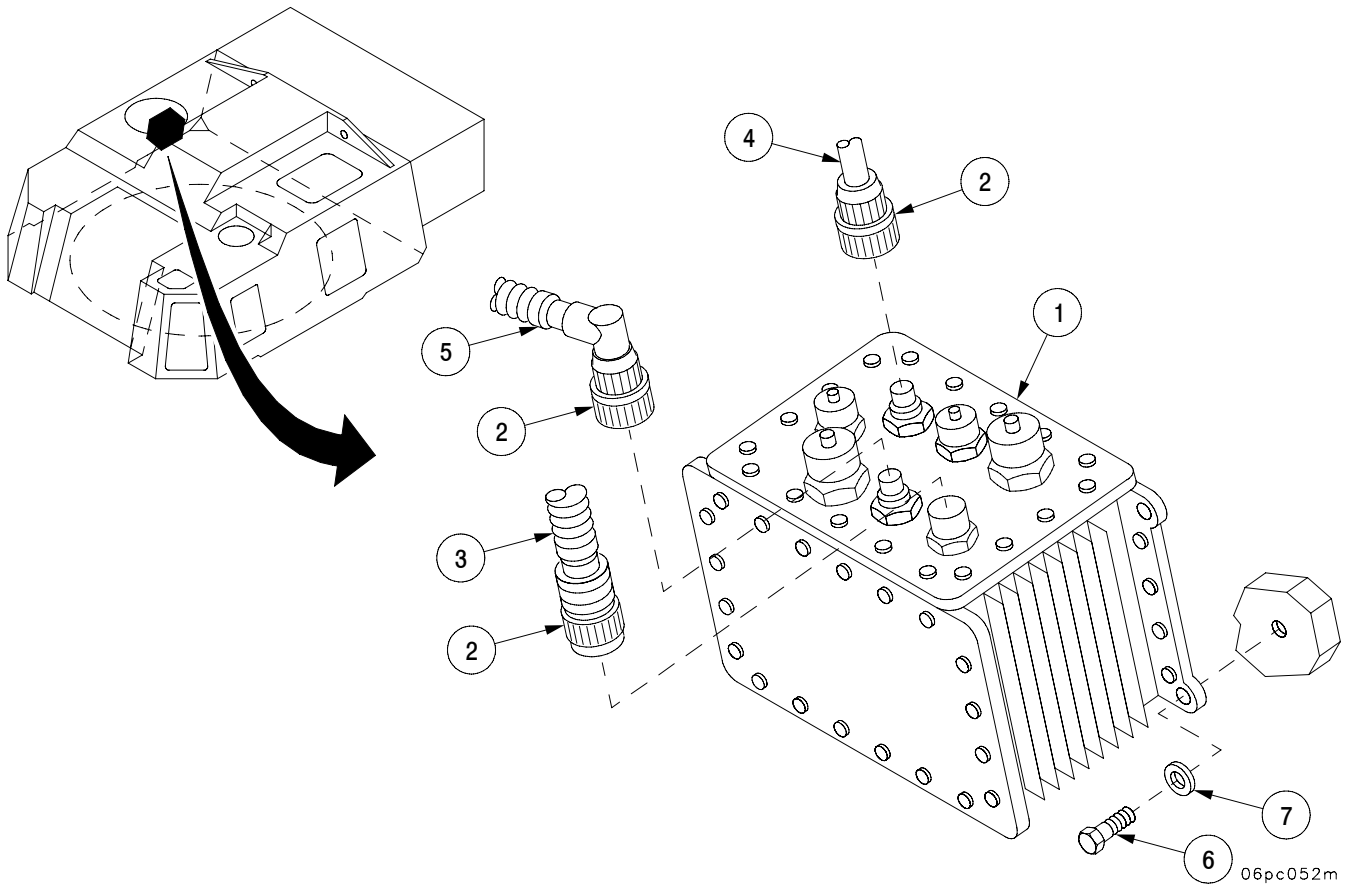
Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Apply sealing compound to screws (6).
- 2 Position PDIU (1) on cab wall and install with three screws (6) and three flat washers (7).
- 3 Push the following connector halves together, then hand tighten coupling nuts (2).
  - (a) P1 of W65 (3) to J6 on PDIU (1).
  - (b) P1 of W15 (4) to J3 on PDIU (1).
  - (c) P2 of W1A (5) to J1 on PDIU (1).

**NOTE**

If the PDIU was replaced, the replacement PDIU must be reprogrammed.

- 4 Reprogram the PDIU using the SPORT, accessory kit and TB 9-2350-314-20-2-1 (CD).



## 8-20 VALVE CORE AND CAP, AFCS UNITS.

This task covers:      a. Removal                                      b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Fire control purging/charging tool kit (item 22, Appx G)

Pneumatic tire valve repair tool (item 30, Appx G)

### NOTE

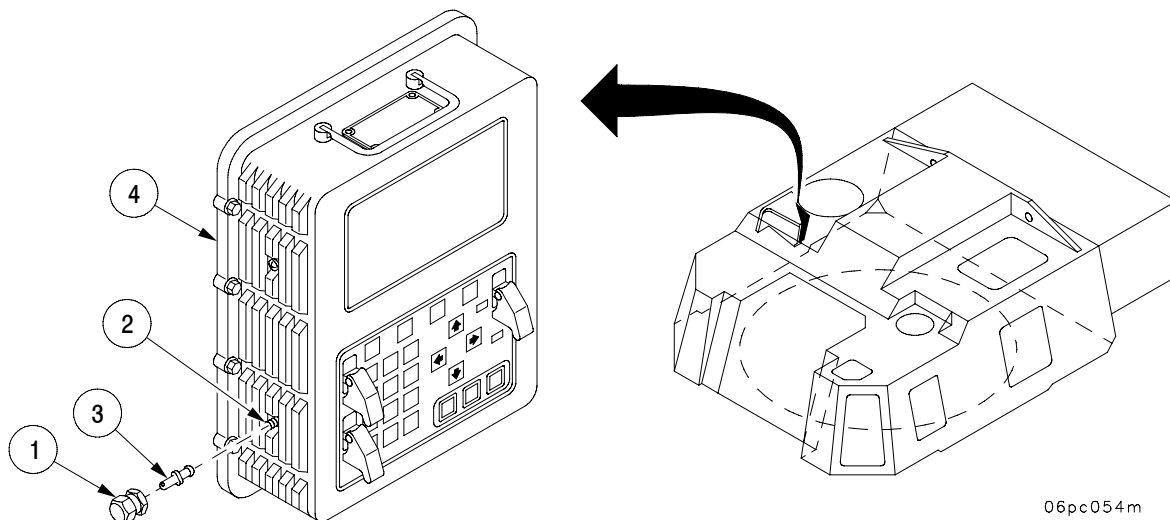
The procedure to remove and install valve cores and caps are identical. The DU is depicted in illustration.

#### a. Removal.

- 1 Remove valve cap (1) from valve stem (2).
- 2 Depress valve core (3) and discharge unit (4).
- 3 Remove valve core (3) from valve stem (2).

#### b. Installation.

- 1 Install valve core (3) in valve stem (2).
- 2 Purge and charge AFCS unit (4) (Chapter 28).



06pc054m



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## 8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE.

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### AUTOMATIC FIRE CONTROL SYSTEM (AFCS) ALIGNMENT PROCEDURE

Fire control alignment is necessary with the AFCS to compensate for deltas between what the DRU is reading and known data. Elevation and azimuth alignments must be performed in order to boresight the DRU with the gun tube. Roll, Quadrant Elevation, and Azimuth Offsets are stored in the AFCS and the NAV System. If the AFCS and NAV System offsets do not match within  $\pm 0.5$  mils, the AFCS will display an alert that a Fire Control Alignment must be performed. These offsets, once stored, are used during all aiming of the tube during fire missions. Before beginning the alignment procedure, affix crosshairs to the muzzle.

#### NOTE

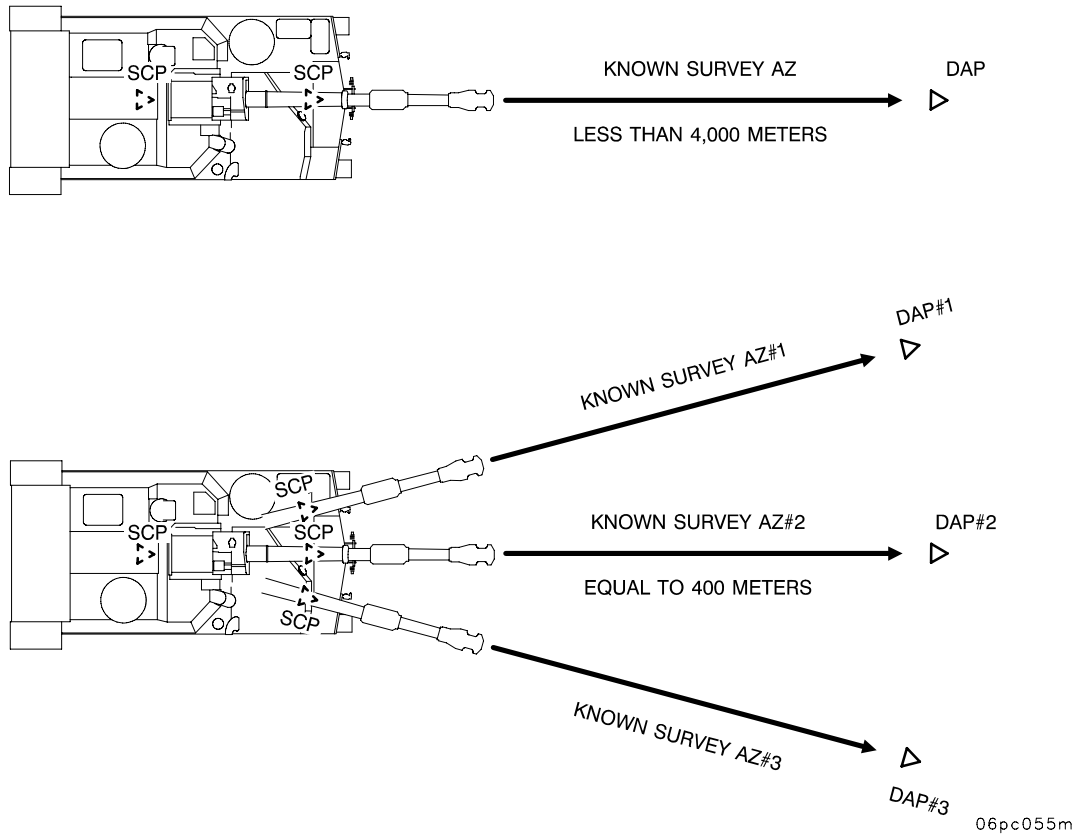
To speed the process, it is desirable to perform the complete fire control alignment for both elevation and azimuth at one location, but it can be done at two locations; one for elevation and one for azimuth.

The howitzer work area should be a reasonably level pad. For the elevation alignment, a plumb line is required. For the azimuth alignment, a distant aiming point (DAP) is required that can be sighted through the gun tube muzzle and the howitzer's location must also be a surveyed point.

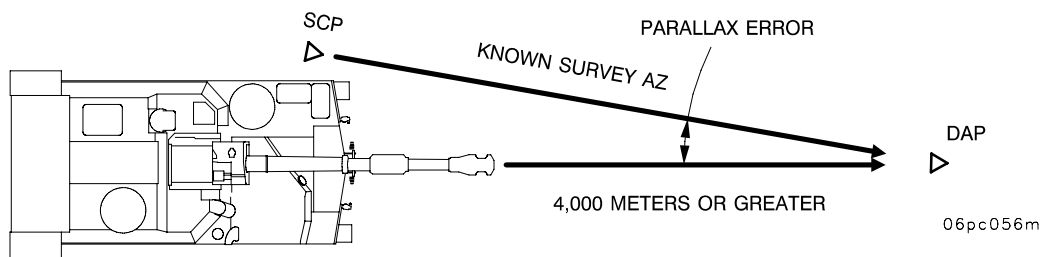
It is desirable that the howitzer's surveyed point be an identified mark on a concrete pad that cannot be moved or damaged, since howitzers will be pulling over this point frequently. The preferred location for the howitzer's surveyed point is directly under the center of rotation of the howitzer turret. The second most desirable location is in front of the vehicle directly under the tube when pointed at the DAP. If the howitzer's surveyed point is directly under the howitzer turret or under the tube, the DAP can be any distance from the howitzer, but the farther away the DAP is, the less error you will have. The least desirable location is near the left front sprocket. If the howitzer's surveyed point is near the left front sprocket, the DAP must be at least 4000 meters from the howitzer.

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**AUTOMATIC FIRE CONTROL SYSTEM (AFCS) ALIGNMENT PROCEDURE - CONTINUED**



For 400 meters one survey control point and three DAPs are needed. The howitzers surveyed point and DAP should be surveyed to the 4th order survey accuracy or better and the UTM coordinates recorded. The three DAPs azimuth should be established by survey and recorded.



The 4,000 meters is the preferred method of alignment. The howitzer's surveyed point and the DAP should be surveyed to 4th order survey accuracy or better and the UTM coordinates recorded. The reference grid azimuth from the howitzer's surveyed point to the DAP should be of 5th order survey accuracy or better and should be recorded. Reference FM 6-2, Appendix E.

The Fire Control Alignment should be done in this order:

1. Enter Roll Offset
2. Enter Quadrant Elevation Offset
3. Enter Azimuth Offset.

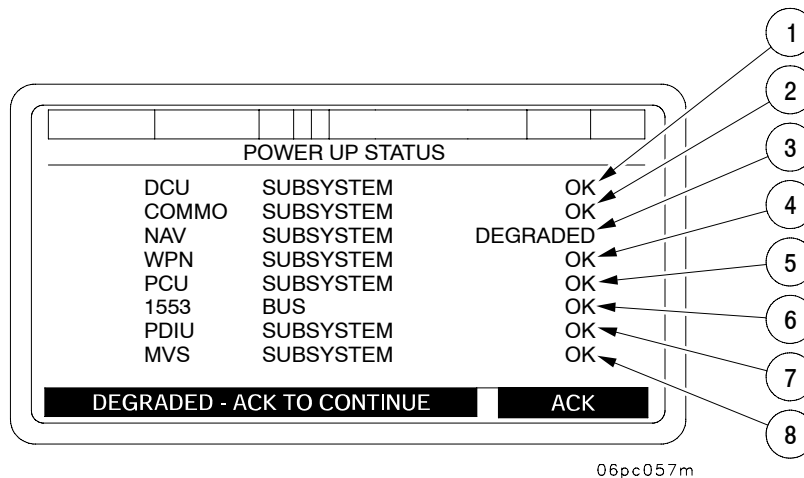
**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.1 Initialization.**

- a. Pull the howitzer into position in front of a plumb line, on reasonably level ground, in accordance with the procedures listed in the vehicle operator’s manual TM 9-2350-314-10, paragraph 3-10.3.
- b. With the tube in travel lock, power up the AFCS. Read the AFCS POWER UP STATUS screen. Also read any alert messages that may appear on the softkey line at the bottom of the screen, then press the ACK softkey.

**NOTE**

A Fire Control Alignment can be conducted so long as the status of the DCU and NAV Systems are OK or DEGRADED. A Fire Control Alignment cannot be conducted if either system has a status of OUT.



In the event of a failure during POWER UP STATUS, the message DEGRADED-ACK TO CONTINUE, will be displayed at the bottom line of the EL panel. To continue, press soft key under ACK.

- |                       |                       |
|-----------------------|-----------------------|
| 1 (OK, DEGRADED)      | 5 (OK, OUT)           |
| 2 (OK, DEGRADED, OUT) | 6 (OK, DEGRADED, OUT) |
| 3 (OK, DEGRADED, OUT) | 7 (OK, DEGRADED)      |
| 4 (OK, DEGRADED, OUT) | 8 (OK, OUT)           |

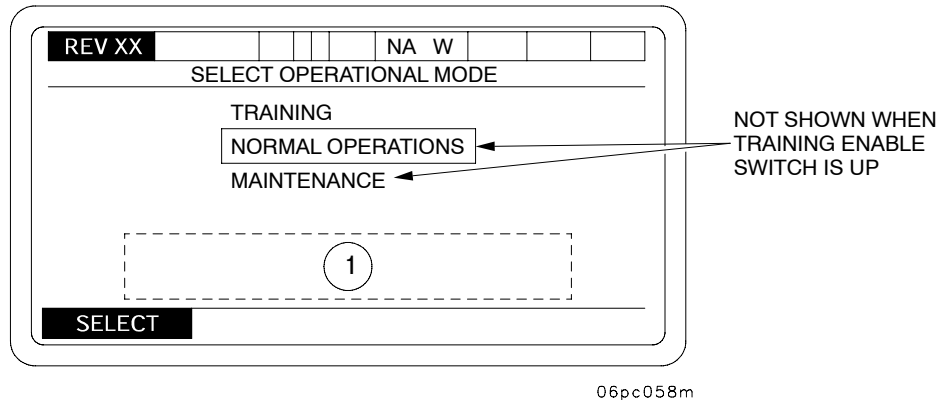
---

## 8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED

---

### 8-21.1 Initialization - Continued

- c. Select NORMAL OPERATIONS from the SELECT OPERATIONAL MODE screen.

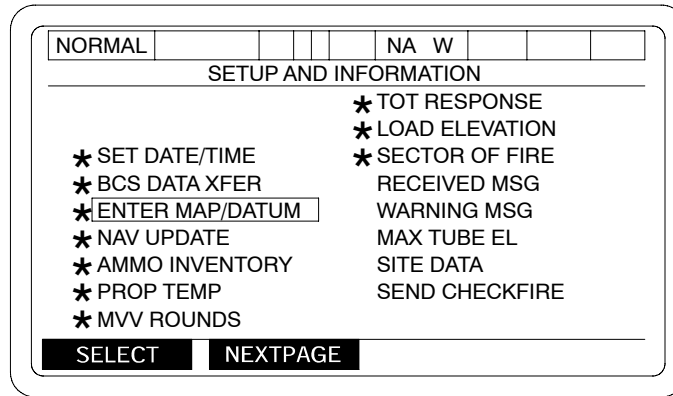


- ① POSITION TRAINING ENABLE SWITCH DOWN  
TO SELECT OTHER MODES
- POSITION TRAINING ENABLE SWITCH UP  
TO SELECT TRAINING MODE

- d. Press USE ALL softkey on the NET ACCESS and NET ADDRESS screens to get to the SETUP AND INFORMATION screen. Select ENTER MAP/DATUM menu item from the SETUP AND INFORMATION screen and verify/change SPHEROID, DATUM, GRID ZONE, and HEMISPHERE entries to the local map data. (It is not necessary to enter SW and NE Easting/Northing values during a Fire Control Alignment.)

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

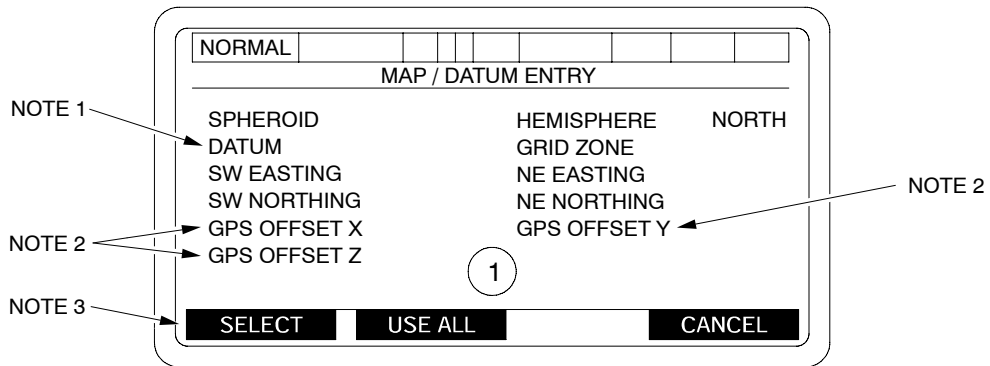
**8-21.1 Initialization - Continued**



06pc059m

**NOTE**

The crew normally receives the MAP/DATUM from BCS. This menu item is included for those times when BCS is not available and the MAP/DATUM needs to be changed.



06pc060m

Values for display data fields above are given on the next page.

---

## 8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED

---

### 8-21.1 Initialization - Continued

NOTE 1: Selection of DATUM transitions to the SELECT DATUM menu.

NOTE 2: Displayed only when the Datum selected is USERDEF.

NOTE 3: When HEMISPHERE is selected you will be asked:

CHANGE HEMISPHERE? YES NO

①

Operator prompt area:

When SPHEROID is selected:

A SELECT SPHEROID menu is displayed;

Operator selects desired Spheroid code and presses "USE ALL".

When DATUM is selected:

A SELECT DATUM menu is displayed for the

Datums available to the Spheroid in use. Operator selects desired Datum code and presses "USE ALL".

When SW EASTING is selected:

TYPE SOUTHWEST CORNER OF EASTING

BETWEEN 0 AND 999999

PRESS ENT KEY

When SW NORTHING is selected:

TYPE SOUTHWEST CORNER OF NORTHING

BETWEEN 0 AND 11000000

PRESS ENT KEY

When GRID ZONE is selected:

TYPE GRID ZONE

1 TO 60

PRESS ENT KEY

When NE EASTING is selected:

TYPE NORTHEAST CORNER EASTING

BETWEEN 0 AND 999999

PRESS ENT KEY

When NE NORTHING is selected:

TYPE NORTHEAST CORNER NORTHING

BETWEEN 0 AND 11000000

PRESS ENT KEY

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.1 Initialization - Continued**

NORMAL

SELECT DATUM

LUZ-A NAS-C NAS-D NAS-E NAS-N  
OHA-M USRDEF

USRDEF

SELECT CANCEL

06pc061m

NOTE: ID code USRDEF is always the last entry in the selection list.

**ENTER USER DATUM PARAMETERS**

NORMAL

ENTER USER DATUM PARAMETERS

GPS OFFSET X  
GPS OFFSET Y  
GPS OFFSET Z

1

SELECT 2 CANCEL

06pc062m

- 1 When any field selected:  
TYPE OFFSET  
BETWEEN -2000.0 AND +2000.0  
PRESS ENT KEY
- 2 When a field is selected:  
+/-  
Otherwise: USE ALL

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.1 Initialization - Continued**

- e. Select NAV UPDATE from the SETUP AND INFORMATION screen and enter EASTING, NORTHING, ALTITUDE from the howitzer survey point. Press USE ALL softkey.

NORMAL							
NAVIGATION SUBSYSTEM UPDATE							
EASTING	500000						
NORTHING	100	GET CURR NAV POSN					
ALTITUDE	0						
GRID ZONE	1	GET LAST ENT POSN					
HEMISPHERE	NORTH	GET CURR GPS POSN					
SPHEROID	2	NAV POSITION UPDT					
DATUM	USRDEF						
SELECT		USE ALL		CANCEL			

06pc063m

**NOTE**

If a new DRUH mounting plate, trunnion or cannon tube has been installed, the ALN timer will not appear on top of screen until a roll offset of 0.0, elevation offset of +88.9 and azimuth offset of 0.0 has been entered.

- f. Complete initialization of the AFCS by selecting each menu item with an "\*" on the SETUP AND INFORMATION screen and pressing the USE ALL, NO and CANCEL softkeys or ENT key as necessary.

NORMAL					NA W		
SETUP AND INFORMATION							
		*TOT RESPONSE					
* SET DATE/TIME		* LOAD ELEVATION					
* BCS DATA XFER		* SECTOR OF FIRE					
* ENTER MAP/DATUM		RECEIVED MSG					
* NAV UPDATE		WARNING MSG					
* AMMO INVENTORY		MAX TUBE EL					
* PROP TEMP		SITE DATA					
* MVV ROUNDS		SEND CHECKFIRE					
SELECT		NEXTPAGE					

NORMAL					NA W		
SETUP AND INFORMATION							
						STORED TARGETS	
TUBE TEMPERATURE		AFCS STATUS					
NET ACCESS		DISPLAY FORMAT					
NET ADDRESS		DISPLAY INTENSITY					
MUZZLE VELOCITY							
SYSTEM RESTART		GPS CONTROL					
SELECT		*NEXTPAGE					

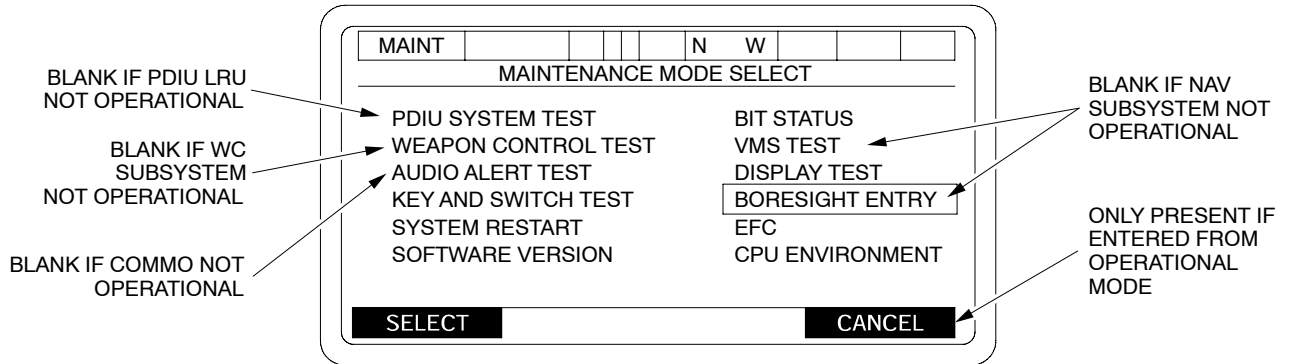
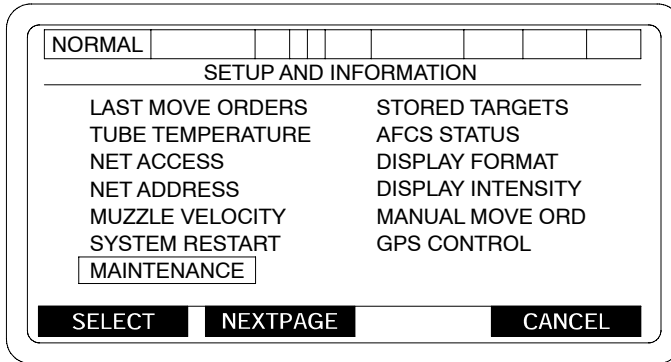
06pc064m



**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.1 Initialization - Continued**

- g. Select MAINTENANCE from the SETUP AND INFORMATION screen. Select BORESIGHT ENTRY from the MAINTENANCE MODE SELECT screen.



06pc065m

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.1 Initialization - Continued**

- h. Record the ROLL OFFSET, EL OFFSET, and AZ OFFSET values under the CURRENT NAV and CURRENT AFCS sides of the BORESIGHT ANGLE ENTRY screen.

06pc066m

Listed below are the legal values for each field of FD-33.

- CURRENT AZ = 0.0..6399.9 mils
- CURRENT EL = -200.0..+1600.0 mils
- ROLL OFFSET = -99.9..+99.9 mils (default = 0.0 mils)
- EL OFFSET = -999.9..+999.9 mils (default = 0.0 mils)
- AZ OFFSET = -99.9..+99.9 mils (default = 0.0 mils)

CURRENT NAV NOT AVAILABLE = Data for offsets is not available from the Navigation Subsystem  
 CURRENT AFCS NOT AVAILABLE = Data for offsets is not available from the AFCS

When ROLL OFFSET selected:

TYPE ROLL OFFSET BETWEEN - 99.9 AND +99.9 MILS  
 - PRESS ENT KEY -

When EL OFFSET selected:

TYPE EL OFFSET BETWEEN -999.9 AND +999.9 MILS  
 - PRESS ENT KEY -

When AZ OFFSET selected:

TYPE AZ OFFSET BETWEEN -99.9 AND +99.9 MILS  
 - PRESS ENT KEY -

**NOTE**

When a numeric entry is selected, the FINISHED key becomes the “±” key.

---

## 8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED

---

### 8-21.1 Initialization - Continued

- i. As a starting point, enter 0 (zero) values on the CURRENT AFCS side of the BORESIGHT ANGLE ENTRY screen for ROLL OFFSET, EL OFFSET, and AZ OFFSET. Press SEND softkey, and the zero values should appear on the CURRENT NAV side of the screen.

#### NOTE

The Roll Offset is adjusted and measured when the Navigation System Mounting Plate is installed. If there is a ROLL OFFSET value in the vehicle logbook, then enter the value in ROLL OFFSET on the CURRENT AFCS side of the BORESIGHT ANGLE ENTRY screen, otherwise enter a ROLL OFFSET of 0.

If it had not already done so, the ALN timer should now appear at the top of the screen and start counting down.

- j. Allow the navigation system to complete a full alignment (ALN timer goes to zero and disappears from the top of the screen). When fully aligned, proceed to Quadrant Elevation Alignment.

### 8-21.2 Quadrant Elevation Alignment.

#### NOTE

An optical Fire Control Alignment on the M145A1 Mount can be performed at the same time.

- a. Unstow the tube and check trunnion level using a plumb line, muzzle crosshair, and a breech boresight disk (other options are small periscope device that fits into the primer chamber or the primer chamber itself). Refer to TM 9-2350-314-10, paragraph 3-10.3 for instructions on leveling the trunnions.

#### NOTE

Ensure the muzzle quadrant seat at the tube muzzle is free of dirt and paint.

- b. Using the upper surface (about one inch wide) of muzzle quadrant seat on the tube and a gunner's quadrant, level the tube to 0 (zero) mils. Use the machined edge to align the feet of the gunner's quadrant, and ensure the feet are on the flat portion of the surface.

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.2 Quadrant Elevation Alignment - Continued**

**NOTE**

Reverse the gunner's quadrant (end-for-end) to verify calibration. It should read level in both directions. If not, perform gunner's quadrant end-for-end test and determine end-for-end correction (refer to paragraph 3-10.5 in TM 9-23250-314-10).

- c. Check for elevation movement (commonly referred to as "creep"). If tube "creeps" up or down, perform adjustment of elevation system in accordance with TM 9-2350-314-10, paragraph 3-8.2 before proceeding with alignment.
- d. Apply end-for-end correction (if any) to the gunner's quadrant. With the tube at 0 mils at the muzzle, measure and record the breech correction (difference between muzzle and breech elevation) using the gunner's quadrant on the breech elevation seats (refer to paragraph 3-10.5 in TM 9-2350-314-10).
- e. Begin measurements and recordings of the tube elevation vs CURRENT EL value on the CURRENT NAV side of the BORESIGHT ANGLE ENTRY screen. Also record the delta between the tube elevation and CURRENT EL. M145A1 Mount Elevation measurements and recordings may also be made at the same time (be sure to level the bubbles).

NORMAL									
BORESIGHT ANGLE ENTRY									
CURRENT NAV					CURRENT AFCS				
CURRENT AZ _____.__					CANNON TYPE XM284				
CURRENT EL _____.__					ROLL OFFSET _____.__				
ROLL OFFSET _____.__					EL OFFSET _____.__				
EL OFFSET _____.__					AZ OFFSET _____.__				
AZ OFFSET _____.__									
<div style="display: flex; justify-content: center; align-items: center; gap: 10px;"> <span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">1</span> </div>									
<b>SELECT</b>		<b>FINISHED</b>			<b>SEND</b>		<b>CANCEL</b>		

06pc066m

- f. Make measurements at 0, 400, 800, and 1200 mils. Set the gunner's quadrant to each elevation step PLUS the total correction (end for end and breech correction) on the gunner's quadrant. Place the gunner's quadrant on the Breech elevation seats and elevate the tube till the gunner's quadrant bubble is exactly level. Read and record the CURRENT EL. Subtract CURRENT EL from tube elevation and record the delta difference in mils.

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.2 Quadrant Elevation Alignment - Continued**

- g. Repeat the measurements in para 8-21.2f at elevations of 1000, 600, 200, and 0 mils.
- h. On the last reading of 0 mils, adjust the gunner's quadrant back to 0 mils and place it on the muzzle seat to verify the tube also returned to 0 mils. If the tube is not at 0 (zero) mils, recheck your measurements from the beginning.
- i. Calculate the AVERAGE DELTA. An example of what your record should look like is as follows:

EXAMPLE OF QUADRANT ELEVATION ALIGNMENT RECORDINGS  
(ALL MEASUREMENTS IN MILS)

TUBE ELEV (1)	-	AFCS CUR EL	=	DELTA (2)
0	-	-2.3	=	+2.3
400	-	+397.6	=	+2.4
800	-	+797.6	=	+2.4
1200	-	+1197.5	=	+2.5
1000	-	+997.5	=	+2.5
600	-	+597.6	=	+2.4
200	-	+197.7	=	+2.3
0	-	-2.4	=	<u>+2.4</u>
Add DELTA Entries				+19.2
AVERAGE DELTA (3)				+2.4

(1) APPLY THE TOTAL CORRECTION PLUS THE TUBE ELEVATION ON THE GUNNER'S QUADRANT. For example:

-2.4 mils total correction plus 400 mils Tube Elev = 403.1 mils on gunner's quadrant.

(2) TUBE ELEV - AFCS current EL = DELTA. For example:

0	-	(+2.3)	=	+2.3
400	-	(+397.6)	=	+2.4

(3) TO CALCULATE AVERAGE DELTA, ADD ALL THE DELTA ENTRIES AND DIVIDE BY THE TOTAL NUMBER OF MEASUREMENT READINGS. For example:

Add all Delta Entries	=	+19.2
Total Number of Readings	=	8
AVERAGE DELTA (+19.2)	=	+2.4

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.3 Entering the Elevation Offset.**

- a. Enter the AVERAGE DELTA from step 8-21.2i into the EL OFFSET entry location on the CURRENT AFCS side of the BORESIGHT ANGLE ENTRY screen (set the proper plus/minus sign with the ± softkey). Some examples:

EXAMPLE 1 (AVERAGE DELTA of +87.2 mils)

Current EL OFFSET entry reads	0.0 mils
ENTER AVERAGE DELTA	+87.2 mils
New EL OFFSET entry reads	+87.2 mils

EXAMPLE 2 (AVERAGE DELTA of -2.1 mils)

Current EL OFFSET entry reads	0.0 mils
ENTER AVERAGE DELTA	-2.1 mils
New EL OFFSET entry reads	-2.1 mils

The screenshot shows a screen titled "BORESIGHT ANGLE ENTRY" with a "NORMAL" indicator at the top left. The screen is divided into two columns: "CURRENT NAV" and "CURRENT AFCS".

CURRENT NAV		CURRENT AFCS	
CURRENT AZ	0.0	CANNON TYPE	XM284
CURRENT EL	0.0	ROLL OFFSET	0.0
ROLL OFFSET	0.0	EL OFFSET	0.0
EL OFFSET	0.0	AZ OFFSET	0.0
AZ OFFSET	0.0		

At the bottom of the screen, there are four buttons: SELECT, FINISHED, SEND, and CANCEL. The EL OFFSET field in the AFCS column is highlighted with a rectangular box.

06pc067m

- b. After the number is correctly entered, press the SEND softkey. See the same Elevation Offset value appear on the CURRENT NAV side of the BORESIGHT ANGLE ENTRY screen (indicates the NAV System accepted the entry).
- c. Verify the Elevation Offset brought the AFCS into elevation alignment by repeating the procedure in para 8-21.2f at 0, 800, and 1200 mils.
- d. If the elevation measurements are within tolerance ( $\pm 0.5$  mils), proceed to paragraph 8-21.4 AZIMUTH ALIGNMENT. The Elevation Offset entry is complete. If the elevation measurements are not within tolerance, repeat the procedure from para 8-21.1a.

---

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

---

**8-21.4 Azimuth Alignment.****NOTE**

Fire Control Alignment for Azimuth should be done only after the Roll and Elevation Offsets have been entered.

The Fire Control Alignment is not degraded by movement. Therefore, you may leave the AFCS powered on and move the howitzer to a new location to complete the Azimuth Alignment, but you must take the following precautions.

If you have just completed the Elevation Offset entry and you have to move to another location to perform the Azimuth Alignment, then press the FINISHED softkey on the BORESIGHT ANGLE ENTRY screen, which takes you back to the MAINTENANCE MODE SELECT screen. This will assure that the Roll and Elevation Offset entries are not accidentally lost during movement. When you arrive at your new destination, you must get back to the BORESIGHT ANGLE ENTRY screen to continue.

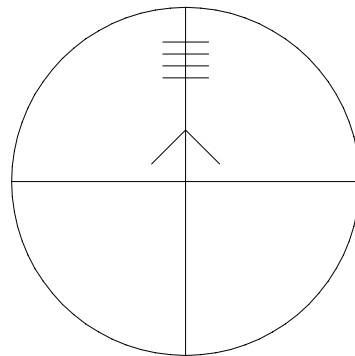
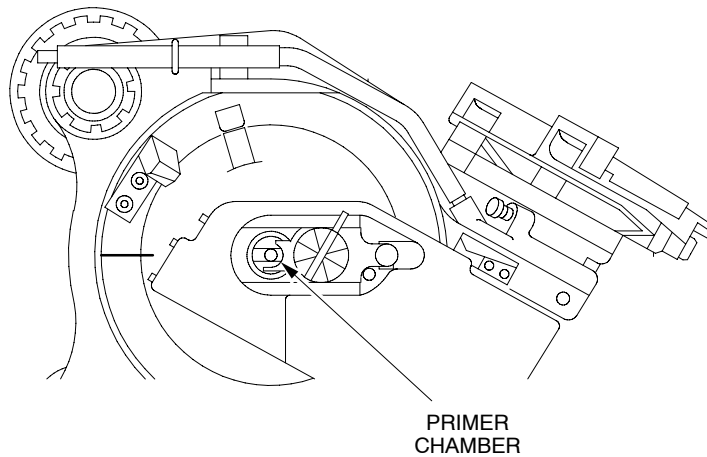
This procedure requires two carefully surveyed points. One point must be a distant aiming point (DAP) and must have a trig marker or some other marker that will allow boresighting on it through the tube with muzzle crosshairs and breech boresight device. The second point is the position where the vehicle will be located to perform the alignment. The howitzer's surveyed point should be firmly set so that vehicles pulling over it will not destroy or move it.

- a. Note the following precautions concerning the position of the howitzer at the surveyed point:
  - (1) Refer to the figure at the beginning of this section. If the DAP is at least 4,000 meters from the howitzer's surveyed point, then it would be acceptable to pull the howitzer's left front sprocket within 1 meter (1 foot if possible) of the surveyed point. The parallax error should be on the order of 0.5 mils. This is based on pulling the howitzer's left sprocket to within 1 meter of the surveyed point, which means the gun tube is offset from the surveyed point about 2 meters (2 meters divided by 4,000 meters = 0.0005), or 0.5 mils parallax error.

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.4 Azimuth Alignment - Continued**

- (2) If the DAP is less than 4,000 meters from the howitzer's surveyed point, then there are two better alternatives for positioning the howitzer so that parallax error is minimized. The preferred method is to position the howitzer so that the howitzer surveyed point is directly under the approximate center of turret rotation. An alternate method is to position the howitzer so that the howitzer's surveyed point is directly under the gun tube in front of the vehicle when the tube is pointed at the DAP.
  - (3) If the DAP is 400 meters from the howitzer's surveyed point, the preferred method is to position the howitzer so that the howitzer surveyed point is directly under the approximate center of turret rotation.
- b. Using the muzzle crosshairs and the primer chamber or a breech boresight disk (or optional magnified sighting equipment) traverse the turret until the tube is sighted on the DAP. If the DAP is difficult to see use the PANTEL to get close, but always complete the procedure by sighting through the tube using the crosshairs.



MUZZLE CROSSHAIRS IMPOSED ON  
DISTANT AIMING POINT

06pc068m



**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.4 Azimuth Alignment - Continued**

(Greater than 400 meters and 4,000 meters)

The screenshot shows a terminal window titled "BORESIGHT ANGLE ENTRY". At the top left is a "NORMAL" button. Below the title, there are two columns of data: "CURRENT NAV" and "CURRENT AFCS".

CURRENT NAV	CURRENT AFCS
CURRENT AZ ____ . __	CANNON TYPE XM284
CURRENT EL ____ . __	ROLL OFFSET ____ . __
ROLL OFFSET ____ . __	EL OFFSET ____ . __
EL OFFSET ____ . __	AZ OFFSET ____ . __
AZ OFFSET ____ . __	

At the bottom of the screen, there are four buttons: "SELECT", "FINISHED", "SEND", and "CANCEL". A circled number "1" is positioned above the "FINISHED" button.

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- c. Read and record the CURRENT AZ on the CURRENT NAV side of the BORESIGHT ANGLE ENTRY screen. Subtract the CURRENT AZ value FROM the known surveyed azimuth and record the Azimuth Delta. MAKE SURE YOU ALSO RECORD THE PLUS (+) OR MINUS (-) SIGN FOR THE DELTA. IT IS IMPORTANT. Some examples:

EXAMPLE 1:

Surveyed Azimuth	4848.98 mils
SUBTRACT CURRENT AZ	<u>4847.6 mils</u>
	+1.38 mils (round to nearest .1 mil)
Azimuth Delta	+1.4 mils

EXAMPLE 2:

Surveyed Azimuth	4848.98 mils
SUBTRACT CURRENT AZ	<u>4850.2 mils</u>
	-1.22 mils (round to nearest .1 mil)
Azimuth Delta	-1.2 mils

- d. Traverse the tube about 200 mils to either side of the DAP and repeat the procedures in para 8-21.4b and c above. Verify the computed Azimuth Delta.
- e. Proceed to paragraph 8-21.5 ENTERING THE AZIMUTH OFFSET or continue with step f performing 400 meter alignment.

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.4 Azimuth Alignment - Continued**

(400 meters)

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- f. Read and record the CURRENT AZ on the CURRENT NAV side of the BORESIGHT ANGLE ENTRY screen for each of three DAPs.
- g. Average the deltas of the three DAPs.
- h. Subtract the CURRENT AZ value FROM the known surveyed azimuth and record the Azimuth Delta. MAKE SURE YOU ALSO RECORD THE PLUS (+) OR MINUS (-) SIGN FOR THE DELTA. IT IS IMPORTANT. Some examples:

EXAMPLE 1:

Surveyed Azimuth	400.00 mils
SUBTRACT CURRENT AZ	<u>399.10 mils</u>
	+0.90 mils (round to nearest .1 mil)
Azimuth Delta	+0.9 mils

EXAMPLE 2:

Surveyed Azimuth	400.00 mils
SUBTRACT CURRENT AZ	<u>401.1 mils</u>
	-1.10 mils (round to nearest .1 mil)
Azimuth Delta	-1.1 mils

EXAMPLE 3:

Surveyed Azimuth	476.60 mils
SUBTRACT CURRENT AZ	<u>475.3 mils</u>
	+1.30 mils (round to nearest .1 mil)
Azimuth Delta	+1.3 mils

---

## 8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED

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### 8-21.4 Azimuth Alignment - Continued

Calculate Average deltas of the three DAPs.

Azimuth Delta #1	+0.90 mils
Azimuth Delta #2	-1.1 mils
Azimuth Delta #3	<u>+1.3</u> mils
Sum Delta #1, #2, #3	+1.1 mils
	+0.36 mils (rounded to the nearest .1 mil)
Average Azimuth Delta	+0.4 mils

- i. Proceed to paragraph 8-21.5.

### 8-21.5 Entering the Azimuth Offset.

- a. Enter the verified Azimuth Delta into the AZ OFFSET entry position on the CURRENT AFCS side of the BORESIGHT ANGLE ENTRY screen (set the proper plus or minus sign with the  $\pm$  softkey). Some examples:

EXAMPLE 1 (Azimuth Delta of +1.4 mils)

Current AZ OFFSET reads	0.0 mils
Enter Azimuth Delta	+1.4 mils
New AZ OFFSET entry reads	+1.4 mils

EXAMPLE 2 (Azimuth Delta of -1.2 mils)

Current AZ OFFSET reads	0.0 mils
Enter Azimuth Delta	-1.2 mils
New AZ OFFSET entry reads	-1.2 mils

- b. Verify the Azimuth Delta is correctly entered and press the SEND softkey. See the same Azimuth Offset value appear on the CURRENT NAV side of the BORESIGHT ANGLE ENTRY screen (indicates the NAV System accepted the entry).
- c. Traverse the gun tube approximately 200 mils off the DAP in either direction. Verify the Azimuth Offset brought the AFCS into azimuth alignment by repeating the procedures in para 8-21.4b through 8-21.4d.
- d. If the Azimuth measurement is within tolerance ( $\pm 0.5$  mils), proceed to paragraph 8-21.6 STORE OFFSETS TO NON-VOLATILE MEMORY.
- e. If the Azimuth measurement is not within tolerance, repeat the procedure from paragraph 8-21.4 AZIMUTH ALIGNMENT.

**8-21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8-21.6 Store Offsets to Non-volatile Memory.**

**NOTE**

To store the Alignment Offsets in non-volatile memory in both the AFCS and NAV Systems, the AFCS must go through an orderly shutdown. To conduct an orderly shutdown, power off the system with the Power Switch on the Display Unit. Shutting down the AFCS by moving the circuit breakers to OFF on the Power Conditioning Unit is an un-orderly shutdown and will cause the Alignment Offsets to be lost.

- a. Press the FINISHED soft key.

NORMAL									
BORESIGHT ANGLE ENTRY									
CURRENT NAV					CURRENT AFCS				
CURRENT AZ	_____	_____	_____	_____	CANNON TYPE	XM284			
CURRENT EL	_____	_____	_____	_____	ROLL OFFSET	_____	_____	_____	_____
ROLL OFFSET	_____	_____	_____	_____	EL OFFSET	_____	_____	_____	_____
EL OFFSET	_____	_____	_____	_____	AZ OFFSET	_____	_____	_____	_____
AZ OFFSET	_____	_____	_____	_____					
1									
SELECT		FINISHED		SEND		CANCEL			

06pc066m

- b. Place the tube in travel lock.
- c. Move the Power Switch on the Display Unit to OFF.
- d. AFCS Fire Control Alignment is complete.
- e. Enter new offsets on DA Form 2408-4 in the vehicle logbook. (Note: Use these recorded offsets if ACU or DRUH is replaced).

**PAGES 8-75 THROUGH 8-92 DELETED**

## CHAPTER 8.1 PALADIN DIGITAL FIRE CONTROL SYSTEM (PDFCS)

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### GENERAL

This chapter illustrates and describes maintenance procedures for the Paladin Digital Fire Control System (PDFCS). Step-by-step procedures are provided for maintaining the PDFCS components and electrical leads and cables. Maintenance of the PDFCS cables connected to the radio is located in Chapter 21, Communications Equipment.

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## 8.1-1 PDFCS ELEVATION TACHOMETER (EL TACH) SHORTING PLUG.

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This task covers:      a. Removal                                      b. Installation

---

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Gun tube in travel lock  
(TM 9-2350-314-10)

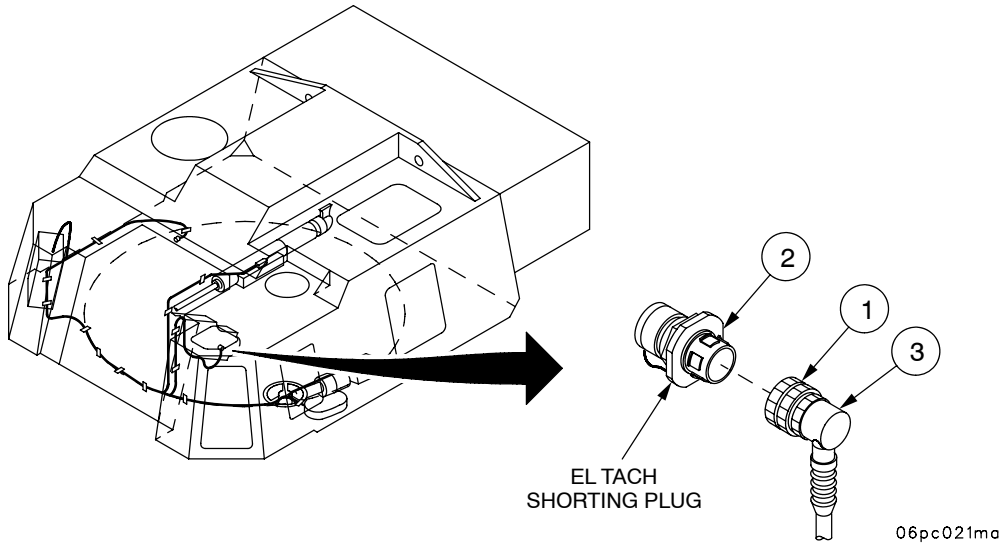
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#### a. Removal.

- 1 Disconnect coupling nut (1) from EL TACH shorting plug (2).
- 2 Remove harness connector (3) from EL TACH shorting plug (2).

#### b. Installation.

- 1 Insert harness connector (3) into EL TACH shorting plug (2).
- 2 Connect coupling nut (1) to EL TACH shorting plug (2).



## 8.1-2 PDFCS AZIMUTH TACHOMETER (AZ TACH) COVER AND FILLER PLATE.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Lockwashers (4) (item 130, Appx F)

#### Equipment Conditions

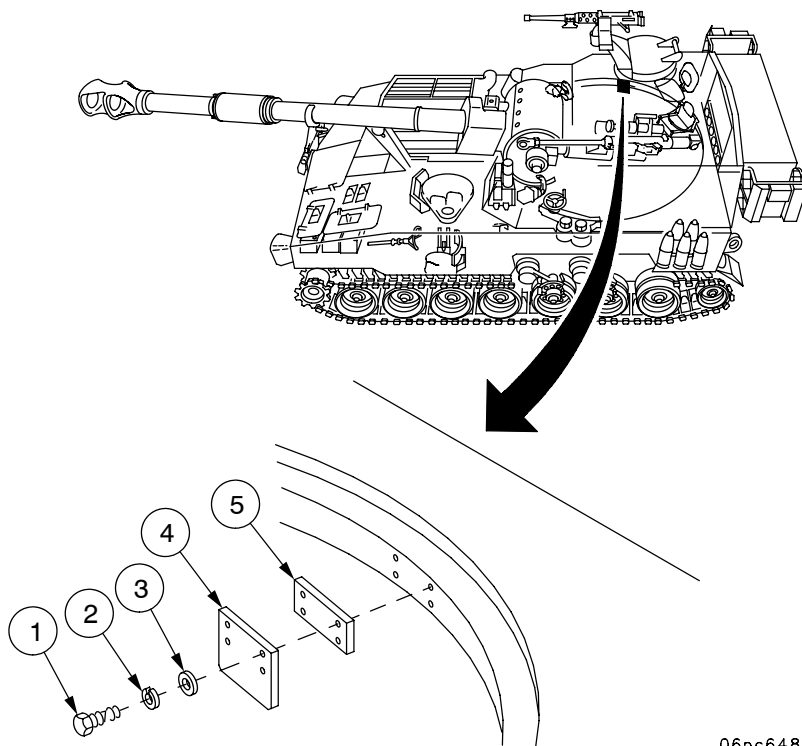
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Gun tube in travel lock  
(TM 9-2350-314-10)

#### a. Removal.

Remove four screws (1), four lockwashers (2), four flat washers (3), AZ TACH cover (4) and filler plate (5). Discard lockwashers.

#### b. Installation.

Install filler plate (5) and AZ TACH cover (4) with four screws (1), four new lockwashers (2) and four flat washers (3).



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### 8.1-3 PDFCS AZIMUTH TACHOMETER (AZ TACH) SHORTING PLUG.

---

This task covers:       a. Removal                                       b. Installation

---

#### **INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Gun tube in travel lock  
(TM 9-2350-314-10)

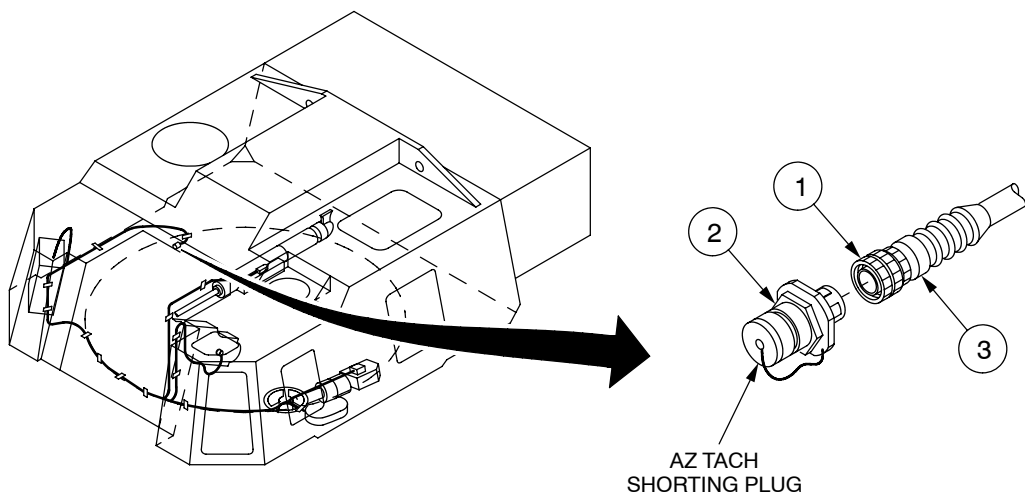
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#### **a. Removal.**

- 1 Disconnect coupling nut (1) from AZ TACH shorting plug (2).
- 2 Remove harness connector (3) from AZ TACH shorting plug (2).

#### **b. Installation.**

- 1 Insert harness connector (3) into AZ TACH shorting plug (2).
- 2 Connect coupling nut (1) to AZ TACH shorting plug (2).



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## 8.1-4 PDFCS BATTERY BOX ASSEMBLY.

This task covers:    a. Removal                    b. Disassembly                    c. Assembly                    d. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Torque wrench (item 56, Appx G)

#### Materials/Parts

Sealing compound (item 41, Appx C)  
Marking tags (AR) (item 87, Appx C)  
Dry-cleaning solvent (item 75, Appx C)  
Gasket tape (item 87.1, Appx C)  
Sealing compound (item 54.1, Appx C)  
Self-locking nuts (2) (item 257, Appx F)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

#### References

TM 9-6140-200-14

### a. Removal.

#### CAUTION

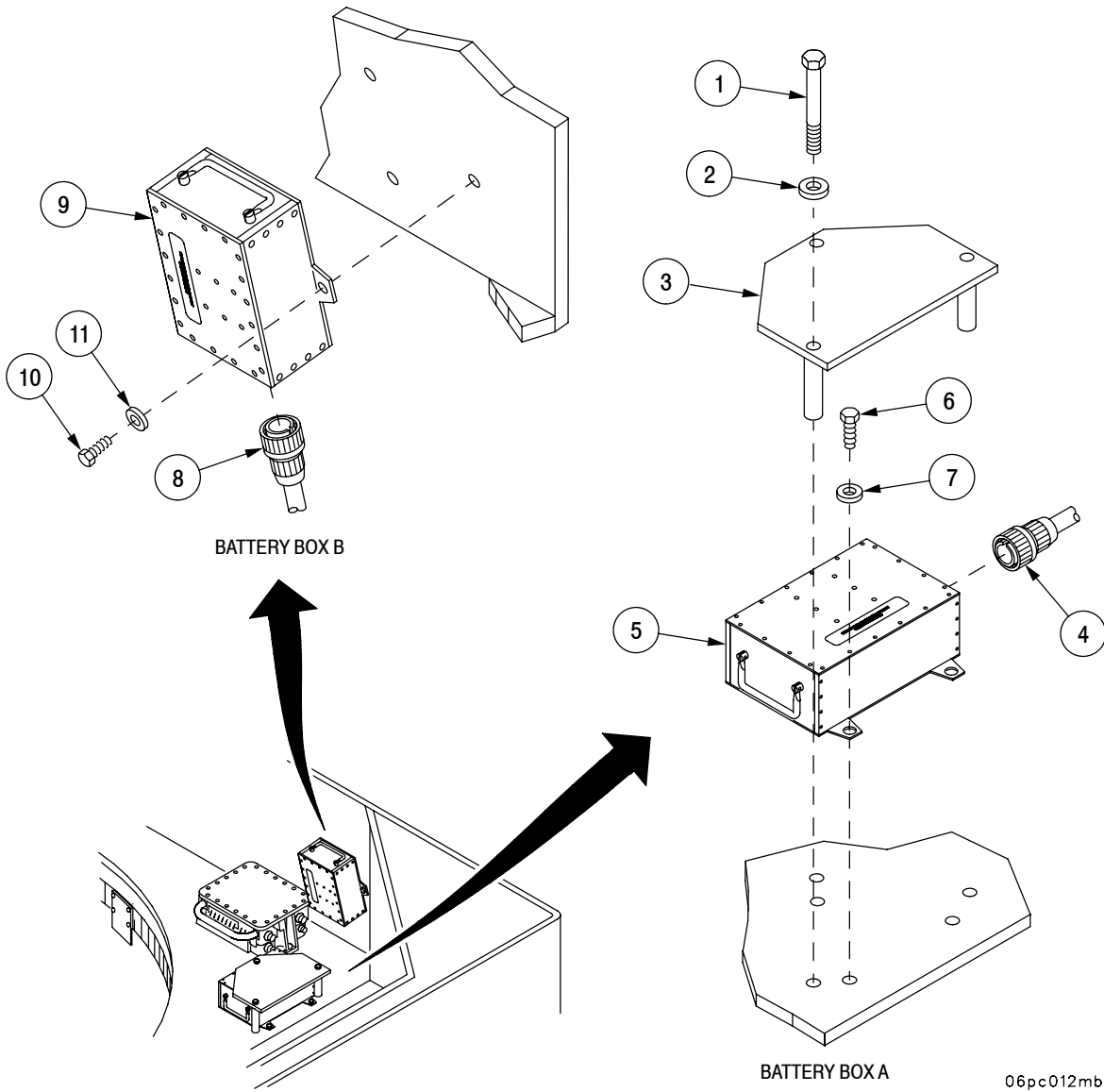
Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### NOTE

- Before removal, tag connectors for identification during installation.
  - To remove battery box A, perform steps 1-4.
  - To remove battery box B, perform steps 5 through 7.
  - Document PDFCS data prior to removing/ replacing battery box assembly.
- 1 Remove three screws (1), three flat washers (2), and cover (3) from cab.
  - 2 Disconnect harness W25 connector P1 (4) at battery box A (5).
  - 3 Remove three screws (6) and three flat washers (7) securing battery box A (5) to cab.
  - 4 Remove battery box A (5).
  - 5 Disconnect harness W25 connector P2 (8) at battery box B (9).
  - 6 Remove three screws (10) and three flat washers (11) that secure battery box B (9) to cab.
  - 7 Remove battery box B (9).

### 8.1-4 PDFCS BATTERY BOX ASSEMBLY - CONTINUED

#### a. Removal - Continued



**8.1-4 PDFCS BATTERY BOX ASSEMBLY - CONTINUED**

**b. Disassembly.**

**NOTE**

There are two battery boxes. Both battery boxes are disassembled in the same manner. This task disassembles one battery box.

- 1 Remove six screws (12) from cover (13).
- 2 Remove 20 screws (14).
- 3 Remove cover (13).
- 4 Remove two self-locking nuts (15), two flat washers (16), and handle (17) from housing (18). Discard self-locking nuts.



When removing battery pack, make sure battery-end furthest from cable assembly connector is removed first. Failure to comply will cause equipment damage.

- 5 Remove nut (19) and cable assembly (20) with battery pack (21) from housing (18).
- 6 Disconnect four cable assembly (20) leads from two batteries (22) in accordance with the following:

Item No	Leads	Terminal
23	A/B, C/D	Positive (+)
24	E/F, G/H	Negative (-)

- 7 Disconnect two cable assembly (20) leads (25) from battery pack (21).

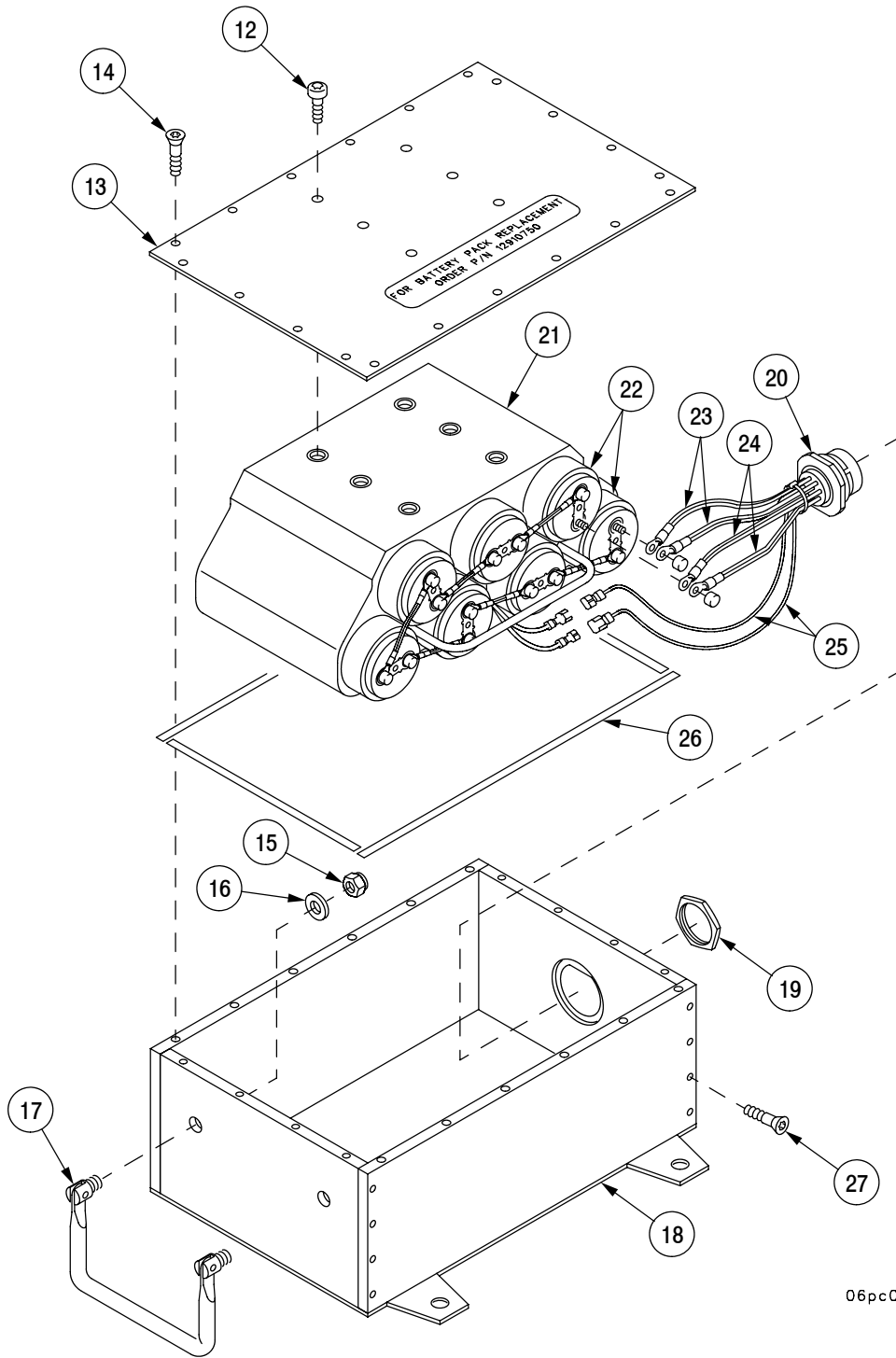


Dry-cleaning solvent (MIL-PRF-680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause SERIOUS INJURY. If you become dizzy while using dry-cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash them with water immediately and obtain medical aid (FM 4-25.11).

- 8 Peel gasket tape (26) off housing (18) and clean housing (18) with dry-cleaning solvent. Discard gasket tape.
- 9 Dispose of battery pack (21) in accordance with TM 9-6140-200-14.
- 10 Inspect housing (18) for damage or missing screws (27). Replace screws (27) as required.

### 8.1-4 PDFCS BATTERY BOX ASSEMBLY - CONTINUED

#### b. Disassembly - Continued



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## 8.1-4 PDFCS BATTERY BOX ASSEMBLY - CONTINUED

### c. Assembly.

#### NOTE

There are two battery boxes. Both battery boxes are assembled in the same manner. This task assembles one battery box.

- 1 Install screws (27) in housing (18) as required.
- 2 Install new gasket tape (26) on housing (18).
- 3 Connect two cable assembly (20) leads (25) to battery pack (21).
- 4 Connect four cable assembly (20) leads to two batteries (22) in accordance with the following:

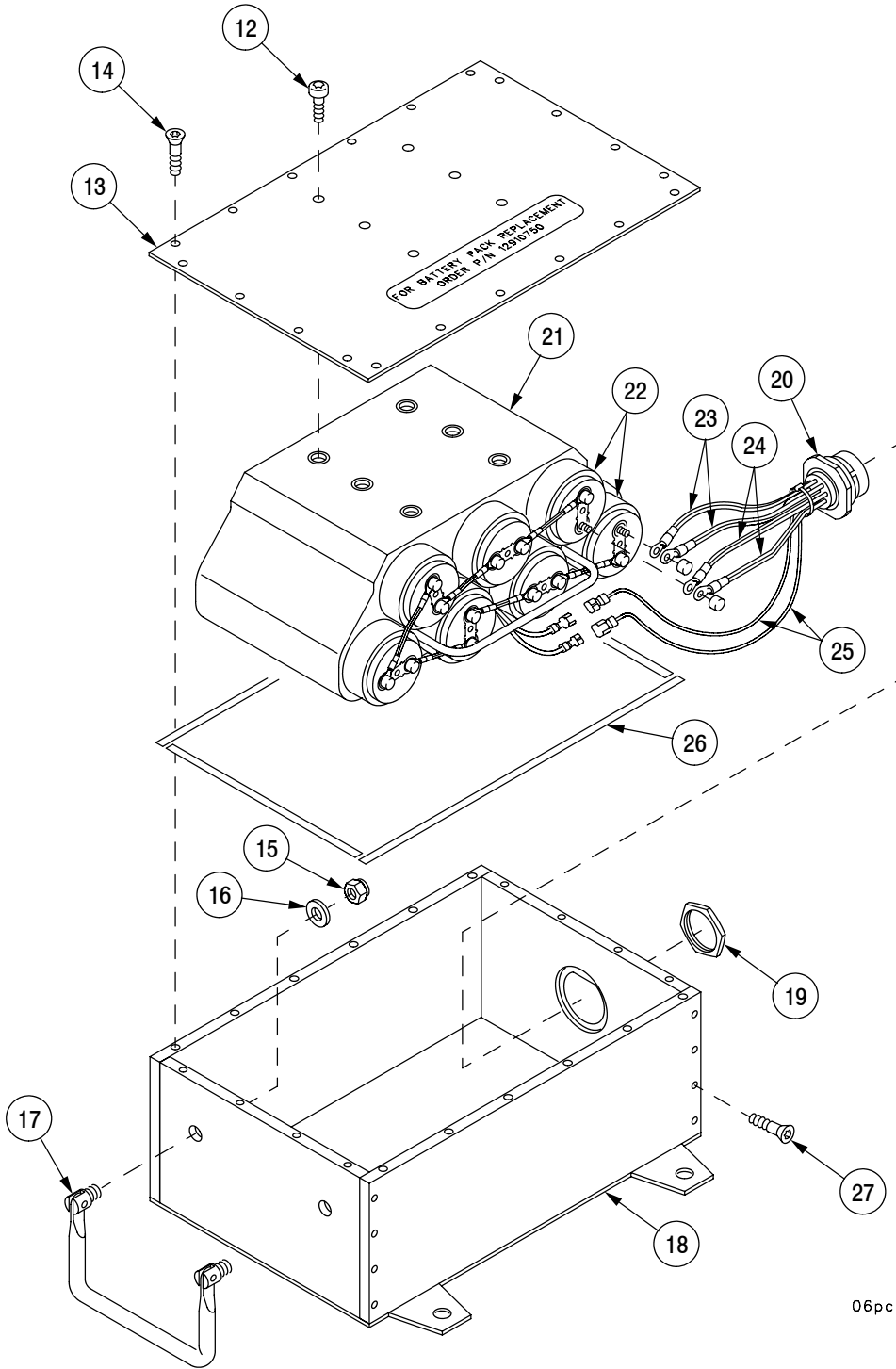
Item No	Leads	Terminal
23	A/B, C/D	Positive (+)
24	E/F, G/H	Negative (-)

#### NOTE

- Ensure cable assembly connector is inserted through hole in housing prior to installing battery pack in housing.
  - New battery pack is supplied with a handle which must be removed after placing battery pack in housing.
- 5 Install cable assembly (20) with battery pack (21) into housing (18). Secure cable assembly (20) to housing (18) with nut (19).
  - 6 Install handle (17) on housing (18) with two flat washers (16) and two new self-locking nuts (15). Torque nuts to 150-160 in-lbs (16.95-18.08 N•m).
  - 7 Apply sealing compound (item 54.1, Appx C) to 20 screws (14) and six screws (12).
  - 8 Install cover (13) on battery box with 20 screws (14). Torque screws to 14-16 in-lb (1.58-1.80 N•m).
  - 9 Install six screws (12) in battery box. Torque screws to 150-160 in-lbs (16.95-18.08 N•m).

### 8.1-4 PDFCS BATTERY BOX ASSEMBLY - CONTINUED

#### c. Assembly - Continued



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## 8.1-4 PDFCS BATTERY BOX ASSEMBLY - CONTINUED

### d. Installation.

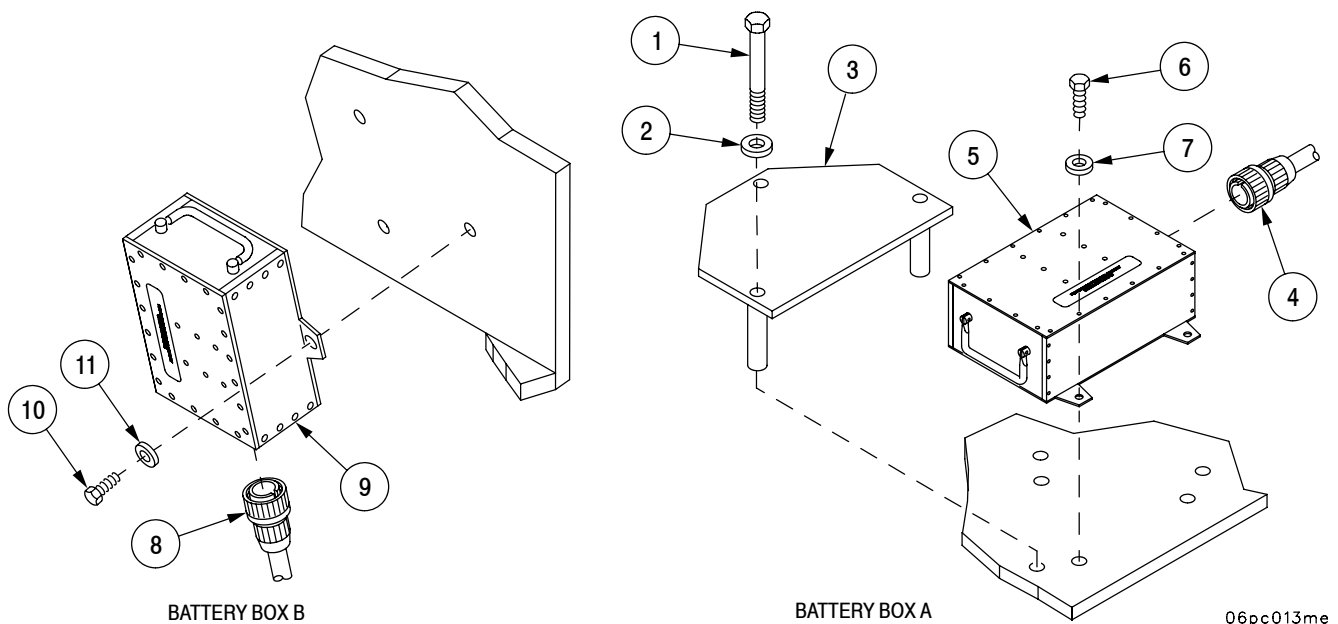
#### CAUTION

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

#### NOTE

- To install battery box B, perform steps 1–3.
- To install battery box A, perform steps 4–7.

- 1 Apply sealing compound (item 41, Appx C) to three screws (10).
- 2 Position battery box B (9) on cab and secure by installing three screws (10) and three flat washers (11).
- 3 Connect harness W25 connector P2 (8) at battery box B (9).
- 4 Apply sealing compound (item 41, Appx C) to three screws (6).
- 5 Position battery box A (5) on cab and secure by installing three screws (6) and three flat washers (7).
- 6 Connect harness W25 connector P1 (4) at battery box A (5).
- 7 Position cover (3) on cab and align mounting holes and secure by installing three screws (1) and three flat washers (2).



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## 8.1-5 PDFCS WIRING HARNESS W1B.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Tiedown straps (3) (item 77, Appx C)  
Marking tags (AR) (item 87, Appx C)  
Lockwashers (2) (item 128, Appx F)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Radio removed (TM 11-5820-890-10-1)

#### a. Removal.

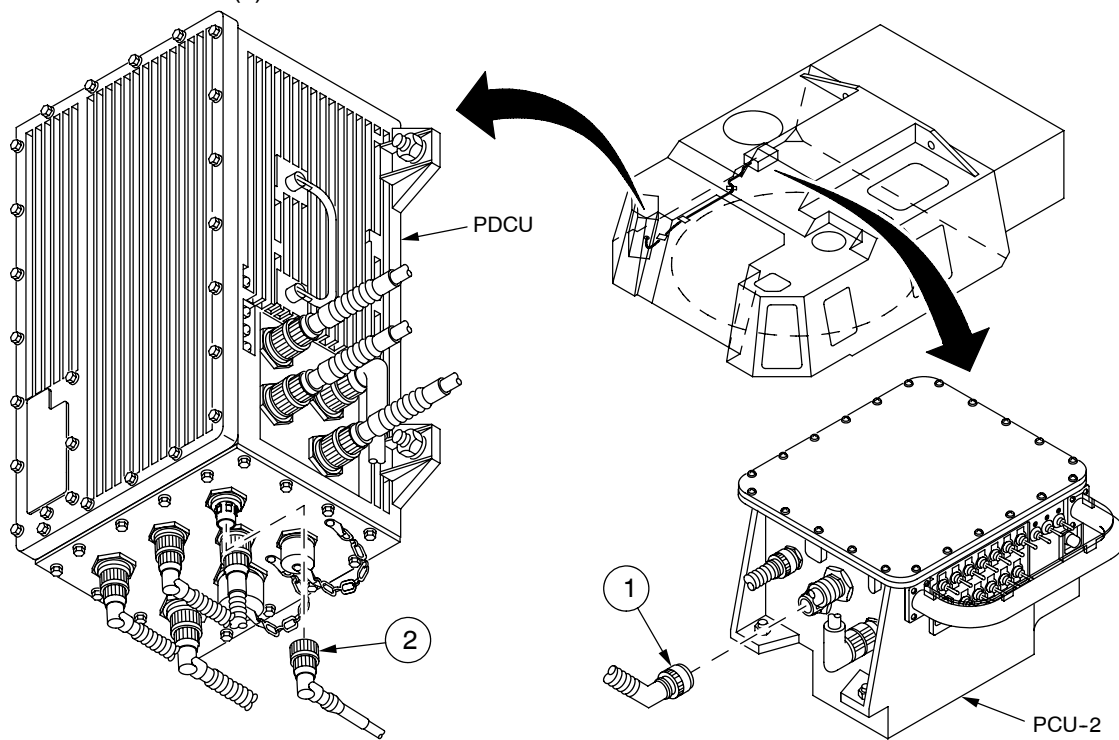
### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

### NOTE

Before removal, tag connectors for identification during installation.

- 1 Disconnect P1 of W1B (1) from J1 on PCU-2.
- 2 Disconnect P3 of W1B (2) from J1 on PDCU.



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## 8.1-5 PDFCS WIRING HARNESS W1B - CONTINUED

### a. Removal - Continued

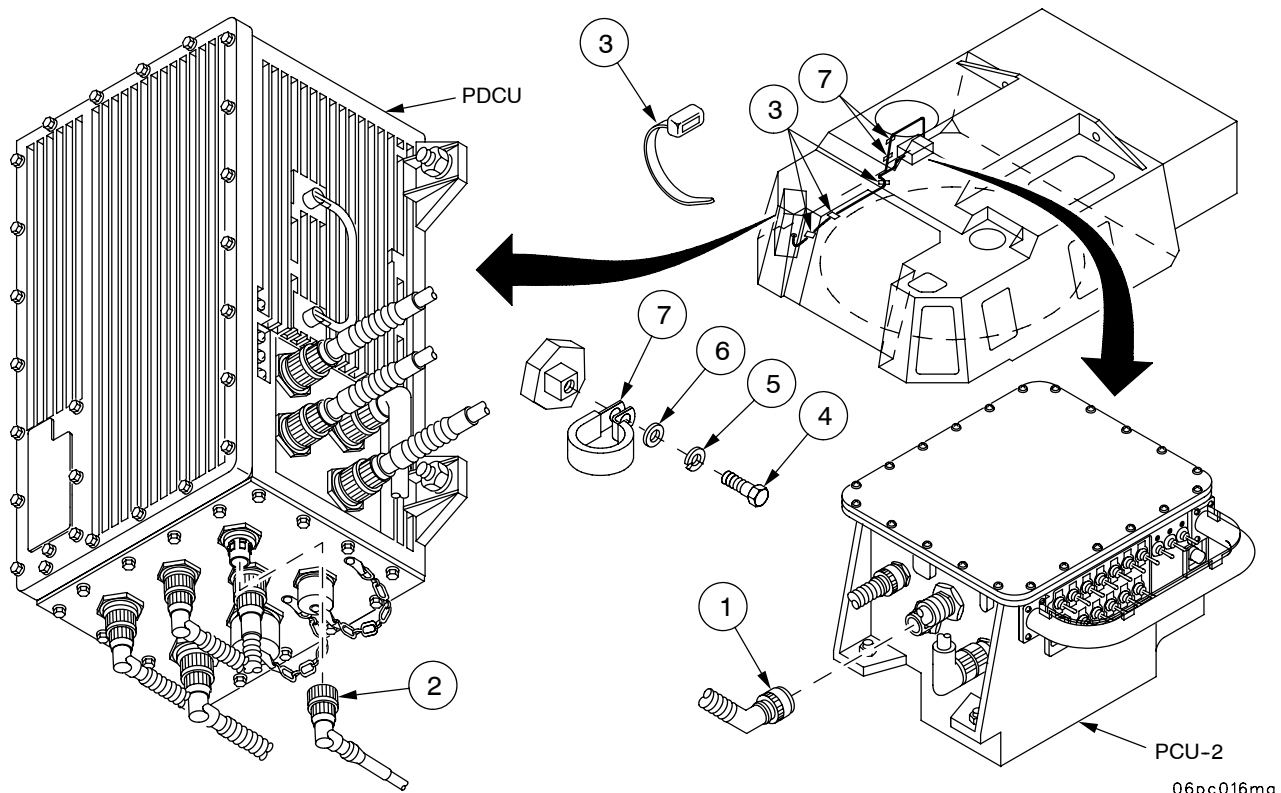
- 3 Remove and discard three tiedown straps (3) securing harness assembly W1B to cab.
- 4 Remove two screws (4), two lockwashers (5), two flat washers (6), and two clamps (7) securing harness assembly W1B to cab. Discard lockwashers.
- 5 Remove harness assembly from cab.

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Position harness assembly in cab.
- 2 Connect P3 of W1B (2) to J1 on PDCU.
- 3 Connect P1 of W1B (1) to J1 on PCU-2.
- 4 Install two clamps (7) and secure with two flat washers (6), two new lockwashers (5), and two screws (4).
- 5 Install three new tiedown straps (3) securing harness assembly W1B to cab.



## 8.1-6 PDFCS WIRING HARNESS W2.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Tiedown straps (3) (item 77, Appx C)  
Marking tags (AR) (item 87, Appx C)  
Lockwashers (item 128, Appx F)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

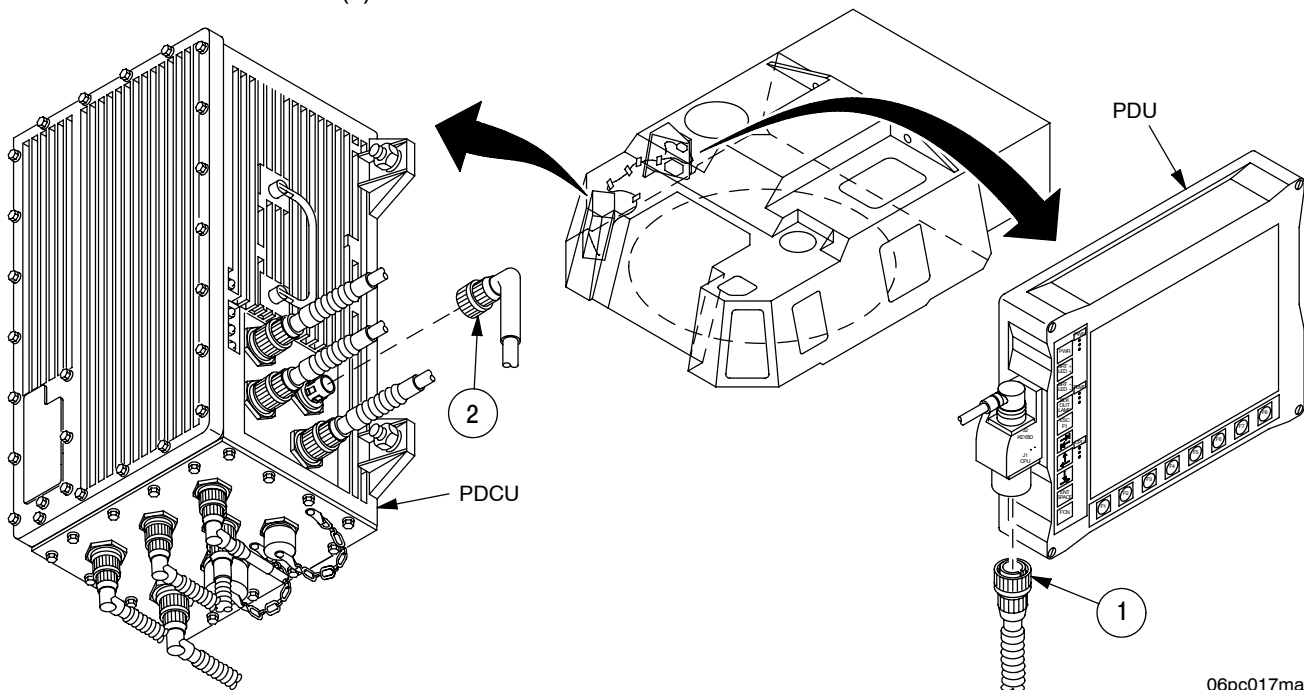
#### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### NOTE

Before removal, tag connectors for identification during installation.

- 1 Disconnect P1 of W2 (1) from J1 on PDU.
- 2 Disconnect P3 of W2 (2) from J10 on PDCU.



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## 8.1-6 PDFCS WIRING HARNESS W2 - CONTINUED

### a. Removal - Continued

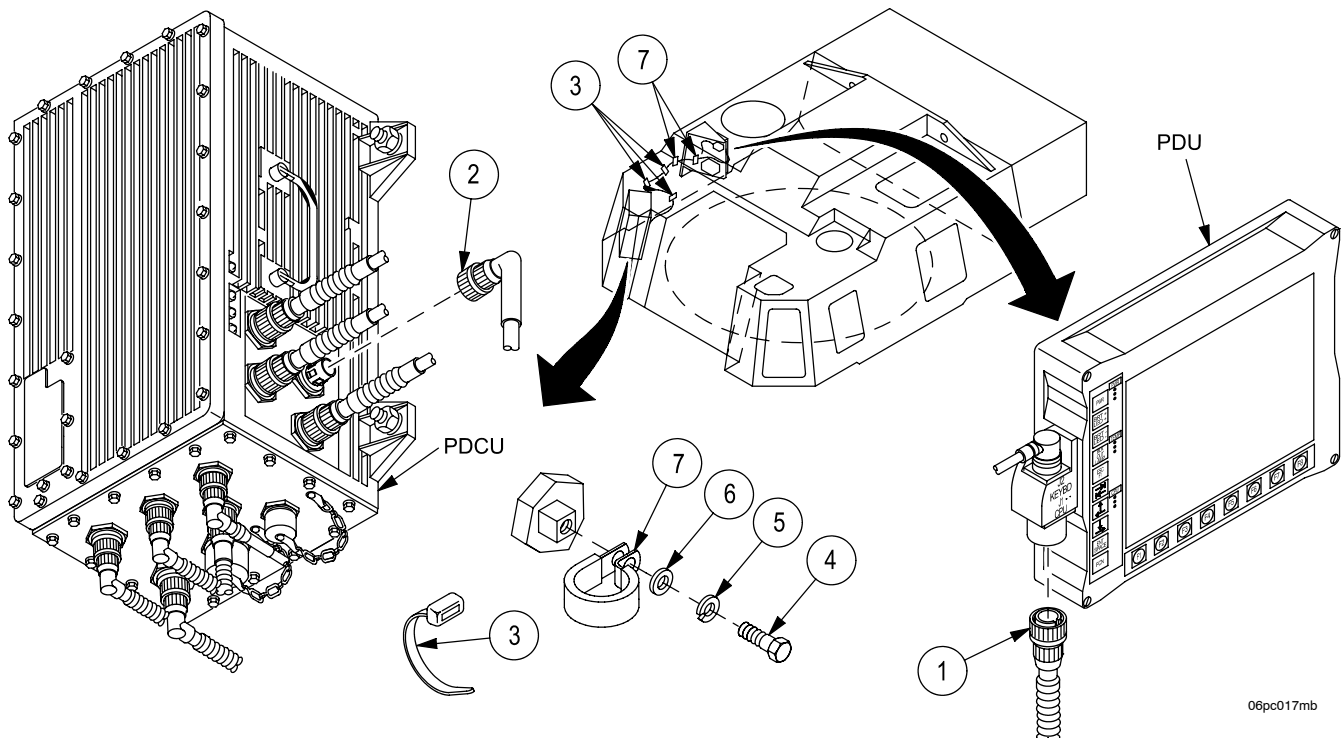
- 3 Remove and discard three tiedown straps (3) securing harness assembly W2 to cab.
- 4 Remove two screws (4), two lockwashers (5), two flat washers (6), and two clamps (7) securing harness assembly W2 to cab. Discard lockwashers.
- 5 Remove harness assembly from cab.

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- Make sure key and keyway are aligned before pushing connector halves together or pins may break.

- 1 Position harness assembly in cab.
- 2 Connect P1 of W2 (2) to J10 on PDCU.
- 3 Connect P2 of W2 (1) to J1 on PDU.
- 4 Install two clamps (7) and secure with two flat washers (6), two new lockwashers (5), and two screws (4).
- 5 Install three new tiedown straps (3) securing harness assembly W2 to cab.



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## 8.1-7 PDFCS WIRING HARNESS W3N.

This task covers: a. Removal b. Installation

### INITIAL SETUP

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Tiedown straps (AR) (item 77, Appx C)  
Marking tags (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

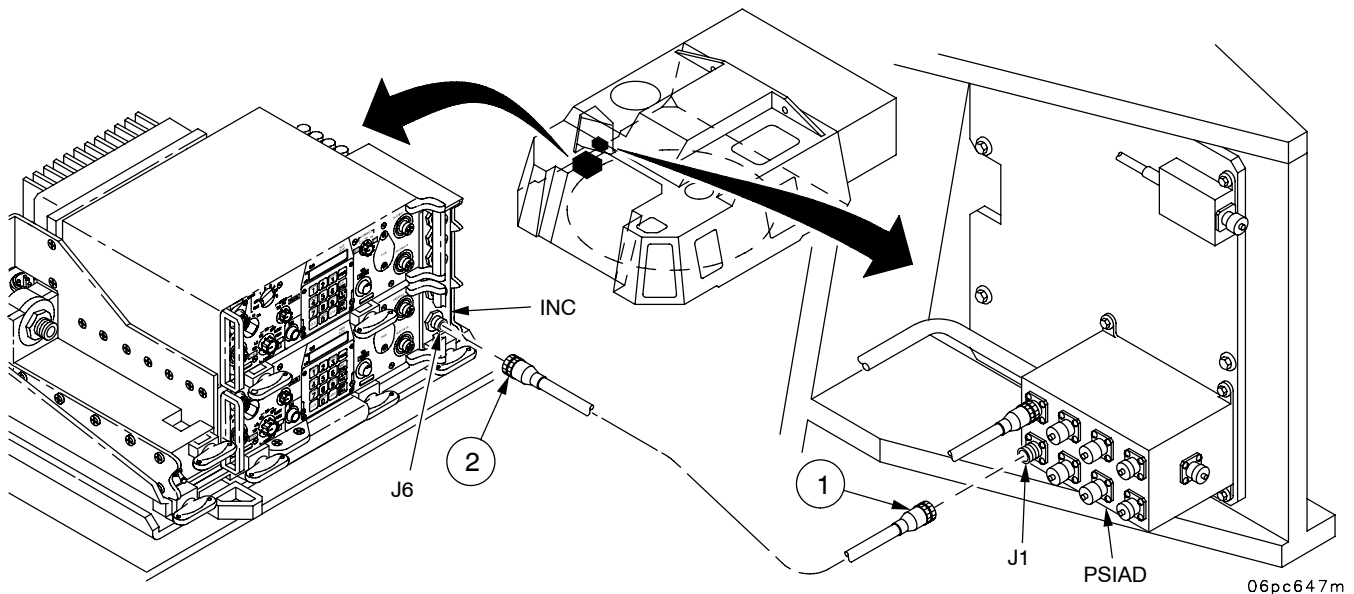
#### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### NOTE

Before removal, tag connectors for identification during installation.

- 1 Disconnect P1 of W3N (1) from J1 on PSIAD.
- 2 Disconnect P2 of W3N (2) from J6 on INC.
- 3 Remove and discard tiedown straps securing harness assembly W3N to cab.
- 4 Remove harness assembly from cab.



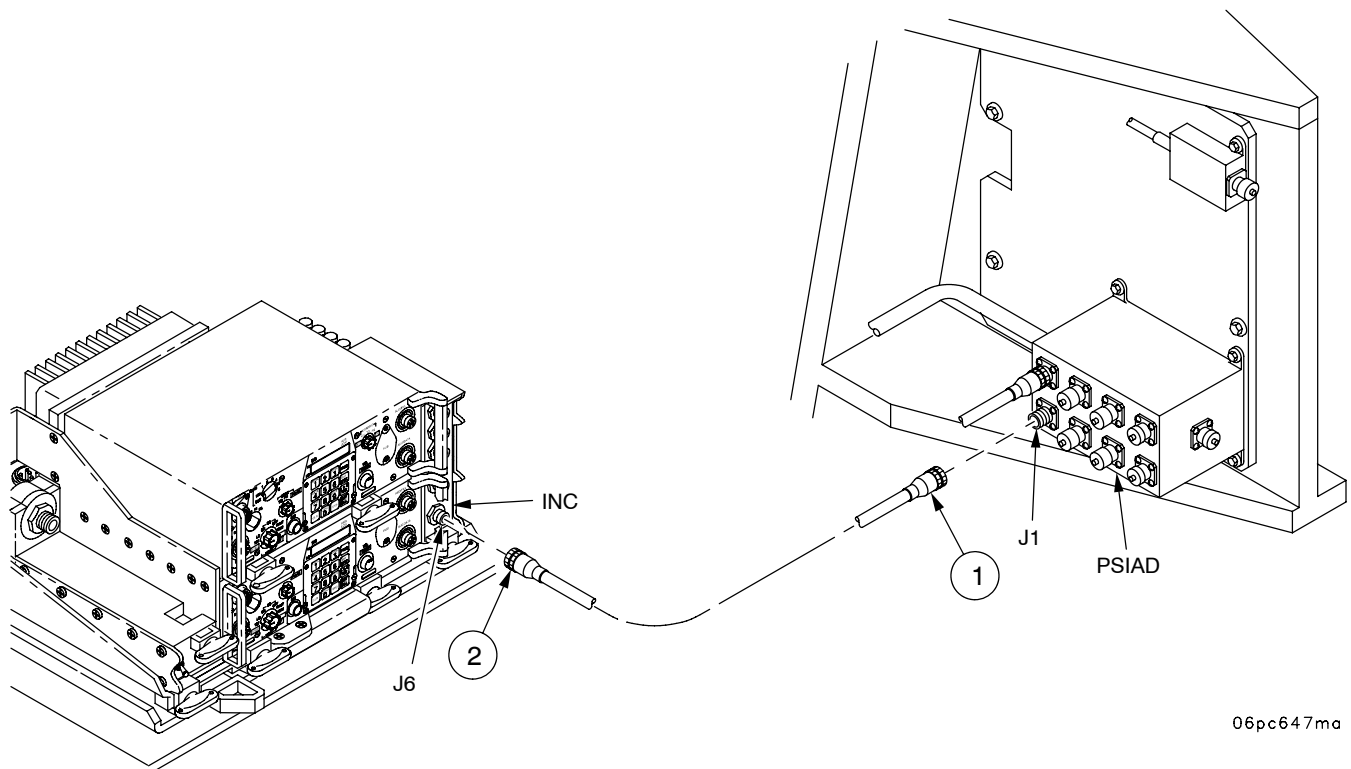
## 8.1-7 PDFCS WIRING HARNESS W3N - CONTINUED

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Position harness assembly in cab.
- 2 Connect P1 of W3N (1) to J1 on PSIAD.
- 3 Connect P2 of W3N (2) to J6 on INC.
- 4 Install new tiedown straps securing harness assembly W3N to cab.



## 8.1-8 PDFCS WIRING HARNESS W7.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Lockwashers (9) (item 126, Appx F)  
Lockwasher (item 109, Appx F)  
Tiedown straps (4) (item 77, Appx C)  
Marking tags (AR) (item 87, Appx C)  
Wire, non-electrical (item 99, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

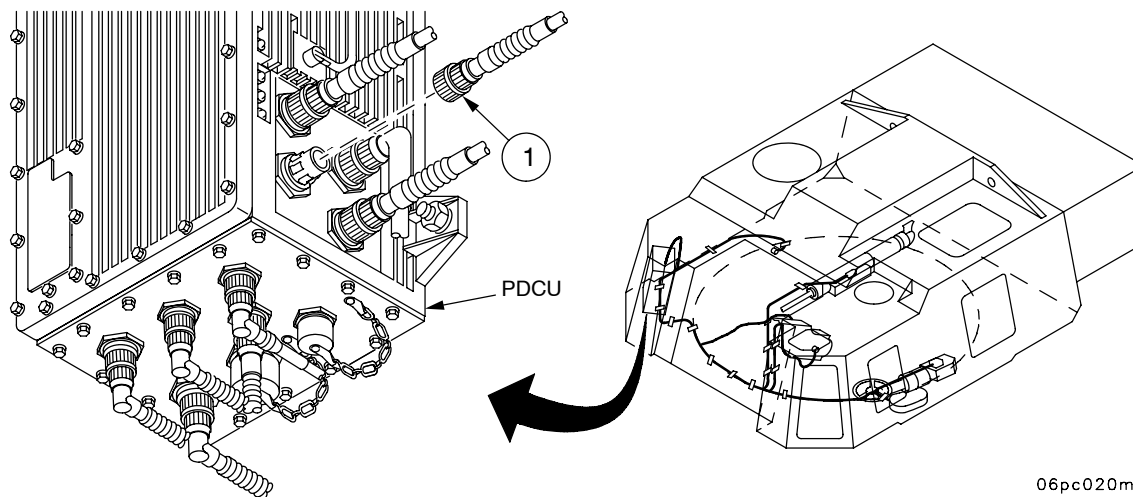
#### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### NOTE

Before removal, tag connectors for identification during installation.

- 1 Disconnect P1 of W7 (1) from J6 on PDCU.

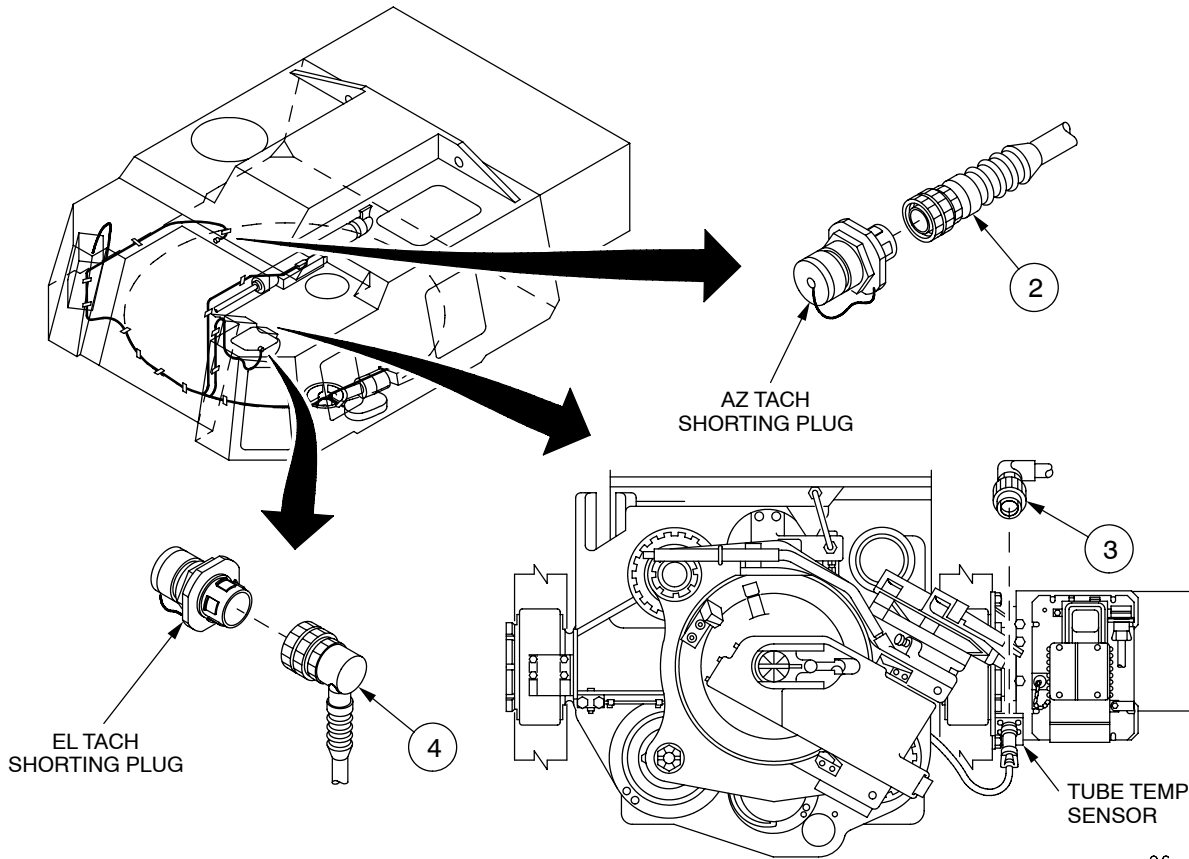


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**8.1-8 PDFCS WIRING HARNESS W7 - CONTINUED**

**a. Removal - Continued**

- 2 Disconnect P2 of W7 (2) from AZ TACH shorting plug.
- 3 Disconnect P3 of W7 (3) from tube temp sensor.
- 4 Disconnect P4 of W7 (4) from EL TACH shorting plug.

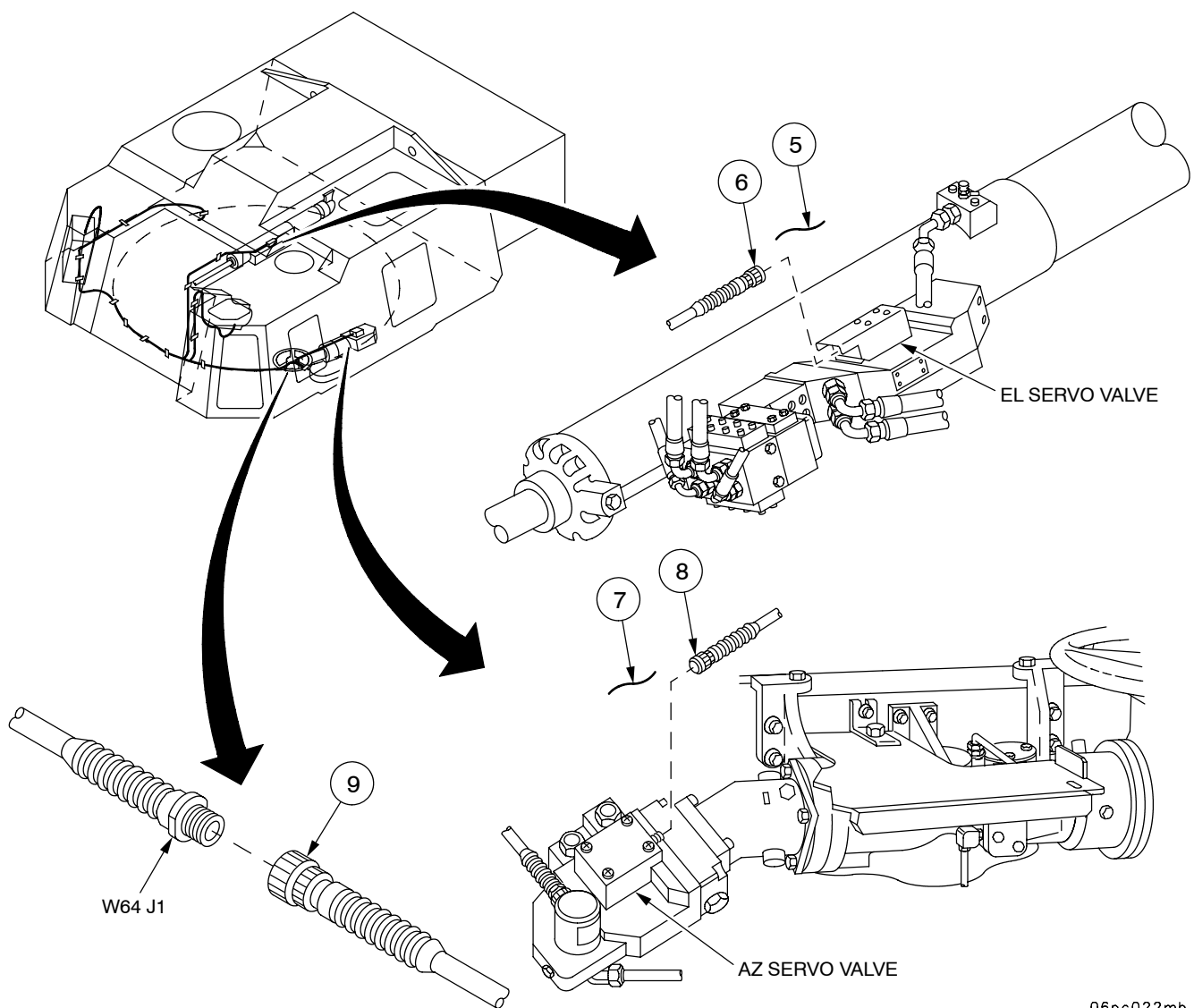


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## 8.1-8 PDFCS WIRING HARNESS W7 - CONTINUED

### a. Removal - Continued

- 5 Remove and discard lockwire (5).
- 6 Disconnect P5 of W7 (6) from EL servo valve.
- 7 Remove and discard lockwire (7).
- 8 Disconnect P6 of W7 (8) from AZ servo valve.
- 9 Disconnect P7 of W7 (9) from J1 of harness assembly W64.



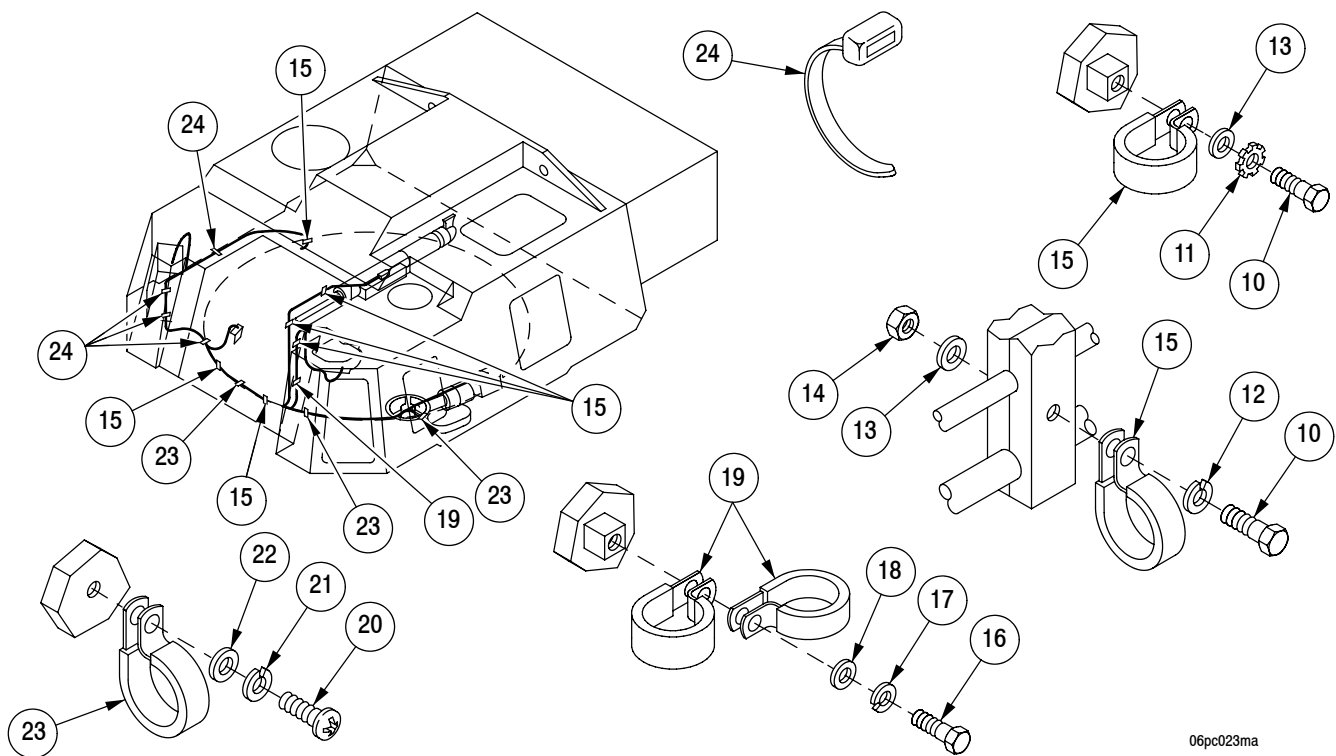
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## 8.1-8 PDFCS WIRING HARNESS W7 - CONTINUED

### a. Removal - Continued

- 10 Remove six screws (10), five lockwashers (11), lockwasher (12), six flat washers (13), nut (14), and six clamps (15) mounting harness to cab. Discard lockwashers.
- 11 Remove screw (16), lockwasher (17), flat washer (18) and two clamps (19). Discard lockwasher.
- 12 Remove three screws (20), three lockwashers (21), three flat washers (22) and three clamps (23). Discard lockwashers.
- 13 Cut and discard four tiedown straps (24) from harness assembly.
- 14 Remove harness assembly from cab.



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### b. Installation.

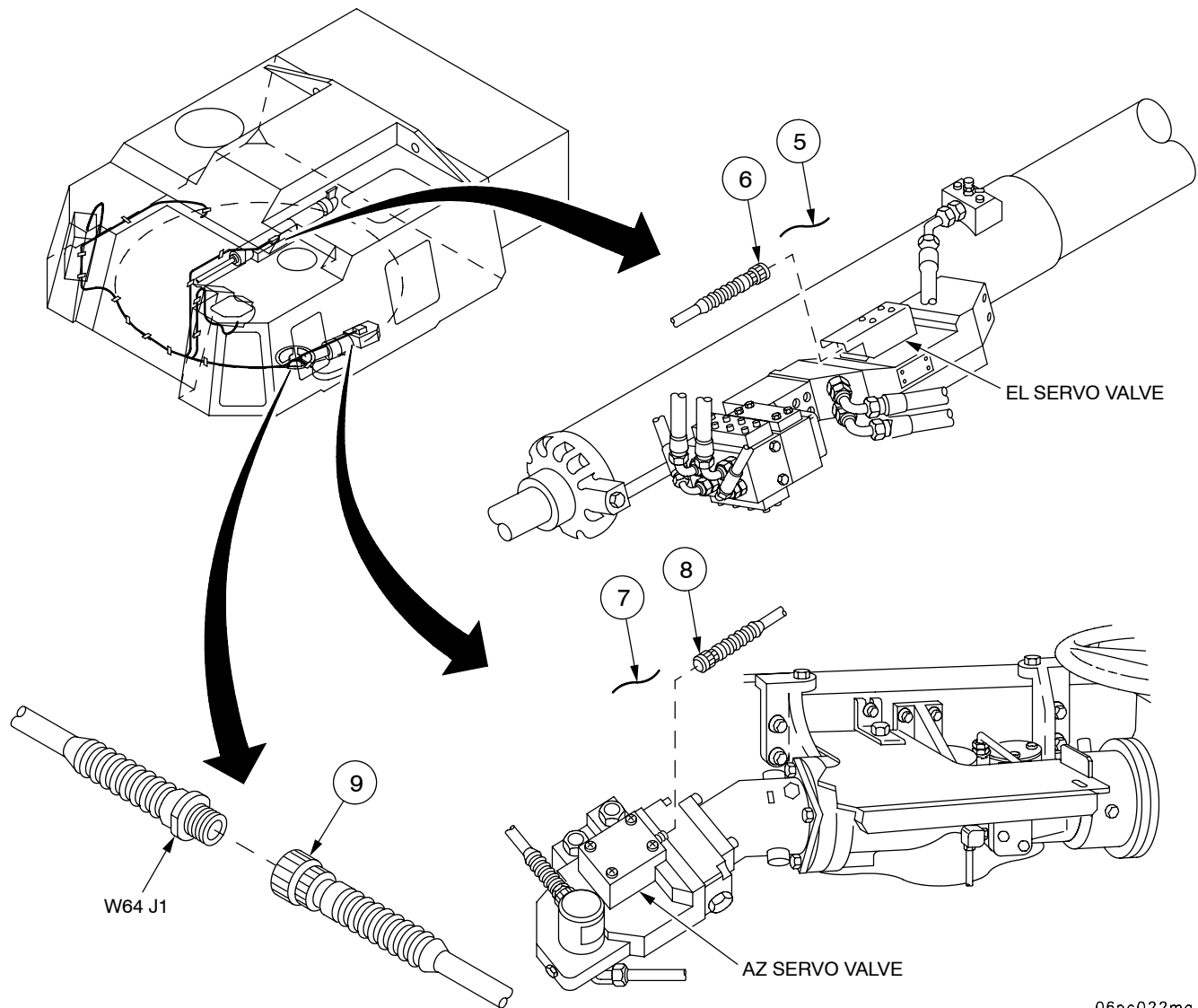
#### CAUTION

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

## 8.1-8 PDFCS WIRING HARNESS W7 - CONTINUED

### b. Installation - Continued

- 1 Position harness assembly in cab.
- 2 Connect P7 of W7 (9) to J1 of harness assembly W64.
- 3 Connect P6 of W7 (8) to AZ servo valve.
- 4 Install new lockwire (7).
- 5 Connect P5 of W7 (6) to EL servo valve.
- 6 Install new lockwire (5).

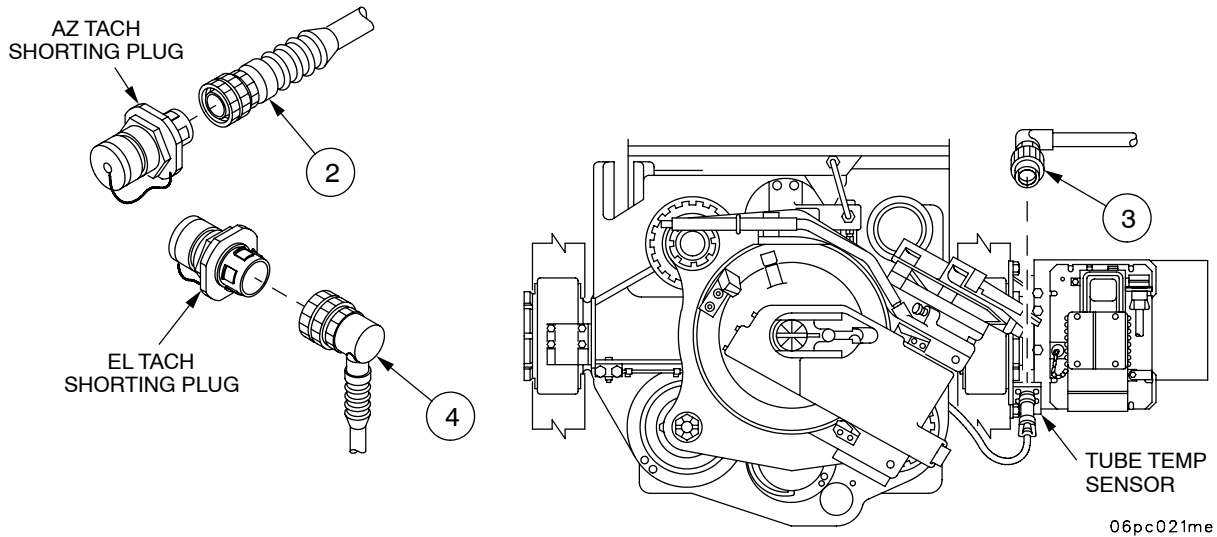


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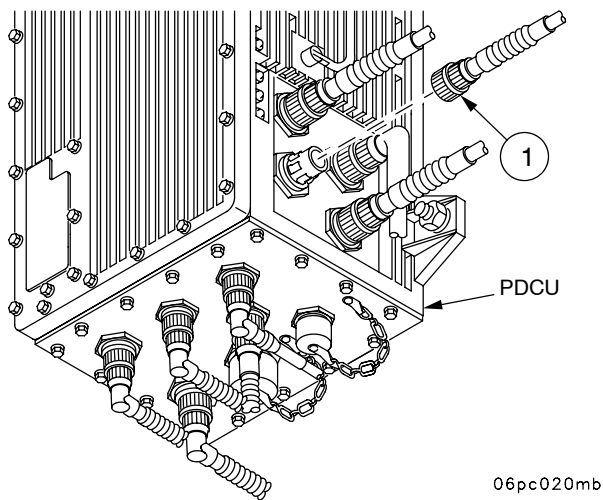
**8.1-8 PDFCS WIRING HARNESS W7 - CONTINUED**

**b. Installation - Continued**

- 7 Connect P4 of W7 (4) to EL TACH shorting plug.
- 8 Connect P3 of W7 (3) to tube temp sensor.
- 9 Connect P2 of W7 (2) to AZ TACH shorting plug.



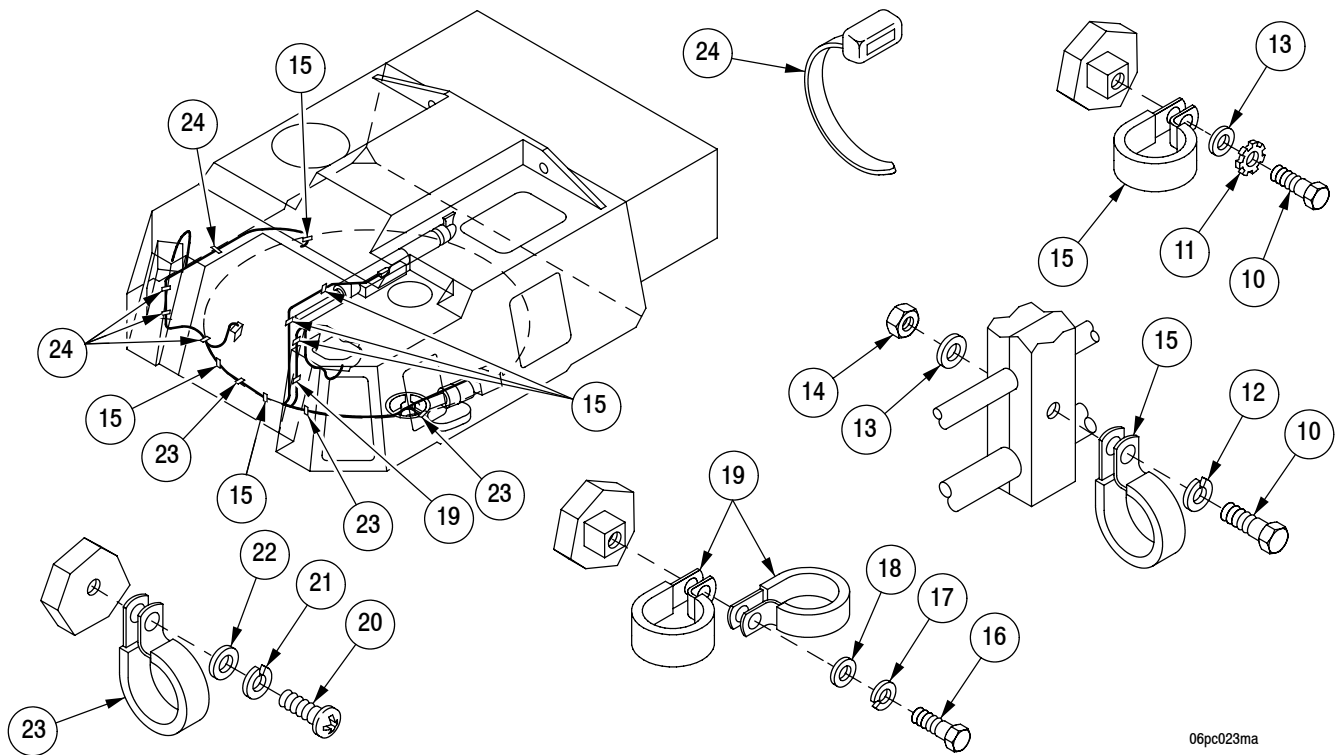
- 10 Connect P1 of W7 (1) to J6 on PDCU.



## 8.1-8 PDFCS WIRING HARNESS W7 - CONTINUED

### b. Installation - Continued

- 11 Secure harness to surrounding harness assembly using four tiedown straps (24).
- 12 Secure harness to cab with three clamps (23), three flat washers (22), three new lockwashers (21), and three screws (20).
- 13 Secure harness to cab with two clamps (19), flat washer (18), new lockwasher (17) and screw (16).
- 14 Secure harness to cab with six clamps (15), nut (14), six flat washers (13), new lockwasher (12), five new lockwashers (11) and six screws (10).



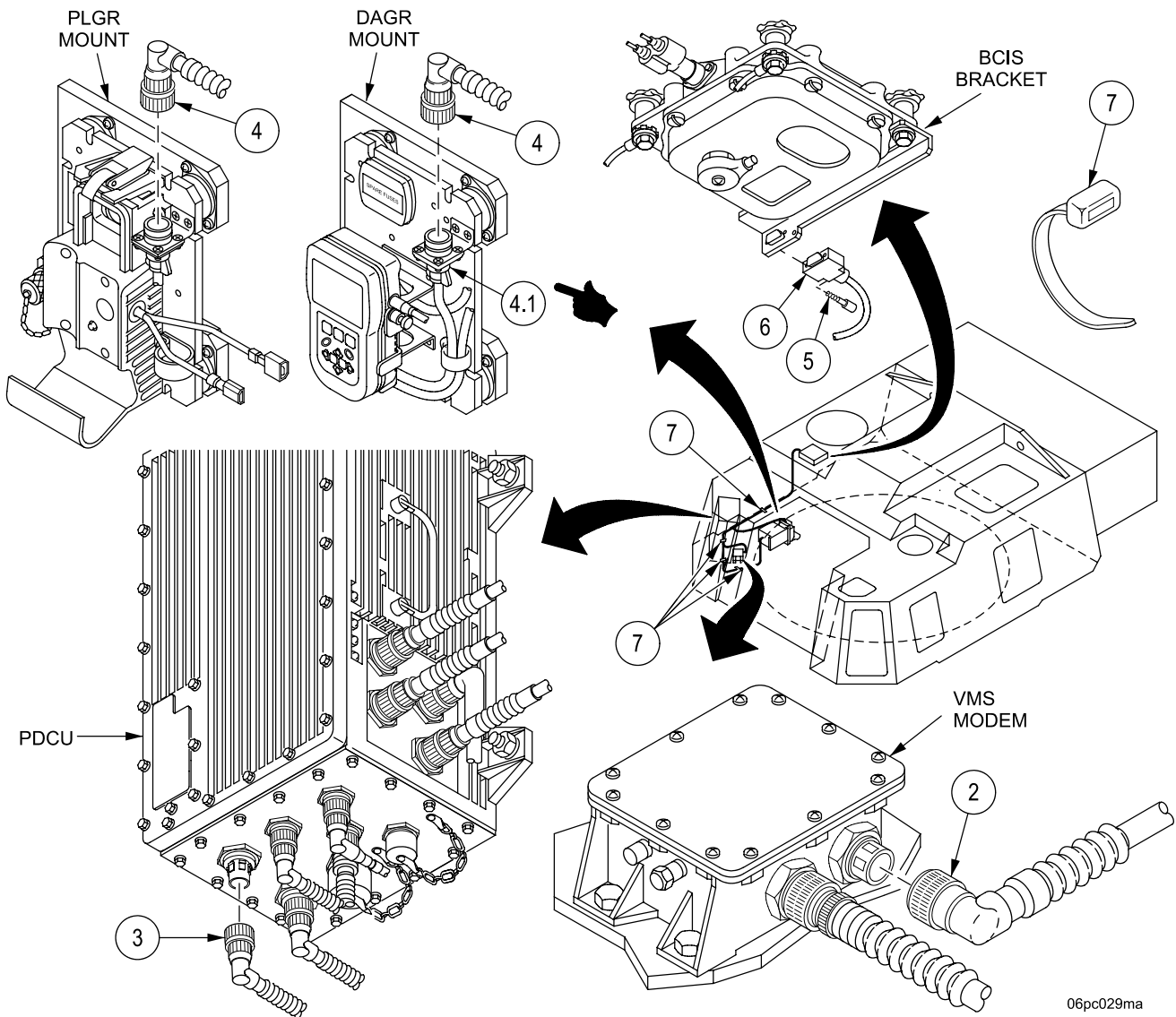
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## 8.1-9 PDFCS WIRING HARNESS W17A - CONTINUED

### a. Removal - Continued

- 2 Disconnect P2 of W17A (2) from J1 on VMS modem.
- 3 Disconnect P3 of W17A (3) from J2 on PDCU.
- 4 Disconnect P4 of W17A (4) from PLGR mount or disconnect from cable assembly W141 (4.1) if equipped with DAGR.
- 5 Loosen two screws (5) on P5 of W17A (6).
- 6 Disconnect P5 of W17A (6) from BCIS bracket.
- 7 Cut and discard four tiedown straps (7) securing harness assembly W17A to cab.
- 8 Remove harness assembly W17A from cab.



06pc029ma

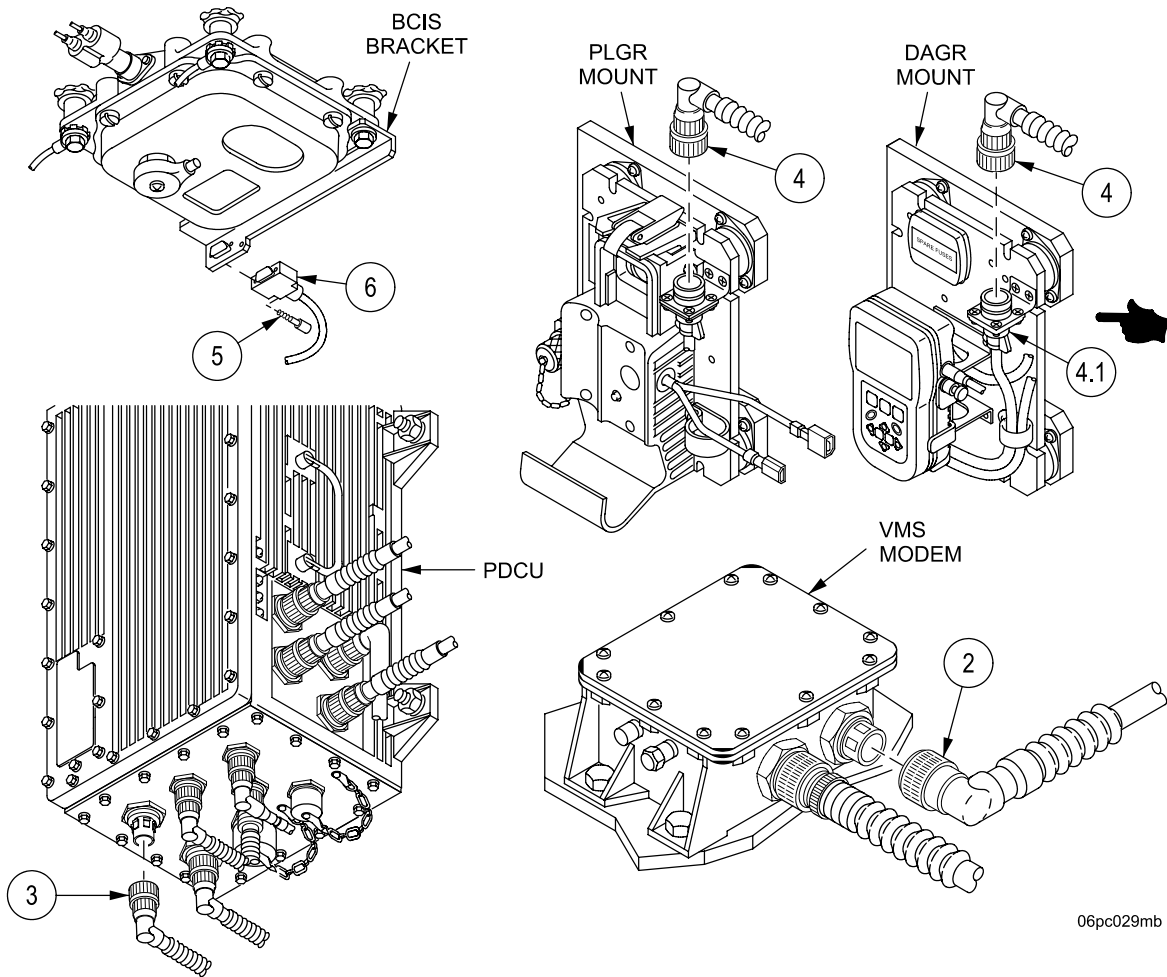
8.1-9 PDFCS WIRING HARNESS W17A - CONTINUED

b. Installation.

**CAUTION**

- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Position harness assembly in cab.
- 2 Connect P5 of W17A (6) to BCIS bracket.
- 3 Tighten two screws (5) on P5 of W17A (6).
- 4 Connect P4 of W17A (4) to PLGR mount or connect to assembly W141 (4.1) if equipped with DAGR. ■
- 5 Connect P3 of W17A (3) to J2 on PDCU.
- 6 Connect P2 of W17A (2) from J1 on VMS modem.

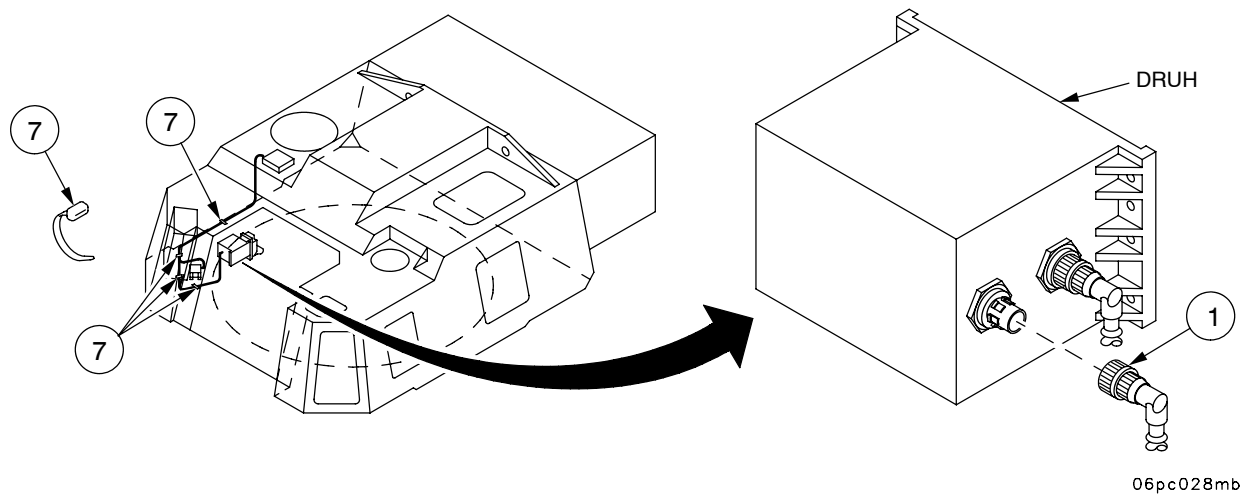


06pc029mb

## 8.1-9 PDFCS WIRING HARNESS W17A - CONTINUED

### b. Installation - Continued

- 7 Connect P1 of W17A (1) to J1 on DRUH.
- 8 Secure harness assembly W17A to cab by installing four new tiedown straps (7).





**8.1-10 PDFCS WIRING HARNESS W22A.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwasher (item 128, Appx F)  
Tiedown straps (2) (item 76, Appx C)  
Marking tags (AR) (item 87, Appx C)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

**a. Removal.**

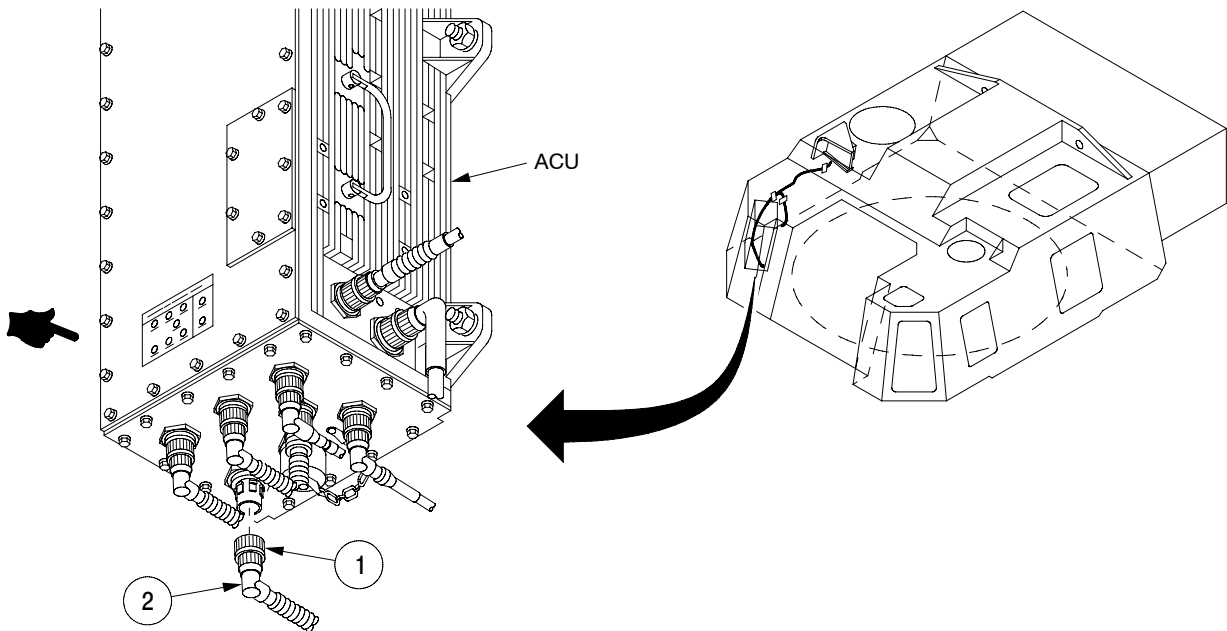
**CAUTION**

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

**NOTE**

Before removal, tag connectors for identification during installation.

- 1 Disconnect P1 of W22A (2) from J7 on PDCU.



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## 8.1-10 PDFCS WIRING HARNESS W22A - CONTINUED

### a. Removal - Continued

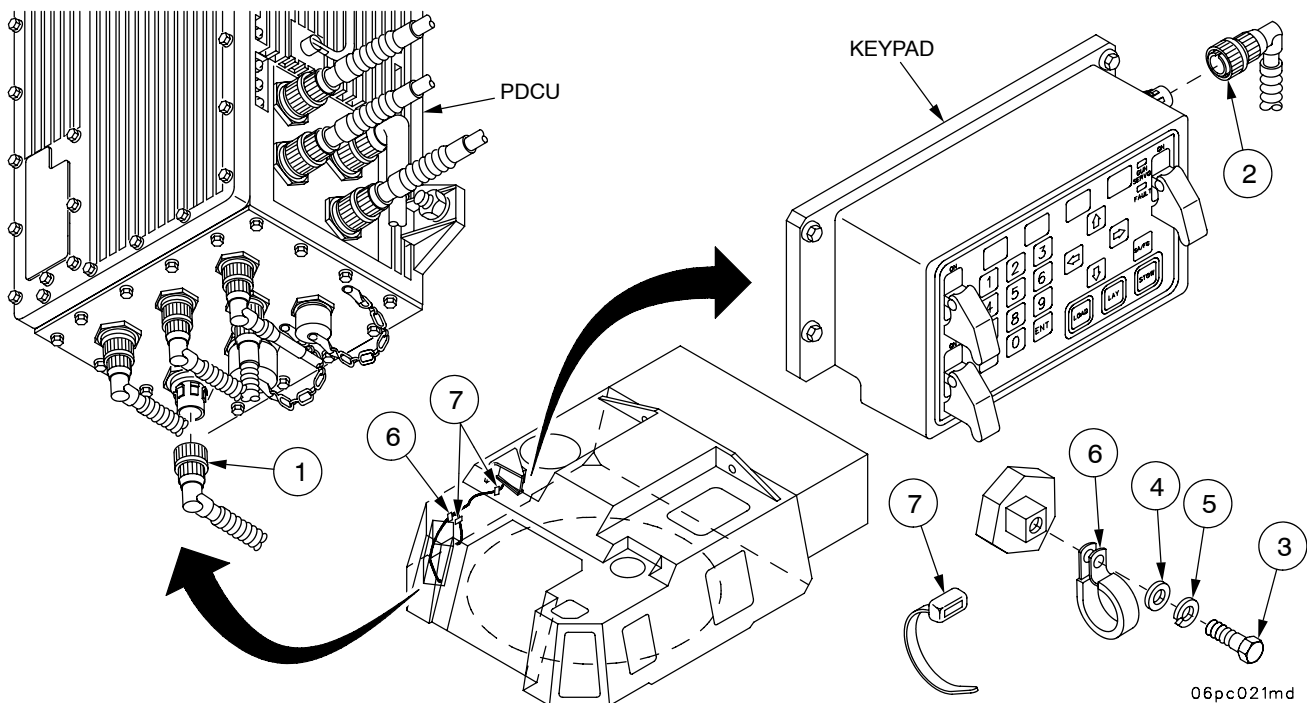
- 2 Disconnect P2 of W22A (2) from J1 on keypad.
- 3 Remove screw (3), flat washer (4), lockwasher (5), and clamp (6). Discard lockwasher.
- 4 Cut and discard two tiedown straps (7).
- 5 Remove wiring harness W22A assembly from cab.

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Position wiring harness W22A assembly in cab.
- 2 Connect P2 of W22A (2) to J1 on keypad.
- 3 Connect P1 of W22A (1) to J7 on PDCU.
- 4 Install screw (3), flat washer (4), new lockwasher (5), and clamp (6).
- 5 Secure harness assembly W22A to cab by installing two new tiedown straps (7).



## 8.1-11 PDFCS WIRING HARNESS W25.

This task covers:      a. Removal                                      b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Marking tags (AR) (item 87, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

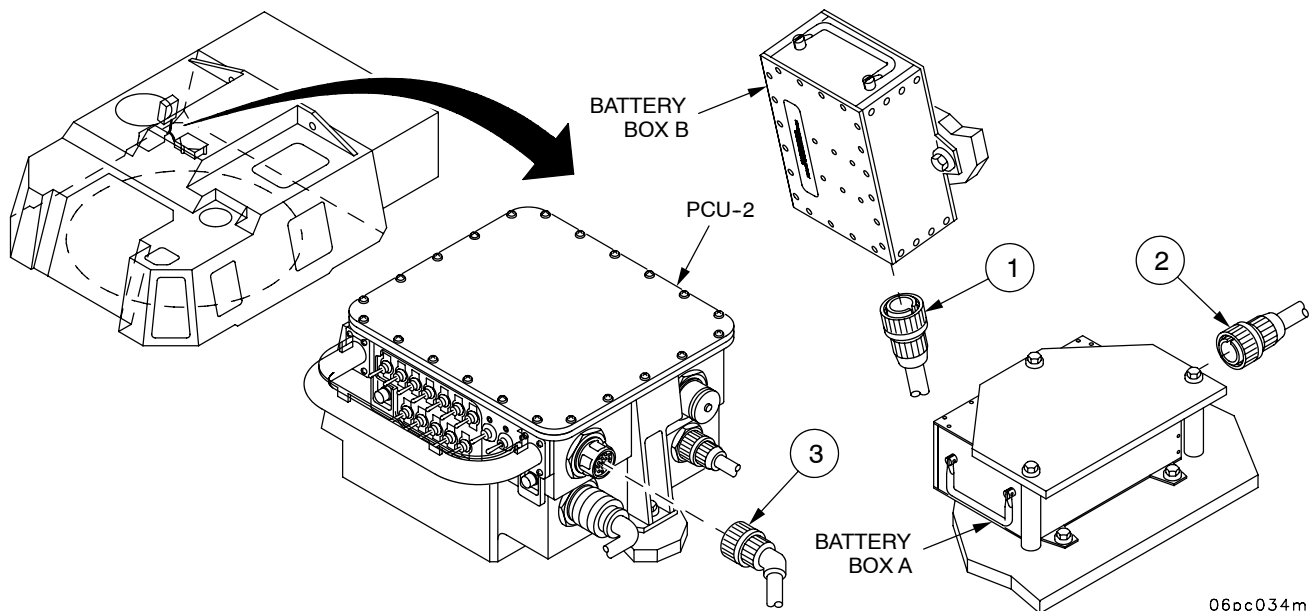
#### CAUTION

Do not twist or turn connector backshell when loosening coupling nuts or pins may break.

#### NOTE

Before removal, tag connectors for identification during installation.

- 1 Disconnect P1 of W25 (1) from battery box B.
- 2 Disconnect P2 of W25 (2) from battery box A.
- 3 Disconnect P3 of W25 (3) from J3 on PCU-2.
- 4 Remove wiring harness W25 assembly from cab.



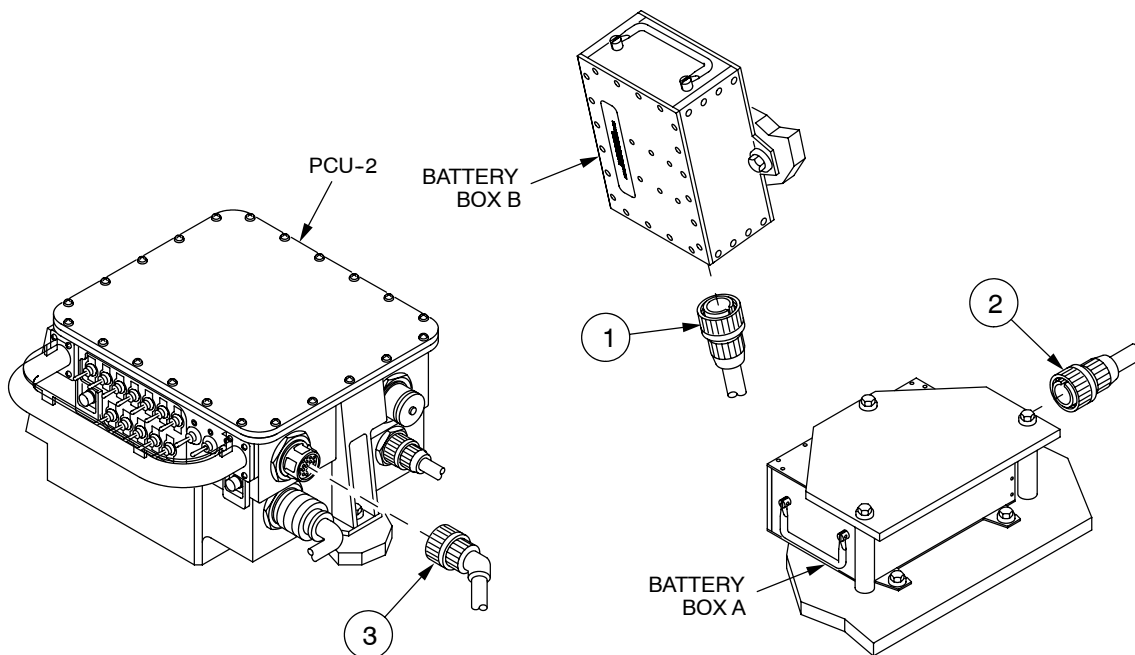
## 8.1-11 PDFCS WIRING HARNESS W25 - CONTINUED

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Position harness assembly in cab.
- 2 Connect P1 of W25 (1) to battery box B.
- 3 Connect P2 of W25 (2) to battery box A.
- 4 Connect P3 of W25 (3) to J3 on PCU-2.



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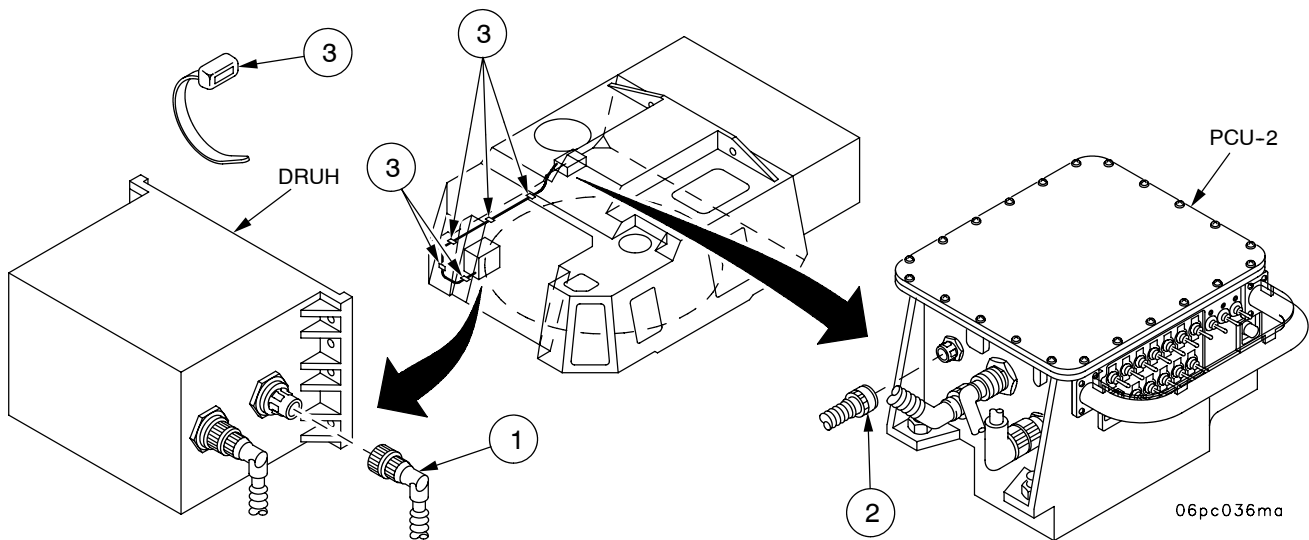
## 8.1-12 PDFCS WIRING HARNESS W27 - CONTINUED

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when loosening coupling nuts.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Position wiring harness W27 assembly in cab.
- 2 Connect P2 of W27 (2) to J8 on PCU-2.
- 3 Connect P1 of W27 (1) to J2 on DRUH.
- 4 Install five new tiedown straps (3) to secure wiring harness W27 to other harnesses.



**8.1-13 PDFCS WIRING HARNESS W92A.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Wire twisting pliers (item 62, Appx G)

Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)

Materials/Parts

Marking tags (AR) (item 87, Appx C)  
Lockwasher (item 116, Appx F)  
Nonelectrical wire (item 96, Appx C)

Personnel Required

Two

**a. Removal.**

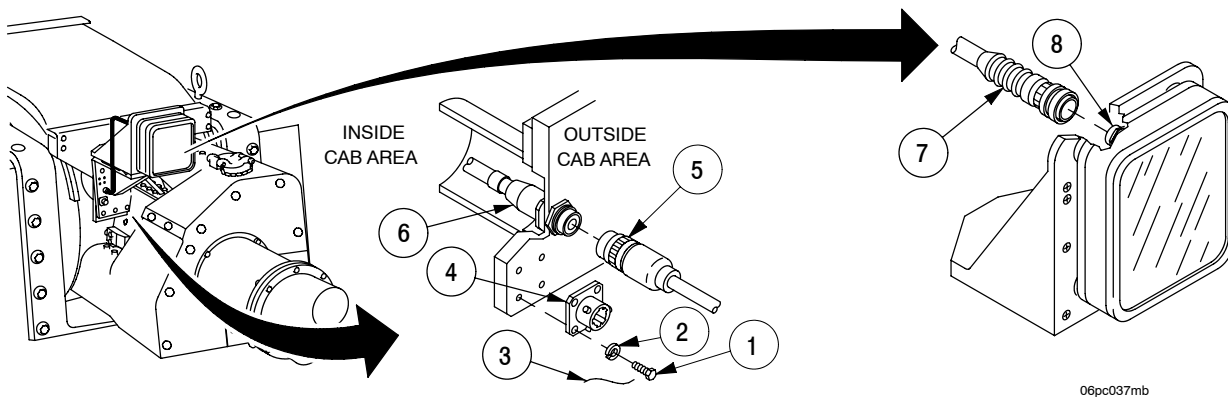
**CAUTION**

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

**NOTE**

Before removal, tag connectors for identification during installation.

- 1 Remove screw (1), lockwasher (2) and nonelectrical wire (3) from dummy connector (4) and W92AP2 (5). Discard lockwasher and nonelectrical wire.
- 2 Disconnect P2 (5) of wiring harness W92A from J2 (6) of wiring harness W93B.
- 3 Disconnect P1 (7) of wiring harness W92A from J1 (8) on PMVS.
- 4 Remove wiring harness W92A assembly from gun.



06pc037mb

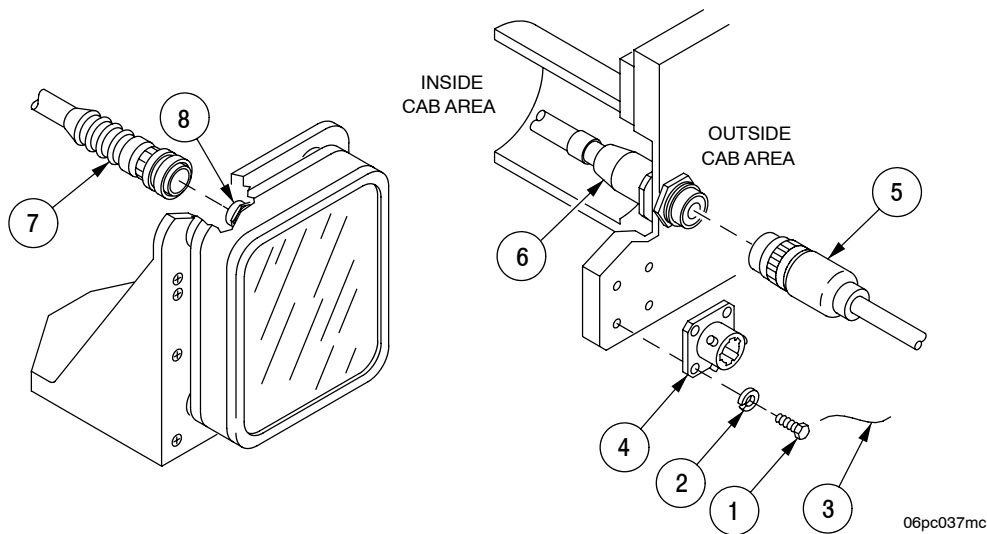
## 8.1-13 PDFCS WIRING HARNESS W92A - CONTINUED

### b. Installation.

#### CAUTION

- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Position wiring harness W92A assembly on gun.
- 2 Connect P1 (7) of wiring harness W92A to J1 (8) on PMVS.
- 3 Connect P2 (5) of wiring harness W92A to J2 (6) of wiring harness W93B.
- 4 Secure P2 (5) of wiring harness W92A to dummy connector (4) with new nonelectrical wire (3), new lockwasher (2) and screw (1) using wire twisting pliers.



06pc037mc



**8.1-14 PDFCS WIRING HARNESS W93B.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit (SC 5180-95-A12)

Materials/Parts

Tiedown straps (5) (item 76, Appx C)  
 Marking tags (AR) (item 87, Appx C)  
 Lockwashers (2) (item 105, Appx F)

Equipment Conditions

Vehicle MASTER power switch OFF (TM 9-2350-314-10)  
 Battery ground leads disconnected (TM 9-2350-314-20-1-2)  
 WP2P2 disconnected from W93BJ2 (para 8.1-13)

Personnel Required

Two

**a. Removal.**

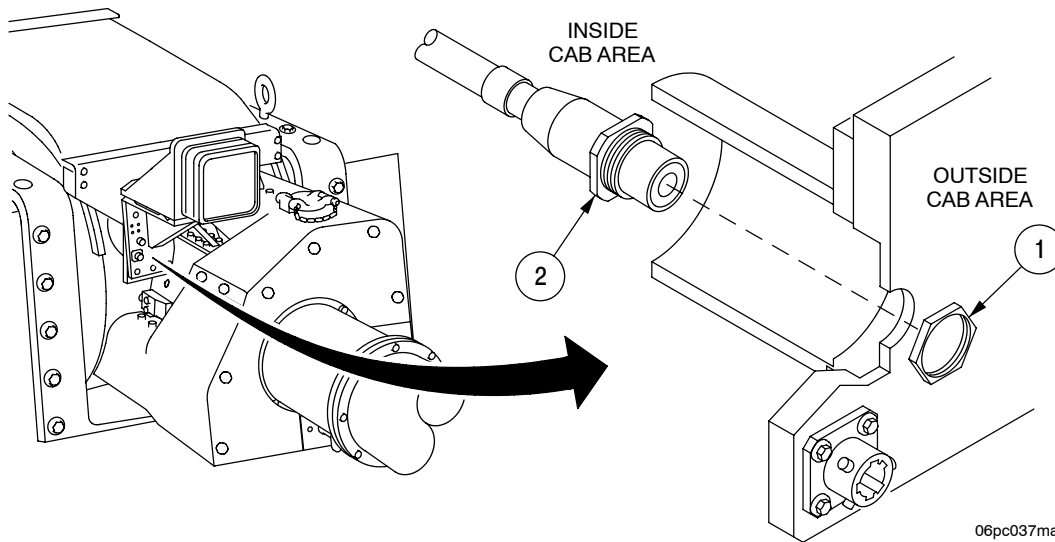
**CAUTION**

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

**NOTE**

- If PMVS is installed, the following procedures apply.
- Before removal, tag connectors for identification during installation.

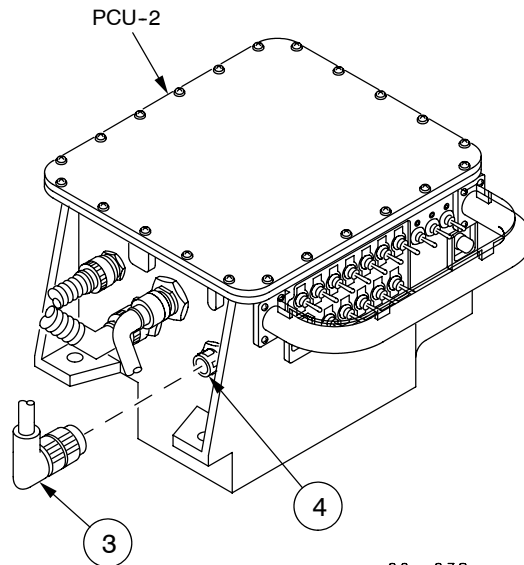
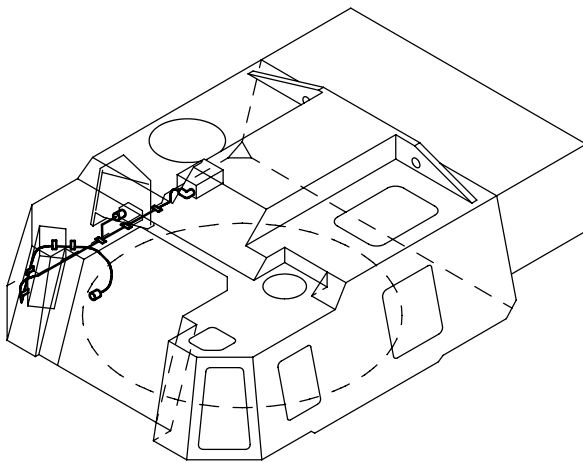
1 Remove locknut (1) from J2 (2) of wiring harness W93B.



## 8.1-14 PDFCS WIRING HARNESS W93B - CONTINUED

### a. Removal - Continued

- 2 Disconnect P6 (3) of W93B from J6 (4) on PCU-2.

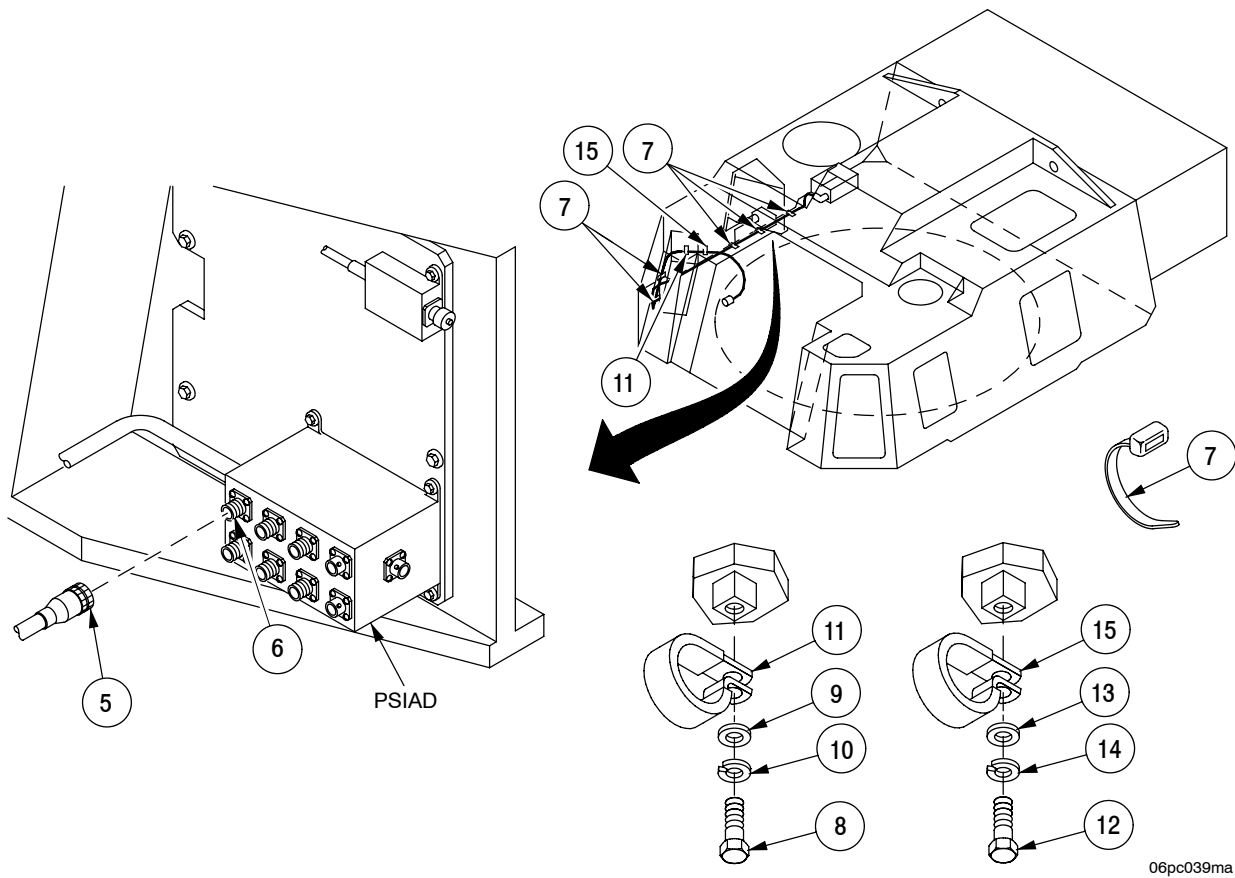


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**8.1-14 PDFCS WIRING HARNESS W93B - CONTINUED**

**a. Removal - Continued**

- 3 Disconnect P3 (5) of W93B (2) from J2 (6) of PSIAD.
- 4 Cut and discard five tiedown straps (7) securing harness W93B to other harnesses.
- 5 Remove screw (8), flat washer (9), lockwasher (10), and clamp (11). Discard lockwasher.
- 6 Remove screw (12), flat washer (13), lockwasher (14), and clamp (15). Discard lockwasher.
- 7 Remove harness from cab.



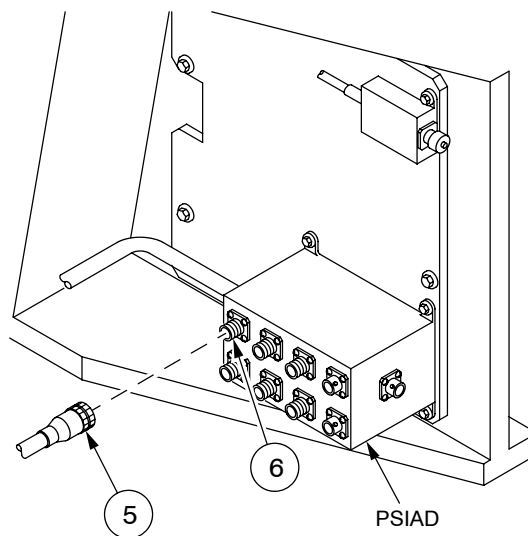
## 8.1-14 PDFCS WIRING HARNESS W93B - CONTINUED

### b. Installation

#### CAUTION

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

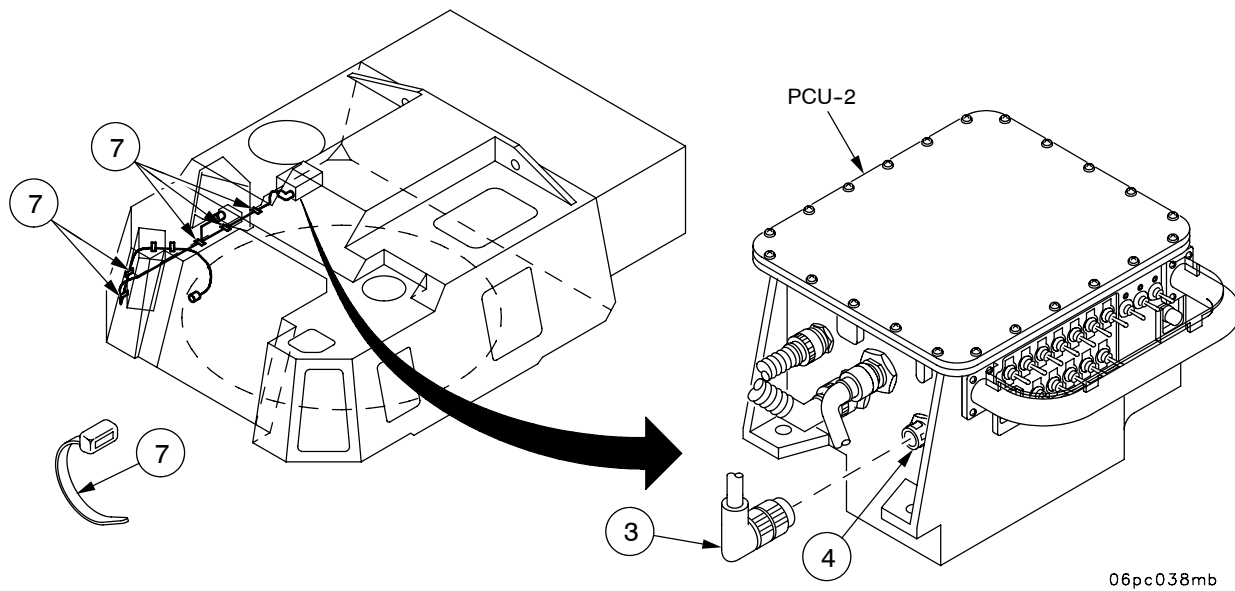
- 1 Position harness assembly in cab.
- 2 Connect P3 (5) of W93B to J2 (6) of PSIAD.



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**8.1-14 PDFCS WIRING HARNESS W93B - CONTINUED****b. Installation - Continued**

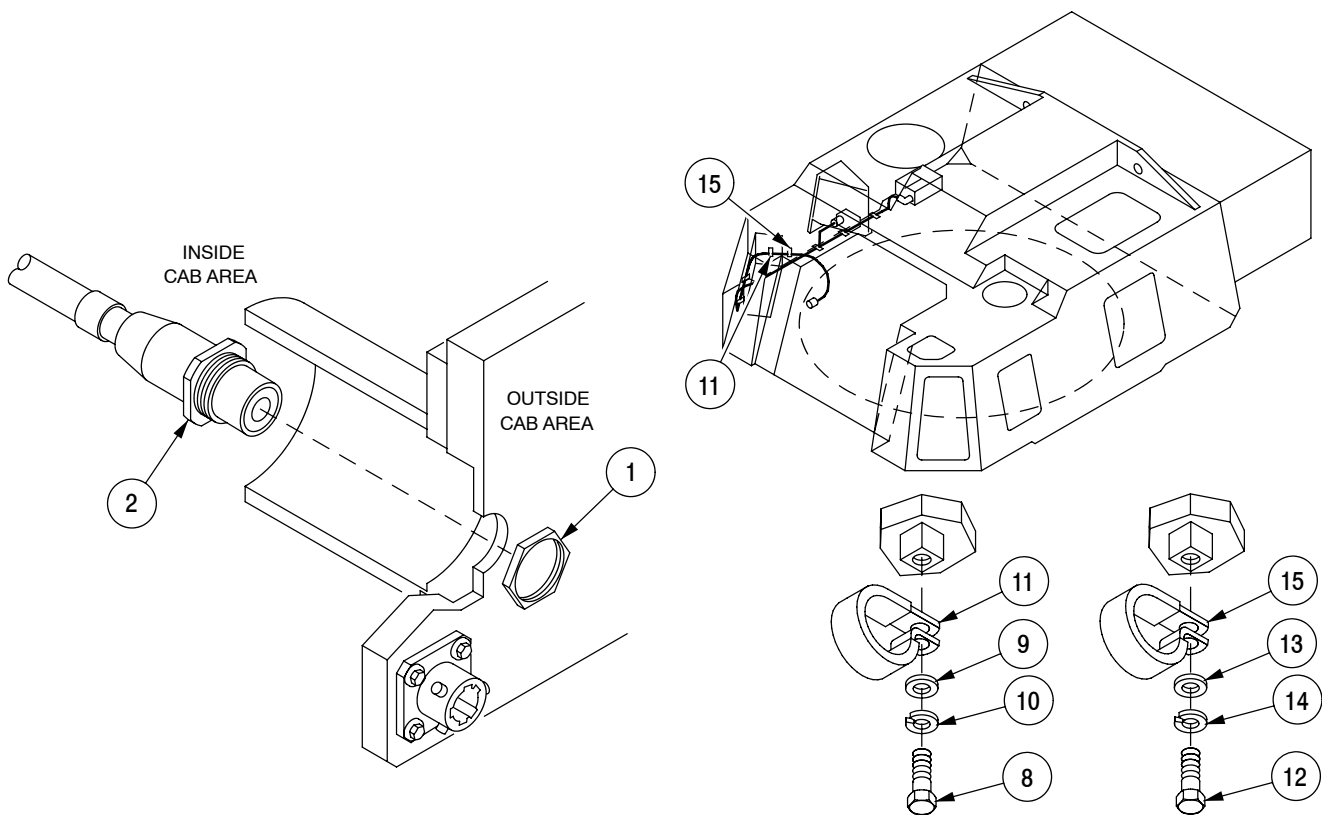
- 3 Connect P6 (3) of W93B to J6 (4) on PCU-2.
- 4 Install five new tiedown straps (7) securing harness W93B to other harnesses.



## 8.1-14 PDFCS WIRING HARNESS W93B - CONTINUED

### b. Installation - Continued

- 5 Have assistant position J2 (2) of wiring harness W93B through gun mount shield and install locknut (1) on J2 (2) of W93B.
- 6 Connect P2 of wiring harness W92A to wiring harness J2 (6) of W93B (para 8.1-13).
- 7 Install clamp (11), new lockwasher (10), flat washer (9), and screw (8) to secure wiring harness assembly W93B.
- 8 Install clamp (15), new lockwasher (14), flat washer (13), and screw (12) to secure wiring harness assembly W93B.



06pc042ma

**8.1-15 PDFCS PMVS DUMMY CONNECTOR.**

This task covers:     a. Removal                                     b. Installation

**INITIAL SETUP**Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwashers (4) (item 116, Appx F)

Equipment Conditions

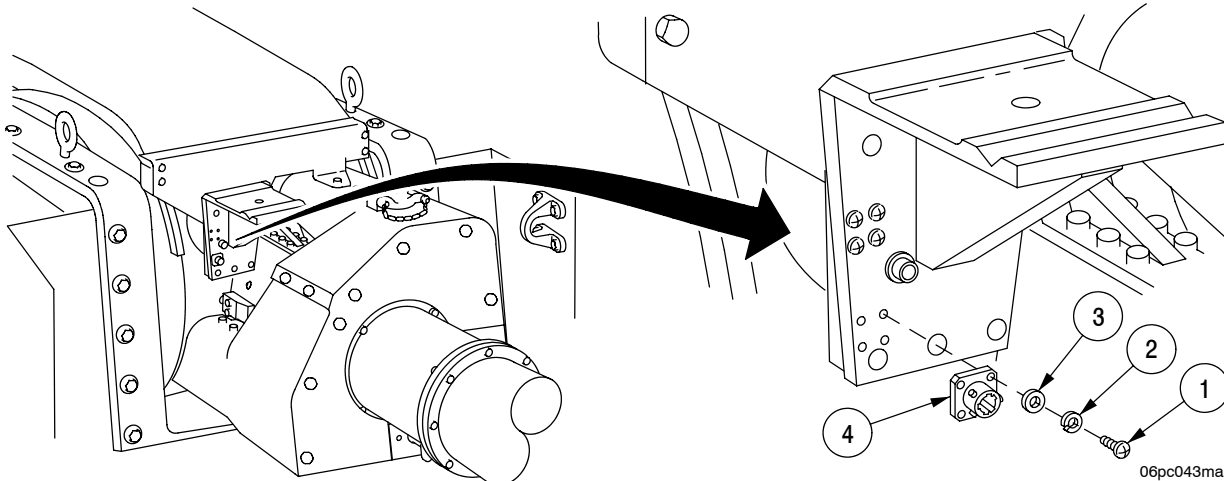
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
Gun tube stowed in travel lock  
(TM 9-2350-314-10)  
Cab traverse lock locked  
(TM 9-2350-314-10)

**a. Removal.**

Remove four screws (1), four lockwashers (2), four flat washers (3) and dummy connector (4). Discard lockwashers.

**b. Installation.**

Install dummy connector (4) with four flat washers (3), four new lockwashers (2), and four screws (1).

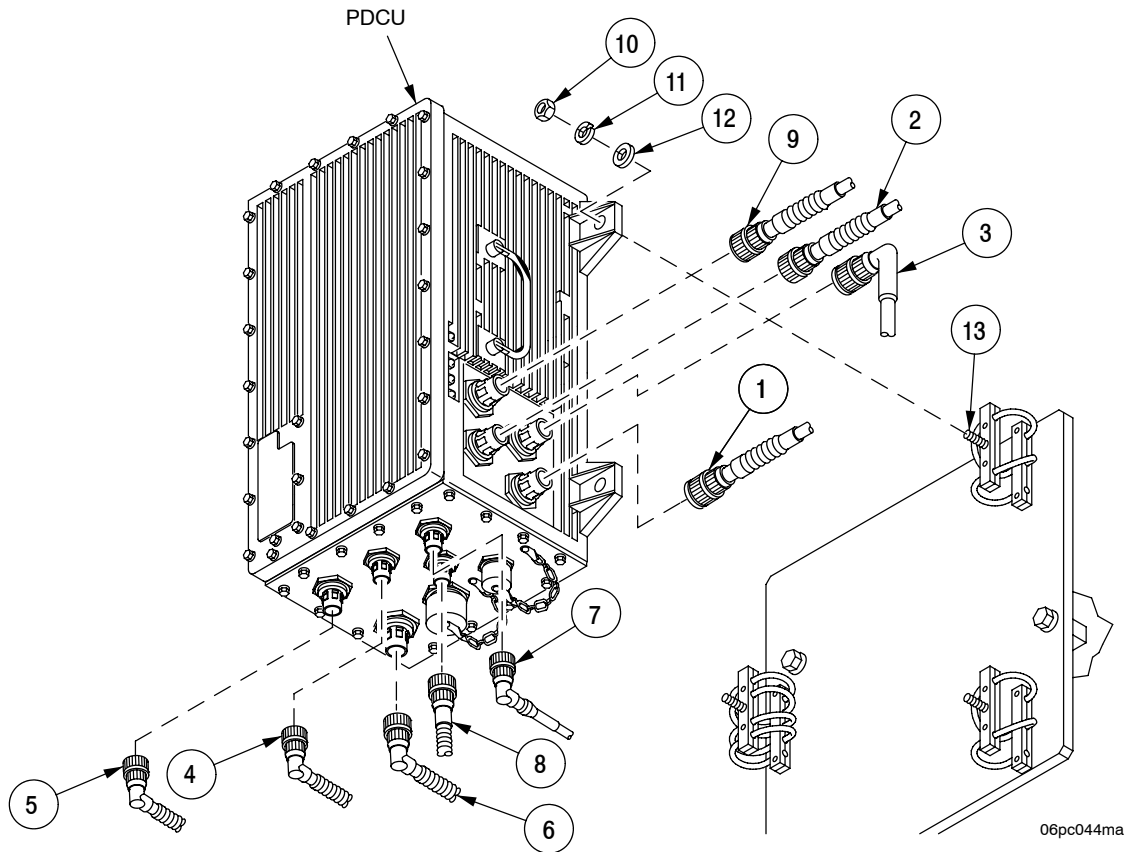






## 8.1-16 PDFCS COMPUTER UNIT (PDCU) - CONTINUED

### a. Removal - Continued



### b. Installation.

#### CAUTION

PDCU weighs 49 lbs (22.25 kg). Assistant should support box during removal to avoid damage to equipment.

#### CAUTION

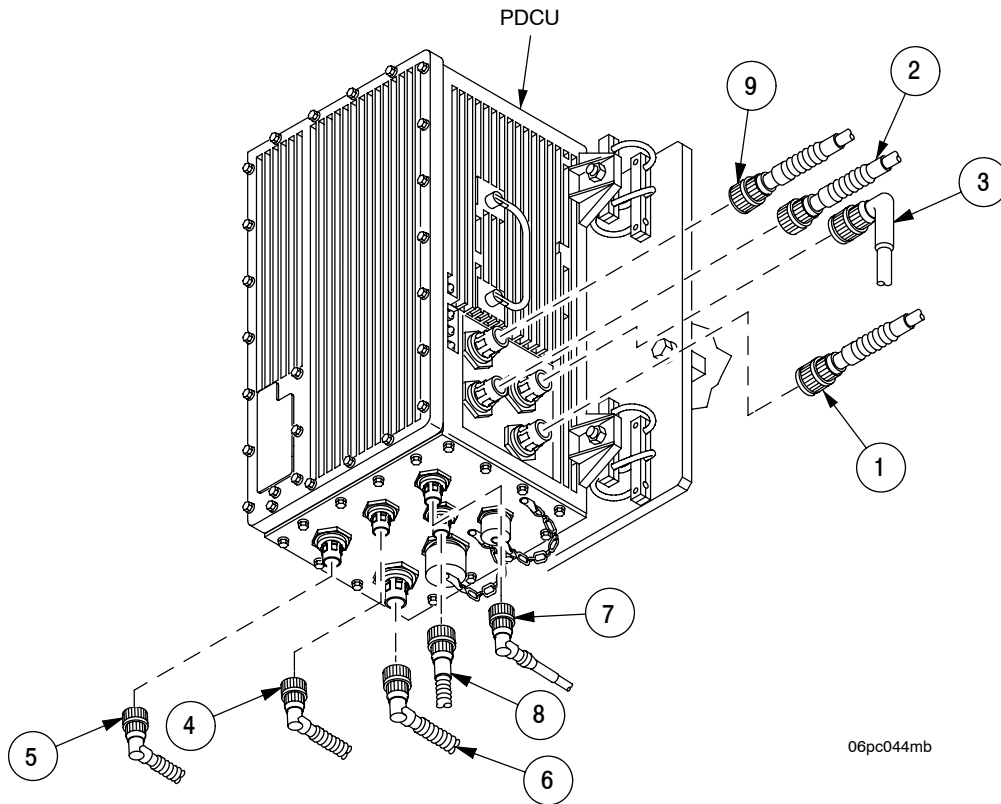
- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Align three mounting holes of PDCU with three mounting studs (13) on shock isolation plate and position PDCU onto plate.
- 2 Secure box assembly to mounting studs (13) with three flat washers (12), three new lockwashers (11), and three nuts (10).

## 8.1-16 PDFCS COMPUTER UNIT (PDCU) - CONTINUED

### b. Installation - Continued

- 3 Connect connector of PSIAD cable (9) to J11 on PDCU.
- 4 Connect P1 (8) of W10 to J4 on PDCU.
- 5 Connect P3 (7) of W1B to J1 on PDCU.
- 6 Connect P1 (6) of W22A to J7 on PDCU.
- 7 Connect P3 (5) of W17A to J2 on PDCU.
- 8 Connect P1 (4) of W12A to J3 on PDCU.
- 9 Connect P1 (3) of W2 to J10 on PDCU.
- 10 Connect P1 (2) of W7 to J6 on PDCU.
- 11 Connect P4 (1) of W65A to J5 on PDCU.
- 12 Check PDCU for correct version of software (TM 9-2350-314-10). If reprogramming of software is required, use PDFCS Sport Accessory Kit and TB 9-2350-314-20-2-5.
- 13 Record PDFCS data in PDCU from DA Form 2408-4 located in vehicle log book.
- 14 Record MAPMOD before attempting a navigation alinement.



06pc044mb

**8.1-17 PDFCS PDCU SHOCK ISOLATION PLATE ASSEMBLY.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Sealing compound (item 44, Appx C)

Equipment Conditions

PDFCS computer unit removed (para 8.1-16)

Personnel Required

Two

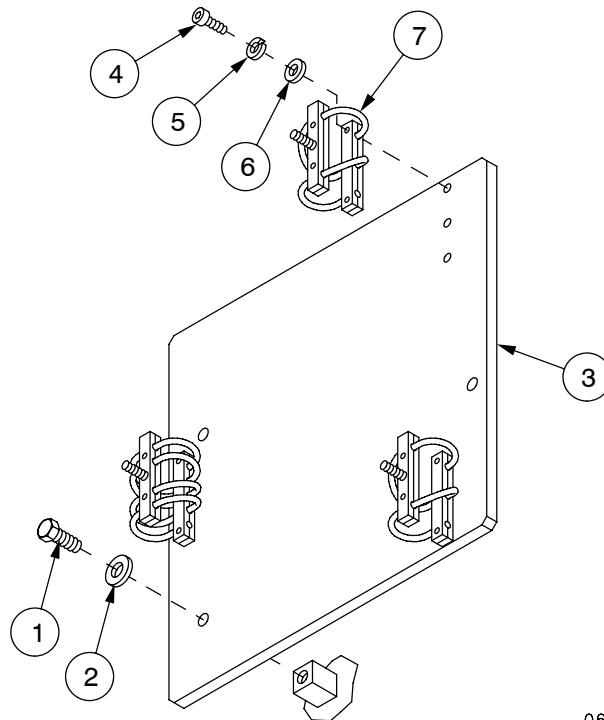
**a. Removal.**

- 1 Remove three screws (1), three flat washers (2), and shock isolation plate (3) from mounting pads.

**NOTE**

There are three isolation shock mounts on the shock isolation plate assembly. All are removed and replaced in the same manner.

- 2 Remove three screws (4), three lockwashers (5), three flat washers (6), and shock mount (7).



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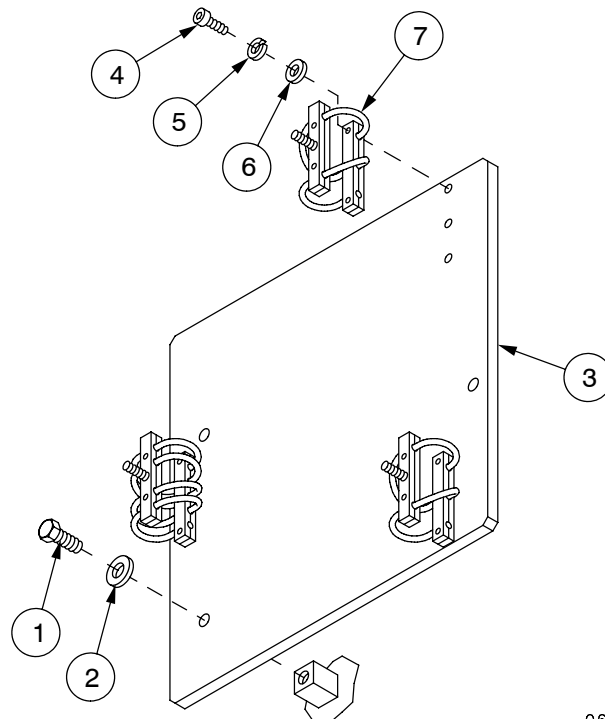
## 8.1-17 PDFCS PDCU SHOCK ISOLATION PLATE ASSEMBLY - CONTINUED

### b. Installation.

#### NOTE

There are three isolation shock mounts on the shock isolation plate assembly. All are removed and replaced in the same manner.

- 1 Install shock mount (7) to shock isolation plate (3) with three flat washers (6), three new lockwashers (5), and three screws (4).
- 2 Apply sealing compound to threads of three screws (1).
- 3 Align shock isolation plate mounting holes with holes in mounting pads and install shock isolation plate (3) with three flat washers (2) and three screws (1).



06pc046ma

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## 8.1-18 PDFCS POWER CONDITIONING UNIT-2 (PCU-2).

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This task covers:           a. Removal    b. Installation

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### **INITIAL SETUP**

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

#### Materials/Parts

Sealing compound (item 41, Appx C)  
Marking tags (AR) (item 87, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

#### Personnel Required

Two

---

### a. Removal.

#### **CAUTION**

- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- PCU-2 box weighs 33 lbs (14.98 kg). Assistant should support box during removal to prevent damage to equipment.

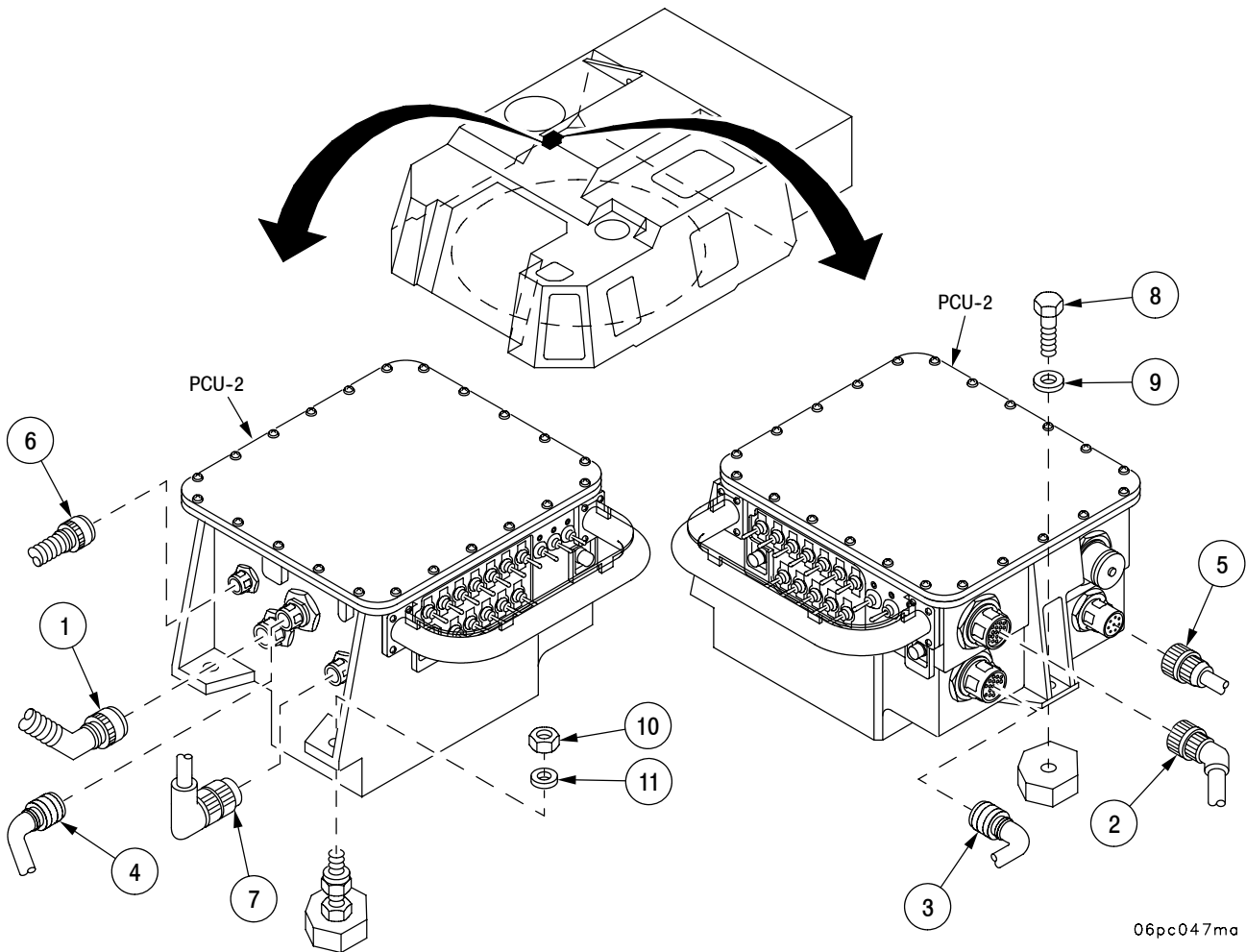
#### **NOTE**

- Document PDFCS data prior to removing/replacing PCU-2.
- Before removal, tag connectors for identification during installation.

**8.1-18 PDFCS POWER CONDITIONING UNIT-2 (PCU-2) - CONTINUED**

**a. Removal - Continued**

- 1 Disconnect P1 (1) of W1B from J1 on PCU-2.
- 2 Disconnect P3 (2) of W25 from J3 on PCU-2.
- 3 Disconnect P1 (3) of W50 from J4 on PCU-2.
- 4 If connected, disconnect P2 (4) of W65A from J5 on PCU-2.
- 5 Disconnect P1 (5) of W26 from J7 on PCU-2.
- 6 Disconnect P2 (6) of W27 from J8 on PCU-2.
- 7 Disconnect P6 (7) of W93B from J6 on PCU-2.
- 8 Remove screw (8), flat washer (9), two nuts (10), and two flat washers (11) from PCU-2.
- 9 Remove PCU-2 from cab.



06pc047ma

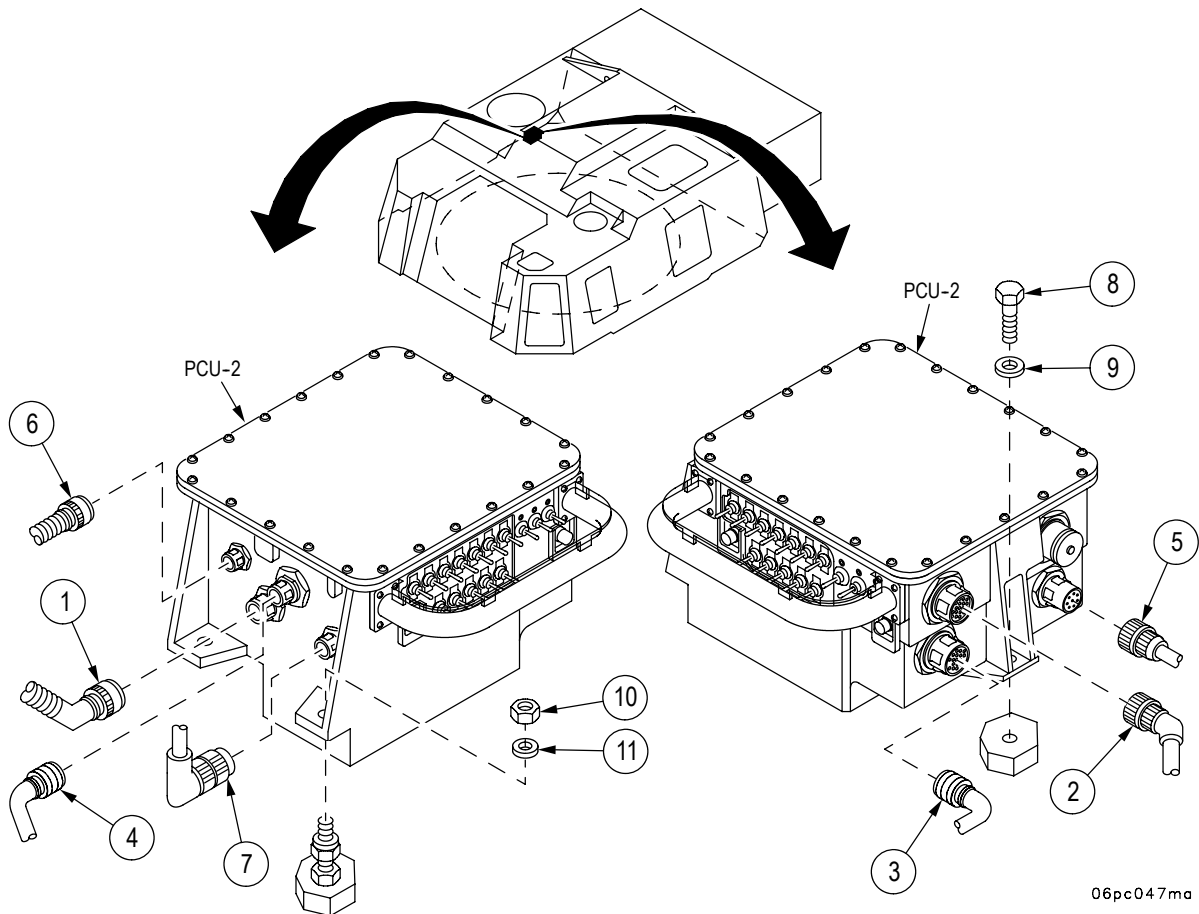
**8.1-18 PDFCS POWER CONDITIONING UNIT-2 (PCU-2) - CONTINUED**

**b. Installation.**

**CAUTION**

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 1 Apply sealing compound to threads of screw (8).
- 2 Place PCU-2 in cab.
- 3 Install with two flat washers (11), two nuts (10), flat washer (9), and screw (8).
- 4 Connect P6 (7) of W93B to J6 on PCU-2.
- 5 Connect P2 (6) of W27 to J8 on PCU-2.
- 6 Connect P1 (5) of W26 to J7 on PCU-2.
- 7 Connect P2 (4) of W65A to J5 (if connected) on PCU-2.
- 8 Connect P1 (3) of W50 to J4 on PCU-2.
- 9 Connect P3 (2) of W25 to J3 on PCU-2.
- 10 Connect P1 (1) of W1B to J1 on PCU-2.



06pc047ma

## 8.1-19 PDFCS DISPLAY UNIT (PDU).

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

#### Materials/Parts

Marking tags (AR) (item 87, Appx C)  
Lockwasher (item 105, Appx F)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

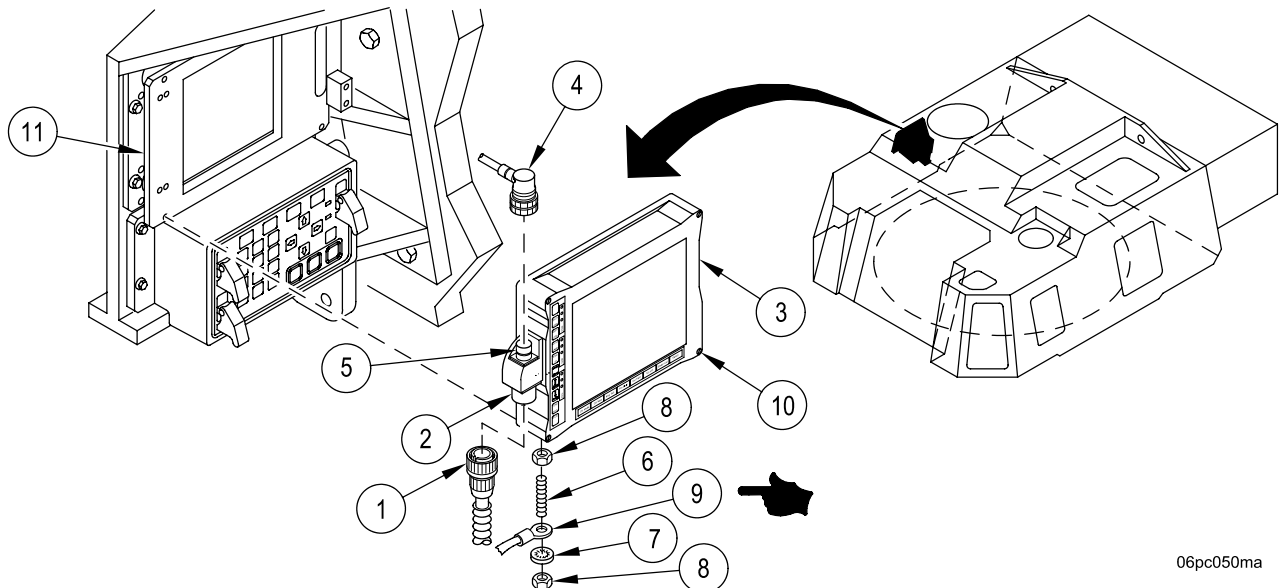
#### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### NOTE

- Document PDFCS data prior to removing/replacing PDFCS Display Unit.
- Before removal, tag connectors for identification during installation

- 1 Disconnect P2 (1) of W2 from J1 (2) on PDU (3).
- 2 Disconnect boot dongle cable BD-P1 (4) from J2 (5) on PDU (3).
- 2.1 Remove stud (6), lockwasher (7), two nuts (8) and ground strap (9) on PDU (3). Discard lockwasher.
- 3 Loosen four captive screws (10) on PDU (3).
- 4 Remove PDU (3) from PDU isolation kit (11).



06pc050ma



## 8.1-19 PDFCS DISPLAY UNIT (PDU) - CONTINUED

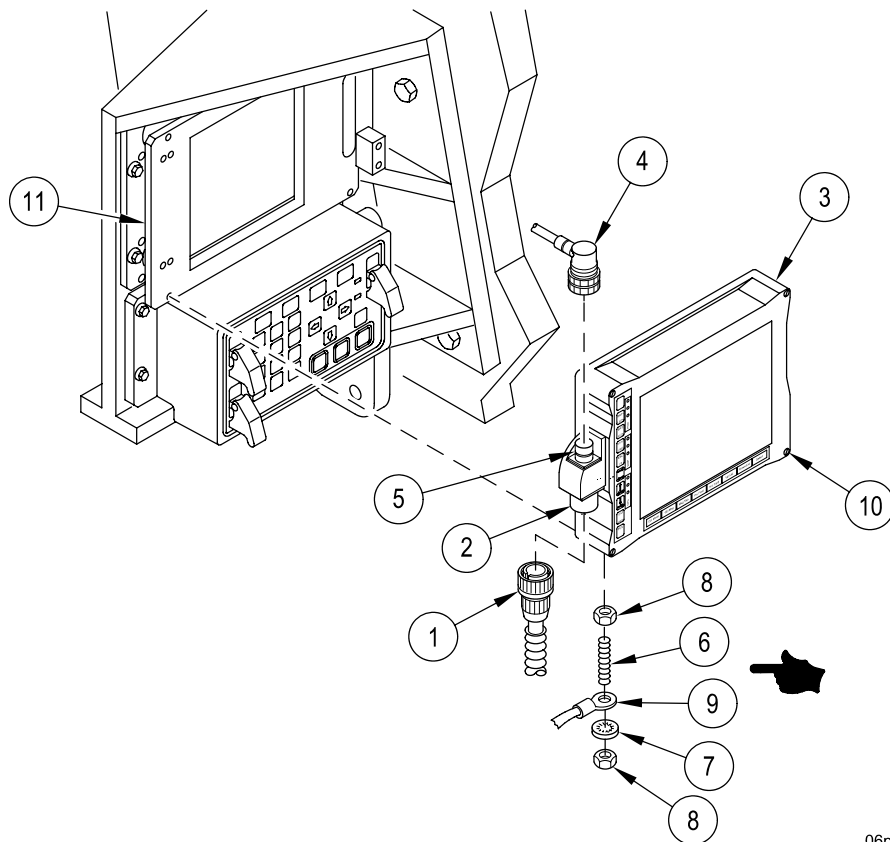
### b. Installation.

- 1 Place PDU (3) on PDU isolation kit (11).
- 2 Tighten four captive screws (10) on PDU (3).

### CAUTION

- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 2.1 Connect ground strap (9) on PDU (3) with stud (6), new lockwasher (7) and two nuts (8).
- 3 Connect boot dangle cable BD-P1 (4) to J2 (5) on PDU (3).
- 4 Connect P2 (1) of W2 to J1 (2) on PDU (3).



06pc050mb

## 8.1-20 PDFCS KEYPAD.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

#### Materials/Parts

Marking tags (AR) (item 87, Appx C)

#### Equipment Conditions

Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

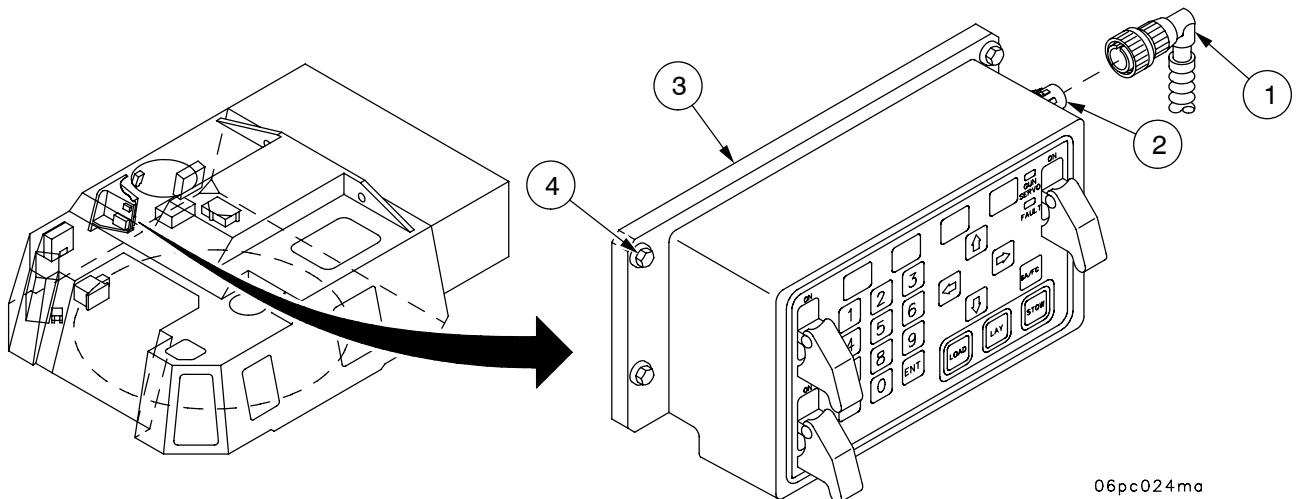
#### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### NOTE

- Document PDFCS data prior to removing/replacing PDFCS Keypad.
- Before removal, tag connectors for identification during installation

- 1 Disconnect P2 (1) of W22A from J1 (2) of keypad (3).
- 2 Loosen four captive screws (4) on keypad (3).
- 3 Remove keypad (3).



06pc024mo

## 8.1-20 PDFCS KEYPAD - CONTINUED

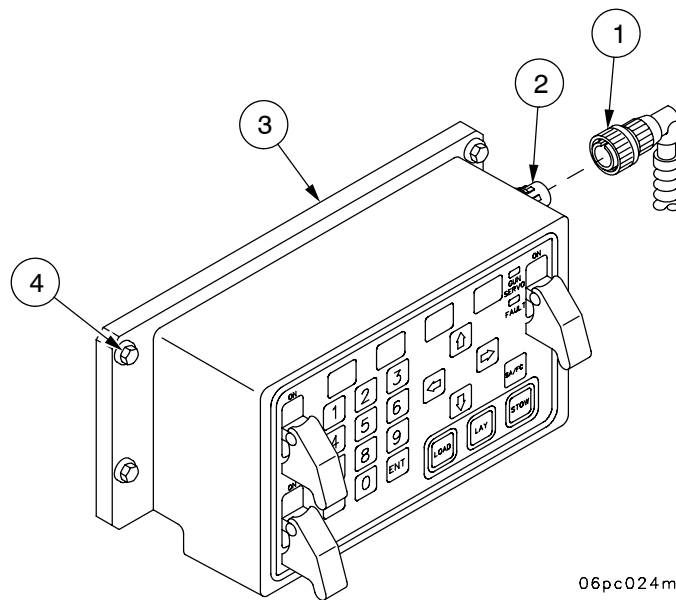
### b. Installation.

- 1 Place keypad (3).
- 2 Tighten four captive screws (4) on keypad (3).

### CAUTION

- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 3 Connect P2 (1) of W22A to J1 (2) of keypad (3).



**8.1-21 PDFCS DISPLAY UNIT ISOLATION PLATE.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)

Materials/Parts

Lockwashers (4) (item 128, Appx F)

Equipment Conditions

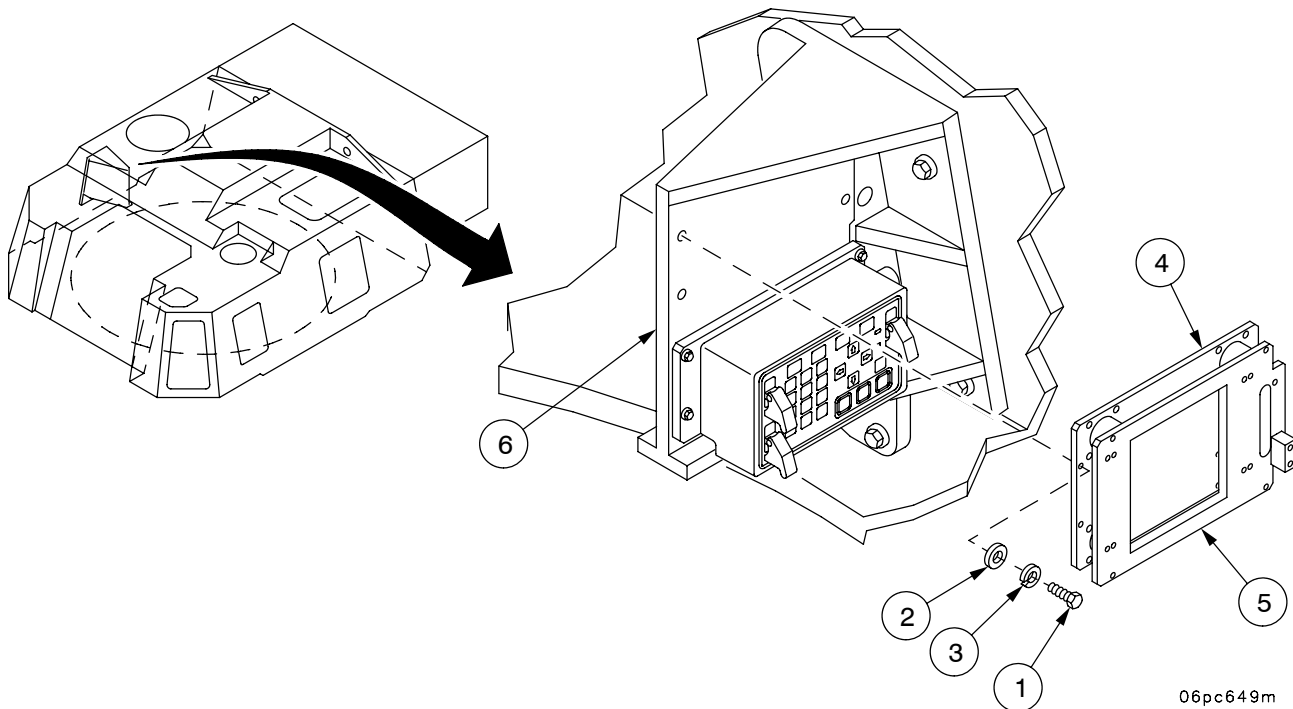
PDFCS powered down  
(TM 9-2350-314-10)  
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
PDFCS display unit removed  
(para 8.1-19)

**a. Removal.**

- 1 Remove four screws (1), four flat washers (2), and four lockwashers (3) from PDU isolation plate (4). Discard lockwashers.
- 2 Remove PDU isolation kit (5) from thermal mounting bracket (6).

**b. Installation.**

- 1 Position PDU isolation kit (5) on thermal mounting bracket (6).
- 2 Install four screws (1), four flat washers (2), and four new lockwashers (3) to PDU isolation plate (4) and thermal mounting bracket (6).



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## 8.1-22 PDFCS THERMAL MOUNTING BRACKET ASSEMBLY.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)  
Socket wrench (item 49, Appx G)  
Torque wrench (item 54, Appx G)

#### Materials/Parts

Sealing compound (item 41, Appx C)

#### Equipment Conditions

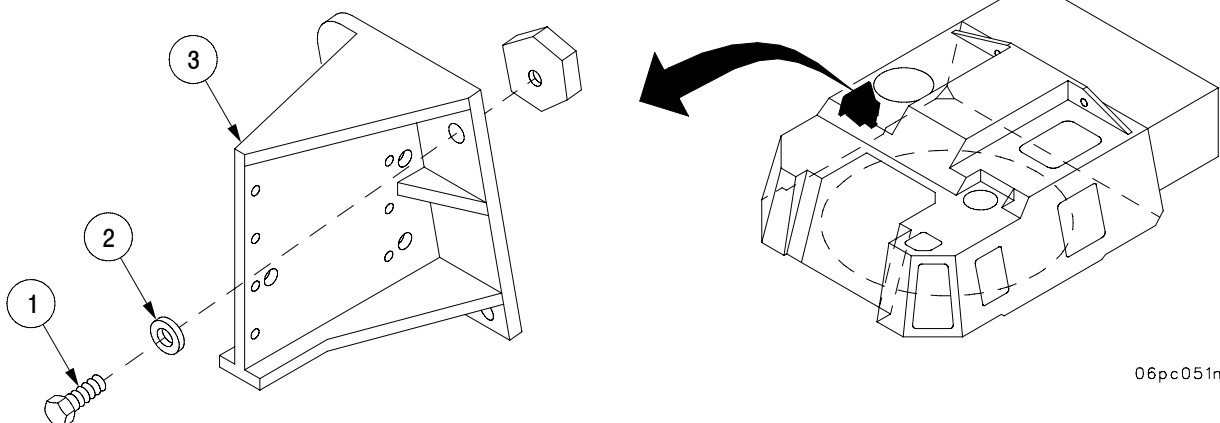
PDFCS powered down  
(TM 9-2350-314-10)  
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
PDFCS Display Unit removed (para 8.1-19)  
PDFCS Keypad removed (para 8.1-20)  
PDFCS PDU isolation plate removed  
(para 8.1-21)  
PDFCS PSIAD removed (para 8.1-23)  
PDFCS Boot Dongle removed  
(para 8.1-24)  
PDFCS PSIAD mounting plate (para 8.1-25)

#### a. Removal.

Remove four mounting bolts (1), four flat washers (2), and bracket assembly (3).

#### b. Installation.

- 1 Apply sealing compound to mounting bolts (1).
- 2 Position bracket assembly (3) on cab wall.
- 3 Install four mounting bolts (1) and four flat washers (2). Torque bolts to 190-210 lb-ft (257-284 N•m).



06pc051m

## 8.1-23 PDFCS PALADIN SERIAL INTERFACE ADAPTER DEVICE (PSIAD).

This task covers: a. Removal b. Installation

### INITIAL SETUP

Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

Materials/Parts

Lockwashers (4) (item 128, Appx F)

Equipment Conditions

PDFCS powered down  
(TM 9-2350-314-10)  
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

**a. Removal.**

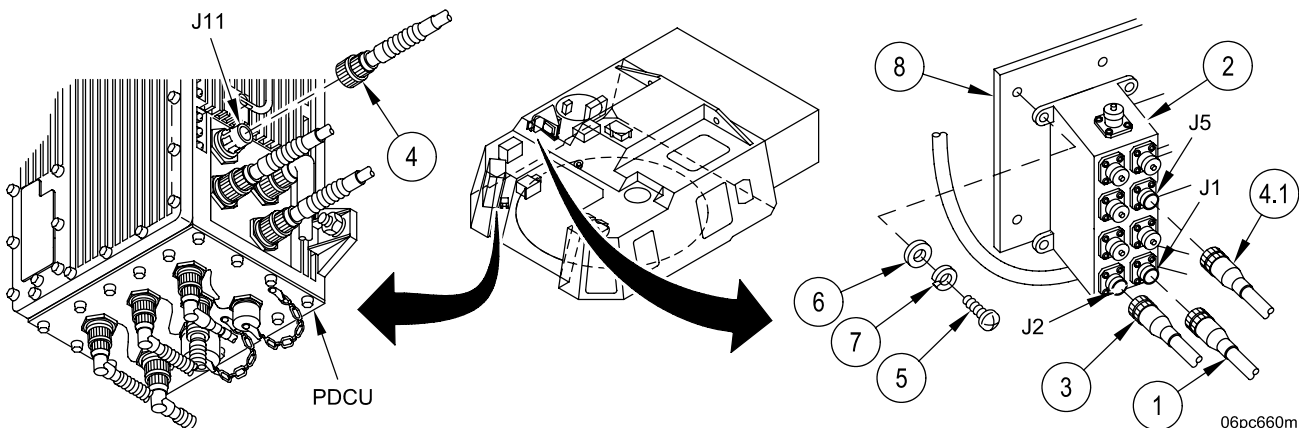
**CAUTION**

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

**NOTE**

- Before removal, tag connectors for identification during installation.
- If vehicle is equipped with Excalibur, perform step 3.1 of removal and step 2.1 of installation.

- 1 Disconnect P1 (1) of W3N from J1 of PSIAD (2).
- 2 Disconnect P3 (3) of W93B from J2 of PSIAD (2).
- 3 Disconnect PSIAD cable (4) from J11 of PDCU.
- 3.1 Disconnect P2 of cable W154 (4.1) from J5 of PSIAD.
- 4 Remove four screws (5), four flat washers (6), and four lockwashers (7) from PSIAD mounting plate (8). Discard lockwashers.
- 5 Remove PSIAD (2) from PSIAD mounting plate (8).



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## 8.1-23 PDFCS PALADIN SERIAL INTERFACE ADAPTER DEVICE (PSIAD) - CONTINUED

### b. Installation.

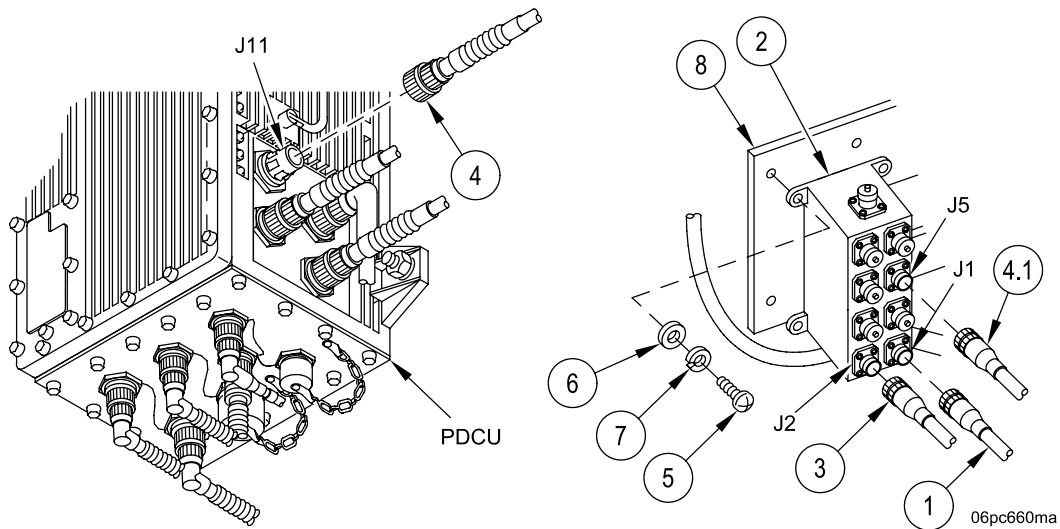
- 1 Place PSIAD (2) on PSIAD mounting plate (8).
- 2 Install four new lockwashers (7), four flat washers (6), and four screws (5) on PSIAD (2).

### CAUTION

- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

2.1 Connect P2 of cable W154 (4.1) to J5 of PSIAD (2).

- 3 Connect PSIAD cable (4) to J11 of PDCU.
- 4 Connect P3 (3) of W93B to J2 of PSIAD (2).
- 5 Connect P1 (1) of W3N to J1 of PSIAD (2).



## 8.1-24 PDFCS BOOT DONGLE.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

#### Materials/Parts

Lockwashers (2) (item 127, Appx F)

#### Equipment Conditions

PDFCS powered down  
(TM 9-2350-314-10)  
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)

### a. Removal.

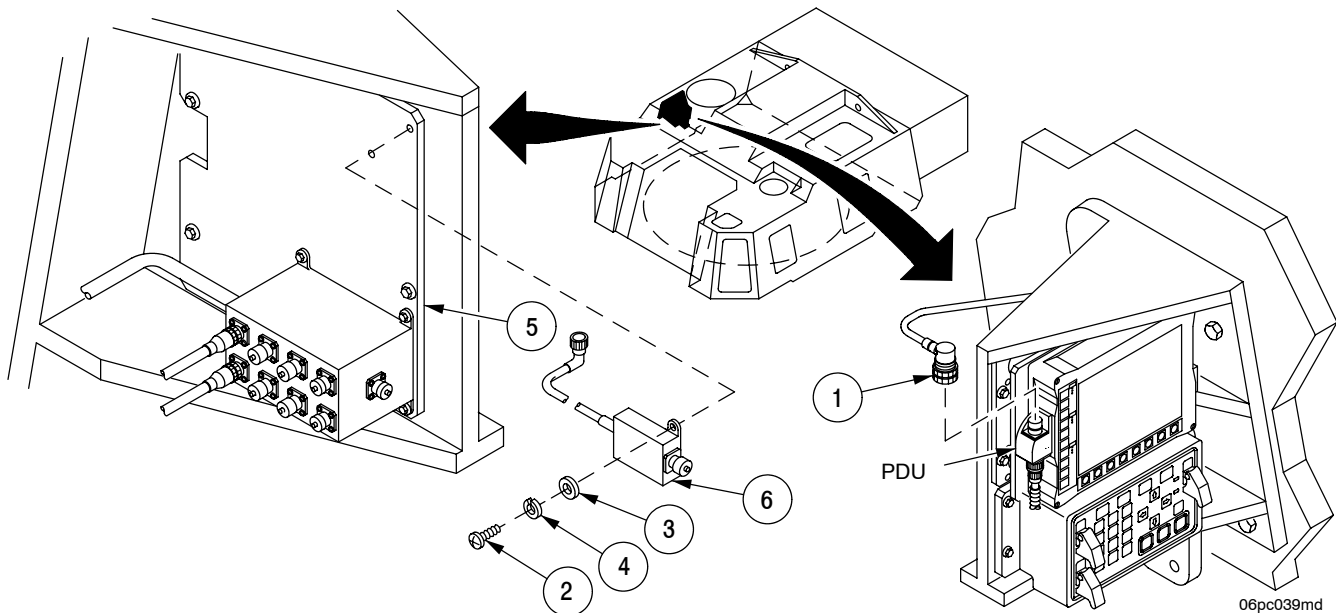
#### CAUTION

Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

#### NOTE

Before removal, tag connectors for identification during installation.

- 1 Disconnect boot dongle BD-P1 (1) from PDU.
- 2 Remove two screws (2), two flat washers (3), and two lockwashers (4) from PSIAD mounting plate (5). Discard lockwashers.
- 3 Remove boot dongle (6) from PSIAD mounting plate (5).



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## 8.1-24 PDFCS BOOT DONGLE - CONTINUED

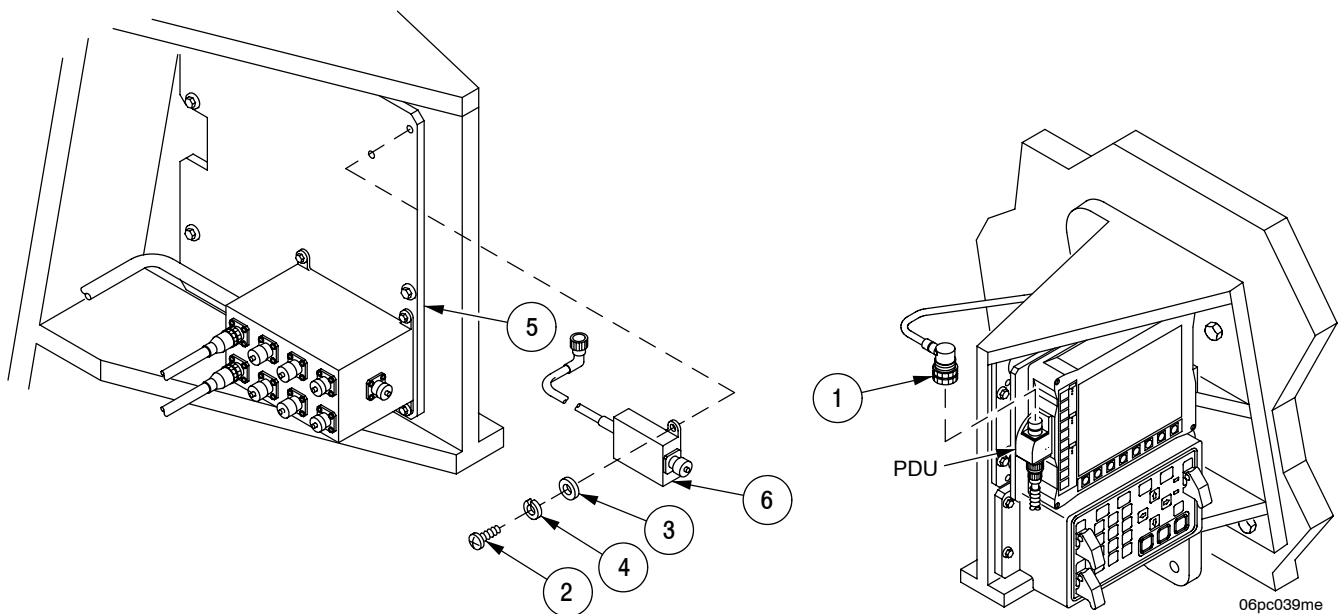
### b. Installation.

- 1 Place boot dongle (6) on PSIAD mounting plate (5).
- 2 Install two new lockwashers (4), two flat washers (3), and two screws (2) on boot dongle (6).

### CAUTION

- Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

- 3 Connect boot dongle BD-P1 (1) to PDU.



## 8.1-25 PDFCS PSIAD MOUNTING PLATE.

This task covers: a. Removal b. Installation

### INITIAL SETUP

#### Tools

Artillery and turret mechanic's tool kit  
(SC 5180-95-A12)  
Socket wrench (item 49, Appx G)

#### Materials/Parts

Sealing compound (item 41, Appx C)  
Lockwashers (3) (item 130, Appx F)

#### Equipment Conditions

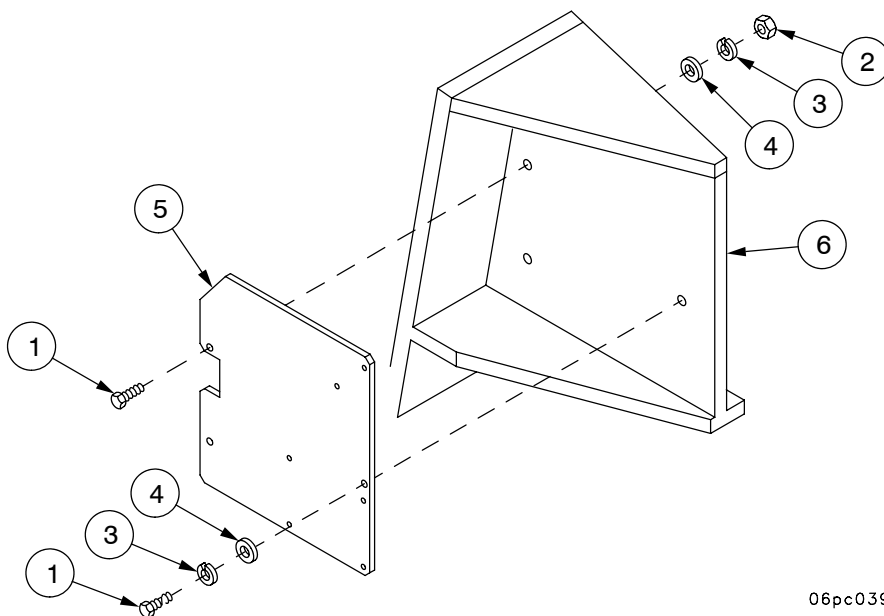
Vehicle MASTER power switch OFF  
(TM 9-2350-314-10)  
Battery ground leads disconnected  
(TM 9-2350-314-20-1-2)  
PDFCS Display Unit removed (para 8.1-19)  
PDFCS Keypad removed (para 8.1-20)  
PDFCS PDU isolation plate removed  
(para 8.1-21)  
PDFCS PSIAD removed (para 8.1-23)  
PDFCS boot dongle removed (para 8.1-24)

#### a. Removal.

Remove three mounting bolts (1), two nuts (2), three lockwashers (3), three flat washers (4), and mounting plate (5) from thermal bracket (6). Discard lockwashers.

#### b. Installation.

- 1 Apply sealing compound to three mounting bolts (1).
- 2 Position mounting plate (5) on thermal bracket (6).
- 3 Install three mounting bolts (1), three new lockwashers (3), three flat washers (4), and two nuts (2).



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**8.1-26 PDFCS PMVS ANTENNA AND ANTENNA BRACKET.**

This task covers: a. Disassembly b. Assembly

**INITIAL SETUP**

Tools

Artillery and turret mechanic's tool kit  
(CL 5180-95-A12)

Equipment Conditions

PMVS antenna bracket removed  
(TM 9-2350-314-10)

Reference

TM 9-2350-314-10

**NOTE**

- Perform only those steps necessary to complete the repair.
- To replace antenna, perform disassembly steps 1 and 2.

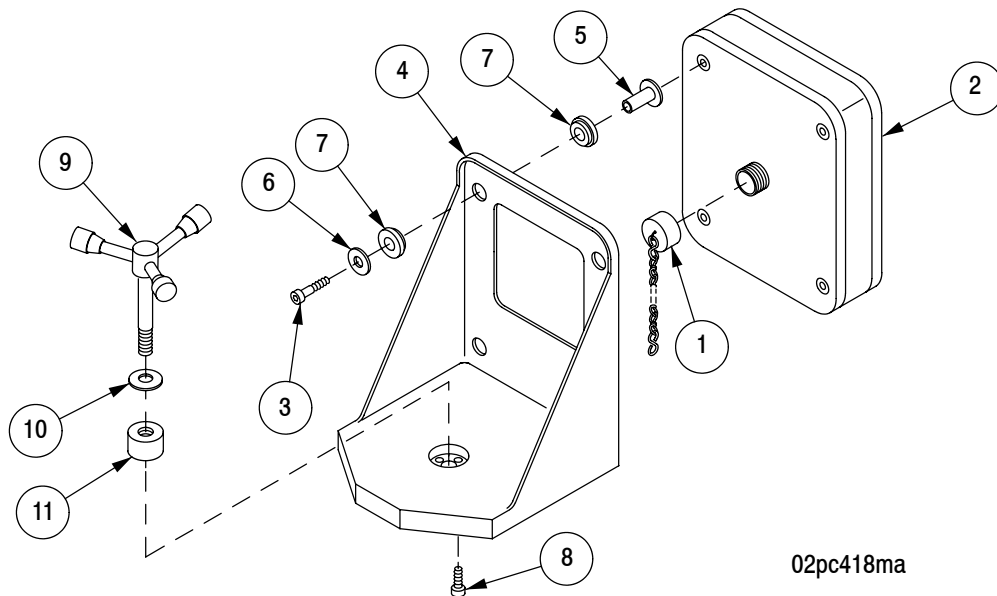
**a. Disassembly**

- 1 Install storage cap (1) on antenna (2).
- 2 Remove four screws (3) and antenna (2) from antenna bracket (4).

**NOTE**

There are four antenna shock absorber mounts.  
Each mount is disassembled in the same manner.  
This task disassembles only one mount.

- 3 Separate bushing (5), flat washer (6) and two shock absorbers (7).
- 4 Remove four screws (8) securing screw handle (9). Separate screw handle (9), spring washer (10) and bushing (11).



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**8.1-26 PDFCS PMVS ANTENNA AND ANTENNA BRACKET - CONTINUED**

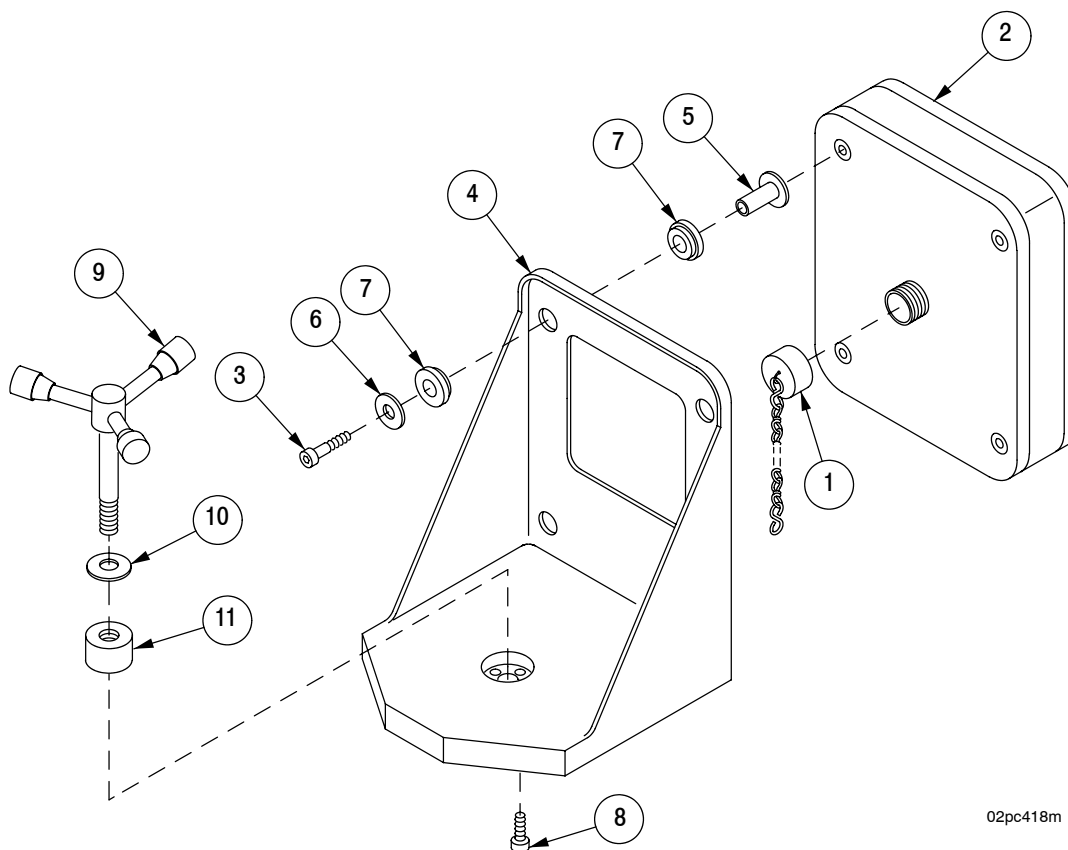
**b. Assembly**

- 1 Install screw handle (9), spring washer (10) and bushing (11) in antenna bracket (4) with four screws (8).

**NOTE**

There are four antenna shock absorber mounts.  
Each mount is assembled in the same manner. This task assembles only one mount.

- 2 Install two shock absorbers (7), bushing (5) and flat washers (6) in antenna bracket (4).
- 3 Position antenna (2) on antenna bracket (4) and secure with four screws (3).
- 4 Remove storage cap (1).
- 5 Install PMVS antenna bracket (4) (TM 9-2350-314-10).



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Pages 8.1-65 thru 8.1-76 deleted

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## 8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE.

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### PDFCS FIRE CONTROL SYSTEM ALIGNMENT PROCEDURE

Fire control alignment is necessary with the PDFCS to compensate for deltas between what the DRU is reading and known data. Elevation and azimuth alignments must be performed in order to boresight the DRU with the gun tube. Roll, Quadrant Elevation, and Azimuth Offsets are stored in the PDFCS and the NAV System. If the PDFCS and NAV System offsets do not match within  $\pm 0.5$  mils, the PDFCS will display an alert that a Fire Control Alignment must be performed. These offsets, once stored, are used during all aiming of the tube during fire missions. Before beginning the alignment procedure, affix crosshairs to the muzzle.

#### NOTE

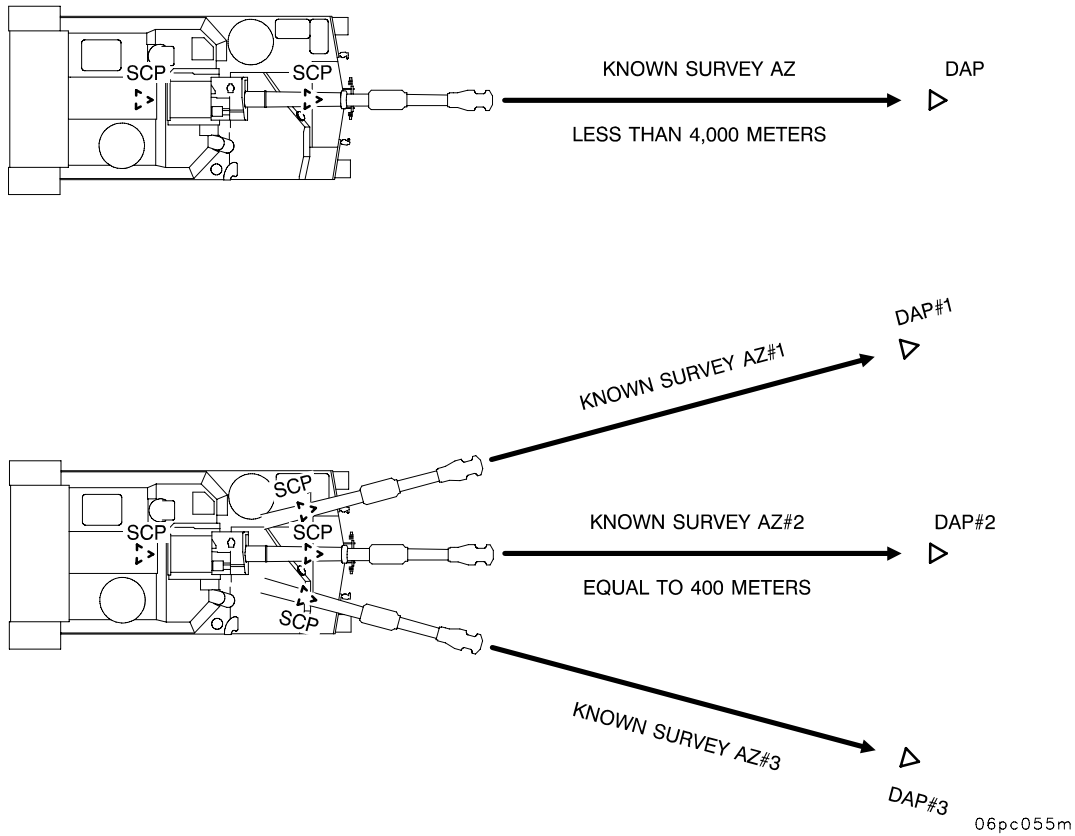
To speed the process, it is desirable to perform the complete fire control alignment for both elevation and azimuth at one location, but it can be done at two locations; one for elevation and one for azimuth.

The howitzer work area should be a reasonably level pad. For the elevation alignment, a plumb line is required. For the azimuth alignment, a distant aiming point (DAP) is required that can be sighted through the gun tube muzzle and the howitzer's location must also be a surveyed point.

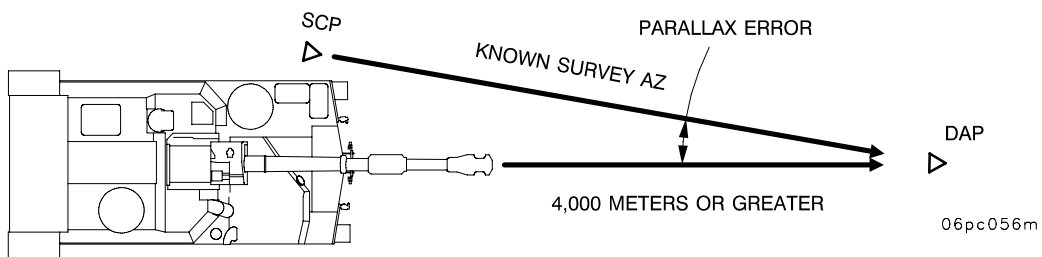
It is desirable that the howitzer's surveyed point be an identified mark on a concrete pad that cannot be moved or damaged, since howitzers will be pulling over this point frequently. The preferred location for the howitzer's surveyed point is directly under the center of rotation of the howitzer turret. The second most desirable location is in front of the vehicle directly under the tube when pointed at the DAP. If the howitzer's surveyed point is directly under the howitzer turret or under the tube, the DAP can be any distance from the howitzer, but the farther away the DAP is, the less error you will have. The least desirable location is near the left front sprocket. If the howitzer's surveyed point is near the left front sprocket, the DAP must be at least 4000 meters from the howitzer.

**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**PDFCS FIRE CONTROL SYSTEM ALIGNMENT PROCEDURE - CONTINUED**



For 400 meters one survey control point and three DAPs are needed. The howitzers surveyed point and DAP should be surveyed to the 4th order survey accuracy or better and the UTM coordinates recorded. The three DAPs azimuth should be established by survey and recorded.



The 4,000 meters is the preferred method of alignment. The howitzer's surveyed point and the DAP should be surveyed to 4th order survey accuracy or better and the UTM coordinates recorded. The reference grid azimuth from the howitzer's surveyed point to the DAP should be of 5th order survey accuracy or better and should be recorded. Reference FM 6-2, Appendix E.

The Fire Control Alignment should be done in this order:

1. Enter Roll Offset
2. Enter Quadrant Elevation Offset
3. Enter Azimuth Offset.

**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.1 Initialization.**

**NOTE**

Ensure that PDFCS Initialization procedures have been completed in accordance with TM 9-2350-314-10.

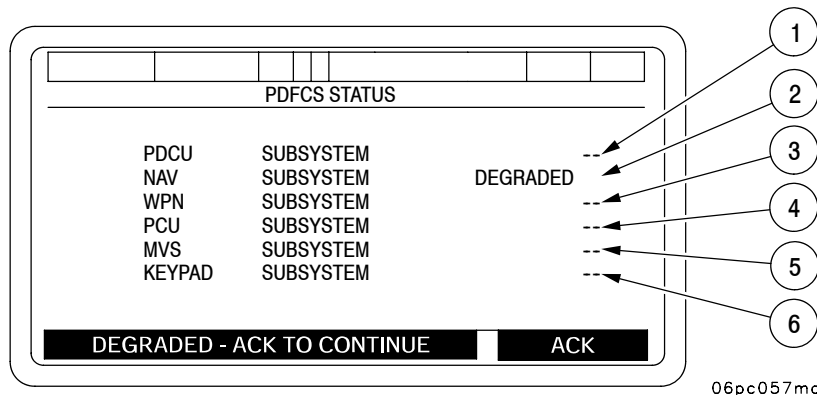
- a. Pull the howitzer into position in front of a plumb line, on reasonably level ground, in accordance with the procedures listed in the vehicle operator's manual TM 9-2350-314-10, paragraph 3-10.3.
- b. With the tube in travel lock, power up the PDFCS. Read the PDFCS POWER UP STATUS screen. Also read any alert messages that may appear on the softkey line at the bottom of the screen, then press the ACK softkey.

**WARNING**

Ensure surrounding area of gun tube is free and clear of personnel and equipment. Failure to comply could result in injury or death to personnel or damage to equipment.

**NOTE**

- Prior to performing initialization, ensure primer vent is clear.
- A Fire Control Alignment can be conducted so long as the status of the DCU and NAV Systems are OK or DEGRADED. A Fire Control Alignment cannot be conducted if either system has a status of OUT.



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In the event of a failure during POWER UP STATUS, the message DEGRADED-ACK TO CONTINUE, will be displayed at the bottom line of the EL panel. To continue, press soft key under ACK.

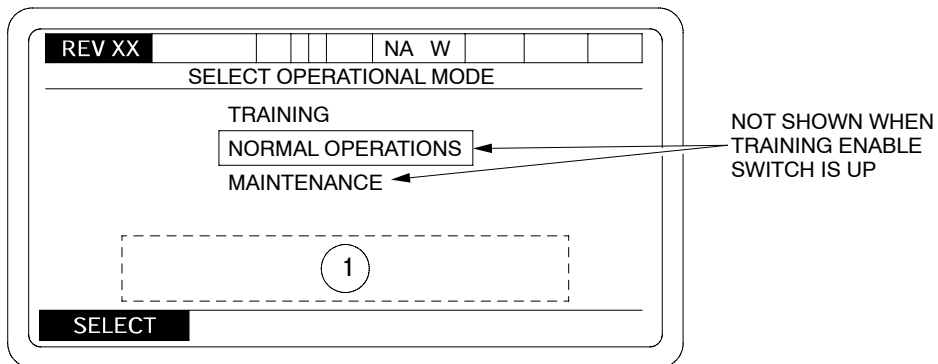
- |                       |                       |
|-----------------------|-----------------------|
| 1 (OK, DEGRADED)      | 4 (OK, DEGRADED, OUT) |
| 2 (OK, DEGRADED, OUT) | 5 (OK, OUT)           |
| 3 (OK, DEGRADED, OUT) | 6 (OK, OUT)           |

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**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.1 Initialization - Continued**

- c. Select NORMAL OPERATIONS from the SELECT OPERATIONAL MODE screen.



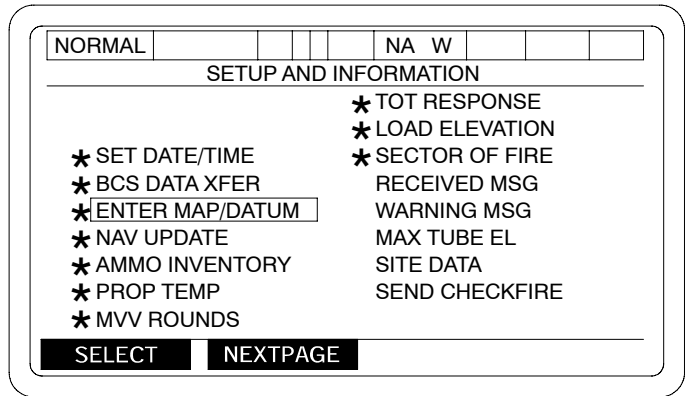
- ① POSITION TRAINING ENABLE SWITCH DOWN  
TO SELECT OTHER MODES
- POSITION TRAINING ENABLE SWITCH UP  
TO SELECT TRAINING MODE

- d. Press USE ALL softkey on the NET ACCESS and NET ADDRESS screens to get to the SETUP AND INFORMATION screen. Select ENTER MAP/DATUM menu item from the SETUP AND INFORMATION screen and verify/change SPHEROID, DATUM, GRID ZONE, and HEMISPHERE entries to the local map data. (It is not necessary to enter SW and NE Easting/Northing values during a Fire Control Alignment.)



**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

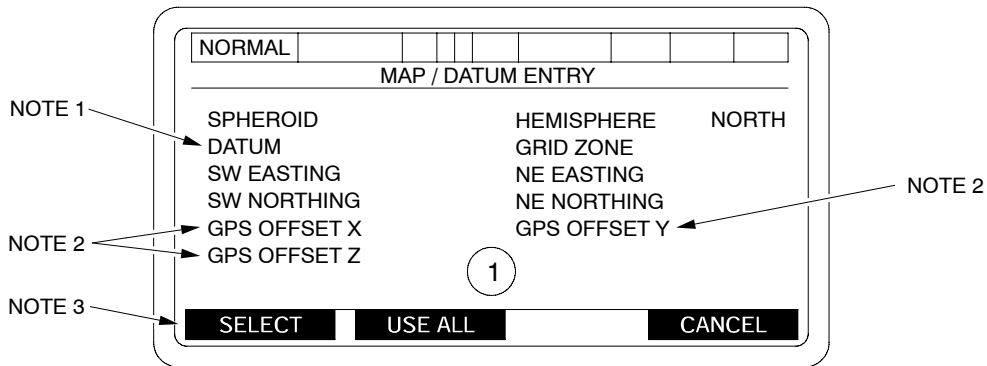
**8.1-34.1 Initialization - Continued**



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**NOTE**

The crew normally receives the MAP/DATUM from BCS. This menu item is included for those times when BCS is not available and the MAP/DATUM needs to be changed.



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Values for display data fields above are given on the next page.

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## 8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED

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### 8.1-34.1 Initialization - Continued

NOTE 1: Selection of DATUM transitions to the SELECT DATUM menu.

NOTE 2: Displayed only when the Datum selected is USERDEF.

NOTE 3: When HEMISPHERE is selected you will be asked:

CHANGE HEMISPHERE? YES NO

1

Operator prompt area:

When SPHEROID is selected:

A SELECT SPHEROID menu is displayed;  
Operator selects desired Spheroid code.

When DATUM is selected:

A SELECT DATUM menu is displayed for the  
Datums available to the Spheroid in use. Operator  
selects desired Datum code.

When SW EASTING is selected:

TYPE SOUTHWEST CORNER EASTING  
BETWEEN 0 AND 999999  
PRESS ENT KEY

When SW NORTHING is selected:

TYPE SOUTHWEST CORNER NORTHING  
BETWEEN 0 AND 11000000  
PRESS ENT KEY

When GRID ZONE is selected:

TYPE GRID ZONE  
1 TO 60  
PRESS ENT KEY

When NE EASTING is selected:

TYPE NORTHEAST CORNER EASTING  
BETWEEN 0 AND 999999  
PRESS ENT KEY

When NE NORTHING is selected:

TYPE NORTHEAST CORNER NORTHING  
BETWEEN 0 AND 11000000  
PRESS ENT KEY

**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.1 Initialization - Continued**

NORMAL

SELECT DATUM

LUZ-A NAS-C NAS-D NAS-E NAS-N  
OHA-M USRDEF

USRDEF

SELECT CANCEL

06pc061m

NOTE: ID code USRDEF is always the last entry in the selection list.

**ENTER USER DATUM PARAMETERS**

NORMAL

ENTER USER DATUM PARAMETERS

GPS OFFSET X  
GPS OFFSET Y  
GPS OFFSET Z

1

SELECT 2 CANCEL

06pc062m

- 1 When any field selected:  
TYPE OFFSET  
BETWEEN -2000.0 AND +2000.0  
PRESS ENT KEY
- 2 When a field is selected:  
+/-  
Otherwise: USE ALL

**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.1 Initialization - Continued**

- e. Select NAV UPDATE from the SETUP AND INFORMATION screen and enter EASTING, NORTHING, ALTITUDE from the howitzer survey point. Press USE ALL softkey.

NORMAL							
NAVIGATION SUBSYSTEM UPDATE							
EASTING	500000						
NORTHING	100	GET CURR NAV POSN					
ALTITUDE	0						
GRID ZONE	1	GET LAST ENT POSN					
HEMISPHERE	NORTH	GET CURR GPS POSN					
SPHEROID	2	NAV POSITION UPDT					
DATUM	USRDEF						
SELECT		USE ALL		CANCEL			

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**NOTE**

If a new DRUH mounting plate, trunnion or cannon tube has been installed, the ALN timer will not appear on top of screen until a roll offset of 0.0, elevation offset of +88.9 and azimuth offset of 0.0 has been entered.

- f. Complete initialization of the PDFCS by selecting each menu item with an “ ” on the SETUP AND INFORMATION screen and pressing the USE ALL, NO and CANCEL softkeys or ENT key as necessary.

NORMAL				NA W			
SETUP AND INFORMATION							
		* TOT RESPONSE					
		* LOAD ELEVATION					
* SET DATE/TIME		* SECTOR OF FIRE					
* BCS DATA XFER		RECEIVED MSG					
ENTER MAP/DATUM		WARNING MSG					
NAV UPDATE		MAX TUBE EL					
* AMMO INVENTORY		SITE DATA					
* PROP TEMP		SEND CHECKFIRE					
* MVV ROUNDS							
SELECT		NEXT PAGE					

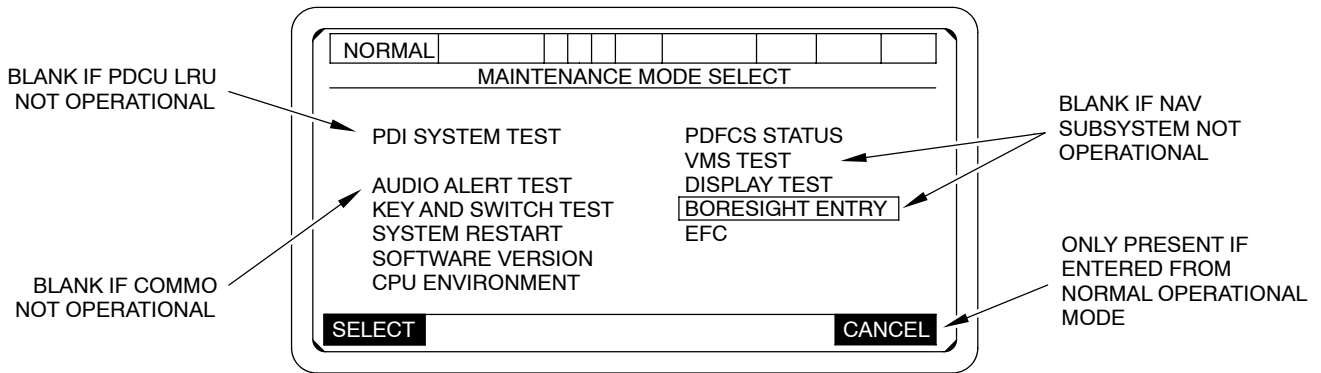
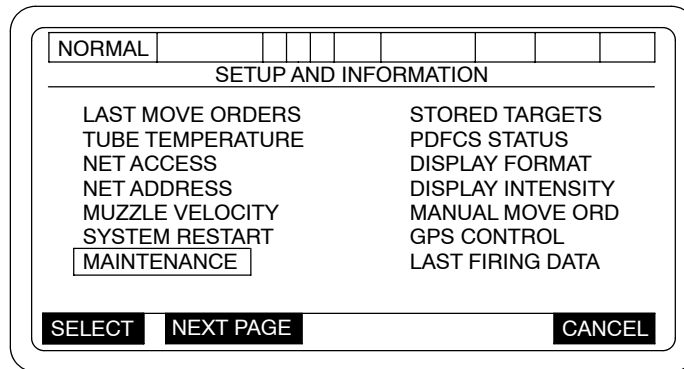
NORMAL				NA W			
SETUP AND INFORMATION							
						STORED TARGETS	
		TUBE TEMPERATURE				PDFCS STATUS	
		NET ACCESS				DISPLAY FORMAT	
		NET ADDRESS				DISPLAY INTENSITY	
		MUZZLE VELOCITY				MANUAL MOVE ORD	
		SYSTEM RESTART				GPS CONTROL	
		MAINTENANCE				LAST FIRING DATA	
SELECT		NEXT PAGE					

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**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.1 Initialization - Continued**

- g. Select MAINTENANCE from the SETUP AND INFORMATION screen. Select BORESIGHT ENTRY from the MAINTENANCE MODE SELECT screen.



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**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.1 Initialization - Continued**

- h. Record the ROLL OFFSET, EL OFFSET, and AZ OFFSET values under the CURRENT NAV and CURRENT PALADIN sides of the BORESIGHT ANGLE ENTRY screen.

NORMAL									
BORESIGHT ANGLE ENTRY									
CURRENT NAV					CURRENT PALADIN				
CURRENT AZ	_____	_____	_____	_____	CANNON TYPE M284				
CURRENT EL	_____	_____	_____	_____	ROLL OFFSET	_____	_____		
ROLL OFFSET	_____	_____	_____	_____	EL OFFSET	_____	_____		
EL OFFSET	_____	_____	_____	_____	AZ OFFSET	_____	_____		
AZ OFFSET	_____	_____	_____	_____					
1									
SELECT		FINISHED		SEND		CANCEL			

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Listed below are the legal values for each field of FD-33.

- CURRENT AZ = 0.0..6399.9 mils
- CURRENT EL = -200.0..+1600.0 mils
- ROLL OFFSET = -99.9..+99.9 mils (default = 0.0 mils)
- EL OFFSET = -999.9..+999.9 mils (default = 0.0 mils)
- AZ OFFSET = -99.9..+99.9 mils (default = 0.0 mils)

CURRENT NAV NOT AVAILABLE = Data for offsets is not available from the Navigation Subsystem  
 CURRENT PALADIN NOT AVAILABLE = Data for offsets is not available from the PDFCS

When ROLL OFFSET selected:

TYPE ROLL OFFSET BETWEEN - 99.9 AND +99.9 MILS  
 - PRESS ENT KEY -

When EL OFFSET selected:

TYPE EL OFFSET BETWEEN -999.9 AND +999.9 MILS  
 - PRESS ENT KEY -

When AZ OFFSET selected:

TYPE AZ OFFSET BETWEEN -99.9 AND +99.9 MILS  
 - PRESS ENT KEY -

**NOTE**

When a numeric entry is selected, the FINISHED key becomes the “±” key.

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## 8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED

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### 8.1-34.1 Initialization - Continued

- i. As a starting point, enter 0 (zero) values on the CURRENT PALADIN side of the BORESIGHT ANGLE ENTRY screen for ROLL OFFSET, EL OFFSET, and AZ OFFSET. Press SEND softkey, and the zero values should appear on the CURRENT NAV side of the screen.

#### NOTE

The Roll Offset is adjusted and measured when the Navigation System Mounting Plate is installed. If there is a ROLL OFFSET value in the vehicle logbook, then enter the value in ROLL OFFSET on the CURRENT PDFCS side of the BORESIGHT ANGLE ENTRY screen, otherwise enter a ROLL OFFSET of 0.

If it had not already done so, the ALN timer should now appear at the top of the screen and start counting down.

- j. Allow the navigation system to complete a full alignment (ALN timer goes to zero and disappears from the top of the screen). When fully aligned, proceed to Quadrant Elevation Alignment.

### 8.1-34.2 Quadrant Elevation Alignment.

#### NOTE

An optical Fire Control Alignment on the M145A1 Mount can be performed at the same time.

- a. Unstow the tube and check trunnion level using a plumb line, muzzle crosshair, and a breech boresight disk (other options are small periscope device that fits into the primer chamber or the primer chamber itself). Refer to TM 9-2350-314-10, paragraph 3-10.3 for instructions on leveling the trunnions.

#### NOTE

Ensure the muzzle quadrant seat at the tube muzzle is free of dirt and paint.

- b. Using the upper surface (about one inch wide) of muzzle quadrant seat on the tube and a gunner's quadrant, level the tube to 0 (zero) mils. Use the machined edge to align the feet of the gunner's quadrant, and ensure the feet are on the flat portion of the surface.

**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.2 Quadrant Elevation Alignment - Continued**

**NOTE**

Reverse the gunner's quadrant (end-for-end) to verify calibration. It should read level in both directions. If not, perform gunner's quadrant end-for-end test and determine end-for-end correction (refer to paragraph 3-10.5 in TM 9-23250-314-10).

- c. Check for elevation movement (commonly referred to as "creep"). If tube "creeps" up or down, perform adjustment of elevation system in accordance with TM 9-2350-314-10, paragraph 3-8.2 before proceeding with alignment.
- d. Apply end-for-end correction (if any) to the gunner's quadrant. With the tube at 0 mils at the muzzle, measure and record the breech correction (difference between muzzle and breech elevation) using the gunner's quadrant on the breech elevation seats (refer to paragraph 3-10.5 in TM 9-2350-314-10).
- e. Begin measurements and recordings of the tube elevation vs CURRENT EL value on the CURRENT NAV side of the BORESIGHT ANGLE ENTRY screen. Also record the delta between the tube elevation and CURRENT EL. M145A1 Mount Elevation measurements and recordings may also be made at the same time (be sure to level the bubbles).

NORMAL	
BORESIGHT ANGLE ENTRY	
CURRENT NAV	CURRENT PALADIN
CURRENT AZ _____	CANNON TYPE M284
CURRENT EL _____	ROLL OFFSET _____
ROLL OFFSET _____	EL OFFSET _____
EL OFFSET _____	AZ OFFSET _____
AZ OFFSET _____	
1	
SELECT	FINISHED
SEND	CANCEL

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- f. Make measurements at 0, 400, 800, and 1200 mils. Set the gunner's quadrant to each elevation step PLUS the total correction (end for end and breech correction) on the gunner's quadrant. Place the gunner's quadrant on the Breech elevation seats and elevate the tube till the gunner's quadrant bubble is exactly level. Read and record the CURRENT EL. Subtract CURRENT EL from tube elevation and record the delta difference in mils.



**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.2 Quadrant Elevation Alignment - Continued**

- g. Repeat the measurements in para 8.1-34.2f at elevations of 1000, 600, 200, and 0 mils.
- h. On the last reading of 0 mils, adjust the gunner’s quadrant back to 0 mils and place it on the muzzle seat to verify the tube also returned to 0 mils. If the tube is not at 0 (zero) mils, recheck your measurements from the beginning.
- i. Calculate the AVERAGE DELTA. An example of what your record should look like is as follows:

EXAMPLE OF QUADRANT ELEVATION ALIGNMENT RECORDINGS  
(ALL MEASUREMENTS IN MILS)

TUBE ELEV (1)	AFCS CUR EL	DELTA (2)
0	-2.3	= 2.3
400	397.6	= 2.4
800	797.6	= 2.4
1200	1197.5	= 2.5
1000	997.5	= 2.5
600	597.6	= 2.4
200	197.7	= 2.3
0	-2.4	= 2.4
Add DELTA Entries		19.2
AVERAGE DELTA (3)		2.4

(1) APPLY THE TOTAL CORRECTION PLUS THE TUBE ELEVATION ON THE GUNNER’S QUADRANT. For example:

2.4 mils total correction plus 400 mils Tube Elev = 403.1 mils on gunner’s quadrant.

(2) TUBE ELEV - AFCS current EL = DELTA. For example:

0	-	(-2.3)	= 2.3
400	-	(397.6)	= 2.4

(3) TO CALCULATE AVERAGE DELTA, ADD ALL THE DELTA ENTRIES AND DIVIDE BY THE TOTAL NUMBER OF MEASUREMENT READINGS. For example:

Add all Delta Entries	= 19.2
Total Number of Readings	= 8
AVERAGE DELTA (19.2)	= 2.4

**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.3 Entering the Elevation Offset.**

- a. Enter the AVERAGE DELTA from step 8-34.2i into the EL OFFSET entry location on the CURRENT PALADIN side of the BORESIGHT ANGLE ENTRY screen (set the proper plus/minus sign with the ± softkey). Some examples:

EXAMPLE 1 (AVERAGE DELTA of +87.2 mils)

Current EL OFFSET entry reads	0.0 mils
ENTER AVERAGE DELTA	+87.2 mils
New EL OFFSET entry reads	+87.2 mils

EXAMPLE 2 (AVERAGE DELTA of -2.1 mils)

Current EL OFFSET entry reads	0.0 mils
ENTER AVERAGE DELTA	-2.1 mils
New EL OFFSET entry reads	-2.1 mils

NORMAL								
BORESIGHT ANGLE ENTRY								
CURRENT NAV					CURRENT PALADIN			
CURRENT AZ	0.0	CANNON TYPE		M284				
CURRENT EL	0.0	ROLL OFFSET		0.0				
ROLL OFFSET	0.0	EL OFFSET		0.0				
EL OFFSET	0.0	AZ OFFSET		0.0				
AZ OFFSET	0.0							
SELECT		FINISHED		SEND		CANCEL		

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- b. After the number is correctly entered, press the SEND softkey. See the same Elevation Offset value appear on the CURRENT NAV side of the BORESIGHT ANGLE ENTRY screen (indicates the NAV System accepted the entry).
- c. Verify the Elevation Offset brought the PDFCS into elevation alignment by repeating the procedure in para 8.1-34.2f at 0, 800, and 1200 mils.
- d. If the elevation measurements are within tolerance ( $\pm 0.5$  mils), proceed to paragraph 8.1-33.4 AZIMUTH ALIGNMENT. The Elevation Offset entry is complete. If the elevation measurements are not within tolerance, repeat the procedure from para 8.1-34.1a.

## 8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED

### 8.1-34.4 Azimuth Alignment.

#### NOTE

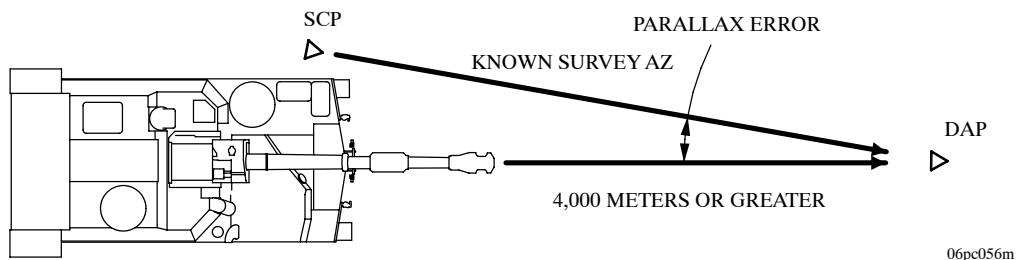
Fire Control Alignment for Azimuth should be done only after the Roll and Elevation Offsets have been entered.

The Fire Control Alignment is not degraded by movement. Therefore, you may leave the PDFCS powered on and move the howitzer to a new location to complete the Azimuth Alignment, but you must take the following precautions.

If you have just completed the Elevation Offset entry and you have to move to another location to perform the Azimuth Alignment, then press the FINISHED softkey on the BORESIGHT ANGLE ENTRY screen, which takes you back to the MAINTENANCE MODE SELECT screen. This will assure that the Roll and Elevation Offset entries are not accidentally lost during movement. When you arrive at your new destination, you must get back to the BORESIGHT ANGLE ENTRY screen to continue.

This procedure requires two carefully surveyed points. One point must be a distant aiming point (DAP) and must have a trig marker or some other marker that will allow boresighting on it through the tube with muzzle crosshairs and breech boresight device. The second point is the position where the vehicle will be located to perform the alignment. The howitzer's surveyed point should be firmly set so that vehicles pulling over it will not destroy or move it.

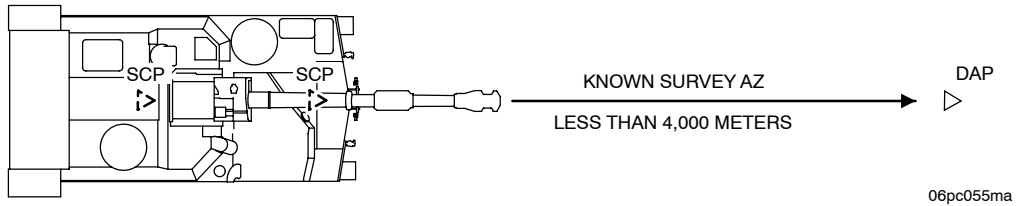
- a. Note the following precautions concerning the position of the howitzer at the surveyed point:
- (1) Refer to the figure at the beginning of this section. If the DAP is at least 4,000 meters from the howitzer's surveyed point, then it would be acceptable to pull the howitzer's left front sprocket within 1 meter (1 foot if possible) of the surveyed point. The parallax error should be on the order of 0.5 mils. This is based on pulling the howitzer's left sprocket to within 1 meter of the surveyed point, which means the gun tube is offset from the surveyed point about 2 meters (2 meters divided by 4,000 meters = 0.0005), or 0.5 mils parallax error.



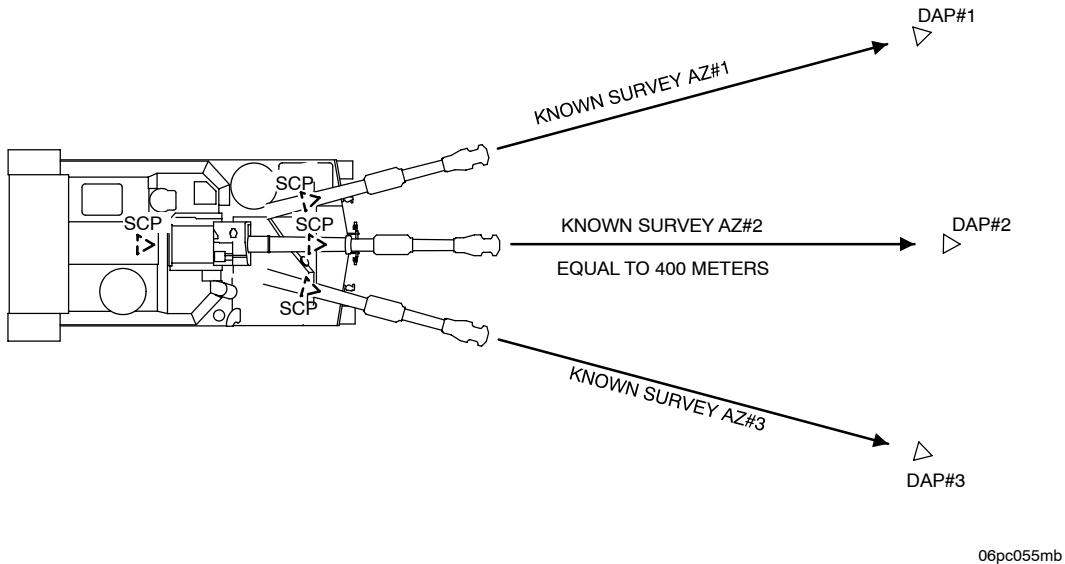
**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.4 Azimuth Alignment - Continued**

- (2) If the DAP is less than 4,000 meters from the howitzer's surveyed point, then there are two better alternatives for positioning the howitzer so that parallax error is minimized. The preferred method is to position the howitzer so that the howitzer surveyed point is directly under the approximate center of turret rotation. An alternate method is to position the howitzer so that the howitzer's surveyed point is directly under the gun tube in front of the vehicle when the tube is pointed at the DAP.



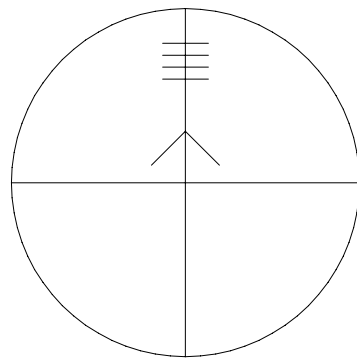
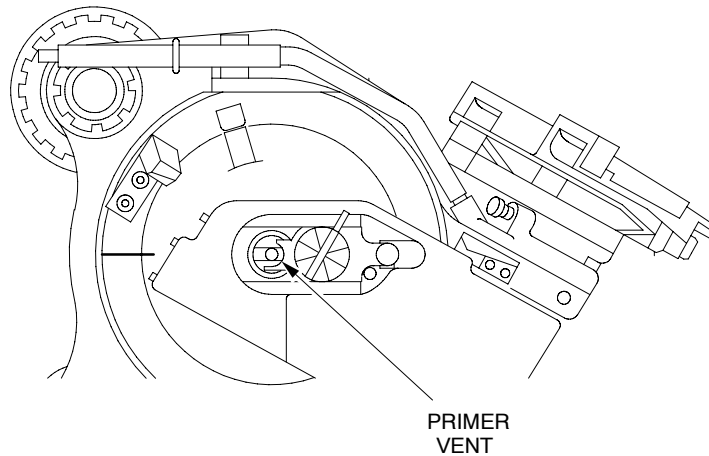
- (3) If the DAP is 400 meters from the howitzer's surveyed point, the preferred method is to position the howitzer so that the howitzer surveyed point is directly under the approximate center of turret rotation.



**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.4 Azimuth Alignment - Continued**

- b. Using the muzzle crosshairs and the primer vent or a breech boresight disk (or optional magnified sighting equipment) traverse the turret until the tube is sighted on the DAP. If the DAP is difficult to see, use the PANTEL to get close, but always complete the procedure by sighting through the tube using the crosshairs.



MUZZLE CROSSHAIRS IMPOSED ON  
DISTANT AIMING POINT

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**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.4 Azimuth Alignment - Continued**

(Greater than 400 meters and 4,000 meters)

NORMAL	
BORESIGHT ANGLE ENTRY	
CURRENT NAV	CURRENT PALADIN
CURRENT AZ _____	CANNON TYPE M284
CURRENT EL _____	ROLL OFFSET _____
ROLL OFFSET _____	EL OFFSET _____
EL OFFSET _____	AZ OFFSET _____
AZ OFFSET _____	
1	
SELECT	FINISHED
SEND	CANCEL

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- c. Read and record the CURRENT AZ on the CURRENT NAV side of the BORESIGHT ANGLE ENTRY screen. Subtract the CURRENT AZ value FROM the known surveyed azimuth and record the Azimuth Delta. MAKE SURE YOU ALSO RECORD THE PLUS (+) OR MINUS (-) SIGN FOR THE DELTA. IT IS IMPORTANT. Some examples:

EXAMPLE 1:

Surveyed Azimuth	4848.98 mils
SUBTRACT CURRENT AZ	<u>4847.6 mils</u>
	+1.38 mils (round to nearest .1 mil)
Azimuth Delta	+1.4 mils

EXAMPLE 2:

Surveyed Azimuth	4848.98 mils
SUBTRACT CURRENT AZ	<u>4850.2 mils</u>
	-1.22 mils (round to nearest .1 mil)
Azimuth Delta	-1.2 mils

- d. Traverse the tube about 200 mils to either side of the DAP and repeat the procedures in para 8.1-34.4b and c above. Verify the computed Azimuth Delta.
- e. Proceed to paragraph 8.1-34.5 ENTERING THE AZIMUTH OFFSET or continue with step f performing 400 meter alignment.

**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.4 Azimuth Alignment - Continued**

(400 meters)

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- f. Read and record the CURRENT AZ on the CURRENT NAV side of the BORESIGHT ANGLE ENTRY screen for each of three DAPs.
- g. Average the deltas of the three DAPs.
- h. Subtract the CURRENT AZ value FROM the known surveyed azimuth and record the Azimuth Delta. MAKE SURE YOU ALSO RECORD THE PLUS (+) OR MINUS (-) SIGN FOR THE DELTA. IT IS IMPORTANT. Some examples:

EXAMPLE 1:

Surveyed Azimuth	400.00 mils
SUBTRACT CURRENT AZ	<u>399.10 mils</u>
	+0.90 mils (round to nearest .1 mil)
Azimuth Delta	+0.9 mils

EXAMPLE 2:

Surveyed Azimuth	400.00 mils
SUBTRACT CURRENT AZ	<u>401.1 mils</u>
	-1.10 mils (round to nearest .1 mil)
Azimuth Delta	-1.1 mils

EXAMPLE 3:

Surveyed Azimuth	476.60 mils
SUBTRACT CURRENT AZ	<u>475.3 mils</u>
	+1.30 mils (round to nearest .1 mil)
Azimuth Delta	+1.3 mils

**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.4 Azimuth Alignment - Continued**

Calculate Average deltas of the three DAPs.

Azimuth Delta #1	+0.90 mils
Azimuth Delta #2	-1.1 mils
Azimuth Delta #3	<u>+1.3</u> mils
Sum Delta #1, #2, #3	+1.1 mils
	+0.36 mils (rounded to the nearest .1 mil)
Average Azimuth Delta	+0.4 mils

- i. Proceed to paragraph 8.1-34.5.

**8.1-34.5 Entering the Azimuth Offset.**

- a. Enter the verified Azimuth Delta into the AZ OFFSET entry position on the CURRENT PALADIN side of the BORESIGHT ANGLE ENTRY screen (set the proper plus or minus sign with the ± softkey). Some examples:

EXAMPLE 1 (Azimuth Delta of +1.4 mils)

Current AZ OFFSET reads	0.0 mils
Enter Azimuth Delta	+1.4 mils
New AZ OFFSET entry reads	+1.4 mils

EXAMPLE 2 (Azimuth Delta of -1.2 mils)

Current AZ OFFSET reads	0.0 mils
Enter Azimuth Delta	-1.2 mils
New AZ OFFSET entry reads	-1.2 mils

- b. Verify the Azimuth Delta is correctly entered and press the SEND softkey. See the same Azimuth Offset value appear on the CURRENT NAV side of the BORESIGHT ANGLE ENTRY screen (indicates the NAV System accepted the entry).
- c. Traverse the gun tube approximately 200 mils off the DAP in either direction. Verify the Azimuth Offset brought the PDFCS into azimuth alignment by repeating the procedures in para 8.1-34.4b through 8.1-34.4d.
- d. If the Azimuth measurement is within tolerance (± 0.5 mils), proceed to paragraph 8.1-34.6 STORE OFFSETS TO NON-VOLATILE MEMORY.
- e. If the Azimuth measurement is not within tolerance, repeat the procedure from paragraph 8.1-34.4 AZIMUTH ALIGNMENT.



**8.1-34 PDFCS FIRE CONTROL ALIGNMENT PROCEDURE - CONTINUED**

**8.1-34.6 Store Offsets to Non-volatile Memory.**

**NOTE**

To store the Alignment Offsets in non-volatile memory in both the PDFCS and NAV Systems, the PDFCS must go through an orderly shutdown. To conduct an orderly shutdown, power off the system with the Power Switch on the Display Unit. Shutting down the PDFCS by moving the circuit breakers to OFF on the Power Conditioning Unit is an un-orderly shutdown and will cause the Alignment Offsets to be lost.

- a. Press the FINISHED soft key.

NORMAL									
BORESIGHT ANGLE ENTRY									
CURRENT NAV					CURRENT PALADIN				
CURRENT AZ	_____	.	__		CANNON TYPE	M284			
CURRENT EL	_____	.	__		ROLL OFFSET	_____	.	__	
ROLL OFFSET	_____	.	__		EL OFFSET	_____	.	__	
EL OFFSET	_____	.	__		AZ OFFSET	_____	.	__	
AZ OFFSET	_____	.	__						
1									
SELECT		FINISHED		SEND		CANCEL			

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- b. Place the tube in travel lock.
- c. Move the Power Switch on the Display Unit to OFF.
- d. PDFCS Fire Control Alignment is complete.
- e. Enter new offsets on DA Form 2408-4 in the vehicle logbook. (Note: Use these recorded offsets if ACU or DRUH is replaced).



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PUBLICATION/FORM NUMBER TM 9-2350-314-20-2-1				DATE February 1999		TITLE UNIT MAINTENANCE MANUAL FOR 155MM M109A6, SP HOWITZER	
ITEM	PAGE	PARA	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
	7-3	7-1				Torque value of 250-350 lb-ft (28-39 N•m) in step 7 (a) should be 250-350 lb-in (28-39 N•m).	
SAMPLE							
*Reference to line numbers within the paragraph or subparagraph.							
TYPED NAME, GRADE OR TITLE Your name, your title				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION Your phone number		SIGNATURE Your signature	

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PUBLICATION NUMBER			DATE			TITLE		
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

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DATE  
February 1999

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UNIT MAINTENANCE MANUAL FOR  
155MM M109A6, SP HOWITZER

ITEM	PAGE	PARA	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

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**By Order of the Secretary of the Army:**

**DENNIS J. REIMER**  
*General, United States Army*  
*Chief of Staff*

Official:



**JOEL B. HUDSON**

*Acting Administrative Assistant to the*  
*Secretary of the Army*

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# CONVERSION TABLE

inch	decimal	mm	inch	decimal	mm	inch	decimal	mm
1/64	0.015625	0.3969	23/64	0.359375	9.1281			
1/32	0.031250	0.7938	3/8	0.375000	9.5250	45/64	0.703125	17.8594
3/64	0.046875	1.1906				23/32	0.718750	18.2562
1/16	0.062500	1.5875	25/64	0.390625	9.9219	47/64	0.734375	18.6531
			13/32	0.406250	10.3188	3/4	0.750000	19.050
5/64	0.078125	1.9844	27/64	0.421875	10.7156			
3/32	0.093750	2.3812	7/16	0.437500	11.1125	49/64	0.765625	19.4469
7/64	0.109375	2.7781				25/32	0.781250	19.8437
1/8	0.125000	3.1750	29/64	0.453125	11.5094	51/64	0.796875	20.2406
			15/32	0.468750	11.9062	13/16	0.812500	20.6375
9/64	0.140625	3.5719	31/64	0.484375	12.3031			
5/32	0.156250	3.9688	1/2	0.500000	12.7000	53/64	0.828125	21.0344
11/64	0.171875	4.3656				27/32	0.843750	21.4312
3/16	0.187500	4.7625	33/64	0.515625	13.0969	55/64	0.859375	21.8281
			17/32	0.531250	13.4938	7/8	0.875000	22.2250
13/64	0.203125	5.1594	35/64	0.546875	13.8906			
7/32	0.218750	5.5562	9/16	0.562500	14.2875	57/64	0.890625	22.6219
15/64	0.234375	5.9531				29/32	0.906250	23.0188
1/4	0.250000	6.3500	37/64	0.578125	14.6844	59/64	0.921875	23.4156
			19/32	0.593750	15.0812	15/16	0.937500	23.8125
17/64	0.265625	6.7469	39/64	0.609375	15.4781			
9/32	0.281250	7.1438	5/8	0.625000	15.8750	61/64	0.953125	24.2094
19/64	0.296875	7.5406				31/32	0.967500	24.6062
5/16	0.312500	7.9375	41/64	0.640625	16.2719	63/64	0.984375	25.0031
			21/32	0.656250	16.6688			
21/64	0.328125	8.3344	43/64	0.671875	17.0656	1	1.000000	25.4000
11/32	0.343750	8.7312	11/16	0.687500	17.4625			



# THE METRIC SYSTEM AND EQUIVALENTS

## LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches  
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches  
 1 Kilometer = 1000 Meters = 0.621 Miles

## WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces  
 1 Kilogram = 1000 Grams = 2.2 Lb.  
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

## LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces  
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

## SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches  
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet  
 1 Sq. Kilometer = 1,000 Sq. Meters = 0.386 Sq. Miles

## CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches  
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

## TEMPERATURE

$5/9 (°F - 32) = °C$   
 212° Fahrenheit is equivalent to 100° Celsius  
 90° Fahrenheit is equivalent to 32.2° Celsius  
 32° Fahrenheit is equivalent to 0° Celsius  
 $(9/5 \times °C) + 32 = °F$

## APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

