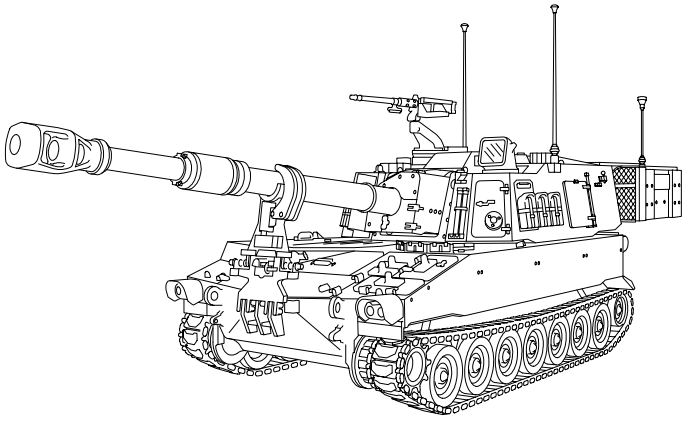
TM 9–2350–314–20–2–1
VOLUME 1
See page i for details.

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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Distribution Statement A: Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY
08 FEBRUARY 1999

TM 9–2350–314–20–2–1
C1
HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 APRIL 2001

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:

Remove Pages	Insert Pages
none	A through D
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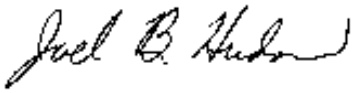
Index–1 and Index–2	Index–1 and Index–2
Index–5 through Index–7/(Index–8 blank)	Index–5 through Index–7/(Index–8 blank)
DA2028–2 sample form	DA2028–2 sample form
DA2028–2 form (3)	DA2028–2 form (3)
Cover/blank	Cover/blank

4. File this change in front of the publication.

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

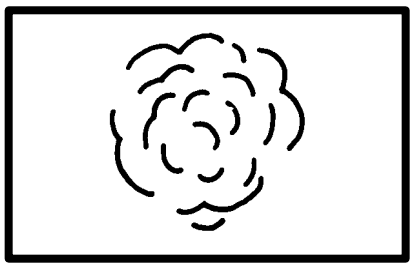
Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army

0009806

DISTRIBUTION: To be distributed in accordance with IDN 371934 requirements for TM 9–2350–314–20–2–1.



WARNING

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.

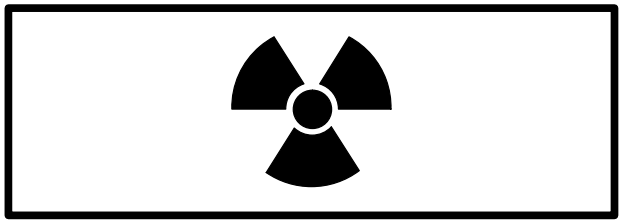
Do not drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.

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

This item contains radioactive material. Control of this radioactive material is mandated by federal law. Immediately report any suspected lost or damaged items to your Radiation Protection Officer (RPO). If your RPO cannot be reached, contact the TACOM–ACALA safety office.

Handle with care. In the event the radioluminous source is broken, cracked, or there is no illumination, immediately wrap device in plastic bag (item 5, Appendix D) and notify the local RPO. Contact the base safety office for the name and telephone number of your local RPO:

LOCAL RPO:_____ TELEPHONE:_____

SAFETY PROCEDURES FOR NUCLEAR REGULATORY COMMISSION
(NRC) TRITIUM FIRE CONTROL DEVICES

1. Purpose: To implement mandatory license requirements for use and maintenance of tritium radioluminous fire control devices used on howitzers, mortars, tanks, and rifles.

2. Scope: This procedure is applicable to all personnel working with tritium devices, including unit, direct support and general support maintenance, and operator's levels.

3. Radiological hazard: The beta radiation emitted by tritium presents no external radiation hazard. However, if taken internally, it can damage soft tissue. If a capsule is broken, the tritium gas will dissipate into the surrounding air, and surfaces near the vicinity of the break may become contaminated. Tritium can be taken into the body by inhalation, ingestion, or skin absorption/injection.

4. 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 RPO.

    b. No eating, drinking, or smoking will be allowed in tritium device work areas.

5. Emergency procedures: 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 RPO. Actions below will be taken under supervision or direction of the local RPO.

a. Personnel handling the device should wear rubber or latex gloves (item 51, Appx C). Device must be immediately double wrapped in plastic, sealed (item 90, Appx C) and marked as “Broken Tritium Device — Do Not Open” per RPO direction. Package (item 19, Appendix C) item and return to depot for disposal. Dispose of used gloves as radioactive waste, per instructions from local RPO, and wash hands well.

b. Personnel who may have handled the broken tritium should report to health clinic for tritium bioassay. Optimum bioassay sample is at least 4 hours after exposure.

c. Broken tritium sources indoors may result in tritium contamination in the area, such as work bench or table. The area must be cordoned off and restricted until wipe tests indicate no contamination.

6. Further information:

a. Requirements for safe handling and maintenance are located in TM 9–254, General Maintenance Procedures for Fire Control Materiel.

b. 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.

c. The ACALA RPO/licensee may be contacted by calling: DSN 793–2965/2969/2995, Commercial (309) 782–2965/2969/2995. After duty hours contact the Staff Duty Office through the operator at DSN 793–6001, Commercial (309) 782–6001. The following rules and regulations are available from ACALA, ATTN: AMSMC–SFS, Rock Island, IL 61299–7630. Copies may be requested, or further information obtained by contacting the ACALA Radiation Protection Office (RPO).

(1) Title 10 CFR Part 19 – Notices, Instructions, and Reports to Workers.

(2) Title 10 CFR Part 20 – Standards for Protection Against Radiation.

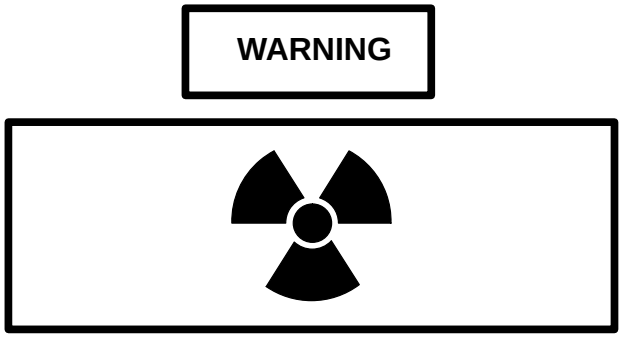
(3) Title 10 CFR Part 21 – Reporting of Defects and Noncompliance.

(4) NRC License, License Conditions, and License Application.

7. Safety, Care, and Handling:

WARNING

Nuclear, Biological, and Chemical (NBC) agents can kill you. If NBC exposure is suspected, all air filter media must be handled by personnel wearing full NBC protective equipment (FM 21–11).



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.

Pre–Maintenance Check:

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 Protection Officer (RPO). Wash well with nonabrasive soap and water.

   (5) Per RPO direction, place bag in a strong, tight container, such as fiberboard box (item 19, Appx C) with all seams sealed using tape (item 90, Appx C) (masking tape is not authorized).

   (6) Send package to depot level maintenance for repair/disposal.

c. If illumination is observed, maintenance actions may proceed.

WARNING

- Do not purge and charge any instrument containing a radioluminous source if there is no illumination in the assembly. The local Radiological Protection Officer (RPO) 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 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 21–11, First Aid For Soldiers, for correct procedures to be taken if personnel are injured.

- 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.

INSERT LATEST CHANGED PAGES.
DESTROY SUPERSEDED PAGES

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.

Date of issue for original and changed pages are:

Original . . . . . 0 . . . . . 8 February 1999
Change . . . . . 1 . . . . . 1 April 2001

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 1572, CONSISTING OF THE FOLLOWING:

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C–4	0
D–1	0
D–2	1
E–1 – E–4	0
E–5	0
E–6 Blank	1
F–1	0

*Zero in this column indicates an original page

Page No.	*Change No.
F–2	1
F–3	0
F–4	1
F–5 – F–8	0
G–1 – G–2	0
G–3	1
G–4 Blank	0
H–1 – H–2	0
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Index–2	0
Index–3	0
Index–4	1
Index–5 – Index–6	1
Index–7	1
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DA Form 2028–2 Sample	1
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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

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This manual supersedes TM 9–2350–314–20–2–1 dated 25 October 1993, including all changes.

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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).

   Appendix C. Expendable supplies and material lists.

   Appendix D. Illustrated list of manufactured items.

   Appendix E. Torque limits.

   Appendix F. Mandatory replacement parts.

   Appendix G. Tool identification list.

   Appendix H. Corrosion prevention and control (CPC).

   Index

   Foldouts: (FOs) Electrical and hydraulic schematics.

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

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 738–750, 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:

U. S. Army Armament Research, Development
and Engineering Center
ATTN: AMSTA–AR–QAW–A [R]
Customer Feedback Center
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	MORE COMMON NAME
Cab ammunition rack	Ammo rack
Cable assembly	Wiring harness
Caliber .50 machine gun M2	.50 cal.
Electrical arm	Contact arm assembly
Electrical contact race ring (or race ring segment)	Slip ring segment board
Elevating cylinder	Equilibrated elevating cylinder
Gage rod	Dipstick, bayonet gage
Howitzer M182A1 gun mount	M182A1 gun mount
Infinity aiming reference collimator M1A1	Collimator
Intercommunications power harness	Intercom wiring harness
Intercommunications system	Intercom system
M284 cannon assembly	Cannon
155MM medium self–propelled howitzer M109A6	Howitzer (Modified 155MM)
Panoramic telescope M117A2	PANTEL, telescope M117A2
Safety wire	Lockwire
Socket head screw key	Hex key
Spindle assembly	Obturator group or bump spindle
Telescope mount M145A1	Mount M145A1, PANTEL mount
Tube assembly	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:

U. S. Army Armament Research, Development
and Engineering Center
ATTN: AMSTA–AR–QAW–A [R]
Customer Feedback Center
Rock Island, IL 61299–7300

We'll send you a reply.

1–8 WARRANTY INFORMATION.

The M109A6 is not warranted.

1–9 CORROSION PREVENTION 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)

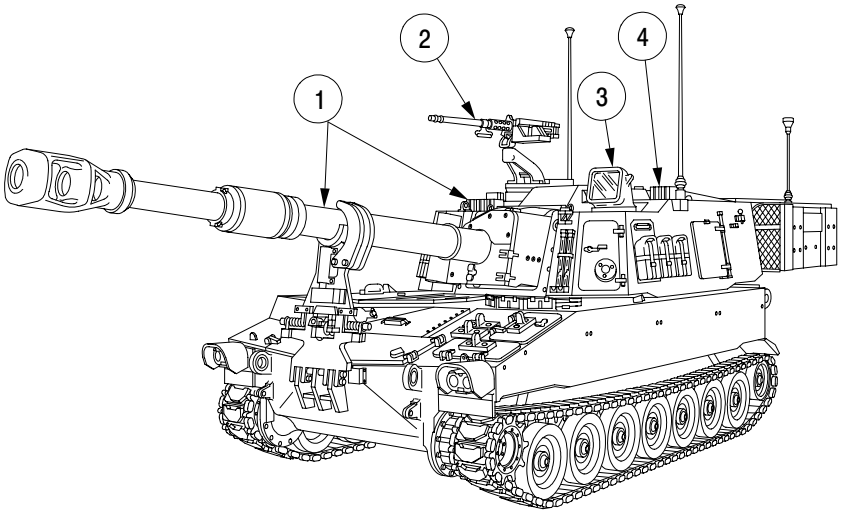
Automatic, recoil operated, link belt fed
Air cooled, heavy barrel
Flexible type configuration
Fired manually

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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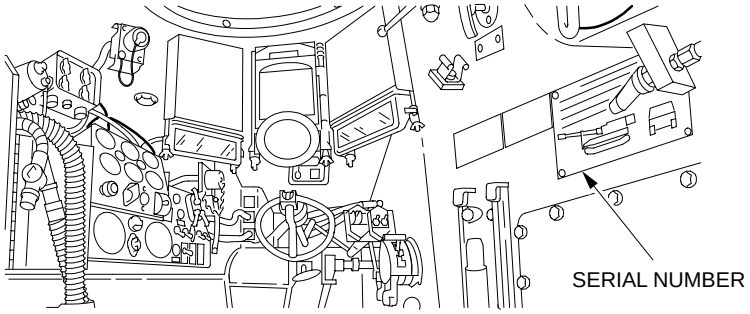
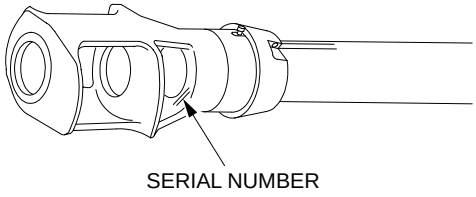
1–11 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

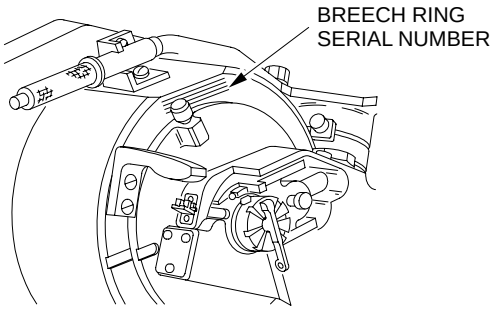
1–11.3 Serial Number Locations.



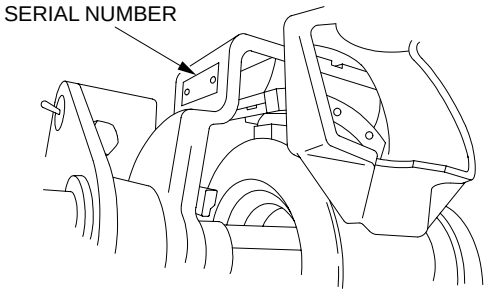
VEHICLE – On vehicle data plate right of driver's seat.



TUBE – On tip of tube.



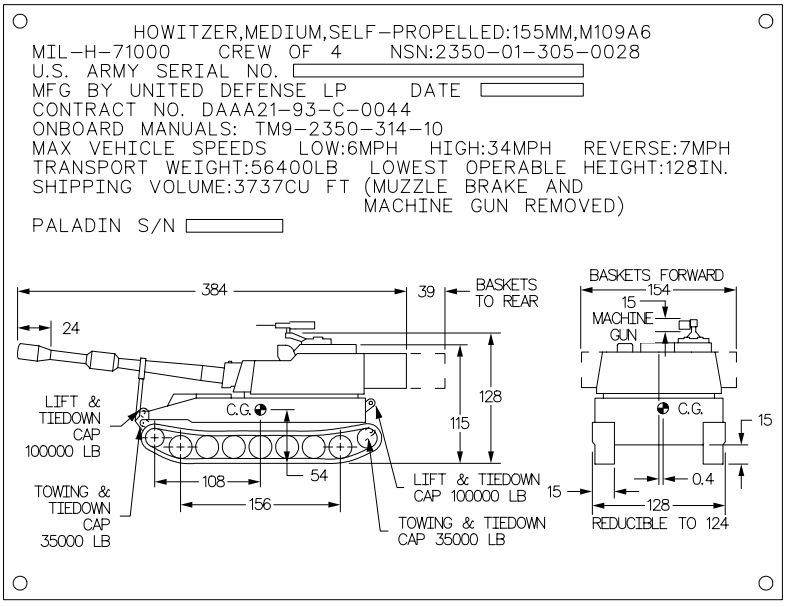
BREECH – On rear of breech ring.



M145A1 MOUNT – Upper left side.

14pc018m

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



22ph036m

1–11 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

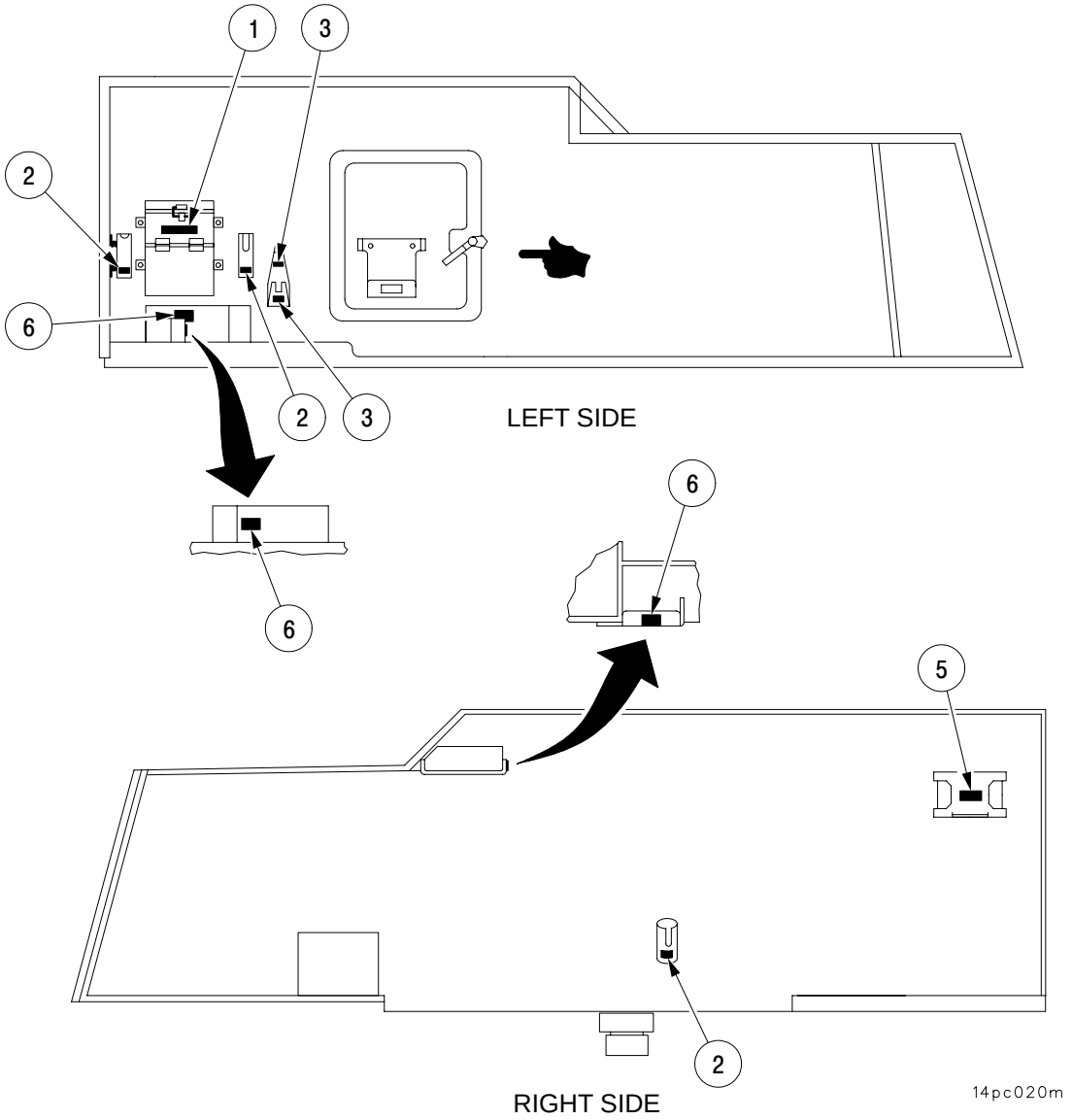
1–11.4 Decal Locations (Interior).

Legend

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

How To Apply Decals

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



1–11 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

1–11.5 Stencil Location (Interior and Exterior).

Legend

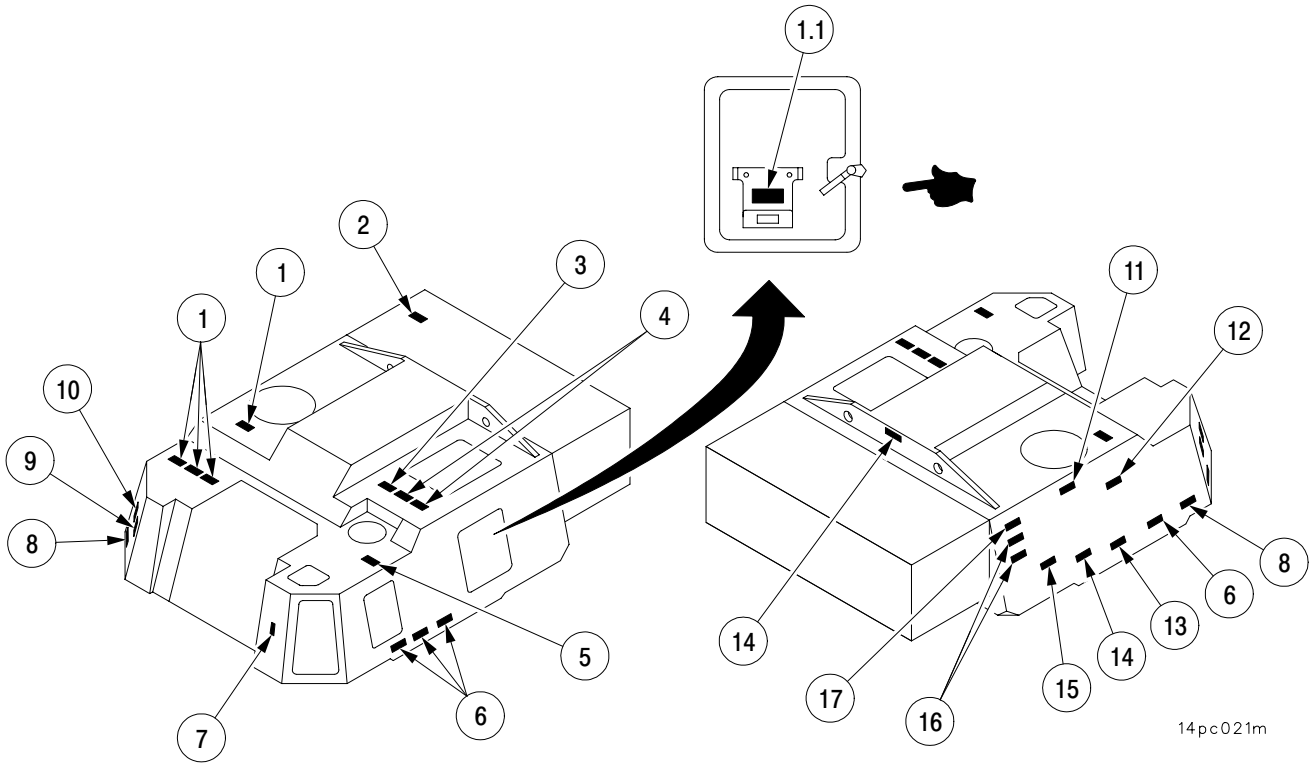
1	.50 cal. ammo	9	Pick
1.1	M140 aiming device and case	10	Mattock
2	Tow cable	11	Crow bar
3	Signal flares	12	.50 cal. barrel
4	M16 ammo	13	M13 decontamination kit
5	Sledge	14	Shovel
6	Water can	15	Rammer staff
7	Track fixture	16	Handle
8	Oil can	17	Axe

How To Apply Stencils

a. Before applying stencils, clean and prime metal.
b. Letters must be black.
c. Letters must be 1/10 in. (2.5 mm) x 1/2 in. (12.7 mm) high.
d. 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:

- 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:

- 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)

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, 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

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.

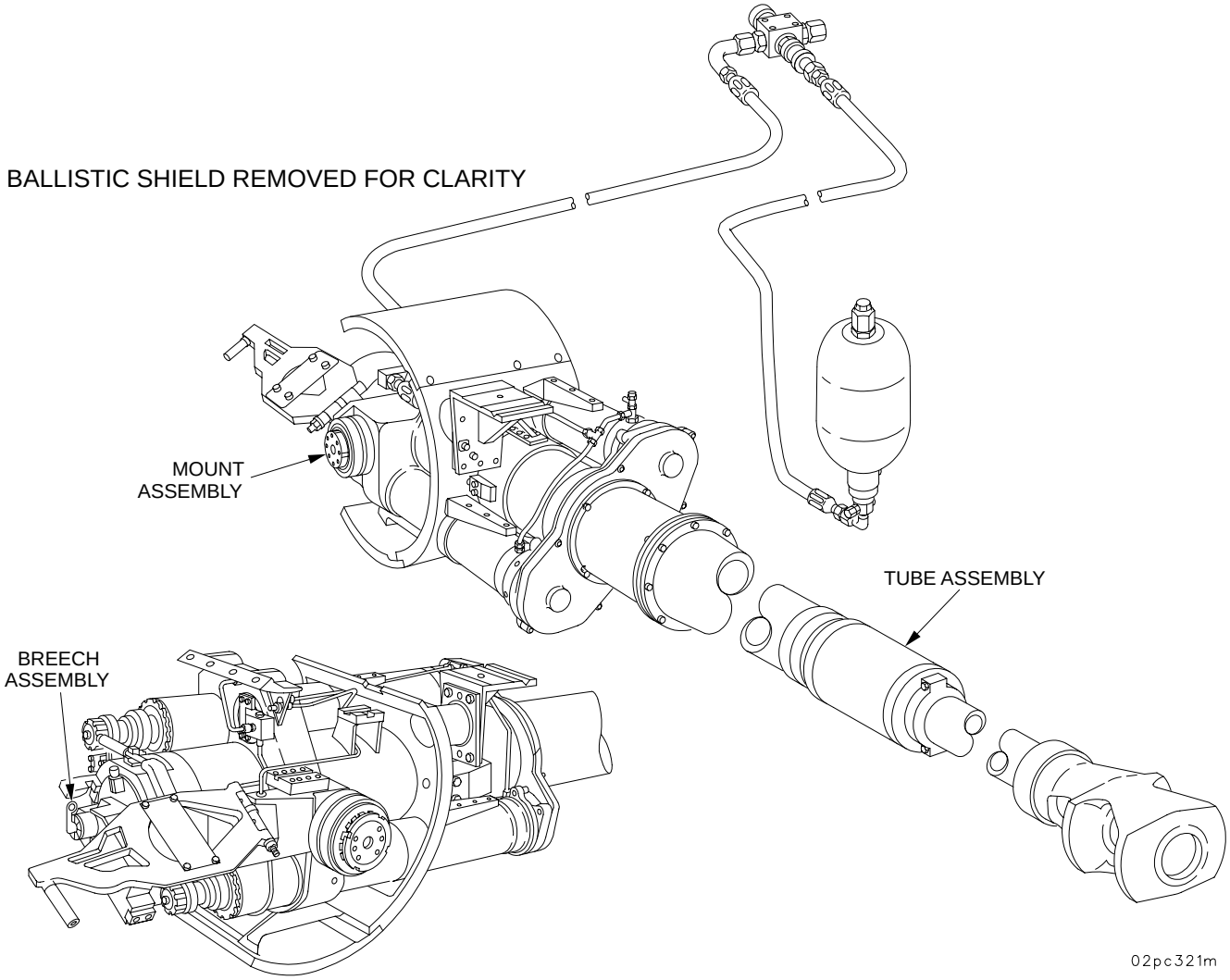
Traversed 6400 mils by traversing the cab. Traversing is accomplished either hydraulically or manually.

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.

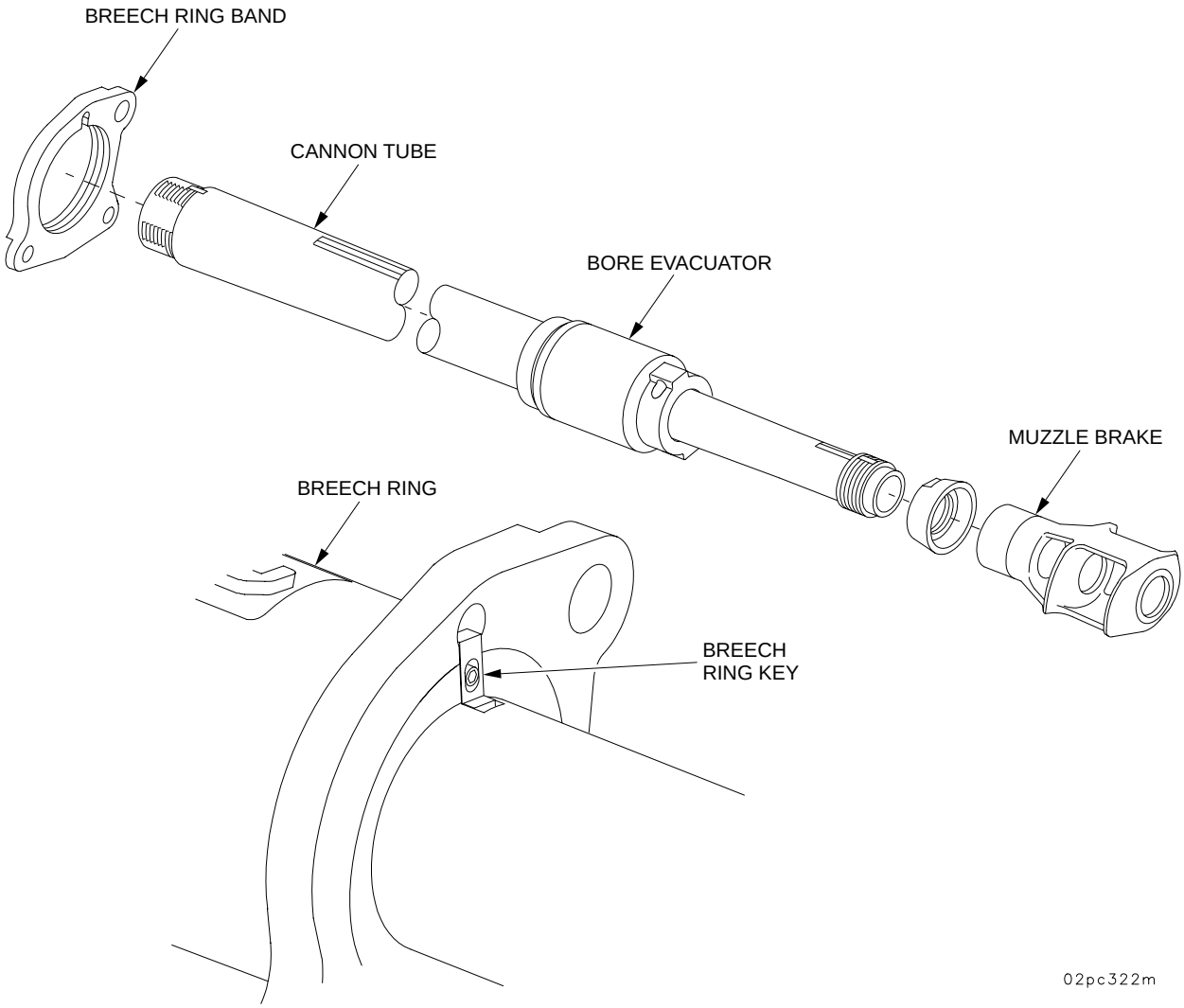
BREECH RING BAND: Locks the tube assembly in place along with the breech ring key.

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.



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

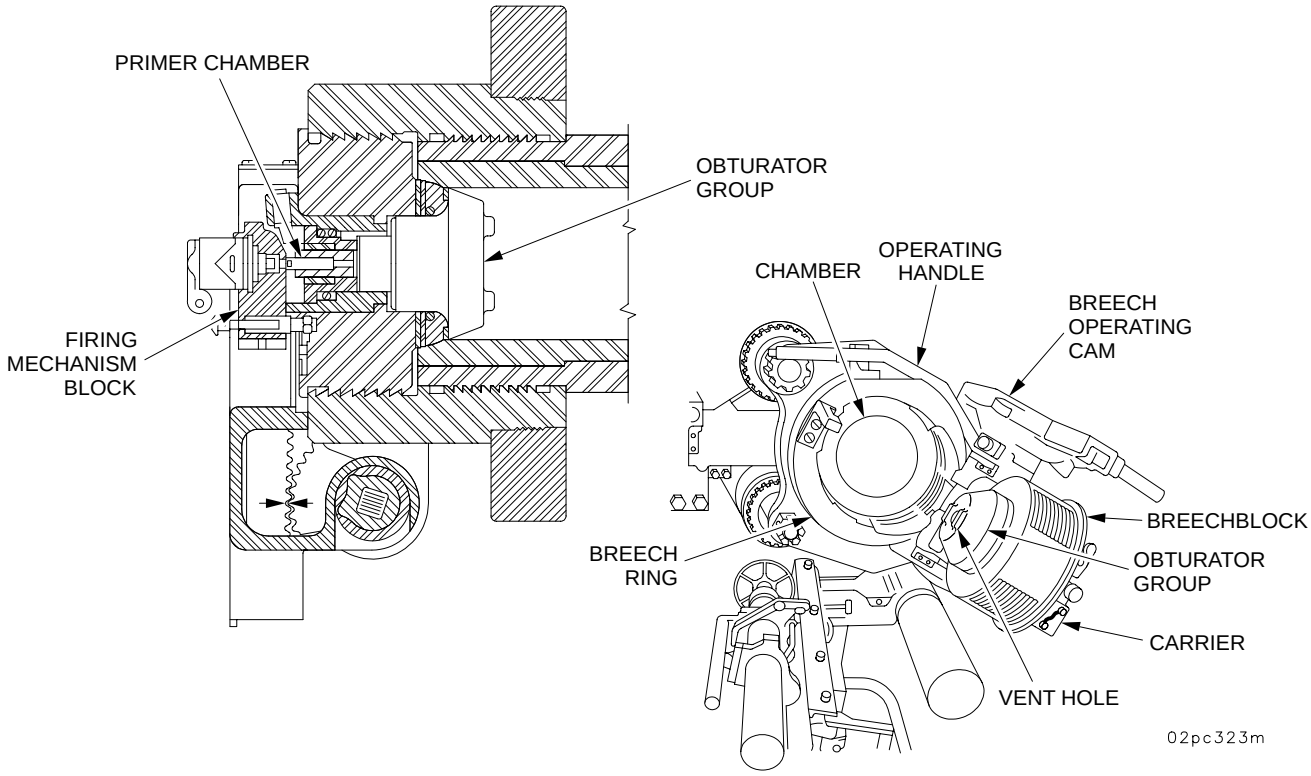
As the cannon returns to battery, the combined operations of the operating handle, the breech operating cam, and the carrier open the breechblock.

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.



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.

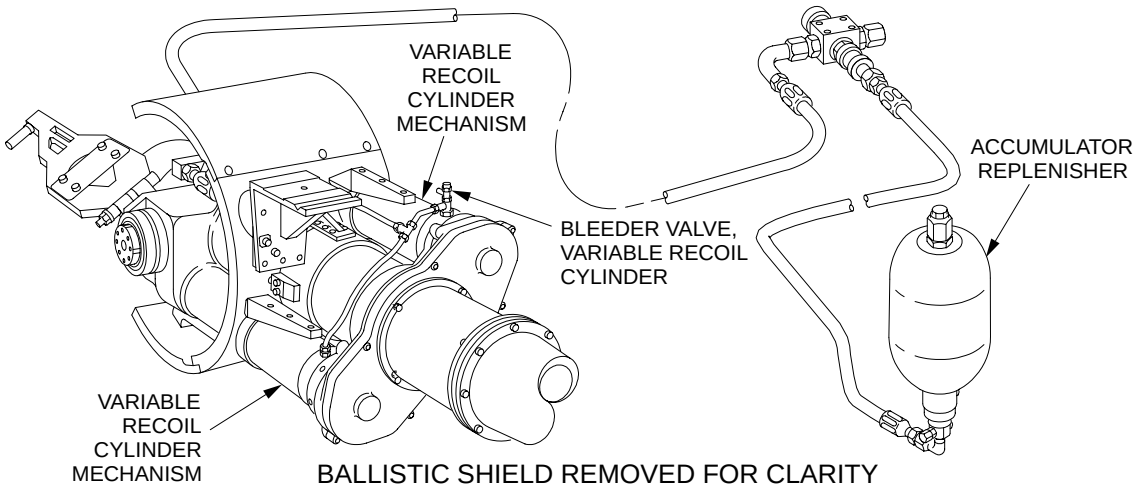
RECUPERATOR: Returns the cannon tube to battery after firing.

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

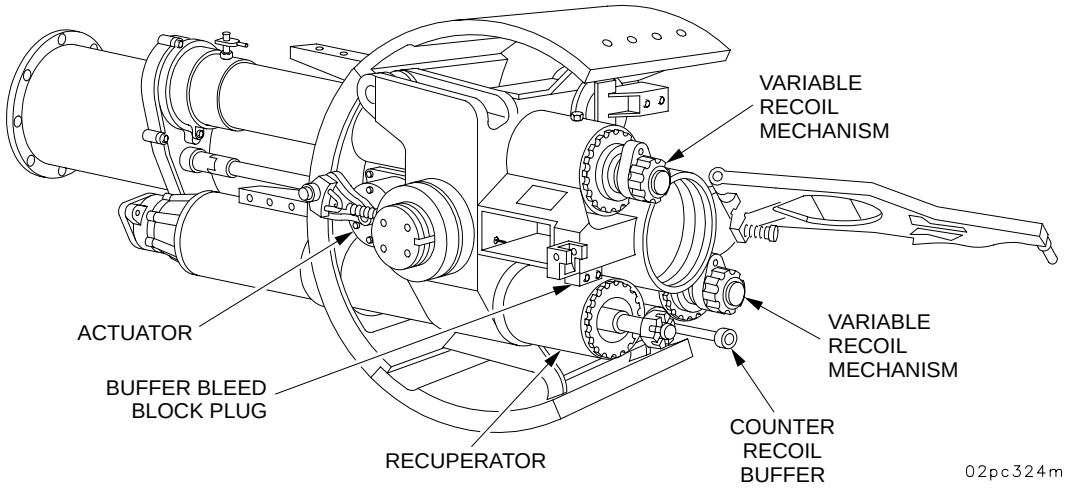
ACTUATOR: Adjusts recoil orifices depending on cannon elevation. Allows 36 inch (91 cm) recoil below 45 degrees (–3 degrees) elevation and up to 27 inches (69 cm) recoil above 45 degrees (+3 degrees) elevation.

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

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



BALLISTIC SHIELD REMOVED FOR CLARITY



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.

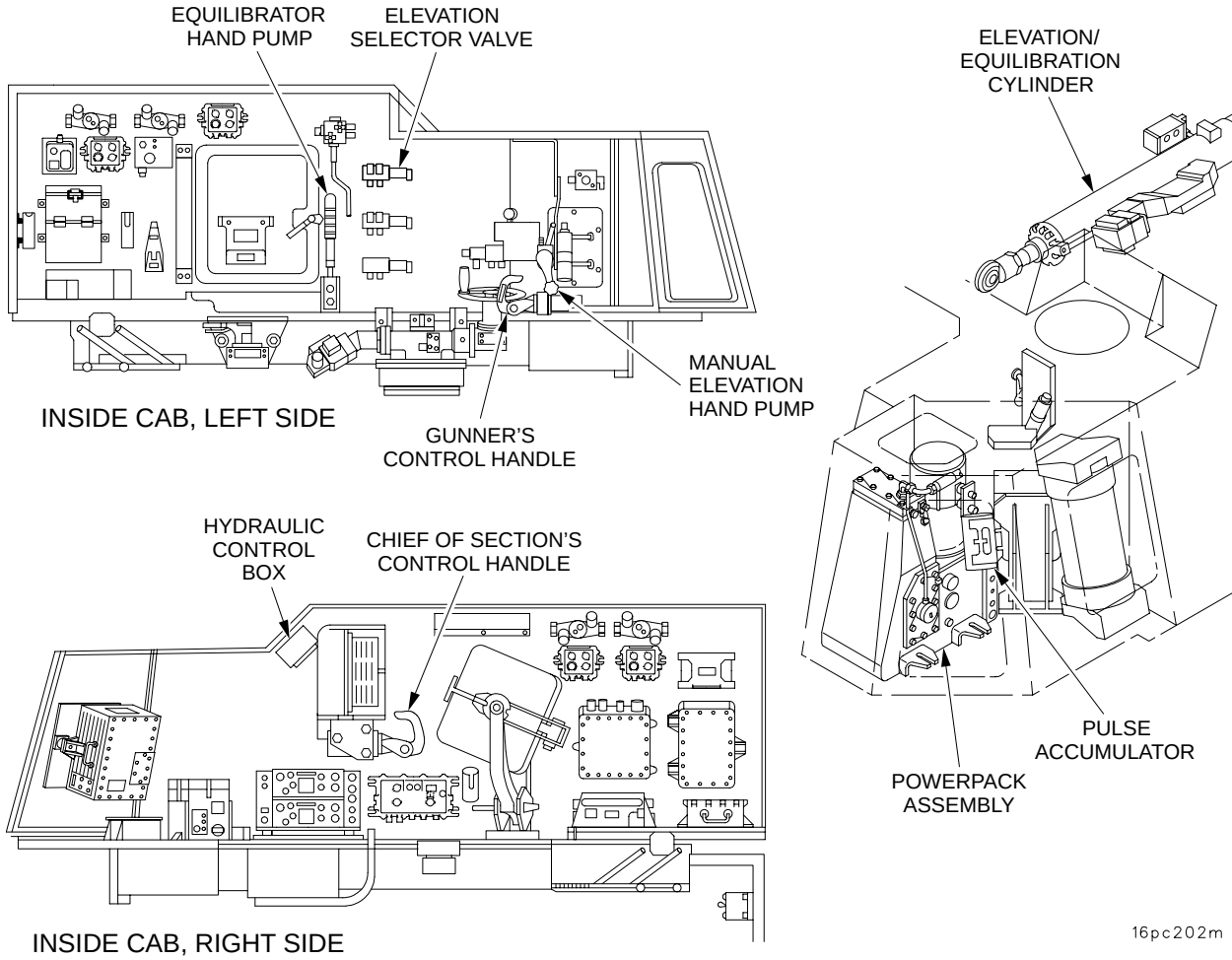
PULSE ACCUMULATOR: Assists in the functioning of velocity fuses should a hydraulic line rupture.

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).



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.

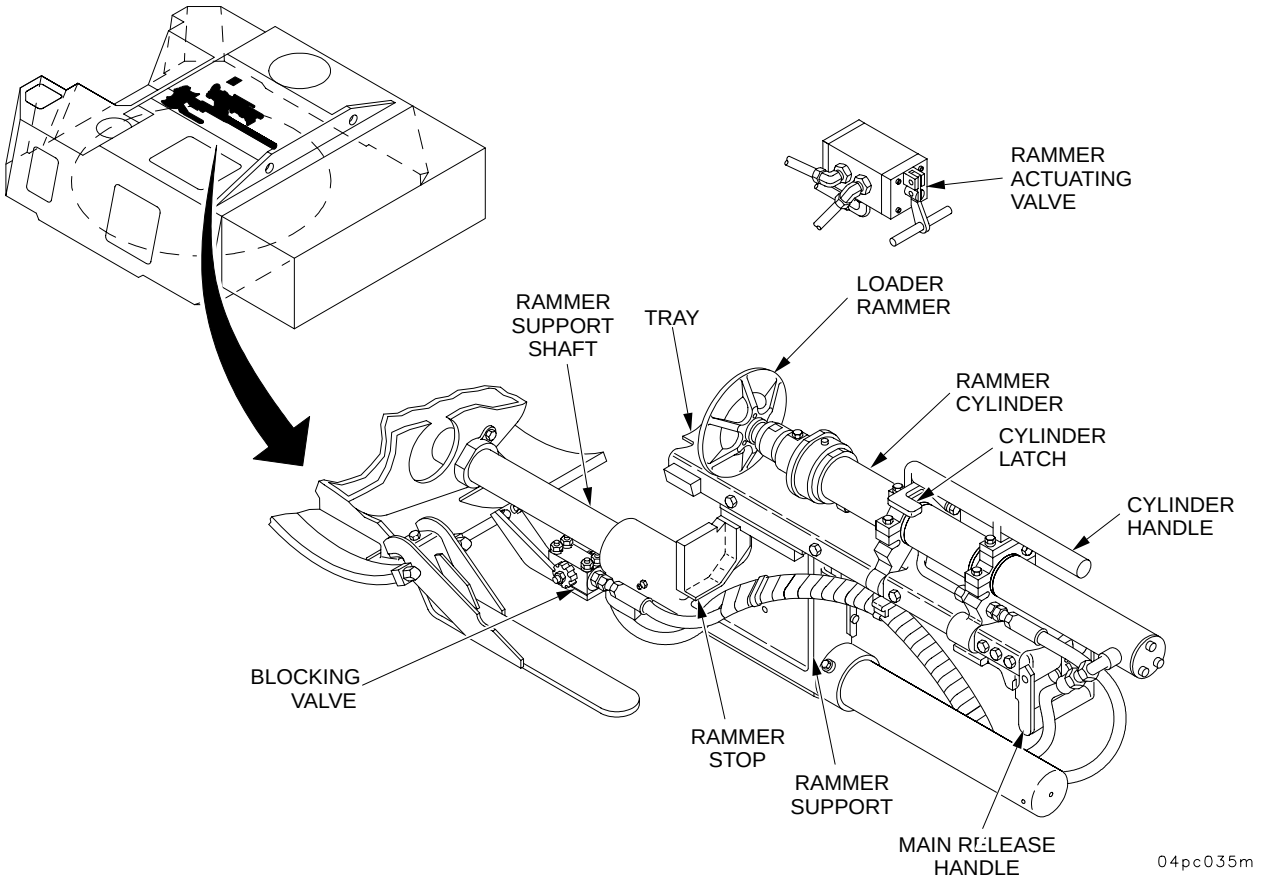
CYLINDER LATCH: Locks the rammer cylinder into position on the tray.

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.

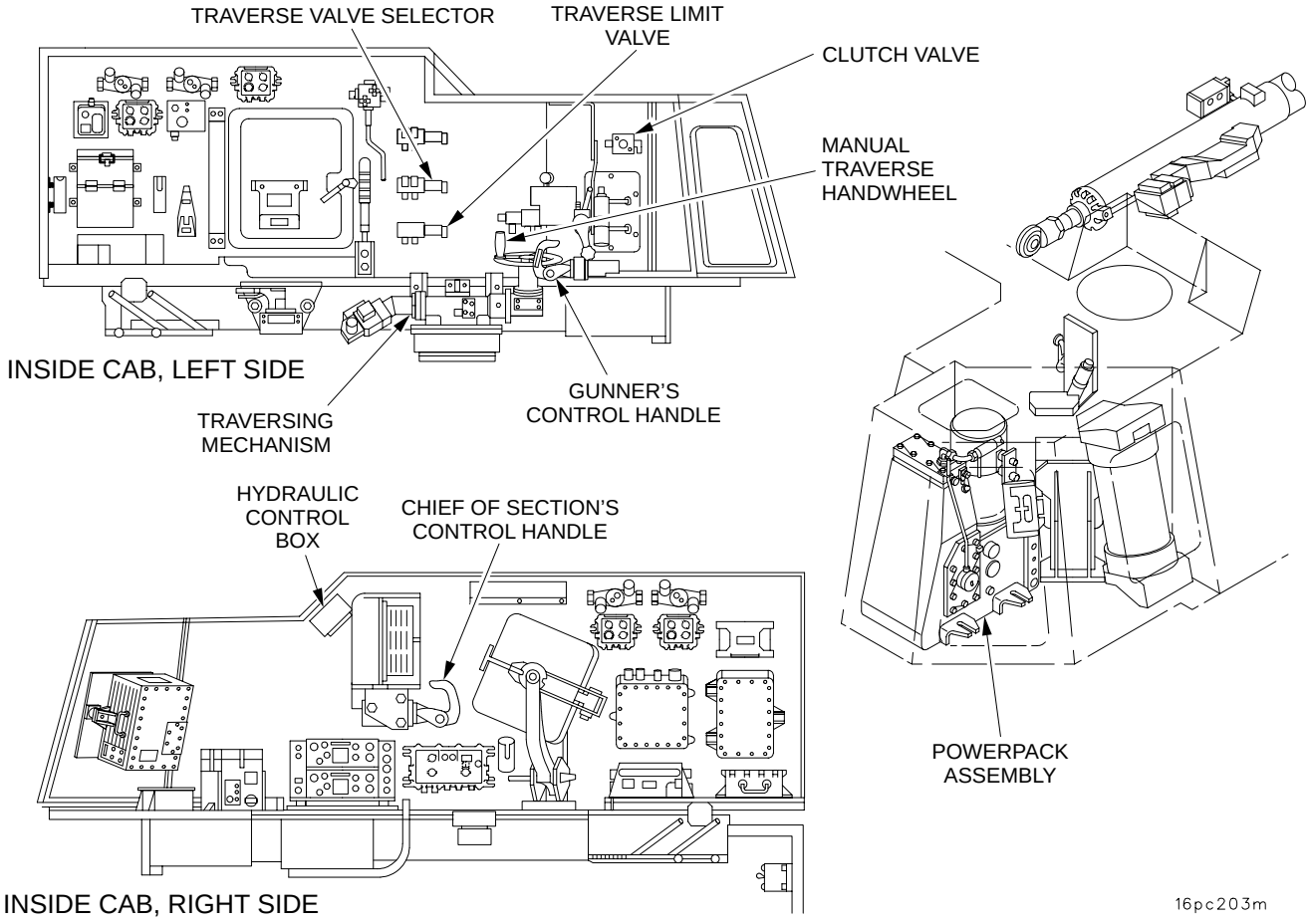
TRAVERSE VALVE SELECTOR: Directs hydraulic flow to allow manual or power traversing.

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.



1–15 EQUIPMENT OPERATION AND DESCRIPTION – CONTINUED

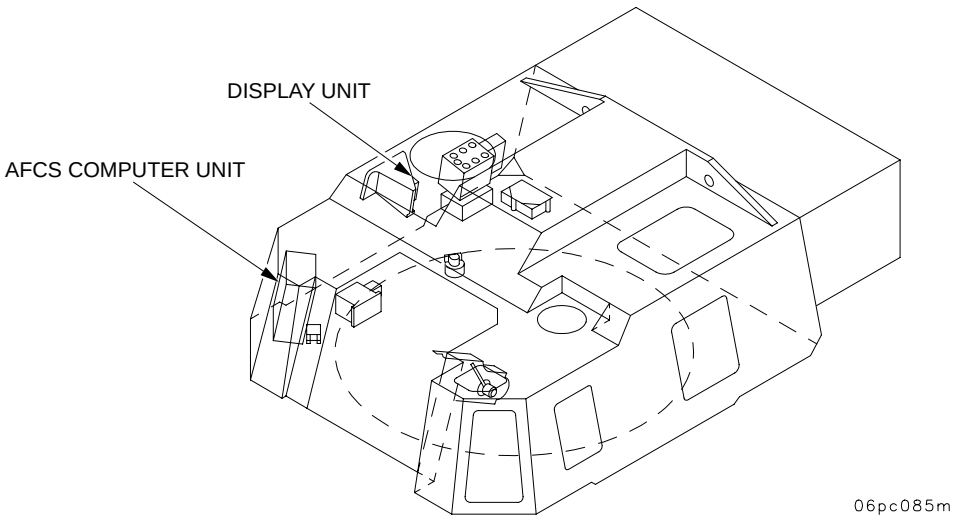
1–15.6 Description of AFCS and Associated Items.

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.



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.

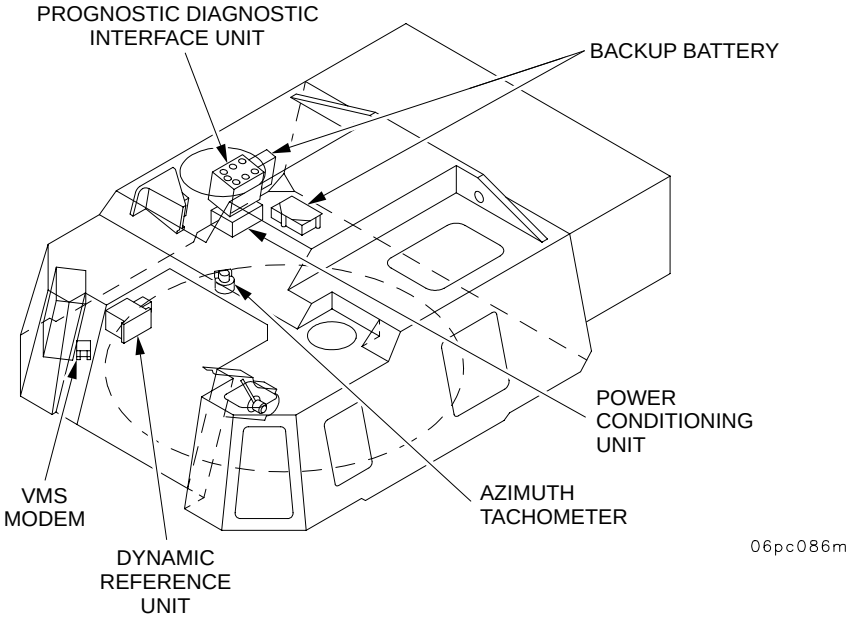
d. Backup Batteries (two sets). Provide electrical power necessary to support AFCS during power dropout or when vehicle output power falls below 20 volts. These batteries are of a sealed and vented lead acid type (no maintenance required).

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.

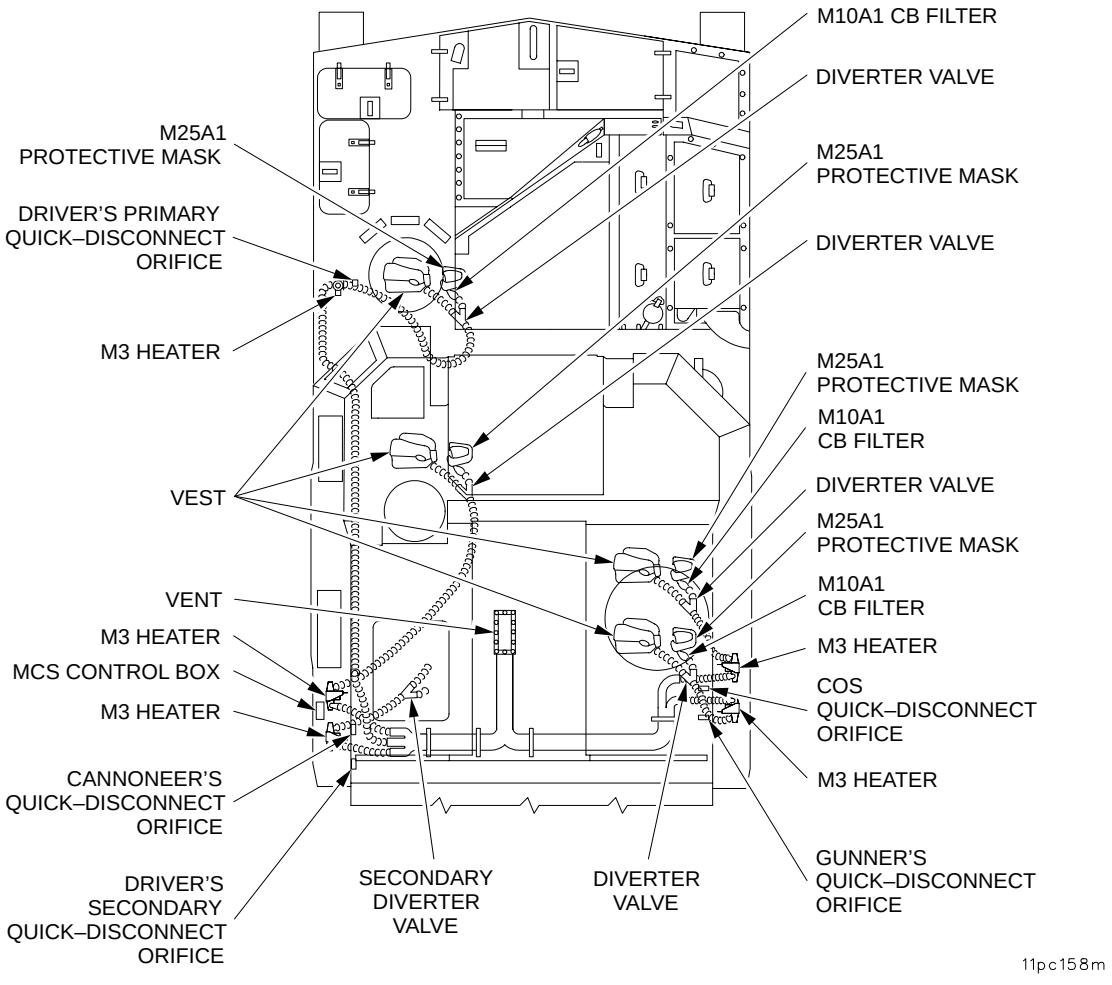
The MCS is a self–contained air filtering system located on the cab roof. Air output is vented through the cab roof and to the M3 heaters.

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.



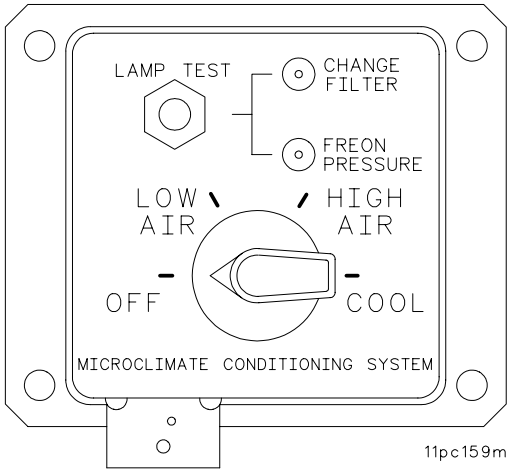
1–15 EQUIPMENT OPERATION AND DESCRIPTION – CONTINUED

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

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 (P–D–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 21–11).

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 P–D–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.

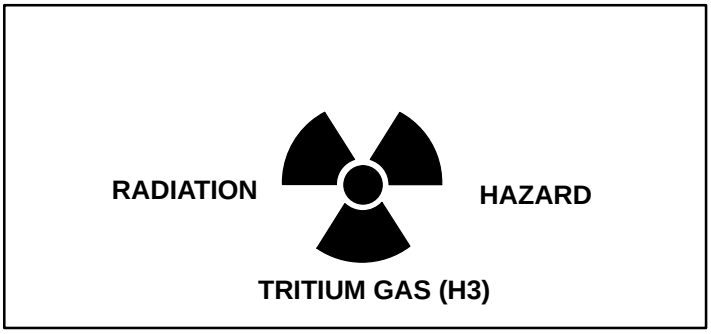
LOCATION	ITEM	ACTION	REMARKS/REFERENCES
M109A6	Unpacking	Remove closure kit Remove COEI and BII	para 2–4.3
Cab M109A6	Armament Cannon 155MM, M284	Clean surface to remove rust–preventive compounds	para 2–4.1
	Surfaces Interior/ Exterior	Inspect for rust or damage which could render the unit unserviceable	PMCS Table 2–1
	Ballistic Cover	Uncrate and install	para 7–3
	Panoramic Telescope Mount M145	Check counter box area for evidence of moisture; purge if required. Check for illumination. Check synchronization	para 28–7 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 radiological protection office. Do not attempt to repair.

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

NOTE

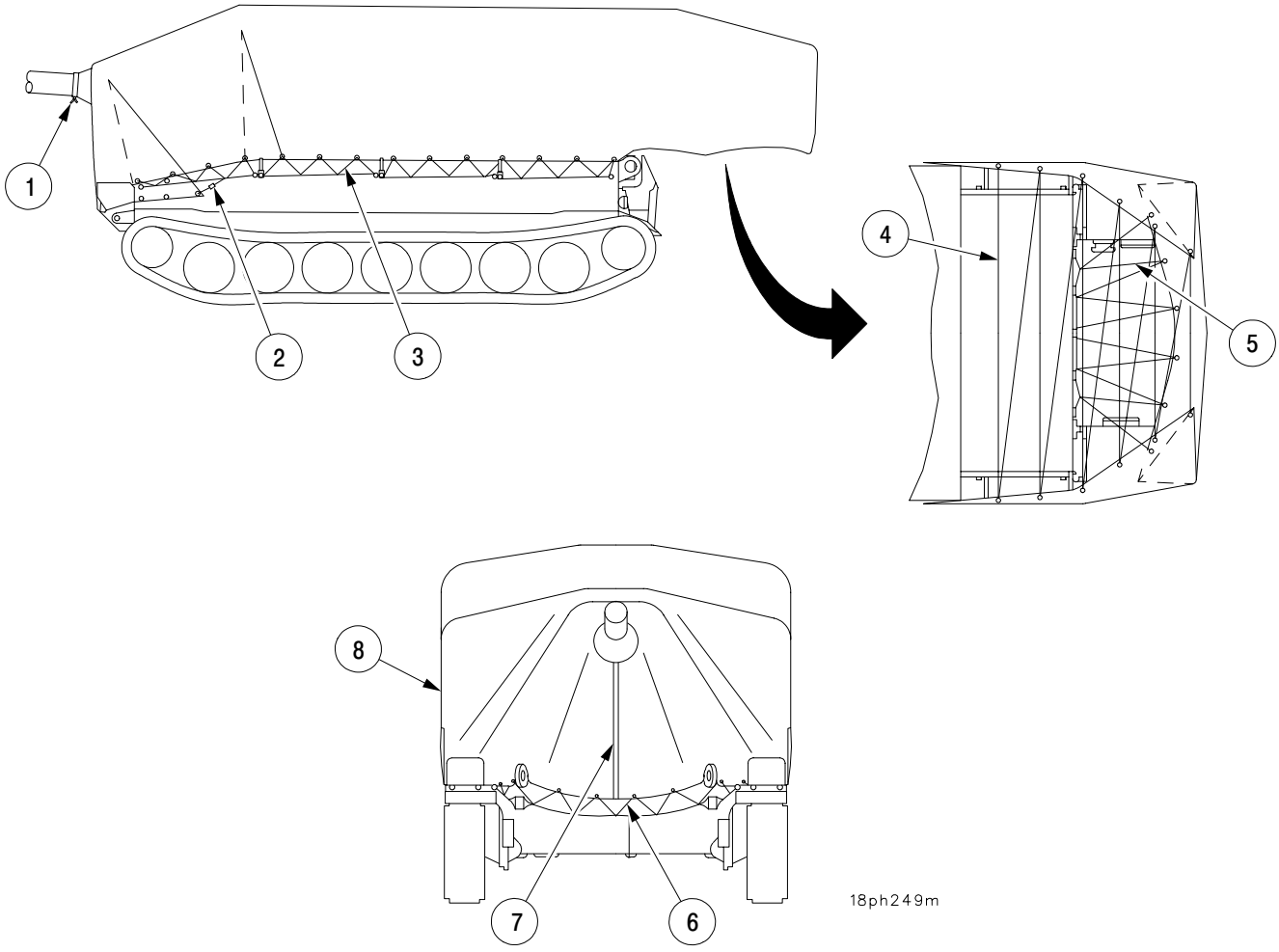
Establish preventive maintenance schedule and record (DD Form 314) for required cab components and fire control items (DA PAM 738–750).

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).



2–4 SERVICE UPON RECEIPT – CONTINUED

2–4.3 Unpacking – Continued

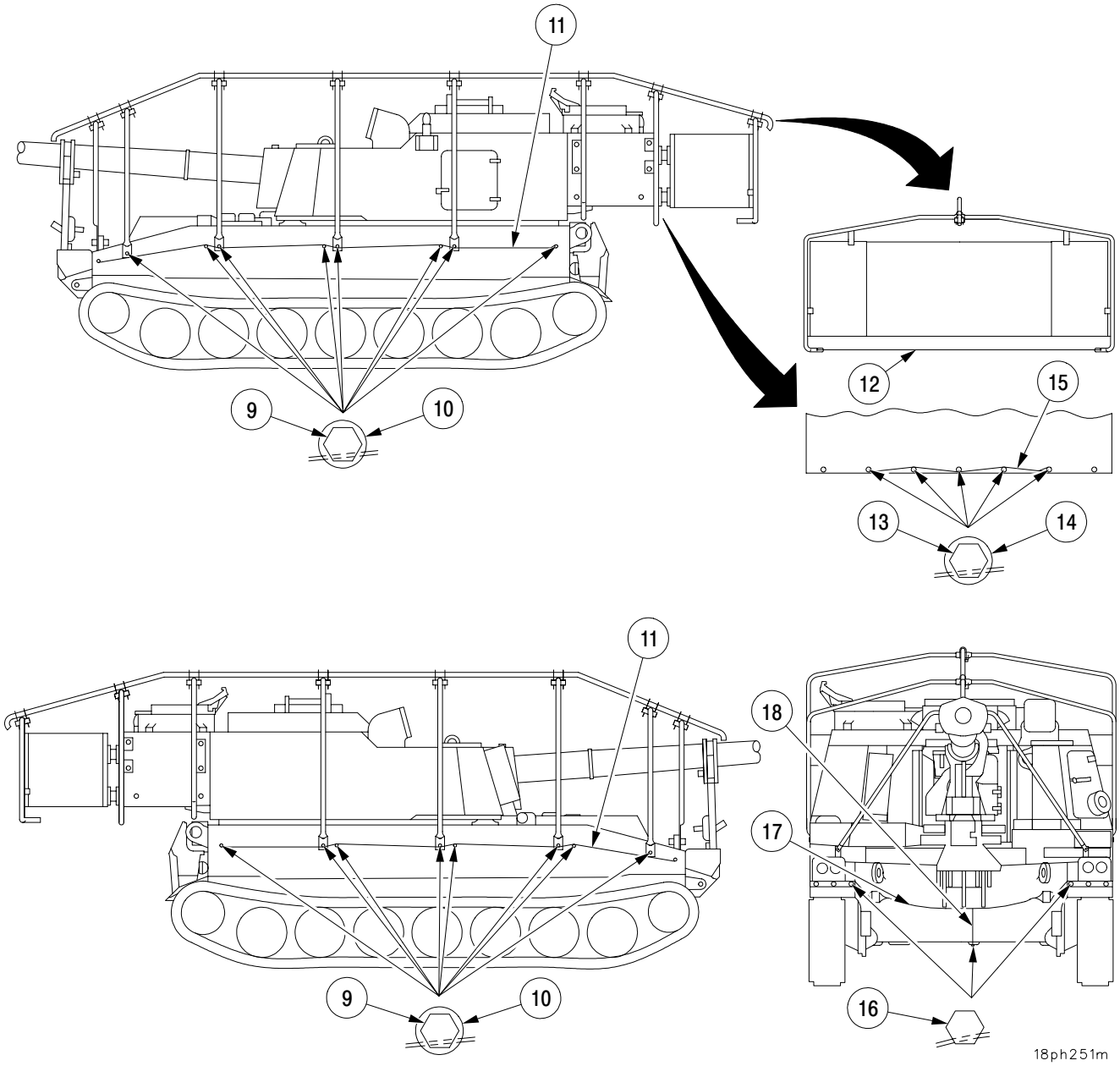
2–4.3.1 Unpacking – Closure Kit Removal – Continued

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.



2–4 SERVICE UPON RECEIPT – CONTINUED

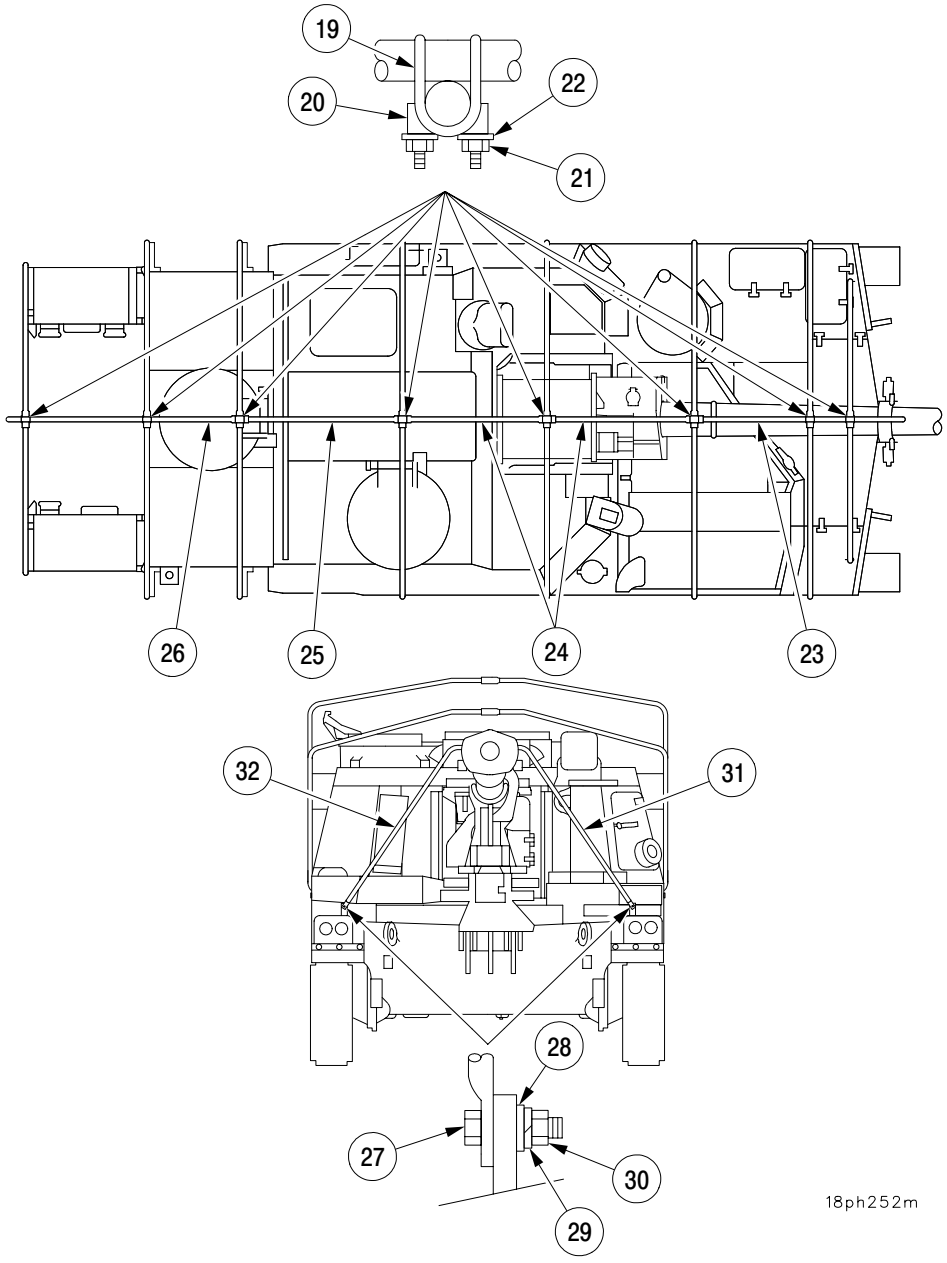
2–4.3 Unpacking – Continued

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).



2–4 SERVICE UPON RECEIPT – CONTINUED

2–4.3 Unpacking – Continued

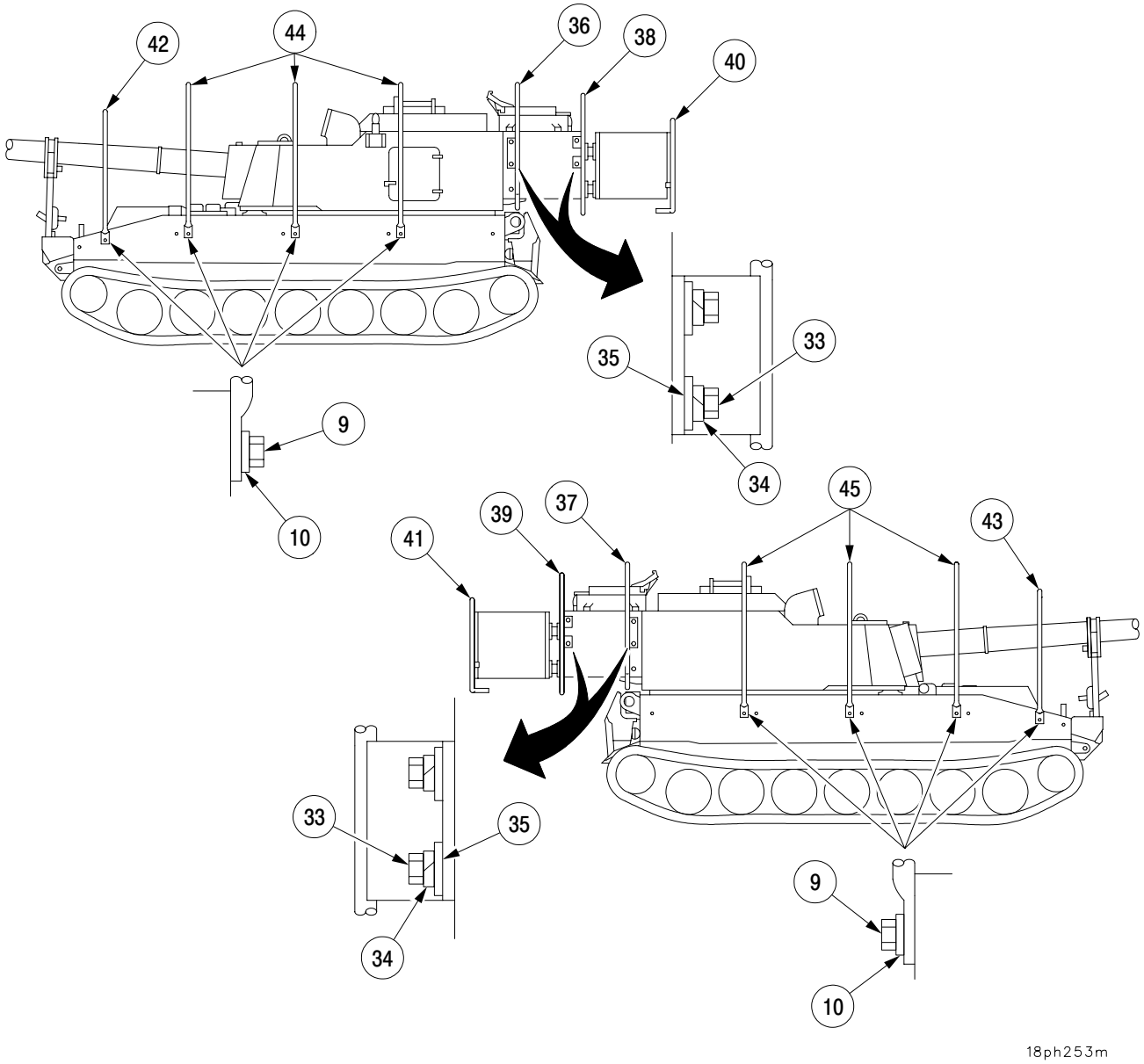
2–4.3.1 Unpacking – Closure Kit Removal – Continued

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).

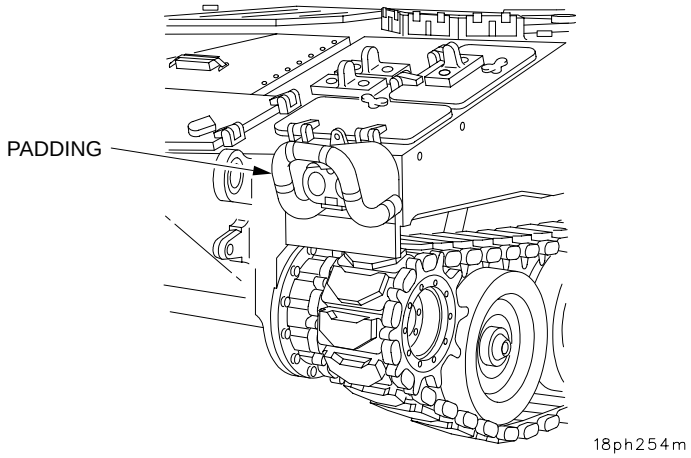


2–4 SERVICE UPON RECEIPT – CONTINUED

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 Discrepancies.
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).

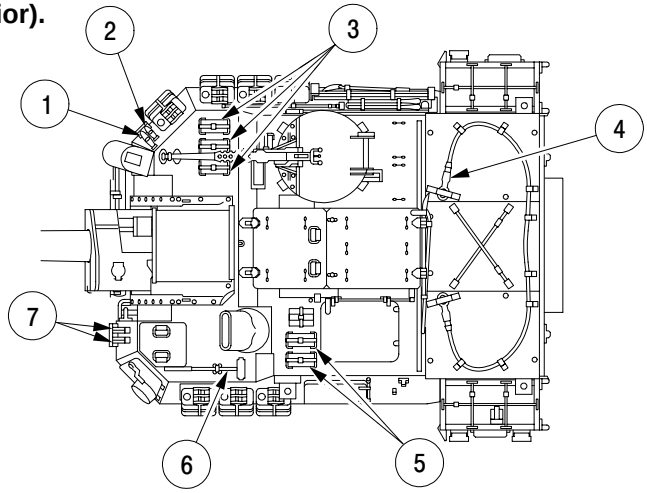
b. Caliber .50 machine gun mount support (para 14–3).

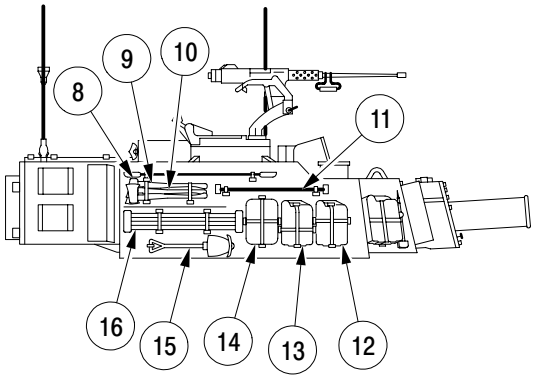
c. Ballistic cover (para 7–3).

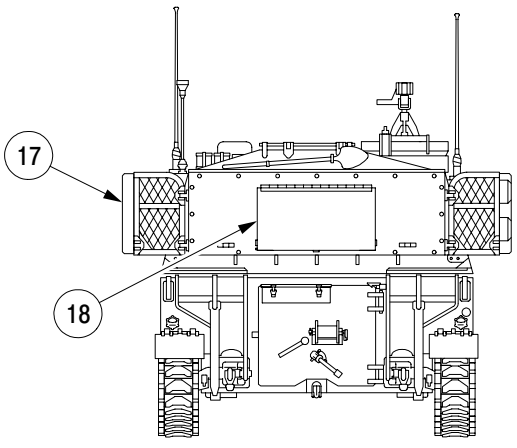
2–5.1 Stowed Items – Location Index (Cab Exterior).

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







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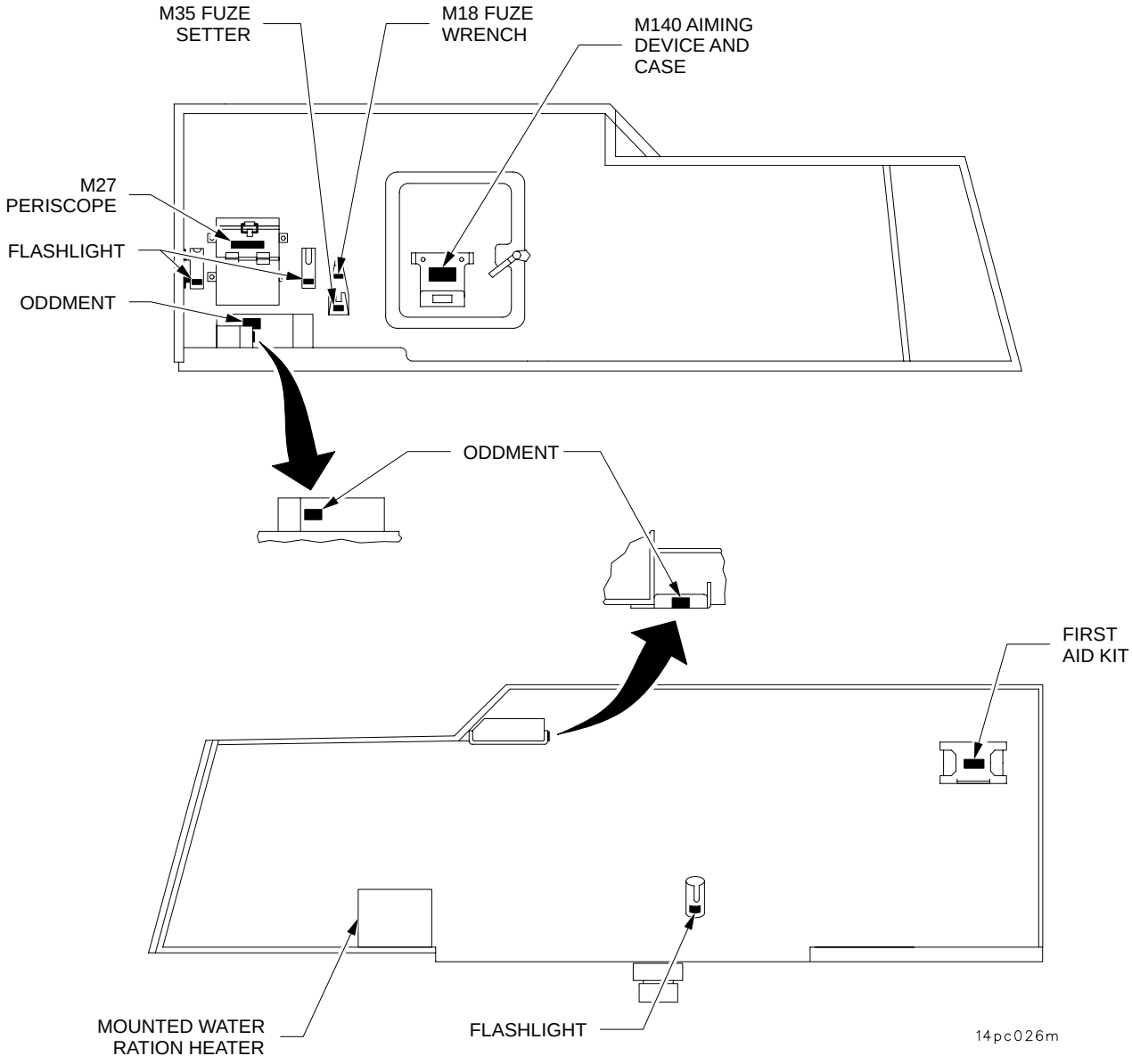
2–5 INSTALLATION INSTRUCTIONS – CONTINUED

2–5.2 Stowed Items – Location Index (Internal).

CAB INTERIOR



Equipment in oddment trays:
Gun tool roll
Bore brush
Breech boresight
Wire cutter
Tube reducer, M3

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
   Alignment Device M140

b. Make sure collimator M1A1 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 (P–D–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 21–11).

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
(SC 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.

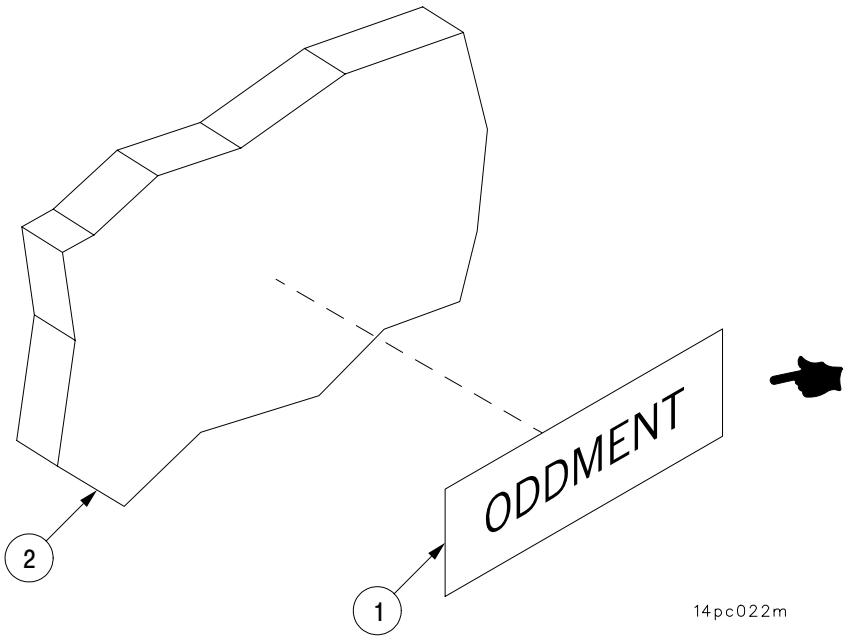
2–8 DECALS, LABELS, IDENTIFICATION PLATES, AND INSTRUCTION SIGNS – CONTINUED

b. Installation.

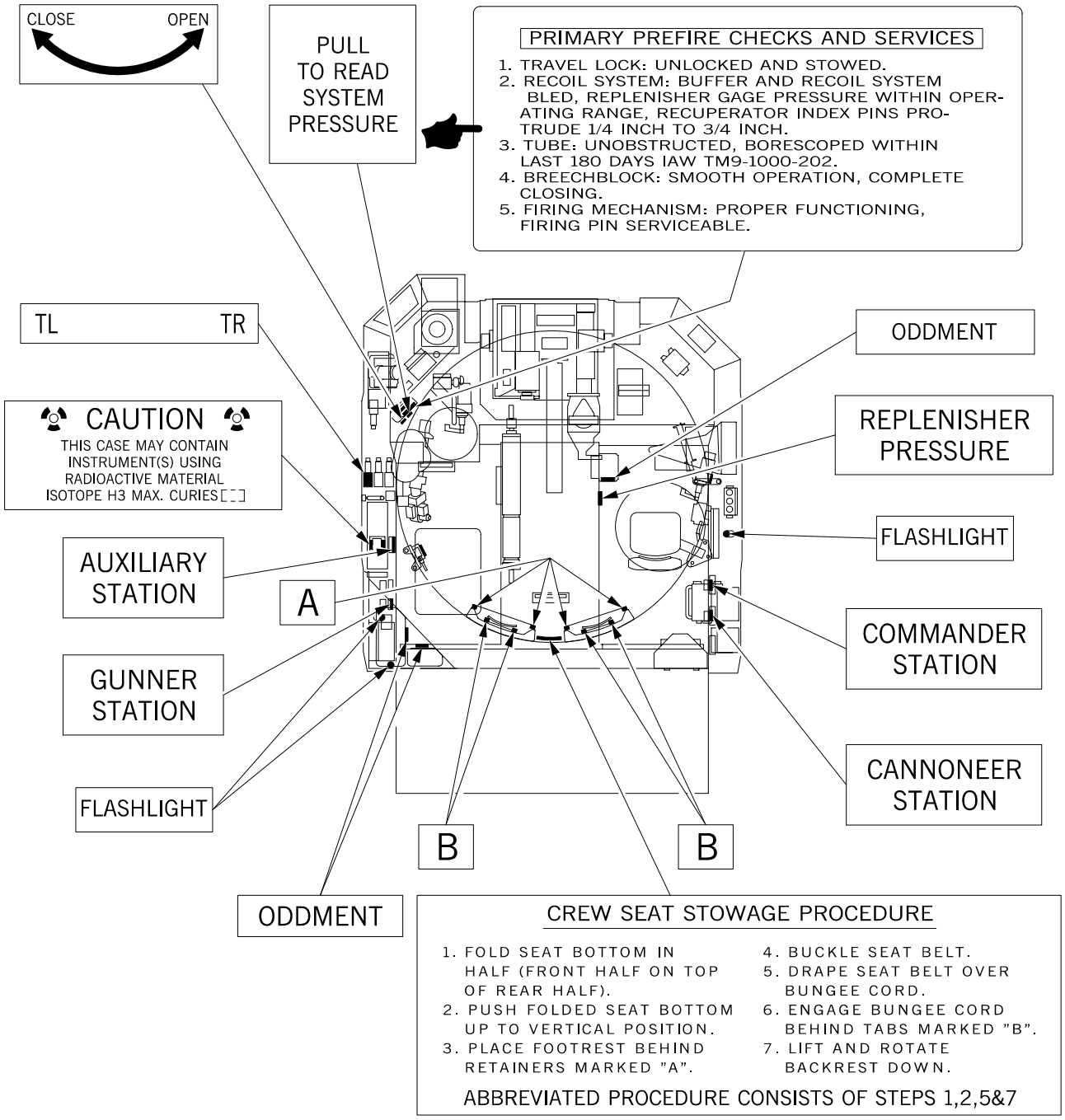
WARNING

Dry–cleaning solvent (P–D–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 21–11).

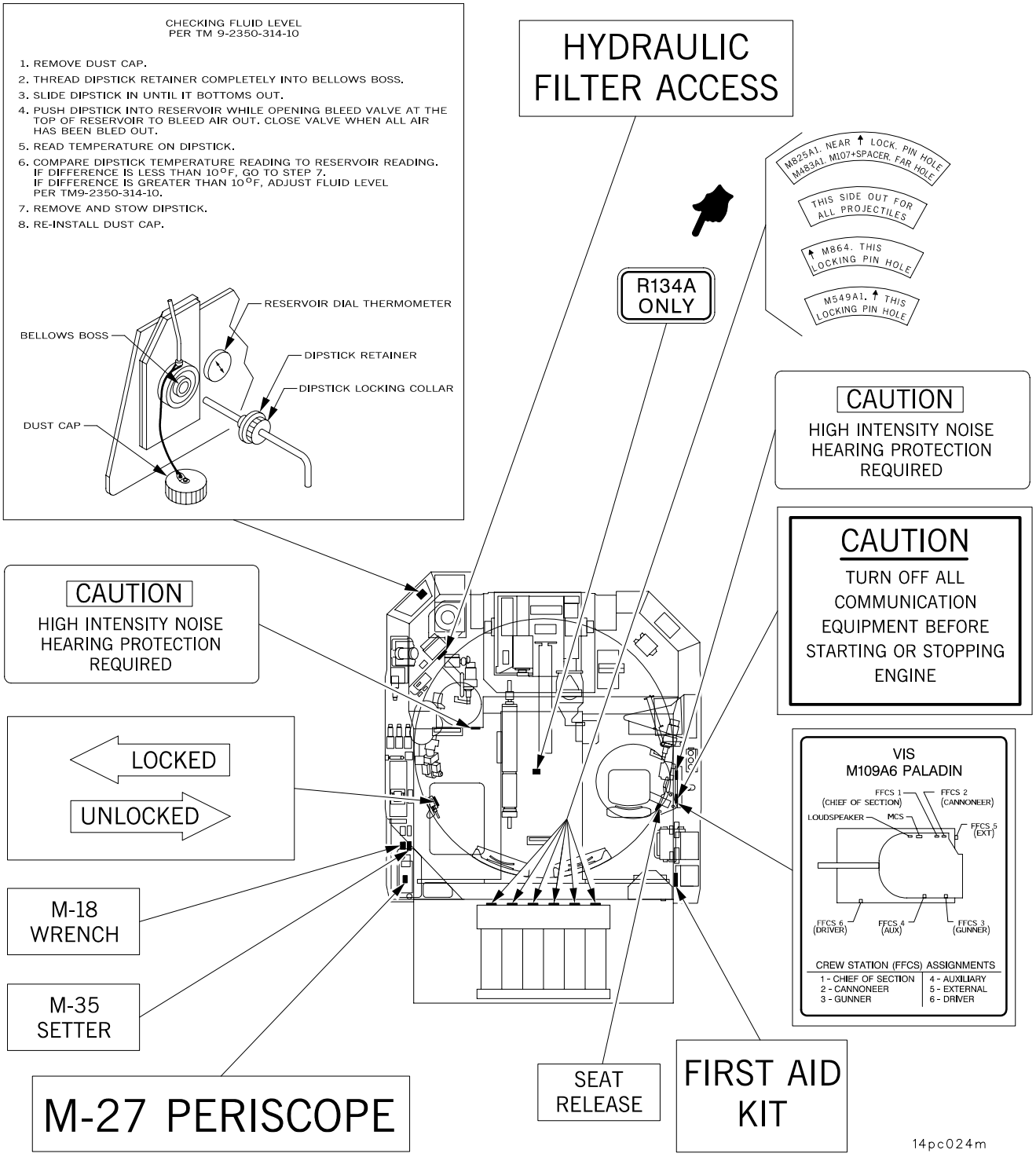
1 Clean mounting surface using dry–cleaning solvent.
2 Remove paper backing from new label (1) and position in place on mounting surface (2).
3 Press label (1) firmly to remove air bubbles from under label (1).



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



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



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.

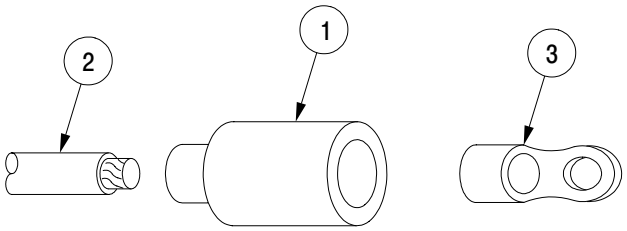
b. Assembly

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

2–9.3 Female Cable Connector with Washer

a. Disassembly

Cut and discard connector.

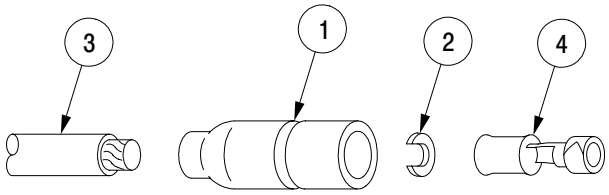
b. Assembly

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.

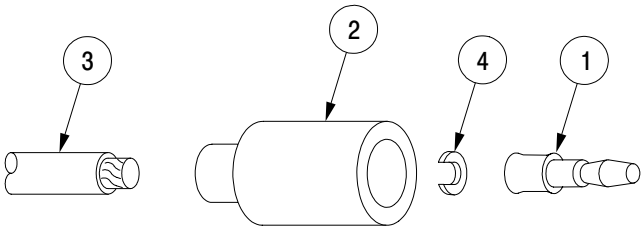
b. Assembly

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

2–9.5 Female Cable Connector with Sleeve

a. Disassembly

Cut and discard connector.

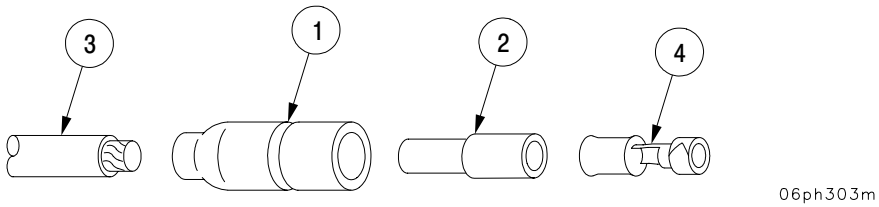
b. Assembly

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).



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 738–750, 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 738–750.

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 DA PAM 738–750.

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 (P–D–680) (item 75, Appx C).

2–10.2 Lubrication Instructions – Continued

WARNING

Dry–cleaning solvent (P–D–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 21–11).

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−G−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)	For arctic operation, refer to FM 9–207	
GAA (MIL–L–10924) Grease, Automotive and Artillery LOMD NATO–S–1735 Lubricating Oil, Molybdenum Disulfide GMD (MIL–G–21164) Grease, Molybdenum Disulfide GGP (MIL–G–23549) Grease, General Purpose Mount Cradle Bearing and Torque Key	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 Hydraulic Powerpack & Equilibrator	46 Qts. (43.51 LI)			OHT	OHT	OHT		
Gun Mount & Replenisher	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.

CAUTION

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.

CAUTION

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.

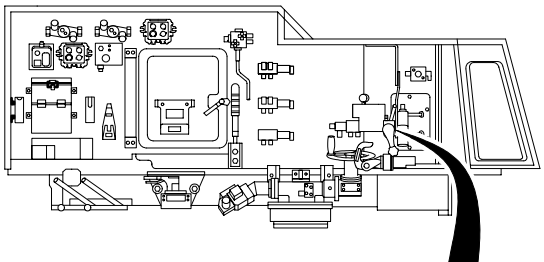
c. Location, Item to Check/Service column. This column provides the location and the item to be checked or serviced. The item location is underlined.

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	**NOTE** • Refer to Army Oil Analysis Program (AOAP) DA PAM 738–750. • Samples must be taken with engine running and hydraulic system power ON (TM 9–2350–314–10). Replace when oil analysis program at Army installation indicates contaminated hydraulic fluid (OHT) (para 18–2). If fluid is contaminated, notify support maintenance. System sampling can be accomplished at sampling valve (1) on the pressure manifold and valve (2) on return manifold. 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.	



INTERIOR
LEFT CAB WALL

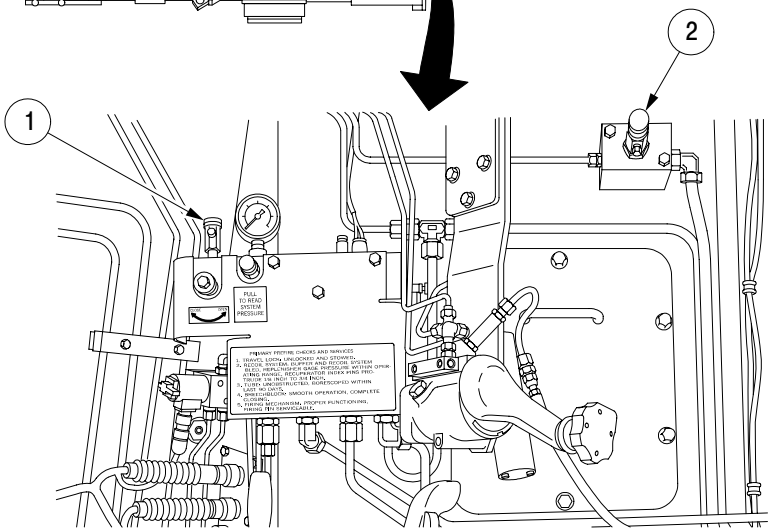


Table 2–1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF–PROPELLED HOWITZER – CONTINUED

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
2	QUARTERLY	Hydraulic Powerpack	Perform zero pressure check as follows: a. Park vehicle on level ground, if possible. b. Place gun tube in stowed position (TM 9–2350–314–10). c. Turn MASTER power and hydraulic control box power switches ON to charge system. d. Observe reading of pressure gage. Normal operating pressure is 1925 ± 50 psi. e. Set cab traversing lock. f. Turn MASTER power and hydraulic control box power switches OFF. 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 900 ± 50 psi then to zero pressure. h. Check hydraulic system sight gage to determine if system fluid level is correct. If not, add or drain fluid. i. Check hydraulic compartment for leaks with hydraulic fittings and lines. j. Check hydraulic cooling fan for accumulation of sand or dust. Use air and air hose to remove sand and dust from fan. k. Check electrical connections for damage. l. Check hydraulic system reservoir for leaks. m. Check pulse accumulator and equilibrator accumualtor for hydraulic or nitrogen leaks. n. Service pulse accumulator (para 28–9) as required. o. Service equilibrator accumulator (para 28–7) as required.	Class III leaks Class III leaks
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 Alignment Device M140	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	**WARNING** • Failure to align reticle of the M117A2 telescope to the M140 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. • 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. Perform boresighting on target board, aligning reticles of M117A2 on test target board. Next, install the M140 alignment device in front of M117A2. Ensure the reticles of the M117A2 are aligned with the reticle of the M140 alignment device. This check must be performed to ensure accuracy of the M117A2 telescope.	
7	QUARTERLY	Microclimate Conditioning System (MCS)	**NOTE** 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). a. Inspect Freon lines for punctures, fractures, and leaks. b. Inspect drive belt for breaks or cracks. c. Inspect scavenger duct flex hose for tears or weakness. d. Inspect compressor for signs of leakage. e. Inspect filter area for damage. f. Inspect wires for tears or frays. g. Check air particle separator for clogging (para 13–8).	

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).	

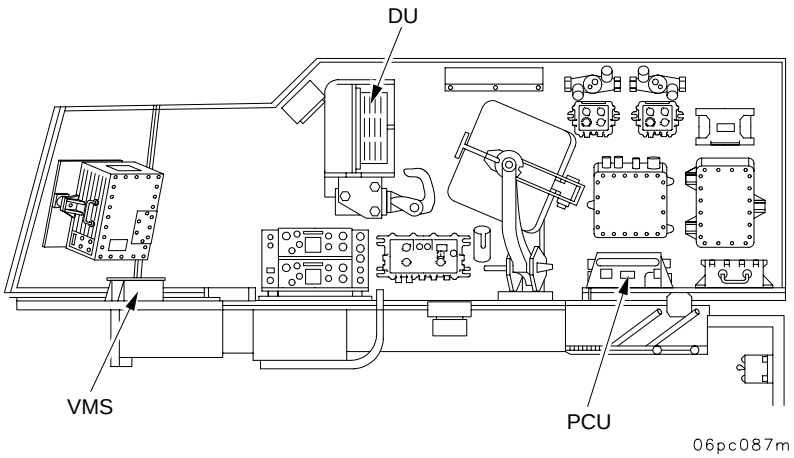


Table 2–1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF–PROPELLED HOWITZER – CONTINUED

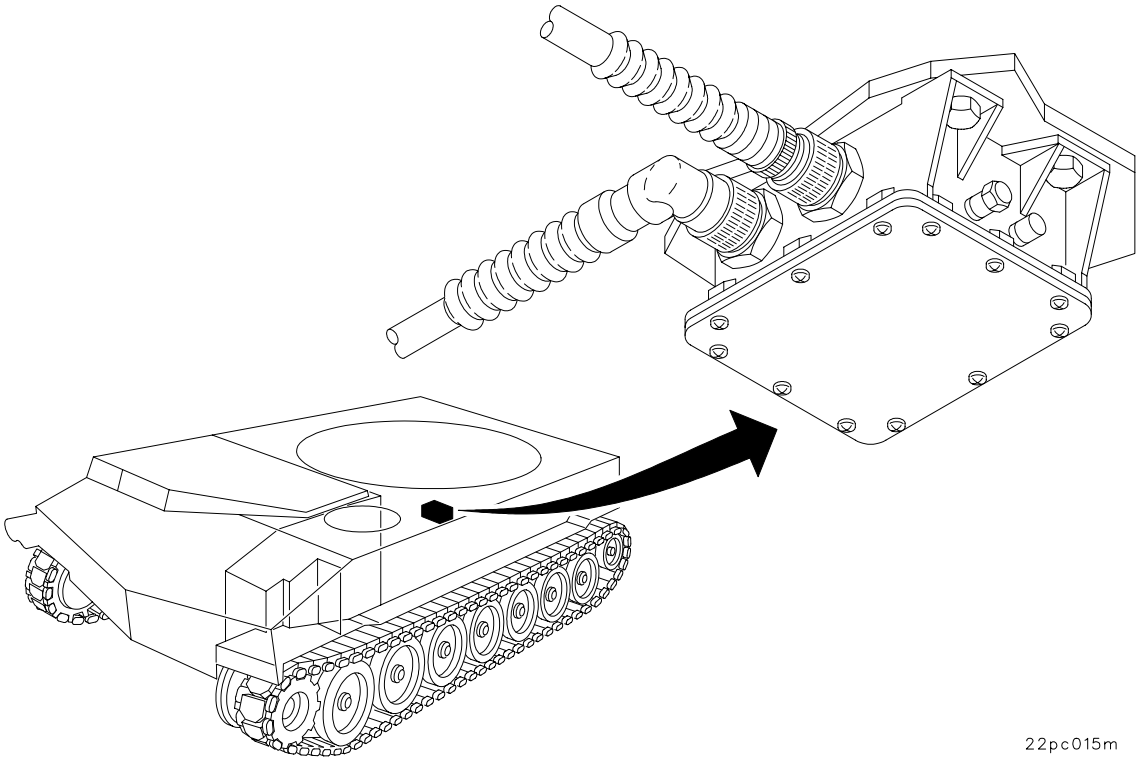
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
11	QUARTERLY	Vehicle Motion Sensor (VMS) Modem Hull Side	Purge quarterly (para 28–3).	
			 22pc015m	
12	QUARTERLY	Cab Bearing Assembly	Check cab bearing mounting bolts, both cab and hull side. Ensure bolts are torqued 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).	

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	Clean as follows: **WARNING** Be sure all personnel are clear of traversing area and bustle storage baskets are closed and secure. a. Remove gun tube from travel lock (TM 9–2350–314–10). b. Unlock cab traverse lock (TM 9–2350–314–10). **WARNING** Make sure MASTER switch is OFF and disconnect battery cables. c. Turn vehicle MASTER switch OFF (TM 9–2350–314–10) and disconnect battery cables (TM 9–2350–314–20–1–2). d. Remove four screws (1), four lockwashers (2), and four flat washers (3) securing cover (4). Discard lockwashers. e. Remove final six screws (5), six lockwashers (6), and six flat washers (7) securing cover (4). Discard lockwashers.	Communication cables are inoperative or if gun tube cannot be removed from travel lock.

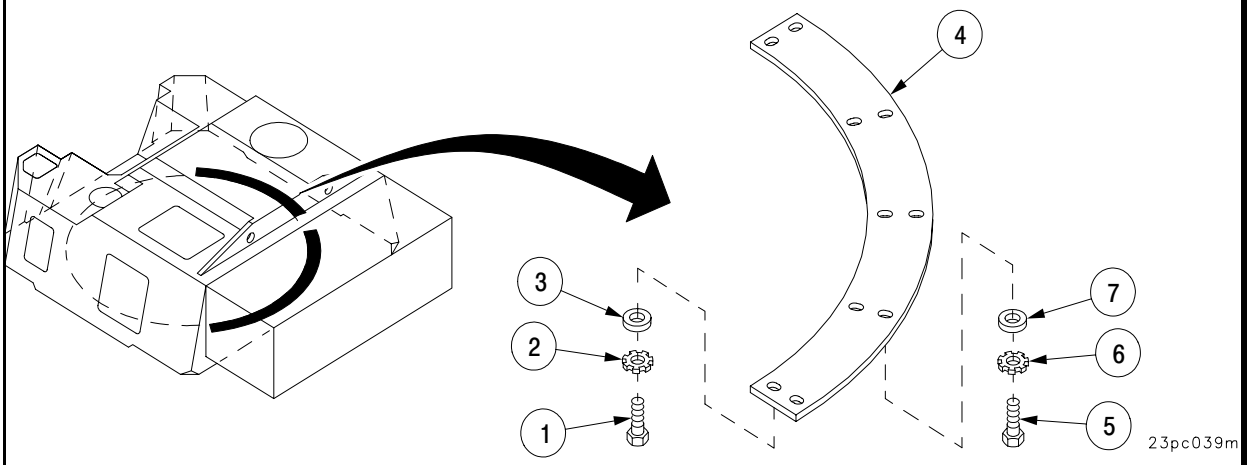
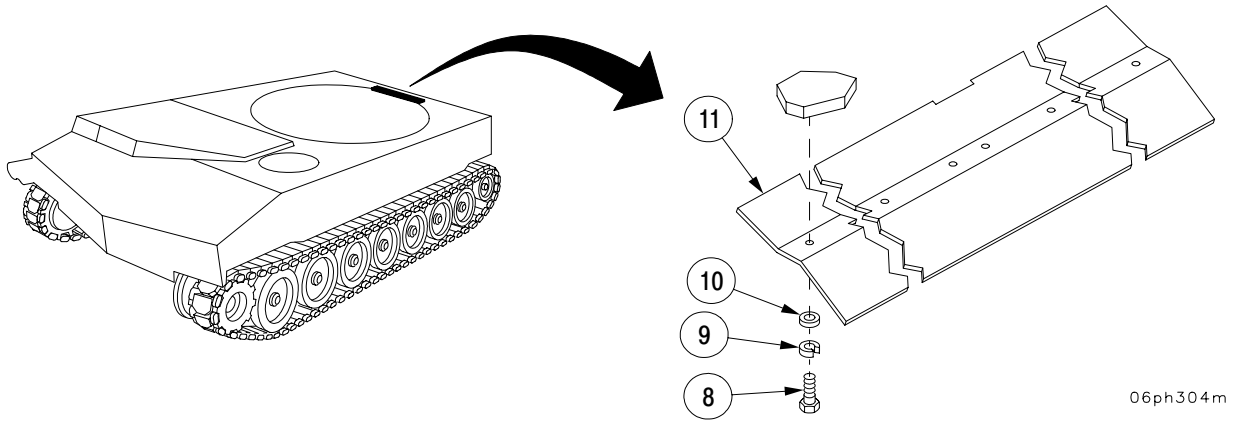


Table 2–1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF–PROPELLED HOWITZER – CONTINUED

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
14	QUARTERLY	Brush Block Assembly – Continued	f. Remove six screws (8), six lockwashers (9), six flat washers (10), and guard (11). Discard lockwashers.	



NOTE

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.

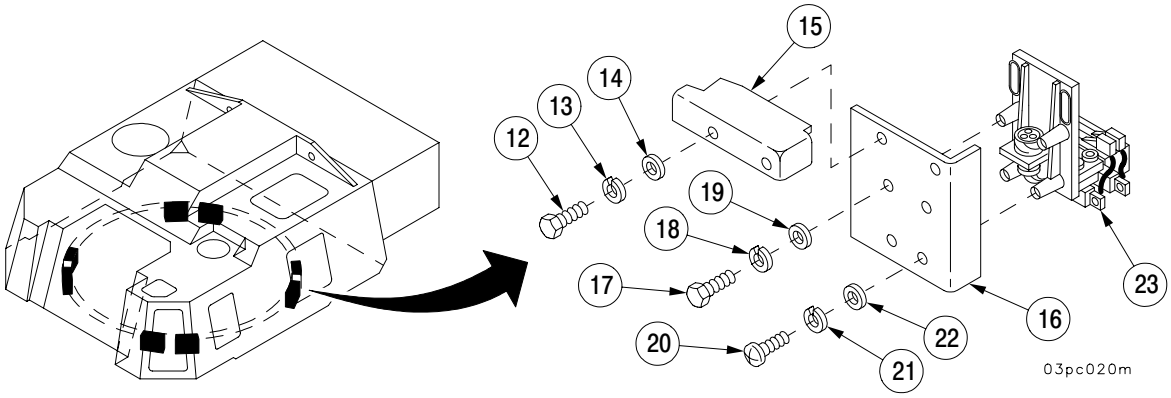
g. Remove two screws (12), two lockwashers (13), two flat washers (14), and lid (15) from contact arm assembly cover (16). Discard lockwashers.

h. Remove two screws (17), two lockwashers (18), and two flat washers (19) securing contact arm assembly cover (16) to brush block (23). Discard lockwashers.

i. Remove two screws (20), two lockwashers (21), two flat washers (22), and contact arm assembly cover (16) from brush block (23). Discard lockwashers.

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		



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.

WARNING

Dry–cleaning solvent (P–D–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 (ref. FM 21–11).

k. Using dry–cleaning solvent (item 75, Appx C), clean contact arm assembly (brush blocks). Allow surfaces to dry before installing shields.

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

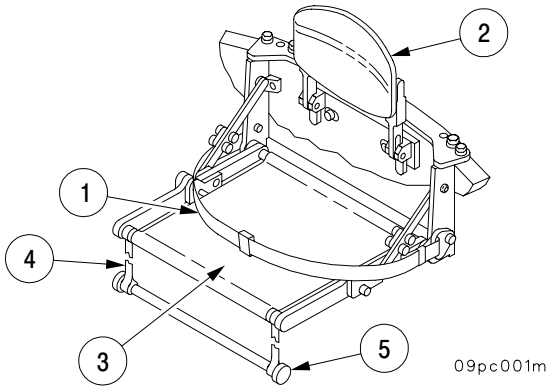
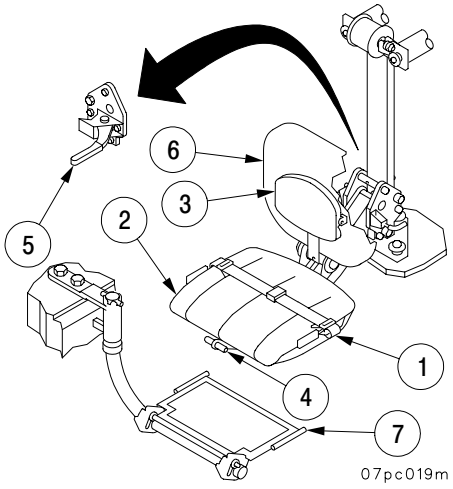
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
15	QUARTERLY	Crew Seats	Inspect seatbelt (1), backrest (2), seat (3), and footrest straps (4) for deterioration. Ensure seatbelt (1) mounting brackets are securely attached, and buckle/end plate engages securely. Open and restore backrest (2), seat (3), and footrest (5). Check for binding, loose, or missing mounting hardware.	
				
16	QUARTERLY	COS Seat and Footrest	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.	
				

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	Breechblock (1): Check for cracks, ruined/damaged locking threads and ease/smoothness of operation. Firing Block Assembly (2): Check for rust, deterioration of firing pin, and condition of firing block. Obturator (3): Check for correct alignment of front and rear split rings, and corrosion/deterioration/pitting of rings/assembly.	Breechblock is cracked, has damaged threads, rusted firing block, fouled firing pin, corroded rings, or split rings not aligned.

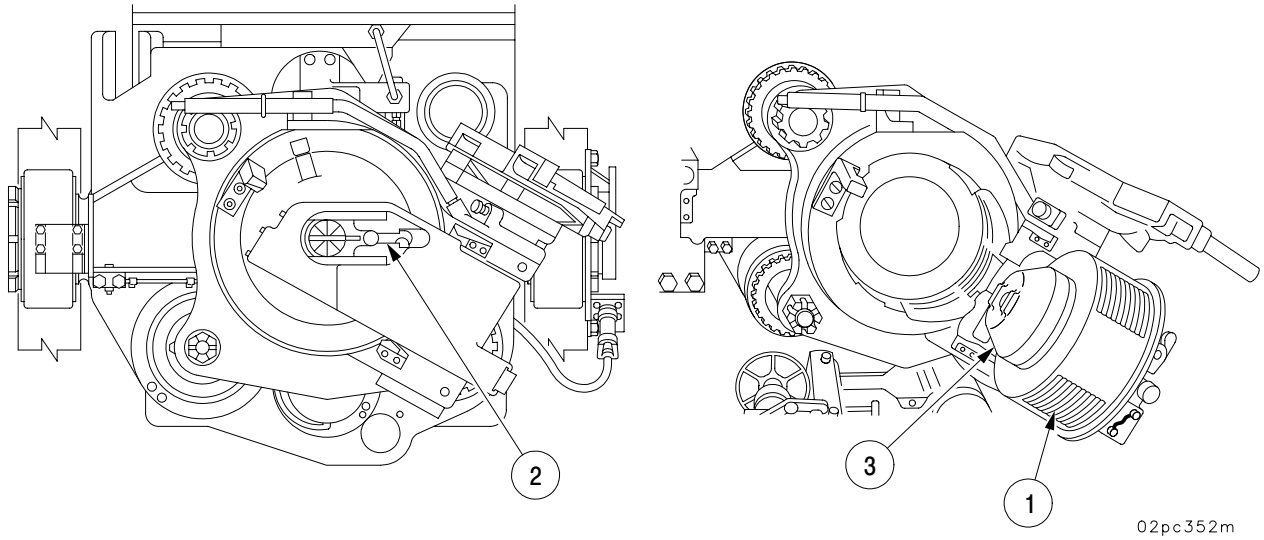


Table 2–1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF–PROPELLED HOWITZER – CONTINUED

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
18	QUARTERLY	Breech Operating Cam	Requires check and adjustment when torque key is checked or replaced (para 4–6). Check cam for ease of rolling and for flat spots. Check and adjust operating cam and roller as follows: **CAUTION** 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. a. Back a wrecker in front of howitzer with wrecker boom aligned with cannon tube. **NOTE** Information on fabrication of bracket installed on the wrecker boom is found in Appx D. b. Elevate cannon tube to mate with exercising bracket. c. Step deleted.	Breech cam cannot be adjusted.

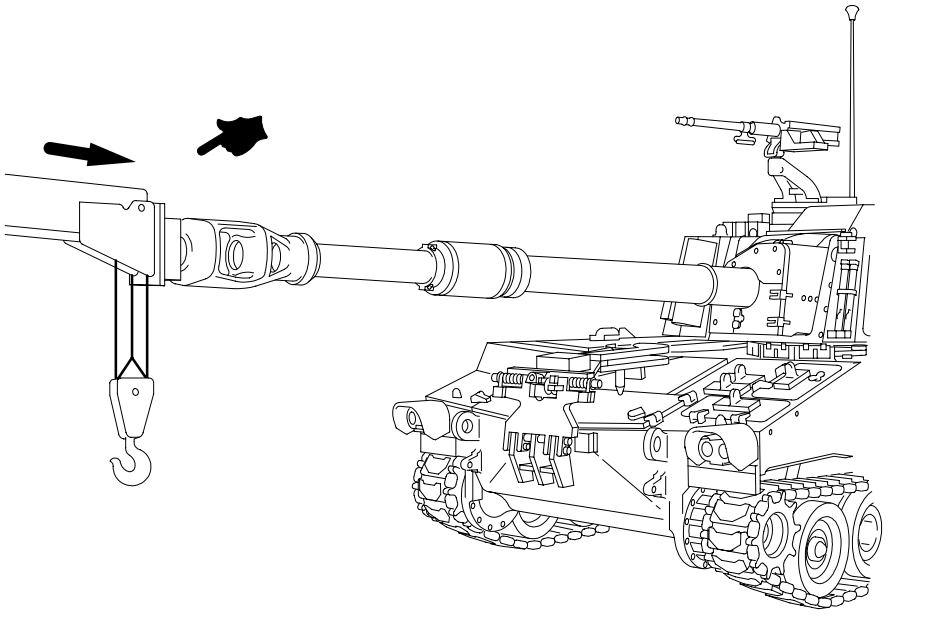


Table 2–1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF–PROPELLED HOWITZER – CONTINUED

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
18	QUARTERLY	Breech Operating Cam – Continued	**WARNING** 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. 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). 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. 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).	

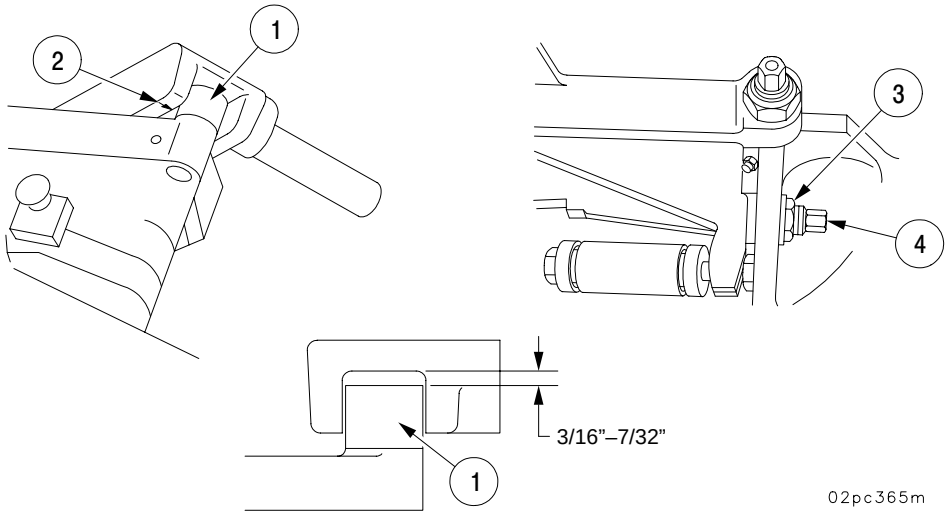


Table 2–1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF–PROPELLED HOWITZER – CONTINUED

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
18	QUARTERLY	Breech Operating Cam – Continued	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. 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). i. Adjust distance between spring cap ends (7) to 4 inches (101 mm) for correct cam tension. j. Prior to returning tube to battery, perform buffer inspection.	

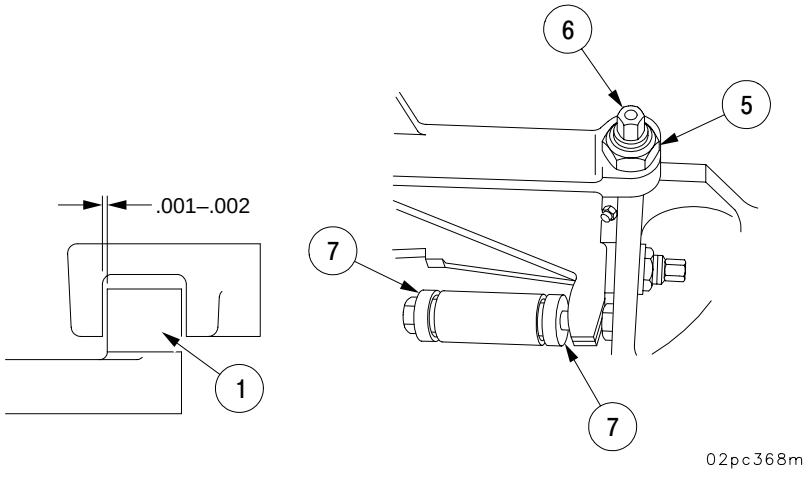


Table 2–1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF–PROPELLED HOWITZER – CONTINUED

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
19	QUARTERLY	Buffer Counter Recoil Assembly	a. Inspect counter recoil buffer (1) for leaks. **CAUTION** 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. b. Inspect buffer piston rod (2) for: (1) Extension of approximately 13 inches (33 cm). (2) Spring tension: Attempt to push rod in. If rod can be pushed in easily, buffer is defective. (3) Scratches, gouges, and other defects. c. Inspect piston rod bumper (3) for damage or deterioration. d. If buffer is damaged or bumper deteriorated, notify support maintenance. e. Slowly return the cannon tube to battery. f. Step deleted.	

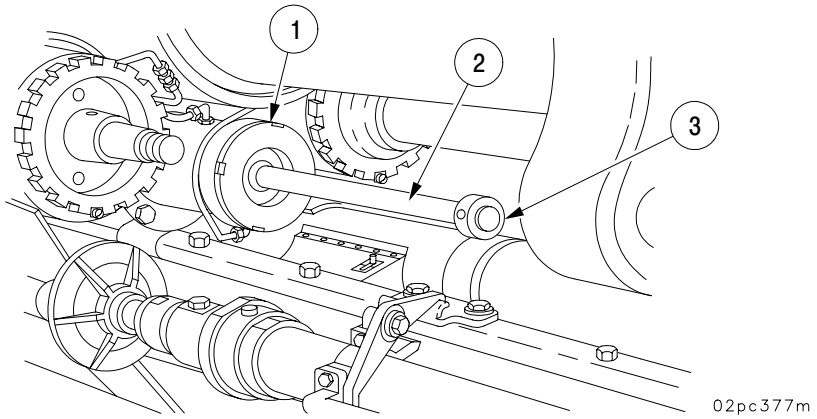


Table 2–1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF–PROPELLED HOWITZER – CONTINUED

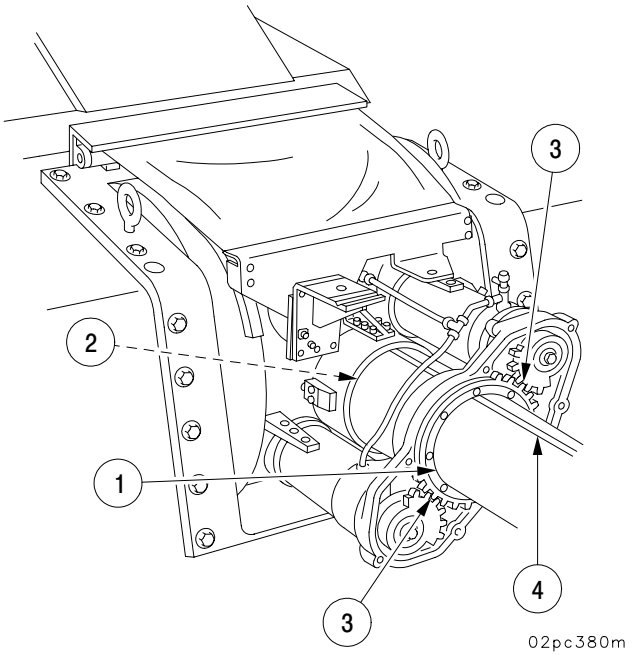
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
20	SEMI–ANNUALLY	Variable Recoil Housing	Remove dust cover, dust shield retainers, and variable recoil cover. Check operation of variable recoil mechanism (1). Examine dust shield seals (2) for tears and remove excess 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. **NOTE** For sustained operation at 0° temperature or below, change grease to GAA.	
			 **NOTE** Gun mount ballistic shield removed for clarity.	

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

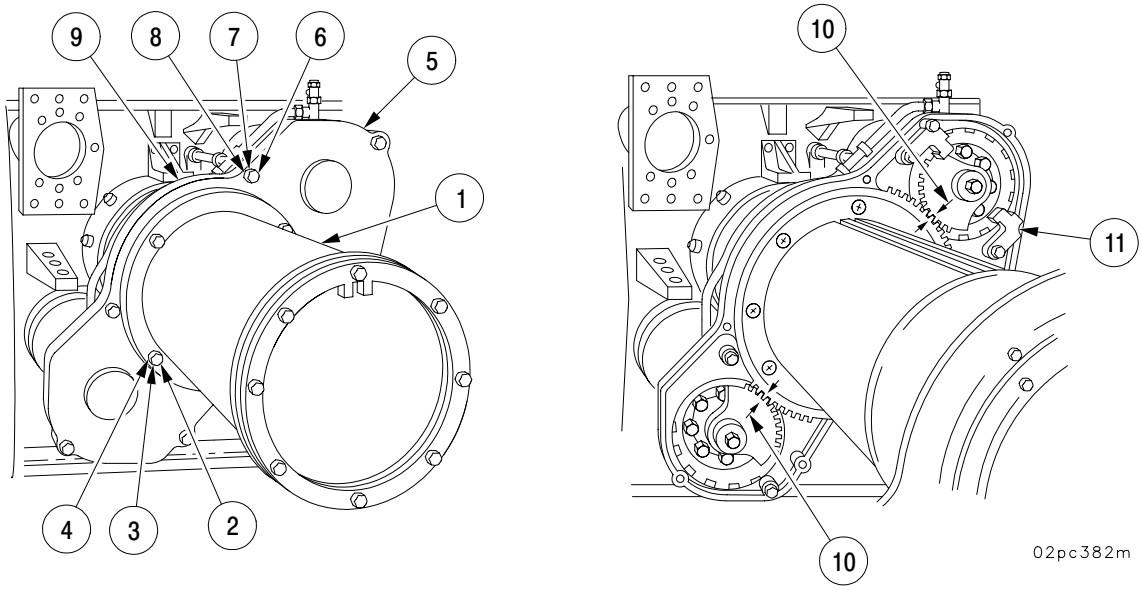
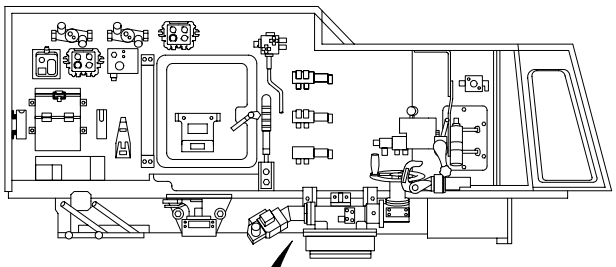
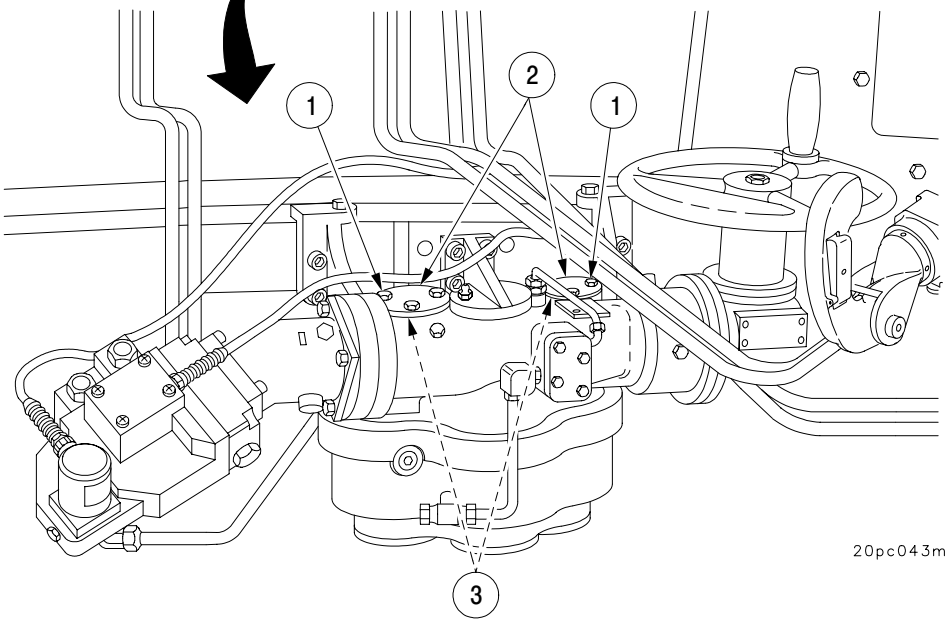
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
21	SEMI–ANNUALLY	Variable Recoil	Inspect and service as follows: a. Remove ballistic shield front cover (para 4–12). b. Remove dust shield (1) by removing four screws (2), four lockwashers (3), and four flat washers (4). Discard lockwashers. c. Remove variable recoil housing (5) by removing six screws (6), six lockwashers (7), six flat washers (8), and gasket (9). Discard lockwashers and gasket. d. Elevate cannon to check operation of variable recoil components. e. By 750 mils, index arrows (10) should begin to separate. f. Check for dirt/water accumulation and rust on recoil gears and torque key groove (11). g. Lubricate per TM 9–2350–314–10.	Arrows do not separate, notify support maintenance for repair.
				
21.1	SEMI–ANNUALLY	Variable Recoil	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 9–1000–234–30 or by using the Recoil Exerciser Kit NSN 1015–01–410–8087 P/N 12940961.	

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	**CAUTION** 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.

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	The following lubrications are not based on any calendar period. They are to be performed when indicated. a. Actuate rammer (1) into gun tube. If rammer (1) is not centered in gun tube, then rammer must be adjusted. b. Remove two plugs (2) from lower gun shield (3). c. Loosen two jam nuts (4) from rammer positioning block (5). d. Adjust two setscrews (6) until rammer (1) is centered in cannon. e. Hold setscrews (6) while tightening jam nuts (4).	

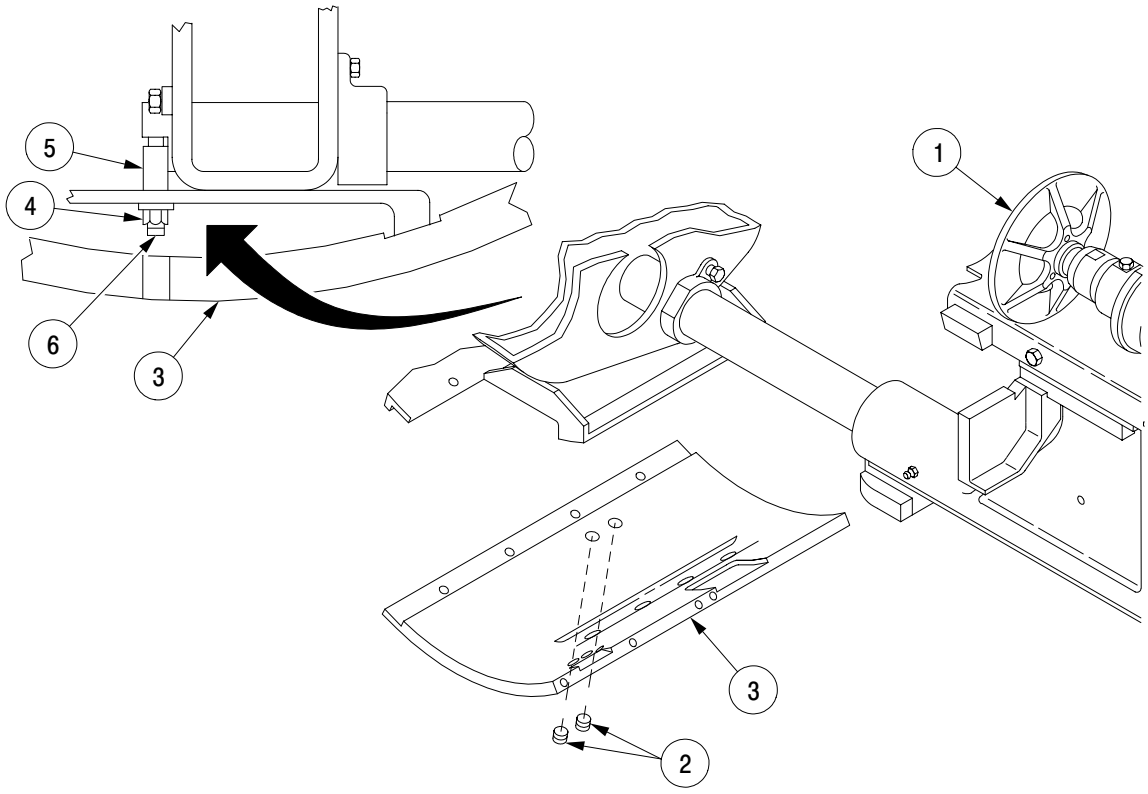


Table 2–1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF–PROPELLED HOWITZER – CONTINUED

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

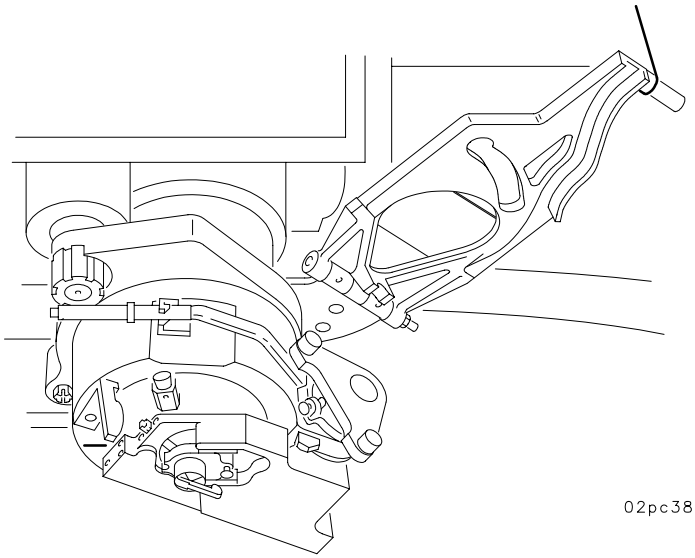
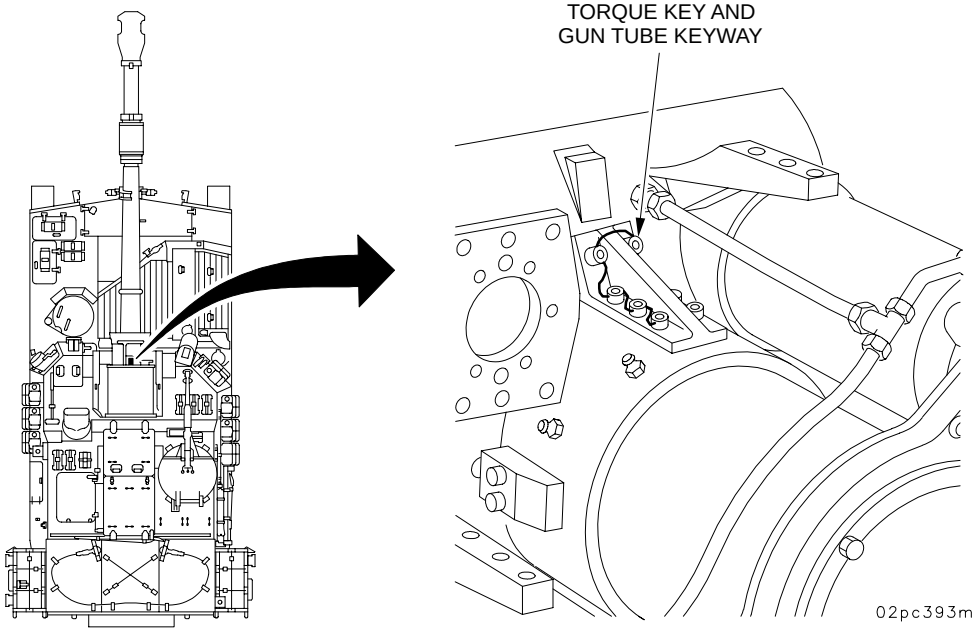


Table 2–1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR M109A6 SELF–PROPELLED HOWITZER – CONTINUED

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	**NOTE** Do not mix grease. If changing between GGP, GMD, and GAA, wipe key and keyway clean before using new grease. After firing 1,000 actual rounds, notify direct support maintenance. **NOTE** Gun mount ballistic shield removed for clarity.	



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 troubleshooting tasks will require the use of the Paladin's "SOLDERS PORTABLE ON–SYSTEM REPAIR TOOL" (SPORT), with the Digital Multimeter (DMM), and PCMCIA card (part number 710833–1), TB 9–2350–314–20–2–1 M109A6 Accessory Software, "AFCS TROUBLESHOOTING" (CD), and the SPORT Accessory kit needed to perform that task. When these components are required TB 9–2350–314–20–2–1 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 PDIU MAINTENANCE MODE. The QUICK GUIDE lists the items to check, possible symptoms with each item, the PDIU message (if any), and directions to a paragraph where a corrective action for the problem can be found. A PDIU diagnostic test (TM 9–2350–314–10) should be completed before troubleshooting. If the PDIU 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 TROUBLE-SHOOTING.

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.

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

3–2.1 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.

CODE	PDIU FAULT SUMMARY SCREEN MESSAGE	PAGE	PARAGRAPH	STEP
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	3–68.1	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	3–68.1	3–3.n(18)	A

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

CODE	PDIU FAULT SUMMARY SCREEN MESSAGE	PAGE	PARAGRAPH	STEP
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	

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

CODE	PDIU FAULT SUMMARY SCREEN MESSAGE	PAGE	PARAGRAPH	STEP
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	3–142	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	3–120	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
105	P1 HYDRAULIC POWER PACK...HYM, HYP		Notify DS	

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

CODE	PDIU FAULT SUMMARY SCREEN MESSAGE	PAGE	PARAGRAPH	STEP
106	P2 TRAVERSE CONTROL...TRDM		Notify DS	
107	P3 TRAVERSE CONTROL...CLSL, CLV	3–248	3–3.l(3)	F
108	P2 TRAVERSE CONTROL...TRDM OR TRAV GEAR		Notify DS	
109	P2 COS TRAVERSE CONTROL...HCB, W64, W65, PDIU	3–245	3–3.l(2)	E
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	3–245	3–3.l(3)	C
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	3–136	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	3–248	3–3.l(3)	E
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	3–248	3–3.l(3)	E
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	3–248	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 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, ACU, 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	
142	P2 COS ELEVATION CTRL...HCB, W64, W65, PDIU	3–106	3–3.d(3)	C

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

CODE	PDIU FAULT SUMMARY SCREEN MESSAGE	PAGE	PARAGRAPH	STEP
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	3–3.d(3)	A
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, ACU, CBLS	3–103	3–3.d(2)	E
150	P2 TRAVERSE CONTROL...TRLSL, TRLV	18–160	18–43	
151	P1 AUTO WPN CTRL...ELTACH, W7, ACU, 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	
185	P2 TRAVERSE CONTROL...TRLSL, TRLV, GCH, VLF		Fix GCH Fault first & Rerun	

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

CODE	PDIU FAULT SUMMARY SCREEN MESSAGE	PAGE	PARAGRAPH	STEP
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...ACU, TTSN, W7, TTCBL	3–34	3–3.a(6)	A
195	P1 ACU...ACU	8–40	8–14	
196	P1 AUTO WEAPON CONTROL...ACU	8–40	8–14	
197	P1 AUTO WEAPON CONTROL...ACU, ELTACH, W7	3–34	3–3.a(6)	A
198	P1 AUTO WEAPON CONTROL...AZTACH, ACU, W7	3–34	3–3.a(6)	A
199	P1 AUTO WEAPON CONTROL...ACU, ELSV, W7	3–34	3–3.a(6)	A
200	P1 AUTO WEAPON CONTROL...ACU, TRSV, W7	3–34	3–3.a(6)	A
204	P1 COMMO...PCU	8–45	8–16	
205	P1 COMMO...ACU, 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...ACU, 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...ACU, 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...ACU	3–58	3–3.a(16)	
219	P3 POWER LAMP...ACU	3–42	3–3.a(7)	A
220	P3 BIT LAMP...ACU	3–43	3–3.a(8)	
221	P1 COMMO...ACU	8–40	8–14	
237	P3 BIT LAMP...DU	3–42	3–3.a(7)	A
238	P3 BIT LAMP...PDIU	3–58	3–3.a(8)	A
239	P3 POWER LAMP...PDIU	3–42	3–3.a(7)	A

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

CODE	PDIU FAULT SUMMARY SCREEN MESSAGE	PAGE	PARAGRAPH	STEP
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
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

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

CODE	PDIU FAULT SUMMARY SCREEN MESSAGE	PAGE	PARAGRAPH	STEP
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 11-5825-291-13	
304	P3 NAV...PLGR, ANT, CBLS		See TM 11-5825-291-13	
305	P3 NAV...PLGR, DRU, W17A		See TM 11-5825-291-13	
306	P1 ACU...ACU	8–40	8–14	
307	P3 DISPLAY UNIT...DU	8–40	8–17	

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.

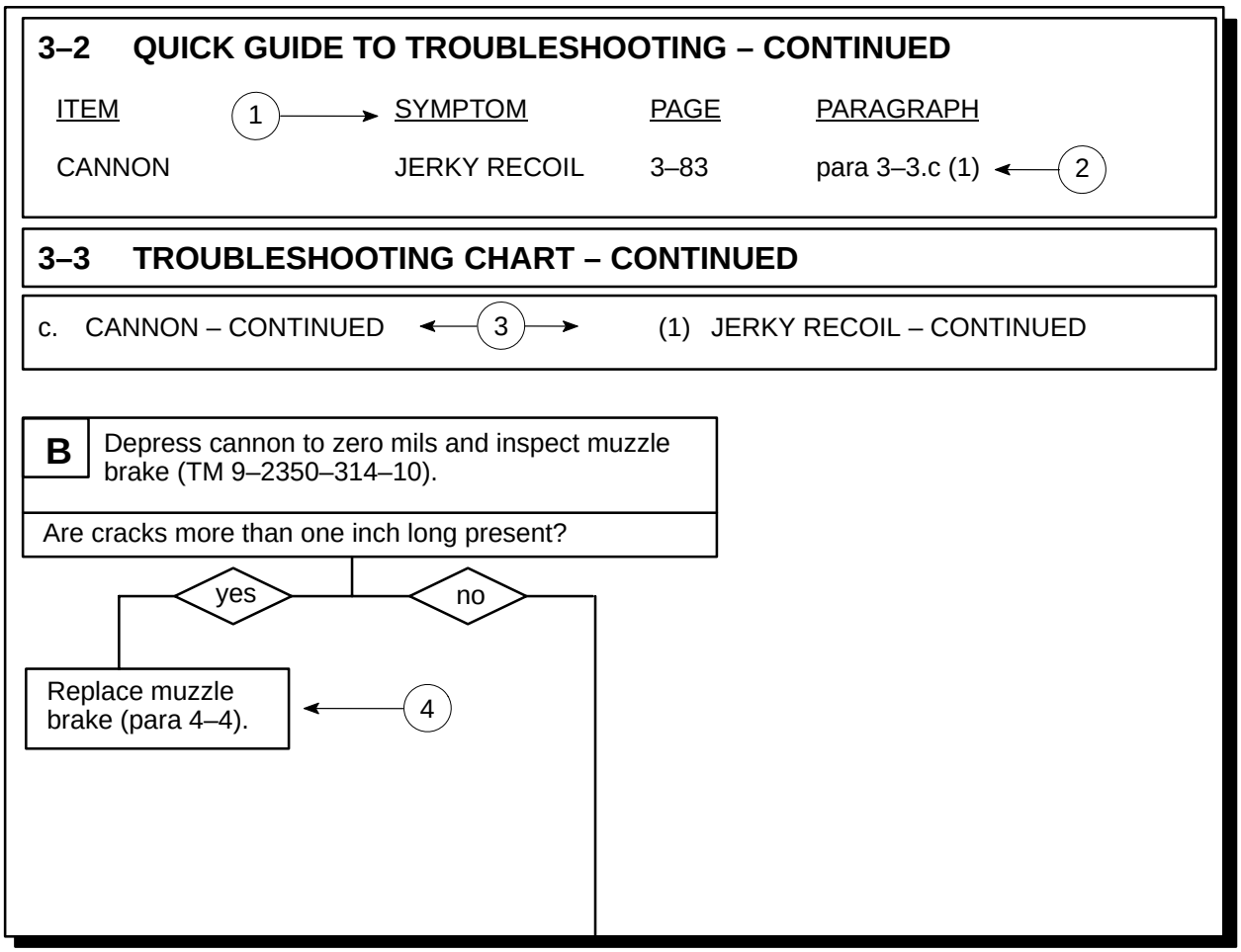
4 Turn to the procedure (3) identified in the Quick Guide to Troubleshooting.

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.



3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

ITEM	SYMPTOM	PAGE	PARAGRAPH
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)

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

ITEM	SYMPTOM	PAGE	PARAGRAPH
CANNON (CONTINUED)	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)
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)

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

ITEM	SYMPTOM	PAGE	PARAGRAPH
HYDRAULIC SYSTEM (CONTINUED)	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)
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)

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

ITEM	SYMPTOM	PAGE	PARAGRAPH
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.	3–236	3–3.k(10)
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)
	INABILITY TO POWER TRAVERSE BEFORE 45° LIMIT. Traverse limit light is on.	3–266	3–3.l(9)

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

ITEM	SYMPTOM	PAGE	PARAGRAPH
TRAVERSE (CONTINUED)	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	NO POWER TO MUZZLE VELOCITY SENSOR.		
	WIRING HARNESS W93A.	3–350	3–3.p(1)
	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)

3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

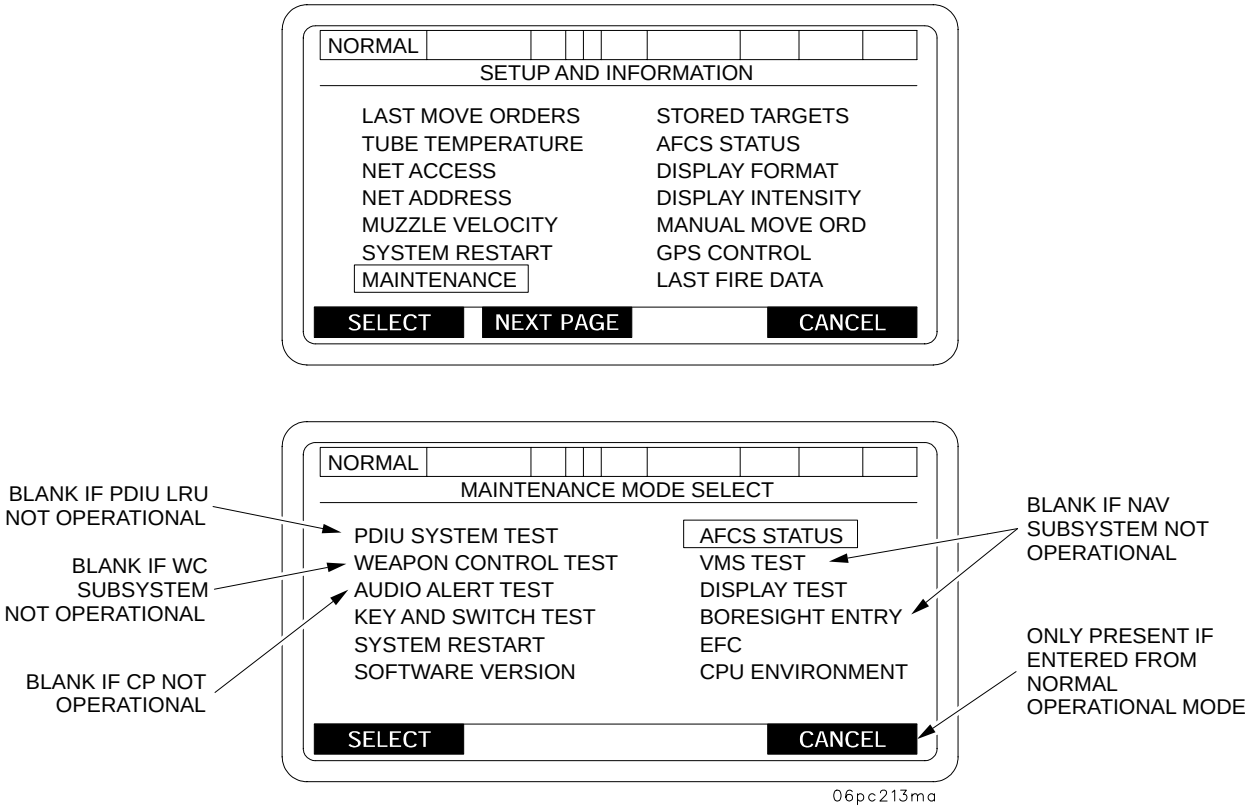
3–2.3 BIT STATUS Test.

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, 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, then 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 faul 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.

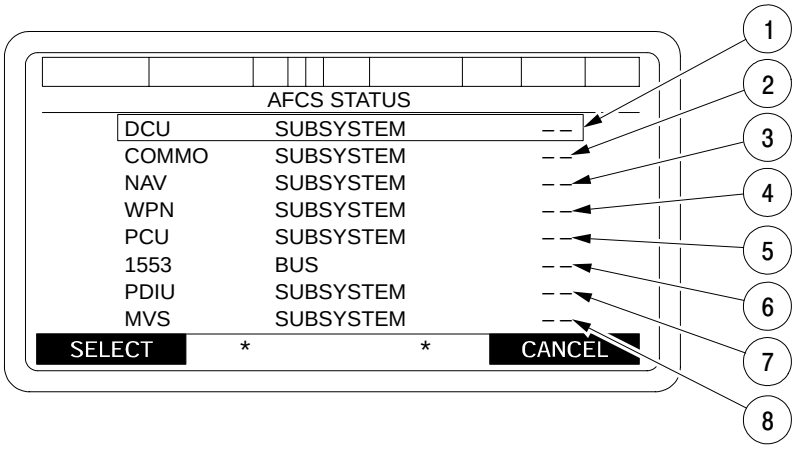


3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

3–2.3 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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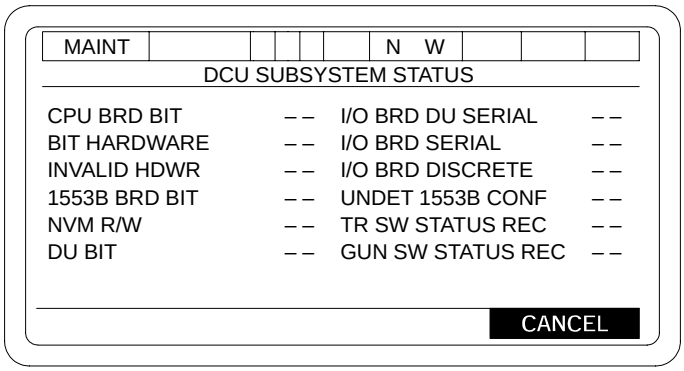
3–2 QUICK GUIDE TO TROUBLESHOOTING – CONTINUED

3–2.3 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

3–2.4 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 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 (El 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.

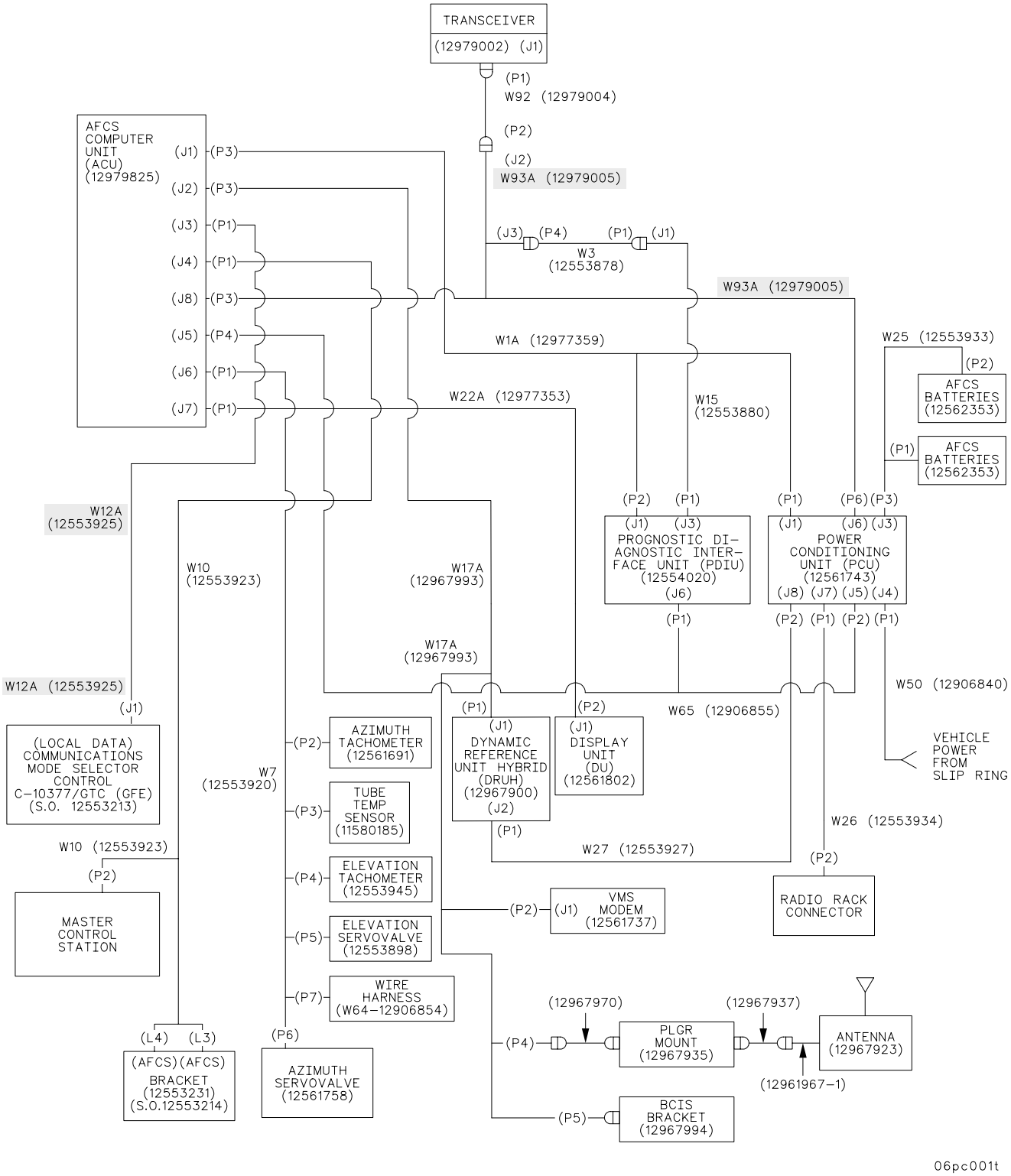
With the AFCS operating, the ACU supplies 24 V dc to the Az Tach, El Tach, TTS, El Servo Valve and Az Servo Valve. The Az Tach provides cab position feedback to the ACU while traversing to control the AZ SERVO valve. The El Tach provides gun position feedback to the ACU while elevating the gun to control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

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.

For vehicles with W1–W13–W1E power harness configuration – Run TB 9–2350–314–20–2–1 M109A6 Accessory Software, “AFCS TROUBLESHOOTING”, Single test “AFCS Power problem/DU Out”. (W1–W13–W1E Configuration)

For vehicles with W1A power harness configuration – Run TB 9–2350–314–20–2–1 M109A6 Accessory Software, “AFCS TROUBLESHOOTING” Single test “AFCS Power problem/DU Out”. (W1A Configuration)

Tools
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 39.1, 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).

Is the PCU VEHICLE POWER lamp ON?

yes

no

Refer to para 3–3.a(4).

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 A

B Attempt to turn DU POWER switch ON (TM 9–2350–314–10).

Does the DU POWER switch stay in the ON position?

yes → Go to Step H.

no

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?

yes → Go to Step S.

no

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?

yes → Go to Step U.

no

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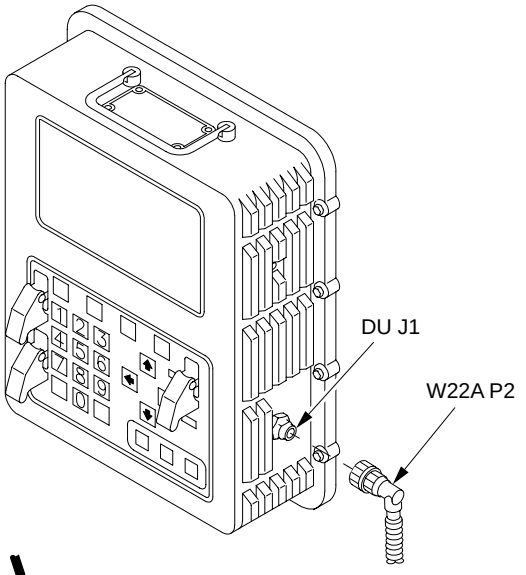

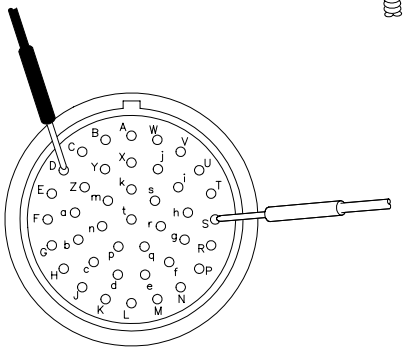

W22A
CONNECTOR P2
SOCKET S
SOCKET D

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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

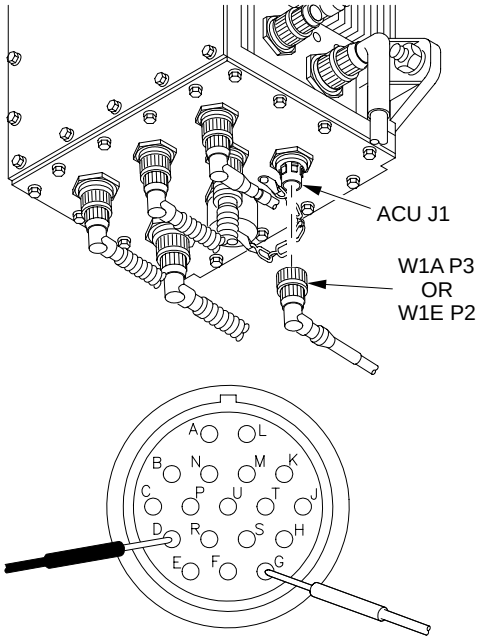
For vehicles with W1–W13–W1E harness configuration:

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).

Is the voltage greater than 18 V dc?



W1A CONNECTOR P3 OR WIE P2
SOCKET G and D

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yes

no

Go to Step G.

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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

F

1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W22A connector P1 at ACU 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 D	Connector P1 pin D

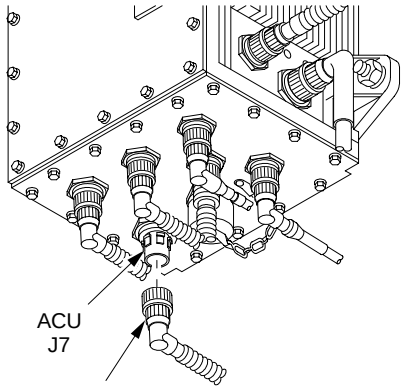
Is there continuity at both points (resistance less than 10 ohms)?

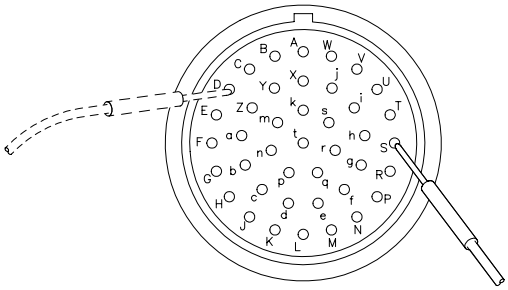
yes

Replace ACU (para 8–14).

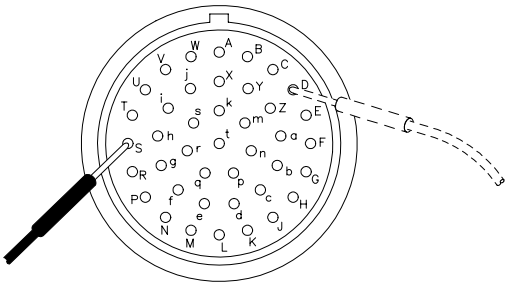
no

Replace harness W22A (para 8–9).





W22A
CONNECTOR P2
SOCKET S
(SOCKET D)



W22A
CONNECTOR P1
PIN S
(PIN 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 F

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)?

yes

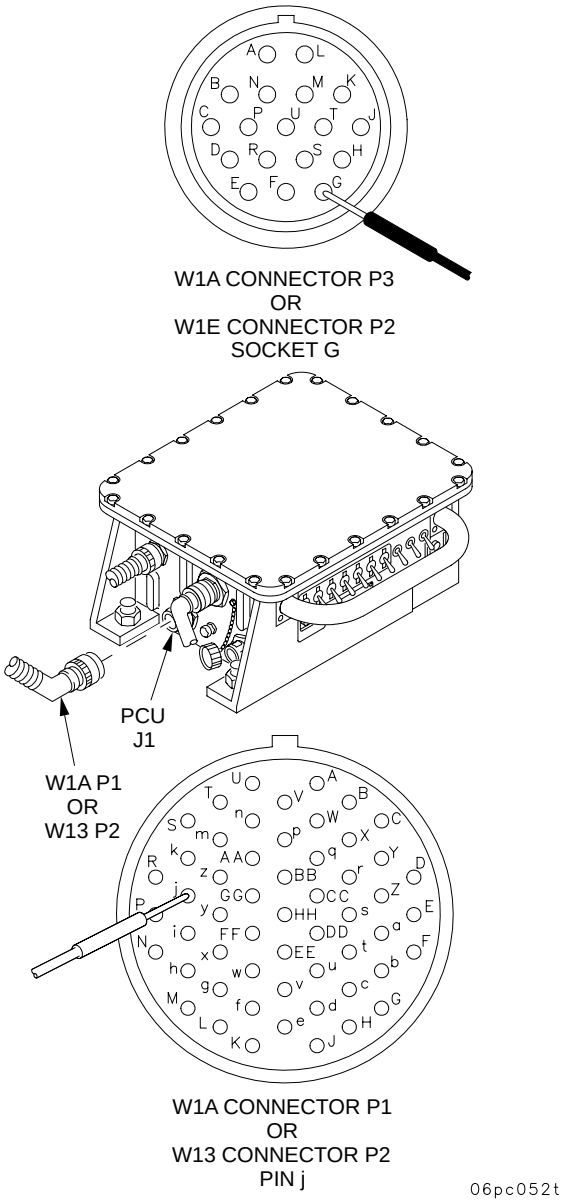
Replace PCU (para 8–16).

no

Replace harness W1A (para 8–4).

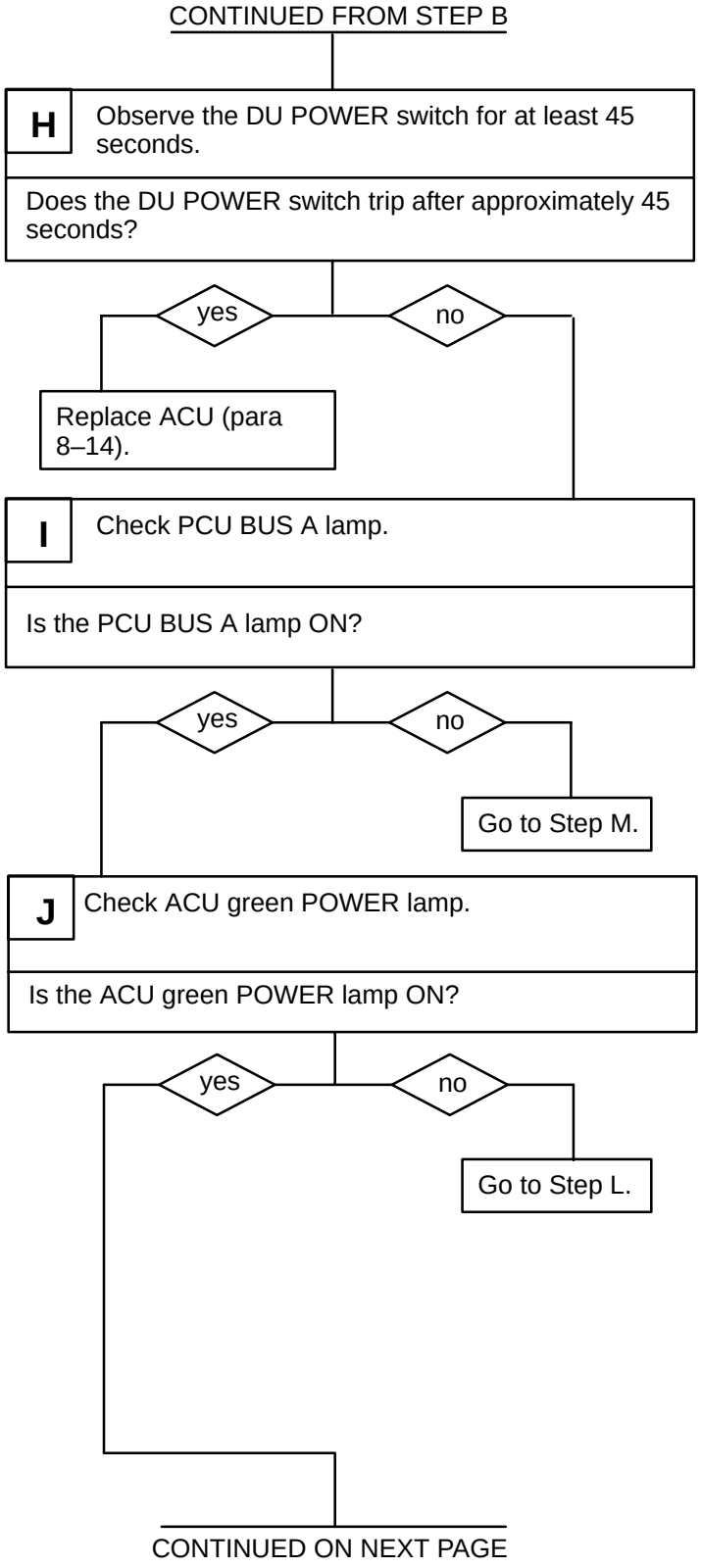
NOTE

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



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



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

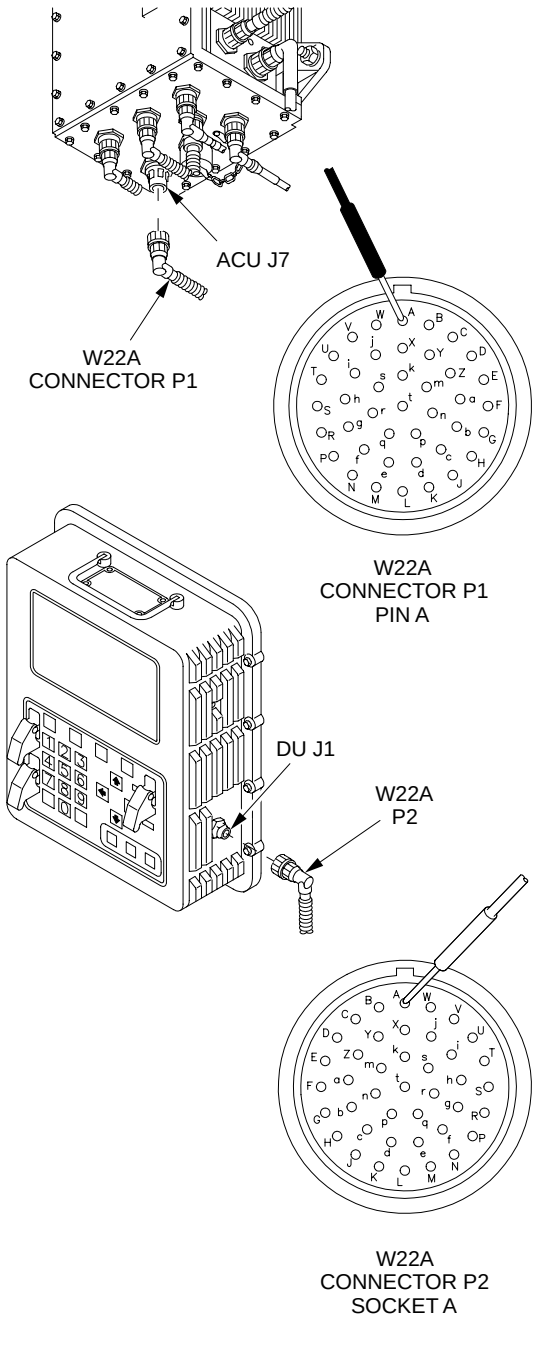
NOTE

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).

no

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)?

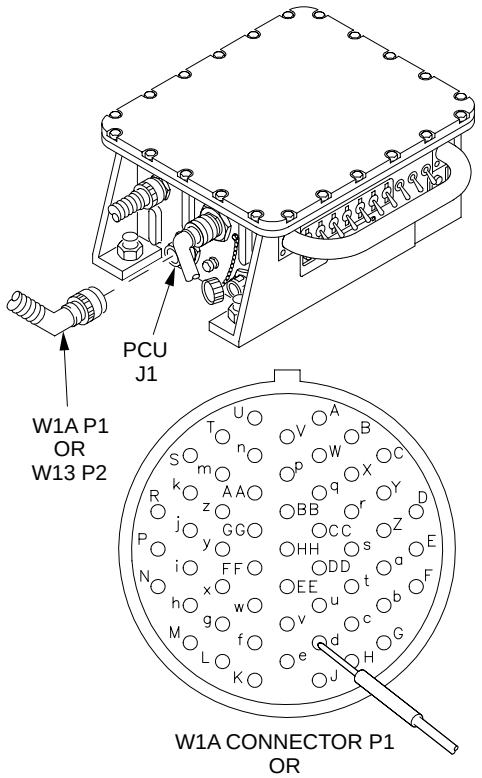
yes → Replace ACU (para 8–14).

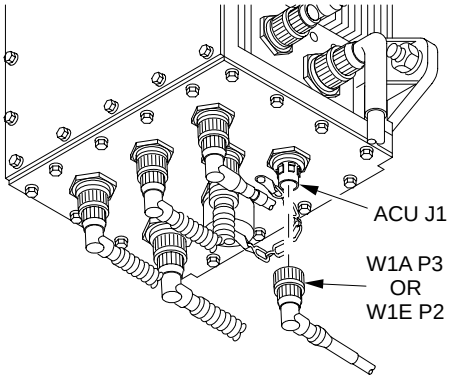
no →

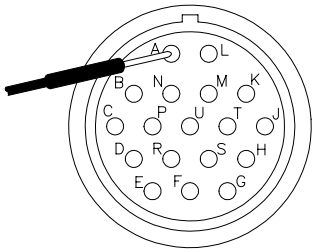
NOTE

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?

yes / no

no → Go to Step Q.

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).

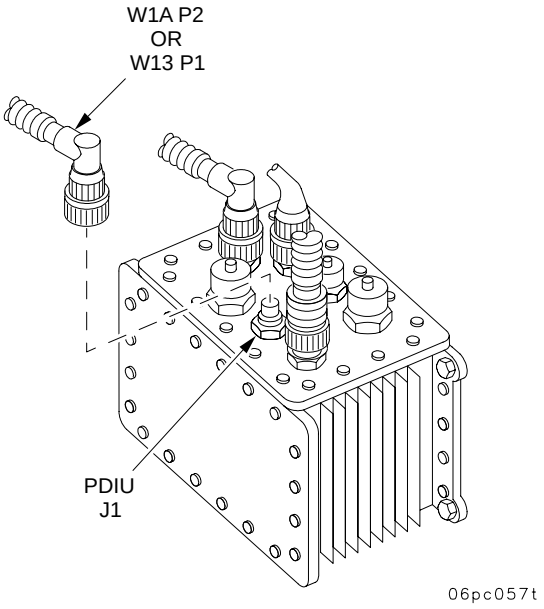
For vehicles with W1A harness configuration:

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?

yes / no

no → Replace PDIU (para 8–19).



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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:

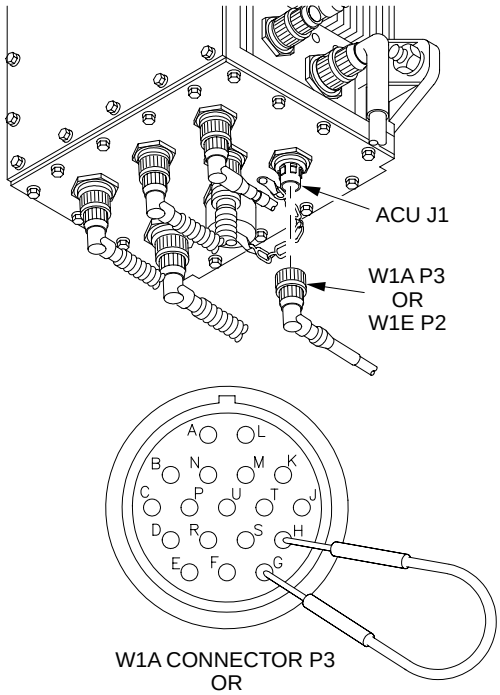
1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W1A connector P3 at ACU connector J1.
3. Connect jumper wire between harness W1A connector P3 sockets G and H.
4. Turn PCU BUS A circuit breaker (CB10) ON (TM 9–2350–314–10).
5. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).

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

yes

no

Replace ACU (para 8–14).



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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

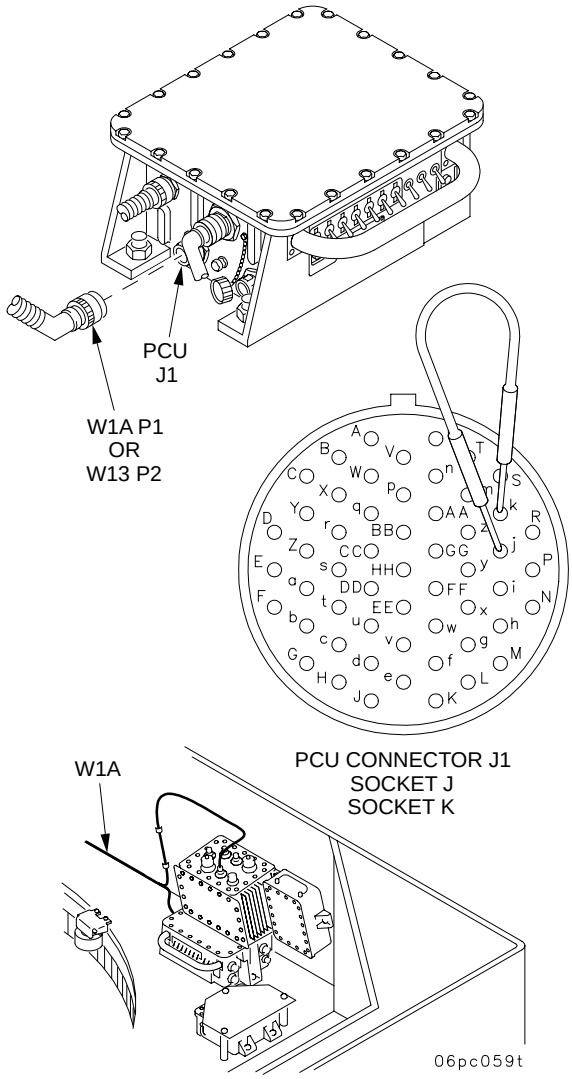
P

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?

yes

Replace PCU (para 8–16).

no

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 M

Q

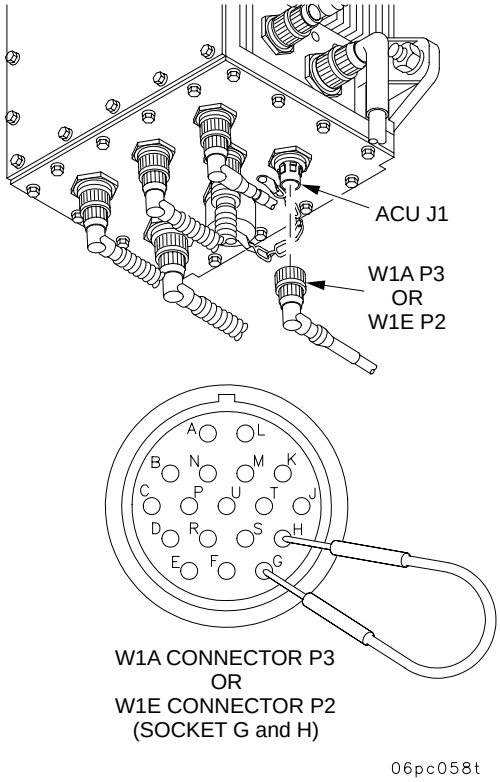
For vehicles with W1–W13–W1E harness configuration:

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?



yes

Replace ACU (para 8–14).

no

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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)?

yes

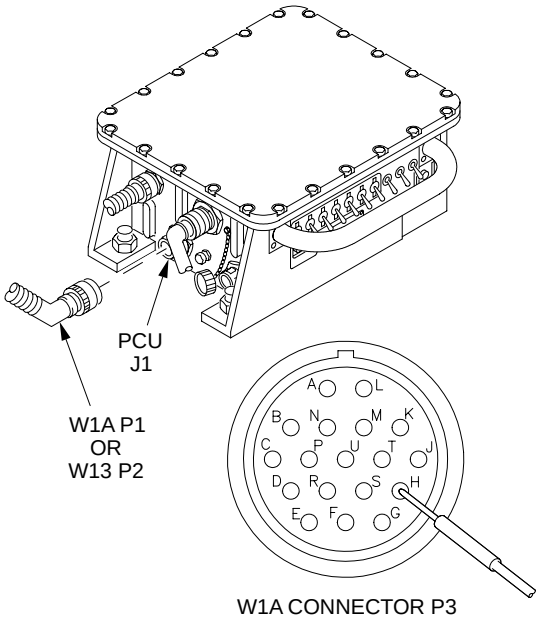
Replace PCU (para 8–16).

no

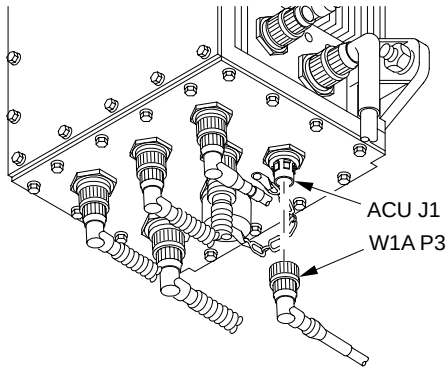
NOTE

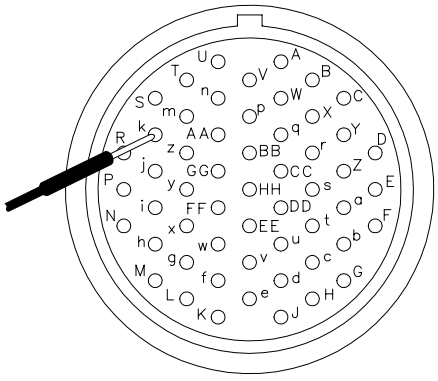
Replace W1–W13–W1E harness configuration with harness W1A.

Replace harness W1A (para 8–4).



W1A CONNECTOR P3
OR
W1E CONNECTOR P2
SOCKET H





W1A CONNECTOR P1
0R
W13 CONNECTOR P2
PIN k

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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

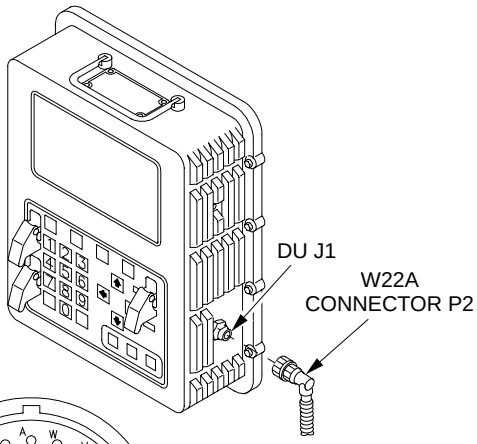
1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W22A connector P2 at DU connector J1.
3. Check for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

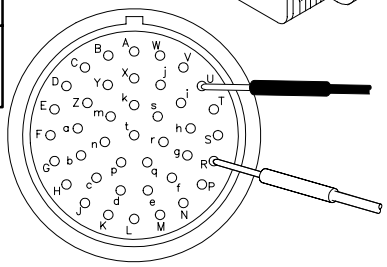
Point A	Point B
W22A Connector P2 socket U	W22A Connector P2 pin R
W22A Connector P2 socket V	W22A Connector P2 pin D

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

yes → Replace DU (para 8–17).

no





W22A CONNECTOR P2 SOCKETS U AND R (SOCKET V AND D)

T

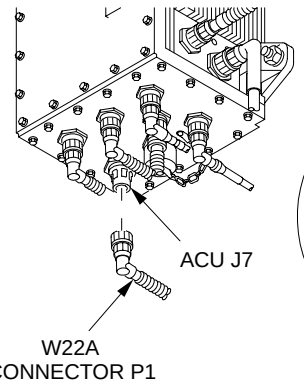
1. Disconnect harness W22A connector P1 at ACU connector J7.
2. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

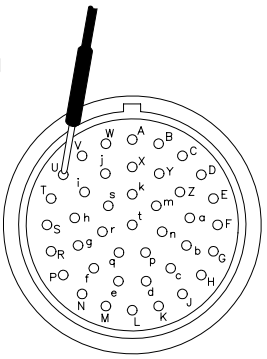
Point A	Point B
W22A Connector P2 socket U	W22A Connector P1 pin U
W22A Connector P2 socket R	W22A Connector P1 pin R
W22A Connector P2 socket V	W22A Connector P1 pin V
W22A Connector P2 socket D	W22A Connector P1 pin D

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

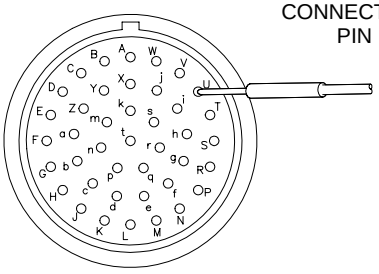
yes → Replace ACU (para 8–14).

no → Replace harness W22A (para 8–9).





W22A CONNECTOR P1 PIN U



W22A CONNECTOR P2 SOCKET U

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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)?

yes

Replace ACU (para 8–14).

no

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.

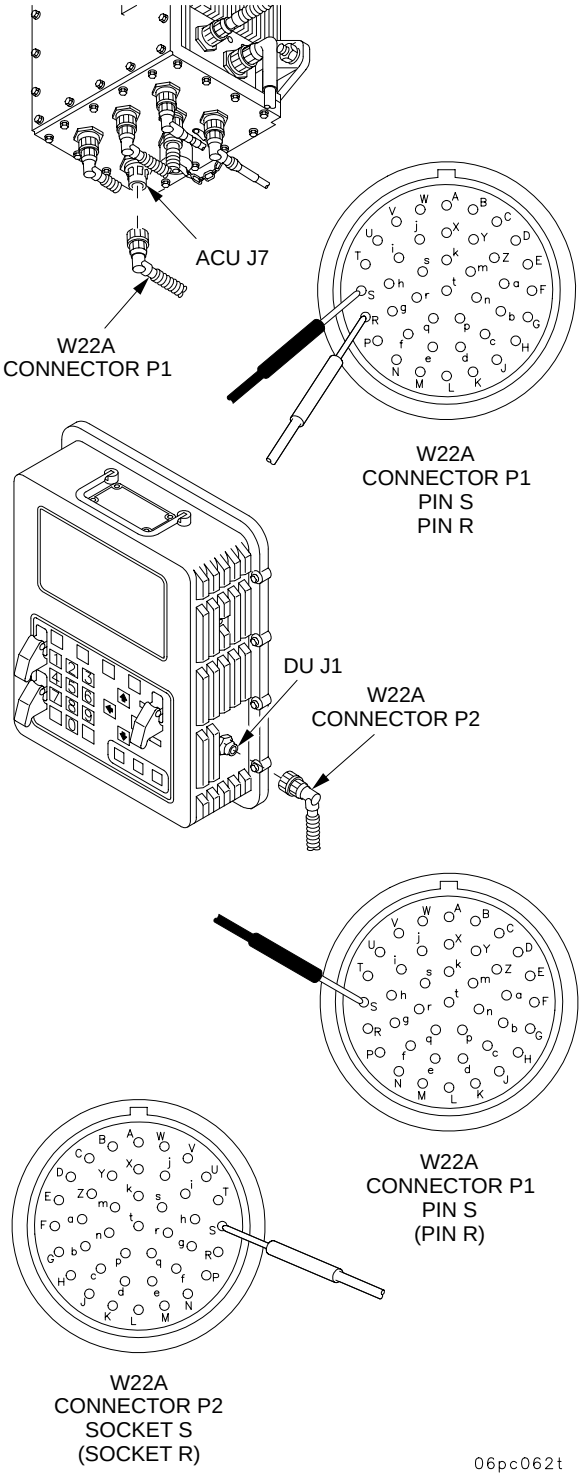
Is there continuity at all points (resistance less than 10 ohms)?

yes

Replace DU (para 8–17).

no

Replace harness W22A (para 8–9).



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?

yes

no → Go to Step E.

B Check lamps on PDIU.

Is the PDIU red BIT lamp lit?

yes → Replace PDIU (para 8–19).

no

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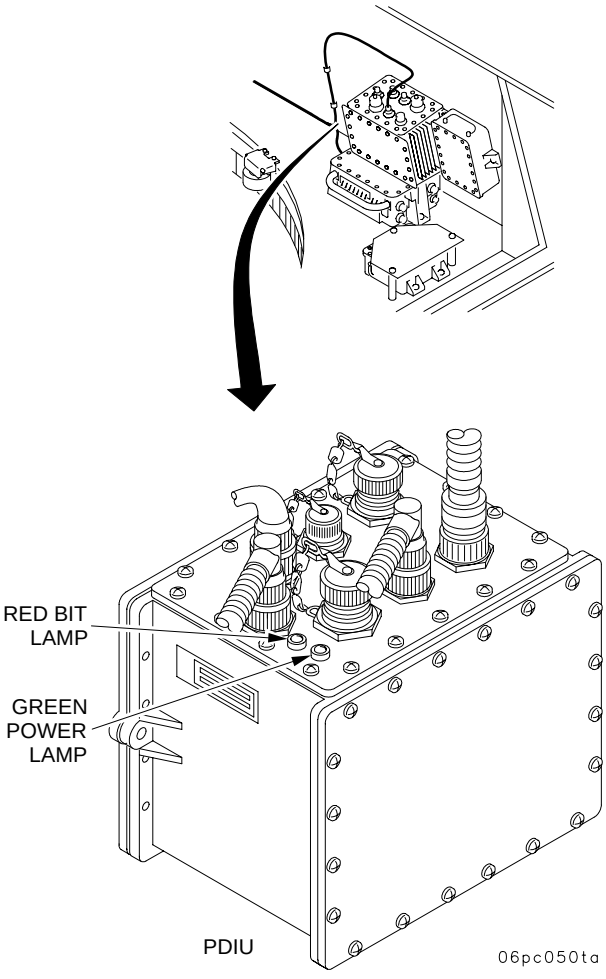


3–3. TROUBLESHOOTING CHART – CONTINUED

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?

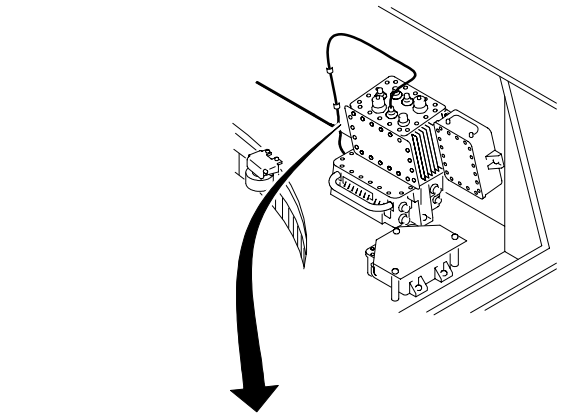
yes

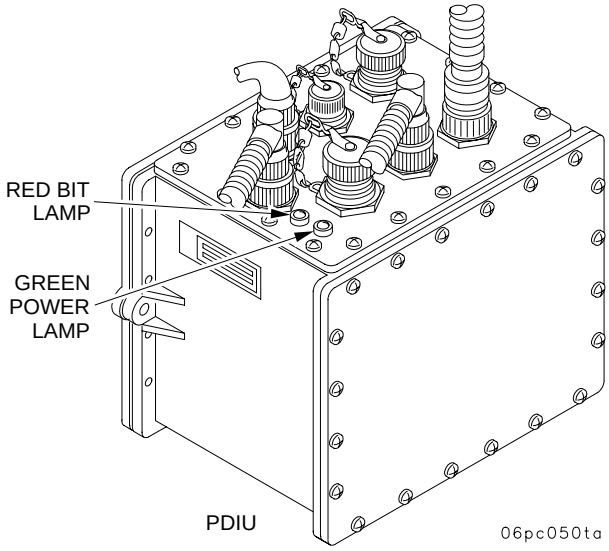
no

Refer to para 3–3a (9).

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?

yes

Replace PDIU (para 8–19).

no

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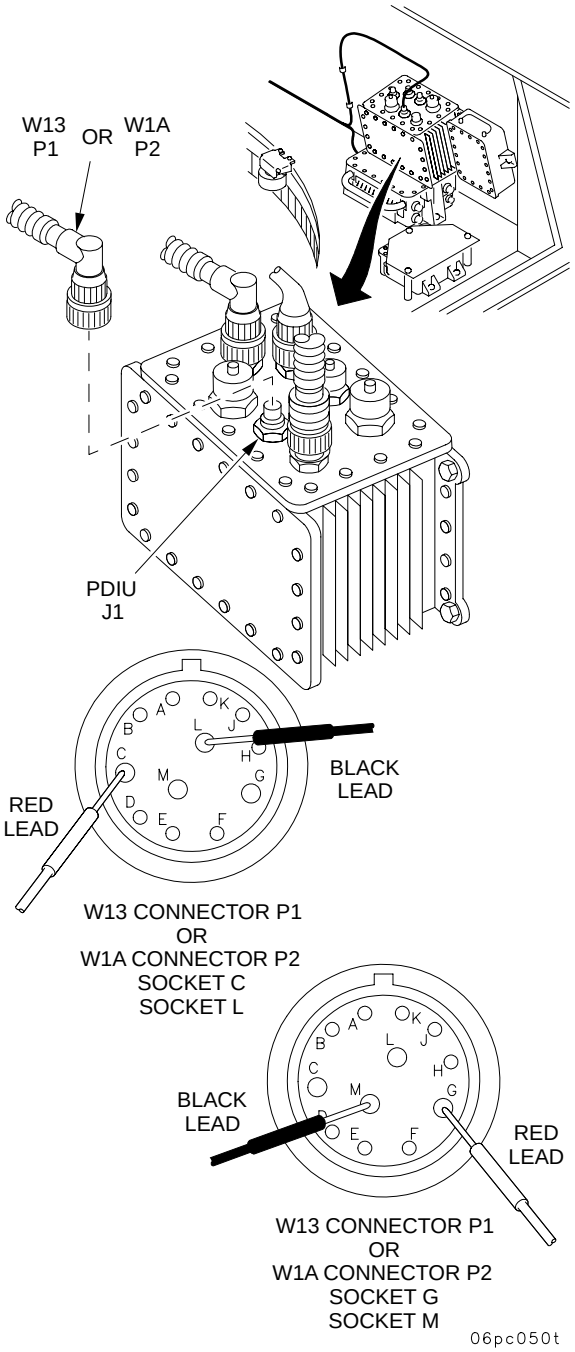


3–3. TROUBLESHOOTING CHART – CONTINUED

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)?

yes

Replace PCU (para 8–16).

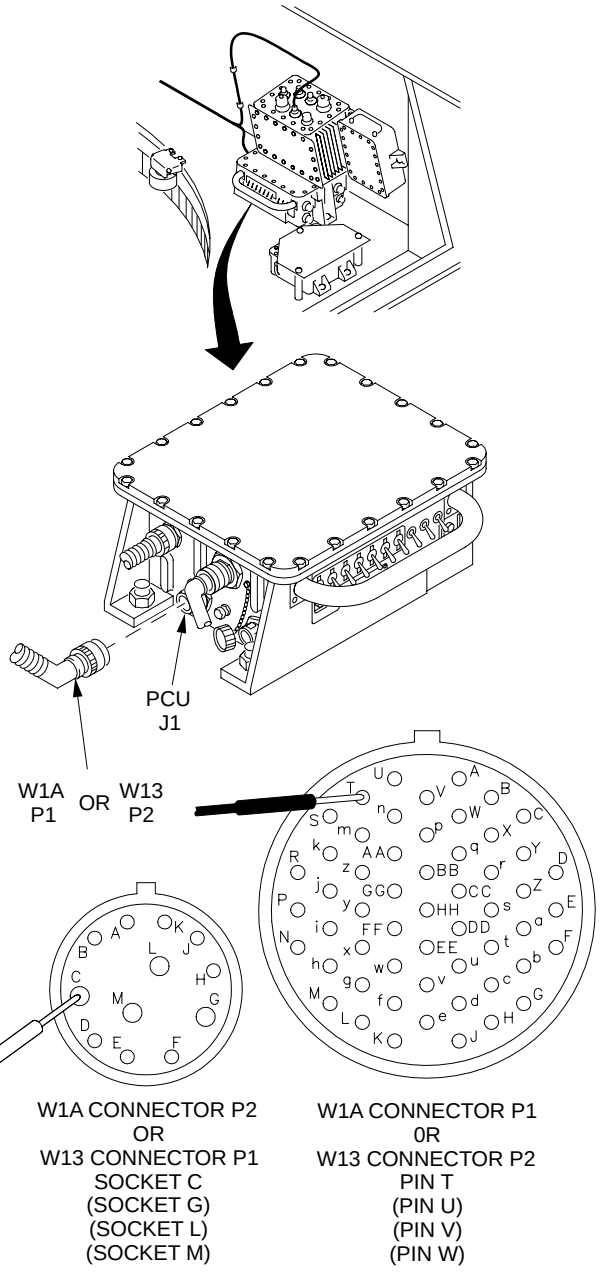
no

NOTE

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

Replace harness W1A (para 8–4).

END OF TASK



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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?

yes

Replace PCU (para 8–16).

no

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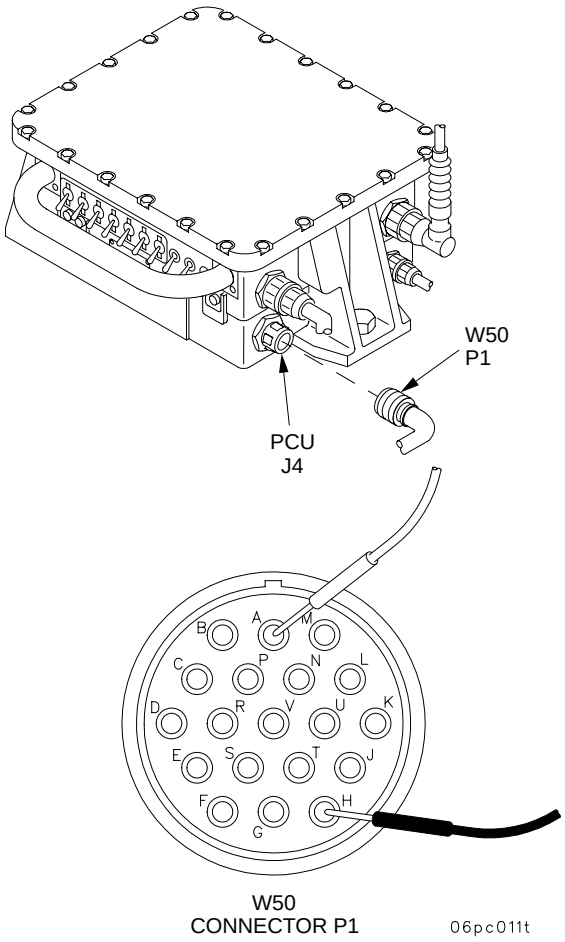


3–3. TROUBLESHOOTING CHART – CONTINUED

a. AFCS – CONTINUED	(4) PCU 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).

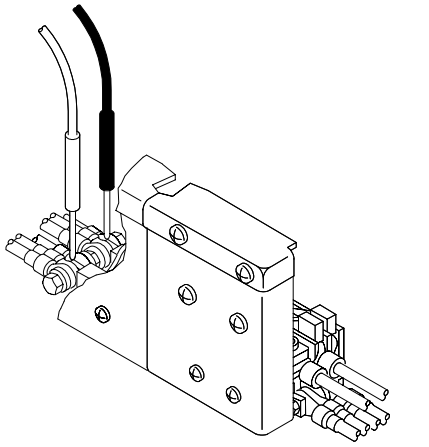
Is voltage greater than 18 V dc?

yes

Repair or replace wiring harness W50 (para 5–11).

no

Troubleshoot slip ring (para 3–3.m(1)).



06pc012t

END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

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

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 "DCU DEGRADED on Power Up."
Run PDIU AFCS 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)

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	NVM R/W
BIT HARDWARE	I/O BD DISCRTE
INVALID HDWR	I/O BOARD SERIAL
1553 BOARD BIT	UNDET 1553B CONF

yes → Replace ACU (para 8–14).

no

B Continue checking the DCU SUBSYSTEM STATUS.

Is the TR SW STATUS REC FAILed ?

yes → Go to Step F.

no

CONTINUED ON NEXT PAGE

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 ?

yes → no → Replace DU (para 8–17).

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)?

yes → Replace ACU (para 8–14).

no →

E

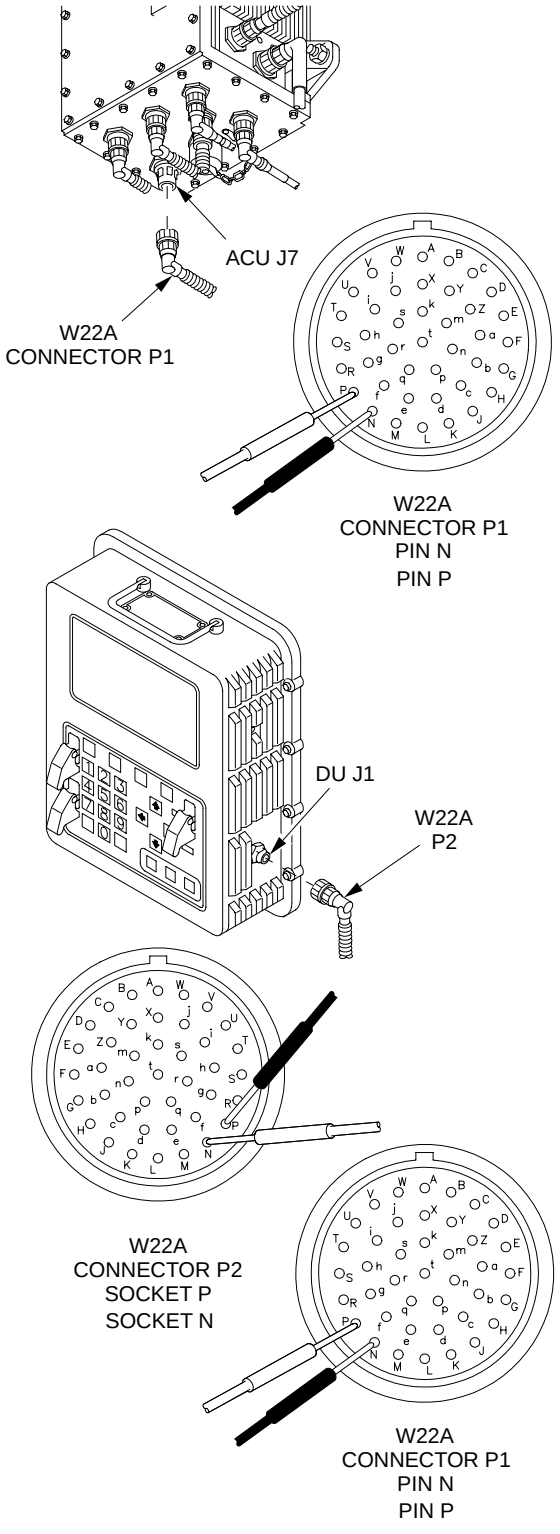
1. Disconnect harness W22A connector P2 from DU connector J1.
2. Check harness W22A for continuity by placing one multimeter lead on point A and other multimeter lead on point B.

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)?

yes → Replace DU (para 8–17).

no → Replace harness W22A (para 8–9).



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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)?

yes → Replace ACU (para 8–14).

no →

G

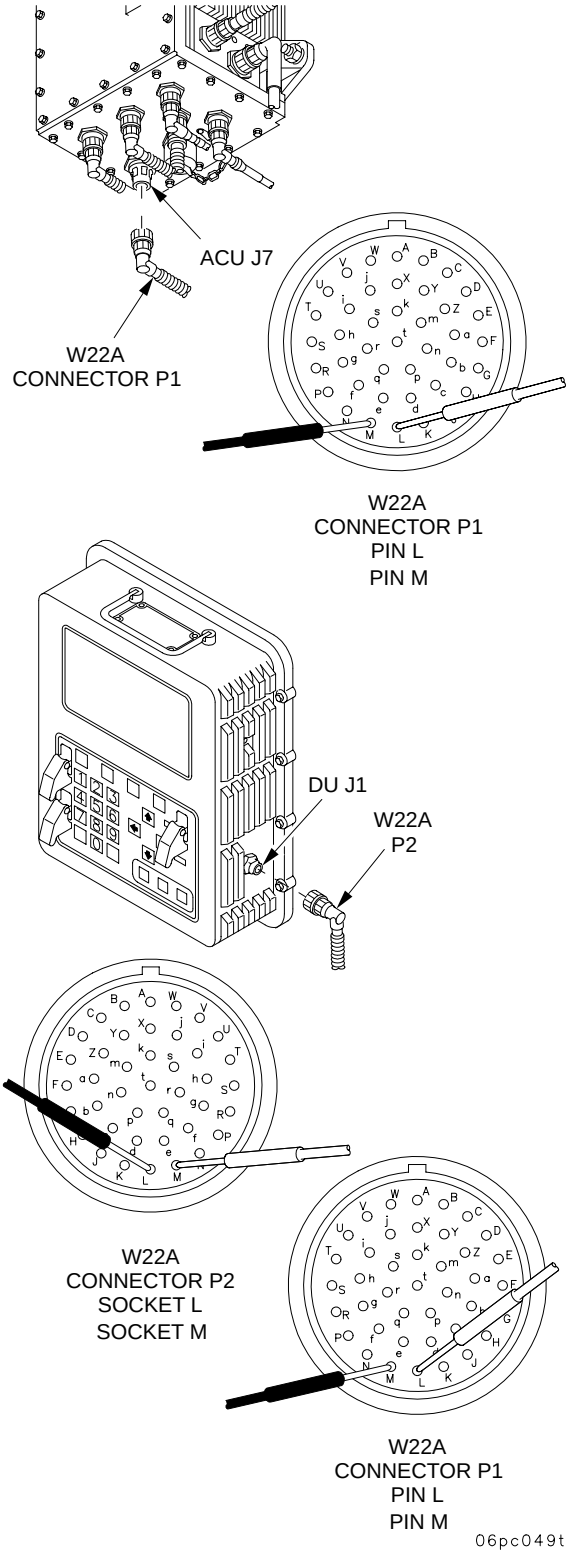
1. Disconnect harness W22A connector P2 from DU connector J1.
2. Check harness W22A for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

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)?

yes → Replace DU (para 8–17).

no → Replace harness W22A (para 8–9).



END OF TASK

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)

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

yes → Replace ACU (para 8–14).

no

B

Continue checking the WPN SUBSYSTEM STATUS.

Is the TUBE TEMP BIT FAILed?

yes → Go to Step G.

no

C

Continue checking the WPN SUBSYSTEM STATUS.

Are the AZ VOLT or AZ CURRENT FAILed?

yes → Go to Step M.

no

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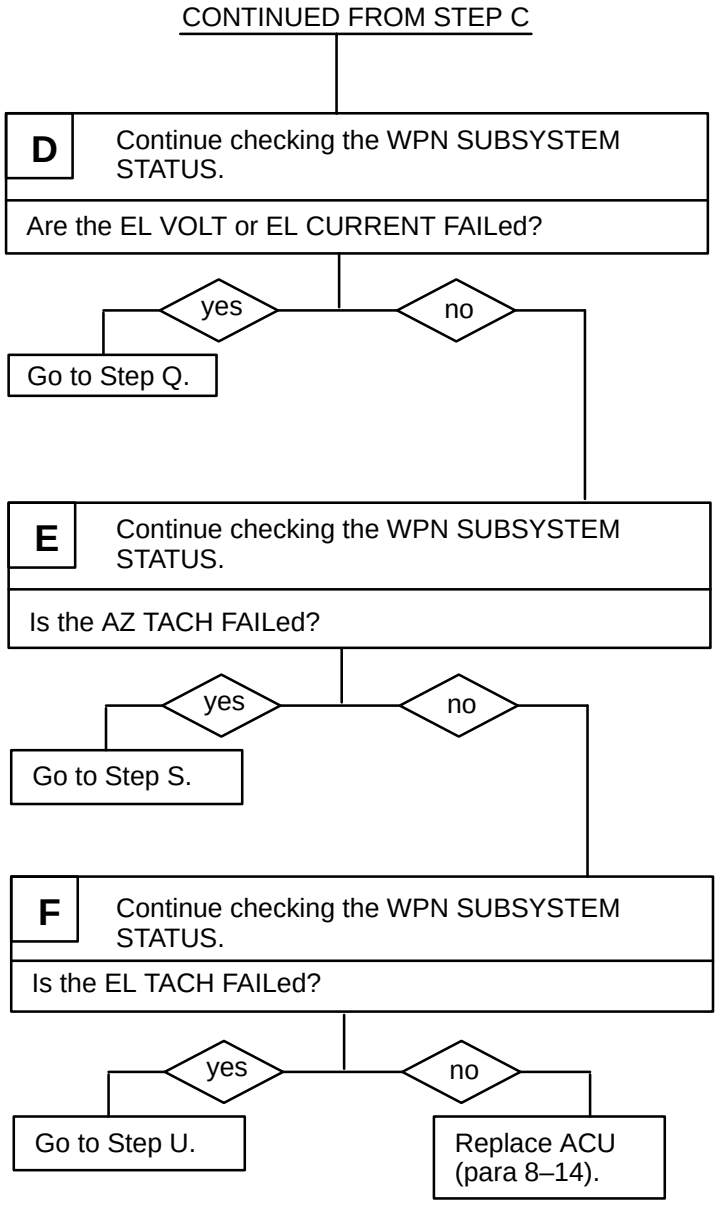
3–3. TROUBLESHOOTING CHART – CONTINUED

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



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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP B

G

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. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

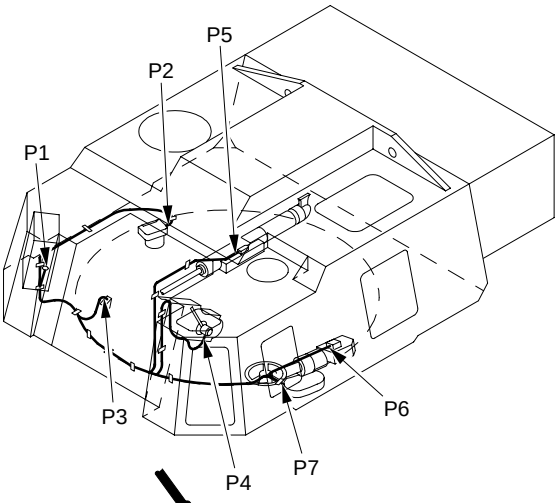
Point A	Point B
W7 Connector P1 pin T	W7 Connector P1 pin c
W7 Connector P1 pin U	W7 Connector P1 pin d

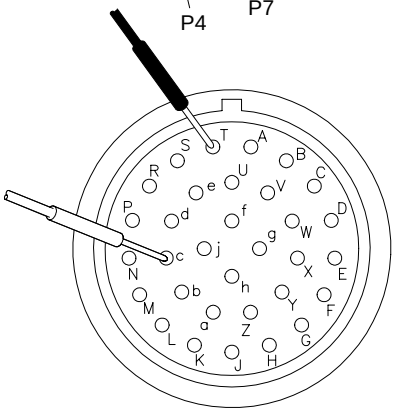
Is there continuity at all points (resistance less than 10 ohms)?

yes

Go to Step J.

no





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

06pc063t

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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP G

H

1. Disconnect harness W7 connector P3 from harness 12576092 (tube temperature sensor connector).
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 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

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

yes

no

Replace harness W7 (para 8–6).

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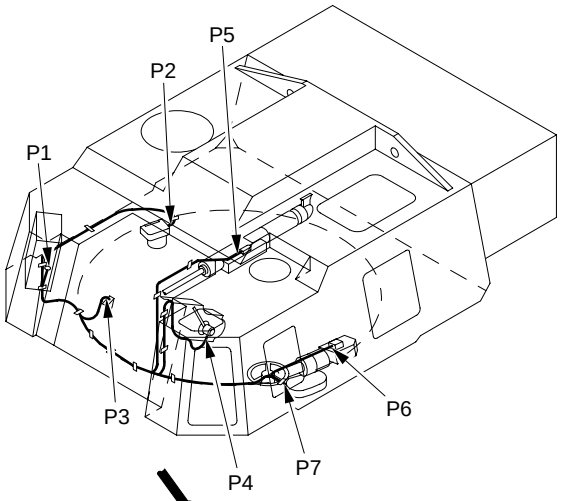
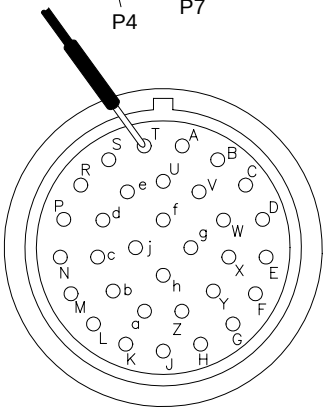
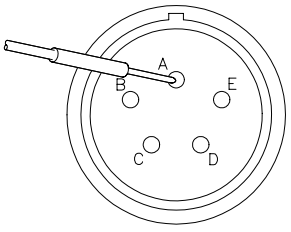




W7
CONNECTOR P1
PIN T
(PIN U)
(PIN c)
(PIN d)



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

06pc064t

3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP H

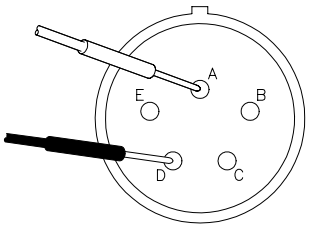
I Check harness 12576092 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

Point A	Point B
12576092 Connector P1 pin A	12576092 Connector P1 pin D
12576092 Connector P1 pin B	12576092 Connector P1 pin E

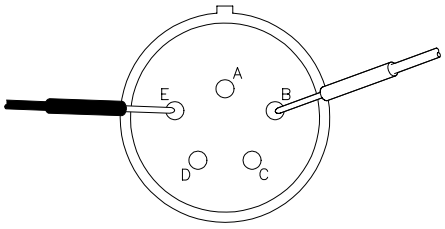
Is there continuity at all points (resistance less than 10 ohms)?

yes → Go to Step K.

no → Replace harness 12576092 (para 4–7).



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

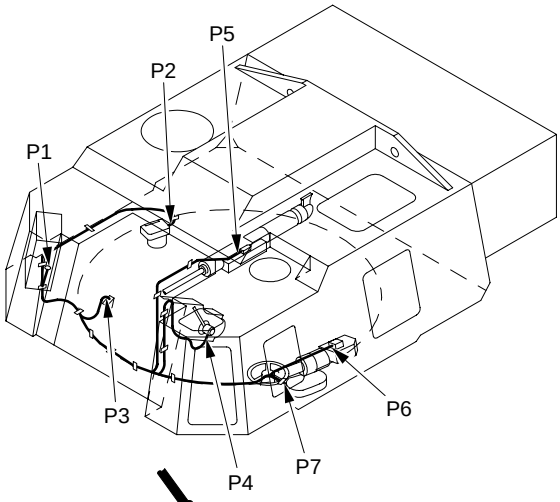
J

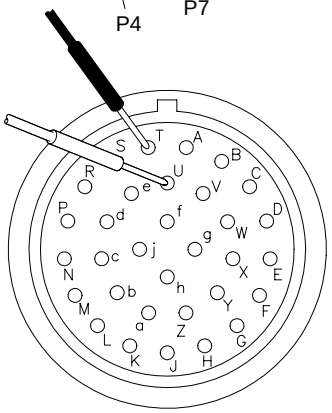
1. Place one multimeter lead in harness W7 connector P1 pin T and other lead in harness W7 connector P1 pin U.
2. Measure the resistance (ohms).

Is the resistance between 80 and 180 ohms?

yes → Replace ACU (para 8–14).

no → Go to Step H.





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

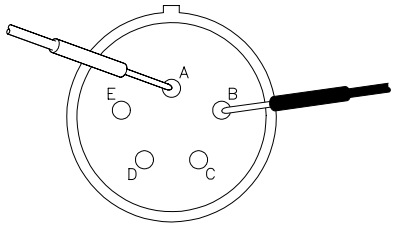
1. Place one multimeter lead in harness 12576092 connector P1 pin A and other lead in harness 12576092 connector P1 pin B.
2. Measure the resistance (ohms).

Is the resistance between 80 and 180 ohms?

yes

no

Replace tube temperature sensor (para 4–7).



12576092
CONNECTOR
PIN A
PIN B

L

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.

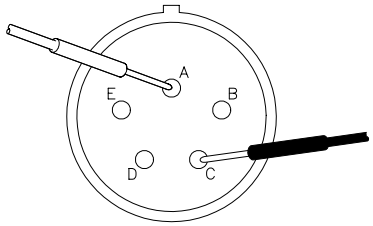
Is there continuity (resistance less than 10 ohms)?

yes

no

Replace tube temperature sensor (para 4–7).

Replace harness 12576092 (para 4–7).



12576092
CONNECTOR
PIN A
PIN C

06pc067t

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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP C

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 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)?

yes

no

Go to Step O.

N

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.

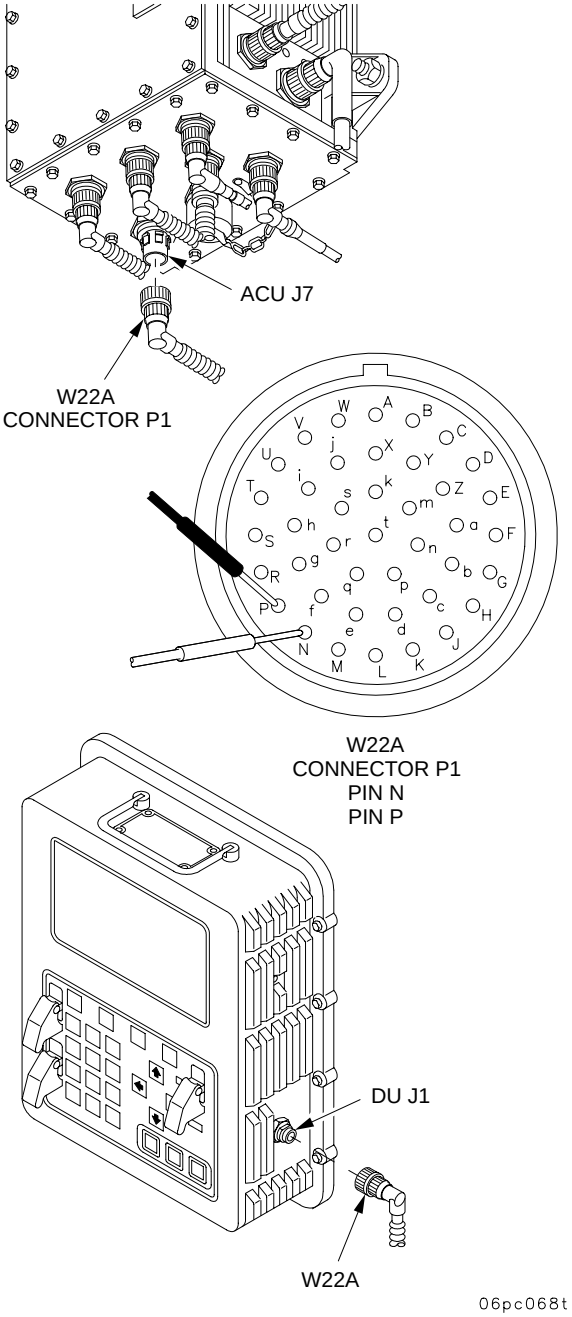
Is there continuity (resistance less than 10 ohms)?

yes

no

Replace harness W22A (para 8–9).

Replace DU (para 8–17).



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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP M

O

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?

yes

Replace ACU (para 8–14).

no

P

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

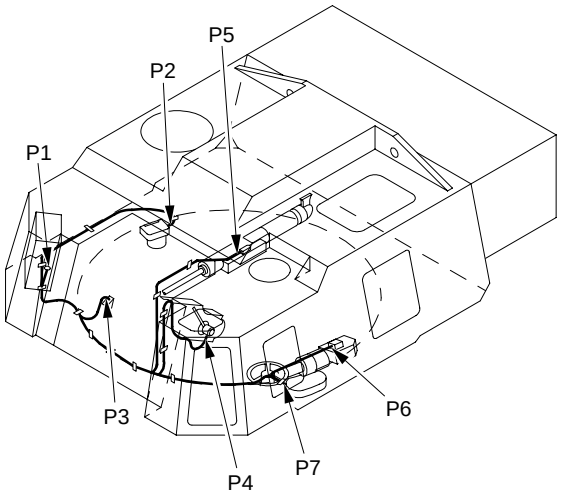
Is there continuity at all points (resistance less than 10 ohms)?

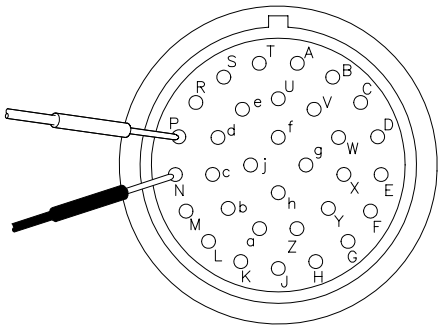
yes

Notify Direct Support Maintenance. Replace AZ SERVO VALVE.

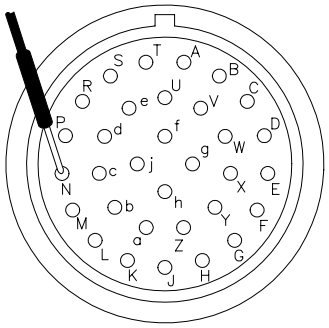
no

Replace harness W7 (para 8–6).

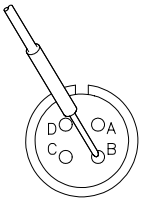




W7
CONNECTOR P1
PIN N
PIN P



W7
CONNECTOR P1
PIN N
(PIN N)
(PIN P)
(PIN P)



W7
CONNECTOR P6
SOCKET B
(SOCKET D)
(SOCKET A)
(SOCKET C)

06pc069t

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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP D

Q

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?

yes

Replace ACU (para 8–14).

no

R

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)?

yes

Notify Direct Support Maintenance. Replace EL SERVO VALVE.

no

Replace harness W7 (para 8–6).

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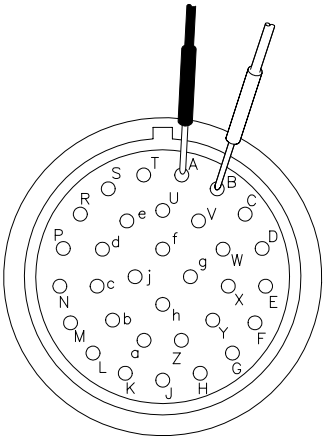
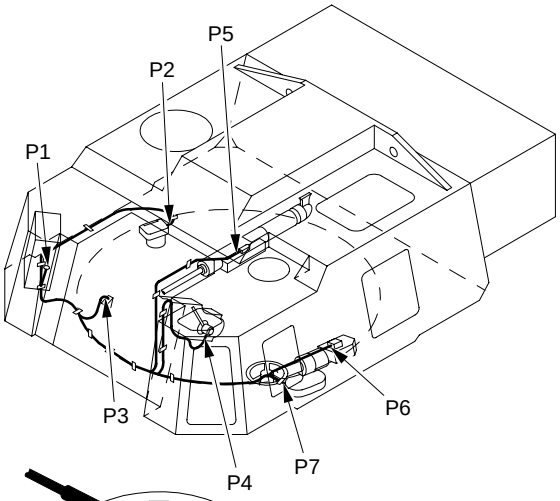
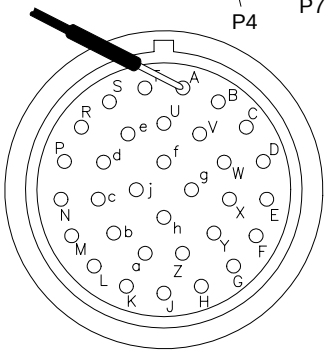
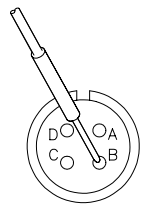








06pc070t

3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP E

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 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?

yes → Replace ACU (para 8–14).

no

T

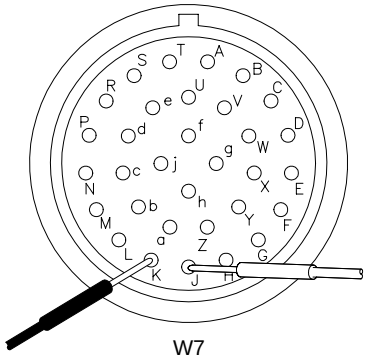
1. Disconnect harness W7 connector P2 from AZ TACH.
2. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

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

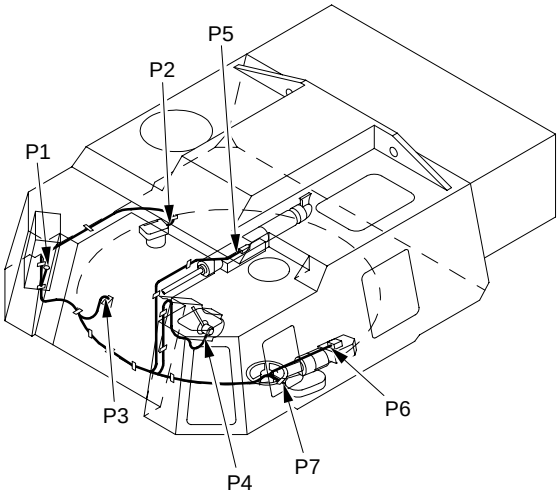
Is there continuity at all points (resistance less than 10 ohms)?

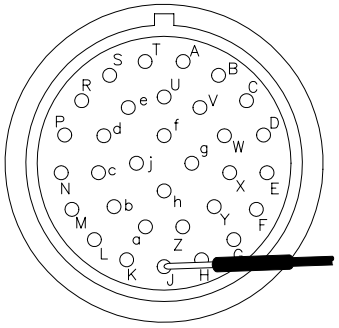
yes → Replace azimuth tachometer (para 8–2).

no → Replace harness W7 (para 8–6).

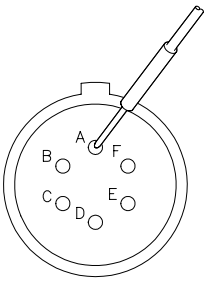


W7
CONNECTOR P1
PIN J
PIN K





W7
CONNECTOR P1
PIN J
(PIN K)



W7
CONNECTOR P2
SOCKET A
(SOCKET B)

06pc071t

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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP F

U

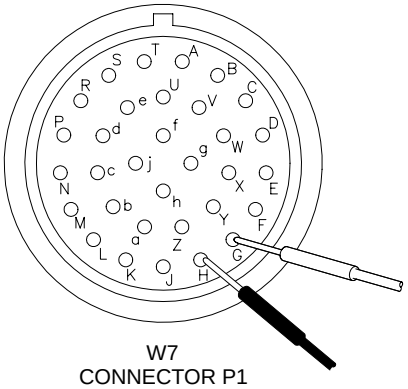
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W7 connector P1 from ACU connector J6.
3. Place one multimeter lead in harness W7 connector P1 pin G and other lead in harness W7 connector P1 pin H.
4. Measure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

Is the resistance between 27 and 600 ohms?

yes

Replace ACU (para 8–14).

no



W7
CONNECTOR P1
PIN G
PIN H

V

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

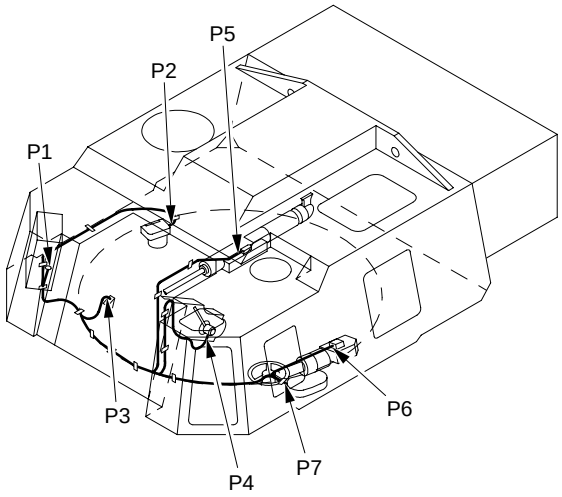
Is there continuity at all points (resistance less than 10 ohms)?

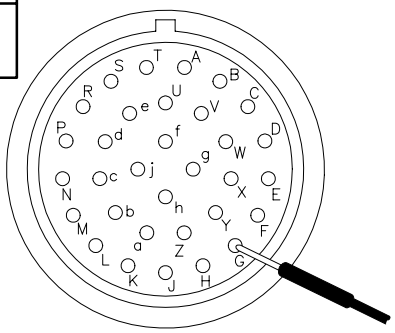
yes

Replace elevation tachometer (para 8–1).

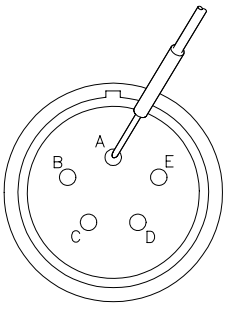
no

Replace harness W7 (para 8–6).





W7
CONNECTOR P1
PIN G
(PIN H)



W7
CONNECTOR P4
SOCKET A
(SOCKET B)

06pc072t

END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

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

INITIAL SETUP

Run PDIU AFCS and 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)

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?

yes → Refer to Quick Guide and troubleshoot subsystem.

no → Replace LRU when mission allows.

B Check VMS power lamp.

Is VMS green power lamp out?

yes → No fault

no

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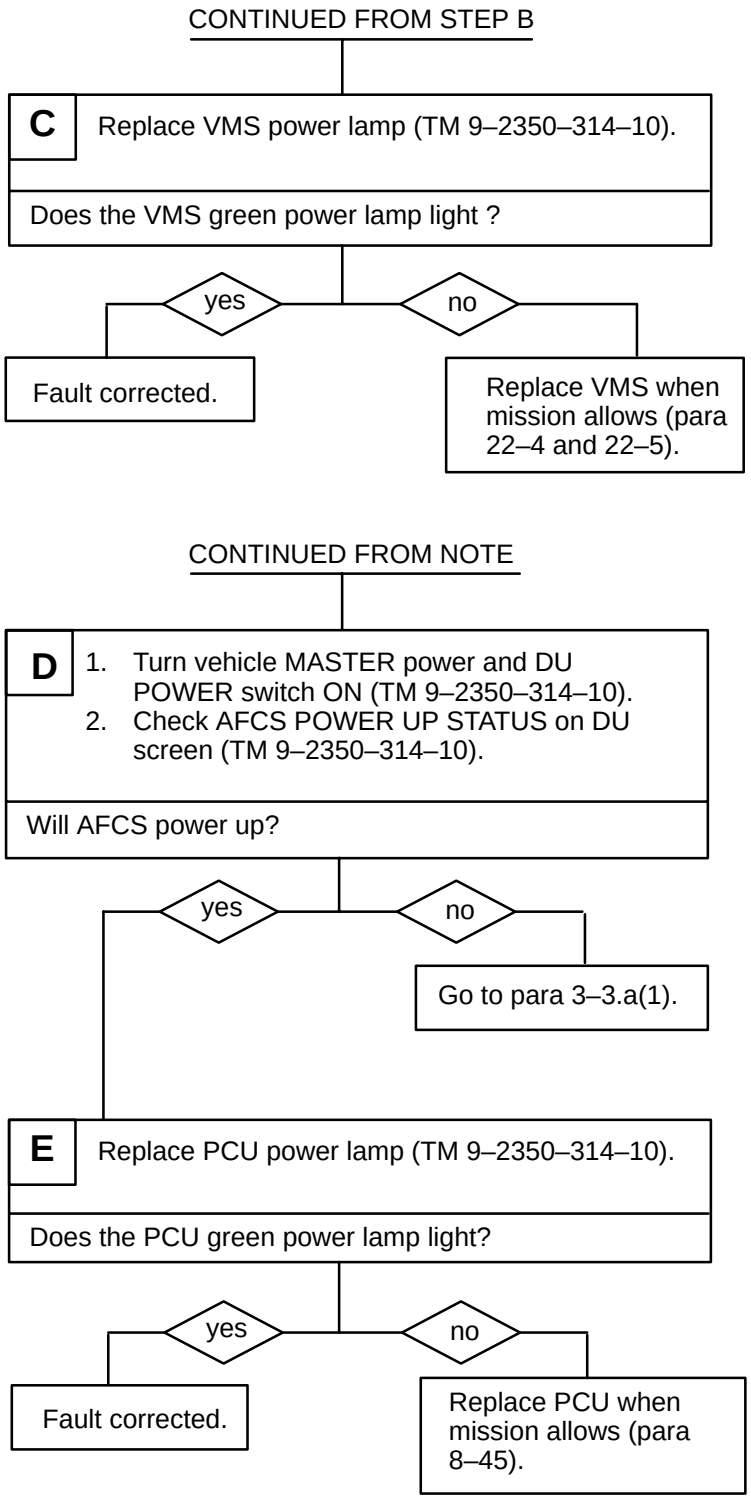
3–3. TROUBLESHOOTING CHART – CONTINUED

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



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?

yes → No fault.

no

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

Is NAVIGATION system degraded or out?

yes → Go to para 3–3.a(16).

no → Replace LRU when mission allows.

END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

DELETED

3–3. TROUBLESHOOTING CHART – CONTINUED

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

INITIAL SETUP	Tools
Connect the MVS system, if it is disconnected. Run PDIU AFCS Tests.	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 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

yes

Replace ACU (para 8–14).

no

B Continue checking the 1553 BUS STATUS.

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

yes

no

Go to Step I.

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?

yes

Go to Step F.

no

D

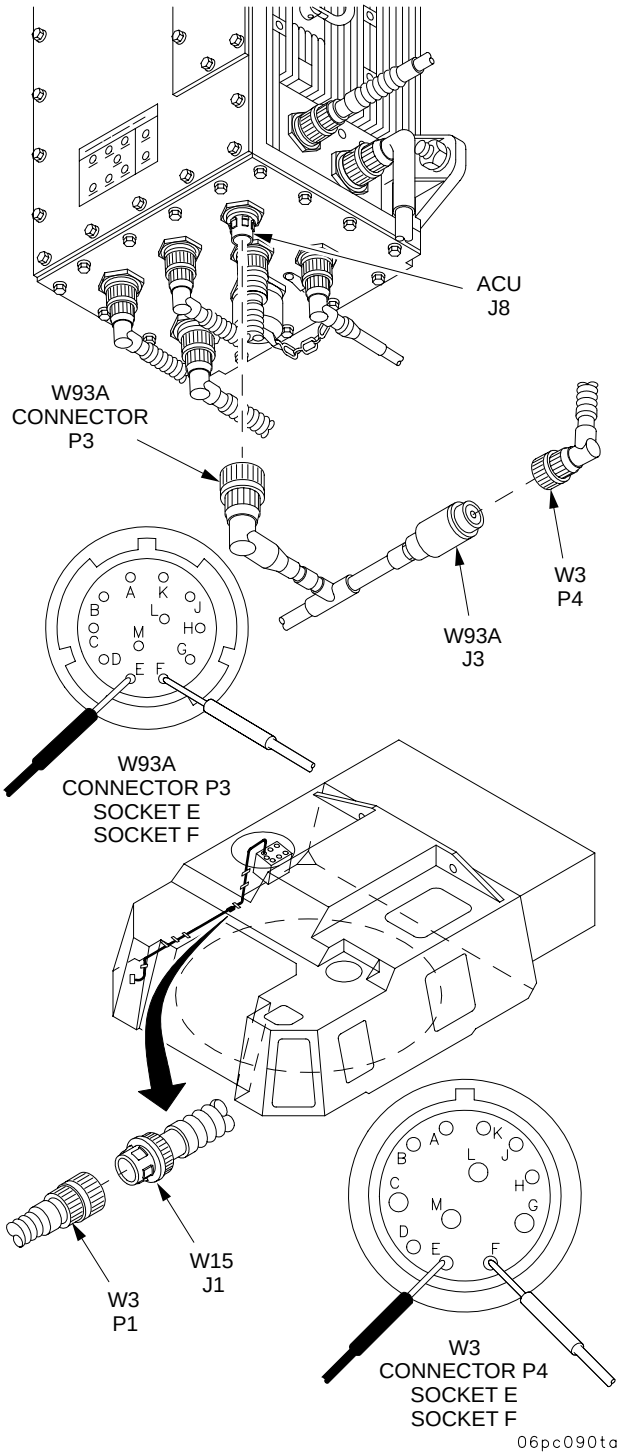
1. Disconnect harness W93A connector J3 from harness W3 connector P4.
2. Disconnect harness W3 connector P1 from harness W15 connector J1.
3. Place one multimeter lead in harness W3 connector P4 socket E and the other lead in harness W3 connector P4 socket F.
4. Measure the resistance (ohms).

Is the resistance between 55 and 95 ohms?

yes

no

Replace harness W3 (para 8–5).



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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP D

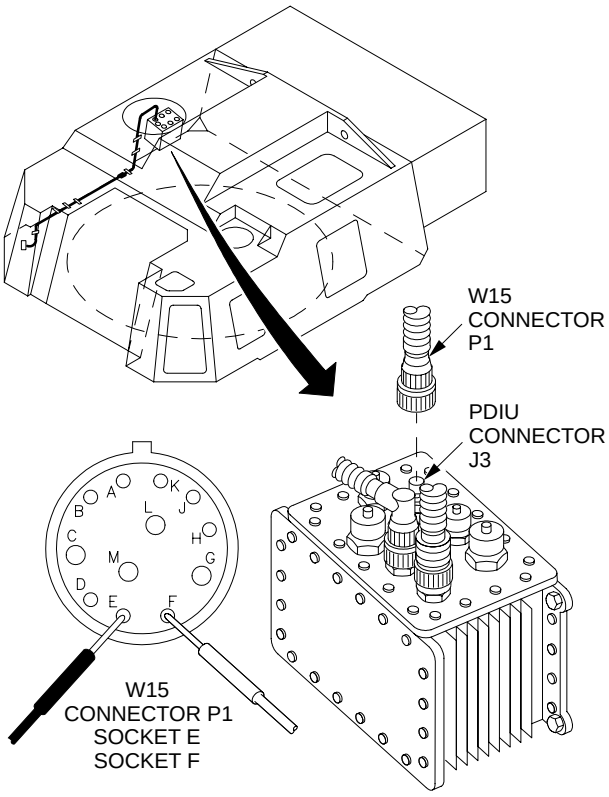
E

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?

yes → Replace harness W93A (para 8–12).

no → Replace harness W15 (para 8–7).



CONTINUED FROM STEP C

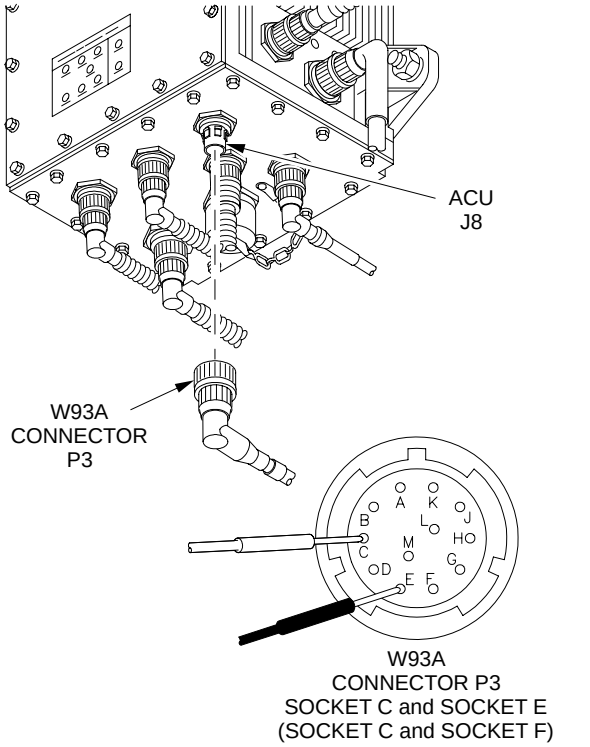
F Check 1553 harness for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

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?

yes → Replace ACU (para 8–14).

no



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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP F

G

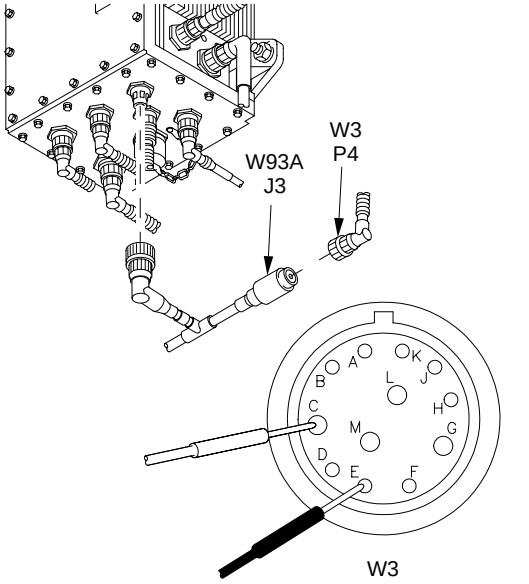
1. Disconnect harness W93A connector J3 from harness W3 connector P4.
2. Check 1553 harness for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

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?

yes → Replace harness W93A (para 8–12).

no



W3
CONNECTOR P4
SOCKET C and SOCKET E
(SOCKET C and SOCKET F)

H

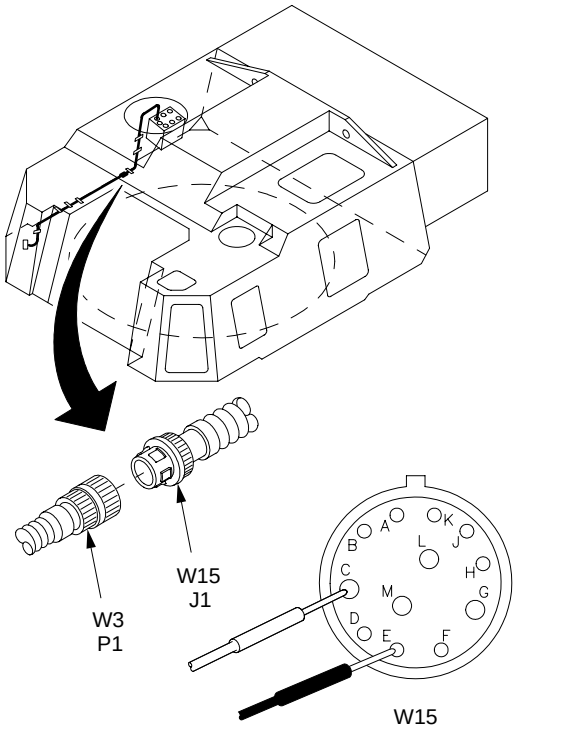
1. Disconnect harness W3 connector P1 from harness W15 connector J1.
2. Check W15 harness for shorts by placing one multimeter lead on Point A and other multimeter lead on Point B.

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?

yes → Replace harness W15 (para 8–7).

no → Replace harness W3 (para 8–5).



W15
CONNECTOR J1
SOCKET C and SOCKET E
(SOCKET C and SOCKET F)

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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

yes

no

Go to Step P.

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.

Point A	Point B
W93A connector P3 socket E	W93A connetor J3 pin E
W93A connector P3 socket F	W93A connector J3 pin F

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

yes

no

Replace harness W93A (para 8–12)

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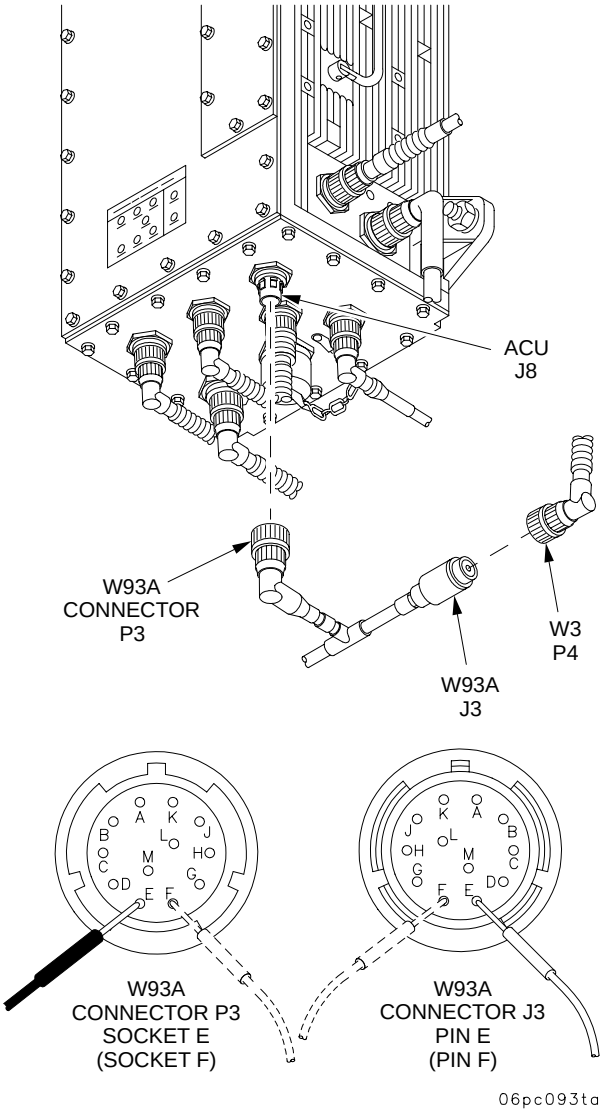


3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP J

K

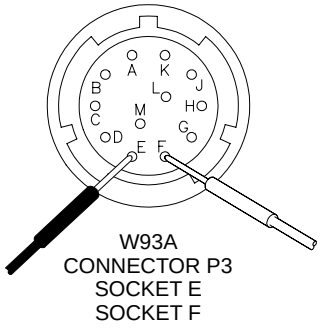
1. Place one multimeter lead in harness W93A connector socket E and the other lead in harness W93A connector P3 socket F.
2. Measure the resistance (ohms).

Is the resistance between 90 and 140 ohms?

yes

no

Replace harness W93A (para 8–12).



W93A
CONNECTOR P3
SOCKET E
SOCKET F

L

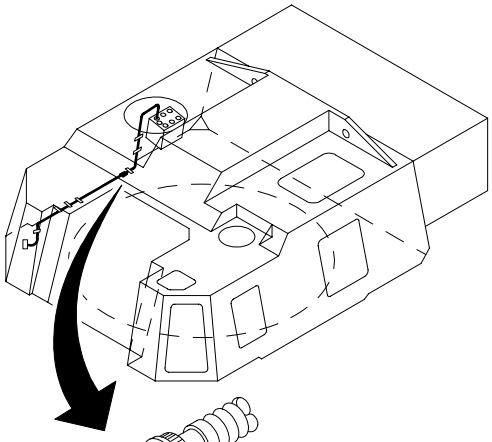
1. Disconnect W3 connector P1 from harness W15 connector J1.
2. Place one multimeter lead in harness W3 connector P4 socket E and the other lead in harness W3 connector P4 socket F.
3. Measure the resistance (ohms).

Is the resistance between 55 and 95 ohms?

yes

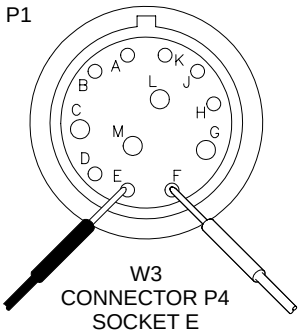
no

Replace harness W3 (para 8–5).



W15
J1

W3
P1



W3
CONNECTOR P4
SOCKET E
SOCKET F

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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.

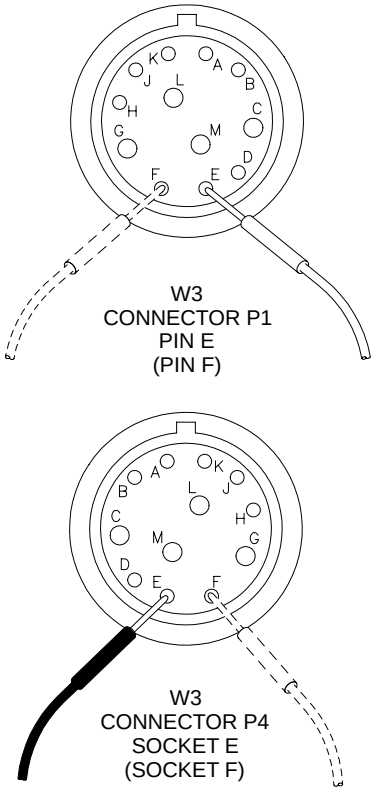
Point A	Point B
W3 Connector P1 pin E	W3 Connector P4 socket E
W3 Connector P1 pin F	W3 Connector P4 socket F

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

yes

no

Replace harness W3 (para 8–5).



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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 connctor P1 socket F.
3. Measure the resistance (ohms).

Is the resistance between 55 and 95 ohms?

yes

no

Replace harness W15 (para 8–7).

O

Check harness W15 connectors for continuity by placing one multimeter lead on point A and other lead on point B a 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

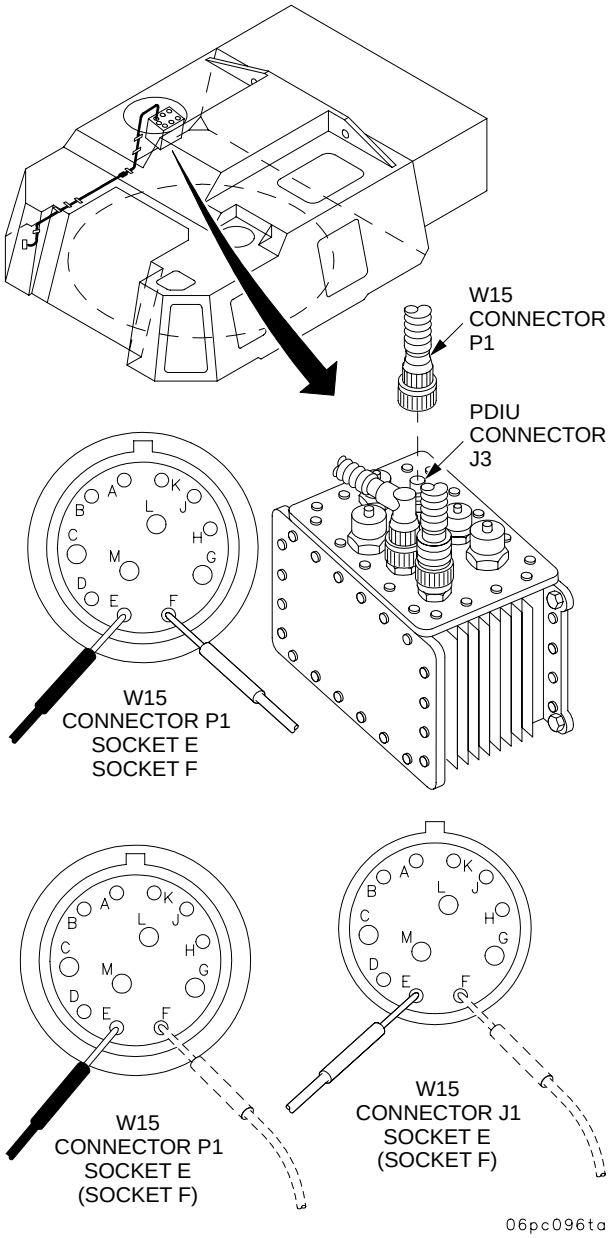
Is there continuity at all points (resistance less than 10 ohms)?

yes

no

Replace PDIU (para 8–19).

Replace harness W15 (para 8–7).



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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?

yes

no

Go to Step S.

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)?

yes

no

1. Replace MVS (TM 9–2350–314–10).
2. If the problem still occurs after retesting the AFCS, replace harness W93 (para 8–12).

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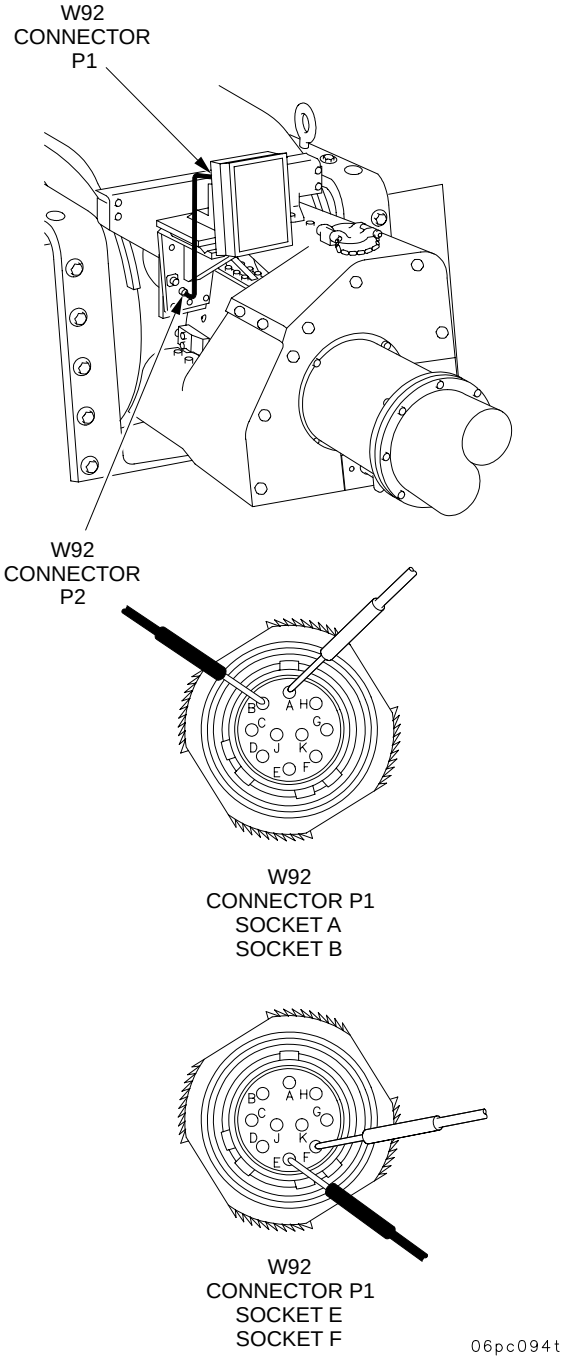


3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP Q

R

1. Disconnect harness W92 connector P2 from harness W93A connector J2.
2. Check harness W92 for continuity by placing one multimeter lead on point A and other multimeter lead on point B.

Point A	Point B
W92 Connector P1 socket E	W92 Connector P2 pin E
W92 Connector P1 socket F	W92 Connector P2 pin F

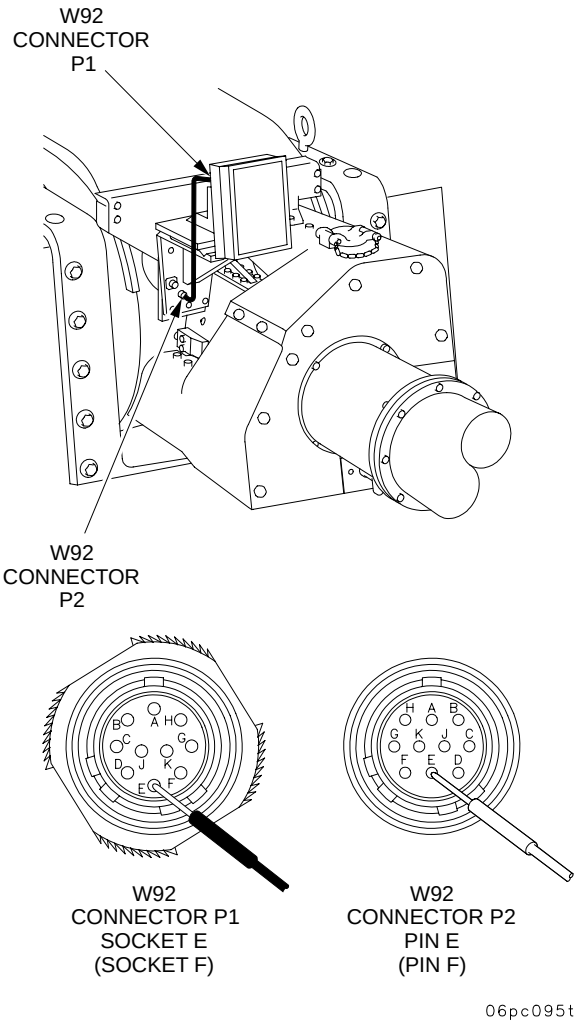
Is there continuity at all points (resistance less than 10 ohms)?

yes

Replace harness W93A (para 8–12).

no

Replace harness W92 (TM 9–2350–314–10).



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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?

yes

Replace harness W92 (TM 9–2350–314–10).

no

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).

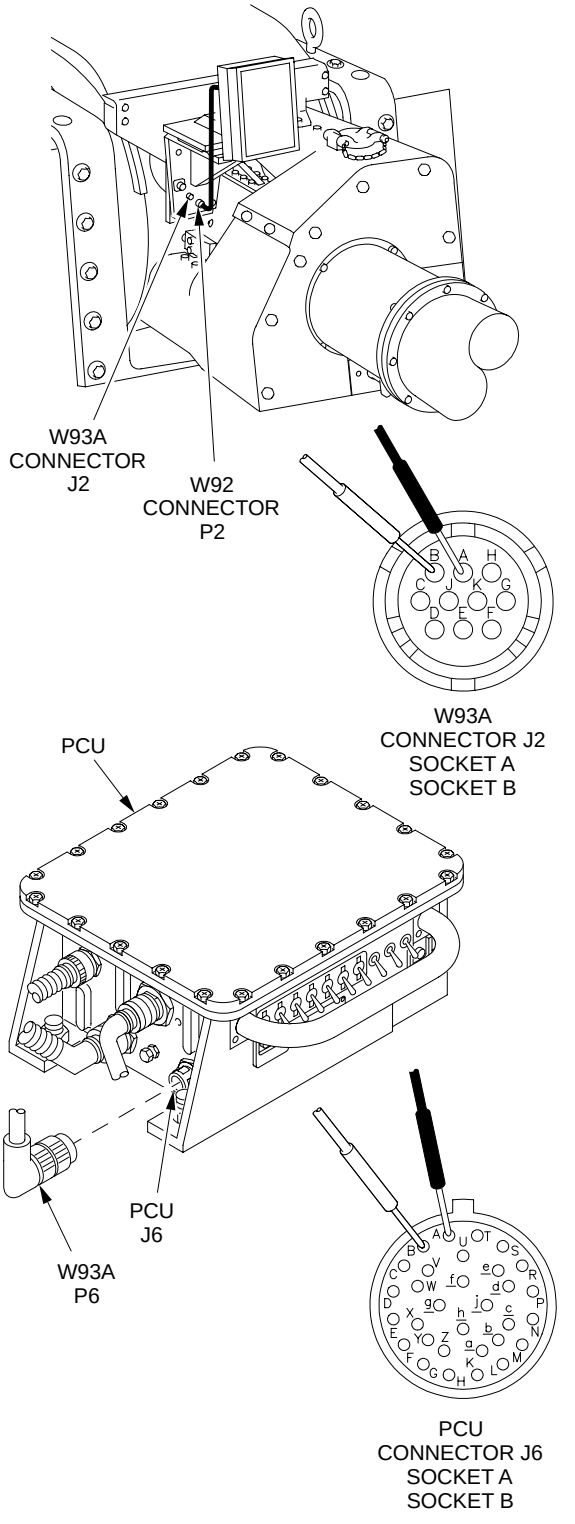
Is the voltage greater than 18 V dc?

yes

Replace harness W93A (para 8–12).

no

Replace PCU (para 8–16).



END OF TASK

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).

INITIAL SETUP

Start engine to ensure backup batteries are charged and run PDIU CAB ELECTRICAL Test.

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

- 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).

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

yes

Replace PCU (para 8–16).

no

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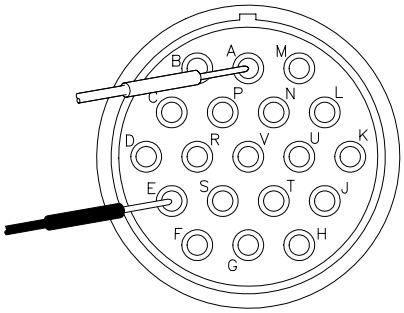

W25
CONNECTOR P3
TO PCU J3
SOCKET A
SOCKET E

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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.

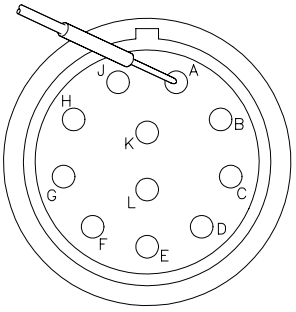
B

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:

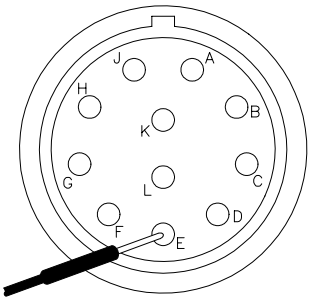
Point A Harness W25	Point B Harness W25
Connector P1 pin A	Connector P2 pin E
Connector P1 pin B	Connector P2 pin F
Connector P1 pin C	Connector P2 pin G
Connector P1 pin D	Connector P2 pin H
Connector P2 pin A	Connector P1 pin E
Connector P2 pin B	Connector P1 pin F
Connector P2 pin C	Connector P1 pin 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?



W25
CONNECTOR P1
TO AFCS BATTERIES
PIN A



W25
CONNECTOR P2
TO AFCS BATTERIES
PIN E

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yes

Replace backup batteries (para 8–3).

no

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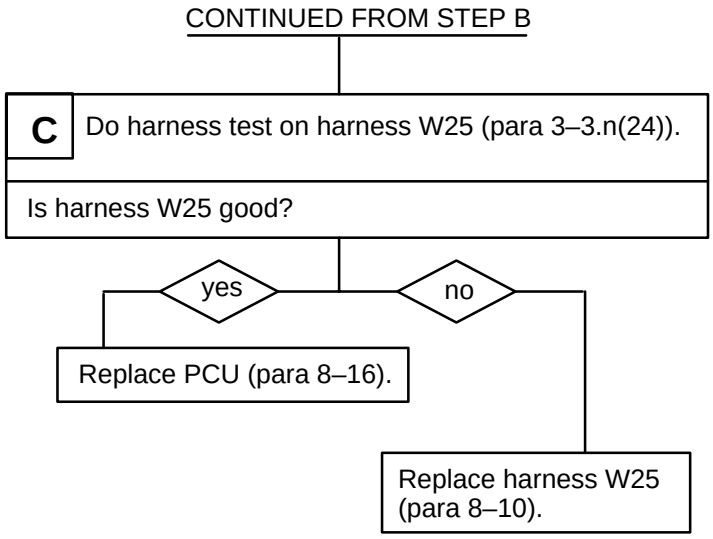
3–3. TROUBLESHOOTING CHART – CONTINUED

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



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?

yes

no → Go to para 3–3.a(14).

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?

yes → Go to Step D.

no

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?

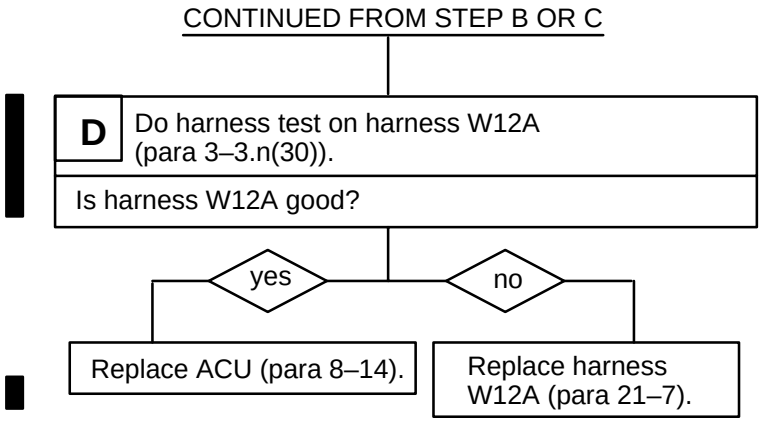
yes

no → Replace radio (TM 11–5820–401–10–1).

CONTINUED ON NEXT PAGE

3–3. TROUBLESHOOTING CHART – CONTINUED

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



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?

yes → Go to Step D.

no

B

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

Does CB4 stay in the ON position?

yes → Notify Communications Maintenance Section.

no

C

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

Does CB4 stay in the ON position?

yes → Replace harness W26 (para 21–7).

no → Replace PCU (para 8–16).

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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP A

D

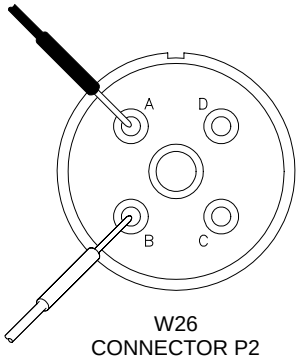
1. Disconnect harness W26 connector P2 from radio rack connector.
2. Place multimeter red lead in harness W26 connector P2 socket B and black lead in harness W26 connector P2 socket A.
3. Measure voltage (V dc).

Is voltage greater than 18 V dc?

yes

Notify Communications Maintenance Section.

no



W26
CONNECTOR P2
SOCKET B
SOCKET A

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E

Do harness test on harness W26 (para 3–3.n(31)).

Is harness W26 good?

yes

Replace PCU (para 8–16).

no

Replace harness W26 (para 21–7).

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
(SC 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?

yes

no

Notify Communications Maintenance Section.

B

Do harness test on harness W10 (para 3–3.n(32)).

Is harness W10 good?

yes

no

Replace ACU (para 8–14).

Replace harness W10 (para 21–8).

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 (SC 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

yes → Replace ACU (para 8–14).
no

B Continue checking the NAV SUBSYSTEM STATUS.

Is the DRU CONNECT item FAILed?

yes → Go to Step J.
no

C Continue checking the NAV SUBSYSTEM STATUS.

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

yes → Replace DRUH (para 22–8).
no

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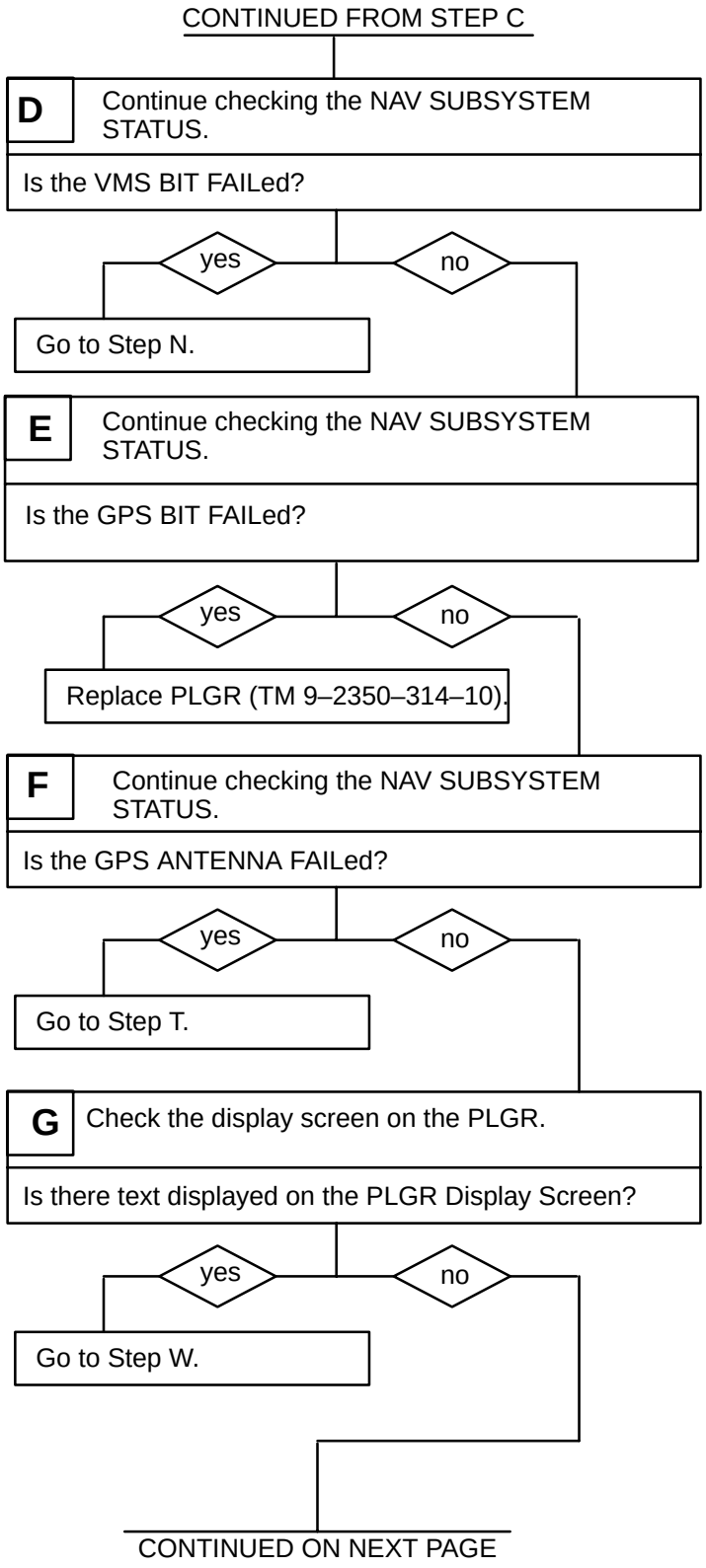
3–3. TROUBLESHOOTING CHART – CONTINUED

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



3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP G

H

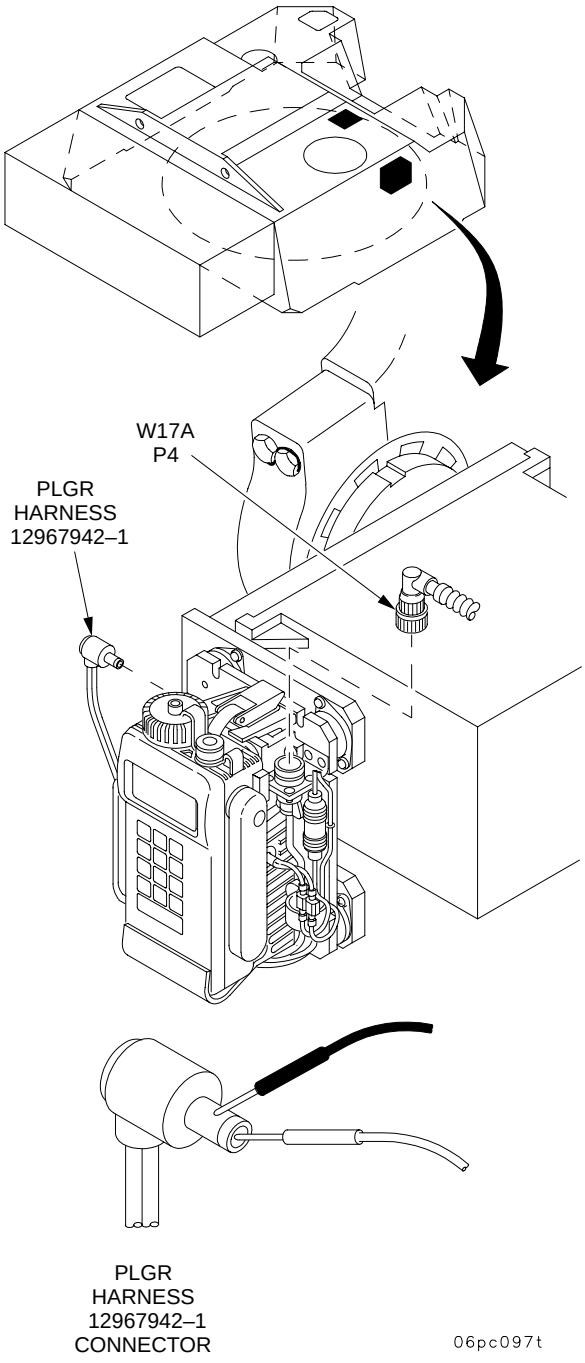
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect PLGR power harness 12967942–1 from PLGR connector J4.
3. Disconnect harness W17A connector P4 from PLGR harness 12967970 connector P1.
4. Verify that the PLGR is securely 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?

yes

Replace PLGR (TM 9–2350–314–10).

no



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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP H

I

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).

Is the voltage greater than 18 V dc?

yes → Replace PLGR MOUNT (para 22–12).

no → Refer to para 3–3.o(1).

CONTINUED FROM STEP B

J

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

Is the DRUH power lamp ON?

yes → Go to Step Z.

no →

K Check circuit breakers NAV1 and NAV2 on the PCU and reset them if they have tripped.

Do the circuit breakers stay ON?

yes →

no → Go to Step AC.

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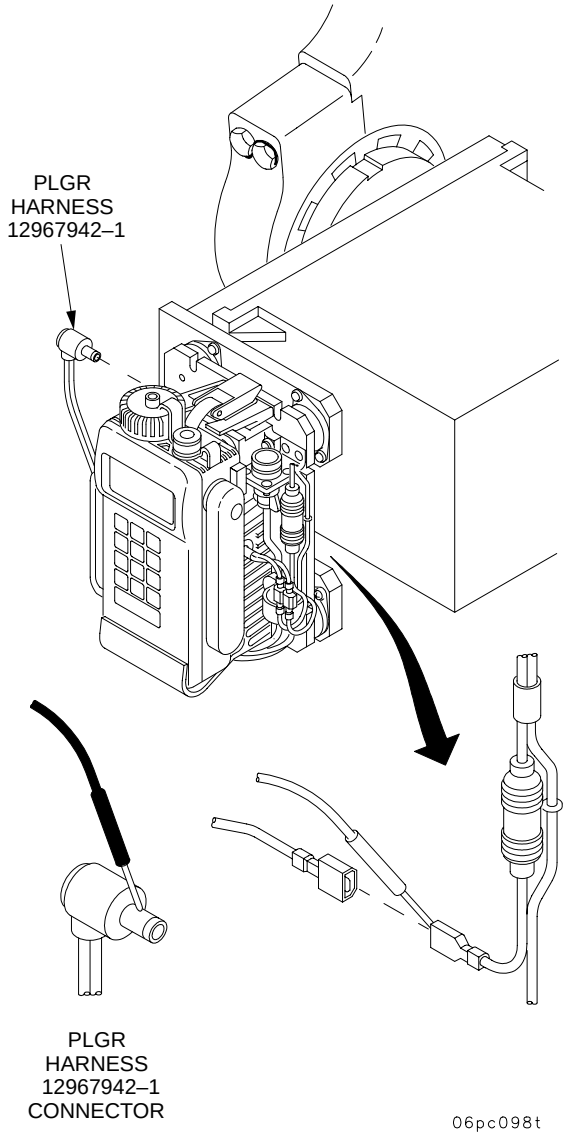


3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP K

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 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?

yes → Replace DRUH (para 22–8).

no

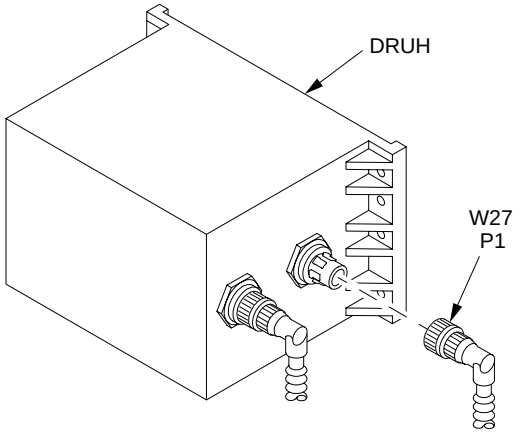
M

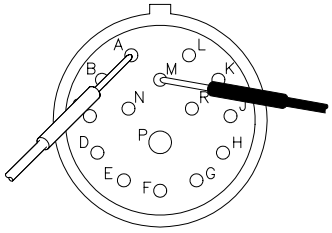
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Do a harness test on harness W27 (para 3–3.n(26)).

Does harness W27 test good?

yes → Replace PCU (para 8–16).

no → Replace harness W27 (para 8–11).





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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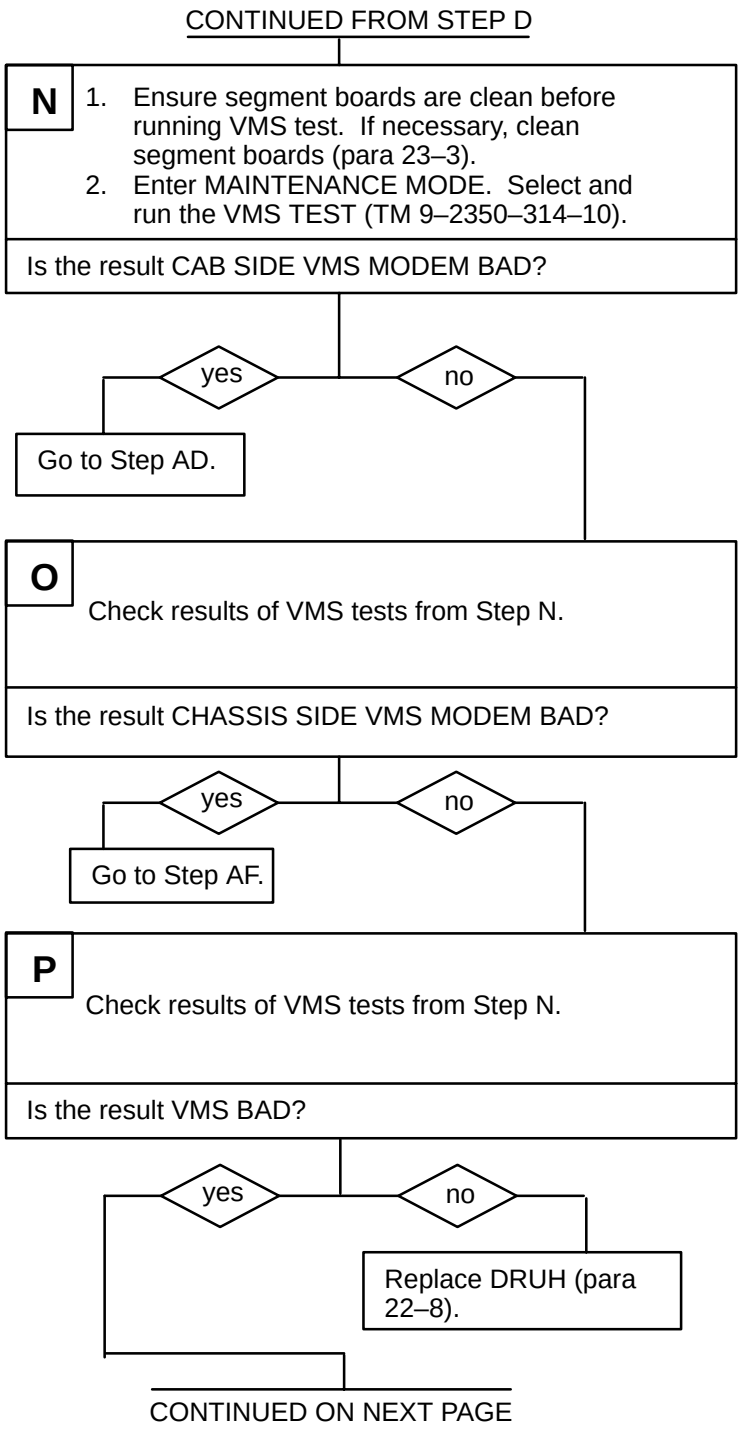
3–3. TROUBLESHOOTING CHART – CONTINUED

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



3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP P

Q

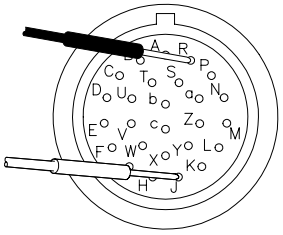
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W21 connector P2 at VMS hull side modem connector J1.
3. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).
4. Place multimeter red lead on VMS hull side modem 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 18 V dc?

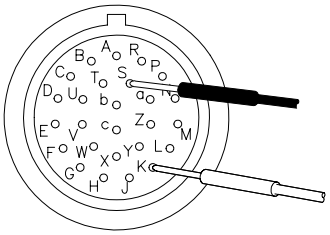
yes

no

Replace VMS hull side modem (para 22–4).



VMS MODEM CONNECTOR J1
SOCKET J
SOCKET R



VMS MODEM CONNECTOR J1
SOCKET K
SOCKET S

22pc002t

R 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?

yes

no

Replace harness W21 (para 22–6).

S Do harness test on harness W28 (para 3–3.n(29).

Is harness W28 good?

yes

no

Replace VMS (para 22–1).

Replace harness W28 (para 22–7).

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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP F

T

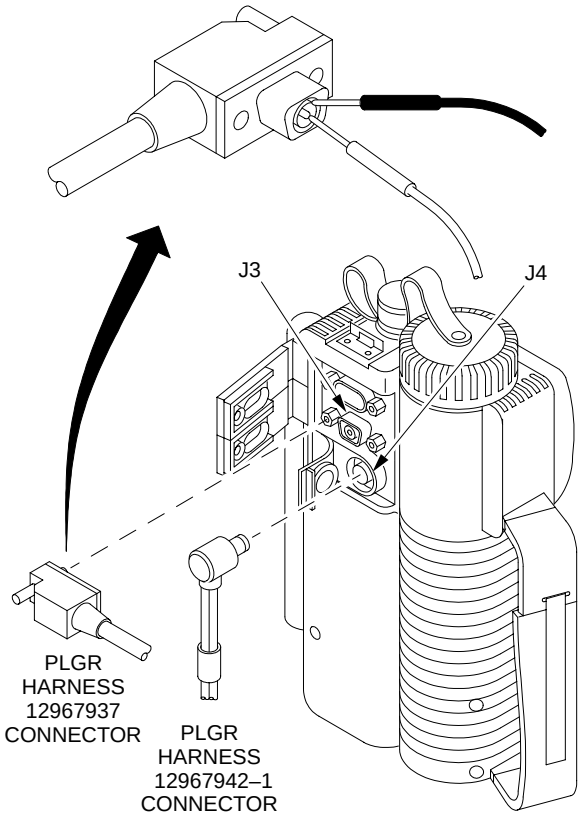
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect PLGR power harness 12967942–1 from PLGR connector J4.
3. Disconnect PLGR antenna harness 12967937 from PLGR connector J3.
4. Connect one lead of multimeter to the center 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?

yes

no

Go to Step AV.



U

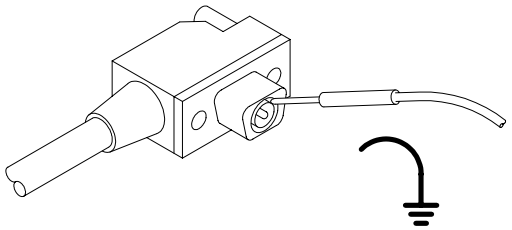
1. Connect one lead of multimeter to the outside wire shield of antenna harness 12967937 connector and the other lead to chassis ground.
2. Measure the resistance (ohms).

Is the resistance greater than 1000 ohms?

yes

no

Replace PLGR (TM 9–2350–314–10).



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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP U

V

1. Disconnect PLGR antenna harness 12967967–1 from PLGR antenna on the outside of the vehicle.
2. Connect one lead of multimeter to the outside wire shield of antenna harness 12967967–1 connector and the other lead to chassis ground.
3. Measure the resistance (ohms).

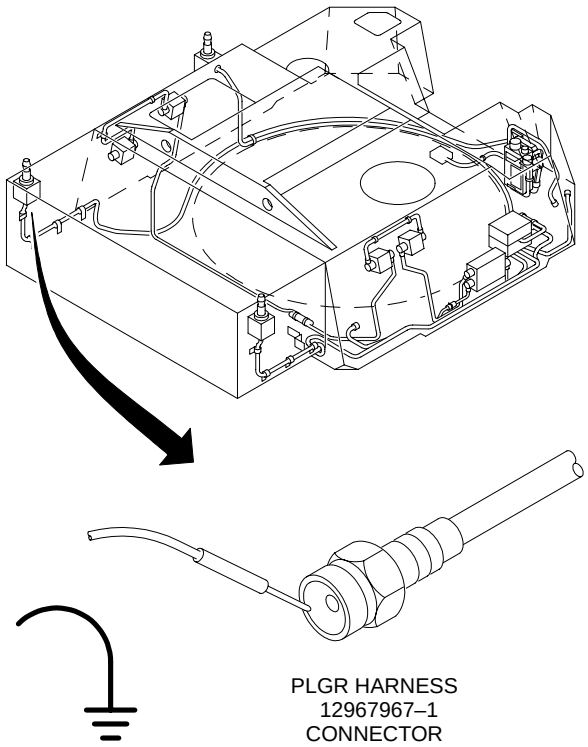
Is the resistance greater than 1000 ohms?

yes

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

no

Replace PLGR antenna 12967923 (para 21–10).



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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP G

W

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)?

yes

no

Replace harness W17A (para 8–8).

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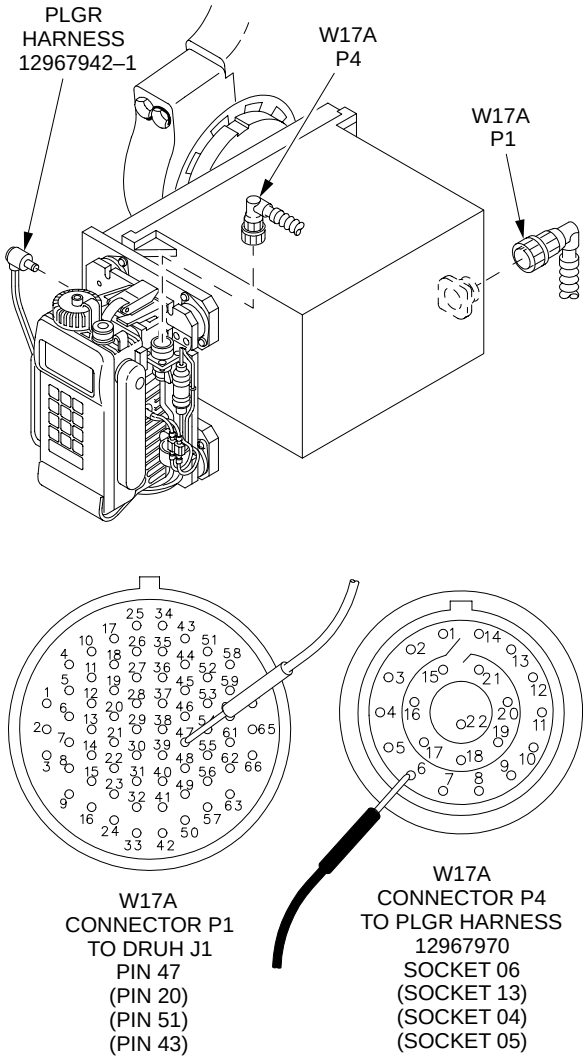


3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP W

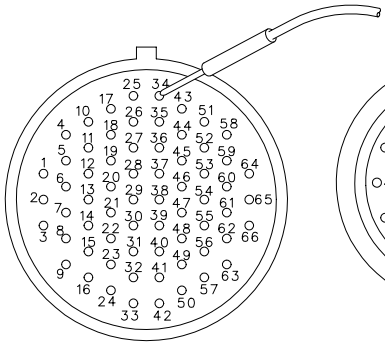
X Check harness W17A for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
W17A Connector P1 pin 34	W17A Connector P4 socket 09
W17A Connector P1 pin 25	W17A Connector P4 socket 10

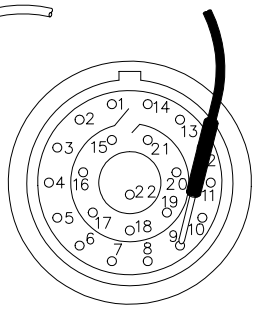
Is there continuity at all points (resistance less than 10 ohms)?

yes — **Y**

no — Go to Step AL.



W17A CONNECTOR P1 TO DRUH J1 PIN 34 (PIN 25)



W17A CONNECTOR P4 TO PLGR HARNESS 12967970 SOCKET 09 (SOCKET 10)

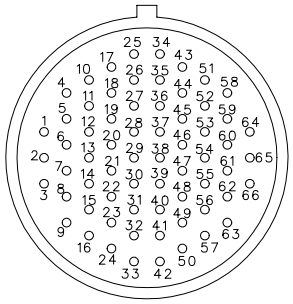
Y Check harness W17A for shorts by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

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

Are there any shorts?

yes — Replace harness W17A (para 8–8).

no — Replace DRUH (para 22–8).



W17A CONNECTOR P1 TO DRUH J1

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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP J

Z 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?

yes

no

Replace DRUH (para 22–8).

AA

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)?

yes

no

Replace harness W17A (para 8–8).

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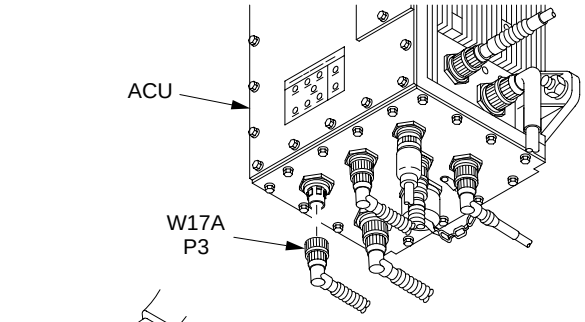
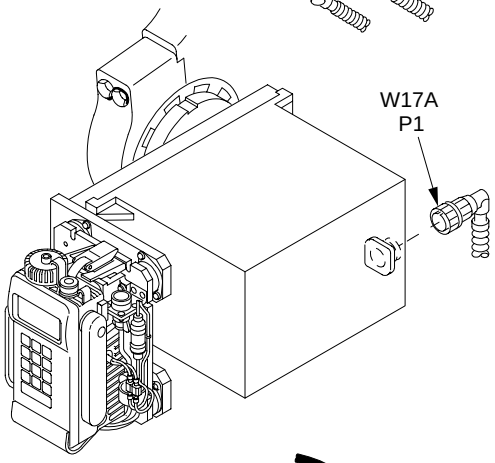
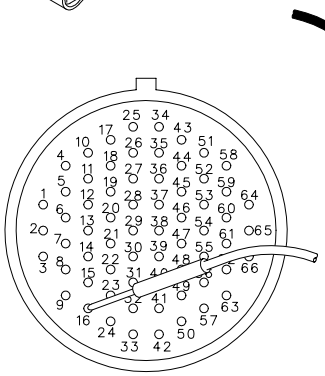
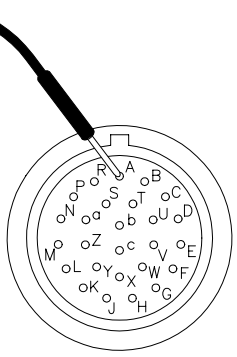






W17A
CONNECTOR P1
TO DRUH J1
PIN 16
(PIN 24)
(PIN 08)
(PIN 09)



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

06pc104t

3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP AA

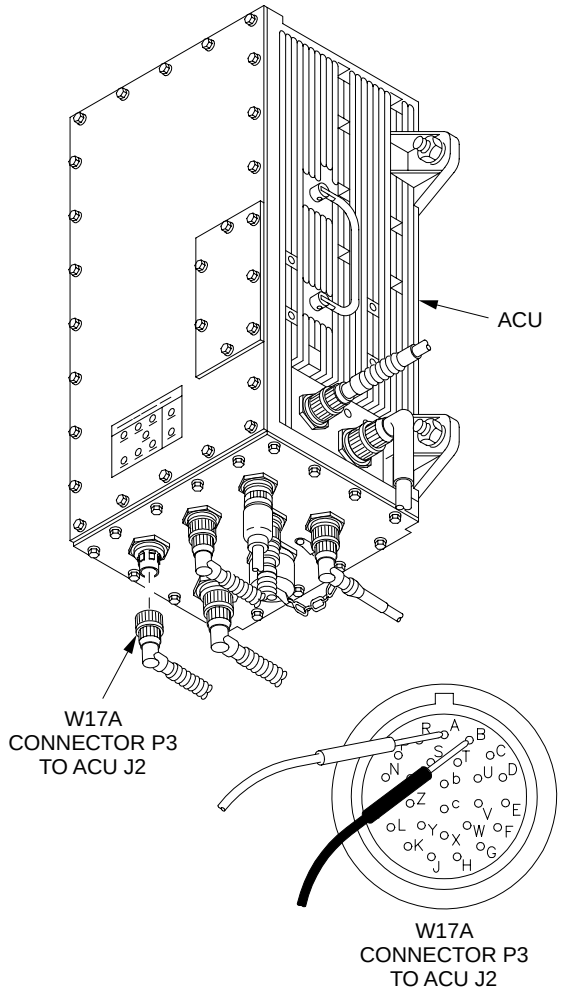
AB Check harness W17A for shorts by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

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?

yes → Replace harness W17A (para 8–8).

no → Replace ACU (para 8–14).



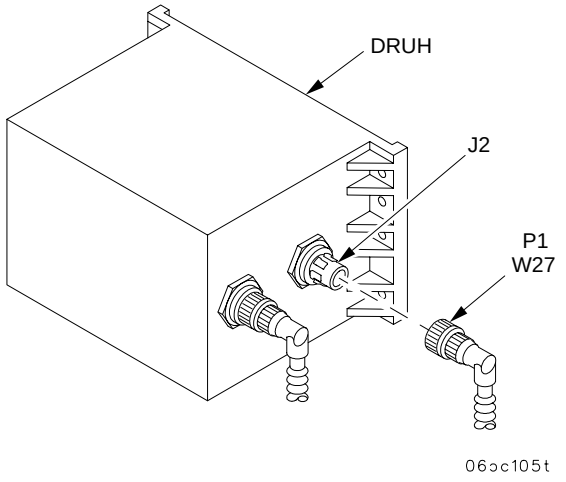
CONTINUED FROM STEP K

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

Do the circuit breakers stay ON?

yes → Replace DRUH (para 22–8).

no → Go to Step AX.



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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP N

AD Check the power lamp on the VMS cab side modem.

Is the power lamp ON?

yes

no → Go to Step AM.

AE
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?

yes → Replace VMS cab side modem (para 22–5).

no → Replace harness W17A (para 8–8).

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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 hull side modem.

Is the power lamp ON?

yes

no → Go to Step AO.

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. 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)?

yes

no → Go to Step AP.

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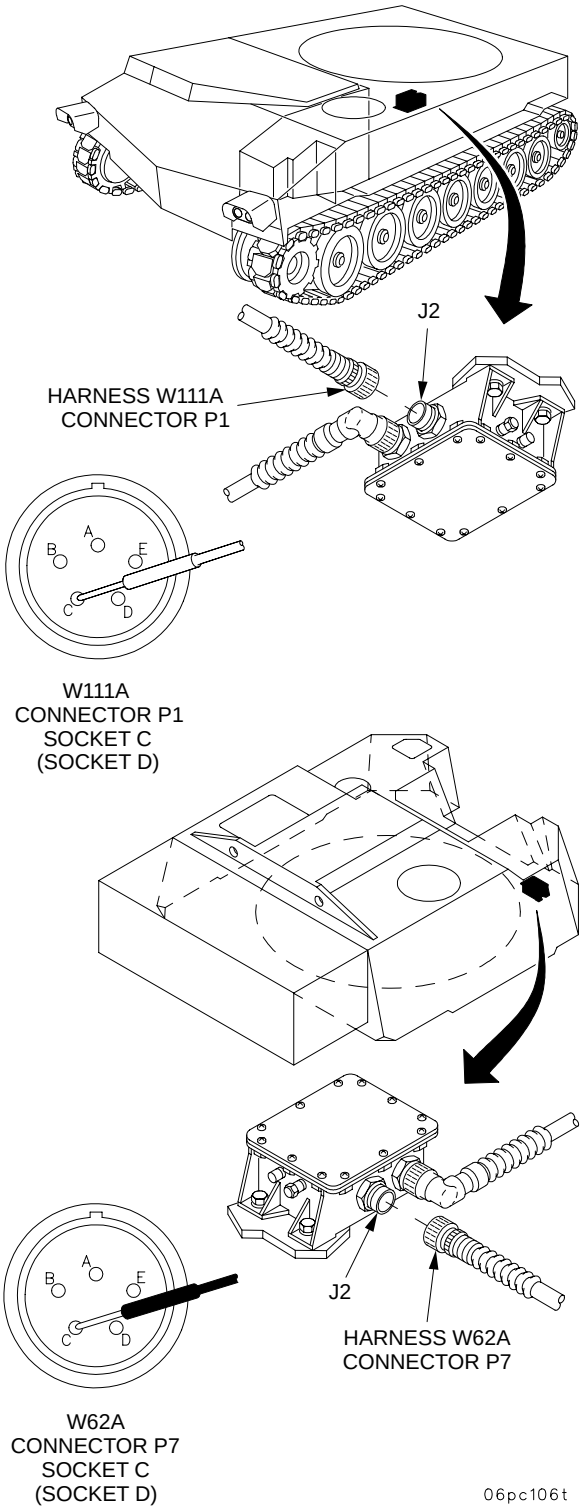

3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP AG

AH

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?

yes

Replace harness W111A (TM 9–2350–314–20–1–2).

no

AI

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?

yes

Replace VMS hull side modem (para 22–4).

no

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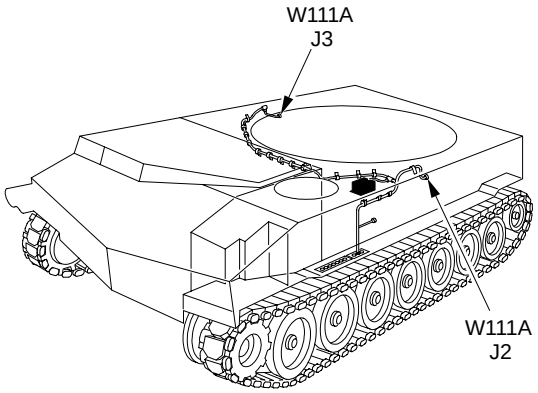
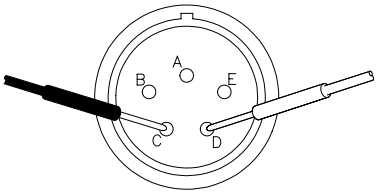
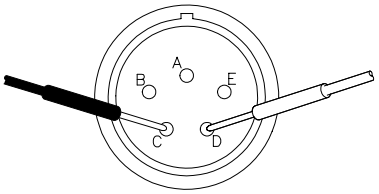




W111A
CONNECTOR P1
SOCKET C and SOCKET D
(SOCKET C and SOCKET E)
(SOCKET D and SOCKET E)



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

06pc107t

3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP AI

AJ

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?

yes → Replace harness W62A (para 5–30).

no

AK

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

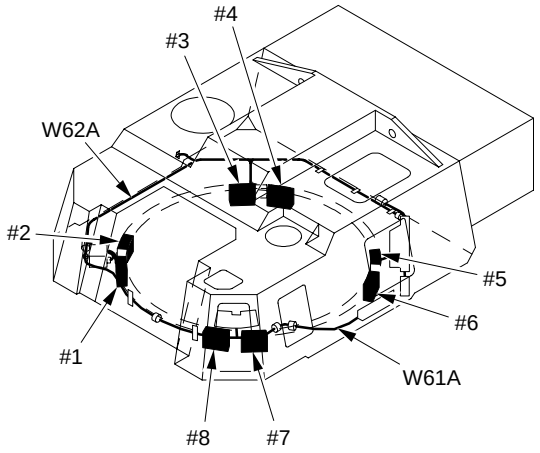
Are there any shorts?

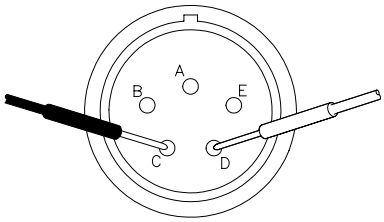
yes → Replace harness W61A (para 5–16).

no → Refer to para 3–3.m(2).

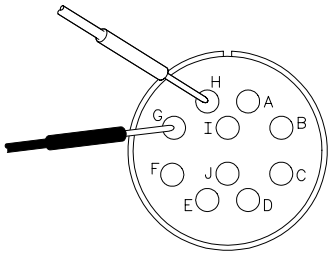
NOTE:
Brush Blocks #s 1,2,3,& 4, connected to W62A Wiring Harness

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

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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP X

AL

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 the one multimeter lead on Point A and the other multimeter lead on Point B.

Point A	Point B
Connector pin 08	Connector pin 09
Connector pin 10	Connector pin 11

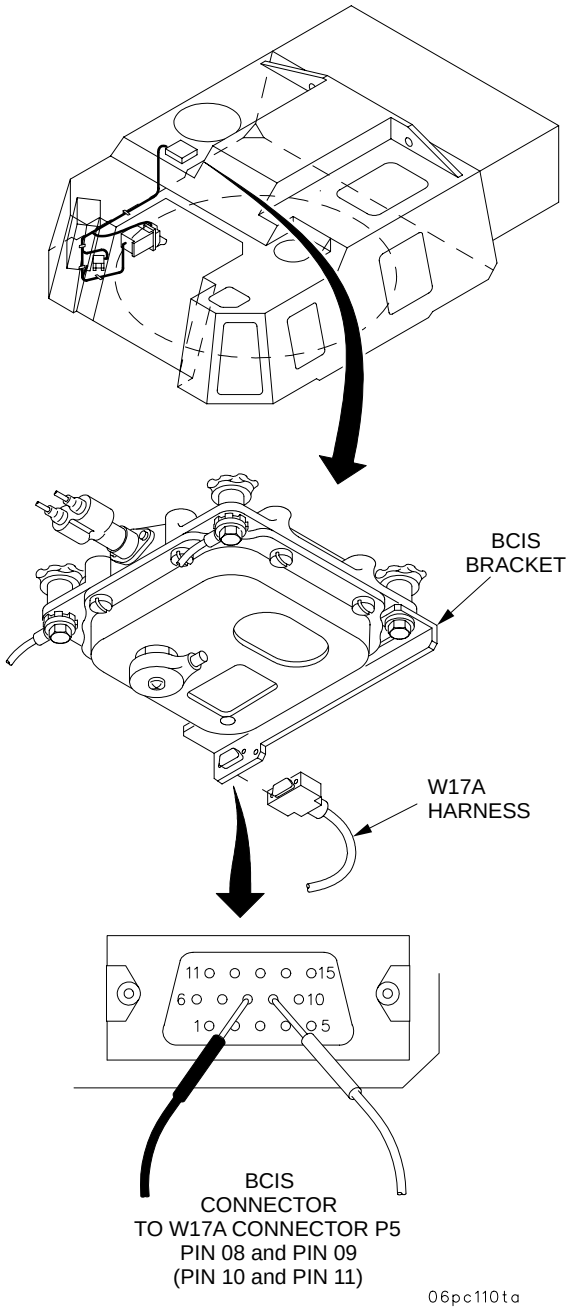
Is there continuity at all points (resistance less than 10 ohms)?

yes

Replace harness W17A (para 8–8).

no

Replace BCIS bracket with connector 12967987 (para 5–26).



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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP AD

AM

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?

yes → Replace VMS cab side modem (para 22–5).

no

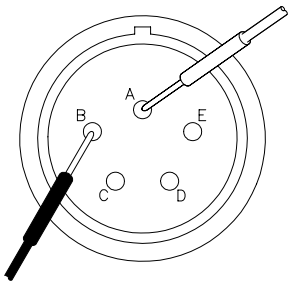
AN

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).

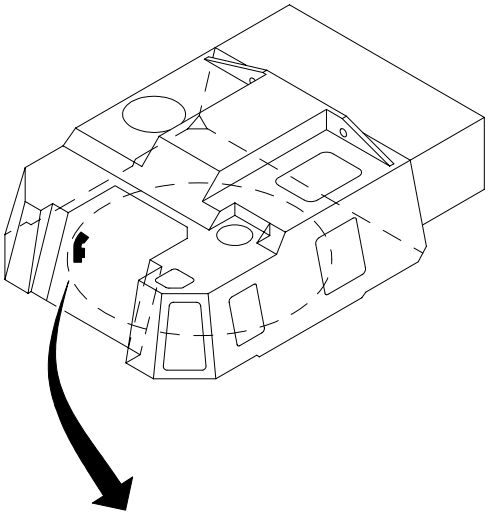
Is the voltage greater than 18 V dc?

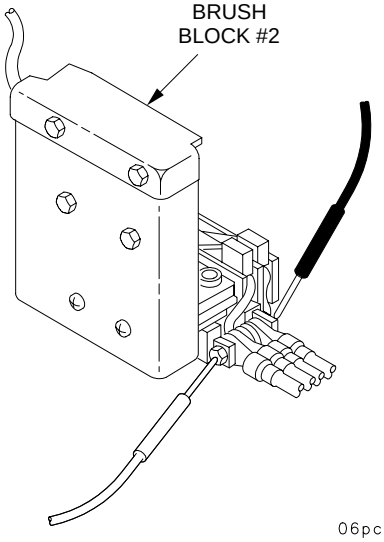
yes → Replace harness W62A from brush block to VMS cab side modem (para 5–30).

no → Go to hull electrical troubleshooting (TM 9–2350–314–20–1–1).



W62A
CONNECTOR P7
SOCKET A
SOCKET B





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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 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).

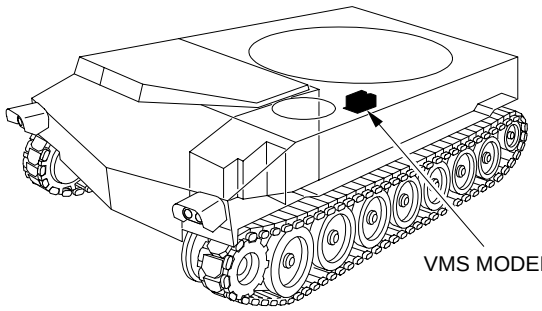
Is the voltage greater than 18 V dc?

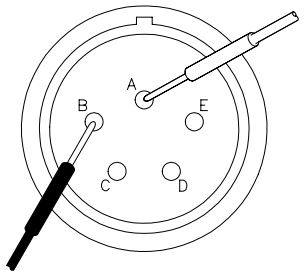
yes

Replace VMS hull side modem (para 22–4).

no

Go to Step AS.





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 AG

AP

1. Disconnect harness W111A connector J2 from VIS cable A3206130–10 connector P3.
2. Disconnect harness W111A connector J3 from right slip ring connector.
3. Check harness W111A for continuity by placing the one multimeter lead on Point A and the other multimeter lead on Point B.

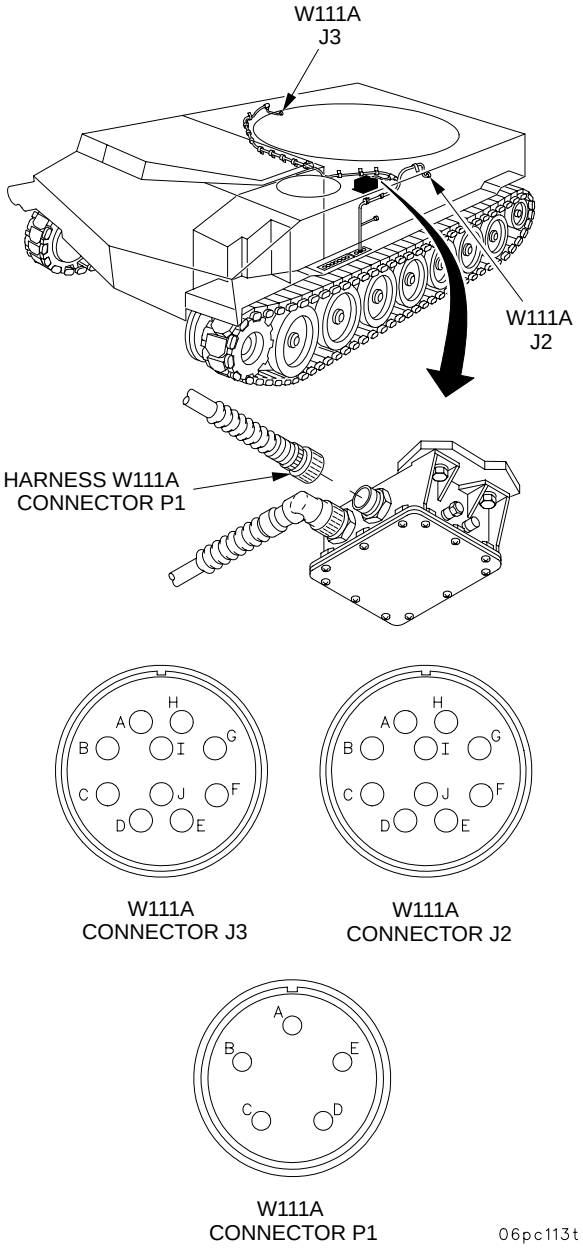
Point A	Point B
W111A Connector P1 socket C	W111A Connector J2 socket H
W111A Connector P1 socket C	W111A Connector J3 socket H
W111A Connector P1 socket D	W111A Connector J2 socket G
W111A Connector P1 socket D	W111A Connector J3 socket G

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

yes

no

Replace harness W111A (TM 9–2350–314–20–1–2).



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3–3. TROUBLESHOOTING CHART – CONTINUED

a. AFCS – CONTINUED

(16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. – CONTINUED

CONTINUED FROM STEP AP

AQ

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.

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)?

yes

no

Replace harness W62A (para 5–30).

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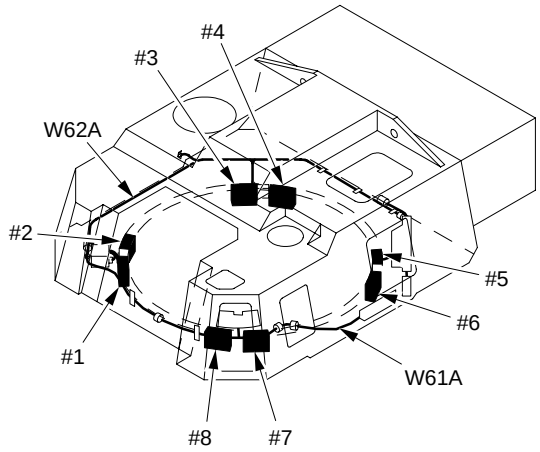
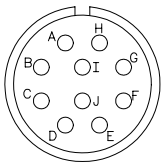
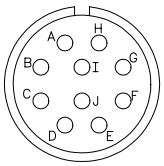
NOTE:
Brush Blocks #s 1,2,3,& 4, connected to W62A Wiring Harness

Brush Blocks #s 5,6,7,& 8, connected to W61A Wiring Harness

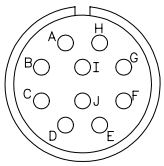




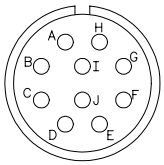
W62A CONNECTOR P1 TO W61 A CONNECTOR P6



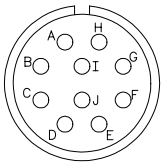
W62A CONNECTOR P2 TO BRUSH HOLDER NUMBER 1



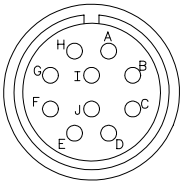
W62A CONNECTOR P3 TO BRUSH HOLDER NUMBER 2



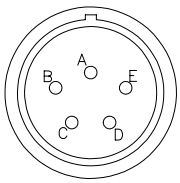
W62A CONNECTOR P4 TO BRUSH HOLDER NUMBER 3



W62A CONNECTOR P5 TO BRUSH HOLDER NUMBER 4



W62A CONNECTOR J1 TO W61A CONNECTOR P1



W62A CONNECTOR P7 TO CAB SIDE VMS MODEM

06pc114t

3–3. TROUBLESHOOTING CHART – CONTINUED

a. AFCS – CONTINUED

(16) NAVIGATION SUBSYSTEM DEGRADED OR OUT. – CONTINUED

CONTINUED FROM STEP AQ

AR

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

yes

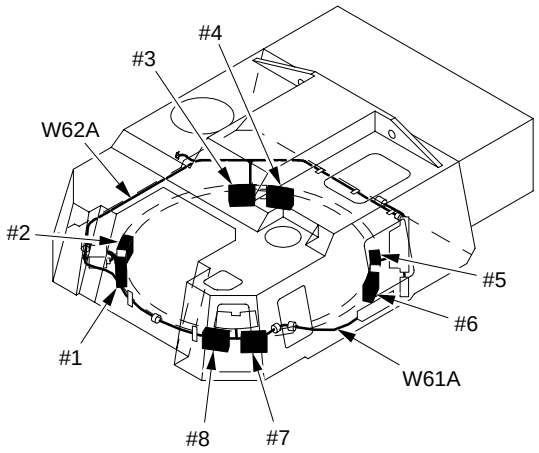
Refer to para 3–3.m(2).

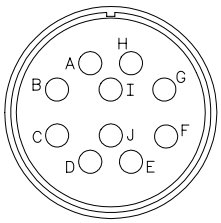
no

Replace harness W61A (para 5–16).

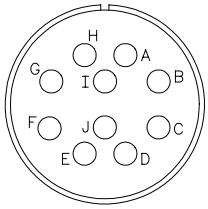
NOTE:
Brush Blocks #s 1,2,3,& 4, connected to W62A Wiring Harness

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

06pc115t

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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP AO

AS

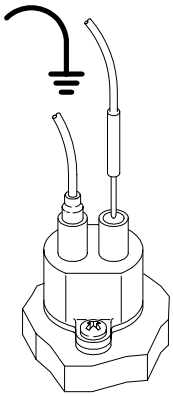
1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W111A lead 48 at circuit breaker CB9 in driver's compartment.
3. Turn vehicle MASTER power and DU POWER switch ON (TM 9–2350–314–10).
4. Place multimeter red lead in CB9 connector and black lead to chassis ground.
5. Measure the DC voltage (V dc).

Is the voltage greater than 18 V dc?

yes

no

Go to hull electrical troubleshooting (TM 9–2350–314–20–1–1).

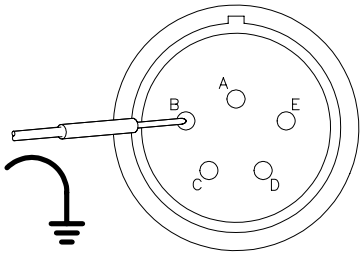


CIRCUIT BREAKER NO. 9

AT

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

yes

no

Replace harness W111A (TM 9–2350–314–20–1–2).

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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP AT

AU

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)?

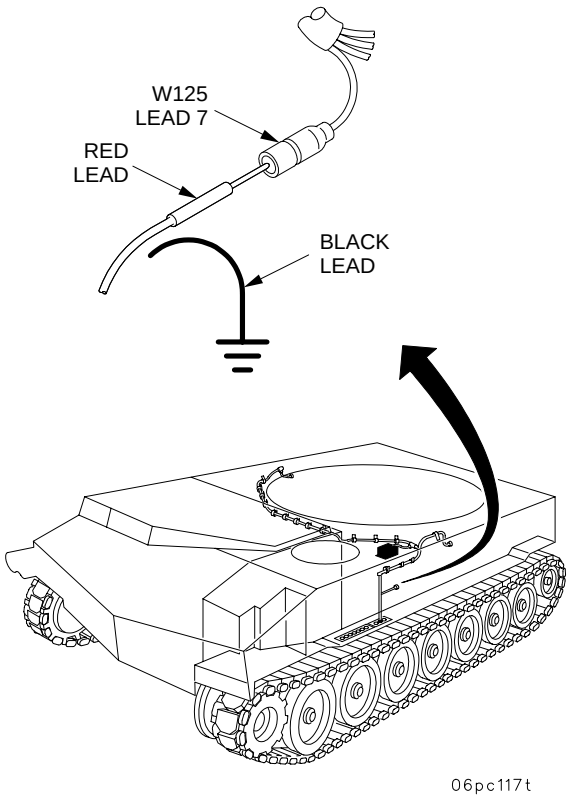
yes

Replace harness W111A (TM 9–2350–314–20–1–2).

no

Go to hull electrical troubleshooting (TM 9–2350–314–20–1–1).

(Ground connection bad, check W125 and W116).



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3–3. TROUBLESHOOTING CHART – CONTINUED

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

CONTINUED FROM STEP T

AV

1. Disconnect PLGR antenna harness 12967937 from PLGR antenna harness 12967967–1.
2. Connect one lead of multimeter to the center wire of antenna harness 12967967–1 connector and the other lead to the outside wire shield of antenna harness 12967967–1 connector.
3. Measure the resistance (ohms).

Is the resistance between 80 and 280 ohms?

yes

Replace PLGR antenna harness 12967937 (para 22–10).

no

AW

1. Disconnect PLGR antenna harness 12967967–1 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).

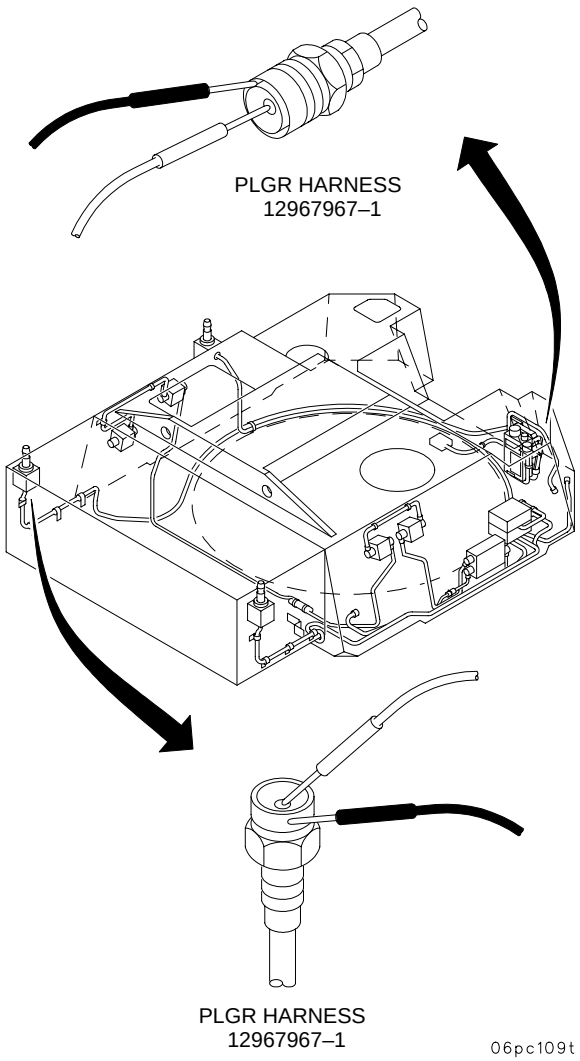
Is the resistance between 80 and 280 ohms?

yes

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

no

Replace PLGR antenna 12967923 (para 22–10).



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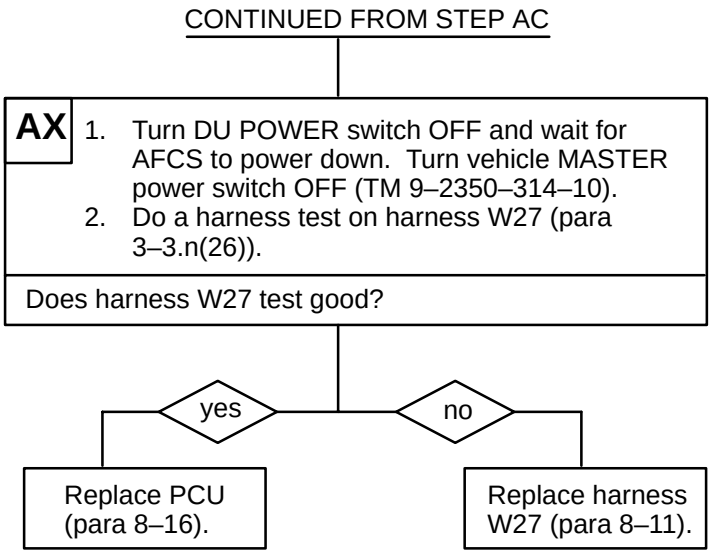
3–3. TROUBLESHOOTING CHART – CONTINUED

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



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.

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 "TRAVERSE or ELEVATION ABNORMAL." Run PDIU HYDRAULICS and GUN POSITIONING Tests.

Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Multimeter (item 24, Appx G)
TA1 probe kit (iitem 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 and the DU POWER switch ON (TM 9–2350–314–10).
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.

Do the DU LOAD, LAY, and STOW keys function properly?

yes

no

Replace DU (para 8–17).

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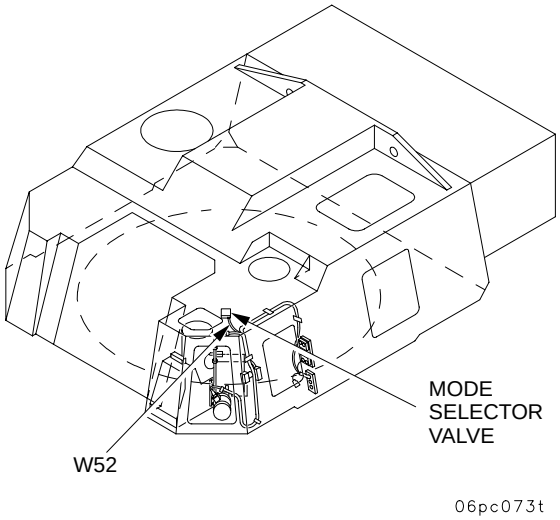


3–3. TROUBLESHOOTING CHART – CONTINUED

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?

yes

no → Refer to para 3–3.a(5), Step D.

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?

yes → Go to Step S.

no

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?

yes → Go to Step L.

no

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 D

E Note cannon symptoms.

Does the cannon FAIL to operate normally in the TRAVERSE direction?

yes → Go to Step M.

no →

WARNING
Make sure elevation and traverse paths are clear.

F

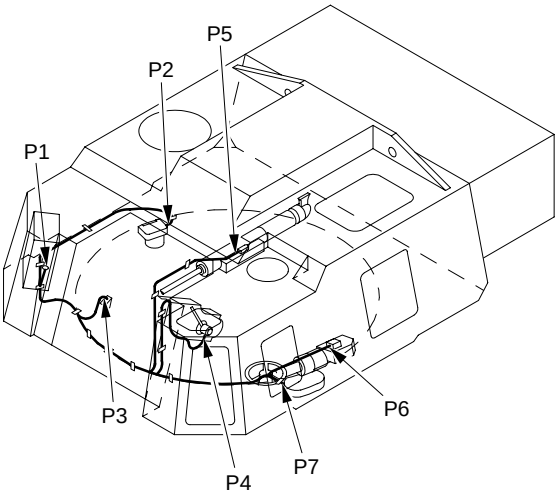
1. Turn DU POWER switch OFF and wait for AFCS to power down (TM 9–2350–314–10).
2. Turn DU POWER switch ON (TM 9–2350–314–10).
3. Initialize AFCS (TM 9–2350–314–10) and enter FIRE COMMAND (para 3–2.4). Determine the ACTL QUAD (Actual Quadrant) and then select EOM (End of Mission).
4. Enter FIRE COMMAND (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).

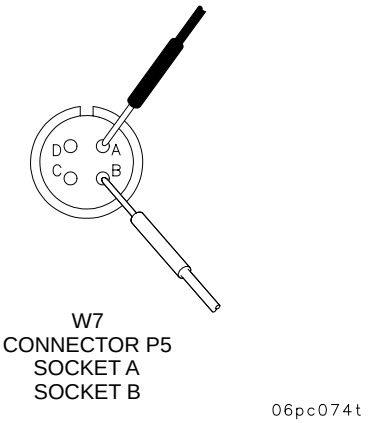
NOTE
Voltage will only be present for about 5 to 15 seconds.

Is the voltage between –8.5 and –10.0 V dc?

yes →

no → Go to Step R.





W7
CONNECTOR P5
SOCKET A
SOCKET B

06pc074t

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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

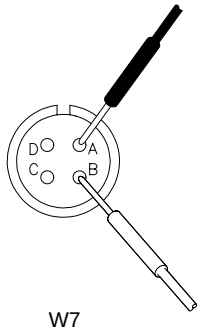
G

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

yes

no

Replace ACU (para 8–14).

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 G

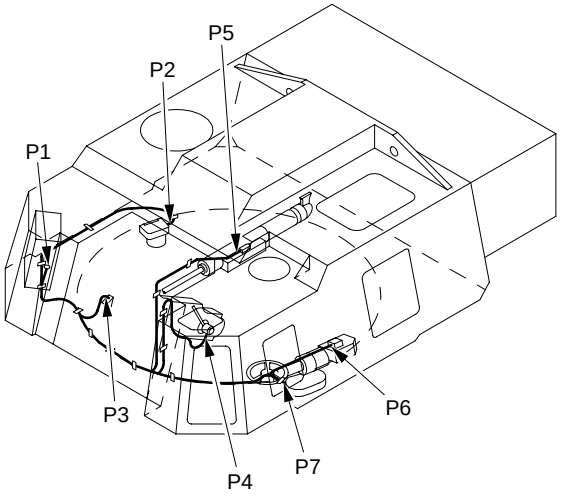
H

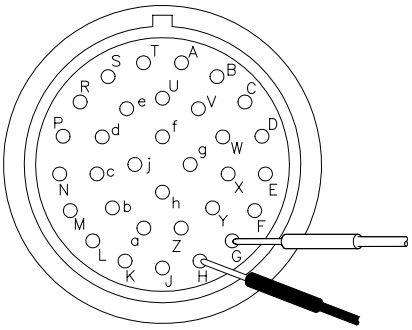
1. Turn GUN SERVO and DU POWER switches OFF and wait for AFCS to power down (TM 9–2350–314–10).
2. Disconnect harness W7 connector P1 at ACU connector J6.
3. Connect harness W7 connector P5 to elevation servo valve.
4. Start engine and idle between 1000 and 1200 RPMs.
5. Turn CAB LOCK to unlock.
6. Turn 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?

yes

no → Go to Step K.





W7
CONNECTOR P1

06pc076t

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?

yes

no → Replace elevation tachometer (para 8–1).

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 I

J

NOTE

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.

1. Place multimeter red lead in W7 connector P1 pin G and black lead in W7 connector P1 pin H.
2. Set the multimeter to measure V dc.
3. Slowly power elevate the cannon (TM 9–2350–314–10) approximately 45 degrees in elevation at a constant speed.
4. Observe the multimeter during the elevation operation, and look for the voltage to drop to zero during the operation.

Was there a constant or near constant voltage level observed?

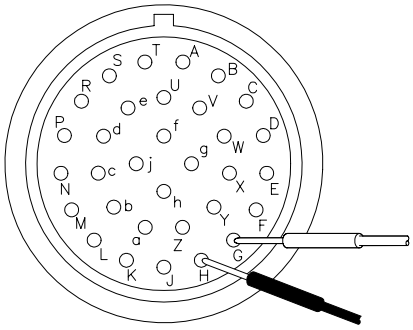
yes

Notify direct support maintenance.

Replace the elevation servo valve.

no

Replace elevation tachometer (para 8–1).



W7
CONNECTOR P1

06pc077t

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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 H

K

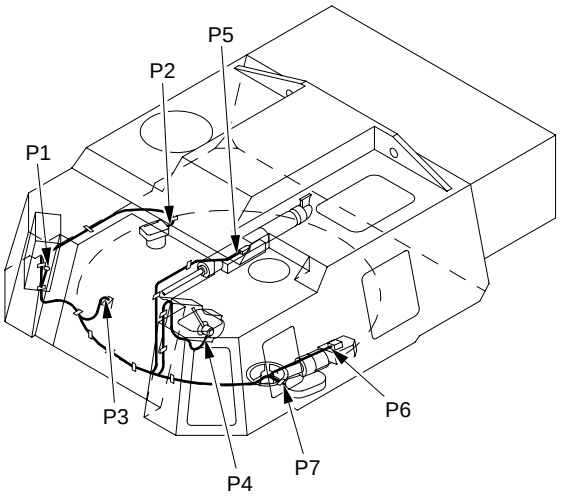
1. Turn HYDRAULIC POWER and vehicle MASTER power switches OFF (TM 9–2350–314–10).
2. Disconnect harness W7 connector P4 from the elevation tachometer.
3. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

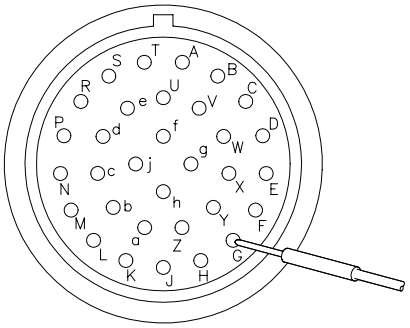
Point A	Point B
Connector P1 pin G	Connector P4 socket A
Connector P1 pin H	Connector P4 socket B

Is there continuity (resistance less than 10 ohms)?

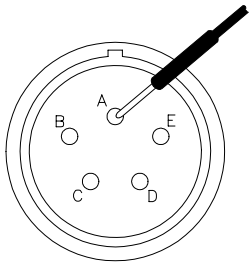
yes → Replace elevation tachometer (para 8–1).

no → Replace harness W7 (para 8–6).





W7
CONNECTOR P1
PIN G
(PIN H)



W7
CONNECTOR P4
SOCKET A
(SOCKET B)

06pc078t

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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

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	W22A Connector P2 socket b
W22A Connector P1 pin c	W22A Connector P2 socket c

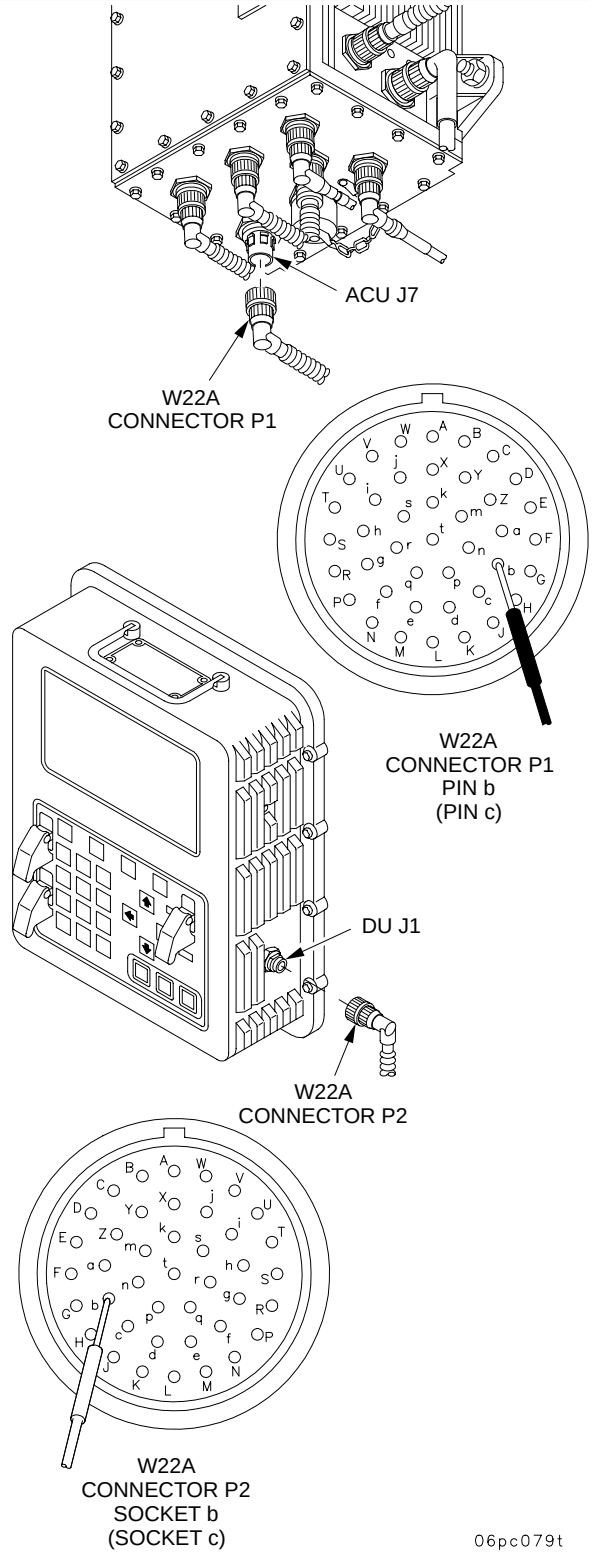
Is there continuity at all points (resistance less than 10 ohms)?

yes

1. Replace ACU (para 8–14).
2. If the problem still occurs after re–testing the AFCS, replace DU (para 8–17).

no

Replace harness W22A (para 8–9).



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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

WARNING
Make sure elevation and traverse paths are clear.

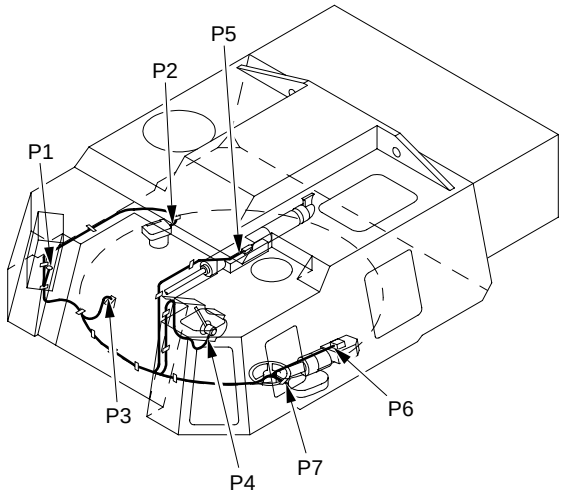
CONTINUED FROM STEP E

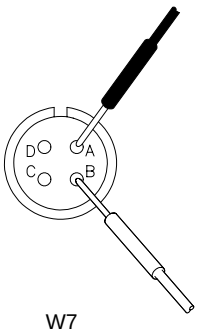
M

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.

Is the voltage between –8.5 and –10.0 V dc?





W7
CONNECTOR P6
SOCKET A
SOCKET B

06pc080t

yes

no

Go to Step Z.

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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 M

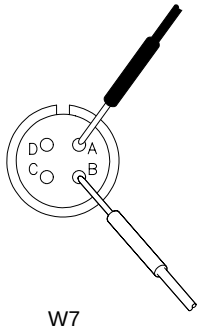
N

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

yes

no

Replace ACU (para 8–14).

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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 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?

yes

no → Go to Step AA.

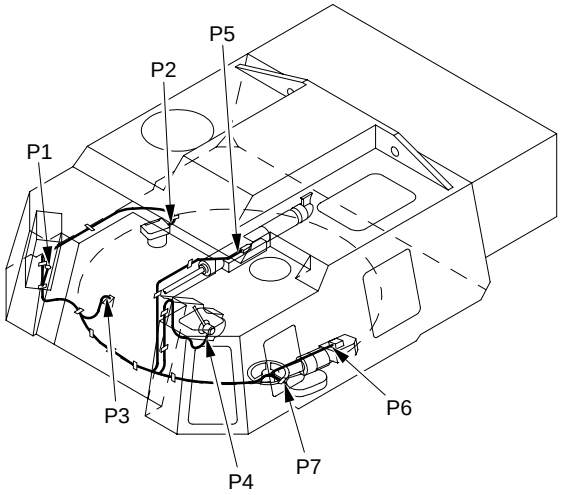
P

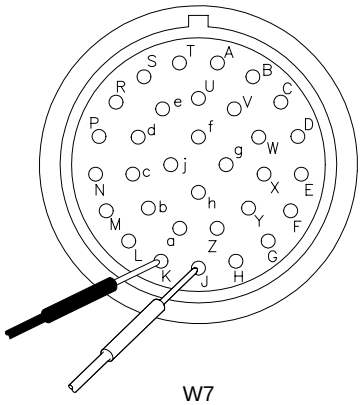
1. Place multimeter red lead in W7 connector P1 pin J and black lead in W7 connector P1 pin K.
2. Power traverse the cannon left (TM 9–2350–314–10) at full speed.
3. Measure the DC Voltage (V dc).

Is the voltage between –1.5 and –5.0 V dc?

yes

no → Replace azimuth tachometer (para 8–2).





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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 P

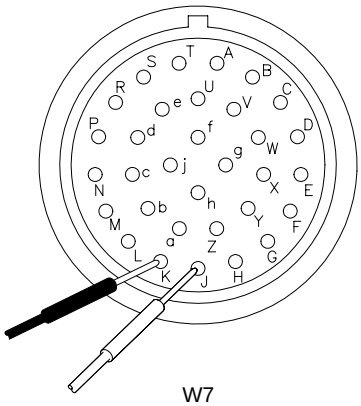
Q

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?



W7
CONNECTOR P1
PIN J
PIN K

06pc083t

yes

Notify direct support maintenance.

Replace the azimuth servo valve.

no

Replace azimuth tachometer (para 8–2).

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 F

R

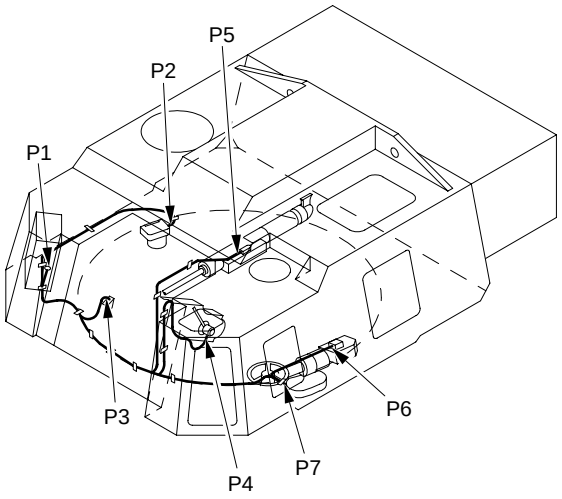
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W7 connector P1 at ACU connector J6.
3. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

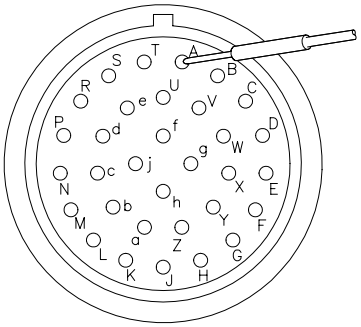
Point A	Point B
Connector P1 pin A	Connector P5 socket D
Connector P1 pin A	Connector P5 socket B
Connector P1 pin B	Connector P5 socket A
Connector P1 pin B	Connector P5 socket C

Is there continuity (resistance less than 10 ohms)?

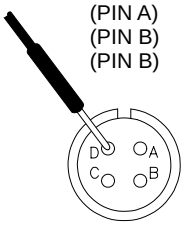
yes → Replace ACU (para 8–14).

no → Replace harness W7 (para 8–6).





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)?

yes → Go to Step V.

no

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)?

yes

no → Replace EL TACH (para 8–1).

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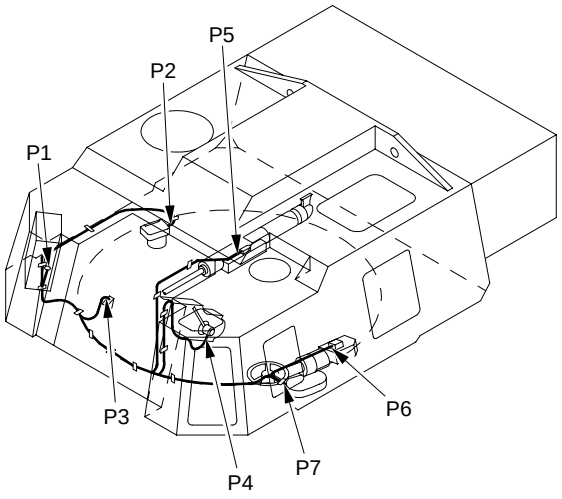
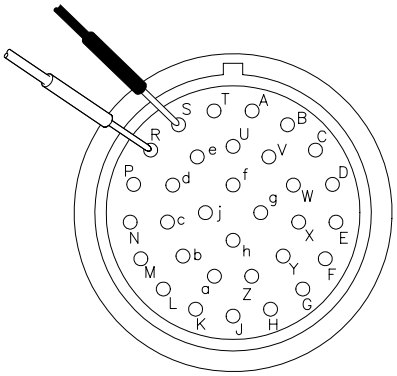
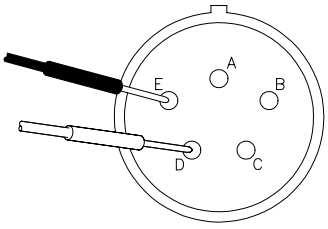




W7
CONNECTOR P1



EL TACH CONNECTOR

06pc034t

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

U

1. Reconnect harness W7 connector P4 to EL TACH.
2. Disconnect harness W7 connector P2 from AZ TACH.
3. Place one multimeter lead on AZ TACH connector pin D and other lead on AZ TACH pin E.
4. Check for continuity.

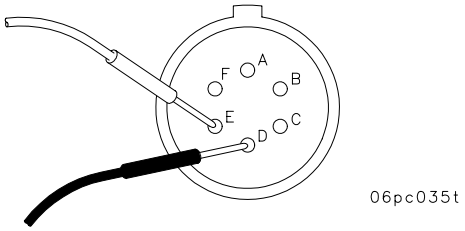
Is there continuity (resistance less than 10 ohms)?

yes

Replace harness W7 (para 8–6).

no

Replace AZ TACH (para 8–2).



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

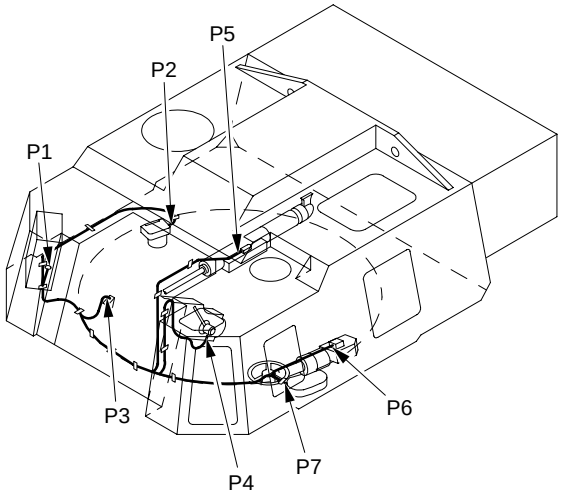
V

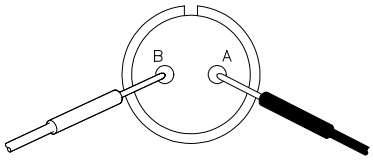
1. Reconnect harness W7 connector P1 to ACU connector J6.
2. Turn vehicle MASTER power switch and DU POWER switch ON (TM 9–2350–314–10).
3. Initialize AFCS (TM 9–2350–314–10) and enter FIRE COMMAND (para 3–2.4).
4. Ensure HYDRAULIC POWER switch is OFF.
5. Turn DU GUN SERVO switch ON (TM 9–2350–314–10).
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?





W7
CONNECTOR P7
SOCKET B
SOCKET A

06pc085t

yes

no

Go to Step Y.

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 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

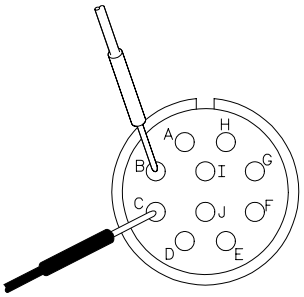
Voltage will only be present for about 5 to 15 seconds.

Is the voltage greater than 18 V dc?

yes

no

Replace harness W64 (para 5–31).



W64
CONNECTOR P2
SOCKET B
SOCKET C

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.

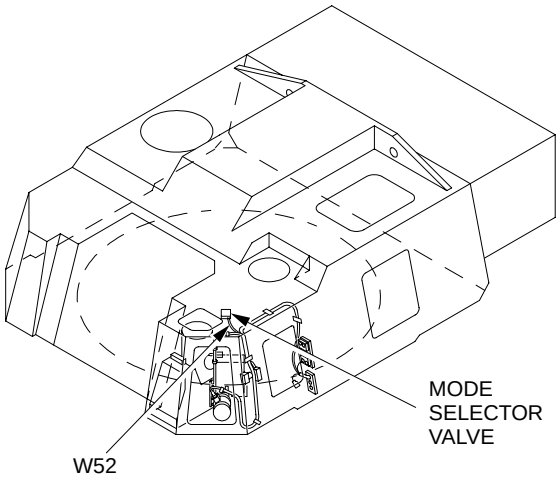
Is the voltage greater than 18 V dc?

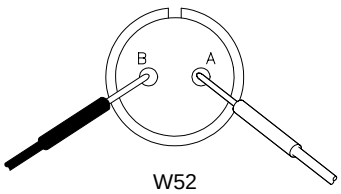
yes

no

Replace mode selector valve (para 18–27).

Replace harness W52 (para 5–35).





W52
CONNECTOR P6
SOCKET A
SOCKET B

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

Y

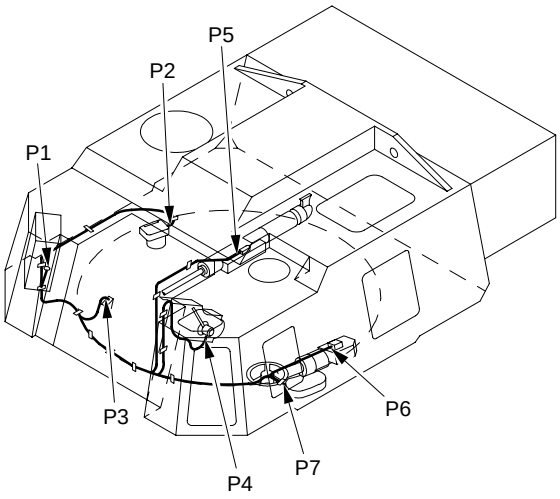
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W7 connector P1 at ACU connector J6.
3. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

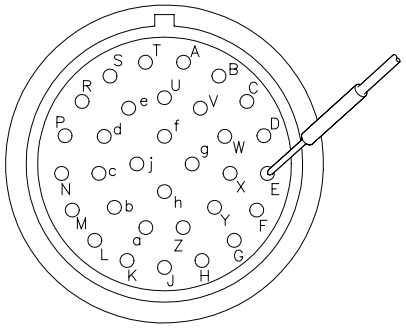
Point A	Point B
Connector P1 pin E	Connector P7 socket A
Connector P1 pin F	Connector P7 socket B

Is there continuity (resistance less than 10 ohms)?

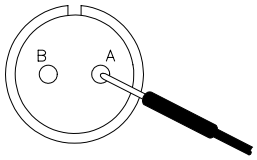
yes → Replace ACU (para 8–14).

no → Replace harness W7 (para 8–6).





W7
CONNECTOR P1
PIN E
(PIN F)



W7
CONNECTOR P7
SOCKET A
(SOCKET B)

06pc087t

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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 M

Z

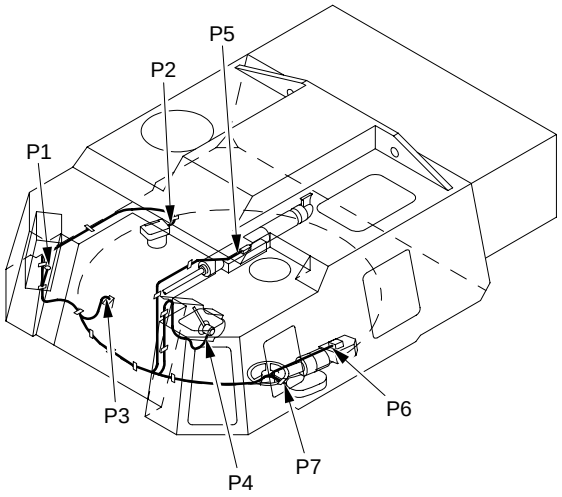
1. Turn DU POWER switch OFF and wait for AFCS to power down. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W7 connector P1 at ACU connector J6.
3. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

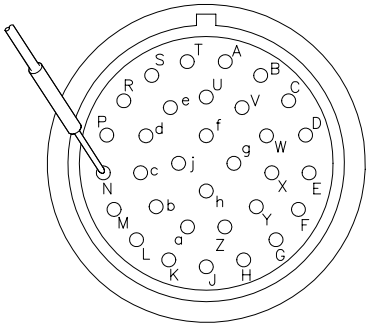
Point A	Point B
Connector P1 pin N	Connector P6 socket D
Connector P1 pin N	Connector P6 socket B
Connector P1 pin P	Connector P6 socket A
Connector P1 pin P	Connector P6 socket C

Is there continuity (resistance less than 10 ohms)?

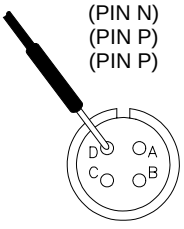
yes → Replace ACU (para 8–14).

no → Replace harness W7 (para 8–6).





W7
CONNECTOR P1
PIN N
(PIN N)
(PIN P)
(PIN P)



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

06pc088t

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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 O

AA

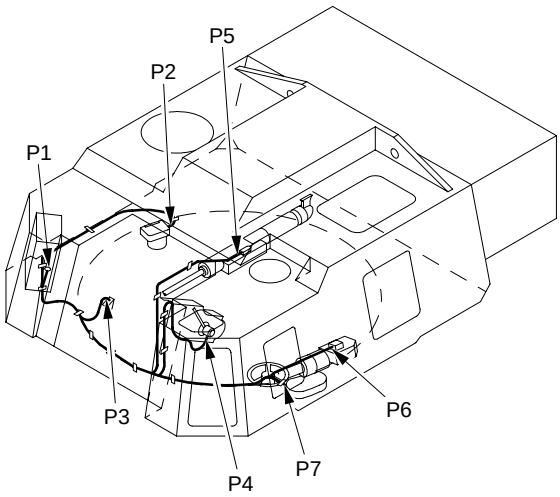
1. Turn HYDRAULIC POWER switch OFF and shut down engine.
2. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
3. Disconnect harness W7 connector P2 from the azimuth tachometer.
4. Check harness W7 for continuity by placing one multimeter lead on Point A and other multimeter lead on Point B.

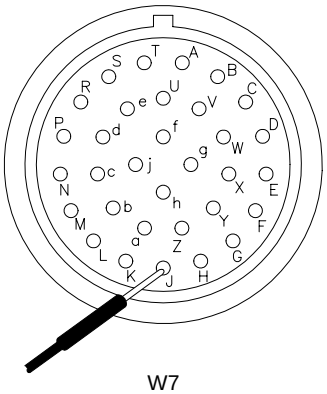
Point A	Point B
Connector P1 pin J	Connector P2 socket A
Connector P1 pin K	Connector P2 socket B

Is there continuity (resistance less than 10 ohms)?

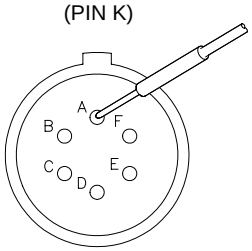
yes → Replace azimuth tachometer (para 8–2).

no → Replace harness W7 (para 8–6).





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.

INITIAL SETUP

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.

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

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?

yes → No fault exists.

no

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

yes / no

Replace azimuth tachometer (para 8–2).

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?

yes / no

Replace azimuth tachometer (para 8–2).

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?

yes / no

Replace azimuth tachometer (para 8–2).

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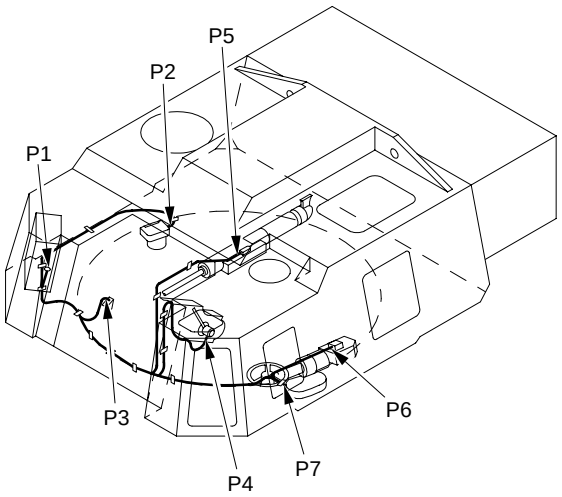
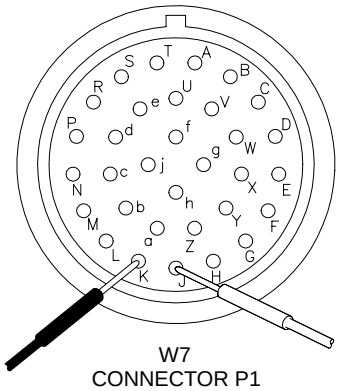




3–3. TROUBLESHOOTING CHART – CONTINUED

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

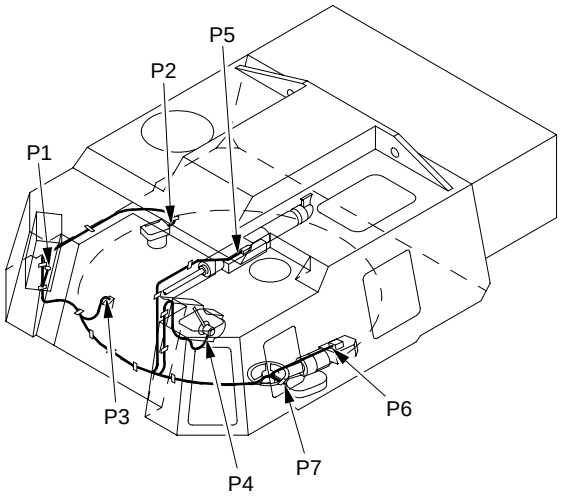
This test is checking that the azimuth tachometer outputs a constant (or near constant) voltage as it rotates. There should be no voltage drops or spikes to zero as long as the cannon is moving.

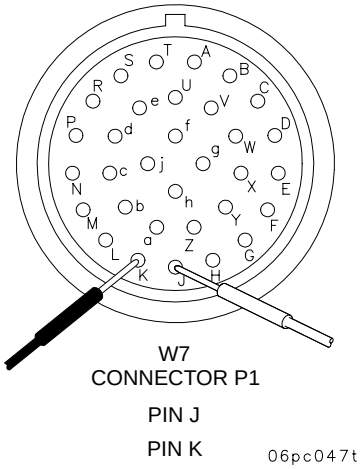
1. Place multimeter red lead in W7 connector P1 pin J and black lead in W7 connector P1 pin K.
2. Set the multimeter to measure V dc.
3. Slowly power traverse the cannon right (TM 9–2350–314–10) approximately 180 degrees in rotation at a constant speed.
4. Observe the multimeter during the traverse operation, and look for the voltage to drop to zero during the operation.

Was there a constant or near constant voltage level observed?

yes → Replace ACU (para 8–14).

no → Replace azimuth tachometer (para 8–2).





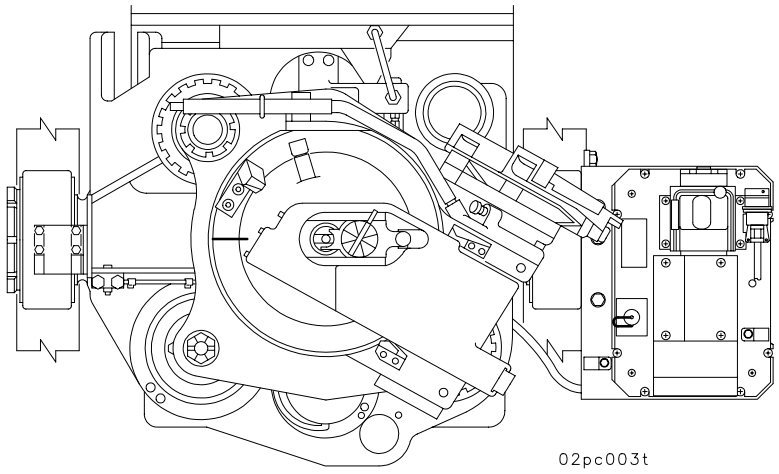
END OF TASK

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?

yes

no → Notify Direct Support Maintenance.

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?

yes

no → Go to Step D.

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?

yes → Verify fault is corrected.

no

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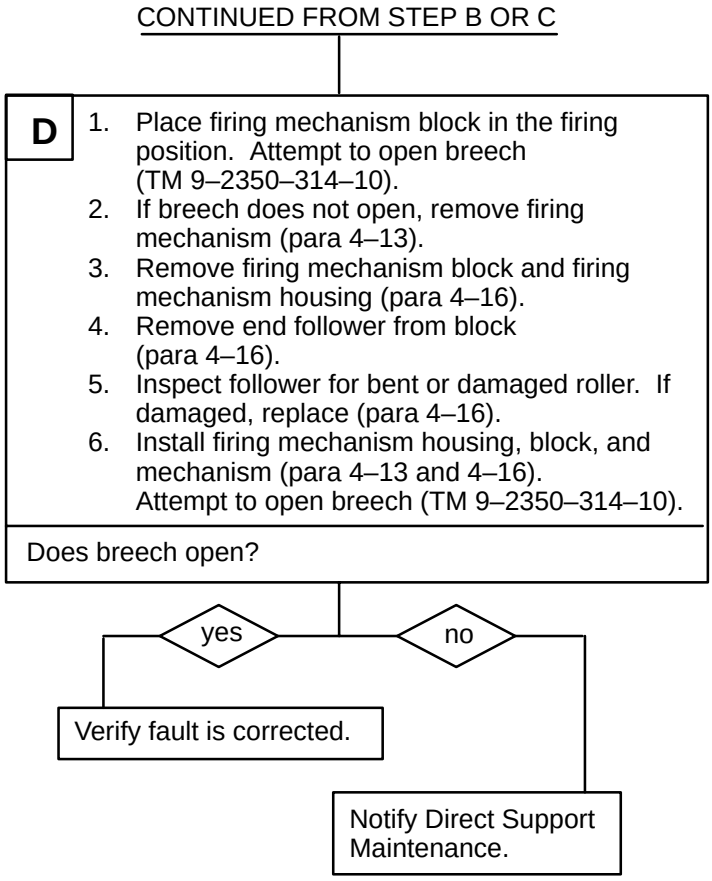
3–3. TROUBLESHOOTING CHART – CONTINUED

b. BREECH MECHANISM – CONTINUED	(1) BREECH DOES NOT OPEN MANUALLY. – CONTINUED



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?

yes

no → Go to step C.

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?

yes → Verify fault is corrected.

no

C

Adjust closing spring tension at leaf spring adjuster (para 4–15).

Does adjuster rotate past last notch?

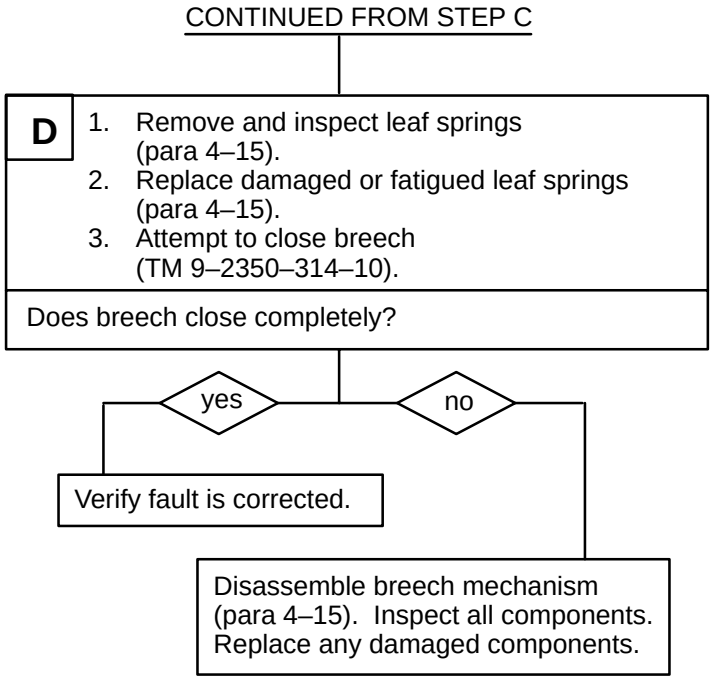
yes

no → If timing marks align, breech is fully closed. If not, go to para 4–15.

CONTINUED ON NEXT PAGE

3–3. TROUBLESHOOTING CHART – CONTINUED

b. BREECH MECHANISM – CONTINUED	(2) BREECH DOES NOT CLOSE COMPLETELY. – CONTINUED

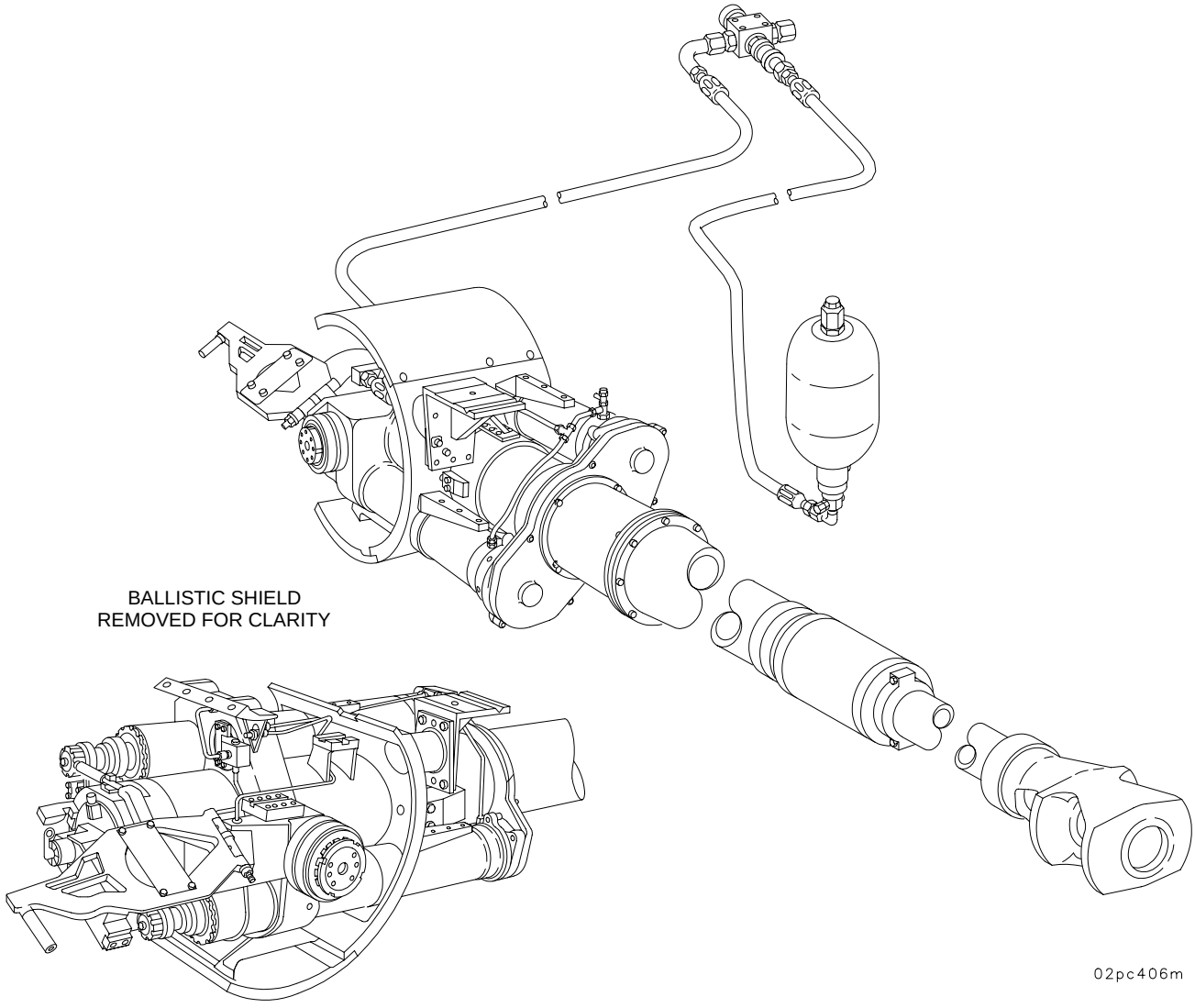


END OF TASK

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
(SC 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?

yes → Replace muzzle brake (para 4–14).

no

B Check accumulator pressure after mount has cooled. Pressure should be between 17 and 24 psi (TM 9–2350–314–10).

Is accumulator pressure at least 17–24 psi?

yes

no → Add hydraulic fluid (TM 9–2350–314–10).

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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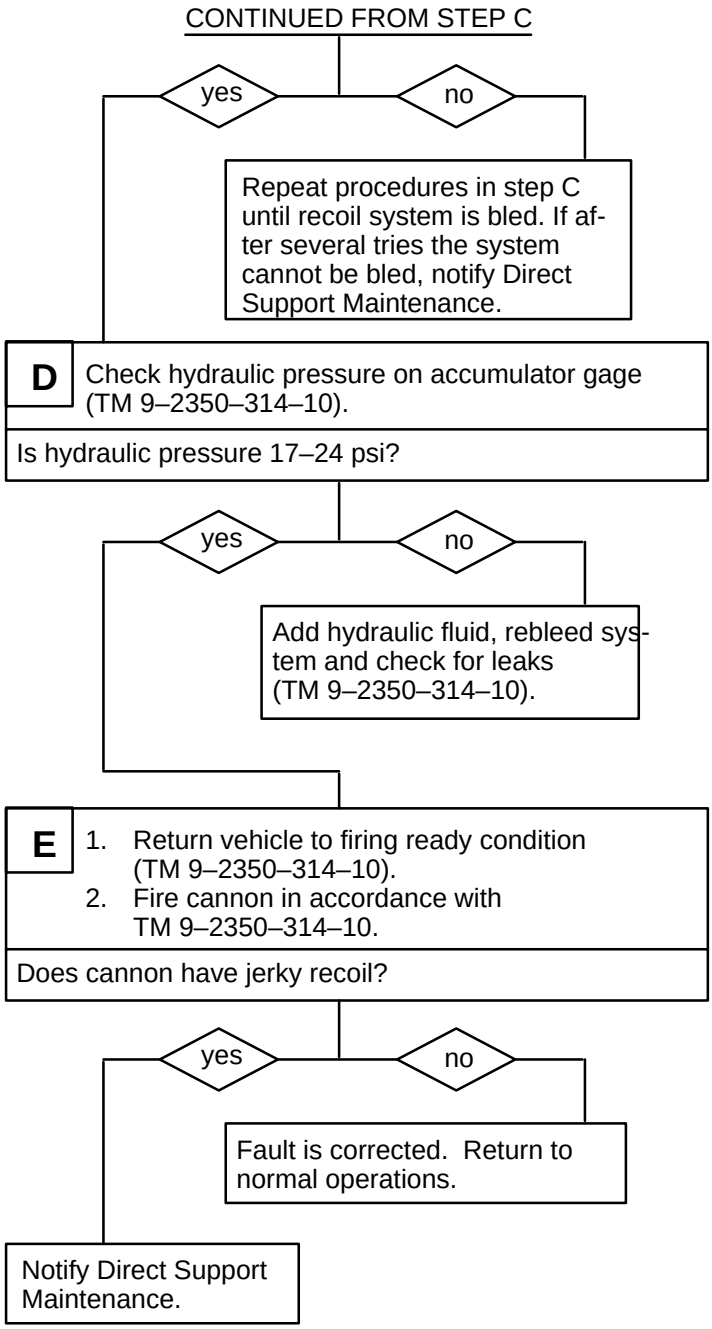
3–3. TROUBLESHOOTING CHART – CONTINUED

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
(SC 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?

yes → Replace muzzle brake (para 4–14).

no

B Check accumulator pressure after mount has cooled. Pressure should be between 17 and 24 psi (TM 9–2350–314–10).

Is replenisher pressure 17–24 psi?

yes

no → Add hydraulic fluid (TM 9–2350–314–10).

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?

CONTINUED ON NEXT PAGE

3–3. TROUBLESHOOTING CHART – CONTINUED

c. CANNON – CONTINUED (2) EXCESSIVE RECOIL FORCE. – CONTINUED

CONTINUED FROM STEP C

yes

no

Repeat procedures in step C until recoil system is bled. If after several tries the system cannot be bled, notify Direct Support Maintenance.

D Check hydraulic pressure on accumulator gage (TM 9–2350–314–10).

Is hydraulic pressure 17–24 psi?

yes

no

Add hydraulic fluid, rebleed system and check for leaks (TM 9–2350–314–10).

E

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 have excessive recoil force?

yes

no

Fault is corrected. Return to normal operations.

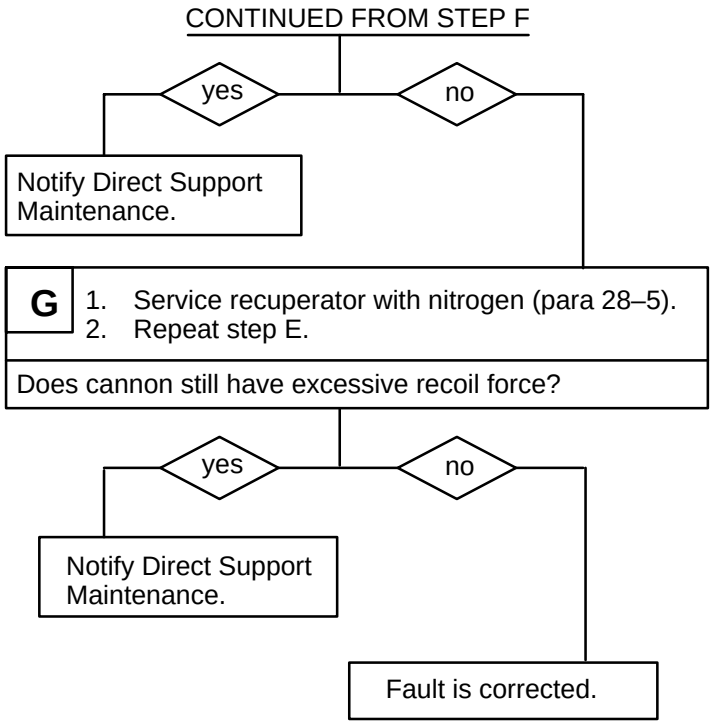
F Measure recuperator index pins (TM 9–2350–314–10).

Do pins protrude 1/8 to 3/4 inch?

CONTINUED ON NEXT PAGE

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
(SC 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?

yes

no

Repeat procedures in step A until recoil system is bled. If after several tries, the system cannot be bled, notify Direct Support Maintenance.

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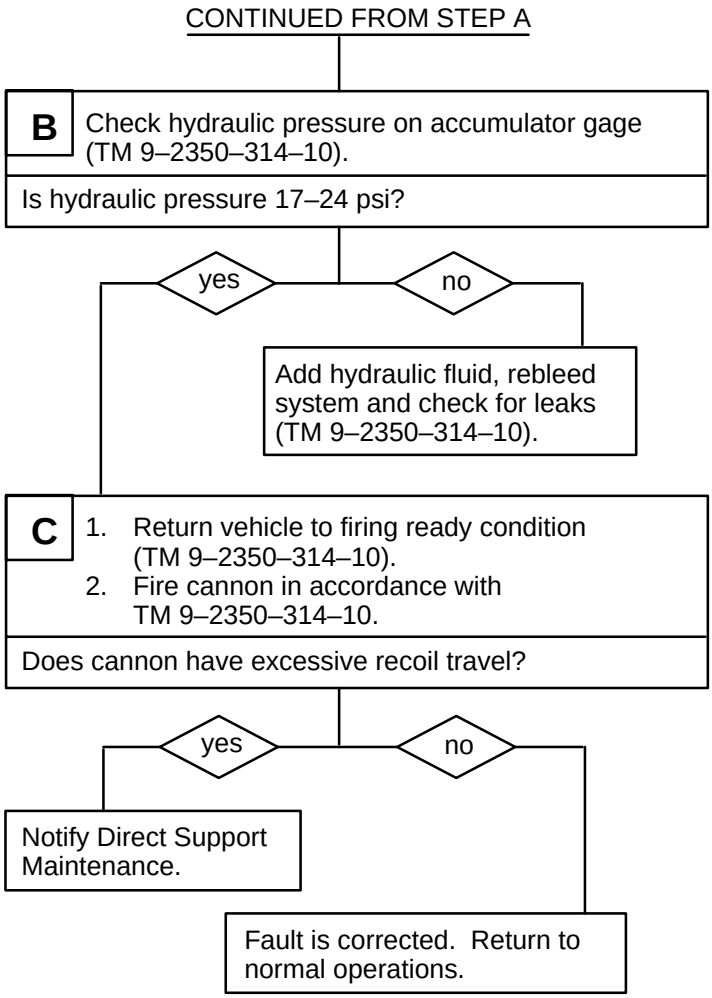
3–3. TROUBLESHOOTING CHART – CONTINUED

c. CANNON – CONTINUED (3) EXCESSIVE RECOIL TRAVEL. – CONTINUED



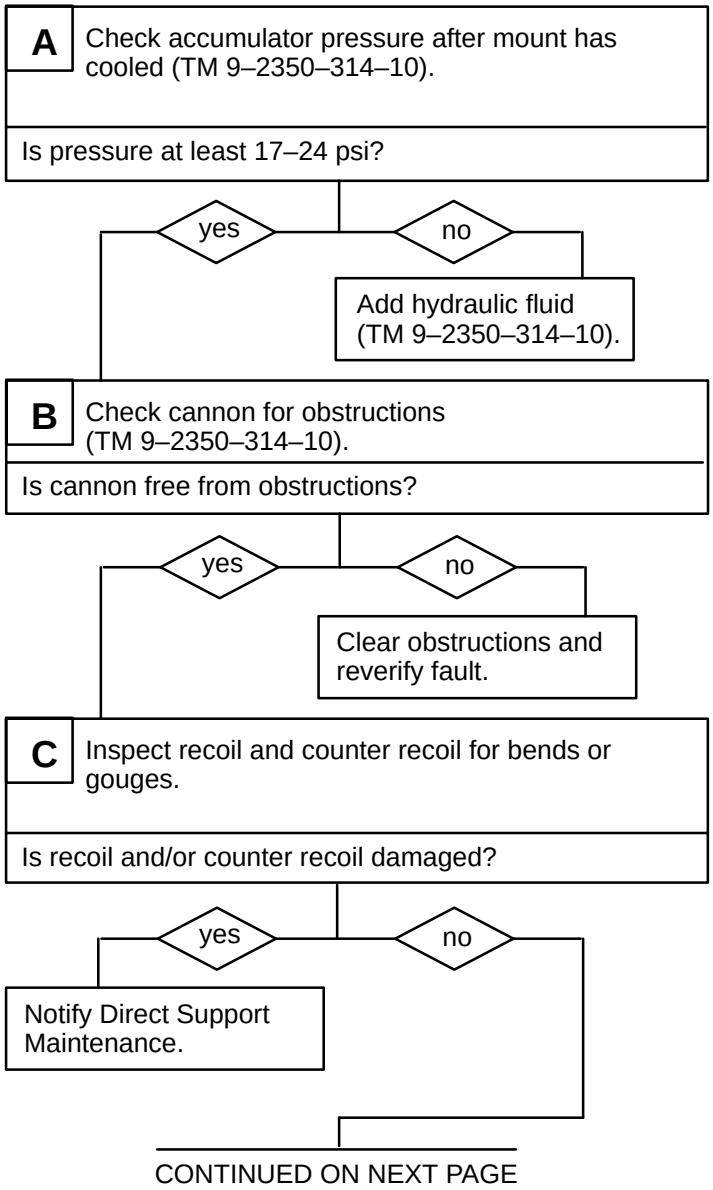
END OF TASK

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
(SC 5180–95–A12)
Nitrogen charging kit (item 23, Appx G)



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3–3. TROUBLESHOOTING CHART – CONTINUED

c. CANNON – CONTINUED	(4) CANNON DOES NOT RETURN TO BATTERY. – CONTINUED

CONTINUED FROM STEP C

D

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.

Is all air bled from recoil system?

yes

no

Repeat step D. If recoil system cannot be bled after several tries, notify Direct Support Maintenance.

E

Attach gages of nitrogen charging kit to recuperator and check recuperator pressure (para 28–5).

Is recuperator pressure 700 $\pm$ 50 psi?

yes

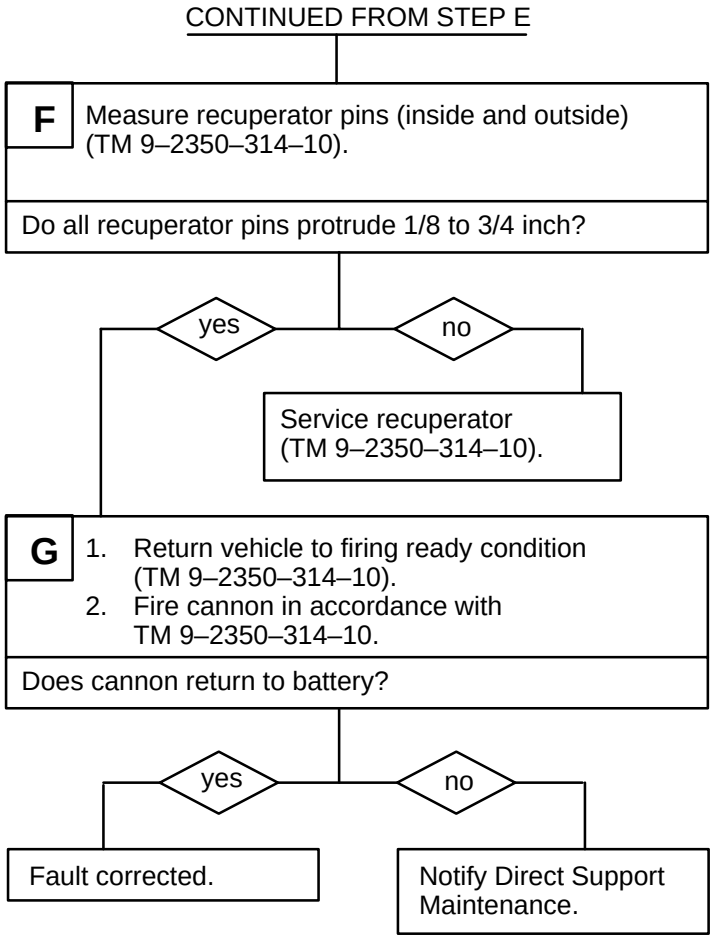
no

Service recuperator (para 28–5).

CONTINUED ON NEXT PAGE

3–3. TROUBLESHOOTING CHART – CONTINUED

c. CANNON – CONTINUED	(4) CANNON DOES NOT RETURN TO BATTERY. – CONTINUED



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?

yes

Clean restricted firing pin and/or replace damaged parts (para 4–13).

no

B Reassemble and test mechanism.

Does firing mechanism function properly?

yes

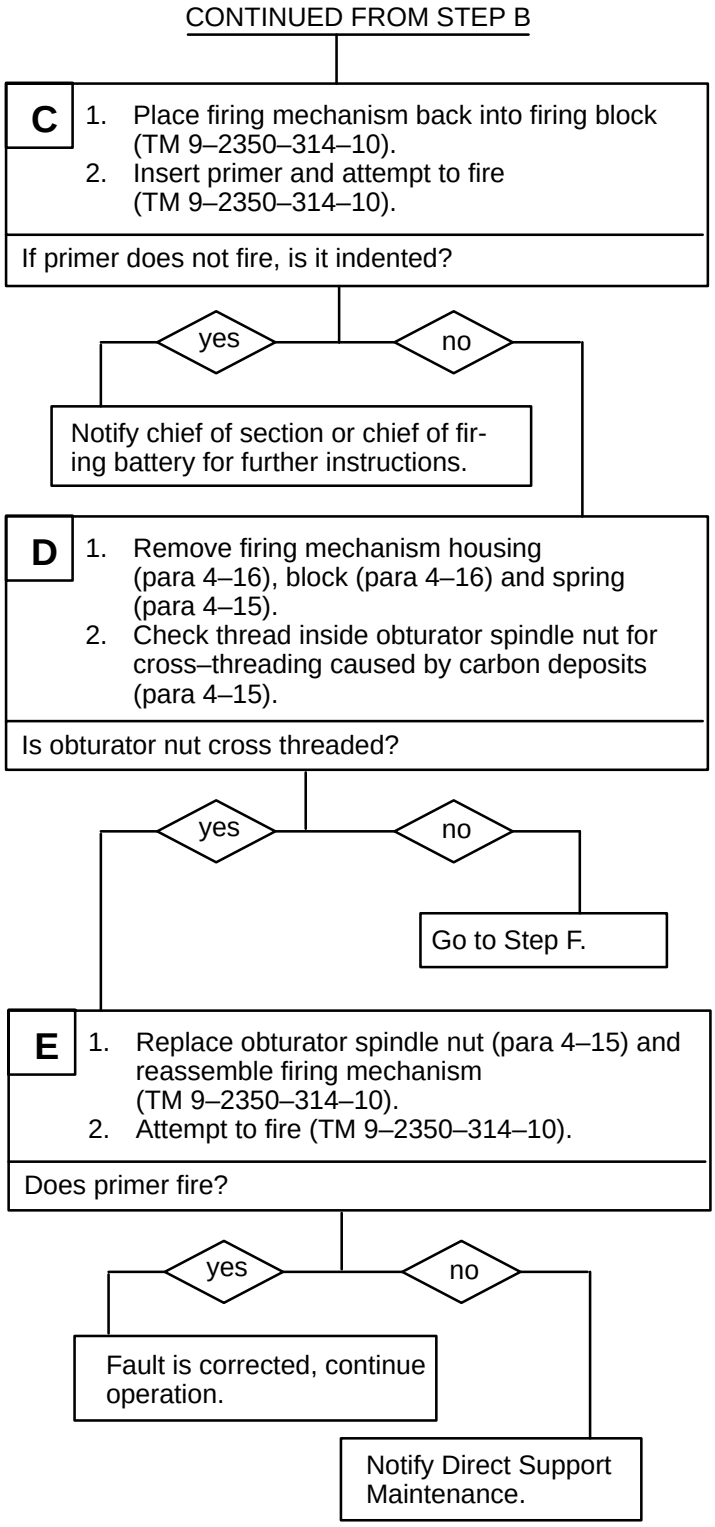
no

Replace firing mechanism (para 4–13).

CONTINUED ON NEXT PAGE

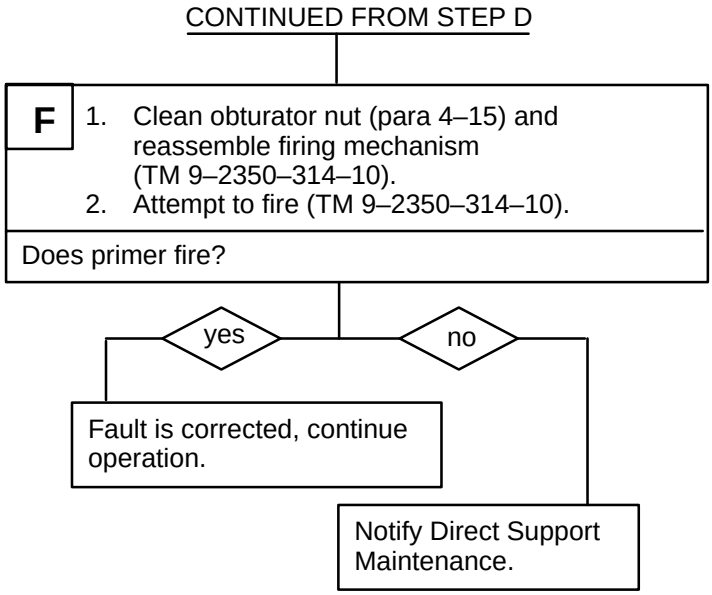
3–3. TROUBLESHOOTING CHART – CONTINUED

c. CANNON – CONTINUED	(5) PRIMER DOES NOT FIRE – PRIMER NOT INDENTED. – CONTINUED



3–3. TROUBLESHOOTING CHART – CONTINUED

c. CANNON – CONTINUED	(5) PRIMER DOES NOT FIRE – PRIMER NOT INDENTED. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

d. ELEVATION SYSTEM

The elevation system consists of the 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, and equilibration accumulator. The diagram on the following page shows the relationship of these components.

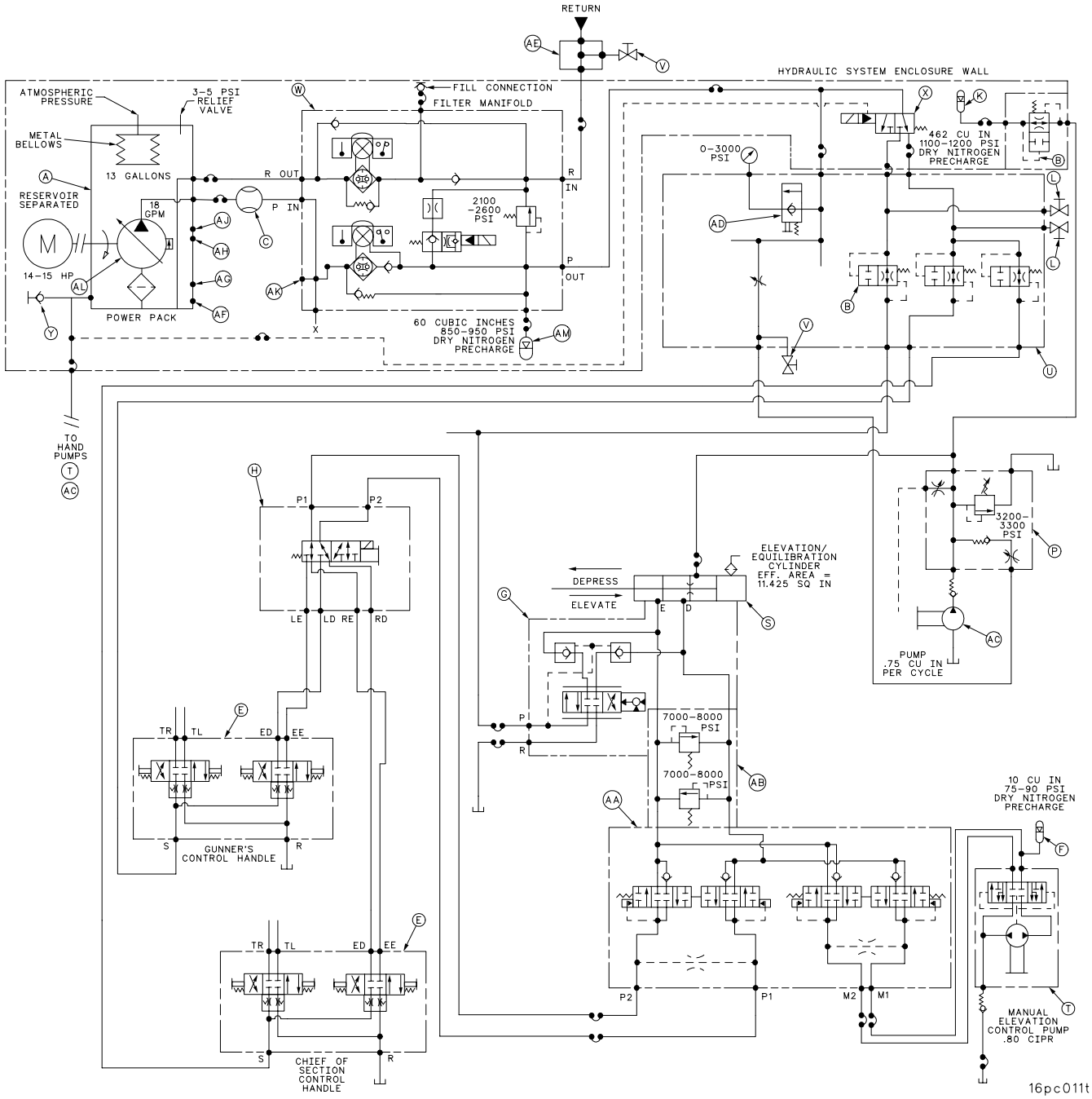
With the engine running and the hydraulic power switch (S1) on the hydraulic control box in the ON position, the hydraulic system will power up. Hydraulic pressure is supplied by the pump through the flowmeter and filter assembly to the mode selector valve. The mode selector valve is controlled by the AFCS. When in AFCS mode, hydraulic pressure is supplied to the elevation cylinder via the pulse accumulator, fuse assembly, and elevation servo valve. In power mode, pressure is supplied via 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, the relief valves, and on to elevate or depress the elevation cylinder. The cannon may also be elevated manually using the manual elevation control pump which 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			
C	FLOW METER	12562735	V	SAMPLING BLEED VALVE	M81940/1–2	AG	TEMP. TRANSDUCER	12554015
E	GUNNER'S CONTROL	10922902	W	FILTER ASSY.	12553354	AH	LEVEL SENSOR	12934603
F	ACCUMULATOR	7974982	X	MODE SELECTOR VALVE	12561784	AJ	WARM UP TEMP. SWITCH	M24236/2A8DUCS
G	EL SERVOVALVE ASSY.	12553898	Y	QUICK DISC. CPL. & HALF	12910614–1			
H	SELECTOR VALVE	12553595	AA	LOCKING VALVE ASSY.	11784023	AK	PRESSURE TRANSDUCER	12554014
K	ACCUMULATOR,EQUILIBRATION	12553726	AB	RELIEF VALVE	7738814	AL	HYDRAULIC PUMP	12553353
L	BLEED VALVE	11783927	AC	EQUILIBRATION HANDPUMP	7382992	AM	ACCUMULATOR	11665003
P	EQUILIBRATION MANF.	11636342	AD	MANUAL PULL VALVE	12948159			
S	EL/EQUILIBRATOR CYL.	12553710	AE	RETURN MANIFOLD	12553564			



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

Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Nitrogen charging kit (item 23, Appx G)

Equipment Conditions
Gun tube out of travel lock (TM 9–2350–314–10)

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?

yes → Correct leakage. Recheck for fault indication.

no →

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?

yes → Notify Direct Support Maintenance.

no →

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?

yes → Fault does not exist as indicated.

no →

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?

yes → Fault corrected.

no

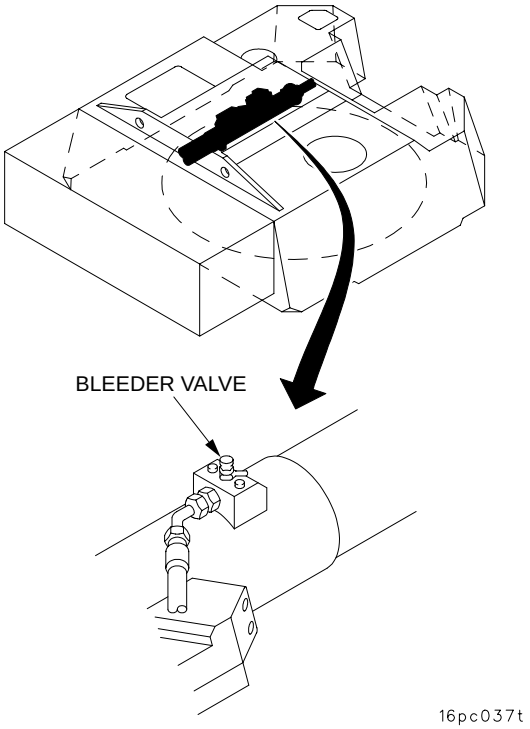
E

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?

yes → Bleed the elevation cylinder by turning bleeder valve knob counter–clockwise until air–free fluid flows and recheck for fault. If fault still exists go to Step I.

no



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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

F

1. Turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
2. Turn engine OFF (TM 9–2350–314–10).
3. Turn vehicle MASTER POWER switch OFF (TM 9–2350–314–10).
4. Check the equilibration accumulator nitrogen pressure (para 28–7).

Is nitrogen pressure between 1100 and 1200 psi?

yes → Go to Step J.

no

G Charge equilibration accumulator (para 28–7).

Does equilibration accumulator pressure stay between 1100 and 1200 psi?

yes

no → Replace accumulator (para 18–33).

H Attempt to elevate cannon tube using manual mode (TM 9–2350–314–10).

Does cannon elevate?

yes → Fault is corrected.

no → Notify Direct Support Maintenance.

CONTINUED ON NEXT PAGE

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?

yes

no

Replace velocity fuse (para 18–11). If system still does not operate, notify Direct Support Maintenance.

CONTINUED FROM STEP F

J

Attempt to equilibrate the system (TM 9–2350–314–10).

Will system equilibrate?

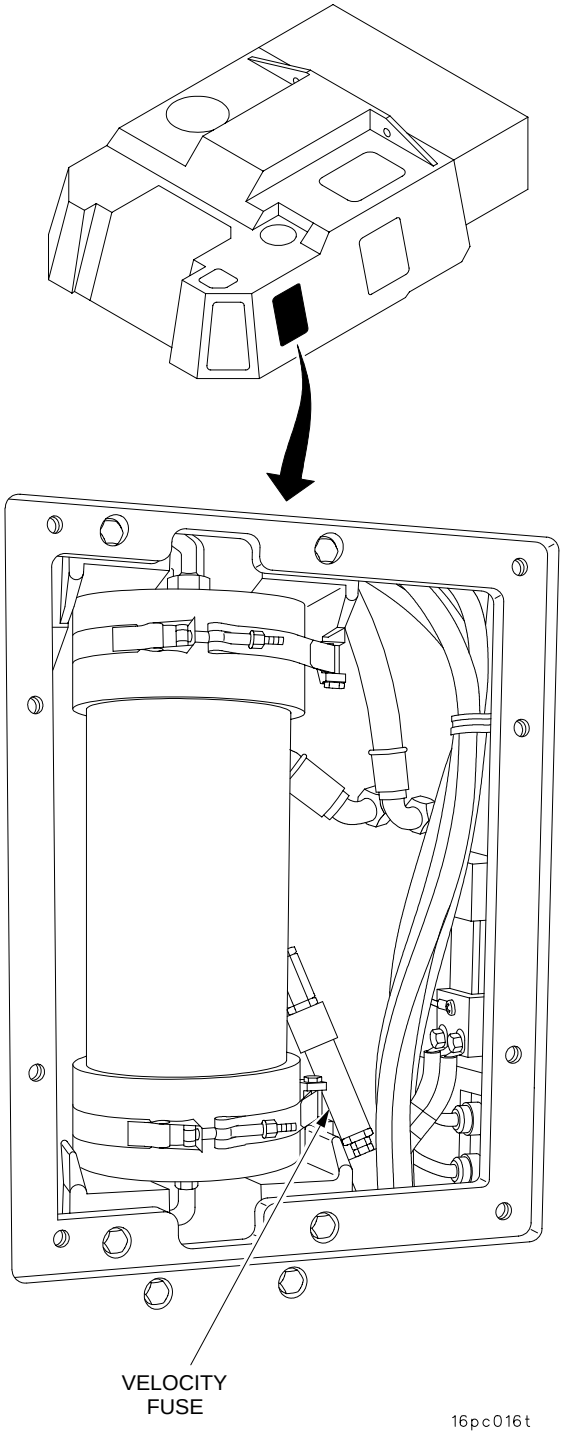
yes

no

Fault is corrected.

Repeat Step J. If system still will not equilibrate, notify Direct Support Maintenance.

END OF TASK



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)
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 Inspect cab and hydraulic compartment for leakage (TM 9–2350–314–10).

Does leakage exist?

yes

Correct leakage. Recheck for fault indication.

no

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).

Does damage and/or binding exist?

yes

Notify Direct Support Maintenance.

no

CONTINUED ON NEXT PAGE

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

C

1. Release travel lock (TM 9–2350–314–10).
2. Manually attempt to raise cannon tube (hand pump) (TM 9–2350–314–10).
3. Manually attempt to lower cannon tube (hand pump) (TM 9–2350–314–10).

Does cannon elevate and depress?

yes

no → Go to para 3–3.d(1).

D

1. Remove hydraulic exterior access panel (para 24–3).
2. Bleed system pressure to zero (para 18–1).
3. Listen to and feel for elevation velocity fuse to reset.

Did the velocity fuse reset?

yes

no → Replace velocity fuse (para 18–11).

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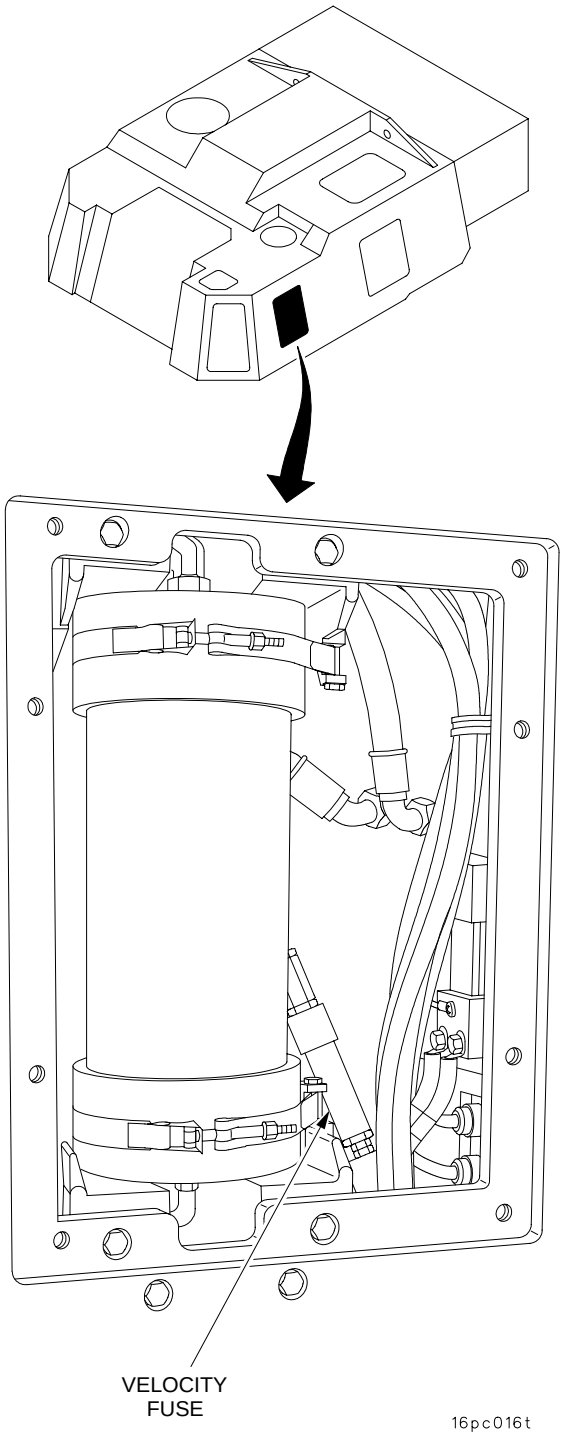


3–3. TROUBLESHOOTING CHART – CONTINUED

d. ELEVATION SYSTEM – CONTINUED	(2) CANNON WILL ONLY ELEVATE A FEW MILS OR ELEVATES SLOWLY. – CONTINUED

CONTINUED FROM STEP 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?

yes → Fault is corrected.

no

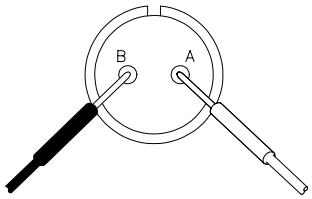
F

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?

yes → Go to para 3–3.a(18).

no → Notify Direct Support Maintenance.



W52
CONNECTOR P6
SOCKET A
SOCKET B

03pc080t

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

Prior to starting this tree, ensure that the velocity fuse is reset (para 18–46).

A

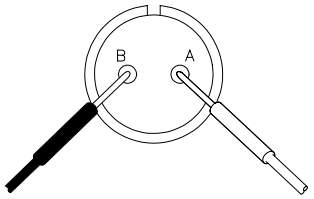
1. Turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
2. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
3. Disconnect harness W64 connector P4 from solenoid of elevation selector valve.
4. Turn vehicle MASTER power switch ON and start engine (TM 9–2350–314–10).
5. Turn HYDRAULIC POWER switch 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.

Is voltage present?

yes

Replace the elevation selector valve (para 18–40).

no



W64
CONNECTOR P4
SOCKET A
SOCKET B

03pc085t

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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 A

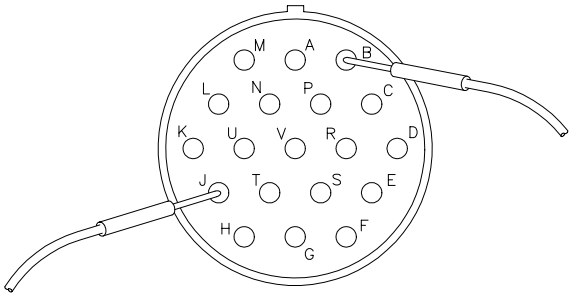
B

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 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?

yes / no

Perform a harness check on harness W64 (para 3–3.n(7)).



HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN B
PIN J

C

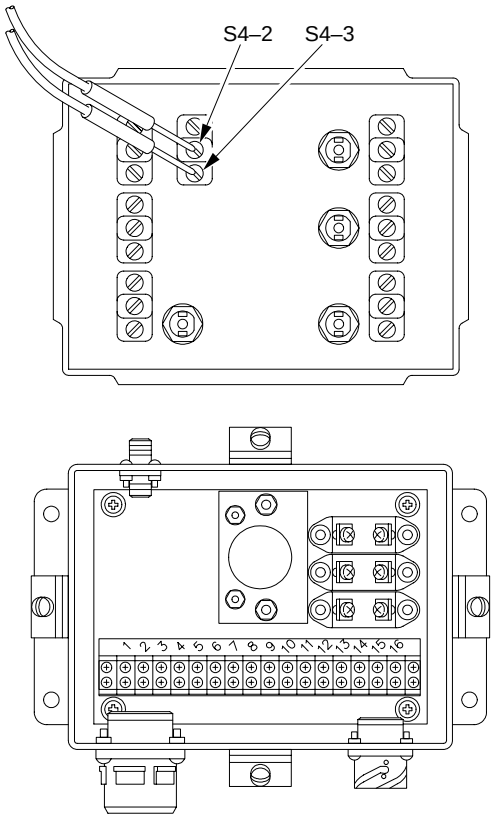
1. Remove cover from hydraulic control box (para 5–20).
2. Disconnect wire 12934657–5 from TB1–8 (para 5–21).
3. Make sure ELEVATION switch is set to COS (TM 9–2350–314–10).
4. Check the elevation switch for continuity by placing one multimeter lead on elevation switch terminal 2 (S4–2) and placing the other lead on elevation switch terminal 1 (S4–1).

Is continuity present?

yes / no

Replace ELEVATION switch (para 5–20). Verify problem is solved.

Fault does not exist as indicated. Recheck fault symptom.



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.

Is voltage present?

yes

Replace the elevation selector valve (para 18–40).

no

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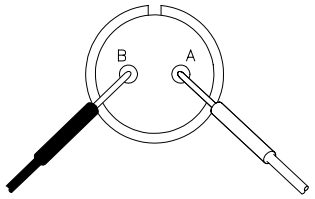


W64
CONNECTOR P4
SOCKET A
SOCKET B

03pc085t

3–3. TROUBLESHOOTING CHART – CONTINUED

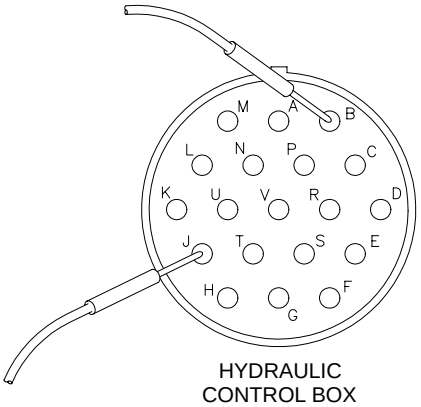
d. ELEVATION SYSTEM – CONTINUED	(4)	CANNON WILL NOT ELEVATE USING GUNNER'S CONTROL HANDLE (COS is normal). ELEVATION switch is set to GUNNER. – CONTINUED

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?



HYDRAULIC CONTROL BOX CONNECTOR J1
PIN B
PIN J

03pc086t

yes

Perform a harness check on harness W64 (para 3–3.n(7)).

no

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?

yes

no

Tighten connections and recheck for fault.

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 C

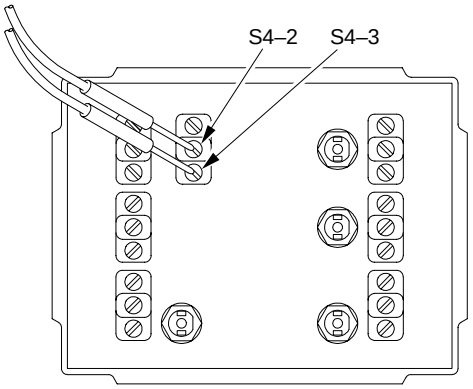
D

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?

yes → Replace harness 12563029 (para 5–22). Verify problem is solved.

no → Replace ELEVATION switch (para 5–20). Verify problem is solved.



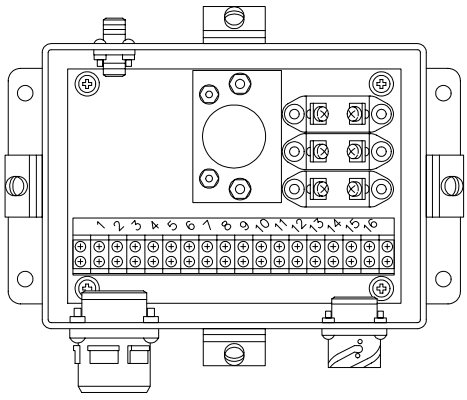
E

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?

yes → Replace lead 12934657–5 (para 5–21). Verify problem is solved.

no → Replace harness 12563029 (para 5–22). Verify problem is solved.



HYDRAULIC CONTROL BOX OPENED

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?

yes → Correct leakage. Recheck for fault indication.

no

B

Inspect cannon mount and elevation cylinder for damage (TM 9–2350–314–10).

Is cannon mount or elevation cylinder damaged?

yes → Notify Direct Support Maintenance.

no

C

Check accumulator nitrogen pressure (para 28–6).

Does nitrogen gage read 1100–1200 psi?

CONTINUED ON NEXT PAGE

3–3. TROUBLESHOOTING CHART – CONTINUED

d. ELEVATION SYSTEM – CONTINUED	(5) CANNON DRIFTS. Inability to hold in power mode. – CONTINUED

CONTINUED FROM STEP C

yes

no

Charge accumulator (para 28–6).

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.

D

1. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).
2. Unlock and lower travel lock (TM 9–2350–314–10).
3. Turn HYDRAULIC POWER switch ON (TM 9–2350–314–10).
4. Raise cannon to max elevation.
5. Lower cannon at full speed to minimum elevation (see Note above).
6. Raise cannon to 533 mils.
7. Elevate and depress cannon using manual elevation handle (TM 9–2350–314–10).

Does cannon elevate and depress with equal force and speed?

yes

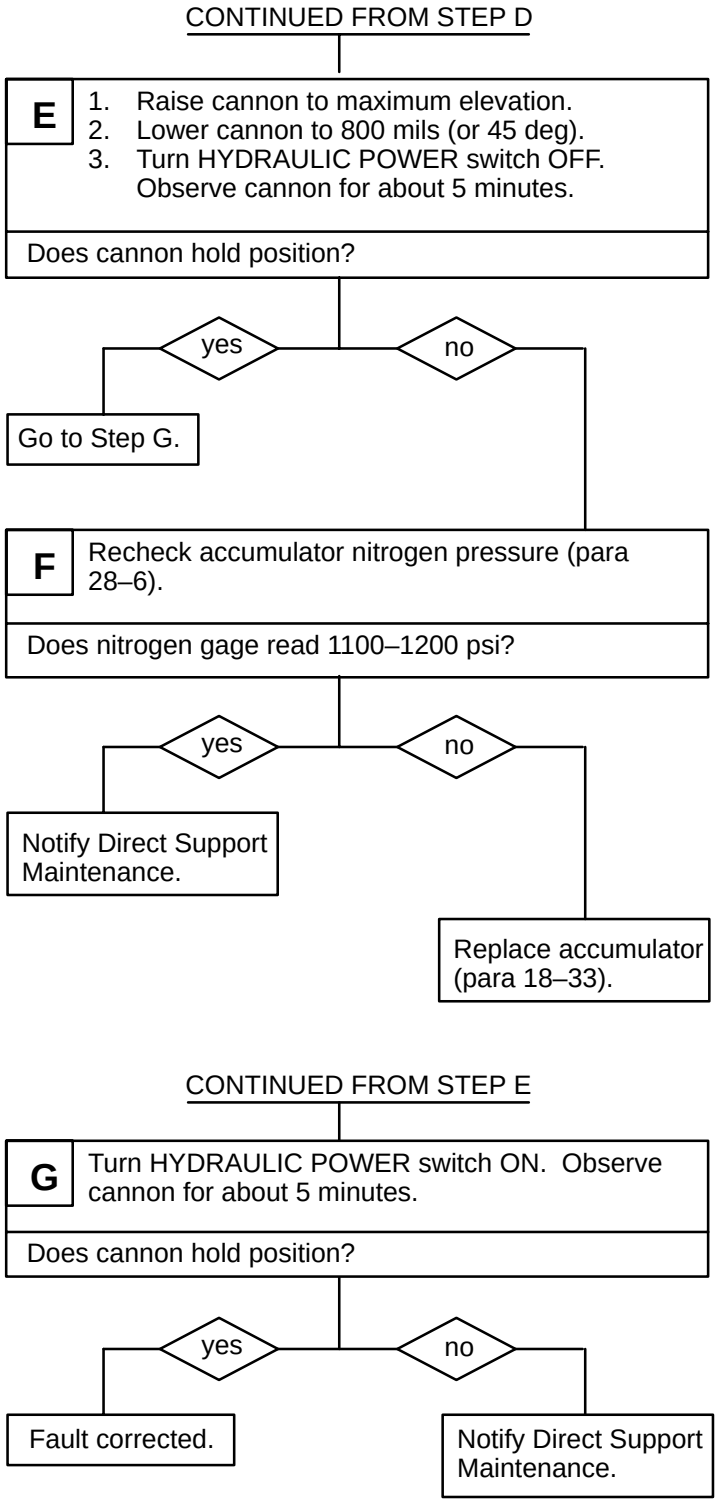
no

Notify Direct Support Maintenance.

CONTINUED ON NEXT PAGE

3–3. TROUBLESHOOTING CHART – CONTINUED

d. ELEVATION SYSTEM – CONTINUED	(5) CANNON DRIFTS. Inability to hold in power mode. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

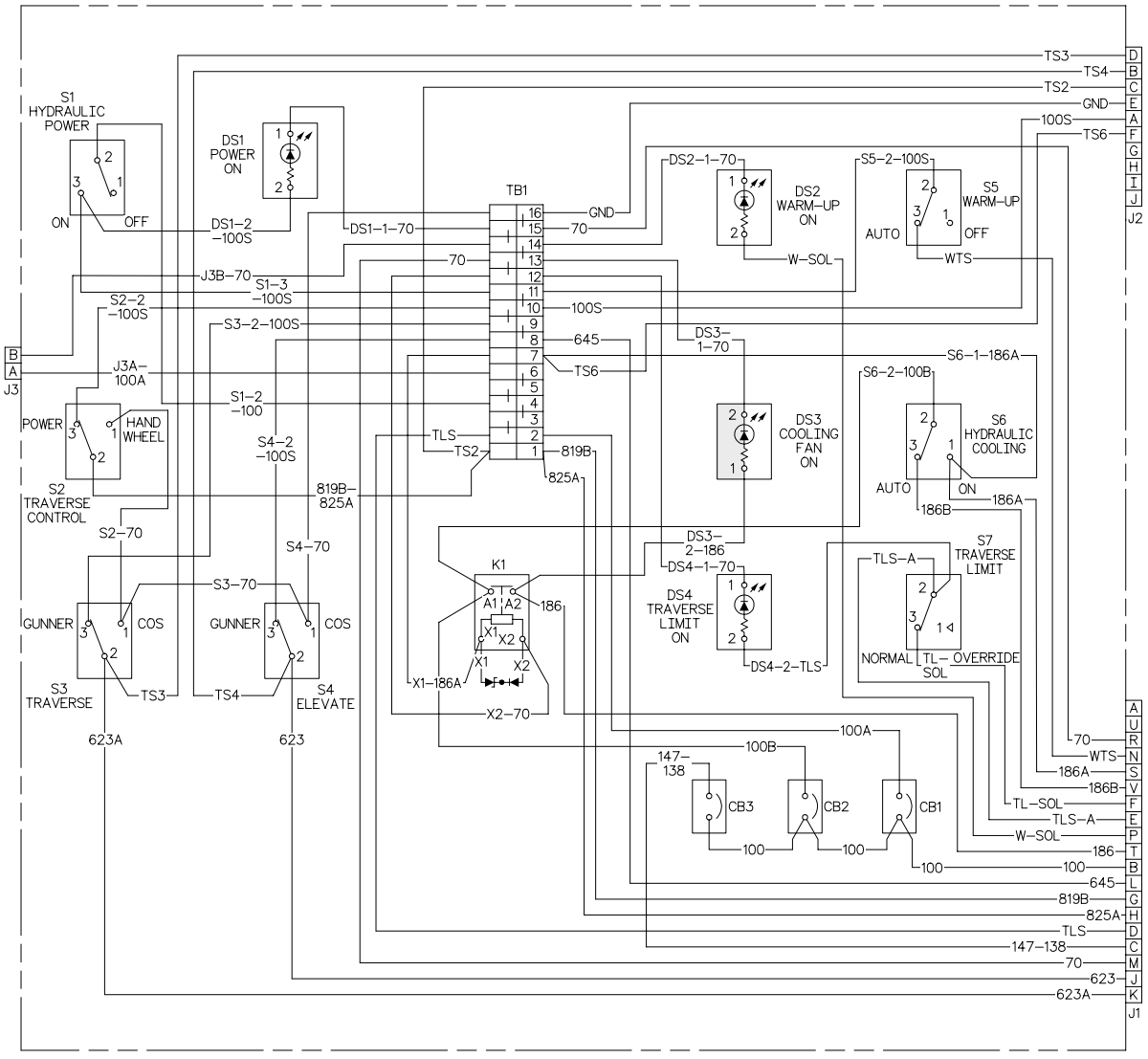
e. HYDRAULIC COOLING SYSTEM

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.

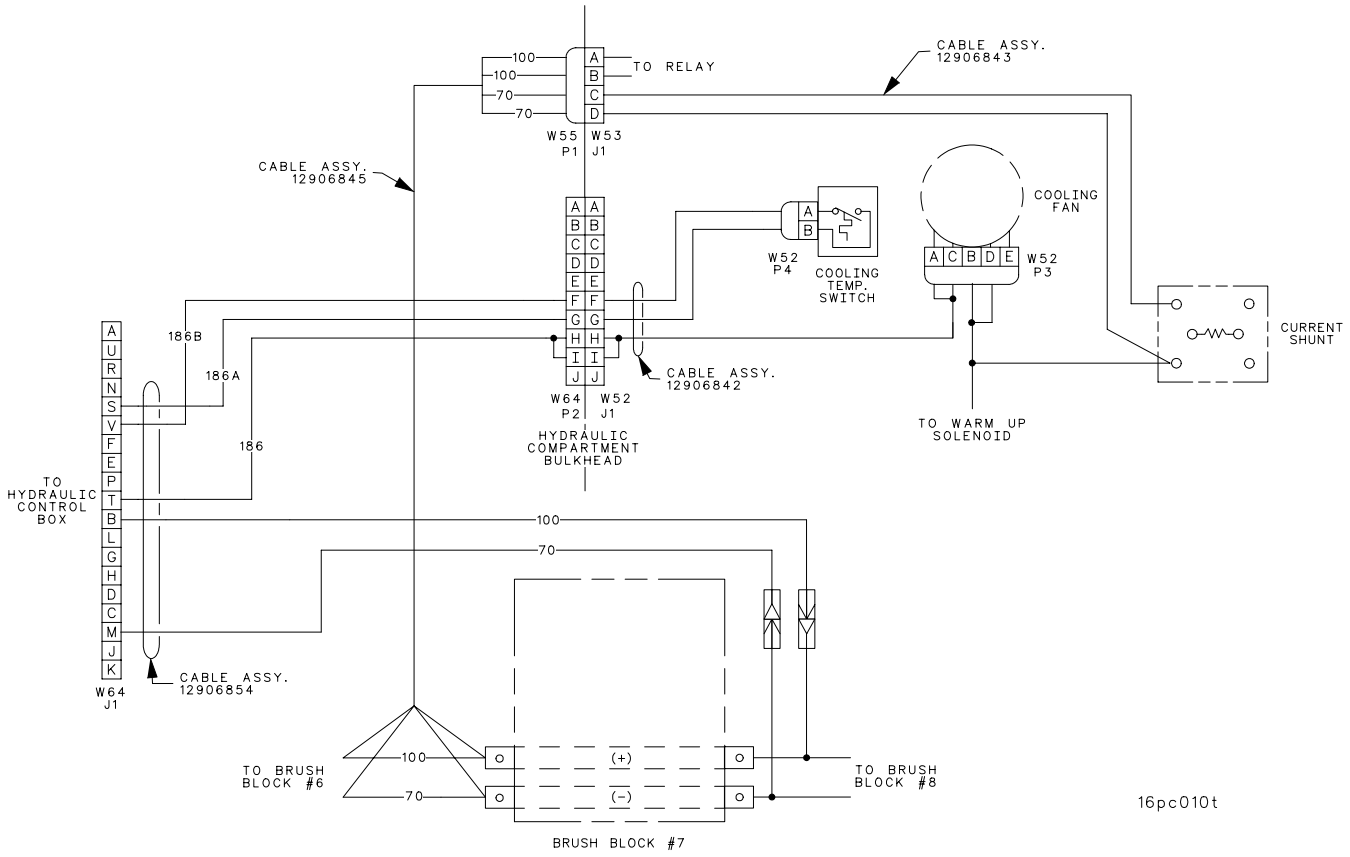
When the MASTER power switch is ON, 24 V dc and ground is supplied through brush block #7 to the hydraulic control box. Ground is also supplied through one side of the current shunt to the hydraulic cooling fan.

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.



3–3. TROUBLESHOOTING CHART – CONTINUED

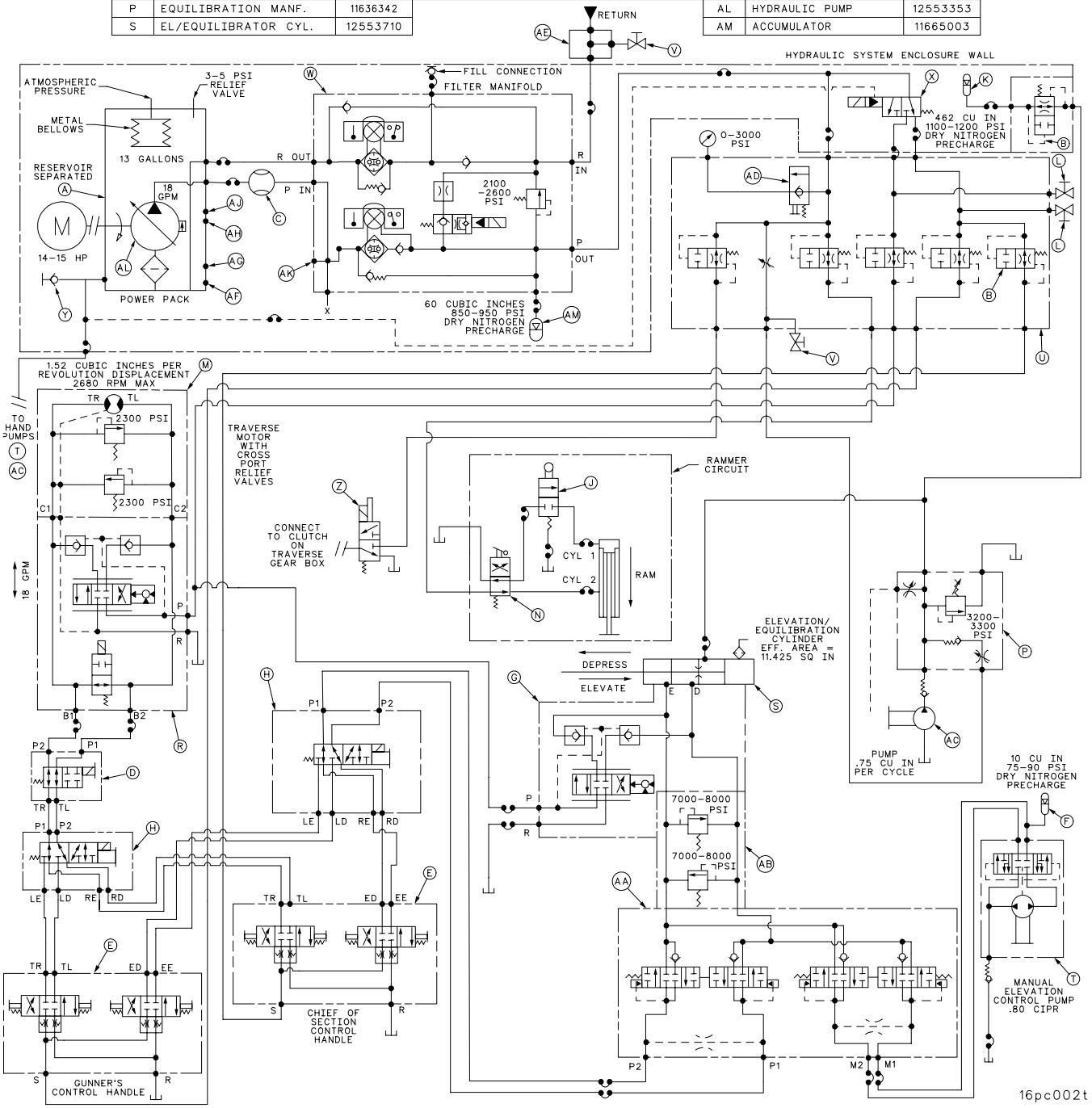
e. HYDRAULIC COOLING SYSTEM – CONTINUED



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			
F	ACCUMULATOR	7974982	X	MODE SELECTOR VALVE	12561784	AG	TEMP. TRANSDUCER	12554015
G	EL SERVOVALVE ASSY.	12553898	Y	QUICK DISC. CPL. & HALF	12910614–1	AH	LEVEL SENSOR	12934603
H	SELECTOR VALVE	12553595	AA	LOCKING VALVE ASSY.	11784023	AJ	WARM UP TEMP. SWITCH	M24236/ 2A8DUCS
K	ACCUMULATOR,EQUILIBRATION	12553726	AB	RELIEF VALVE	9399024			
L	BLEED VALVE	11783927	AC	EQUILIBRATION HANDPUMP	7382992	AK	PRESSURE TRANSDUCER	12554014
P	EQUILIBRATION MANF.	11636342				AL	HYDRAULIC PUMP	12553353
S	EL/EQUILIBRATOR CYL.	12553710				AM	ACCUMULATOR	11665003



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?

yes

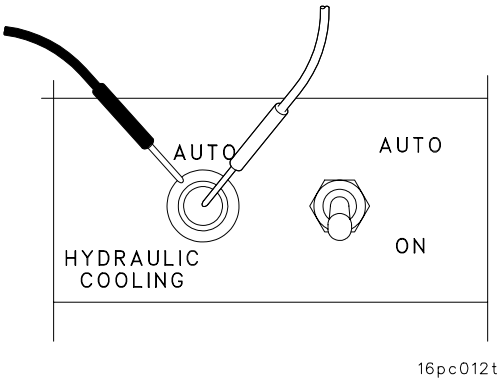
no

Go to para 3–3.e(2) Step D.

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

yes

no

Replace LED (para 5–20).

CONTINUED ON NEXT PAGE

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?

yes

no

Replace lead 12563130–6 from DS3–2 to relay K1 terminal A2 (para 5–21).

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).

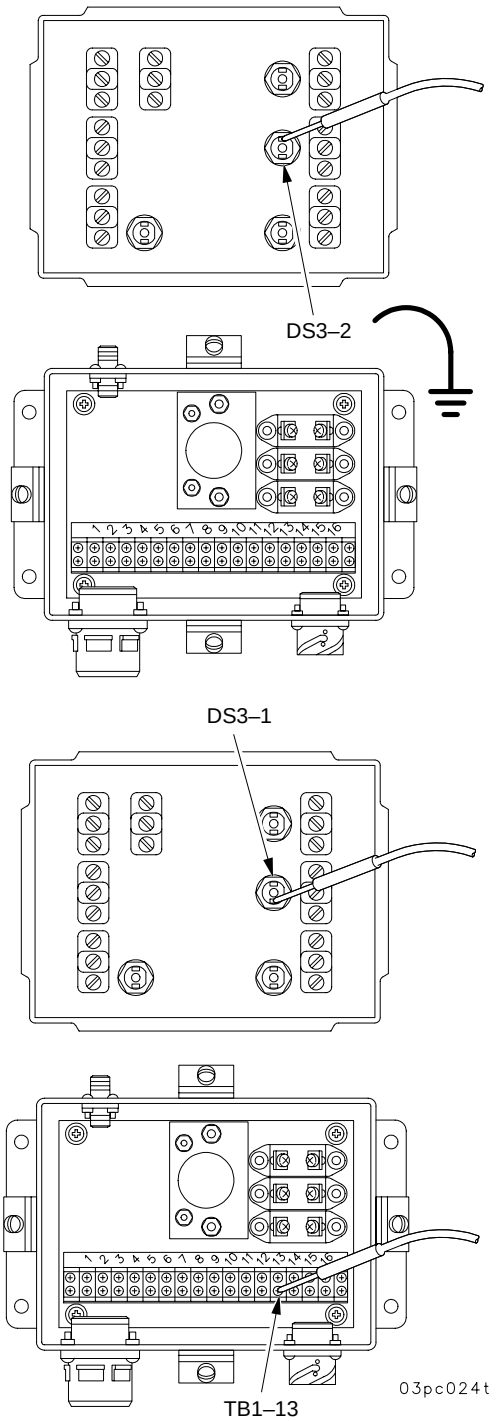
Is continuity present?

yes

no

Replace hydraulic cooling indicator light housing (para 5–20).

Replace lead 12563130–2 DS3 1 to TB1–13 (para 5–21).



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)

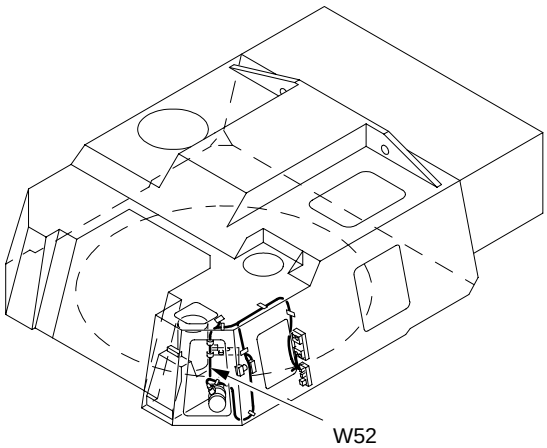
A

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.

Is COOLING FAN LED illuminated?

yes

no → Go to Step P.



B

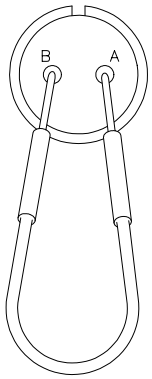
1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W52 connector P4 from the hydraulic cooling temperature switch.
3. Place a jumper in harness W52 connector P4 between sockets A and B.
4. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).
5. Turn HYDRAULIC COOLING switch to AUTOMATIC (TM 9–2350–314–10).

Does hydraulic cooling fan come on?

yes

no

Replace hydraulic cooling temperature switch (para 5–20).



W52
CONNECTOR P4
SOCKET A
SOCKET B

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 B

C

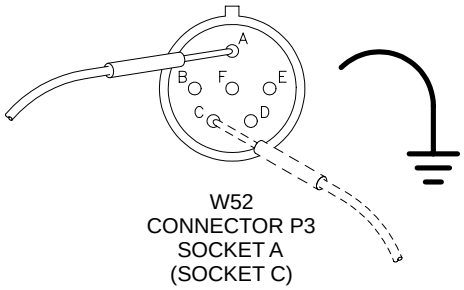
1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Reconnect harness W52 connector P4 to hydraulic cooling temperature switch.
3. Disconnect harness W52 connector P3 from cooling fan.
4. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).
5. Place multimeter red lead in harness W52 connector P3 sockets A and C (one at a time) while holding black lead to ground. Check for voltage.

Is voltage present?

yes

no

Do harness check on harness W52 (para 3–3.n(1)).



W52
CONNECTOR P3
SOCKET A
(SOCKET C)

D

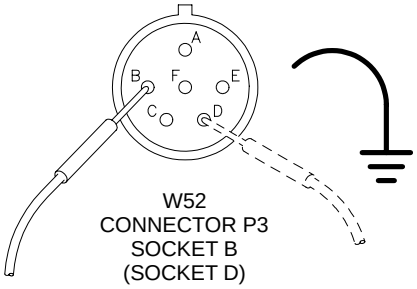
1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Place multimeter red lead in harness W52 connector P3 sockets B and D (one at a time) while holding black lead to ground. Check for continuity.

Is continuity present?

yes

no

Replace cooling fan (para 5–1).



W52
CONNECTOR P3
SOCKET B
(SOCKET D)

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 D

E

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?

yes

no

Do harness check on harness W52 (para 3–3.n(1)).

F

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?

yes

no

Perform a harness check on harness W64 connector P1 to P4 (para 3–3.n(7)).

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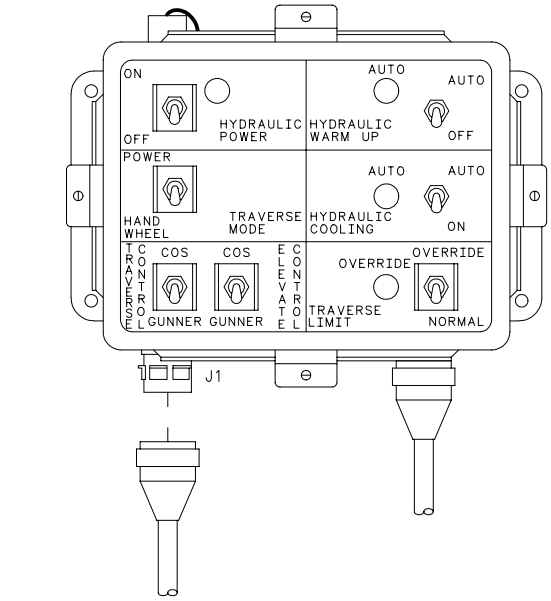
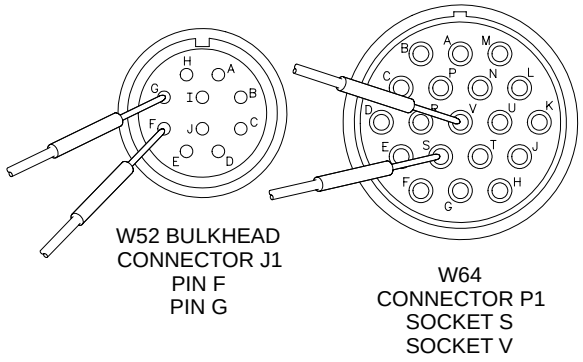




03pc027t

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 D

G

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?

yes

no

Replace harness 12563029 from hydraulic control box connector J1 to CB2–A (para 5–22).

H

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?

yes

no

Go to Step K.

I

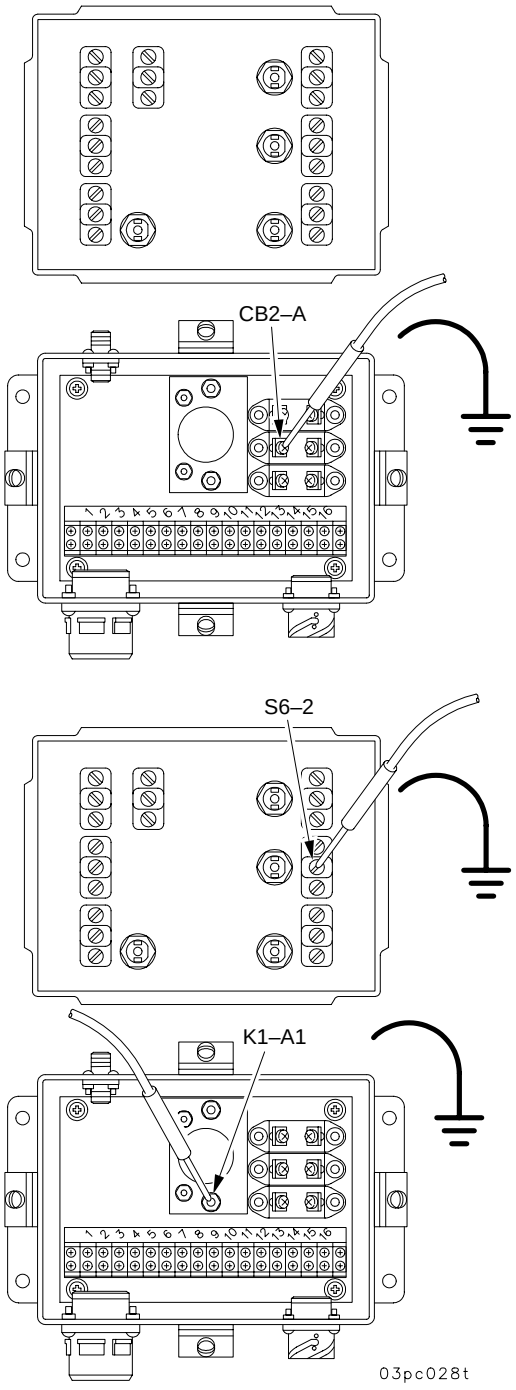
Check lead 100 for voltage by placing multimeter red lead on relay K1 terminal A1 (K1–A1) and placing the black lead to ground.

Is voltage present?

yes

no

Replace lead 12934657–11 from relay K1 terminal A1 (K1–A1) to hydraulic cooling switch terminal 2 (S6–2), (para 5–21).



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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 I

J Check lead 100 for voltage by placing multimeter red lead on circuit breaker 2 terminal B (CB2–B) and black lead to ground.

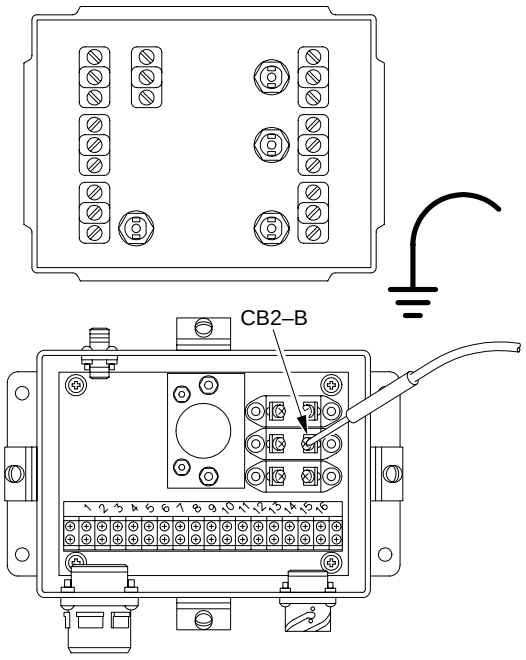
Is voltage present?

yes

Replace lead 12563131–2 from CB2–B to K1–A1 (para 5–21).

no

Replace circuit breaker 2 (CB2) (para 5–20).



CONTINUED FROM STEP H

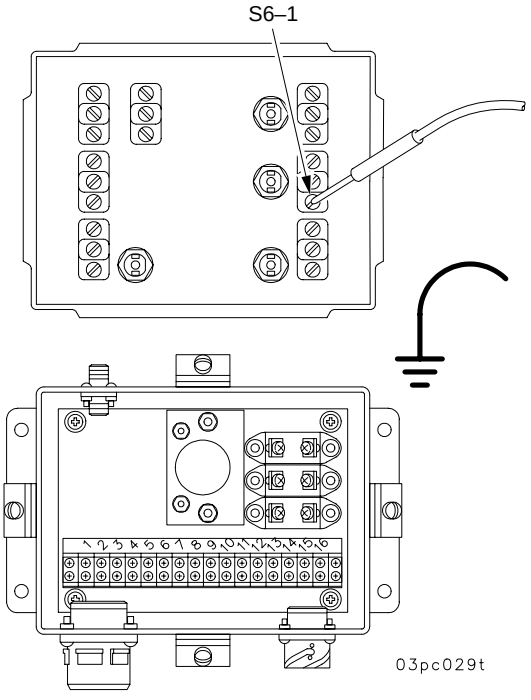
K
1. Turn HYDRAULIC COOLING switch ON (TM 9–2350–314–10).
2. Check hydraulic cooling switch for voltage by placing multimeter red lead on hydraulic cooling switch terminal 1 (S6–1) and black lead to ground.

Is voltage present?

yes

no

Replace hydraulic cooling switch (para 5–20).



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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

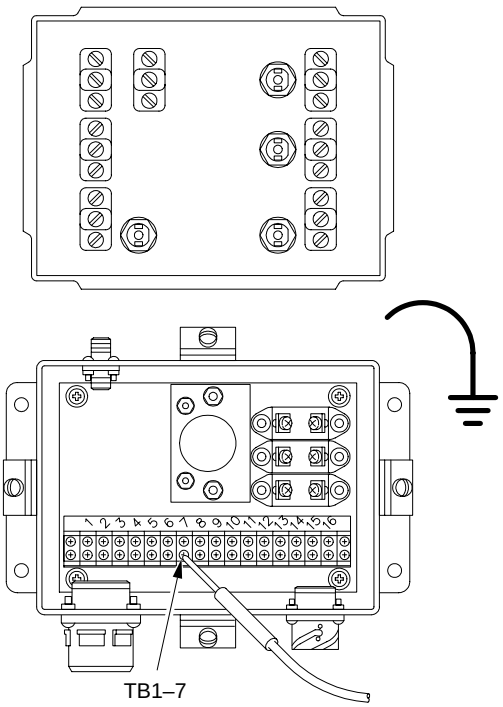
L Check for voltage by placing multimeter red lead on terminal board 1 terminal 7 (TB1–7) and black lead to ground.

Is voltage present?

yes

no

Replace lead 12934657–3 from hydraulic cooling switch terminal 1 (S6–1) to terminal board terminal 7 (TB1–7) (para 5–21)



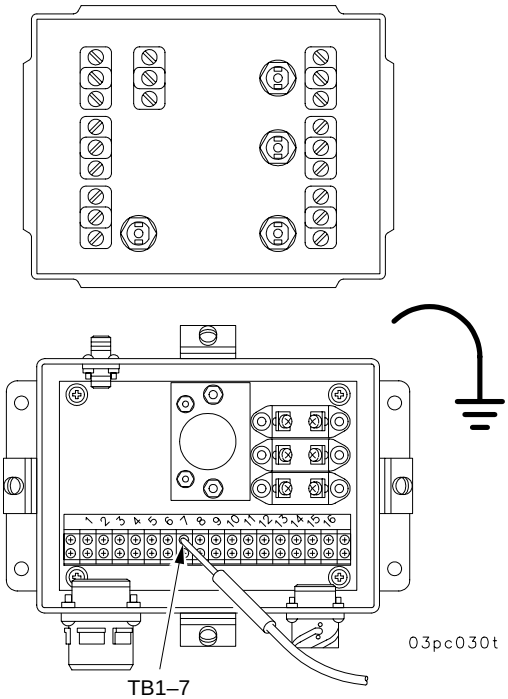
M Check for voltage by placing multimeter red lead on terminal board 1 terminal 7 (TB1–7) output side and black lead to ground.

Is voltage present?

yes

no

Replace lead S6–186A across terminal board 1 terminal 7 (TB1–7) from input side to output side (para 5–21)



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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

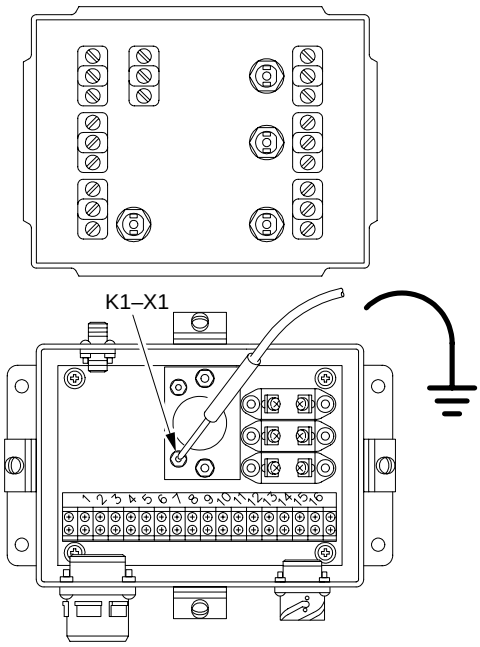
N Check for voltage by placing multimeter red lead on relay K–1 terminal X–1 (K1–X1) and black lead to ground.

Is voltage present?

yes

no

Replace lead 12934657–10 from terminal board 1 terminal 7 (TB1–7) to K1–X1 (para 5–21).



O Check relay K1 for voltage by placing multimeter red lead on relay K1 terminal A2 (K1–A2) and black lead to ground.

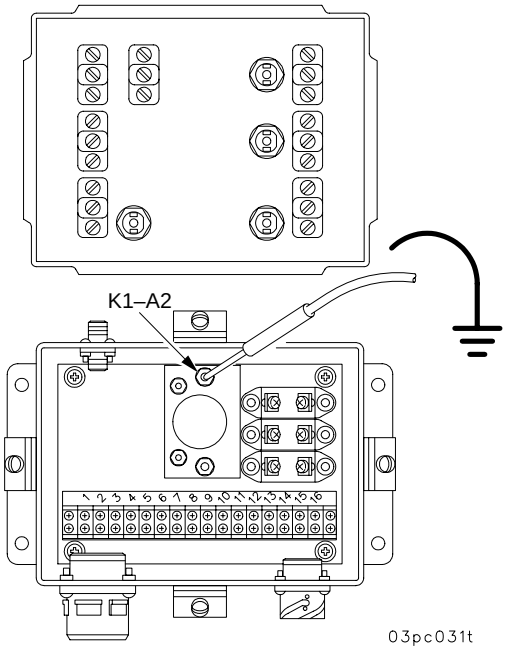
Is voltage present?

yes

no

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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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 A

P

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?

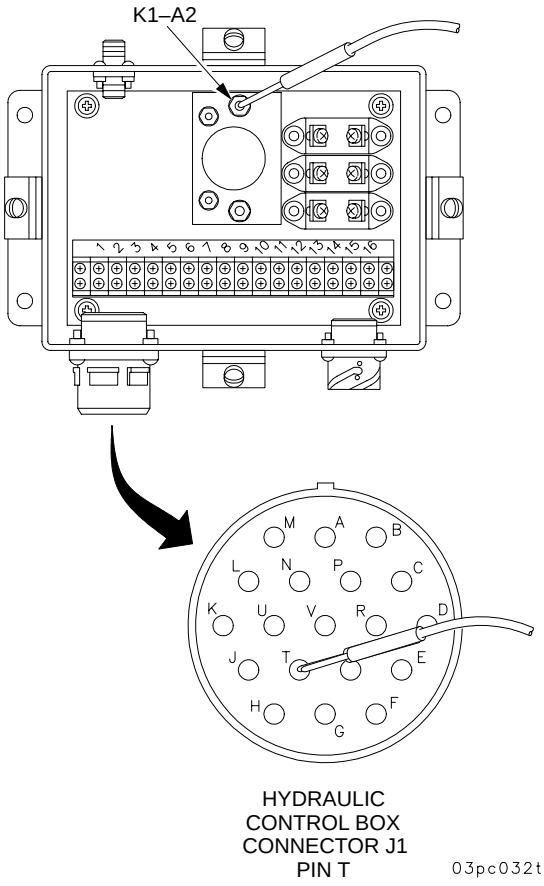
yes

Replace cooling fan LED (para 5–20).

no

Replace lead 186 from K1–A2 to J1 pin T (para 5–20).

END OF TASK



HYDRAULIC CONTROL BOX CONNECTOR J1 PIN T

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.

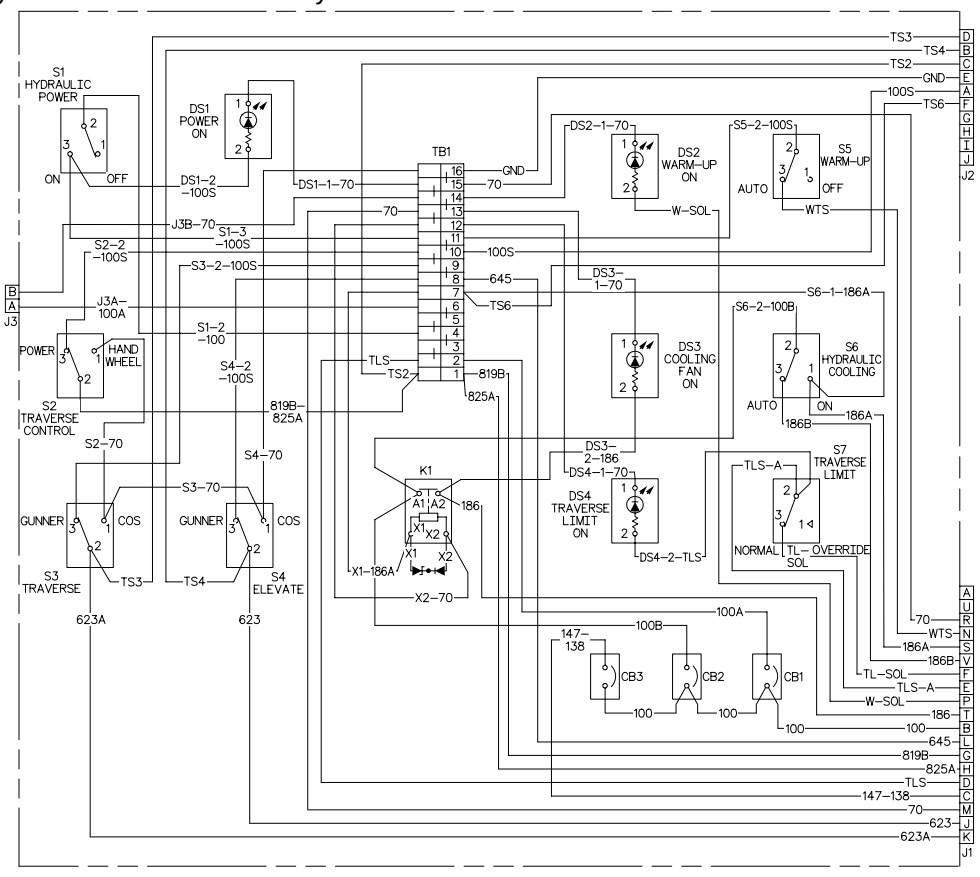
The traverse components are used during a cab traverse and consist of velocity fuses, clutch valve, gunner and COS control handles, traverse selector valve, traverse limit solenoid valve, azimuth servo valve assembly, and hydraulic motor.

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.

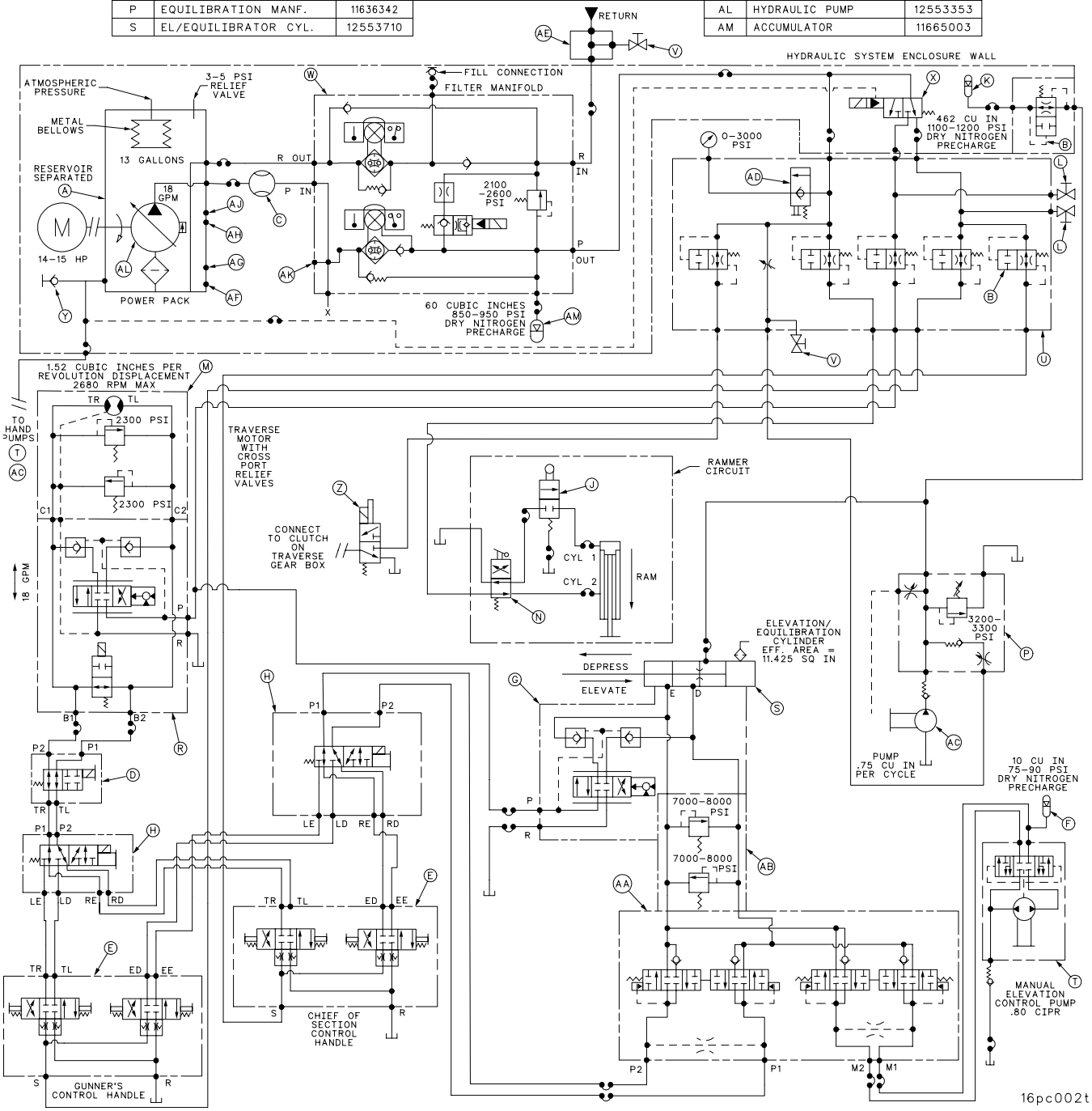
The loader/rammer components are used in loading the projectile into the cannon and consist of the velocity fuse, loader/rammer valve, loader valve, and ram cylinder.

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.



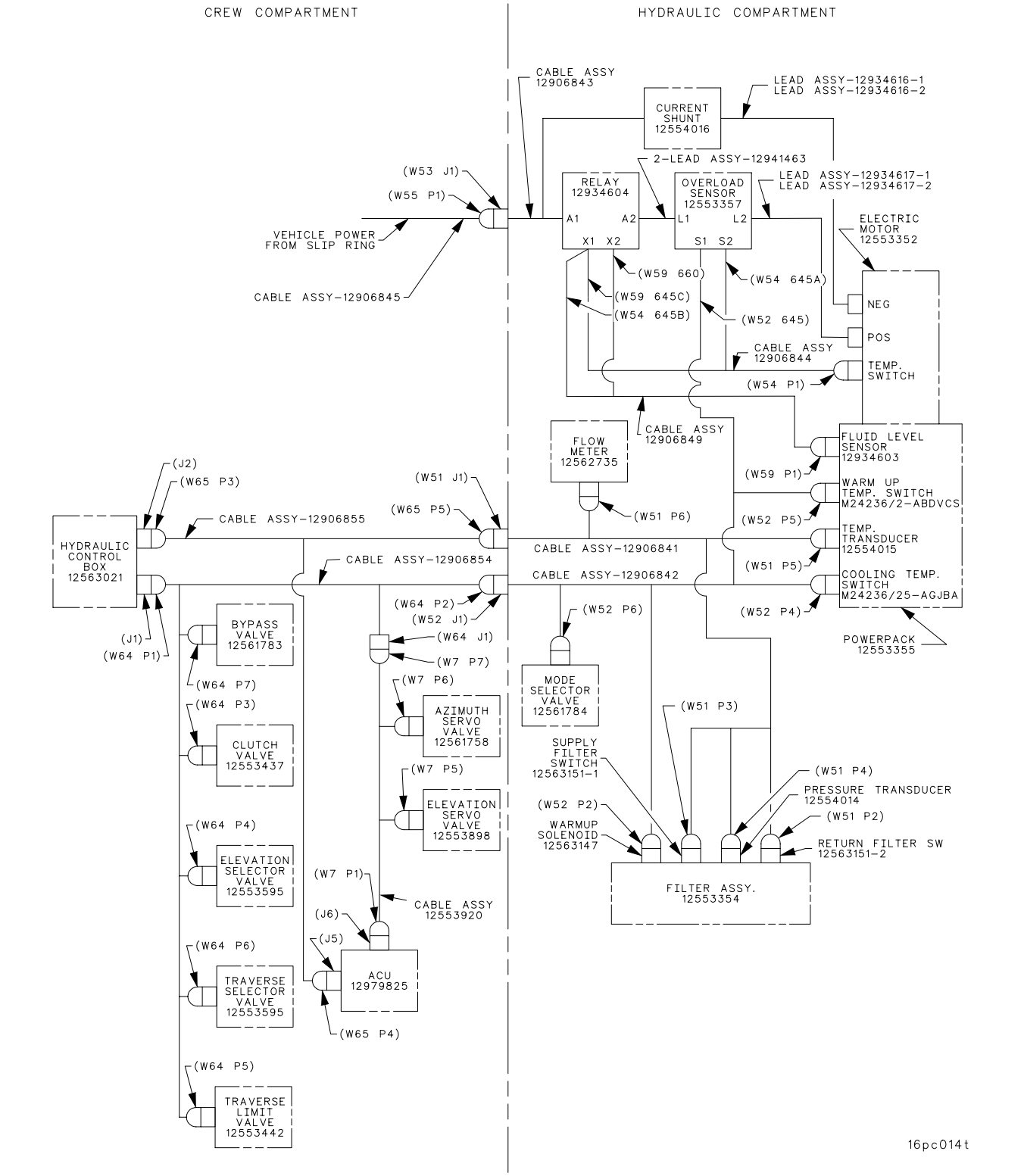
3–3. TROUBLESHOOTING CHART – CONTINUED

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			
F	ACCUMULATOR	7974982	X	MODE SELECTOR VALVE	12561784	AG	TEMP. TRANSDUCER	12554015
G	EL SERVOVALVE ASSY.	12553898	Y	QUICK DISC. CPL. & HALF	12910614–1	AH	LEVEL SENSOR	12934603
H	SELECTOR VALVE	12553595	AA	LOCKING VALVE ASSY.	11784023	AJ	WARM UP TEMP. SWITCH	M24236/2A8DUCS
K	ACCUMULATOR,EQUILIBRATION	12553726	AB	RELIEF VALVE	9399024			
L	BLEED VALVE	11783927	AC	EQUILIBRATION HANDPUMP	7382992	AK	PRESSURE TRANSDUCER	12554014
P	EQUILIBRATION MANF.	11636342				AL	HYDRAULIC PUMP	12553353
S	EL/EQUILIBRATOR CYL.	12553710				AM	ACCUMULATOR	11665003



3–3. TROUBLESHOOTING CHART – CONTINUED

f. HYDRAULIC SYSTEM – CONTINUED



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?

yes

no → Go to Step C.

B Check hydraulic compartment and cab interior for leakage (TM 9–2350–314–10).

Does leakage exist?

yes → Correct leakage and recheck for fault indication.

no → Fill reservoir to proper level and recheck for fault indication.

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?

yes

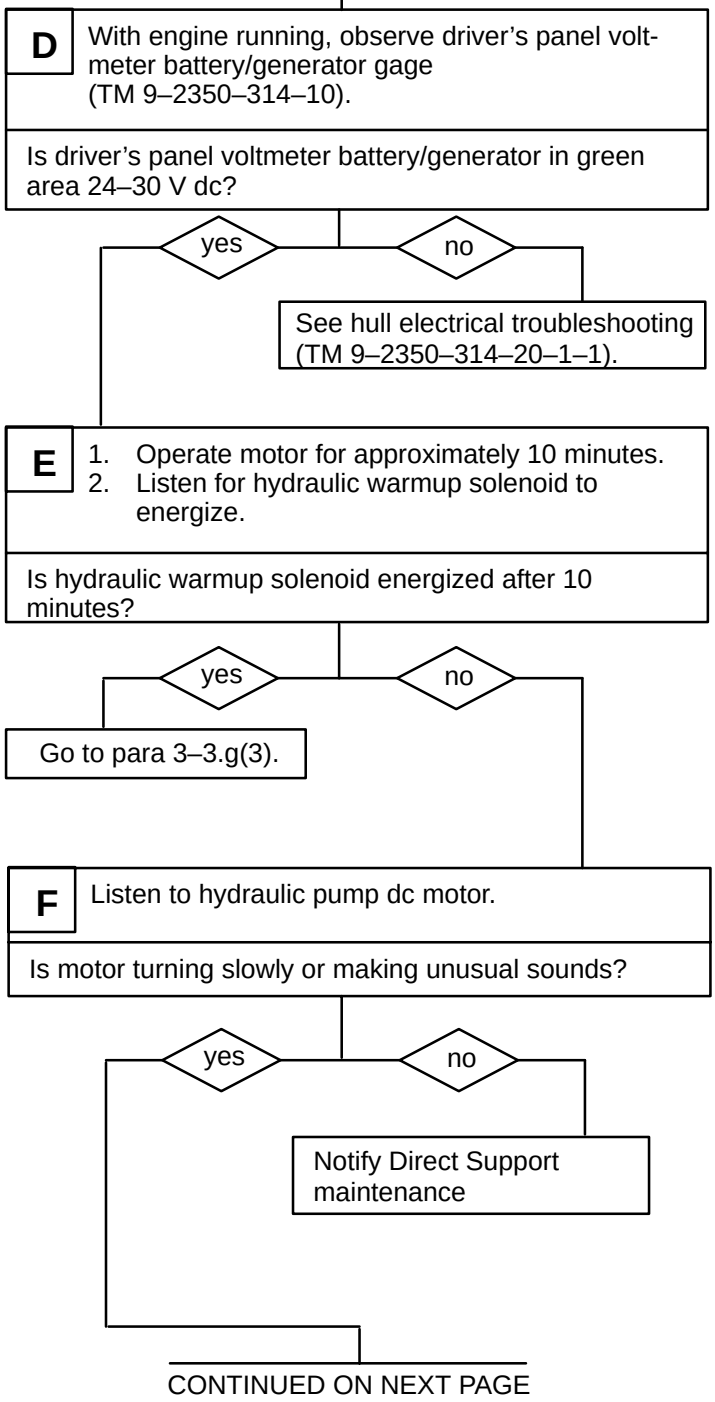
no → Replace hydraulic pressure gage (para 18–11).

CONTINUED ON NEXT PAGE

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



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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

G

1. Turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
2. Bleed pressure at hydraulic fuse manifold (para 18–1).
3. Turn HYDRAULIC POWER switch ON (TM 9–2350–314–10).

Does motor turn slowly or still make unusual sounds?

yes

Replace hydraulic pump dc motor (para 5–19).
Recheck for fault indication.

no

H

1. Turn HYDRAULIC POWER, engine, and MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect hydraulic tube from velocity fuse manifold at clutch valve (para 18–3).
3. Drain hydraulic tube into suitable container.

NOTE

Velocity fuse should trip immediately. If it doesn't, shut system down immediately.

4. 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?

yes

Replace clutch valve (para 18–28).

no

CONTINUED ON NEXT PAGE

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?

yes

Replace rammer valve (para 18–20).

no

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).

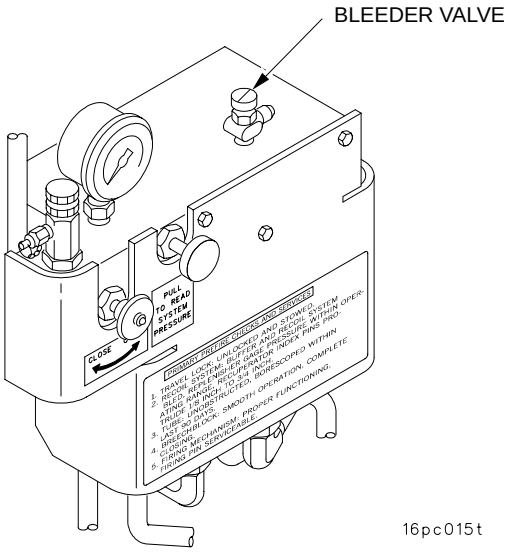
Does gage read above 1500 psi?

yes

Replace filter manifold solenoid valve (para 18–9).

no

Notify Direct Support Maintenance.



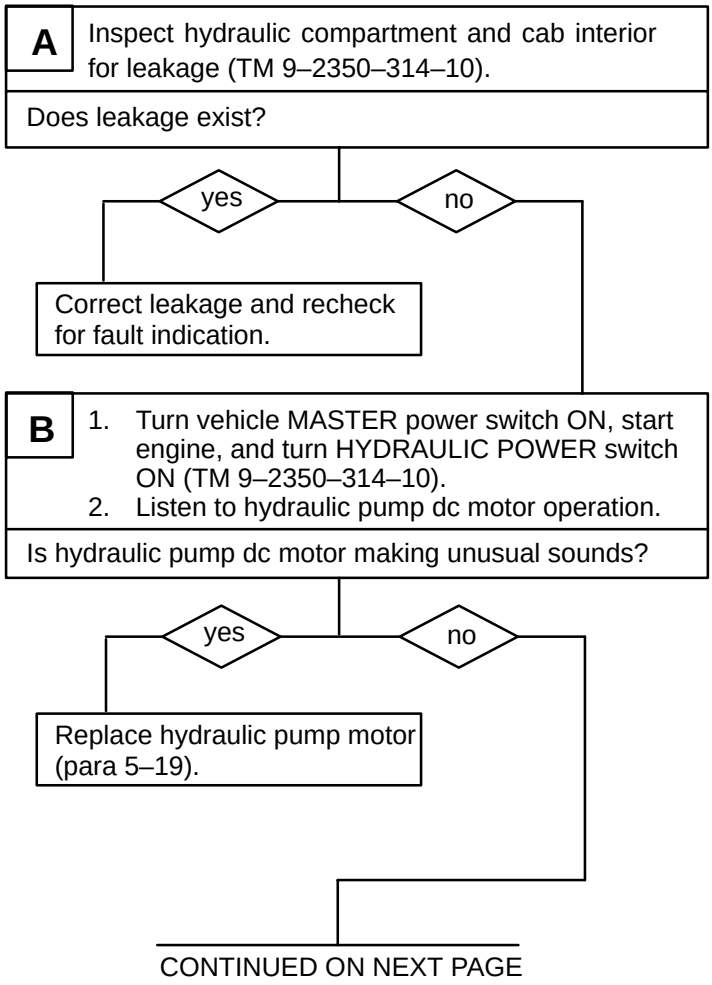
END OF TASK

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)



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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

C

1. Turn HYDRAULIC POWER, engine, and vehicle MASTER power switch OFF (TM 9–2350–314–10).
3. Disconnect hydraulic return line at hydraulic reservoir (para 18–15).
4. Drain fluid into an appropriate container.
5. Reconnect return line to reservoir (para 18–15).
6. Turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9–2350–314–10).
7. Turn HYDRAULIC POWER, engine, and vehicle MASTER power switch OFF (TM 9–2350–314–10).
8. Disconnect hydraulic return line at hydraulic reservoir (para 18–15).

Does any fluid drain?

yes → Replace reservoir relief valve (para 18–35).

no

D

1. Reconnect return line to reservoir.
2. Disconnect pressure–in line to filter assembly (para 18–10).
3. Drain fluid into a suitable container.
4. Reconnect pressure–in line (para 18–10).
5. Turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9–2350–314–10).
6. Turn engine, vehicle MASTER power switch, and HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
7. Disconnect pressure–in line to filter assembly (para 18–10).

Does any fluid drain?

yes → Replace filter assembly (para 18–10)

no

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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

E

1. Reconnect pressure–in line to filter assembly.
2. Disconnect hydraulic tube at flowmeter to filter manifold (para 18–10).
3. Drain fluid into a suitable container.
4. Reconnect tube at flowmeter (para 18–10).
5. Turn vehicle MASTER switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9–2350–314–10).
6. Shut off engine, turn vehicle MASTER power switch OFF, and turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
7. Disconnect tube at flowmeter to filter manifold (para 18–10).

Does any fluid drain?

yes → Replace tube from flowmeter to filter manifold (para 18–10).

no

F

1. Reconnect tube at flowmeter.
2. Disconnect hydraulic tube from hydraulic powerpack at flowmeter (para 18–10).
3. Drain fluid into a suitable container.
4. Reconnect tube at flowmeter (para 18–10).
5. Turn vehicle MASTER power switch ON, start engine, and turn HYDRAULIC POWER switch ON (TM 9–2350–314–10).
6. Shut off engine, turn vehicle MASTER power switch OFF, and turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
7. Disconnect tube from powerpack at flowmeter (para 18–15).

Does any fluid drain?

yes → Replace flowmeter (para 18–10).

no → Replace hydraulic tube from powerpack to flowmeter (para 18–10).

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)

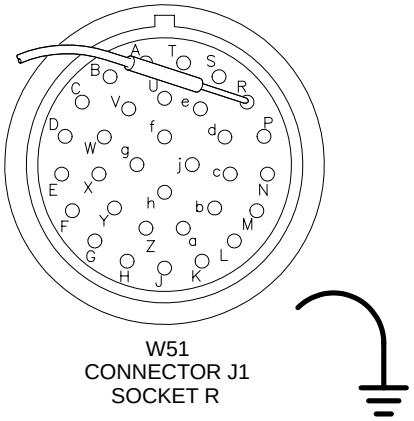
A

1. Disconnect harness W65 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).

Is voltage present with clogged indicator popped out?

yes

no → Go to Step C.



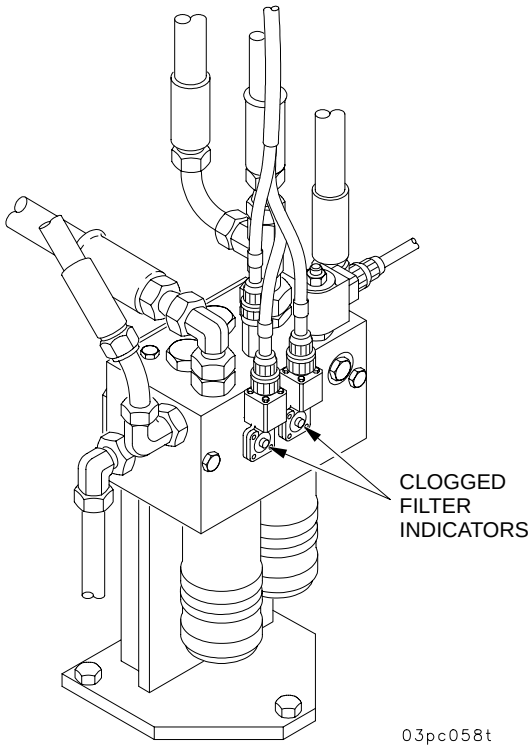
W51
CONNECTOR J1
SOCKET R

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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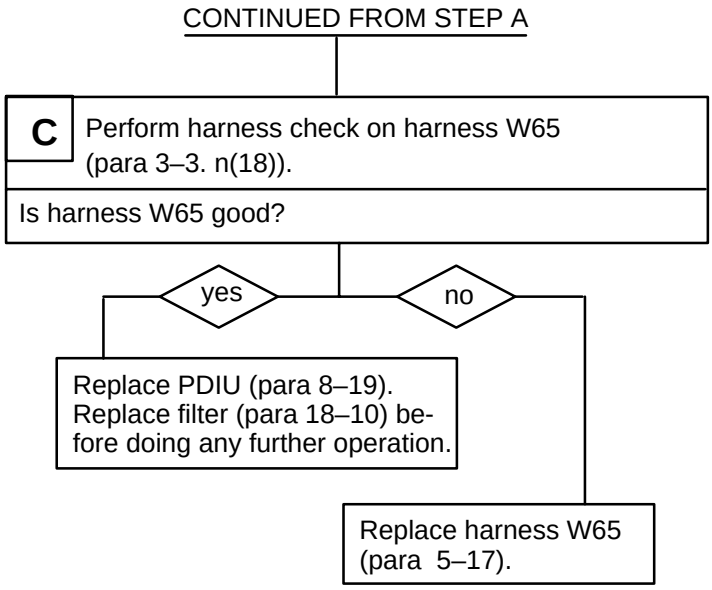
3–3. TROUBLESHOOTING CHART – CONTINUED

f.	HYDRAULIC SYSTEM – CONTINUED	(3) NO CLOGGED FILTER INDICATION ON DISPLAY UNIT. Mechanical return or supply clogged filter indication is present. – CONTINUED



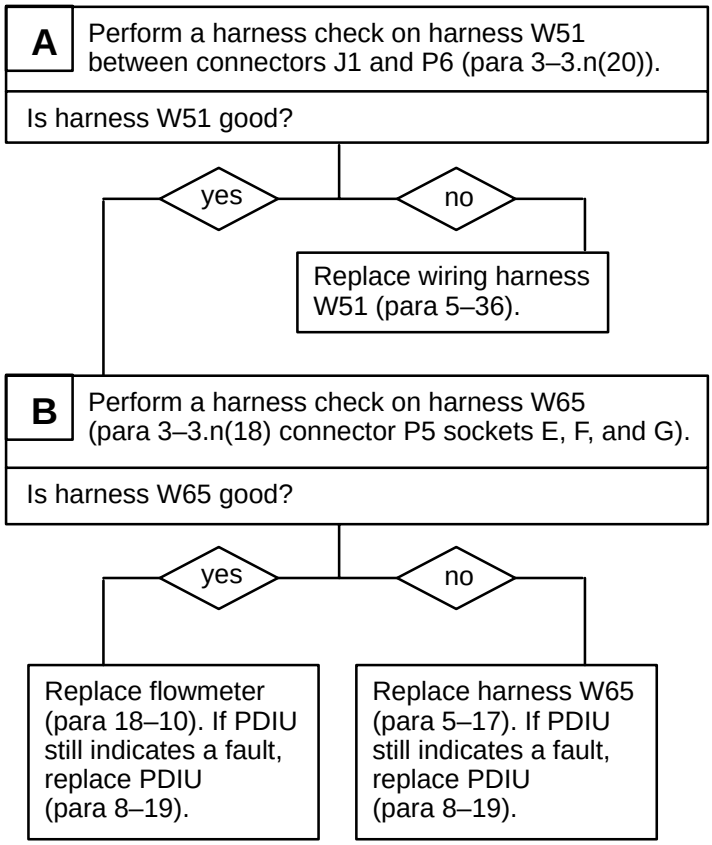
END OF TASK

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)



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 WARNING MESSAGE MENU.

Does AFCS WARNING MESSAGE MENU indicate a clogged hydraulic filter?

yes

no

Fault does not exist as indicated.

B

Check hydraulic filter pop–out indicators (para 18–13).

Are any indicators popped out?

yes

no

Replace hydraulic filter(s) (para 18–13). Perform operational check.

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?

yes / no

Fault is corrected.

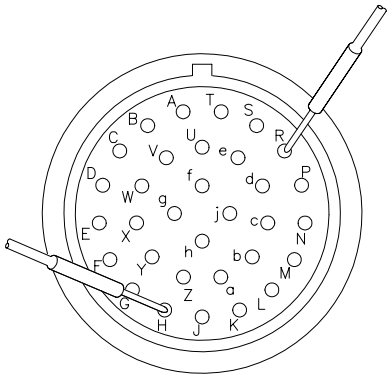
D

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 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.

Is continuity present?

yes / no

Go to Step F.



W51
CONNECTOR J1
SOCKET R
SOCKET H

03pc059t

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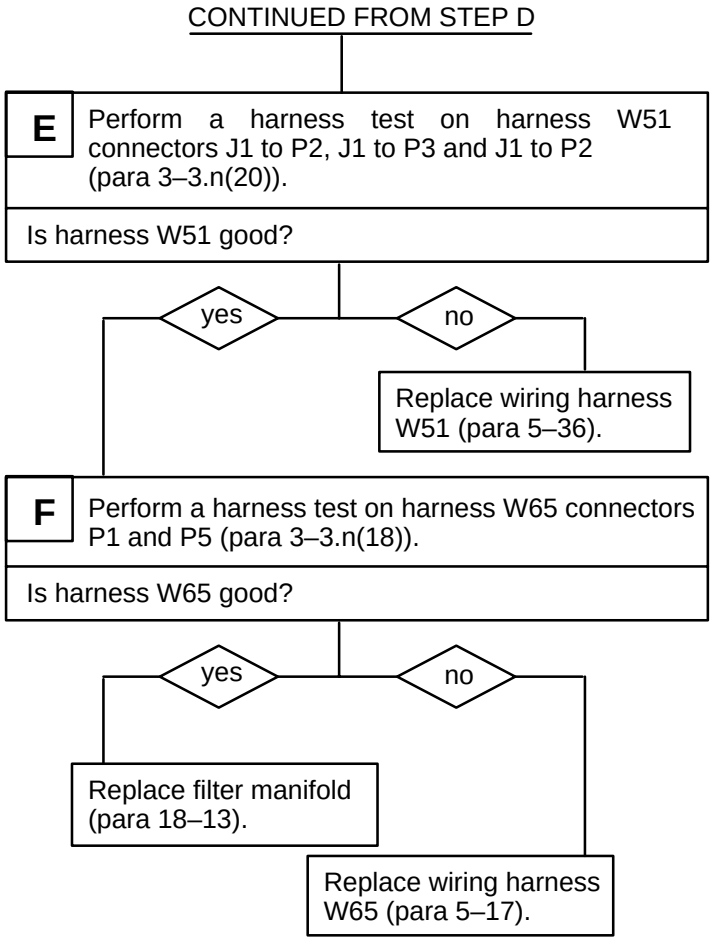
3–3. TROUBLESHOOTING CHART – CONTINUED

f.	HYDRAULIC SYSTEM – CONTINUED	(5) CLOGGED HYDRAULIC FILTER. No mechanical indication. – CONTINUED



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 WARNING MESSAGE MENU indicate high hydraulic temperature?

yes

no

Fault does not exist as indicated.

B

Check hydraulic reservoir fluid temperature gage (TM 9–2350–314–10).

Is temperature greater than 200° F?

yes

no

Go to para 3–3.e(2).

C

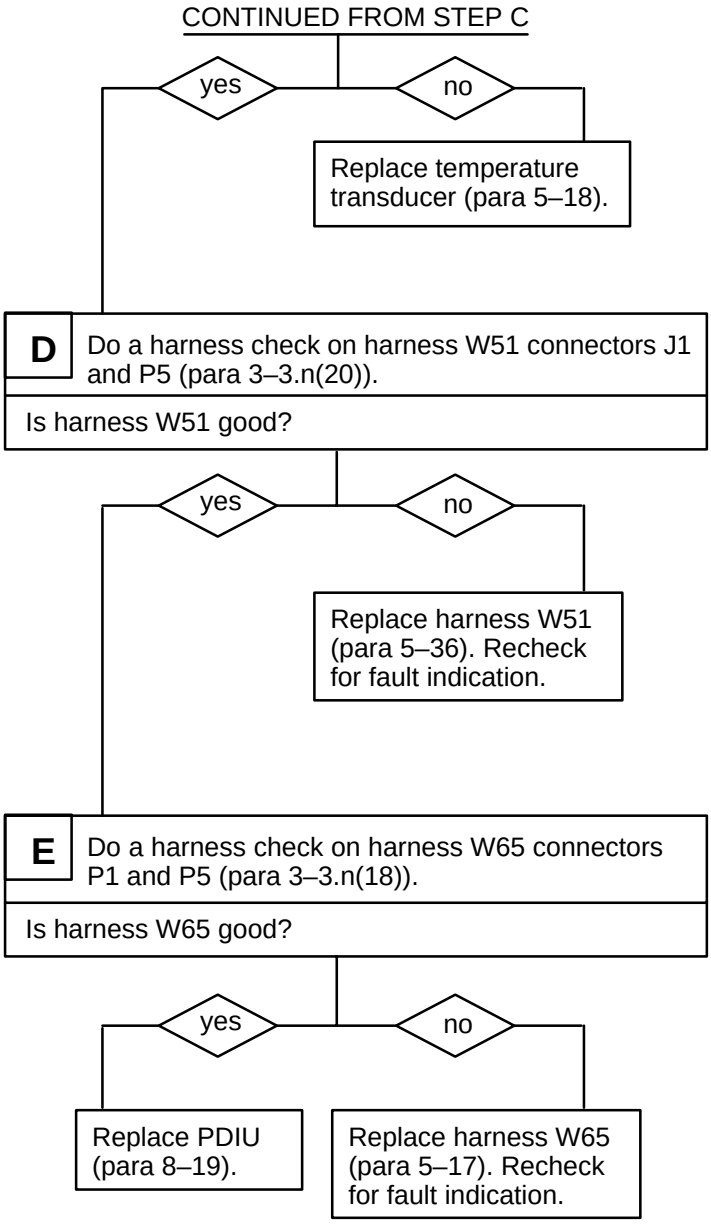
1. Disconnect harness W51 connector P5 from the temperature transducer.
2. Check display unit.

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



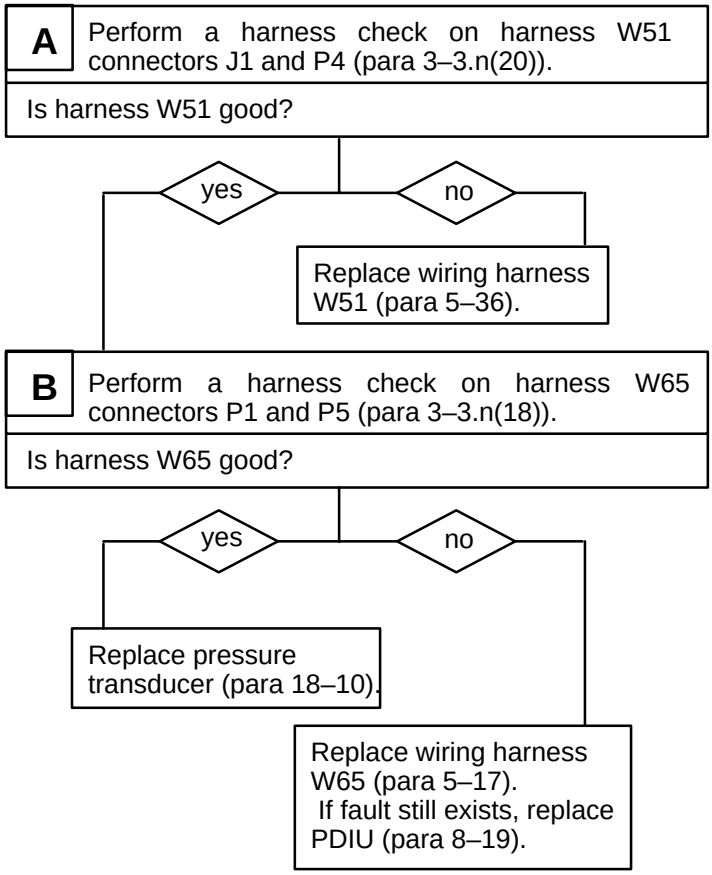
END OF TASK

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)



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?

yes

no → Fill reservoir (para 18–1).

B Perform an operational check on the cab hydraulic system (TM 9–2350–314–10).

Does hydraulic pump dc motor operate?

yes

no → Go to para 3–3.f(9).

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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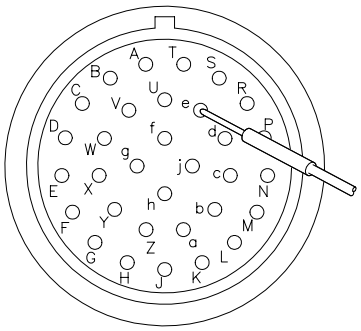
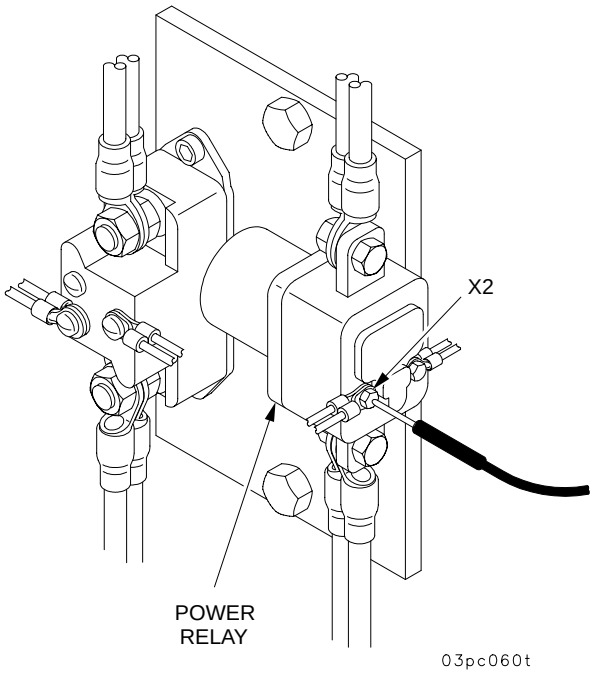


W51
CONNECTOR J1
SOCKET e



3–3. TROUBLESHOOTING CHART – CONTINUED

f. HYDRAULIC SYSTEM – CONTINUED	(8) LOW RESERVOIR FLUID LEVEL ON DISPLAY UNIT. – CONTINUED

CONTINUED FROM STEP C

yes

no

Replace harness W51 lead 775 (para 5–36).

D

1. Disconnect harness W65 connector P1 from PDIU connector J6.
2. Check harness W65 for continuity by placing one multimeter lead in harness W65 connector P5 pin e and by placing the other lead in harness W65 connector P1 socket 61.

Is continuity present?

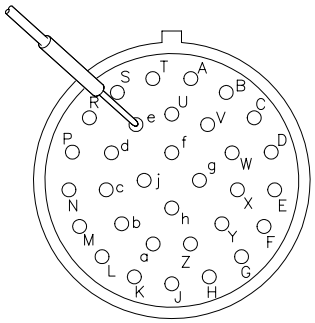
yes

no

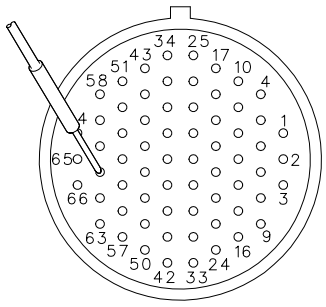
Replace PDIU (para 8–19).

Replace wiring harness W65 (para 5–17).

END OF TASK



W65
CONNECTOR P5
PIN e



03pc061t

W65
CONNECTOR P1
SOCKET 61

3–3. TROUBLESHOOTING CHART – CONTINUED

f.	HYDRAULIC SYSTEM – CONTINUED	(9) HYDRAULIC PUMP MOTOR IS DE–ENERGIZED WHEN HYDRAULIC POWER SWITCH 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)

Equipment Conditions
Hydraulic pump motor circuit breaker cover removed (para 5–6)

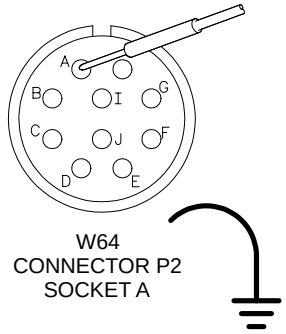
A

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?

yes → Go to Step K.

no



W64
CONNECTOR P2
SOCKET A

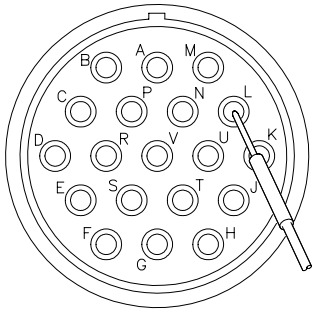
B

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.

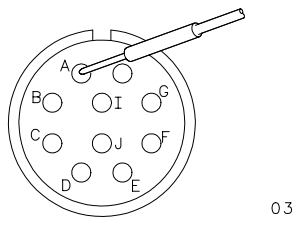
Is continuity present?

yes

no → Replace harness W64 (para 5–31).



W64
CONNECTOR P1
SOCKET L



03pc062t

W64
CONNECTOR P2
SOCKET A

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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?

yes

no

Replace harness 12563029 (para 5–22).

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?

yes

no

Replace terminal board (para 5–20).

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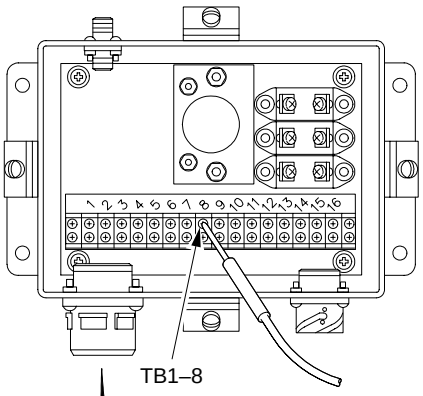
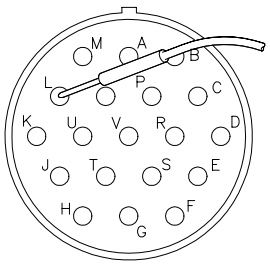
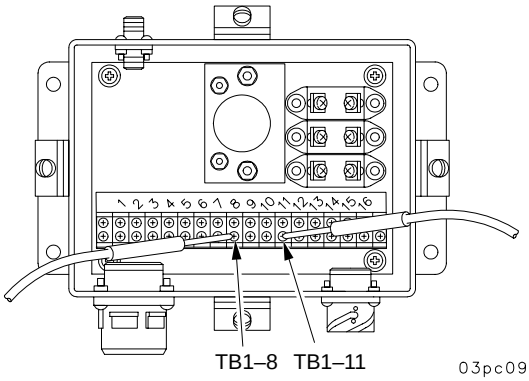




HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN L



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?

yes

no

Repair or replace lead 12934657–9 (para 5–21).

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?

yes

no

Replace HYDRAULIC POWER switch (para 5–20).

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?

yes

no

Repair or replace lead 12934657–2 (para 5–21).

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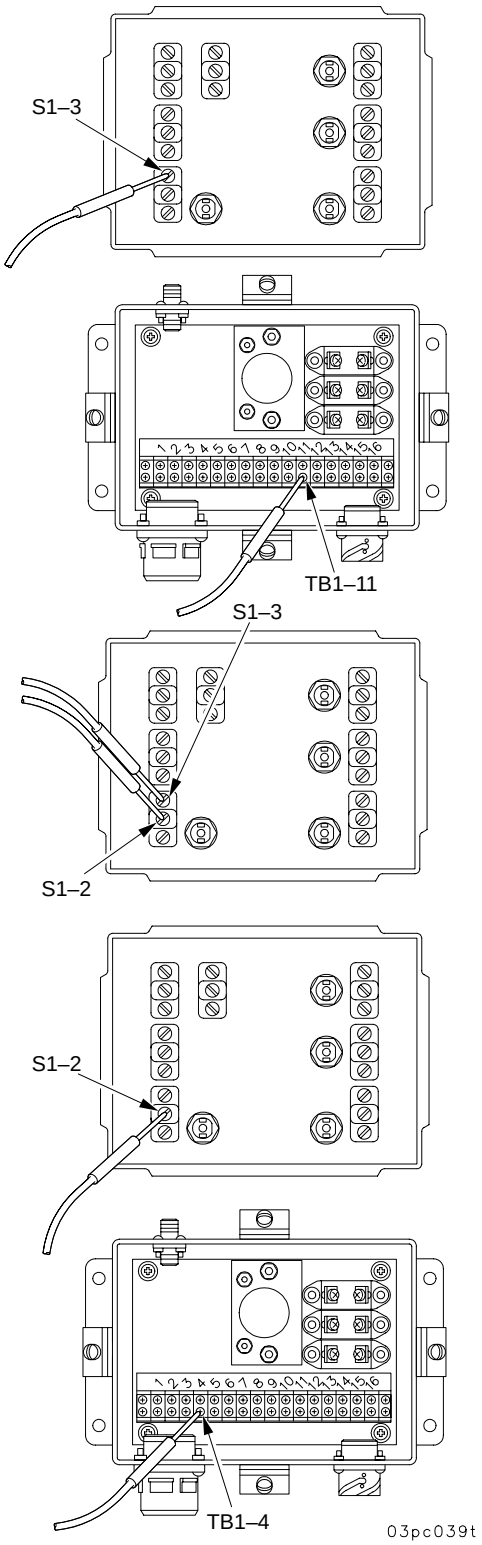


3–3. TROUBLESHOOTING CHART – CONTINUED

f.	HYDRAULIC SYSTEM – CONTINUED	(9) HYDRAULIC PUMP MOTOR IS DE–ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON. – CONTINUED

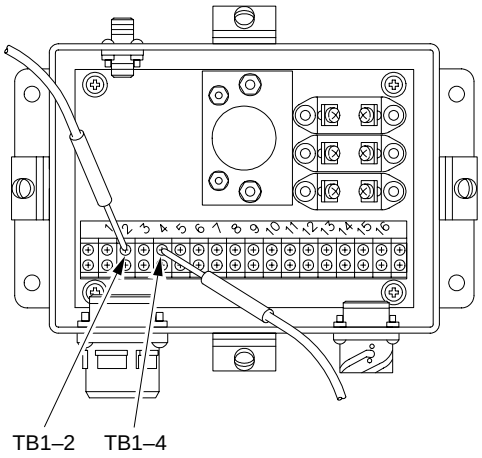
CONTINUED FROM STEP G

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?

yes

no → Replace terminal board (para 5–20).

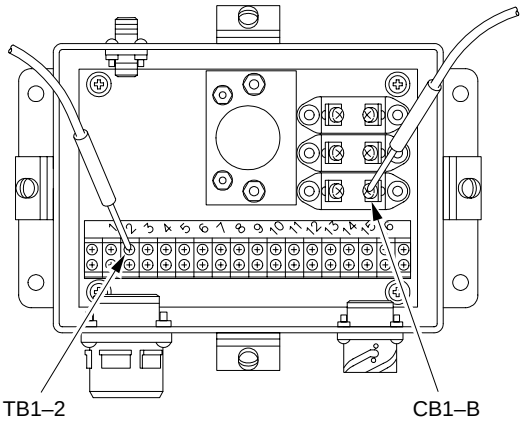


I Check lead 12934658 for continuity by placing one multimeter lead on circuit breaker 1 terminal B (CB1–B) and placing the other lead on terminal board 1 terminal 2 (TB1–2).

Is continuity present?

yes

no → Repair or replace lead 12934658 (para 5–21).

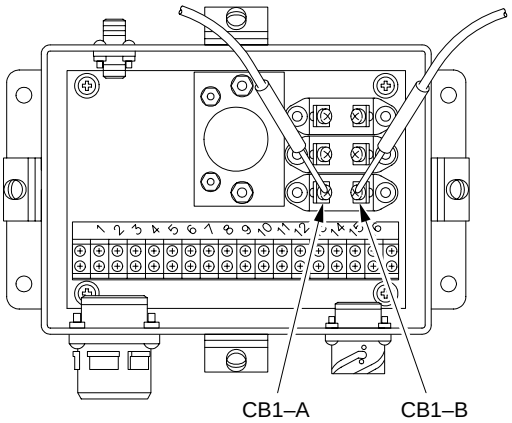


J Check circuit breaker 1 (CB1) for continuity by placing one multimeter lead on circuit breaker 1 terminal A (CB1–A) and placing the other lead on circuit breaker 1 terminal B (CB1–B).

Is continuity present?

yes → Replace lead 100 (para 5–22).

no → Replace circuit breaker 1 (CB1) (para 5–20).



03pc005t

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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

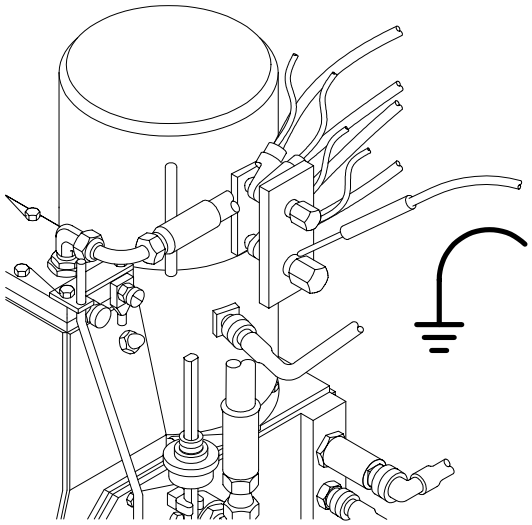
K

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?

yes → **L**

no → Go to Step U.



HYDRAULIC PUMP MOTOR

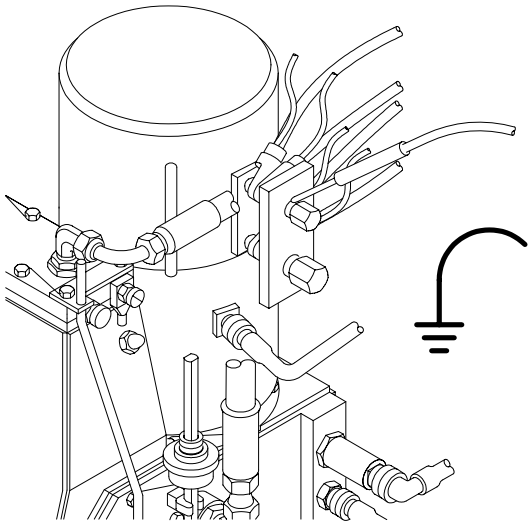
L

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?

yes → Replace pump motor (para 5–19).

no



HYDRAULIC PUMP MOTOR

03pc006t

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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 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?

yes / no

Replace harness 12934616–1 (para 5–4 and 5–19).

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?

yes / no

Replace current shunt (para 5–4).

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:

Point 1	Point 2
Connector J1 pin C	harness W53 lead 70 at current shunt
Connector J1 pin D	harness W53 lead 70 at current shunt

Does multimeter show approximately zero ohms?

yes / no

Replace wiring harness W53 (para 5–12).

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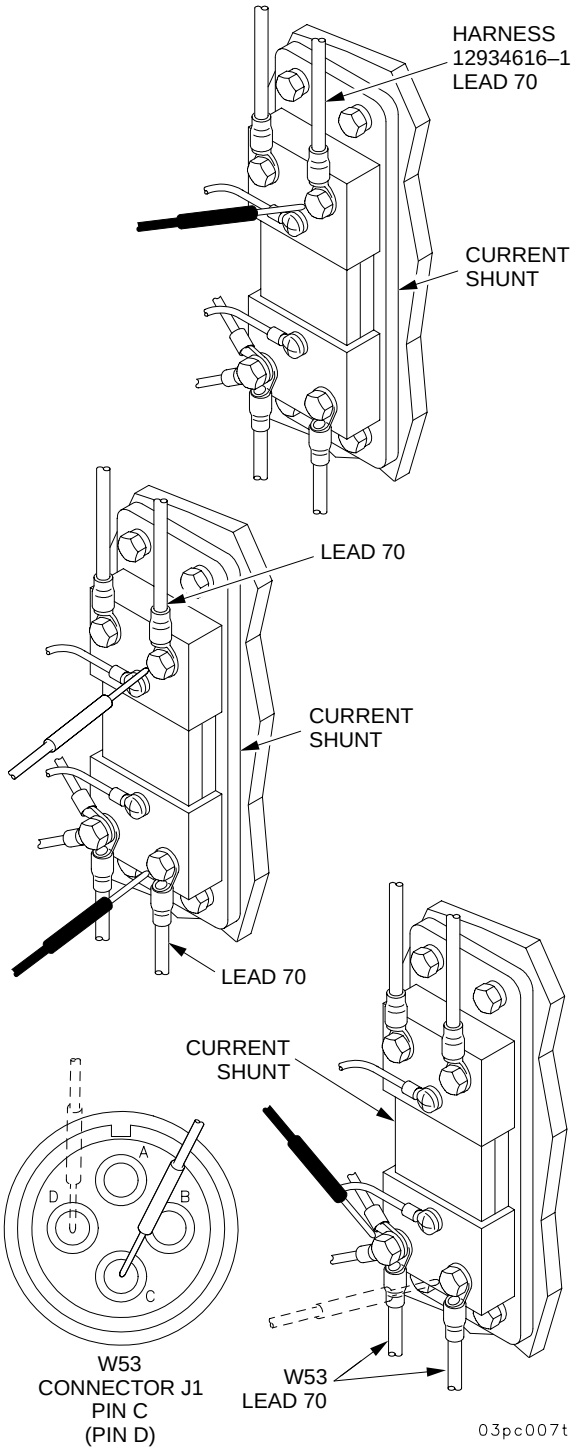


3–3. TROUBLESHOOTING CHART – CONTINUED

f.	HYDRAULIC SYSTEM – CONTINUED	(9) HYDRAULIC PUMP MOTOR IS DE–ENERGIZED WHEN HYDRAULIC POWER SWITCH IS ON – CONTINUED

CONTINUED FROM STEP O

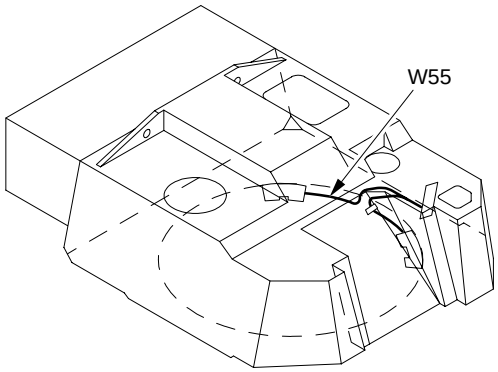
P Do a shorts test on harness W55 (para 3–3.n(10)).

Are there any shorts?

yes

Replace harness W55 (para 5–13).

no



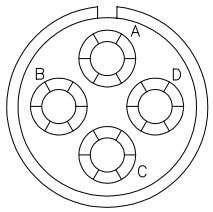
Q
1. Reconnect harness W55.
2. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).
3. Check circuit breaker for voltage by placing multimeter red lead on circuit breaker terminal L2 and placing black lead to ground.

Is voltage present?

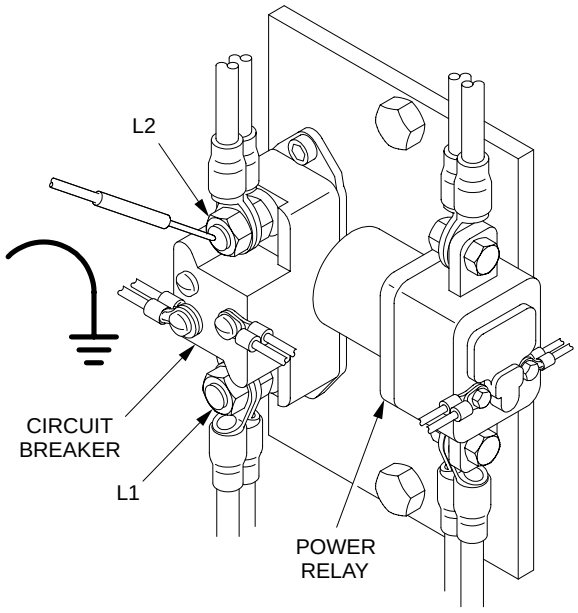
yes

Replace leads 12934617–1 and –2 (para 5–6).

no



W55
CONNECTOR P1



03pc008m

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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

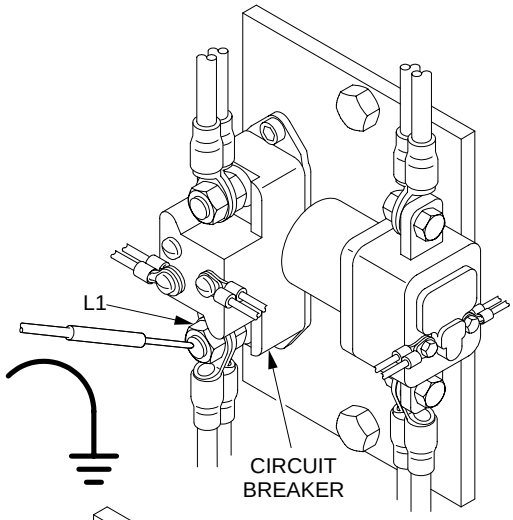
CONTINUED FROM STEP Q

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?

yes → Replace circuit breaker (para 5–6).

no

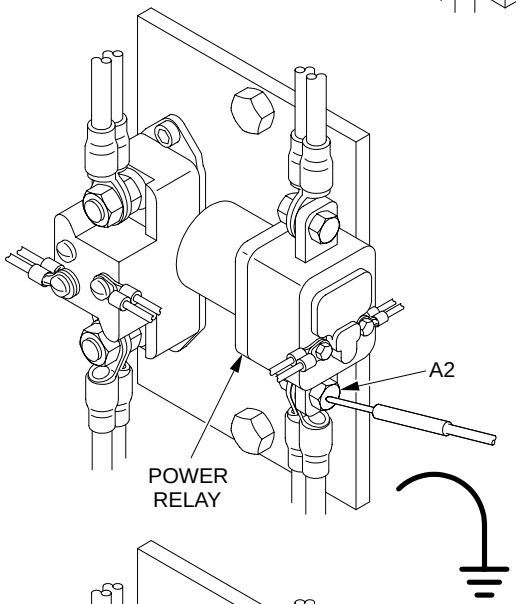


S Check power relay for voltage by placing multimeter red lead on power relay terminal A2 and placing the black lead to ground.

Is voltage present?

yes → Replace lead 12941463 (para 5–29).

no

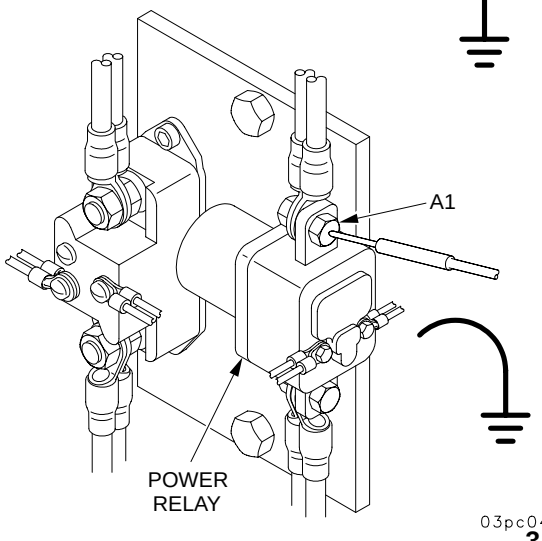


T Check power relay for voltage by placing multimeter red lead on power relay terminal A1 and placing the black lead to ground.

Is voltage present?

yes → Perform step V, X, Y, and Z of this tree. If fault still exists, replace power relay (para 5–5).

no



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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 K OR T

U

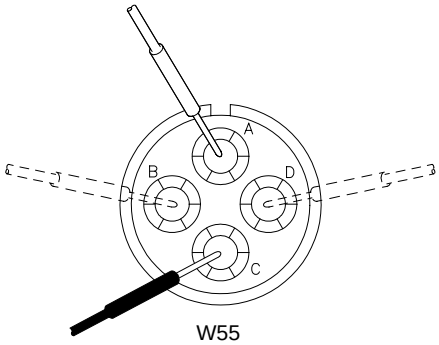
1. Turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
2. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
3. Disconnect harness W55 connector P1 from harness W53 connector J1.
4. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).
5. Check harness W55 connector P1 for voltage by placing multimeter red lead in point 1 and placing the black lead in point 2:

Point 1	Point 2
socket A	socket C
socket B	socket D

Is voltage present?

yes → Replace harness W53 (para 5–12).

no → Replace harness W55 (para 5–13).



W55
CONNECTOR P1
SOCKET A
(SOCKET B)
(SOCKET C)
(SOCKET D)

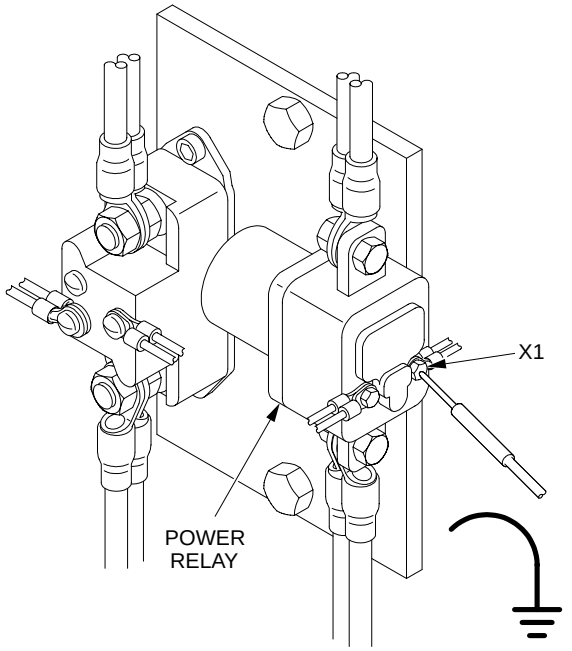
CONTINUED FROM STEP T

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

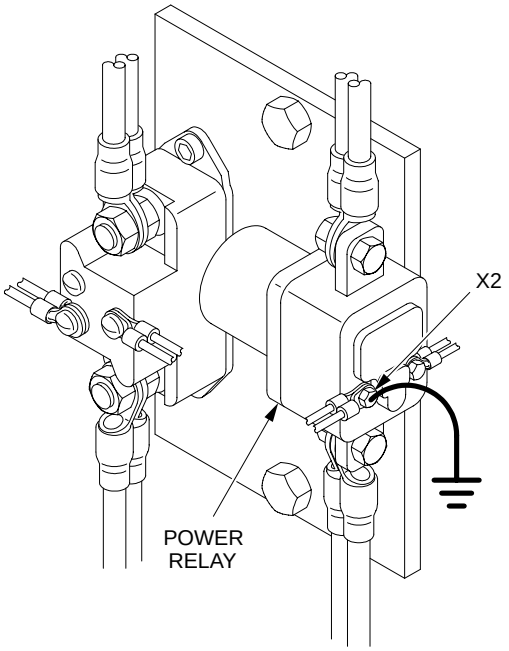
1. Turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
2. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
3. Place jumper wire from X2 terminal on power relay to ground.
4. Turn vehicle MASTER power switch ON.
5. Start engine and turn HYDRAULIC POWER switch ON.

Does hydraulic pump dc motor come on?

yes

no

Replace relay (para 5–5).



X

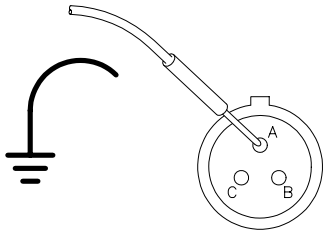
1. Turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
2. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
3. Disconnect harness W59 connector P1 from level sensor.
4. Turn vehicle MASTER power switch and HYDRAULIC POWER switch ON (TM 9–2350–314–10).
5. Check harness W59 connector P1 for voltage by placing one multimeter lead on harness W59 connector P1 socket A and black lead to ground.

Is voltage present?

yes

no

Replace wiring harness W59 (para 5–33).



W59
CONNECTOR P1
SOCKET A

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

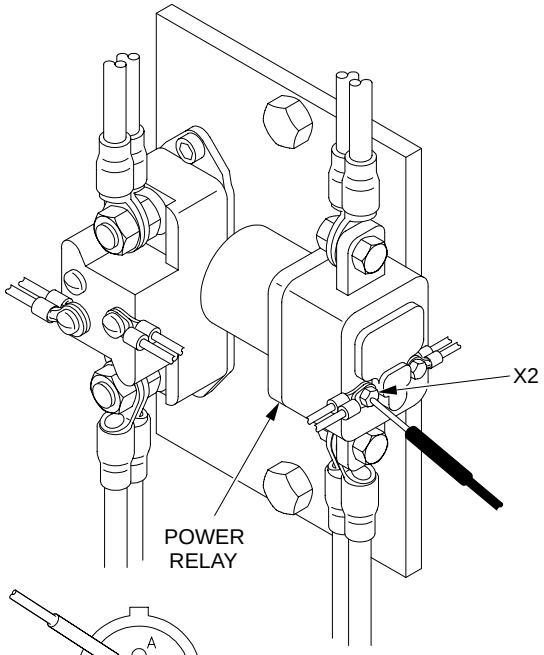
Y

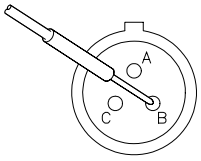
1. Turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
2. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
3. Check harness W59 for continuity by placing one multimeter lead in harness W59 connector P1 socket B and placing the other lead on power relay terminal X2.

Is continuity present?

yes

no → Replace wiring harness W59 (para 5–33).





W59 CONNECTOR P1 SOCKET B

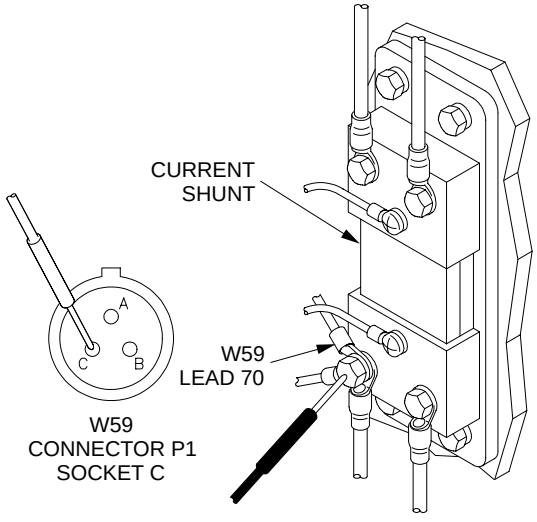
Z

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?

yes → Replace level sensor (para 5–18).

no → Replace harness W59 (para 5–33).



W59 CONNECTOR P1 SOCKET C

03pc046t

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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?

yes

no

Fault does not exist as indicated.

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.

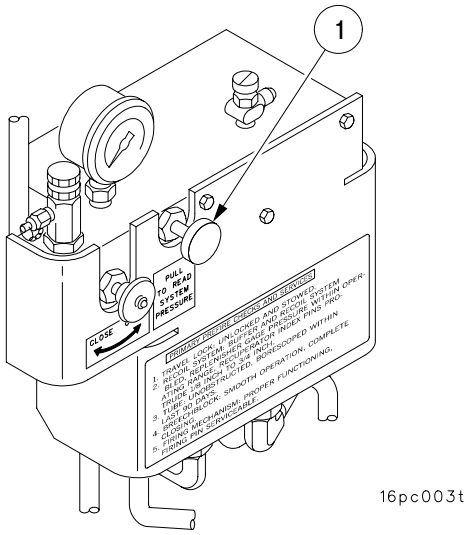
Does pressure gage read greater than 1975 PSI?

yes

no

Notify Direct Support Maintenance.

Fault corrected.



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.

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 wiring harness W64 connector P1 from hydraulic control box.
2. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).

Does hydraulic pump motor operate?

yes

no

Repair or replace hydraulic control box (para 5–20).

B

1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
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.
3. Check for continuity.

Is continuity present?

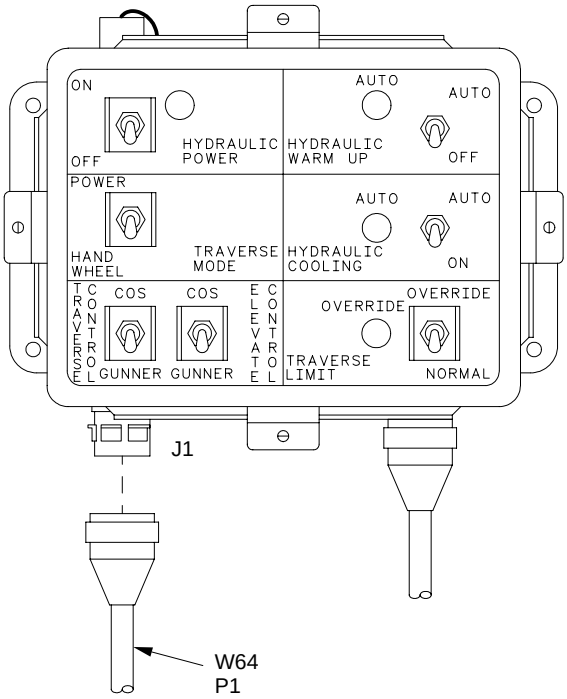
yes

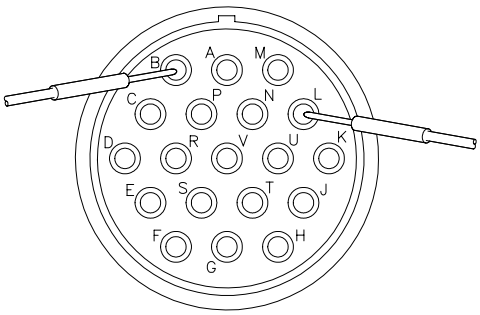
no

Replace wiring harness W64 (para 5–31).

Replace hydraulic pump motor relay (para 5–5).

END OF TASK





W64
CONNECTOR P1
SOCKET B
SOCKET L

03pc009t

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?

yes → Perform hydraulic system test (para 3–3.f(1) steps c through j).

no →

B

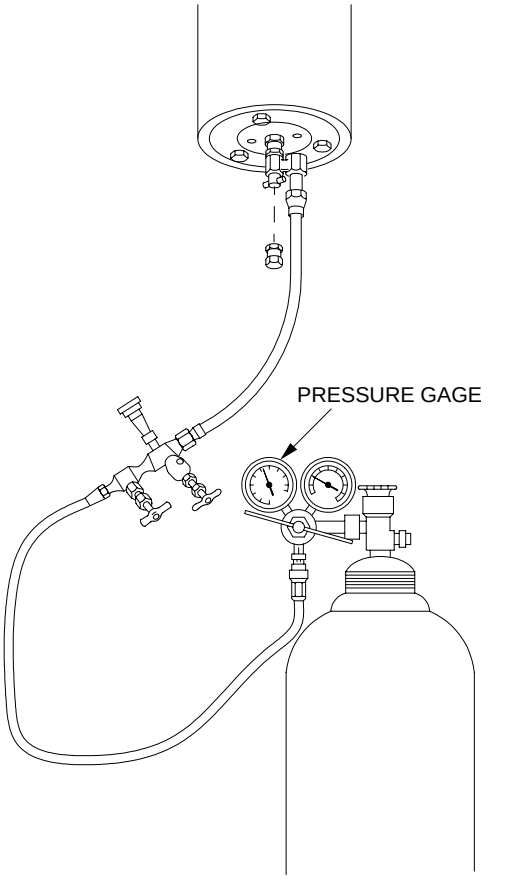
1. Charge pulse accumulator to 850 to 950 psi (para 28–9).
2. Check for nitrogen leak by watching gages.

Is pressure leaking?

yes → Replace pulse accumulator (para 18–14).

no → Fault corrected.

END OF TASK



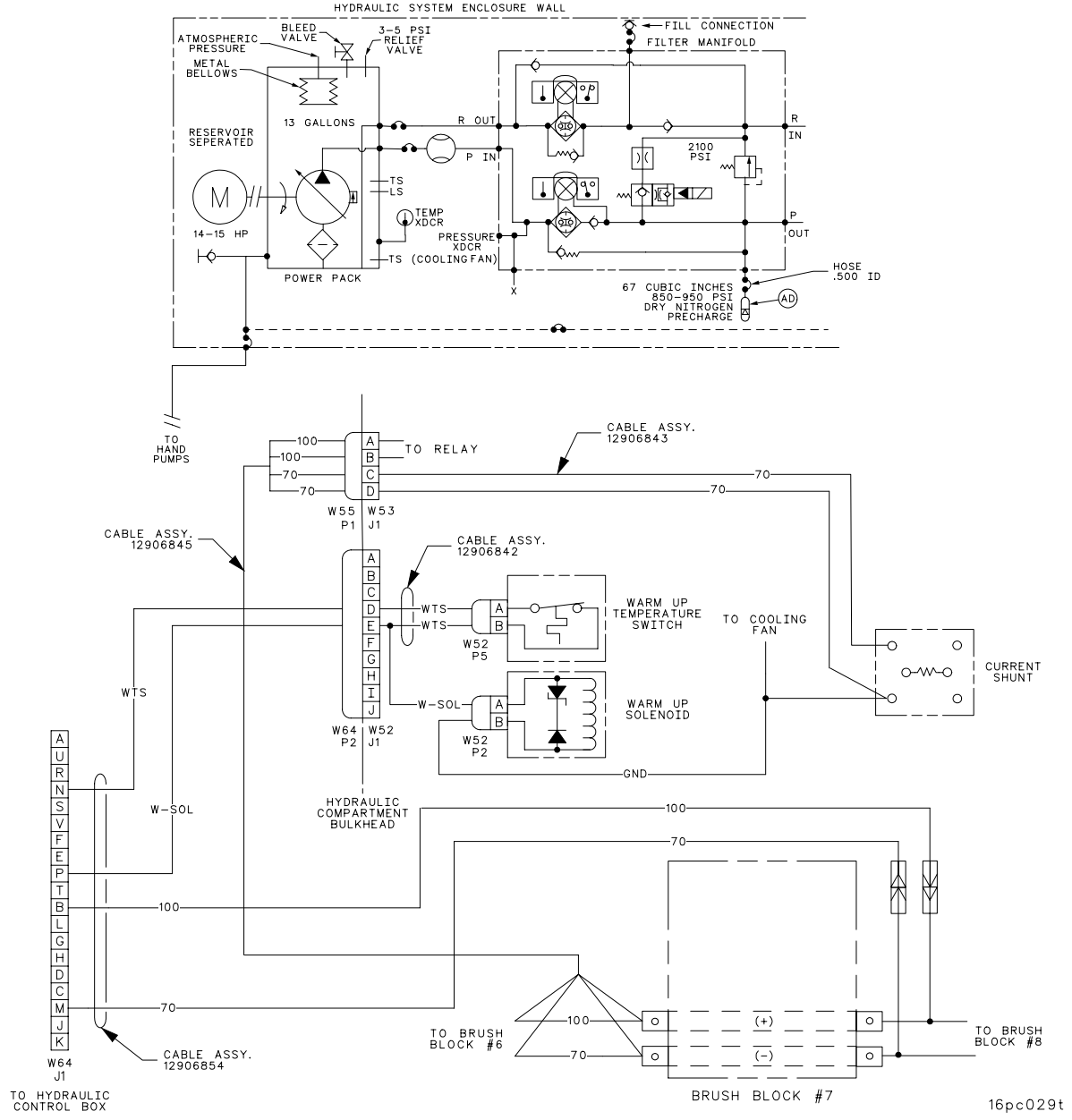
16pc034t

3–3. TROUBLESHOOTING CHART – CONTINUED

g. HYDRAULIC WARMUP SYSTEM

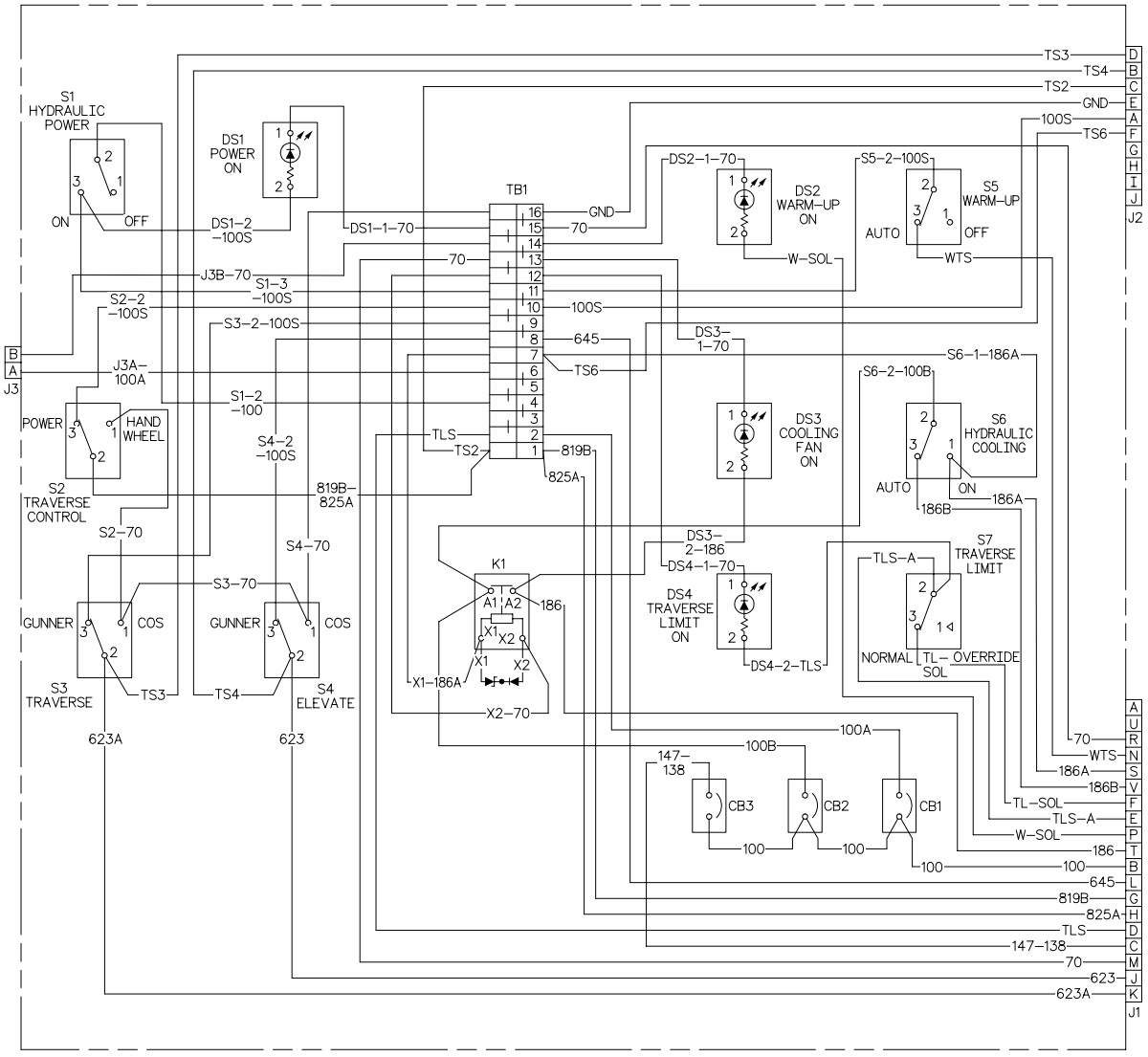
The hydraulic warm–up system consists of the hydraulic control box, warm–up temperature switch, and warm–up temperature solenoid. The schematic below shows the relationship between these components.

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.



3–3. TROUBLESHOOTING CHART – CONTINUED

g. HYDRAULIC WARMUP SYSTEM – CONTINUED



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.

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.

Is voltage present?

yes → Replace warmup indicator LED (para 5–20).

no

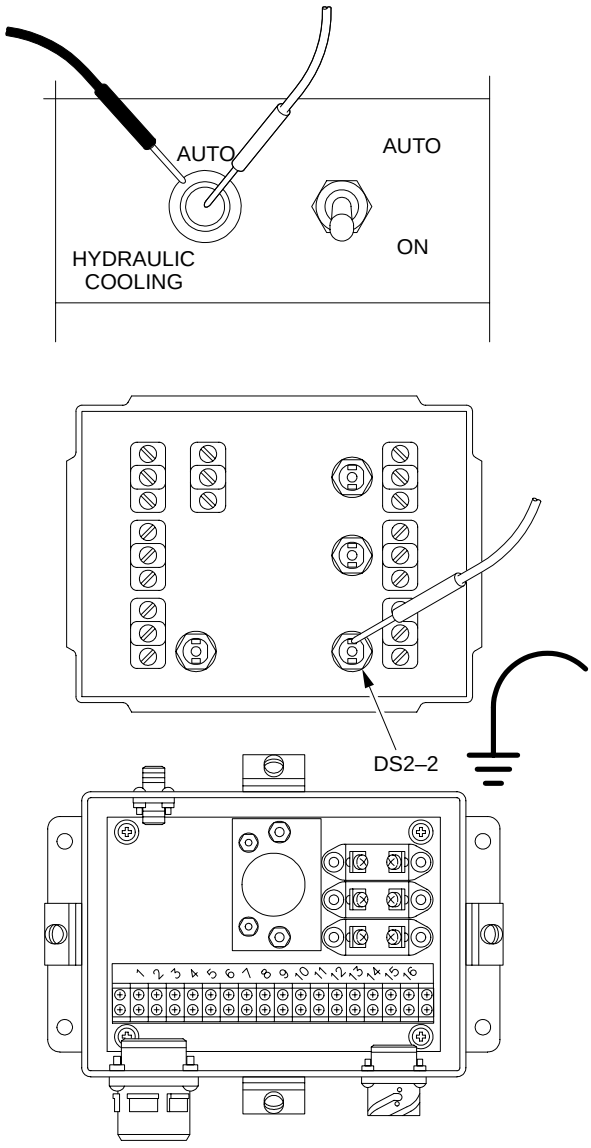
B

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.

Is voltage present?

yes

no → Replace lead 12934657–8 (para 5–21).



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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).

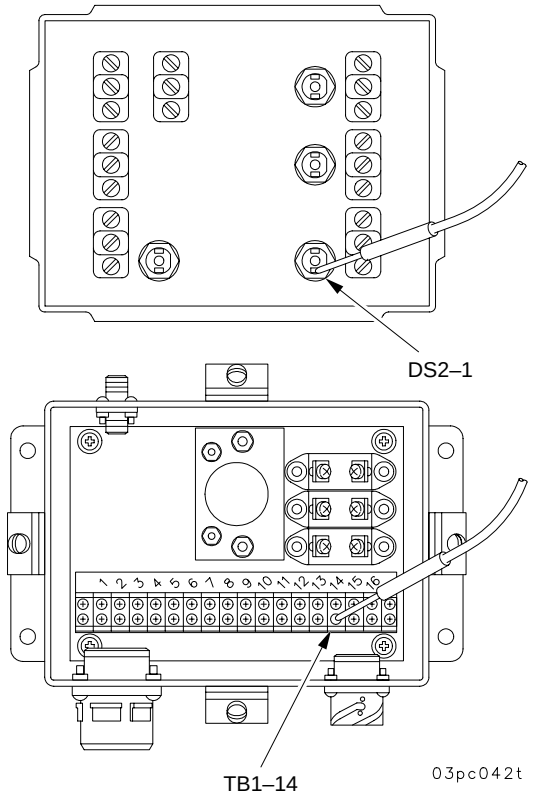
Is continuity present?

yes

Replace hydraulic warmup indicator light housing (para 5–20).

no

Replace lead from DS2–1 to TB1–14 (para 5–21).



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)

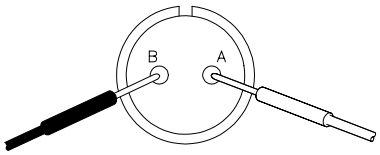
A

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).

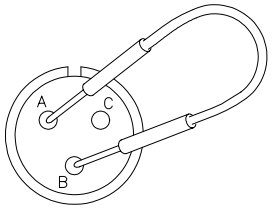
Is voltage present?

yes → Replace warmup temperature sensor (para 5–18).

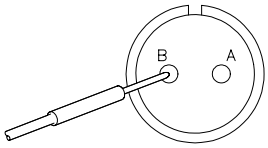
no → **B**



W52
CONNECTOR P2
SOCKET A
SOCKET B



W52
CONNECTOR P5
SOCKET A
SOCKET B



W52
CONNECTOR P2
SOCKET B

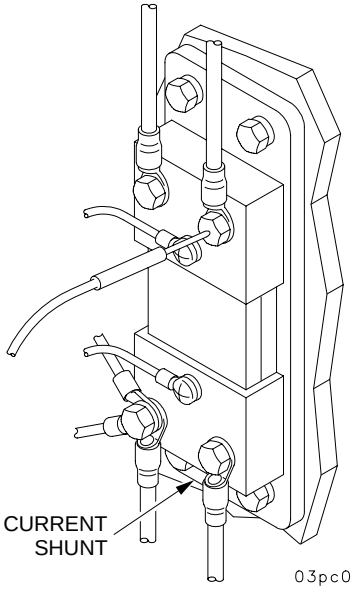
B

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?

yes → Replace harness W52 (para 5–35).

no → Replace lead 70 from harness W52 connector P2 to current shunt 12554016 (para 5–4 and 5–35).



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.

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 HYDRAULIC POWER switch ON (TM 9–2350–314–10).
2. Power up AFCS and run PDIU system test (TM 9–2350–314–10).

Does PDIU systems test show a faulty temperature sensor?

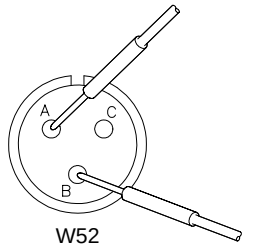
yes

no → Go to Step C.

B

1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W52 connector P5 from the warmup temperature sensor.
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.

Is continuity present?



W52
CONNECTOR P5
SOCKET A
SOCKET B

03pc036t

yes → Perform a harness check on harness W52 (para 3–3.n(1)).

no → Replace warmup temperature sensor (para 5–18).

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

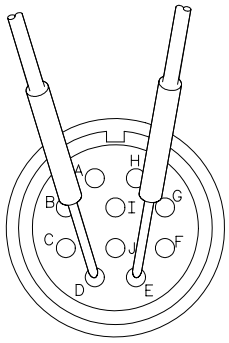
1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W64 connector P2 from harness W52 connector J1.
3. Check harness W64 for continuity by placing one multimeter lead in harness W64 connector P2 socket D and placing other lead in harness W64 connector P2 socket E.

Is continuity present?

yes

Do harness check on harness W64 (para 3–3.n(7)).

no



W64
CONNECTOR P2
SOCKET D
SOCKET E

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.

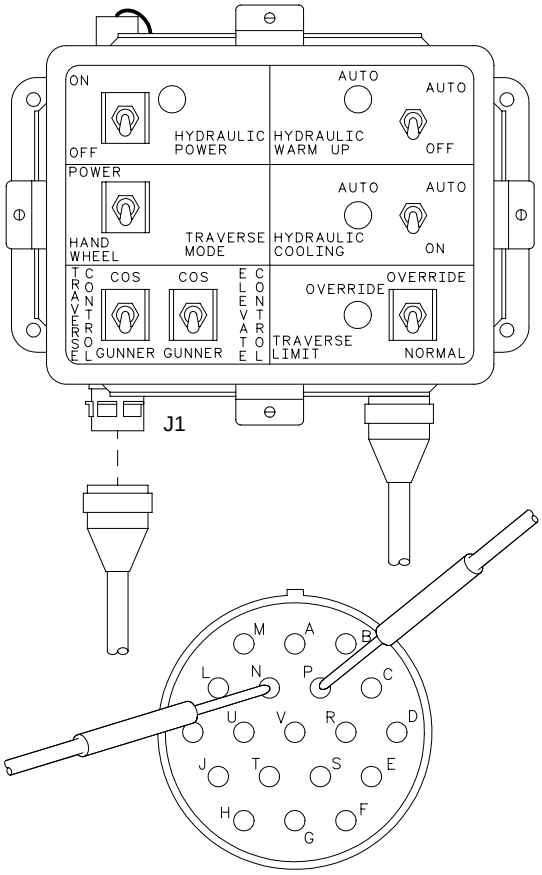
Is continuity present?

yes

Replace hydraulic warmup switch (para 5–20).

no

Replace harness 12563029 (para 5–22).



HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN N
PIN P

03pc037t

END OF TASK

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)

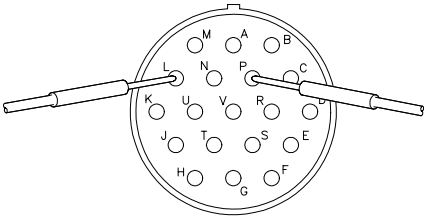
A

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.

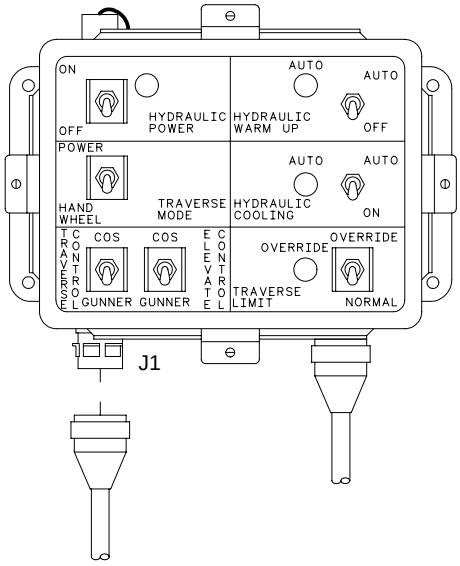
Is continuity present?

yes → Replace harness 12563029 (para 5–22).

no



HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN L
PIN P



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?

yes → Go to Step D.

no

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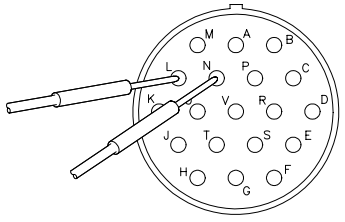


HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN L
PIN N

03pc035t

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).

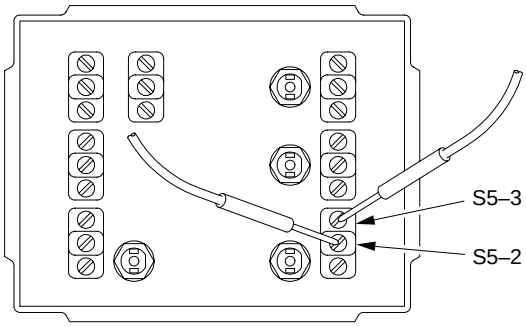
Is continuity present?

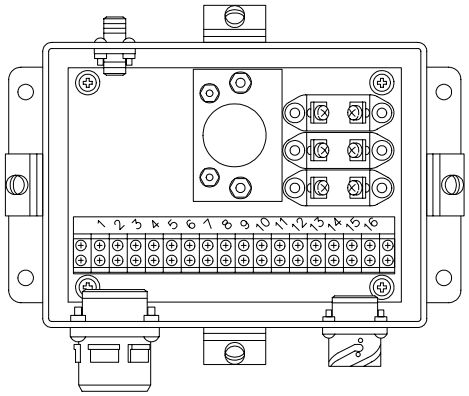
yes

Replace HYDRAULIC WARM UP switch (para 5–20).

no

Replace harness 12563029 (para 5–22).





CONTINUED FROM STEP B

D

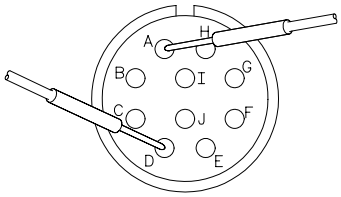
1. Disconnect harness W64 connector P2 from bulkhead connector.
2. Check harness W64 for continuity by placing one multimeter lead in harness W64 connector P2 socket A and placing the other lead in harness W64 connector P2 socket D.

Is continuity present?

yes

Perform a harness check on harness W64 (para 3–3.n(7)).

no



W64
CONNECTOR P2
SOCKET A
SOCKET D

03pc038t

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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

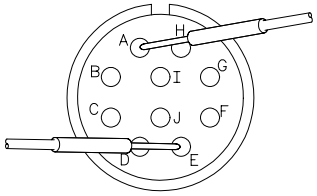
CONTINUED FROM STEP D

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?

yes → Replace harness W64 (para 5–31).

no → Replace harness W52 (para 5–35).



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)

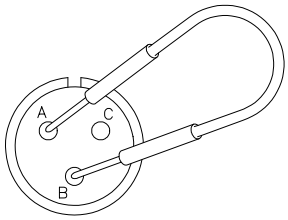
A

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).

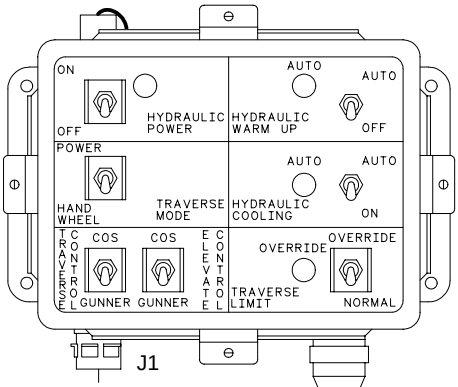
Does hydraulic warmup indicator light come on and solenoid energize?

yes → Replace HYDRAULIC WARM UP switch (para 5–20).

no



W52
CONNECTOR P5
SOCKET A
SOCKET B



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?

yes → Go to Step E.

no

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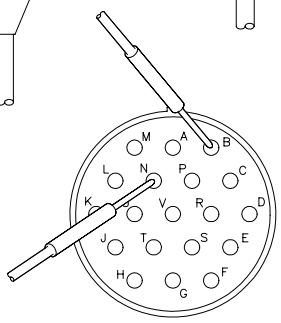


HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN B
PIN N

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

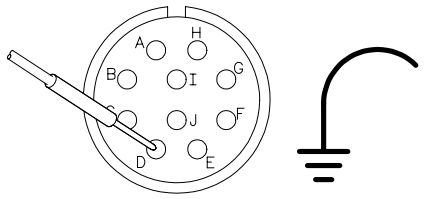
C

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?

yes / no

Replace harness W64 (para 5–31).



W64
CONNECTOR P2
SOCKET D

D

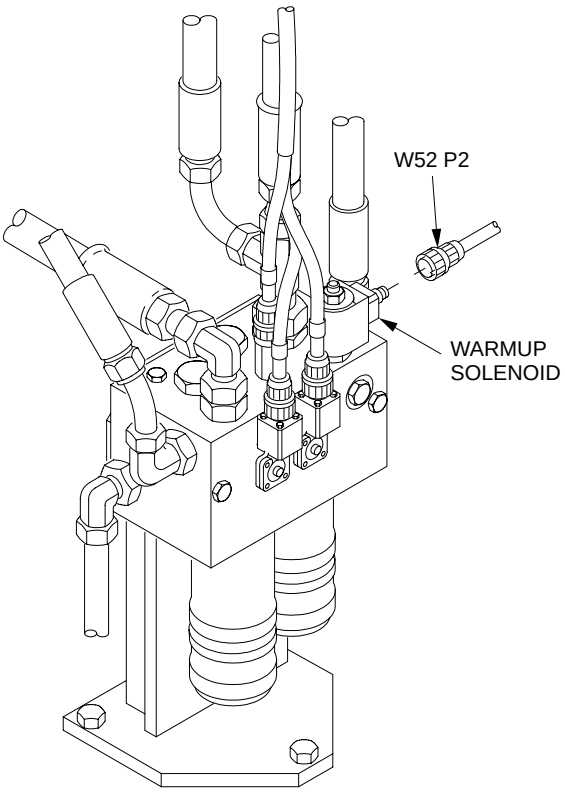
1. Shut engine OFF (TM 9–2350–314–10).
2. Turn HYDRAULIC POWER switch, vehicle MASTER power switch, and HYDRAULIC WARM UP switch OFF (TM 9–2350–314–10).
3. Reconnect harness W64 connector P2 to bulkhead connector.
4. Disconnect harness W52 connector P2 from warm–up solenoid.
5. Turn vehicle MASTER power 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.

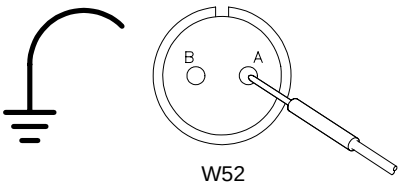
Is voltage present?

yes / no

Replace warm–up solenoid (para 18–13).

Replace harness W52 (para 5–35).





W52
CONNECTOR P2
SOCKET A

03pc078t

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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 B

E Remove cover from hydraulic control box (para 5–20).

Are all connections to terminal board 1 (TB1) tight?

yes → Go to Step G.

no

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 → Fault is corrected.

no

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).

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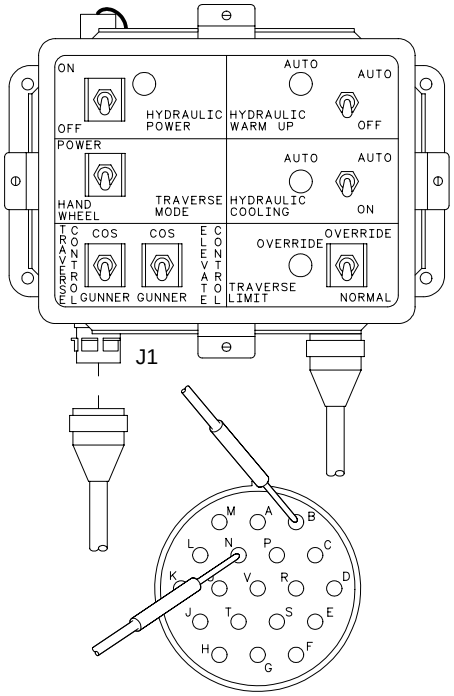
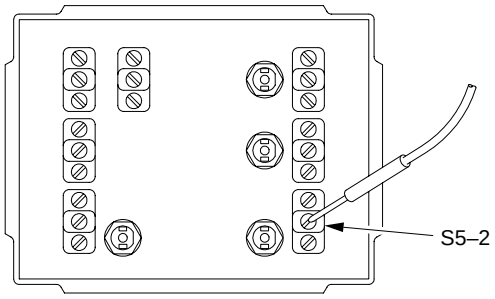
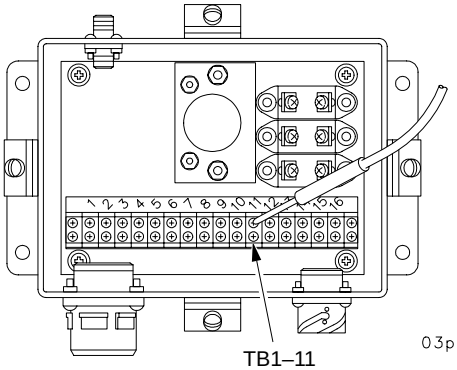


HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN B
PIN N





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

H 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?

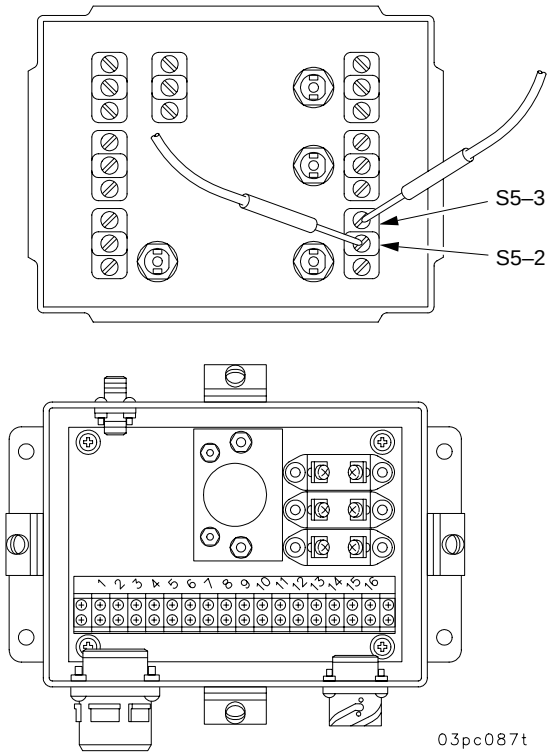
yes

Replace harness 12563029 (para 5–22).

no

Replace HYDRAULIC WARM UP switch (para 5–20).

END OF TASK

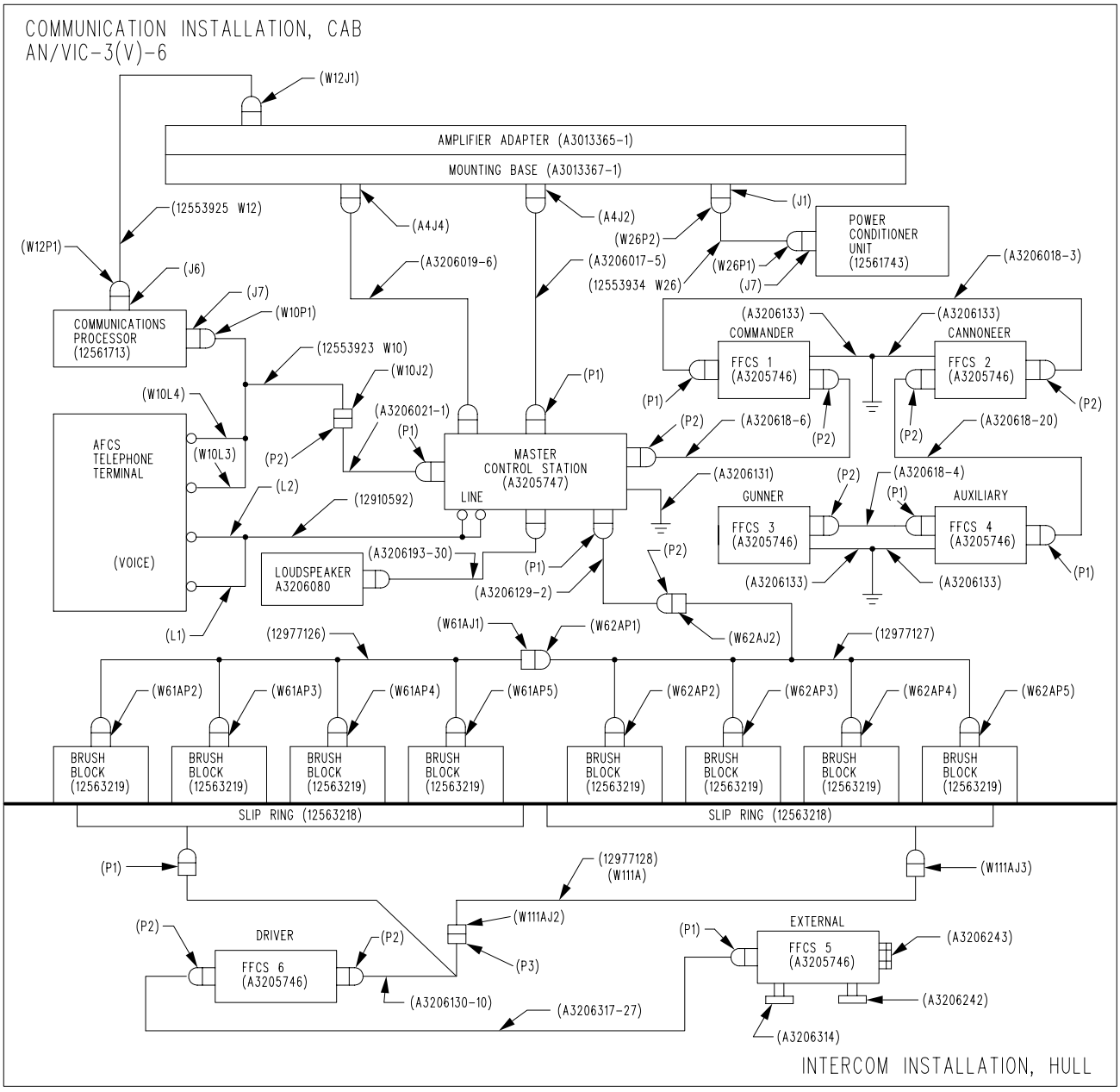


3–3. TROUBLESHOOTING CHART – CONTINUED

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?

yes

no

Fault does not exist as indicated.

B Perform a harness test on harness W61A (para 3–3.n(12)).

Is harness W61A good?

yes

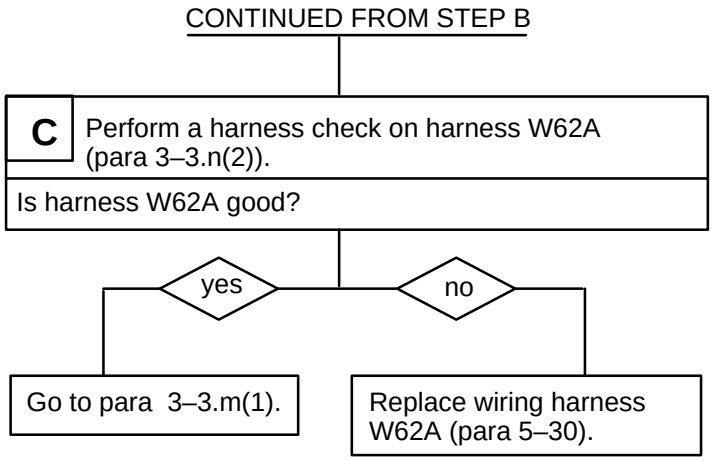
no

Replace wiring harness W61A (para 5–16).

CONTINUED ON NEXT PAGE

3–3. TROUBLESHOOTING CHART – CONTINUED

h. INTERCOM SYSTEM – CONTINUED	(1) INTERCOM SYSTEM DOES NOT OPERATE PROPERLY – CONTINUED



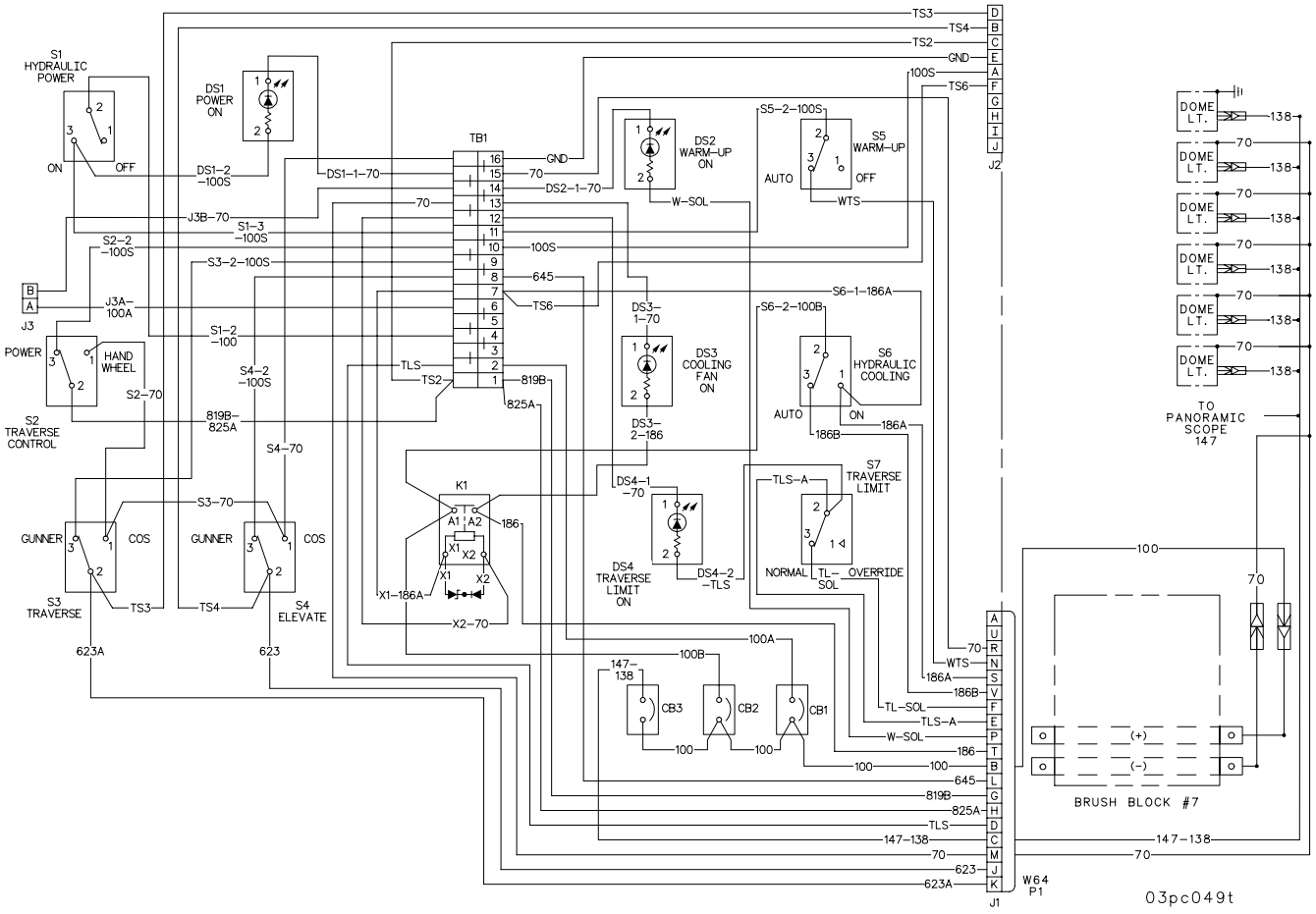
END OF TASK

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?

yes → Fault is corrected.

no

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?

yes → Replace lead 12563130–1 (para 5–21).

no

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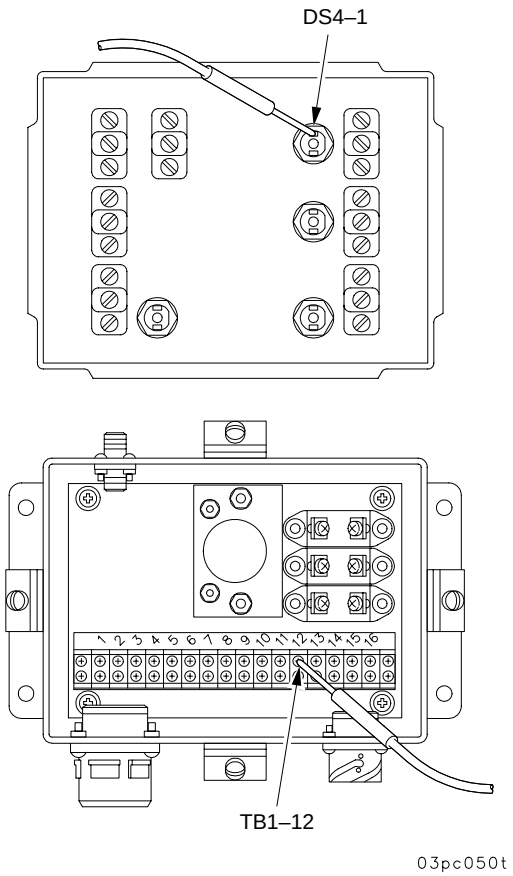


3–3. TROUBLESHOOTING CHART – CONTINUED

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?

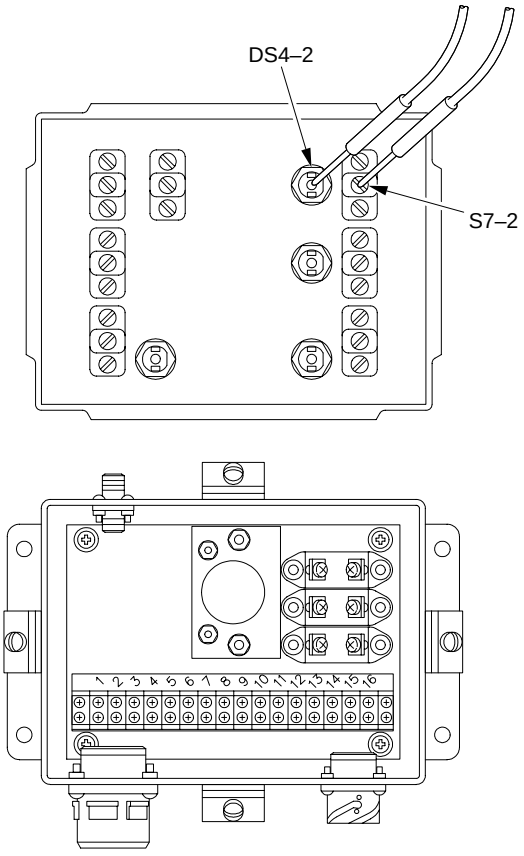
yes

Replace DS4 light housing (para 5–20).

no

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?

yes

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?

yes

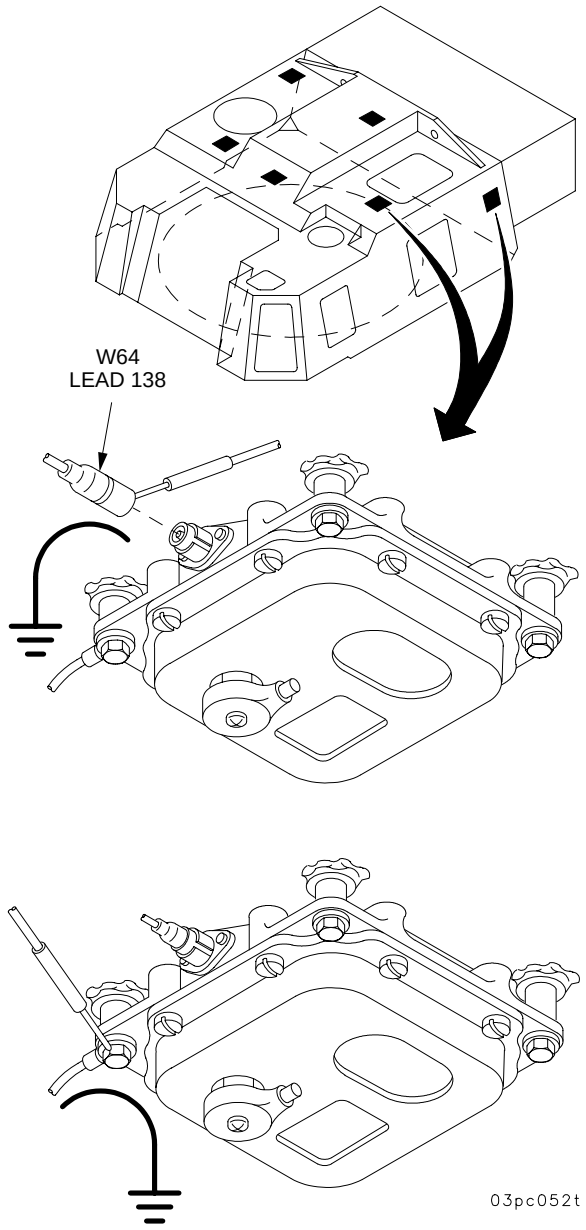
Go to Step I.

no

Replace harness W64 lead 70 to dome light (para 5–31).

no

Go to Step C.



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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?

yes

no

Replace W64 lead 70 from connector to dome light ground connector (para 5–31).

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?

yes

no

Replace harness W64 (para 5–31).

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?

yes

no

Fault does not exist as indicated.

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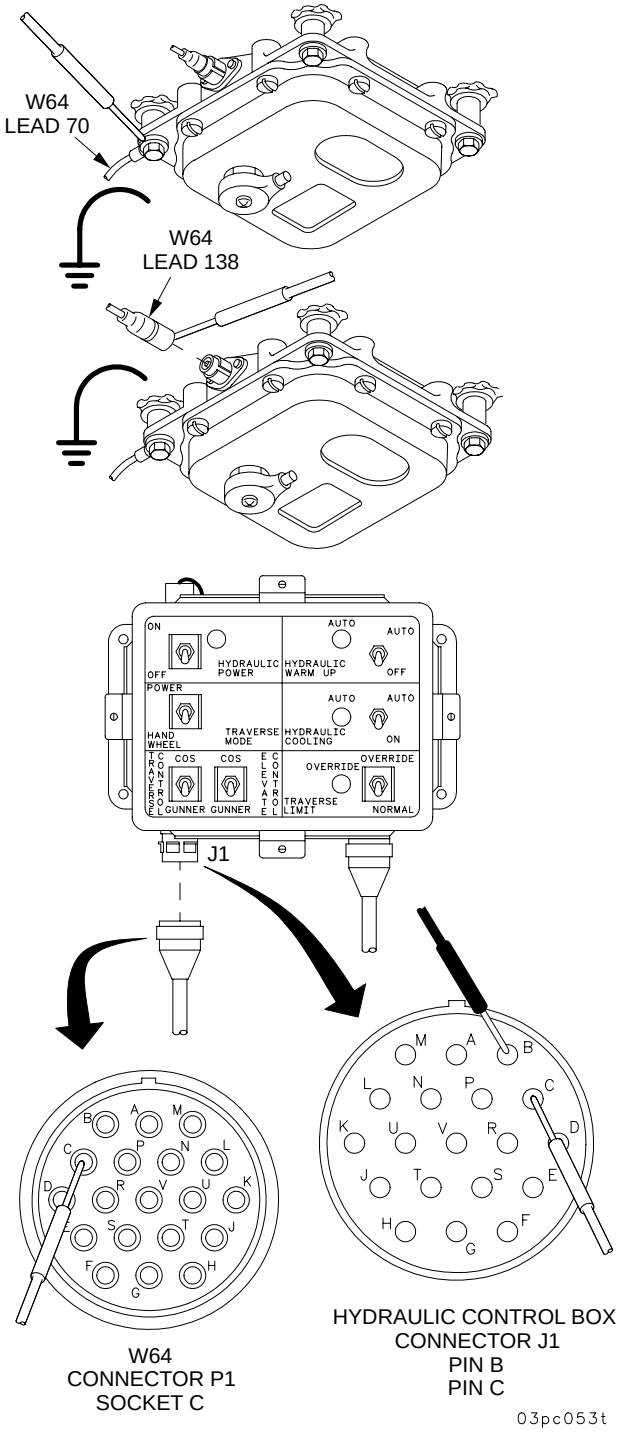


3–3. TROUBLESHOOTING CHART – CONTINUED

i. LIGHTS – CONTINUED	(2) DOME LIGHT FAILS TO OPERATE. All other lights operate. – CONTINUED

CONTINUED FROM STEP 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?

yes

no

Replace wire 100 from hydraulic control box connector J1 pin B to CB2 terminal A (para 5–21).

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?

yes

no

Replace CB2 (para 5–20).

H

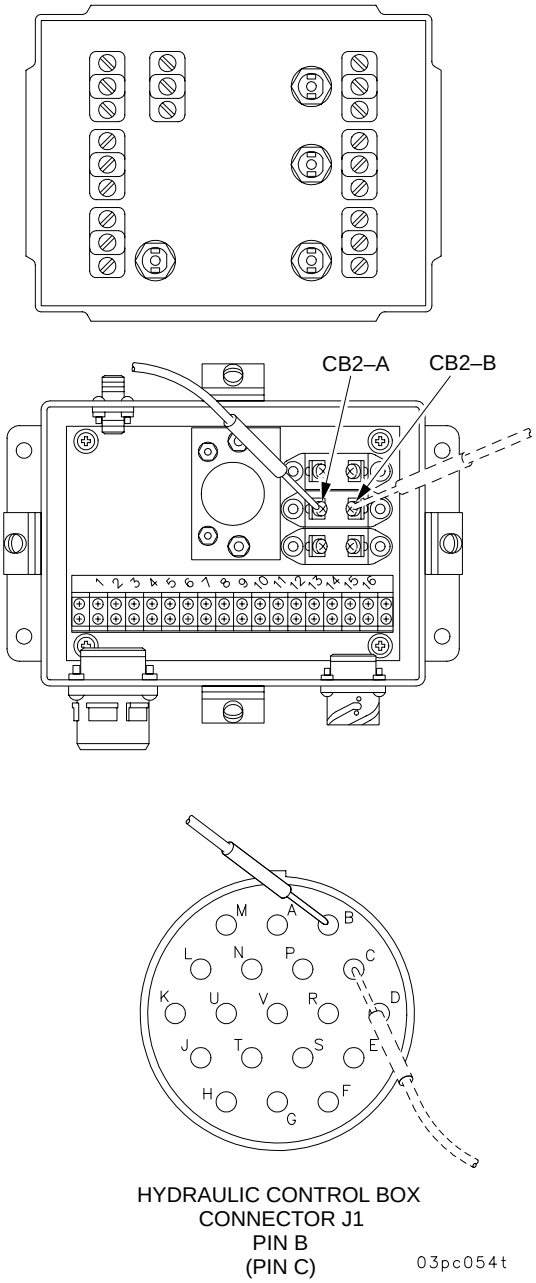
1. Place one multimeter lead on CB2 terminal B and other multimeter lead in hydraulic control box connector J1 pin C.
2. Check for continuity.

Is continuity present?

yes

no

Replace wire 147/138 from CB2 to hydraulic control box connector J1 pin C (para 5–21).



HYDRAULIC CONTROL BOX CONNECTOR J1
PIN B
(PIN C)

03pc054t

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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 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?

yes

no

Replace switch power internal lead 138 (para 5–26).

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?

yes

no

Replace dome light switch (para 5–26).

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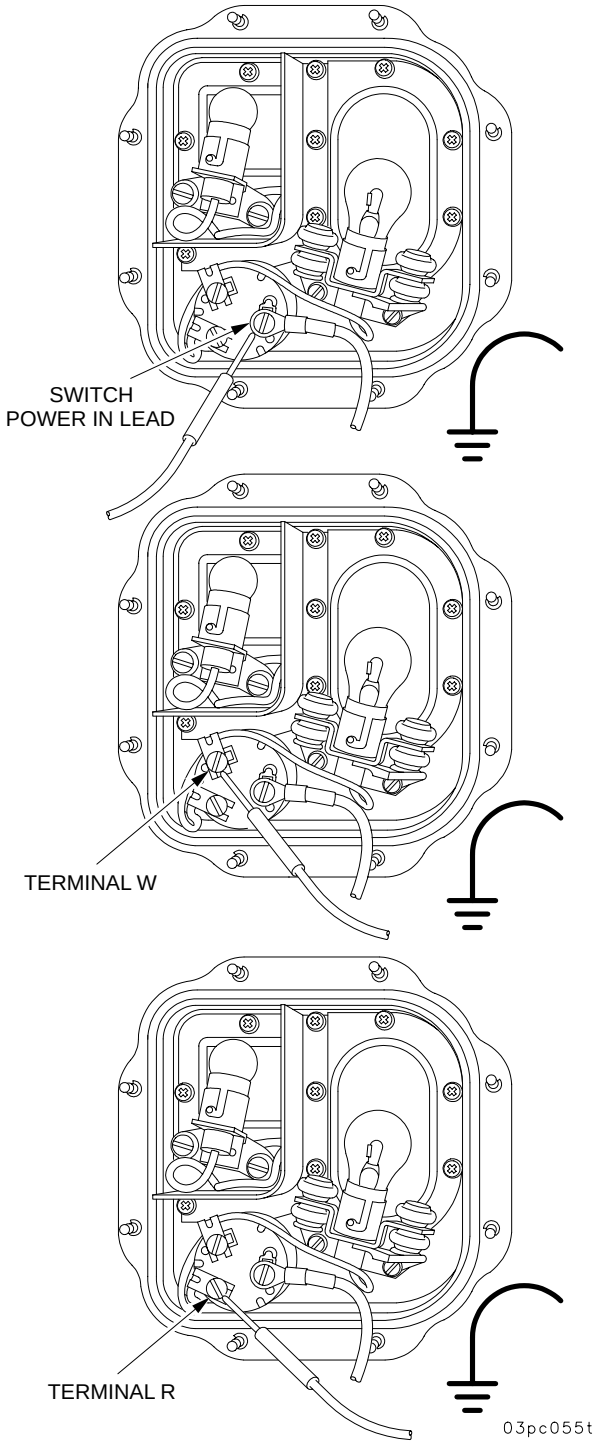


3–3. TROUBLESHOOTING CHART – CONTINUED

i. LIGHTS – CONTINUED	(2) DOME LIGHT FAILS TO OPERATE. All other lights operate. – CONTINUED

CONTINUED FROM STEP J

K

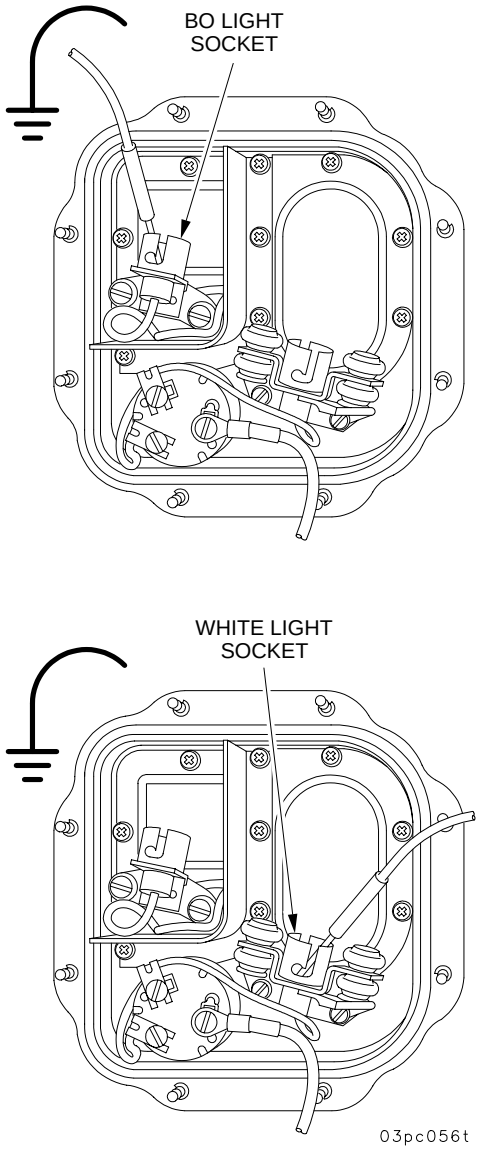
1. Turn dome light switch OFF (TM 9–2350–314–10).
2. Remove bulbs from BO and white light sockets.
3. Place multimeter red lead on light socket center contact of BO light and black lead on ground.
4. Turn dome light switch to BO and check for voltage (TM 9–2350–314–10).
5. Place multimeter red lead on light socket center contact of white light and black lead on ground.
6. Turn dome light switch to white light and check for voltage (TM 9–2350–314–10).

Is voltage present?

yes → Replace light bulb(s) (para 5–26).

no → Replace light (para 5–26).

END OF TASK

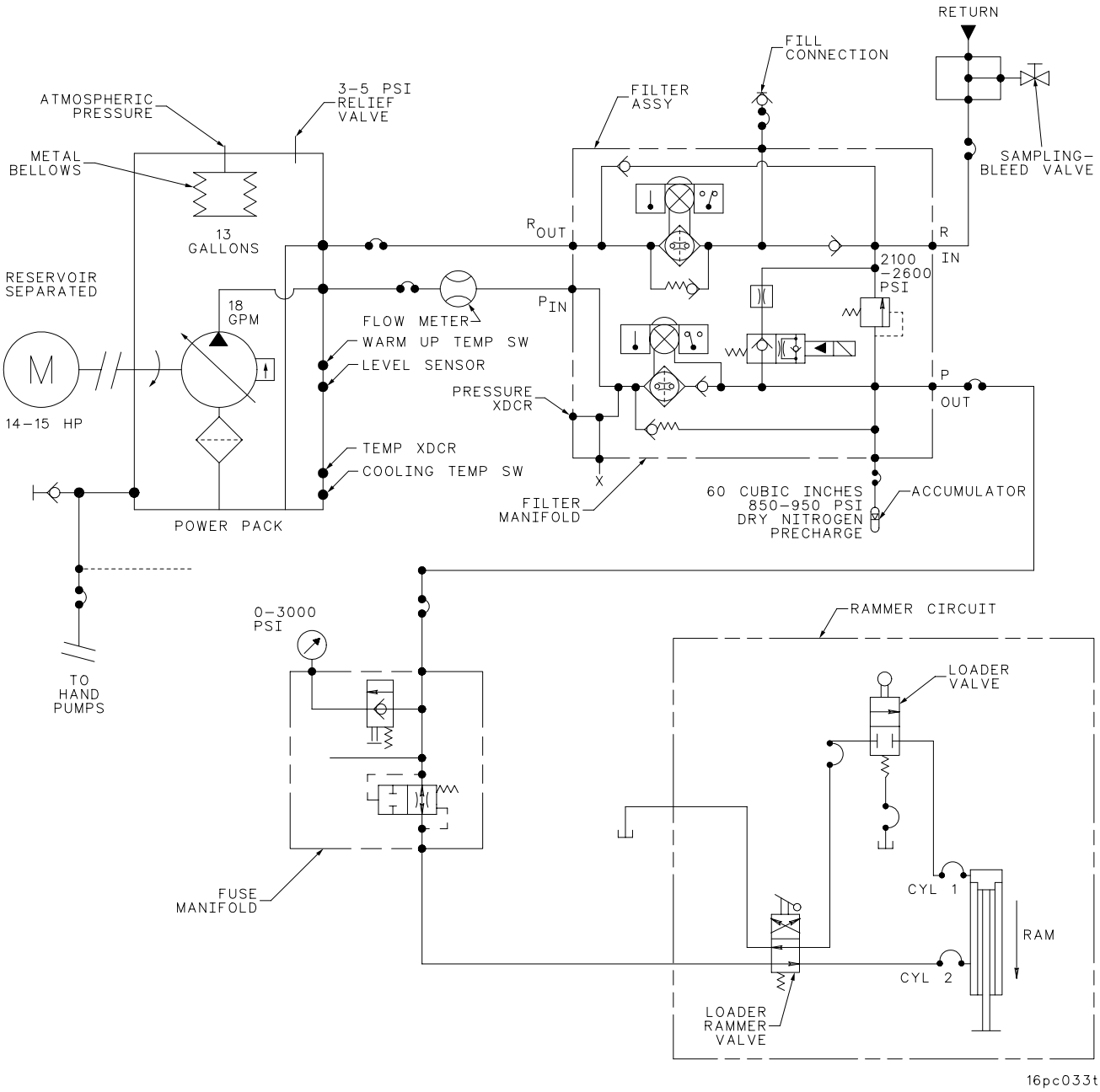


3–3. TROUBLESHOOTING CHART – CONTINUED

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.



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?

yes → Correct leakage. Re-check for fault.

no

B Do an operational check on rammer (TM 9–2350–314–10).

Does rammer operate smoothly and properly?

yes → Fault corrected.

no

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?

yes

no → Adjust blocking valve (para 6–2).

CONTINUED ON NEXT PAGE

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

D

1. Push main release handle to unlatch rammer (TM 9–2350–314–10).
2. Extend rammer fully rearward and down (TM 9–2350–314–10).
3. Push in blocking valve plunger (para 6–2).

Does blocking valve plunger push in?

yes

no → Replace blocking valve (para 6–3).

E

Check lines and fitting for any restrictions or leakage.

Are lines and fitting good?

yes

no → Repair or replace lines and/or fitting (para 18–18).

F

1. Make sure rammer is in the ram position (TM 9–2350–314–10).
2. While holding the rammer hydraulic supply line, activate the rammer (TM 9–2350–314–10).

Did the line move and could you feel the fluid moving through the line?

yes

no → Go to Step H.

CONTINUED ON NEXT PAGE

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

G

1. Open equilibration shutoff valve (TM 9–2350–314–10).
2. Turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
3. Shut off engine and turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
4. Zero hydraulic system pressure (para 18–1).
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).

Could you hear or feel the velocity fuse reset?

yes → Recheck for fault indication.

no

H

1. Replace the velocity fuse (para 18–11).
2. Do an operational check on rammer (TM 9–2350–314–10).

Does rammer extend and retract?

yes → Fault corrected.

no → Notify Direct Support Maintenance.

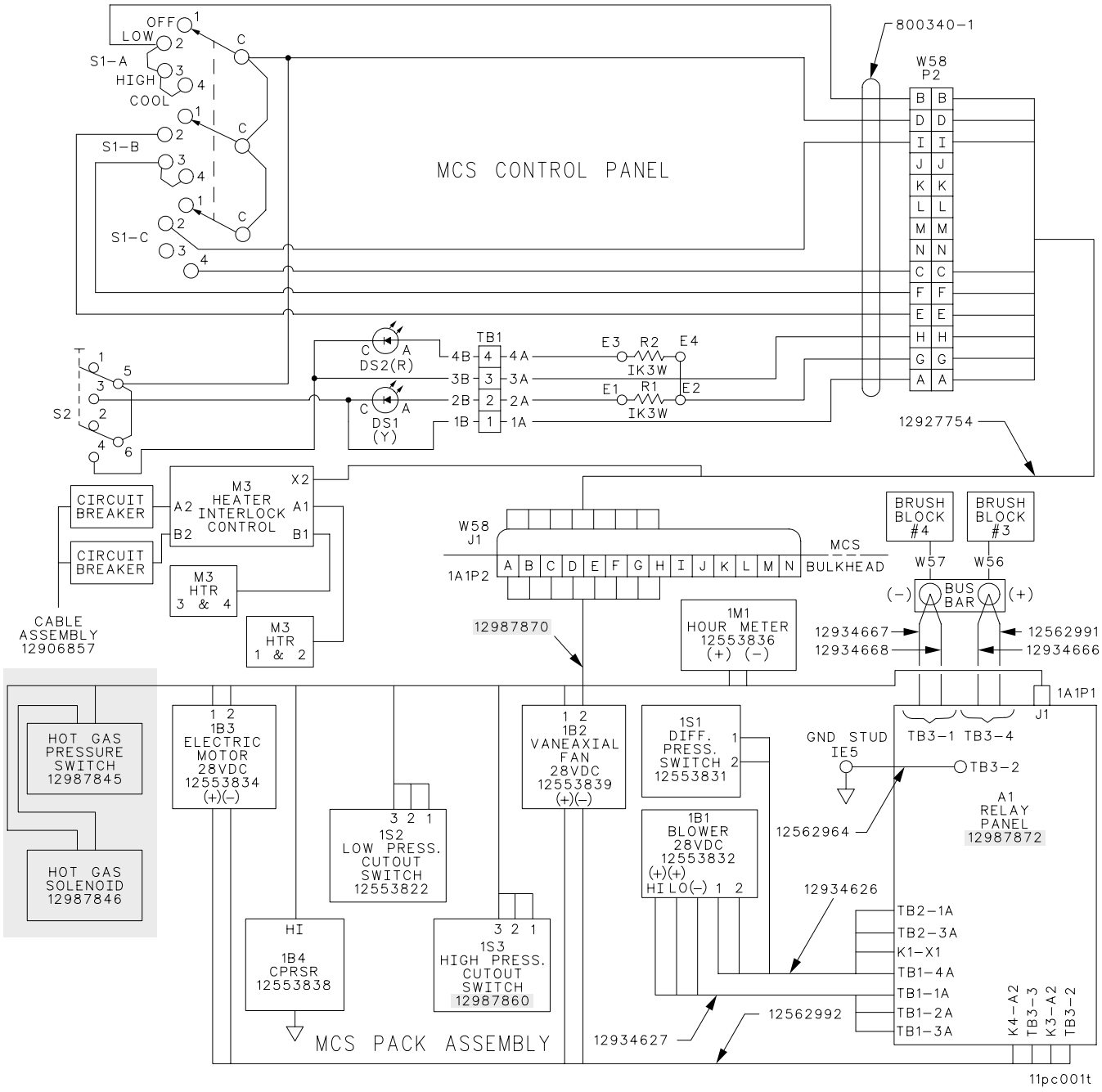
END OF TASK

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.



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?

yes

no

Perform harness test on harness W56 (para 3–3.n(13)) and on harness W57 (para 3–3.n(16)).

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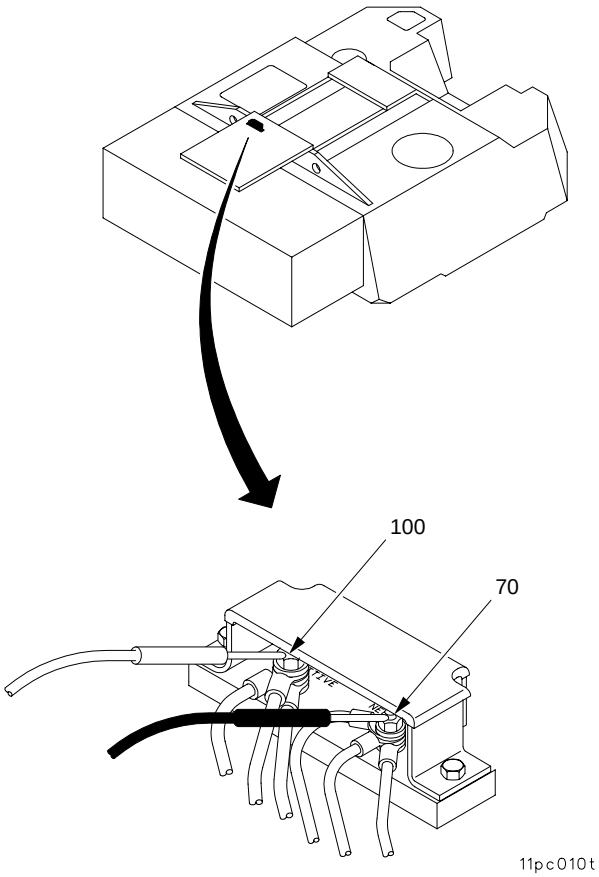


3–3. TROUBLESHOOTING CHART – CONTINUED

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?

yes → Go to Step D.

no

C

1. Place multimeter red lead on terminal SB–E1 of TB3 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes → Repair or replace lead 70 from TB3 to bus bar 70 of MCS (para 13–27).

no → Repair or replace lead 100 from TB3 to bus bar 100 of MCS (para 13–26).

CONTINUED FROM STEP B

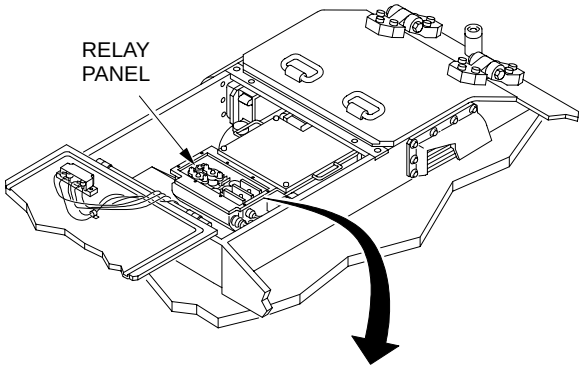
D

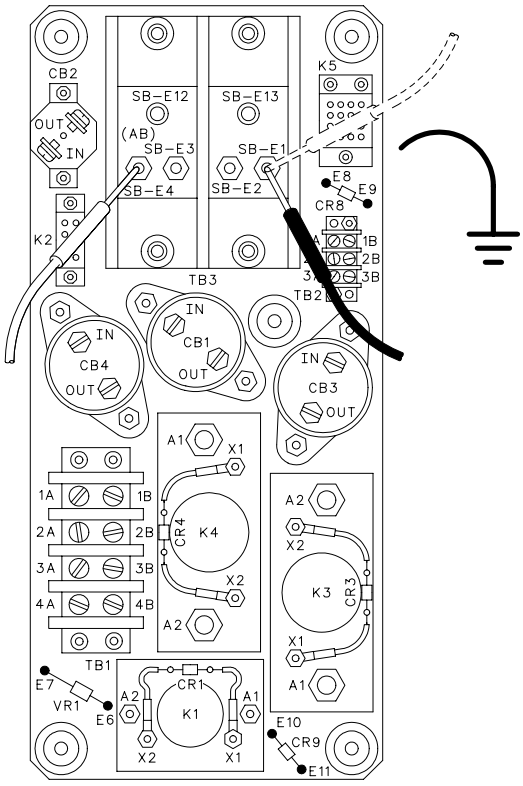
1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect wire 1P2 from harness W58 connector J1 at MCS and CAB bulkhead.
3. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).
4. Place multimeter red lead in socket G of wire 1P2 and black lead in socket D of wire 1P2.

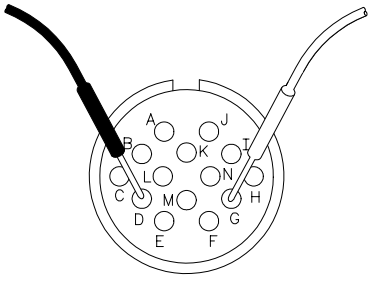
Is voltage present?

yes

no → Go to Step F.







1P2
SOCKET G

3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(1) MCS DOES NOT OPERATE IN ANY MODE. – CONTINUED

CONTINUED FROM STEP D

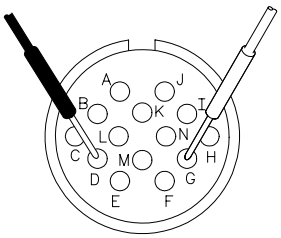
E

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?

yes → Replace MCS control box (para 13–35).

no → Repair or replace harness W58 (para 5–15).



W58
CONNECTOR P2
SOCKET G
SOCKET D

CONTINUED FROM STEP D

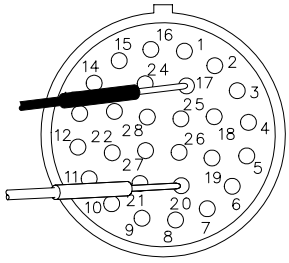
F

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?

yes → Repair or replace wire leads from wire 1P1 to 1P2 (para 13–32).

no → CONTINUED ON NEXT PAGE



RELAY PANEL
CONNECTOR J1
PIN 20
PIN 17

11pc012t

3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(1) MCS DOES NOT OPERATE IN ANY MODE. – CONTINUED

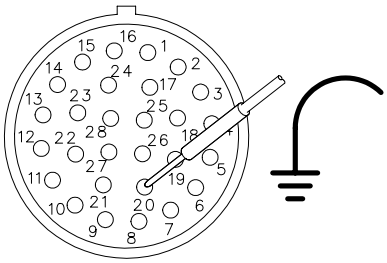
CONTINUED FROM STEP F

G Place multimeter red lead on relay panel connector J1 pin 20 and black lead on ground.

Is voltage present?

yes → Repair or replace ground lead from relay panel connector J1 pin 17 to terminal SB–E3 of TB3 (para 13–32).

no → **H**



RELAY PANEL CONNECTOR J1 PIN 20

H Place multimeter red lead inside of CB2 and black lead on ground.

Is voltage present?

yes → **I**

no → Notify Direct Support Maintenance.

I Place multimeter red lead on outside of CB2 and black lead on ground.

Is voltage present?

yes → **J**

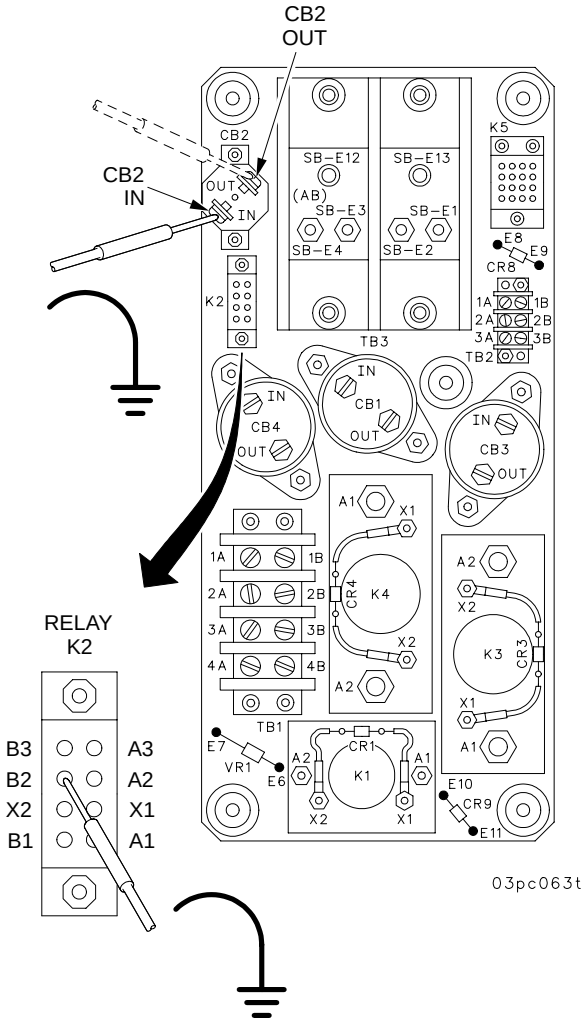
no → Notify Direct Support Maintenance.

J Place multimeter red lead on relay K2 terminal B2 and black lead on ground.

Is voltage present?

yes → ———

no → Notify Direct Support Maintenance.



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?

yes

no

Notify Direct Support Maintenance.

L Place multimeter red lead on relay K3 terminal X1 and black lead on ground.

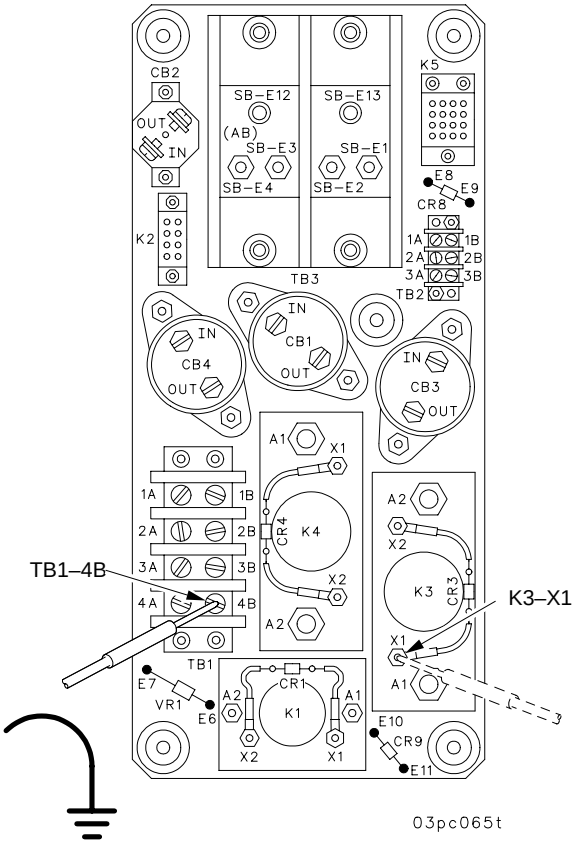
Is voltage present?

yes

no

Turn MCS ON. If MCS does not operate, notify Direct Support Maintenance.

Notify Direct Support Maintenance.



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

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 opened (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. 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 (–).

Is voltage present?

yes → Replace crew blower motor (para 13–19).

no →

B

1. Place multimeter red lead on terminal 1B of TB1 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes → Repair or replace wire from HI terminal of crew blower to TB1–1B (para 13–31).

no →

C

1. Place multimeter red lead on terminal A2 of relay K1 and black lead on ground.
2. Check for voltage.

Is voltage present?

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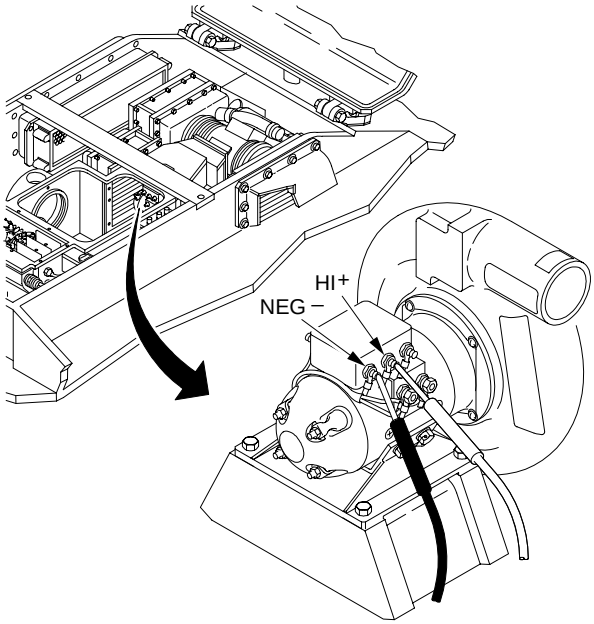
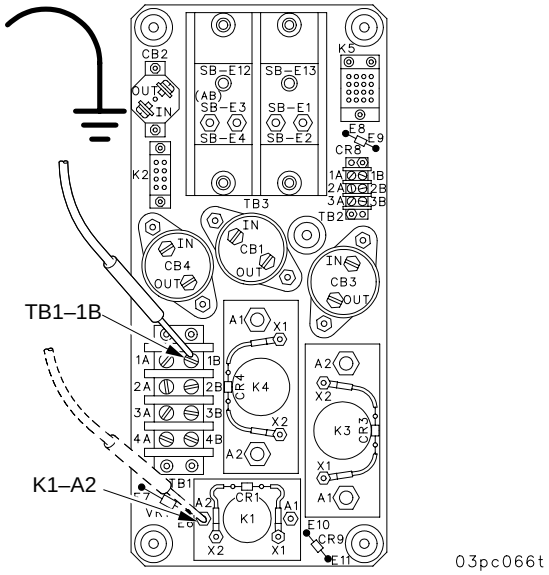




3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(2) MCS HAS NO OUTPUT TO CREW STATION WHEN IN HI MODE. – CONTINUED

CONTINUED FROM STEP C

yes / no

Notify Direct Support Maintenance.

D

1. Place multimeter red lead on terminal A1 of relay K1 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes / no

Go to Step G.

E

1. Place multimeter red lead on OUT side of CB1 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes / no

Notify Direct Support Maintenance.

F

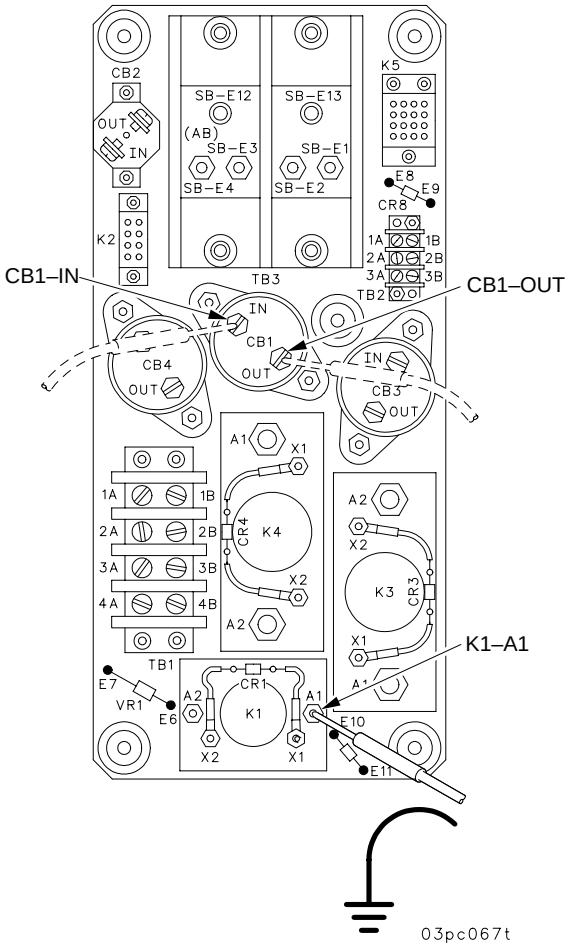
1. Place multimeter red lead on IN side of CB1 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes / no

Replace MCS relay panel (para 13–23).

Notify Direct Support Maintenance.



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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 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?

yes → **H**

no → Notify Direct Support Maintenance.

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?

no → Notify Direct Support Maintenance.

yes → **I**

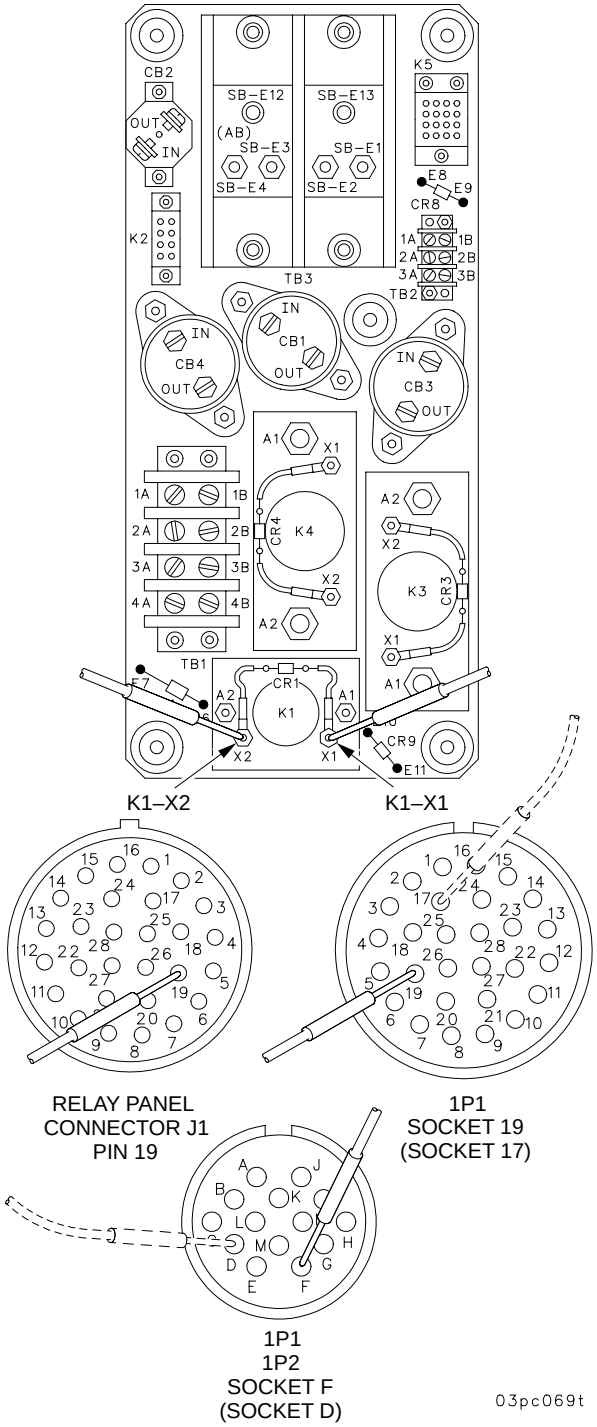
I

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?

yes → CONTINUED ON NEXT PAGE

no → Notify Direct Support Maintenance.



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.

Position 1	Position 2
W58 J1 pin F	W58 P2 socket F
W58 J1 pin D	W58 P2 socket D

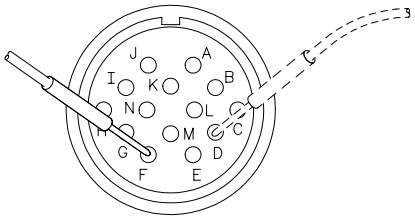
4. Check for continuity.

Is continuity present?

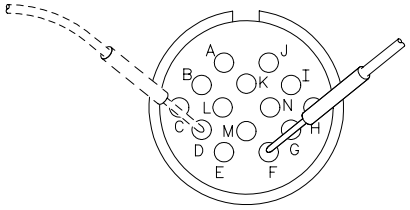
yes

no

Replace wiring harness W58 (para 5–15).



W58
CONNECTOR J1
PIN F
(PIN D)



W58
CONNECTOR P2
SOCKET F
(SOCKET D)

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.

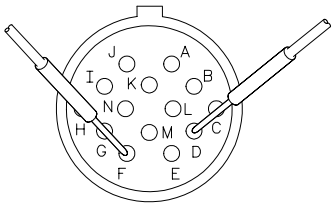
Is continuity present?

yes

no

No fault in HI mode. Check for other fault indications.

Replace MCS control box (para 13–35).



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?

yes → Replace crew blower motor (para 13–19).

no

B

1. Place multimeter red lead on terminal 2B of TB1 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes → Repair or replace wire from terminal 2A of TB1 to crew blower motor (para 13–31).

no

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?

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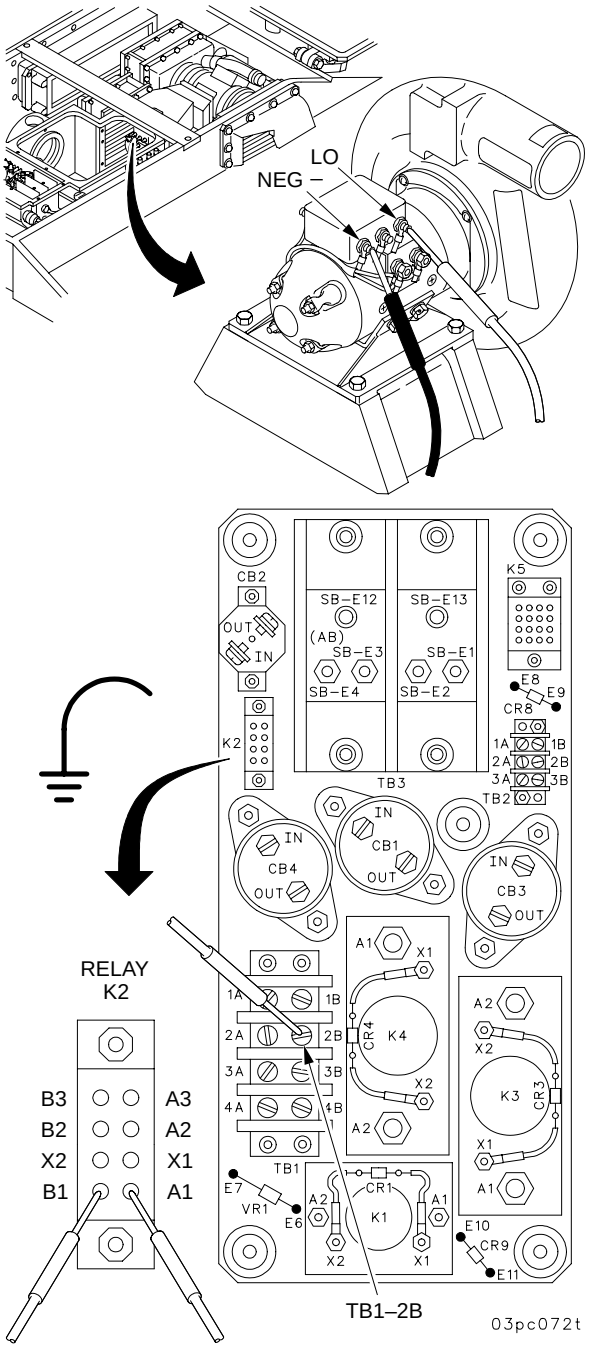


3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(3) MCS HAS NO OUTPUT TO CREW STATION WHEN IN LO MODE. – CONTINUED

CONTINUED FROM STEP C

yes / no

Notify Direct Support Maintenance.

D

1. Place multimeter red lead on terminal A2 or B2 of relay K2 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes / no

Go to Step G.

E

1. Place multimeter red lead on OUT side of CB2 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes / no

Notify Direct Support Maintenance.

F

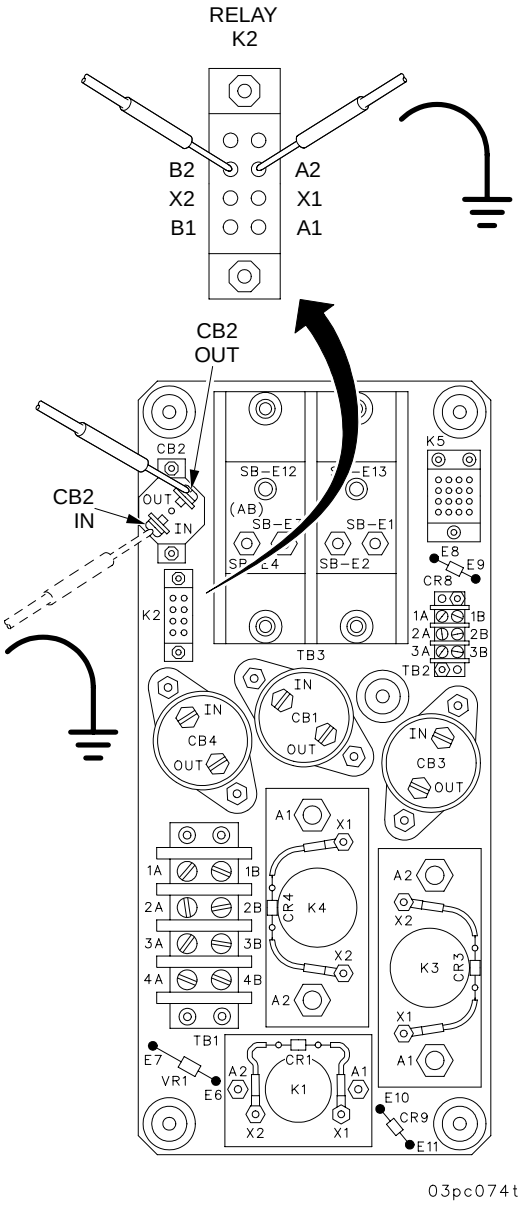
1. Place multimeter red lead on IN side of CB2 and black lead on ground
2. Check for voltage.

Is voltage present?

yes / no

Replace MCS relay panel (para 13–23).

Notify Direct Support Maintenance.



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?

yes → **H**

no → Notify Direct Support Maintenance.

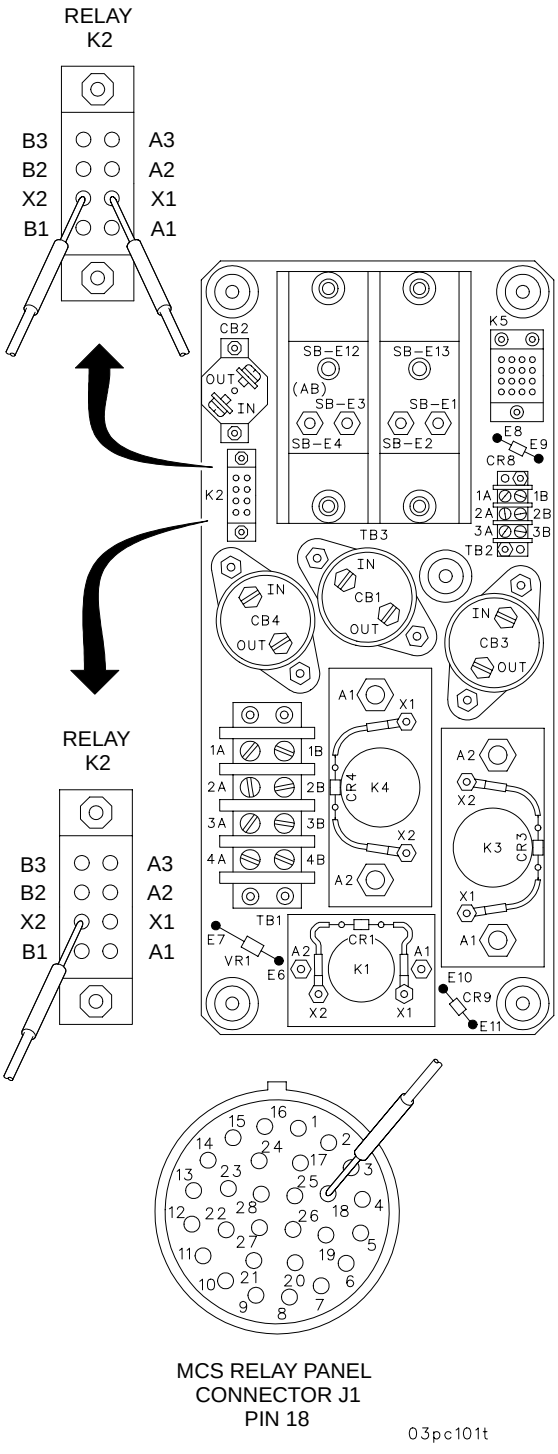
H

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?

yes → CONTINUED ON NEXT PAGE

no → Replace MCS relay panel (para 13–23).



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

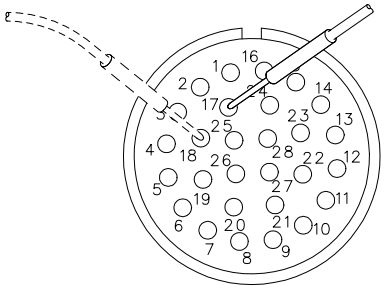
1. Disconnect wiring harness 1P2 from MCS bulkhead connector.
2. Disconnect wiring harness 1P1 from MCS relay panel connector J1.
3. Place one lead of multimeter on 1P1 Socket 17 and the other lead on 1P2 Socket D.
4. Place one multimeter lead on 1P1 Socket 18 and other lead on 1P2 Socket E.
5. Check for continuity.

Is continuity present at both points?

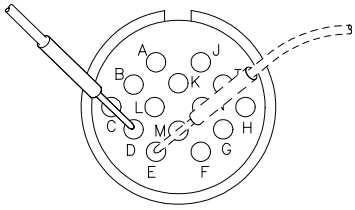
yes

no

Notify Direct Support Maintenance.



1P1
SOCKET 17
(SOCKET 18)



1P2
SOCKET D
(SOCKET E)

J

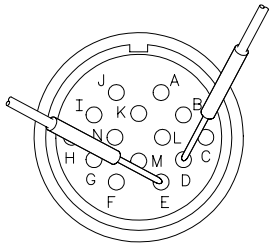
1. Disconnect wiring harness W58 connector P2 from the MCS control box.
2. Place one multimeter lead on pin D and the other lead on pin E of the MCS control box.
3. Check for continuity.

Is continuity present?

yes

no

Replace MCS control box (para 13–35).



W58
CONNECTOR J1
PIN D
PIN E

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.

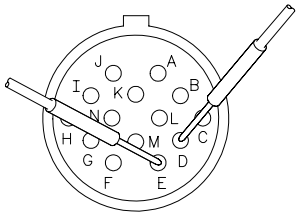
Is continuity present?

yes

no

No fault. Recheck for fault indication.

Replace harness W58 (para 5–15).



MCS CONTROL PANEL
CONNECTOR J1
PIN D
PIN E

03pc102t

END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(4) MCS HAS NO COOL AIR OUTPUT WHEN IN COOL 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)

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?

yes → Go to Step G.

no

B

1. Place multimeter red lead on positive (+) terminal of compressor motor and black lead on ground.
2. Check for voltage.

Is voltage present?

yes

no → Go to Step M.

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?

no → Replace compressor motor (para 13–18).

yes

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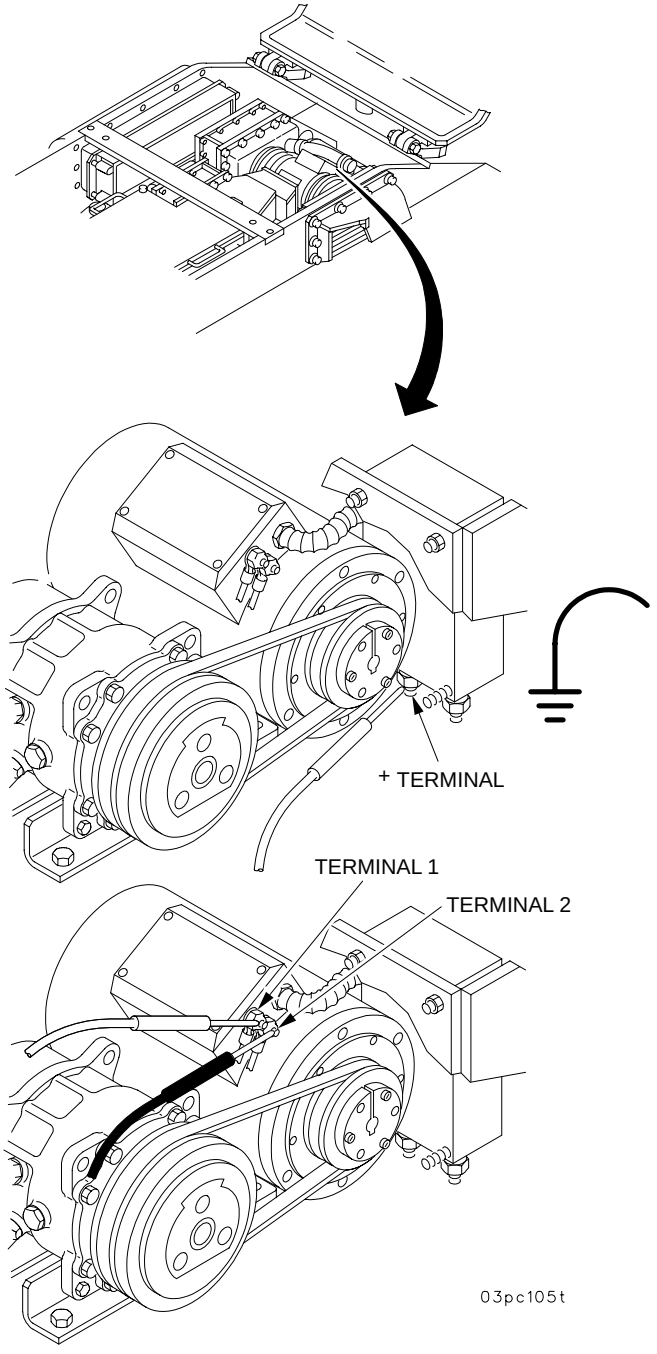


3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(4) MCS HAS NO COOL AIR OUTPUT WHEN IN COOL MODE. – CONTINUED

CONTINUED FROM STEP 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?

yes

no

Replace compressor motor (para 13–18).

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?

yes

no

Replace compressor motor (para 13–18).

F

1. Place one multimeter lead on connector J1 pin 8 and other lead on relay K5 terminal A1.
2. Check for continuity.

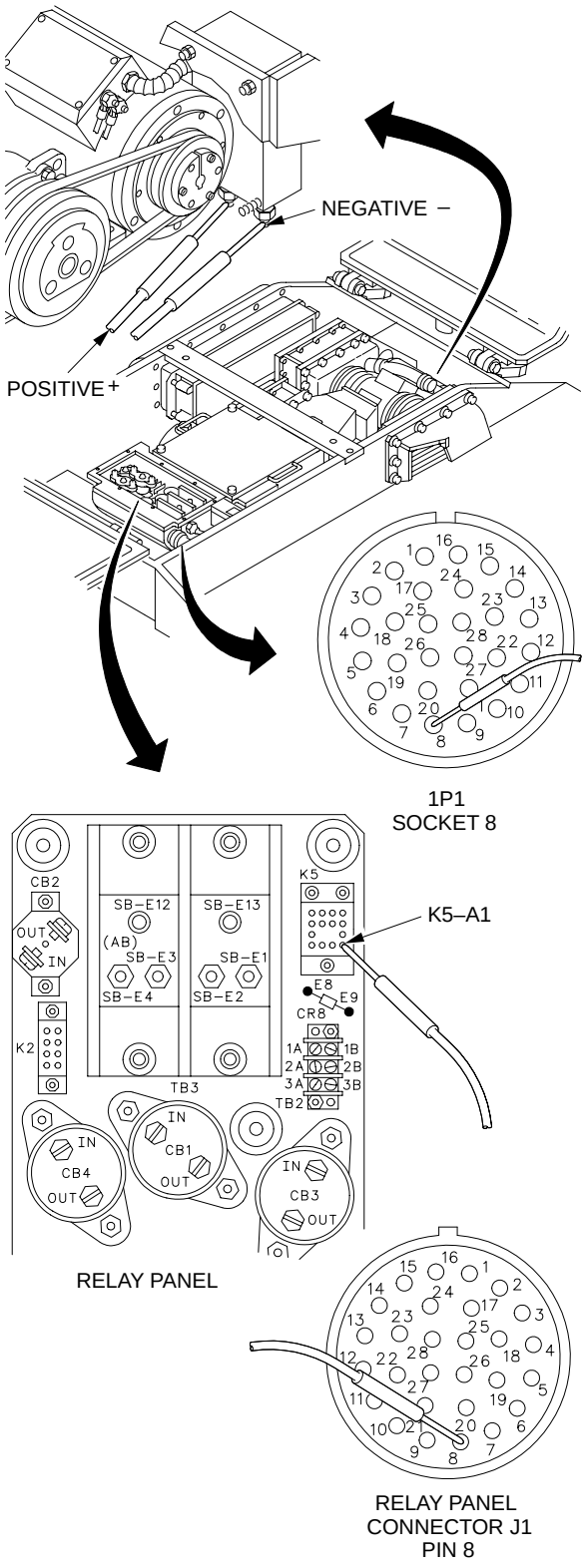
Is continuity present?

yes

no

Replace compressor motor (para 13–18).

Notify Direct Support Maintenance.



03pc106t

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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 A

G

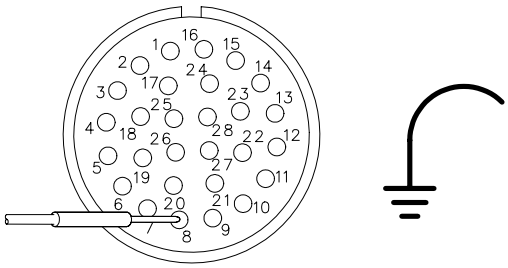
1. Turn MCS control box selector to OFF (TM 9–2350–314–10).
2. Check compressor V–belt for proper adjustment and serviceability (para 13–17).

Is V–belt adjusted to proper tension and is it serviceable?

yes

no

Adjust or replace V–belt as necessary (para 13–17).



1P1
SOCKET 8

03pc108t

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?

yes

no

Notify Direct Support Maintenance.

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?

yes

no

Notify Direct Support Maintenance.

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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 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?

yes

no

Notify Direct Support Maintenance.

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?

yes

no

Notify Direct Support Maintenance.

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.

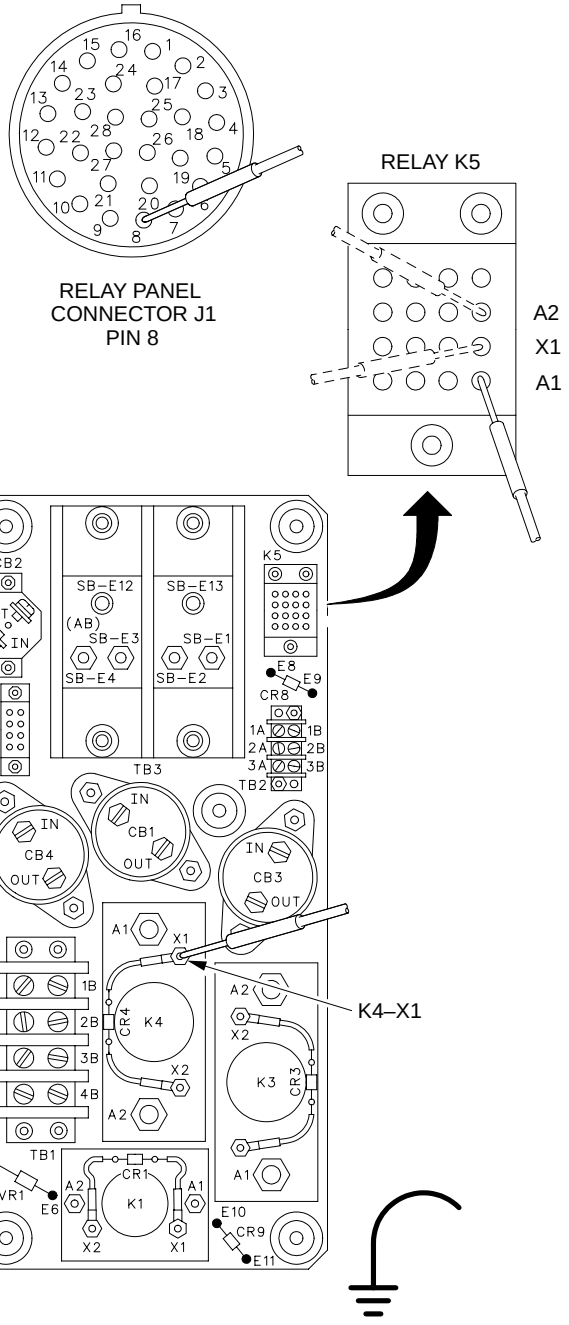
Is continuity present?

yes

no

Fault does not exist as indicated. Recheck fault indication.

Notify Direct Support Maintenance.



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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?

yes

Repair or replace wire from terminal A2 of relay K4 to positive (+) terminal of compressor motor (para 13–18 and 13–23).

no

N

1. Place multimeter red lead on terminal A1 of relay K4 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes

Notify Direct Support Maintenance.

no

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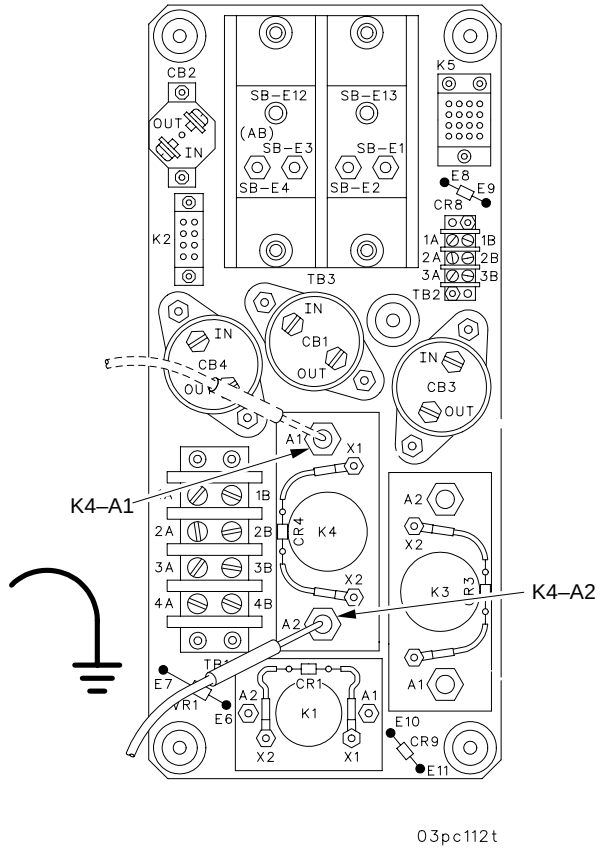

3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(4) MCS HAS NO COOL AIR OUTPUT WHEN IN COOL MODE. – CONTINUED

CONTINUED FROM STEP 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?

yes → Notify Direct Support Maintenance.

no →

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?

yes → Notify Direct Support Maintenance.

no →

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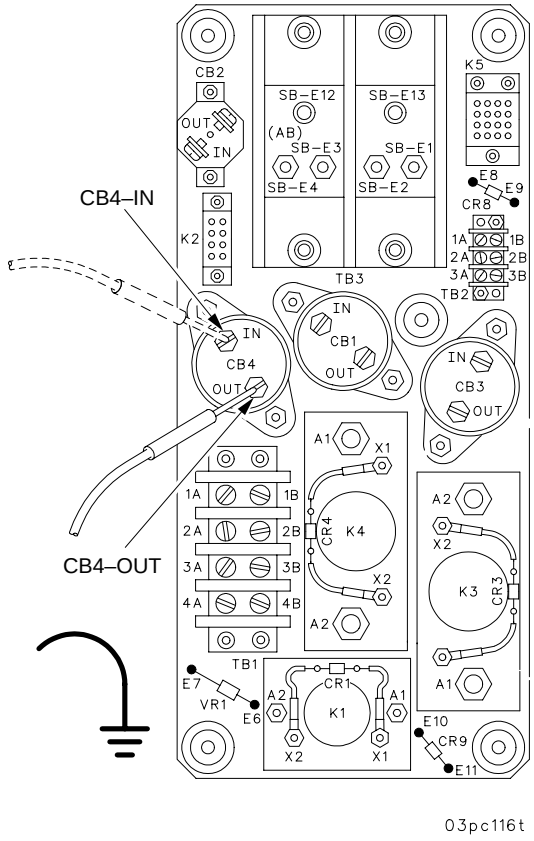


03pc116t

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?

yes → Notify Direct Support Maintenance.

no →

R Turn HYDRAULIC POWER switch ON (TM 9–2350–314–10).

Does hydraulic motor come on?

no → Troubleshoot hull electrical system (TM 9–2350–314–20–1–1).

yes →

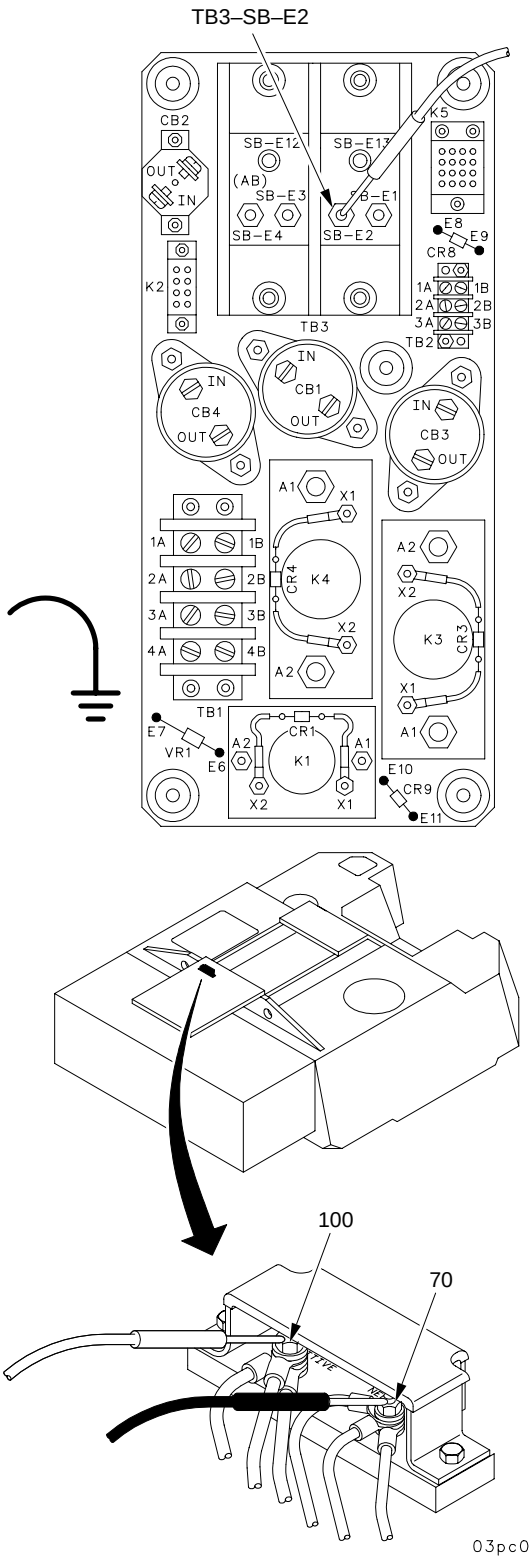
S

1. Place multimeter red lead on bus bar 100 and black lead on bus bar 70.
2. Check for voltage.

Is voltage present?

yes → Fault does not exist as indicated. Recheck fault.

no → Do harness test on harness W56 (para 3–3.n(13)) and harness W57 (para 3–3.n(16)).



03pc071t

END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(5) MCS VANEAXIAL FAN DOES 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)

Equipment Conditions
Ballistic cover open (TM 9–2350–314–10)

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.

Is voltage present?

yes

no → Go to Step L.

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.

Is continuity present?

yes

no → Replace vaneaxial fan motor (para 13–21).

C

1. Place one multimeter lead on terminal 1 of vanaxial fan motor and other lead in socket 2 of harness 1P1.
2. Check for continuity.

Is continuity present?

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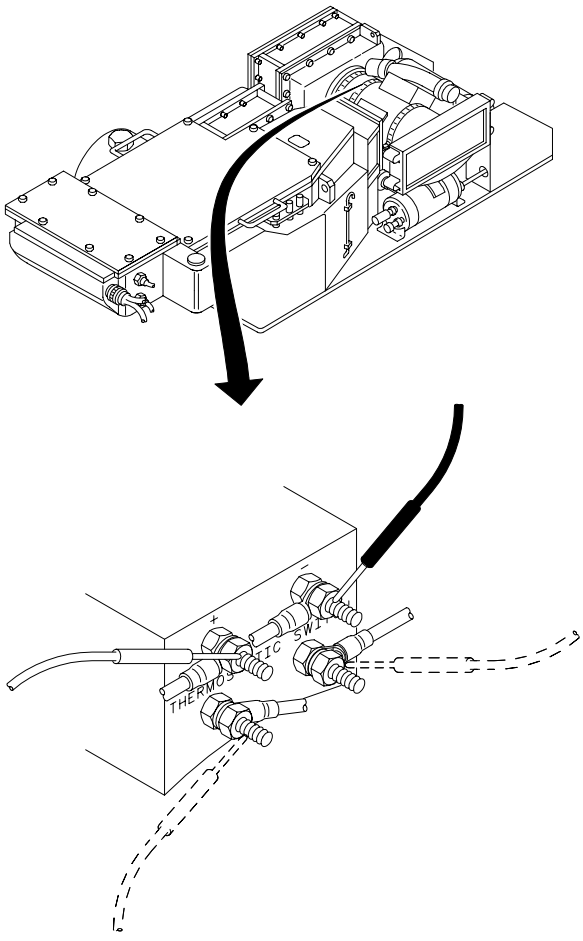

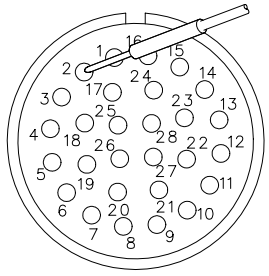

03pc073t

1P1
SOCKET 2

3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(5) MCS VANEAXIAL FAN DOES NOT OPERATE. – CONTINUED

CONTINUED FROM STEP C

yes

no

Repair or replace wire from fan motor terminal 1 to socket 2 of connector 1P1 (para 13–29).

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?

yes

no

Repair or replace wire from fan motor terminal 2 to socket 3 of connector 1P1 (para 13–29).

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?

yes

no

Replace MCS relay panel (para 13–23).

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?

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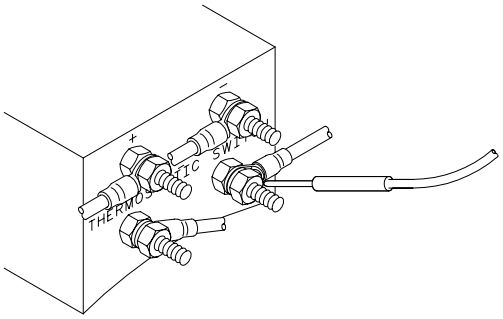
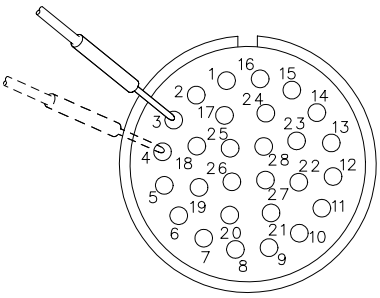
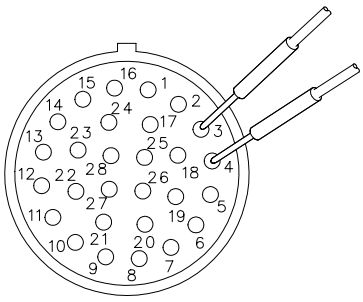
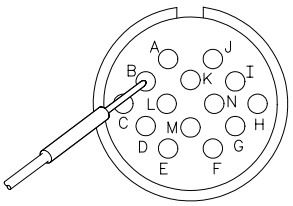




1P1
SOCKET 3
(SOCKET 4)



MCS RELAY PANEL
CONNECTOR J1
PIN 3
PIN 4



1P2
SOCKET B

03pc075t

3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(5) MCS VANEAXIAL FAN DOES NOT OPERATE. – CONTINUED

CONTINUED FROM STEP F

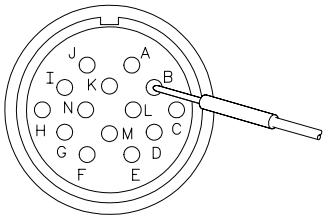
yes / no

Repair or replace wire from socket 4 of 1P1 P1 to socket B of 1P1 P2 (para 13–29).

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.

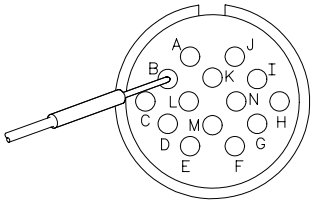
Is continuity present?



W58
CONNECTOR J1
PIN B

yes / no

Do a wiring harness check on harness W58 (para 3–3.n(3)).



W58
CONNECTOR P2
SOCKET B

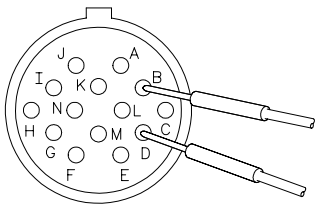
H

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?

yes / no

Replace MCS control box (para 13–35).



MCS CONTROL PANEL
CONNECTOR J1
PIN B
PIN D

03pc076t

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3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(5) MCS VANEAXIAL FAN DOES NOT OPERATE. – CONTINUED

CONTINUED FROM STEP H

I

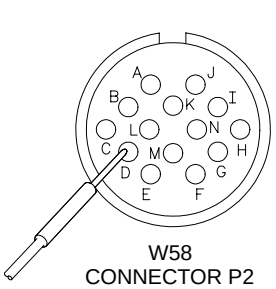
1. Place one multimeter lead in socket D of wiring harness W58 P2 and other lead in pin D of W58 J1.
2. Check for continuity.

Is continuity present?

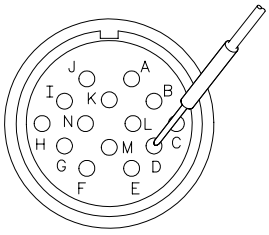
yes

no

Do a wiring harness check on harness W58 (para 3–3.n(3)).



W58 CONNECTOR P2 SOCKET D



W58 CONNECTOR J1 PIN D

J

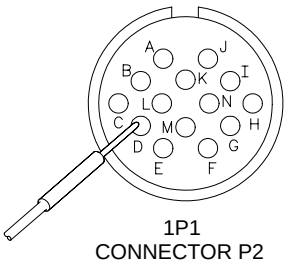
1. Place one multimeter lead in socket D of 1P1 P2 and other lead in socket 17 1P1 P1.
2. Check for continuity.

Is continuity present?

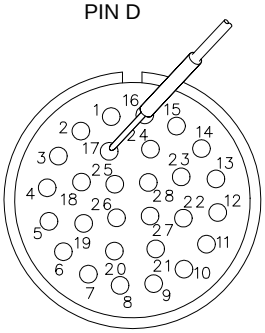
yes

no

Notify Direct Support Maintenance.



1P1 CONNECTOR P2 SOCKET D



1P1 CONNECTOR P1 SOCKET 17

K

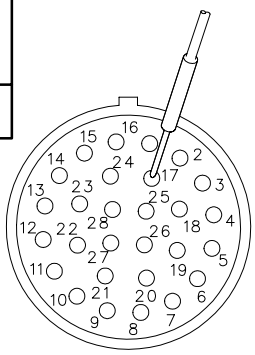
1. Place one multimeter lead on pin 17 of relay panel connector J1 and other lead on terminal SB–E3 of terminal board 3 (TB3).
2. Check for continuity.

Is continuity present?

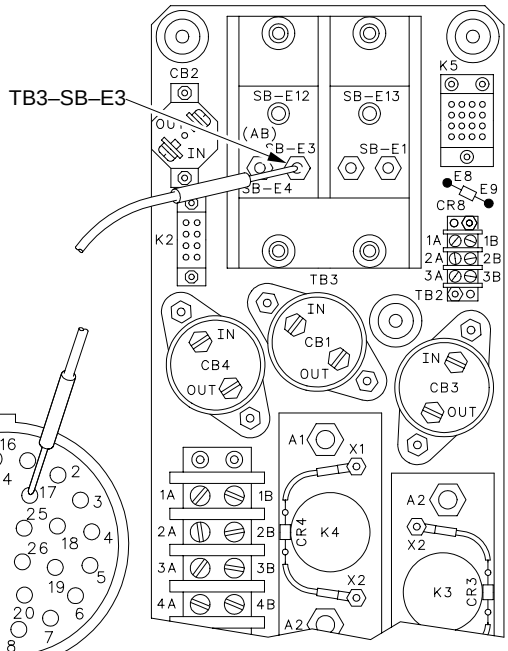
yes

no

Notify Direct Support Maintenance.



RELAY PANEL CONNECTOR J1 PIN 17



RELAY PANEL

03pc103t

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3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(5) MCS VANEAXIAL FAN DOES NOT OPERATE. – CONTINUED

CONTINUED FROM STEP A or K

L

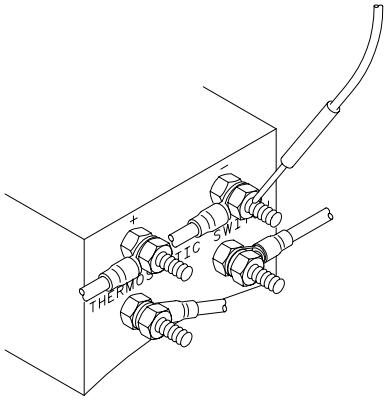
1. Make sure vehicle MASTER power switch is OFF (TM 9–2350–314–10).
2. Place one multimeter lead on negative (–) terminal of vaneaxial fan and other lead on terminal SB–E4 of terminal board 3 (TB3).
3. Check for continuity.

Is continuity present?

yes

no

Repair or replace wire from negative (–) terminal of vaneaxial fan to terminal SB–E4 of TB3 (para 13–29).



M

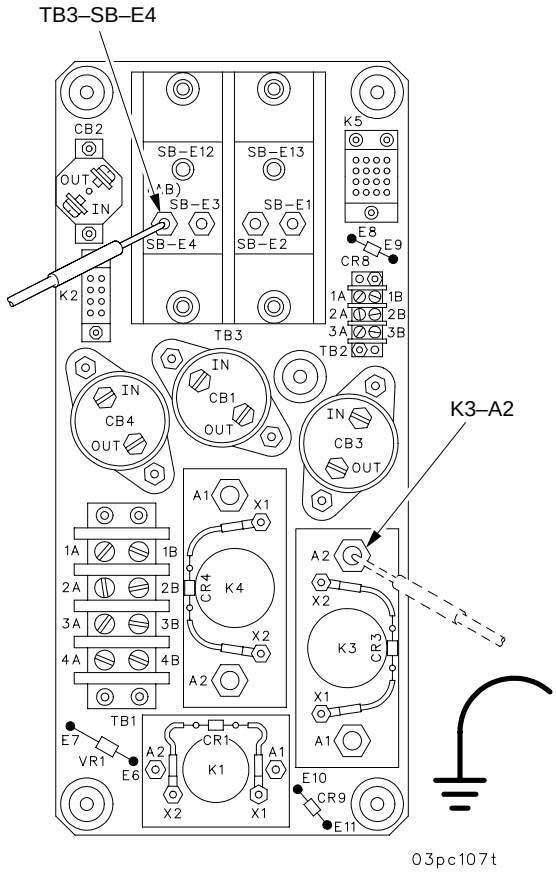
1. Connect any loose connectors.
2. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).
3. Turn MCS control box selector to LO or HI mode (TM 9–2350–314–10).
4. Place multimeter red lead on terminal A2 of relay K3 and black lead on ground.
5. Check for voltage.

Is voltage present?

yes

no

Repair or replace wire from terminal A2 of relay K3 to positive (+) terminal of vaneaxial fan (para 13–29).



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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?

yes

no

Go to Step P.

O

1. Place multimeter red lead on terminal X1 of relay K3 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes

no

Notify Direct Support Maintenance.

Go to Step T.

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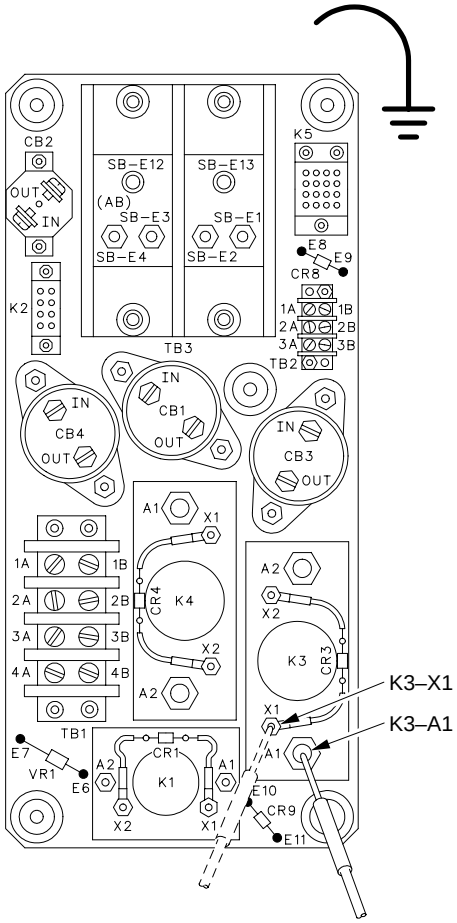

03pc109t

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?

yes

Notify Direct Support Maintenance.

no

Q

1. Place multimeter red lead on IN terminal of CB3 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes

Notify Direct Support Maintenance.

no

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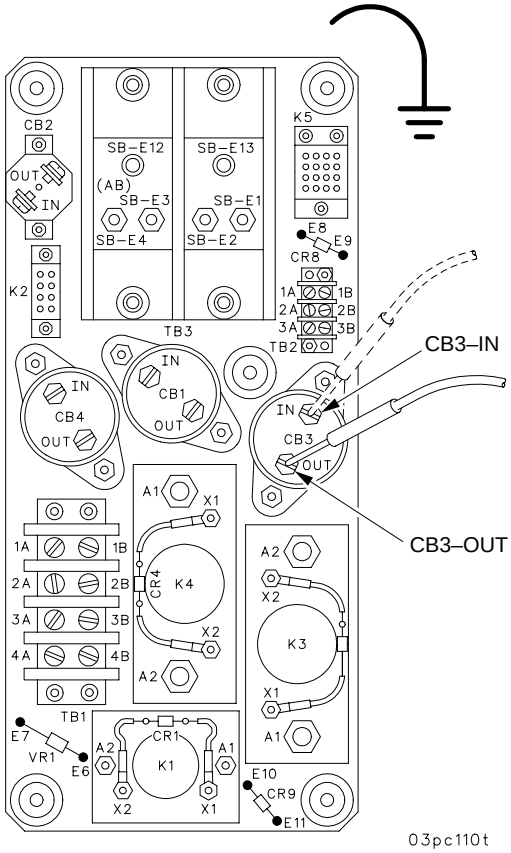


3–3. TROUBLESHOOTING CHART – CONTINUED

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?

yes → Notify Direct Support Maintenance.

no →

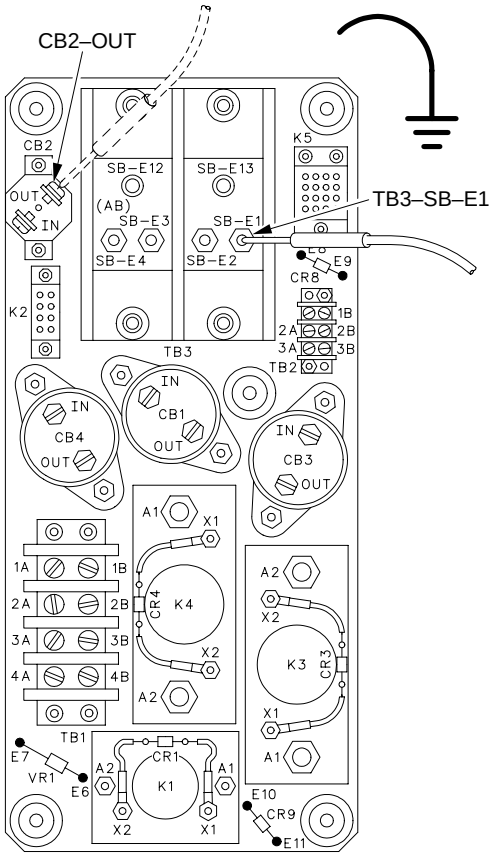
S

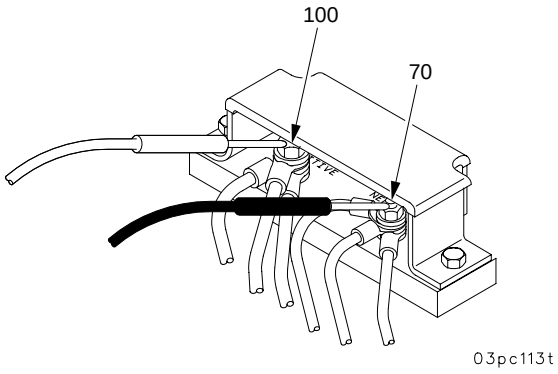
1. Place multimeter red lead on bus bar 100 and black lead on bus bar 70.
2. Check for voltage.

Is voltage present?

yes → Fault does not exist as indicated. Recheck fault.

no → 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?

yes → Notify Direct Support Maintenance.

no →

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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?

yes → Notify Direct Support Maintenance.

no →

V

1. Place multimeter red lead on terminal SB–E2 of TB3 and black lead on ground.
2. Check for voltage.

Is voltage present?

yes → Notify Direct Support Maintenance.

no →

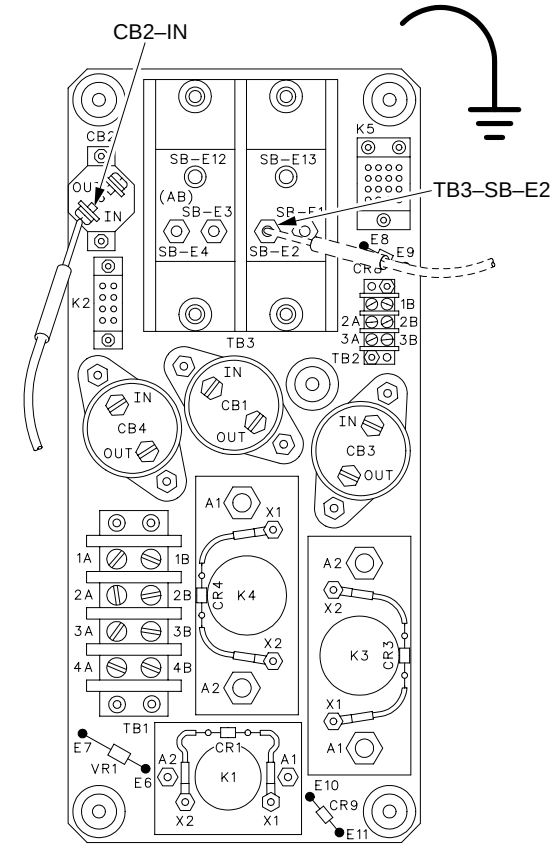
W

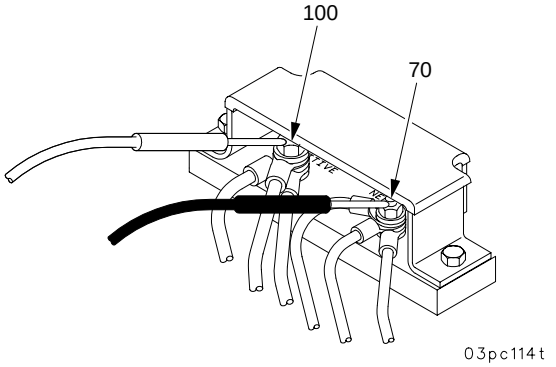
1. Place multimeter red lead on bus bar 100 and black lead on bus bar 70.
2. Check for voltage.

Is voltage present?

yes → Fault does not exist as indicated. Recheck fault.

no → 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	(6) MCS CONTROL PANEL “CHANGE FILTER” LIGHT CONTINUOUSLY 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)

Equipment Conditions
Ballistic cover open (TM 9–2350–314–10)

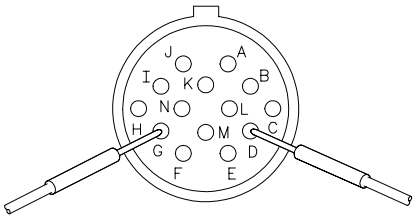
A

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.

Is continuity present?

yes → Replace MCS control box (para 13–35).

no → **B**



MCS CONTROL PANEL
CONNECTOR J1
PIN G
PIN D

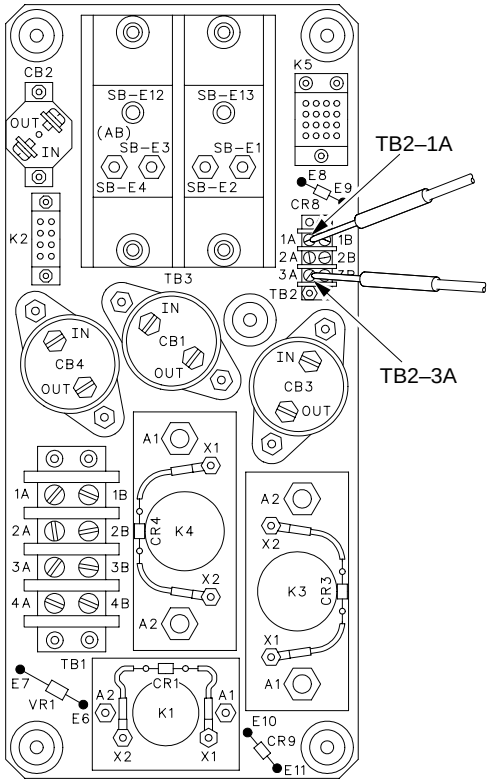
B

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.

Is continuity present?

yes → Replace differential pressure switch (para 13–20).

no → Check filter for blockage and serviceability. Clean as necessary (para 13–7).



03pc115t

END OF TASK

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.

Is voltage present?

yes → Go to Step C.

no →

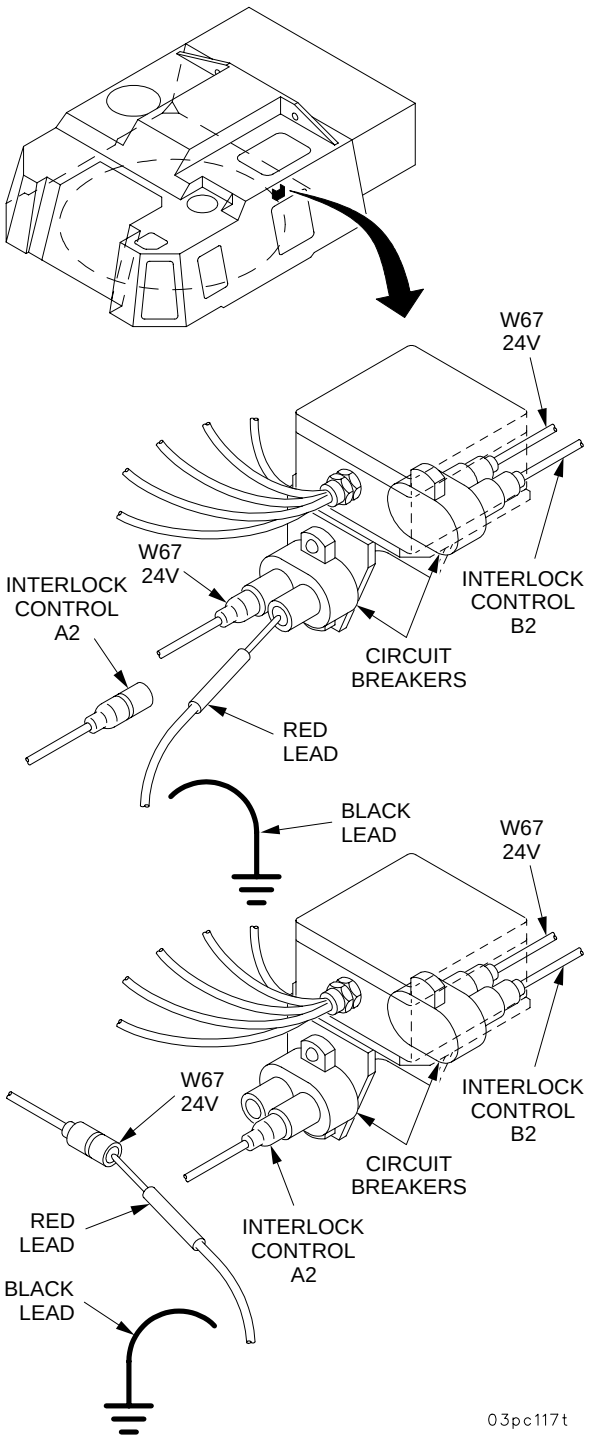
B

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.

Is voltage present?

yes → Replace circuit breaker (para 5–3).

no → Perform harness check on harness W67 (para 3–3.n(9)).



03pc117t

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?

yes → Replace interlock control assembly (para 5–3).

no

D

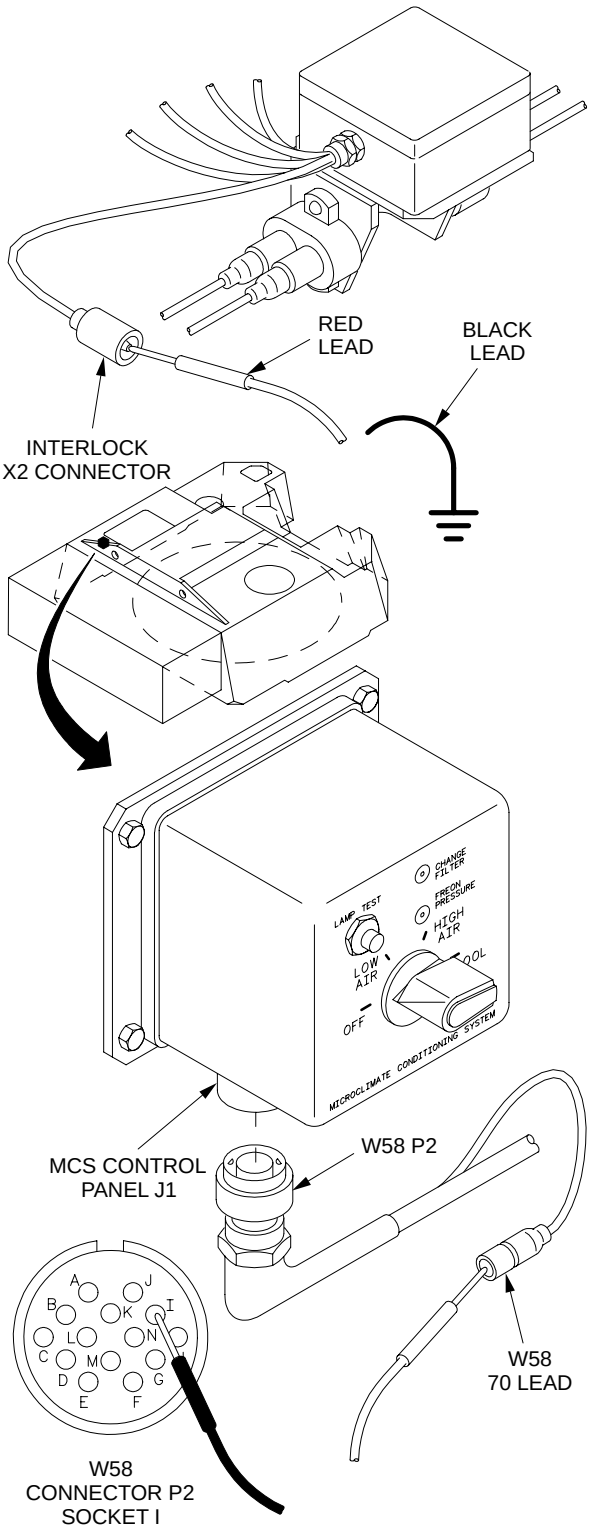
1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W58 P2 from MCS control panel J1.
3. Place one multimeter lead on socket I of harness W58 connector P2 and other lead in W58 70 lead connector.
4. Check for continuity.

Is continuity present?

yes → Replace M3 control box (para 13–35).

no → Repair or replace harness W58 (para 5–15).

END OF TASK



11pc008t

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?

yes

Troubleshoot individual heaters (para 3–3.k(10)).

no

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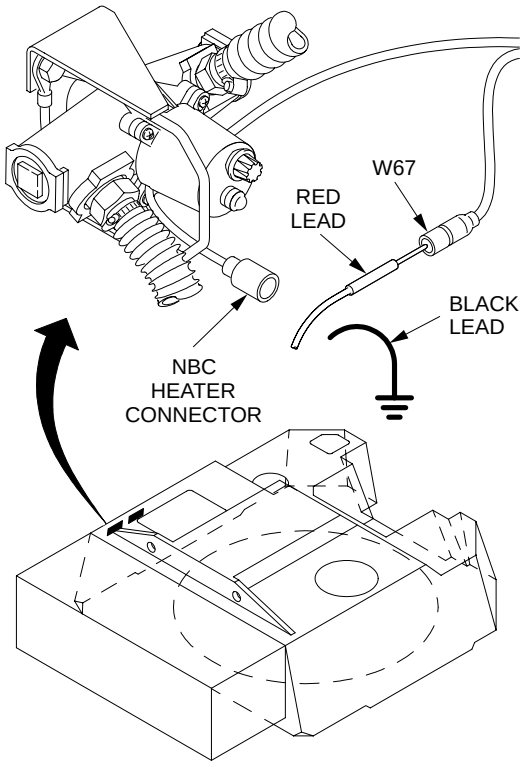

3–3. TROUBLESHOOTING CHART – CONTINUED

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?

yes

Perform harness check on harness W67 (para 3–3.n(9)).

no

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?

yes

Replace interlock control (para 5–3).

no

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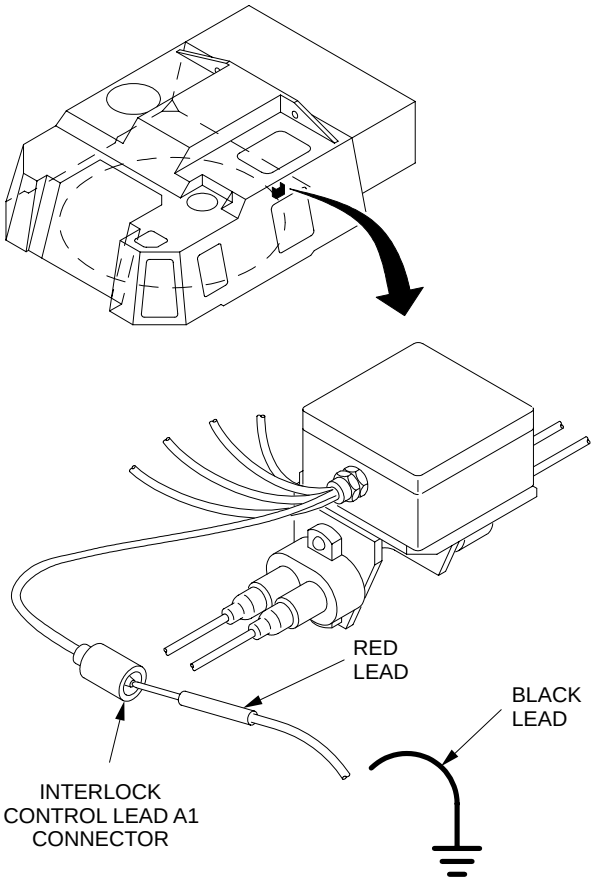
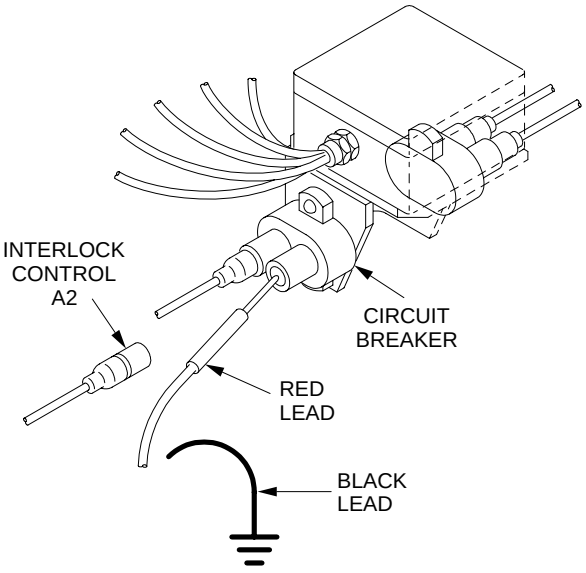




3–3. TROUBLESHOOTING CHART – CONTINUED

k. MCS – CONTINUED	(8) M3 HEATERS 1 AND 2 FAIL TO OPERATE. M3 HEATERS 3 AND 4 OPERATE. – CONTINUED

CONTINUED FROM STEP C

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.

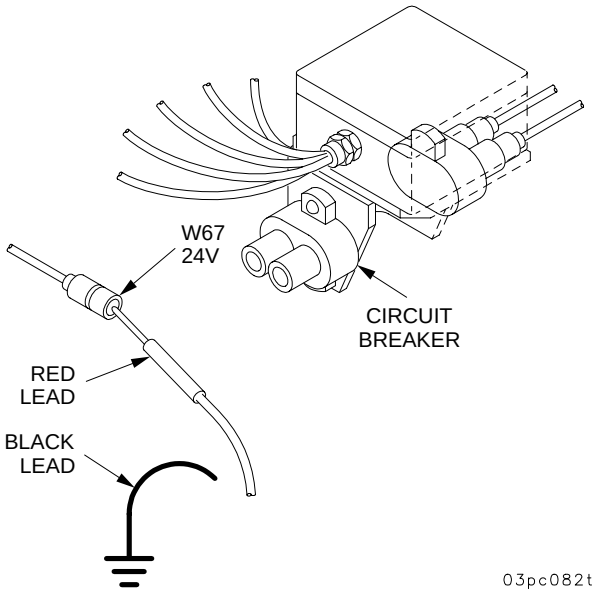
Is voltage present?

yes

Replace circuit breaker (para 5–3).

no

Perform harness check on harness W67 (para 3–3.n(9)).



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?

yes

Troubleshoot individual heaters (para 3–3.k(10)).

no

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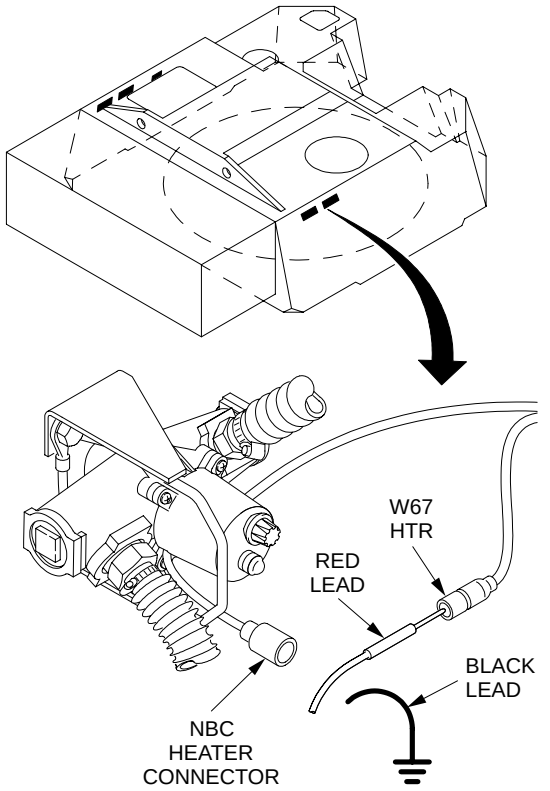

11pc013t

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?

yes

Perform harness check on harness W67 (para 3–3.n(9)).

no

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?

yes

Replace interlock control (para 5–3).

no

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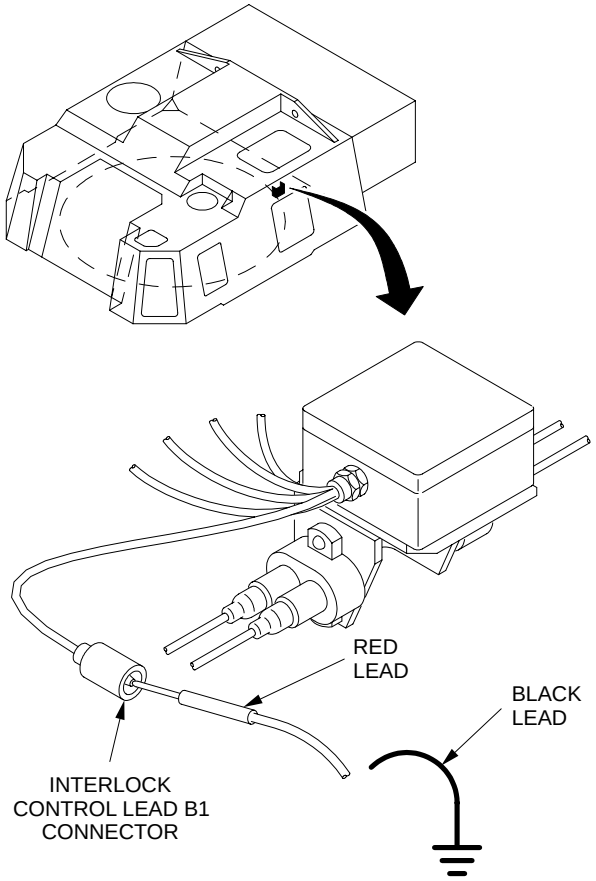
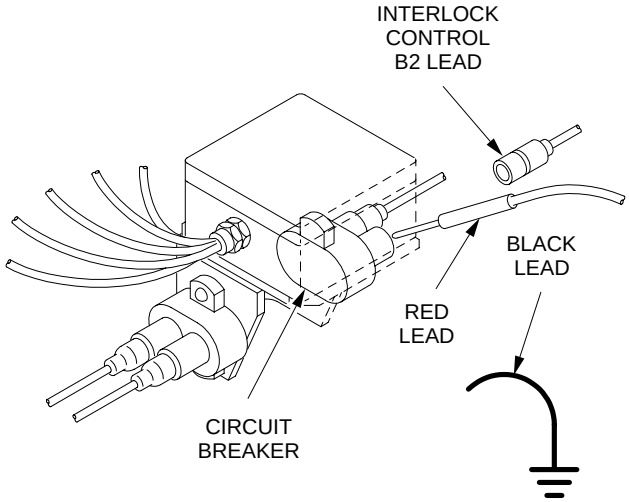




03pc084t

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.

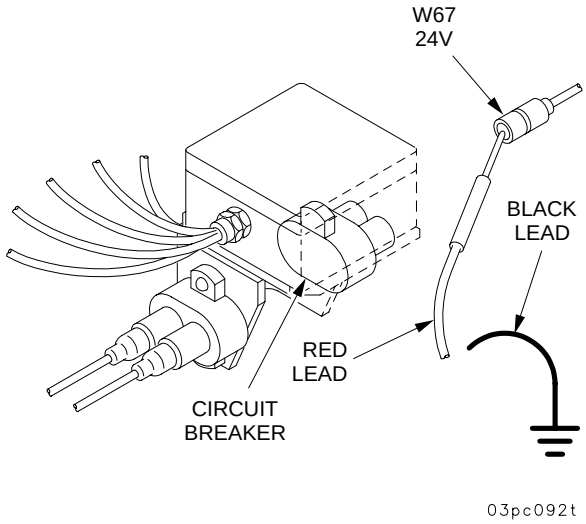
Is voltage present?

yes

Replace circuit breaker (para 5–3).

no

Perform harness check on harness W67 (para 3–3.n(9)).



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?

yes

no

Repair or replace W67 HTR lead (para 5–37).

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.

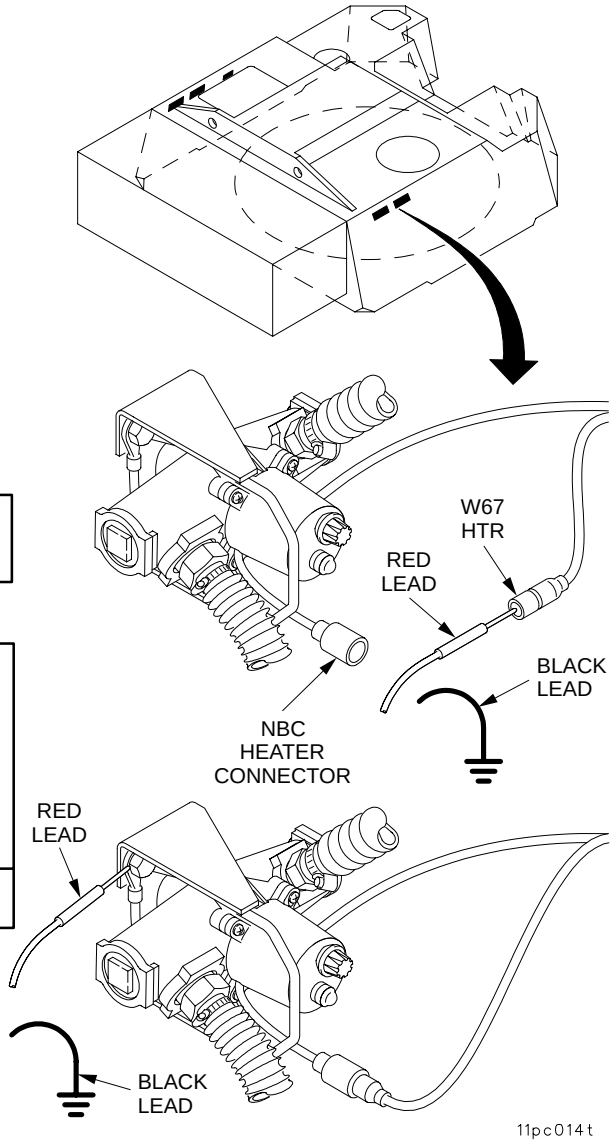
Is continuity present?

yes

no

Replace M3 heater (para 13–33).

Repair or replace harness W67 (para 5–37).



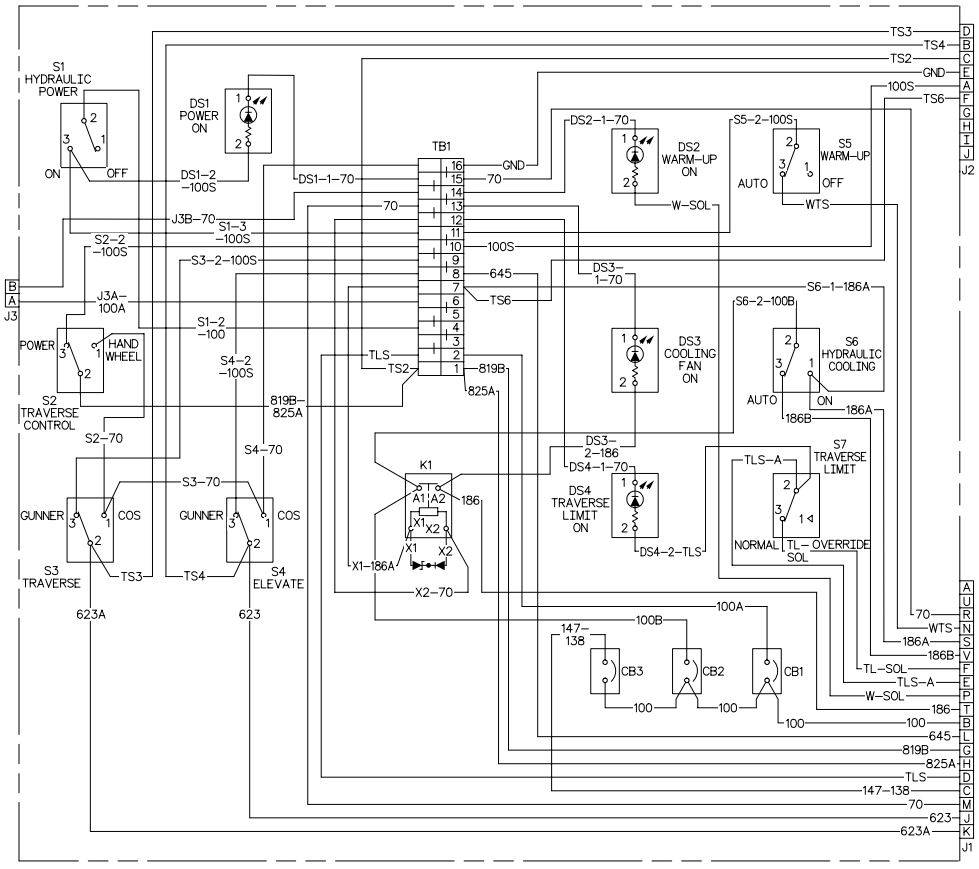
END OF TASK

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.

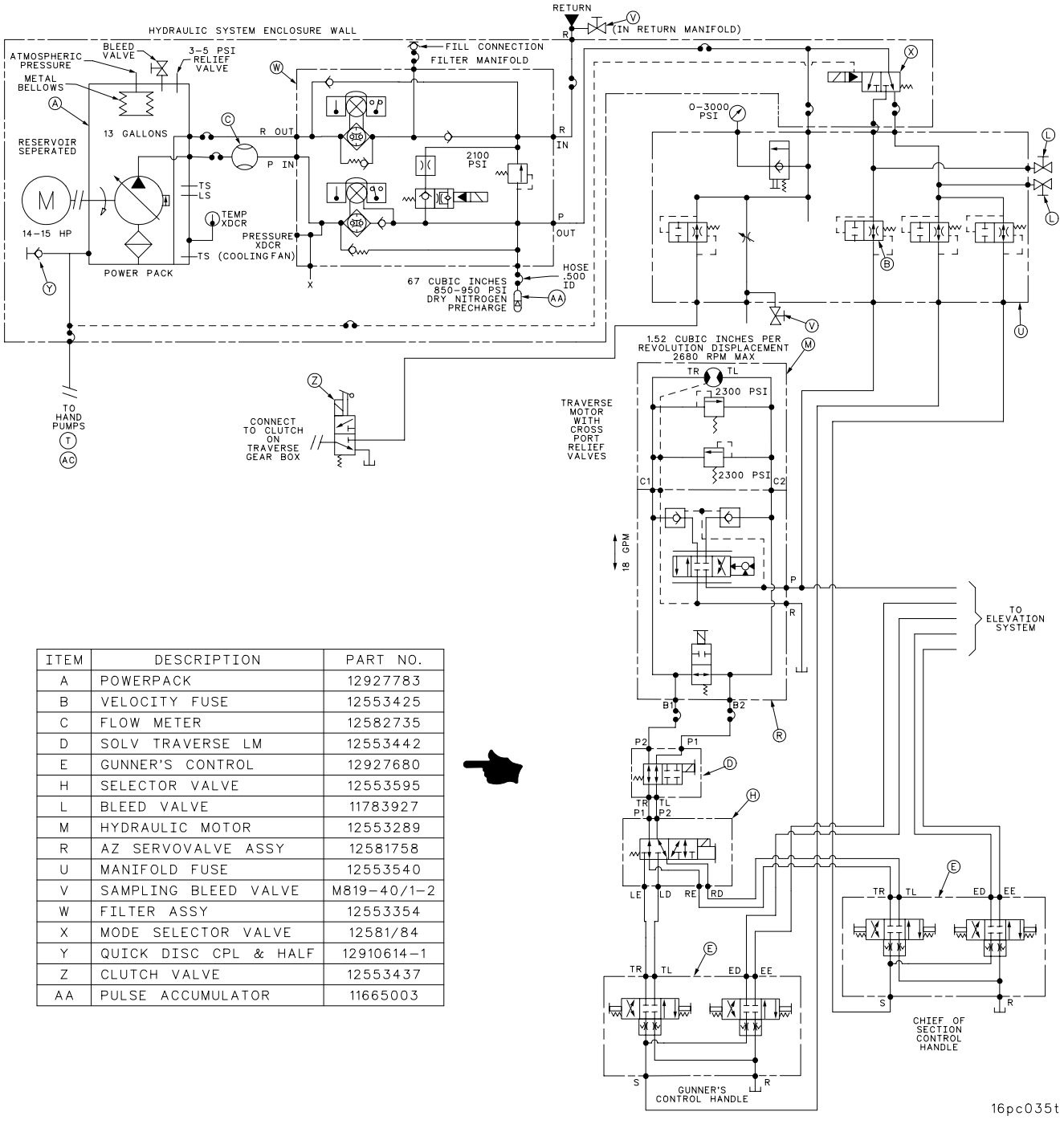
When the MASTER power switch and the HYDRAULIC power switch (S1) on the hydraulic motor box are both set to ON, 24 V dc is applied through the slip ring brush blocks and hydraulic control box to energize the powerpack. Hydraulic pressure is applied through the filter assembly to the mode selector valve. If AFCS 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



ITEM	DESCRIPTION	PART NO.
A	POWERPACK	12927783
B	VELOCITY FUSE	12553425
C	FLOW METER	12582735
D	SOLV TRAVERSE LM	12553442
E	GUNNER'S CONTROL	12927680
H	SELECTOR VALVE	12553595
L	BLEED VALVE	11783927
M	HYDRAULIC MOTOR	12553289
R	AZ SERVOVALVE ASSY	12581758
U	MANIFOLD FUSE	12553540
V	SAMPLING BLEED VALVE	M819–40/1–2
W	FILTER ASSY	12553354
X	MODE SELECTOR VALVE	12581/84
Y	QUICK DISC CPL & HALF	12910614–1
Z	CLUTCH VALVE	12553437
AA	PULSE ACCUMULATOR	11665003

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?

yes → Correct leakage. Verify fault is corrected.

no →

WARNING

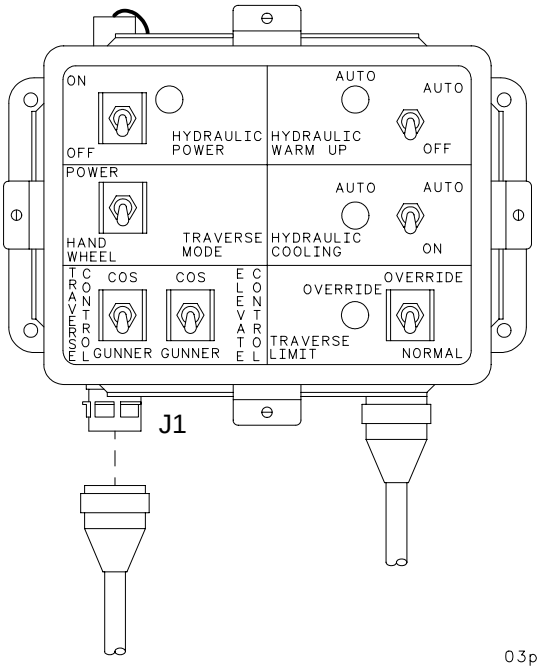
If cab drifts, immediately place TRAVERSE CONTROL switch in HANDWHEEL position. Failure to comply may result in injury or death to personnel.

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?

yes →

no → See hull electrical troubleshooting (TM 9–2350–314–20–1–1).



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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 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?

yes → Go to para 3–3.f(1).

no

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?

yes

no → Fault does not exist as indicated. Recheck fault symptom.

CONTINUED ON NEXT PAGE

3–3. TROUBLESHOOTING CHART – CONTINUED

l.	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

E

1. Turn on DU (TM 9–2350–314–10).
2. Select NORMAL OPERATION from the SELECT OPERATIONS MENU (TM 9–2350–314–10).
3. Initialize system (TM 9–2350–314–10).
4. Select FIRE COMMAND from the SETUP and INFORMATION MENU screen (TM 9–2350–314–10).
5. Use the DU to enter a deflection of 3600 (to traverse left) or 2600 (to traverse right) (TM 9–2350–314–10).
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).
7. Press and hold LAY KEY until gun stops moving (TM 9–2350–314–10).

Does cab traverse slowly or traverse slowly and stop?

yes

no

Fault does not exist as indicated.

F

1. Turn TRAVERSE CONTROL switch to HANDWHEEL position (TM 9–2350–314–10).
2. Flip lever on clutch valve to depress MANUAL OVERRIDE button (TM 9–2350–314–10).

Can override button be depressed?

yes

no

Replace clutch valve (para 18–28).

CONTINUED ON NEXT PAGE

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?

yes → Go to Step J.

no

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?

yes → Replace clutch valve (para 18–28).

no

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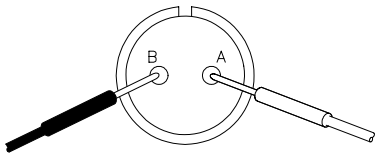


W64
CONNECTOR P3
SOCKET A
SOCKET B

03pc088t

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.

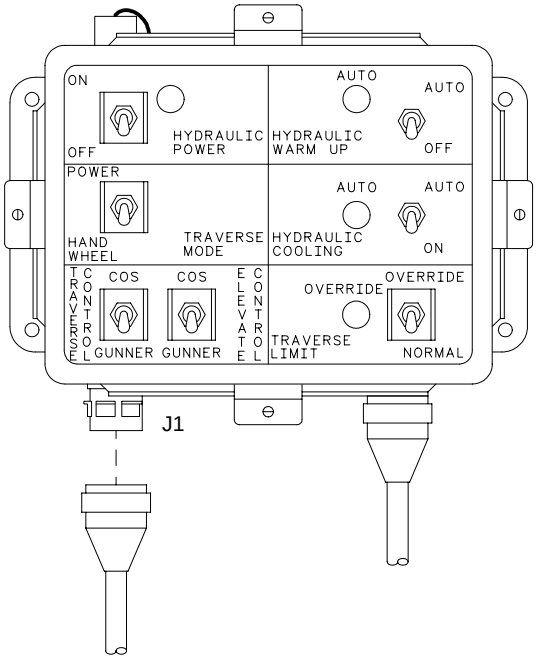
Is continuity present?

yes

Replace harness W64 (para 5–31).

no

Repair or replace harness 12563029 (para 5–22).



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?

yes

Go to para 3–3.f(1).

no

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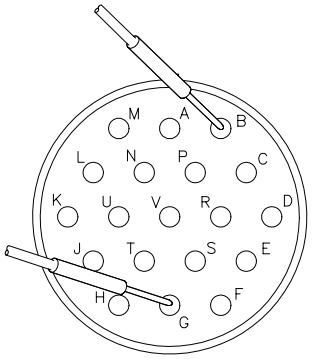


HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN B
PIN G

03pc089t

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

K

1. Turn HYDRAULIC POWER switch OFF (TM 9–2350–314–10).
2. Discharge hydraulic system pressure (para 18–1).
3. Open the equilibration shut off valve.
4. Open the bleeder sampling valve on the top of the pressure manifold.

Did you hear or feel the clutch valve fuse reset?

- yes → Go to Step M.
- no

L Replace the clutch valve fuse (para 18–11).

Does cab traverse normally?

- yes → Fault is corrected.
- no → Notify Direct Support Maintenance.

CONTINUED FROM STEP K

M Traverse cab left and right using either control handle and AFCS.

Does cab traverse normally?

- yes → Fault is corrected.
- no → Notify Direct Support Maintenance.

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

Prior to starting this tree, ensure that the velocity fuse is reset (para 18–46).

A

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?

yes → Go to Step C.

no

B

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?

yes → Replace damaged lines (para 18–4 and 18–23).

no

CONTINUED ON NEXT PAGE

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 A AND B

C

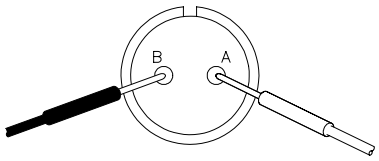
1. Make sure TRAVERSE CONTROL switch is set to COS (TM 9–2350–314–10).
2. Check harness W64 for voltage by placing multimeter red lead in harness W64 connector P6 socket A and placing multimeter black lead in harness W64 connector P6 socket B.

Is voltage present?

yes

no

Replace traverse selector valve (para 18–40).



W64
CONNECTOR P6
SOCKET A
SOCKET B

D

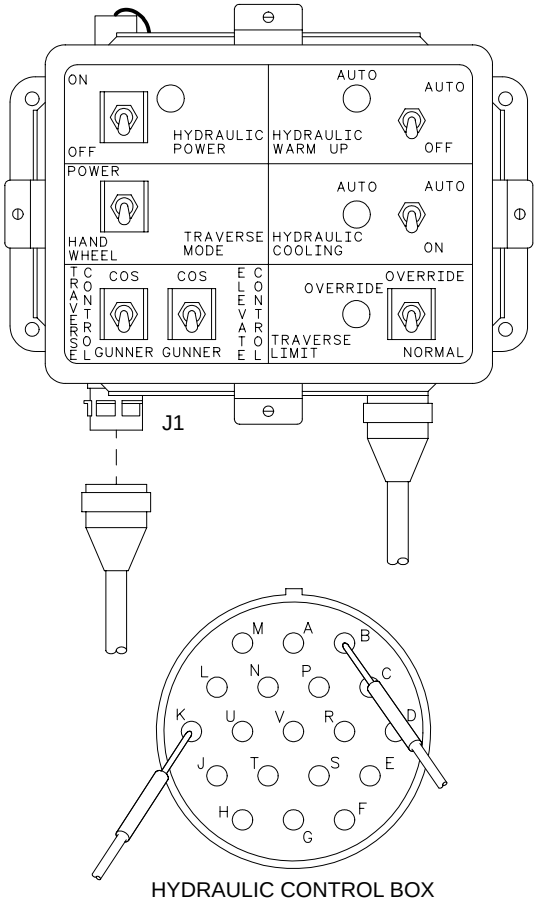
1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness W64 connector P1 from hydraulic control box connector J1 (para 5–21).
3. Make sure HYDRAULIC POWER switch is ON (TM 9–2350–314–10).
4. Check hydraulic control box for continuity by placing one multimeter lead on hydraulic control box connector J1 pin B and placing the other lead on hydraulic control box connector J1 pin K.

Is there continuity?

yes

no

Perform harness check on harness W64 (para 3–3.n(7)).



HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN B
PIN K

03pc090t

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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 D

E

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?

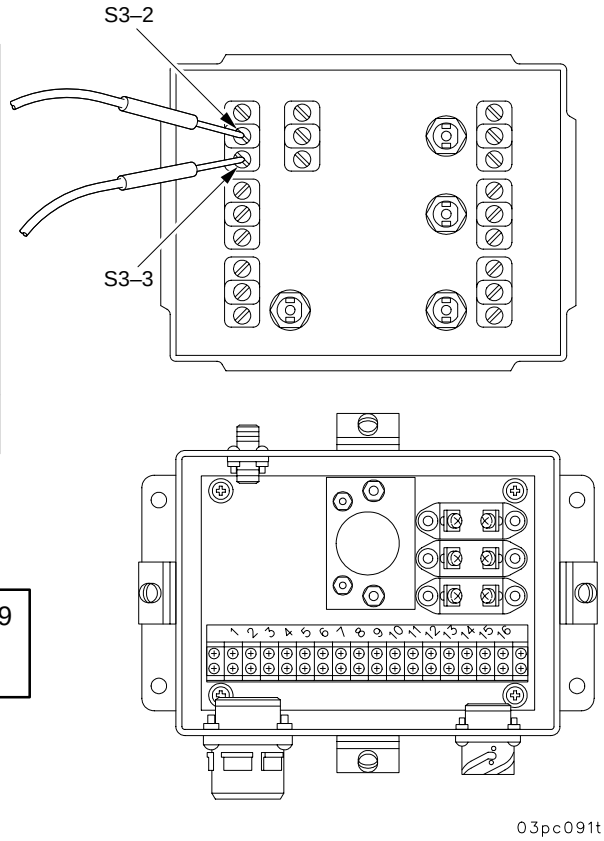
yes

Replace TRAVERSE CONTROL switch S3 (para 5–20).

no

Replace harness 12563029 (para 5–22). Recheck for fault indication

END OF TASK



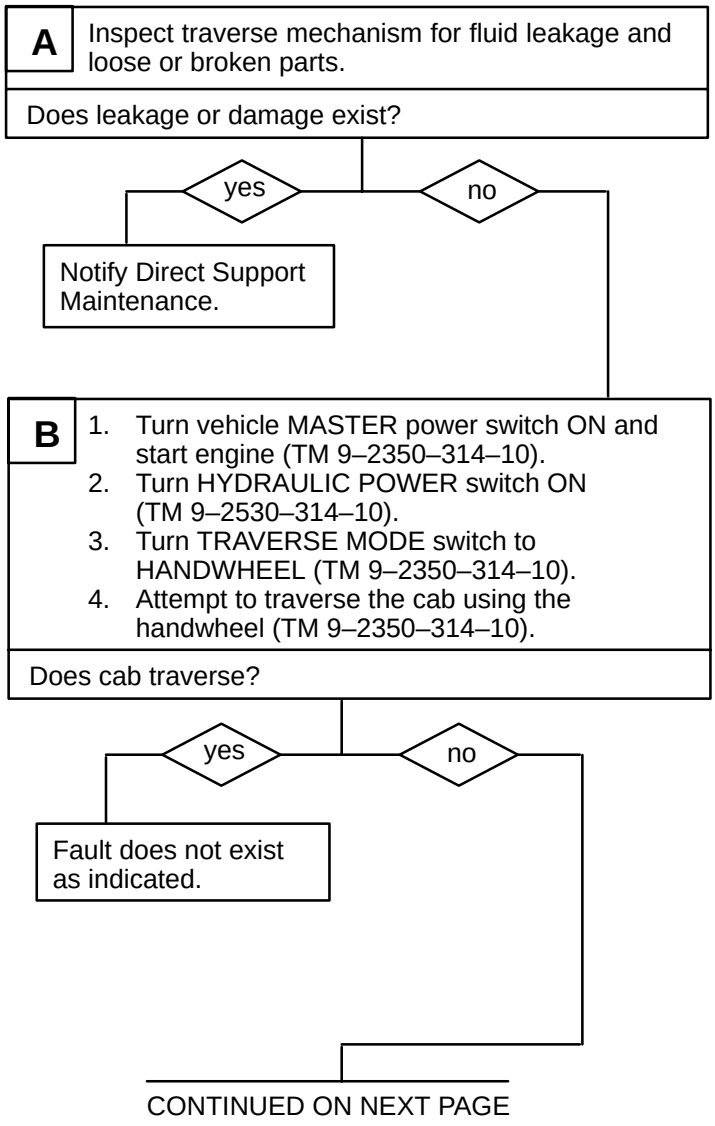
03pc091t

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)



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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 B

C

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?

yes

no

Go to Step E.

D

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).

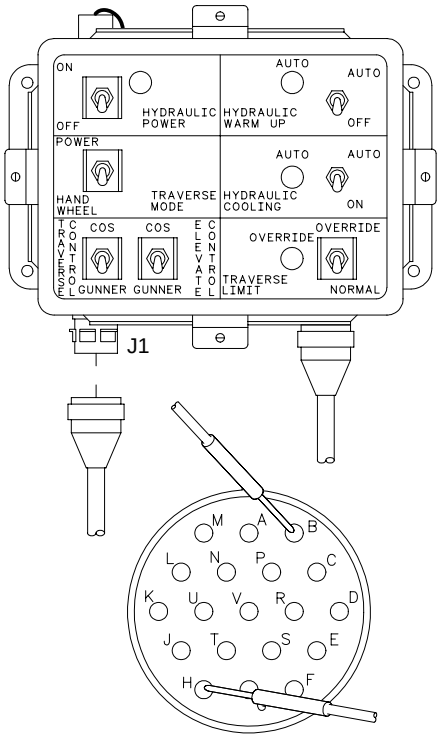
Is continuity present?

yes

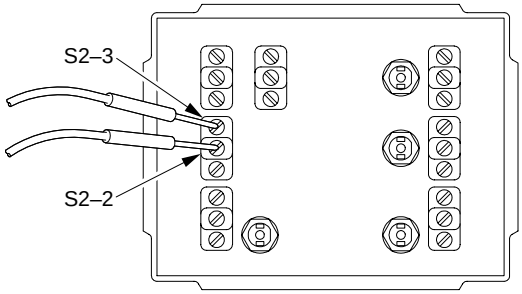
no

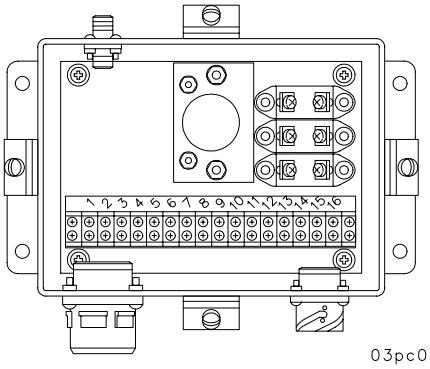
Replace traverse mode switch (para 5–20).

Replace lead 12934657–1 (para 5–21).



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 C

E

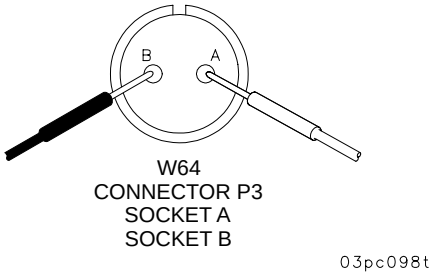
1. Disconnect harness W64 connector P3 from clutch valve.
2. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).
3. Place multimeter red lead in harness W64 connector P3 socket A and black lead in harness W64 connector P3 socket B. Check for voltage.

Is voltage present?

yes

Replace harness W64 (para 5–31).

no



F

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?

yes

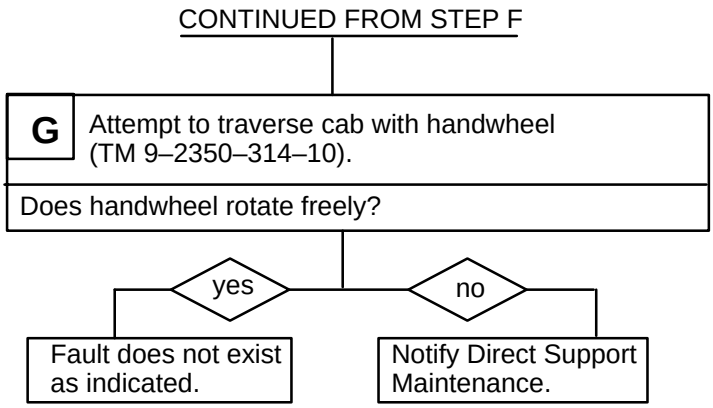
no

Replace the clutch valve (para 18–28).

CONTINUED ON NEXT PAGE

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

l.	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?

yes → Go to para 3–3.f(1).

no

B Check traverse limit LED (TM 9–2350–314–10).

Is LED lit?

yes → Go to para 3–3.l(9).

no → Replace traverse limit valve (para 18–43). Recheck for fault indication.

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?

yes

no

Go to hull electrical troubleshooting (TM 9–2350–314–20–1–1).

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?

yes

no

Go to para 3–3.f(1).

CONTINUED ON NEXT PAGE

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?

yes

Notify Direct Support Maintenance.

no

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?

yes

Do a wiring harness check on harness W64 (para 3–3.n(7)).

no

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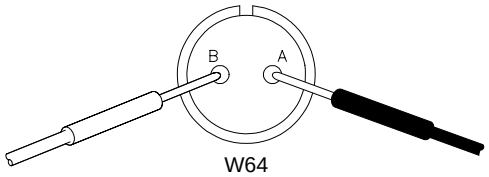
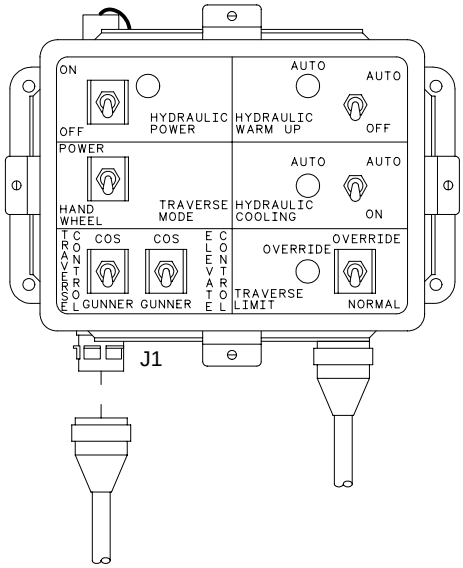
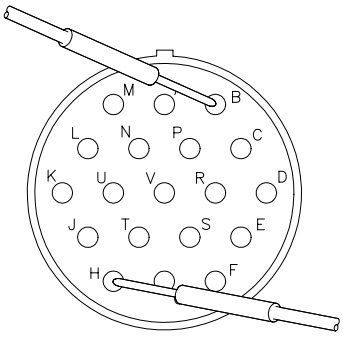


W64
CONNECTOR P7
SOCKET A
SOCKET B





HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN B
PIN H

03pc094t

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?

yes

no

Tighten TB1 connections (para 5–20). Make sure fault is corrected.

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?

yes

no

Repair wiring harness 12563029 (para 5–22).

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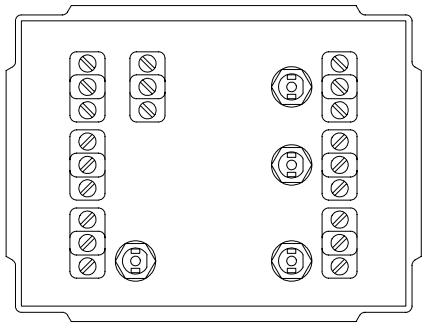
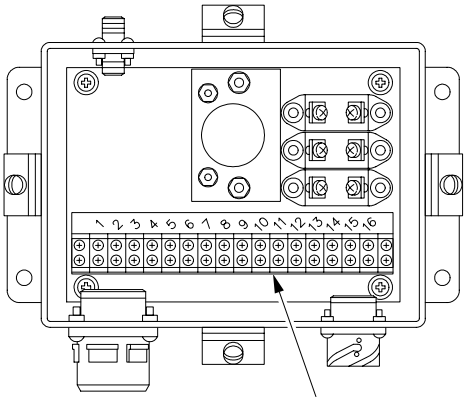
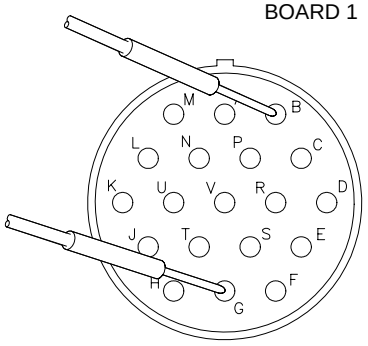




TERMINAL BOARD 1



HYDRAULIC CONTROL BOX CONNECTOR J1
PIN B
PIN G

03pc095t

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?

yes

no

Replace lead 12564657–7 (para 5–21).

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?

yes

no

Replace TRAVERSE MODE switch (para 5–20). Verify fault is corrected.

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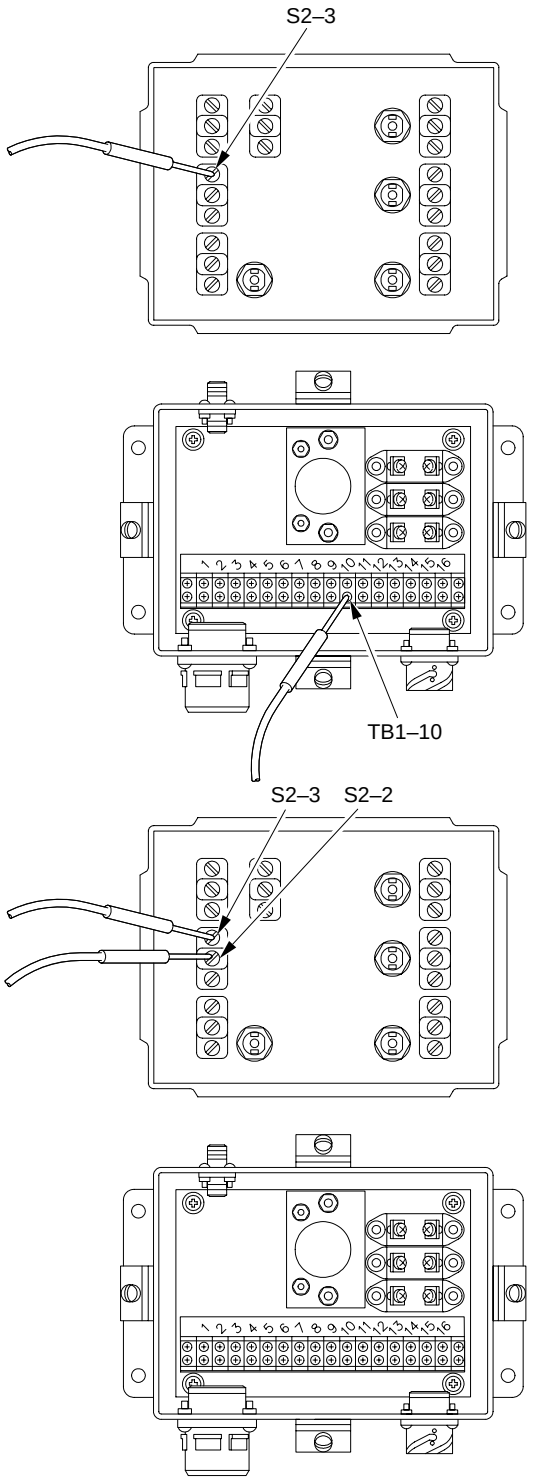


03pc096t

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?

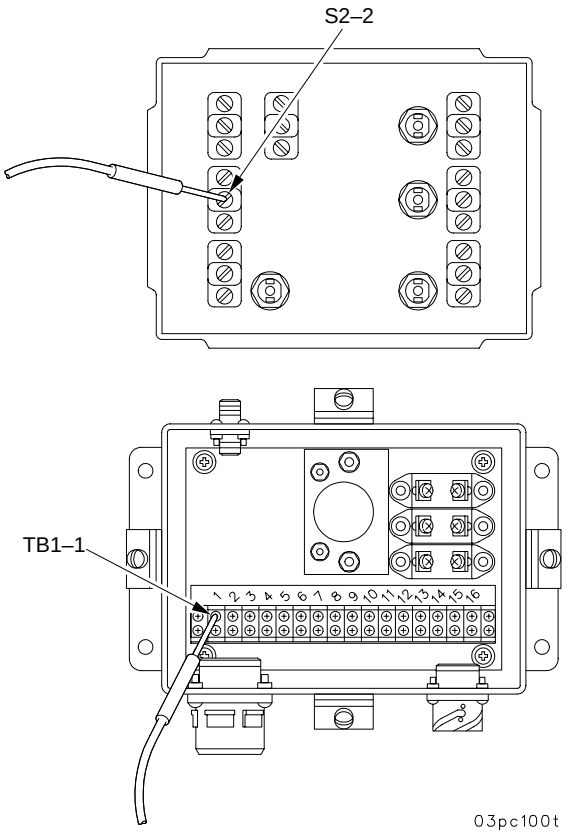
yes

Replace harness 12563029 (para 5–22). Verify fault is corrected.

no

Replace lead 12934657–1 (para 5–21). Verify fault is corrected.

END OF TASK



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?

yes → Correct leakage. Recheck for fault indication.

no →

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)?

yes →

no → See hull electrical troubleshooting (TM 9–2350–314–20–1–1).

CONTINUED ON NEXT PAGE

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

C Turn HYDRAULIC POWER switch ON (TM 9–2350–314–10).

Does hydraulic pressure gage read less than 1500 psi?

- yes → Go to para 3–3.f(1).
- no →

D
1. Turn TRAVERSE MODE switch to POWER position (TM 9–2350–314–10).
2. Turn TRAVERSE CONTROL switch to either position (TM 9–2350–314–10).
3. Move either control handle in direction of traverse fault (TM 9–2350–314–10).

Does cab traverse?

- yes → Fault does not exist as indicated.
- no →

E Inspect cab interior for hydraulic fluid leakage (TM 9–2350–314–10).

Does leakage exist?

- yes → Correct leakage. Recheck for fault indication.
- no → Replace gun control assembly (para 18–29).

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?

yes → Correct leakage. Verify fault is corrected.

no →

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?

yes → Go to para 3–3.f(1).

no →

CONTINUED ON NEXT PAGE

3–3. TROUBLESHOOTING CHART – CONTINUED

I. TRAVERSE – CONTINUED	(7) CAB DRIFTS. Inability to hold in POWER and AFCS modes. – CONTINUED

CONTINUED FROM STEP B

C

1. Release travel lock and raise cannon.
2. Place travel lock in stowed position.
3. Unlock cab traverse lock.
4. Make sure cab traverse gear and cannon are free of obstructions.
5. Turn TRAVERSE MODE switch to POWER position (TM 9–2350–314–10).
6. Turn TRAVERSE CONTROL switch to COS.
7. Use COS control handle and traverse right and left, then return handle to center position.

Does cab drift when COS position is selected?

yes → Go to Step E.

no → **D**

D Repeat step C with vehicle on a 10° slope.

Does cab drift?

yes → **E**

no → Fault does not exist as indicated.

E Use gunner's control handle and traverse right and left, then return handle to center position (TM 9–2350–314–10).

Does cab drift?

yes → Go to Step G.

no → CONTINUED ON NEXT PAGE

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?

yes

no

Fault does not exist as indicated.

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?

yes

no

Notify Direct Support Maintenance.

CONTINUED ON NEXT PAGE

3–3. TROUBLESHOOTING CHART – CONTINUED

I. TRAVERSE – CONTINUED	(7) CAB DRIFTS. Inability to hold in POWER and AFCS modes. – CONTINUED

CONTINUED FROM STEP G

H

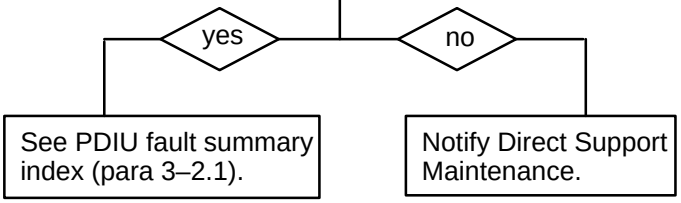
1. Use arrows on display control panel until the word MAINTENANCE is enclosed by brackets (TM 9–2350–314–10).
2. Press illuminated soft key beneath SELECT to enter maintenance mode master menu (TM 9–2350–314–10).

NOTE

Perform setup for vehicle test in accordance with Appendix F in TM 9–2350–314–10.

3. Use arrows on display control panel until the words SYSTEM TEST are enclosed by brackets (TM 9–2350–314–10).
4. Press illuminated soft key beneath SELECT (TM 9–2350–314–10).
5. Press illuminated soft key beneath GO.
6. Answer all questions and perform all tasks that appear on screen (TM 9–2350–314–10).

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?

yes → Replace traverse limit switch S7 (para 5–24).

no

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?

yes

no → Replace connector J1, TLS–A and TL–SOL in hydraulic control box (para 5–21).

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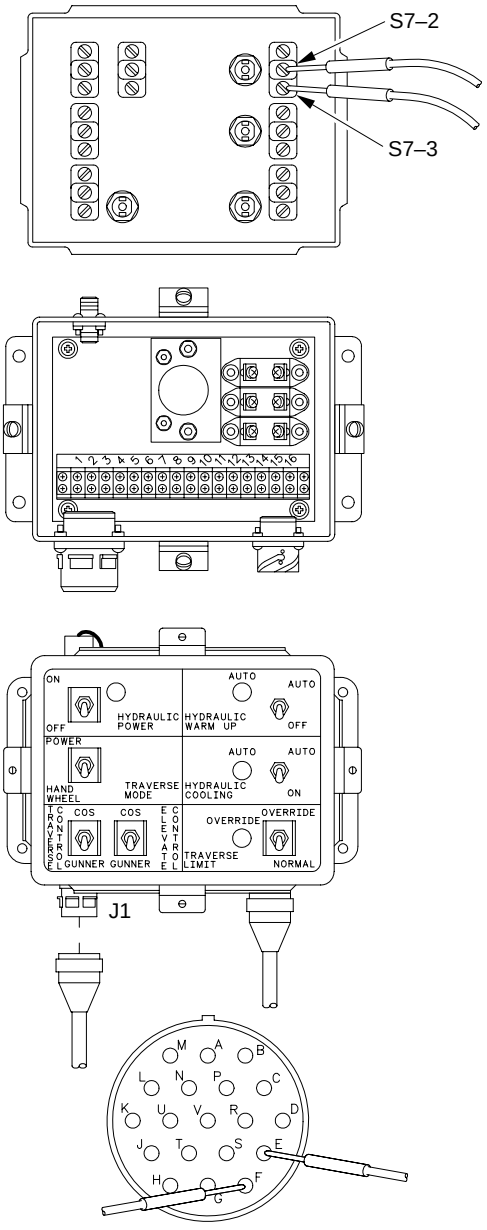
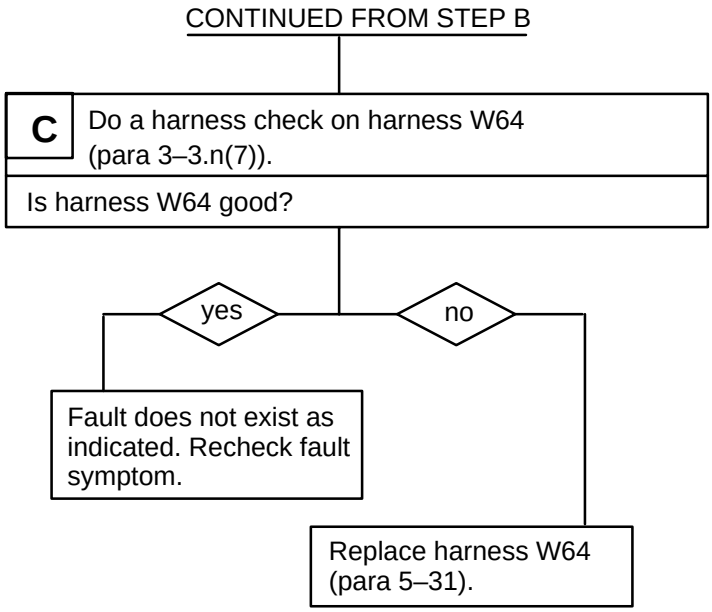


HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN E
PIN F

03pc127t

3–3. TROUBLESHOOTING CHART – CONTINUED

I.	TRAVERSE – CONTINUED	(8)	CAB WILL NOT TRAVERSE BEYOND 45° WITH TRAVERSE LIMIT SWITCH HELD IN OVERRIDE POSITION.



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?

yes

no

Go to Step C.

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.

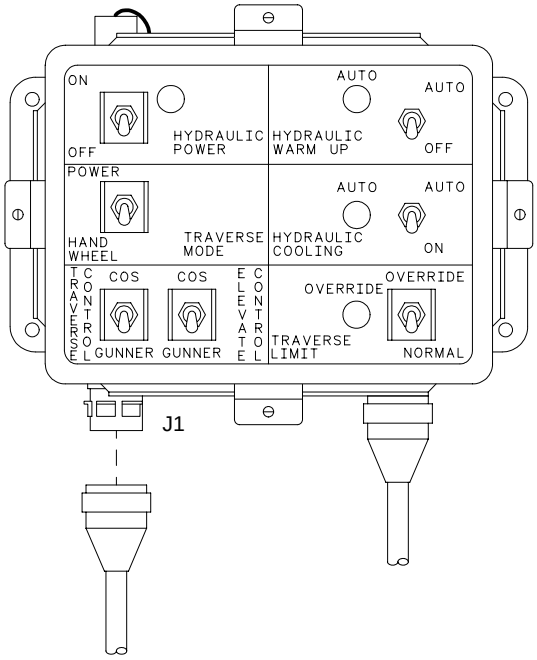
Is continuity present?

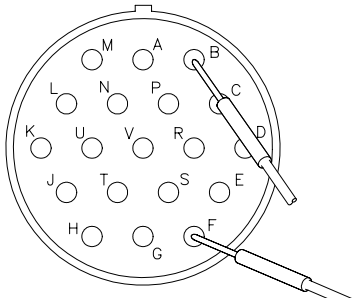
yes

no

Replace harness 12563029 (para 5–22).

Replace wiring harness W64 (para 5–31).





HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN B
PIN F

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?

yes

no

Go to Step E.

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 .

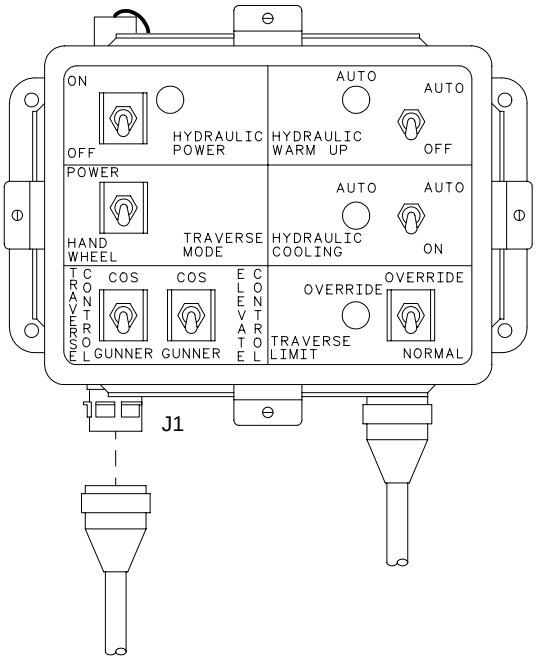
Is continuity present?

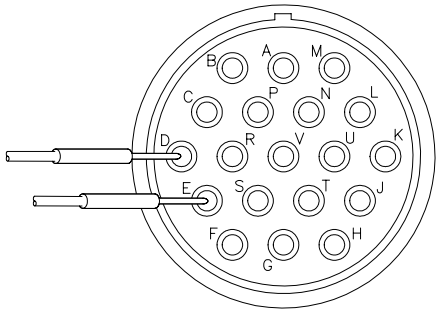
yes

no

Replace harness W64 (para 5–31).

Replace traverse limit switch (para 5–24).





W64
CONNECTOR P1
SOCKET D
SOCKET E

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?

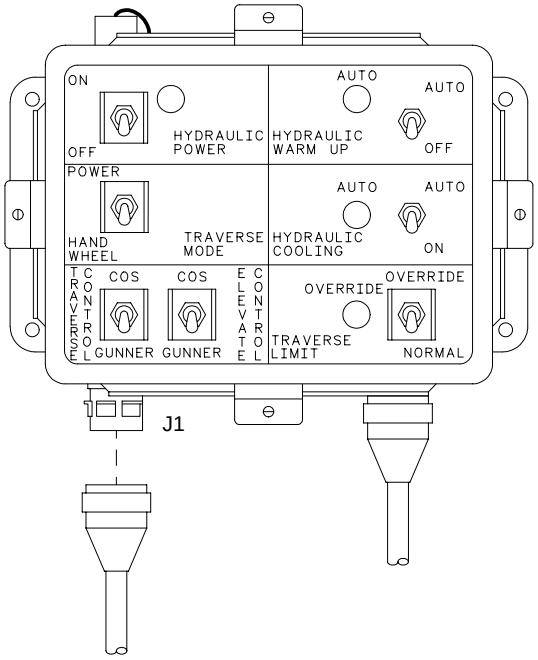
yes

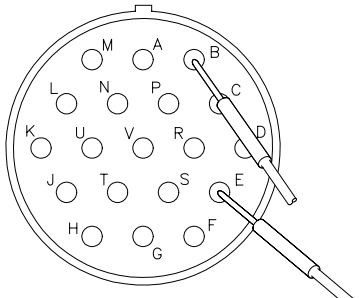
Replace harness 12563029 (para 5–22).

no

Replace harness W64 (para 5–31).

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?

yes

Fault does not exist as indicated.

no

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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?

yes → Go to Step D.

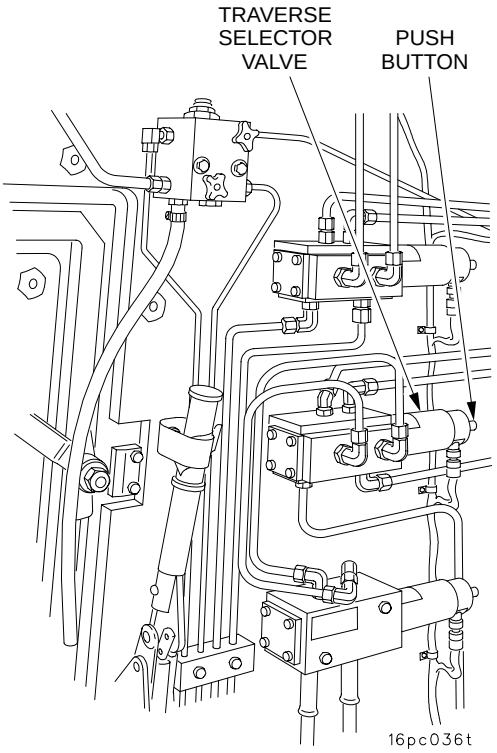
no

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?

yes → Replace any damaged and/or restricted lines (para 18–12).

no → Replace traverse selector valve (para 18–40).



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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.

Is voltage present?

yes

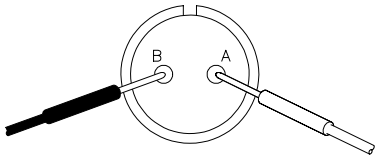
Replace traverse selector valve (para 18–40).

no

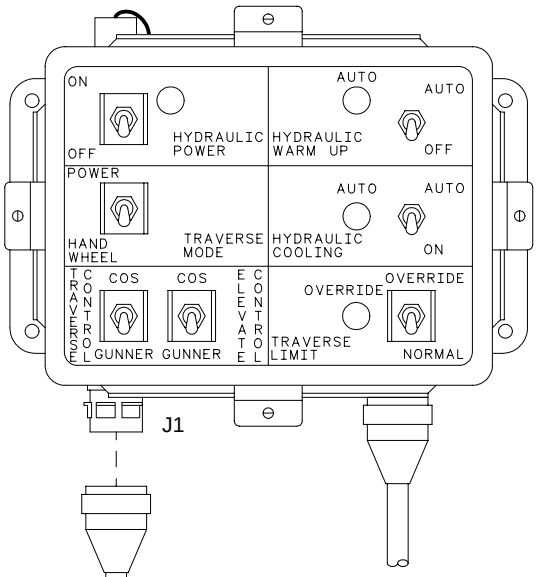
E

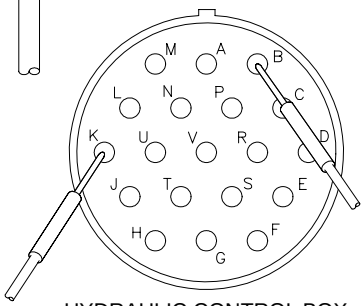
1. Turn HYDRAULIC POWER switch OFF and shut off engine (TM 9–2350–314–10).
2. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
3. Disconnect harness W64 connector P1 from hydraulic control box connector J1.
4. Turn HYDRAULIC POWER switch ON and turn TRAVERSE CONTROL switch to GUNNER position (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.

Is continuity present?



W64
CONNECTOR P6
SOCKET A
SOCKET B





HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN B
PIN K

03pc090t

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3–3. TROUBLESHOOTING CHART – CONTINUED

l. 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

yes / no

Do a harness check on harness W64 (para 3–3.n(7)).

F

1. Remove cover from hydraulic control box (para 5–20).
2. Place one multimeter lead on TRAVERSE CONTROL switch terminal S3–2 and other lead on TRAVERSE CONTROL switch terminal S3–3. Check for continuity.

Is continuity present?

yes / no

Replace TRAVERSE CONTROL switch (para 5–20).

G

Place one multimeter lead on terminal S3–2 of S3 and other lead on TB1–9 of TB1. Check for continuity.

Is continuity present?

yes / no

Repair or replace lead 12934657–6 (para 5–21).

H

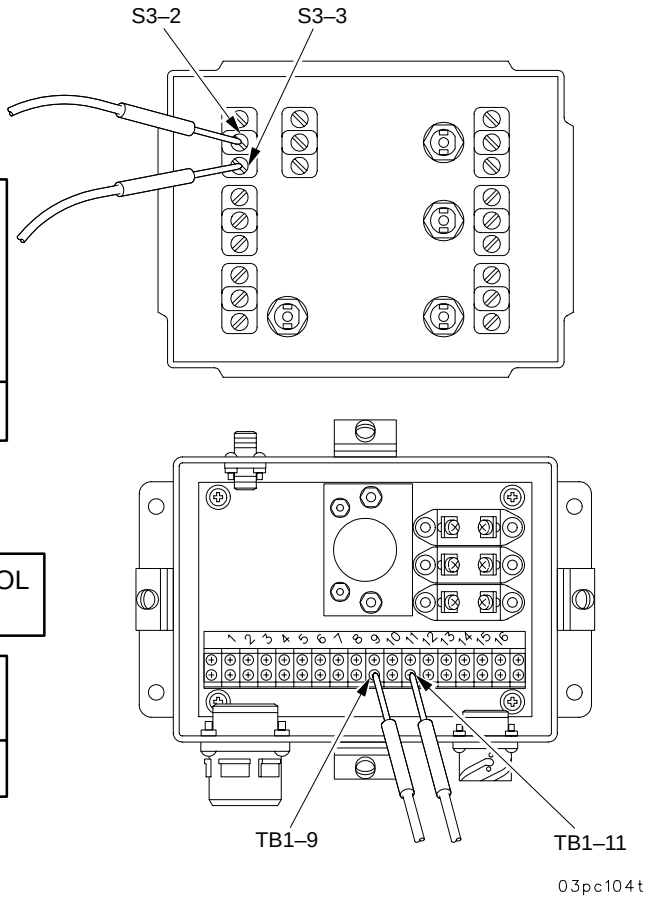
Place one multimeter lead on TB1–9 of terminal board TB1 and other lead on TB1–11. Check for continuity.

Is continuity present?

yes / no

Replace harness 12563029 (para 5–22).

Repair or replace TB1 (para 5–20).



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?

yes

no → Go to Step D.

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?

yes

no → Go to Step G.

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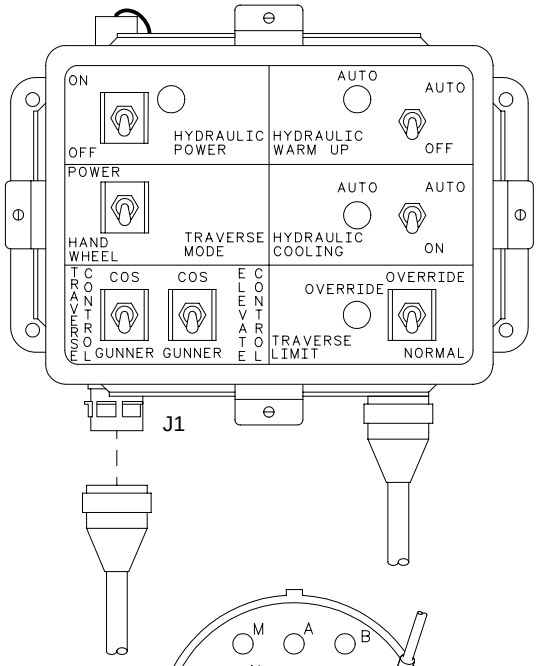
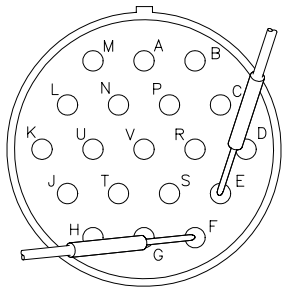




HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN E
PIN F

03pc118t

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

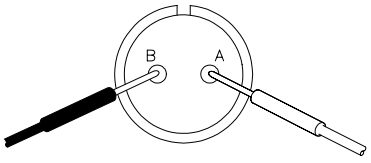
C

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?

yes → Replace traverse limit valve (para 18–43).

no → Replace wiring harness W64 (para 5–31).



W64
CONNECTOR P5
SOCKET A
SOCKET B

CONTINUED FROM STEP A

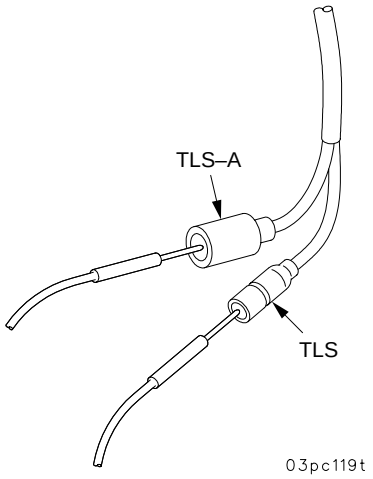
D

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?

yes →

no → Replace traverse limit switch (para 5–20).



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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 D

E Perform a harness check on harness W64 (para 3–3.n(7)).

Is harness W64 good?

yes

no → Replace wiring harness W64 (para 5–31).

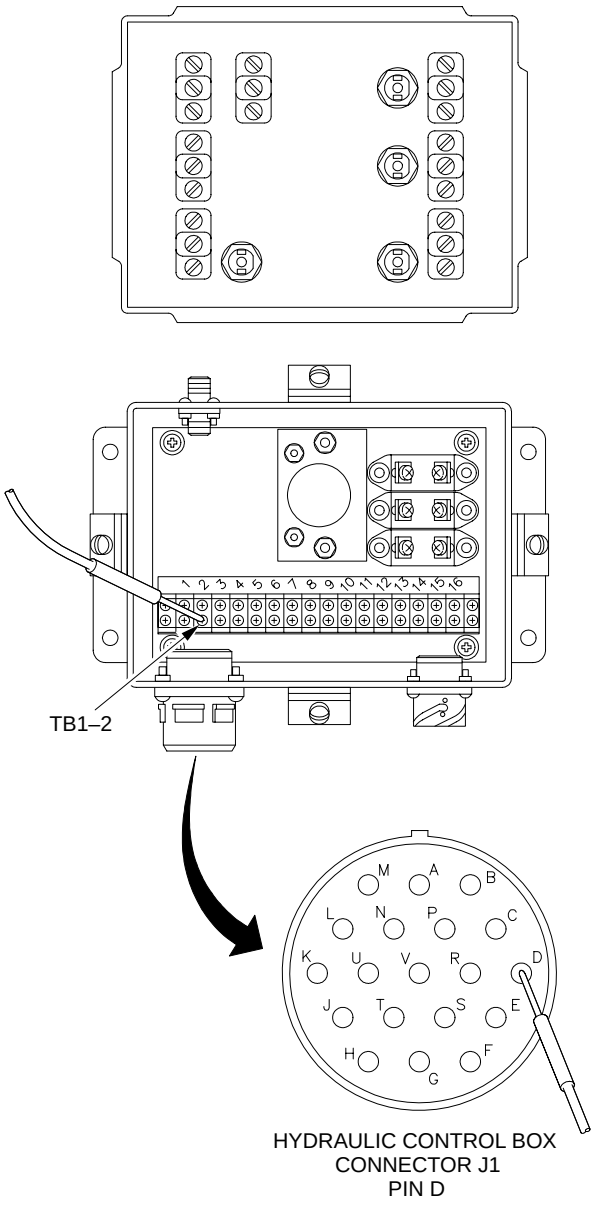
F

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?

yes → Fault does not exist as indicated.

no → Replace harness 12563029 (para 5–22).



HYDRAULIC CONTROL BOX
CONNECTOR J1
PIN D

03pc121t

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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

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?

yes

no

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?

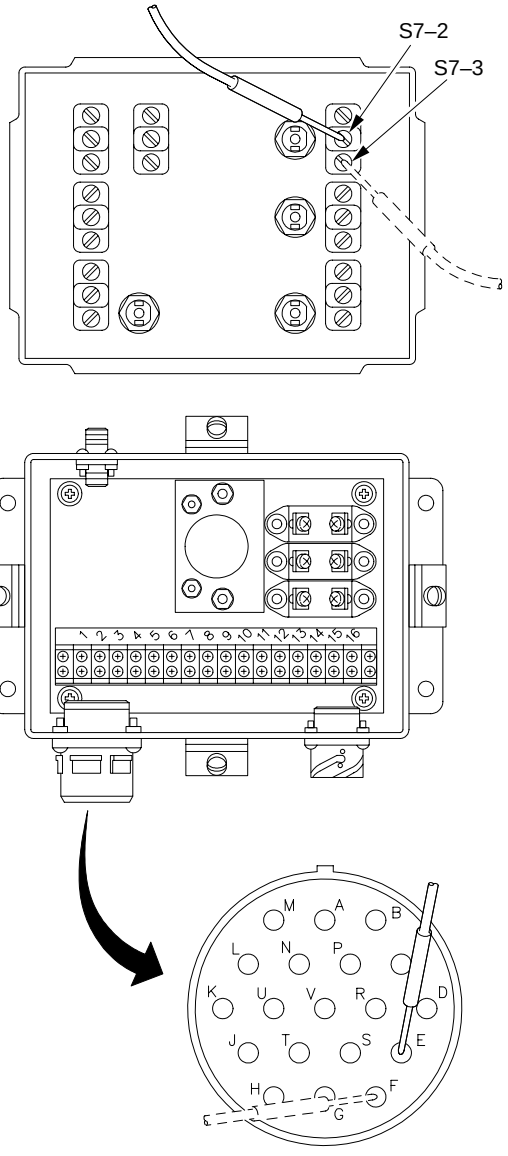
yes

no

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.

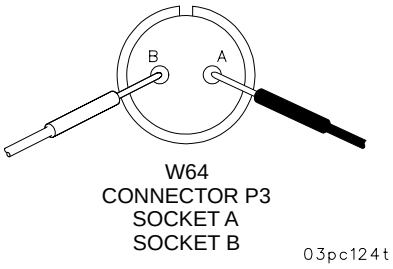
INITIAL SETUP

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?



yes → Troubleshoot cab traverse electrical system (para 3–3.I(4)).

no → **B**

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?

yes → Replace clutch valve (para 18–28).

no → Fault does not exist as indicated.

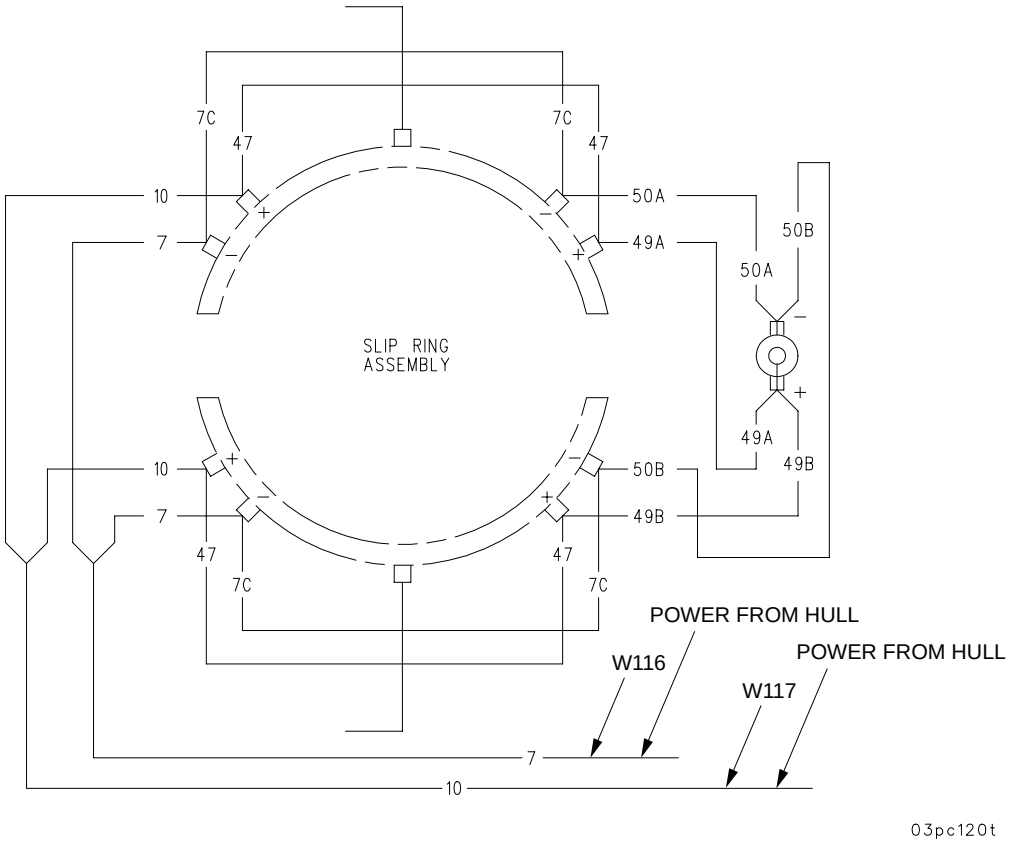
END OF TASK

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.



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?

yes

no

Go to TM 9–2350–314–20–1–1 Troubleshooting.

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?

yes

no

Go to TM 9–2350–314–20–1–1 Troubleshooting.

C

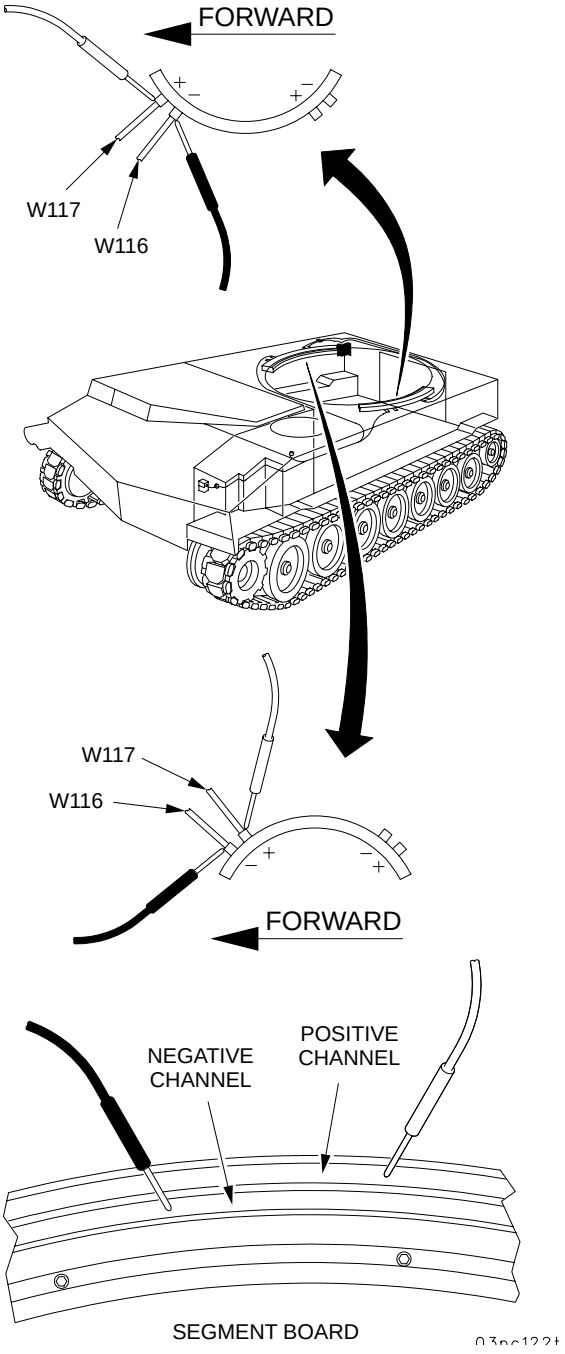
Check the right segment board power channel for voltage by placing multimeter red lead on positive channel and black lead on negative channel.

Is voltage present?

yes

no

Replace right segment board (para 23–3).



3–3. TROUBLESHOOTING CHART – CONTINUED

m. CAB POWER – CONTINUED	(1) NO POWER TO CAB. – CONTINUED

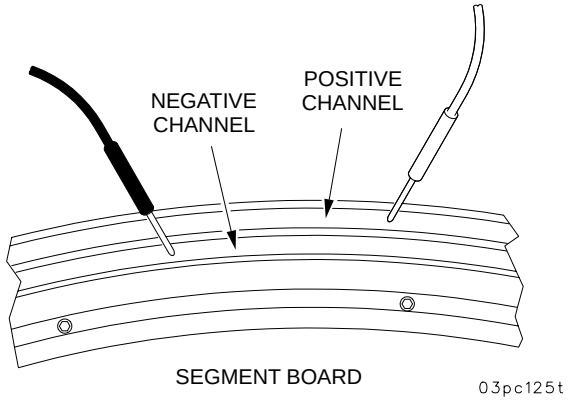
CONTINUED FROM STEP C

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?

yes

no → 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?

yes → Reverify fault indication.

no → Replace faulty harness(es) (Chapter 5).

END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS SHORTS TEST

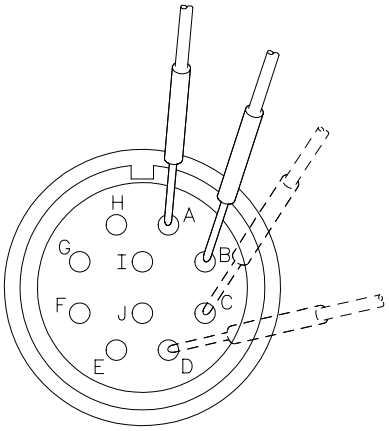
When doing a shorts test, make sure all connectors and/or leads are disconnected from their components. Probe the pins or sockets with a multimeter. This is done by placing the red lead on pin or socket A or 1 and then placing the black lead on the next pin or socket in ascending order. Probe every pin 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.

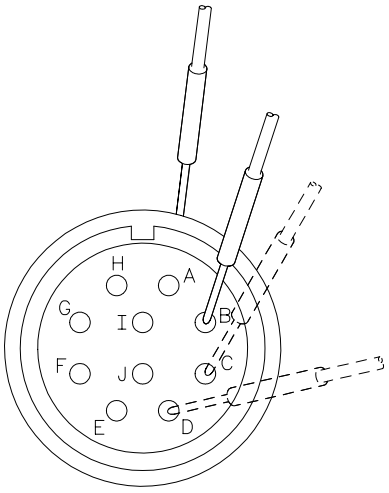
If continuity is present between any two points during probing, a short exists. Shorts must be repaired to continue any operation.

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

03pc126t

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?

yes → Replace harness W52 (para 5–35).

no →

B

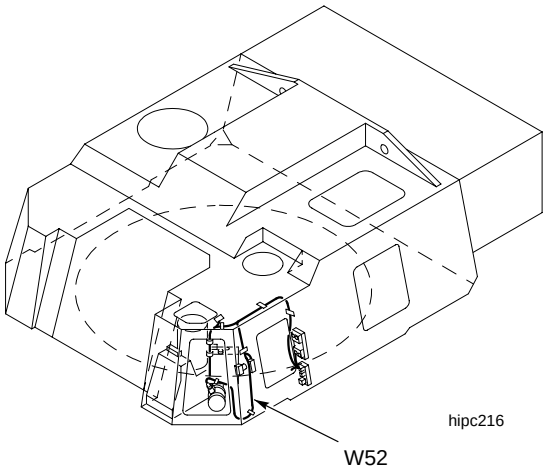
1. Disconnect all leads and connectors of harness W52.
2. Check harness W52 for continuity by placing one multimeter lead on point 1 and other lead on points 2 and 3 (one at a time), as shown in this table.

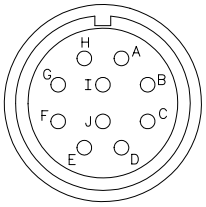
Point 1	Point 2	Point 3
connector J1 socket A	lead 645	–
connector J1 socket B	connector P6 socket A	–
connector J1 socket C	connector P6 socket B	–
connector J1 socket D	connector P5 socket A	–
connector J1 socket E	connector P5 socket B	connector P2 socket A
connector J1 socket F	connector P4 socket 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	–

Is continuity present at all points?

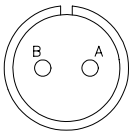
yes →

no → Replace harness W52 (para 5–35).

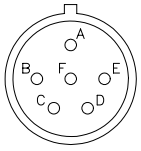




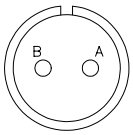
W52 CONNECTOR J1 TO W64 CONNECTOR P2



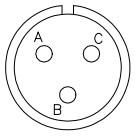
W52 CONNECTOR P2 TO WARM UP TEMP. SOLENOID



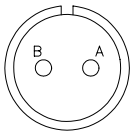
W52 CONNECTOR P3 TO COOLING FAN



W52 CONNECTOR P4 TO COOLING TEMP. SWITCH



W52 CONNECTOR P5 TO WARM UP TEMP. SWITCH



W52 CONNECTOR P6 TO MODE SELECTOR VALVE

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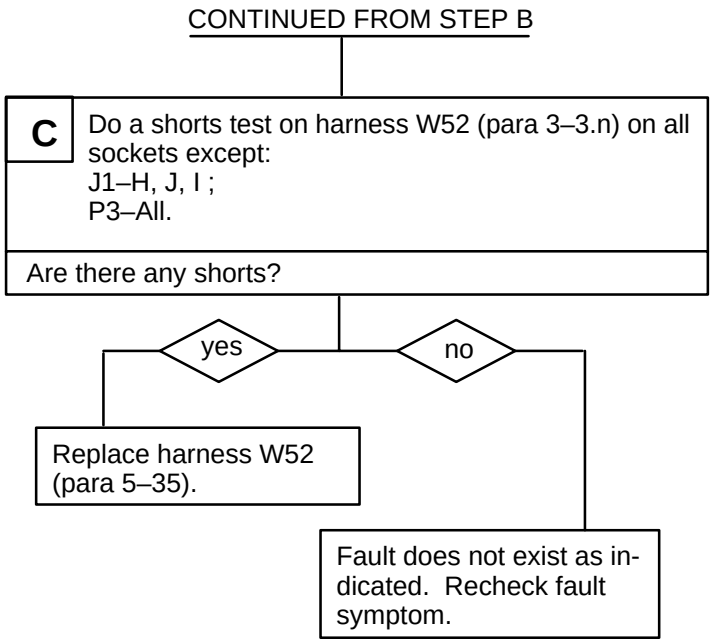
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(1) WIRING HARNESS W52. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n.	WIRING HARNESS CHECK – CONTINUED	(2) WIRING HARNESS W62A.

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
Covers for brush blocks 1, 2, 3, and 4 removed (para 23–2)
Lower shield assembly removed (para 23–1)

NOTE

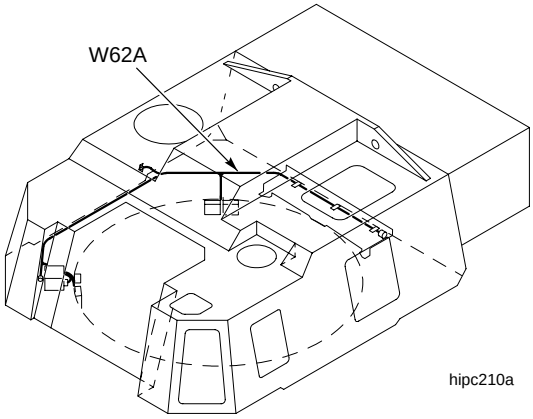
For harness connector locations, refer to para 5–30.

A Visually inspect harness W62A for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes → Replace harness W62A (para 5–30).

no



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?

yes → Replace harness W62A (para 5– 30).

no

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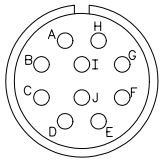
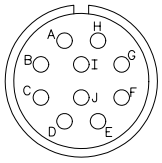
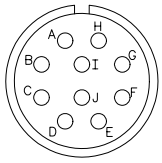


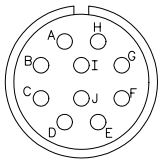
W62A CONNECTOR P1 TO W61 A CONNECTOR P6



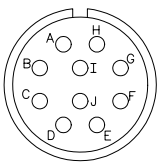
W62A CONNECTOR P2 TO BRUSH HOLDER NUMBER 1



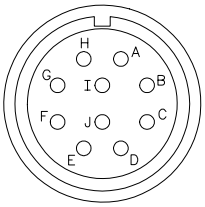
W62A CONNECTOR P3 TO BRUSH HOLDER NUMBER 2



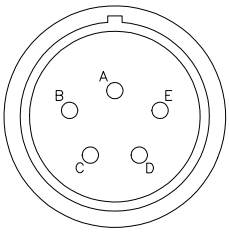
W62A CONNECTOR P4 TO BRUSH HOLDER NUMBER 3



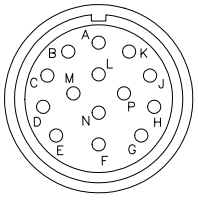
W62A CONNECTOR P5 TO BRUSH HOLDER NUMBER 4



W62A CONNECTOR J1 TO W61A CONNECTOR P1



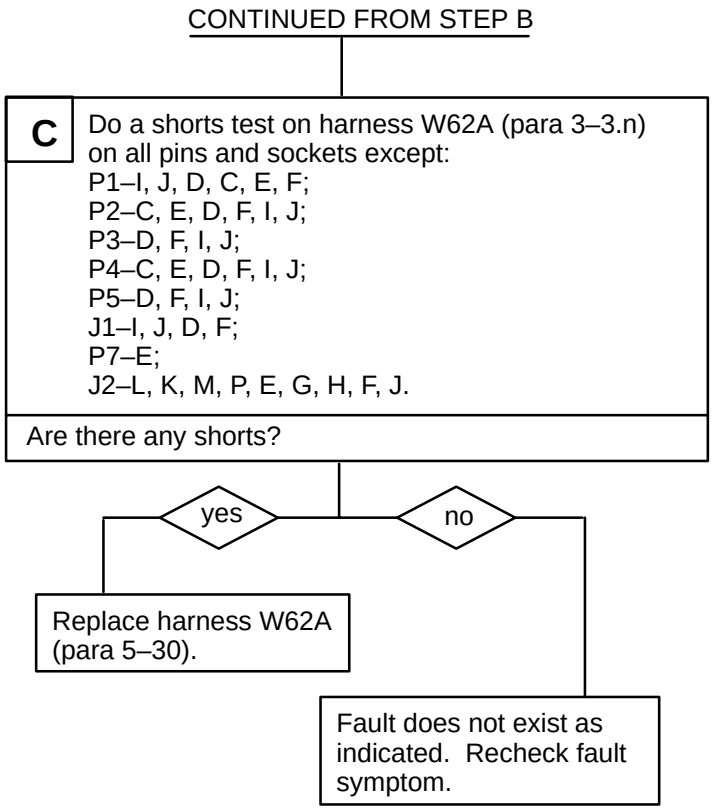
W62A CONNECTOR P7 TO CAB SIDE VMS MODEM



W62A CONNECTOR J2 TO MASTER CONTROL STATION

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(2) WIRING HARNESS W62A. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED

(3) WIRING HARNESS W58.

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
MCS compartment open (TM 9–2350–314–10)

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?

yes → Replace harness W58 (para 5–15).

no

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?

yes

no → Replace harness W58 (para 5–15).

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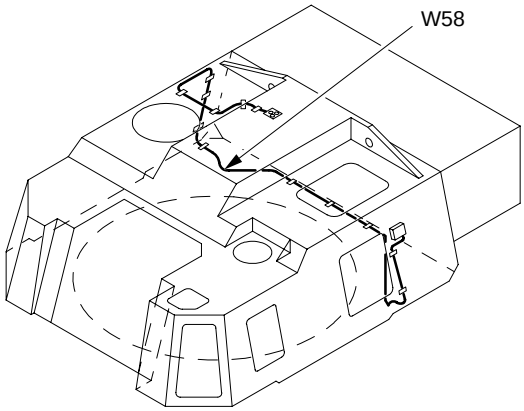
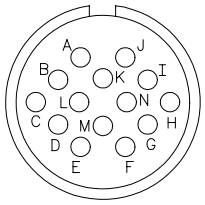
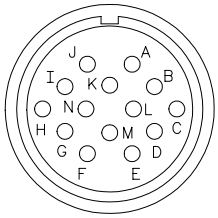
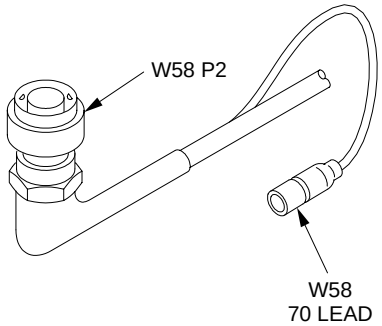




W58
CONNECTOR P2
TO MCS CONTROL BOX



W58
CONNECTOR J1
TO MCS UNIT



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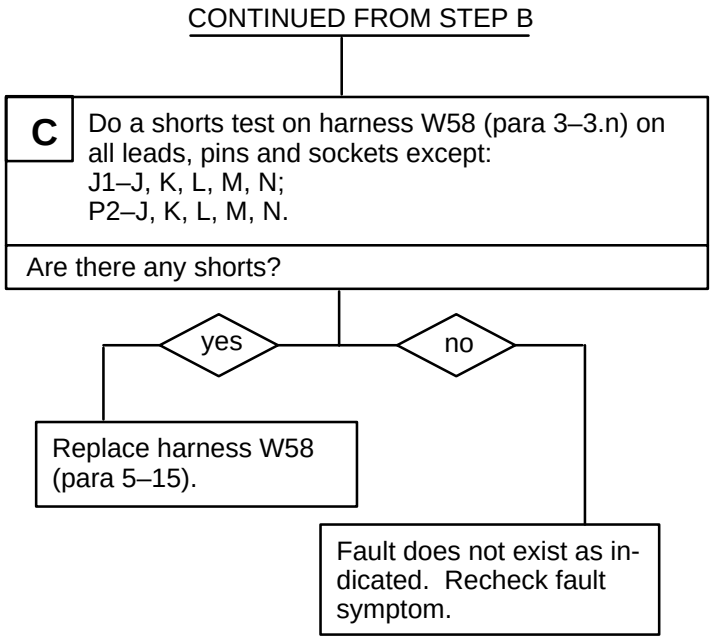
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(3) WIRING HARNESS W58. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n.	WIRING HARNESS CHECK – CONTINUED	(4) WIRING HARNESS W53.

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 door open (TM 9–2350–314–10)
Hydraulic compartment access panel removed (TM 9–2350–314–10)

NOTE

For harness connector locations, refer to para 5–12.

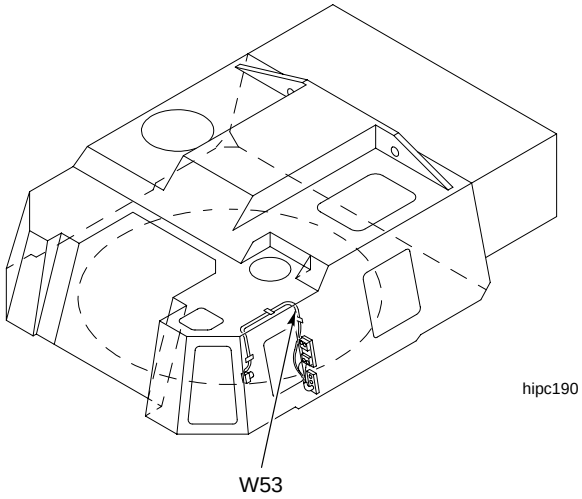
A Visually inspect harness W53 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes

Replace harness W53 (para 5–12).

no



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.

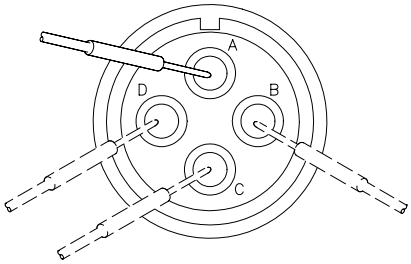
Point 1	Point 2
connector J1 pin A	lead terminal 100
connector J1 pin B	lead terminal 100
connector J1 pin C	lead terminal 70
connector J1 pin D	lead terminal 70

Is continuity present at all points?

yes

Replace harness W53 (para 5–12).

no



W53
CONNECTOR J1
PIN A
(PIN B)
(PIN C)
(PIN D)

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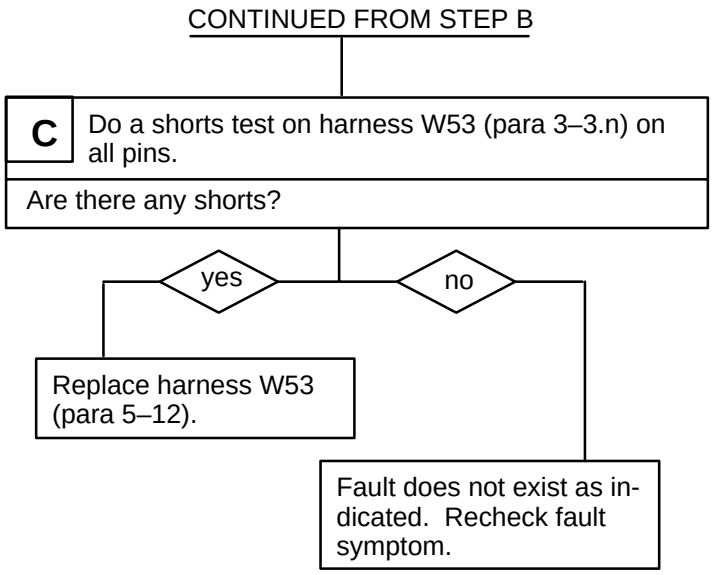
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED

(4) WIRING HARNESS W53. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n.	WIRING HARNESS CHECK – CONTINUED	(5) WIRING HARNESS W60.

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 door open (TM 9–2350–314–10)

NOTE

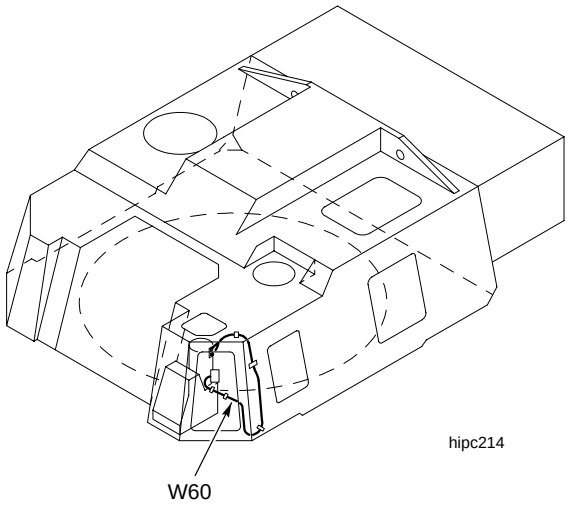
For harness connector locations, refer to para 5–34.

A Visually inspect harness W60 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

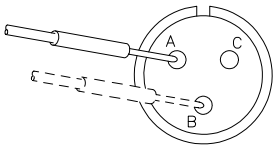
yes / no

yes → 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



W60
CONNECTOR P1
PIN A
(PIN B)

Is continuity present at all points?

yes / no

no → Replace harness W60 (para 5–34).

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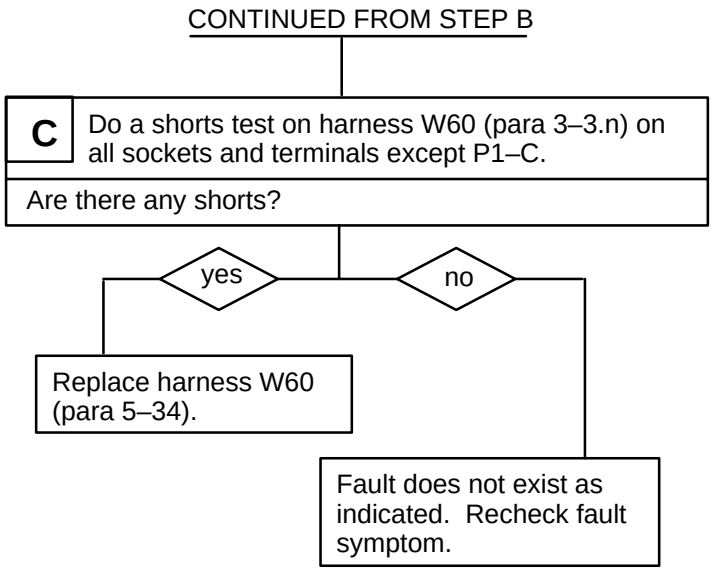
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(5) WIRING HARNESS W60. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n.	WIRING HARNESS CHECK – CONTINUED	(6) WIRING HARNESS W59.

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 door open (TM 9–2350–314–10)
Hydraulic compartment side access panel removed (TM 9–2350–314–10)

NOTE

For harness connector locations, refer to para 5–33.

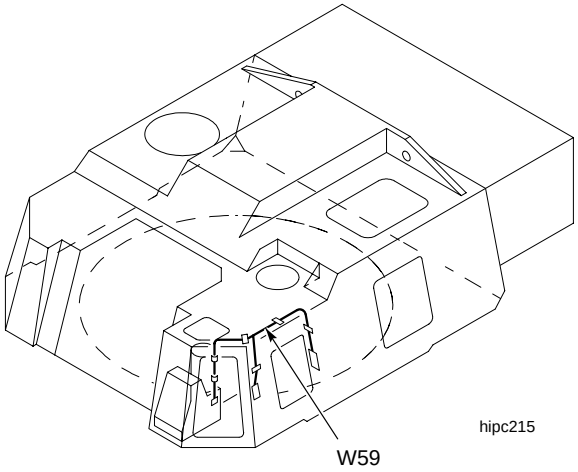
A Visually inspect harness W59 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes

Replace harness W59 (para 5–33).

no



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:

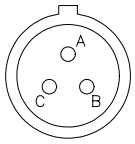
Point 1	Point 2
connector P1 pin A	lead terminal 645C
connector P1 pin B	lead terminal 660
connector P1 pin C	lead terminal 70

Is continuity present at all points?

yes

Replace harness W59 (para 5–33).

no



W59
CONNECTOR P1
TO LEVEL SENSOR

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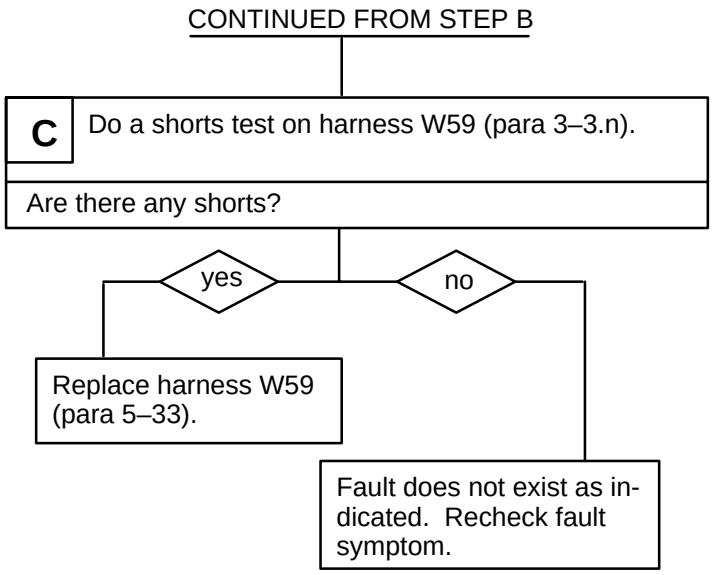
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(6) WIRING HARNESS W59. – CONTINUED



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

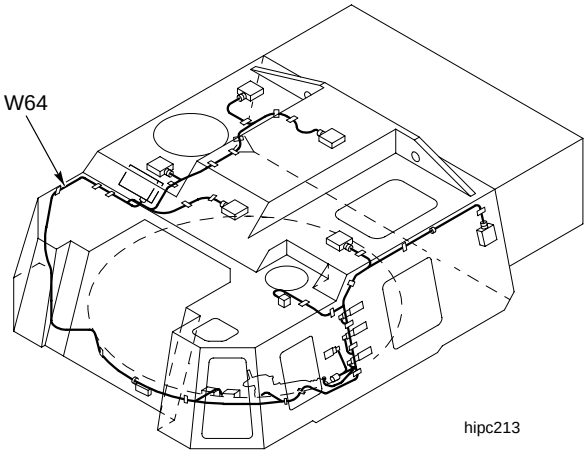
For harness connector locations, refer to para 5–31.

A Visually inspect harness W64 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes → Replace harness W64 (para 5–31).

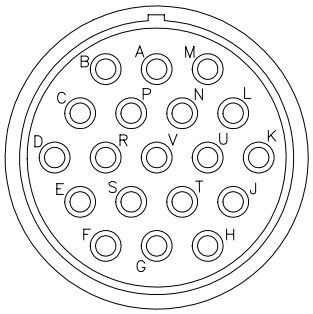
no



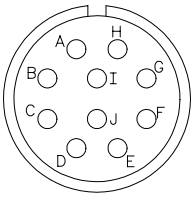
B Disconnect all harness W64 connections and check harness W64 for continuity by placing one multimeter lead on point 1 and other lead on points 2 thru 7 (one at a time) as shown in this table.

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	–	–	–	–	–

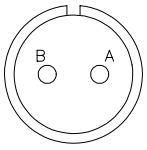
*=Disconnect at all six dome lights.
**=Disconnect at brush block #8.
***=Panoramic scope and all six dome lights.



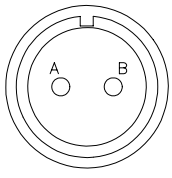
W64 CONNECTOR P1



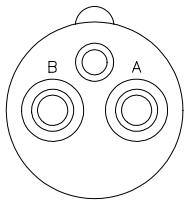
W64 CONNECTOR P2



W64 CONNECTOR P3
CONNECTOR P4
CONNECTOR P5
CONNECTOR P6
CONNECTOR P7



W64 CONNECTOR J1



W64 CONNECTOR P9

Is continuity present at all points?

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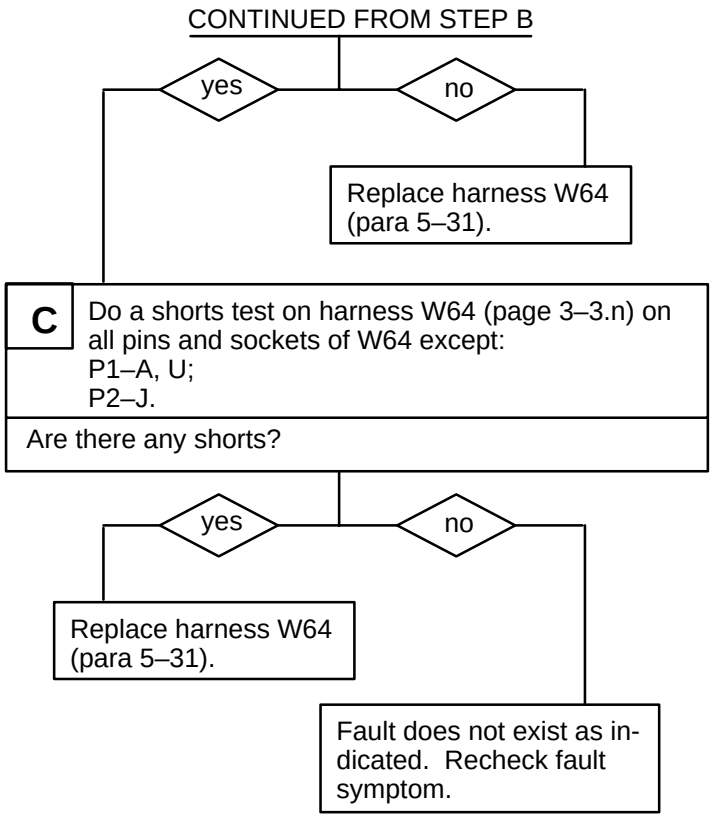
3–3. TROUBLESHOOTING CHART – CONTINUED

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.

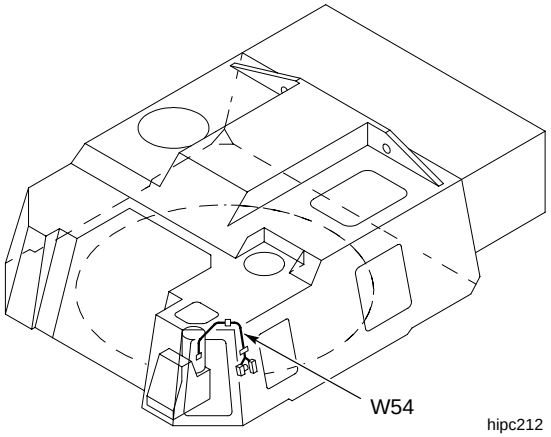
A Visually inspect harness W54 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

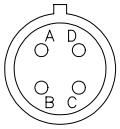
yes

Replace harness W54 (para 5–32).

no



hipc212



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	lead terminal 645A	
connector P1 pin B	lead terminal 645B	lead terminal 780

Is continuity present at all points?

yes

Replace harness W54 (para 5–32).

no

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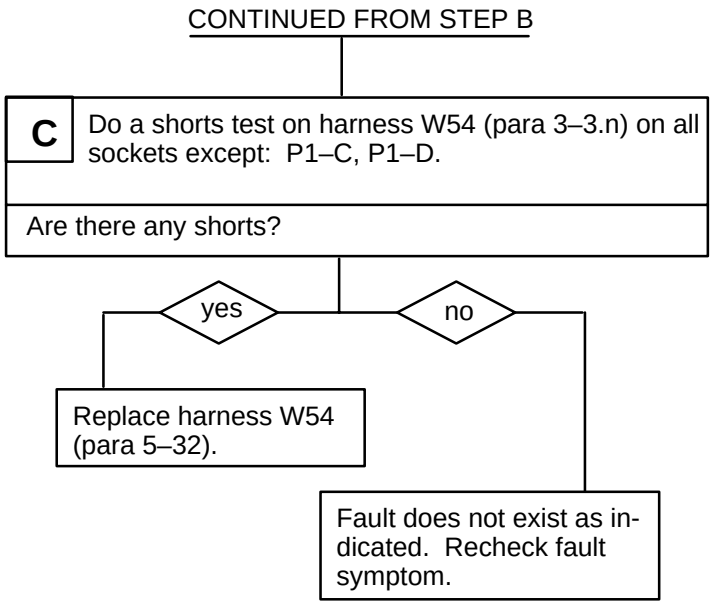
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(8) WIRING HARNESS W54. – CONTINUED



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.

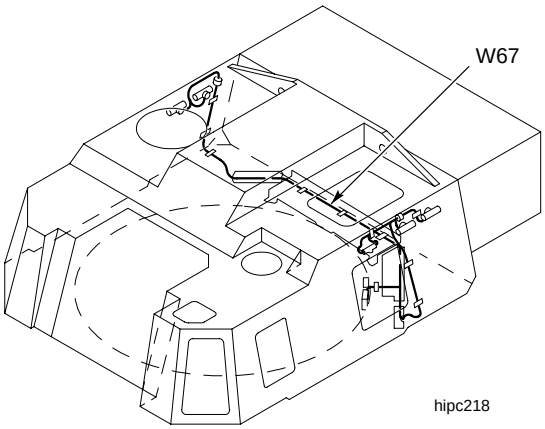
A Visually inspect harness W67 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes

Replace harness W67 (para 5–37).

no



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.

Point 1	Point 2
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?

yes

Fault does not exist as indicated. Recheck fault symptom.

no

Replace harness W67 (para 5–37).

END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(10) WIRING HARNESS W55.

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
Shields removed from brush holders 7 and 8 (para 23–2)
Harness W55 connector P1 disconnected from harness W53 connector P1 (para 5–13)

NOTE

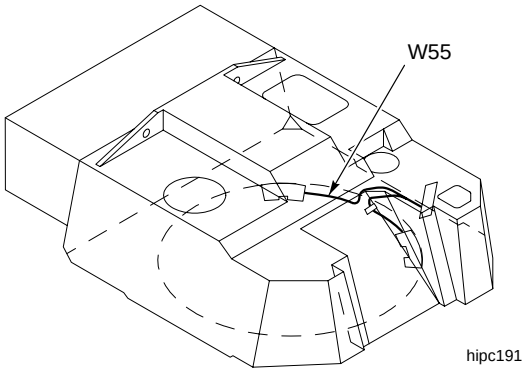
For harness connector locations, refer to para 5–13.

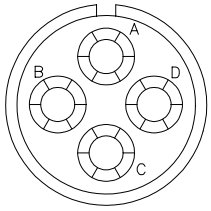
A Visually inspect harness W55 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes → Replace harness W55 (para 5–13).

no





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.

Point 1	Point 2
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

Is continuity present?

yes

no → Replace harness W55 (para 5–13).

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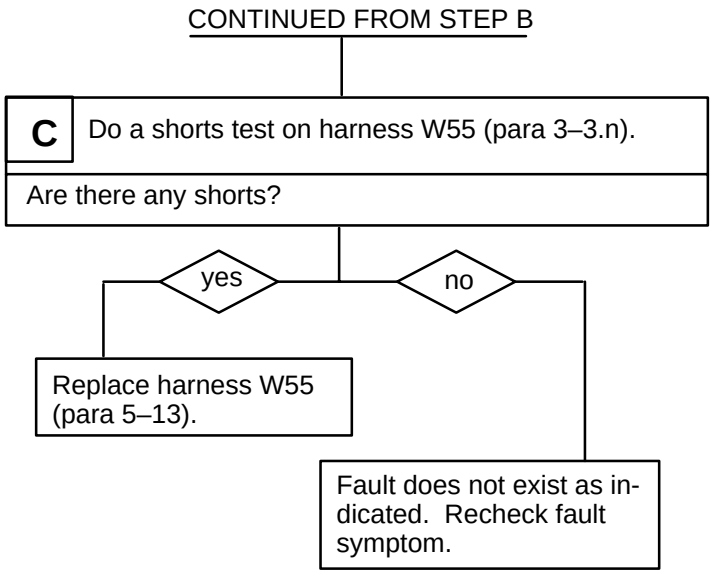
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(10) WIRING HARNESS W55. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(11) WIRING HARNESS 12563029.

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 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?

yes → Replace harness 12563029 (para 5–22).

no

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?

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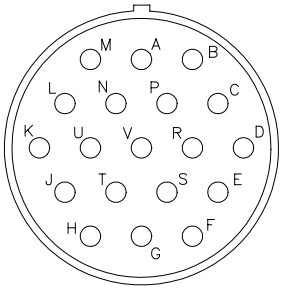
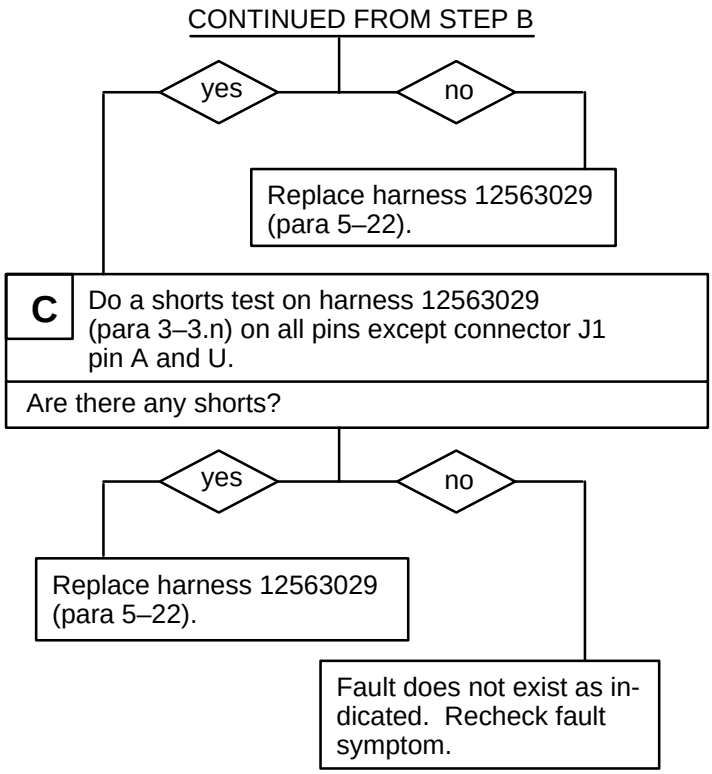


HYDRAULIC CONTROL BOX CONNECTOR J1

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

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
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)

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?

yes → Replace harness W61A (para 5–16).

no → **B**

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?

yes → Replace harness W61A (para 5–16).

no →

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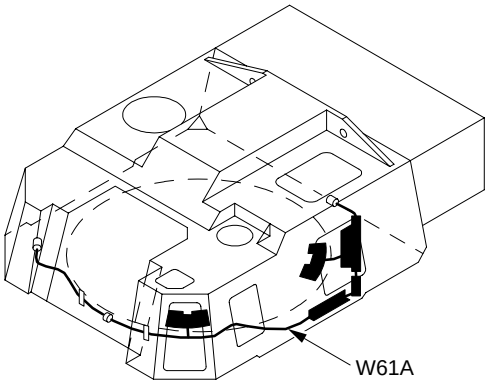
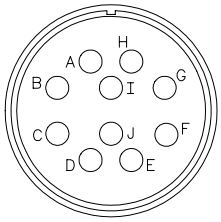
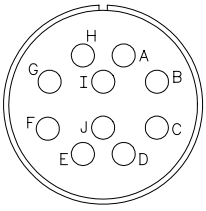




W61A
CONNECTOR P1
CONNECTOR P2
CONNECTOR P3
CONNECTOR P4
CONNECTOR P5

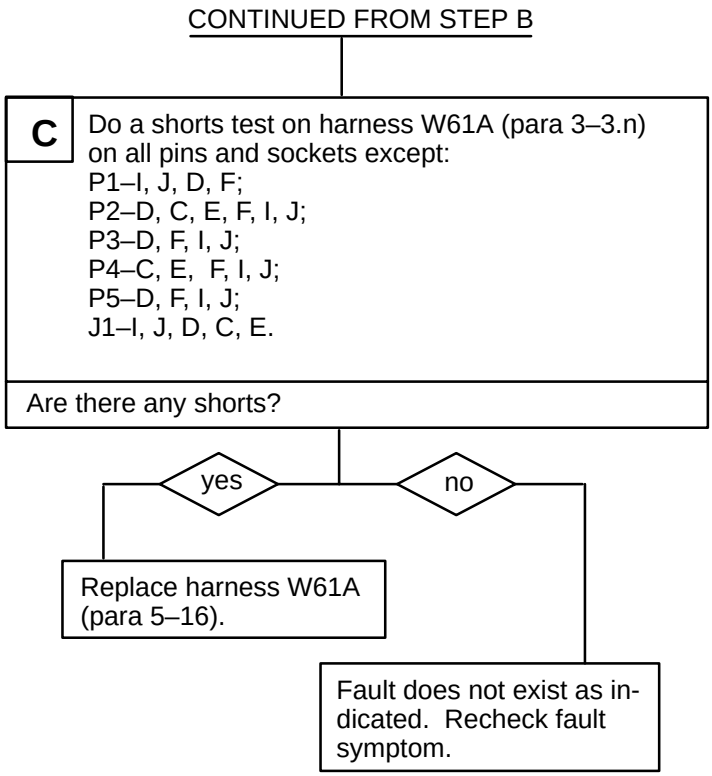


W61A
CONNECTOR J1

03pc015t

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(12) WIRING HARNESS W61A. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(13) WIRING HARNESS W56.

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
MCS compartment door open (TM 9–2350–314–10)

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?

yes

Fault does not exist as indicated. Recheck fault symptom.

no

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.

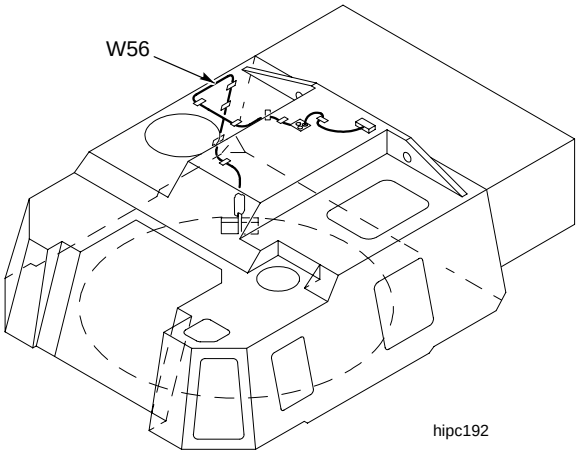
Is continuity present?

yes

Fault does not exist as indicated. Recheck fault symptom.

no

Replace harness W56 (para 5–14).



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(14) WIRING HARNESS 12563030.

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 control box removed (para 5–20)
Hydraulic control box cover removed (para 5–20)

A Visually inspect harness 12563030 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

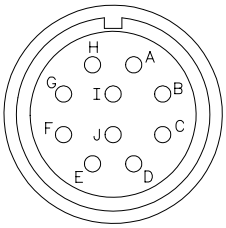
yes → Replace harness 12563030 (para 5–23).

no

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:

Point 1	Point 2
connector J2 pin A	lead terminal +28S
connector J2 pin B	lead terminal TS4
connector J2 pin C	lead terminal TS2
connector J2 pin D	lead terminal TS3
connector J2 pin E	lead terminal GND
connector J2 pin F	lead terminal TS6



12563030
CONNECTOR J2

Is continuity present at all points?

yes

no → Replace harness 12563030 (para 5–23).

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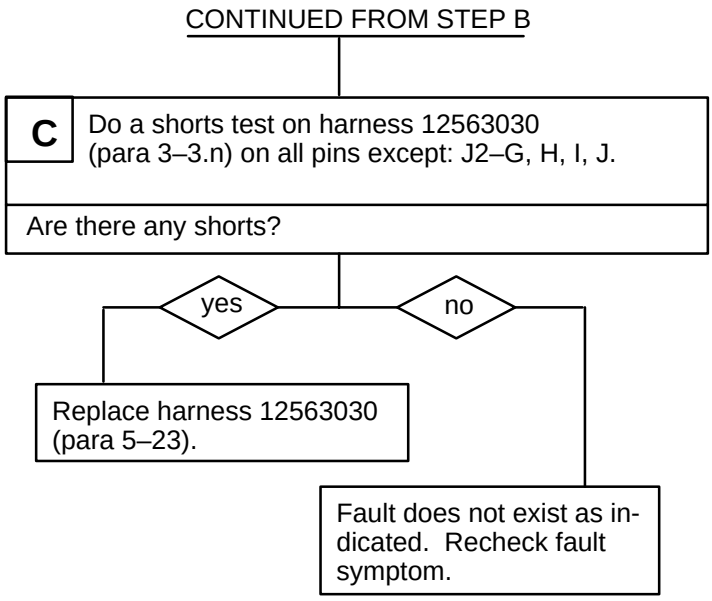
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(14) WIRING HARNESS 12563030. – CONTINUED



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?

yes → Replace harness W50 (para 5–11).

no →

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.

Point 1	Point 2
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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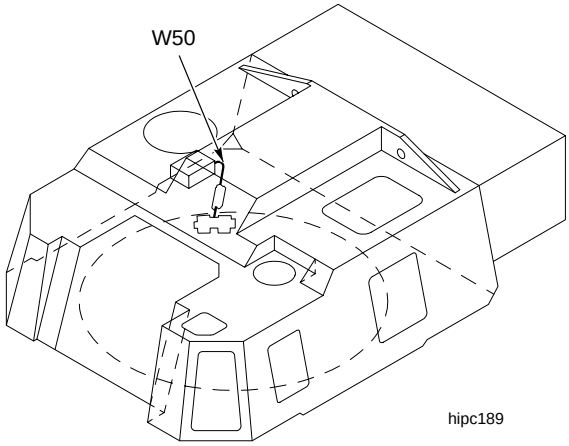
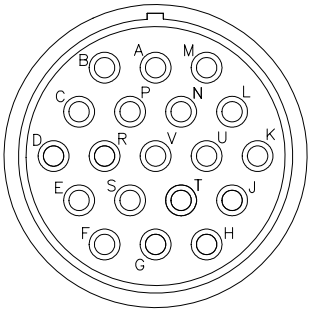
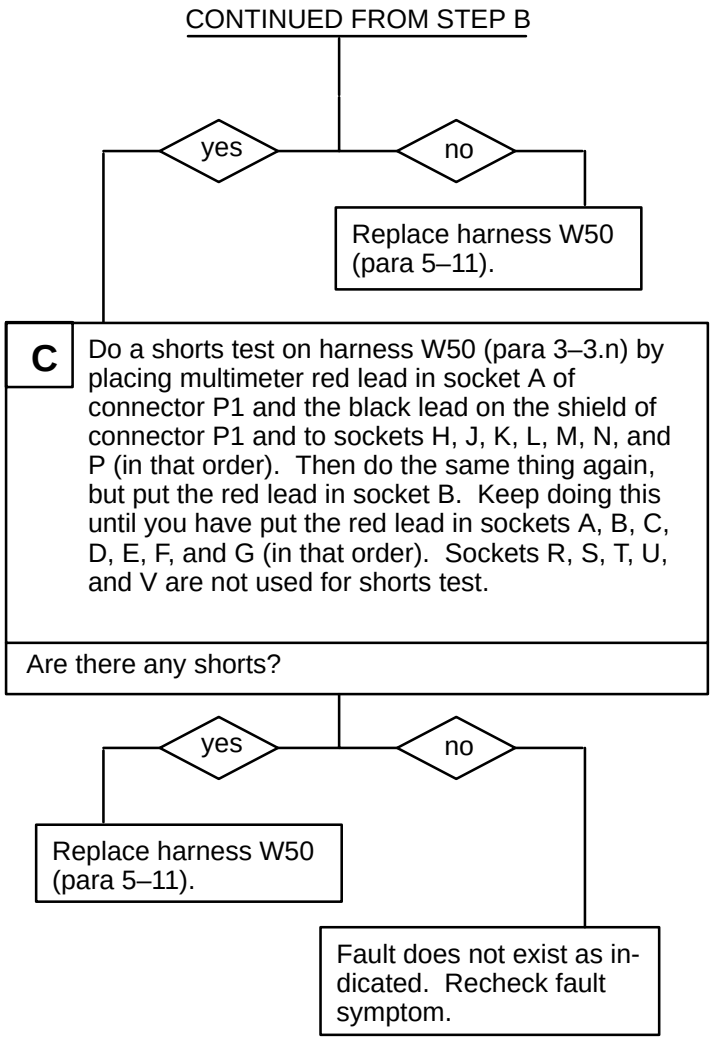




W50
CONNECTOR P1

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(15) WIRING HARNESS W50. – CONTINUED



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)

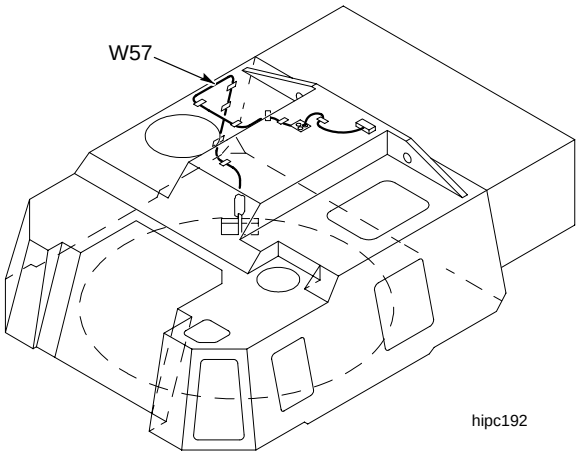
A

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.

Is continuity present?

yes → Fault does not exist as indicated. Recheck fault symptom.

no



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.

Is continuity present?

yes → Fault does not exist as indicated. Recheck fault symptom.

no → Replace harness W57 (para 5–14).

END OF TASK

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?

yes → Replace harness W22A (para 8–9).

no

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?

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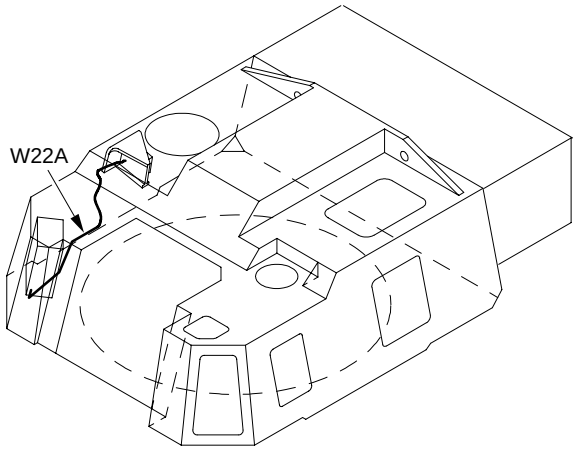

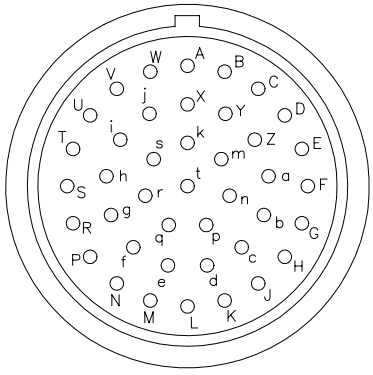

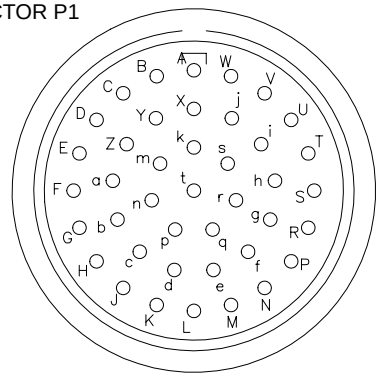

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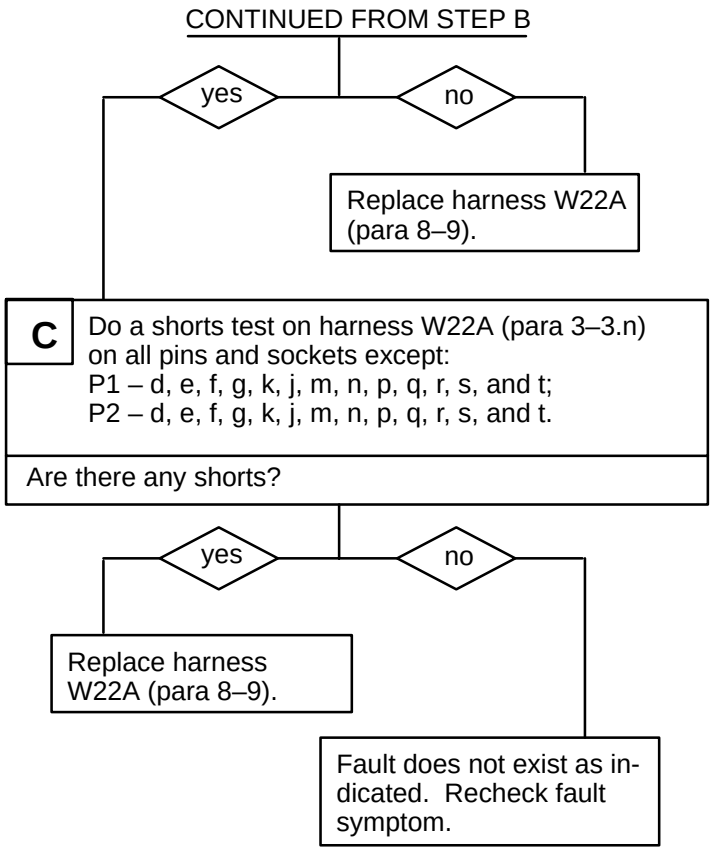
3–3. TROUBLESHOOTING CHART – CONTINUED

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?

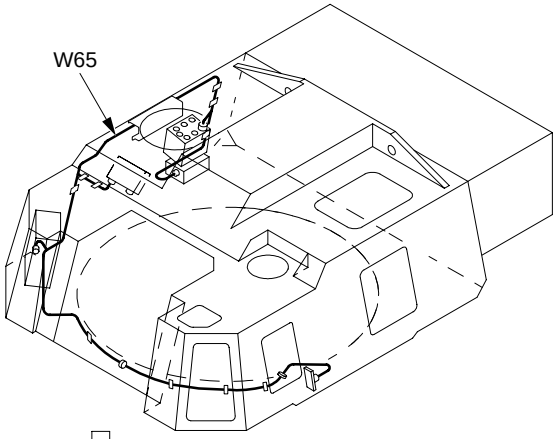
yes → Replace harness W65 (para 5–17).

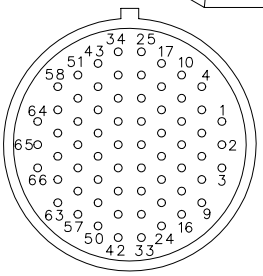
no

B

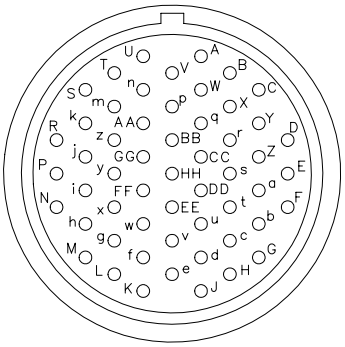
1. Disconnect harness W65 connectors P1, P2, P3, P4, and P5.
2. Check harness W65 for continuity by placing one multimeter on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2	TM Code
connector P1 socket 38	connector P2 pin T	
connector P1 socket 35	connector P2 pin X	247, 253
connector P1 socket 50	connector P2 pin U	252
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	
connector P1 socket 40	connector P2 pin b	
connector P1 socket 62	connector P2 pin Y	
connector P1 socket 37	connector P2 pin Z	242
connector P1 socket 42	connector P2 pin W	206
connector P1 socket 58	connector P2 pin D	
connector P1 socket 34	connector P2 pin B	260
connector P1 socket 33	connector P3 socket F	104
connector P1 socket 43	connector P3 socket E	104
connector P1 socket 32	connector P3 socket D	131
connector P1 socket 30	connector P3 socket C	123
connector P1 socket 31	connector P3 socket B	147
connector P1 socket 29	connector P3 socket A	60
connector P1 socket 36	connector P4 pin b	14
connector P1 socket 44	connector P4 pin c	14
connector P1 socket 20	connector P4 pin d	13, 21
connector P1 socket 16	connector P4 pin e	33
connector P1 socket 21	connector P4 pin f	33

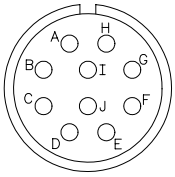




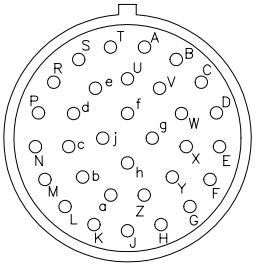
W65
CONNECTOR P1



W65
CONNECTOR P2
CONNECTOR P4



W65
CONNECTOR P3



W65
CONNECTOR P5

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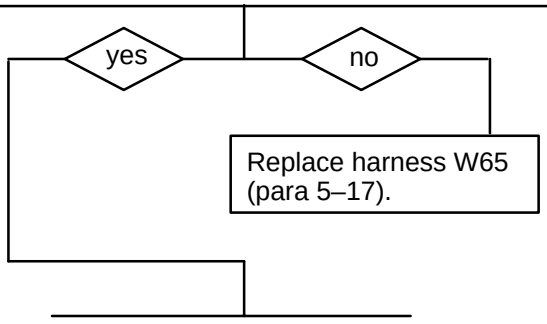
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(18) WIRING HARNESS W65. – CONTINUED

B – CONTINUED

Point 1	Point 2	TM Code
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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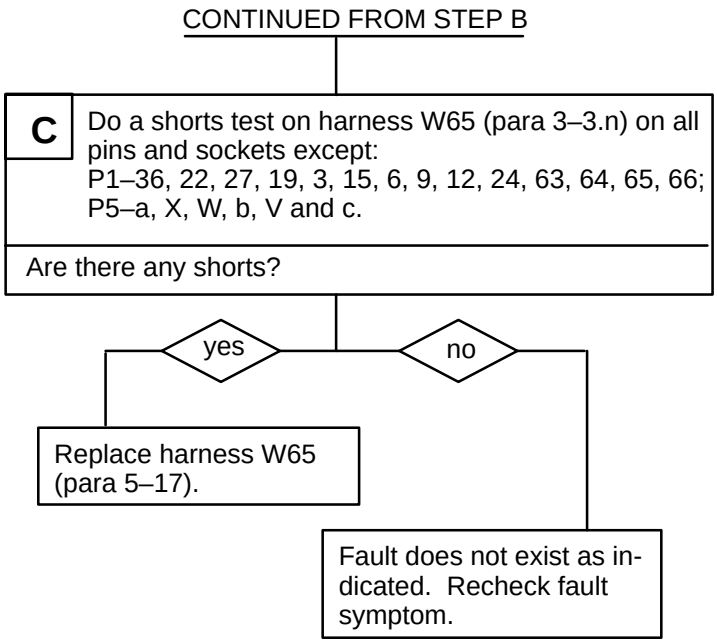
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(18) WIRING HARNESS W65. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(19) WIRING HARNESS W7.

INITIAL SETUP

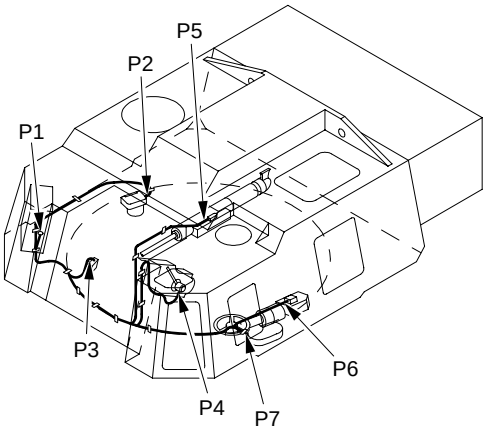
Tools
Artillery and turret mechanic's tool kit
(SC 5180–95–A12)
Multimeter (item 24, Appx G)
TA1 probe kit (item 42, Appx G)

A Visually inspect harness W7 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes → Replace harness W7 (para 8–6).

no

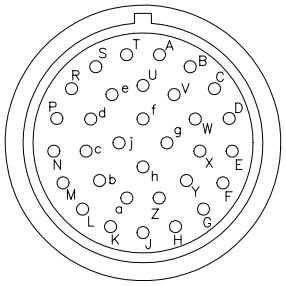


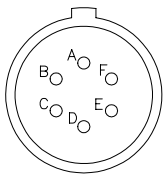
B

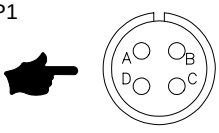
1. Disconnect the following harness W7 connectors:
   W7–P1 from ACU
   W7–P2 from AZ TACH
   W7–P3 from TTS
   W7–P4 from EL TACH
   W7–P5 from EL SERVO VALVE
   W7–P6 from AZ SERVO VALVE
   W7–P7 from W64–J1
2. Check harness W7 for continuity by placing one multimeter lead on point 1 and other lead on point 2 and point 3, as shown in this table.

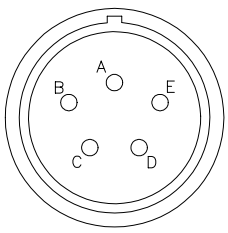
Point 1	Point 2	Point 3
connector P1 pin K	connector P2 socket B	–
connector P1 pin J	connector P2 socket A	–
connector P1 pin S	connector P2 socket E	–
connector P1 pin c	connector P3 socket D	–
connector P1 pin d	connector P3 socket E	–
connector P1 pin T	connector P3 socket A	–
connector P1 pin U	connector P3 socket B	–
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	–

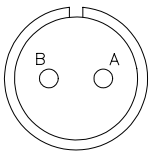
Is continuity present at all points?











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3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(19) WIRING HARNESS W7. – CONTINUED

CONTINUED FROM STEP B

yes

no

Replace harness W7 (para 8–6).

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, i, 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?

yes

no

Replace harness W7 (para 8–6).

Fault does not exist as indicated. Recheck fault symptom.

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 (SC 5180–95–A12)
Multimeter (item 24, Appx G)
TA1 probe kit (item 42, Appx G)

NOTE

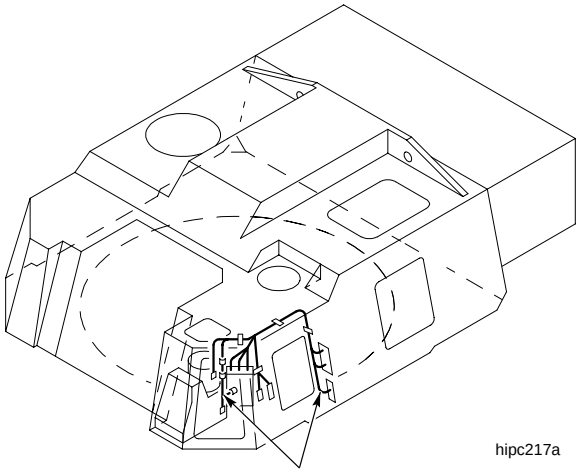
- If DU displayed a code for PDIU fault summary, check connectors in step B with TM codes listed.
- For harness connector locations, refer to para 5–36.

A Visually inspect harness W51 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes → Replace harness W51 (para 5–36).

no

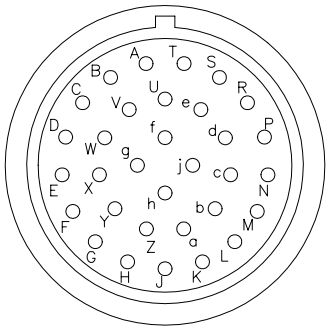


W51

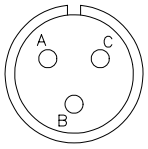
B Disconnect leads of harness W51. Check harness W51 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2	TM Code
connector J1 socket f	lead terminal AWG16 783	
connector J1 socket K	lead terminal AWG16 782	
connector J1 socket J	lead terminal AWG16 781	
connector J1 socket H	lead terminal AWG16 779	
connector J1 socket d	lead terminal AWG16 780	
connector J1 socket S	lead terminal 100	
connector J1 socket T	lead terminal 70	
connector J1 socket R	connector P3 socket C	
connector J1 socket N	connector P4 socket A	182
connector J1 socket P	connector P4 socket B	182
connector J1 socket A	connector P4 socket C	187
connector J1 socket B	connector P4 socket D	187
connector J1 socket L	connector P5 socket A	181
connector J1 socket M		181
connector J1 socket C	connector P5 socket B	187
connector J1 socket D	connector P5 socket C	181
connector J1 socket G	connector P5 socket D	34
connector J1 socket E	connector P6 pin A	187
connector J1 socket F		187
connector J1 socket e	connector P6 pin B	
connector P3 socket B	connector P6 pin C	
connector P2 socket B	lead terminal AWG16 775	
	connector P2 socket C	
	lead terminal AWG16 778	

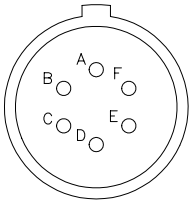
Is continuity present at all points?



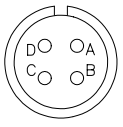
W51
CONNECTOR J1



W51
CONNECTOR P2
CONNECTOR P3



W51
CONNECTOR P4
CONNECTOR P5



W51
CONNECTOR P6

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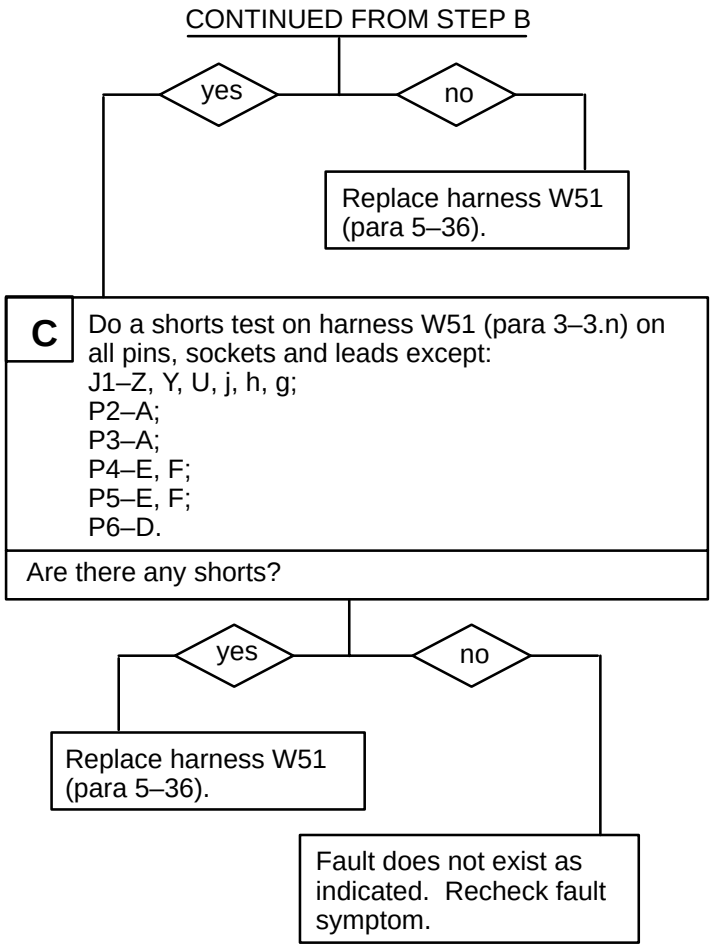
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(20) WIRING HARNESS W51. – CONTINUED



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)

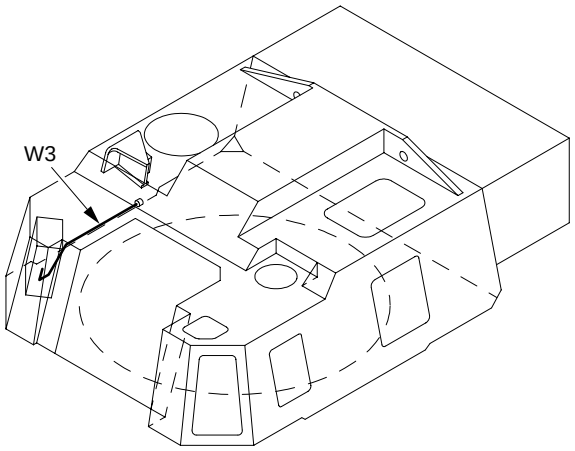
A Visually inspect harness W3 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes

Replace harness W3 (para 8–5).

no



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.

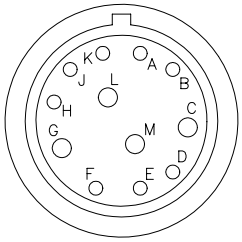
Point 1	Point 2
Connector P1 pin E	Connector P4 socket E
Connector P1 pin F	Connector P4 socket F

Is continuity present at all points?

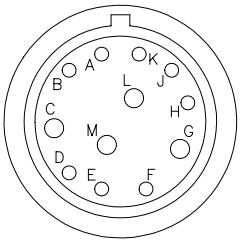
yes

Replace harness W3 (para 8–5).

no



W3
CONNECTOR P1
TO W15 J1



W3
CONNECTOR P4
TO W93 J3

03pc019t

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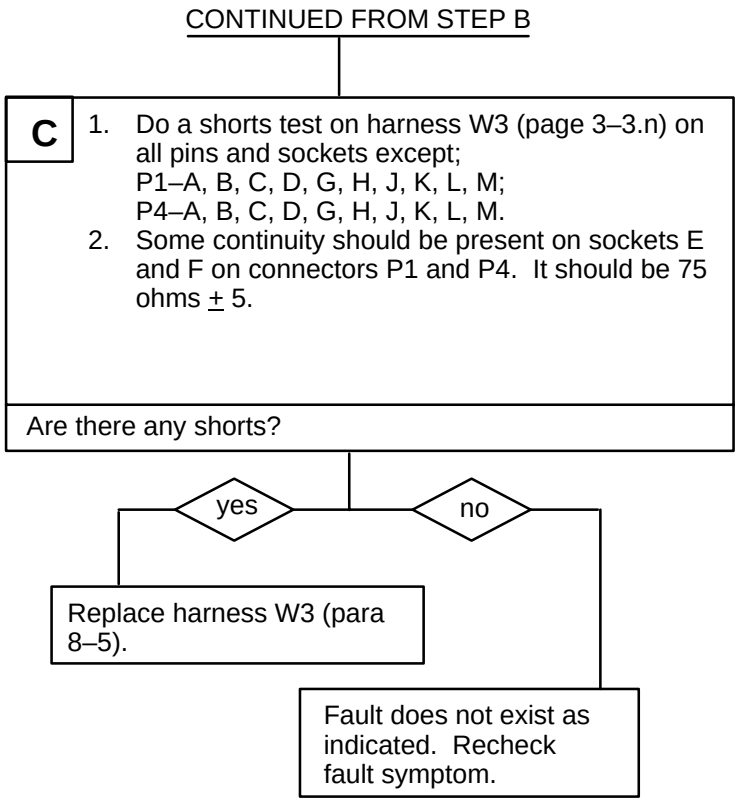
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(21) WIRING HARNESS W3. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(22) WIRING HARNESS W15.

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
Harness guard removed (para 8–12)

A Visually inspect harness W15 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes

Replace harness W15 (para 8–7).

no

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:

Point 1	Point 2
Connector P1 socket E	Connector J1 socket E
Connector P1 socket F	Connector J1 socket F

Is continuity present at all points?

yes

Replace harness W15 (para 8–7).

no

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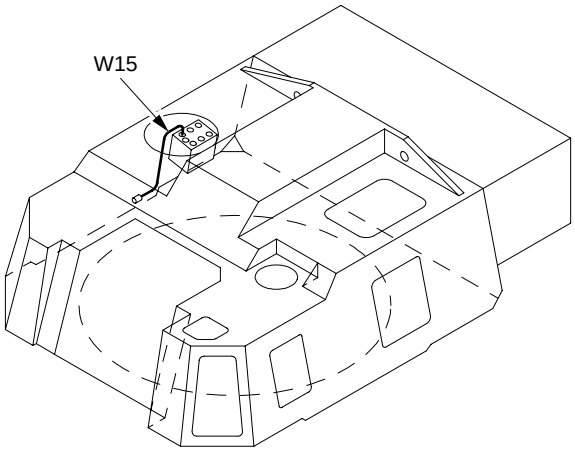
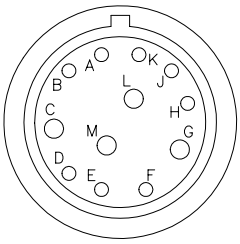
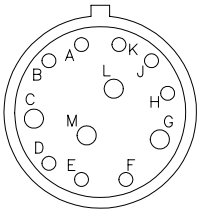




W15
CONNECTOR P1
TO PDIU J3

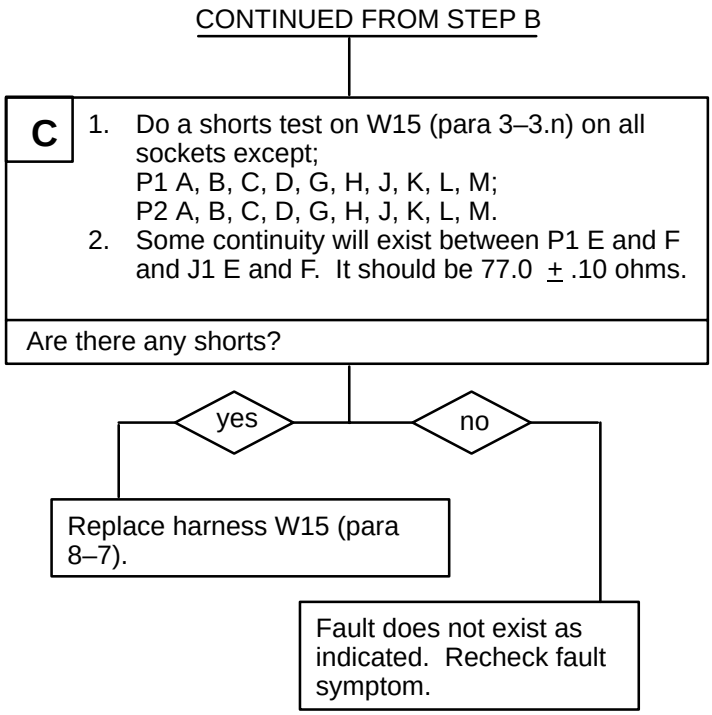


W15
CONNECTOR J1
TO W3 P1

03pc020t

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(22) WIRING HARNESS W15. – CONTINUED



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?

yes → Replace harness W1A (para 8–4).

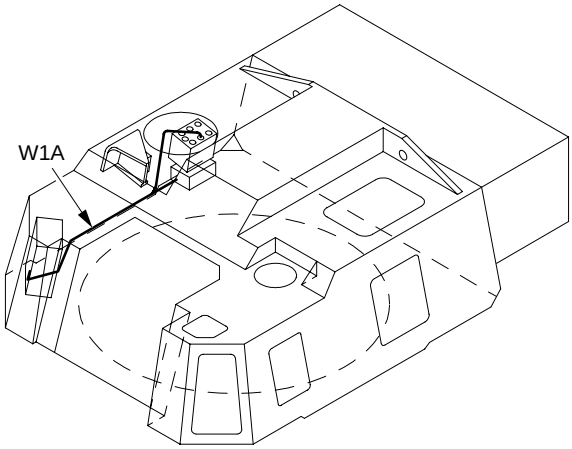
no

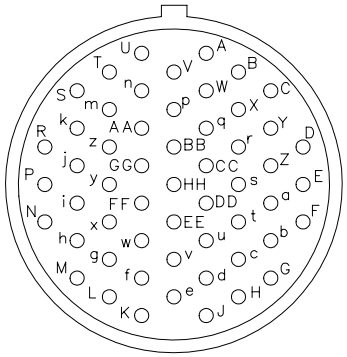
B

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.

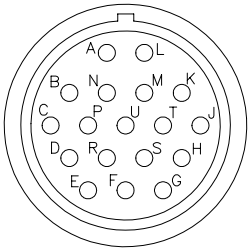
Point 1	Point 2
connector P1 pin d	connector P3 socket A
connector P1 pin e	connector P3 socket B
connector P1 pin f	connector P3 socket C
connector P1 pin g	connector P3 socket D
connector P1 pin h	connector P3 socket E
connector P1 pin i	connector P3 socket F
connector P1 pin j	connector P3 socket 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?

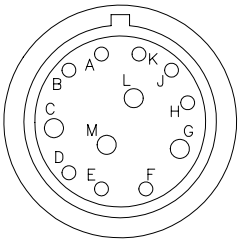




W1A
CONNECTOR P1



W1A
CONNECTOR P3



W1A
CONNECTOR P2

03pc021t

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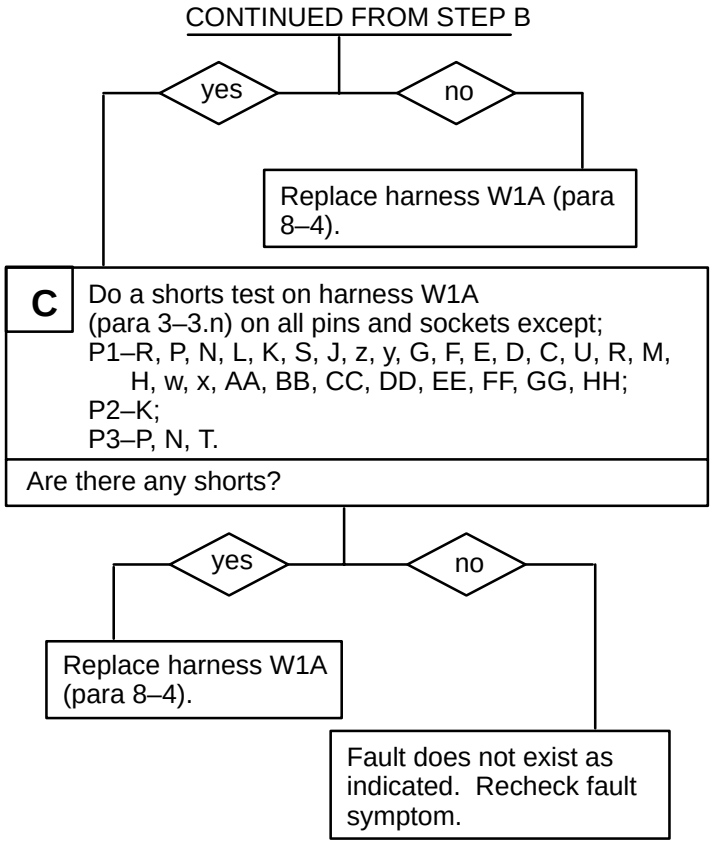
3–3. TROUBLESHOOTING CHART – CONTINUED

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

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

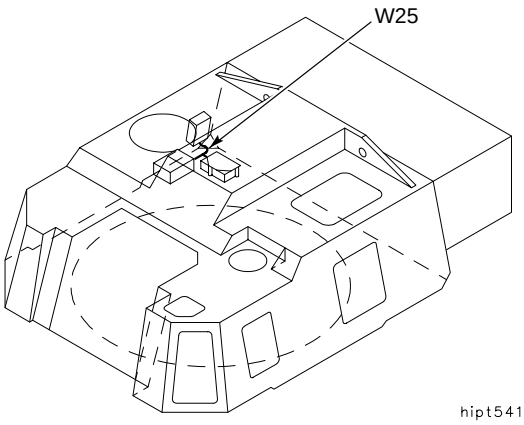
Equipment Condition
PCU power switch OFF (TM 9–2350–314–10)

A Visually inspect harness W25 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes → Replace harness W25 (para 8–10).

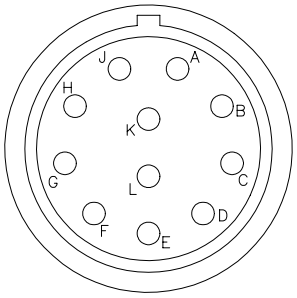
no →



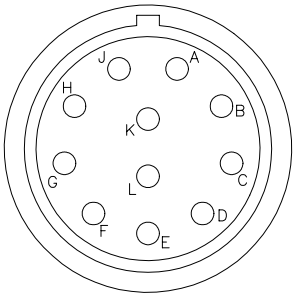
B
1. Disconnect harness W25 leads.
2. Check harness W25 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

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

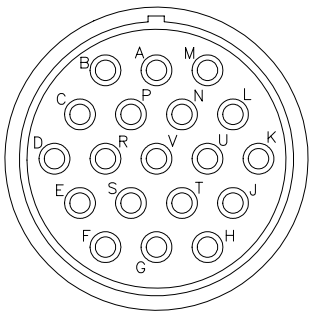
Is continuity present at all points?



W25
CONNECTOR P1
TO AFCS BATTERIES



W25
CONNECTOR P2
TO AFCS BATTERIES



W25
CONNECTOR P3
TO PCU J3

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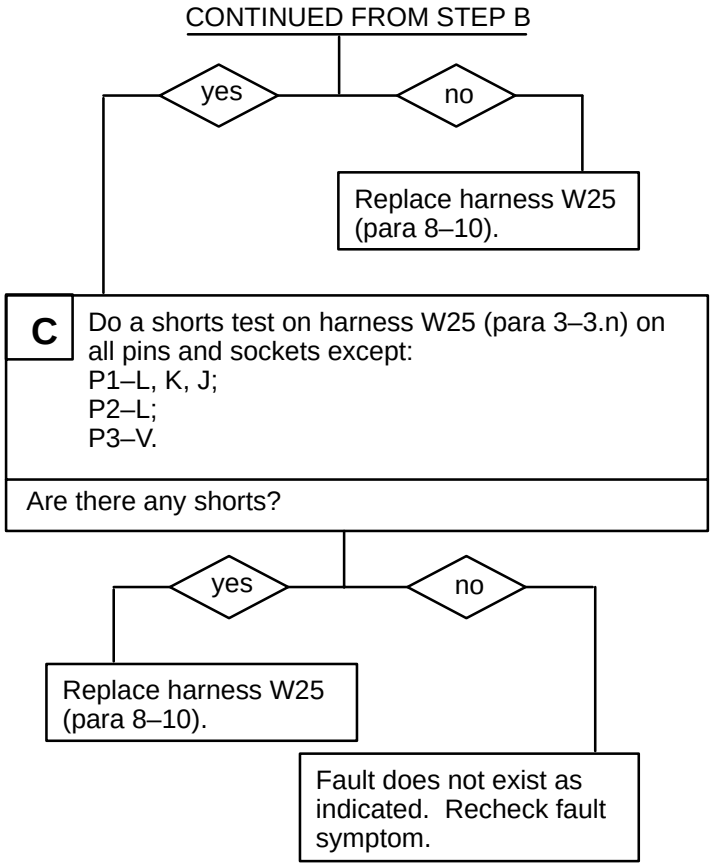
3–3. TROUBLESHOOTING CHART – CONTINUED

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

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
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)

A Visually inspect harness 12576092 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes

Replace harness 12576092 (para 4–7).

no

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?

yes

Replace harness 12576092 (para 4–7).

no

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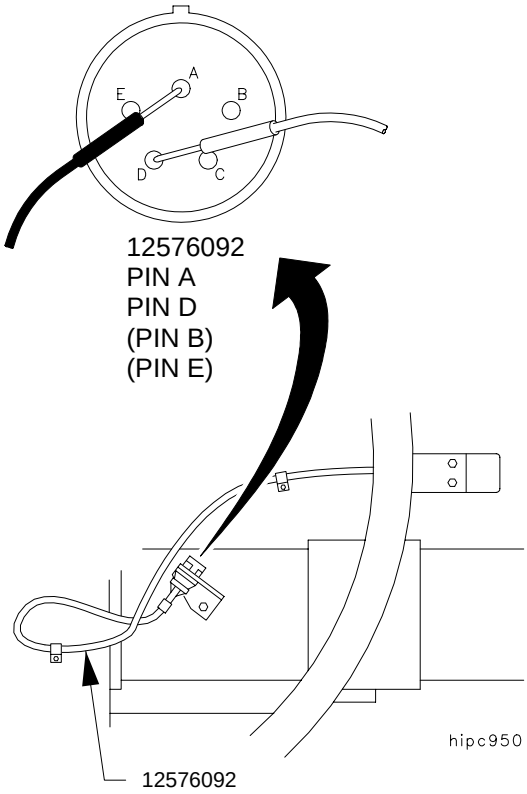
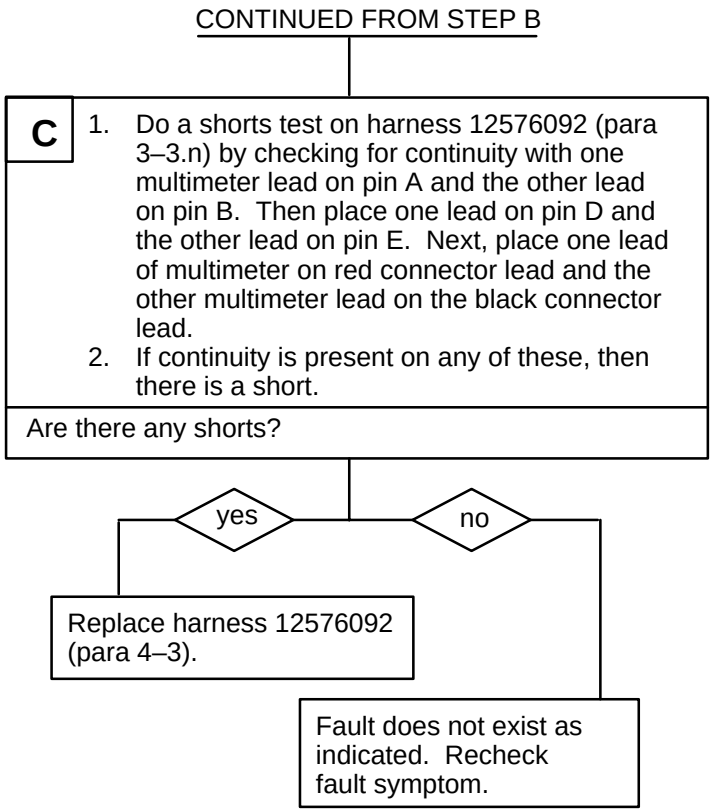


3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(25) WIRING HARNESS 12576092. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(26) WIRING HARNESS W27.

INITIAL SETUP

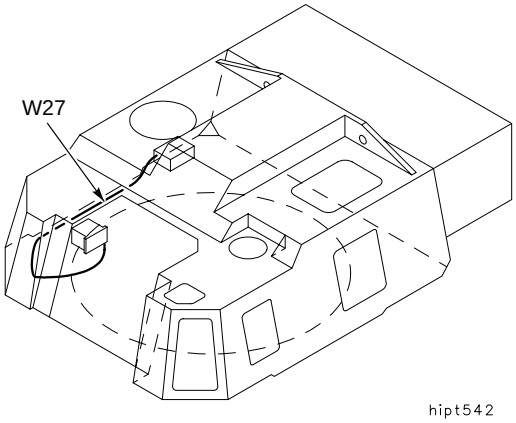
Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Multimeter (item 24, Appx G)
TA1 probe kit (item 42, Appx G)

A Visually inspect harness W27 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

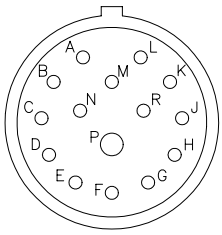
yes → Replace harness W27 (para 8–11).

no

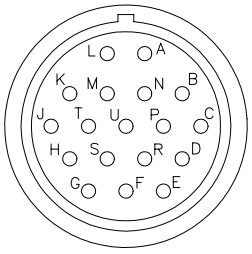


B
1. Disconnect the following harness W27 connectors:
   P1 from DRUH
   P2 from PCU.
2. Check harness W27 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table:

Point 1	Point 2
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?

yes → Replace harness W27 (para 8–11).

no

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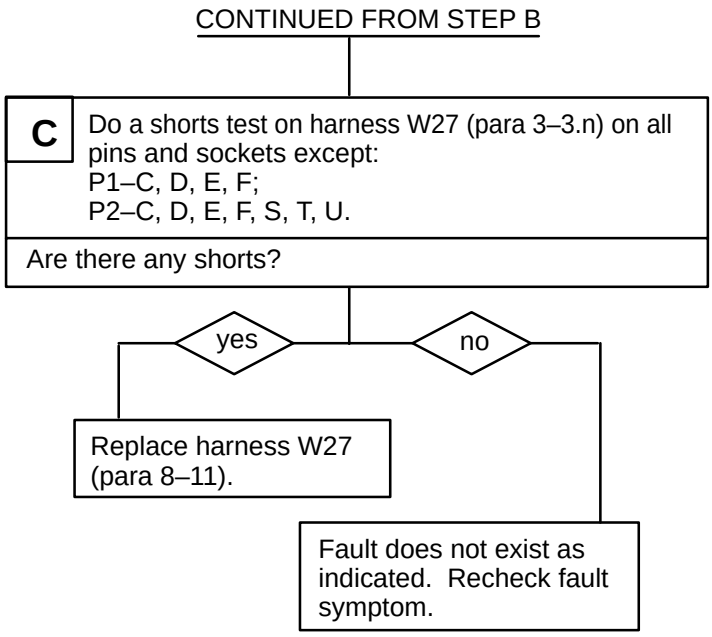
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(26) WIRING HARNESS 27. – CONTINUED



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 (SC 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?

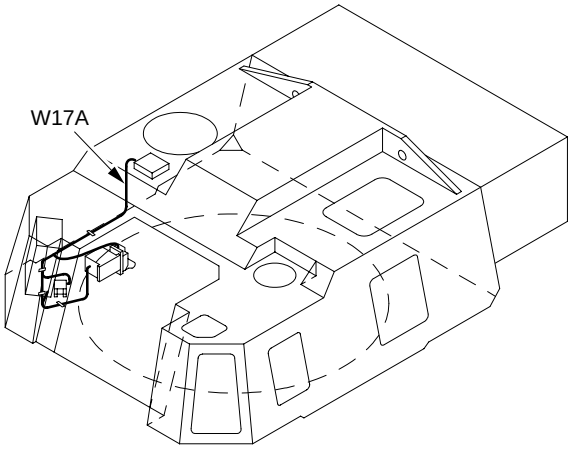
yes → Replace harness W17A (para 8–8).

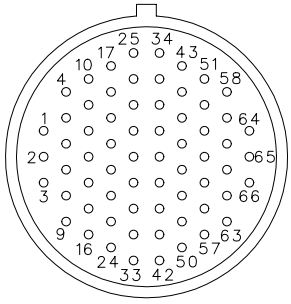
no

B

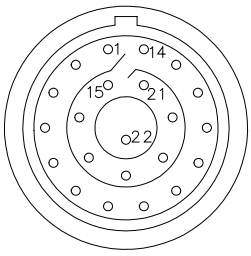
1. Disconnect the following harness W17A connectors:
   P1 from DRUH J1,
   P2 from VMS modem cab side J1,
   P3 from ACU J2,
   P4 from PLGR harness 12967970,
   P5 from BCIS.
2. Check harness W17A connectors for continuity by placing one multimeter lead on point 1 and other lead on point 2, 3, 4, or 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	–

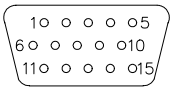




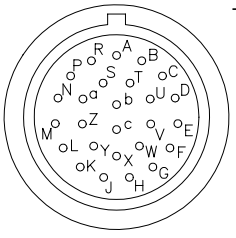
W17A
CONNECTOR P1
TO DRUH J1



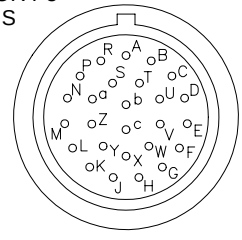
W17A
CONNECTOR P4
TO PLGR HARNESS
12967970



W17A
CONNECTOR P5
TO BCIS



W17A
CONNECTOR P2
TO VMS CAB
MODEM J1



W17A
CONNECTOR P3
TO ACU J2

03pc022t

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED

(27) WIRING HARNESS W17A. – CONTINUED

B – 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?

yes

no

Replace harness W17A (para 8–8).

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?

yes

no

Replace harness W17A (para 8–8).

Fault does not exist as indicated. Recheck fault symptom.

END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(28) WIRING HARNESS W21.

INITIAL SETUP

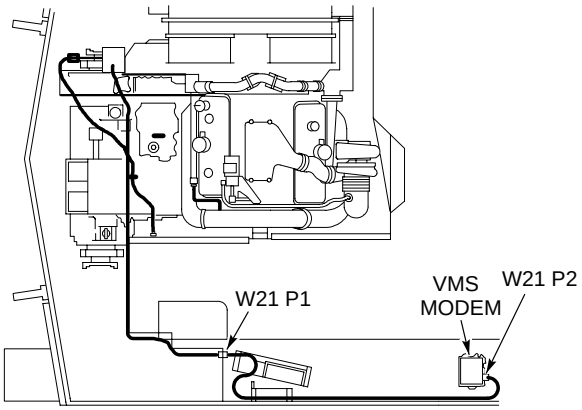
Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Multimeter (item 24, Appx G)
TA1 probe kit (item 42, Appx G)

A Visually inspect harness W21 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes → Replace harness W21 (para 22–6).

no →



22hip182

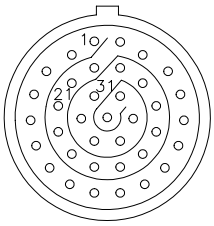
B

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.

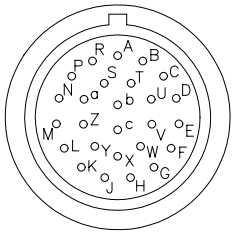
Point 1	Point 2	Point 3
connector P1 socket 5	connector P2 pin A	–
connector P1 socket 6	connector P2 pin B	–
connector P1 socket 3	connector P2 pin C	–
connector P1 socket 4	connector P2 pin D	–
connector P1 socket 9	connector P2 pin E	connector P2 pin L
connector P1 socket 10	connector P2 pin F	connector 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?

CONTINUED ON NEXT PAGE



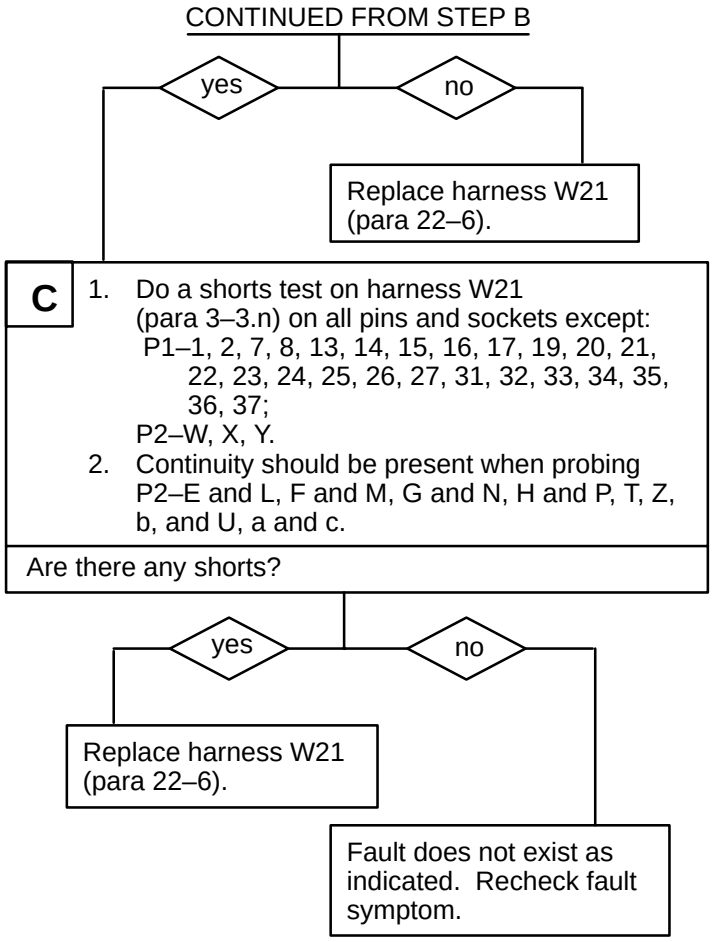
W21
CONNECTOR P1
TO DRIVER'S BULKHEAD



W21
CONNECTOR P2
TO VMS MODEM

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(28) WIRING HARNESS W21. – CONTINUED



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?

yes → Replace harness W28 (para 22–7).

no

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:

Point 1	Point 2
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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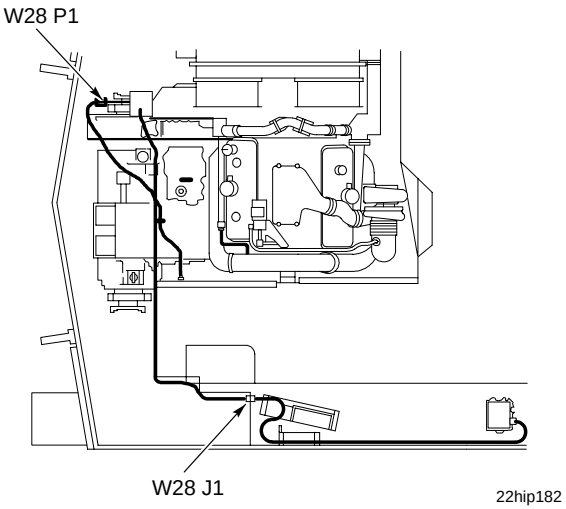
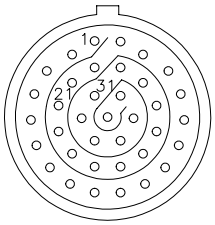
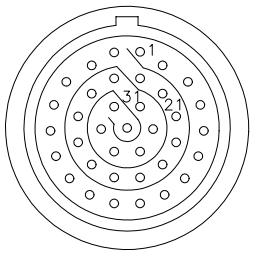




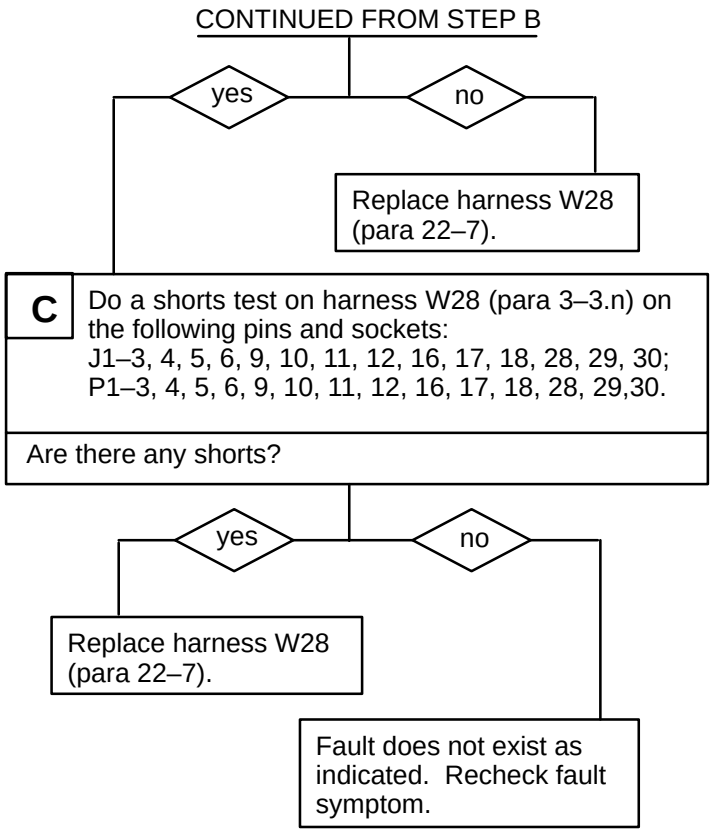
W28
CONNECTOR P1



W28
CONNECTOR J1

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 W12.

INITIAL SETUP

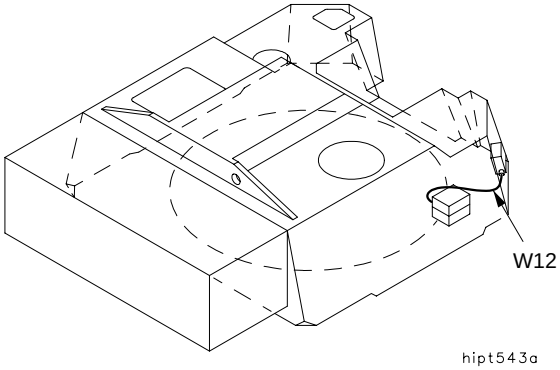
Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Multimeter (item 24, Appx G)
TA1 probe kit (item 42, Appx G)

A Visually inspect harness W12 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

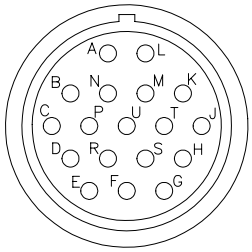
yes → Replace harness W12 (para 21–7).

no

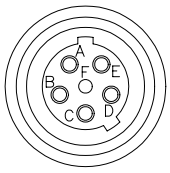


B
1. Disconnect the following harness W12 connectors:
   W12 P1 from ACU J3
   W12 J1 from Radio Rack
2. Check harness W12 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
connector P1 socket 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



W12 CONNECTOR P1



W12 CONNECTOR J1

Is continuity present at all points?

yes

no → Replace harness W12 (para 21–7).

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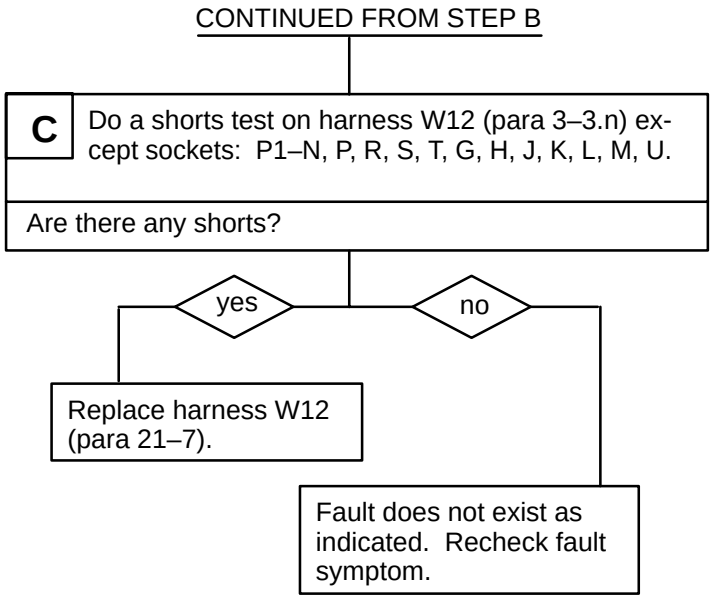
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(30) WIRING HARNESS W12. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(31) WIRING HARNESS W26.

INITIAL SETUP

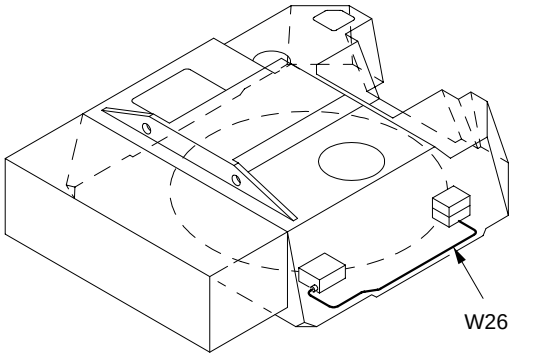
Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Multimeter (item 24, Appx G)
TA1 probe kit (item 42, Appx G)

A Visually inspect harness W26 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes → Replace harness W26 (para 21–7).

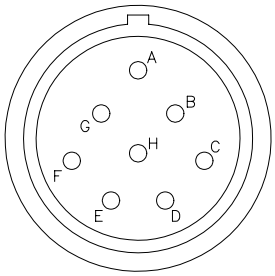
no



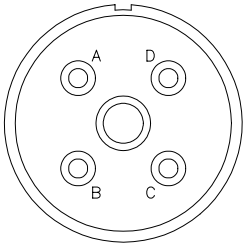
B
1. Disconnect the following harness W26 connectors:
   W26 P1 from PCU J7
   W26 P2 from Radio Rack
2. Check harness W26 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

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

Is continuity present at all points?



W26 CONNECTOR P1



W26 CONNECTOR P2

yes → Replace harness W26 (para 21–7).

no

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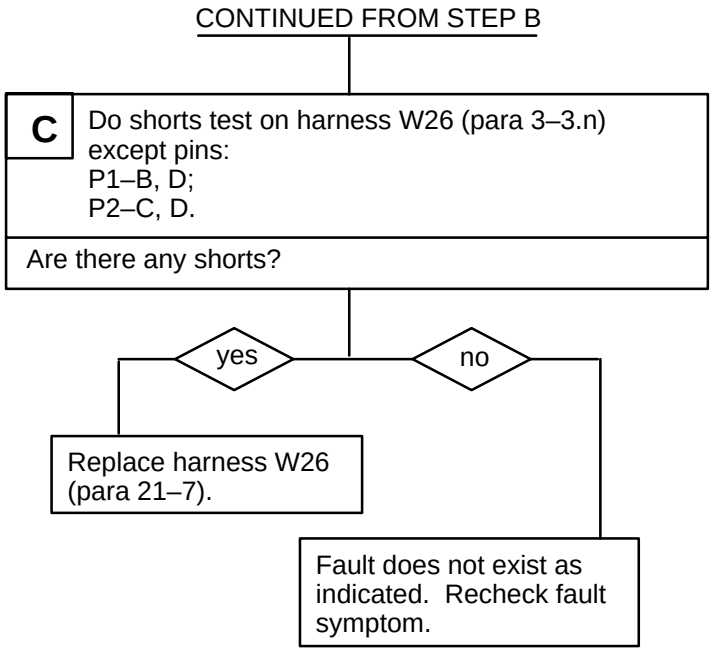
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(31) WIRING HARNESS W26. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(32) WIRING HARNESS W10.

INITIAL SETUP

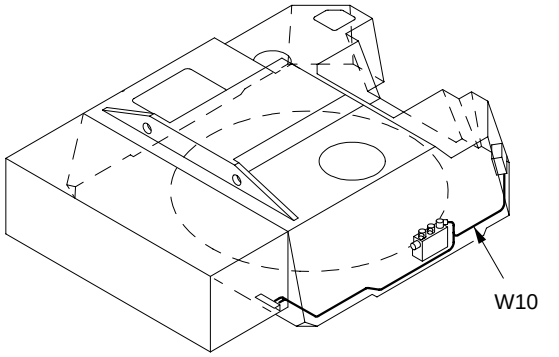
Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Multimeter (item 24, Appx G)
TA1 probe kit (item 42, Appx G)

A Visually inspect harness W10 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes → Replace harness W10 (para 21–8).

no



hipt543a

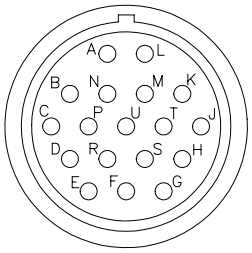
B
1. Disconnect the following harness W10 connectors:
   W10 P1 from ACU J4;
   W10 P2 from Intercom.
2. Check harness W10 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
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

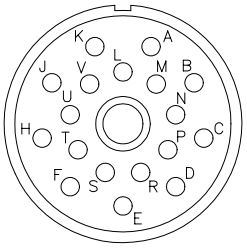
Is continuity present at all points?

yes

no → Replace harness W10 (para 21–8).



W10
CONNECTOR P1



W10
CONNECTOR P2

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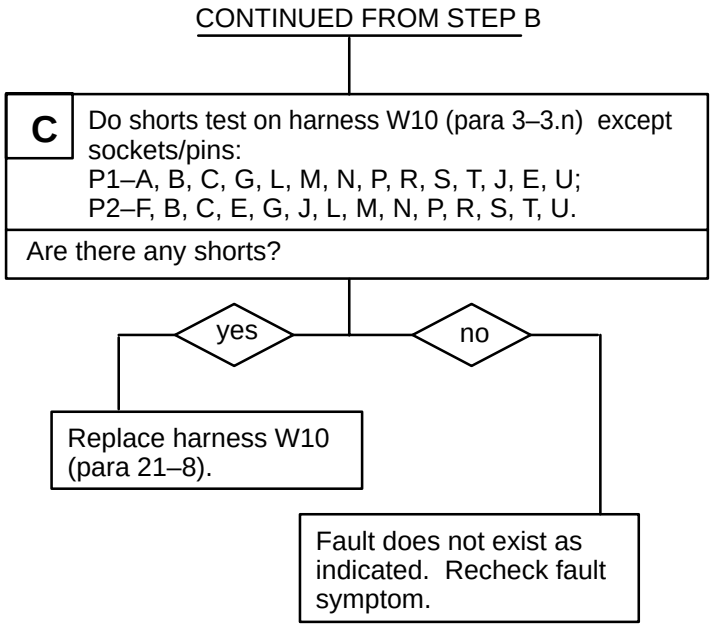
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(32) WIRING HARNESS W10. – CONTINUED



END OF TASK

3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(33) WIRING HARNESS 12940911.

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
Cover for brush block 2 removed (para 23–2)

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?

yes → Replace harness 12940911 (para 5–38).

no →

B

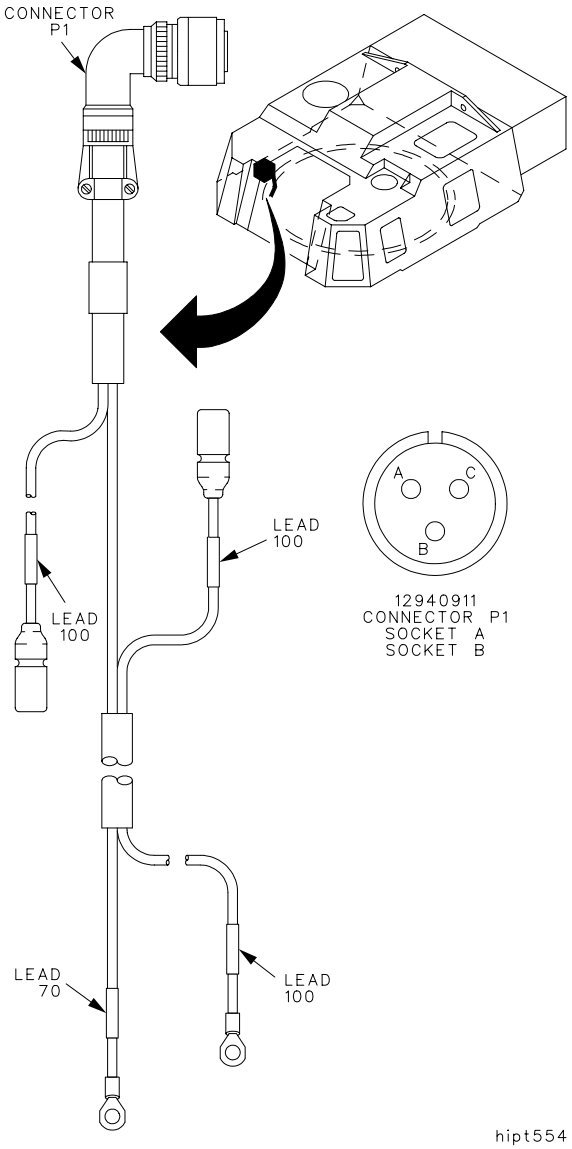
1. Disconnect all harness 12940911 connectors and leads.
2. Check harness 12940911 for continuity by placing one multimeter lead on point 1 and other lead on point 2, as shown in this table.

Point 1	Point 2
Socket A	Lead 100
Socket B	Lead 70
Lead 100	Lead 100

Is continuity present at all points?

yes →

no → Repair or replace harness 12940911 (para 5–38).



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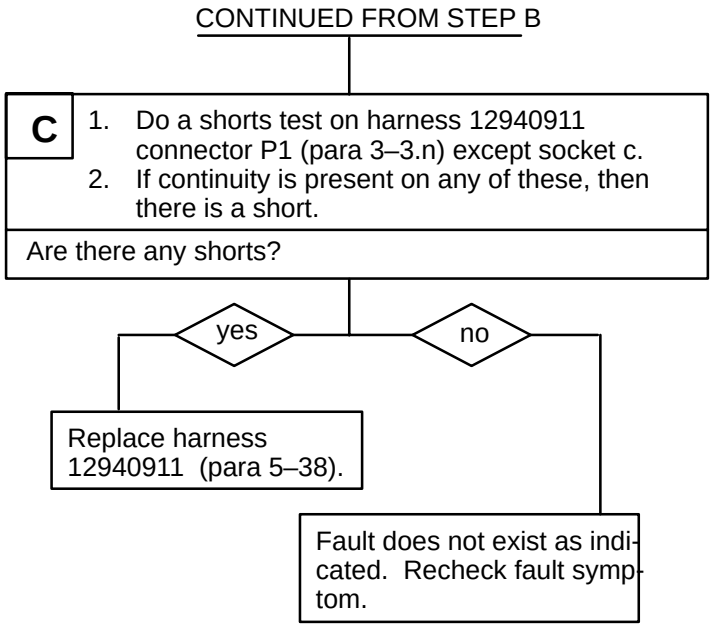
3–3. TROUBLESHOOTING CHART – CONTINUED

n. WIRING HARNESS CHECK – CONTINUED	(33) WIRING HARNESS 12940911. – CONTINUED



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 (SC 5180–95–A12)
Multimeter (item 24, Appx G)
TA1 probe kit (item 42, Appx G)

A Visually inspect harness 12967942 for any cuts, breaks, kinks, or missing segments.

Are there any cuts, breaks, kinks, or missing segments?

yes → Replace harness 12967942 (para 22–11).

no

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?

yes

no → Replace fuse (TM 9–2350–314–10).

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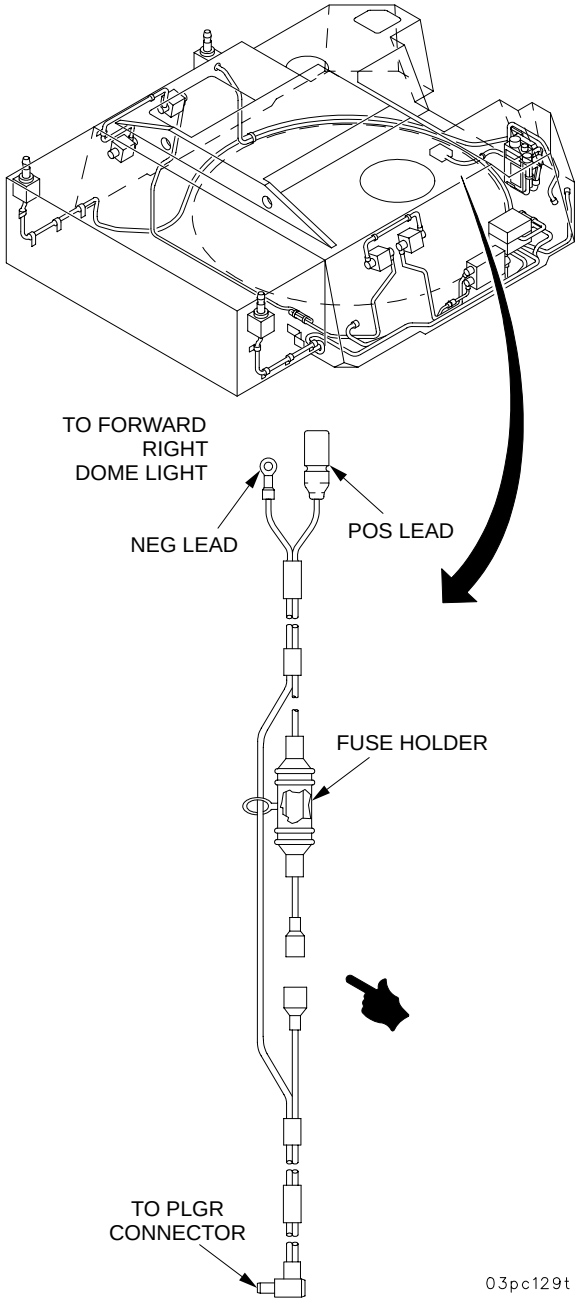


3–3. TROUBLESHOOTING CHART – CONTINUED

o. PRECISION LIGHTWEIGHT GPS (PLGR) – CONTINUED	(1) NO POWER TO PRECISION LIGHTWEIGHT GPS (GLOBAL POSITIONING SYSTEM) RECEIVER (PLGR). – CONTINUED

CONTINUED FROM STEP B

C

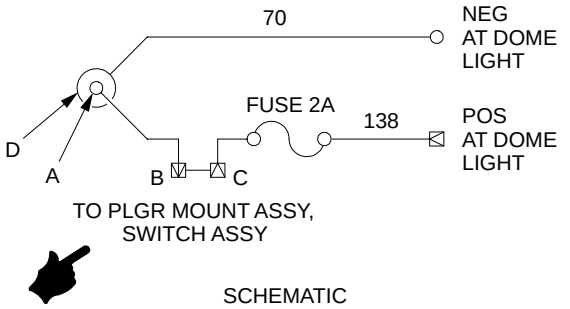
1. Disconnect harness 12967942 connector and leads.
2. Check harness for continuity by placing one multimeter lead on point one and the other lead on point two, as shown in this table.

Point 1	Point 2
A	B
C	Pos Lead
D	Neg lead

Is continuity present at all points?

yes / no

Repair or replace harness 12967942 (para 22–11).



SCHEMATIC

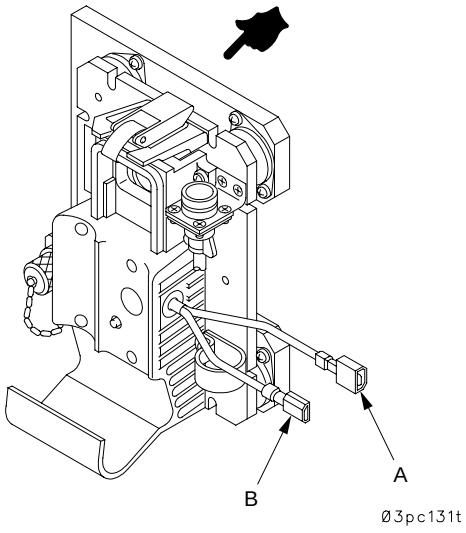
D

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?

yes / no

Replace PLGR mount assembly.



E

1. Do shorts test on harness 12967942 (para 3–3.n).
2. If continuity is present on any of these, then there is a short.

Are there any shorts?

yes / no

Replace harness 12967942 (para 22–11).

Go to PLGR troubleshooting (TM 11–5825–291–13).

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 (SC 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?

yes → Replace harness W93A (para 8–12).

no →

B

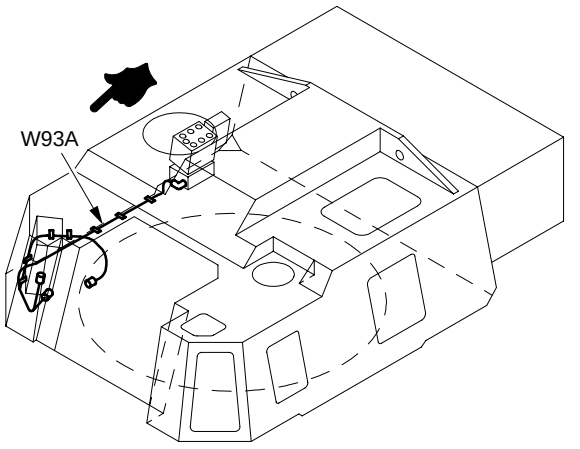
1. Disconnect the following harness W93A connectors:
   - W92 P2 or 1553 termination connector from W93A J2
   - W93A P6 from PCU J6
   - W93A P3 from ACU J8
   - W93A J3 from W3 P4
2. Check harness W93A for continuity by placing one multimeter lead on point 1 and other lead on points 2, 3, and 4 (one at a time), as shown in this table.

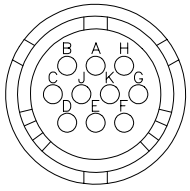
Point 1	Point 2	Point 3	Point 4
Connector J2 pin A	Connector P6 socket A	–	–
Connector J2 pin B	Connector P6 socket B	–	–
Connector J2 pin E	–	–	–
Connector J2 pin F	–	–	–
		Connector P3 socket E	Connector J3 socket E
		Connector P3 Socket F	Connector J3 socket F

Is continuity present at all points?

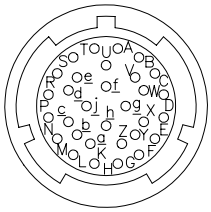
yes → Replace harness W93A (para 8–12).

no →

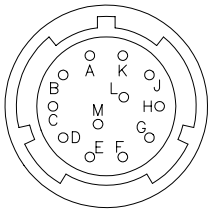




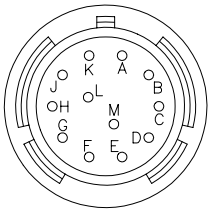
W93A CONNECTOR J2 TO W92 P2 OR 1553 TERMINATION CONNECTOR



W93A CONNECTOR P6 TO PCU J6



W93A CONNECTOR P3 TO ACU J8



W93A CONNECTOR J3 TO W3 P4

03pc023t

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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?

yes

Replace harness W93A (para 8–12).

no

Refer to TM 9–1290–365–14&P for troubleshooting the M93 radar transceiver.

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 (SC 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 tranceiver is installed and wiring harness W92 P2 connector was installed, troubleshoot W92 wiring harness in accordance with TM 9–1290–365–14&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 ± 5.

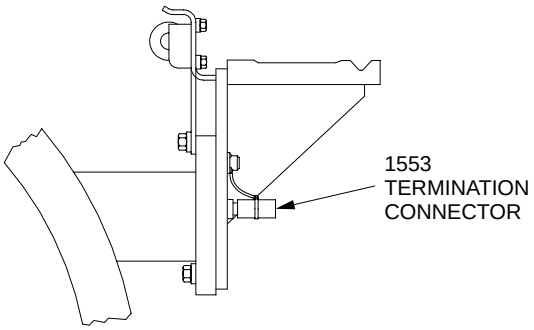
Is continuity present?

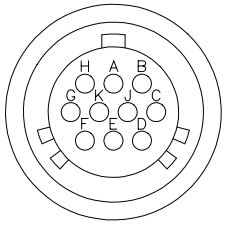
yes

Fault does not exist as indicated. Recheck fault symptom.

no

Replace 1553 termination connector (para 8–13).





1553 TERMINATION CONNECTOR P1

END OF TASK

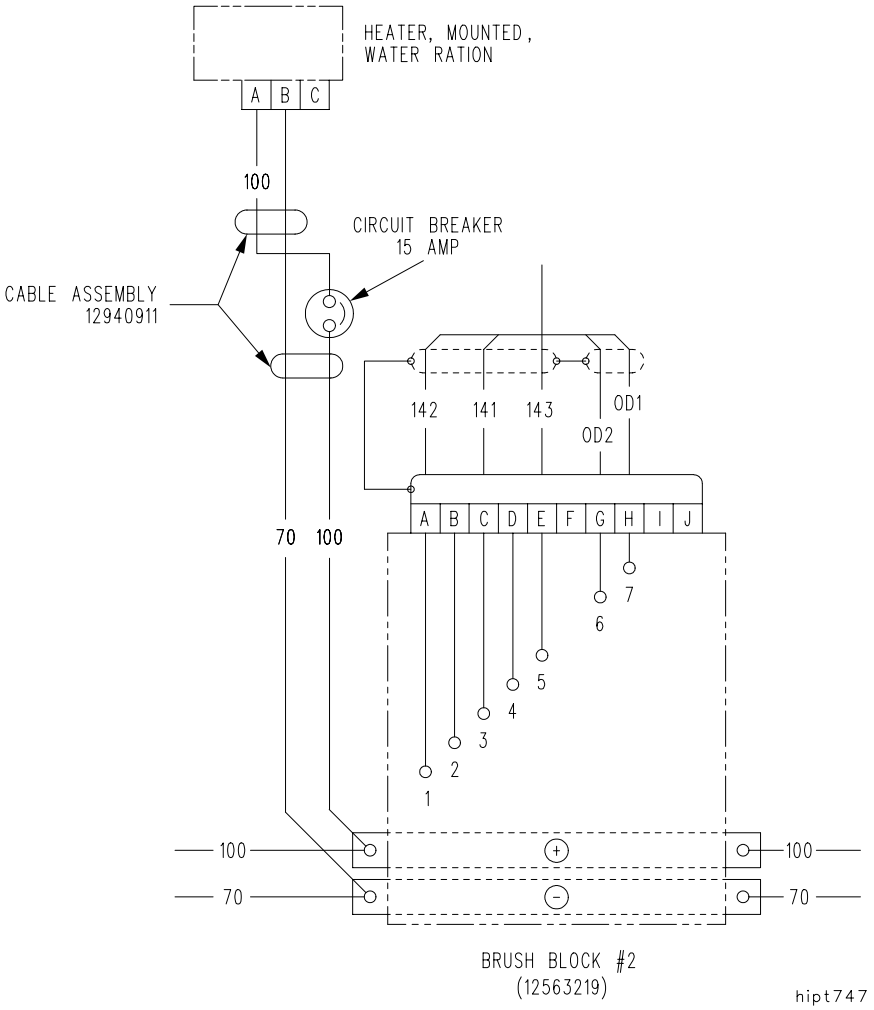
hipt559

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?

yes

Go to TM 10–7310–241–12&P and troubleshoot Mounted Water Ration Heater.

no

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?

yes

Perform harness check on harness 12940911 (para 3–3.n(33)).

no

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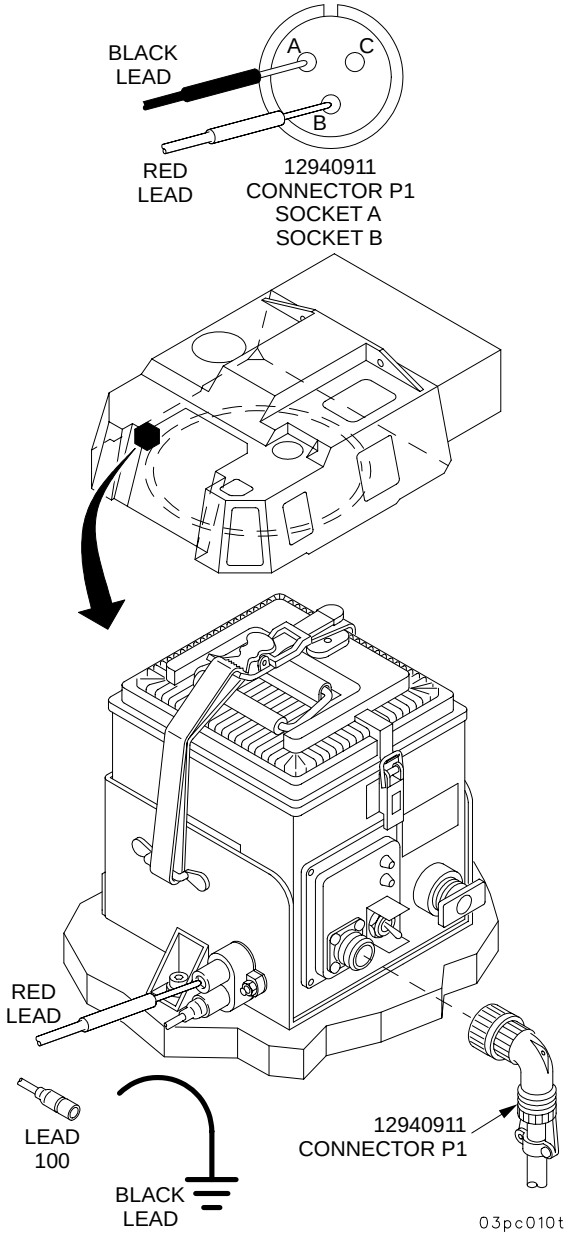


3–3. TROUBLESHOOTING CHART – CONTINUED

q. MOUNTED WATER RATION HEATER – CONTINUED	(1) MOUNTED WATER RATION HEATER (MWRH) WILL NOT OPERATE. – CONTINUED

CONTINUED FROM STEP B

C

1. Turn vehicle MASTER power switch OFF (TM 9–2350–314–10).
2. Disconnect harness 12940911 (24V) lead 100 from circuit breaker.
3. Turn vehicle MASTER power switch ON (TM 9–2350–314–10).
4. Place red multimeter lead in harness 12940911 (24V) connector lead 100 and black lead to ground.
5. Check for voltage.

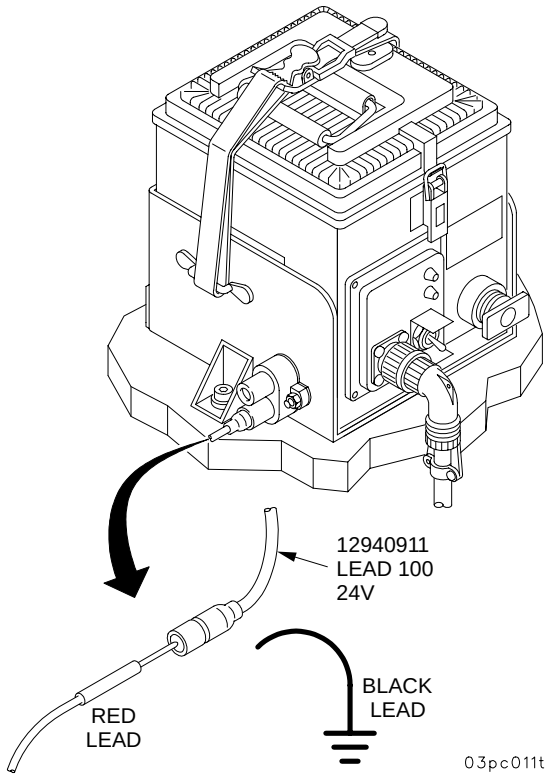
Is voltage present?

yes

Replace circuit breaker (para 5–38).

no

Perform harness check on harness 12940911 (para 3–3.n(33)).



END OF TASK

CHAPTER 4
CANNON AND MOUNT

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 (SC 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).

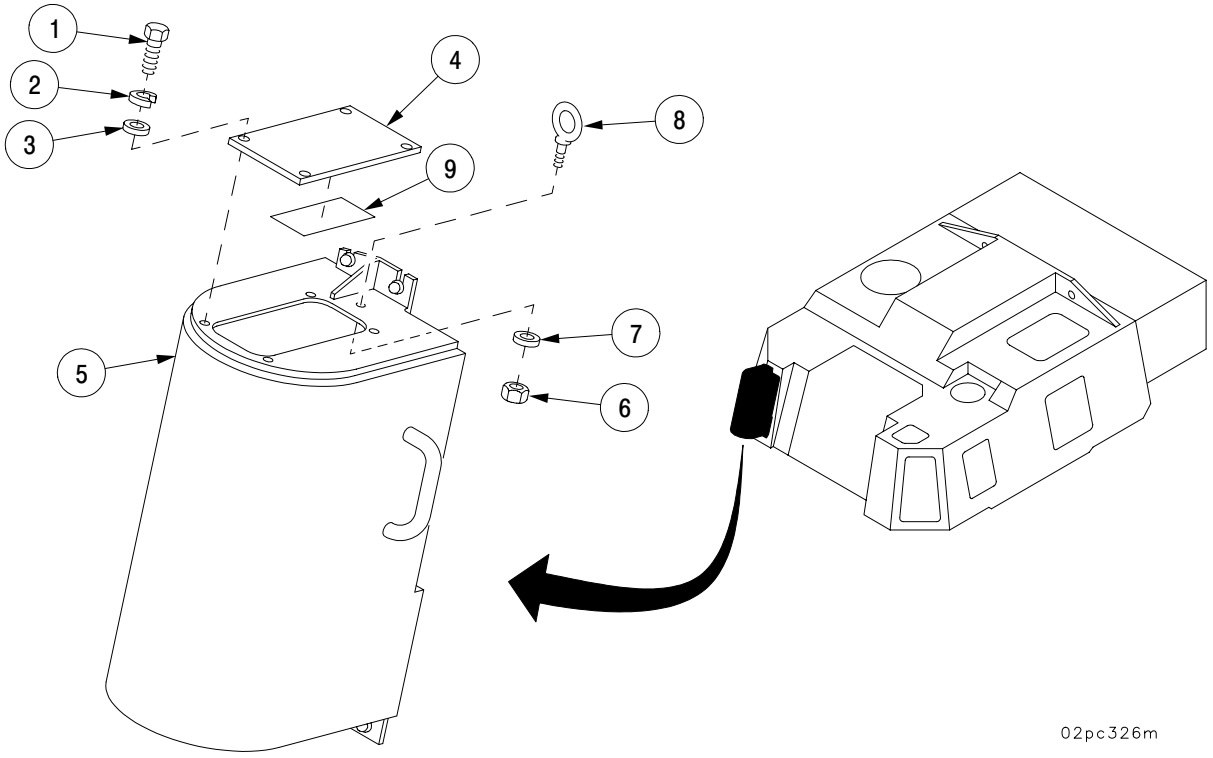
3 Remove label (9), if damaged (para 2–8).

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).



4–2 REPLENISHER ACCUMULATOR ASSEMBLY.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Drain pan (item 26, Appx G)
■ Torque wrench (item 55, Appx G)

Materials/Parts
Hydraulic fluid (item 50, Appx C)
Dust protective plug (item 66, Appx C)
Preformed packings (2) (item 88, Appx F)
Cotter pins (4) (item 155, Appx F)
Sealing compound (item 42, Appx C)
■ Sealing compound (item 46.1, Appx C)
Primer (item 67, Appx C)

Equipment Conditions
Hydraulic pressure discharged (TM 9–2350–314–10)

Personnel Required
Two

a. Removal.

WARNING

- Always wear safety glasses when working on hydraulic system. If fluid gets in eyes, flush immediately with water and notify medical personnel.
- Replenisher accumulator shield is heavy. Use caution when removing shield to avoid personnel injury.

CAUTION

All hydraulic lines and ports must be capped to prevent contaminants from entering the hydraulic system and causing internal damage to hydraulic components.

4–2 REPLENISHER ACCUMULATOR ASSEMBLY – CONTINUED

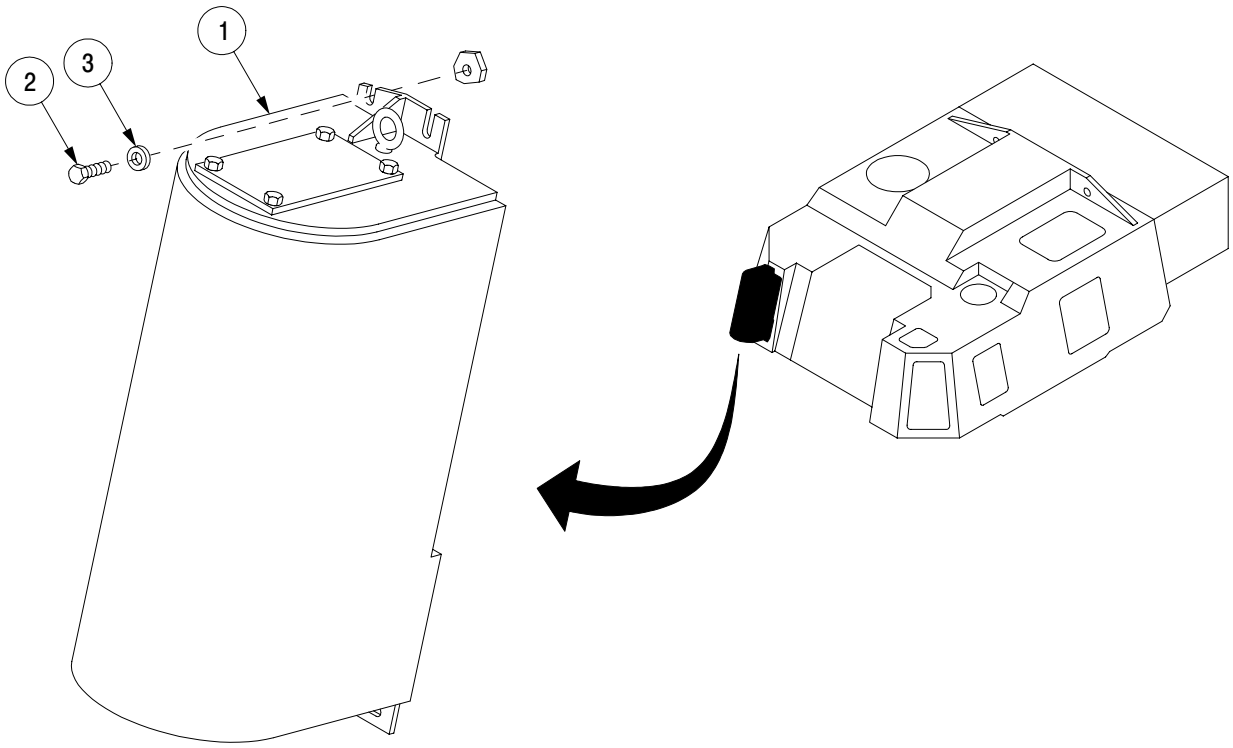
a. Removal – Continued

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).

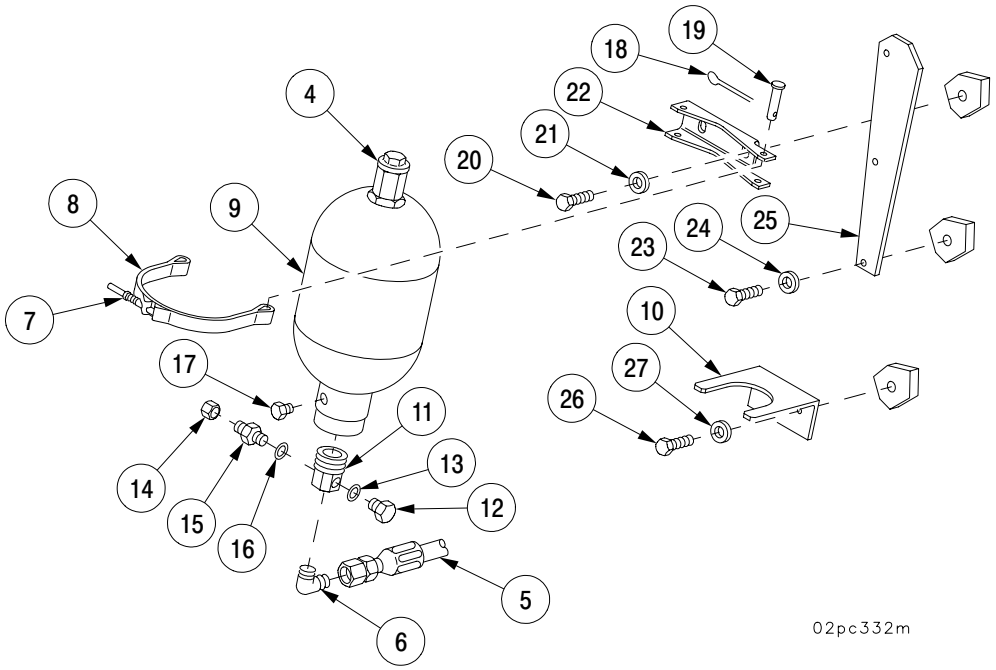
10 Remove plug (17) from replenisher accumulator (9).

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).



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.

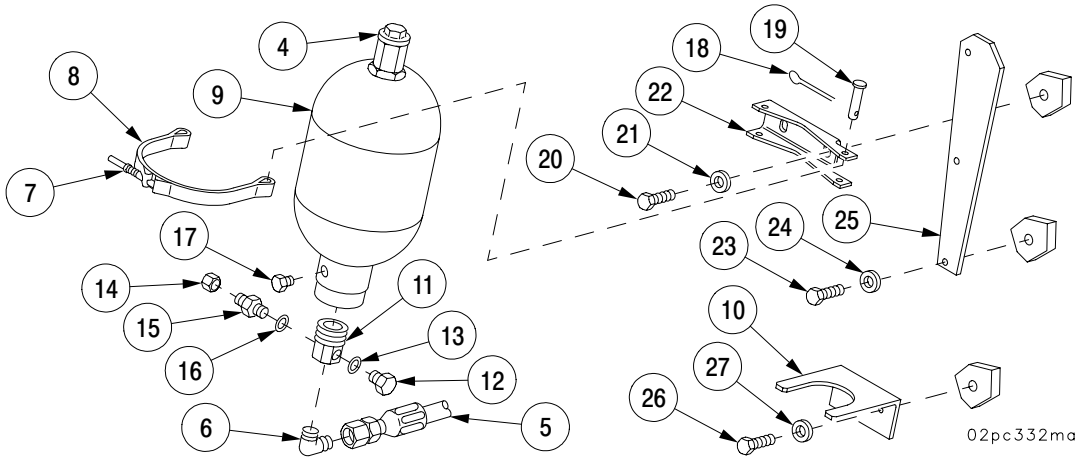
11 Install elbow (6) on adapter (11). Position elbow (6) 180 degrees ± 90 degrees from valve (15).

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).



4–2 REPLENISHER ACCUMULATOR ASSEMBLY – CONTINUED

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.

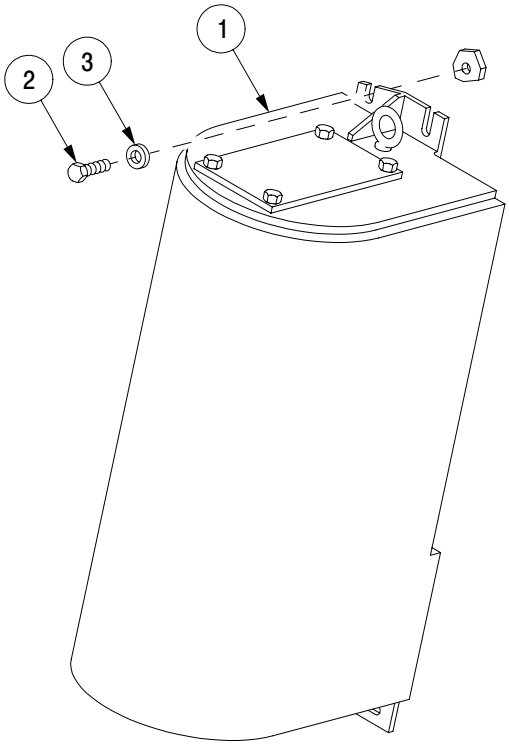
15.1 Apply sealing compound (item 46.1, Appx C) to aluminum/steel interface of shield (1).

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).



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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
Lockwasher (5) (item 132, Appx F)
Lockwasher (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)

a. Removal.

1 Remove four screws (1), four lockwashers (2), four flat washers (3), and dummy connector (4) from bracket assembly (5). Discard lockwashers.

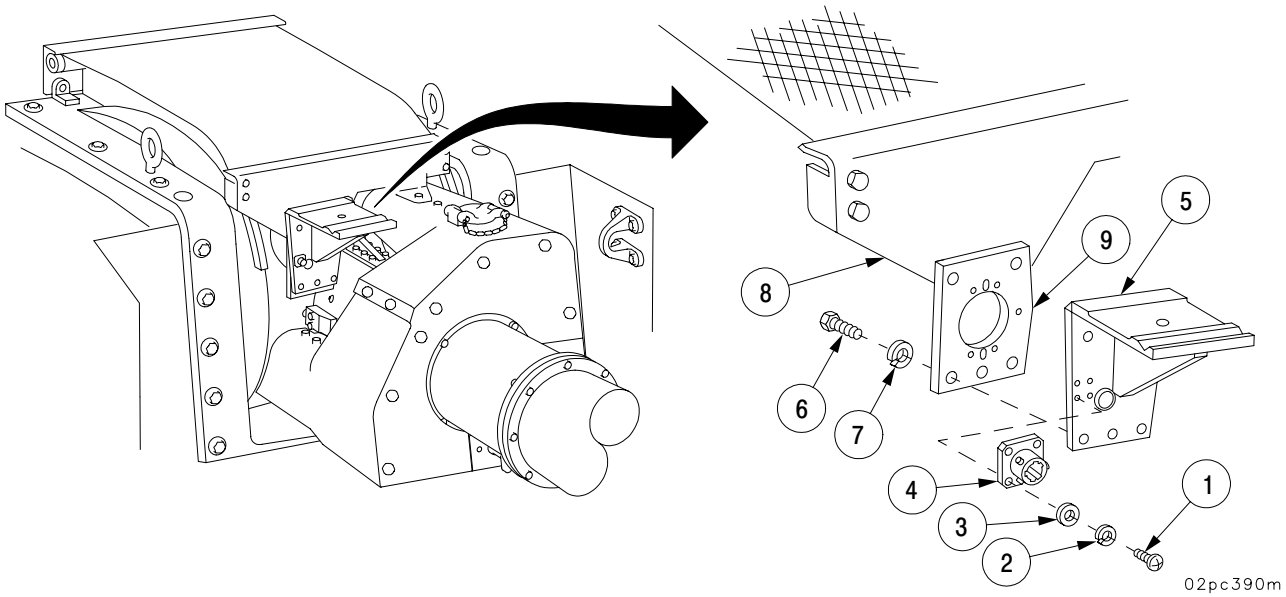
2 Remove five screws (6) and five lockwashers (7) securing bracket assembly (5) to curtain support (8) and mount (9). Discard lockwashers.

3 Remove bracket assembly (5).

b. Installation.

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).



4–4 HOSE 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)
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

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).

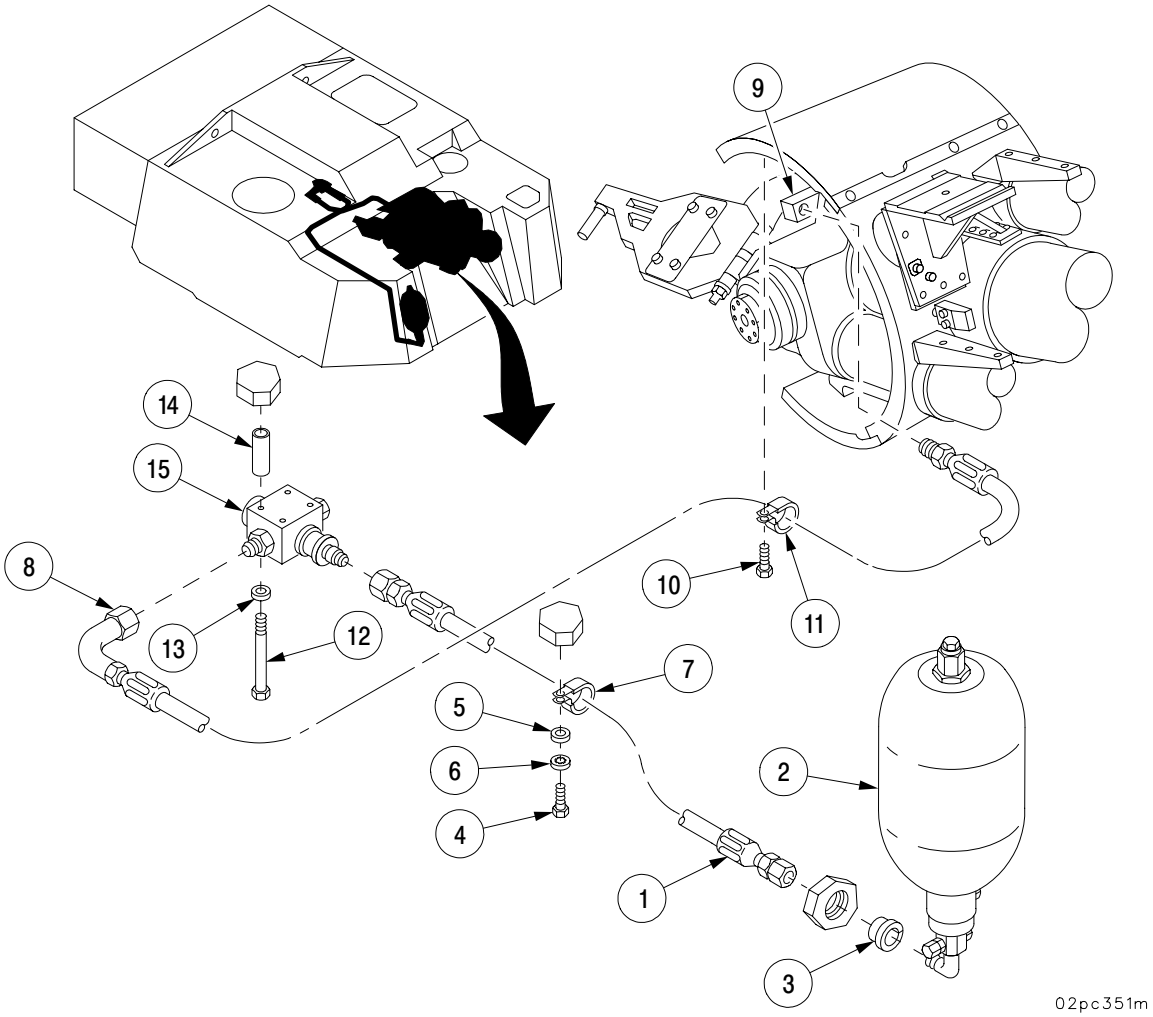
3 Feed hose (1) through cab wall.

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).



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).

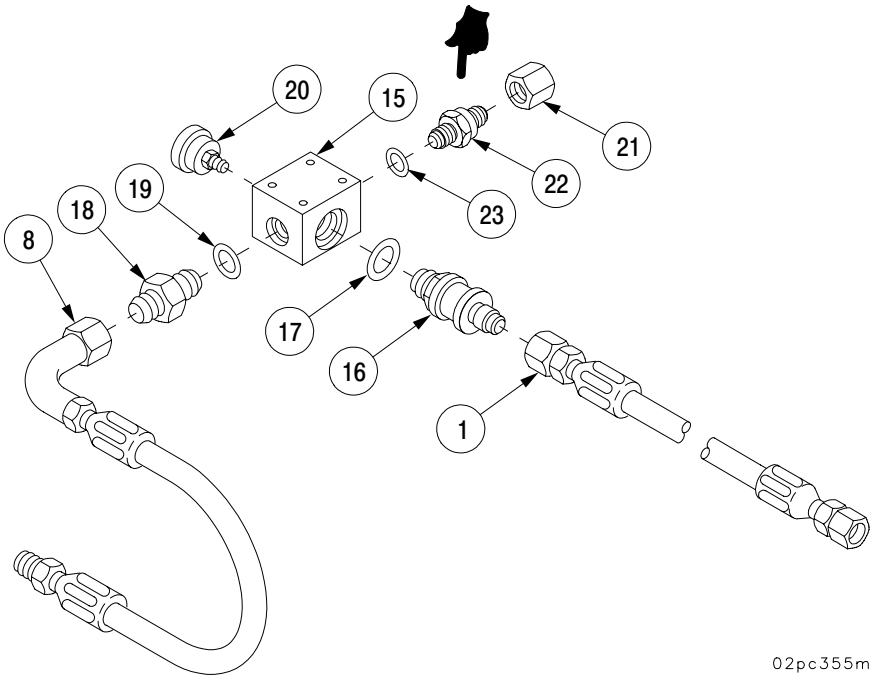
2 Install gage (20) in manifold (15).

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).



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).

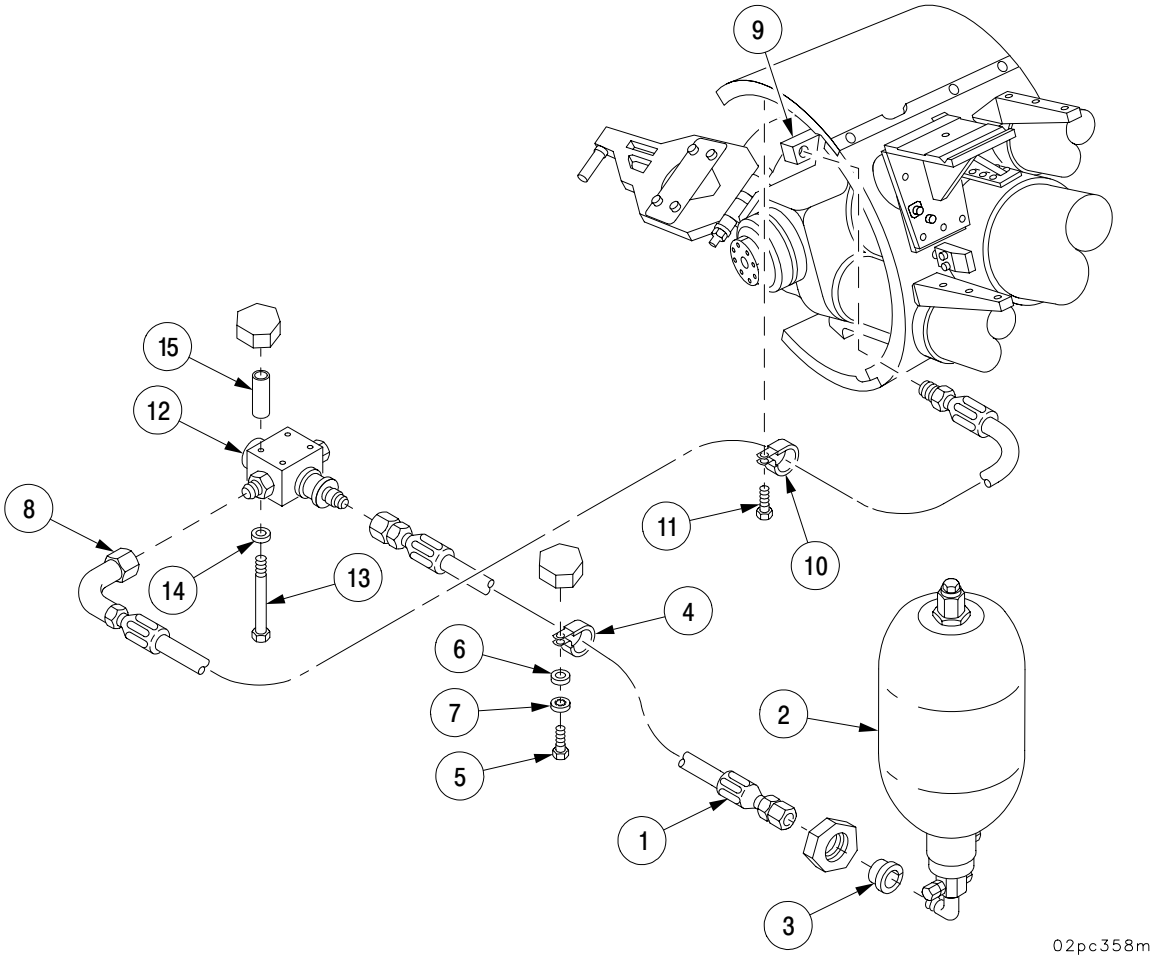
6 Feed hose (1) through cab wall.

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).



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)

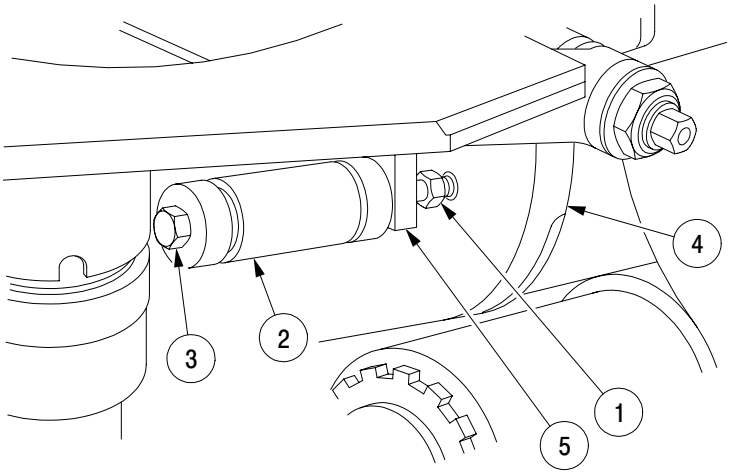
a. Removal.

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).



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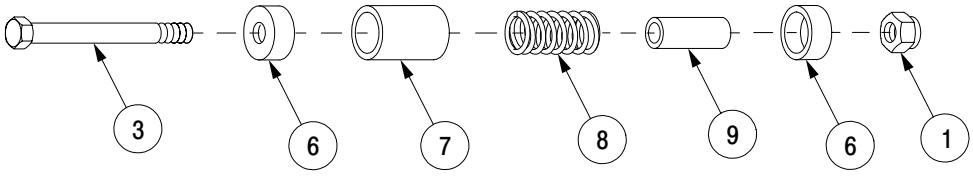
b. Disassembly.

Remove jamnut (1), two seats (6), limit stop (7), helical spring (8), and spacer (9) from screw (3).



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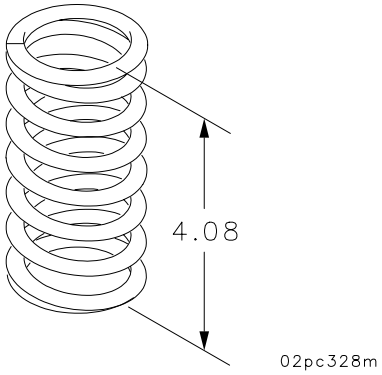
4–5 CAM DAMPER ASSEMBLY – CONTINUED

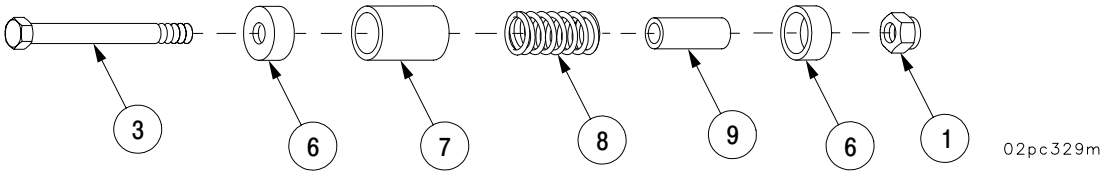
c. Inspection.

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).



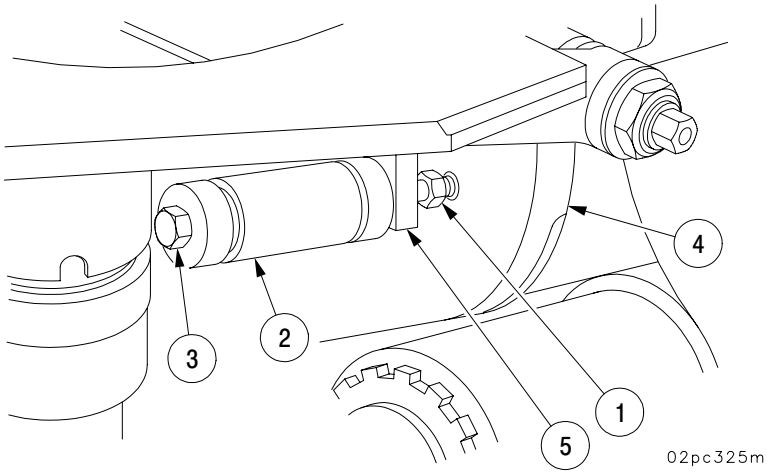
e. Installation.

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).



4–6 BREECH CAM.

This task covers: Adjustment

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

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

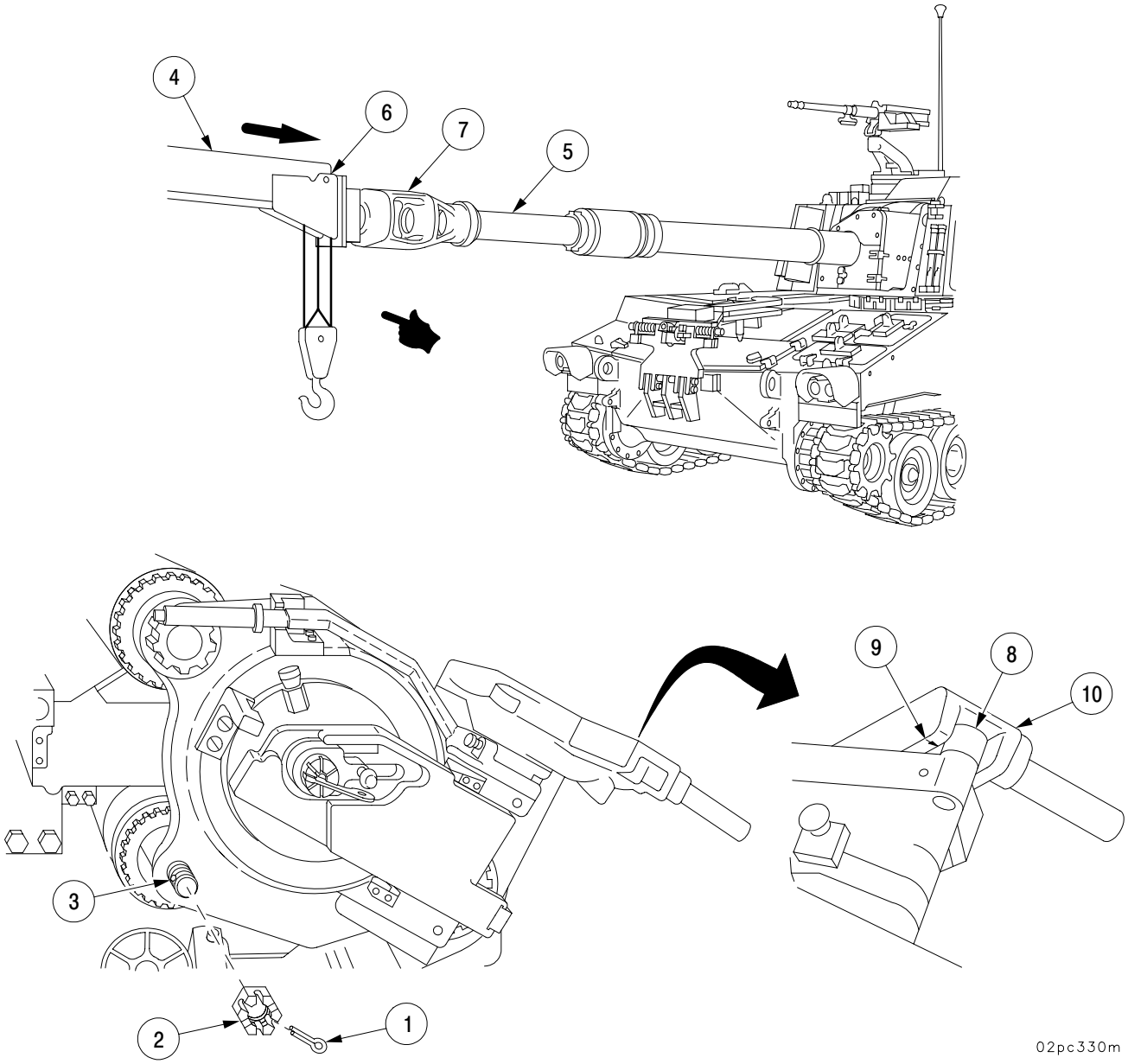
Adjustment – Continued

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).



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).

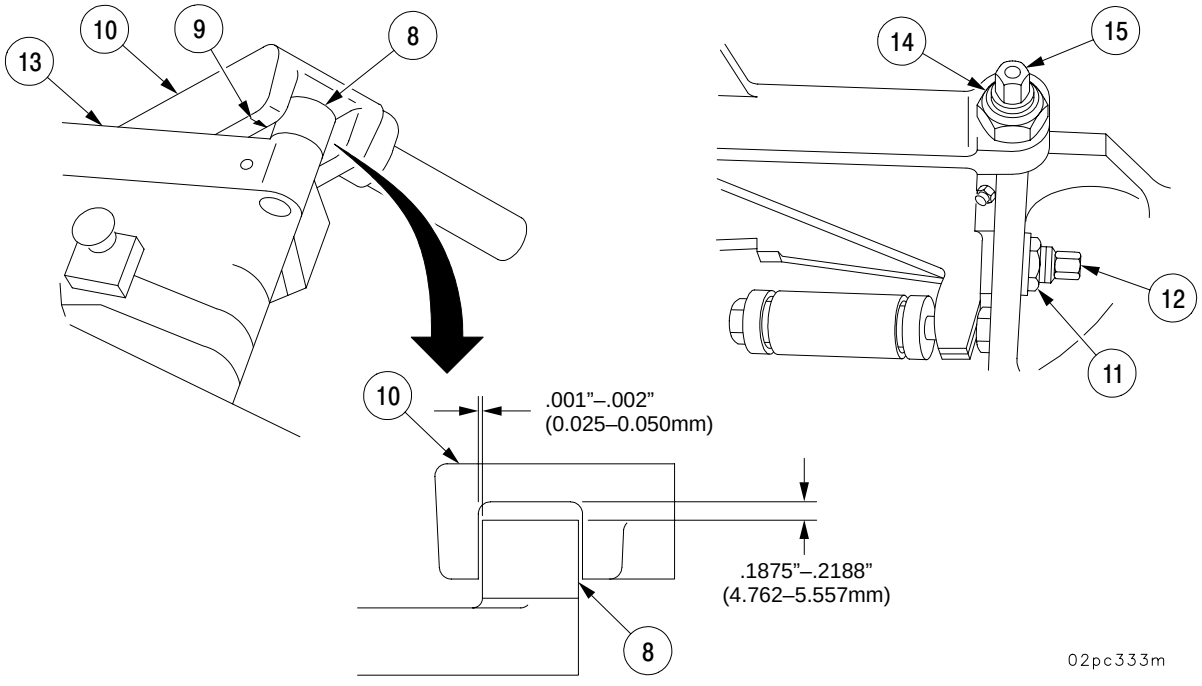
NOTE

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).



4–6 BREECH CAM – CONTINUED

Adjustment – Continued

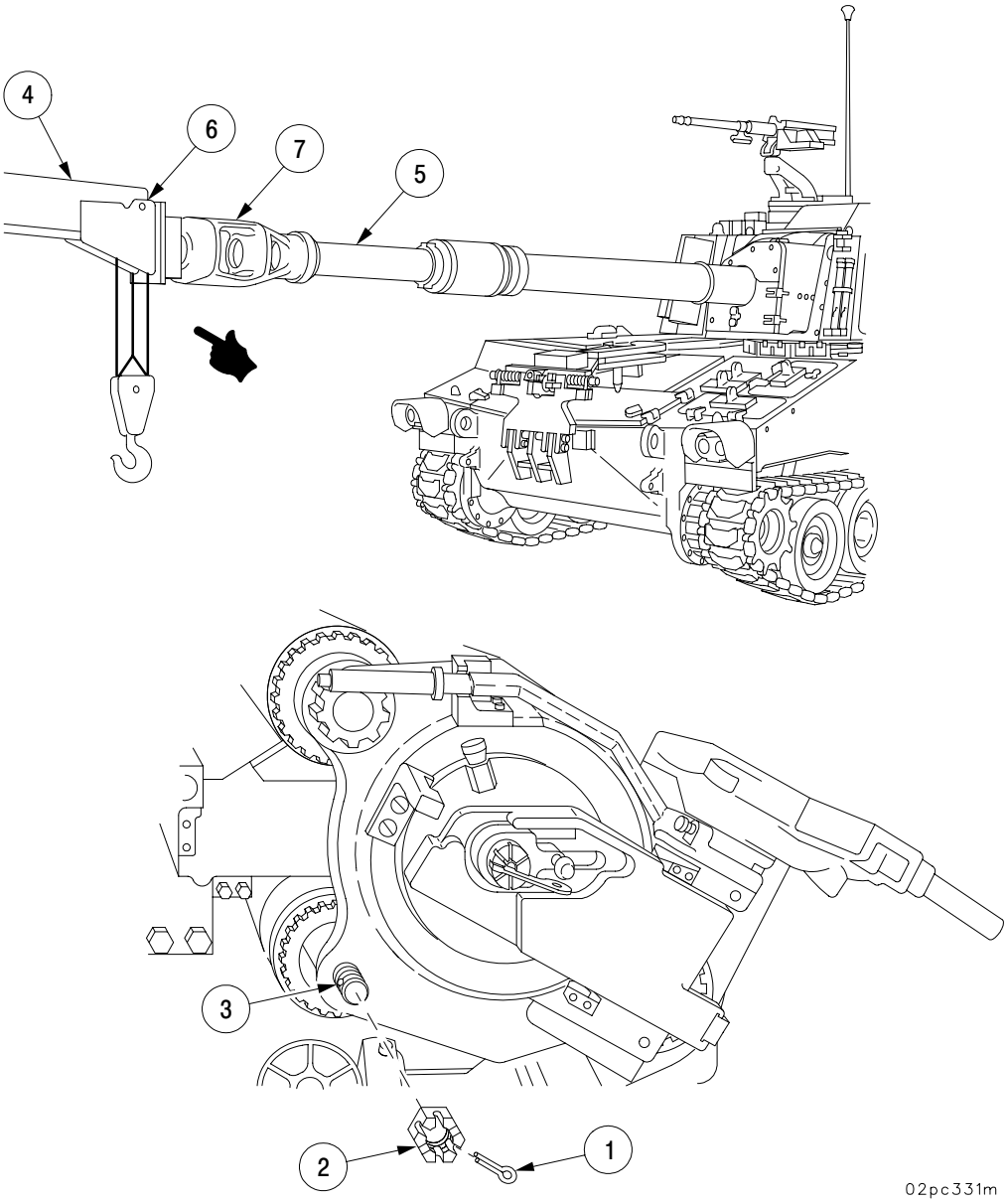
14 Install and tighten nut (2) until nut and collar on rod touch breech ring adapter band.

15 Slowly retract wrecker boom (4) allowing cannon tube (5) to return to battery.

16 Loosen nut 1/16 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).



4–7 WIRE, COVER, BLOCK ASSEMBLIES, AND TEMPERATURE SENSOR.

This task covers: a Removal b. Installation

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)

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.

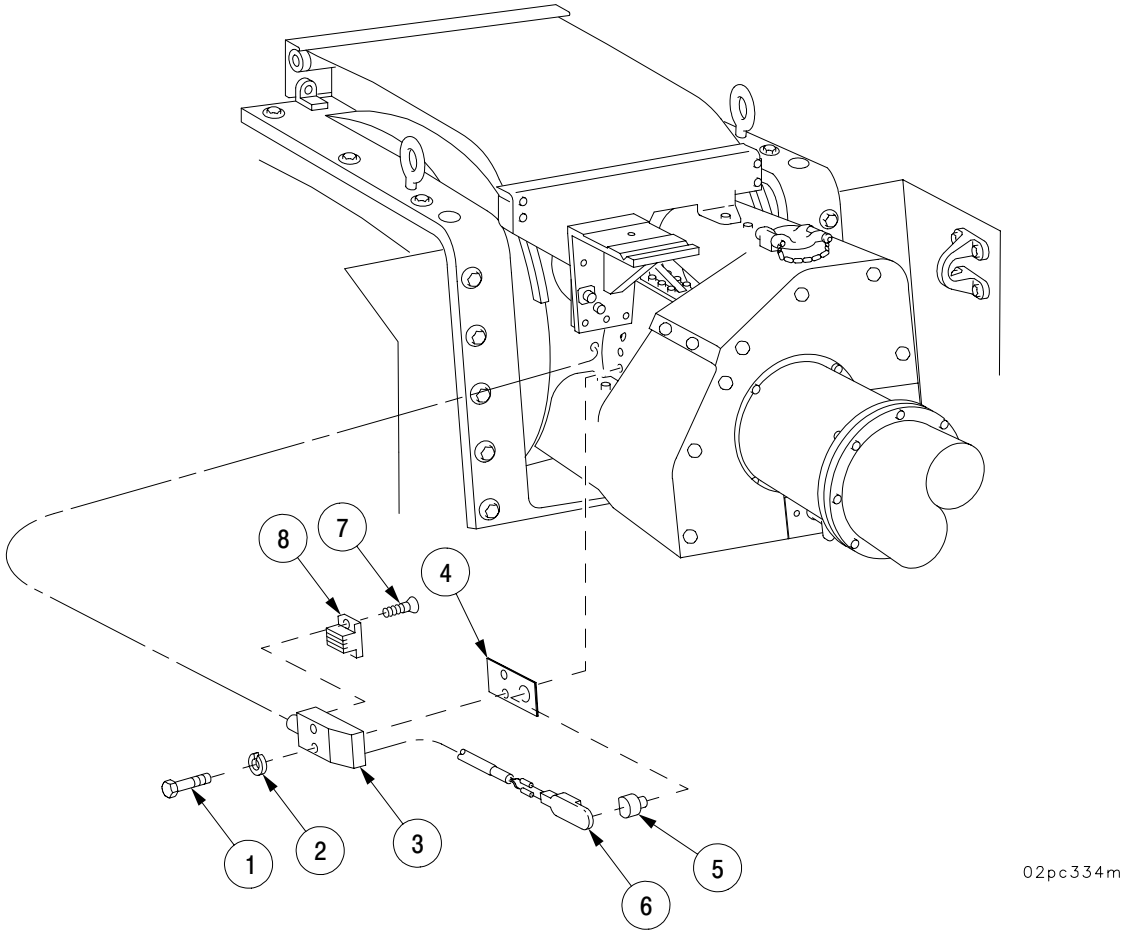
4–7 WIRE, COVER, BLOCK ASSEMBLIES, AND TEMPERATURE SENSOR – CONTINUED

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.



4–7 WIRE, COVER, BLOCK ASSEMBLIES, AND TEMPERATURE SENSOR – CONTINUED

a. Removal – Continued

NOTE

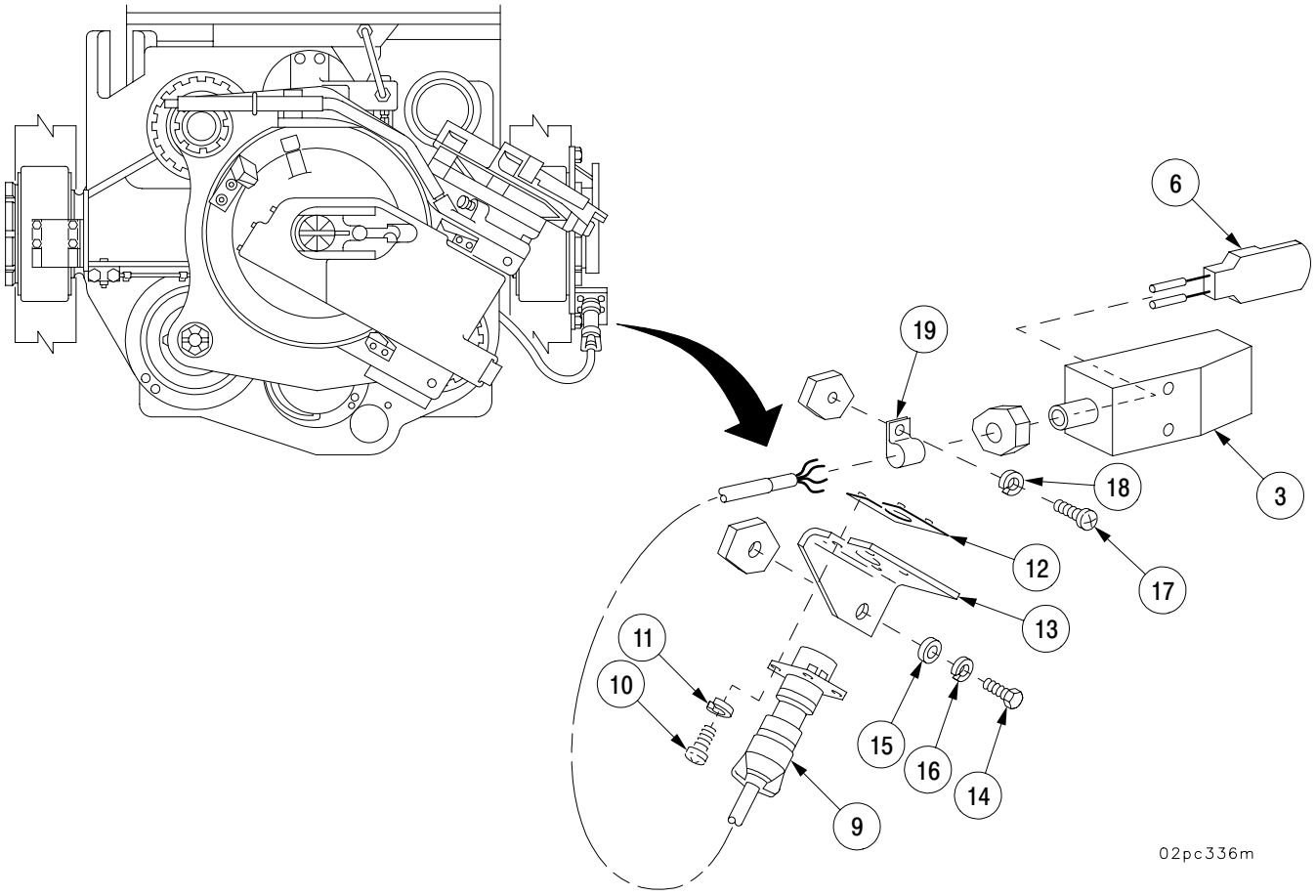
- Tag all electrical connections for identification during assembly.
- Elevation of tube may be required to gain access to wiring harness.

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.



4–7 WIRE, COVER, BLOCK ASSEMBLIES, AND TEMPERATURE SENSOR – CONTINUED

b. Installation.

WARNING

Dry–cleaning solvent (P–D–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 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 with water immediately, and obtain medical aid. (ref FM 21–11)

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).

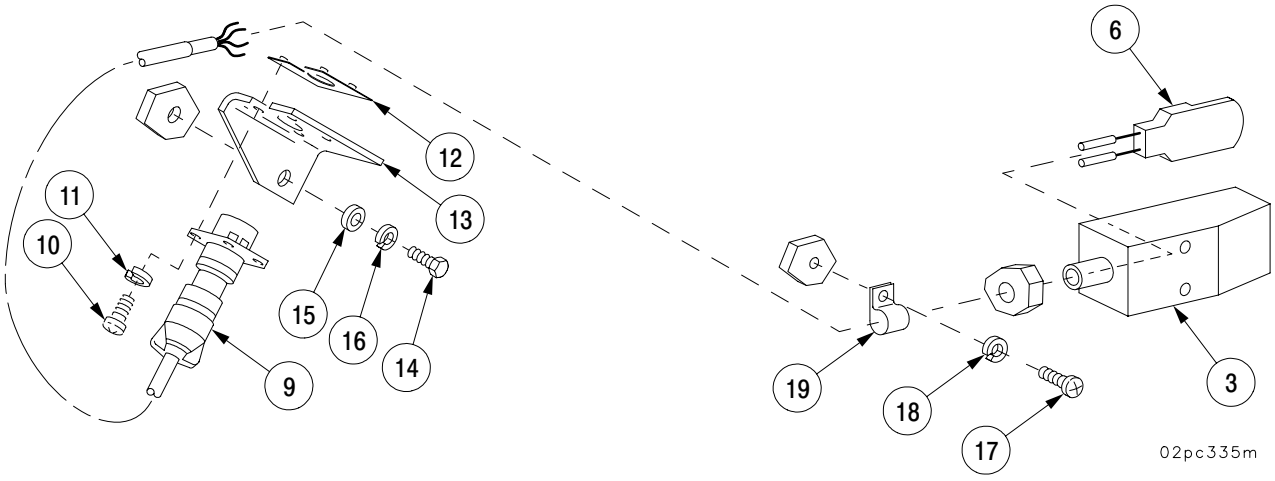
3 Position bracket (13), if removed, and secure by installing screw (14), flat washer (15), and new lockwasher (16).

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).



4–7 WIRE, COVER, BLOCK ASSEMBLIES, AND TEMPERATURE SENSOR – CONTINUED

b. Installation – Continued

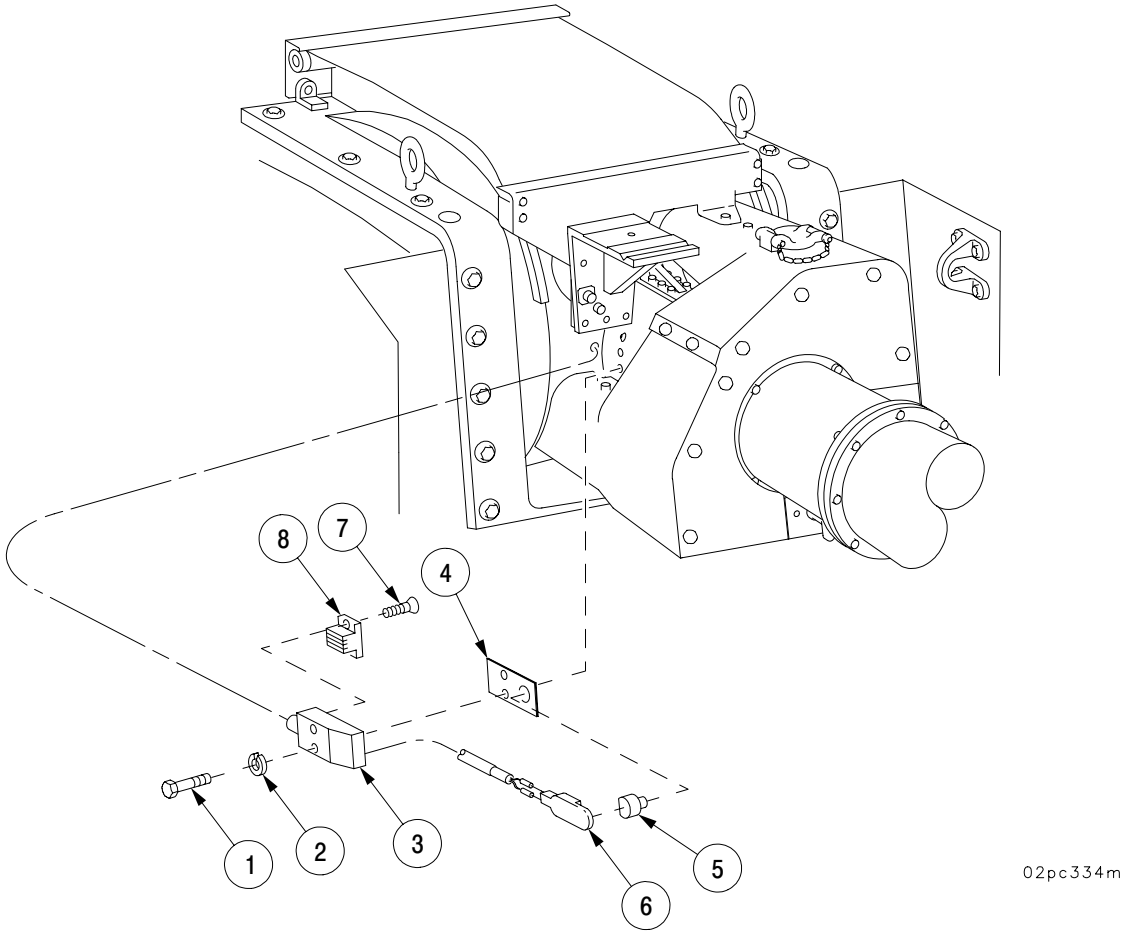
8 Install block clamp (8) to block assembly (3) using two new self–locking screws (7).

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).



4–8 DIRECT FIRE RANGE PLATE.

This task covers: a Removal b. Installation

INITIAL SETUP

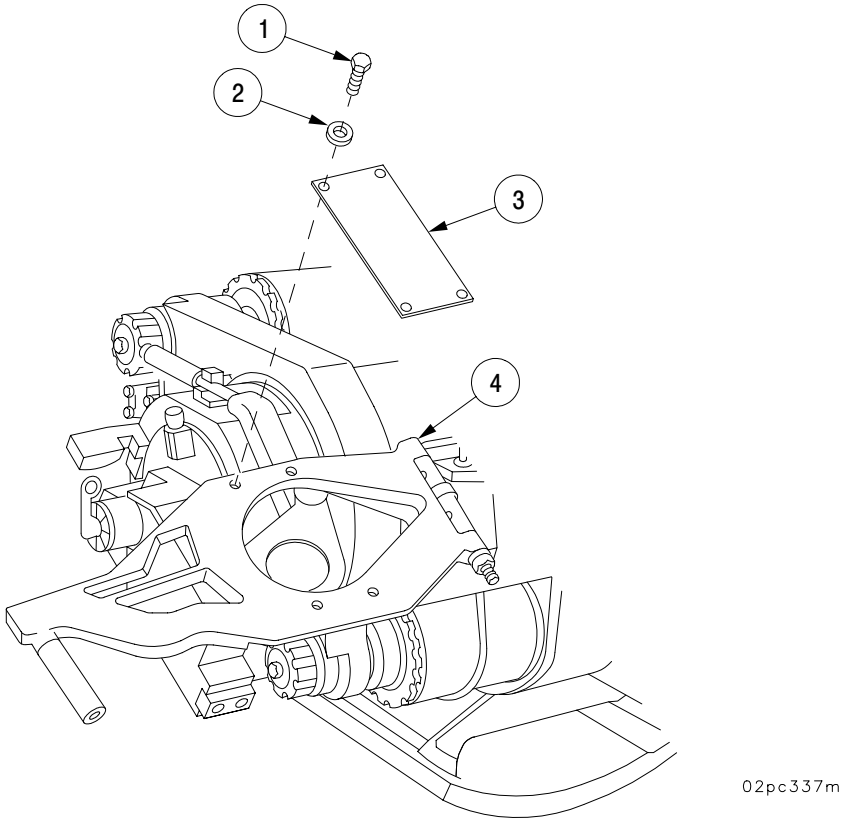
Tools
Artillery and turret mechanic's tool kit
(SC 5180–95–A12)

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).



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

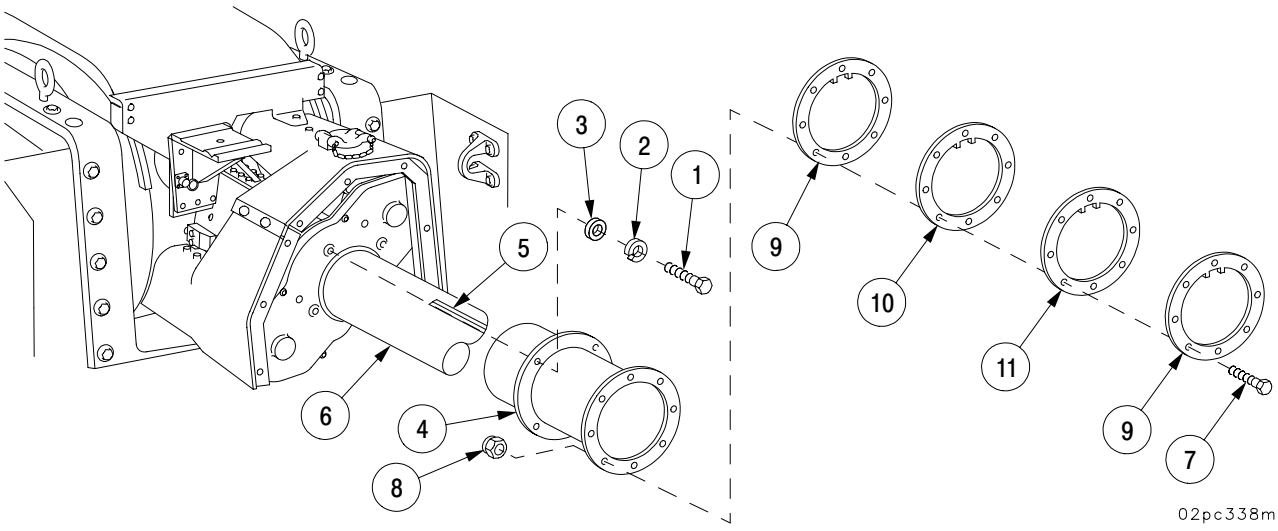
Dust shield, retainers, and seal do not have to be removed as an assembly.

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.



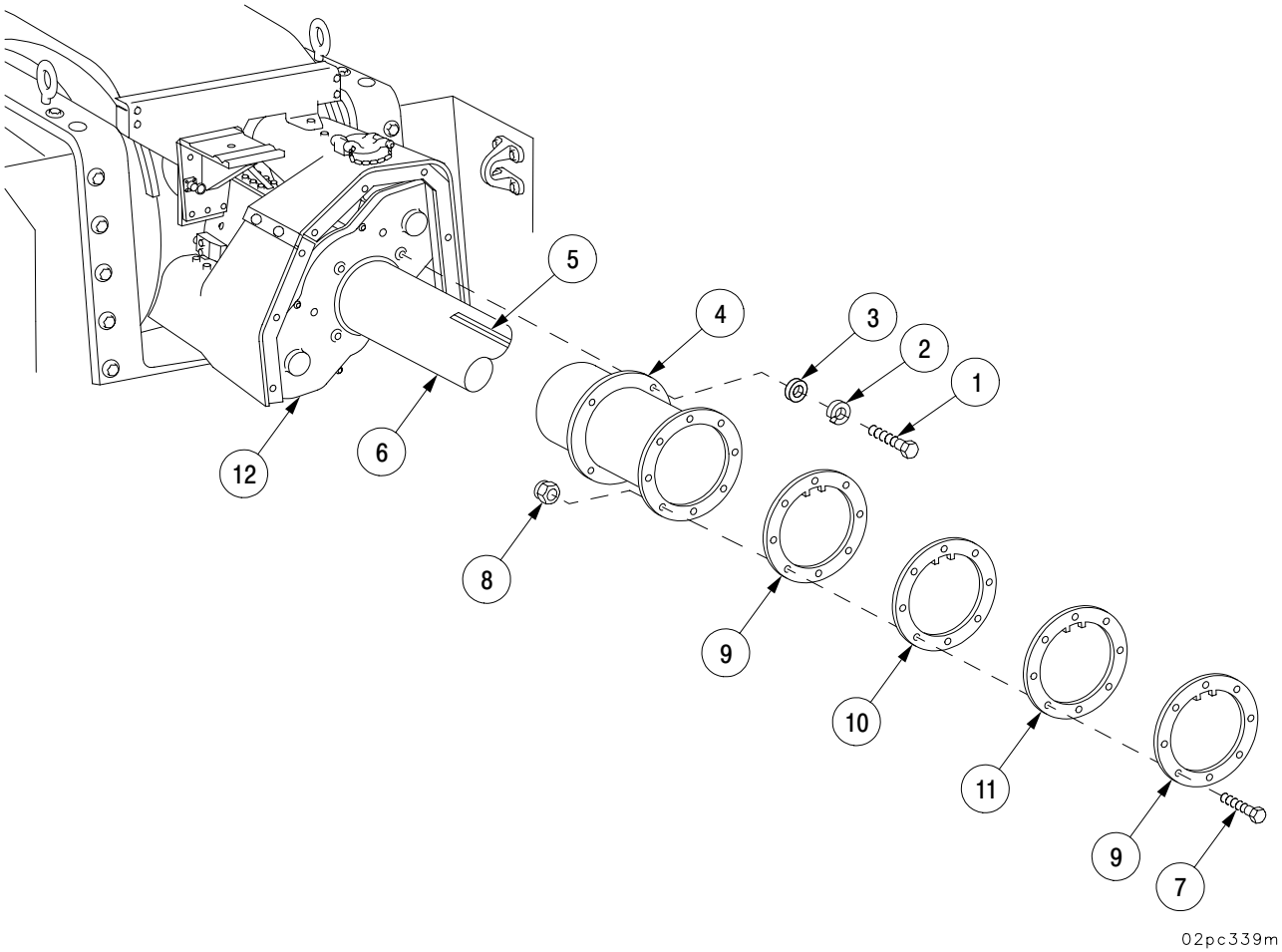
4–9 DUST SHIELD – CONTINUED

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).



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)

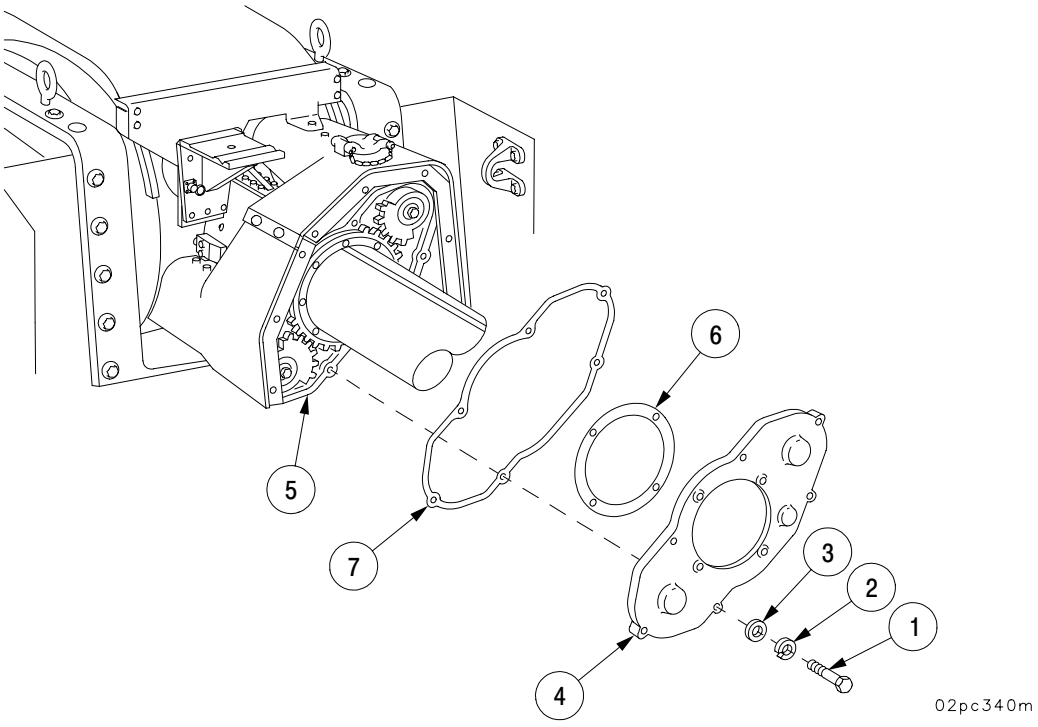
Materials/Parts
Gasket (item 162, Appx F)
Lockwashers (8) (item 129, Appx F)
Sealing compound (item 37, Appx C)
Gasket (item 163, Appx F)

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.



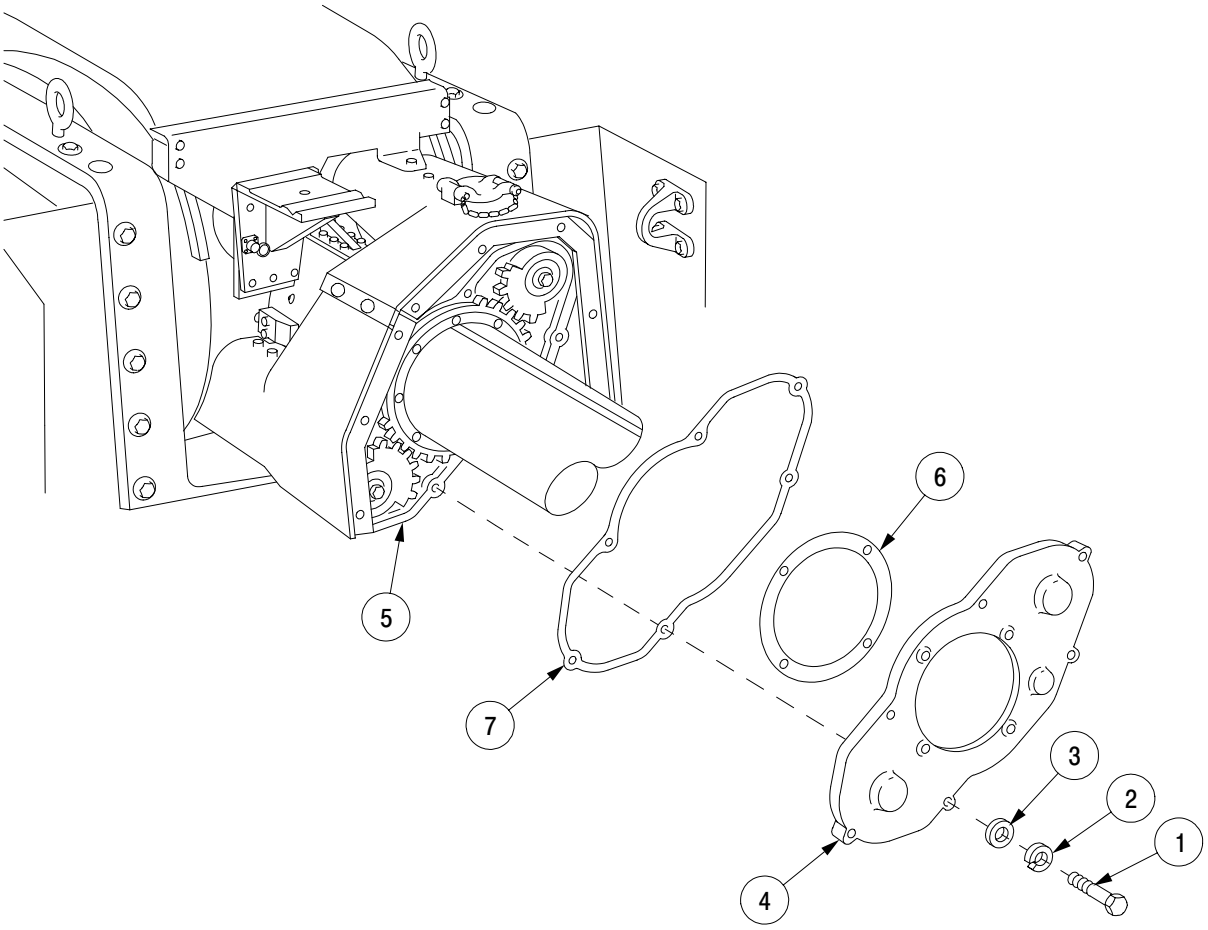
4–10 VARIABLE RECOIL ASSEMBLY – HOUSING COVER – CONTINUED

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).



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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)

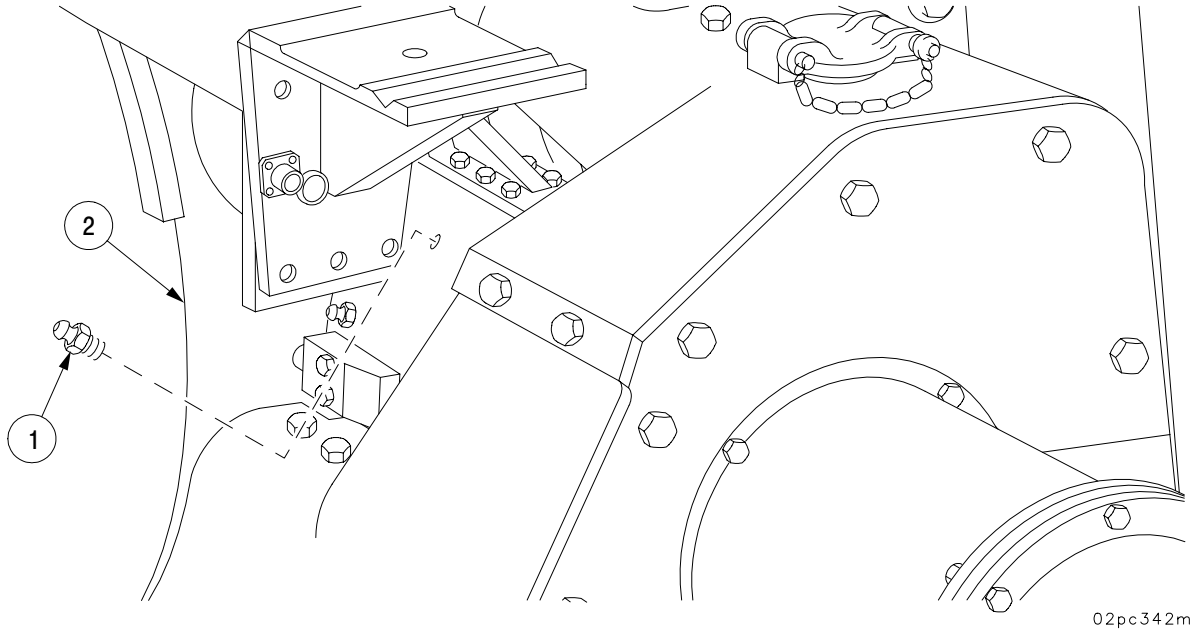
a. Removal.

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).

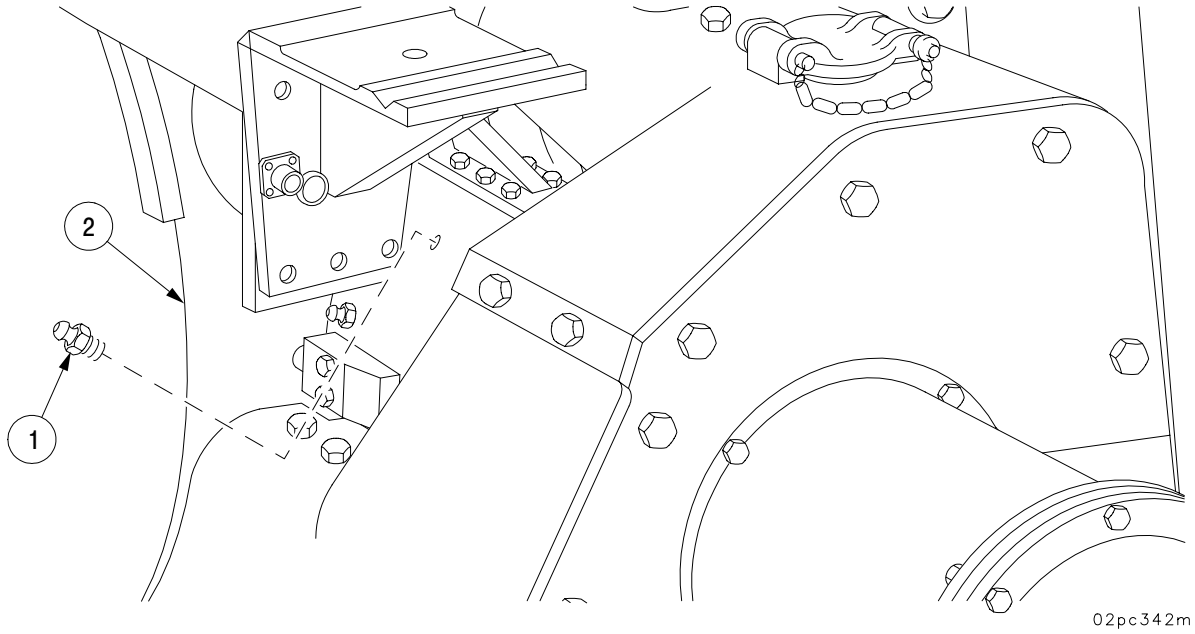


4–11 VARIABLE RECOIL ASSEMBLY – CONTINUED

b. Installation.

1 Install grease fitting (1) onto cradle (2).

2 Lubricate in accordance with TM 9–2350–314–10.



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)

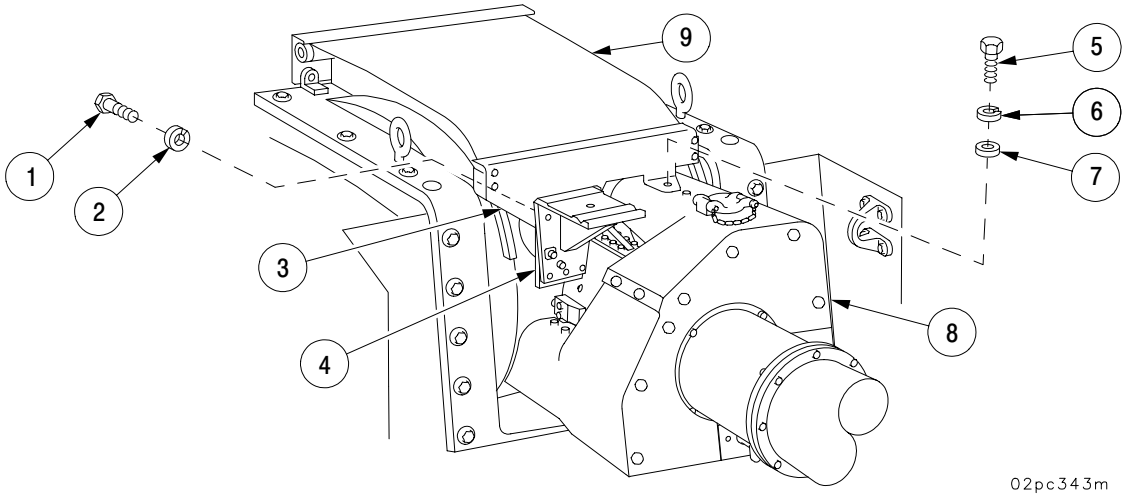
a. Removal.

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.



4–12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY – CONTINUED

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

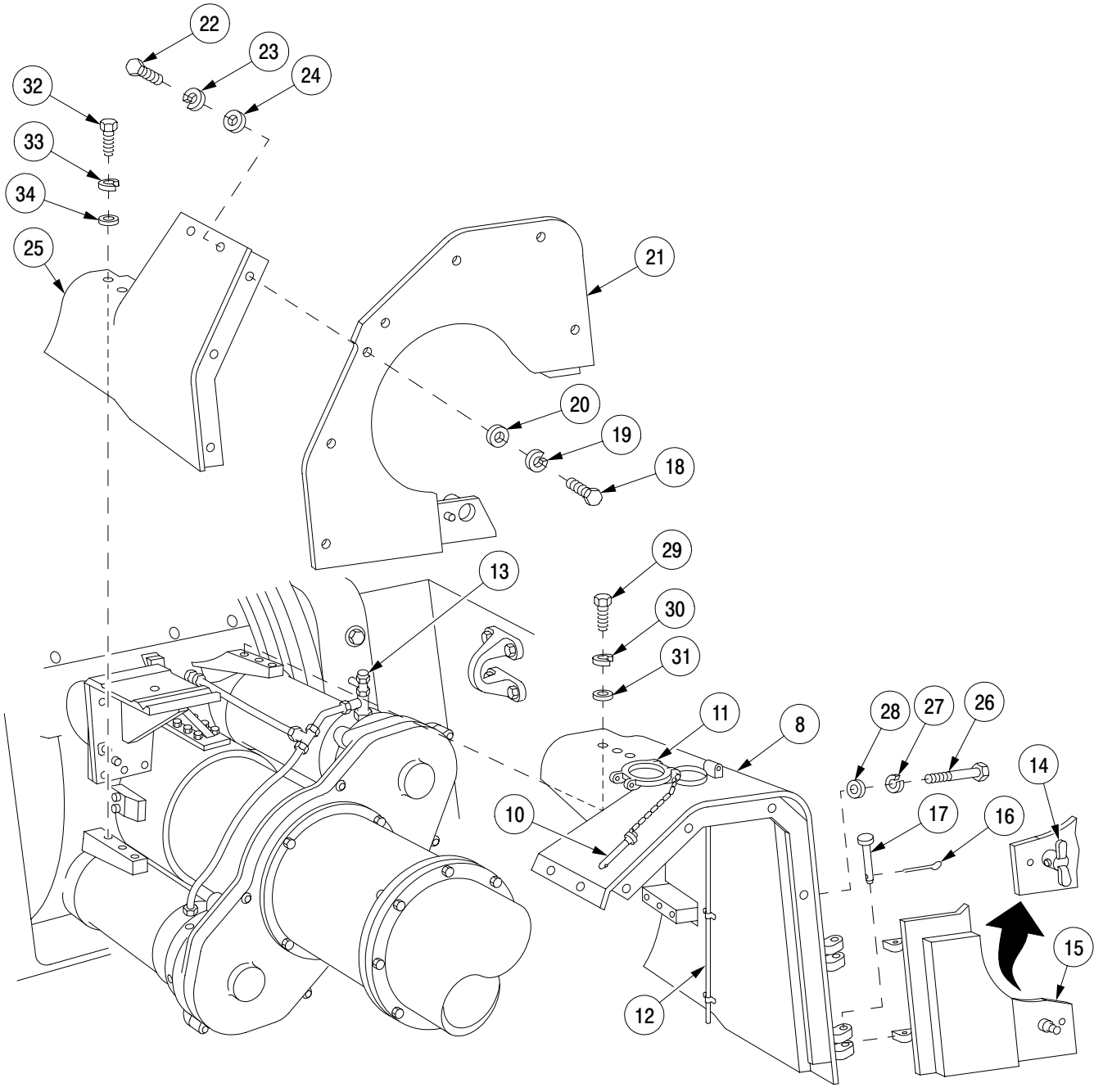
There are three holes in left composite cover and in bracket it is attached to. Only two screws, two lockwashers, and two flat washers secure cover to bracket. Note location of unused hole for proper installation.

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



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.

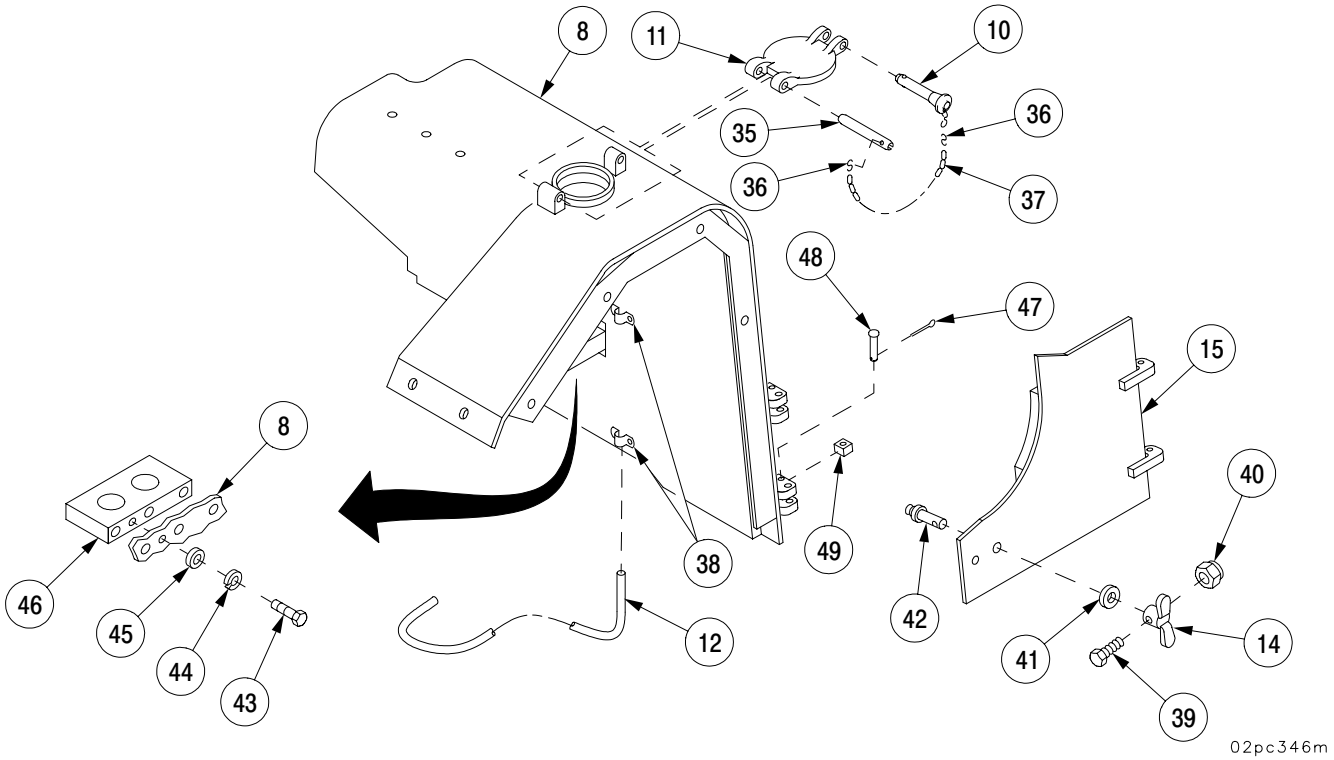
5 Slide transfer tube (12) from four straps (38) inside left composite cover (8).

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.



4–12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY – CONTINUED

c. Repair.

NOTE

Left composite cover must be removed to repair straps.

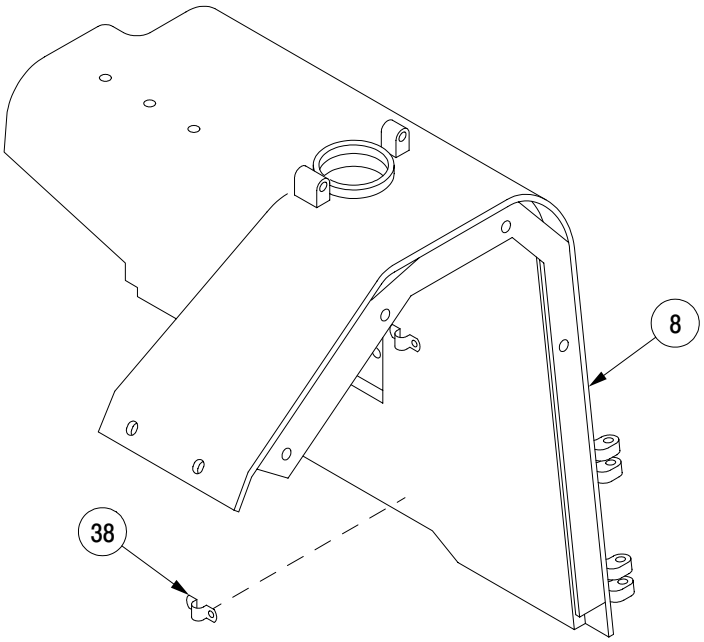
1 Remove four straps (38) from inside left composite cover (8).

WARNING

Dry–cleaning solvent (P–D–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 21–11).

2 Clean strap mounting area with cleaning solvent.

3 Apply adhesive to strap mounting area and install four straps (38).



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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).

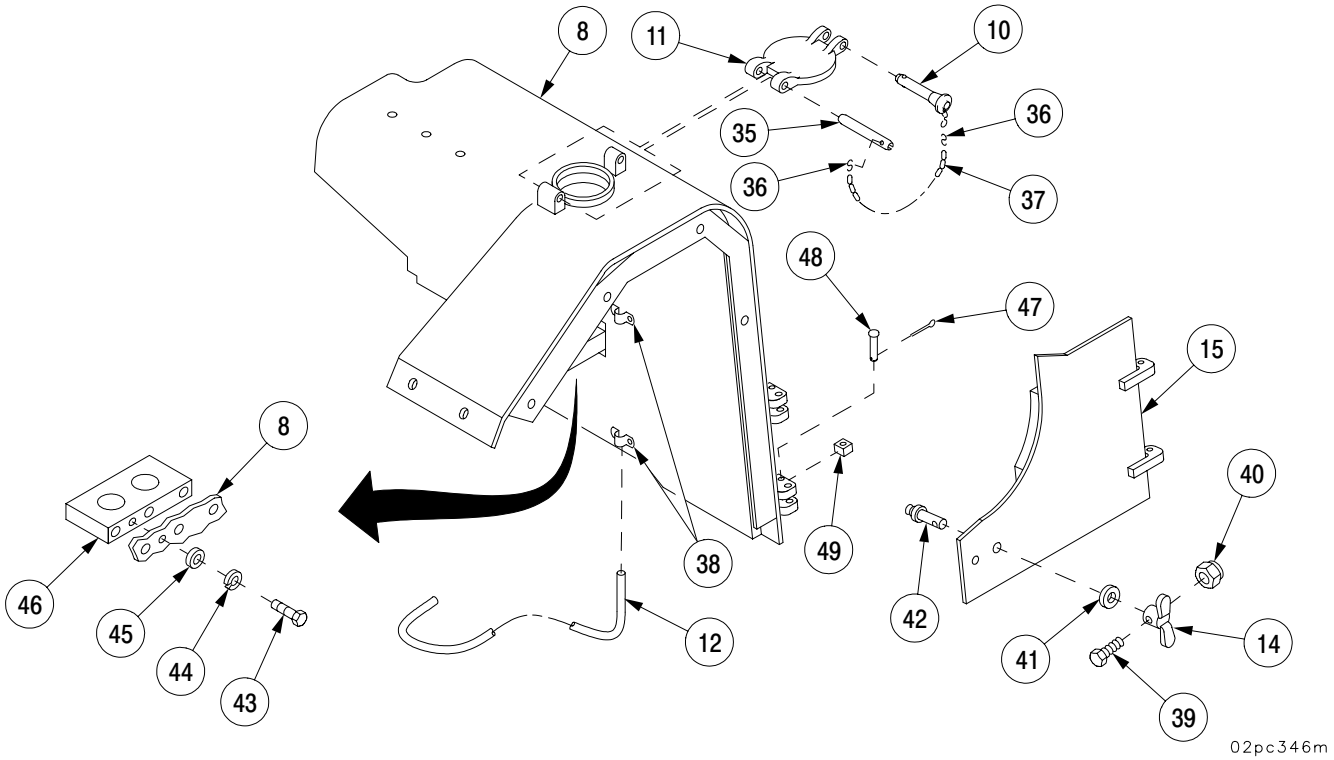
4 Install handle (14) and secure with screw (39) and new self–locking nut (40).

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).



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.

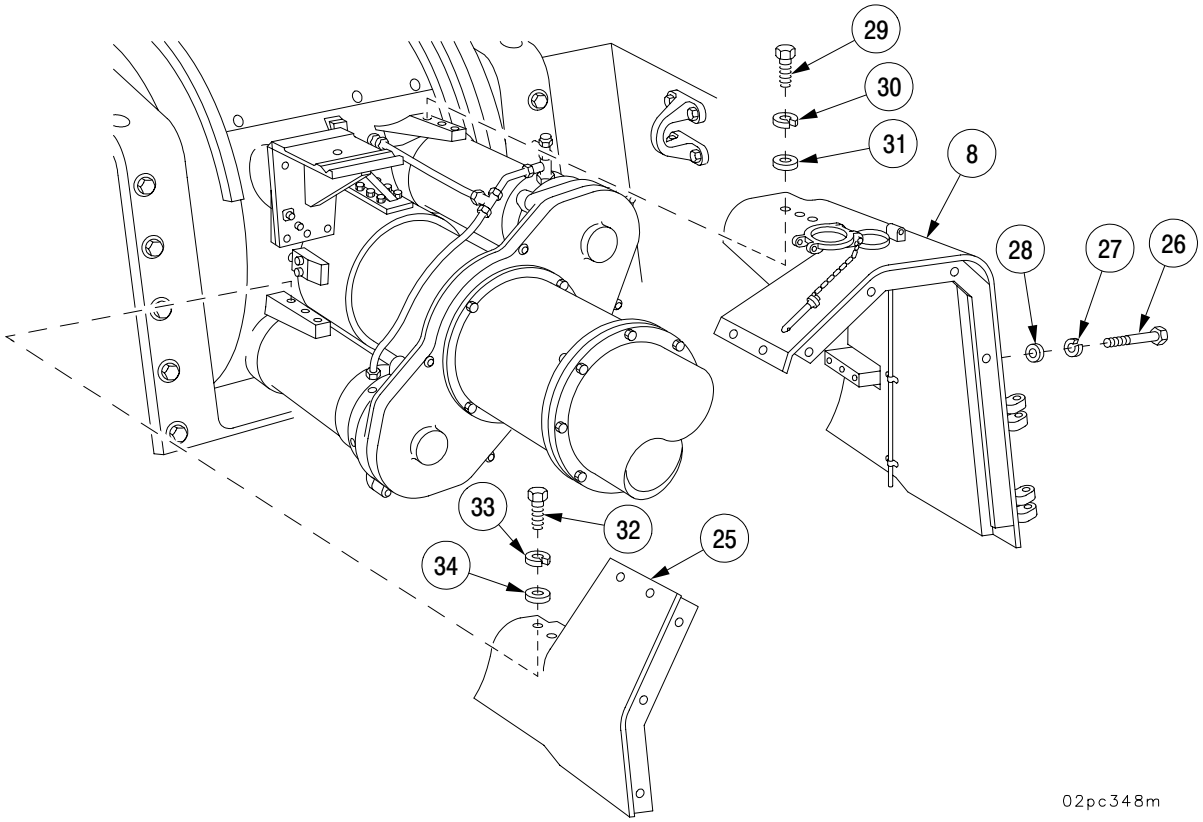
NOTE

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).



4–12 GUN MOUNT BALLISTIC SHIELD ASSEMBLY – CONTINUED

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).

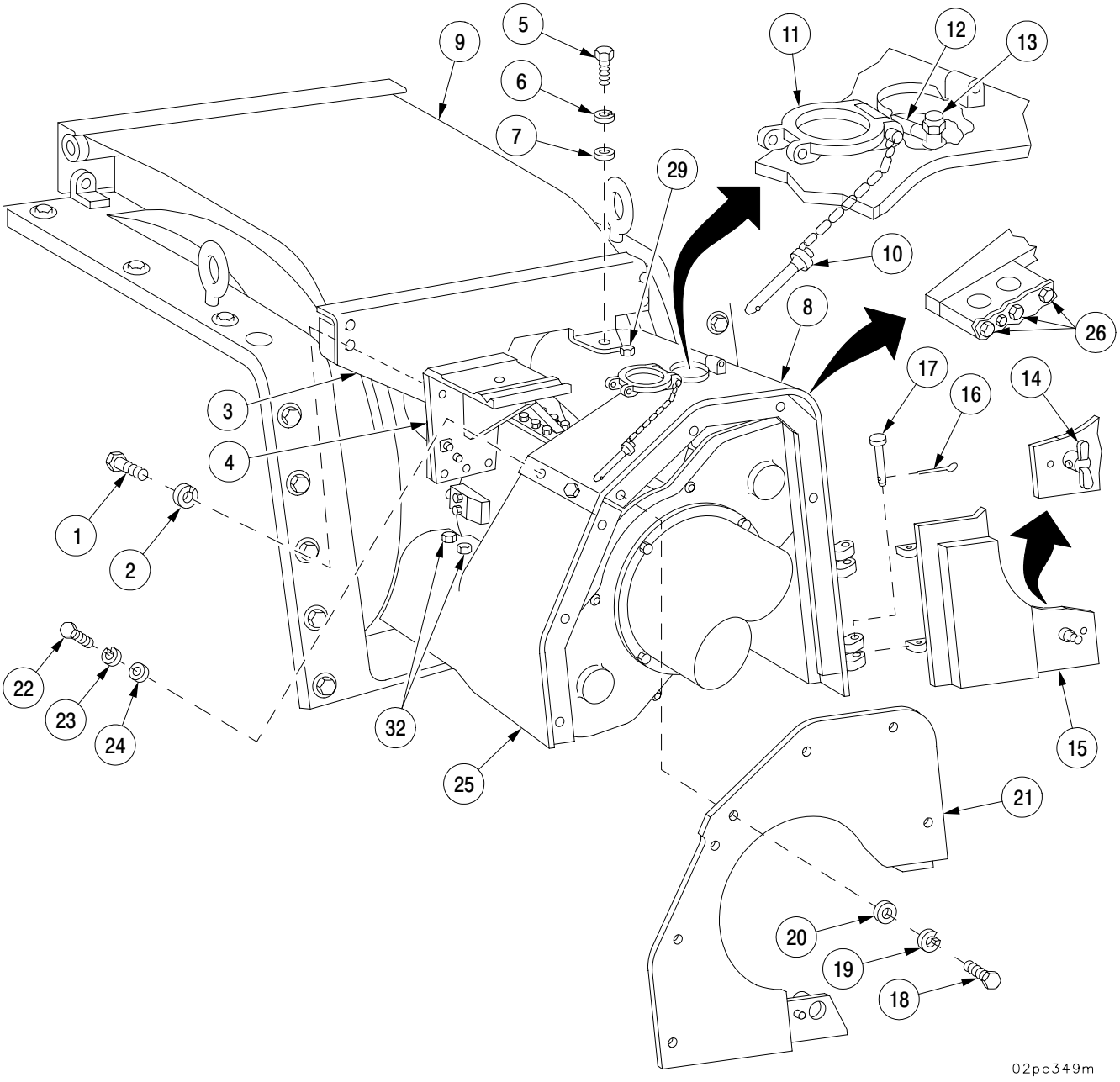
9 Install front access door (15) on left composite cover (8) with two pins (17) and two new cotter pins (16). Close front access door (15) and secure with T–handle (14).

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.

This task covers: a. Removal b. Disassembly c. Assembly d. Installation

INITIAL SETUP

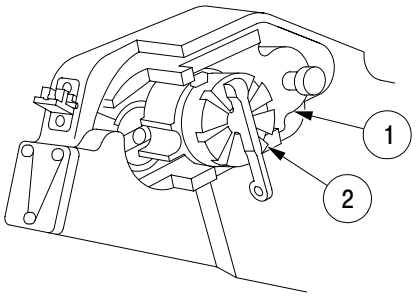
Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
M18 fuzesetter wrench (BII)

References
TM 9–2350–314–10

Materials/Parts
Automotive grease (item 52, Appx C)
Lubricant cleaner (item 32, Appx C)

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.



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4–13 FIRING MECHANISM – CONTINUED

b. Disassembly.

1 Place firing mechanism on solid flat surface with follower (3) end up.

2 Place fuzesetter 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 fuzesetter wrench, follower, and case assembly slowly or personnel injury may result.

3 Raise fuzesetter wrench and remove fuzesetter wrench, follower (3), and case assembly (7).

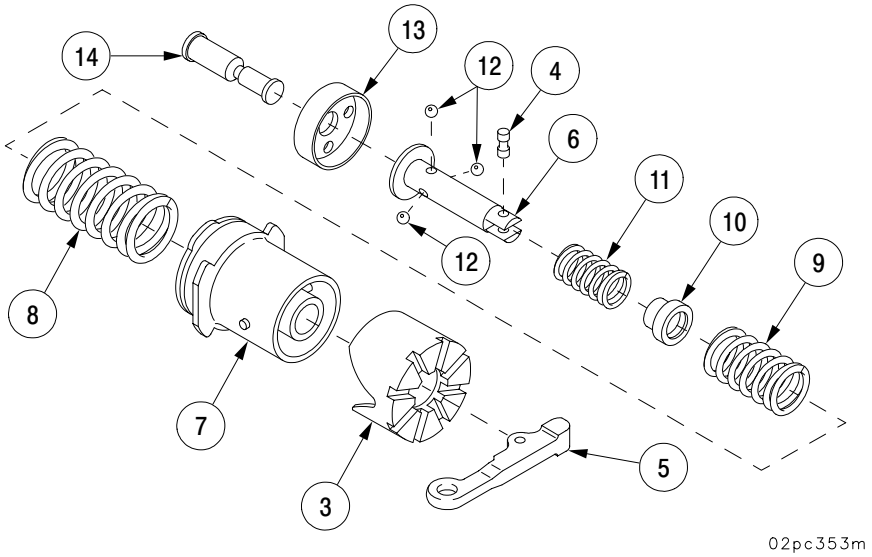
NOTE

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.



4–13 FIRING MECHANISM – CONTINUED

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.

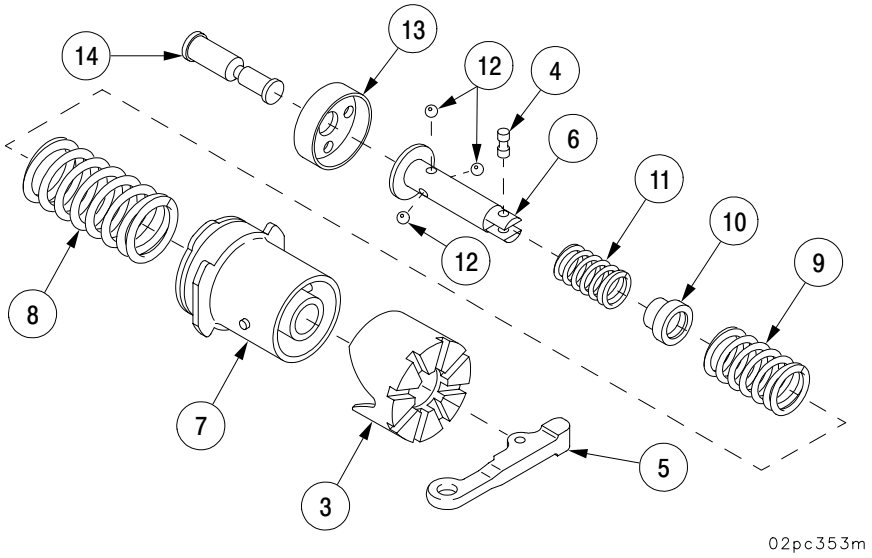
13 Place fuzesetter wrench over follower (3) and depress to compress springs until lever (5) can be inserted in yoke (6).

14 Install pin (4) in lever (5) and yoke (6).

15 Push hammer (14) against solid surface to seat assembly.

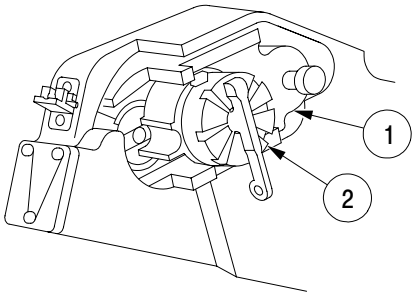
4–13 FIRING MECHANISM – CONTINUED

c. Assembly – Continued



d. Installation.

1 With firing block assembly (1) in center position, insert firing mechanism (2) and rotate counterclockwise until locked.



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.

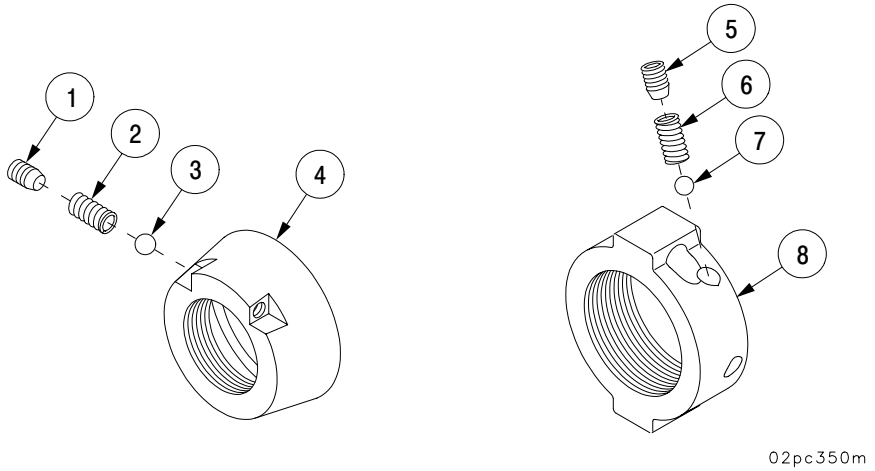
1 Remove setscrew (1), spring (2), and detent ball (3) from muzzle brake thrust collar (4).

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

4–14 MUZZLE BRAKE, THRUST COLLAR, AND BORE EVACUATOR – CONTINUED

d. Installation.

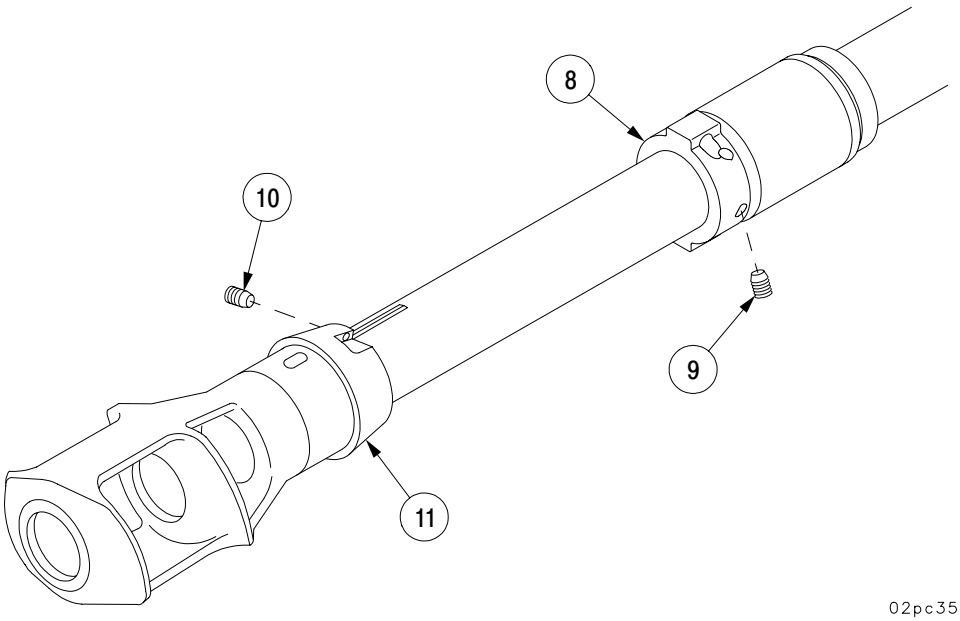
1 Clean threads of both thrust collars with lubricant cleaner prior to installation.

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).



4–15 BREECH MECHANISM.

This task covers: a. Disassembly b. Inspection c. Assembly

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

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

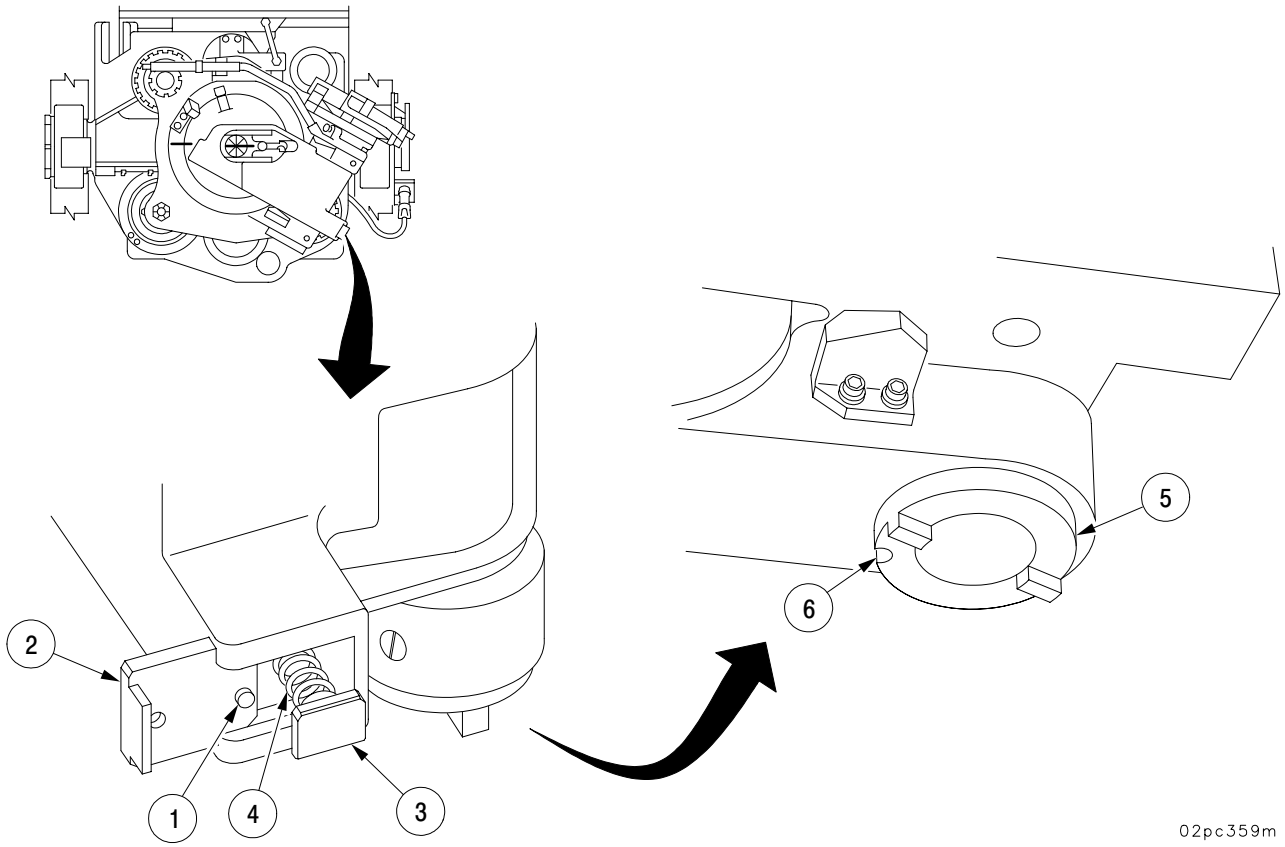
WARNING

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.



4–15 BREECH MECHANISM – CONTINUED

a. Disassembly – Continued

NOTE

Cannon must be elevated to 175 mils for accessibility.

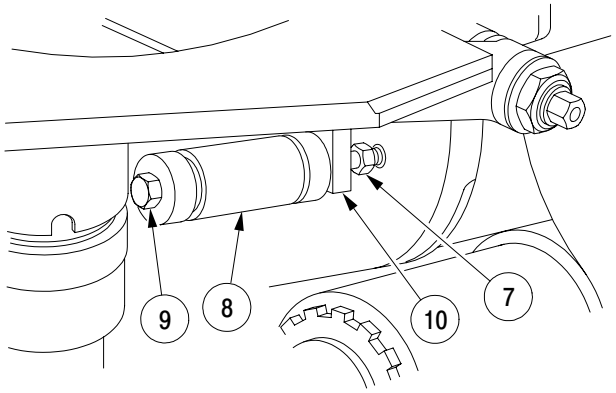
4 Loosen jamnut (7) of cam damper assembly (8).

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).

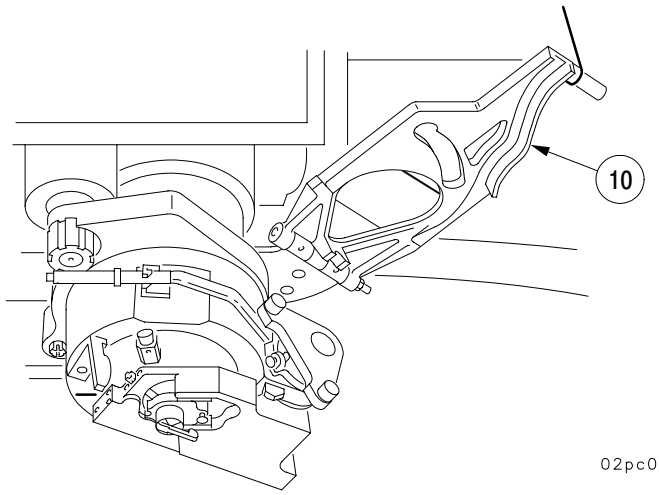
NOTE

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.

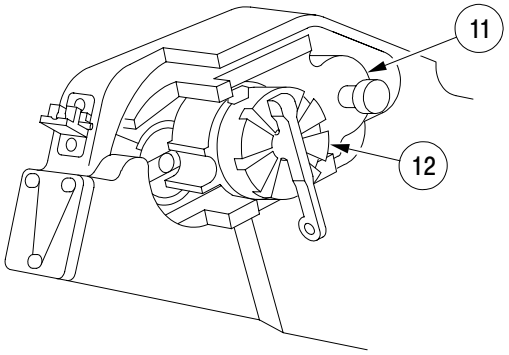


02pc038m

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.



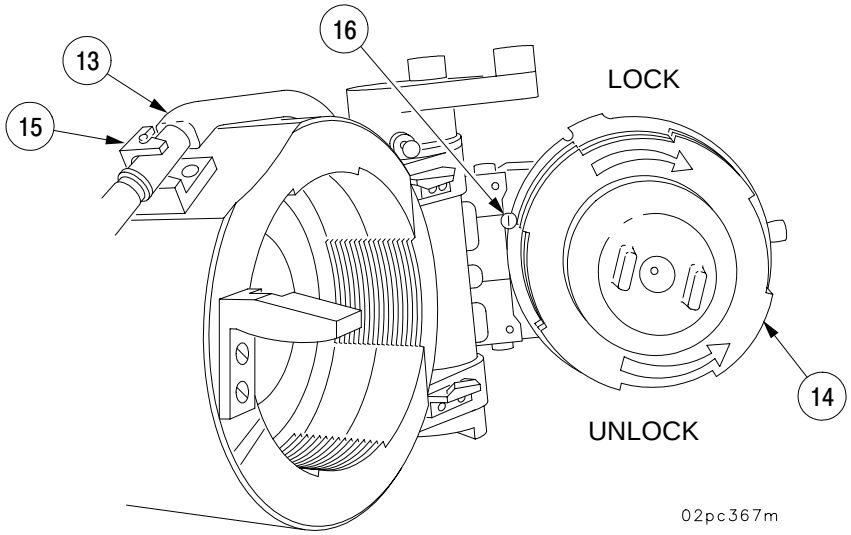
CAUTION

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.

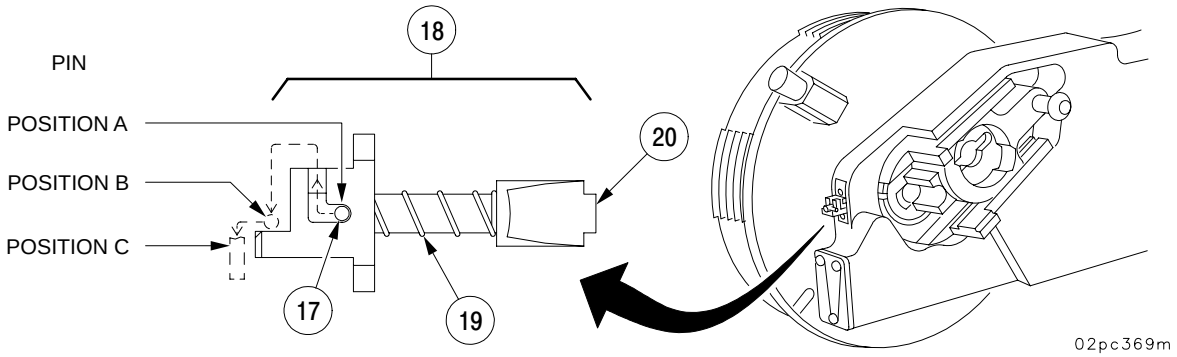


4–15 BREECH MECHANISM – CONTINUED

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).

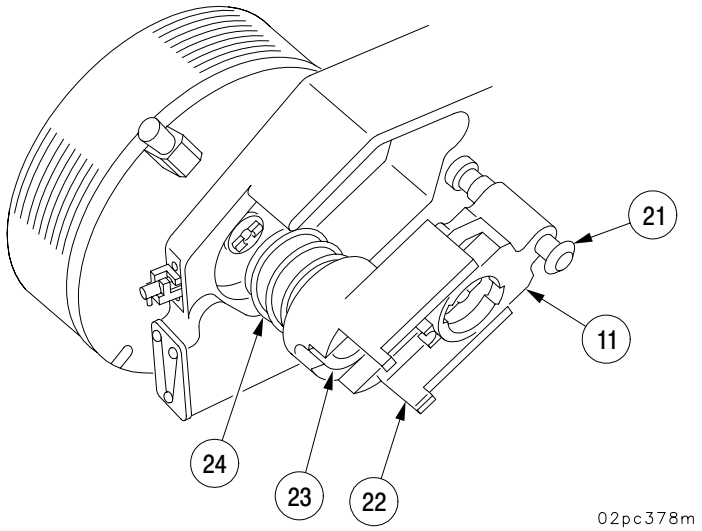
4–15 BREECH MECHANISM – CONTINUED

a. Disassembly – Continued

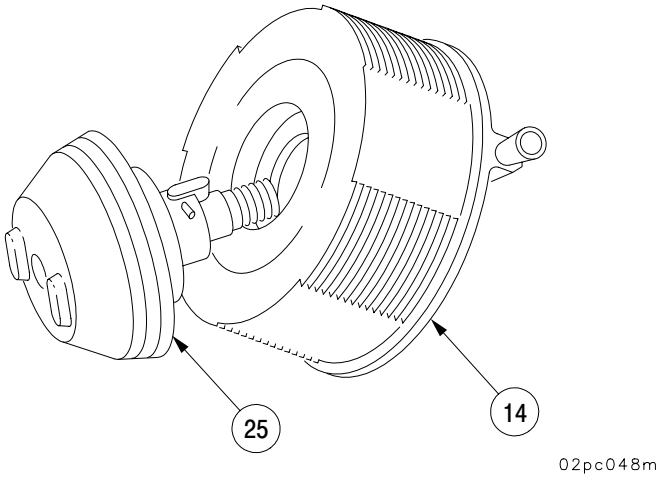
14 Pull out on follower knob (21) and slide firing block assembly (11) to extreme right position.

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).



17 Remove spindle assembly (25) from breechblock (14).



4–15 BREECH MECHANISM – CONTINUED

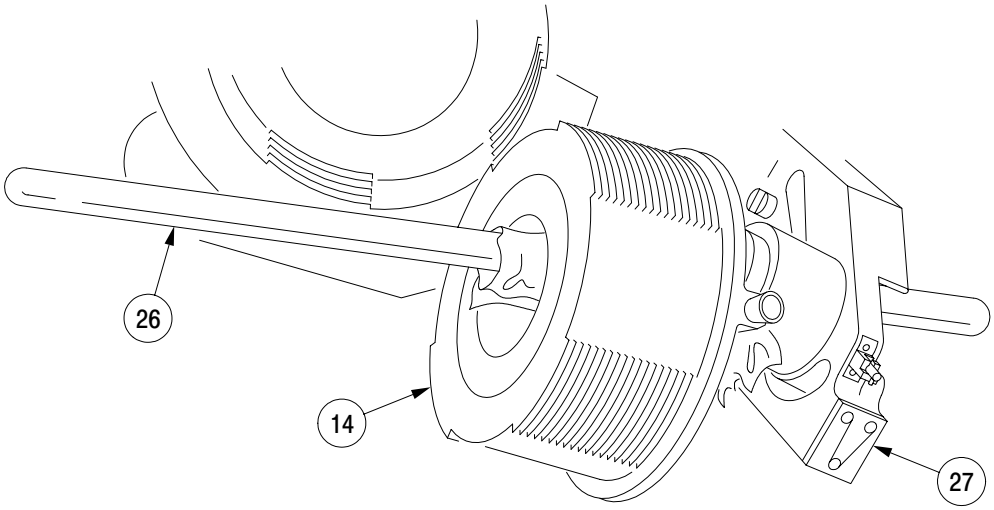
a. Disassembly – Continued

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

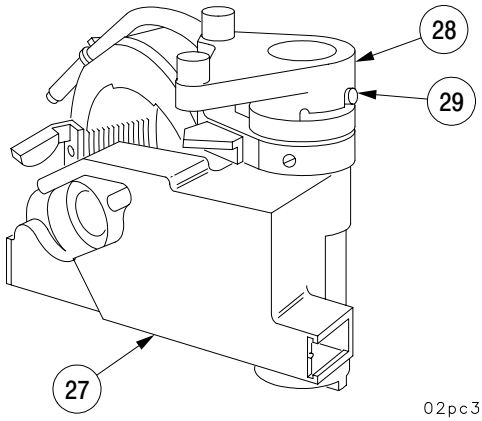
NOTE

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).

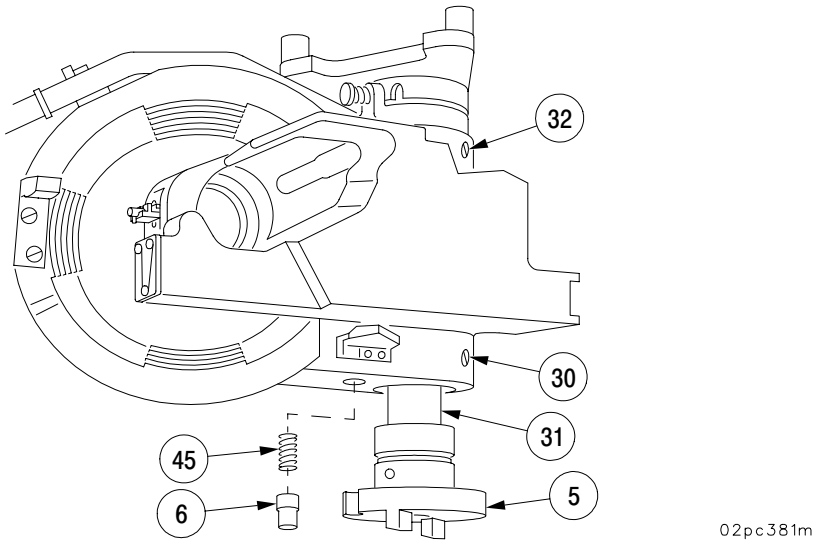


23 Remove adjuster detent (30) while supporting adjuster (5) and leaf spring pack (31).

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).



4–15 BREECH MECHANISM – CONTINUED

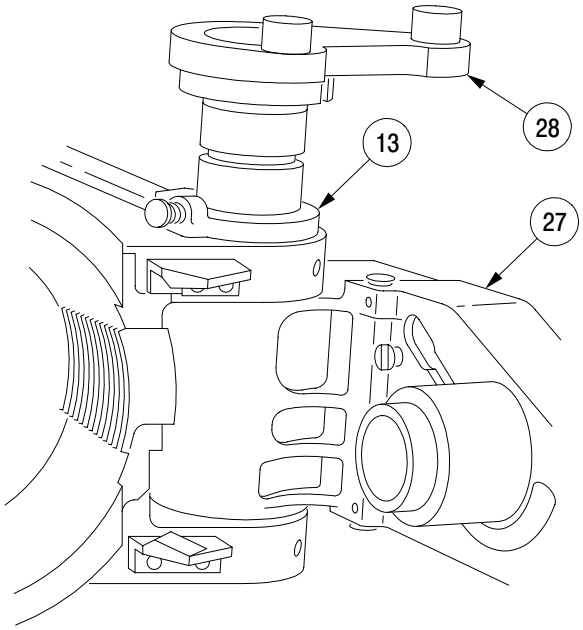
a. Disassembly – Continued

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

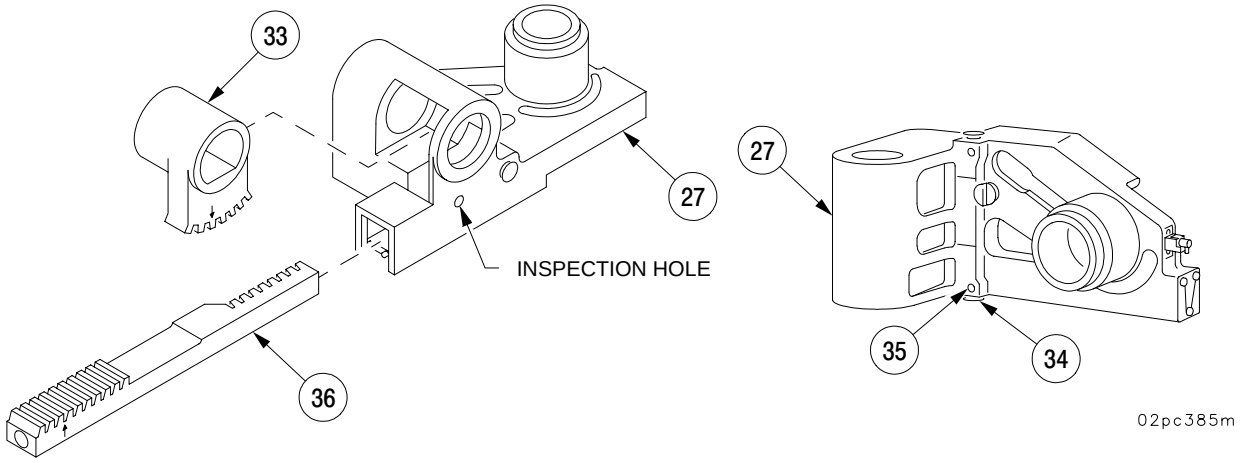
a. Disassembly – Continued

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.

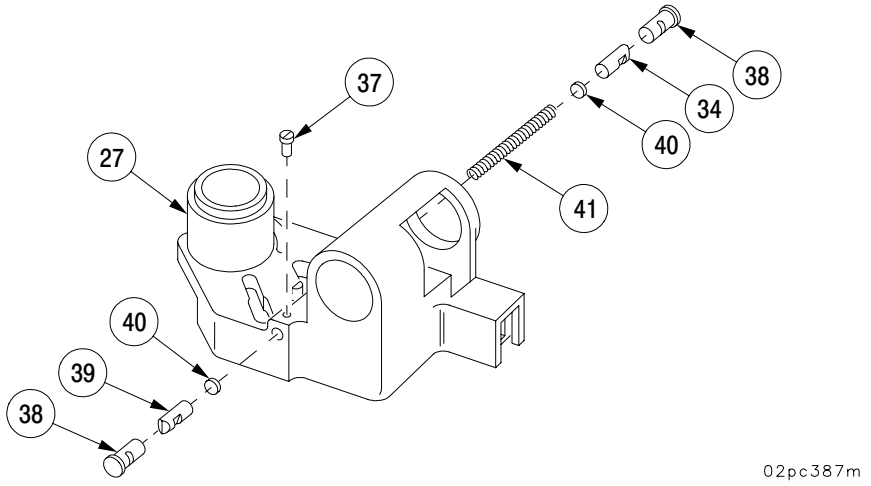
30 Place carrier assembly (27) on a flat surface with left plunger (34) down. Press down on carrier assembly to compress plunger spring and remove left plunger detent (35) and rack (36).



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.

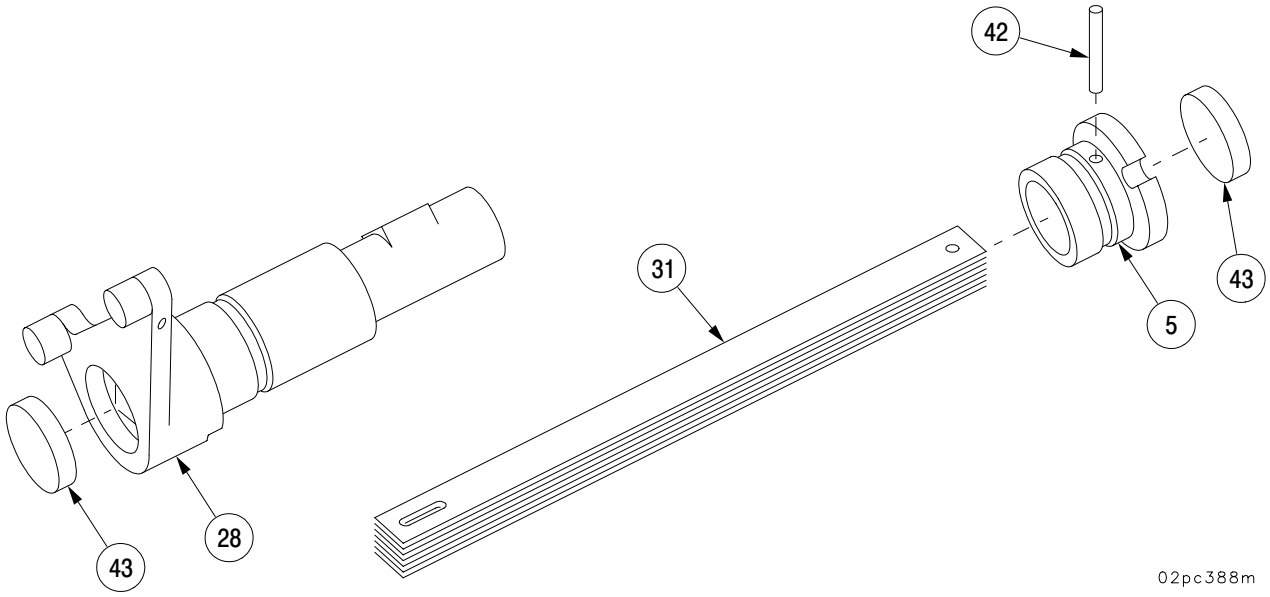


4–15 BREECH MECHANISM – CONTINUED

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.



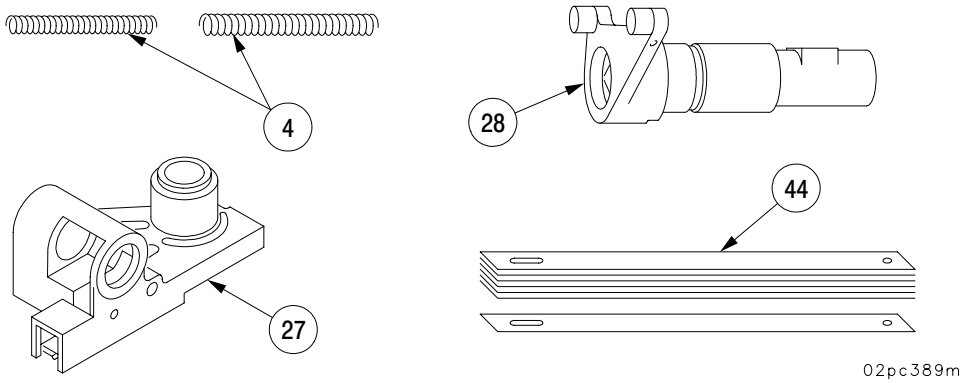
b. Inspection.

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).

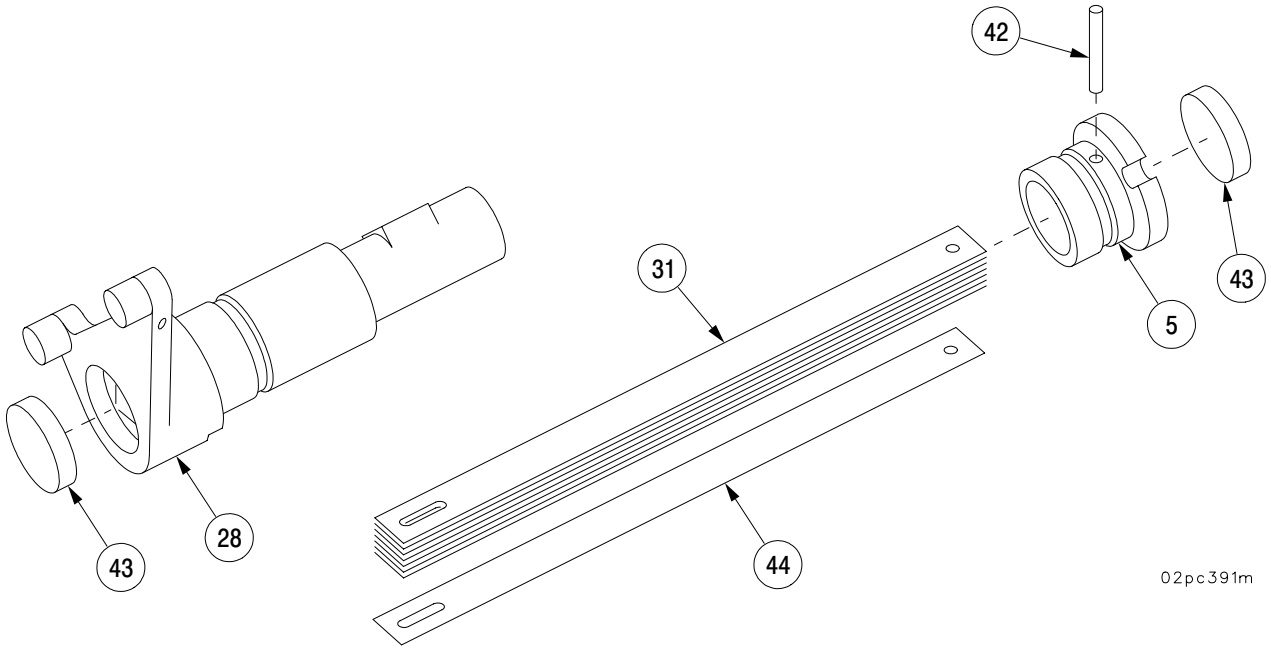
2 Apply a light coat of grease to each leaf spring (44).

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.



4–15 BREECH MECHANISM – CONTINUED

c. Assembly – Continued

NOTE

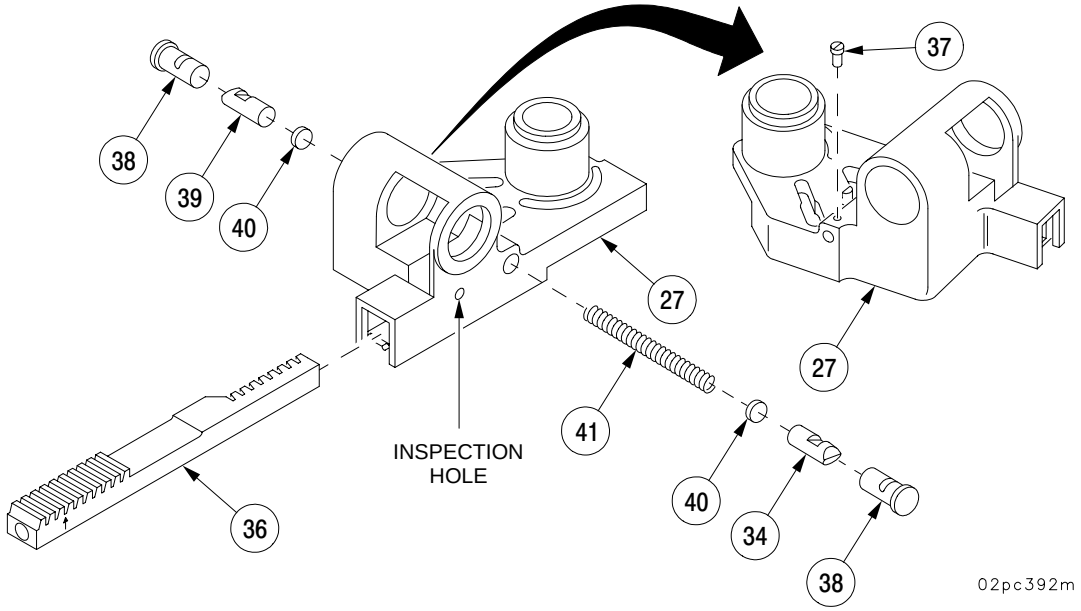
The left and right plungers are stamped on the flat (inside) ends with “L” for left and “R” for right. These correspond to the same markings on the carrier assembly next to each plunger hole.

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).



4–15 BREECH MECHANISM – CONTINUED

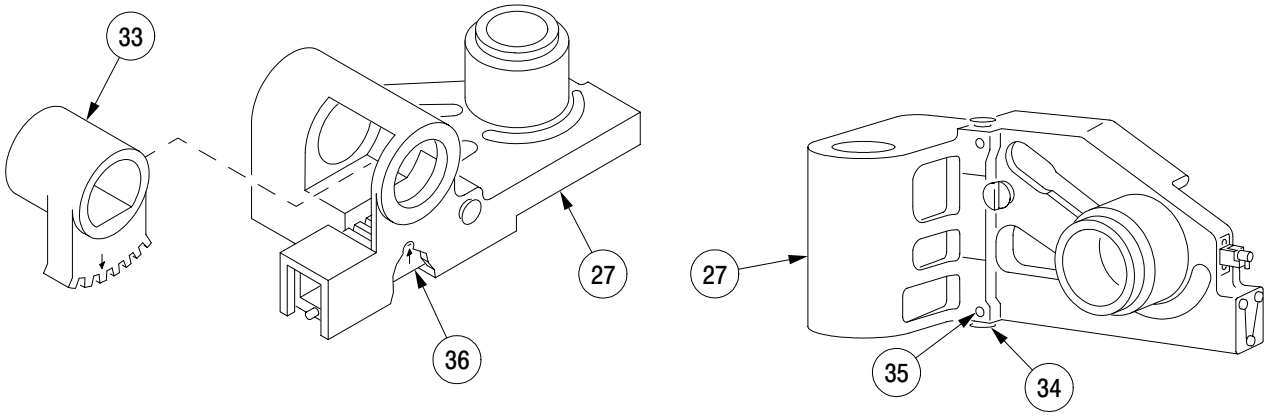
c. Assembly – Continued

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

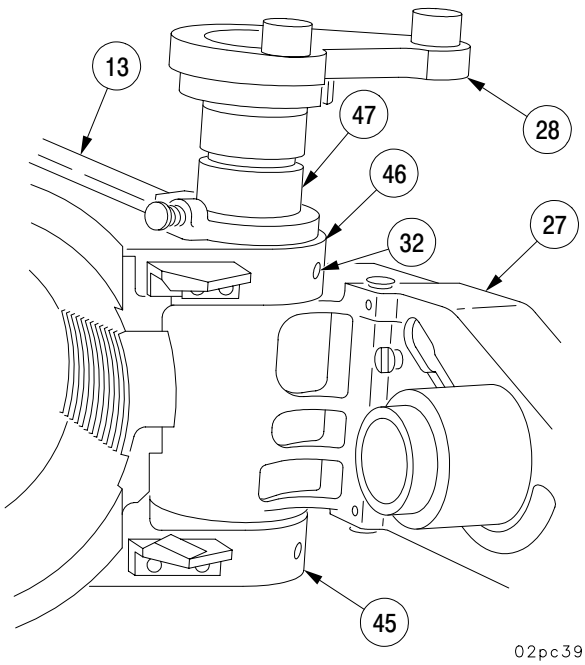
11 Place carrier assembly (27) between lower breech ring lug (45) and upper breech ring lug (46) and align operating crank assembly holes.

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.

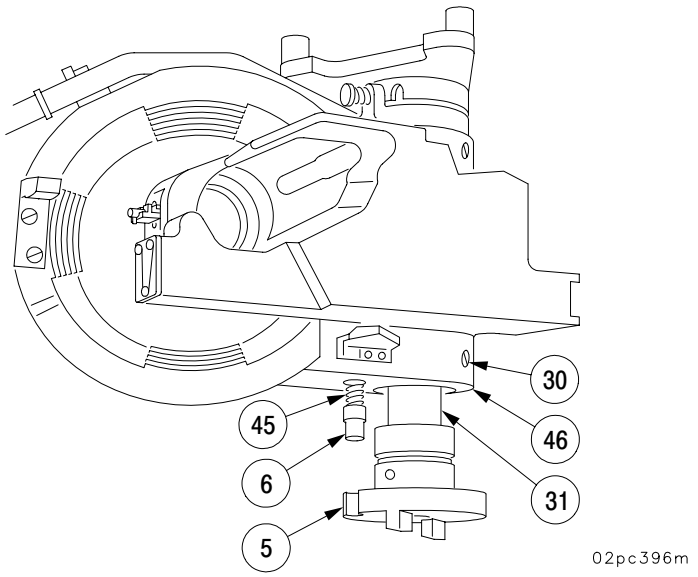
13 Install operating crank detent (32) engaging annular grove (47) of operating crank assembly (28).



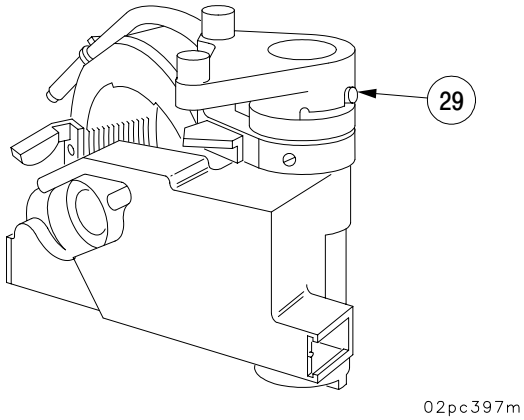
4–15 BREECH MECHANISM – CONTINUED

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).



4–15 BREECH MECHANISM – CONTINUED

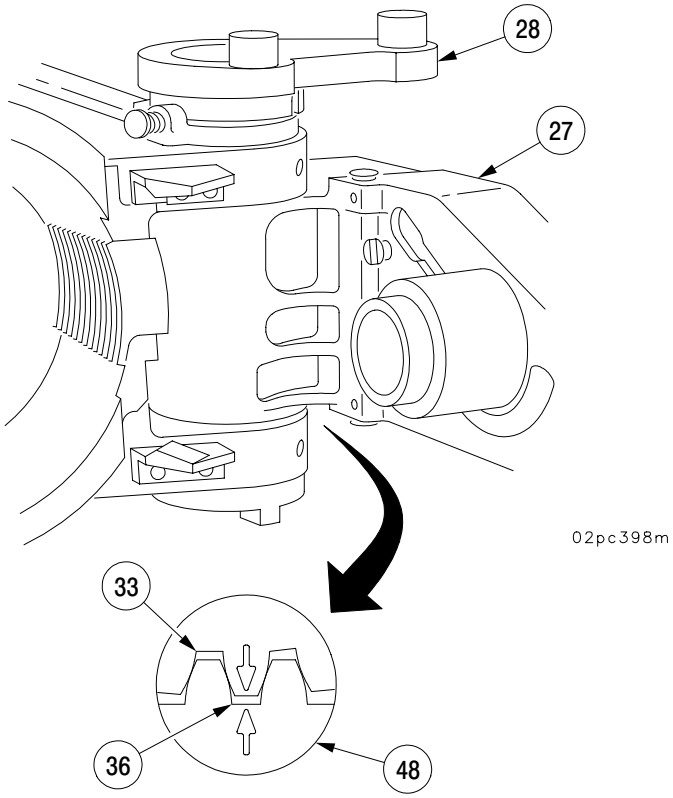
c. Assembly – Continued

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.



4–15 BREECH MECHANISM – CONTINUED

c. Assembly – Continued

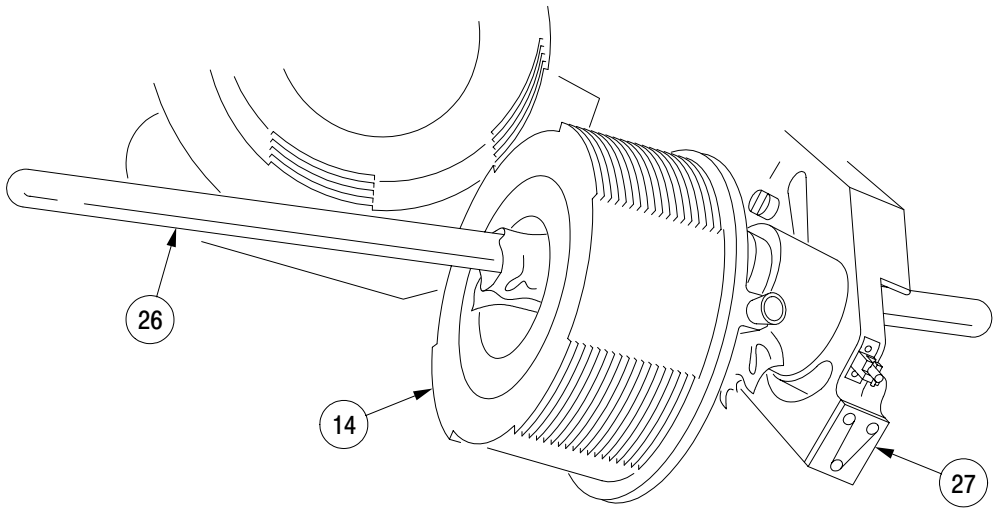
WARNING

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.



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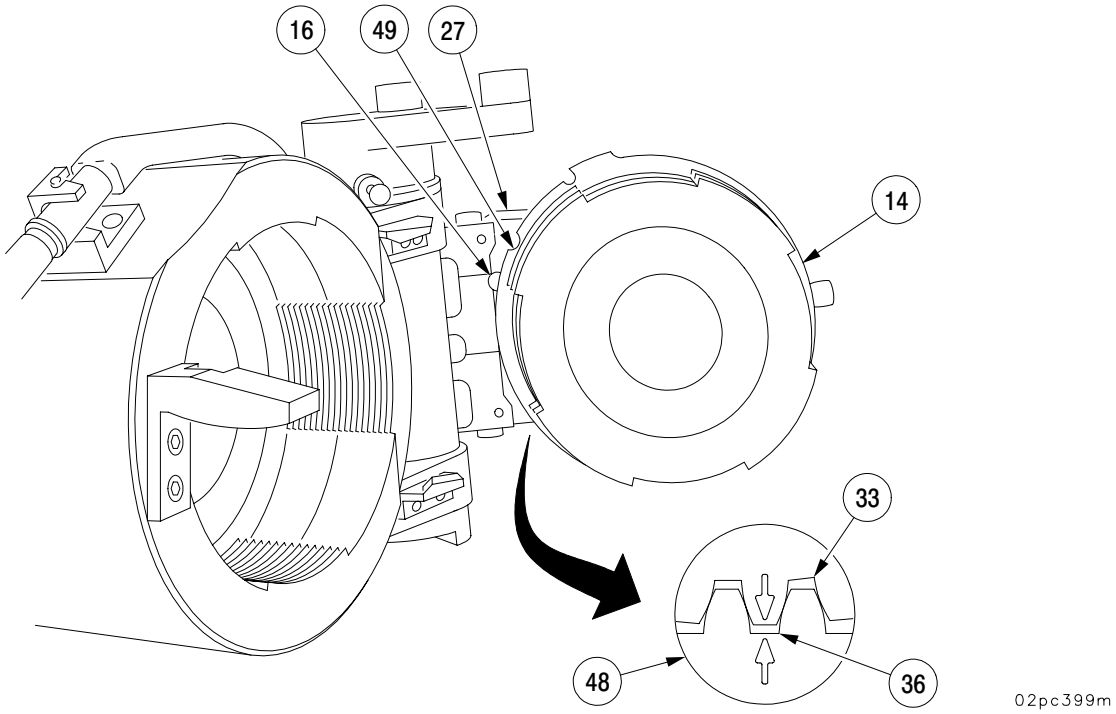
4–15 BREECH MECHANISM – CONTINUED

c. Assembly – Continued

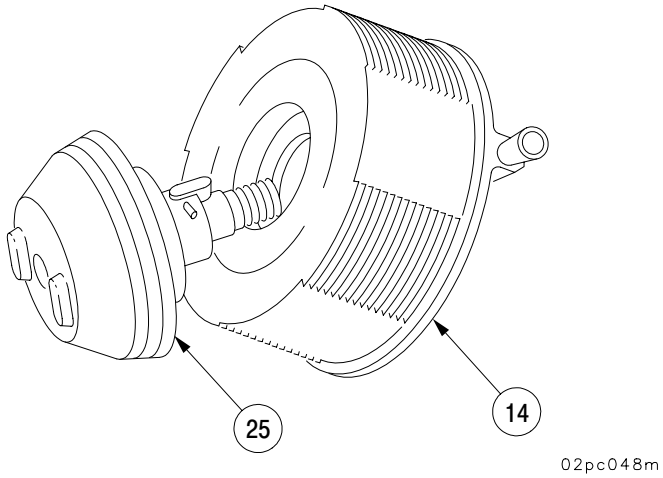
21 With carrier assembly (27) in fully open position, align closing lug (49) with detent plunger (16). With arrows on spur gear (33) and rack (36) aligned in center of inspection hole (48), slide breechblock (14) completely onto carrier assembly. Recheck alignment marks.



NOTE

Make sure split rings on the spindle assembly are aligned 180° apart.

22 Install spindle assembly (25) into breechblock (14).



4–15 BREECH MECHANISM – CONTINUED

c. Assembly – Continued

WARNING

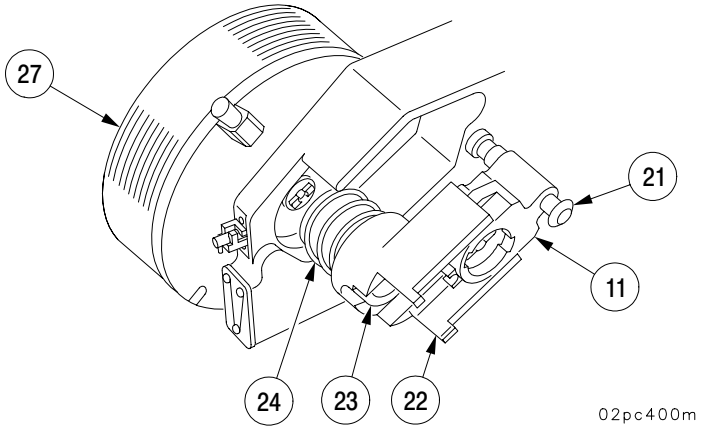
The follower group has a safety interlock which keeps the block from moving to the firing position until breechblock is fully closed. The follower must be in good working condition and properly assembled in firing mechanism to make sure safety works.

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.

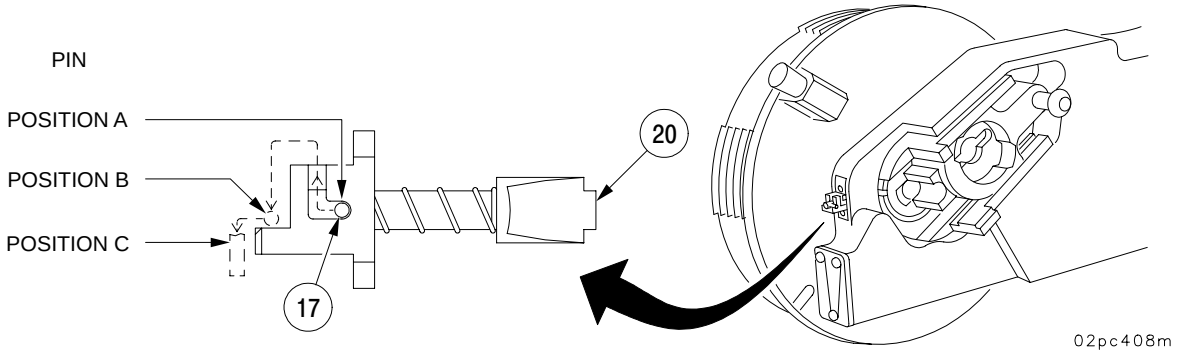
25 Support firing block assembly (11) and firing mechanism housing (22). Install obturator nut (23) with spanner wrench.

26 Rotate plunger pin (17) from position C to position A to seat plunger tip (20) into narrow slot of obturator nut (23).



NOTE

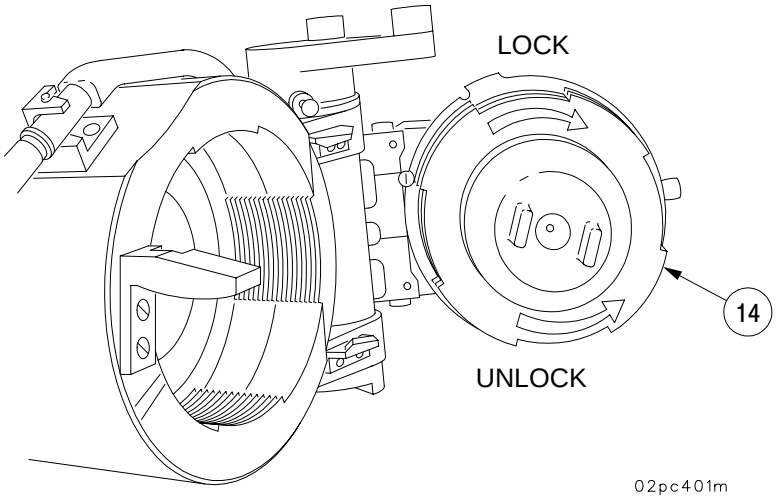
Ensure that plunger tip seats in narrow slot of obturator nut (23).



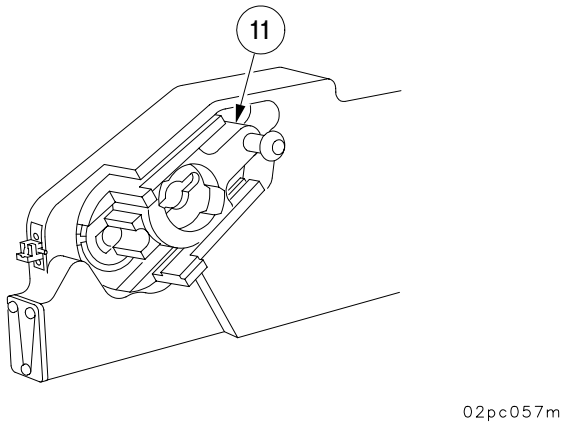
4–15 BREECH MECHANISM – CONTINUED

c. Assembly – Continued

27 Rotate breechblock (14) clockwise to the LOCK position. Make sure carrier detent plunger is extended.



28 Slide firing block assembly (11) to center position.



4–15 BREECH MECHANISM – CONTINUED

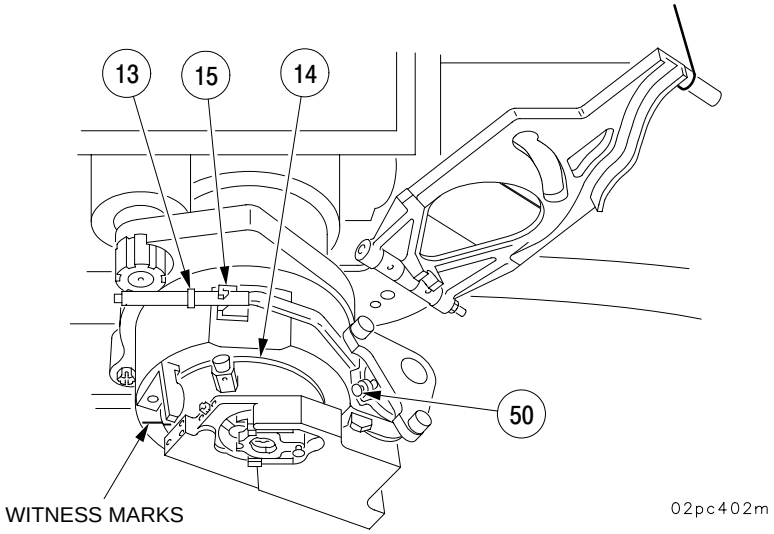
c. Assembly – Continued

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.

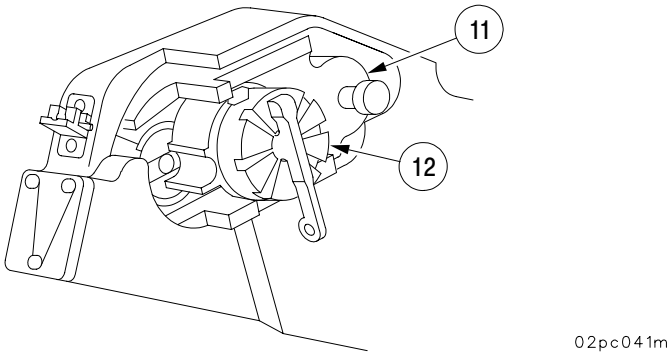
30 Return breech operating handle (13) to stop (15).

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.



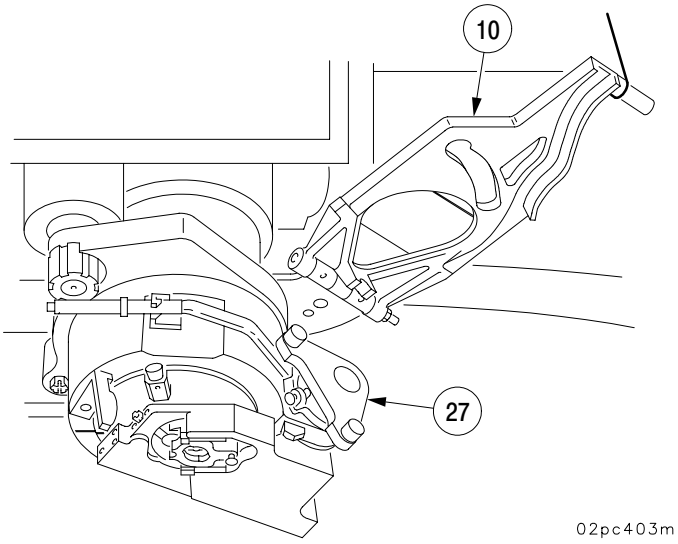
31 With firing block assembly (11) in center position, insert firing mechanism (12) and rotate counterclockwise until locked.



4–15 BREECH MECHANISM – CONTINUED

c. Assembly – Continued

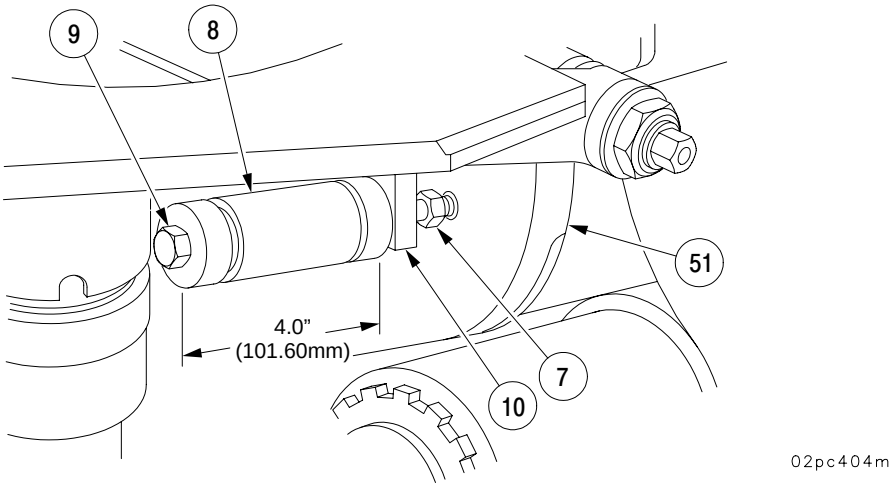
32 Remove strap and lower breech mechanism operating cam (10) onto operating crank assembly (27).



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).



4–15 BREECH MECHANISM – CONTINUED

c. Assembly – Continued

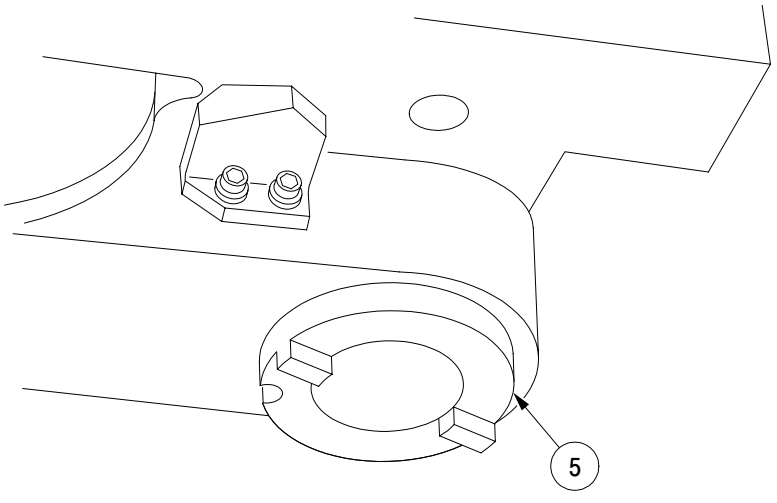
CAUTION

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.



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4–15 BREECH MECHANISM – CONTINUED

c. Assembly – Continued

WARNING

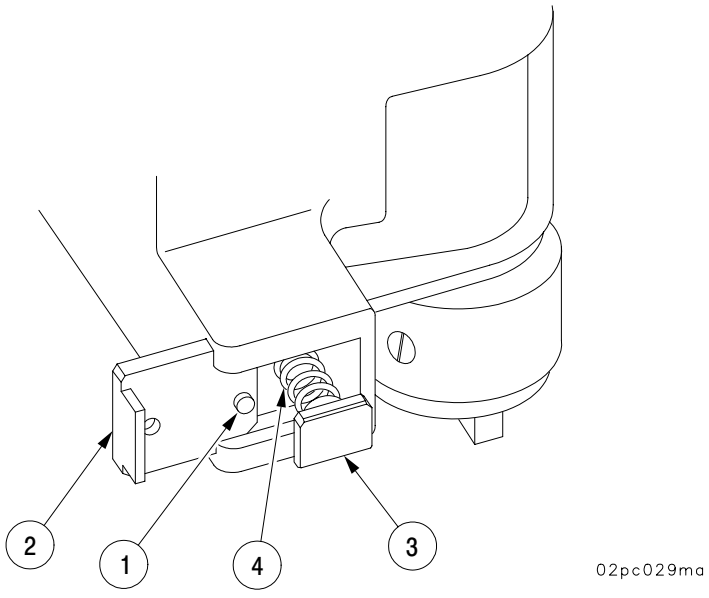
Failure to insure proper installation of rack springs and plates could cause injury to personnel during operation of breechblock.

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.



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)

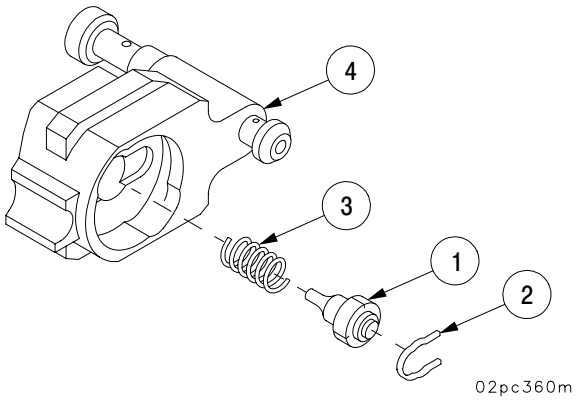
a. Disassembly

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

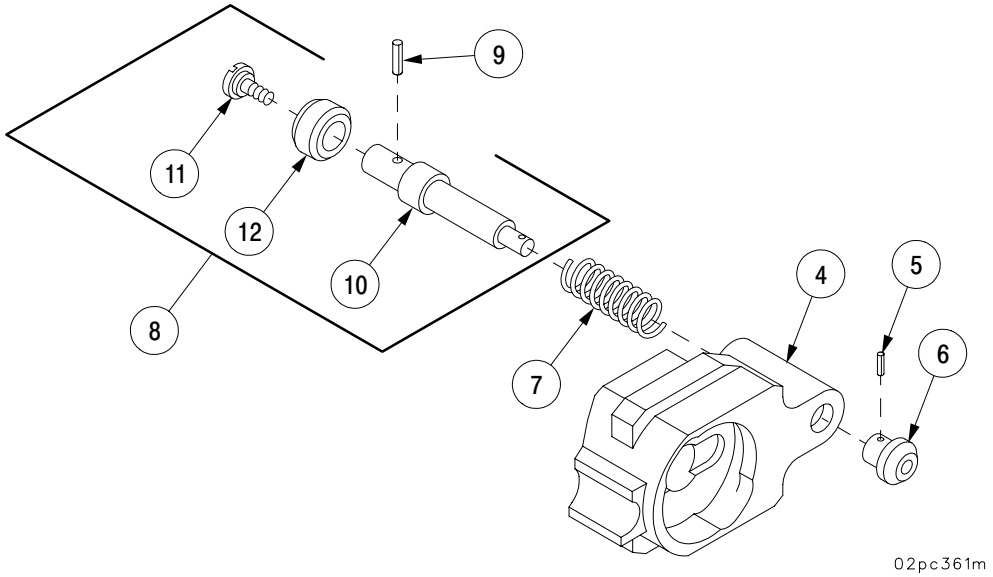
a. Disassembly – Continued

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.

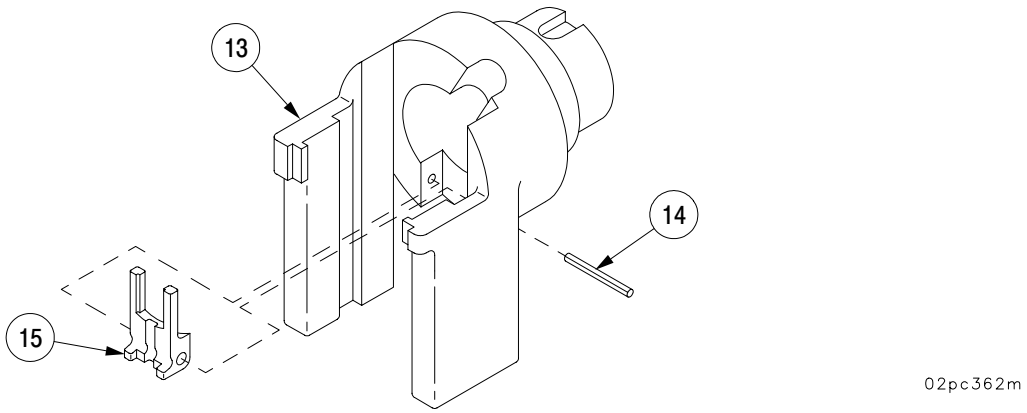
6 Remove screw (11) and roller (12) from shaft (10).



7 Place housing (13) on solid surface.

8 Remove spring pin (14). Discard spring pin.

9 Remove extractor (15).



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.

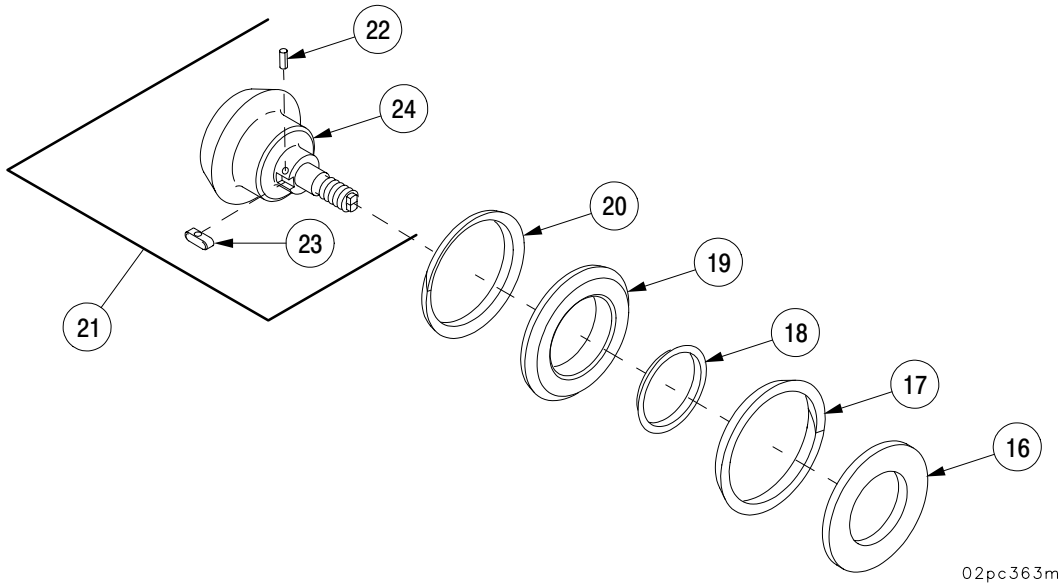
12 Remove spring pin (22) from key (23) and spindle shaft (24). Discard spring pin.

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.

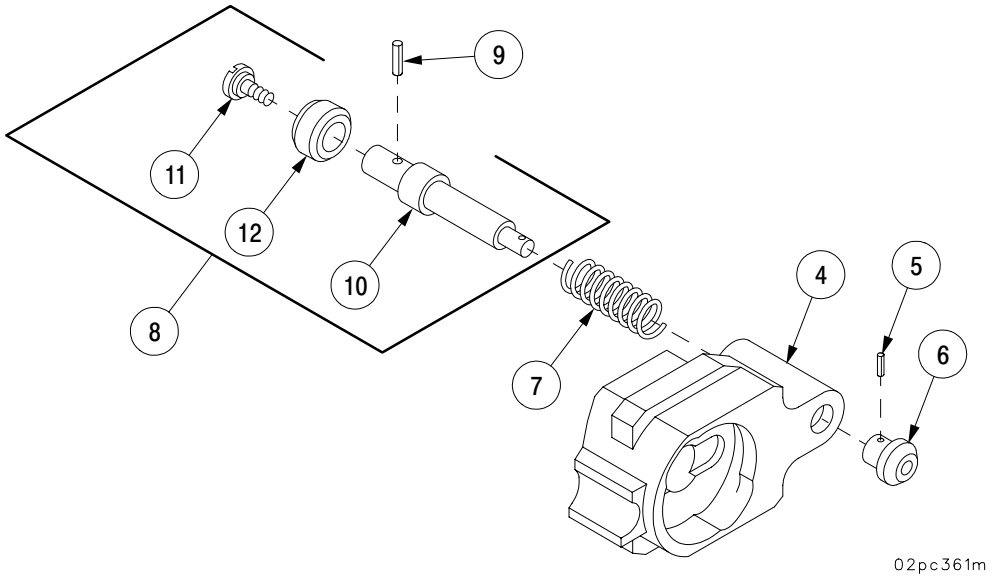


4–16 FIRING MECHANISM HOUSING, FIRING BLOCK ASSEMBLY, AND SPINDLE ASSEMBLY – CONTINUED

b. Assembly – Continued

3 Install extractor (15) in housing (13).

4 Install new spring pin (14).

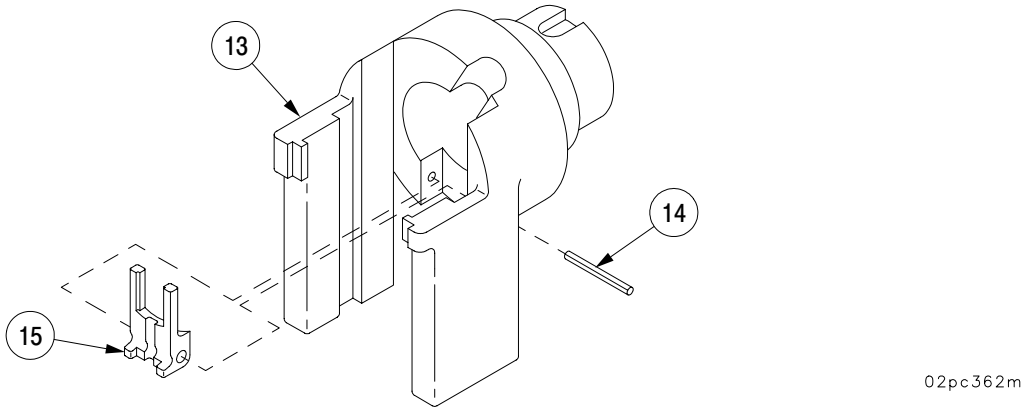


5 Install roller (12) and screw (11) onto shaft (10).

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).



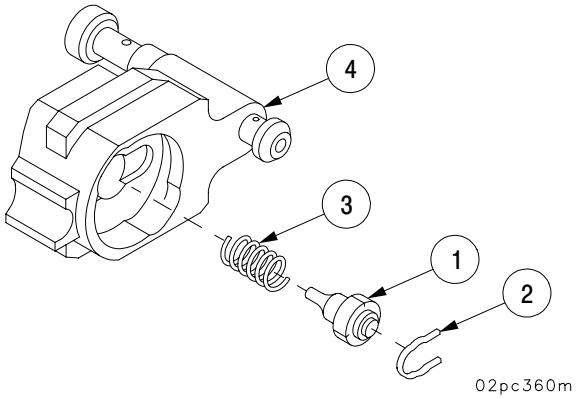
4–16 FIRING MECHANISM HOUSING, FIRING BLOCK ASSEMBLY, AND SPINDLE ASSEMBLY – CONTINUED

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).

4–17 CARRIER AND PLUNGER ASSEMBLIES – CONTINUED

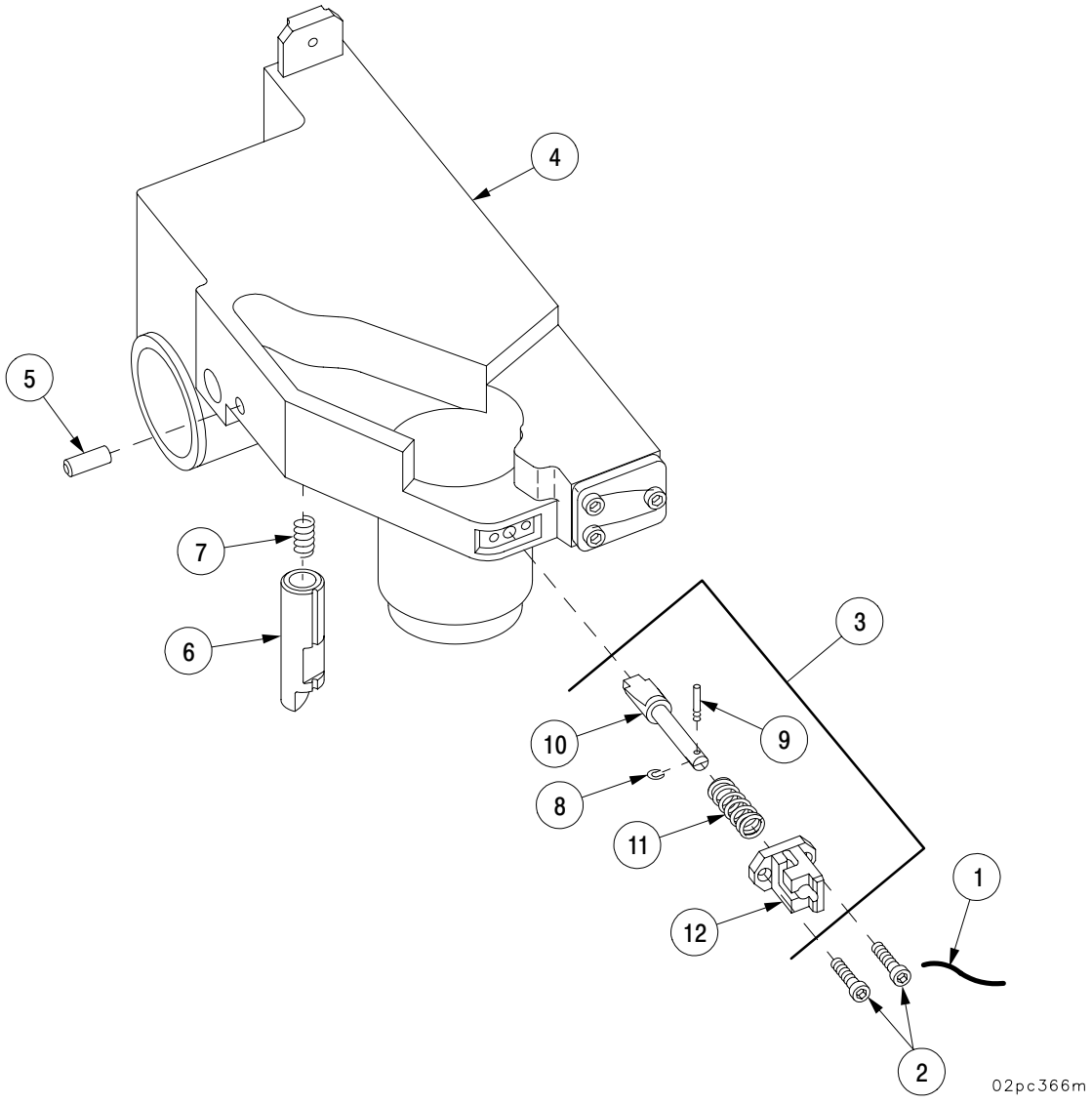
d. Installation.

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. Disassembly c. Assembly d. Installation

INITIAL SETUP

Tools
Artillery and turret mechanic's tool kit
(SC 5180–95–A12)

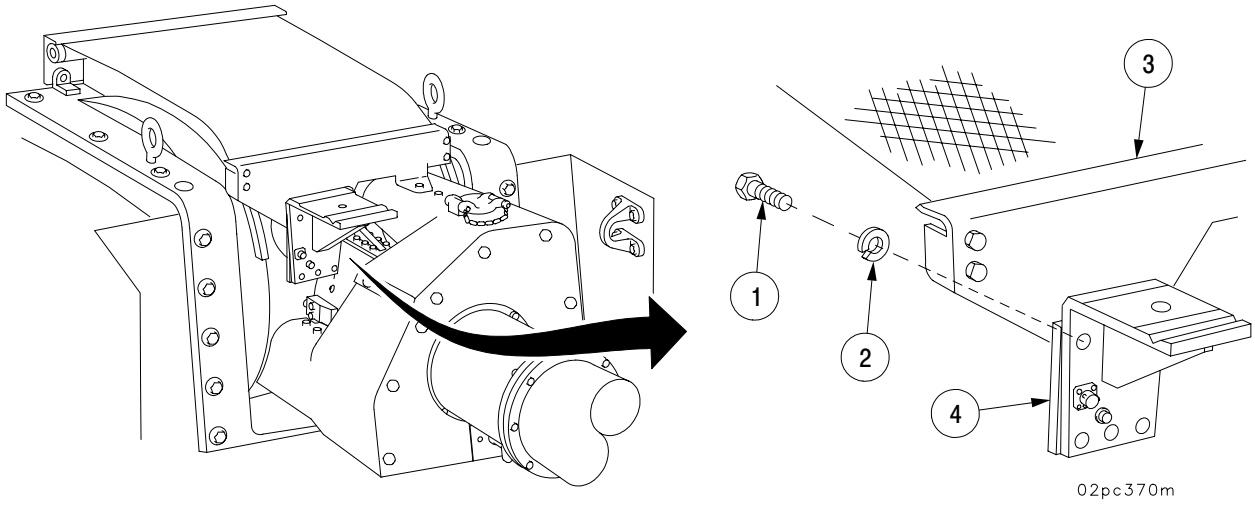
Materials/Parts
Lockwashers (4) (item 129, Appx F)
Spring pin (item 48, Appx F)
Spring pin (item 50, Appx F)
Lockwashers (4) (item 128, Appx F)
Lockwashers (2) (item 132, Appx F)
Solid film lubricant (item 55, Appx C)
Lockwasher (item 131, Appx F)

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.

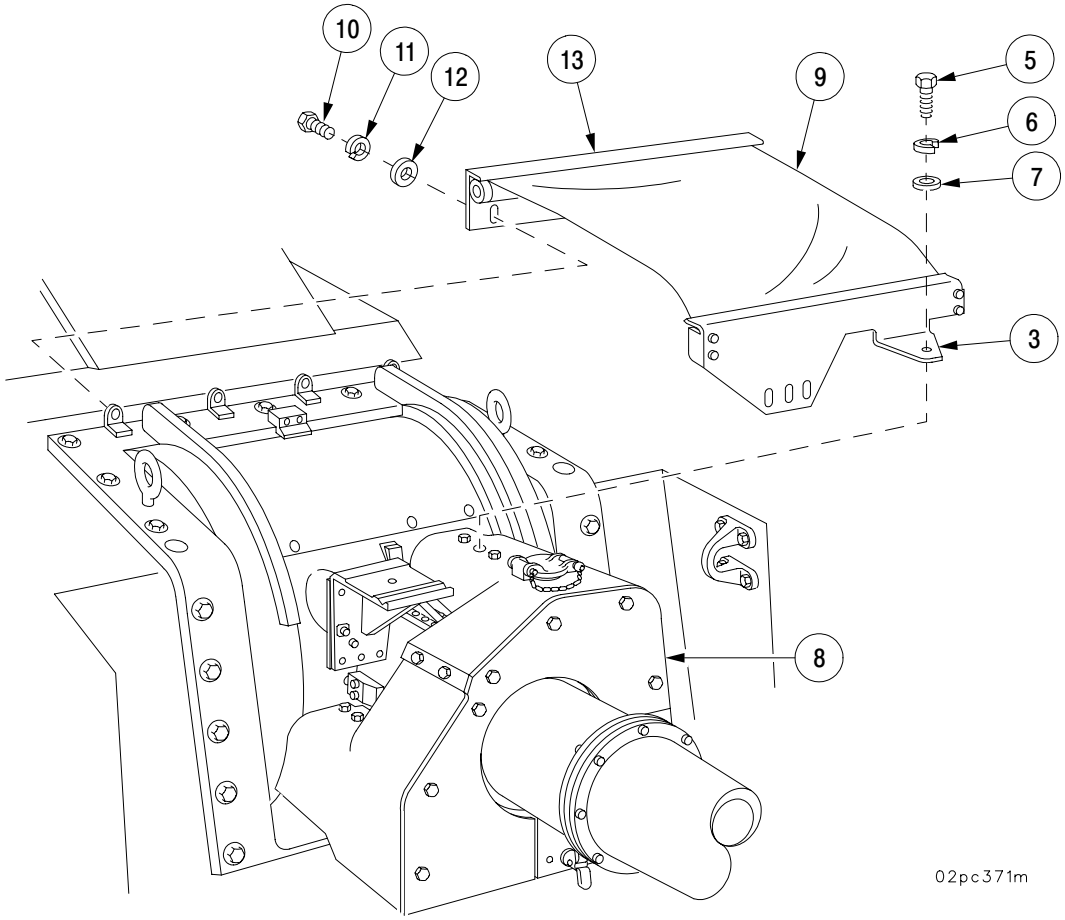


4–18 CURTAIN ROLLER ASSEMBLY – CONTINUED

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.



4–18 CURTAIN ROLLER ASSEMBLY – CONTINUED

NOTE

When the right mounting bracket is removed from the angle bracket, tension on the helical spring will cause the mounting bracket to rotate four revolutions clockwise.

b. Disassembly.

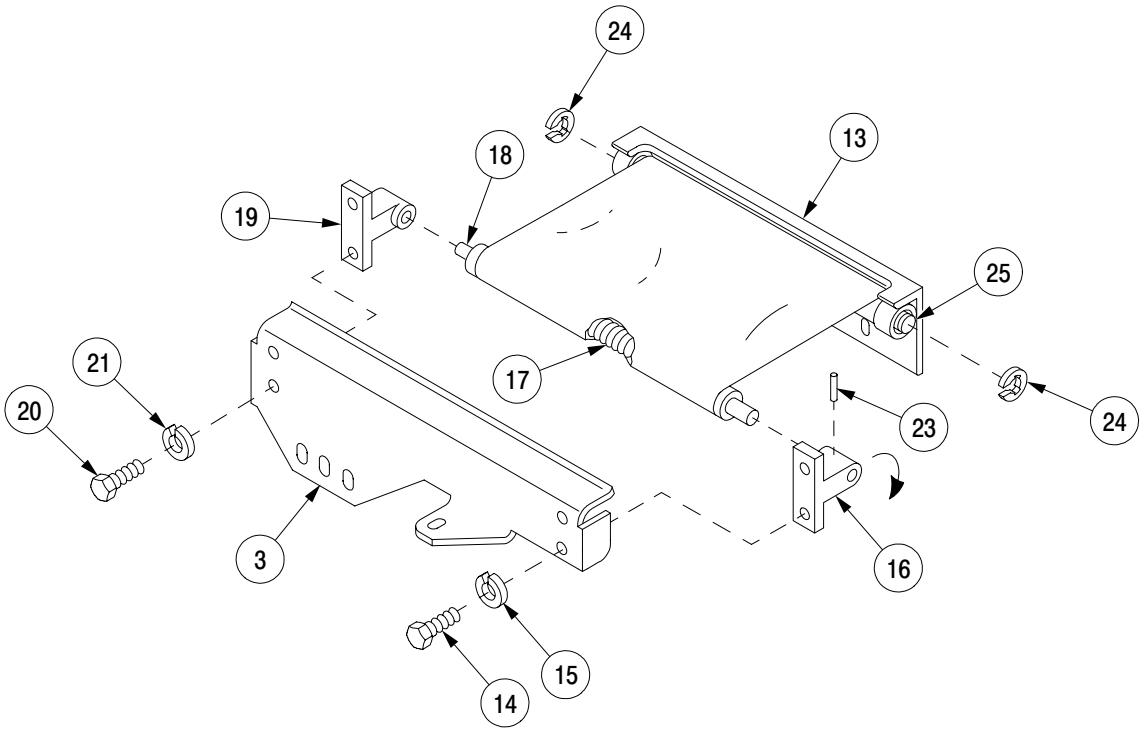
1 Remove two screws (14) and two lockwashers (15), and slowly rotate right mounting bracket (16) clockwise until tension is relieved on helical spring (17). Discard lockwashers.

2 Slide end of shaft (18) out of left mounting bracket (19) and remove roller assembly (13).

3 Remove two screws (20), two lockwashers (21), and left mounting bracket (19) from curtain support bracket (3). Discard lockwashers.

4 Remove spring pin (23) and right mounting bracket (16) from shaft (18). Discard spring pin.

5 Remove two retaining rings (24) from shaft (25).



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4–18 CURTAIN ROLLER ASSEMBLY – CONTINUED

b. Disassembly– Continued

6 Remove shaft (25) from angle bracket (26) and curtain (9).

7 Unroll curtain (9) and remove two screws (27) from tube (28).

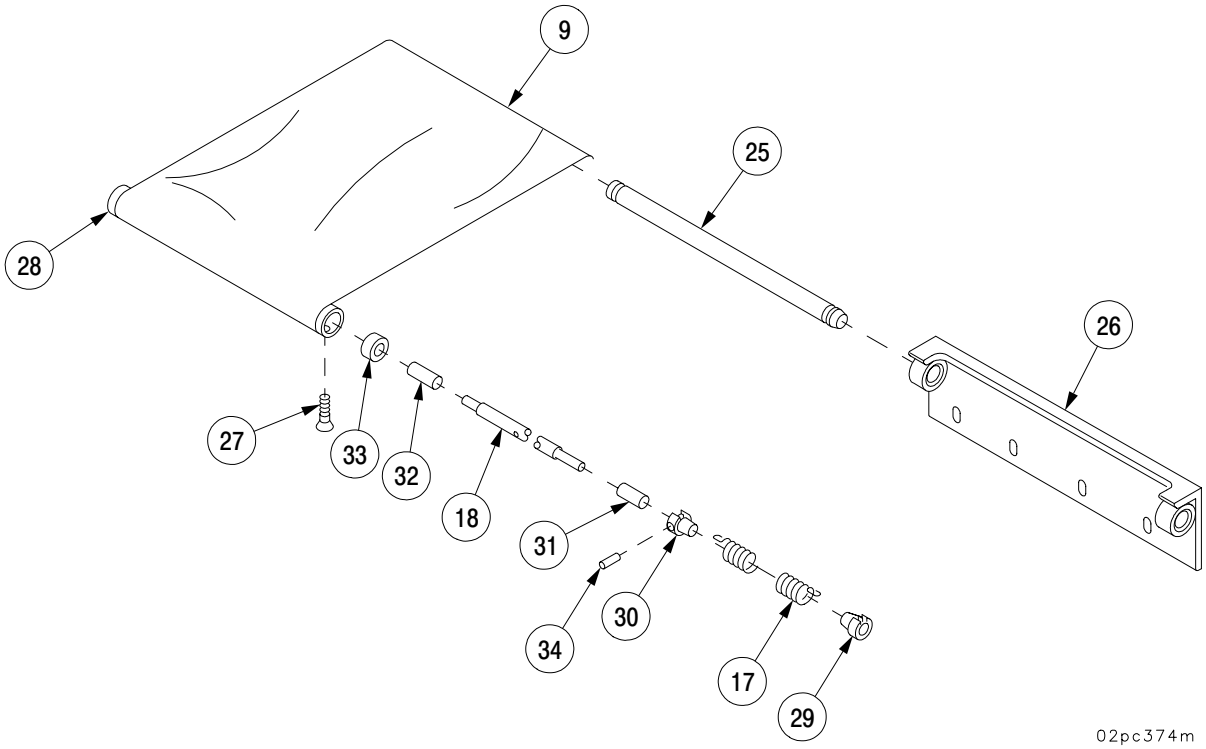
8 Slide shaft (18) with spring anchor (29), helical spring (17), spring anchor (30), bushing (31), bushing (32), and shaft collar (33) from tube (28).

9 Remove shaft collar (33), bushing (32), and bushing (31) from shaft (18).

10 Detach helical spring (17) from spring anchor (29) and spring anchor (30).

11 Remove spring anchor (29) and helical spring (17) from shaft (18).

12 Remove spring pin (34) from spring anchor (30). Remove spring anchor (30) from shaft (18). Discard spring pin.



4–18 CURTAIN ROLLER ASSEMBLY – CONTINUED

c. Assembly.

1 Install spring anchor (30) on shaft (18) and secure with new spring pin (34).

2 Install shaft collar (33) and bushing (32) on shaft (18).

3 Apply solid film lubricant over assembled parts.

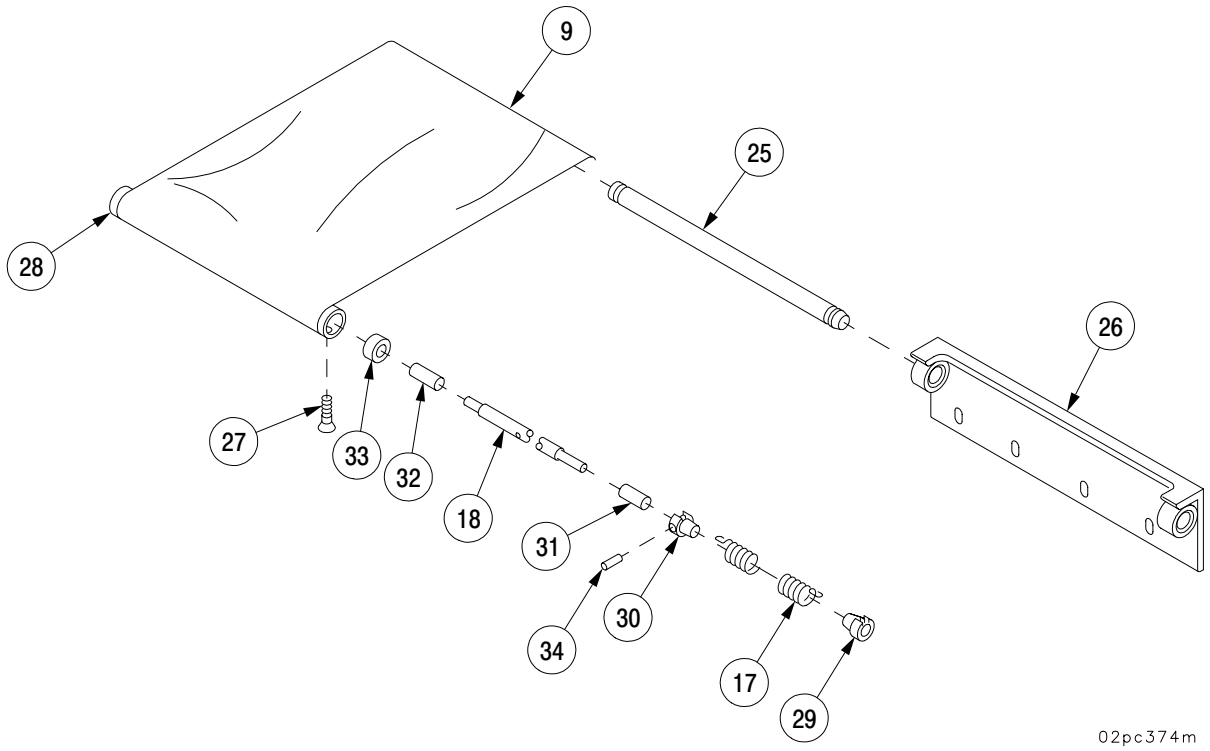
4 Install helical spring (17) and spring anchor (29) on shaft (18). Attach helical spring to spring anchor (30) and spring anchor (29).

5 Install bushing (31) on shaft (18).

6 Slide assembled parts (shaft (18), spring anchor (29), helical spring (17), spring anchor (30), bushing (31), bushing (32), and shaft collar (33)) into tube (28).

7 Align holes in tube (28) with holes in spring anchor (29) and shaft collar (33). Install two screws (27).

8 Install shaft (25) in curtain (9) and angle bracket (26).



4–18 CURTAIN ROLLER ASSEMBLY – CONTINUED

c. Assembly – Continued

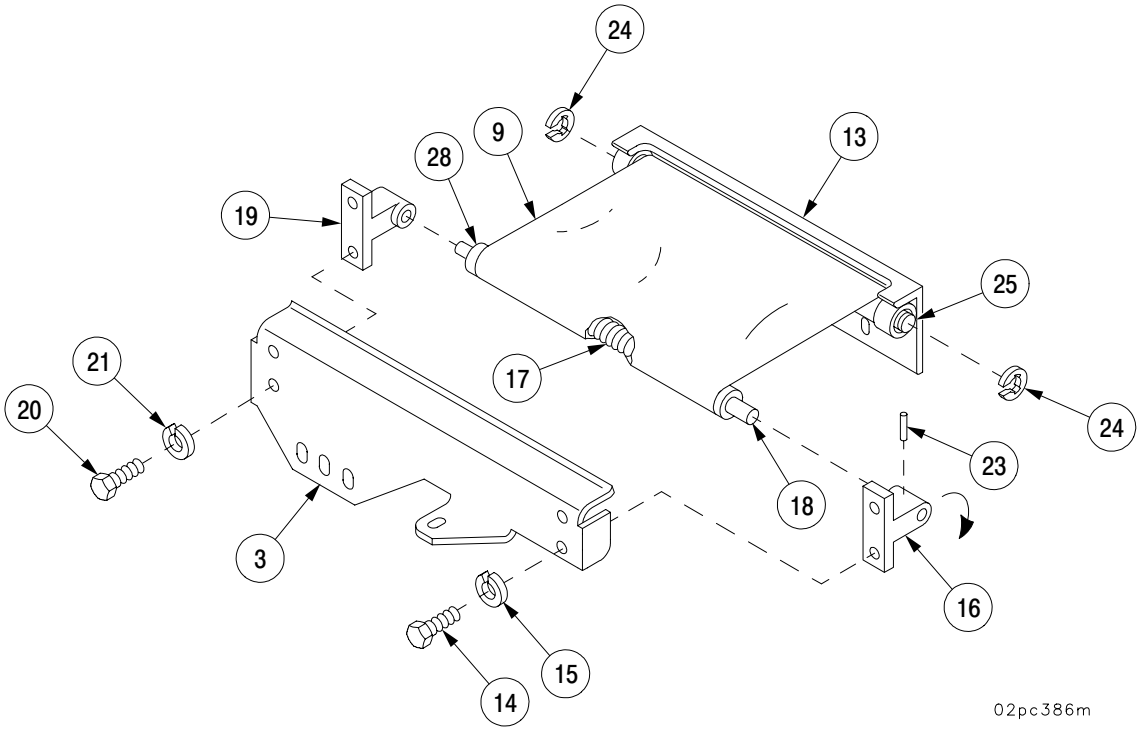
9 Install two retaining rings (24) on shaft (25).

10 Roll curtain (9) onto tube (28).

11 Install right mounting bracket (16) on shaft (18) and secure with new spring pin (23).

12 Install left mounting bracket (19) on curtain support (3) with two new lockwashers (21) and two screws (20).

13 Install roller assembly (13) by inserting end of shaft (18) into left mounting bracket (19). Wind right curtain bracket (16) four turns counterclockwise and install on curtain support bracket (3) with two new lockwashers (15) and two screws (14).



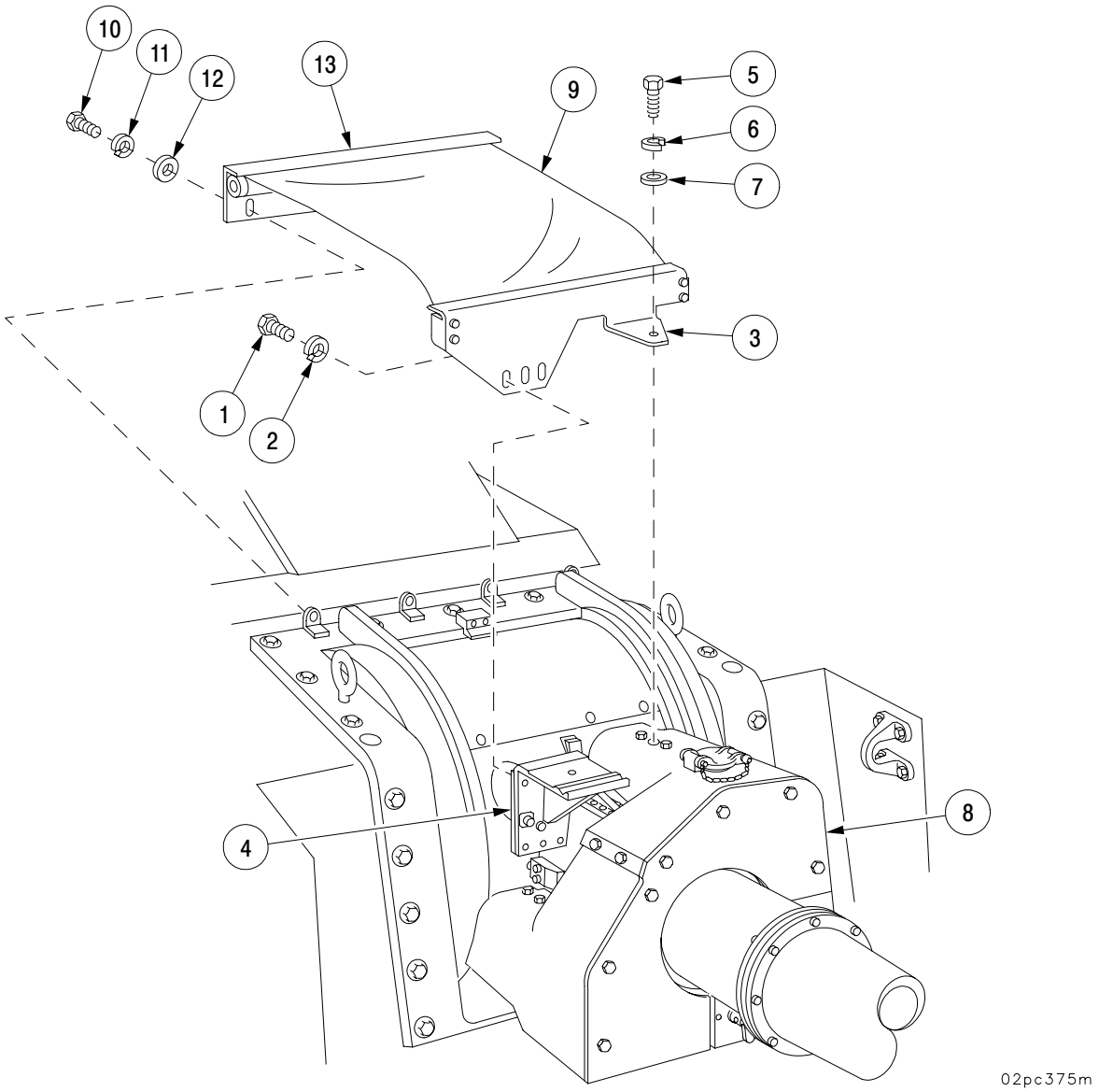
4–18 CURTAIN ROLLER ASSEMBLY – CONTINUED

d. 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).



4–19 SUPPORT BACKING STRIP AND SEAL.

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)

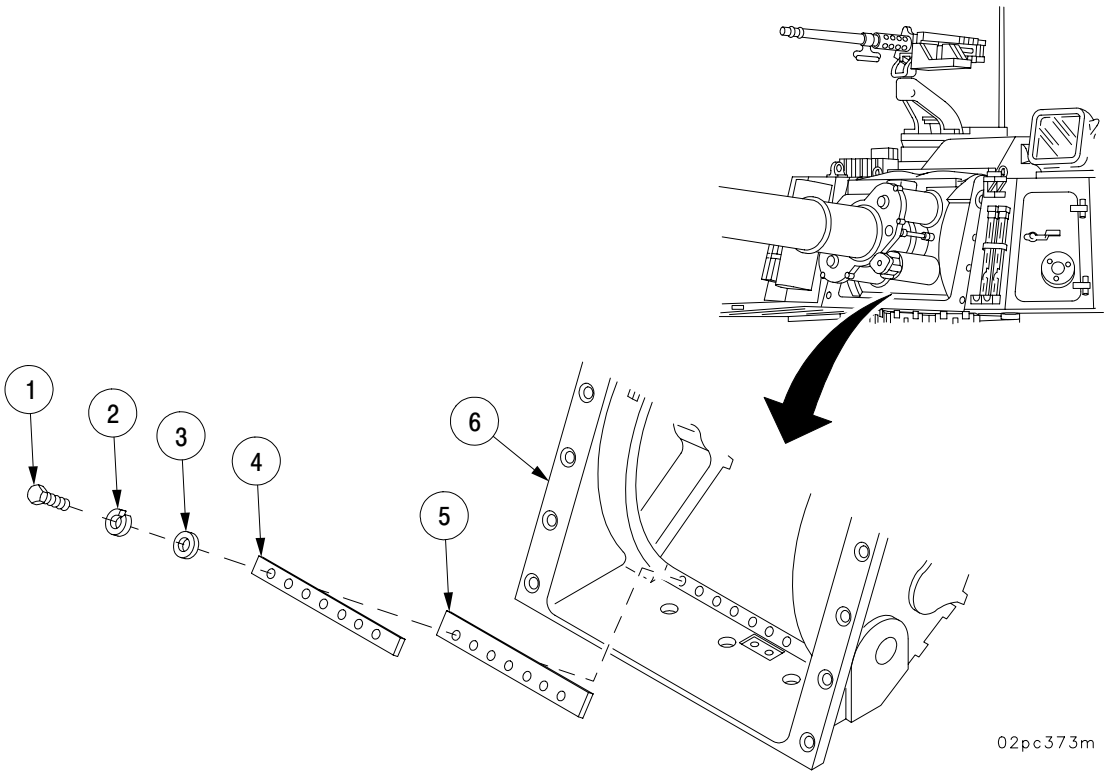
Materials/Parts
Lockwashers (7) (item 128, Appx F)

a. Removal.

Remove seven screws (1), seven lockwashers (2), seven flat washers (3), backing strip (4), and rubber seal (5) from trunnion bracket (6). Discard seven lockwashers.

b. Installation.

Install rubber seal (5), backing strip (4), seven flat washers (3), seven new lockwashers (2), and seven screws (1) onto trunnion bracket (6).



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.

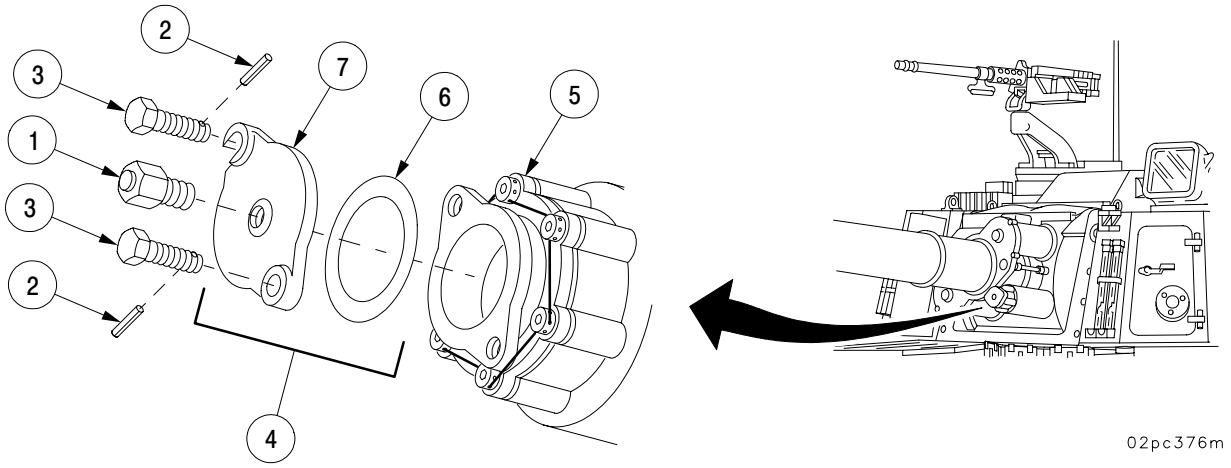
b. Installation.

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).



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)

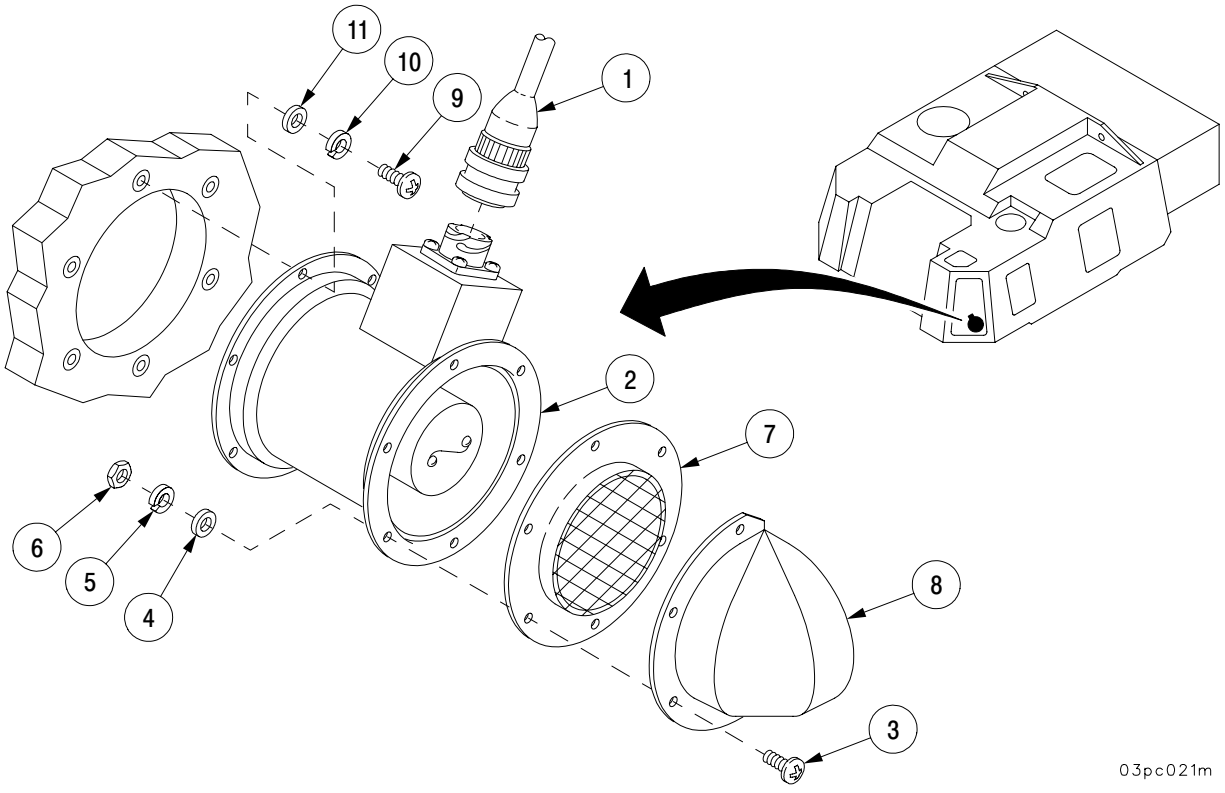
Equipment Conditions
Vehicle MASTER power switch OFF (TM 9–2350–314–10)
Battery ground leads disconnected (TM 9–2350–314–20–1–2)
Hydraulic access door opened (TM 9–2350–314–10)

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.



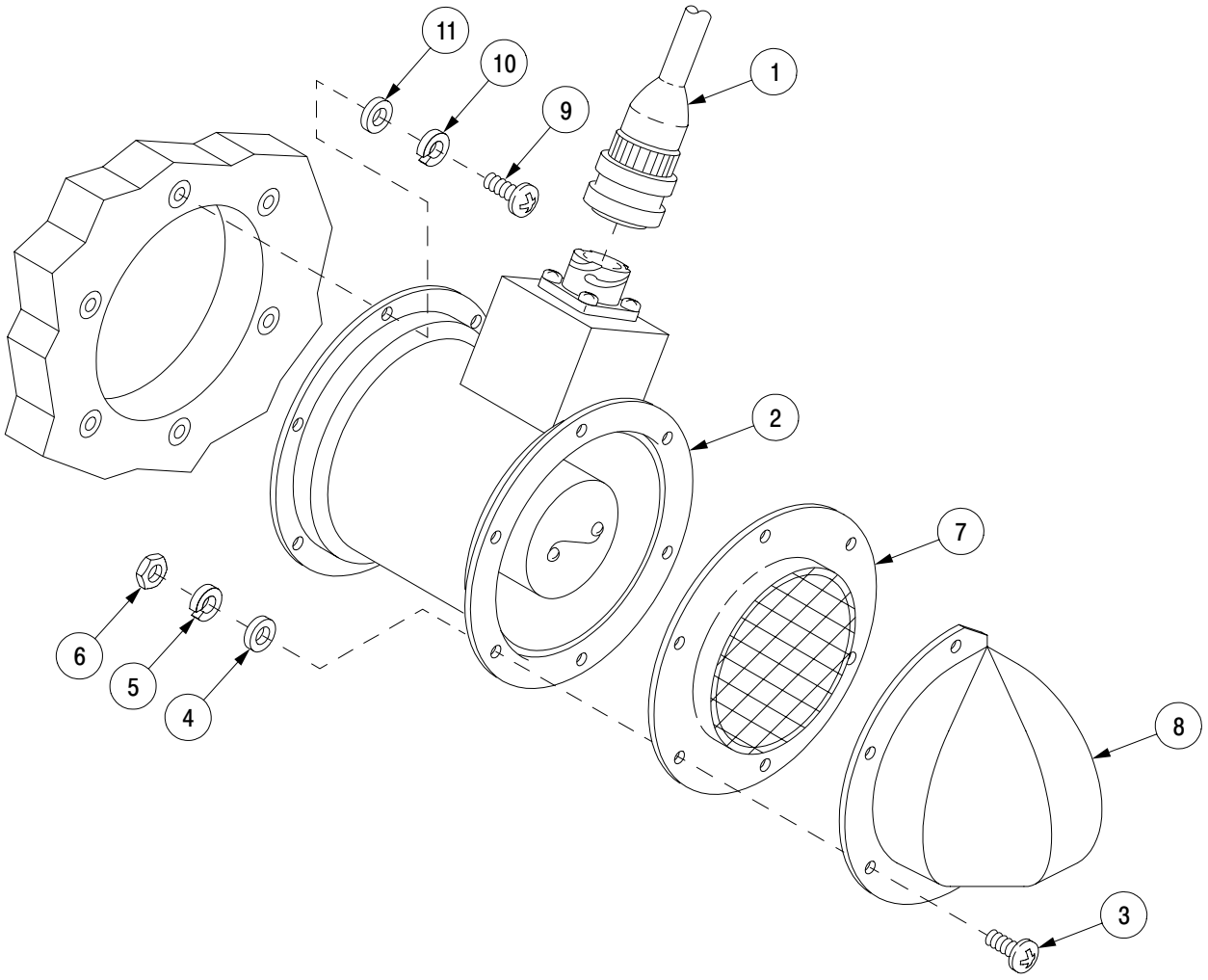
5–1 HYDRAULIC COMPARTMENT COOLING FAN – CONTINUED

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).



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.

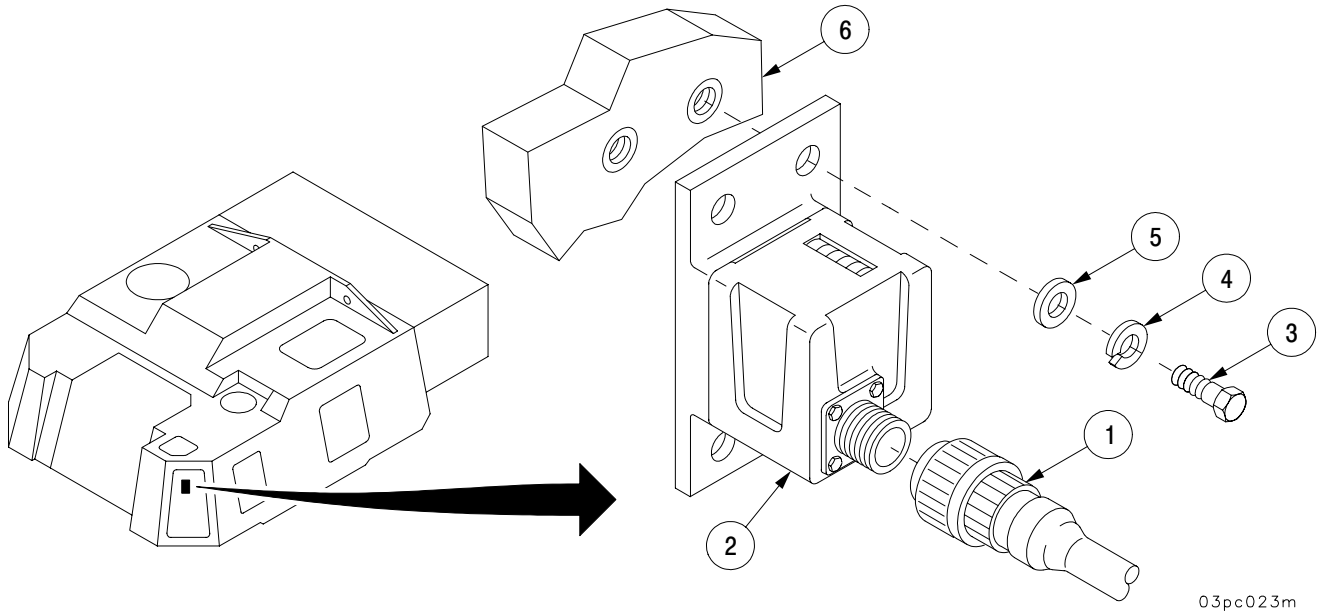
3 Remove time meter (2).

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.

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 126, Appx F)
Lockwashers (2) (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)

a. Removal.

NOTE

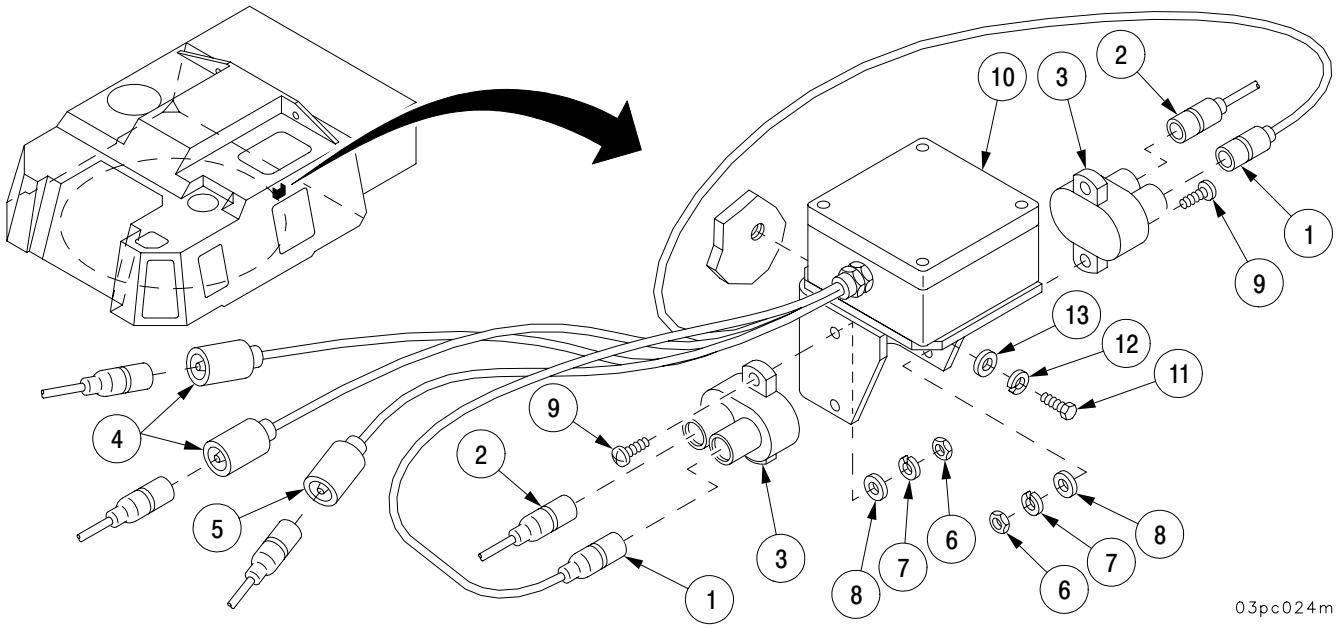
Tag leads before disconnecting to aid in installation.

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 harness W67 and interlock control lead 70 (5) from 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.



5–3 M3 HEATER CIRCUIT BREAKERS AND INTERLOCK CONTROL – CONTINUED

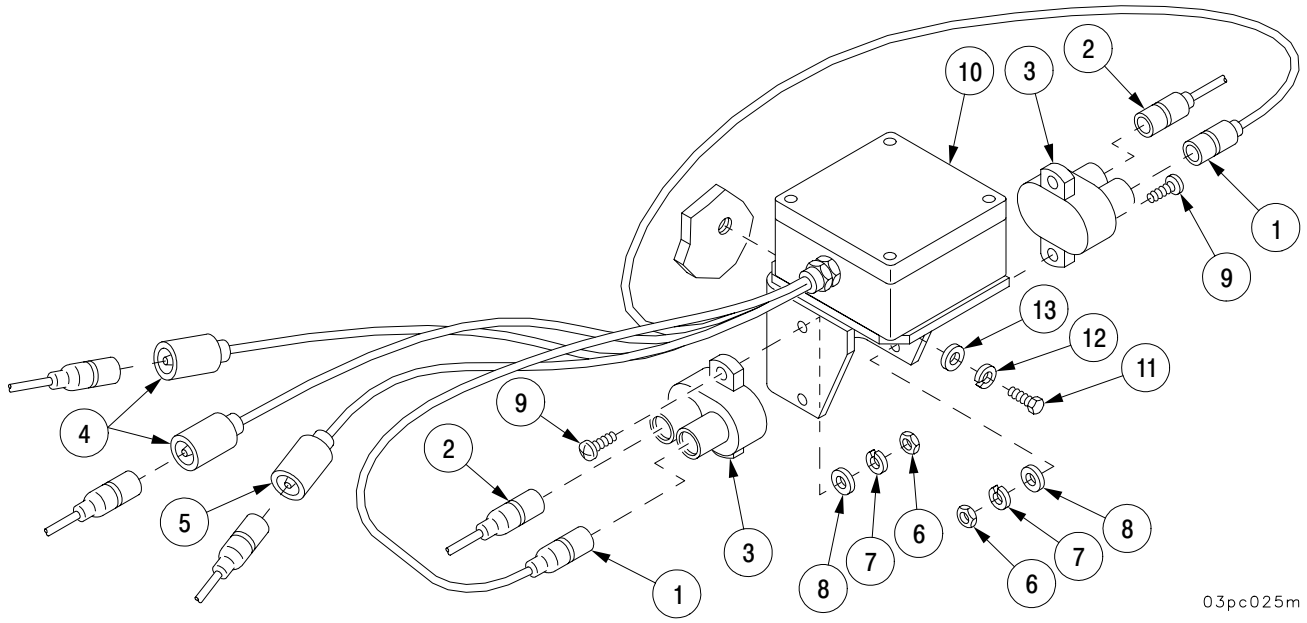
b. Installation.

1 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 harness W67 and interlock control lead 70 (5) to harness W58.

4 Connect two interlock control leads (1) and two wiring harness W67 leads (2) to two circuit breakers (3).



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.

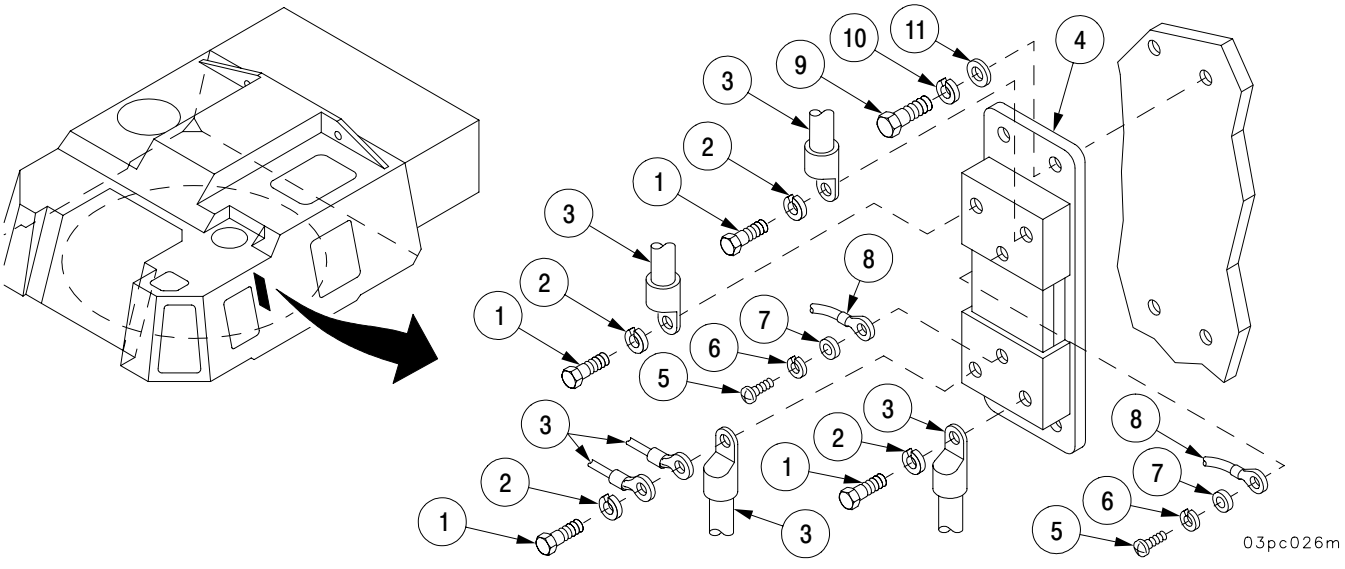
NOTE
Tag leads before disconnecting to aid in installation.

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. Discard lockwashers.

4 Remove shunt (4) from cab.



5–4 INSTRUMENT GROUND SHUNT – CONTINUED

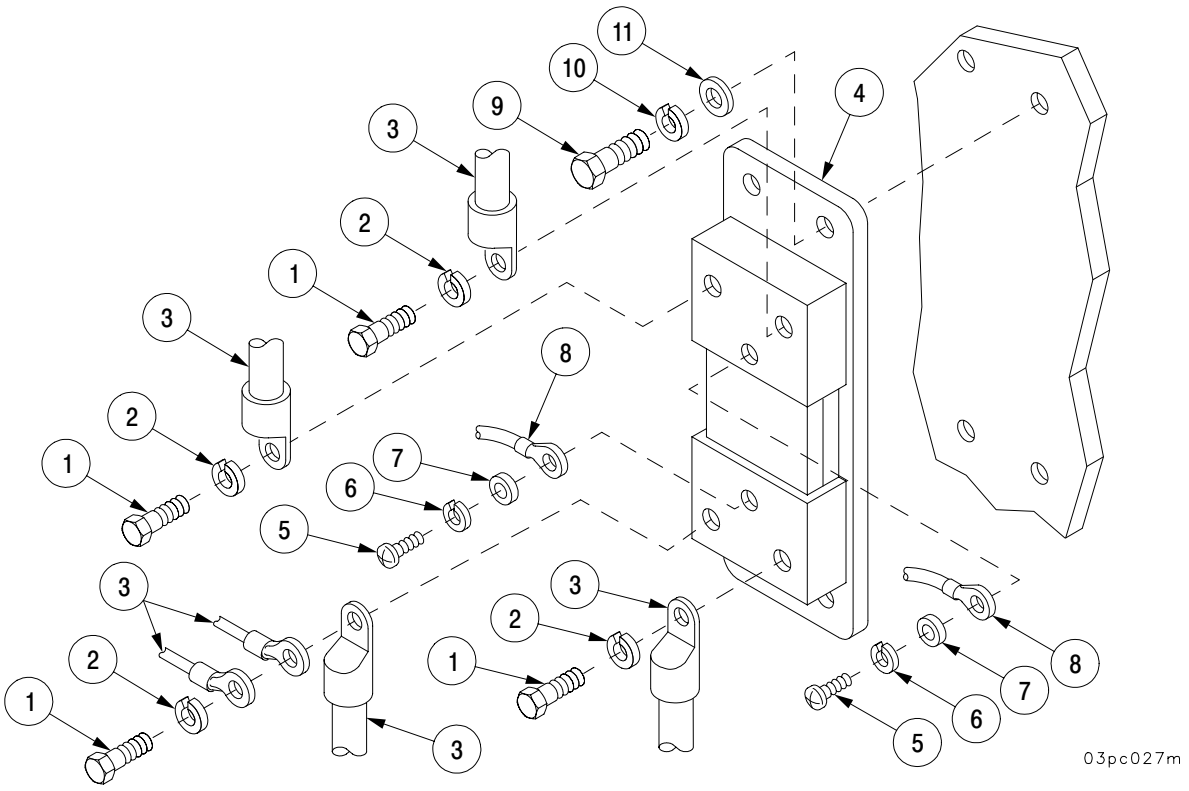
b. Installation.

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.

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 (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).

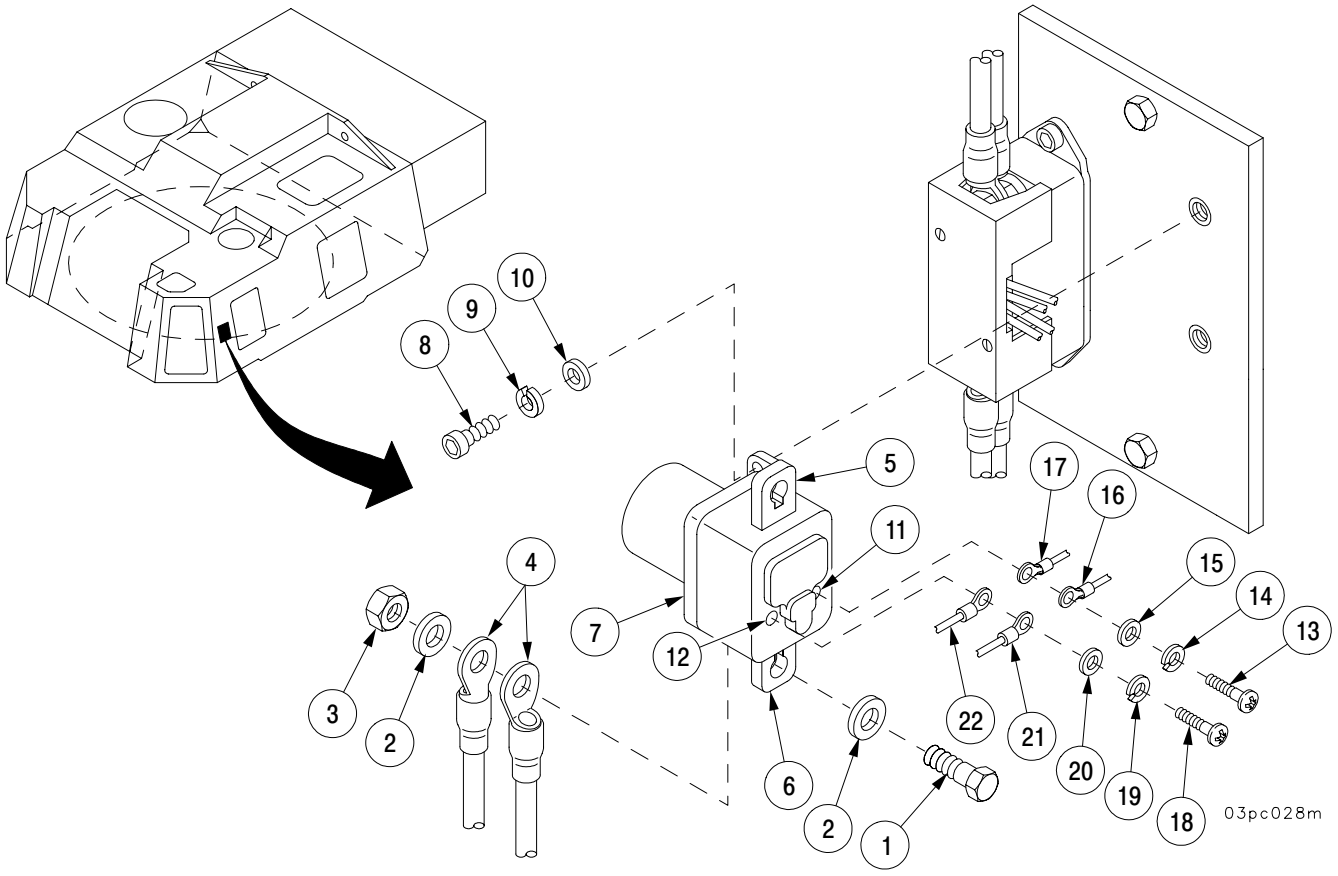
3 Connect leads 645B (16) and 645C (17) to terminal X1 (11) with screw (13), new lockwasher (14), and flat washer (15) (screw, lockwasher, and flat washer supplied with power relay).

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

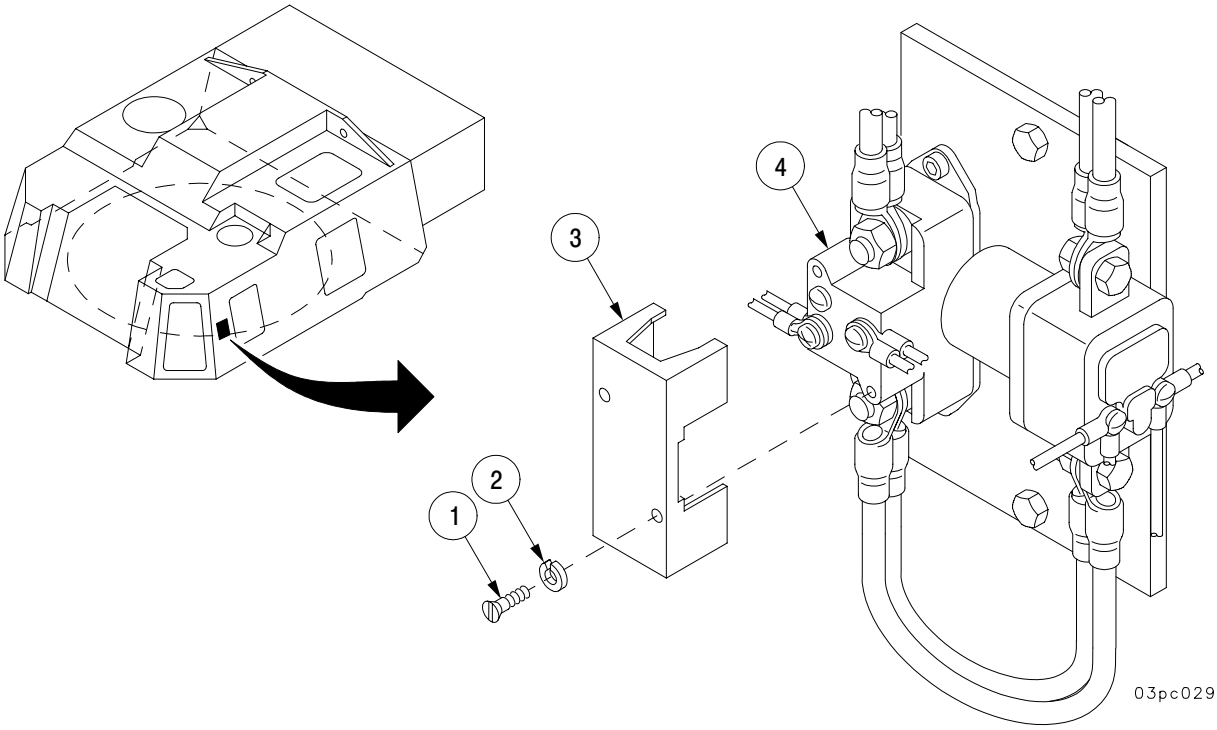
Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)

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.

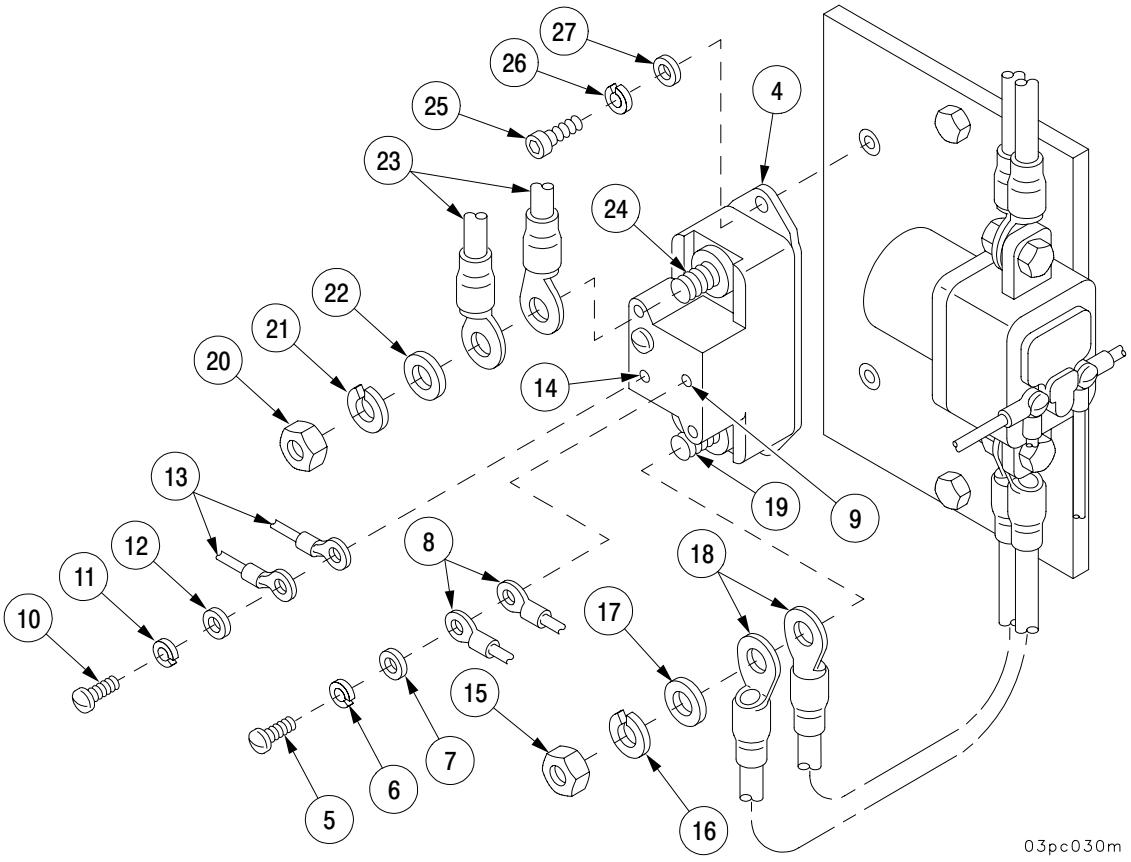
2 Remove screw (5), lockwasher (6), and flat washer (7) securing leads, 645 and 778 (8), to terminal S1 (9) (screw, lockwasher, and flat washer supplied with circuit breaker).

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.



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).

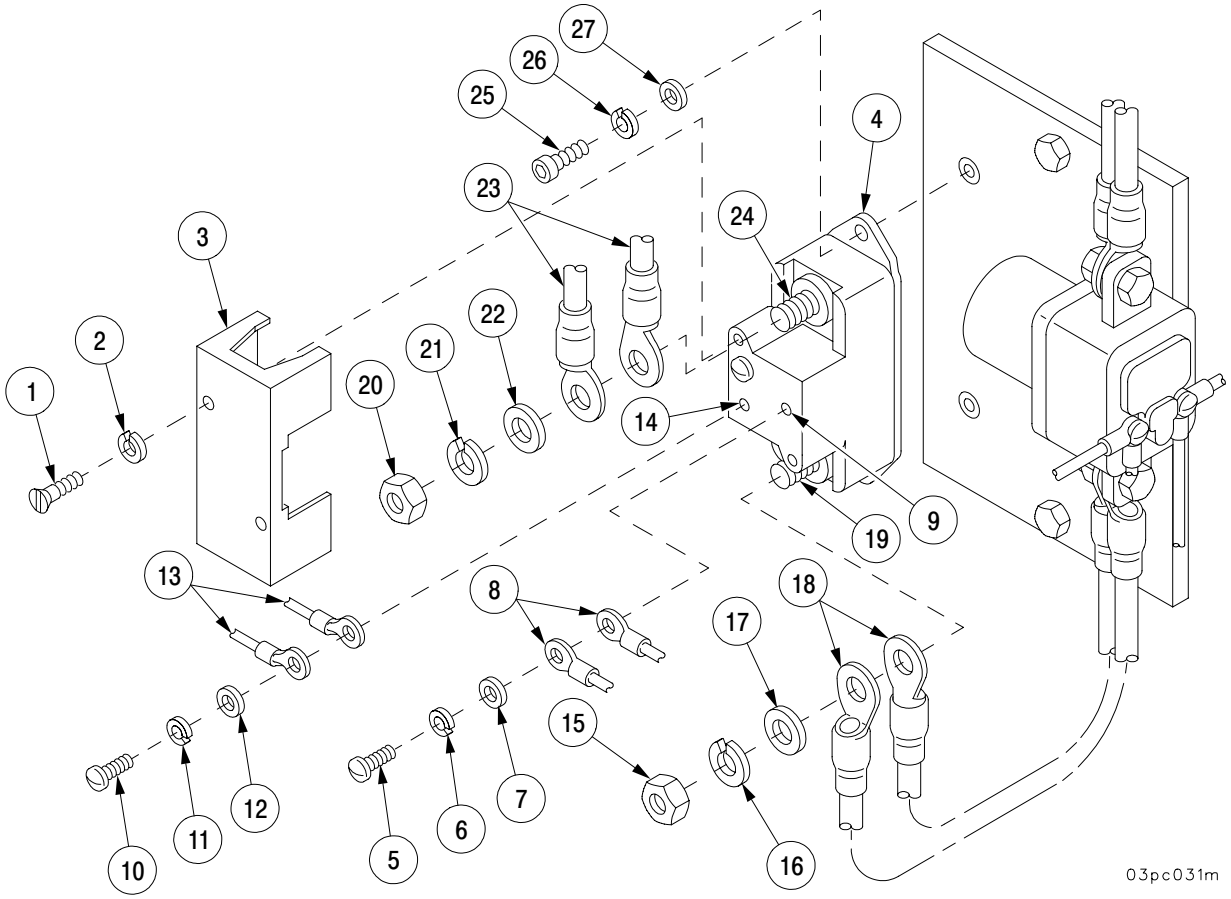
2 Connect two leads 100 (23) to terminal L2 (24) (to motor) with nut (20), lockwasher (21), and flat washer (22) supplied with circuit breaker.

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).



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)

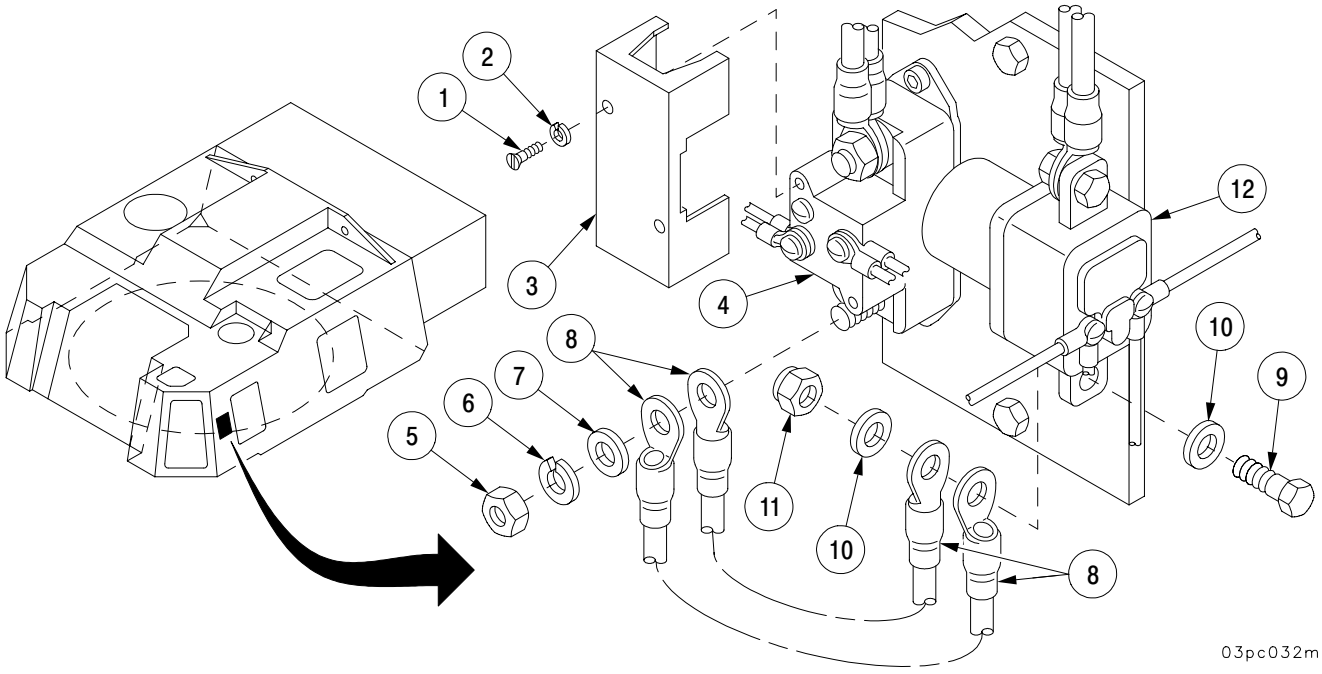
Equipment Conditions
Vehicle MASTER power switch OFF (TM 9–2350–314–10)
Battery ground leads disconnected (TM 9–2350–314–20–1–2)
Hydraulic compartment door open (TM 9–2350–314–10)
Hydraulic compartment access cover removed (para 19–2)

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.



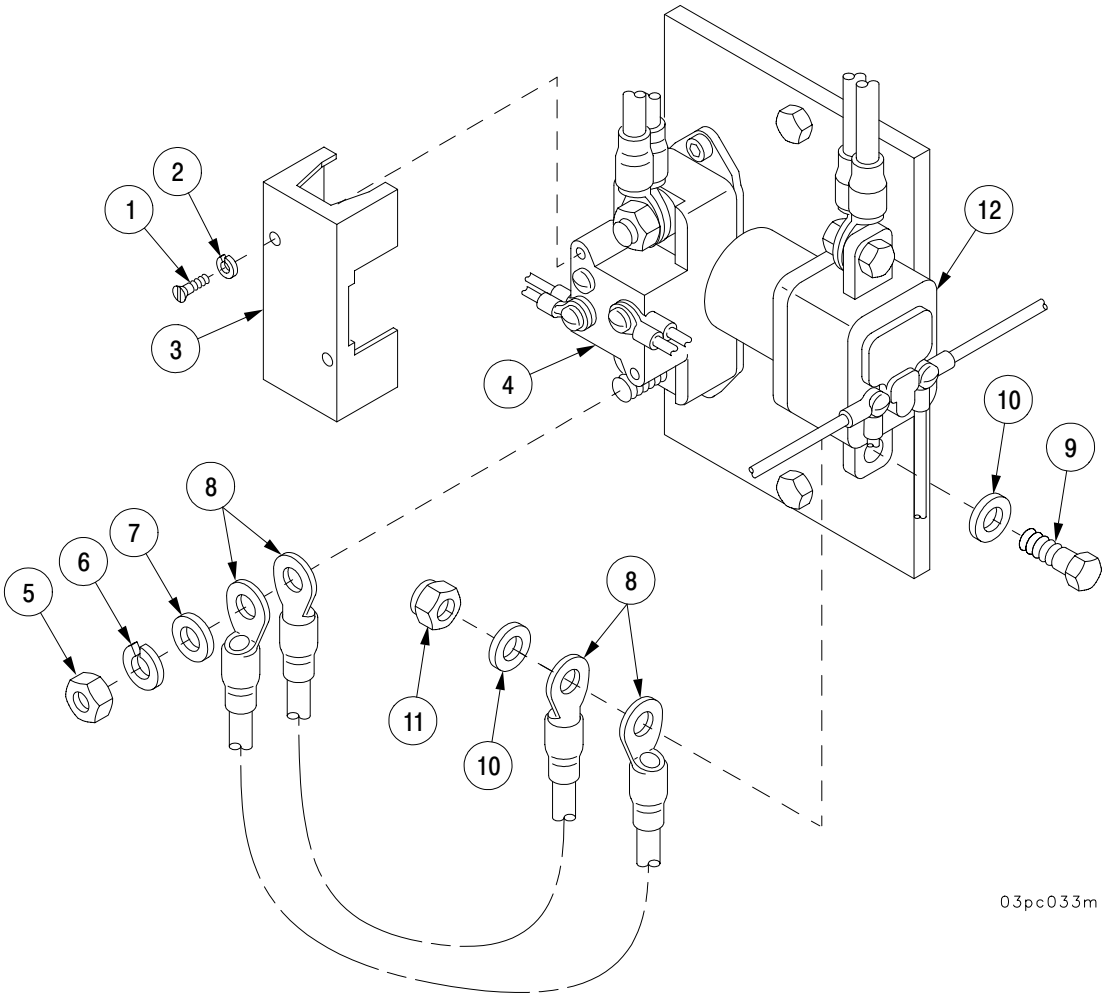
5–7 HYDRAULIC PUMP MOTOR RELAY TO HYDRAULIC PUMP MOTOR CIRCUIT BREAKER LEADS – CONTINUED

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 (17) 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).



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)

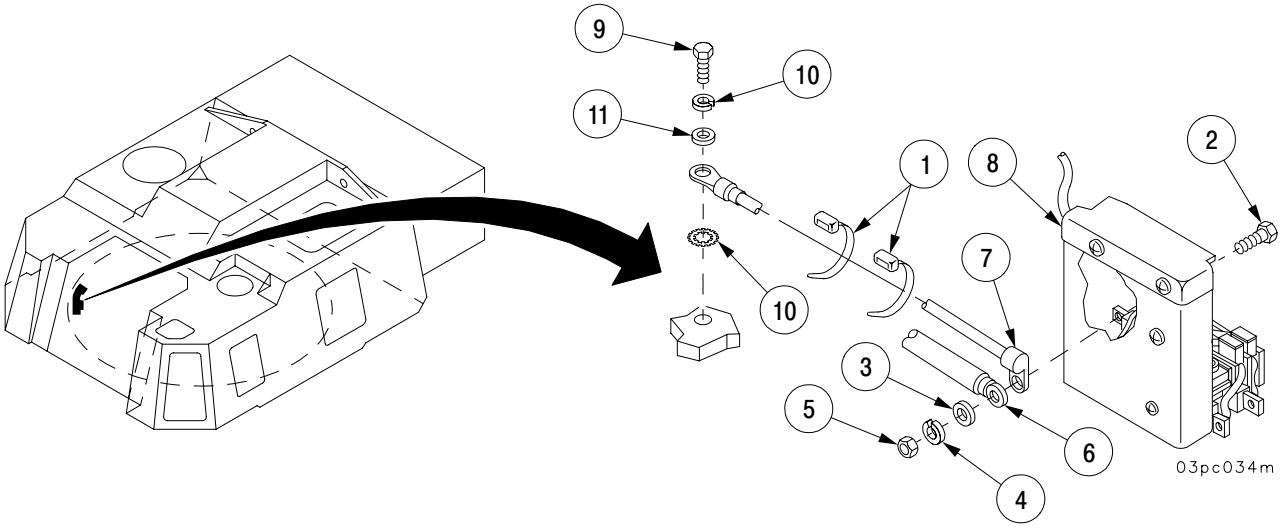
a. Removal.

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.



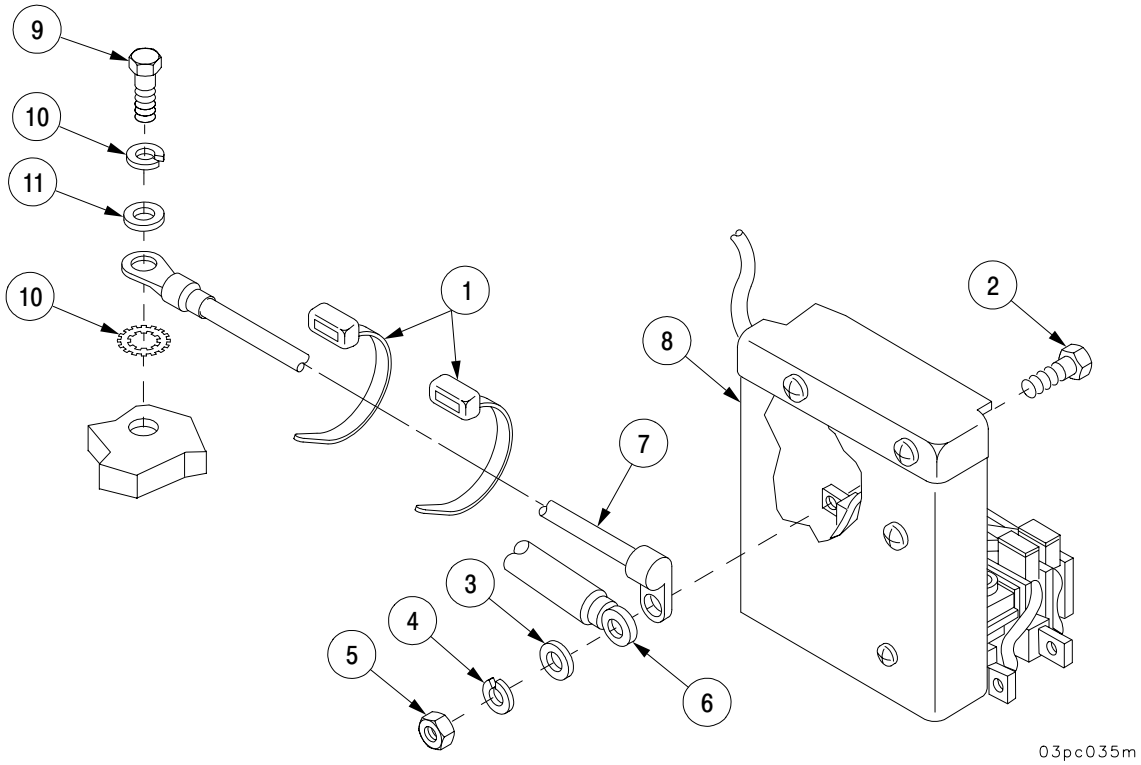
5–8 BRUSH BLOCK NO. 2 GROUND LEAD – CONTINUED

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).



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.

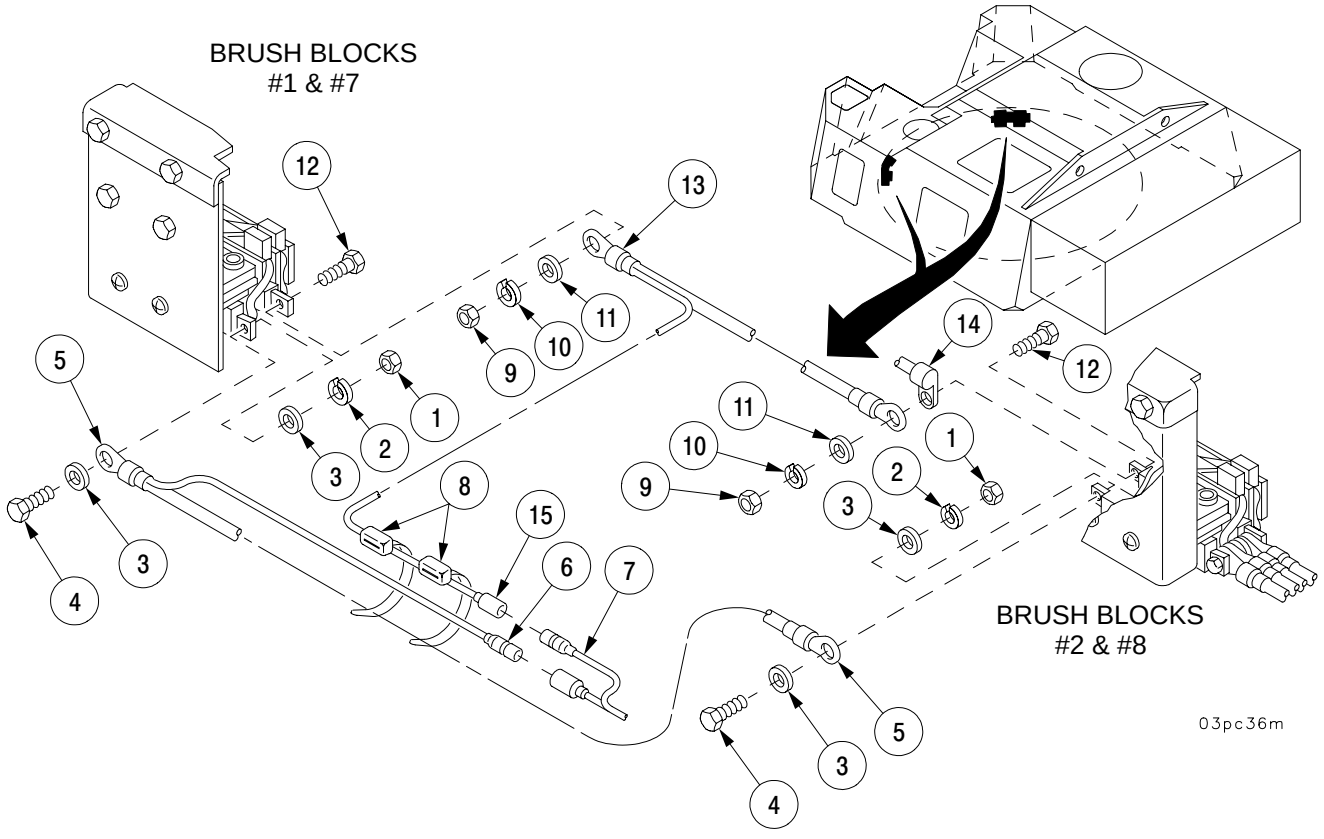
2 Disconnect plug (6) of lead 12934620 (5) from wiring harness W62 or W64 (7).

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).



5–9 LEAD ASSEMBLIES BETWEEN BRUSH BLOCKS 1 & 2, 3 & 4, 5 & 6, 7 & 8 – CONTINUED

a. Removal – Continued

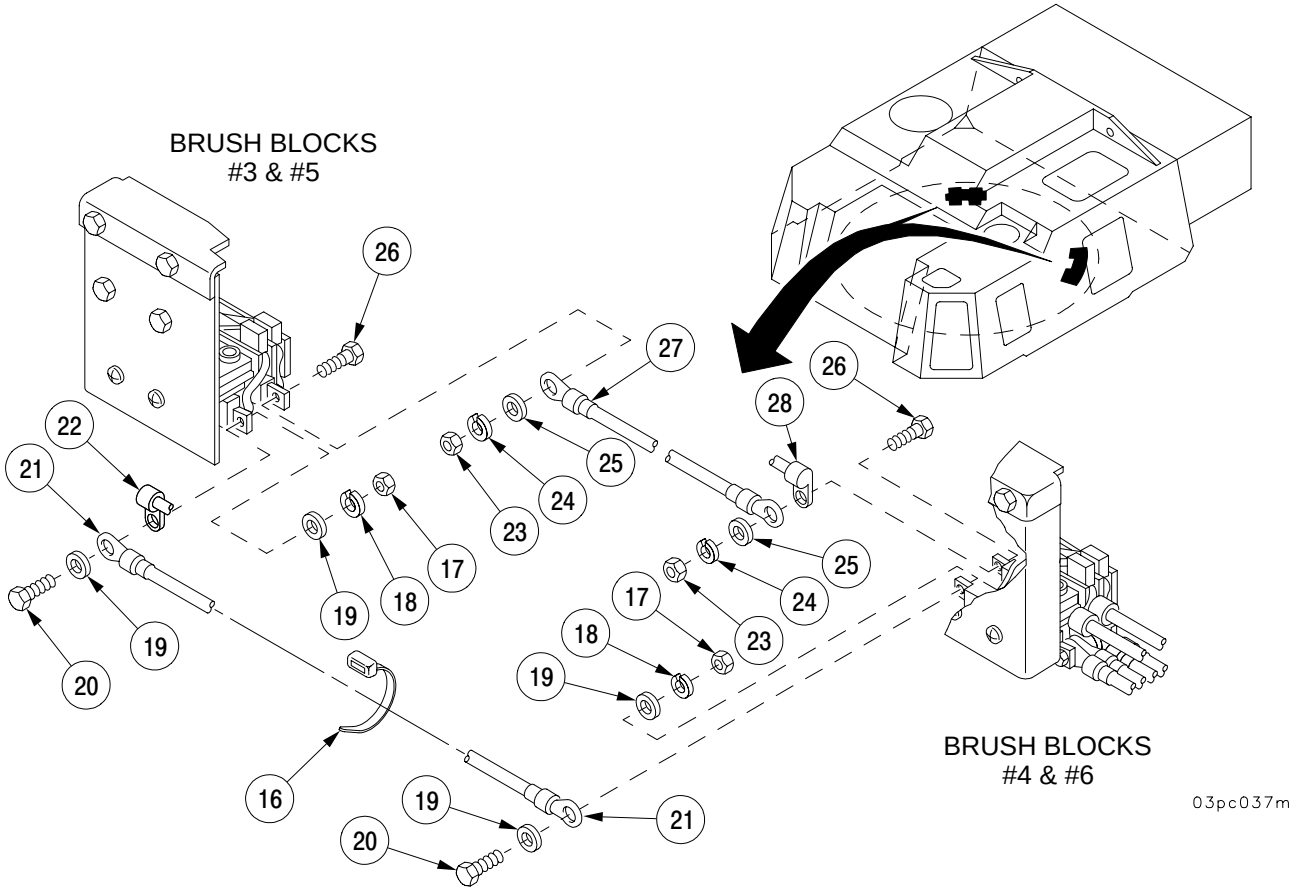
7 Cut and discard tiedown strap (16).

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.



5–9 LEAD ASSEMBLIES BETWEEN BRUSH BLOCKS 1 & 2, 3 & 4, 5 & 6, 7 & 8 – CONTINUED

b. Installation.

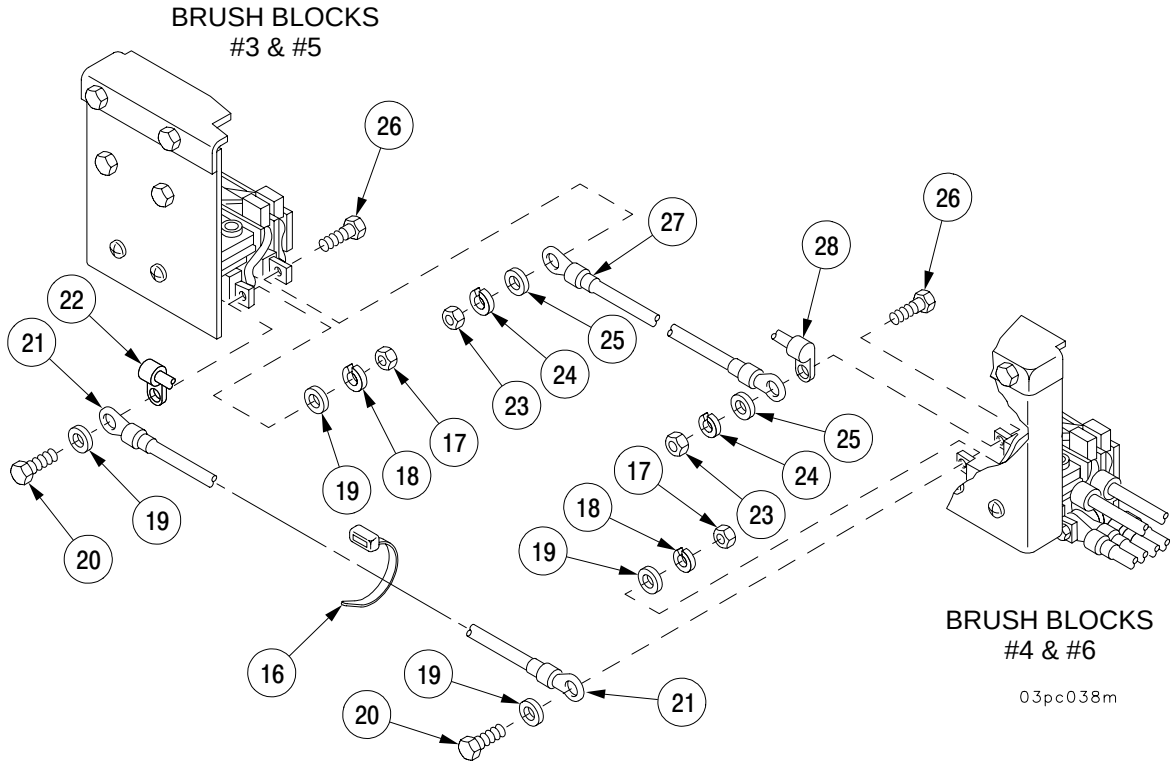
1 Connect lead 12910373–1 (27) to brush blocks 5 and 6 negative terminals with two screws (26), two flat washers (25), two new lockwashers (24), and two nuts (23).Torque nuts to 25–30 lb–ft (34–41 N•m).

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).

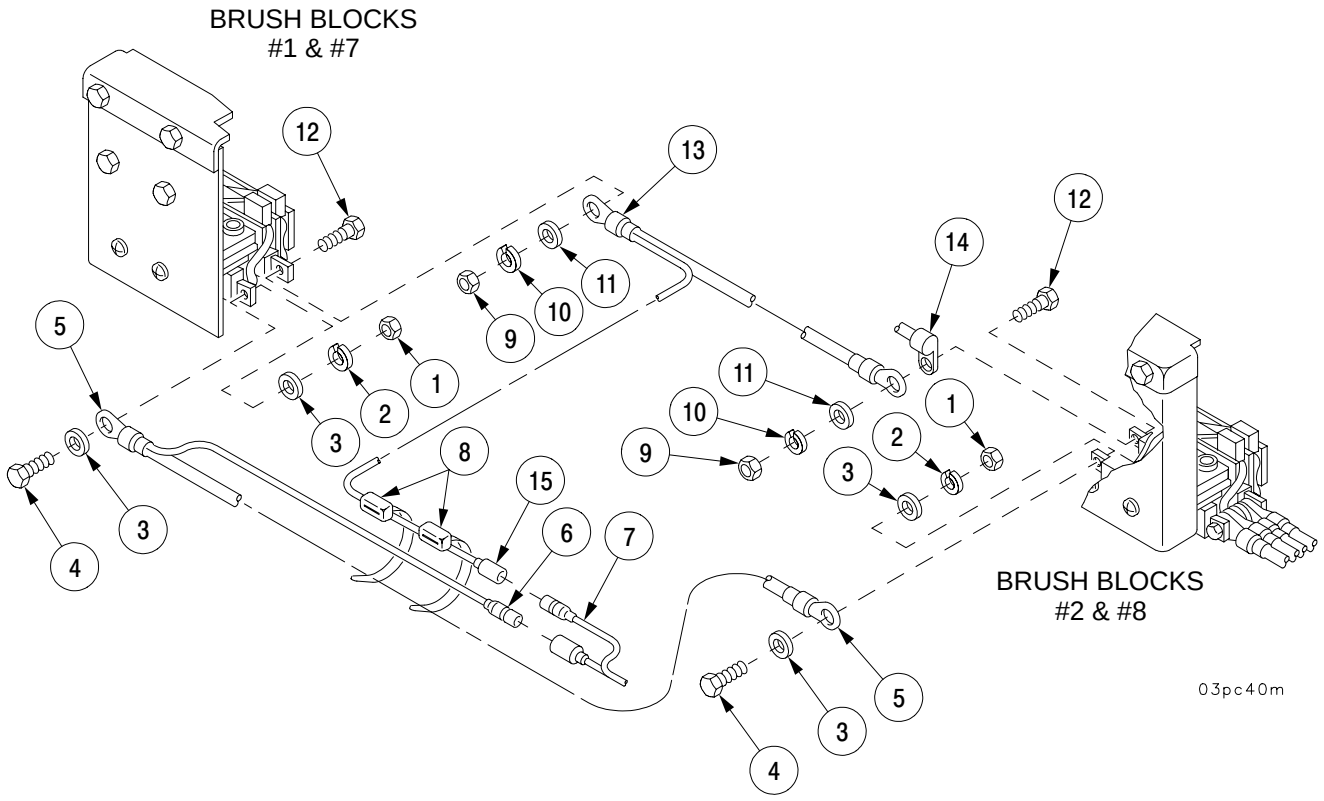
7 Connect leads 12361825–2 (14) and 12934619 (13) to brush blocks 1 and 2 negative terminals with two screws (12), two flat washers (11), two new lockwashers (10), and two nuts (9). Torque nuts to 35–40 lb–ft (41–47 N•m).

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).



5–10 LEAD ASSEMBLIES BETWEEN BRUSH BLOCK SETS.

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 79, Appx C)
Lockwashers (8) (item 130, Appx F)
Lockwashers (8) (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 sixteen leads. Refer to the following matrix for specific steps and figure to use.

Lead	Brush Block	Steps	
		Removal	Installation
12934614 –1 or –2	2 to 3	1–3	1–2
12934614 –3 or –4	2 to 3	4–6	3–4
12934614 –1 or –2	4 to 5	7–9	5–6
12934614 –3 or –4	4 to 5	10–13	7–9
12934614 –1 or –2	6 to 7	14–16	10–11
12934614 –3 or –4	6 to 7	17–19	12–13
12934614 –1 or –2	8 to 1	20–22	14–15
12934614 –3 or –4	8 to 1	23–25	16–17

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.

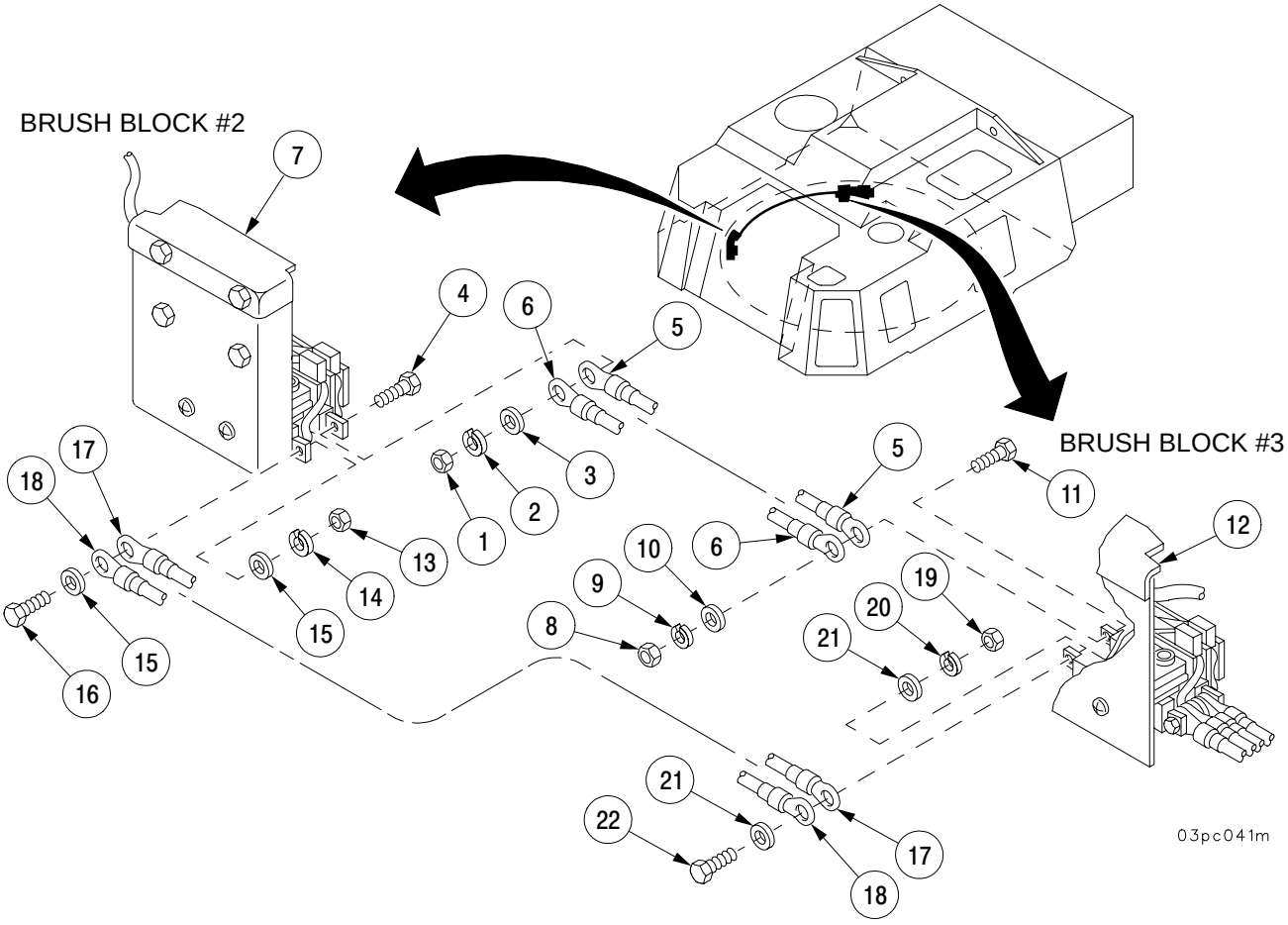
2 Remove nut (8), lockwasher (9), flat washer (10), screw (11), lead 12934614–1 (5), and lead 12934614–2 (6) from brush block 3 (12). Discard lockwasher.

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.

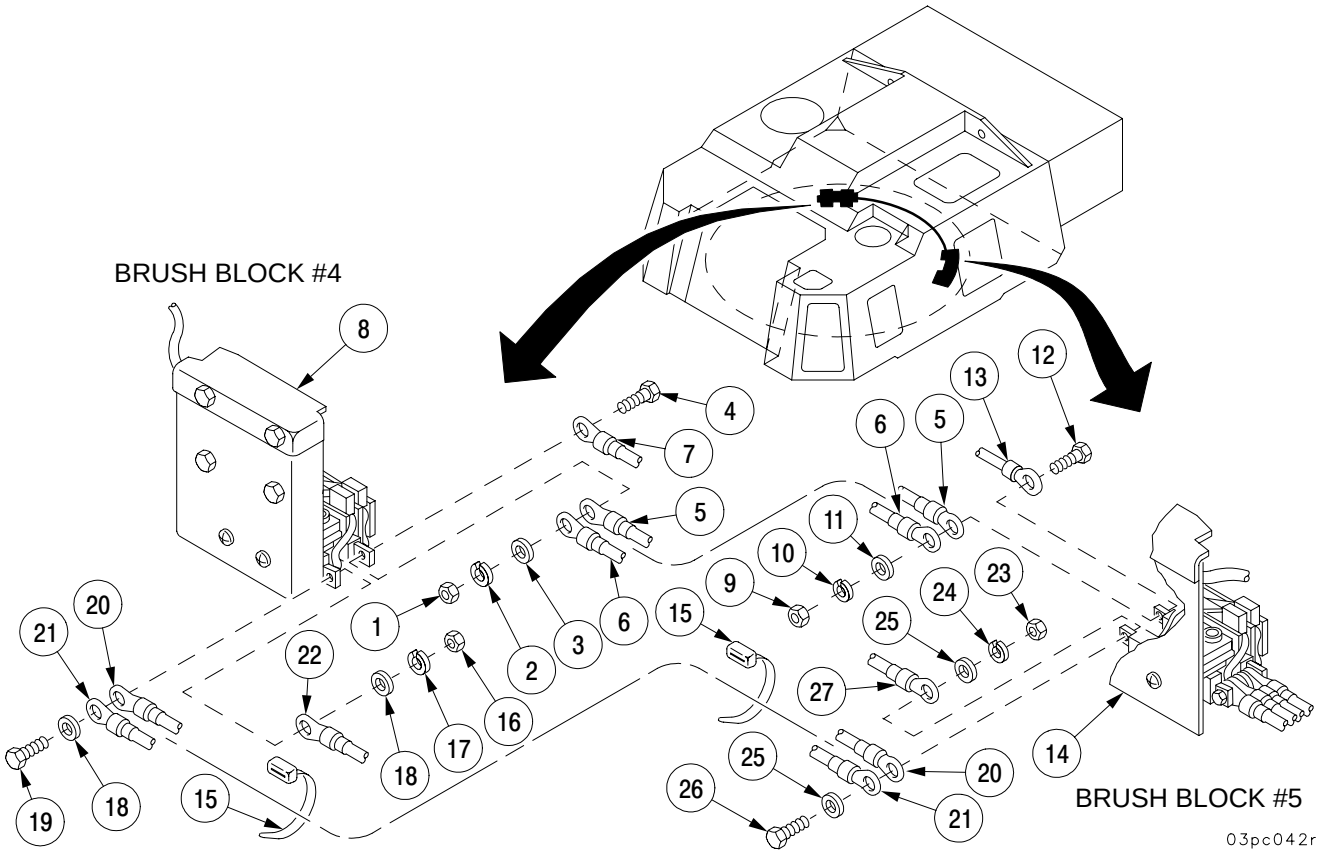
9 Remove lead 12934614–1 (5) and lead 12934614–2 (6) from cab.

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.



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.

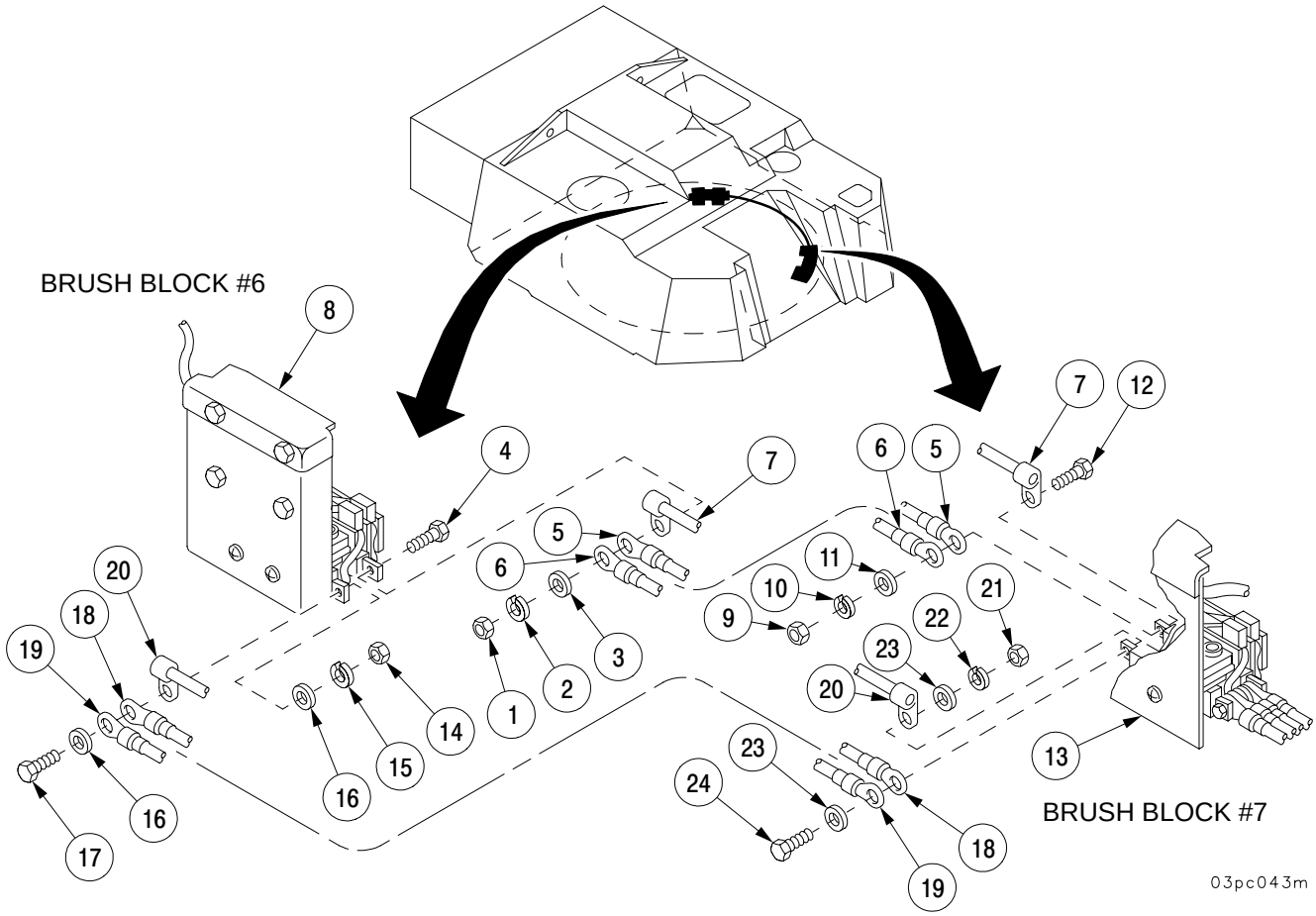
15 Remove nut (9), lockwasher (10), flat washer (11), screw (12), lead 12934614–1 (5), lead 12934614–2 (6), and wiring harness W55 lead 70 (7) from brush block 7 (13). Discard lockwasher.

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 129346141–4 (19) from cab.



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.

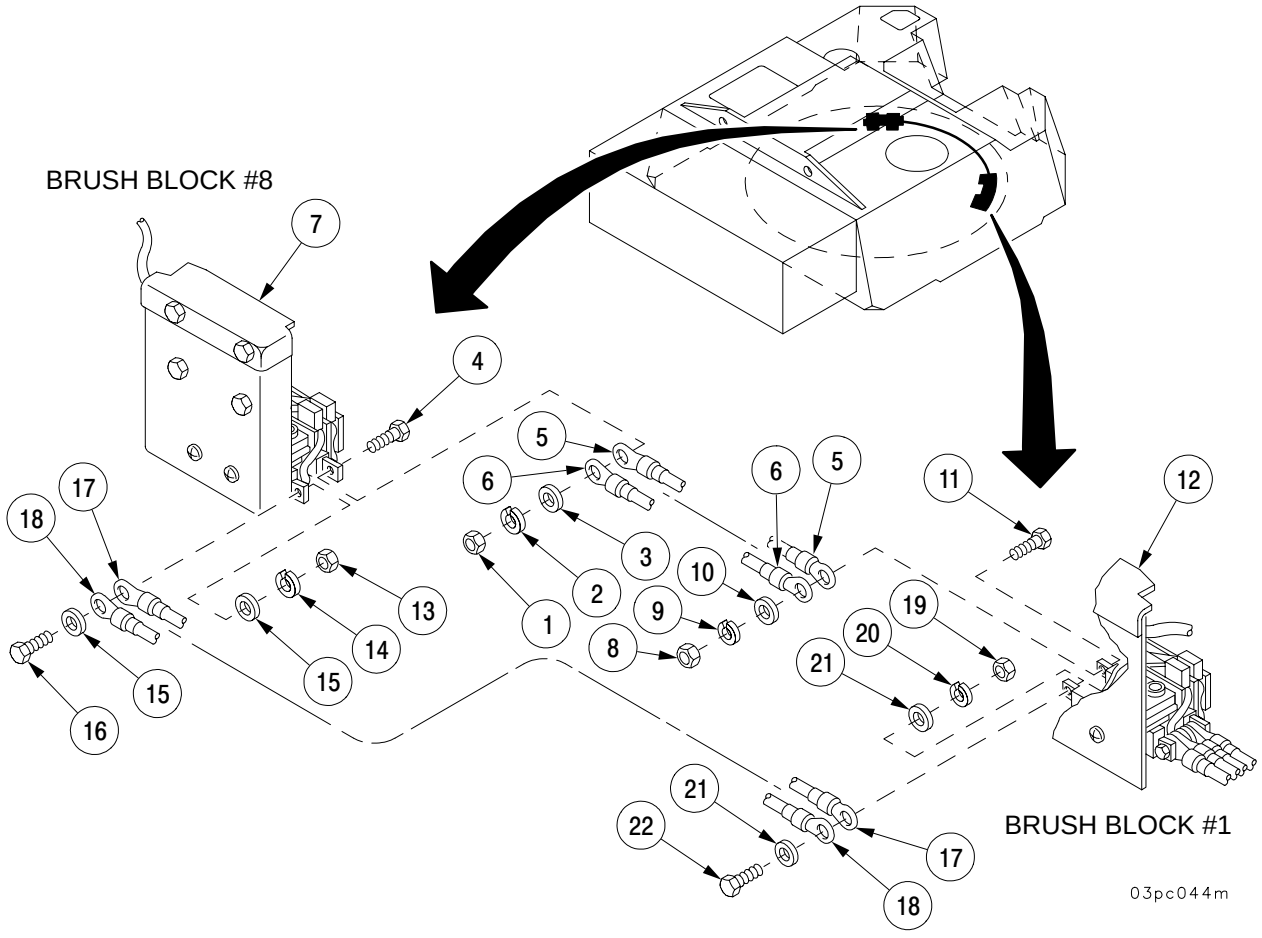
21 Remove nut (8), lockwasher (9), flat washer (10), screw (11), lead 12934614–1 (5), and lead 129346141–2 (6) from brush block 1 (12). Discard lockwasher.

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

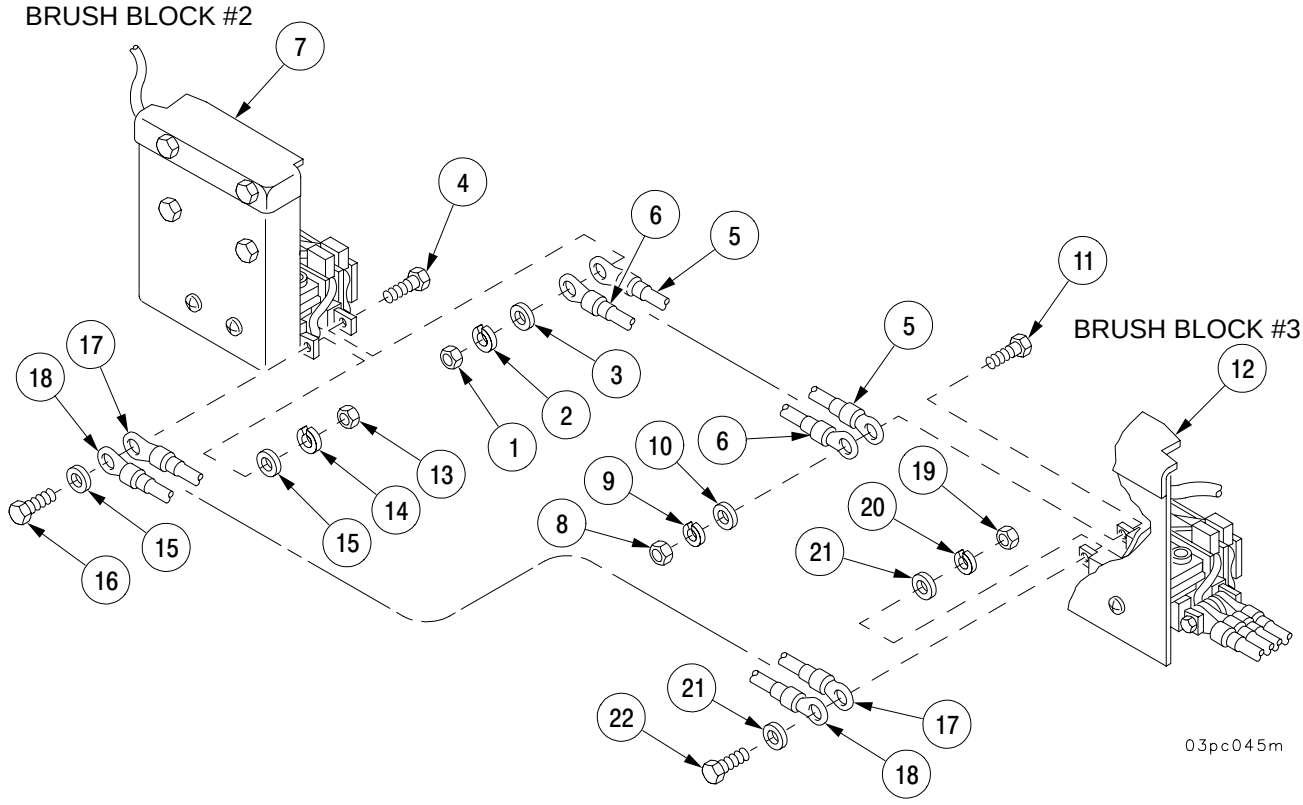
b. Installation (Leads between brush blocks 2 and 3).

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).

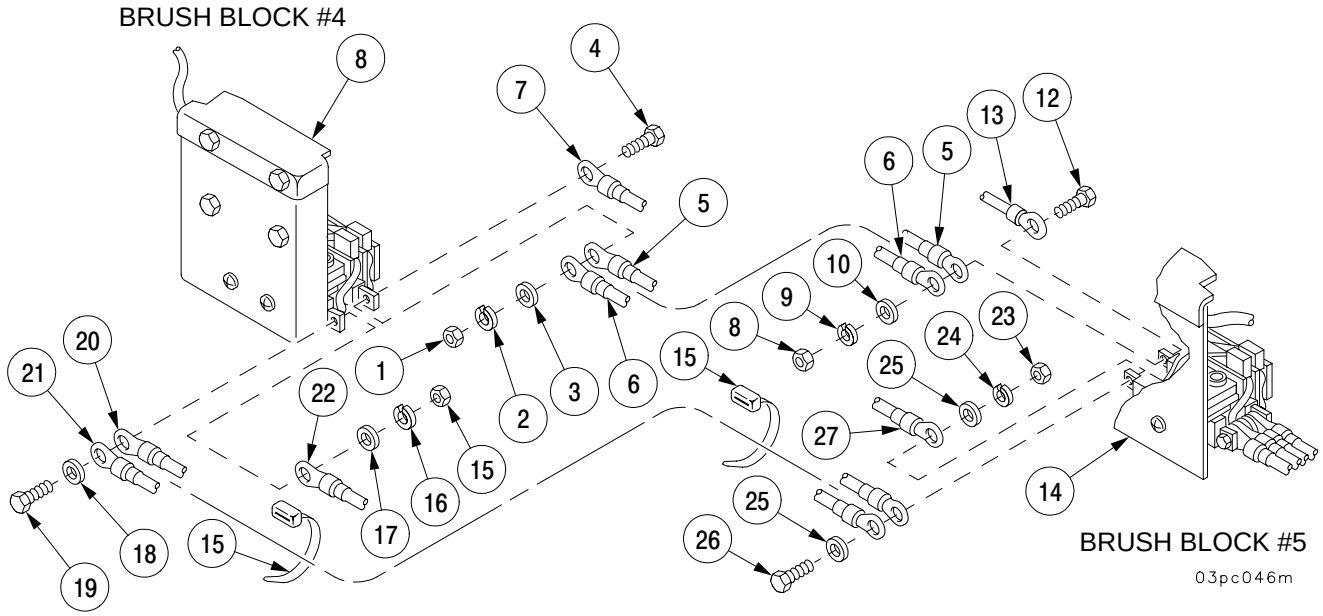
5 Connect leads 12934614–1 (5) and 12934614–2 (6) and wiring harness W67 lead 70 (13) to brush block 5 (14) with nut (9), new lockwasher (10), flat washer (11), and screw (12). Torque nut to 25–30 lb–ft (34–41 N·m).

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

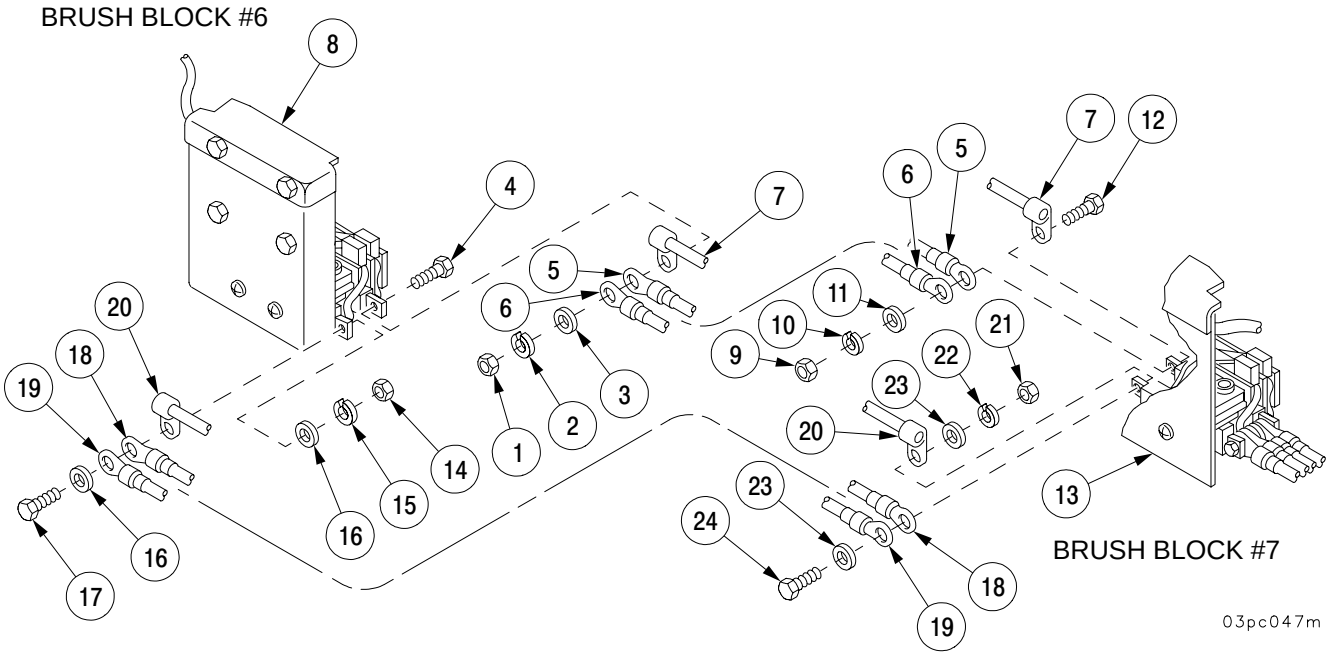
b. Installation (Leads between brush blocks 6 and 7).

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).



5–10 LEAD ASSEMBLIES BETWEEN BRUSH BLOCK SETS – CONTINUED

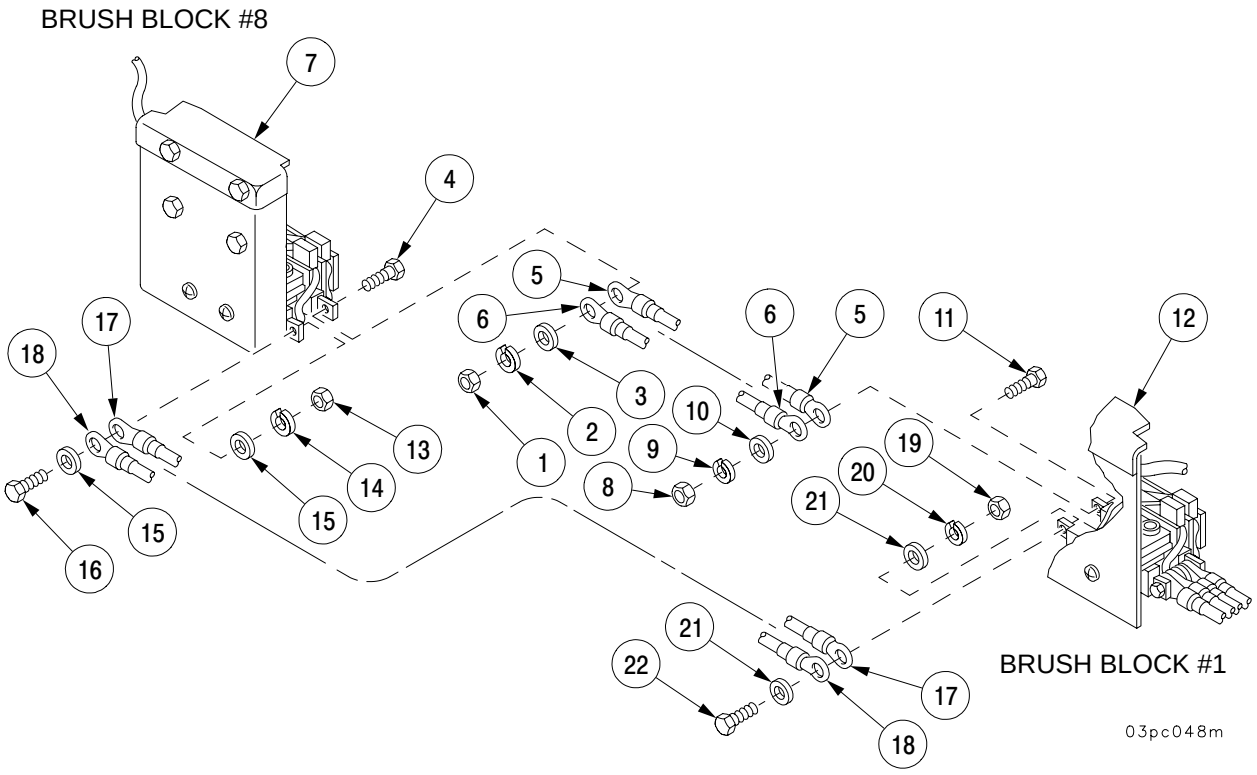
b. Installation (Leads between brush blocks 8 and 1).

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).



5–11 WIRING HARNESS W50.

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 (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)

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.

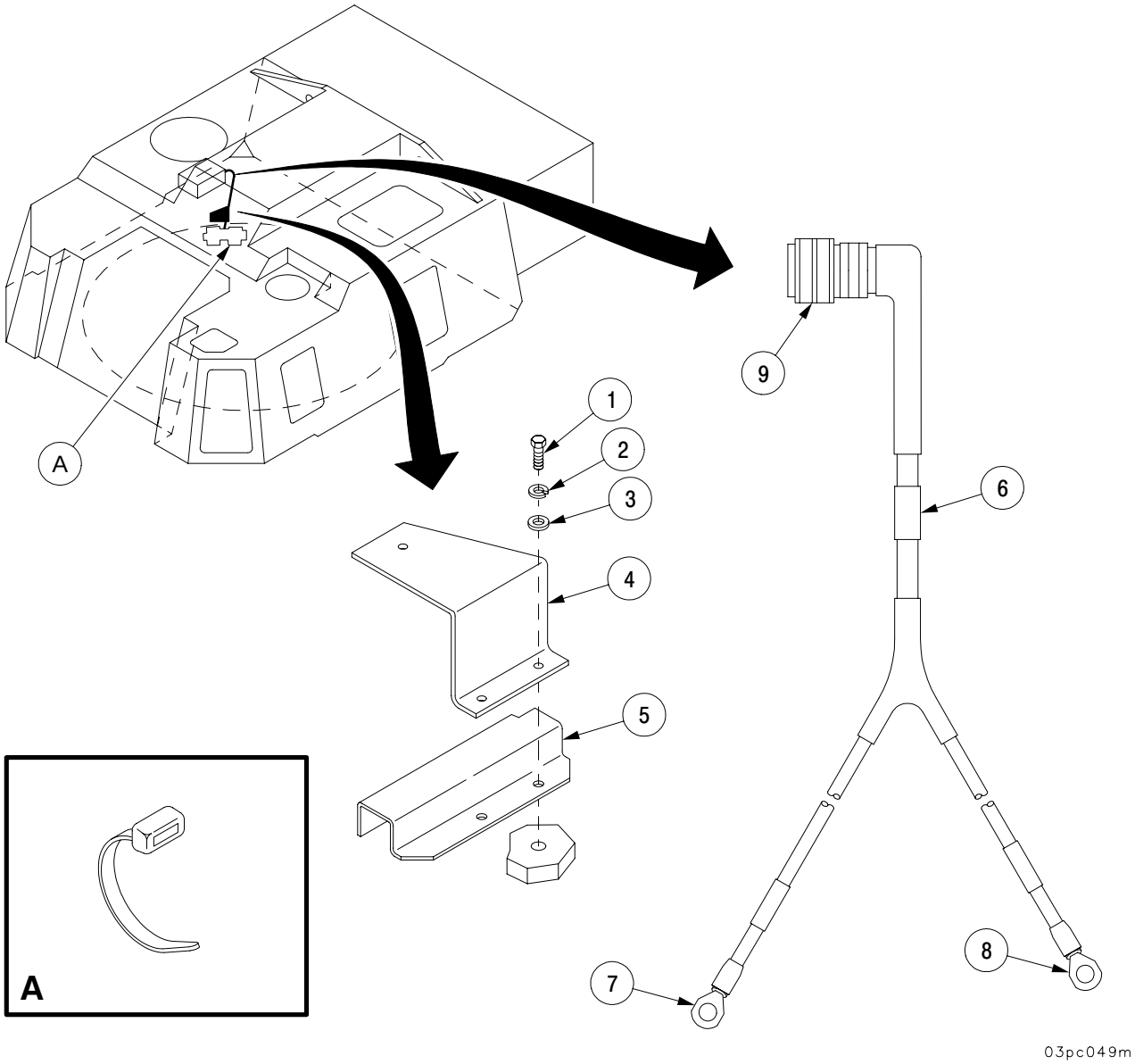
3 Install guard (5) and bracket (4) with two flat washers (3), two new lockwashers (2), and two screws (1).

* 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



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).

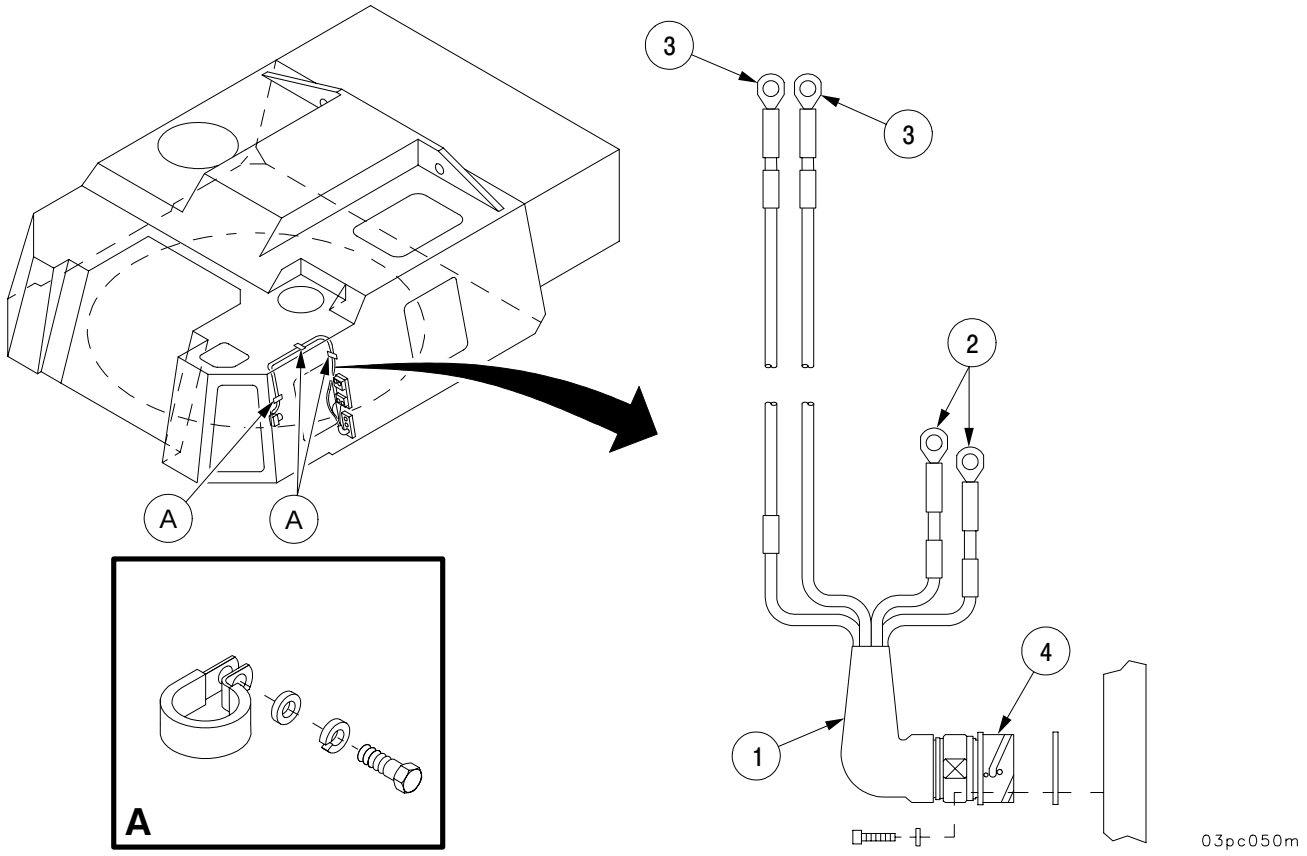
5–12 WIRING HARNESS W53 – CONTINUED

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.

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 strap (item 81, Appx C)
Marking tag (AR) (item 87, Appx C)
Lockwashers (2) (item 132, Appx F)
Lockwashers (2) (item 130, Appx F)

Equipment Conditions
Slip ring covers 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 lead before disconnecting to aid in installation.
Four additional leads must be removed/installed during this task.

1 Disconnect wiring harness (1) and attaching hardware at the following points: Discard lockwashers.

Item No.	W55 Connector/Lead/Wire	From Connector/ Lead/Wire/Component	Location
2	70	Brush block 6	Slip ring – rear of cab behind Gunner's station.
3	100	Brush block 6	Slip ring – rear of cab behind Gunner's station.
4	70	Brush block 7	Slip ring – rear of cab behind Gunner's station.
5	100	Brush block 7	Slip ring – rear of cab behind Gunner's station.
6	W55 P1	Hydraulic bulkhead connector	Forward cab bulkhead to hydraulic compartment.

2 Remove and discard tiedown strap.

3 Remove wiring harness (1) from vehicle.

5–13 WIRING HARNESS W55 – CONTINUED

b. Installation

1 Install wiring harness (1) in vehicle.

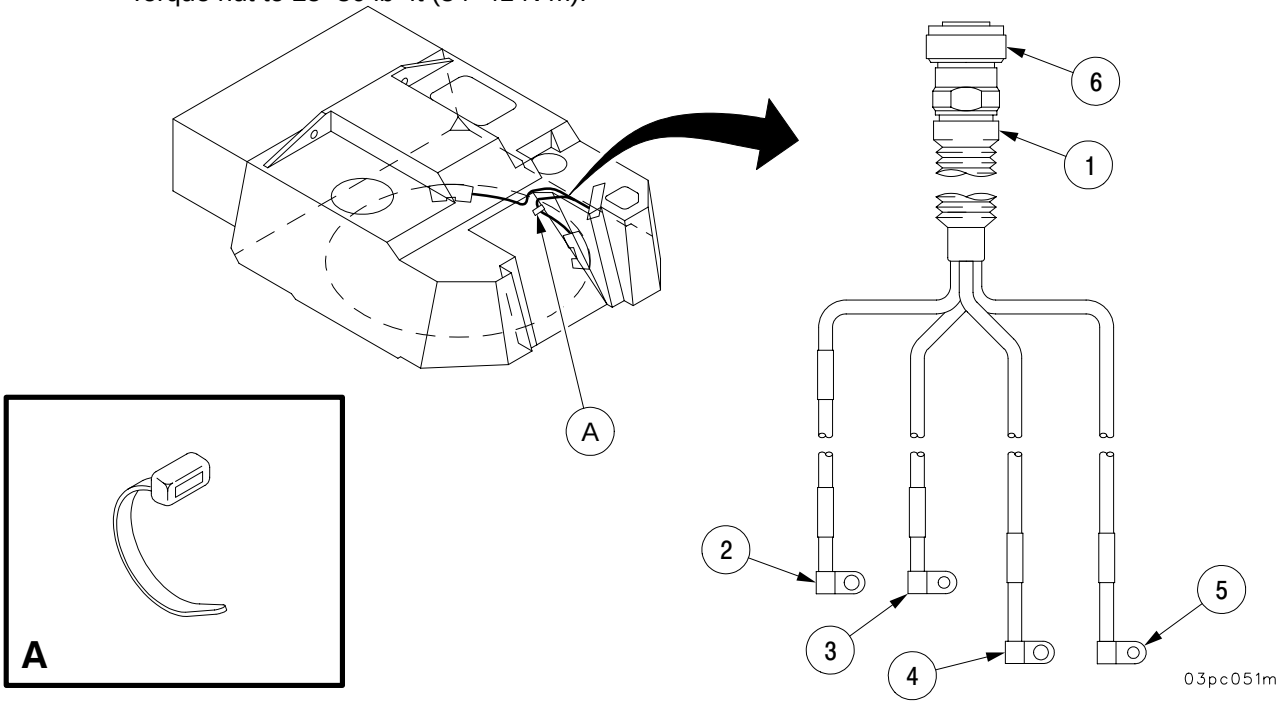
2 Connect wiring harness (1) and attaching hardware and new lockwashers at the following points:

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).



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.

Item No.	W56 Connector/Lead/Wire	From Connector/ Lead/Wire/Component	Location
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.

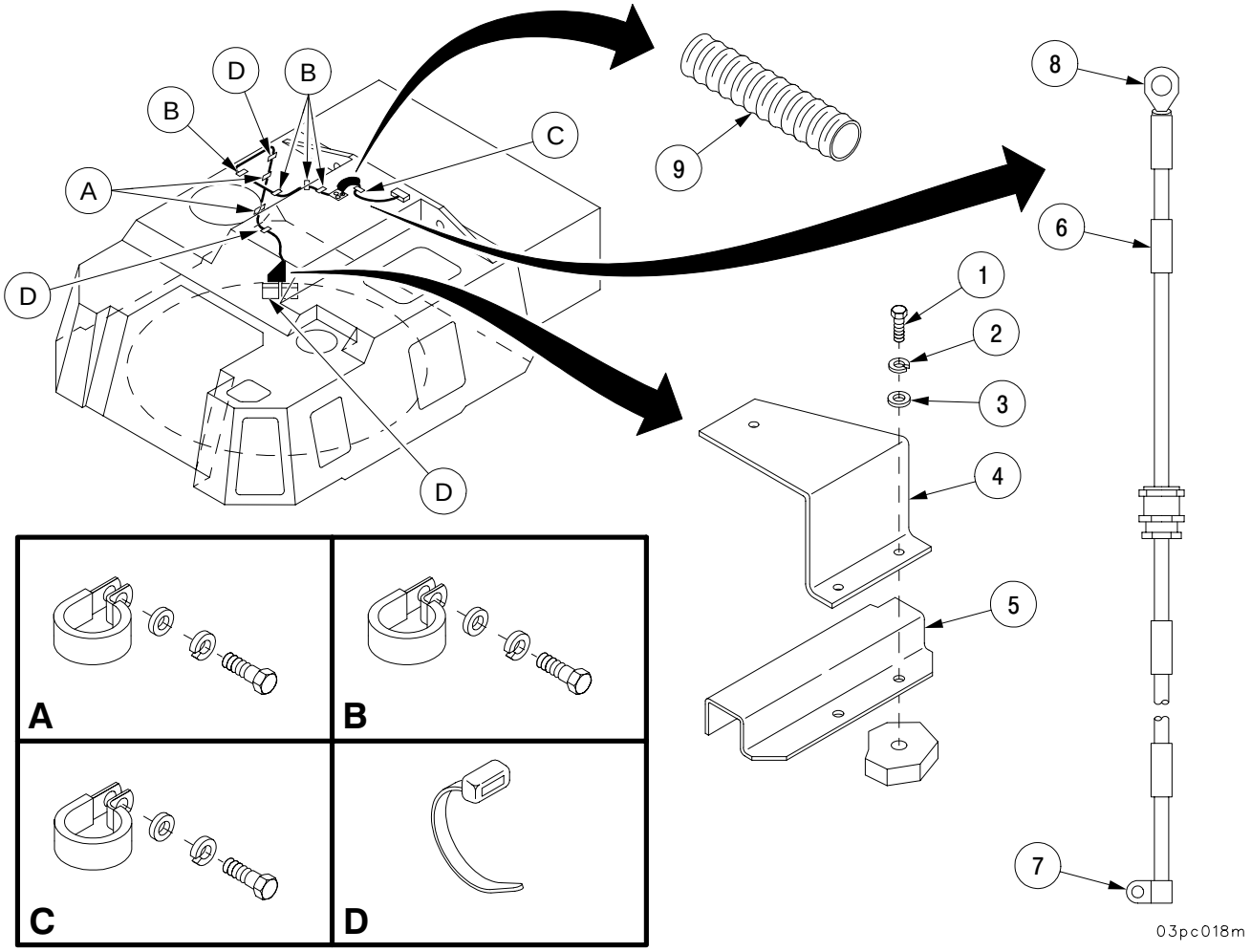
2 Thread lead (8) through conduit (9).

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).



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)

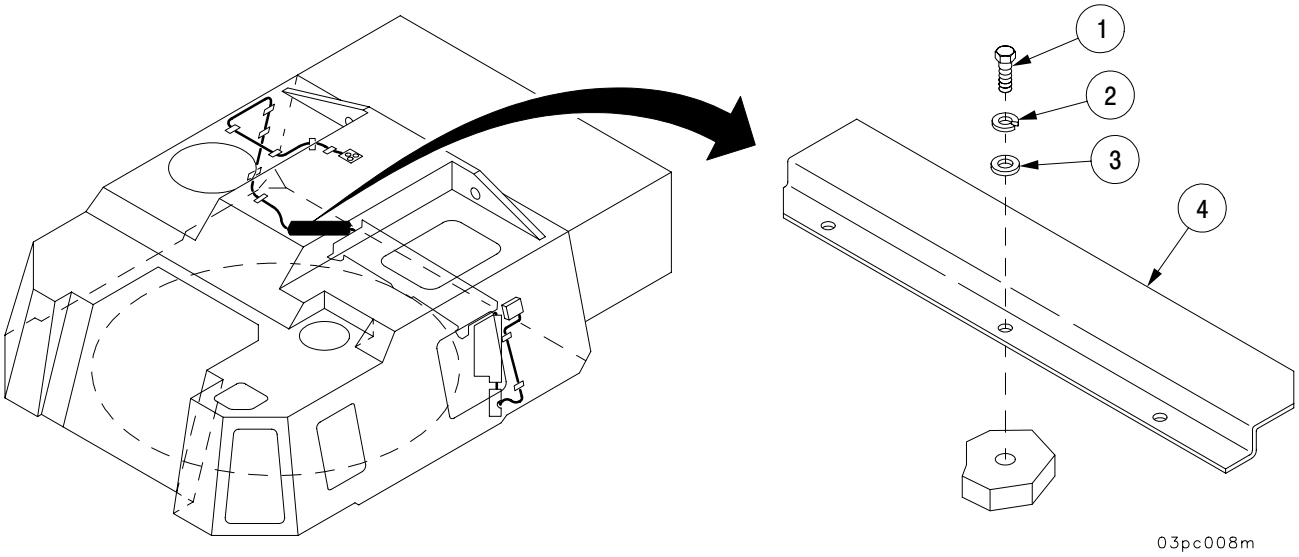
Materials/Parts
Lockwashers (4) (item 124, Appx F)
Lockwashers (15) (item 130, Appx F)
Gasket (item 14, Appx F)
Tiedown straps (2) (item 79, Appx C)
Marking tag (AR) (item 87, Appx C)
Lockwashers (11) (item 128, Appx F)
Lockwashers (5) (item 129, Appx F)
Tiedown straps (4) (item 81, Appx C)

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.



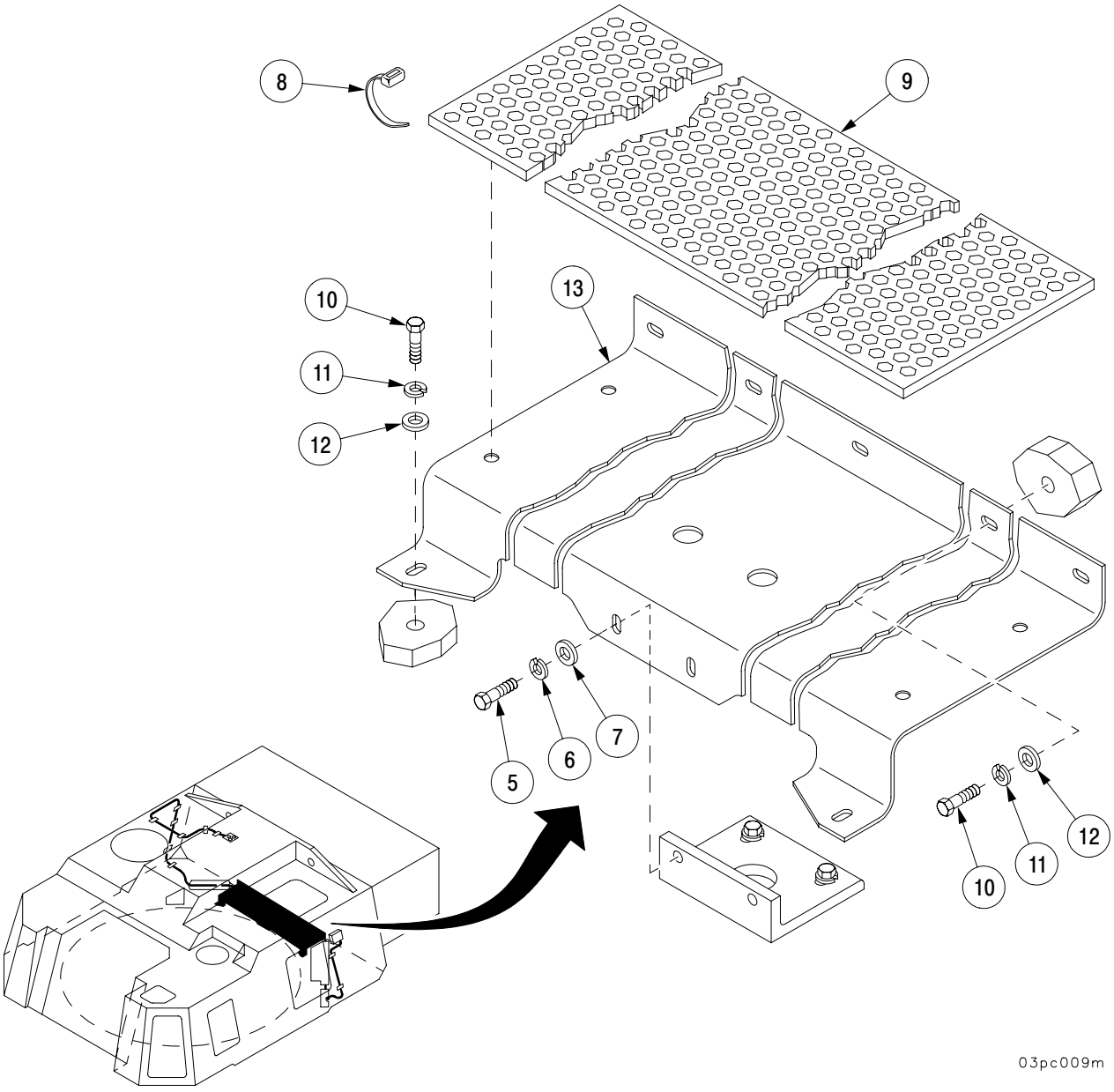
5–15 WIRING HARNESS W58 – CONTINUED

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.



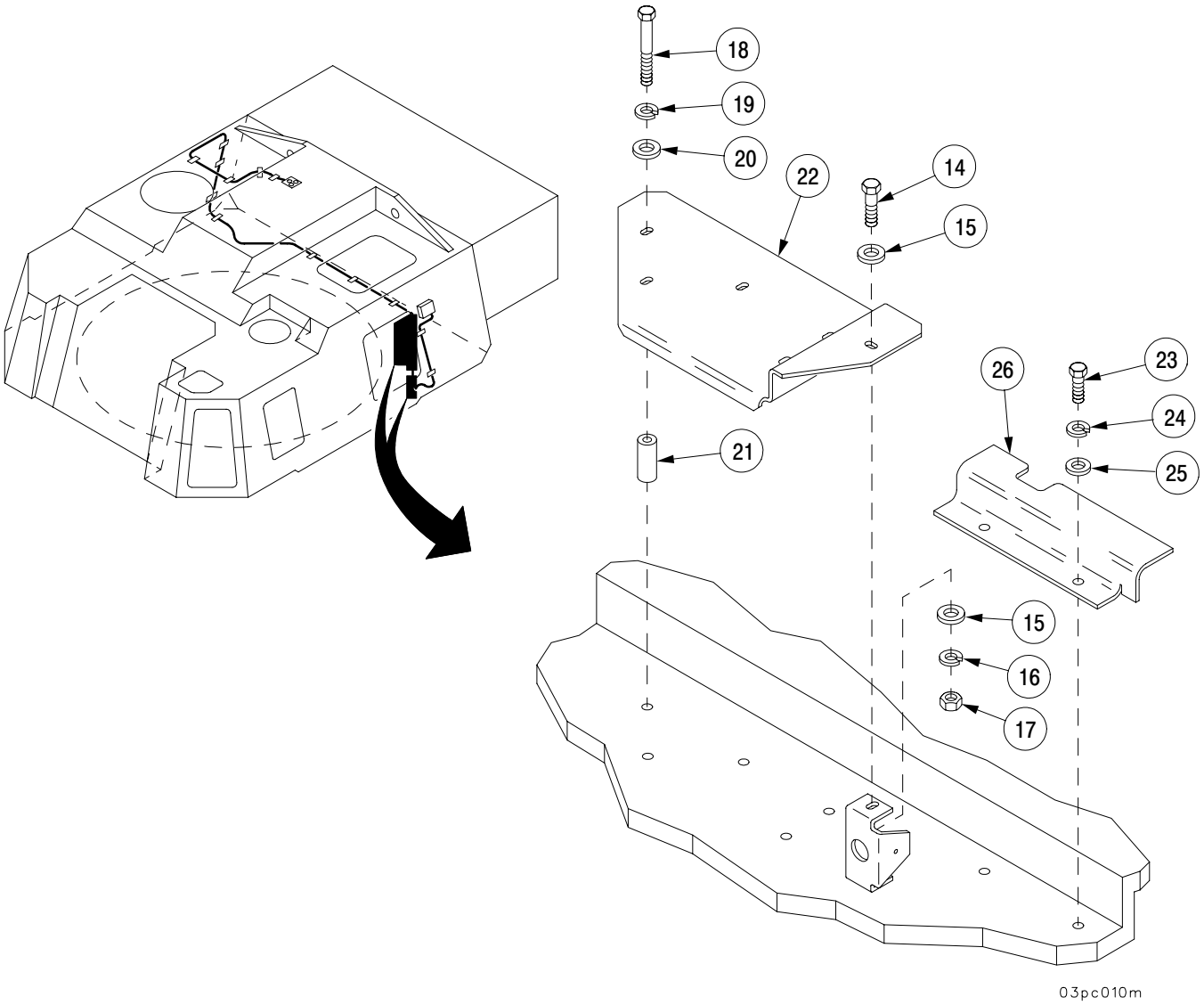
5–15 WIRING HARNESS W58 – CONTINUED

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.



5–15 WIRING HARNESS W58 – CONTINUED

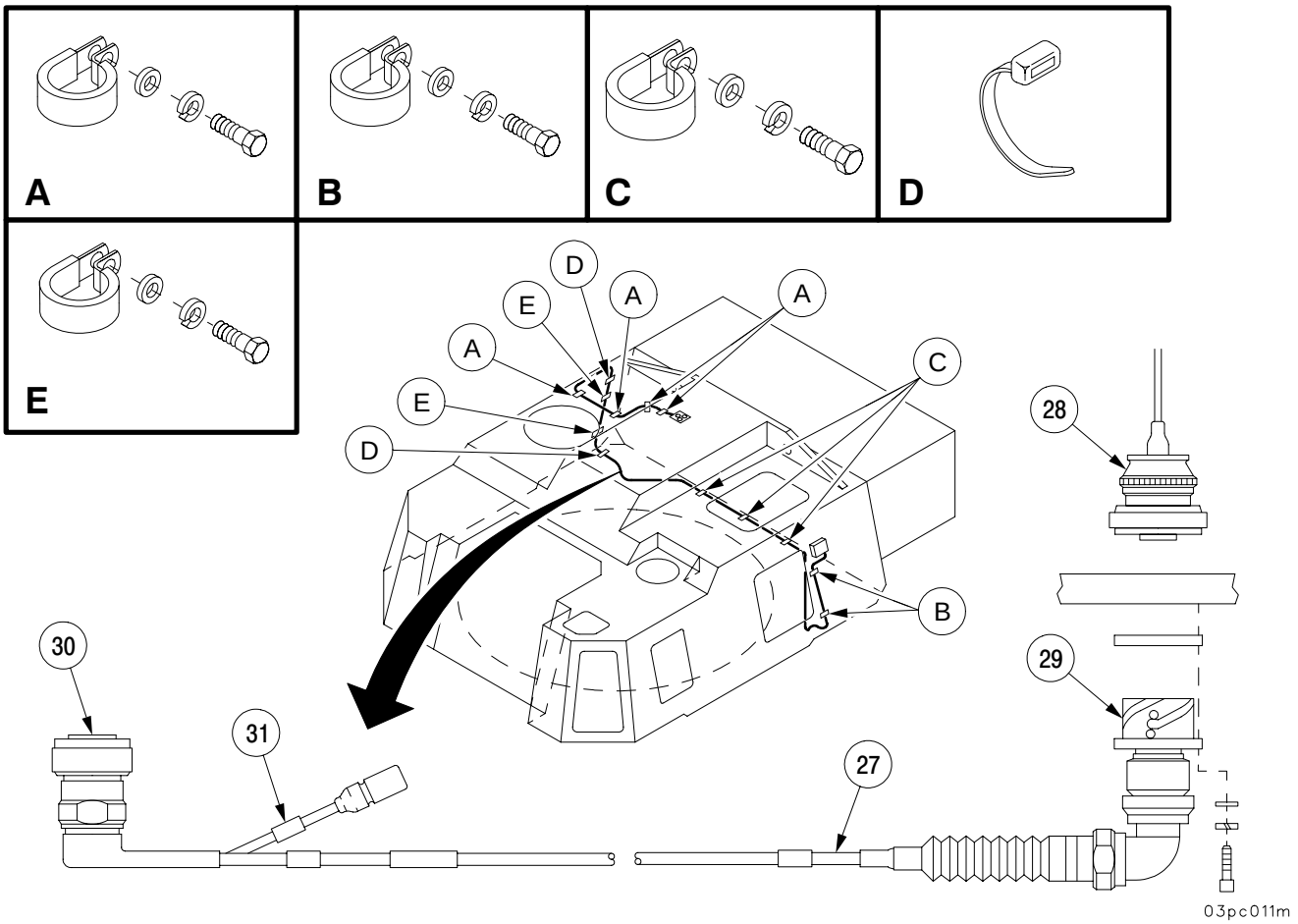
a. Removal – Continued

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.



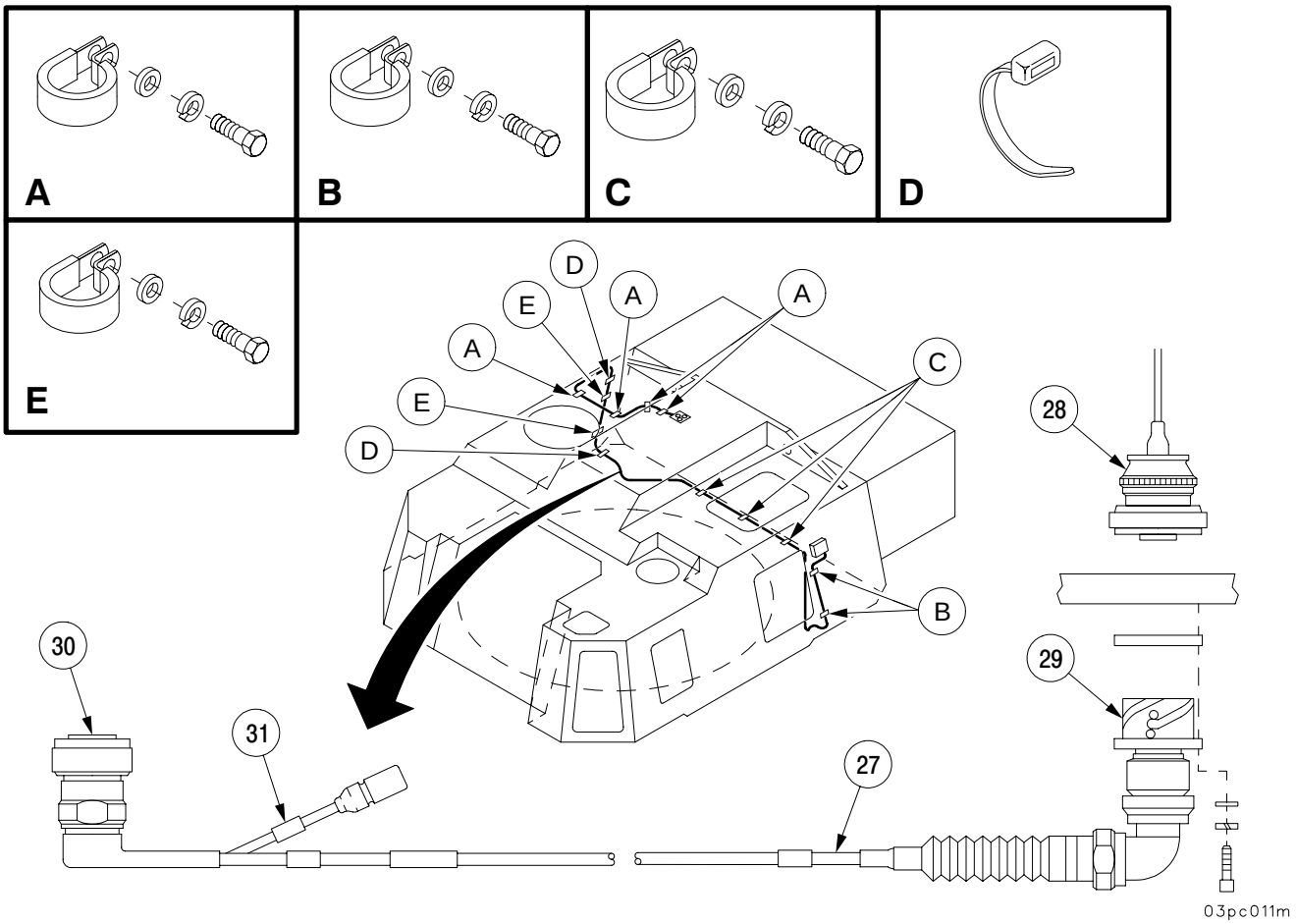
5–15 WIRING HARNESS W58 – CONTINUED

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.



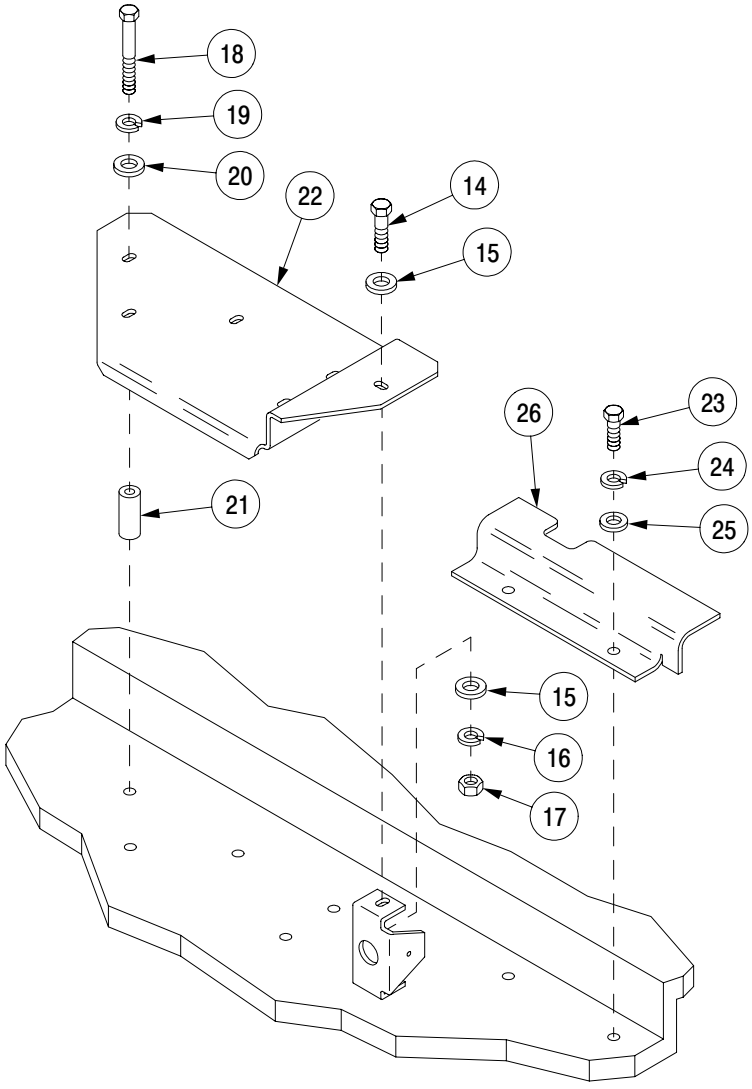
5–15 WIRING HARNESS W58 – CONTINUED

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).



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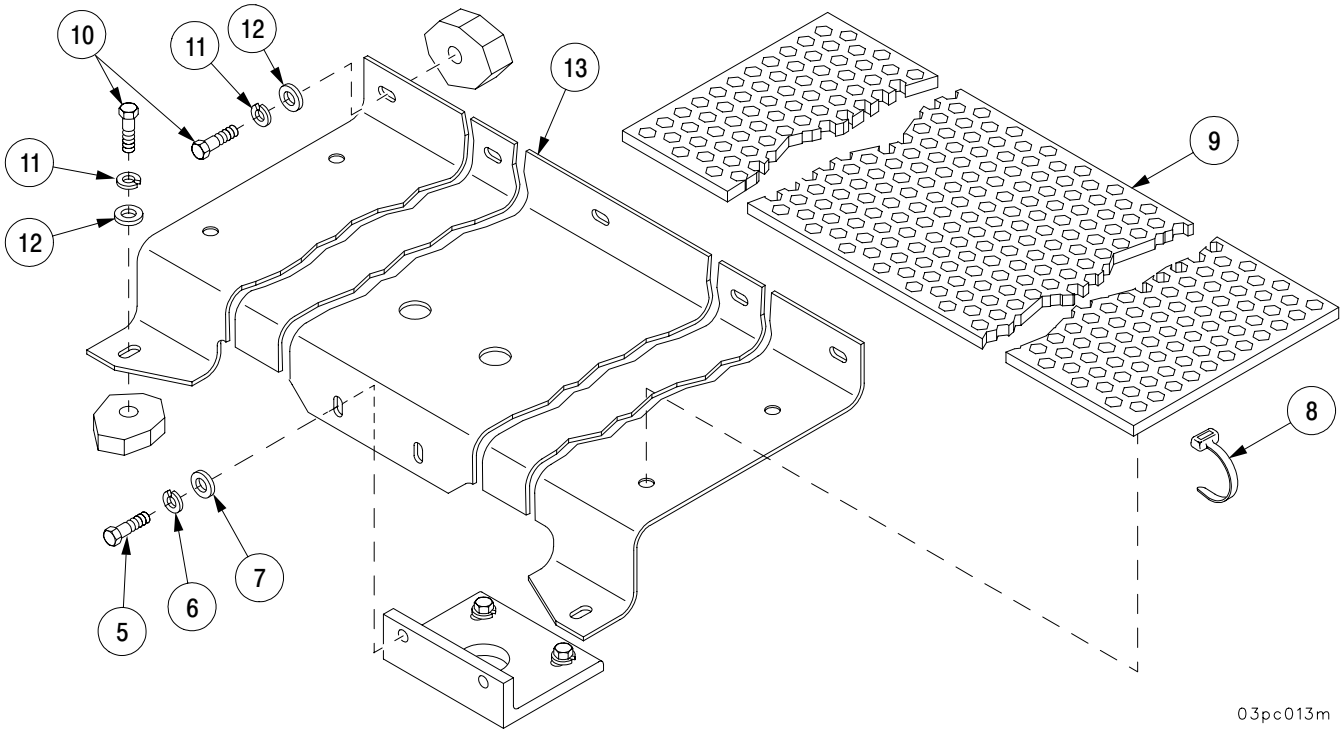
5–15 WIRING HARNESS W58 – CONTINUED

b. Installation – Continued

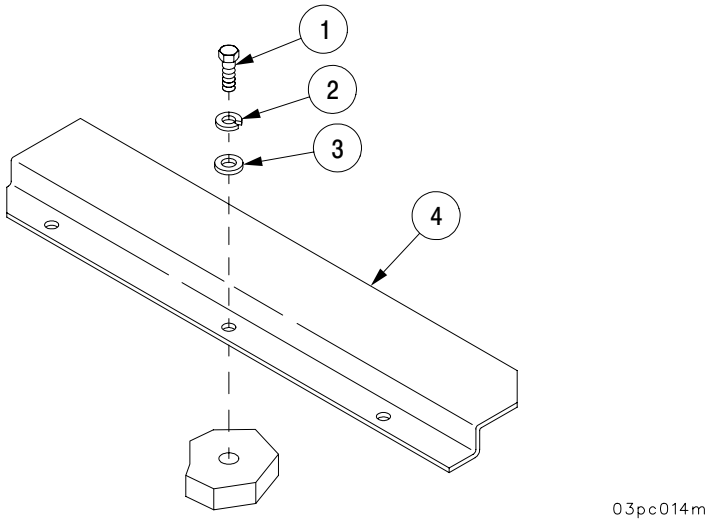
6 Install guard (13) with seven screws (10), seven new lockwashers (11), and seven flat washers (12).

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

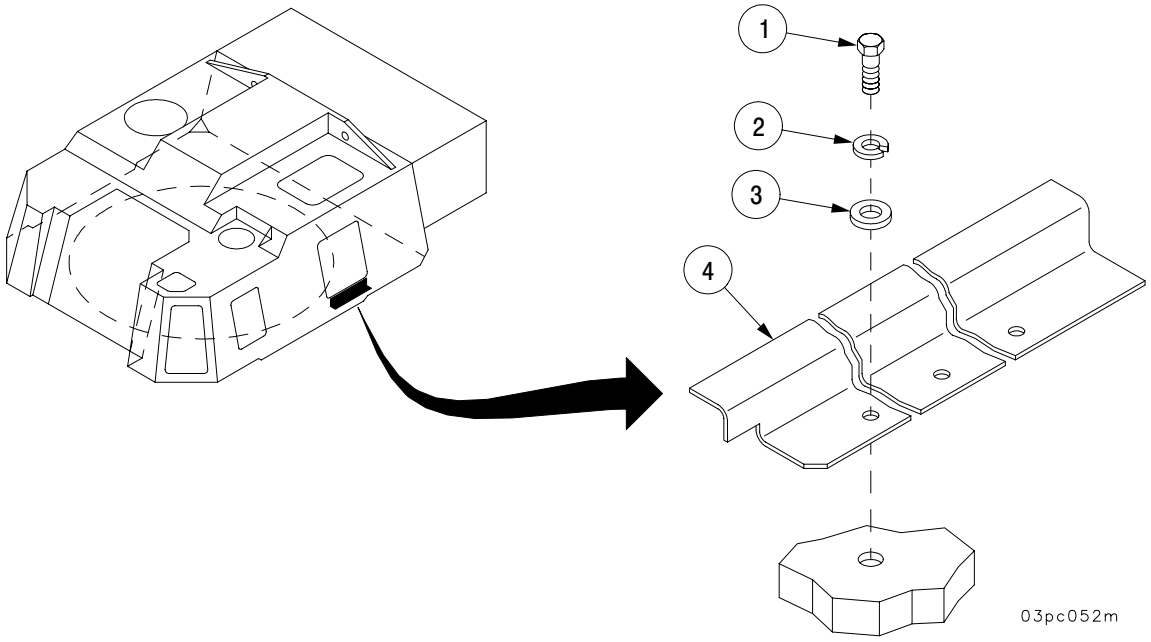
Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)

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.

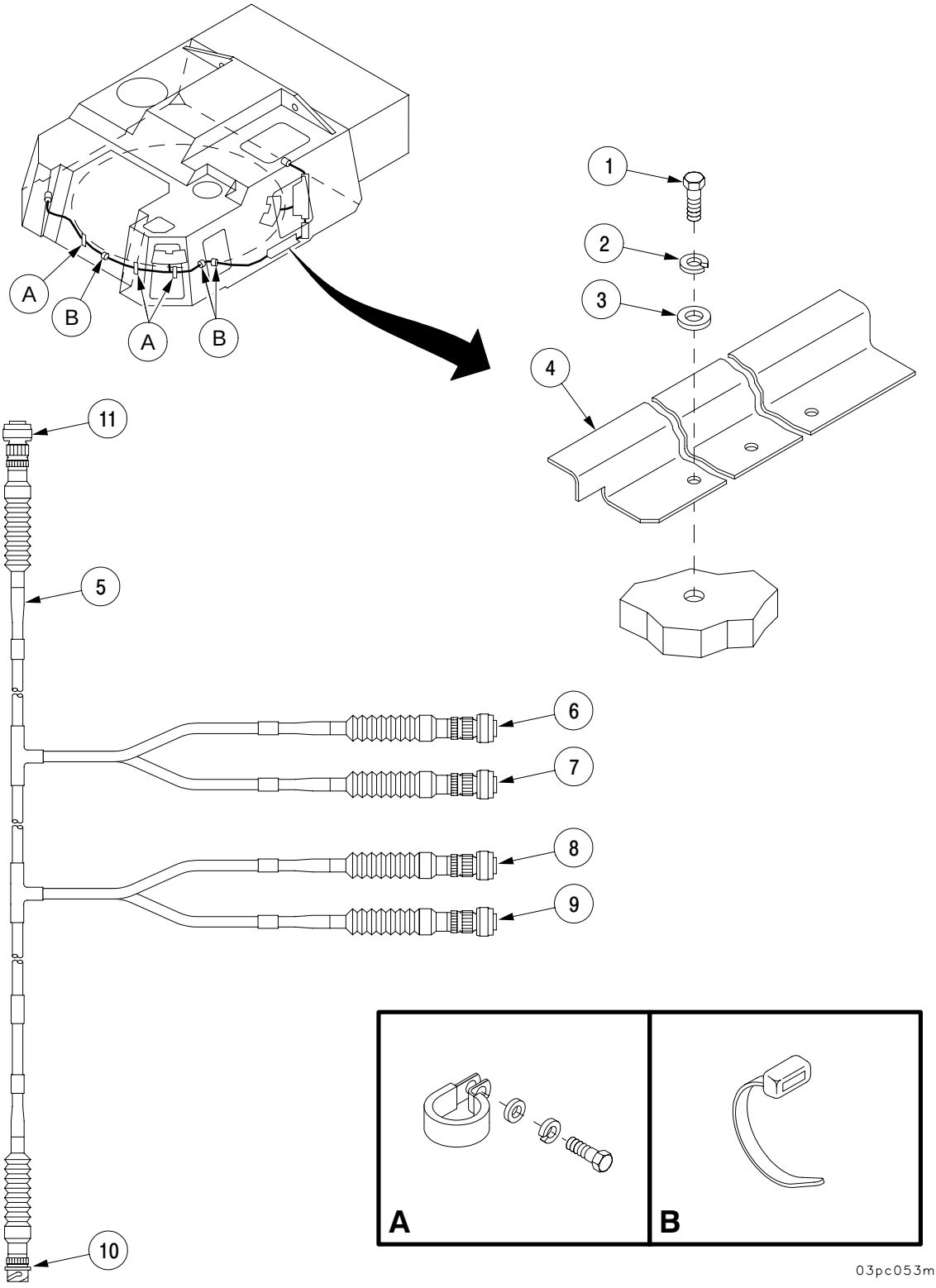
2 Connect wiring harness W61A (5) at the following points:

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



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)

Materials/Parts
Lockwashers (11) (item 128, Appx F)
Tiedown straps (4) (item 76, Appx C)
Marking tag (AR) (item 87, Appx C)

Equipment Conditions
Vehicle MASTER power switch OFF
Battery ground leads disconnected
Radios removed (TM 11–5330–890–10)

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 W65 (5) at the following points.

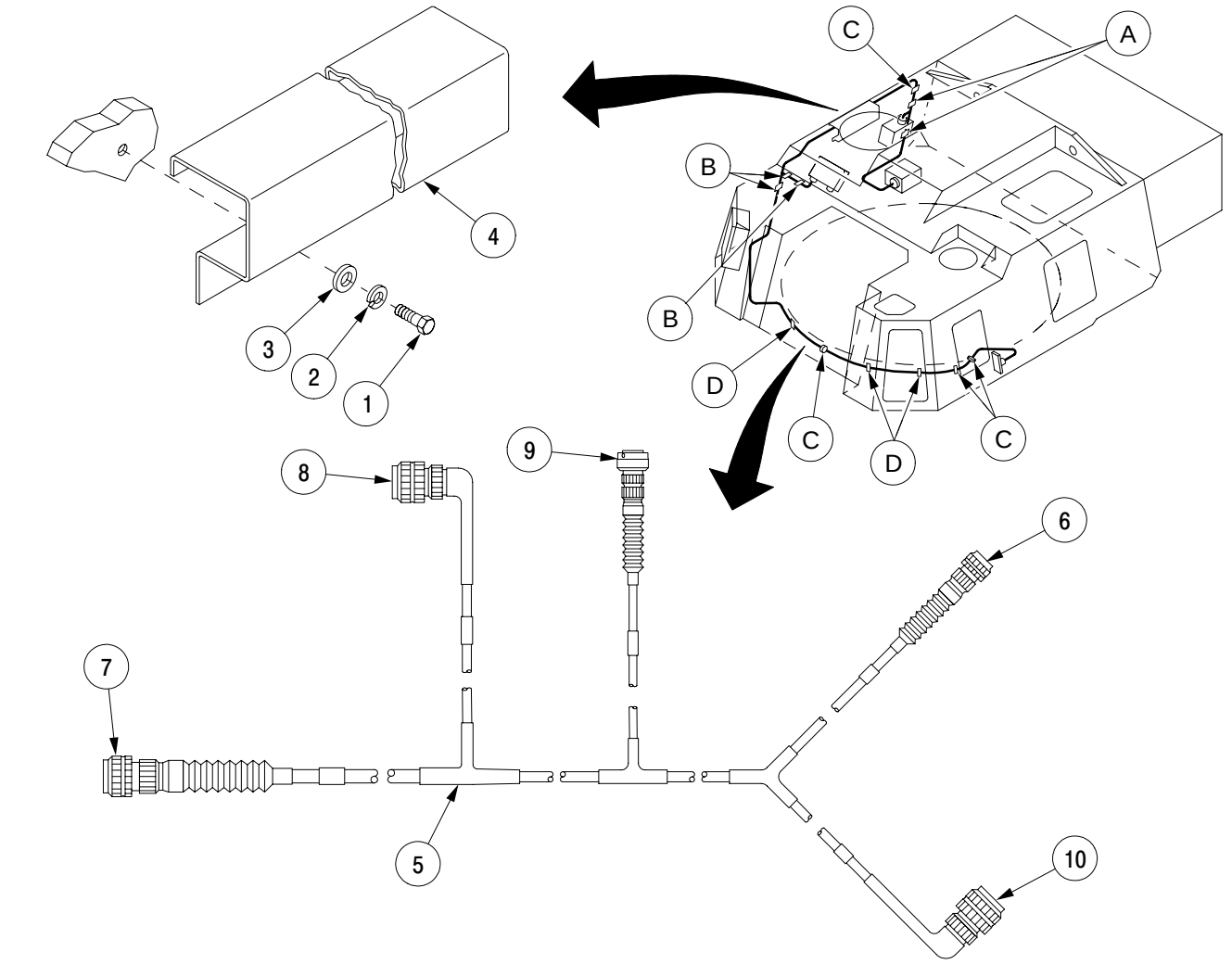
Item No.	W65 Connector/Lead/Wire	From Connector/ Lead/Wire/Component	Location
6	W65 P5	Hydraulic compartment bulkhead connector	On bulkhead separating cab and hydraulic compartment at Gunner's station.
7	W65 P1	PDIU connecter J6	Right side rear cab on shelf behind COS station.
8	W65 P2	PCU connector 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.

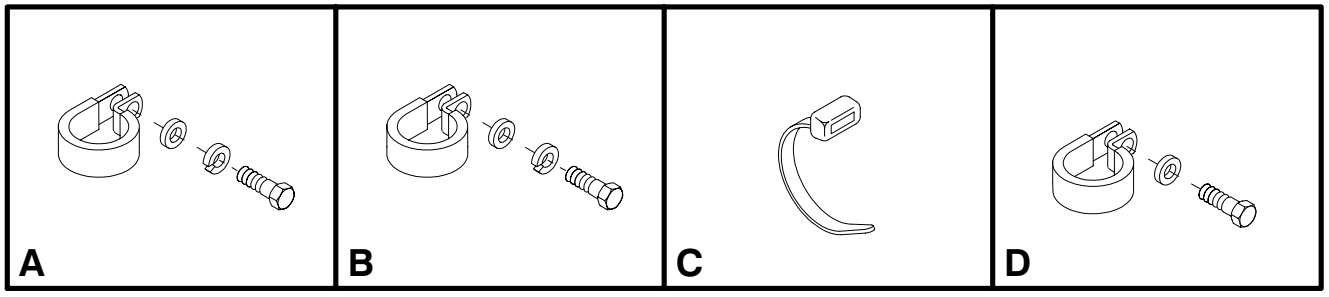
3 Remove clamps, tiedown straps and attaching hardware securing wiring harness W65 (5) from vehicle. Discard tiedown straps and lockwashers.

4 Remove wiring harness W65 (5) from vehicle.

5–17 WIRING HARNESS W65 – CONTINUED

a. Removal – Continued





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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.

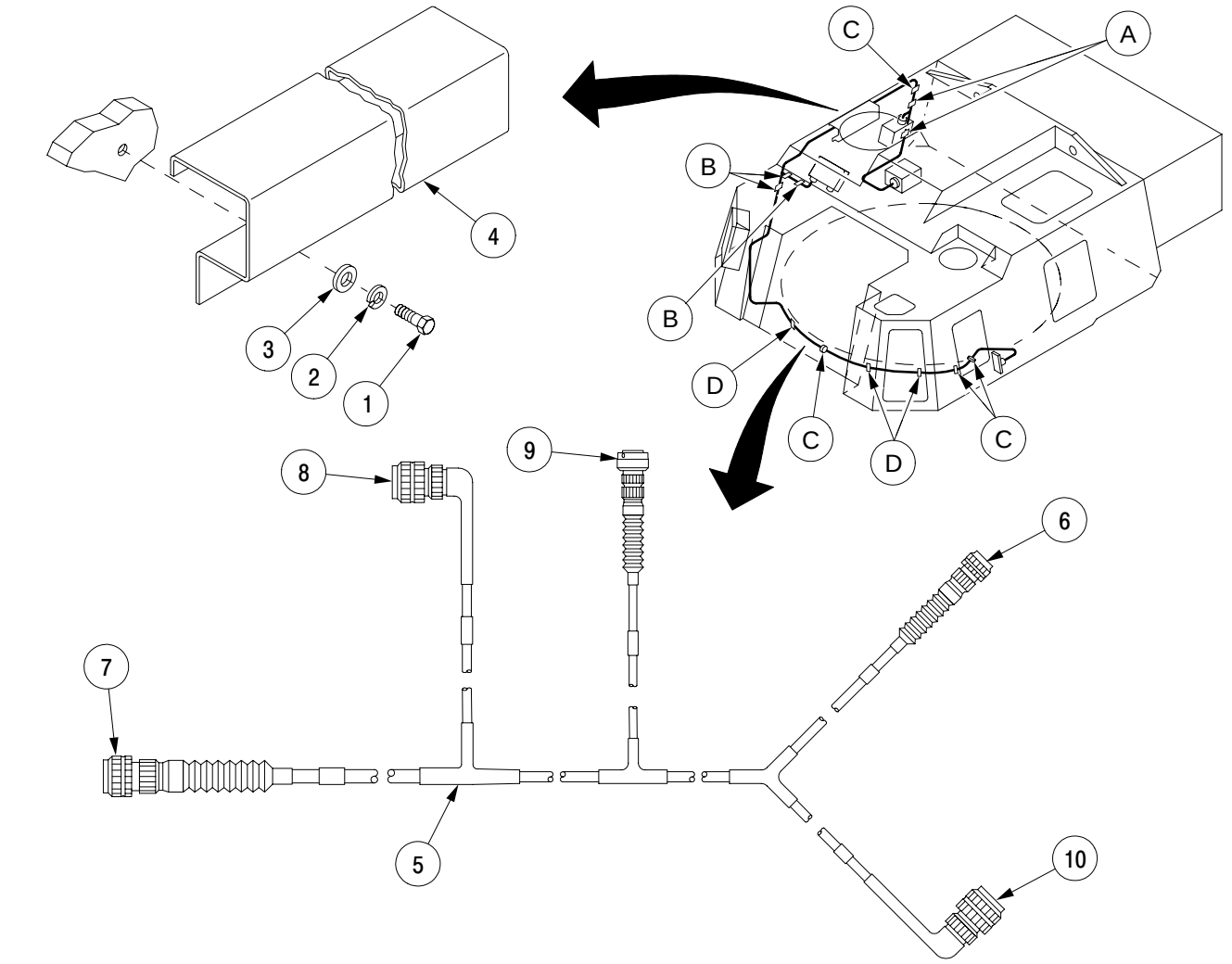
2 Connect wiring harness W65 (5) at the following points:

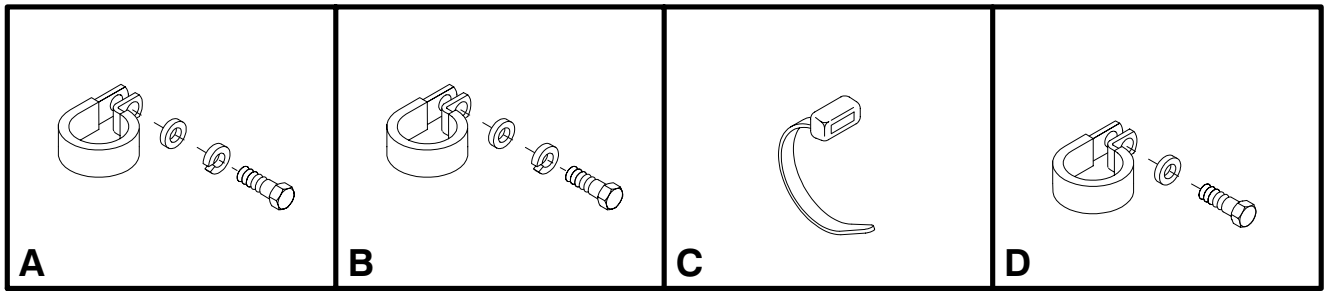
Item No.	W65 Connector/Lead/Wire	To Connector/ Lead/Wire/Component	Location
10	W65 P4	ACU connector J5	Right front cab on right bulkhead.
9	W65 P3	Hydraulic control box	At COS station below cupola on overhead.
8	W65 P2	PCU connector J5	Right side center cab on bulkhead at COS station.
7	W65 P1	PDIU connector 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





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5–18 HYDRAULIC SENSORS.

This task covers: a. Removal b. Installation

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 open (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.

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.

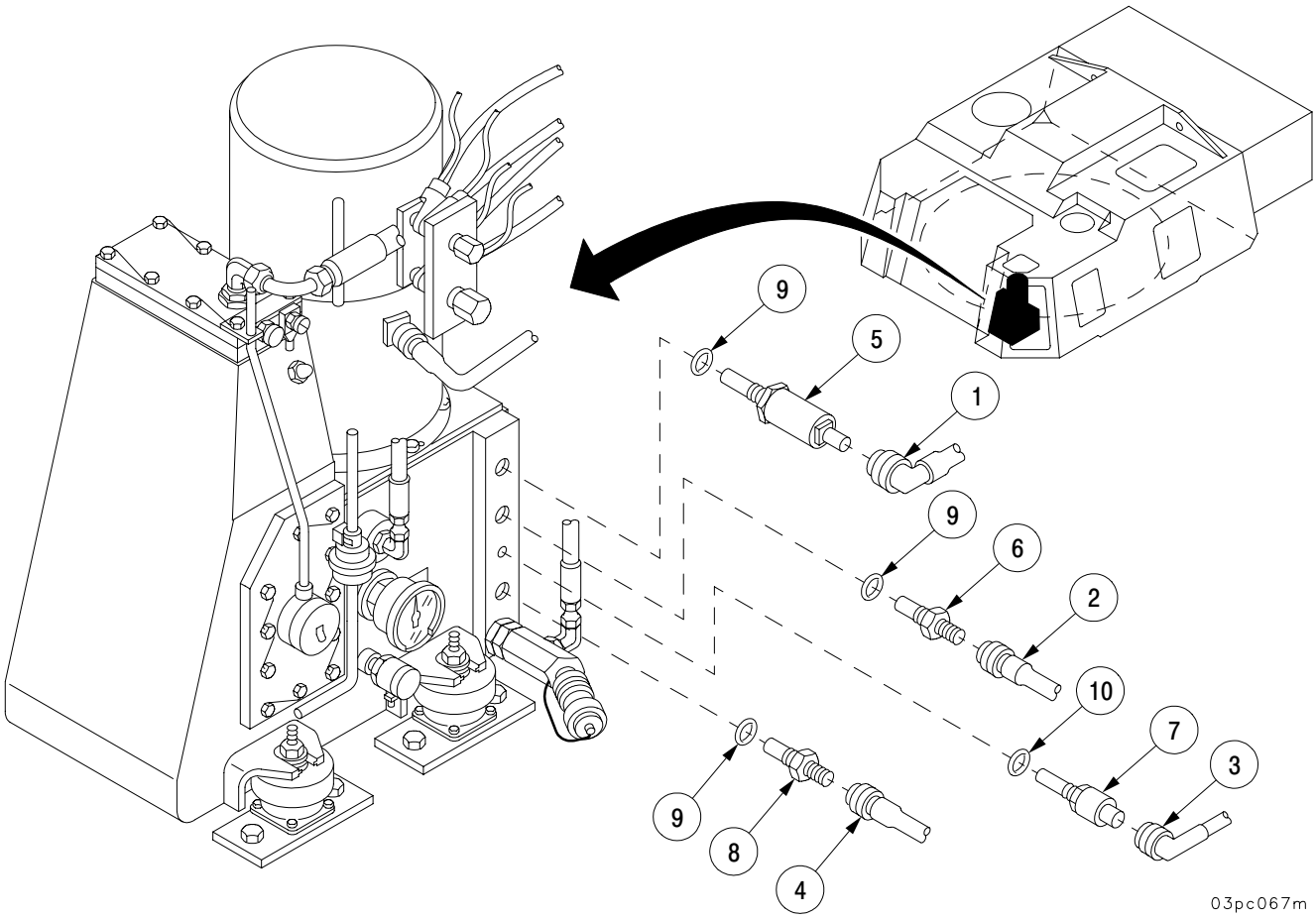
5–18 HYDRAULIC SENSORS – CONTINUED

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).



5–19 HYDRAULIC PUMP MOTOR.

This task covers: a. Removal b. Installation

INITIAL SETUP

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

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.

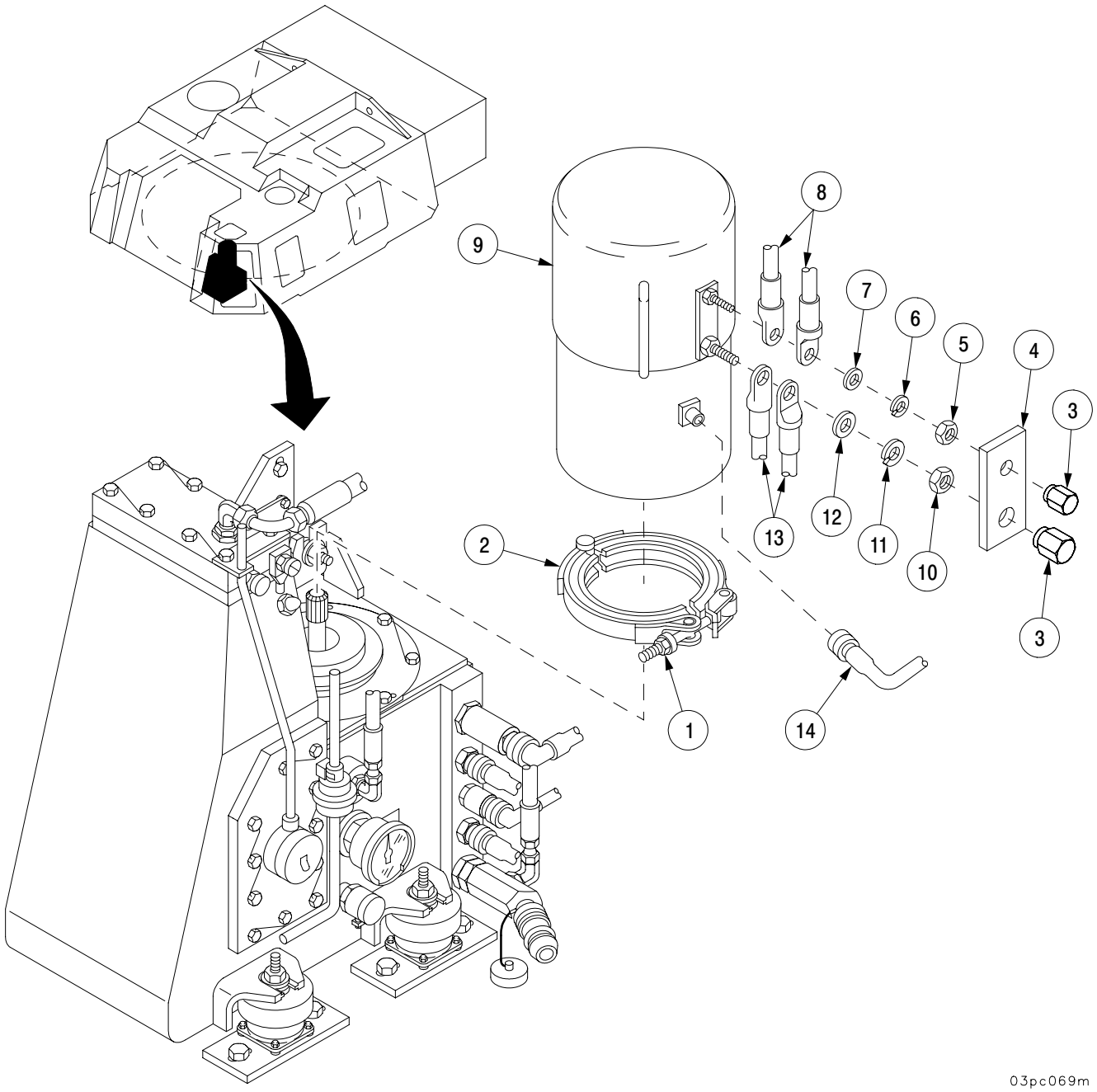
3 Remove nut (5), lockwasher (6), flat washer (7), and two leads 70 (8) from electric motor (9). Discard lockwasher.

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



5–19 HYDRAULIC PUMP MOTOR – CONTINUED

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).

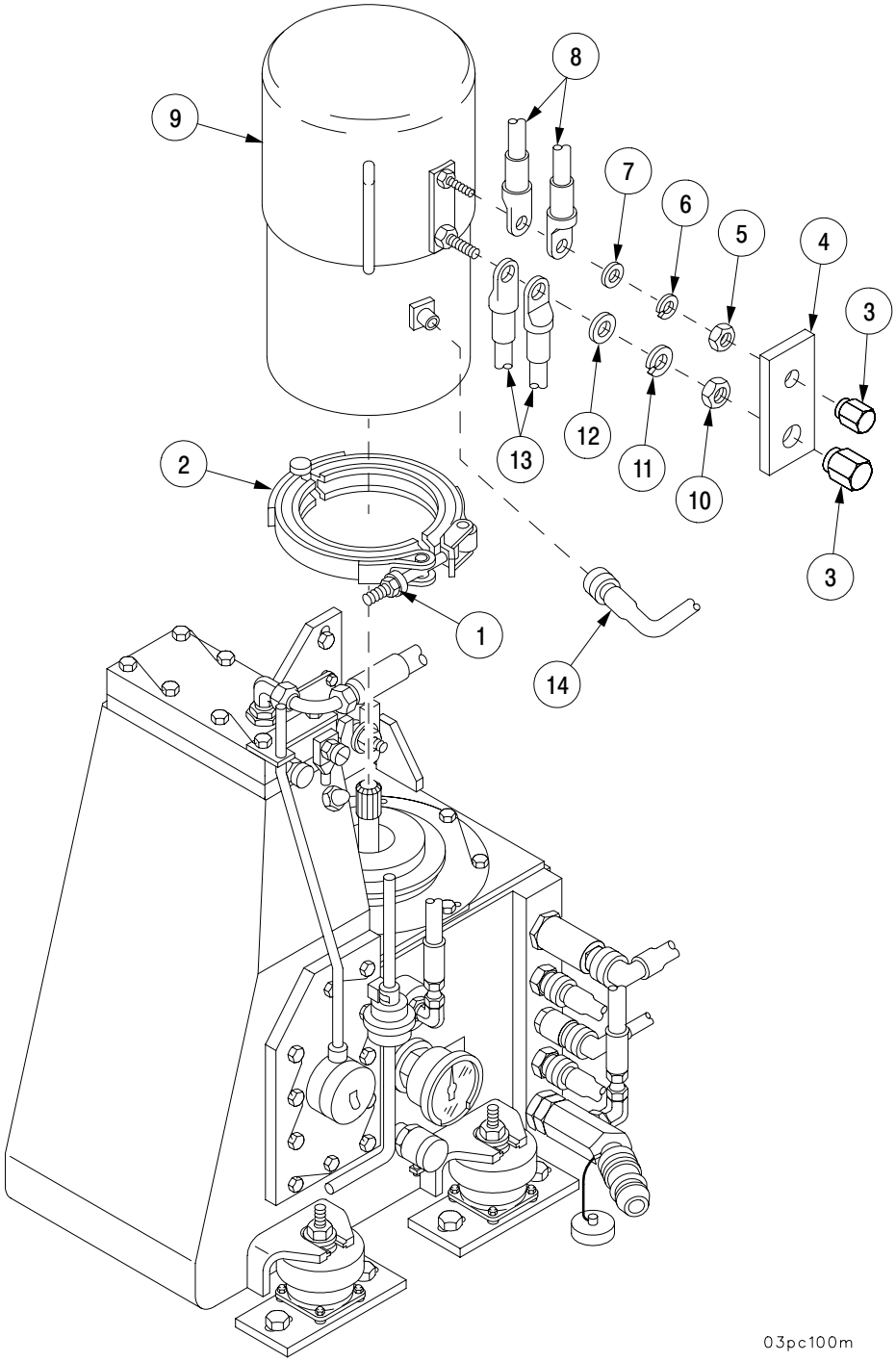
5 Install two leads 70 (8) to negative post on electric motor (9) with flat washer (7), new lockwasher (6), and nut (5).

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



5–20 HYDRAULIC CONTROL BOX.

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)

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).

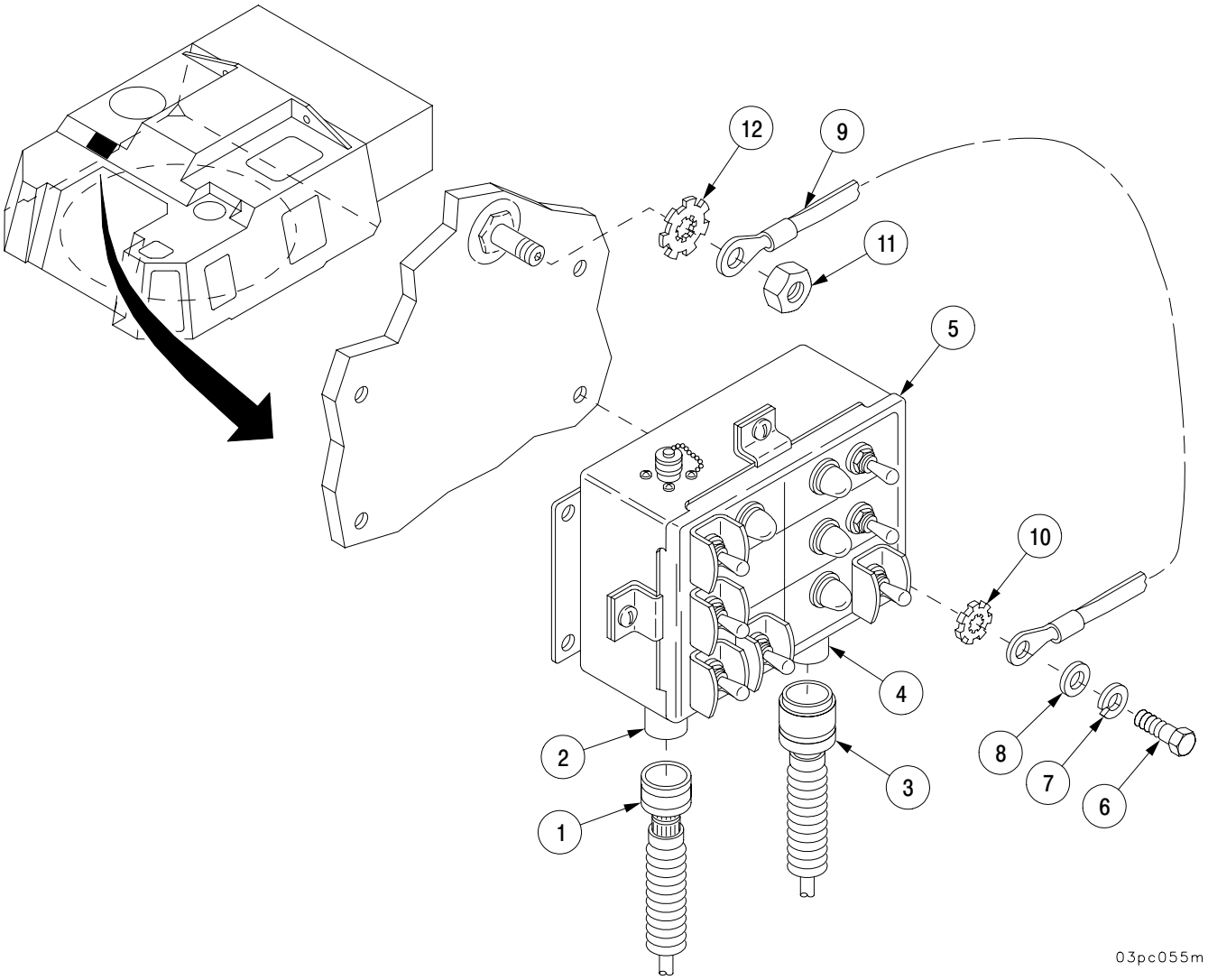
2 Remove four screws (6), four lockwashers (7), four flat washers (8), and ground lead (9) and lockwasher (10) securing hydraulic control box (5). Discard lockwashers.

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



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).

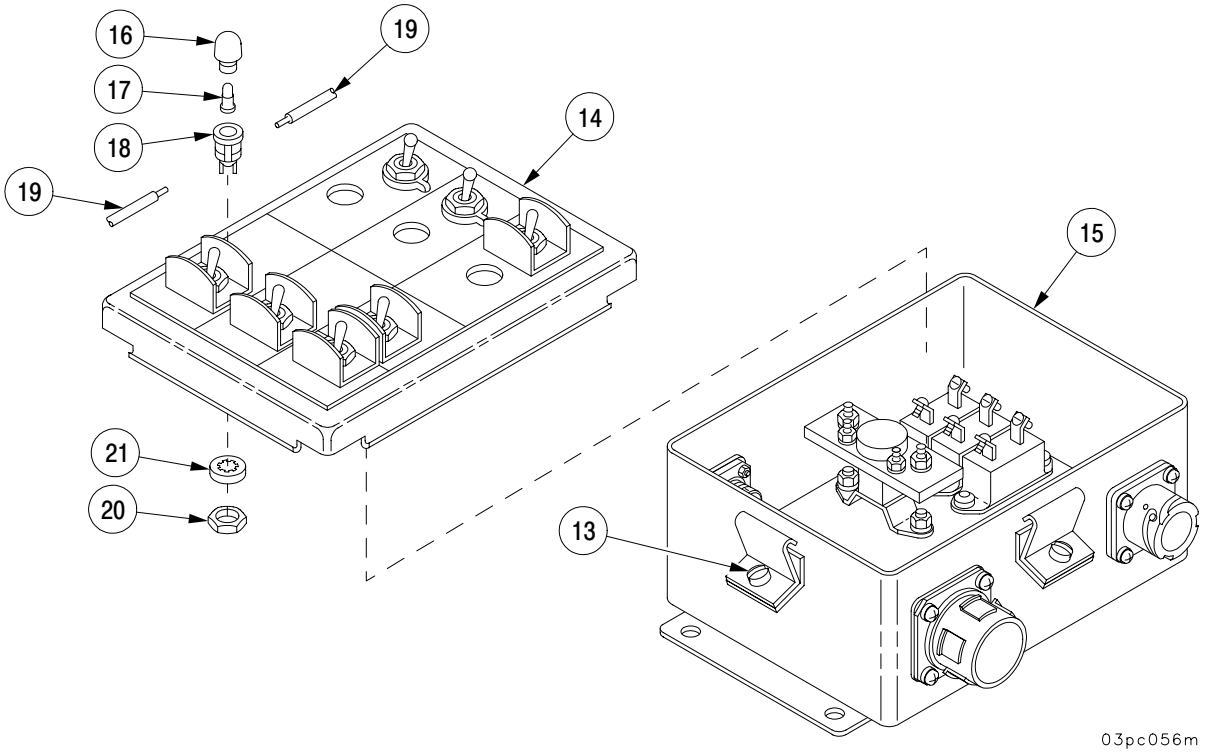
NOTE

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).

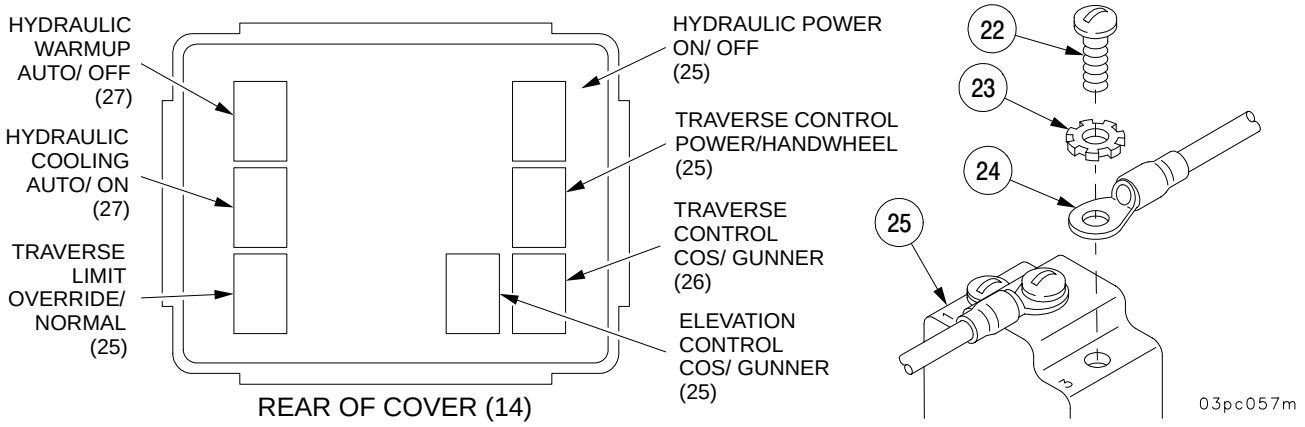


5–20 HYDRAULIC CONTROL BOX – CONTINUED

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–S0L



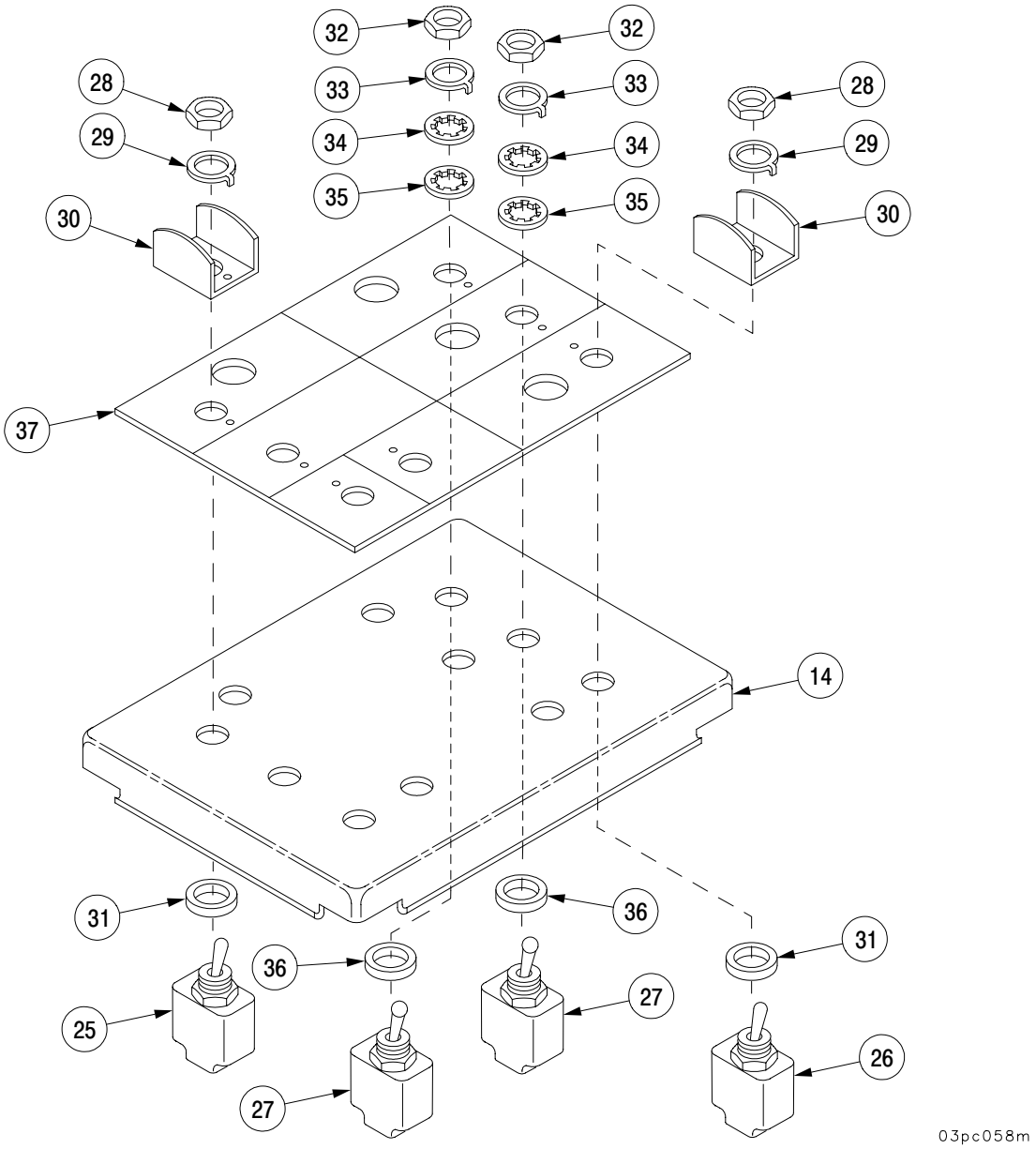
5–20 HYDRAULIC CONTROL BOX – CONTINUED

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.

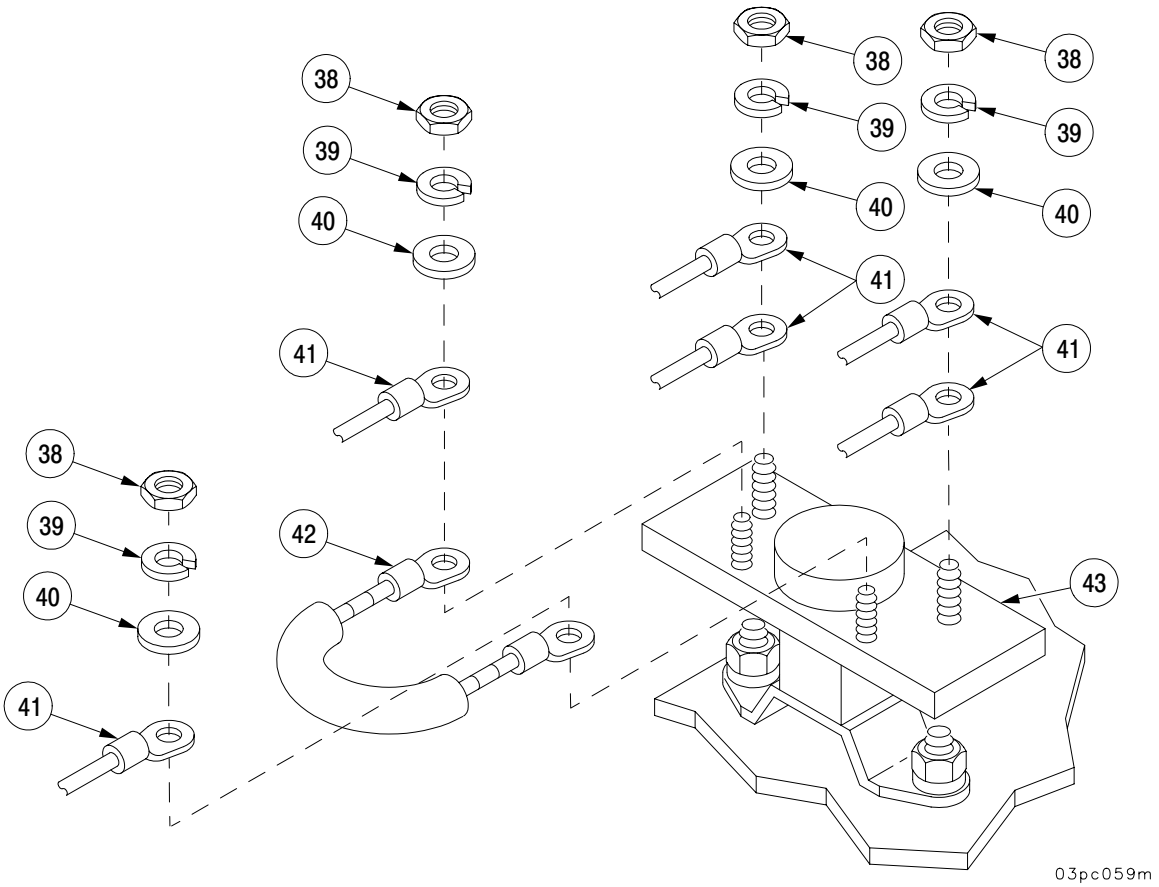


5–20 HYDRAULIC CONTROL BOX – CONTINUED

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

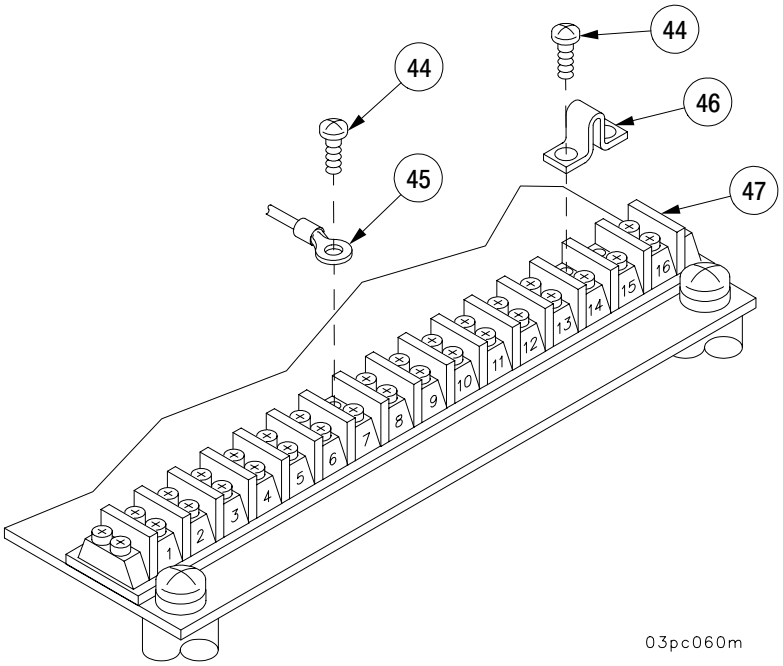


5–20 HYDRAULIC CONTROL BOX – CONTINUED

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		

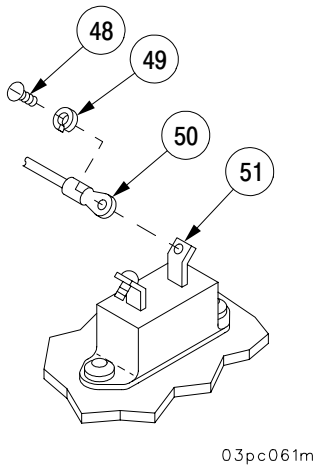


5–20 HYDRAULIC CONTROL BOX – CONTINUED

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).

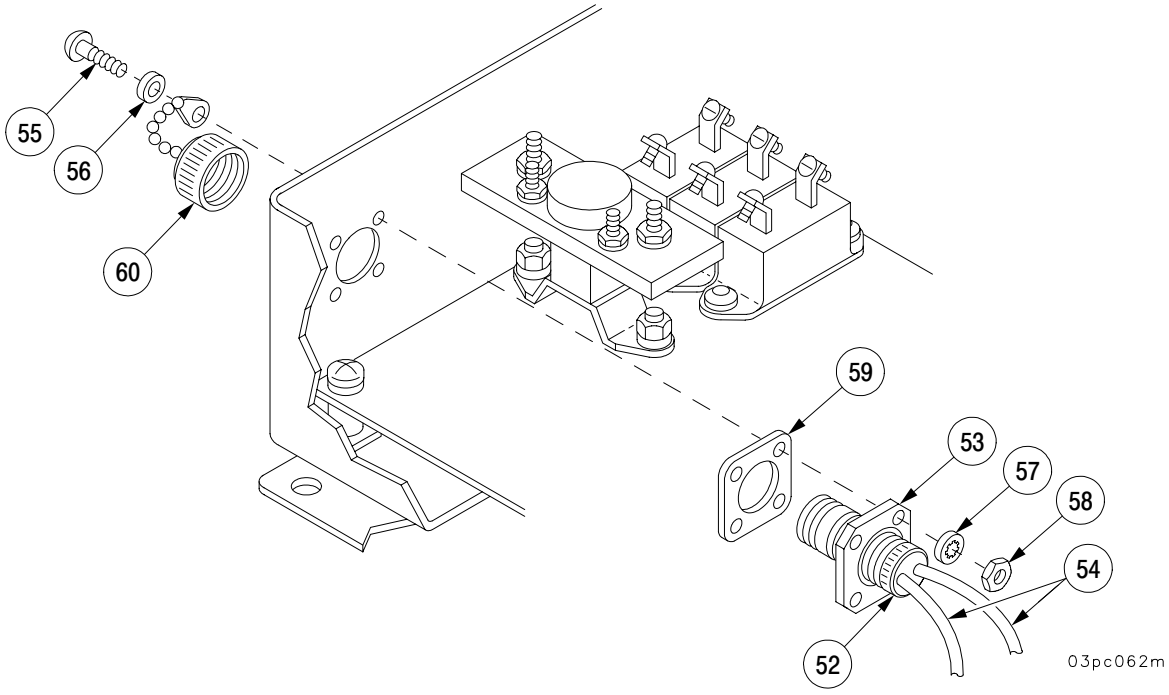
Circuit Breaker	Lead
CB1	100A
	100
	100
CB2	100B
	100
CB3	100
	147–138
	100



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.



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.

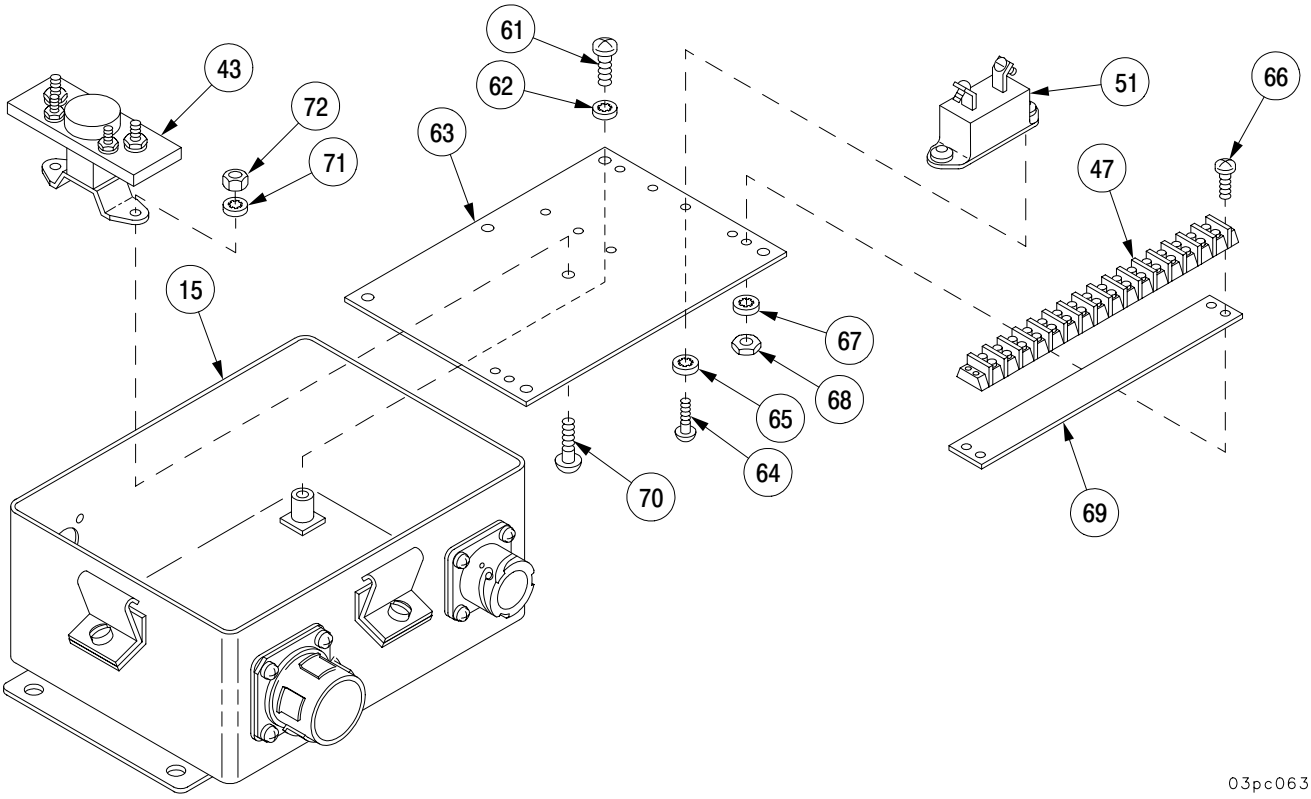
c. Assembly.

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).



5–20 HYDRAULIC CONTROL BOX – CONTINUED

c. Assembly – Continued

NOTE

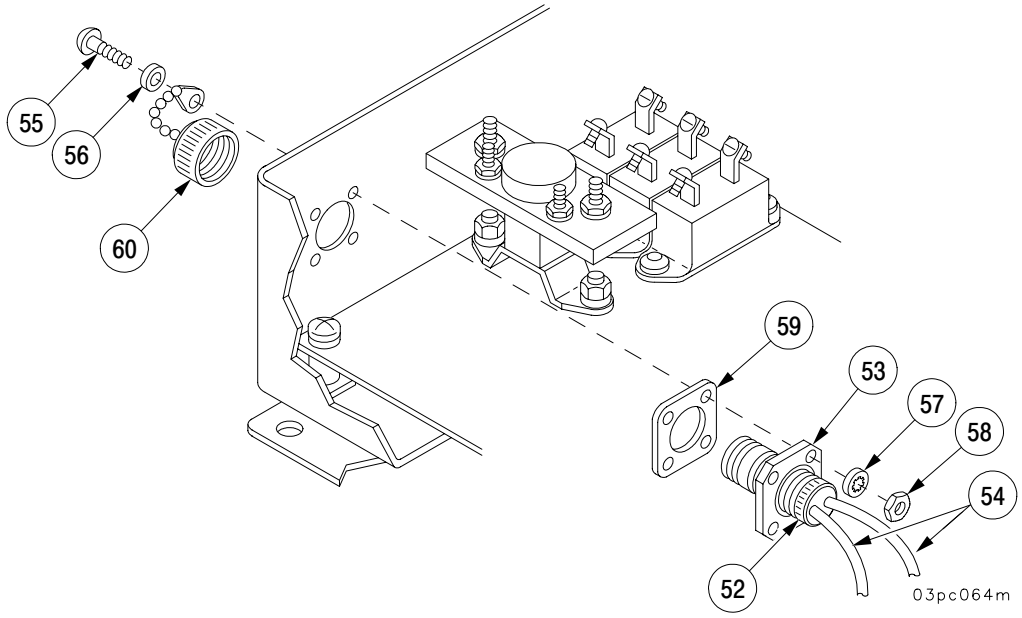
If installing new connector, remove backshell prior to installation.

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).

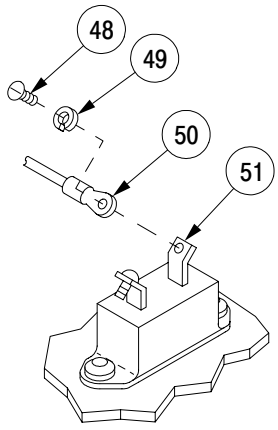
7 Solder two leads (54) to connector J3 (53).

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

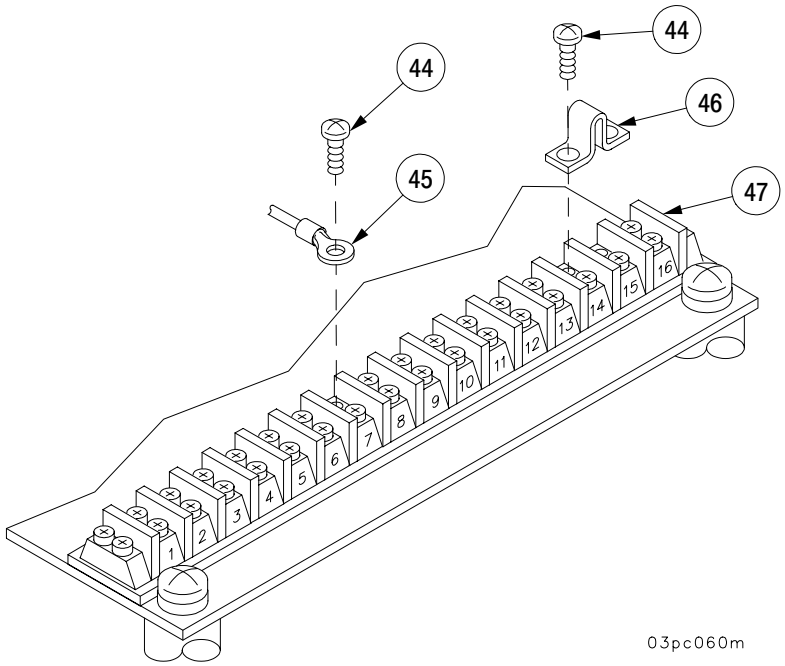


5–20 HYDRAULIC CONTROL BOX – CONTINUED

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		

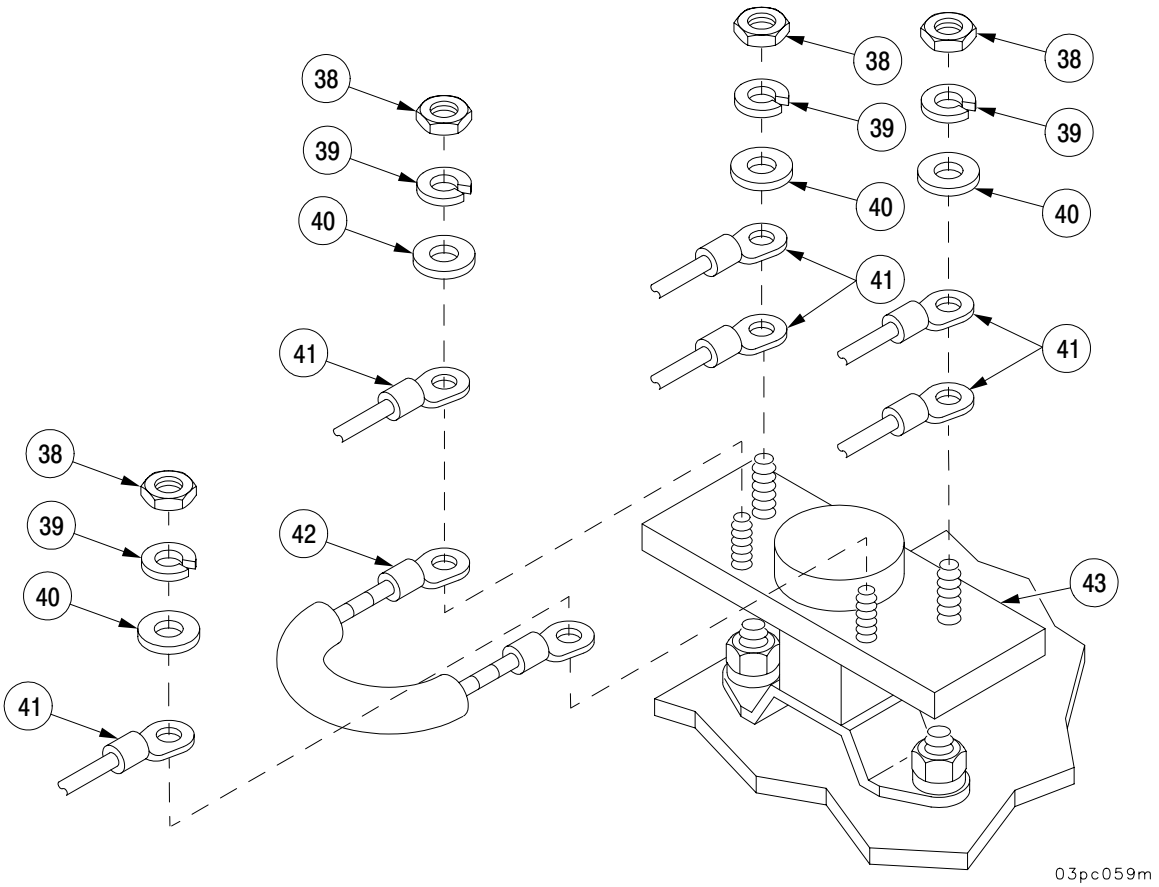


5–20 HYDRAULIC CONTROL BOX – CONTINUED

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

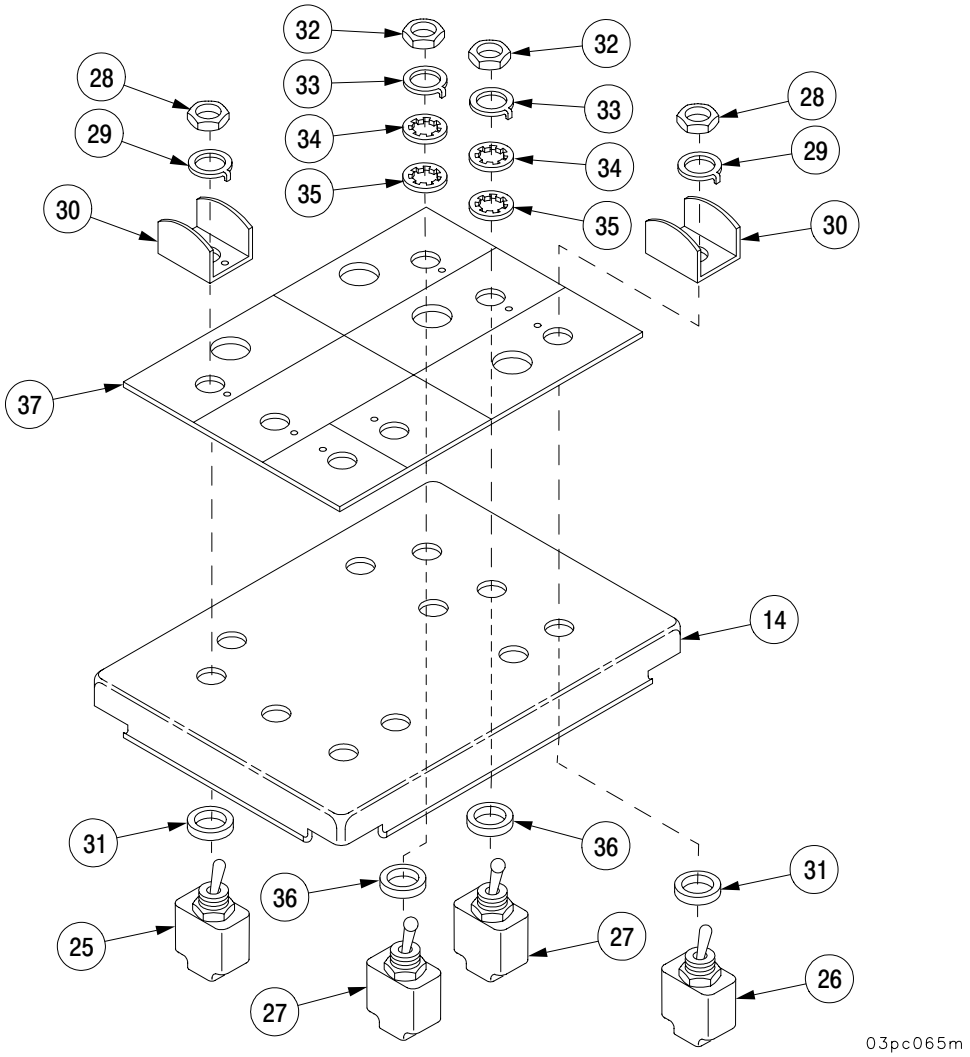
12 Remove protective backing and install new faceplate (37) on cover (14).

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).

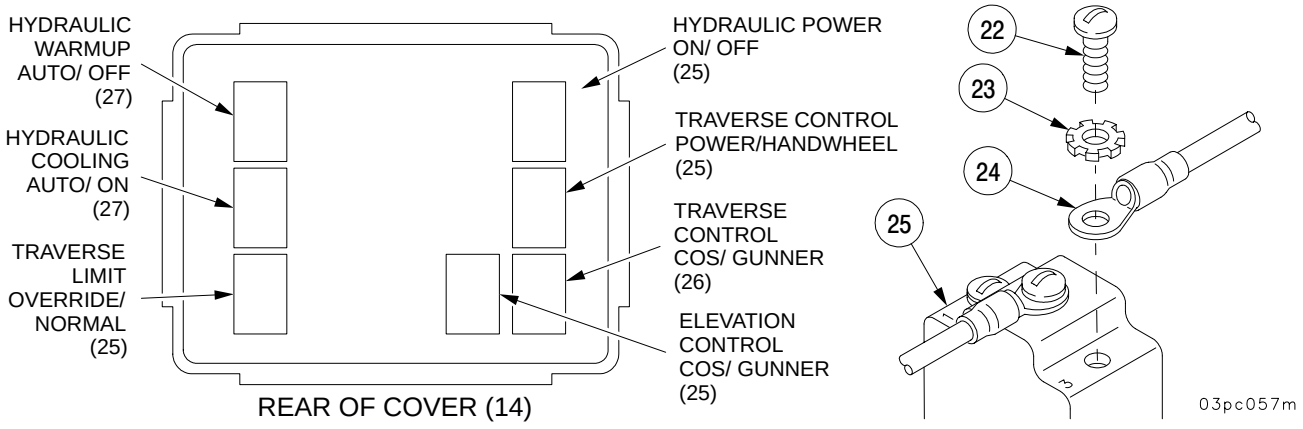


5–20 HYDRAULIC CONTROL BOX – CONTINUED

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)
	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–S0L



5–20 HYDRAULIC CONTROL BOX – CONTINUED

c. Assembly – Continued

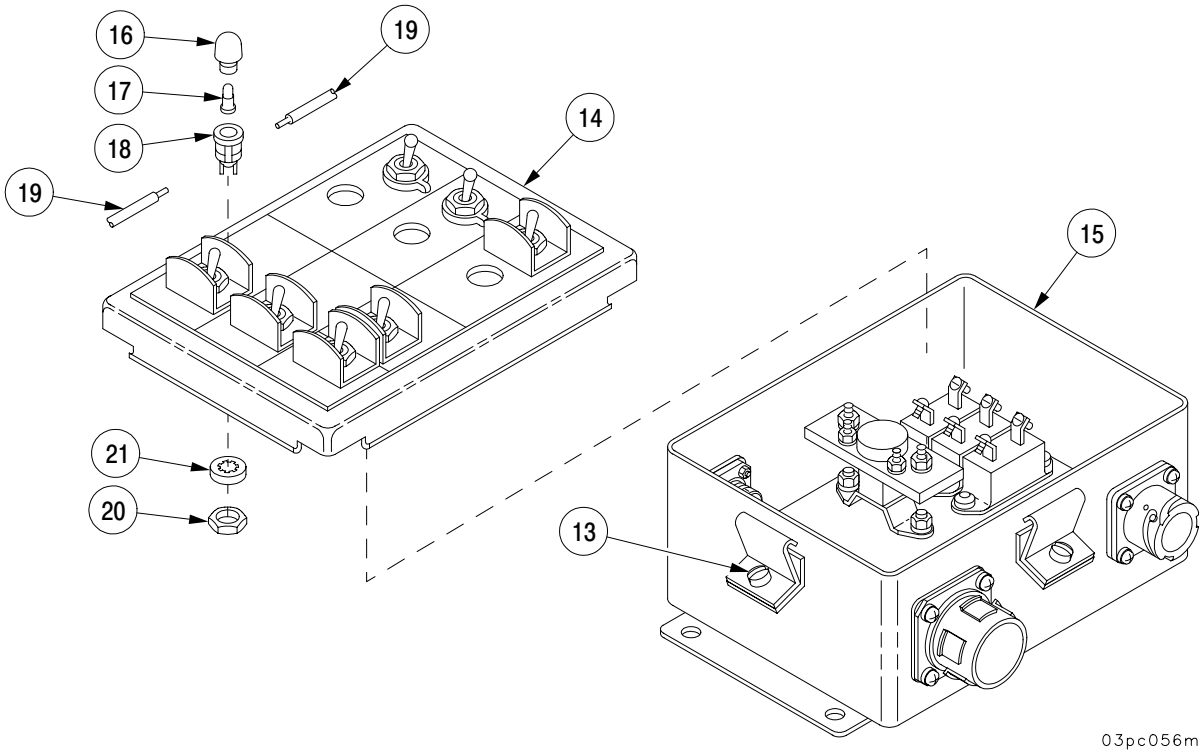
16 Install four LED housings (18) with four nuts (20) and four lockwashers (21) (nuts and lockwashers supplied with housing).

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

18 Install four LEDs (17) and four lenses (16) in four LED housings (18).

19 Install cover (14) and tighten four screws (13).



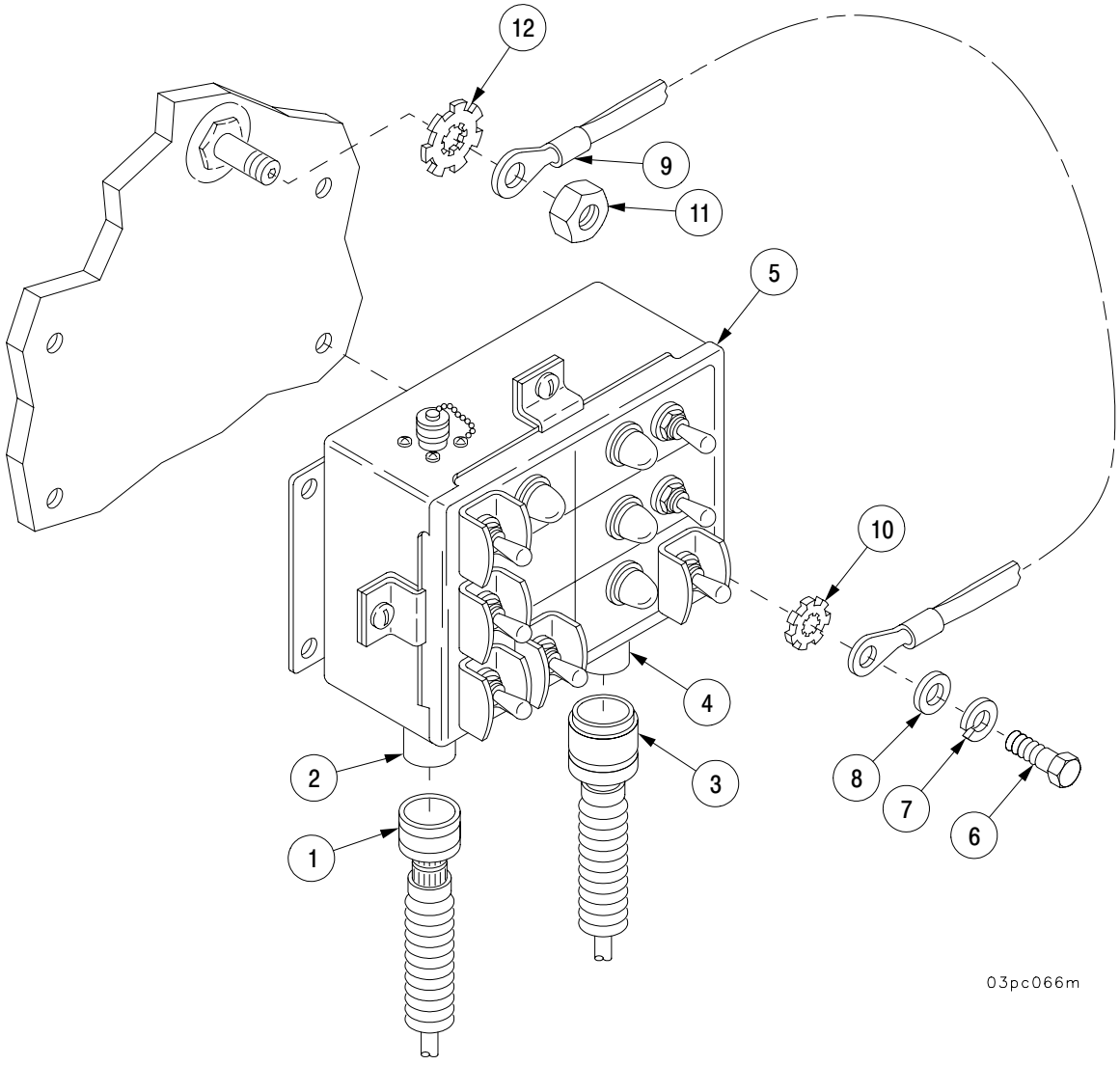
5–20 HYDRAULIC CONTROL BOX – CONTINUED

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.

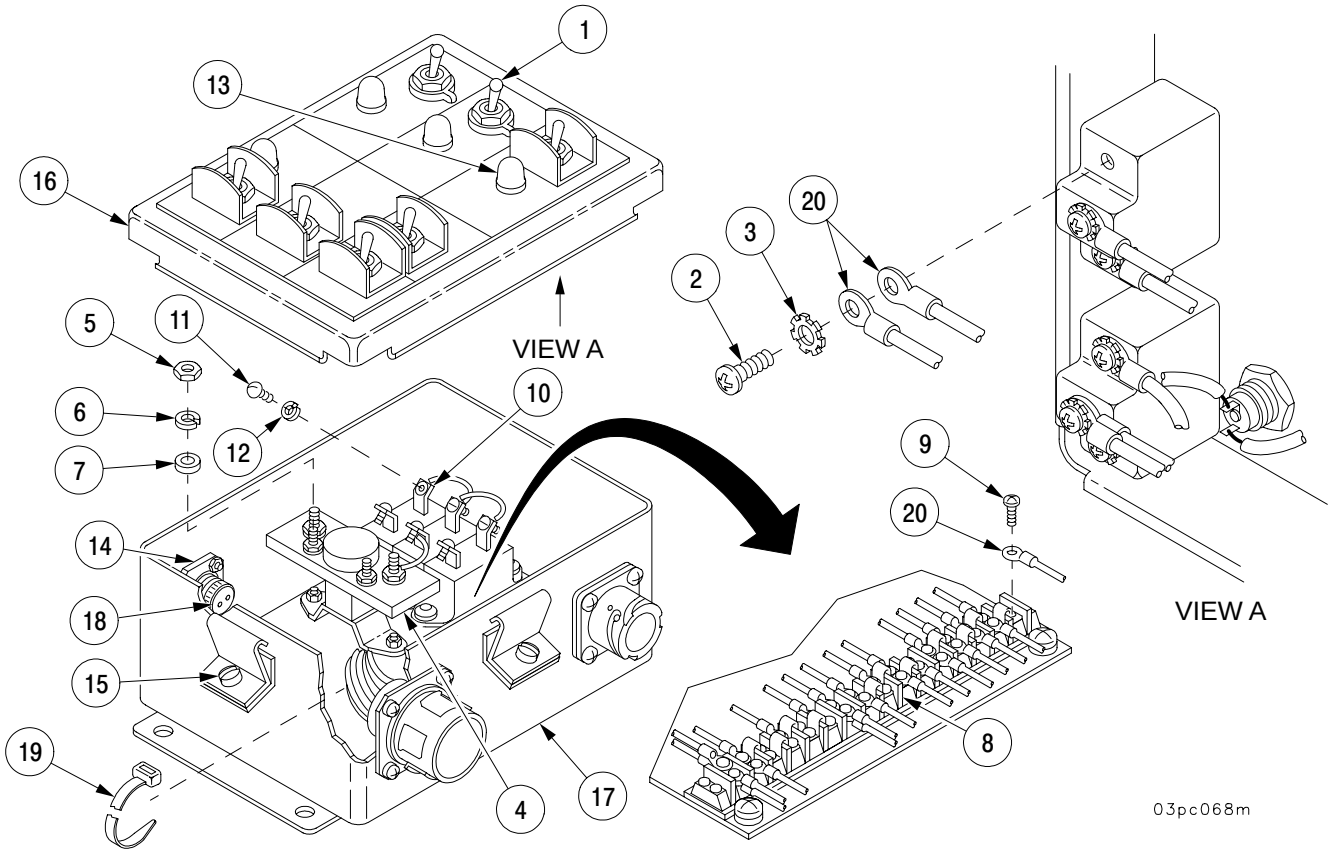
1 Loosen four screws (15) and separate cover (16) from control box (17).

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).

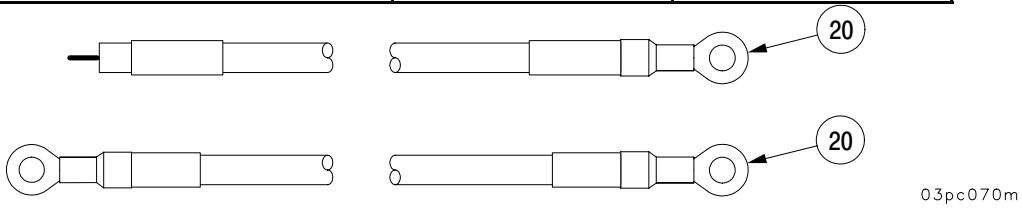
3 Remove the following leads (20) from indicated components (1, 4, 8, 10, 13, and 14).



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



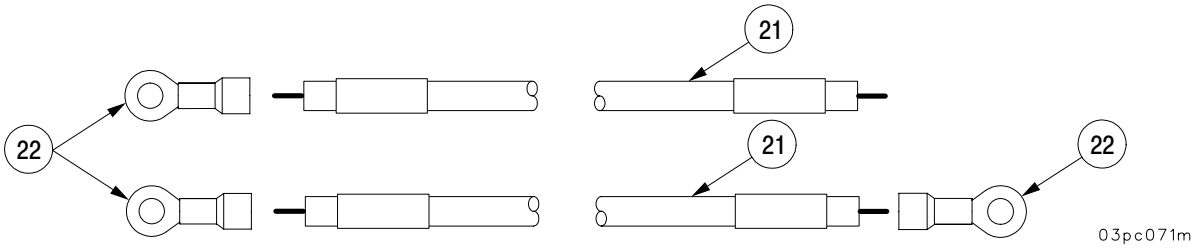
5–21 HYDRAULIC CONTROL BOX LEAD ASSEMBLIES – CONTINUED

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

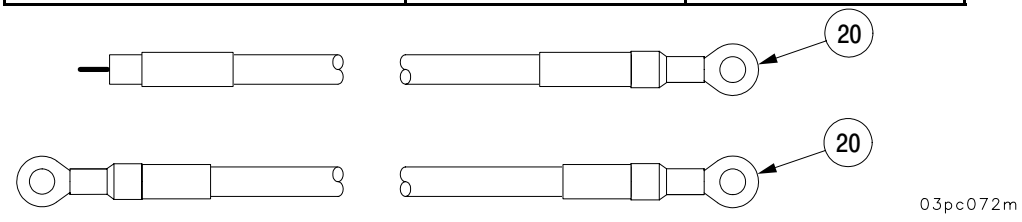
2 Install terminals (22).



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



5–21 HYDRAULIC CONTROL BOX LEAD ASSEMBLIES – CONTINUED

b. Installation – Continued

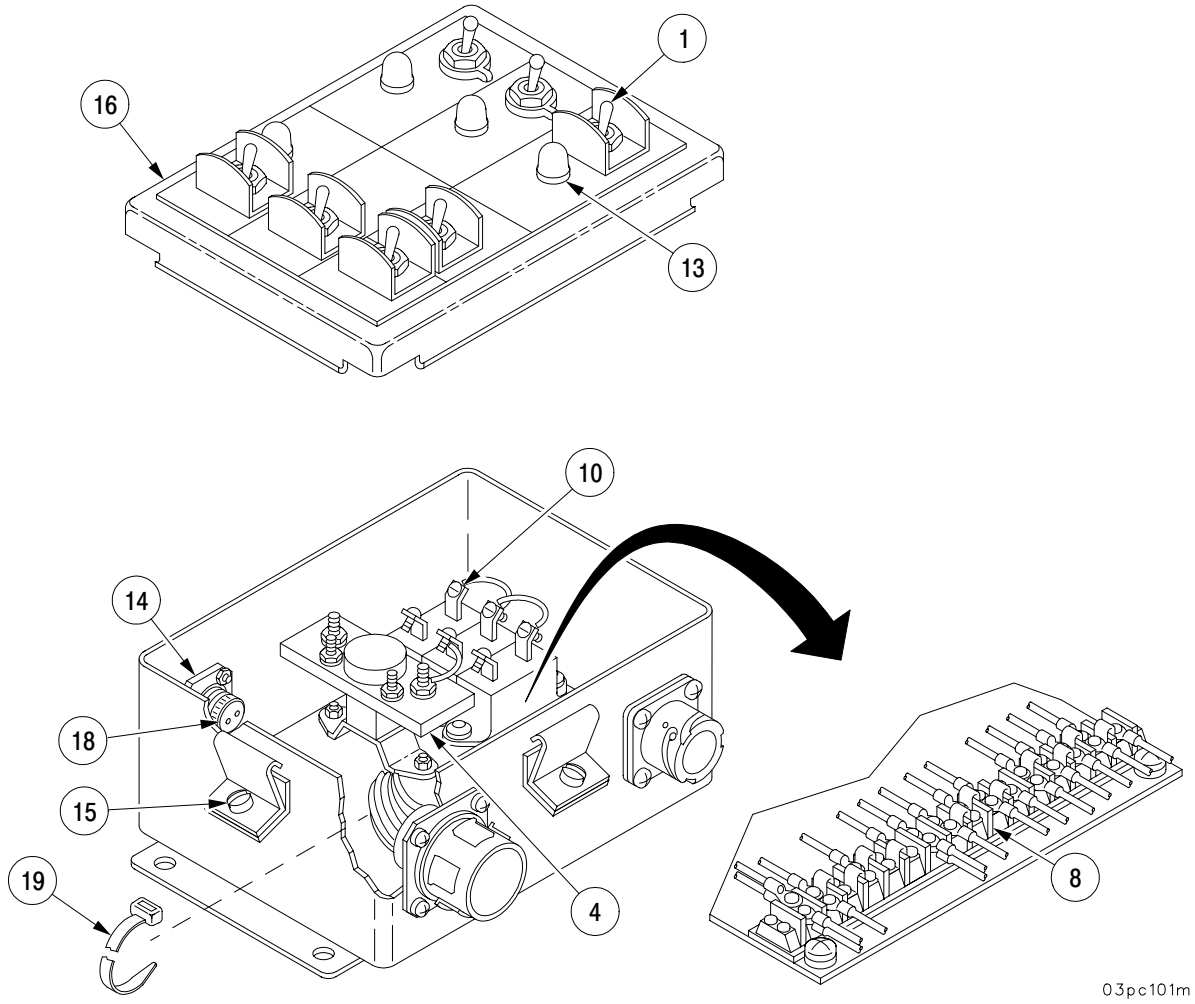
NOTE

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).



5–22 HYDRAULIC CONTROL BOX HARNESS 12563029.

This task covers: a. Removal b. Disassembly

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)

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.

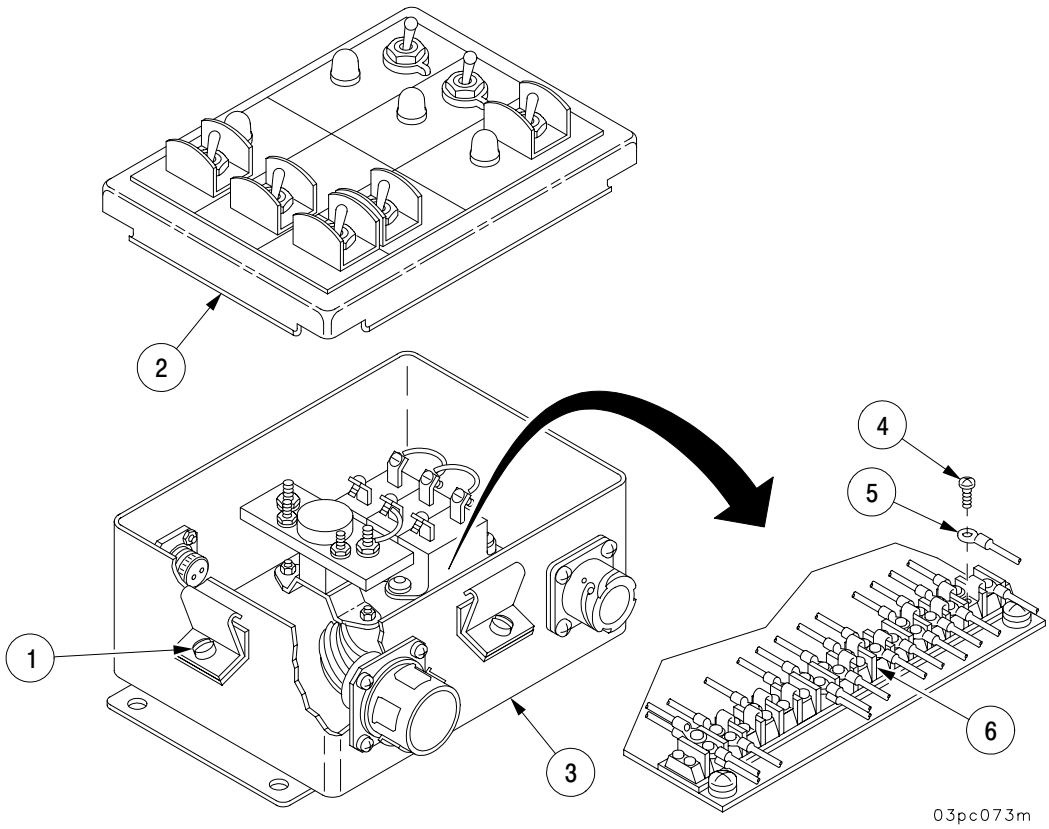
1 Loosen four screws (1) and separate cover (2) from control box (3).

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).

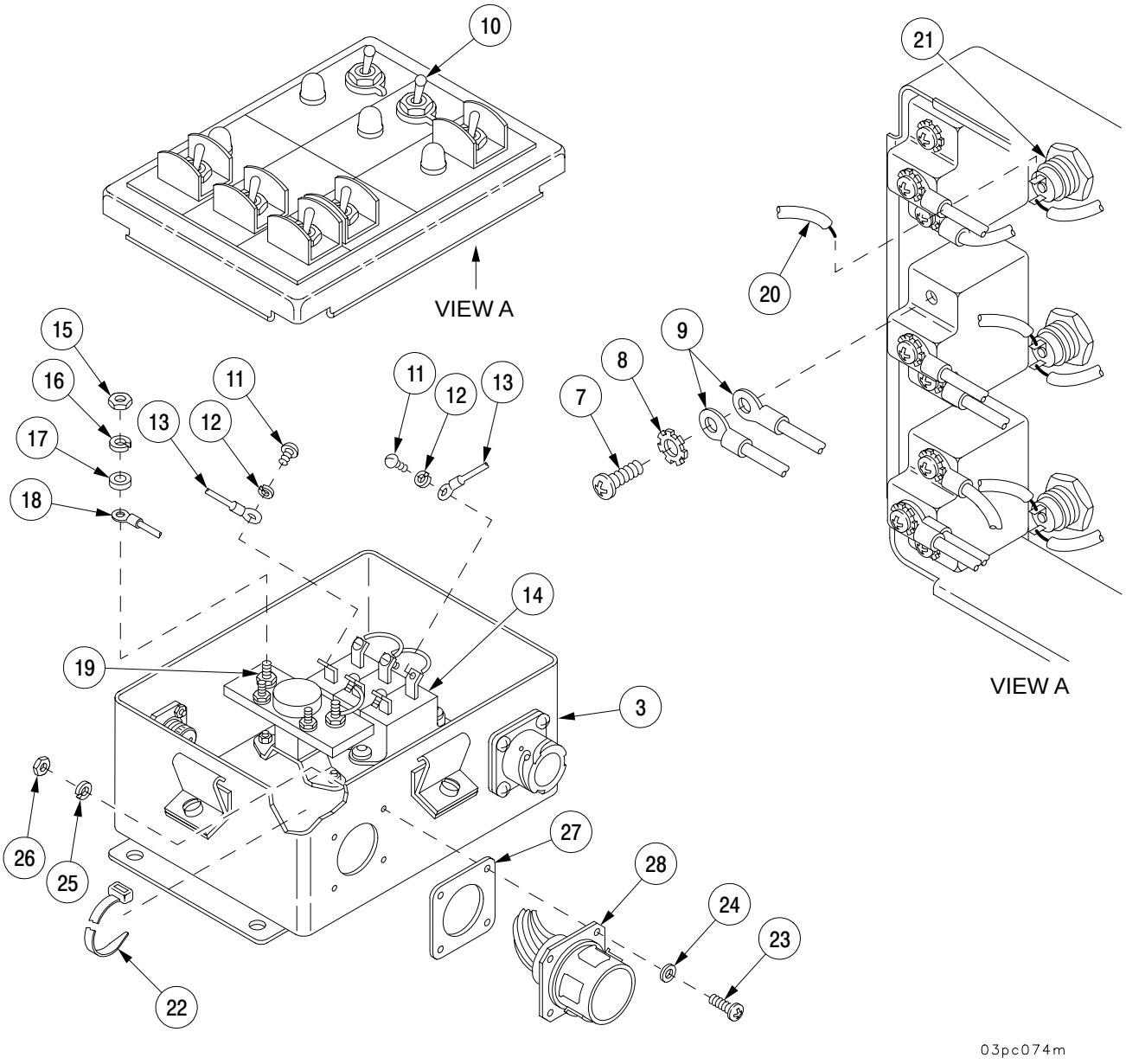
6 Desolder lead W–SOL (20) from HYDRAULIC WARMUP indicator DS2–2 (21).

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



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)

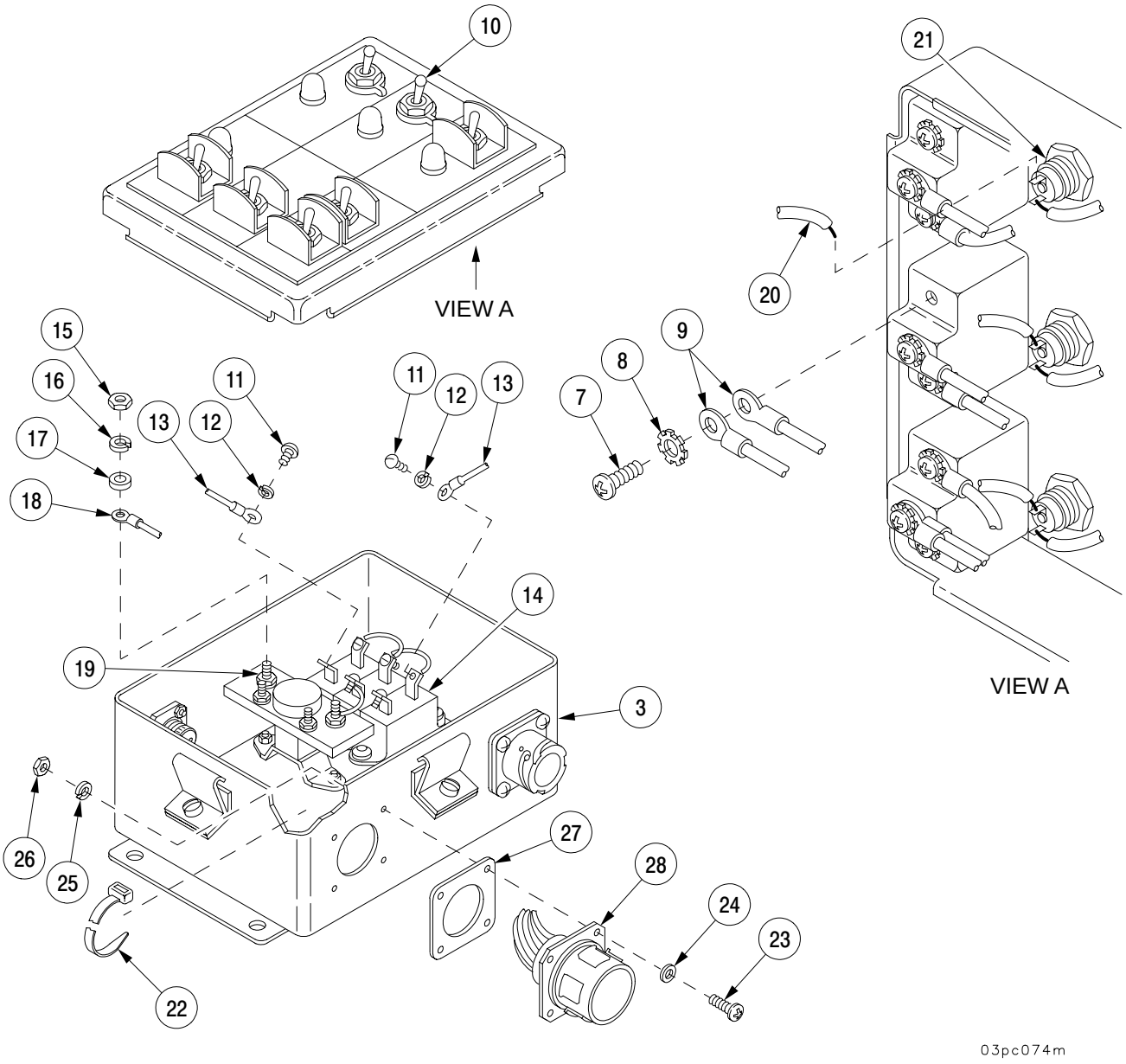
Cable Lead	Circuit Breaker
100	CB1
147–138	CB3

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



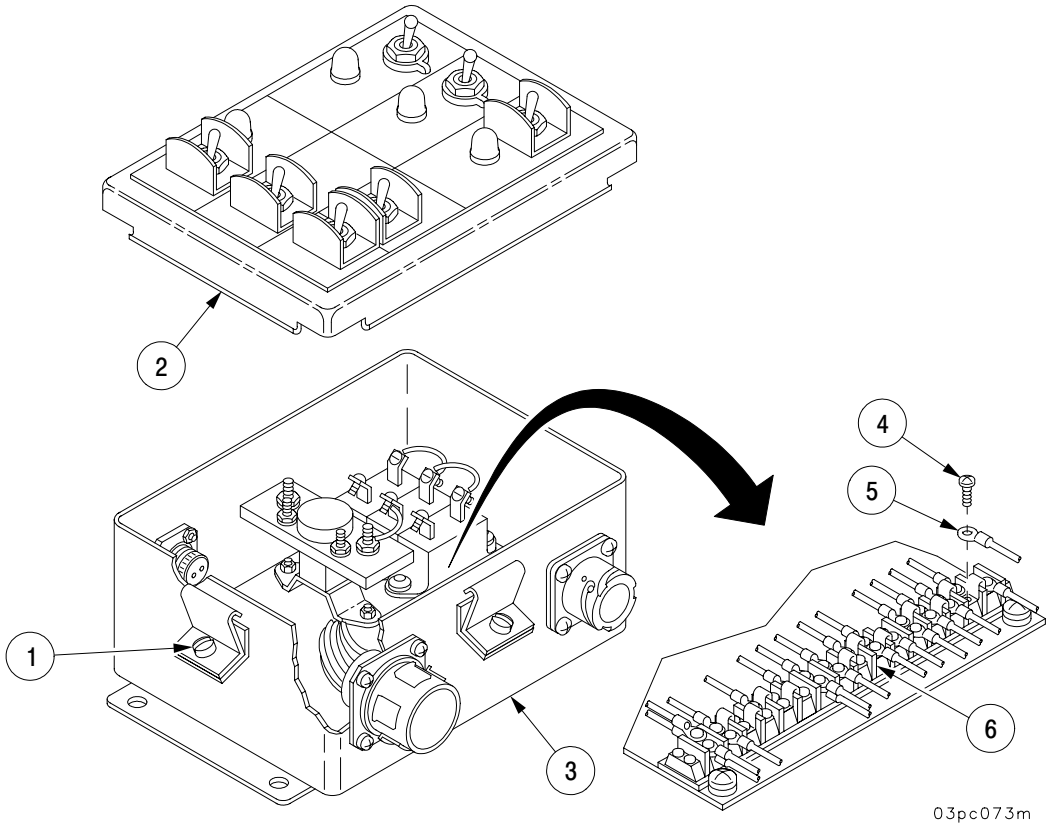
5–22 HYDRAULIC CONTROL BOX HARNESS 12563029 – CONTINUED

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).



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.

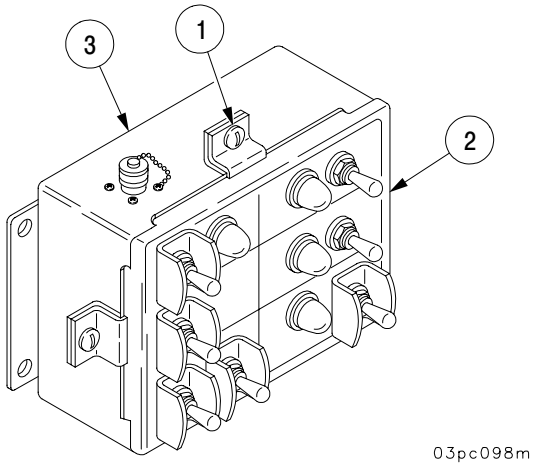
CAUTION

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).



5–23 HYDRAULIC CONTROL BOX HARNESS 12563030 – CONTINUED

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).

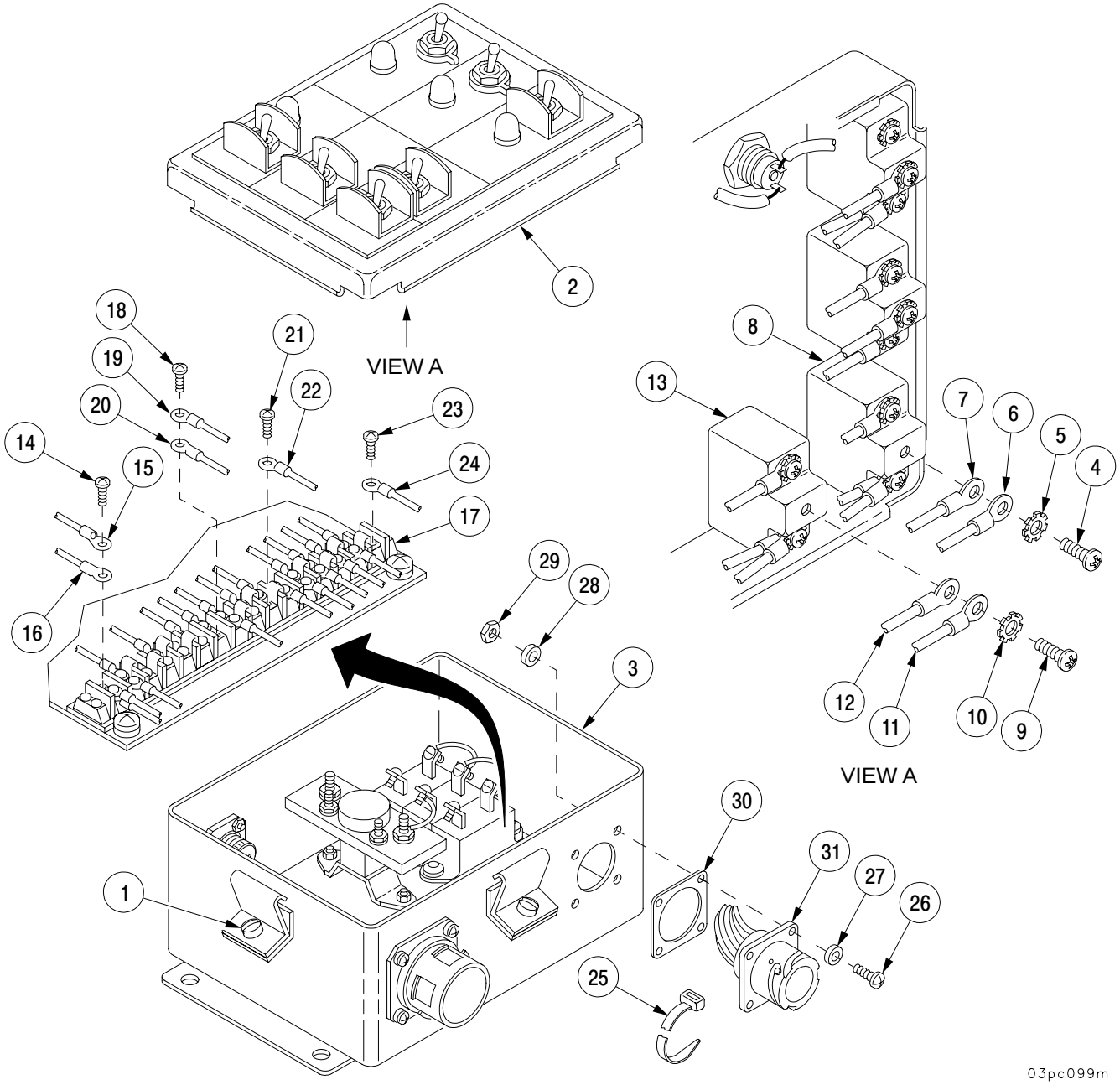
7 Connect cable lead TS4 (11) and lead 623 (12) to ELEVATION CONTROL COS/GUNNER switch (13) S4–2 with screw (9) and lockwasher (10) (supplied with switch).

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.



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)

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
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)

a. Removal.

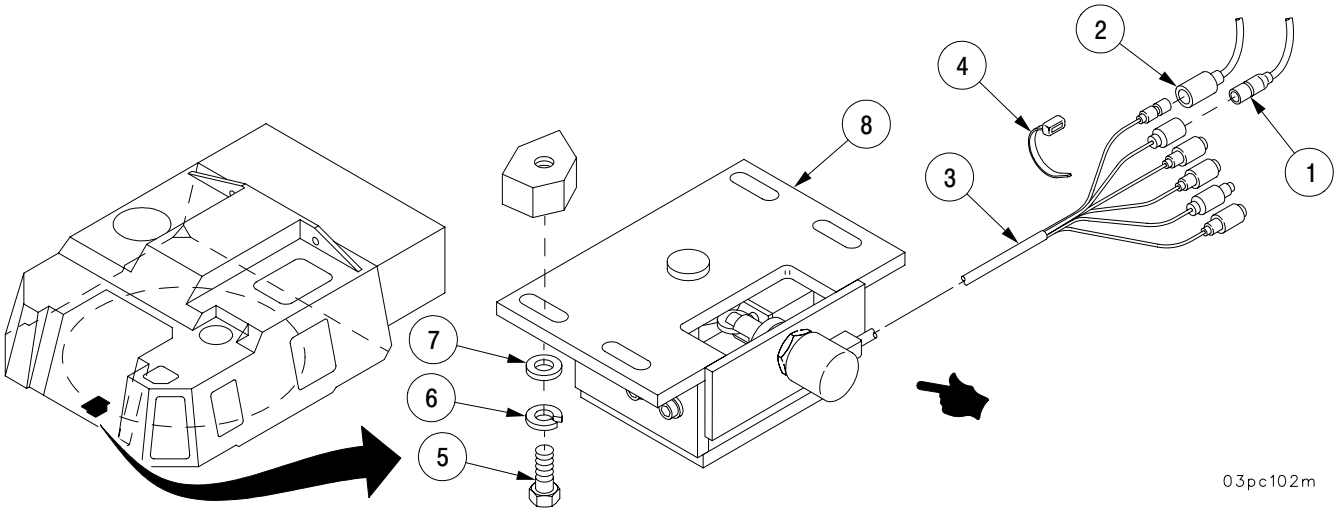
NOTE

- 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.



5–24 TRAVERSE LIMIT SWITCH – CONTINUED

b. Disassembly.

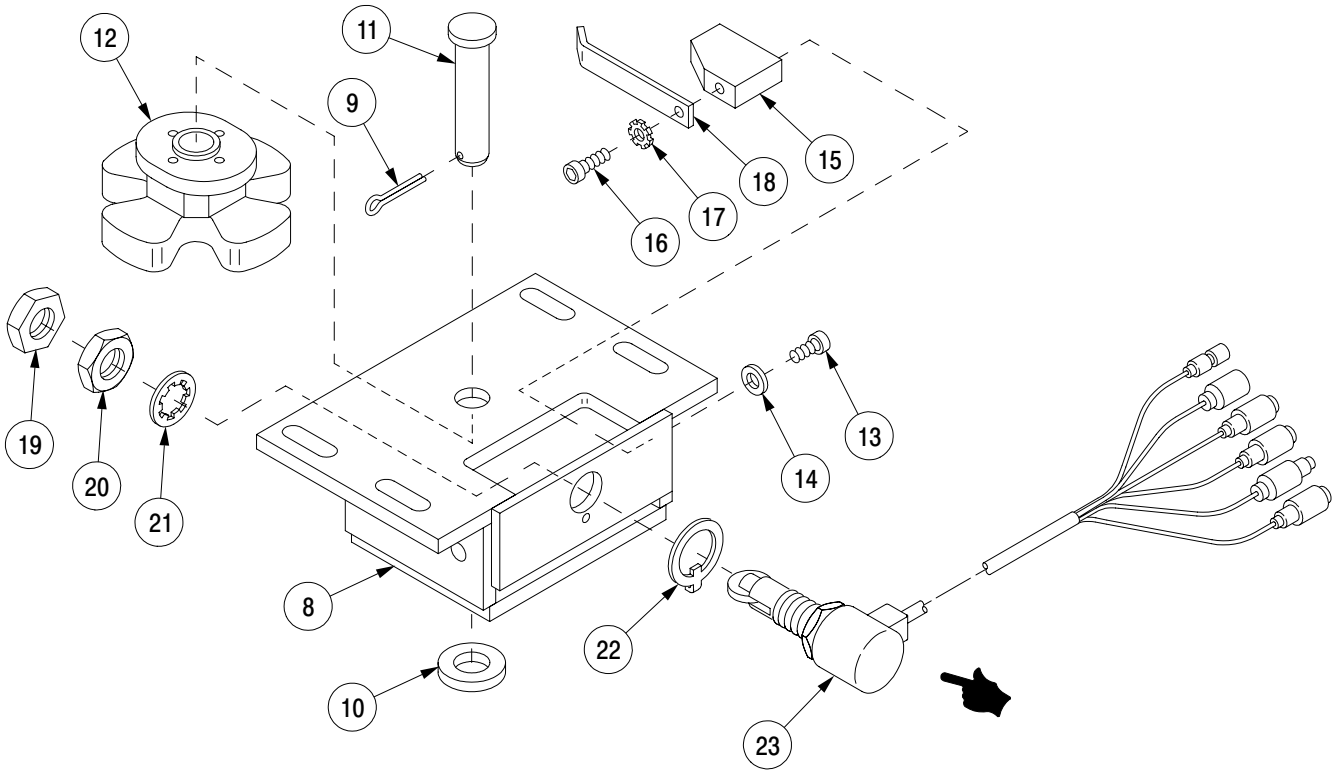
1 Remove cotter pin (9), flat washer (10), and pin (11) from cam (12) and housing (8). Discard cotter pin.

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).



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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.

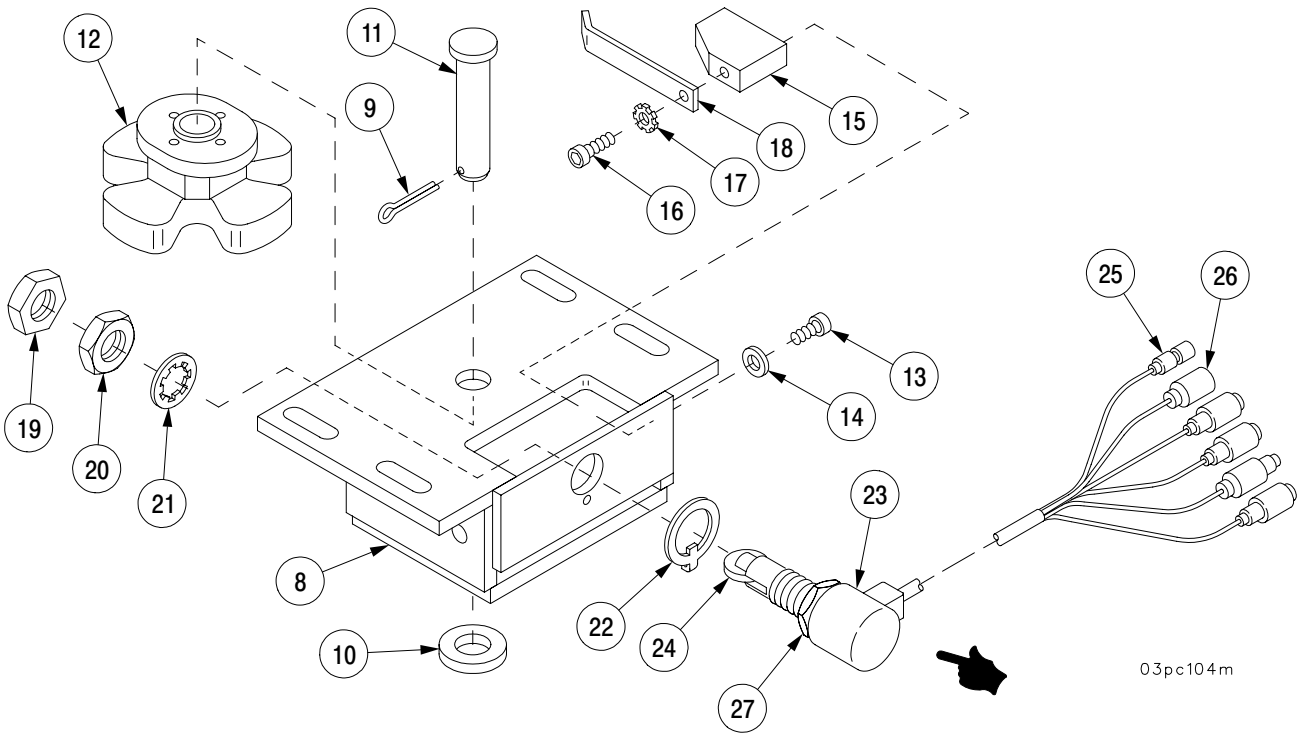
5 Adjust nut (27) so that multimeter reads zero ohms when cam (12) is placed in the high lobe position and infinite ohms when cam (12) is in the low lobe position.

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).

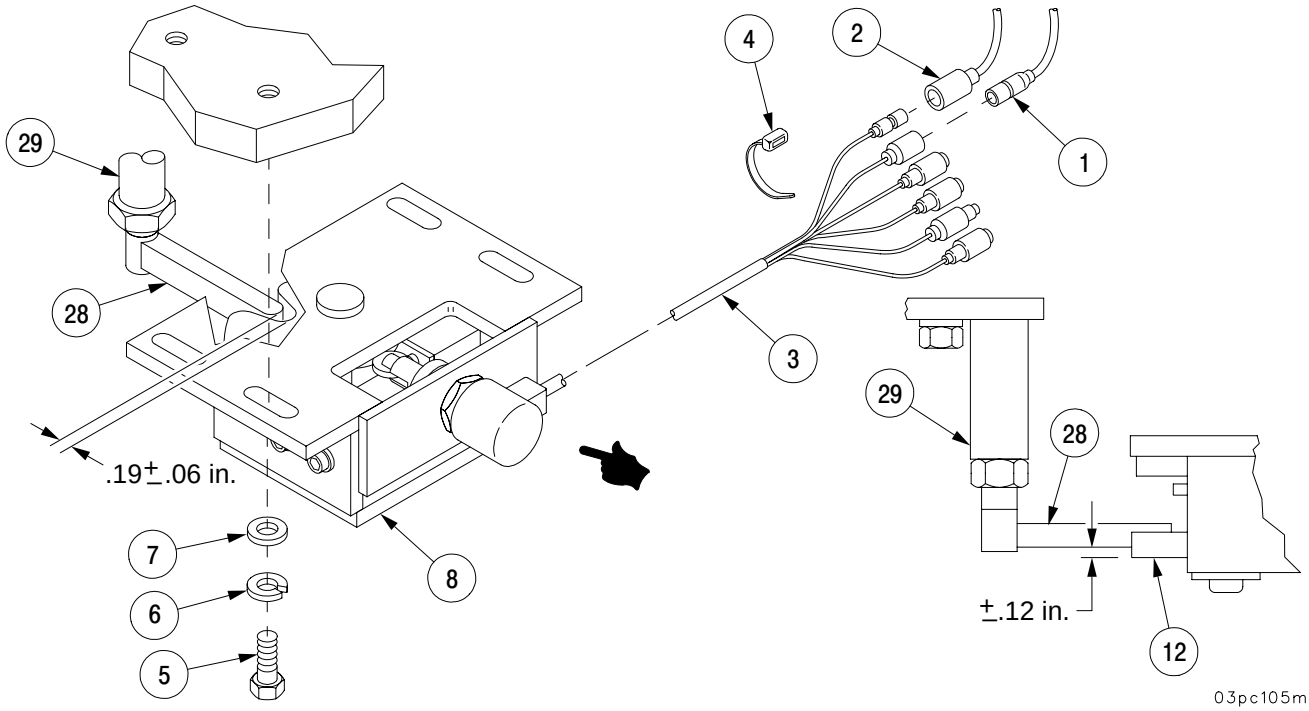
4 Position switch assembly (8) so that the distance between the low lobe of the cam (12) and the trip (28) is .19 ± .06 inches. If unable to achieve tolerance, adjust trip bracket (29) in or out.

5 Tighten four screws (5).

6 Check that the trip (28) is flush with the cam (12) within ± .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).

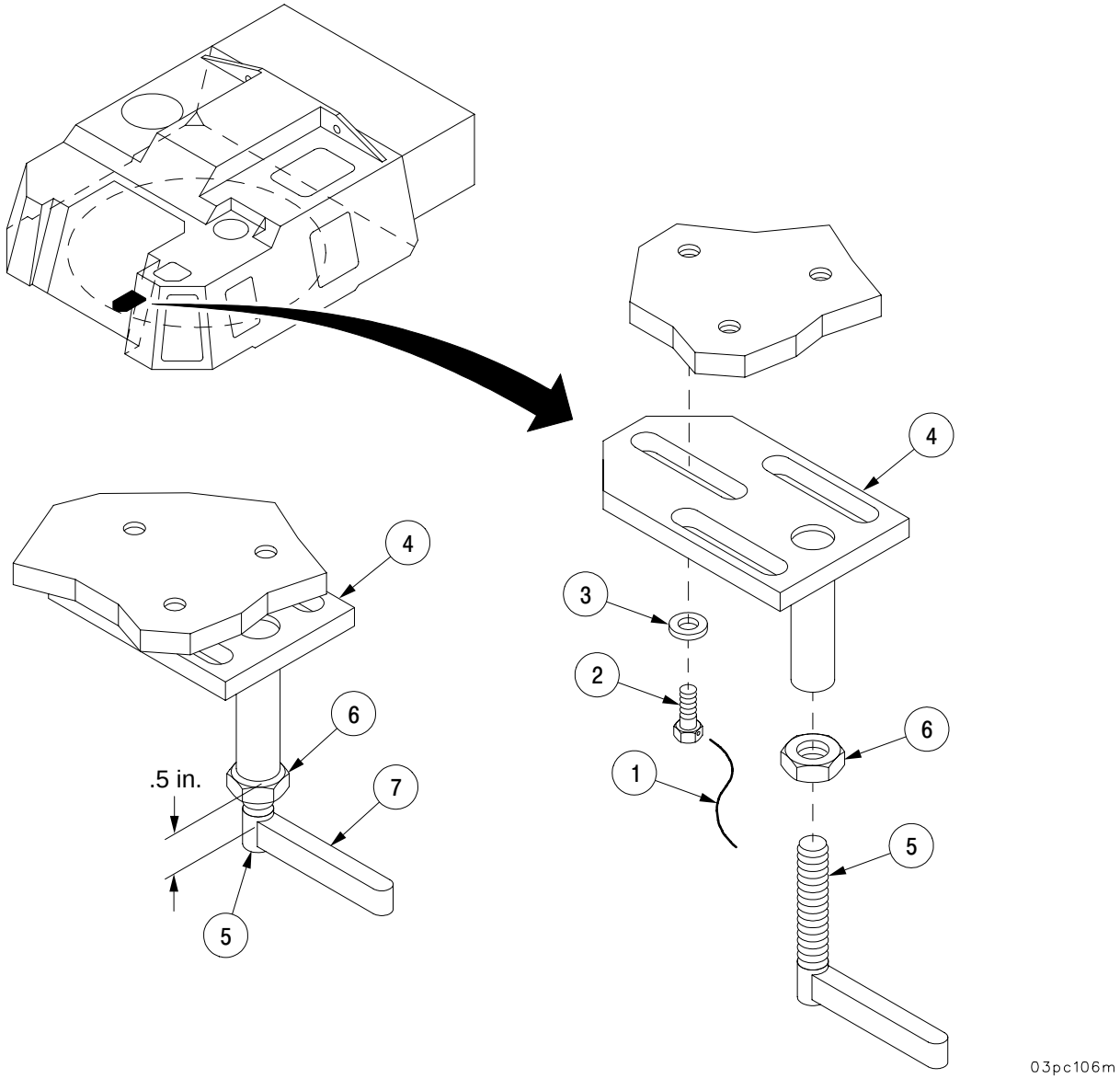
c. Assembly.

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



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).

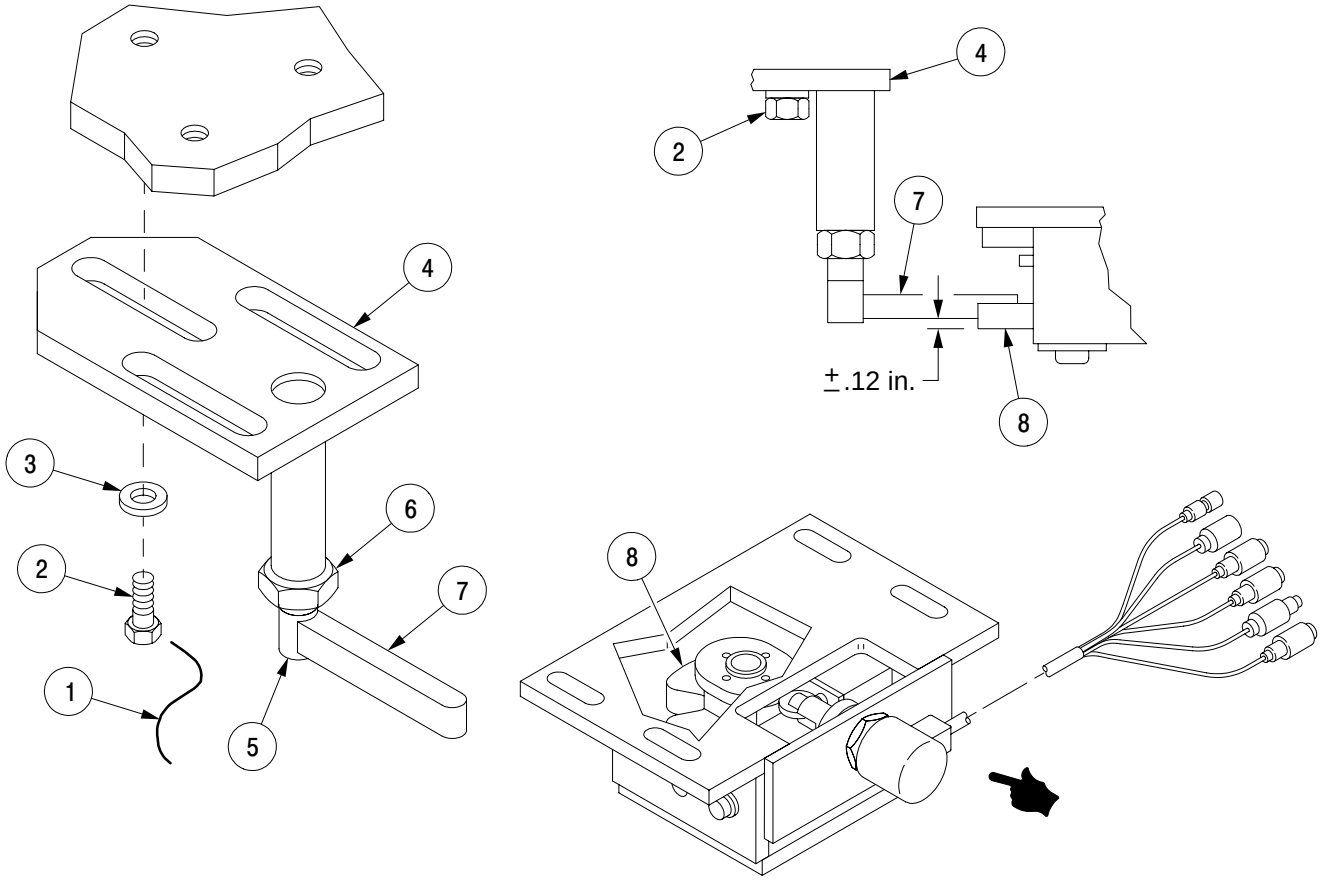
2 Point trip foot (7) toward center of cab. Tighten nut (6).

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 ± .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 (SC 5180–95–A12)

Materials/Parts
Gasket (item 210, Appx F)
Lockwashers (4) (item 128, Appx F)
Lockwashers (5) (item 144, Appx F)

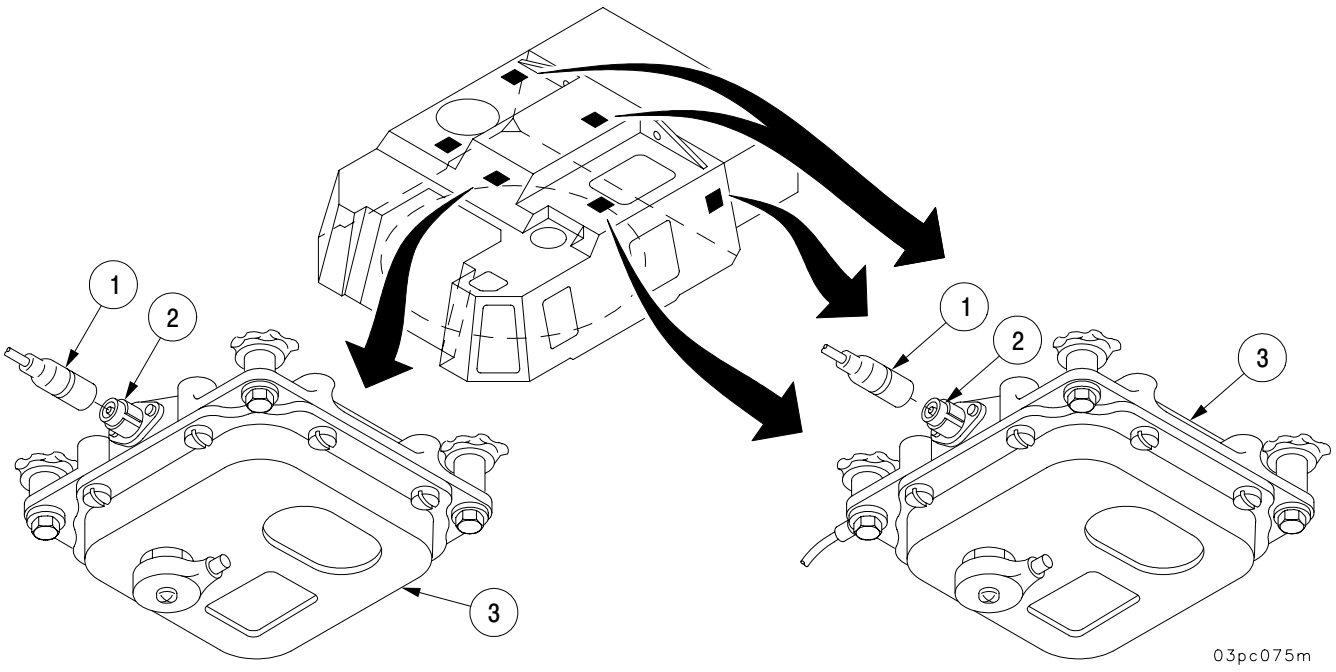
Equipment Conditions
Vehicle MASTER power switch OFF (TM 9–2350–314–10)
Battery ground leads disconnected (TM 9–2350–314–20–1–2)

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 cable mounting bracket installed.

1 Disconnect wiring harness W64 lead 138 (1) from connector (2) on dome light (3).



5–26 DOME LIGHT ASSEMBLIES – CONTINUED

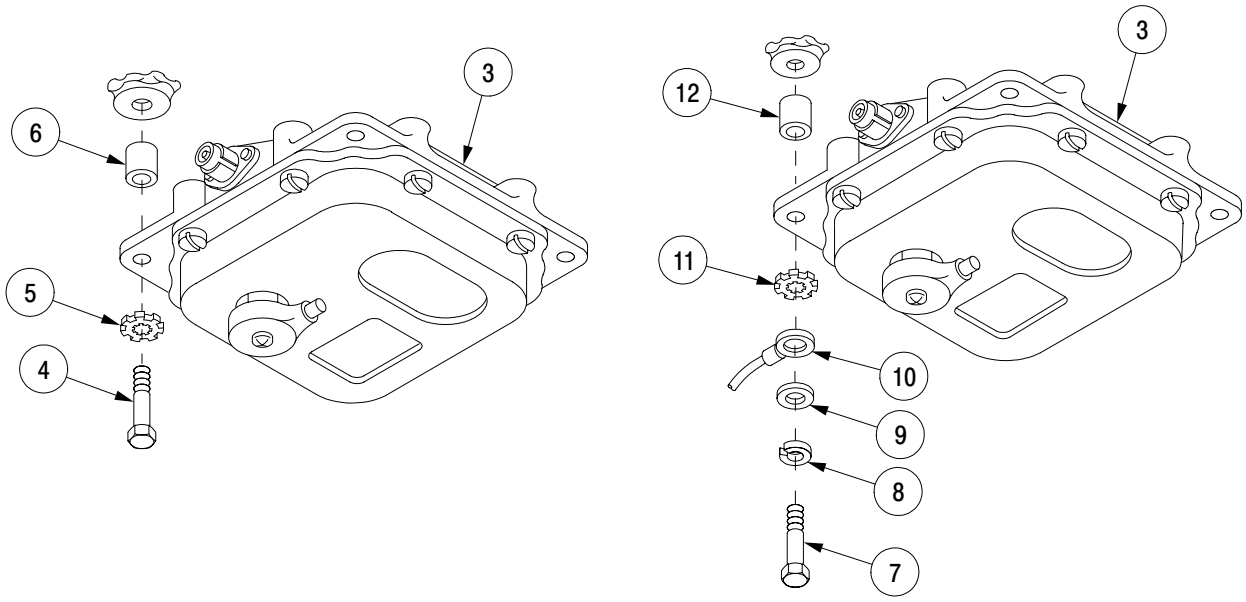
a. Removal – Continued

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.



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5–26 DOME LIGHT ASSEMBLIES – CONTINUED

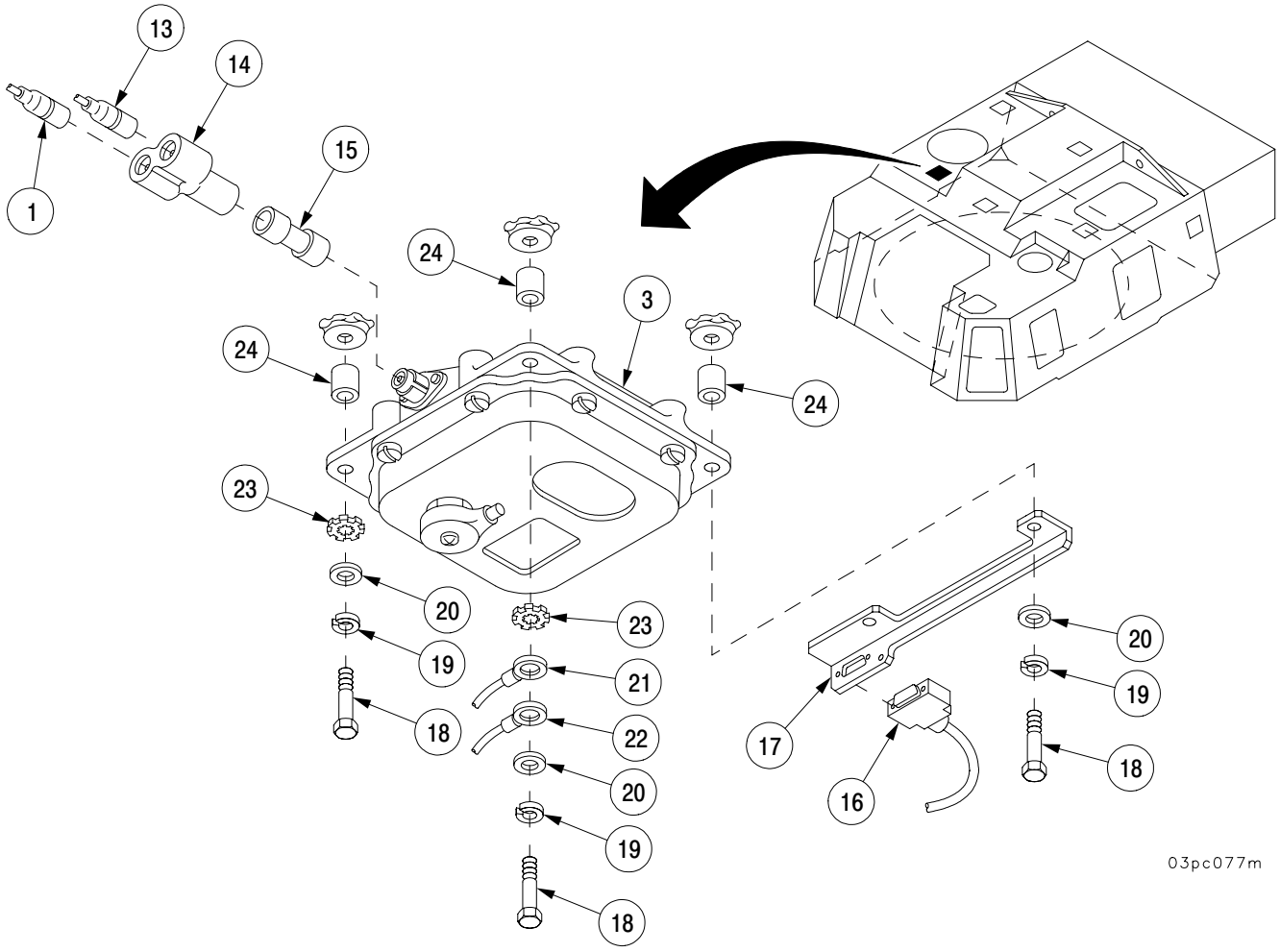
a. Removal – Continued

4 Disconnect wiring harness W64 lead 138 (1) and PLGR 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 cable ground lead (22), two lockwashers (23), bracket (17), four standoffs (24), and dome light (3). Discard lockwashers.



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).

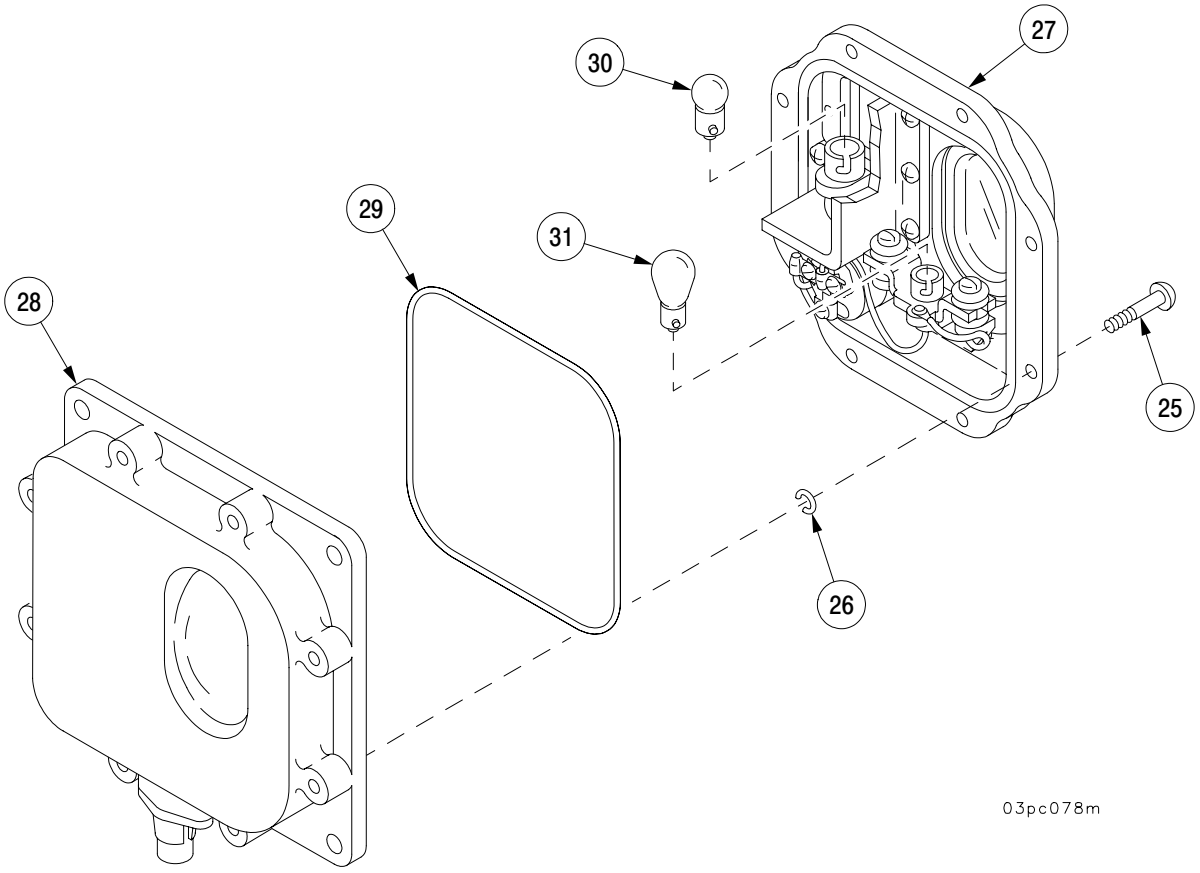
3 Remove two bulbs (30) and (31).

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).



5–26 DOME LIGHT ASSEMBLIES – CONTINUED

d. Installation.

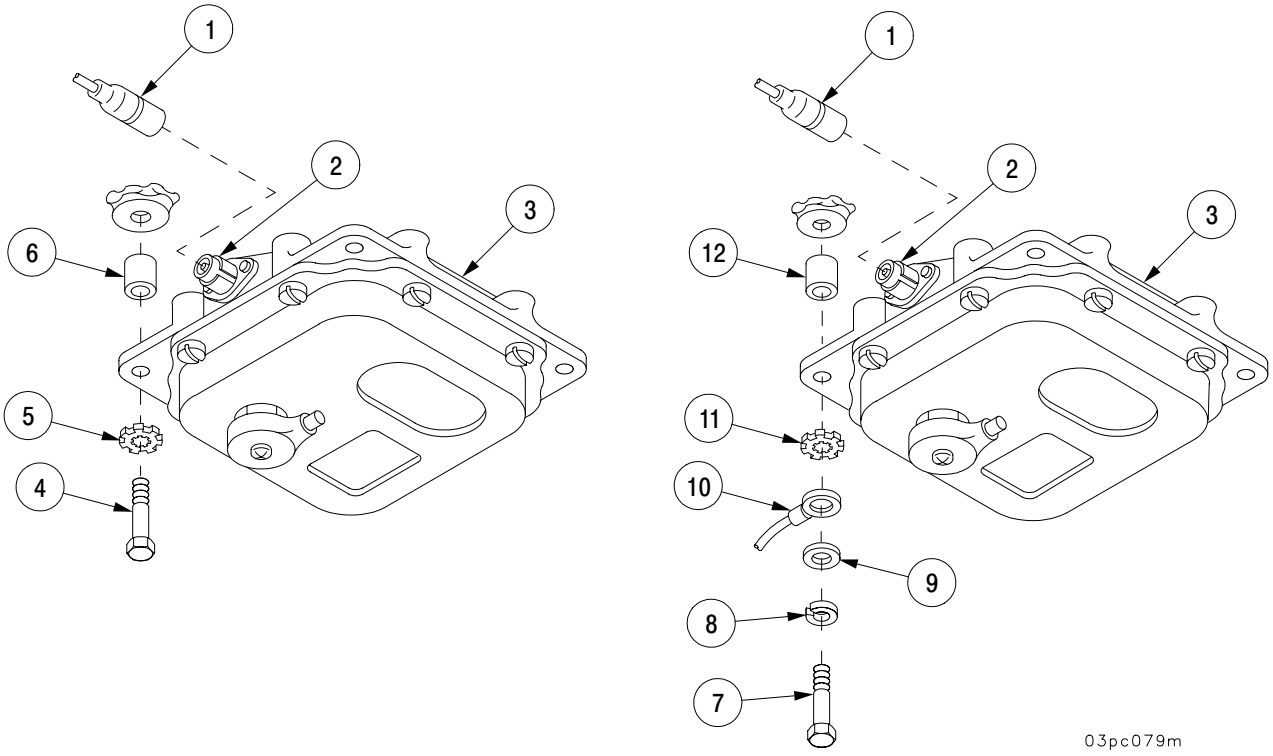
NOTE

- 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.

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).



5–26 DOME LIGHT ASSEMBLIES – CONTINUED

d. Installation – Continued

NOTE

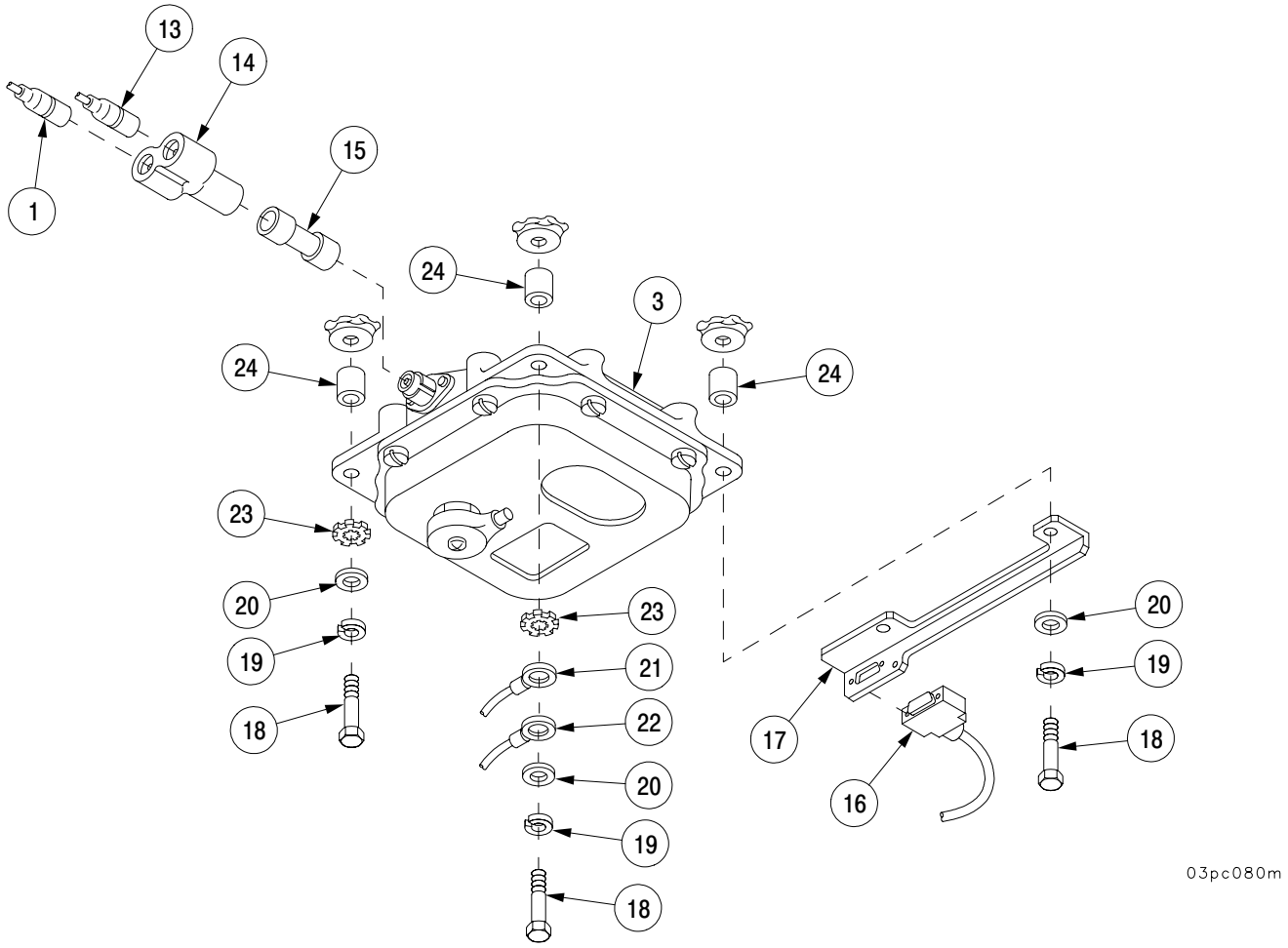
Insure ground leads, washers and bolts are free of paint prior to installation.

4 Install dome light (3) with four standoffs (24), bracket (17), two new lockwashers (23), PLGR 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 power cable assembly (13) to Y–adapter (14) on dome light (3).



5–27 LEAD ASSEMBLIES, HARNESS W64 TO BRUSH BLOCKS 7 AND 8 OR LEAD ASSEMBLIES, HARNESS W62A TO BRUSH BLOCKS 1 AND 2.

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 (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)

5–27 LEAD ASSEMBLIES, HARNESS W64 TO BRUSH BLOCKS 7 AND 8 OR LEAD ASSEMBLIES, HARNESS W62A TO BRUSH BLOCKS 1 AND 2 – CONTINUED

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).

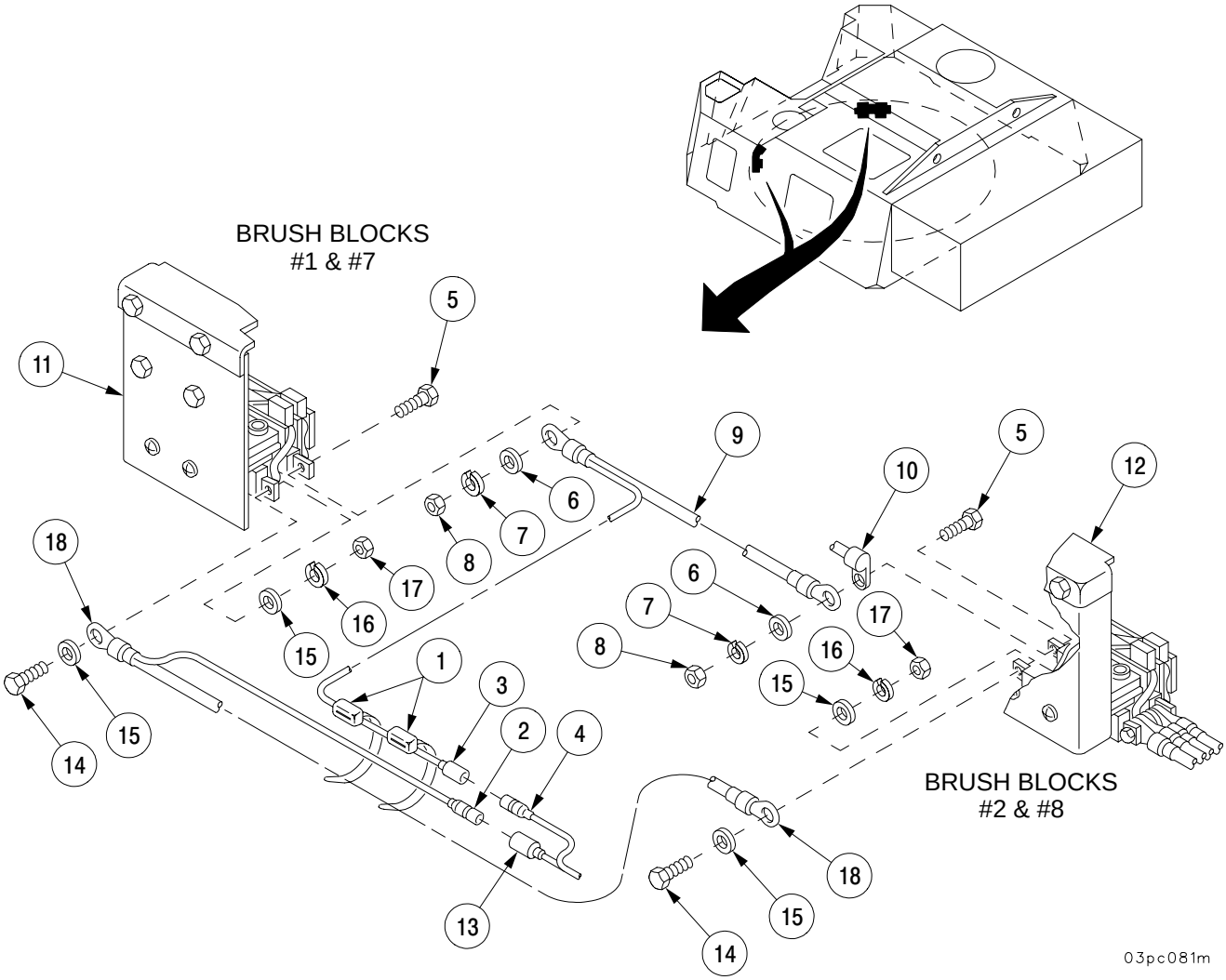
3 Connect lead 70 (9) and lead (10) to brush blocks 1 or 7 (11) and 2 or 8 (12) with two screws (5), two flat washers (6), two new lockwashers (7), and two nuts (8). Torque nuts to 25–30 lb–ft (34–41 N·m).

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



5–28 LEAD ASSEMBLIES BETWEEN SHUNT AND HYDRAULIC PUMP MOTOR.

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 (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)

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.

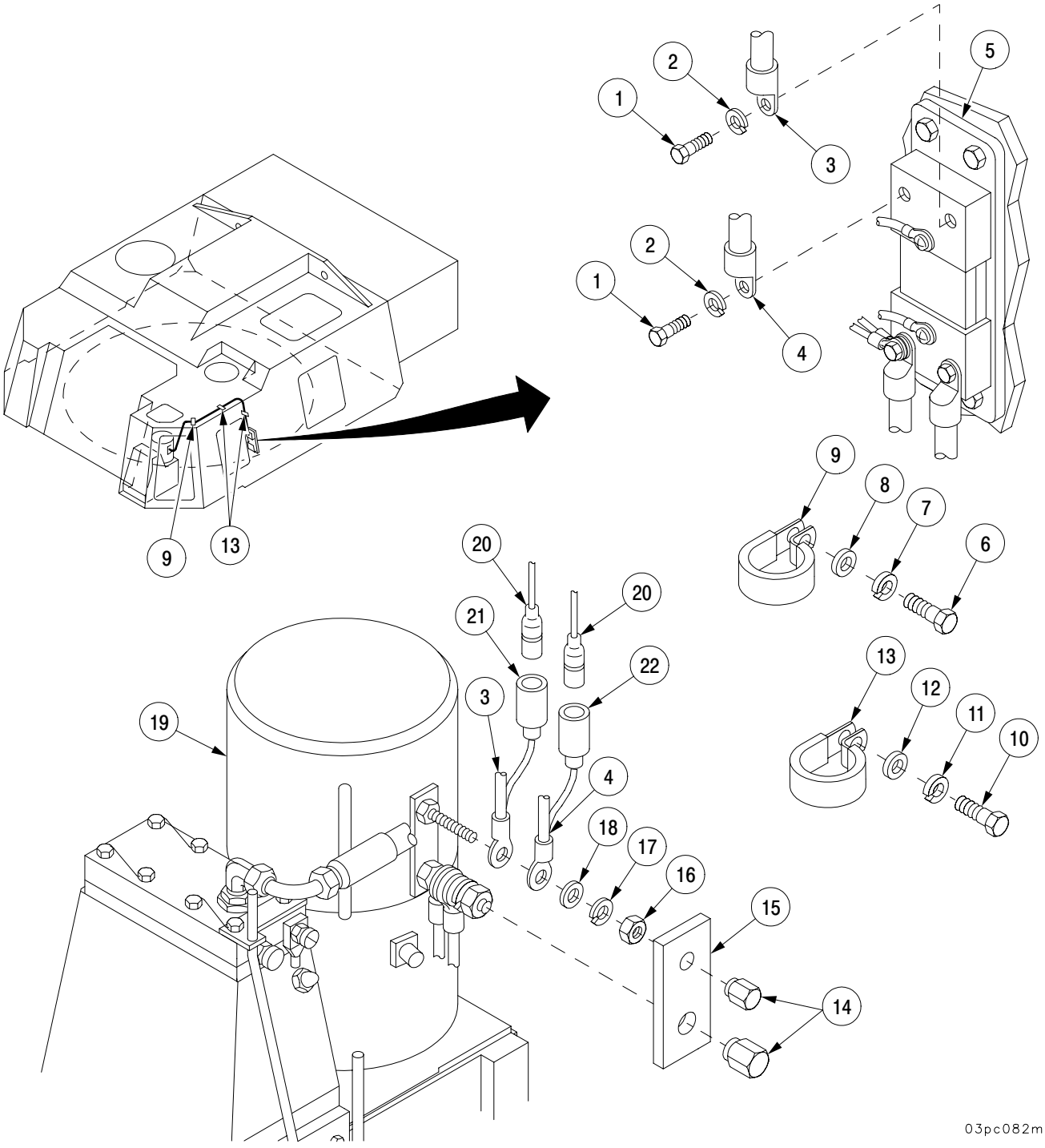
4 Remove two plastic nuts (14), rubber cover (15), nut (16), lockwasher (17), flat washer (18), lead 70 (3), and lead 70 (4) from hydraulic pump motor (19). Discard lockwasher.

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

a. Removal – Continued



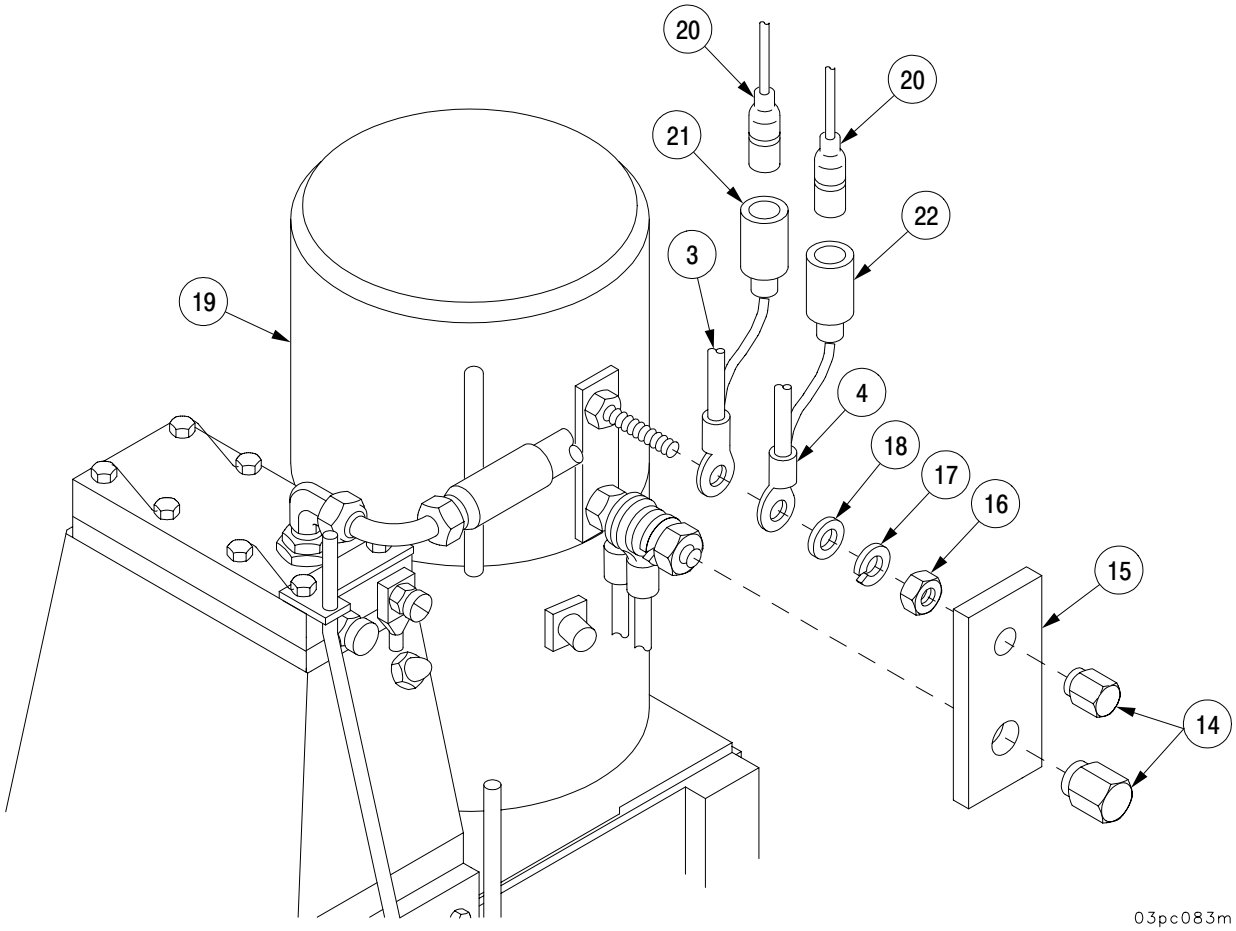
5–28 LEAD ASSEMBLIES BETWEEN SHUNT AND HYDRAULIC PUMP MOTOR – CONTINUED

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).



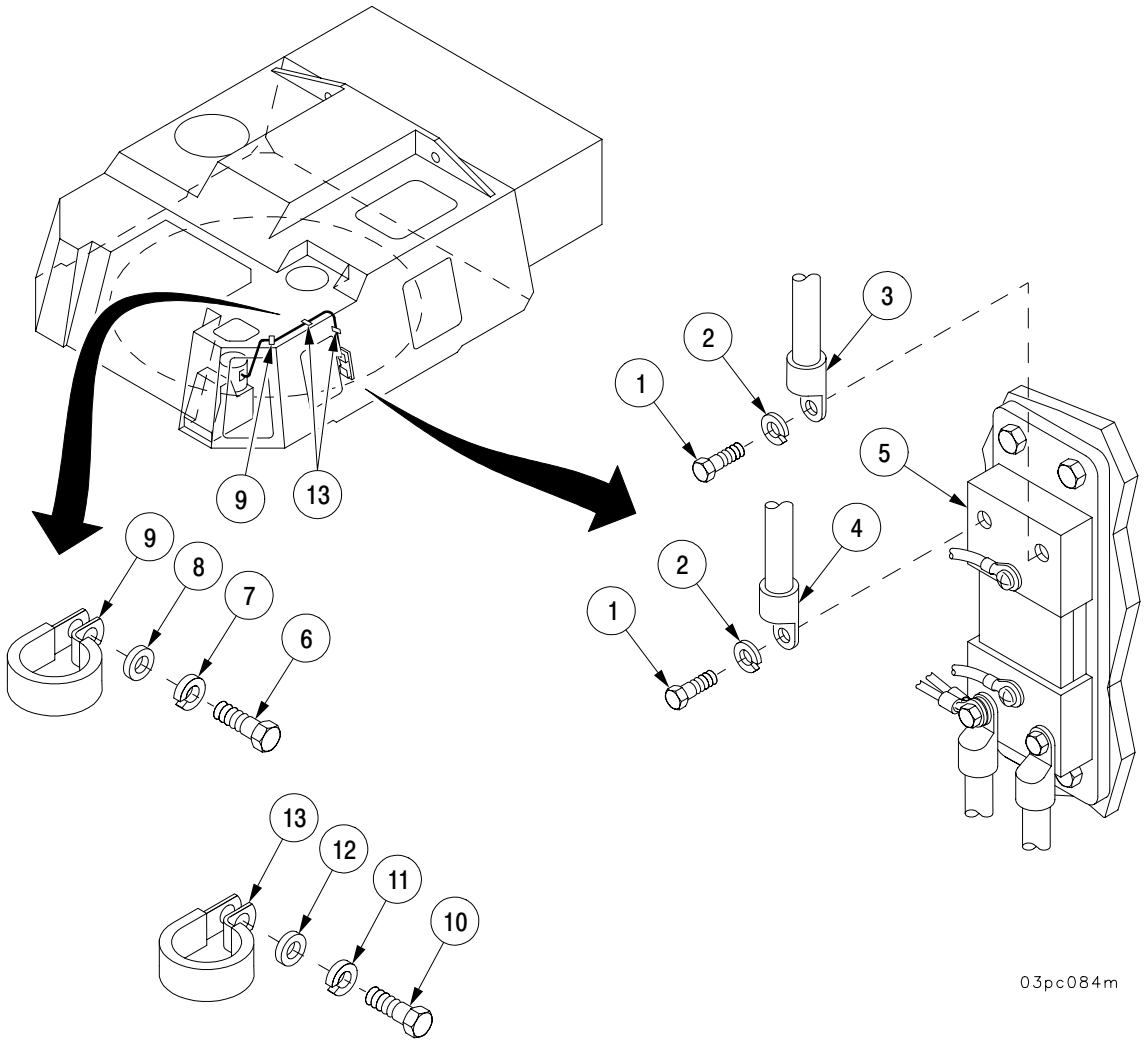
5–28 LEAD ASSEMBLIES BETWEEN SHUNT AND HYDRAULIC PUMP MOTOR – CONTINUED

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

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)

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.

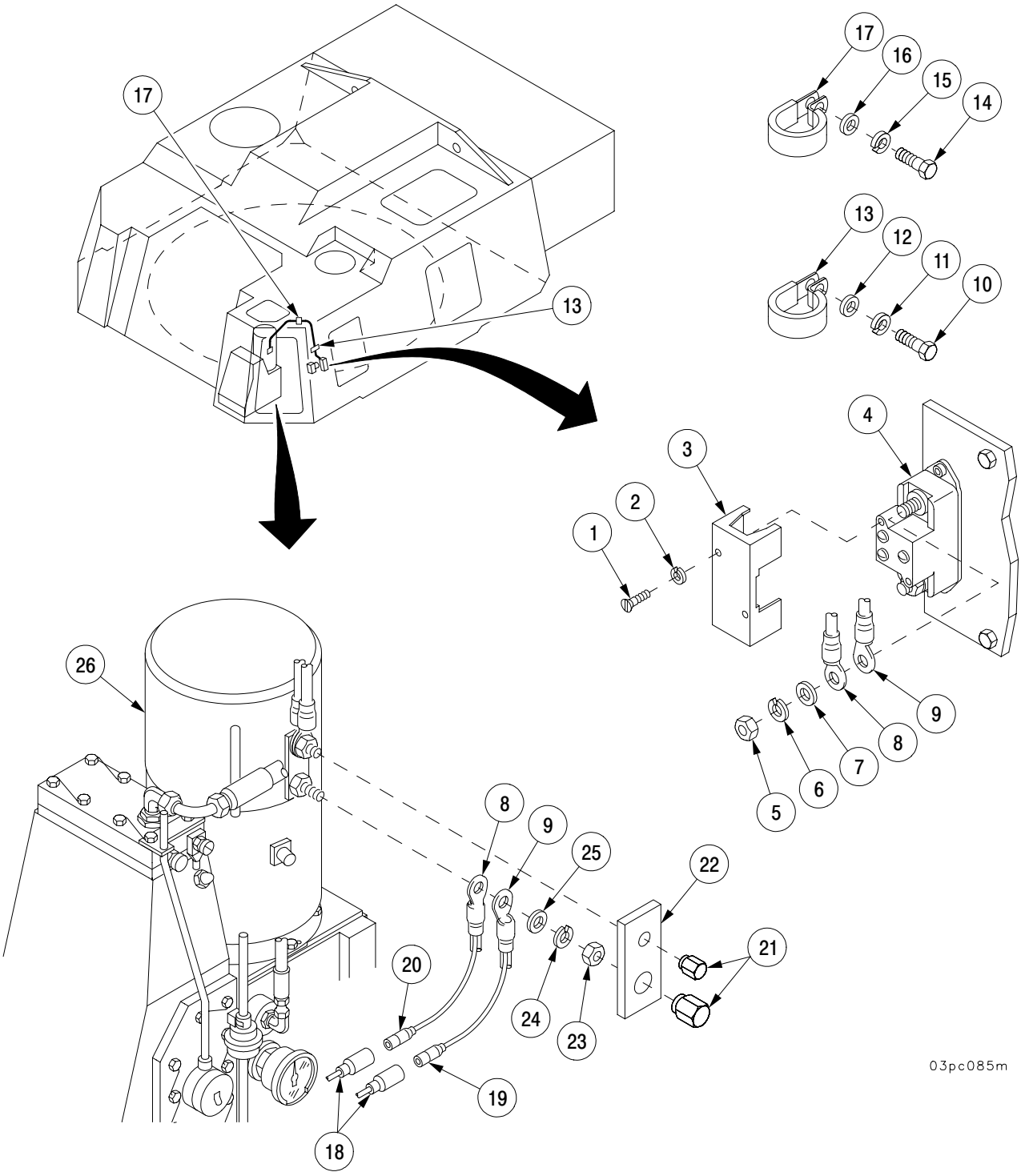
5 Disconnect two leads (18) (wiring harness W51 lead 100 and wiring harness W60 lead 135) from lead 100 (19) and lead 135 (20).

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



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).

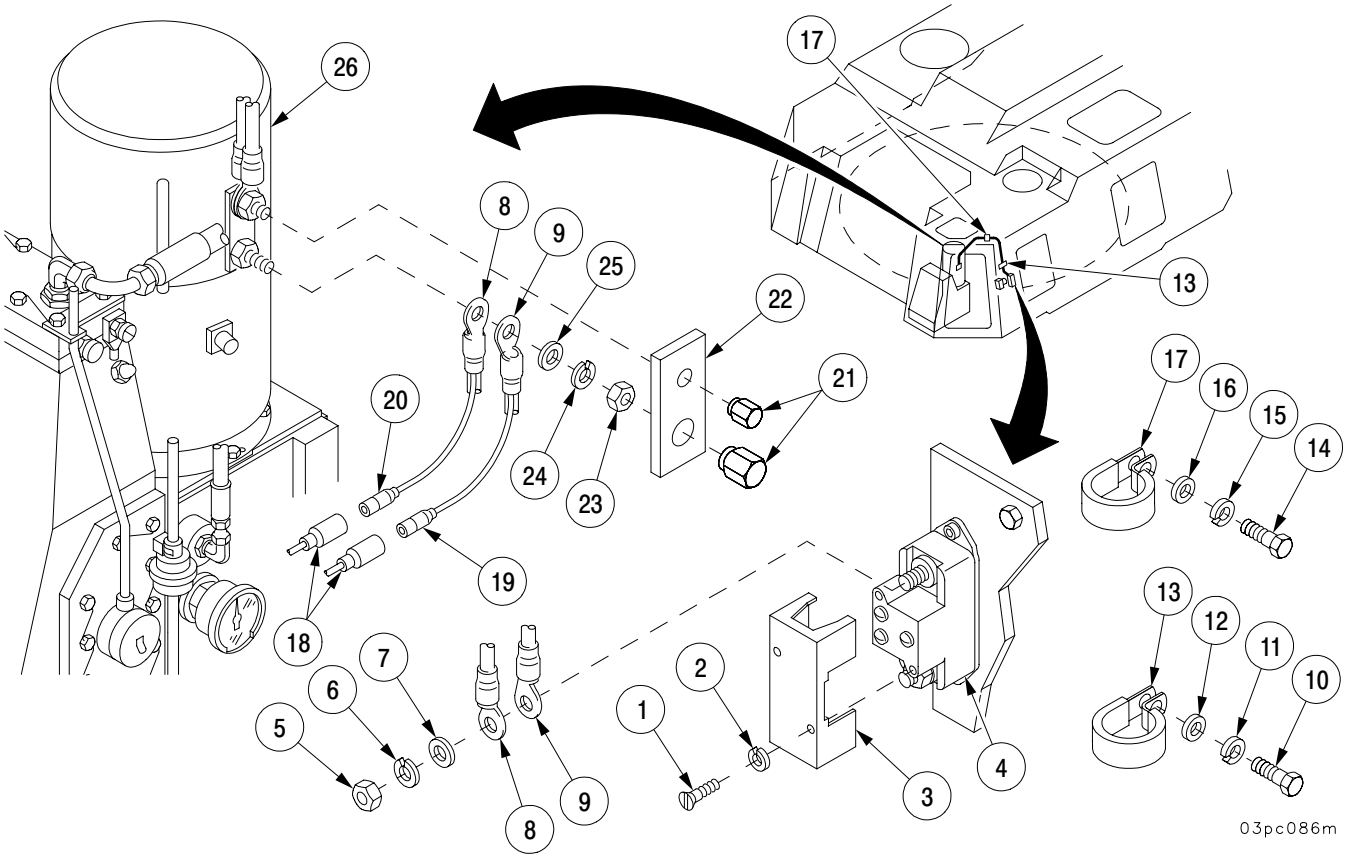
3 Connect two leads (18) (wiring harness W51 lead 100 and wiring harness W60 lead 135) to lead 100 (19) and lead 135 (20).

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)

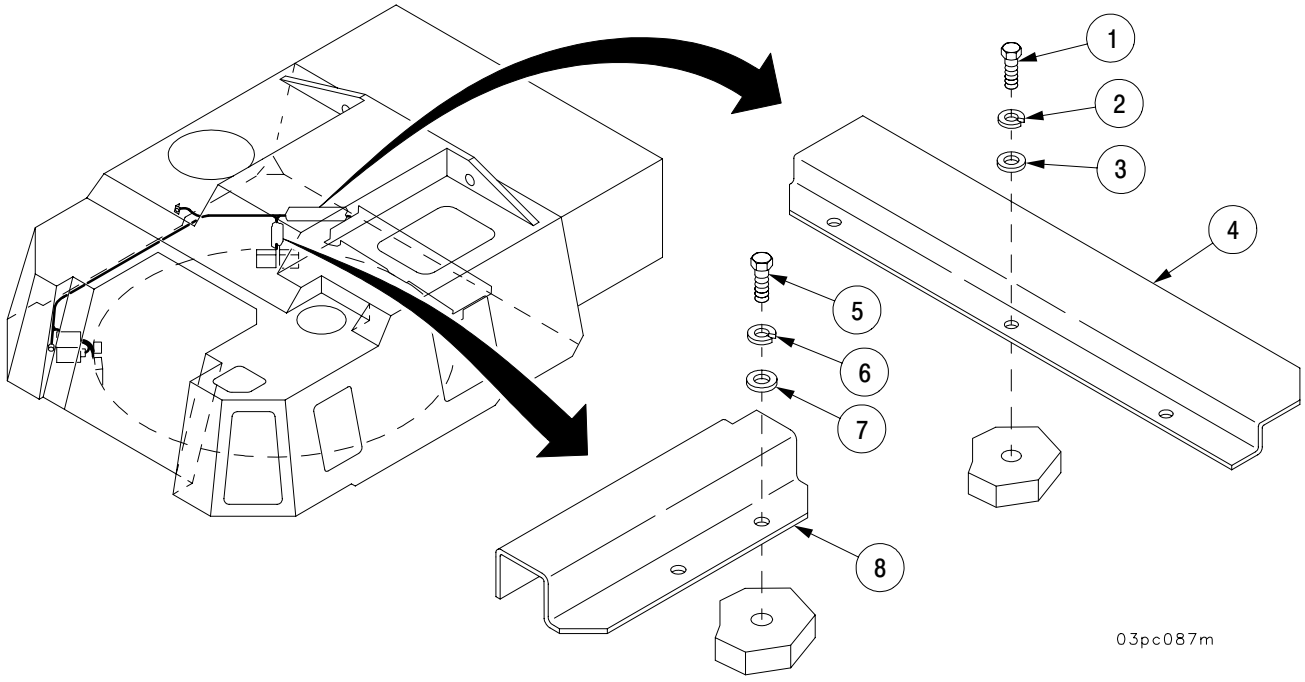
Materials/Parts
Lockwashers (2) (item 129, Appx F)
Lockwashers (8) (item 126, Appx F)
Lockwashers (3) (item 130, Appx F)
Lockwashers (4) (item 128, Appx F)
Marking tag (AR) (item 87, Appx C)
Tiedown straps (4) (item 81, Appx C)

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:

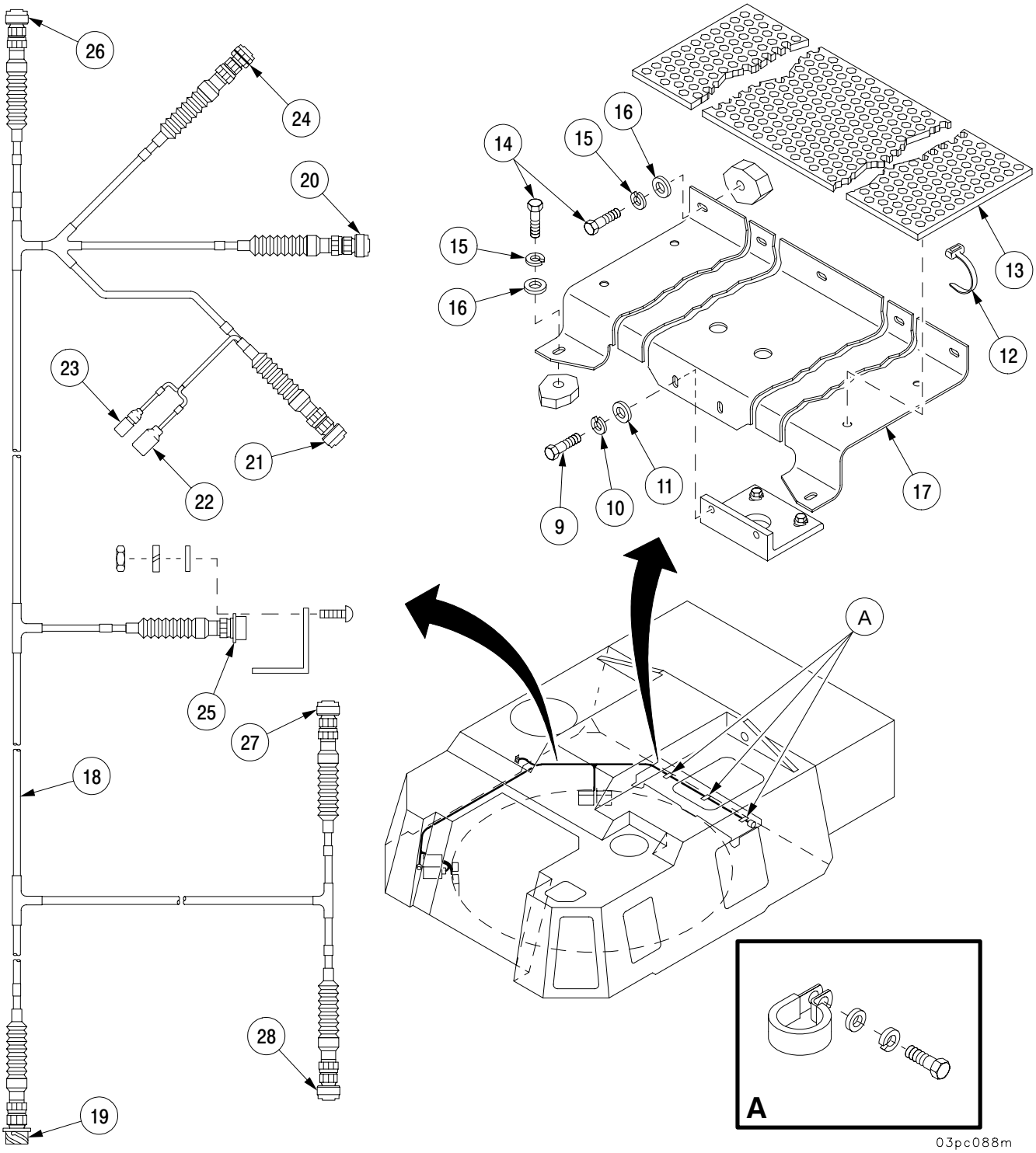
Item No.	W62A Connector/Lead/Wire	From Connector/ Lead/Wire/Component	Location
19	W62A J1	W61A P1	Rear of cab left side behind left crew seat location.
20	W62A P2	Brush block 1	Right front corner of cab ahead of COS station.
21	W62A P3	Brush block 2	Right front corner of cab ahead of COS station.
22	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:

Item No.	W62A Connector/Lead/Wire	To Connector/ Lead/Wire/Component	Location
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).

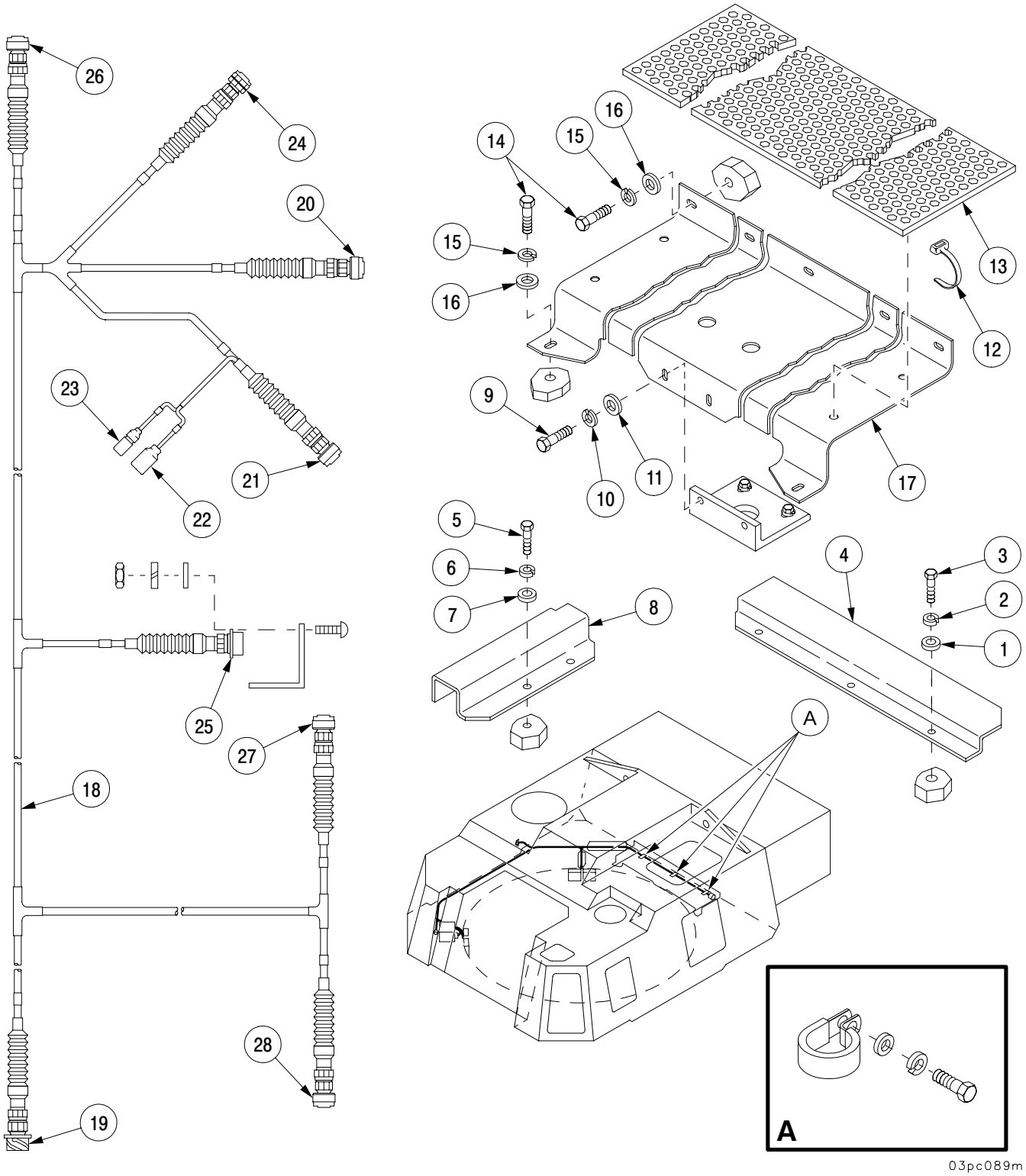
5 Install two screws (9), two new lockwashers (10), and two flat washers (11).

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



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

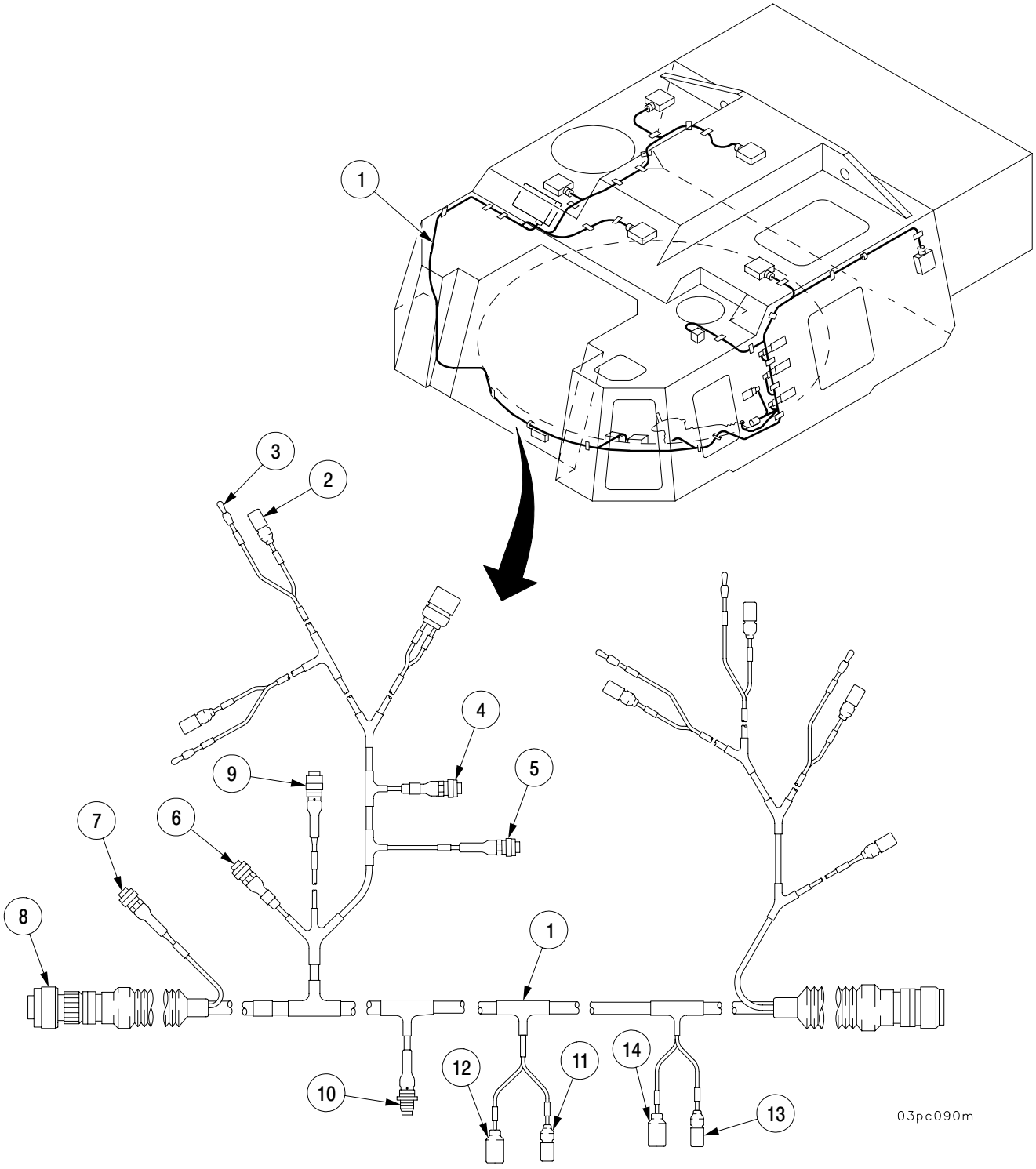
Tag leads before disconnecting to aid in installation.

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



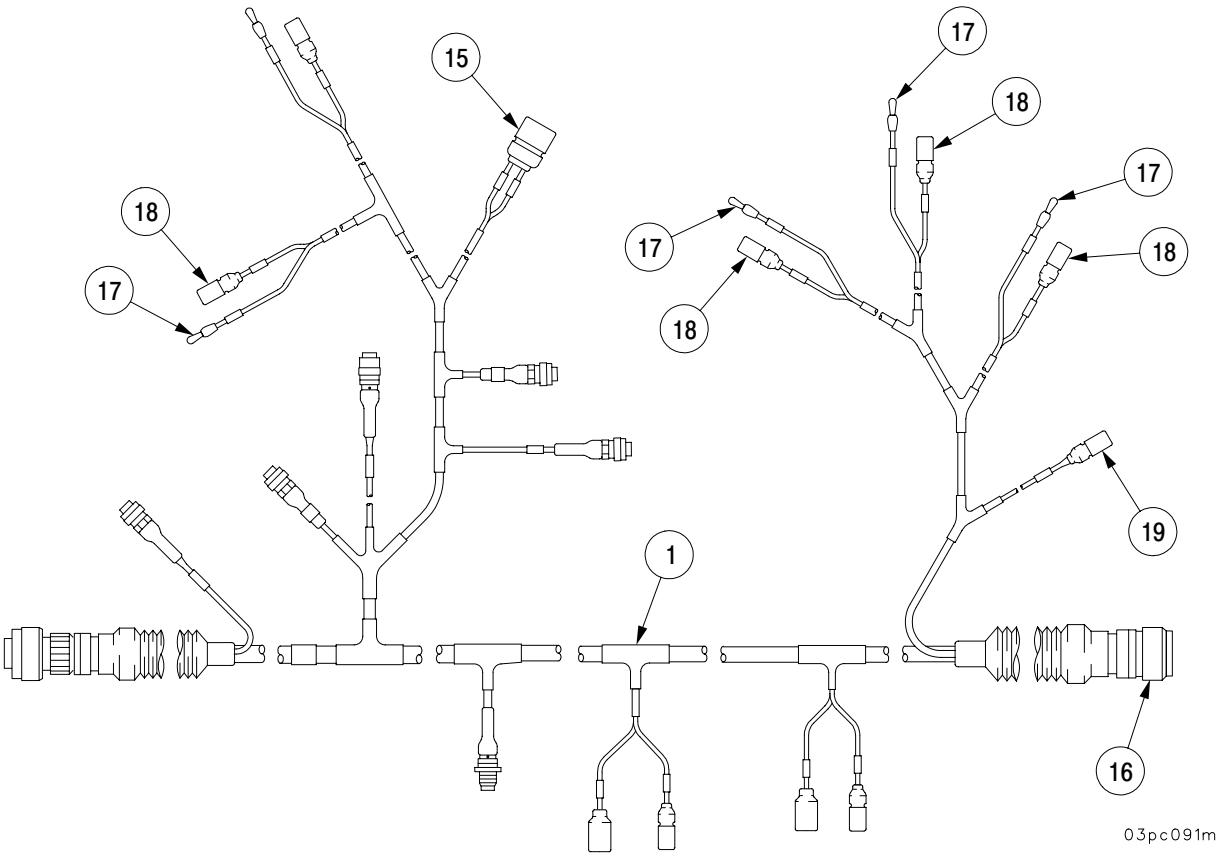
5–31 WIRING HARNESS W64 – CONTINUED

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.

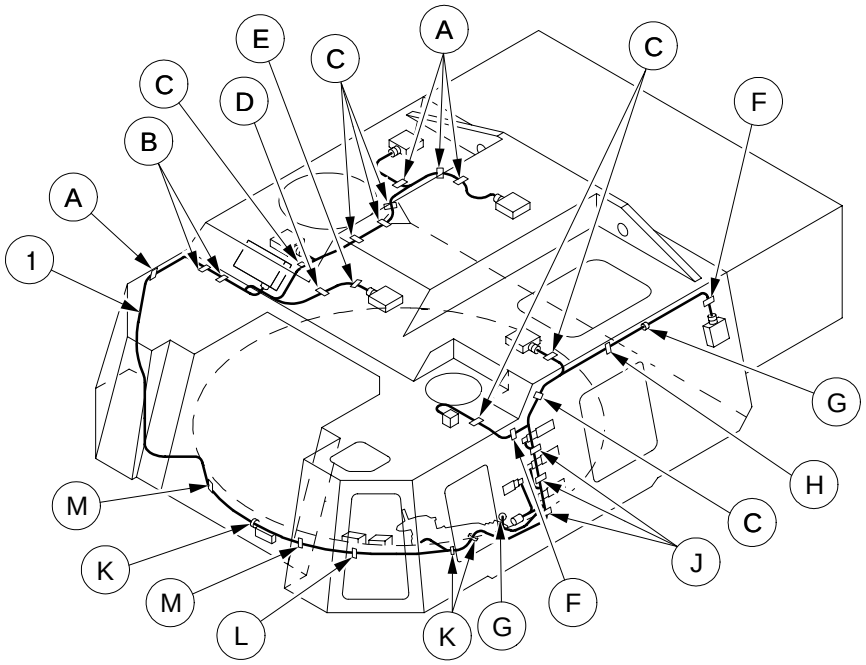
3 Remove wiring harness W64 (1) from vehicle.

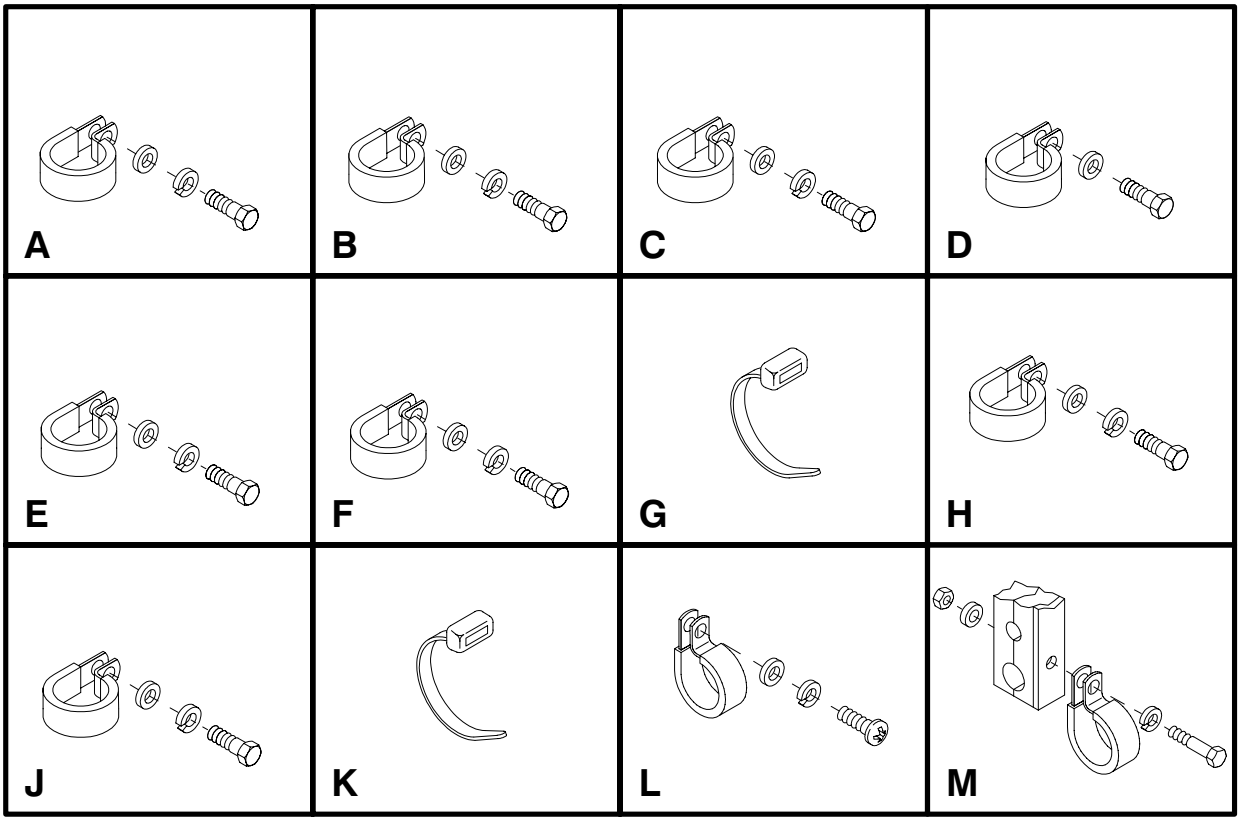


5–31 WIRING HARNESS W64 – CONTINUED

b. Installation.

1 Install wiring harness W64 (1) in vehicle with clamps and attaching hardware.





5–31 WIRING HARNESS W64 – CONTINUED

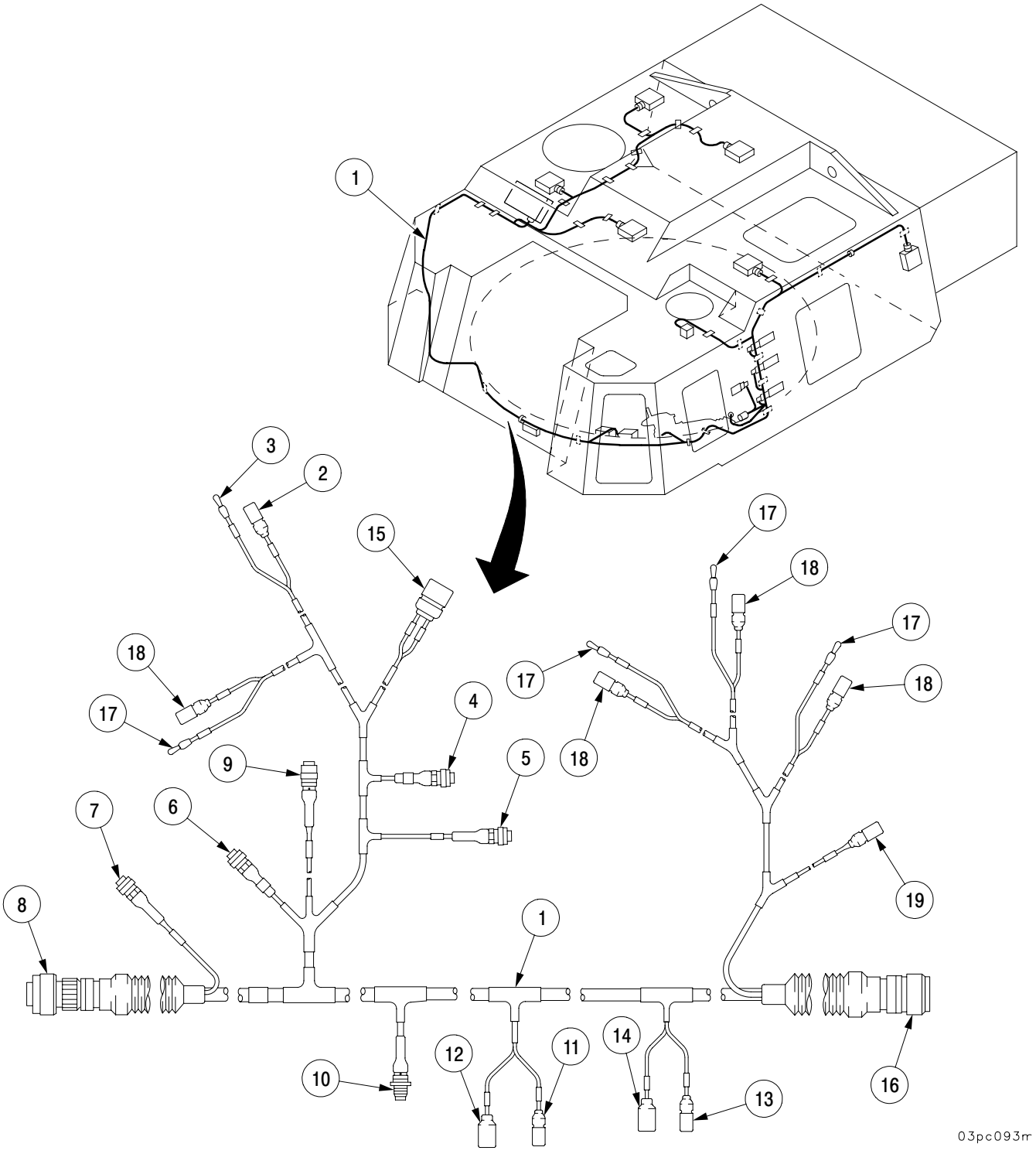
b. Installation – Continued

2 Connect wiring harness W64 (1) at the following points:

Item No.	W64 Connector/Lead/Wire	To Connector/ Lead/Wire/Component	Location
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



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:

Item No.	W54 Connector/Lead/Wire	From Connector/ Lead/Wire/Component	Location
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.

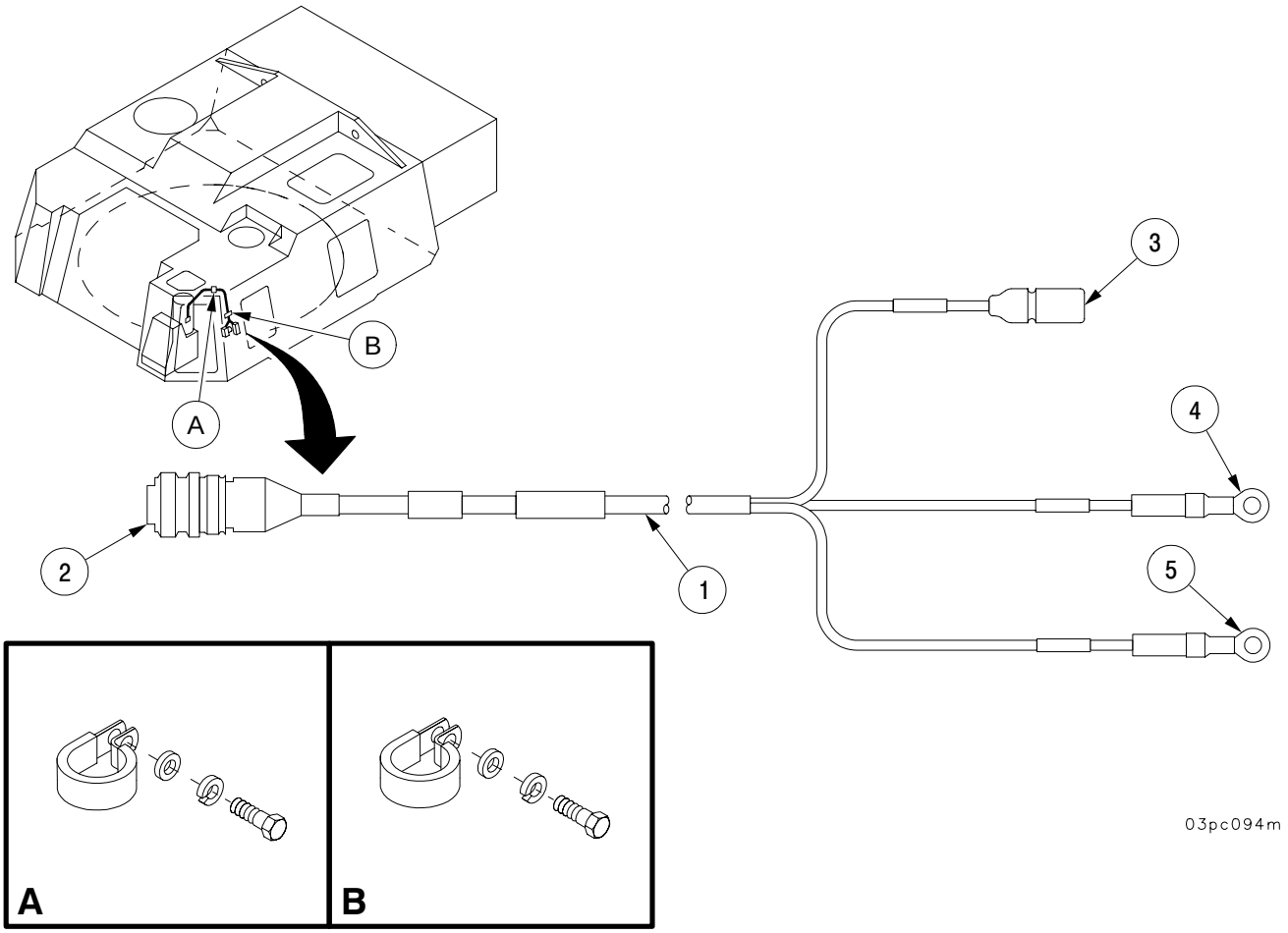
5–32 WIRING HARNESS W54 – CONTINUED

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.



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.

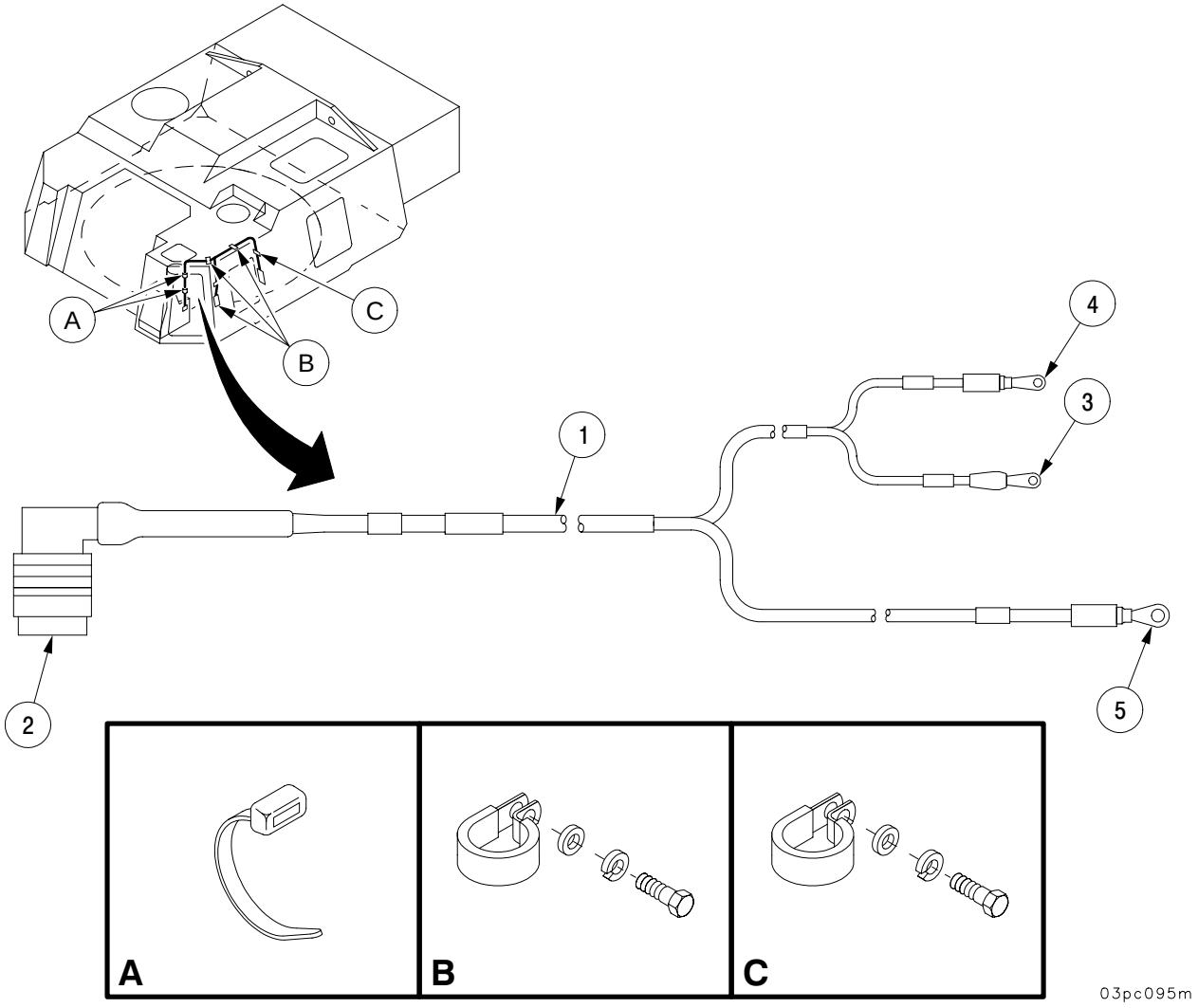
5–33 WIRING HARNESS W59 – CONTINUED

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.



5–34 WIRING HARNESS W60.

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 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.

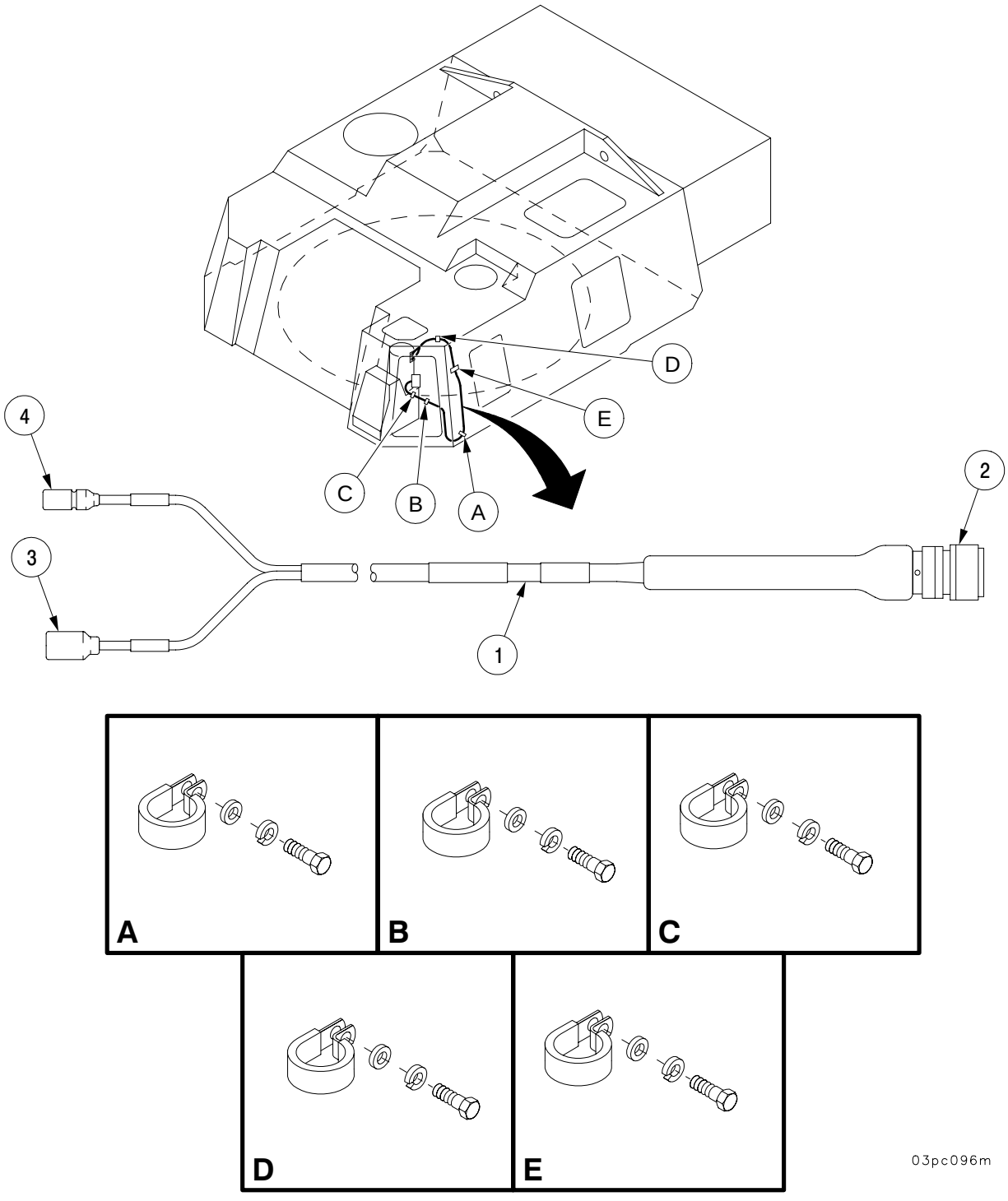
1 Install wiring harness W60 (1) in vehicle with clamps, and attaching hardware.

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



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:

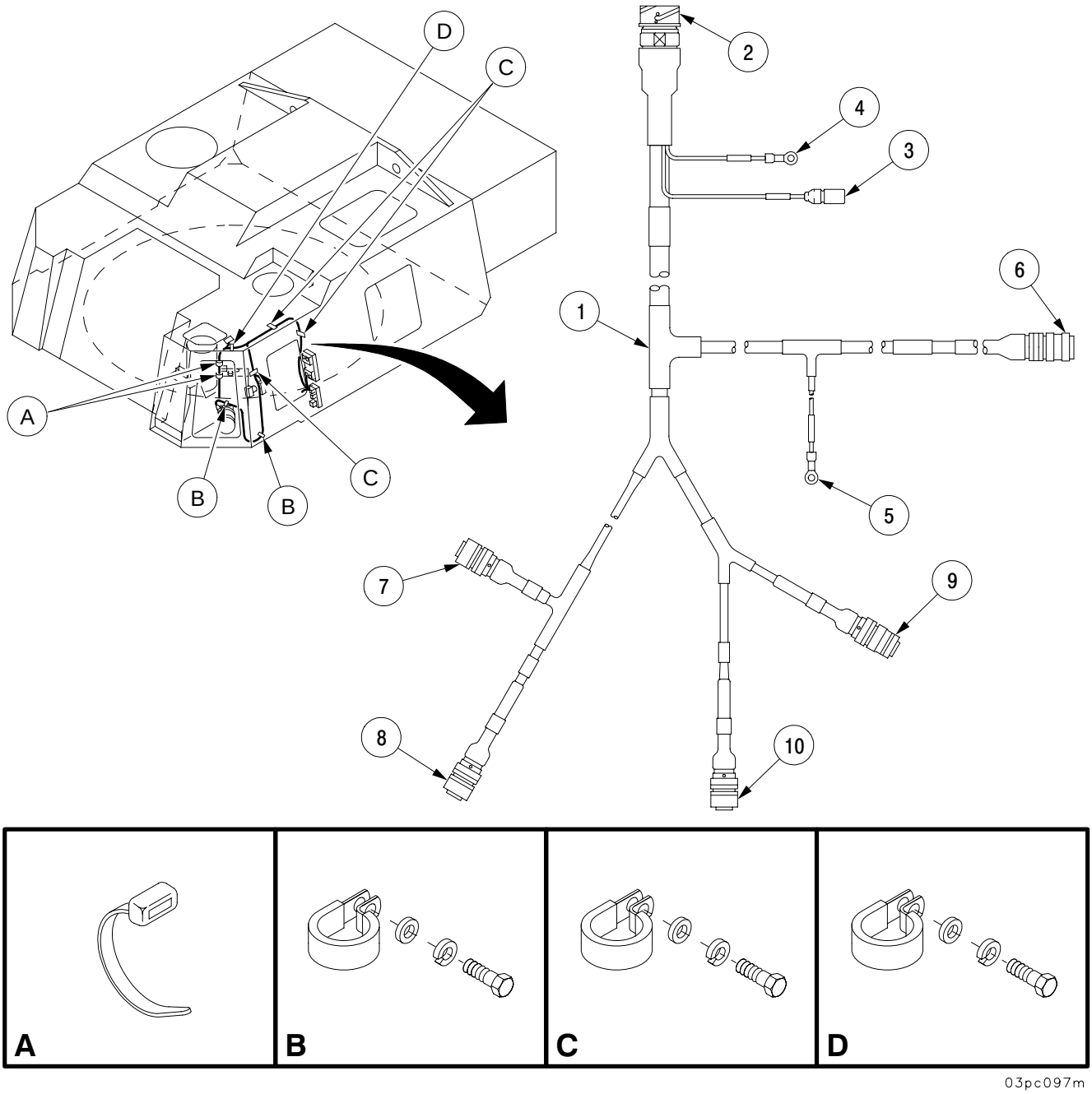
Item No.	W52 Connector/Lead/Wire	From Connector/ Lead/Wire/Component	Location
2	W52 J1	W64 P2	Inside cab at Gunner's station on hydraulic compartment bulkhead at opposite side in hydraulic compartment.
3	W52 783	W51 783	Inside hydraulic compartment – single lead off of main harness by bulkhead.
4	W52 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.

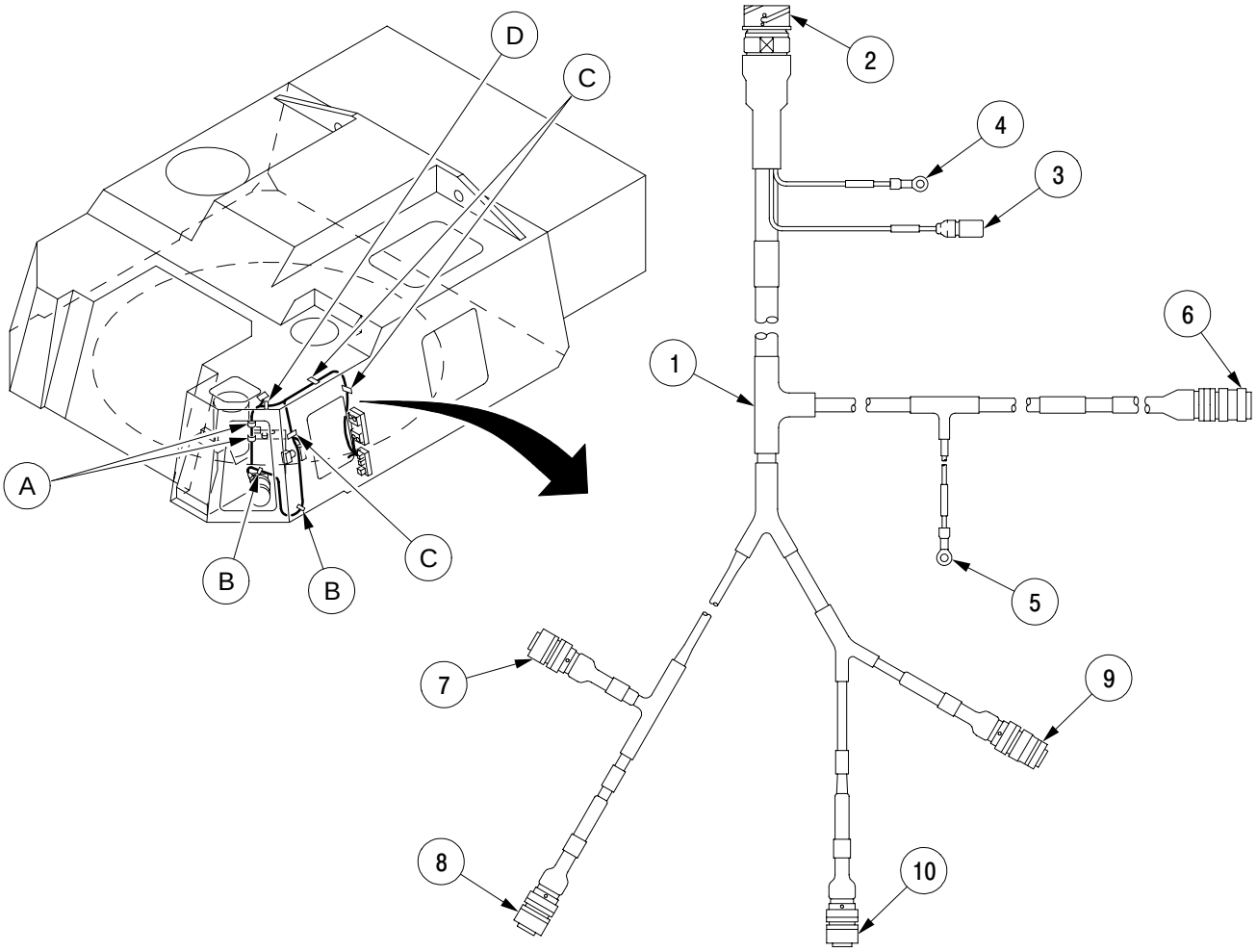
1 Install wiring harness W52 (1) in vehicle with clamps, tiedown straps and attaching hardware.

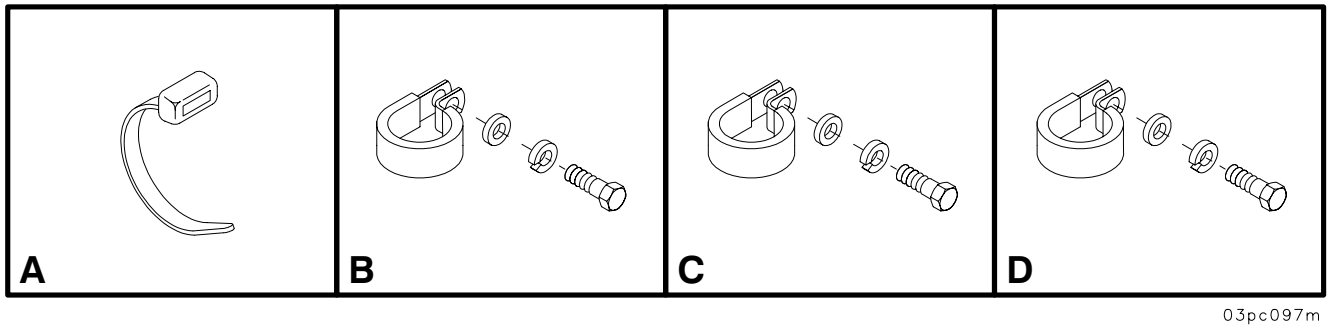
2 Connect wiring harness W52 (1) and attaching hardware at the following points:

Item No.	W52 Connector/Lead/Wire	To Connector/ Lead/Wire/Component	Location
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





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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 P2	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.

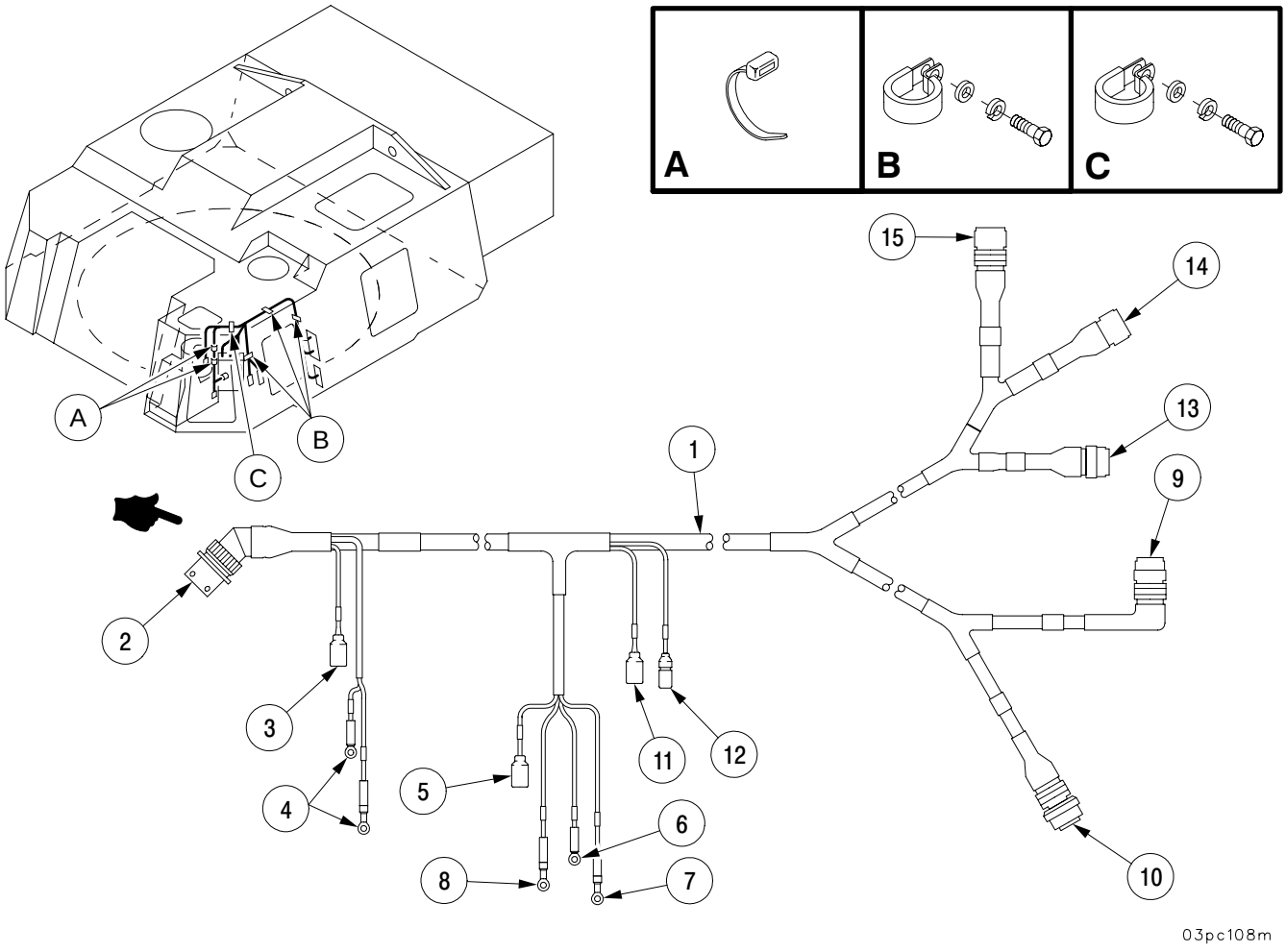
5–36 WIRING HARNESS W51 – CONTINUED

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.

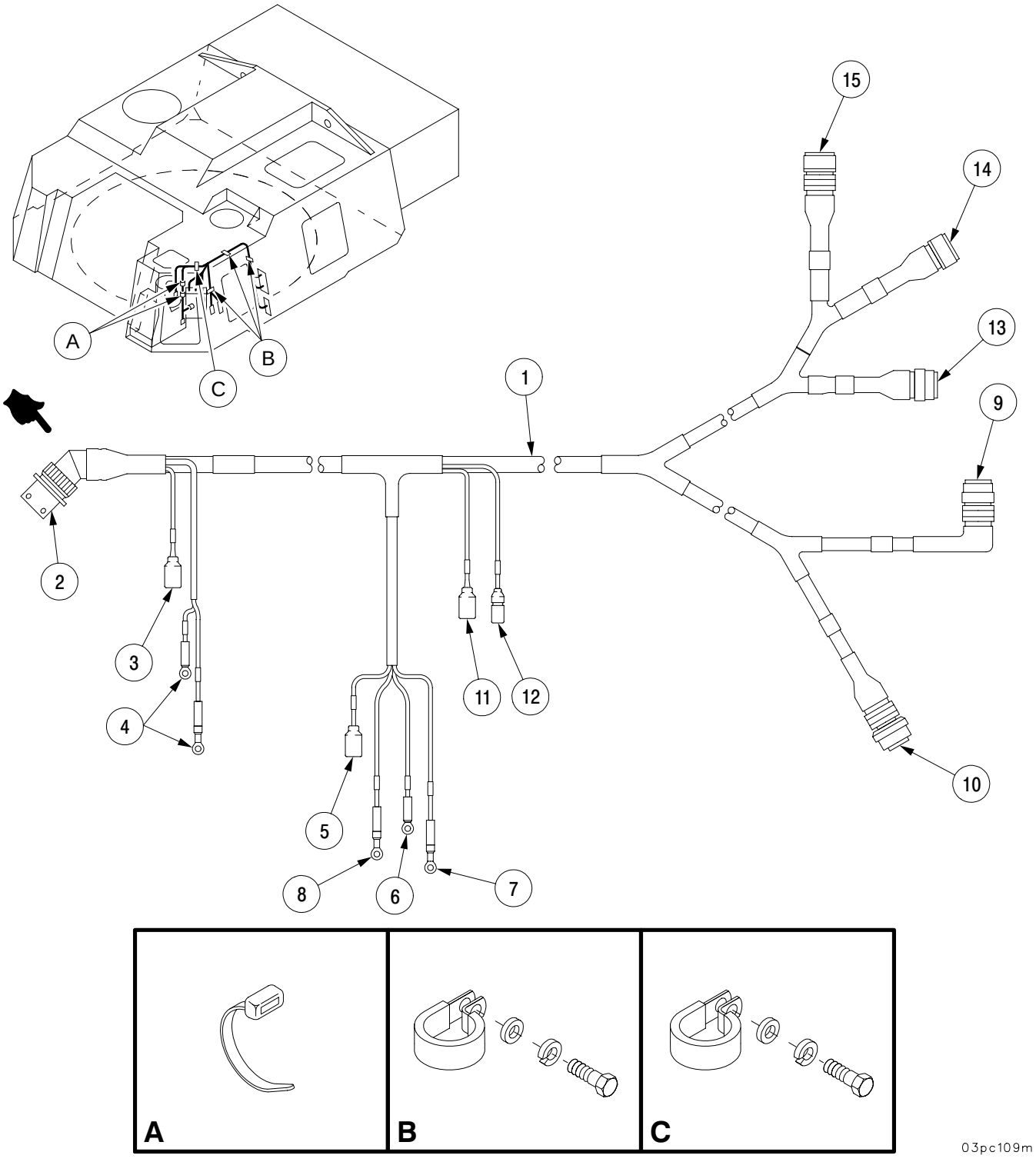
1 Install wiring harness W51 (1) in vehicle with clamps, tiedown straps and attaching hardware.

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 P2	Inside cab at Gunner’s station on hydraulic compartment bulkhead and at opposite side in hydraulic compartment.

5–36 WIRING HARNESS W51 – CONTINUED

b. Installation – Continued



5–37 WIRING HARNESS W67.

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 (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.

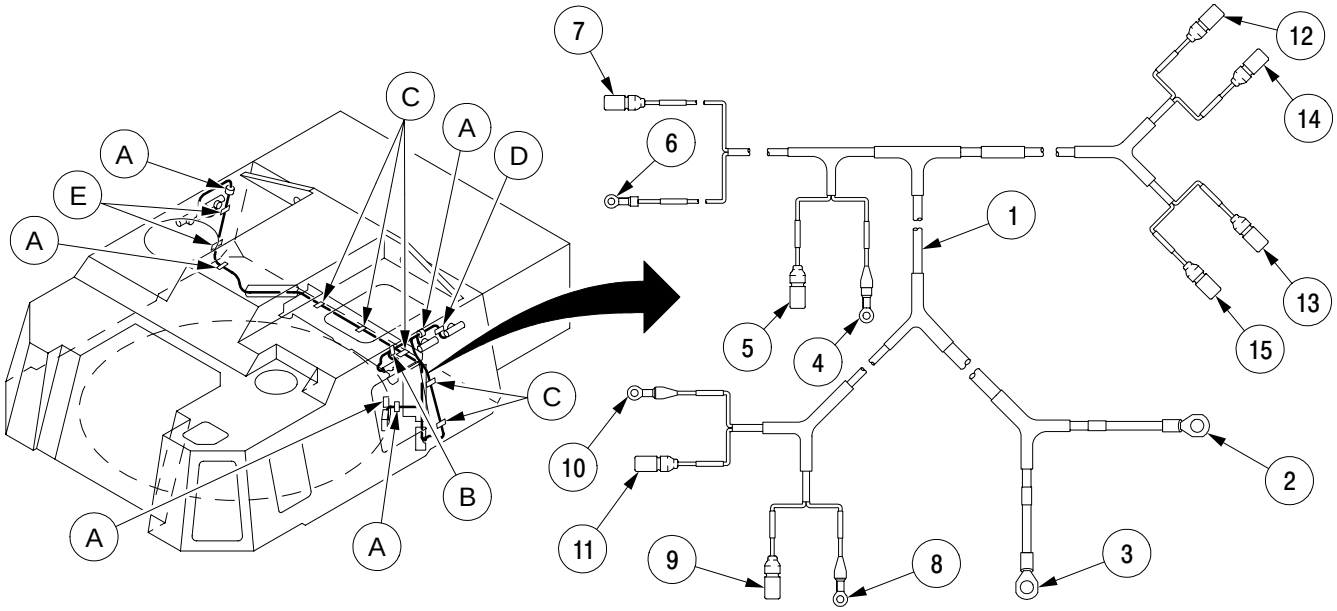
5–37 WIRING HARNESS W67 – CONTINUED

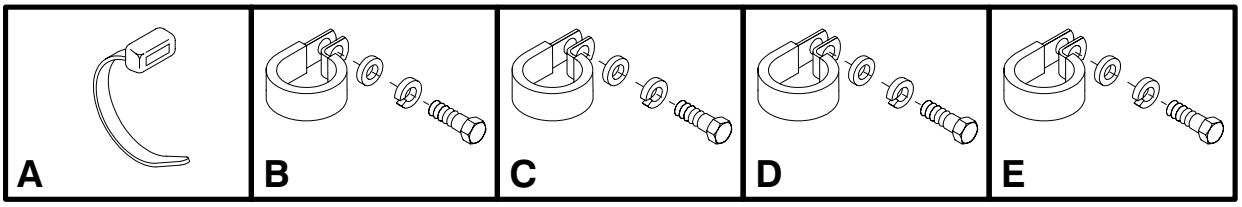
a. Removal – Continued

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.

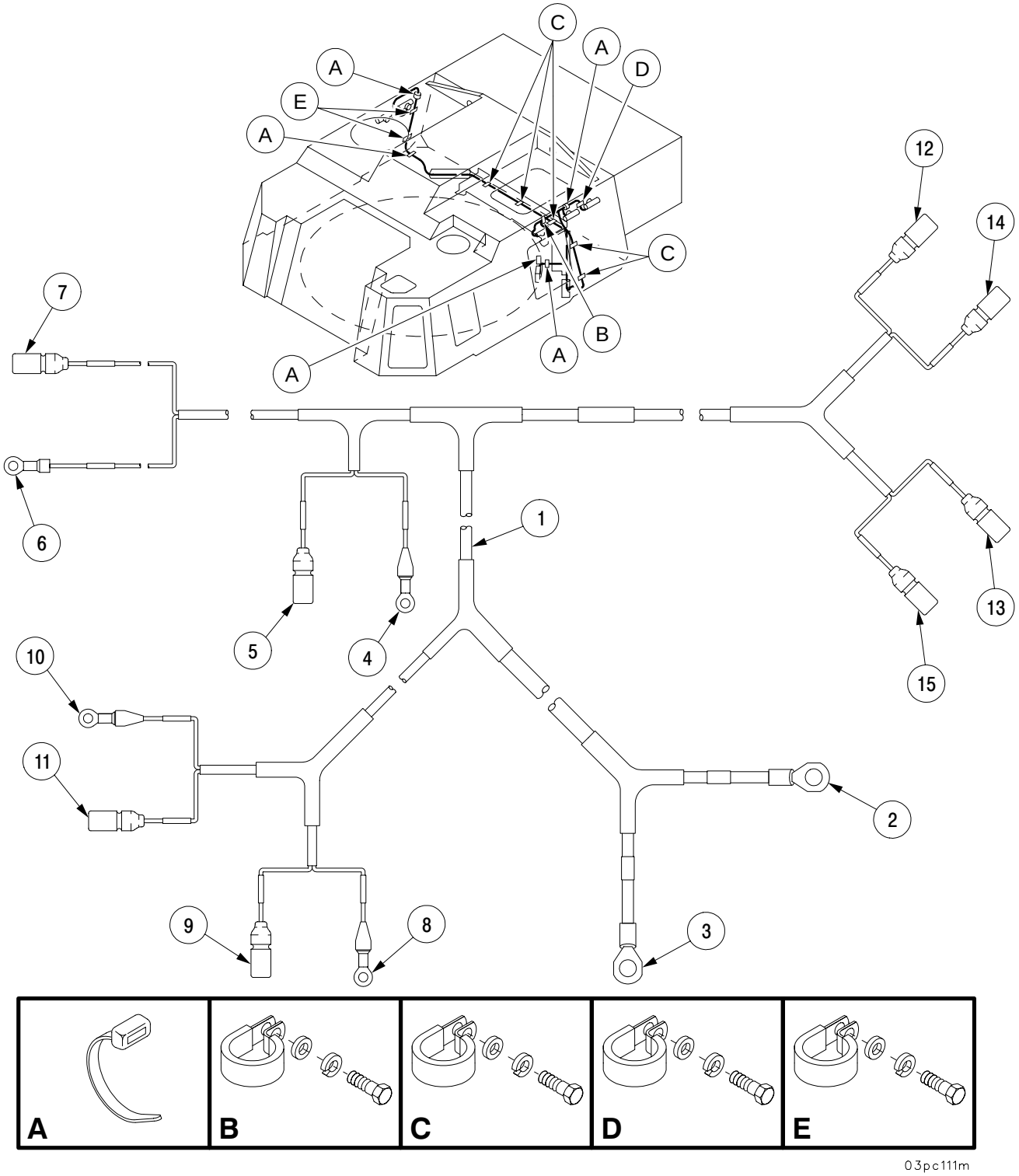
1 Install wiring harness W67 (1) in vehicle with clamps, tiedown straps and attaching hardware.

2 Connect wiring harness W67 (1) and attaching hardware at the following points:

Item No.	W67 Connector/Lead/Wire	To Connector/ Lead/Wire/Component	Location
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



5–38 MOUNTED WATER RATION HEATER WIRING HARNESS AND 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 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.

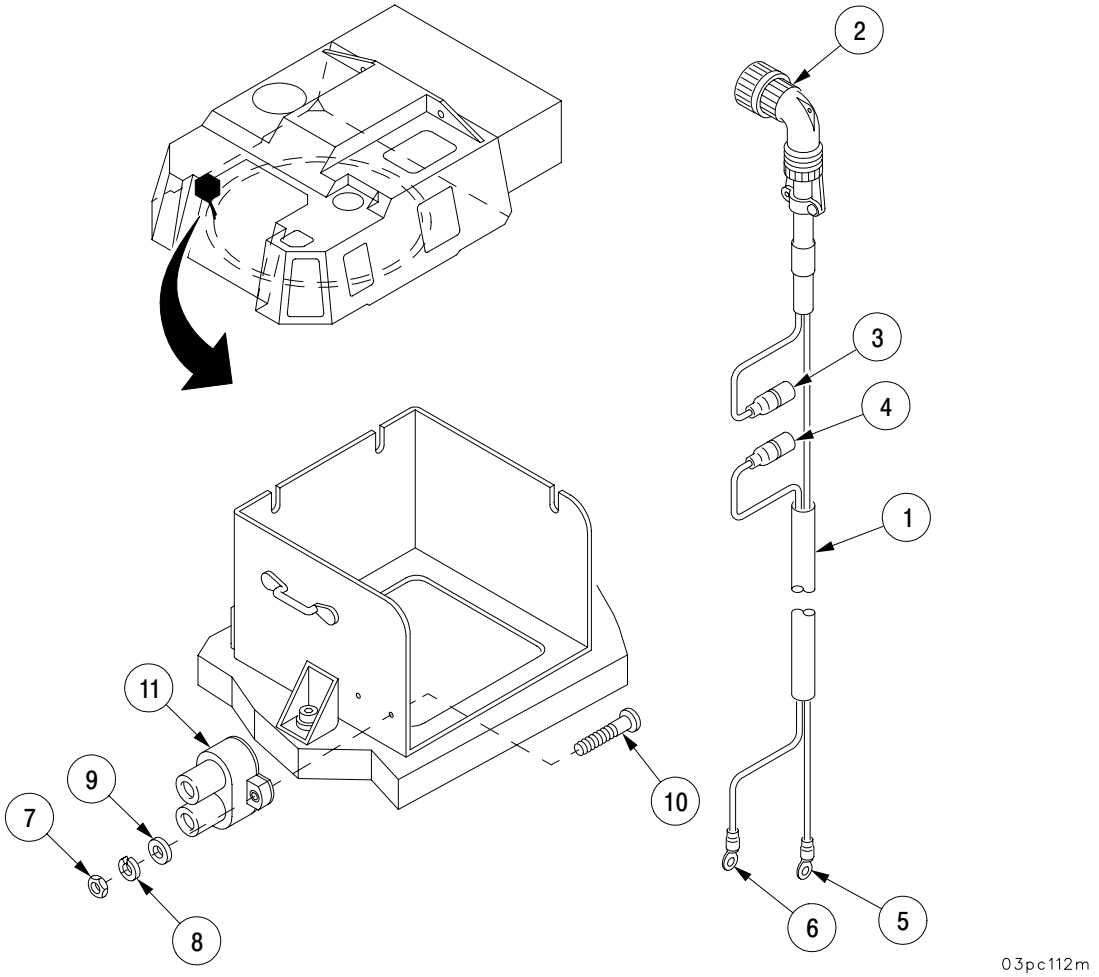
5–38 MOUNTED WATER RATION HEATER WIRING HARNESS AND CIRCUIT BREAKER – CONTINUED

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).



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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6–3	BLOCKING VALVE AND SUPPORT BRACKET	6–6
6–4	RAMMER ASSEMBLY LATCHING COMPONENTS	6–8

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 (SC 5180–95–A12)

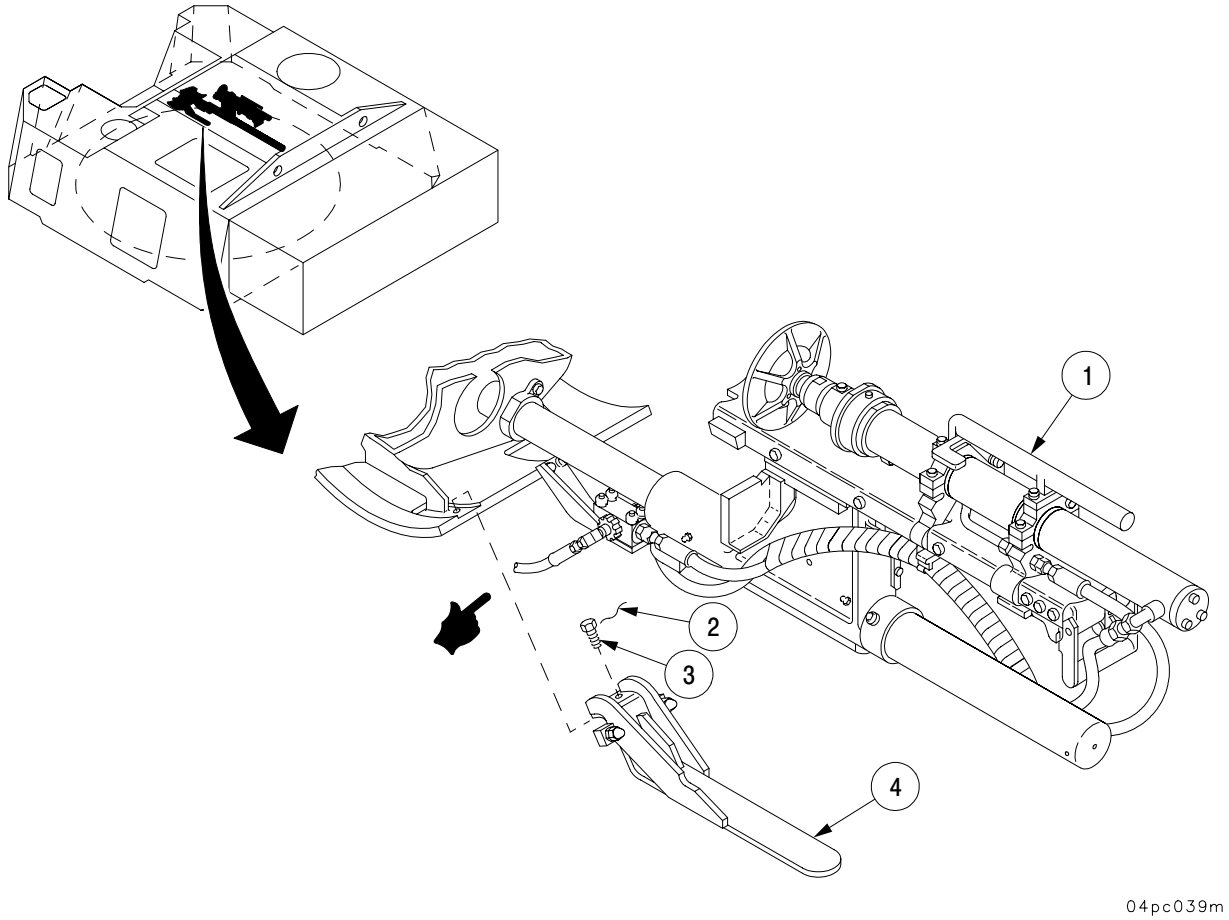
References
TM 9–2350–314–10

Materials/Parts
Nonelectrical wire (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).

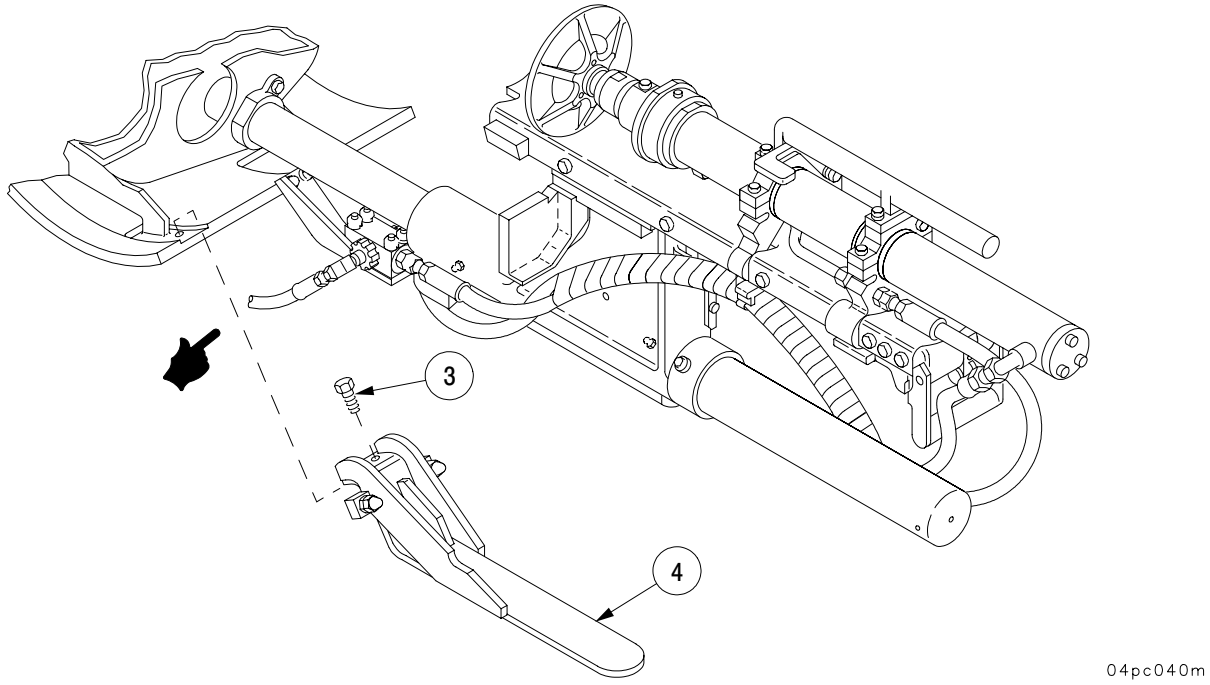
2 Remove lockwire (2), two screws (3), and stowage bracket (4). Discard lockwire.



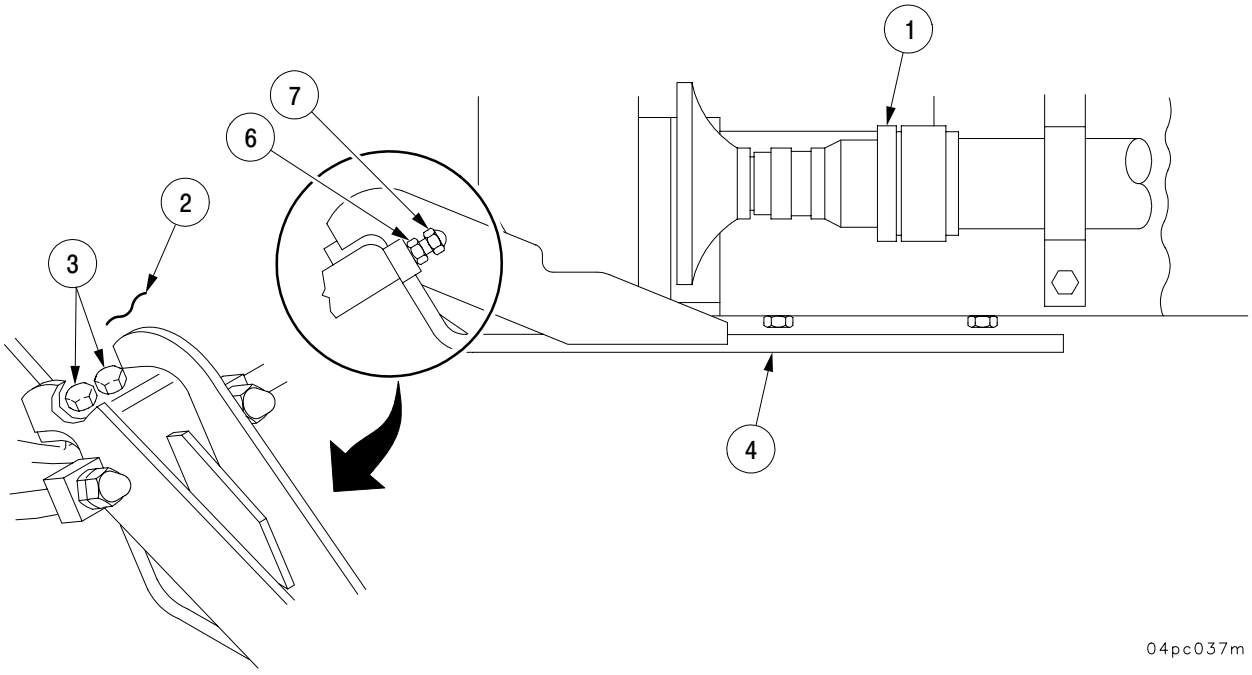
6–1 PROJECTILE RAMMER STOWAGE BRACKET – CONTINUED

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 two cap nuts (7).

2 Remove lockwire (2) from two screws (3). Discard lockwire.

3 Loosen two screws (3).

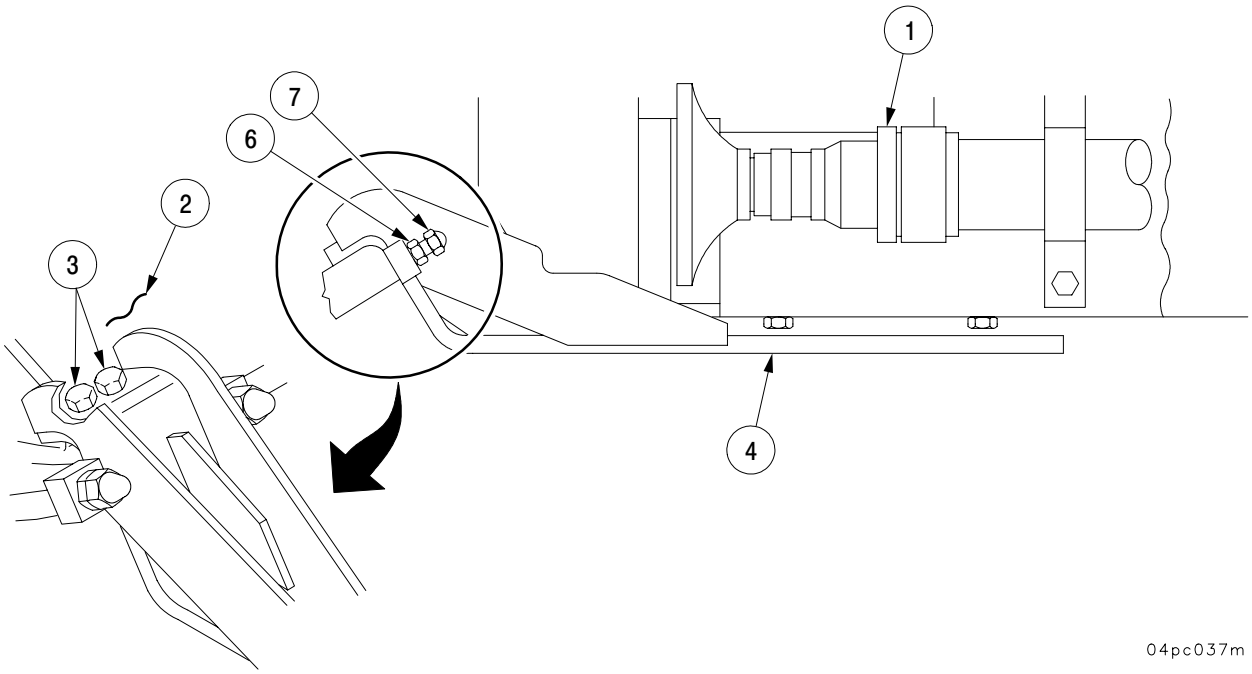
4 Turn two nuts (6) and two cap nuts (7) to adjust stowage bracket (4) until rammer (1) slides freely.

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).



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.

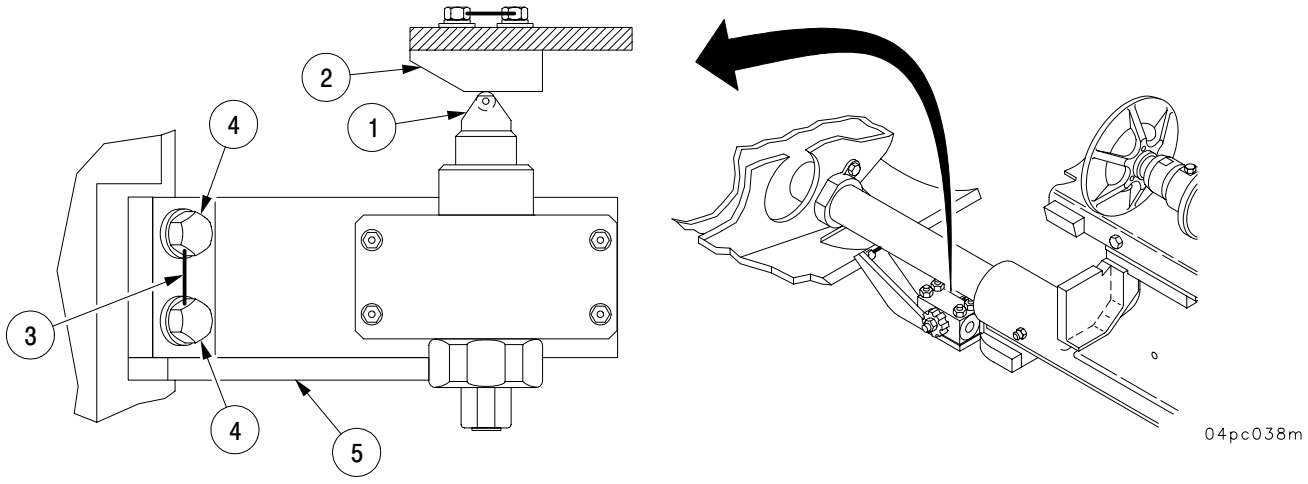
CAUTION

- 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 35–45 lb–ft (47–61 N•m). Install new lockwire (3).



6–3 BLOCKING VALVE AND SUPPORT BRACKET.

This task covers: a. Removal b. Installation

INITIAL SETUP

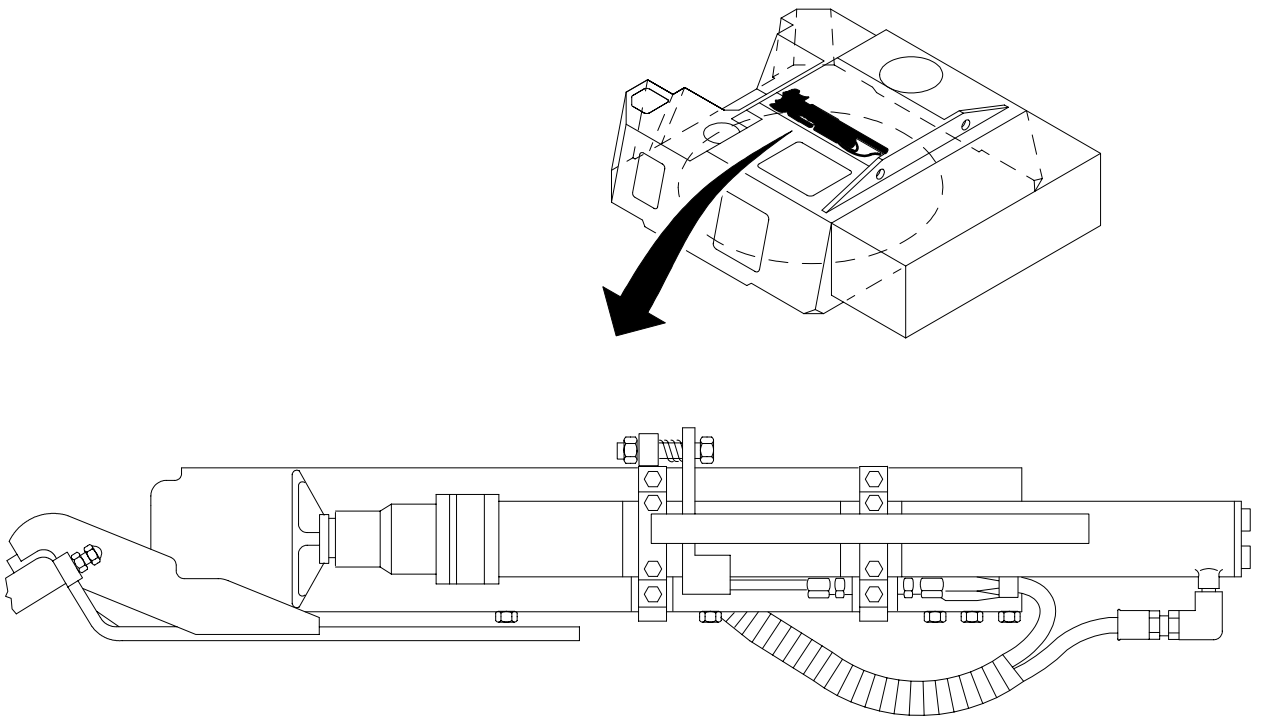
Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Torque wrench (item 53, Appx G)

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.

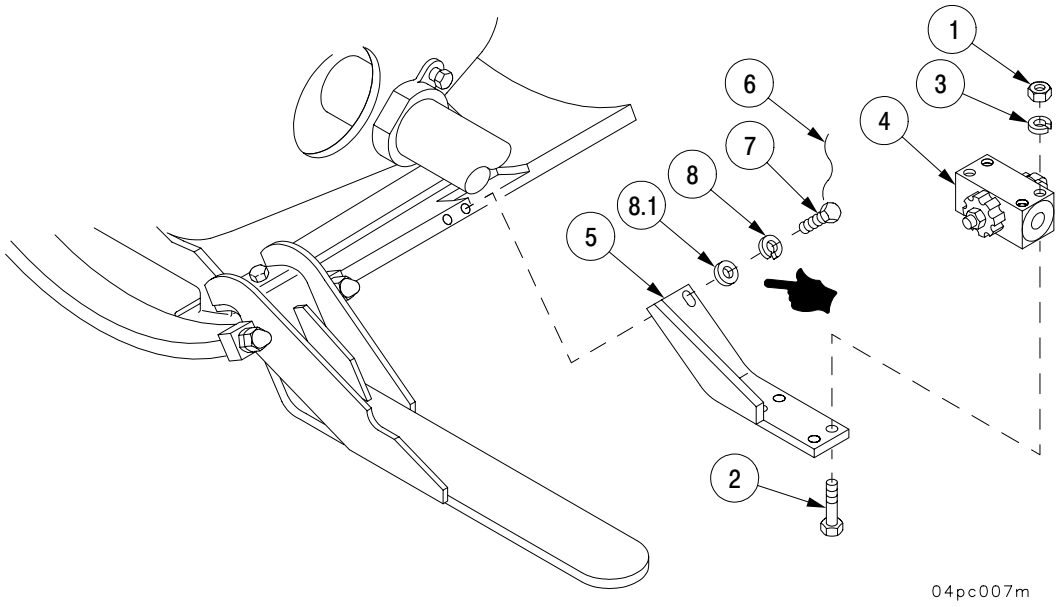
1 Install blocking valve support bracket (5) with two screws (7), two new lockwashers (8), and two flat washers (8.1). Torque screws to 35–45 lb–ft (47–61 N•m). Install new lockwire (6).

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

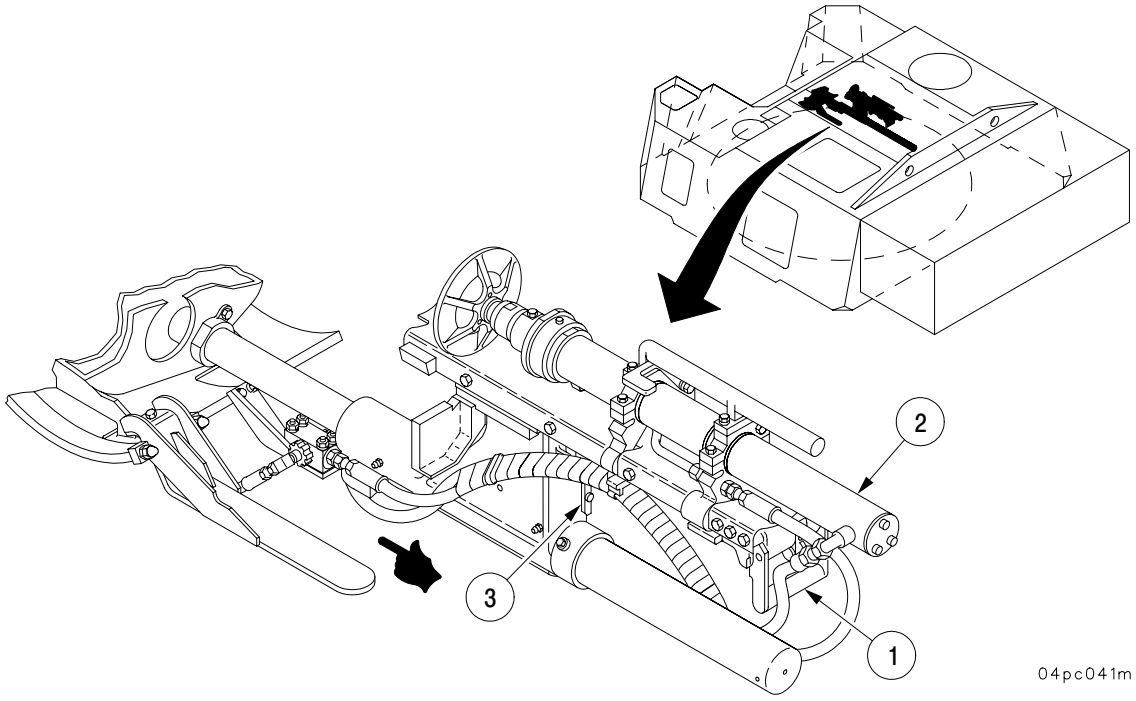
Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Torque wrench (item 53, Appx G)
Drill twist, set (item15, Appx G)
Electric drill (item 14, Appx G)
Machinist vise (item 46, Appx G)

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).



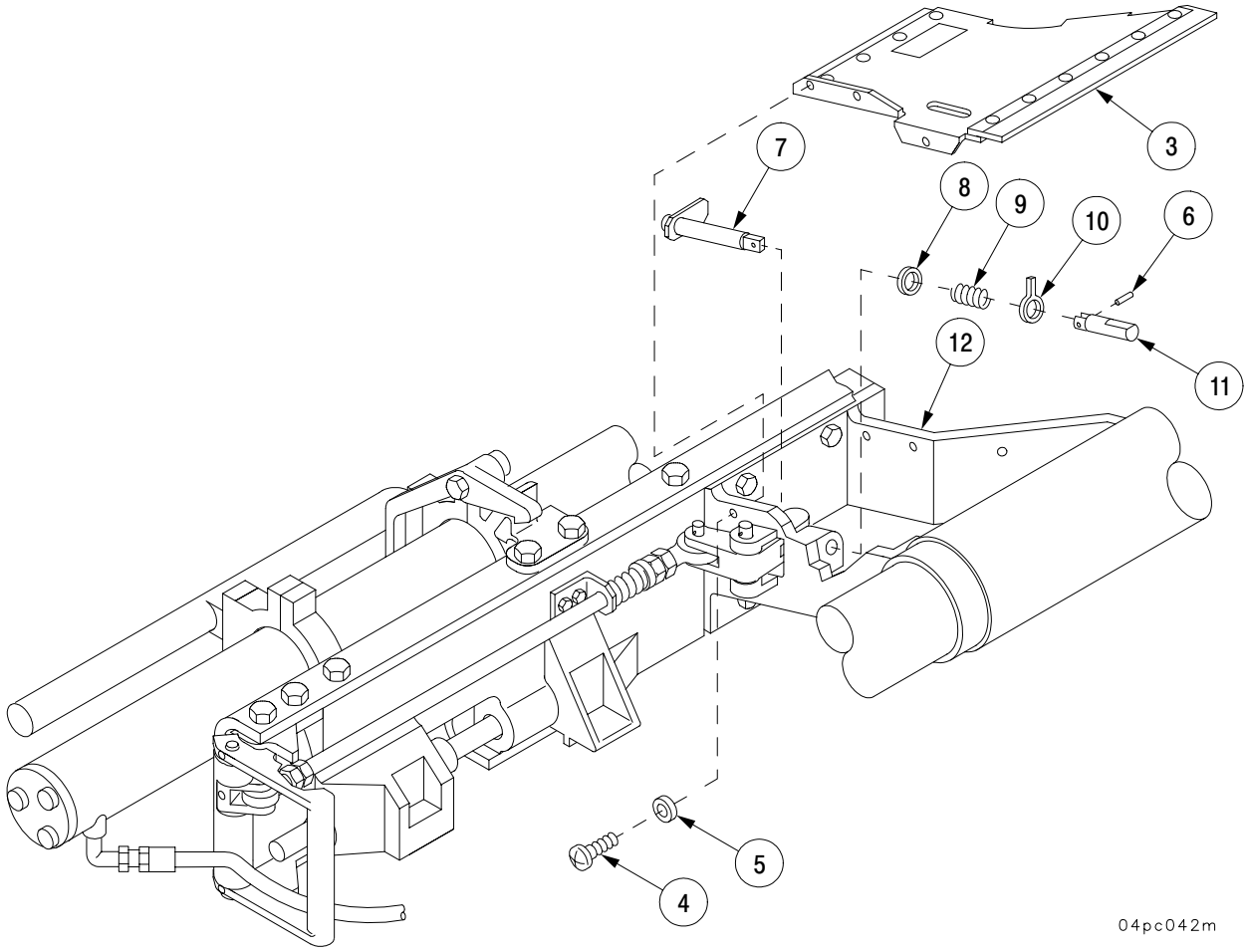
6–4 RAMMER ASSEMBLY LATCHING COMPONENTS – CONTINUED

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).



6–4 RAMMER ASSEMBLY LATCHING COMPONENTS – CONTINUED

a. Disassembly – Continued

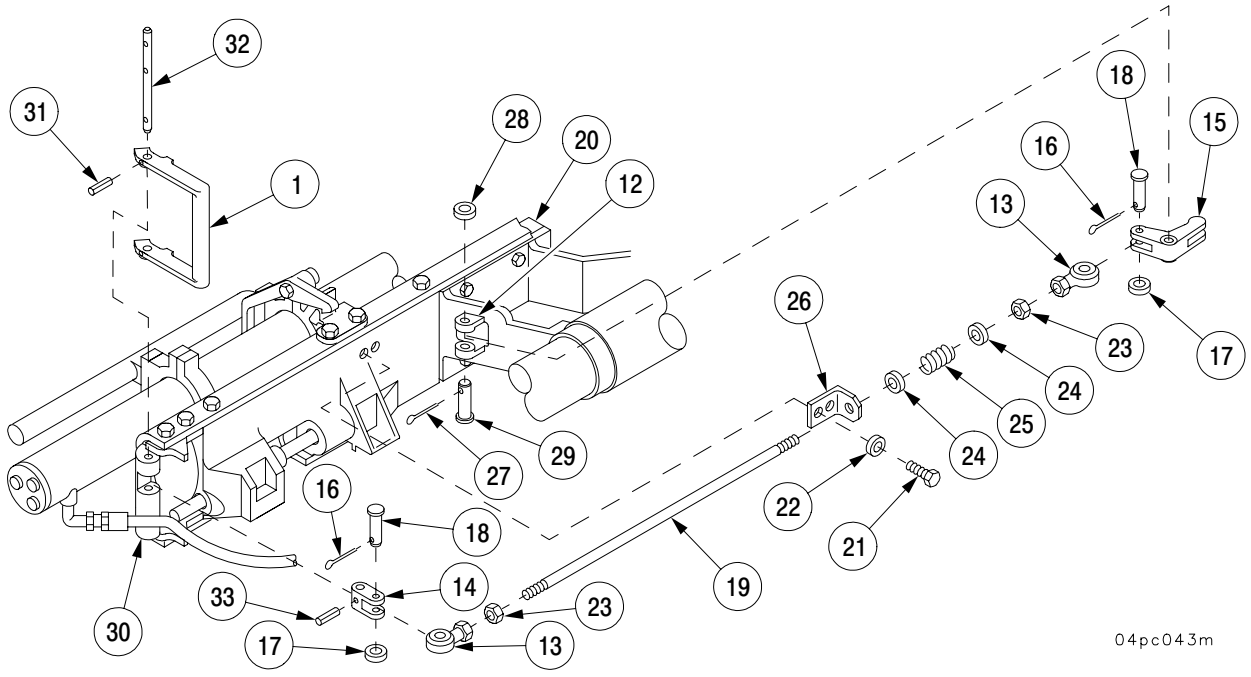
5 Disconnect two rod ends (13) from two levers (14 and 15) by removing two cotter pins (16), two flat washers (17), and two straight pins (18). Discard cotter pins.

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.



6–4 RAMMER ASSEMBLY LATCHING COMPONENTS – CONTINUED

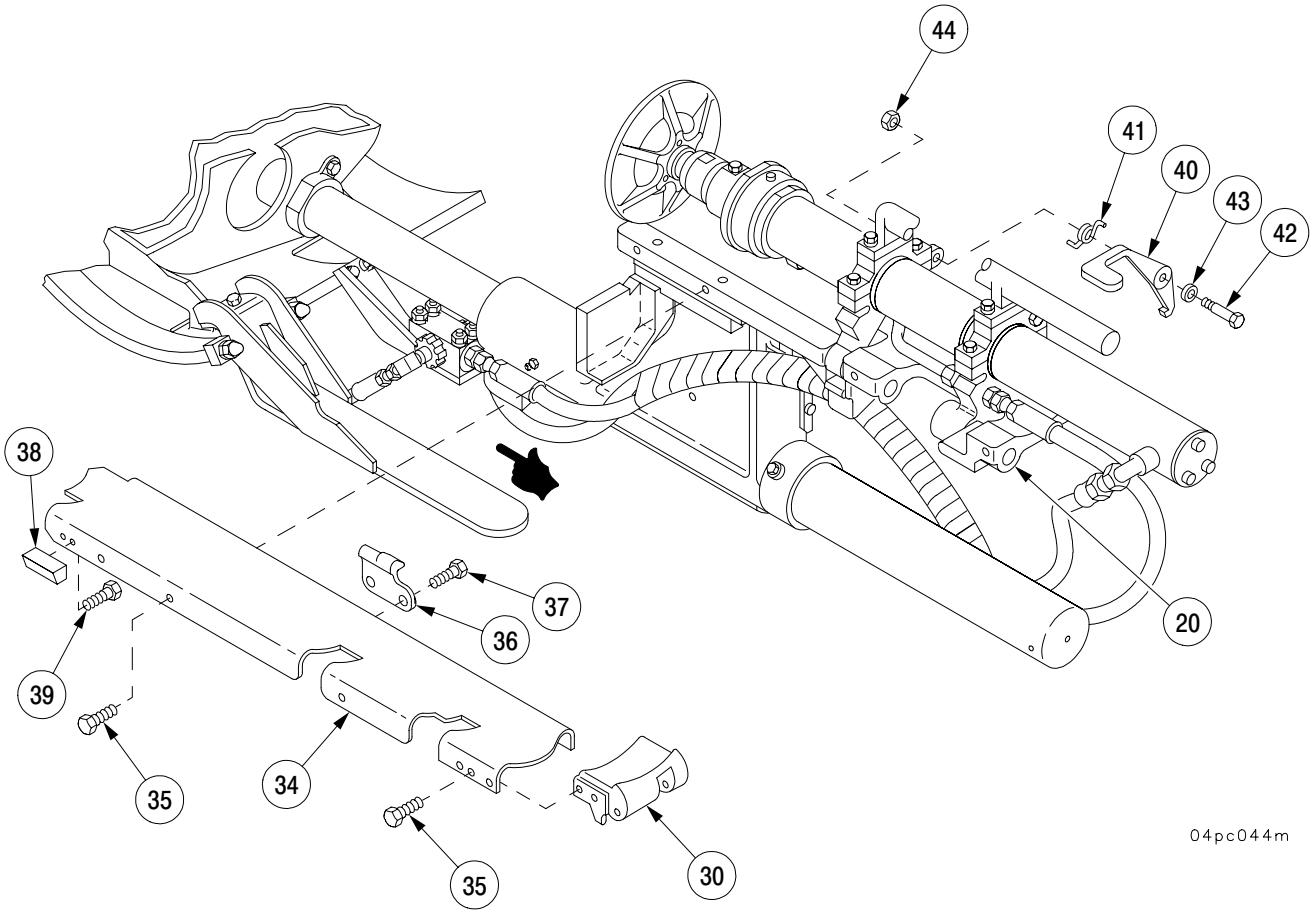
a. Disassembly – Continued

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).



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).

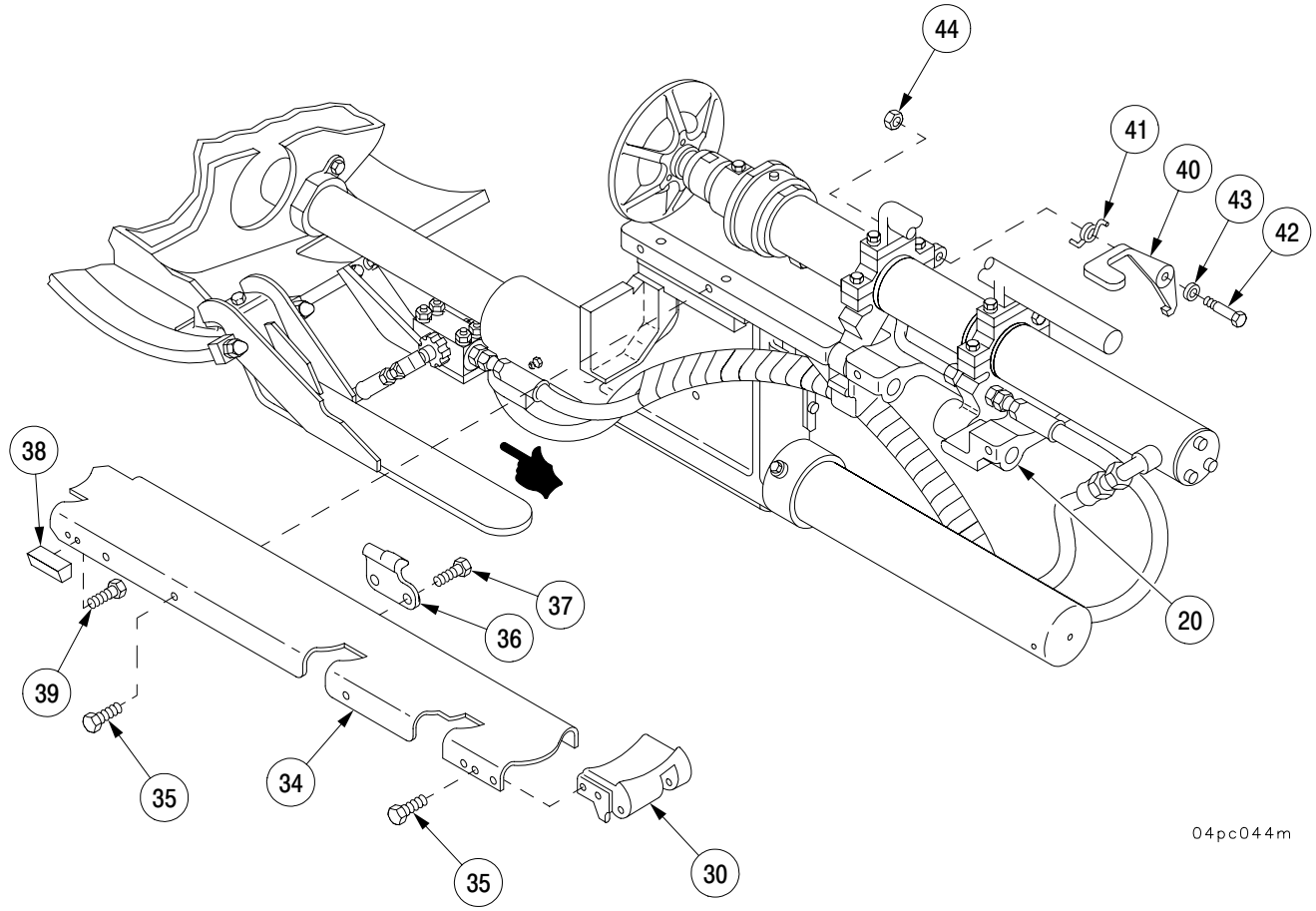
3 Install block (38) on ammo tray (34) with two screws (39).

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).



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).

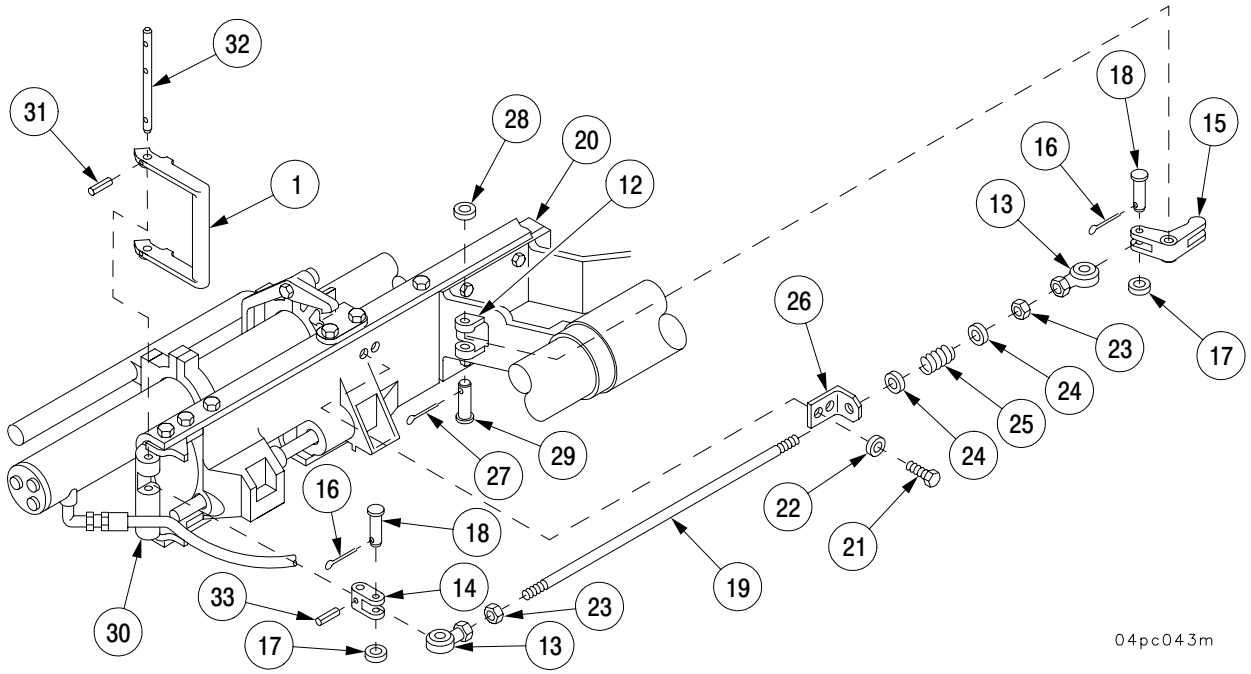
11 Install lever (15) in support (12) with straight pin (29), flat washer (28), and new cotter pin (27).

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).

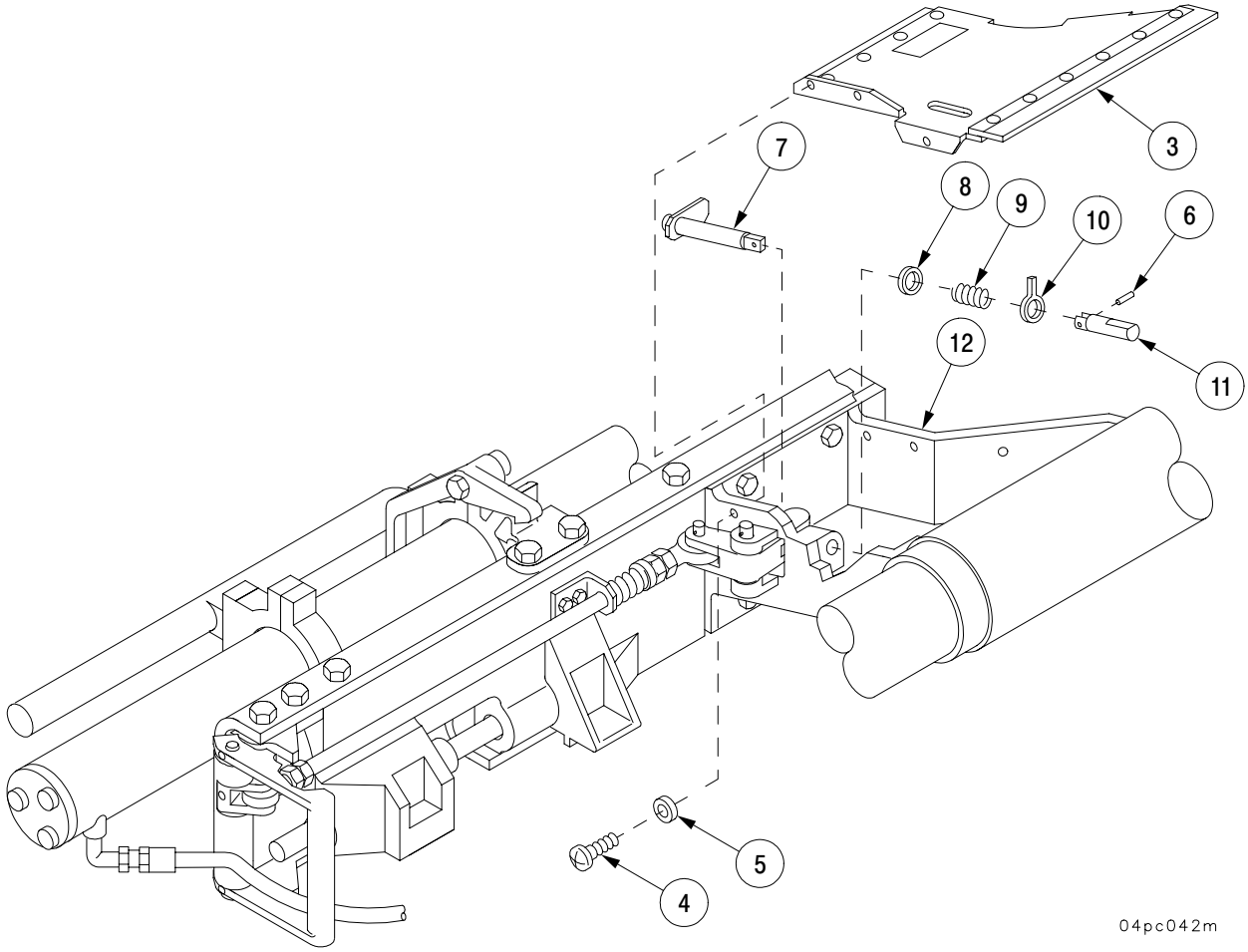


6–4 RAMMER ASSEMBLY LATCHING COMPONENTS – CONTINUED

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).



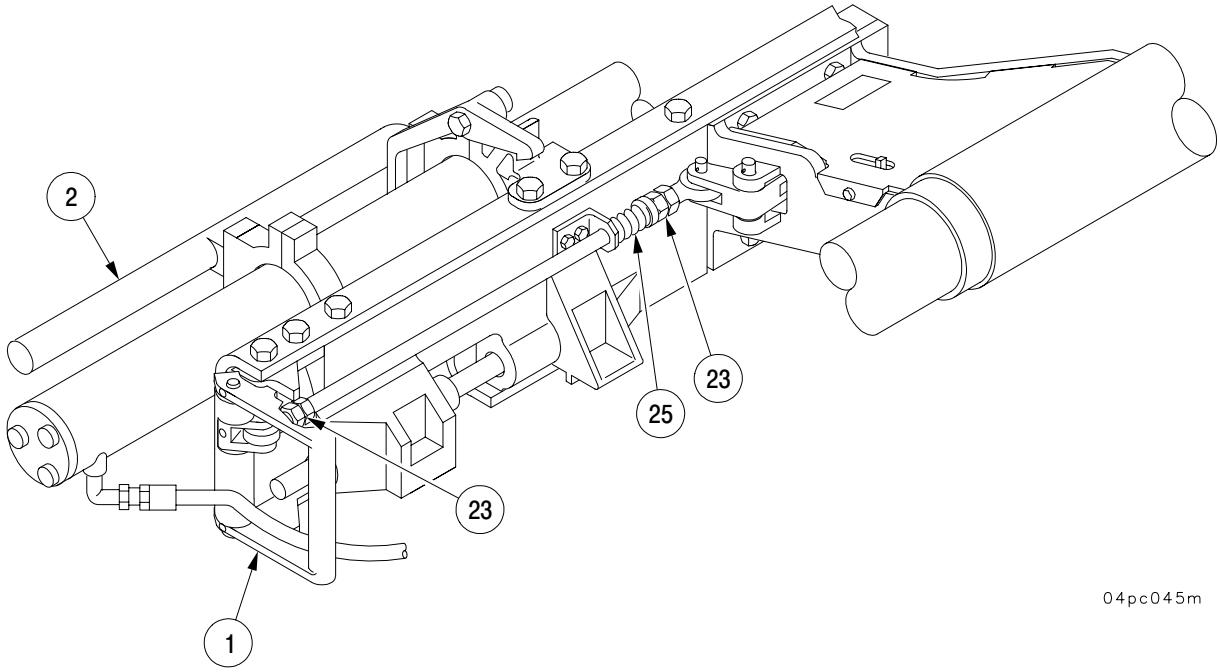
6–4 RAMMER ASSEMBLY LATCHING COMPONENTS – CONTINUED

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.



CHAPTER 7
SIGHTING EQUIPMENT

GENERAL

This chapter illustrates and describes maintenance procedures for telescope mount M145A1, linkage assembly, ballistic cover, M140 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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7–3	TELESCOPE COVER, OBSERVATION WINDOW, AND RING ASSEMBLY	7–22
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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

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.

7–1 M145A1 MOUNT AND LINKAGE – CONTINUED

a. Leveling Gun Trunnions.

NOTE

All quadrant seats must be wiped clean before positioning gunner's quadrant on them for taking readings.

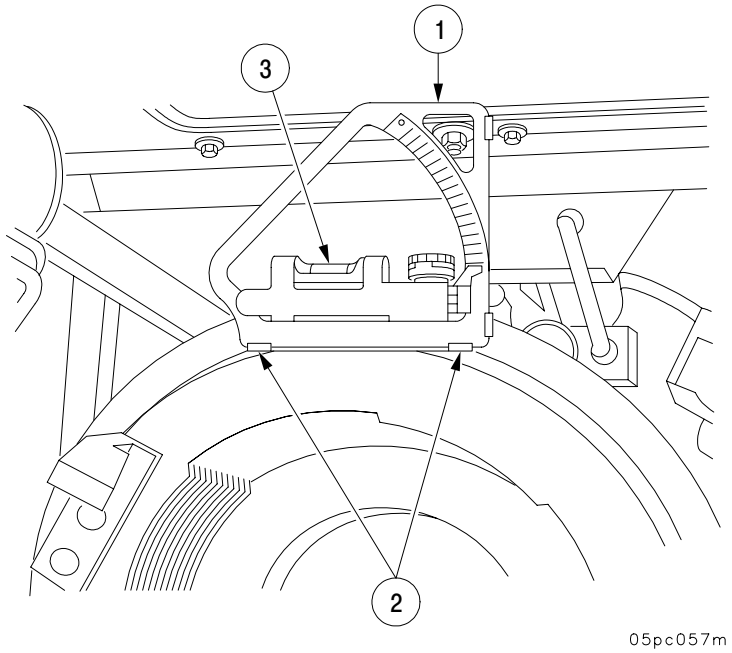
1 Park vehicle on level ground (hard surface if available). Bring cannon to zero elevation, using gunner's quadrant (end–for–end correction applied) on M145A1 quadrant seats.

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 correction applied) placed on breech quadrant seats (2).

NOTE

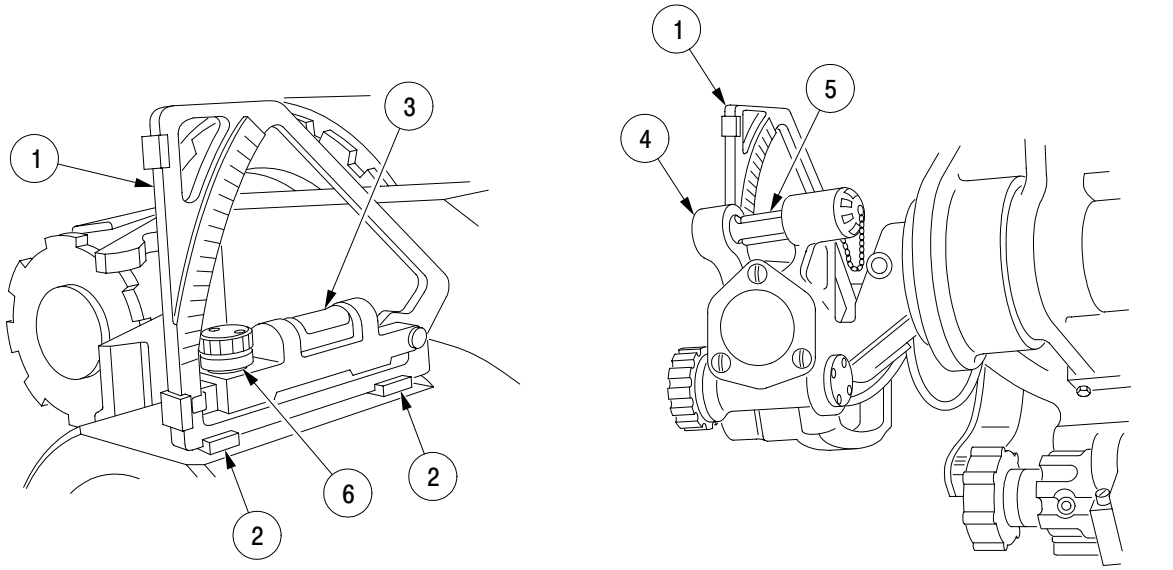
With gunner's quadrant on mount M145A1 quadrant seats, the bubble in the gunner's quadrant can be read more accurately by observing gunner's quadrant bubble with inspection mirror.

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).



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7–1 M145A1 MOUNT AND LINKAGE – CONTINUED

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 correction applied) placed on breech quadrant seats (2).

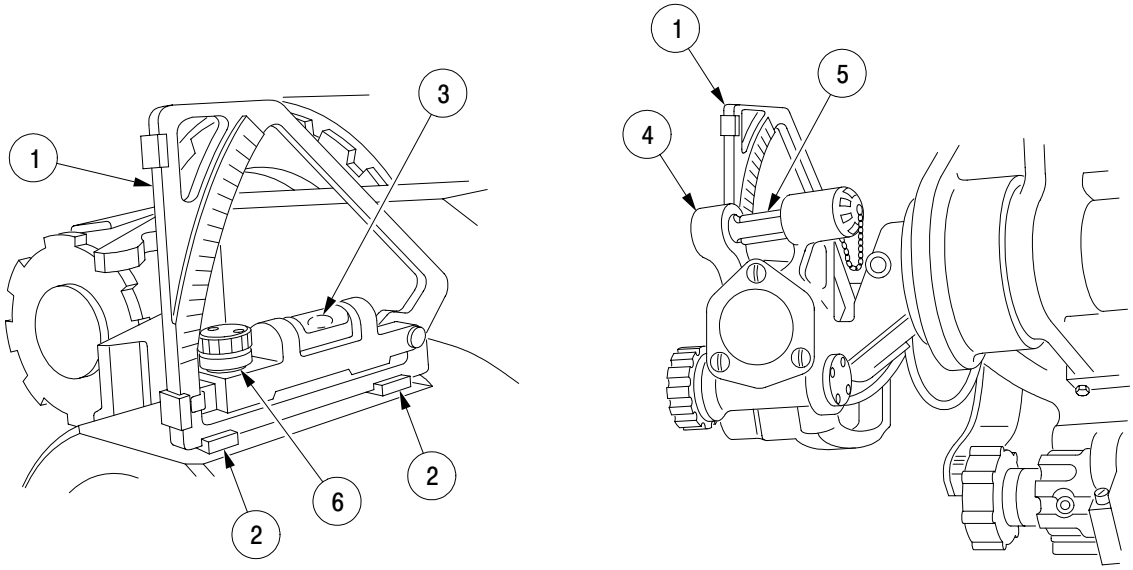
NOTE

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.



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7–1 M145A1 MOUNT AND LINKAGE – CONTINUED

c. Adjusting Shaft Arm – Continued

NOTE

If reading on gunner's quadrant has not changed more than ± 0.5 mils at 800 mils, skip steps 5 and 6. If reading on gunner's quadrant has changed more than ± 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.

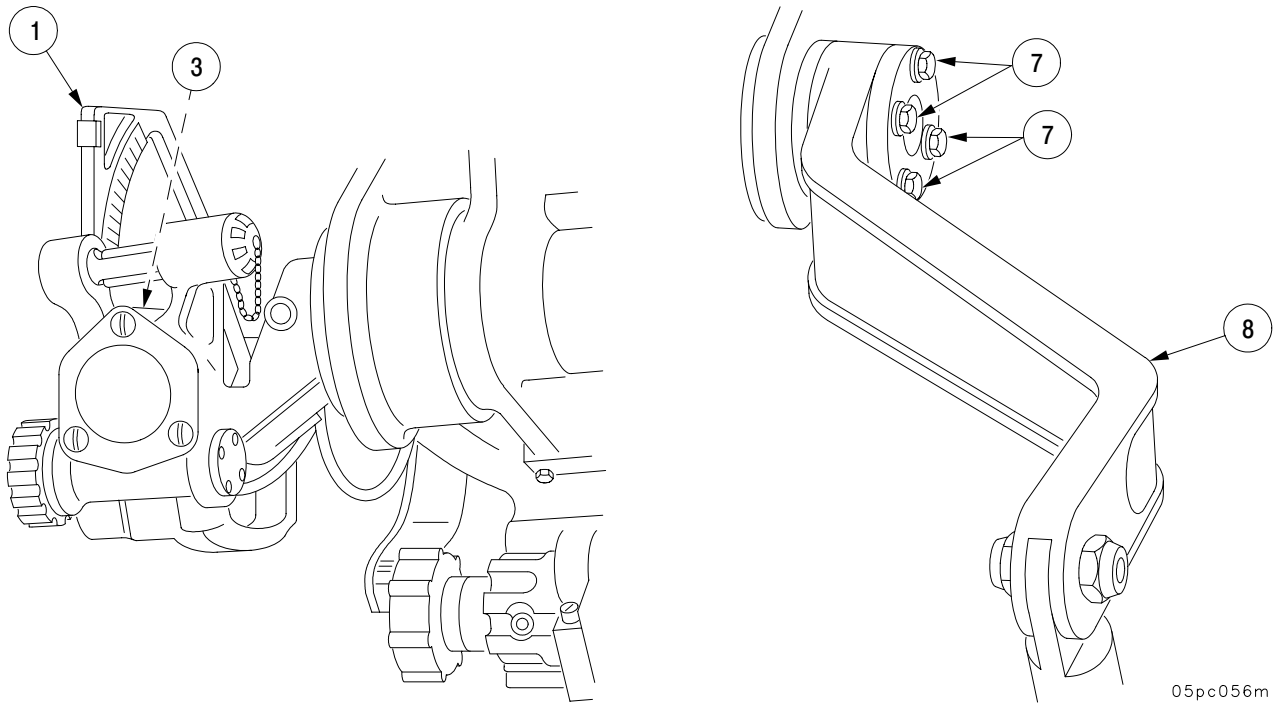
5 Loosen four screws (7) on shaft arm (8).

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.



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 correction applied) placed on breech quadrant seats (2).

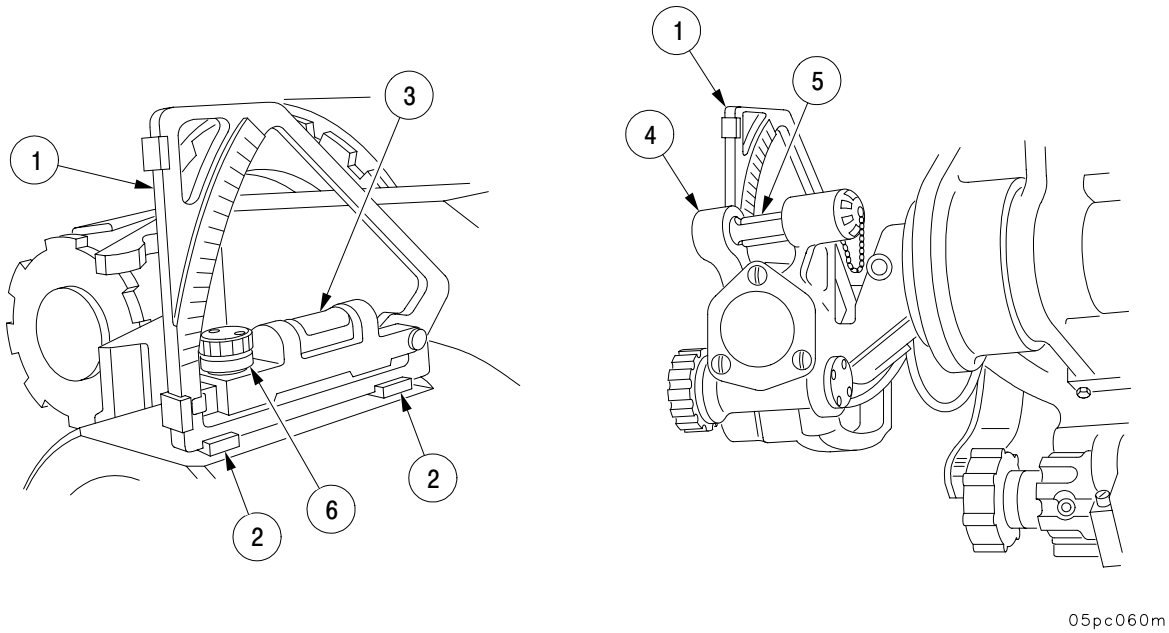
2 Place gunner's quadrant (1) with reading of 400 mils (end–for–end correction applied) on telescope mount M145A1 quadrant seats (4).

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 ± 0.5 mils at 400 mils, skip steps 5 and 6. If reading on gunner's quadrant has changed more than ± 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.



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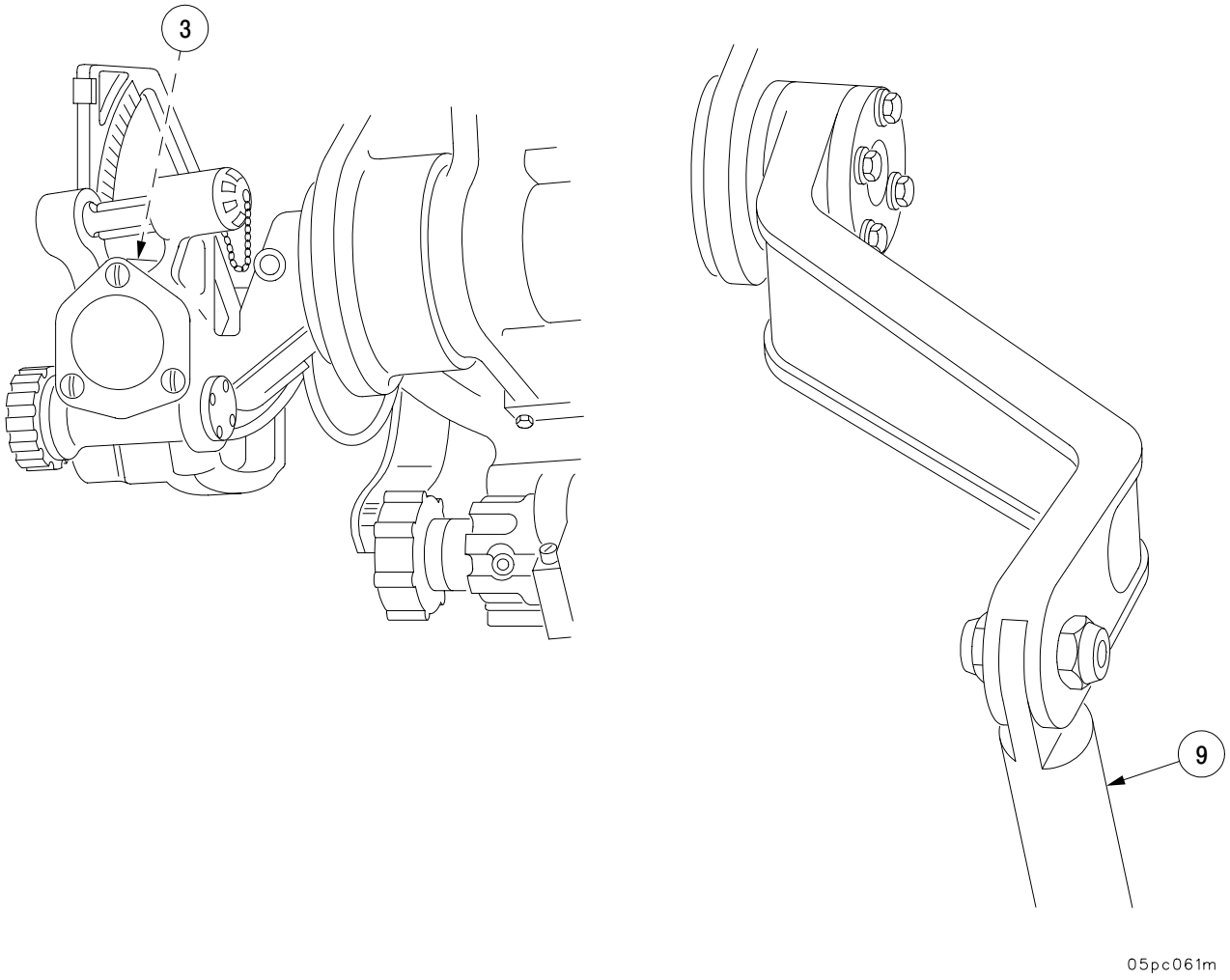
7–1 M145A1 MOUNT AND LINKAGE – CONTINUED

d. Adjusting Gun Trunnion Arm – Continued

5 Loosen clamp screw (not shown) on gun trunnion arm (9).

6 Rotate adjustment rod until bubble (3) in gunner's quadrant is centered. Tighten clamp screw at 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.



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 correction applied) placed on breech quadrant seats (2).

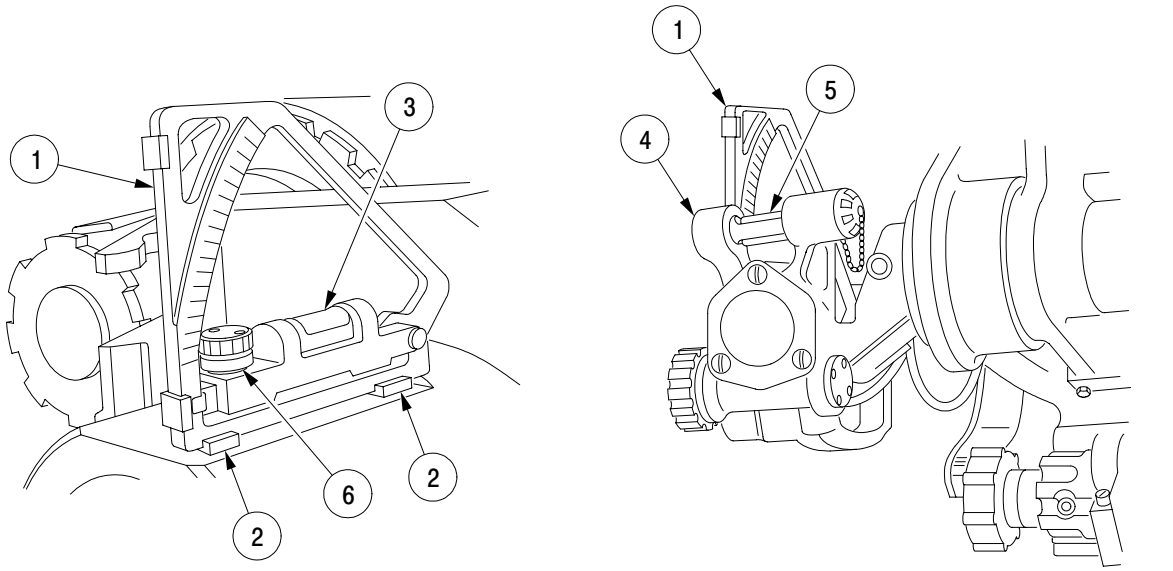
NOTE

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).



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7–1 M145A1 MOUNT AND LINKAGE – CONTINUED

e. Adjusting Eccentric Shaft – Continued

NOTE

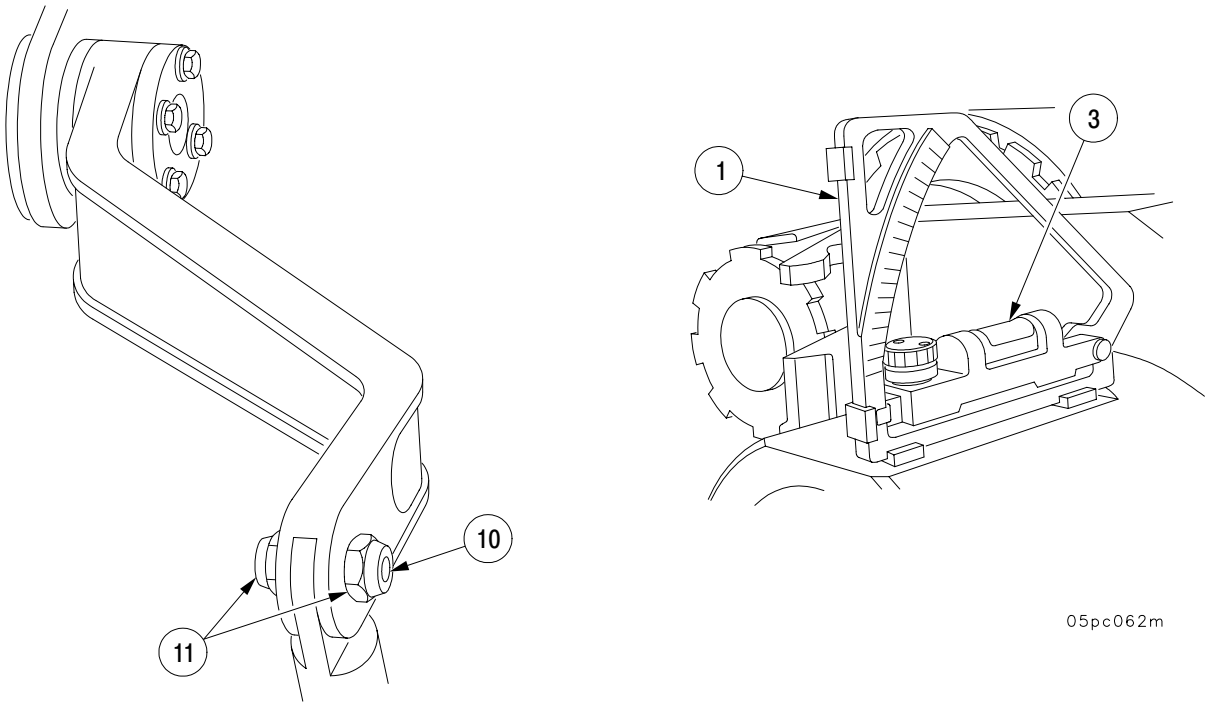
If reading on gunner's quadrant has not changed more than ± 0.5 mils at 1200 mils, skip steps 5 thru 7. If reading on gunner's quadrant has changed more than ± 0.5 mils, turn back micrometer knob on gunner's quadrant to get a reading of 1200 mils (end–for–end correction applied). Then follow steps 5 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

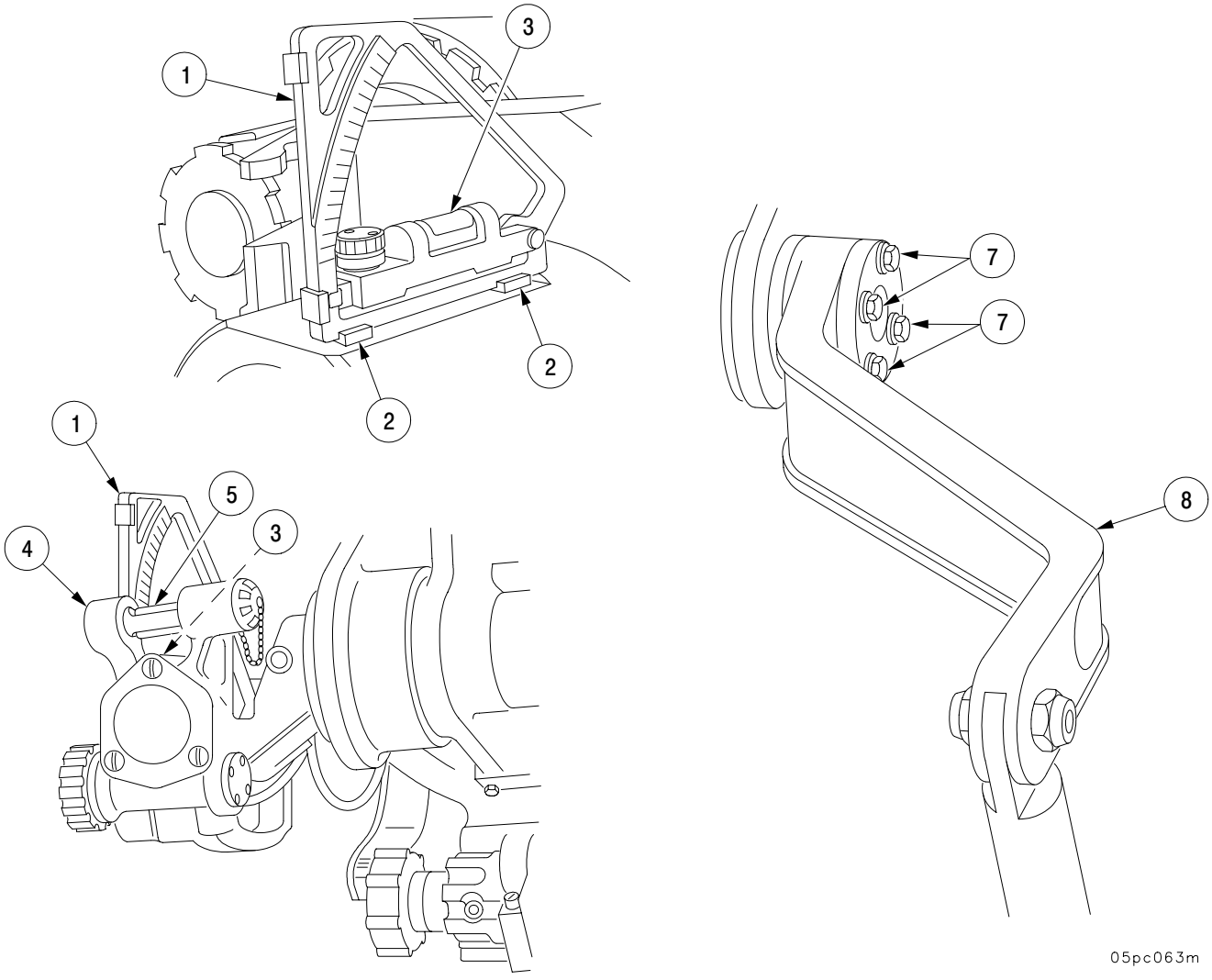
f. Adjusting Mount M145A1 at Zero Elevation.

1 Depress cannon tube to zero elevation, using gunner's quadrant (1) (end–for–end 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 (± 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).



7–1 M145A1 MOUNT AND LINKAGE – CONTINUED

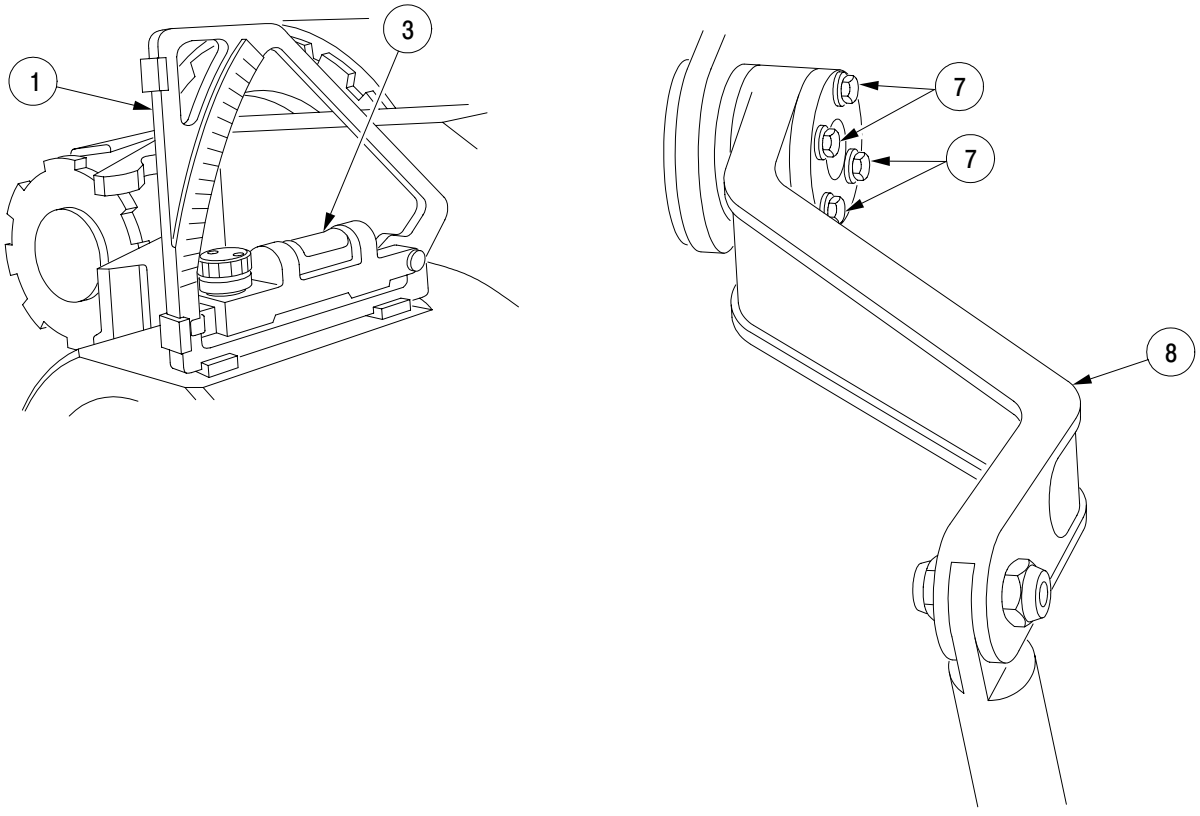
f. Adjusting Mount M145A1 at Zero Elevation – Continued

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.



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7–1 M145A1 MOUNT AND LINKAGE – CONTINUED

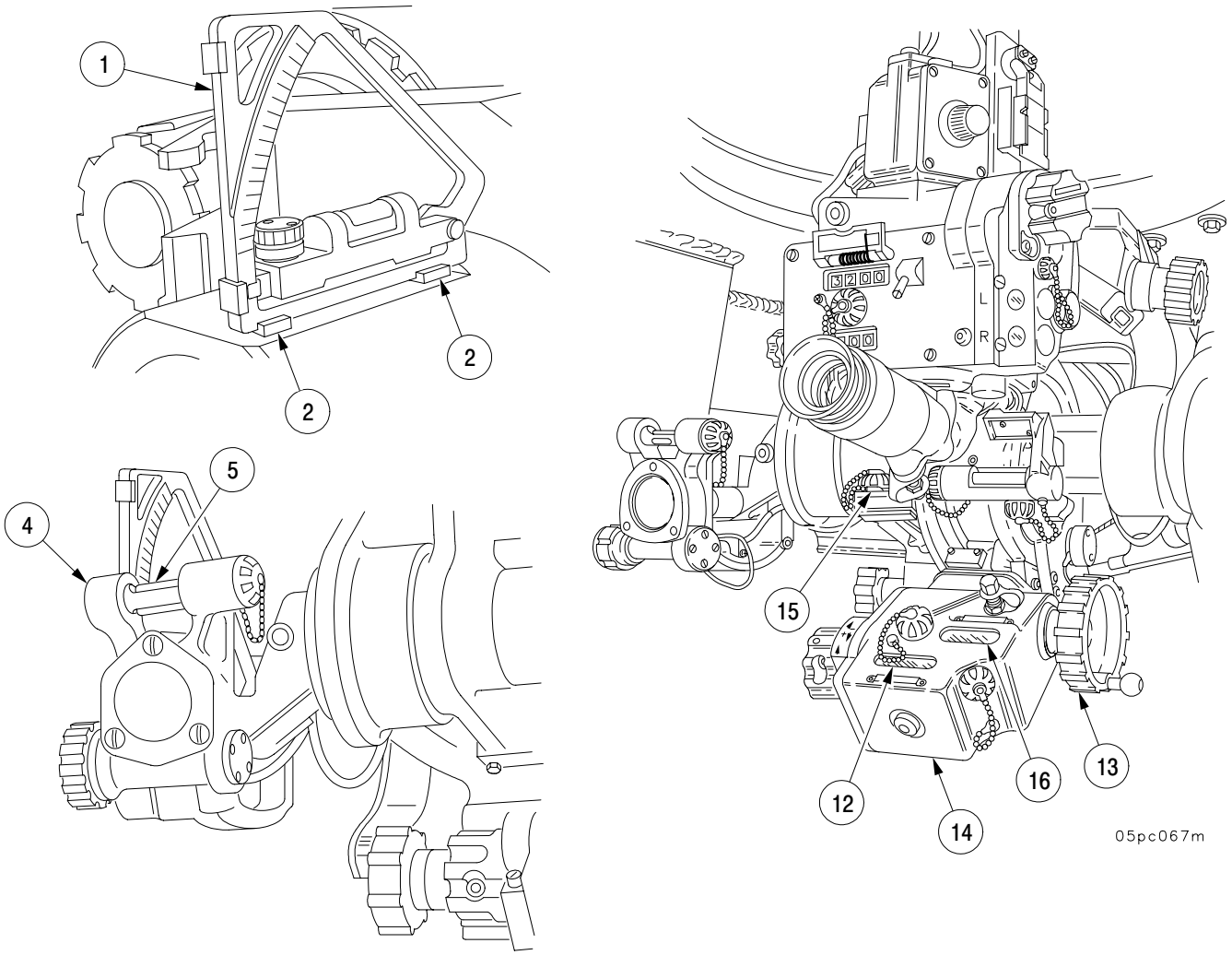
g. Checking Elevation Counter.

1 Bring cannon tube to zero elevation, using gunner's quadrant (1) (end–for–end 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.

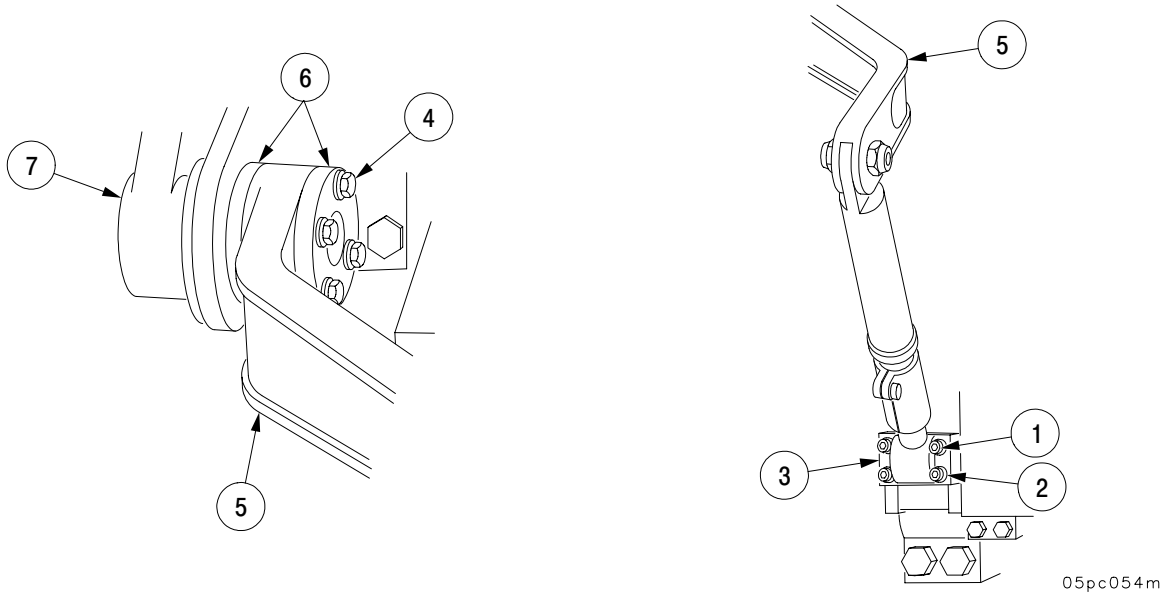
1 Remove four socket head screws (1), four lockwashers (2), and two lower gun arm caps (3). Discard lockwashers.

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).



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).

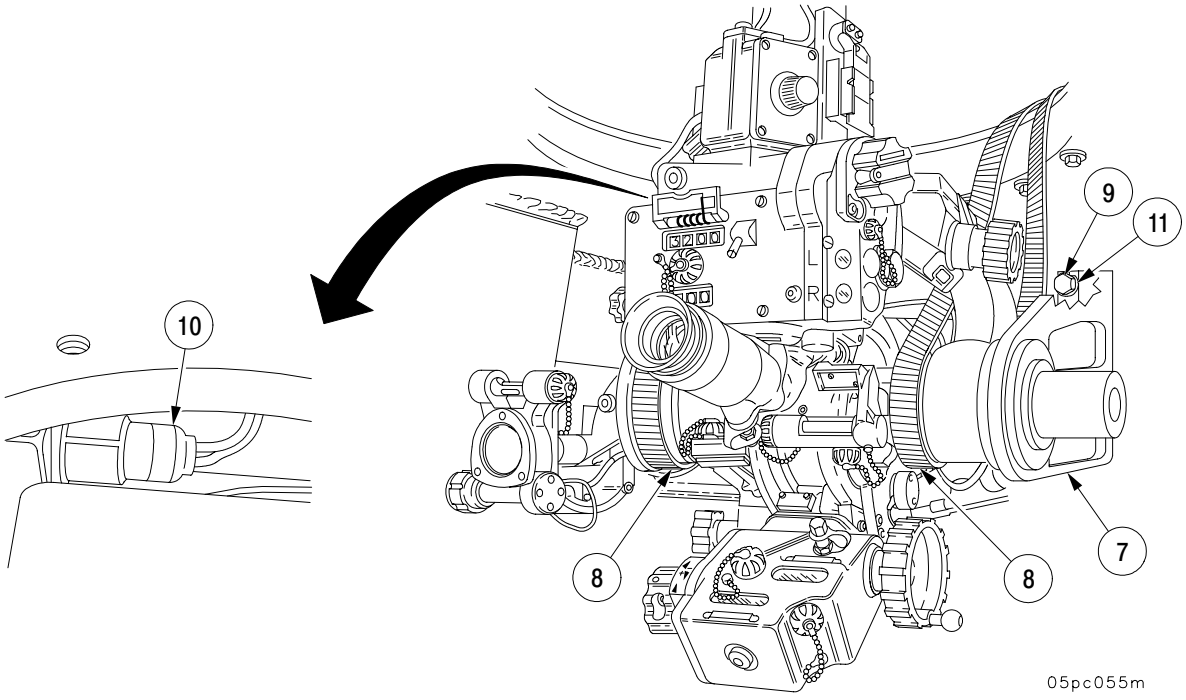
6 Loosen four mounting screws (9), but leave enough of the threads holding to support mount M145A1 (7).

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.

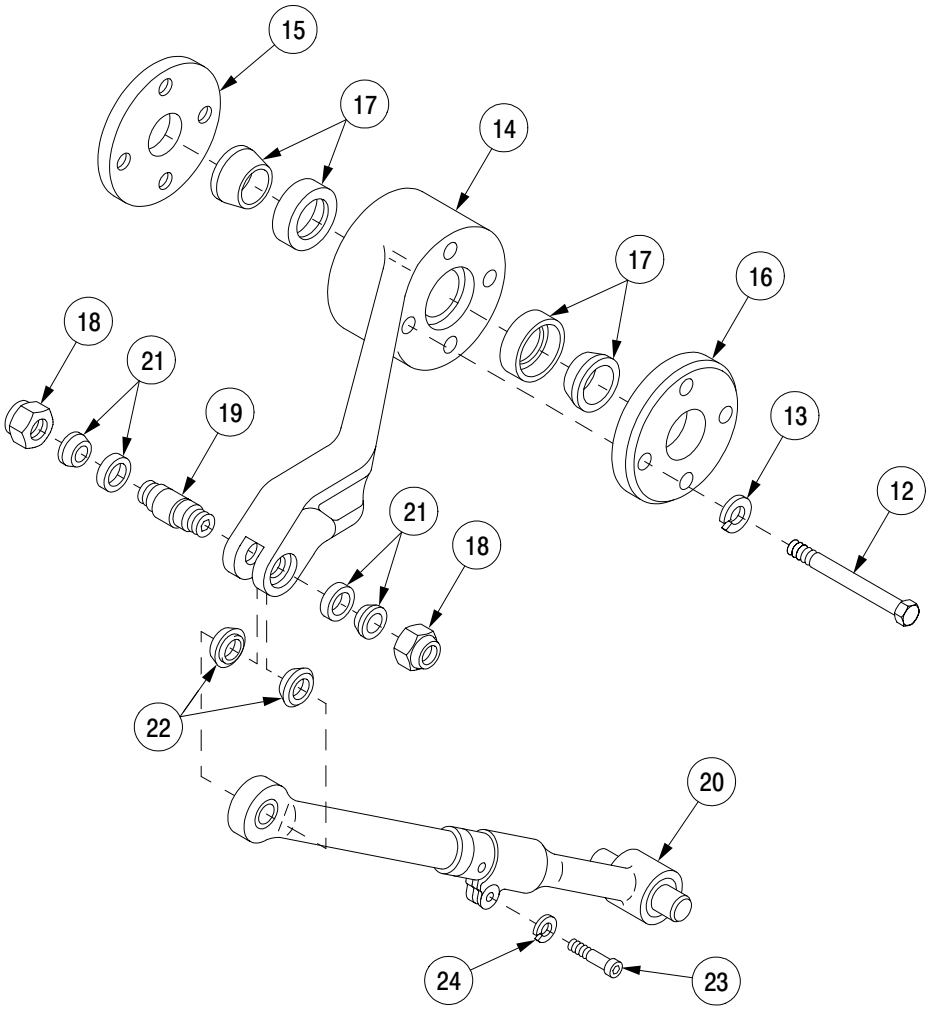
1 Remove four screws (12) and four lockwashers (13) from shaft arm (14). Discard lockwashers.

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.



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).

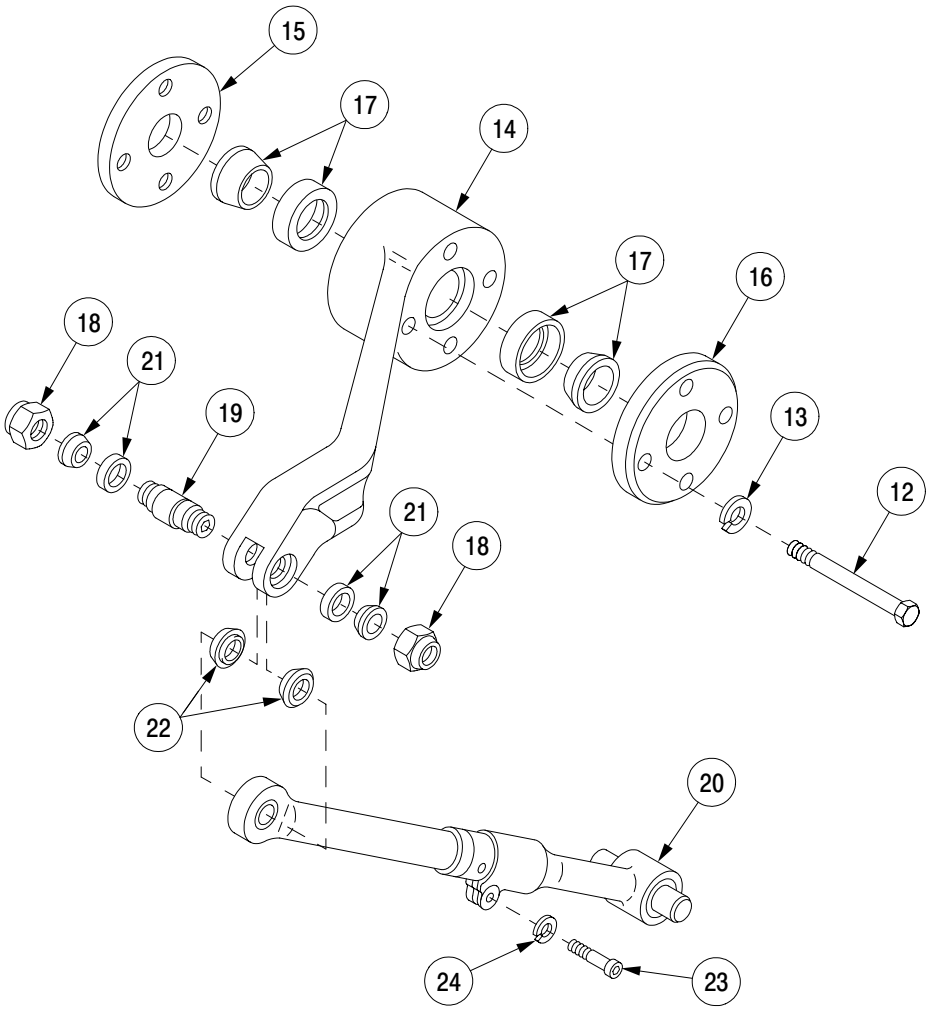
2 Insert shaft (19) into arm (14) and tap into place using brass drift and hammer. Install two new self–locking nuts (18).

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.



7–2 M145A1 MOUNT AND LINKAGE ASSEMBLY AND CONNECTING LINK – CONTINUED

e. Installation of Mount, M145A1.

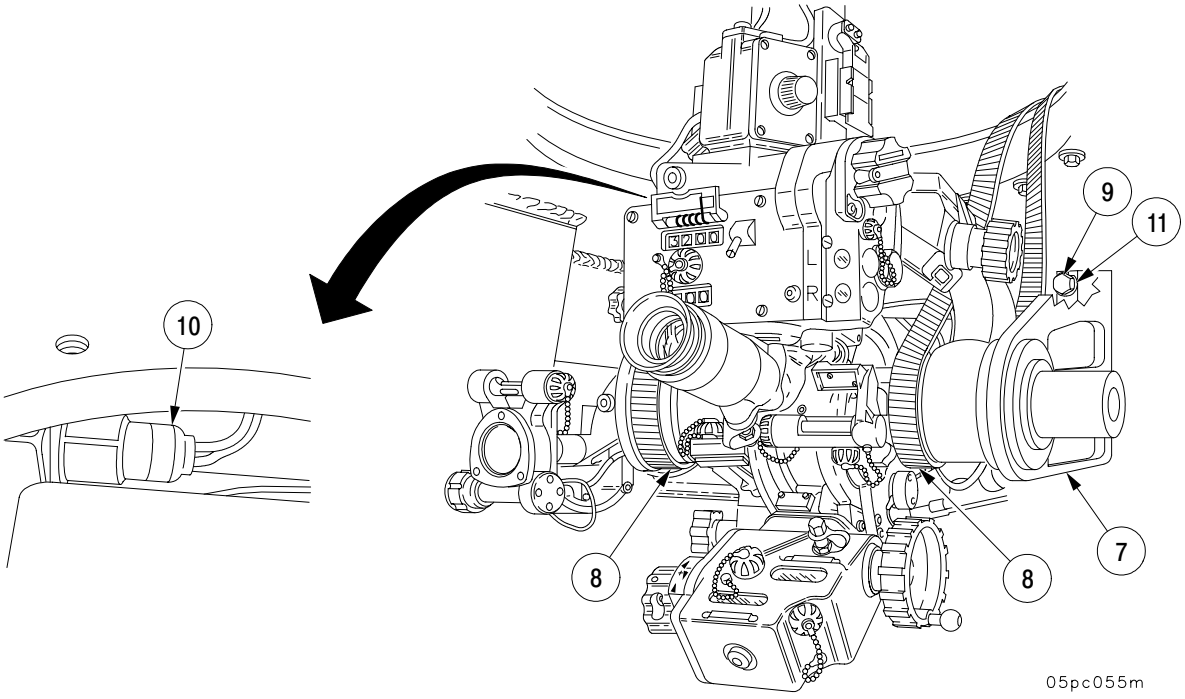
1 Position lifting sling (8) through telescope cover opening and attach to M145A1 mount (7). Raise and position mount M145A1 to support bracket.

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).



7–2 M145A1 MOUNT AND LINKAGE ASSEMBLY AND CONNECTING LINK – CONTINUED

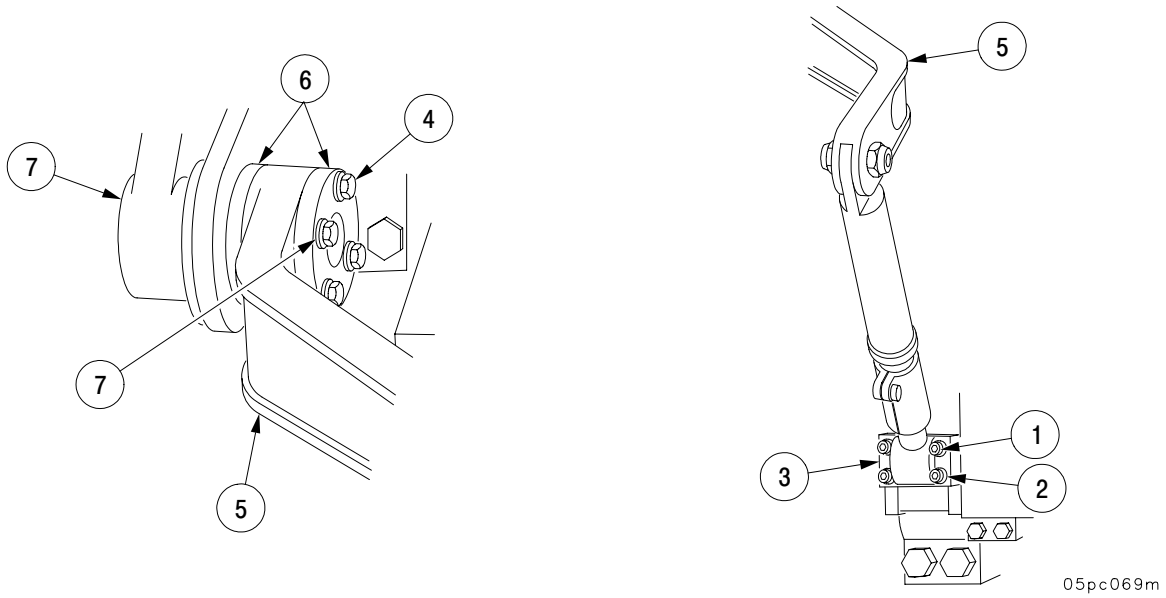
e. Installation of Mount, M145A1 – Continued

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).



7–3 TELESCOPE COVER, OBSERVATION WINDOW, AND RING ASSEMBLY.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools
Artillery and turret mechanic's tool kit (SC 5180–95–A12)
Suitable lifting device
Lifting sling (item 34, Appx G)
Torque wrench (item 53, Appx G)

Materials/Parts
Gasket (item 176, Appx F)
Dry–cleaning solvent (item 75, Appx C)
Lockwashers (10) (item 132, Appx F)

Personnel Required
Three

a. Removal.

CAUTION

Cover glass prior to removal of telescope cover. Failure to protect glass could result in damage to glass surface.

NOTE

Use longitudinal locking knob to move telescope cover to access front mounting bolts.

1 Attach lifting sling cables (1) to lugs (2) on cover (3) with clevises (4), bolts (5), and nuts (6).

2 From inside cab, remove eight long bolts (7), two short bolts (8), 10 lockwashers (9), and 10 flat washers (10). Discard lockwashers.

3 Lift cover (3) away from roof of cab.

4 Remove and discard gasket (11).

7–3 TELESCOPE COVER, OBSERVATION WINDOW, AND RING ASSEMBLY – CONTINUED

b. Installation.

WARNING

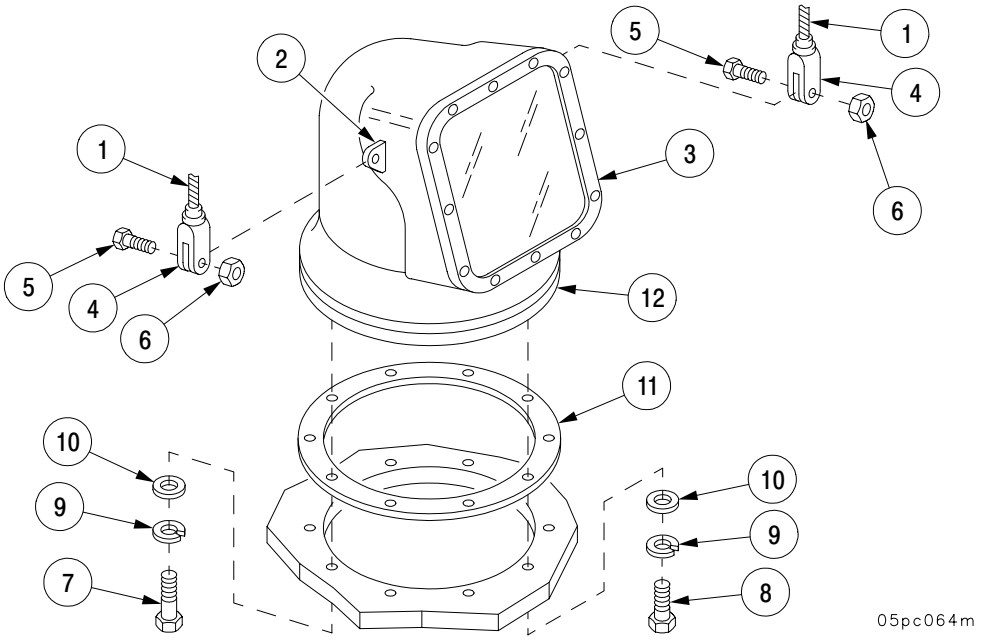
Dry–cleaning solvent (P–D–680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well–ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure 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 21–11).

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 ALIGNMENT DEVICE MOUNT AND BRACKET.

This task covers: a. Disassembly b. Assembly

INITIAL SETUP

Tools
Artillery and turret mechanic's tool kit (SC 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 (P–D–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 21–11).

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 ALIGNMENT DEVICE MOUNT AND BRACKET – CONTINUED

WARNING

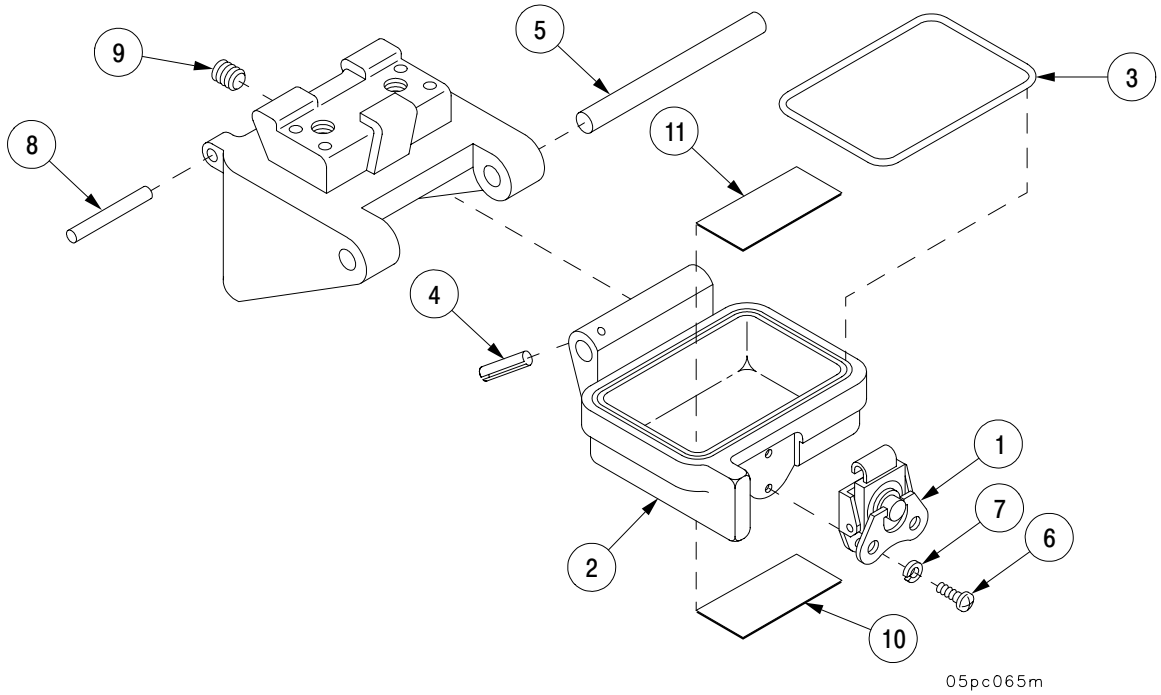
Dry–cleaning solvent (P–D–680), used to clean parts, is toxic and flammable. Wear protective goggles and gloves and use only in a well–ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure 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 21–11).

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).



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).

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)

a. Removal.

CAUTION

Do not twist harness connector backshell when loosening coupling nuts or pins may break.

1 Unscrew coupling nut (1). Pull harness connector (2) from housing (3).

2 Remove screw (4) securing spacer (5), EL TACH feedback arm (6), and bushing (7) to gun mount (8).

3 Loosen four captive screws (9) and four lockwashers (10) securing EL TACH (11) to gun trunnion (12).

4 Remove EL TACH (11) from gun trunnion (12).

b. Installation.

1 Position EL TACH (11) at gun trunnion (12) and align mounting holes. Secure EL TACH (11) to gun trunnion (12) with four captive screws (9) and four lockwashers (10).

2 Align EL TACH feedback arm (6) and bushing (7) mounting hole with gun mount (8). Secure EL TACH feedback arm (6) to gun mount (8) with spacer (5) and screw (4).

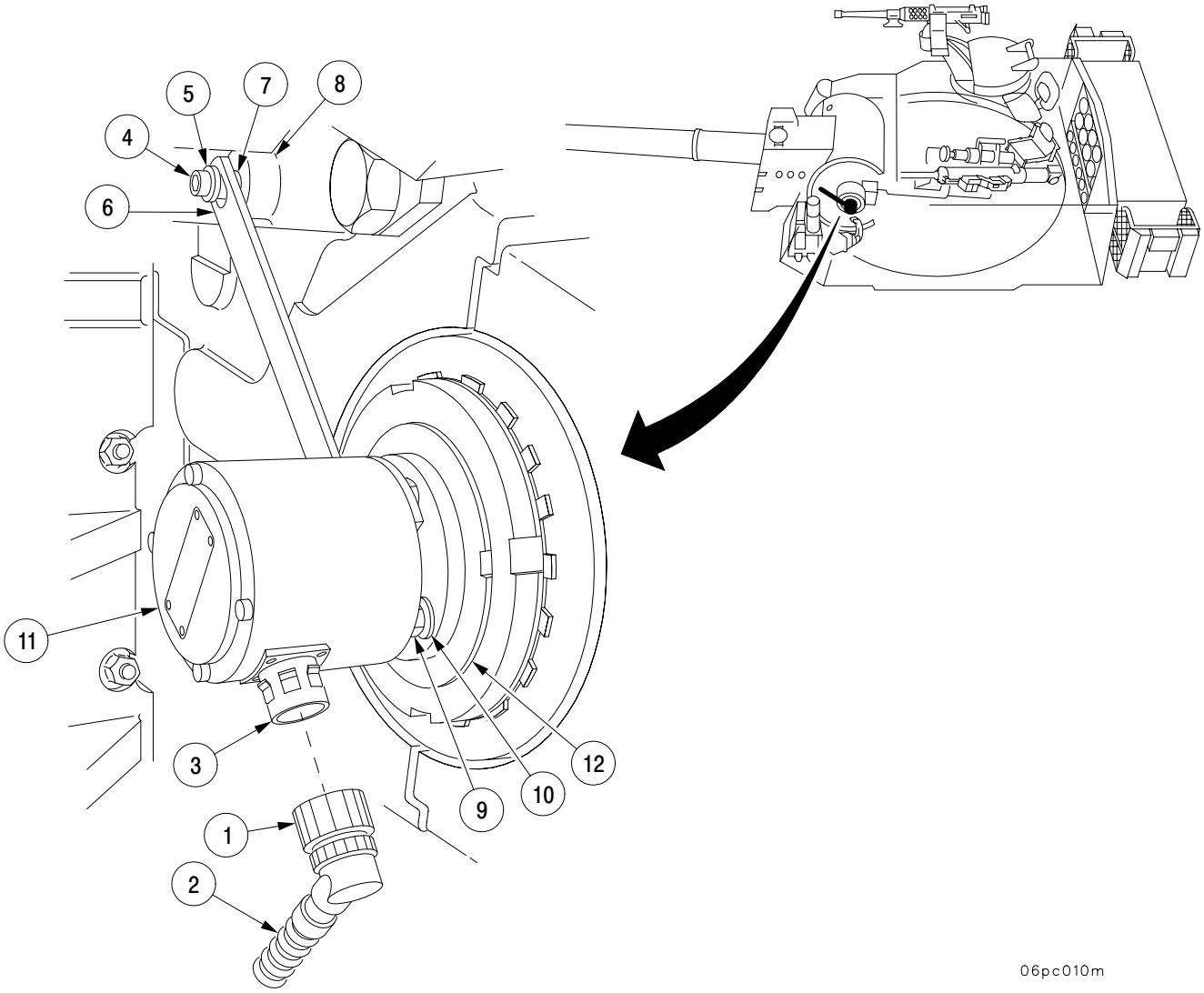
8–1 ELEVATION TACHOMETER (EL TACH) – CONTINUED

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).



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).

CAUTION

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.

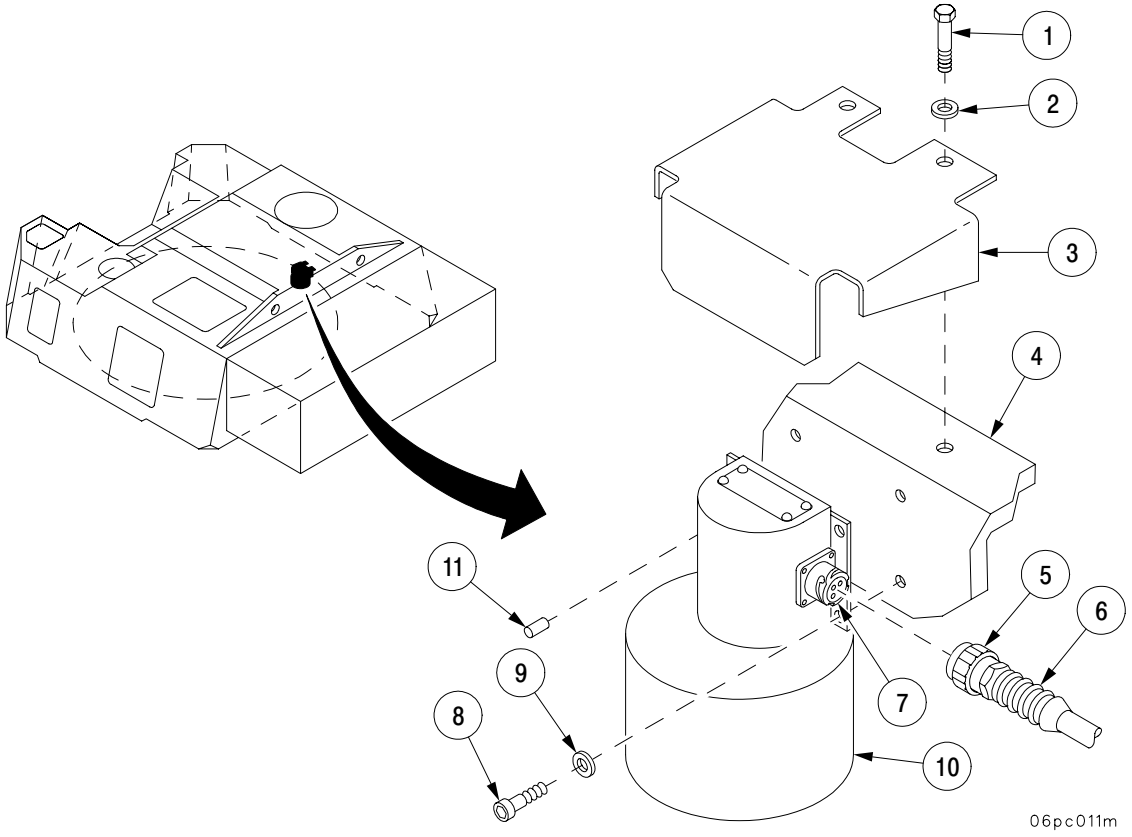
3 Secure AZ TACH (10) to cab race mounting bracket (4) with four socket head screws (8) and four flat washers (9). Insure AZ TACH mounting surface is flat against cab race mounting bracket (4).

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).



8–3 BATTERY BOX 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 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)

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

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.

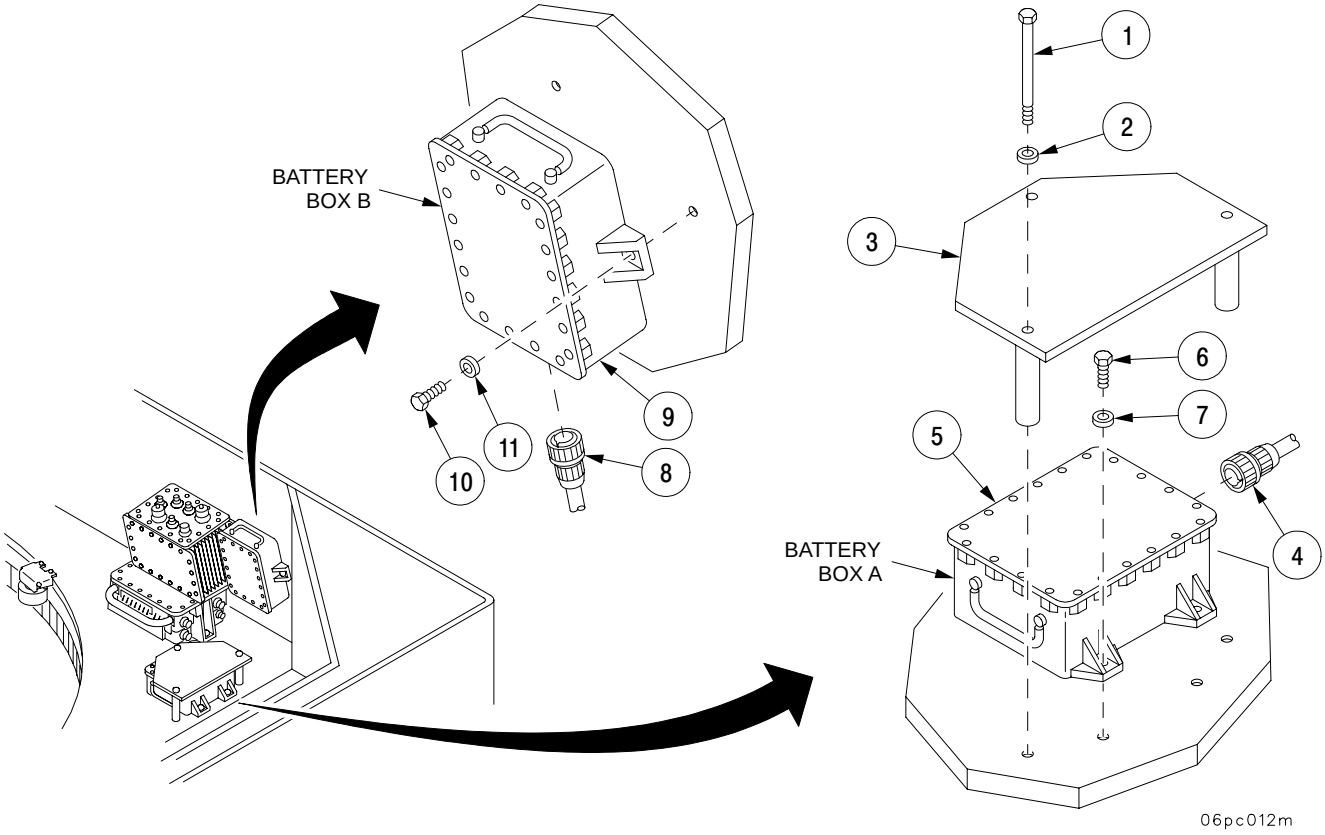
NOTE

- To install battery box B, perform steps 1–3.
- To install battery box A, perform steps 4–7.

1 Apply sealing compound 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).



8–3 BATTERY BOX ASSEMBLY – CONTINUED

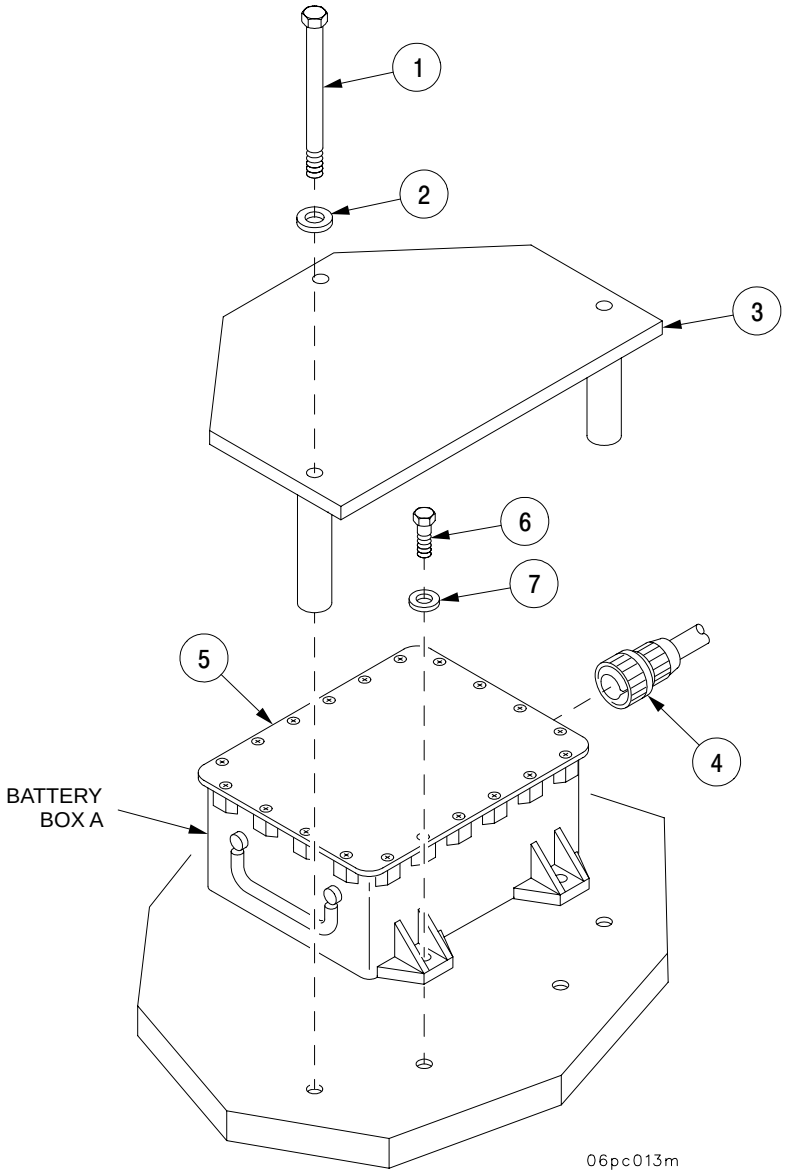
b. Installation – Continued

4 Apply sealing compound 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

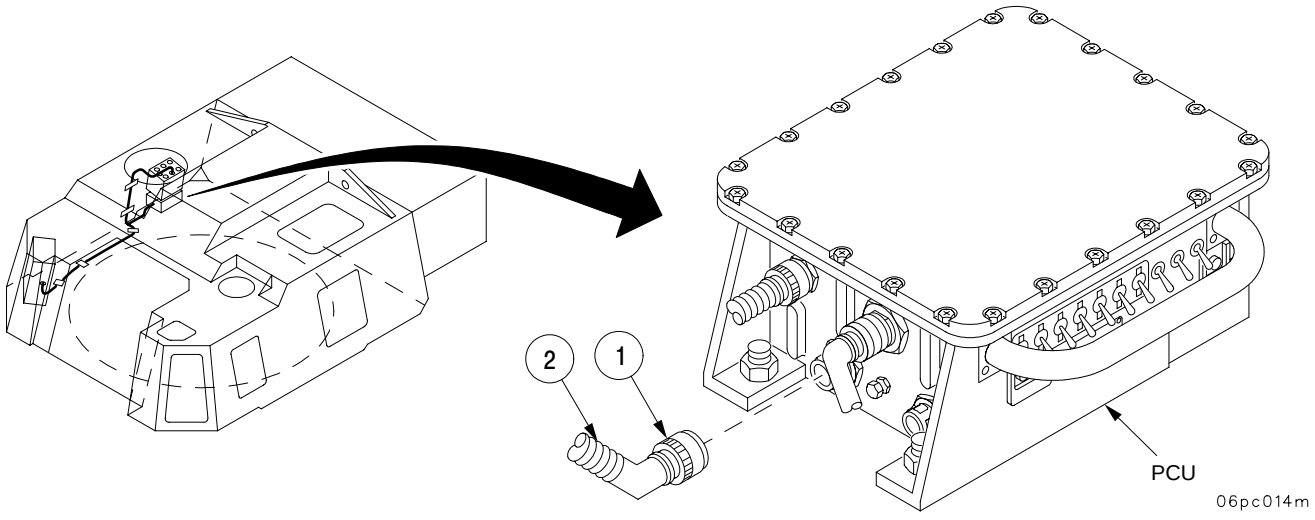
Do not twist or turn harness connector backshell when loosening nuts or pins may break.

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.

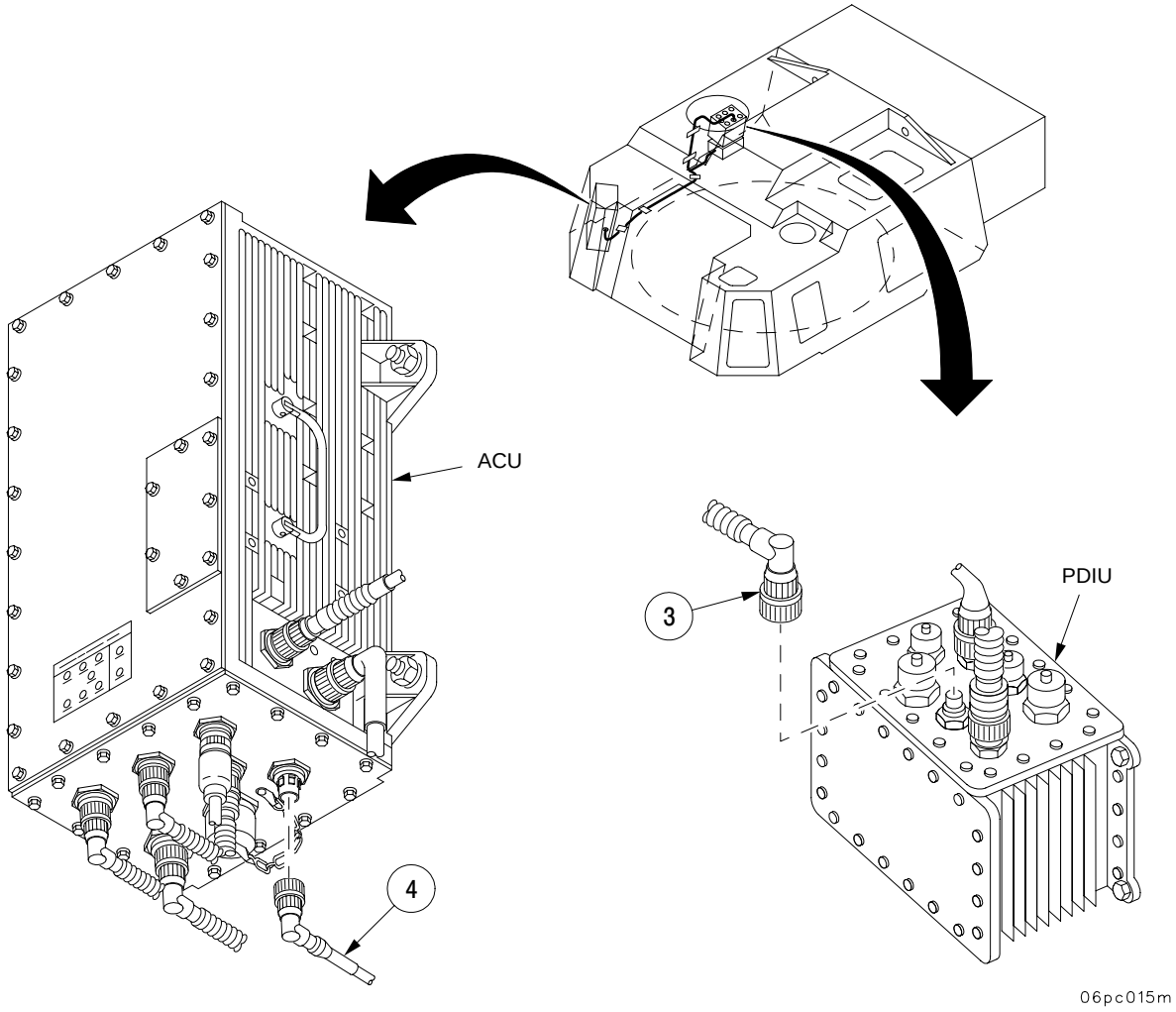


8–4 AFCS WIRING HARNESS W1A – CONTINUED

a. Removal – Continued

(b) P2 of W1A (3) from J1 on PDIU.

(c) P3 of W1A (4) from J1 on ACU.



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.

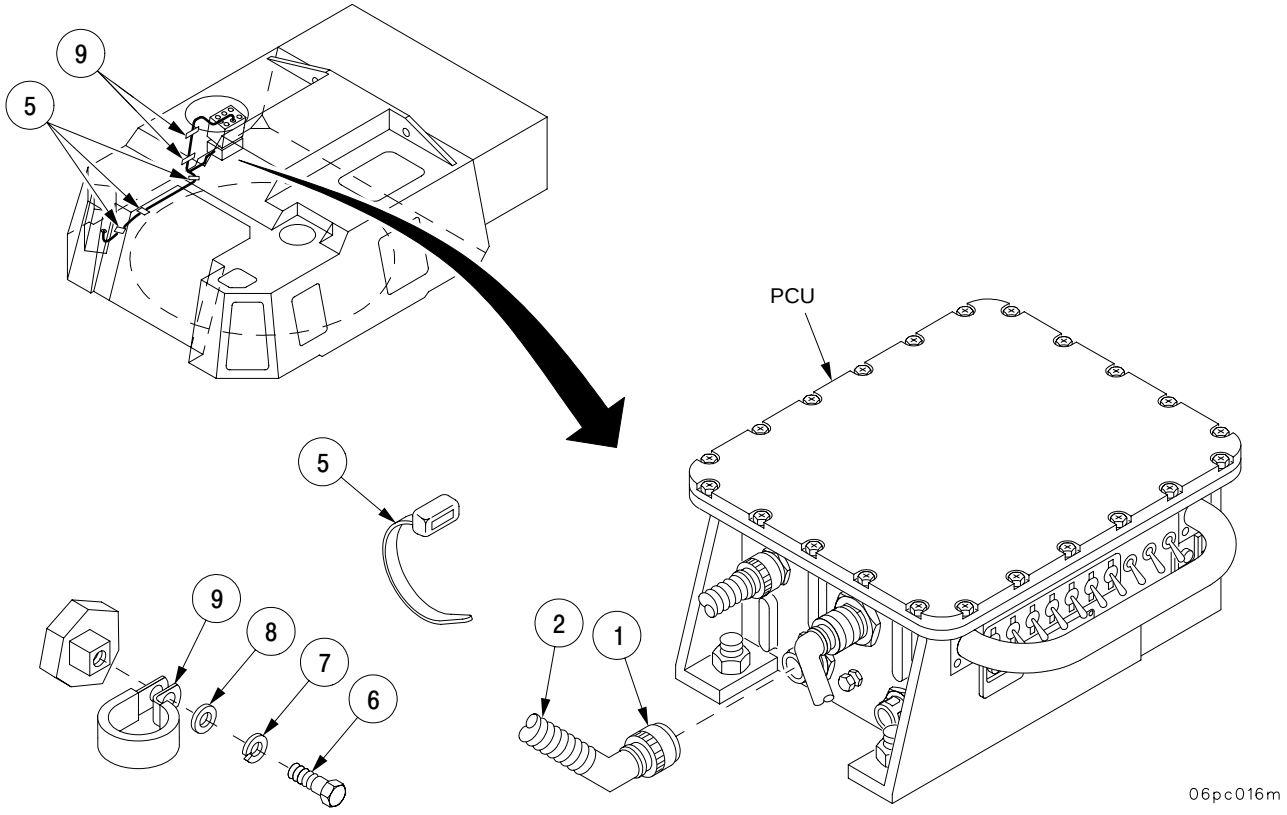
CAUTION

- 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.



8–4 AFCS WIRING HARNESS W1A – CONTINUED

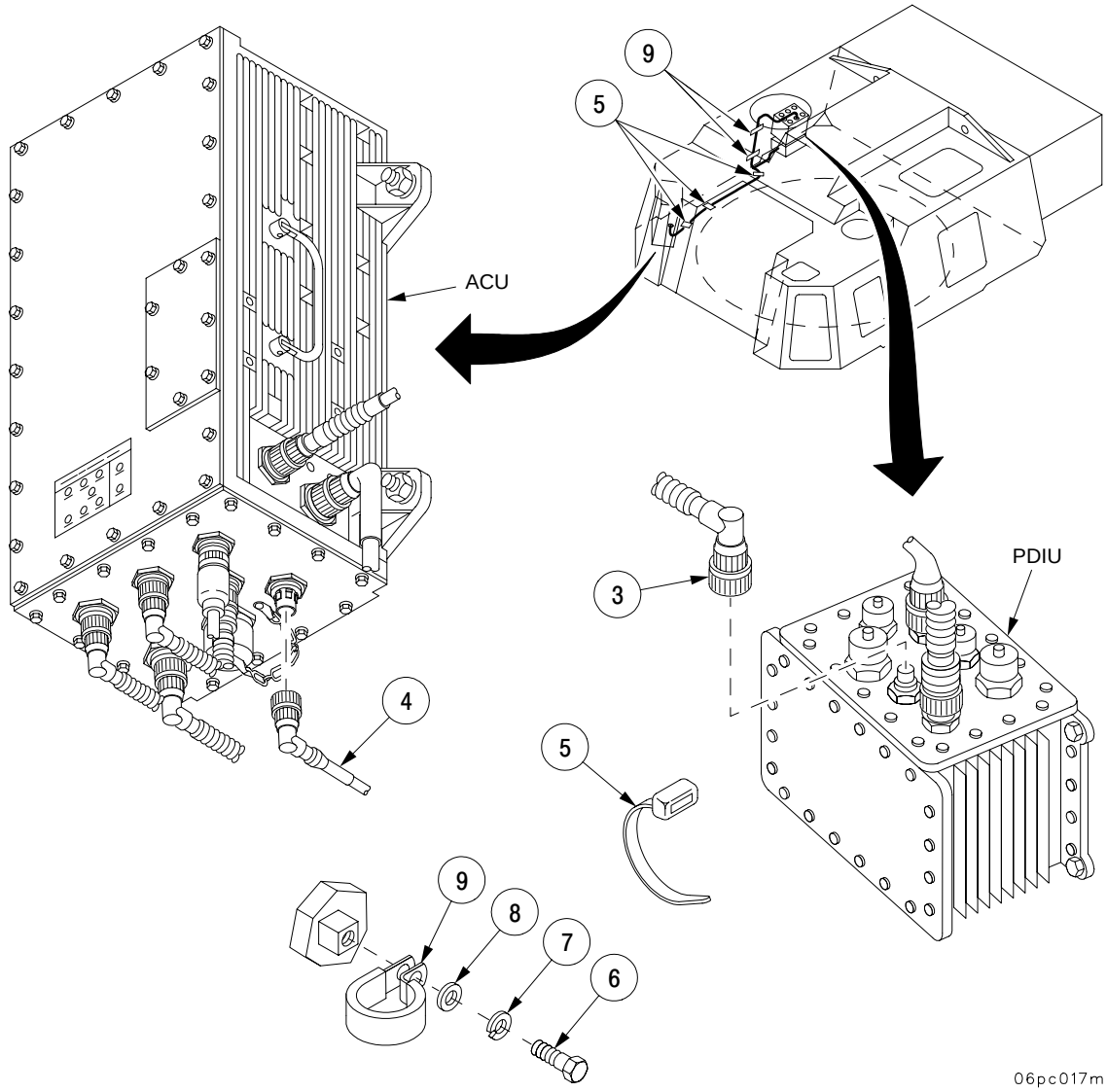
b. Installation – Continued

(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).



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.

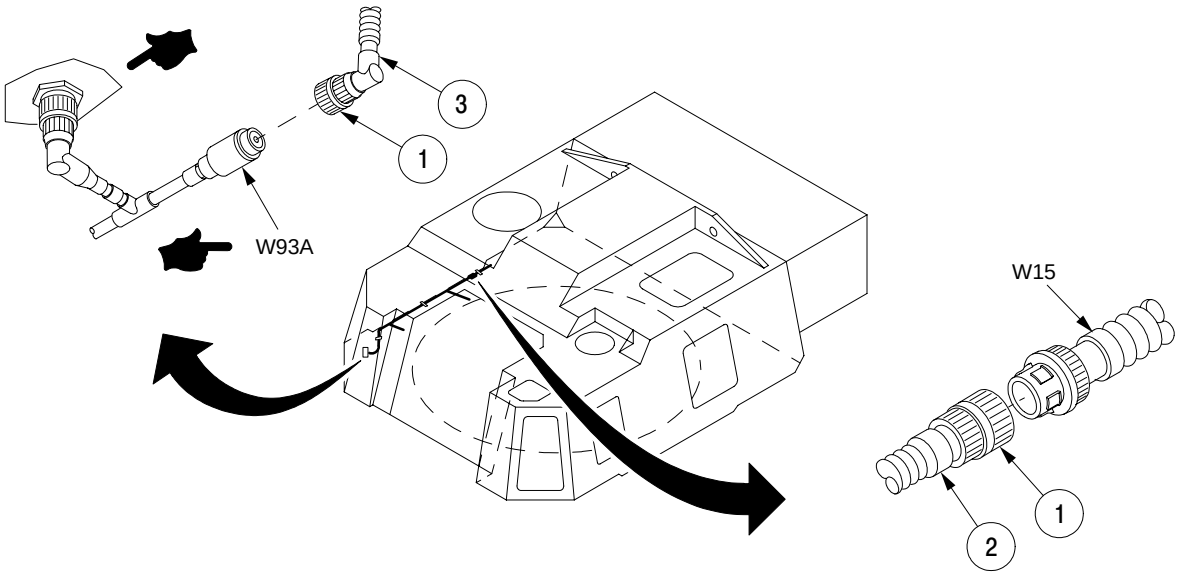
NOTE

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

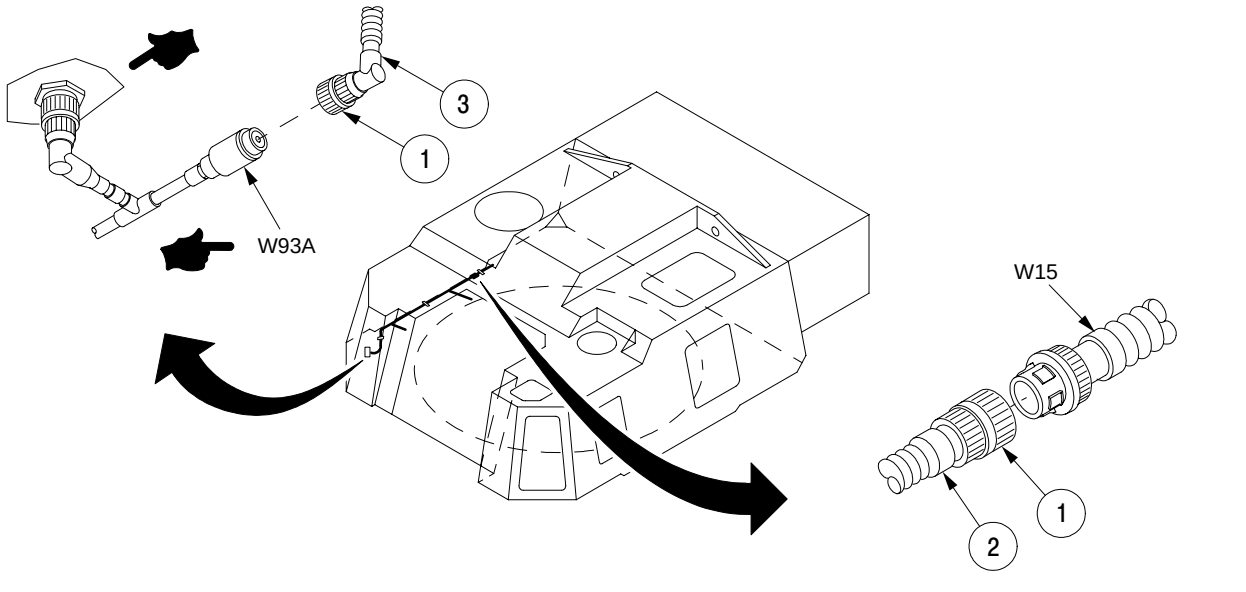
- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

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.



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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

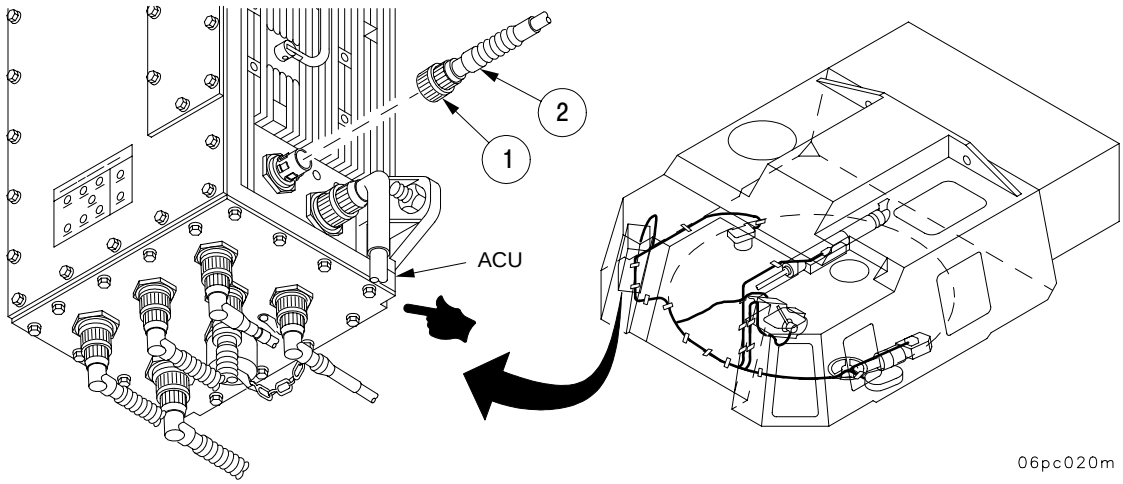
Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

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.



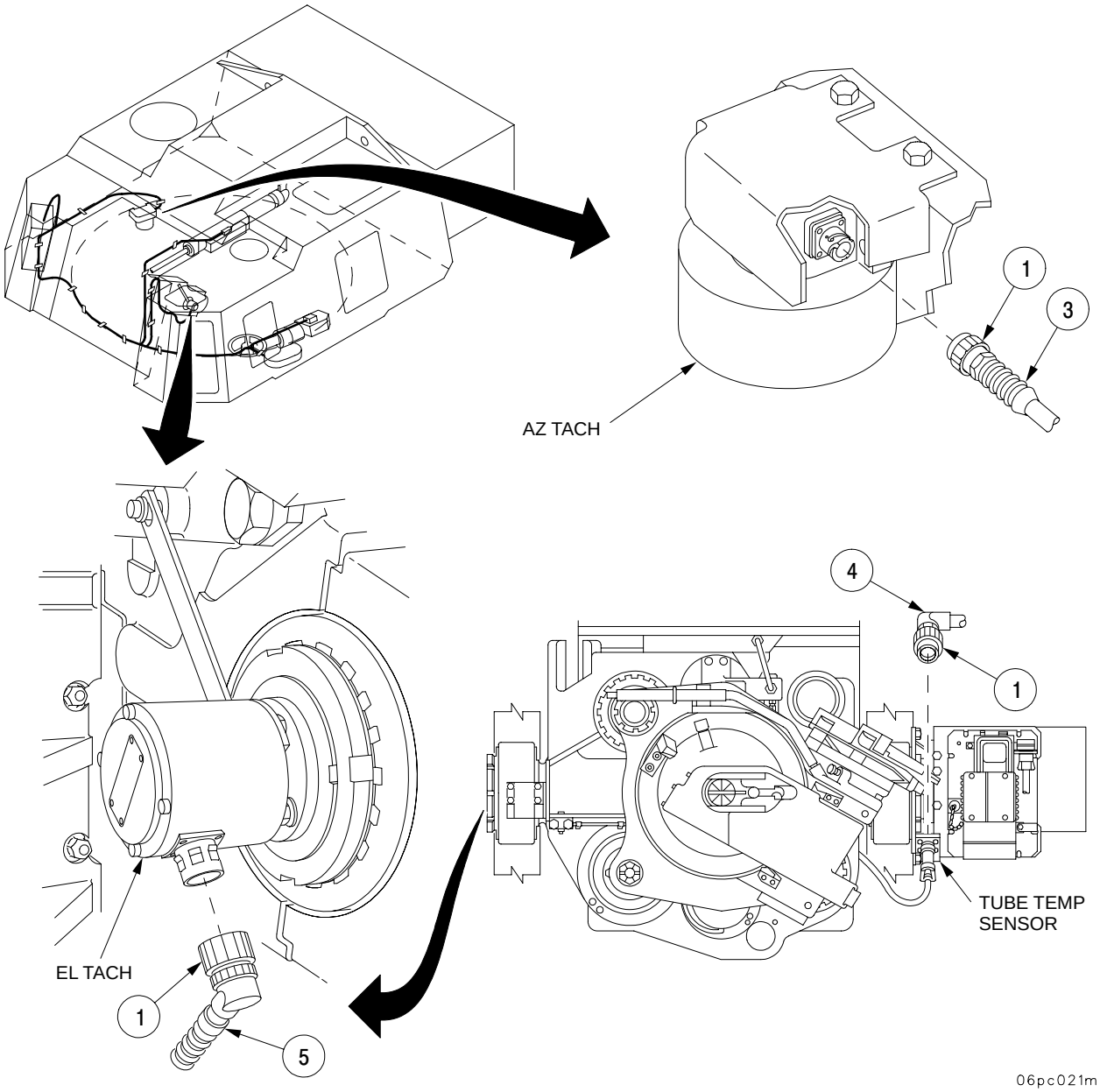
8–6 AFCS WIRING HARNESS W7 – CONTINUED

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.



8–6 AFCS WIRING HARNESS W7 – CONTINUED

a. Removal – Continued

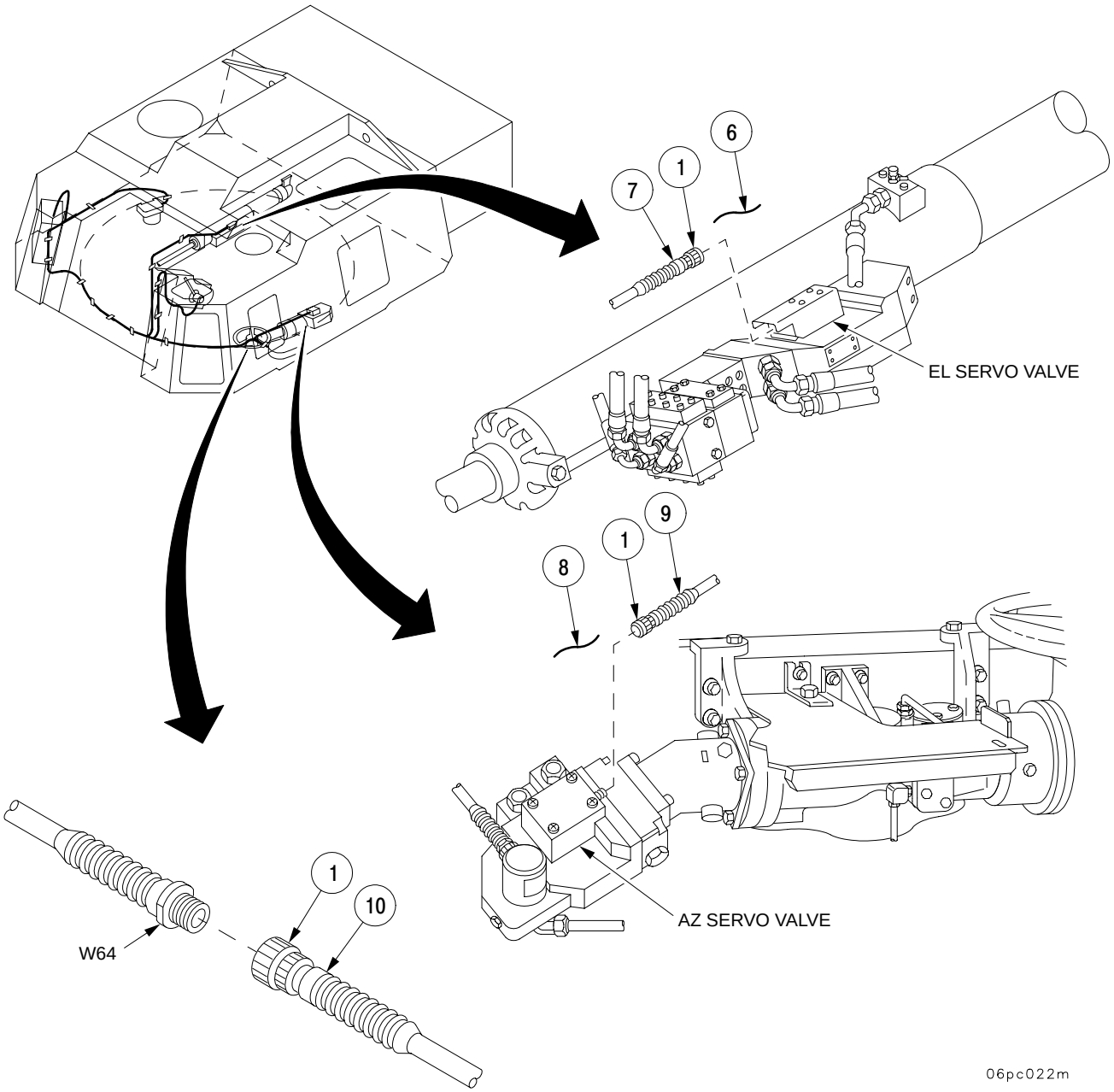
(e) Remove and discard lockwire (6).

(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.



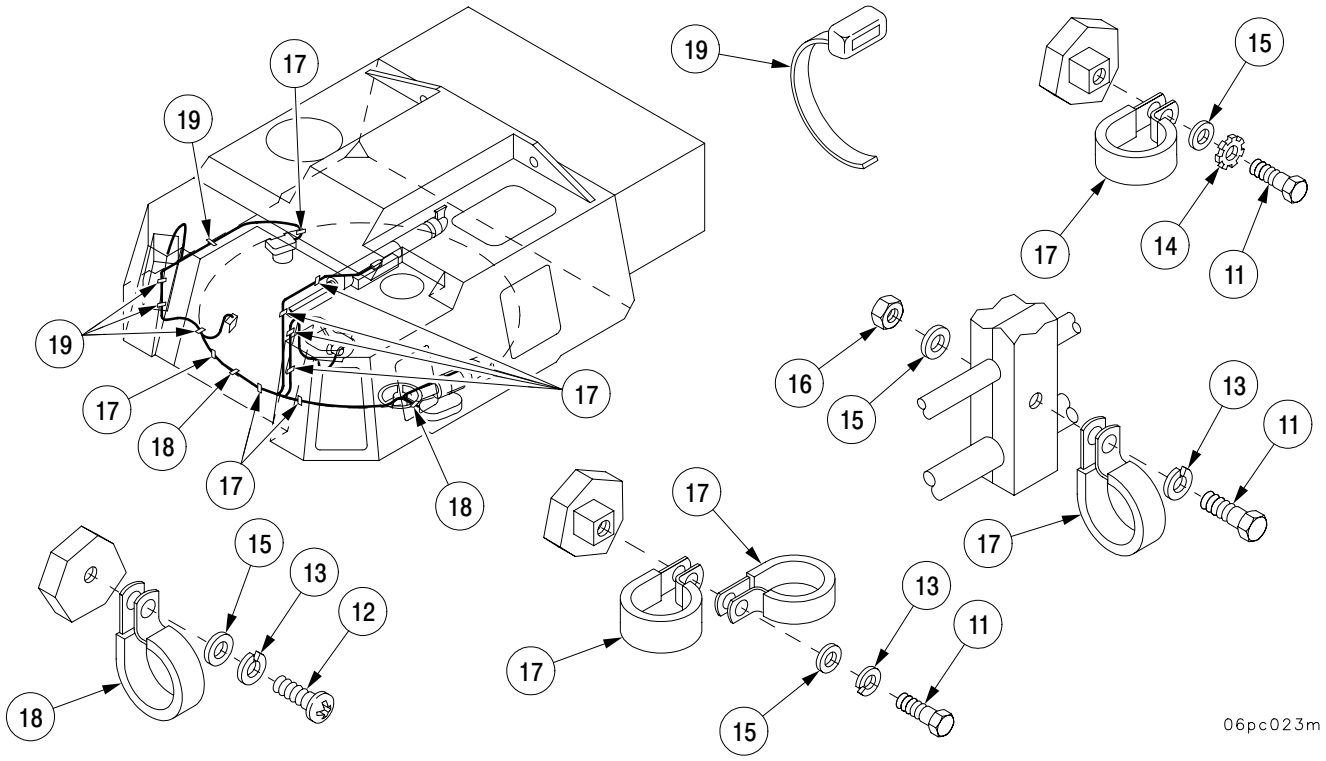
8–6 AFCS WIRING HARNESS W7 – CONTINUED

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.



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

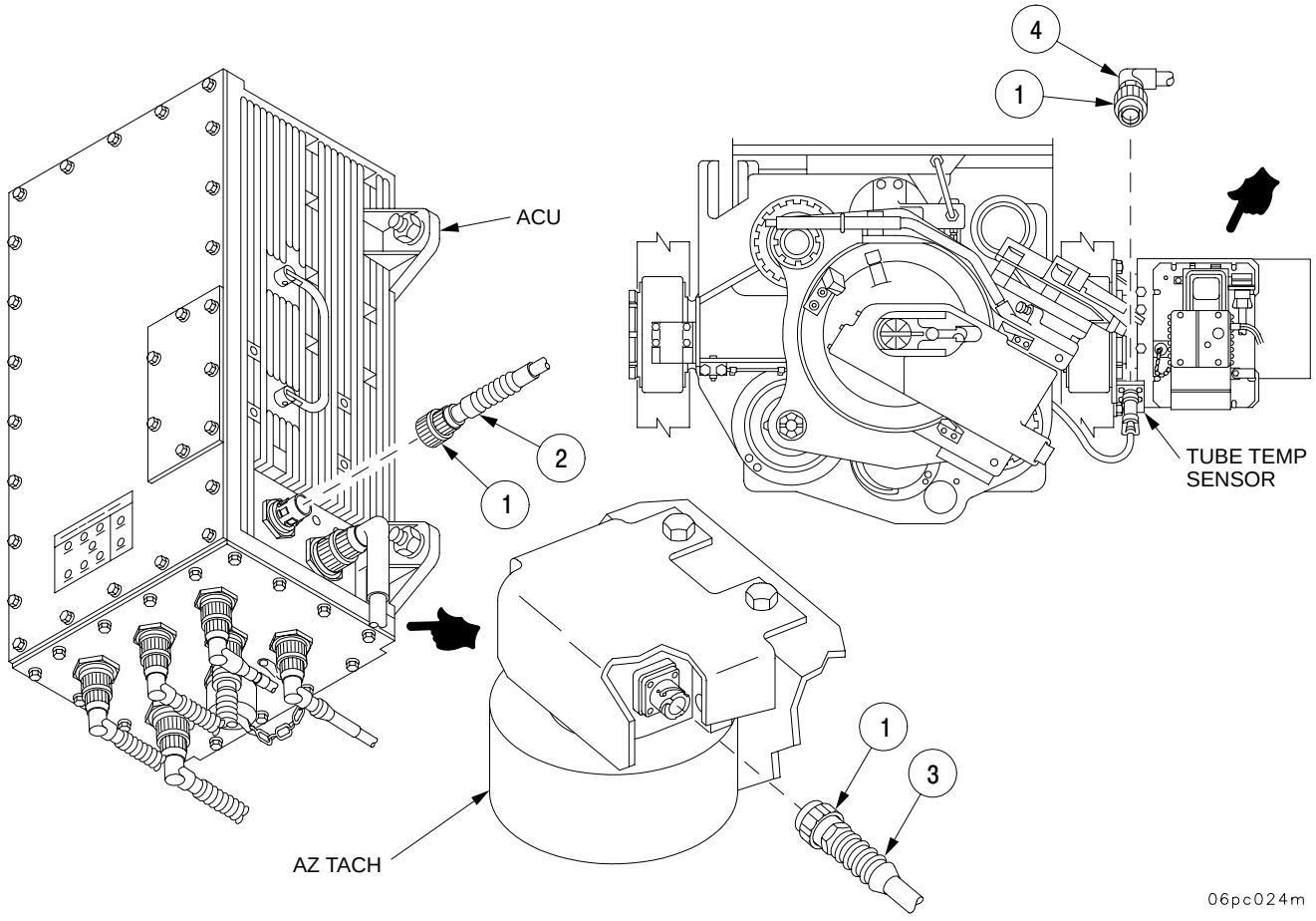
- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Align key and keyway of harness connectors before pushing connector halves together or pins may break.

4 Connect the following harness connectors by pushing connector halves together, then tightening coupling nuts (1):

(a) P1 of W7 (2) to J6 on ACU.

(b) P2 of W7 (3) to AZ TACH.

(c) P3 of W7 (4) to Tube Temp Sensor.



8–6 AFCS WIRING HARNESS W7 – CONTINUED

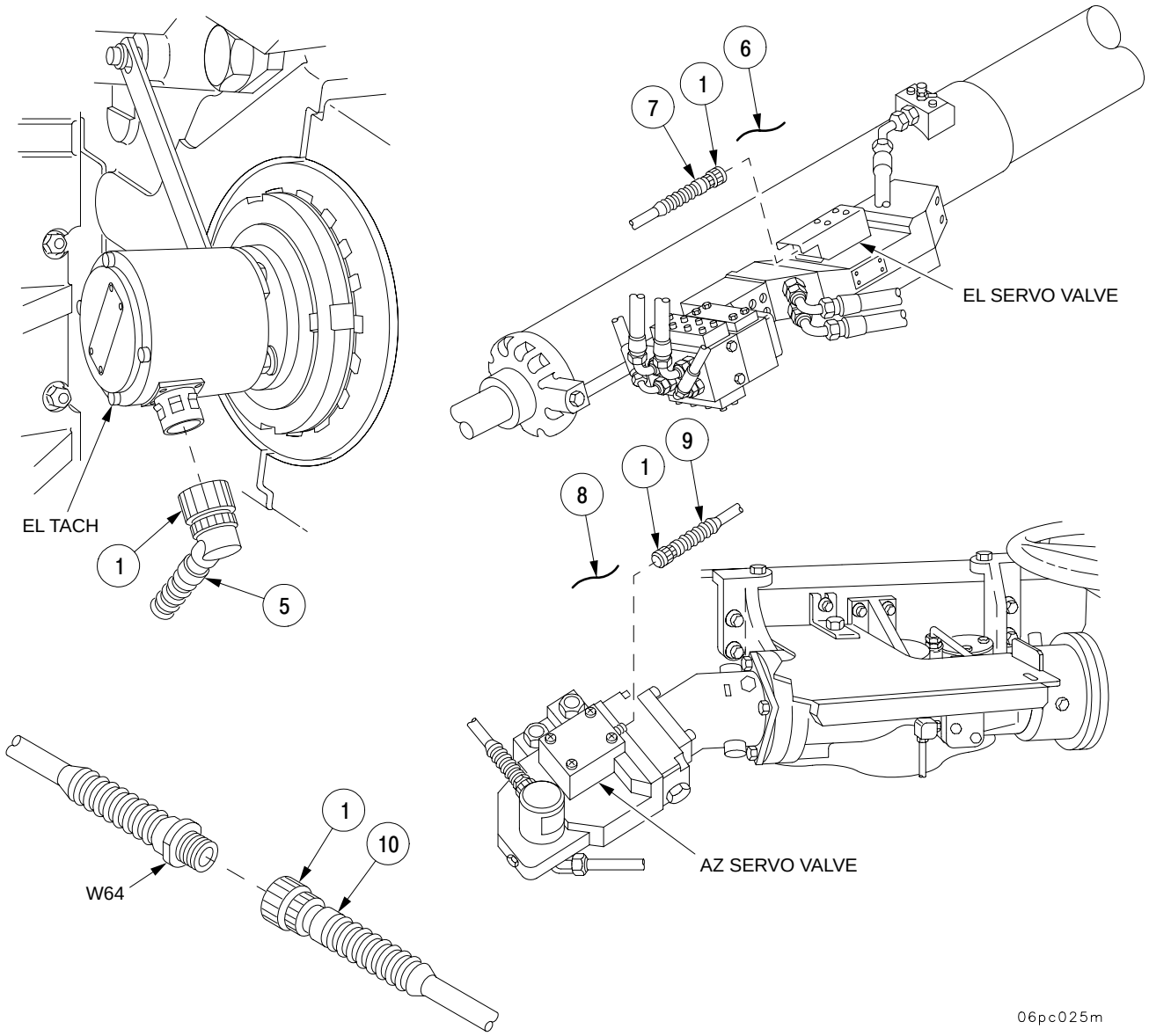
b. Installation – Continued

(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.



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.

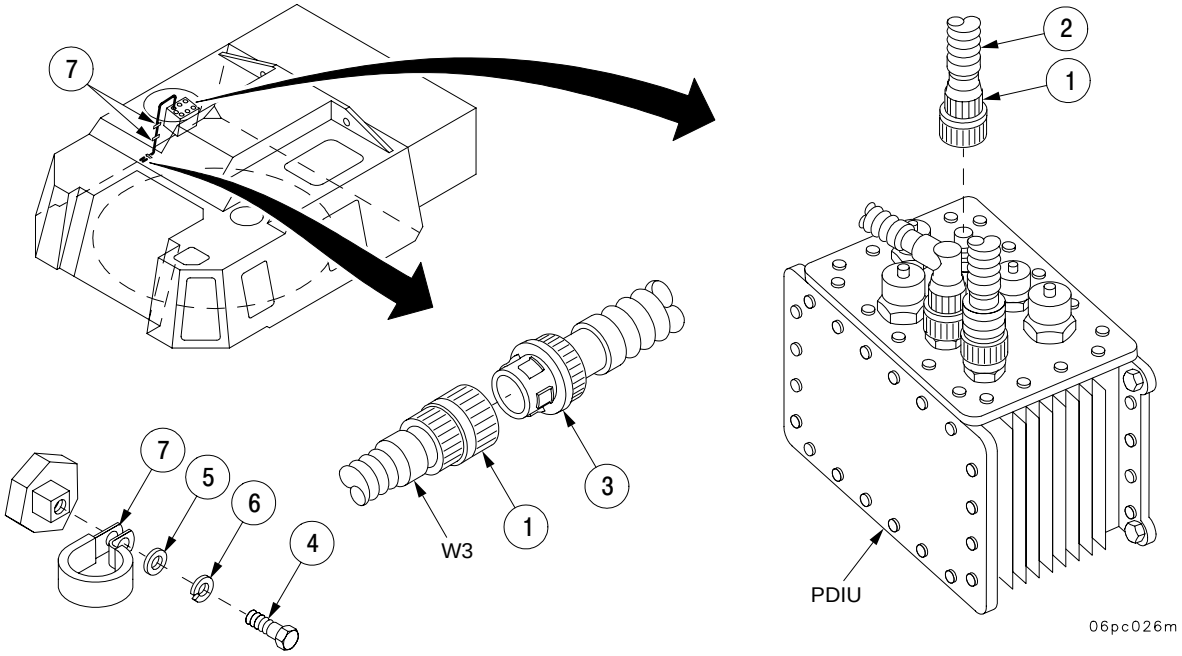
NOTE

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.



8–7 AFCS WIRING HARNESS W15 – CONTINUED

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).

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.

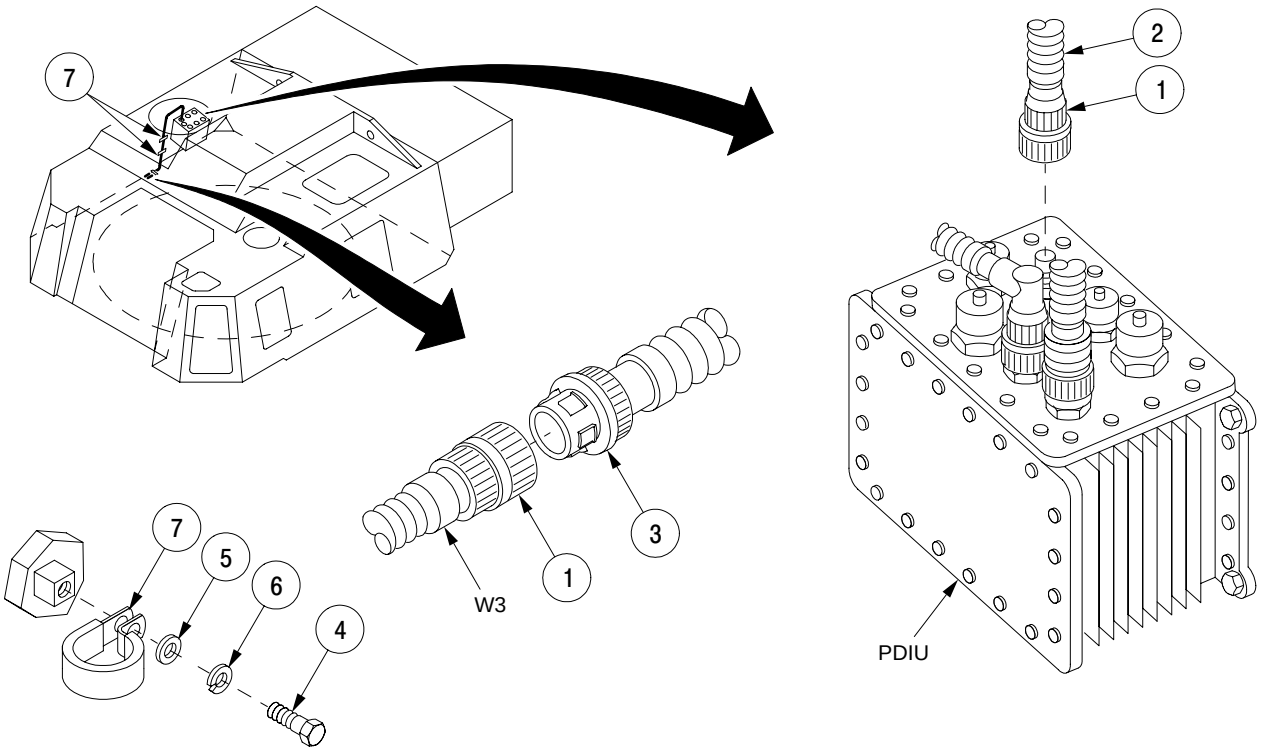
3 Connect the following harness connectors by pushing connector halves together, then tightening coupling nuts (1):

(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

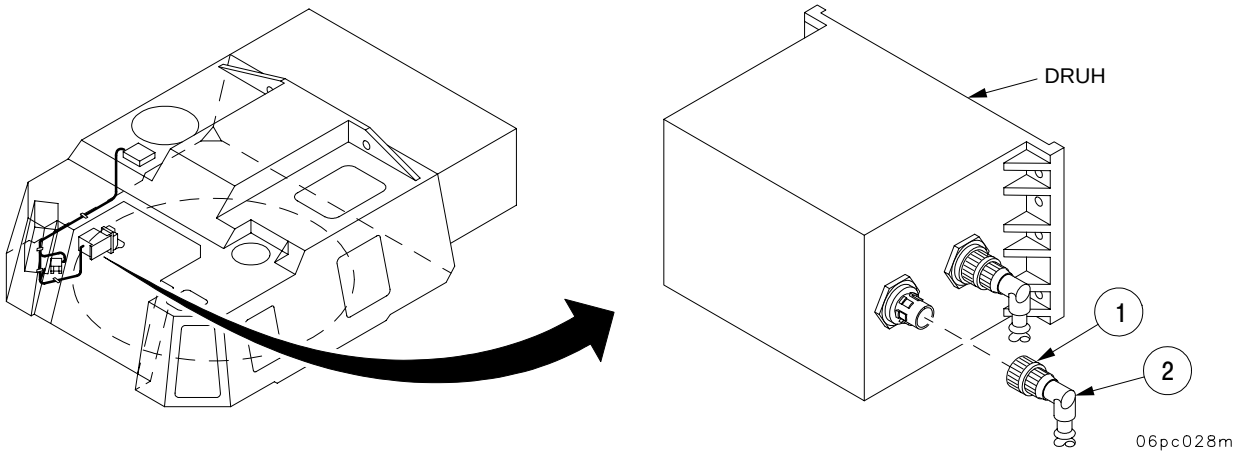
Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

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.

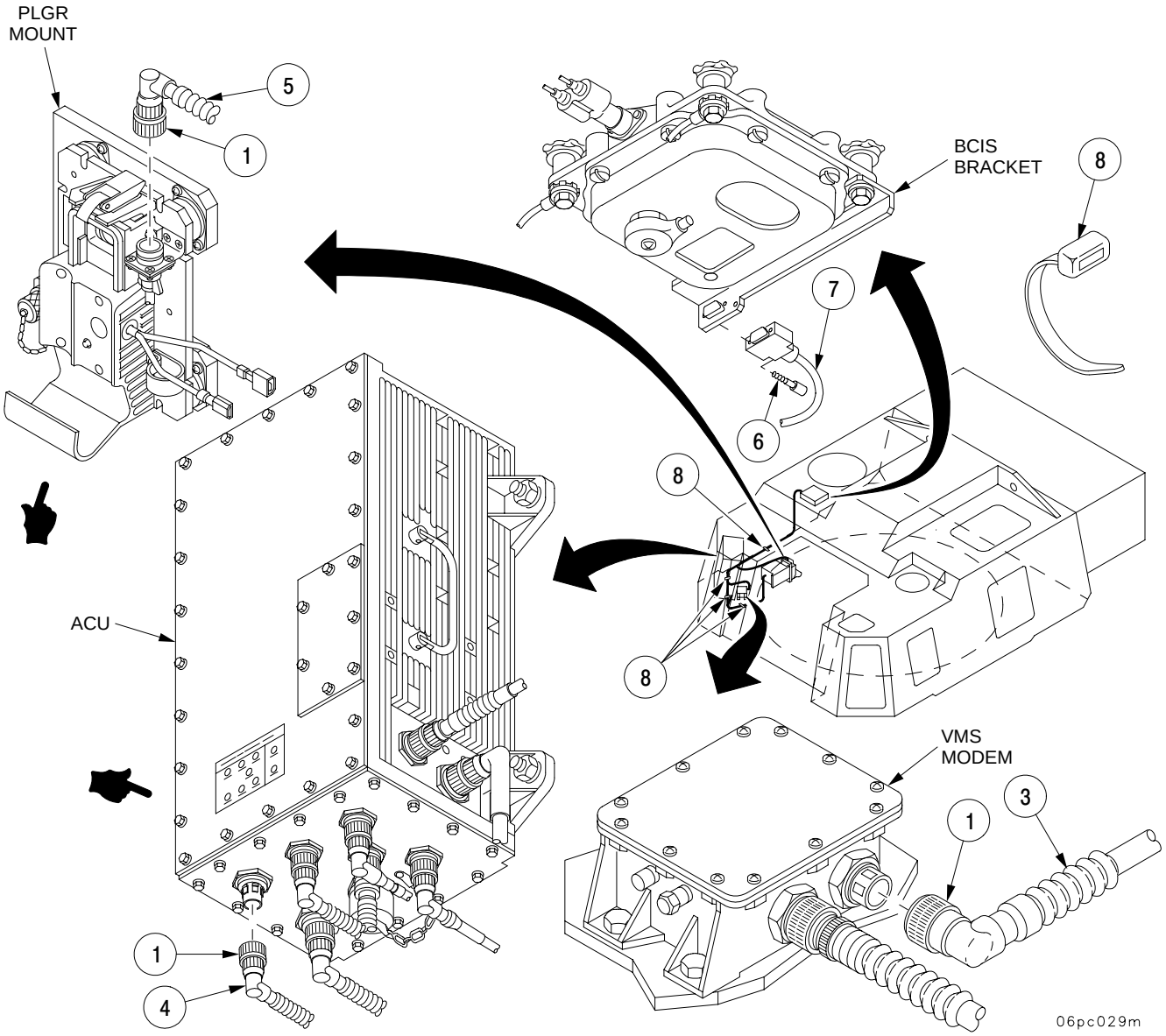
(c) P3 of W17A (4) from J2 on ACU.

(d) P4 of W17A (5) from PLGR mount.

(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.



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):

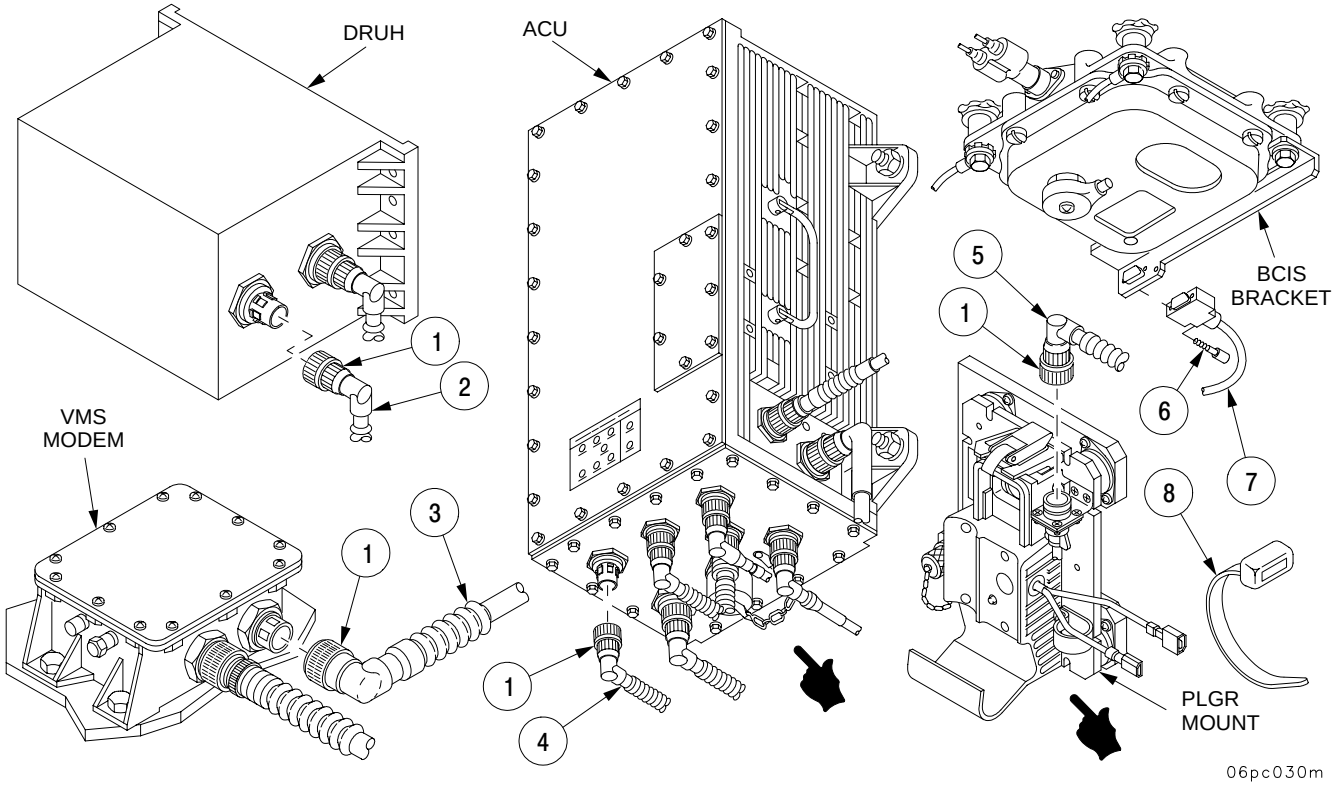
(a) P1 of W17A (2) to J1 on DRUH.

(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.

(e) Install P5 of W17A (7) to BCIS bracket with two screws (6).



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

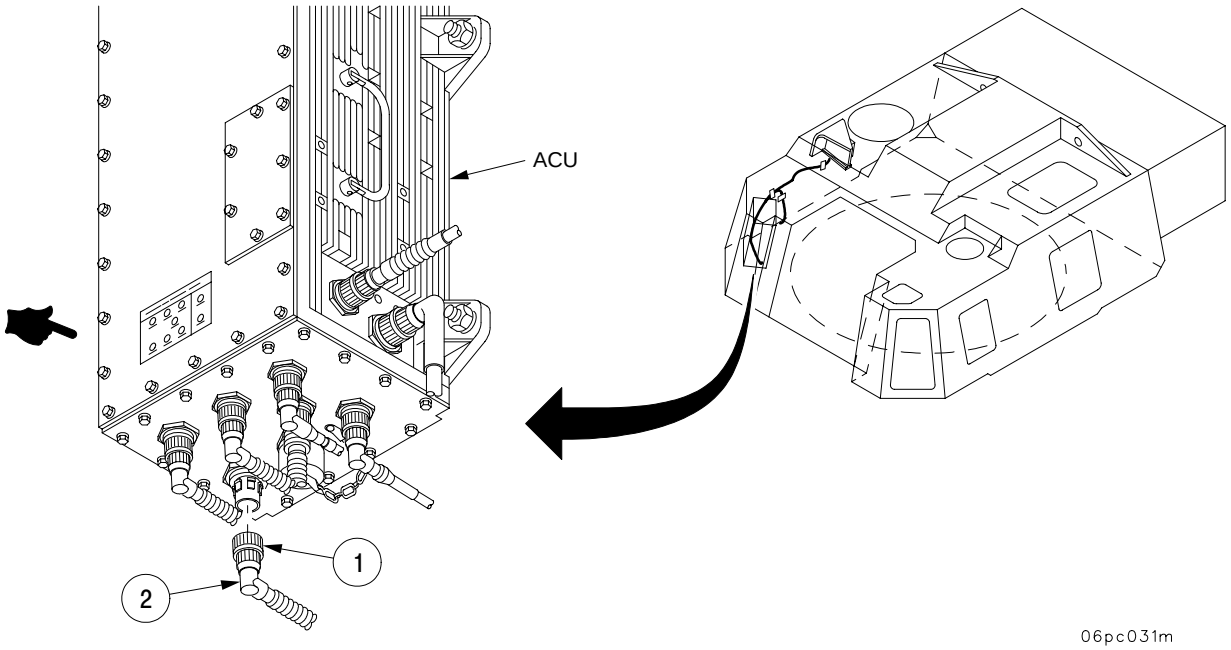
Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

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.



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.

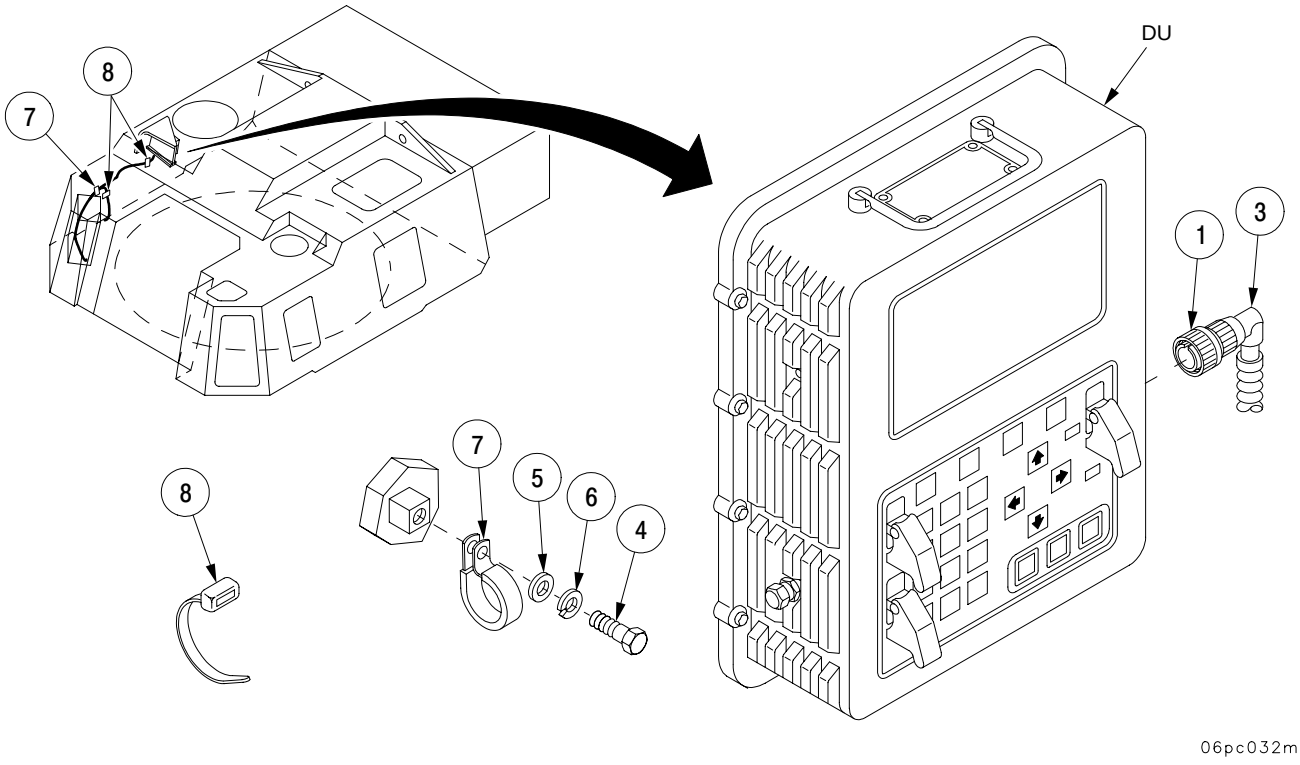
b. Installation.

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).



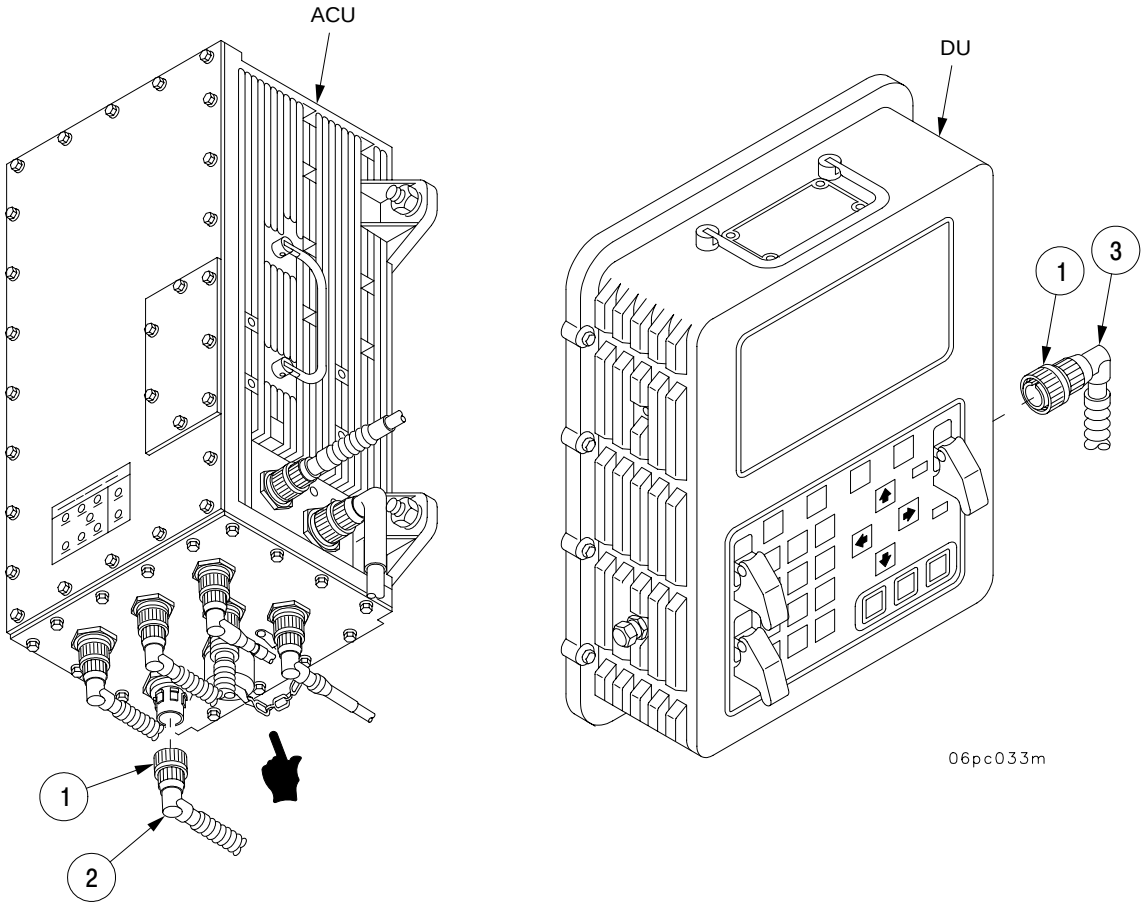
8–9 AFCS WIRING HARNESS W22A – CONTINUED

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.



8–10 AFCS 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.

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

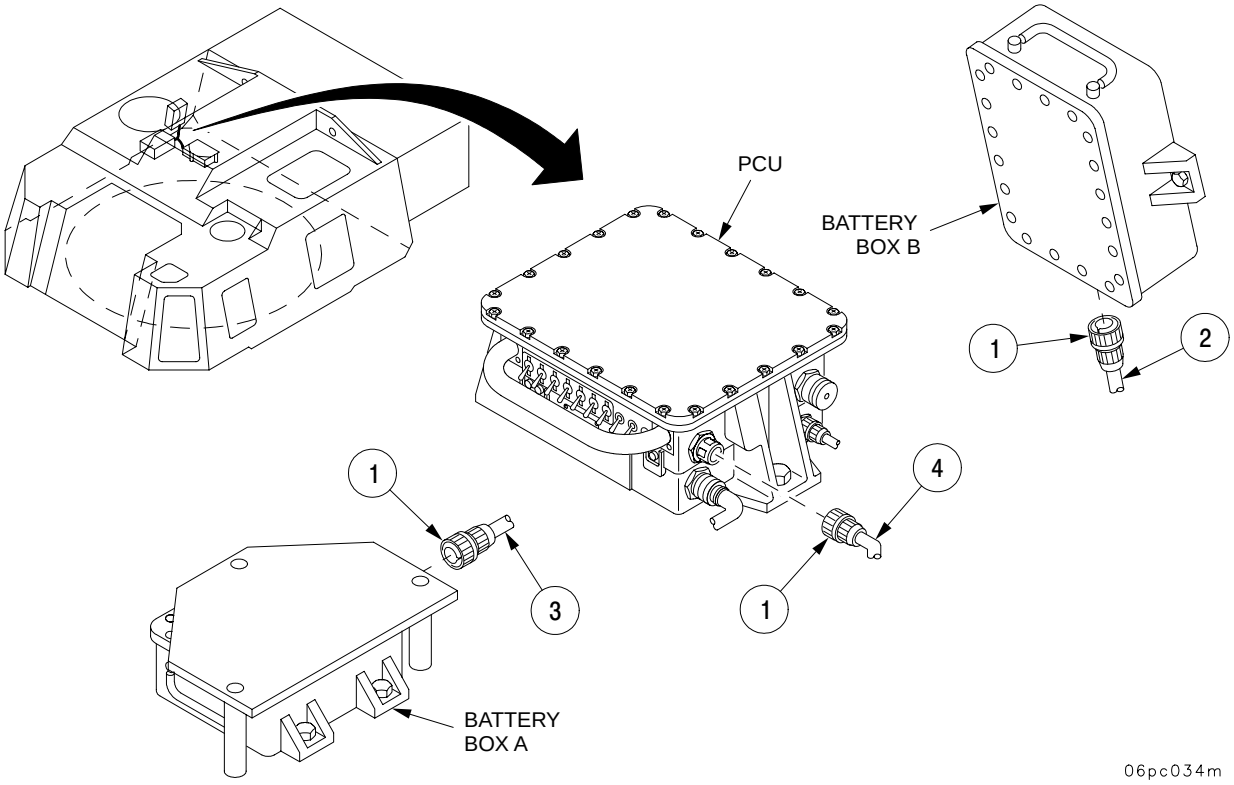
- Do not twist or turn harness connector backshell when tightening coupling nuts or pins may break.
- Make sure key and keyway are aligned before pushing connector halves together or pins may break.

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.



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

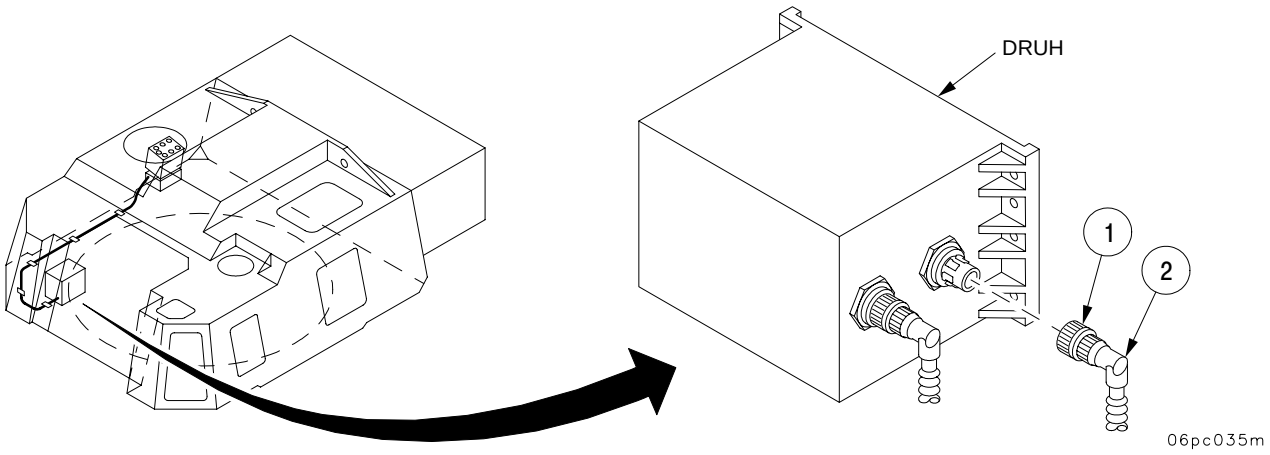
Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

NOTE

Before removal, tag connectors for identification during installation.

1 Unscrew coupling nuts (1) and disconnect the following connectors:

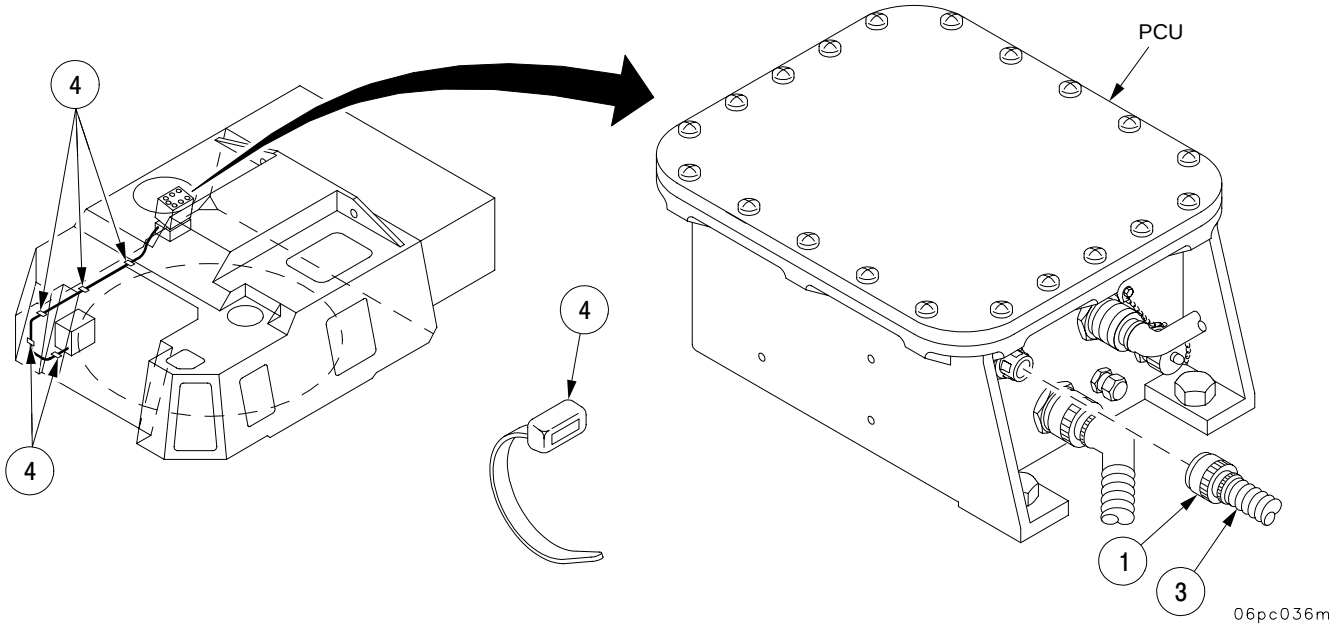
(a) P1 of W27 (2) from J2 on DRUH.



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)

Equipment Conditions
Vehicle MASTER power switch OFF (TM 9–2350–314–10)

Materials/Parts
Tiedown straps (5) (item 76, Appx C)
Marking tags (AR) (item 87, Appx C)
Lockwashers (2) (item 105, Appx F)

Personnel Required
Two

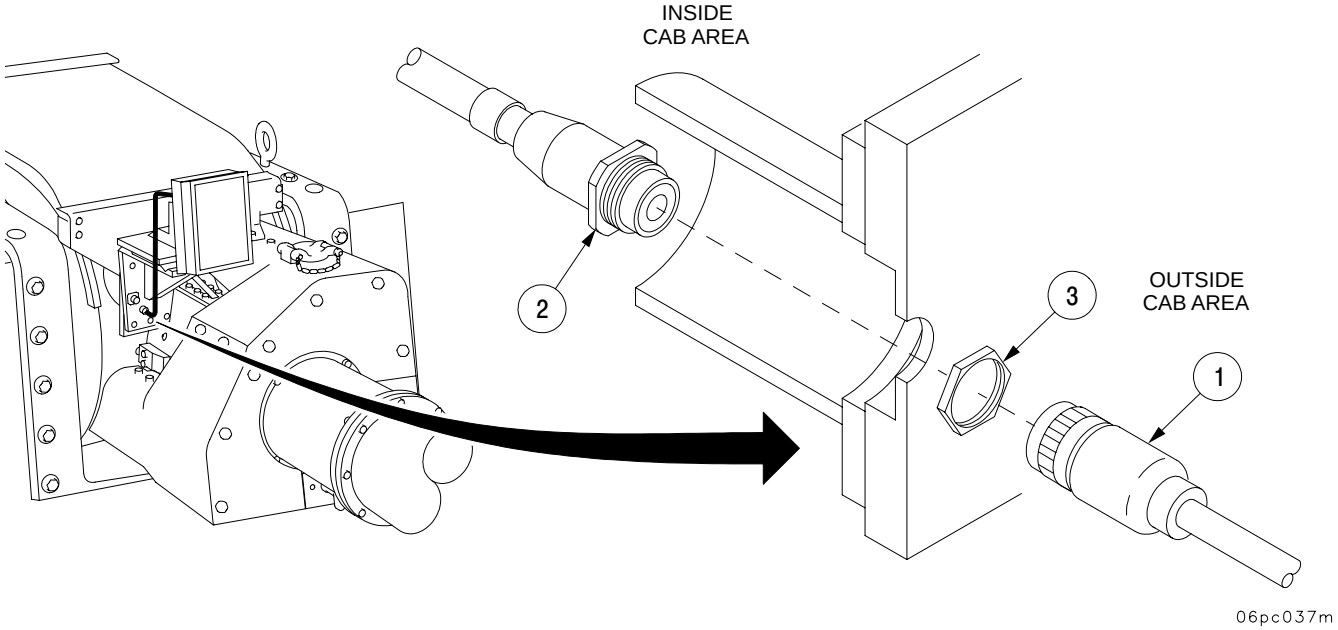
a. Removal.

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).



8–12 AFCS WIRING HARNESS W93A – CONTINUED

a. Removal – Continued

CAUTION

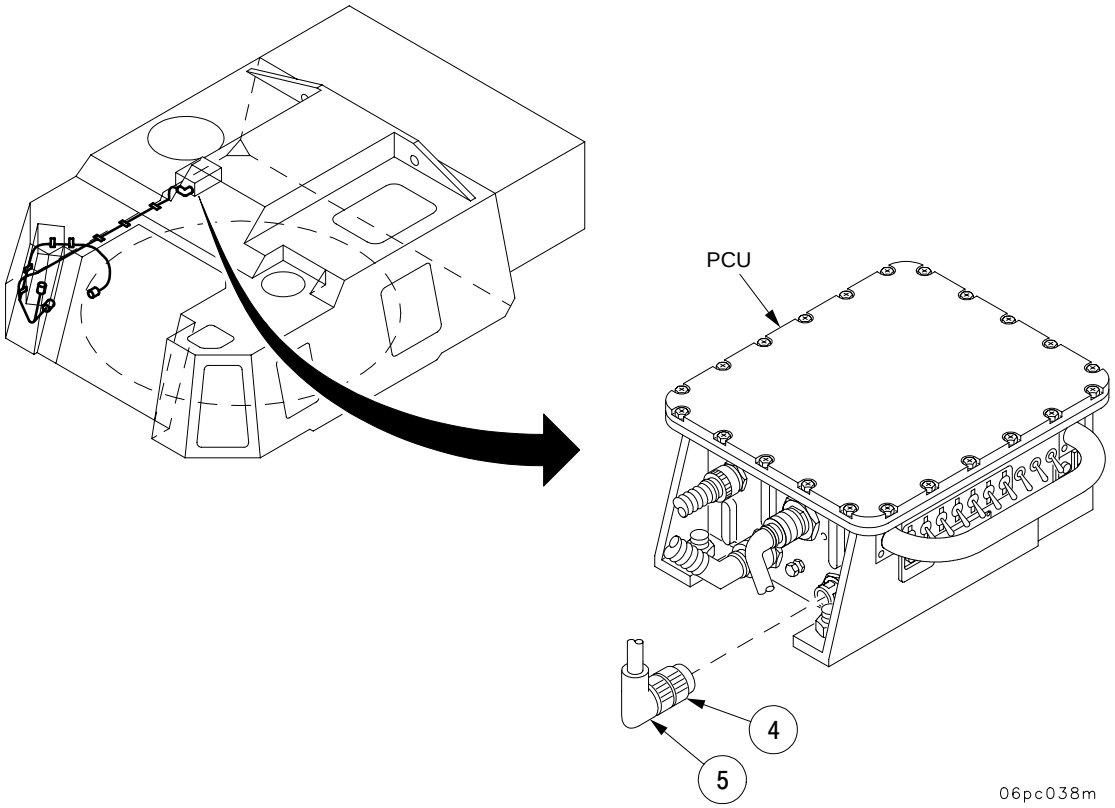
Do not twist or turn harness connector backshell when loosening coupling nuts or pins may break.

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.

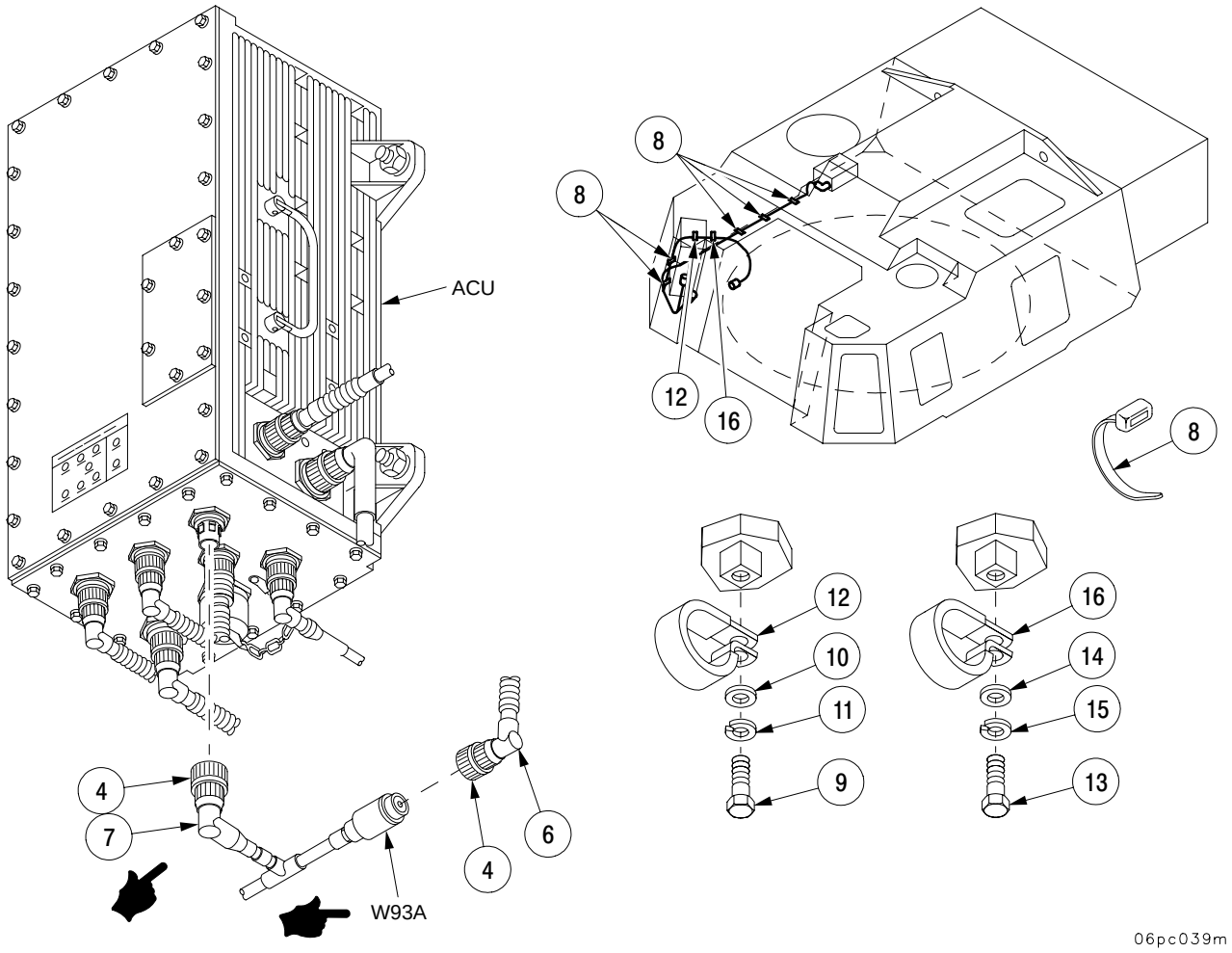
(c) P3 of W93A (7) from J8 of ACU.

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.



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).

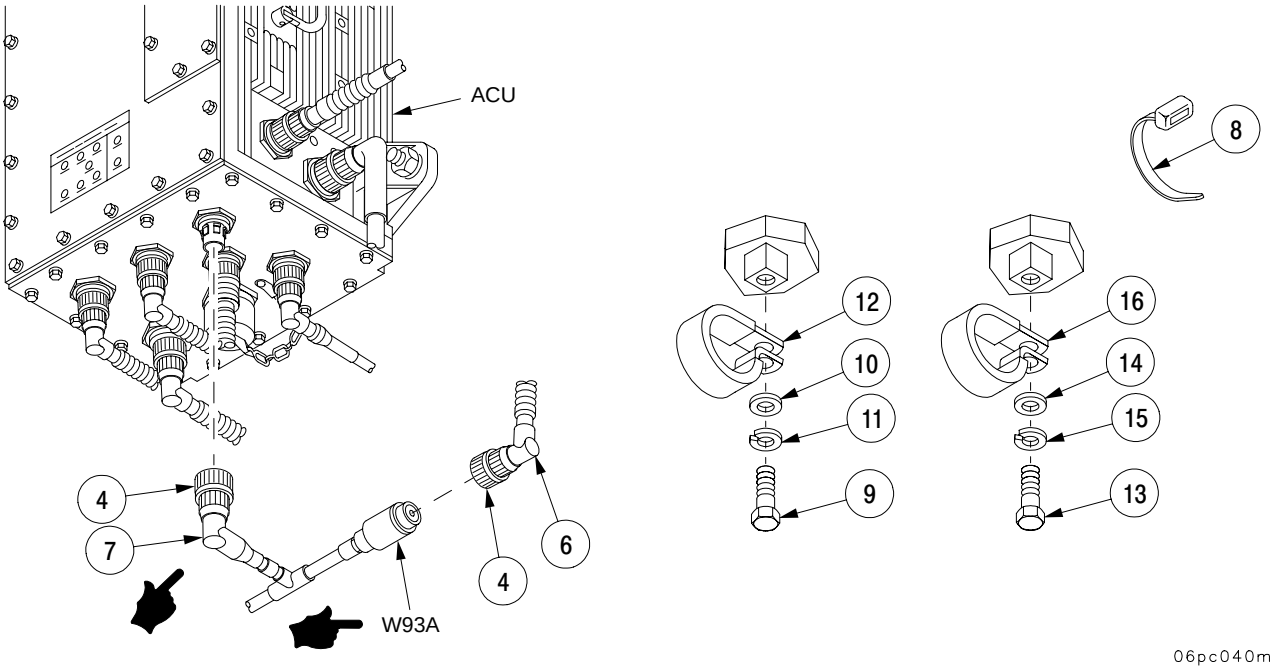
CAUTION

- 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.

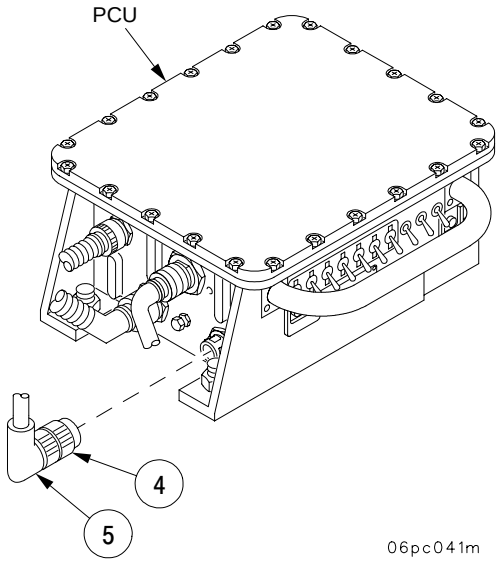
(b) P2 of W3 (6) on W93A J3.



8–12 AFCS WIRING HARNESS W93A – CONTINUED

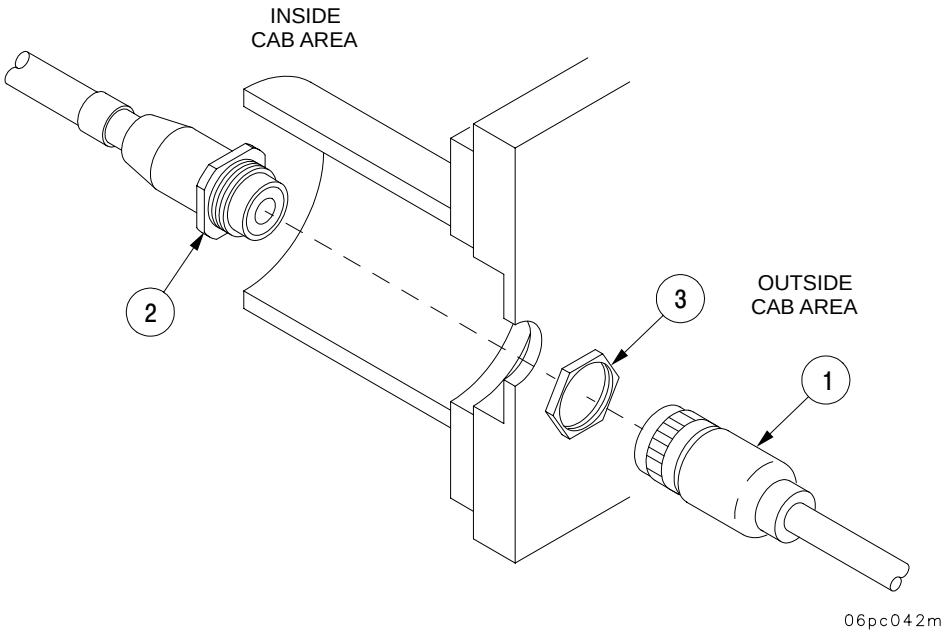
b. Installation – Continued

(c) P6 of W93A (5) on J6 of PCU.



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).



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).

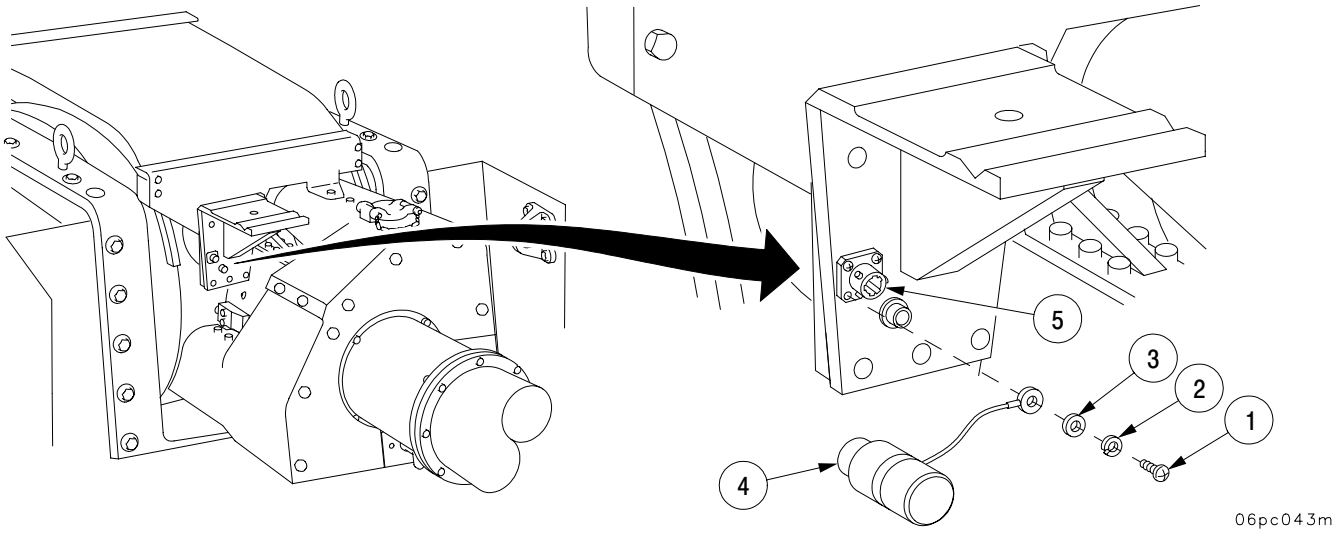
b. Installation.

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).



8–14 AFCS COMPUTER UNIT (ACU).

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)
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)

Equipment Conditions – Continued
Mounted water ration heater removed (TM 9–2350–314–10)

Personnel Required
Two

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 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.

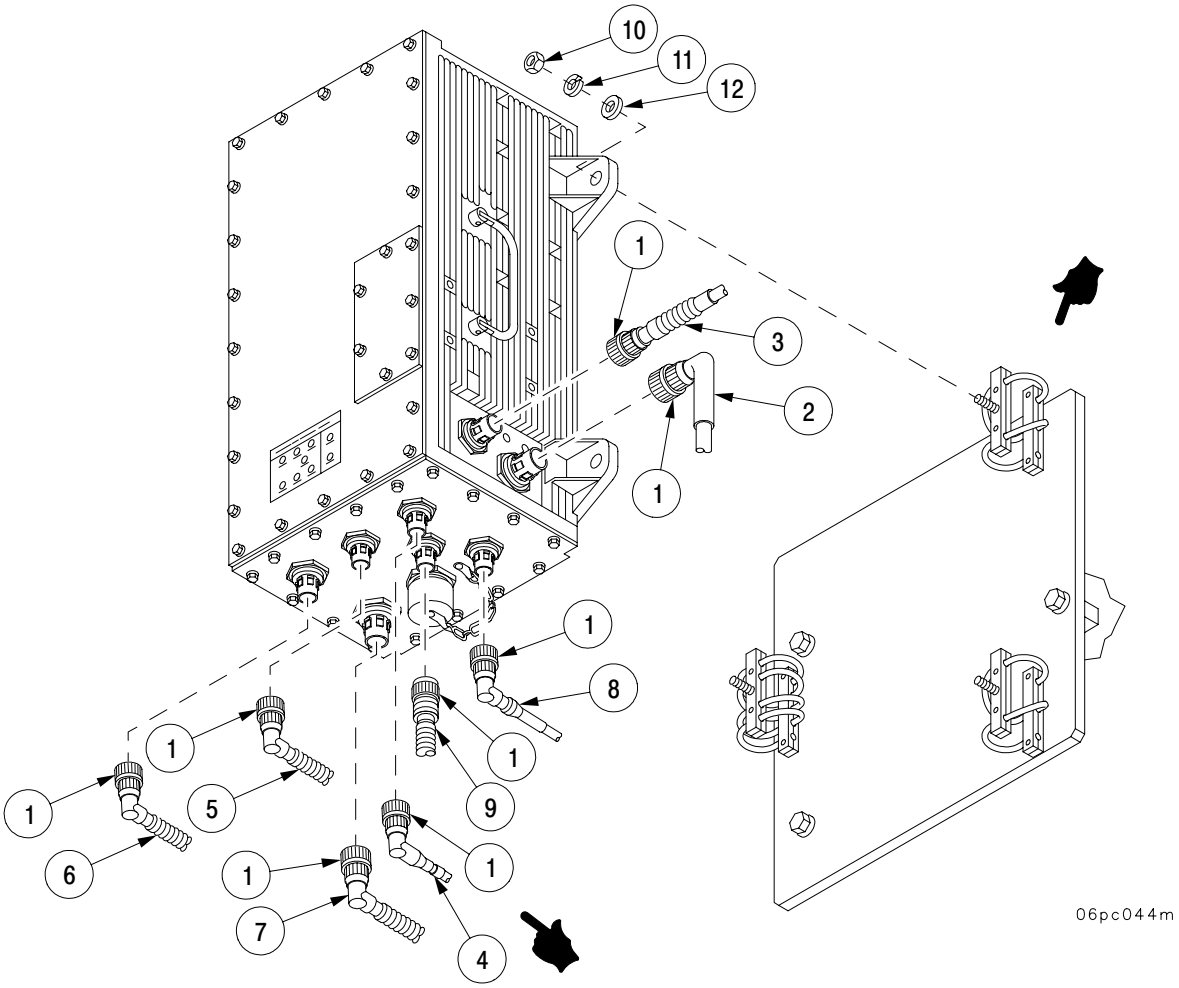
CAUTION

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



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

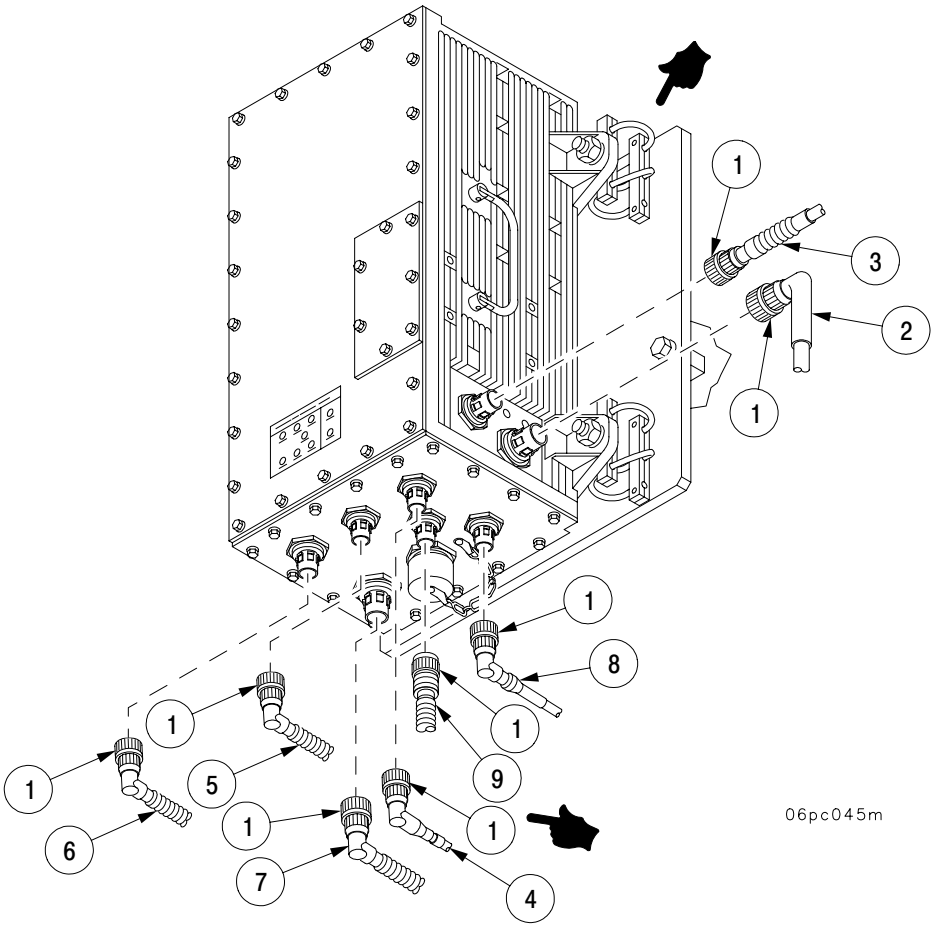
Align key and keyway of harness connectors before pushing connector halves together or pins may break.

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.



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)

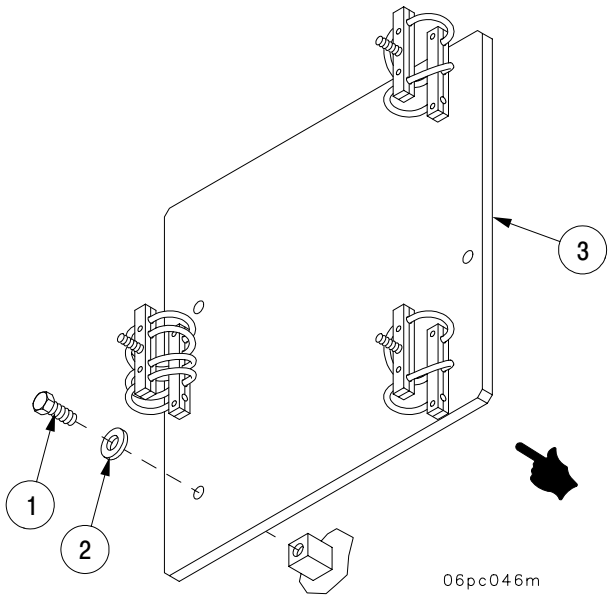
Materials/Parts
Sealing compound (item 44, Appx C)

Equipment Conditions
AFCS computer unit removed (para 8–14)

Personnel Required
Two

a. Removal.

Remove three screws (1), three flat washers (2), and shock isolation plate (3) from mounting pads.

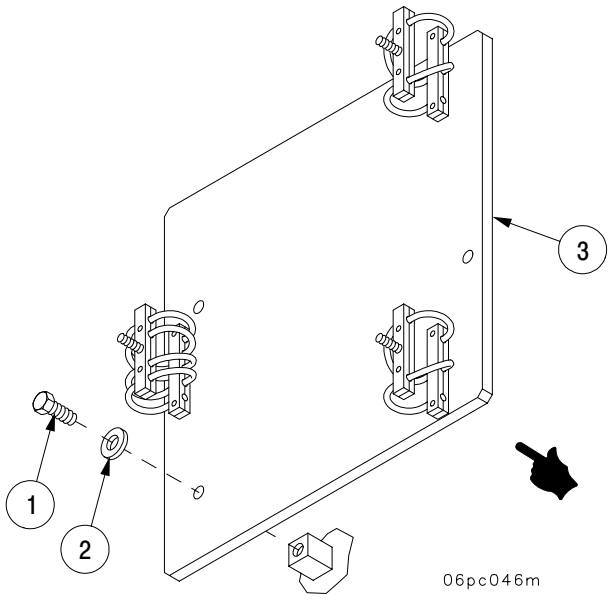


8–15 ACU SHOCK ISOLATION PLATE ASSEMBLY – CONTINUED

b. Installation.

1 Apply sealing compound to threads of three screws (1).

2 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).



8–16 POWER CONDITIONING UNIT (PCU).

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 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

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.

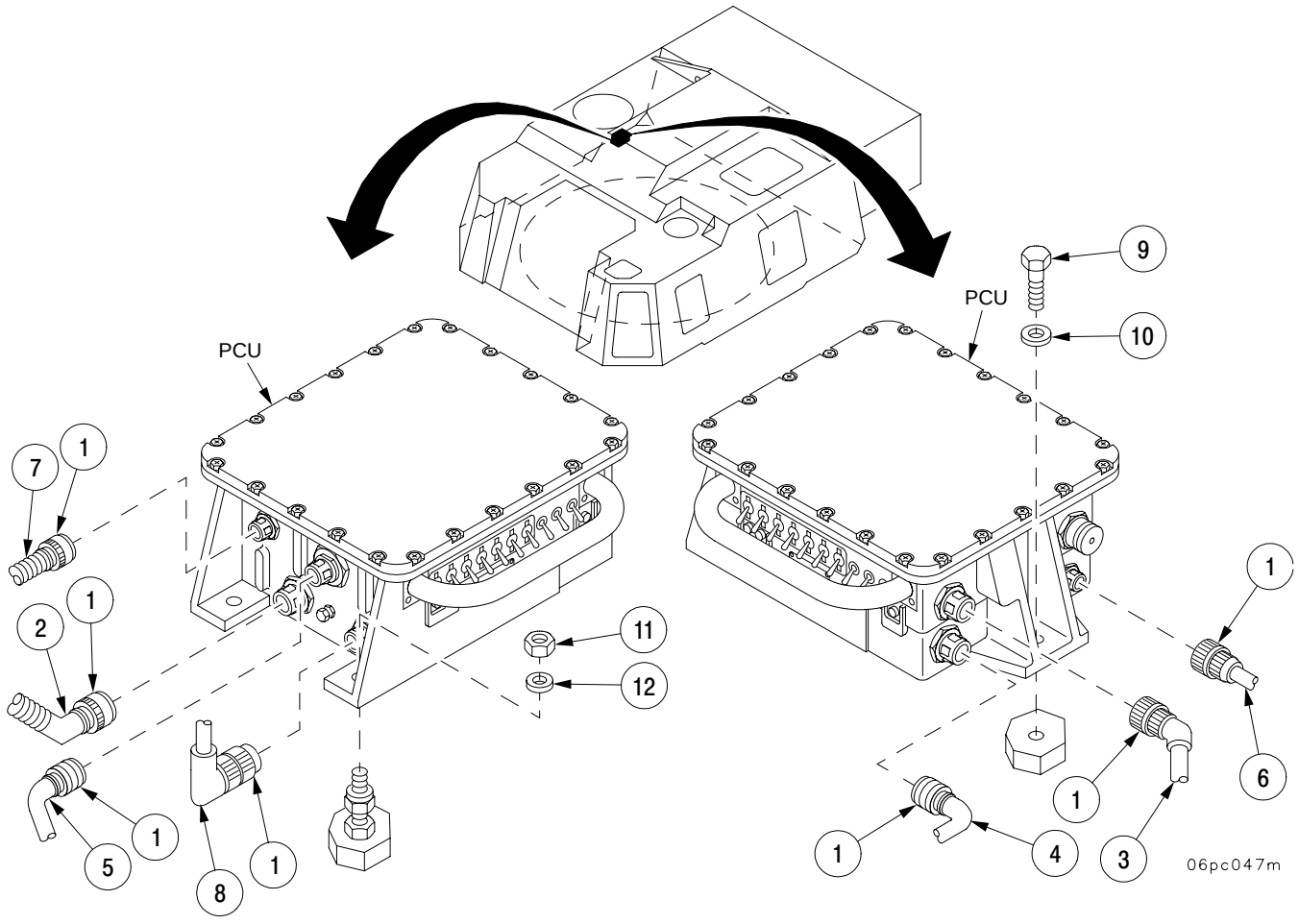
(d) P2 of W65 (5) from J5 (if connected) on PCU.

(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.

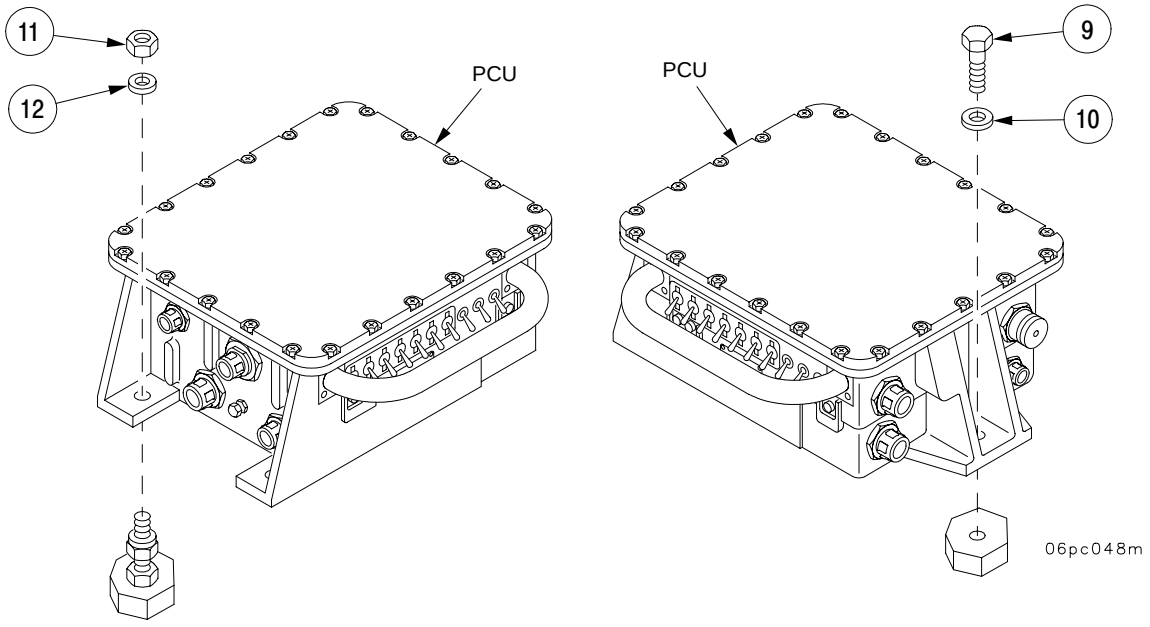


8–16 POWER CONDITIONING UNIT (PCU) – CONTINUED

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.

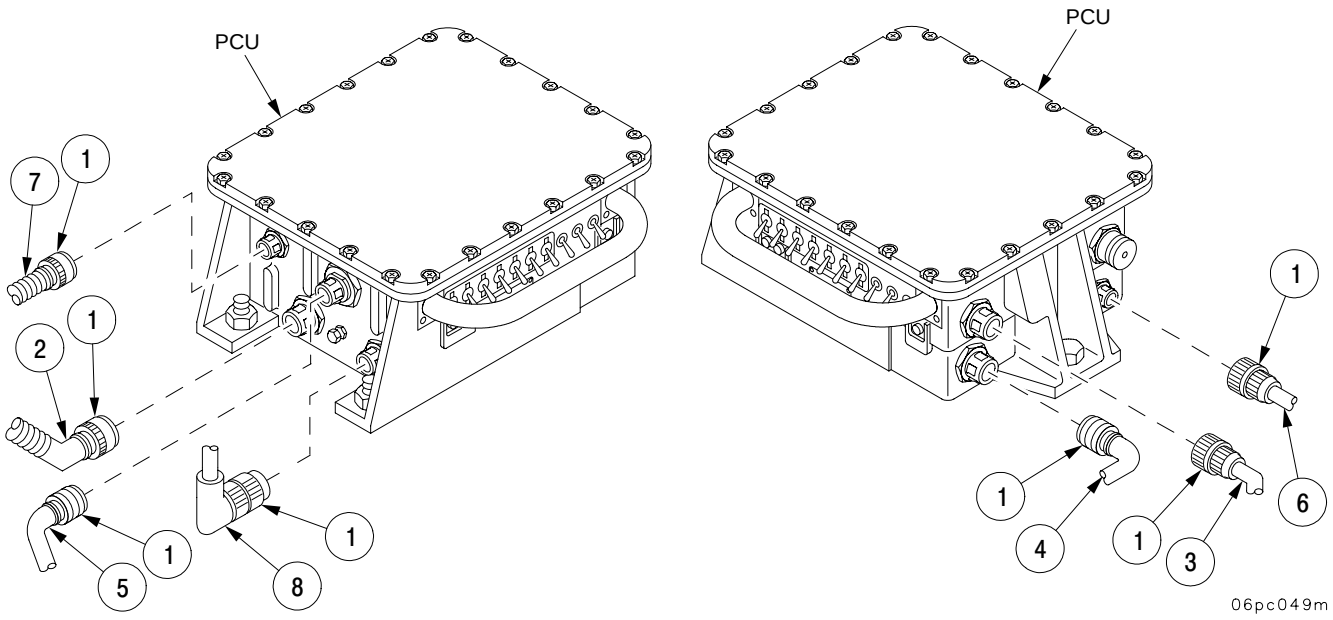
(c) P1 of W50 (4) to J4 on PCU.

(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.



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.

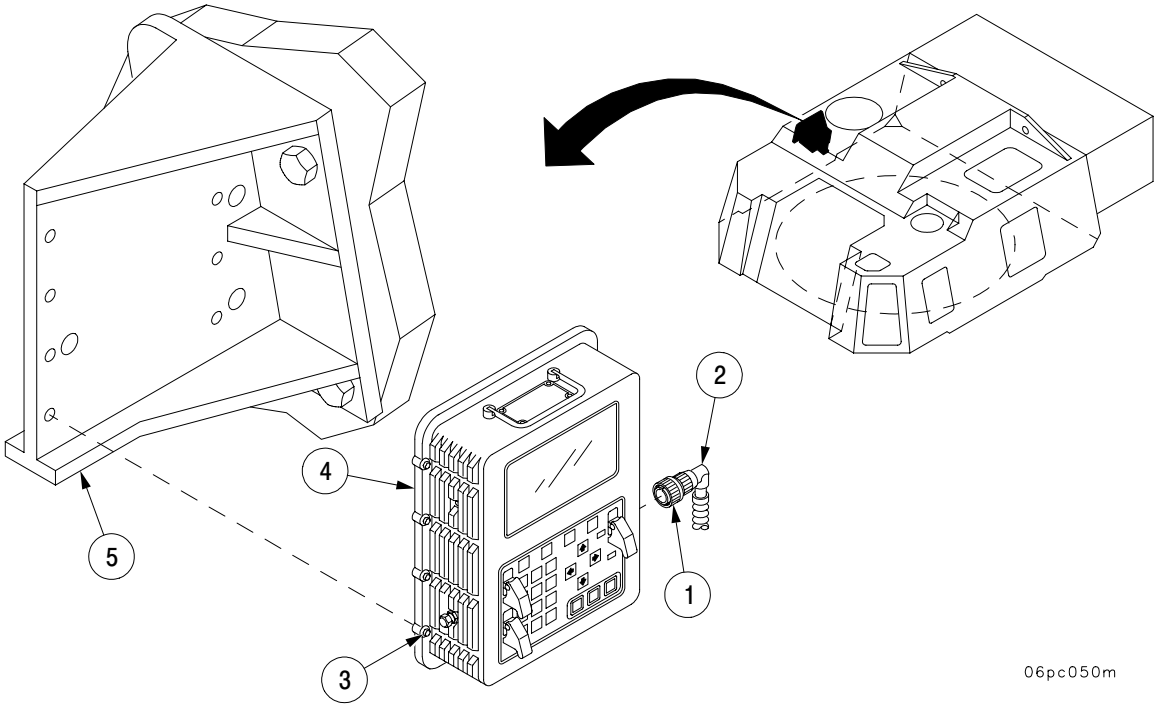
NOTE

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).



8–17 DISPLAY UNIT (DU) – CONTINUED

b. Installation.

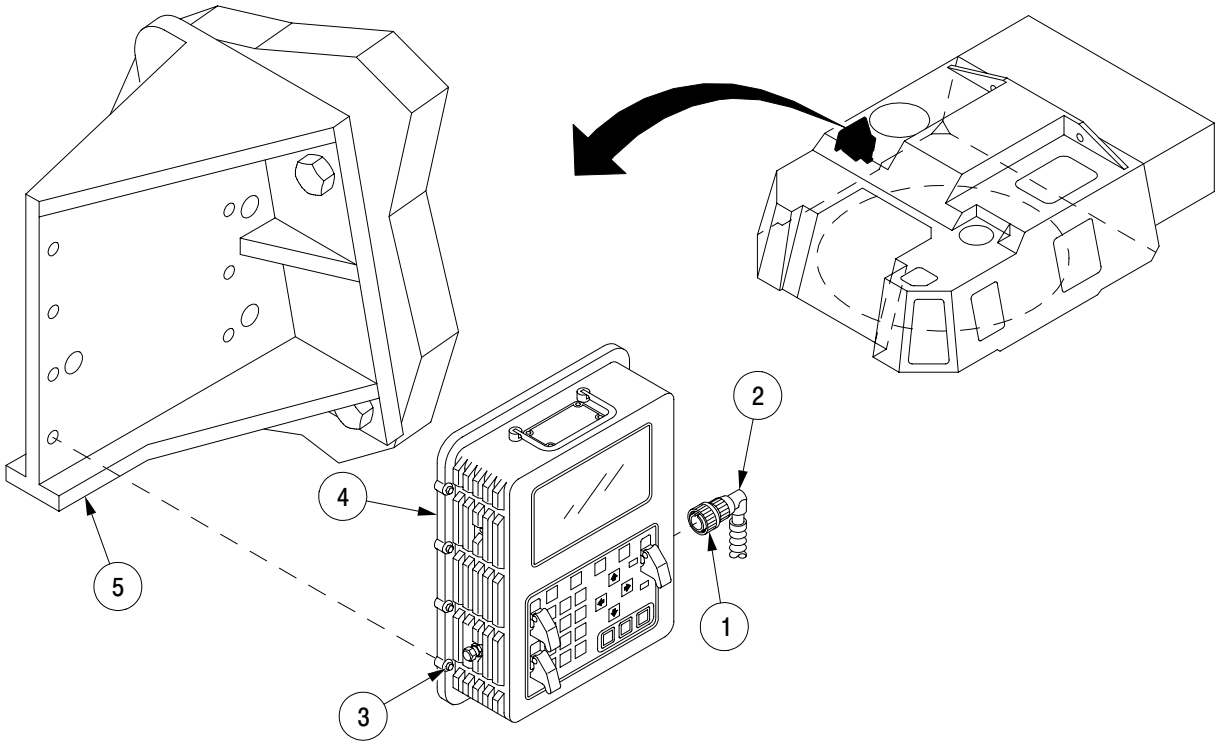
1 Position DU (4) on mounting bracket (5) and align mounting holes.

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)

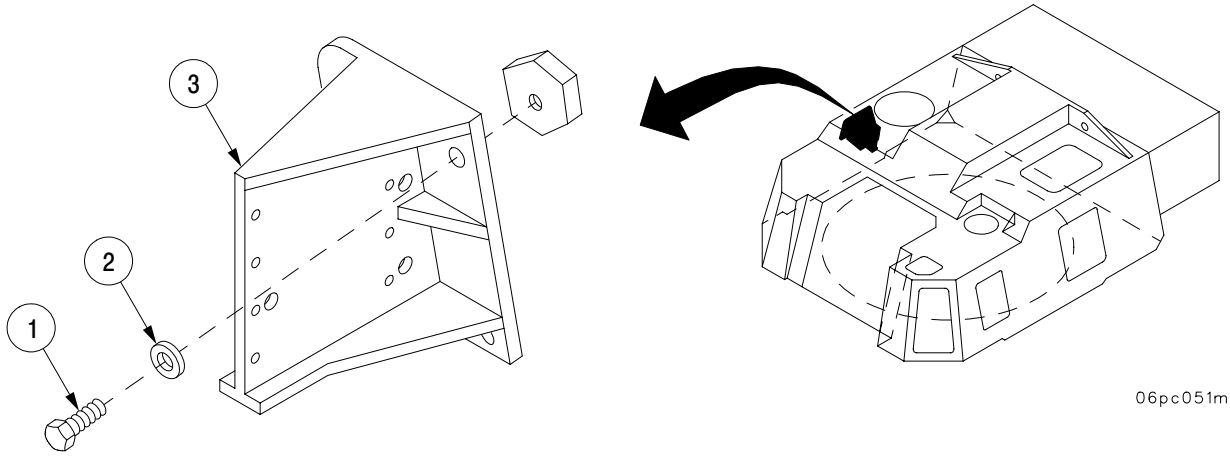
a. Removal.

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).



8–19 PROGNOSTIC/DIAGNOSTIC INTERFACE UNIT (PDIU).

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 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)

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.
- Document AFCS data prior to removing/replacing PDIU box.

a. Removal.

1 Remove the following connectors from the PDIU (1) by unscrewing coupling nuts (2) and pulling connectors apart:

(a) P1 of W65 (3) from J6 on PDIU (1).

(b) P1 of W15 (4) from J3 on PDIU (1).

(c) P2 of W1A (5) from J1 on PDIU (1).

2 Remove three screws (6), three flat washers (7), and PDIU (1) from cab wall.

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).

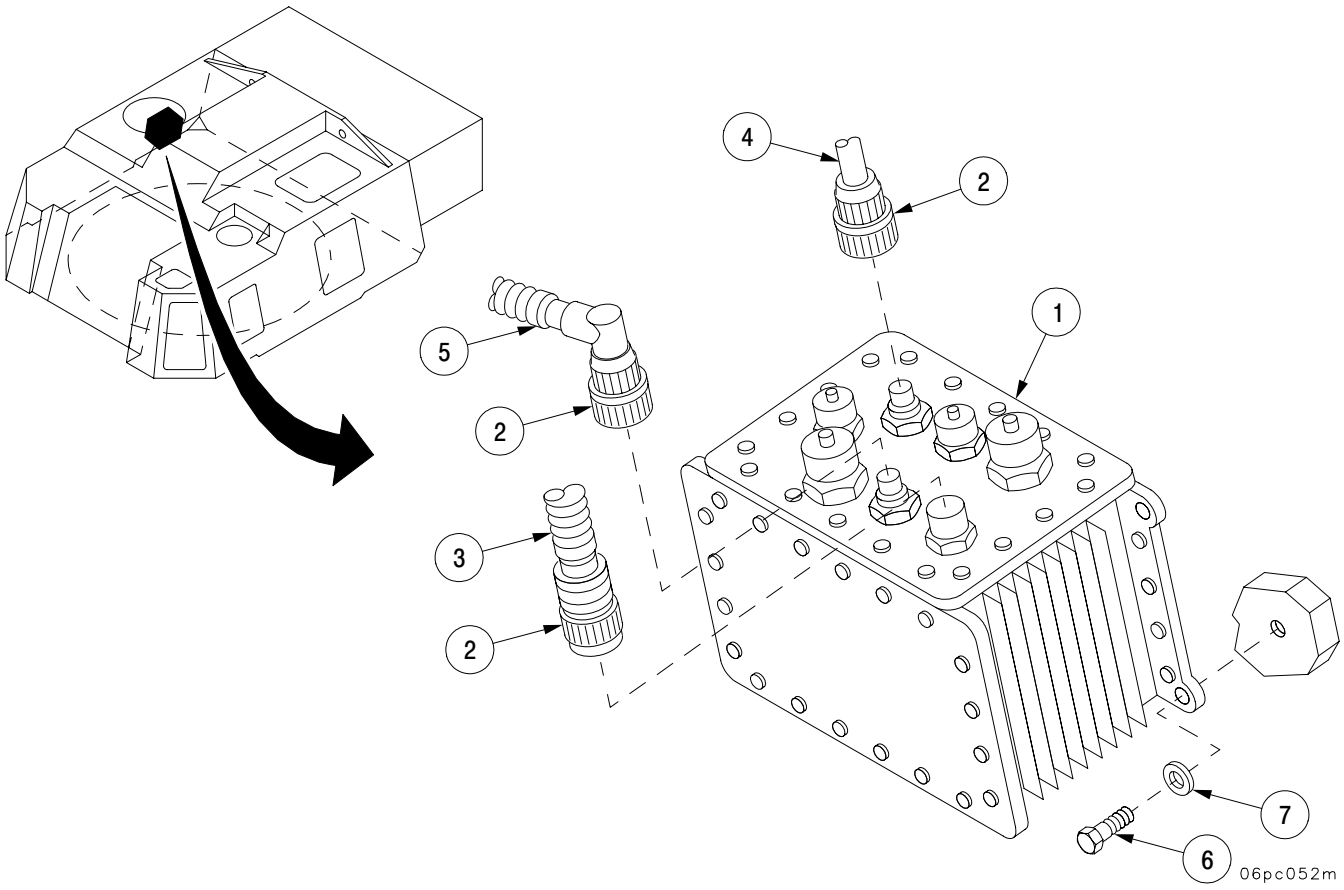
(b) P1 of W15 (4) to J3 on PDIU (1).

(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).

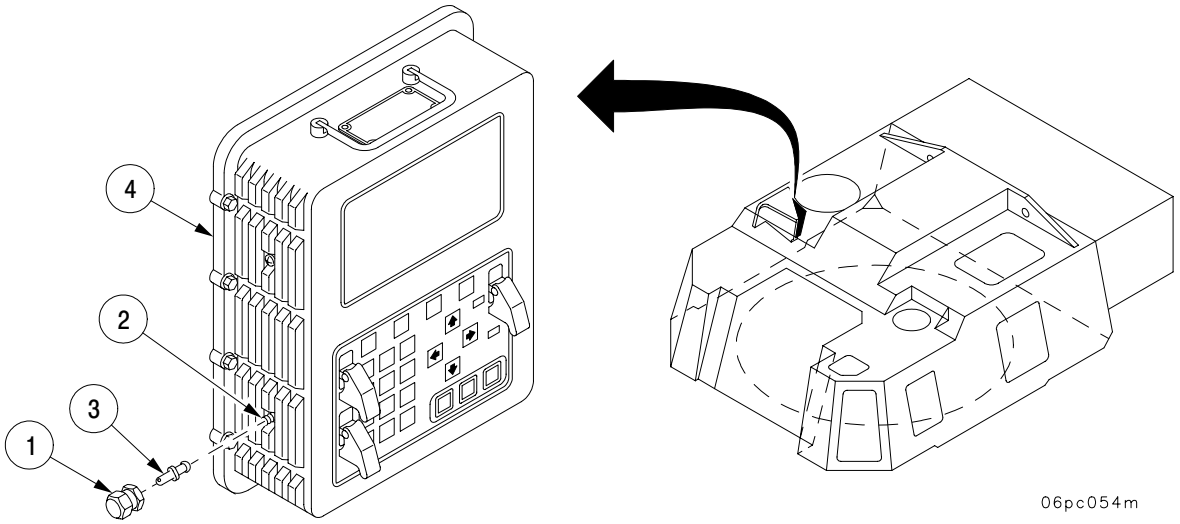
2 Depress valve core (3) and discharge unit (4).

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).



8–21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE.

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

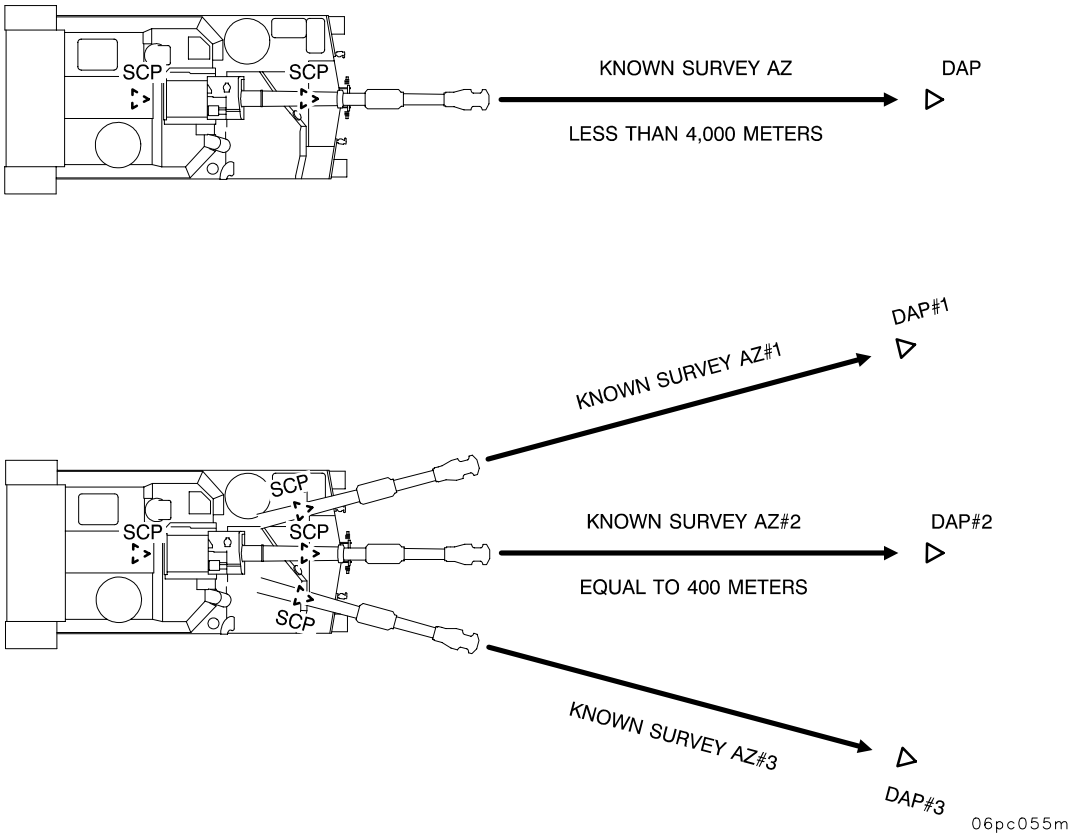
To speed the process, it is desirable to perform the complete fire control alignment for both elevation and azimuth at one location, but it can be done at two locations; one for elevation and one for azimuth.

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.

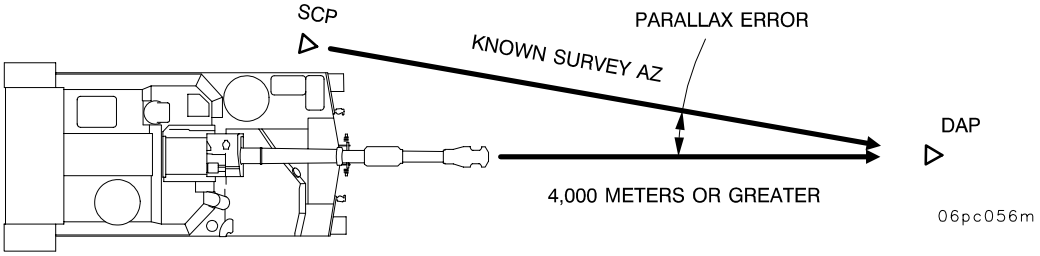
It is desirable that the howitzer's surveyed point be an identified mark on a concrete pad that cannot be moved or damaged, since howitzers will be pulling over this point frequently. The preferred location for the howitzer's surveyed point is directly under the center of rotation of the howitzer turret. 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

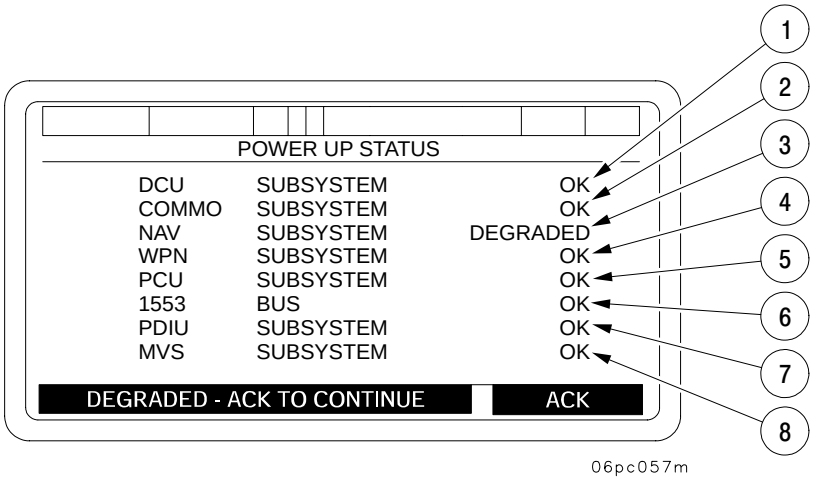
8–21.1 Initialization.

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)

(2) (OK, DEGRADED, OUT)

(3) (OK, DEGRADED, OUT)

(4) (OK, DEGRADED, OUT)

(5) (OK, OUT)

(6) (OK, DEGRADED, OUT)

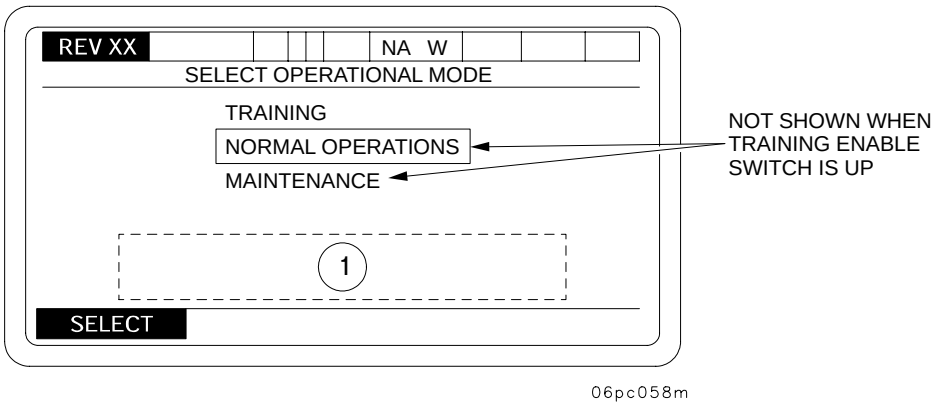
(7) (OK, DEGRADED)

(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.



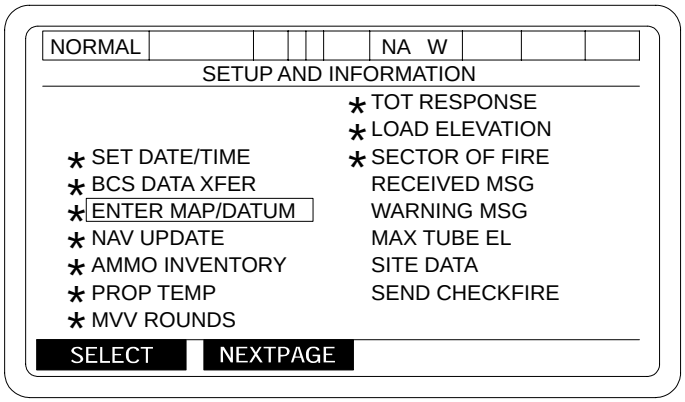
1 POSITION TRAINING ENABLE SWITCH DOWN TO SELECT OTHER MODES

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

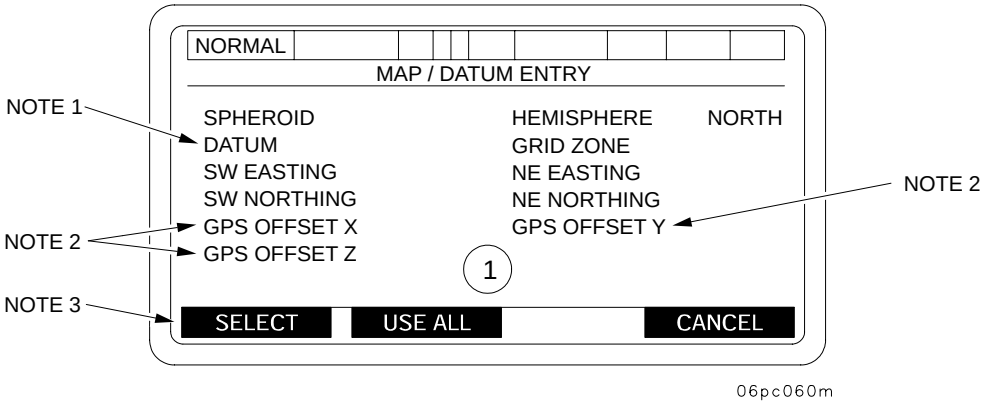
8–21.1 Initialization – Continued



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.



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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

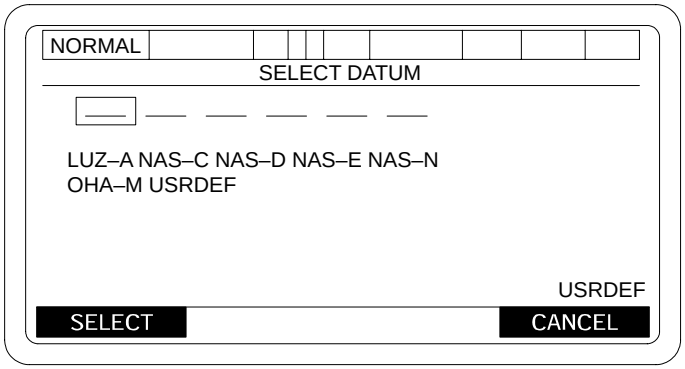
When GRID ZONE is selected:
TYPE GRID ZONE
1 TO 60
PRESS ENT KEY

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

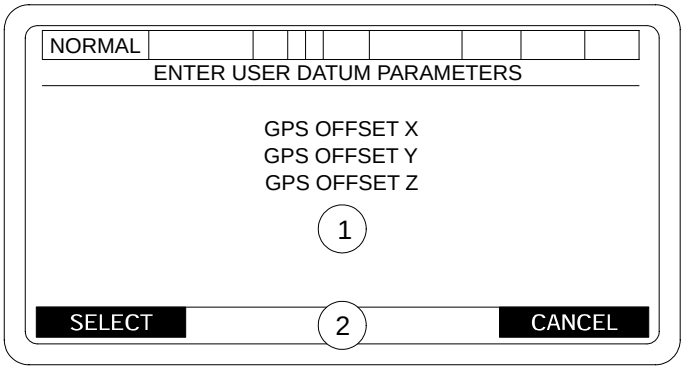
8–21.1 Initialization – Continued



06pc061m

NOTE: ID code USRDEF is always the last entry in the selection list.

ENTER USER DATUM PARAMETERS



06pc062m

(1) When any field selected:

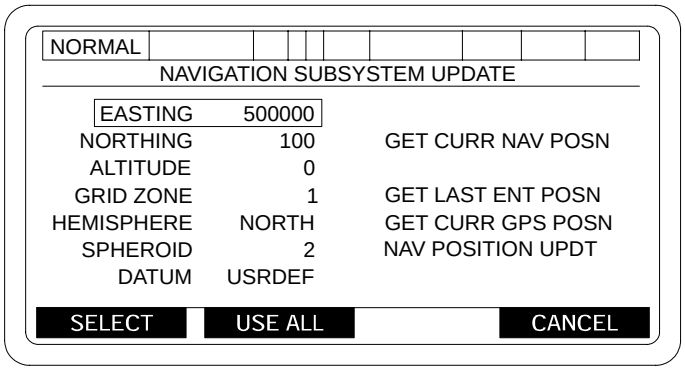
TYPE OFFSET
BETWEEN –2000.0 AND +2000.0
PRESS ENT KEY

(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.

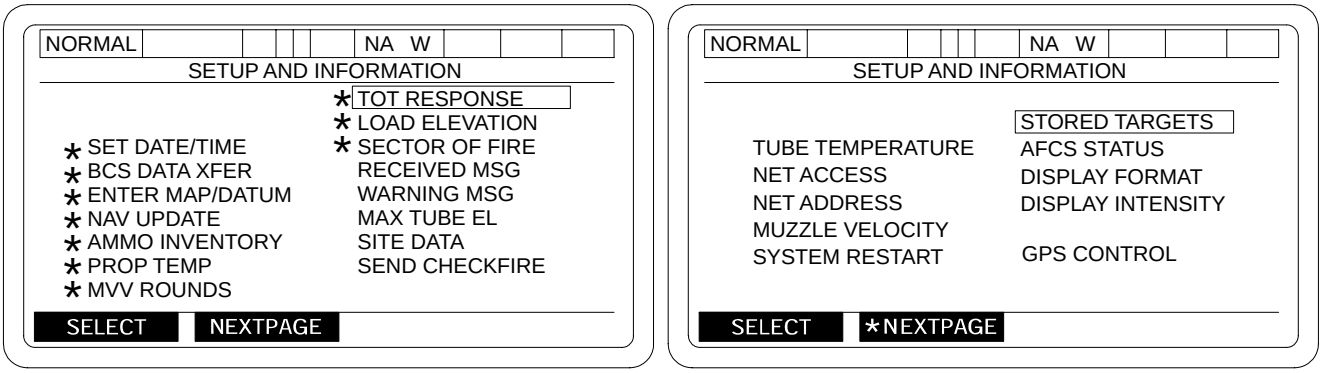


06pc063m

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.

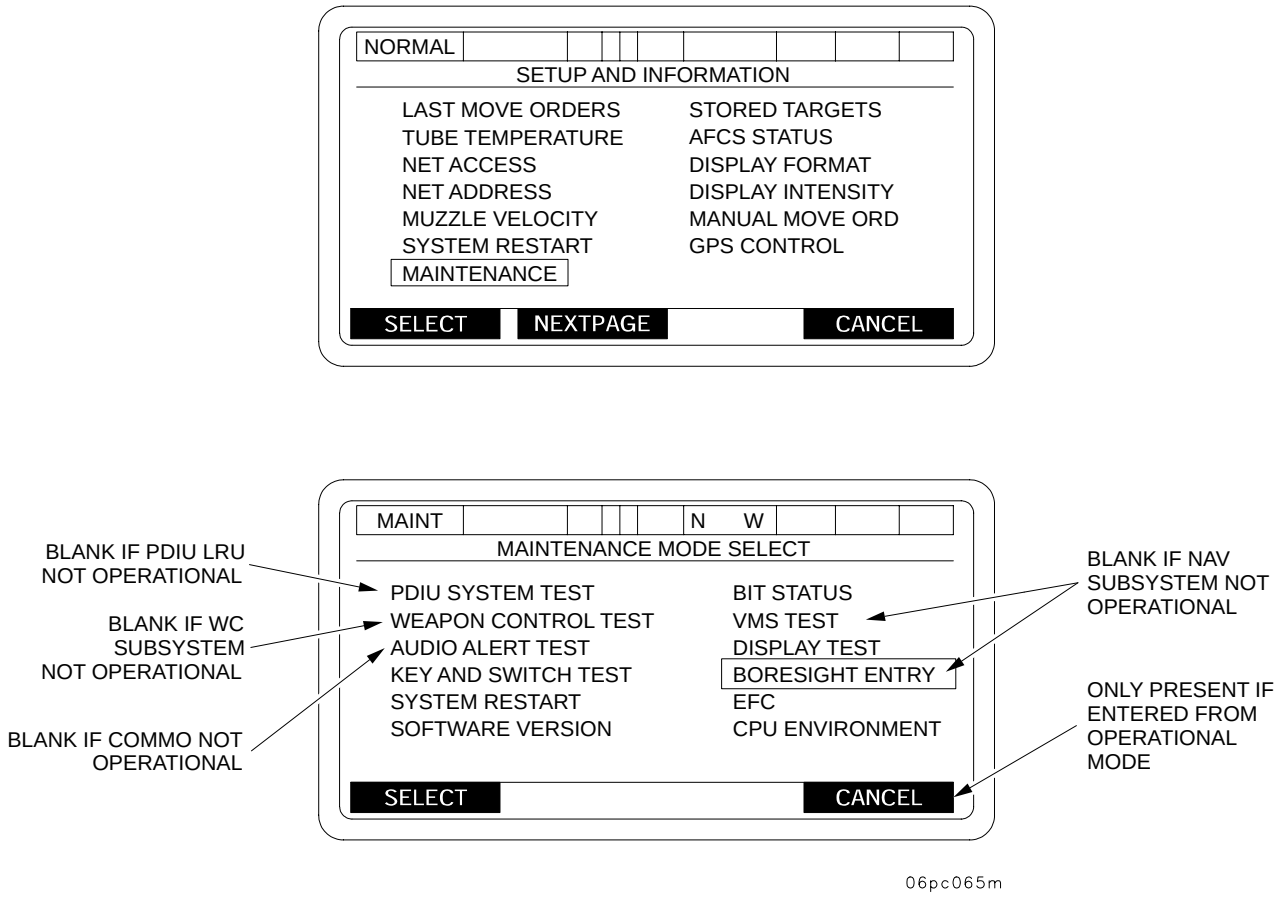


06pc064ma

8–21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE – CONTINUED

8–21.1 Initialization – Continued

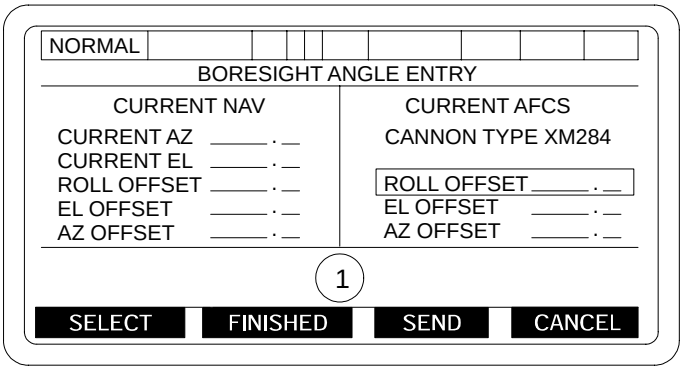
g. Select MAINTENANCE from the SETUP AND INFORMATION screen. Select BORESIGHT ENTRY from the MAINTENANCE MODE SELECT screen.



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.



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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 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

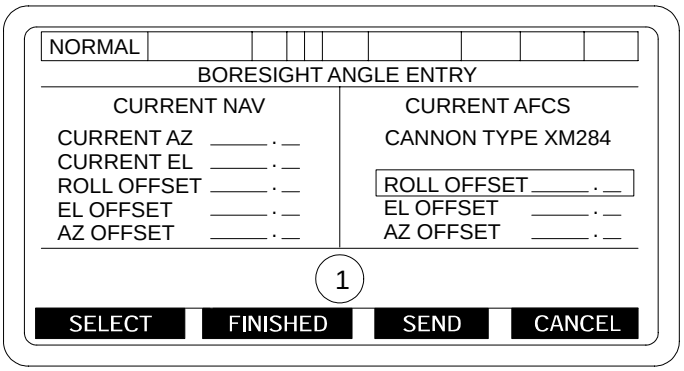
NOTE

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).



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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.

8–21 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 UR 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 = 402.4 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.

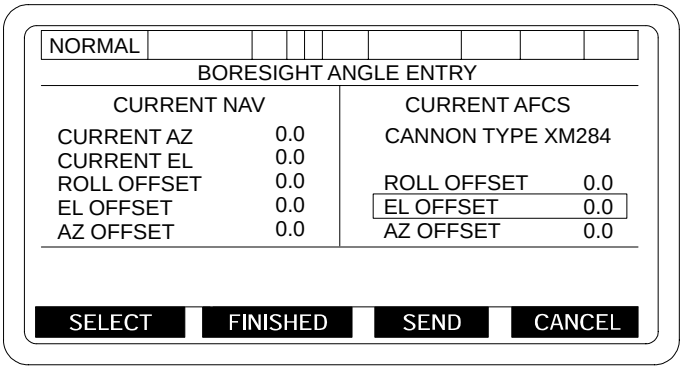
a. Enter the AVERAGE DELTA from step 8–21.2i into the EL OFFSET entry location on the CURRENT AFCS side of the BORESIGHT ANGLE ENTRY screen (set the proper plus/minus sign with the ± softkey). Some examples:

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



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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 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 (±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.

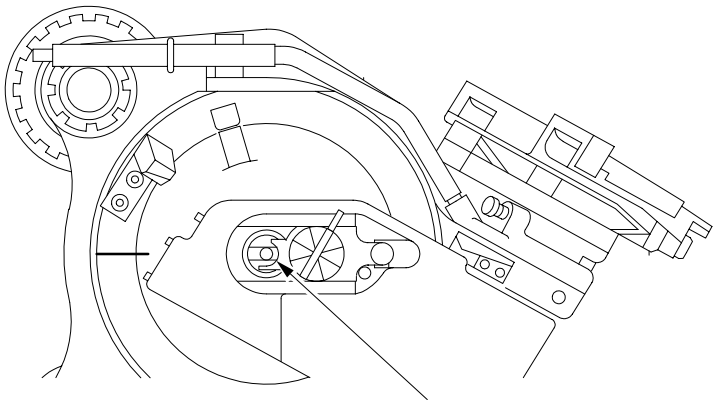
8–21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE – CONTINUED

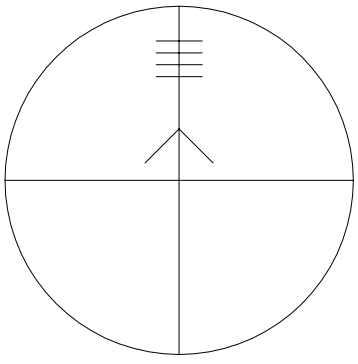
8–21.4 Azimuth Alignment – Continued

(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

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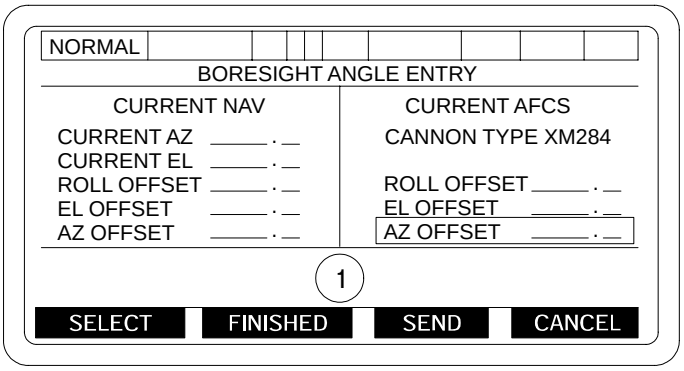
8–21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE – CONTINUED

8–21.4 Azimuth Alignment – Continued

(Greater than 400 meters and 4,000 meters)



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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	4847.6 mils
	+1.38 mils (round to nearest .1 mil)
Azimuth Delta	+1.4 mils

EXAMPLE 2:

Surveyed Azimuth	4848.98 mils
SUBTRACT CURRENT AZ	4850.2 mils
	–1.22 mils (round to nearest .1 mil)
Azimuth Delta	–1.2 mils

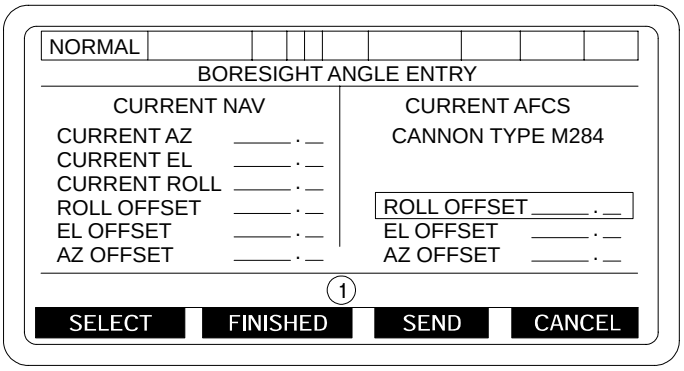
d. Traverse the tube about 200 mils to either side of the DAP and repeat the procedures in para 8–21.4b and c above. Verify the computed Azimuth Delta.

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	399.10 mils
	+0.90 mils (round to nearest .1 mil)
Azimuth Delta	+0.9 mils

EXAMPLE 2:

Surveyed Azimuth	400.00 mils
SUBTRACT CURRENT AZ	401.1 mils
	–1.10 mils (round to nearest .1 mil)
Azimuth Delta	–1.1 mils

EXAMPLE 3:

Surveyed Azimuth	476.60 mils
SUBTRACT CURRENT AZ	475.3 mils
	+1.30 mils (round to nearest .1 mil)
Azimuth Delta	+1.3 mils

8–21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE – CONTINUED

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	±1.3 mils
Sum Delta #1, #2, #3	+1.1 mils
	+.36 mils (rounded to the nearest .1 mil)
Average Azimuth Delta	+.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 ± 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 (± 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.

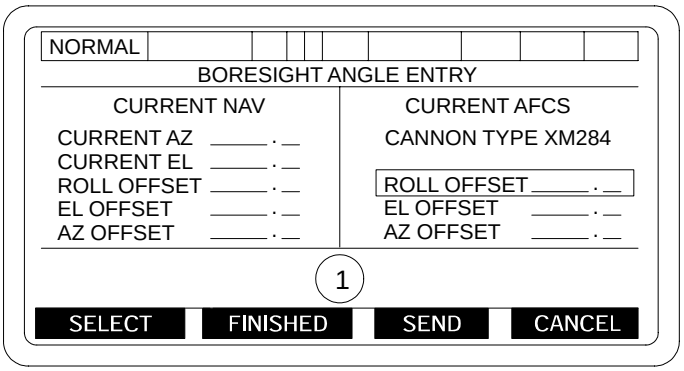
8–21 AFCS FIRE CONTROL ALIGNMENT PROCEDURE – CONTINUED

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.



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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).

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By Order of the Secretary of the Army:

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AND WHAT SHOULD BE DONE ABOUT IT:

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).

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CONVERSION TABLE

inch	decimal	mm
1/64	0.015625	0.3969
1/32	0.031250	0.7938
3/64	0.046875	1.1906
1/16	0.062500	1.5875
5/64	0.078125	1.9844
3/32	0.093750	2.3812
7/64	0.109375	2.7781
1/8	0.125000	3.1750
9/64	0.140625	3.5719
5/32	0.156250	3.9688
11/64	0.171875	4.3656
3/16	0.187500	4.7625
13/64	0.203125	5.1594
7/32	0.218750	5.5562
15/64	0.234375	5.9531
1/4	0.250000	6.3500
17/64	0.265625	6.7469
9/32	0.281250	7.1438
19/64	0.296875	7.5406
5/16	0.312500	7.9375
21/64	0.328125	8.3344
11/32	0.343750	8.7312

inch	decimal	mm
23/64	0.359375	9.1281
3/8	0.375000	9.5250
25/64	0.390625	9.9219
13/32	0.406250	10.3188
27/64	0.421875	10.7156
7/16	0.437500	11.1125
29/64	0.453125	11.5094
15/32	0.468750	11.9062
31/64	0.484375	12.3031
1/2	0.500000	12.7000
33/64	0.515625	13.0969
17/32	0.531250	13.4938
35/64	0.546875	13.8906
9/16	0.562500	14.2875
37/64	0.578125	14.6844
19/32	0.593750	15.0812
39/64	0.609375	15.4781
5/8	0.625000	15.8750
41/64	0.640625	16.2719
21/32	0.656250	16.6688
43/64	0.671875	17.0656
11/16	0.687500	17.4625

inch	decimal	mm
45/64	0.703125	17.8594
23/32	0.718750	18.2562
47/64	0.734375	18.6531
3/4	0.750000	19.050
49/64	0.765625	19.4469
25/32	0.781250	19.8437
51/64	0.796875	20.2406
13/16	0.812500	20.6375
53/64	0.828125	21.0344
27/32	0.843750	21.4312
55/64	0.859375	21.8281
7/8	0.875000	22.2250
57/64	0.890625	22.6219
29/32	0.906250	23.0188
59/64	0.921875	23.4156
15/16	0.937500	23.8125
61/64	0.953125	24.2094
31/32	0.96750	24.6062
63/64	0.984375	25.0031
1	1.000000	25.4000

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

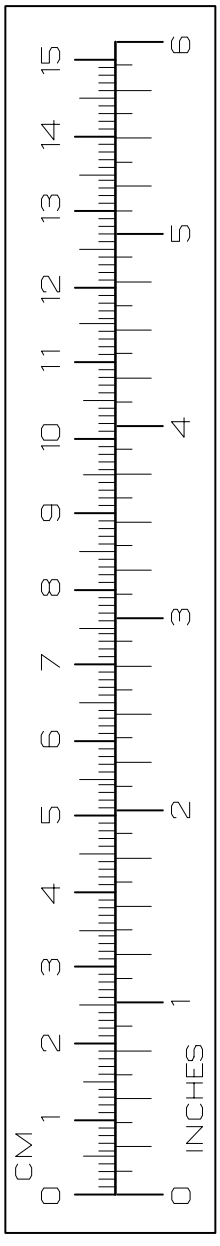
TEMPERATURE

$^{\circ}C = 5/9 (^{\circ}F - 32)$
212° Fahrenheit is equivilent to 100° Celsius
90° Fahrenheit is equivilent to 32.2° Celsius
32° Fahrenheit is equivilent to 0° Celsius
$(9/5 \times {}^{\circ}C) + 32 = {}^{\circ}F$

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	Millimeters	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



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