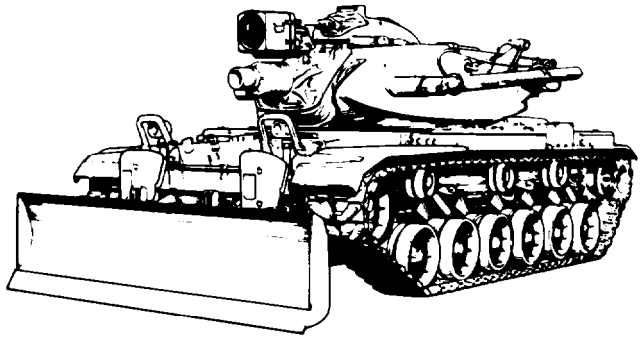
TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE
VOLUME 2 OF 5
CHAPTER 4



COMBAT ENGINEER VEHICLE, FULL-TRACKED, M728

2350-00-795-1797

(HULL)

This copy is a reprint which includes current pages from Changes 1 through 4.

TA141002

HEADQUARTERS, DEPARTMENT OF THE ARMY

FEBRUARY 1981

WARNING

The following summary list is adapted from the warnings within this volume. However, all warnings should be observed as noted in the text.

Compressed air used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

Handle charged cylinders with care. Do not jar or subject cylinders to temperatures above 140°F (60°C).

Never allow flame or sparks near battery. Battery gas (hydrogen and air) is a dangerous explosive.

Check that all personnel are clear of vehicle before traversing turret,

Driver must notify all personnel that brake check is to take place so they can be prepared for sudden stops.

Shock absorbers may be extremely hot.

Exercise caution to relieve system of high (800-1800 psi) pressure gas slowly. Gloves and eye protection should be worn. Avoid breathing vapor.

Unit commander or senior officer in charge of maintenance personnel assigned to remove and dispose of contaminated gas filters must prescribe necessary clothing (TM 10-277) to be worn during this operation. He must also prescribe necessary safety measures that must be followed including decontamination operation that must be performed before new gas filters are installed (TM 3-220).

Do not attempt to operate vehicle if there is any chance the trouble may harm personnel or damage equipment.

Setting MASTER BATTERY switch OFF will not deenergize the following circuits; 2, 14A, 49, 81, 400, 405, 415A, 459, 530, 531, 975 and 975B. When working with any of the above circuits, the battery ground straps must be disconnected.

Do not accelerate engine unless all personnel are clear of vehicle.

Do not smoke or allow flames or sparks within area while draining fuel tanks. Have manned fire extinguishers present.

Wear goggles to protect eyes from spraying fuels. Fuel pressure in primer pump pressure line may reach 200 psi.

CHANGE

NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D. C., 22 *July 1993*

TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE
VOLUME 2 OF 5
CHAPTER 4
COMBAT ENGINEER VEHICLE,
FULL-TRACKED, M728
2350-00-795-1797
(HULL)

TM 9-2350-222-20-1-2, 20 February 1981, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

2. New or changed material is indicated by a vertical bar in the margin of the page.

Remove Pages	Insert Pages
4-1 and 4-2	4-1 and 4-2
4-7 and 4-8	4-7 and 4-8
4-25 and 4-26	4-25 and 4-26
4-26.1 and 4-26.2	4-26.1 and 4-26.2
4-101 thru 4-130	None
4-131 and 4-132	4-131 and 4-132
4-141 and 4-142	4-141 and 4-142
4-149 and 4-150	4-149 and 4-150
None	4-150.1 thru 4150.7 /(4-150.8 blank)
4-165 thru 4-178	4-165 thru 4-178
4-181 and 4-182	4-181 and 4-182
4-185 and 4-186	4185/(4-186 blank)
4187 and 4-188	None
4-189 and 4-190	4-189 and 4-190
4-193 thru 4200	4193 thru 4-200
4-203 thru 4-216	4203/(4-204 blank) thru 4-216
4-221 and 4-222	4-221 and 4-228
4-223 thru 4-228	None
4-229 thru 4-232	4-229 thru 4-232
4-269 thru 4-274	4-269 thru 4-274
4-277 and 4-278	4-277 and 4-278
4-283 thru 4-288	4-283 thru 4-288
4-289 thru 4-308	4-289 and 4308

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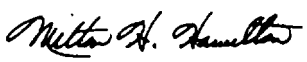
Remove Pages	Insert Pages
4-331 and 4-332	4-331/(4-332 blank)
4-333 thru 4-336	None
4-347 and 4-348	4-347/(4-348 blank)
4-349 thru 4-370	None
4-391 and 4-392	4-391 and 4-392
4-419 thru 4-428	4-419 thru 4-428
4-428.33/(4-428.34 blank)	None
4-429 thru 4-436	None
4-437 and 4-438	(4-437 blank) /4-438
4449 and 4-450	4-449/(4-450 blank)
4-461 and 4-462	4-461 and 4-462
4-467 thru 4-474	4-467 thru 4-474
4-525 and 4-526	4-525 and 4-550
4-527 thru 4-550	None
4-579 thru 4-592	None
4-593 and 4-594	4593 and 4-594
4-607 thru 4-618	None
4-619 and 4620	(4619 blank)/4620
4-637 thru 4-650	None
4651 and 4-652	4-651 and 4-652
4-669 thru 4-678	4-669 thru 4-678
4-681 and 4-682	4-681 /(4-682 blank)
4-685 and 4-686	4-685 and 4-686
4-689 and 4-690	4689 and 4690
4-691 thru 4694	4-691 and 4-694
4-719 and 4-720	4-719/(4-720 blank)
4-721 thru 4-724	None
4-733 thru 4-740	None
4-741 and 4-742	4-741 and 4-742
4-783 and 4784	4-783 and 4-784
4-989 thru 4-992	4-989 thru 4-992
4-1009 thru 4-1014	4-1009 thru 4-1014
4-1023 thru 4-1026	4-1023 thru 4-1026

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:



MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
04568

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To be distributed in accordance with DA Form 12-37-E, Block 1504, requirements for TM 9-2350-222-20-1-2.

CHANGE

NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., 30 *December 1985*

ORGANIZATIONAL MAINTENANCE
COMBAT ENGINEER VEHICLE
FULL TRACKED, M728
NSN (2350-00-795-1797)
(HULL)

TM 9-2350-222-20-1-2, 20 February 1981 is changed as follows:

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3. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration identification number.

Remove Pages	Insert Pages
b and c	b and c
None	d/(e blank)
i and ii	i and ii
4-21 thru 4-26	4-21 thru 4-26
None	4-26.1 and 4-26.2
4-427 and 4-428	4-427 and 4-428
None	4-428.1 thru 4-428.33/(4-428.34 blank)
4-741 and 4-742	4-741 and 4-742
None	4-742 .1/(4-742.2 blank)
4-1015 and 4-1016	4-1015 and 4-1016
4-1027 and 4-1028	4-1027 and 4-1028
4-1033 and 4-1034	4-1033 and 4-1034
4-1049 and 4-1050	4-1049 and 4-1050
4-1053 and 4-1054	4-1053 and 4-1054
None	DA Forms 2028-2

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Chief of Staff

Official:

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The Adjutant General

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CHANGE

No. 2 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 2 *October* 1984

ORGANIZATIONAL MAINTENANCE

VOLUME 2 OF 5

CHAPTER 4

COMBAT ENGINEER VEHICLE,

FULL-TRACKED,M728

2350-00-795-1797

(HULL)

This Change No. 2 is necessary to remove "ADVANCED COPY December 1982" from change sheet for Change No. 1, and add date.

TM 9-2350-222-20-1-2, 20 February 1981, is changed as follows:

1. Change sheet for C1, “ADVANCED COPY December 1982”.

2. Change sheet for C 1, insert date 31 August 1983.

3. File this change sheet in front of the publication for reference purposes.

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General, United States Army
chief of staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

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Remove Pages	Insert Pages
4-489 and 4-490	4-489 and 4-490
4-493 thru 4-496	4-493 thru 4-496
4-505 and 4-506	4-505 and 4-506
NONE	4-508 .1/(4.508.2 blank)
4-511 and 4-512	4-511 and 4-512
4-553 and 4-556	4-553 thru 4-556
4-563 and 4-564	4-693 and 4-464
NONE	4-752.1/(4-752.2 blank)
4-759 and 4-760	4-759 and 4-760
4-843 and 4-844	4-843 and 4-844
4-919 thru 4-924	4-919 thru 4-924
NONE	4-928.1 thru 4-9328.3/(4-928.4 blank)
4-943 thru 4-946	4-943 thru 4-946
NONE	4-984.1 thru 4-984.19/(984.20 blank)
4-1019 and 4-1020	4-1019 and 4-1020

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CHANGE NO. 1

c l

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. 31 August 1983

ORGANIZATIONAL MAINTENANCE
COMBAT ENGINEER VEHICLE
FULL TRACKED, M728
NSN (2350-00-795-1797)
(HULL)

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Remove Pages	Insert Pages
i and ii	i and ii
4-21 thru 4-24	4-21 thru 4-24
4-27 thru 4-32	4-27 thru 4-32
4-77 and 4-78	4-77 and 4-78
4-103 and 4-104	4-103 and 4-104
4-109 thru 4-112	4-109 thru 4-112
4-115 and 4-116	4-115 and 4-116
4-123 and 4-124	4-123 and 4-124
4-151 and 4-152	4-151 and 4-152
4-155 and 4-156	4-155 and 4-156
4-159 thru 4-162	4-159 thru 4-162
4-209 thru 4-216	4-209 thru 4-216
4-283 thru 4-292	4-283 thru 4-292
4-295 and 4-296	4-295 and 4-296
4-299 and 4-300	4-299 and 4-300
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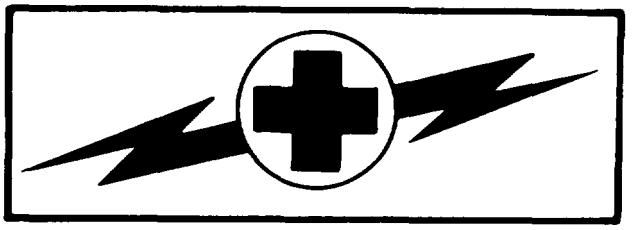
4-307 thru 4-310	4-307 thru 4-310
4-313 and 4-314	4-313 and 4-314
4-317 thru 4-326	4-317 thru 4-326
4-331 and 4-332	4-331 and 4-332
4-419 and 4-420	4-419 and 4-420
4-453 and 4-454	4-453 and 4-454
NONE	4-454.1/(4-454.2 blank)
4-487 and 4-488	4-487 and 4-488
NONE	4-488.l and 4-488.2

To avoid personal injury due to high pressure grease, pressure must be reduced to zero before gage is attached to adjusting link.

To avoid personal injury due to high pressure grease, pressure must be reduced to zero before gage is removed.

To prevent screws from pulling out of box and injuring personnel, a minimum of 200 pounds must be placed atop the door before attempting to remove screws.

Dry cleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #l Dry Cleaning Solvent is 100°F (38°C) and for Type #2 is 138°F (50°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.



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, and/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 make sure of the safety of personnel whenever the personnel heater, main or auxiliary engine of any tank is operated for maintenance purposes or tactical use.

1. DO NOT operate heater or engine of tank in an enclosed area unless the area is ADEQUATELY VENTILATED.

2. DO NOT idle engine for long periods without maintaining ADEQUATE VENTILATION in personnel compartments

3. DO NOT drive any tank with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.

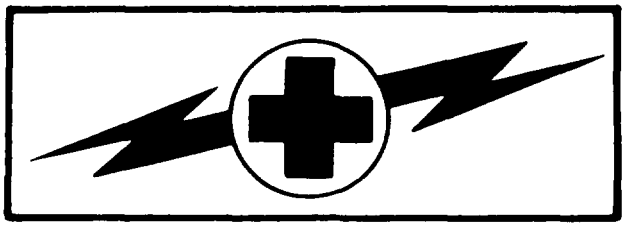
4. BE ALERT at all times during tank operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected personnel from tank and treat as follows: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS ADEQUATE VENTILATION.

For artificial respiration, refer to FM 21-11.

TA248782

WARNING



WARNING

HIGH VOLTAGE

Used in the operation of this equipment

DEATH ON CONTACT

May result if personnel fail to observe safety precautions.

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When a technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the master battery switch and battery ground straps should be either turned off or disconnected before beginning work on the equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

Before you work around tracked vehicles, remove rings, bracelets, and wristwatches. These items may be caught on projections and cause injury or may be shorted across an electrical circuit and cause severe burns and electrical shock.

For artificial respiration, refer to FM 21-11.

TA248781

Technical Manual

No. 9-2350-222-20-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 20 February 1981

ORGANIZATIONAL MAINTENANCE
COMBAT ENGINEER VEHICLE
FULL TRACKED, M728
NSN (2350-00-795-1 797)
(HULL)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Tank-Automotive Command, Attn: AMSTA-MBC, Warren, Michigan 48397-5000. A reply will be furnished to you.

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VOLUME 2

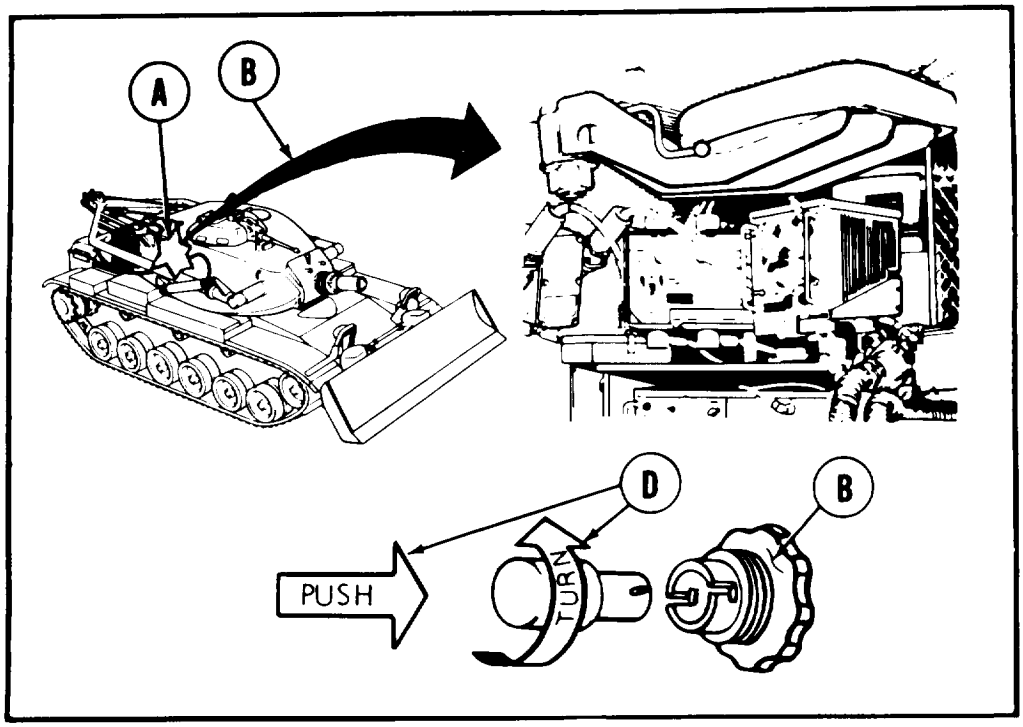
VOLUME 3

l This manual, together with TM 9-2350-222-20-1-1, 20 February 1981, TM 9-2350-222-20-1-3, 20 February 1981, TM 9-2350-222-20-14,20 February 1981, and TM 9-2350-222-20-1-5,20 February 1981, supersedes TM 9-2350-222-20, 27 September 1965, including all changes.

TABLE OF CONTENTS - Continued Page

HOW TO USE THIS MANUAL:

- This manual is divided into chapters.
- Chapters are by functional group code and are presented in same order as the RPSTL (Repair Parts and Special Tool List).
- Procedure indexes are on procedures that are four pages or more, and indicate how the procedure is set up, i.e., disassembly, removal, cleaning and inspection, etc.
- All references within this technical manual refer to page numbers.
- Steps are numbered and are to be performed in that order.
- Be sure to read all NOTES, WARNINGS, AND CAUTIONS.
- Locator views are included wherever necessary. These will help you locate the item for which the procedure is referencing.
- Jagged circle ( ) on locator (A) indicates a cutout and means the item is inside the vehicle.
- A ( ) symbol represents the outside surface (B) of a piece of equipment that cannot be shown in its entirety.
- Callouts are shown by a circle with a letter inside.
- Locator arrows (C) are black and mechanical motion arrows (D) are white.
- Broken leader arrow (---›) indicates the item is either inside or under the vehicle and cannot be seen.



TA141268

HOW TO USE THIS MANUAL - Continued

- Certain sections of the manual have detailed 'how to use' instructions at the beginning of the section - for example, troubleshooting.
- A maintenance information index is located in back of this manual. It is set up in alphabetical order and maintenance function, for example, disassemble, clean, inspect, repair, remove, install, assemble, and test.
- An illustrated list of manufactured items, or better known as fabricated tools, is located in back of this manual. It is nothing more than direction on how to fabricate tools that are listed throughout the manual.

CHAPTER 4

TROUBLESHOOTING

GENERAL

Troubleshooting is the step-by-step process of identifying, locating, isolating, and repairing equipment malfunctions or breakdowns. This section contains instructions and information which will assist the technician in troubleshooting the M728 hull. The Detailed Troubleshooting Procedures cover the most frequent failures and a wide variety of other failures that can be identified and dealt with effectively, using the information in this section.

CONTENTS Page

USER GUIDE

NOTE

The TROUBLESHOOTING USER GUIDE which follows is presented in the same format as the detailed troubleshooting procedure you will be using to identify and correct the trouble in the M728 vehicle.

1 **Check the four key steps that make good troubleshooting - (Troubleshooting without the SHOTGUN APPROACH).**

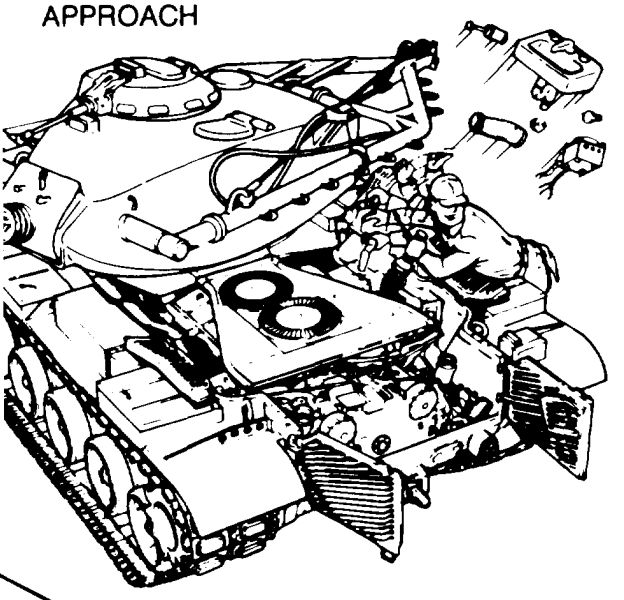
- Identify the trouble.
- Find the right troubleshooting procedure.
- Determine the test equipment, special tools, and number of technicians needed to perform the troubleshooting procedure.
- Use the detailed troubleshooting procedure to locate, isolate, and repair the trouble.

How do you "identify" the trouble spot?

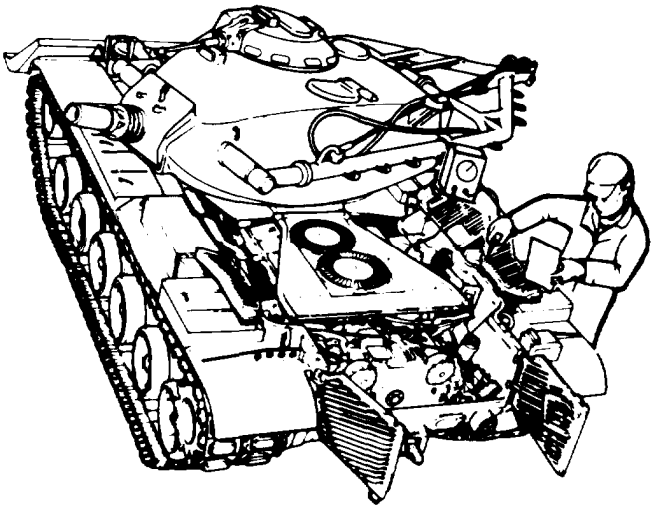
NOTE

This line indicates the procedure is continued on the next page.

SHOTGUN APPROACH



USER GUIDE APPROACH



TA141623

TROUBLESHOOTING
USER GUIDE
(Continued)

NOTE

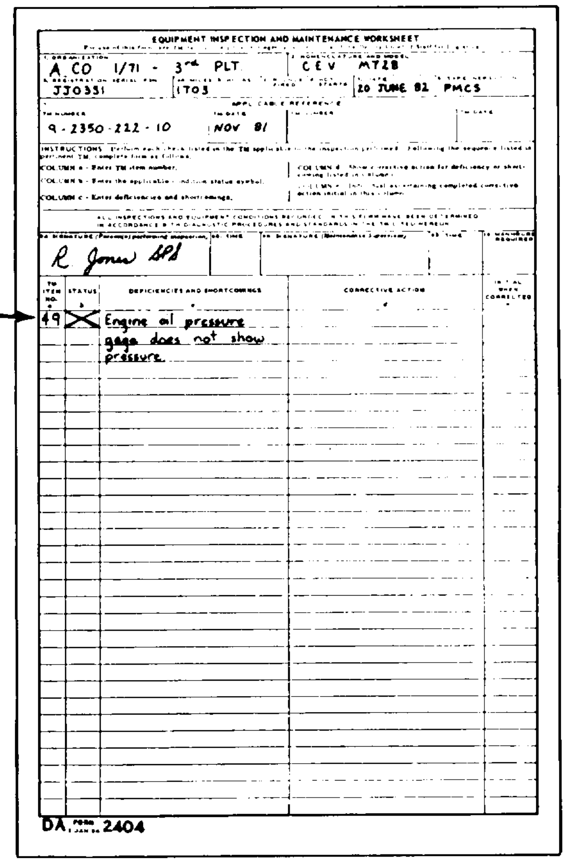
This line indicates the procedure is continued from the previous page.

(2) To identify the trouble spot, check DA Form 2404 filled out by the crew.

- Check what the crew has entered on DA Form 2404.
- Question the crew to get as much information as possible about the trouble —

Example:
  - Was the powerplant warning lamp on?
  - Was the engine running?
  - Did the other gages work?

- Make sure there was no crew error in following the Operator Procedure listed in TM 9-2350-222-10


EQUIPMENT INSPECTION AND MAINTENANCE WORKSHEET
A CO 1/71 - 3rd PLT | CEV M728
J30331 | 1705 | 20 JUNE 82 | PMCS
9-2350-222-10 | NOV 81
R Jones SP4
49 | X | Engine oil pressure gage does not show pressure.
DA 2404

WARNING

Do not attempt to operate the vehicle if there is any chance the trouble may harm personnel or damage equipment.
(Example: Brakes do not Hold.)

- If necessary, operate the vehicle to help identify the trouble.

Now that you have an idea what the trouble is, how do you find the right troubleshooting procedure?

TA141624

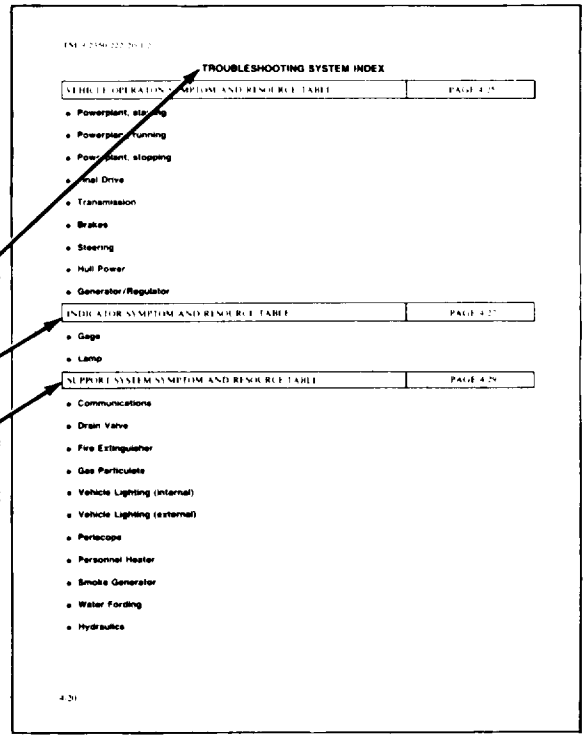
TROUBLESHOOTING
USER GUIDE
(Continued)

NOTE

The circled number at the top left corner of each block is a step number.

3 **Check the TROUBLESHOOTING SYSTEM INDEX to find the proper system/subsystem.**

- Turn to the TROUBLESHOOTING SYSTEM INDEX (page 4-20).
- Find the system in which your trouble occurs.
- Find the subsystem in which your trouble occurs.


TROUBLESHOOTING SYSTEM INDEX
VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE PAGE 4-25
• Powerplant, starting
• Powerplant, running
• Powerplant, stopping
• Final Drive
• Transmission
• Brakes
• Steering
• Hull Power
• Generator/Regulator
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• Gage
• Lamp
SUPPORT SYSTEM SYMPTOM AND RESOURCE TABLE PAGE 4-29
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• Drain Valve
• Fire Extinguisher
• Gas Particulate
• Vehicle Lighting (internal)
• Vehicle Lighting (external)
• Periscope
• Personnel Heater
• Smoke Generator
• Water Fording
• Hydraulics
4-20

NOTE

- **Most troubleshooting procedures contain many branches (paths).**
- **You will not follow every possible branch.**
- **The branch you follow will depend on your answer to each question block.**
- **If your answer is no, follow this branch.**
- **If your answer is yes, follow this branch.**

Were you able to find the proper system/subsystem in which your trouble occurs?

YES

NO

4 **If you have trouble locating the proper system/subsystem, check the TROUBLESHOOTING SUBJECT INDEX.**

- **See Step (8) .**

TA141625

TROUBLESHOOTING
USER GUIDE
(Continued)

5 **Find the right Troubleshooting Procedure.**

- Note the SYSTEM/SUBSYSTEM and RESOURCE TABLE listed for the SYSTEM/SUBSYSTEM in which your trouble occurs.
- Turn to the page number indicated for the above table.
- Find the same subsystem.
- Check the symptom titles listed under this subsystem until you find the one that describes your trouble.

Have you found the proper symptom title?

6 **Notify your supervisor.**

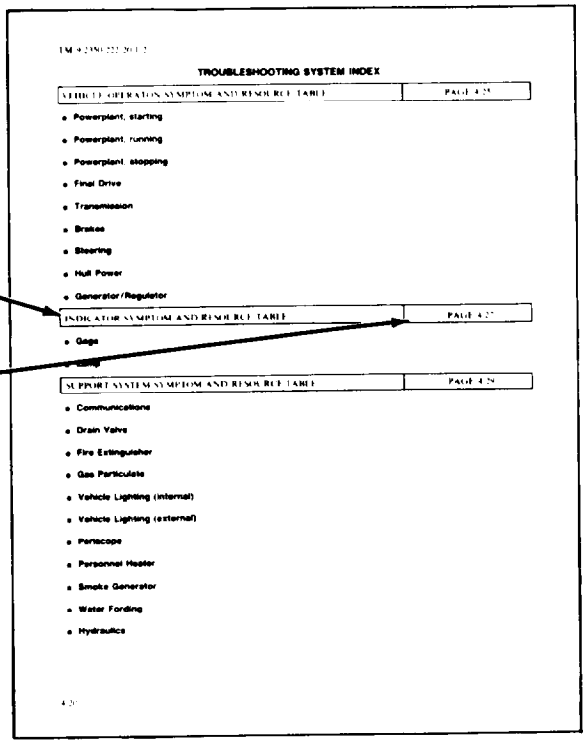
NO

7

- **Determine the test equipment, special tools and number of technicians required.**

YES

- **See Step (13) .**



TROUBLESHOOTING SYSTEM INDEX

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• Powerplant, starting	
• Powerplant, running	
• Powerplant, stopping	
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• Steering	
• Hull Power	
• Generator/Regulator	
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SUPPORT SYSTEM SYMPTOM AND RESOURCE TABLE	PAGE 4-29
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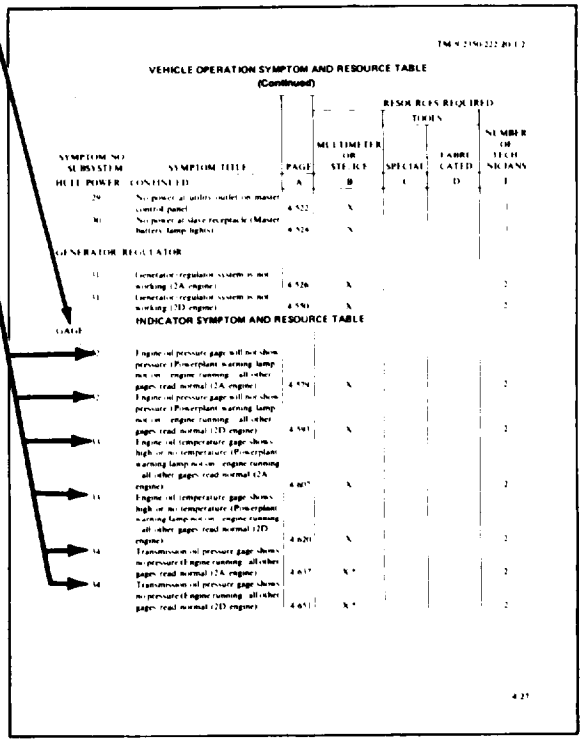
• Fire Extinguisher	
• Gas Particulate	
• Vehicle Lighting (internal)	
• Vehicle Lighting (external)	
• Periscope	
• Personnel Heater	
• Smoke Generator	
• Water Fording	
• Hydraulics	



VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE
(Continued)

SYMPTOM NO	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED: TOOLS: MULTIMETER OR STE/ICE A	TOOLS: SPECIAL C	TOOLS: FABRICATED D	NUMBER OF TECHNICIANS E
SUBSYSTEM						
HULL POWER - CONTINUED						
29	No power at utility outlet (on master control panel)	4-522	X			1
30	No power at slave receptacle (Master battery lamp lights)	4-524	X			1
GENERATOR/REGULATOR						
31	Generator regulator system is not working (2A engine)	4-526	X			2
31	Generator regulator system is not working (2D engine)	4-530	X			2
GAGE	INDICATOR SYMPTOM AND RESOURCE TABLE					
32	Engine oil pressure gage will not show pressure (Powerplant warning lamp not on - engine running - all other gages read normal (2A engine)	4-532	X			2
32	Engine oil pressure gage will not show pressure (Powerplant warning lamp not on - engine running - all other gages read normal (2D engine)	4-541	X			2
33	Engine oil temperature gage shows high or no temperature (Powerplant warning lamp not on - engine running - all other gages read normal (2A engine)	4-537	X			2
33	Engine oil temperature gage shows high or no temperature (Powerplant warning lamp not on - engine running - all other gages read normal (2D engine)	4-620	X			2
34	Transmission oil pressure gage shows no pressure (Engine running - all other gages read normal (2A engine)	4-617	X *			2
34	Transmission oil pressure gage shows no pressure (Engine running - all other gages read normal (2D engine)	4-631	X *			2

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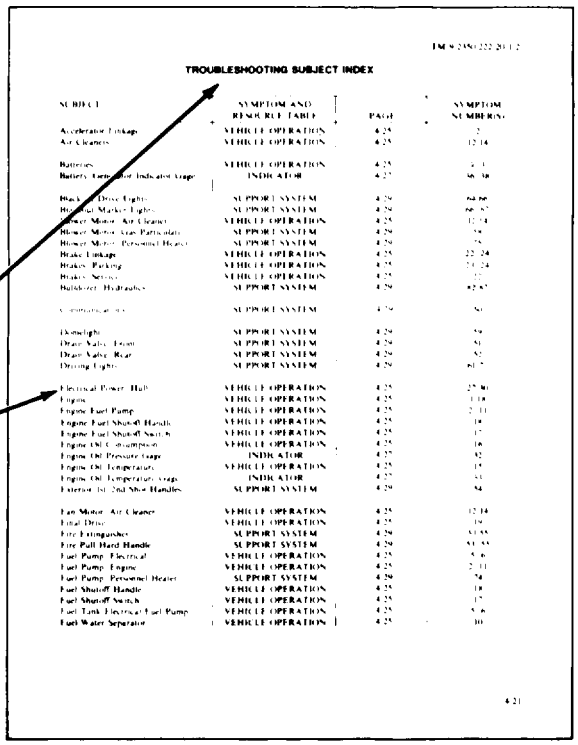
TROUBLESHOOTING
USER GUIDE
(Continued)

FROM STEP 4

8 **If you cannot locate the proper system/subsystem in the SYSTEM INDEX, find an item listed in the TROUBLESHOOTING SUBJECT INDEX that pertains to your trouble.**

- Turn to the TROUBLESHOOTING SUBJECT INDEX (page 4-21).
- Check the subjects listed in this index until you find one that pertains to your trouble.

Can you find an item that pertains to your trouble?



TROUBLESHOOTING SUBJECT INDEX

SUBJECT	SYMPTOM AND RESOURCE TABLE	PAGE	SYMPTOM NUMBERING
Accelerator Linkage	VEHICLE OPERATION	4-25	2
Air Cleaners	VEHICLE OPERATION	4-25	12-14
Batteries	VEHICLE OPERATION	4-25	1
Battery Isolator Indicator Gage	INDICATOR	4-27	56-58
Black Drive Lights	SUPPORT SYSTEM	4-29	64-66
Blackout Marker Lights	SUPPORT SYSTEM	4-29	66-67
Blower Motor, Air Cleaner	VEHICLE OPERATION	4-25	12-14
Blower Motor, Gas Particulate	SUPPORT SYSTEM	4-29	74
Blower Motor, Personnel Heater	SUPPORT SYSTEM	4-29	75
Brake Linkage	VEHICLE OPERATION	4-25	22-24
Brakes, Parking	VEHICLE OPERATION	4-25	23-24
Brakes, Service	VEHICLE OPERATION	4-25	22
Bulkhead, Hydraulics	SUPPORT SYSTEM	4-29	82-85
Communication	SUPPORT SYSTEM	4-29	50
Dome Light	SUPPORT SYSTEM	4-29	59
Drain Valve, Front	SUPPORT SYSTEM	4-29	81
Drain Valve, Rear	SUPPORT SYSTEM	4-29	82
Driving Lights	SUPPORT SYSTEM	4-29	60-63
Electrical Power, Hull	VEHICLE OPERATION	4-25	27-30
Engine	VEHICLE OPERATION	4-25	1-10
Engine Fuel Pump	VEHICLE OPERATION	4-25	2-11
Engine Fuel Shutoff Handle	VEHICLE OPERATION	4-25	18
Engine Fuel Shutoff Switch	VEHICLE OPERATION	4-25	17
Engine Oil Consumption	VEHICLE OPERATION	4-25	16
Engine Oil Pressure Gage	INDICATOR	4-27	52
Engine Oil Temperature	VEHICLE OPERATION	4-25	15
Engine Oil Temperature Gage	INDICATOR	4-27	53
Exterior Lt, 2nd Shot Handles	SUPPORT SYSTEM	4-29	54
Fan Motor, Air Cleaner	VEHICLE OPERATION	4-25	12-14
Final Drive	VEHICLE OPERATION	4-25	19
Fire Extinguisher	SUPPORT SYSTEM	4-29	93-95
Fire Pull Hand Handle	SUPPORT SYSTEM	4-29	93-95
Fuel Pump, Electrical	VEHICLE OPERATION	4-25	5-6
Fuel Pump, Engine	VEHICLE OPERATION	4-25	2-11
Fuel Pump, Personnel Heater	SUPPORT SYSTEM	4-29	74
Fuel Shutoff Handle	VEHICLE OPERATION	4-25	18
Fuel Shutoff Switch	VEHICLE OPERATION	4-25	17
Fuel Tank Electrical Fuel Pump	VEHICLE OPERATION	4-25	5-6
Fuel Water Separator	VEHICLE OPERATION	4-25	10

4-21

YES

NO

9 **Notify your supervisor.**

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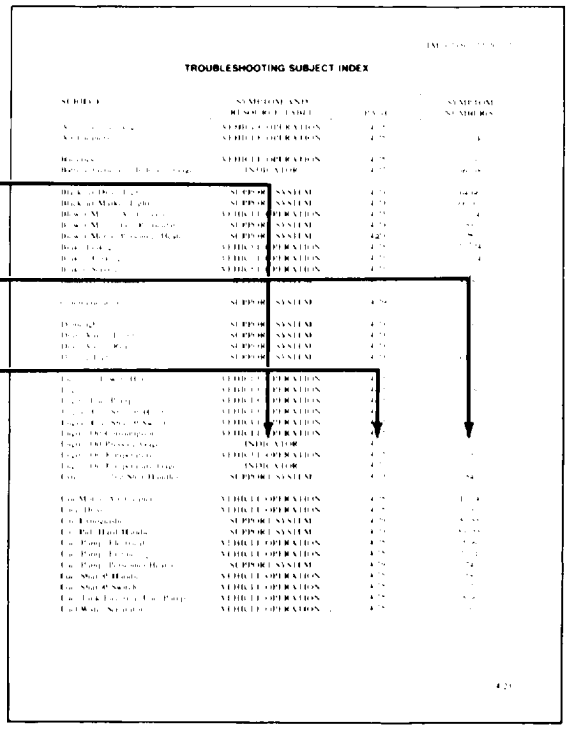
TROUBLESHOOTING
USER GUIDE
(Continued)

10 **Find the right Troubleshooting Procedure.**

- Check the SYMPTOM and RESOURCE TABLE listed for the subject you have selected.
- Note the symptom number(s) listed for your subject.
- Turn to the page number indicated for the SYMPTOM and RESOURCE TABLE.



TROUBLESHOOTING SUBJECT INDEX

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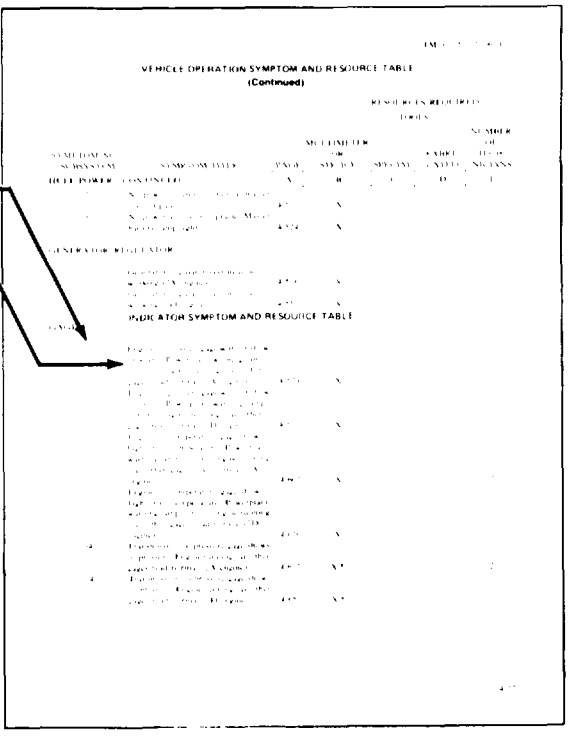
TROUBLESHOOTING
USER GUIDE
(Continued)

STEP (10) CONTINUED

- Find the same symptom number(s).
- The title listed for this number is the symptom title that describes your trouble.

NOTE

If there is more than one symptom number listed, review the symptom title for each number until you find the title that describes your trouble.


VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE
(Continued)

INDICATOR SYMPTOM AND RESOURCE TABLE

Have you found the proper symptom title?

NO

(11) **Notify your supervisor.**

YES

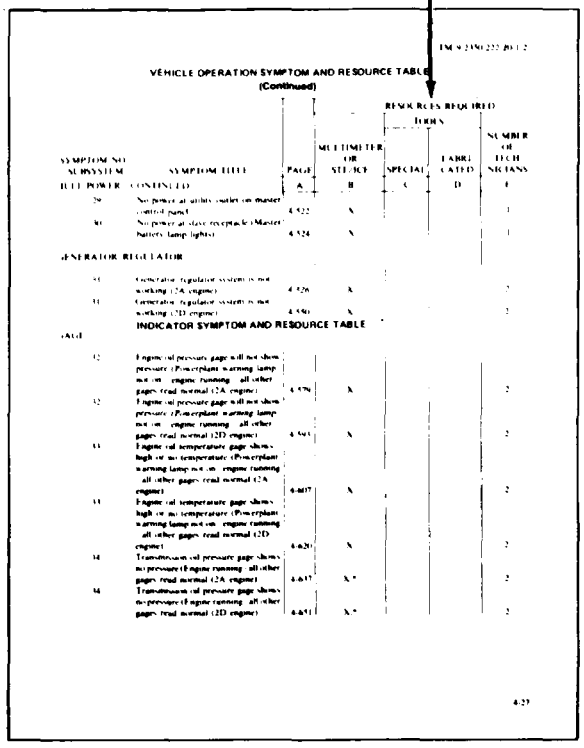
(12)
- **Determine the test equipment, special tools, and number of technicians required.**
- **See Step (13) .**

TROUBLESHOOTING
USER GUIDE
(Continued)

FROM STEP
(7) OR (12)

(13) **Determine the test equipment, special tools, and number of technicians needed to perform the troubleshooting procedure.**

- Locate the RESOURCES REQUIRED columns.
- An (X) in column B indicates that you will need test equipment. Either a multimeter or a STE/ICE set can be used. You do not need both.
- An (X,*) in column B indicates that the procedure test should be performed with the STE/ICE set. However, if a STE/ICE set is not available, troubleshooting may still be accomplished by using the alternate method provided in the Detailed Troubleshooting Procedure.
- Check column C to determine if you will need special tools.
- Check column D to determine if you will need fabricated tools.



VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE
(Continued)

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED: MULTIMETER OR STE/ICE (B)	TOOLS: SPECIAL (C)	TOOLS: FABRICATED (D)	NUMBER OF TECH SECTIONS
ELECTRICAL POWER	CONTINUED					
29	No power at utility outlet on master control panel	4-522	X			1
30	No power at slave receptacle (Master Battery lamp lights)	4-524	X			1
GENERATOR REGULATOR						
31	Generator regulator system is not working (2A engine)	4-526	X			2
31	Generator regulator system is not working (2D engine)	4-530	X			2

INDICATOR SYMPTOM AND RESOURCE TABLE

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED: MULTIMETER OR STE/ICE (B)	TOOLS: SPECIAL (C)	TOOLS: FABRICATED (D)	NUMBER OF TECH SECTIONS
GAGE						
32	Engine oil pressure gage will not show pressure (Pressure warning lamp not on, engine running, all other gages read normal (2A engine)	4-536	X			2
32	Engine oil pressure gage will not show pressure (Pressure warning lamp not on, engine running, all other gages read normal (2D engine)	4-541	X			2
33	Engine oil temperature gage shows high or no temperature (Pressure warning lamp not on, engine running, all other gages read normal (2A engine)	4-607	X			2
33	Engine oil temperature gage shows high or no temperature (Pressure warning lamp not on, engine running, all other gages read normal (2D engine)	4-620	X			2
34	Transmission oil pressure gage shows no pressure (Engine running, all other gages read normal (2A engine)	4-633	X*			2
34	Transmission oil pressure gage shows no pressure (Engine running, all other gages read normal (2D engine)	4-651	X*			2

4-29

NOTE

- **The numbers listed in column C are reference code numbers.**
- **If column C has a reference code number listed, turn to Chapter 3, Section 1 (page 3-1).**
- **Locate the same reference code number in this section. This code will indicate which special tool is needed.**

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TROUBLESHOOTING
USER GUIDE
(Continued)

STEP (13) CONTINUED

NOTE

- **The numbers listed in column D are figure numbers.**
- **If column D has a figure number listed, turn to APPENDIX F (page F-1).**
- **Locate the same figure number in this appendix. This figure will indicate which fabricated tool is needed.**

- Check column E to determine how many technicians are required to perform the procedure.

Now that you have identified the trouble; found the right troubleshooting procedure; and obtained the test equipment, special tools, and number of technicians required: What is the last step to good troubleshooting?

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TROUBLESHOOTING
USER GUIDE
(Continued)

WARNING

Do not start your troubleshooting procedure until you have studied Step (16) . This step contains important information you will need to know in order to perform the procedure safely.

14

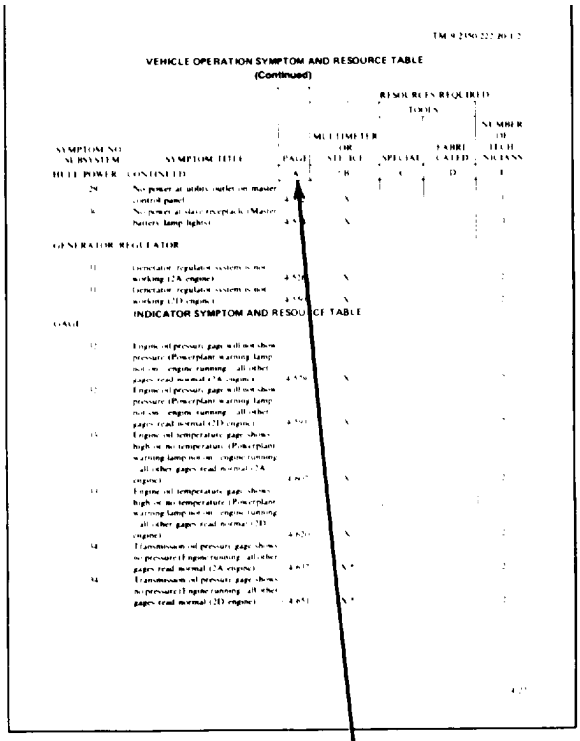
Use the troubleshooting procedure to locate, isolate, and repair the trouble.

- After studying Step (16) , you will be ready to begin your Troubleshooting Procedure.

Are you familiar with the IMPORTANT TROUBLESHOOTING INFORMATION contained in Step (16) ?

NO

YES


VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE
(Continued)

INDICATOR SYMPTOM AND RESOURCE TABLE

15

- **Turn to the page number indicated in column A.**
- **On this page you will locate the procedure that pertains to your trouble.**
- **Use this Detailed Troubleshooting procedure to locate, isolate, and repair the trouble.**

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TROUBLESHOOTING
USER GUIDE
(Continued)

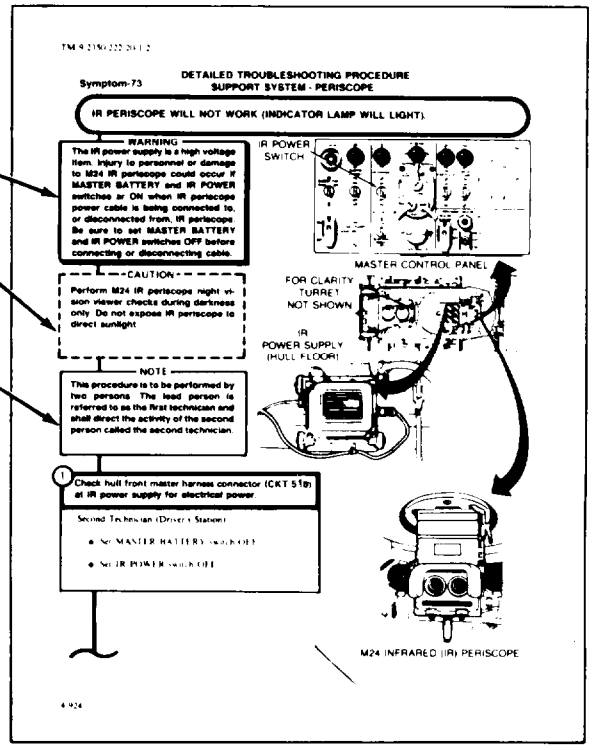
16

IMPORTANT TROUBLESHOOTING INFORMATION.

- Be sure you read every WARNING, CAUTION, and NOTE.
- A WARNING indicates possible injury to personnel. It may also include equipment damage.
- A CAUTION indicates possible equipment damage only.
- A NOTE contains information you will need to know in order to properly perform the troubleshooting procedure.

WARNING

- **Be sure there is no electrical power at the cable to be disconnected or repaired.**
- **Before making cable repairs or disconnecting any cable, be sure MASTER BATTERY switch is set OFF.**



TA141633

TROUBLESHOOTING

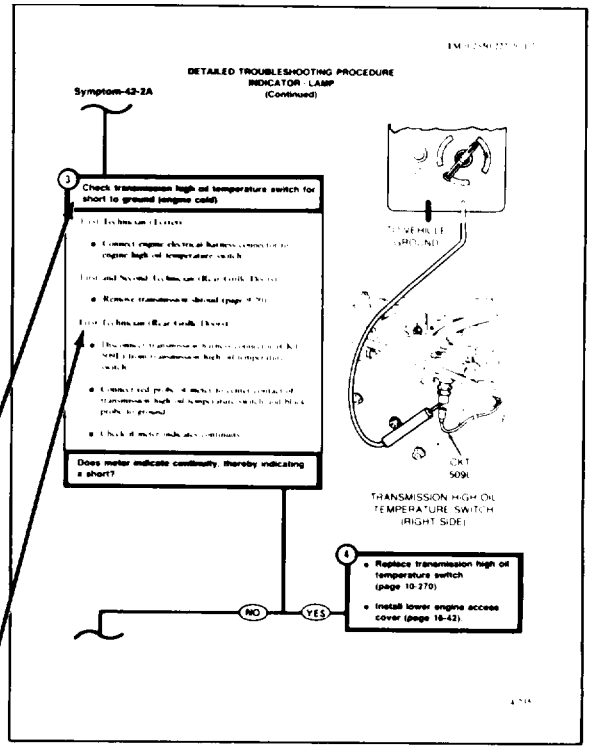
USER GUIDE
(Continued)

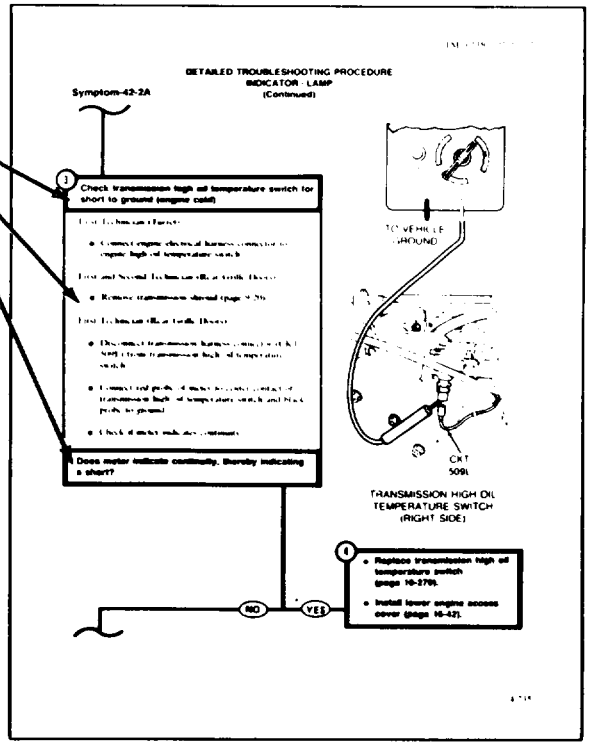
STEP 16 CONTINUED

WARNING

- **Setting MASTER BATTERY switch OFF will not de-energize the following circuits: 14A, 49, 50, 81, 82, 400, 405, 459, and 975. When working with any of the above circuits, the battery ground cables must be disconnected.**
- **Failure to de-energize any electrical circuit may result in serious injury to personnel and damage to equipment.**

- If you are a skilled technician and already know how to perform the test or inspection called for here, you may omit the part of that step that is not shaded with heavy lines and printed in bold type.
- If you do not know how to do the test or inspection called for, you must perform every part of each step.





TA141634

TROUBLESHOOTING
USER GUIDE
(Continued)

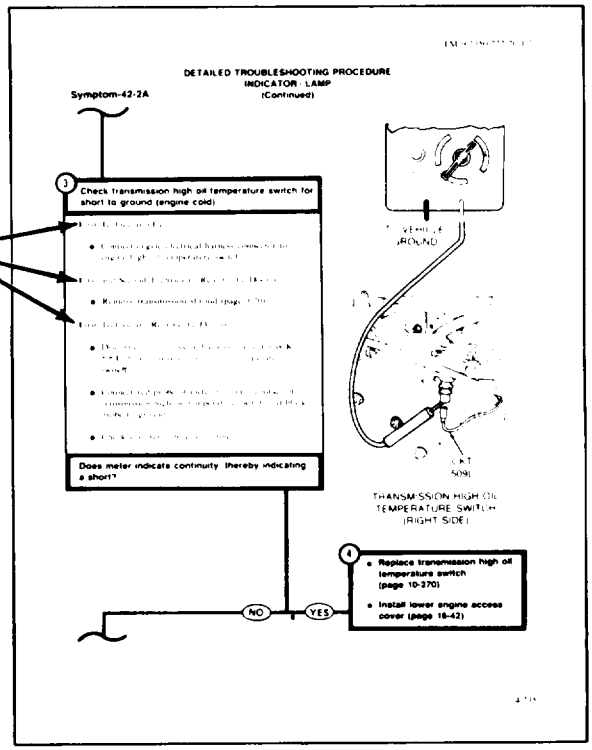
STEP 16 CONTINUED

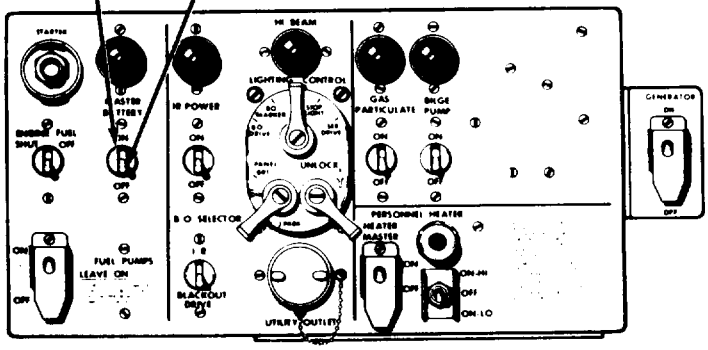
- These locators tell you two things:
  - Which technician will do the task that follows.
  - Where this technician must be in order to do the task.

EXAMPLE: First Technician (Driver's Station)

- The words printed in BOLD TYPE show you what you will see marked on the actual equipment you will be using.

EXAMPLE: • Set MASTER BATTERY switch OFF.





MASTER CONTROL PANEL

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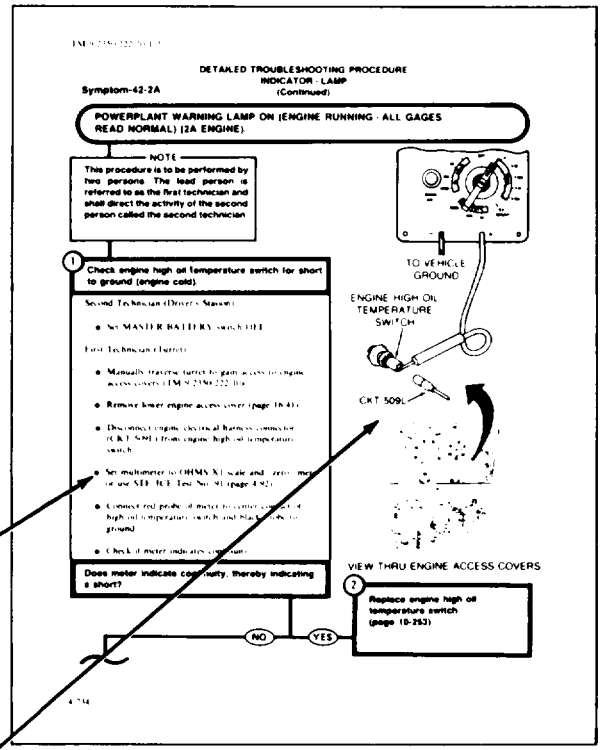
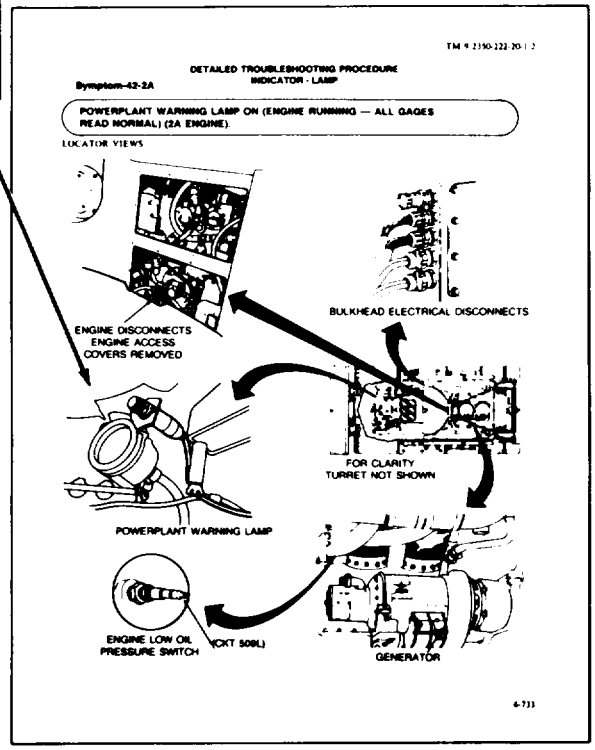
TROUBLESHOOTING
USER GUIDE
(Continued)

STEP 16 CONTINUED

- **Many steps call for the use of test equipment.**
- **If you do not know how to use this equipment (or if you have forgotten how to do the test called for) see page 4-32 for multimeter instructions or page 4-50, for STE/ICE instructions.**
- **A picture is included with most steps to make the task easier to understand, or show you where a particular part is located.**



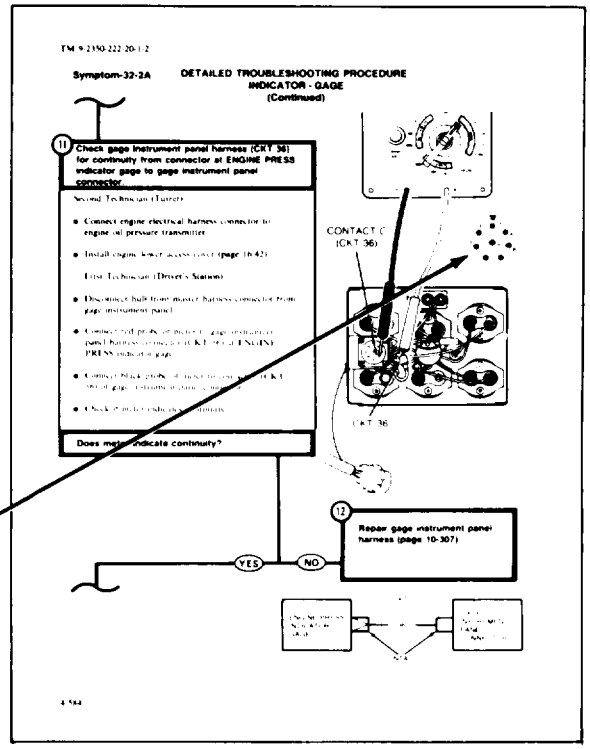


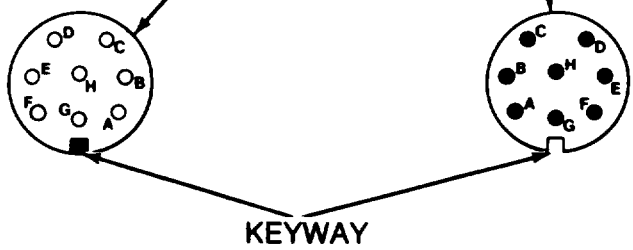
TA141636

USER GUIDE (Continued)

STEP 16 CONTINUED

- Many of the electrical troubleshooting checks in this manual involve harness connector contacts. Cramped work areas and insufficient lighting make identification of contacts difficult.
- Connector diagrams are included to assist the technician in locating the proper contact. By noting the position of the keyway, the contact for the circuit under test can be easily located.
- Male contacts are indicated by solid circles.
- Female contacts are indicated by open circles.



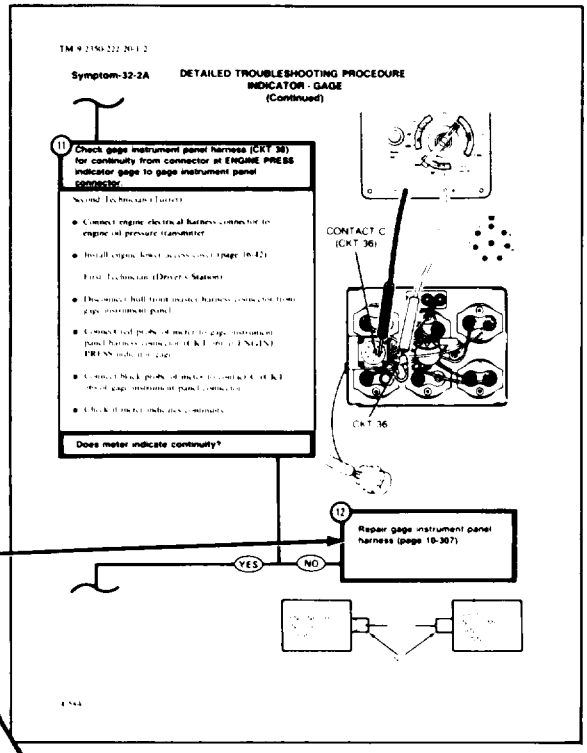


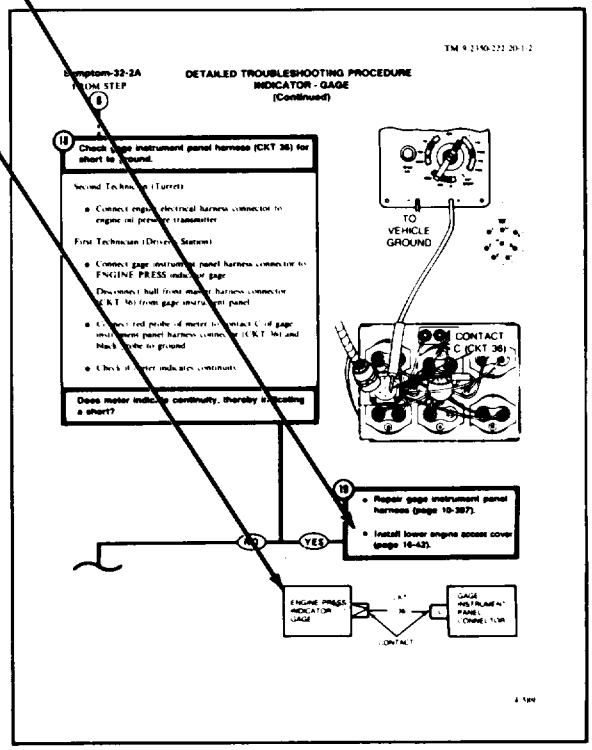
TA141637

TROUBLESHOOTING
USER GUIDE
(Continued)

STEP 16 CONTINUED

- When a step tells you inspect for bent/broken connector contacts or loose wires at the rear of connectors (or repair a harness) - a harness circuit diagram is included.
- This harness circuit diagram will show you which connectors to inspect/repair and where they are located.
- See page 4-97 for explanation of these harness circuit diagrams.





TA141638

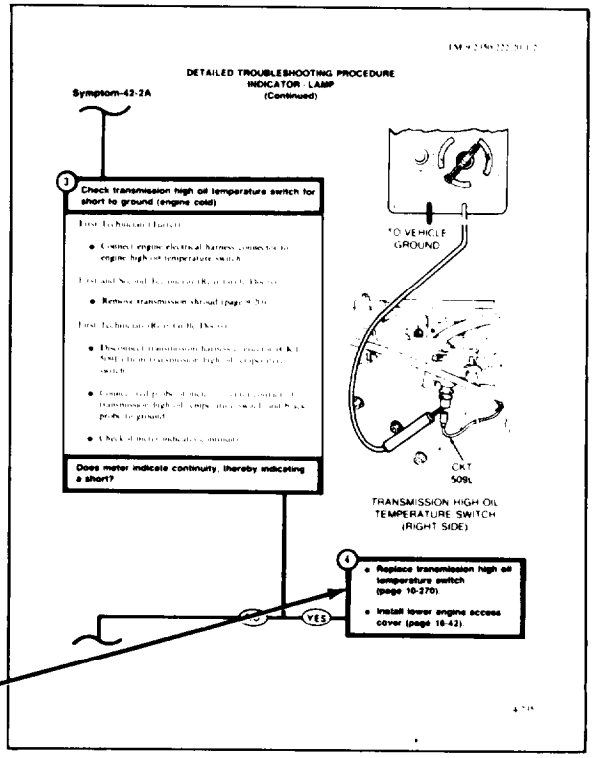
TROUBLESHOOTING
USER GUIDE
(Continued)

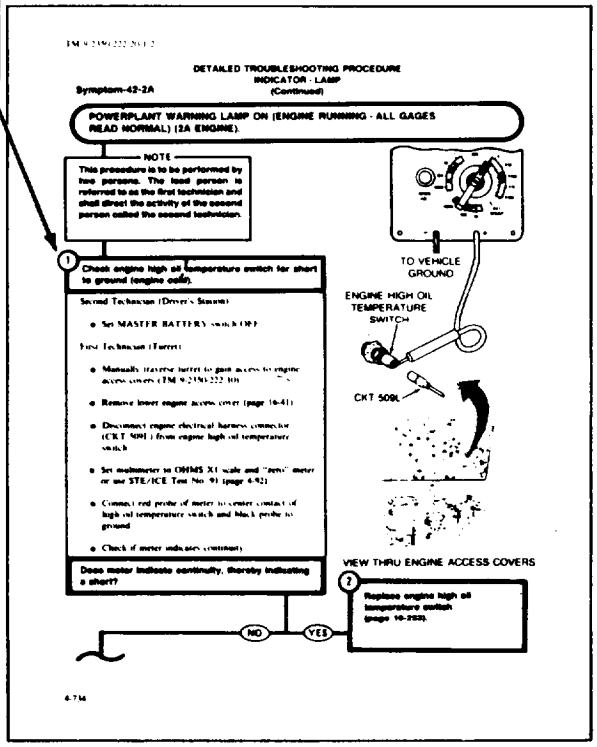
STEP (16) CONTINUED

NOTE

- **For the benefit of the skilled technician, a complete wiring diagram of the vehicle hull is included in this manual.**
- **See (page E-1) for this diagram.**

- After you finish any repair in a troubleshooting procedure, check to see that the trouble has been corrected.
- If the problem still exists, go back to Step (1) of the same procedure and continue troubleshooting.





TA141639

TROUBLESHOOTING
USER GUIDE
(Continued)

STEP 16 CONTINUED

Do you understand all the information in this USER GUIDE?

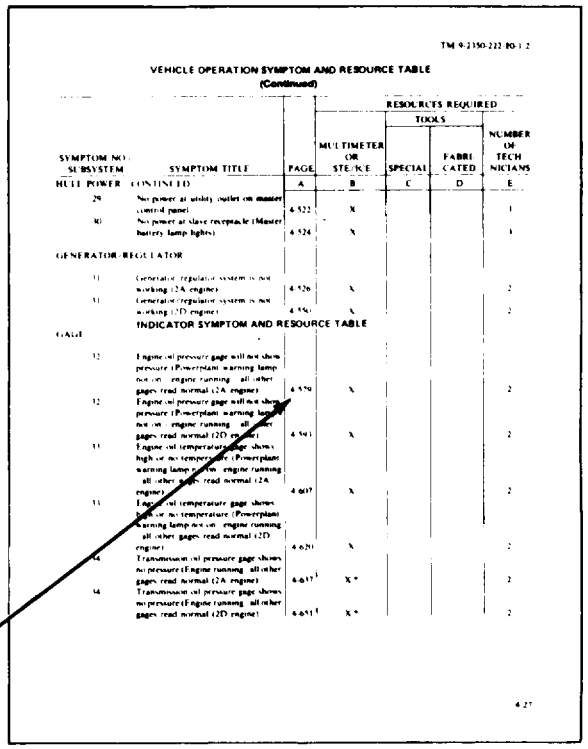
NO

17 **Ask your supervisor to help you with the part you don't understand.**

YES

18

- **Turn to the page number indicated in column A.**
- **On this page you will see the procedure that pertains to your trouble.**
- **Use this DETAILED TROUBLESHOOTING PROCEDURE to locate, isolate and repair the trouble.**



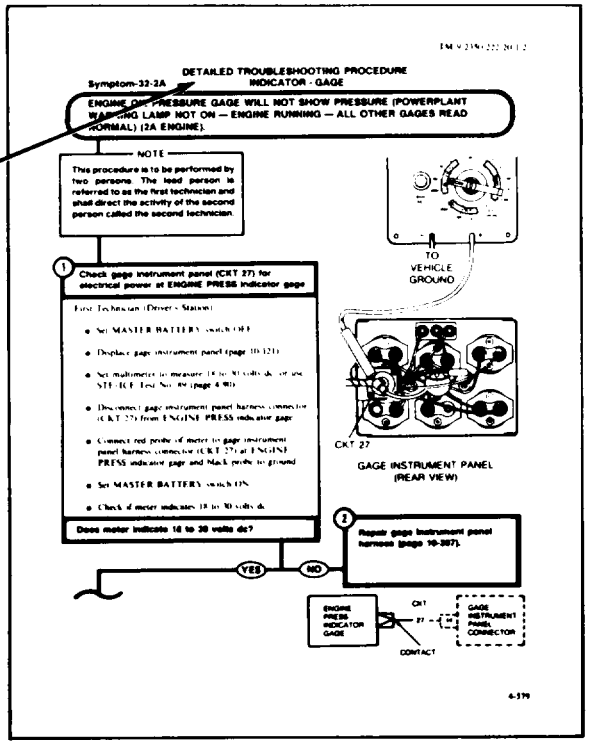
VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE
(Continued)

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED: TOOLS: MULTIMETER OR ST/E/ICE	TOOLS: SPECIAL	TOOLS: FABRICATED	NUMBER OF TECHNICIANS
		A	B	C	D	E
HEAT POWER - CONTINUED						
29	No power at utility outlet on master control panel	4-522	X			1
30	No power at slave receptacle (Master battery lamp lights)	4-524	X			1
GENERATOR/REGULATOR						
31	Generator/regulator system is not working (2A engine)	4-526	X			2
31	Generator/regulator system is not working (2D engine)	4-55(	X			2

INDICATOR SYMPTOM AND RESOURCE TABLE

GAGE						
32	Engine oil pressure gage will not show pressure (Powerplant warning lamp not on - engine running - all other gages read normal (2A engine)	4-579	X			2
32	Engine oil pressure gage will not show pressure (Powerplant warning lamp not on - engine running - all other gages read normal (2D engine)	4-583	X			2
33	Engine oil temperature gage shows high or no temperature (Powerplant warning lamp not on - engine running - all other gages read normal (2A engine)	4-607	X			2
33	Engine oil temperature gage shows high or no temperature (Powerplant warning lamp not on - engine running - all other gages read normal (2D engine)	4-620	X			2
34	Transmission oil pressure gage shows no pressure (Engine running - all other gages read normal (2A engine)	4-631[1]	X*			2
34	Transmission oil pressure gage shows no pressure (Engine running - all other gages read normal (2D engine)	4-651[1]	X*			2

4-27



DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE

Symptom-32-2A

ENGINE OIL PRESSURE GAGE WILL NOT SHOW PRESSURE (POWERPLANT WARNING LAMP NOT ON — ENGINE RUNNING — ALL OTHER GAGES READ NORMAL) (2A ENGINE).

NOTE
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check gage instrument panel (CKT 27) for electrical power at ENGINE PRESS indicator gage

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace gage instrument panel (page 10-321).
- Set multimeter to measure 18 to 30 volts dc or use ST/E/ICE Test Set No. 49 (page 4-40).
- Disconnect gage instrument panel harness connector (CKT 27) from ENGINE PRESS indicator gage.
- Connect red probe of meter to gage instrument panel harness connector (CKT 27) at ENGINE PRESS indicator gage and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES NO

2 Repair gage instrument panel harness (page 10-307).

TO VEHICLE GROUND

CKT 27

GAGE INSTRUMENT PANEL (REAR VIEW)

ENGINE PRESS INDICATOR GAGE

CKT 27

GAGE INSTRUMENT PANEL CONNECTOR

CONTACT

6-579

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TROUBLESHOOTING SYSTEM INDEX

TA141641

TROUBLESHOOTING SUBJECT INDEX

TA253051

TROUBLESHOOTING SUBJECT INDEX
(Continued)

TA248783

TROUBLESHOOTING SUBJECT INDEX
(Continued)

TA248784

TROUBLESHOOTING SUBJECT INDEX
(Continued)

TA248785

VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE

SYMPTOM NO./ SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
				TOOLS		
			MULTIMETER OR STE/ICE	SPECIAL	FABRI-CATED	NUMBER OF TECH-NICIANS
POWERPLANT, STARTING		A	B	c	D	E
1	Engine will not crank when starter switch is pressed (2D engine)	4-131	x,*			2
2	Engine cranks at normal speed, but will not start (Battery/Generator gage shows in yellow area).	4-166	x			2
3	Engine cranks slowly and will not start.	4-210	X,*			2
4	Engine starter spins, but will not crank engine.	4-230				1
5	One electrical fuel pump will not work.	4-232	x			2
6	Both electrical fuel pumps will not work.	4-253	x			1
7	Primer pump will not work.	4-258				2
8	One intake manifold preheater will not work.	4-283	x			2
9	Both intake manifold preheater will not work (2D engine).	4-308	x			2
10	Fuel/Water Separator will not work (2D engine).	4-337	x			2
POWERPLANT, RUNNING						
11	Engine will not run right (2D engine)	4-371	X,*			2
12	One air cleaner blower fan will not work.	4-394	x			2
13	Both air cleaner blower fans in one air cleaner assembly will not work.	4-403	x			2
14	All air cleaner blower fans will not work.	4-409	x			2
15	Engine oil temperature gage shows high temperature (Powerplant warning lamp on).	4-419				2

VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE
(Continued)

SYMPTOM NO./ SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
				TOOLS		
			MULTIMETER OR STE/ICE	SPECIAL	FABRI-CATED	NUMBER OF TECH-NICIANS
POWERPLANT, RUNNING - CONTINUED		A	B	c	D	E
16	Engine oil level too low (Exceeds 3.5 quarts per hour,while running).	4-423	X.*			2
16.1	Powerplant warning and dust detector warning lights on. one (or both) dust detector pressure switch(es) tripped. and dust detector filter strip indicates contamination of intake air by dust	4-428				1
16.2	Powerplant warning and dust detector warning lights on, one (or both) dust detector pressure switch(es) tripped, and dust detector filter strip indicates contamination of intake air by fuel.	4-428.3				1
16.3	Powerplant warning and dust detector warning lights on, one (or both) dust detector pressure switch(es) tripped, and dust detector filter strip indicates contamination of intake air by soot	4-428.5				1
16.4	Powerplant warning and dust detector warning lights on, one (or both) dust detector pressure switch(es) tripped. and dust detector filter strip indicates contamination of intake air by water	4-428.7				1
16.5	Powerplant warning and dust detector warning lights on, one (or both) dust detector pressure switch(es) tripped. and dust detector filter strip is black and wet. indicating contamination of intake air by oil	4-428.9				1
16.6	Powerplant warning and dust detector warning lights are on (engine running - all gages read normal)	4-428.10				1

VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE
(Continued)

SYMPTOM NO./ SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
				TOOLS		
			MULTIMETER OR STE/ICE	SPECIAL	FABRI-CATED	NUMBER OF TECH-NICIANS
POWERPLANT, RUNNING - CONTINUED		A	B	c	D	E
16.7	Powerplant warning and dust detector warning light on, one (or both) dust detector pressure switch(es) tripped, but dust detector filter strip does not indicate contamination of intake air	4-428.12				1
16.8	Powerplant warning and dust detector warning lights on, but dust detector pressure switch(es) not tripped	4-428.13	x			1
16.9	Powerplant warning and dust detector warning lights not on. Dust detector pressure switch(es) not tripped. Dust ingestion is apparent by oil sample analysis or dust trails	4-428.17				1
16.10	Powerplant warning light on, dust detector warning light off, dust detector pressure switch(es) tripped, engine running	4-428.19	x			1
16.11	Dust detector pressure switch(es) tripped, but dust detector warning light and powerplant warning light do not come on when engine is running	4-428.22	x			1
16.12	Visual inspection/AOAP indicates dust ingestion, dust detector warning light and powerplant warning light not on	4-428.26				1
16.13	Low power, excessive black smoke, one or both filters require frequent cleaning	4-428.27				1
16.14	Low power, excessive black smoke	4-428.31				1

VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE
(Continued)

SYMPTOM NO./ SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
				TOOLS		
			MULTIMETER OR STE/ICE	SPECIAL	FABRI-CATED	NUMBER OF TECH-NICIANS
POWERPLANT, STOPPING		A	B	c	D	E
17	Engine fuel shutoff switch will not stop engine (2D engine)	4-438	x			2
18	Manual fuel shutoff handle will not stop engine (2D engine)	4-451				1
FINAL DRIVE						
19	Final drive leaks oil	4-452				2
TRANSMISSION						
20	Transmission will not shift properly	4-456				2
21	Transmission oil temperature gage shows high temperature (Powerplant warning lamp ON)	4-468				2
BRAKES						
22	Service brakes will not work right	4-475				2
23	Parking brake will not release	4-483				2
24	Parking brake cannot be applied	4-486				2
STEERING						
25	Vehicle will not steer properly	4-493				2
26	Vehicle pivots to the left or right	4-501				2
HULL POWER						
27	No power distribution from master relay to hull and/or turret (master battery indicator lamp will light)	4-506	x			2
28	No power in vehicle (Master battery indicator lamp will not light)	4-516	x,*			2

VEHICLE OPERATION SYMPTOM AND RESOURCE TABLE

(Continued)

SYMPTOM NO./ SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
				TOOLS		
			MULTIMETER OR STE/ICE	SPECIAL	FABRI-CATED	NUMBER OF TECH-NICIANS
HULL POWER CONTINUED		A	B	c	D	E
29	No power at utility outlet on master control panel.	4-522	x			1
30	No power at slave receptacle (Master battery lamp lights).	4-524	x			1
GENERATOR/REGULATOR						
31	Generator/regulator system is not working (2A engine).	$-526	x			2
31	Generator/regulator system is not working (2D engine).	4-550	x			2
	INDICATOR SYMPTOM AND RESOURCE TABLE					
GAGE						
32	Engine oil pressure gage will not show pressure (Powerplant warning lam not on - engine running - all other gages read normal (2A engine).	4-579	x			2
32	Engine oil pressure gage will not show pressure (Powerplant warning lam not on - engine running - all other gages read normal (2D engine).	4-593	x			2
33	Engine oil temperature gage show: high or no temperature (Powerplant warning lamp not on - engine running - all other gages read normal (2A engine).	4-607	x			2
33	Engine oil temperature gage shows high or no temperature (Powerplant warning lamp not on - engine running - all other gages read normal (2D engine).	4-620	x			2
34	Transmission oil pressure gage shows no pressure (Engine running - all other gages read normal (2A engine).	4-637	X,*			2
34	Transmission oil pressure gage shows no pressure (Engine running - all other gages read normal (2D engine).	4-651	X,*			2

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INDICATOR SYMPTOM AND RESOURCE TABLE
(Continued)

SYMPTOM NO./ SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED — TOOLS: MULTI-METER OR STE/ICE	TOOLS: SPECIAL	TOOLS: FABRI-CATED	NUMBER OF TECH-NICIANS
GAGE CONTINUED		A	B	c	D	E
35	Transmission oil temperature gage shows high or no temperature (Powerplant warning lamp not on - engine running - all other gages read normal.	4-669	X			2
36	Battery/generator gage will not work (all other gages work).	4-694	**X**			1
37	Battery/generator gage pointer in right red area.	4-695	X,*			2
38	Battery/generator gage pointer in yellow or left red area (engine running).	4-700	X,*			2
39	Fuel level gage will not work (all other gages work).	4-702	**X**			2
40	All gages on gage instrument panel will not work (engine running).	4-715	**X**			1
LAMP						
41	Powerplant warning lamp will not come on (Engine not running) (2A engine).	4-720	**X**			2
41	Powerplant warning lamp will not come on (Engine not running) (2D engine).	4-725	X			2
42	Powerplant warning lamp on (Engine running - all gages read normal (2A engine).	4-733	**X**			2
42	Powerplant warning lamp on (Engine running - all gages read normal) (2D engine).	4-741	X			2
43	Master battery indicator lamp will not light (There is power in vehicle).	4-752	X			1
43.1	Bilge pump indicator lamp will not work (Bilge pump works)	4-752.1	X			1
44	Gas particulate indicator lamp will not light (Gas particulate blower works).	4-753	X			1
45	Personnel heater indicator lamp will not light (Personnel heater works).	4-754	X			1
46	Night vision/IR indicator lamp will not light (Night vision/IR viewer will work).	4-759	**X**			1

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INDICATOR SYMPTOM AND RESOURCE TABLE
(Continued)

SYMPTOM NO./ SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
				TOOLS		
			MULTIMETER OR STE/ICE	SPECIAL	FABRI-CATED	NUMBER OF TECH-NICIANS
LAMP CONTINUED		A	B	C	D	E
47	High beam indicator lamp will not light when white service and/or B.O. service high beam lamps are on.	4-760	X			1
48	Smoke generator indicator lamp will not light (Smoke generator will make smoke).	4-767	X			1
49	Hydraulic pump indicator lamp will not light (There is hydraulic power in vehicle).	4-769	X			1
COMMUNICATIONS	SUPPORT SYSTEM SYMPTOM AND	INDEX				
50	Static or whining noise in radio (Electromagnetic interference EMI).	4-770				2
DRAIN VALVE						
51	Front drain valve will not work.	4-793				1
52	Rear drain valve will not work.	4-794				2
FIRE EXTINGUISHER						
53	Fixed fire extinguisher fails to operate when FIRE-PULL HARD handle is pulled.	4-798				1
54	Fixed fire extinguisher fails to operate when exterior FIRST SHOT or SECOND SHOT handles are pulled.	4-804				2
55	Engine does not stop running when FIRE-PULL HARD handle is pulled (Engine fuel shut-off switch on master control panel will work).	4-812	X			2
GAS PARTICULATE						
56	Driver's gas particulate air temperature will not adjust.	4-824	X			1
57	Driver's gas particulate hose will not deliver sufficient air flow.	4-827				1
58	Gas particulate blower motor will not run.	4-835	X			1

TA141650

SUPPORT SYSTEM SYMPTOM AND RESOURCE TABLE
(Continued)

SYMPTOM NO./ SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
				TOOLS		
			MULTI-METER OR STE/ICE	SPECIAL	FABRI-CATED	NUMBER OF TECH-NICIANS
VEHICLE LIGHTING (Internal)		A	B	C	D	E
59	Driver's domelight will not light.	4-843	X			1
60	Gage instrument panel lamps will not light (Panel light switch at BRIGHT).	4-847	X			2
VEHICLE LIGHTING (External)						
61	Lights controlled by lighting control switch will not light (Panel switch at OFF, BRIGHT, or DIM).	4-852	X			1
62	Panel and drive lights are very dim or will not light, with panel light switch at BRIGHT, DIM, or PARK (Lights are OK with panel light switch at OFF).	4-855	X			2
63	Service stoplight will not light.	4-860	X			2
64	B.O. stoplight will not light.	4-869	X			2
65	B.O. drive lamp will not light (IR service lamps will light).	4-875	X			2
66	Both B.O. taillights and/or both B.O. marker lights will not light.	4-880	X			2
67	One headlight B.O. marker lamp or one taillight B.O. marker lamp will not light.	4-885	X			2
68	High beam or low beam, in one service headlight lamp, will not light - or service taillight will not light (Panel light switch at BRIGHT, DIM, or OFF).	4-890	X			2
69	Both high beam and/or both low beam service lamps will not light (Dimmer switch in either position).	4-902	X			1
70	Both high beam or both low beam IR lamps will not light.	4-906	X			1
71	IR lamps will not light.	4-909	X			2
PERISCOPE						
72	Night vision/IR periscope will not work (Night vision/IR power indicator lamp will not light).	4-920	X			1
73	IR periscope will not work (IR power indicator lamp will light).	4-924	X			2
73.1	Night vision viewer will not work (Night vision indicator lamp will light).	4-928.1	X			1

TA253055

SUPPORT SYSTEM SYMPTOM AND RESOURCE TABLE
(Continued)

SYMPTOM NO./ SUBSYSTEM SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
			TOOLS		
		MULTI-METER OR STE/ICE	SPECIAL	FABRI-CATED	NUMBER OF TECH-NICIANS
PERSONNEL HEATER	A	B	c	D	E
74 No heat from personnel heater.	4-929	X			1
75 Personnel heater HI/LO switch will not control heater (blower runs in one or both ON-HI, ON-LO switch positions).	4-948	X			1
76 Personnel heater starts, workа for a short time, then stops.	4-956				2
77 Exhaust fumes from personnel heater inside vehicle.	4-961				1
SMOKE GENERATOR					
78 Smoke generator will not work (No smoke or quantity of smoke is not normal).	4-963	X			2
WATER FORDING					
79 Hull-turret inflatable seal will not work (leaks when fording).	4-977				1
79.1 Bilge pump will not work.	-984.1	X			1
HYDRAULICS (BULLDOZER)					
80 No hydraulic power in hull or turret (Indicator light ON).	4-985	X			2
81 No hydraulic power (Hydraulic pump indicating lamp will not light).	4-997	X			1
82 No hydraulic power to turret (Bulldozer blade rises and lowers).	4-1002				2
83 Bulldozer blade operation sluggish in both directions.	4-1014				2
84 Bulldozer blade creeps down in hold.	4-1035				2
85 Bulldozer blade will not float.	4-1045				2
86 Bulldozer blade will not raise.	4-1051				2
87 Bulldozer blade will not lower (Dig).	L1057				2

An (X) in column B indicates that you will need test equipment. Either a multimeter or an STE/ICE set can be used. You do not need both.

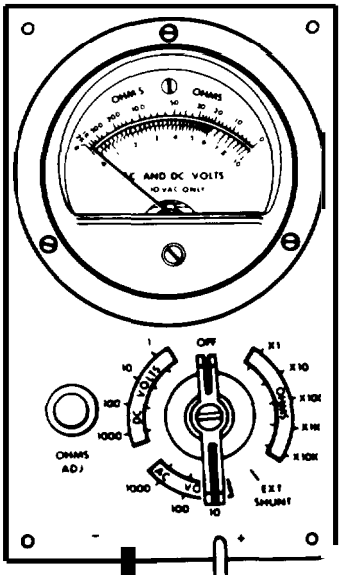
An (X,*) in column B indicates that the procedure test should be performed with the STE/ICE set. If an STE/ICE set is not available, troubleshooting may still be accomplished by using the alternate method provided in the Detailed Troubleshooting Procedure.

TA253056

USE OF AN/URM-105 OR ME-77 C/U MU LTIMETER.

N O T E

If you are familiar with the MULTI METER BEFORE OPERATION PREVENTIVE MAINTENANCE CHECKS AND SERVICES explained in Steps (1) through (11) proceed to Step (12) : MULTIMETER TESTS AND MEASUREMENTS.



AN/URM-105
OR
ME-77 c/u
MU LTIMETER

(1) **Multimeter before operation preventive maintenance** checks **and services:**

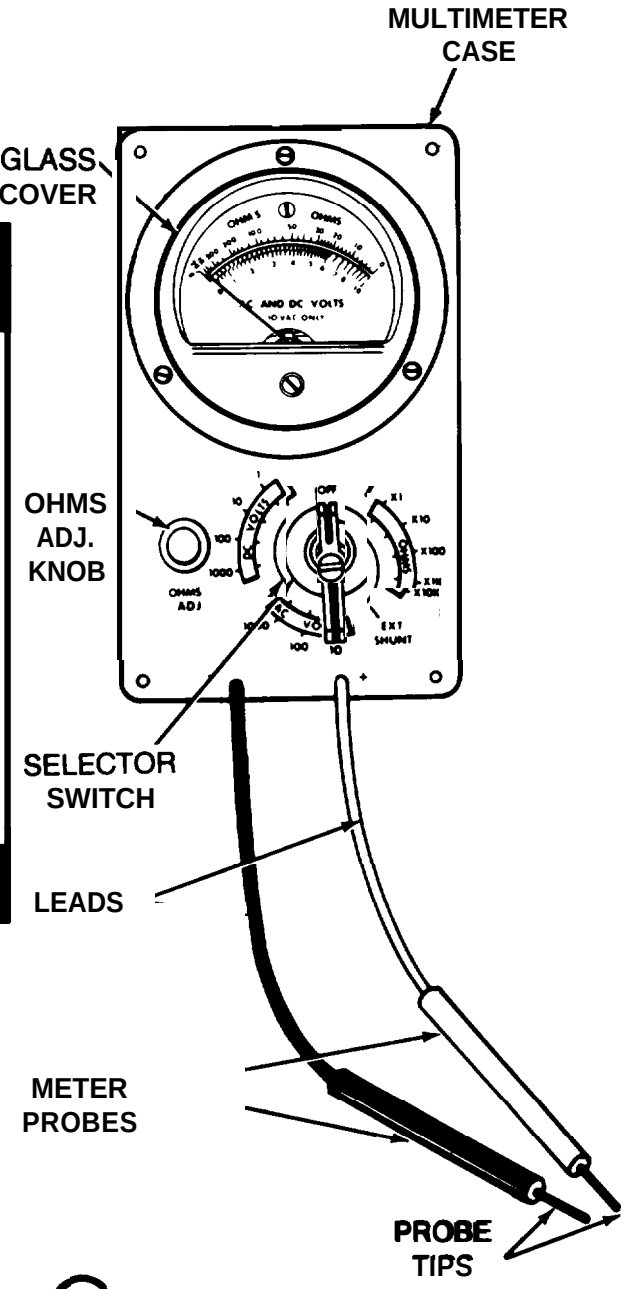
- Locate calibration sticker on multimeter case.
- Check dates on calibration sticker and determine if multimeter has been calibrated within the **past** year.

NO — YES

(2) **Turn in multimeter for cal-**
i

TA141653

USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)



3 **Inspect multimeter for damage.**

- Check if **multimeter** case is damaged.
- Check if glass cover over meter scale is damaged.
- Check if OHMS ADJ knob turns freely from maximum counterclockwise to maximum clockwise position.
- Check if selector switch turns through **all** switch positions. A "click" sound should be heard as selector switch stops at each position.
- Check if leads to meter probes are damaged.
- Check if probe tips are **missing, loose,** or dirty.

Is multimeter damaged?

NO — YES

4

- **If probe tips are loose or dirty, clean and tighten tips.**
- **If probe tips are not loose or dirty, turn In multimeter for repair.**

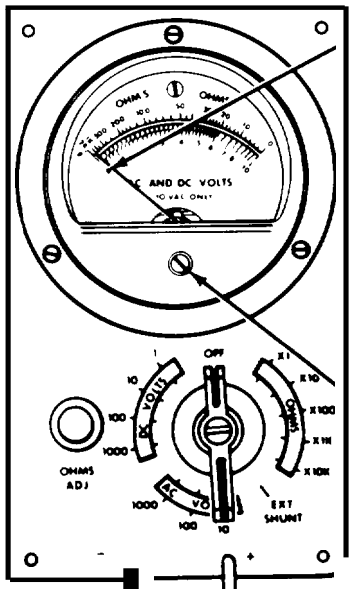
TA141654

USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

5 **Mechanically adjust meter needle to zero position.**

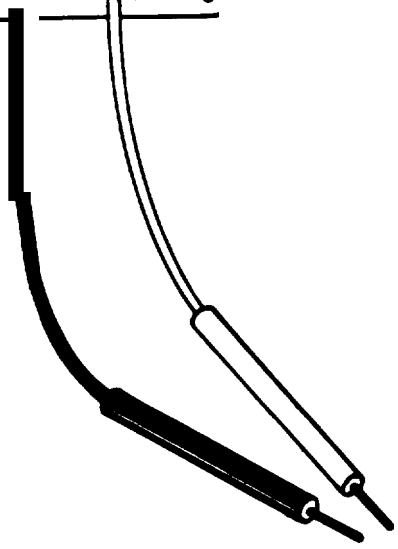
- Place **multimeter** in position of use (upright or flat on back).
- Check that meter probes are not connected to a circuit.
- Check that probe tips are not touching each other.
- Turn adjustment screw until meter needle is over black zero mark on far left side of bottom scale.

Does meter needle mechanically adjust to black zero mark?



METER NEEDLE (SHOWN OVER BLACK ZERO MARK ON FAR LEFT SIDE OF BOTTOM SCALE)

ADJUSTMENT SCREW



YES

NO

6 **Turn in multimeter for repair.**

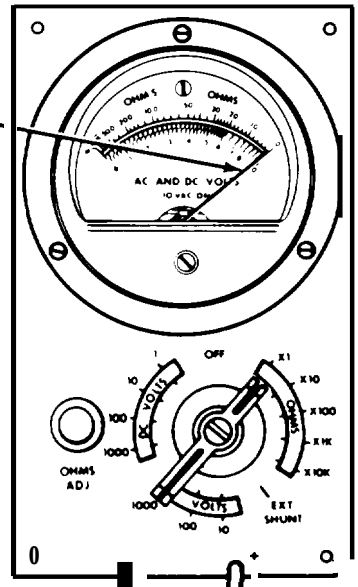
TA141655

USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

NOTE

- **The following steps are referred to as "zero" meter in the Detailed Troubleshooting Procedures.**
- **Be sure to "zero" meter again each time you change 'the selector switch to another OHMS position.**

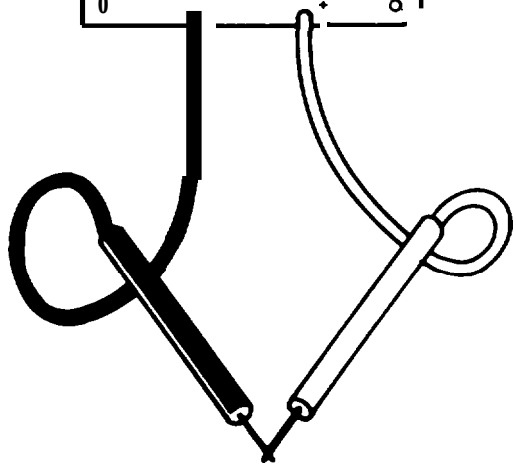
MASTER NEEDLE (SHOWN OVER GREEN ZERO MARK ON FAR RIGHT SIDE OF UPPER SCALE).



7 **Electrically "zero" meter.**

- Set selector switch to the OHMS scale indicated in your Detailed Troubleshooting Procedure.
- While touching probe tips together, turn OHMS ADJ. knob until meter needle is over green zero mark on far right side of upper scale.

Does meter needle move to green zero mark?



NO — **YES**

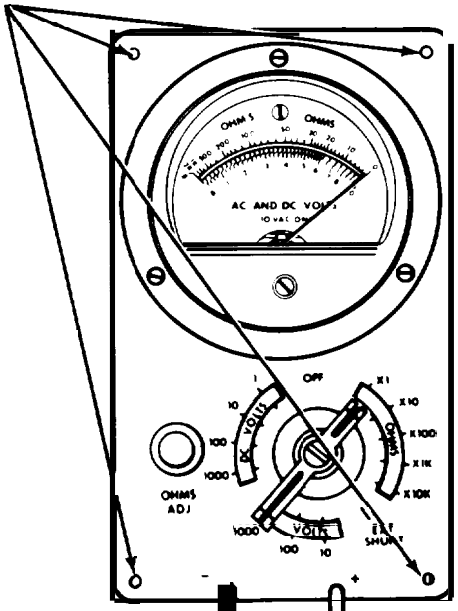
8

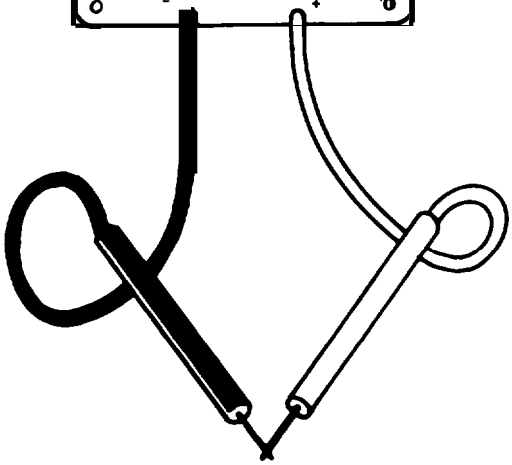
- **Multimeter is ready for use.**
- **See Step (12), MULTIMETER TESTS AND MEASUREMENTS.**

TA141656

USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

FOUR SCREWS AND WASHERS





9 **Replace multimeter batteries.**

- Remove four screws and washers from front panel of multimeter.
- Remove multimeter from case.
- Replace multimeter batteries.
- Install multimeter in case.
- Install four screws and washers in front panel of multimeter.
- Check that selector switch is set to the OHMS scale indicated in your Detailed Troubleshooting Procedure.
- While touching probe tips together, turn OHMS ADJ. knob until meter needle is over green zero mark on far right side of upper scale.

Does meter needle move to green zero mark?

YES

10

- **Multimeter is ready for use.**
- **See Step (12): MULTIMETER TESTS AND MEASUREMENTS.**

NO

11 **Turn in multimeter for repair.**

TA141657

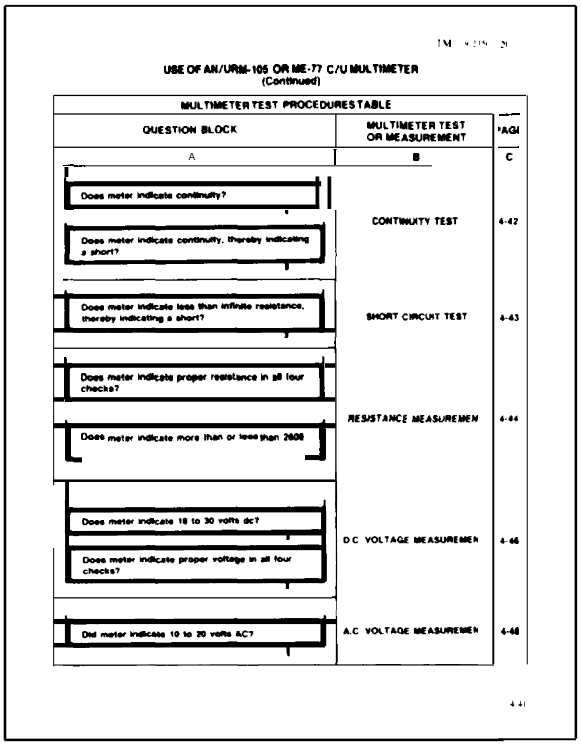
USE OF ANWRM-105 OR ME-77 C/U MULTIMETER (Continued)

FROM STEP (1), (8) OR (10)

(12) MULTIMETER TESTS AND MEASUREMENTS.

- Turn to the MULTIMETER TEST PROCEDURES TABLE (page 4-41).
- This table lists all the multimeter tests and measurements used in this manual.

Are you familiar with multimeter tests and measurements?



USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

MULTIMETER TEST PROCEDURES TABLE

QUESTION BLOCK	MULTIMETER TEST OR MEASUREMENT	PAGE
A	B	C
Does meter indicate continuity?	CONTINUITY TEST	4-42
Does meter indicate continuity, thereby indicating a short?		
Does meter indicate less than infinite resistance, thereby indicating a short?	SHORT CIRCUIT TEST	4-43
Does meter indicate proper resistance in all four checks?	RESISTANCE MEASUREMEN	4-44
Does meter indicate more than or less than 2600		
Does meter indicate 18 to 30 volts dc?	DC VOLTAGE MEASUREMEN	4-46
Does meter indicate proper voltage in all four checks?		
Did meter indicate 10 to 20 volts AC?	AC VOLTAGE MEASUREMEN	4-48

4-41

(13)
- Locate the proper multimeter test or measurement.
- See Step@.

YES

(14)
- Locate the proper question block.
- See Step (18).

NO

TA141658

USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

FROM STEP 13

15 **Locate the proper multimeter test or measurement.**

- In column B, locate the name of the test or measurement that you need to perform.

Were you able to locate the proper test or measurement?

16

- **Turn to the page number indicated in column C. On this page you will find a procedure that explains the test or measurement you need to perform.**

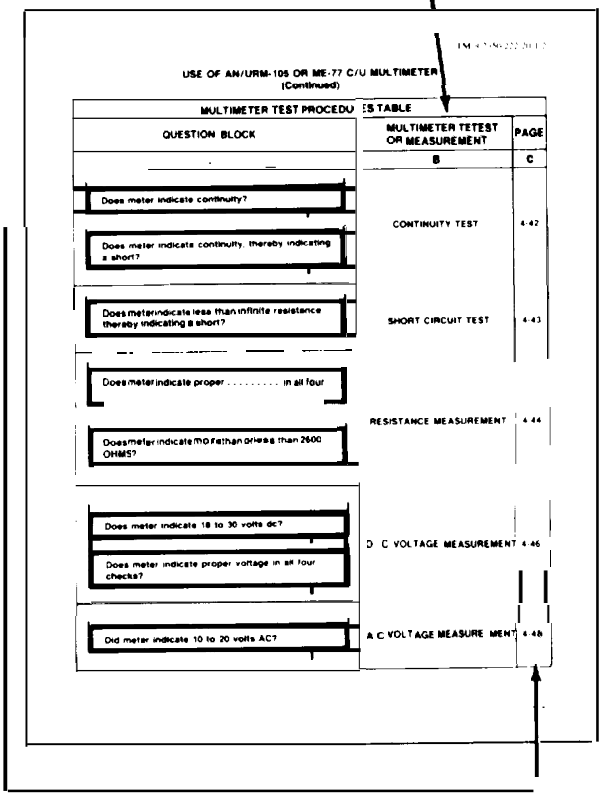
YES

17

- **Locate the proper Question Block.**

. See Step 18 .

NO


USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

MULTIMETER TEST PROCEDURES TABLE

QUESTION BLOCK	MULTIMETER TETEST OR MEASUREMENT	PAGE
	B	C
Does meter indicate continuity?	CONTINUITY TEST	4-42
Does meter indicate continuity, thereby indicating a short?		
Does meter indicate less than infinite resistance thereby indicating a short?	SHORT CIRCUIT TEST	4-43
Does meter indicate proper ..... in all four	RESISTANCE MEASUREMENT	4-44
Does meter indicate no more than or less than 2600 OHMS?		
Does meter indicate 18 to 30 volts dc?	D C VOLTAGE MEASUREMENT	4-46
Does meter indicate proper voltage in all four checks?		
Did meter indicate 10 to 20 volts AC?	A C VOLTAGE MEASUREMENT	4-48

TA141659

USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

FROM STEP 14 OR 17

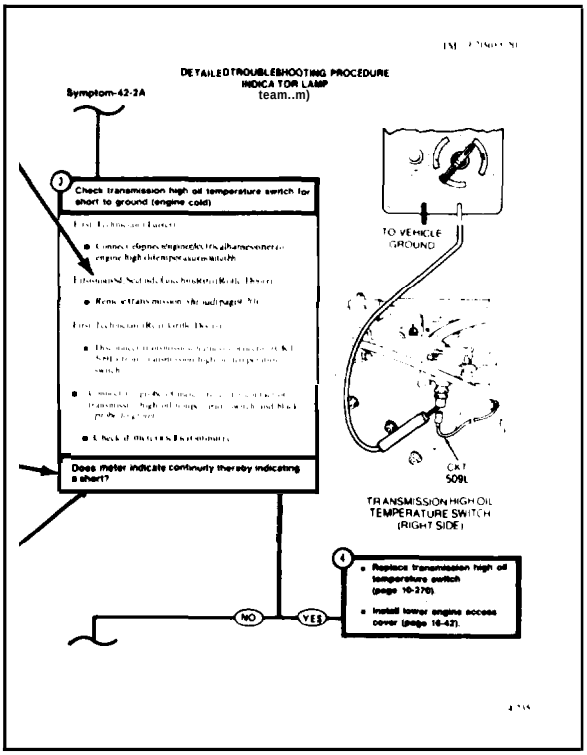
18 **Locate the proper question block.**

- Turn to the step of your Detailed Troubleshooting **Procedure** that contains the test or measurement that you need to perform.

NOTE

The bottom section of each step is called the question block. it contains a 'Question" sentence surrounded by heavy black lines.

- Locate the Question Block of your step.



TA141660

USE OF ANWRM-105 OR ME-77 C/U MULTIMETER (Continued)

STEP 18 CONTINUED

- Find the question block in column A that most closely resembles the question block of your step.

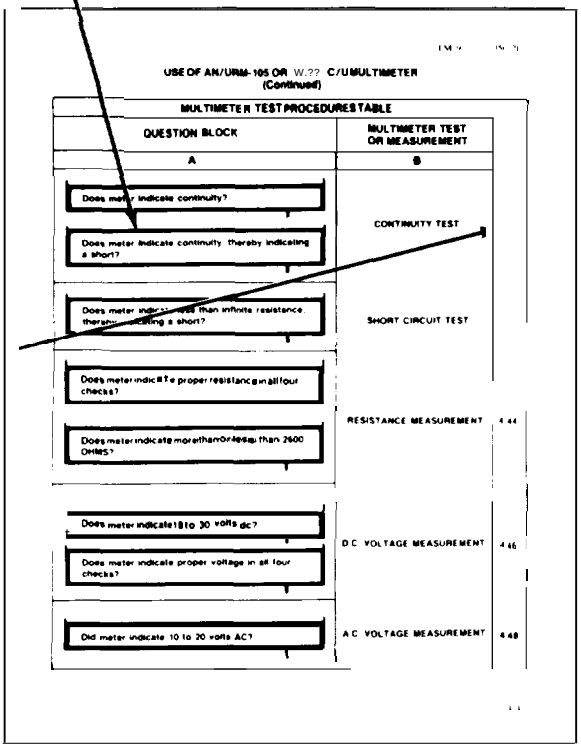
Were you able to locate the proper question block?

YES

19 ● **Turn to the page number indicated in column C. On this page, you will find a procedure that explains the test or measurement you need to perform.**

NO

20 **Notify your supervisor.**


USE OF AN/URM-105 OR W.?? C/U MULTIMETER (Continued)

MULTIMETER TEST PROCEDURES TABLE

QUESTION BLOCK A	MULTIMETER TEST OR MEASUREMENT B	
Does meter indicate continuity?		
Does meter indicate continuity thereby indicating a short?	CONTINUITY TEST	
Does meter indicate less than infinite resistance, thereby indicating a short?	SHORT CIRCUIT TEST	
Does meter indicate proper resistance on all four checks?		
Does meter indicate more than or less than 2600 OHMS?	RESISTANCE MEASUREMENT	4-44
Does meter indicate 18 to 30 volts dc?		
Does meter indicate proper voltage in all four checks?	DC VOLTAGE MEASUREMENT	4-46
Did meter indicate 10 to 20 volts AC?	AC VOLTAGE MEASUREMENT	4-48

TA141661

USE OF **AN/URM-105** OR ME-77 C/U MULTIMETER
(Continued)

MULTIMETER TEST PROCEDURES TABLE

QUESTION BLOCK	MULTIMETER TEST OR MEASUREMENT	PAGE
A	B	C
Does meter indicate continuity?	**CONTINUITY TEST**	**4-42**
Does meter Indicate continuity, thereby Indicating		
Does meter indicate leas than infinite resistance, thereby indicating a short?	**SHORT CIRCUIT TEST**	**4-43**
Does meter indicate proper resistance in all four checks?	**RESISTANCE MEASUREMENT**	**4-44**
Does meter Indicate more than or less than **2600 OHMS?**		
Does meter Indicate **18 to 30 volts dc?**	**D.C. VOLTAGE MEASUREMENT**	**4-46**
Does meter Indicate proper voltage in all four		
Did meter indicate **10 to 20 volts AC?**	**A.C. VOLTAGE MEASUREMENT**	**4-48**

T/ 41662

USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

CONTINUITY TEST.

NOTE

- IF NEEDLE JUMPS OR FLICKERS; CIRCUIT HAS A LOOSE CONNECTION.
- IF NEEDLE MOVES TO RIGHT BUT NOT TO ZERO, THE CIRCUIT HAS RESISTANCE. CONTINUITY IS A RESISTANCE OF LESS THAN 1 OHM.

1

1 Check if needle swings to far right (over green zero mark on upper scale).

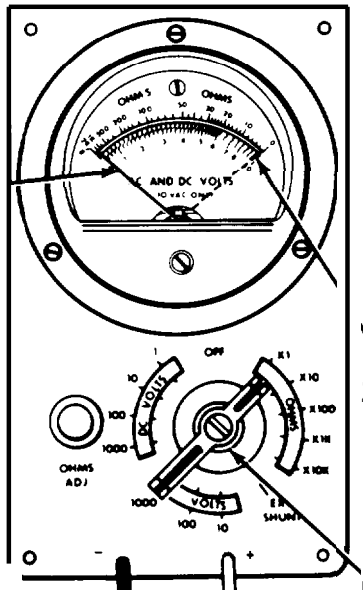
- Set multimeter selector switch to the scale indicated in your troubleshooting procedure.
- Zero meter (page 4-35)

WARNING

De-energize circuits as indicated in your troubleshooting procedure.

- Connect meter probes to circuit under test as indicated in your troubleshooting procedure.
- Observe meter needle.

Does needle swing to far right (over green zero mark on upper scale)?



2 Meter indicates continuity.

YES

NO

3 Meter doea not indicate continuity.

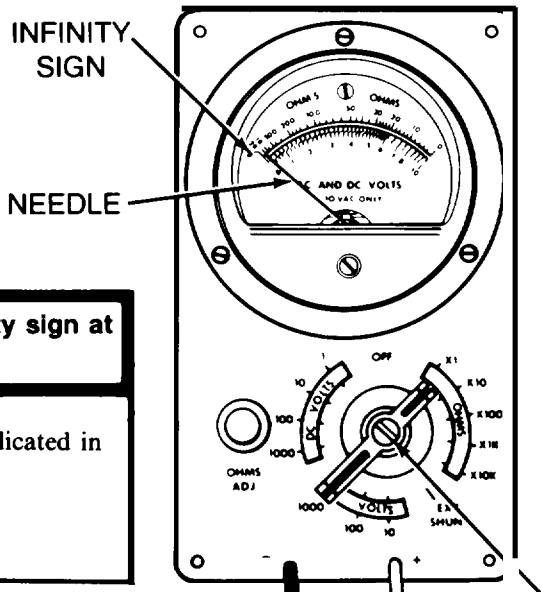
TA141663

USE OF **AN/URM-105** OR ME-77 **C/U** MULTIMETER
(Continued)

SHORT CIRCUIT TEST.

NOTE

Infinite resistance is indicated by the "infinity sign" (∞) at far left of top scale.



1 **Check if needle moves off the green infinity sign at far left of upper scale.**

- Set multimeter selector switch to the scale indicated in your troubleshooting procedure.
- Zero meter (page 4-35).

WARNING

De-energize circuits as indicated in your troubleshooting procedure.

- Connect meter probes to circuit under test as indicated in your troubleshooting procedure.
- Observe meter needle.

Does meter needle move off the green infinity sign at far left of upper scale?

YES

2 Meter indicates less than infinite resistance (there is a short circuit).

NO

3 Meter Indicates infinite resistance (there is not **a** short **circuit).**

TA141664

USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

RESISTANCE MEASUREMENT.

EXAMPLE: THE METER SHOWN BELOW HAS THE FOLLOWING READINGS:

SELECTOR SWITCH	READING
OHMS XI	.4 OHMS
OHMS XI0	40 OHMS
OHMS XIOO	400 OHMS
OHMSXIK	4,000 OHMS
OHMS XIOK	40,000 OHMS

1 **Read position of needle on green OHMS scale and interpret reading according to selector switch setting.**

- Set multimeter selector switch to the OHMS scale indicated in your troubleshooting procedure.
- Zero meter (page 4-35). Be sure to zero meter again if you change the position of the selector switch to another OHMS scale.

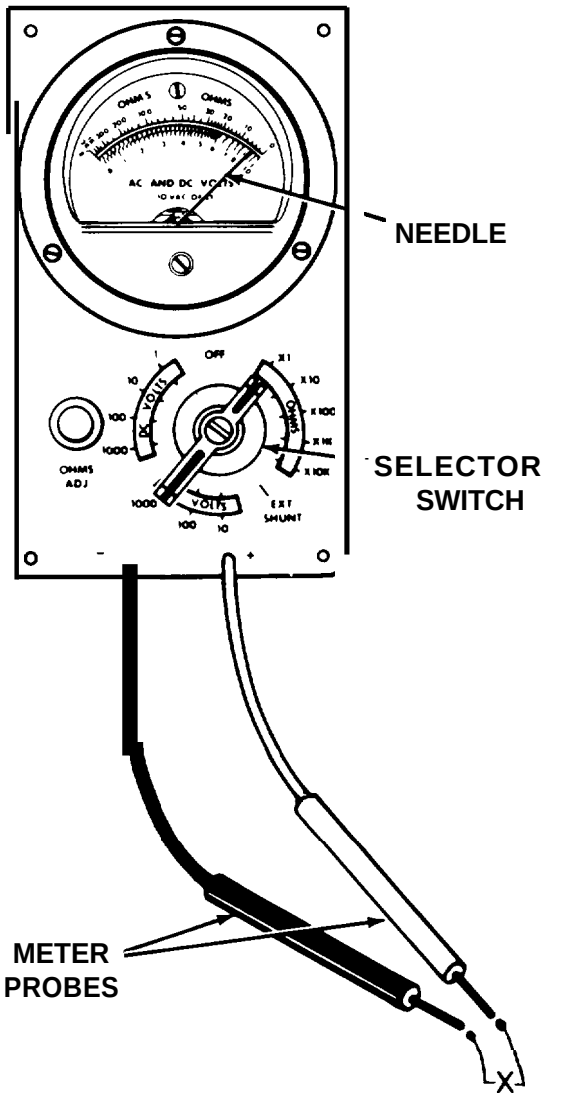
WARNING

De-energize circuits as indicated in your troubleshooting procedure.

- Connect meter probes to circuit under test as indicated in your troubleshooting procedure.
- Read position of needle on green OHMS scale and interpret reading according to the following table:

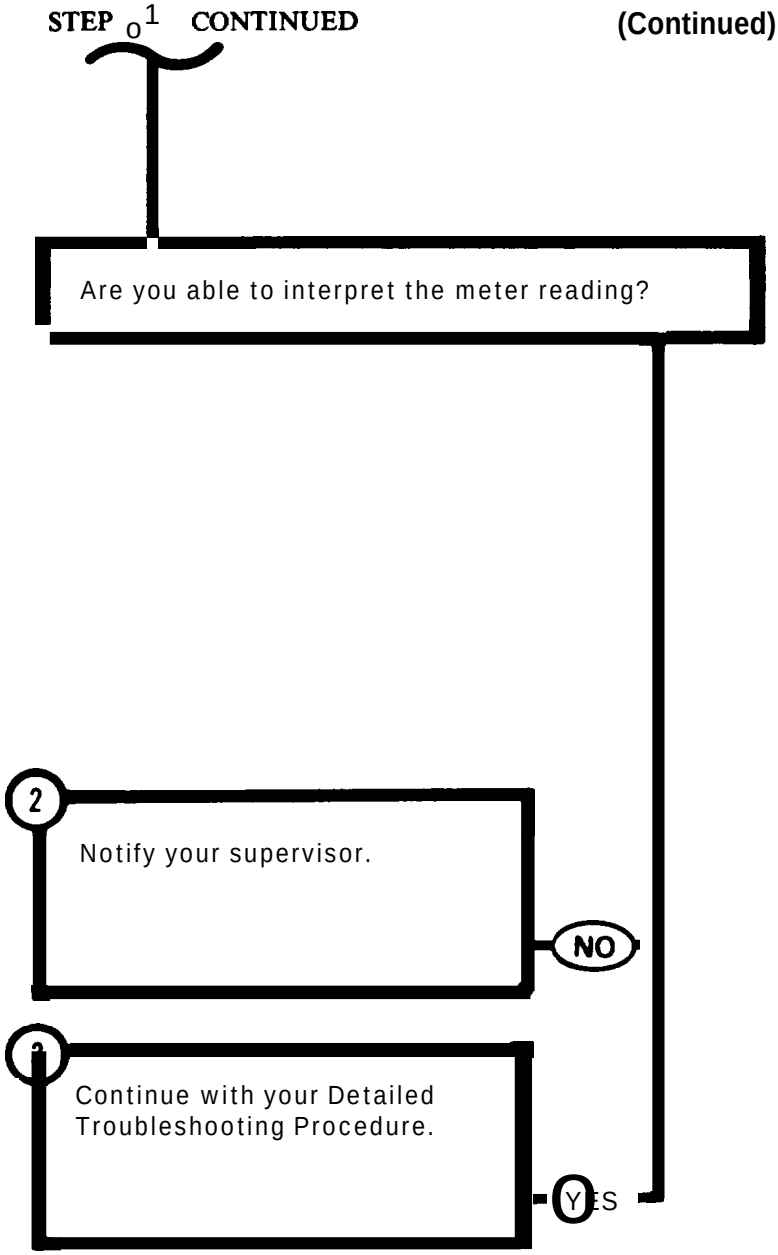
SELECTOR SWITCH SETTING	POSITION OF NEEDLE ON GREEN OHMS SCALE IS:
OHMS XI	READ DIRECTLY ON SCALE
OHMS XIO	MULTIPLIED BY 10
OHMS XIOO	MULTIPLIED BY 100
● OHMS XIK	MULTIPLIED BY 1000
*OHMS XIOK	MULTIPLIED BY 10,000

*K = 1000



TA141665

USE OF **AN/URM-105** OR ME-77 C/U MULTIMETER
RESISTANCE MEASUREMENT
(Continued)



TA141666

USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

D.C. VOLTAGE MEASUREMENT.

1 **Read position of needle on black DC VOLTS scale and interpret reading according to selector switch**

- Set multimeter selector switch to the DC VOLTS scale indicated in your troubleshooting procedure.

WARNING

De-energize/energize circuits as indicated in your troubleshooting procedure.

CAUTION

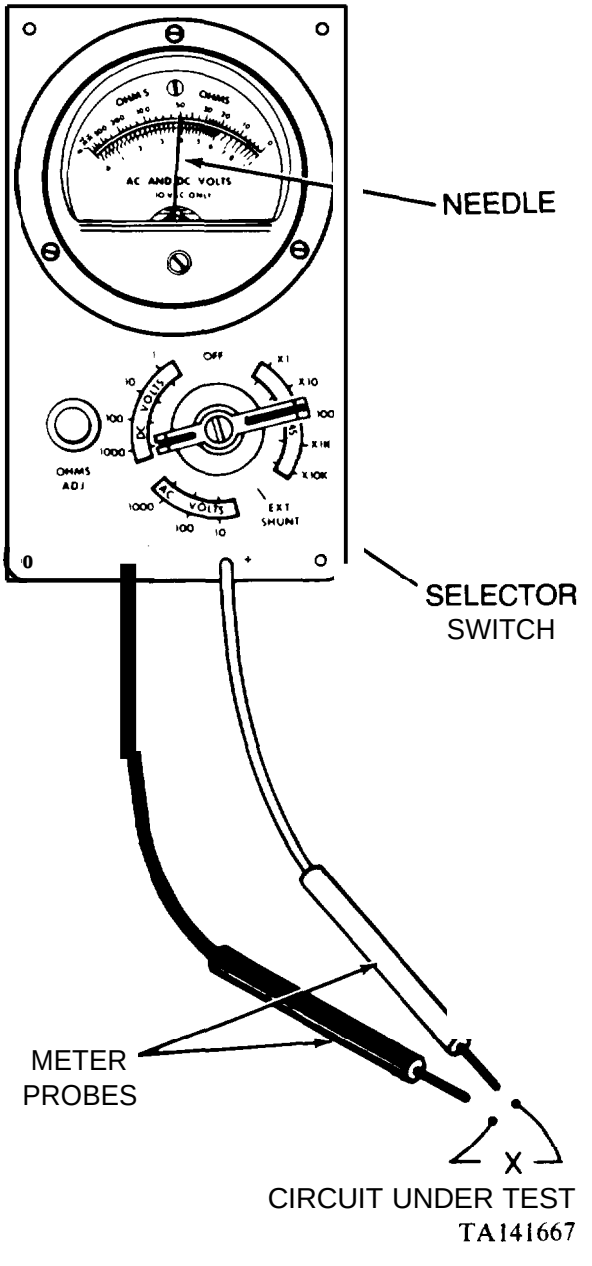
If you are unsure of the amount of voltage to be measured always start with selector switch at DC VOLTS 1000 for the first reading. If first reading is less than 100 volts, set selector switch to DC VOLTS 100. If second reading is less than 10 volts, set selector switch to DC VOLTS 10 and take third reading, etc.

- Connect meter probes to circuit under test as indicated in your troubleshooting procedure.
- Read position of needle on black DC VOLTS scale and interpret reading according to the following table:

SELECTOR SWITCH SETTING	POSITION OF NEEDLE ON BLACK DC VOLTS SCALE IS:
DC VOLTS 1 (1 VOLTS DC MAX)	DIVIDED BY 10
DC VOLTS 10 (10 VOLTS DC MAX)	READ DIRECTLY ON SCALE
DC VOLTS 100 (100 VOLTS DC MAX)	MULTIPLIED BY 10
DC VOLTS 1000 (1000 VOLTS DC MAX)	MULTIPLIED BY 100

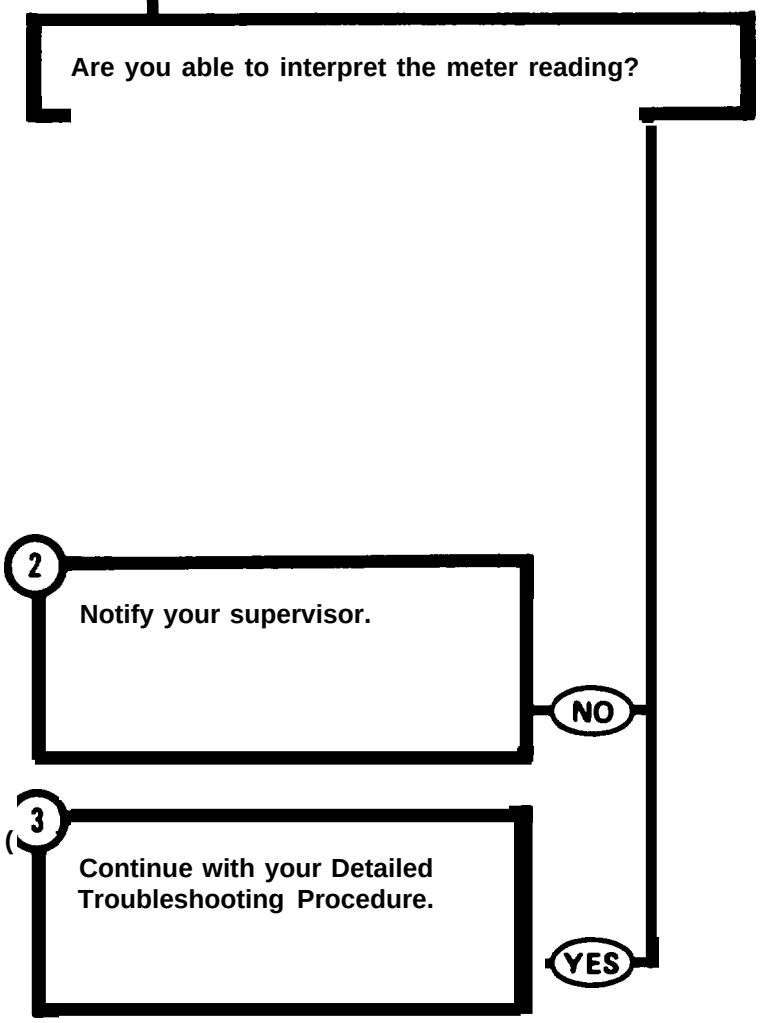
EXAMPLE: THE METER SHOWN BELOW HAS THE FOLLOWING READINGS:

SELECTOR SWITCH	READING
DC VOLTS 1	0.4 VOLTS
DC VOLTS 10	4 VOLTS
DC VOLTS 100	40VOLTS
DC VOLTS 1000	400 VOLTS



USE OF AN/URM-105 OR ME-77 C/U MULTIMETER
DC VOLTAGE MEASUREMENT
(Continued)

STEP 10 CONTINUED



TA141668

USE OF AN/URM-105 OR ME-77 C/U MULTIMETER (Continued)

A.C. VOLTAGE MEASUREMENT.

The only time the red scale is used is when the selector switch is set to the AC VOLTS 10 position.

EXAMPLE: THE METER SHOWN BELOW HAS THE FOLLOWING READINGS:

SELECTOR SWITCH	READING
AC VOLTS1O	..4.0 VOLTS (RED SCALE)
AC VOLTS1OO	.40 VOLTS (BLACK SCALE)
AC VOLTS 1OOO	.400 VOLTS (BLACK SCALE)

1. **Read position of needle on red/black AC VOLTS scale and interpret reading according to selector**

- Set multimeter selector switch to the AC VOLTS scale indicated in your troubleshooting procedure.

W A R N I N G

De-energize/energize circuits as indicated in your troubleshooting procedure.

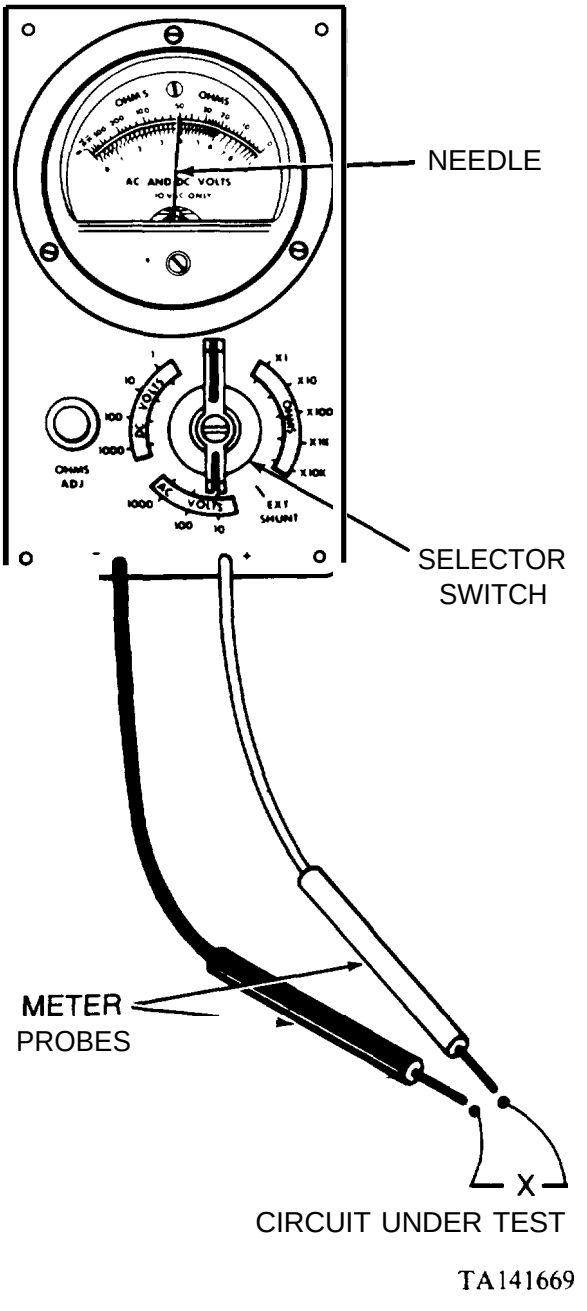
- - C A U T I O N

If you are unsure of the amount of voltage to be measured always start with the selector switch, at AC VOLTS 1000 for the first reading. If first reading is less than 100 volts, set selector switch to AC VOLTS 100. If second reading is less than 10 volts, set selector switch to AC VOLTS 10 and take third reading.

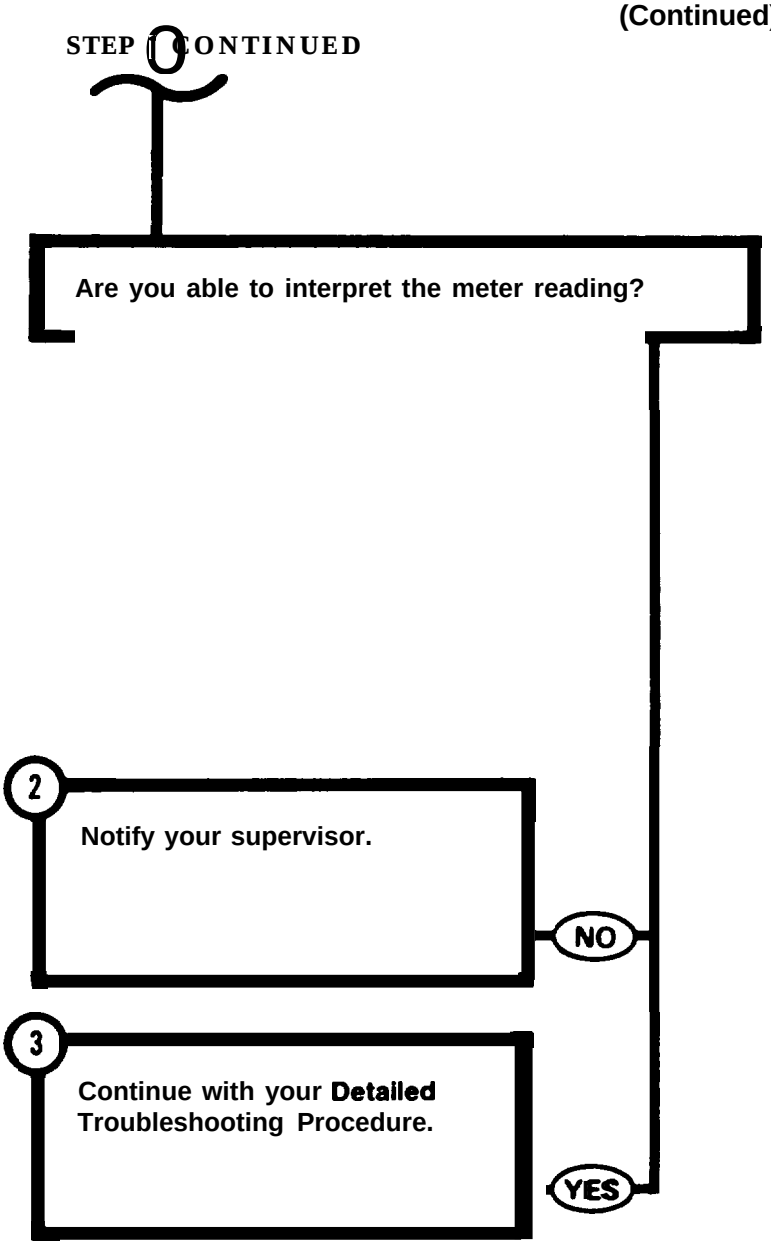
. Connect meter probes to circuit under test as indicated in your troubleshooting procedure.

- Read position of needle on red/black AC VOLTS scale and interpret reading according to the following table:

SELECTOR SWITCH SETTING	POSITION OF NEEDLE ON RED/BLACK AC VOLTS SCALE IS:
AC VOLTS 10 (10 VOLTS AC MAX)	READ DIRECTLY ON RED SCALE
AC VOLTS 1111 (100 VOLTS AC MAX)	MULTIPLIED BY 10 (BLACK SCALE)
AC VOLTS1000 (1000 VOLTS AC MAX)	MULTIPLIED BY 100 (B1 ACK SCALE)



USE OF AN/URM-105 OR ME-77 C/U MULTIMETER A.C. VOLTAGE MEASUREMENT (Continued)

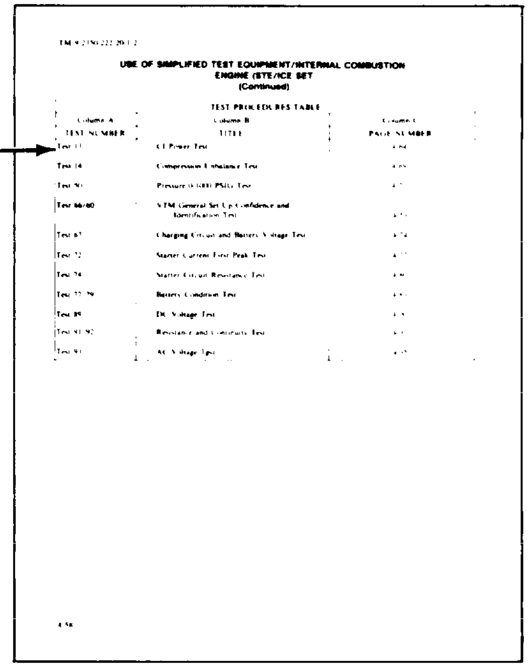


TA141670

USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE) SET

USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE) SET.

1 **Locate SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE) TEST PROCEDURE TABLE.**



TM 9-2350-222-20-1-2

USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE SET (Continued)

TEST PROCEDURES TABLE

Column A TEST NUMBER	Column B TITLE	Column C PAGE NUMBER
Test [illegible]	CI Power Test	[illegible]
Test 14	Compression Unbalance Test	[illegible]
Test [illegible]	Pressure ([illegible] PSIG) Test	[illegible]
Test 66/60	VTM General Set Up Confidence and Identification Test	[illegible]
Test 67	Charging Circuit and Battery Voltage Test	[illegible]
Test 72	Starter Current First Peak Test	[illegible]
Test 74	Starter Circuit Resistance Test	[illegible]
Test [illegible]	Battery Condition Test	[illegible]
Test 89	DC Voltage Test	[illegible]
Test [illegible]	Resistance and Continuity Test	[illegible]
Test [illegible]	AC Voltage Test	[illegible]

- Turn to TEST PROCEDURE TABLE (page 4-58).
- This table lists all the STE/ICE tests used in this manual.

Have you located the table listing the test procedures?

YES → 2 | NO → 3

3 **Notify your supervisor.**

2 **Determine STE/ICE test to be performed.**

- Determine number or title of test to be performed from either.
  - TROUBLESHOOTING procedure.
  - PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).
- Locate the proper test number in column A on test title in column B of TEST PROCEDURE TABLE.

Has test number or test title been located in TEST PROCEDURE TABLE?

YES → (continued) | NO → 4

4 **Notify your supervisor.**

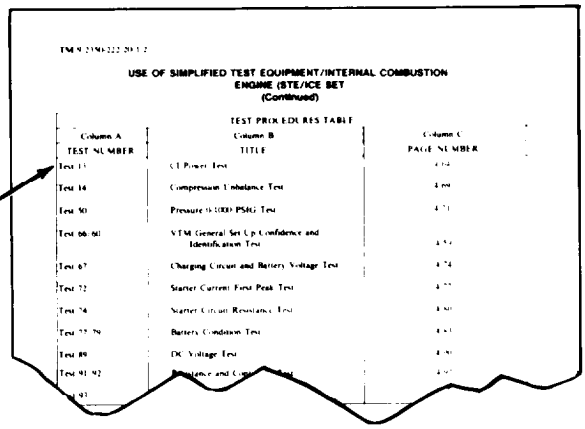
TA141671

USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE) SET
(Continued)

5 **Locate page number of STE/ICE test to be performed.**

- Once either TEST NO., column A or test TITLE column B is known, locate Page number in column C.
- Turn to page number indicated in column C, on this page you will find a procedure of how to perform
  (1) the desired STE/ICE test and,
  (2) the desired test results.

Have you located the page number of the STE/ICE test to be performed?


USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE SET (Continued)

TEST PROCEDURES TABLE

Column A TEST NUMBER	Column B TITLE	Column C PAGE NUMBER
Test 13	CE Power Test	4-54
Test 14	Compression Unbalance Test	4-60
Test 50	Pressure (1000 PSIG) Test	4-71
Test 66-68	VTM General Set Up Confidence and Identification Test	4-73
Test 67	Charging Circuit and Battery Voltage Test	4-74
Test 72	Starter Current Free Peak Test	4-77
Test 74	Starter Circuit Resistance Test	4-80
Test 77-79	Battery Condition Test	4-83
Test 89	DC Voltage Test	4-90
Test 91-92	Resistance and Continuity Test	4-93
Test 93		

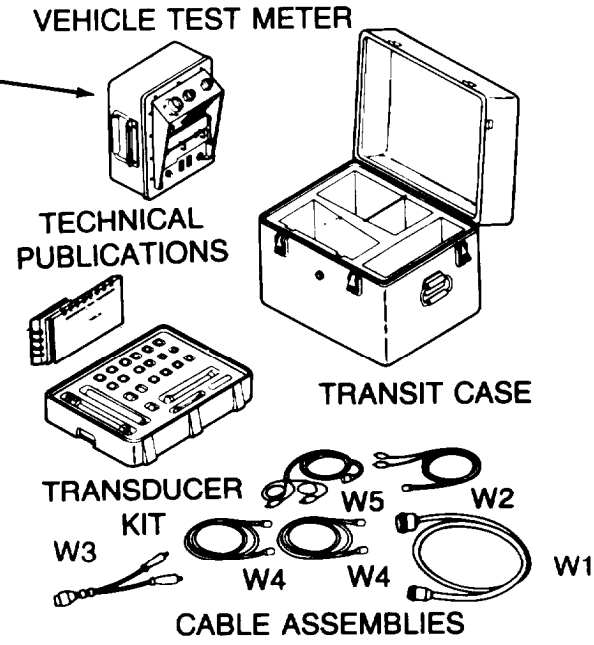
YES NO

6 **Notify your supervisor.**

7 **Get to know your STE/ICE System.**

- Check if the following STE/ICE system items are available.
- Vehicle Test Meter (VTM).
- Transducer kit.
- Cable assemblies W1 (1 each), W2 (1 each), W3 (1 each), W4 (2 each), and W5 (1 each).
- Technical publications.
- Transit case.

Are all STE/ICE system items available?



SIMPLIFIED TEST EQUIPMENT INTERNAL COMBUSTION ENGINE (STE/ICE) SYSTEM
TA141672

USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE) SET (Continued)

YES NO

8 **Identify and become familiar with Vehicle Test Meter (VTM) controls, indicators and connectors.**

- POWER SWITCH (PUSH ON/PULL OFF). Controls power to the VTM. When power switch is pushed in (PUSH ON), the VTM power is on. When POWER SWITCH is pulled out (PULL OFF) the VTM power is off.
- TEST SELECT SWITCHES. Each switch has 10 positions, 0 through 9. Test to be performed is to be dialed into these switches.
- TEST BUTTON. Depressing and releasing the TEST BUTTON causes the test measurement to begin.
- READOUT DISPLAY. This contains up to a four character readout. STE/ICE test procedure being performed will explain readout.
- FLIP CARDS. Lists the two digit test number system for selecting various tests.
- POWER/DCA CONNECTOR J1. Used with power cable W5 to connect the VTM to a power source.
- TRANSDUCER CABLE CONNECTORS J2 AND J3. Used with transducer cables W4 to connect VTM to any transducer in the transducer kit. Connectors J2 and J3 are identical and can be interchanged with each other or used in combination.
- TEST PROBE CABLE CONNECTOR J4. Connects test lead to the VTM when doing voltage or resistance tests.

Are you familiar with VTM controls, indicators and connectors?

YES NO

9 **Check desired STE/ICE test procedure for cables, transducers and fittings required to perform test.**

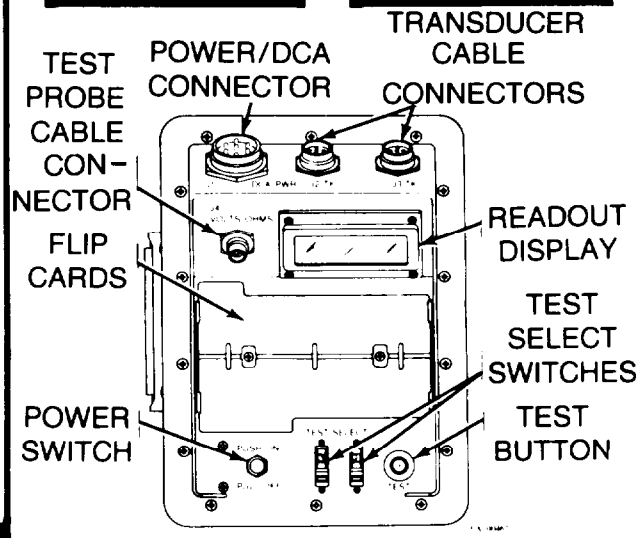
- Check that cables, transducers and fittings required to perform STE/ICE tests are available.

Are all parts required to perform STE/ICE test available?

YES NO

10 **Go to Step (13).**

11 **Notify your supervisor.**



VTM CONTROLS AND READOUT DISPLAY

12 **Notify your supervisor.**

YES NO

TA141673

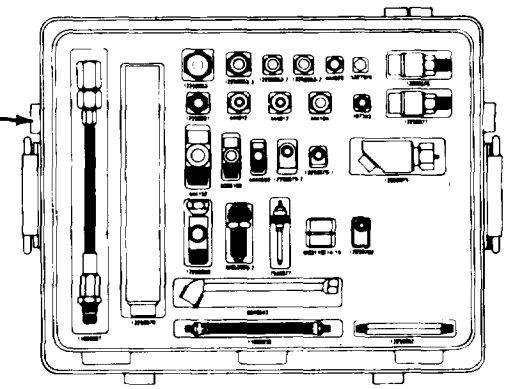
USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION

ENGINE (STE/ICE) SET (Continued)

13 **Identify and become familiar with items in the Transducer Kit required for STE/ICE test to be performed.**

- Check TRANSDUCER TABLE (page 4-55) for listing of items found in Transducer kit.
- Make sure all Transducer kit items that are necessary to perform desired STE/ICE test are available.

Are you familiar with Transducer Kit and are all items required for STE/ICE test available?



TRANSDUCER KIT

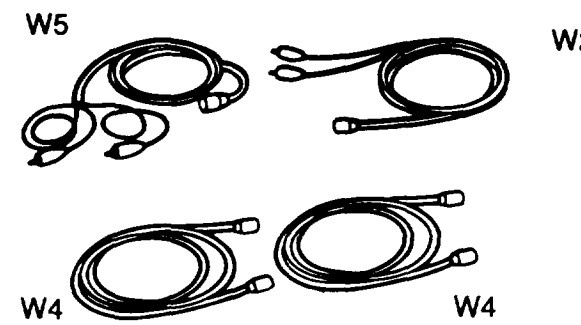
YES — NO

14 **Notify your supervisor.**

15 **Identify and become familiar with the cable assemblies required for STE/ICE test to be performed.**

- Test Probe Cable W2, to be connected to VTM connector J4 if required for test.
- Transducer Cables W4 (2 each), to be connected to VTM connector J2 or J3. Cables W4 may be joined together with adapter MS3119E-14-19 supplied in transducer kit to make one long cable.
- Power Cable W5, to be connected to VTM connector J1 to supply power to the VTM.

Are you familiar with cable assemblies and are all cable assemblies required for STE/ICE test available?



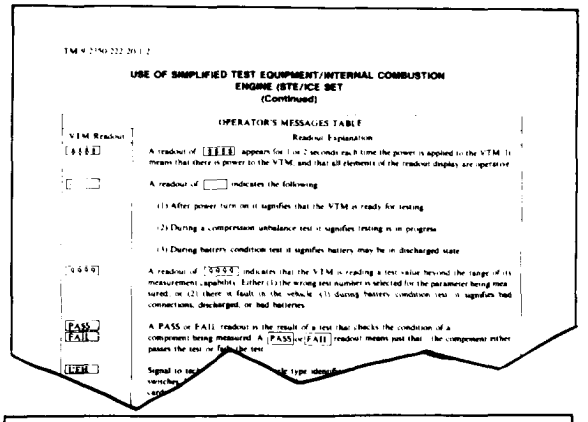
CABLE ASSEMBLIES

YES — NO

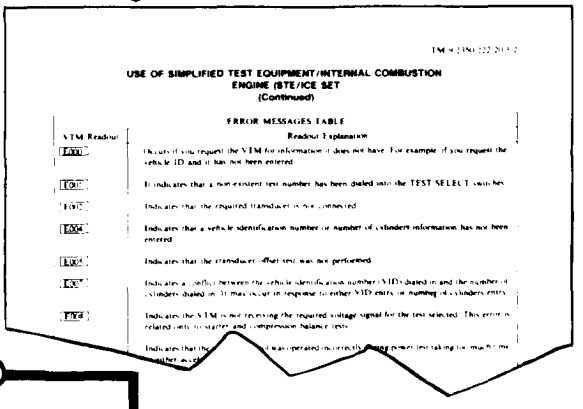
16 **Notify your supervisor.**

TA141674

USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE) SET (Continued)


USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE) SET (Continued)

OPERATOR'S MESSAGES TABLE


USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE) SET (Continued)

ERROR MESSAGES TABLE

17 **While performing test, an OPERATOR'S MESSAGES or ERROR MESSAGES may appear on VTM display. Locate OPERATOR'S MESSAGES and ERROR MESSAGES TABLES.**

- Turn to OPERATOR'S MESSAGES TABLE (page 4-56) for explanation of OPERATOR'S MESSAGE if displayed on VTM readout display.
- Turn to ERROR MESSAGES TABLE (page 4-57) for explanation of ERROR MESSAGE if displayed on VTM readout display.

Have you located the TABLE that gives the explanation of OPERATOR'S MESSAGES or ERROR MESSAGES?

YES / NO

19 **Locate the readout shown on the VTM display in OPERATOR'S MESSAGES or ERROR MESSAGES TABLE.**

- Check OPERATOR'S MESSAGE TABLE (page 4-56) for OPERATOR'S MESSAGE readout shown on VTM display.
- Check ERROR MESSAGE TABLE (page 4-57) for ERROR MESSAGE readout shown on VTM display.

Did you locate the readout shown on VTM display in either the OPERATOR'S MESSAGES or ERROR MESSAGES TABLES?

18 **Notify your supervisor.**

21 **Continue with STE/ICE test to be performed.**

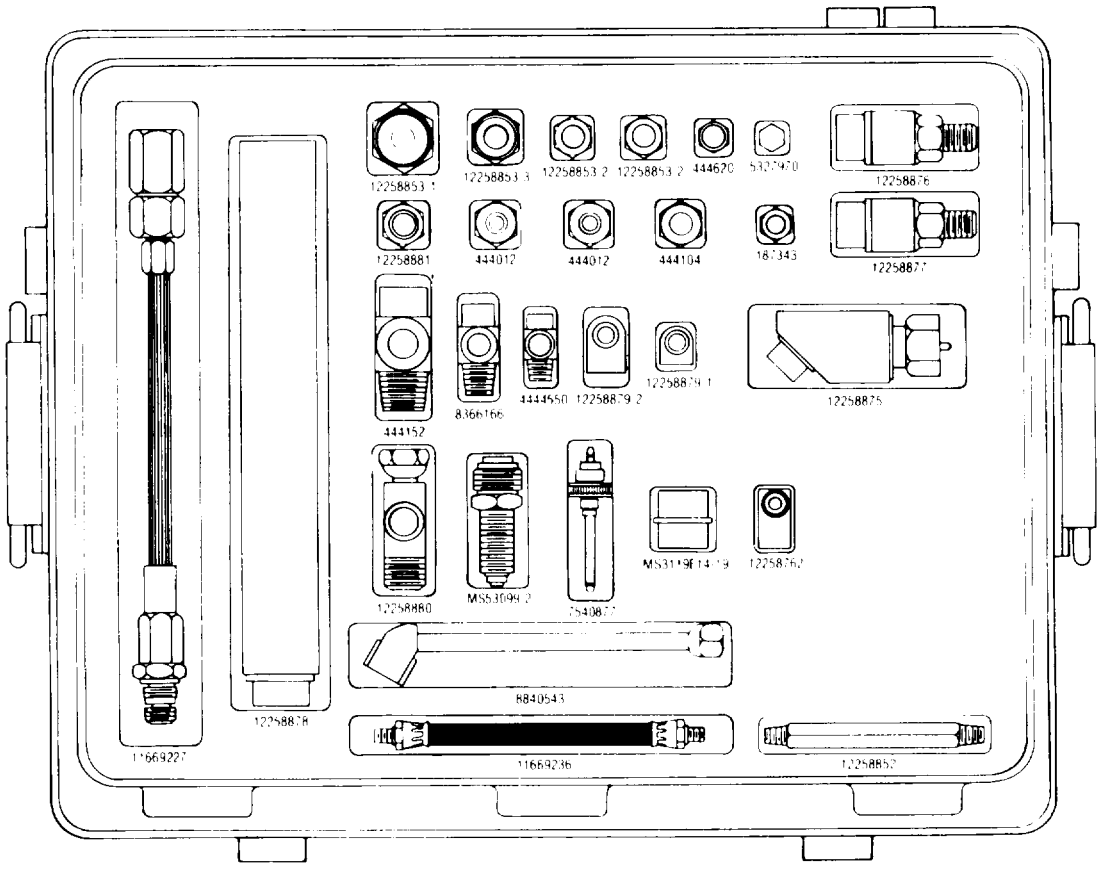
YES / NO

20 **Notify your supervisor.**

TA141675

USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE) SET (Continued)

TRANSDUCER KIT TABLE



Part Number	Qty	Item
187343	1	Male Connector,5/16 tube to 1/4 MPT
444012	2	Adapter, 1/8 MPT to 1/4 FPT
444104	1	Coupling Reducer, 1/8 FPT to 1/4 FPT
444550	1	Street Tee, 1/8 pipe thread
444152	1	Street Tee, 1/2 pipe thread
444620	1	Hex Head Plug, 1/4 MPT
7540877	1	Ignition Adapter
8366166	1	Street Tee, 1/4 pipe thread
8840543	1	Air Chuck
5327970	1	Hex Head Plug, 1/8 MPT
11669227	1	Hose & Fitting Ass"y. (Spark Plug Adapter)
11669236	1	Hose Assembly, 1/8 MPT
12258762	1	Tee, Inverted Flare
12258852	1	Pipe Nipple, 1/8 MPT
12258853-1	1	Pipe Thread Reducer, 3/4 MPT to 1/4 FPT
12258853-2	2	Pipe Thread Reducer, 3/8 MPT to 1/4 FPT
12258853-3	1	Pipe Thread Reducer, 1/2 MPT to 1/4 FPT
12258875	1	Pulse Tachometer
12258876	1	Pressure Transducer, 0-1000 PSI
12258877	1	Pressure Transducer, -30 in. Hg to 25 PSIG
12258878	1	Current Probe
12258879-1	1	Street Elbow, 1/8 pipe thread
12258879-2	1	Street Elbow, 1/4 pipe thread
12258880	1	Fuel Line Adapter
12258881	1	Snubber
MS53099-2	1	Tachometer Drive Adapter
MS3119E14-19	1	Adapter (connector-to-connector)

TA100466

TA141676

USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE SET (Continued)

OPERATOR'S MESSAGES TABLE	
VTM Readout	Readout Explanation
.8.8.8.8	A readout of .8.8.8.8 appears for 1 or 2 seconds each time the power is applied to the VTM. It means that there is power to the VTM, and that all elements of the readout display are operative.
----	A readout of ---- indicates the following: (1) After power turn on it signifies that the VTM is ready for testing. (2) During a compression unbalance test it signifies testing is in progress. (3) During battery condition test it signifies battery may be in discharged state.
.9.9.9.9	A readout of .9.9.9.9 indicates that the VTM is reading a test value beyond the range of its measurement capability. Either (1) the wrong test number is selected for the parameter being measured, or (2) there is fault in the vehicle, (3) during battery condition test, it signifies bad connections, discharged, or bad batteries.
PASS FAIL	A PASS or FAIL readout is the result of a test that checks the condition of a component being measured. A PASS or FAIL readout means just that - the component either passes the test or fails the test.
UEH	Signal to technician to enter vehicle type identification number (VID) on the TEST SELECT switches. Vehicle ID numbers are found under TEST DATA on the flip cards, on the vehicle test cards.
GO	Signal to technician to crank engine in compression balance or first peak tests.
CIP	Signal to technician to apply full throttle in a CI power test.
OFF	Signal to technician to stop cranking in compression balance test or to release the accelerator in the CI power test.
CAL	Signal to the technician to release the TEST button during an offset test.
66	Numbers are used for prompting messages in several tests. They are as follows: in confidence test 66 signals the technician to dial in "99"; in CI acceleration/deceleration power test No. 12, the first numerical readout signals the technician to shut off fuel.

TA141677

USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE SET
(Continued)

ERROR MESSAGES TABLE	
VTM Readout	Readout Explanation
E000	Occurs if you request the VTM for information it does not have. For example, if you request the vehicle ID and it has not been entered.
E001	It indicates that a non-existent test number has been dialed into the TEST SELECT switches.
E002	Indicates that the required transducer is not connected.
E004	Indicates that a vehicle identification number or number of cylinders information has not been entered.
E005	Indicates that the transducer offset test was not performed.
E007	Indicates a conflict between the vehicle identification number (VID) dialed in and the number of cylinders dialed in. It may occur in response to either VID entry or number-of-cylinders entry.
E008	Indicates the VTM is not receiving the required voltage signal for the test selected. This error is related only to starter and compression balance tests.
E011	Indicates that the throttle control was operated incorrectly during power test taking too much time to either accelerate or decelerate.
E012	Indicates that the CI plus tachometer is missing.
E013	Indicates bad data were taken for the test in progress. Repeat the test one (1) time.
E018	Indicates that an engine rpm or ac frequency test was terminated automatically to protect the VTM. Termination is only after several minutes of no-signal operation. Most likely the VTM was left on the vehicle and the engine stalled.

TA141678

USE OF SIMPLIFIED TEST EQUIPMENT/INTERNAL COMBUSTION ENGINE (STE/ICE SET
(Continued)

TEST PROCEDURES TABLE		
Column A	Column B	Column C
TEST NUMBER	TITLE	PAGE NUMBER
Test 13	CI Power Test	4-64
Test 14	Compression Unbalance Test	4-69
Test 50	Pressure 0-1000 PSIG Test	4-71
Test 66/60	VTM General Set-Up Confidence and Identification Test	4-59
Test 67	Charging Circuit and Battery Voltage Test	4-74
Test 72	Starter Current First Peak Test	4-77
Test 74	Starter Circuit Resistance Test	4-80
Test 77/79	Battery Condition Test	4-83
Test 89	DC Voltage Test	4-90
Test 91/92	Resistance and Continuity Test	4-92
Test 93	AC Voltage Test	4-95

TA141679

VTM GENERAL SET UP, CONFIDENCE AND IDENTIFICATION TEST 66/60

CAUTION

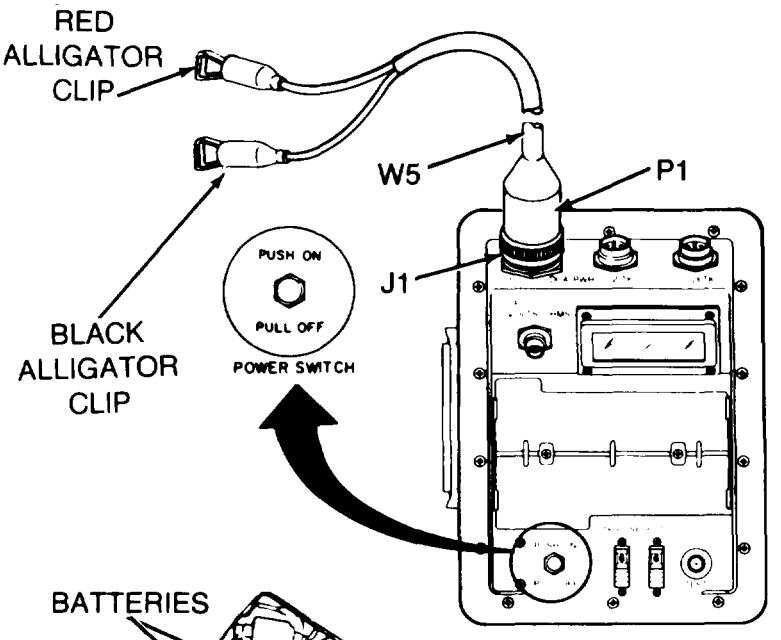
Do not connect or disconnect VTM while vehicle engine is running.

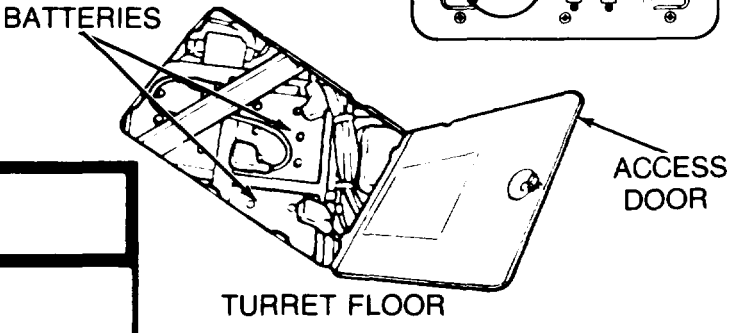
CAUTION

Connect P1 of power cable W5 to J1 of VTM before connecting clip leads to battery cable.

CAUTION

Observe polarity. Make sure red alligator clip of power cable W5 connects to positive (+) connector on battery and black alligator clip of power cable W5 connects to negative (–) on battery.

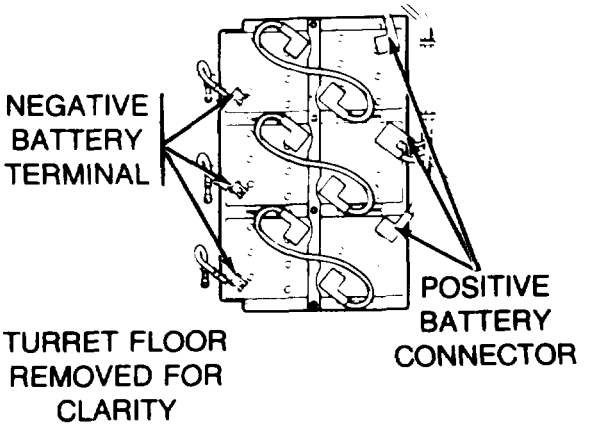




1 VTM general set up.

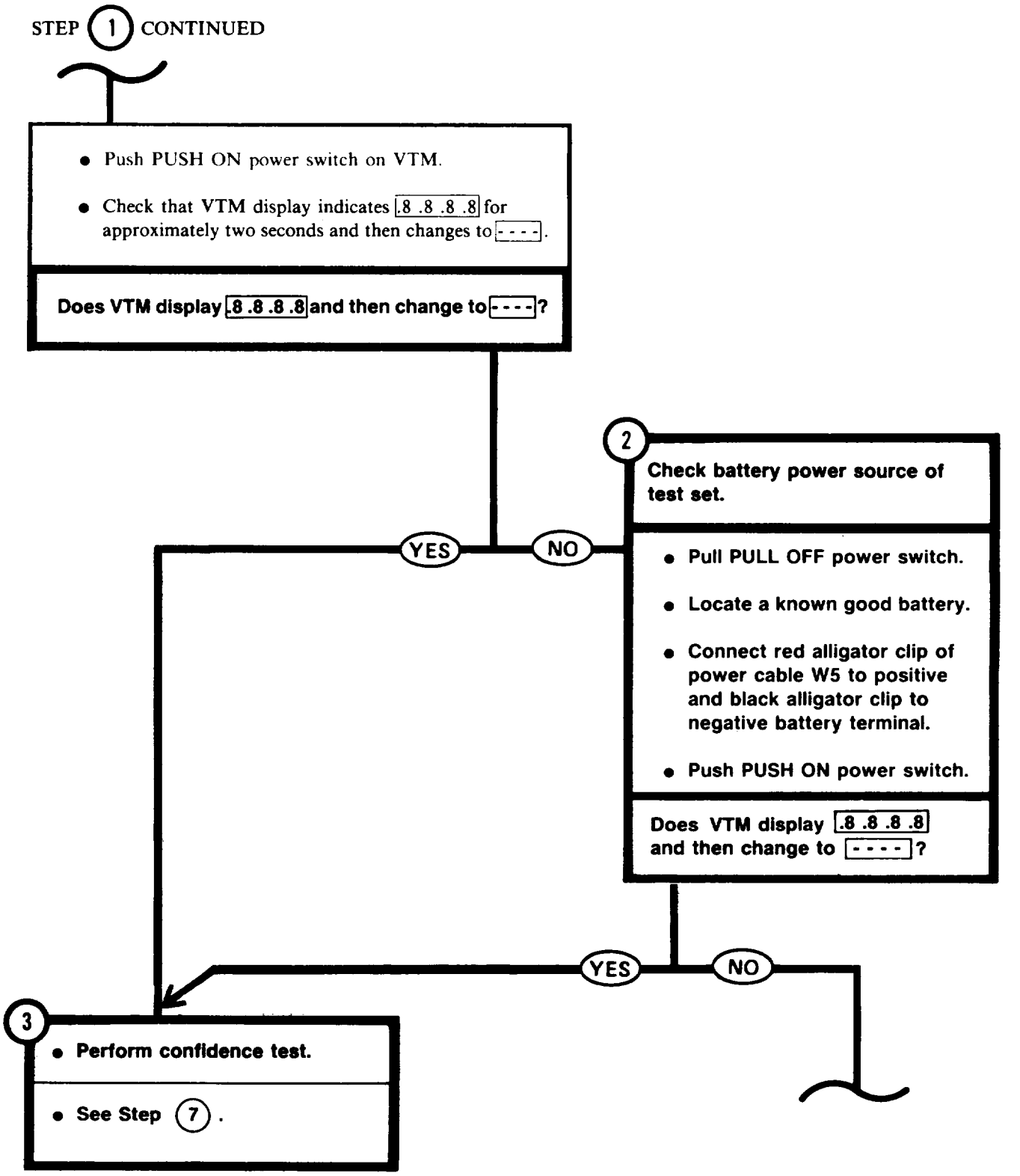
Technician (Turret)

- PULL OFF power switch on VTM.
- Connect P1 of power cable W5 to J1 on VTM.
- Open access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to battery (TM 9-2350-222-10).
- Connect red alligator clip of power cable W5 to positive (+) terminal on battery.
- Connect black alligator clip of power cable W5 to negative (–) terminal on battery.



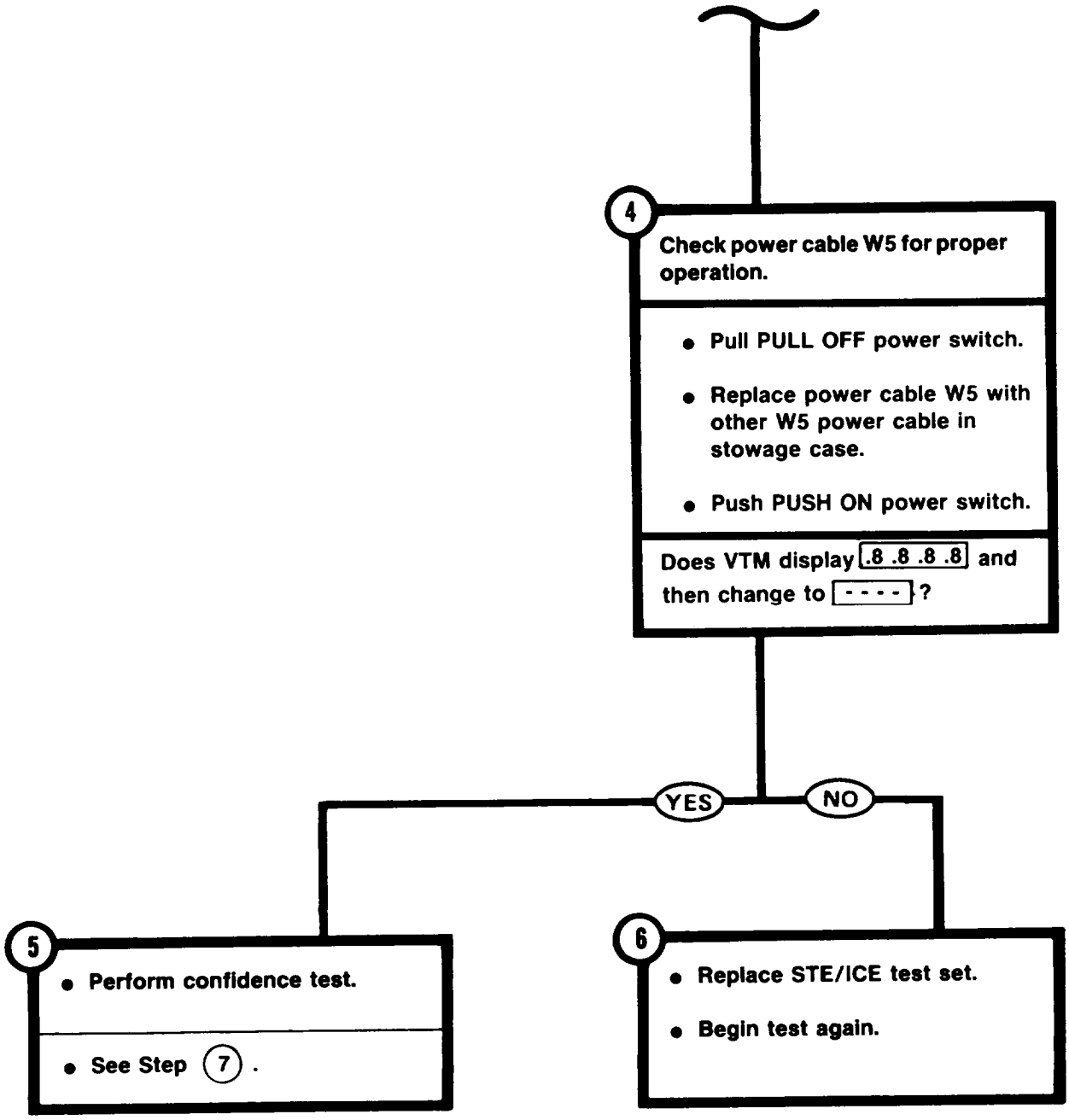
TA141680

STE/ICE Test Procedures - Continued



TA141681

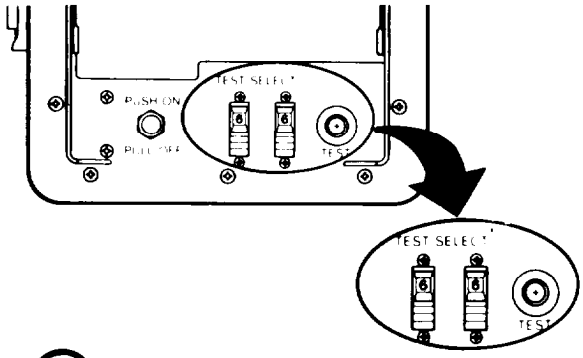
STE/ICE Test Procedures - Continued



TA141682

FROM STEPS (3) OR (5)

STE/ICE Test Procedures - Continued



(7) Confidence Test

- Dial TEST SELECT switches to 66.
- Press and release TEST button.
- Check that VTM display indicates 66 and holds.

Does VTM display and hold 66?

YES → (10)

NO → **(8) Re-dial 66 and press TEST button.**

Does VTM display indicate and hold 66?

YES → (10)

NO → **(9) Replace STE/ICE set.**

(10)

- Dial TEST SELECT switches to 99.
- Press and release TEST button.
- Check that several numbers appear on VTM display, 99, .8 .8 .8 .8 and others.
- Wait for VTM display to indicate PASS.

Does VTM display PASS?

YES → (11)

NO → **NOTE**

The VTM can fail the Confidence Test if a bad transducer is connected to it. If the VTM fails, the Confidence Test when powered by W5, (TK power cable), disconnect all cables from J2, J3 and J4 and try again. If it passes, one of the transducers is bad. If it fails, the VTM has failed internally.

(11)

- **Repeat Confidence Test.**
- **Wait for VTM display to indicate PASS.**

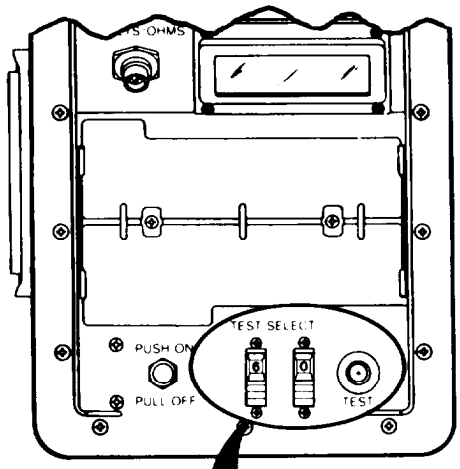
Does VTM display indicate PASS?

YES → (11)

NO → **(12) Replace STE/ICE set.**

TA141683

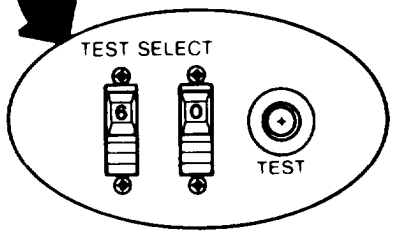
STE/ICE Test Procedures - Continued



13 **Enter vehicle identification (VID) number.**

- Dial TEST SELECT switches to 60.
- Press and release TEST button.
- VTM display will indicate [UEH].
- Dial TEST SELECT switches to [4].
- Press and release TEST button.
- Check that VTM display indicates [4].

Does VTM display indicate [4]?



YES

NO

14

- **Repeat test.**
- **Check that VTM display indicates [4].**

Does VTM display indicate [4]?

YES

NO

15 **Replace STE/ICE set.**

16 **Proceed with STE/ICE test.**

TA141684

STE/ICE Test Procedure - Continued

CI POWER TEST NO. 13

WARNING

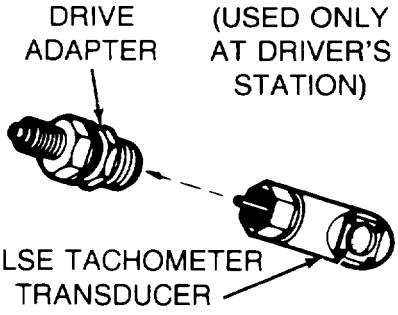
Stop engine before installing pulse tachometer transducer.

CAUTION

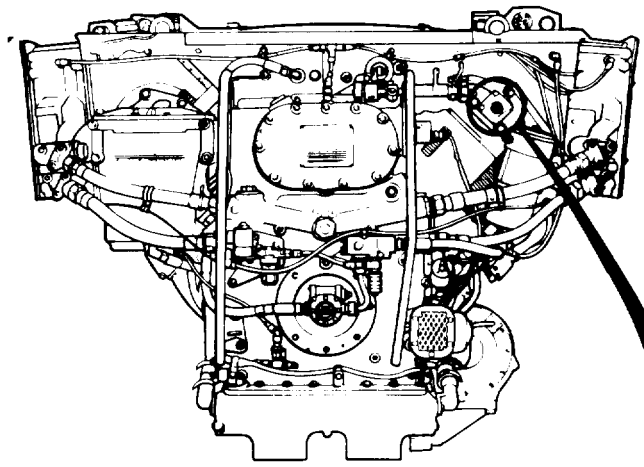
Clean all mounting surfaces before installing pulse tachometer transducer and tachometer drive adapter to prevent entry of foreign matter that may damage engine or test equipment.

NOTE

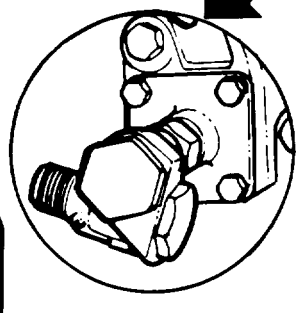
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



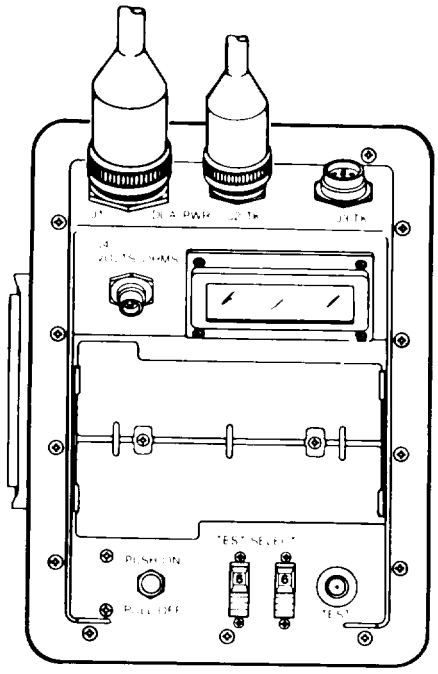
1 **Perform VTM GENERAL SET UP, CONFIDENCE and IDENTIFICATION TEST NO. 66/60 (page 4-59).**



POWERPLANT REMOVED FOR CLARITY



ENGINE TACHOMETER ADAPTER



VTM

TA141685

STE/ICE Test Procedures - Continued

2 Where is test being performed?

At driver's station.

3 Install tachometer adapter, pulse tachometer, transducer - connect cables.

Second Technician (Driver's Station)

- Disconnect tachometer cable from tachometer.
- Install drive adapter onto tachometer cable.
- Install pulse tachometer transducer onto drive adapter.

First Technician (Turret)

- Connect P1 of transducer cable W4 to J2 or J3 on VTM.
- Connect P2 of transducer cable W4 to connector on pulse tachometer.

At powerplant.

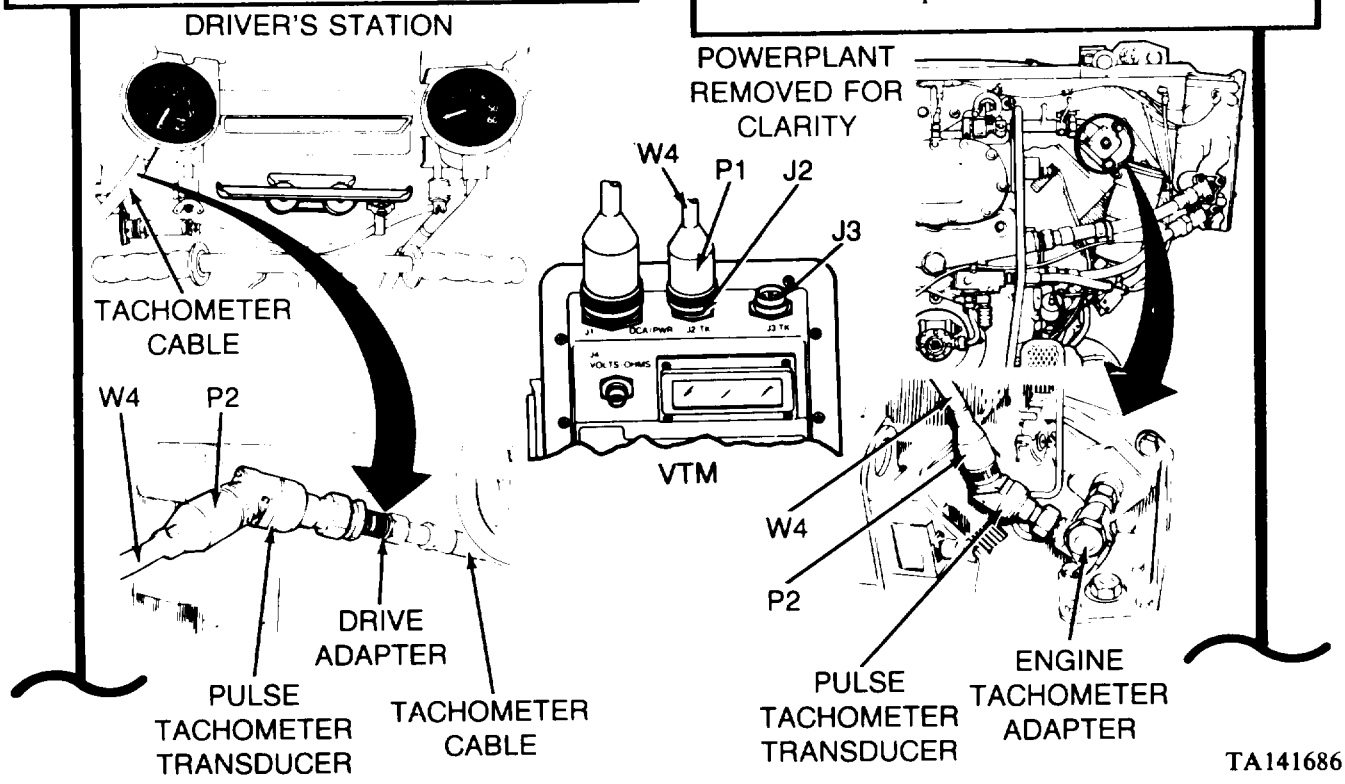
3 Install pulse tachometer - connect cables.

Second Technician (Top Deck)

- Open left top deck grille doors.
- Disconnect tachometer cable from engine tachometer adapter.
- Install pulse tachometer transducer on engine tachometer adapter.

First Technician (Turret)

- Connect P1 of transducer cable W4 to J2 or J3 on VTM.
- Connect P2 of transducer cable W4 to connector on pulse tachometer transducer.



STE/ICE Test Procedure - Continued

4

Second Technician

- **Apply parking brake.**
- **Start engine.**

4

Second Technician

- **Start engine.**

CAUTION

Do not perform power test unless engine is operating at normal operating temperature.

5

Perform engine-governed No-Load test.

First Technician

- Dial TEST SELECT switches to 10.
- Press TEST button.

CAUTION

Do not run engine faster than 2640 rpm for more than 2 or 3 seconds in the event of governor malfunction.

NOTE

In most cases, engine speed will surge over 2600 rpm and then stabilize within 30 seconds between 2550 and 2640 rpm.

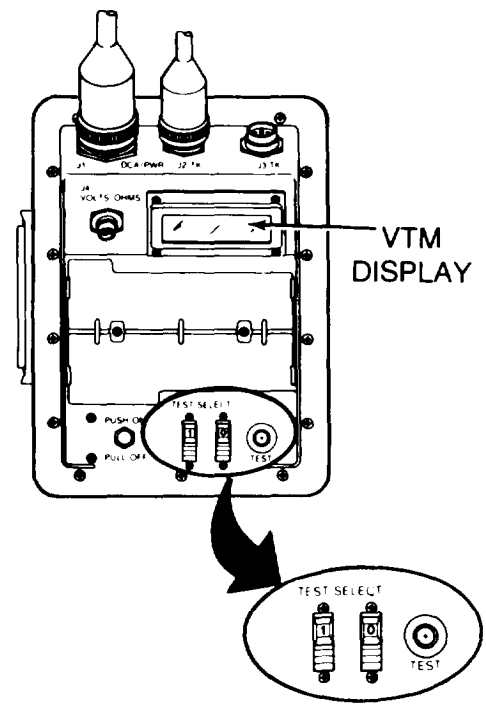
Second Technician

- Gradually depress accelerator pedal to floor.

First Technician

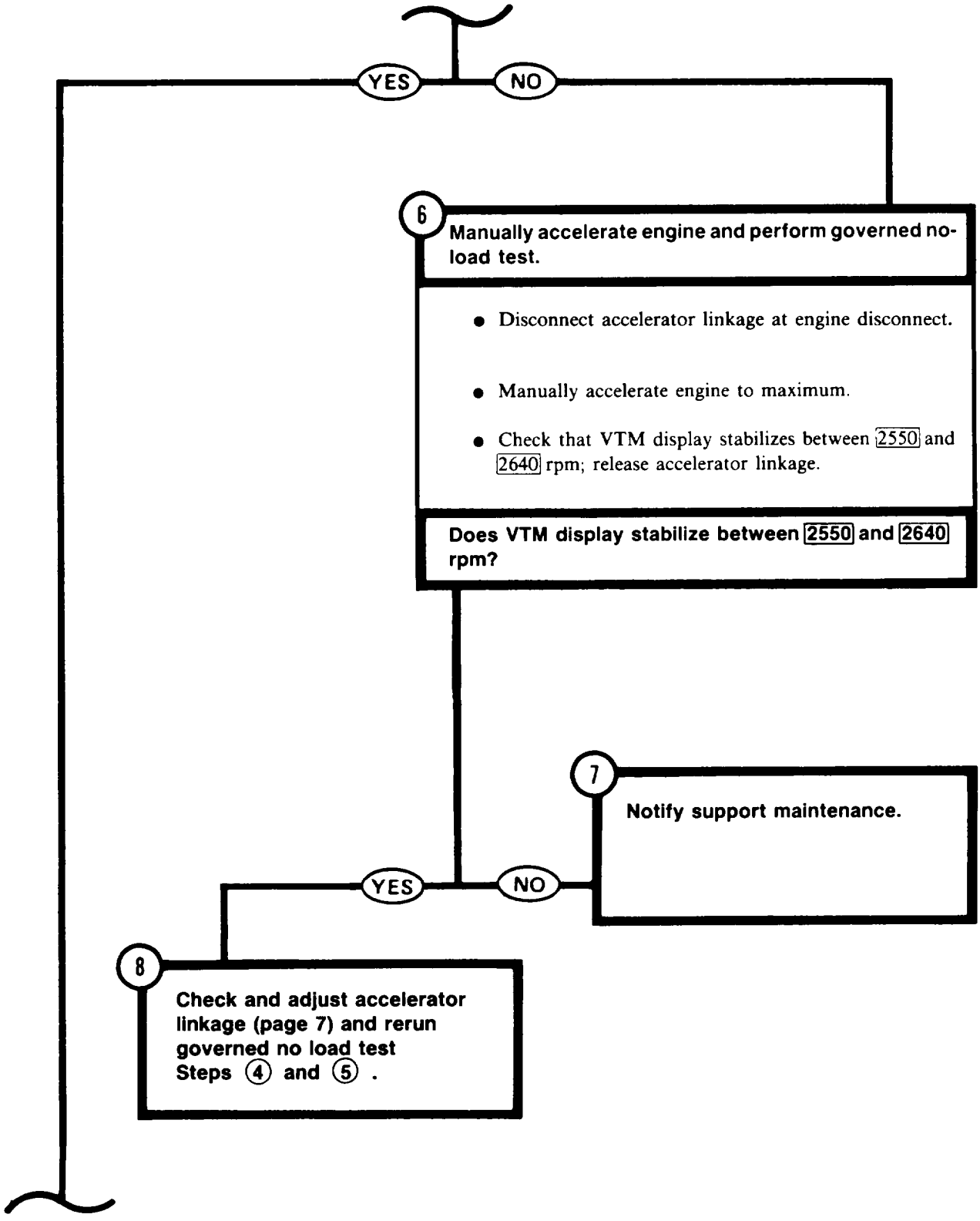
- Check that VTM display stabilizes between 2550 and 2640 rpm. Release accelerator.

Does VTM display stabilize between 2550 and 2640 rpm?



TA141687

STE/ICE Test Procedures - Continued



TA141688

STE/ICE Test Procedures - Continued

NOTE

Read and understand the following steps before proceeding.

9 **Perform CI power test.**

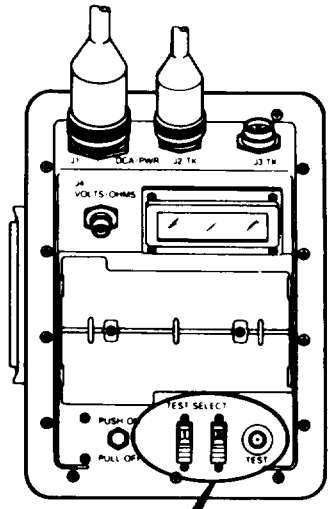
First Technician

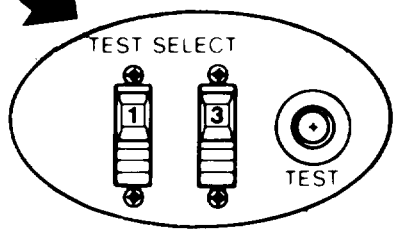
- Dial TEST SELECT switches to 13.
- Press TEST button.

Second Technician

- When VTM display indicates [CIP], quickly depress accelerator pedal to floor and hold until VTM display indicates [OFF].
- When VTM display indicates [OFF], immediately release accelerator.
- Check that VTM display indicates [75] or more.

Does VTM display indicate [75] or more?





YES

10

- **End of STE/ICE Test.**
- **If you came:**

From	Proceed	To
PMCS		PMCS, Next Step

NO

11 **Go to troubleshooting Symptom 11 ENGINE WILL NOT RUN RIGHT 2A Engine (page 4-348) 2D Engine (page 4-371).**

TA141689

COMPRESSION UNBALANCE TEST NO. 14

CAUTION

Do not perform more than 2 compression unbalance tests in a row or vehicle batteries may become discharged. Engine must be at normal operating temperature before performing compression unbalance test.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1. **Perform VTM GENERAL SET UP, CONFIDENCE and IDENTIFICATION TEST NO. 66/60 (page 4-59).**

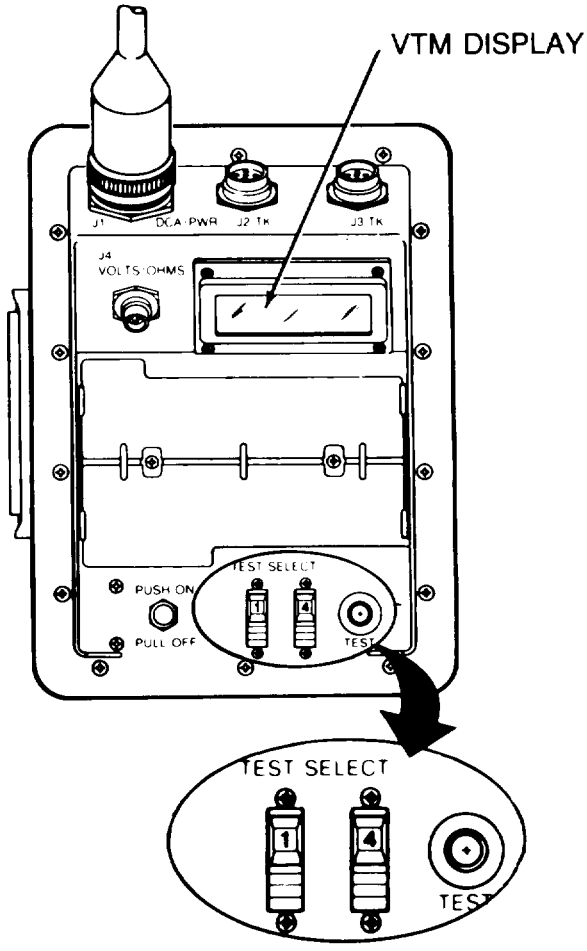
2. **Condition vehicle-shut-off engine.**

   Second Technician (Driver's Station)
   - Make sure engine is running at normal operating temperature.
   - Run engine at fast idle (1500 rpm) for 2 minutes.
   - Stop engine.

3. **Condition STE/ICE set.**

   Second Technician
   - Make sure MASTER BATTERY switch is ON.

   First Technician (Turret)
   - Dial TEST SELECT switches to 14.
   - Press then release TEST button.
   - Wait for message GO to appear on the VTM display.



TA141690

STE/ICE Test Procedures - Continued

NOTE
Read and understand the following steps before proceeding.

4 **Perform compression unbalance test.**

- VTM display will indicate GO

Second Technician

- Hold ENGINE FUEL SHUT OFF switch up and crank engine by pressing STARTER switch and holding until VTM display indicates ----.
- Release STARTER switch when VTM display changes from ---- to OFF or EO13.
- Check that VTM display changes to indicate a number between 0 - 15.

Does VTM display indicate a number between 0 - 15 ?

YES / NO

5 **Does VTM display GO ?**

NO / YES

6
- **End of STE/ICE test.**
- **If you came:**

From	Proceed To
Symptom 11	Symptom 11 Step (1)
Symptom 16	Symptom 16 Step (5)

7 **Does VTM display FAIL ?**

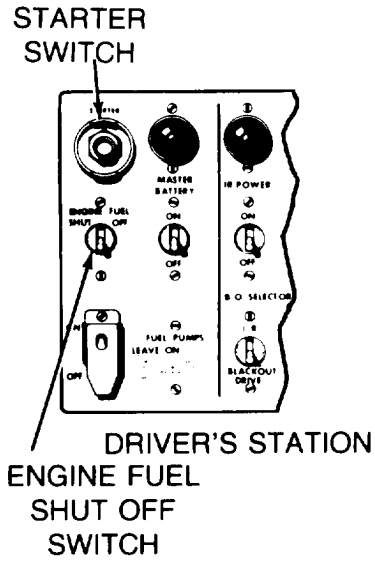
YES / NO

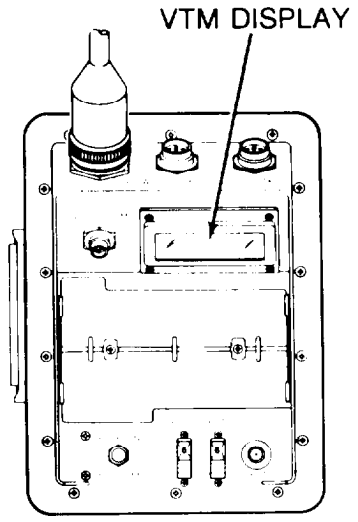
8 **Rerun compression unbalance test.**

IF VTM display still indicates FAIL, notify DS maintenance.

9
- Operator may have stopped cranking during test.
- Batteries may be discharged. Check battery electrolyte level, specific gravity and recharge batteries (TM 9-6140-200-14).

Correct problem, repeat test.





TA141691

PRESSURE 0-1000 PSIG TEST NO. 50

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1. **Perform VTM GENERAL SET UP, CONFIDENCE and IDENTIFICATION TEST NO. 66/60 (page 4-59).**

NOTE

When performing the offset test, make sure engine is off and system to be tested is depressurized.

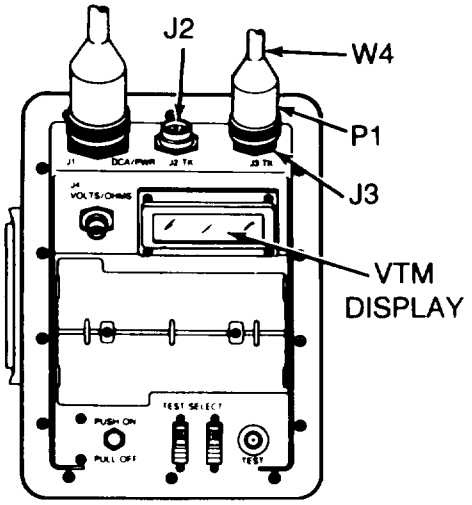
2. **Connect test cables and pressure transducer.**

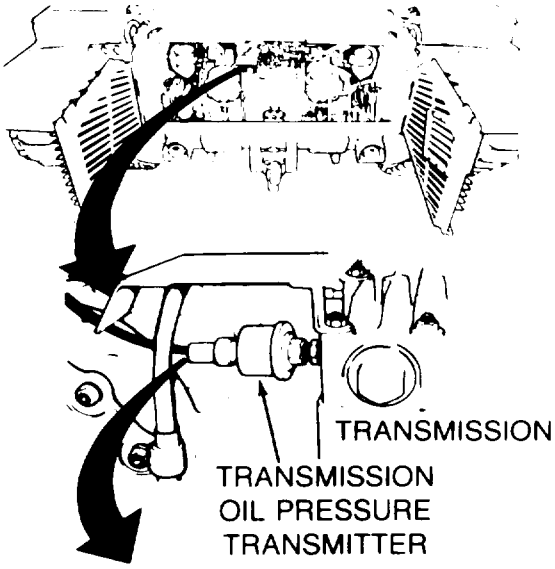
First Technician (Rear Grille Doors)

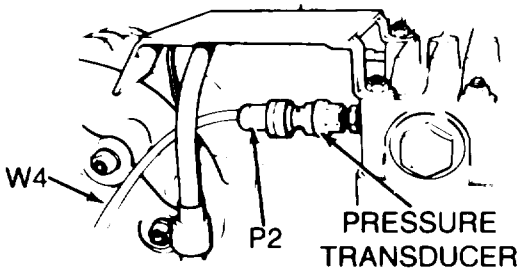
- Connect P1 of transducer cable W4 to J2 or J3 on VTM.
- Connect P2 of cable W4 to cable adapter J1 (MS 3119E-14-19).
- Connect P1 of second W4 cable to J1 adapter.

Both Technicians (Rear Grille Doors)

- Open rear grille doors.
- Remove transmission shroud (page 9-19).
- Remove transmission oil pressure transmitter (page 10-274).
- Install blue stripe 0-1000 psig pressure transducer (12258876) on transmission.
- Connect P2 of second cable W4 to connector on pressure transducer.







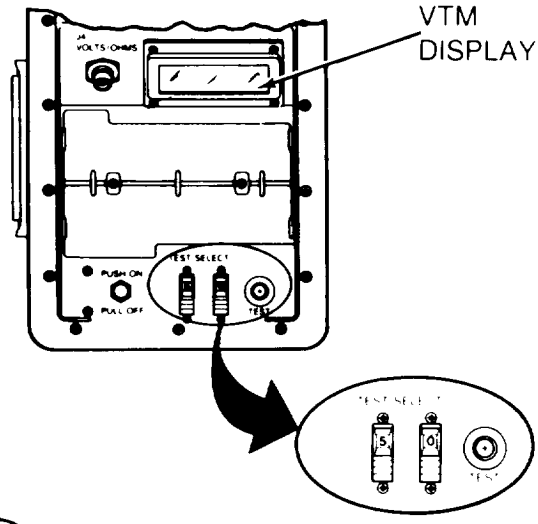
TA141692

STE/ICE Test Procedures - Continucd

3 **Do OFFSET TEST.**

First Technician
- Dial TEST SELECT switches to 50.
- Press and hold TEST button until VTM display indicates CAL
- Release TEST button.
- Check that offset measurement on VTM display indicates between −150 to +150

Does VTM display indicate between −150 to +150 ?



YES

NO

5 **Perform pressure test.**

Second Technician (Driver's Compartment)
- Start engine and let idle.
- Make sure engine is operating at normal operating temperature.

First Technician
- Press and hold TEST button until CAL appears.
- Release TEST button.
- Check that VTM display indicates 2 or more.

Does VTM display indicate 2 or more?

YES

NO

4 **Do OFFSET FAULT ISOLATION (TM 9-4910-571-12&P).**

6 **Notify DS maintenance.**

TA141693

STE/ICE Test Procdures - Continued

WARNING

DO NOT ACCELERATE ENGINE UNLESS ALL PERSONNEL ARE CLEAR OF VEHICLE.

7

Second Technician

- Accelerate engine to 2400 rpm.

First Technician

- Check that VTM display indicates between [8] to [40] .

Does VTM display indicate between [8] to [40] ?

YES

NO

8

Notify DS Maintenance.

9

- **End of STE/ICE test.**
- **If you came:**

From -	Proceed To
Symptom 34	Symptom 34 Step ⑥

TA141694

STE/ICE Test Procedures - Continued

CHARGING CIRCUIT AND BATTERY VOLTAGE TEST NO. 67

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1. **Perform VTM GENERAL SET UP, CONFIDENCE and IDENTIFICATION TEST NO. 66/60 (page 4-59).**

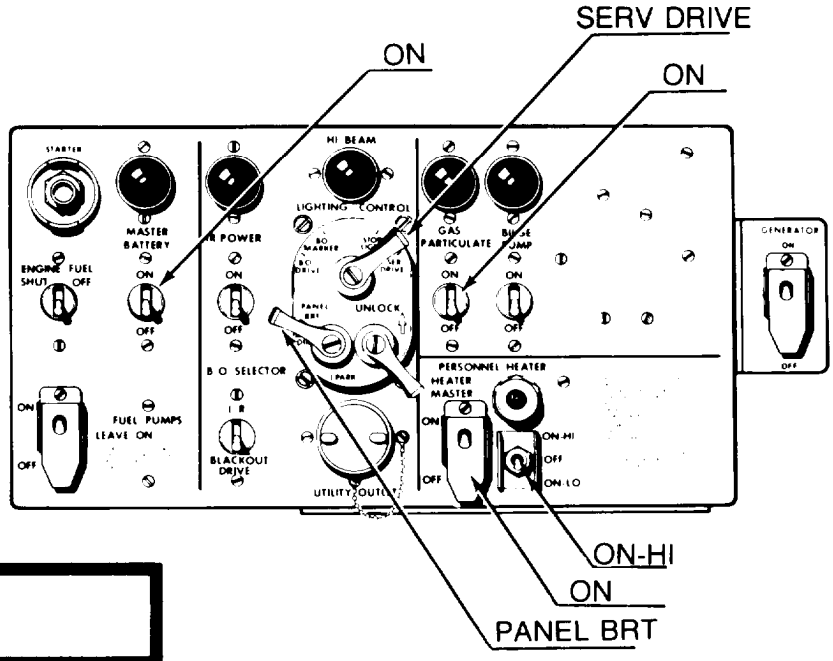
CAUTION

Engine must be at normal operating temperature before increasing speed to 1500 rpm.

2. **Set engine RPM.**

Second Technician (Driver's Station)

- Start engine.
- Set engine speed at 1500 rpm.
- Turn lighting control switch to SERV DRIVE.
- Turn panel light switch to PANEL BRT.
- Make sure HEATER MASTER is ON.
- Set PERSONNEL HEATER switch to ON-HI.
- Set GAS PARTICULATE switch to ON.



TA141695

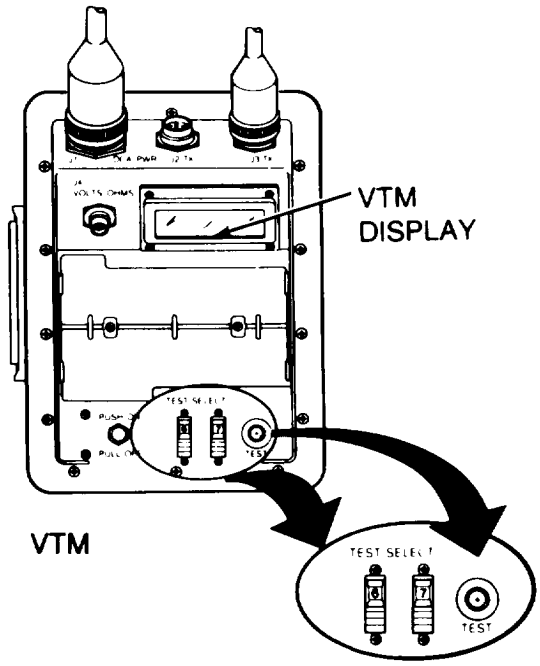
STE/ICE Test Procedures - Continued

3 **Measure battery/generator voltage.**

First Technician (Turret)

- Dial TEST SELECT switches to 67.
- Press and release TEST button.
- Check that VTM display indicates 27 to 30 volts dc.

Does VTM display 27 to 30 volts dc?



YES — NO

4 **Check for low voltage.**

See Step (8).

5 **Check BATT GEN INDICATOR.**

Second Technician

Check if BATT GEN INDICATOR reads in green area (charging).

Does BATT GEN INDICATOR read in green area?

YES — NO

6

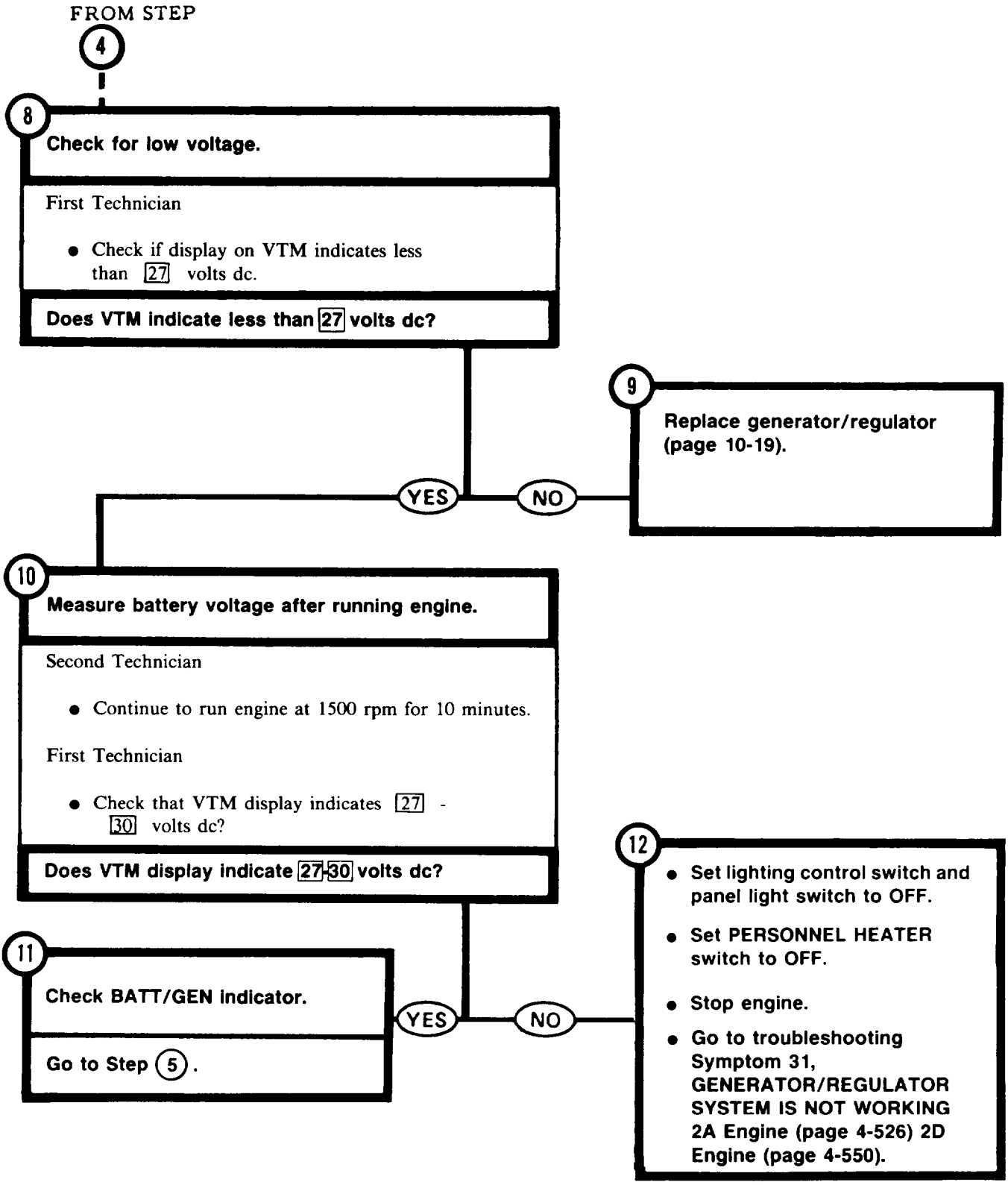
- **Turn LIGHTING CONTROL switch panel light switch to OFF.**
- **Set PERSONNEL HEATER switch to OFF.**
- **Stop engine.**
- **End of STE/ICE test.**
- **If you came:**

From - Proceed - To	
PMCS	PMCS, Next Step

7 **Go to troubleshooting Symptom 36, BATTERY GENERATOR GAGE WILL NOT WORK (ALL OTHER GAGES WORK) (page 4-694).**

TA141696

STE/ICE Test Procedures - Continued



TA141697

STE/ICE Test Procedures - Continued

STARTER CURRENT FIRST PEAK TEST NO. 72.

WARNING

Make sure engine is not running.

CAUTION

When traversing turret check that STE/ICE W5 alligator clips do not become loose or disengaged.

NOTE

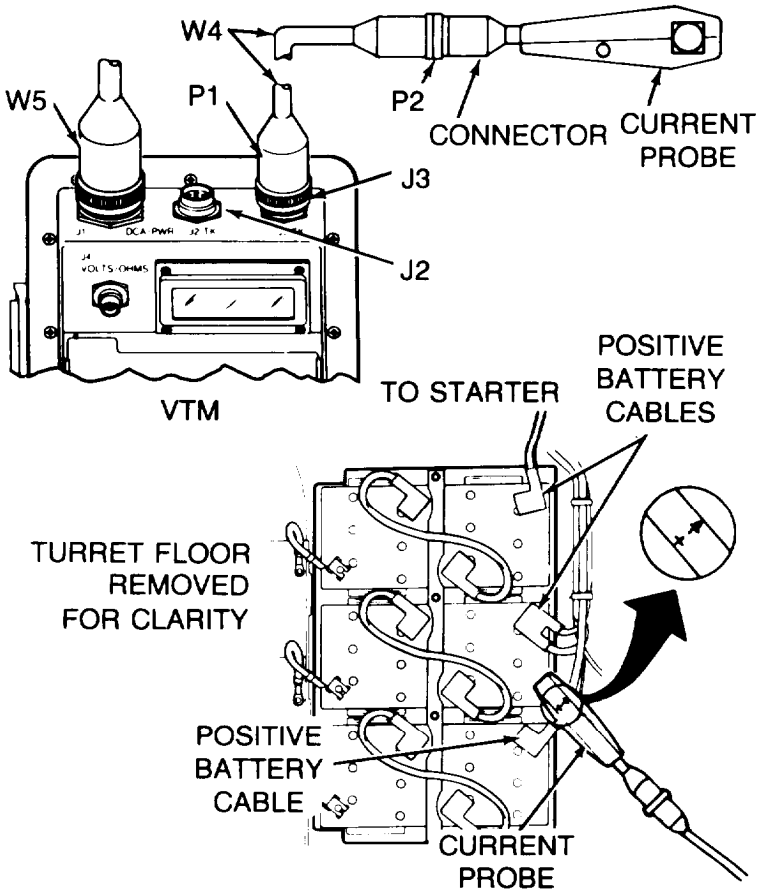
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1. **Perform VTM GENERAL SET UP, CONFIDENCE and IDENTIFICATION TEST NO. 66/60 (page 4-59).**

2. **Condition current probe - Do OFFSET.**

First Technician (Turret)

- Connect P1 of transducer cable W4 to J2 or J3 on VTM.
- Connect P2 of cable W4 to connector on current probe.
- Clamp current probe around one positive battery cable going to starter with arrow on probe pointing in direction of starter.



TA253058

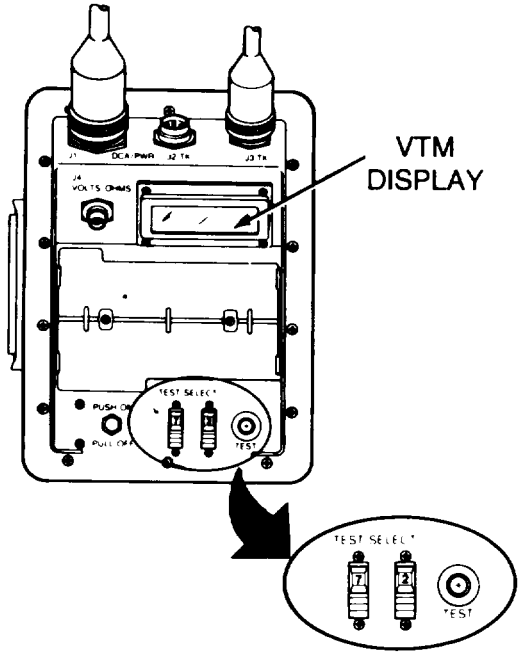
STEP (2) CONTINUED

Second Technician (Driver's Station)

- Make sure MASTER BATTERY switch is set to ON.
- Hold ENGINE FUEL SHUT OFF switch up and crank engine for 3 seconds by pressing STARTER switch.
- Set MASTER BATTERY switch to OFF.
- Make sure HEATER MASTER circuit breaker is set to OFF.

First Technician

- Dial TEST SELECT switches to 72.
- Press and hold TEST button until [CAL] message appears on VTM display.
- Release TEST button.
- Check that offset measurement on VTM display indicates between [−225] to [+225]



Does VTM display indicate between [−225] to [+225]?

YES

NO

3 **Perform OFFSET FAULT ISOLATION (TM 9-4910-571-12&P).**

4 **Check starter current first peak.**

Second Technician

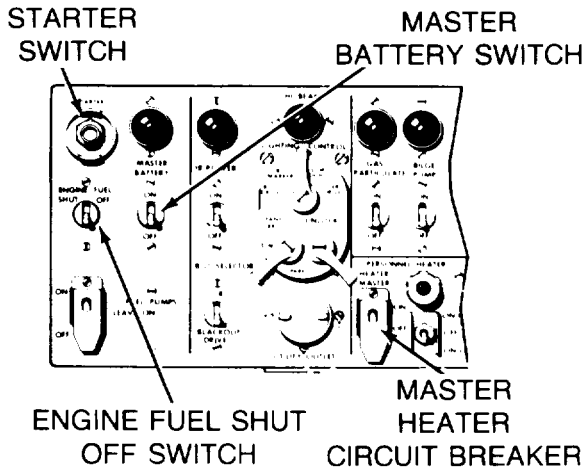
- Set MASTER BATTERY switch to ON.

First Technician

- Press then release TEST button.

Second Technician

- When [GO] appears on VTM display, hold ENGINE FUEL SHUT OFF switch up and crank engine by pressing starter switch until [OFF] appears on VTM display.



TA141699

STE/ICE Test Procedures - Continued

STEP 4 CONTINUED

Second Technician

- Release STARTER switch.

First Technician

- Check that VTM displays a number.

Does VTM display between 460 and 800 ?

5 **Does VTM display indicate more than 800 ?**

NO

YES

6

- **If performing troubleshooting proceed to Symptom 1, ENGINE WILL NOT CRANK WHEN STARTER SWITCH IS PRESSED, Step 37 .**
- **If performing PMCS proceed to next step of PMCS.**

NO

YES

7 **Replace engine starter (page 10-26).**

8 **See detailed troubleshooting Symptom 1, ENGINE WILL NOT CRANK WHEN STARTER SWITCH IS PRESSED, Steps 7 through 36 .**

TA141700

STARTER CIRCUIT RESISTANCE TEST NO. 74

WARNING

Make sure engine is not running.

CAUTION

When traversing turret, check that STE/ICE W5 alligator clips do not become loose or disengaged.

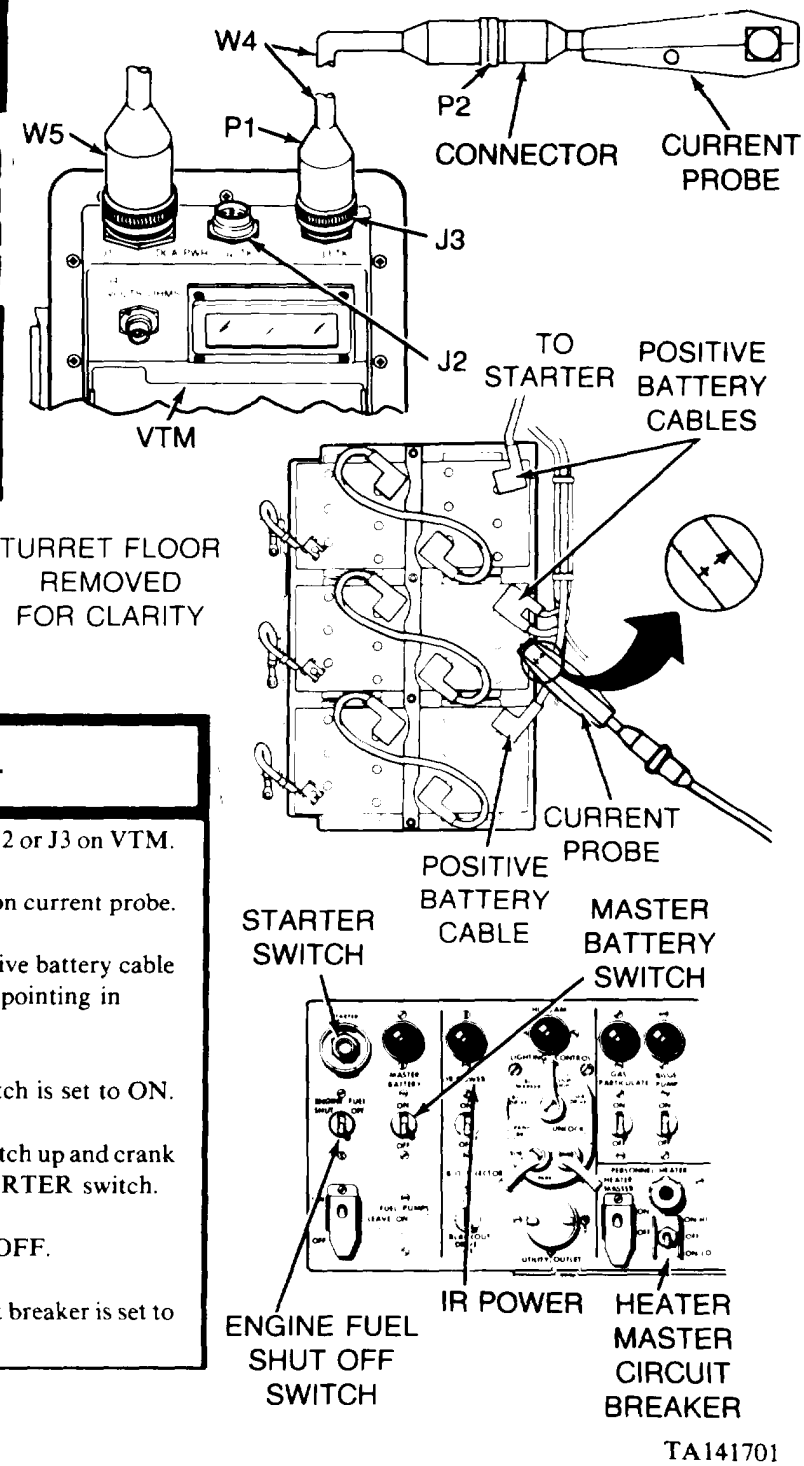
NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1. **Perform VTM GENERAL SET UP, CONFIDENCE and IDENTIFICATION TEST NO. 66/60 (page 4-59).**

2. **Condition current probe - Do OFFSET.**

   - Connect P1 of transducer cable W4 to J2 or J3 on VTM.
   - Connect P2 of cable W4 to connector on current probe.
   - Clamp current probe around one positive battery cable going to starter with arrow on probe pointing in direction of starter.
   - Make sure MASTER BATTERY switch is set to ON.
   - Hold ENGINE FUEL SHUT OFF switch up and crank engine for 3 seconds by pressing STARTER switch.
   - Set MASTER BATTERY switch to OFF.
   - Make sure HEATER MASTER circuit breaker is set to OFF.



TA141701

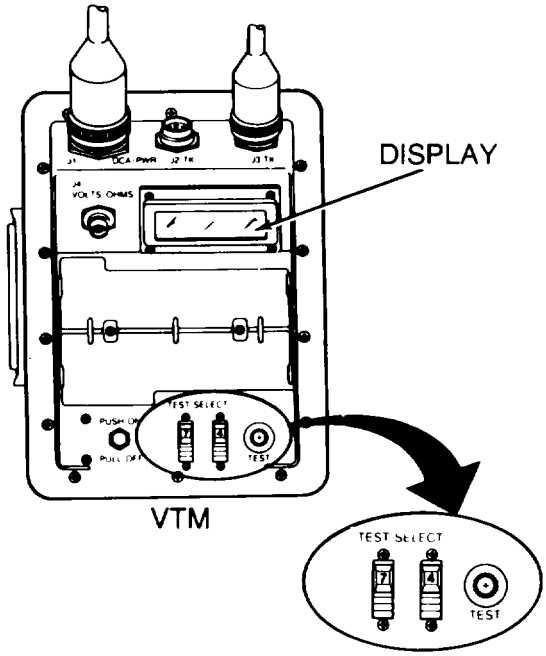
STE/ICE Test Procedures - Continued

STEP 2 CONTINUED

First Technician

- Dial TEST SELECT switches to 74.
- Press and hold TEST button until CAL message appears on VTM display.
- Release TEST button.
- Check that offset measurement on VTM display indicates between −225 to +225.

Does VTM display indicate between −225 to +225 ?



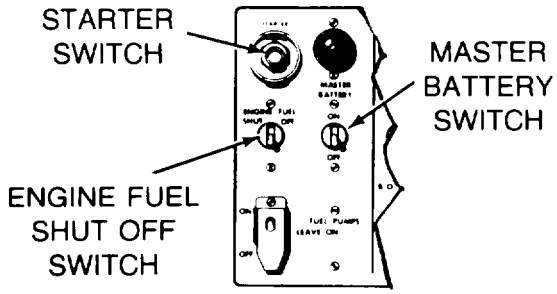
YES — NO

3 **Perform OFFSET FAULT ISOLATION (TM 9-4910-571-12 & P).**

4 **Check starter circuit resistance.**

- Set MASTER BATTERY switch to ON.
- Press and release TEST button.
- Check that VTM display indicates GO.

Does VTM display indicate GO ?



YES — NO

5

- **VTM display indicates an error code. See Error Readout, (page 4-57).**
- **Correct error and retest.**

6

- Hold ENGINE FUEL SHUT OFF switch up and crank engine by pressing STARTER switch until OFF appears on VTM display.
- Release STARTER switch and set MASTER BATTERY switch to OFF. Check that VTM display indicates between 10 and 60 milliohms.

Does VTM indicate between 10 and 60 milliohms?

TA141702

STE/ICE Test Procedures - Continued

NO

YES

8 **Check for high resistance.**

First Technician

- Check VTM display for high resistance indication.

Is VTM display above 60 milliohms?

7

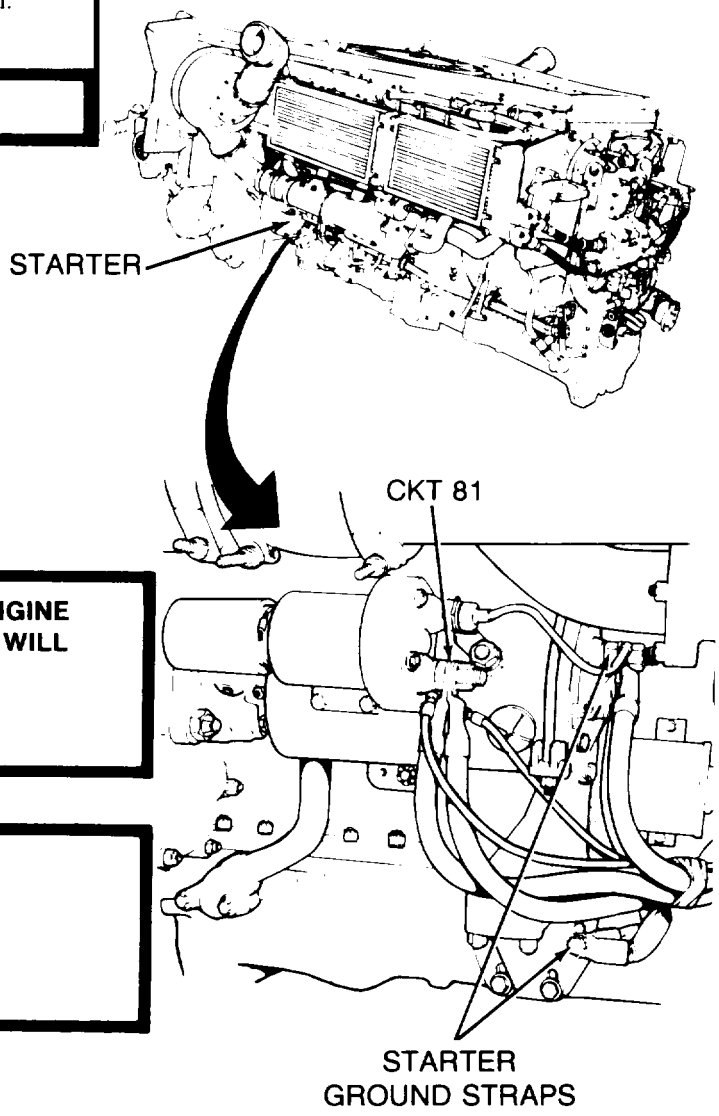
- **END OF STE/ICE TEST.**
- **Proceed to next step of PMCS.**

YES

9 **Refer to Symptom 3: ENGINE CRANKS SLOWLY AND WILL NOT START. Steps (5) through (26) (page 4-230).**

NO

10 **Replace Engine Starter (Page 10-26).**



TA141703

BATTERY CONDITION TEST NO. 77/79.

WARNING

Make sure engine is not running.

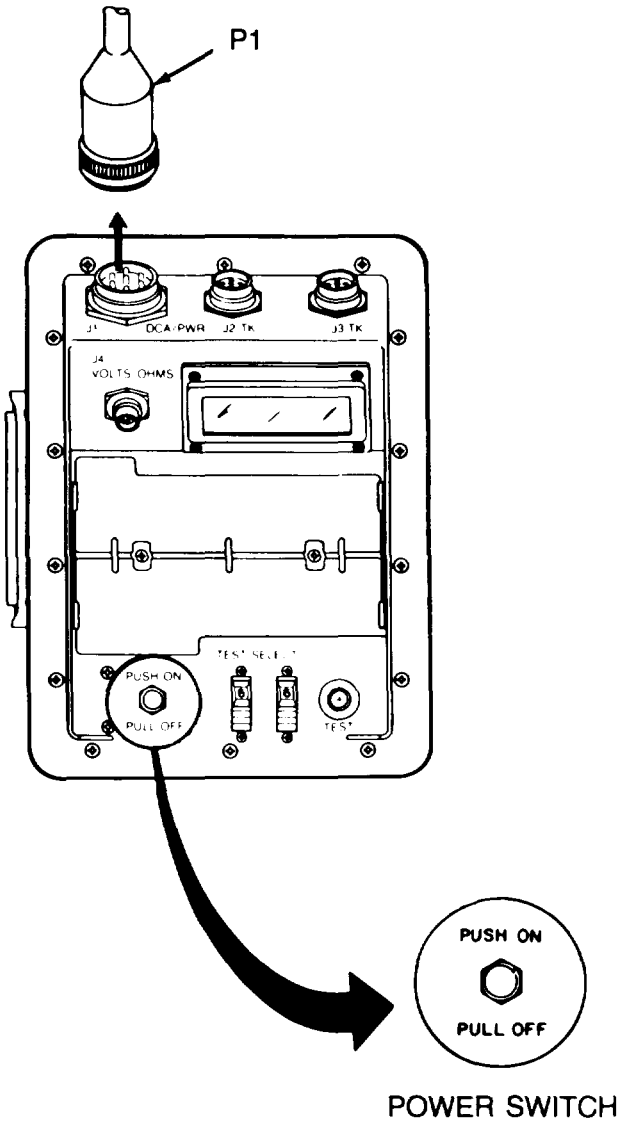
CAUTION

When traversing turret, check that STE/ICE W5 alligator clips do not become loose or disengaged.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1. **Perform VTM GENERAL SET UP, CONFIDENCE and IDENTIFICATION TEST NO. 66/60 (page 4-59).**



POWER SWITCH

TA141704

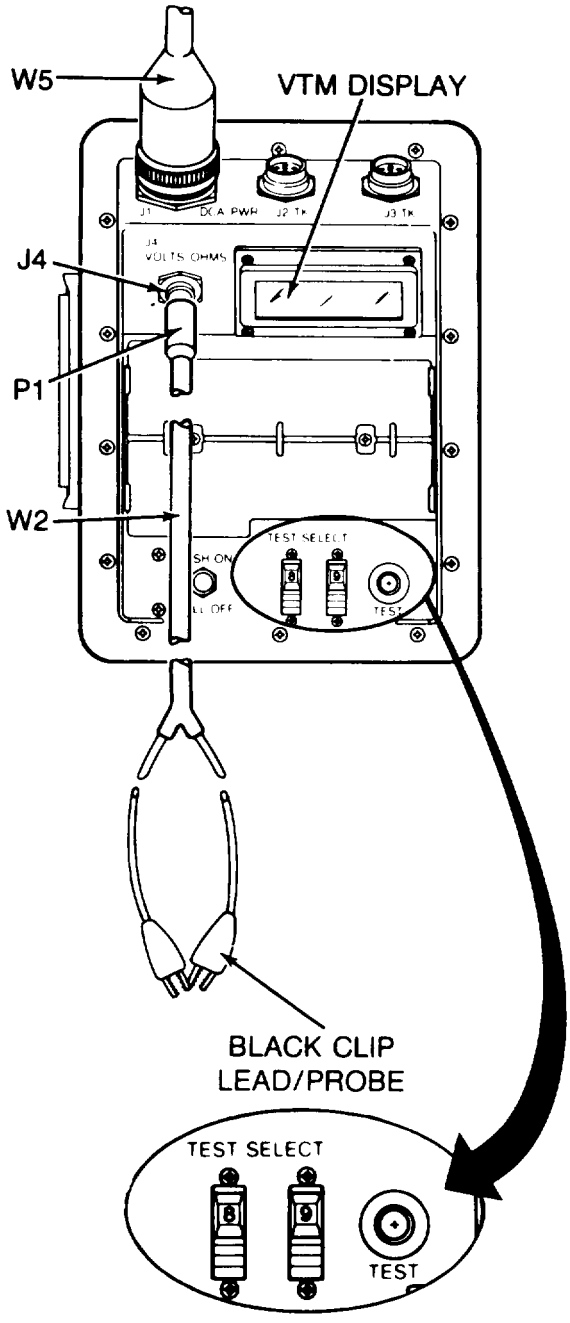
STE/ICE Test Procedures - Continued

2 **Connect test probe cable to VTM, do OFFSET test.**

First Technician (Turret)

- Connect P1 of test probe cable W2 to J4 of VTM.
- Connect red and black clip leads/probes of cable W2 together.
- Dial TEST SELECT switches to 89.
- Press TEST button and hold until VTM display indicates [CAL] .
- Release TEST button.
- Check that offset measurement on VTM display indicates between [−6.8] to [+6.8] .

Does VTM display indicate between [−6.8] to [+6.8] ?



YES

NO

3 **Replace STE/ICE set.**

TA141705

STE/ICE Test Procedures - Continued

4 **Installation of clip leads/probes of cable W2.**

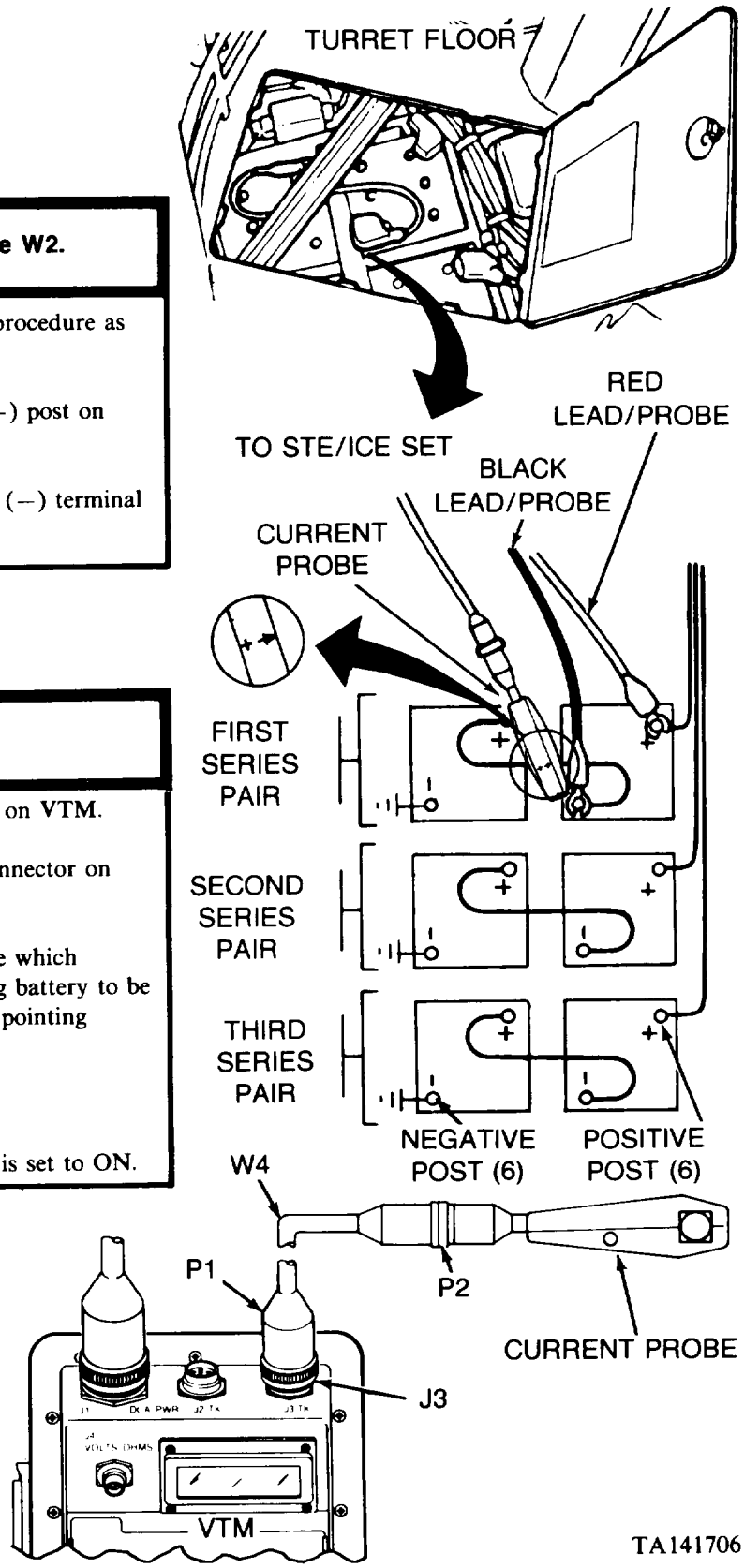
- Manually traverse turret throughout this procedure as necessary to gain access to batteries.
- Connect red clip lead/probe to positive (+) post on battery being tested.
- Connect black clip lead/probe to negative (−) terminal on battery being tested.

5 **Condition current probe - Do OFFSET.**

- Connect P1 of transducer cable W4 to J3 on VTM.
- Connect P2 of transducer cable W4 to connector on current probe.
- Clamp current probe around battery cable which connects series pair of batteries containing battery to be tested. Make sure current probe arrow is pointing toward negative-terminal.

Second Technician (Driver's Station)

- Make sure MASTER BATTERY switch is set to ON.

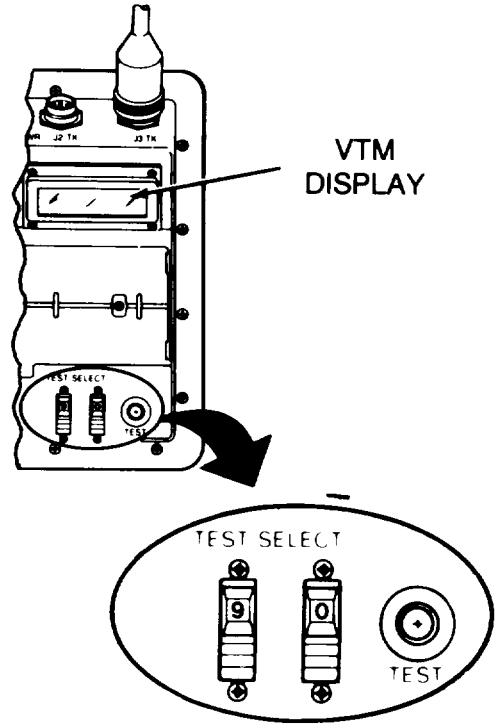


TA141706

STEP 5 CONTINUED

- Hold ENGINE FUEL SHUT OFF switch up and crank engine for 3 seconds by pressing STARTER switch.
- Set MASTER BATTERY switch to OFF.
- Make sure HEATER MASTER circuit breaker is set to OFF.
- Dial TEST SELECT switches to 90.
- Press TEST and hold until VTM display indicates CAL .
- Release TEST.
- Check that offset measurement on VTM display indicates between −225 to +225.

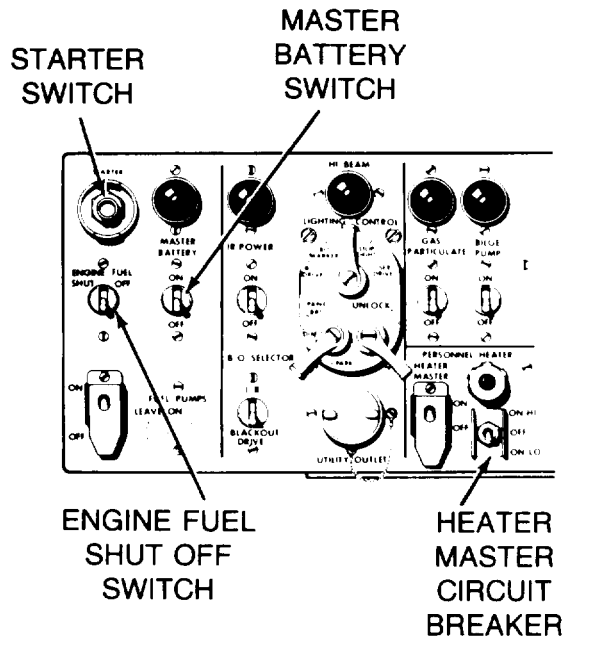
Does VTM display indicate between −225 to +225 ?



NO

6 **Perform OFFSET Fault Isolation (TM 9-4910-571-12 & P).**

YES



TA141707

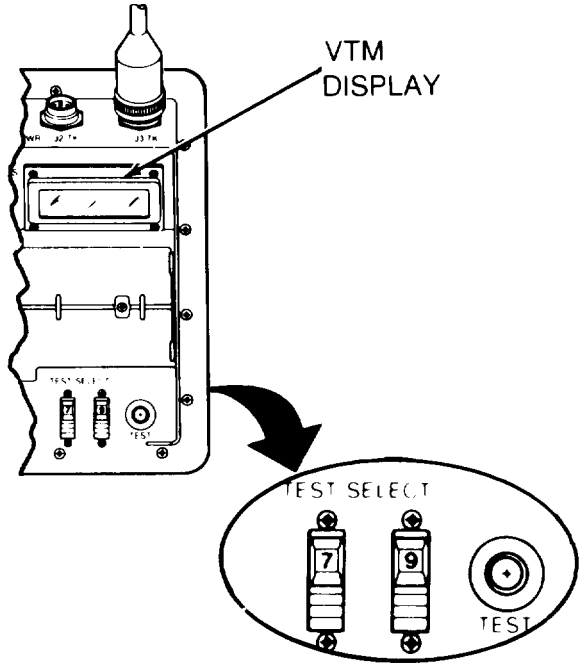
STE/ICE Test Procedures - Continued

7 **Measure battery resistance change.**

First Technician

- Dial TEST SELECT switches to 79.
- Press then release TEST button.
- Check that VYM display indicates [GO] .

Does VTM display indicate [GO] ?



NO

8

- **VTM display indicates an error code. See Error Readouts (page 4-57).**
- **Correct error and retest.**

YES

9

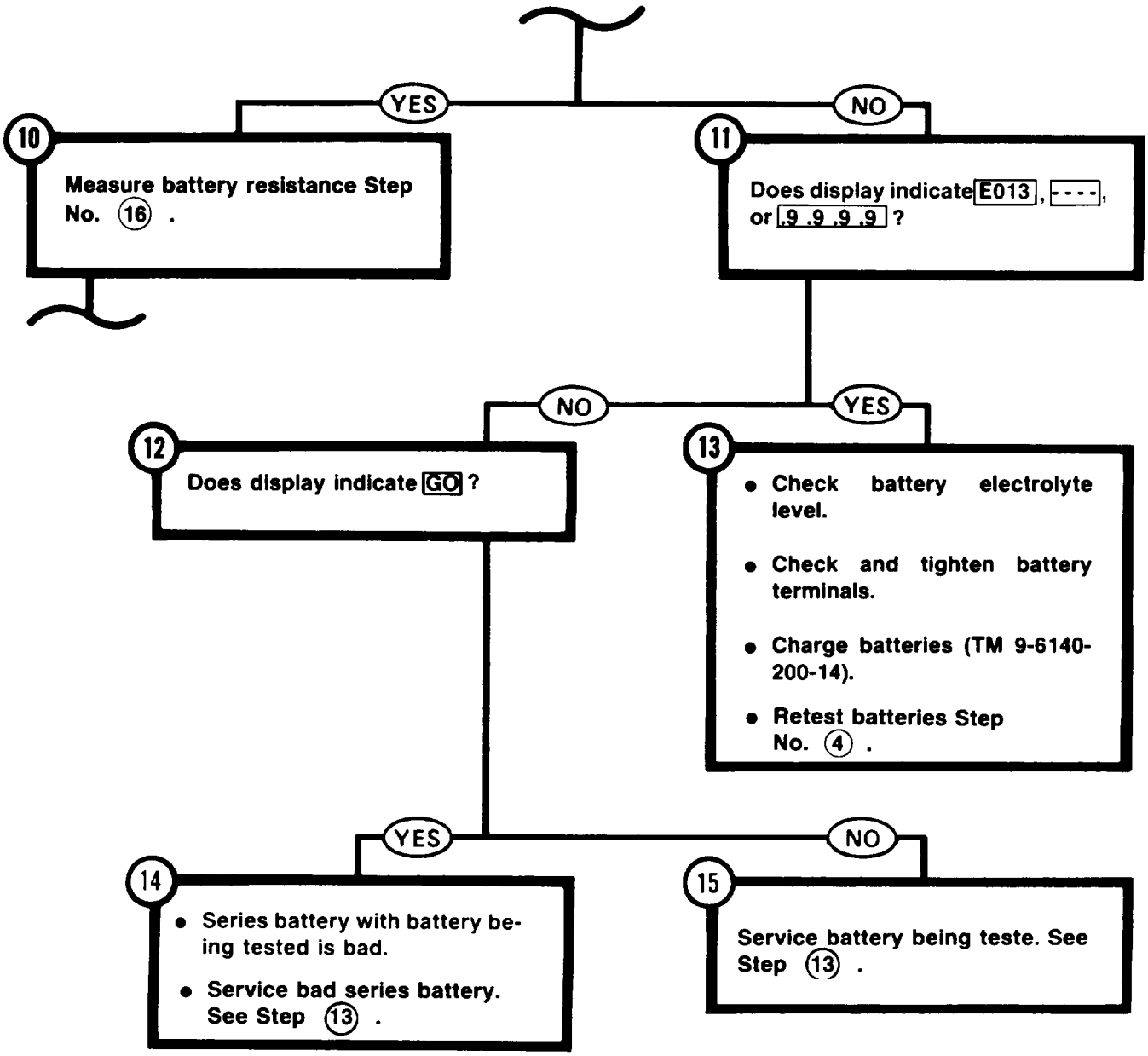
Second Technician

- Hold ENGINE FUEL SHUT OFF switch up and crank engine by pressing STARTER switch (Not more than 15 seconds) until [OFF] appears on VTM display.
- Release starter and check that VTM display indicates [25] or less.

Does VTM display indicate [25] or less?

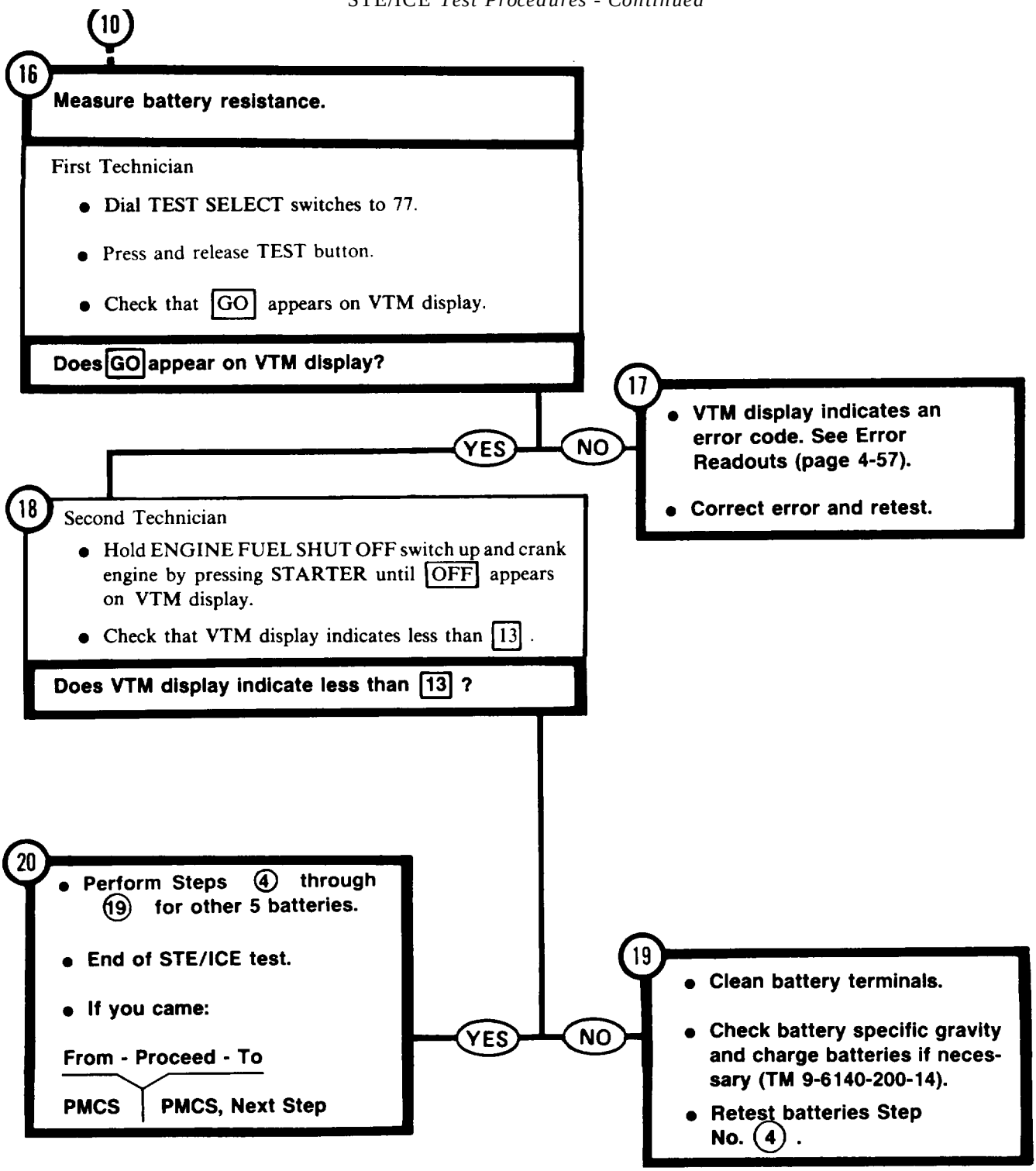
TA141708

STE/ICE *Test Procedures - Continued*



TA141709

STE/ICE *Test Procedures - Continued*



TA141710

T E S T 8 9

DC VOLTAGE TEST NO. 89

1 **Perform VTM GENERAL SET UP, CONFIDENCE and IDENTIFICATION TEST NO. 66/60 (page 4-59).**

2 **Connect test probe cable to VTM, do OFFSET test.**

- Connect P1 of test probe cable W2 to J4 of VTM.
- Connect red and black clip leads/probes of cable W2 together.
- Dial TEST SELECT switches to 89.
- Press TEST button and hold until VTM display indicates CAL.
- Release TEST button.
- Check that offset measurement on VTM display indicates between −6.8 to +6.8.

Does VTM display indicate between −6.8 to +6.8 ?

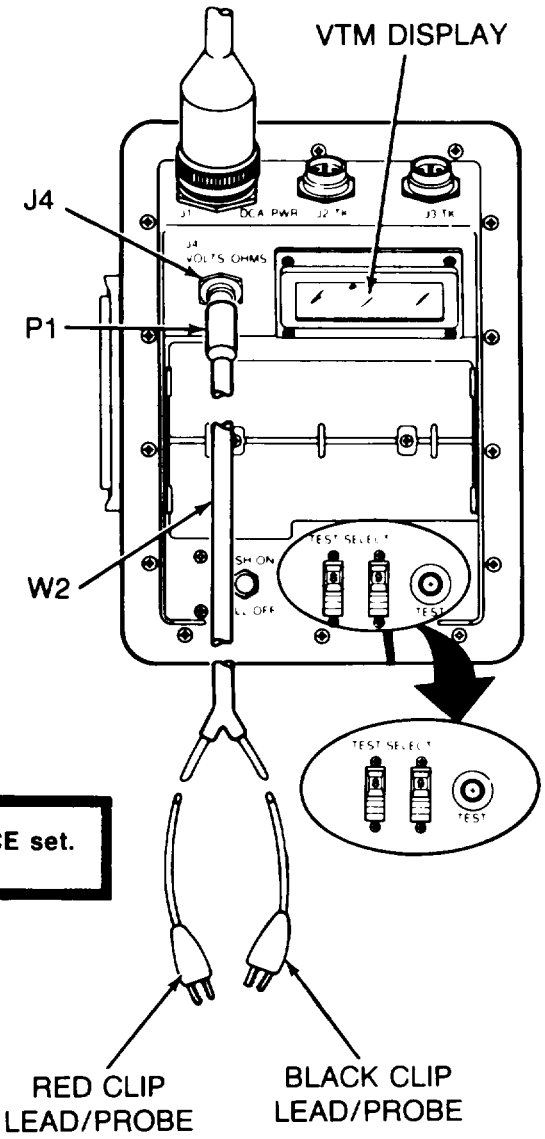
YES — NO

3 **Replace STE/ICE set.**

4 **Determine use of STE/ICE set.**

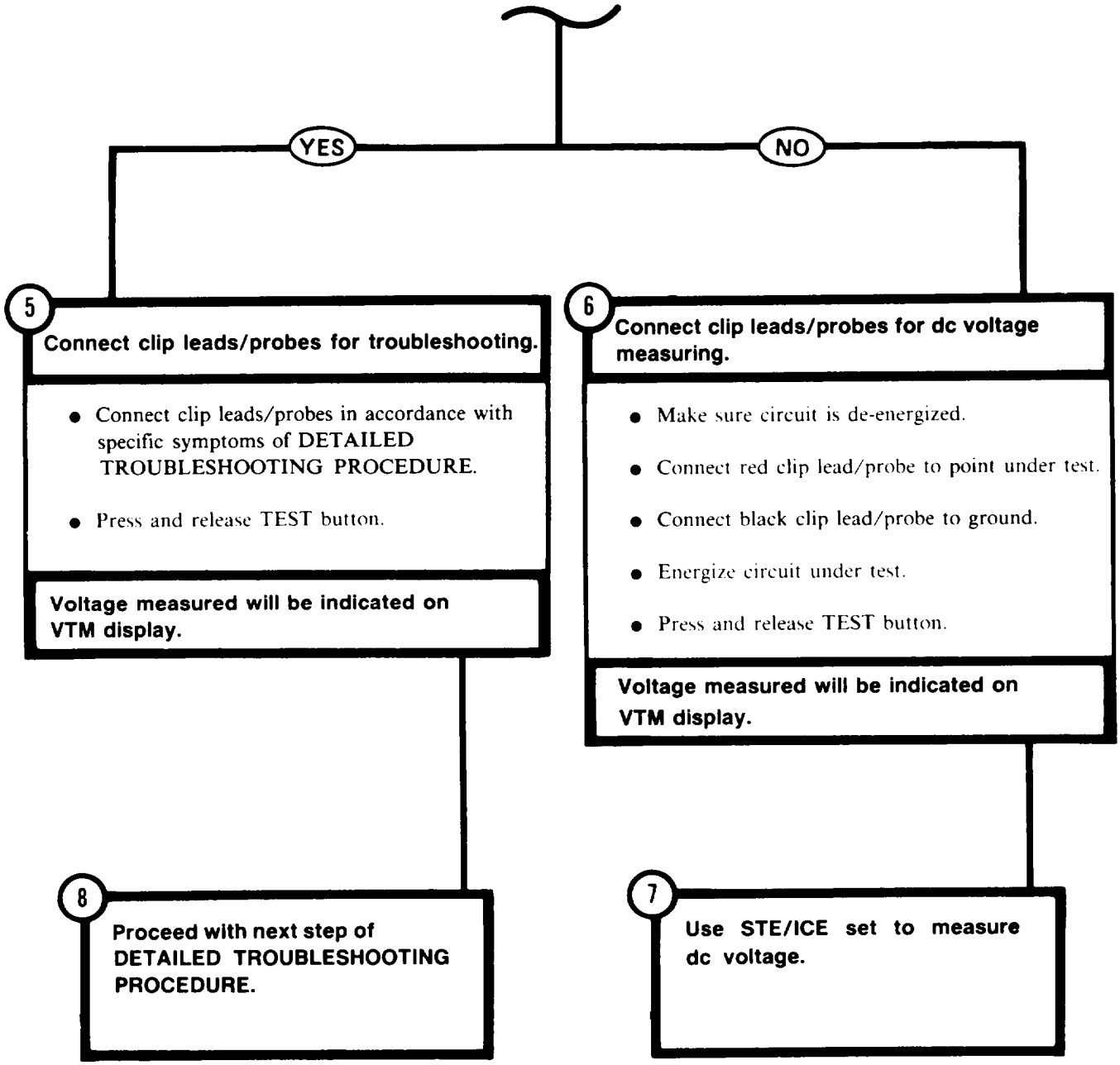
Check if STE/ICE set is to be used with DETAILED TROUBLESHOOTING PROCEDURES.

Is STE/ICE set to be used with DETAILED TROUBLESHOOTING PROCEDURES?



TA141711

STE/ICE Test Procedures - Continued



TA141712

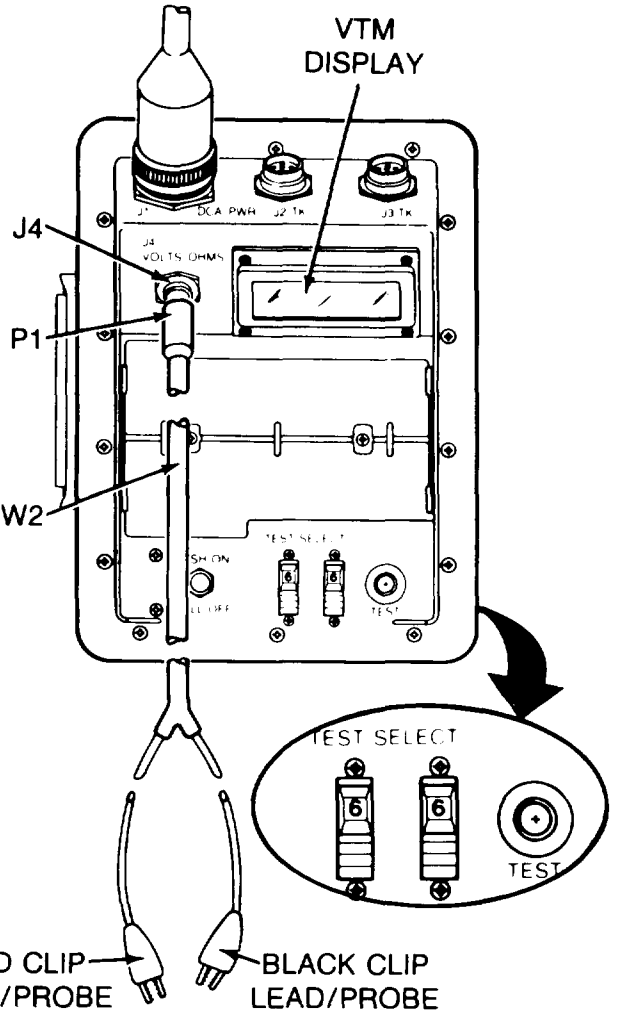
RESISTANCE AND CONTINUITY CHECK TEST NO. 91/92

1. **Perform VTM GENERAL SET UP, CONFIDENCE and IDENTIFICATION TEST NO. 66/60 (page 4-59).**

2. **Connect test probe cable to VTM.**

   Technician (Turret)
   - Connect P1 of test probe cable W2 to J4 of VTM.
   - Connect red and black clip leads/probes of cable W2 together.

   Is STE/ICE to be used to check continuity/0-1500 ohms resistance?



YES

3. **Continuity/0-1500 ohms resistance check.**

   Proceed with Step (5).

NO

4. **0-40,000 ohms resistance check.**

   Proceed with Step (6).

TA141713

STE/ICE Test Procedures - Continued

FROM STEP 3

5 Do OFFSET test for continuity/0-1500 ohms resistance checks.

- Dial TEST SELECT switches to 91.
- Press TEST button and hold until VTM display indicates CAL.
- Release TEST button.
- Check that offset measurement on VTM display indicates between -225 to +225.

Does VTM display indicate between -225 to +225?

FROM STEP 4

6 Do OFFSET test for 0-40,000 ohms resistance check.

- Dial TEST SELECT switches to 92.
- Press TEST button and hold until VTM display indicates CAL.
- Release TEST button.
- Check that offset measurement on VTM display indicates between -3.00 to +3.00.

Does VTM display indicate between -3.00 to +3.00?

8 Determine use of STE/ICE set.

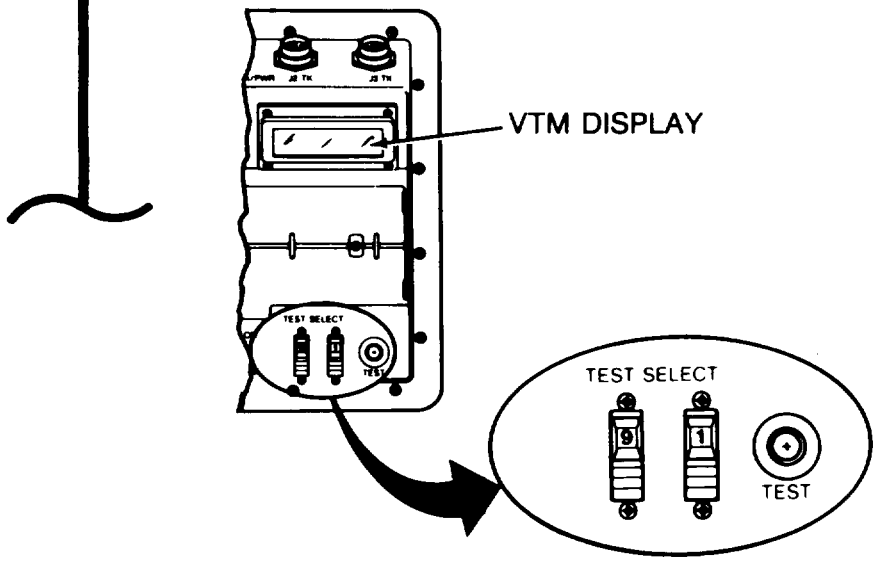
Check if STE/ICE set to be used with DETAILED TROUBLESHOOTING PROCEDURES.

Is STE/ICE set to be used with DETAILED TROUBLESHOOTING PROCEDURES?

YES

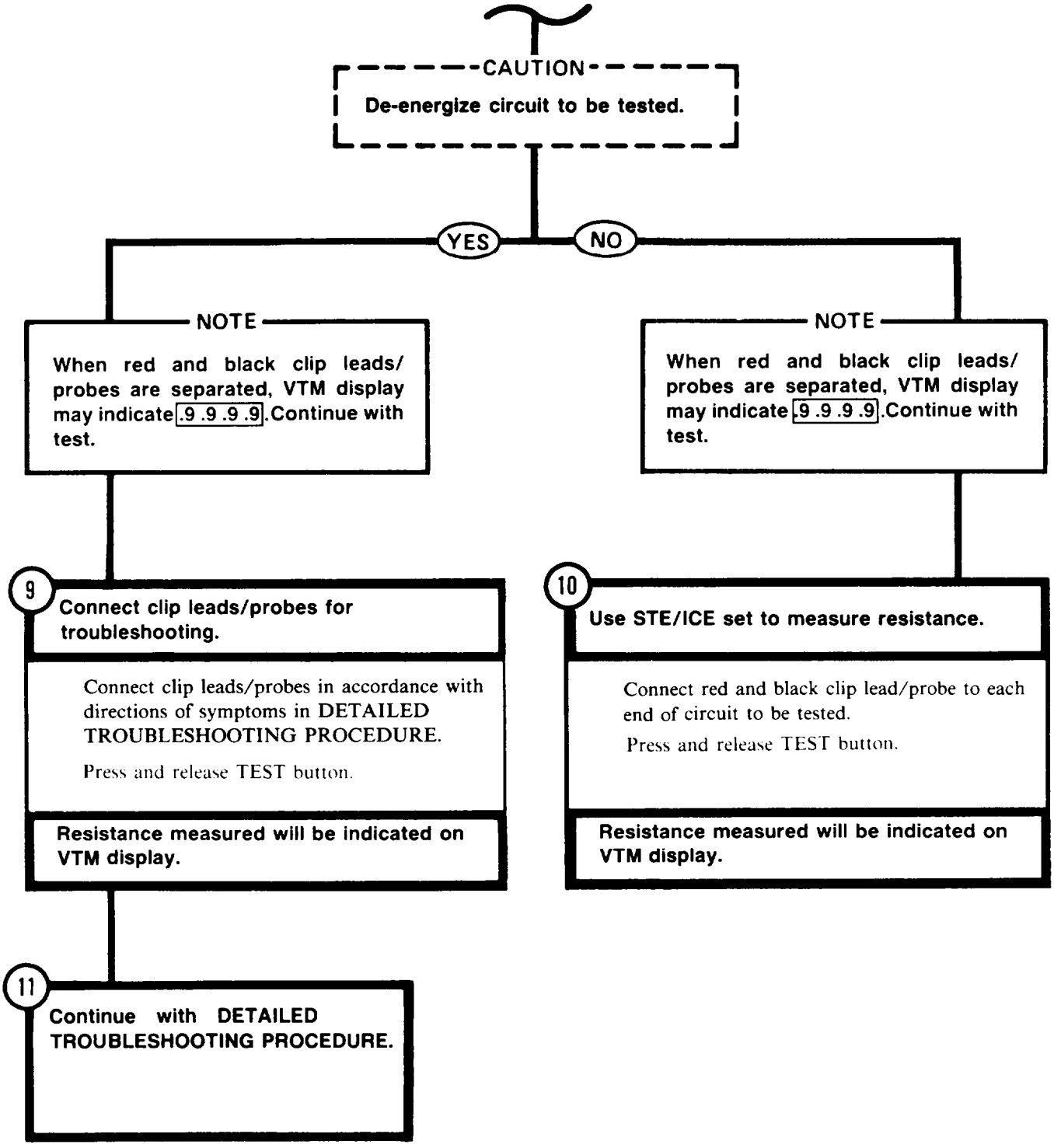
NO

7 Replace STE/ICE set.



TA141714

STE/ICE Test Procedures - Continued



TA141715

AC VOLTAGE TEST NO. 93

CAUTION
Do not use VTM to measure AC voltage greater than 35 vac.

1. **Perform VTM GENERAL SET UP, CONFIDENCE and IDENTIFICATION TEST NO. 66/60 (page 4-59).**

2. **Connect test probe cable to VTM, do OFFSET test.**

   - Connect P1 of test probe cable W2 to J4 of VTM.
   - Connect red and black clip leads/probes of cable W2 together.
   - Dial test select switches to 93.
   - Press TEST button and hold until CAL appears on display.
   - Release TEST.
   - Check that offset measurement on VTM display indicates between −6.8 to +6.8.

Does VTM display indicate between −6.8 to +6.8 ?

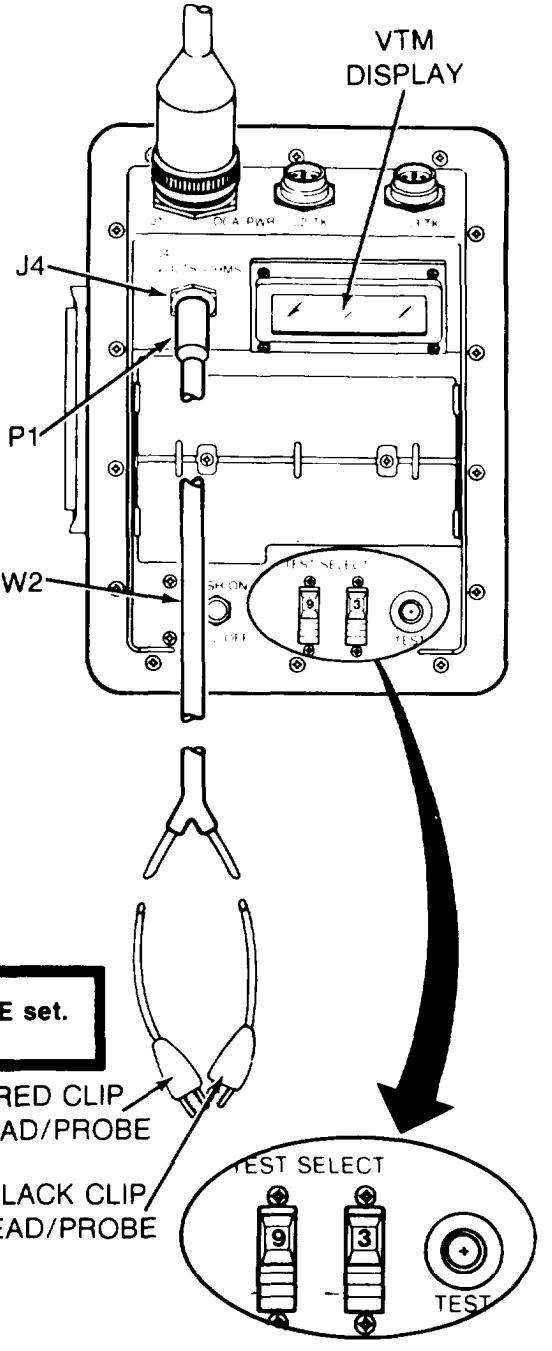
YES — NO

3. **Replace STE/ICE set.**

4. **Determine use of STE/ICE set.**

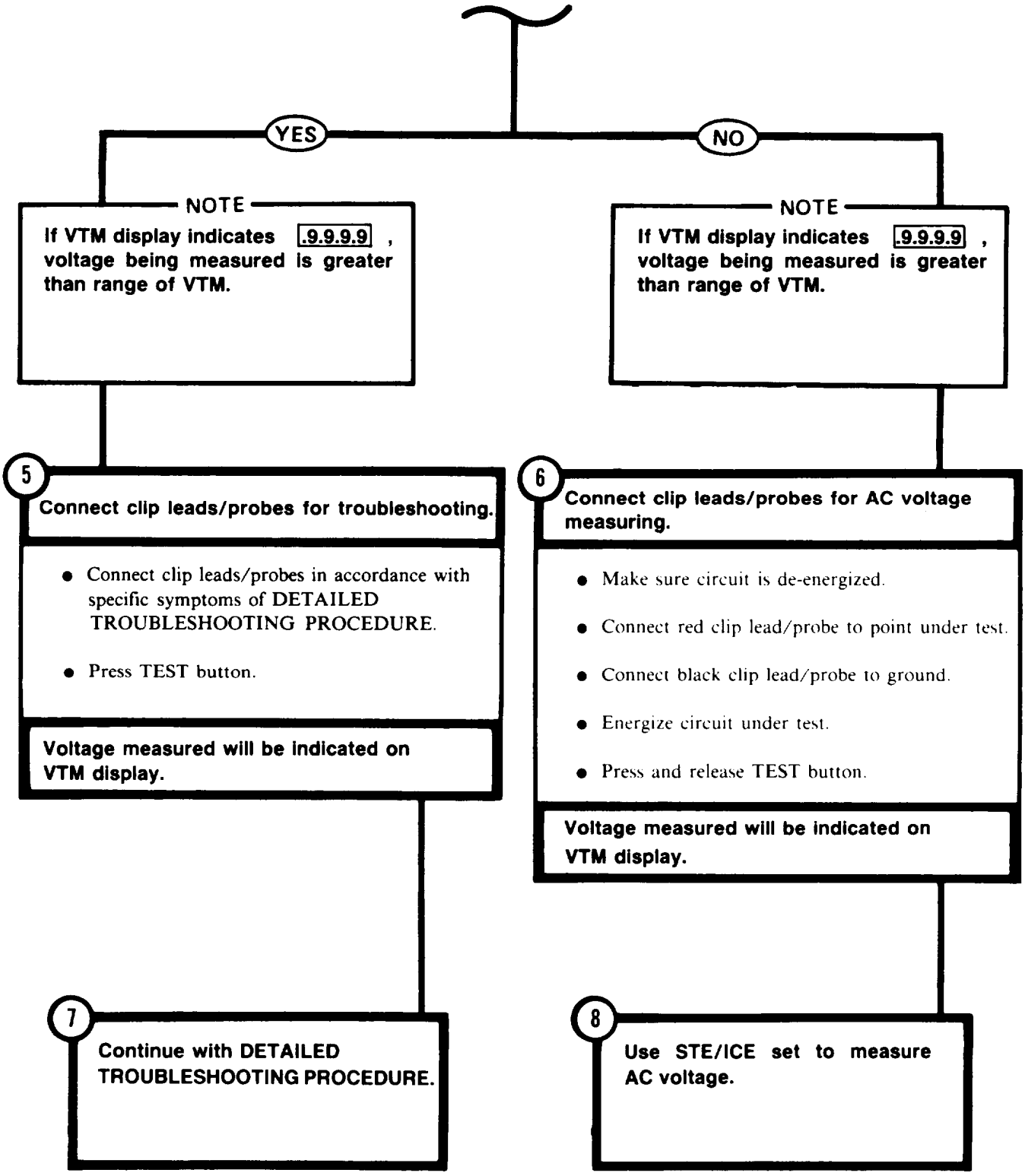
   Check if STE/ICE set is to be used with DETAILED TROUBLESHOOTING PROCEDURES.

Is STE/ICE set to be used with DETAILED TROUBLESHOOTING PROCEDURES?



TA141716

STE/ICE Test Procedures - Continued

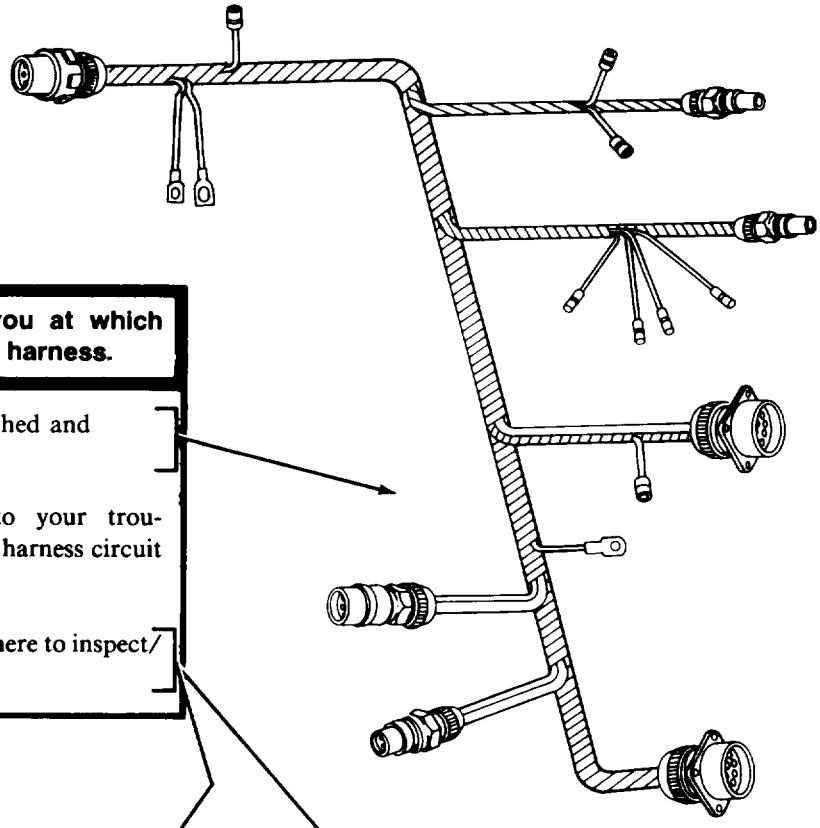


TA141717

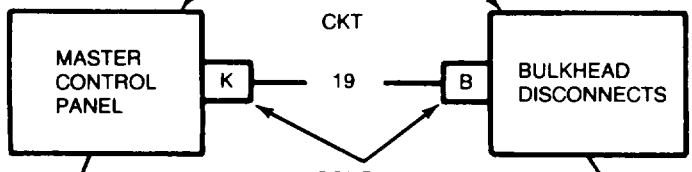
HARNESS CIRCUIT DIAGRAMS.

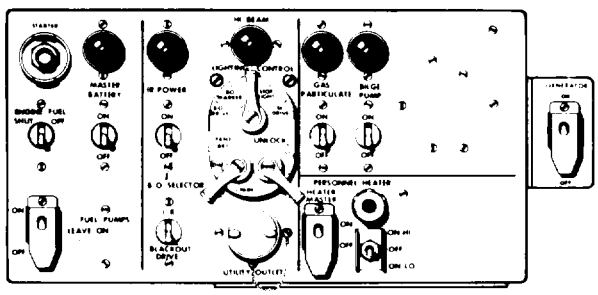
1 **The harness circuit diagram shows you at which points to inspect or repair an electrical harness.**

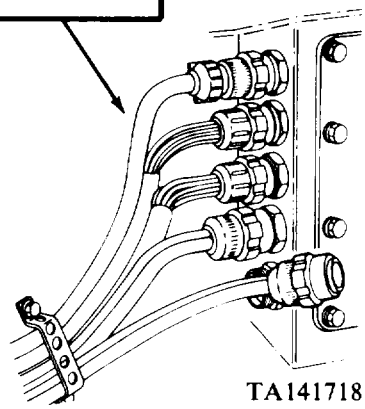
- Most of the M728 harnesses are branched and contain many connectors.
- Only the connectors that pertain to your troubleshooting procedure are shown in the harness circuit diagram.
- The items inside these blocks indicate where to inspect/repair the electrical harness.



ENGINE ELECTRICAL HARNESS

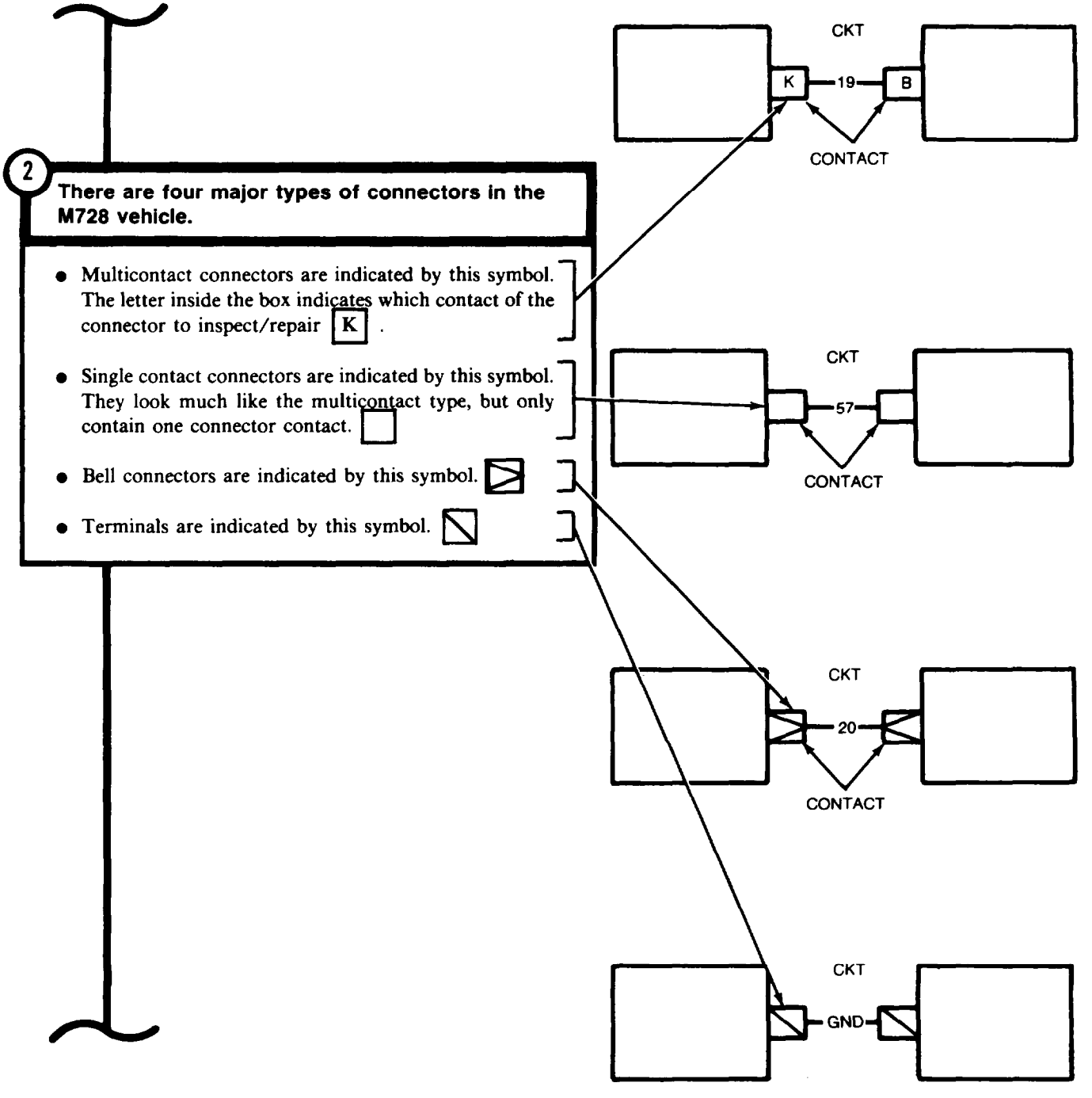






TA141718

HARNESS CIRCUIT DIAGRAMS
(Continued)

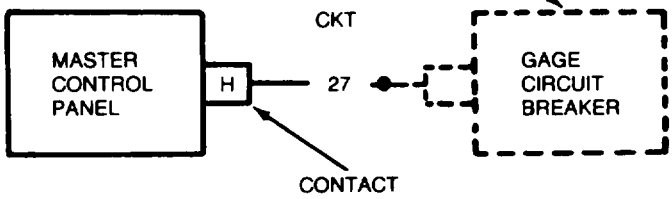


TA141719

HARNESS CIRCUIT DIAGRAMS
(Continued)

3 Broken-line Diagrams.

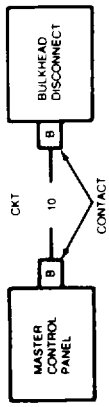
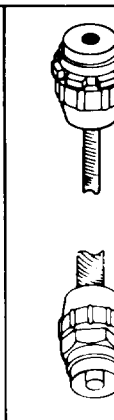
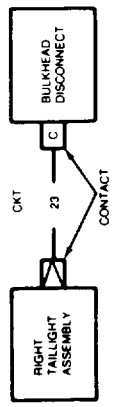
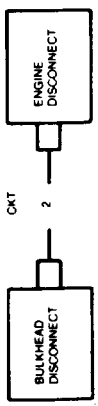
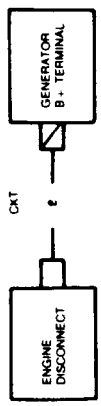
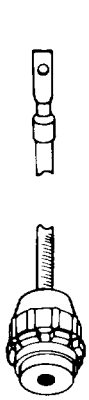
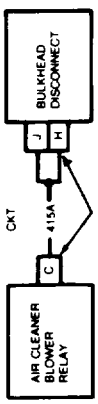
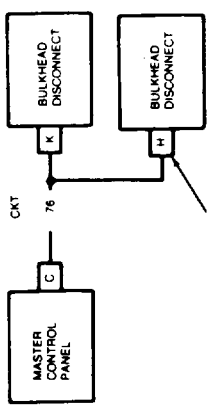
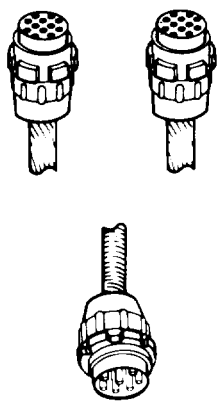
- The broken line section of a harness circuit diagram does not have to be inspected/repaired. It is shown so the technician will know where to check for continuity after a circuit repair is made.
- Turn to the HARNESS CIRCUIT DIAGRAM TABLE (page 4-100) for examples of the different types of diagrams covered in this manual.



TA141720

HARNESS CIRCUIT DIAGRAMS
(Continued)

HARNESS CIRCUIT DIAGRAM TABLE

DIAGRAM	EXPLANATION	PHYSICAL APPEARANCE
	Inspect/repair circuit 10 which runs from contact B of a multicontact connector at the master control panel to contact B of a multicontact connector at the bulkhead disconnects.	
	Inspect/repair circuit 23 which runs from a bell connector at the right taillight assembly to contact C of a multicontact connector at the bulkhead disconnects.	
	Inspect/repair circuit 2 which runs from a single contact connector at the bulkhead disconnects to a single contact connector at the engine disconnects.	
	Inspector/repair circuit 2 which runs from a single contact connect to a terminal connector at the generator B+ terminal.	
	Inspect/repair circuit 415A which runs from contact C of a multicontact connector at the air cleaner blower relay to an internal harness tie point (dot). After the tie point the circuit splits and connects to contacts J and H of the same multicontact connector.	
	Inspect/repair circuit 76 which runs from contact C of a multicontact connector at the master control panel to an internal harness tie point. After the tie point (dot) the circuit splits, then connects to contact K of one multicontact connector at the bulkhead disconnects and contact H of another multicontact connector at the bulkhead disconnects.	

TA141721

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-1-2D

ENGINE WILL NOT CRANK WHEN STARTER SWITCH IS PRESSED (2D ENGINE).

NOTE

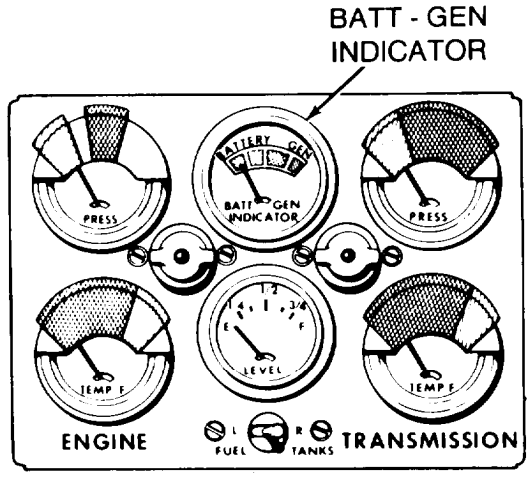
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 **Check for electrical power in the vehicle by observing BATT GEN INDICATOR for movement.**

First Technician (Driver's Station)

- Observe position of BATT GEN INDICATOR when MASTER BATTERY switch is OFF.
- Set MASTER BATTERY switch ON.
- Check position of BATT GEN INDICATOR.

Did the BATT GEN INDICATOR move when the MASTER BATTERY switch was turned ON?



GAGE INSTRUMENT PANEL

YES

NO

2

- **Check if MASTER BATTERY indicator lamp lights.**
- **See Step (34).**

All data on pages 4-101 thru 4-130 deleted. ■

Symptom-1-2D

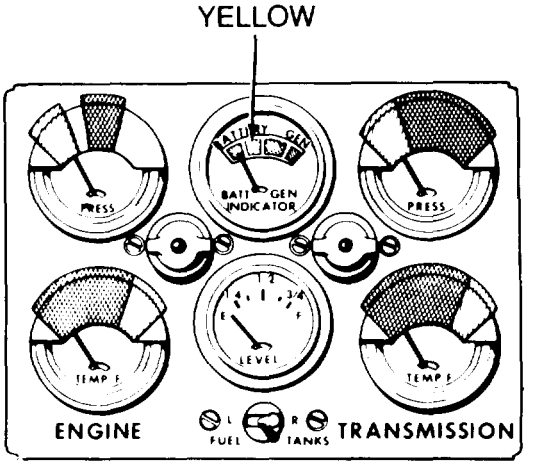
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

3 **Check BATT GEN INDICATOR gage for above mid yellow indication.**

First Technician (Driver's Station)

- Visually check if BATT GEN INDICATOR gage indicates above mid yellow.

Does BATT GEN INDICATOR gage indicate above mid yellow ?



YES

NO

4

- **Service batteries (page 3-41).**
- **Charge batteries (TM 9-6140-200-14)**
- **If STE/ICE is available perform Test No. 77/79 BATTERY CONDITION (page 4-83).**

TA141753

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-1-2D

NOTE

- **If STE/ICE is available, perform test no. 72 STARTER CURRENT FIRST PEAK (page 4-77).**
- **If STE/ICE is not available, go to Step (5).**

5 **Check for sound of starter solenoid and/or starter engaging.**

Second Technician (Turret)

- Manually traverse turret to gain access to right top deck grille doors (TM 9-2350-222-10).

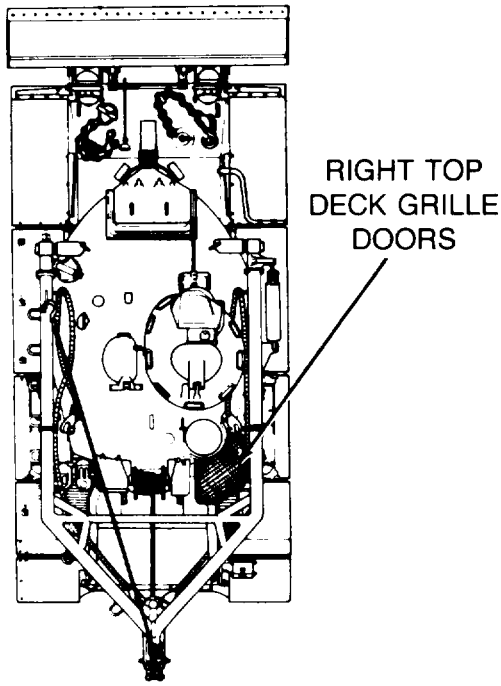
Second Technician (Top Deck)

- Open right top deck grille doors.
- Listen for clicks or other noise coming from starter when STARTER switch is pressed.

First Technician (Driver's Station)

- Set FUEL PUMPS switch OFF.
- Press STARTER switch several times.

Is there a clicking sound, or other noise from starter when STARTER switch is pressed?



NO

YES

6

- **Check for locked engine.**
- **See Step (37).**

TA141754

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

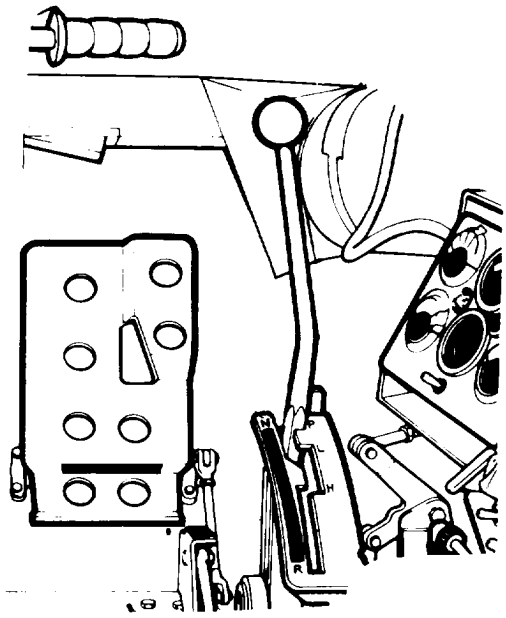
Symptom-1-2D **(Continued)**

7 **Check for transmission shift lever to be in "P" (park) position.**

First Technician (Driver's Station)

- Move transmission shift lever out of "P" into "H", "L" or "R" positions and return lever to "P" position.
- Attempt to start engine.

Does engine crank?



TRANSMISSION SHIFT LEVER

NO

YES

8 **Adjust shift control linkage (page 11-2).**

TA141755

DETAILED TROUBLESHOOTING PROCEDURE

VEHICLE OPERATION - POWERPLANT, STARTING (Continued)

Symptom-1-2D

9 **Check engine accessory harness (CKT 14) at engine electrical disconnect for electrical power.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Turret)

- Manually traverse turret to gain access to left top deck grille doors.

Second Technician (Top Deck)

- Open left top deck grille doors.
- Disconnect engine accessory harness connector from engine electrical harness connector at engine disconnect.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact M (CKT 14) of engine accessory harness connector and black probe to ground.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press and release STARTER switch.

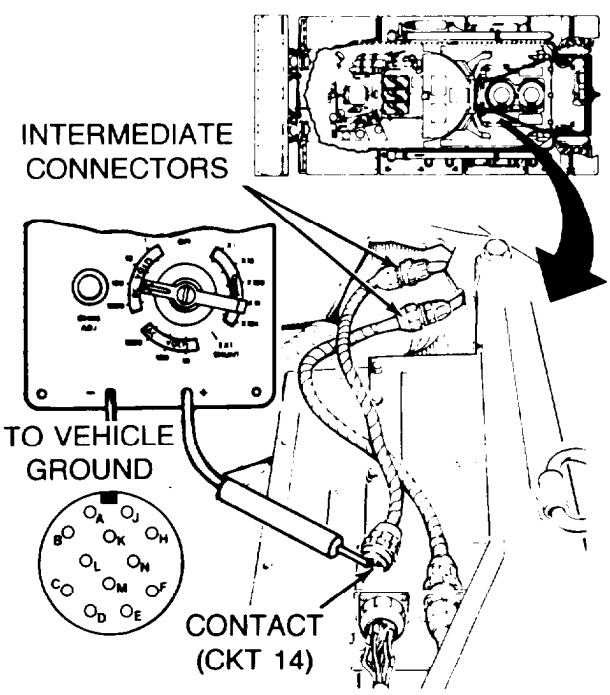
Second Technician (Top Deck)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES

NO



10

- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness extension (CKT 14) for continuity from intermediate connector to connector of engine disconnect.**
- **See Step (40) .**

For harness without intermediate connector:

- **Check hull front master harness (CKT 14) at bulkhead electrical disconnect for electrical power.**
- **See Step (43) .**

TA141756

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-1-2D **(Continued)**

11 **Check for electrical power at neutral shift switch.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

Second Technician (Rear Grille Doors)

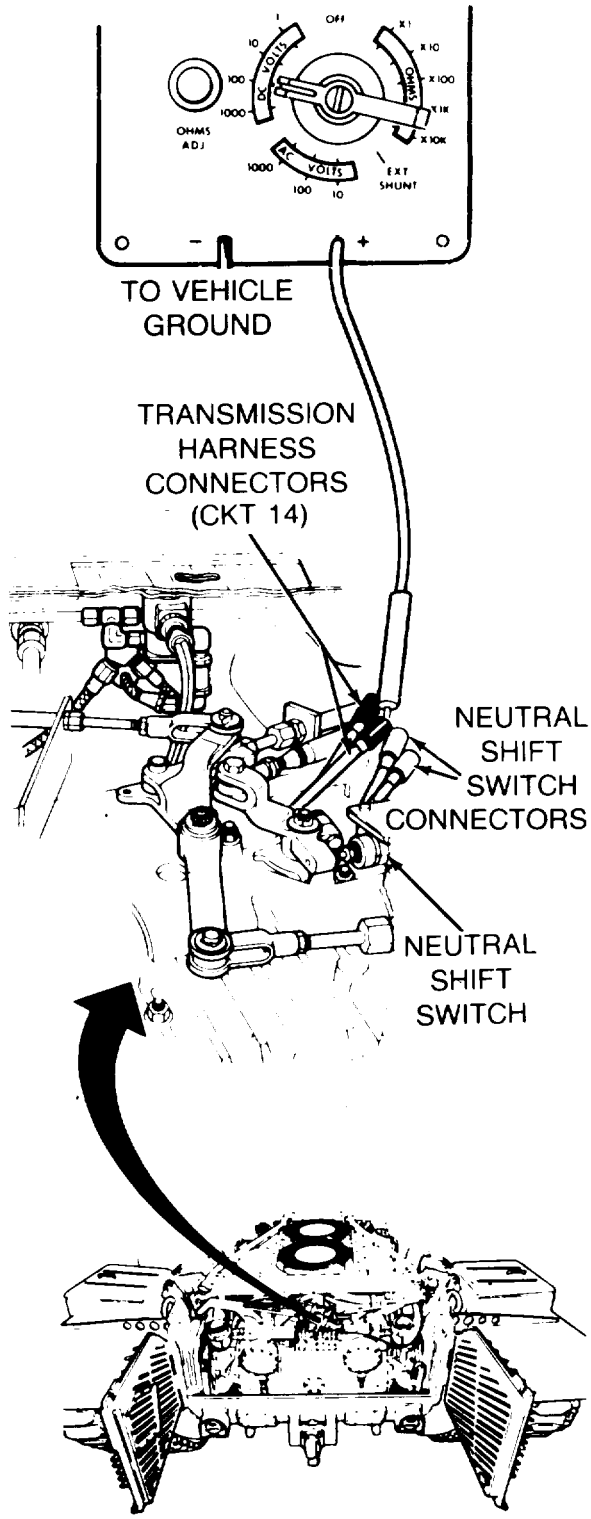
- Disconnect both transmission harness connectors (CKT 14) from neutral shift switch.
- Connect red probe of meter to one of the two (CKT 14) transmission harness connectors at neutral shift switch and black probe to ground.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press and hold STARTER switch for about 5 seconds.

Second Technician (Rear Grille Doors)

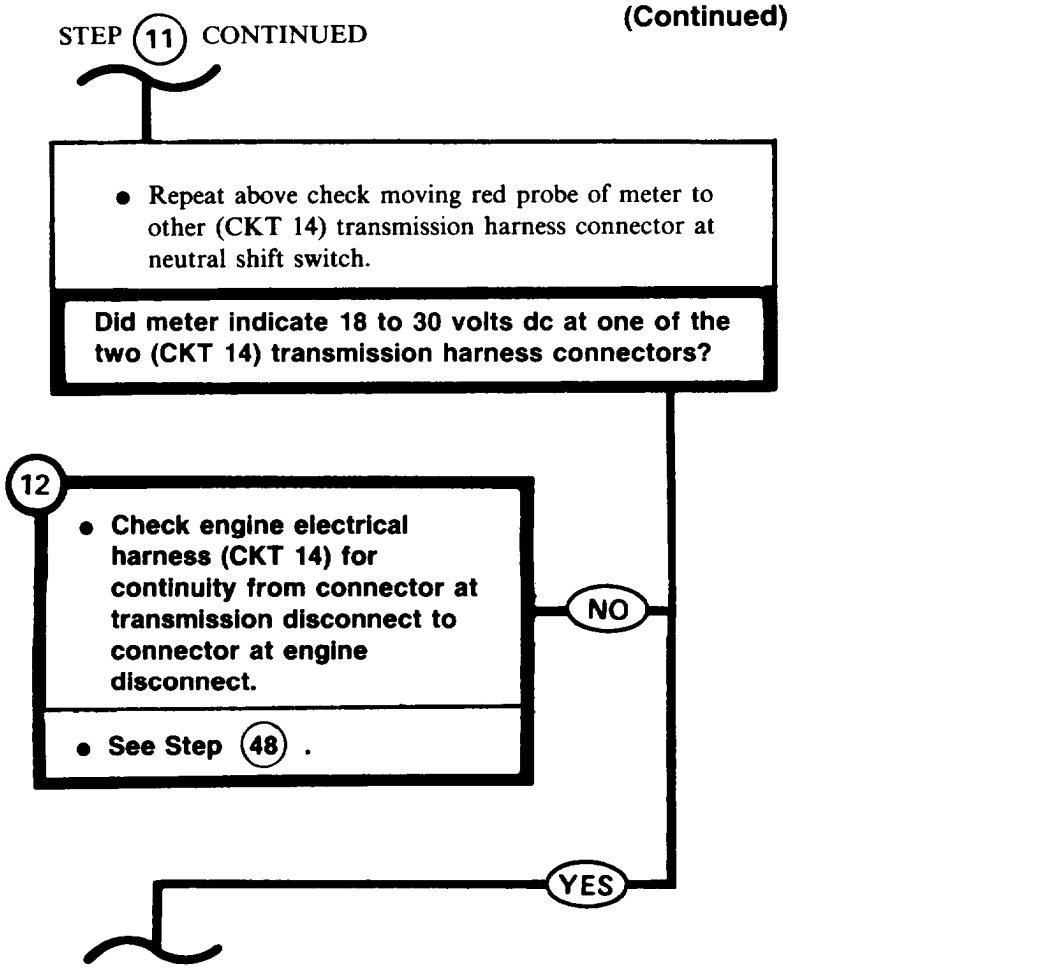
- Check if meter indicates 18 to 30 volts dc.



TA141757

Symptom-1-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)



TA141758

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-1-2D **(Continued)**

13 **Check neutral shift switch for continuity.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Rear Grille Doors)

- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to one of the neutral shift switch connectors.
- Connect black probe to the other neutral shift switch connector.

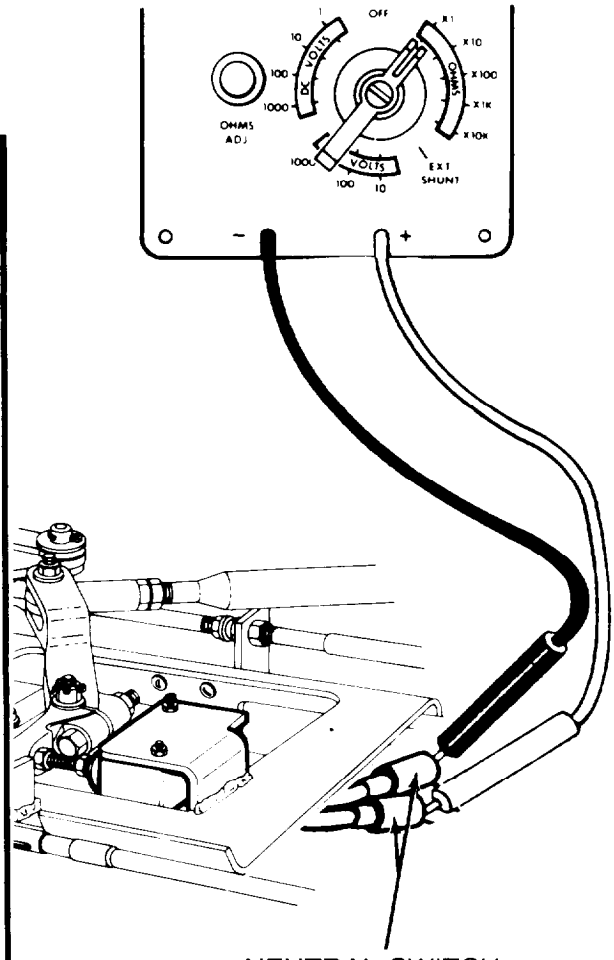
First Technician (Driver's Station)

- Move shift lever from "L" to "N" several times.

Second Technician (Rear Grille Doors)

- Check if meter indicates continuity each time the shift lever is moved to "N".

Does meter indicate continuity each time the shift lever is moved to "N".



YES

NO

14

- **Adjust neutral shift switch (page 11-22).**
- **If switch does not adjust properly, replace neutral shift switch (page 10-272).**

TA141759

Symptom-1-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

WARNING

Use extreme care when working with circuit 81. This circuit carries battery voltage at all times whether MASTER BATTERY switch is ON or OFF.

15 Check starter feed harness (CKT 81), at engine disconnect, for electrical power.

Second Technician (Rear Grille Doors)

- Connect transmission harness connectors (CKT 14) to neutral shift switch connectors.

First Technician (Driver's Station)

- Disconnect three battery ground cables from floor plate behind driver's seat (page 10-283).

Second Technician (Top Deck)

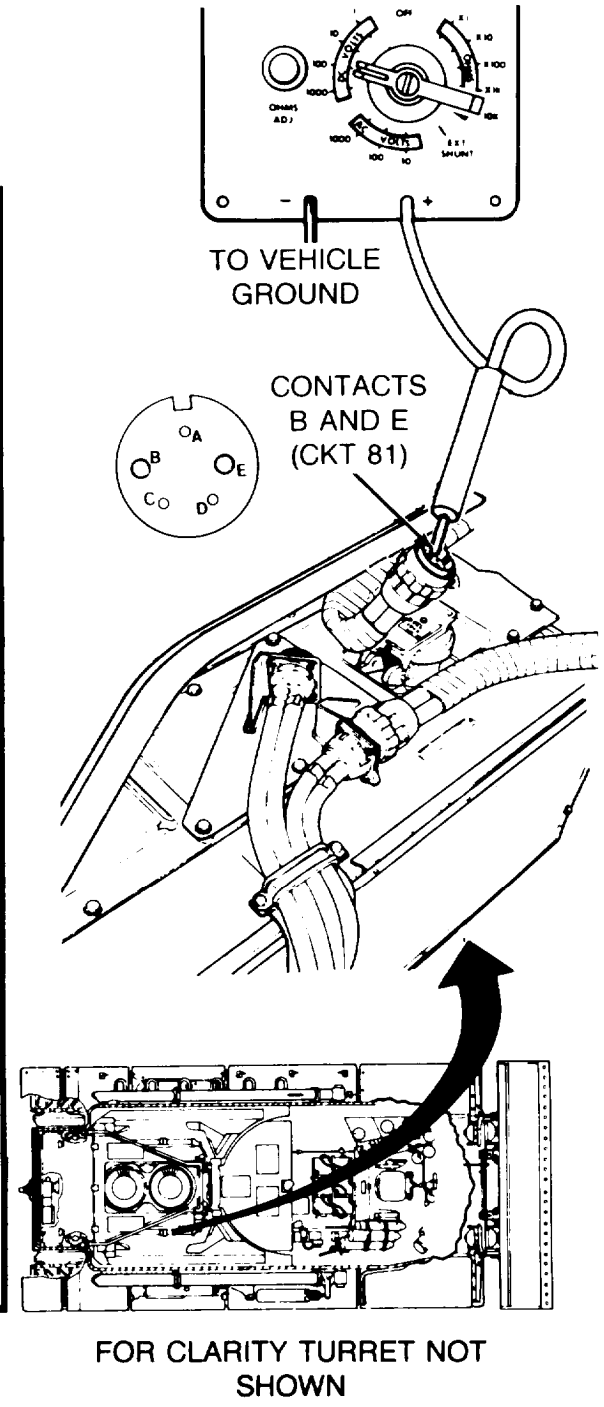
- Disconnect starter feed harness connector from engine disconnect.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).

First Technician (Driver's Station)

- Connect three ground cables to floor plate behind driver's seat (page 10-283).

Second Technician (Top Deck)

- Connect red probe of meter to contact B (CKT 81) at starter feed harness connector at engine disconnect and black probe to ground.
- Check if meter indicates 18 to 30 volts dc.



FOR CLARITY TURRET NOT SHOWN

TA141760

Symptom-1-2D **DETAILED TROUBLESHOOTING PROCEDURE**
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP (15) CONTINUED

- Repeat above check moving red probe of meter to contact E (CKT 81) at starter feed harness connector.

Does meter indicate 18 to 30 volts dc at contacts B and E?

YES

NO

16

- **Check starter relay cable (CKT 81) at bulkhead electrical disconnect for electrical power.**
- **See Step (51) .**

TA141761

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-1-2D

17 **Check engine ground cable (CKT GND) at engine disconnect for continuity to ground.**

First Technician (Driver's Station)

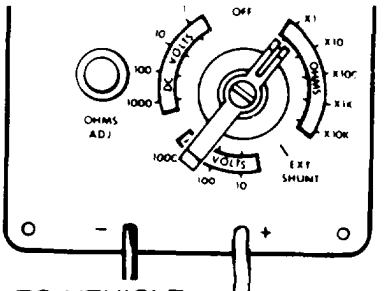
- Disconnect three battery ground cables from floor plate behind driver's seat (page 10-283).

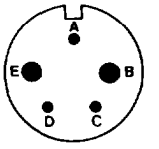
Second Technician (Top Deck)

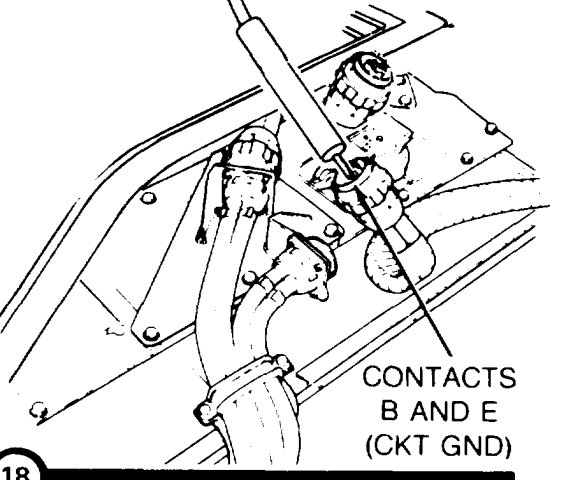
- Connect starter feed harness connector to starter motor harness connector at engine disconnect.
- Disconnect engine ground cable connector from starter ground harness connector at engine disconnect.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT GND) of engine ground cable connector and black probe to ground.
- Check if meter indicates continuity.
- Repeat above check, moving red probes to contact E (CKT GND) of ground cable connector.

Does meter indicate continuity to ground at both connector contacts?

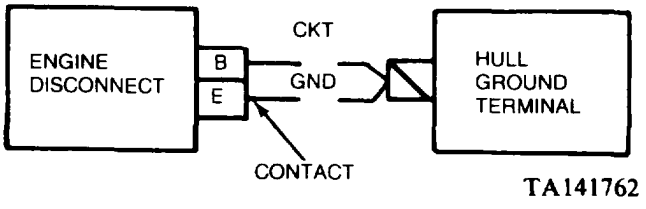
YES — NO







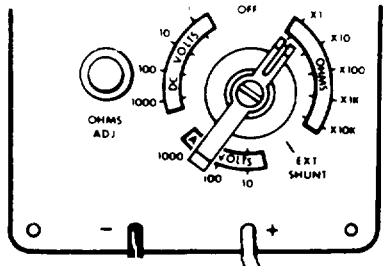
18
- **Replace engine ground cable (page 10-284).**
- **Connect three battery ground cables (page 10-283).**
- **Install transmission shroud (page 9-23).**



TA141762

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-1-2D **(Continued)**

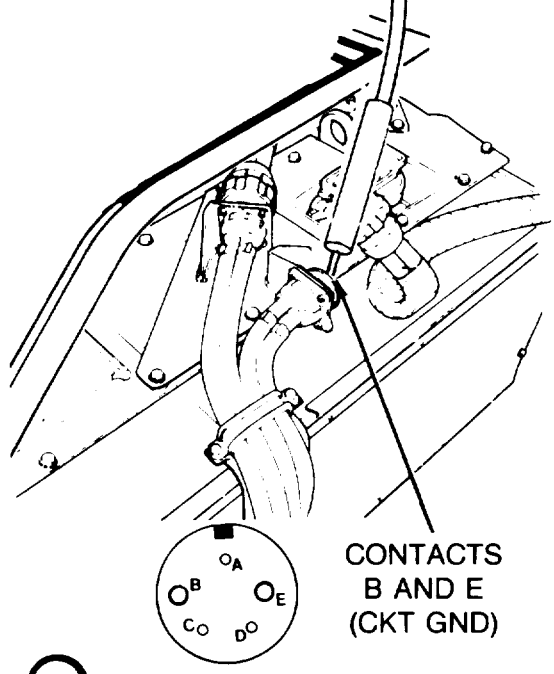


19 **Check starter ground harness (CKT GND) at engine disconnect for continuity to ground.**

Second Technician (Top Deck)

- Connect red probe of meter to contact B (CKT GND) of starter ground harness connector at engine disconnect and black probe to ground.
- Check if meter indicates continuity.
- Repeat above check, moving red probe to contact E (CKT GND) of starter ground harness connector.

Did meter indicate continuity at both contacts B and E?



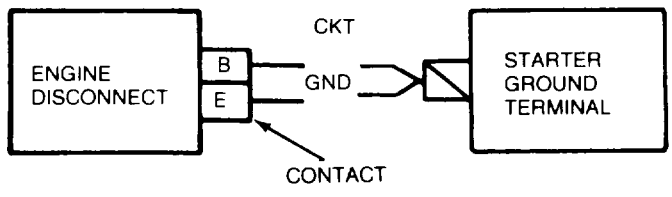
YES

NO

20
- **Repair starter ground harness (CKT GND) (page 10-307).**
- **Connect battery ground cables (page 10-283).**

NOTE

For -2D engine with top mounted low voltage protection relay, go to step 33.1. For -2D engine with side mounted low voltage protection relay, go to step 21.



Symptom-1-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

21 **Check for electrical power at starter solenoid (CKT 81).**

First Technician (Rear of Vehicle)

- Remove powerplant (page 5-1).

Both Technicians (Powerplant)

- Ground hop powerplant (page 5-48).

First Technician (Left Side of Engine)

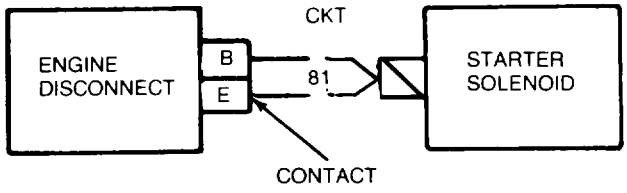
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to starter solenoid terminal (CKT 81) and black probe to ground.
- Check if meter indicates 18 to 30 volts dc when STARTER switch is pressed.

Second Technician (Driver's Station)

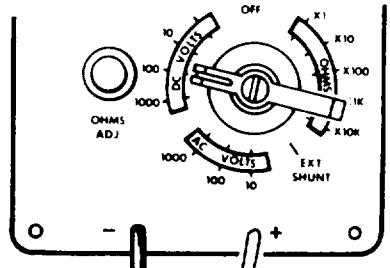
- Set MASTER BATTERY switch ON.
- Press and release STARTER switch.

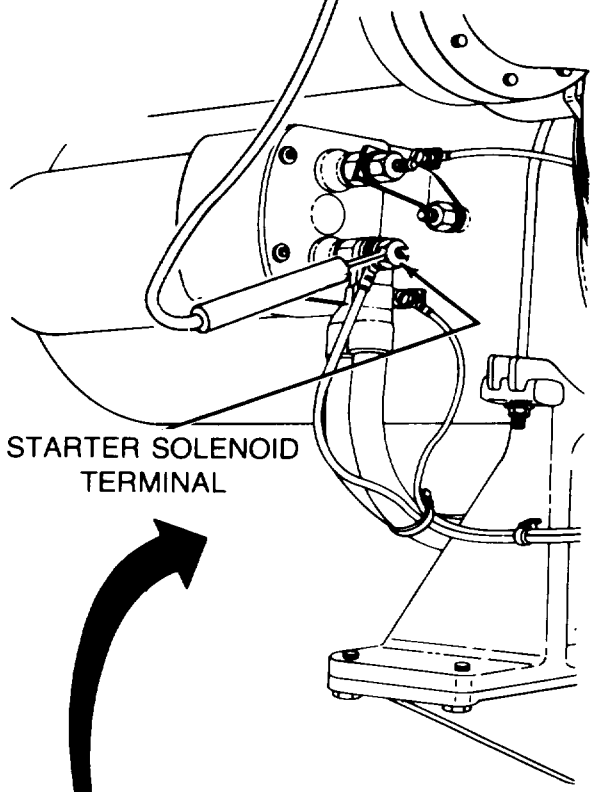
Does meter indicate 18 to 30 volts dc?

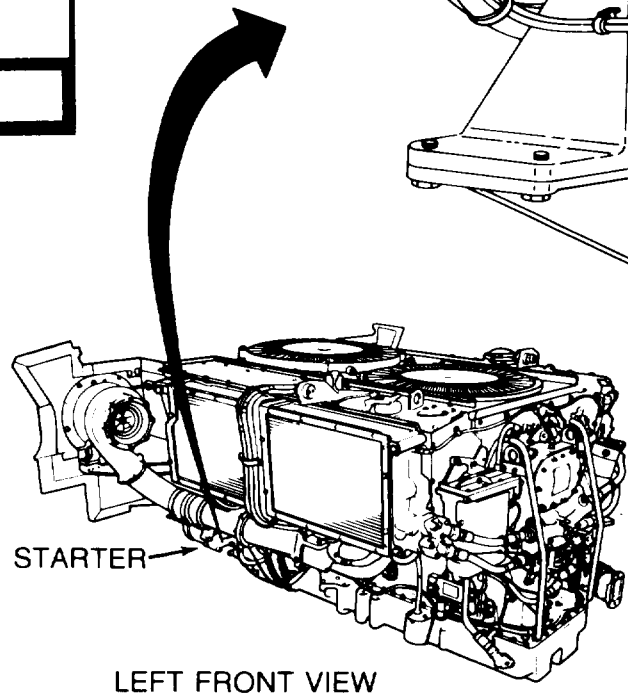
22 **Repair starter motor harness (page 10-307).** — NO



YES







TA141764

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-1-2D

(Continued)

23 **Check terminal A of starter solenoid for electrical power.**

First Technician (Left Side of Engine)

- Connect red meter probe to terminal A at starter solenoid and black probe to ground.

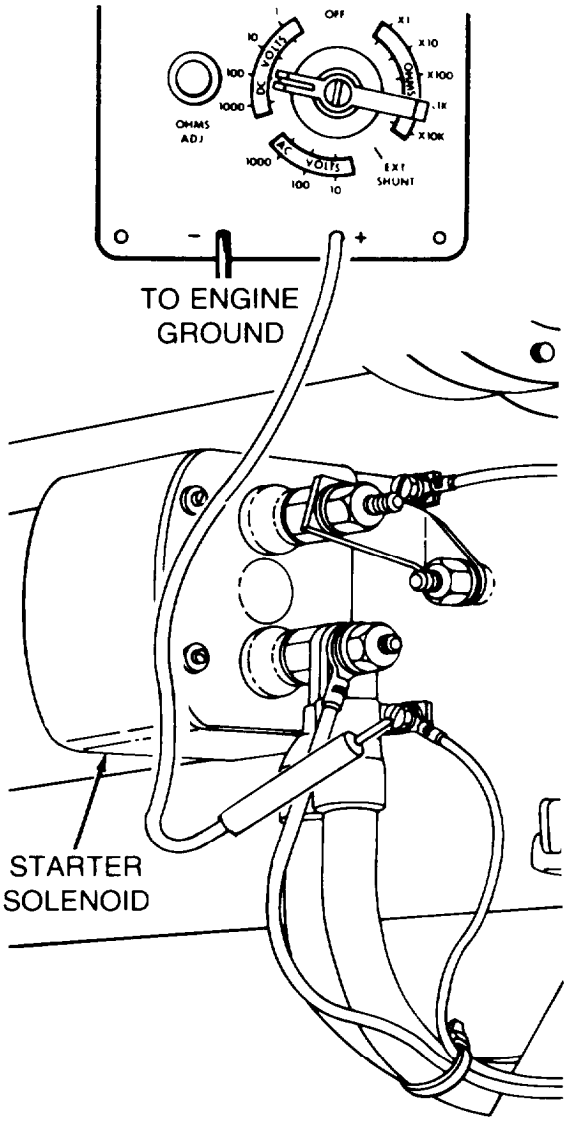
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press and release STARTER switch.

First Technician (Left Side of Engine)

- Check if meter indicates 18 to 30 volts dc when the STARTER switch is pressed.

Did meter indicate 18 to 30 votls dc?



NO

YES

24 **Replace starter (page 10-26).**

TA141765

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-1-2D **(Continued)**

25 **Check engine electrical harness (CKT 14A) for continuity between starter solenoid terminal and low voltage protection connector contact D.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect three battery ground cables from floor plate behind driver's seat (page 10-283).

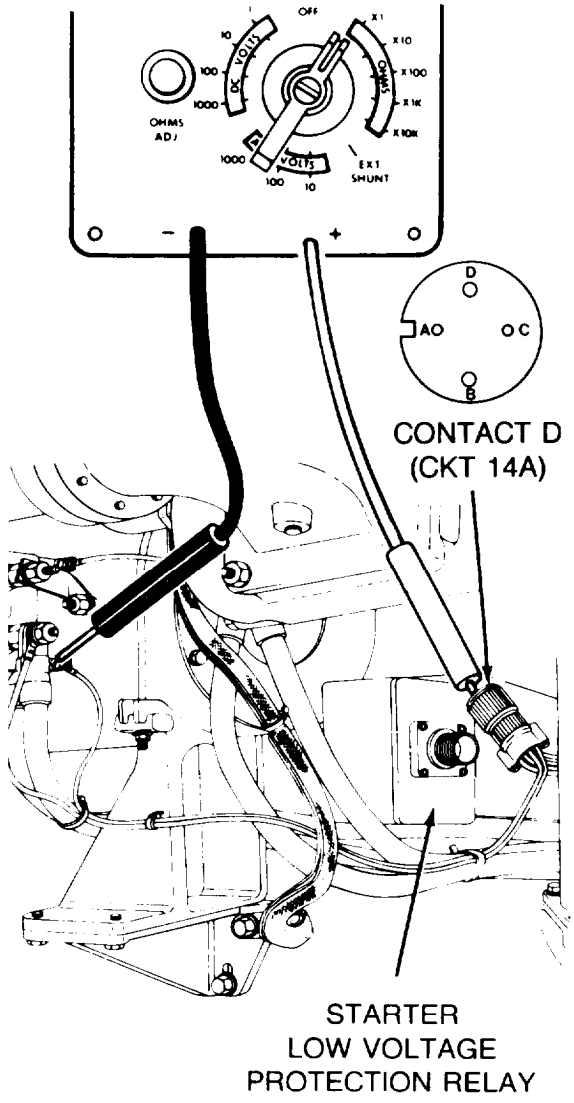
First Technician (Left Side of Engine)

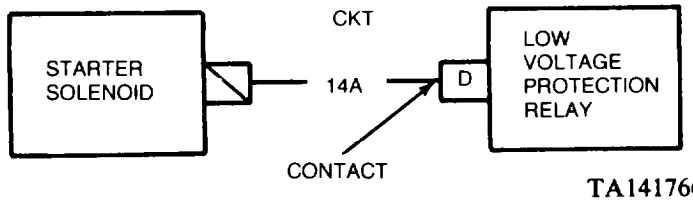
- Disconnect engine electrical harness connector from low voltage protection relay.
- Set multimeter on OHMS X1 scale and "zero"meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact D (CKT 14A) of engine harness low voltage protection connector.
- Connect black probe of meter to terminal (CKT 14A) of starter solenoid.
- Check if meter indicates continuity.

Does meter indicate continuity?

YES — NO

26 **Repair engine electrical harness (CKT 14A) (page 10-307).**





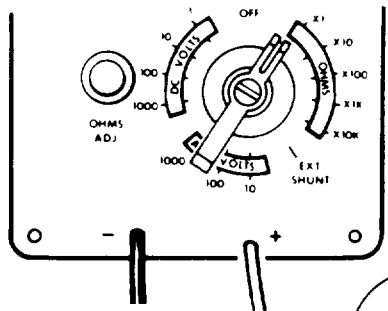
TA141766

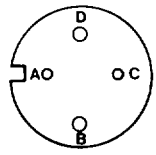
Symptom-1-2D

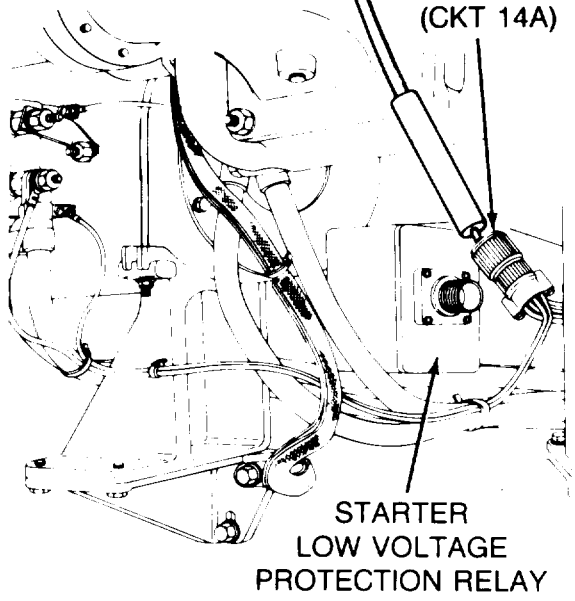
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

WARNING

Use extreme care when working with circuit 14A. This circuit carries battery voltage at all times whether MASTER BATTERY switch is ON or OFF.







27 **Check engine electrical harness (CKT 14A) for continuity between starter solenoid and low voltage protection relay (Contact B).**

First Technician (Left Side of Engine)

- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact B (CKT 14A) of engine electrical harness connector and black probe to ground.

Second Technician (Driver's Station)

- Connect three ground cables to floor plate behind driver's seat (page 10-283).

First Technician (left side of engine)

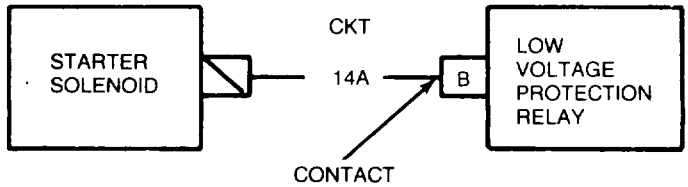
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES

NO

28 **Repair engine electrical harness (CKT 14A) (page 10-307).**



TA141767

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
Symptom-1-2D **(Continued)**

29 **Check engine electrical harness (CKT 14) at starter low voltage protection relay for electrical power.**

First Technician (Left Side of Engine)

- Connect red probe of meter to contact A of engine electrical harness connector and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press and release STARTER switch.

First Technician (Left Side of Engine)

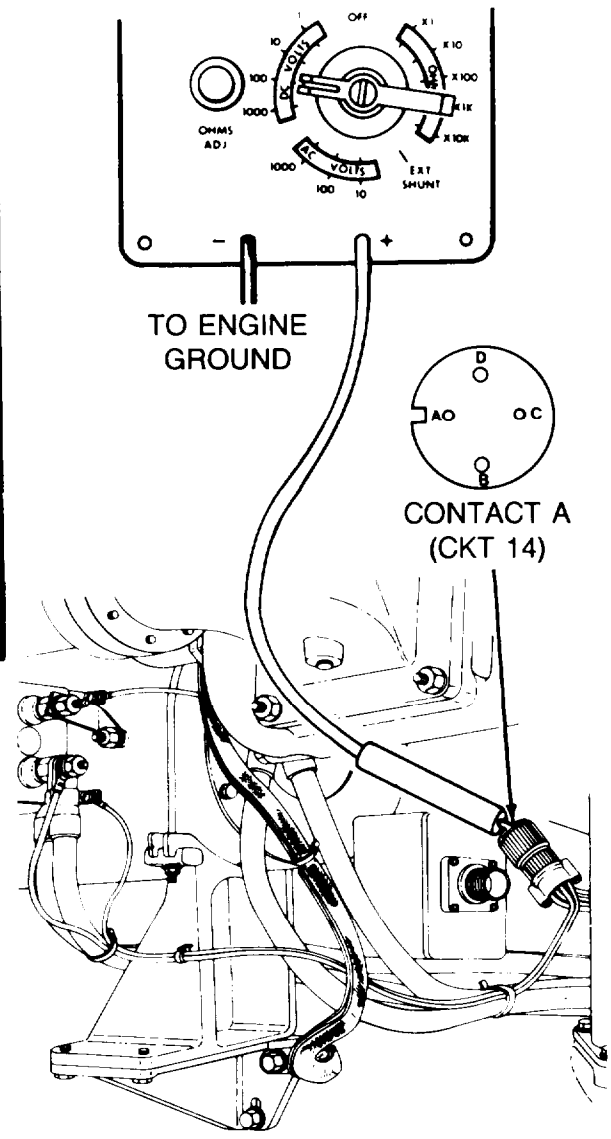
- Check if meter indicates 18 to 30 volts dc when STARTER switch is pressed.

Did meter indicate 18 to 30 volts dc?

YES

30 **Replace low voltage protection relay (page 10-33).**

NO



TA141768

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-1-2D

31 **Check engine electrical harness (CKT 14) for continuity from connector at starter low voltage relay to connector at transmission disconnect.**

Second Technician (Driver's Station)

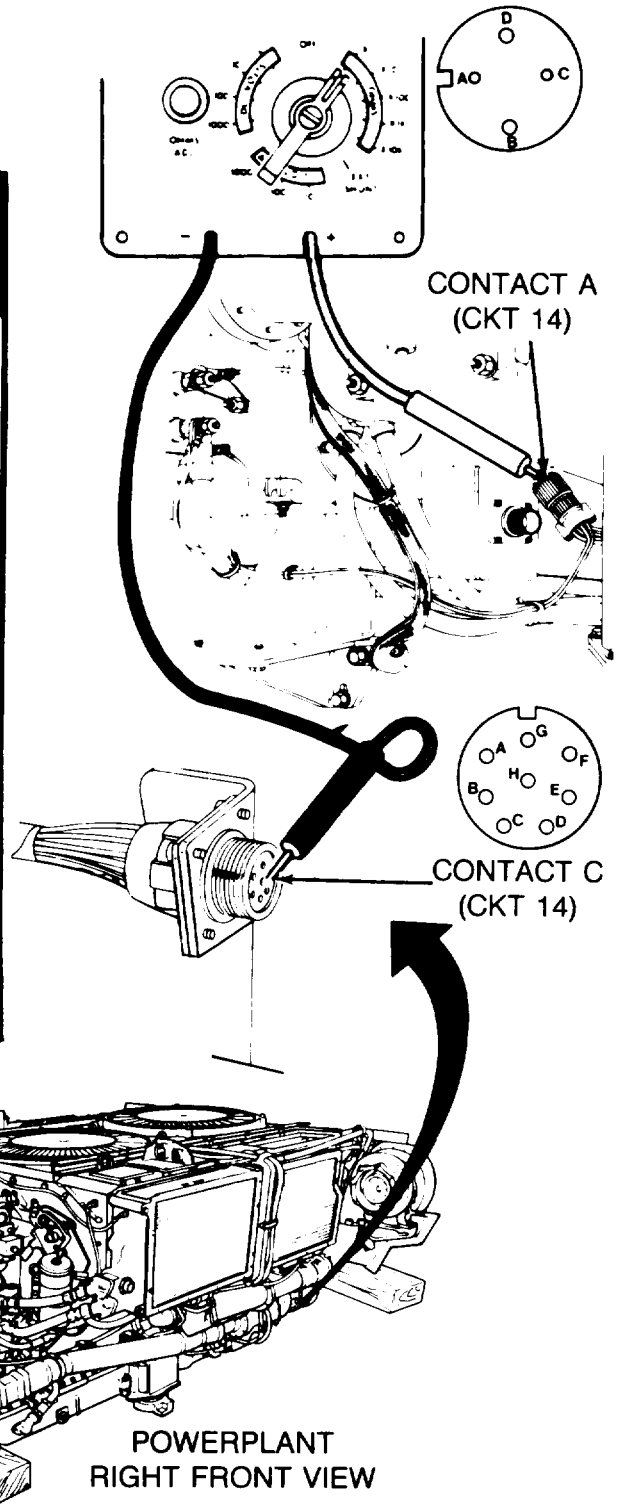
- Set MASTER BATTERY switch OFF.

First Technician (Left Side of Engine)

- Set multimeter to OHMS X1 scale and "zero"meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact A (CKT 14) of engine electrical harness connector at starter low voltage protection relay.

Second Technician (Right Side of Engine)

- Disconnect transmission harness connector from engine electrical harness connector at transmission disconnect.
- Connect black probe of meter to contact C of engine electrical harness connector at transmission disconnect.



TA141769

Symptom-1-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP (31) CONTINUED

First Technician (Left Side of Engine)

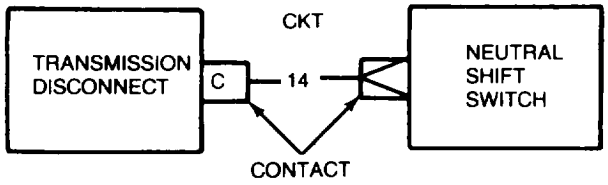
- Check if meter indicates continuity.

Does meter indicate continuity?

32

- **Repair transmission harness (CKT 14) (page 10-307).**
- **Connect engine electrical harness connector to low voltage protection relay connector.**

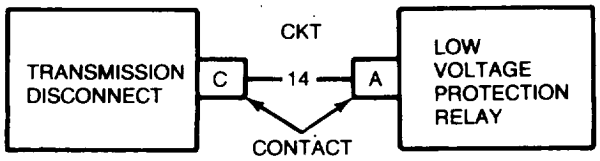
YES



33

- **Repair engine electrical harness (CKT 14) (page 10-307).**

NO



TA141770

DETAILED TROUBLESHOOTING PROCEDURE

Symptom-1-2D

VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 19

33.1 Check engine electrical harness (CKT 14) at starter low voltage protection relay for electrical power.

First Technician (Right Side of Engine Compartment)

- Disconnect engine ground cable connector from starter ground harness connector at engine disconnect.
- Connect red probe of meter to contact A of engine electrical harness low voltage protection relay connector and black probe to ground.

Second Technician (Driver's Compartment)

- Connect three ground cables to floor plate behind driver's seat (page 10-283).
- Set MASTER BATTERY switch to ON.
- Press and release STARTER switch.

First Technician (Right Side of Engine Compartment)

- Check if meter indicates 18 to 30 volts dc when STARTER switch is pressed.

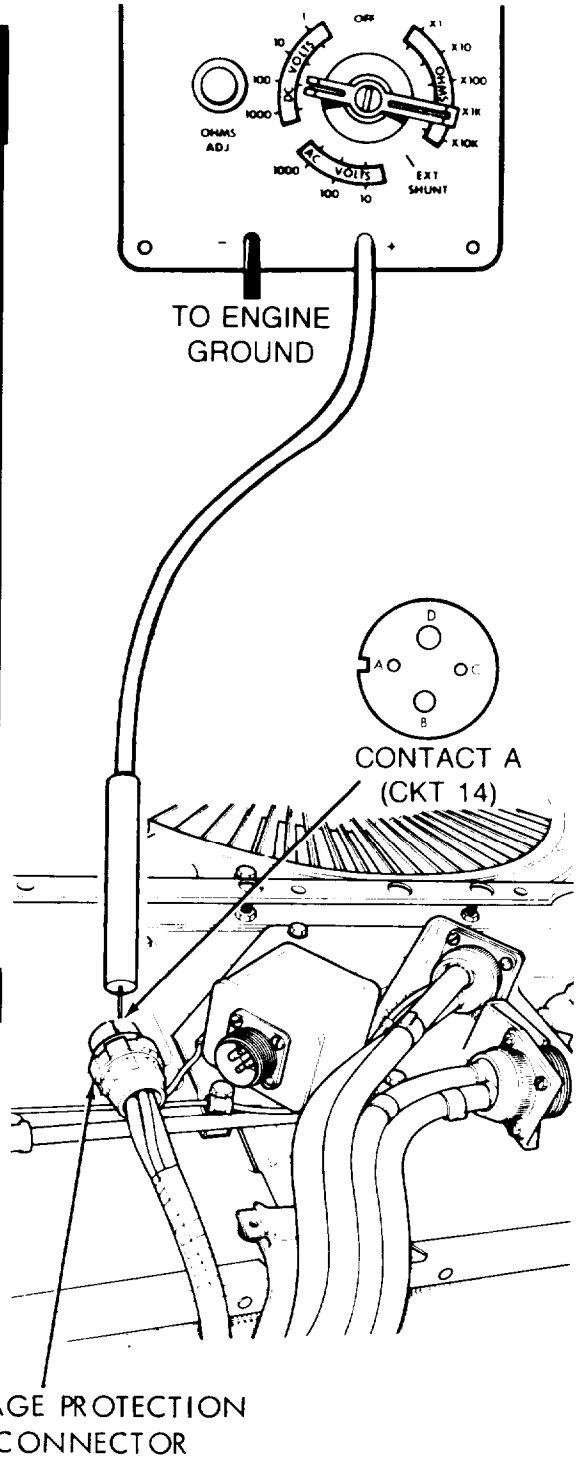
Did meter indicate 18 to 30 volts dc?

33.2 Check between pins C and G on transmission harness for continuity.

NO

See Step 33.9.

YES



DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-1-2D

WARNING

Use extreme care when working with circuit 14A. This circuit carries battery voltage at all times whether MASTER BATTERY switch is ON or OFF.

33.3 Check engine electrical harness (CKT 14A) for electrical power at low voltage protection relay connector.

First Technician (Right Side of Engine Compartment)

- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact B (CKT 14A) of engine electrical harness connector and black probe to ground.

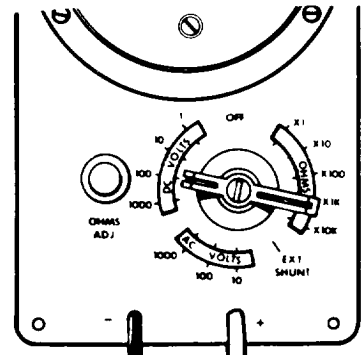
Second Technician (Driver's Engine Compartment)

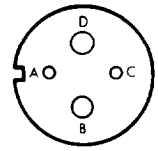
- Connect three ground cables to floor plate behind driver's seat (page 10-283).

First Technician (Right Side of Engine Compartment)

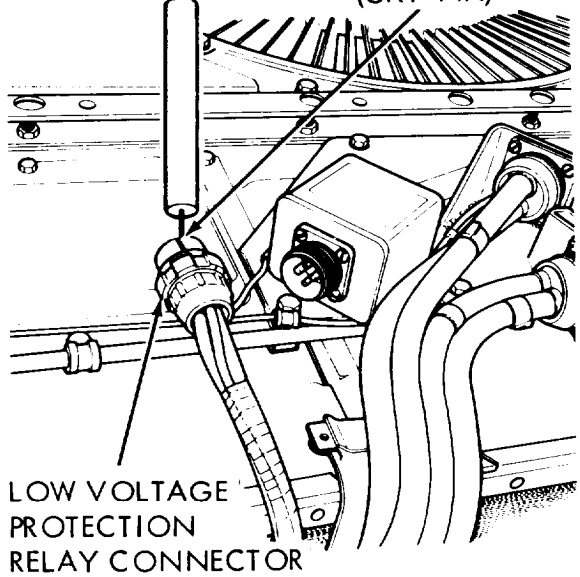
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?





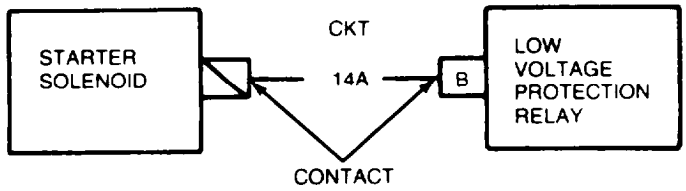
CONTACT B (CKT 14A)



YES

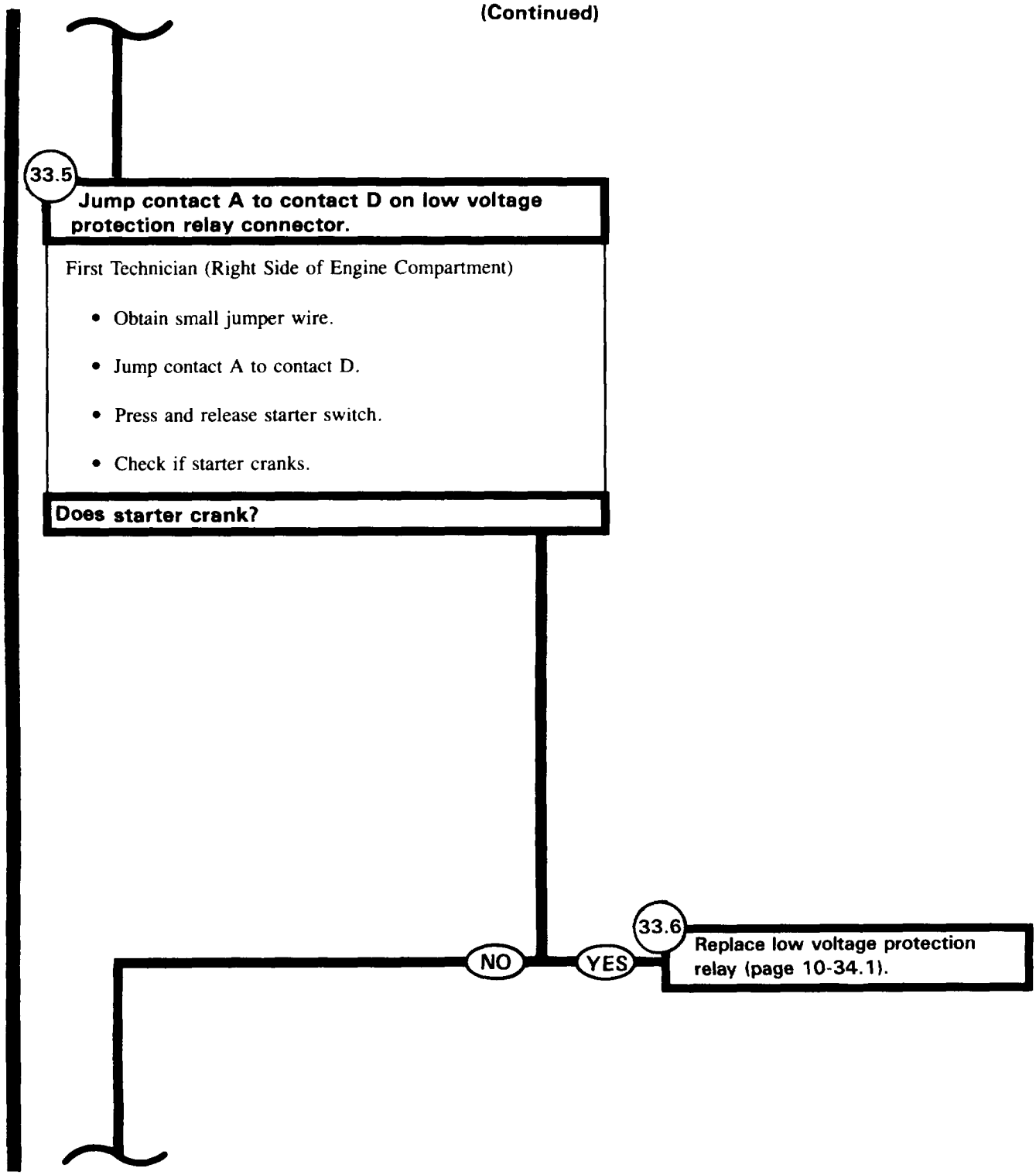
NO

33.4 Check for continuity between low voltage protection relay connector pin B and large terminal on starter. See Step 33.12.



Symptom-1-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)



Symptom-1-2D

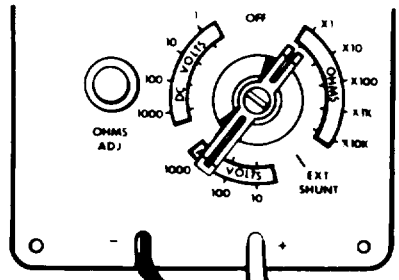
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

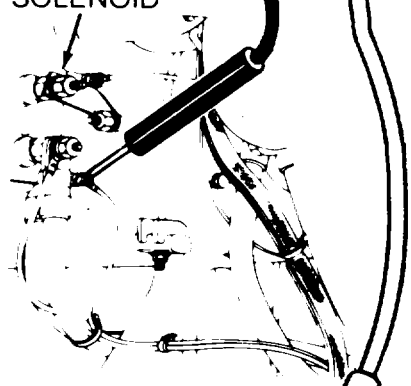
33.7 **Check engine electrical harness (CKT 14A) for continuity between starter solenoid terminal and low voltage protection connector contact D.**

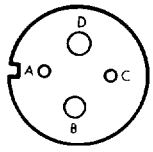
First Technician (Right Side of Engine Compartment)

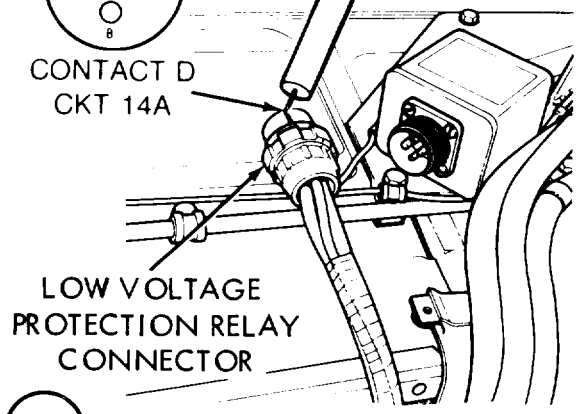
- Have powerplant removed (page 5-1).
- Set multimeter on OHMS X1 scale and zero meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact D (CKT 14A) of engine harness low voltage protection connector.
- Connect black probe of meter to terminal (CKT 14A) of starter solenoid.
- Check if meter indicates continuity.

Does meter indicate continuity?



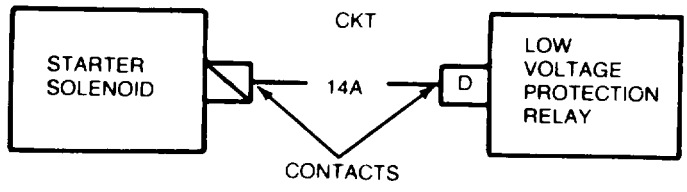






YES → **Replace starter (page 10-26).**

NO → **33.8** **Repair engine electrical harness (CKT 14A) (TM-20).**



Symptom-1-2D **DETAILED TROUBLESHOOTING PROCEDURE**
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP
33.2

33.9 **Check for continuity between pins C and G on transmission harness connector.**

First Technician (Top Deck)

- Have powerplant removed (page 5-1).

Both Technicians (Powerplant)

- Disconnect transmission harness connector from engine electrical harness connector at transmission disconnect.
- Set multimeter to OHMS X1 scale and zero meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact C of transmission harness.
- Connect black probe of meter to contact G of transmission harness.
- Check if meter indicates continuity.

Does meter indicate continuity?

DETAILED TROUBLESHOOTING PROCEDURE

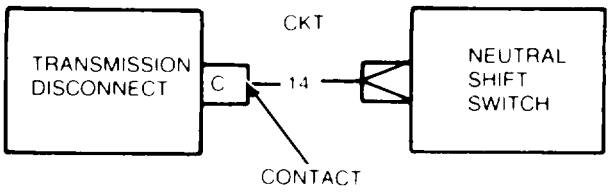
Symptom-1-2D

VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

33.10

- **Repair transmission harness (CKT 14) (page 10-307).**
- **Connect engine electrical harness connector to low voltage protection relay connector.**

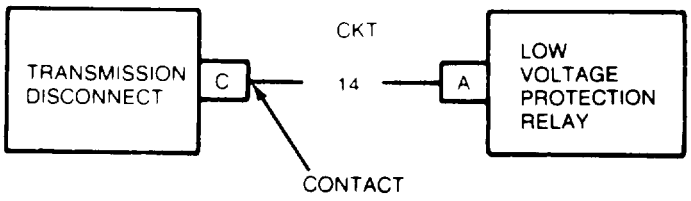
NO



33.11

- **Repair engine electrical harness (CKT 14) (page 10-307).**

YES



DETAILED TROUBLESHOOTING PROCEDURE

Symptom-1-2D **VEHICLE OPERATION - POWERPLANT, STARTING (Continued)**

FROM STEP 33.4

33.12 Check for continuity between low voltage protection relay connector and starter terminal.

First Technician (Top Deck)

- Have powerplant removed (page 5-1).

Both Technicians (Powerplant)

- Set multimeter to OHMS X1 scale and zero meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B of low voltage protection relay connector and black probe to large terminal on starter.
- Check if meter indicates continuity.

Does meter indicate continuity?

NO → **33.13 Repair engine electrical harness (CKT 14A) (page 10-307).**

YES → **33.14 Repair starter motor harness (CKT 81) (page 10-307).**

Symptom-1-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 2

34 **Check if MASTER BATTERY indicator lamp lights.**

First Technician (Driver's Station)

- Check if MASTER BATTERY indicator lamp lights when MASTER BATTERY switch is set ON.

Does MASTER BATTERY indicator lamp light?

YES → **35** **See Symptom-27: NO POWER DISTRIBUTION FROM MASTER RELAY TO HULL AND/OR TURRET (MASTER BATTERY INDICATOR LAMP WILL LIGHT).**

NO → **36** **See Symptom 28: NO POWER IN VEHICLE (MASTER BATTERY INDICATOR LAMP WILL NOT LIGHT).**

Symptom-1-2D
FROM STEP 6

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

37 Check for locked engine.

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Top Deck)

- Remove powerplant (page 5-1).

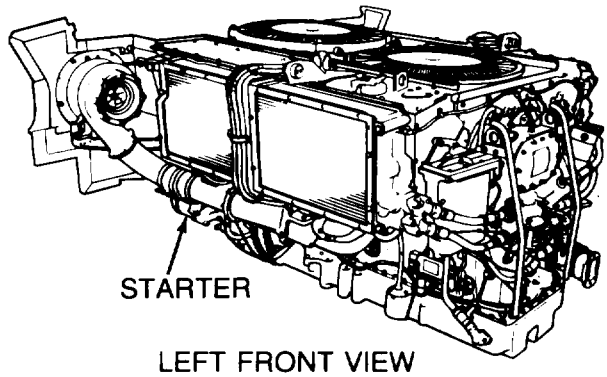
Both Technicians (Powerplant)

- Ground hop powerplant (page 5-48). Do not start engine.
- Replace starter (page 10-26).

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press and release STARTER switch.

Does engine crank?



LEFT FRONT VIEW

NO → **38 Notify support maintenance of locked engine.**

YES → **39**
- **Condition corrected by replacing starter.**
- **Install powerplant (page 5-37).**

TA253064

Symptom-1-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

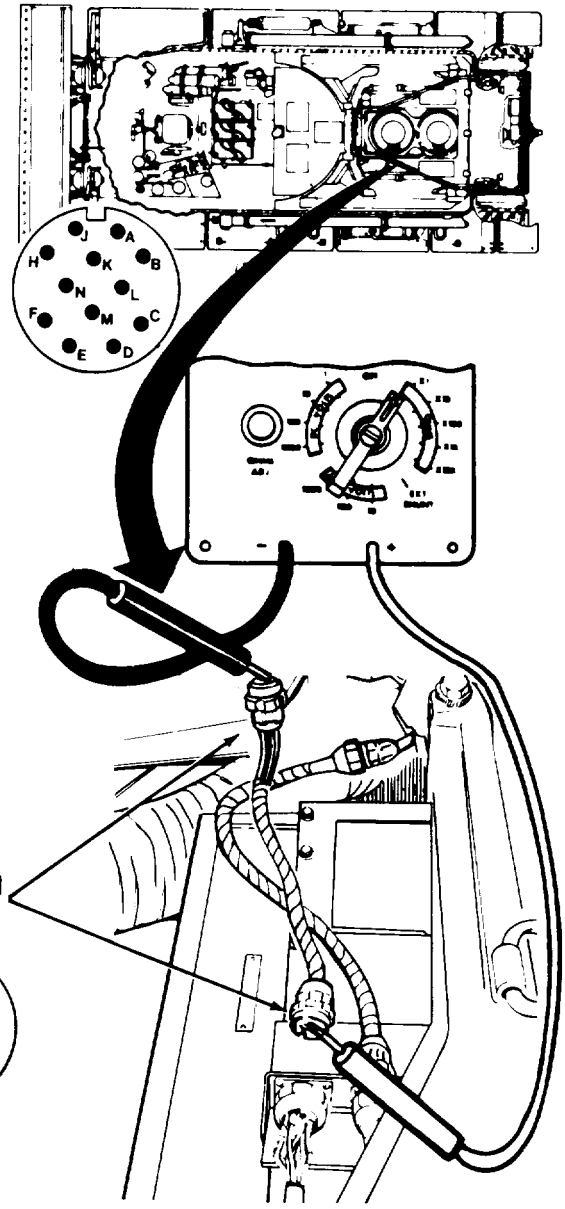
FROM STEP 10

40 **Check engine accessory harness extension (CKT 14) for continuity from intermediate connector to connector of engine disconnect.**

Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact M (CKT 14) of extension harness intermediate connector.
- Connect black probe of meter to contact M (CKT 14) of extension harness connector at engine disconnect.

CONTACT M
(CKT 14)



TA141773

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-1-2D

STEP (40) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

YES

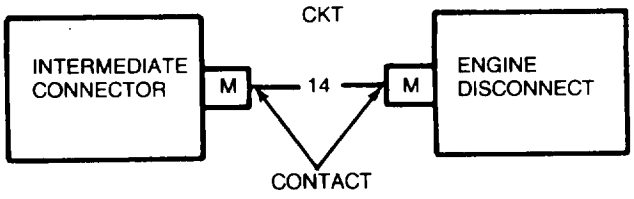
(41) **Check hull front master harness (CKT 14) at bulkhead electrical disconnect for electrical power.**

See Step (43) .

NO

(42)

- **Inspect engine accessory harness extension for bent/broken connector contacts or loose (CKT 14) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness to bulkhead electrical disconnect.**



TA141774

Symptom-1-2D
FROM STEP
10 or 41

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

43 Check hull front master harness (CKT 14) at bulkhead electrical disconnect for electrical power.

First Technician (Driver's Station)

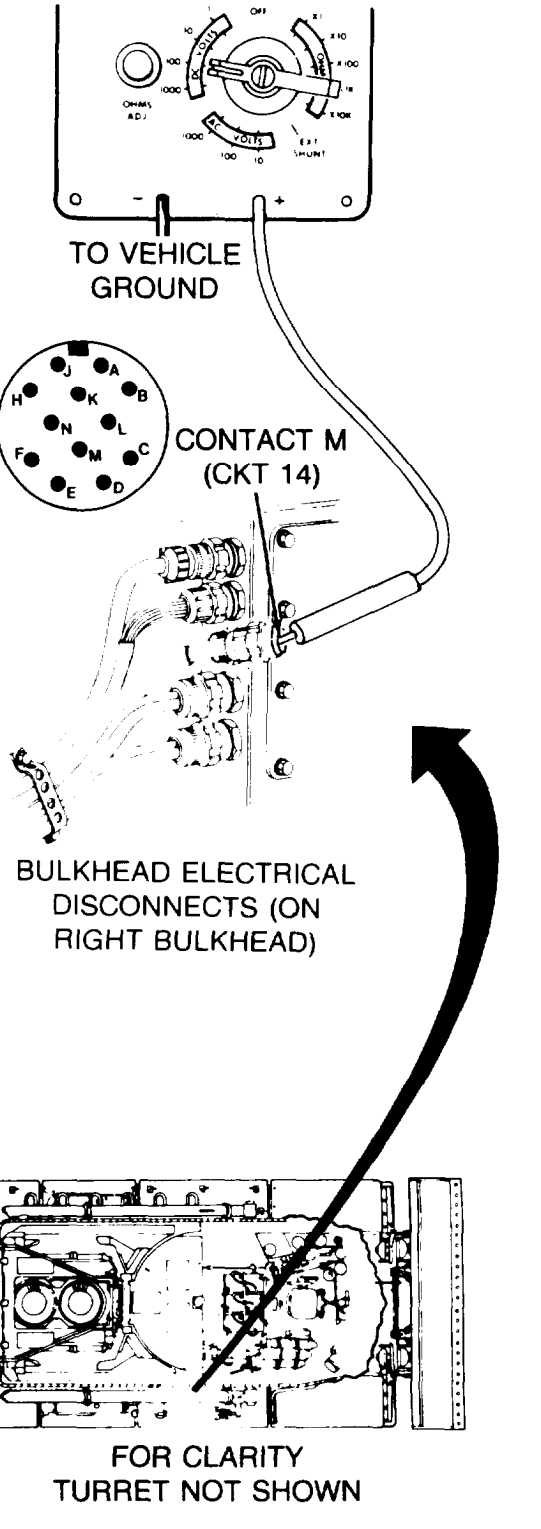
- Set MASTER BATTERY switch OFF.

Second Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front master harness (CKT 14) connector from bulkhead electrical disconnect.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact M (CKT 14) of hull front master harness connector at bulkhead electrical disconnect and black probe to ground.
- Check if meter indicates 18 to 30 volts dc when STARTER switch is pressed.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.



TA141775

Symptom-1-2D **DETAILED TROUBLESHOOTING PROCEDURE**
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP 43 CONTINUED

- Press and release STARTER switch.

Does meter indicate 18 to 30 volts dc?

YES

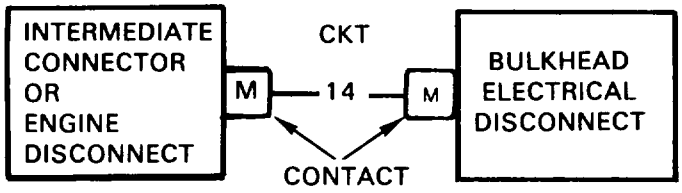
44

- **Inspect engine accessory harness for bent broken connector contacts or loose (CKT 14) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect hull front master harness to bulkhead electrical disconnect.**
- **Connect engine accessory harness extension to engine accessory harness and/or engine accessory harness to engine electrical disconnect.**

NO

44.1

- **Vehicles without starter relay, check master control panel accessories harness (CKT 14) at hull front master harness connector for electrical power. See step 57.**
- **Vehicles with starter relay, check hull front master harness (CKT 14) at starter relay for electrical power. See step 45.**



DETAILED TROUBLESHOOTING PROCEDURE

VEHICLE OPERATION - POWERPLANT, STARTING (Continued)

Symptom-1-2D

NOTE

See next page for locator views to Step (45).

WARNING

Use extreme care when working with starter relay. CKT 81/82 carries battery voltage at all times whether master battery switch is on or off.

(45) Check hull front master harness (CKT 14) at starter relay for electrical power.

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Traverse turret to gain access to starter relay (TM 9-2350-222-10).
- Remove cover from starter relay (page 10-173).
- Connect red probe of meter to (CKT 14) connection on starter relay.
- Check if meter indicates 18 to 30 volts dc when STARTER switch is pressed.

First Technician (Driver's Station)

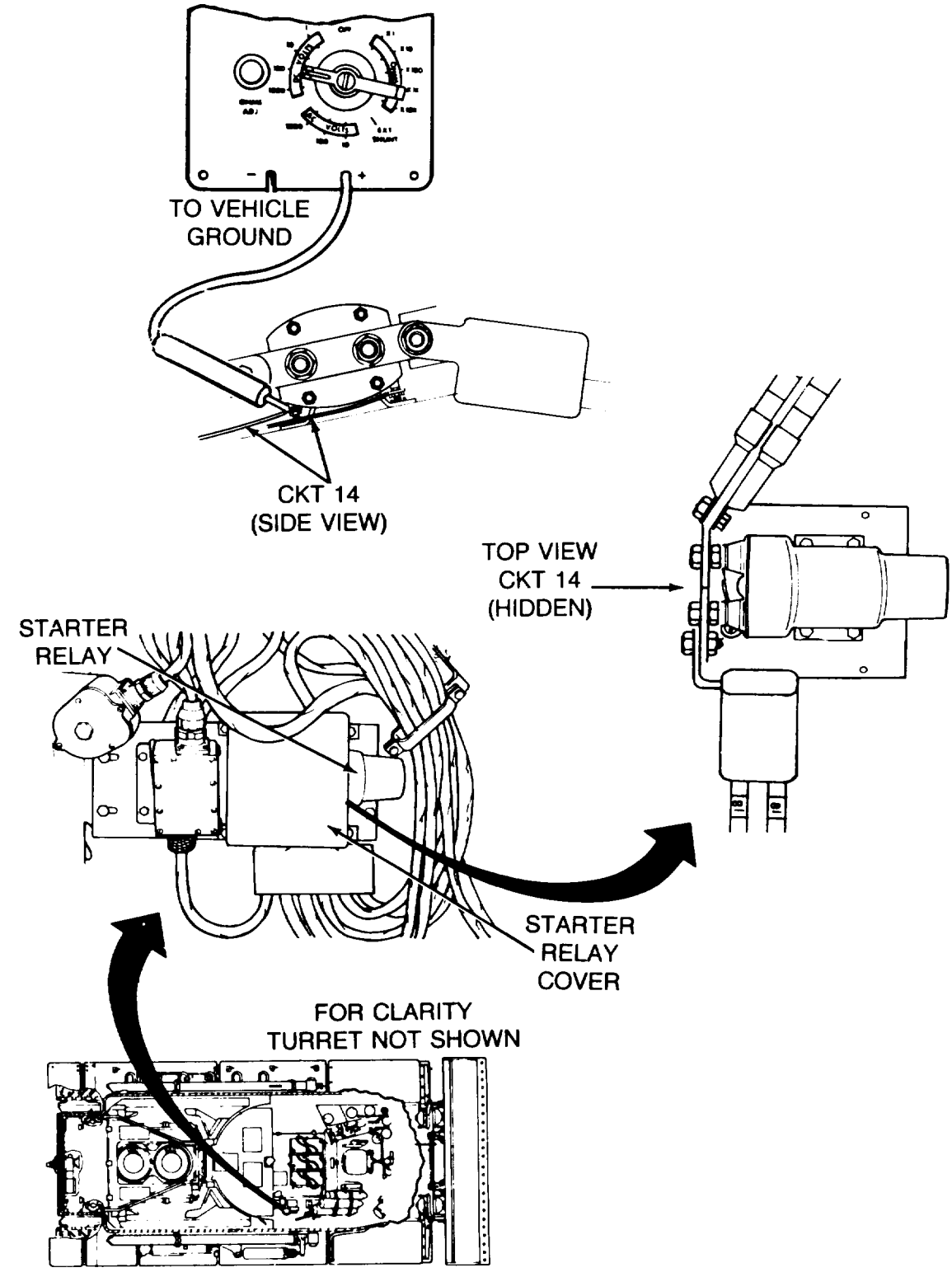
- Set MASTER BATTERY switch ON.

TA141777

Symptom-1-2D

STEP (45)
LOCATOR VIEWS

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)



TA141778

DETAILED TROUBLESHOOTING PROCEDURE

Symptom-1-2D

VEHICLE OPERATION - POWERPLANT, STARTING (Continued)

STEP (45) CONTINUED

- Press STARTER switch and release.

Does meter indicate 18 to 30 volts dc?

NO

46

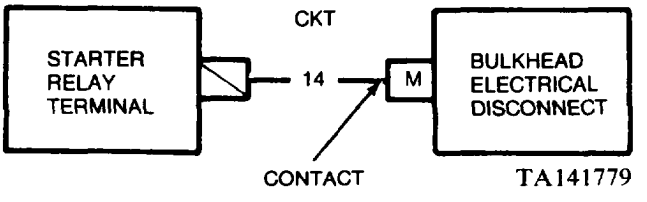
- **Check master control panel accessories harness CKT 14 at master control panel for electrical power.**

- **See Step (56).**

YES

47

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 14) wires at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective hull front master harness.**
- **Install starter relay cover (page 10-174).**
- **Connect hull front master harness to bulkhead electrical disconnect.**
- **Connect engine accessory harness extension to engine accessory harness connector and/or engine accessory harness to engine electrical disconnect.**



Symptom-1-2D

FROM STEP 12

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

48 **Check engine electrical harness (CKT 14) for continuity from connector at transmission disconnect to connector at engine disconnect.**

First Technician (Top Deck)

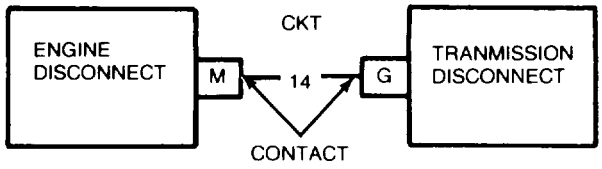
- Remove powerplant (page 5-1).

First Technician (Right Side of Engine)

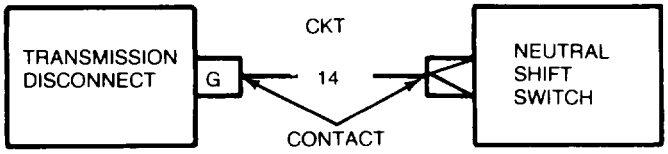
- Disconnect engine electrical harness connector from transmission harness connector at engine disconnect.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact G (CKT 14) of engine electrical harness connector at transmission disconnect.
- Connect black probe ofmeter to contact M (CKT 14) of engine electrical harness connector at engine disconnect.
- Check if meter indicates continuity.

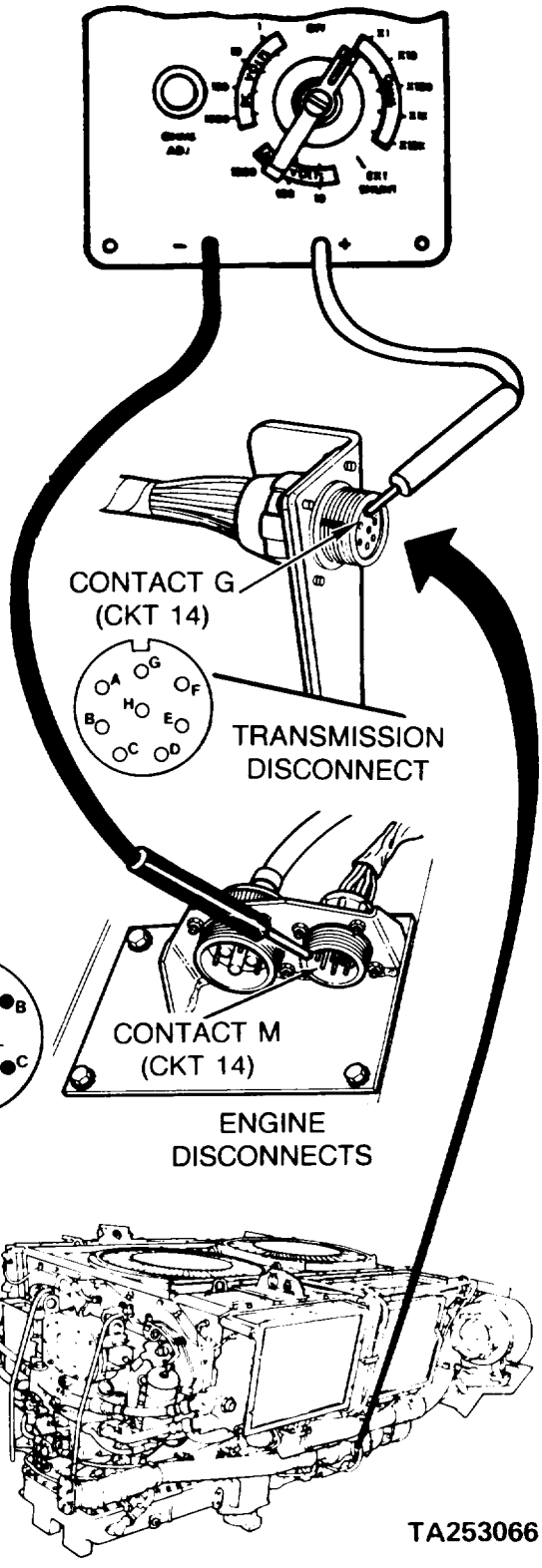
Does meter indicate continuity?

49 **Repair engine electrical harness (CKT 14) (page 10-307).** YES



50 **Repair transmission harness (CKT 14) (page 10-307).** NO





Symptom-1-2D
FROM STEP
16

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

WARNING

Use extreme care when working with circuit 81. This circuit carries battery voltage at all times whether MASTER BATTERY switch is ON or OFF.

51 **Check starter relay cable (CKT 81) at bulkhead electrical disconnect for electrical power.**

First Technician (Driver's Station)

- Disconnect three battery ground cables from floor plate behind driver's seat (page 10- 283).

Second Technician (Turret)

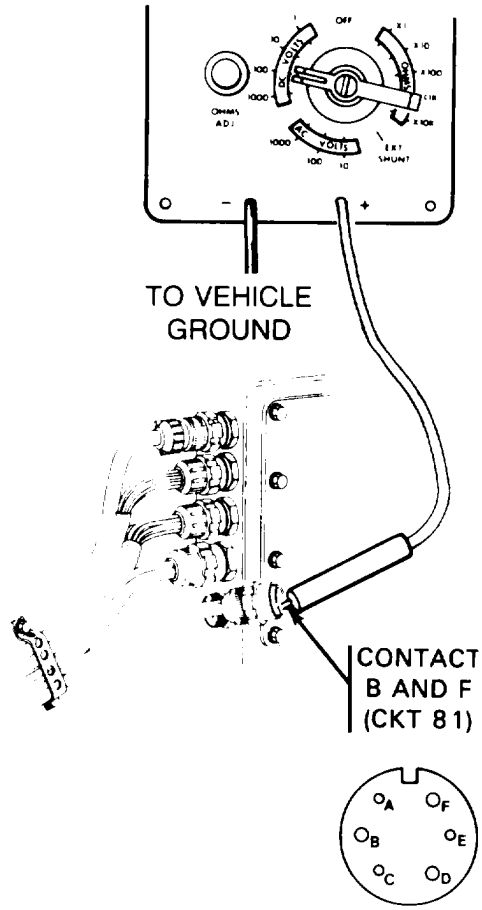
- Disconnect starter relay cable connector from bulkhead electrical disconnect.
- Connect red meter probe to contact B of starter relay cable connector at bulkhead electrical disconnect and black probe to ground.

First Technician (Driver's Station)

- Connect three battery ground cables to floor plate behind driver's seat.

Second Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.
- Move red probe of meter from contact B to contact F of starter relay cable connector at bulkhead electrical disconnect.



TA253067

Symptom-1-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP (51) CONTINUED

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc at both connector contacts?

NO

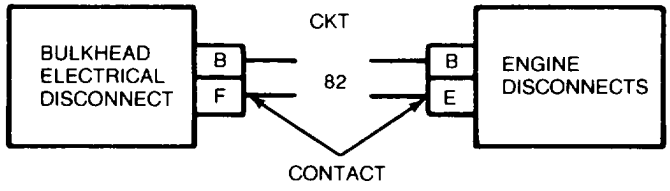
(52)

- **Repair starter feed harness (CKT 81) (page 10-307).**
- **Install transmission shroud (page 9-23).**

(52A)

Vehicles without starter relay, repair battery cable in hull (CKT 81).

- **Vehicles with starter relay, check for electrical power at starter relay bus bar (CKT 81/82) (See step 53).**



TA253068

Symptom-1-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

WARNING

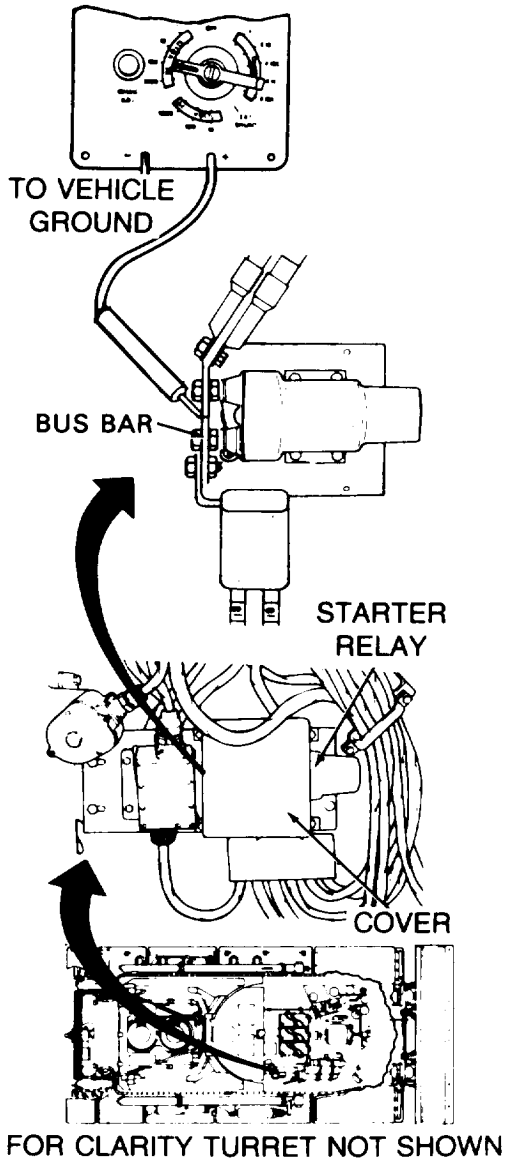
Use extreme care when working with circuit 81/82. This carries battery voltage at all times whether MASTER BATTERY switch is ON or OFF.

53 Check for electrical power at starter relay bus bar (CKT 82/81)

Second Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Traverse turret to gain access to starter relay (TM 9-2350-222-10).
- Remove cover from starter relay (page 10-173).
- Connect red probe of meter to starter relay bus bar and black probe to ground.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

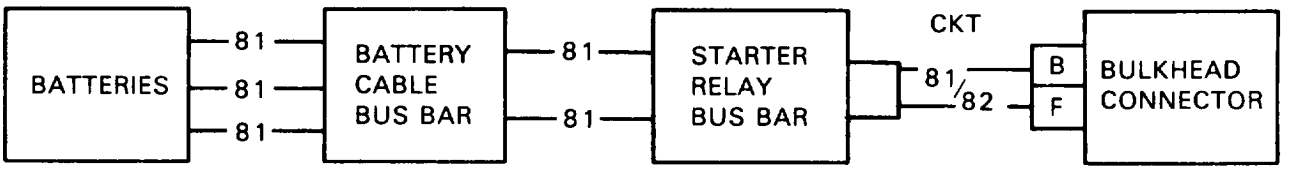


55
- **Repair slave receptacle and relay cable (CKT 81) from battery cable bus bar to starter bus bar (page 10-307).**
- **Connect starter relay cable to bulkhead electrical disconnect.**
- **Install transmission shroud (page 9-23).**

NO

YES

54
- **Repair starter relay cable (CKT 81) (page 10-307).**
- **Install transmission shroud (page 9-23).**



TA253069

Symptom-1-2D

FROM STEP 46

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

56 **Check master control panel accessories harness (CKT 14) at hull front master harness connector for electrical power.**

Both Technicians (Rear Grille Doors)

- Connect transmission harness connectors (CKT 14) to neutral shift switch connectors.
- Install transmission shroud (page 9-23).

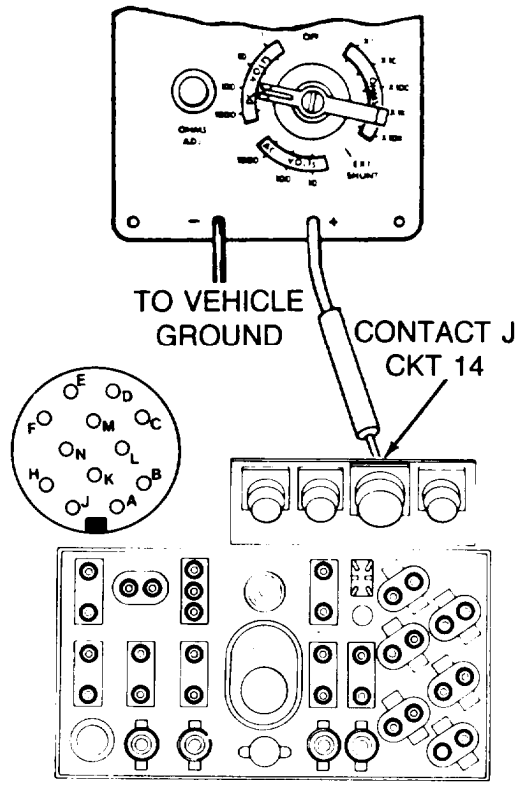
First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master control panel.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to master control panel accessories harness connector contact J (CKT 14) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Press STARTER switch.
- Check if meter indicates 18 to 30 volts dc when STARTER switch is pressed.

Does meter indicate 18 to 30 volts dc?

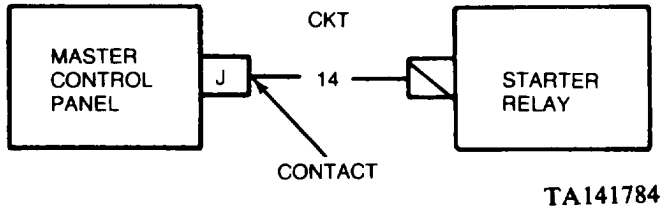
NO

YES



57

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 14) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to master control panel.**



TA141784

DETAILED TROUBLESHOOTING PROCEDURE

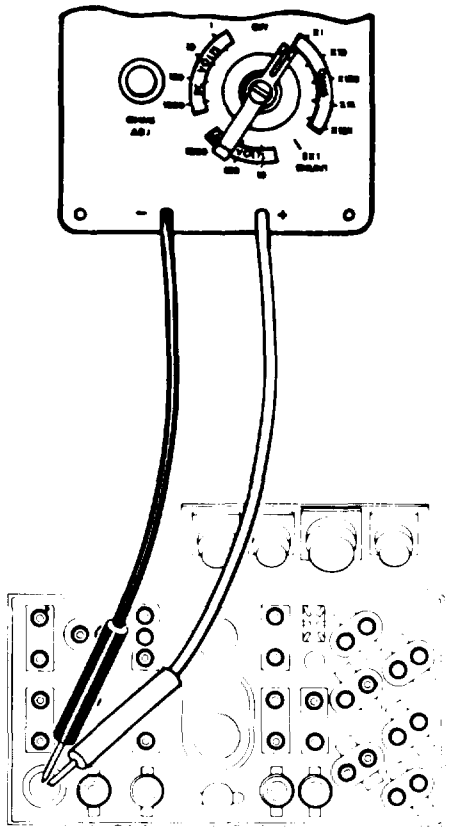
VEHICLE OPERATION - POWERPLANT, STARTING (Continued)

Symptom-1-2D

58 **Check STARTER switch for continuity**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect master control panel accessories harness (CKT 14) connector from STARTER switch.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to one contact and black probe to other contact of STARTER switch.
- Press and release STARTER switch.
- Check if meter indicates continuity when STARTER switch is pressed.



Does meter indicate continuity?

YES

NO

59

- **Replace STARTER switch (page 10-55).**
- **Connect hull front master harness connector to master control panel.**
- **Connect hull power harness connector to master control panel.**

TA141785

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-1-2D

60 **Check master control panel accessories harness (CKT 14) for continuity between accessory harness connector and master control panel harness intermediate connector.**

First Technician (Driver's Station)

- Disconnect master control panel accessories harness from master control panel harness connector at intermediate connector.
- Connect red probe of meter to master control panel accessories harness contact J (CKT 14)
- Connect black probe of meter to master control panel accessories harness intermediate connector (CKT 14)
- Check if meter indicates continuity?

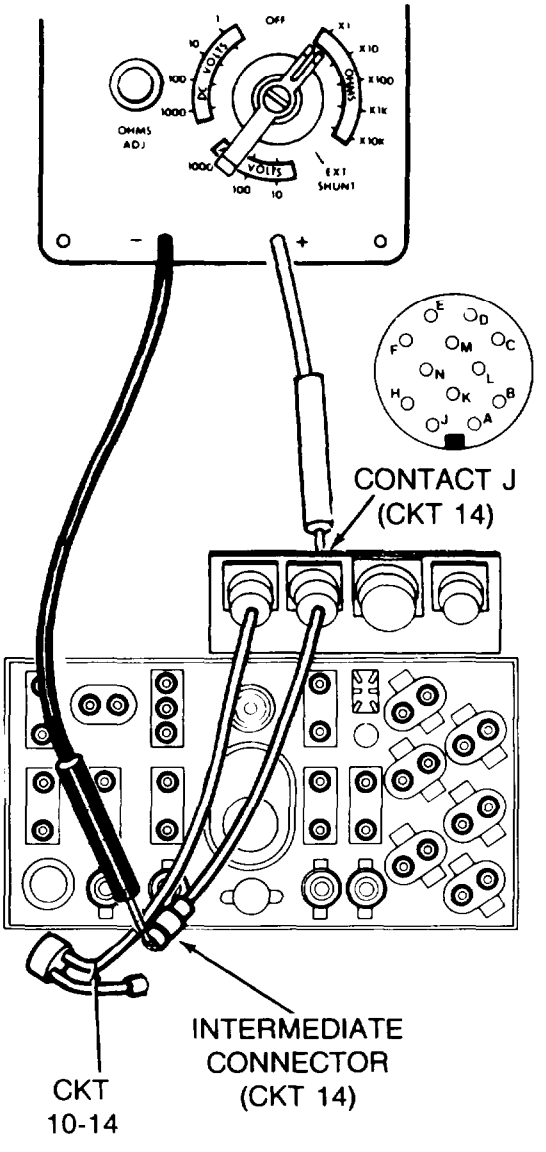
Does meter indicate continuity?

NO

61 **Replace master control panel accessories harness (page 10-103).**

YES

62
- **Replace master control panel harness (page 10-111).**
- **Connect hull front master harness connector to master control panel.**



TA141786

Symptom-2 **DETAILED TROUBLESHOOTING PROCEDURE**
VEHICLE OPERATION - POWERPLANT, STARTING

ENGINE CRANKS AT NORMAL SPEED, BUT WILL NOT START (BATTERY/GENERATOR GAGE SHOWS IN YELLOW AREA).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

Steps (1) thru (6) deleted

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

7 **Check if manual fuel shutoff handle is in down (ON) position.**

Second Technician (Driver's Station)

- Operate fuel shutoff handle several times and leave in down (ON) position.

Did manual fuel shutoff handle go freely to the down (ON) position?

NO

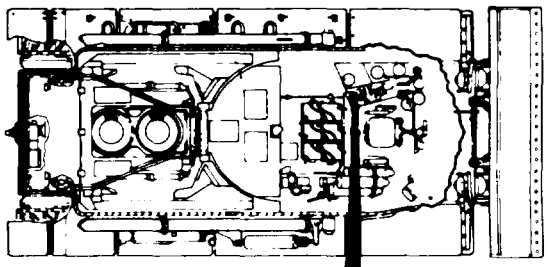
8 **See Symptom 18: MANUAL FUEL SHUTOFF HANDLE WILL NOT STOP ENGINE.**

YES

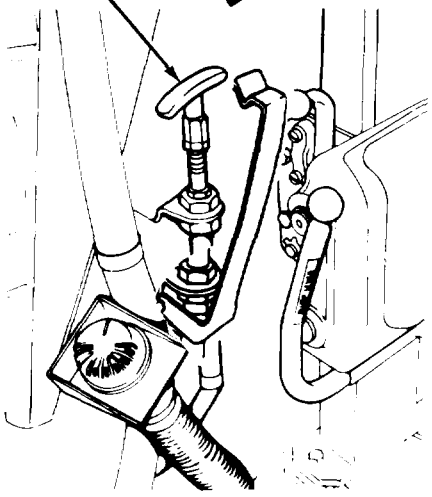
9

- **Check if fuel tank electrical pumps are running.**
- **See Step (10).**

FOR CLARITY
TURRET NOT SHOWN



MANUAL FUEL SHUTOFF HANDLE



■ All data on Page 4-167 deleted.

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP (2)

4 **Check if manual fuel shutoff valve operates.**

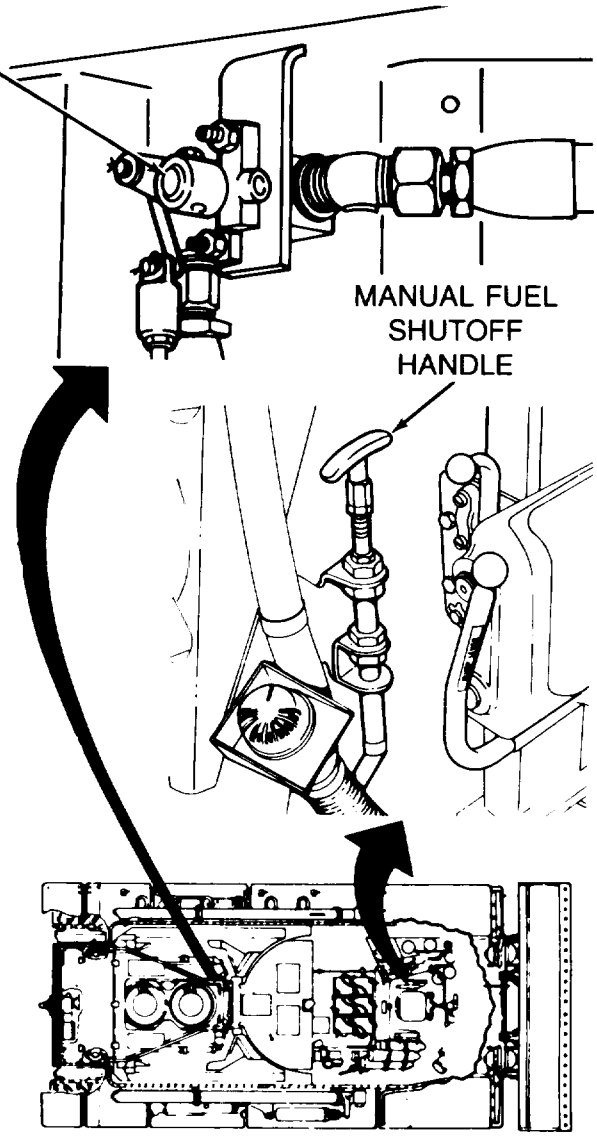
First Technician (Turret)

- Visually check if arm on shutoff valve moves when manual fuel shutoff handle is operated.

Second Technician (Driver's Station)

- Operate fuel shutoff handle several times and leave in down (ON) position.

Did manual fuel shutoff valve arm move when handle was operated?



FOR CLARITY TURRET NOT SHOWN

YES

5

- **Check if fuel tank's electrical pumps are running.**
- **See Step (10) .**

NO

6 **See Symptom 18: MANUAL FUEL SHUTOFF HANDLE WILL NOT STOP ENGINE.**

TA141788

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP (3)

(7) Check if manual fuel shutoff handle is in down (ON) position.

Second Technician (Driver's Station)

- Operate fuel shutoff handle several times and leave in down (ON) position.

Did manual fuel shutoff handle go freely to the down (ON) position?

(8) See Symptom 18: MANUAL FUEL SHUTOFF HANDLE WILL NOT STOP ENGINE.

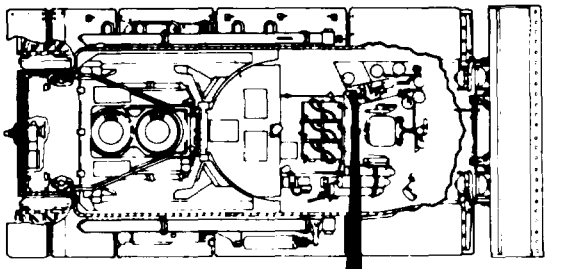
NO

(9)

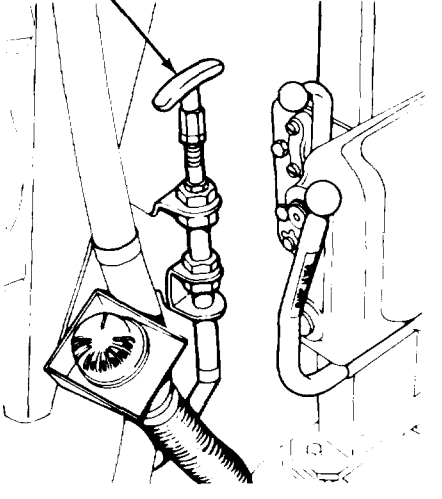
- **Check if fuel tank's electrical pumps are running.**
- **See Step (10) .**

YES

FOR CLARITY
TURRET NOT SHOWN



MANUAL FUEL SHUTOFF HANDLE



TA141789

Symptom-2

FROM STEP

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

9

10 **Check if fuel tanks electrical fuel pumps are running.**

Second Technician (Driver's Station)

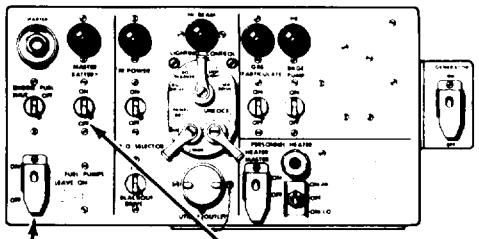
- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.
- Listen for sound of right fuel tank electrical fuel pump running (below turret floor).

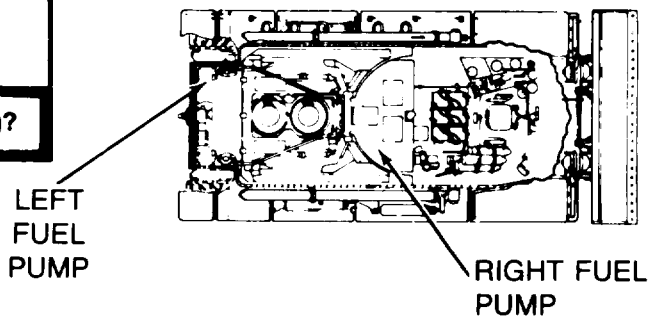
First Technician (Rear Grille Doors)

- Open rear grille doors.
- Listen for sound of left fuel tank electrical fuel pump running.

Are both fuel tanks electrical fuel pumps running?

MASTER CONTROL PANEL





FOR CLARITY
TURRET NOT SHOWN

YES

NO

11
- **If only one pump is not running, see Symptom 5: ONE ELECTRICAL FUEL PUMP WILL NOT WORK.**
- **If both pumps are not running, see Symptom 6: BOTH ELECTRICAL FUEL PUMPS WILL NOT WORK.**

Symptom-2

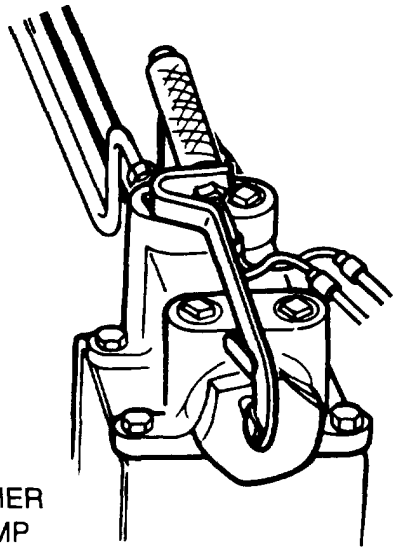
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

12 **Check primer pump for back pressure.**

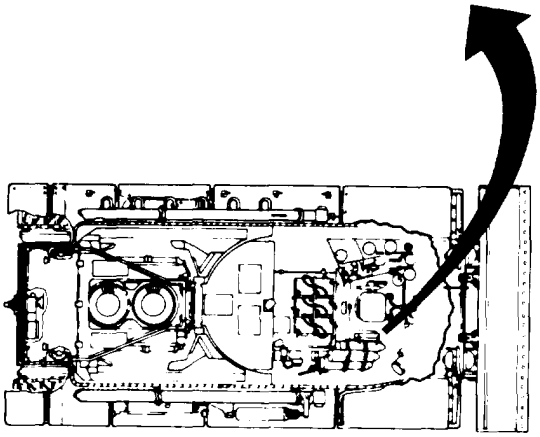
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Operate primer pump handle several times.

Does primer pump have back pressure?



PRIMER PUMP



FOR CLARITY
TURRET NOT SHOWN

YES

NO

13 **See Symptom 7: PRIMER PUMP WILL NOT WORK.**

TA141791

Symptom-2

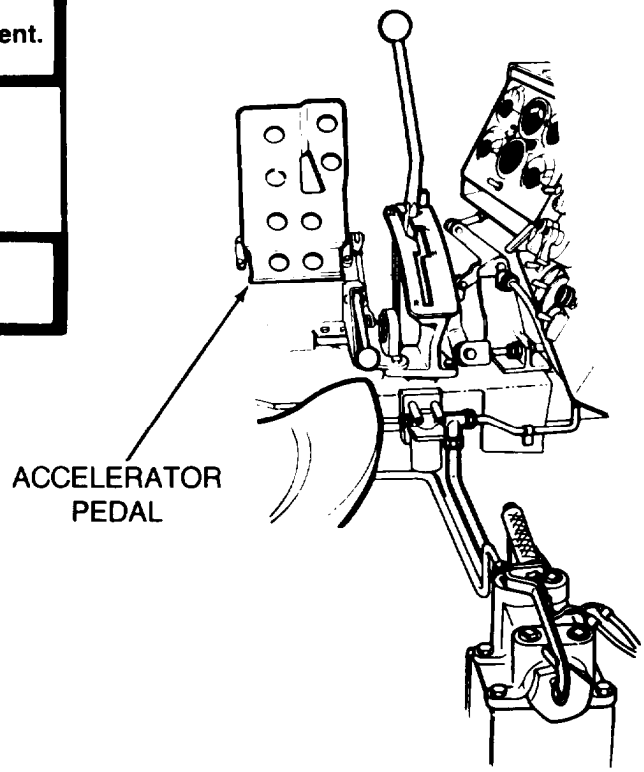
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

14 **Check accelerator pedal for freedom of movement.**

Second Technician (Driver's Station)

- Press and release accelerator pedal several times.

Does accelerator pedal operate freely without binding?



YES

NO

15

- **Check for binding at accelerator pedal.**
- **Close rear grille doors.**
- **See Step (33).**

TA141792

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

16 **Check accelerator linkage movement at the front of engine.**

First Technician (Turret)

- Manually traverse turret to gain access to engine access covers (TM 9-2350-222-10).
- Remove upper engine access cover (page 16-40).
- Observe idle adjusting screw for full movement off the stop when accelerator pedal is pressed.

Second Technician (Driver's Station)

- Press accelerator pedal all the way down and release.

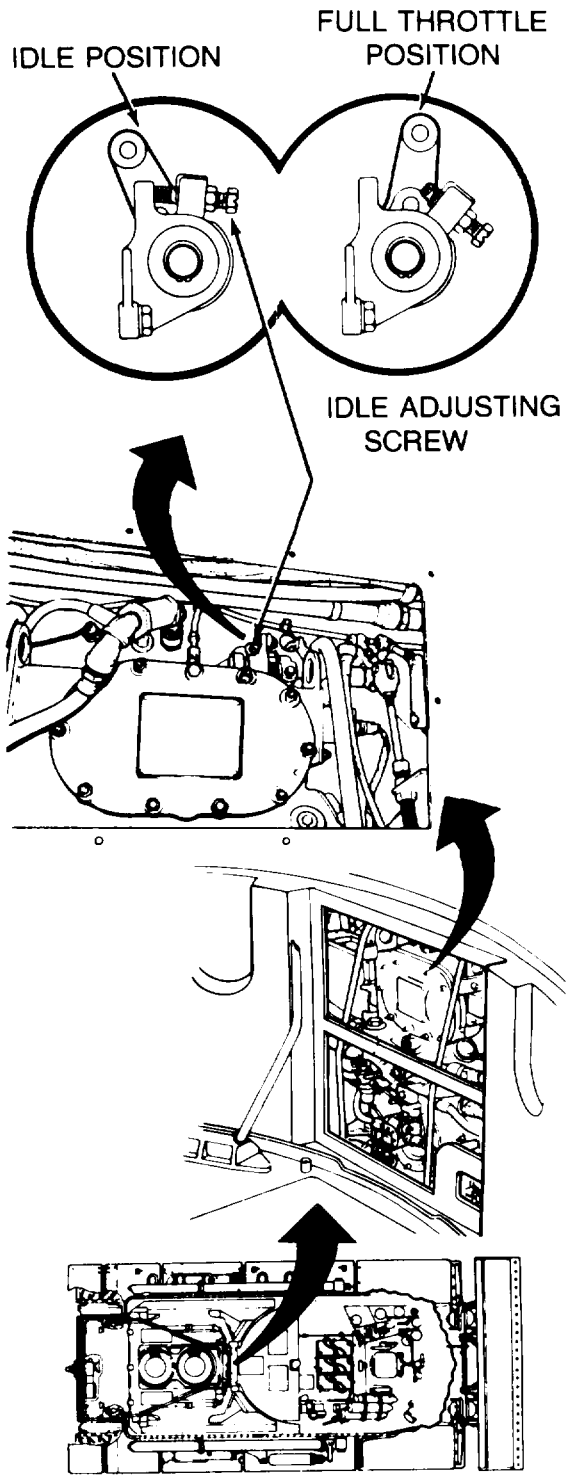
Does idle adjustment screw move to full throttle position?

17

- **Check for movement of throttle stop pin at engine.**
- **See Step (38) .**

NO

YES



ENGINE ACCESS COVERS
(VIEW FROM TURRET PLATFORM)

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

18 **Check engine fuel shutoff solenoid for operation.**

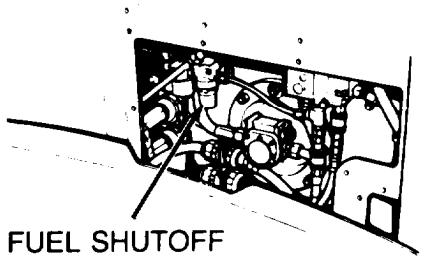
First Technician (Turret)

- Listen at engine access cover opening for sound of fuel shutoff solenoid clicking.

Second Technician (Driver's Station)

- Set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch ON.
- Operate ENGINE FUEL SHUTOFF switch several times.

Does engine fuel shutoff solenoid click when ENGINE FUEL SHUTOFF switch is operated?



FUEL SHUTOFF SOLENOID

YES

NO

19

- **Check hull front master harness (CKT 54A) at bulkhead electrical disconnect for electrical power (MASTER BATTERY switch OFF).**

- **See Step (41) .**

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

20 Check for free fuel flow at main fuel return line quick disconnect.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

First Technician (Rear Grille Doors)

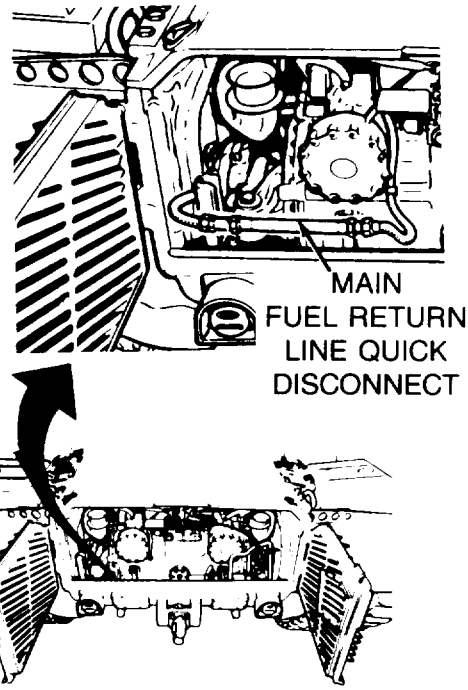
- Disconnect main fuel return line disconnect.
- Remove quick disconnect half from fuel line coming from engine.
- Place one gallon container under open line to catch any fuel.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.

First Technician (Rear Grille Doors)

- Observe return line for free fuel flow.
- Direct second technician to set MASTER BATTERY and FUEL PUMPS switches OFF if fuel flows freely.



REAR OF ENGINE (TRANSMISSION SHROUD REMOVED)

Does fuel flow freely from main fuel return line?

YES

NO

21

- **Check for free fuel flow at main fuel supply line (located behind engine access covers).**
- **See Step (46) .**

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

NOTE

Diesel fuel containing water will be milky. The water will settle out in a short period of time.

22 **Check for water in fuel.**

First Technician (Rear Grille Doors)

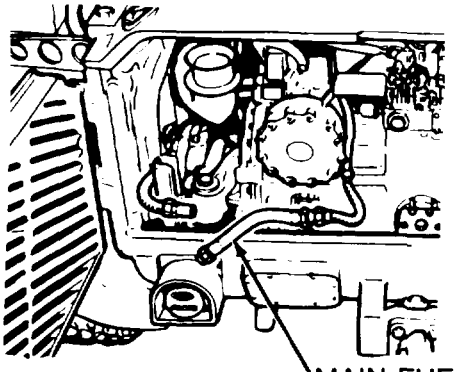
- Place one gallon container under open fuel return line to catch fuel.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.

First Technician (Rear Grille Doors)

- Allow container to fill with fuel then direct second technician to set MASTER BATTERY and FUEL PUMPS switches OFF.
- Observe for water (fuel is milky).



Does fuel contain water?

NO

YES

23 **See Symptom 10: FUEL-WATER SEPARATOR WILL NOT WORK (2D ENGINE) (WILL NOT DRAIN).**

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

WARNING

Do not touch manifold preheaters with bare hands.

24 **Check intake manifold preheaters for operation.**

Both Technicians (Rear Grille Doors)

- Install quick disconnect and connect fuel return line.
- Install transmission shroud (page 9-23).

First Technician (Turret)

- Manually traverse turret to gain access to left and right top deck grille doors.

First Technician (Top Deck)

- Open left and right top deck grille doors.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.
- At the same time, press STARTER switch, MANIFOLD PREHEAT switch, and operate PRIMER PUMP. Do not hold switches on for more than 14 seconds.

First Technician (Top Deck)

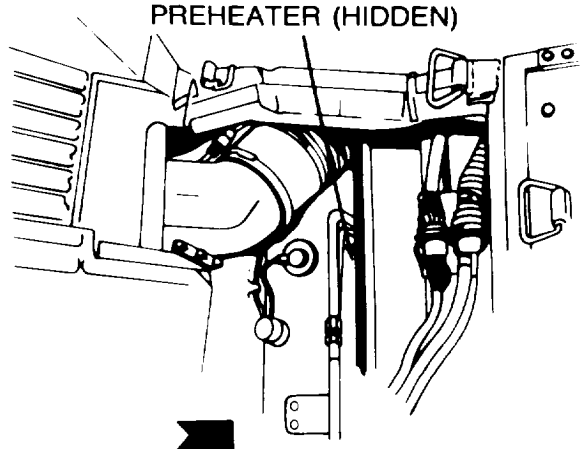
- Reach down through grille door openings and feel for heat from intake manifold preheaters.

Are both intake manifold preheaters warm?

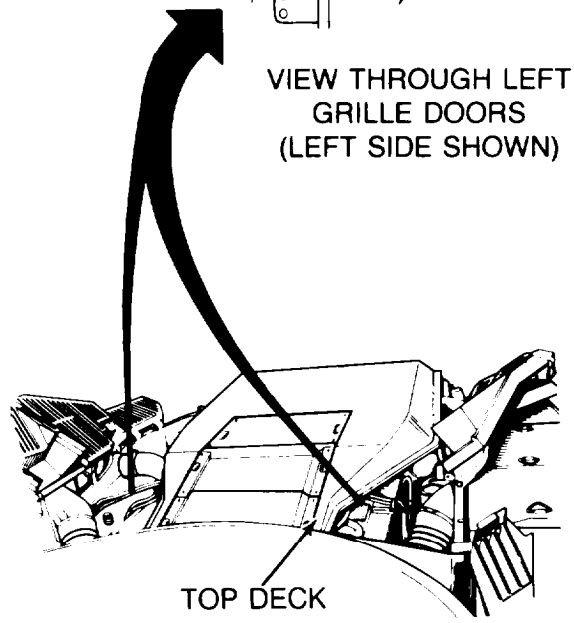
YES

NO

ACCESS TO INTAKE MANIFOLD PREHEATER (HIDDEN)



VIEW THROUGH LEFT GRILLE DOORS (LEFT SIDE SHOWN)



25

- **If both preheaters are cold, see Symptom 9: BOTH INTAKE MANIFOLD PREHEATERS WILL NOT WORK.**
- **If only one preheater is cold, see Symptom 8: ONE INTAKE MANIFOLD PREHEATER WILL NOT WORK.**

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

NOTE

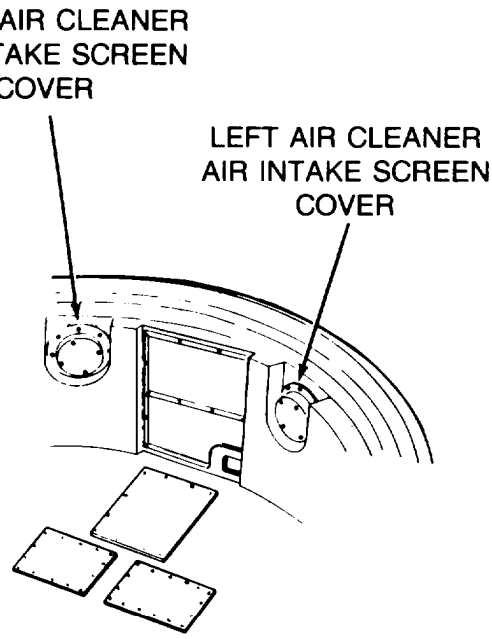
There are two sets of air cleaning components which are the same and are located across from one another on each side of the engine.

26 **Check engine air intake screens for clogging or damage.**

First Technician (Turret)

- Manually traverse turret to gain access to right and left engine air intakes.
- Gain access to air intake screens.
- Inspect air intake screens for clogging or damage.

Are engine air intake screens clogged or damaged?



VIEWED FROM TURRET PLATFORM

NO

YES

27

- **Clean engine air intake screens or replace damaged screens.**
- **Install upper engine access cover (page 16-40).**

TA141798

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

28 **Check engine air cleaner for collapsed hoses.**

First Technician (Turret)

- Install air intake screen covers (page 7-85).

Second Technician (Top Deck)

- Check both right and left intake hoses and outlet hoses for collapsing or other damage.

Are engine air cleaning hoses collapsed or damaged?

YES

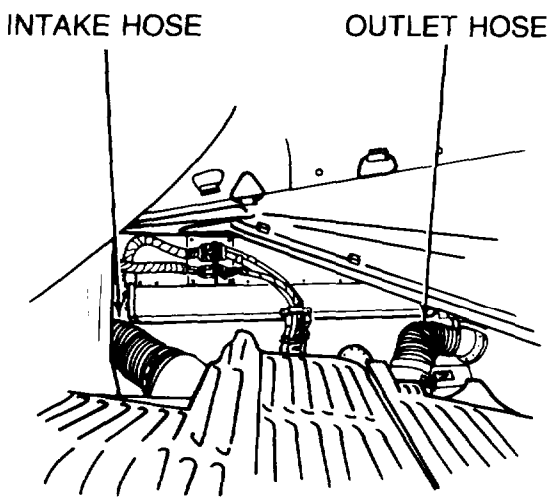
29

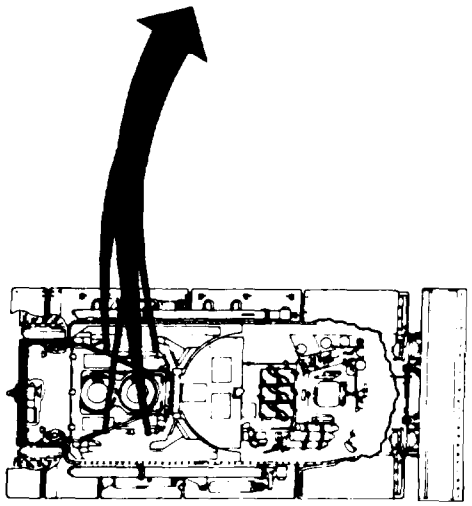
- **Replace engine air intake hose (page 7-82) and/or air outlet hose (page 7-73).**
- **Install upper engine access cover (page 16-40).**

NO

(VIEW LOOKING DOWN THROUGH LEFT TOP DECK GRILLE DOORS)

(LEFT SIDE SHOWN)





TA141799

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

NOTE

- **If engine air cleaners are equipped with restriction indicators, See Step (30) .**
- **If engine air cleaners are not equipped with restriction indicators, service engine air cleaner filters (page 7-110).**
- **If engine will not start after air cleaner, filters are serviced See Step (32) .**

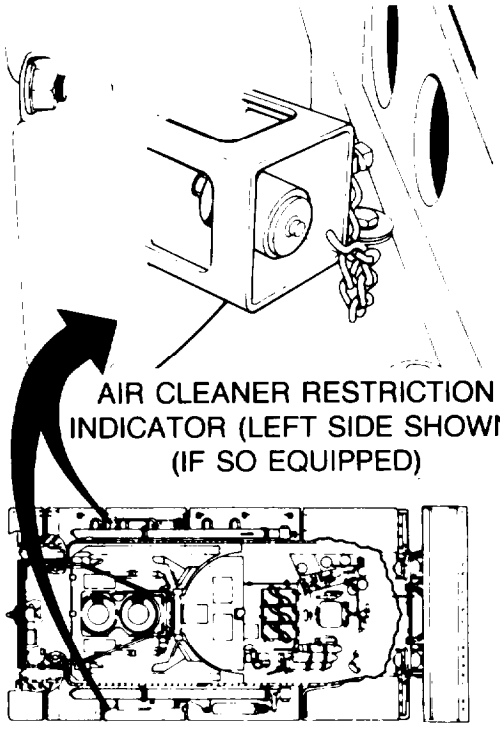
(30) Check engine air cleaner filters, on each side of vehicle, for being clogged.

Second Technician (Top Deck)

- Check engine air cleaner restriction indicator on each side of vehicle for clogged filters (TM 9-2350-222-10).

Are engine air cleaner filters clogged?

AIR CLEANER RESTRICTION INDICATOR
(LEFT SIDE SHOWN)



YES

(31)

- **Remove and service engine air cleaner filters (page 7-110).**
- **Install upper engine access cover (page 16-40).**

NO

(32)

- **Notify support maintenance that engine cranks but will not start.**
- **Install upper engine access cover (page 16-40).**

TA141800

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

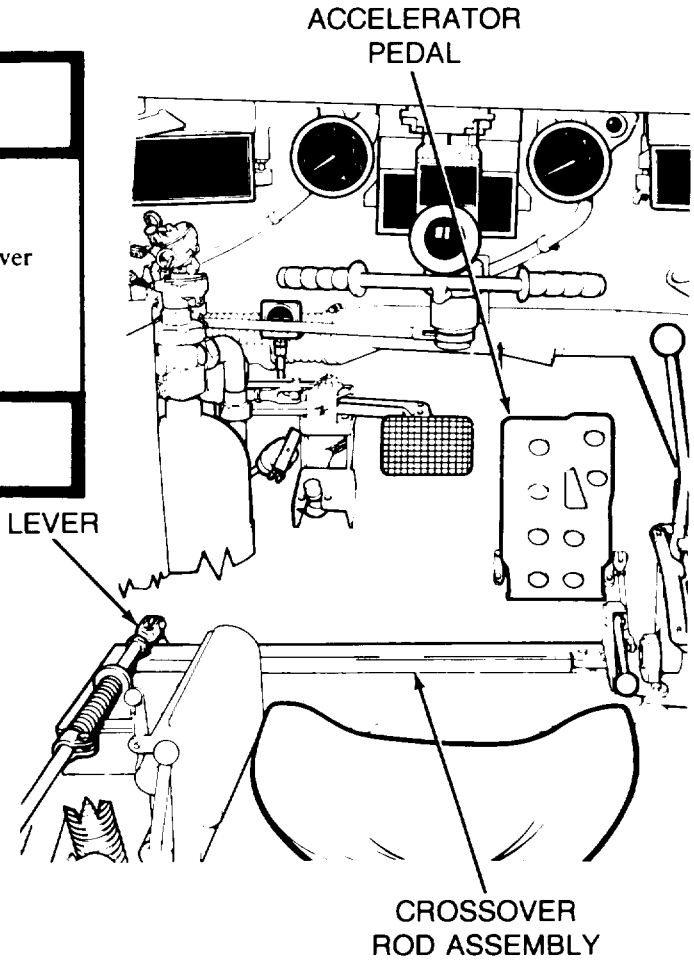
FROM STEP (15)

(33) Check for binding at accelerator pedal.

Second Technician (Driver's Station)

- Disconnect rod from lever on left side of crossover rod assembly.
- Move accelerator up and down by hand.

Does accelerator pedal move freely without binding?



YES

NO

(34)

- **Check for binding in linkage between accelerator crossover rod assembly and engine compartment bulkhead.**
- **See Step (76) .**

TA141801

Symptom-2

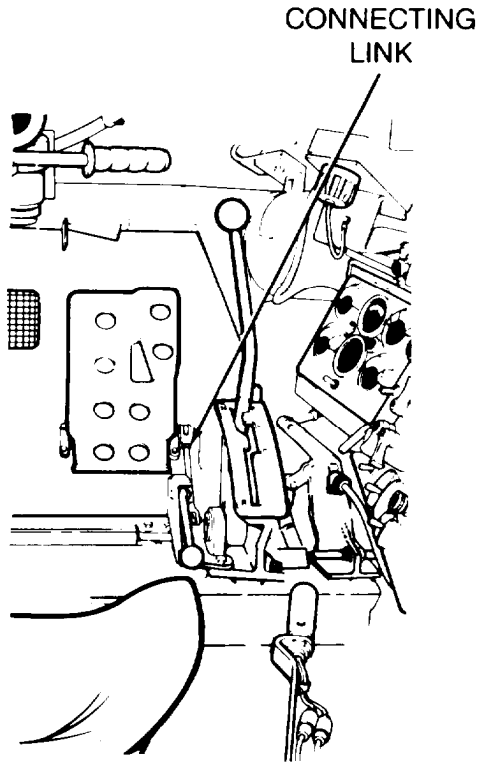
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

35 **Check for binding between accelerator pedal and crossover rod.**

Second Technician (Driver's Station)

- Disconnect accelerator connecting link.
- Move accelerator pedal up and down by hand.

Does accelerator pedal move freely without binding?



NO

36
- **Replace accelerator pedal (page 7-446).**
- **Close rear grille doors (TM 9-2350-222-10).**

YES

37
- **Replace accelerator crossover rod assembly (page 7-429).**
- **Close rear grille doors (TM 9-2350-222-10).**

TA141802

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP (17)

38 **Check for movement at throttle stop pin at engine.**

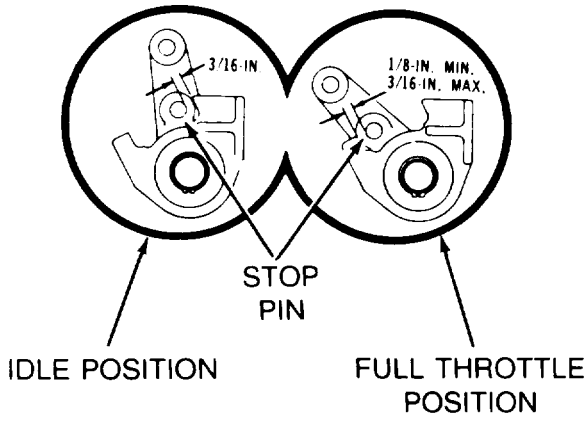
Second Technician (Driver's Station)

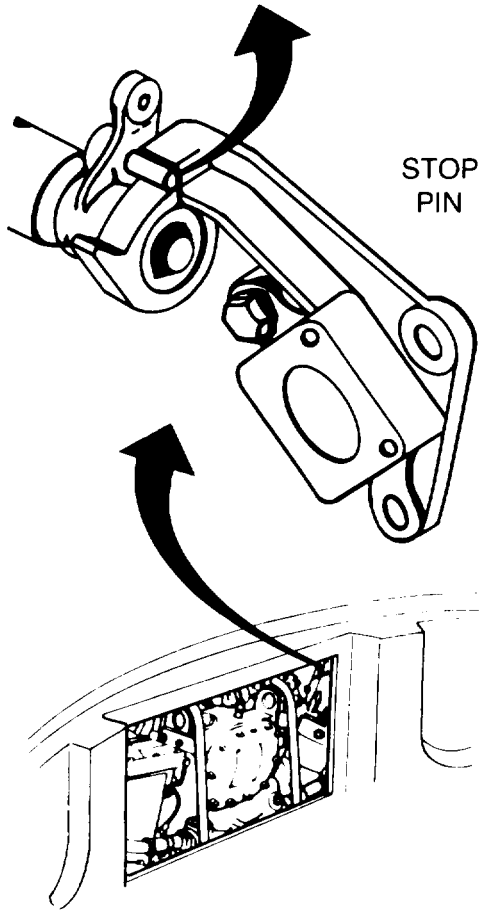
- Press accelerator pedal all the way down and release.

First Technician (Turret)

- Check position of stop pin at idle and at full throttle.

Does stop pin move to specified positions?





39

- **Adjust accelerator linkage to get correct throttle stop pin specifications (page 7-415).**
- **Close rear grille doors (TM 9-2350-222-10).**

NO

40

- **Notify support maintenance of problem with throttle crossover shaft.**
- **Close rear grille doors (TM 9-2350-222-10).**
- **Install upper and lower engine access covers, upper (page 16-40) and lower (page 16-42).**

YES

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP (19)

(41) Check hull front master harness (CKT 54A) at bulkhead electrical disconnect for electrical power (MASTER BATTERY switch OFF).

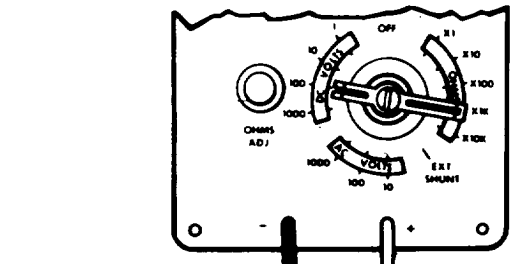
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

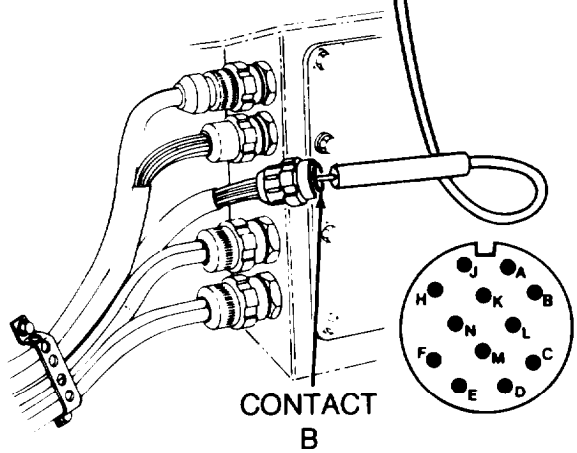
First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front master harness from bulkhead electrical disconnect.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact B (CKT 54A) of hull front master harness connector at bulkhead electrical disconnect and black probe to ground.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



TO VEHICLE GROUND



BULKHEAD ELECTRICAL DISCONNECTS

YES

NO

(42)

- **Check hull front master harness (CKT 54A) at bulkhead electrical disconnect for electrical power (MASTER BATTERY switch ON).**
- **See Step (83) .**

TA141804

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

43 **Check fire extinguisher fuel shutoff switch for continuity (internal short).**

First Technician (Turret)

- Connect hull front harness connector to bulkhead electrical disconnect.
- Install lower engine access panel (page 16-42).

Second Technician (Driver's Station)

- Disconnect both hull front master harness connectors (CKT 975) from fire extinguisher fuel shutoff switch.
- Set multimeter to read OHMS X1 scale and "zero" meter, STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to center contact of disconnected fuel shutoff switch connector and black probe to center contact of other switch connector.
- Check if meter indicates continuity.

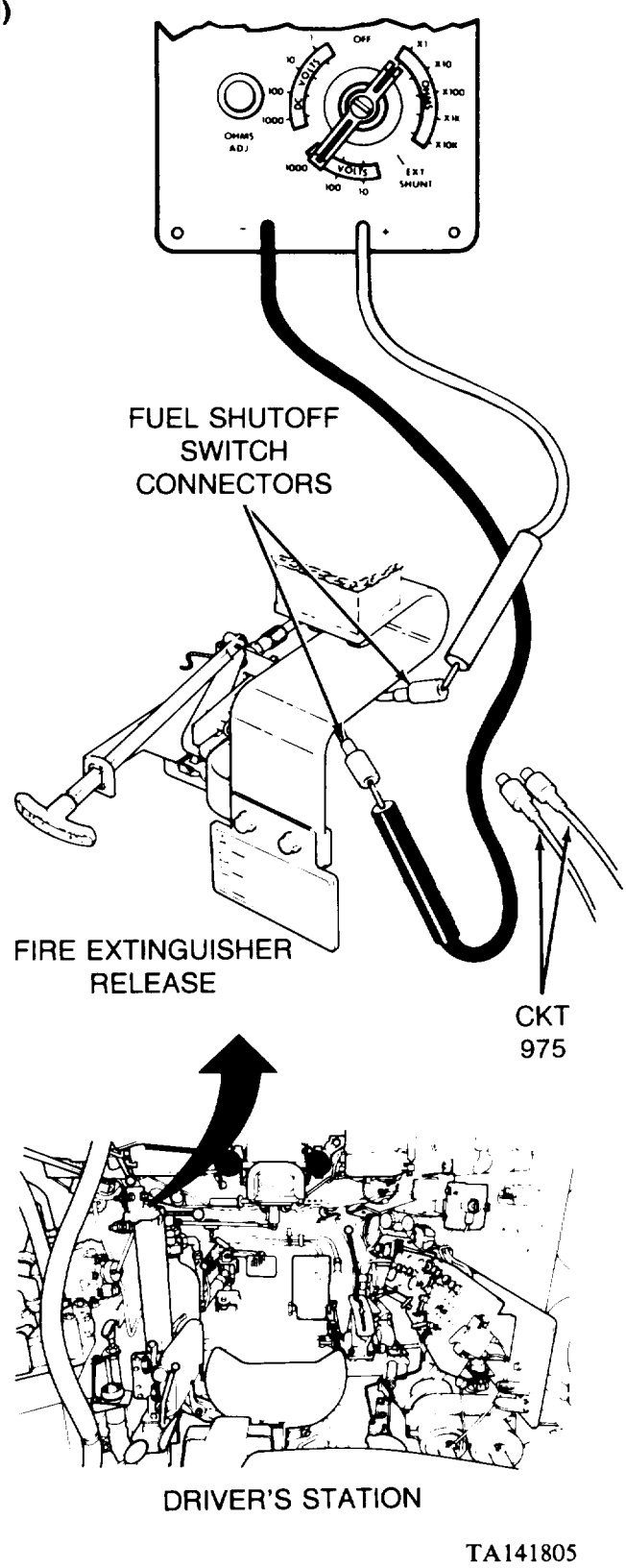
Did meter indicate continuity?

44
- **Replace fire extinguisher and fuel shutoff relay (page 10-177).**
- **Connect hull front master harness connectors (CKT 975) to fire extinguisher fuel shutoff switch.**

NO

45 **Replace fuel shutoff switch (page 10-85).**

YES



TA141805

Symptom-2

FROM STEP (21)

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

(46) Check for free fuel flow from main fuel supply line quick disconnect (located at front of engine).

First Technician (Rear Grille Doors)

- Install quick disconnect and connect fuel line.

First Technician (Turret)

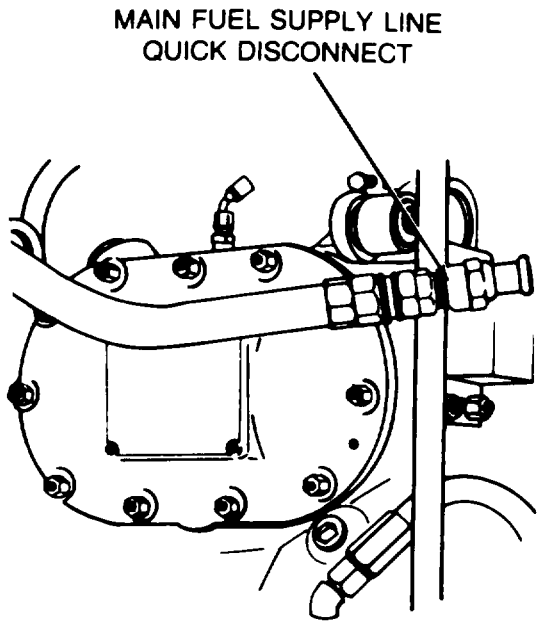
- Disconnect main fuel line quick disconnect.
- Place a suitable container under the line to catch any fuel.
- Push in (and hold) on the center of the female quick disconnect.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for approximately 10 seconds then set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Top Deck)

- Check for free fuel flow from main fuel line quick disconnect.



Did fuel flow freely from main fuel line quick disconnect?

NO

(47)
- **Check for free fuel flow from main fuel supply line with quick disconnect half removed.**

- **See Step (86) .**

YES

(48)
- **Check for free fuel flow to primary filter.**

- **See step (56) .**

Steps (49) thru (55) deleted

All data on pages 4-186 thru 4-188 deleted.

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

51 **Check for free fuel flow from primary fuel filter outlet elbow.**

First Technician (Turret)

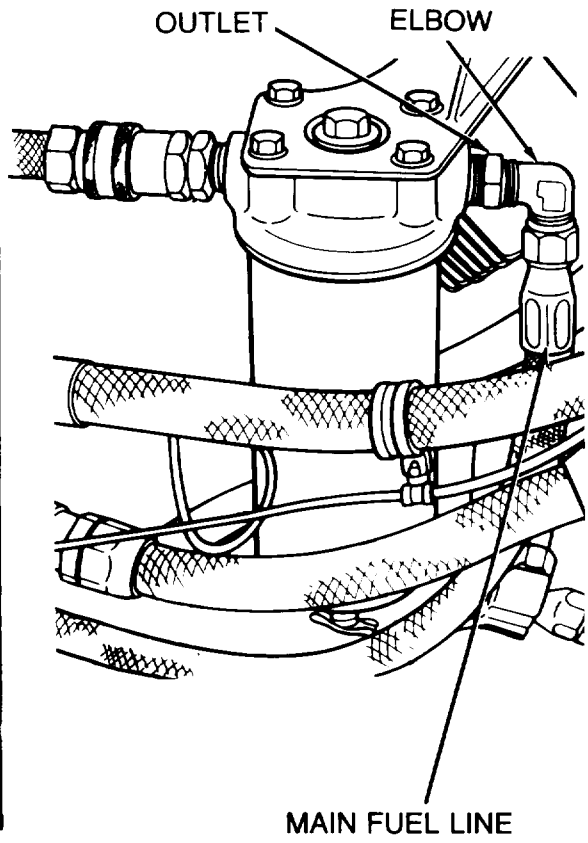
- Connect main fuel line to primary fuel filter inlet.
- Disconnect main fuel line from primary fuel filter outlet elbow (page 7-42).

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for approximately 10 seconds.
- Set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Top Deck)

- Check for free fuel flow from primary fuel outlet elbow.



Did fuel flow freely from elbow at primary fuel filter outlet?

YES

NO

52

- **Check elbow at primary fuel filter for blockage.**
- **See Step (103)**

TA141808

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

53 **Check for free fuel flow to the inlet side of the backflow valve.**

First Technician (Turret)

- Connect main fuel line to primary fuel filter outlet.
- Disconnect main fuel line from backflow valve inlet (page 7-42).
- Place a container or rags under main fuel line to catch any fuel.

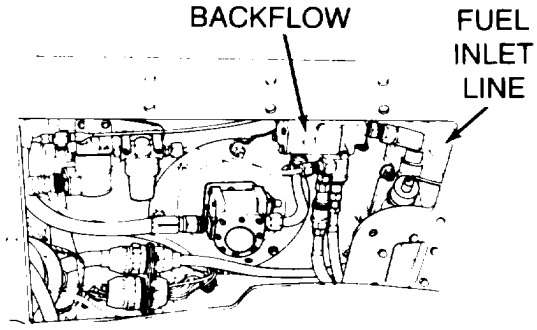
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for approximately 10 seconds then set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Check for free fuel flow from main fuel line.

Did fuel flow freely from main fuel line to the backflow valve?



2A ENGINE SHOWN, LOCATION ON 2D ENGINE SIMILAR

54 **Check for free fuel flow at outlet side of backflow valve.**

YES → **See Step (61) .**

NO →

55

- **Clear line between primary fuel filter and backflow valve by blowing with compressed air.**
- **If this does not work, replace fuel line, 2A engine (page 7-48) or 2D engine (page 7-50).**
- **Connect main fuel line to backflow valve inlet (page 7-45).**

TA141809

Symptom-2
FROM STEP (48)

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

(56) Check for free fuel flow to primary fuel filter.

First Technician (Turret)

- Connect main fuel line quick disconnect.
- Manually traverse turret to gain access to left top deck grille doors.

First Technician (Top Deck)

- Open left top grille doors.
- Loosen bleed valve on primary filter.

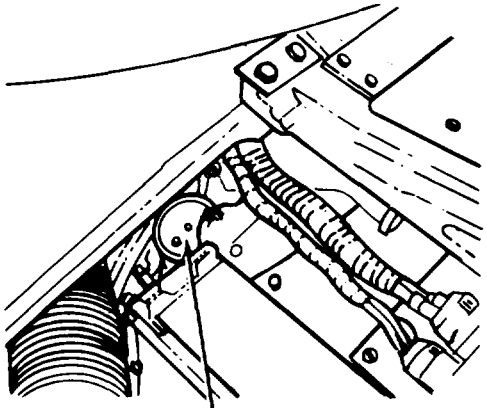
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for a few seconds, then set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Top Deck)

- Check for free fuel flow from primary fuel filter bleed valve.

Did fuel flow freely from primary fuel filter bleed valve?



PRIMARY FUEL FILTER
BLEED VALVE
(VIEW LOOKING DOWN THROUGH LEFT
TOP DECK GRILLE DOORS)

YES

NO

(57)

- **Check for free fuel flow with primary fuel filter element removed.**
- **See Step (100) .**

TA141810

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

58 **Check for free fuel flow to the inlet side of the backflow valve.**

First Technician (Top Deck)

- Close primary fuel filter bleed valve.
- Close top left grille doors.

First Technician (Turret)

- Manually traverse turret to gain access to engine access covers.
- Remove lower engine access cover (page 16-41).
- Disconnect main fuel line from backflow valve inlet (page 7-42).
- Place a container or rags under fuel line to catch any fuel.

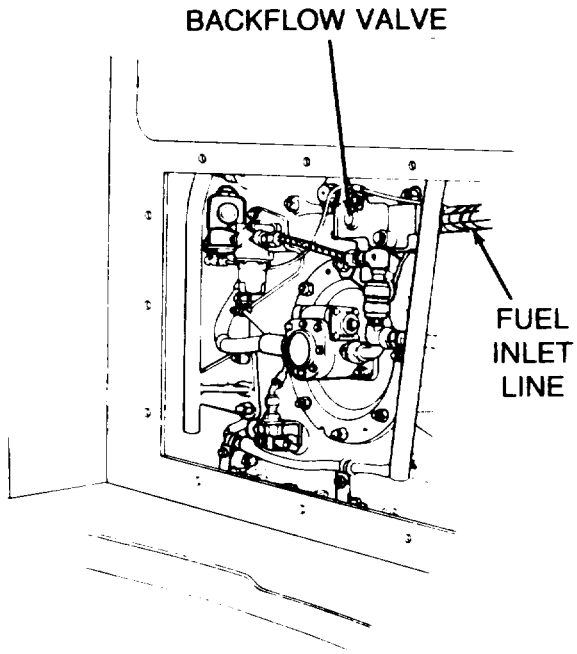
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for approximately 10 seconds then set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Check for free fuel flow from main fuel line.

Did fuel flow freely from main fuel line to the backflow valve?



59

- **Check for free fuel flow at outlet side of backflow valve.**
- **See Step (61).**

YES

NO

60

- **Clear line between primary fuel filter and backflow valve by blowing with compressed air.**
- If this does not work, replace fuel line, (page 7-50).
- **Connect main fuel line to backflow valve inlet (page 7-45).**

Symptom-2

FROM STEPS (54) OR (59)

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

(61) Check for free fuel flow at outlet side of backflow valve.

First Technician (Turret)

- Connect main fuel line from primary fuel filter to backflow valve.
- Disconnect main fuel line at outlet side of backflow valve.
- Place a container or rags under the open fuel line to catch any fuel.

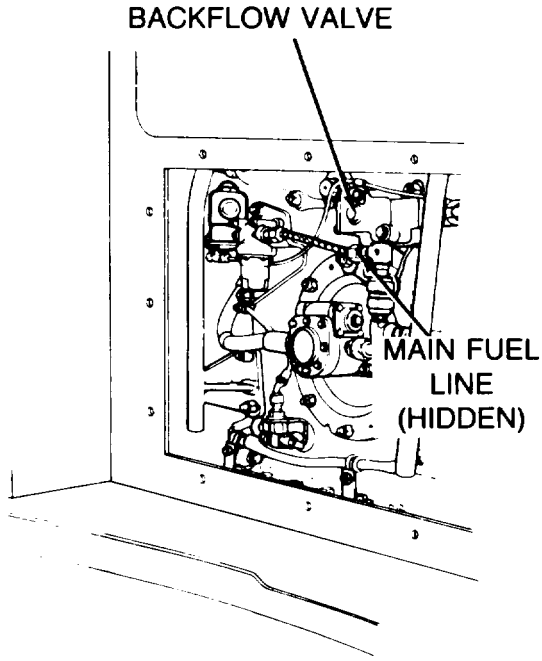
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for approximately 10 seconds then set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Check for free fuel flow from backflow valve.

Did fuel flow freely from outlet side of backflow valve?



YES

NO

(62) Replace backflow valve (page 7-41).

TA141812

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-2

63 **Check main fuel line between backflow valve and engine fuel pump for leaks.**

First Technician (Turret)

- Connect main fuel line to outlet side of backflow valve.

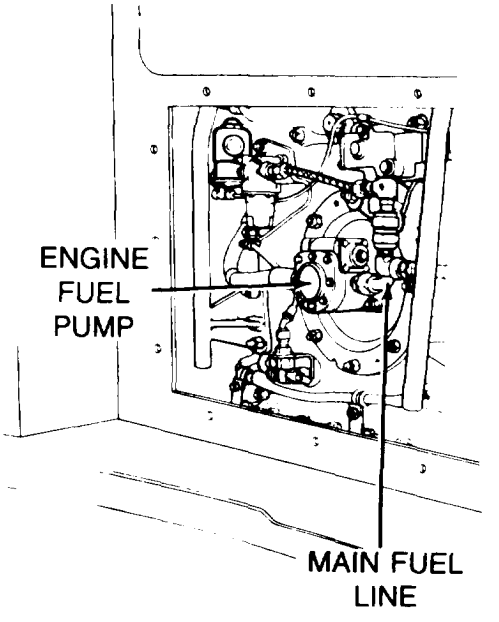
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.

First Technician (Turret)

- Check for leaks in main fuel line to engine fuel pump.

Is main fuel line to engine fuel pump leaking?



NO

YES

64 **Replace line between backflow valve and engine fuel pump (page 7-43).**

TA141813

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

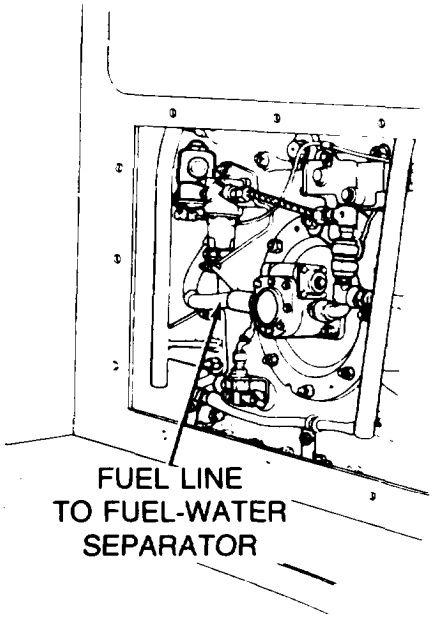
Symptom-2

65 **Check for fuel leaks in fuel line from engine fuel pump to fuel-water separator.**

First Technician (Turret)

- Check flexible hose line from engine fuel pump to fuel-water separator for leaks at fittings and hose.

Is fuel line between fuel-water separator and engine fuel pump leaking?



NO

YES

66

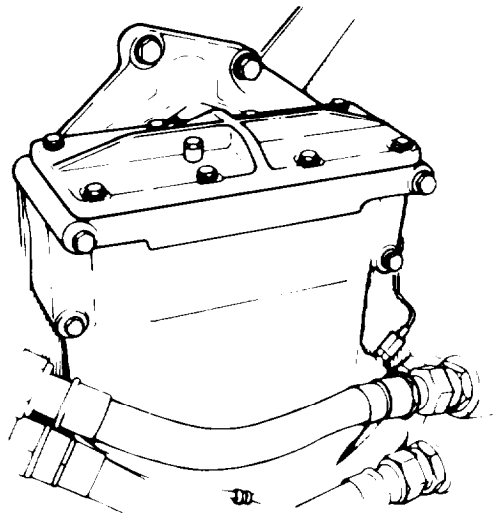
- **Tighten fitting.**
- **If this does not stop leaks replace fuel line (page 7-299).**

TA141814

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-2

FUEL-WATER SEPARATOR



67 **Check for fuel leaks at fuel-water separator.**

First Technician (Turret)

- Check fuel-water separator for cracks and fuel leaks at cover and line connections.

Does fuel-water separator leak?

NO

YES

68

- **Tighten leaking fittings.**
- **If the fuel-water separator is cracked, replace (page 7-314).**

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

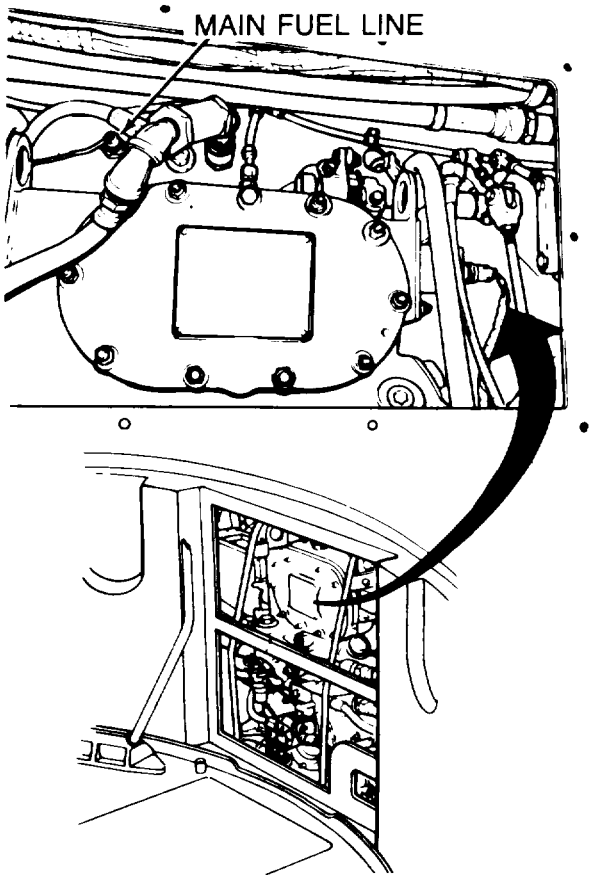
Symptom-2

69 **Check fuel line between fuel-water separator and engine shroud for leaks.**

First Technician (Turret)

- Check flexible hose line between fuel-water separator and front shroud on engine for leaks at connections and in the line.

Is fuel line leaking?



NO

YES

70

- **Tighten leaking fittings.**
- **If line is leaking, replace (page 7-296).**

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

71 Check main fuel line from front of engine to fuel injector pump for leaks.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set FUEL PUMPS switch OFF.

First Technician (Rear of Vehicle)

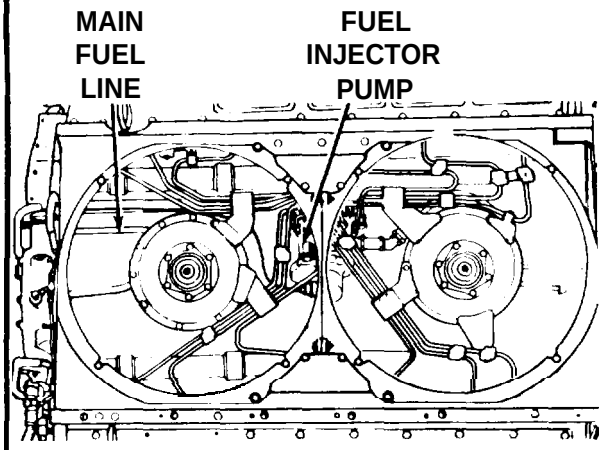
- Remove top deck (page 16-21).
- Remove engine cooling fans (page 9-48).

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.

First Technician (Top of Engine)

- Check for leaks in main fuel line from front of engine to fuel injection pump.



VIEW FROM LEFT SIDE OF VEHICLE

IS main fuel line leaking?

NO

YES

72
- Replace main fuel line from front of engine to fuel injection pump (page 7-32).
- Install cooling fan (page 9-49).
- Install top deck (page 16-23).

TA141817

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

73 **Check main fuel return line from fuel injector pump. to back of engine for leaks.**

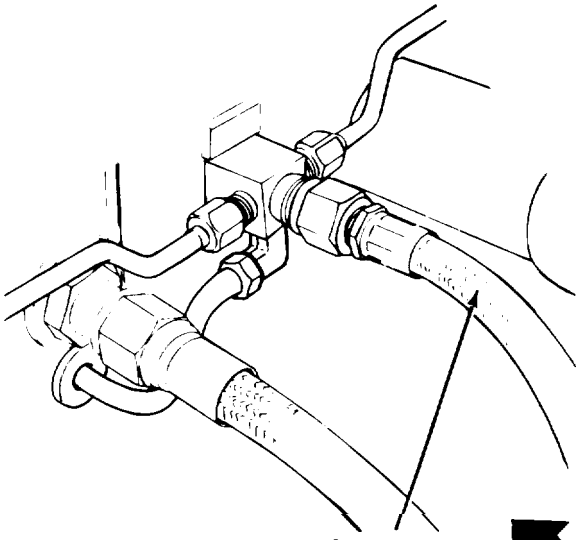
First Technician (Top Deck)

- **Inspect main fuei return line between fuel injector pump and rear shroud for leaks.**

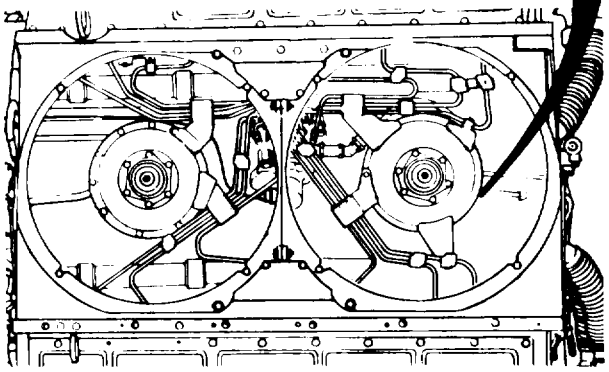
Second Technician (Driver's Station)

- **After ieak check is complete, set MASTER BATTERY switch OFF.**

is main fuel return line leaking?



MAiN FUEL RETURN LINE



VIEW FROM LEFT SiDE OF VEHiCLE

YES

74
- Replace main fuel return line between fuel injector pump and rear shroud on engine, (page 7-22).
- **install engine cooling fans (page 9-49).**
- **Install top deck (page 16-23).**

NO

75
- **Check main fuel return iine from engine shroud to quick disconnect for leaks.**

- **See Step (106) .**

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 34

76 **Check for binding in linkage between accelerator crossover rod assembly and engine compartment bulkhead.**

Second Technician (Driver's Station)

- Connect tube to lever on crossover rod assembly.

First Technician (Turret)

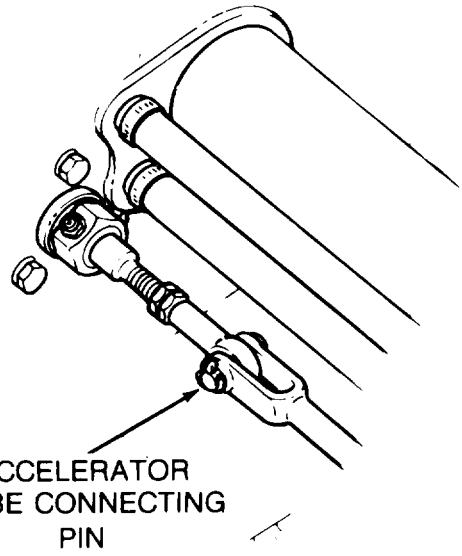
- Manually traverse turret to gain access to accelerator linkage at bulkhead.
- Remove pin connecting accelerator tubes at bulkhead.
- Support tube to keep it free when accelerator pedal is pressed.

Second Technician (Driver's Station)

- Press accelerator pedal down and release.

Does accelerator pedal move freely without binding?

UNDER TURRET PLATFORM



YES

NO

77 **Replace accelerator lever assembly (page 7-435).**

TA141819

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-2

78 **Check for binding in flange at engine compartment bulkhead.**

First Technician (Turret)

- Install pin connecting accelerator tubes at bulkhead.

Second Technician (Driver's Station)

- Lock accelerator pedal in full down position.

First Technician (Turret)

- Remove nuts holding flange to bulkhead (page 7-451).
- Slide flange forward on accelerator tube.

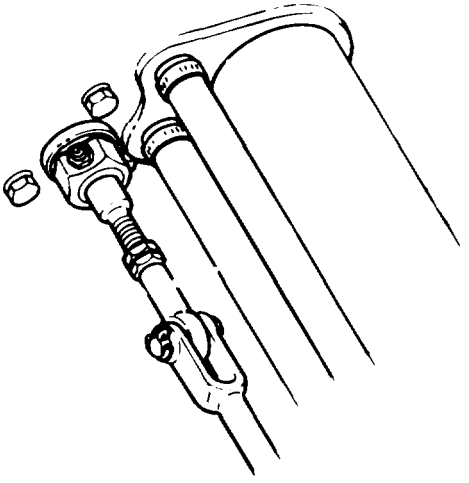
Does flange move freely on the tube after it is out of the bulkhead?

YES

NO

79 **Repair flange (page 7-455).**

FLANGE



TA141820

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

80 **Check for binding in accelerator linkage between bulkhead and engine.**

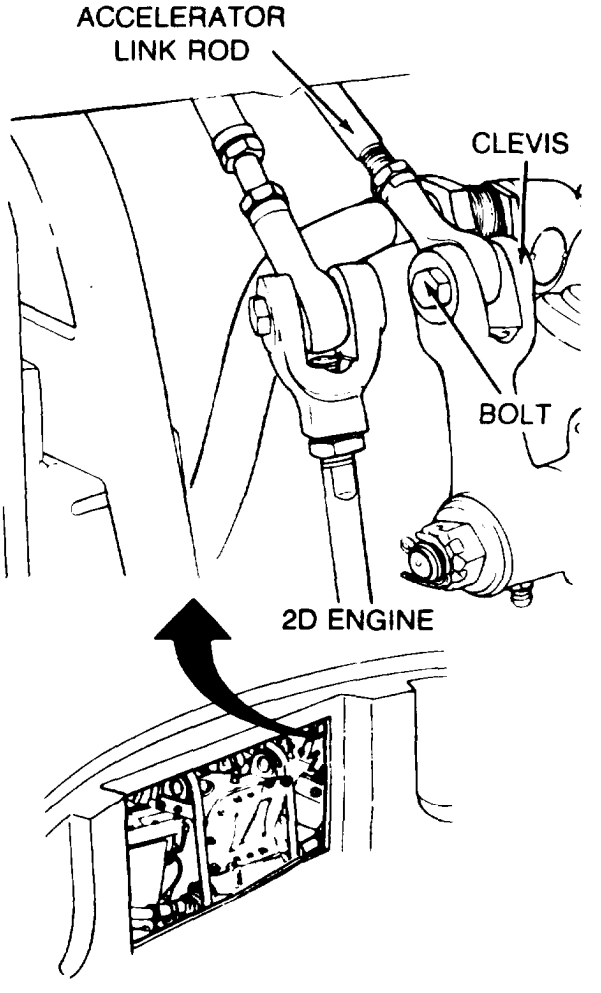
First Technician (Turret)

- Install flange (page 7-453).
- Manually traverse turret to gain access to engine access covers.
- Remove upper engine access cover (page 16-40).
- Disconnect accelerator link rod by removing bolt from clevis.

Second Technician (Driver's Station)

- Press and release accelerator pedal.

Does accelerator pedal move freely without binding?



NO

81
- **Notify support maintenance of accelerator linkage problem between bulkhead floor and engine.**
- **Connect link rod between accelerator lever and engine crossover assembly.**
- **Install upper engine access cover (page 16-40).**

YES

82
- **Notify support maintenance of accelerator linkage problem on engine.**
- **Connect link rod between accelerator lever and engine crossover assembly.**
- **Install upper engine access cover (page 16-40).**

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 42

83 **Check hull front master harness (CKT 54A) at bulkhead electrical disconnect for electrical power (MASTER BATTERY switch ON).**

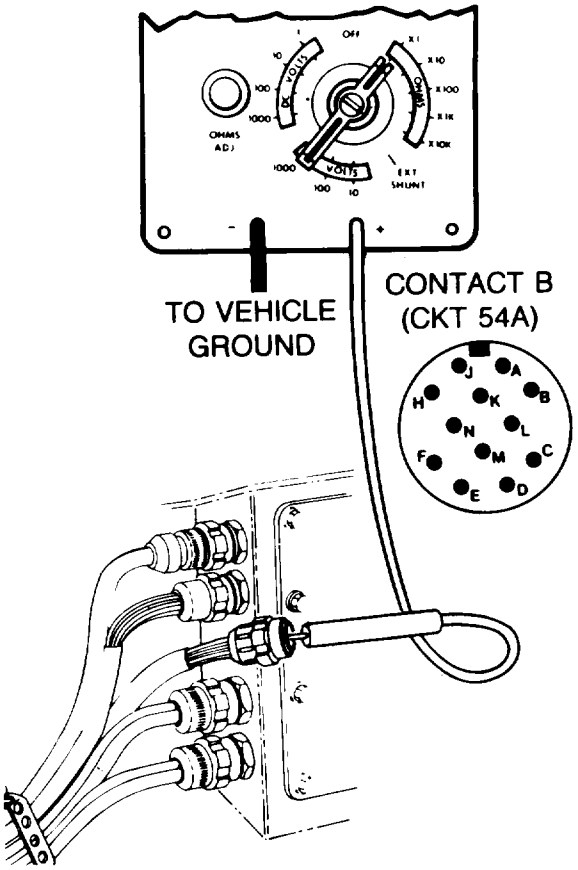
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Turret)

- Connect red probe of meter to contact B (CKT 54A) of hull front master harness connector at bulkhead electrical disconnect and black probe to ground.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



NO

84

- **Notify support maintenance of inoperative fuel shutoff solenoid.**
- **Install engine upper access cover (page 16-40).**
- **Connect hull front master harness connector at bulkhead electrical disconnect.**

YES

85

- **Replace fuel shutoff switch (page 10-61).**
- **Install engine upper access cover (page 16-40).**
- **Connect hull front master harness connector at bulkhead electrical disconnect.**

TA141822

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 47

86 Check for free fuel flow from main fuel supply line with quick disconnect removed.

First Technician (Turret)

- Remove female quick disconnect half from flexible line.
- Place a container or rags under open line to catch any fuel.

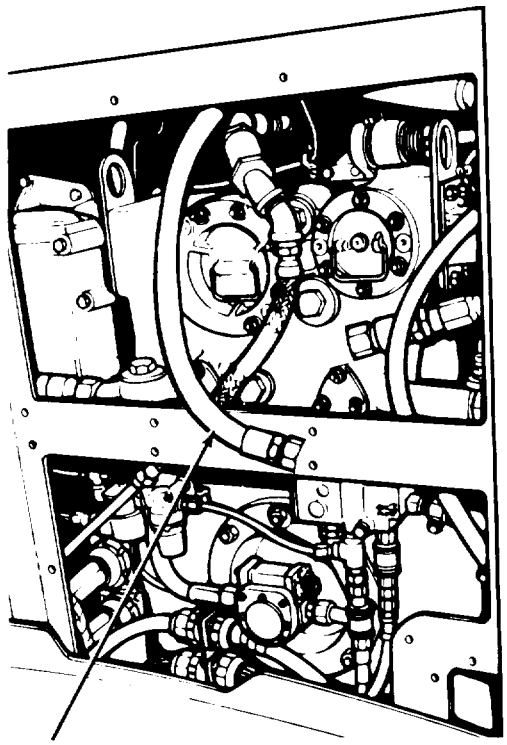
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for approximately 10 seconds, then set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Check for free fuel flow from main fuel supply line.

Does fuel flow freely from flexible line?



MAIN FUEL SUPPLY LINE

NO

YES

87 Replace quick disconnect (page 7-197).

TA141823

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-2

88 **Check for free fuel flow from tee on main fuel supply line in engine compartment.**

First Technician (Turret)

- Install quick disconnect half to flexible line.
- Remove powerplant (page 5-1).

First Technician (Engine Compartment)

- Disconnect main fuel line flexible hose from tee above engine access doors.
- Place a container or rags under open fitting to catch any fuel.

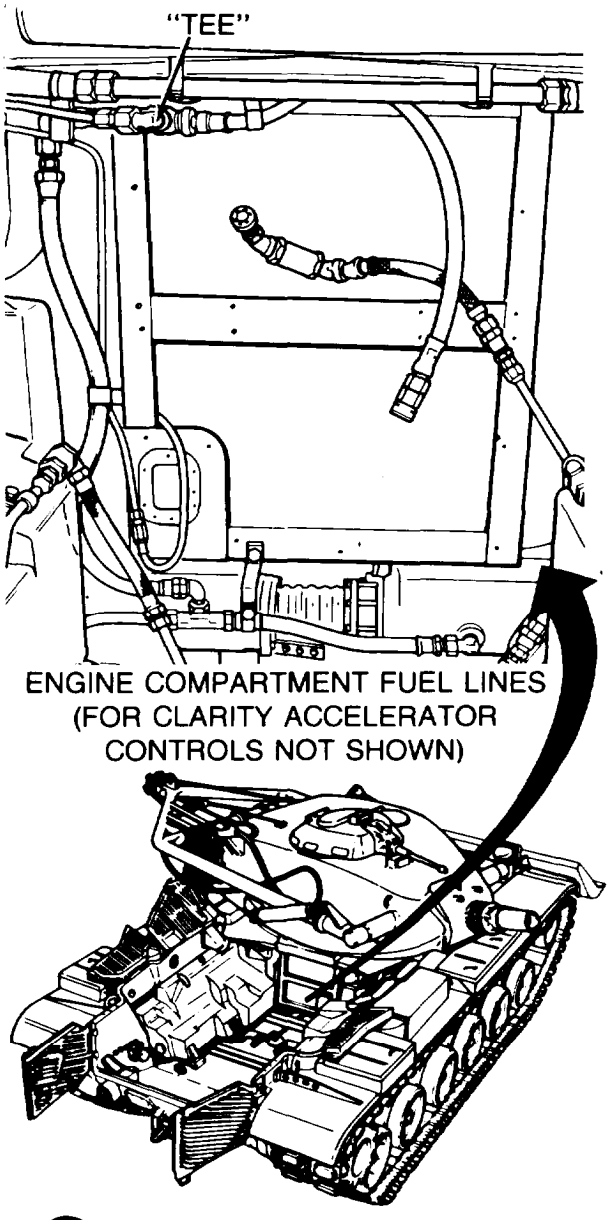
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for a few seconds, then set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Check for free fuel flow from tee on main fuel supply line.

Did fuel flow freely from tee of main fuel supply line?



ENGINE COMPARTMENT FUEL LINES
(FOR CLARITY ACCELERATOR
CONTROLS NOT SHOWN)

NO

89 **See step (94).**

YES

90
- **Clear clogged main fuel line by blowing through it with compressed air.**
- **Reinstall main fuel line.**
- **If this does not work, replace flexible line (page 7-197).**

Steps (91) thru (93) deleted.

All data on page 4-204 deleted.

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

94 **Check for free fuel flow from main fuel line at elbow, upper left side of engine access opening.**

First Technician (Engine Compartment)

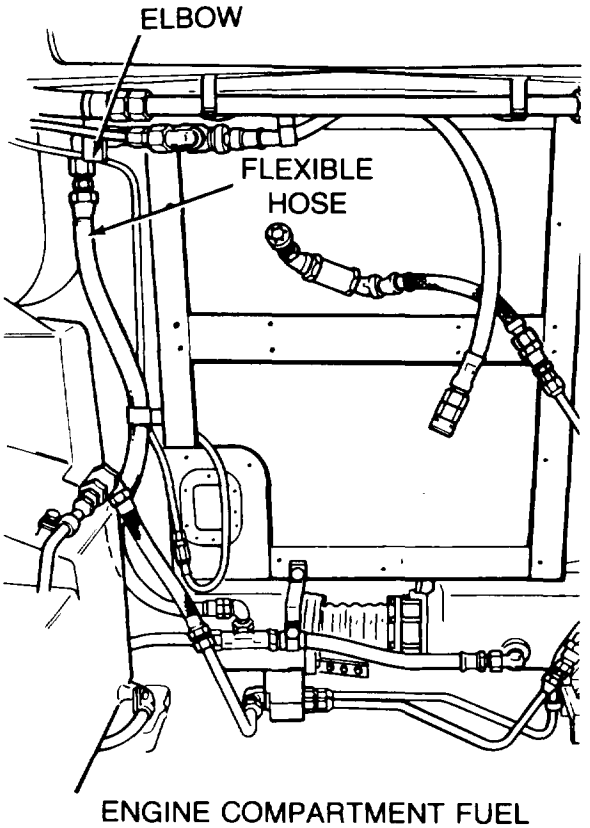
- Connect main fuel line flexible hose to tee.
- Disconnect main fuel line flexible hose from elbow on upper left side of engine access opening.
- Place a suitable container under hose to catch any fuel.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for a few seconds, then set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Engine Compartment)

- Check for free fuel flow from tee on main fuel supply line.



ENGINE COMPARTMENT FUEL LINES (FOR CLARITY, ACCELERATOR CONTROLS NOT SHOWN)

Did fuel flow freely from tee of main fuel supply line?

NO

95

- **Check for free fuel flow at swing check valve in engine compartment.**
- **See Step (97)**

YES

96

- **Clear clogged fittings above access door by blowing with compressed air (page 7-197).**
- **If clogs cannot be cleared or fittings are damaged, replace (page 7-197).**

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 95

97 Check for free fuel flow at swing check valve in engine compartment.

First Technician (Engine Compartment)

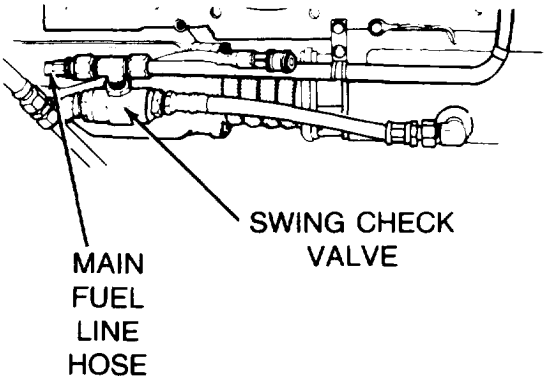
- Install main fuel line between flexible hose and tee.
- Disconnect main fuel line at swing check valve.
- Place a container or rags under fuel line to catch any fuel.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for approximately 10 seconds, then set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Engine Compartment)

- Check for free fuel flow from swing check valve.



Did fuel flow freely from swing check valve?

YES

98
- **Clear main fuel line between swing check valve and tee fitting by blowing with compressed air.**
- **Reinstall main fuel line.**
- **If this does not work, replace main fuel line (page 7-197).**

NO

99 Replace swing check valve (page 7-235).

Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP (57)

(100) Check for free flow with primary fuel filter, element removed.

First Technician (Top Deck)

- Install quick disconnect on fuel line to primary fuel filter.

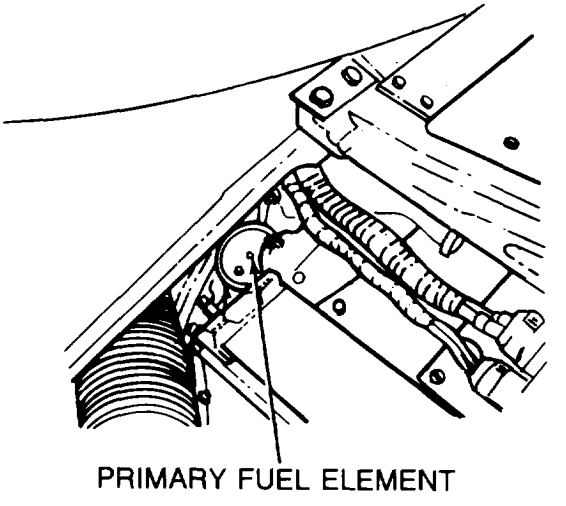
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON for approximately 10 seconds, then set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Top Deck)

- Check for fuel flowing into primary fuel filter.

Did fuel flow into primary fuel filter with element removed?



NO

(101)

- **Clear flexible line to primary fuel filter by blowing with compressed air.**
- **If this does not work, replace flexible line (page 7-197).**

YES

(102) Replace primary fuel filter element, (page 7-332).

Symptom-2 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 52

103 **Check elbow and adapter at primary fuel filter for blockage.**

First Technician (Turret)

- Remove elbow and adapter from primary fuel filter.
- Check elbow and adapter for blockage by blowing with compressed air.

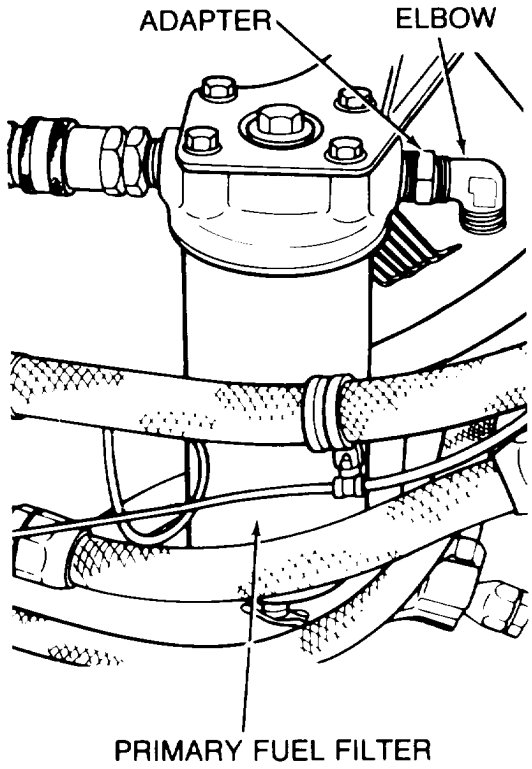
Is elbow and/or adapter blocked?

104
- **Clear blockage by running wire through elbow and/or adapter.**
- **If blockage cannot be cleared, replace elbow and/or adapter.**

YES

105 **Replace primary filter element, (page 7-288).**

NO



Symptom-2

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP

75

106 **Check main fuel return line from engine shroud to quick disconnect for leaks.**

First Technician (Rear Grille Doors)

- Check main fuel return line from engine shroud to quick disconnect for leaks.

Second Technician (Driver's Station)

- After leak check is complete, set MASTER BATTERY switch off.

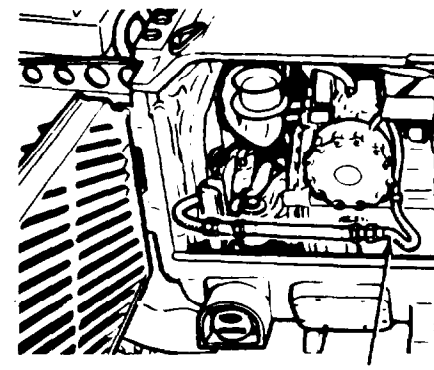
Is main fuel return line leaking?

YES

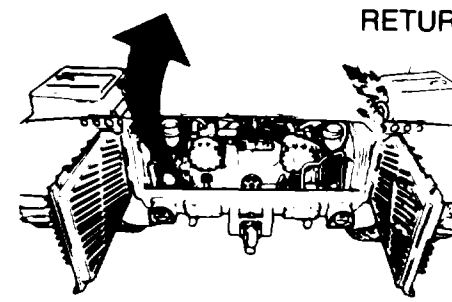
107 **Replace main fuel line between engine shroud and quick disconnect.**

NO

108
- **Notify support maintenance engine cranks but will not start.**
- **Install engine cooling fans (page 9-49).**
- **Install top deck (page 16-23).**
- **Install transmission shroud (page 9-23).**



MAIN FUEL RETURN LINE



REAR OF ENGINE (TRANSMISSION SHROUD REMOVED)

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-3

ENGINE CRANKS SLOWLY AND WILL NOT START.

NOTE

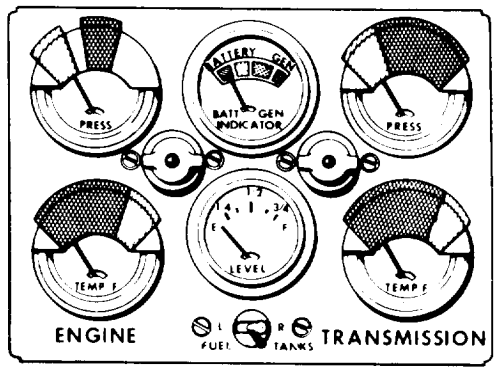
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 **Check BATT GEN INDICATOR gage for above mid-yellow indication.**

First Technician (Driver's Station)

- Visually check if BATT GEN INDICATOR gage indicates above mid-yellow.

Does BATT GEN INDICATOR gage indicate above mid-yellow.



YES

1.1

- **Vehicles with starter relay, go to step 5.**
- **Vehicles without starter relay, go to step 9.**

NO

2

- **Service batteries (page 3-41).**
- **Charge batteries (TM 9-6140-200-14).**
- **If STE/ICE is available, perform test No. 77/79: Battery Condition (page 4-83).**

TA253070

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-3

NOTE

If outside air temperature is above 40°, go to Step (5).

WARNING

Do not touch manifold preheaters with bare hands.

(3) Check manifold preheaters for heat.

First Technician (Turret)

- Manually traverse turret to gain access to top grille doors (TM 9-2350-222-10).

First Technician (Top Deck)

- Open left and right top deck grille doors.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMP switch ON.
- At the same time, press STARTER switch, preheat switch and operate primer pump. Do not hold switches on for more than 14 seconds.

First Technician (Top Deck)

- Reach through grille door opening and feel for heat from manifold preheater (left and right side).
- Check if heat comes from both manifold preheaters.

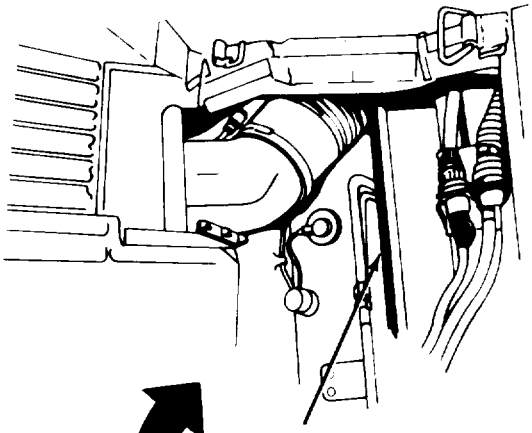
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

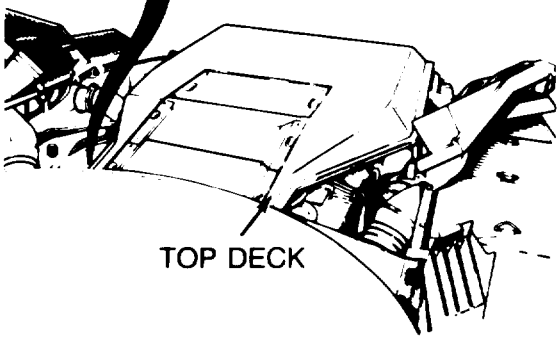
Does heat come from both manifold preheaters?

YES | **NO**

VIEW THROUGH LEFT GRILLE DOORS



ACCESS TO MANIFOLD HEATER



TOP DECK

(4)

- **If both preheaters are cold, see Symptom 9: BOTH INTAKE MANIFOLD PREHEATERS WILL NOT WORK.**
- **If only one preheater is cold, see Symptom 8: ONE INTAKE MANIFOLD PREHEATER WILL NOT WORK.**

TA141832

Symptom-3

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

NOTE
If STE/ICE is available, perform Test No. 74, Starter Circuit Resistance (page 4-80) before doing Step (5).

5 **Check slave receptacle and relay cable CKT 81 for loose wires and bent, broken or corroded connector contacts.**

Second Technician (Driver's Station)

- Disconnect three battery ground cables from floor plate behind driver's seat (page 10- 283).

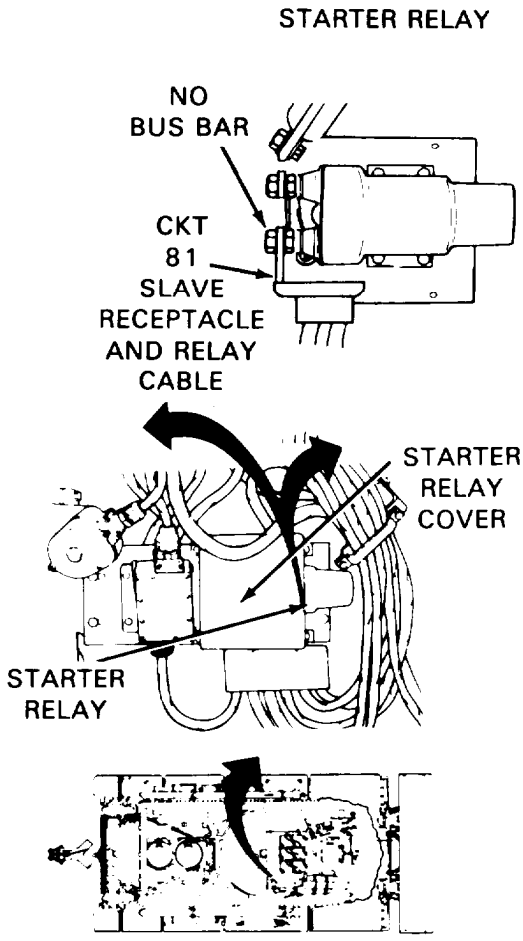
First Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Traverse turret to gain access to starter relay.
- Remove cover from starter relay (page 10-173).
- Check slave receptacle and relay cable (CKT 81) connector for loose, corroded or damaged wires and/or contacts.

Does connector have loose, corroded or damaged wires and/or contacts?

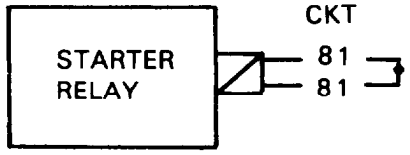
NO

YES



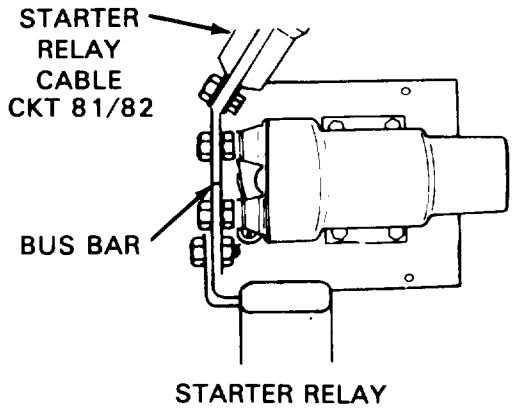
FOR CLARITY TURRET NOT SHOWN

6
- **Inspect slave receptacle and relay cable for bent/broken connector contacts or loose wire (CKT 81) at rear of connectors.**
- **Repair defective connectors (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad slave receptacle and relay cable.**



DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-3



7 **Check starter relay cable (CKT 81/82) for loose wires and bent, broken or corroded connector contacts.**

First Technician (Turret)

- Check starter relay cable (CKT 81/82) for loose wires and bent, broken or corroded connector contacts.

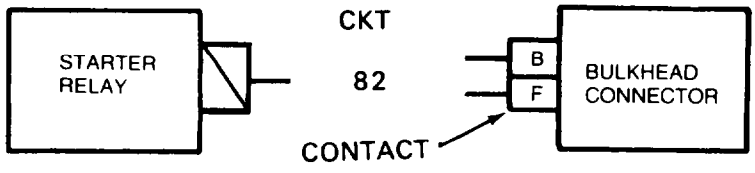
Does connector have loose, corroded, or damaged wires and/or contacts?

NO

YES

8

- **Inspect starter relay cable for bent/broken connector contacts or loose (CKT 81/82) wire at rear of connectors.**
- **Repair defective connectors (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad front starter relay cable.**



Symptom-3

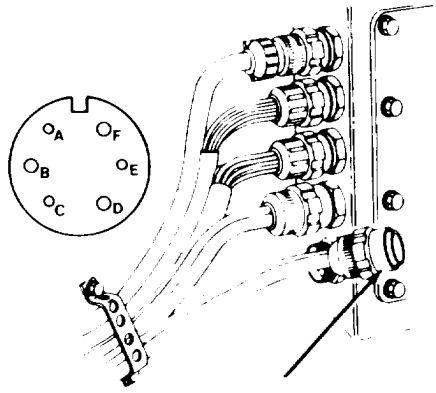
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

9 Check starter relay cable (CKT 81/82) at bulkhead electrical connector for loose wires, and bent, broken or corroded connector contacts.

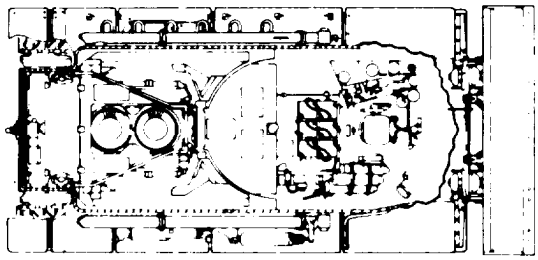
First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect starter relay cable (CKT 81/82) connector from bulkhead electrical disconnect.
- Check battery starter relay cable, connector, contacts B and F, for loose, corroded or damaged wire and/or contacts.

Does connector have loose, corroded or damaged wires and/or contacts?



STARTER RELAY CABLE CKT 81/82 CONTACTS B AND F



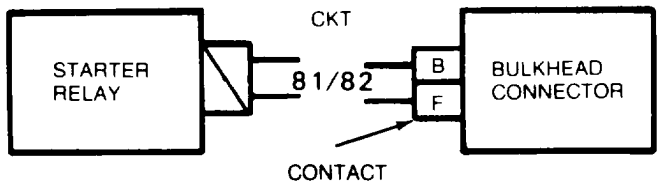
FOR CLARITY TURRET NOT SHOWN

NO

YES

10

- **Inspect starter relay cable for bent/broken connector contacts or loose (CKT 81/82) wire at rear of connectors.**
- **Repair defective connectors (page 10-307).**
- **If connectors are not defective notify support maintenance of bad starter relay cable. Connect starter relay cable to bulkhead connector.**



TA253073

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

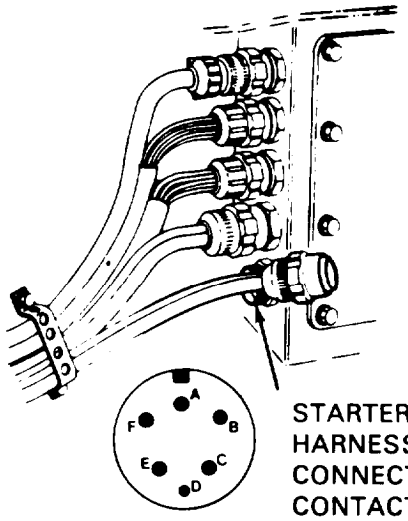
Symptom-3

11 **Check starter (feed) harness (CKT 81/82) bulkhead connector for loose wires and bent, broken or corroded connector contacts.**

First Technician (Turret)

- Check starter (feed) harness (CKT 81/82) bulkhead connector, contacts B and F, for loose wires and bent broken or corroded connector contacts.

Does connector have loose, corroded or damaged wires and/or contacts?



STARTER (FEED) HARNESS CONNECTOR CONTACTS B and F (CKT 81/82)

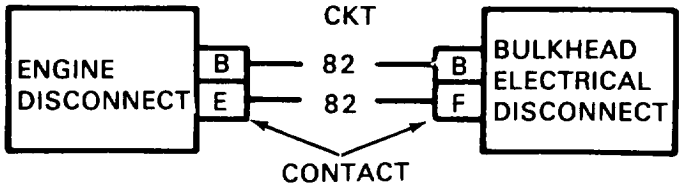
NO

12 **See Step (14).**

YES

13

- **Inspect starter (feed) harness for bent/broken connector contacts or loose (CKT 81/82) wire at rear of connectors.**
- **Repair defective connectors (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad starter (feed) harness.**
- **Connect starter relay harness to bulkhead electrical connector.**



Steps (27) thru (39) deleted

Symptom-3

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 13

14 Check starter feed harness (CKT 81) connector at engine disconnect for loose wires and bent, broken or corroded connector contacts.

First Technician (Turret)

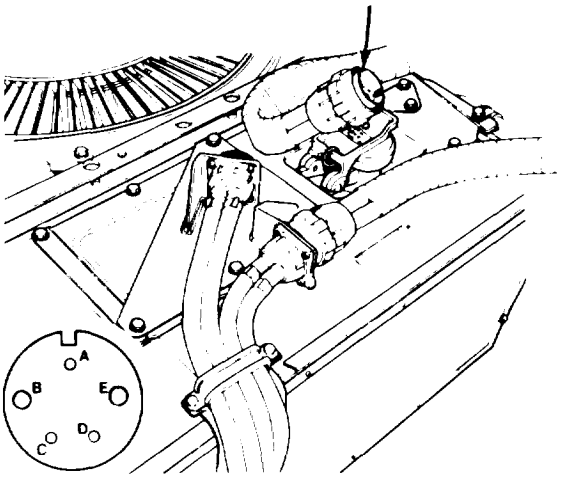
- Connect starter relay cable to bulkhead electrical disconnect.
- Manually traverse turret to gain access to right top deck grille doors.

First Technician (Top Deck)

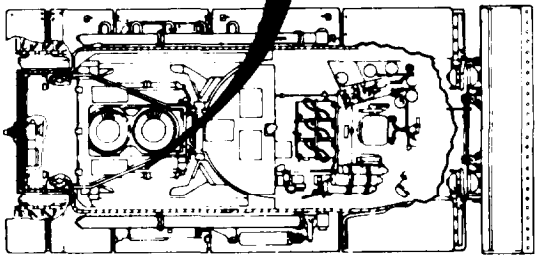
- Open right top deck grille doors.
- Disconnect starter feed harness connector (CKT 81) from engine disconnect.
- Check starter feed harness connector, contacts B and E for loose, corroded or damaged wires and/or contacts.

Does connector have loose, corroded or damaged wires and/or contacts?

STARTER FEED HARNESS CONNECTOR



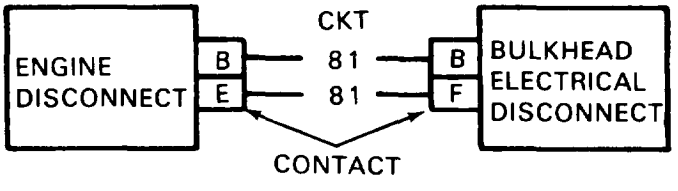
CONTACTS B AND E (CKT 81)



NO

YES

15 • Repair defective connectors (page 10-307).



TA253075

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

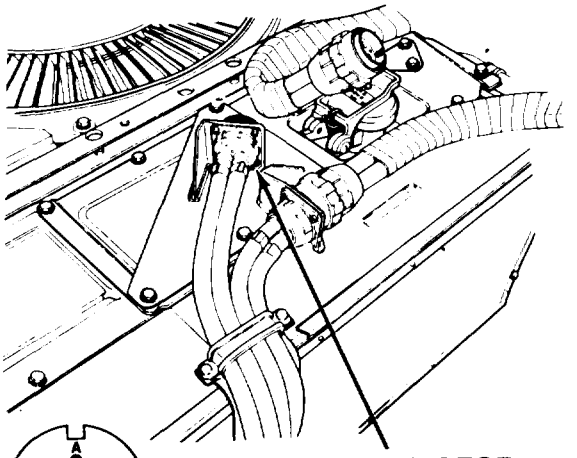
Symptom-3

16 **Check starter motor harness (CKT 81) connector at engine disconnect for loose, corroded or damaged wires and/or connectors.**

First Technician (Top Deck)

- Check starter motor harness (CKT 81) connector, contacts B and E, at engine disconnect for loose corroded or damaged wires and/or contacts.

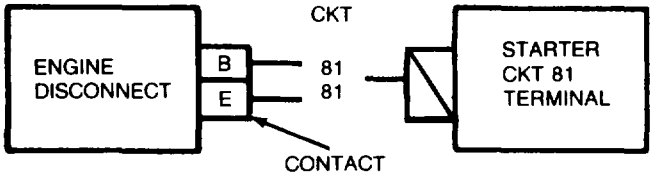
Does connector have loose, corroded or damaged wires and/or loose contacts?



NO

YES

17 **Repair starter motor harness (page 10-307).**



TA141838

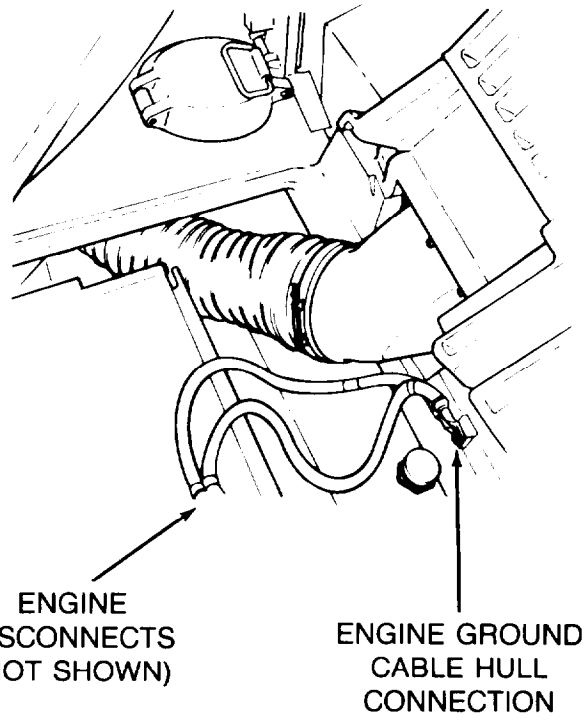
Symptom-3 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

18 **Check engine ground cable (CKT GND) for loose, corroded or damaged wires and/or terminals at hull connection.**

First Technician (Top Deck)

- Connect starter feed harness to engine disconnect.
- Check engine ground cable (CKT GND) for loose, corroded or damaged wires and/or terminals at hull connection.

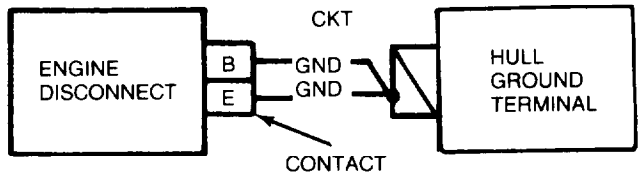
Does cable have loose, corroded or damaged wires and/or terminals at hull connection?



NO

YES

19 **Replace engine ground cable (page 10-391).**



TA141839

Symptom-3

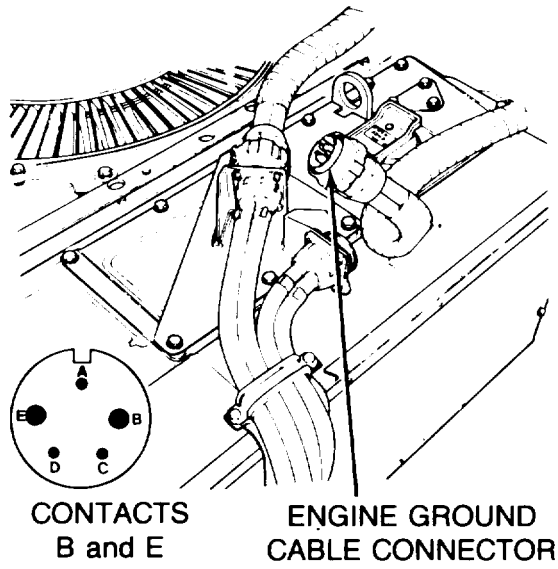
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

20 **Check engine ground cable (CKT GND) connector at engine disconnect for loose, corroded or damaged wires and/or contacts.**

First Technician (Top Deck)

- Connect starter feed harness to engine disconnect.
- Disconnect engine ground cable connector (CKT GND) from engine disconnect.
- Check engine ground cable (CKT GND) connector, contacts B and E, for loose, corroded or damaged wires and/or contacts.

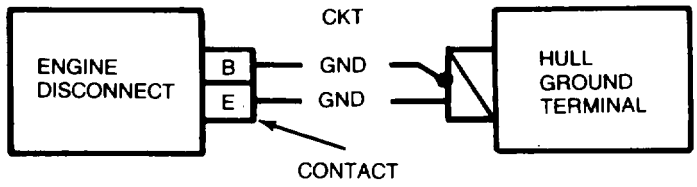
Does connector have loose, corroded or damaged wires and/or contacts?



NO

YES

21 **Repair engine ground cable (page 10-307).**



TA141840

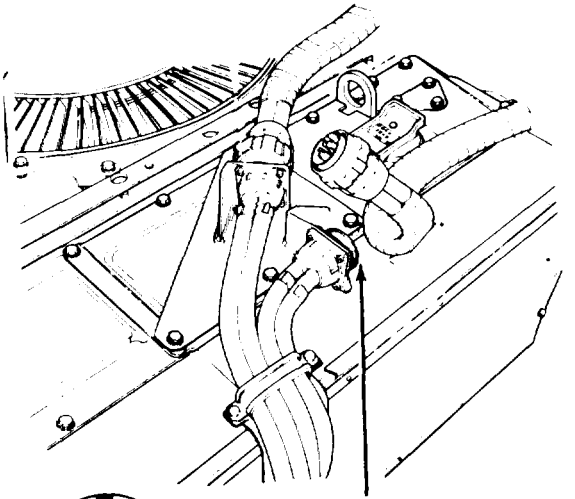
Symptom-3 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

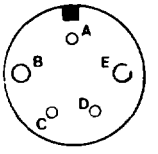
22 **Check starter ground harness (CKT GND) connector at engine disconnect for loose corroded or damaged wires and/or contacts.**

First Technician (Top Deck)

- Check starter ground harness (CKT GND) connector, contacts B and E, at engine disconnect for loose corroded or damaged wires and/or contacts.

Does connector have loose, corroded or damaged wires and/or contacts?



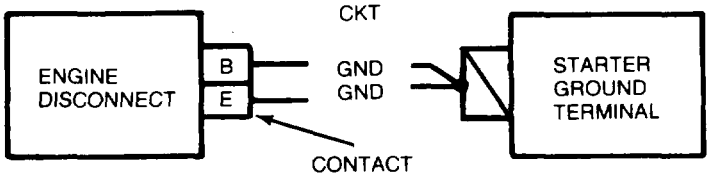


CONTACTS
B and E

NO

YES

23 **Repair starter ground harness (page 10-307).**



TA141841

Symptom-3

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

24 **Check starter motor harness (CKT 81) at starter solenoid terminals for loose wires and bent, broken or corroded connector contacts.**

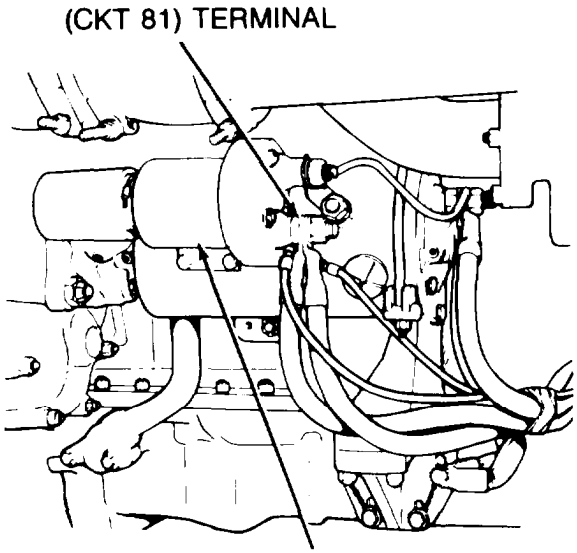
First Technician (Top Deck)

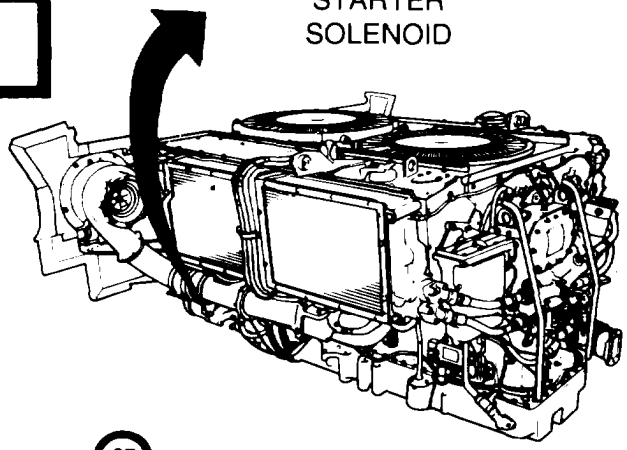
- Remove powerplant (page 5-1).

First Technician (Left Side of Powerplant)

- Check starter motor harness (CKT 81) at starter solenoid terminal for loose, corroded or damaged wires and/or terminal connectors.

Does harness have loose, corroded or damaged wires and/or terminal connectors?



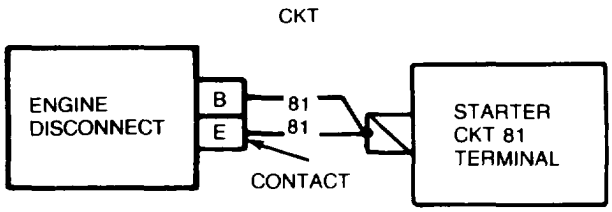


NO

25
- **Check strap between starter solenoid and starter for loose connections and connections and corrosions.**
- **See Step 40**

YES

26 **Repair starter motor harness (page 10-307).**



TA141842

Symptom-3

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

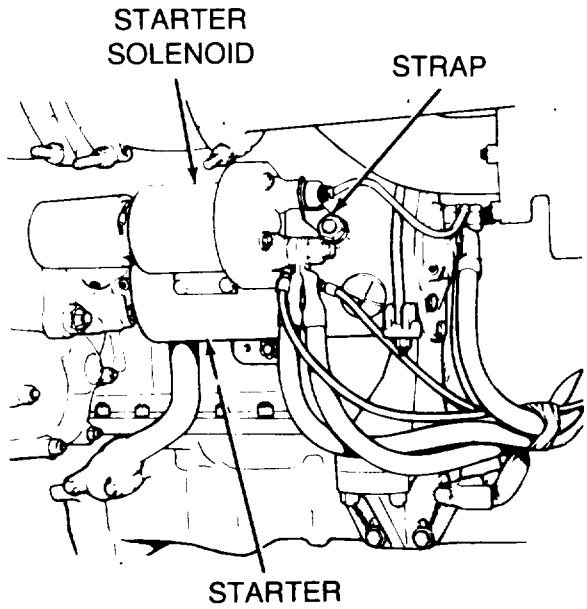
FROM STEP 25

40 **Check strap between starter solenoid and starter for loose connections and corrosion.**

First Technician (Left Side of Powerplant)

- Check strap between starter solenoid and starter for loose connections and corrosion.

Does strap have loose connections or corrosion?



NO

YES

41 **Clean and tighten strap.**

■ All data on pages 4-222 thru 4-227 deleted.

Symptom-3

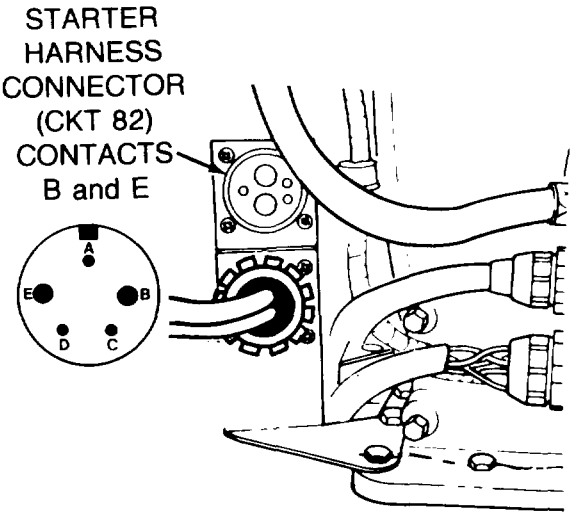
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

29 **Check starter harness (CKT 82) for loose wires and bent, broken or corroded connector contacts at engine disconnect.**

First Technician (Turret)

- Check starter harness (CKT 82) connector, contacts B and E, at engine disconnect for loose corroded or damaged wires and/or contacts.

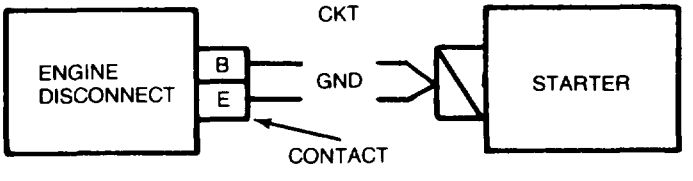
Does connector have loose, corroded or damaged wires and/or contacts?



NO

YES

30 **Repair starter harness (page 10-307).**



TA141844

Symptom-3

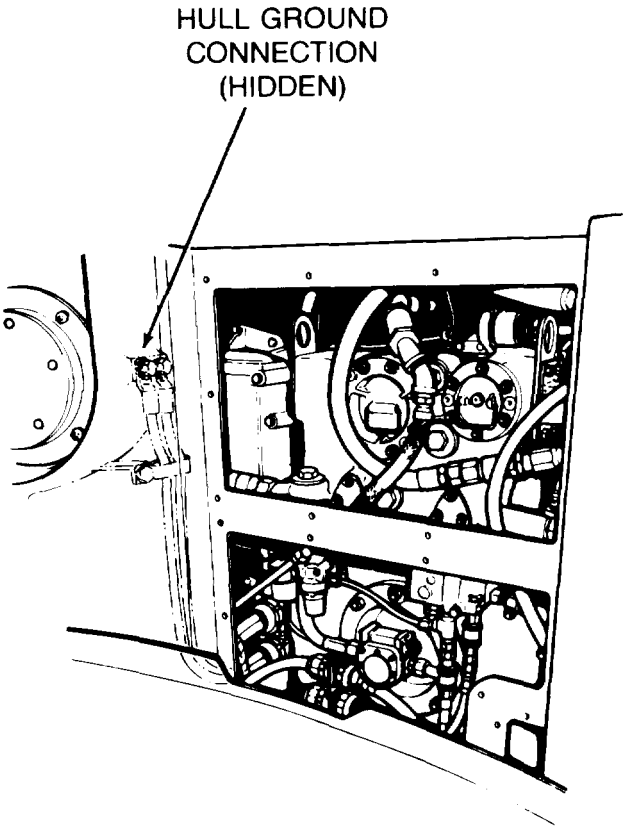
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

31 **Check engine ground cable (CKT GND) for loose, wires and bent, broken or corroded connections at hull connection.**

First Technician (Turret)

- Connect starter harness to engine disconnect.
- Check engine ground cable (CKT GND) for loose wires and bent, broken or corroded connections at hull connection.

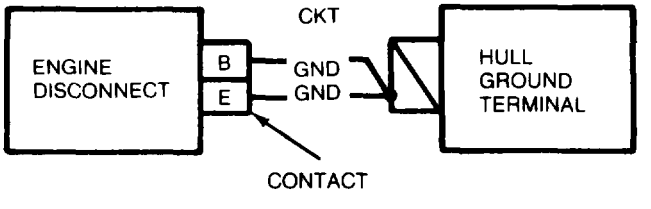
Does cable have loose, corroded or damaged wires and/or terminals at hull connection?



NO

YES

32 **Repair engine ground cable (page 10-307).**



TA141845

Symptom-3

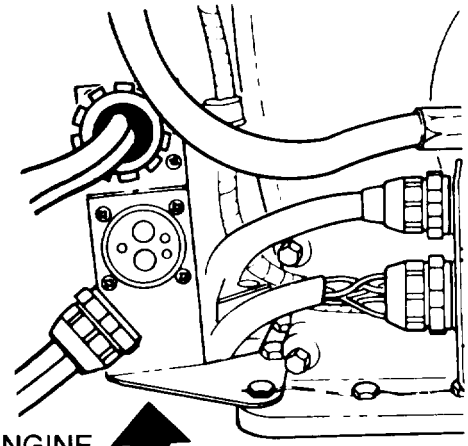
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

33 **Check engine ground cable (CKT GND) for loose wires and bent, broken or corroded connector contacts at engine disconnect.**

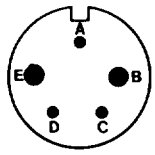
First Technician (Turret)

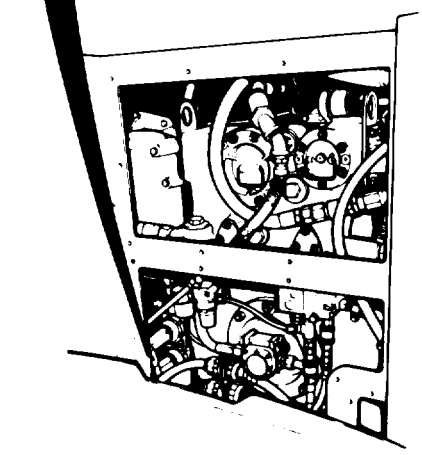
- Disconnect engine ground (CKT GND) from engine disconnect.
- Check engine ground cable (CKT GND) connector, contacts B and E at engine disconnect for loose, corroded or damaged wires and/or connector.

Does connector have loose, corroded or damaged wires and/or contacts?



ENGINE GROUND CABLE CONTACTS B and E

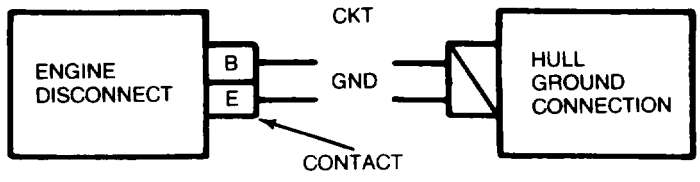




NO

YES

34 **Repair engine ground cable (page 10-307).**



TA141846

Symptom-3

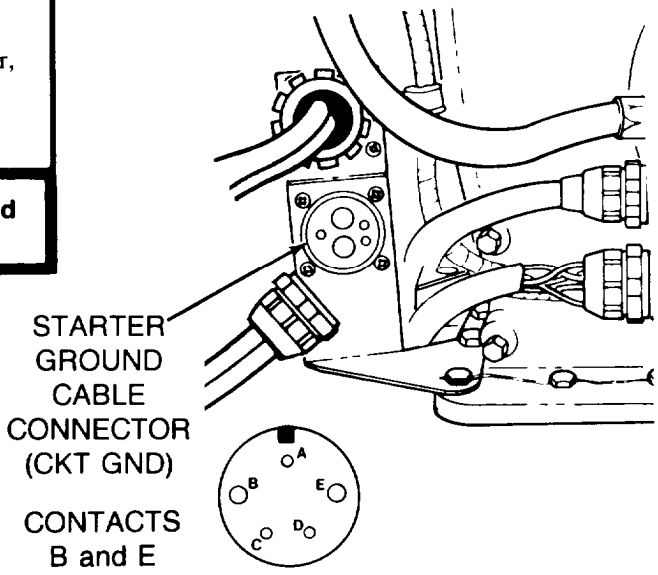
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

35 **Check starter ground cable (CKT GND) for loose wires and bent, broken or corroded connector contacts at engine disconnect.**

First Technician (Turret)

- Check starter ground cable (CKT GND) connector, contacts B and E, at engine disconnect for loose, corroded or damaged wires and/or contacts.

Does connector have loose, corroded or damaged wires and/or contacts?



NO

YES

36 **Replace starter ground cable (page 10-368).**

TA141847

Symptom-3

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

37 **Check powerplant starter harness (CKT 82) starter solenoid terminals for loose, corroded or damaged wires and terminal connectors.**

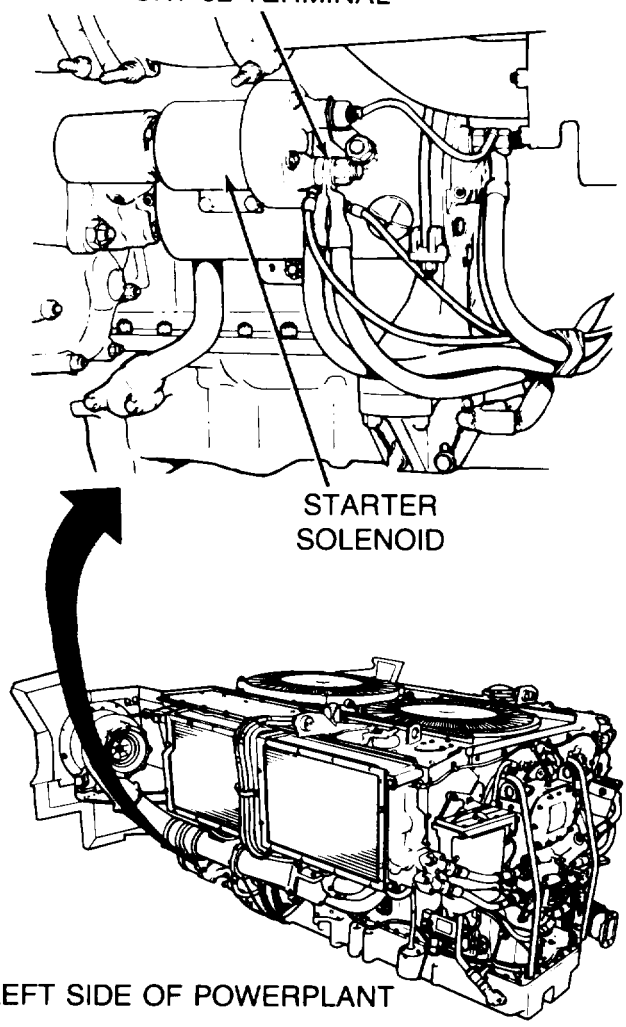
First Technician (Top Deck)

- Remove powerplant (page 5-1).

First Technician (Left Side of Powerplant)

- Check powerplant starter harness (CKT 82) at starter solenoid terminal for loose, corroded or damaged wires and/or terminal connectors.

Does harness have loose, corroded or damaged wires and/or terminal connectors?



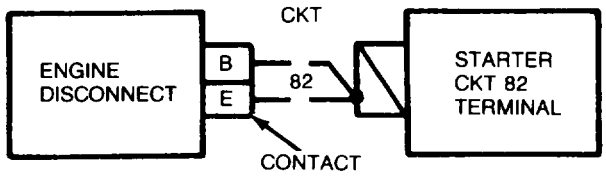
YES

39 **Repair powerplant harness (page 10-307).**

NO

38

- **Check strap between starter solenoid and starter for loose connections and corrosion.**
- **See Step 40**



TA141848

Symptom-3

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP

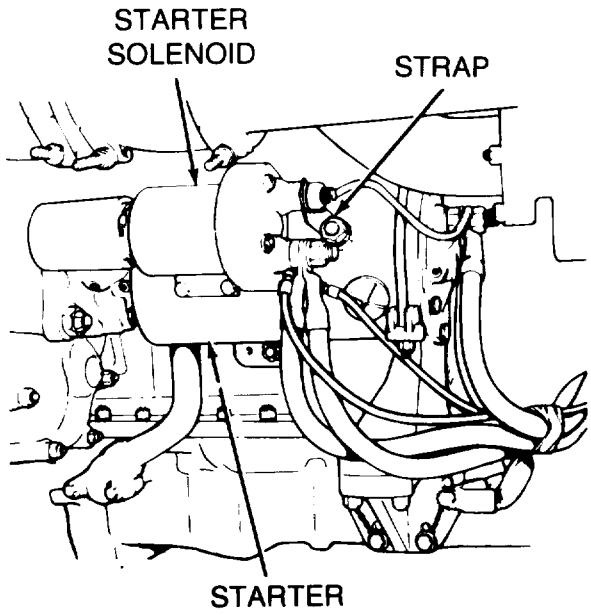
25 OR 38

40 Check strap between starter solenoid and starter for loose connections and corrosion.

First Technician (Left Side of Powerplant)

- Check strap between starter solenoid and starter for loose connections and corrosion.

Does strap have loose connections or corrosion?



NO

YES

41 Clean and tighten strap.

TA141849

Symptom-3

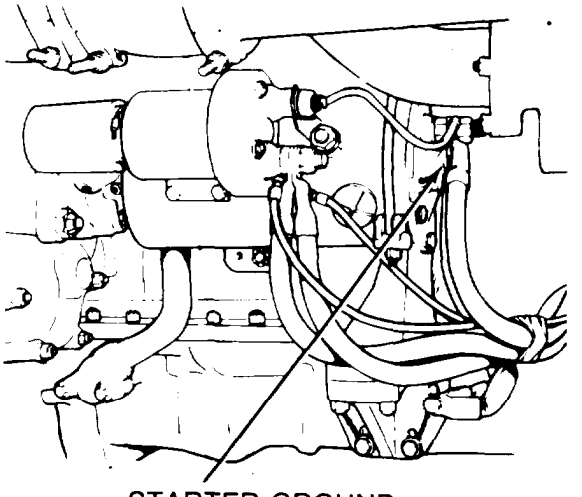
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

42 **Check starter ground harness (CKT GND) at starter for loose, corroded or damaged wires and/or terminal connectors.**

First Technician (Left Side of Powerplant)

- Check starter ground harness (CKT GND) at starter for loose, corroded or damaged wires and/or terminal connectors.

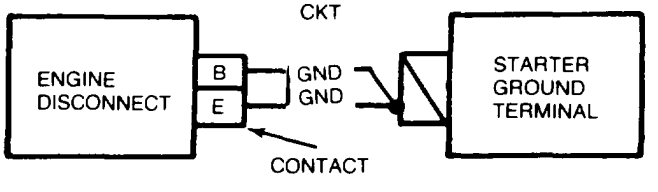
Does harness have loose, corroded or damaged wires and/or terminal connectors?



STARTER GROUND TERMINAL

YES

43 **Repair starter ground harness (page 10-307).**



NO

44 **Replace starter (page 10-26).**

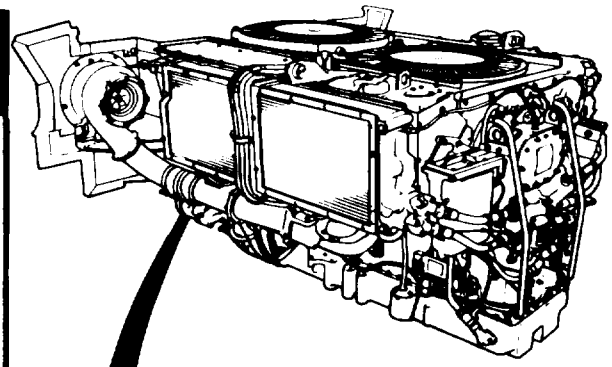
TA141850

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-4

ENGINE STARTER SPINS, BUT WILL NOT CRANK ENGINE.

POWERPLANT



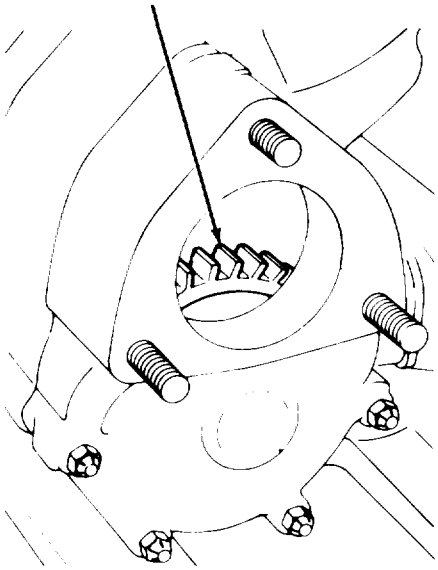
1 **Check starter driven gear, on the engine for damaged and broken teeth.**

Technician (Rear of Vehicle)

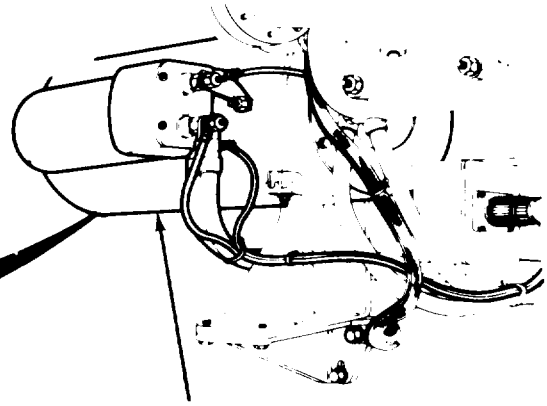
- Remove powerplant (page 5-1).
- Remove starter (page 10-27).
- Look through the opening in the starter adapter at the starter driven gear.

Does the starter driven gear have damaged or broken teeth?

STARTER DRIVEN GEAR



STARTER ADAPTER



STARTER

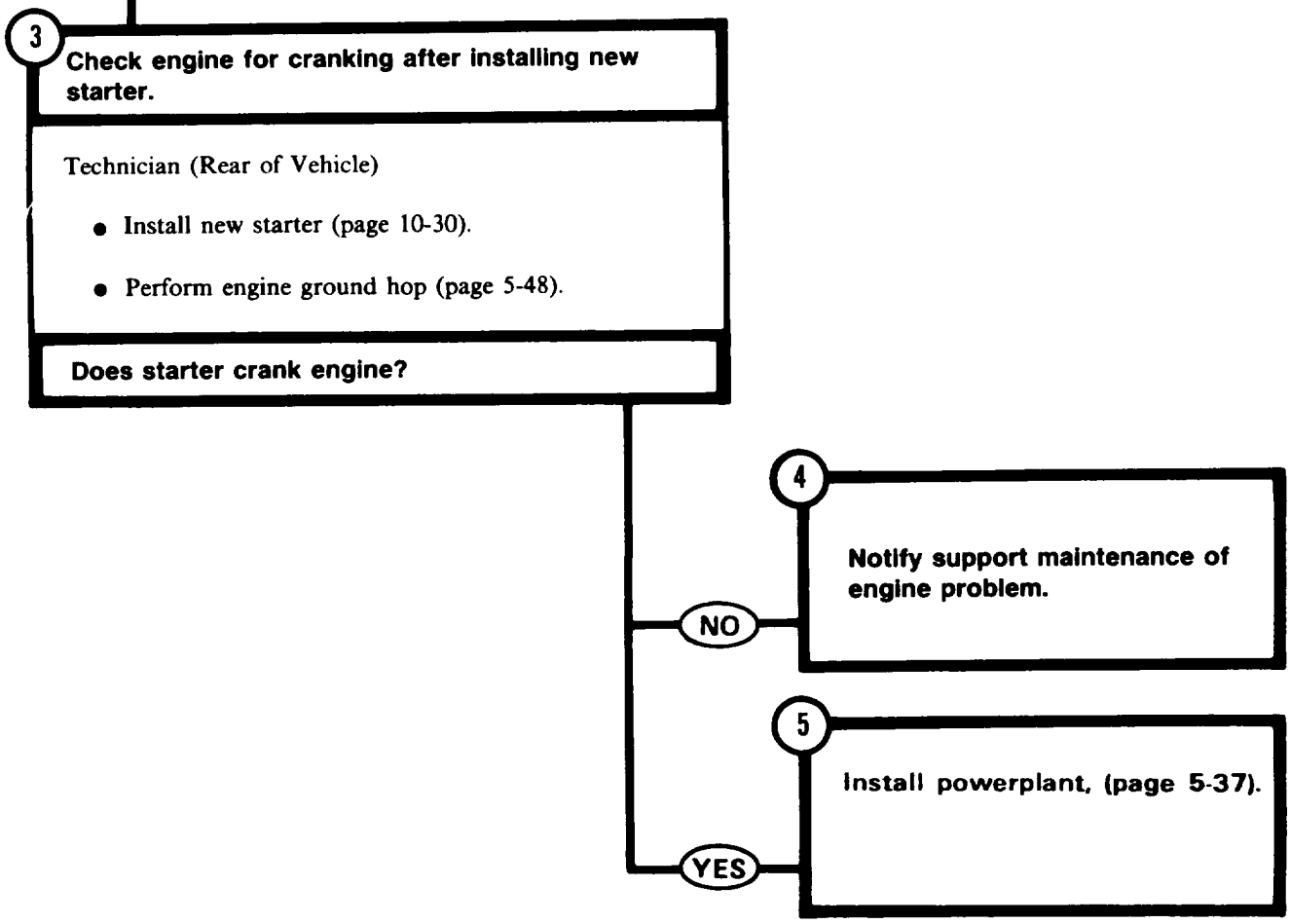
NO

YES

2 **Notify support maintenance of damaged starter driven gear.**

Symptom-4

DETAILED TROUBLESHOOTING PROCEDURE VEHICLE OPERATION - POWERPLANT, STARTING (Continued)



DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

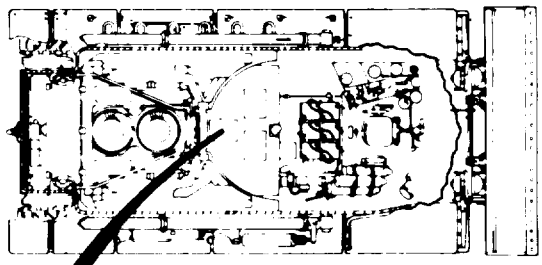
Symptom-5

ONE ELECTRICAL FUEL PUMP WILL NOT WORK.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

FOR CLARITY
TURRET NOT SHOWN



1 Check for fuel pump not running.

First Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to right fuel tank fuel pump access cover (TM 9-2350-222-10).

First Technician (Rear Grille Doors)

- Listen for sound of left fuel pump running when switches are turned ON.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.
- Listen for sound of right fuel tank fuel pump running.
- Determine which fuel pump is not running; then set MASTER BATTERY switch OFF.

Which fuel pump was not running?

RIGHT FUEL TANK FUEL PUMP ACCESS COVER

RIGHT

LEFT

2

- **Check hull front master harness (CKT 76) at bulkhead electrical disconnect for electrical power to left fuel tank fuel pump.**
- **See Step (18) .**

TA141853

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

3 **Check hull front master harness (CKT 76) at bulkhead electrical disconnect for electrical power to right fuel tank fuel pump.**

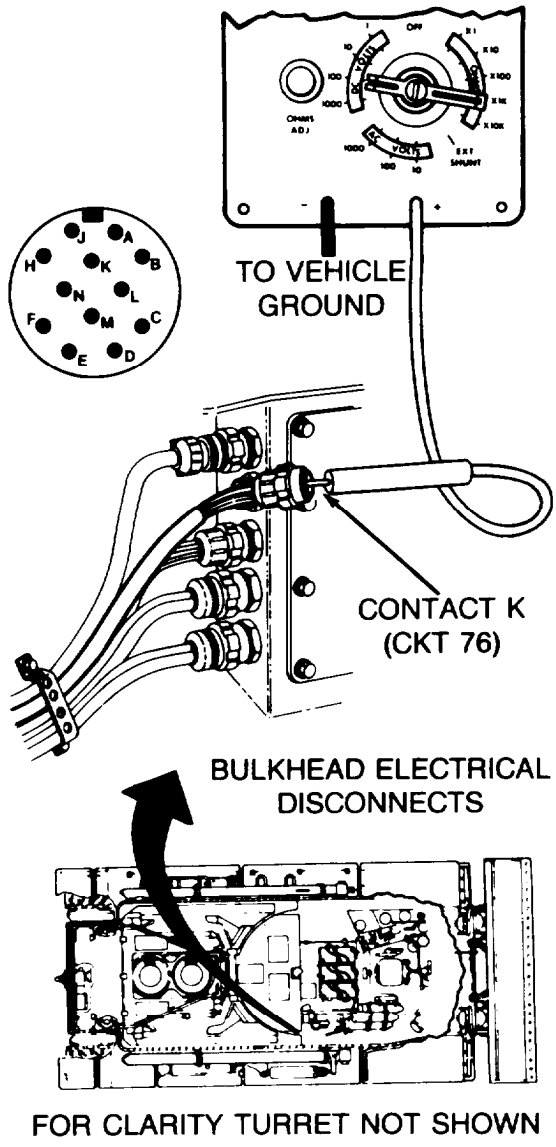
First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front master harness from bulkhead electrical disconnect.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact K (CKT 76) of hull front master harness connector and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Turret)



TA141854

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP (3) CONTINUED

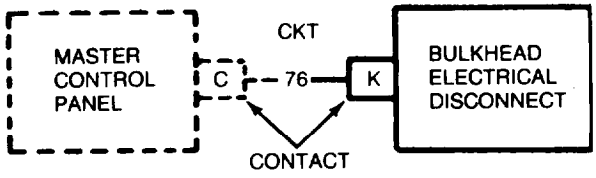
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

NO

4

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 76) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness to bulkhead electrical disconnect.**



YES

TA141855

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

5 **Check engine accessory harness (CKT 76) for electrical power at right fuel pump connector.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Connect hull front master harness to bulkhead electrical disconnect.
- Manually traverse turret to gain access to fuel crossover valve access cover.
- Remove bulkhead floor access cover (page 16-37).
- Disconnect engine accessory harness connector (CKT 76) from capacitor connector and housing assembly at right fuel tank fuel pump.
- Connect red probe of meter to CKT 76 of engine accessory harness connector and black probe to ground.

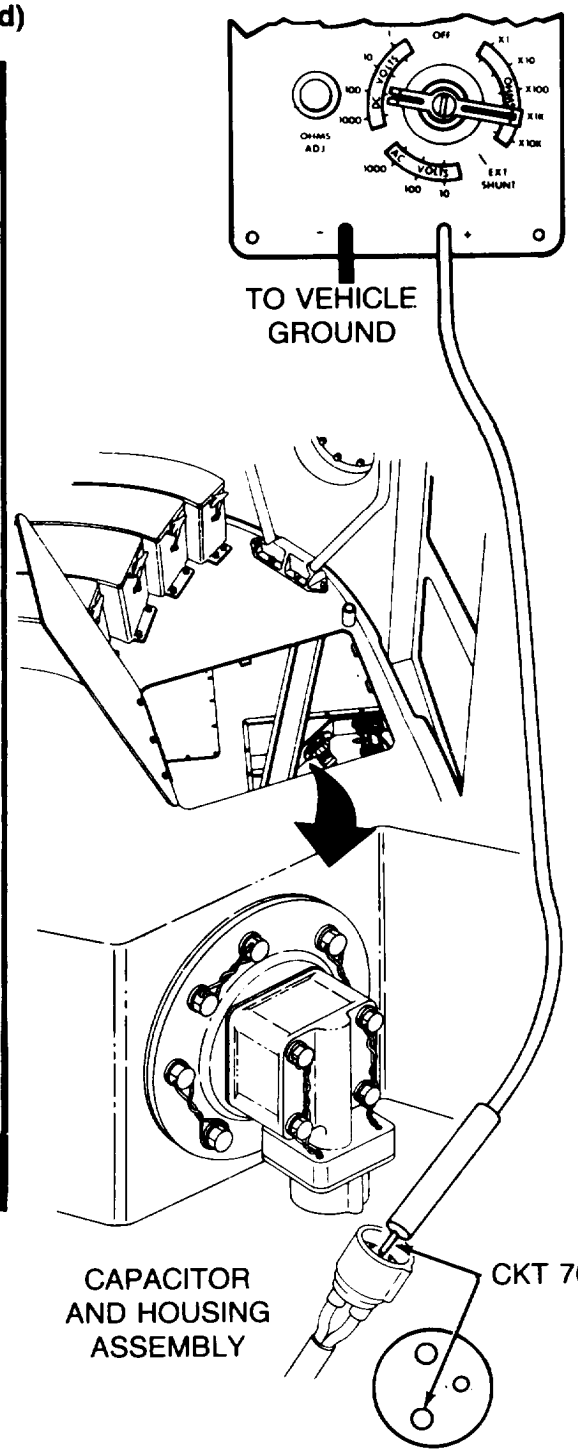
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



6 **Check engine accessory harness (CKT 76) for intermediate connector in harness to right fuel pump.**

NO

- **See Step (33).**

YES

TA141856

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

7 Check circuit 76 for continuity from connector contact to capacitor lead connector.

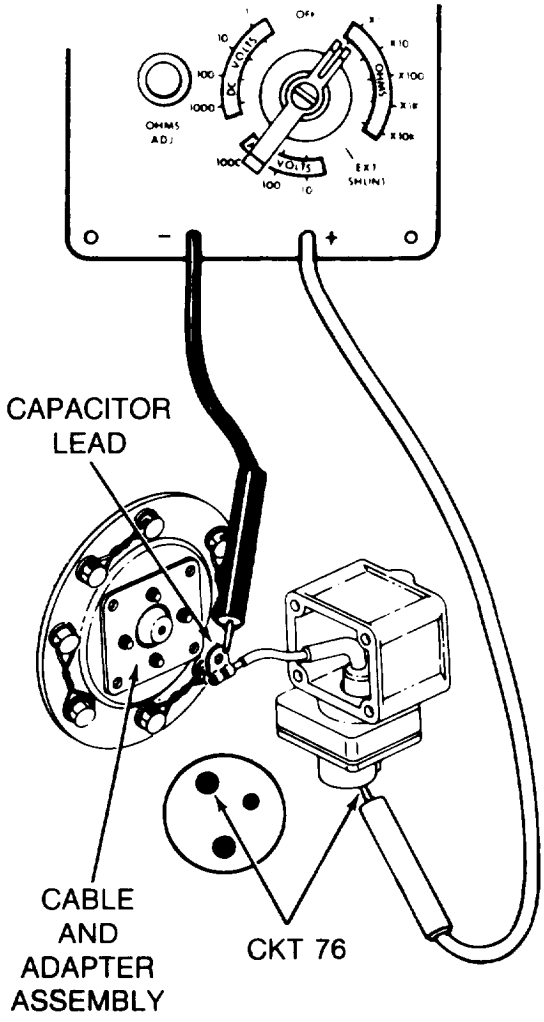
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Remove capacitor and housing assembly from cable and adapter assembly (page 10-411).
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to capacitor and housing assembly connector contact (CKT 76).
- Connect black probe of meter to capacitor lead connector.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

8 Repair capacitor and housing assembly (page 10-411).

TA141857

Symptom-5

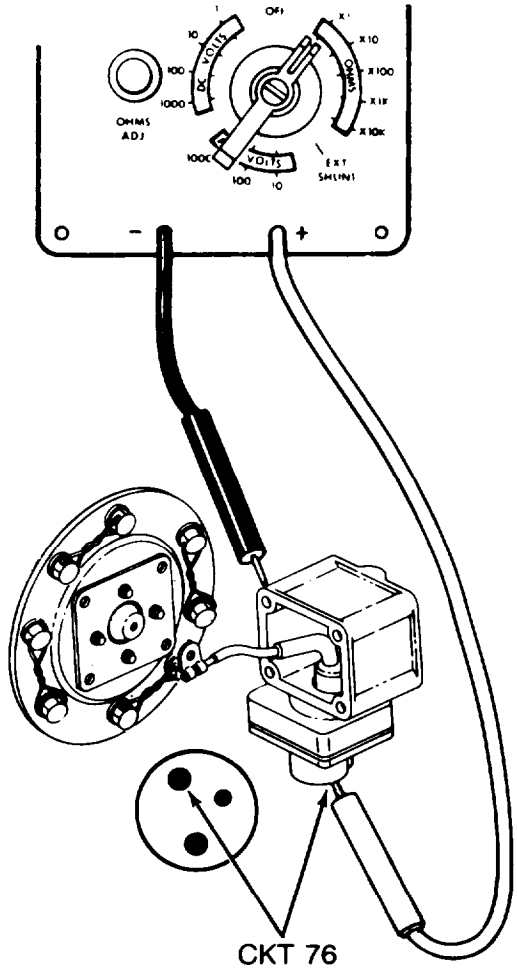
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

9 **Check capacitor lead for internal short.**

First Technician (Turret)

- Connect red probe of meter. to capacitor and housing assembly connector contact (CKT 76).
- Connect black probe of meter to outside of the capacitor and housing assembly.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

10 **Repair capacitor and housing assembly (page 10-411).**

TA141858

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

WARNING

Do not smoke or allow flames or sparks within area while draining tanks. Have manned fire extinguisher present.

11 Check for continuity from adapter assembly to fuel pump connector.

Second Technician (Rear Under Side of Hull)

- Isolate and drain right fuel tank (page 7-158).

First Technician (Turret)

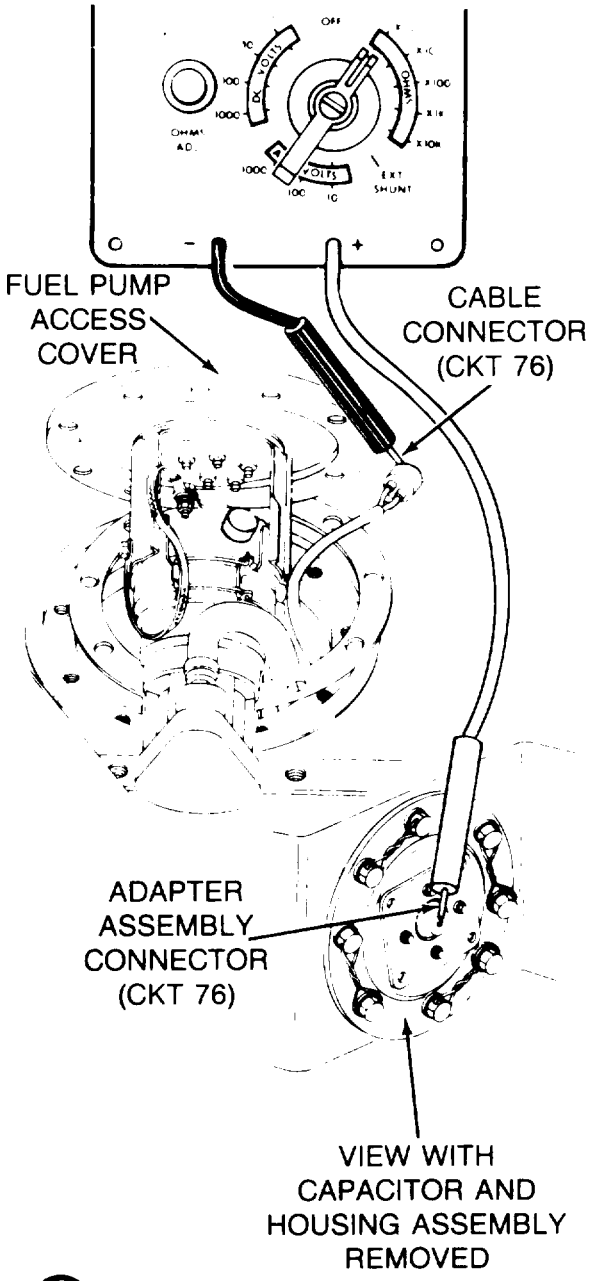
- Manually traverse turret to gain access to right fuel tank fuel pump access panel.
- Remove right fuel pump access cover (page 7-61).
- Disconnect electrical cable from fuel pump.
- Connect black probe of meter to cable connector (CKT 76).
- Connect red probe of meter to cable and adapter assembly (CKT 76).
- Check if meter indicates continuity.

Does meter indicate continuity?

YES

NO

12 Replace cable and adapter assembly (page 10-402).



TA141859

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

13 **Check adapter assembly cable for short to ground.**

First Technician (Turret)

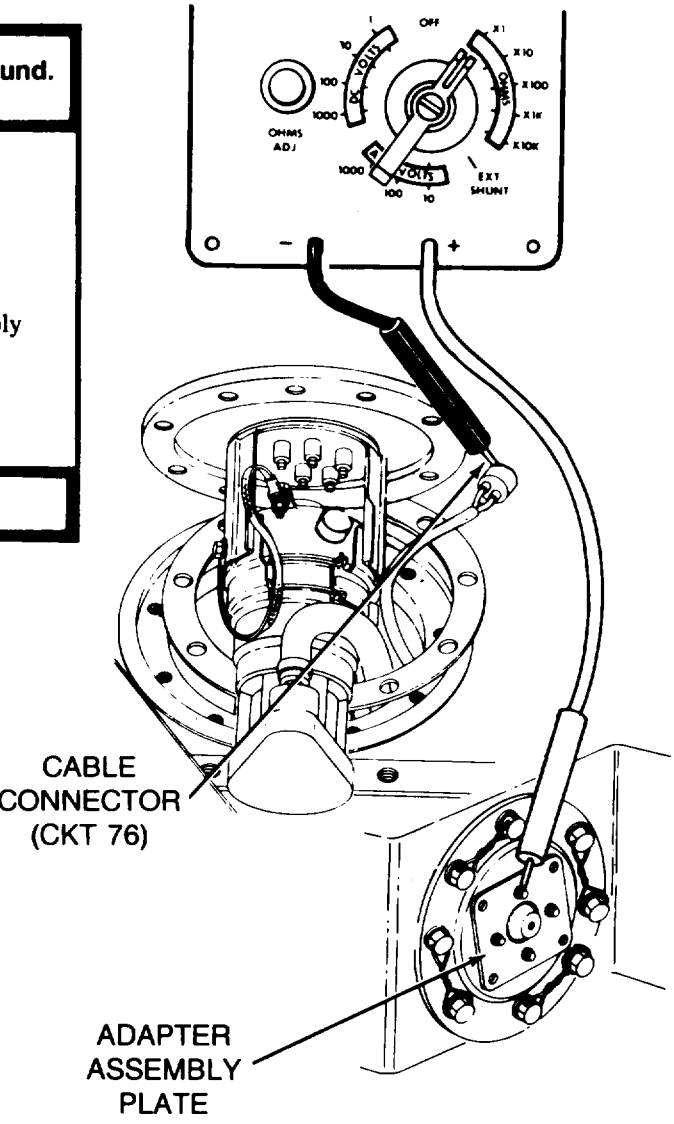
- Connect red probe of meter to cable connector (CKT 76).
- Connect black probe of meter to adapter assembly plate.
- Check if meter indicates continuity.

Does meter indicate continuity?

YES

14 **Replace cable and adapter assembly (page 10-402).**

NO



TA141860

Symptom-5

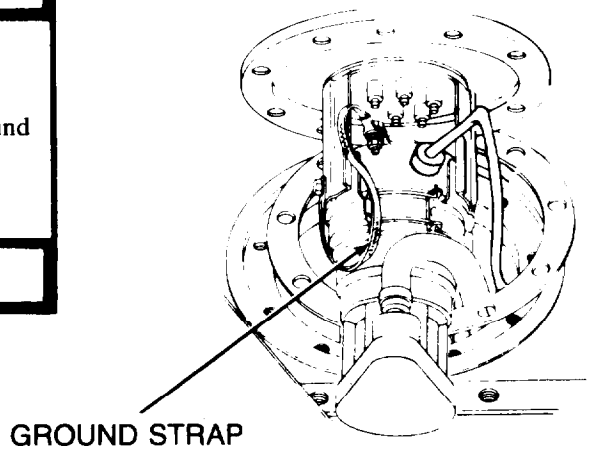
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

15 **Check ground strap on fuel pump for tightness at attaching points.**

First Technician (Turret)

- Check if connections are tight at each end of ground strap.

Are ground strap connections loose?



YES

16
- **Tighten ground strap connections.**
- **Install capacitor and housing assembly (page 10-407).**

NO

17
- **Replace right fuel tank fuel pump (page 7-61).**
- **Install capacitor and housing assembly (page 10-407).**

TA141861

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 2

18 **Check hull front master harness (CKT 76) at bulkhead electrical disconnect for electrical power to left fuel tank fuel pump.**

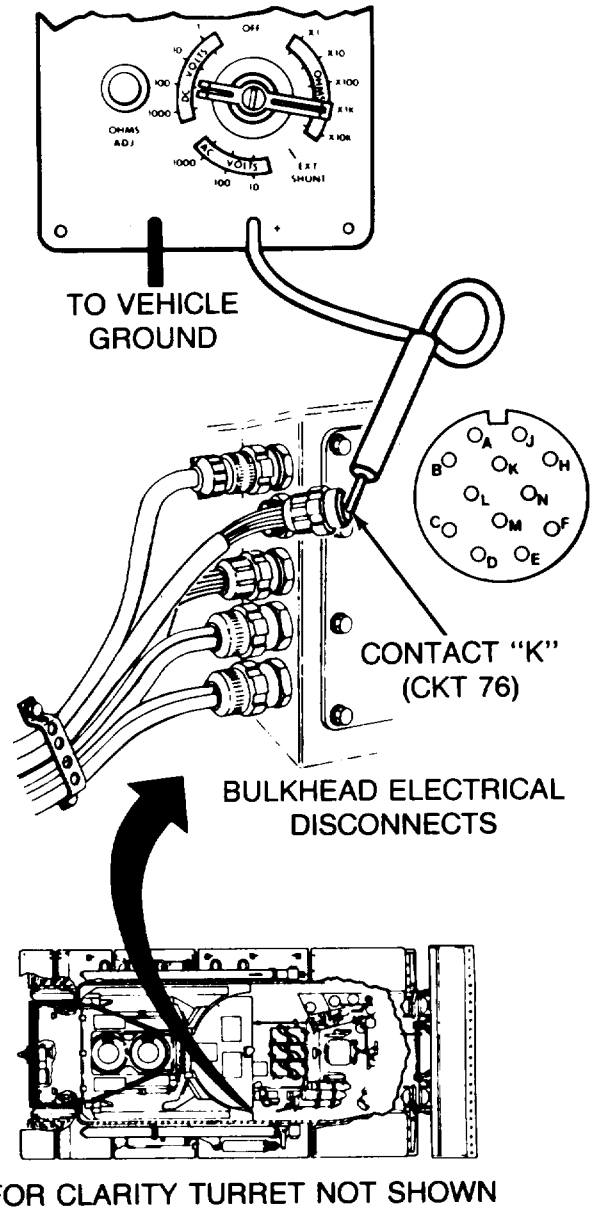
First Technician (Turret)

- Disconnect hull front master harness from bulkhead electrical disconnect.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to hull front master harness connector contact K (CKT 76) and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Turret)



TA141862

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP (18) CONTINUED

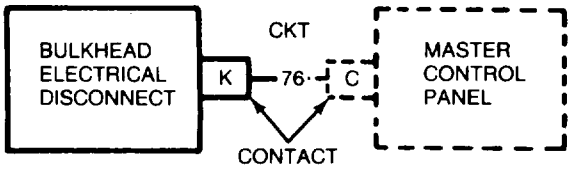
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

NO

19

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 76) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness to bulkhead electrical disconnect.**



YES

TA141863

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

20 **Check rear accessory harness (CKT 76) at left fuel pump connector for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Connect hull front master harness connector to bulkhead electrical disconnect.

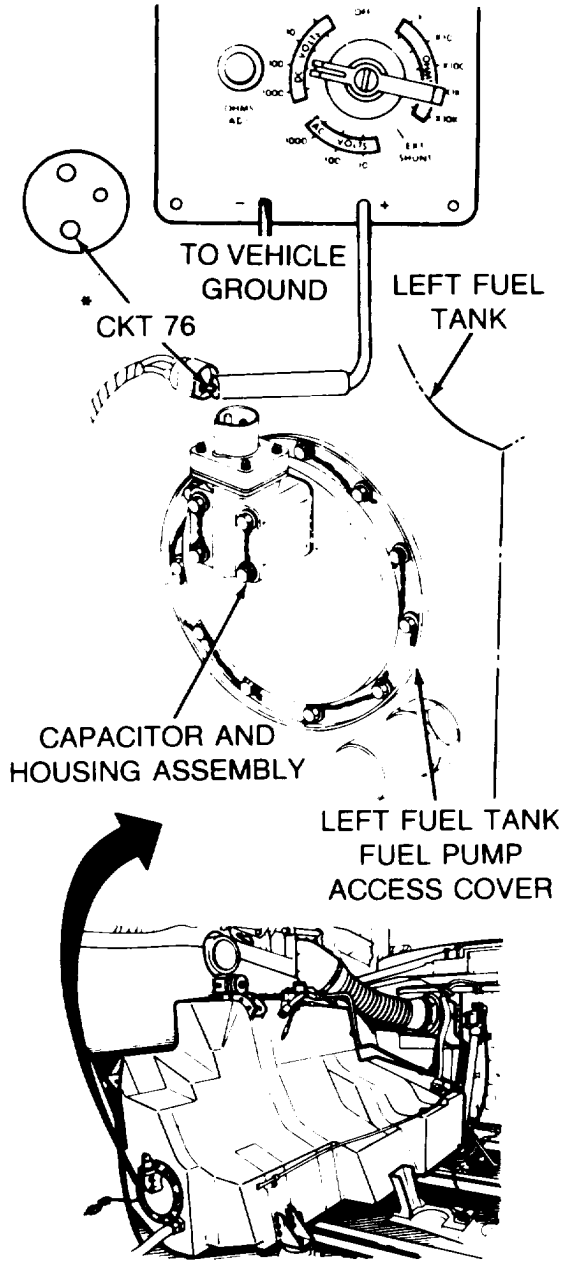
First Technician (Top Deck)

- Remove powerplant (page 5-1).
- Disconnect rear accessory harness connector (CKT 76) from capacitor and housing assembly at left fuel pump.
- Connect red probe of meter to (CKT 76) of rear accessory harness connector and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Engine Compartment)



LEFT FUEL TANK (ENGINE REMOVED)

TA141864

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP (20) CONTINUED

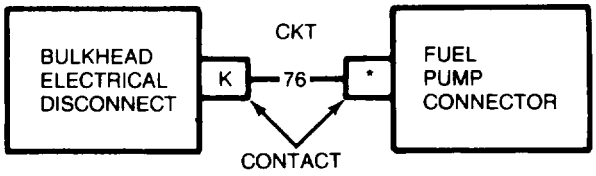
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

NO

21

- **Inspect rear accessory harness for bent/broken connector contacts or loose (CKT 76) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective rear accessory harness.**
- **Connect rear accessory harness to left fuel pump.**



* FUEL PUMP CONNECTOR NOT MARKED-SEE ILLUSTRATION.

YES

TA141865

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

22 **Check circuit 76 for continuity from connector contact to capacitor lead connector.**

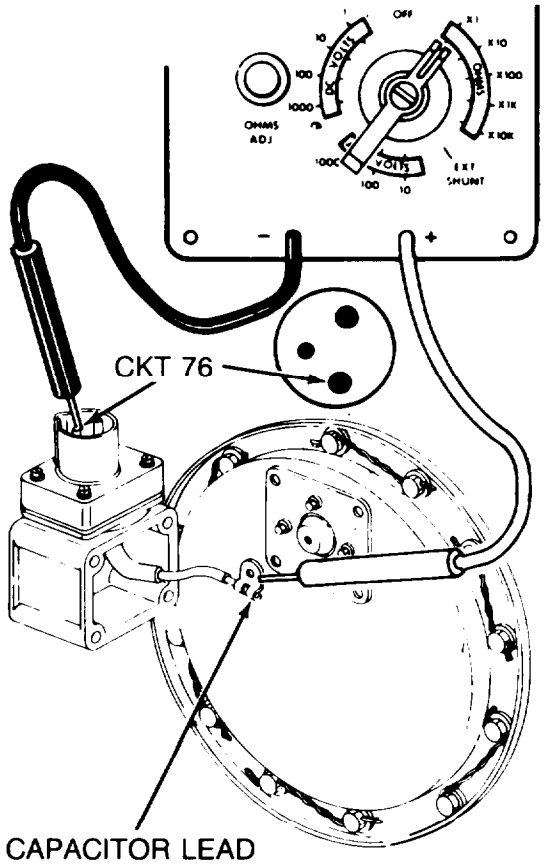
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Engine Compartment)

- Remove capacitor connector and housing assembly from cable and adapter assembly (page 10-411).
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to capacitor lead connector.
- Connect black probe of meter to capacitor and housing assembly connector (CKT 76).
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

23 **Repair capacitor and housing assembly (page 10-411).**

TA141866

Symptom-5

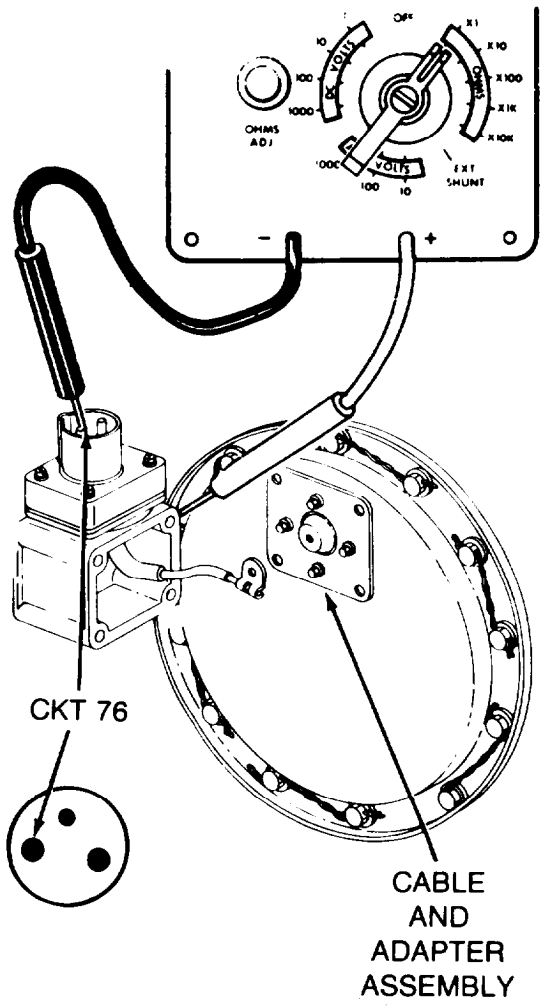
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

24 **Check capacitor lead for internal short.**

First Technician (Engine Compartment)

- Connect red probe of meter to outside of capacitor and housing assembly.
- Connect black probe of meter to capacitor and housing assembly connector contact (CKT 76).
- Check if multimeter indicates continuity.

Does multimeter indicate continuity?



NO

YES

25 **Repair capacitor and housing assembly (page 10-411).**

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

26 **Check for continuity from adaptor assembly to fuel pump connector.**

Second Technician (Rear Underside of Hull)

- Isolate and drain left fuel tank (page 7-158).

CAUTION

Remove debris, if any, to prevent it from entering fuel tank which could clog pump and fuel lines.

First Technician (Engine Compartment)

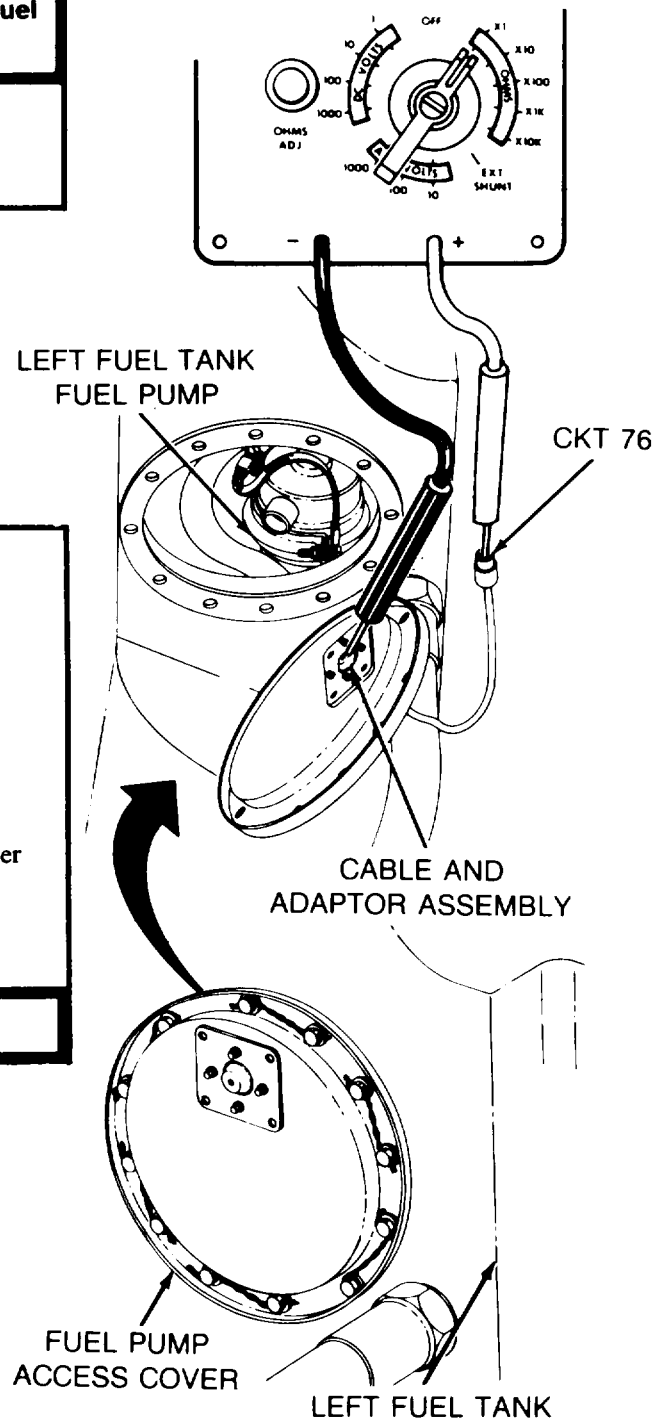
- Remove fuel pump access cover (page 7-52).
- Disconnect electrical cable from fuel pump.
- Connect red probe of meter to cable connector (CKT 76).
- Connect black probe of meter to cable and adapter assembly connector (CKT 76).
- Check if meter indicates continuity.

Does meter indicate continuity?

27 **Replace cable and adapter assembly (page 10-396).**

NO

YES



TA141868

DETAILED TROUBLESHOOTING PROCEDURE

VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

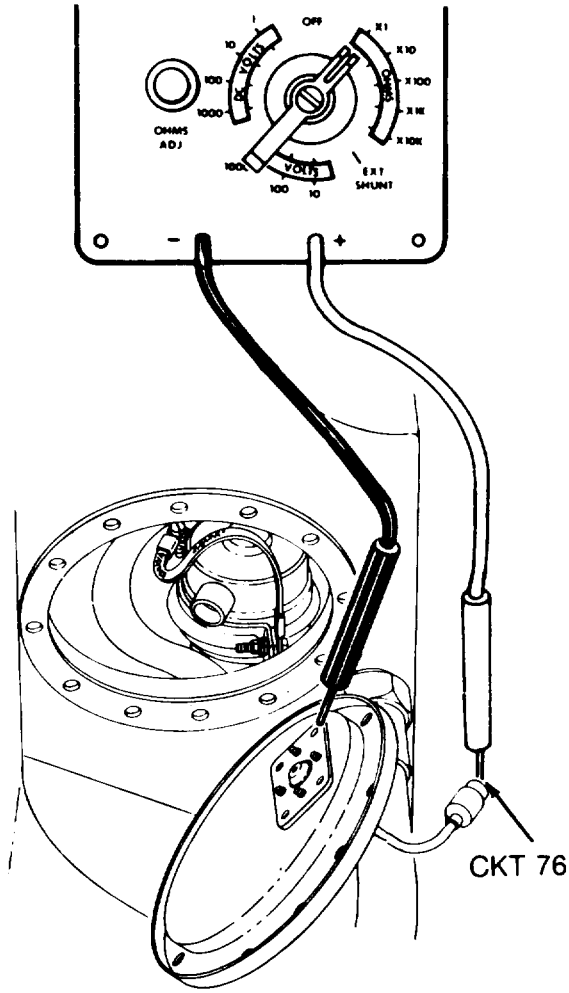
Symptom-5

28 **Check adapter assembly cable for short to ground.**

First Technician (Engine Compartment)

- Connect red probe of meter to cable connector (CKT 76).
- Connect black probe of meter to adapter assembly plate.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO

YES

29 **Replace cable and adapter assembly (page 10-396).**

TA141869

Symptom-5

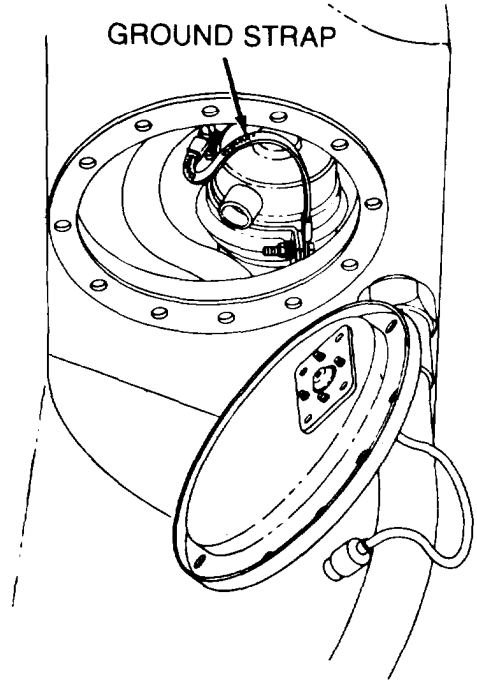
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

30 **Check ground strap on fuel pump for tightness at attaching points.**

First Technician (Engine Compartment)

- Check if connections are tight at each end of ground stap.

Are ground strap connections loose?



YES

31

- **Tighten ground strap connections.**
- **Install capacitor and housing assembly (page 10-399).**

NO

32

- **Replace left fuel tank fuel pump (page 7-52).**
- **Install capacitor and housing assembly (page 10-399).**

TA141870

Symptom-5 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 6

33 **Check engine accessory harness (CKT 76) for intermediate connector in harness to right fuel pump.**

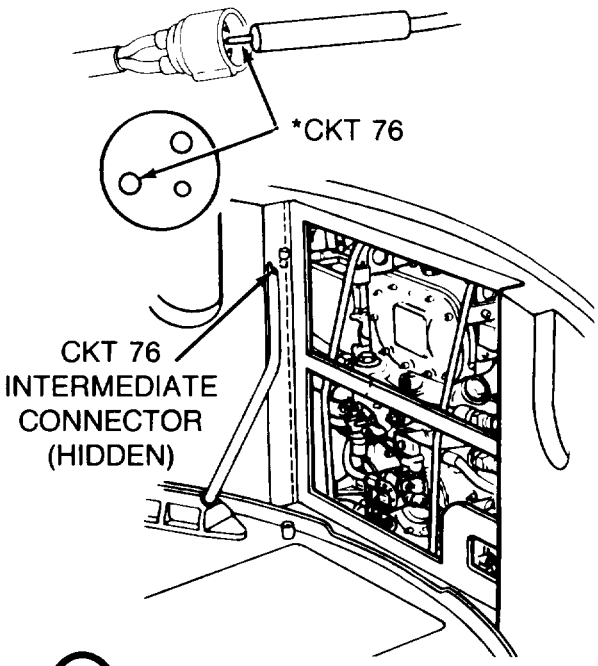
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Manually traverse turret to gain access to engine access covers (TM 9-2350-222-10).
- Remove upper engine access cover (page 16-40).
- Check for intermediate connector in harness (CKT 76) in upper left area of access door opening.

Is there an intermediate connector in CKT 76?

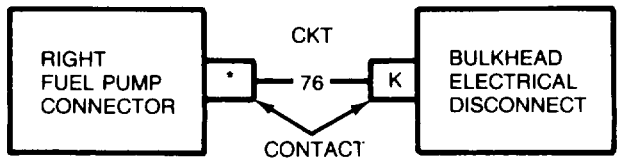


YES

NO

34

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 76) wires at the rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad engine accessory harness.**
- **Connect engine accessory harness to intermediate and fuel pump connectors.**



* FUEL PUMP CONNECTOR NOT MARKED. SEE ILLUSTRATION.

TA141871

Symptom-5

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

35 **Check engine accessory harness (CKT 76) at fuel pump intermediate connector for electrical power.**

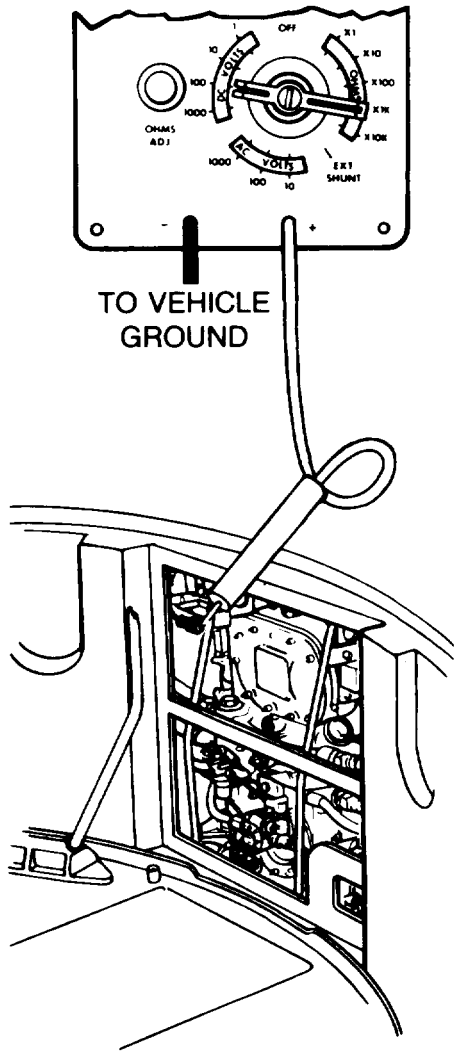
First Technician (Turret)

- Disconnect fuel pump intermediate connector.
- Connect red probe of meter to engine accessory harness intermediate connector and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Turret)



TA141872

Symptom-5 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP (35) CONTINUED

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

NO

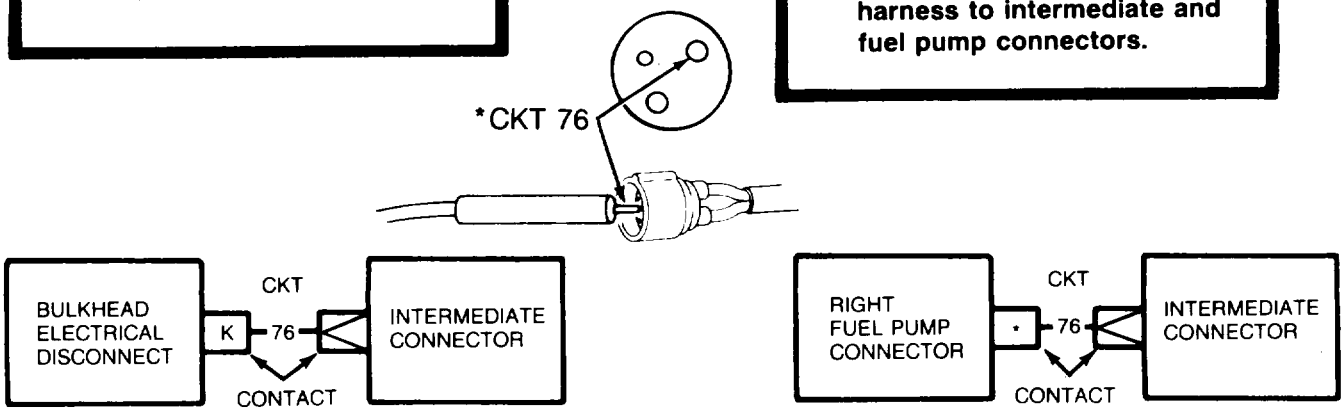
36

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 76) wires at the rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad engine accessory harness.**
- **Connect engine accessory harness to intermediate and fuel pump connectors.**

YES

37

- **Inspect engine accessory harness (CKT 76) extension for bent/broken connector contacts or loose (CKT 76) wires at the rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad engine accessory harness (CKT 76) extension.**
- **Connect engine accessory harness to intermediate and fuel pump connectors.**



* FUEL PUMP CONNECTOR NOT MARKED. SEE ILLUSTRATION.

TA141873

DETAILED TROUBLESHOOTING PROCEDURE

Symptom-6 VEHICLE OPERATION - POWERPLANT, STARTING

BOTH ELECTRICAL FUEL PUMPS WILL NOT WORK.

1 Check master battery harness (CKT 76) for electrical power.

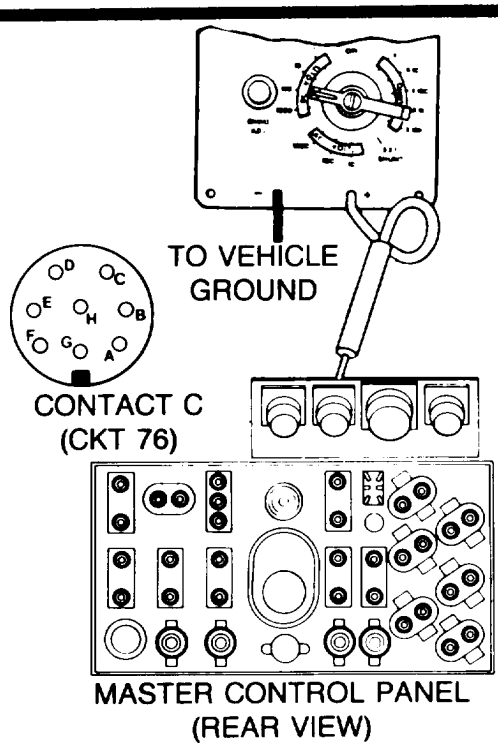
Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness from master control panel.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to master battery harness connector contact C (CKT 76) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

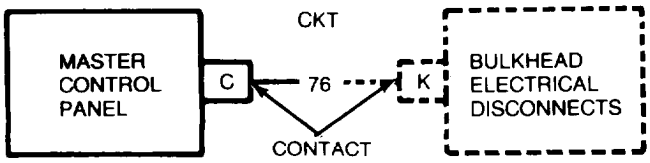
NO

YES



2

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 76) wires at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad hull front master harness.**
- **Install master control panel (page 10-47).**



TA141874

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

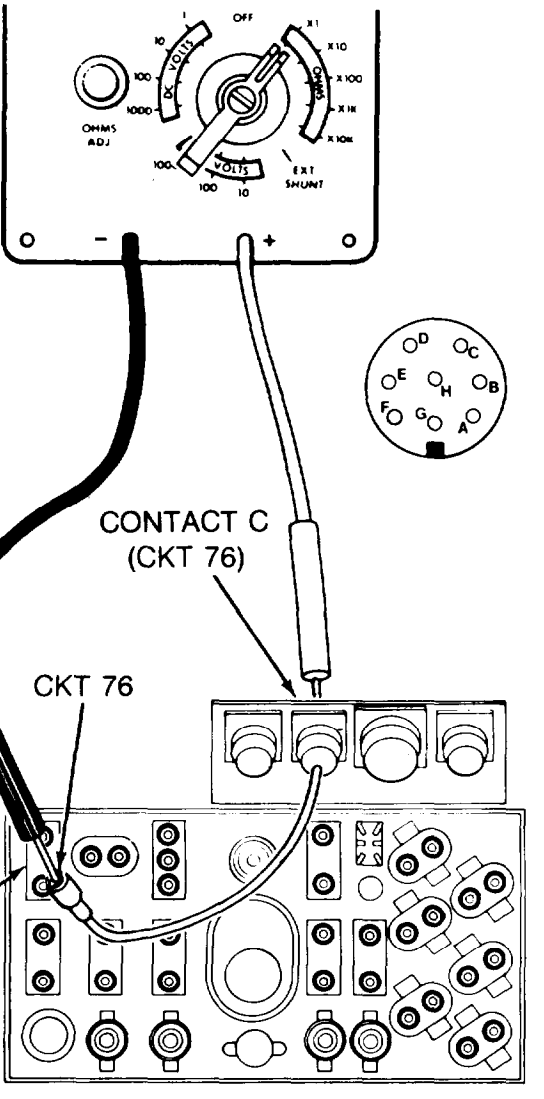
Symptom-6

3 **Check master battery harness (CKT 76) for continuity from FUEL PUMPS switch to panel connector contact C.**

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Disconnect master control panel accessories harness connector (CKT 76) from FUEL PUMPS switch.
- Connect red probe of meter to contact C at master battery harness connector (CKT 76).
- Connect black probe of meter to master battery harness connector (CKT 76) at FUEL PUMPS switch.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

4 **Replace master battery harness (page 10-107).**

TA141875

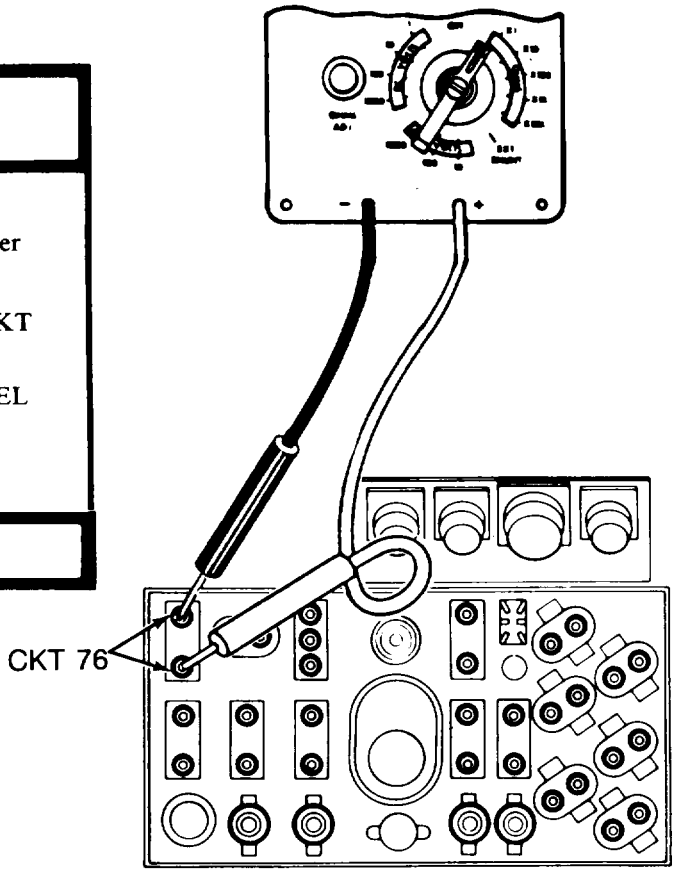
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-6

5 **Check FUEL PUMPS switch for continuity.**

- Connect hull front master harness to the master control panel.
- Disconnect fuel shut off harness connector (CKT 76) from FUEL PUMPS switch.
- Connect meter probes to both contacts of FUEL PUMPS switch (CKT 76).
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

6 **Replace FUEL PUMPS switch (page 10-61).**

TA141876

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

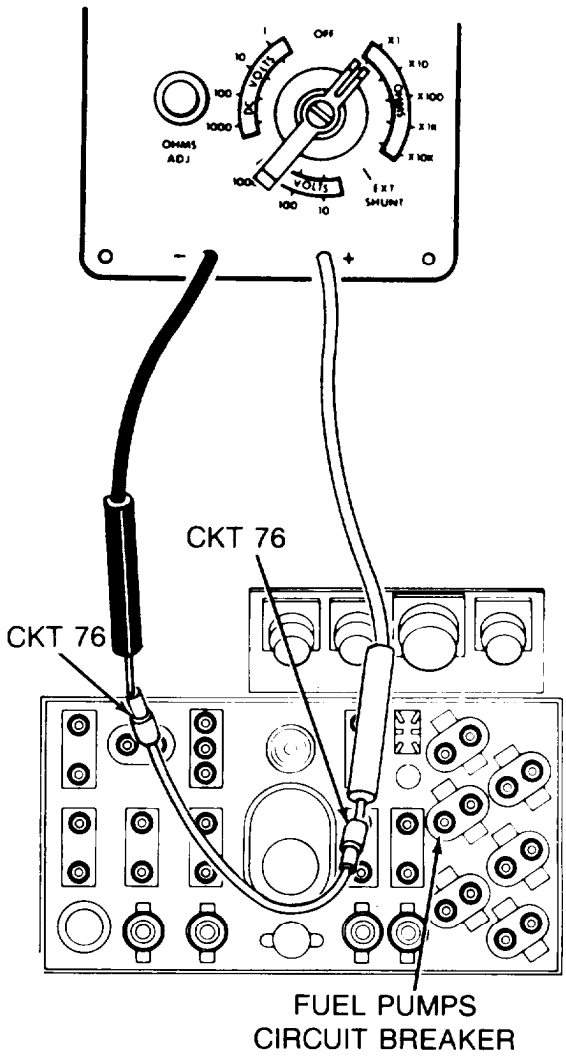
Symptom-6

7 **Check master control panel fuel shut off harness (CKT 76) for continuity from FUEL PUMPS switch to fuel pumps circuit breaker.**

Technician (Driver's Station)

- Disconnect CKT 76 connector from fuel pumps circuit breaker.
- Connect red probe at meter to fuel shutoff harness connector (CKT 76) at fuel pumps circuit breaker.
- Connect black probe of meter to fuel shutoff harness connector (CKT 76) at FUEL PUMPS switch.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

8 **Replace master control panel fuel shutoff harness (page 10-118).**

TA141877

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

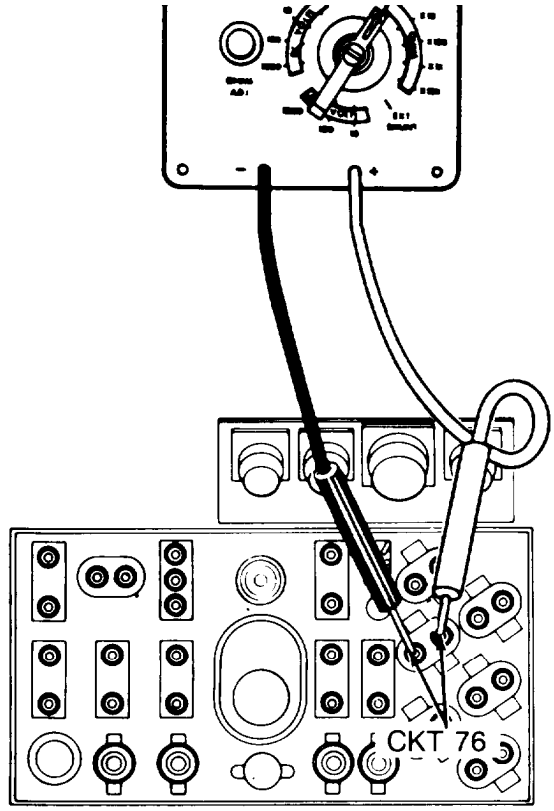
Symptom-6

9 **Check fuel pumps circuit breaker for continuity.**

Technician (Driver's Station)

- Connect both (CKT 76) connectors to FUEL PUMPS switch.
- Disconnect (CKT 76) connector from fuel pumps circuit breaker.
- Connect red probe of meter to one (CKT 76) connector on fuel pumps circuit breaker.
- Connect black probe of meter to the other (CKT 76) connector on fuel pumps circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO → **10** **Replace fuel pumps circuit breaker (page 10-61).**

YES → **11** **Replace master control panel power harness (page 10-107).**

TA141878

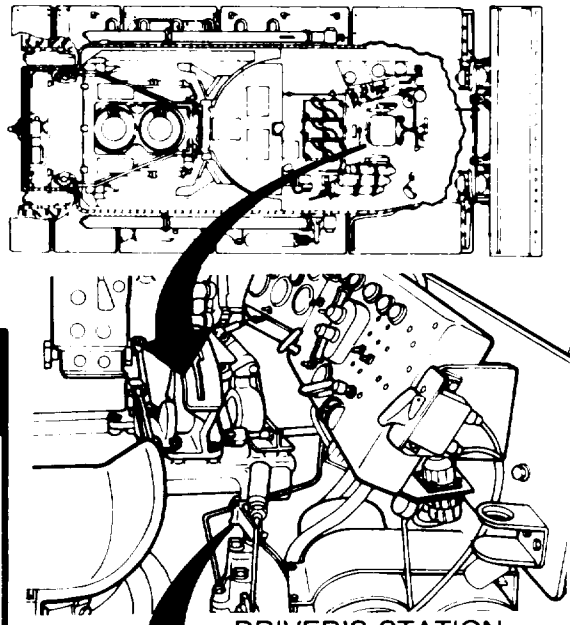
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-7

PRIMER PUMP WILL NOT WORK.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



1 Check primer pump back pressure.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON, operate primer pump several times, then set FUEL PUMPS switch OFF.

Does pressure required to operate the primer pump become too hard?

NO

YES

2

- **Check for free fuel flow from primer pump pressure line at the left hull bulkhead.**
- **See Step (21) .**

TA141879

Symptom-7

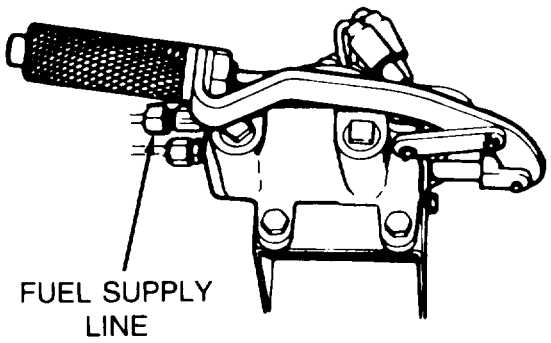
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

3 **Check for free fuel flow from fuel inlet line at primer pump.**

First Technician (Driver's Station)

- Disconnect fuel supply line at primer pump inlet.
- Place a container under open line to catch any fuel.
- Set FUEL PUMPS switch ON then OFF.

Does fuel flow freely from fuel supply line?



YES

NO

4

- **Check for free fuel flow from primer pump supply line at bulkhead connection.**

- **See Step (10).**

TA141880

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

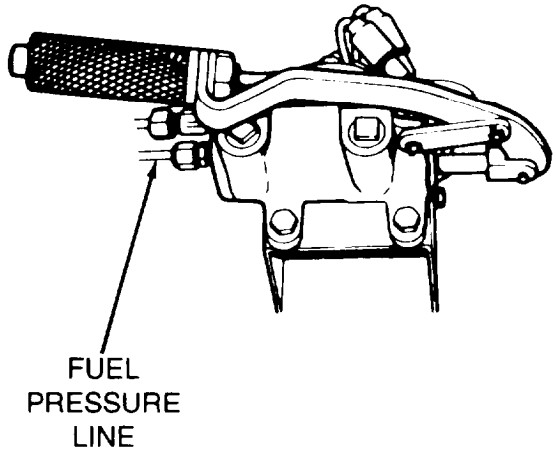
Symptom-7

5 **Check for free fuel flow at primer pump pressure line outlet.**

First Technician (Driver's Station)

- Connect fuel supply line to primer pump.
- Disconnect pressure fuel line at primer pump.
- Place a container under primer pump to catch any fuel coming out.
- Set FUEL PUMP switch ON, operate primer pump, then set switch OFF.

Does fuel spurt freely from the primer pump outlet?



YES

NO

6 **Replace primer pump (page 7-359).**

TA141881

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

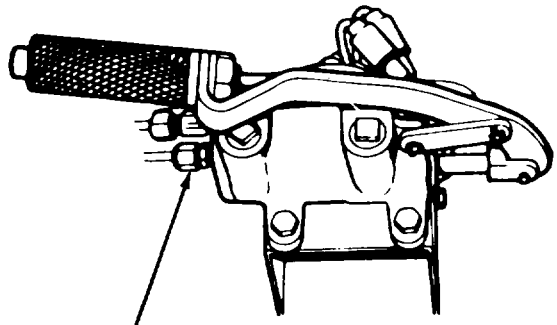
Symptom-7

7 **Check primer pump operation with primer pump outlet plugged.**

First Technician (Driver's Station)

- Install a plug in primer pump outlet opening.
- Operate primer pump.

Does primer pump become hard to operate and lock up?



NO

8 **Replace primer pump (page 7-359).**

YES

9

- **Remove plug from primer pump.**
- **Check for free fuel flow from primer pump pressure line at left hull bulkhead.**

- **See Step (21) .**

TA141882

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

FROM STEP (4)

(10) Check for free fuel flow from primer pump supply line at bulkhead connection.

Second Technician (Driver's Station)

- Connect fuel supply line to primer pump.

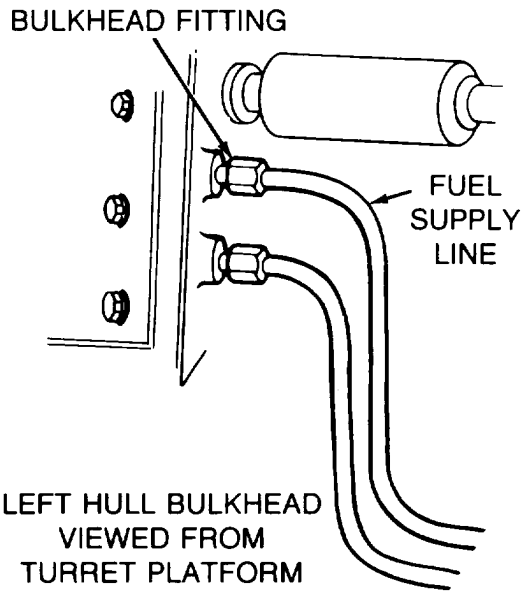
First Technician (Turret)

- Manually traverse turret to gain access to fittings on left hull bulkhead. (TM 9-2350-222-10).
- Disconnect fuel supply line at bulkhead fitting.
- Place a container under bulkhead fitting to catch any fuel.

Second Technician (Driver's Station)

- Set FUEL PUMPS switch ON then OFF.

Does fuel flow freely from bulkhead fittings?



YES

NO

(11)

- **Check for free fuel flow from primer pump supply line in engine compartment.**
- **See Step (50)**

TA141883

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

12 **Check for free fuel flow from fuel supply line at inline connection on lower front wall of driver's station.**

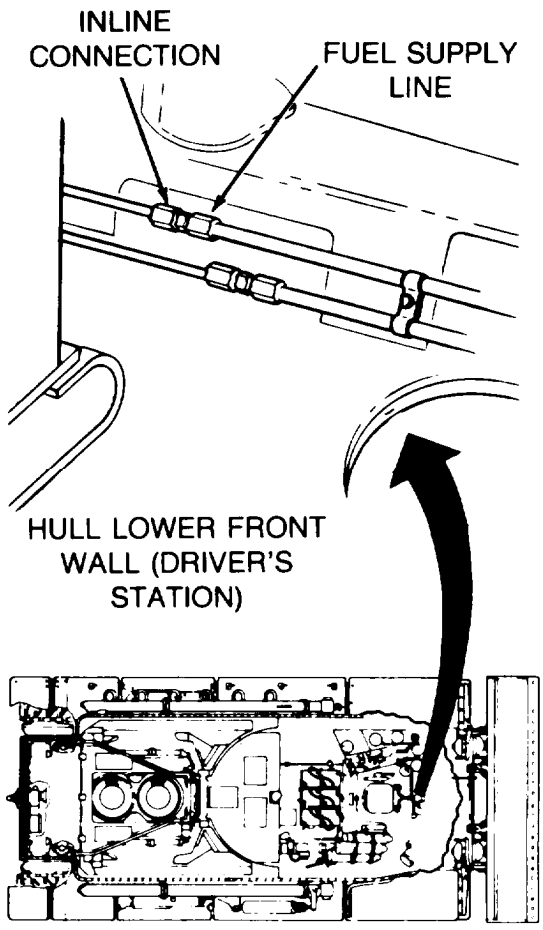
First Technician (Turret)

- Connect fuel supply line at bulkhead fitting.

Second Technician (Driver's Station)

- Disconnect fuel supply line at inline connection on lower forward wall.
- Place container or rags under line to catch any fuel.
- Set FUEL PUMPS switch ON then OFF.

Does fuel flow from disconnected line?



FOR CLARITY TURRET NOT SHOWN

YES

NO

13 **Clear clogged line between inline connection and bulkhead fitting by blowing with compressed air. If this does not work, replace the lines (page 7-337).**

TA141884

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

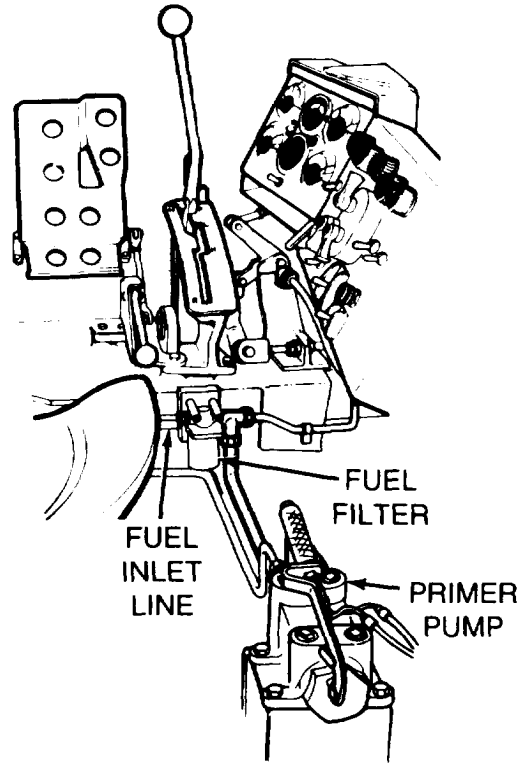
Symptom-7

14 **Check for free fuel flow from line leading to inlet side of fuel filter.**

Second Technician (Driver's Station)

- Connect fuel supply line at lower front wall.
- Disconnect fuel supply line from inlet side of the fuel filter.
- Place a container under line to catch any fuel. fuel.
- Set FUEL PUMPS switch ON then OFF.

Does fuel flow freely from disconnected line at fuel filter?



YES

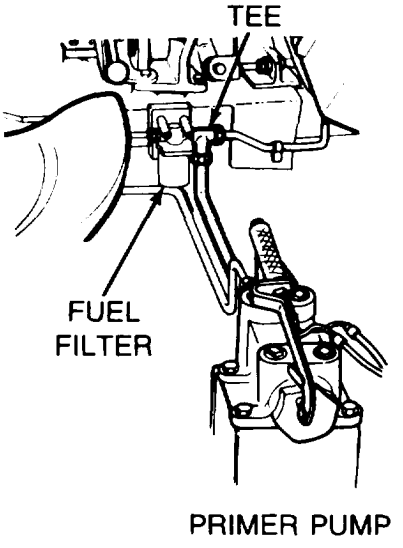
NO

15 **Clear clogged line between the lower wall fitting and fuel filter by blowing with compressed air. If this does not work, replace the line (page 7-350).**

TA141885

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7



16 **Check for free fuel flow at tee outlet.**

Second Technician (Driver's Station)

- Connect fuel supply line to inlet side of fuel filter.
- Disconnect line from tee to primer pump, at tee.
- Place a container under tee to catch any fuel.
- Set FUEL PUMPS switch ON then OFF.

Does fuel flow freely from tee?

YES

17 **Clear clogged line between tee and primer pump by blowing with compressed air. If this does not work, replace line (page 7-348).**

NO

18 **Check for free fuel flow at fuel filter outlet.**

Second Technician (Driver's Station)

- Remove tee from fuel filter.
- Place a container under fitting to catch any fuel.
- Set FUEL PUMPS switch ON then OFF.

Does fuel flow freely from fuel filter outlet?

YES

20 **Clear clogged tee by blowing with compressed air. If this does not work, replace the tee (page 7-348).**

NO

19 **Replace fuel filter element (page 7-294).**

TA141886

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7
FROM STEP (2) OR (9)

WARNING

Wear goggles to protect eyes from spraying fuel. Fuel pressure in primer pump pressure line may reach 200 psi.

(21) Check for free fuel flow from primer pump pressure line at left hull bulkhead.

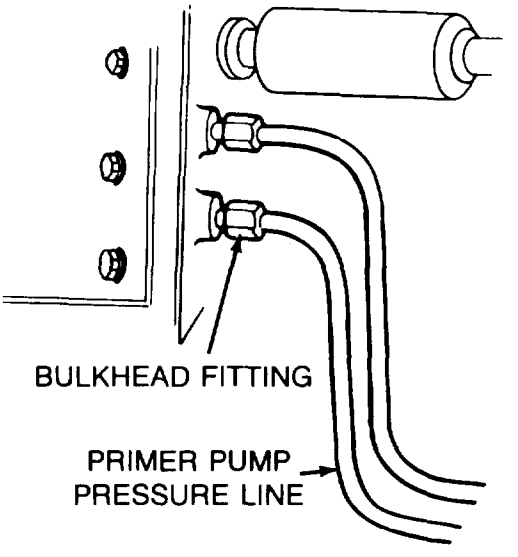
First Technician (Turret)

- Manually traverse turret to gain access to fittings on left hull bulkhead (TM 9-2350-222-10).
- Disconnect primer pump pressure line at bulkhead fitting.
- Place a container under line to catch any fuel.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Remove plug from primer pump outlet.
- Connect primer pump pressure line to primer pump.
- Operate primer pump.

Does fuel flow from primer pump pressure line at bulkhead?



LEFT HULL BULKHEAD VIEWED FROM TURRET PLATFORM

NO

YES

(22)

- **Check for free fuel flow from primer pump pressure line at quick disconnect in the engine compartment.**
- **See Step (26) .**

TA141887

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

WARNING

Wear goggles to protect eyes from spraying fuel. Fuel pressure in primer pump pressure line may reach 200 psi.

23 **Check for free fuel flow from primer pump pressure line at connection on lower front wall.**

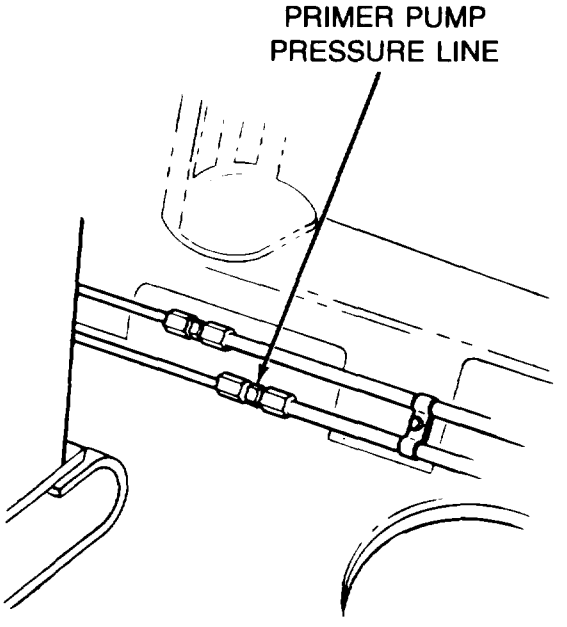
First Technician (Turret)

- Connect primer pump pressure line at left hull bulkhead.

Second Technician (Driver's Station)

- Disconnect primer pump pressure line at fitting on hull lower front wall.
- Place a container under line to catch any fuel.
- Operate primer pump.

Does fuel flow freely from disconnected line at the lower front wall?



PRIMER FUEL LINES
LOWER FRONT WALL
(DRIVER'S STATION)

NO

24 **Clear clogged line between fitting on lower front wall and primer pump by blowing with compressed air. If this does not work, replace line (page 7-343).**

YES

25 **Clear clogged line between fitting on lower front wall and left hull bulkhead by blowing with compressed air. If this does not work, replace line (page 7-337).**

TA141888

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

FROM STEP 22

26 **Check for free fuel flow from primer pump pressure line at quick disconnect in engine compartment.**

First Technician (Turret)

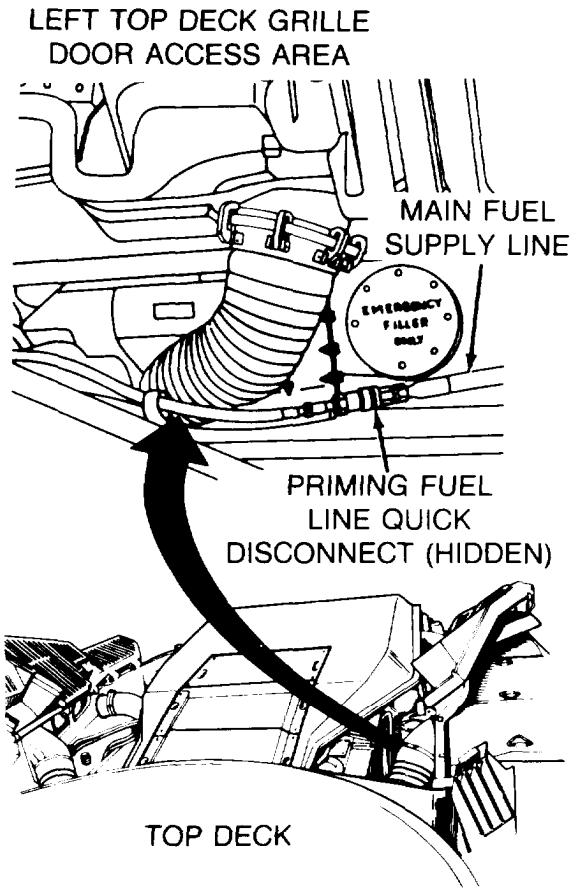
- Connect primer pump pressure line at left hull bulkhead.
- Manually traverse turret to gain access to left top deck grille doors.

First Technician (Top Deck)

- Open left top deck grille doors.
- Separate primer pump pressure line at quick disconnect. (Primer pump pressure line is the smaller of the two lines.)
- Push in on male end of quick disconnect with a punch or phillips screwdriver.

Second Technician (Driver's Station)

- Operate primer pump.



Does fuel flow freely from primer pump pressure line at quick disconnect?

YES

NO

27 **Clear clogged line between quick disconnect and left hull bulkhead by blowing with compressed air. If this does not work, notify support maintenance.**

TA141889

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

28 **Check for free fuel flow from primer pump pressure line at backflow valve.**

First Technician (Top Deck)

- Connect primer pump pressure line quick disconnect.
- Close left top deck grille doors.

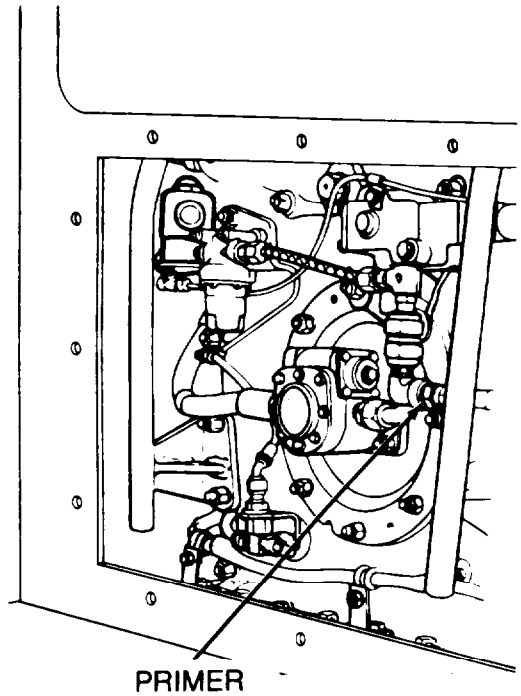
First Technician (Turret)

- Manually traverse turret to gain access to engine access covers (TM 9-2350-222-10).
- Remove lower engine access cover (page 16-41).
- Disconnect primer pump pressure line at elbow, under filter at backflow valve.
- Place a container under line to catch any fuel.

Second Technician (Driver's Station)

- Operate primer pump.

Does fuel flow freely from line at backflow valve?



PRIMER PUMP PRESSURE LINE

FRONT OF ENGINE ACCESS COVERS REMOVED

YES

NO

29 **Clear clogged line between quick disconnect and the backflow valve by blowing with compressed air. If this does not work, replace line (page 7-343).**

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

30 **Check for free fuel flow from tee fitting under backflow valve.**

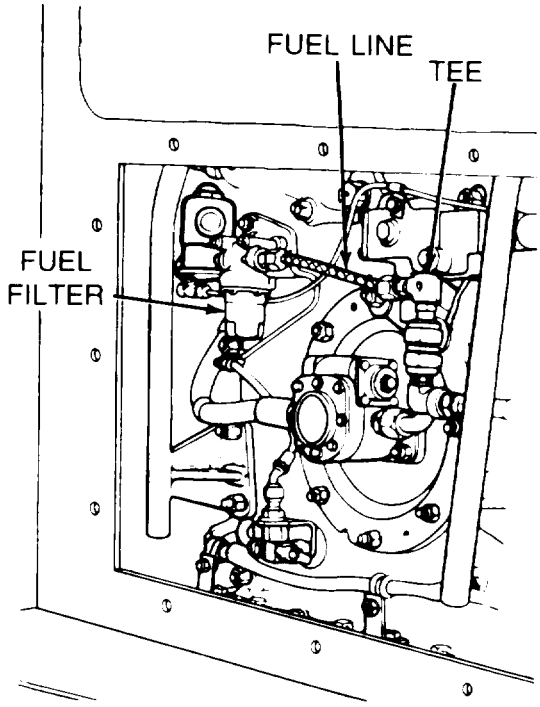
First Technician (Turret)

- Connect primer pump pressure line to elbow.
- Disconnect fuel line between the tee under backflow valve and filter of manifold fuel supply solenoid at filter.
- Place a container under tee to catch any fuel.

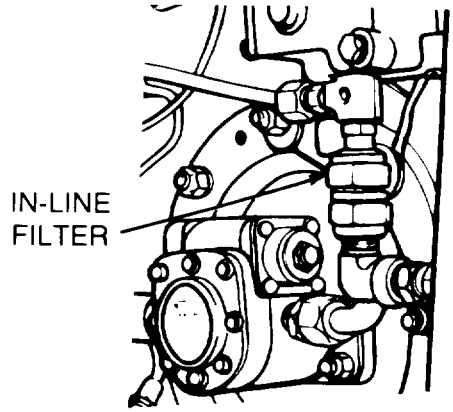
Second Technician (Driver's Station)

- Operate primer pump.

Does fuel flow freely from tee under backflow valve?



FRONT OF ENGINE VIEWED FROM TURRET PLATFORM



YES

NO

31 **Replace inline filter under the backflow valve (page 7-41).**

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

32 **Check for free fuel flow between engine fuel pump and backflow valve.**

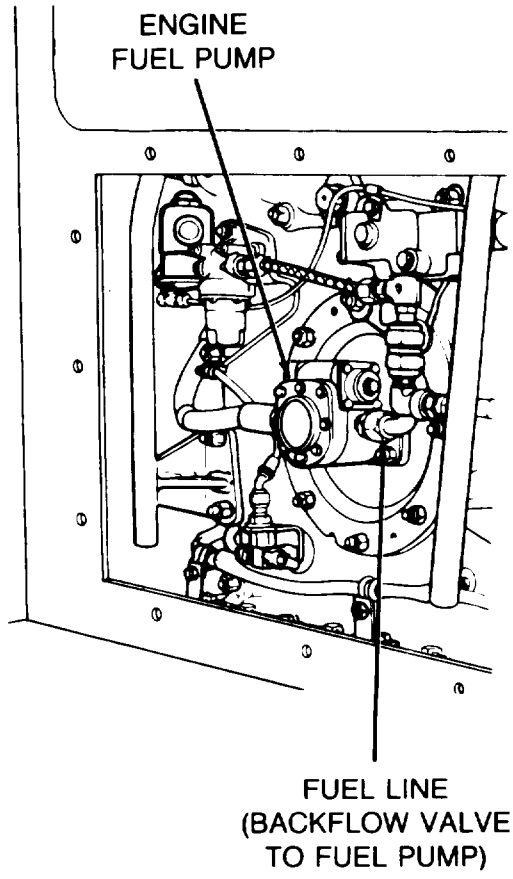
First Technician (Turret)

- Connect fuel line between tee under the backflow valve and filter of manifold heater fuel supply solenoid.
- Loosen line between backflow valve and engine fuel pump.
- Place a container under loose connection to catch any fuel.

Second Technician (Driver's Station)

- Operate primer pump.

Does fuel squirt from loose connection?



YES

NO

33 **Replace backflow valve (page 7-41).**

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

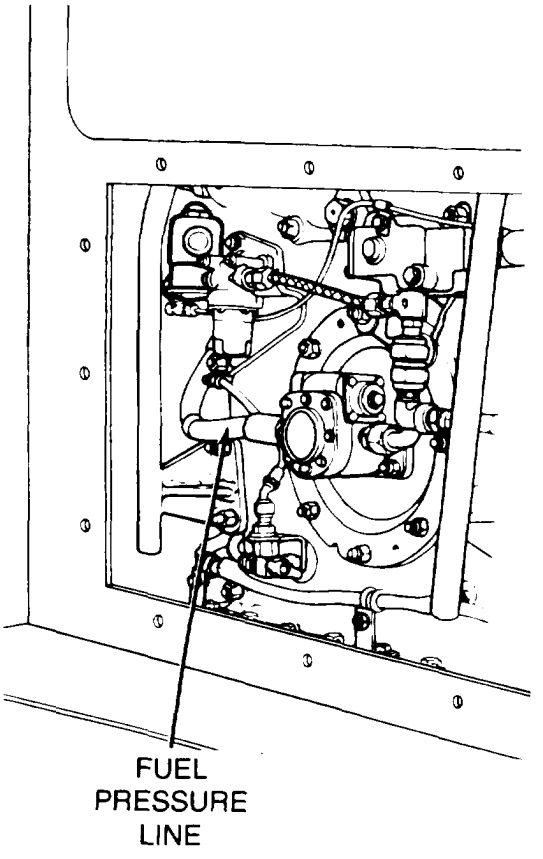
34 **Check for free fuel flow at outlet side of engine fuel pump.**

First Technician (Turret)

- Tighten line between backflow valve and engine fuel pump.
- Disconnect line between engine fuel pump and fuel-water separator at fuel pump.
- Place a container under engine fuel pump to catch any fuel.

Second Technician (Driver's Station)

- Operate primer pump.



Does fuel flow freely from outlet side of engine fuel pump?

YES

NO

35 **Replace engine fuel pump (page 7-37).**

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

36 **Check for free fuel flow at fuel-water separator.**

First Technician (Turret)

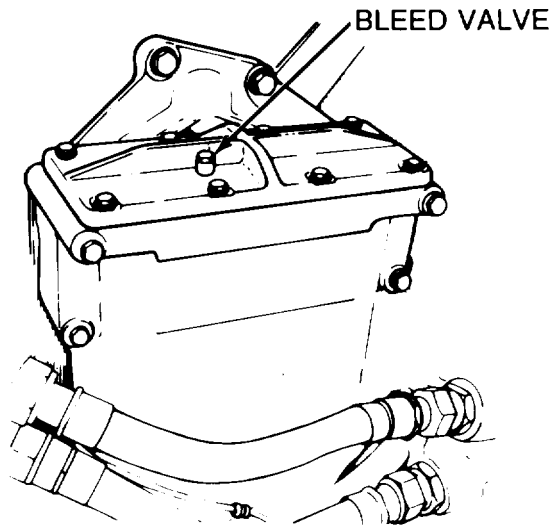
- Connect fuel line between engine fuel pump and fuel-water separator.
- Loosen bleed valve on top of fuel-water separator.

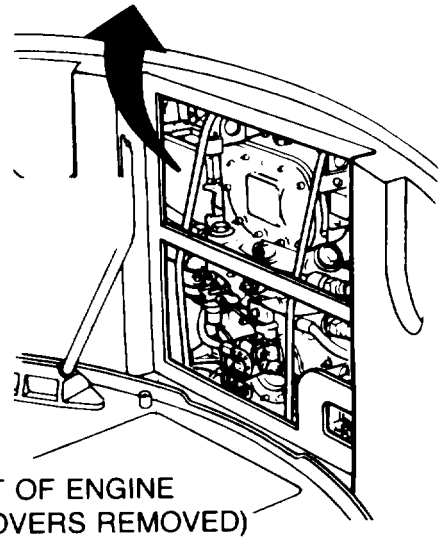
Second Technician (Driver's Station)

- Operate primer pump several times.

Does fuel flow freely from fuel-water separator bleed valve?

FUEL-WATER SEPARATOR





YES

NO

37 **Clear clogged line between engine fuel pump and fuel-water separator by blowing with compressed air. If this does not work, replace line (page 7-299).**

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

38 **Check main fuel line from fuel-water separator to engine for free fuel flow.**

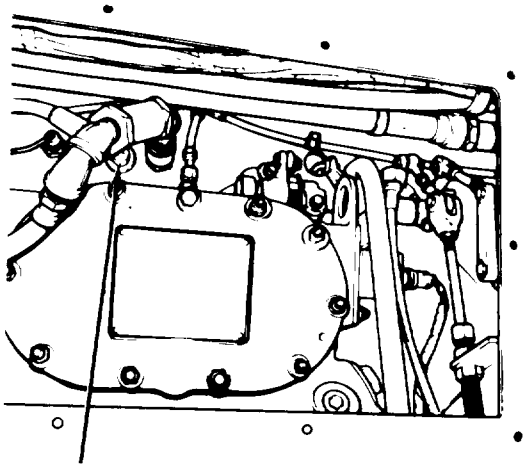
First Technician (Turret)

- Tighten bleed valve on top of fuel-water separator.
- Disconnect fuel line from fuel-water separator at top of engine.
- Place a container under disconnected line to catch any fuel.

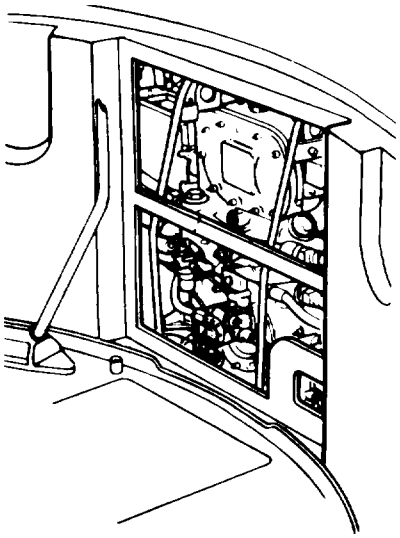
Second Technician (Driver's Station)

- Operate primer pump.

Does fuel flow freely from main fuel line at top of engine?



MAIN
FUEL LINE



YES

NO

39 **Clear line between fuel-water separator and engine by blowing with compressed air. If this does not work, replace the line (page 7-296).**

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

40 **Check for free fuel flow at engine fuel return line quick disconnect.**

First Technician (Turret)

- Connect fuel line from fuel-water separator to engine.
- Install lower engine access cover (page 16-42).

Both Technicians (Rear Grille Doors)

- Remove transmissions shroud (page 9-20).

First Technician (Rear Grille Doors)

- Separate main fuel return line quick disconnect.
- Place a container under disconnected line to catch any fuel.
- Using a punch or phillips screwdriver, press in on female end of the disconnect valve.

Second Technician (Driver's Station)

- Operate primer pump.

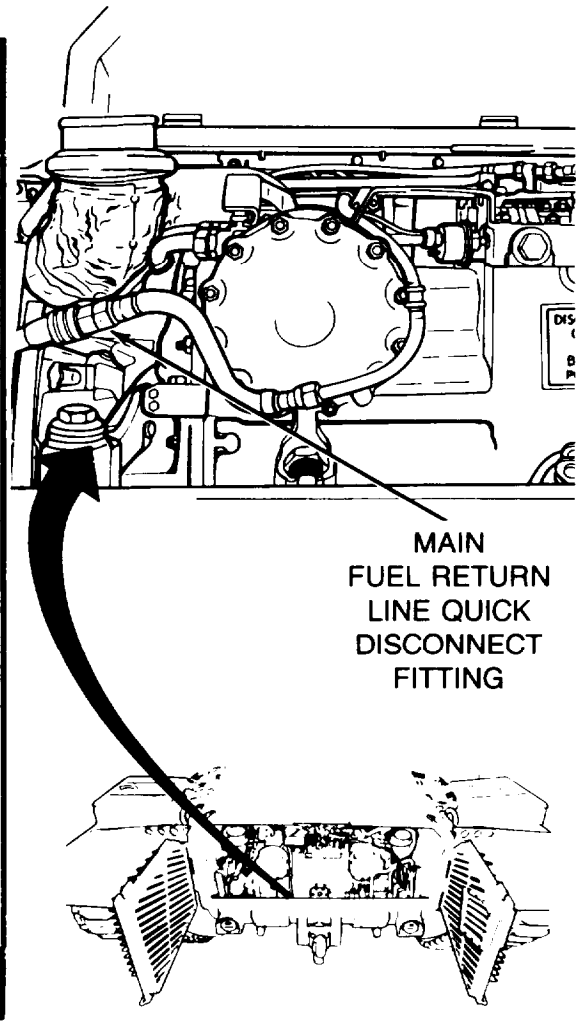
Does fuel flow freely from quick disconnect?

41 **Check for free fuel flow from quick disconnect on the hose leading to fuel tank return selector valve.**

YES

- **See Step 53.**

NO



TA141896

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-7

42 **Check for free fuel flow from main fuel return line at top of engine.**

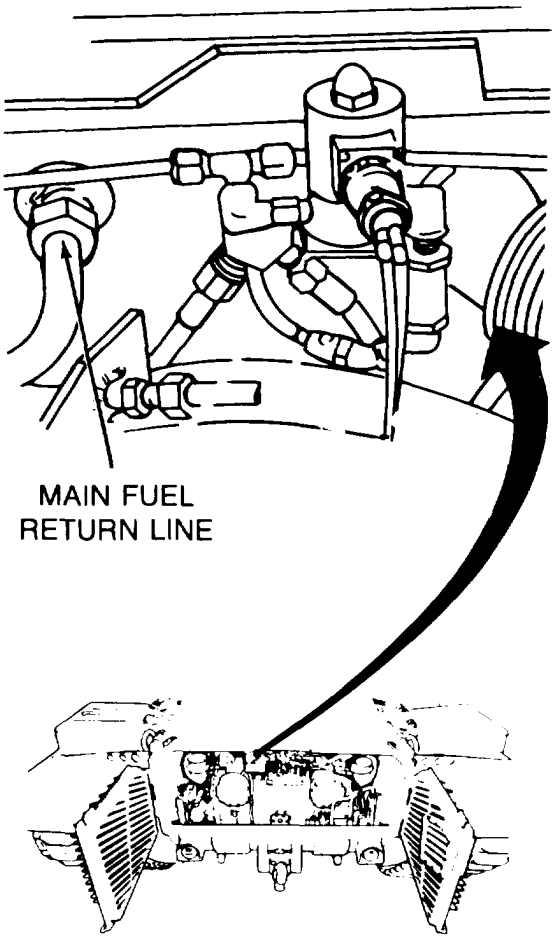
First Technician (Rear Grille Doors)

- Loosen connection in main fuel return line at top of the engine.
- Place a container under loose connection to catch any fuel.

Second Technician (Driver's Station)

- Operate primer pump.

Does fuel flow freely from loose connection?



YES

NO

43

- **Check for free fuel flow from main fuel return outlet at injector pump.**
- **See Step (47) .**

TA141897

Symptom-7

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

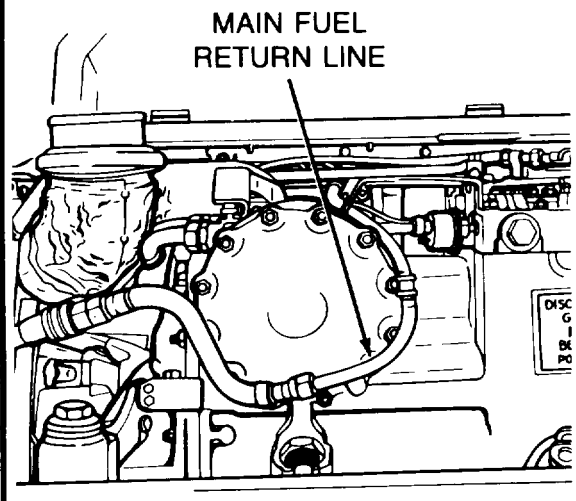
44 **Check for free fuel flow at connection between main fuel return line tubing and flexible hose leading to quick disconnect.**

First Technician (Rear Grille Doors)

- Attach main fuel return line quick disconnect.
- Tighten main fuel return connection at top of engine.
- Loosen connection betweeen main fuel return line and flexible hose.
- Place a container under loose connection to catch any fuel.

Second Technician (Driver's Station)

- Operate primer pump.



Does fuel flow freely from loose connection?

NO → **45** **Clear clogged line between top of engine and flexible hose by blowing with compressed air. If this does not work, replace line (page 7-251).**

YES → **46** **Clear clogged hose by blowing with compressed air. If this does not work, replace flexible hose (page 7-251).**

TA141898

Symptom-7

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 43

47 Check for free fuel flow from main fuel return outlet at injector pump.

First Technician (Rear Grille Doors)

- Connect main fuel return line quick disconnect.

Both Technicians (Top Deck)

- Remove top deck (page 16-21).
- Remove engine cooling fans (page 9-48).
- Disconnect main fuel return line at injector pump.

Second Technician (Driver's Station)

- Operate primer pump.

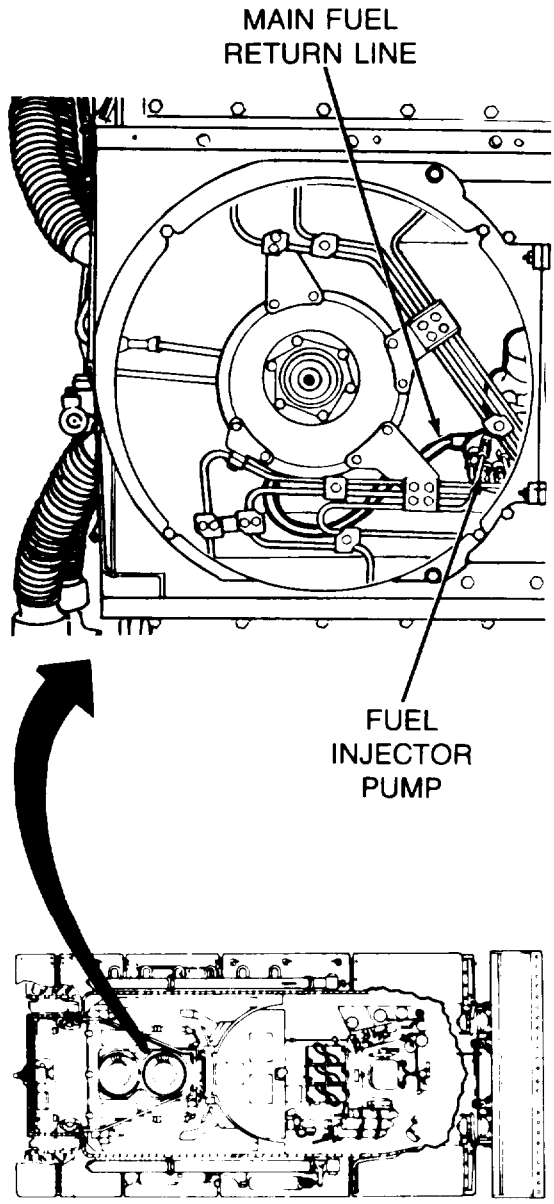
Does fuel flow from injector pump return outlet?

48 Clear clogged fuel supply line between front of engine and inlet side of fuel injector pump by blowing with compressed air. If this does not work, replace line (page 7-32).

NO

49 Clear clogged fuel return line between injector pump and the rear of engine by blowing with compressed air. If this does not work, replace line (page 7-22).

YES



Symptom-7 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 11

50 **Check for free fuel flow from primer pump supply line in engine compartment.**

First Technician (Turret)

- Connect fuel supply line to bulkhead.

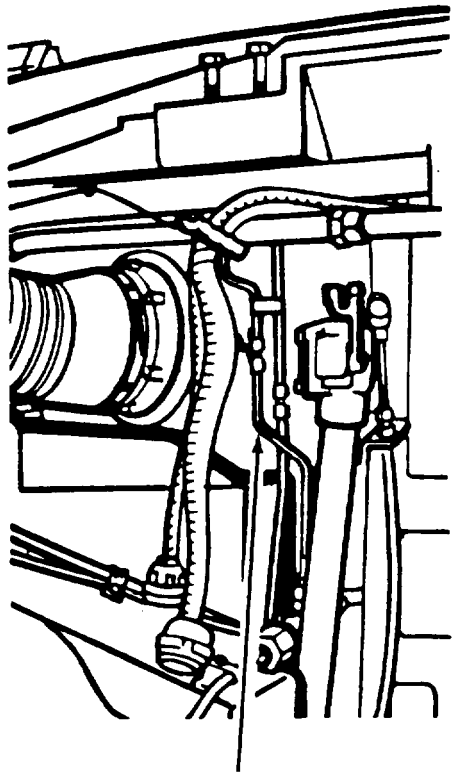
Both Technicians (Top Deck)

- Remove powerplant (page 5-1).
- Disconnect primer pump supply line at inline connection.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON, then OFF.

Does fuel flow freely from primer pump supply line in engine compartment?



PRIMER PUMP SUPPLY LINE

NO → **51** **Clear line between inline connector and main fuel supply by blowing with compressed air. If this does not work, replace the line (page 7-348).**

YES → **52** **Clear line between inline connector in engine compartment and left hull bulkhead by blowing with compressed air. If this does not work, notify support maintenance.**

TA141900

Symptom-7

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 41

53 **Check for free fuel flow from quick disconnect on hose leading to fuel tank return selector valve.**

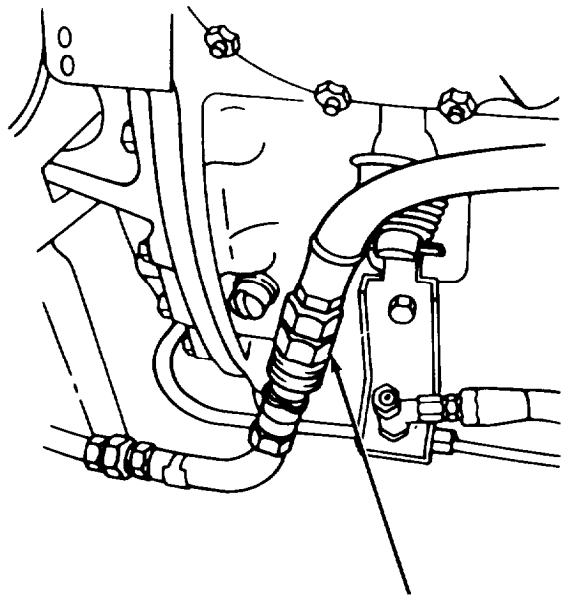
NOTE

Fuel tanks must be full to perform this check.

First Technician (Rear Grille Doors)

- Holding line as low as possible push in on male main fuel return line quick disconnect with a punch or phillips screwdriver.

Does fuel flow freely from quick disconnect?



NO

YES

54 **Replace main fuel line quick disconnect fitting (page 7-251).**

TA141901

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

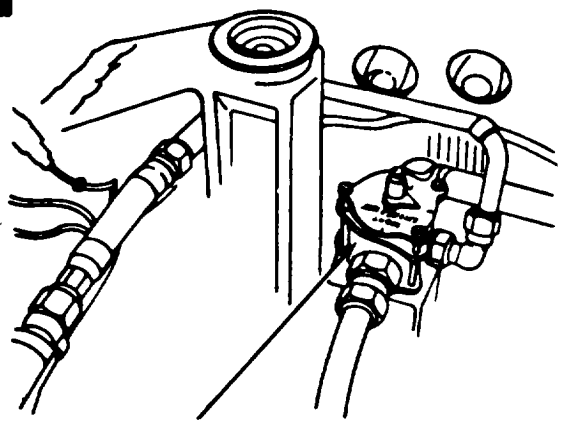
Symptom-7

55 **Check engine fuel return tank selector valve for proper position.**

First Technician (Rear Grille Doors)

- Connect main fuel return line quick disconnect.
- Observe selector valve for both positions.

Is return tank selector valve wired in BOTH position?



FUEL RETURN SELECTOR VALVE

SHOWN WITH POWERPLANT REMOVED FOR CLARITY

YES

NO

56 **Place valve in BOTH position and lockwire.**

TA141902

Symptom-7

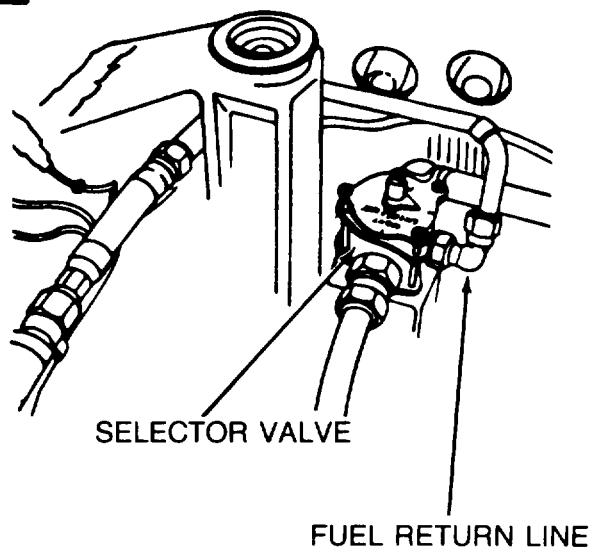
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

57 **Check for free fuel flow at inlet side on engine fuel return tank selector valve.**

First Technician (Rear Grille Doors)

- Loosen engine fuel return line at tank selector valve.

Does fuel flow from loose connection?



YES → **58** **Clear clogs from return line between quick disconnect and tank selector by blowing with compressed air. If this does not work, replace the line (page 7-251).**

NO → **59** **Replace engine fuel return tank selector valve (page 7-253).**

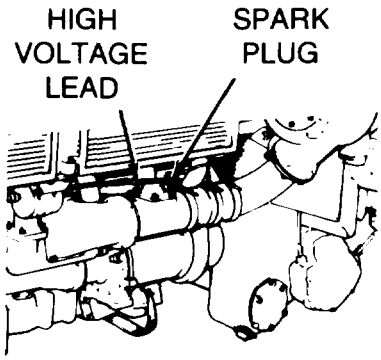
TA141903

Symptom-8 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

ONE INTAKE MANIFOLD PREHEATER WILL NOT WORK.

WARNING

When power is on, keep hands away from high voltage ignition lead. Contact with high voltage output can cause injury or death.



NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check for electrical power to manifold preheater spark plug.

First Technician (Top Deck)

- Remove powerplant (page 5-1).

First Technician (Powerplant)

- Ground hop powerplant (page 5-48). Do not start engine.
- Disconnect high voltage ignition lead from spark plug of cold manifold preheater.
- Place disconnected end of high voltage ignition lead 1/4 inch from engine ground.
- Check if disconnected end of high voltage ignition lead arcs to ground when manifold preheater and starter switches are pressed.

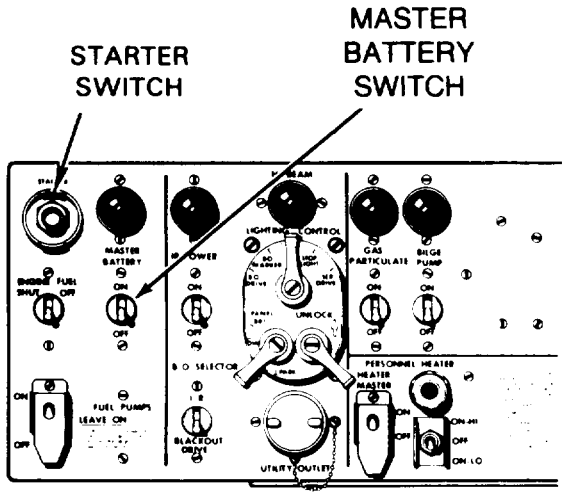
Symptom-8 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP 1 CONTINUED

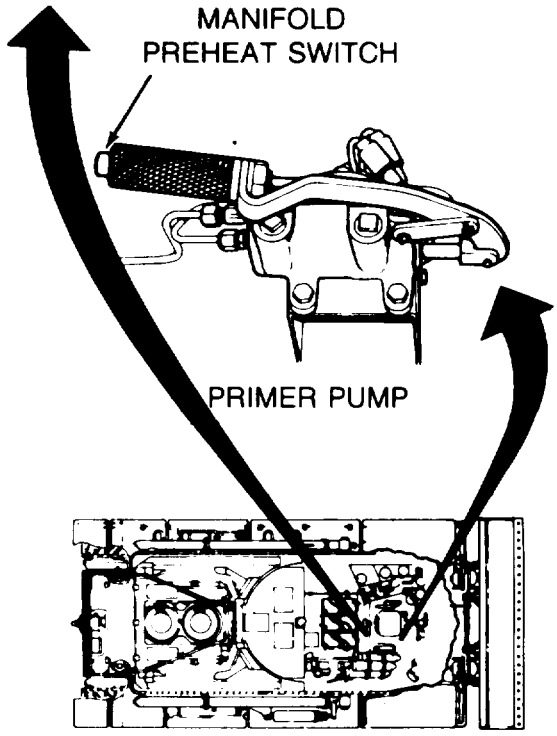
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches for approximately 10 seconds, then release.

Did voltage arc to ground from high voltage ignition lead?



MASTER CONTROL PANEL



FOR CLARITY TURRET NOT SHOWN

NO

2

- **Check for electrical power to manifold heater ignition unit (CKT 486).**
- **See Step 6 .**

YES

TA253077

Symptom-8

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

3 **Check if fuel is being supplied to spark plug of cold manifold heater.**

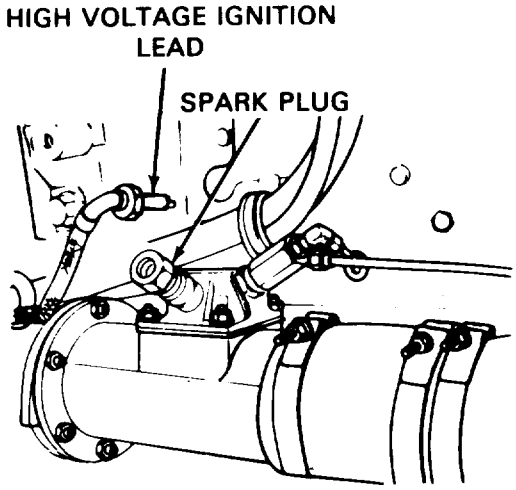
Second Technician (Driver's Station)

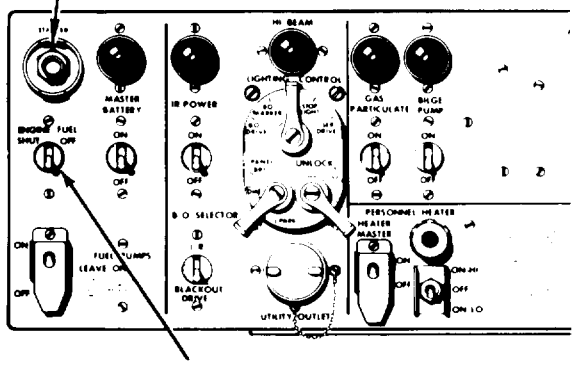
- Set MASTER BATTERY switch ON.
- Hold fuel SHUTOFF switch in OFF position.
- Press manifold preheat and starter switches. Operate primer pump for approximately 10 seconds, then release.
- Set MASTER BATTERY switch OFF.

First Technician (Powerplant)

- Remove spark plug from cold manifold heater (page 7-372).
- Check electrodes of spark plug for presence of fuel.

Is spark plug wet with fuel?





MASTER CONTROL PANEL

4 **Replace manifold heater spark plug (page 7-372).**

YES

NO

5

- **Check if fuel is being supplied to manifold heater nozzle.**
- **See Step (13).**

TA253078

Symptom-8
FROM STEP

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

2

6 **Check for electrical power to manifold heater ignition unit (CKT 486).**

First Technician (Powerplant)

- Disconnect engine electrical harness connector from manifold heater ignition unit at cold manifold heater.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact A (CKT 486) of engine electrical harness connector at manifold heater ignition unit.
- Connect black probe to ground.

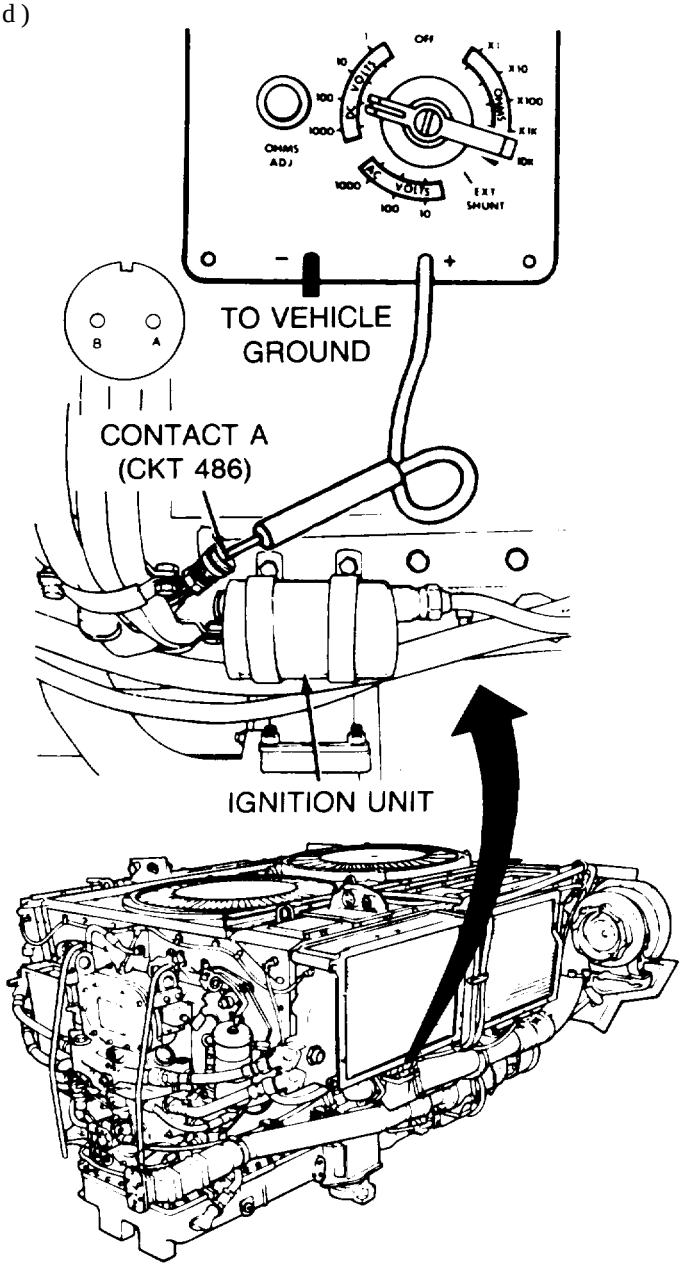
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches for approximately 10 seconds, then release.

First Technician (Powerplant)

- Check if meter indicates 18 to 30 volts dc.

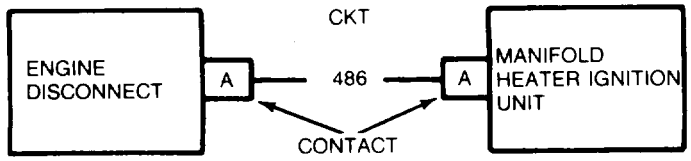
Does meter indicate 18 to 30 volts dc?



7 **Repair engine electrical harness (CKT 486) (page 10-307).**

NO

YES



Symptom-8

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

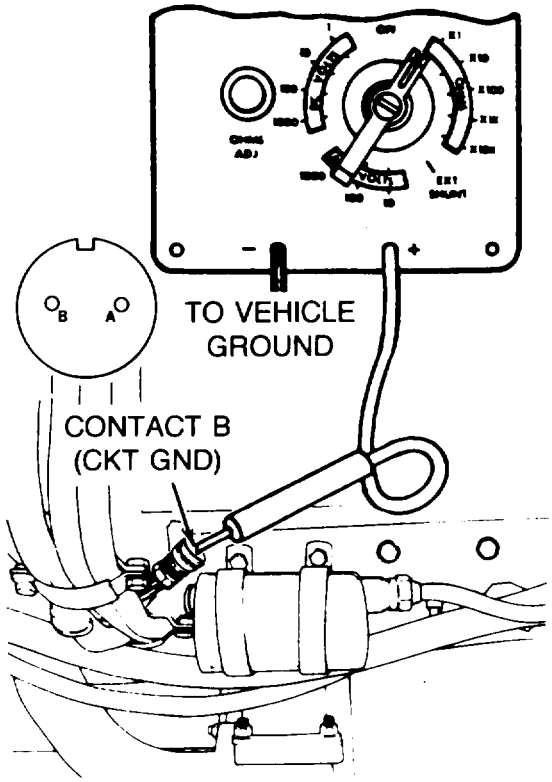
8 Check engine electrical harness (CKT GND) for continuity.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Powerplant)

- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT GND) of engine electrical harness connector at manifold heater ignition unit.
- Connect black probe to ground.
- Check if meter indicates continuity.

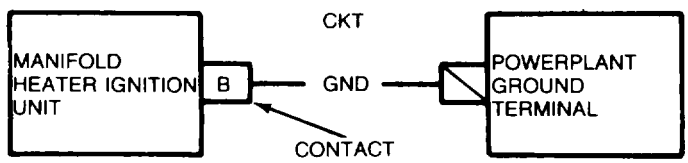


Does meter indicate continuity?

YES

NO

9 Repair engine electrical harness (CKT GND) (page 10-307).



TA141908

Symptom-8

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

10 Check high voltage ignition lead for short to ground.

First Technician (Powerplant)

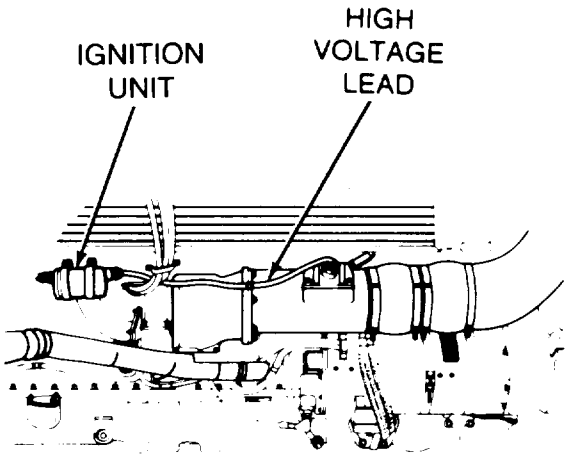
- Connect engine electrical harness connector to manifold heater ignition unit at cold manifold heater.
- Disconnect high voltage ignition lead from manifold heater ignition unit at cold manifold heater (keep this lead).
- Disconnect high voltage ignition lead from manifold heater ignition unit and spark plug at manifold heater on opposite side of engine and connect it to ignition unit and spark plug of cold manifold heater.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches and hold for 10 seconds, then release.

First Technician (Powerplant)

- Check if heat can be felt from manifold heater.



(RIGHT SIDE OF ENGINE SHOWN)

Did manifold heater get hot?

YES

11 Replace high voltage ignition lead, (page 7-394).

NO

12
- **Replace manifold heater ignition unit, (page 7-394).**
- **Reinstall high voltage ignition lead to manifold heater without a lead.**

Symptom-8

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 5

13 Check if fuel is being suplied to manifold heater nozzle.

First Technician (Powerplant)

- Disconnect manifold heater fuel inlet line at manifold heater which is not working.

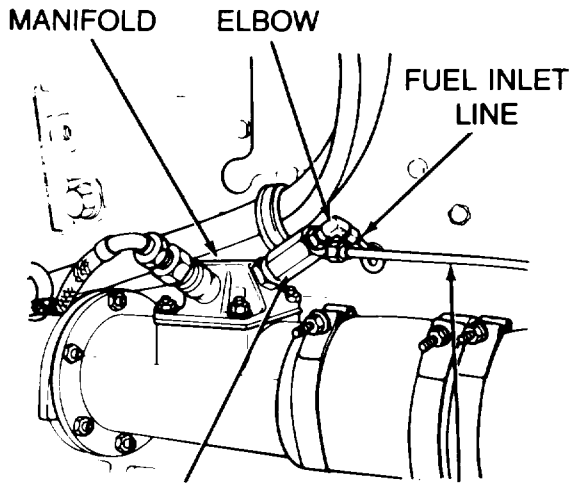
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches. Operate primer pump for approximately 10 seconds, then release.

First Technician (Powerplant)

- Check for free fuel flow, at disconnected inlet line, while primer pump is being operated.

Is fuel being supplied to manifold heater nozzle?



MANIFOLD HEATER
(RIGHT SIDE OF ENGINE SHOWN)

NO → **14 Replace fuel line from solenoid valve to manifold heater nozzle (page 7-397).**

YES → **15 Replace manifold heater nozzle (page 7-369).**

TA253081

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-9-2D

BOTH INTAKE MANIFOLD PREHEATERS WILL NOT WORK (2D ENGINE)

NOTE

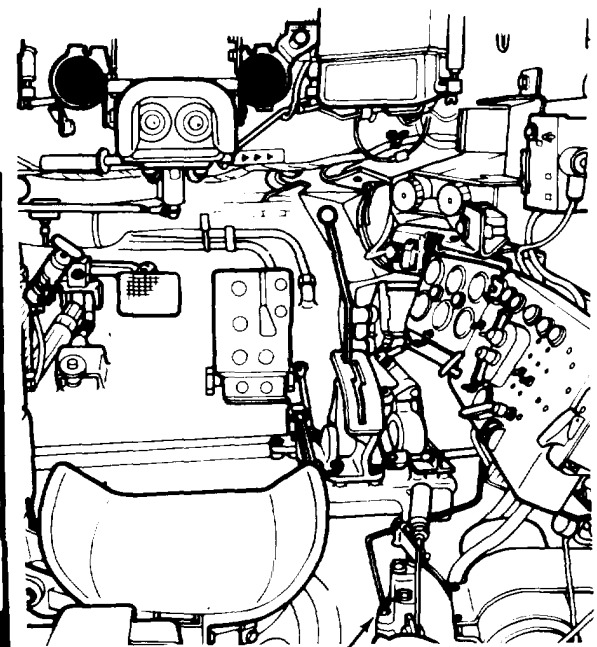
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check primer pump for back pressure.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.
- Operate primer pump several times.
- Check if back pressure builds up while operating primer pump.

Does primer pump build up normal back pressure?



YES

NO

2 See Symptom 7; PRIMER PUMP WILL NOT WORK.

■ All data on pages 4-290 thru 4-307 deleted.

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

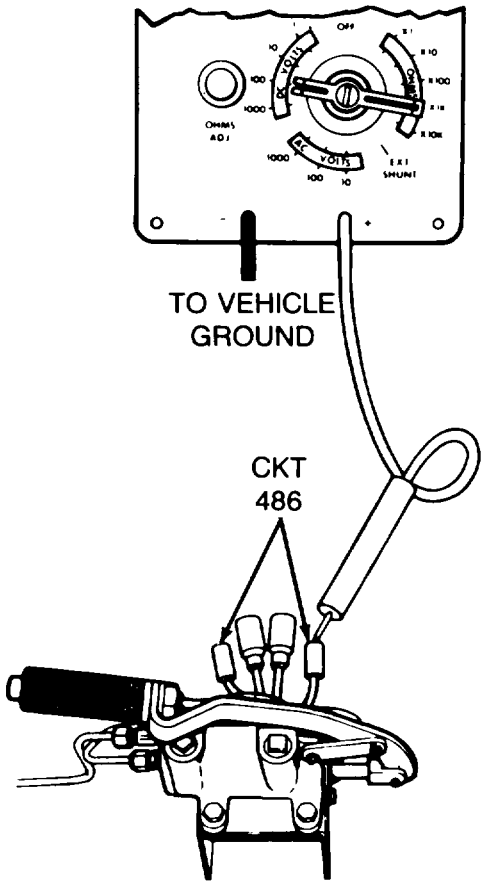
Symptom-9-2A

3 **Check hull front master harness (CKT 486) at manifold preheat switch connector for electrical power.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect both harness connectors (CKT 486) from preheat switch at primer pump.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect black probe of meter to ground.
- Connect red probe of meter to one of hull front master harness CKT 486 leads and then to other lead.
- Set MASTER BATTERY switch ON.
- Press and release STARTER switch.
- Check if meter indicates 18 to 30 volts dc.

Did meter indicate 18 to 30 volts dc at one of the connectors?



NO

YES

4
- **Check manifold preheat switch for continuity.**
- **See Step 10 .**

TA253082

Symptom-9-2A

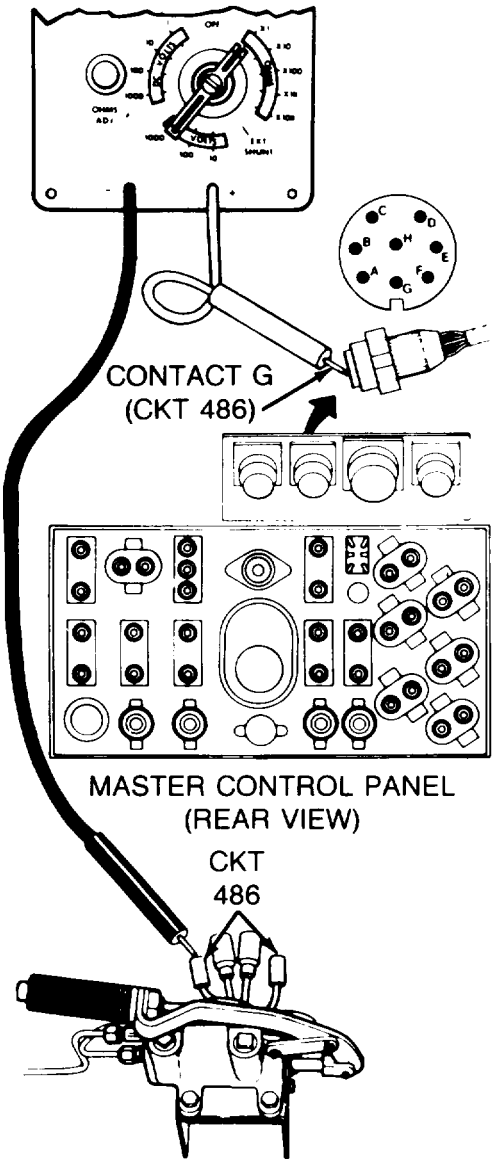
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

5 **Check for continuity between primer pump (CKT 486) and master control panel.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master battery harness at master control panel.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact G (CKT 486) of hull front master harness connector at master control panel.
- Connect black probe of meter first to one (CKT 486) lead at primer pump and then to other lead.
- Check if meter indicates continuity at one of the leads (CKT 486) at primer pump.

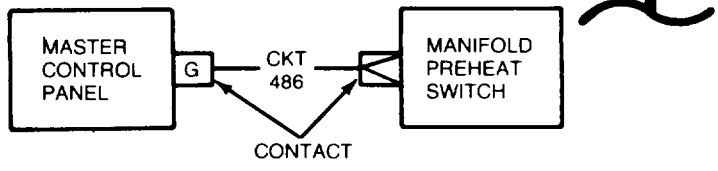
Did multimeter indicate continuity at one of the two (CKT 486) leads at primer pump?



6

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 486) wire at rear of connector.**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Repair connectors if defective (page 10-307).**
- **Connect both harness connectors to manifold preheat switch.**
- **Connect hull front master harness to master control panel.**
- **Install master control panel (page 10-47).**

NO — YES



TA141913

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

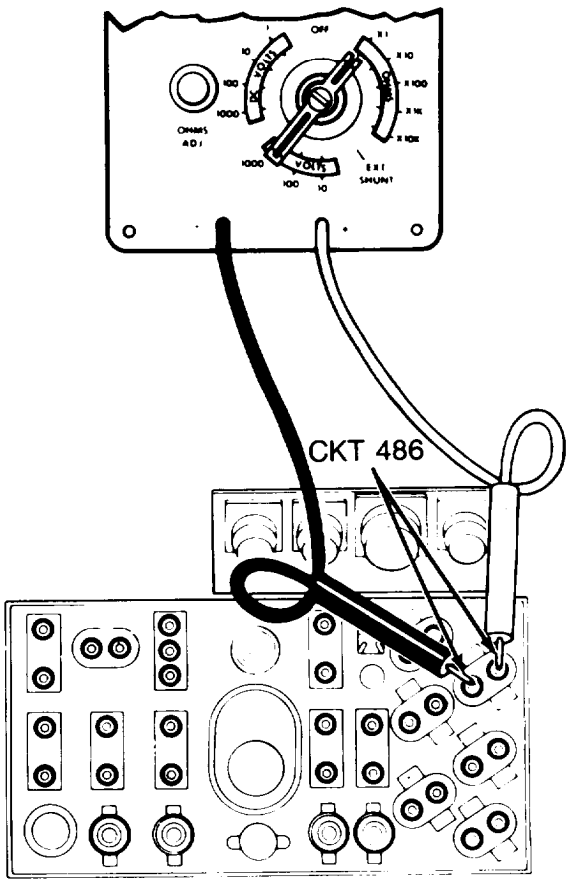
Symptom-9-2A

7 **Check manifold preheat circuit breaker (CKT 486) for continuity.**

First Technician (Driver's Station)

- Connect hull front master harness connectors to preheat switch at primer pump.
- Connect hull front master harness connector to master control panel.
- Disconnect electrical lead connectors (CKT 486) from manifold preheat circuit breaker on master control panel.
- Connect red probe of meter to one circuit breaker contact and black probe of meter to other circuit breaker contact.
- Check if meter indicates continuity.

Did meter indicate continuity?



NO

8 **Replace manifold preheat circuit breaker (page 10-90).**

YES

9
- **Replace master battery harness (page 10-107).**
- **Connect electrical lead connector to manifold preheat circuit breaker.**

TA141914

Symptom-9-2A DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

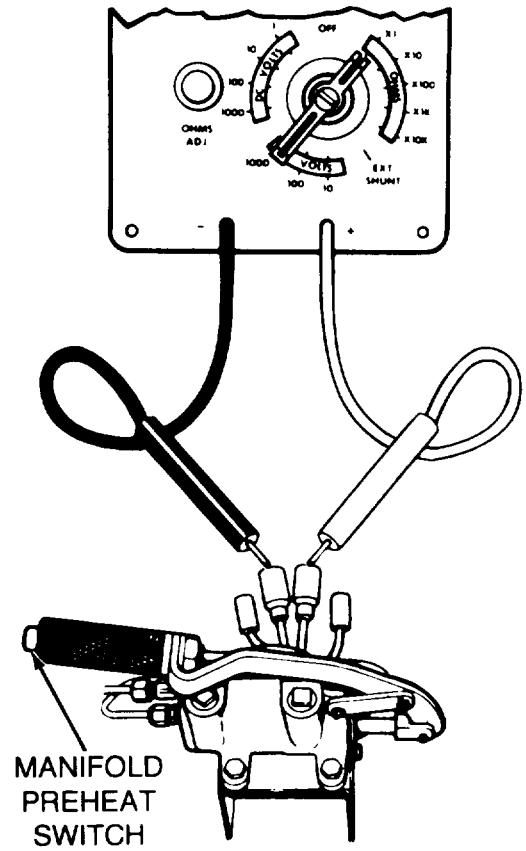
FROM STEP 4

10 Check manifold preheat switch for continuity.

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to one manifold preheat switch connector and black probe to other manifold preheat switch connector.
- Press and hold manifold preheat switch.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

11 Replace primer pump (page 7-359).

TA141915

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-9-2A

12 **Check hull front master harness (CKT 486) at bulkhead electrical disconnect for electrical power.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect both hull front master harness connectors to preheat switch at primer pump.

Second Technician (Turret)

- Disconnect hull front master harness connector from engine accessory harness connector at bulkhead electrical disconnect.
- Connect red probe of meter to contact A (CKT 486) of hull front master harness black probe to ground.

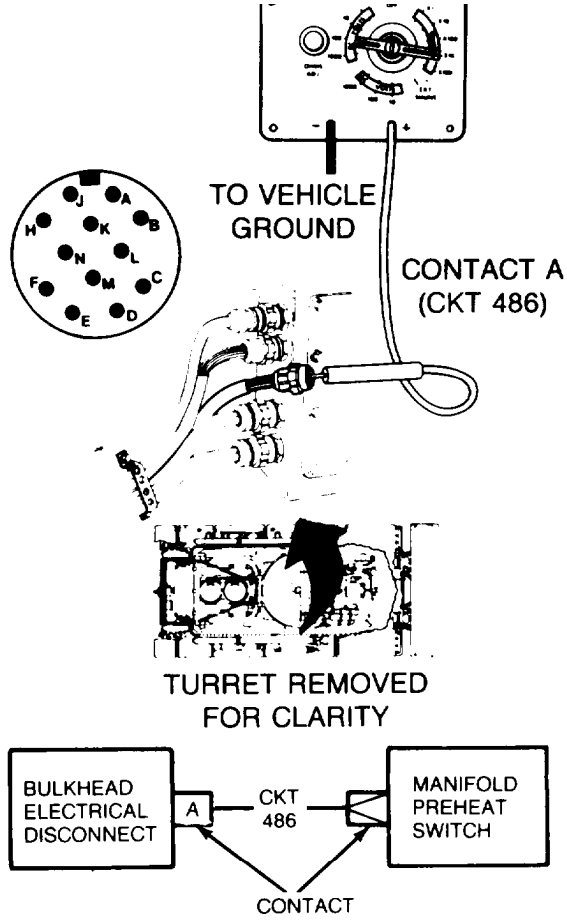
First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches for about 10 seconds, then release.

Second Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

Did meter indicate 18 to 30 volts dc?



YES

NO

13

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 486) wire.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness to bulkhead electrical disconnect.**

TA253083

Symptom-9-2A

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

14 **Check engine accessory harness (CKT 486) at engine disconnect for electrical power.**

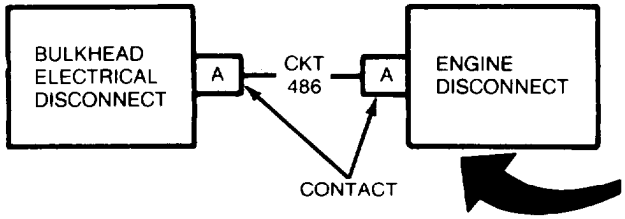
First Technician (Driver's Station)
- Set MASTER BATTERY switch OFF.

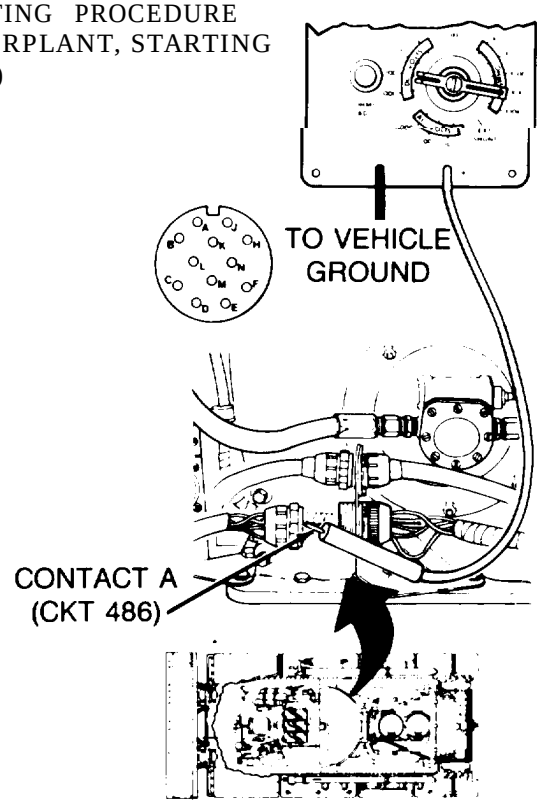
Second Technician (Turret)
- Connect hull front master harness connector to bulkhead disconnect.
- Manually traverse turret to gain access to engine access covers (TM 9-2350-222-10).
- Remove lower engine access cover (page 16-41).
- Disconnect engine accessory harness connector from engine electrical harness connector at engine disconnect.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact A (CKT 486) of engine accessory harness connector at engine disconnect and black probe to ground.

First Technician (Driver's Station)
- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches for about 10 seconds then release.

Second Technician (Turret)
- Check if meter indicates 18 to 30 volts dc.

Did meter indicate 18 to 30 volts dc?





TURRET REMOVED FOR CLARITY

YES

NO

15
- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 486) wire.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness to engine disconnect.**
- **Install lower engine access cover (page 16-42).**

TA253084

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-9-2A

16 **Check manifold heater fuel supply solenoid for operation.**

Second Technician (Turret)

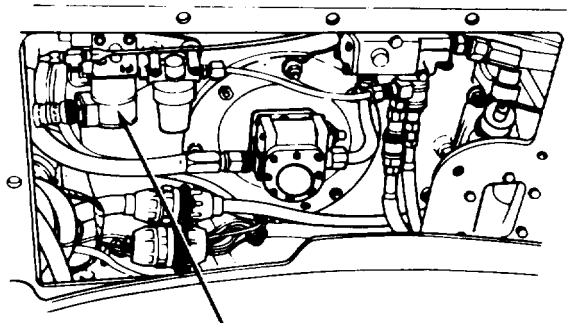
- Connect engine accessory harness connector to engine electrical harness connector at engine disconnect.
- Listen for manifold heater fuel supply solenoid to click when first technician operates switches.

First Technician (Driver's Station)

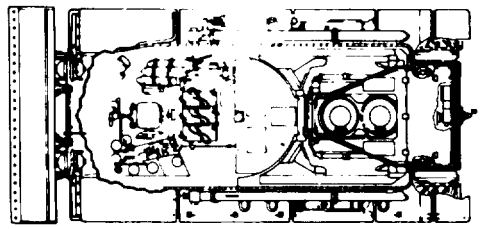
- Set MASTER BATTERY switch ON.
- Press the manifold preheat switch several times and release.
- Set MASTER BATTERY switch OFF.

Did manifold heater fuel supply solenoid click when manifold preheat switch was pressed?

LOWER ENGINE ACCESS COVERS REMOVED



FUEL SUPPLY SOLENOID VALVE



FOR CLARITY TURRET NOT SHOWN

NO

YES

17

- **Check for free fuel flow at outlet of manifold heater solenoid valve.**
- **See Step (23).**

TA141918

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-9-2A

18 **Check for voltage at connector to manifold heater fuel supply solenoid.**

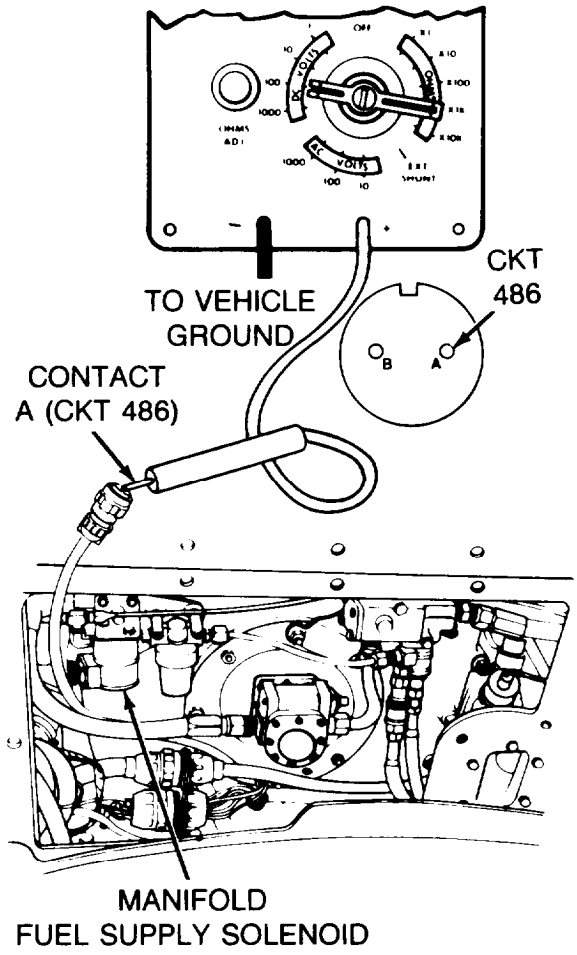
Second Technician (Turret)

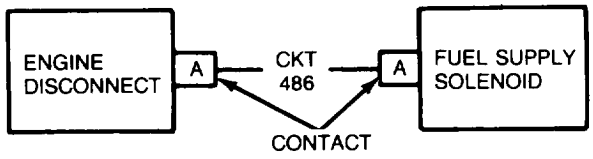
- Disconnect engine electrical harness connector from manifold heater fuel solenoid connector.
- Connect red probe of meter to contact A (CKT 486) of engine electrical harness connector and black probe to ground.
- Observe meter for voltage indication when first technician operates switches.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat switch several times and release.

Does meter indicate 18 to 30 volts dc?





YES

NO

19 **Repair engine electrical harness (CKT 486) (page 10-307).**

TA141919

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-9-2A

20 **Check engine electrical harness at connector to manifold heater fuel supply solenoid, for continuity from CKT GND to vehicle ground.**

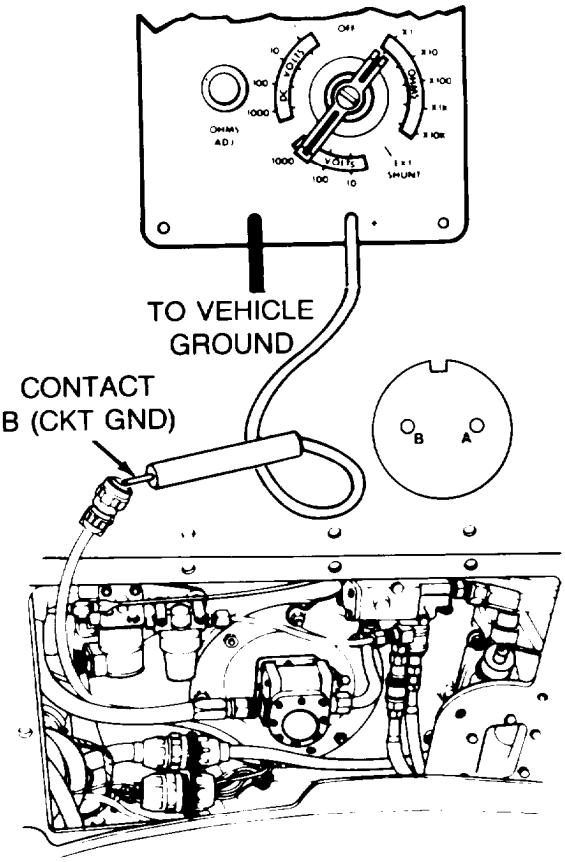
First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Turret)

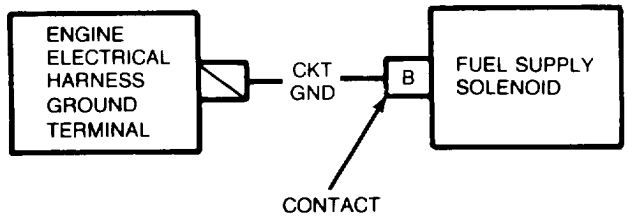
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT GND) of engine electrical harness connector at manifold heater fuel supply solenoid and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?



21 **Replace manifold heater fuel supply solenoid (page 7-402).** YES

22 **Repair engine electrical harness (CKT GND) (page 10-307).** NO



TA 141920

DETAILED TROUBLESHOOTING PROCEDURE

VEHICLE OPERATION - POWERPLANT, STARTING

(Continued)

Symptom-9-2A

FROM STEP 17

23 **Check for free fuel flow from outlet of manifold heater solenoid valve.**

Second Technician (Turret)

- Remove elbow from manifold heater solenoid valve outlet port.
- Place a container under line to catch any fuel.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches for about 10 seconds and release.
- Set MASTER BATTERY switch OFF.

Does fuel flow freely from outlet of manifold heater solenoid valve?

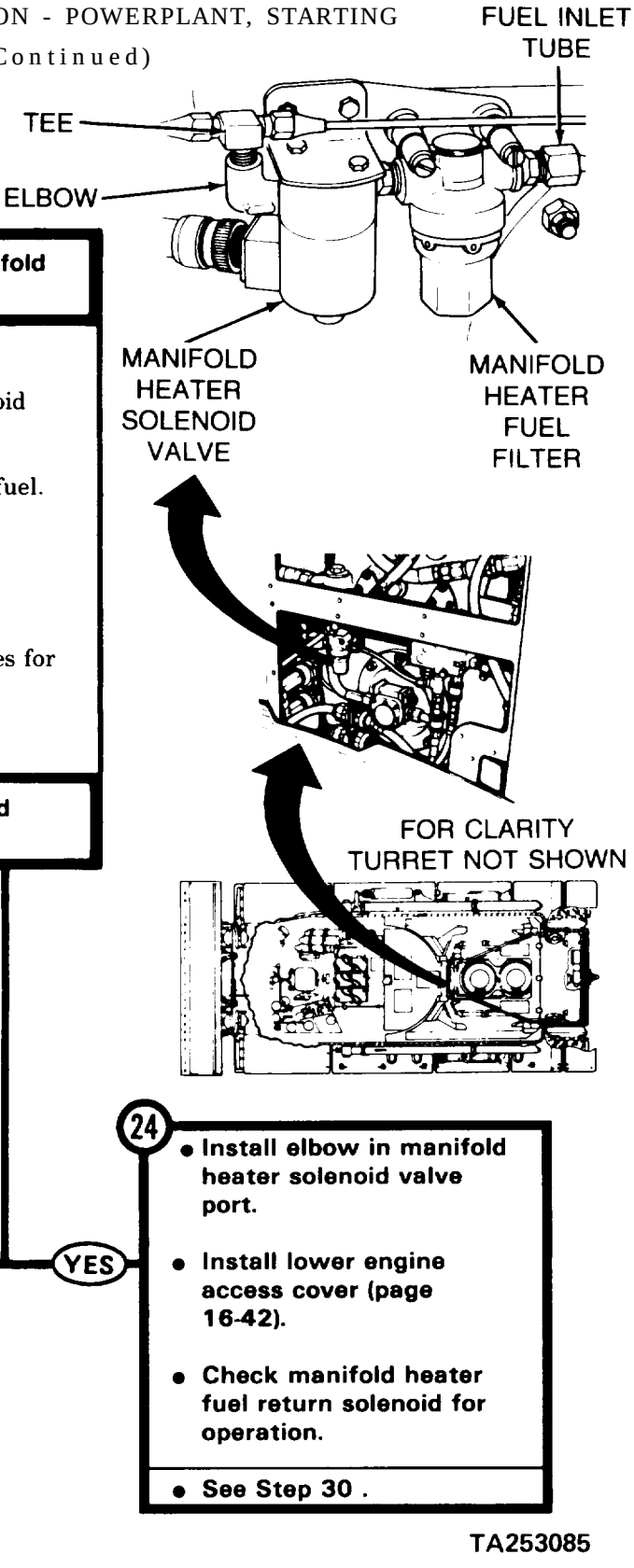
NO

YES

24

- **Install elbow in manifold heater solenoid valve port.**
- **Install lower engine access cover (page 16-42).**
- **Check manifold heater fuel return solenoid for operation.**

- **See Step 30 .**



TA253085

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-9-2A

25 **Check for free fuel flow at inlet to manifold heater fuel filter.**

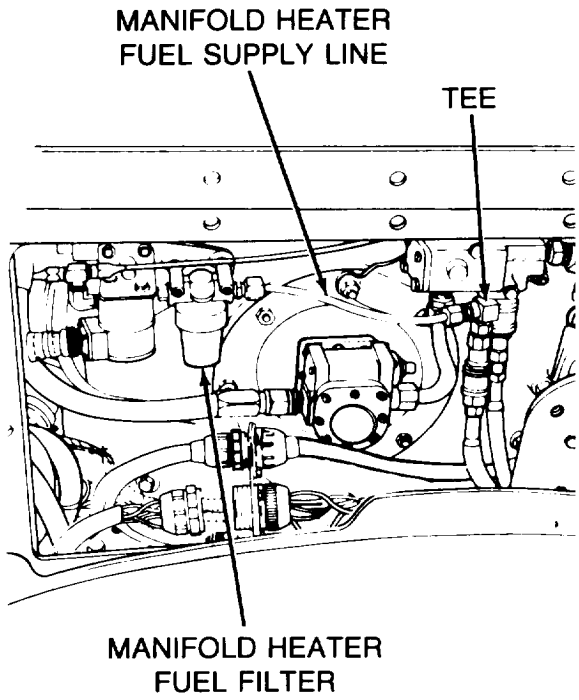
Second Technician (Turret)

- Disconnect fuel supply line to manifold heater fuel filter.
- Place a container under fuel supply line to catch any fuel coming out.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Operate primer pump.
- Set MASTER BATTERY switch OFF.

Does fuel flow freely from disconnected line?



YES

NO

26 **Clear clogged line between the tee under backflow valve and fuel filter by blowing with compressed air. If this does not work, replace the line (page 7-414).**

TA141922

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-9-2A

27 **Check for free fuel flow at outlet of manifold heater fuel filter.**

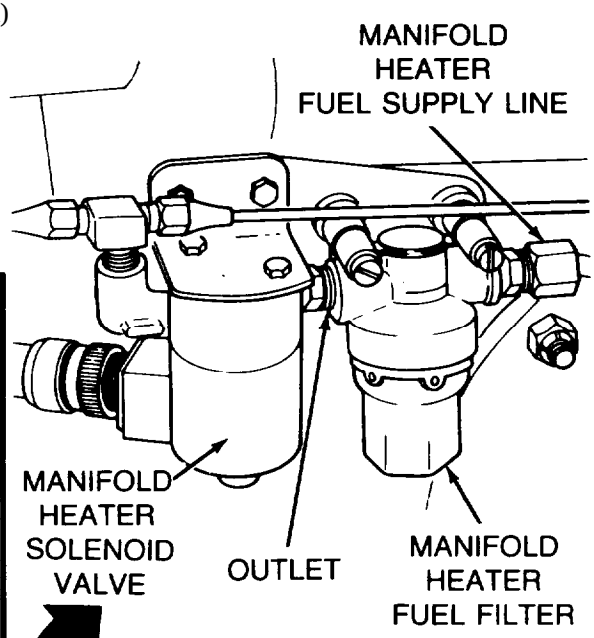
Second Technician (Turret)

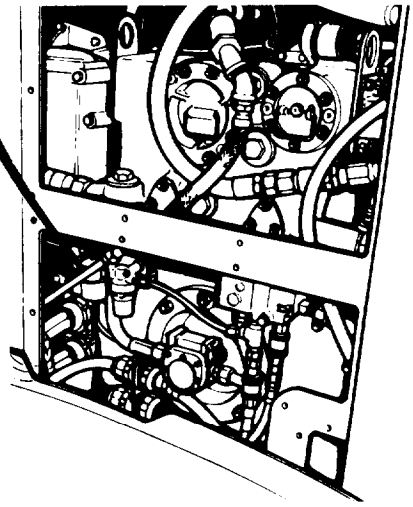
- Connect fuel supply line to manifold heater fuel filter.
- Disconnect manifold heater solenoid valve from manifold heater fuel filter.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Operate primer pump.
- Set MASTER BATTERY switch OFF.

Does fuel flow freely at outlet of manifold heater fuel filter?





YES

28 **Replace manifold heater solenoid valve (page 7-402).**

NO

29 **Replace manifold heater fuel filter element (page 7-407).**

TA141923

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-9-2A

FROM STEP (24)

(30) Check manifold heater fuel return solenoid for operation.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

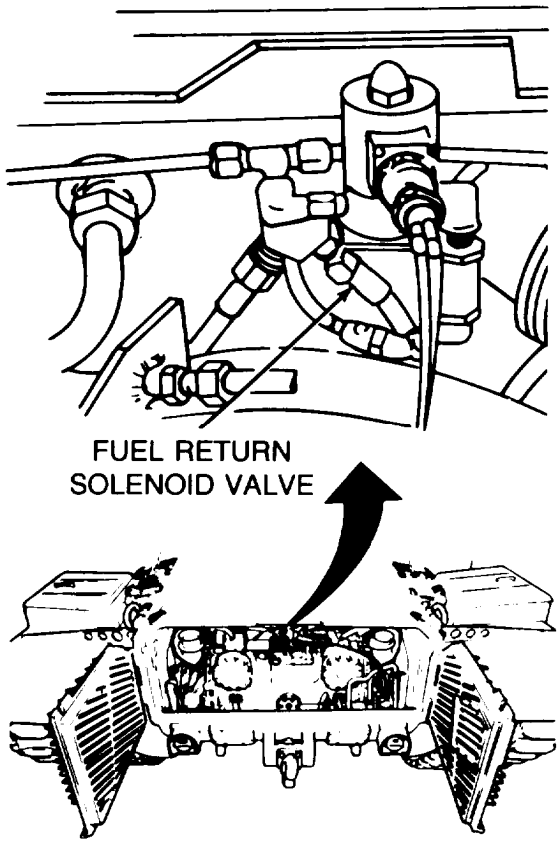
First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches several times and release.

Second Technician (Rear Grille Doors)

- Listen for manifold heater fuel return solenoid to click when preheat switch is pressed.

Does manifold heater fuel return solenoid click?



NO

YES

(31)

- **Check for power at manifold heater spark plugs.**
- **See Step (37).**

TA253086

Symptom-9-2A DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

32 **Check for voltage at connector to manifold heater fuel return solenoid.**

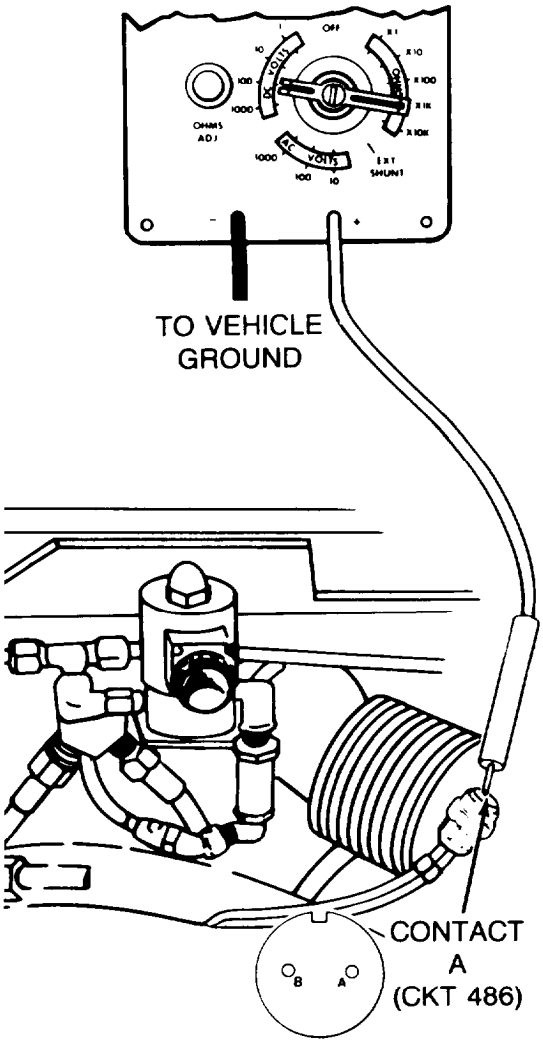
Second Technician (Rear Grille Doors)

- Disconnect engine electrical harness connector from manifold heater fuel return solenoid.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact A (CKT 486) of engine electrical harness connector at manifold fuel return solenoid and black probe to ground.

First Technician (Driver's Station)

- Press manifold preheat and starter switches for about 10 seconds, then release.
- Check if meter indicates 18 to 30 volts dc.

Did meter indicate 18 to 30 volts dc?



YES

NO

33
- **Repair engine electrical harness (CKT 486) (page 10-307).**
- **Connect engine electrical harness connector to manifold heater fuel return solenoid.**

TA253087

Symptom-9-2A DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

34 **Check engine electrical harness at connector to manifold heater fuel return solenoid, for continuity from CKT GND to vehicle ground.**

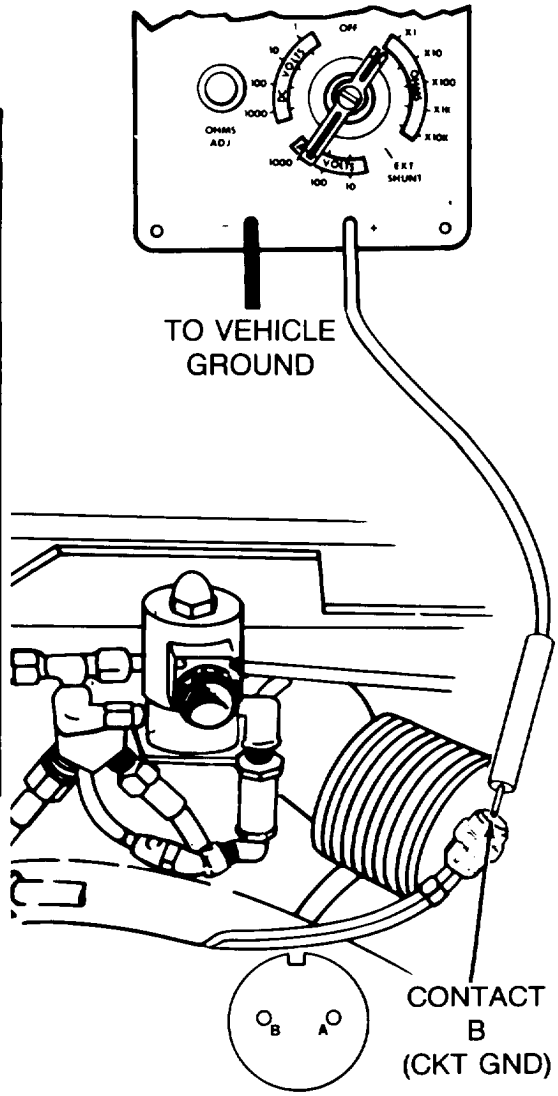
First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Rear Grille Doors)

- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT GND) of engine electrical harness connector at manifold heater fuel return solenoid and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?

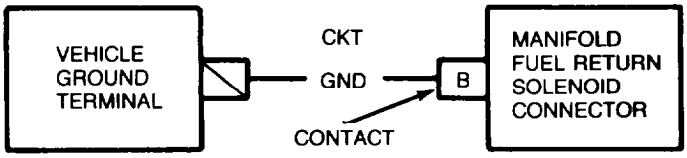


NO

35 **Repair engine harness (CKT GND) (page 10-307).**

YES

36
- **Replace manifold heater fuel return solenoid (page 7-402).**
- **Connect transmission harness connector to manifold heater fuel return solenoid.**



TA141926

Symptom-9-2A
FROM STEP
31

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

WARNING

Stay clear of high voltage ignition wires. Contact with high voltage can cause injury or death.

37 Check for electrical power at manifold heater spark plug connectors.

First Technician (Driver's Station)

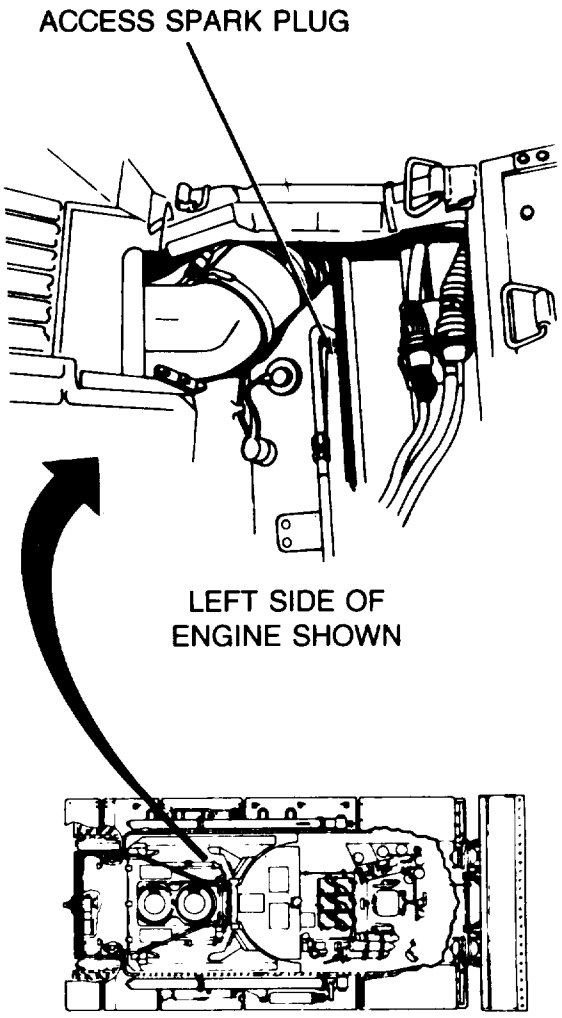
- Set MASTER BATTERY switch off.

Second Technician (Turret)

- Manually traverse turret to gain access to both left and right top deck grille doors (TM 9-2350-222-10).

Second Technician (Top Deck)

- Open left and right top deck grille doors.
- Disconnect right and left manifold heater spark plug ignition wires and lay loose ends 1/4 inch from vehicle ground.



TA141927

Symptom-9-2A

DETAILED TROUBLESHOOTING PROCEDURE

VEHICLE OPERATION - POWERPLANT, STARTING

(Continued)

STEP 37 CONTINUED

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches and hold for about 10 seconds, then release.

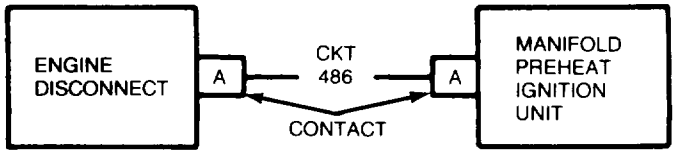
Second Technician (Top Deck)

- Check for arcing from ignition wires to ground when manifold preheat switch is pressed.

Did power arc to ground at high tension ignition leads?

NO

38 **Repair engine electrical harness (CKT 486) (page 10-307).**



YES

39
- **Connect right and left manifold heater spark plug wires.**
- **See Symptom 2: ENGINE CRANKS AT NORMAL SPEEDS, BUT WILL NOT START (BATTERY/GENERATOR GAGE SHOWS IN YELLOW AREA).**
- **Install transmission shroud (page 9-23).**

TA253088

Symptom-9-2D

BOTH INTAKE MANIFOLD PREHEATERS WILL NOT WORK (2D ENGINE)

NOTE

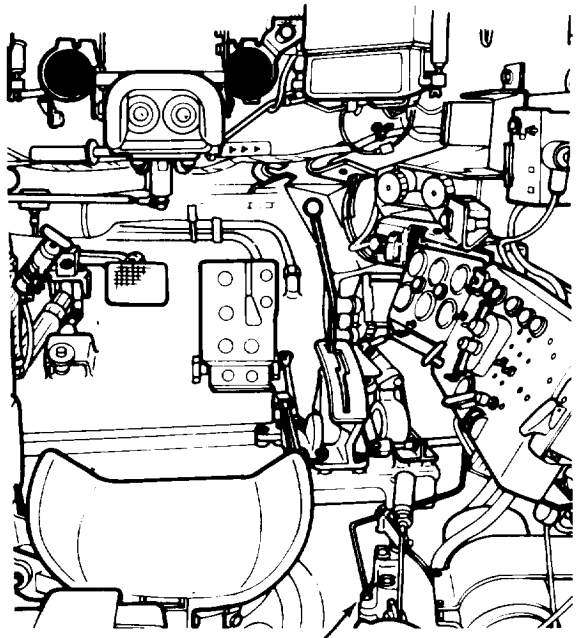
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 **Check primer pump for back pressure.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.
- Operate primer pump several times.
- Check if back pressure builds up while operating primer pump.

Does primer pump build up normal back pressure?



YES

NO

2 **See Symptom 7; PRIMER PUMP WILL NOT WORK.**

TA141929

Symptom-9-2D

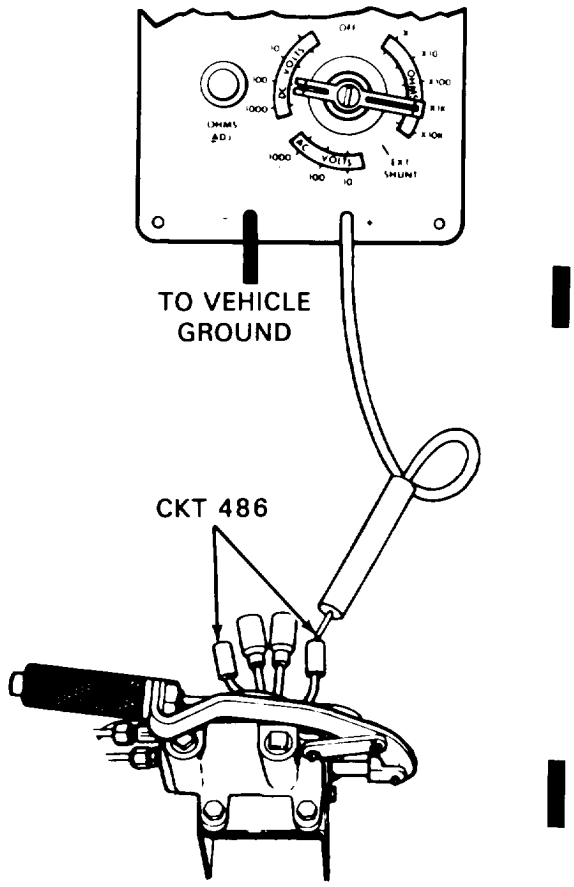
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

3 **Check hull front master harness (CKT 486) at manifold preheat switch connector for electrical power.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Place MANUAL FUEL shutoff handle in OFF (up) position.
- Disconnect both harness connectors (CKT 486) from preheat switch at primer pump.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect black probe of meter to ground.
- Connect red probe of meter to one of hull front master harness CKT 486 leads and then to other lead.
- Set MASTER BATTERY switch ON.
- Press and release STARTER switch.
- Check if meter reads 18 to 30 volts dc.

Did meter indicate 18 to 30 volts dc at one of the connectors?



NO

YES

4
- **Check manifold preheat switch for continuity.**
- **See Step 10.**

TA253089

Symptom-9-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

WARNING

Circuit (CKT 459) carries battery voltage at all times whether the MASTER BATTERY switch is ON or OFF.

5 Check for continuity between primer pump (CKT 486) and master control panel.

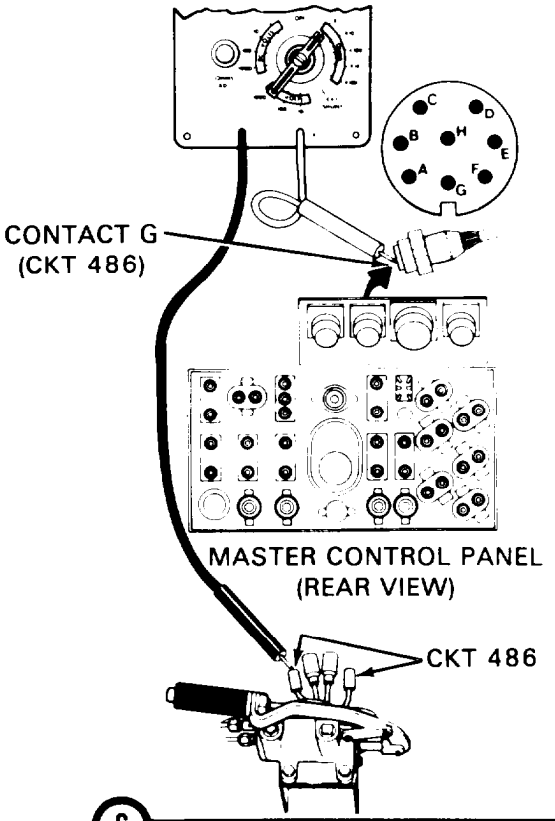
First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master switch harness at master control panel.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact G (CKT 486) of hull front master harness connector at master control panel.
- Connect black probe of meter first to one (CKT 486) lead at primer pump and then to other lead.
- Check if meter indicates continuity at one of leads (CKT 486) at primer pump.

Did multimeter indicate continuity at one of the two (CKT 486) leads at primer pump?

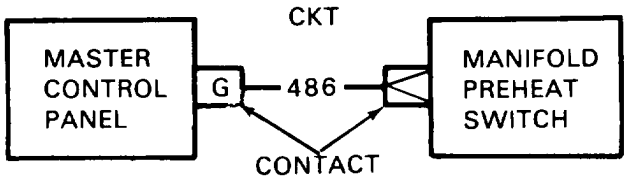
YES

NO



6

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 486) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect both hull front master harness connectors (CKT 486) to preheat switch at primer pump.**
- **Connect hull front master harness connector to master control panel.**
- **Install master control panel (page 10-47).**



TA253090

Symptom-9-2D

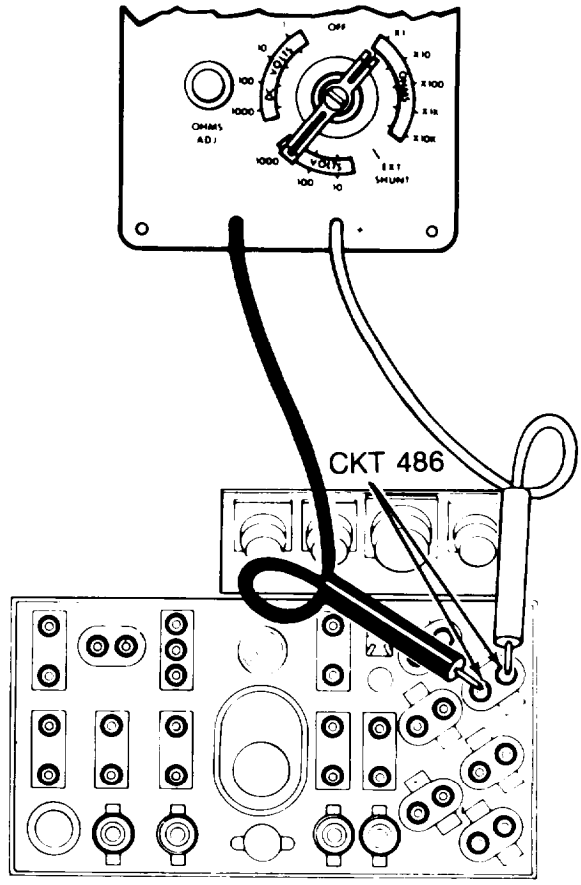
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT. STARTING
(Continued)

7 **Check manifold preheat circuit breaker (CKT 486) for continuity.**

First Technician (Driver's Station)

- Connect hull front master harness connectors to preheat switch at primer pump.
- Connect hull front master harness connector to master control panel.
- Disconnect electrical lead connectors (CKT 486) from manifold preheat circuit breaker on master control panel.
- Connect red probe of meter to one circuit breaker contact and black probe of meter to other circuit breaker contact.
- Check if meter indicates continuity.

Did meter indicate continuity?



8 **Replace manifold preheat circuit breaker (page 10-90).**

NO

9

- **Replace master battery harness (page 10-107).**
- **Connect electrical lead connector (CKT 486) to manifold preheat circuit breaker.**

YES

TA141932

Symptom-9-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

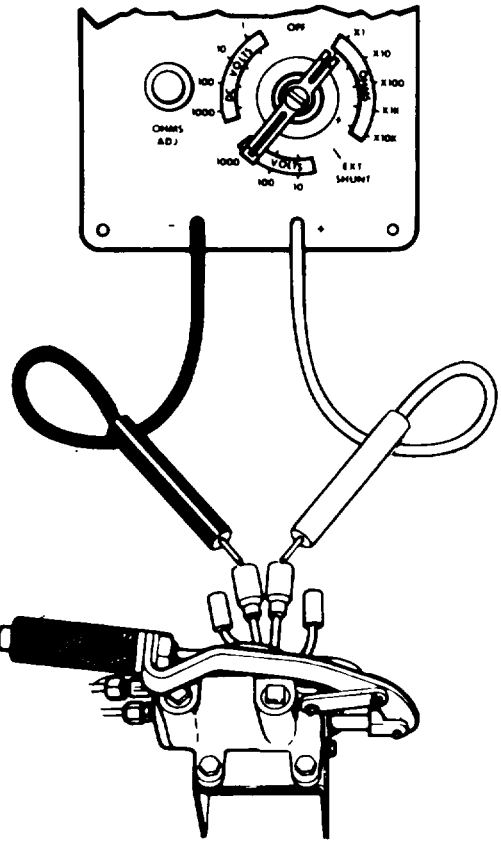
FROM STEP 4

10 Check manifold preheat switch for continuity.

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to one manifold preheat switch connector and black probe to other manifold preheat switch connector.
- Press and hold manifold preheat switch.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

11 Replace primer pump (page 7-359).

TA141933

Symptom-9-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWE~RPLANT, STARTING
(Continued)

12 **Check hull front master harness (CKT 486) at bulkhead electrical disconnect for electrical power.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect both hull front master harness connectors to preheat switch at primer pump.

Second Technician (Turret)

- Disconnect hull front master harness connector from engine accessory harness connector at bulkhead electrical disconnect.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact A (CKT 486) of hull front master harness and black probe to ground.

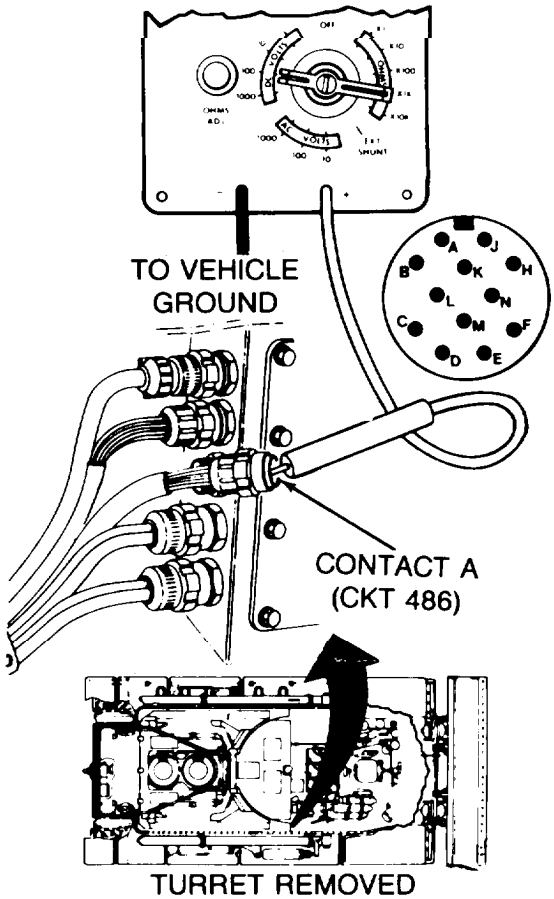
First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches for about 10 seconds, then release.

Second Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

Did meter indicate 18 to 30 volts dc?

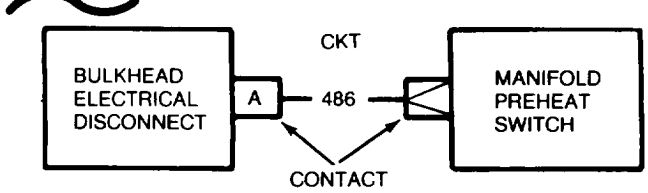


13

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 486) wires.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master to bulkhead disconnect.**

YES

NO



TA253091

Symptom-9-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

14 Check engine accessory harness (CKT 486) at engine disconnect for electrical power.

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Turret)

- Connect hull front master harness connector to bulkhead electrical disconnect.
- Manually traverse turret to allow access to the left top deck grille doors (TM 9-2350- 222-10).

Second Technician (Top Deck)

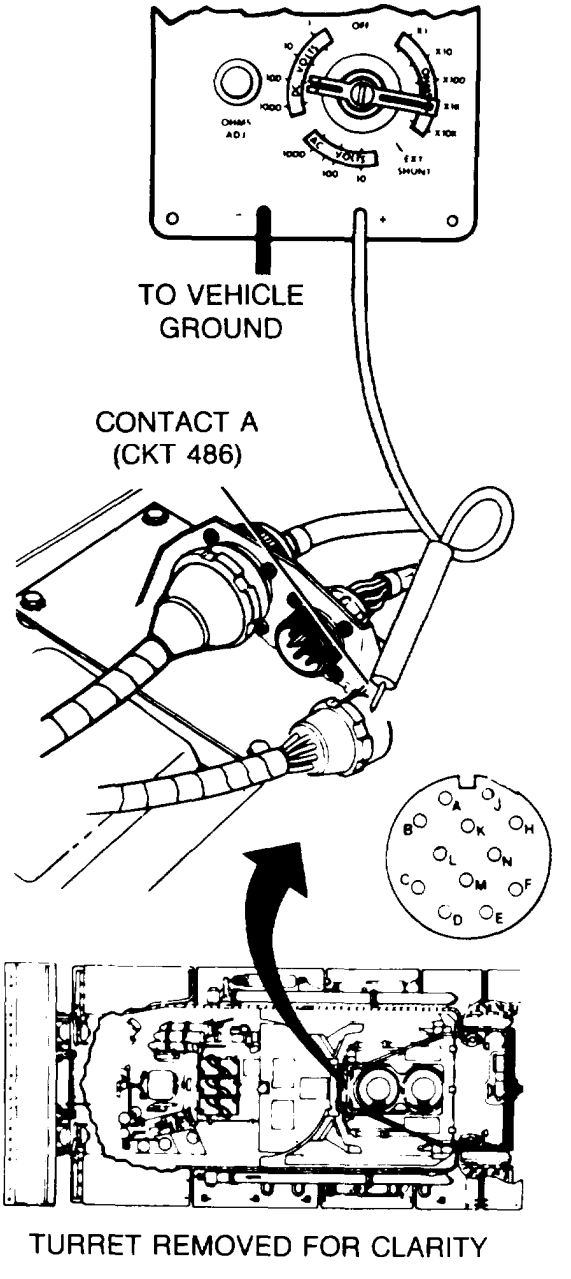
- Open left top grille doors.
- Disconnect engine accessory harness connector from engine electrical harness connector at engine disconnect.
- Connect red probe of meter to contact A (CKT 486) of engine accessory harness connector at engine disconnect and black probe to ground.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches for about 10 seconds then release.

Second Technician (Top Deck)

- Check if meter indicates 18 to 30 volts dc.



TA253092

Symptom-9-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP (14) CONTINUED

Did meter indicate 18 to 30 volts dc?

NO

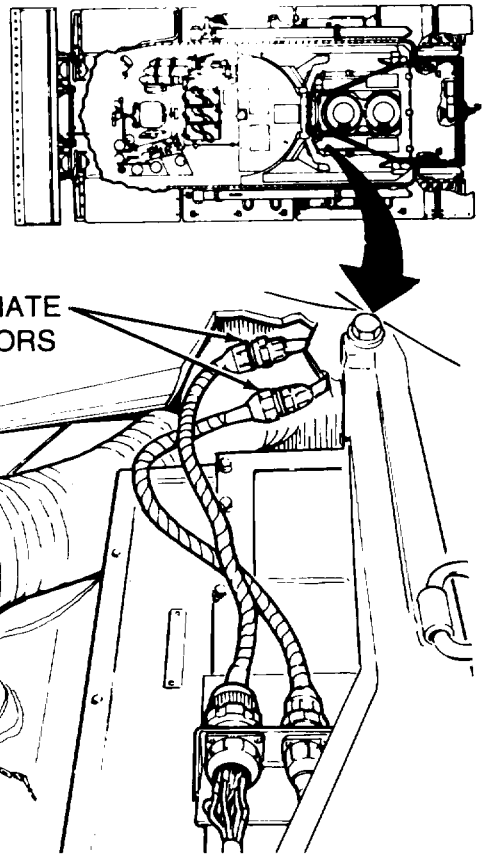
YES

15

- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness extension (CKT 486) for continuity from intermediate connector to connector of engine disconnect.**
- **See Step (17) .**

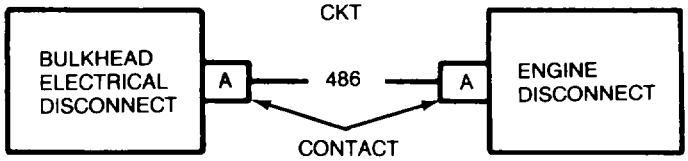
For harness without intermediate connector:

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 486) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**



16

- **Check manifold heater fuel supply solenoid for operation.**
- **See Step (20) .**



TA141936

Symptom-9-2D

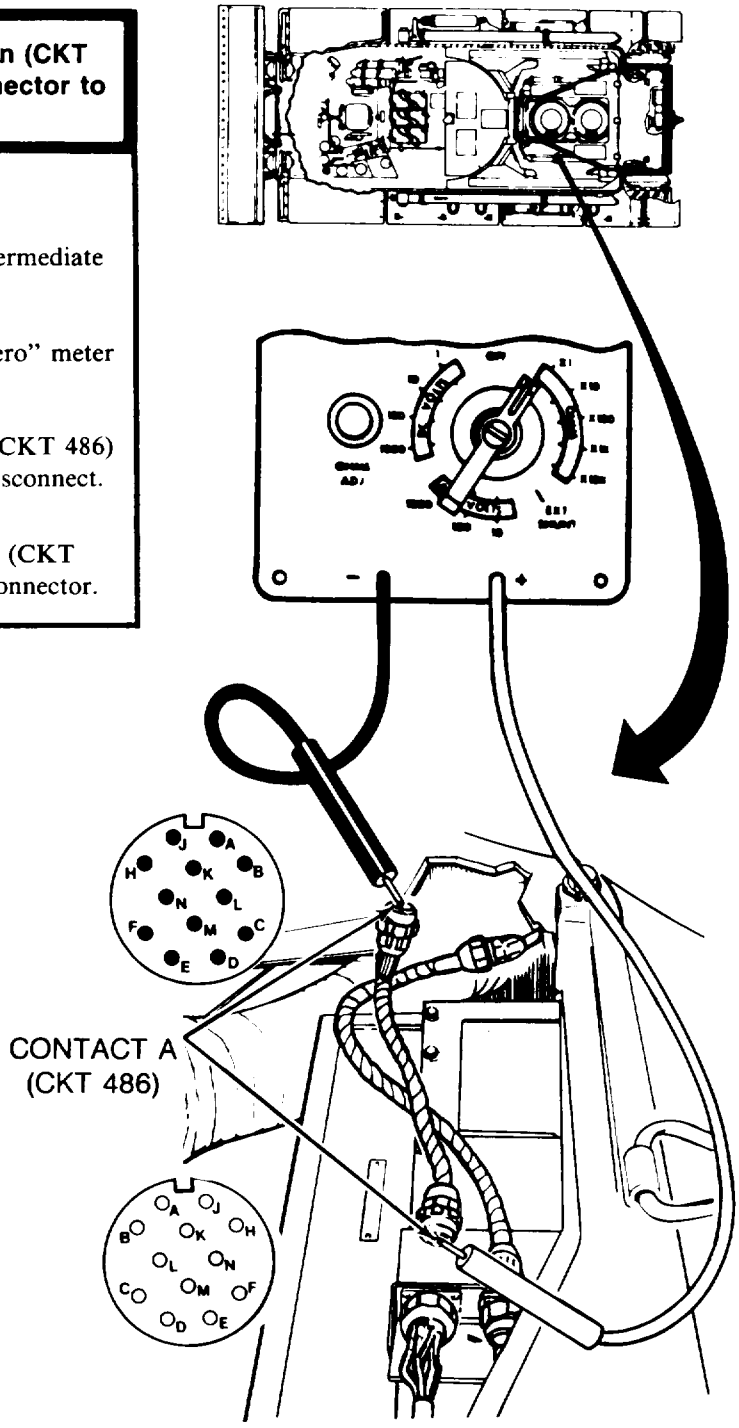
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 15

17 Check engine accessory harness extension (CKT 486) for continuity from intermediate connector to connector of engine disconnect.

Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact A (CKT 486) of extension harness connector at engine disconnect.
- Connect black probe of meter to contact A (CKT 486) of extension harness at intermediate connector.



TA141937

Symptom-9-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
STEP 17 CONTINUED (Continued)

- Check if meter indicates continuity.

Does meter indicate continuity?

NO

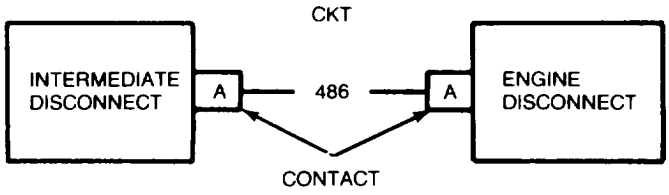
18

- Inspect engine accessory harness extension for bent/broken connector contacts or loose (CKT 486) wire.
- Repair connectors if defective (page 10-307).
- If connectors are not defective notify support maintenance of defective engine accessory harness extension.
- Connect engine accessory harness extension to intermediate connector and to engine disconnects.

YES

19

- Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 486) wire.
- Repair connectors if defective (page 10-307).
- If connectors are not defective, notify support maintenance of defective engine accessory harness.
- Connect engine accessory harness extension to intermediate connector and to engine disconnects.



TA253093

Symptom-9-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 16

20 Check manifold heater fuel supply solenoid for operation.

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Top Deck)

- Connect engine accessory harness connector to engine electrical harness connector at engine disconnect.
- Close left top grille doors.

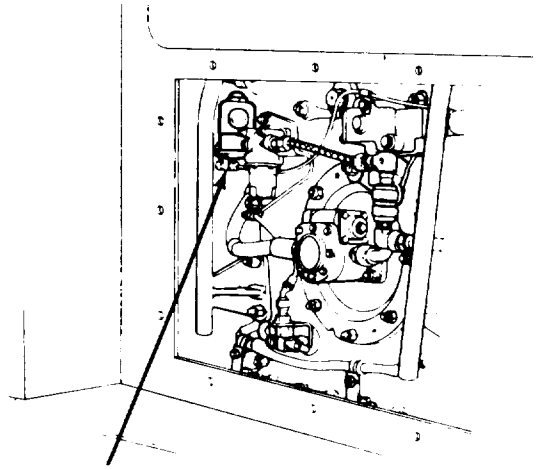
Second Technician (Turret)

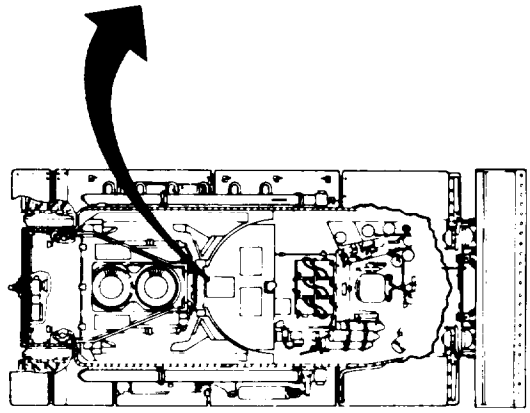
- Manually traverse turret to gain access to engine access covers (TM 9-2350-222-10).
- Remove lower engine access cover (page 16-41).
- Listen for manifold heater fuel supply solenoid to click when first technician operates switches.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press the manifold preheat and starter switches several times and release.
- Set MASTER BATTERY switch OFF.

Did manifold heater fuel supply solenoid click when manifold preheat switch was pressed?





NO

YES

21
- **Check for free fuel flow at outlet of manifold heater solenoid valve.**
- **See Step 27.**

TA253094

Symptom-9-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

22 **Check for voltage at connector to manifold heater fuel supply solenoid.**

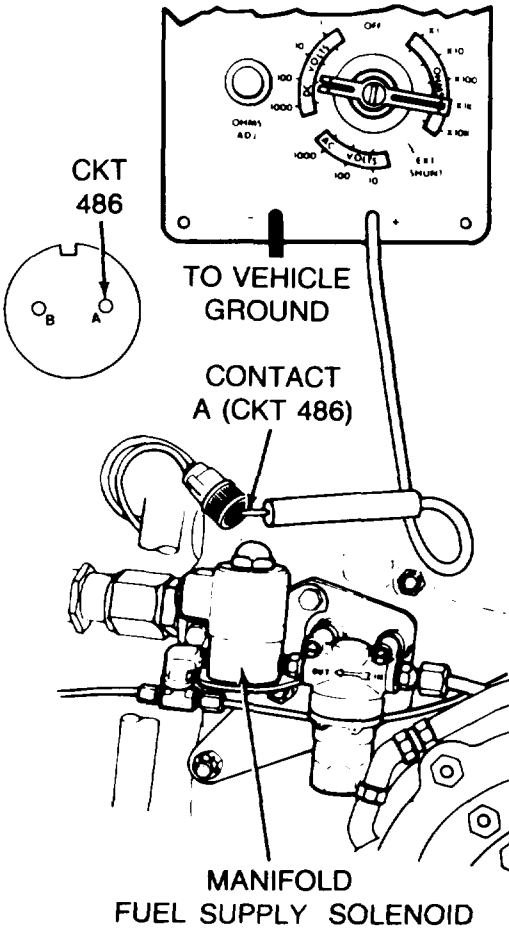
Second Technician (Turret)

- Disconnect engine electrical harness connector from manifold heater fuel solenoid connector.
- Connect red probe of meter to contact A (CKT 486) of engine electrical harness connector and black probe to ground.
- Observe meter for voltage indication when first technician operates switches.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches for approximately 10 seconds, then release.

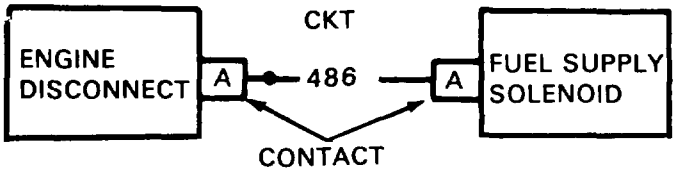
Does meter indicate 18 to 30 volts dc?



YES

NO

23 **Repair engine electrical harness (CKT 486) (page 10-307).**



TA253095

Symptom-9-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

24 **Check engine electrical harness, at connector to manifold heater fuel supply solenoid, for continuity from CKT GND to vehicle ground.**

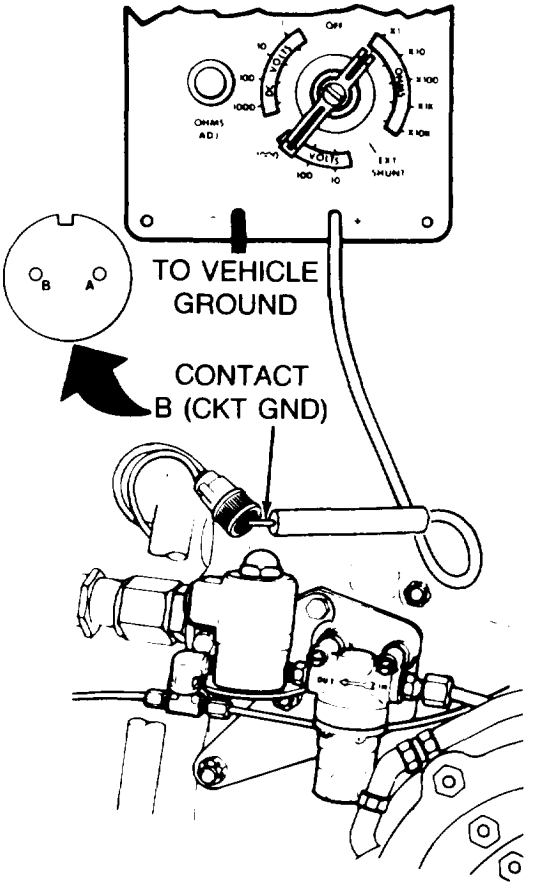
First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Turret)

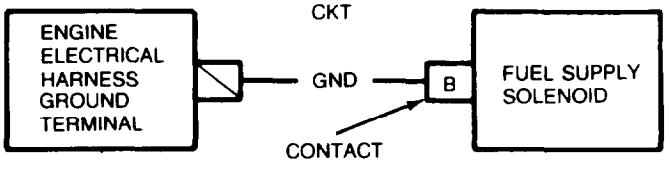
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT GND) of engine electrical harness connector at manifold heater fuel supply solenoid and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?



25 **Replace manifold heater fuel supply solenoid (page 7-402).** YES

26 **Repair engine electrical harness (CKT GND) (page 10-307).** NO



TA141941

Symptom-9-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)i

FROM STEP

21

27 **Check for free fuel flow from outlet of manifold heater solenoid valve.**

Second Technician (Turret)

- Remove elbow from manifold heater solenoid valve outlet port.
- Place a container under line to catch any fuel.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches for about 10 seconds and release.
- Set MASTER BATTERY switch OFF.

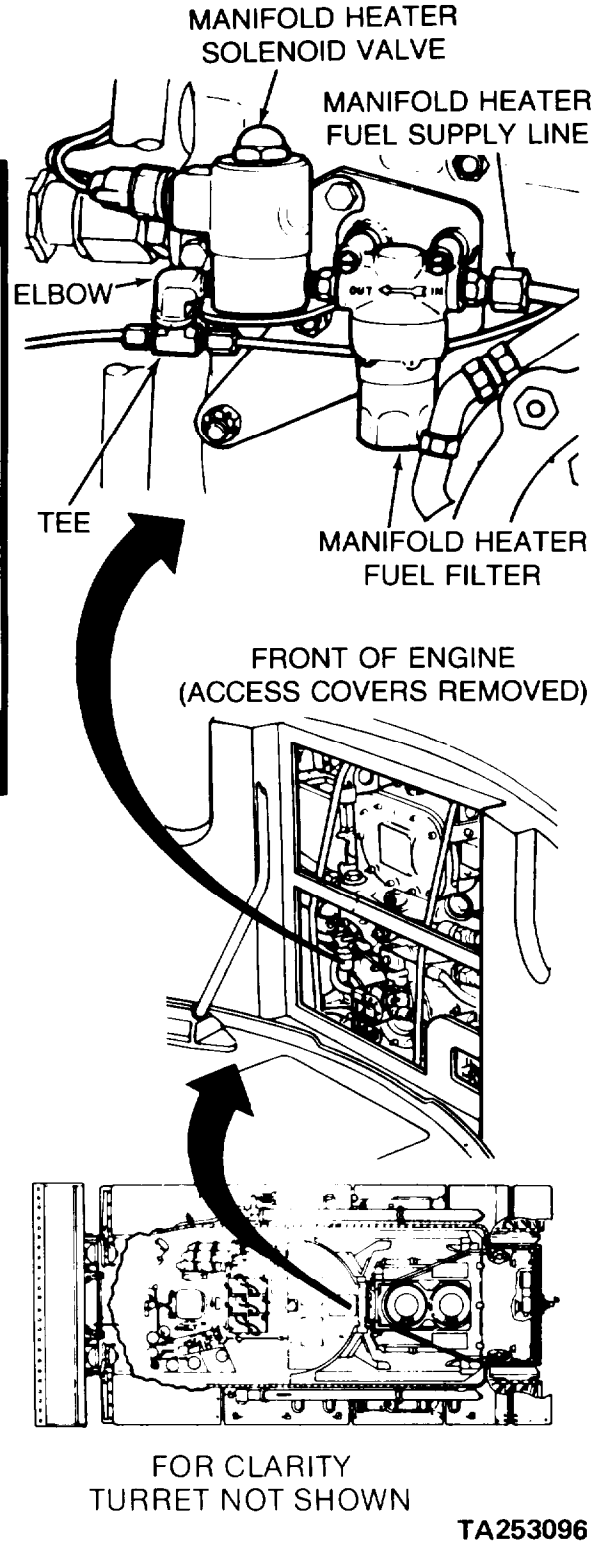
Does fuel flow freely from outlet of manifold heater solenoid valve?

YES

28
- **Install elbow in manifold heater solenoid valve outlet port.**
- **Install lower engine access cover (page 16-42).**
- **Check manifold heater fuel return solenoid for operation.**

- **See Step 34 .**

NO



DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

29 **Check for free fuel flow at inlet to manifold heater fuel filter.**

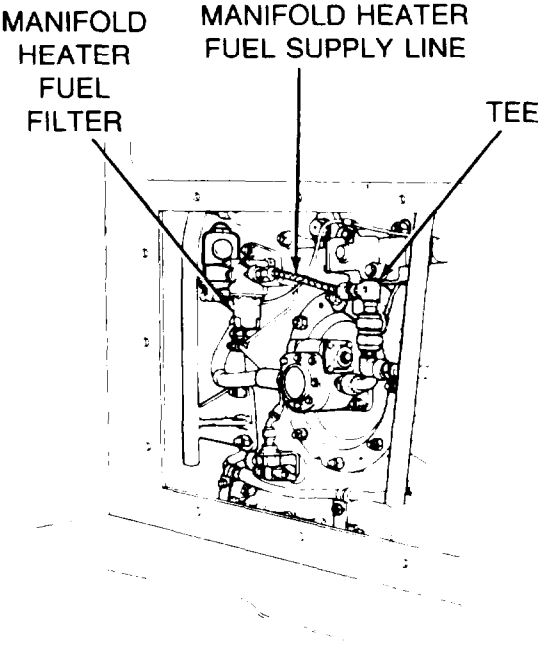
Second Technician (Turret)

- Install elbow to manifold heater solenoid valve outlet port.
- Disconnect fuel supply line to manifold heater fuel filter.
- Place a container under fuel supply line to catch any fuel coming out.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Operate primer pump.
- Set MASTER BATTERY switch OFF.

Does fuel flow freely from disconnected line?



TA141943

30

- **Clear clogged line between the tee under backflow valve and fuel filter by blowing with compressed air. If this does not work, replace the line (page 7-414).**

NO

YES

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-9-2D

31 Check for free fuel flow at outlet of manifold heater fuel filter.

Second Technician (Turret)

- Connect fuel supply line to manifold heater fuel filter.
- Disconnect manifold heater solenoid valve from manifold heater fuel filter (page 7-403).

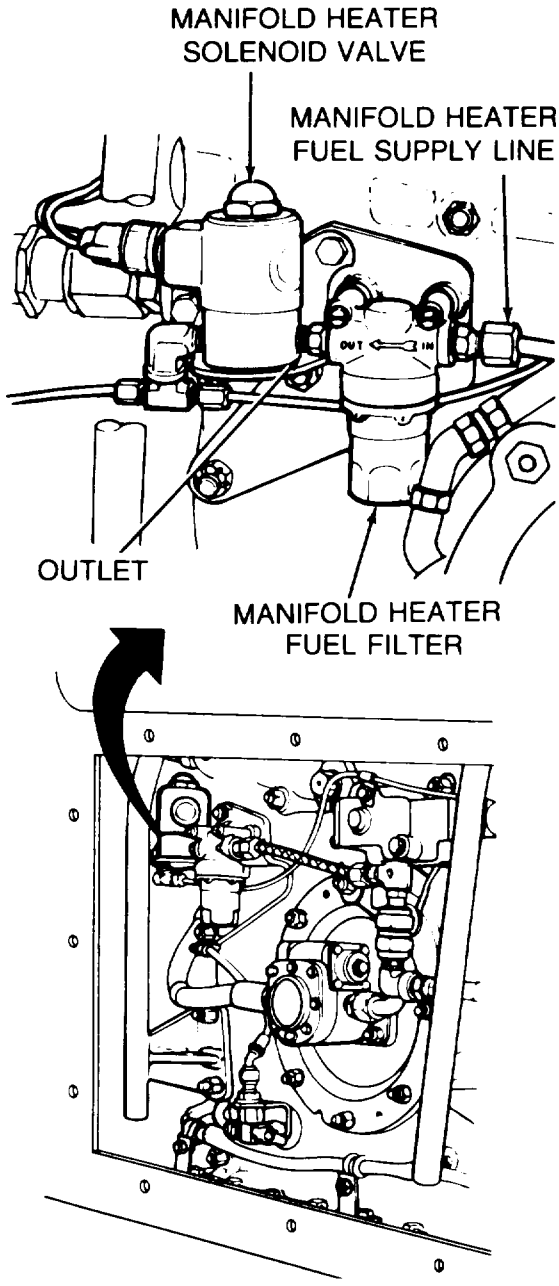
First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Operate primer pump.
- Set MASTER BATTERY switch OFF.

Does fuel flow freely at outlet of manifold heater fuel filter?

32 Replace manifold heater solenoid valve (page 7-402). — YES

33 Replace manifold heater fuel filter element (page 7-412). — NO



TA141944

Symptom-9-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP (28)

(34) Check manifold heater fuel return solenoid for operation.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

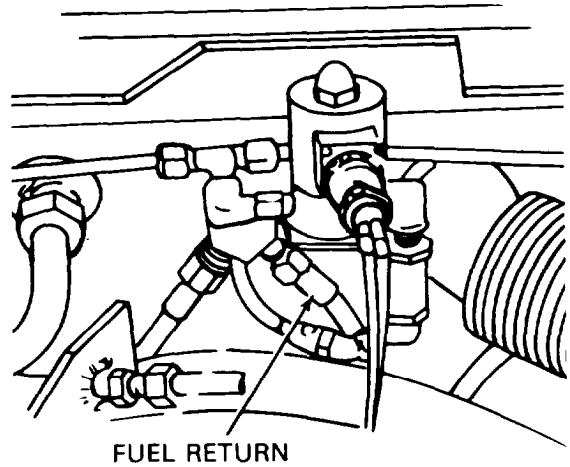
First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press manifold preheat and starter switches several times and release.

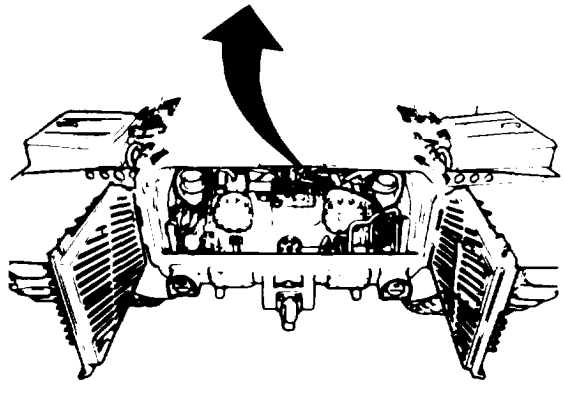
Second Technician (Rear Grille Doors)

- Listen for manifold heater fuel return solenoid to click when switches are pressed.

Does manifold heater fuel return solenoid click?



FUEL RETURN SOLENOID VALVE



NO

YES

(35)

- **Check for power at manifold heater spark plugs.**
- **See Step (46).**

TA253097

Symptom-9-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

36 **Check for voltage at connector to manifold heater fuel return solenoid.**

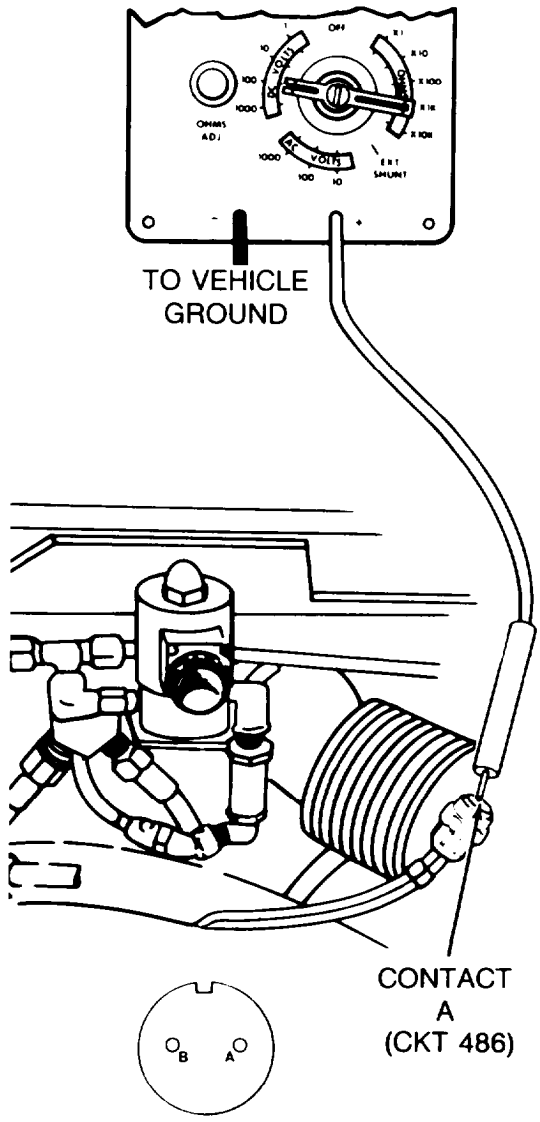
Second Technician (Rear Grille Doors)

- Disconnect transmission harness connector from manifold heater fuel return solenoid connector.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact A (CKT 486) of transmission harness connector at manifold fuel return solenoid and black probe to ground.

First Technician (Driver's Station)

- Press manifold preheat and starter switches for approximately 10 seconds, then release.
- Check if meter indicates 18 to 30 volts dc.

Did meter indicate 18 to 30 volts dc?



YES

NO

37 **• Check transmission harness (CKT 486) for continuity from connector at transmission disconnect to connector at manifold heater fuel return solenoid.**

• See Step (43).

TA253098

Symptom-9-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

38 **Check transmission harness, at connector to manifold heater fuel return solenoid, for continuity from CKT GND to vehicle ground.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Rear Grille Doors)

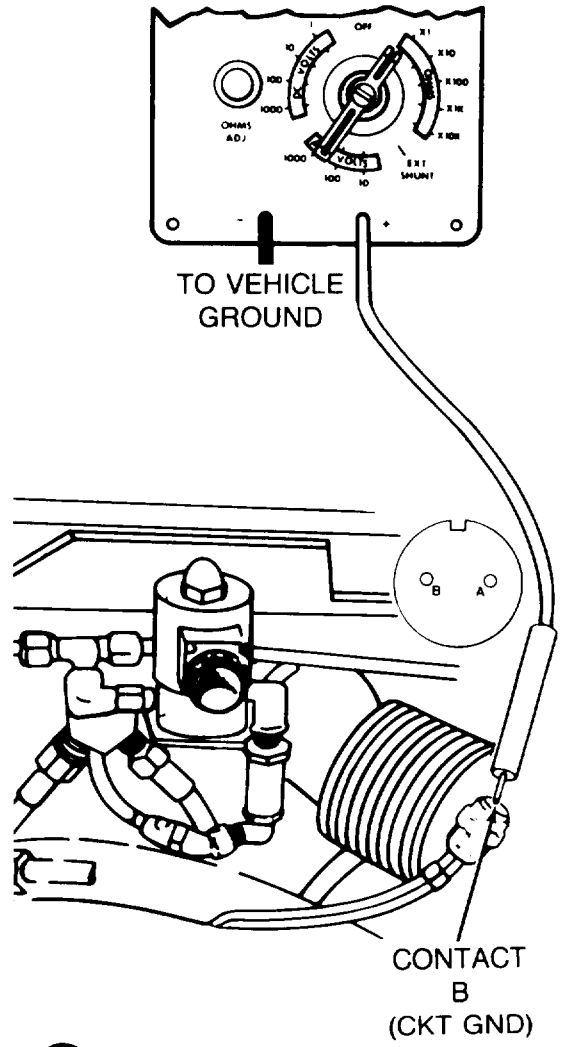
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT GND) of transmission harness connector at manifold heater fuel return solenoid and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?

NO

YES

39 **Replace manifold heater fuel return solenoid (page 7-376).**



TA141947

Symptom-9-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

40 Check engine electrical harness ground (CKT GND) circuit for continuity at transmission disconnect.

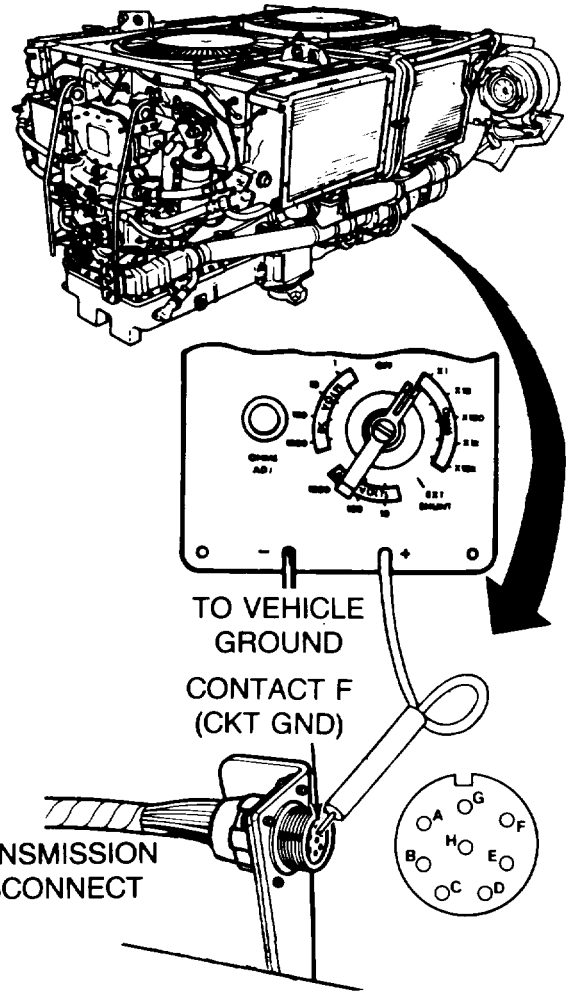
Second Technician (Rear of Vehicle)

- Remove powerplant (page 5-1).

Second Technician (Right Side of Engine)

- Disconnect engine electrical harness connector from transmission harness connector at transmission disconnect.
- Connect red probe of meter to contact F (CKT GND) of transmission harness connector transmission disconnect and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO

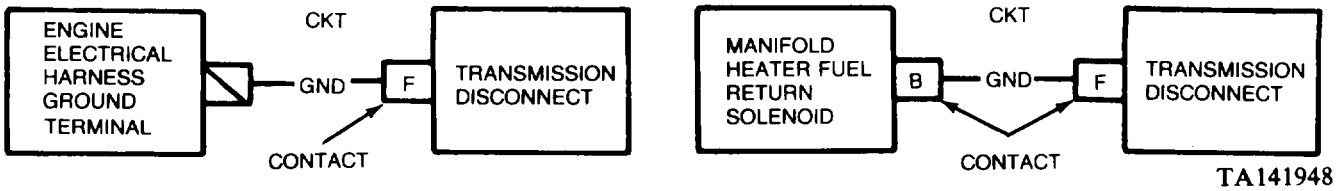
42

- **Repair engine harness (CKT GND) (page 10-307).**
- **Connect engine electrical harness connector to transmission harness connector at transmission disconnect.**
- **Connect transmission harness connector to manifold heater fuel return solenoid.**

YES

41

- **Repair transmission harness (CKT GND) (page 10-307).**
- **Connect engine electrical harness connector to transmission harness connector at transmission disconnect.**



TA141948

Symptom-9-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP

37

43

Check transmission harness (CKT 486) for continuity from connector at transmission disconnect to connector at manifold heater fuel return solenoid.

First Technician (Driver's Station)

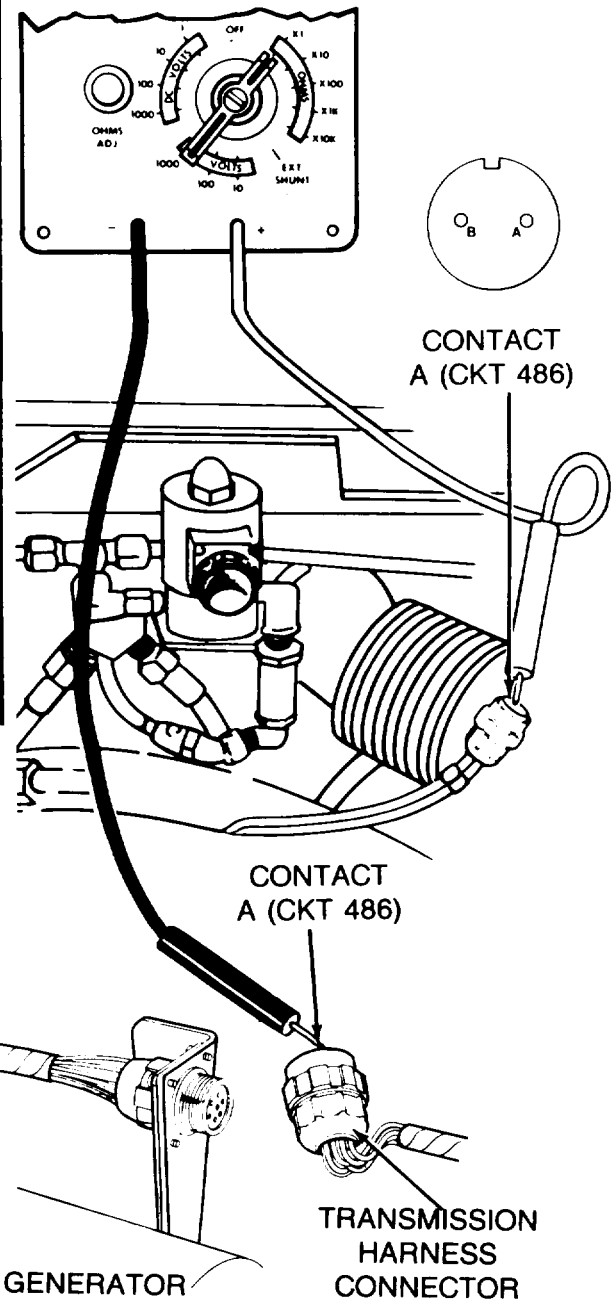
- Set MASTER BATTERY switch OFF.

Second Technician (Rear of Vehicle)

- Remove powerplant (page 5-1).

Second Technician (Right Side of Engine)

- Disconnect engine electrical harness connector from transmission harness connector at transmission disconnect.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact A (CKT 486) of transmission harness connector at manifold fuel return solenoid.



TA141949

Symptom-9-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

STEP (43) CONTINUED

- Connect black probe of meter to contact A (CKT 486) of transmission harness connector at transmission disconnect.
- Check if meter indicates continuity.

Does multimeter indicate continuity?

NO

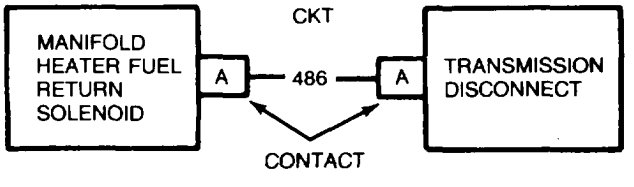
44

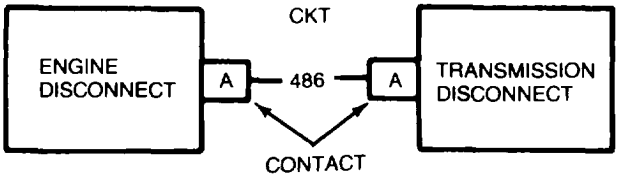
- **Repair transmission harness (CKT 486) (page 10-307).**
- **Connect engine electrical harness connector to transmission harness connector at transmission disconnect.**

YES

45

- **Repair engine electrical harness CKT 486 (page 10-307).**
- **Connect engine electrical harness connector to transmission disconnect.**
- **Connect transmission harness connector to manifold heater fuel return solenoid.**





TA141950

Symptom-9-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 35

WARNING

Stay clear of high voltage ignition wires. Contact with high voltage can cause injury or death.

46 Check for electrical power at manifold heater spark plug connectors.

First Technician (Driver's Station)

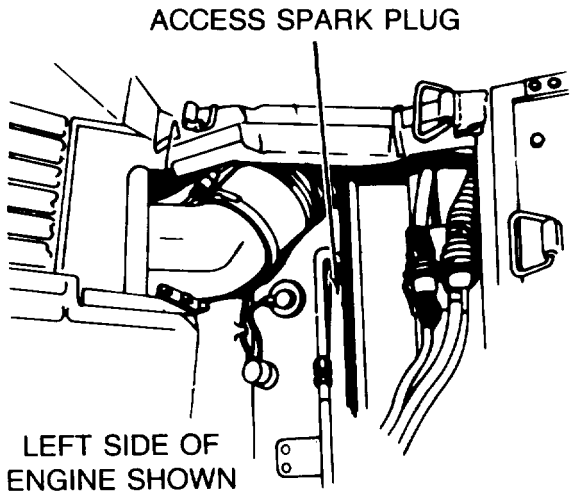
- Set MASTER BATTERY switch OFF.

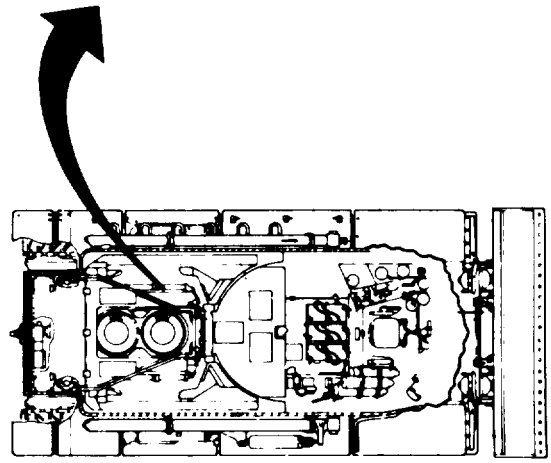
Second Technician (Turret)

- Manually traverse turret to gain access to both left and right top deck grille doors (TM 9-2350-222-10).

Second Technician (Top Deck)

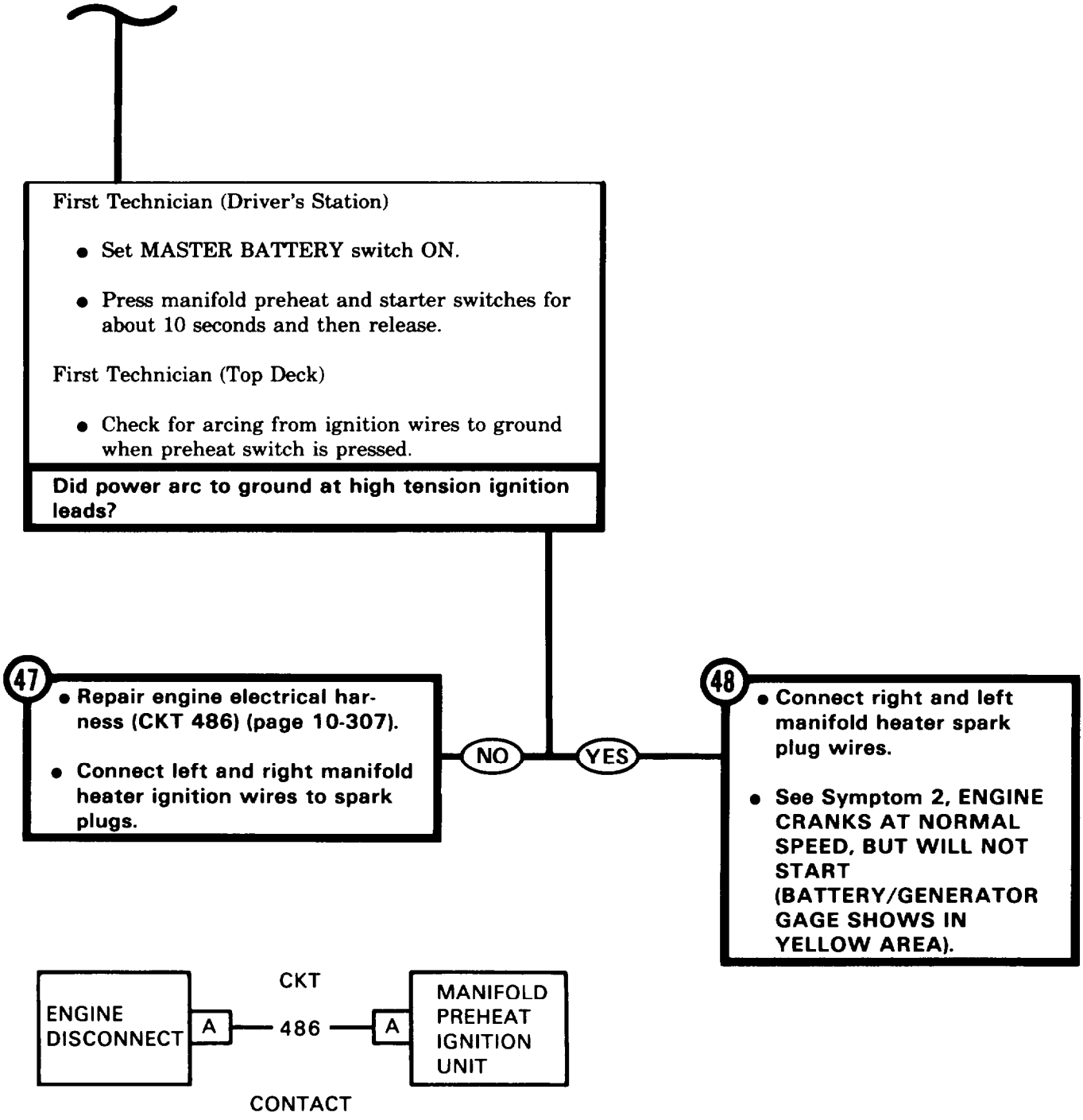
- Open left and right top deck grille doors.
- Disconnect right and left manifold heater spark plug ignition wires and lay loose ends 1/4 inch from vehicle ground.





TA141951

Symptom-9-2D DETAILED TROUBLESHOOTING PROCEDURE
STEP CONTINUED VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)



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DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-10-2A

3 Check short metal tube between rubber tube and fuel-water separator drain valve for clogs.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Top Deck)

- Disconnect short metal tube from outlet side of fuel-water separator drain valve.

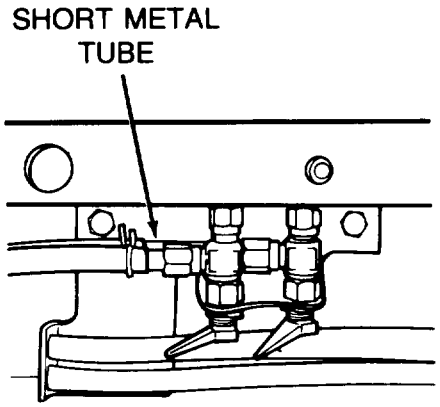
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Top Deck)

- Open fuel-water separator drain valve.
- Check if fuel flows from fuel-water separator drain valve.

Does fuel flow from drain valve?



NO

YES

4

- **Clear metal tube of clogs, by blowing with compressed air.**
- **If clogs cannot be cleared replace tube.**
- **Close fuel-water separator drain valve.**

TA141954

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-10-2A

5 Check for fuel flow to inlet side of fuel-water separator drain valve.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Top Deck)

- Disconnect fuel-water separator dran line from inlet side of drain valve.

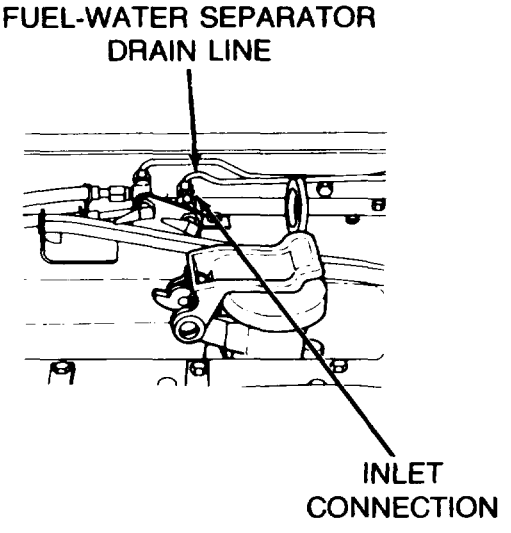
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Top Deck)

- Check if fuel flows from drain line.

Does fuel flow from drain line?



NO

YES

6

- **Clear fuel-water separator drain valve of clogs.**
- **If clogs cannot be cleared replace fuel-water separator drain valve.**
- **Install rubber drain tube.**

TA141955

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-10-2A

7 **Check drain line between bottom of fuel-water separator and fuel-water separator drain valve for clogs.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Top Deck)

- Install short metal tube and rubber tube to fuel-water separator drain valve.
- Close fuel-water separator drain valve.
- Remove powerplant (page 5-1).
- Install powerplant ground hop kit (page 5-49).

First Technician (Front of Engine)

- Disconnect drain line from elbow at bottom of fuel-water separator.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

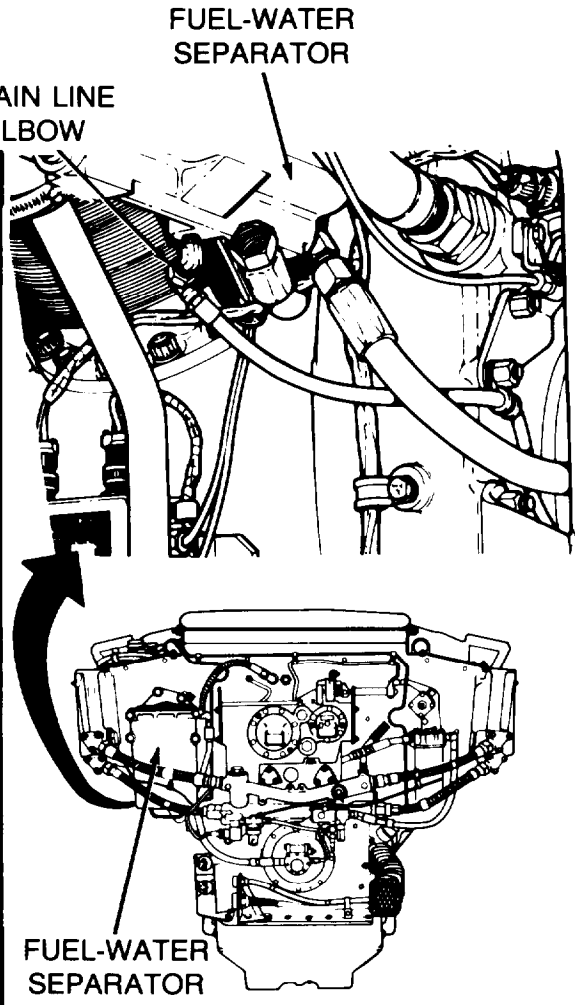
First Technician (Front of Engine)

- Check if fuel flows from elbow at bottom of fuel-water separator.

Does fuel flow from elbow at bottom of fuel-water separator?

NO

YES



8
- **Remove clogs from line between fuel-water separator and fuel-water separator drain valve by blowing with compressed air.**
- **If clogs cannot be cleared replace drain line.**

TA141956

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-10-2A

9 Check if fuel will drain from fuel-water separator with drain line elbow removed.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Front of Engine)

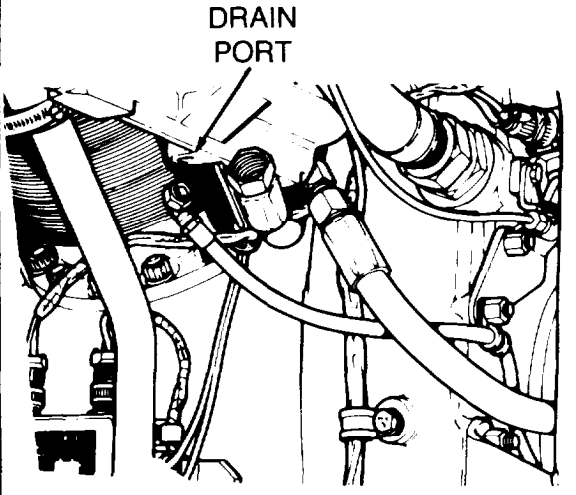
- Remove elbow from bottom of fuel-water separator.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Front of Engine)

- Check if fuel drains from bottom of fuel-water separator.



Does fuel flow from drain port in bottom of fuel-water separator?

NO

10

- **Set MASTER BATTERY switch OFF.**
- **Service fuel-water separator (page 7-322).**
- **Install elbow in bottom of fuel-water separator.**
- **Connect drain line to fuel-water separator and drain valve.**

YES

11

- **Set MASTER BATTERY switch OFF.**
- **Clear clogs from elbow by blowing with compressed air.**
- **If clogs cannot be cleared replace elbow (page 7-277).**
- **Connect drain line to drain valve.**

TA141957

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING

Symptom-10-2D

FUEL-WATER SEPARATOR WILL NOT WORK (2D ENGINE).

NOTE

- **To provide troubleshooting for malfunctions discovered during vehicle operation or fuel-water separator operational check, this procedure is divided into three malfunctions as follows:**
- **If fuel-water separator will not drain SEE STEP (1) .**
- **If fuel-water separator will not stop draining SEE STEP (19) .**
- **If fuel-water separator automatic drain exceeds 21 seconds and then stops replace control assembly (page 7-314).**

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

TA141958

Symptom-10-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

1 Check for fuel flow from manual drain valve.

First Technician (Top Deck)

- Remove powerplant (page 5-1).
- Ground hop powerplant (page 5-48).

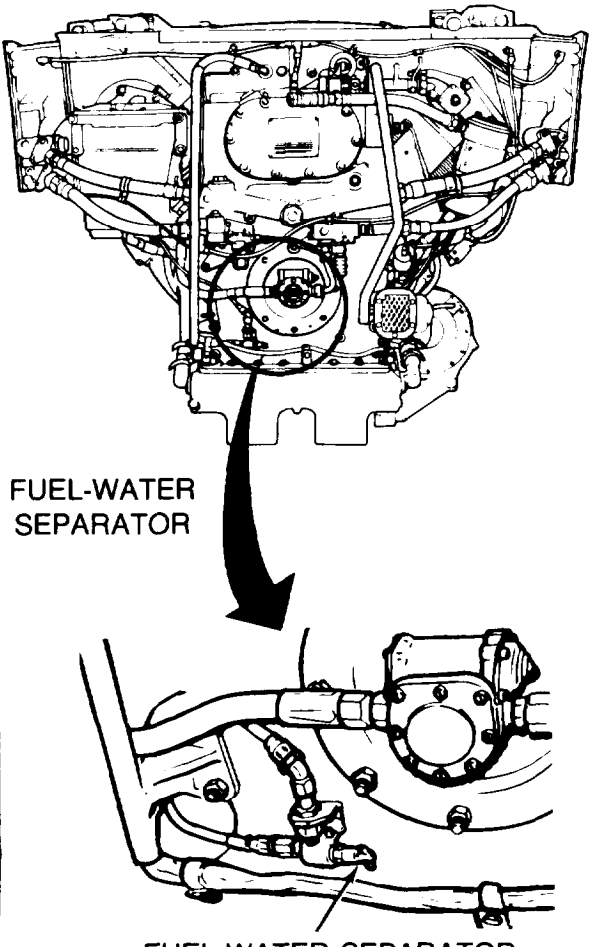
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMP switch ON.

First Technician (Front of Engine)

- Place suitable container under fuel-water separator fuel drain.
- Open fuel-water separator manual drain valve.
- Check if fuel drains from fuel-water separator.
- Close fuel-water separator manual drain valve.

Does fuel drain from manual fuel drain?



YES

NO

2 Disassemble fuel-water separator manual drain lines and fittings. Clear clogged components with compressed air. If lines or fittings cannot be cleared of clogs, replace clogged components (page 7-308).

TA141959

Symptom-10-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

WARNING

Do not allow fuel to overflow container. Should container start to overflow disconnect ground hop fuel supply line.

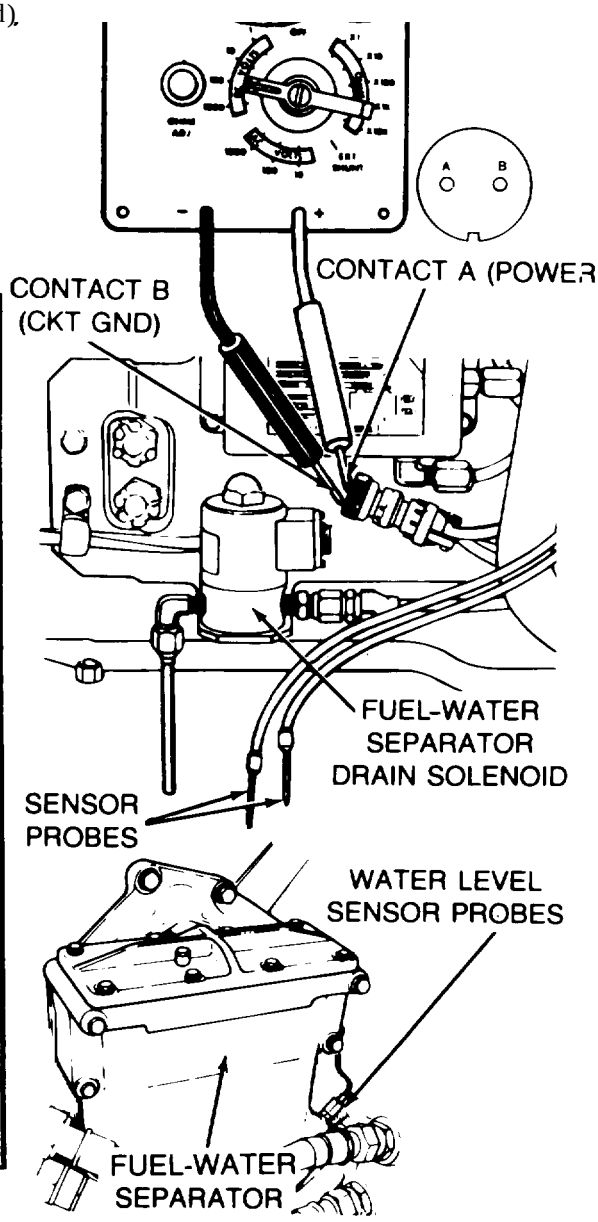
3 Check fuel-water separator harness for electrical power at solenoid connector.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

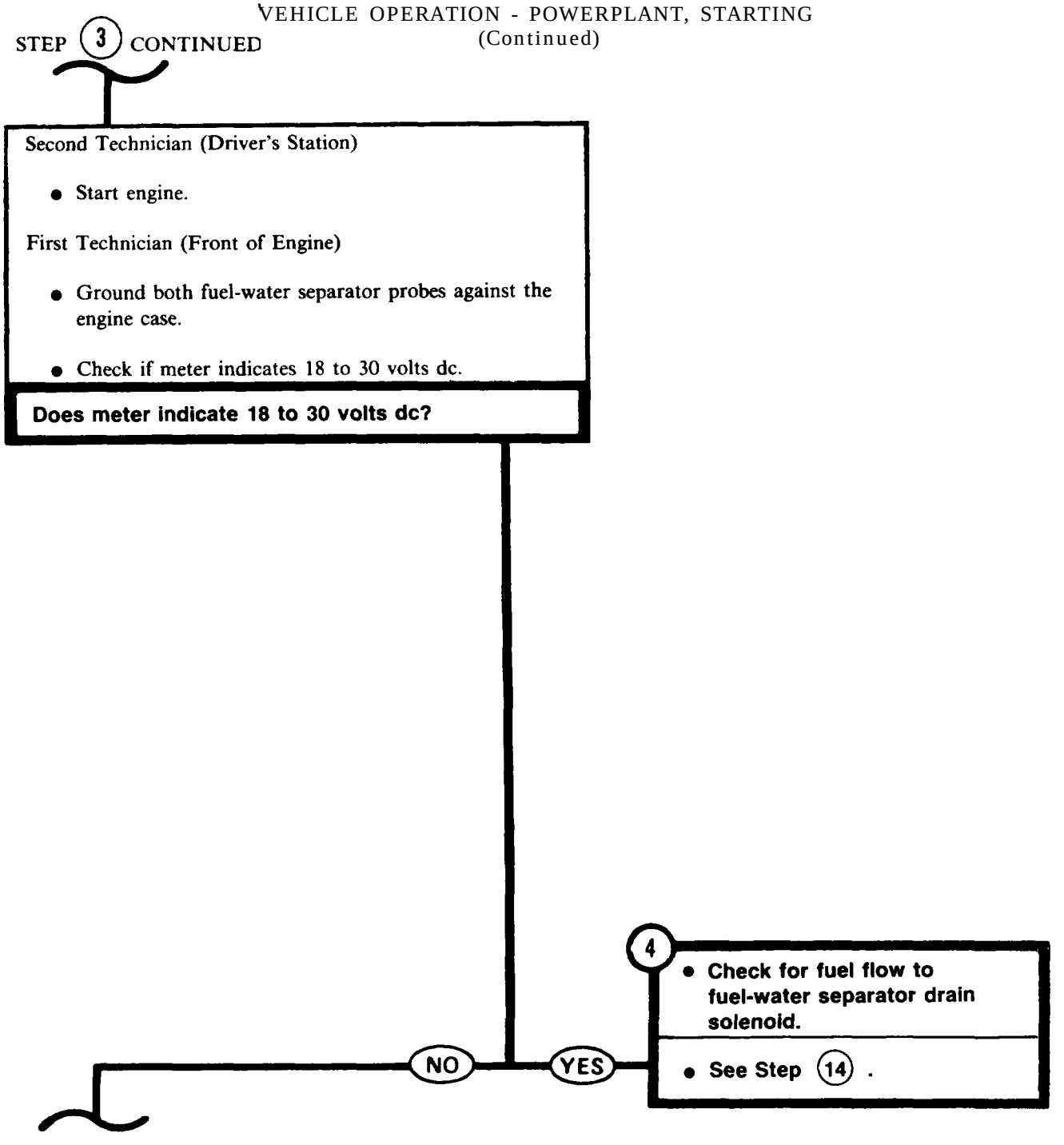
First Technician (Front of Engine)

- Disconnect ground hop fuel supply line from engine.
- Remove two probes and adapters from fuel-water separator.
- Install 1/8 inch pipe plugs in adapter openings.
- Place suitable container under drain line.
- Connect ground hop fuel supply line to engine.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Disconnect harness from fuel-water separator drain solenoid.
- Connect red probe of meter to contact A and black probe to contact B of the harness connector.



TA141960

Symptom-10-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)



TA141961

Symptom-10-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

5 **Check fuel-water separator harness for continuity between solenoid connector contact A and control assembly connector contact A.**

Second Technician (Driver's Station)

- Stop engine.

First Technician (Front of Engine)

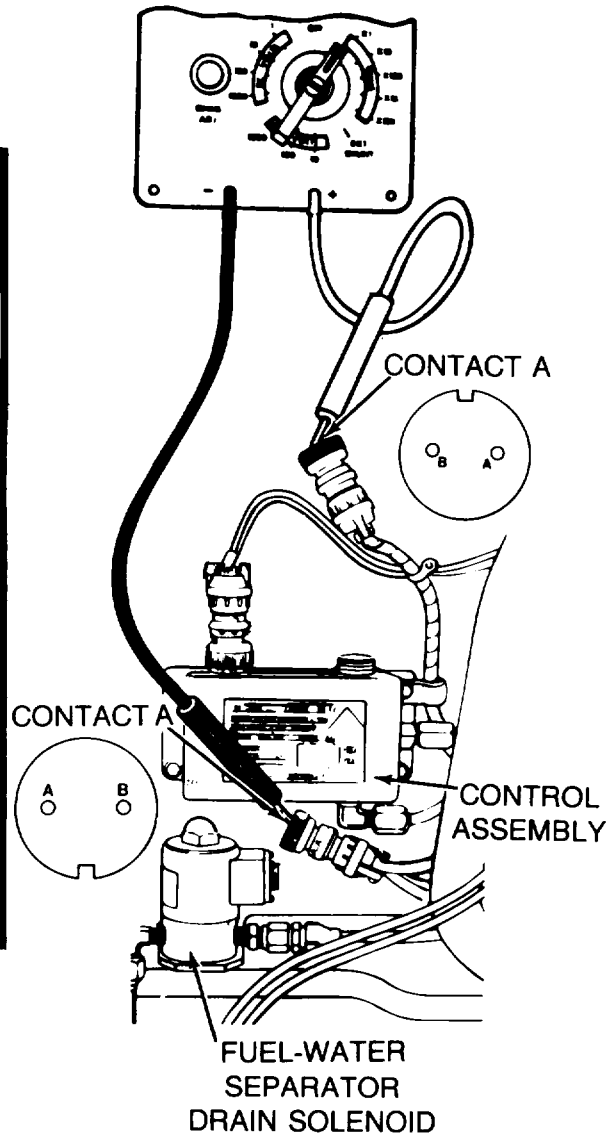
- Disconnect fuel-water harness from control assembly.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact A of fuel-water separator harness, control assembly connector.
- Connect black probe of meter to contact A of fuel-water separator harness, solenoid connector.
- Check if meter indicates continuity.

Does meter indicate continuity?

6
- **Replace harness between control assembly and solenoid (page 7-304).**
- **Install probes in separator.**

NO

YES



TA141962

Symptom-10-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

7 **Check fuel-water separator harness for continuity between solenoid connector contact B and control assembly connector contact B.**

First Technician (Front of Engine)

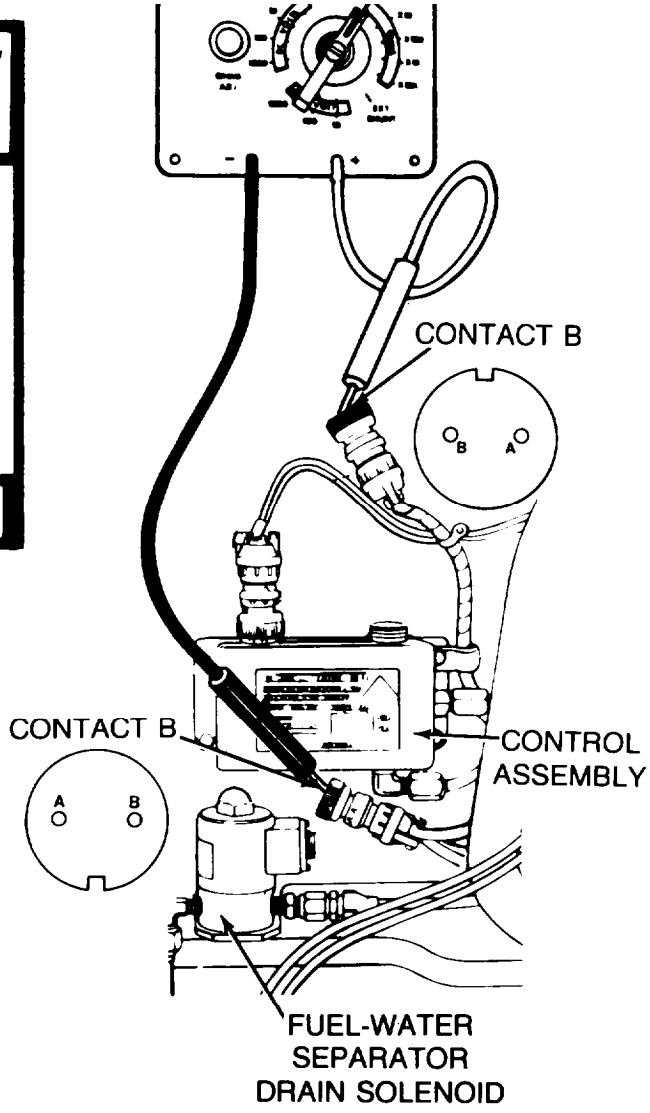
- Connect red probe of meter to contact B of fuel-water separator harness, control assembly connector.
- Connect black probe of meter to contact B of fuel-water separator harness, solenoid connector.
- Check if meter indicates continuity.

Does meter indicate continuity?

8
- **Replace harness between control assembly and solenoid (page 7-304).**
- **Install probes in separator.**

NO

YES



TA141963

Symptom-10-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

9 **Check engine harness for electrical power at control assembly connector.**

First Technician (Front of Engine)

- Connect fuel-water separator harness to control assembly and solenoid.
- Disconnect engine electrical harness from control assembly.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact A and black probe to contact B of engine harness connector.

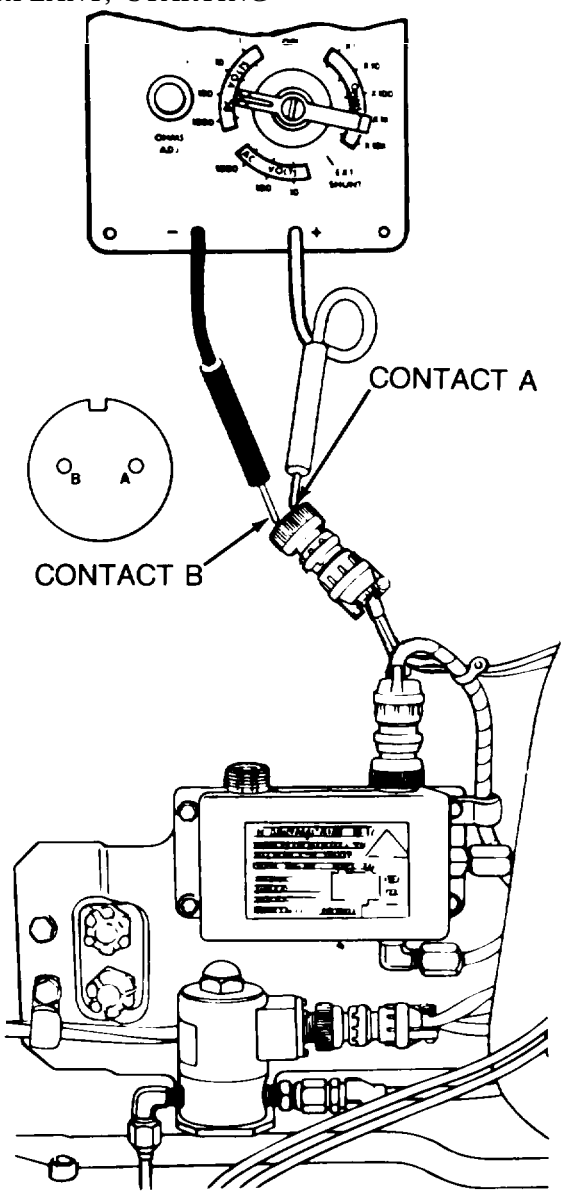
Second Technician (Driver's Station)

- Start engine.

First Technician (Front of Engine)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



NO

YES

10 **Replace fuel-water separator control assembly (page 7-314).**

TA141964

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-10-2D

11 **Check engine electrical harness from connector at fuel-water separator control to engine ground for continuity.**

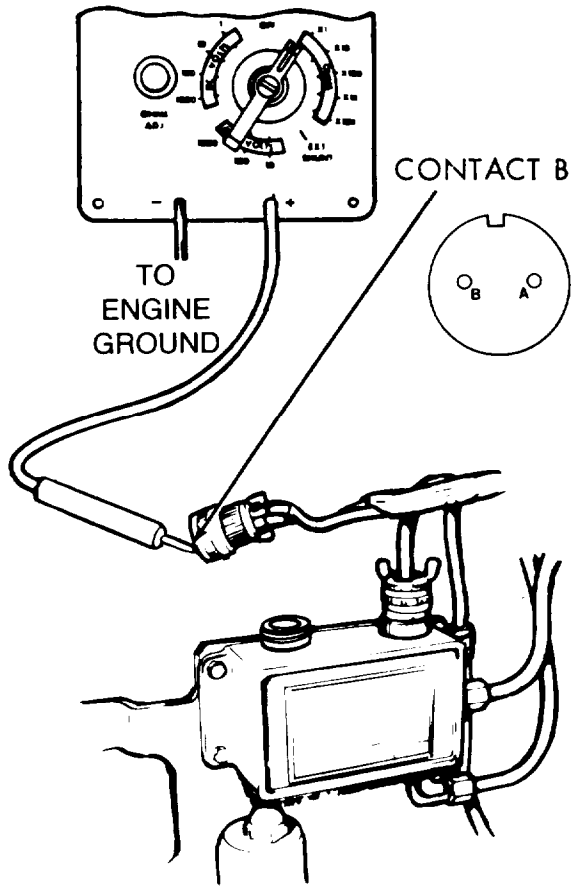
Second Technician (Driver's Station)

- Stop engine.

First Technician (Front of Engine)

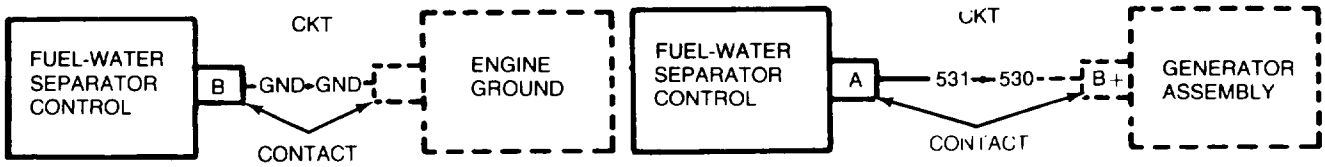
- Install probes in fuel-water separator (page 7-304).
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT GND) of engine electrical harness connector at fuel-water separator control and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO → **12** **Repair engine electrical harness CKT GND (page 10-307).**

YES → **13** **Repair engine electrical harness CKT 531 (page 10-307).**



TA141965

Symptom-10-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM STEP 4

14 Check for fuel flow to fuel-water separator drain solenoid.

Second Technician (Driver's Station)

- Stop engine.

First Technician (Front of Engine)

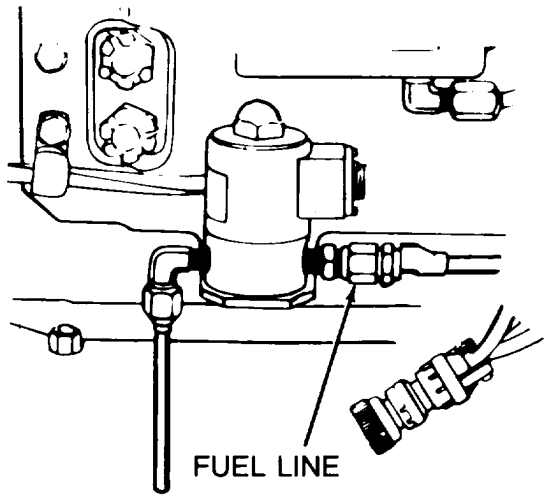
- Disconnect fuel line to fuel-water separator drain solenoid.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMP switch ON.

First Technician (Front of Engine)

- Check if fuel flows from disconnected line.



Does fuel flow from the disconnected line?

YES

NO

15

- **Remove clogs from line by blowing with compressed air. If line cannot be cleared, replace line (page 7-308).**
- **Connect electrical harness to drain solenoid.**

TA141966

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

Symptom-10-2E

16 Check drain line from fuel-water separator solenoid for clogs.

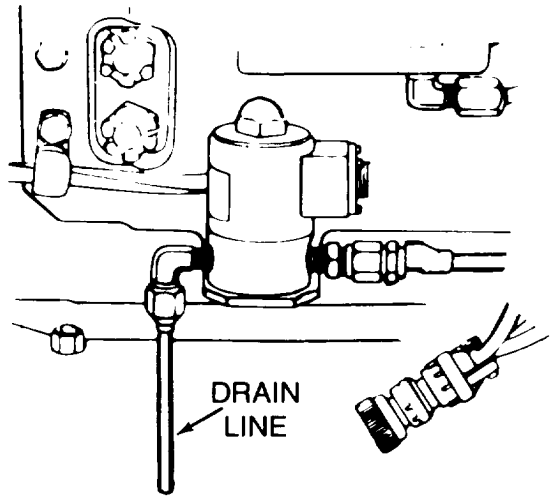
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Front of Engine)

- Remove drain line from fuel-water separator drain solenoid.
- Using compressed air, blow through drain line.
- Check if air flows through drain line.

Does air flow through drain line.



NO → **17**

- **Replace drain line from fuel-water separator solenoid (page 7-308).**
- **Connect fuel line to fuel-water separator drain solenoid.**
- **Reconnect electrical harness to drain solenoid.**

YES → **18**

Replace fuel-water separator drain solenoid (page 7-305).

TA141967

Symptom-10-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STARTING
(Continued)

FROM NOTE PRIOR TO STEP (1)

(19) Check if fuel stops draining when wiring harness to solenoid is disconnected.

First Technician (Top Deck)

- Remove powerplant (page 5-1).
- Ground hop powerplant (page 5-48).

First Technician (Front of Engine)

- Disconnect harness from fuel-water separator drain solenoid.

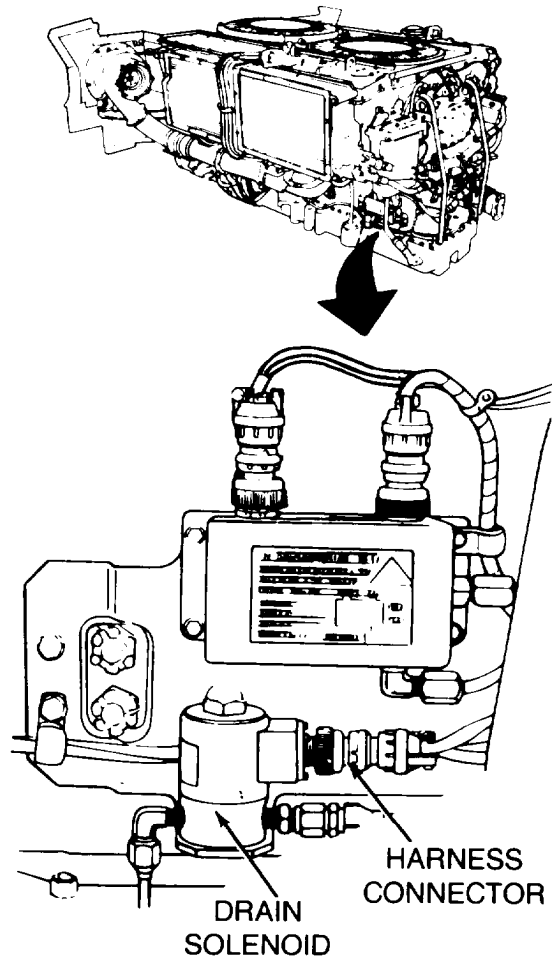
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMP switch ON.

First Technician (Front of Engine)

- Check if fuel flows from solenoid drain line.

Does fuel flow from solenoid drain line?



YES

(20) Replace fuel-water separator drain solenoid (page 7-305).

NO

(21)
- **Replace fuel-water separator control assembly (page 7-314).**
- **Connect electrical harness to drain solenoid.**

All data on pages 4-348 thru 4-370 deleted.

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING

Symptom-ll-2D

ENGINE WILL NOT RUN RIGHT (2D ENGINE).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

NOTE

- **If STE/ICE is available, perform Compression Unbalance Test No. 14: (page 4-69).**
- **If STE/ICE is not available, go to Step (1).**

(1) Check engine air intake and outlet hoses for damage.

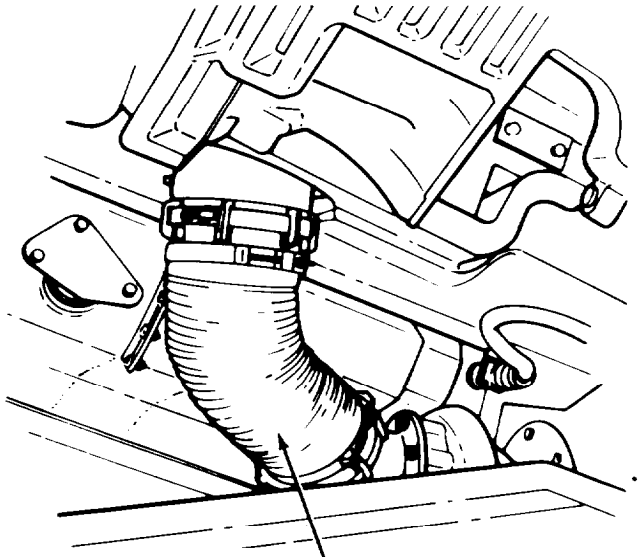
Both Technicians (Top Deck)

- Open top deck grille doors on both sides of vehicle.
- Check left and right side air intake hoses and outlet hoses for damage.

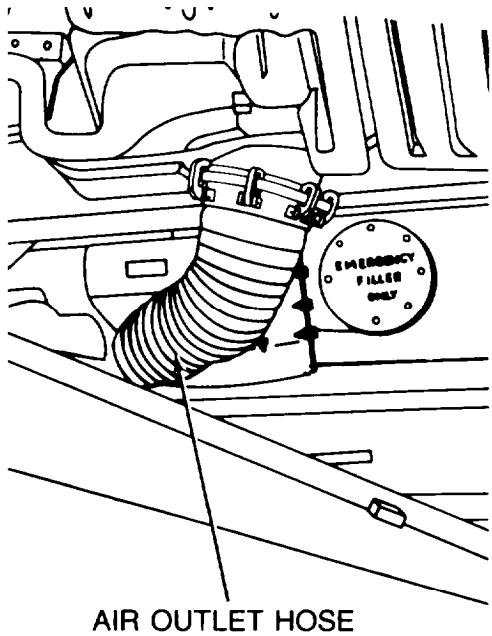
Are air intake or outlet hoses damaged?

(2) Replace damaged intake (page 7-82) or outlet hoses (page 7-73).

YES



AIR INTAKE HOSE
(LEFT SIDE SHOWN)



AIR OUTLET HOSE
(LEFT SIDE SHOWN)

TA141992

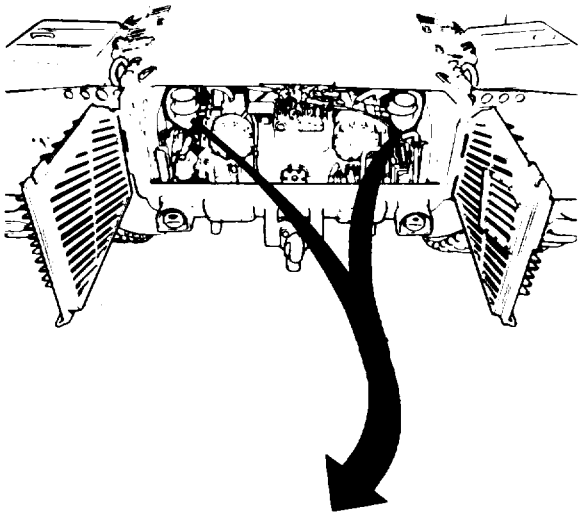
Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

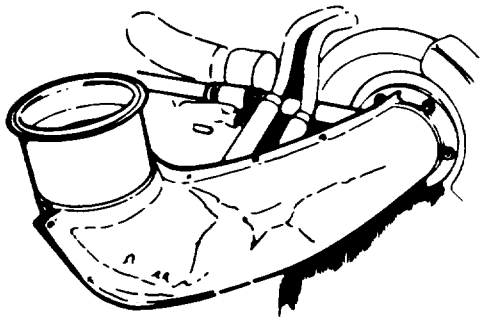
3 **Check right and left exhaust pipes for restrictions or damage.**

Both Technicians (Rear of Vehicle)

- Remove transmission shroud (page 9-20).
- Check right and left exhaust pipes for restriction or damage.

Are exhaust pipes restricted or damaged?





EXHAUST PIPE
(RIGHT SIDE SHOWN)

NO

YES

4 **Remove restrictions, if restrictions cannot be removed, replace damaged exhaust pipes, left (page 8-5), right (page 8-9).**

TA141993

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

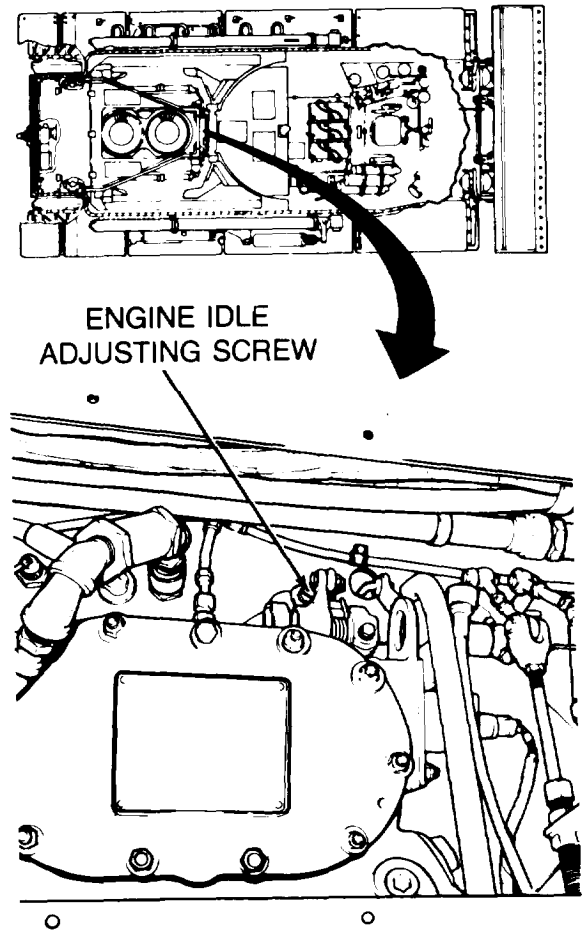
5 **Check engine idle adjustment.**

Both Technicians (Turret)

- Remove upper engine access cover (page 16-40).
- Check if engine idle screw is properly adjusted (page 7-423).

Is engine idle properly adjusted?

FOR CLARITY
TURRET NOT SHOWN



YES

NO

6 **Adjust engine idle (page 7-423).**

TA141994

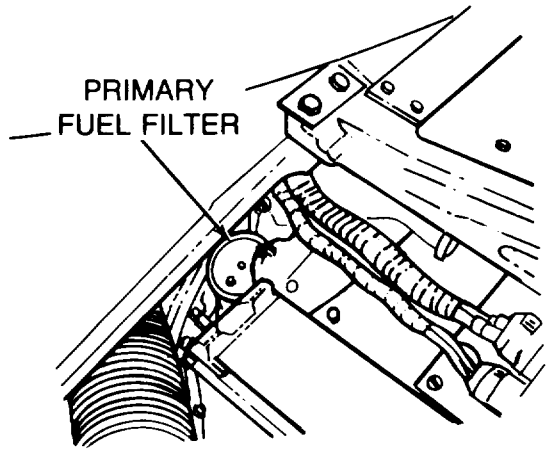
Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

7 **Check primary fuel filter for contamination.**

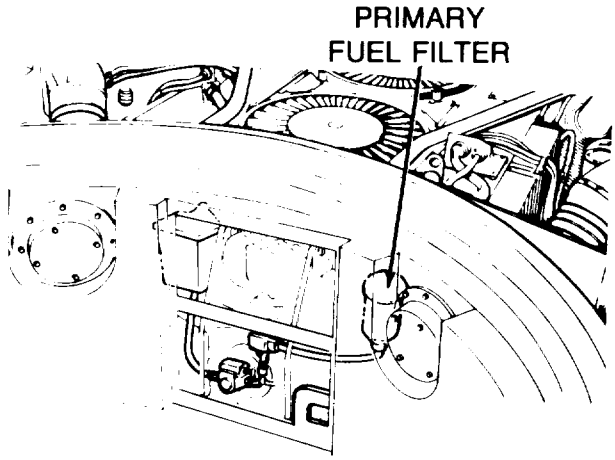
First Technician (Turret)

- Remove primary fuel filter element and check filter element for contamination (page 7-332).

Is primary fuel filter contaminated?



VIEWED FROM LEFT TOP
DECK GRILLE DOORS



VIEWED FROM TURRET PLATFORM
(ENGINE ACCESS COVERS REMOVED
FOR CLARITY)

NO

YES

8 **Service primary fuel filter (page 7-334).**

TA141995

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

9 **Check if electric fuel pumps work.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch ON.

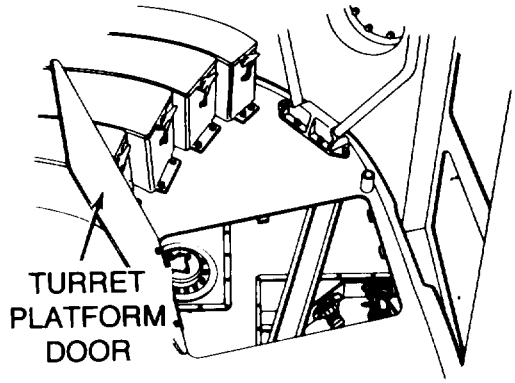
First Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Traverse turret to gain access to right electric fuel pump access panel (TM 9-2350-222-10).
- Listen for sound of right electric fuel pump running.

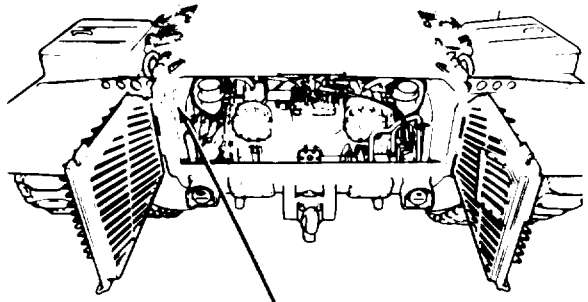
First Technician (Rear Grille Doors)

- Open rear grille doors.
- Listen for sound of left electric fuel pump running.
- Close turret platform access door.

Do electric fuel pumps work?



RIGHT FUEL TANK ELECTRICAL FUEL PUMP COVER (ACCESS COVER REMOVED FOR CLARITY)



LEFT FUEL TANK ELECTRICAL FUEL PUMP

YES

NO

10 **See Symptom 5: ONE ELECTRIC FUEL PUMP WILL NOT WORK, or Symptom 6: BOTH ELECTRIC FUEL PUMPS WILL NOT WORK.**

TA141996

Symptom-11-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

NOTE

Step (11) locator views on next page.

(11) Check fuel lines backflow valve and filters for leaks or damage.

Second Technician (Driver's Station)

- Set FUEL PUMPS switch OFF.
- Set MASTER BATTERY switch OFF.

Both Technicians (Outside of Vehicle)

- Have powerplant removed (page 5-1).
- Ground hop powerplant (page 5-48).

Second Technician (Driver's Station)

- Start engine.

First Technician (Front of Engine)

- With the engine idling, visually check the following for leaks or damage:
  - Main fuel feed hose.
  - Quick disconnects.
  - Primary fuel filter inlet hose.
  - Primary fuel filter housing.
  - Primary fuel filter outlet hose.

TA141997

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

STEP 11 CONTINUED

- Backflow valve.
- Backflow valve outlet tube.
- Fuel-water separator inlet line.
- Fuel-water separator.
- Fuel-water separator outlet line.

Are lines or hoses leaking or damaged?

NO

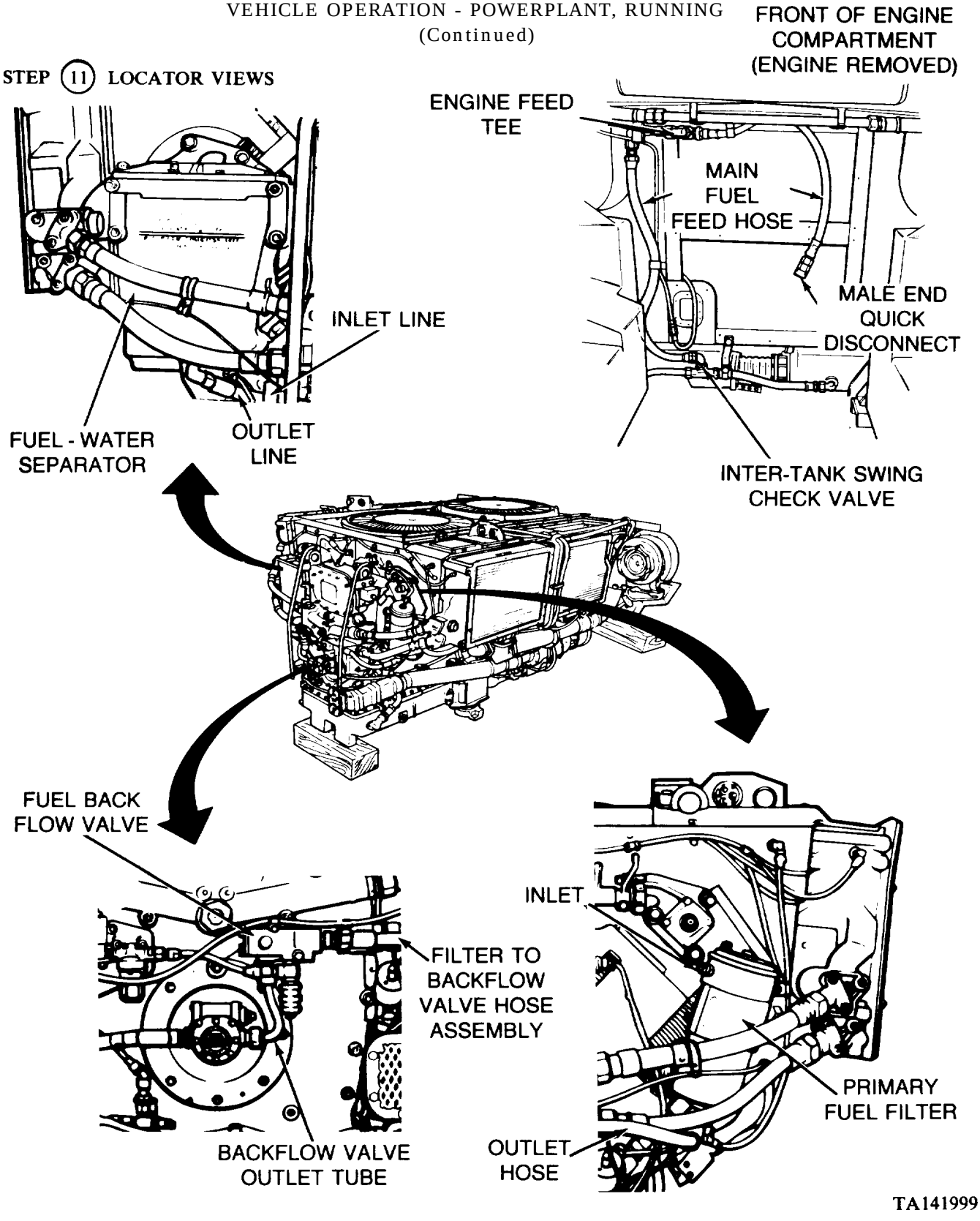
YES

12

- **Tighten leaking connections.**
- **If connections are stil leaking or any parts are damaged, replace the following as necessary:**
  - **Main fuel feed hose (page 7-197).**
  - **Quick disconnect (page 7-197).**
  - **Primary fuel filter inlet hose (page 7-223).**
  - **Primary fuel filter housing (page 7-284).**
  - **Primary fuel filter outlet hose (page 7-48).**
  - **Backflow valve assembly (page 7-41).**
  - **Backflow valve outlet tube (page 7-41).**
  - **Fuel-water separator inlet line (page 7-296).**
  - **Fuel-water separator outlet line (page 7-296).**

TA141998

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)



Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

13 **Check low pressure fuel hose assembly (fuel injector pump inlet to bulkhead elbow) for leaks or damage.**

Both Technicians (Top of Engine)

- Remove front cooling fan (page 9-48).

First Technician (Driver's Station)

- Set FUEL PUMPS switch ON.
- Set MASTER BATTERY switch ON.

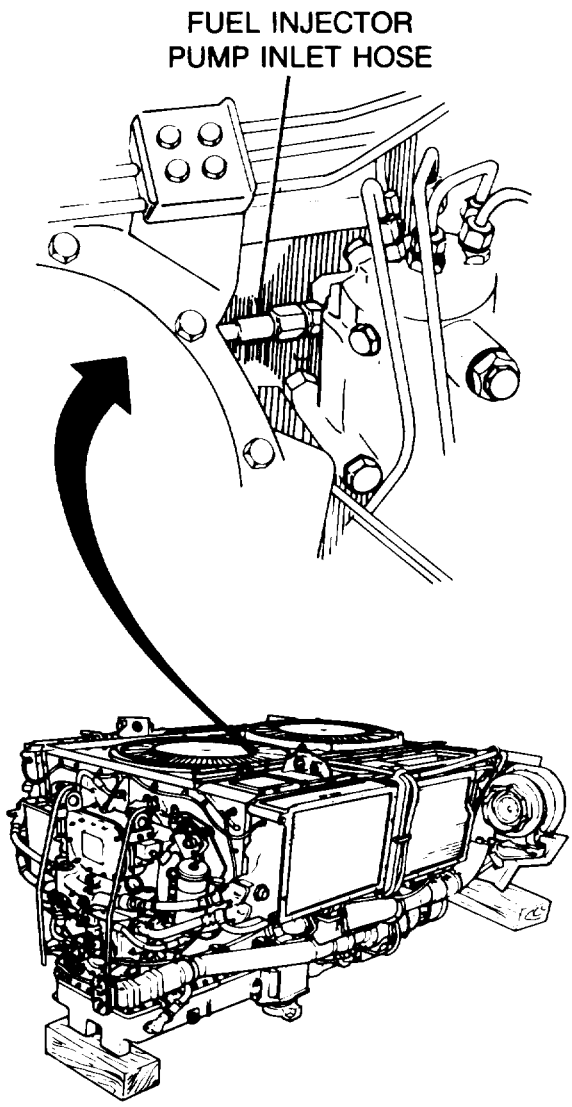
Second Technician (Top of Engine)

- Check the fuel injector pump inlet hose assembly for leaks, or damage.

First Technician (Driver's Station)

- Set FUEL PUMPS switch OFF.

Is the fuel injector pump inlet hose leaking or damaged?



NO

YES

14

- **Tighten loose connections.**
- **Replace damaged fuel injector pump inlet hose assembly (page 7-32).**

TA142000

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

15 Check for fuel flow at inlet side of fuel injector pump.

Second Technician (Top of Engine)

- Disconnect hose at inlet side of fuel injector pump and place disconnected end in suitable container.

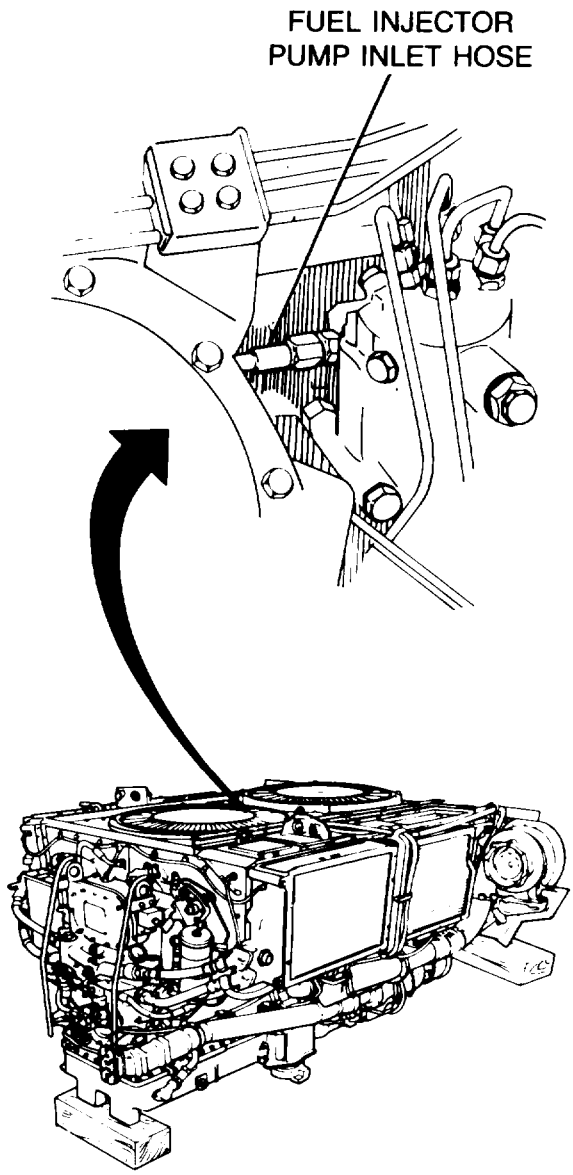
First Technician (Driver's Station)

- Set FUEL PUMPS switch ON, for a few seconds, then OFF.

Second Technician (Top of Engine)

- Check if fuel flows freely into container.

Does fuel flow freely?



NO

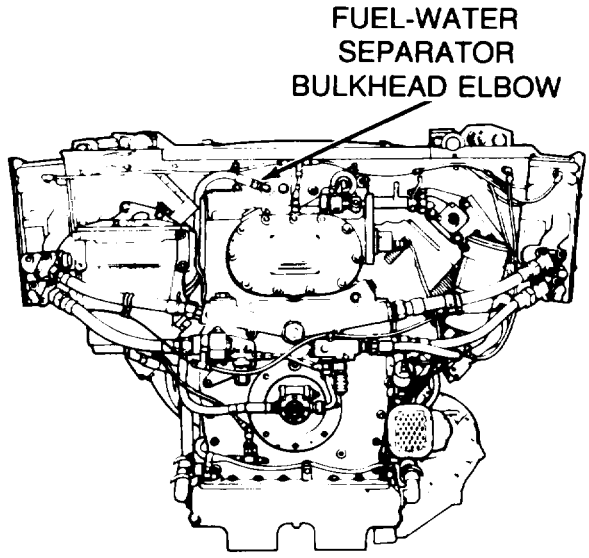
YES

16

- **Notify support maintenance of engine problem.**
- **Connect fuel injector pump inlet hose.**
- **Install cooling fans (page 9-49).**

TA142001

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

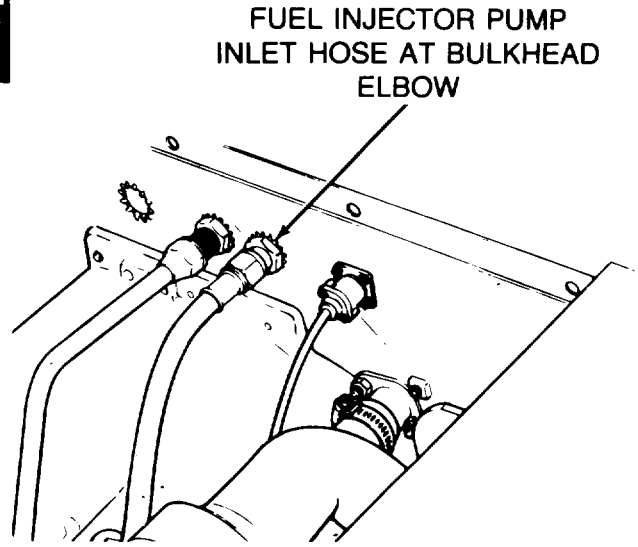


17 **Check fuel injector pump inlet hose for blockage.**

Second Technician (Top of Engine)

- Disconnect fuel injector pump inlet hose at the bulkhead elbow.
- Blow through hose with compressed air to check if hose is blocked.

Is hose blocked?



NO

YES

18 **Remove blockage. If blockage cannot be removed, replace fuel injector pump inlet hose (page 7-32).**

TA142002

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

19 **Check for fuel flow at bulkhead elbow.**

First Technician (Front of Engine)

- Disconnect fuel-water separator outlet hose from bulkhead elbow.
- Place hose in suitable container.

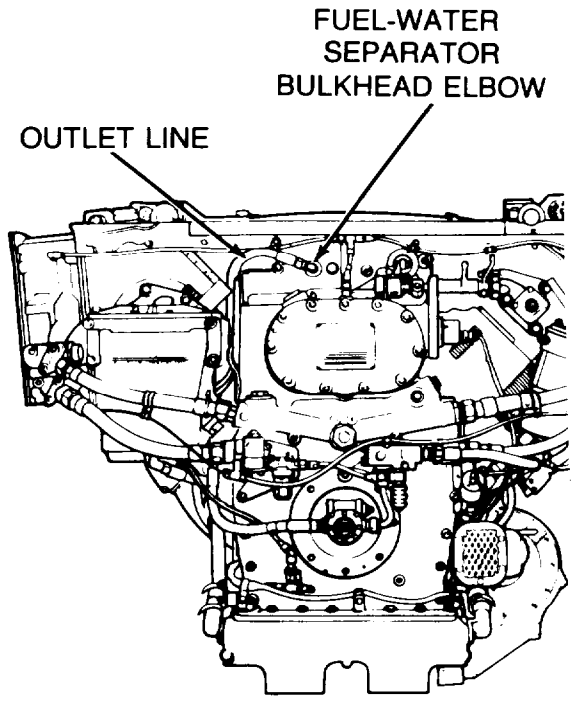
Second Technician (Driver's Station)

- Set FUEL PUMPS switch ON, for a few seconds, then OFF.

First Technician (Front of Engine)

- Check if fuel flows freely into container.

Does fuel flow freely?



NO

YES

20 **Replace bulkhead elbow (page 7-32).**

TA142003

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

21 **Check if fuel-water separator outlet hose is blocked.**

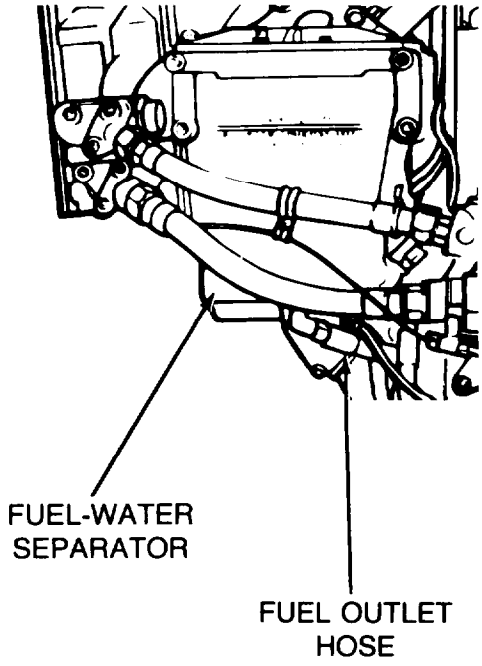
Both Technicians (Top of Engine)

- Connect fuel injector inlet line.
- Install front cooling fan (page 9-49).

First Technician (Front of Engine)

- Place suitable container under fuel-water separator.
- Disconnect fuel-water separator outlet hose from fuel-water separator.
- Using Compressed air, check if hose is blocked.

Is hose blocked?



NO

YES

22 **Replace fuel-water separator outlet hose if blockage cannot be removed (page 7-296).**

TA142004

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

23 **Check for fuel flow at fuel-water separator inlet hose.**

First Technician (Front of Engine)

- Connect fuel-water separator outlet hose to bulkhead elbow and to fuel-water separator.
- Disconnect fuel-water separator inlet hose from fuel-water separator.
- Place end of hose in suitable container.

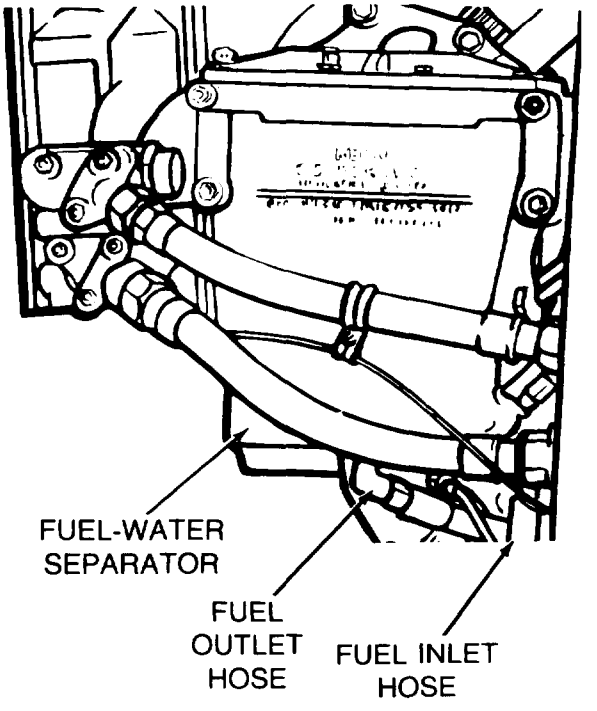
Second Technician (Driver's Station)

- Set FUEL PUMPS switch ON for a few seconds, then OFF.

First Technician (Front of Engine)

- Check if fuel flows freely into container.

Does fuel flow freely?



NO

YES

24 **Perform fuel-water separator operational checks (page 7-266)(Automatic Drain Test).**

TA142005

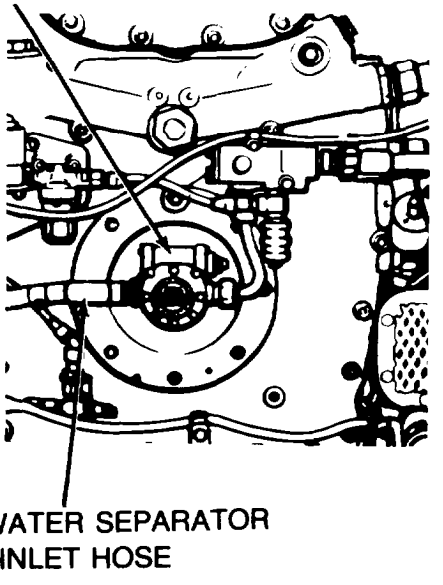
Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

25 **Check if fuel-water separator inlet hose is blocked.**

First Technician (Front of Engine)

- Disconnect fuel-water separator inlet hose from engine driven fuel pump.
- Using compressed air, check if hose is blocked.

Is hose blocked?



NO

YES

26 **Replace fuel-water separator hose if blockage cannot be removed.**

TA142006

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

27 **Check for fuel flow on inlet side of engine driven fuel pump.**

First Technician (Front of Engine)

- Connect fuel-water separator inlet hose to engine driven fuel pump and fuel-water separator.
- Disconnect fuel backflow valve outlet tube from engine driven fuel pump.
- Place suitable container under tube.

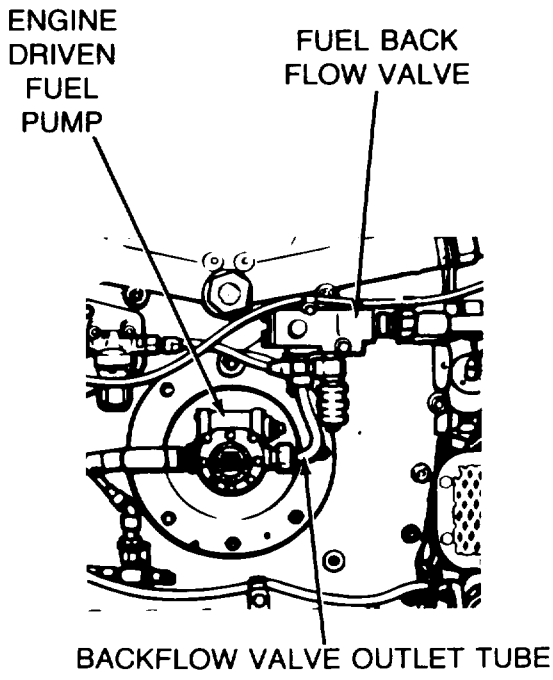
Second Technician (Driver's Station)

- Set FUEL PUMPS switch ON for a few seconds, then OFF.

First Technician (Engine)

- Check if fuel flows freely into container.

Does fuel flow freely?



NO

YES

28 **Replace engine driven fuel pump (page 7-37).**

TA142007

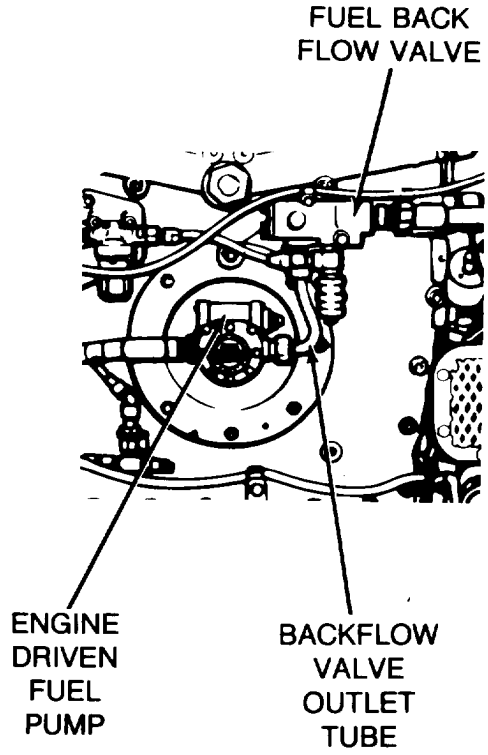
Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

29 **Check backflow valve outlet tube for blockage.**

First Technician (Front of Engine)

- Disconnect backflow valve outlet tube from backflow valve.
- Blow air through backflow valve outlet tube.

Is backflow valve outlet tube blocked?



NO

YES

30 **Replace backflow valve outlet tube if blockage cannot be removed.**

TA142008

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

31 **Check for fuel flow at inlet side of fuel backflow valve.**

First Technician (Engine)

- Disconnect primary fuel filter outlet hose from backflow valve inlet.
- Place hose in suitable container.

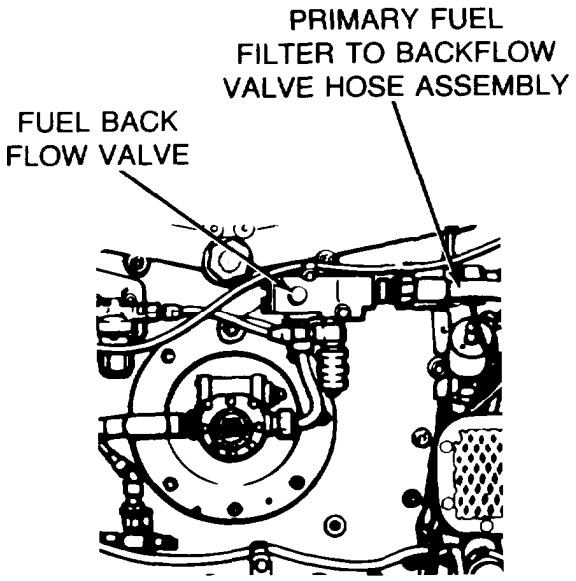
Second Technician (Driver's Station)

- Set FUEL PUMPS switch ON for a few seconds then OFF.
- Set MASTER BATTERY switch OFF.

First Technician (Engine)

- Check if fuel flows freely into container.

Does fuel flow freely?



NO

YES

32 **Replace fuel backflow valve (page 7-41).**

TA142009

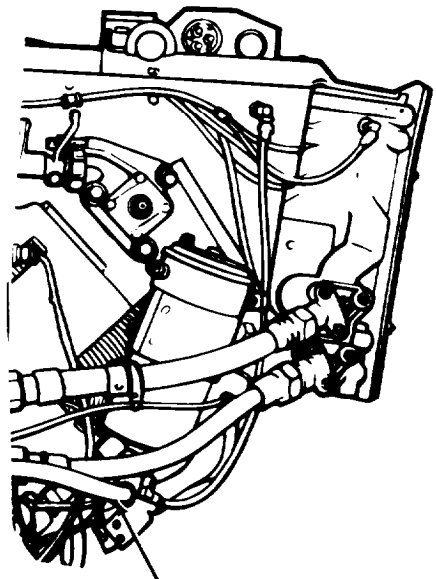
Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

33 **Check if primary fuel filter outlet hose is blocked or defective.**

First Technician (Front of Engine)

- Install backflow valve outlet tube.
- Place suitable container under primary fuel filter.
- Disconnect primary fuel filter outlet hose from primary fuel filter body.
- Using compressed air, check if hose is blocked.

Is hose blocked?



NO

YES

34 **Remove blockage. If blockage cannot be removed, replace primary fuel filter outlet hose (page 7-50).**

TA142010

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

35 **Check if primary fuel filter inlet hose assembly is defective.**

First Technician (Front of Engine)

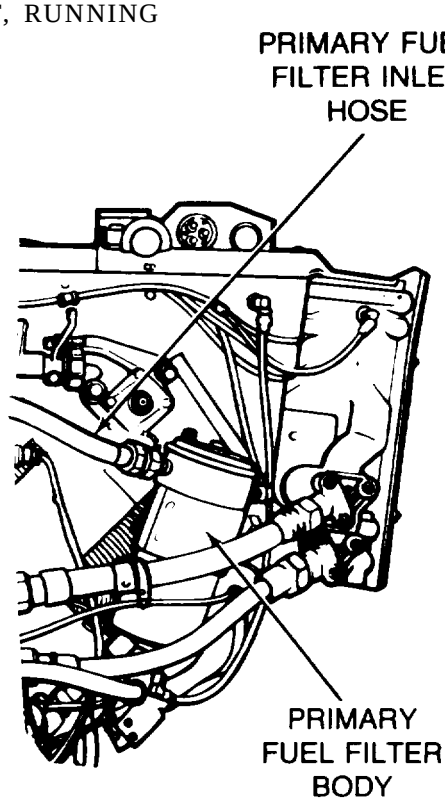
- Install primary fuel filter outlet hose assembly.
- Disconnect primary fuel filter inlet hose from filter body.
- Disconnect primary fuel filter inlet hose at quick disconnect.
- Remove male end of quick disconnect from primary fuel filter inlet hose.
- Using compressed air, check to see if hose is blocked.

Is primary fuel filter inlet hose blocked?

36 **Replace primary fuel filter inlet hose if blockage cannot be removed.**

YES

NO



TA142011

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

37 **Check quick disconnect for proper operation.**

Second Technician (Inside Hull)

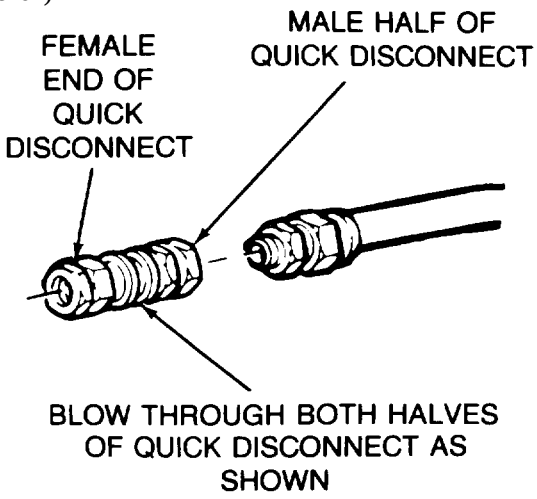
- Remove female half of quick disconnect from main fuel feed.
- Connect both halves of quick disconnect together.
- Using compressed air, check to see if quick disconnect is blocked.

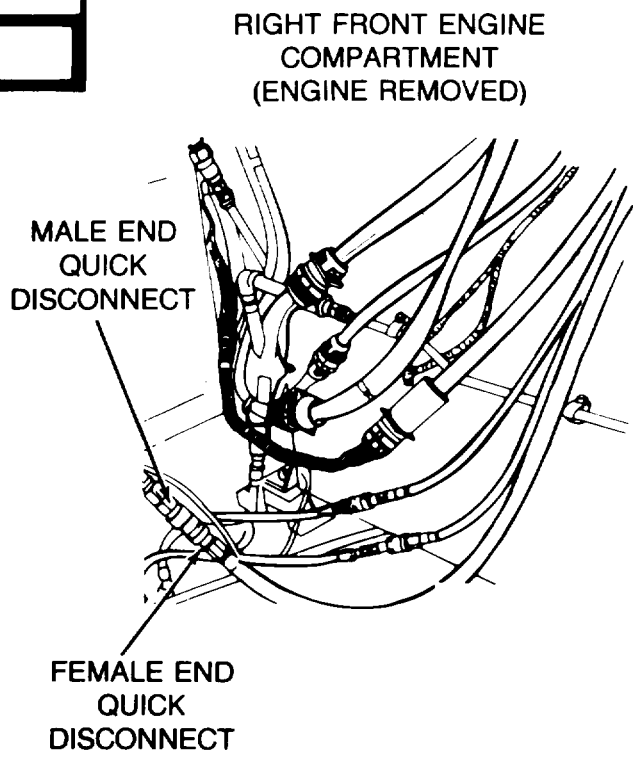
Is quick disconnect blocked?

YES

38 **Replace quick disconnect if blockage cannot be removed (page 7-197).**

NO





Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

NOTE

Step (39) Locator views continued on next page.

39 Check fuel lines from main fuel hoses to right and left fuel tanks.

Both Technicians (Engine)

- Connect primary fuel filter hose to primary fuel filter body.
- Connect male half of quick disconnect to primary fuel filter hose.
- Drain both fuel tanks (page 7-158).
- Remove the following lines/valves and check for blockage by using compressed air:
  - Main fuel feed hose
  - Engine feed tee
  - Inter-tank swing check valve

Are any lines or valves blocked?

NO

40

- **Install all lines, tubes, female quick disconnect, and check valve.**
- **Install powerplant, (page 5-37).**
- **Fill fuel tanks.**
- **Notify support maintenance of engine problem.**

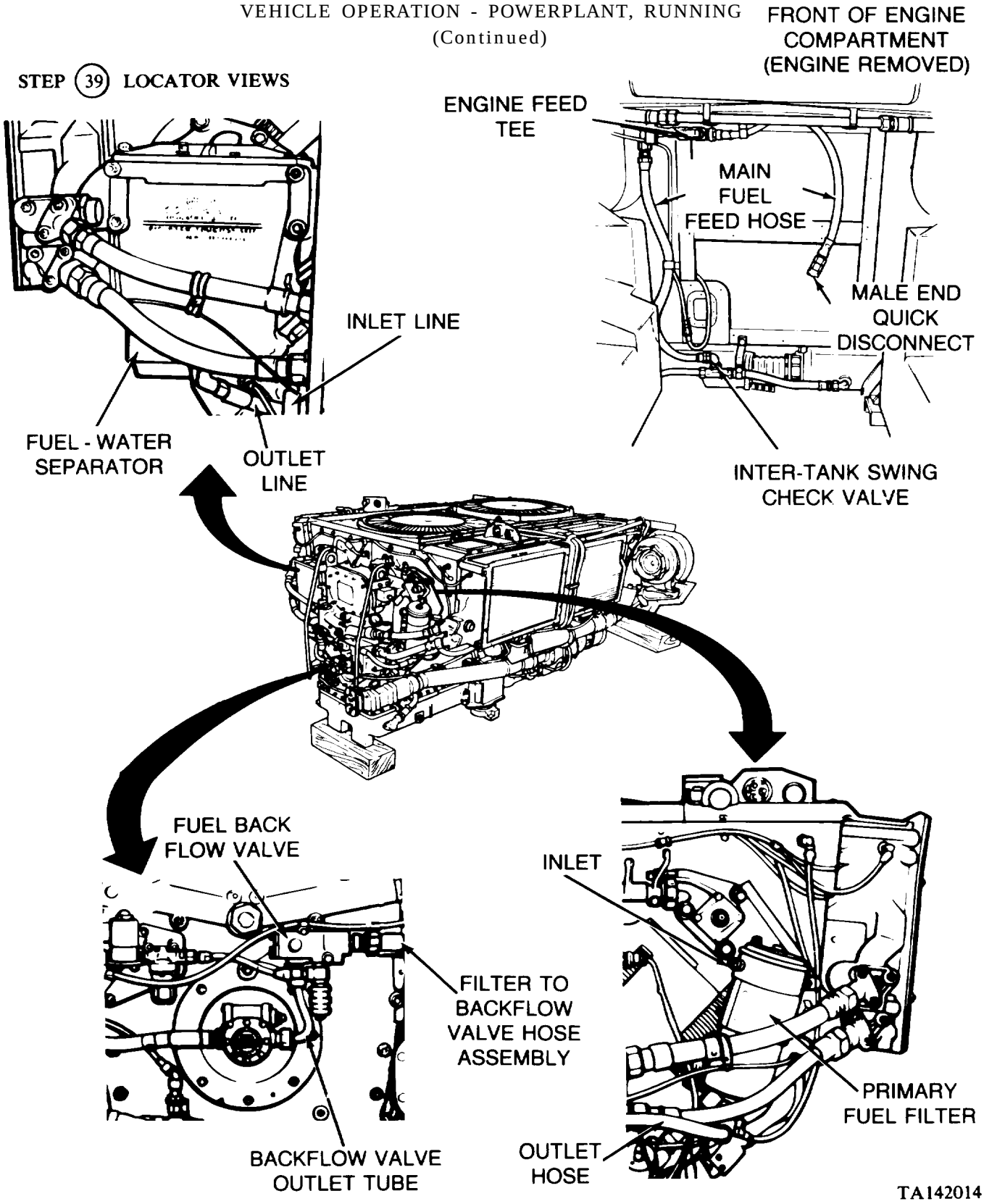
YES

41

- **If blockage cannot be removed, replace the flowing parts as necessary:**
  - **Main fuel feed hose (page 7-216).**
  - **Engine feed tee (page 7-216).**
  - **Inter-tank swing check valve (page 7-235).**
- **Install all lines, tubes, female quick disconnect, and check valve.**
- **Install powerplant (page 5-37).**
- **Fill fuel tanks.**

Symptom-11-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

STEP (39) LOCATOR VIEWS



DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING

Symptom-12

ONE AIR CLEANER BLOWER FAN WILL NOT WORK.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

NOTE

This procedure is the same for both left and right air cleaners. The Armored and Aluminum air cleaner are functionally identical.

NOTE

If your vehicle has side-loading air cleaners, see step (11).

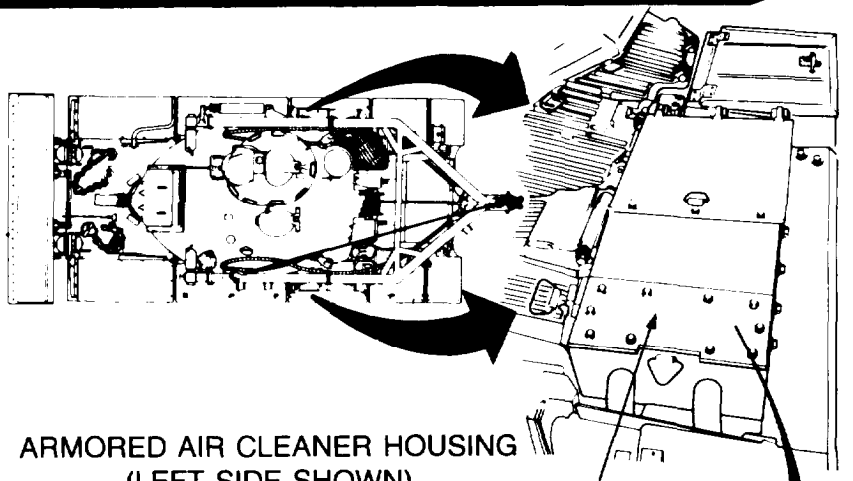
(1) Check air cleaner blower fan power jumper lead at inoperative fan motor for electrical power.

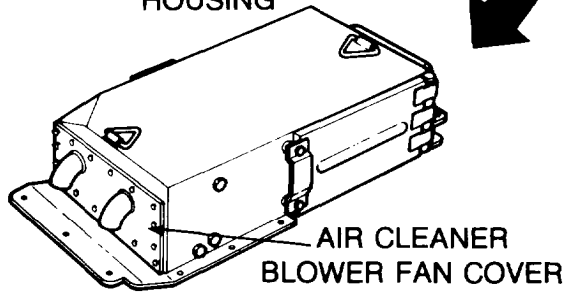
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Disabled Air Cleaner)

- Remove air cleaner blower cover aluminum (page 7-131) or armored (page 7-148).





TA142015

Symptom-12

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

STEP (1) CONTINUED

First Technician (Air Cleaner)

- Disconnect air cleaner, blower fan power jumper lead from fan motor electrical lead connector.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to air cleaner blower fan power jumper lead and black probe to ground.

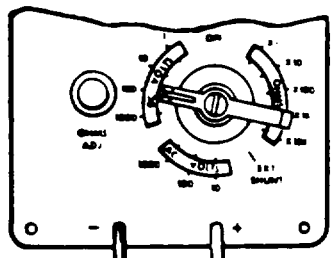
Second Technician (Driver's Station)

- Start engine.

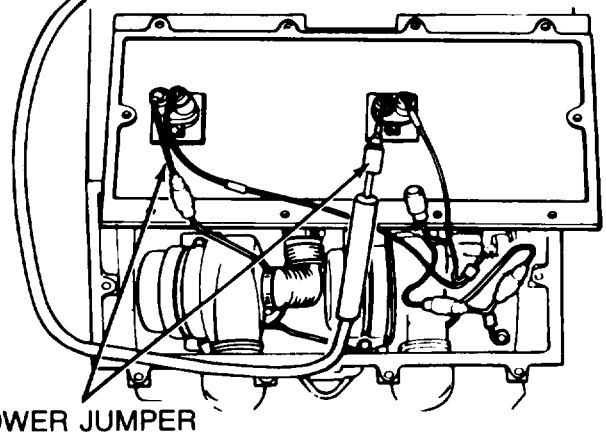
First Technician (Air Cleaner)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



TO VEHICLE GROUND



POWER JUMPER LEADS

NO

YES

(2)

- **Check air cleaner blower fan ground lead for continuity.**
- **See Step (8).**

TA142016

Symptom-12

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

3 Check air cleaner blower fan power jumper lead for continuity.

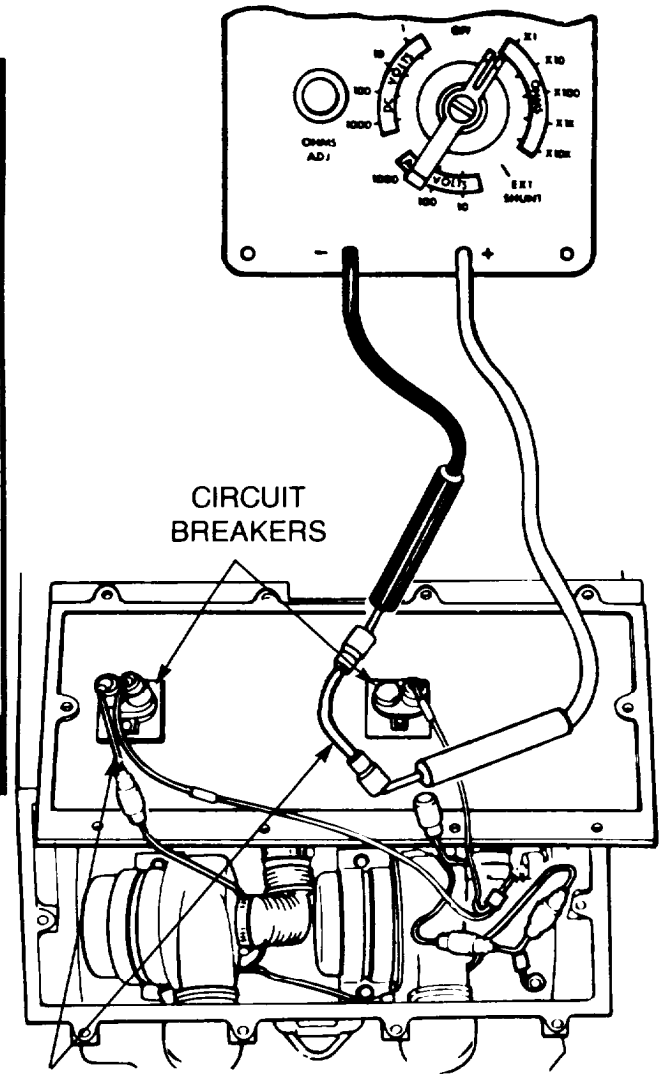
Second Technician (Driver's Station)

- Stop engine.

First Technician (Air Cleaner)

- Disconnect air cleaner, blower fan power jumper lead from fan circuit breaker.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect meter probes to connector contact at each end of power jumper lead.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

4 Replace air cleaner blower fan jumper lead, aluminum (page 7-117) or armored (page 7-134).

TA142017

Symptom-12

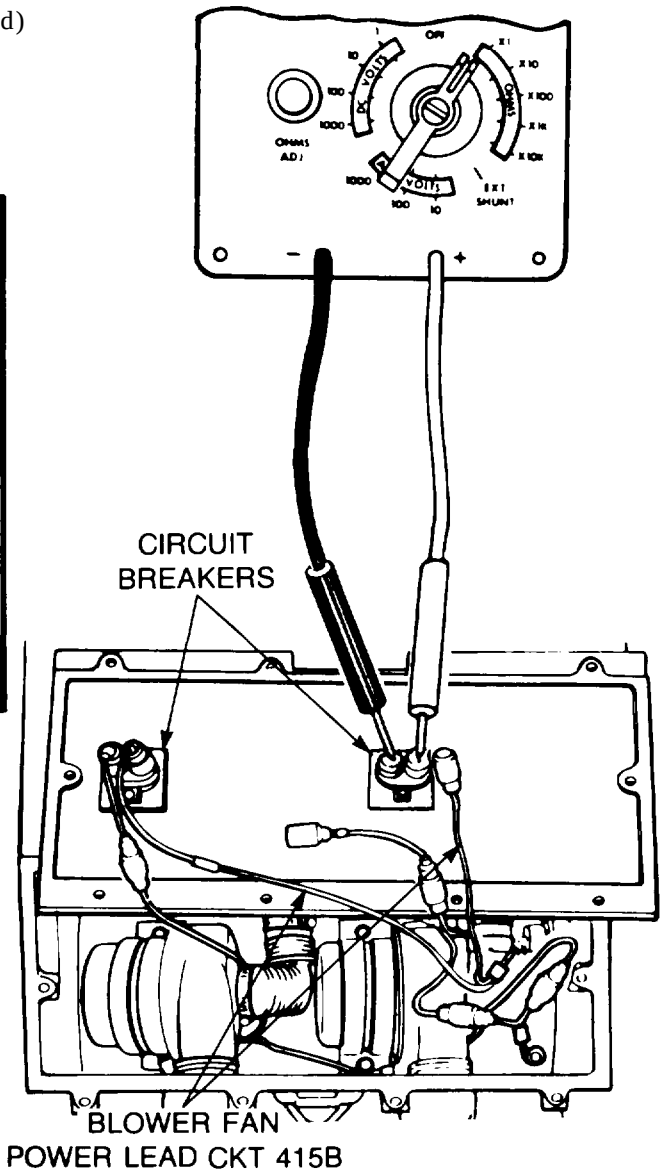
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

5 Check air cleaner blower fan circuit breaker for continuity.

First Technician (Air Cleaner)

- Disconnect blower fan power lead (CKT 415B) from circuit breaker of inoperative blower fan.
- Connect probes of meter to contacts of circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO

6 Replace air cleaner blower fan circuit breaker, aluminum (page 7-115) or armored (page 7-133).

YES

7
- **Replace air cleaner blower fan power lead, aluminum (page 7-117) or armored (page 7-134).**
- **Connect power jumper lead to circuit breaker and fan lead.**

TA142018

Symptom-12 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

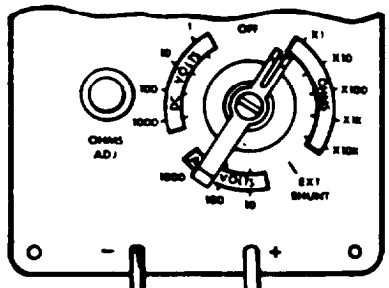
FROM STEP (2)

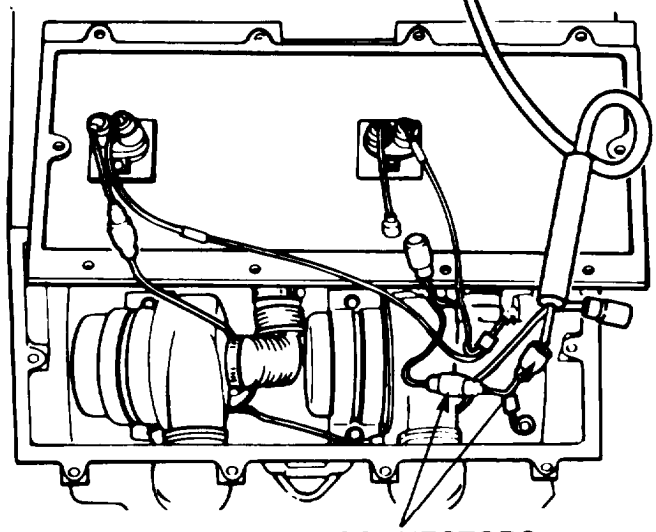
8 Check air cleaner blower fan ground lead for continuity.

First Technician (Air Cleaner)

- Disconnect air cleaner blower fan ground lead connector from inoperative blower fan.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to ground lead connector contact.
- Connect black probe of meter to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?





NO

9
- **Replace air cleaner blower fan ground lead aluminum' (page 7-122) or armored (page 7-138).**
- **Connect air cleaner blower fan jumper lead to blower fan electrical lead.**

YES

10 Replace air cleaner blower fan, aluminum (page 7-124) or armored (page 7-140).

TA142019

Symptom-12

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

FROM NOTE STEP

(1)

(11) **Check air cleaner blower fan power harness (CKT 415B) for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Disabled Air Cleaner)

- Remove air cleaner blower cover aluminum (page 7-130) or armored (page 7-147).
- Disconnect air cleaner blower fan power harness connector (CKT 415B) from air cleaner blower power lead at fan motor.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to air cleaner blower fan power harness connector contact (CKT 415B) at air cleaner blower power lead.
- Connect black probe of meter to ground.

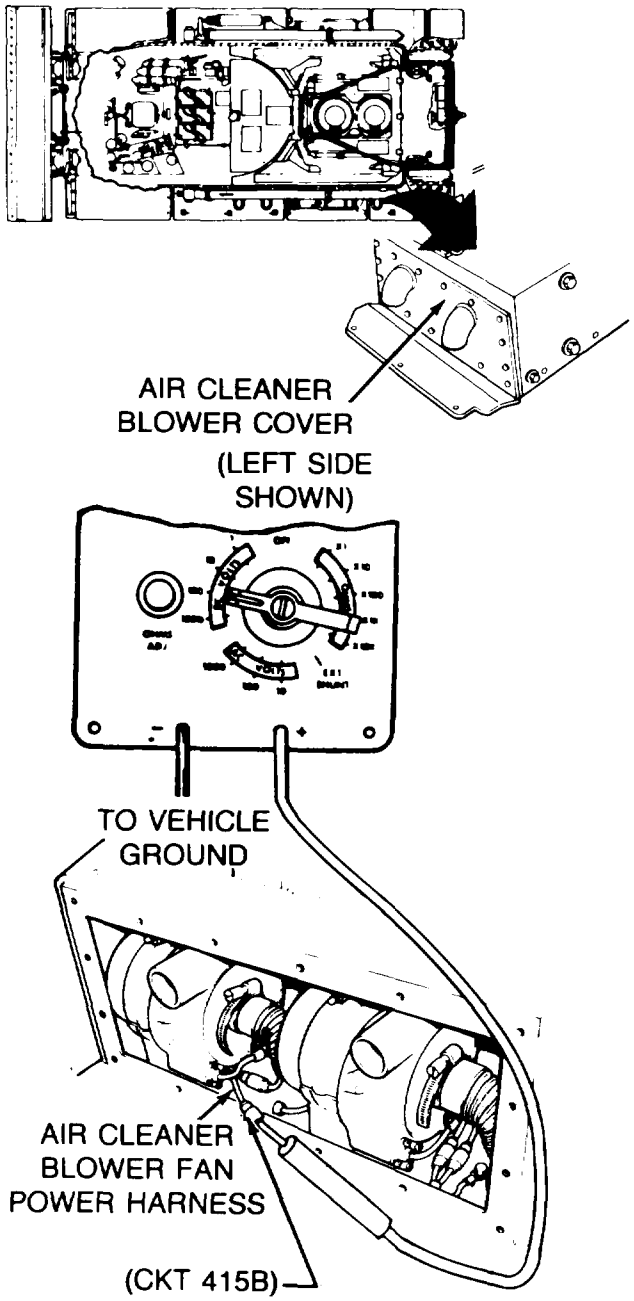
Second Technician (Driver's Station)

- Start engine.

First Technician (Air Cleaner)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

NO

(12)

- **Stop engine**
- **Replace air cleaner blower fan power harness, aluminum (page 7-117) or armored (page 7-134).**

TA142020

Symptom-12 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

13 Check air cleaner blower fan ground harness for continuity.

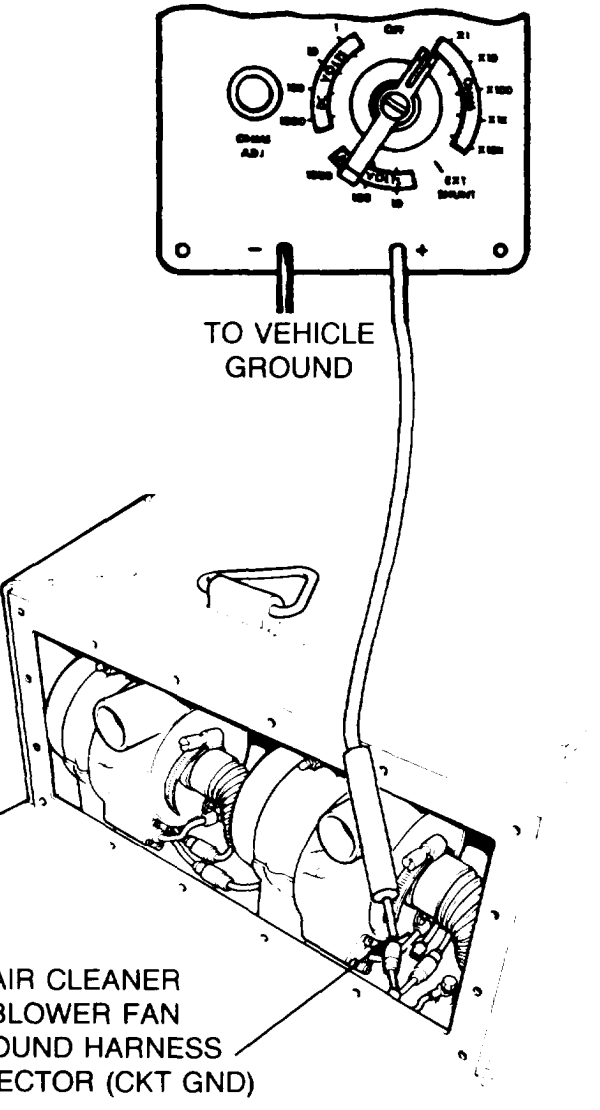
Second Technician (Driver's Station)

- Stop engine.

First Technician (Air Cleaner)

- Connect air cleaner blower fan power harness connector (CKT 415B) to air cleaner blower power lead.
- Disconnect air cleaner blower fan ground harness connector from air cleaner blower ground lead.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to air cleaner blower fan ground harness connector (CKT GND) and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

14 Replace air cleaner blower fan ground harness, aluminum (page 7-122) or armored (page 7-138).

TA142021

Symptom-12

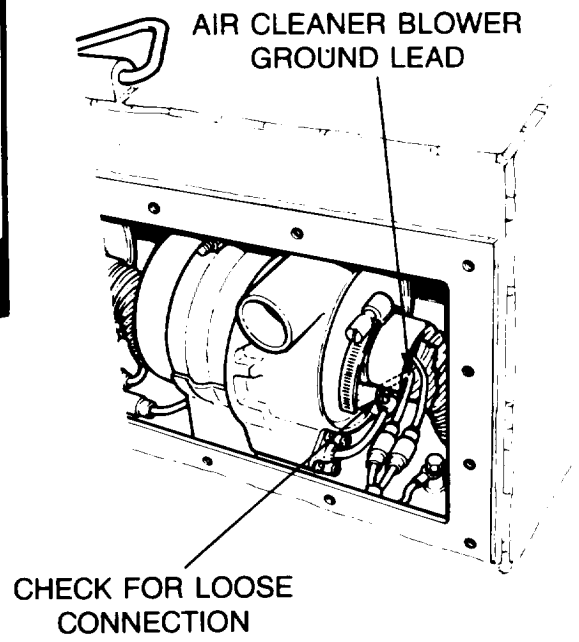
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

15 Check air cleaner blower fan ground lead for loose connection.

First Technician (Air Cleaner)

- Connect air cleaner blower fan ground harness connector (CKT GND) to air cleaner blower fan ground lead.
- Check air cleaner blower fan ground lead for loose connection at blower fan.

Is connection loose?



NO

YES

16 Clean and tighten loose connection.

TA142022

Symptom-12

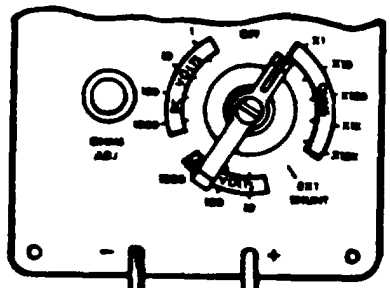
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

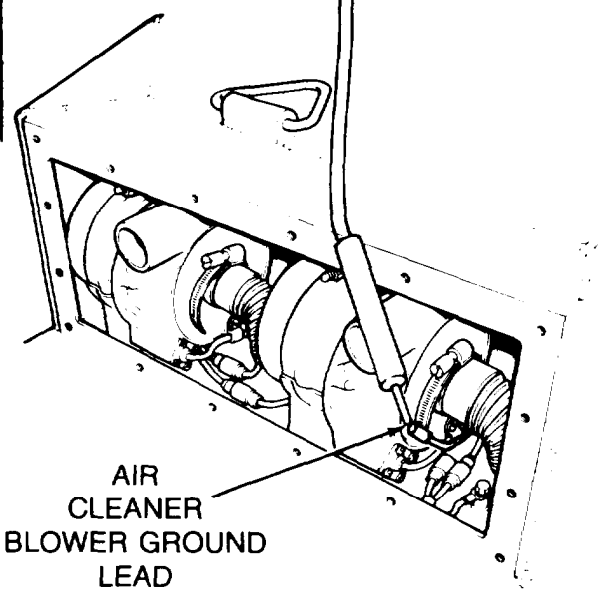
17 Check air cleaner blower fan ground lead for continuity.

First Technician (Air Cleaner)

- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to air cleaner blower fan ground lead connector contact.
- Connect black probe of meter to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?





NO

18 Replace air cleaner blower fan ground lead, aluminum (page 7-122) or armored (page 7-138).

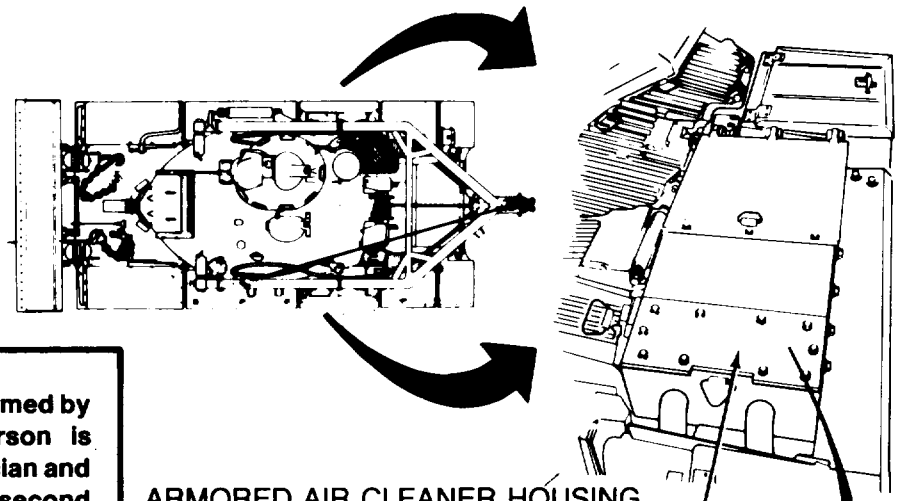
YES

19 Replace air cleaner blower fan, aluminum (page 7-124) or armored (page 7-140).

TA142023

Symptom-13 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING

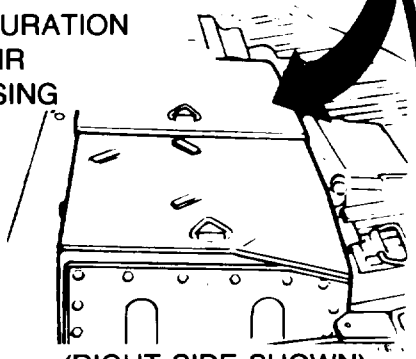
BOTH AIR CLEANER BLOWER FANS IN ONE AIR CLEANER ASSEMBLY WILL NOT WORK.



ARMORED AIR CLEANER HOUSING (LEFT SIDE SHOWN)

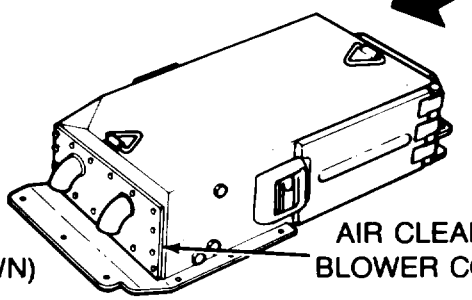
AIR CLEANER BLOWER COVER

ALTERNATE CONFIGURATION ALUMINUM AIR CLEANER HOUSING



(RIGHT SIDE SHOWN)

ALTERNATE CONFIGURATION SIDE-LOADING AIR CLEANER HOUSING



(LEFT SIDE SHOWN)

AIR CLEANER BLOWER COVER

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

NOTE

This procedure is the same for both left and right air cleaners. The Armored and Aluminum air cleaners are functionally identical.

1 **Check rear accessory harness (CKT 415B) at inoperative air cleaner for electrical power.**

First Technician (Turret)

- Manually traverse turret to gain access to top deck grille doors (TM 9-2350-222-10).

TA142024

Symptom-13

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

STEP (1) CONTINUED

First Technician (Top Deck)

- Open top deck grille doors at inoperative air cleaner.
- Disconnect rear accessory harness connector (CKT 415B) at inoperative air cleaner.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to rear accessory harness connector (CKT 415B) at inoperative air cleaner and black probe to ground.

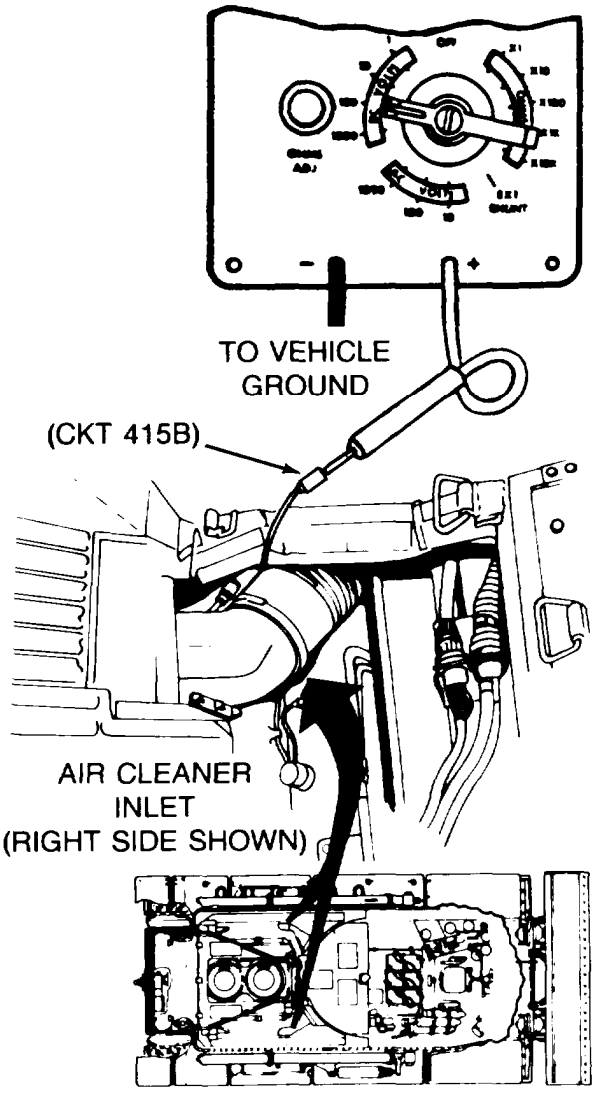
Second Technician (Driver's Station)

- Start engine and run at idle.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

NO

2

- **Check hull front master harness (CKT 415B) at bulkhead electrcial disconnect for electrical power.**
- **See Step (6).**

TA142025

Symptom-13

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

NOTE
If your vehicle has side-loading air cleaners, see Step (9).

(3) Check air cleaner fan motor power harness for continuity.

Second Technician (Driver's Station)

- Stop engine.

First Technician (Top Deck)

- Remove blower fan cover from inoperative air cleaner, aluminum (page 7-131) or armored (page 7-148).
- Disconnect blower fan power harness connector from one of the circuit breakers.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to blower fan power harness (CKT 415B) at accessory harness connector.
- Connect black probe of meter to blower fan power harness (CKT 415B) at circuit breaker connector.
- Check if meter indicates continuity.

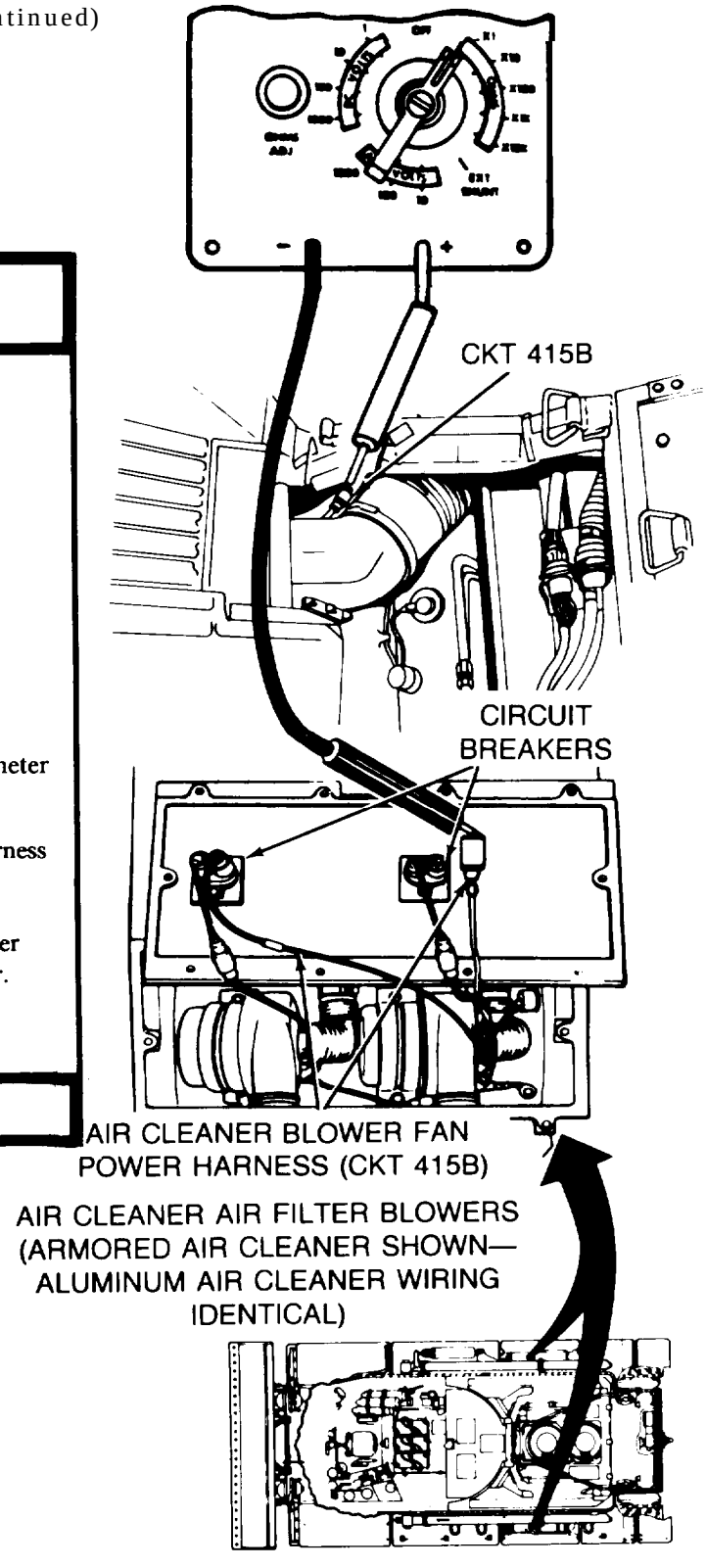
Does meter indicate continuity?

(4)
- **Replace air cleaner blower fan power harness, aluminum (page 7-117) or armored (page 7-134).**

NO

(5)
- **Replace fan ground electrical lead, aluminum (page 7-122) or armored (page 7-138).**
- **Connect blower fan power harness to rear accessory harness and to circuit breaker.**

YES



TA142026

Symptom-13

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

FROM STEP

(2)

(6) Check front master harness (CKT 415B) at bulkhead electrical disconnect for electrical power.

First Technician (Top Deck)

- Connect rear accessory harness connector (CKT 415B) at inoperative air cleaner.
- Close top deck grille doors.

Second Technician (Driver's Station)

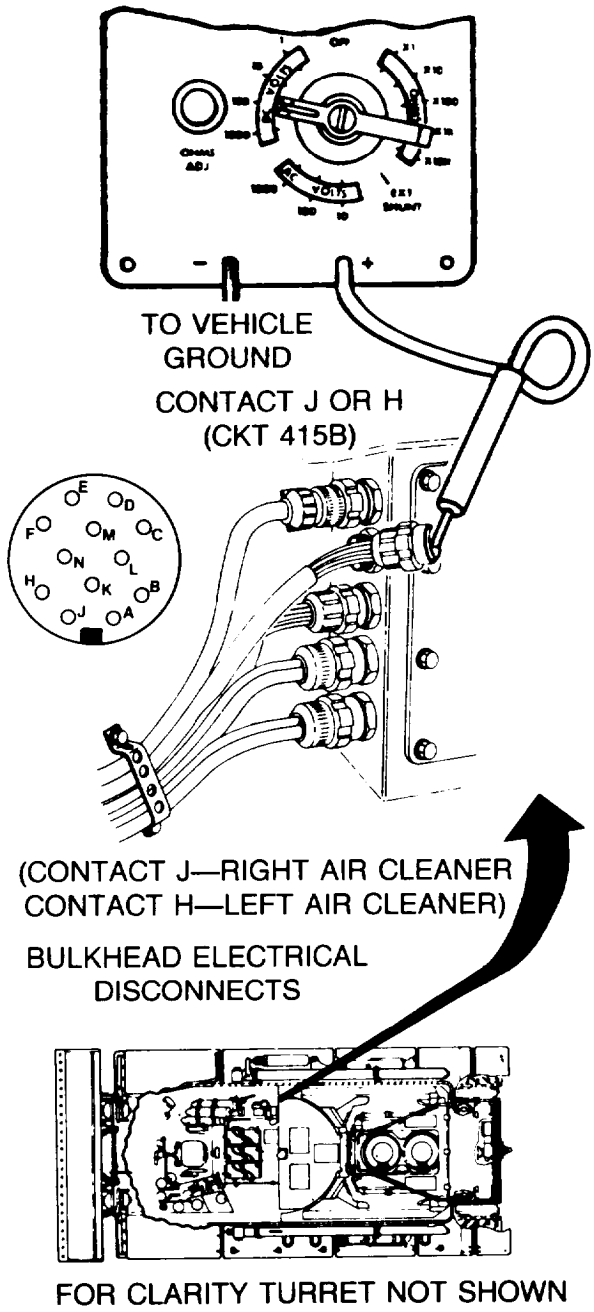
- Stop engine.

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front master harness connector at bulkhead electrical disconnect.
- If right air cleaner is inoperative, connect red probe of meter to contact J (CKT 415B) of hull front master harness bulkhead connector and black probe to ground.
- If left air cleaner is inoperative connect red probe of meter to contact H (CKT 415B) of hull front master harness bulkhead connector and black probe to ground.

Second Technician (Driver's Station)

- Start engine.



TA142027

Symptom-13 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

STEP (6) CONTINUED

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

Second Technician (Driver's Station)

- Stop engine.

Did meter indicate 18 to 30 volts dc?

NO

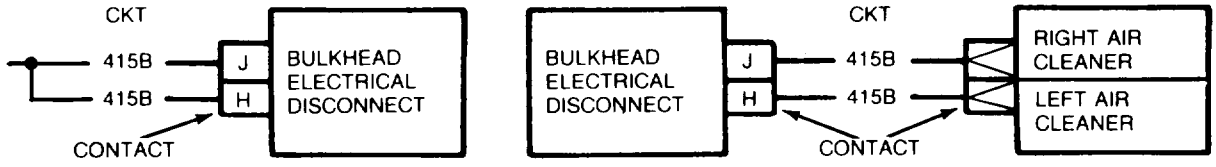
7

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 415B) wires at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness to bulkhead electrical disconnect.**

YES

8

- **Inspect rear accessory harness for bent/broken connector contacts or loose (CKT 415B) wires at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective rear accessory harness.**
- **Connect hull front master harness to bulkhead electrical disconnect.**



TA142028

Symptom-13

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

FROM STEP 3

9 Check air cleaner, blower fan power harness for continuity.

Second Technician (Driver's Station)

- Stop engine.

First Technician (Top Deck)

- Remove blower fan cover from inoperative air cleaner, aluminum (page 7-131) or armored (page 7-148).
- Disconnect blower fan power harness connector from one of the air cleaner blower power leads.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to air cleaner blower fan power harness connector contact (CKT 415B) at rear accessory connector.
- Connect black probe of meter to air cleaner blower fan power harness connector contact at air cleaner blower power lead.
- Check if meter indicates continuity.

Does meter indicate continuity?

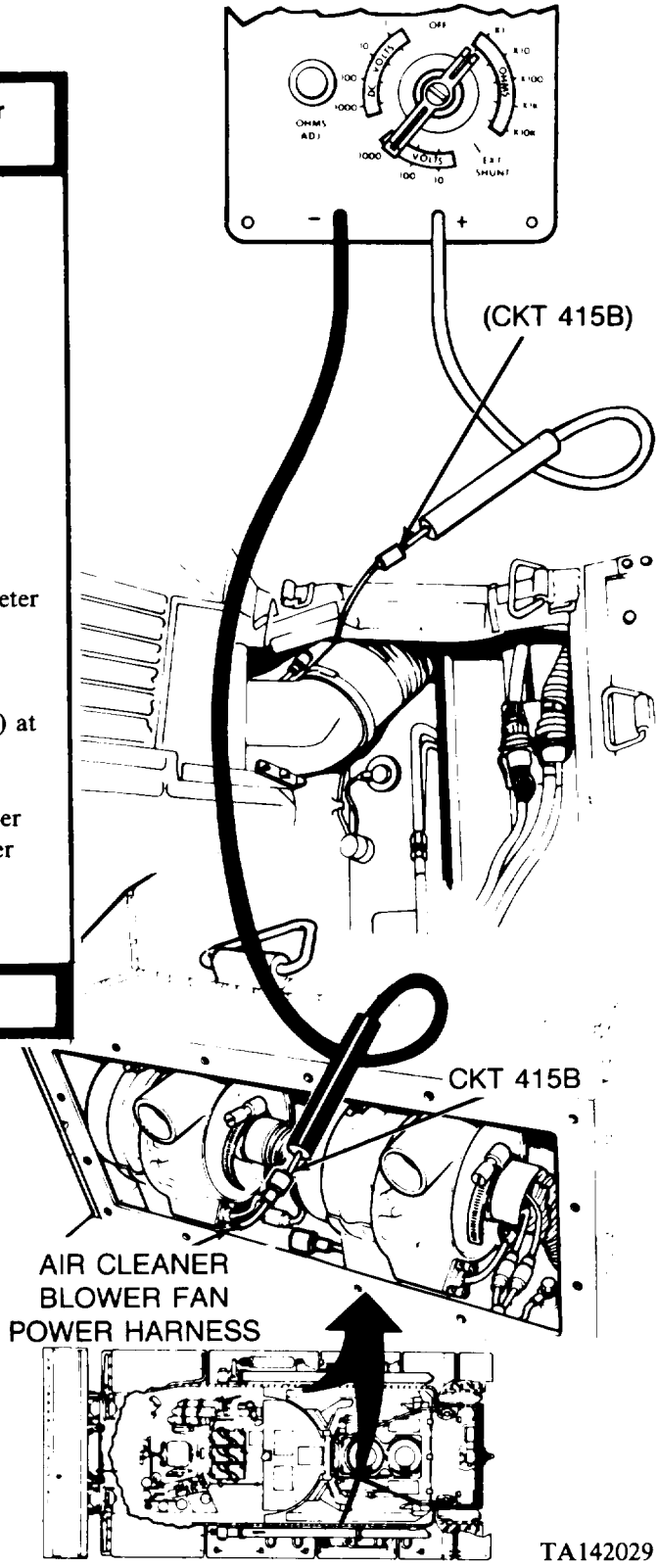
10 Replace air cleaner blower fan power harness, aluminum (page 7-117) or armored (page 7-134).

NO

11

- **Replace blower fan ground electrical lead, aluminum (page 7-122) or armored (page 7-138).**
- **Connect blower fan power harness to rear accessory harness to air cleaner blower power lead.**

YES



DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING

Symptom-14

ALL AIR CLEANER BLOWER FANS WILL NOT WORK.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

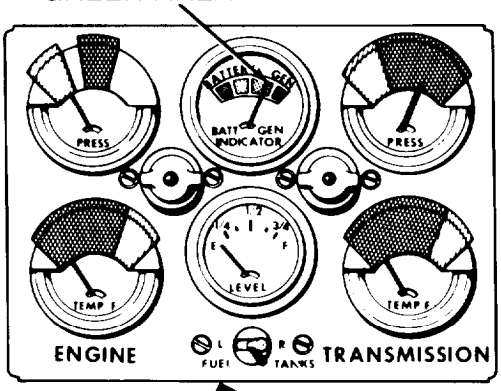
1 Check if BATT/GEN INDICATOR indicates in green area.

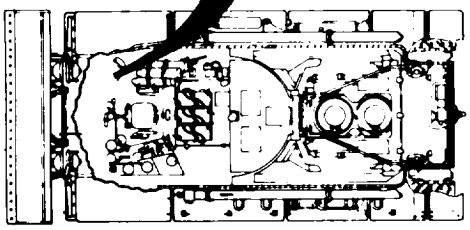
Second Technician (Driver's Station)

- Start engine.
- Check if BATT/GEN INDICATOR is indicating in green area?

Does BATT/GEN INDICATOR indicate in green area?

BATT/GEN INDICATOR GREEN AREA





FOR CLARITY TURRET NOT SHOWN

YES

NO

2

- **Stop engine.**
- **See Symptom 31: GENERATOR/REGULATOR SYSTEM IS NOT WORKING.**

TA142030

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

Symptom-14

NOTE

If your vehicle does not have a smoke generator, go to Step (5).

3 Check if air cleaner blower fans operate without smoke generator switch harness installed.

Second Technician (Driver's Station)

- Stop engine.
- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to AIR CLEANER BLOWER FAN RELAY (TM 9-2350-222-10).
- Disconnect smoke generator switch harness from AIR CLEANER BLOWER FAN RELAY and hull front master harness.
- Connect hull front master harness to AIR CLEANER BLOWER FAN RELAY.

Second Technician (Driver's Station)

- Start engine.

First Technician (Outside Vehicle)

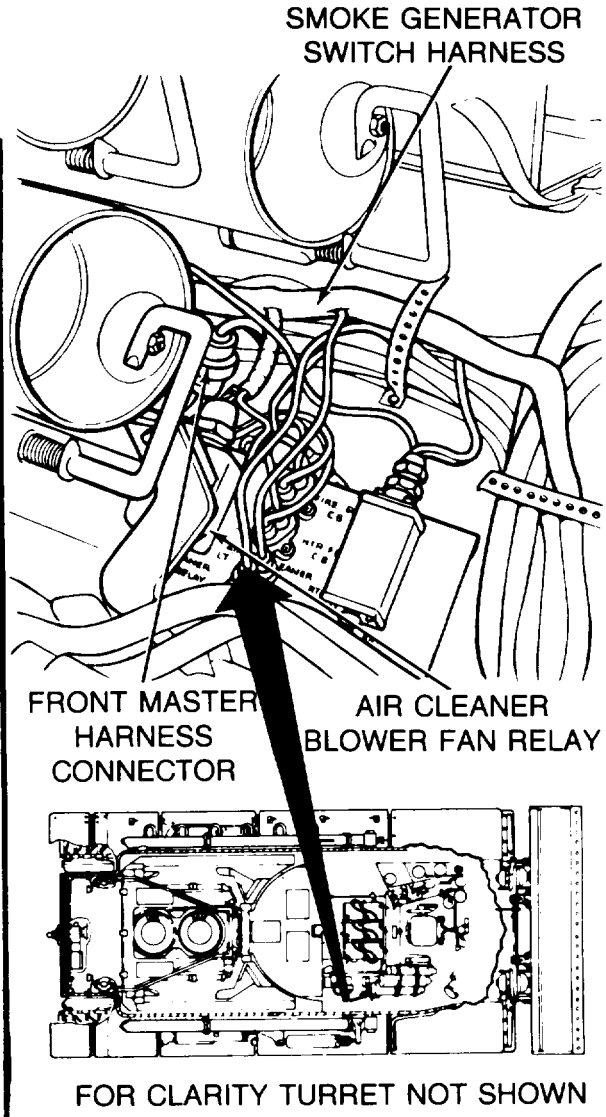
- Check air cleaner blower fans for operation.

Are air cleaner blower fans operating?

NO

YES

4 Replace smoke generator switch harness (page 23-12).



FOR CLARITY TURRET NOT SHOWN

TA142031

Symptom-14

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

5 **Check hull front master harness (CKT 415B) for continuity from AIR CLEANER BLOWER RELAY to bulkhead electrical disconnect J or H.**

Second Technician (Driver's Station)

- Stop engine.
- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Disconnect hull front master harness from bulkhead electrical disconnect and AIR CLEANER BLOWER FAN RELAY.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to hull front master harness connector Contact C (CKT 415B) at AIR CLEANER BLOWER FAN RELAY.
- Connect black probe of meter to hull front master harness connector contact J or H (CKT 415B) at bulkhead electrical disconnect.
- Check if meter indicates continuity.

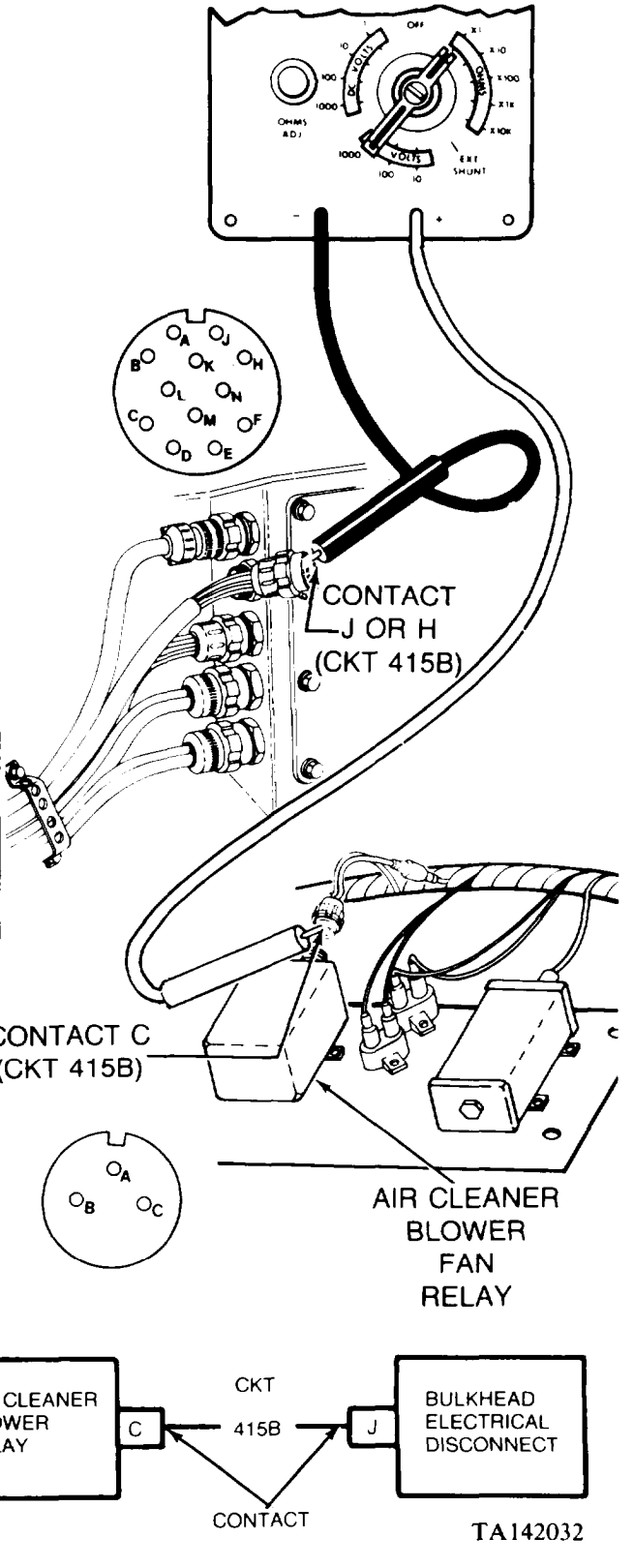
Does meter indicate continuity?

6

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 415B) wires at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness to bulkhead electrical disconnect and AIR CLEANER BLOWER FAN RELAY.**

NO

YES



DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

Symptom-14

NOTE

If your vehicle has sideloading air cleaners, go to Step (14).

7 **Check hull power harness (CKT 415) at intermediate connector to AIR CLEANER BLOWER FAN RELAY for electrical power.**

First Technician (Turret)

- Connect hull front master harness to bulkhead electrical disconnect.
- Disconnect hull power harness intermediate connector from hull front master harness (CKT 415) at AIR CLEANER BLOWER FAN RELAY.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to hull power harness intermediate connector (CKT 415) at AIR CLEANER BLOWER FAN RELAY, and black probe to ground.

Second Technician (Driver's Station)

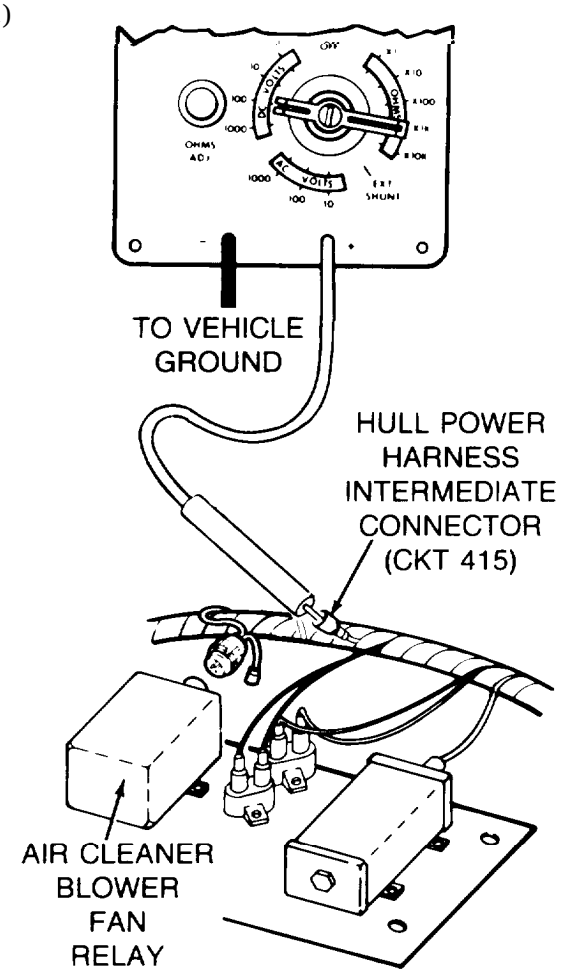
- Set MASTER BATTERY switch ON.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

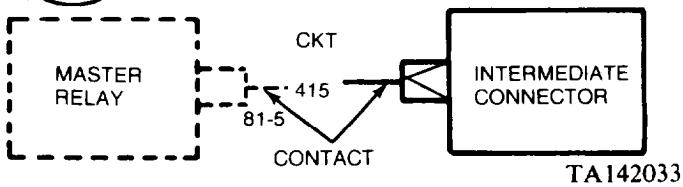
Does meter indicate 18 to 30 volts dc?

YES — NO



8

- **Inspect hull power harness for bent/broken connector contacts or loose wires (CKT 415) at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull power harness.**



TA142033

Symptom-14

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

9 **Check for continuity from hull power harness intermediate connector (CKT 415) to AIR CLEANER BLOWER FAN RELAY contact B.**

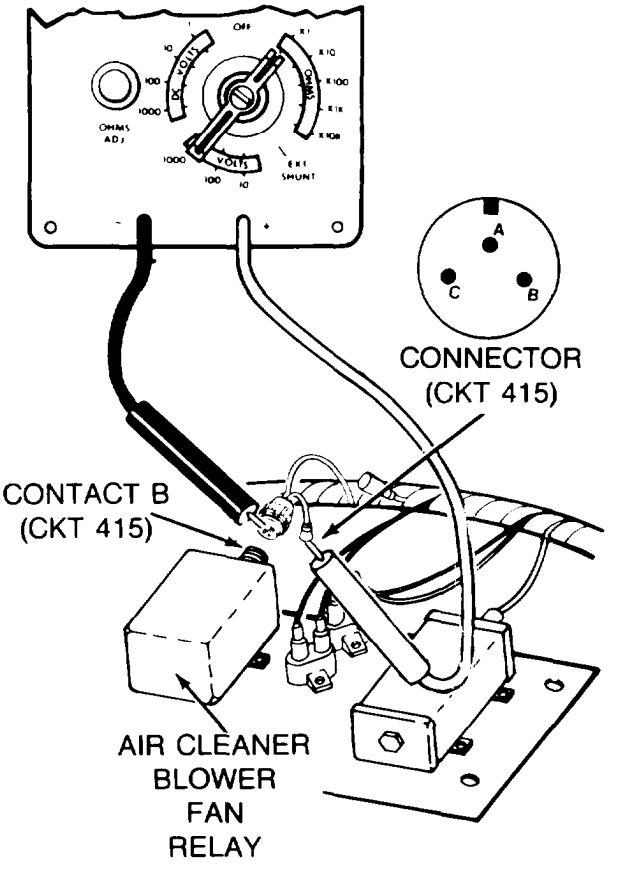
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to hull power harness intermediate connector (CKT 415).
- Connect black probe of meter to AIR CLEANER BLOWER FAN RELAY harness connector Contact B.
- Check if meter indicates continuity.

Does meter indicate continuity?

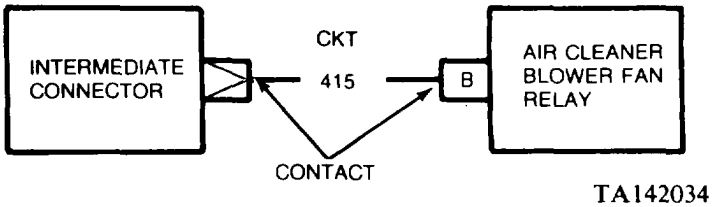


YES

NO

10

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 415) wires at rear of connectors.**
  - **Repair connectors if defective (page 10-307).**
  - **If connectors are not defective, notify support maintenance of defective hull front master harness.**



TA142034

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

Symptom-14

11 **Check hull front master harness (CKT 415A) at AIR CLEANER BLOWER FAN RELAY for electrical power.**

First Technician (Turret)

- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to hull front master harness at AIR CLEANER BLOWER FAN RELAY connector contact A (CKT 415A) and black probe to ground.

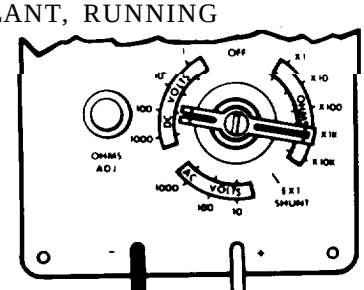
Second Technician (Driver's Station)

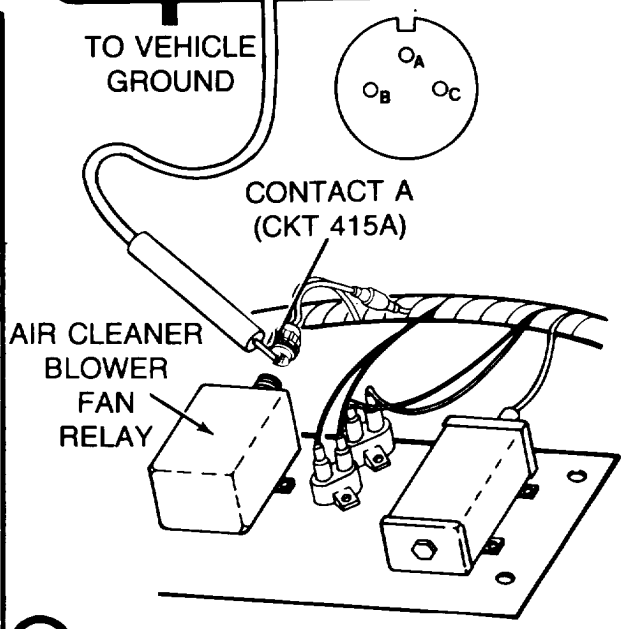
- Start engine.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



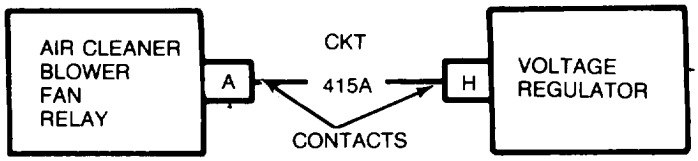


12
- **Stop engine.**
- **Replace AIR CLEANER BLOWER FAN RELAY (page 10-180).**
- **Install smoke generator switch harness (page 23-12).**

YES

NO

13
- **Stop engine.**
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 415A) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Install smoke generator switch harness (page 23-12).**



TA142035

Symptom-14
FROM STEP (7)

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

14 **Check hull power harness for continuity from MASTER RELAY (CKT 81-5) to AIR CLEANER BLOWER FAN RELAY circuit breaker (CKT 415).**

First Technician (Turret)

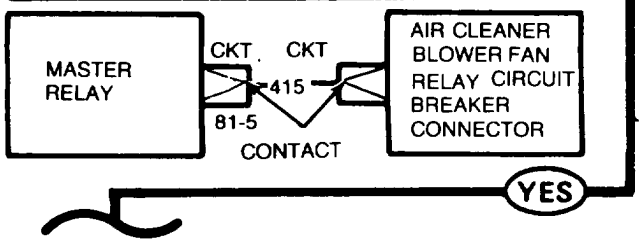
- Reconnect hull front master harness to bulkhead electrical disconnect and BLOWER FAN RELAY.
- Disconnect hull power harness connector (CKT 81-5) from MASTER RELAY.
- Disconnect hull power harness connector (CKT 415) from AIR CLEANER BLOWER RELAY circuit breaker.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to hull power harness connector (CKT 815) at MASTER RELAY. BLOWER FAN RELAY circuit breaker.
- Connect black probe of meter to hull power harness connector (CKT 415) at AIR CLEANER BLOWER RELAY circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?

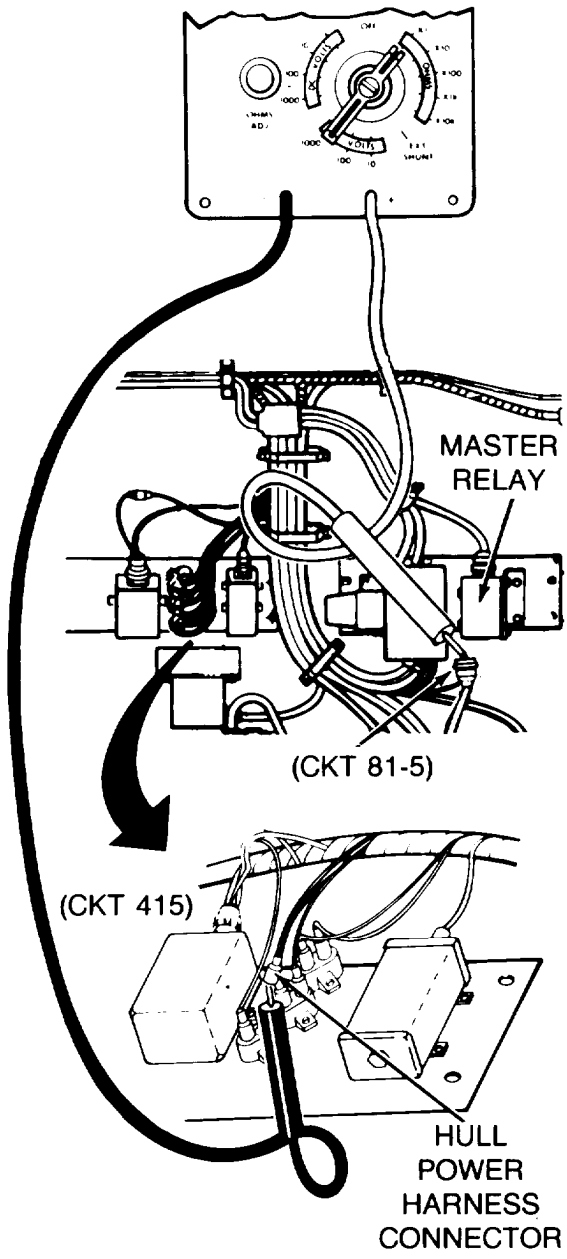
NO

15

- **Inspect hull power harness for bent/broken connector contacts or loose (CKT 415/81-5) wires at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull power harness.**



YES



TA142036

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

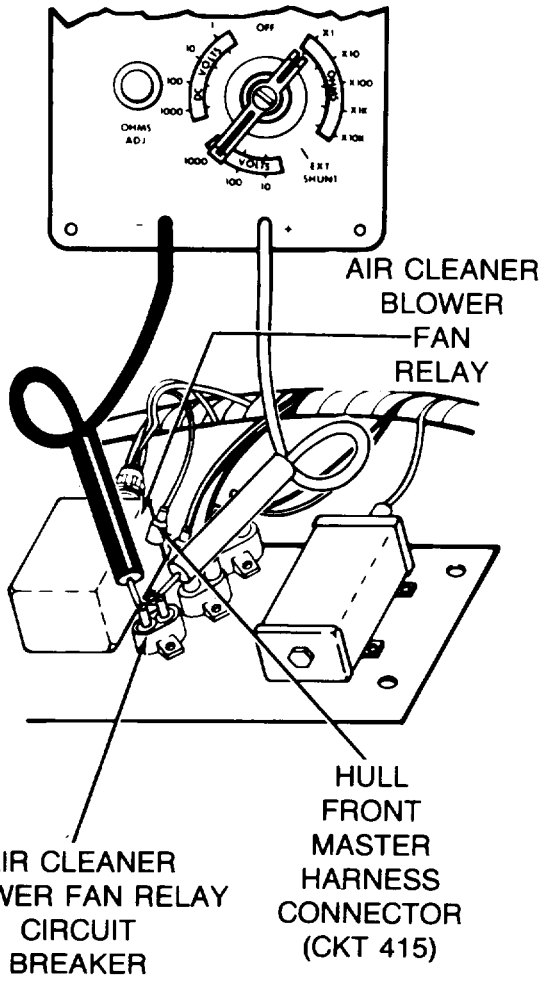
Symptom-14

16 **Check AIR CLEANER BLOWER FAN RELAY circuit breaker for continuity.**

First Technician (Turret)

- Connect hull power harness connector (CKT 81-5) to MASTER RELAY.
- Disconnect hull front master harness connector (CKT 415) from AIR CLEANER BLOWER FAN RELAY circuit breaker.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect probes of meter to contacts of AIR CLEANER BLOWER FAN RELAY circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

17 **Replace AIR CLEANER BLOWER FAN RELAY circuit breaker (page 10-182).**

TA142037

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

Symptom-14

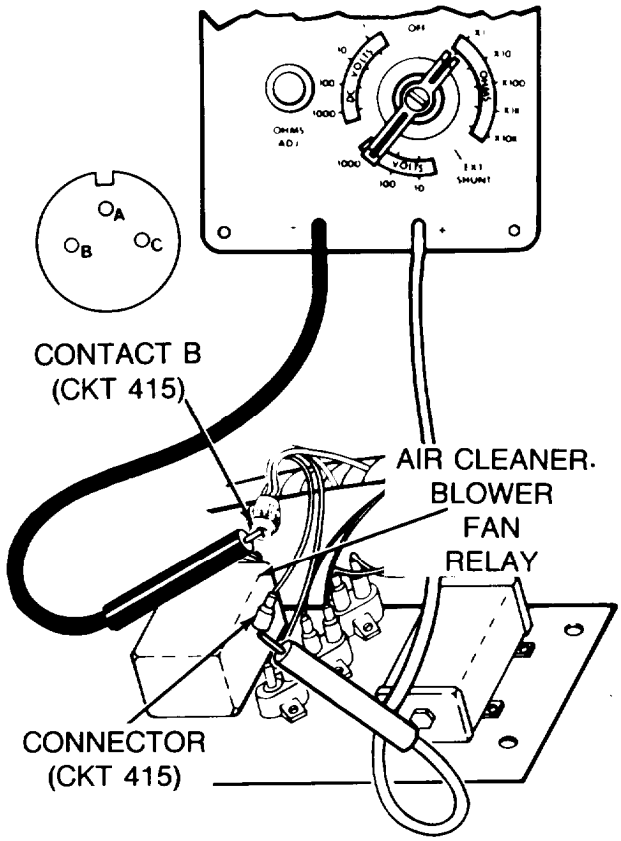
18 **Check hull front master harness (CKT 415) for continuity from AIR CLEANER BLOWER FAN RELAY circuit breaker to AIR CLEANER BLOWER FAN RELAY connector contact B.**

First Technician (Turret)

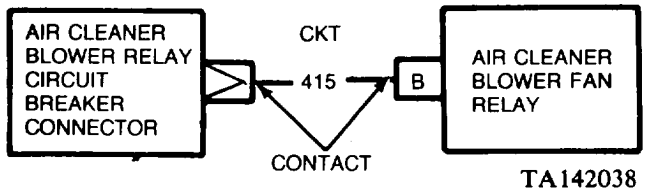
- Connect hull power harness connector (CKT 415) to AIR CLEANER BLOWER FAN RELAY circuit breaker.
- Disconnect hull front master harness connector from AIR CLEANER BLOWER FAN RELAY.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to hull front master harness connector (CKT 415) at AIR CLEANER BLOWER FAN RELAY circuit breaker.
- Connect black probe of meter to hull front master harness connector (CKT 415) contact B at AIR CLEANER BLOWER FAN RELAY.
- Check if meter indicates continuity.

Does meter indicate continuity?

YES — NO



19
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 415) wires at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**



TA142038

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

Symptom-14

20 **Check hull front master harness (CKT 415A) at air cleaner blower relay for electrical power.**

First Technician (Turret)

- Connect hull front master harness connector (CKT 415) to AIR CLEANER BLOWER FAN RELAY circuit breaker.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to hull front master harness at AIR CLEANER BLOWER FAN RELAY connector contacts (CKT 415A) and black probe to ground.

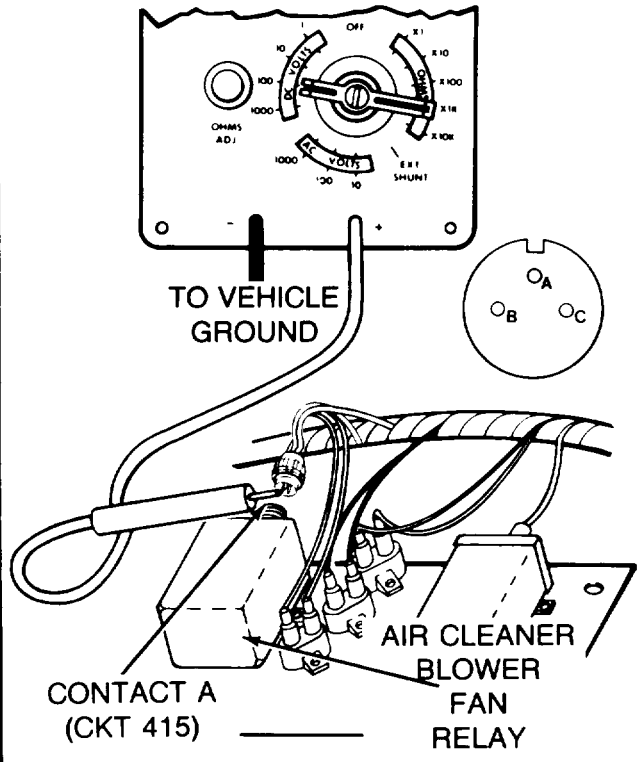
Second Technician (Driver's Station)

- Start engine.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

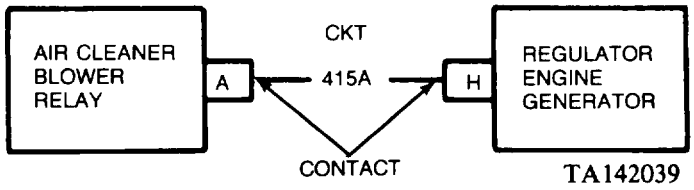


21
- **Stop engine.**
- **Replace AIR CLEANER BLOWER FAN RELAY (page 10-180).**
- **Install smoke generator switch harness (page 23-12).**

YES

NO

22
- **Stop engine.**
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 415A) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Install smoke generator switch harness (page 23-12).**



TA142039

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING

ENGINE OIL TEMPERATURE GAGE SHOWS HIGH TEMPERATURE (POWERPLANT WARNING LAMP ON).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check right and left engine oil coolers for leaks.

First Technician (Turret)

- Manually traverse turret to gain access to top deck grille doors (TM 9-2350-222-10).
- Open left and right top deck grille doors.

Second Technician (Driver's Station)

- Start engine.

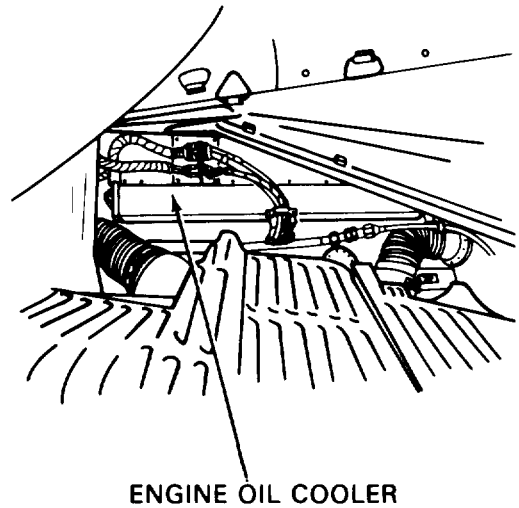
First Technician (Top Deck)

- Visually check area around right and left oil coolers for leaks.

Second Technician (Driver's Station)

- Stop engine.

Is either engine oil cooler leaking?



ENGINE OIL COOLER
(VIEW LOOKING DOWN THROUGH LEFT TOP DECK GRILLE DOORS)

YES

2 Replace defective engine oil cooler, (page 6-130).

NO

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

3 Check engine oil cooler lines for leaks or damage.

First Technician (Top Deck)

- Remove powerplant (page 5-1).

First Technician (Powerplant)

- Ground hop powerplant (page 5-48).

Second Technician (Driver's Station)

- Start engine.

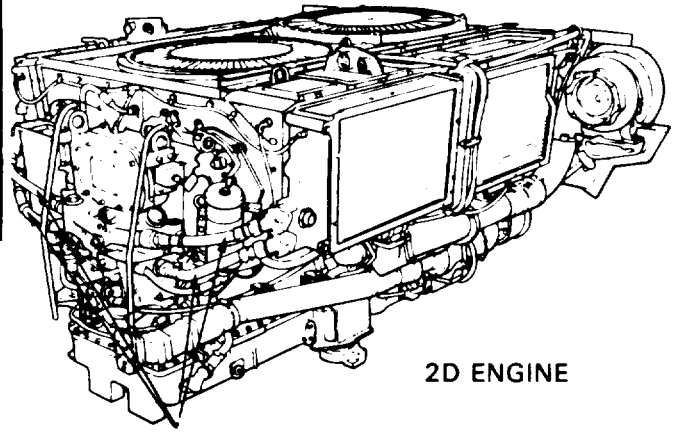
First Technician (Left and Right Side of Powerplant)

- Visually check engine oil cooler lines for damage or leaks.

Second Technician (Driver's Station)

- Stop engine.

Are any engine oil cooler lines leaking or damaged?



ENGINE OIL COOLER LINES

NO

YES

4 Replace defective oil cooler lines (page 6-188.1).

Symptom-15

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

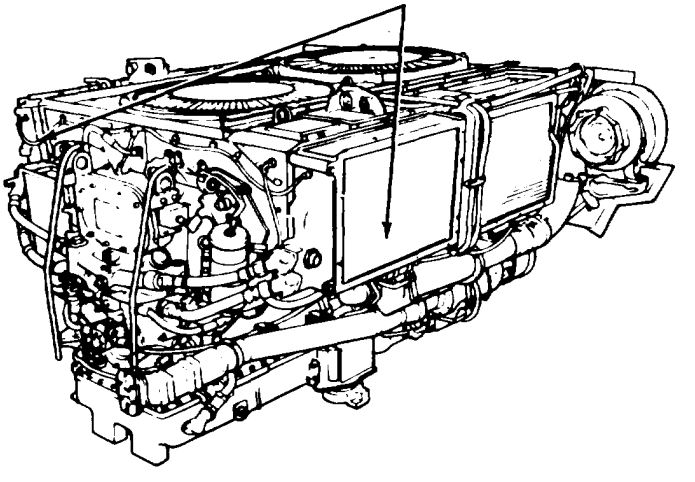
5 **Check engine oil coolers for clogged cores and screens and for clogged or dirty conditions.**

First Technician (Powerplant)

- Remove engine oil cooler screens (page 6-118).
- Shine light through cores and screens.
- Check for clogged or dirty condition.

Are engine oil coolers and screens clean?

ENGINE OIL COOLERS



YES

NO

6 **Clean engine oil cooler cores and screens (page 6-189).**

Symptom-15

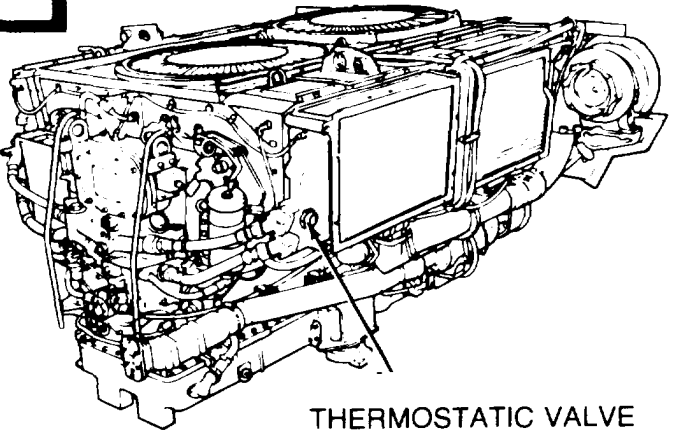
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

7 **Check if right side and left side engine oil cooler thermostatic valves operate properly.**

First Technician (Powerplant)

- Remove right side and left side engine oil cooler thermostatic valves (page 6-161).
- Test both thermostatic valves (page 6-162).

Do both thermostatic valves pass test?



THERMOSTATIC VALVE

YES

8

- **Notify support maintenance of engine problem.**
- **Install engine oil cooler thermostatic valves (page 6-163).**
- Install left and right engine oil coolers, (page 6-133).
- Install powerplant, (page 5-37).

NO

9

- **Replace defective thermostatic valve (page 6-160).**
- **Install left and right engine oil coolers,** (page 6-133).

Symptom-16

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING

ENGINE OIL LEVEL TOO LOW (EXCEEDS 3.5 QUARTS PER HOUR, WHILE RUNNING).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 **Check right and left engine oil coolers for leaks.**

First Technician (Turret)

- Manually traverse turret to gain access to top deck grille doors (TM 9-2350-222-10).
- Open left and right top deck grille doors.

Second Technician (Driver's Station)

- Start engine.

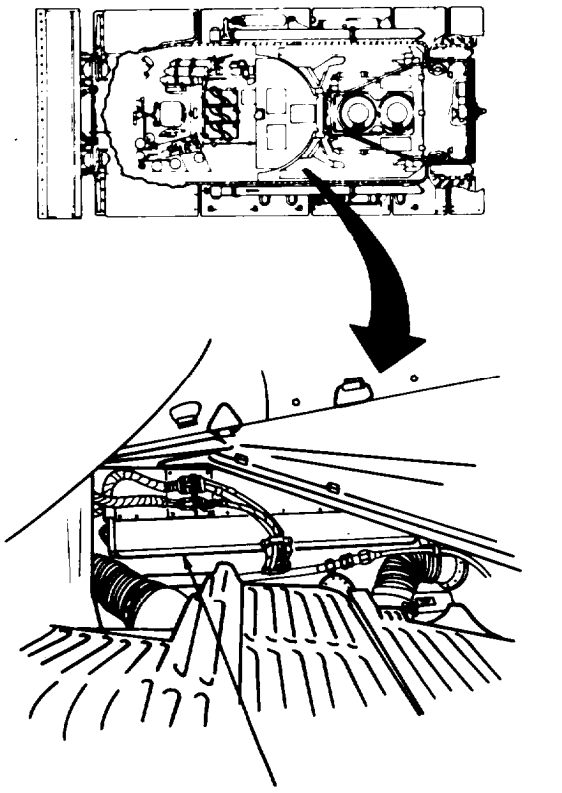
First Technician (Top Deck)

- Visually check area around right and left oil coolers for leaks.

Second Technician (Driver's Station)

- Stop engine.

Is either engine oil cooler leaking?



LEFT ENGINE OIL COOLER
VIEW LOOKING DOWN THROUGH LEFT
TOP DECK GRILLE DOORS)

NO

YES

2 **Replace engine oil cooler that leaks, (page 6-130).**

Symptom-16

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

3 Check engine oil filter cover and engine drain valve for leaks.

First Technician (Turret)

- Remove upper engine access covers (page 16-40).

Second Technician (Driver's Station)

- Start engine.

First Technician (Turret)

- Check for leaks at engine oil filter cover and drain valve.

Second Technician (Driver's Station)

- Stop engine.

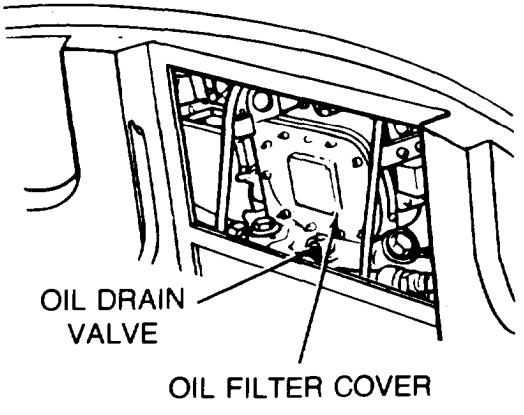
Is there leakage at the engine oil filter cover or drain valve?

4

- **Replace engine oil filter cover gasket (page 6-27).**
- **Tighten engine oil drain valve.**

YES

NO



FRONT OF ENGINE—VIEWED FROM TURRET PLATFORM (ENGINE ACCESS COVER REMOVED)

Symptom-16

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

NOTE

If STE/ICE is available, perform Test No. 14 (Compression Unbalance) (page 4-69).

If STE/ICE is not available, go to Step (5).

5 Check for leaks at fan drive oil seals.

First and Second Technician (Top Deck)

- Remove engine cooling fans (page 9-48).
- Install fan rotor hub spacers from ground hop kit (Item 30, Chapter 3, Section I).

Second Technician (Driver's Station)

- Start engine.

First Technician (Top of Engine)

- Check for oil leaks around both fan drive oil seals.

Second Technician (Driver's Station)

- Stop engine.

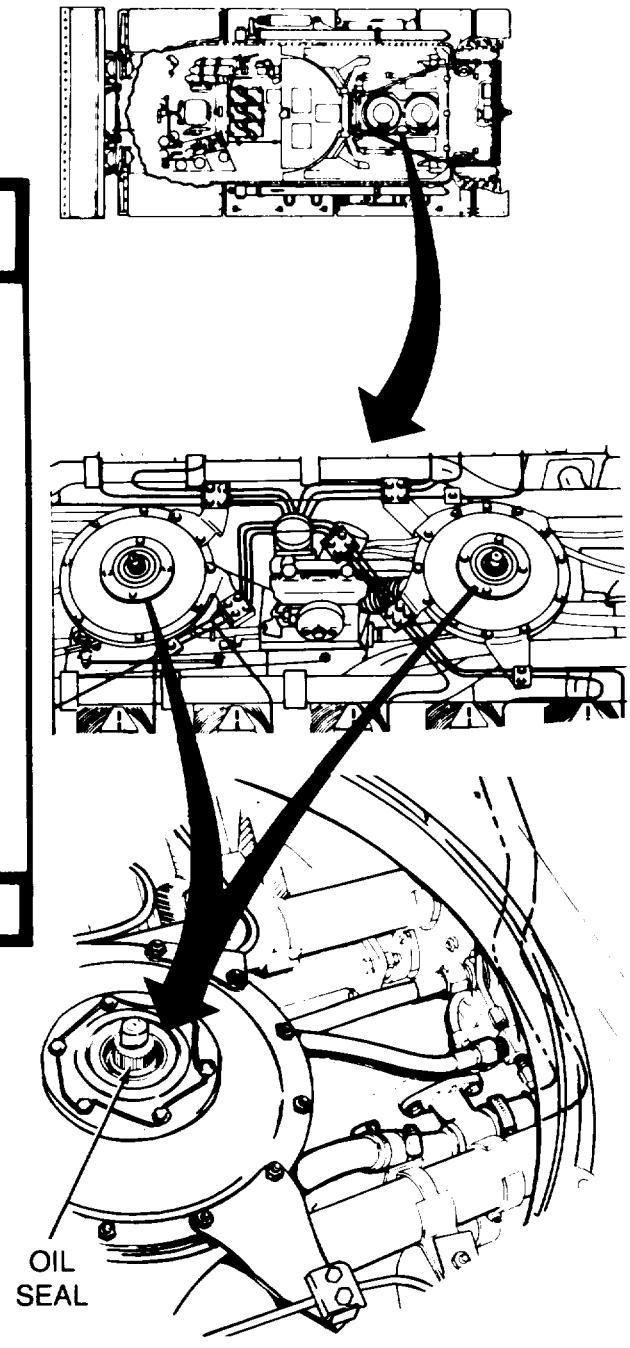
Is either engine fan drive oil seal leaking?

6

- **Remove fan rotor hub spacers.**
- **Replace defective fan drive oil seals (page 9-62).**

YES

NO



TA142046

Symptom-16

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued)

NOTE

Locator views for Step (7) continued on next page.

7 Check oil lines, tubes, plugs and thermostatic valves for leaks or damage.

First Technician (Top Deck)

- Remove powerplant (page 5-1).
- Ground hop powerplant (page 5-48).

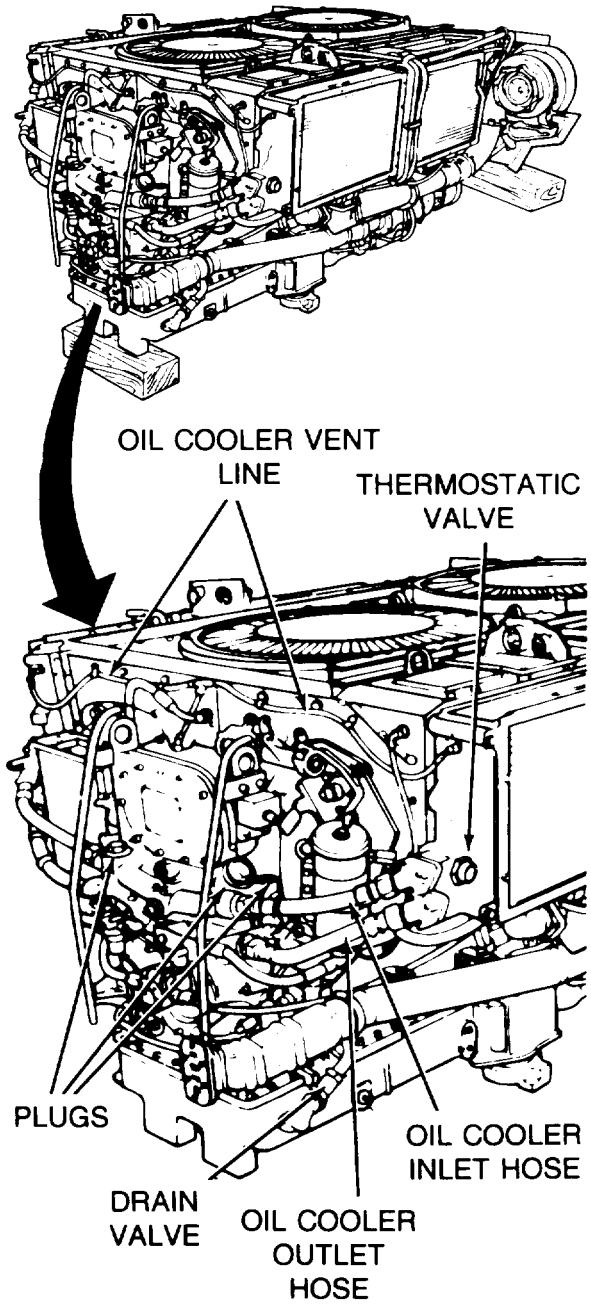
Second Technician (Driver's Station)

- Start engine.

First Technician (Powerplant)

- With engine idling, visually check the following for leaks and damage:
  - Left and right oil cooler inlet and outlet lines.
  - Left and right drain tubes.
  - Oil cooler vent line.
  - Plugs.
  - Engine oil filler tube.
  - Oil cooler thermostatic valves.
  - Engine oil drain plug.

Second Technician (Driver's Station)

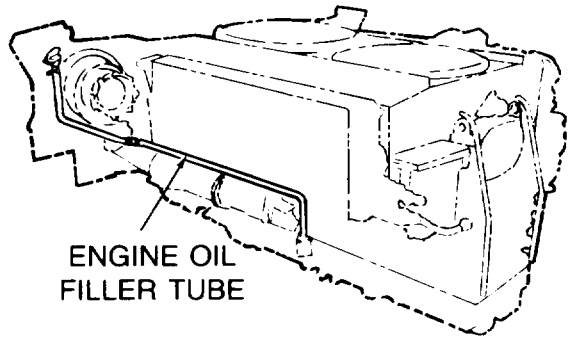


Symptom-16 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, RUNNING
(Continued]

STEP (7) CONTINUED

- Stop engine.

Are any of the oil lines, tubes, drain plugs, or thermostatic valves leaking or damaged?



YES

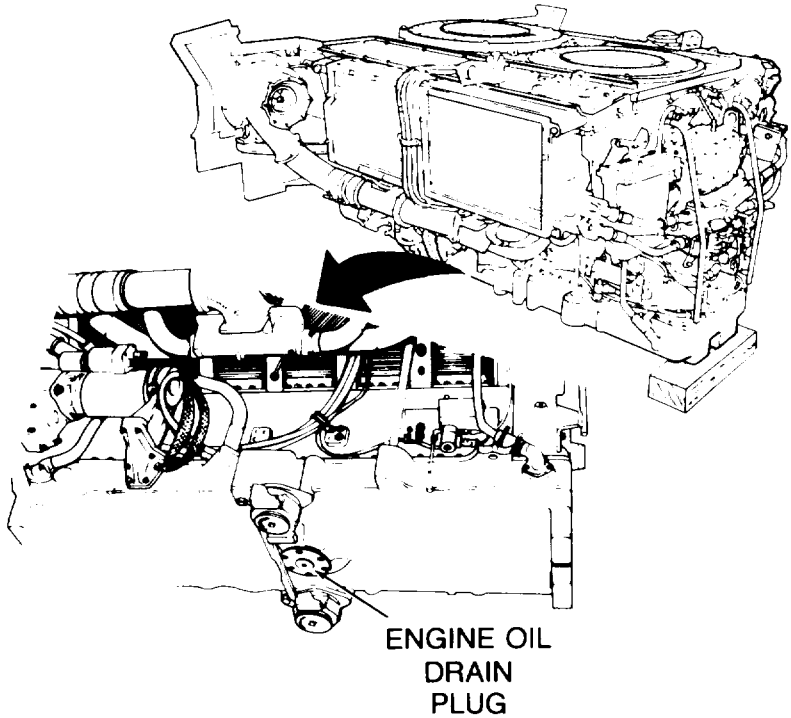
8

- **If leaking or damaged, replace:**
  - **Oiler cooler inlet lines and outlet lines.**
  - **Drain tubes.**
  - **Oil cooler vent line (page 6-76).**
  - **Engine oil filler tube (page 6-43).**
  - **Engine oil drain plug (page 6-51).**
  - **Oil cooler thermostatic valve spacer ring (page 6-160).**
- **Remove fan rotor hub spacers.**
- **Install cooling fans (page 9-49).**
- **Install powerplant, (page 5-37).**

NO

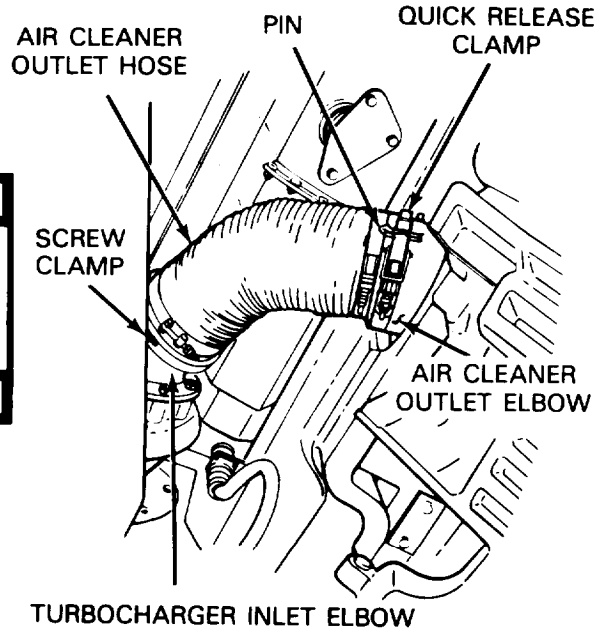
9

- **Remove fan rotor hub spacers.**
- **Install cooling fans (page 9-49).**
- **Install powerplant, (page 5-37).**
- **Notify support maintenance that engine uses too much oil.**



Symptom 16.1-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

POWERPLANT WARNING AND DUST DETECTOR WARNING LIGHTS ON, ONE (OR BOTH) DUST DETECTOR PRESSURE SWITCH(ES) TRIPPED, AND DUST DETECTOR FILTER STRIP INDICATES CONTAMINATION OF INTAKE AIR BY DUST.



1 Check air cleaner outlet hose.

- Check for loose or damaged clamps.
- Check hose for damage.

Are clamps and hose tight and serviceable?

YES

NO

2

- **Tighten loose clamps (page 7-75).**
- **Replace damaged clamps (page 7-75).**
- **Replace damaged hose (page 7-75).**
- **Change engine oil (LO 9-2350-222-12).**

TA248808

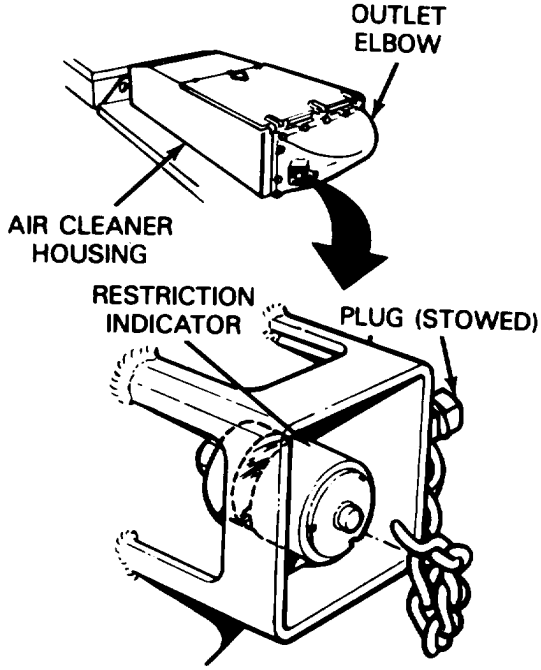
Symptom 16.1-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

3 Check air cleaner outlet elbow.

- Check for presence of restriction indicator or plug.
- Check for presence of gasket between housing and outlet elbow.
- Check elbow for holes or cracks.

Is air cleaner outlet elbow serviceable?



NO

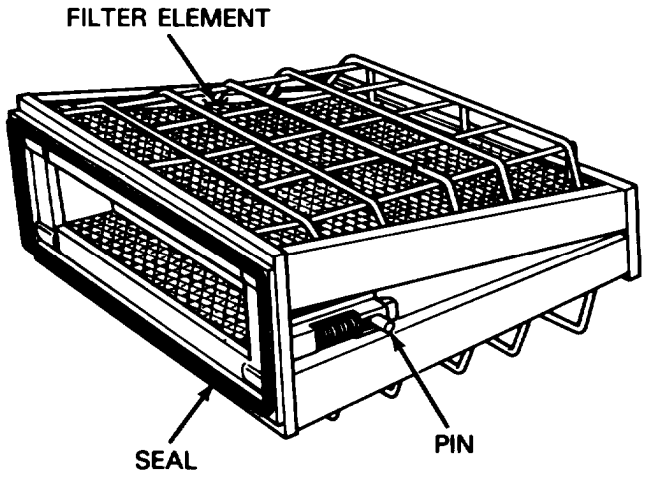
4 Replace air cleaner outlet elbow (page 7-77).

YES

5 Check air cleaner filter element.

- Remove air cleaner filter element (page 7-93).
- Check filter element for tears or holes.
- Check seal for tears, gaps, or hardness.
- Check spring loaded pin for damage.

Is air cleaner filter element serviceable?



YES

NO

- **Replace air cleaner filter element (page 7-93).**
- **Change engine oil (LO 9-2350-222-12).**

TA248809

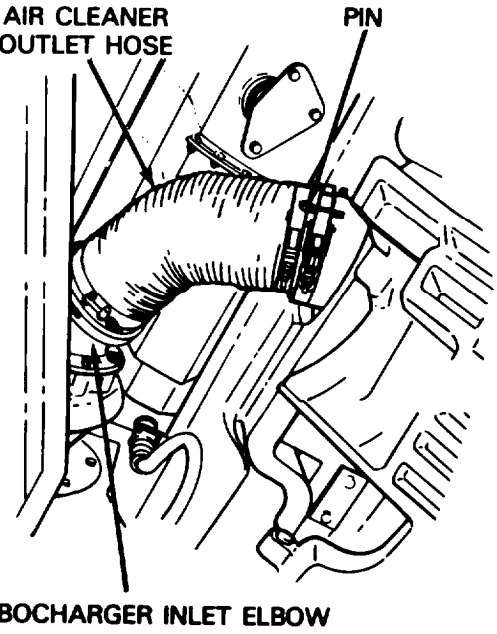
Symptom 16.1-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

6 Check turbosupercharger inlet elbow.

- Check for holes or cracks.
- Check for security.

Is turbosupercharger elbow serviceable?



YES

- **Replace turbosupercharger inlet elbow gasket (page 7-70).**
- **Change engine oil (LO 9-2350-222-12).**

NO

- **Replace turbosupercharger inlet elbow (page 7-70).**
- **Change engine oil (LO 9-2350-222-12).**

TA248810

Symptom 16.2-2DA

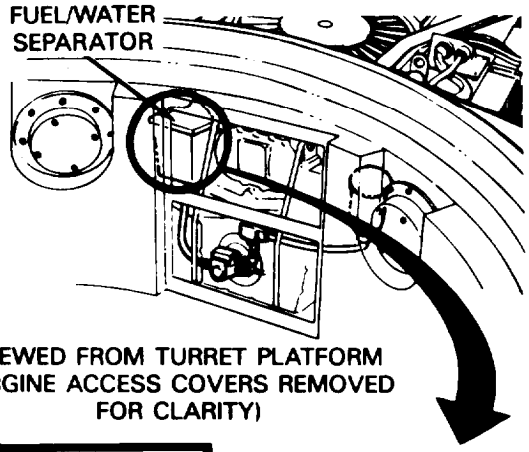
DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

POWERPLANT WARNING AND DUST DETECTOR WARNING LIGHTS ON, ONE (OR BOTH) PRESSURE SWITCH(ES) TRIPPED, AND DUST DETECTOR FILTER STRIP INDICATES CONTAMINATION OF INTAKE AIR BY FUEL.

1 Check fuel water separator bleed cap.

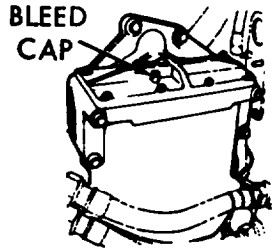
- Remove engine access cover.
- Inspect fuel/water separator bleed cap for security.

Is fuel water separator bleed cap leaking or loose?



VIEWED FROM TURRET PLATFORM
(ENGINE ACCESS COVERS REMOVED
FOR CLARITY)

YES — NO



2

- **Tighten or replace bleed cap (page 7-302).**
- **Replace air cleaner filter element (page 7-93).**
- **Thoroughly clean inside air cleaner housing outlet elbow and outlet hose.**
- **Service dust detector filter strip(s) (page 7-148.15).**

Symptom 16.2-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

3 Check primary fuel filter.

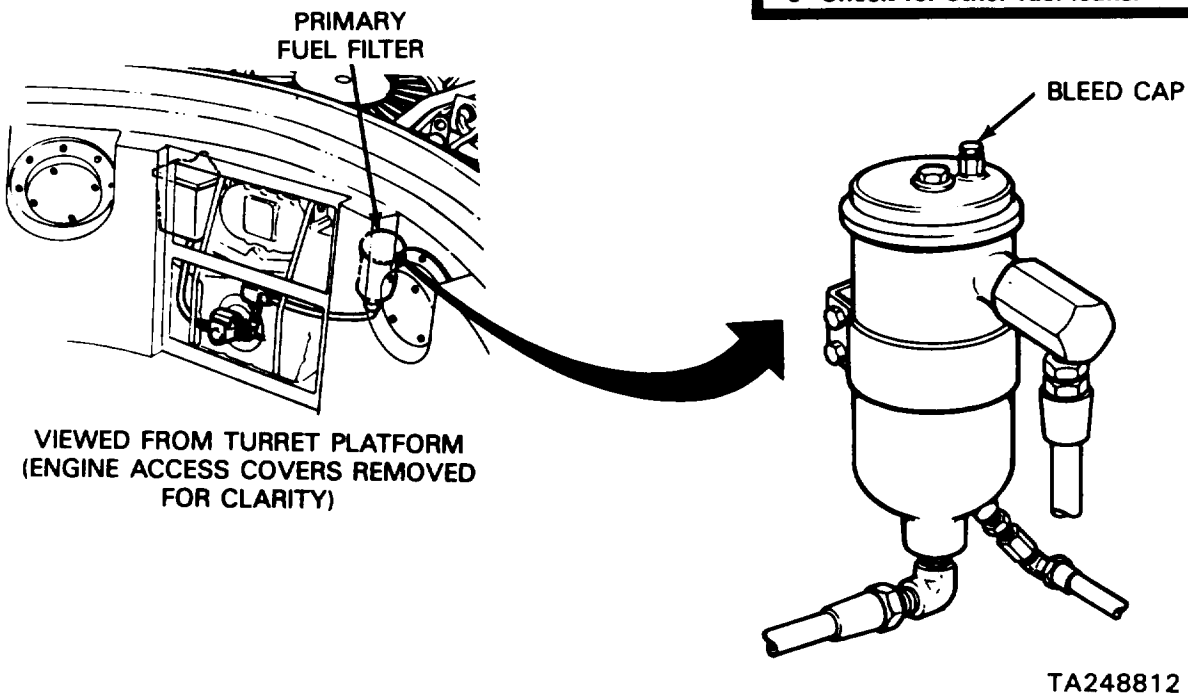
- Inspect primary fuel filter bleed cap for security.
- **Is primary fuel filter bleed cap leaking or loose?**

YES

- **Tighten or replace bleed cap (page 7-333).**
- **Replace air cleaner filter element (page 7-93).**
- **Thoroughly clean inside air cleaner housing outlet elbow, outlet hose, and inlet hose.**
- **Service dust detector filter strip(s) (page 7-148.15).**

NO

- **Replace fuel tank check valve (page 7-178).**
- **Replace air cleaner filter element (page 7-93).**
- **Thoroughly clean inside air cleaner housing outlet elbow, outlet hose, and inlet hose.**
- **Service dust detector filter strip(s) (page 7-148.15).**
- **Check for other fuel leaks.**



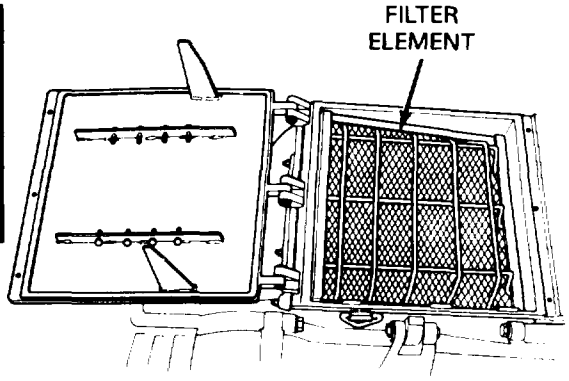
DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

POWERPLANT WARNING AND DUST DETECTOR WARNING LIGHTS ON, ONE (OR BOTH) DUST DETECTOR PRESSURE SWITCH(ES) TRIPPED, AND DUST DETECTOR FILTER STRIP INDICATES CONTAMINATION OF INTAKE AIR BY SOOT.

1 Check air cleaner filter elements.

- Remove air cleaner filter element (page 7-93).
- Inspect air cleaner filter element.

Does element show evidence of soot or charring?



NO

2 Service dust detector filter strip (page 7-148.15).

YES

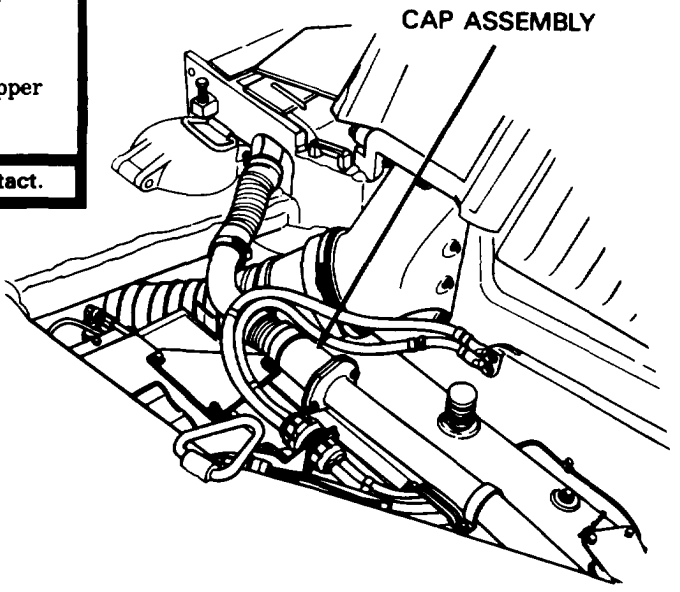
Symptom 16.3-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

3 Replace or clean air cleaner element (page 7-93).

- Remove cap assembly (Check valve) (page 8-14).
- Tilt cap assembly (check valve) side to side to verify flapper valve is free.
- Look inside cap assembly (check valve) to verify flapper valve is not damaged or missing.

Is cap assembly (check valve) flapper valve free and intact.



YES → **Install cap assembly (check valve) (page 8-16).**

NO → **Replace cap assembly (check valve) (page 8-16).**

TA248814

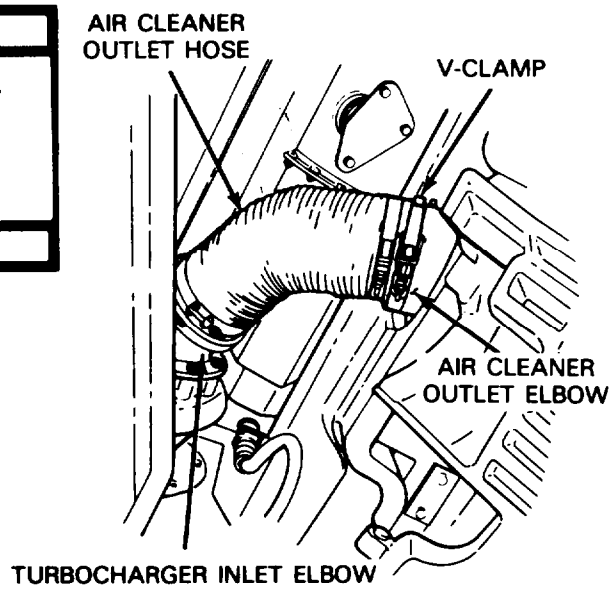
DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

POWERPLANT WARNING AND DUST DETECTOR WARNING LIGHTS ON, ONE (OR BOTH) DUST DETECTOR PRESSURE SWITCH(ES) TRIPPED, AND DUST DETECTOR FILTER STRIP INDICATES CONTAMINATION OF INTAKE AIR BY WATER.

1 Check air cleaner outlet hose assembly.

- Inspect for loose or damaged V-clamps at both ends of hose assembly.
- Inspect hose for damage.

Are outlet hose assembly and clamps serviceable?



YES

NO

2

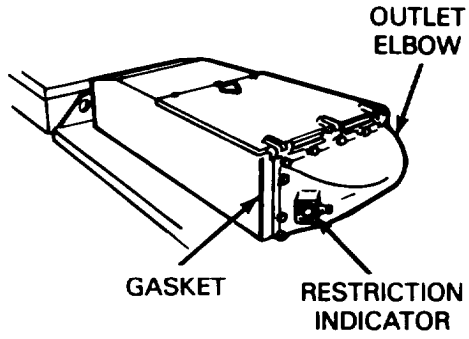
- **To replace bad outlet hose assembly refer to page 7-74.**
- **To replace bad hose clamp refer to page 7-74.**
- **Tighten any loose hose clamps (page 7-74).**

Symptom 16.4-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

3 Check air cleaner outlet elbow.

- Check elbow for holes or cracks.
- Check for presence of gasket between housing and elbow.
- Check for presence of restriction indication or plug.

Is air cleaner elbow serviceable?



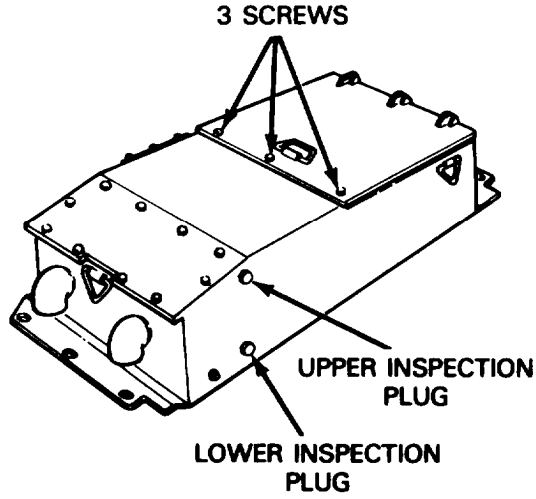
YES / NO

4 Check air cleaner housing.

- Remove lower inspection plug.
- Shine light in plug hole.
- Check precleaner for water accumulation.

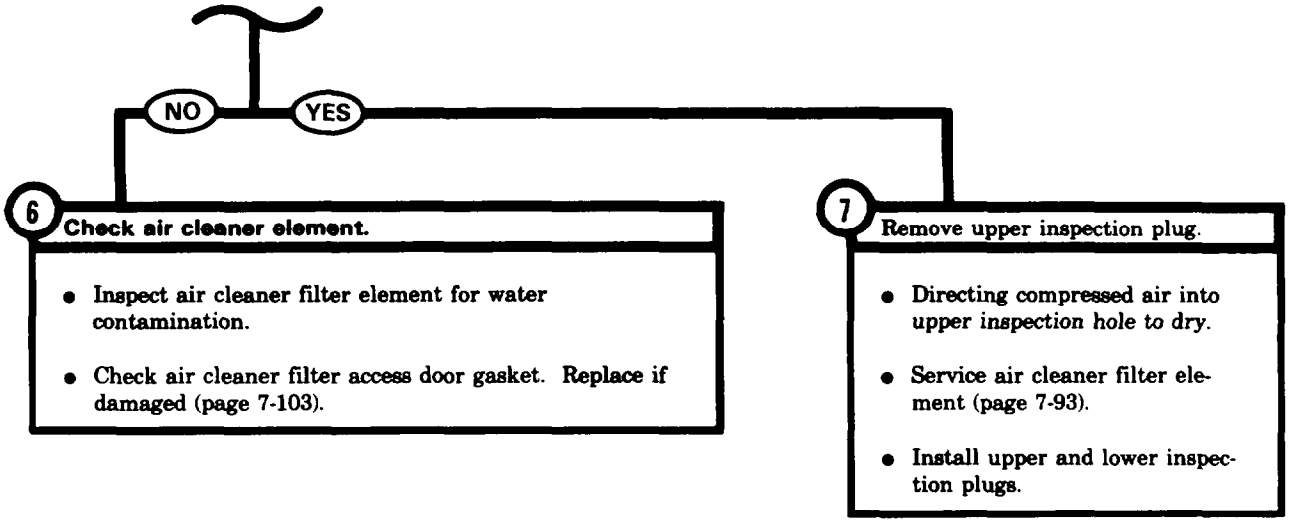
Does precleaner contain water?

5 Replace air cleaner outlet elbow (page 7-76).

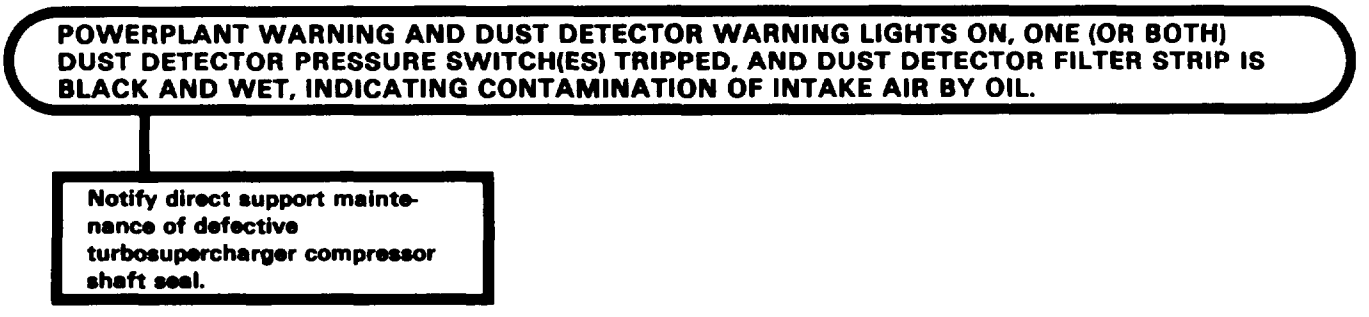


TA248816

Symptom 16.4-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)



Symptom 16.5-2DA **DETAILED TROUBLESHOOTING PROCEDURE**
TANK OPERATION - POWERPLANT, RUNNING



TA248817

Symptom 16.6-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

POWERPLANT WARNING AND DUST DETECTOR WARNING LIGHTS ARE ON (ENGINE RUNNING - ALL GAGES READ NORMAL).

1 Check dust detector pressure switch(es) for tripped condition.

- Open top deck grille doors (TM 9-2350-222-10).
- Check dust detector switch(es).

Is dust detector pressure switch(es) tripped?

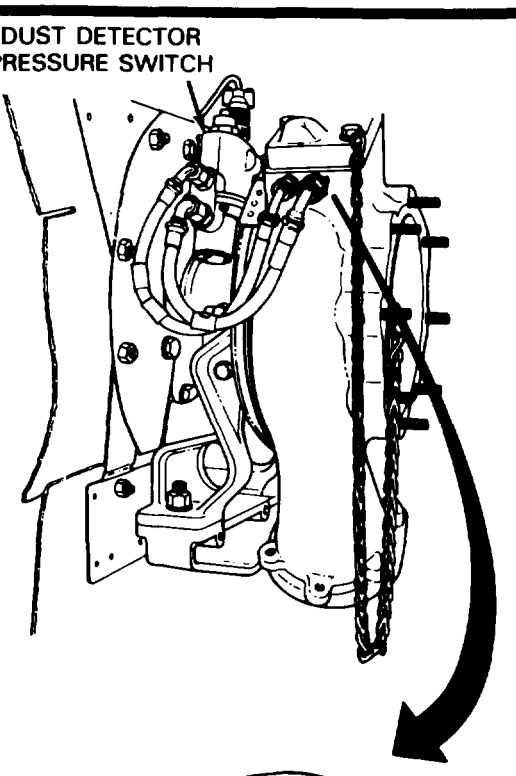
NO → **Go to symptom 16.8.**

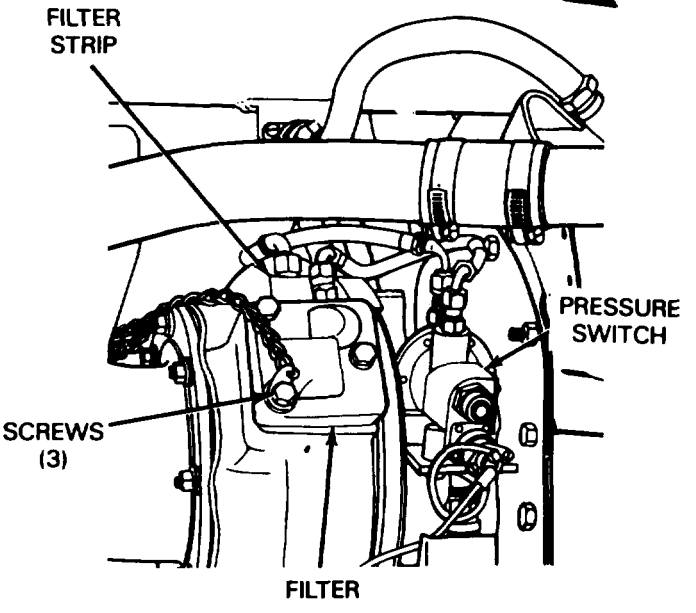
YES

2 Check filter strip on dust detector.

- Loosen three screws.
- Pull out approximately three inches of filter strip.
- Cut filter strip, leaving approximately one inch sticking out of filter.
- Tighten three screws.

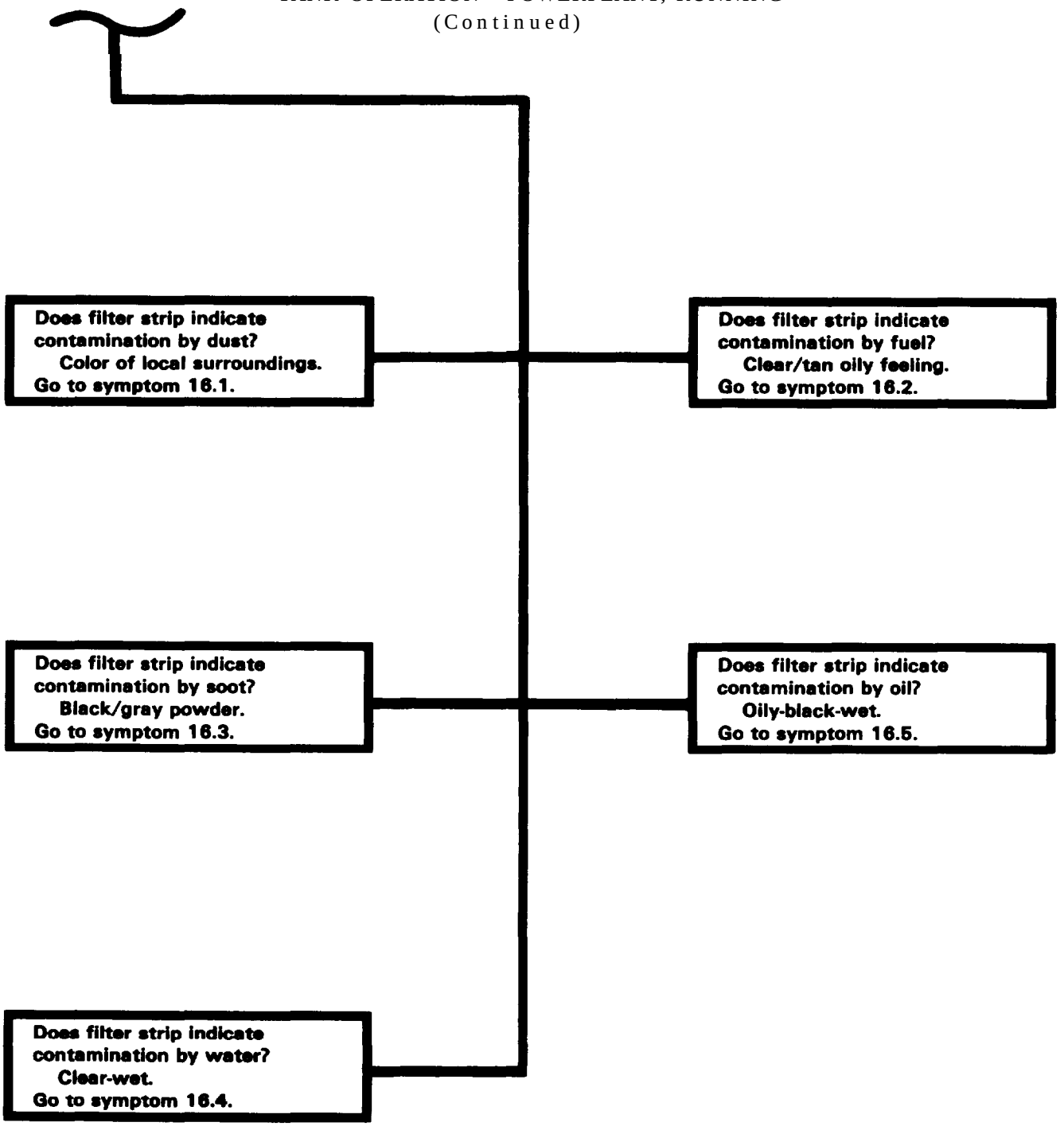
Does filter strip indicate contamination?





TA248818

Symptom-16.6-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)



TA248819

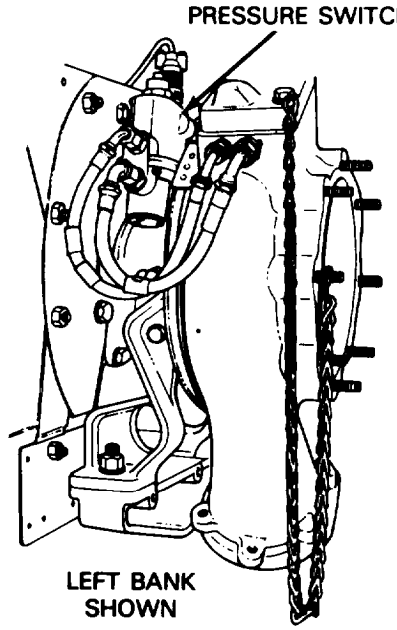
Symptom 16.7-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

POWERPLANT WARNING AND DUST DETECTOR WARNING LIGHT ON, ONE (OR BOTH) DUST DETECTOR PRESSURE SWITCH(ES) TRIPPED, BUT DUST DETECTOR FILTER STRIP DOES NOT INDICATE CONTAMINATION OF INTAKE AIR.

1 Check dust detector pressure switch(es).

- Press plastic cap on pressure switch to reset switch(es).
- Perform engine stall test (page 5-55).
- Check indicators on pressure switch(es).

Is dust detector pressure switch(es) tripped?



YES / **NO**

NO → **Return vehicle to service.**

YES → **2**

2
- **Service dust detector filter strip(s) (page 7-148.15).**
- **Perform dust detector operational test (page 10-350.19).**

Is dust detector pressure switch(es) tripped?

YES / **NO**

NO → **Return vehicle to service.**

YES → **3**

3 Replace dust detector pressure switch(es) (page 7-148.8).

TA248820

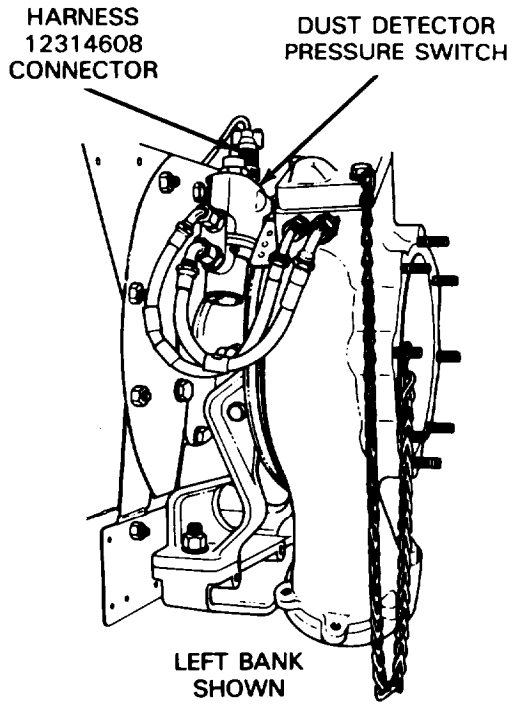
Symptom 16.8-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

POWERPLANT WARNING AND DUST DETECTOR WARNING LIGHTS ON, BUT DUST DETECTOR PRESSURE SWITCH(ES) NOT TRIPPED.

1 Check pressure switches for continuity.

- Set master switch to OFF.
- Disconnect connector (P) of engine wiring harness 12314608 (circuit 510 L) from right and left dust detector pressure switches.
- Set multimeter to read ohms X1.
- Check continuity across each switch terminal.

Does continuity exist across switch terminal?



YES

2 • **Replace dust detector pressure switches (page 7-148.8).**

NO

TA248821

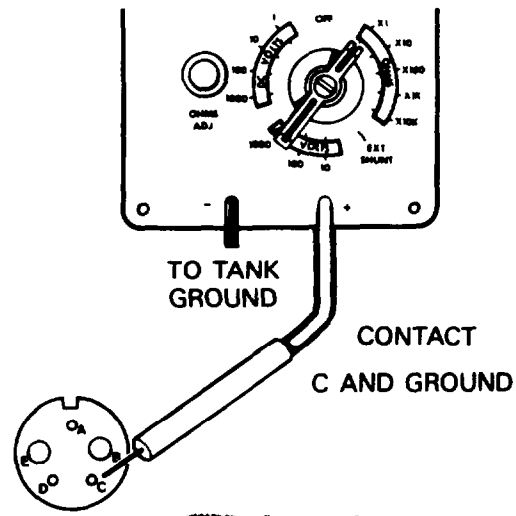
Symptom 16.8-2DA

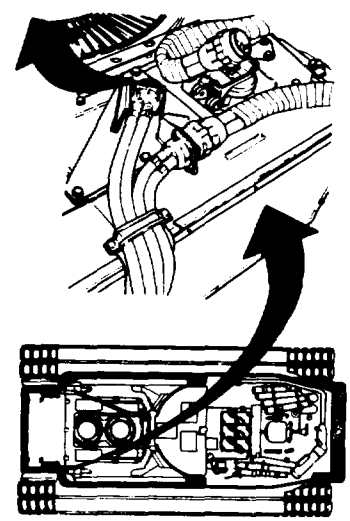
DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

3 **Check engine wiring harness 12314608 at engine disconnect.**

- Disconnect starter connector at engine disconnect.
- Set multimeter to read ohms X1.
- Check harness at engine disconnect by checking continuity between pin C and ground.

Does continuity exist between pin C and ground?





YES — NO

4 • **Replace engine wiring harness (page 10-350.1).**

TA248822

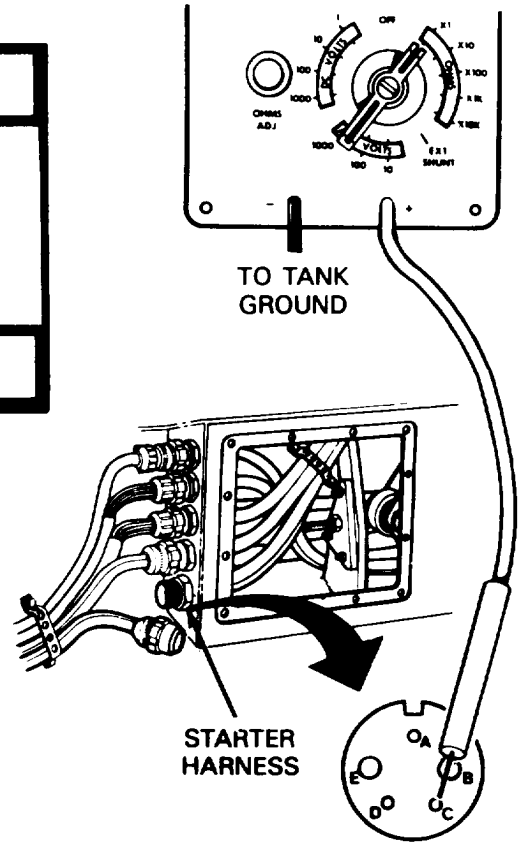
Symptom 16.8-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

5 **Check dust detector engine disconnect to bulkhead wiring harness.**

- Disconnect connectors of starter harness.
- Set multimeter to read ohms X1.
- Measure continuity between connector C and ground.

Does continuity exist between connector C and ground?



YES **NO**

6 **Notify support maintenance to replace starter feed harness assembly.**

TA248823

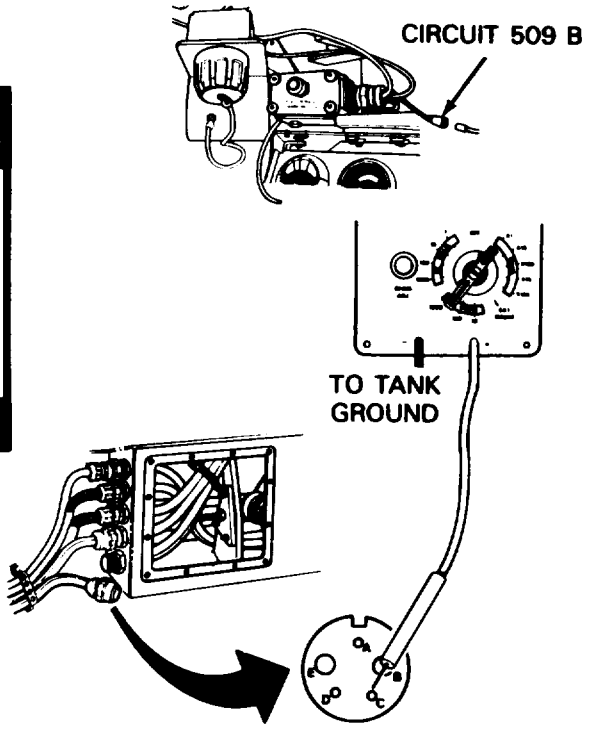
Symptom 16.8-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

7 **Check bulkhead to dust detector warning box lead (12325928).**

- Disconnect dust detector lead assembly connector (circuit 509 B) at dust detector warning light box.
- Set multimeter to read ohms X1.
- Measure continuity between connector C and ground.

Does continuity exist between pin C and ground?



YES / **NO**

8 **Replace hull intermediate lead assembly (page 10-350.9).**

9 **Replace dust detector warning light box assembly (page 10-350.16).**

10 **Connect all harness connectors that were disconnected.**

TA248824

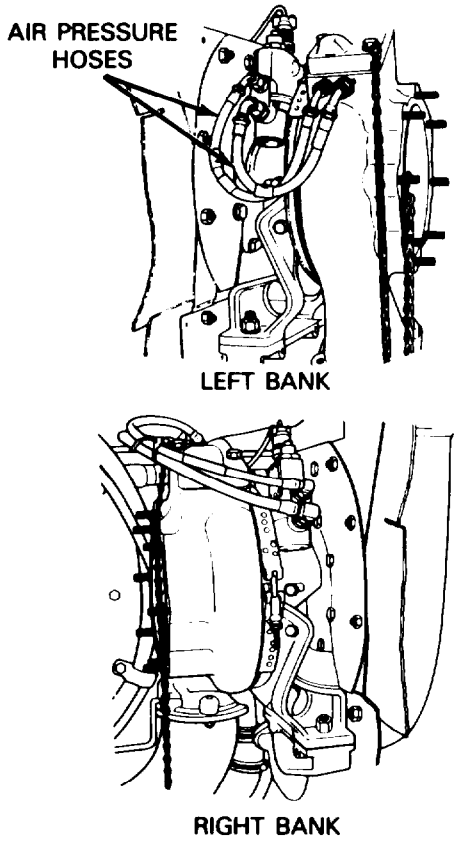
Symptom 16.9-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

POWERPLANT WARNING AND DUST DETECTOR WARNING LIGHTS NOT ON. DUST DETECTOR PRESSURE SWITCH(ES) NOT TRIPPED. DUST INGESTION IS APPARENT BY OIL SAMPLE ANALYSIS OR DUST TRAILS.

1. **Service dust detector filter strip (page 7-148.15).**

2. **Check air pressure hoses on both sides of engine.**
   - Check air pressure hoses for cracks, breaks, and proper connections.
   - Remove air pressure hoses and check for blockage (page 7-148.17).

   Is any air pressure hose(s) damaged, blocked or improperly connected?



YES

3. - **Replace any defective air pressure hose(s) (page 7-148.17).**
   - **Install any serviceable hoses (page 7-148.18).**
   - **Check for proper connection (page 7-148.18).**

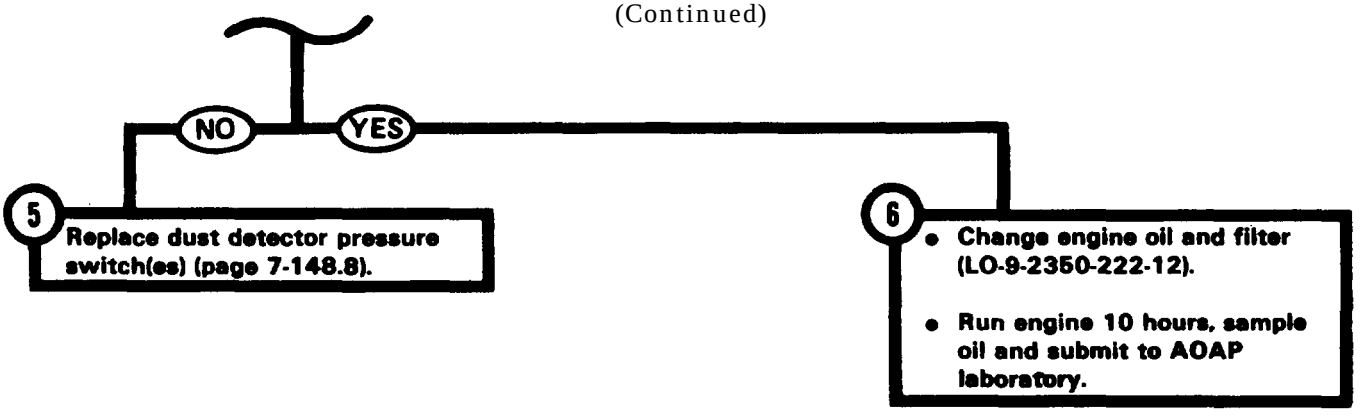
NO

4. - **Install air pressure hoses (page 7-148.18).**
   - **Perform dust detector operational test (page 10-350.19).**

   Are dust detector pressure switches serviceable?

TA248825

Symptom 16.9-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)



TA248826

Symptom 16.10-2DA

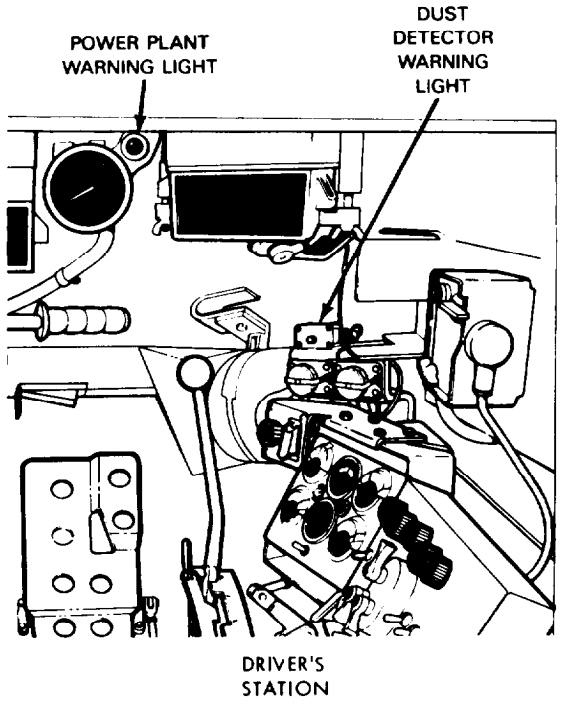
DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

POWERPLANT WARNING LIGHT ON, DUST DETECTOR WARNING LIGHT OFF, DUST DETECTOR PRESSURE SWITCH(ES) TRIPPED, ENGINE RUNNING.

1 **Check dust detector warning light box.**

- Shut down engine.
- Press dust detector warning light to test.

Does dust detector warning lamp light?



YES

2
- **Replace dust detector warning light box (page 10-350.16).**

NO

3
- **Replace lamp (TM 9-2350-222-10).**
- **Press dust detector warning light to test.**

Does dust detector warning lamp light?

TA248827

Symptom 16.10-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

NO

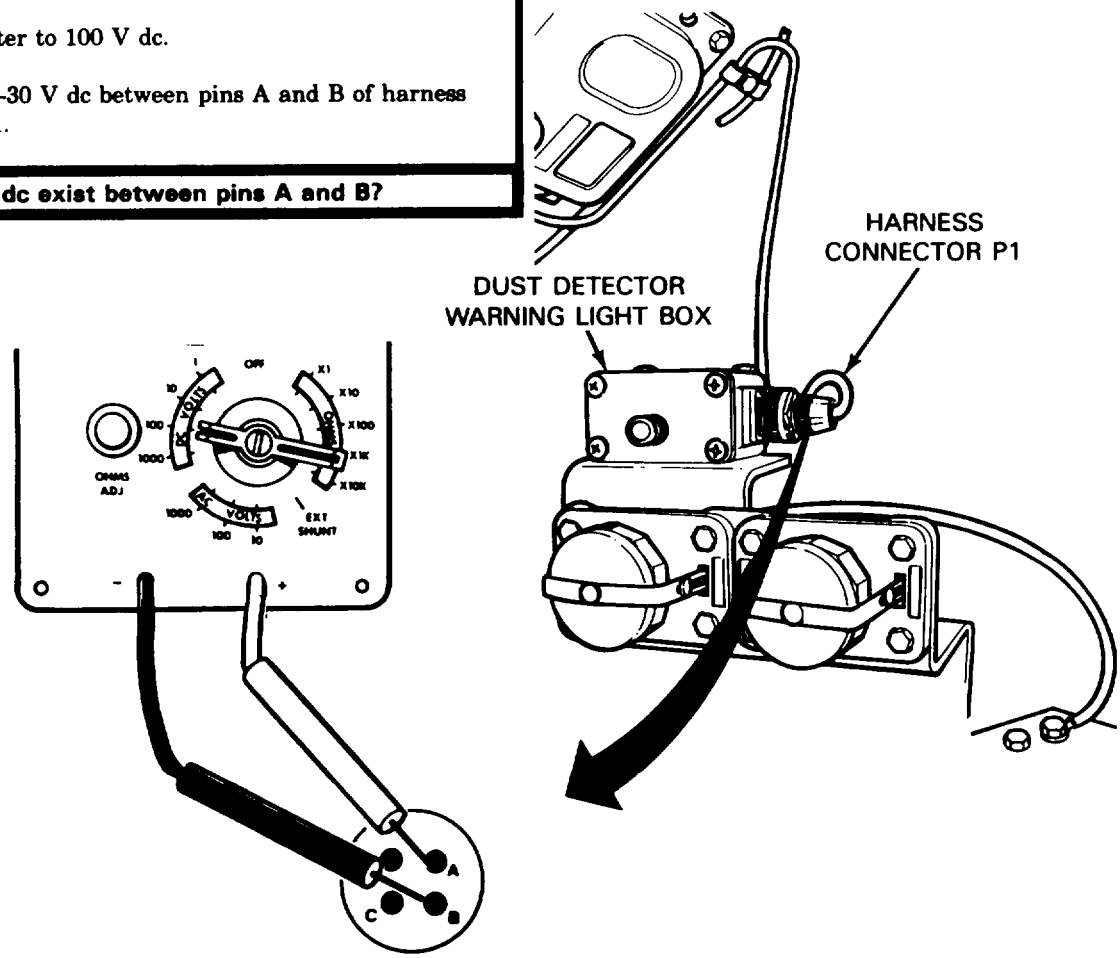
YES

4 **Check dust detector warning light harness 12325927 for 18-30 volts dc.**

- Set master switch to OFF.
- Disconnect harness connector P1 at dust detector warning light box.
- Set master switch to ON.
- Set multimeter to 100 V dc.
- Check for 18-30 V dc between pins A and B of harness connector P1.

Does 18-30 V dc exist between pins A and B?

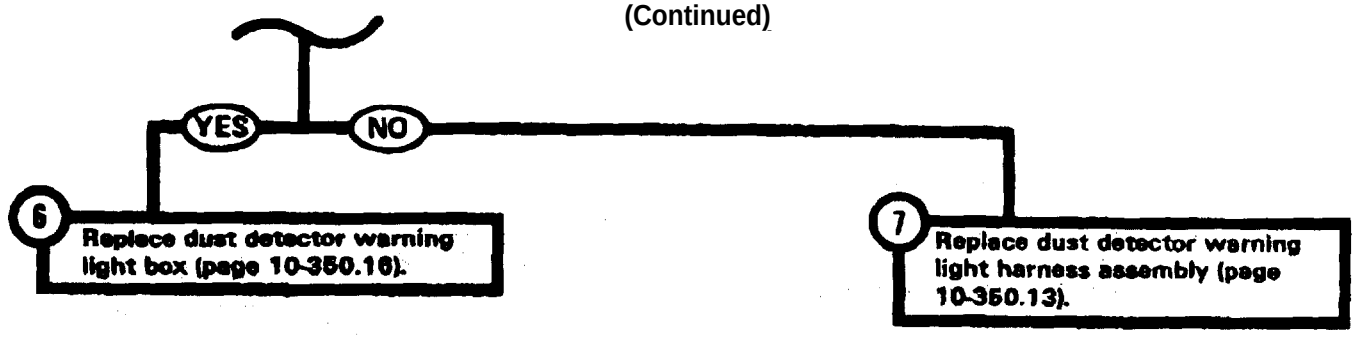
5 **Problem is solved.**



TA248828

Symptom 16.10-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)



TA248829

Symptom 16.11-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

DUST DETECTOR PRESSURE SWITCH(ES) TRIPPED, BUT DUST DETECTOR WARNING LIGHT AND POWERPLANT WARNING LIGHT DO NOT COME ON WHEN ENGINE IS RUNNING.

1 Check pressure switches for continuity.

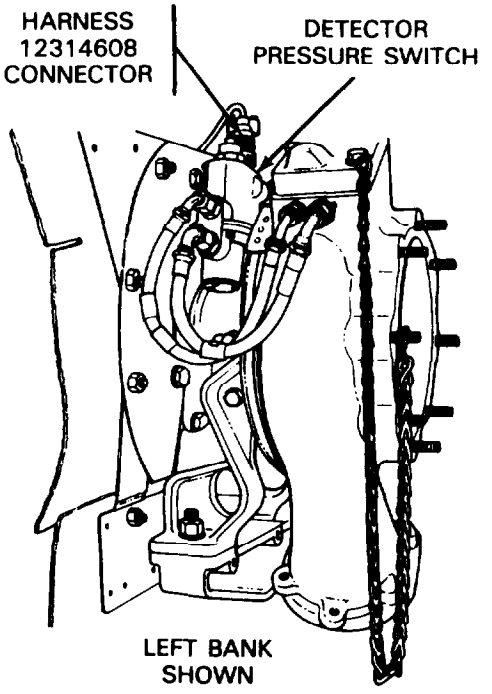
- Set master switch to OFF.
- Disconnect connector of engine wiring harness 12314608 (circuit 510 L) from right and left dust detector pressure switches.
- Set multimeter to read ohms X1.
- Check for continuity across each switch terminal.

Does continuity exist across switch terminal?

NO

2 Replace dust detector pressure switch(es) (page 7-148.8).

YES



TA248830

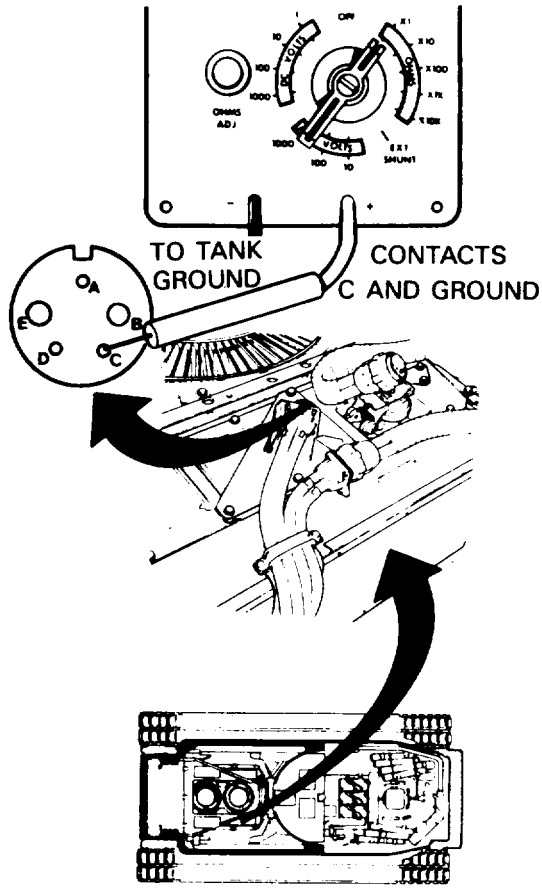
Symptom 16.11-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

3 **Check engine wiring harness at engine disconnect.**

- Disconnect starter feed harness engine disconnect.
- Connect pressure switch connectors to switch(es).
- Set multimeter to read ohms X1.
- Check harness at engine disconnect by checking continuity between pin C and ground.

Does continuity exist between pin C and ground?



TA248831

NO → **4** **Replace engine wiring harness (page 10-350.1).**

YES

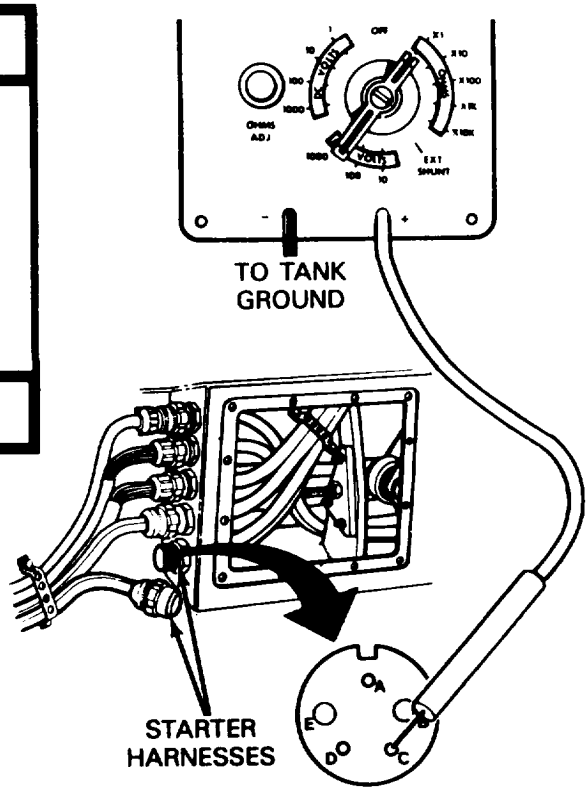
Symptom 16.11-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

5 **Check dust detector engine disconnect to bulkhead wiring harness.**

- Connect cable at engine.
- Disconnect connectors of starter harness at bulkhead disconnect.
- Set multimeter to read ohms X1.
- Measure continuity between connector C and ground.

Does continuity exist between connector C and ground?



NO

6 **Notify support maintenance to replace starter feed harness assembly.**

YES

TA248832

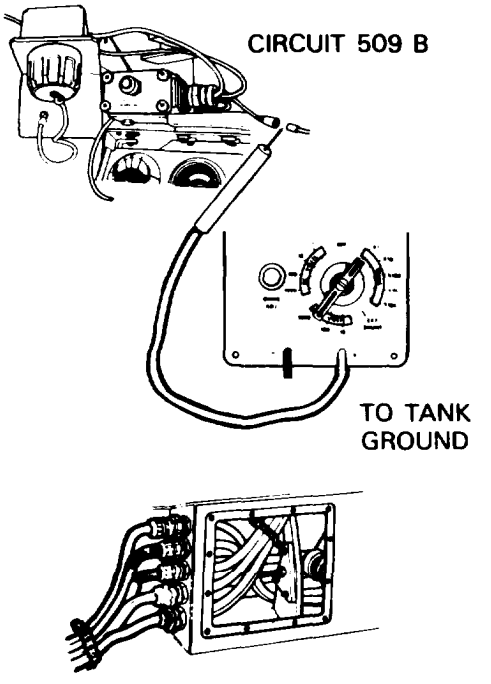
Symptom 16.11-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

7 **Check hull intermediate lead assembly.**

- Connect starter cable at bulkhead.
- Disconnect dust detector lead assembly connector (circuit 509 B) at dust detector warning light box.
- Set multimeter to read ohms X1.
- Measure continuity between dust detector lead assembly connector and ground.

Does continuity exist between lead and ground?



NO

8 **Replace hull intermediate lead assembly (page 10-350.9).**

YES

9 **Replace dust detector warning light box assembly (page 10-350.16).**

10 **Connect all harness connectors that were disconnected.**

TA248833

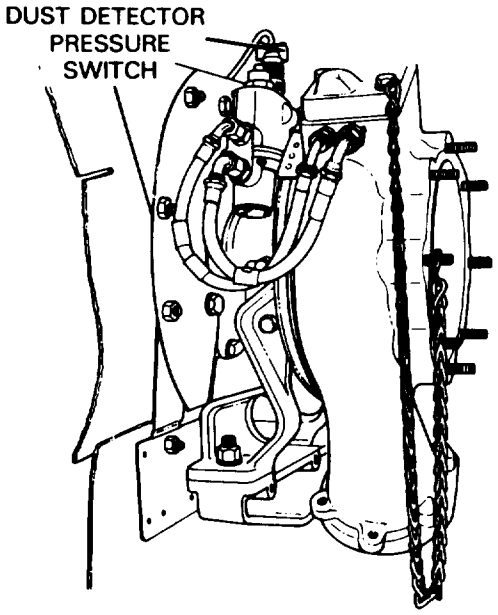
Symptom 16.12-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

VISUAL INSPECTION/AOAP INDICATES DUST INGESTION, DUST DETECTOR WARNING LIGHT AND POWERPLANT WARNING LIGHT NOT ON.

Check dust detector pressure switches.

- Open top grille doors.
- Check dust detector pressure switches.

Is dust detector pressure switch(es) tripped?



NO → **Go to symptom 16.9.**

YES → **Go to symptom 16.11.**

TA248834

Symptom 16.13-2DA

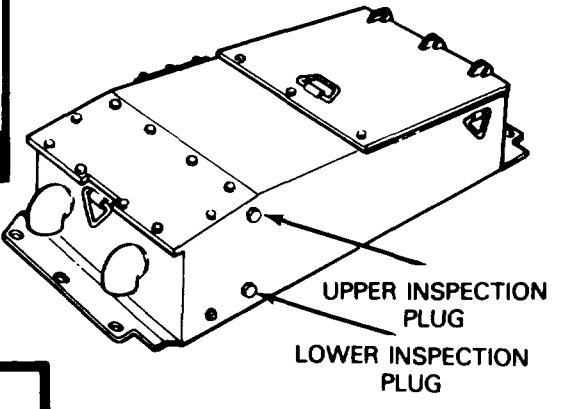
DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

LOW POWER, EXCESSIVE BLACK SMOKE, ONE OR BOTH FILTERS REQUIRE FREQUENT CLEANING.

1 Inspect air cleaner section for accumulation of foreign matter.

- Remove inspection plugs.
- Shine light into lower inspection hole.

Does pre-cleaner section contain foreign matter?



NO — YES

2 Inspect air cleaner filter element access door gasket.

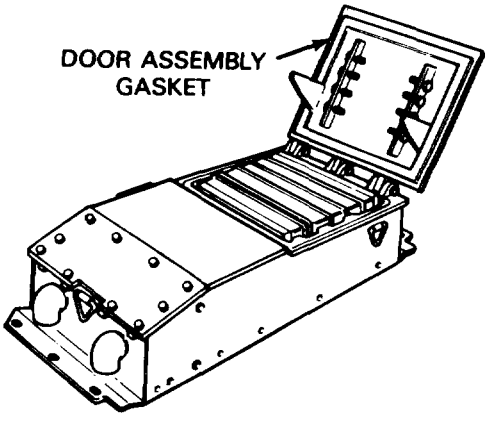
Open air cleaner access door (page 7-103) and inspect gasket for dust leakage (page 7-104).

Is access door gasket leaking?

YES — NO

3 Replace access door gasket (page 7-104).

4 Replace air cleaner filter element (page 7-93).



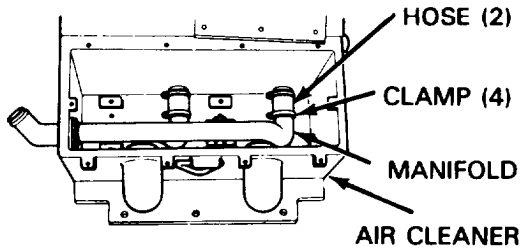
TA248835

Symptom 16.13-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

5 **Clean pre-cleaner section of air cleaner.**

Check for loose or missing VEDES components.

Are hose clamps loose or any VEDES components missing?



YES — NO

6
- **Tighten or replace loose or missing hose clamps or VEDES components.**

7 **Inspect VEDES scavenger tubes and hoses for damage.**

- Inspect tubes for dents or cracks.
- Inspect hoses for cuts or tears.

Are any VEDES scavenger tubes or hoses damaged?

YES — NO

8 **Replace damaged scavenger tubes or hoses (page 8-17).**

TA248836

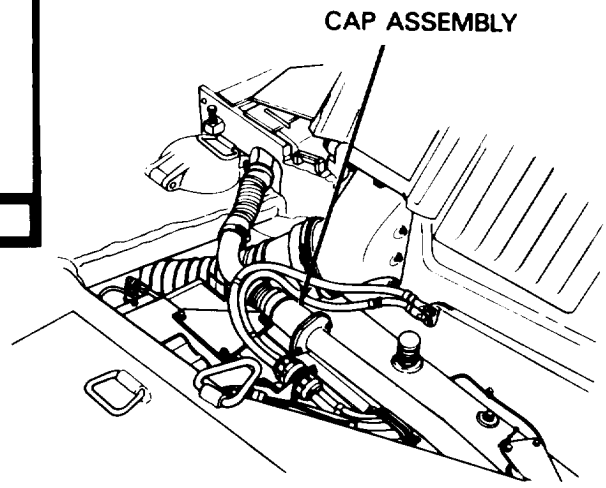
Symptom 16.13-2DA

DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

9 **Check cap assembly (check valve) for proper operation.**

- Remove cap assembly (check valve) (page 8-14).
- Tilt cap assembly (check valve) side to side to verify flapper is free.
- Look inside cap assembly (check valve) to see that flapper is not damaged or missing.

Is cap assembly (check valve) operating properly?



YES / **NO**

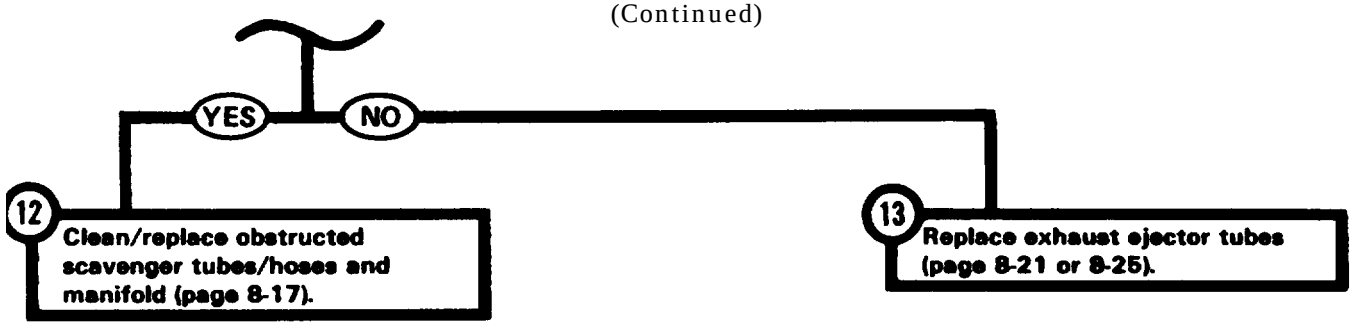
10
- **Install cap assembly (check valve) (page 8-16).**
- **Remove and inspect VEDES scavenger tubes, hoses, and air cleaner manifold for obstruction (page 8-17).**

Are scavenger tubes, hoses, or manifold obstructed?

11
- **Replace cap assembly (check valve) (page 8-14).**

TA248837

Symptom 16.13-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)



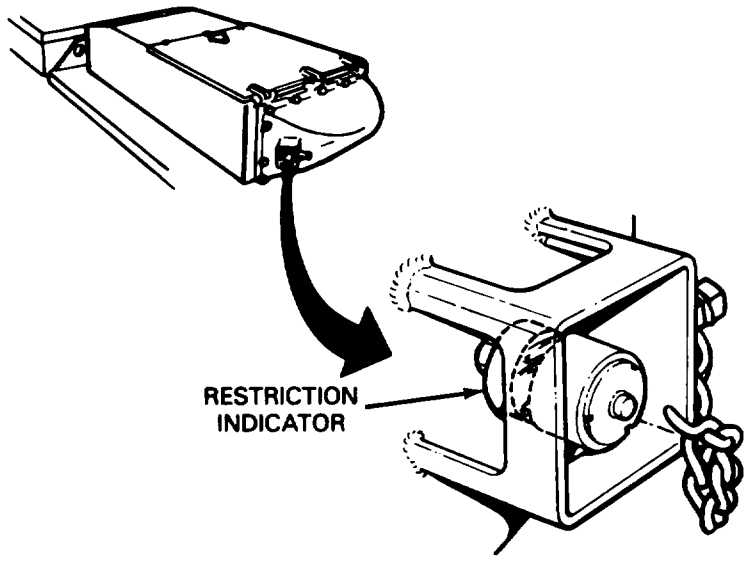
TA248838

Symptom 16.14-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING

LOW POWER, EXCESSIVE BLACK SMOKE.

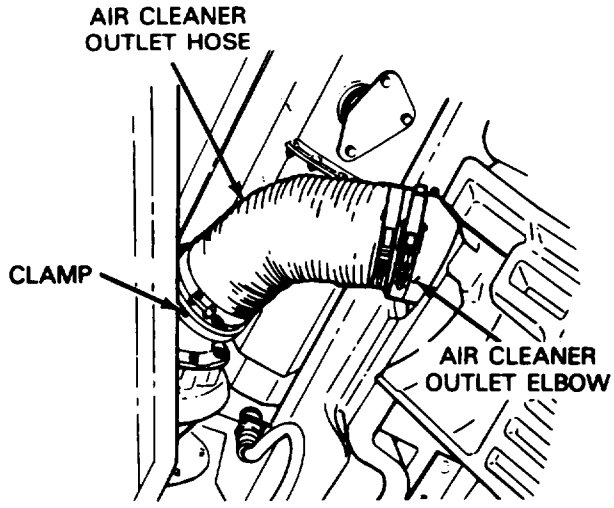
1 • **Check right and left restriction indicators and note reading.**

Does indicator read 30 or more?



YES **NO**

2 **Service air cleaner filter elements on both sides of tank (page 7-93).**



3 **Check air cleaner outlet hoses.**

- Open top deck grille doors.
- Inspect air cleaner outlet hoses.

Is either air cleaner outlet hose damaged?

TA248839

Symptom 16.14-2DA DETAILED TROUBLESHOOTING PROCEDURE
TANK OPERATION - POWERPLANT, RUNNING
(Continued)

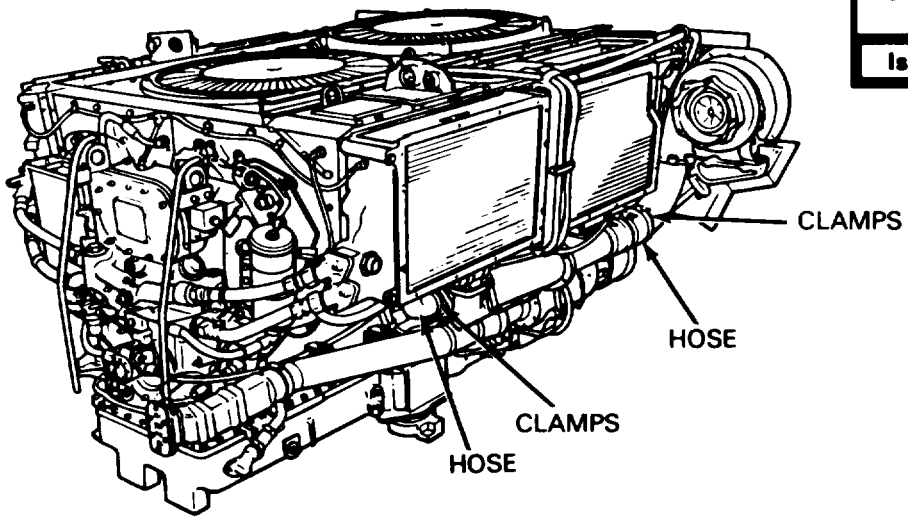
YES / NO

4 Replace air cleaner outlet hose(s) (page 7-73).

5 Check engine intake manifold for leaks.

- Check all hoses for cuts or tears.
- Check clamps for security.
- Check tubes for cracks.

Is manifold leaking?



YES / NO

6 Notify direct support.

7 Go to symptom 11-2D, step 3 (page 4-372).

TA248841

DETAILED TROUBLESHOOTING PROCEDURE

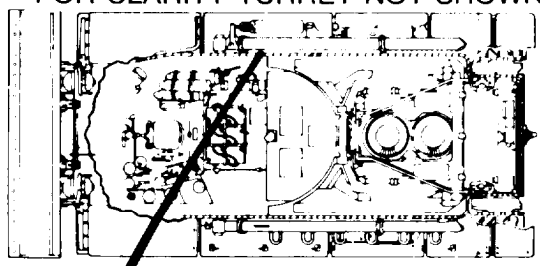
Symptom -17-2D VEHICLE OPERATION - POWERPLANT, STOPPING

ENGINE FUEL SHUT OFF SWITCH WILL NOT STOP ENGINE (2D ENGINE)

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

FOR CLARITY TURRET NOT SHOWN



1 Check hull front master harness contact B (CKT 54A) at bulkhead disconnect for electrical power.

First Technician (Turret)

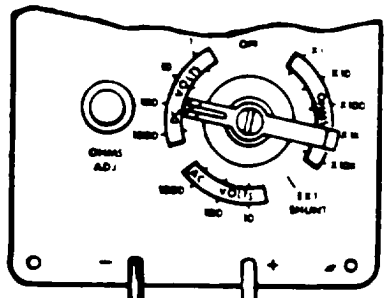
- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10).
- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact B (CKT 54A) of hull front master harness connector and black probe to ground.

Second Technician (Driver's Station)

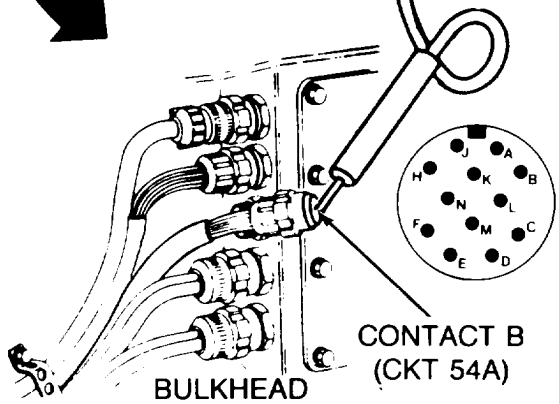
- Set MASTER BATTERY switch ON.
- Momentarily set ENGINE FUEL SHUT OFF switch in UP position, then release it.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc while switch is in UP position.



TO VEHICLE GROUND



CONTACT B (CKT 54A)

BULKHEAD ELECTRICAL DISCONNECTS

Does meter indicate 18 to 30 volts dc?

YES

NO

2

- **Check ENGINE FUEL SHUT OFF switch for continuity.**
- **See Step (10) .**

■ All data on pages 4-428.33/(4-42834 blank) thru 4-437 deleted.

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STOPPING
(Continued)

Symptom-17-2D

3 Check engine accessory harness (CKT 54A) at engine disconnect for electrical power.

Second Technician (Driver's Station)

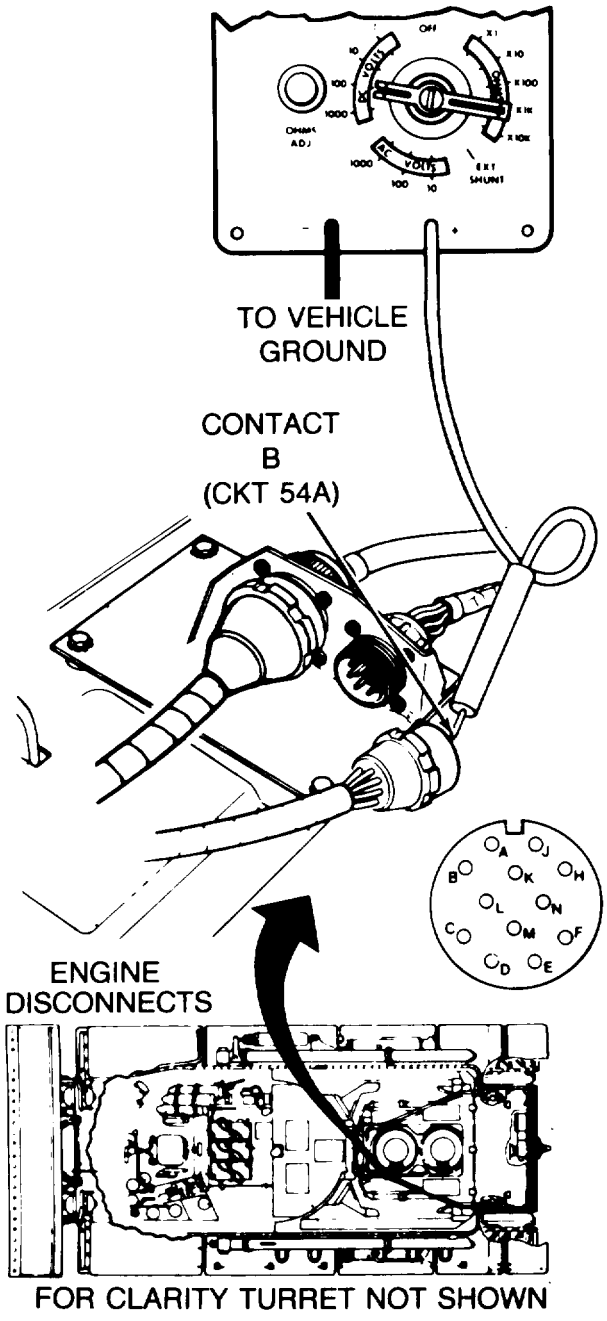
- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Connect hull front master harness to bulkhead electrical disconnect.
- Manually traverse turret to gain access to left top deck grille doors (TM 9-235-222-10).

First Technician (Left Top Deck Grille Doors)

- Open left top deck grille doors to gain access to engine disconnect.
- Disconnect engine accessory harness from engine disconnect.
- Connect red probe of meter to contact B (CKT 54A) of engine accessory harness connector and black probe to ground.



TA142060

Symptom-17-2D DETAILED TROUBLESHOOTING PROCEDURE
STEP (3) CONTINUED VEHICLE OPERATION - POWERPLANT, STOPPING
(Continued)

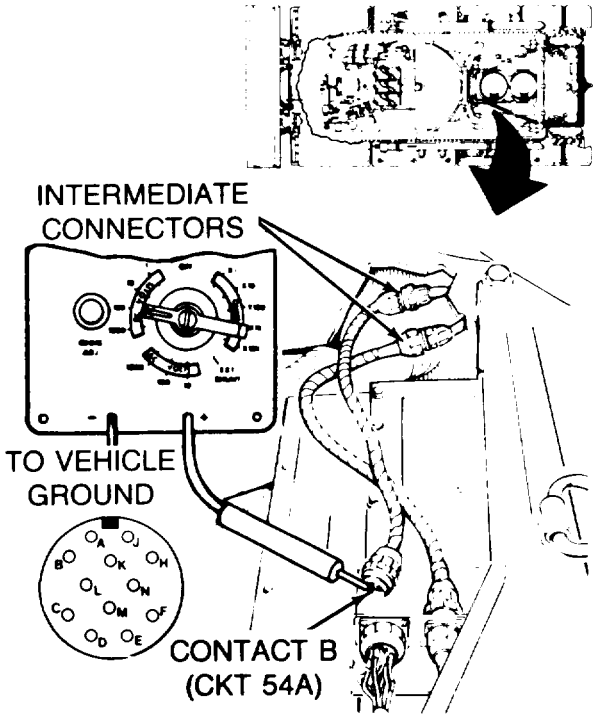
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Momentarily set ENGINE FUEL SHUT OFF switch in UP position, then release it.

First Technician (Engine Disconnect)

- Check if meter indicates 18 to 30 volts dc while switch is in UP position.

Does meter indicate 18 to 30 volts dc?



YES

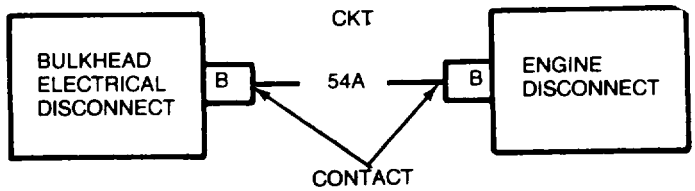
NO

(4)

- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine control harness extension (CKT 54A) for continuity from intermediate connector to connector of engine disconnect.**
- **See Step (21) .**

For harness without intermediate connector:

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 54A) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**



TA142061

Symptom-17-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STOPPING
(Continued)

5 Check engine electrical harness (CKT 54A) at front of engine for electrical power.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Left Top Deck)

- Connect engine accessory harness to engine disconnect.

First Technician (Turret)

- Manually traverse turret to gain access to engine access covers (TM 9-2350-222-10).
- Remove upper engine access cover (page 16-40).
- Disconnect engine electrical harness (CKT 54A) from fuel shutoff solenoid lead connector.
- Connect red probe of meter to center contact of engine electrical harness (CKT 54A) and black probe to ground.

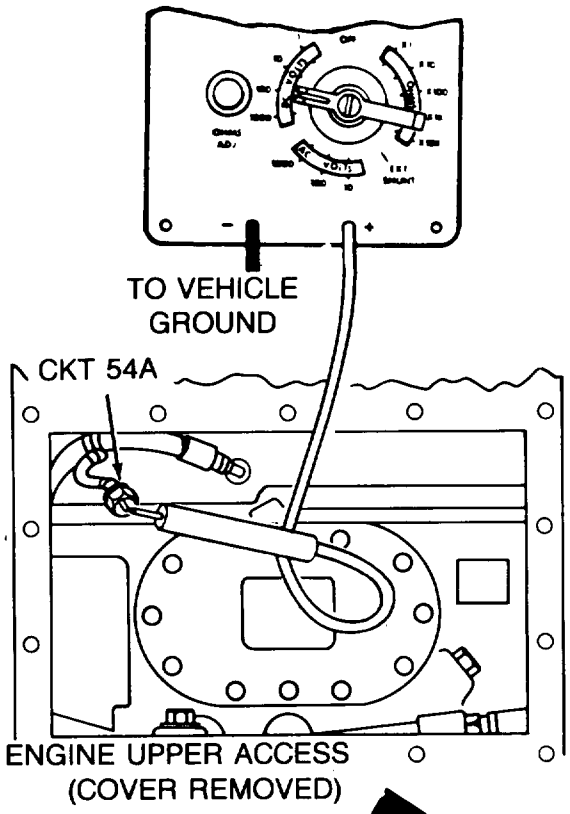
Second Technician (Driver's Station)

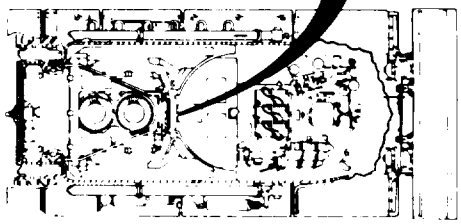
- Set MASTER BATTERY switch ON.
- Momentarily set ENGINE FUEL SHUT OFF switch is UP position, then release it.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc while switch is in UP position.

Does meter indicate 18 to 30 volts dc?



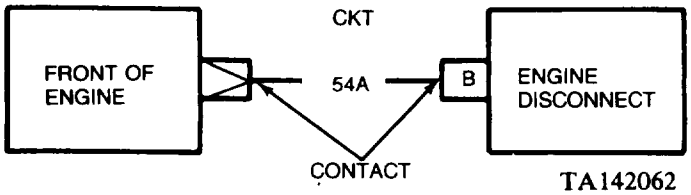


FOR CLARITY TURRET NOT SHOWN

YES

NO

6
- **Repair engine electrical harness (page 10-307).**



TA142062

Symptom-17-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STOPPING
(Continued)

7 **Check fuel shutoff solenoid lead (CKT 54A) at fuel shutoff solenoid for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Connect engine electrical harness (CKT 54A) to fuel shutoff lead connector.

First Technician (Top Deck)

- Remove front engine cooling fan (page 9-48).

First Technician (Engine)

- Disconnect fuel shutoff solenoid electrical lead (CKT 54A) from fuel shutoff solenoid.
- Connect red probe of meter to center contact of solenoid electrical lead connector, and connect black probe to ground.

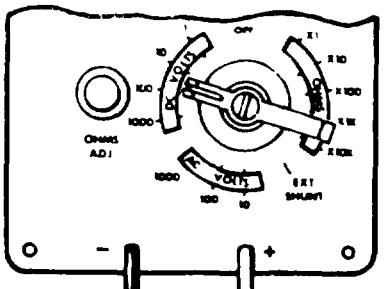
Second Technician (Driver's Station)

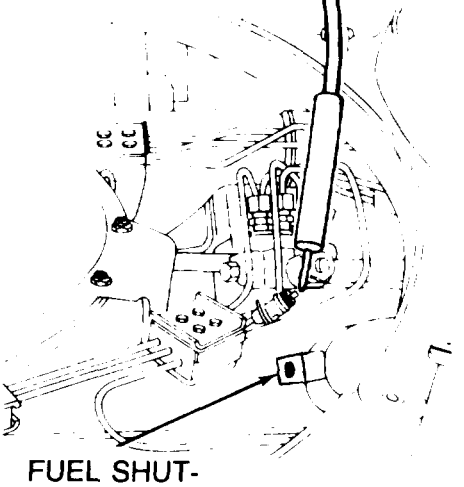
- Set MASTER BATTERY switch ON.
- Momentarily set ENGINE FUEL SHUT OFF switch in UP position, then release it.

First Technician (Top Deck)

- Check if meter indicates 18 to 30 volts dc while switch is in UP position.

Does meter indicate 18 to 30 volts dc?





NO → **8** **Replace fuel shutoff solenoid lead (page 10-35).**

YES → **9** **Notify support maintenance of defective fuel shutoff solenoid/fuel injection pump.**

TA142063

Symptom-17-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STOPPING
(Continued)

FROM STEP 2

10 Check ENGINE FUEL SHUT OFF switch for continuity.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

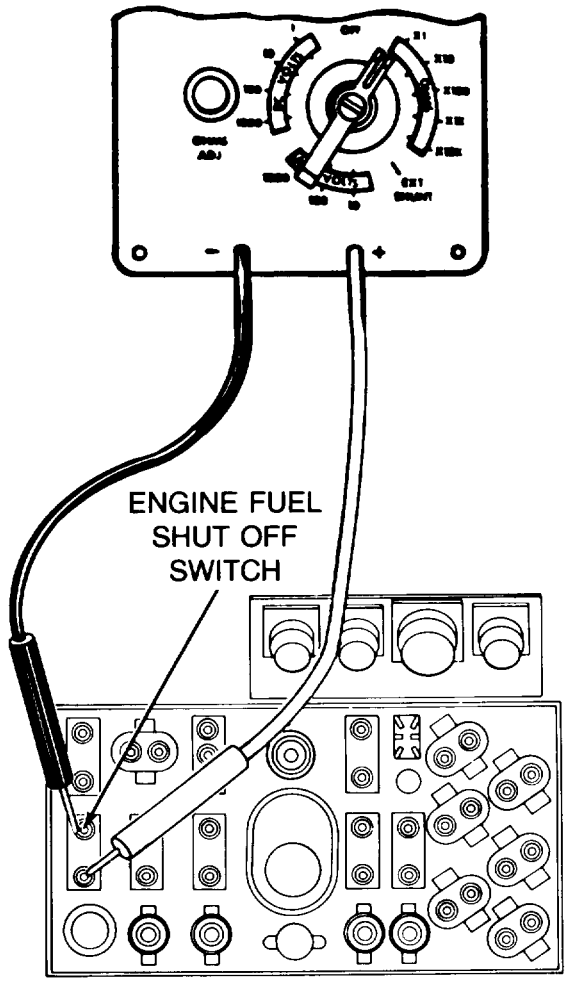
First Technician (Turret)

- Connect hull front master harness connector to bulkhead electrical disconnect.

Second Technician (Driver's Station)

- Displace master control panel (page 10-45).
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Disconnect two connectors (CKT 54 and 54A) from ENGINE FUEL SHUT OFF switch.
- Connect red probe of meter to one contact of ENGINE FUEL SHUTOFF switch.
- Connect black probe of meter to other contact of ENGINE FUEL SHUT OFF switch.
- Momentarily set ENGINE FUEL SHUT OFF switch in UP position, then release it.
- Check if meter indicates continuity while switch is in UP position.

Does meter indicate continuity?



MASTER CONTROL PANEL
(REAR VIEW)

YES

NO

11 Replace ENGINE FUEL SHUT-OFF switch (page 10-61).

TA142064

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STOPPING
(Continued)

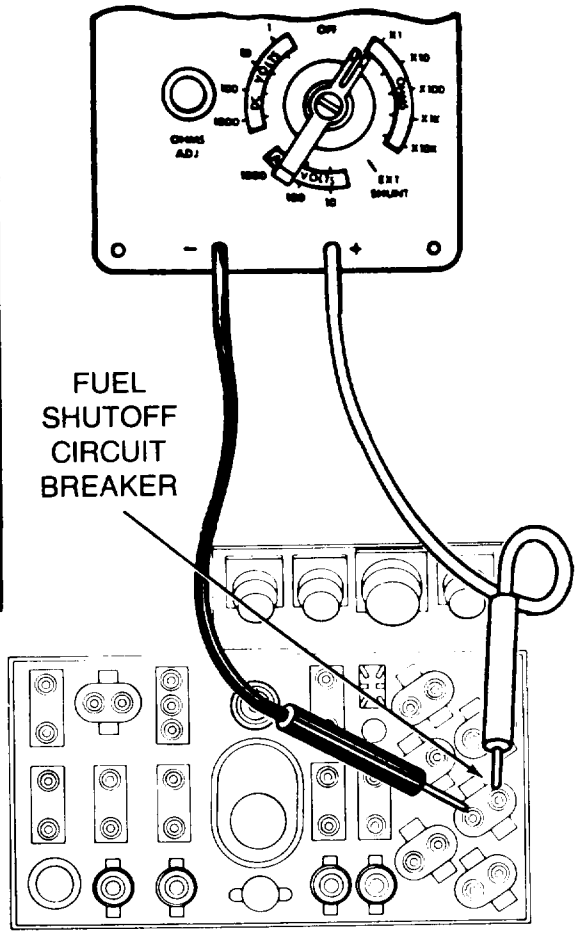
Symptom-17-2D

12 Check fuel shutoff circuit breaker for continuity.

Second Technician (Driver's Station)

- Disconnect two (CKT 54) connectors from fuel shutoff circuit breaker.
- Connect probes of meter to contacts of fuel shutoff circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

13

- **Replace fuel shutoff circuit breaker (page 10-61).**
- **Connect two connectors (CKT 54A and 54) of ENGINE FUEL SHUTOFF switch.**

TA142065

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT: STOPPING
(Continued)

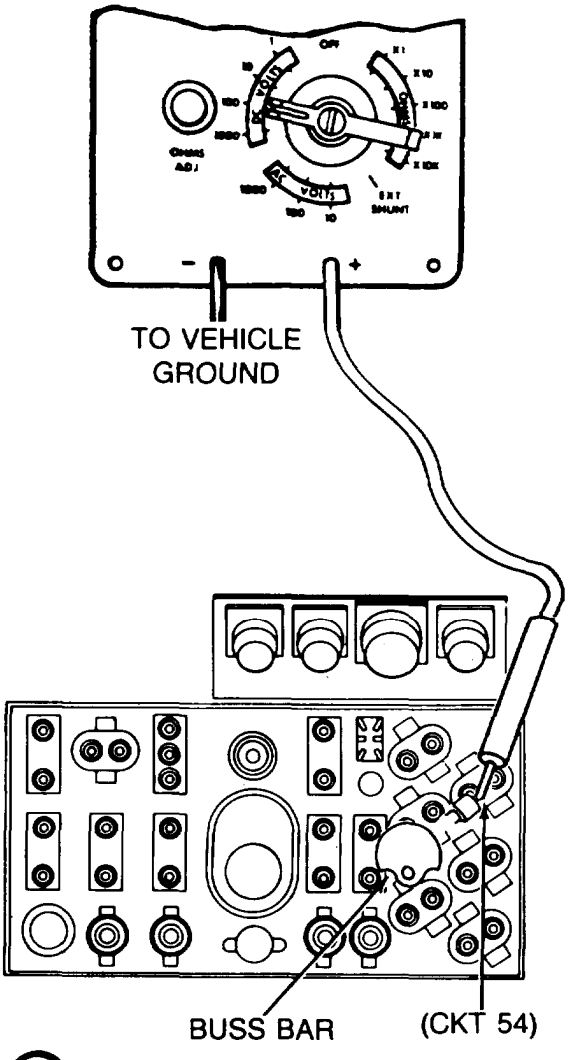
Symptom-17-2D

14 **Check (CKT 54) input to fuel shutoff circuit breaker for electrical power.**

Second Technician (Driver's Station)

- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to (CKT 54) connector coming from buss bar and connect black probe of meter to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

NO

15

- **Replace master control panel harness (page 10-111).**
- **Connect (CKT 54 and 54A) to ENGINE FUEL SHUT OFF switch.**
- **Connect (CKT 54) connectors to fuel shutoff circuit breaker.**

TA142066

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STOPPING
(Continued)

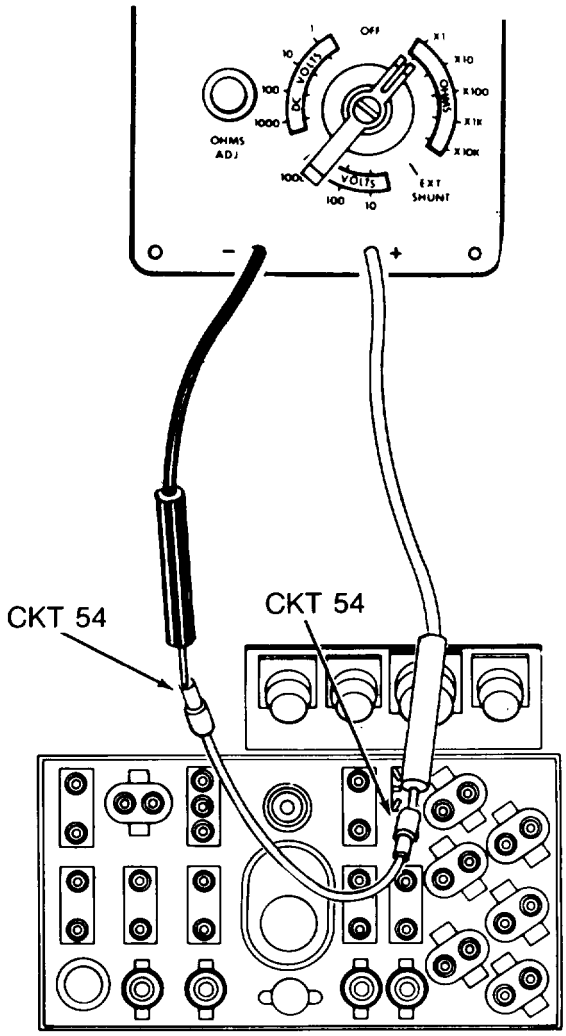
Symptom-17-2D

16 **Check fuel shutoff harness (CKT 54) for continuity from ENGINE FUEL SHUT OFF switch to fuel shutoff circuit breaker.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to fuel shutoff harness connector (CKT 54) at circuit breaker.
- Connect black probe of meter to fuel shutoff harness connector (CKT 54) at switch.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

17
- **Replace master control panel fuel shutoff harness (page 10-118).**
- **Connect master control panel harness (CKT 54) to circuit breaker.**
- **Connect (CKT 54A) connector to ENGINE FUEL SHUT OFF switch.**

TA142067

Symptom-17-2D

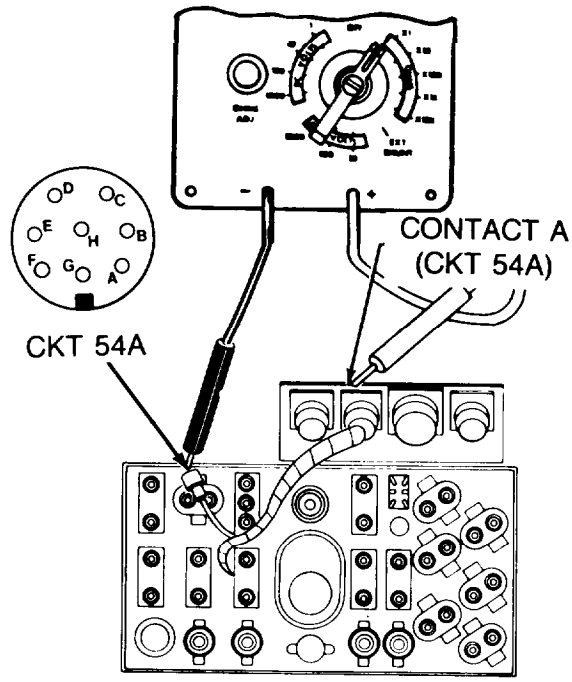
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT. STOPPING
(Continued)

18 **Check master battery harness (CKT 54A) for continuity from panel connector to connector at ENGINE FUEL SHUT OFF switch.**

Second Technician (Driver's Station)

- Connect the fuel shutoff harness (CKT 54) to circuit breaker and to ENGINE FUEL SHUT OFF switch.
- Connect master control panel harness connector (CKT 54) to fuel shutoff circuit breaker.
- Disconnect hull front master harness connector from master control panel.
- Connect red probe of meter to contact A (CKT 54A) of panel connector.
- Connect black probe of meter to (CKT 54A) connector at ENGINE FUEL SHUT OFF switch.
- Check if meter indicates continuity.

Does meter indicate continuity?

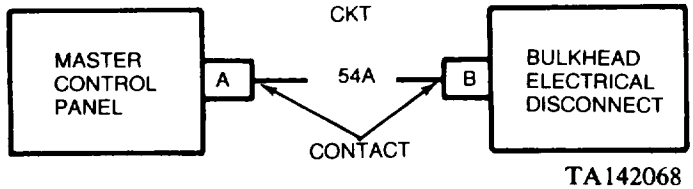


YES

20
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 54A) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Connect (CKT 54A) connector to ENGINE FUEL SHUT OFF switch.**
- **Connect hull front master harness connector to master control panel.**

NO

19 **Replace master battery harness (page 10-107).**



TA142068

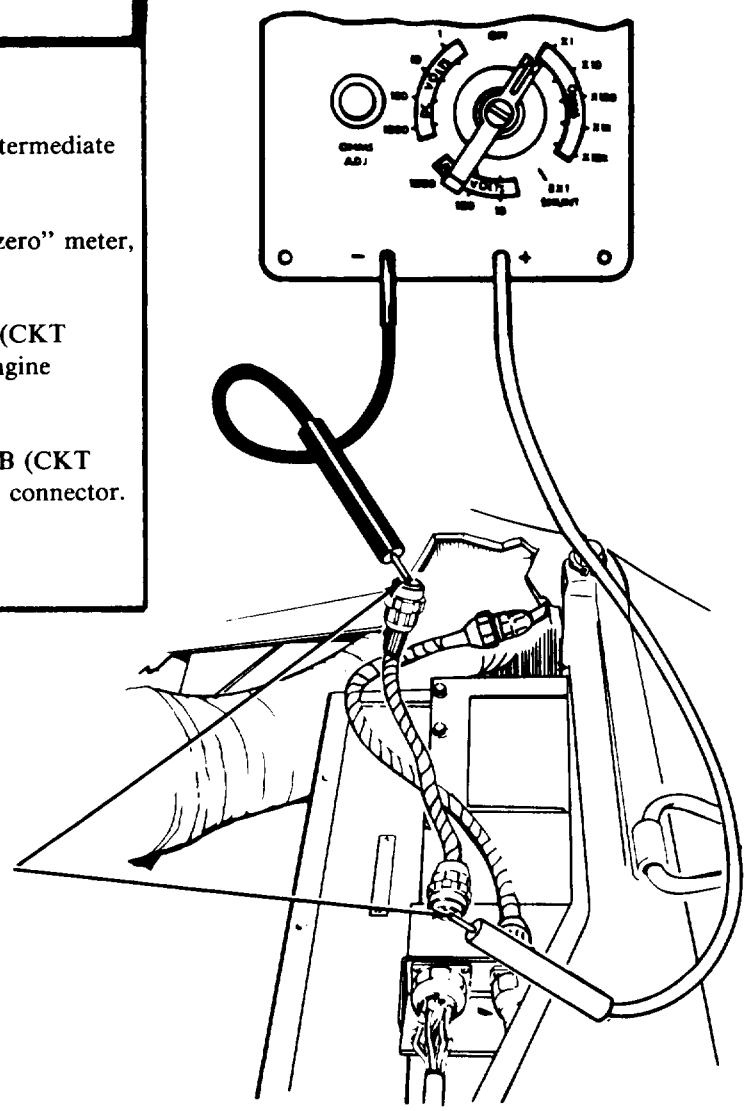
Symptom-17-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STOPPING
(Continued)

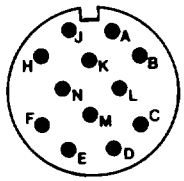
FROM STEP 4

21 Check engine accessory harness extension (CKT 54A) for continuity from intermediate connector to connector of engine disconnect.

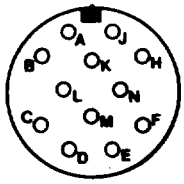
Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT 54A) of extension harness connector at engine disconnect.
- Connect black probe of meter to contact B (CKT 54A) of extension harness at intermediate connector.





CONTACT B
(CKT 54A)



TA142069

Symptom-17-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STOPPING
(Continued)

STEP (21) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

NO

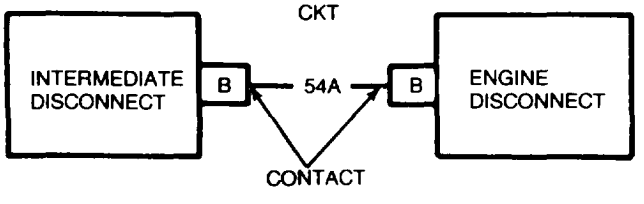
22

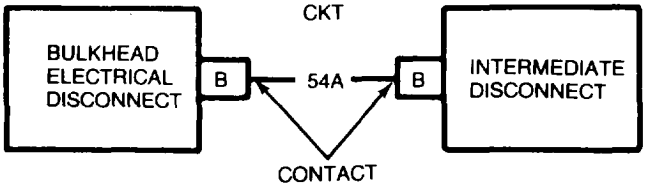
- **Inspect engine accessory harness extension for bent/broken connector contacts or loose (CKT 54A) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness to bulkhead electrical disconnect.**

YES

23

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 54A) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness to bulkhead electrical disconnect.**





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Symptom-18-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - POWERPLANT, STOPPING

MANUAL FUEL SHUTOFF HANDLE WILL NOT STOP ENGINE (2D ENGINE).

1 Check if clevis pin connecting fuel shutoff cable to fuel shutoff lever on engine is installed.

Technician (Turret)

- Manually traverse turret to gain access to upper engine access cover (TM 9-2350-222-10).
- Remove upper engine access cover (page 16-40).
- Check if clevis pin connecting fuel shutoff cable to fuel shutoff lever on engine is installed.

Is clevis pin installed?

2

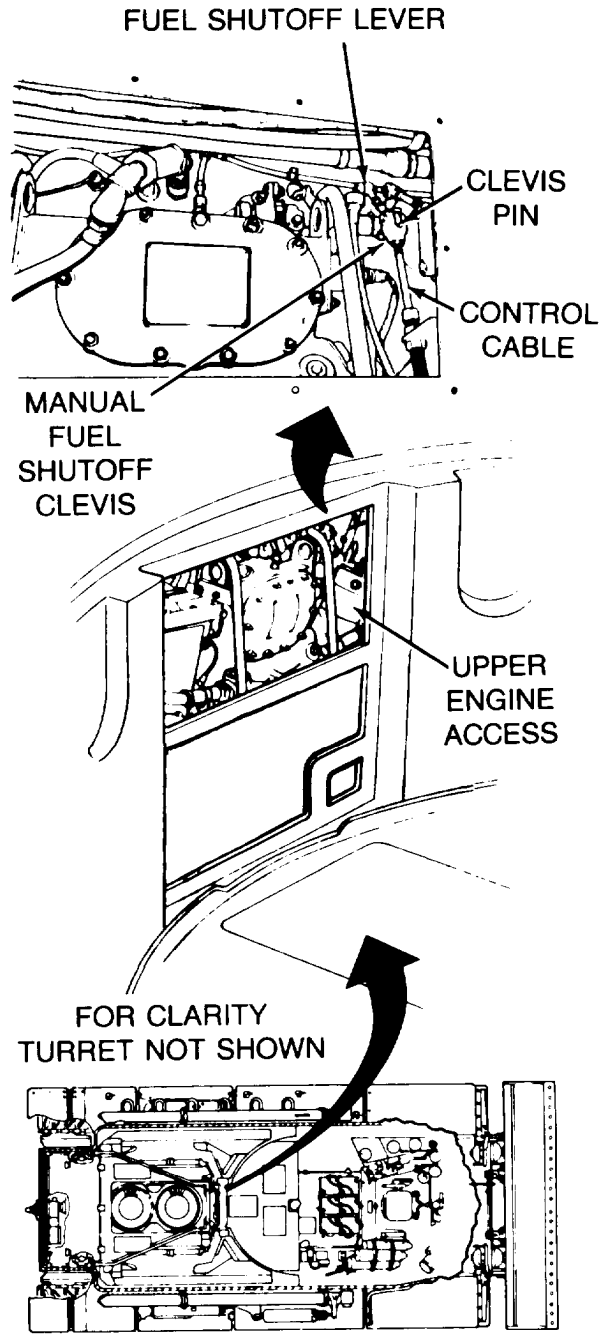
- **Install upper engine access cover (page 16-40).**
- **Notify support maintenance of fuel shutoff problem.**

YES

3

- **Install clevis pin.**

NO



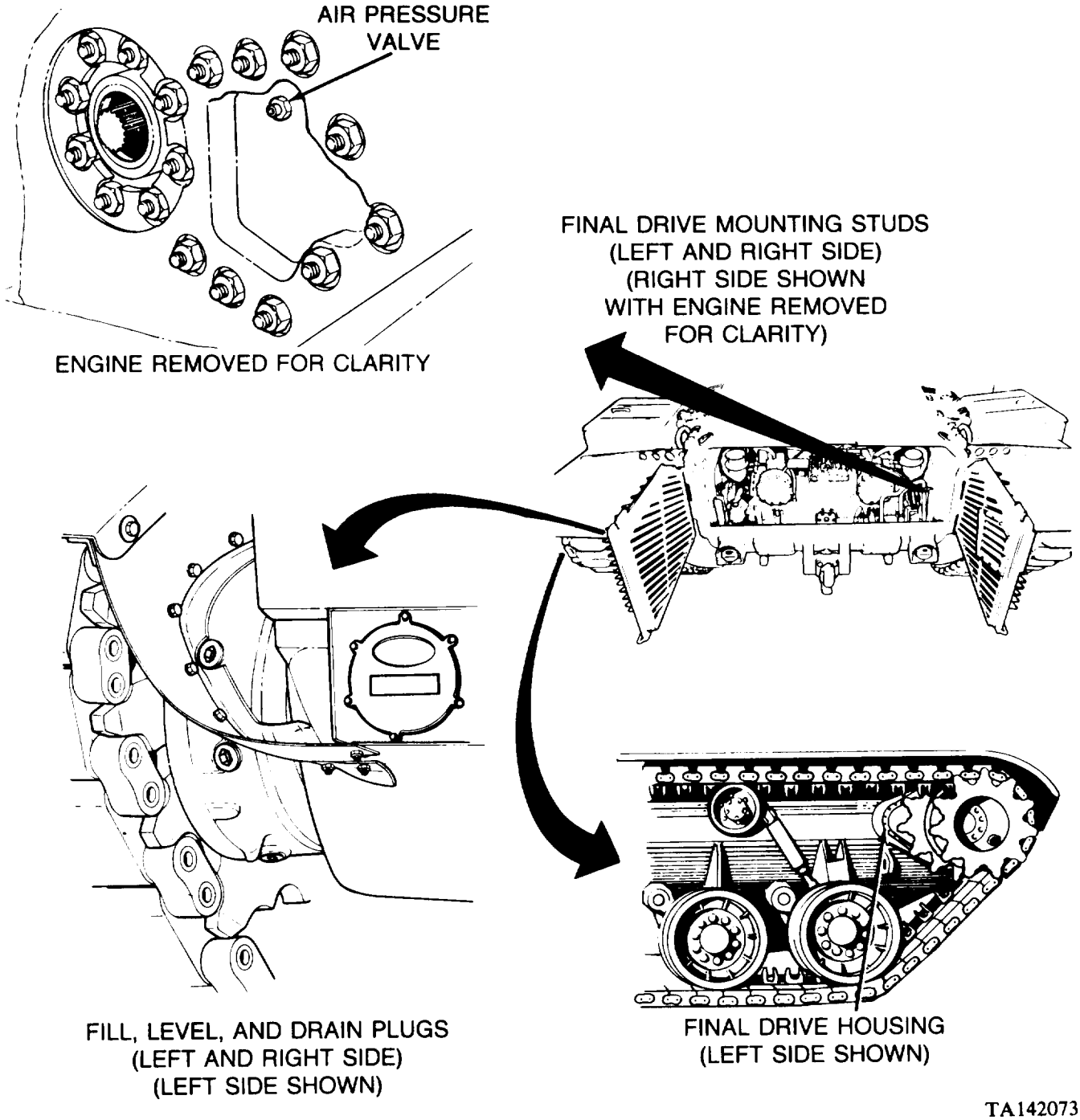
TA142072

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - FINAL DRIVE

Symptom-19

FINAL DRIVE LEAKS OIL.

LOCATOR VIEWS



TA142073

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - FINAL DRIVE
(Continued)

Symptom-19

FINAL DRIVE LEAKS OIL.

NOTE

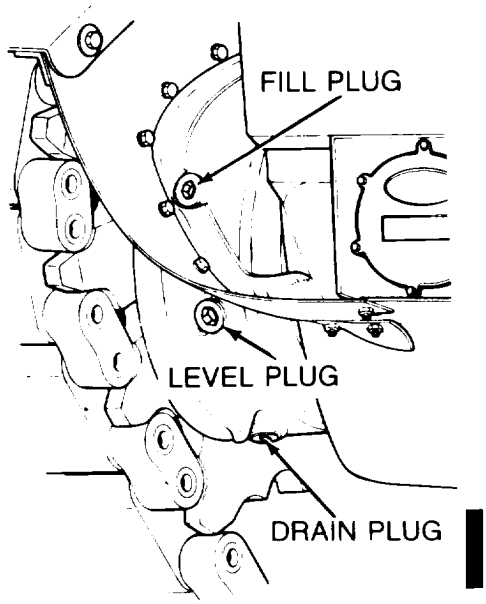
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check final drive housing for loose or missing fill, level, and drain plugs.

Both Technicians (Rear of Vehicle)

- Remove oil and dirt from rear of leaking final drive housing.
- Visually check final drive housing for missing or loose fill, level, or drain plug.

Are fill, level, and drain plugs in place and tight?



REAR OF FINAL DRIVE

NOTE
LEFT AND RIGHT FINAL DRIVE ARE THE SAME (LEFT SIDE SHOWN)

YES

NO

2

- **Tighten fill, level, or drain plug.**
- **Replace missing or damaged plugs (page 12-2).**
- **Service final drive (LO 9-2350-222-12).**

TA253102

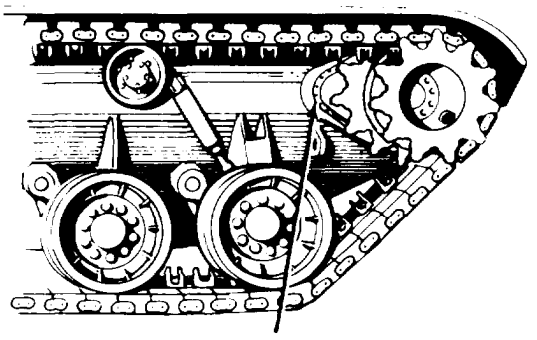
Symptom-19

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - FINAL DRIVE
(Continued)

3 **Check outside of final drive housing for cracks or other damage.**

- Be sure that entire final drive housing has been cleaned and free of oil and dirt.
- Visually check leaking final drive housing for cracks or other damage.

Is outside of final drive housing cracked or damaged?



FINAL DRIVE HOUSING

NOTE

Final drive may be equipped with an air pressure valve or vent tubing system.

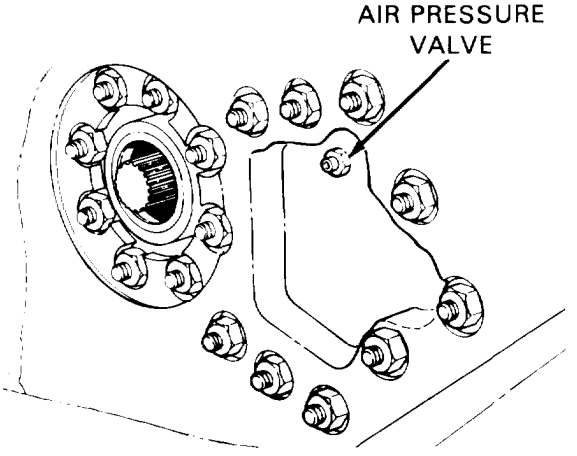
YES → **4** **Replace final drive (page 12-2).**

NO

5 **Check final drive air pressure valve for operation.**

- Remove transmission shroud (page 9-20).
- Check leaking final drive air pressure valve by manually turning spring-loaded cap in one direction then in the other.

Does air pressure valve cap operate freely?



ENGINE REMOVED FOR CLARITY

NO → **6**

- **Replace pressure valve (page 12-8).**
- **Service final drive (LO 9-350-222-12).**

YES

TA253103

Symptom-19

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - FINAL DRIVE
(Continued)

6.1 Check final drive vent tubing system for damage.

Both Technicians

- Remove transmission shroud (page 9-20).

Second Technician (Top Deck)

- Open left top deck grille doors (TM 9-2350-222-10).
- Visually check the following for damage:
  - Steel tubing (A) from fitting (B) to tee fitting (C).
  - Steel tubing (D) from tee fitting (C) to reducer fitting (E).

First Technician (Rear of Vehicle)

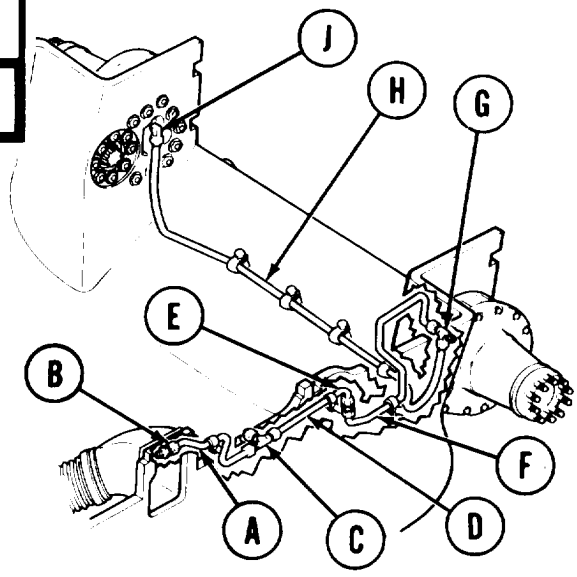
- Visually check the following for damage:
  - Steel tubing (F) from reducer fitting (E) to tee fitting (G).
  - Plastic tubing (H) from tee fitting (G) to elbow fitting (J).

Is vent tubing or fittings cracked, crimped, or broken?

YES

6.2
- **Replace damaged tubing and/or fittings.**

NO



TA253104

Symptom-20 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

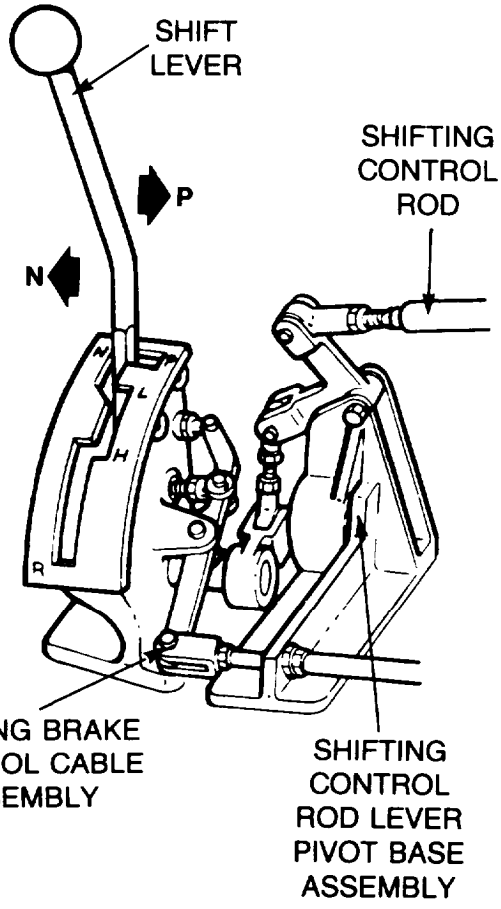
FROM STEP (3) or (25)

(4) Check shifting control hand lever pivot base assembly for binding or obstruction.

Second Technician (Driver's Station)

- Disconnect shifting control rod from shifting control rod lever pivot base assembly (page 11-5, Step 15).
- Disconnect parking brake control cable assembly (page 13-106).
- Move shift lever from "P" (park) through "R" (reverse) several times.
- Check shifting control hand lever and pivot base assemblies for binding or obstruction, while moving shift lever.

Is shifting control lever and pivot base assemblies obstructed or binding?



NO

YES

(5) Repair shifting control and related parts (page 11-25).

TA142078

Symptom-20

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

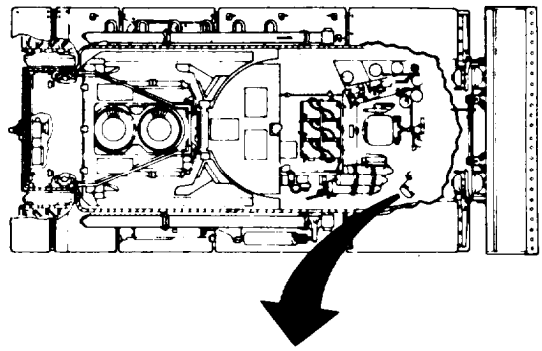
6 **Check shifting control bulkhead link assembly for binding or obstruction.**

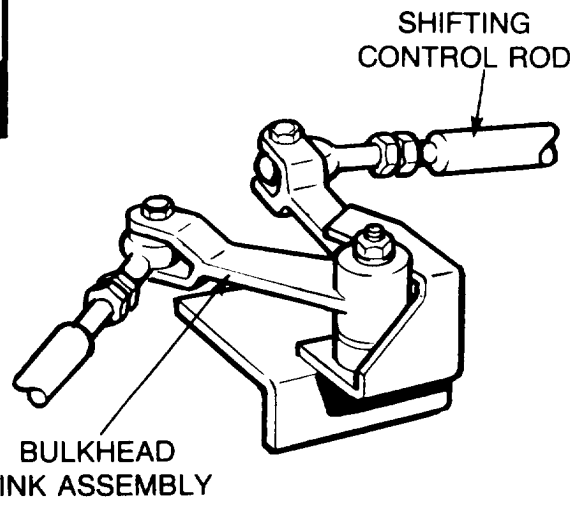
Second Technician (Driver's Station)

- Connect shifting control rod to shifting control rod lever pivot base assembly (page 11-6, Step 19).
- Disconnect shifting control rod from bulkhead link assembly (page 11-10, Step 55).
- Move shifting lever from "P" (park) through "R" (reverse) several times.
- Check bulkhead link assembly for binding or obstruction while moving shift lever.

Is bulkhead link assembly binding or obstructed?

FOR CLARITY TURRET NOT SHOWN





NO

YES

7 **Notify support maintenance of binding bulkhead link assembly.**

TA142079

Symptom-20

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

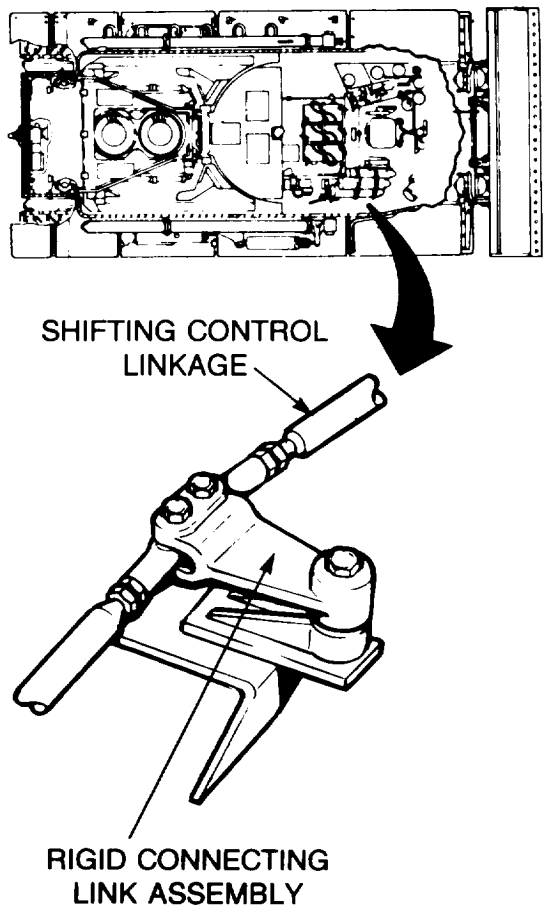
8 **Check the rigid connecting link for binding or obstruction.**

Second Technician (Driver's Station)

- Connect shifting control rod to bulkhead link assembly (page 11-11, Step 60).
- Displace right ammo rack (page 17-7).
- Disconnect shifting control rod from rigid connecting link assembly (page 11-14, Step 88).
- Move shifting lever from "P" (park) through "R" (reverse) several times.
- Check rigid connecting link assembly for binding or obstruction while moving shift lever.

Is rigid connecting link assembly obstructed or binding?

FOR CLARITY TURRET NOT SHOWN



NO

YES

9 **Notify support maintenance of binding rigid connecting link assembly.**

TA142080

Symptom-20

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

10 Check shifting control rod for binding or obstruction.

Second Technician (Driver's Station)

- Connect shifting control rod to the rigid connecting link assembly (page 11-14, Step 93).

First Technician (Rear of Vehicle)

- Remove powerplant (page 5-1).
- Remove connecting link control box cover (page 11-53).
- Disconnect forward shifting control rod from connecting link assembly (page 11-55, Step 10).

Second Technician (Driver's Station)

- Move shift lever from "N" (neutral) through "R" (reverse) several times and check forward shifting control rod for binding.

First Technician (Rear of Vehicle)

- Check forward shifting control rod for obstruction.

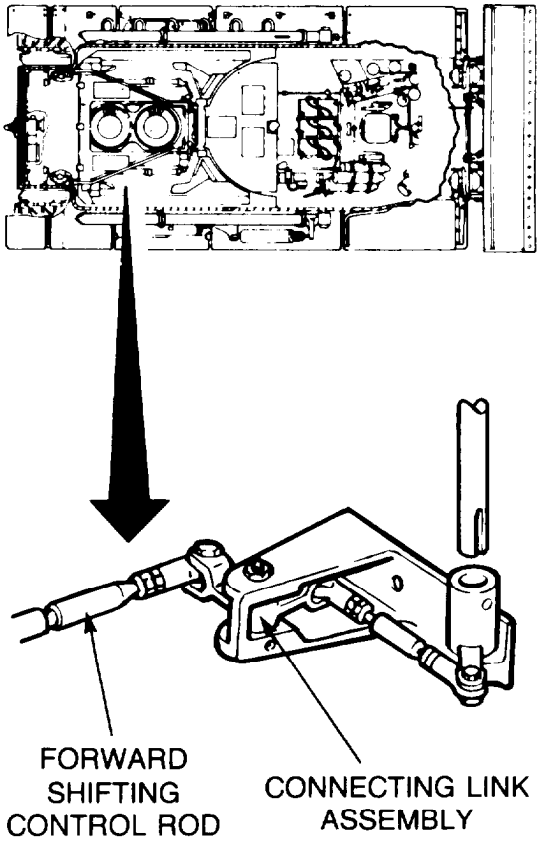
Is forward shifting control rod obstructed or binding?

NO

YES

11 Notify support maintenance of binding or obstructed forward shifing control rod.

FOR CLARITY
TURRET NOT SHOWN



TA142081

Symptom-20

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

12 **Check connecting link assembly for binding or obstruction.**

First Technician (Rear of Vehicle)

- Connect forward shifting control rod to connecting link assembly (page 11-59, Step 5).
- Disconnect shifting control rod from connecting link assembly (page 11-55).

Second Technician (Driver's Station)

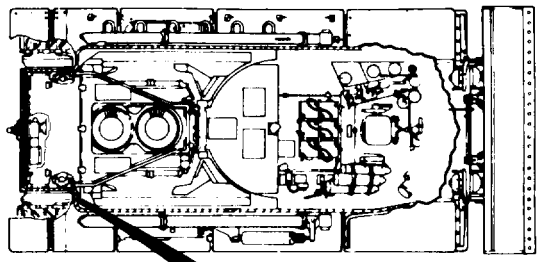
- Move shifting lever from "P" (park) through "R" (reverse) several times and check connecting link assembly for binding.

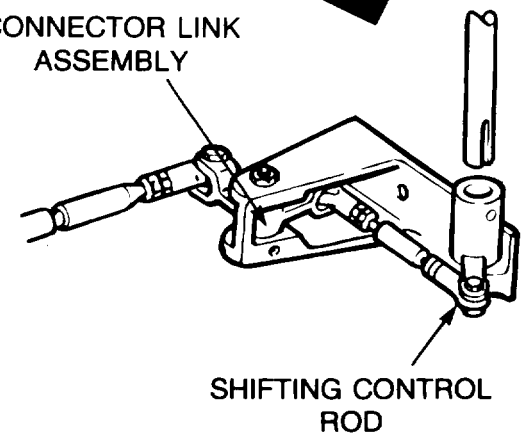
First Technician (Rear of Vehicle)

- Check connecting link assembly for obstruction.

Is connecting link assembly obstructed or binding?

FOR CLARITY
TURRET NOT SHOWN





NO

YES

13 **Remove, disassemble and inspect connecting link assembly (page 11-55).**

TA142082

Symptom-20

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

14 **Check lever and bracket assembly for binding or obstruction.**

First Technician (Rear of Vehicle)

- Connect shifting control rod to connecting link assembly (page 11-58).
- Install connecting link control box cover (page 11-59).
- Install powerplant (page 5-37).
- Disconnect shifting control rod from lever and bracket assembly (page 11-45).

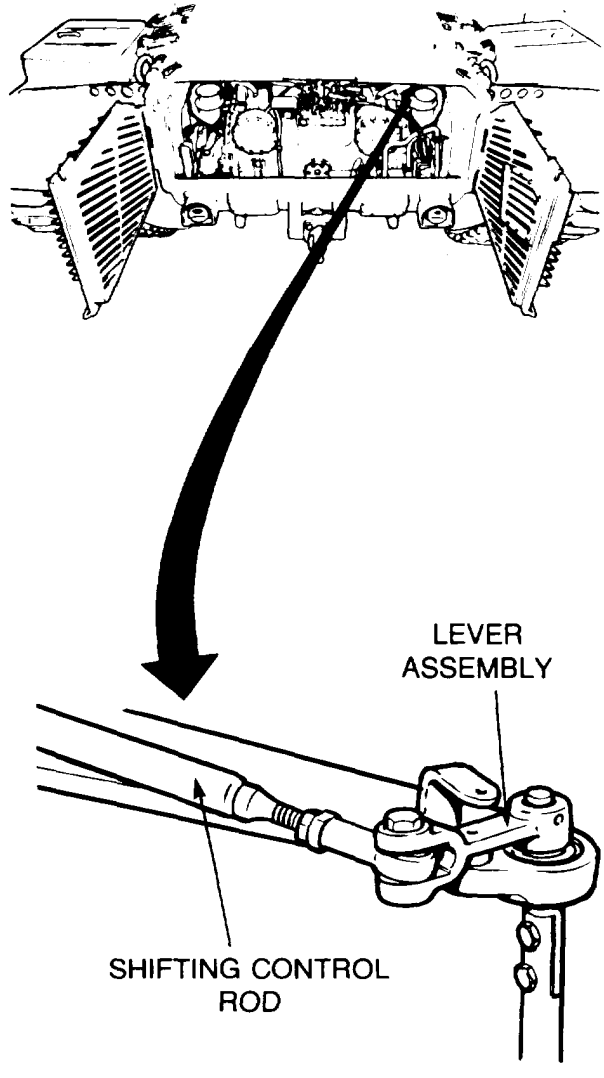
Second Technician (Driver's Station)

- Move shifting lever from "P" (park) through "R" (reverse) several times and check for binding.

First Technician (Rear of Vehicle)

- Check lever assembly for obstruction.

Is lever and bracket assembly obstructed or binding?



NO

YES

15 **Remove, disassemble and inspect lever (page 11-46) and bracket assembly (page 11-42).**

Symptom-20

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

16 **Check shifting control rod and lever assembly for binding or obstruction.**

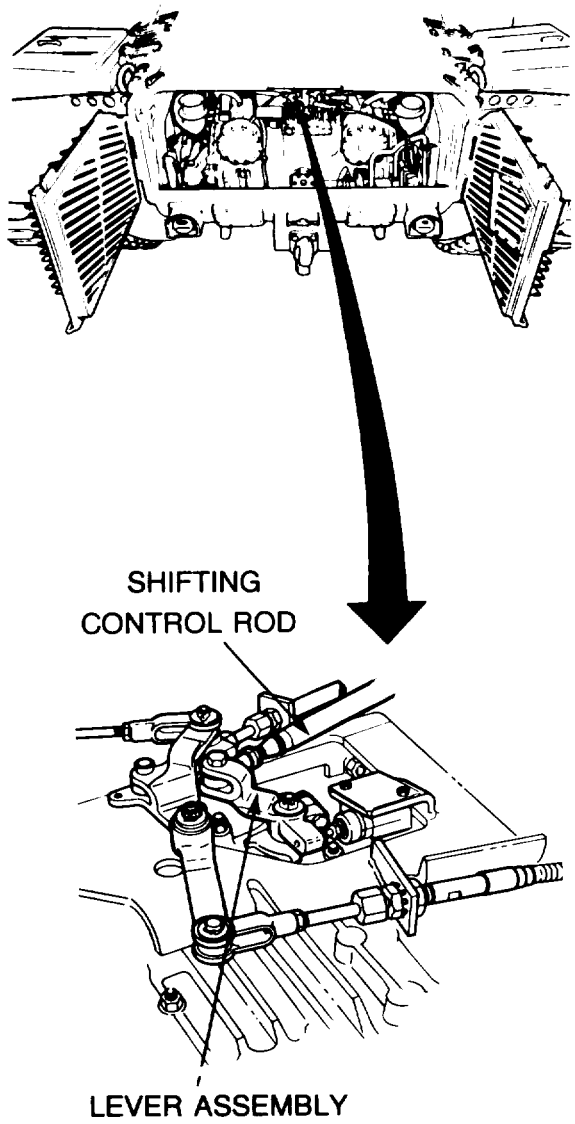
First Technician (Rear of Vehicle)

- Connect shifting control rod to lever (page 11-47) and bracket assembly (page 11-43).

Second Technician (Driver's Station)

- Move shifting lever from "P" (park) through "R" (reverse) several times.
- Check shifting control lever assembly for obstruction or binding.
- Connect parking brake control lever assembly (page 13-110).

Is shifting control lever assembly obstructed or binding?



NO

YES

17 **Remove disassemble and inspect shifting control rod lever assembly (page 11-45).**

TA142084

Symptom-20

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

18 Check brake for proper adjustment.

Both Technicians (Outside Vehicle)

- Block tracks to prevent movement of vehicle.

Both Technicians (Rear of Vehicle)

- Remove right-angle drive assembly (page 18-105).
- Remove transmission shroud (page 9-20).
- Remove lockwires and plugs from brake inspection holes located in transmission rear housing left and right side.

Second Technician (Driver's Station)

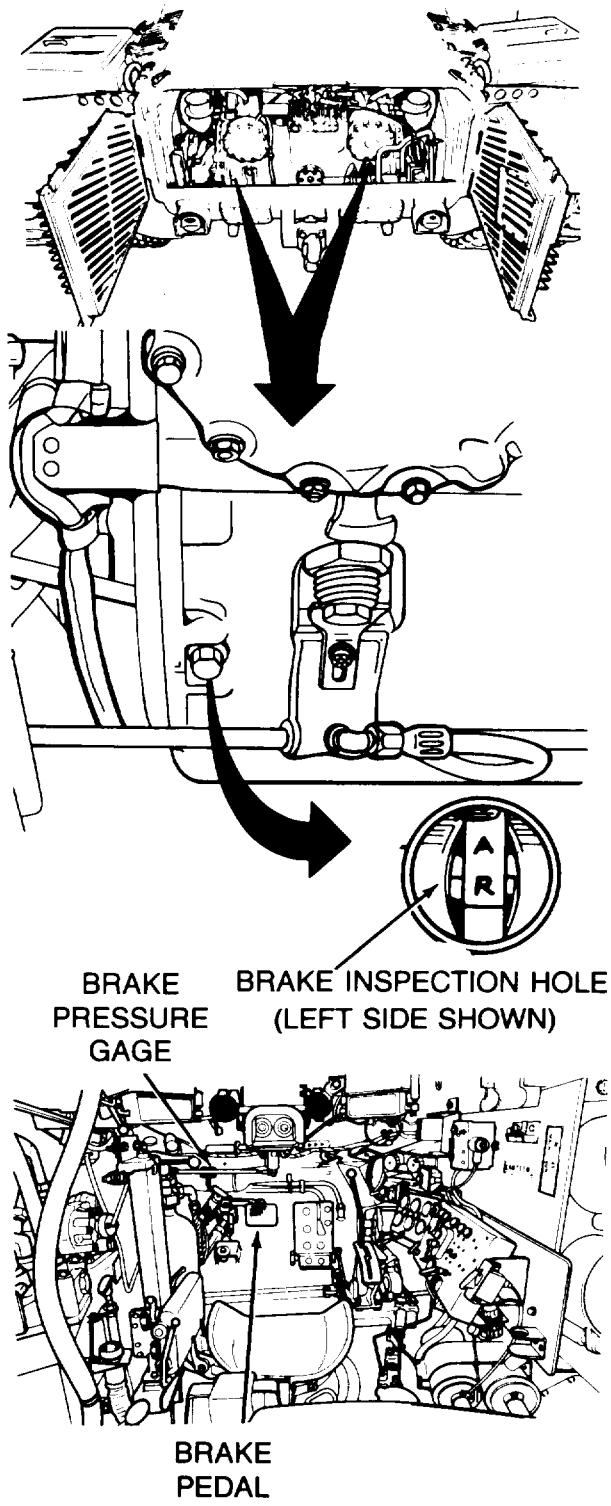
- Depress brake pedal and observe that pressure gage indicates 750 to 900 psi and keep depressed.

First Technician (Rear of Vehicle)

- Observe that line marked "A" alines with the base line chiseled on the anchor within 1/64 inch.

Second Technician (Driver's Station)

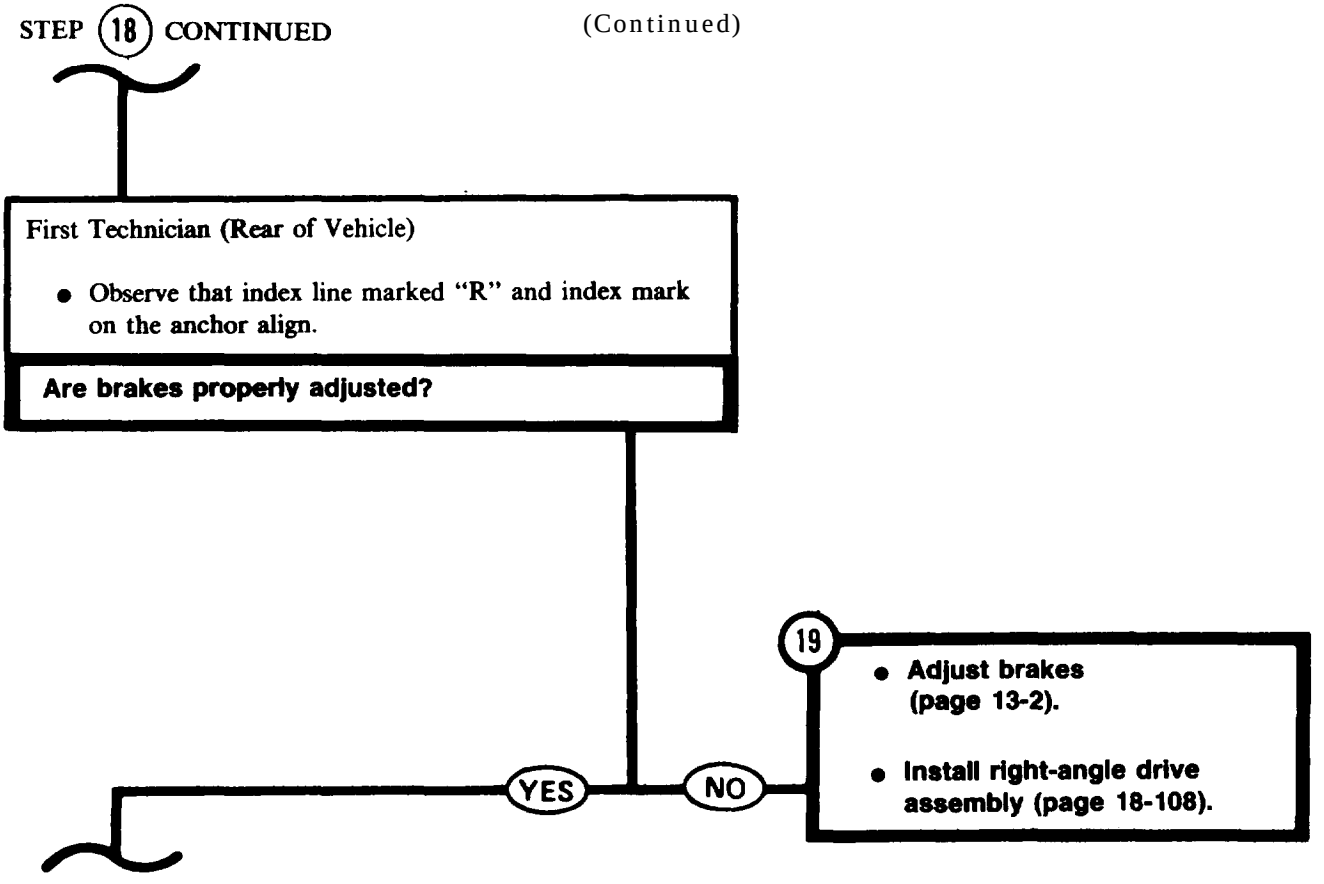
- Release brakes.



TA142085

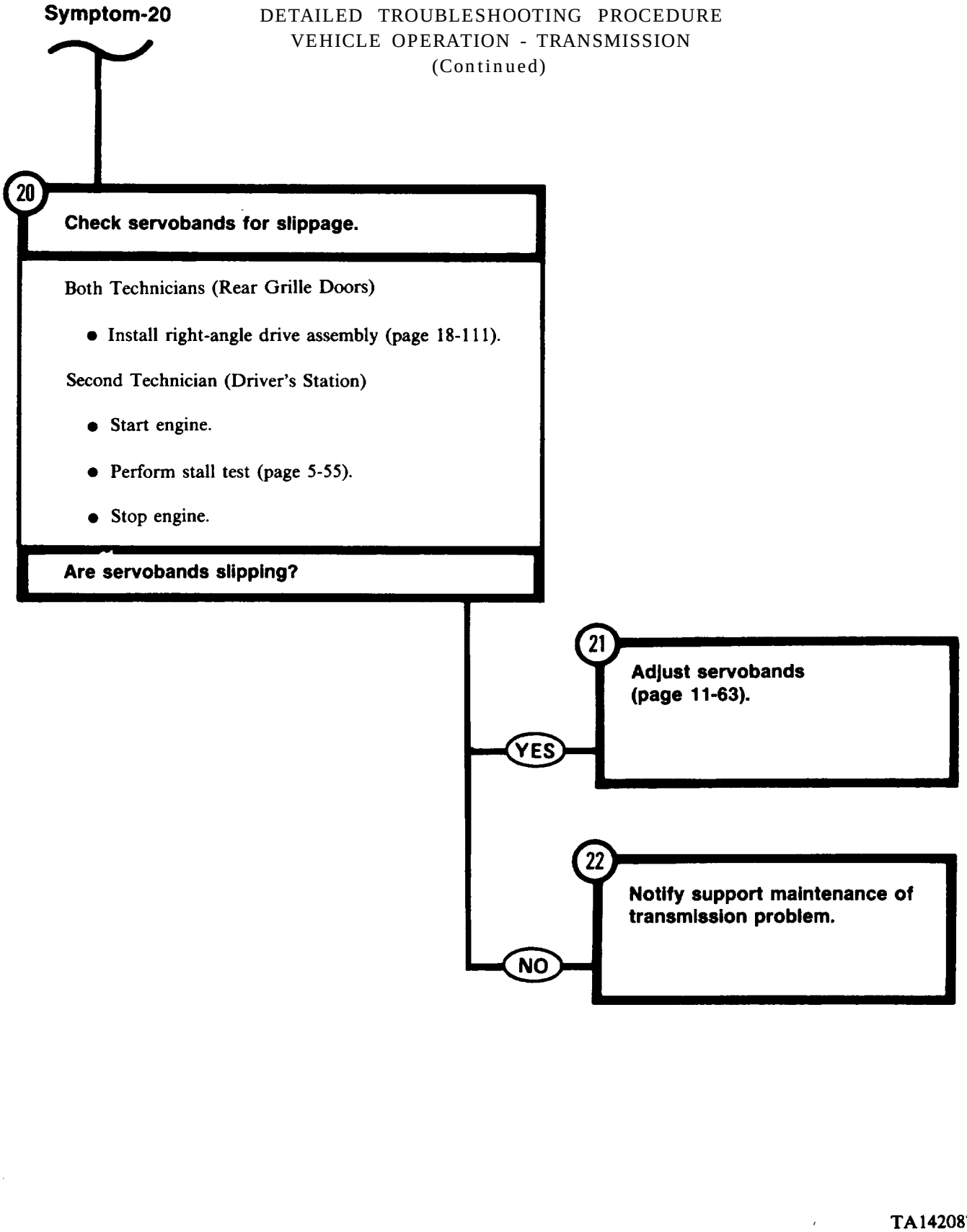
Symptom-20

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)



TA142086

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)



TA142087

Symptom-20

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

FROM STEP (2)

23 Check shifting control linkage adjustment.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

Second Technician (Driver's Station)

- Place transmission shifting control lever in "N" (neutral) position.

First Technician (Rear of Vehicle)

- Check shifting position indicator at top rear of transmission and observe that position indicator is in the forward dot, designated NEUTRAL.

Is shifting position indicator in NEUTRAL?

NO

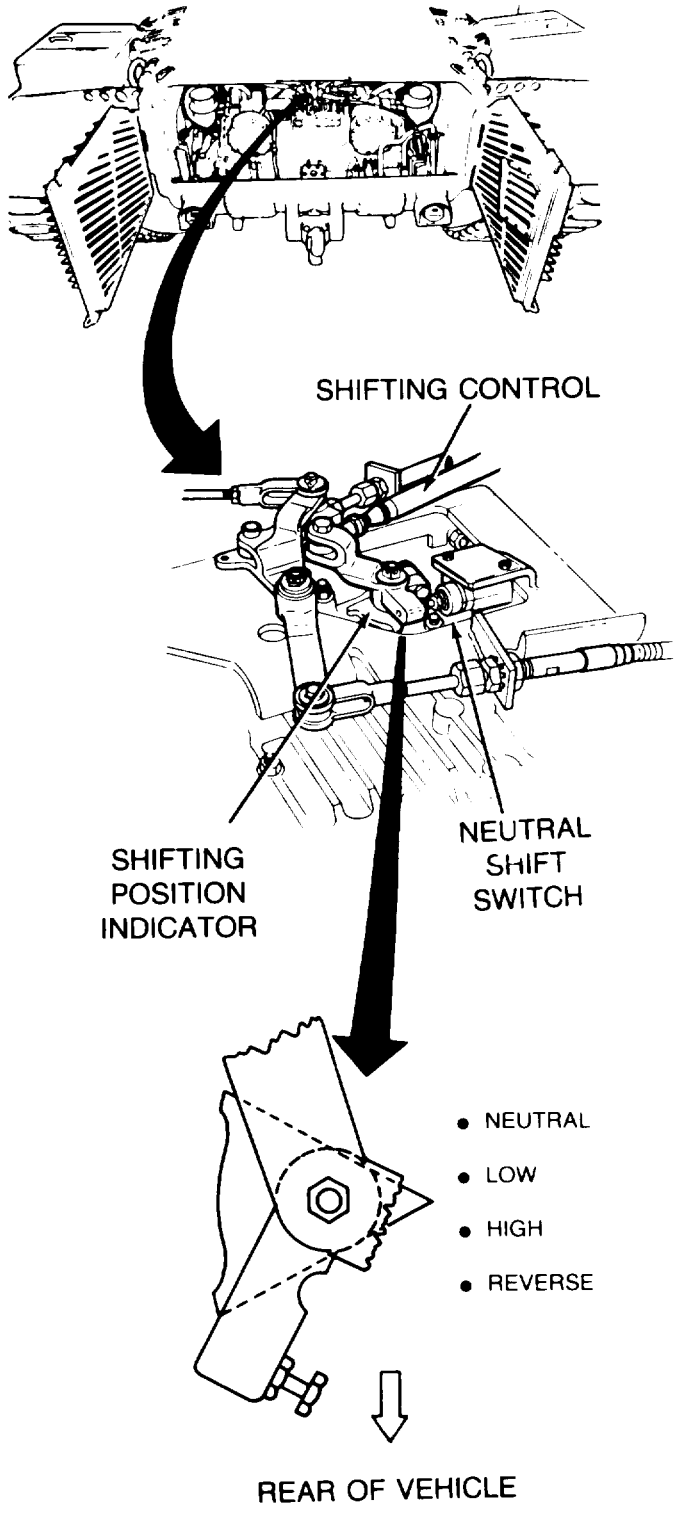
24

- **Adjust shifting control linkage (page 11-2).**
- **Install transmission shroud (page 9-23).**

YES

25

- **Check shifting control hand lever pivot base assembly for binding or obstruction.**
- **See Step (4).**



TA142088

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION

Symptom-21

TRANSMISSION OIL TEMPERATURE GAGE SHOWS HIGH TEMPERATURE (POWERPLANT WARNING LAMP ON).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check right and left outer and inner transmission oil lines for leaks.

First and Second Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

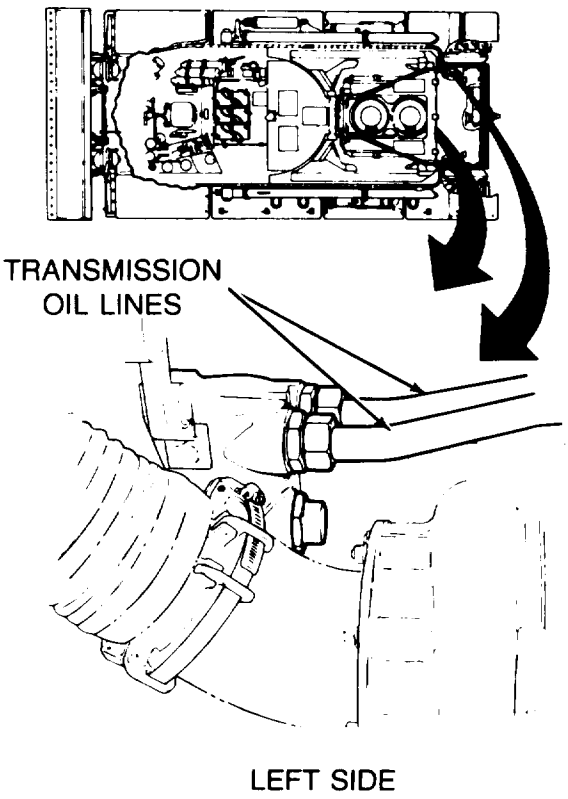
Second Technician (Driver's Station)

- Start engine.

First Technician (Rear Grille Doors)

- Visually check right and left outer and inner oil lines for leaks or damage.

Are transmission oil lines leaking or damaged?



2

- **Tighten leaking oil lines, (page 6-187).**
- **Replace damaged oil lines, (page 6-185).**
- **Install transmission shroud (page 9-23).**

YES

NO

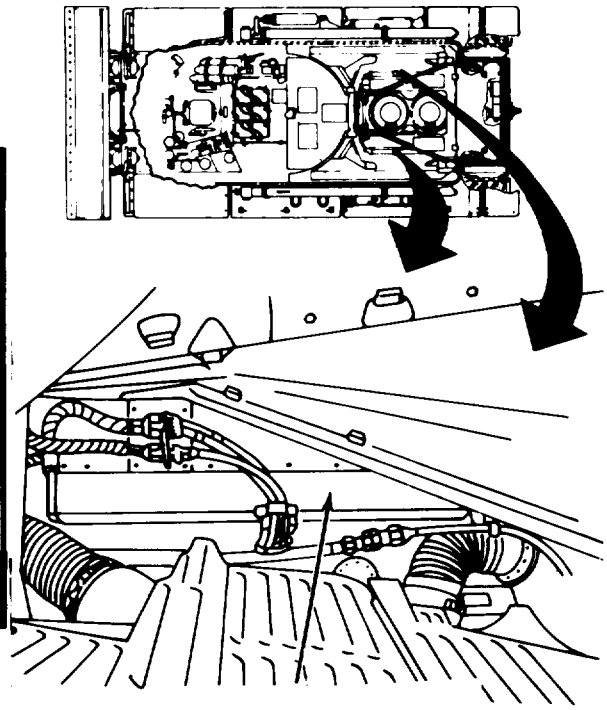
Symptom-21 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

3 **Check right and left transmission oil coolers for leaks.**

First Technician (Top Deck)

- Open left and right top deck grille doors.
- Visually check left and right transmission oil coolers for leaks.
- Stop engine.

Are transmission oil coolers leaking?



TRANSMISSION OIL COOLER

NO

YES

4 **Replace leaking oil cooler, (page 6-146).**

Symptom-21 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

5 **Check service brakes for proper adjustment.**

Both Technicians (Rear Grille Doors)

- Remove right-angle drive assembly (page 18-108).
- Remove transmission shroud (page 9-20).
- Remove plugs from both left and right brake inspection holes (page 13-2).

Second Technician (Driver's Station)

- Press brake pedal and hold when pressure of 750 to 900 psi is reached.

First Technician (Rear Grille Doors)

- Check if index line marked A (applied) aligns within 1/64 inch of index mark located on edge of brake inspection hole.

Second Technician (Driver's Station)

- Release brakes.

First Technician (Rear Grille Doors)

- Check if index line marked R (released) aligns within 1/64 inch of index mark located on edge of brake inspection hole.

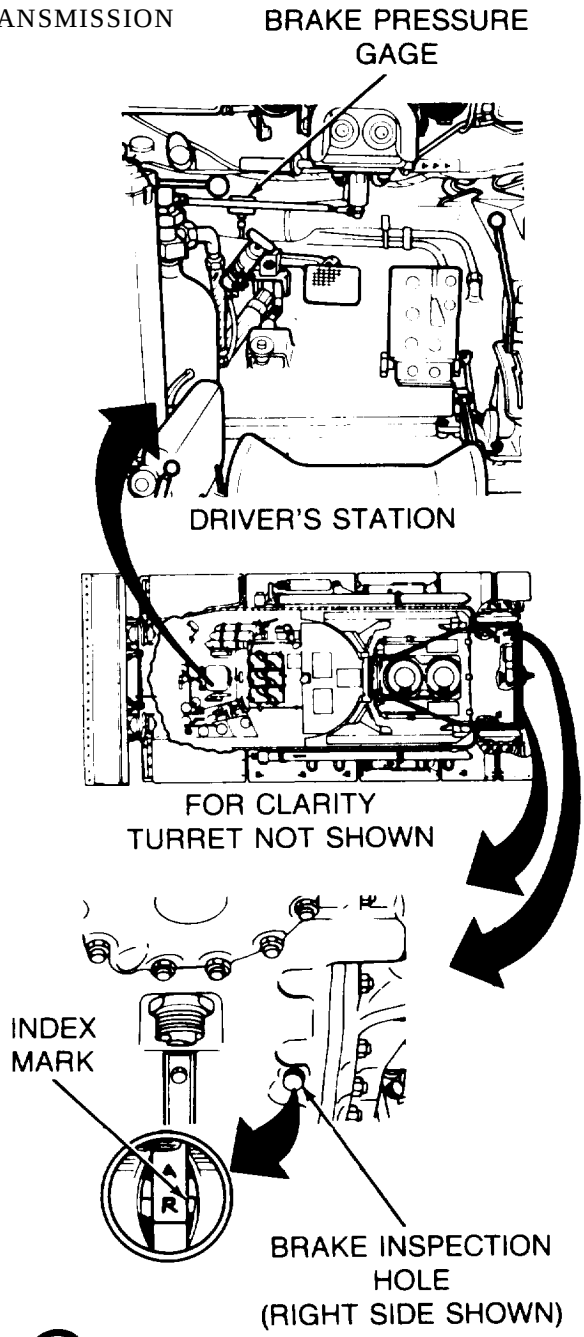
Are service brakes properly adjusted?

YES

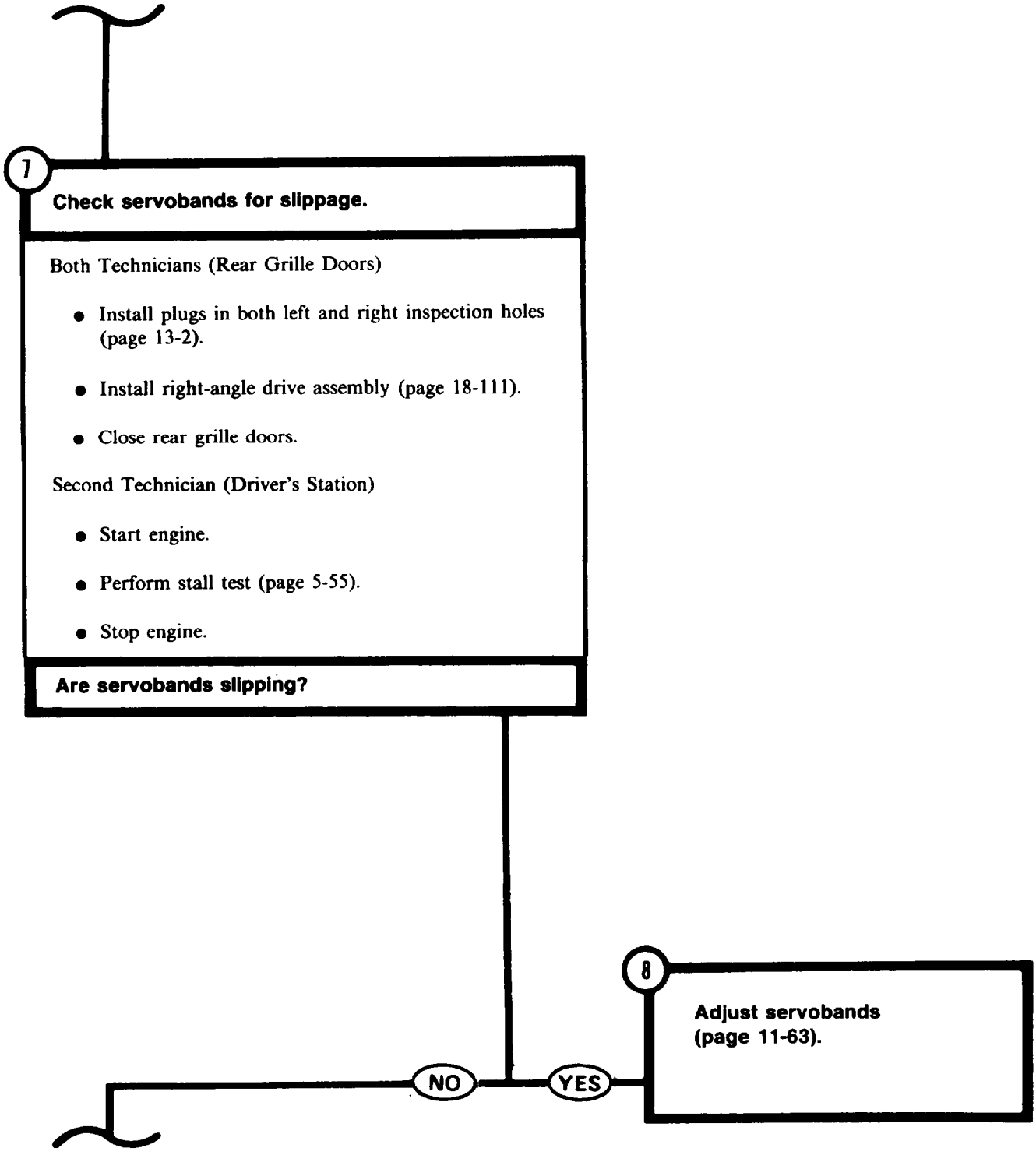
NO

6

- **Adjust service brakes (page 13-2).**
- **Install right-angle drive assembly (page 18-111).**
- **Close left and right top deck grille doors.**



Symptom-21 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)



TA142092

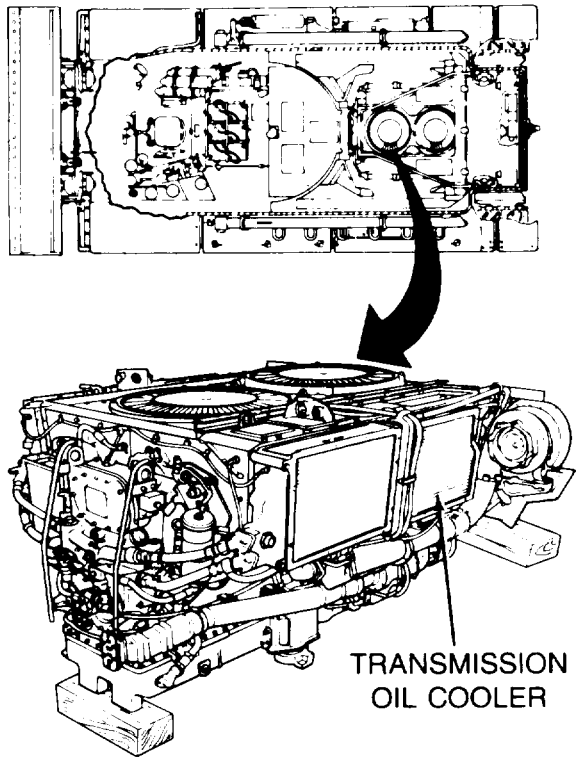
Symptom-21 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)

9 **Check transmission oil coolers for clogged cores and screens.**

Both Technicians (Outside Vehicle)

- Remove powerplant (page 5-1).
- Remove oil cooler screens (page 6-120).
- Shine light through cores and screens.
- Check for clogged or dirty condition.

Are transmission oil cooler screens and cores clean?



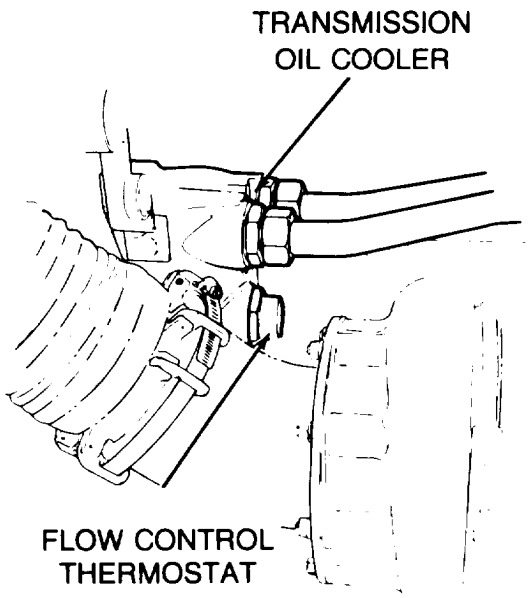
(POWERPLANT - RIGHT SIDE)

YES

NO

10 **Clean transmission oil cooler screen and cores (page 6-189).**

Symptom-21 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - TRANSMISSION
(Continued)



11 Check if transmission oil cooler flow control thermostatic bypass valves work.

Both Technicians (At Powerplant)

- Install oil cooler screens (page 6-121).
- Remove right and left transmission oil cooler flow control thermostats, right (page 6-169), left (page 6-176).
- Check both thermostats for proper operation, right (page 6-170), left (page 6-177).

Do both flow control thermostatic bypass valves work?

NO

12 Replace defective control thermostatic bypass valve, right (page 6-167), left (page 6-174).

YES

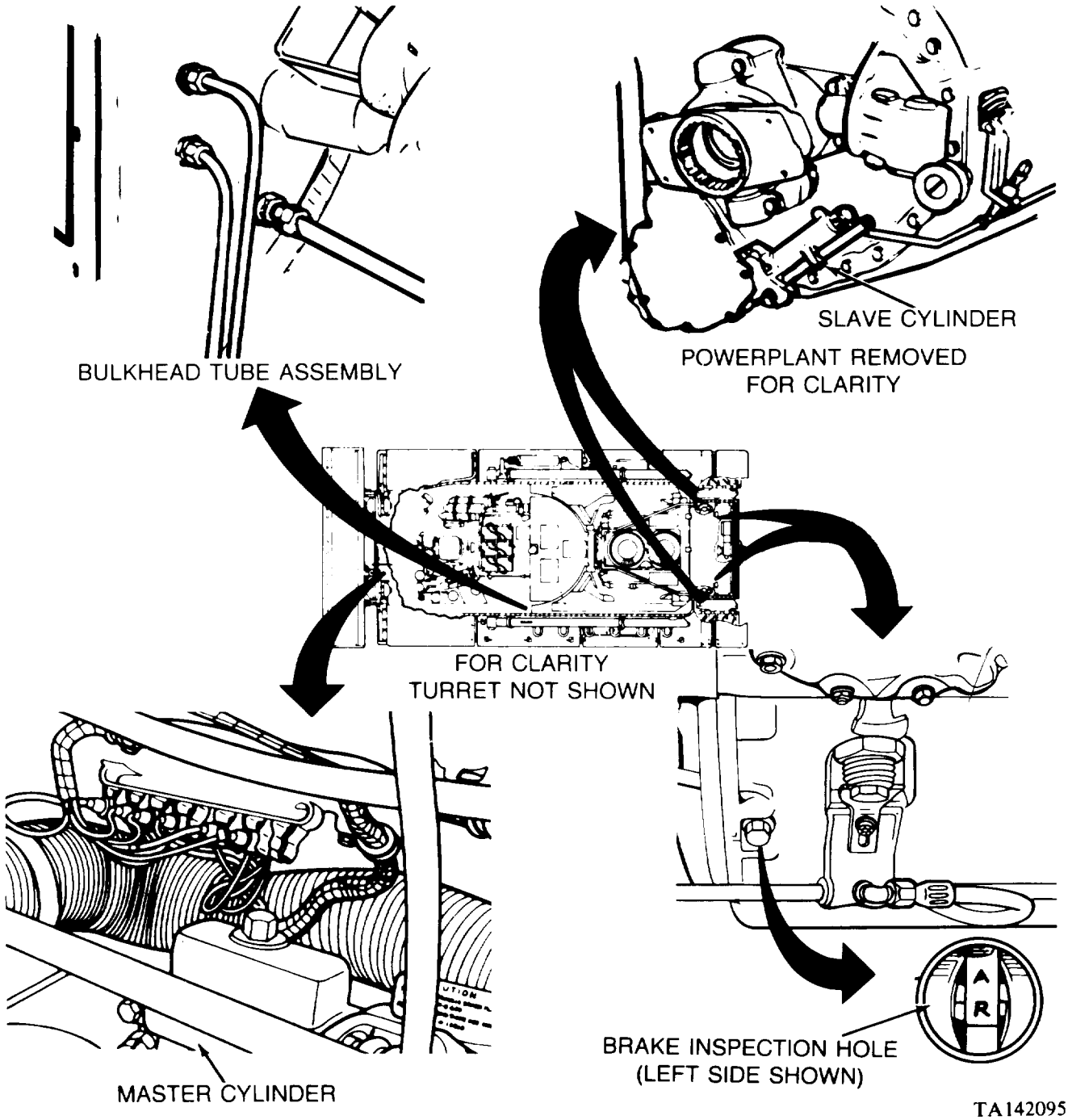
13
- **Notify support maintenance of transmission oil temperature problem.**
- **Install powerplant, (page 5-37).**

DETAILED TROUBLESHOOTING PROCEDURE

Symptom-22 VEHICLE OPERATION - BRAKES

SERVICE BRAKES WILL NOT WORK RIGHT.

LOCATOR VIEWS:



TA142095

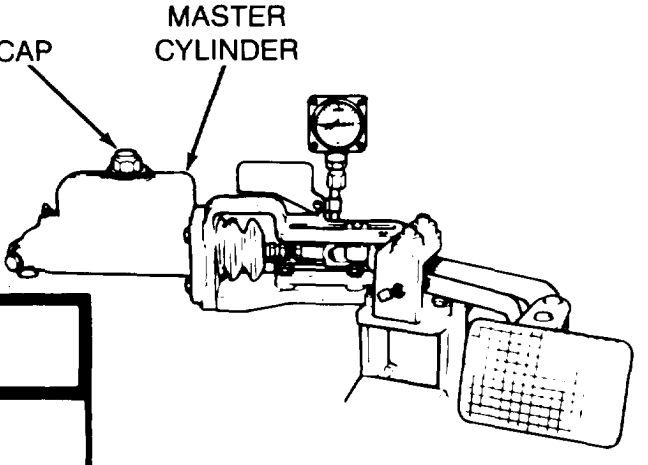
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

Symptom-22

SERVICE BRAKES WILL NOT WORK RIGHT.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



1 Check fluid level in master cylinder.

Both Technicians (Outside Vehicle)

- Block tracks front and rear to prevent movement of vehicle.

First Technician (Driver's Station)

- Remove master cylinder cap.
- Check fluid in master cylinder for proper level. Hydraulic fluid level should be within 1/4 inch from top of master cylinder.

Is fluid level within 1/4 inch from top of master cylinder?

YES

NO

2

- **Service master cylinder (LO9-2350-222-12).**
- **Check master cylinder for leaks.**
- **See Step (10)**

TA142096

Symptom-22

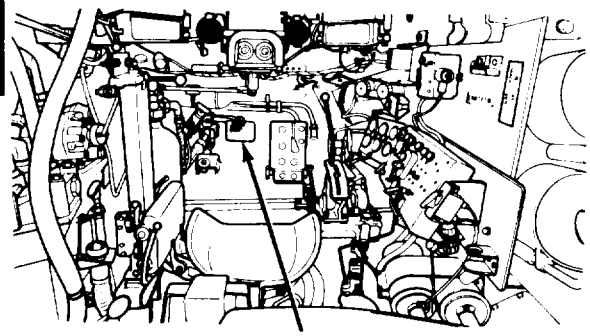
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

3 **Check for air in brake system.**

First Technician (Driver's Station)

- Install master cylinder cap.
- Place shift control lever in "N" (neutral) position.
- Press brake pedal several times and hold.
- Check that brake pedal feels firm - not soft or "spongy"

Does brake pedal feel firm?



DRIVER'S STATION

YES

NO

4 **Bleed brake system (page 13-12).**

TA142097

Symptom-22

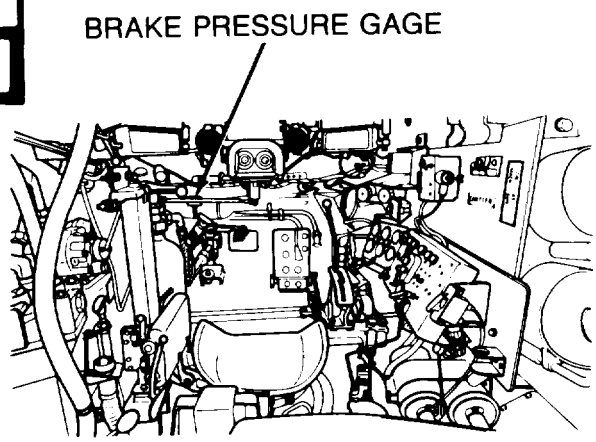
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

5 **Check brake pedal linkage for proper adjustment.**

First Technician (Driver's Station)

- Press brake pedal several times and observe that gage reads 750 psi to 900 psi.

Is brake pedal linkage properly adjusted?



YES

NO

6 **Adjust brake pedal linkage (page 13-10).**

TA142098

Symptom-22

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

7 Check service brakes for proper adjustment.

Both Technicians (Rear Grille Doors)

- Remove right-angle drive assembly (page 18-105).
- Remove transmission shroud (page 9-20).
- Remove lockwires and plugs from both right and left brake inspection holes.

First Technician (Driver's Station)

- Press brake pedal and observe pressure gage indicates 750-900 psi and keep pressed.

Second Technician (Rear Grille Doors)

- Observe that index line marked A alines with the baseline chiseled on the anchor within 1/64 inch.

First Technician (Driver's Station)

- Release brakes.

Second Technician (Rear Grille Doors)

- Observe that index line marked R alines with the base line chiseled on the anchor within 1/64 inch (.04 cm).

Are service brakes properly adjusted?

NO

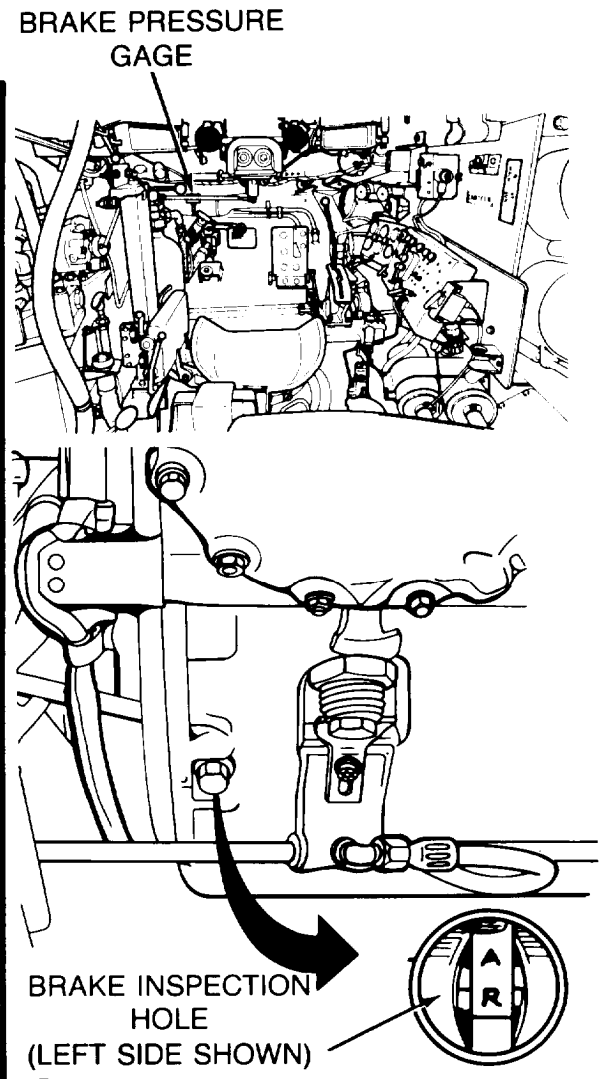
8

- **Adjust service brakes (page 13-2).**
- **Install right-angle drive assembly (page 18-108).**

YES

9

- **Install right-angle drive assembly (page 18-108).**
- **Install plugs and lock wires in both right and left brake inspection holes.**
- **Install transmission shroud (page 9-23).**
- **Notify support maintenance of service brake problem.**



TA142099

Symptom-22 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

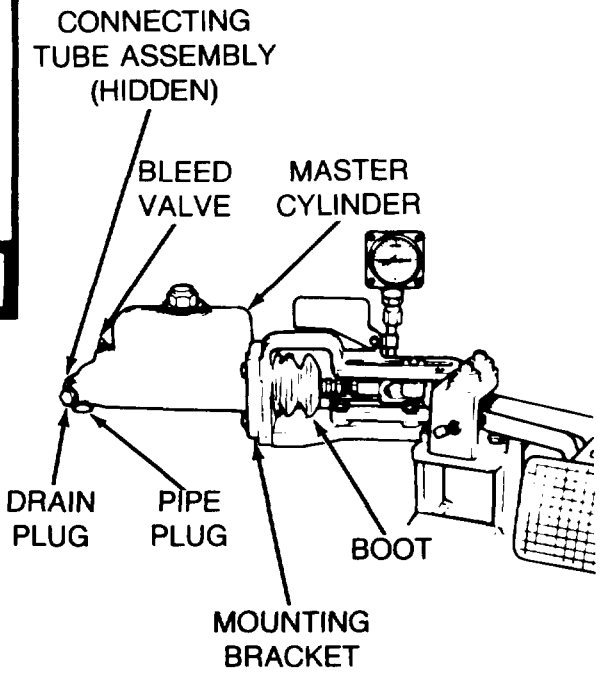
FROM STEP 2

10 Check master cylinder for leaks.

First Technician (Driver's Station)

- Apply 750-900 psi pressure to brake system and check indicator needle for loss of pressure.
- Check master cylinder assembly for leaks at the mounting bracket boot, drain plug, bleeder valve, pipe plug and connecting tube assembly.

Is master cylinder free of leaks?



YES

NO

11 Replace leaking master cylinder (page 13-40).

TA142100

Symptom-22 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

12 Check brake hydraulic lines from master cylinder along bulkhead to back of transmission for leaks or damage.

First Technician (Driver's Station)

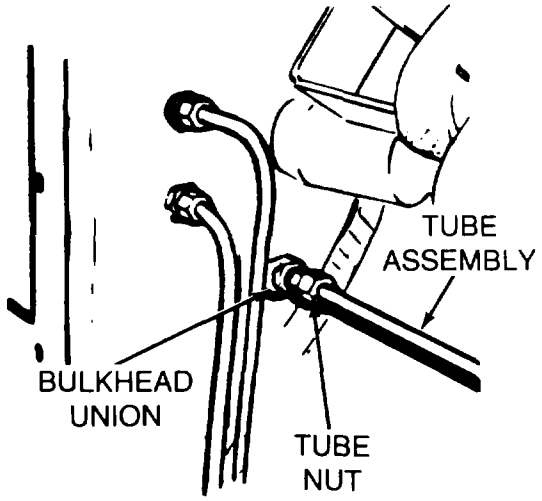
- Visually check brake hydraulic lines and fittings from master cylinder along bulkhead for loose connections or damage.

Second Technician (Turret)

- Traverse turret to gain access to hydraulic tube assembly at left bulkhead (TM 9-2350-222-10).
- Visually check hydraulic lines and fittings from bulkhead to engine compartment for leaks or damage.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).
- Remove right-angle drive assembly (page 18-108).
- Visually check hydraulic lines and fittings at rear of transmission for leaks or damage.



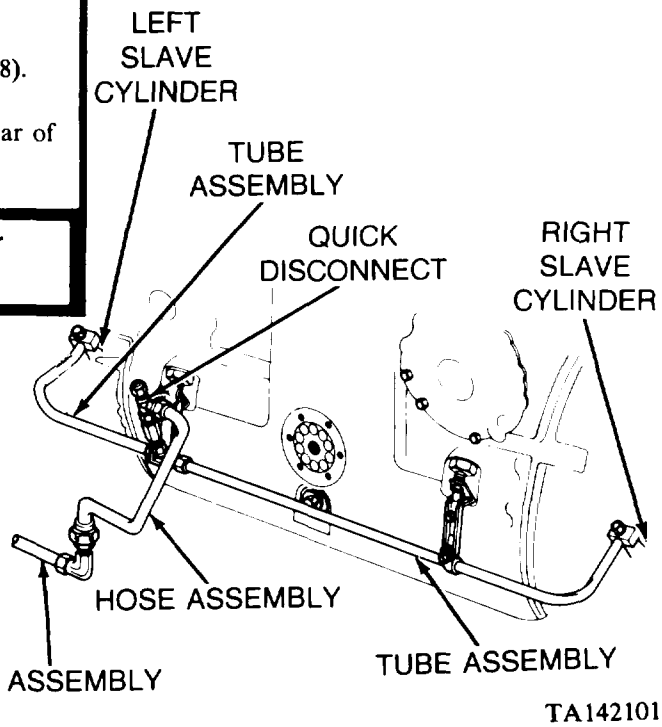
Are hydraulic lines and fittings free of leaks or damage?

13

- **Replace leaking or damaged hydraulic lines and fittings (page 13-47).**
- **Install right-angle drive assembly (page 18-111).**

NO

YES



TA142101

Symptom-22

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

14 **Check left and right slave cylinders and lower hydraulic lines for leaks or damage.**

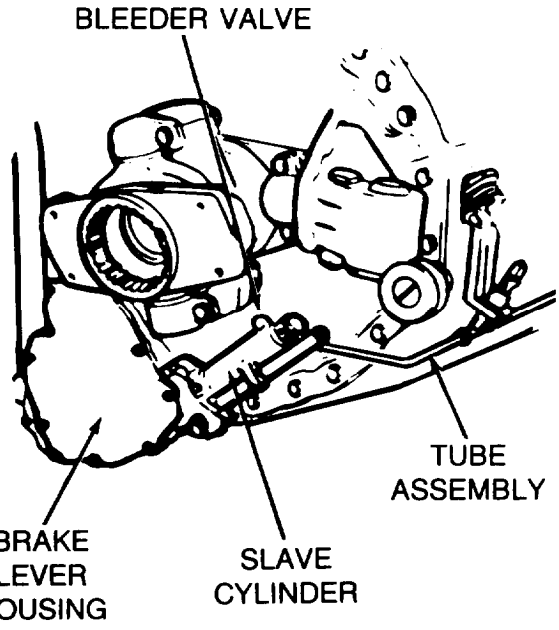
First Technician (Rear of Vehicle)

- Remove powerplant (page 5-1).

First Technician (Powerplant)

- Check left and right slave cylinders for leaks at bleeder valve, plug assembly and connecting tube assemblies.
- Remove drain plug from bottom of brake lever housing and check for evidence of brake fluid, indicating leaking cylinder at preformed packing.

Are both slave cylinders and lower lines free of leaks or damage?



YES

NO

15 **Replace leaking slave cylinder and lower hydraulic lines (page 13-64).**

TA142102

Symptom-22

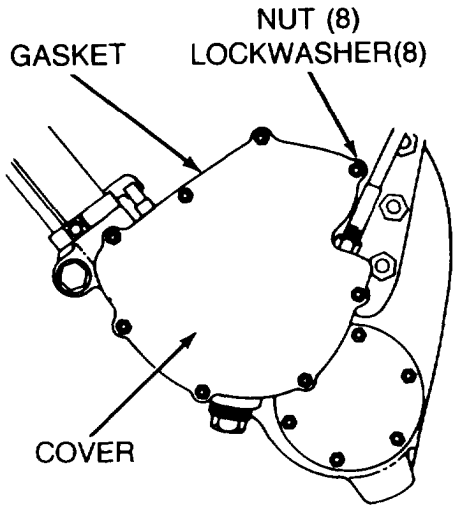
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

16 Check for movement of brake application lever and damaged parts.

First Technician (Powerplant)

- Remove brake control housing cover (page 13-70).
- Visually inspect brake application lever for broken and damaged parts.
- Using a pry bar, move brake application lever counterclockwise and check if brake apply shaft moves.

Is brake application lever broken or damaged?

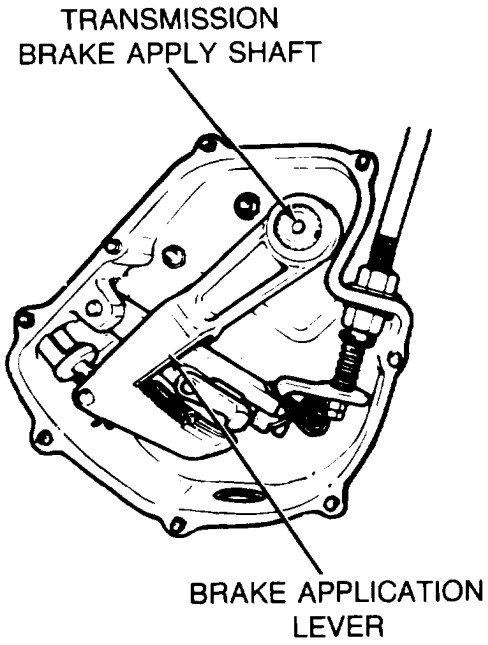


YES

17 Repair brake control housing (page 13-70).

NO

18
- **Notify support maintenance of service brake problem.**
- **Install brake control housing covers (page 13-76).**



TA142103

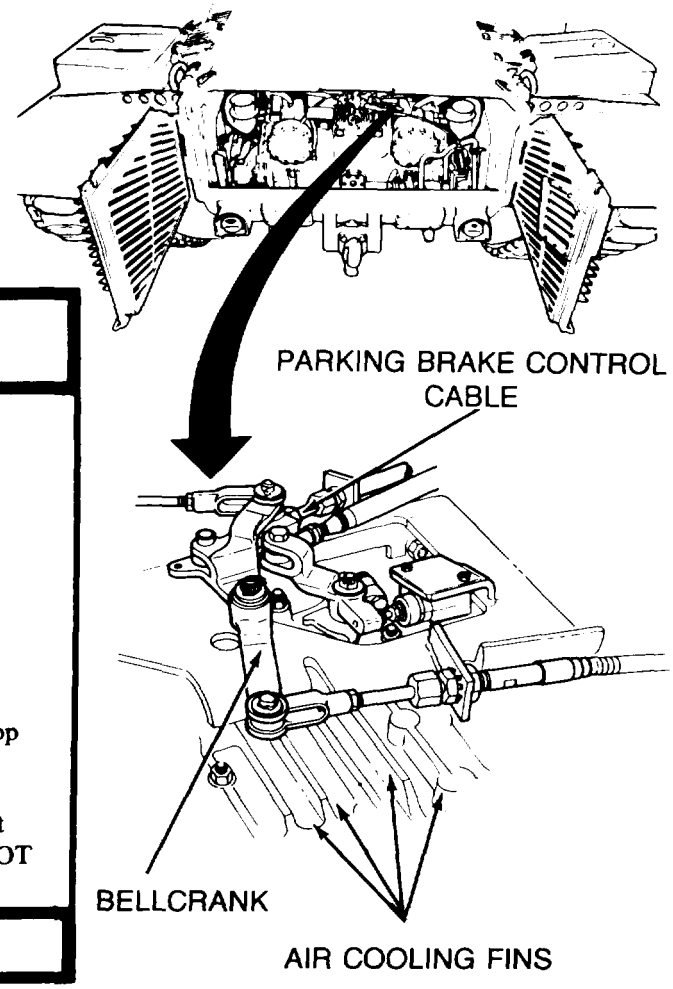
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES

Symptom-23

PARKING BRAKE WILL NOT RELEASE.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



1 Check if parking brakes will release by using prybar on bellcrank.

Both Technicians (Outside Vehicle)

- Block tracks to prevent movement of vehicle.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

First Technician (Rear Grille Doors)

- Disconnect parking brake cable at bellcrank on top of transmission (page 13-99).
- Attempt to release brakes by carefully using short prybar on the bellcrank at air cooling fin (DO NOT USE EXCESSIVE FORCE).

Did parking brakes release?

NO

YES

2

- **Malfunction corrected.**
- **Connect parking brake cable (page 13-101).**
- **Adjust parking brake cable (page 13-20).**

TA142104

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

Symptom-23

3 Check service brakes for proper adjustment.

Both Technicians (Rear Grille Doors)

- Remove right-angle drive assembly (page 18-108).
- Remove lockwires and plugs (one located on each side of transmission rear housing) from brake inspection holes.

Second Technician (Driver's Station)

- Press brake pedal and hold when pressure of 750 to 900 psi is reached.

First Technician (Rear Grille Doors)

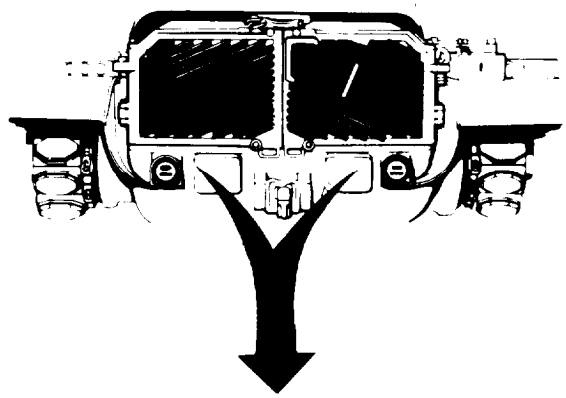
- Check if index line marked A (applied) aligns with index mark located on edge of brake inspection hole.

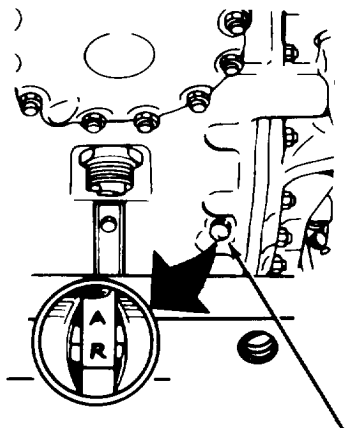
Second Technician (Driver's Station)

- Release brakes.

First Technician (Rear Grille Doors)

- Check if index line marked R (released) aligns with index mark located on edge of brake inspection hole.





BRAKE INSPECTION HOLE
(RIGHT SIDE SHOWN)

Are service brakes properly adjusted?

YES

NO

4

- **Adust service brakes (page 13-2).**
- **Connect parking brake cable (page 13-110).**
- **Install right-angle drive assembly (page 18-111).**

TA142105

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

Symptom-23

5 **Check if parking brake locking pawls are in the released position.**

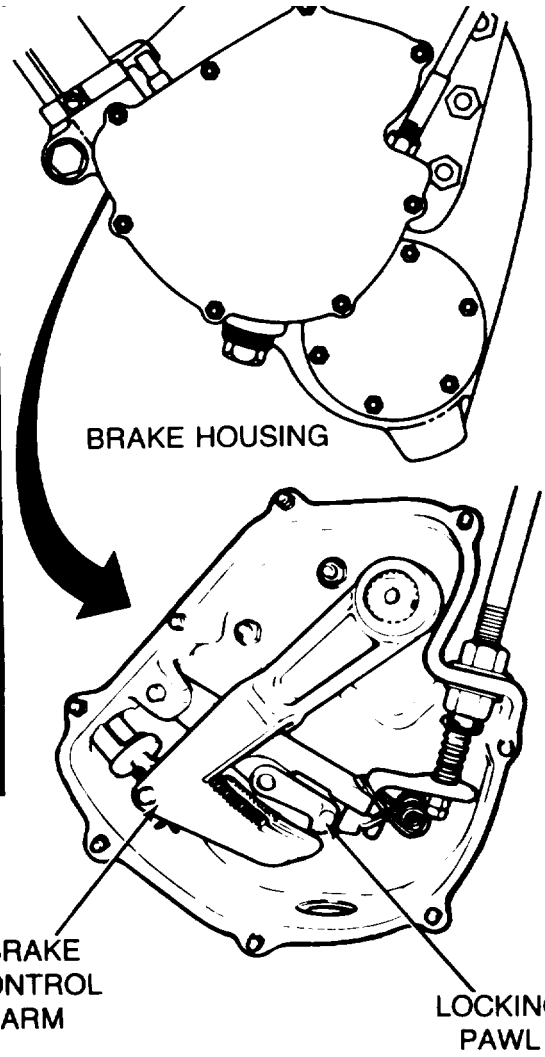
First Technician (Outside Vehicle)

- Remove powerplant (page 5-1).

First Technician (Powerplant)

- Remove left and right brake housing covers from side of transmission (page 13-70).
- Check if locking pawls are released from left side and right side brake control arms.

Are both locking pawls released from brake control arms?



YES → **6** **See Symptom 22: SERVICE BRAKES WILL NOT WORK RIGHT.**

NO → **7** **Repair parking brakes housing assembly (page 13-70).**

TA142106

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES

Symptom-24

PARKING BRAKE CANNOT BE APPLIED.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check service brake system pressure.

Second Technician (Driver's Station)

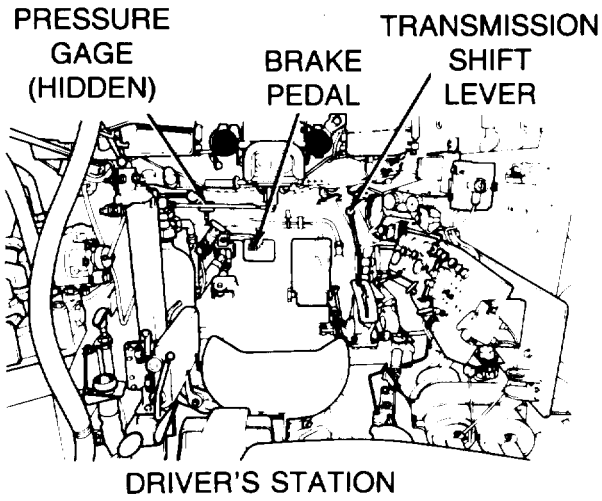
- Move transmission shift lever to "P" (park) position.
- Press brake pedal and observe pressure gage reading of 750 to 900 psi.

Is brake system pressure 750 to 900 psi?

2 See Symptom 22: SERVICE BRAKES WILL NOT WORK RIGHT.

NO

YES



TA142107

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

Symptom-24

3 **Check shifting control hand lever base assembly for damage or improper operation.**

Second Technician (Driver's Station)

- Move transmission shift lever to the left and right from "P" (park) to "N" (neutral) position.
- Check parking brake cable and linkage for disconnects or damage.

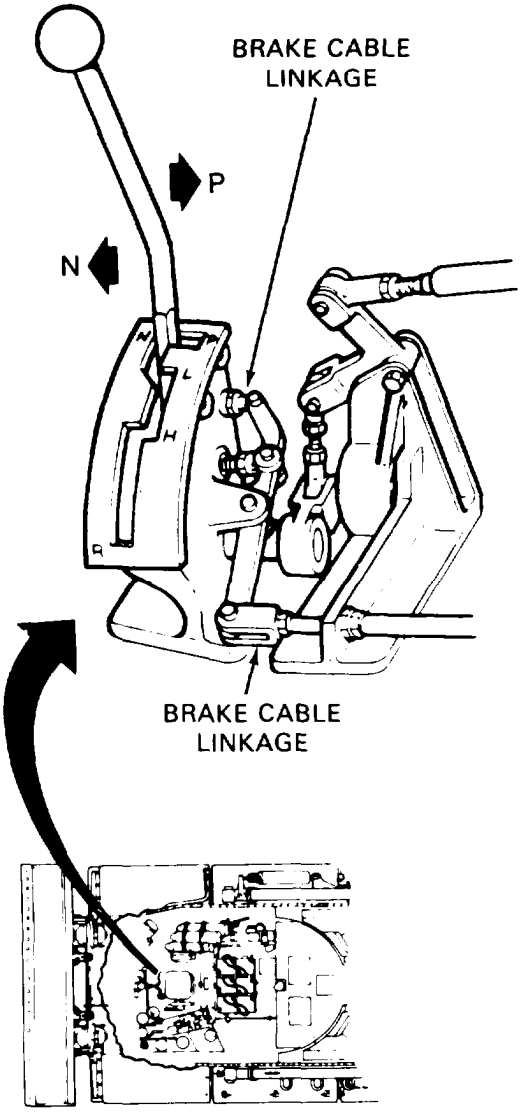
Is parking brake cable and linkage disconnected or damaged?

4 **Connect disconnected linkage or brake control cable. If not disconnected, remove and inspect shifting control hand lever base assembly (page 13-110) and replace damaged parts (page 13-110).**

YES

4.1
- **If vehicle has one piece brake control cable, see Step 5.**
- **If vehicle has two piece brake control cable, see Step 6.2.**

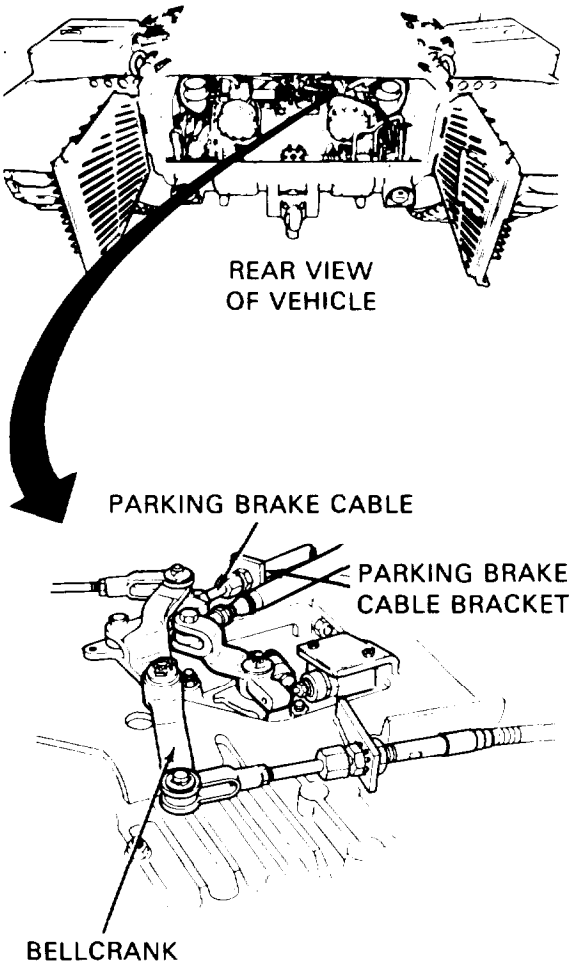
NO



FOR CLARITY
TURRET NOT SHOWN

TA253105

Symptom-24 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)



5 **Check for smooth movement of parking brake control cable assembly in driver's station.**

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).
- Remove parking brake control cable assembly from bellcrank assembly (page 13-85).
- Remove parking brake cable bracket from transmission.

Second Technician (Driver's Station)

- Move shift lever from the "N" (neutral) to "P" (park) positions several times.

First Technician (Rear of Vehicle)

- Check movement of parking brake control assembly at disconnected bellcrank while transmission shift lever is being operated.

Does parking brake cable control assembly operate smoothly?

NO

6 **Remove and inspect parking brake control assembly, remove cause of binding (rust or burrs), or replace damaged parts (page 13-84).**

YES

6.1
- **Check bellcrank assembly for proper operation.**
- **See Step 7.**

TA253106

Symptom-24

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

6.2 Check for smooth movement of parking brake control cable assembly at quick-disconnect.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).
- Disconnect parking brake cable quick-disconnect.

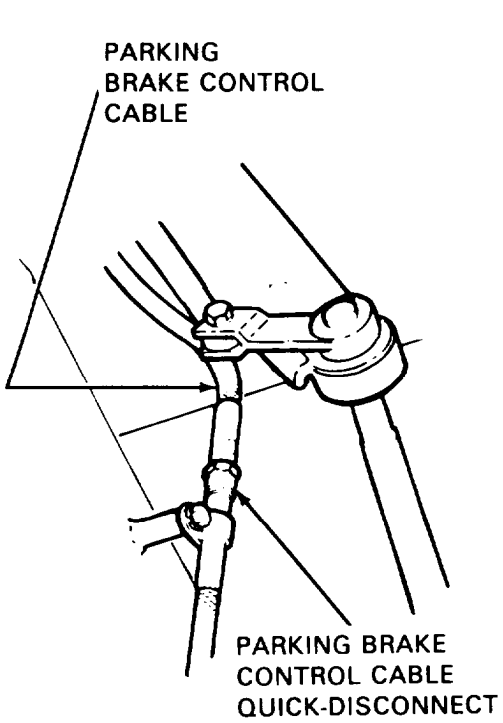
Second Technician (Driver's Station)

- Move shift lever from neutral (N) to park (P) positions several times.

First Technician (Rear of Vehicle)

Check that quick-disconnect is not damaged and that parking cable moves freely at quick-disconnect while transmission shift lever is being operated.

Is quick-disconnect free of damage and does cable move smoothly without binding?



YES

NO

6.3 Remove and inspect parking brake control assembly (page 13-84). Remove cause of binding (rust or burrs) or replace damaged parts.

TA253107

Symptom-24 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

6.4 Check for smooth movement of parking brake intermediate cable assembly at bellcrank.

First Technician (Rear Grille Doors)

- Connect parking brake cable quick-disconnect.
- Remove parking brake intermediate cable from bellcrank assembly (page 13-98.1).
- Remove parking brake cable bracket from transmission (page 13-98.1).

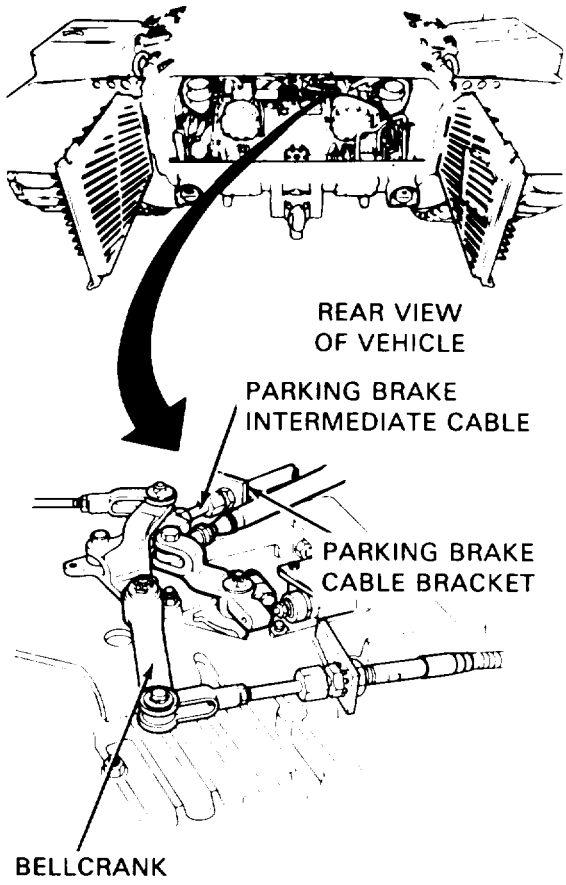
Section Technician (Driver's Compartment)

- Move shift lever from the "N" (neutral) to "P" (park) positions several times.

First Technician (Rear of Vehicle)

- Check movement of parking brake intermediate cable at disconnected bellcrank while transmission shift lever is being operated.

Does parking brake intermediate cable operate smoothly?



NO

6.5 Remove and inspect intermediate cable (page 13-98.1). Remove cause of binding (rust or burrs), or replace damaged parts.

YES

6.6
- **Check bell crank assembly for proper operation.**
- **See Step 7.**

TA253108

Symptom-24

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

FROM STEP

6.1 OR 6.6

7 Check bellcrank assembly for proper operation.

First Technician (Rear of Vehicle)

- Remove both right and left parking brake control assemblies in engine compartment from bellcrank (page 13-85).
- Install parking brake control assembly on bellcrank (page 13-91).
- Install parking brake cable braket to transmission.

Second Technician (Driver's Station)

- Move shift lever from "N" (neutral) to "P" (park) positions several times.

First Technician (Rear of Vehicle)

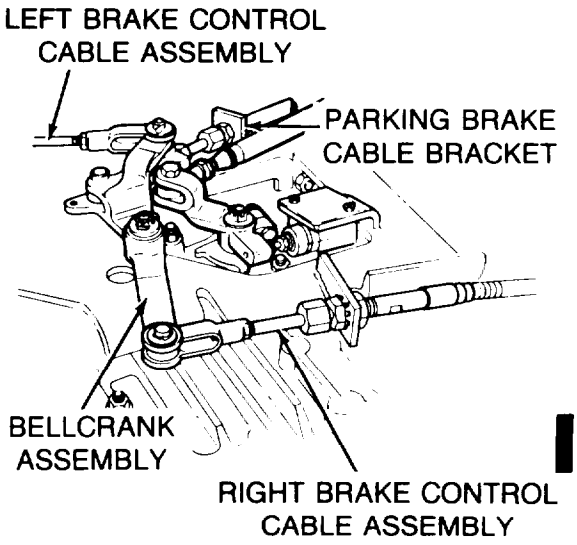
- Check movement of bellcrank assembly while shift lever is being operated.

Does bellcrank assembly operate smoothly?

YES

NO

8 Remove and inspect bellcrank assembly, remove cause of binding (rust or burrs) or replace damaged parts (page 13-99).



TA253109

Symptom-24

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

9 **Check for smooth movement of parking brake cable assembly inside right brake housing.**

Both Technicians (Outside Vehicle)

- Remove powerplant (page 5-1)

First Technician (Right Side of Transmission)

- Remove right side brake housing cover (page 13-70).

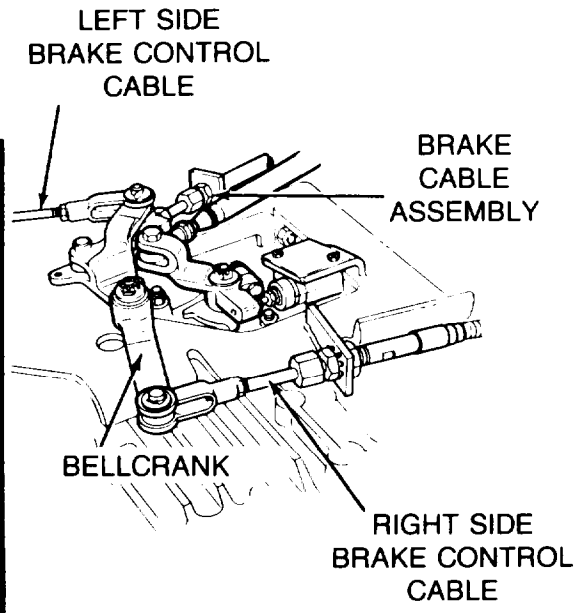
Second Technician (Top of Transmission)

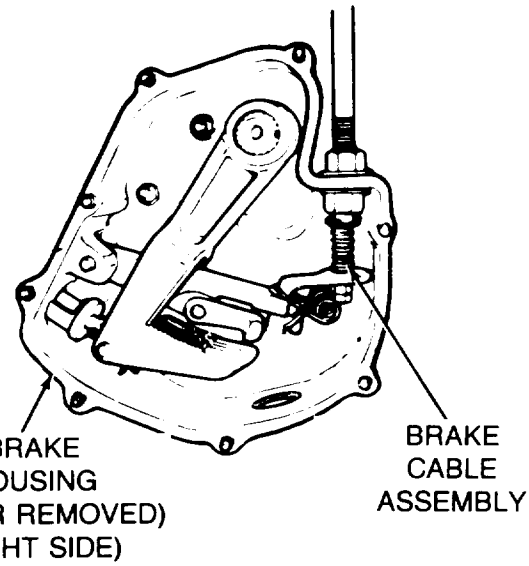
- Connect right side brake control cable to bellcrank (page 13-102, steps 10 and 11).
- Using small pry bar, move bellcrank to the right and then to the left.

First Technician (Right Side of Transmission)

- Observe movement of right parking brake control cable assembly while bellcrank is being moved right and left.

Does parking brake cable assembly move smoothly?





YES

NO

10 **Replace defective parking brake cable assembly from bellcrank to brake housing (page 13-84).**

TA142111

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

Symptom-24

11 Check for smooth movement of parking brake cable assembly inside left brake housing.

First Technician (Left Side of Transmission)

- Remove left side brake housing cover (page 13-70).

Second Technician (Top of Transmission)

- Connect left side brake control cable to bellcrank (page 13-87, steps 15 and 16).
- Using small pry bar, move bellcrank to the left and then to the right.

First Technician (Left Side of Transmission)

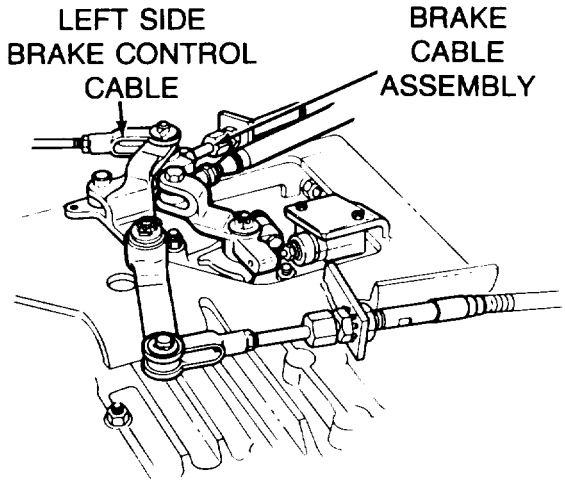
- Observe movement of left, parking brake control cable assembly while bellcrank is being moved left and right.

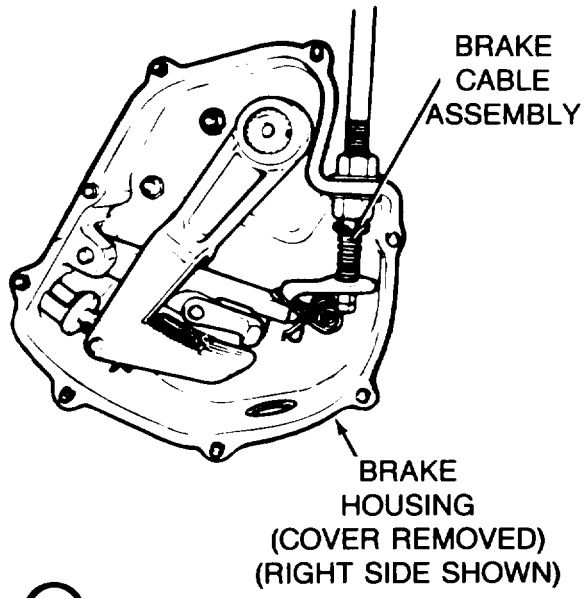
Does parking brake cable assembly move smoothly?

YES

NO

12 Replace defective parking brake cable assembly from bellcrank to brake housing (page 13-84).





TA142112

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - BRAKES
(Continued)

Symptom-24

13 Check brake control arm and locking pawl for proper operation.

First Technician (Sides of Transmission)

- Using brake application tools, set left and right brakes in applied position.

Second Technician (Top of Transmission)

- Using pry bar, move bellcrank.

First Technician (Sides of Transmission)

- Check that left and right locking pawl engages associated brake control arm.

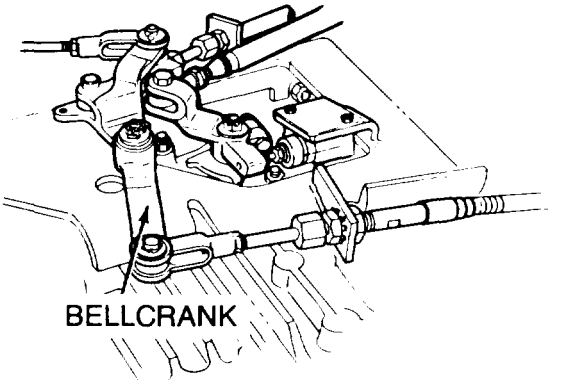
Do locking pawls engage brake control arms?

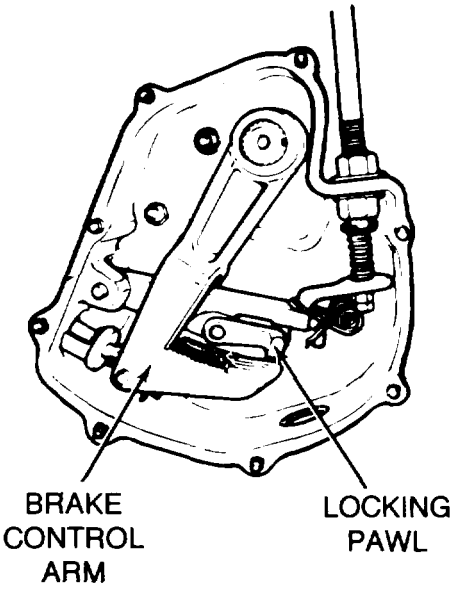
14 Repair brake control housing (page 13-70).

NO

15 Notify support maintenance of brake problem.

YES





(RIGHT SIDE SHOWN)

TA142113

Symptom-25 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING

VEHICLE WILL NOT STEER PROPERLY.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check steering control linkage for binding.

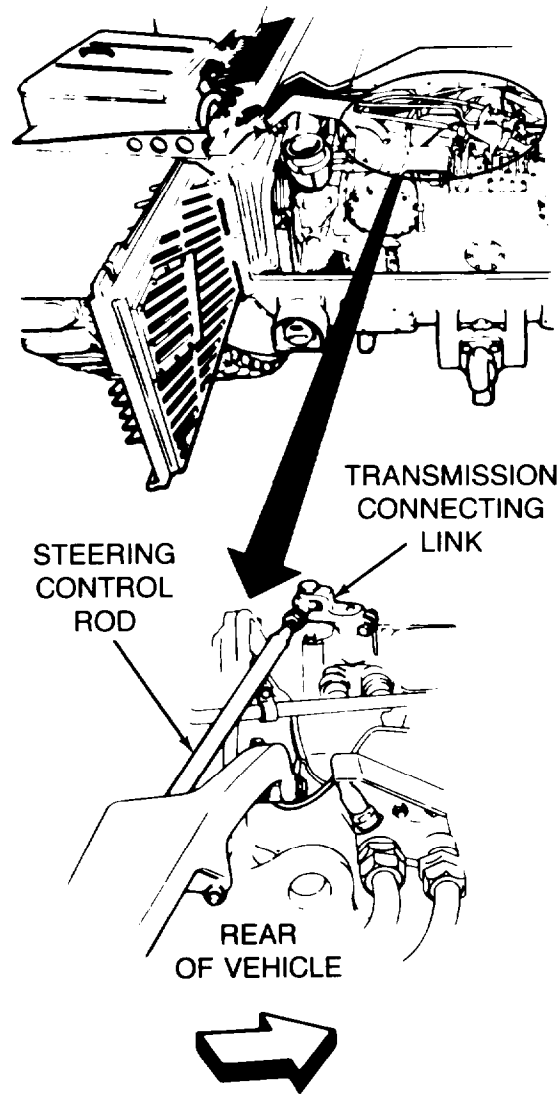
Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).
- Disconnect steering control rod from transmission connecting link (page 15-32).

Second Technician (Driver's Station)

- Move steering control handle right and left.

Does steering control linkage bind?



YES

NO

2
- **Check steering control position indicator.**
- **See Step 16.**

TA253110

Symptom-25

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING
(Continued)

3 **Check steering control handle assembly for binding or obstruction.**

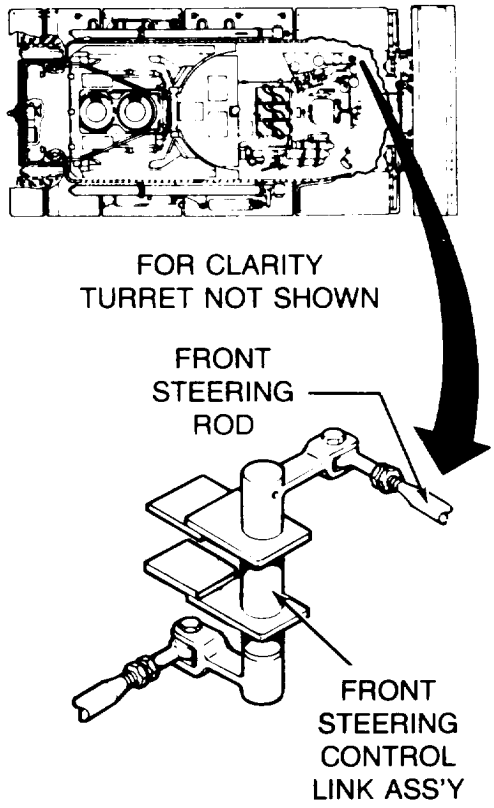
First Technician (Rear Grille Doors)

- Connect steering control rod to transmission connecting link assembly (page 15-33).

Second Technician (Driver's Station)

- Disconnect front steering control rod from front steering control link assembly (page 15-17, step 3).
- While holding disconnected control rod, move steering control handle right and left.

Does steering control handle move smoothly without binding?



YES

NO

4

- **Remove, disassemble, and inspect steering control handle and sleeve mount assembly (page 15-15).**
- **Install transmission shroud (page 9-23).**

TA253111

Symptom-25

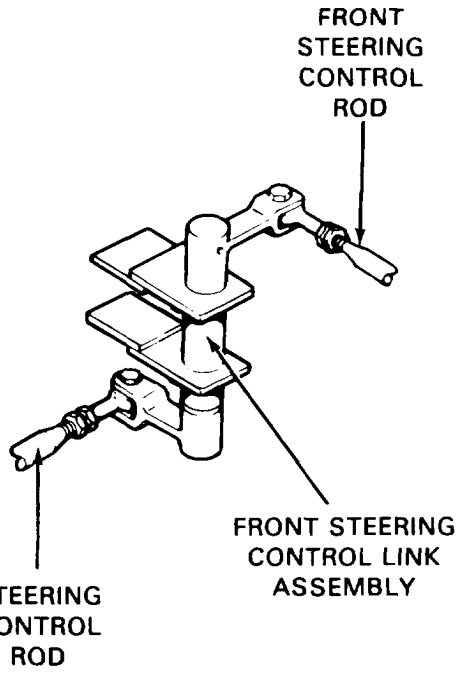
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING
(Continued)

5 **Check front steering control link assembly for binding or obstruction.**

Second Technician (Driver's Station)

- Connect front steering control rod to front steering control link assembly (page 15-19).
- Disconnect steering control rod from bottom of front steering control link assembly (page 15-20).
- Move steering control handle right and left.

Is front steering control link assembly obstructed or binding?



NO

YES

6

- **Remove, disassemble, and inspect front steering control link assembly (page 15-20).**
- **Install transmission shroud (page 9-23).**

Symptom-25

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING
(Continued)

7 Check steering control intermediate link assembly for binding or obstruction.

Second Technician (Driver's Station)

- Connect steering control rod to bottom of front steering control link assembly (page 15-21).

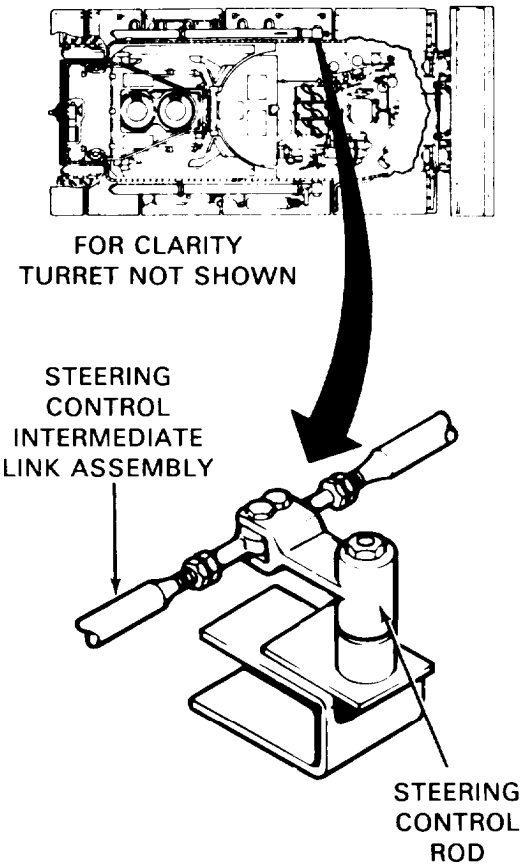
First Technician (Turret)

- Disconnect steering control rod from left side of steering control intermediate link assembly (page 15-22).

Second Technician (Driver's Station)

- Move steering control handle right and left.

Is steering control intermediate link assembly obstructed or binding?



NO

YES

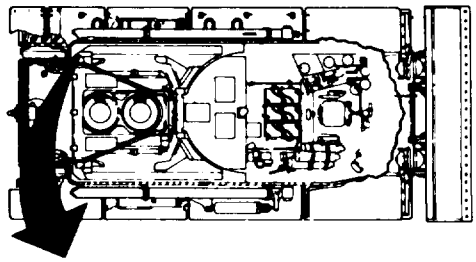
8

- **Remove, disassemble, and inspect the steering control intermediate link assembly (page 15-22).**
- **Install transmission shroud (page 9-23).**

TA253114

Symptom-25

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING
(Continued)



9 **Check lower connecting rod for binding or obstruction.**

First Technician (Turret)

- Connect steering control rod to steering control intermediate link assembly (page 15-23).

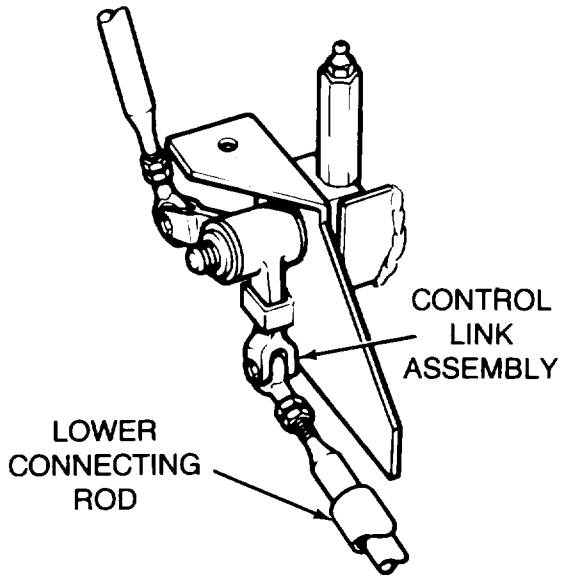
First Technician (Top Deck)

- Open left rear top deck grille door.
- Remove inboard shield face from connecting link assembly (page 15-28).
- Disconnect connector rod from lower side of connector link assembly (page 15-28).

Second Technician (Driver's Station)

- Move steering control handle right and left.

Is lower connecting rod obstructed or binding?



INBOARD SHIELD FACE REMOVED FOR CLARITY

NO

YES

10

- **Notify support maintenance of steering control linkage problem.**
- **Connect connector rod to lower side of connector link assembly.**
- **Install inboard shield face (page 15-20).**
- **Install transmission shroud (page 9-23).**

TA142118

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING
(Continued)

11 **Check connecting link assembly for binding or obstruction.**

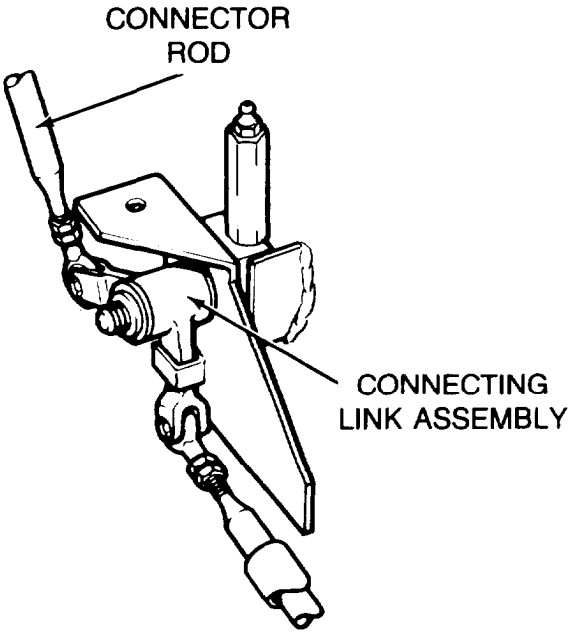
First Technician (Top Deck)

- Connect connector rod to lower side of connector link assembly (page 15-28).
- Disconnect connector rod from upper side of connector link assembly (page 15-28).

Second Technician (Driver's Station)

- Move steering control handle right and left.

Is connecting link assembly obstructed or binding?



NO

YES

12

- **Remove, disassemble, and inspect connecting link assembly (page 15-28).**
- **Install transmission shroud (page 9-23).**

TA142119

Symptom-25

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION -STEERING
(Continued)

13 Check riser connecting link assembly for binding or obstruction.

First Technician (Top Deck)

- Connect connector rod to upper side of connecting link assembly (page 15-29).
- Install shield face on connecting link assembly (page 15-29).

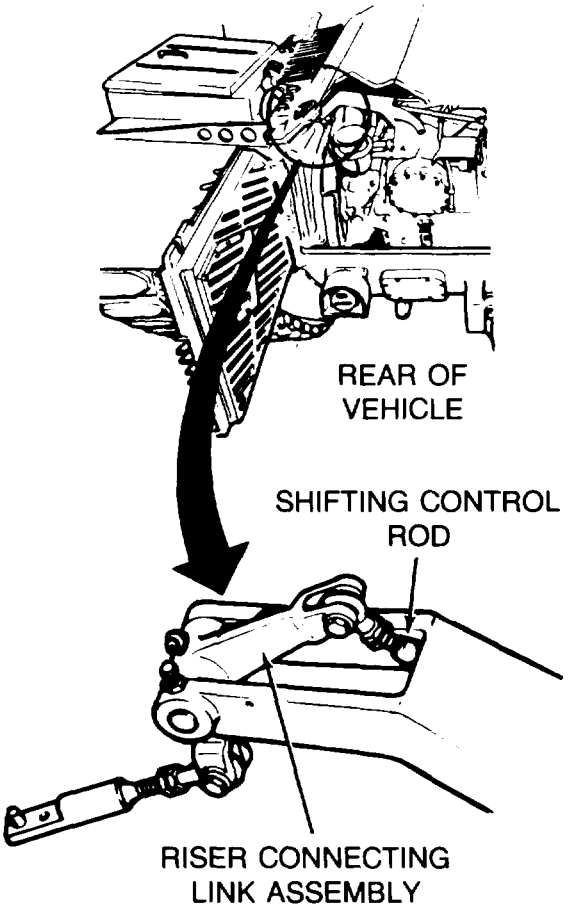
First Technician (Rear Grille Doors)

- Disconnect shifting control rod from upper side of riser connecting link assembly.

Second Technician (Driver's Station)

- Move steering control handle right and left.

Is riser connecting link assembly obstructed or binding?



YES

14 Remove, disassemble, and inspect the riser connecting link assembly (page 15-38).

NO

15

- **Notify support maintenance of steering problem.**
- **Connect shifting control rod to upper side of riser connecting link assembly (page 15-38).**
- **Install transmission shroud (page 9-23).**

TA142120

Symptom-25

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING
(Continued)

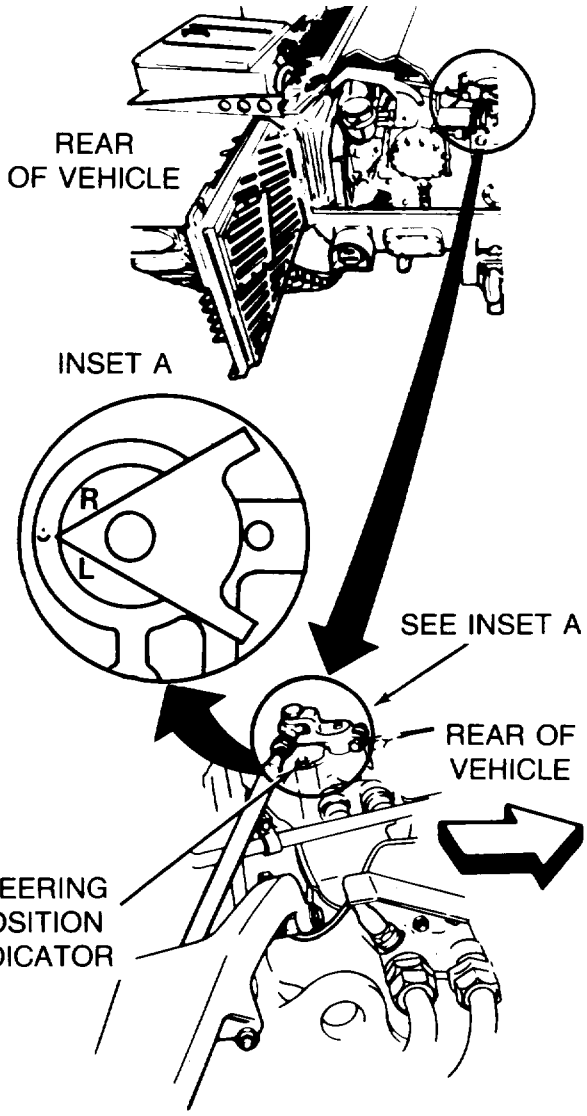
FROM STEP (2)

16 Check steering control position indication for proper indications.

First Technician (Top Deck)

- Check steering position indicator on top of transmission. Indicator should point to center dimple.
- Move sterring control valve link assembly to the right.
- Check that indicator points to (R).
- Move steering control valve link assembly to the left.
- Check that indicator points to (L).

Does steering position indicator show proper indications?



YES

17

- **Adjust steering control linkage (page 15-2).**
- **Connect steering control rod to transmission connecting link (page 15-33).**

NO

18

- **Notify support maintenance of steering problem.**
- **Connect steering control rod to transmission connecting link (page 15-33).**
- **Install transmission shroud (page 9-23).**

TA142121

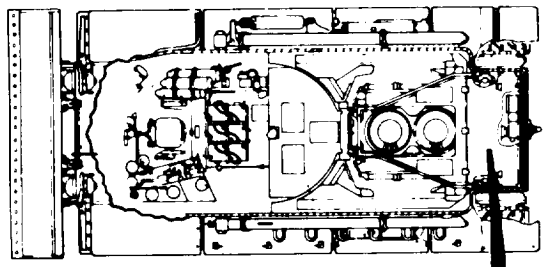
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING

Symptom-26

VEHICLE PIVOTS TO THE LEFT OR RIGHT.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



1 Check steering position indicator for correct indications.

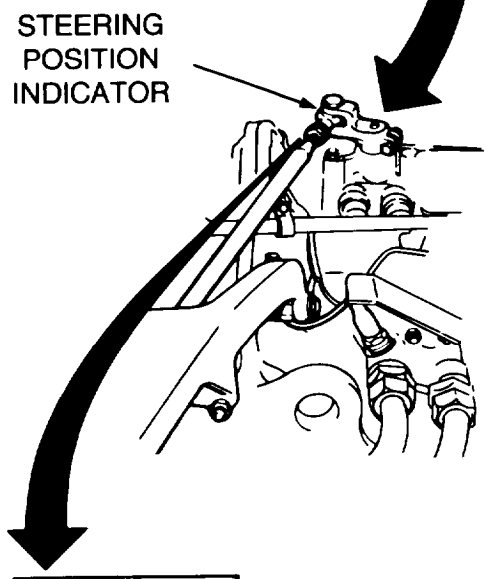
Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

Second Technician (Driver's Station)

- With steering control not applied, check steering position indicator to see that it points to the center dimple.
- Move steering control to the right and to the left.
- Check that positon indicator moves to L then to R.

Does steering position indicator show correct position?

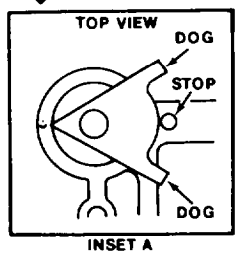


2

- **See Symptom 25: VEHICLE WILL NOT STEER PROPERLY.**

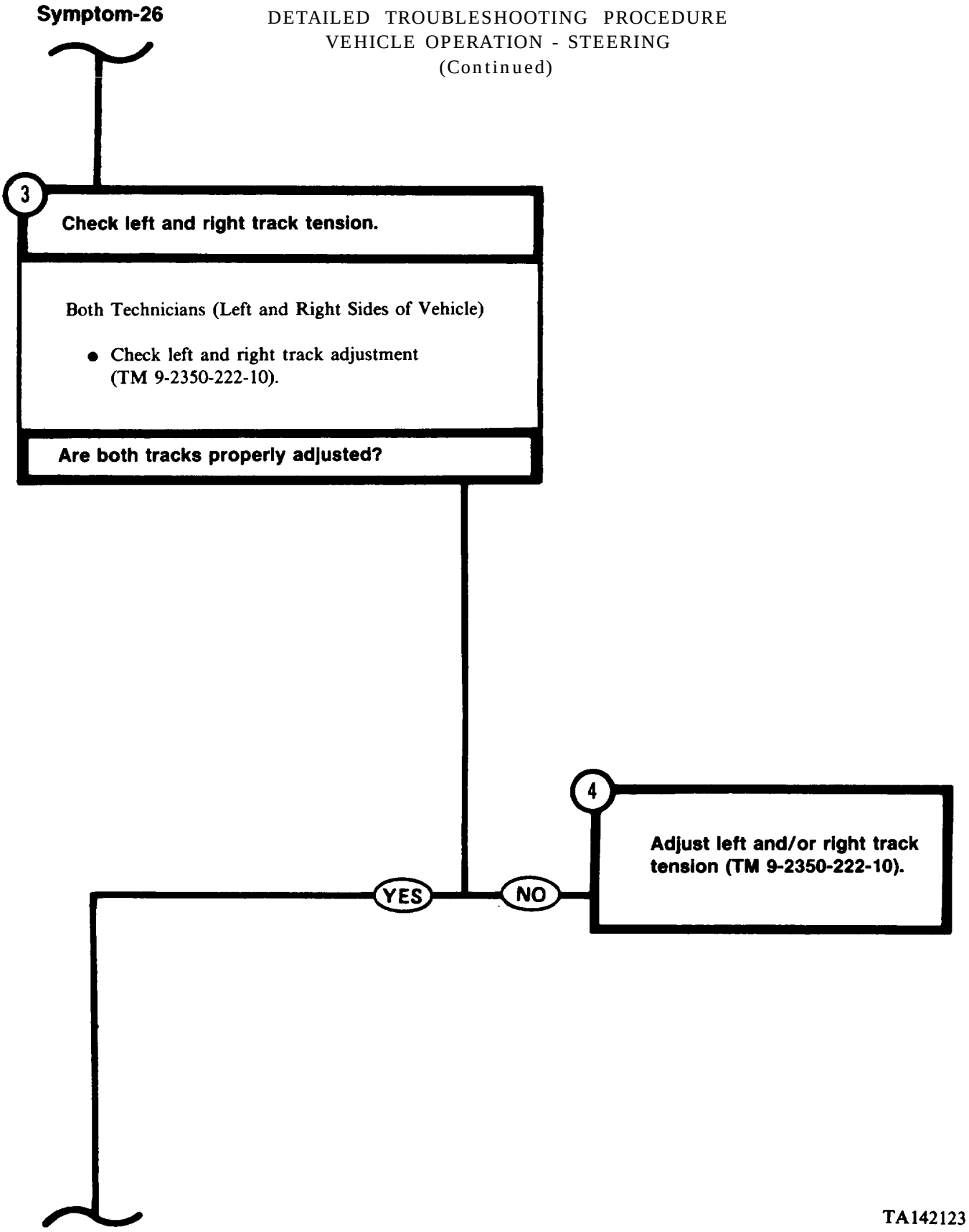
NO

YES



TA142122

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING
(Continued)



Symptom-26 DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING
(Continued)

5 Check service brake for adjustment.

Both Technicians (Left and Right Side of Vehicle)

- Block tracks to prevent movement of vehicle.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).
- Remove right-angle drive assembly (page 18-108).
- Remove lockwires and plugs (one located on each side of transmission rear housing) from brake inspection holes.

Second Technician (Driver's Station)

- Press brake pedal and hold when pressure of 750 to 900 psi is reached.

First Technician (Rear Grille Doors)

- Check if index line marked A (applied) aligns with index mark located on edge of brake inspection hole.

Second Technician (Driver's Station)

- Release brakes.

First Technician (Rear Grille Doors)

- Check if index line marked R (released) aligns with index mark located on edge of brake inspection hole.

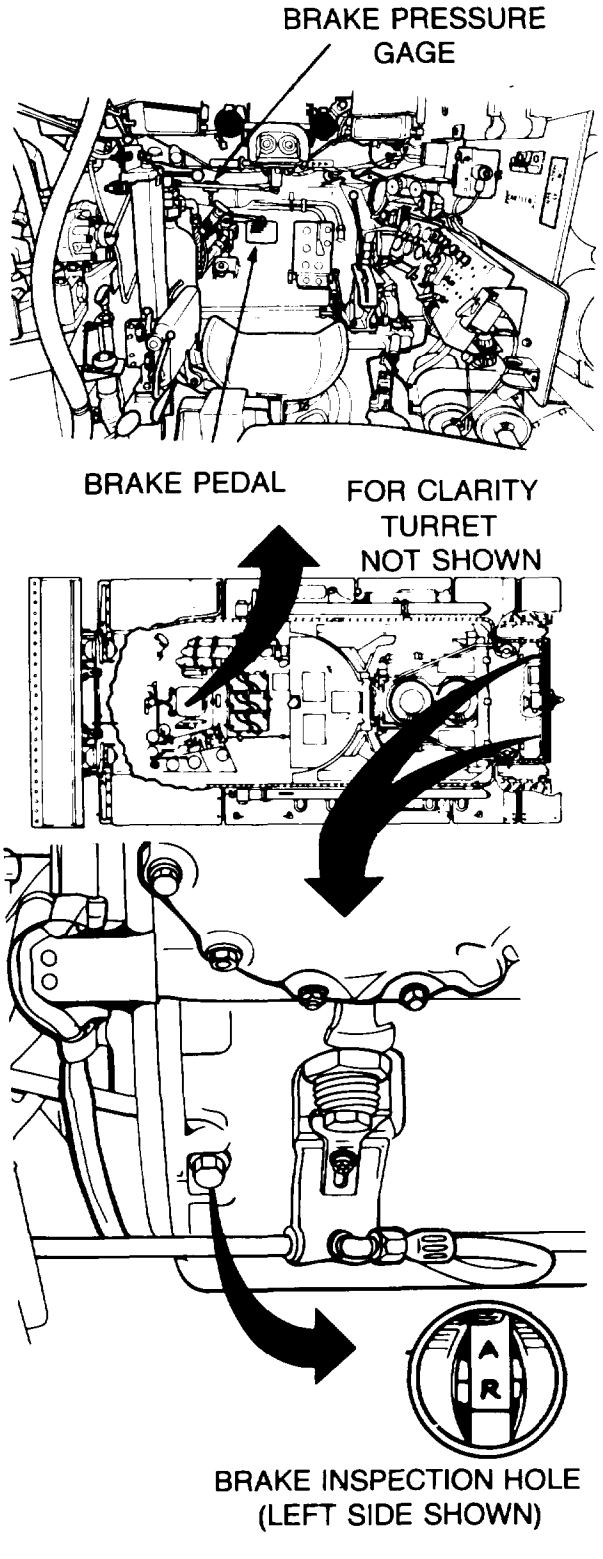
Are service brakes properly adjusted?

6

- **Adjust service brakes (page 13-2).**
- **Install right-angle drive (page 18-111).**

NO

YES



TA142124

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING
(Continued)

7 **Check universal joints for damage.**

Both Technicians (Rear Grille Doors)

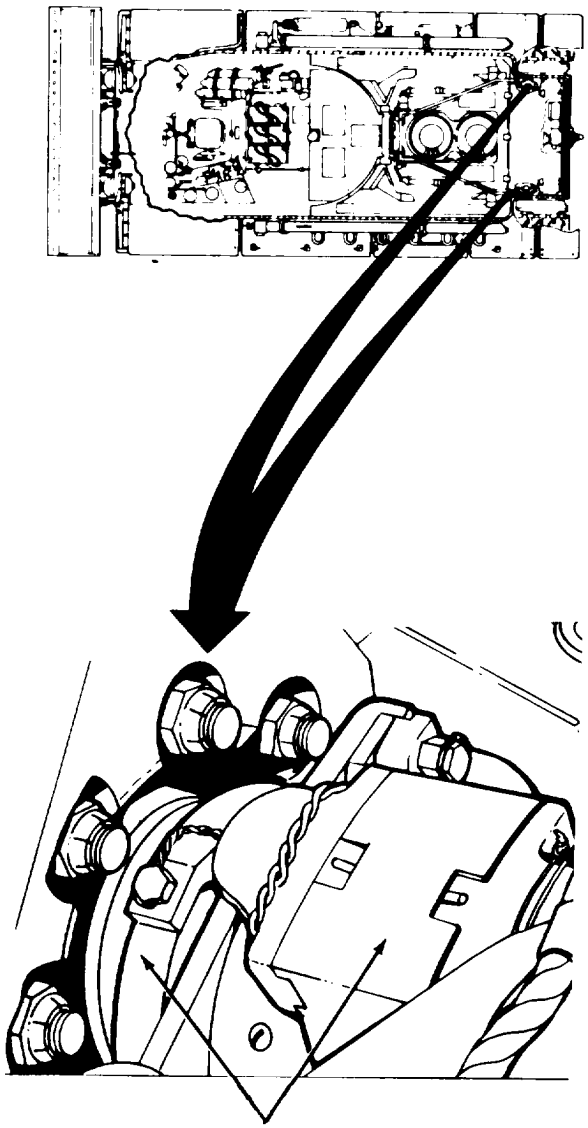
- Install right-angle drive assembly (page 18-111).
- Remove left or right universal joint (page 12-12).
- Disassemble universal joint (page 12-18).
- Check universal joint for excessive wear, broken parts, or other damage.

Are universal joints worn, broken or damaged?

YES

8 **Replace universal joint (page 12-11).**

NO



UNIVERSAL JOINT
(LEFT SIDE SHOWN)

TA142125

Symptom-26

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - STEERING
(Continued)

9 **Check final drive input shafts for breaks or damage.**

Both Technicians (Rear Grille Doors)

- Remove right or left input shaft adapter (page 12-9).
- Check final drive input shaft for broken or damaged condition.

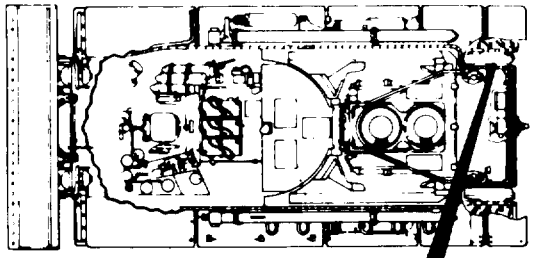
Is final drive input shaft broken or damaged?

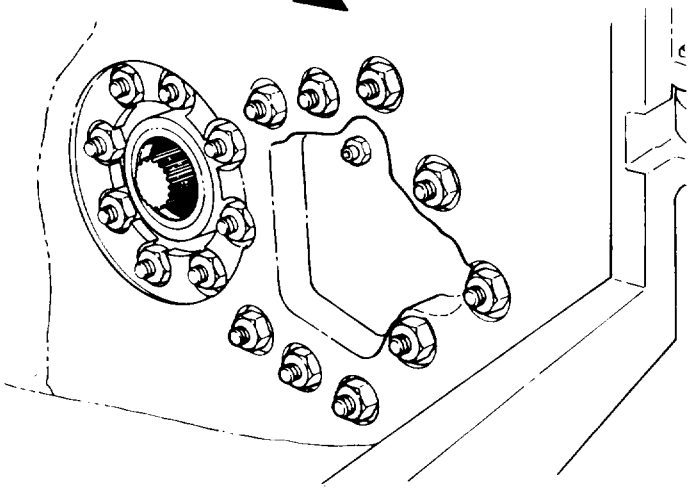
10 **Replace final drive (page 12-2).**

YES

11 **Notify support maintenance of steering problem.**

NO





FINAL DRIVE INPUT SHAFT (RIGHT SIDE SHOWN - POWERPLANT REMOVED FOR CLARITY)

TA142126

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER

Symptom-27

NO POWER DISTRIBUTION FROM MASTER RELAY TO HULL AND/OR TURRET (MASTER BATTERY INDICATOR LAMP WILL LIGHT).

WARNING

Use extreme care when working with circuit 81. This circuit carries battery voltage at all times, whether MASTER BATTERY switch is ON or OFF.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 **Listen for MASTER RELAY to work when setting MASTER BATTERY switch ON.**

Second Technician (Driver's Station)

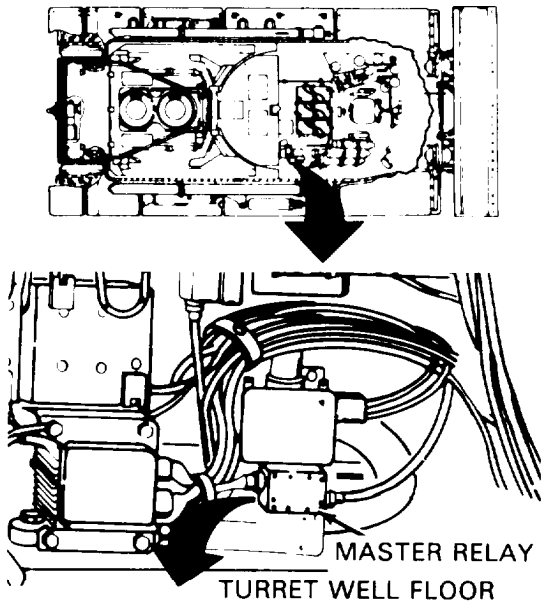
- Set MASTER BATTERY switch ON.
- If master relay coil is working, a click should be heard from MASTER RELAY.
- Set MASTER BATTERY switch OFF and ON several times, listening for clicking sound.

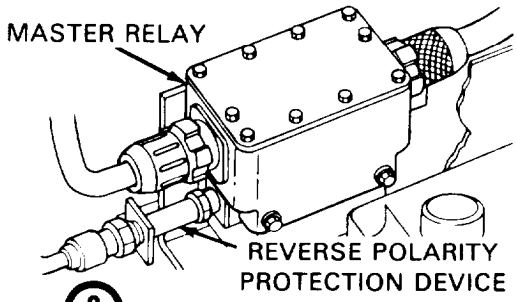
Can clicking sound be heard?

YES

NO

FOR CLARITY
TURRET NOT SHOWN





2

- **Vehicles equipped with reverse polarity protection device, check if MASTER RELAY operates without reverse polarity protection device installed. See Step (7.1).**
- **Vehicles without reverse polarity protection device, check for electrical power at turret electrical contact ring (CKT 47). See Step (8).**

TA253113

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

Symptom-27

3 **Check for electrical power at output of MASTER RELAY (CKT 81-5).**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

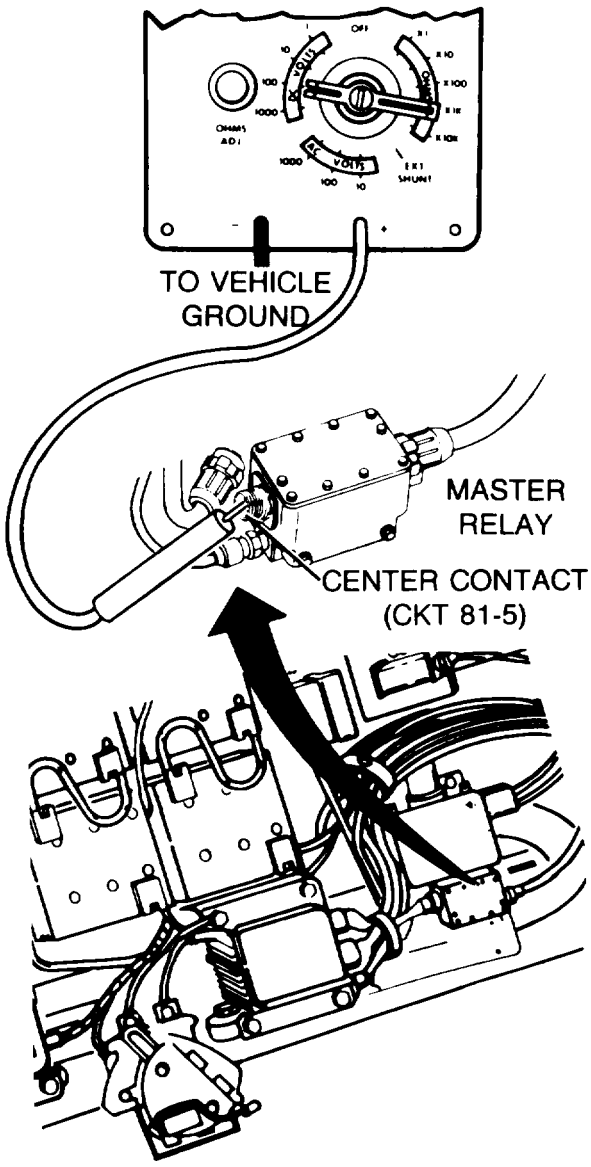
- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to MASTER RELAY (TM 9-2350-222-10).
- Disconnect hull power harness connector from MASTER RELAY.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to center contact of MASTER RELAY connector (CKT 81-5) and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.



Does meter indicate 18 to 30 volts dc?

NO

YES

4

- **Check for electrical power at turret electrical contact ring (CKT 47).**
- **See Step (13) .**

TA142128

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

Symptom-27

5 **Check for electrical power at input to MASTER RELAY (CKT 81).**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect three battery ground cables from floor plate behind driver's seat (page 10-283).

First Technician (Turret)

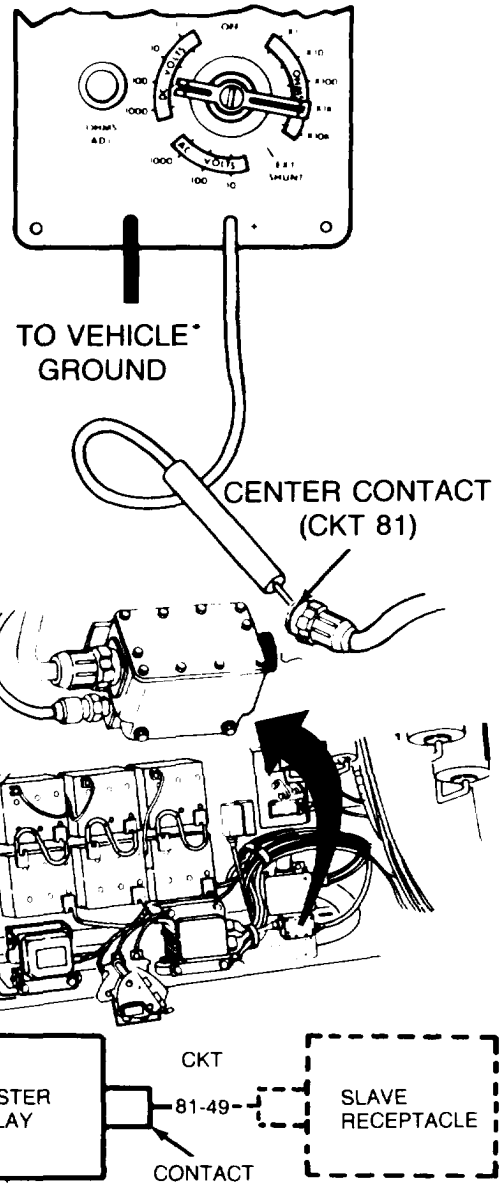
- Connect hull power harness connector to MASTER RELAY.
- Disconnect slave receptacle and relay lead connector from MASTER RELAY.
- Connect red probe of meter to center contact of slave receptacle and relay lead (CKT 81) connector and black probe to ground.

Second Technician (Driver's Station)

- Connect three battery ground cables to floor plates behind driver's seat (page 10-283).

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.



Does meter indicate 18 to 30 volts dc?

YES

6
- **Replace master relay (page 10-166).**

NO

7 **Repair slave receptacle and relay lead (page 10-307).**

TA142129

Symptom-27

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

FROM STEP (2)

7.1 Check if MASTER RELAY operates without reverse polarity protection device installed.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access in MASTER RELAY (TM 9-2350-222-10).
- Disconnect hull front master harness connector from reverse polarity protection device.
- Disconnect reverse polarity protection device from MASTER RELAY.
- Connect hull front master harness to MASTER RELAY.

Second Technician (Driver's Station)

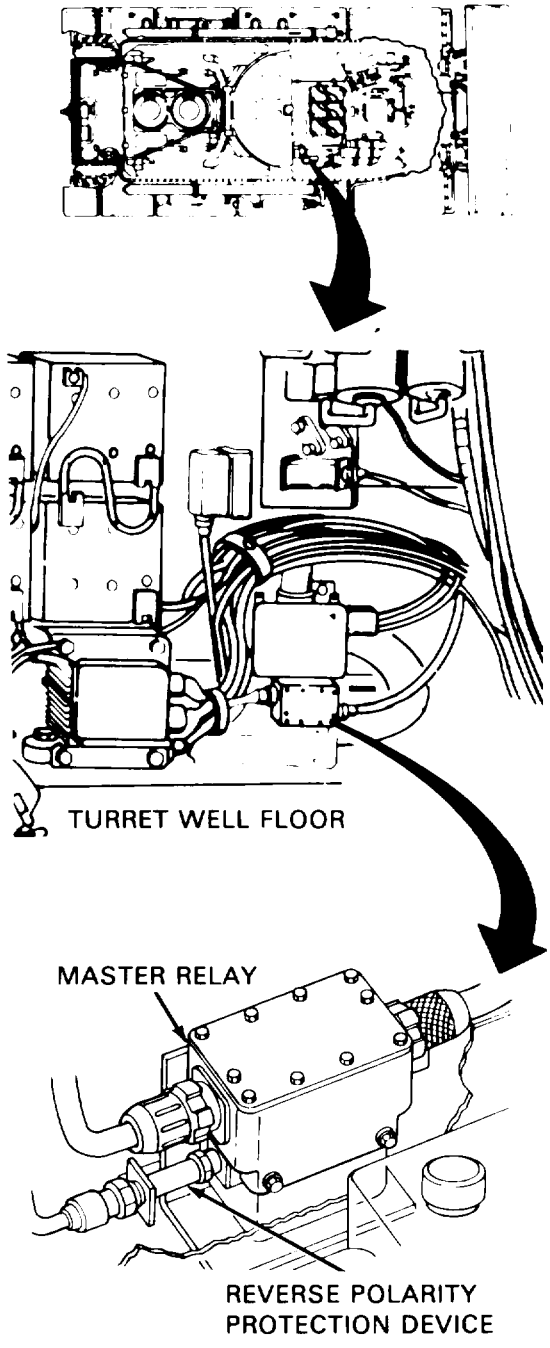
- Set MASTER BATTERY switch ON and OFF several times, listening for clicking sound.

Can clicking sound be heard?

NO

YES

7.2 Replace reverse polarity protection device (page 10-170).



TA253115

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

Symptom-27

FROM STEP 2

8 Check for electrical power to coil of MASTER RELAY (CKT 459A).

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

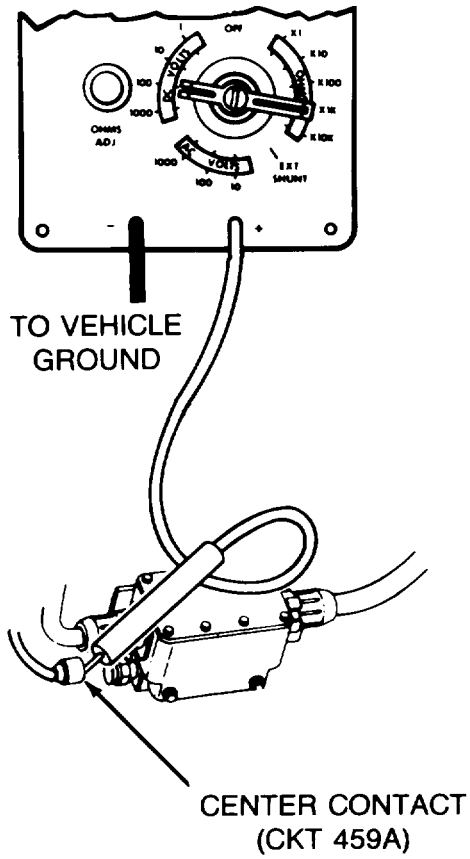
- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to MASTER RELAY (TM 9-2350-222-10).
- Disconnect hull front master harness connector from MASTER RELAY.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to center contact of hull front master harness (CKT 459A) and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.



Does meter indicate 18 to 30 volts dc?

NO

YES

9 Replace MASTER RELAY (page 10-166).

TA142130

Symptom-27

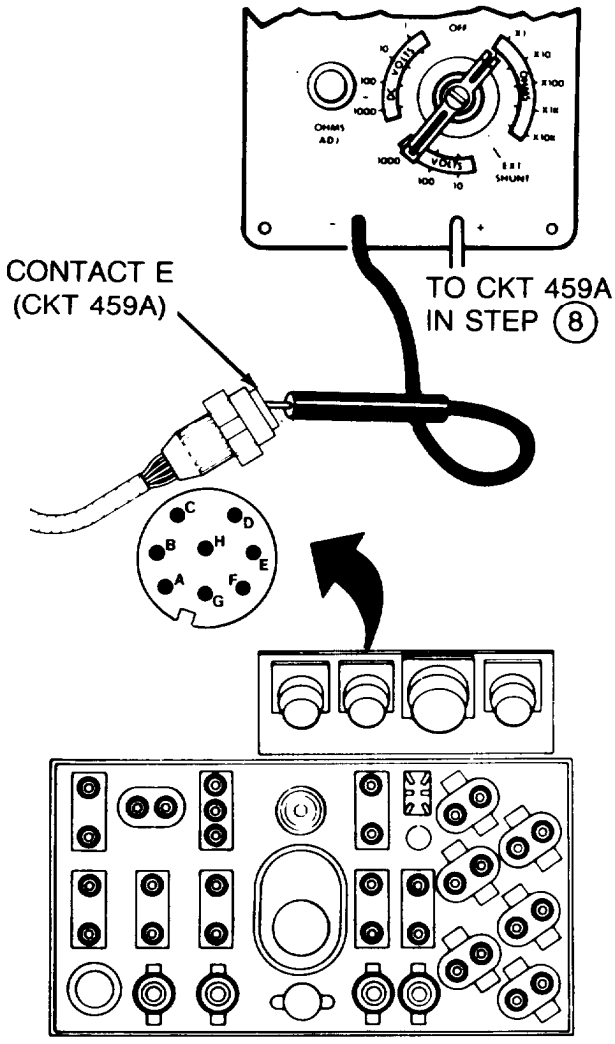
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

10 **Check (CKT 459A) in hull front master harness for continuity.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect three battery ground cables from floor plate behind driver's seat (page 10-283).
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master control panel.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to hull front master harness connector (CKT 459A) at MASTER RELAY, see Step (8) .
- Connect black probe of meter to contact E (CKT 459A) of hull front master harness connector at master control panel.
- Check if meter indicates continuity.

Does meter indicate continuity?



MASTER CONTROL PANEL
(REAR VIEW)

TA142131

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

Symptom-27

11

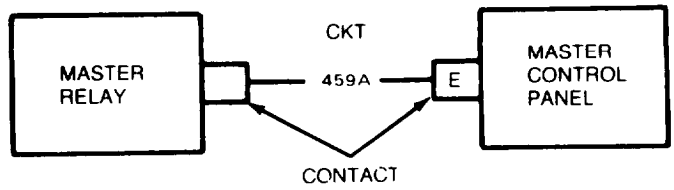
- Replace master control panel battery harness (page 10-107).
- Connect hull front master harness connector to MASTER RELAY.
- Install reverse polarity protection device (page 10-171).
- Close turret platform access door.
- Connect three battery ground cables to floor plate behind driver's seat (page 10-283).

YES

NO

12

- Inspect hull front master harness for bent/broken connector contacts or loose (CKT 459A) wire at rear of connectors.
- Repair connectors if defective (page 10-307).
- If connectors are not defective, notify support maintenance of defective hull front master harness.
- Connect hull front master harness connector to master control panel.
- Install master control panel (page 10-47).
- Install reverse polarity protection device (page 10-171).
- Close turret platform access door.
- Connect three battery ground cables to floor plate behind driver's seat (page 10-283).



TA253116

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

Symptom-27

FROM STEP 4

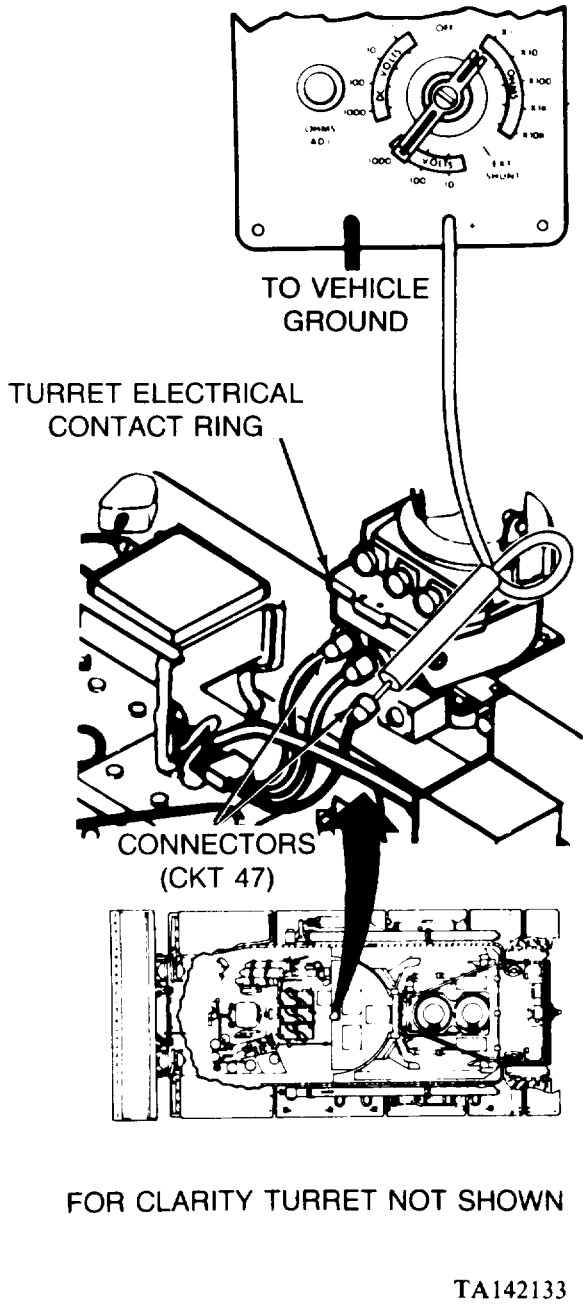
13 Check for electrical power at turret electrical contact ring (CKT 47).

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Connect hull power harness connector to MASTER RELAY.
- Manually traverse turret to gain access to turret electrical contact ring.
- Disconnect hull power harness connector (CKT 47) from turret electrical contact ring.



FOR CLARITY TURRET NOT SHOWN

TA142133

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

Symptom-27

Step (13) Continued

- Connect red probe of meter to center contact (CKT 47) of hull power harness connector and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

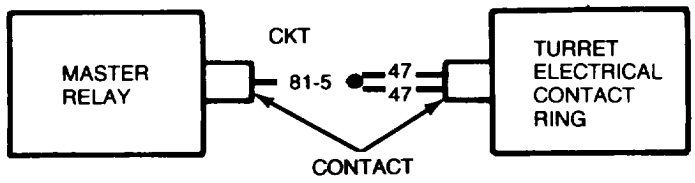
Did meter indicate 18 to 30 volts dc at both connectors?

YES

NO

14

- **Inspect hull power harness for bent/broken connector contacts or loose (CKT 81-5/47) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify suport maintenance of a defective hull power harness.**
- **Connect hull power harness connectors to turret electrical contact ring.**
- **Close turret platform access door.**



TA142134

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

Symptom-27

15 **Check hull power harness for continuity from center connector at turret electrical contact ring (CKT 47) to contact B (CKT 10) at MASTER CONTROL panel.**

Second Technician (Driver's Station)

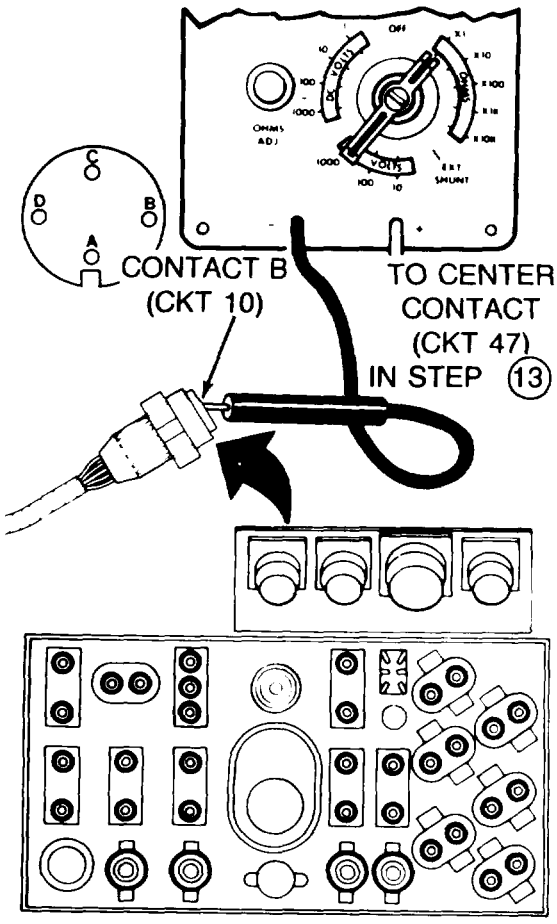
- Set MASTER BATTERY switch OFF.
- Disconnect three battery ground cables from floor plate behind driver's seat (page 10-283).

First Technician (Turret)

- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to center contact (CKT 47) of one hull power harness connector at turret electrical contact ring, see Step (13)

Second Technician (Driver's Station)

- Displace master control panel (page 10-45).
- Disconnect hull power harness connector from master control panel.
- Connect black probe of meter to contact B (CKT 10) of hull power harness connector at master control panel.



TA142135

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

Symptom-27

STEP (15) CONTINUED

First Technician (Turret)

- Check if meter indicates continuity.

Does meter indicate continuity?

YES

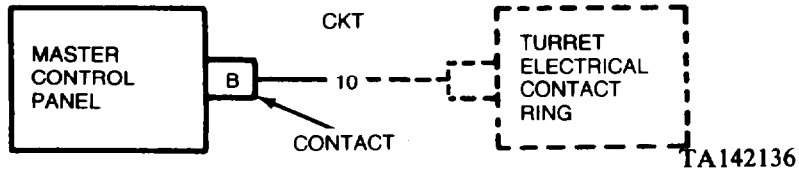
17

- **Install master control panel harness (page 10-111).**
- **Connect both hull power harness connectors to turret electrical contact ring.**
- **Close turret platform access door.**
- **Connect three battery ground cables to floor plate behind driver's seat (page 10-283).**

NO

16

- **Inspect hull power harness for bent/broken connector contact or loose (CKT 10) wire at rear of connector.**
- **Repair connector if defective (page 10-307).**
- **If connector is not defective, notify support maintenance of defective hull power harness.**
- **Connect hull power harness connector at master control panel.**
- **Connect hull power harness connector to turret electrical contact ring.**
- **Close turret platform access door.**
- **Connect three battery ground cables to floor plate behind driver's seat (page 10-283).**



DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER

Symptom-28

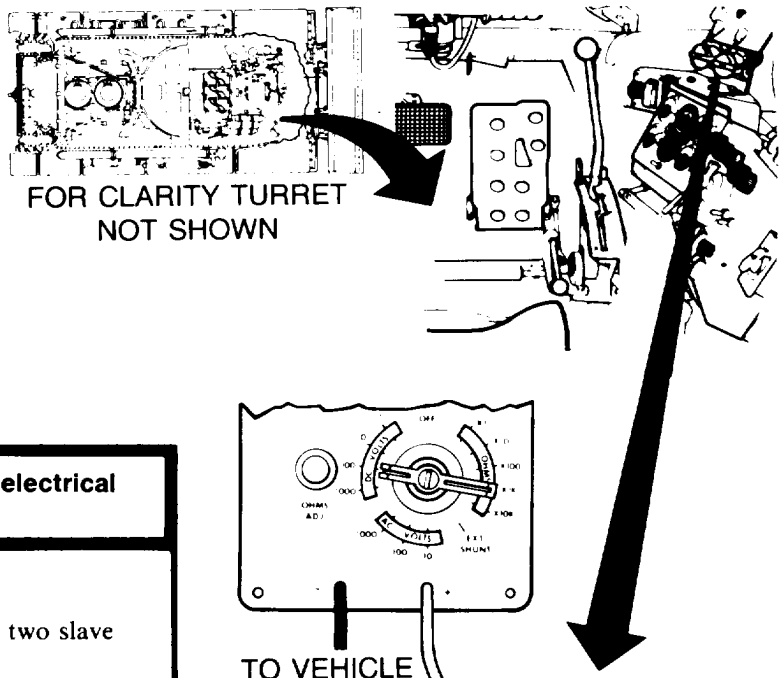
NO POWER IN VEHICLE (MASTER BATTERY INDICATOR LAMP WILL NOT LIGHT)

WARNING

Use extreme care when working with circuit 49. This circuit carries battery voltage at all times, whether MASTER BATTERY switch is ON or OFF.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



1 Check (CKT 49) at slave receptacle for electrical power.

First Technician (Driver's Station)

- Remove protective cap from one of the two slave receptacles.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).

WARNING

Do not allow red probe of meter to touch center contact and outer surface of slave receptacle at the same time.

- Connect red probe of meter to positive contact (CKT 49) of slave receptacle and black probe to ground.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES

NO

2

- **Service batteries (page 3-41).**
- **Charge batteries (TM 9-6140-200-14).**
- **Test batteries (page 10-290). or perform STE/ICE BATTERY CONDITION TEST 77/79 (page 4-83).**
- **Install slave receptacle protective cap.**

TA142137

Symptom-28

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

WARNING

Use extreme care when working with circuit 459. This circuit carries battery voltage at all times, whether MASTER BATTERY switch is ON or OFF.

3 Check MASTER BATTERY switch for continuity.

First Technician (Driver's Station)

- Install slave receptacle protective cap.
- Disconnect three battery ground cables from floor plate behind driver's seat (page 10-283).
- Displace master control panel (page 10-45).
- Set MASTER BATTERY switch ON.
- Disconnect master control panel harness connector (CKT 459) from MASTER BATTERY switch.
- Disconnect master battery harness connector (CKT 459A) from MASTER BATTERY switch.
- Set meter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to one contact and black probe to other contact of MASTER BATTERY switch.
- Check if meter indicates continuity.

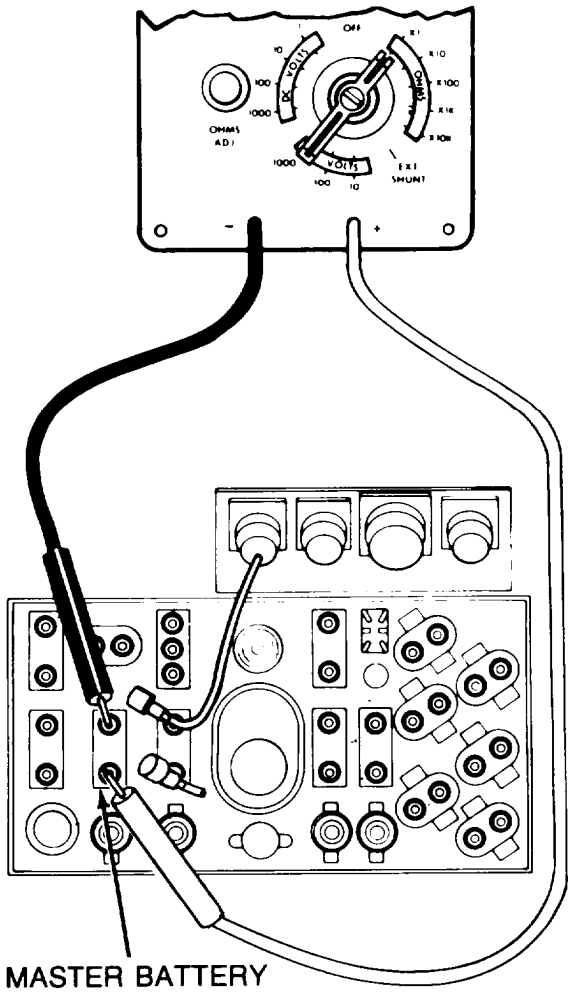
Does meter indicate continuity?

YES

NO

4

- **Replace MASTER BATTERY switch (page 10-57).**
- **Connect three battery ground cables to floor plate behind driver's seat (page 10-283).**



MASTER CONTROL PANEL
(REAR VIEW)

TA142138

Symptom-28

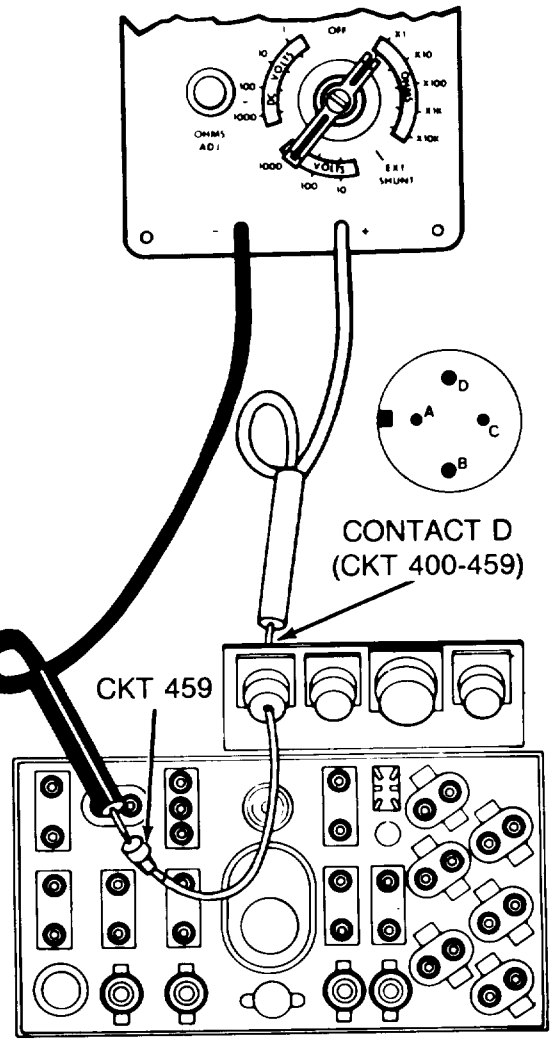
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

5 **Check MASTER CONTROL PANEL harness (CKT 400-459) for continuity from connector on master control panel to connector at MASTER BATTERY switch.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect master battery connector (CKT 459A) to MASTER BATTERY switch.
- Disconnect hull power harness connector from master control panel.
- Connect red probe of meter to contact D (CKT 400-459) of master control panel harness connector.
- Connect black probe of meter to master control panel harness connector at MASTER BATTERY switch (CKT 459A).
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

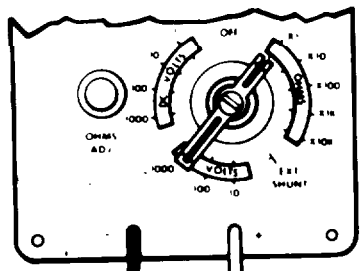
6

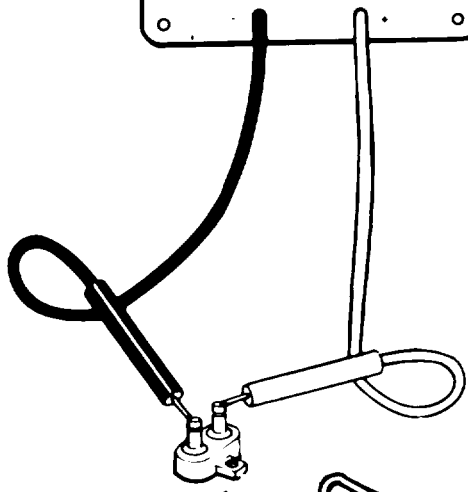
- **Replace master control panel harness (page 10-111).**
- **Connect three battery ground cables to floor plate behind driver's seat (page 10-283).**

TA142139

Symptom-28

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)





7 **Check heater feed circuit breaker for continuity.**

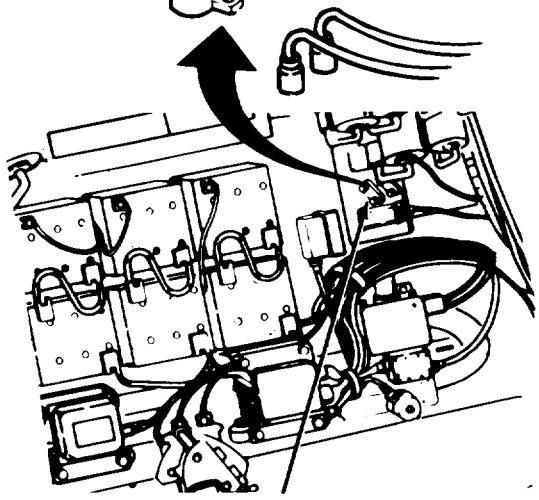
First Technician (Driver's Station)

- Connect master control panel harness connector (CKT 459) to MASTER BATTERY switch.

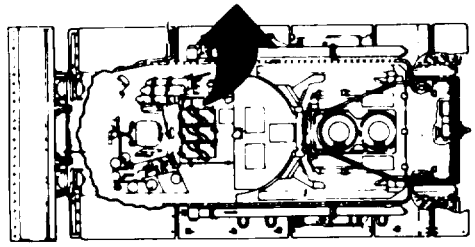
Second Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to heater feed circuit breaker (TM 9-2350-222-10).
- Disconnect both hull power harness connectors (CKT 400-459) from heater feed circuit breaker.
- Connect red probe of meter to one contact and black probe to other contact of heater feed circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?



HEATER FEED CIRCUIT BREAKER



NO

YES

8

- **Replace heater feed circuit breaker (page 10-91).**
- **Install master control panel (page 10-47).**
- **Connect three battery ground cables to floor plate behind driver's seat (page 10-283).**

TA142140

Symptom-28

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

9 **Check hull power harness (CKT 400-459) for continuity from connector at master control panel to connector at output side of heater feed circuit breaker.**

Second Technician (Turret)

- Connect red probe of meter to hull power harness connector (CKT 400-459) at output side of heater feed circuit breaker.

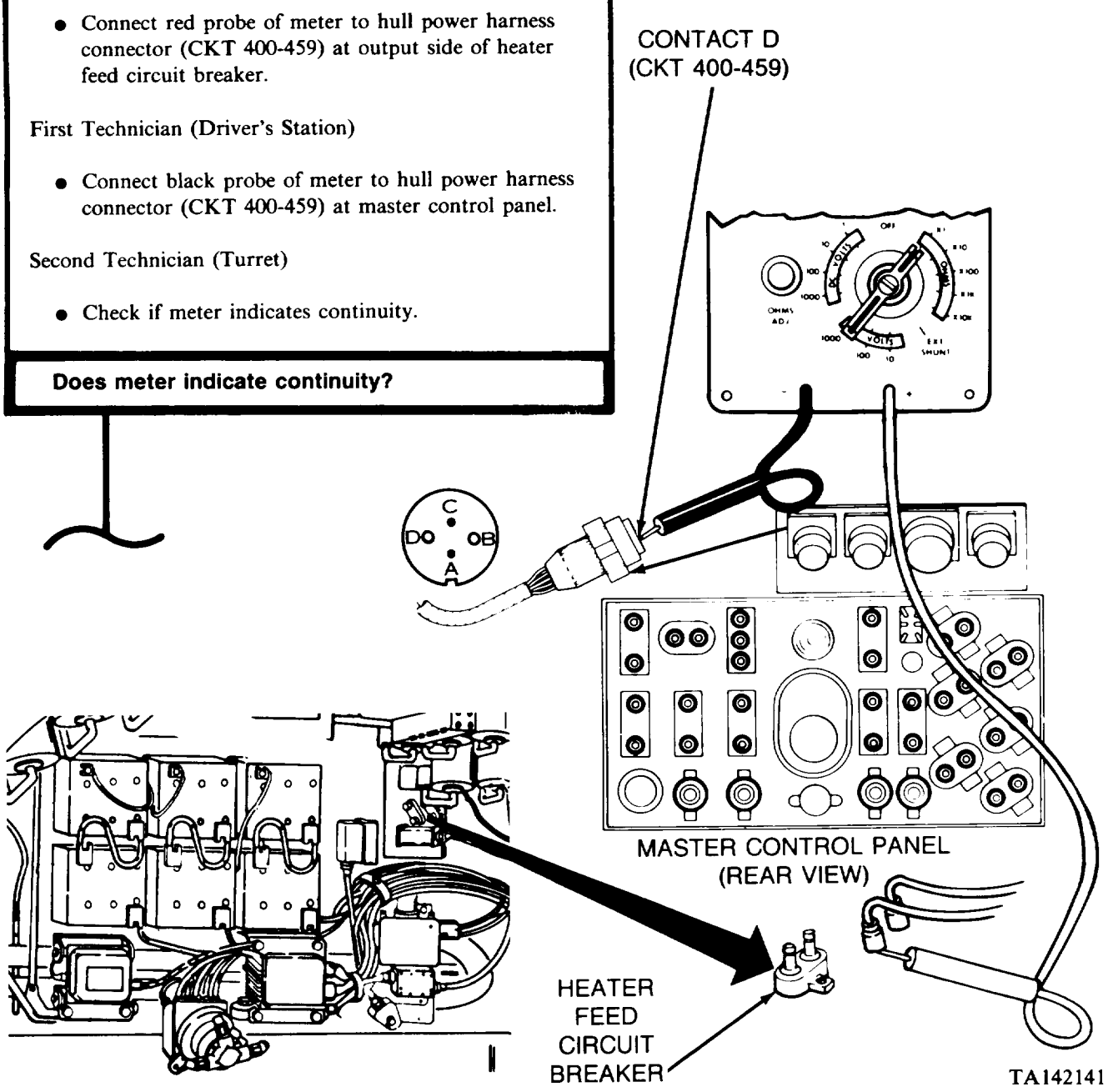
First Technician (Driver's Station)

- Connect black probe of meter to hull power harness connector (CKT 400-459) at master control panel.

Second Technician (Turret)

- Check if meter indicates continuity.

Does meter indicate continuity?



Symptom-28

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

NO

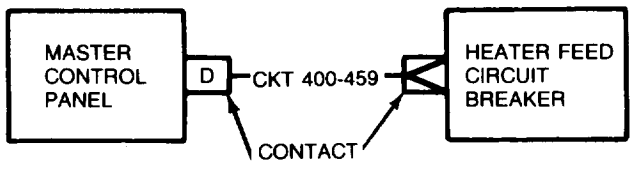
10

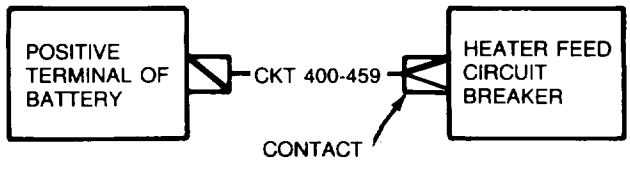
- **Inspect hull power harness from master control panel to heater feed circuit breaker for bent/broken connector contacts or loose (CKT 400-459) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull power harness.**
- **Connect hull power harness connectors to heater feed circuit breaker and master control panel.**
- **Install master control panel (page 10-47).**
- **Connect three battery ground cables to floor plate behind driver's seat (page 10-283).**

YES

11

- **Inspect hull power harness from heater feed circuit breaker to positive terminal of battery for bent/broken connector contacts or loose (CKT 400-459) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull power harness.**
- **Connect hull power harness connectors to heater feed circuit breaker and master control panel.**
- **Install master control panel (page 10-47).**
- **Connect three battery ground cables to floor plate behind driver's seat (page 10-283).**





TA142142

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER

Symptom-29

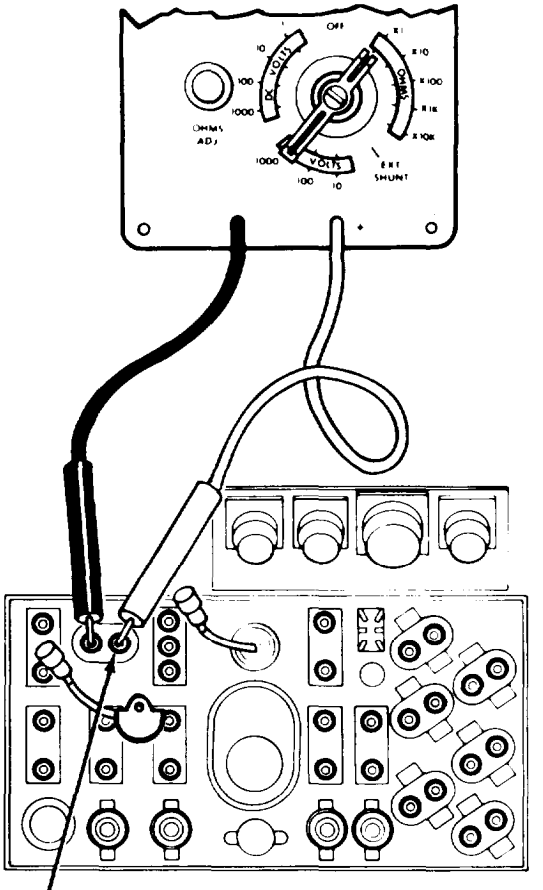
NO POWER AT UTILITY OUTLET ON MASTER CONTROL PANEL

1 Check utility outlet circuit breaker for continuity.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect master control panel harness (CKT 37) and utility outlet assembly connector (CKT 37) from utility outlet circuit breaker.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to one contact and black probe to other contact of utility outlet circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

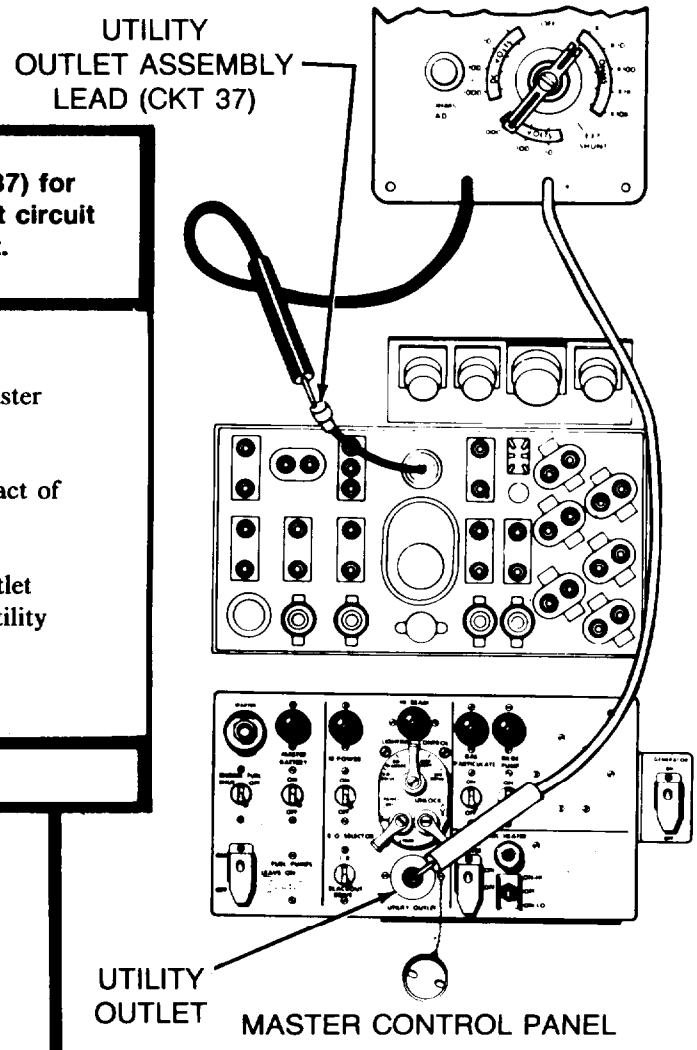
NO

2 Replace utility outlet circuit breaker (page 10-85).

TA142143

Symptom-29

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)



3 **Check utility outlet assembly lead (CKT 37) for continuity from connector at utility outlet circuit breaker to center contact of utility outlet.**

Technician (Driver's Station)

- Disconnect cover from utility outlet on master control panel.
- Connect red probe of meter to center contact of utility outlet.
- Connect black probe of meter to utility outlet assembly lead (CKT 37) at connector to utility outlet circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?

YES

4

- **Replace master control panel harness (page 10-111).**
- **Connect utility outlet assembly lead connector to utility outlet circuit breaker.**

NO

5

- **Replace utility outlet assembly (page 10-74).**
- **Connect master control panel harness to utility outlet circuit breaker.**

TA142144

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER

Symptom-30

NO POWER AT LEFT OR RIGHT SLAVE RECEPTACLE (MASTER BATTERY LAMP LIGHTS)

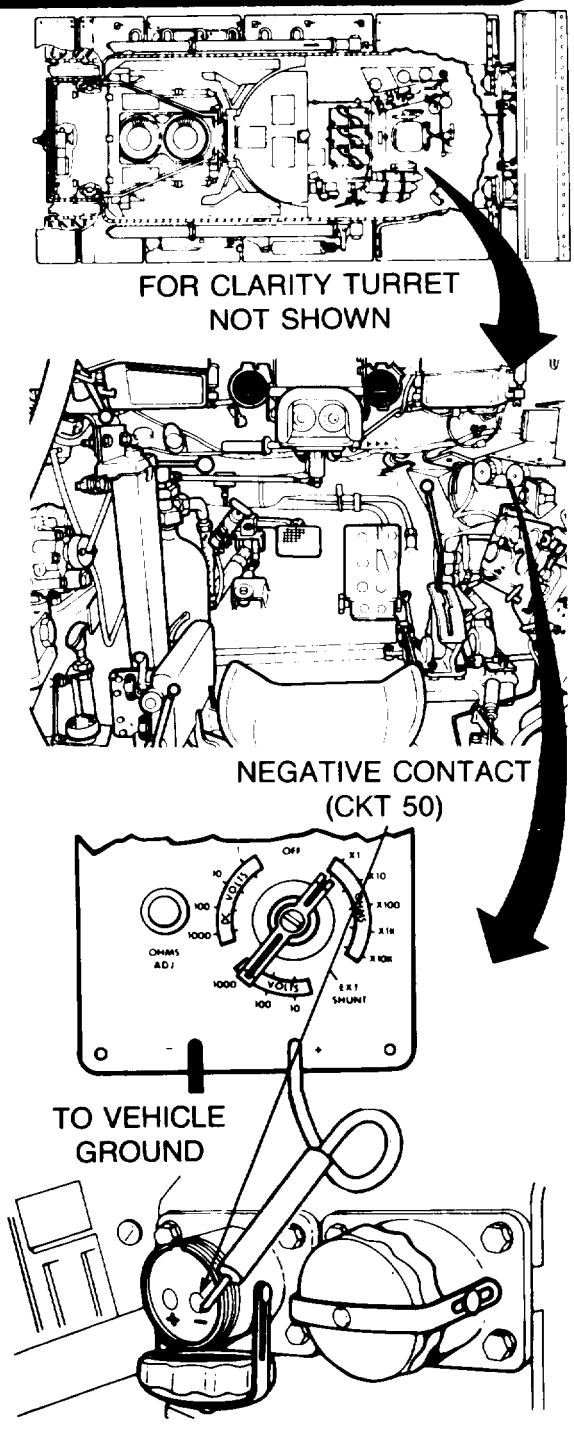
CAUTION

Do not touch positive contact of slave receptacle with multimeter probes when multimeter is set on OHMS scale.

1 Check slave receptacle ground lead (CKT 50-Ground) for continuity from negative contact of inoperative slave receptacle to ground.

Technician (Driver's Station)

- Disconnect protective cap from inoperative slave receptacle.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to negative contact of slave receptacle and black probe to ground.



TA142145

Symptom-30

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - HULL POWER
(Continued)

STEP (1) CONTINUED

- Check if meter indicates continuity.

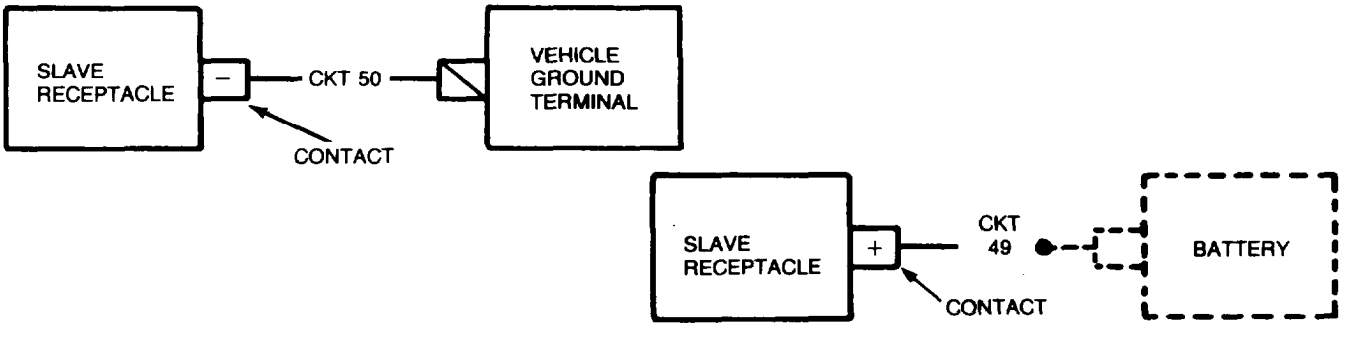
Does meter indicate continuity?

NO

(2) **Repair slave receptacle ground lead (CKT 50) (page 10-307).**

YES

(3) **Repair battery slave cable (CKT 49) (page 10-307).**



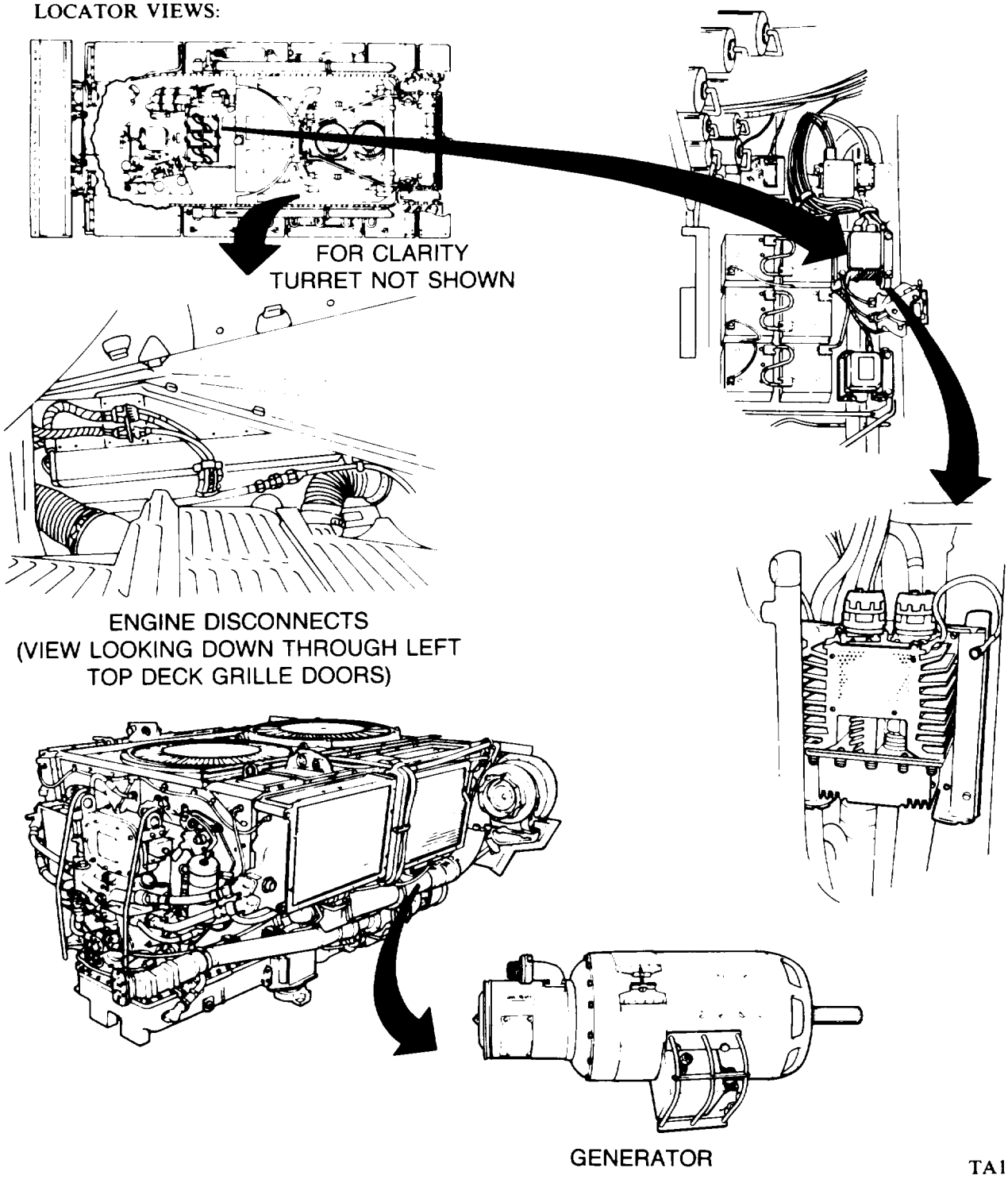
TA142146

DETAILED TROUBLESHOOTING PROCEDURE

Symptom-31-2D VEHICLE OPERATION - GENERATOR/REGULATOR

GENERATOR/REGULATOR SYSTEM IS NOT WORKING (2D ENGINE).

LOCATOR VIEWS:



TA142171

■ All data on pages 4-526 thru 4-549 deleted.

Symptom-31-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 **Check if air cleaner blower motors work.**

Second Technician (Driver's Station)

- Start engine.

First Technician (Outside of Vehicle)

- Check if air exhaust can be felt at any of the four blower fan elbows.

Second Technician (Driver's Station)

- Stop engine.

Was there any air felt at any of the four blower fan elbows?

YES

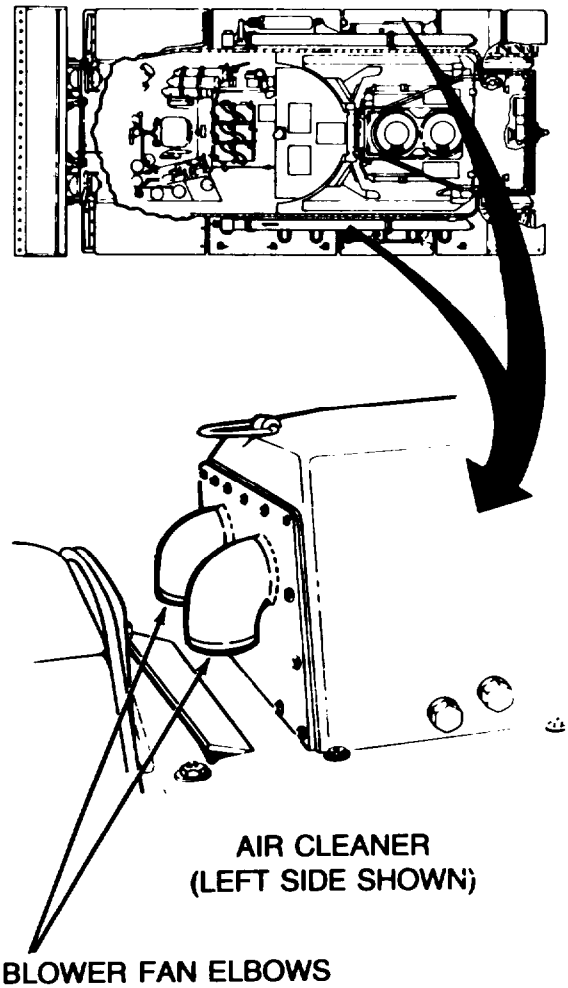
NO

2

- **Check (CKT 1) for continuity from connector at voltage regulator to connector at engine disconnect.**

- **See Step (8).**

FOR CLARITY TURRET NOT SHOWN



TA142172

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

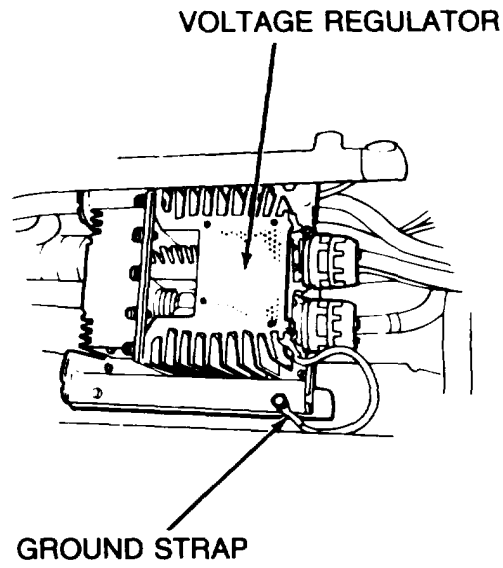
Symptom-31-2D

3 Check for loose ground strap connections or damaged ground strap on voltage regulator.

First Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to voltage regulator (TM 9-2350-222-10).
- Check if ground strap connections are loose.
- Check ground strap for damage.

Is ground strap loose or damaged?



NO

YES

4

- **Clean and tighten loose ground strap.**
- **If ground strap connections are not loose replace damaged ground strap (page 10-19).**

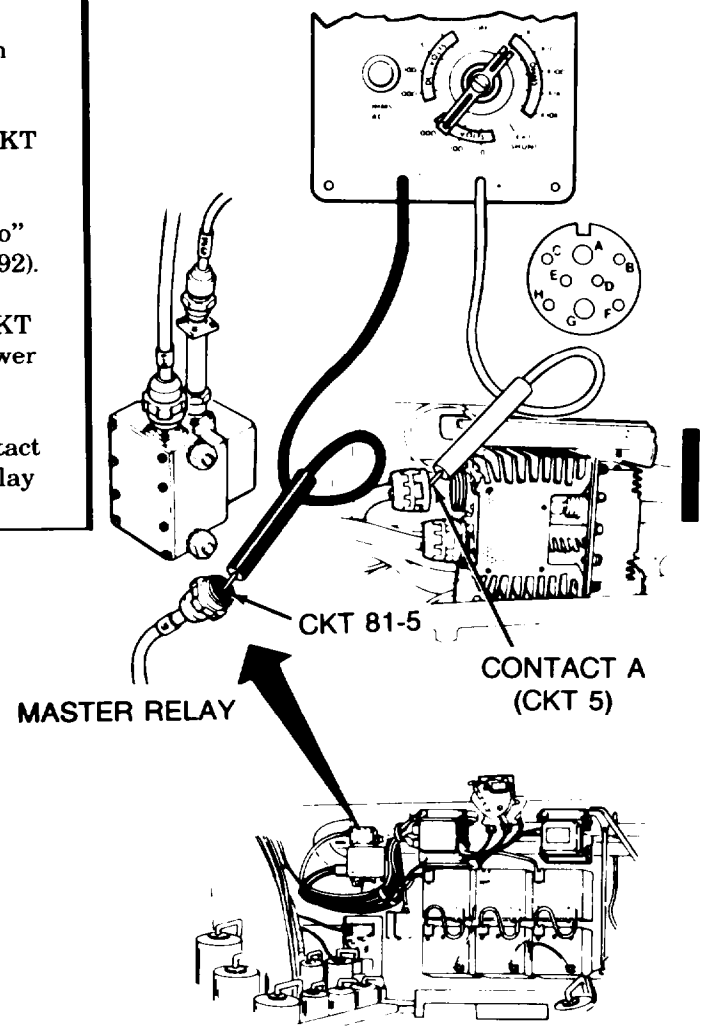
TA142173

Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

5 **Check hull power harness for continuity from connector at voltage regulator (CKT 5) to connector at master relay (CKT 81-5).**

First Technician (Turret)

- Disconnect hull power harness (CKT 5) from voltage regulator.
- Disconnect hull power harness connector (CKT 81-5) from master relay.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact A (CKT 5) at voltage regulator connector of hull power harness.
- Connect black probe of meter to center contact (CKT 81-5) of hull power harness master relay connector.



TA253117

Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

STEP 5 CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

YES

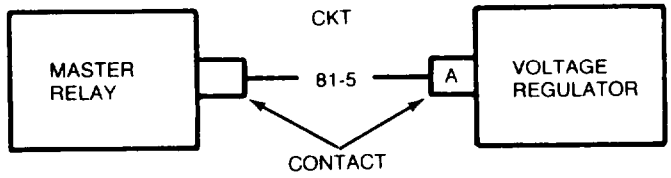
6

- **Replace voltage regulator (page 10-19).**
- **Connect hull power harness to master relay.**

NO

7

- **Inspect hull power harness for bent/broken connector contacts or loose (CKT 81-5) wire at rear of connector.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective hull power harness.**
- **Connect hull power harness to master relay.**
- **Connect hull power harness at voltage regulator.**



TA 142175

Symptom-31-2D
FROM STEP (2)

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

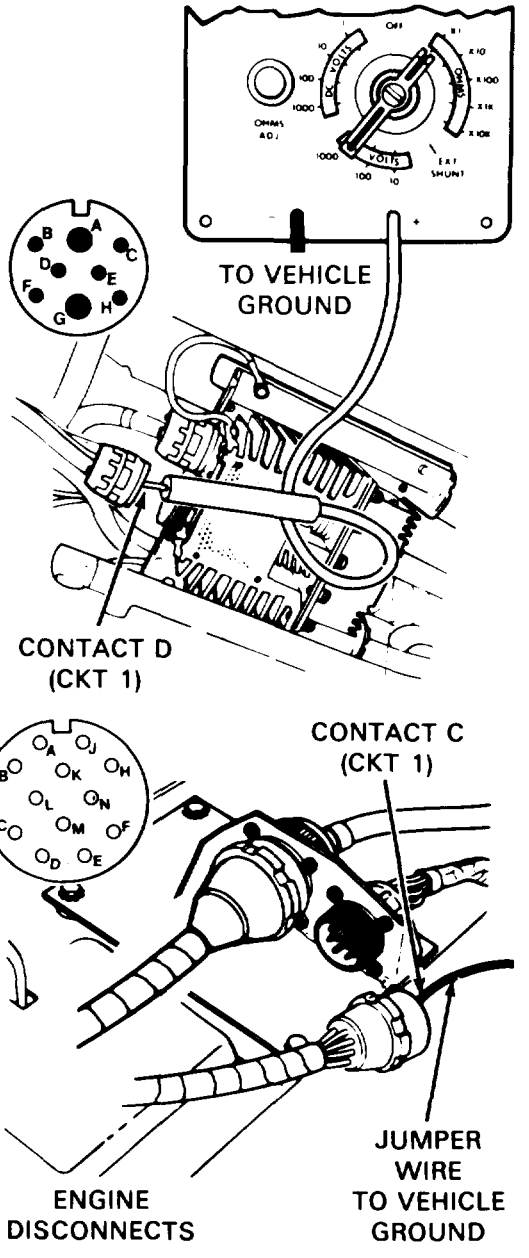
8 **Check (CKT 1) for continuity from connector at voltage regulator to connector at engine disconnect.**

First Technician (Turret)

- Manually traverse turret to gain access to left top deck grille doors.

Second Technician (Left Top Deck Grille Doors)

- Open left top deck grille doors to gain access to engine disconnects.
- Disconnect engine accessory harness connector (CKT 1) from engine disconnect.
- Connect jumper wire from engine accessory harness connector contact C (CKT 1) to ground.



TA253118

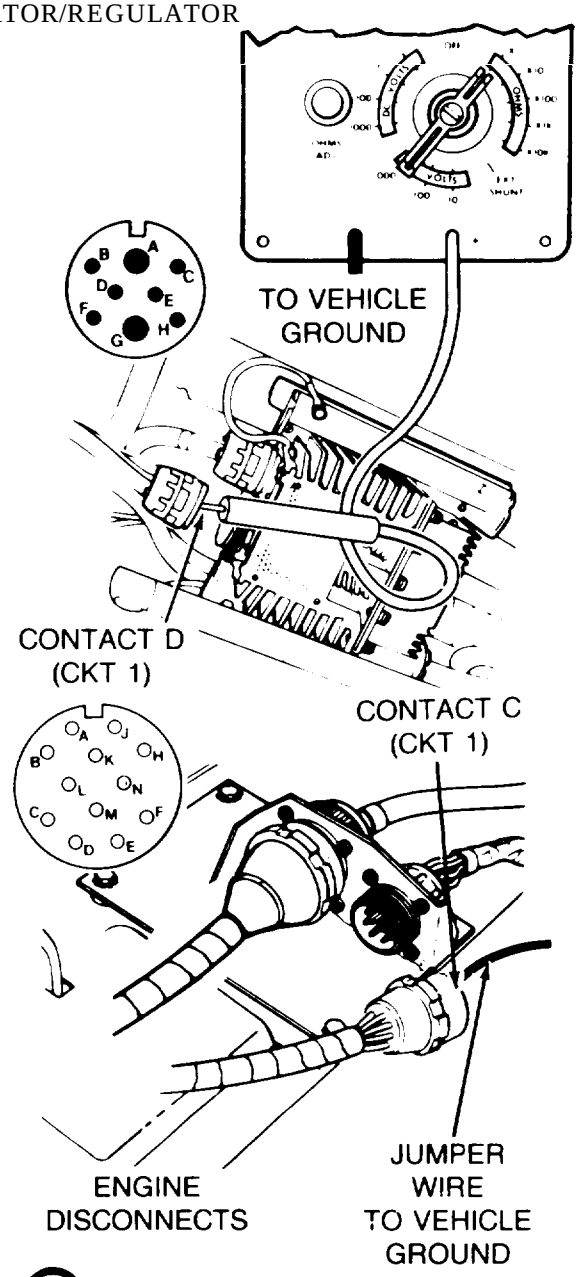
Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

STEP (8) CONTINUED

First Technician (Turret)

- Open turret platform access door and disconnect hull front master harness connector (CKT 1) from voltage regulator.
- Connect red probe of meter to contact D (CKT 1) of hull front master harness connector at voltage regulator and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

9

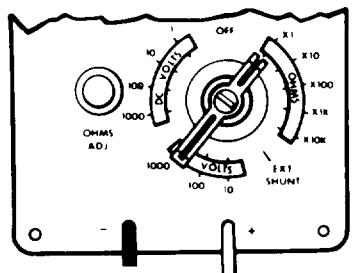
- **Check (CKT 1) for continuity from connector at voltage regulator to connector at bulkhead electrical disconnect.**

- **See Step (25) .**

TA253119

Symptom-31-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)



10 **Check (CKT 478) for continuity from connector at voltage regulator to connector at engine disconnect.**

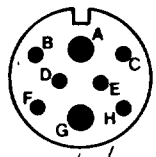
Second Technician (Top Deck)

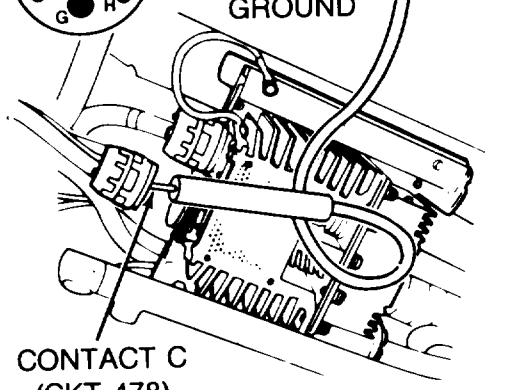
- Connect jumper wire from engine accessory harness connector contact L (CKT 478) to ground.

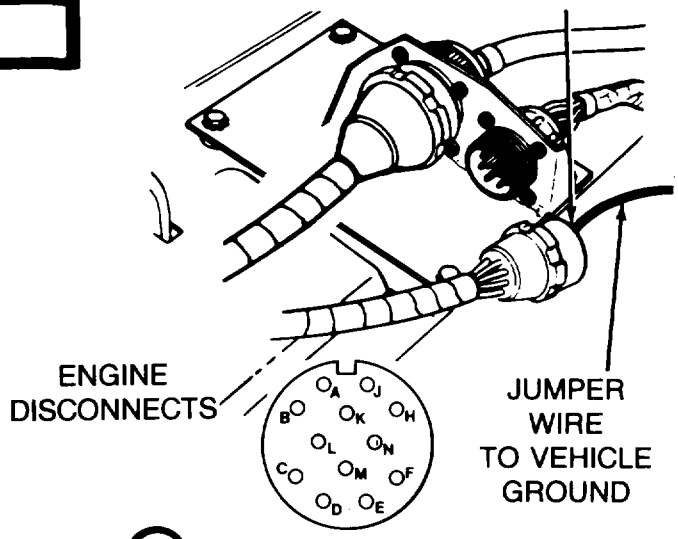
First Technician (Turret)

- Connect red probe of meter to contact C (CKT 478) of hull front master harness connector at voltage regulator and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?







YES

NO

11

- **Check (CKT 478) for continuity from connector at voltage regulator to connector at bulkhead electrical disconnect.**
- **See Step (33) .**

TA142178

Symptom-31-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

12 **Check (CKT 2) for continuity from connector at voltage regulator to connector at engine disconnect.**

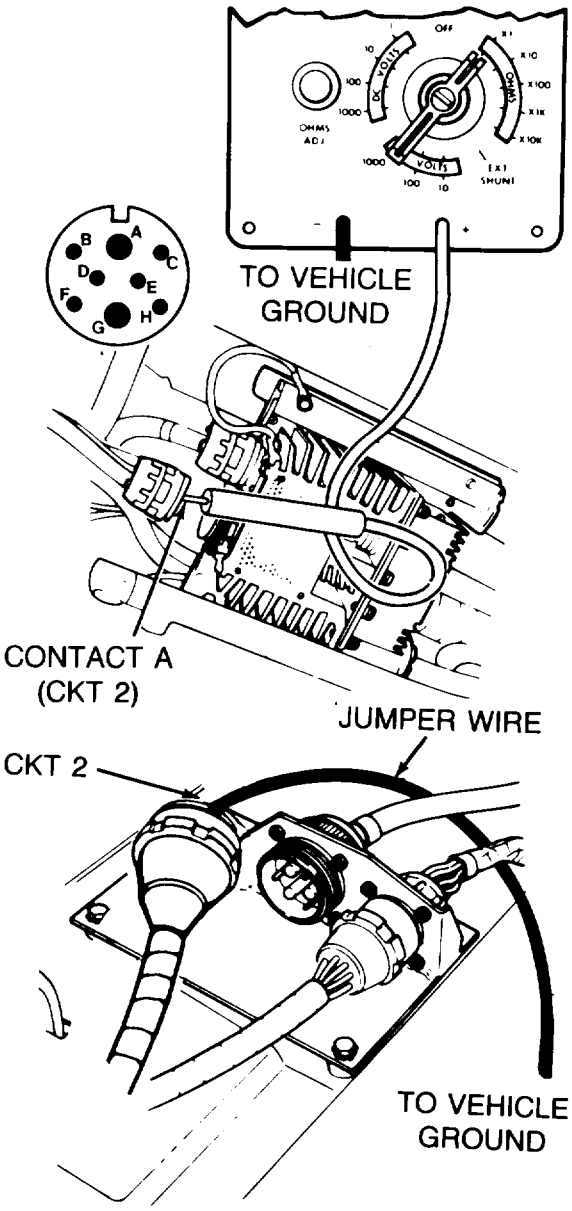
Second Technician (Top Deck)

- Connect engine accessory harness to engine disconnect.
- Disconnect engine disconnect lead at engine disconnect.
- At engine disconnect, connect jumper wire from center contact of engine disconnect lead connector to ground.

First Technician (Turret)

- Connect red probe of meter to center contact A (CKT 2) of hull front master harness connector at voltage regulator and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

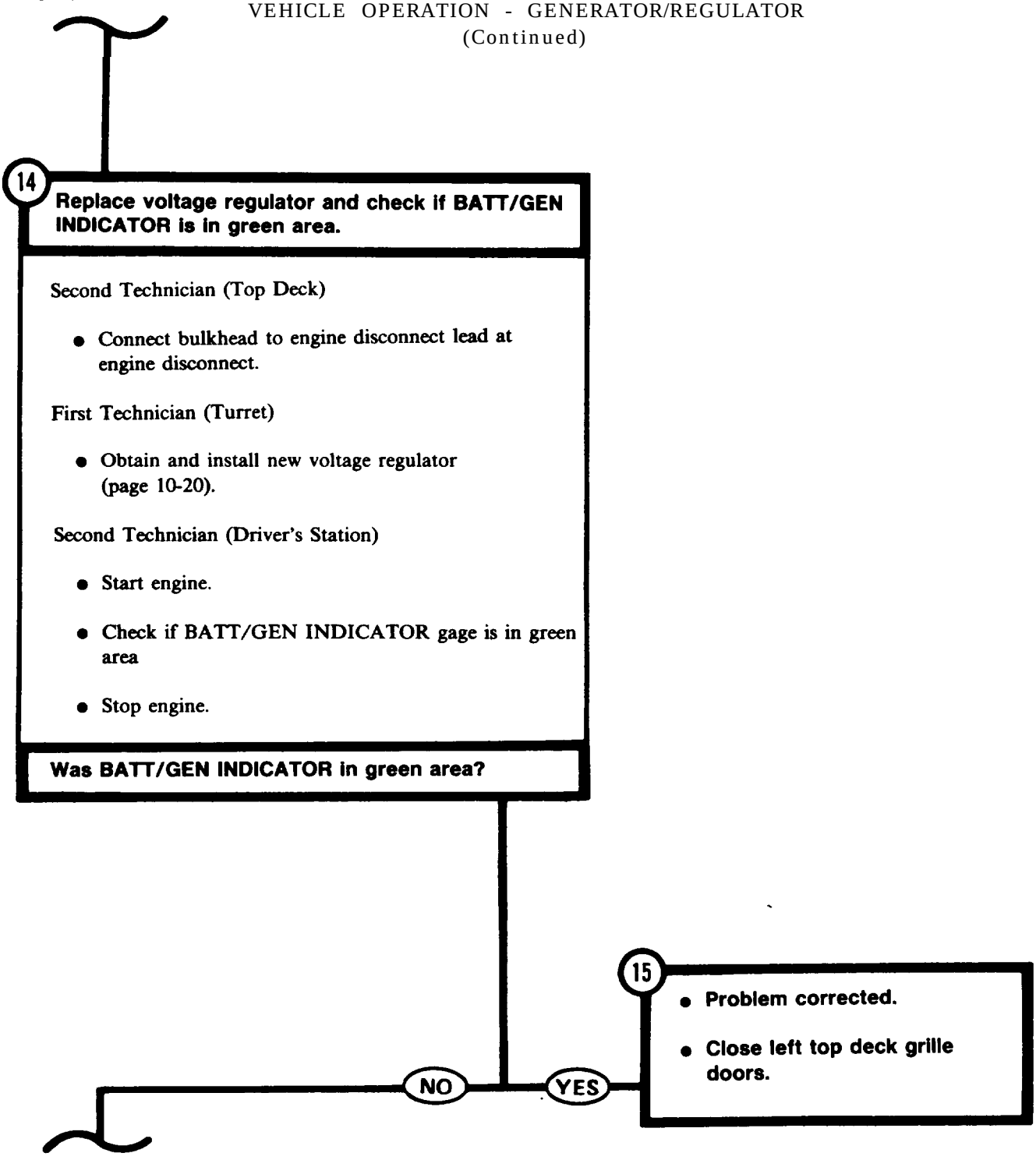
NO

13

- **Check (CKT 2) for continuity from connector at voltage regulator to connector at bulkhead electrical disconnect.**
- **See Step (36) .**

TA142179

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)



TA142180

Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

16 **Check (CKT 1) for continuity from connector at engine disconnect to terminal A on generator.**

First Technician (Top Deck)

- Remove powerplant (page 5-1).

First Technician (Powerplant)

- Connect red probe of meter to contact C (CKT 1) of engine electrical harness connector at engine disconnect.

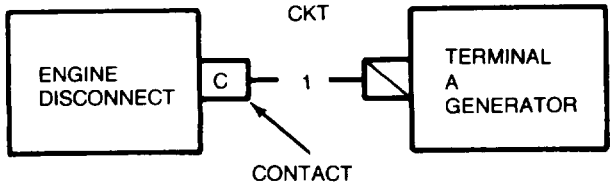
Second Technician (Powerplant)

- Connect black probe of meter to terminal A of generator.
- Check if meter indicates continuity.

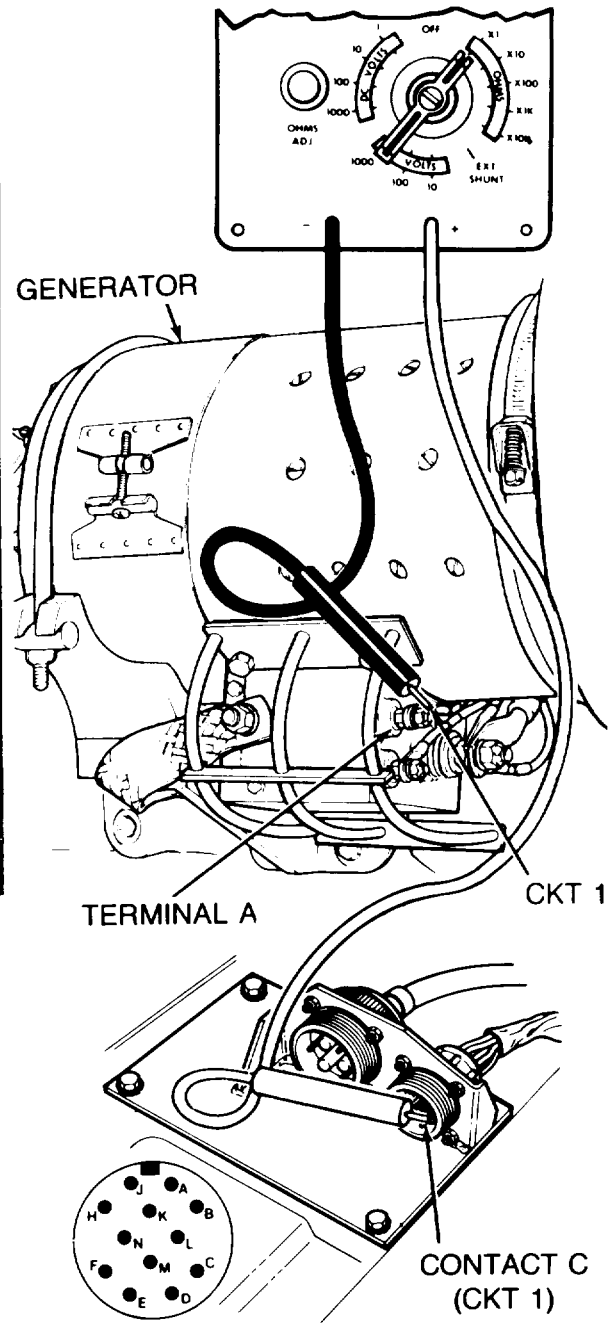
Does meter indicate continuity?

17 **Repair engine electrical harness (CKT 1) (page 10-307).**

NO



YES



ENGINE DISCONNECTS (RIGHT SIDE)

TA142181

Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

18 **Check (CKT 478) for continuity from connector at engine disconnect to terminal D on generator.**

First Technician (Powerplant)

- Connect red probe of meter to contact L (CKT 478) of engine electrical harness connector at engine disconnect.

Second Technician (Powerplant)

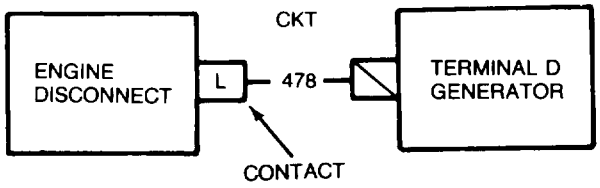
- Connect black probe of meter to terminal D of generator.
- Check if meter indicates continuity.

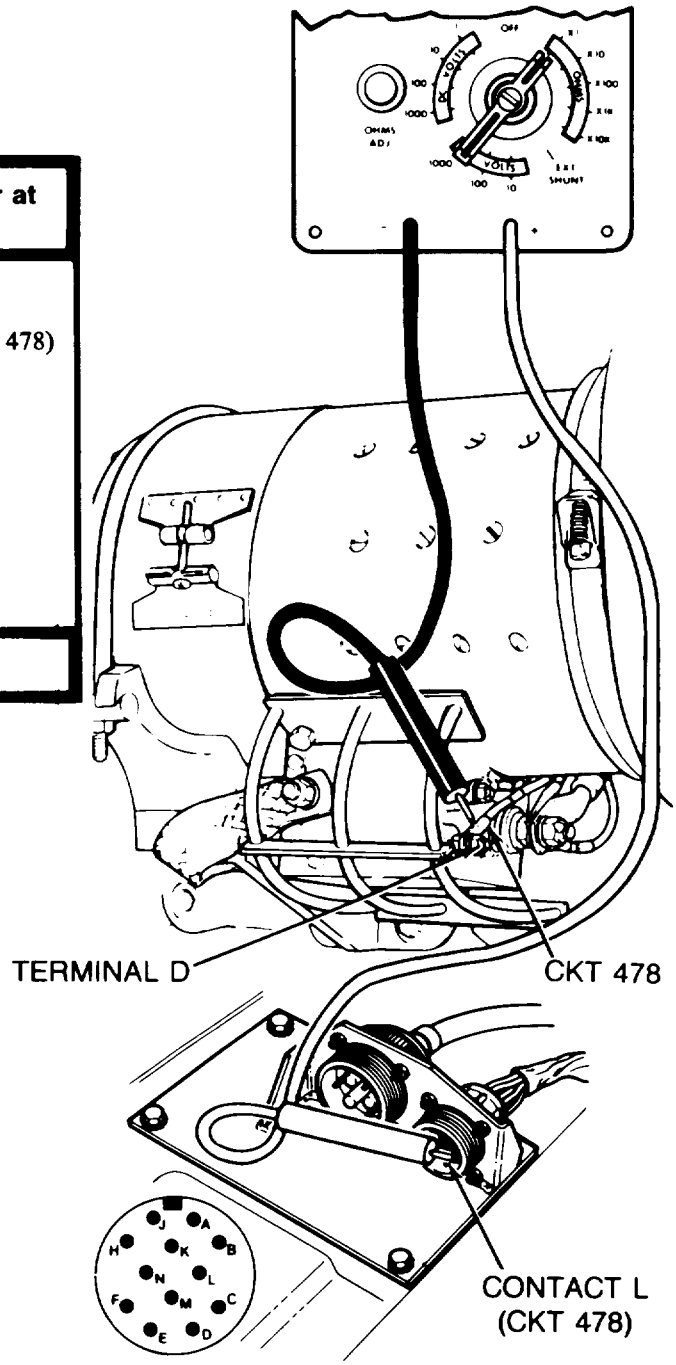
Does meter indicate continuity?

19 **Repair engine electrical harness (CKT 478) (page 10-307).**

NO

YES





TA142182

Symptom-31-2D

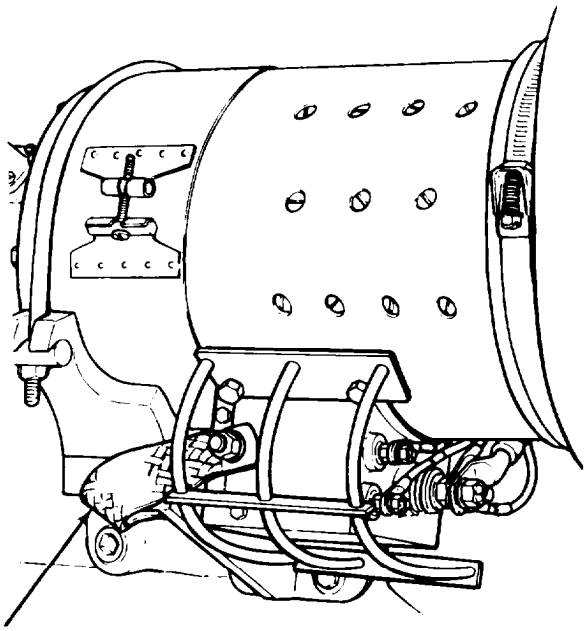
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

20 **Check for loose ground strap connections or damaged ground strap on generator.**

First Technician (Powerplant)

- Check if ground strap connections are loose.
- Check ground strap for damage.

Is ground strap loose or damaged?



NO

YES

21

- **Clean and tighten loose ground strap connections.**
- **If ground strap connections are not loose replace damaged ground strap (page 10-4).**

TA142183

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

Symptom-31-2D

22 **Check (CKT 2) for continuity from connector at engine disconnect to terminal B on generator.**

First Technician (Powerplant)

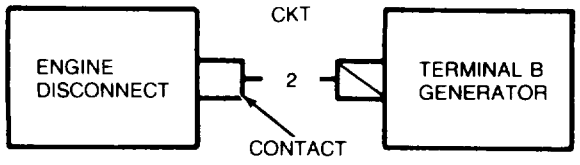
- Connect red probe of meter to (CKT 2) generator lead connector at engine disconnect.

Second Technician (Powerplant)

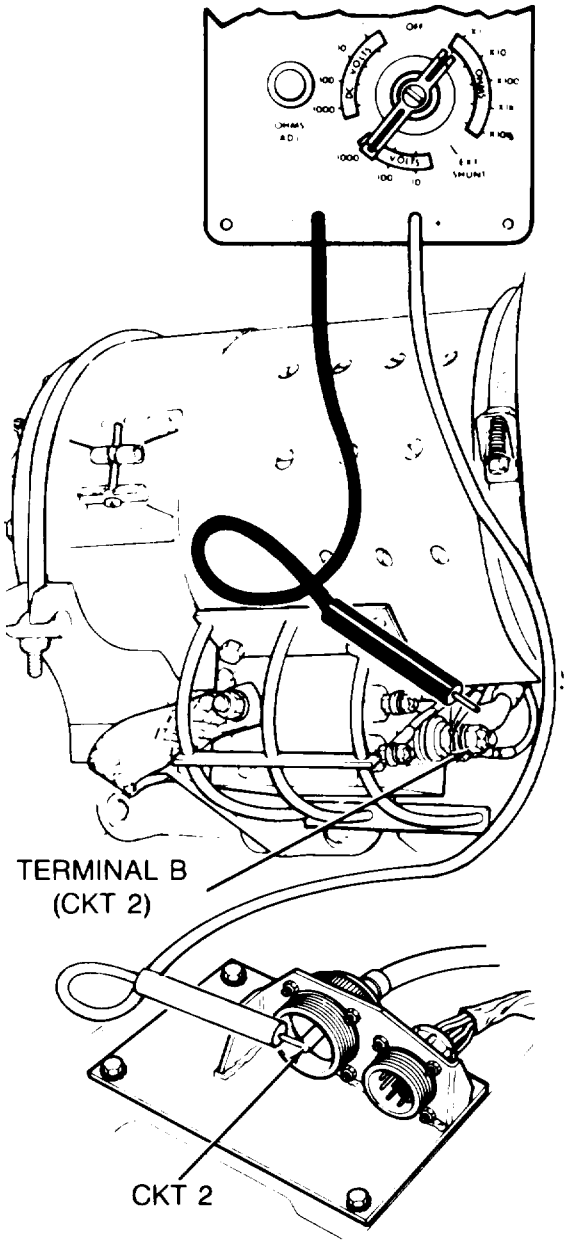
- Connect black probe of meter to generator lead connector at terminal B of generator.
- Check if meter indicates continuity.

Does meter indicate continuity?

23 **Repair generator lead (CKT 2) (page 10-307).** — NO



24 **Replace generator/blower assembly(page 10-4).** — YES



TA 142184

Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

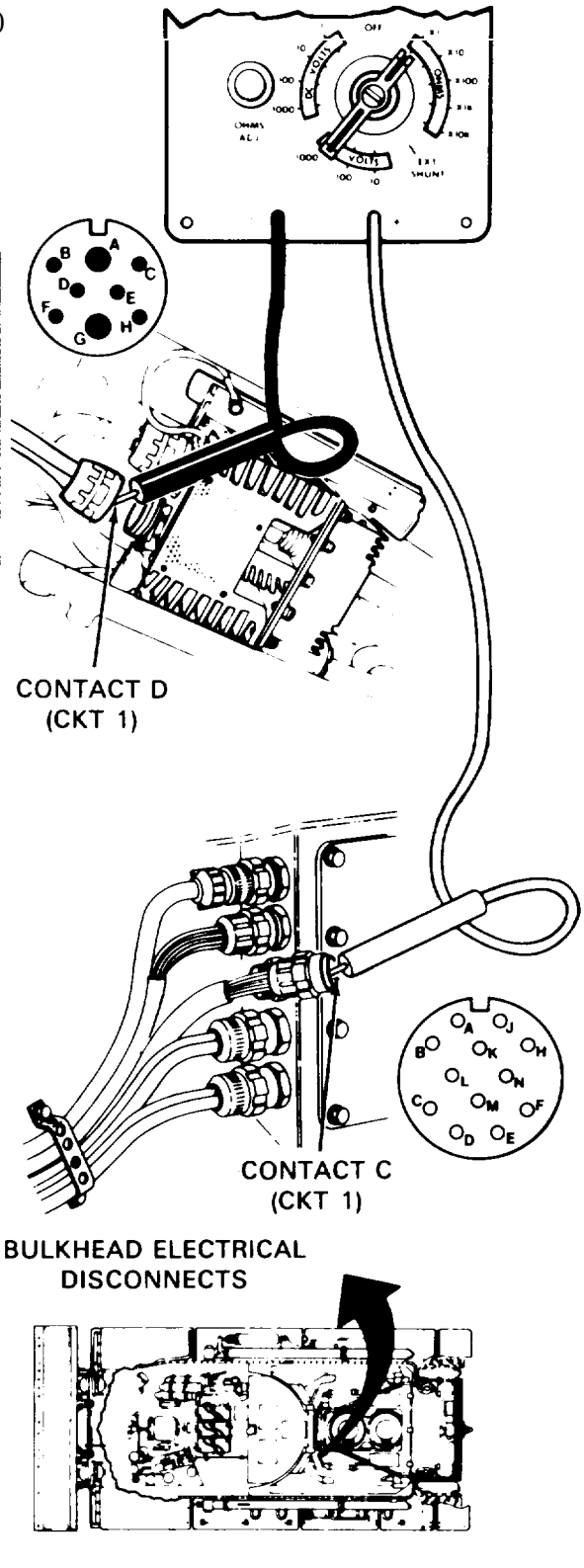
FROM STEP 9

25 **Check (CKT 1) for continuity from connector at voltage regulator to connector at bulkhead electrical disconnect.**

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Connect red probe of meter to contact C (CKT 1) of hull front master harness connector at bulkhead electrical disconnect.
- Connect black probe of meter to contact D (CKT 1) of hull front master harness connector at voltage regulator.
- Check if meter indicates continuity.

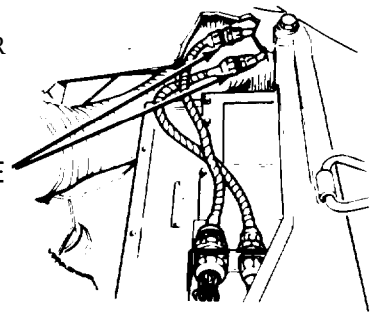
Does meter indicate continuity?



DETAILED TROUBLESHOOTING PROCEDURE

Symptom-31-2D VEHICLE OPERATION - GENREATOR/REGULATOR

(Continued)



STEP (25) CONTINUED

(27)

- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness extension (CKT 1) for continuity from intermediate connector to connector of engine disconnect.**
- **See Step (39) .**

For harness without intermediate connector:

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 1) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**
- **Connect hull front master harness connector to voltage regulator.**

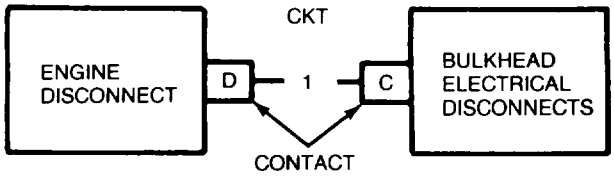
YES / NO

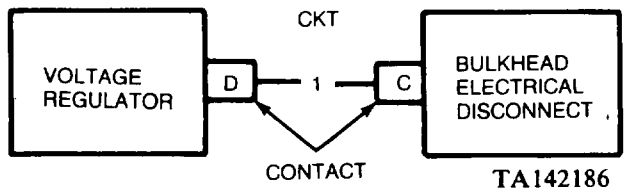
(26)

- **Check if vehicle has GENERATOR switch (located on master control panel).**
- **If vehicle has GENERATOR switch check GENERATOR SWITCH for continuity.**
- **See Step (28) .**

For vehicles without GENERATOR switch:

- **Inspect hull front master harness (CKT 1) at bulkhead electrical disconnect (contact C) and at voltage regulator (contact D) for bent/broken connector contacts or loose circuit wires.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness connector to bulkhead disconnect.**
- **Connect hull front master harness connector to voltage regulator.**





TA142186

Symptom-31-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

FROM STEP 26

28 **Check GENERATOR switch for continuity.**

Second Technician (Driver's Station)

- Disconnect both leads (CKT 1) from GENERATOR switch.
- Set GENERATOR switch ON.
- Connect probes of meter to contacts of GENERATOR switch.
- Check if meter indicates continuity.

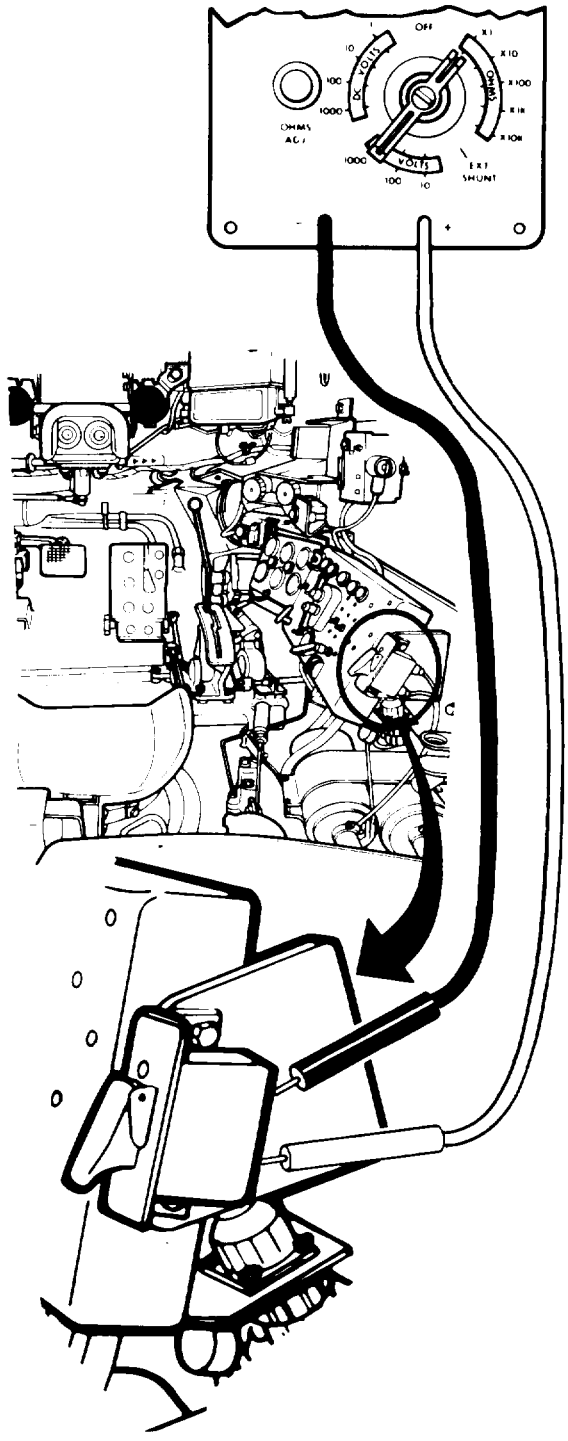
Does meter indicate continuity?

NO

29

- **Replace GENERATOR switch (page 10-40).**
- **Connect engine accessory harness connector at engine disconnect.**
- **Connect hull front master harness connector to bulkhead disconnect.**
- **Connect hull front master harness connector to voltage regulator.**

YES



TA142187

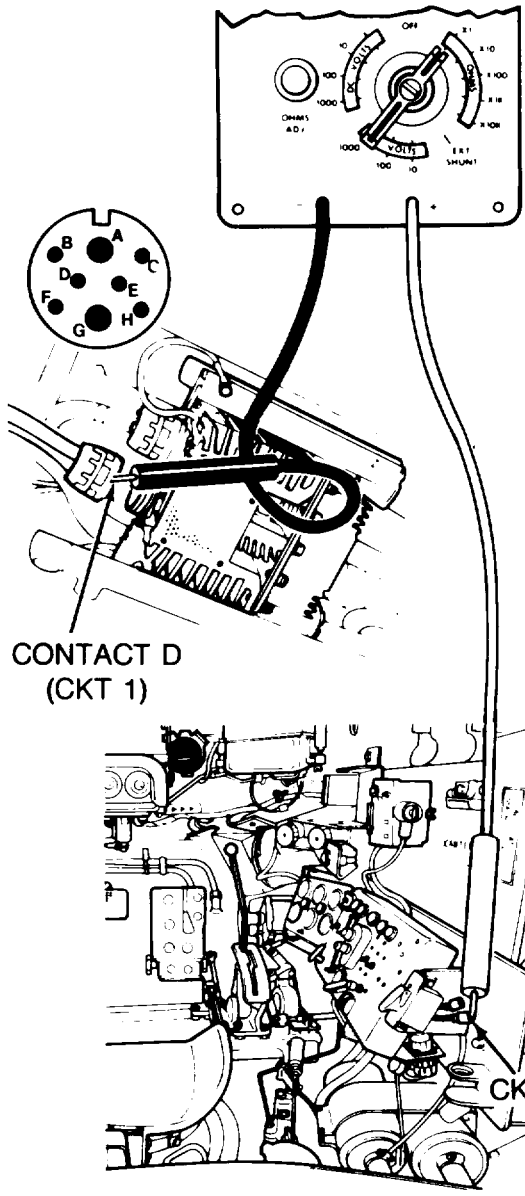
Symptom-31-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

30 **Check (CKT 1) for continuity from connector at voltage regulator to connector at GENERATOR switch.**

First Technician (Turret)

- Connect black probe of meter to contact D (CKT 1) of hull front master harness connector at voltage regulator.
- Connect red probe of meter to one of the hull front master harness (CKT 1) leads at GENERATOR switch.
- Check if meter indicates continuity.
- Connect red probe of meter to the other hull front master harness (CKT 1) lead at GENERATOR switch.



TA142188

Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
STEP (30) CONTINUED (Continued)

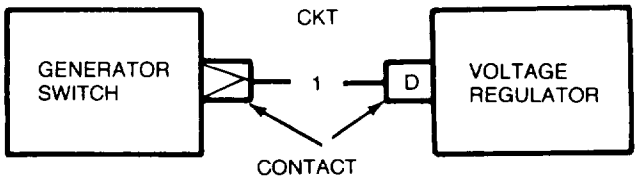
- Check if meter indicates continuity.

Does meter indicate continuity at one of the two leads?

NO

(31)

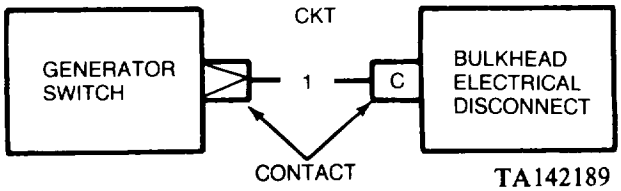
- **Inspect hull front master connector at GENERATOR switch and at voltage regulator for bent/broken connector contacts or loose (CKT 1) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective hull front master harness.**
- **Connect both leads (CKT 1) to GENERATOR switch.**
- **Connect engine accessory harness connector at engine disconnect.**
- **Connect hull front master harness connector to bulkhead disconnect.**
- **Connect hull front master harness connector to voltage regulator.**



YES

(32)

- **Inspect hull front master harness connector at GENERATOR switch and bulkhead electrical disconnect for bent/broken connector contacts or loose (CKT 1) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective hull front master harness.**
- **Connect both leads (CKT 1) to GENERATOR switch.**
- **Connect engine accessory harness connector at engine disconnect.**
- **Connect hull front master harness connector to bulkhead disconnect.**
- **Connect hull front master harness connector to voltage regulator.**



TA142189

Symptom-31-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

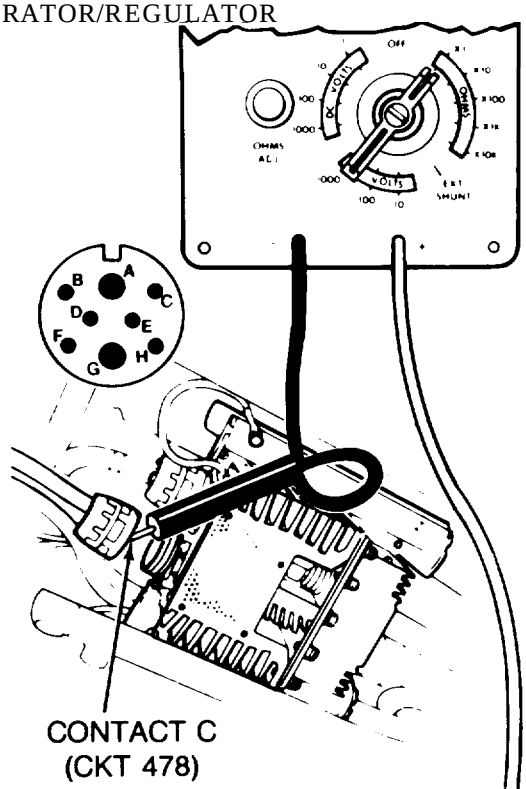
FROM STEP

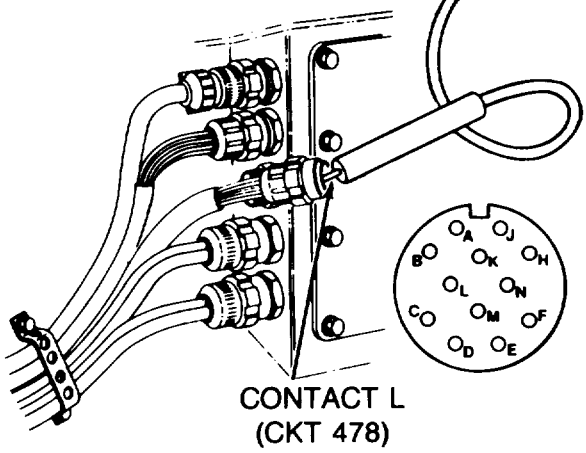
11

33 **Check (CKT 478) for continuity from connector at voltage regulator to connector at bulkhead electrical disconnect.**

First Technician (Turret)

- Disconnect hull front master harness connector (CKT 478) at bulkhead electrical disconnect.
- Connect red probe of meter to contact L (CKT 478) of hull front master harness connector at bulkhead electrical disconnect.
- Connect black probe of meter to contact C (CKT 478) of hull front master harness connector at voltage regulator.





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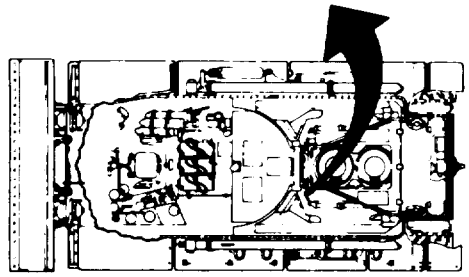


TA142190

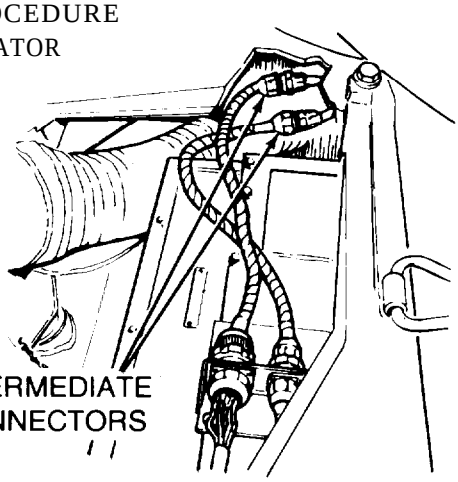
DETAILED TROUBLESHOOTING PROCEDURE

Symptom-31-2D VEHICLE OPERATION - GENERATOR/REGULATOR

STEP (33) CONTINUED (Continued)

- Check if meter indicates continuity.

Does meter indicate continuity?



YES

35

- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness extension (CKT 478) for continuity from intermediate connector to connector of engine disconnect.**
- **See Step (42) .**

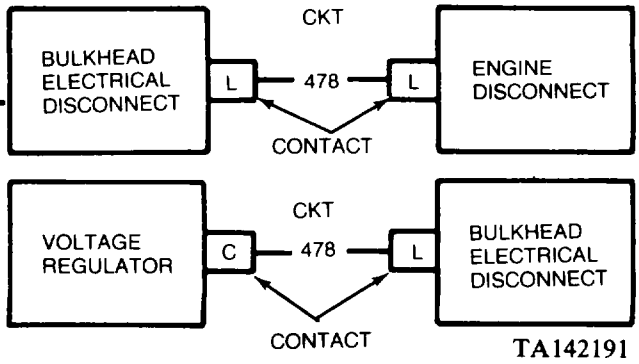
For harness without intermediate connector:

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 478) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**
- **Connect hull front master harness to voltage regulator.**
- **Connect hull front master harness to bulkhead electrical disconnects.**

NO

34

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 478) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective hull front master harness.**
- **Connect front master harness to voltage regulator.**
- **Connect hull front master harness to bulkhead electrical disconnect.**
- **Connect engine accessory harness to engine disconnect.**



TA142191

Symptom-31-2D

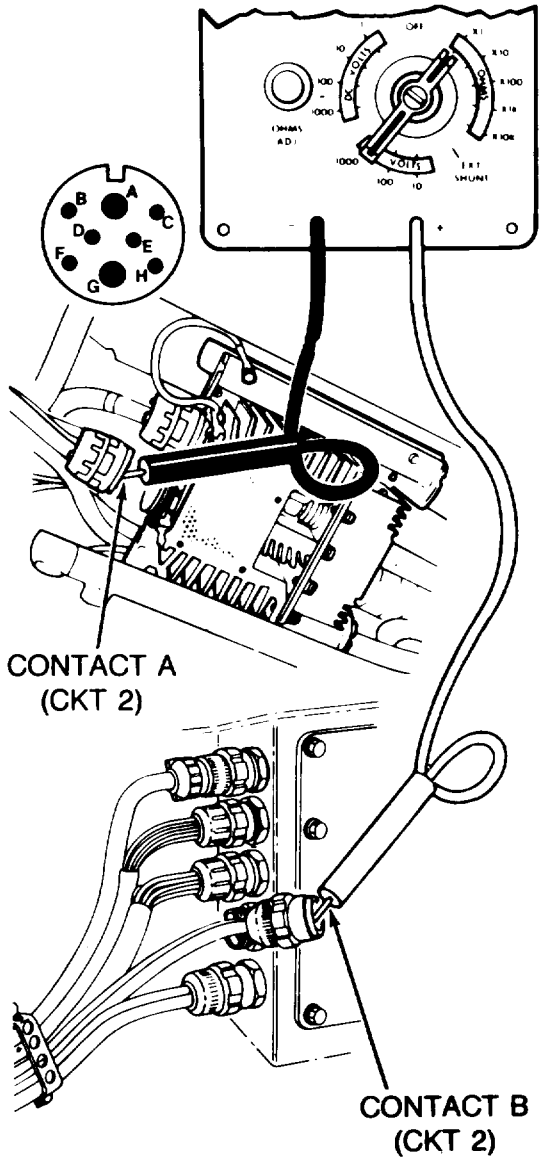
DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

FROM STEP 13

36 **Check (CKT 2) for continuity from connector at voltage regulator to connector at bulkhead electrical disconnect.**

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnect.
- Disconnect hull front master harness connector (CKT 2) from engine disconnect lead at bulkhead electrical disconnect.
- Connect red probe of meter to contact B (CKT 2) of hull front master harness connector at bulkhead electrical disconnect.
- Connect black probe of meter to contact A (CKT 2) of hull front master harness connector at voltage regulator.



TA142192

Symptom-31-2D

STEP (36) CONTINUED

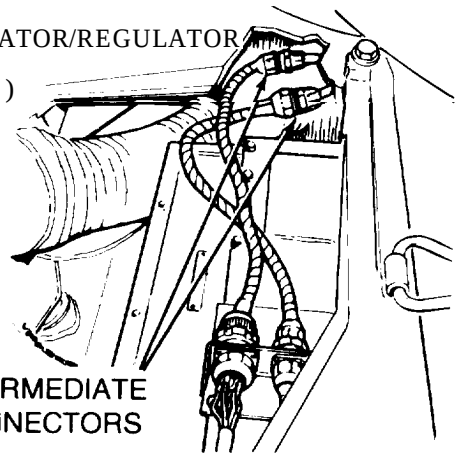
DETAILED TROUBLESHOOTING PROCEDURE

VEHICLE OPERATION - GENERATOR/REGULATOR

(Continued)

- Check if meter indicates continuity.

Does meter indicate continuity?



INTERMEDIATE CONNECTORS

YES

38

- **Check if engine disconnect lead has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If lead has intermediate connector check engine disconnect extension (CKT 2) for continuity from intermediate connector to connector of engine disconnect.**
- **See Step (45) .**

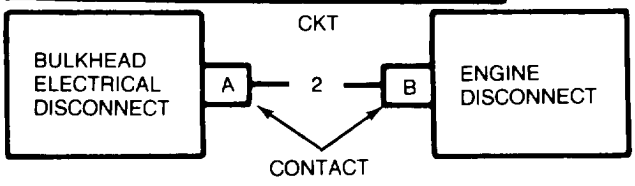
For harness without intermediate connector:

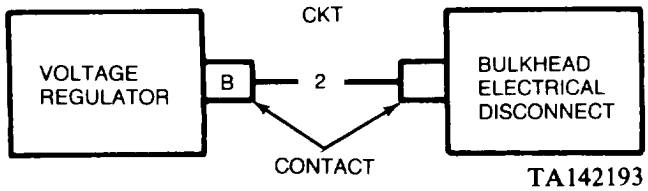
- **Inspect engine disconnect lead for bent/broken connector contacts or loose (CKT 2) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine disconnect lead.**
- **Connect engine disconnect lead connector to engine disconnect.**
- **Connect hull front master harness to voltage regulator.**
- **Connect hull front master harness to bulkhead electrical disconnect.**

NO

37

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 2) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness (CKT 1) at voltage regulator.**
- **Connect hull front master harness (CKT 1) at bulkhead disconnect.**
- **Connect engine disconnect lead at engine disconnect.**





TA142193

Symptom-31-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

FROM STEP (27)

39 Check engine accessory harness extension (CKT 1) for continuity from intermediate connector of engine disconnect.

Second Technician (Driver's Station)

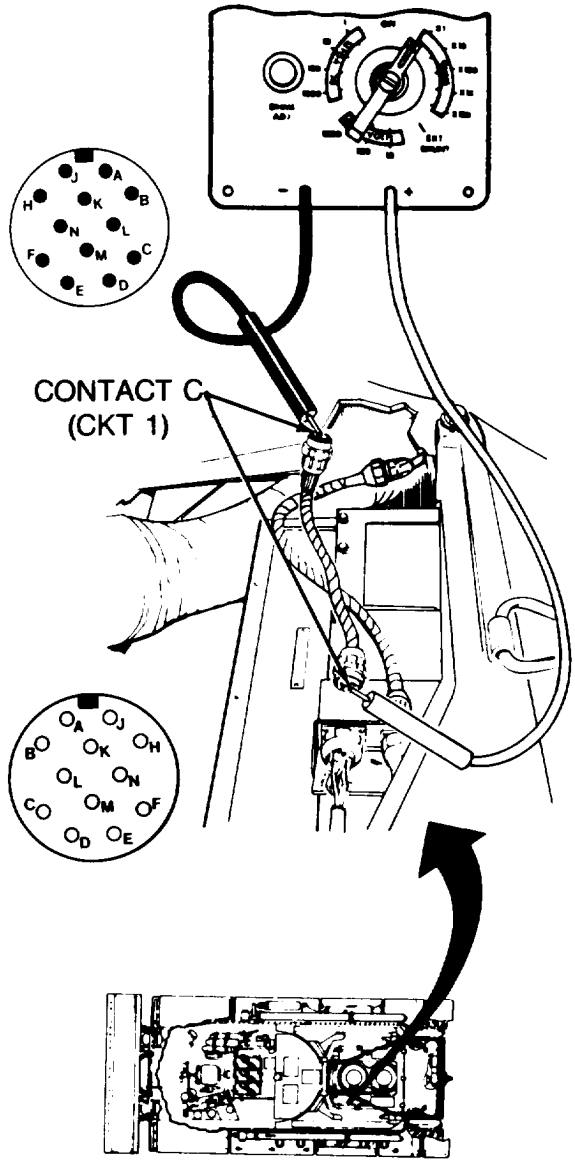
- Connect both leads (CKT 1) to GENERATOR switch.

First Technician (Turret)

- Connect hull front master harness connector to voltage regulator.

Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact C (CKT 1) of extension harness connector at engine disconnect.



TA142194

Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

STEP 39 CONTINUED

- Connect black probe of meter to contact C (CKT 1) of extension harness at intermediate connector.
- Check if meter indicates continuity.

Does meter indicate continuity?

YES

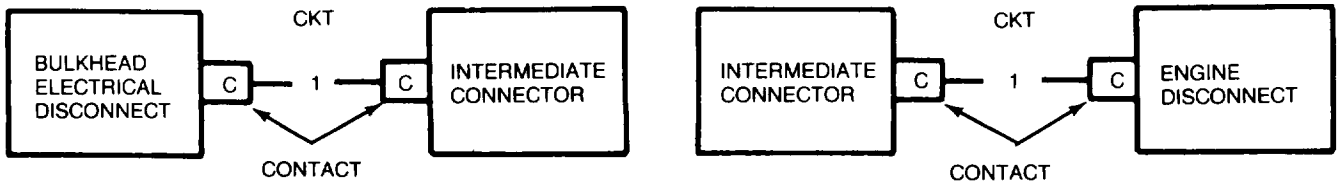
40

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 1) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness to bulkhead electrical disconnect.**

NO

41

- **Inspect engine accessory harness extension for bent/broken connector contacts or loose (CKT 1) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness to bulkhead electrical disconnect.**



TA142195

Symptom-31-2D

DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

FROM STEP

35

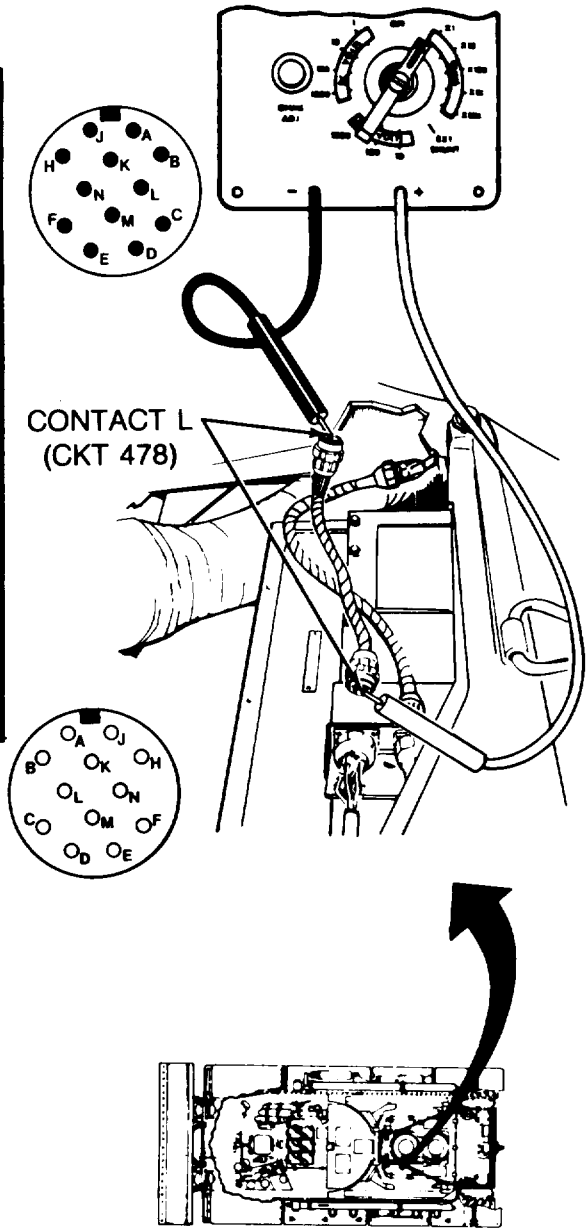
42 **Check engine accessory harness extension (CKT 478) for continuity from intermediate connector to connector of engine disconnect.**

Second Technician (Turret)

- Connect hull front master harness (CKT 1) at voltage regulator.

First Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Connect red probe of meter to contact L (CKT 478) of extension harness connector at engine disconnect.
- Connect black probe of meter to contact L (CKT 478) of extension harness at intermediate connector.



TA142196

Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

STEP 42 CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

YES

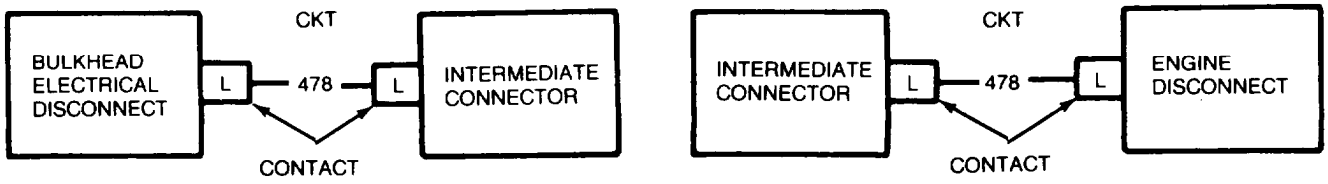
43

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 478) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness to bulkhead electrical disconnect.**

NO

44

- **Inspect engine accessory harness extension for bent/broken connector contacts or loose (CKT 478) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness to bulkhead electrical disconnect.**



TA142197

Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

FROM STEP 38

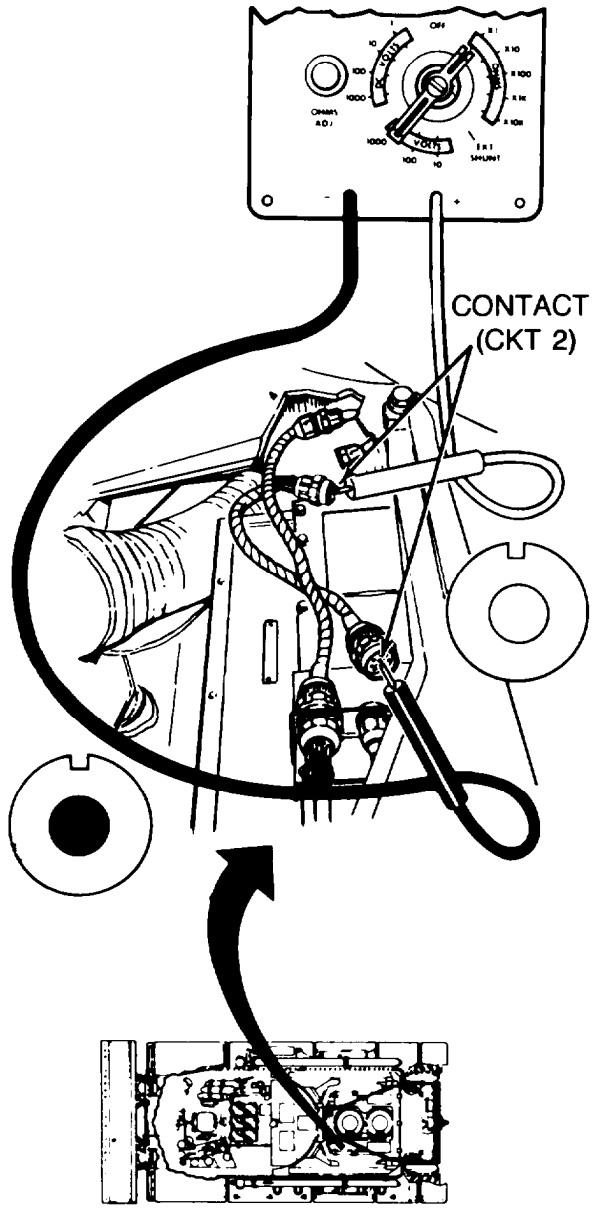
45 **Check engine disconnect lead extension (CKT 2) for continuity from intermediate connector to connector of engine disconnect.**

Second Technician (Turret)

- Connect hull front master harness (CKT 1) at voltage regulator.

First Technician (Top Deck)

- Disconnect engine disconnect lead at intermediate connector.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact (CKT 2) of extension harness connector at engine disconnect.
- Connect black probe of meter to contact (CKT 2) of extension harness at intermediate connector.



TA142198

Symptom-31-2D DETAILED TROUBLESHOOTING PROCEDURE
VEHICLE OPERATION - GENERATOR/REGULATOR
(Continued)

STEP 45 CONTINUED

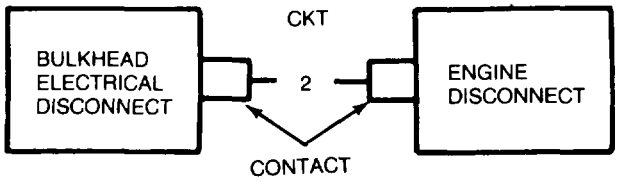
- Check if meter indicates continuity.

Does meter indicate continuity?

YES

46

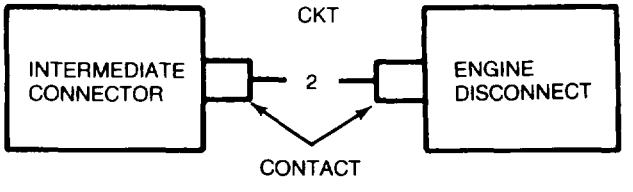
- **Inspect engine disconnect lead for bent/broken connector contacts or loose (CKT 2) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective disconnect lead.**
- **Connect engine disconnect lead to intermediate connector and to engine disconnects.**
- **Connect engine disconnect lead to bulkhead electrical disconnect.**



NO

47

- **Inspect engine disconnect lead extension for bent/broken connector contacts or loose (CKT 2) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine disconnect lead extension.**
- **Connect engine disconnect lead extension to intermediate connector and to engine disconnects.**
- **Connect engine disconnect lead to bulkhead electrical disconnect.**



TA142199

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE

Symptom-32-2D

ENGINE OIL PRESSURE GAGE WILL NOT SHOW PRESSURE (POWERPLANT WARNING LAMP NOT ON — ENGINE RUNNING — ALL OTHER GAGES READ NORMAL)(2D ENGINE).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check gage instrument panel (CKT 27) for electrical power at ENGINE PRESS indicator gage.

First Technician (Driver's Station)

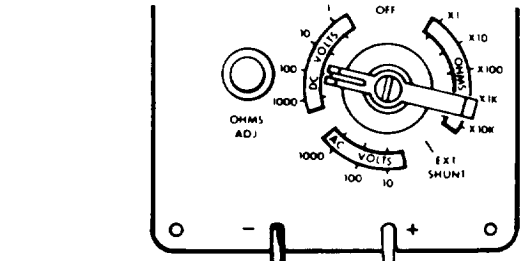
- Set MASTER BATTERY switch OFF.
- Displace gage instrument panel (page 10-121).
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Disconnect gage instrument panel harness connector (CKT 27) from ENGINE PRESS indicator gage.
- Connect red probe of meter to gage instrument panel harness connector (CKT 27) at ENGINE PRESS indicator gage and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

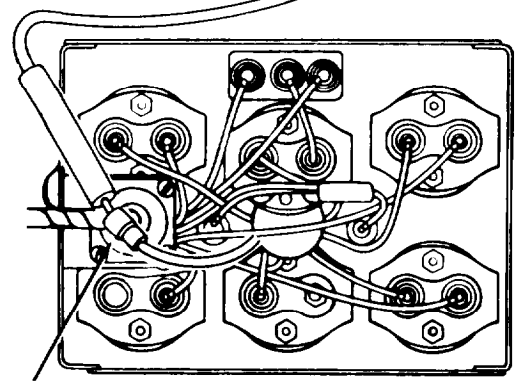
Does meter indicate 18 to 30 volts dc?

YES

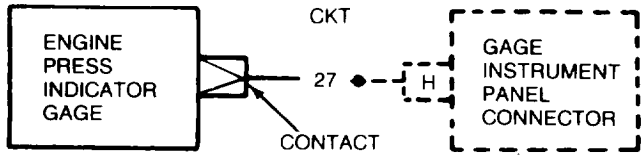
NO

2 Repair gage instrument panel harness (page 10-307).





GAGE INSTRUMENT PANEL (REAR VIEW)



All data on pages 4-579 thru 4-592 deleted. ■

Symptom-32-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

3 **Check engine oil pressure transmitter for short to ground with engine running.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect gage instrument panel harness connector (CKT 27) to ENGINE PRESS indicator gage.

Second Technician (Turret)

- Manually traverse turret to gain access to engine access covers (TM9-2350-222-10).
- Remove lower engine access cover (page 16-41).
- Disconnect engine electrical harness connector (CKT 36) from engine oil pressure transmitter.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to engine oil pressure transmitter contact and black probe to ground.

First Technician (Driver's Station)

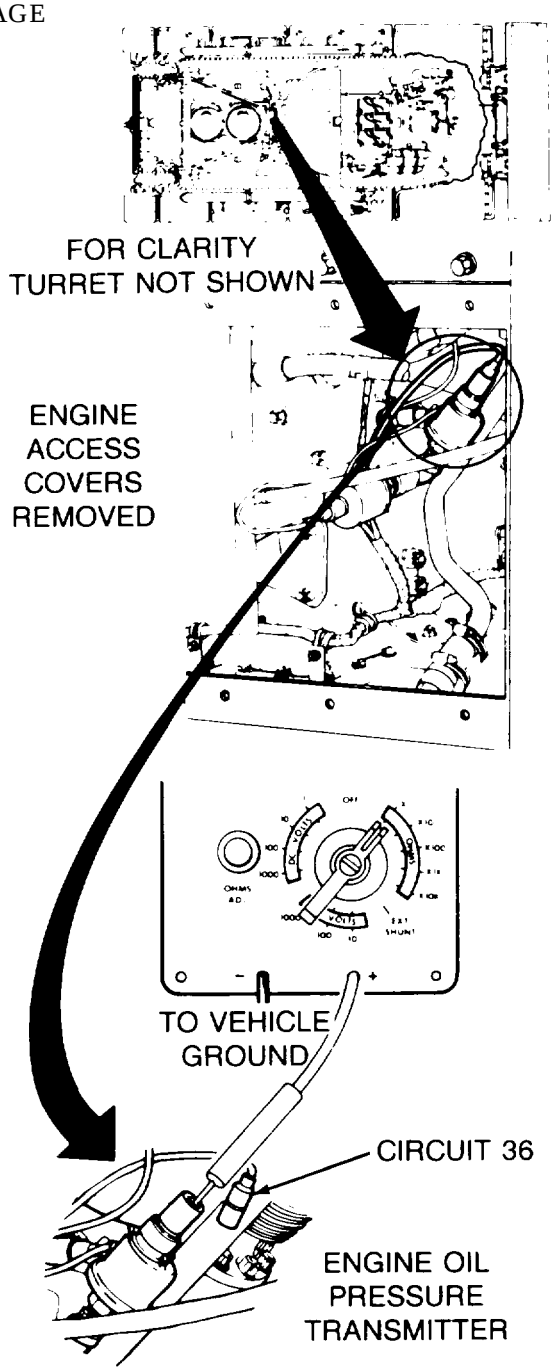
- Start engine.

Second Technician (Turret)

- Check if meter indicates continuity.

First Technician (Driver's Station)

- Stop engine.



Did meter indicate continuity, thereby indicating a short?

NO

YES

4

- **Replace engine oil pressure transmitter (page 10-267).**
- **Install gage instrument panel (page 10-122).**

TA142215

Symptom-32-2D

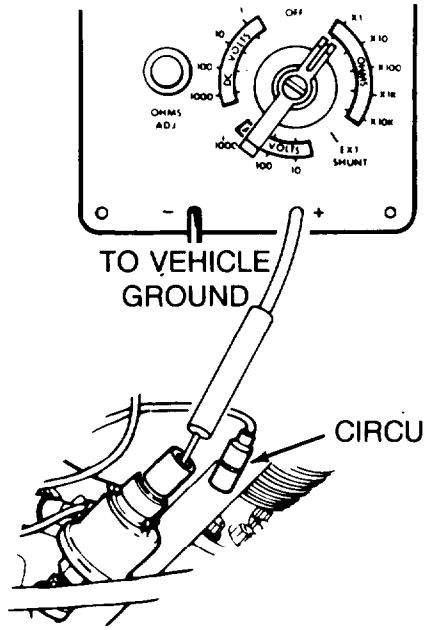
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

5 **Check engine oil pressure transmitter for continuity to ground with engine not running.**

Second Technician (Turret)

- Connect red probe of meter to engine oil pressure transmitter contact (CKT 36) and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?



6

- **Replace engine oil pressure transmitter (page 10-267).**
- **Install gage instrument panel assembly (page 10-122).**

NO

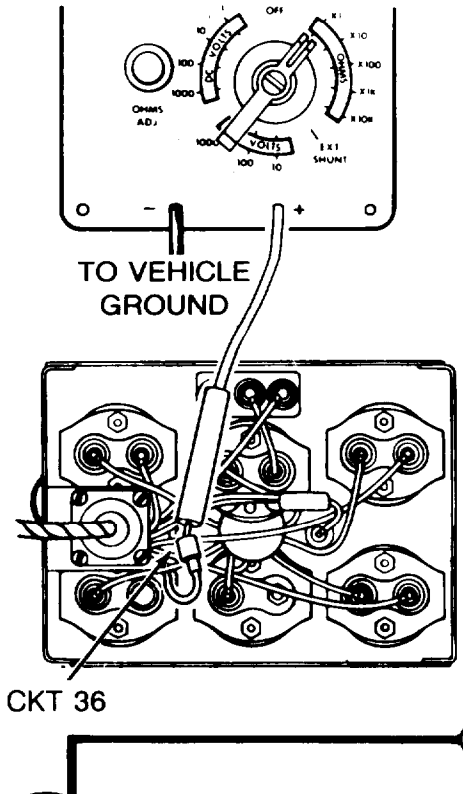
YES

7 **Check oil pressure indication circuit (CKT 36) at ENGINE PRESS indicator gage for short to ground.**

First Technician (Driver's Station)

- Disconnect gage instrument panel harness connector (CKT 36) from ENGINE PRESS indicator gage.
- Connect red probe of meter to gage instrument panel harness connector (CKT 36) and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity, thereby indicating a short?



NO

YES

8

- **Check gage instrument panel harness (CKT 36) for short to ground.**
- **See Step (18) .**

TA142216

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

Symptom-32-2D

9 **Check (CKT 36) for continuity from engine oil pressure transmitter to ENGINE PRESS indicator gage.**

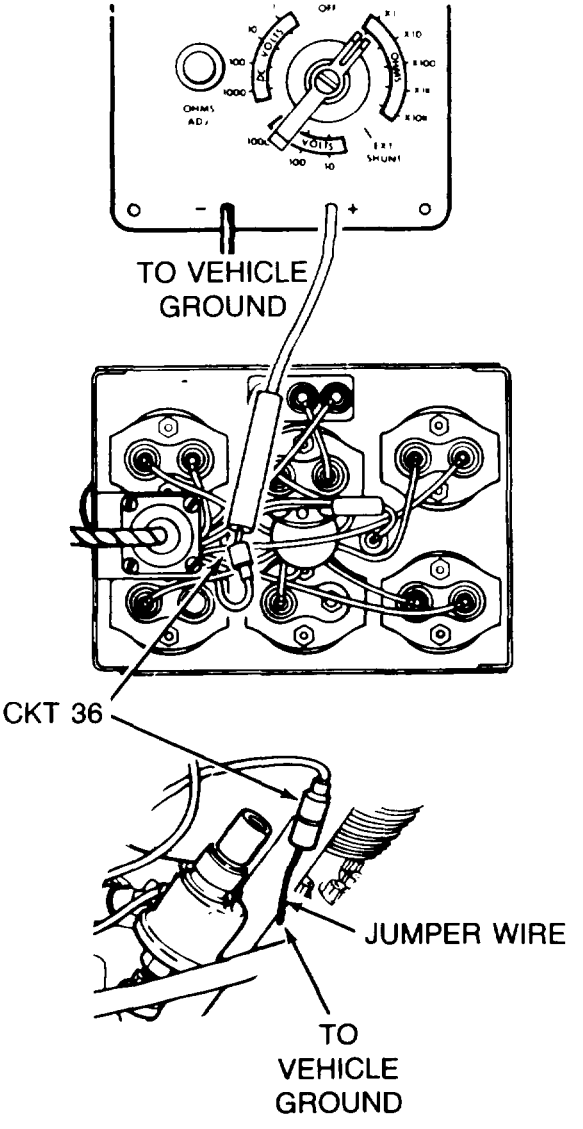
Second Technician (Turret)

- Connect jumper wire from engine electrical harness connector (CKT 36) at engine oil pressure transmitter to ground.

First Technician (Driver's Station)

- Connect red probe of meter to gage instrument panel harness connector (CKT 36) at ENGINE PRESS indicator gage and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO

YES

10

- **Replace ENGINE PRESS indicator gage (page 10-128).**
- **Install lower engine access cover (page 16-42).**

TA142217

Symptom-32-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

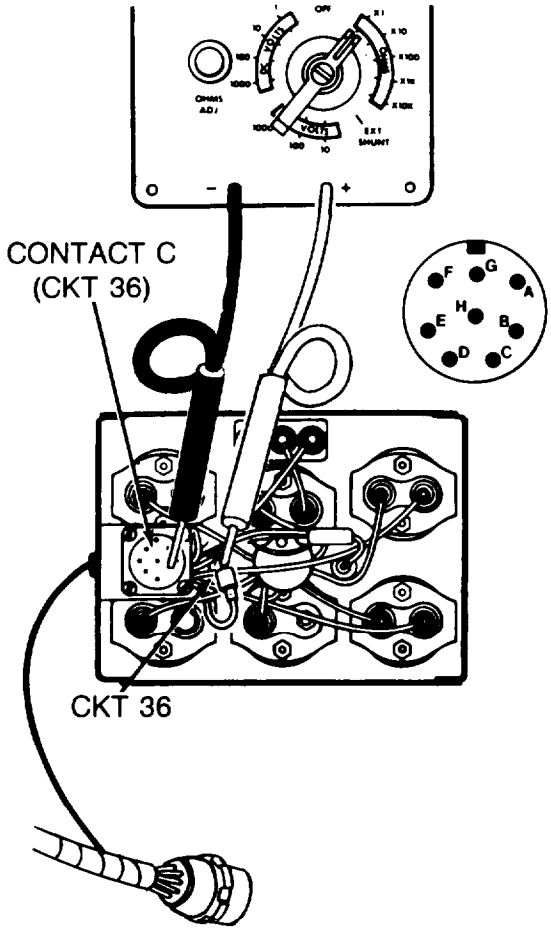
11 **Check gage instrument panel harness (CKT 36) for continuity from connector at ENGINE PRESS indicator gage to gage instrument panel connector.**

Second Technician (Turret)

- Connect engine electrical harness connector to engine oil pressure transmitter.
- Install lower engine access cover (page 16-42).

First Technician (Driver's Station)

- Disconnect hull front master harness connector from gage instrument panel.
- Connect red probe of meter to gage instrument panel harness connector (CKT 36) at ENGINE PRESS indicator gage.
- Connect black probe of meter to contact C (CKT 36) of gage instrument panel connector.
- Check if meter indicates continuity.

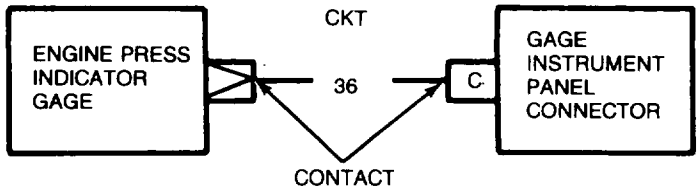


Does meter indicate continuity?

YES

NO

12 **Repair gage instrument panel harness (page 10-307).**



TA142218

Symptom-32-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

13 **Check hull front master harness (CKT 36) for continuity from connector at bulkhead electrical disconnect to connector at instrument panel.**

First Technician (Driver's Station)

- Connect gage instrument panel harness connector (CKT 36) to ENGINE PRESS indicator gage.
- At instrument panel connect jumper wire from contact C (CKT 36) of hull front master harness connector to ground.

Second Technician (Turret)

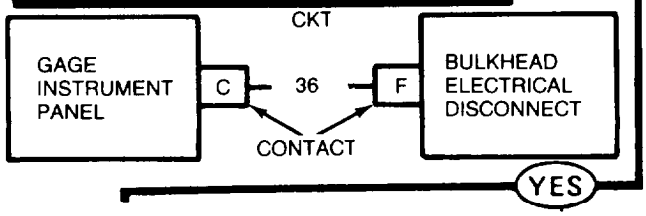
- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front harness connector from bulkhead electrical disconnect.
- Connect red probe of meter to contact F (CKT 36) of hull front master harness connector at bulkhead electrical disconnect and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?

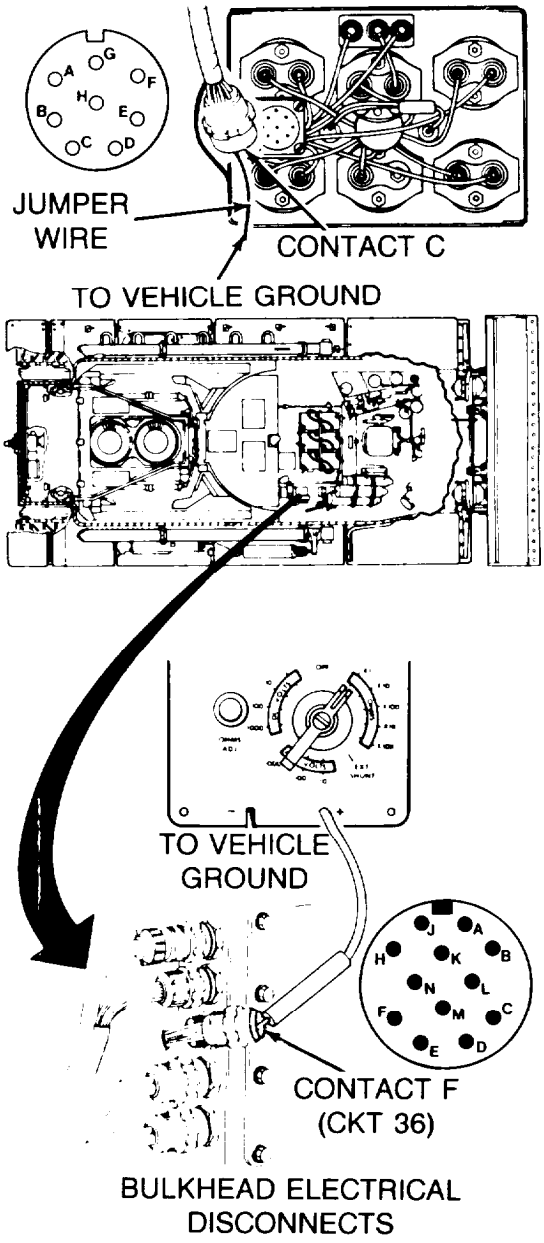
NO

14

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 36) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Install gage instrument panel (page 10-122).**



YES



TA142219

Symptom-32-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

15 **Check engine accessory harness (CKT 36) for continuity from connector at bulkhead electrical disconnect to connector at engine disconnect.**

First Technician (Driver's Station)

- Install gage instrument panel (page 10-122).

Second Technician (Turret)

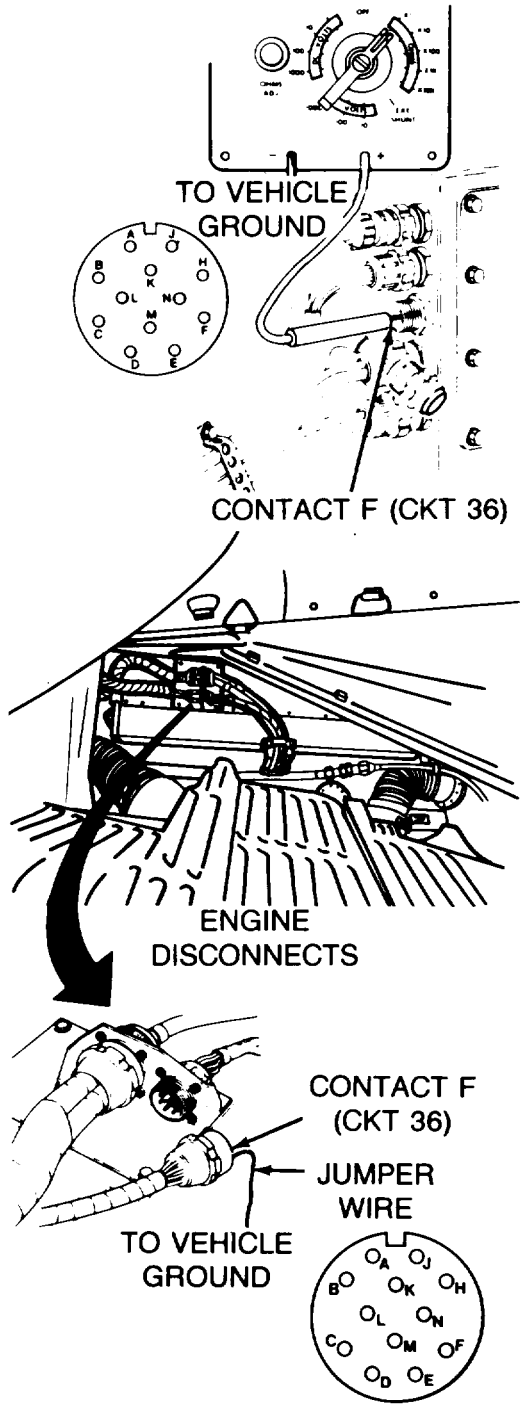
- Manually traverse turret to gain access to left top deck grille doors.

First Technician (Left Top Deck Grille Doors)

- Open left top deck grille doors.
- Disconnect engine accessory harness connector from engine disconnect.
- At engine disconnect, connect jumper wire from contact F (CKT 36) of engine accessory harness connector to ground.

Second Technician (Turret)

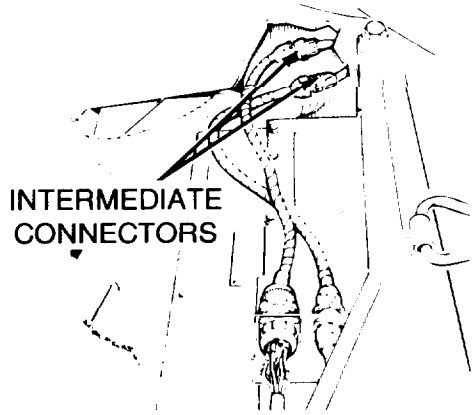
- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Connect red probe of meter to contact F (CKT 36) of engine accessory harness connector at bulkhead electrical disconnect and black probe to ground.



TA142220

Symptom-32-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (15) CONTINUED



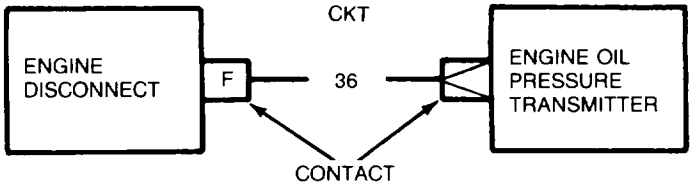
- Check if meter indicates continuity.

Does meter indicate continuity?

YES

(16)

- **Repair engine electrical harness (page 10-307).**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



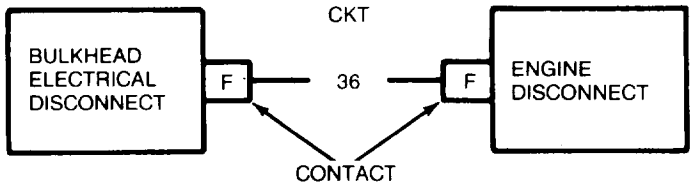
NO

(17)

- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness extension (CKT 36) for continuity from intermediate connector to connector at engine disconnect.**
- **See Step (25) .**

For harness without intermediate connector:

- **Inspect engine accessory harness (CKT 36) for bent/broken connector contacts or loose (CKT 36) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142221

Symptom-32-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP 8

18 Check gage instrument panel harness (CKT 36) for short to ground.

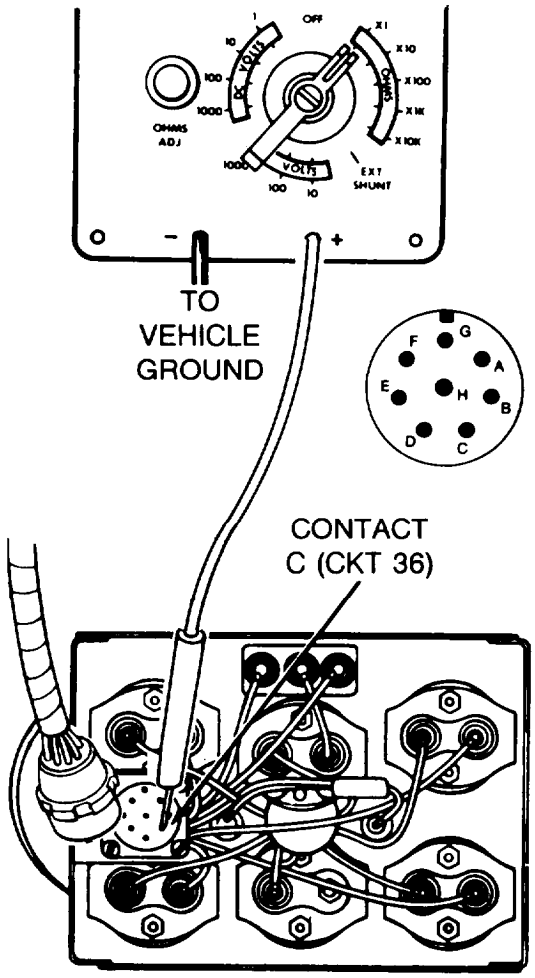
Second Technician (Turret)

- Connect engine electrical harness connector to engine oil pressure transmitter.
- Install lower engine access cover (page 16-42).

First Technician (Driver's Station)

- Connect gage instrument panel harness connector to ENGINE PRESS indicator gage.
- Disconnect hull front master harness connector (CKT 36) from gage instrument panel.
- Connect red probe of meter to contact C of gage instrument panel harness connector (CKT 36) and black probe to ground.
- Check if meter indicates continuity.

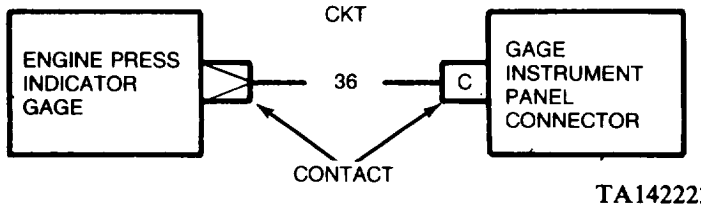
Does meter indicate continuity, thereby indicating a short?



NO

YES

19 Repair gage instrument panel harness (page 10-307).



TA142222

Symptom-32-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

20 **Check hull front master harness (CKT 36) for short to ground.**

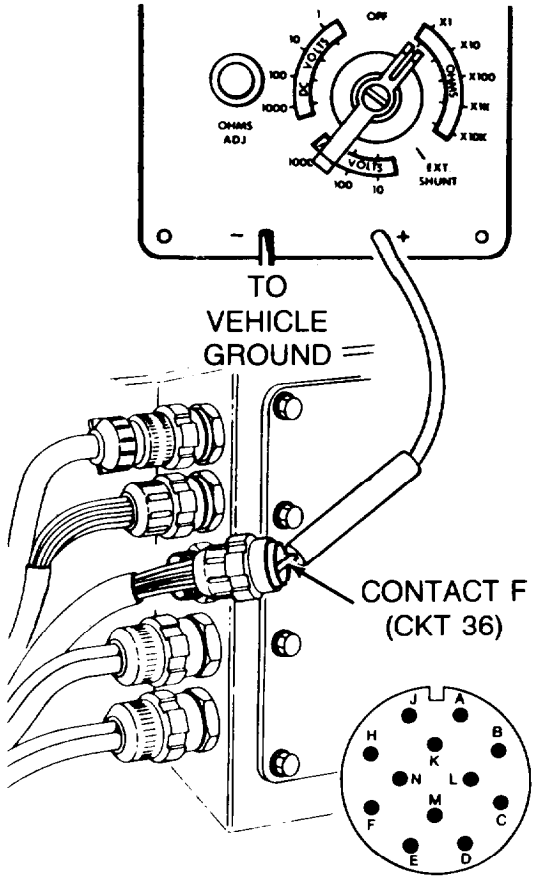
First Technician (Driver's Station)

- Install gage instrument panel (page 10-122).

Second Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Connect red probe of meter to contact F (CKT 36) of hull front master harness connector at bulkhead electrical disconnect and black probe to ground.
- Check if meter indicates continuity.

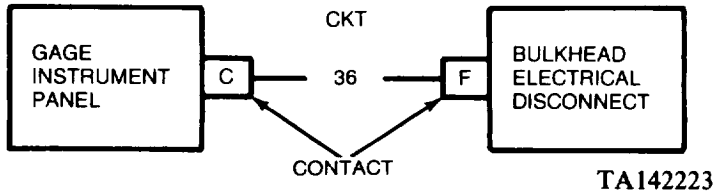
Does meter indicate continuity, thereby indicating a short.



NO

YES

21
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 36) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a bad hull front master harness.**



TA142223

Symptom-32-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

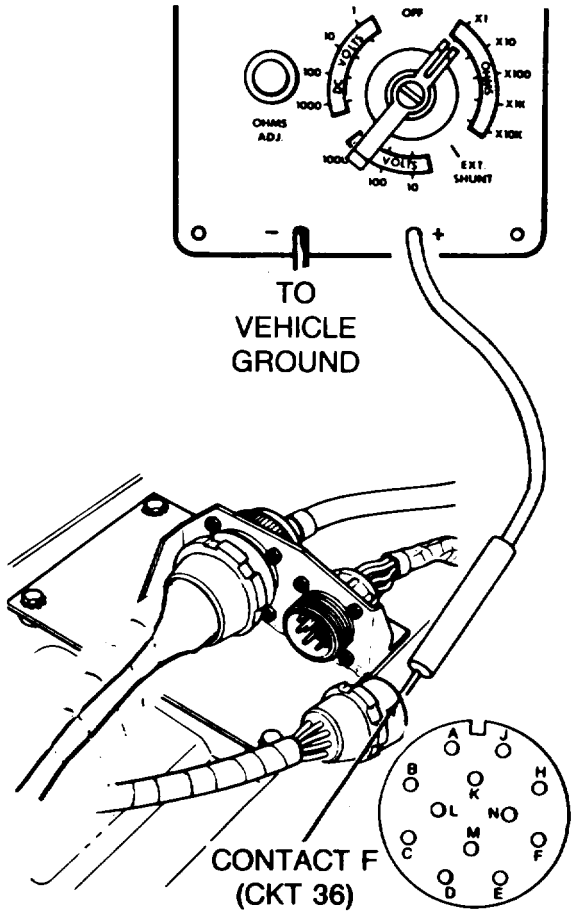
22 **Check engine accessory harness (CKT 36) for short to ground.**

Second Technician (Turret)

- Manually traverse turret to gain access to left top deck grille doors.

First Technician (Left Top Deck Grille Doors)

- Open left top deck grille doors.
- Disconnect engine accessory harness connector from engine disconnect.
- Connect red probe of meter to contact F (CKT 36) of engine accessory harness connector at engine disconnect and black probe to ground.



TA142224

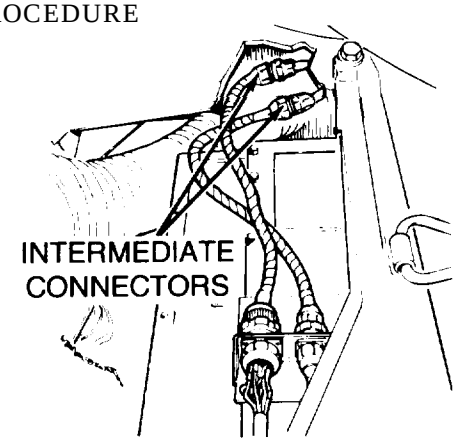
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

Symptom-32-2D

STEP (22) CONTINUE!

- Check if meter indicates continuity.

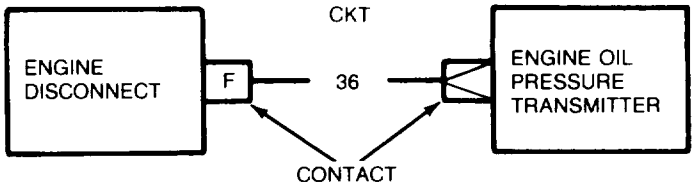
Does meter indicate continuity thereby indicating a short?



YES

23

- **Repair engine electrical harness (page 10-307).**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



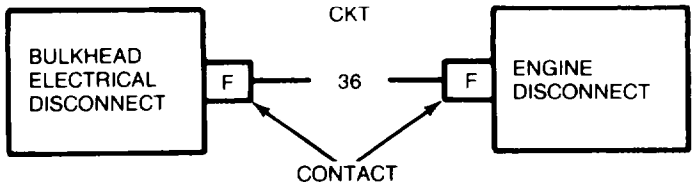
NO

24

- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory (CKT 36) at intermediate connector for short to ground.**
- **See Step (28) .**

For harness without intermediate connector:

- **Inspect engine accessory harness (CKT 36) for bent/broken connector contacts or loose (CKT 36) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142225

Symptom-32-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

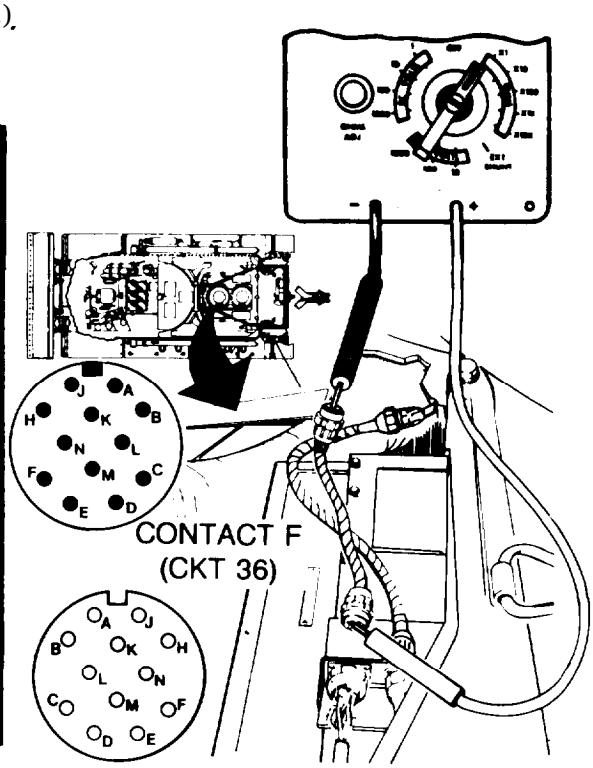
FROM STEP 17

25 **Check engine accessory harness extension (CKT 36) for continuity from intermediate connector to connector of engine disconnect.**

Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Connect black probe of meter to contact F (CKT 36) of extension harness intermediate connector.
- Connect red probe of meter to contact F (CKT 36) of extension harness connector at engine disconnect.
- Check if meter indicates continuity.

Does meter indicate continuity?

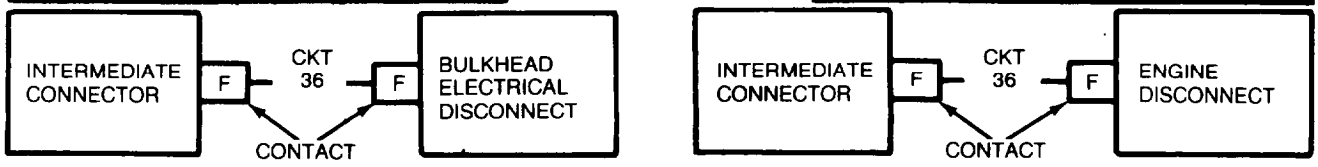


YES

26
- **Inspect engine accessory harness (CKT 36) for bent/broken connector contacts or loose (CKT 36) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**

NO

27
- **Inspect engine accessory harness extension (CKT 36) for bent/broken connector contacts or loose (CKT 36) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnect.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142226

Symptom-32-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

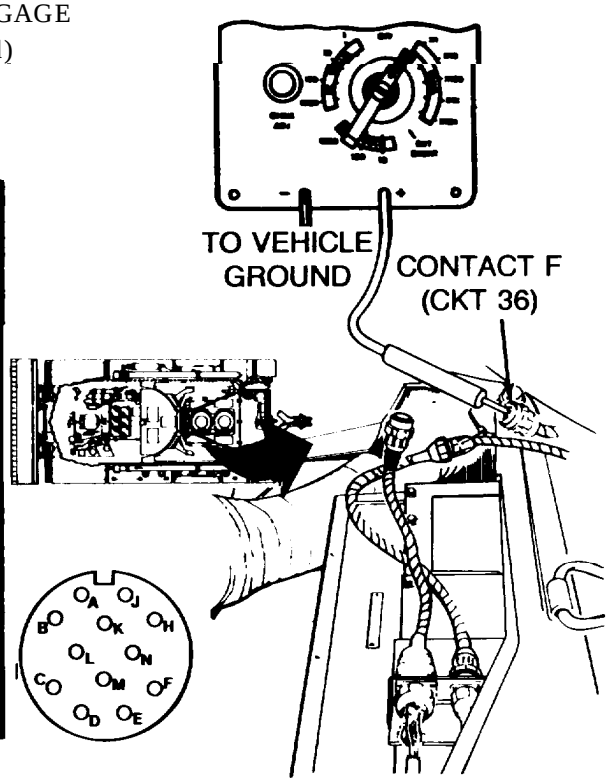
FROM STEP 24

28 **Check engine accessory harness (CKT 36) at intermediate connector for short to ground.**

Technician (Top Deck)

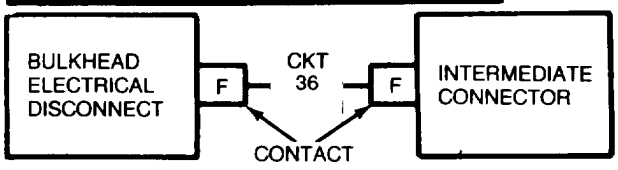
- Disconnect engine accessory harness at intermediate connector.
- Connect red probe of meter to contact F (CKT 36) of engine accessory harness at intermediate connector and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity thereby indicating a short?



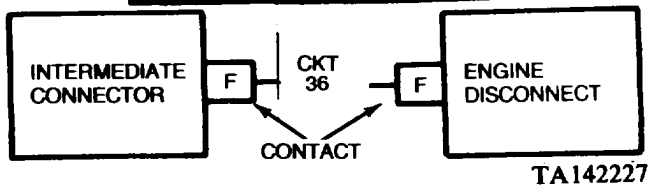
YES

29
- **Inspect engine accessory harness (CKT 36) for bent/broken connector contacts or loose (CKT 36) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disocnnects.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



NO

30
- **Inspect engine accessory harness extension (CKT 36) for bent/broken connector contacts or loose (CKT 36) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnect.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142227

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE

Symptom-33-2D

ENGINE OIL TEMPERATURE GAGE SHOWS HIGH OR NO TEMPERATURE (POWERPLANT WARNING LAMP NOT ON - ENGINE RUNNING - ALL OTHER GAGES READ NORMAL) (2D ENGINE).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check gage instrument panel harness (CKT 27) at ENGINE TEMP indicator gage for electrical power.

First Technician (Driver's Station)

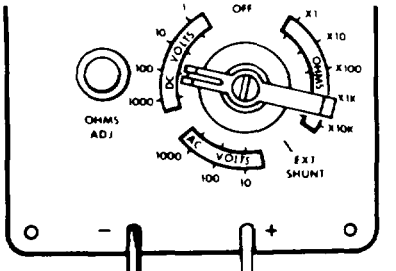
- Set MASTER BATTERY switch OFF.
- Displace gage instrument panel (page 10-121).
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Disconnect gage instrument panel harness connector (CKT 27) from ENGINE TEMP indicator gage.
- Connect red probe of meter to gage instrument panel harness connector (CKT 27) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

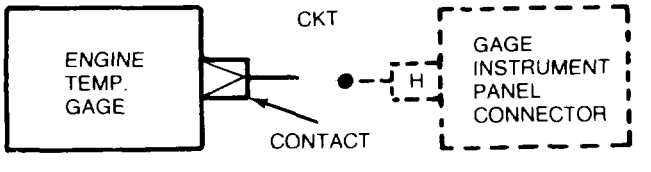
YES

NO

2 Repair gage instrument panel harness (page 10-307).



GAGE INSTRUMENT PANEL (REAR VIEW)



All data on pages 4-607 thru 4-619 deleted.

Symptom-33-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

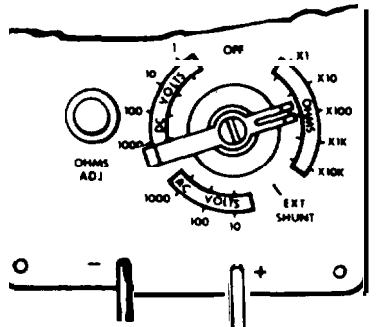
NOTE

This check is to be performed with engine cold.

Check circuit 33 for proper resistance from gage instrument panel harness connector through engine oil temperature transmitter (engine cold).

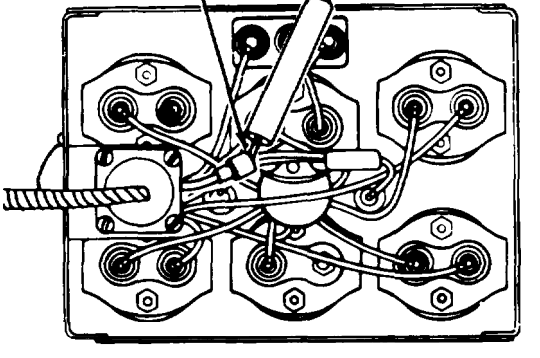
First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect gage instrument panel harness connector (CKT 27) to ENGINE TEMP indicator gage.
- Set multimeter to OHMS X100 scale and "zero" meter, or use STE/ICE Test No. 92 (page 4-92).
- Disconnect gage instrument panel harness connector (CKT 33) from ENGINE TEMP indicator gage.
- Connect red probe of meter to gage instrument panel harness connector (CKT 33) and black probe to ground.
- Check if meter indicates less than 20(M) OHMS or more than 2000 OHMS.



(TO VEHICLE GROUND)

(CKT 33)



Does meter indicate less than or more than 2000 OHMS

MORE

LESS

4

- **Check engine oil temperature transmitter for proper resistance.**
- **See Step (10)**

TA142242

Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

5 **Check circuit 33 for continuity from gage instrument panel harness connector to engine electrical harness connector at engine oil temperature transmitter.**

Second Technician (Turret)

- Manually traverse turret to gain access to engine access covers (TM 9-2350-222-10).
- Remove engine upper access cover (page 16-40).
- Disconnect engine electrical harness connector (CKT 33) from engine oil temperature transmitter.
- Connect jumper wire from engine electrical harness connector (CKT 33) to ground.

First Technician (Driver's Station)

- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connnect red probe of meter to gage instrument panel harness connector (CKT 33) at ENGINE TEMP indicator gage and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?

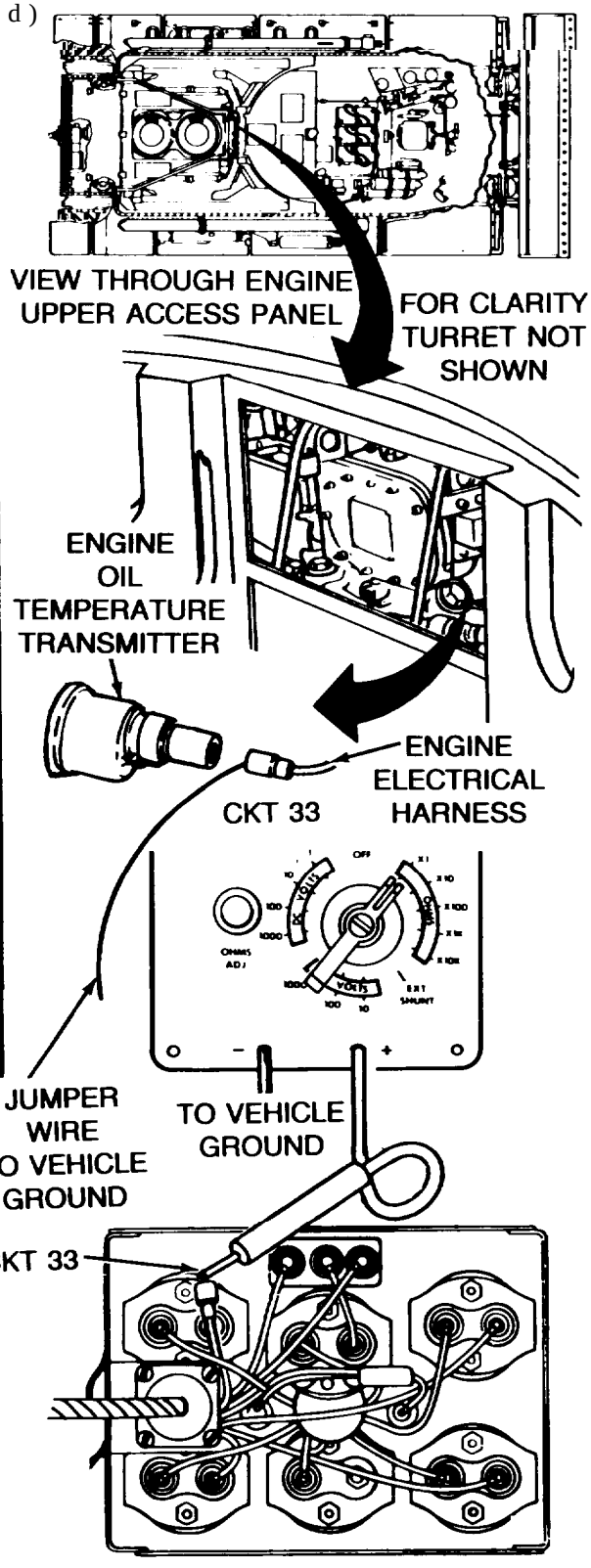
6

- **Check gage instrument panel harness (CKT 33) for continuity from connector at ENGINE TEMP indicator gage to connector on instrument panel.**

NO

- **See Step (19)**

YES



TA142243

Symptom-33-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

NOTE

This check is to be performed with engine warm.

7 **Check engine oil temperature transmitter for proper resistance.**

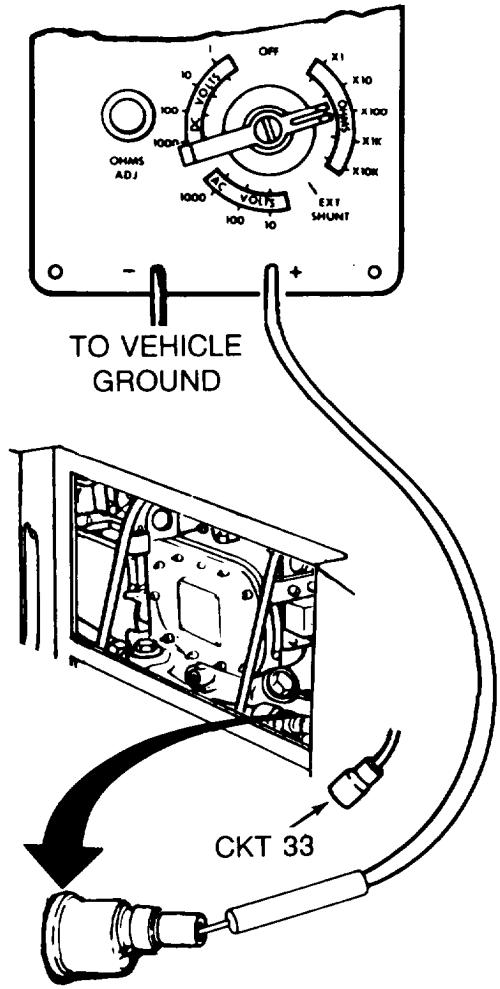
First Technician (Driver's Station)

- Connect gage instrument panel harness connector (CKT 33) to ENGINE TEMP indicator gage.
- Start engine and allow to warm up completely.
- Stop engine.

Second Technician (Turret)

- Set multimeter to OHMS X100 scale and "zero" meter, or use STE/ICE Test No. 92 (page 4-92).
- Connect red meter probe to contact of engine oil temperature transmitter and black probe to ground.
- Check meter for indication of more than or less than 2600 OHMS.

Does meter indicate more than or less than 2600 OHMS?



MORE

8

- **Replace engine oil temperature transmitter (page 10-259).**
- **Install gage instrument panel (page 10-122).**

LESS

9

- **Replace ENGINE TEMP indicator gage (page 10-136).**
- **Install engine upper access cover (page 16-40).**

TA142244

Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP 4

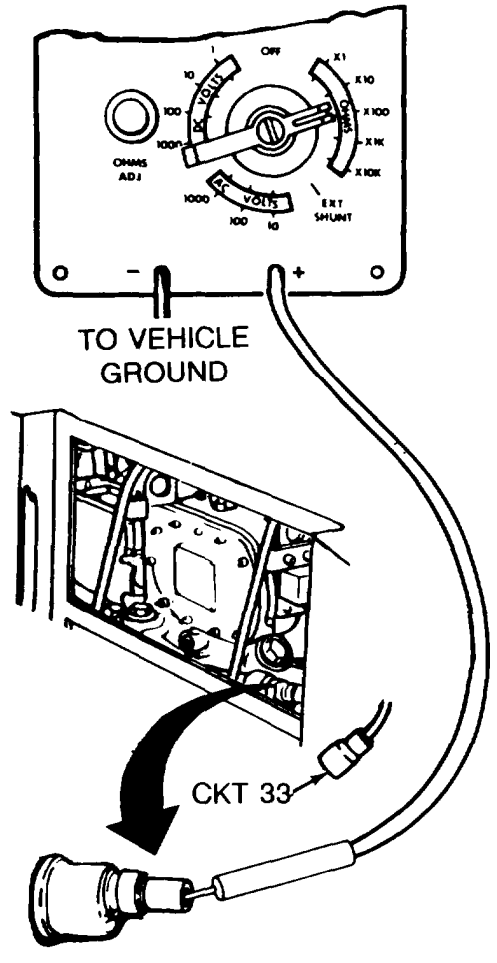
10 Check engine oil temperature transmitter for proper resistance.

First Technician (Driver's Station)

- Connect gage instrument panel harness connector (CKT 33) to ENGINE TEMP indicator gage.

Second Technician (Turret)

- Manually traverse turret to gain access to engine access covers (TM 9-2350-222-10).
- Remove engine upper access cover (page 16-40).
- Disconnect engine electrical harness connector (CKT 33) from engine oil temperature transmitter.
- Connect red meter probe to contact of engine oil temperature transmitter and black probe to ground.
- Check if meter indicates more than or less than 2000 OHMS.



Does meter indicate more than or less than 2000 OHMS?

MORE

LESS

11

- **Replace engine oil temperature transmitter (page 10-259).**
- **Install gage instrument panel (page 10-122).**

TA142245

Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

12 **Check gage instrument panel harness (CKT 33) for short to ground.**

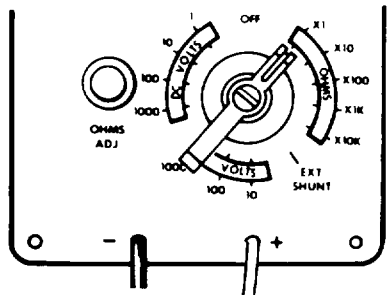
Second Technician (Turret)

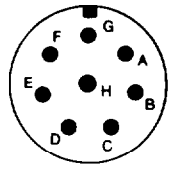
- Connect engine electrical harness connector to engine oil temperature transmitter.
- Install upper engine access cover (page 16-40).

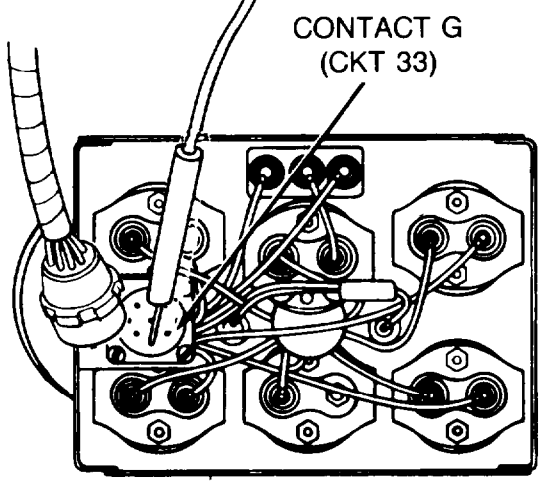
First Technician (Driver's Station)

- Disconnect hull front master harness connector from gage instrument panel.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact G (CKT 33) of gage instrument panel harness connector and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity, thereby indicating a short?



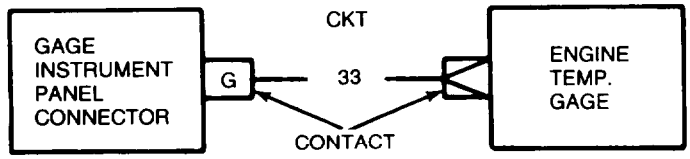




NO

YES

13 **Repair gage instrument panel harness (page 10-307).**



TA142246

Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

14 **Check hull front master harness (CKT 33) at bulkhead electrical disconnect for short to ground.**

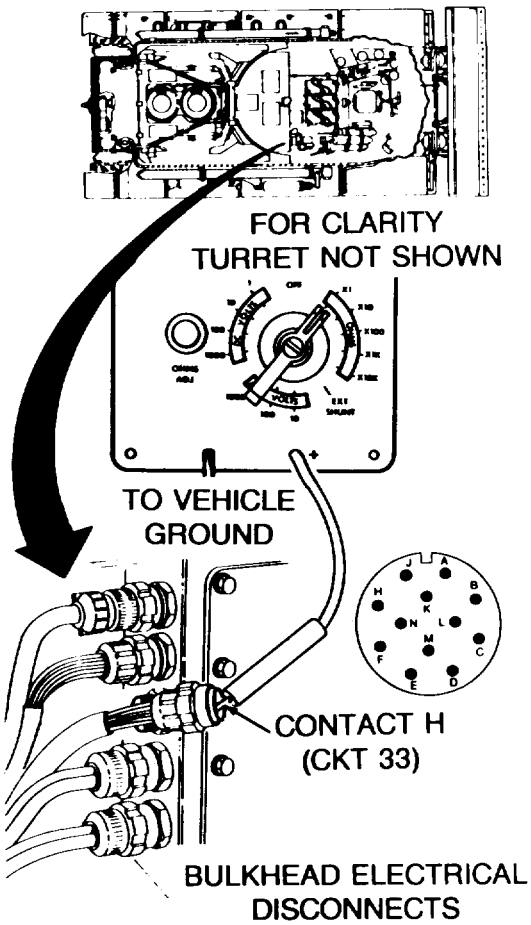
First Technician (Driver's Station)

- Connect hull front master connector to gage instrument panel.
- Install gage instrument panel (page 10-122).

Second Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front master harness connector at bulkhead electrical disconnect.
- Connect red probe of meter to contact H (CKT 33) of hull front master harness connector at bulkhead electrical disconnect and black probe to ground.
- Check if meter indicates continuity.

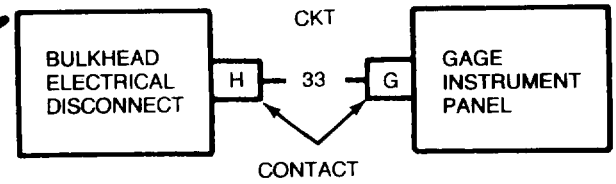
Does meter indicate continuity, thereby indicating a short?



15

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 33) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**

NO YES



TA142247

Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

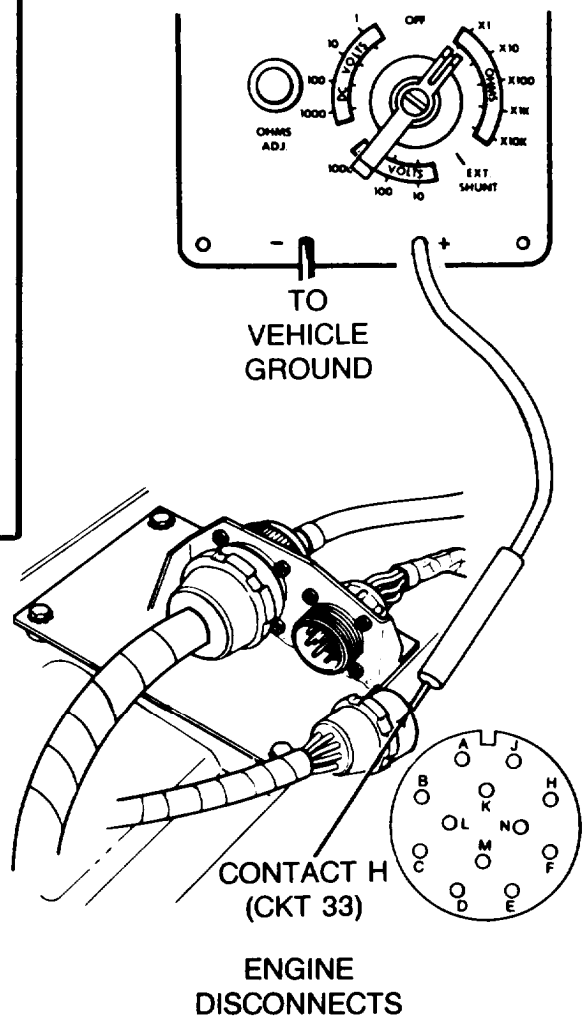
16 **Check engine accessory harness (CKT 33) at engine disconnect for short to ground.**

Second Technician (Turret)

- Connect hull front master harness connector at bulkhead electrical disconnect.
- Manually traverse turret to gain access to left top deck grille doors.

First Technician (Left Top Deck Grille Doors)

- Open left top deck grille doors to gain access to engine disconnects.
- Disconnect engine accessory harness connector from engine disconnect.
- Connect red probe of meter to contact H (CKT 33) of engine accessory harness connector and black probe to ground.



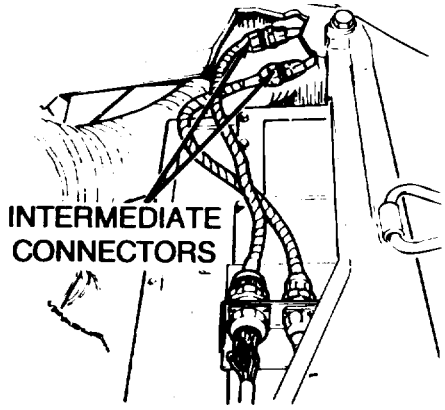
TA142248

Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (16) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity to ground, thereby indicating a short?



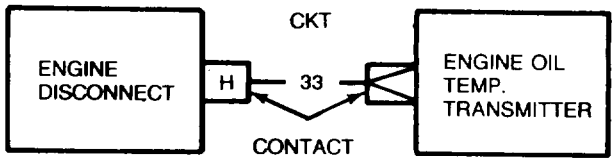
NO → (18) **Repair engine electrical harness (page 10-307).**

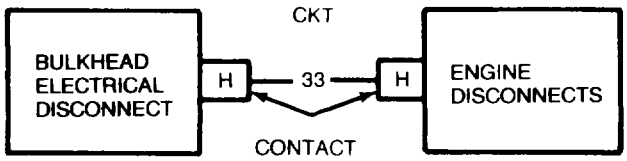
YES → (17)

- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine harness (CKT 33) at intermediate connector for short to ground.**
- **See Step (26) .**

For harness without intermediate connector:

- **Inspect engine accessory harness (CKT 33) for bent/broken connector contacts or loose (CKT 33) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**





TA142249

Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP D

19 **Check gage instrument panel harness (CKT 33) for continuity from connector at ENGINE TEMP indicator gage to connector on instrument panel.**

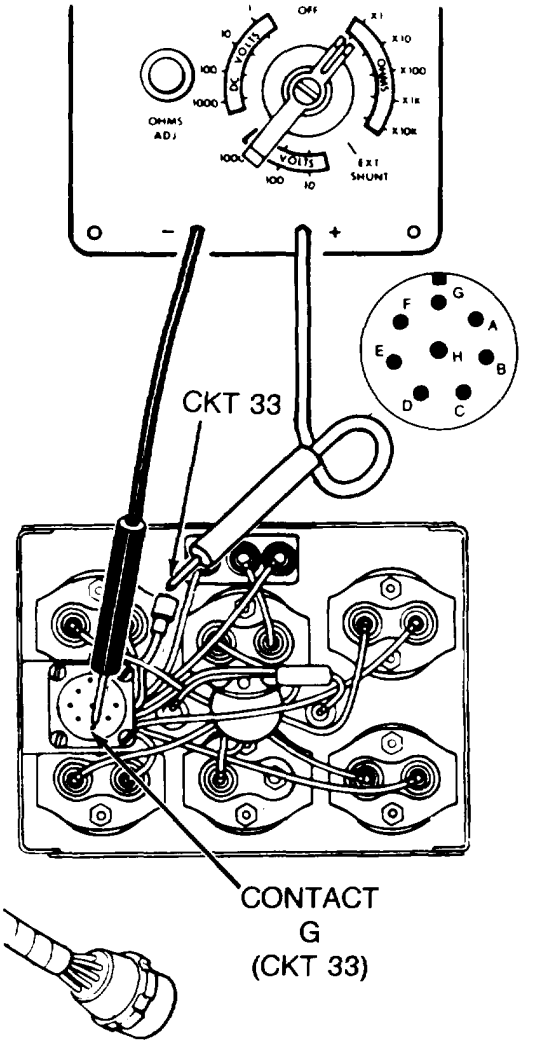
Second Technician (Turret)

- Connect engine electrical harness connector (CKT 33) to engine oil temperature transmitter.
- Install engine upper access cover (page 16-40).

First Technician (Driver's Station)

- Disconnect hull front master harness connector from gage instrument panel.
- Connect red probe of meter to gage instrument panel harness connector (CKT 33) at ENGINE TEMP indicator gage.
- Connect black probe of meter to contact G (CKT 33) of gage instrument panel connector.
- Check if meter indicates continuity.

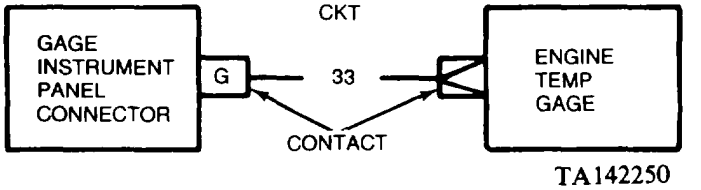
Does meter indicate continuity?



YES

NO

20 **Repair gage instrument panel harness (page 10-307).**



TA142250

Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

21 **Check hull front master harness (CKT 33) for continuity from connector at gage instrument panel to connector at bulkhead electrical disconnect.**

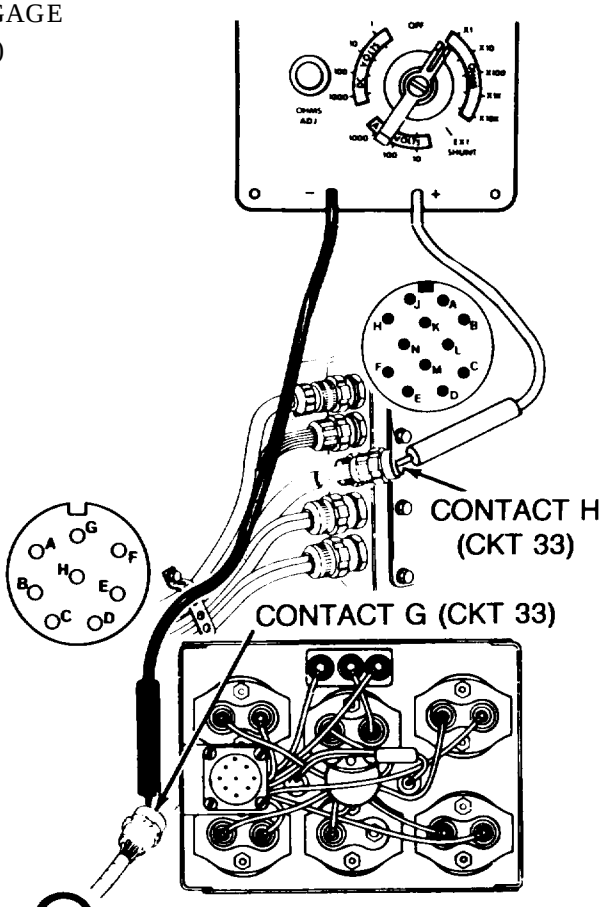
First Technician (Driver's Station)

- Connect gage instrument panel harness connector (CKT 33) to ENGINE TEMP indicator gage.
- Connect black probe of meter to contact G (CKT 33) of hull front master harness connector at gage instrument panel.

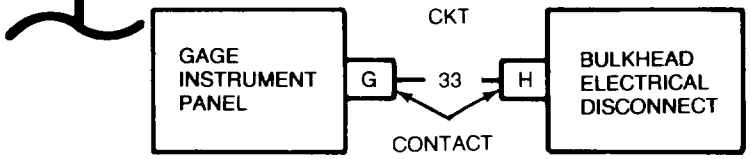
Second Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Connect red probe of meter to contact H (CKT 33) of hull front master harness connector at bulkhead electrical disconnect.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES



NO

22

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 33) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**
- **Install gage instrument panel (page 10-122).**

TA142251

Symptom-33-2D **DETAILED TROUBLESHOOTING PROCEDURE**
INDICATOR - GAGE
(Continued)

23 **Check engine accessory harness (CKT 33) for continuity from connector at bulkhead electrical disconnect to connector at engine disconnect.**

First Technician (Driver's Station)

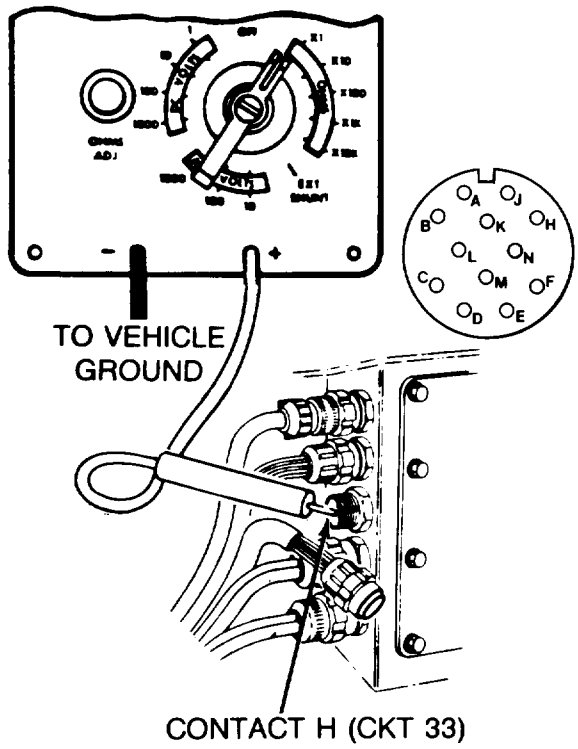
- Connect hull front master harness connector to gage instrument panel.
- Install gage instrument panel (page 10-122).

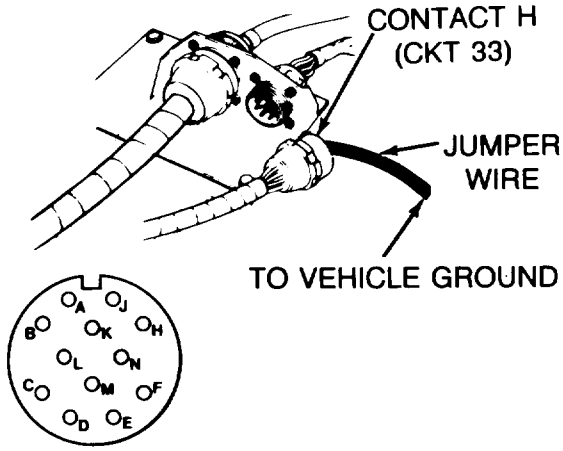
Second Technician (Turret)

- Manually traverse turret to gain access to left top deck grille doors.

First Technician (Left Top Deck Grille Doors)

- Open left top deck grille doors.
- Disconnect engine accessory harness connector from engine disconnect.
- At engine disconnect, connect jumper wire from contact H (CKT 33) of engine accessory harness connector to ground.





DETAILED TROUBLESHOOTING PROCEDURE

INDICATOR - GAGE

(Continued)

STEP (23) CONTINUED

Second Technician (Turret)

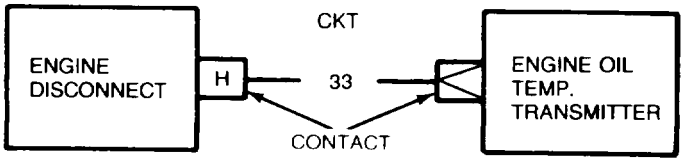
- Connect red probe of meter to contact H (CKT 33) of engine accessory harness connector at bulkhead electrical disconnect and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?

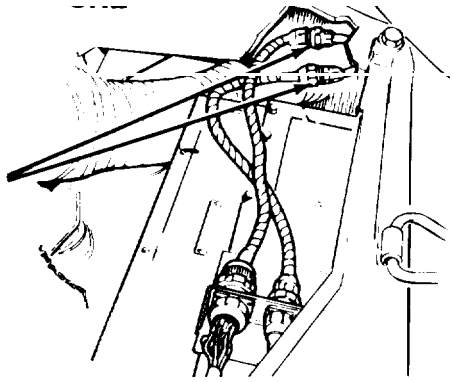
YES

24

- **Repair engine electrical harness (page 10-307).**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



NO

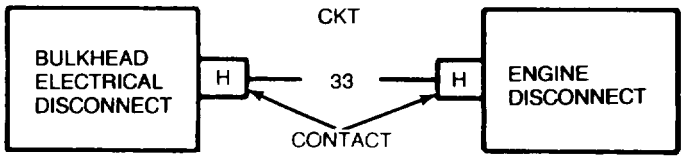


25

- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness extension (CKT 33) for continuity from intermediate connector to connector at engine disconnect.**
- **See Step (29)**

For harness without intermediate connector:

- **Inspect engine accessory harness (CKT 33) for bent/broken connector contacts or loose (CKT 33) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142253

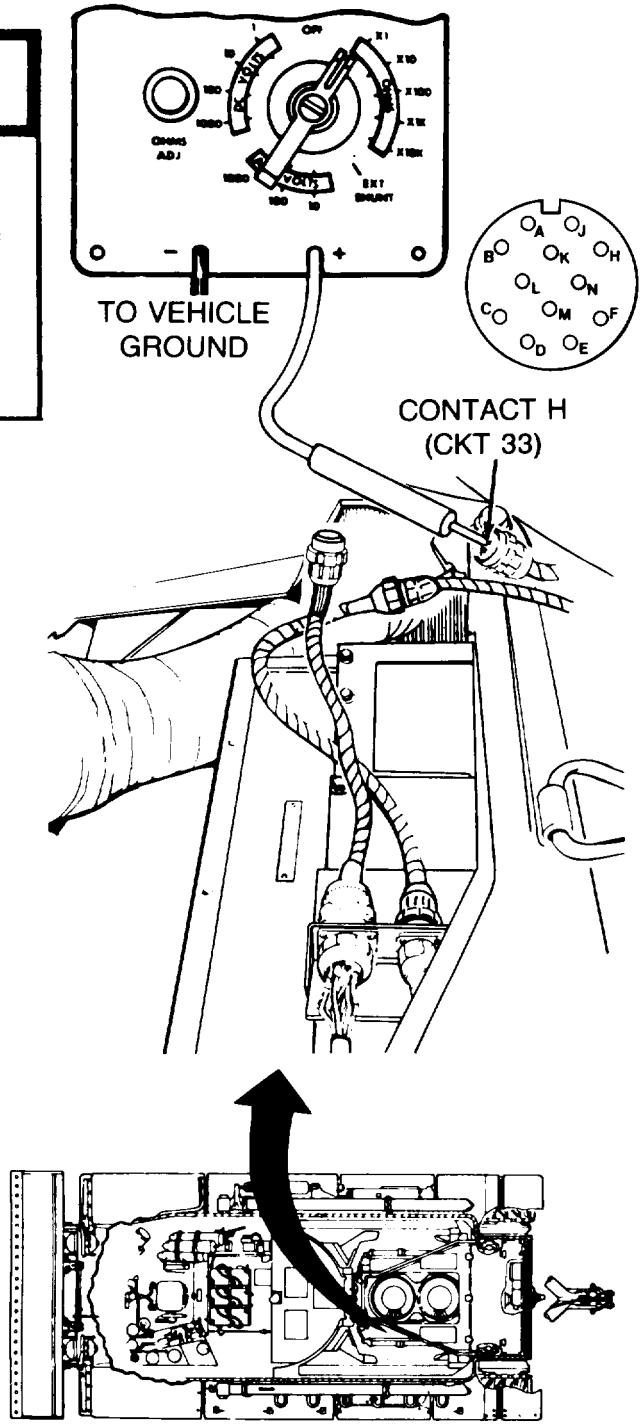
Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP (17)

26 Check engine accessory harness (CKT 33) at intermediate connector for short to ground.

Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Connect red probe of meter to contact H (CKT 33) of engine accessory harness at intermediate connector and black probe to ground.



TA142254

Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (26) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity thereby indicating a short?

YES

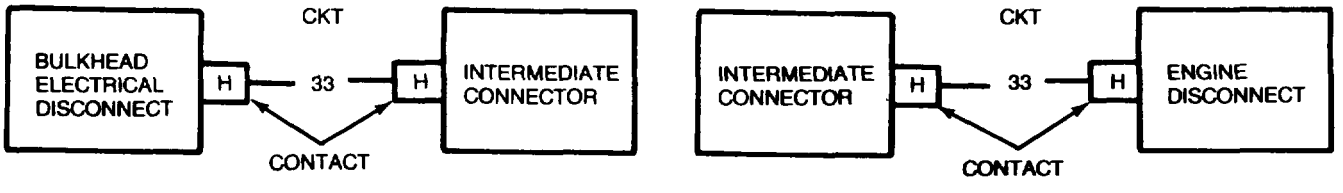
(27)

- **Inspect engine accessory harness (CKT 33) for bent/broken connector contacts or loose (CKT 33) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**

NO

(28)

- **Inspect engine accessory harness extension (CKT 33) for bent/broken connector contacts or loose (CKT 33) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector to engine disconnect.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142255

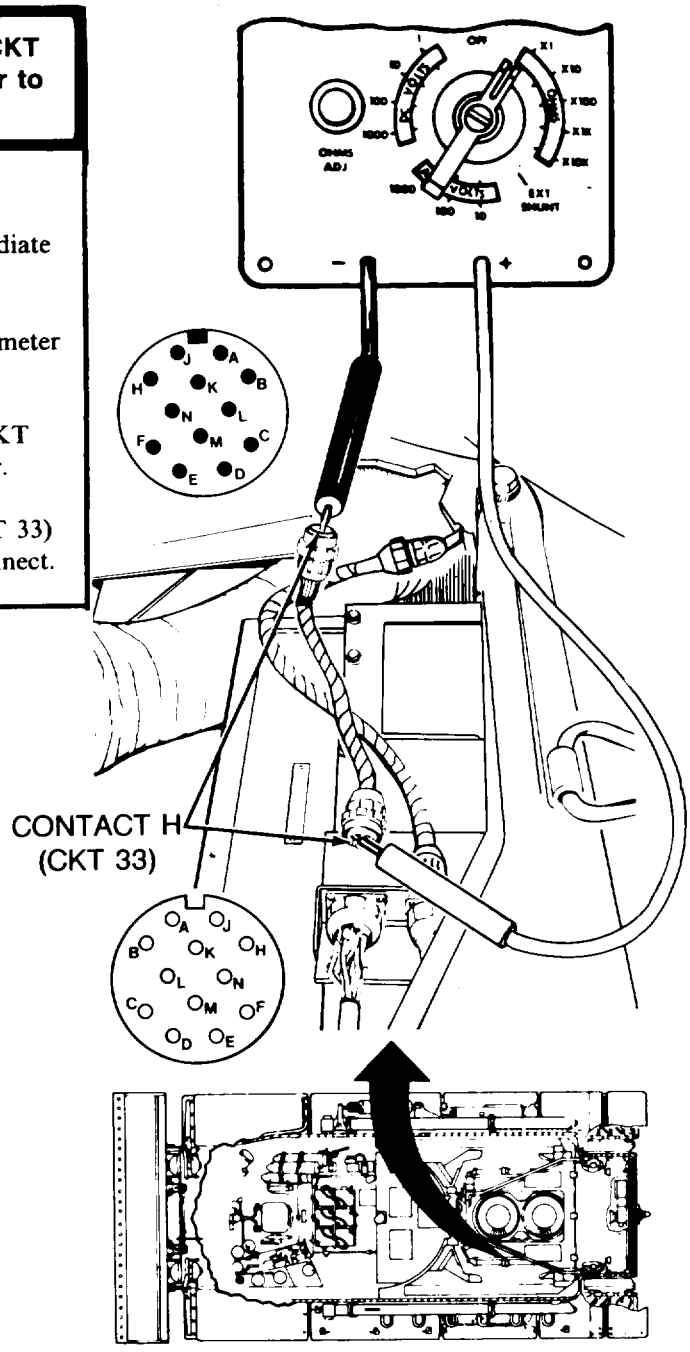
Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP 25

29 **Check engine accessory harness extension (CKT 33) for continuity from intermediate connector to connector of engine disconnect.**

Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect black probe of meter to contact H (CKT 33) of extension harness intermediate connector.
- Connect red probe of meter to contact H (CKT 33) of extension harness connector at engine disconnect.



TA142256

Symptom-33-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (29) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

YES

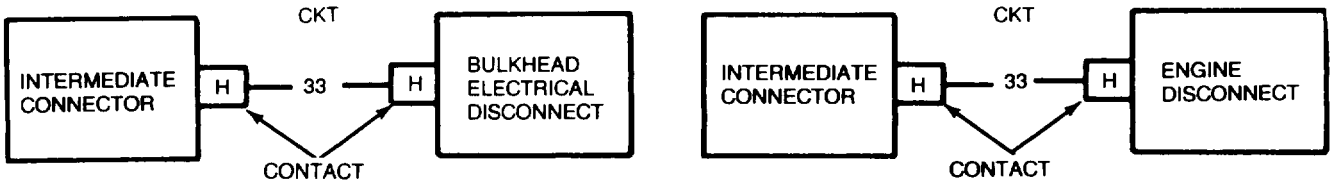
30

- **Inspect engine accessory harness (CKT 33) for bent/broken connector contacts or loose (CKT 33) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**

NO

31

- **Inspect engine accessory harness extension (CKT 33) for bent/broken connector contacts or loose (CKT 33) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142257

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE

Symptom-34-2D

TRANSMISSION OIL PRESSURE GAGE SHOWS NO PRESSURE (ENGINE RUNNING - ALL OTHER GAGES READ NORMAL) (2D ENGINE).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check transmission for full oil level.

First Technician (Turret)

- Manually traverse turret to gain access to top deck grille doors (TM 9-2350-222-10).

Second Technician (Driver's Station)

- Start engine.

First Technician (Top Deck)

- Check transmission oil level (TM 9-2350-222-10).

Is transmission full of oil?

NO

2

- **Check oil coolers for evidence of leaks.**
- **See Step (17).**

YES

3

- **Check for transmission oil pressure of 4 to 40 psi.**
- **See Step (4).**

All data on pages 4-637 thru 4-650 deleted. ■

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

Symptom-34-2D

FROM STEP

(3) or (20)

WARNING

Do not operate engine above idle when personnel are working between rear grille doors.

4 **Check for transmission oil pressure of 4 to 40 psi.**

Second Technician (Driver's Station)

- Stop engine.

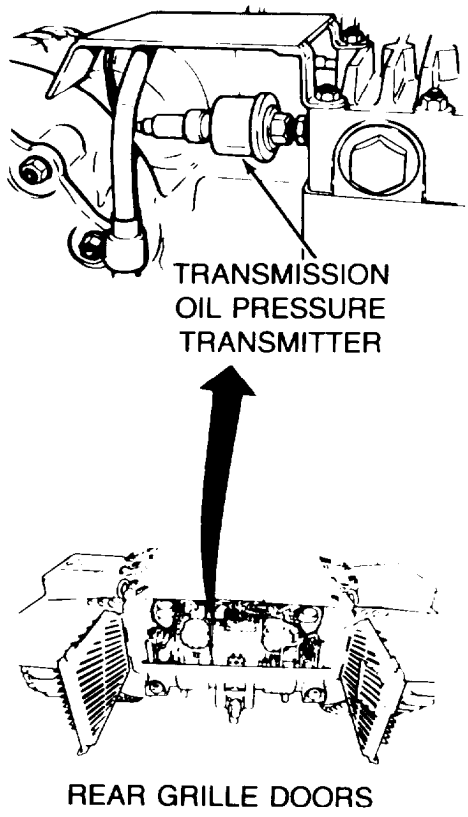
Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

First Technician (Rear Grille Doors)

- Disconnect transmission harness connector (CKT 321) from transmission oil pressure transmitter.
- Remove transmission oil pressure transmitter (page 10-275).
- If STE/ICE is available, install STE/ICE pressure test fittings in transmission and perform Test No. 50: pressure 0-1000 psig (page 4-71).
- If STE/ICE is not available, install test pressure gage in transmission.

Second Technician (Driver's Station)



TA142273

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

Symptom-34-2D

STEP (4) CONTINUED

- Start engine.

First Technician (Rear Grille Doors)

- Check if STE/ICE or gage indicates 4 to 40 psi with engine running.

Does meter/gage indicate 4 to 40 psi?

YES

NO

(5)

- **Stop engine.**
- **Remove pressure test equipment from transmission.**
- **Install oil pressure transmitter (page 10-275).**
- **Connect transmission harness connector to oil pressure transmitter.**
- **Install transmission shroud (page 9-23).**
- **Notify support maintenance of transmission problem.**

TA142274

Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

6 **Check transmission harness (CKT 321) for electrical power at oil pressure transmitter connector.**

Second Technician (Driver's Station)

- Stop engine.

First Technician (Rear Grille Doors)

- Set multimeter to measure 10 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to transmission harness oil pressure transmitter connector and black probe to ground.

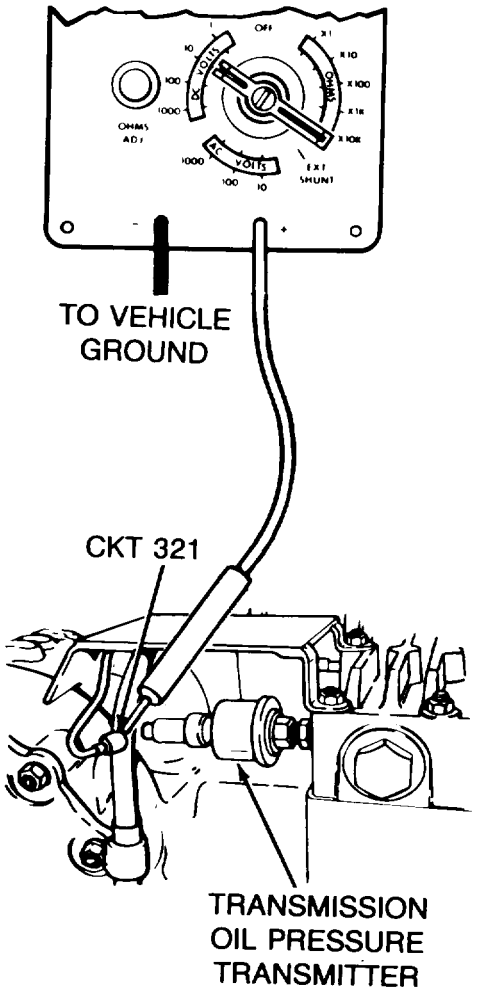
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Rear Grille Doors)

- Check if meter indicates more than 2 volts dc.

Does meter indicate more than 2 volts dc?



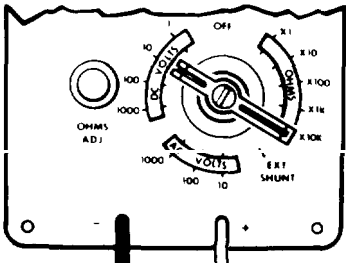
NO

YES

7 **Replace transmission oil pressure transmitter (page 10-274).**

TA142275

Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)



8 **Check hull front master harness (CKT 321) for electrical power at bulkhead connector.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch off.

First Technician (Rear Grille Doors)

- Remove pressure test equipment from transmission.
- Install transmission oil pressure transmitter on transmission (page 10-275).
- Connect transmission harness connector (CKT 321) to oil pressure transmitter.

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10).
- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Connect red probe of meter to contact D (CKT 321) of hull front master harness connector and black probe to ground.

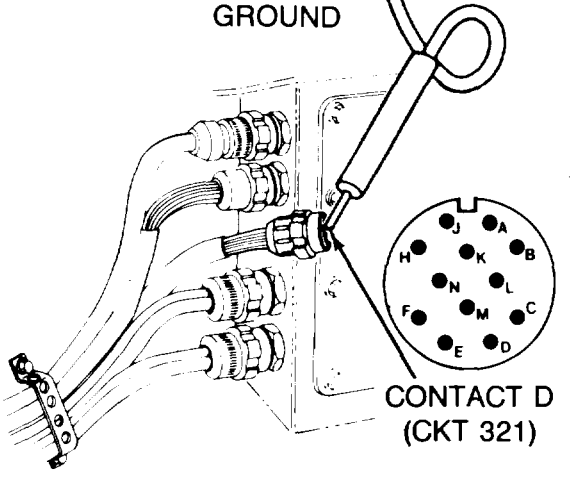
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

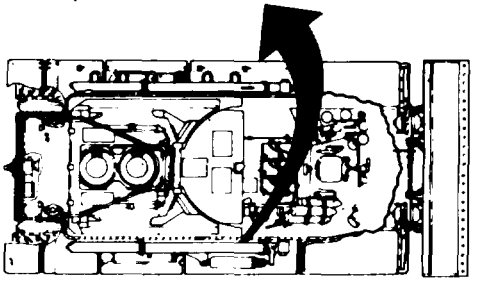
First Technician (Turret)

- Check if meter indicates more than 2 volts dc?

Does meter indicate more than 2 volts dc?



BULKHEAD ELECTRICAL DISCONNECTS (ON RIGHT BULKHEAD)



FOR CLARITY TURRET NOT SHOWN

NO

YES

9

- **Check engine accessory harness (CKT 321) for continuity.**
- **See Step (22) .**

TA142276

Symptom-34-2D

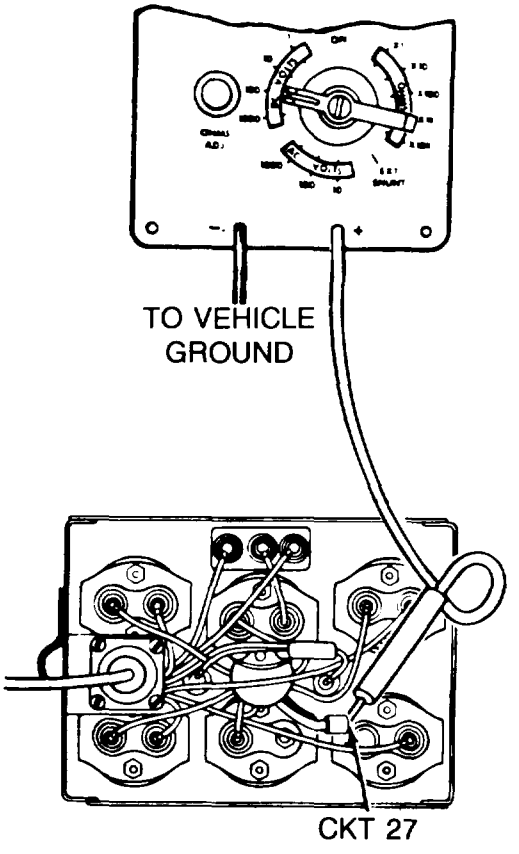
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

10 Check gage instrument panel harness (CKT 27) for electrical power at TRANSMISSION PRESS indicator gage.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace gage instrument panel (page 10-121).
- Disconnect gage instrument panel harness connector (CKT 27) from TRANSMISSION PRESS indicator gage.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to gage instrument panel harness connector (CKT 27) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



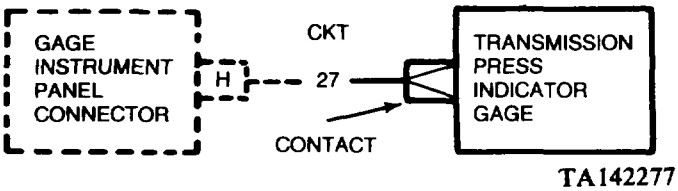
GAGE INSTRUMENT PANEL
(REAR VIEW)

YES

NO

11

- **Repair gage instrument panel harness (page 10-307).**
- **Connect hull front master harness connector (CKT 321) to bulkhead electrical disconnect.**
- **Install transmission shroud (page 9-23).**



TA142277

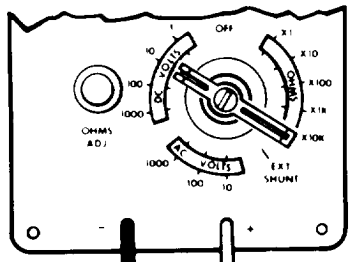
Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

12 **Check TRANSMISSION PRESS gage for electrical power at CKT 321 connector.**

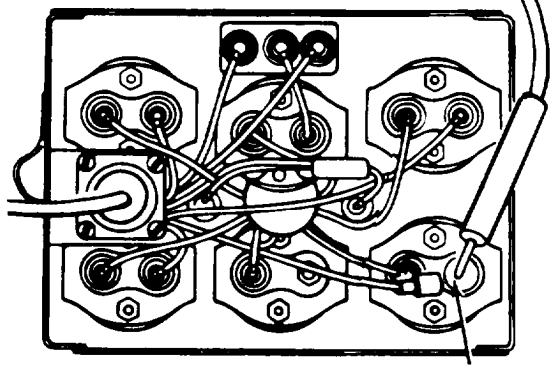
Second Technician (Driver's Station)

- Set MASTER BATTERY switch off.
- Connect gage instrument panel harness connector (CKT 27) to TRANSMISSION PRESS gage.
- Disconnect gage instrument panel harness (CKT 321) from TRANSMISSION PRESS gage.
- Set multimeter to measure 10 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to CKT 321 connector on gage and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates more than 2 volts dc.

Does meter indicate more than 2 volts dc?



TO VEHICLE GROUND



CKT 321

YES

NO

13
- **Replace TRANSMISSION PRESS gage (page 10-274).**
- **Connect hull front master harness connector (CKT 321) to bulkhead electrical disconnect.**
- **Install transmission shroud (page 9-23).**

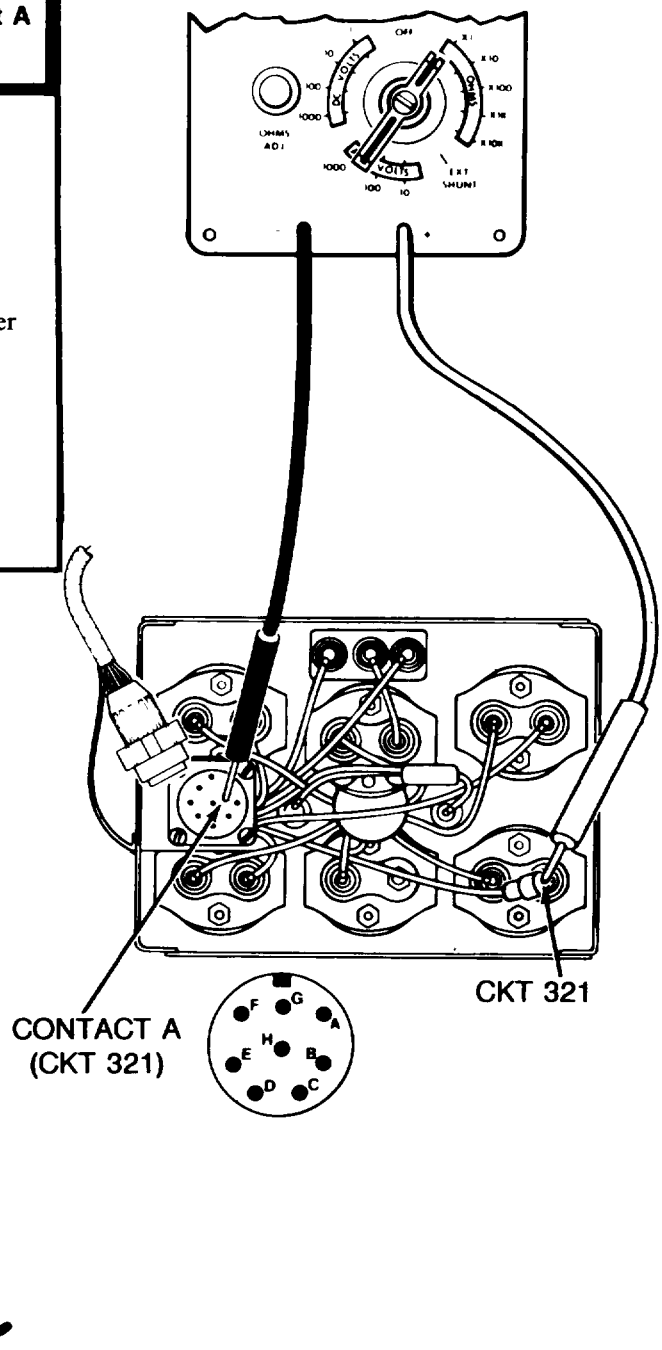
TA142278

Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

14 **Check gage instrument panel wiring harness (CKT 321) for continuity from connector to TRANSMISSION PRESS indicator gage to contact A of gage instrument panel connector.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect hull front master harness from gage instrument panel.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to gage instrument panel wiring harness connector (CKT 321).
- Connect black probe of meter to contact A (CKT 321) of gage instrument panel connector.



TA142279

Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (14) CONTINUED

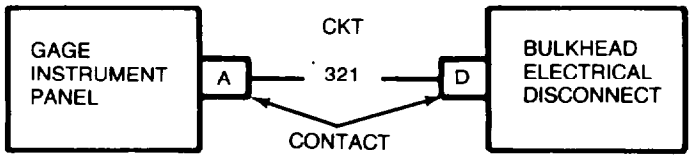
- Check if meter indicates continuity.

Does meter indicate continuity?

YES

15

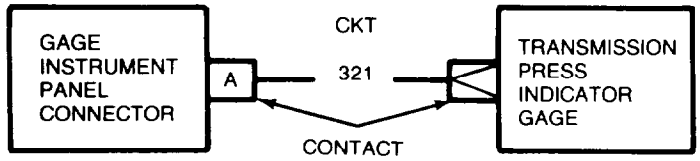
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 321) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect gage instrument panel harness connector (CKT 321) to TRANSMISSION PRESS indicator gage.**
- **Connect hull front master harness connector (CKT 321) to bulkhead electrical disconnect and gage instrument panel.**
- **Install gage instrument panel (page 10-122).**
- **Install transmission shroud (page 9-23).**



NO

16

- **Repair gage instrument panel harness (page 10-307).**
- **Connect hull front master harness connector (CKT 321) to bulkhead electrical disconnect.**
- **Install transmission shroud (page 9-23).**



TA142280

Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP (2)

17 **Check oil coolers for evidence of leaks.**

First Technician (Top Deck)

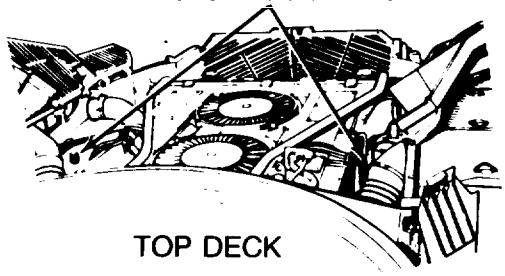
- Add oil to transmission as required (LO 9-2350-222-12).
- Open right top deck grille doors.
- Visually check for evidence of oil leaks around both left and right oil coolers.

Is there evidence of oil leaks around oil coolers?

NO

YES

ACCESS TO OIL COOLERS



TOP DECK

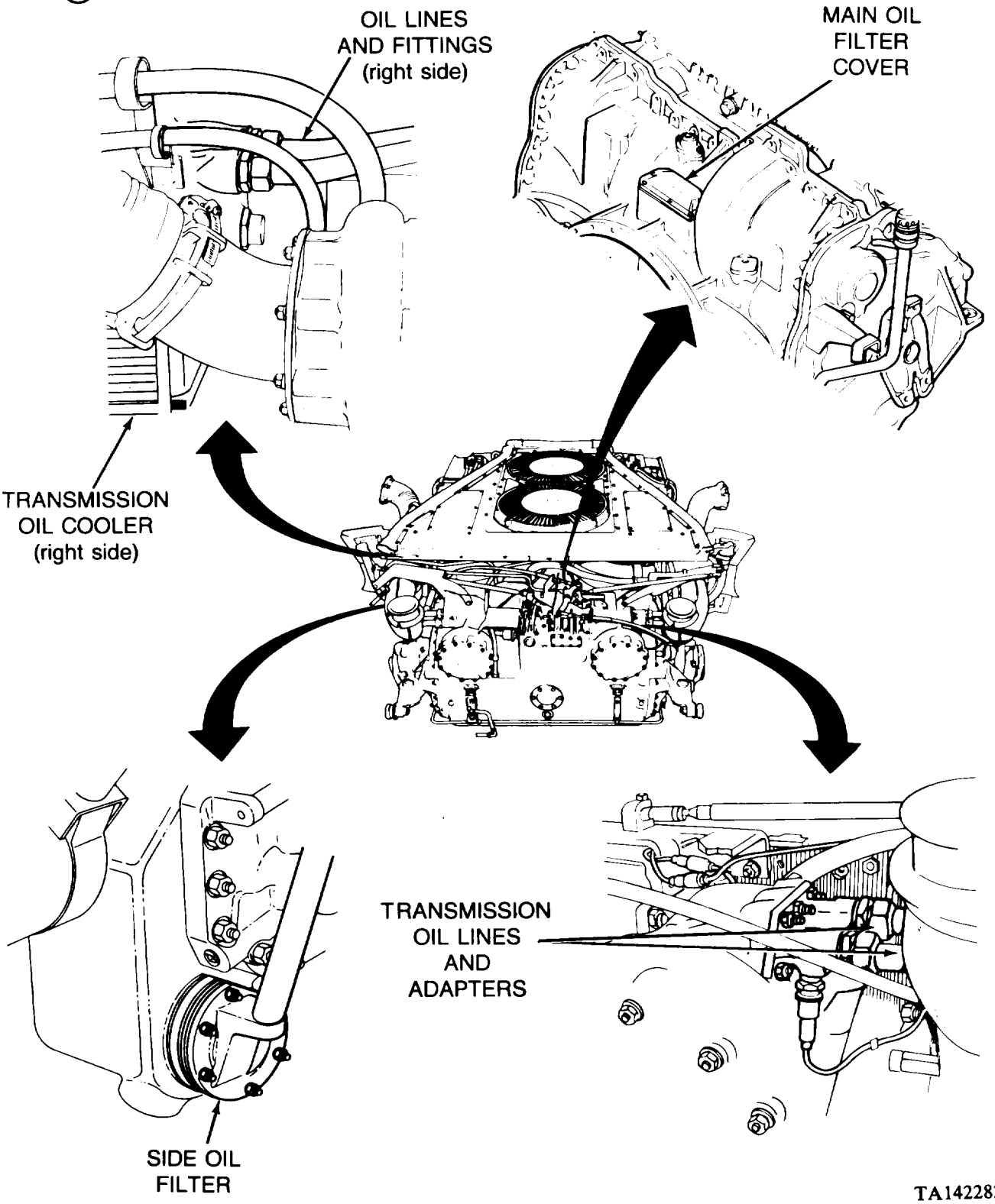
18

- **Remove powerplant and check transmission components listed below for leaks. (See locator art on following page).**
- **Tighten leaking connections.**
- **If connections are still leaking, repair or replace the following as necessary:**
  - **Left oil cooler (page 6-146).**
  - **Right oil cooler (page 6-146).**
  - **Oil lines and/or connections to left oil cooler (page 6-185).**
  - **Oil lines and/or connections to right oil cooler (page 6-185).**
  - **Connections or gaskets at left and right transmission adapters (page 6-185).**
  - **Main oil filter cover gasket (page 11-67).**
  - **Side oil filter gasket (page 11-74).**

TA142281

Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (18) LOCATOR VIEWS:



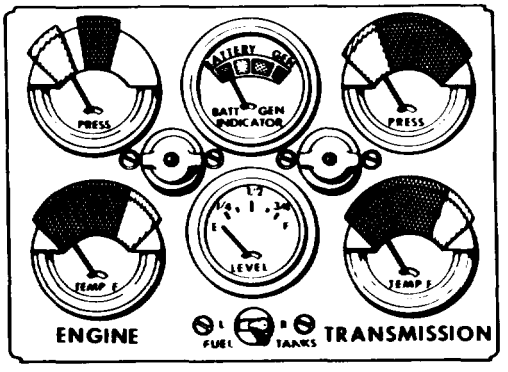
Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

19 **Check if transmission oil pressure gage indicates pressure.**

Second Technician (Driver's Station)

- Check TRANSMISSION PRESS gage for indication of pressure.

Does gage indicate transmission oil pressure?



GAGE INSTRUMENT PANEL

NO

20

- **Check for transmission oil pressure of 4 to 40 psi.**
- **See Step (4).**

YES

21

- **Stop engine.**
- **Problem corrected.**
- **Close top deck grille doors.**

TA142283

Symptom-34-2D

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP (9)

(22) **Check engine accessory harness (CKT 321) for continuity from connector at engine disconnect to connector at bulkhead electrical disconnect.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

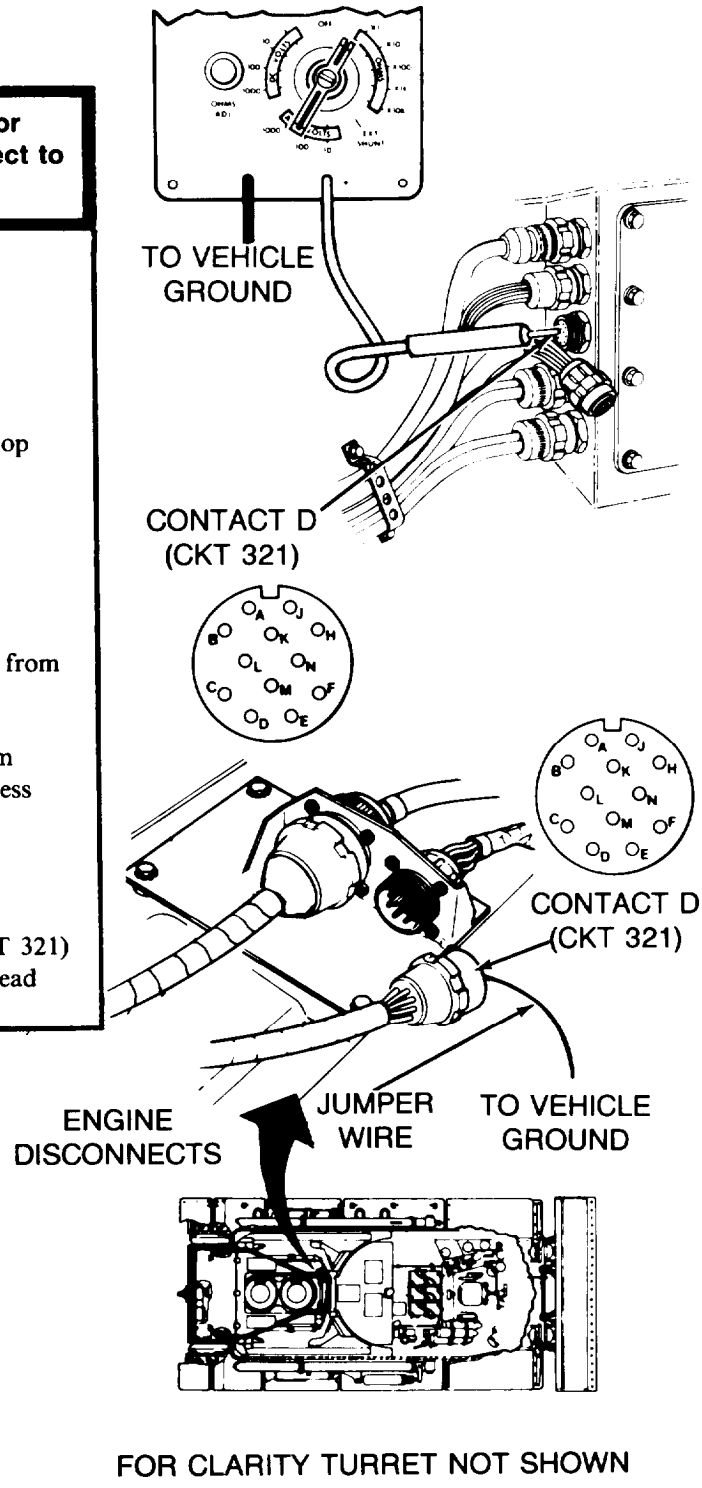
- Manually traverse turret to gain access to left top deck grille doors.

Second Technician (Top Deck)

- Open left top deck grille doors.
- Disconnect engine accessory harness connector from engine disconnect.
- At engine disconnect, connect jumper wire from contact D (CKT 321) of engine accessory harness connector to ground.

First Technician (Turret)

- Connect red probe of meter to contact D (CKT 321) of engine accessory harness connector at bulkhead disconnect and black probe to ground.



TA142284

Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (22) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

NO

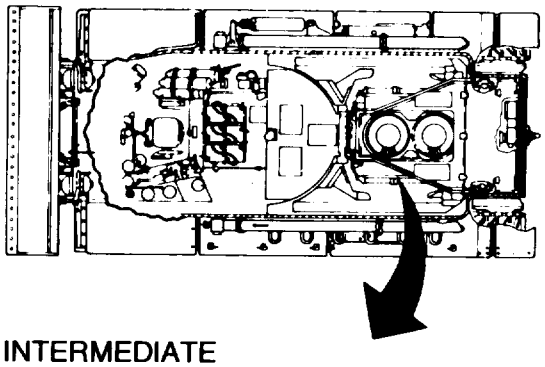
(23)

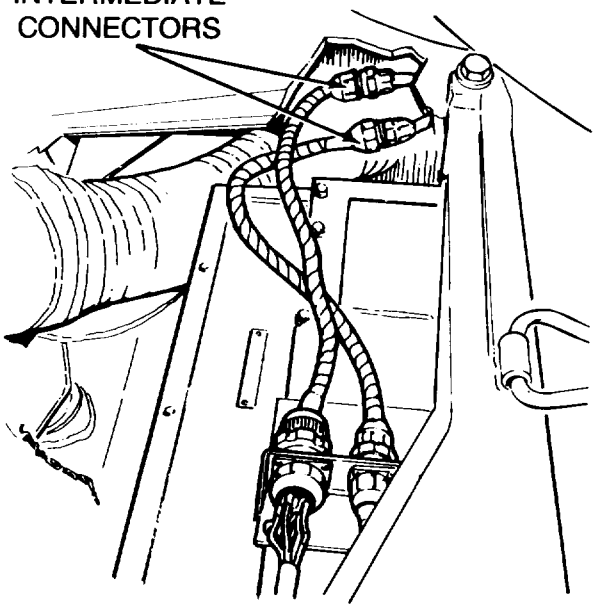
- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness extension (CKT 321) for continuity from intermediate connector to connector of engine disconnect.**
- **See Step (27) .**

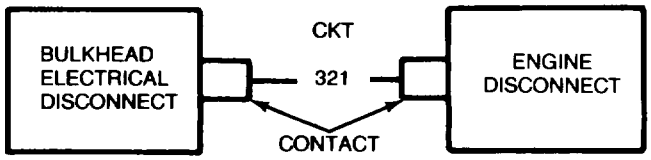
For harness without intermediate connector:

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 321) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**
- **Connect hull front master harness connector (CKT 321) to bulkhead electrical disconnects.**
- **Install transmission shroud (page 9-23).**

YES







TA142285

Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

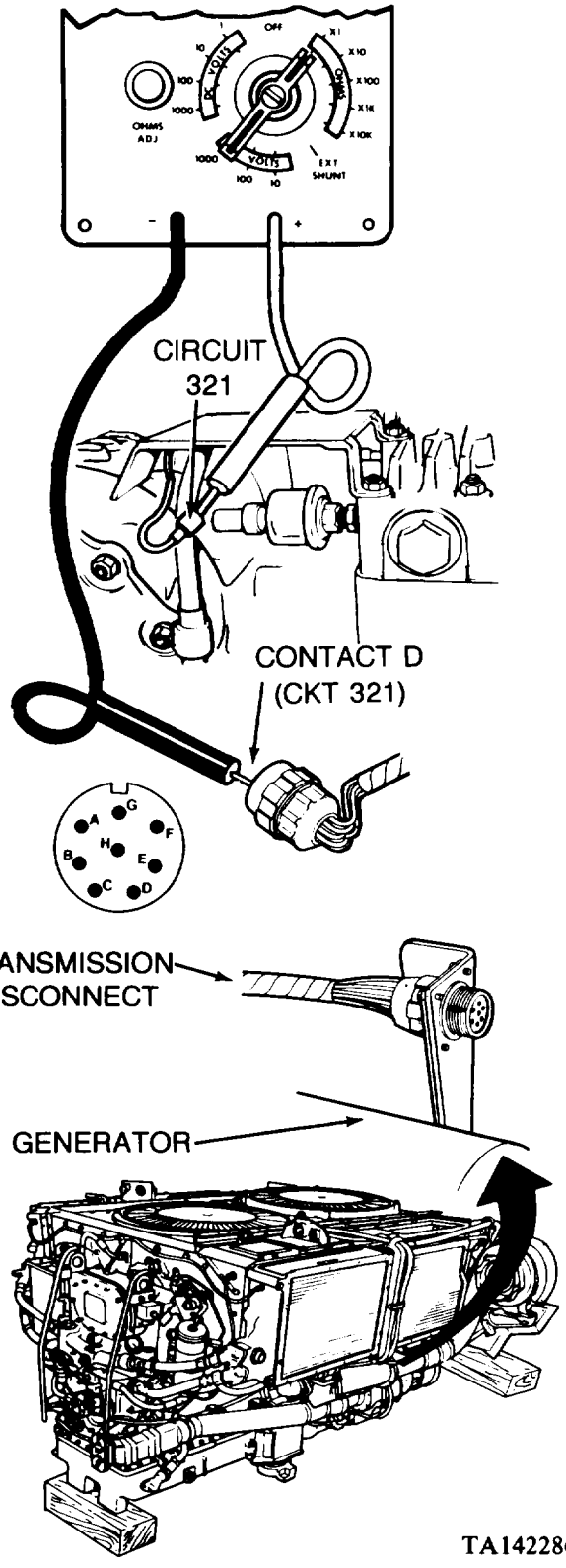
24 **Check transmission harness (CKT 321) for continuity from connector at transmission disconnect to connector at transmission oil pressure transmitter.**

First Technician (Rear of Vehicle)

- Remove powerplant (page 5-1).

First Technician (Powerplant)

- Disconnect transmission harness connector (CKT 321) from transmission oil pressure transmitter.
- Disconnect transmission harness connector from engine electrical harness connector at transmission disconnect.
- Connect red probe of meter to transmission wiring harness connector (CKT 321) at transmission oil pressure transmitter.
- Connect black probe of meter to contact D (CKT 321) of transmission harness connector at transmission disconnect.



TA142286

Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (24) CONTINUED

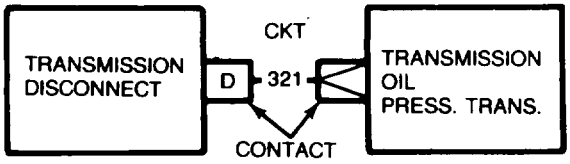
- Check if meter indicates continuity.

Does meter indicate continuity?

NO

(25)

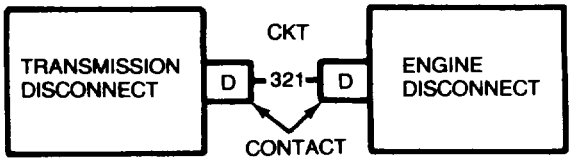
- **Repair transmission harness (page 10-307).**
- **Connect hull front master harness connector (CKT 321) to bulkhead electrical disconnect.**
- **Install powerplant (page 5-37).**



YES

(26)

- **Repair engine electrical harness (page 10-307).**
- **Connect transmission harness connector (CKT 321) to transmission oil pressure transmitter.**
- **Connect hull front master harness connector (CKT 321) to bulkhead electrical disconnect.**
- **Install powerplant (page 5-37).**



TA142287

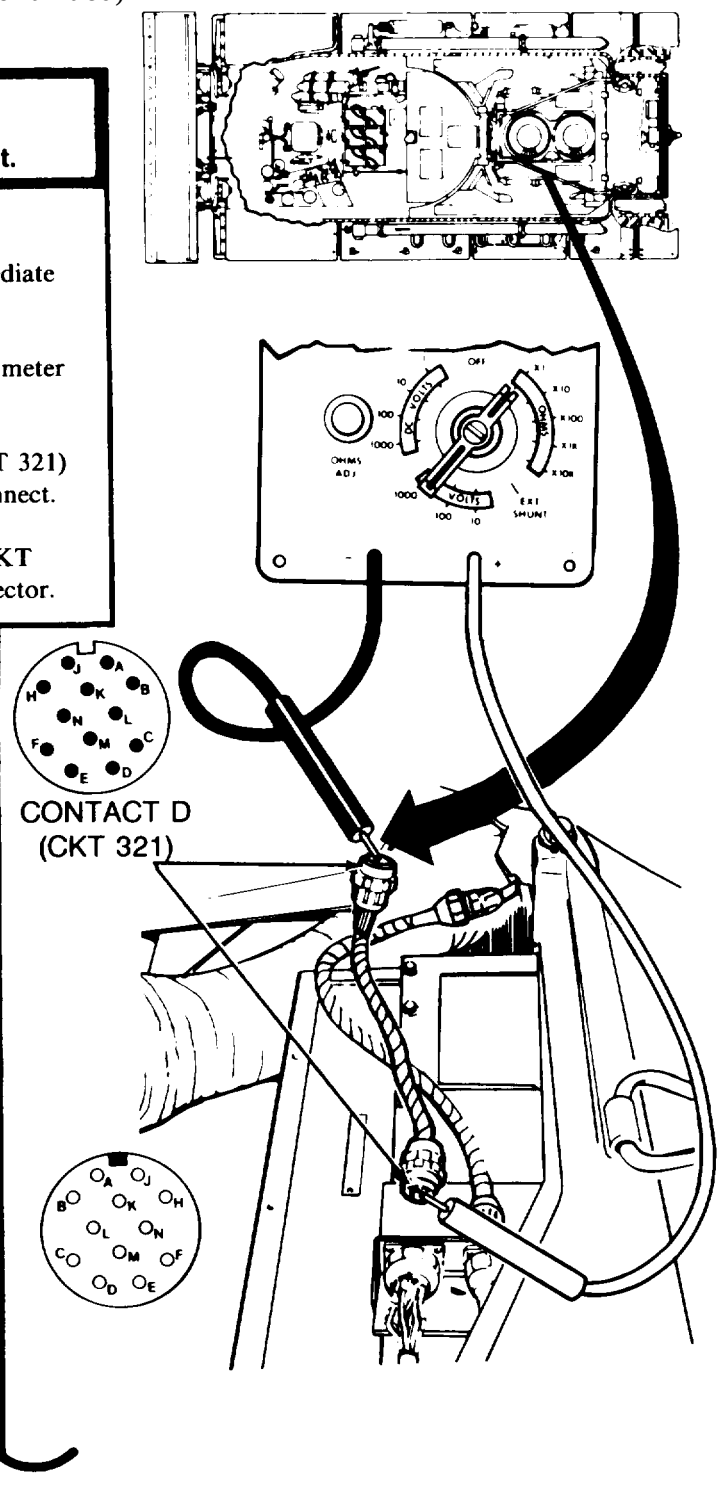
Symptom-34-2D
FROM STEP
(23)

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

(27) Check engine accessory harness extension (CKT 321) for continuity from intermediate connector to connector of engine disconnect.

Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact D (CKT 321) of extension harness connector at engine disconnect.
- Connect black probe of meter to contact D (CKT 321) of extension harness at intermediate connector.



TA142288

Symptom-34-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (27) CONTINUED

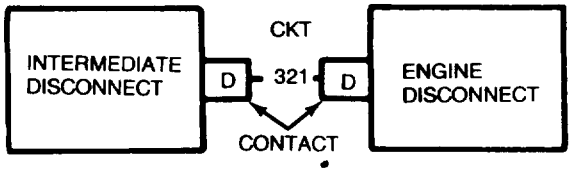
- Check if meter indicates continuity.

Does meter indicate continuity?

NO

28

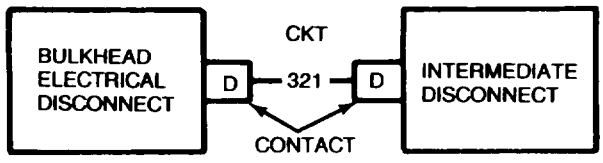
- **Inspect engine accessory harness extension for bent/broken connector contacts or loose (CKT 321) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness to bulkhead electrical disconnect.**



YES

29

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 321) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness to bulkhead electrical disconnect.**



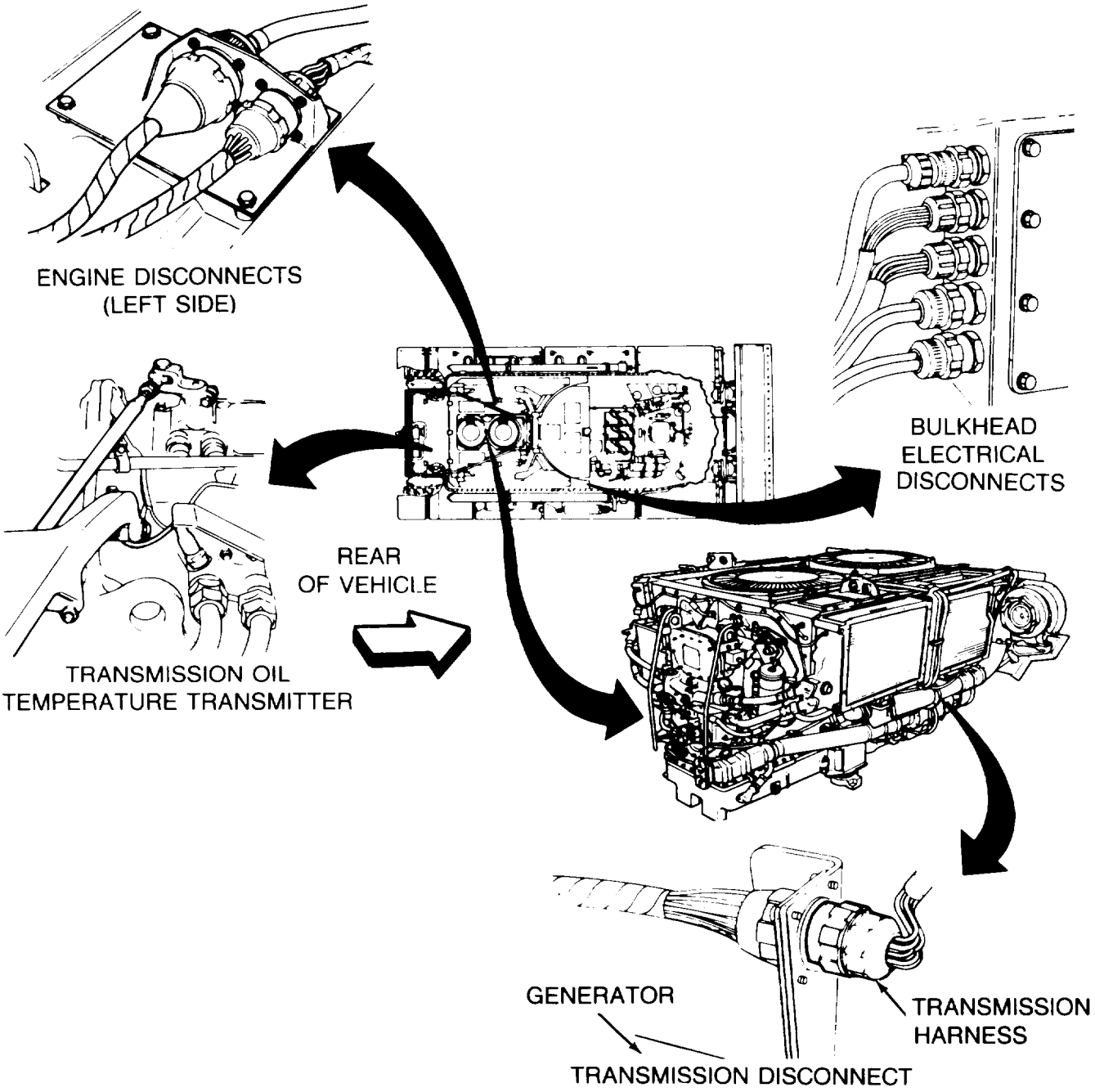
TA142289

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE

Symptom 35

TRANSMISSION OIL TEMPERATURE GAGE SHOWS HIGH OR NO TEMPERATURE (POWERPLANT WARNING LAMP NOT ON - ENGINE RUNNING - ALL OTHER GAGES READ NORMAL).

LOCATER VIEWS:



DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

Symptom-35

TRANSMISSION OIL TEMPERATURE GAGE SHOWS HIGH OR NO TEMPERATURE (POWERPLANT WARNING LAMP NOT ON - ENGINE RUNNING - ALL OTHER GAGES READ NORMAL).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

■ **Steps (1) thru (3) deleted**

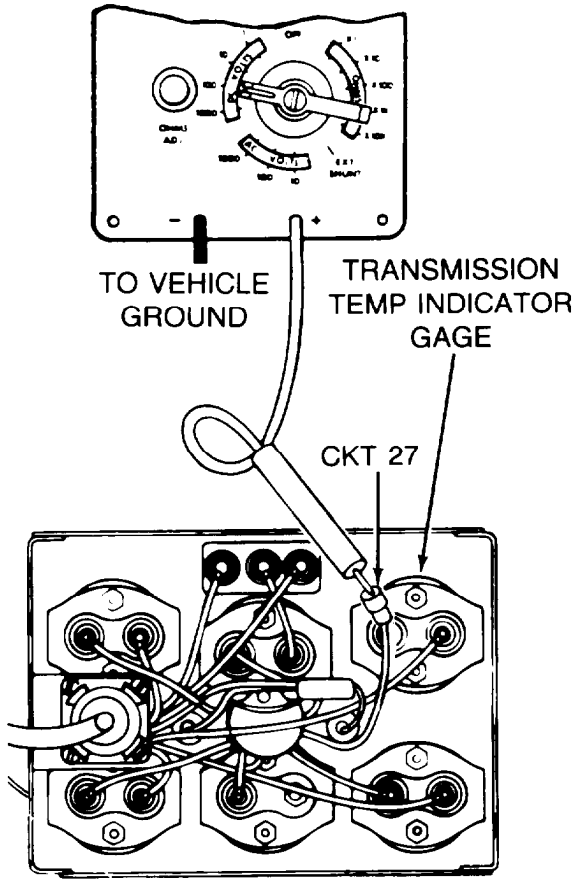
Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

4 **Check gage instrument panel harness (CKT 27) at TRANSMISSION TEMP indicator gage for electrical power.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace gage instrument panel (page 10-121).
- Disconnect gage instrument panel harness connector (CKT 27) from TRANSMISSION TEMP indicator gage.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to gage instrument panel harness connector (CKT 27) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

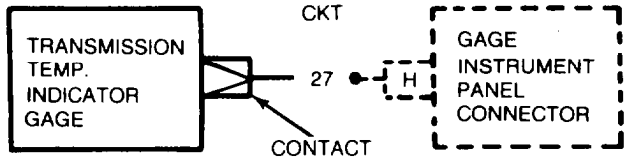


GAGE INSTRUMENT PANEL
(REAR VIEW)

YES

NO

5 **Repair gage instrument panel harness (CKT 27) (page 10-307).**



Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

NOTE

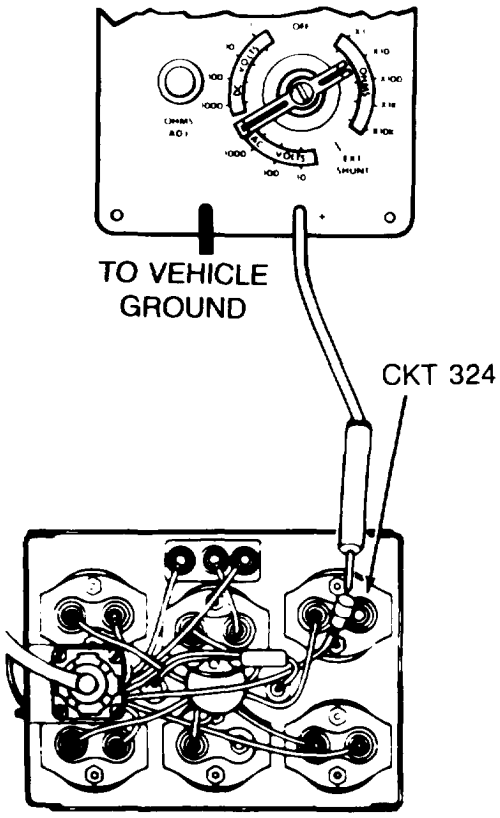
Transmission oil must cool before proceeding.

6 **Check (CKT 324) at TRANSMISSION TEMP indicator gage for proper resistance of transmission oil temperature transmitter.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect gage instrument panel harness connector (CKT 27) to TRANSMISSION TEMP indicator gage.
- Disconnect gage instrument panel harness connector (CKT 324) from TRANSMISSION TEMP indicator gage.
- Set multimeter to OHMS X100 scale and "zero" meter, or use STE/ICE Test No. 92 (page 4-92).
- Connect red probe of meter to gage instrument panel harness connector (CKT 324) and black probe to ground.
- Check if meter indicates more than 2000 OHMS or less than 2000 OHMS.

Does meter indicate more than or less than 2000 OHMS?



MORE

LESS

7

- **Check transmission oil temperature transmitter for proper resistance.**
- **See Step (13).**

TA142293

Symptom 35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

NOTE

Engine connector to transmission oil temperature transmitter is part of transmission harness.

8 **Check (CKT 324) from TRANSMISSION TEMP indicator gage connector to transmission oil temperature transmitter connector for continuity.**

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

Second Technician (Rear Grille Doors)

- Disconnect engine electrical/transmission harness connector (CKT 324) from transmission oil temperature transmitter.
- Connect one end of jumper wire to engine electrical/transmission harness connector (CKT 324) and other end to ground.

First Technician (Driver's Station)

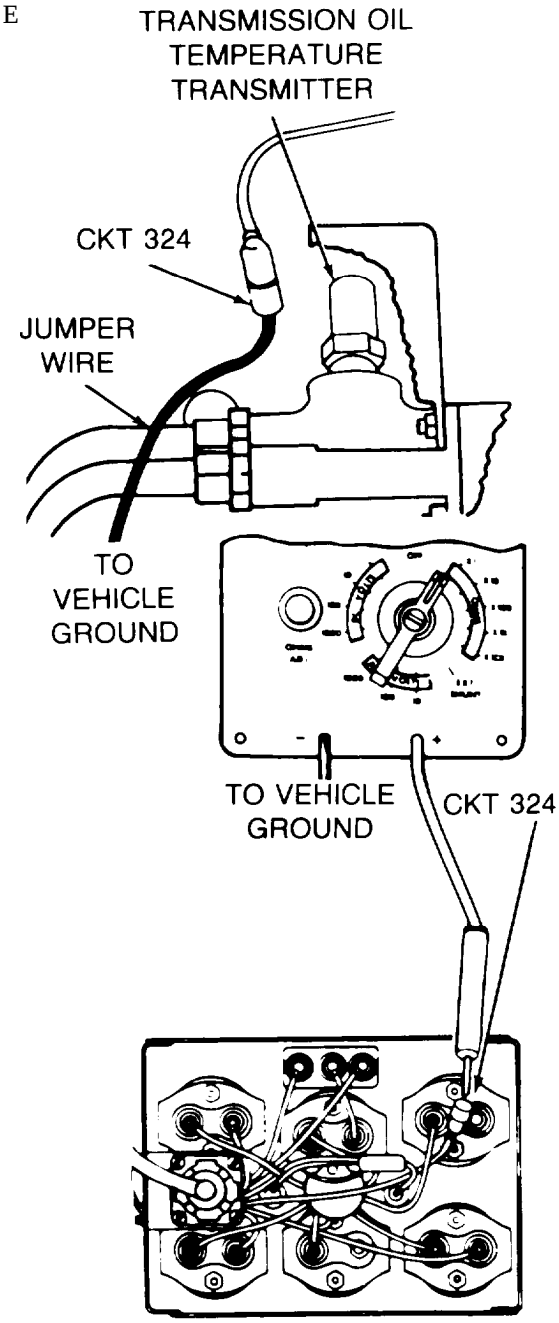
- Set multimeter to OHMS XI scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to gage instrument panel harness connector (CKT 324) and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?

YES — NO

9

- **Check gage instrument panel harness (CKT 324) for continuity.**
- **See Step (31).**



Symptom-35

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

NOTE

This check is to be performed with transmission completely warmed up.

10 Check transmission oil temperature transmitter for proper resistance.

First Technician (Driver's Station)

- Connect gage instrument panel harness connector (CKT 324) to TRANSMISSION TEMP indicator gage.
- Install gage instrument panel (page 10-122).

Second Technician (Rear Grille Doors)

- Remove jumper wire connected between engine electrical/transmission harness connector (CKT 324) and ground.
- Connect engine electrical/transmission connector (CKT 324) to transmission oil temperature transmitter.

Both Technicians (Rear Grille Doors)

- Install transmission shroud (page 9-23).

First Technician (Driver's Station)

- Start engine and allow to warm up completely.
- Drive vehicle in all shift ranges making frequent stops and turns to completely warm up transmission.

TA142295

Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

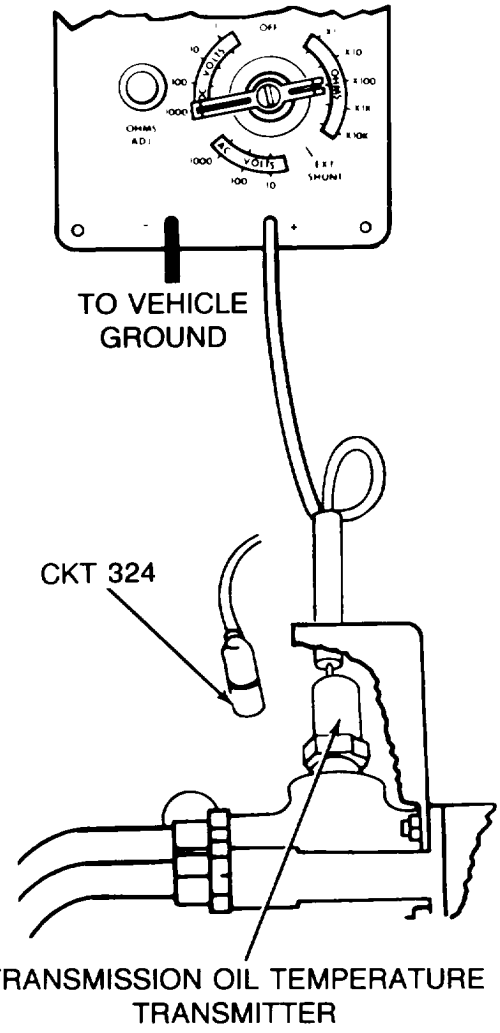
STEP (10) CONTINUED

- Stop engine.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).
- Disconnect engine electrical/transmission harness connector (CKT 324) from transmission oil temperature transmitter.
- Set multimeter to OHMS X100 scale and "zero" meter, or use STE/ICE Test No. 92 (page 4-92).
- Connect red probe of meter to center contact of transmission oil temperature transmitter and black probe to ground.
- Check if meter indicates less than 2600 OHMS or more than 2600 OHMS.

Does meter indicate less than or more than 2600 OHMS?



MORE

(11) Replace transmission oil temperature transmitter (page 10-281).

LESS

(12)

- **Replace TRANSMISSION TEMP indicator gage (page 10-141).**
- **Connect engine electrical/transmission harness connector (CKT 324) to transmission oil temperature transmitter.**
- **Install transmission shroud (page 9-23).**

TA142296

Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP 7

NOTE

- **Engine connector to transmission oil temperature transmitter is part of transmission harness.**

13 Check transmission oil temperature transmitter for proper resistance.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

Second Technician (Rear Grille Doors)

- Disconnect engine electrical/transmission harness connector (CKT 324) from transmission oil temperature transmitter.
- Connect red probe of meter to center contact of transmission oil temperature transmitter and black probe to ground.
- Check if meter indicates more than 2000 OHMS or less than 2000 OHMS.

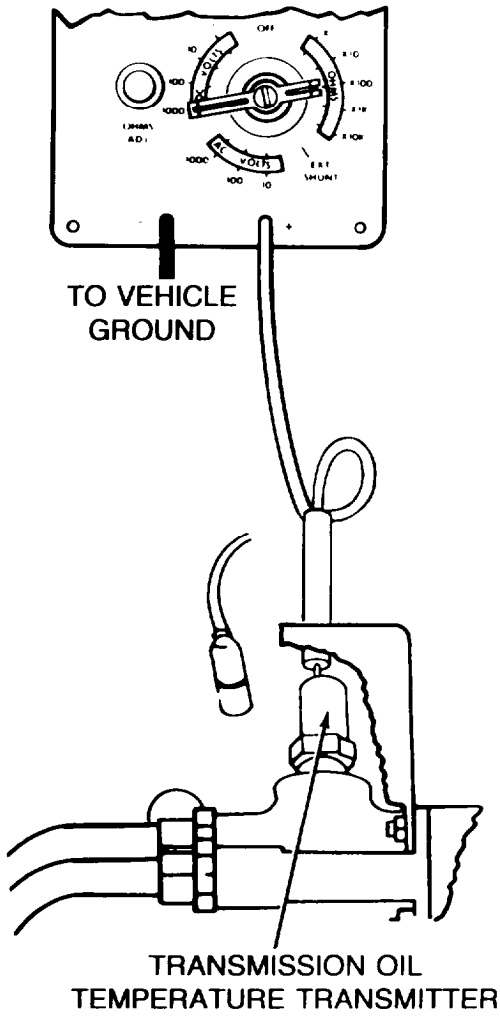
Does meter indicate more than or less than 2000 OHMS?

MORE

LESS

14

- **Replace transmission oil temperature transmitter (page 10-281).**
- **Connect gage instrument panel harness connector (CKT 324) to TRANSMISSION TEMP indicator gage.**
- **Install gage instrument panel (page 10-122).**



Symptom-35

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

15 Check gage instrument panel harness (CKT 324) for short to ground.

Second Technician (Rear Grille Doors)

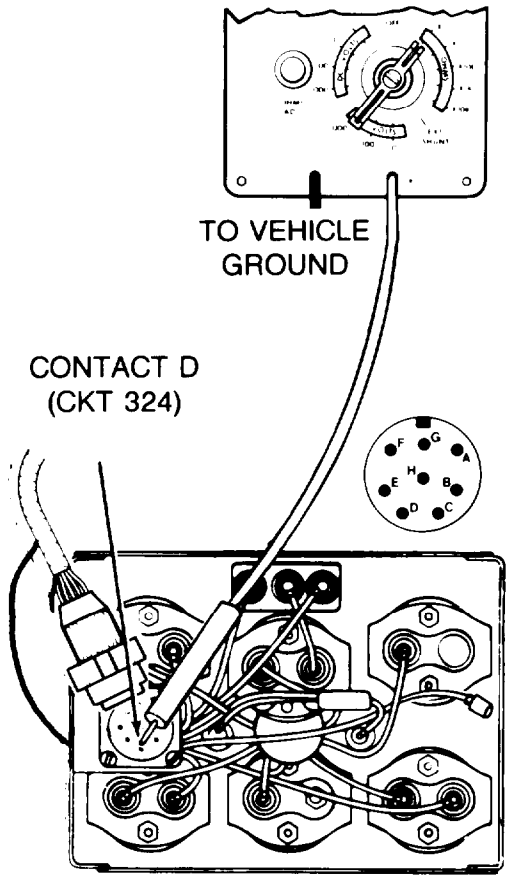
- Connect engine electrical/transmission harness connector (CKT 324) to transmission oil temperature transmitter.

Both Technicians (Rear Grille Doors)

- Install transmission shroud (page 9-23).

First Technician (Driver's Station)

- Disconnect hull front master harness connector from gage instrument panel connector.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact D (CKT 324) of gage instrument panel harness connector and black probe to ground.
- Check if meter indicates continuity.

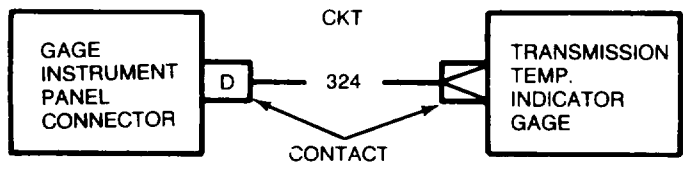


Does meter indicate continuity, thereby indicating a short to ground?

NO

YES

16 Repair gage instrument panel harness (CKT 324) (page 10-307).



TA142298

Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

17 **Check hull front master harness (CKT 324) for short to ground.**

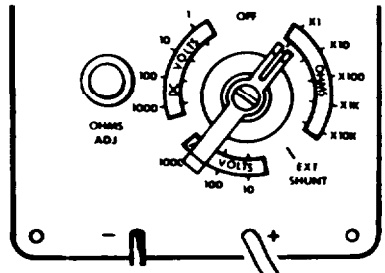
First Technician (Driver's Station)

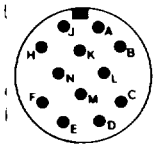
- Connect hull front master harness connector to gage instrument panel connector.
- Connect gage instrument panel harness connector (CKT 324) to TRANSMISSION TEMP indicator gage.
- Install gage instrument panel (page 10-122).

Second Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10).
- Disconnect hull front master harness connector from bulkhead electrical disconnects.
- Connect red probe of meter to contact E (CKT 324) of hull front master harness connector and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity, thereby indicating a short to ground?





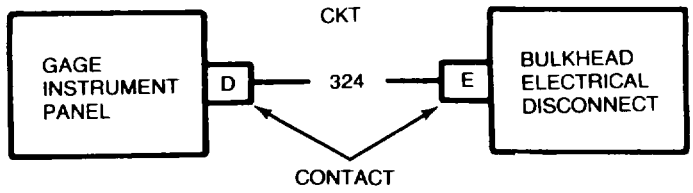
BULKHEAD ELECTRICAL DISCONNECTS

18
- **Check engine accessory harness (CKT 324) for short to ground.**
- **See step (20).**

NO

YES

19
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 324) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness to bulkhead connector.**



Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP 18

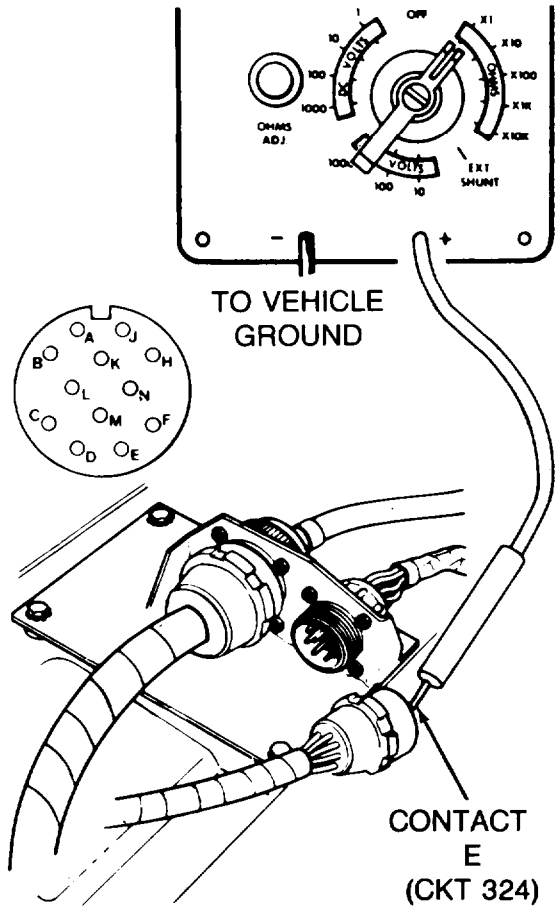
20 Check engine accessory harness (CKT 324) for short to ground.

Second Technician (Turret)

- Connect hull front master harness connector to bulkhead electrical disconnect.
- Manually traverse turret to gain access to left top deck grille doors.

First Technician (Left Top Deck Grille Doors)

- Open left top deck grille doors to gain access to engine disconnect.
- Disconnect engine accessory harness connector from engine disconnect.
- Connect red probe of meter to contact E (CKT 324) of engine accessory harness connector and black probe to ground.



TA142300

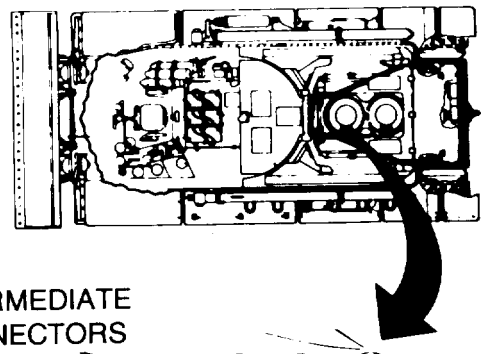
Symptom-35

STEP (20) CONTINUED

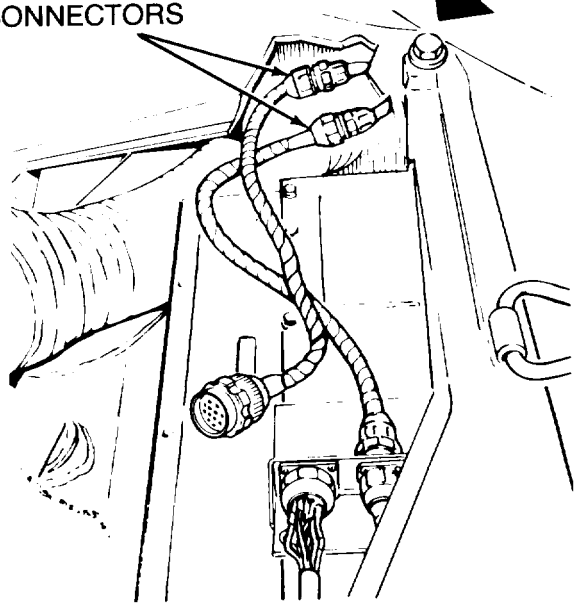
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

- Check if meter indicates continuity.

Does meter indicate continuity thereby indicating a short?



INTERMEDIATE CONNECTORS



(21)

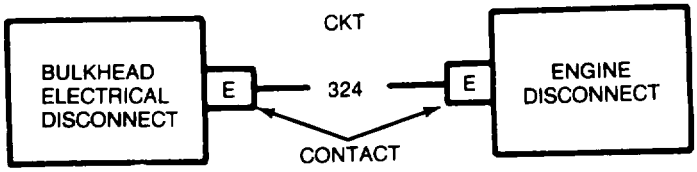
- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness (CKT 324) at intermediate connector for short to ground.**
- **See Step (28) .**

For harness without intermediate connector:

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 324) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**

YES

NO



TA142301

Symptom-35

INDICATOR - GAGE

(Continued)

22 **Check transmission harness (CKT 324) for short to ground.**

Both Technicians (Rear of Vehicle)

- Have powerplant removed (page 5-1).

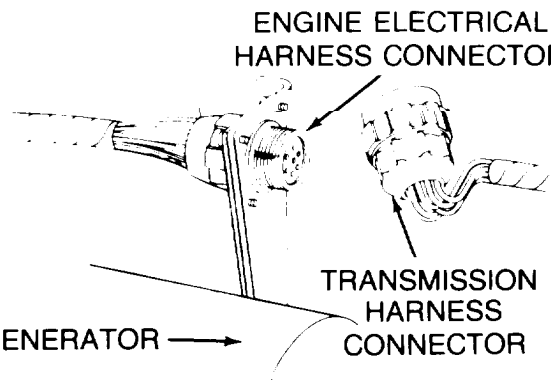
First Technician (Powerplant-Generator Side)

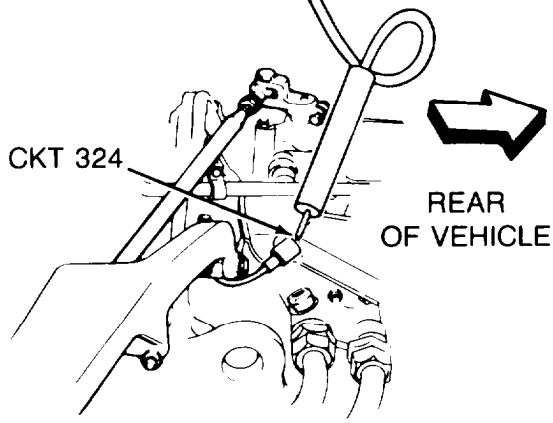
- Disconnect transmission harness connector from transmission disconnect (above generator).

Second Technician (Rear of Powerplant)

- Disconnect transmission harness connector (CKT 324) from transmission oil temperature transmitter.
- Connect red probe of meter to transmission harness connector (CKT 324) and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity, thereby indicating a short to ground?





23

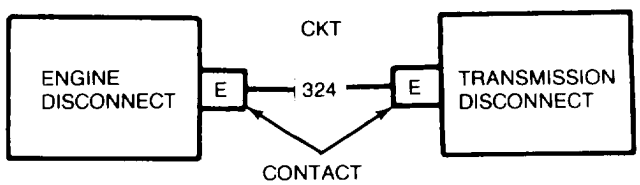
- **Repair engine electrical harness (CKT 324) (page 10-307).**
- **Connect transmission harness connector (CKT 324) to transmission oil temperature transmitter.**
- **Install powerplant, (page 5-37).**

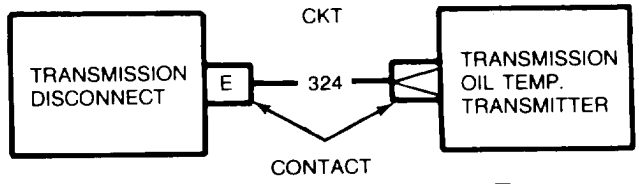
NO

YES

24

- **Repair transmission harness (CKT 324) (page 10-307).**
- **Install powerplant, (page 5-37).**





Steps (25) thru (27) deleted

All data on page 4682 deleted.

Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

33 **Check hull front master harness (CKT 324) for continuity.**

First Technician (Driver's Station)

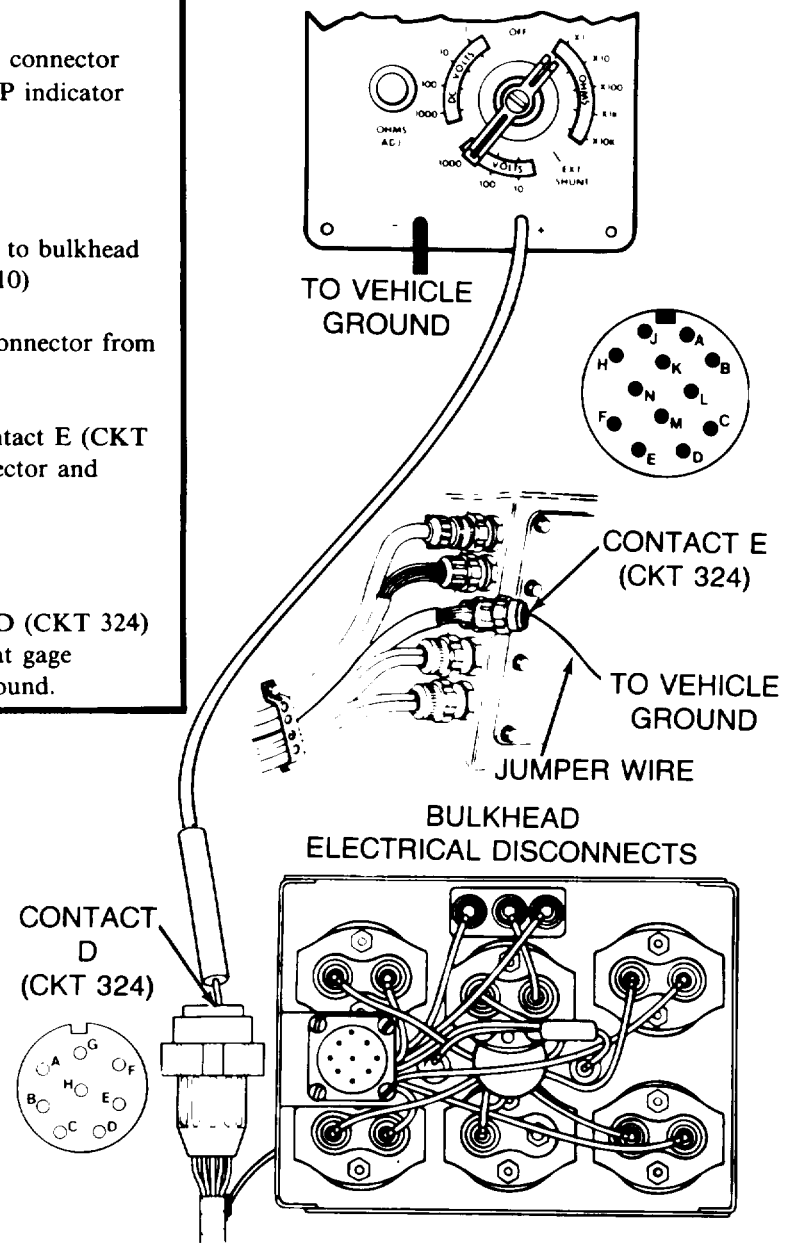
- Connect gage instrument panel harness connector (CKT 324) to TRANSMISSION TEMP indicator gage.

Second Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10)
- Disconnect hull front master harness connector from bulkhead electrical disconnects.
- Connect one end of jumper wire to contact E (CKT 324) of hull front master harness connector and other end to ground.

First Technician (Driver's Station)

- Connect red probe of meter to contact D (CKT 324) of hull front master harness connector at gage instrument panel and black probe to ground.



TA142306

Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (33) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

NO

34

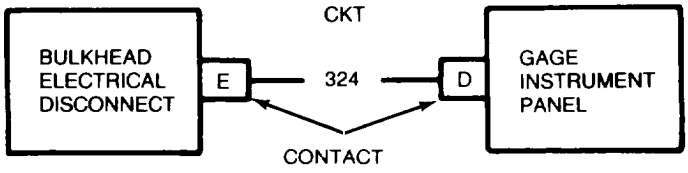
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 324) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Install transmission shroud (page 9-23).**
- **Connect hull front master harness to bulkhead electrical disconnect.**

YES

35

- **Check engine accessory harness (CKT 324) for continuity.**

- **See step (36)**



■ **Steps (44) thru (46) deleted**

Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

35

36 **Check engine accessory harness (CKT 324) for continuity.**

First Technician (Driver's Station)

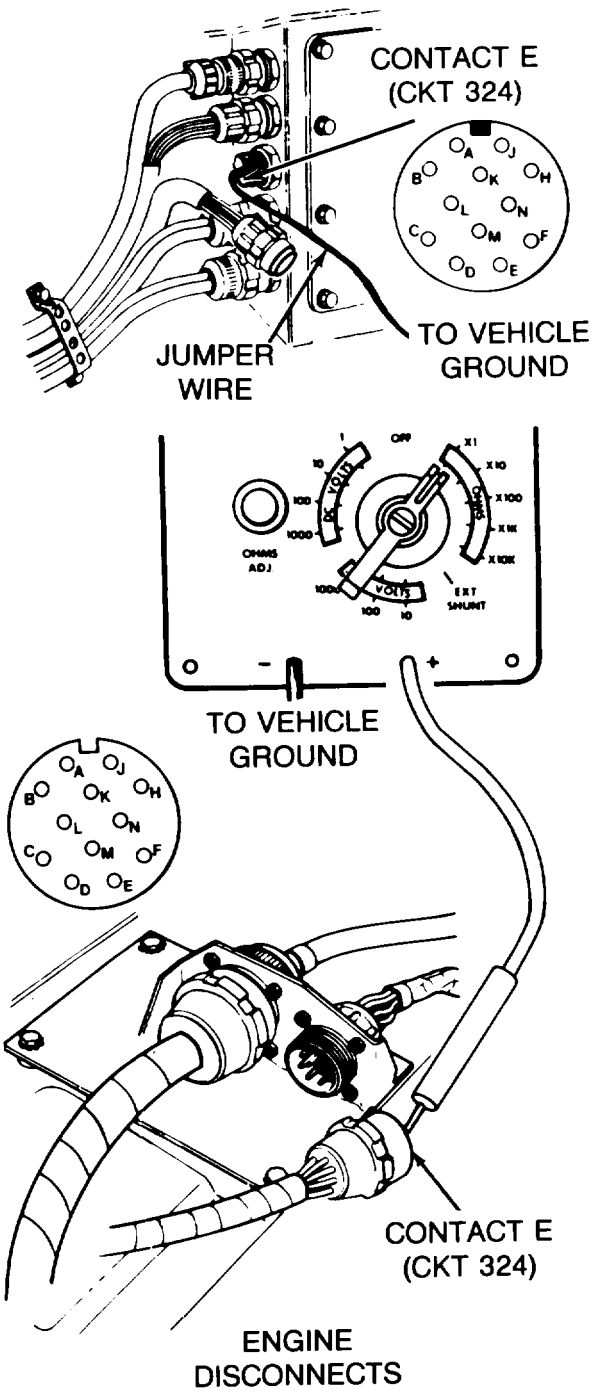
- Connect hull front master harness connector to gage instrument panel.
- Install gage instrument panel (page 10-122).

Second Technician (Turret)

- Connect one end of jumper wire to contact E (CKT 324) of engine accessory harness connector at bulkhead electrical disconnect and other end of jumper wire to ground.

First Technician (Left Top Deck Grille Doors)

- Manually traverse turret to gain access to left top deck grille doors.
- Open left top deck grille doors to gain access to engine disconnects.
- Disconnect engine accessory harness connector from engine disconnect.
- Connect red probe of meter to contact E (CKT 324) of engine accessory harness connector and black probe to ground.



TA142308

Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (36) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

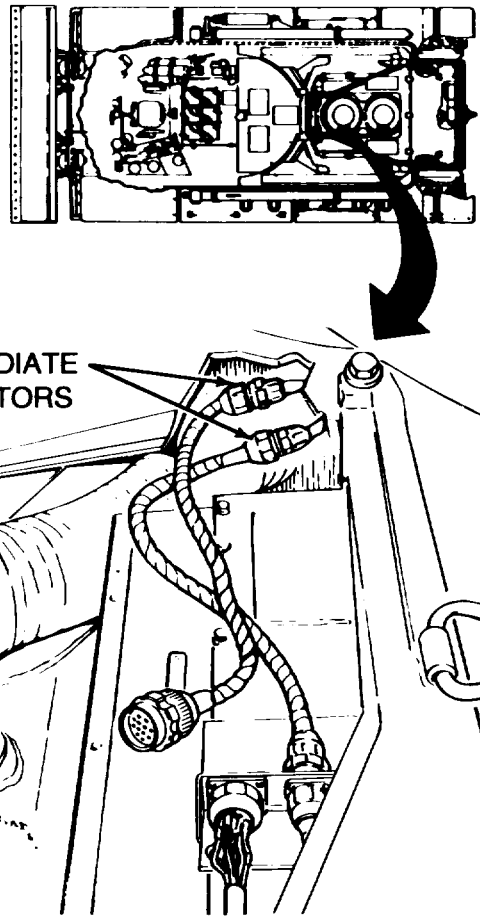
NO

37

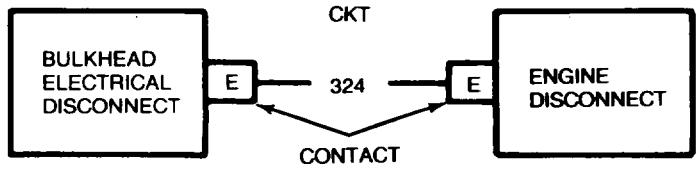
- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness extension (CKT 324) for continuity from intermediate connector to connector of engine disconnect.**
- **See Step (41) .**

For harness without intermediate connector:

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 324) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**
- **Install transmission shroud (page 9-23).**



YES



TA142309

Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

38 **Check transmission harness (CKT 324) for continuity.**

Second Technician (Turret)

- Connect hull front master harness connector to bulkhead electrical disconnects.

Both Technicians (Rear of Vehicle)

- Have powerplant removed (page 5-1).

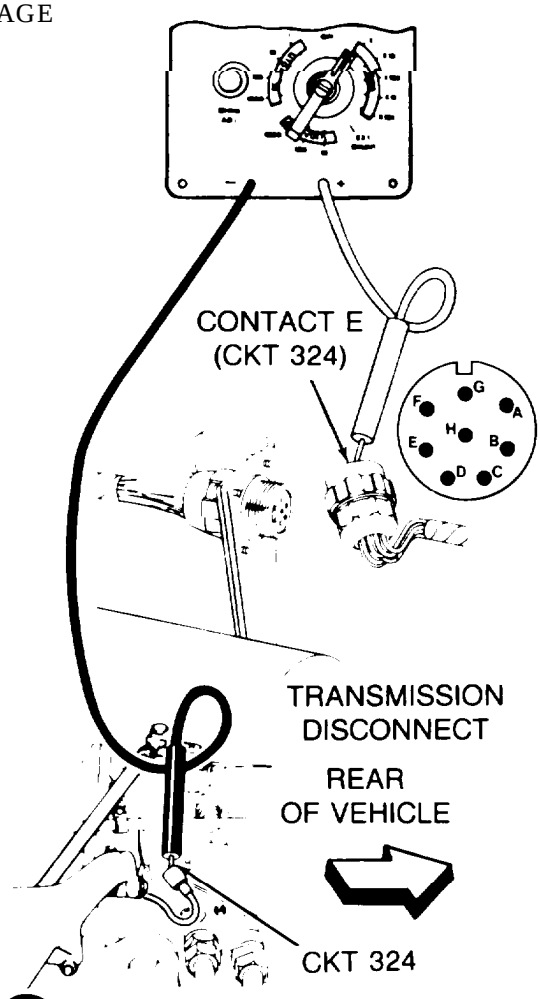
First Technician (Powerplant-Generator Side)

- Disconnect transmission wiring harness connector from transmission disconnect (above generator).

Second Technician (Rear of Engine)

- Disconnect transmission harness connector (CKT 324) from transmission oil temperature transmitter.
- Connect red probe of meter to contact E (CKT 324) of transmission harness connector.
- Connect black probe of meter to transmission harness connector (CKT 324) at transmission oil temperature transmitter.
- Check if meter indicates continuity.

Does meter indicate continuity?



39

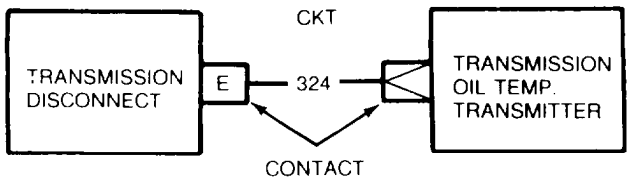
- **Repair transmission harness (CKT 324) (page 10-307).**
- **Install powerplant,(page 5-37).**

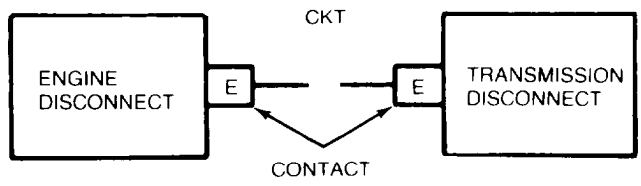
NO

YES

40

- **Repair engine electrical harness (CKT 324) (page 10-307).**
- **Connect transmission harness connector (CKT 324) to transmission oil temperature transmitter.**
- **Install powerplant, (page 5-37).**





Symptom-35

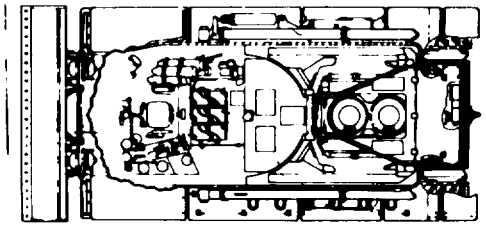
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

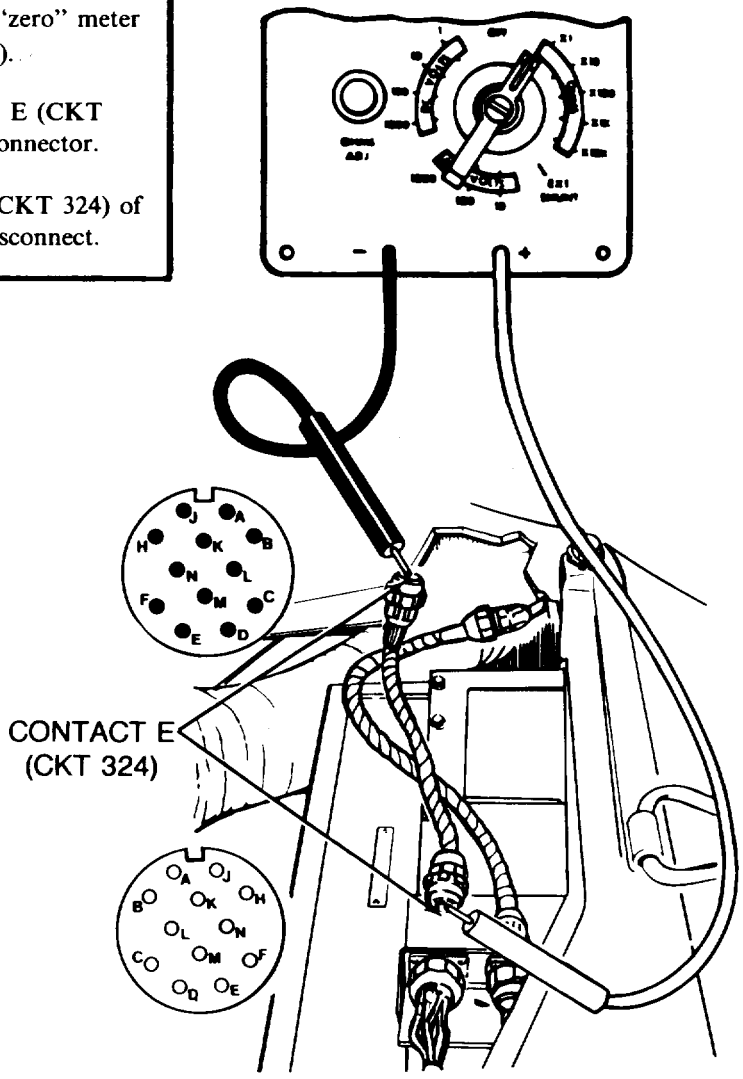
FROM STEP (37)

(41) Check engine accessory harness extension (CKT 324) for continuity from intermediate connector to connector of engine disconnect.

Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect black probe of meter to contact E (CKT 324) of extension harness intermediate connector.
- Connect red probe of meter to contact (CKT 324) of extension harness connector at engine disconnect.





TA142311

Symptom-35 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (41) CONTINUED

- Check if meter indicate continuity.

Does meter indicates continuity?

YES

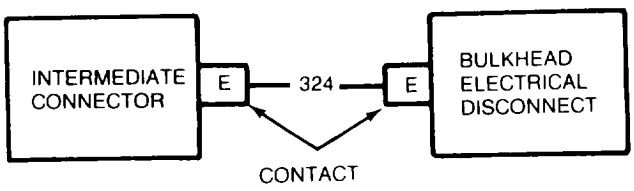
42

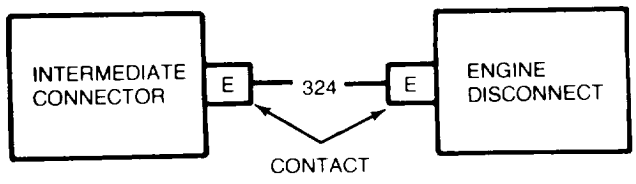
- **Inspect engine accessory harness (CKT 324) for bent/broken connector contacts or loose (CKT 324) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**

NO

43

- **Inspect engine accessory harness extension (CKT 324) for bent/broken connector contacts or loose (CKT 324) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**





TA142312

DETAILED TROUBLESHOOTING PROCEDURE

Symptom-36 INDICATOR - GAGE

BATTERY/GENERATOR GAGE WILL NOT WORK (ALL OTHER GAGES WORK).

1 Check for electrical power at BATT GEN INDICATOR input (CKT 27).

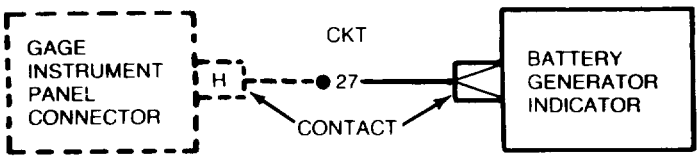
Technician (Driver's Station)

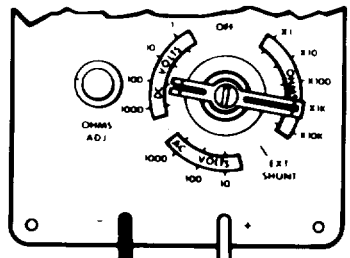
- Set MASTER BATTERY switch OFF.
- Displace gage instrument panel (page 10-121).
- Disconnect gage instrument panel harness connector (CKT 27) from BATT GEN INDICATOR connector.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to gage instrument panel harness connector (CKT 27) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

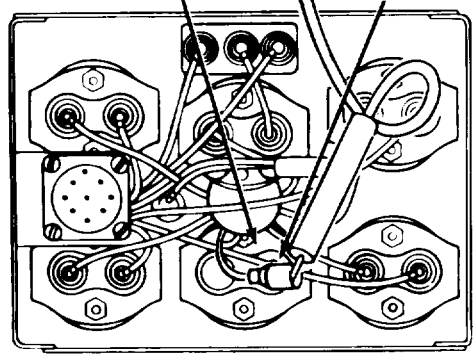
Does meter indicate 18 to 30 volts dc?

2 Replace BATT GEN INDICATOR (page 10-130). YES

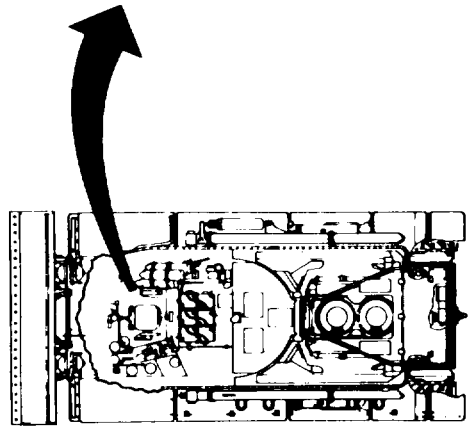
3 Repair gage instrument panel harness (page 10-307). NO







GAGE INSTRUMENT PANEL (REAR VIEW)



FOR CLARITY TURRET NOT SHOWN

■ All data on pages 4-692 thru 4-693 deleted.

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE

Symptom-37

BATTERY/GENERATOR GAGE POINTER IN RIGHT RED AREA.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

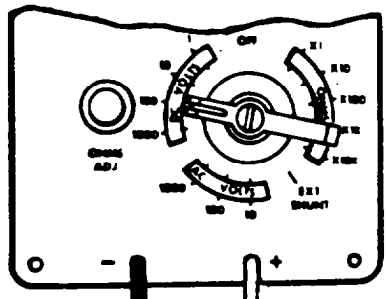
NOTE

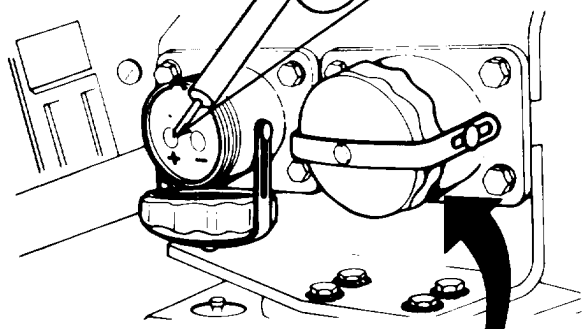
Units with STE/ICE perform Test No. 67, Charging Circuit and Battery Voltage Test. Units without STE/ICE proceed to Step (1) .

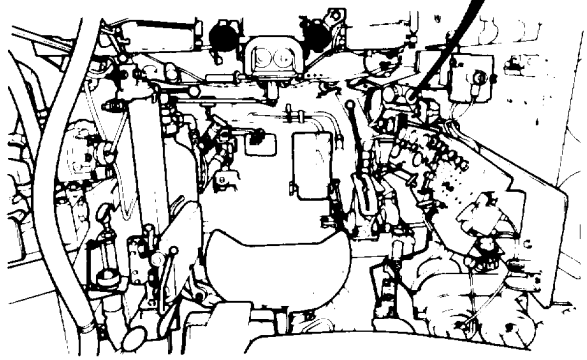
(1) Check for 27 to 30 volts dc at slave receptacle—engine running.

First Technician (Driver's Station)

- Disconnect protective cap from one of the two slave receptacles.
- Set multimeter to measure 27 to 30 volts dc.
- Connect red probe of meter to positive contact (CKT 49) of slave receptacle and black probe to ground.
- Start engine.
- Check if meter indicates 27 to 30 volts dc.







TA142316

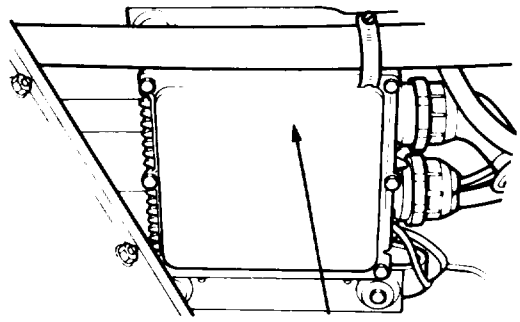
Symptom-37

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP (1) CONTINUED

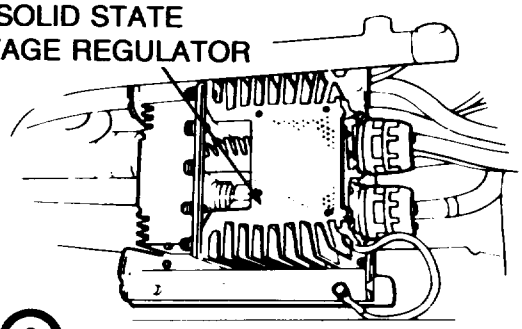
- Stop engine.

Did meter indicate more than 30 volts dc?



CARBON PILE
VOLTAGE REGULATOR

ALTERNATE CONFIGURATION
SOLID STATE
VOLTAGE REGULATOR



YES

NO

(2)

- **Replace BATT GEN INDICATOR (page 10-130).**
- **Connect protective cap to slave receptacle.**

(3)

- **If vehicle has carbon pile voltage regulator with voltage control rheostat perform Step (4). Check if voltage can be adjusted to 27 to 30 volts dc.**
- **If voltage has solid state voltage regulator replace voltage regulator (page 10-19).**

TA142317

Symptom-37

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP 3

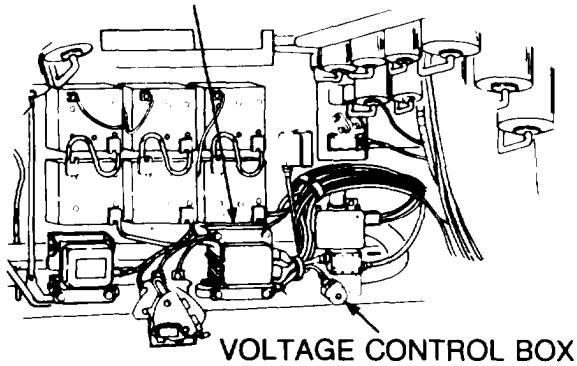
4 Check if voltage can be adjusted to 27 to 30 volts dc.

Second Technician (Turret)

- Perform generator voltage adjustment (page 10-22).

Did voltage adjust to 27 to 30 volts dc?

CARBON PILE VOLTAGE REGULATOR



VOLTAGE CONTROL BOX (ADJUSTING RHEOSTAT) FOR CARBON PILE VOLTAGE REGULATOR

FOR CLARITY TURRET NOT SHOWN

NO

YES

5

- **Stop engine.**
- **Over voltage condition corrected.**

TA142318

Symptom-37 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

6 **Check voltage control rheostat for variable resistance between connector contacts A and B.**

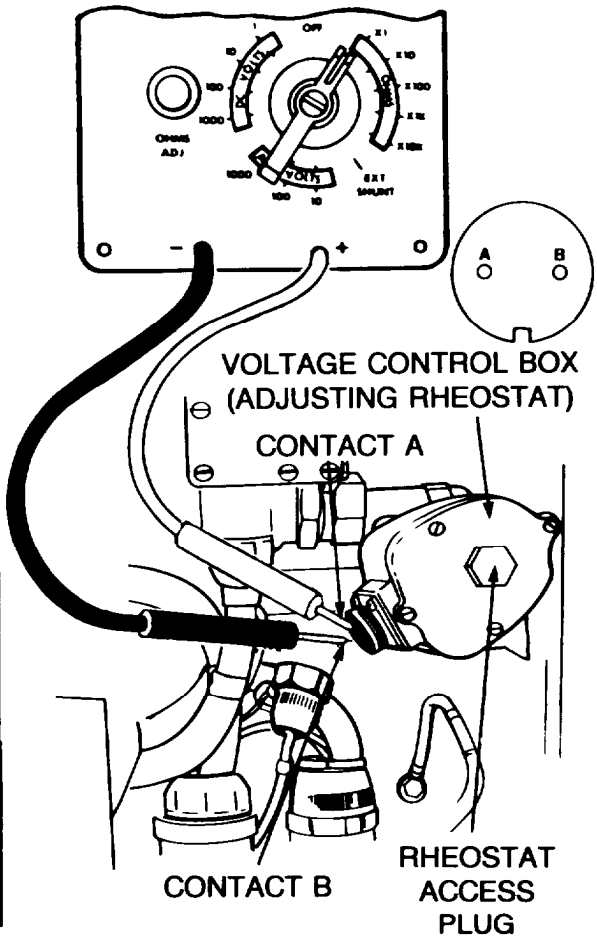
Second Technician (Turret)

- Remove rheostat access plug.
- Disconnect hull power harness from voltage control rheostat.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact A and black probe to contact B of connector on voltage control rheostat.

First Technician (Turret)

- Observe meter while slowly turning voltage control rheostat adjustment screw from fully counterclockwise to fully clockwise position.
- Check if meter reads approximately 5 ohms at fully counterclockwise and smoothly increases to approximately 115 ohms at fully clockwise position.

Does resistance vary when adjustment screw is rotated?



YES

NO

7 **Replace voltage control rheostat (page 10-24).**

TA142319

Symptom-37

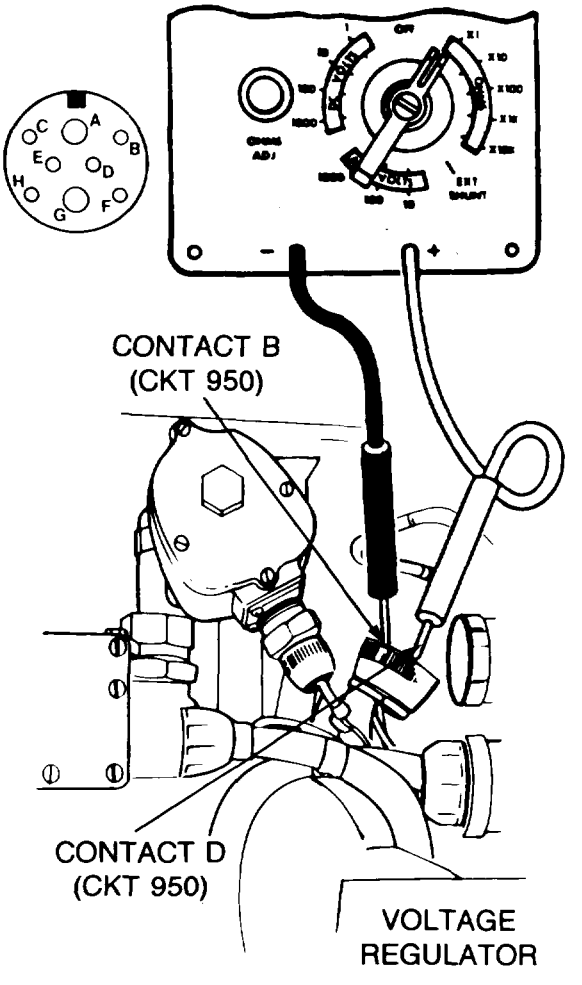
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

8 **Check hull power harness (CKT 950) for variable resistance between contacts B and D at connector to voltage regulator.**

Second Technician (Turret)

- Connect hull power harness to voltage control rheostat.
- Disconnect hull power harness from voltage regulator.
- Connect red probe of meter to contact D (CKT 950) and black probe to contact B (CKT 950) of hull power harness connector at voltage regulator.
- Observe meter while slowly turning voltage control rheostat adjustment screw from fully counterclockwise to fully clockwise position.
- Check if meter reads approximately 5 ohms at fully counterclockwise and smoothly increases to approximately 115 ohms at fully clockwise position.

Does resistance vary when adjustment screw is rotated?

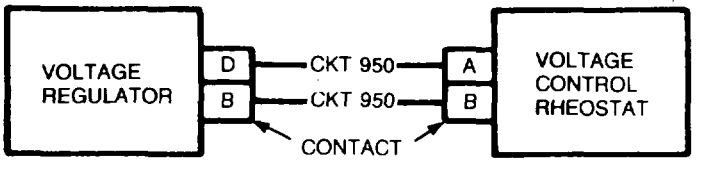


NO → **10**

- **Inspect hull power harness for bent/broken connector contacts or loose (CKT 950) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull power harness.**
- **Connect hull power harness connector to voltage regulator.**
- **Install rheostat access plug.**

YES → **9**

- **Replace voltage regulator (page 10-19).**
- **Install rheostat access plug.**



TA142320

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR-GAGE

Symptom-38

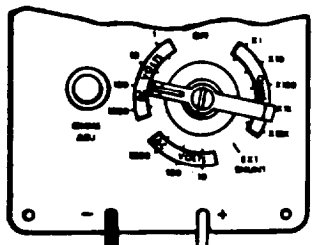
BATTERY/GENERATOR GAGE POINTER IN YELLOW OR LEFT RED AREA (ENGINE RUNNING).

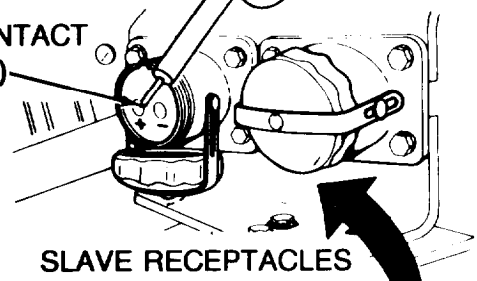
NOTE

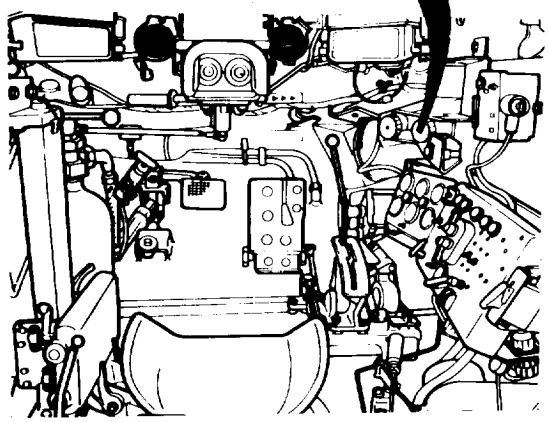
This procedure is to be performed by two persons in step (3) only. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

NOTE

Units with STE/ICE perform Test No. 67, Charging Circuit and Battery Voltage Test (page 4-74). Units without STE/ICE proceed to Step (1).







1 Check for 27 to 30 volts dc at slave receptacle—engine running.

First Technician (Driver's Station)

- Disconnect protective cap from one of the two slave receptacles.
- Set multimeter to measure 27 to 30 volts dc.
- Connect red probe of meter to positive contact (CKT 49) of slave receptacle and black probe to ground.
- Start engine.
- Check if meter indicates 27 to 30 volts dc.
- Stop engine.

Did meter indicate 27 to 30 volts dc?

NO

YES

2

- **See Symptom 36: BATT/GEN GAGE WILL NOT WORK-(ALL OTHER GAGES WORK).**
- **Install protective cap on slave receptacle.**

TA142321

Symptom-38 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR-GAGE
(Continued)

NOTE

If vehicle has carbon pile voltage regulator with voltage control rheostat perform Step (3). If vehicle has solid state voltage regulator see Symptom 31:GENERATOR/REGULATOR SYSTEM NOT WORKING.

3 **Check if voltage can be adjusted to 27 to 30 volts dc.**

Second Technician (Turret)

- Perform generator voltage adjustment (page 10-22).

Did voltage adjust to 27 to 30 volts dc?

4

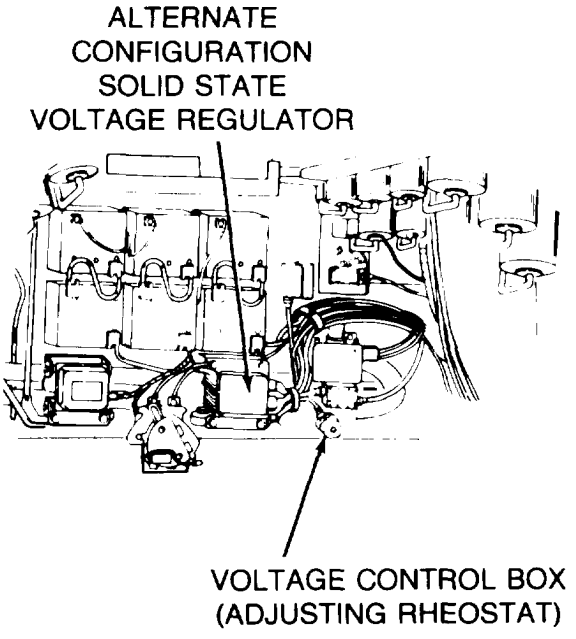
- **Stop engine.**
- **Under voltage condition corrected.**

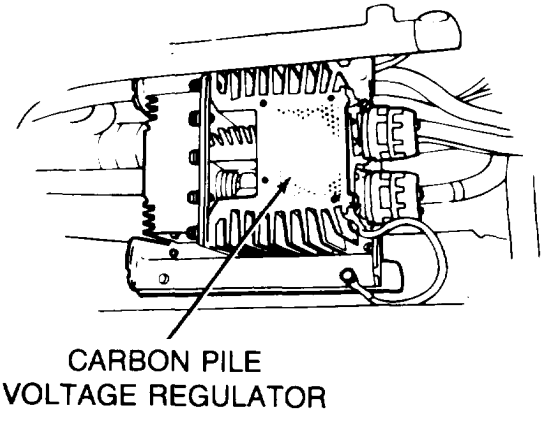
YES

5

- **Generator is not charging the batteries.**
- **Stop engine and see Symptom 31: GENERATOR/REGULATOR SYSTEM IS NOT WORKING.**

NO





TA142322

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE

Symptom 39

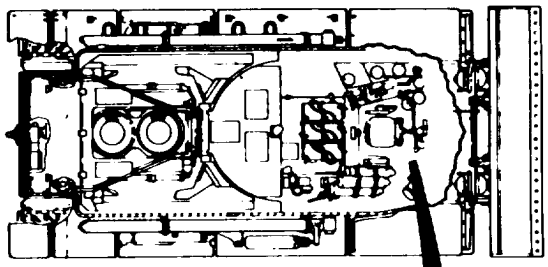
FUEL LEVEL GAGE WILL NOT WORK (ALL OTHER GAGES WORK)

NOTE

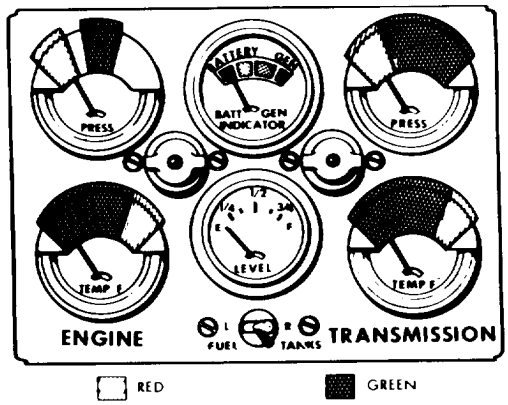
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

NOTE

The difference between early and late model vehicles will be that CKT 28 may be identified as CKT 876.



FOR CLARITY
TURRET NOT SHOWN



GAGE INSTRUMENT PANEL

1 **Check if FUEL TANKS LEVEL indicator gage gives wrong indications for both left (L) and right (R) fuel tank.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set FUEL TANKS selector switch to L.
- Read FUEL TANKS LEVEL indicator gage.
- Set FUEL TANKS selector switch to R.
- Read FUEL TANKS LEVEL indicator gage.

Does FUEL TANKS LEVEL indicator gage give wrong indications for both L and R fuel tanks?

YES

NO

2

- **Check FUEL TANKS selector switch for continuity through circuit that indicated wrong (CKT 30 for left fuel tank, CKT 31 for right fuel tank).**
- **See Step (10).**

TA142323

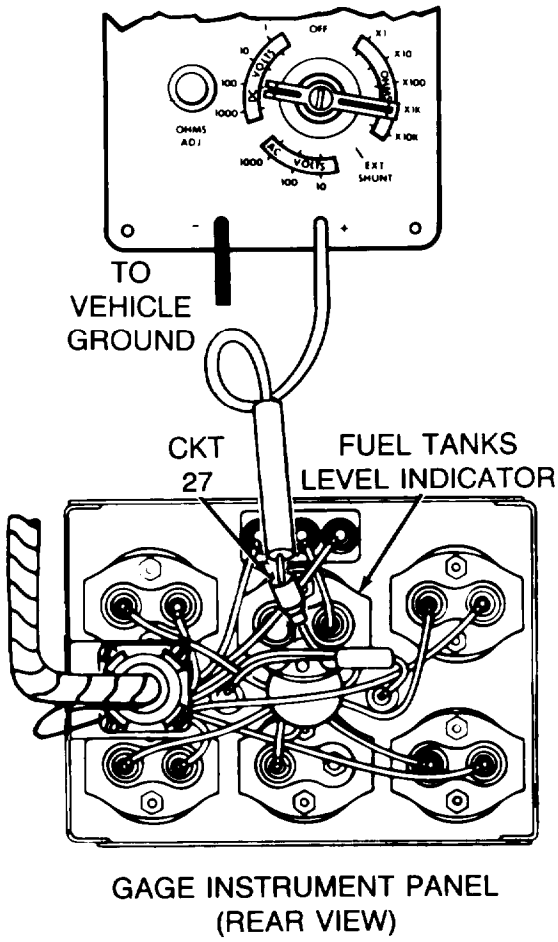
Symptom 39 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

3 **Check gage instrument panel harness connector (CKT 27) at FUEL TANKS LEVEL indicator gage for electrical power.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace gage instrument panel (page 10-121).
- Set meter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Disconnect gage instrument panel harness connector (CKT 27) from FUEL TANKS LEVEL indicator.
- Connect red probe of meter to gage instrument panel harness connector (CKT 27) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

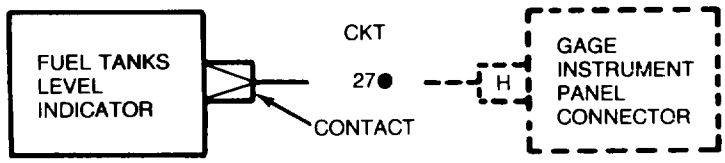


GAGE INSTRUMENT PANEL
(REAR VIEW)

YES

NO

4 **Repair gage instrument panel harness (page 10-307).**



TA142324

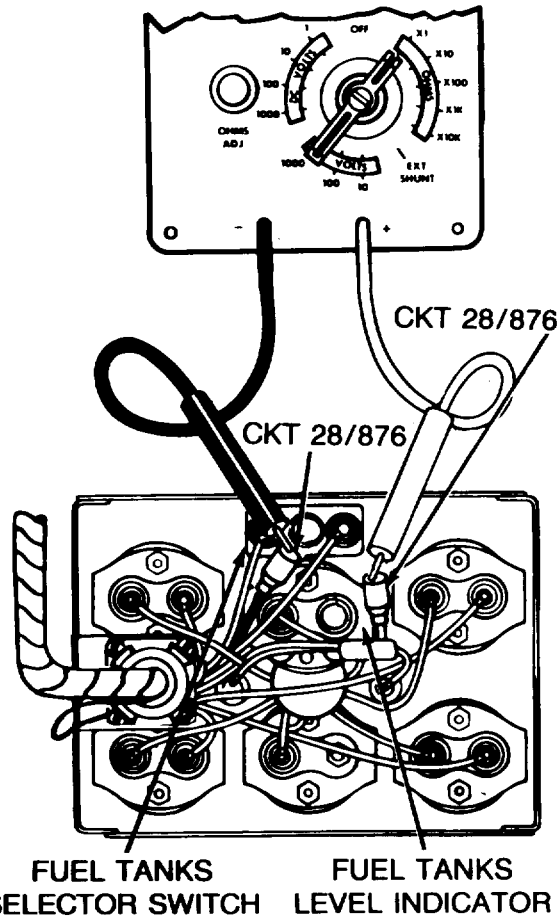
Symptom 39 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

5 **Check fuel tanks selector switch cable (CKT 28/876) for continuity.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect gage instrument panel harness connector (CKT 27) to FUEL TANKS LEVEL indicator.
- Set meter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Disconnect fuel tanks selector switch cable (CKT 28/876) from FUEL TANKS LEVEL indicator and FUEL TANKS selector switch.
- Connect one probe of meter to each end of fuel tanks selector switch cable (CKT 28/876).
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

6 **Replace fuel tanks selector switch cable (page 10-149).**

TA142325

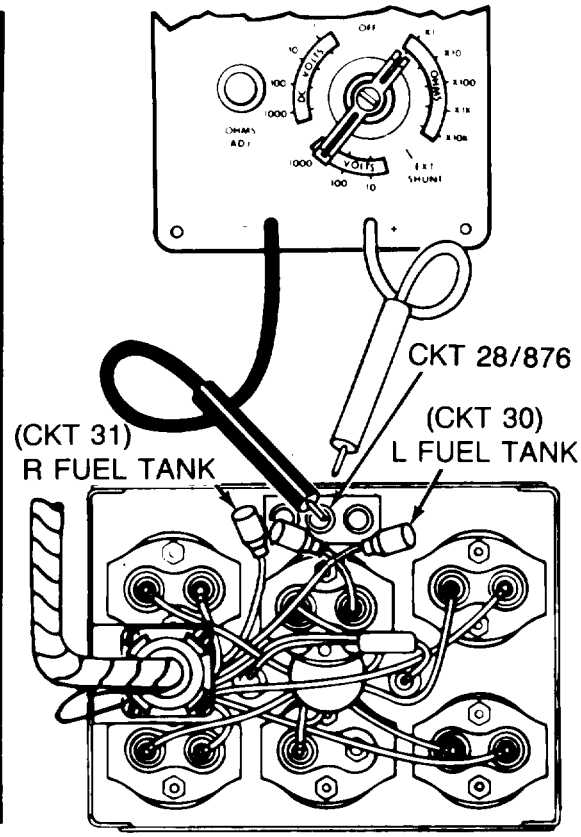
Symptom 39 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

7 **Check FUEL TANKS selector switch for continuity.**

First Technician (Driver's Station)

- Connect fuel tanks selector switch cable (CKT 28/876) to FUEL TANKS LEVEL indicator.
- Connect black probe of meter to center connector of FUEL TANKS selector switch (CKT 28/876).
- Disconnect either CKT 30 or CKT 31 from FUEL TANKS selector switch.
- Connect red probe of meter to gage instrument panel harness connector of circuit disconnected in above step.
- Set FUEL TANKS selector switch to circuit being checked (L for CKT 30, R for CKT 31).
- Check if meter indicates continuity.

Does meter indicate continuity?



8 **Replace FUEL TANKS selector switch (page 10-143).**

NO

YES

9
- **Replace FUEL TANKS LEVEL indicator (page 10-138).**
- **Connect (CKT 28/876 and CKT 30 or CKT 31) connectors to FUEL TANKS selector switch.**

TA142326

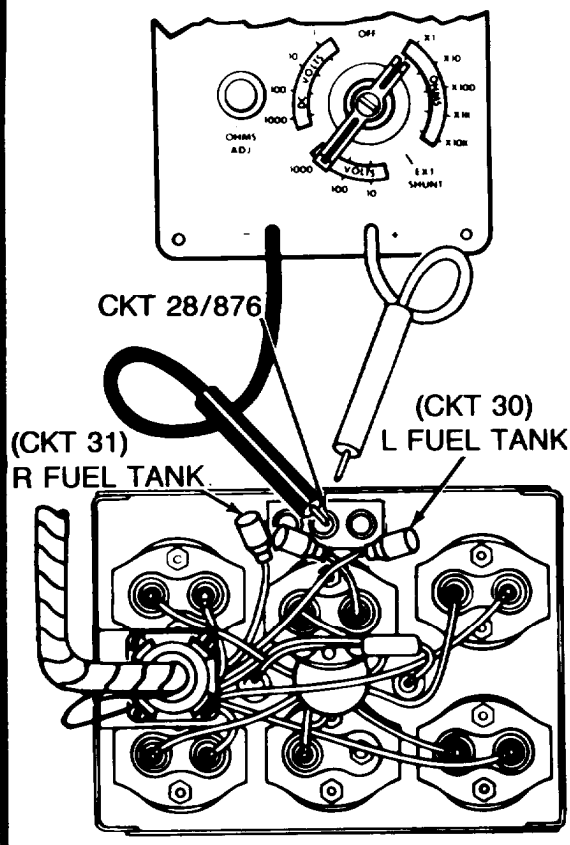
Symptom 39 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP (2)

(10) Check FUEL TANKS selector switch for continuity through circuit that indicated wrong (CKT 30 for left fuel tank, CKT 31 for right fuel tank).

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace gage instument panel (page 10-121).
- Disconnect fuel tanks selector switch cable (CKT 28/876) from FUEL TANKS selector switch.
- Set FUEL TANKS selector switch to circuit being checked (L for CKT 30, R for CKT 31).
- Disconnect gage instrument panel harness connector of CKT 30 or CKT 31 (as indicated by fault in Step (1) from FUEL TANKS selector switch).
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to gage instrument panel harness connector of circuit disconnected in above step.
- Connect black probe of meter to center connector of FUEL TANKS selector switch.
- Check if meter indicates continuity.



Does meter indicate continuity?

YES

NO

(11) Replace FUEL TANKS selector switch (page 10-143).

TA142327

Symptom 39 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

12 **Check (CKT 30 or CKT 31) for continuity from FUEL TANKS selector switch to proper fuel tank liquid quantity transmitter.**

Second Technician (Right or Left Top Deck Grille Doors)

- Open top deck grille doors to gain access to fuel tank liquid quantity transmitter of defective circuit (left fuel tank for CKT 30, right fuel tank for CKT 31).
- Disconnect rear accessory harness connector from fuel tank liquid quantity transmitter.
- Connect one end of jumper wire to connector disconnected from transmitter and other end to ground.

First Technician (Driver's Station)

- Connect fuel tanks selector switch cable (CKT 28/876) to FUEL TANKS selector switch.
- Connect red probe of meter to connector of defective circuit (CKT 30 or CKT 31) at instrument panel and black probe to ground.
- Check if meter indicates continuity.

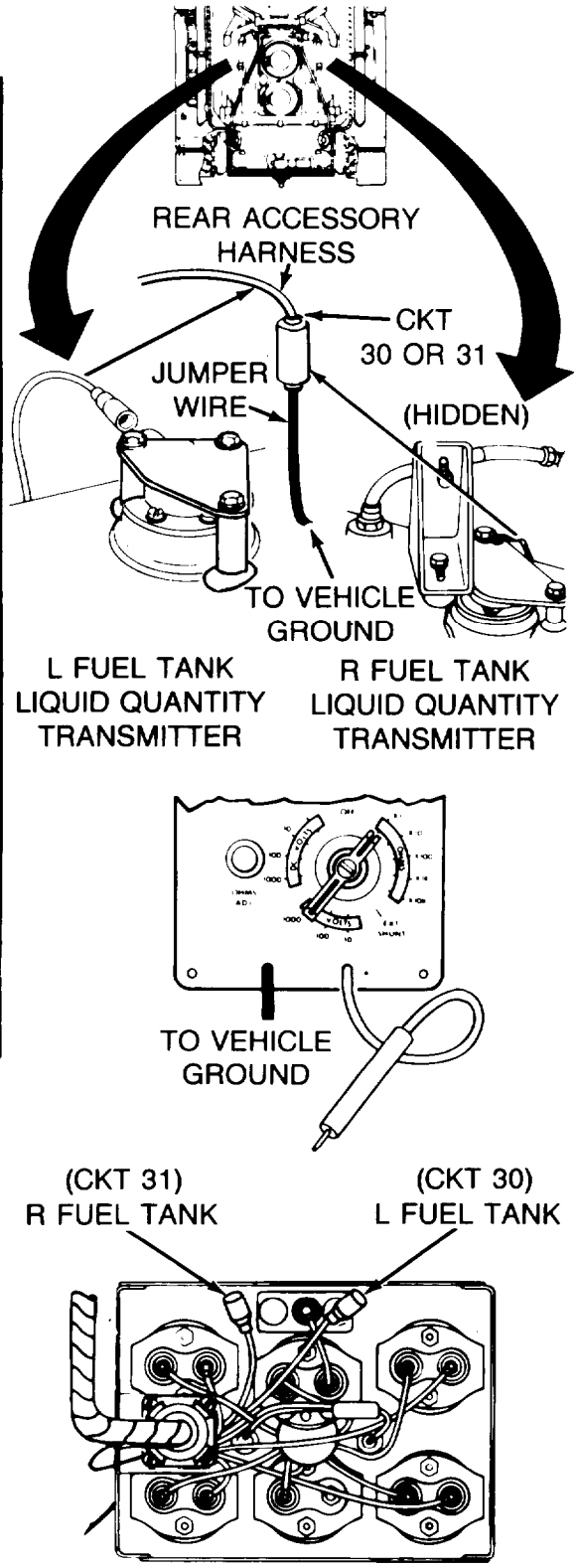
Does meter indicate continuity?

13 **Check gage instrument panel harness (CKT 30 or CKT 31) for continuity from connector at FUEL TANKS selector switch to gage instrument panel connector.**

- **See Step (21).**

NO

YES



TA142328

Symptom 39 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

14 **Check (CKT 30 or CKT 31) at FUEL TANKS selector switch for short to ground.**

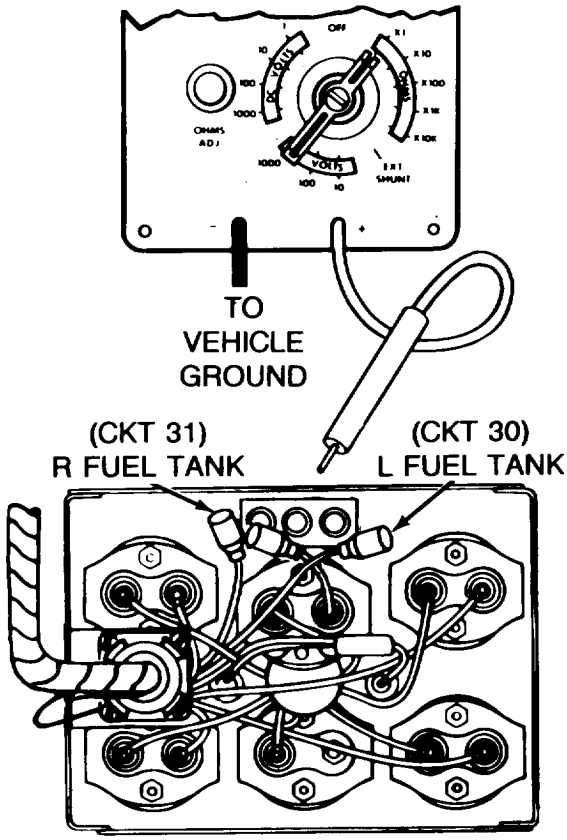
Second Technician (Right or Left Top Deck Grille Doors)

- Remove jumper wire from rear accessory harness connector at fuel tank liquid quantity transmitter.

First Technician (Driver's Station)

- Connect red probe of meter to connector of defective circuit (CKT 30 or CKT 31) at instrument panel and black probe to ground.
- Check if meter indicates less than infinite resistance.

Does meter indicate less than infinite resistance, thereby indicating a short?



YES

NO

15

- **Replace fuel tank liquid quantity transmitter (page 7-167).**
- **Connect gage instrument panel harness connector (CKT 30 or CKT 31) to FUEL TANKS selector switch.**

TA142329

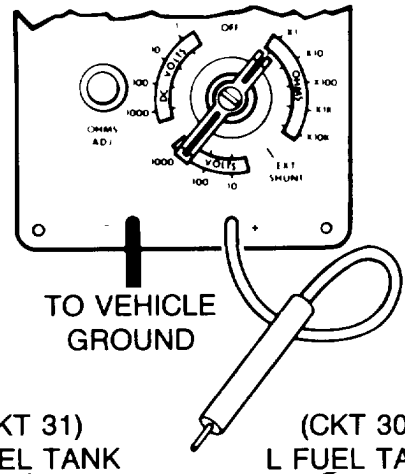
Symptom39 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

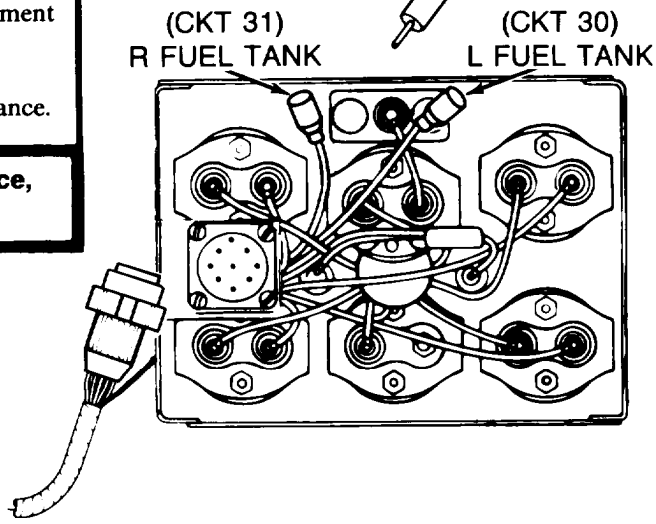
16 **Check gage instrument panel harness (CKT 30 or CKT 31) for short to ground.**

First Technician (Driver's Station)

- Disconnect hull front master harness connector from gage instrument panel.
- Connect red probe of meter to connector of defective circuit (CKT 30 or CKT 31) at instrument panel and black probe to ground.
- Check if meter indicates less than infinite resistance.

Does meter indicate less than infinite resistance, thereby indicating a short?

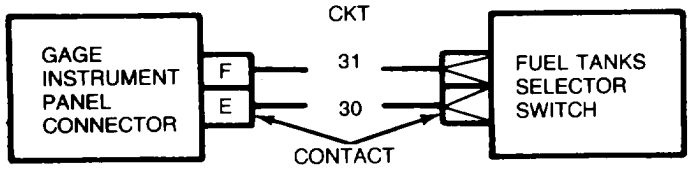




NO

YES

17
- **Repair gage instrument panel harness (page 10-307).**
- **Connect rear accessory harness connector (CKT 30 or CKT 31) to fuel tank liquid quantity transmitter.**



TA142330

Symptom 39 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

18 **Check hull front master harness (CKT 30 or CKT 31) for short to ground.**

Second Technician (Right or Left Top Deck Grille Doors)

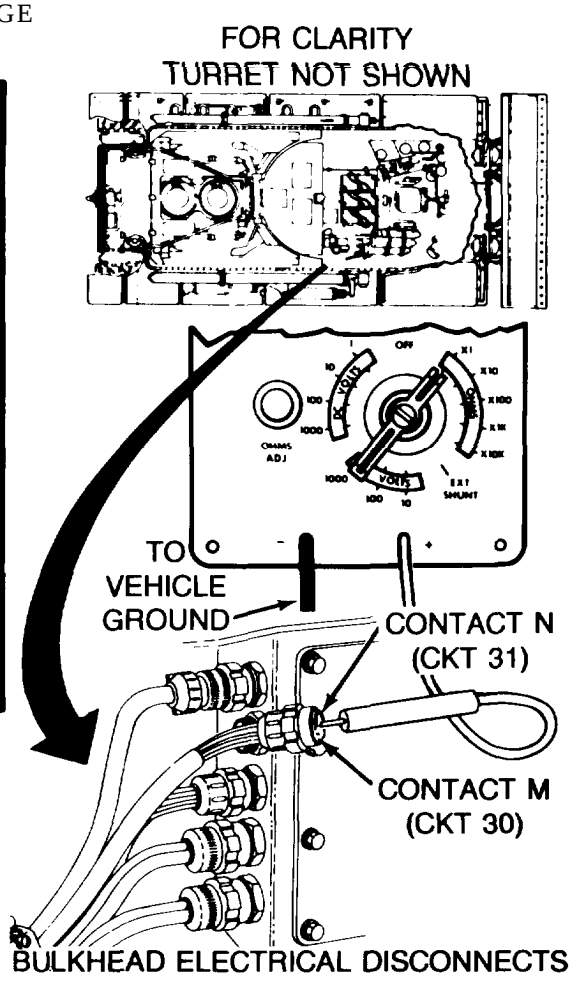
- Connect rear accessory harness connector (CKT 30 or 31) to fuel tank liquid quantity transmitter.

First Technician (Driver's Station)

- Connect CKT 30 or CKT 31 to FUEL TANKS selector switch.

Second Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10).
- Disconnect hull front master harness connector from bulkhead electrical disconnects.
- Connect red probe of meter to contact of defective circuit in hull front master harness connector (M for CKT 30, left tank; N for CKT 31, right tank) and black probe to ground.



TA142331

Symptom-39

STEP (18) CONTINUED

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

- Check if meter indicates less than infinite resistance.

Does meter indicate less than infinite resistance, thereby indicating a short?

YES

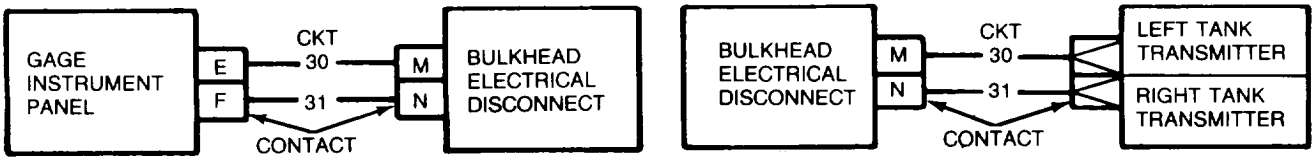
19

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 30 or CKT 31) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to gage instrument panel.**
- **Install gage instrument panel (page 10-122).**

NO

20

- **Inspect rear accessory harness for bent/broken connector contacts or loose (CKT 30 or CKT 31) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective rear accessory harness.**
- **Connect hull front master harness connector to gage instrument panel.**
- **Install gage instrument panel (page 10-122).**



TA142332

Symptom 39 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

FROM STEP 13

21 **Check gage instrument panel harness (CKT 30 or CKT 31) for continuity from connector at FUEL TANKS selector switch to gage instrument panel connector.**

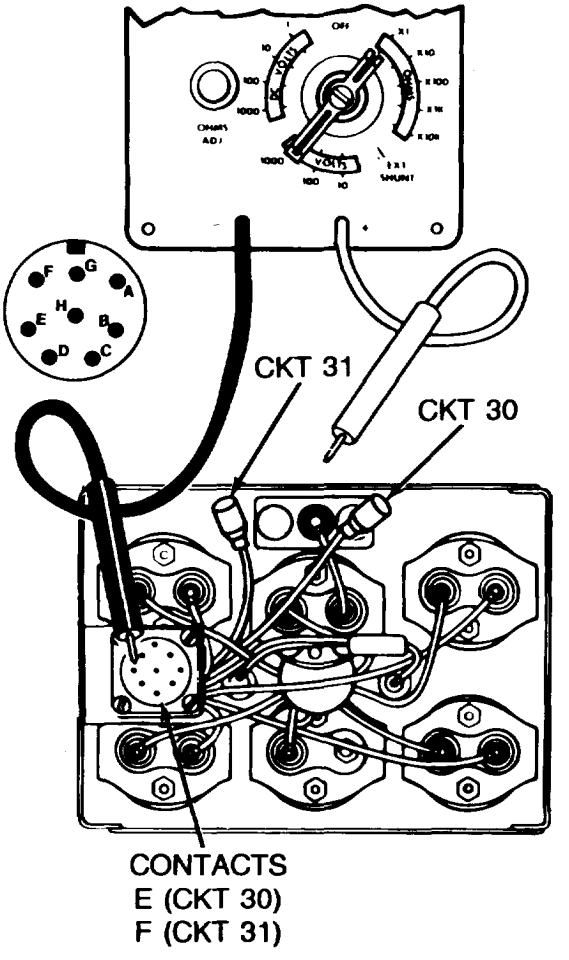
Second Technician (Right or Left Top Deck Grille Doors)

- Connect rear accessory harness connector (CKT 30 or 31) to fuel tank liquid quantity transmitter.

First Technician (Driver's Station)

- Disconnect hull front master harness connector from gage instrument panel.
- Connect red probe of meter to connector of defective circuit (CKT 30 or CKT 31) disconnected from FUEL TANKS selector switch.
- Connect black probe to gage instrument panel connector contact E (CKT 30) or contact F (CKT 31).
- Check if meter indicates continuity.

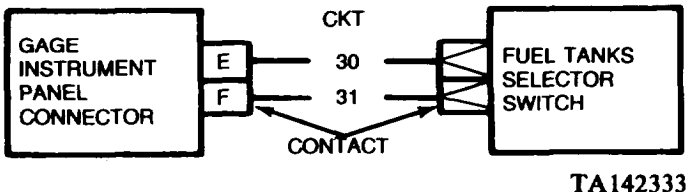
Does meter indicate continuity?



YES

NO

22 **Repair gage instrument panel harness (page 10-307).**



TA142333

Symptom 39

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

23 **Check hull front master harness (CKT 30 or CKT 31) for continuity from connector at bulkhead electrical disconnect to connector at gage instrument panel.**

First Technician (Driver's Station)

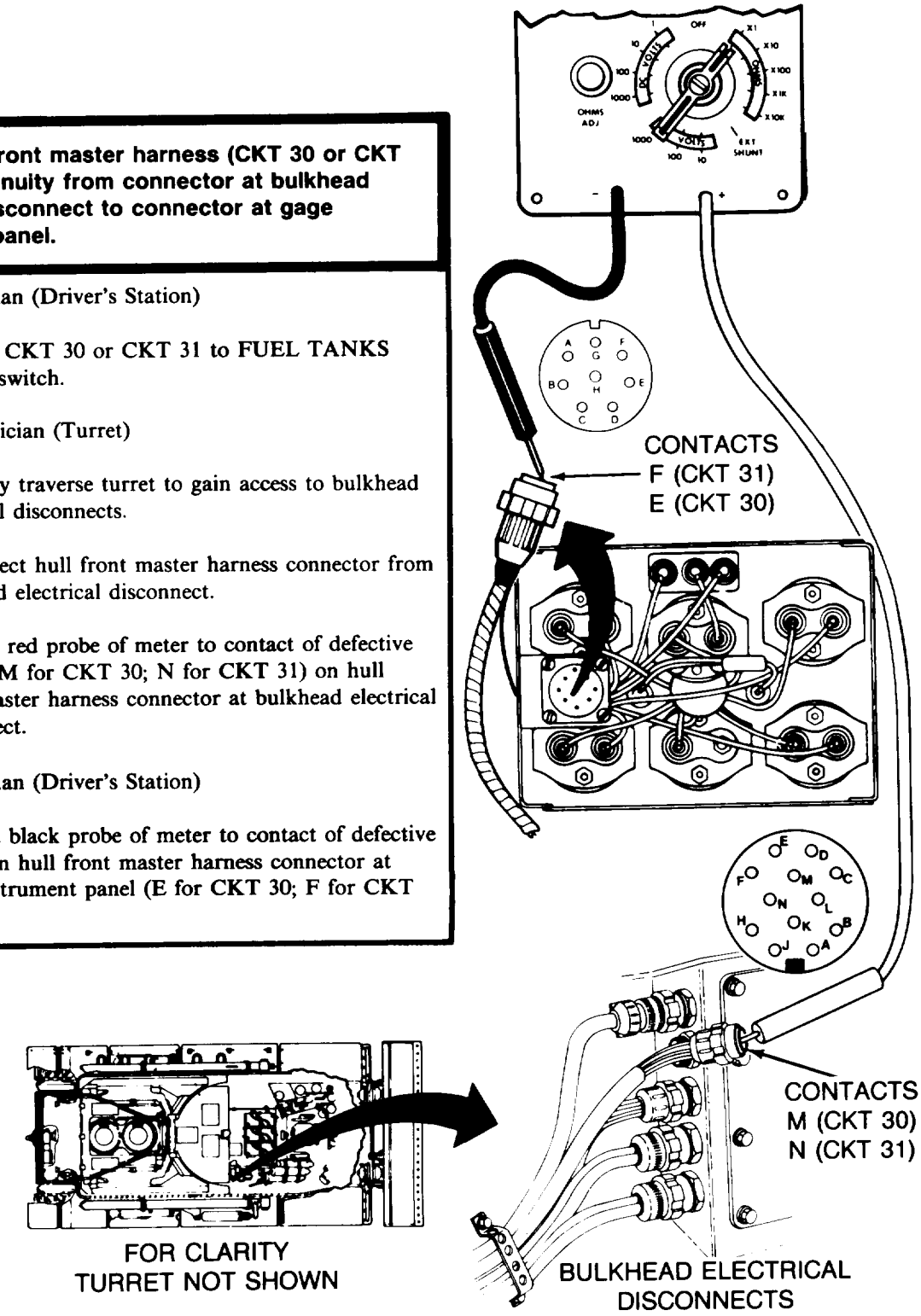
- Connect CKT 30 or CKT 31 to FUEL TANKS selector switch.

Second Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Connect red probe of meter to contact of defective circuit (M for CKT 30; N for CKT 31) on hull front master harness connector at bulkhead electrical disconnect.

First Technician (Driver's Station)

- Connect black probe of meter to contact of defective circuit in hull front master harness connector at gage instrument panel (E for CKT 30; F for CKT 31).



TA142334

Symptom 39 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

STEP 23 CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

NO

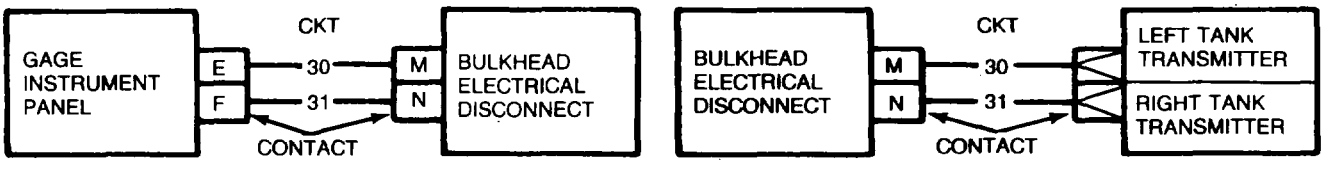
24

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 30 or CKT 31) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to bulkhead electrical disconnect and to gage instrument panel.**
- **Install gage instrument panel (page 10-122).**

YES

25

- **Inspect rear accessory harness for bent/broken connector contacts or loose (CKT 30 or CKT 31) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective rear accessory harness.**
- **Connect hull front master harness connector to bulkhead electrical disconnect and to gage instrument panel.**
- **Install gage instrument panel (page 10-122).**



TA142335

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE

Symptom-40

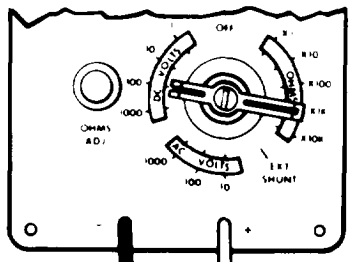
ALL GAGES ON GAGE INSTRUMENT PANEL WILL NOT WORK (ENGINE RUNNING)

1 Check hull front master harness (CKT 27) at gage instrument panel for electrical power.

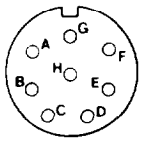
Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace gage instrument panel (page 10-121).
- Disconnect hull front master harness from gage instrument panel.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact H (CKT 27) of hull front master harness connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

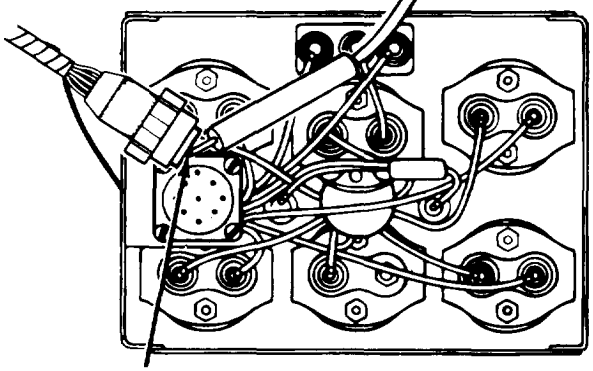
Does meter indicate 18 to 30 volts dc?



TO VEHICLE GROUND



INSTRUMENT PANEL (REAR VIEW)



CONTACT H (CKT 27)

NO

YES

2 Replace gage instrument panel harness (page 10-145).

TA142336

Symptom-40

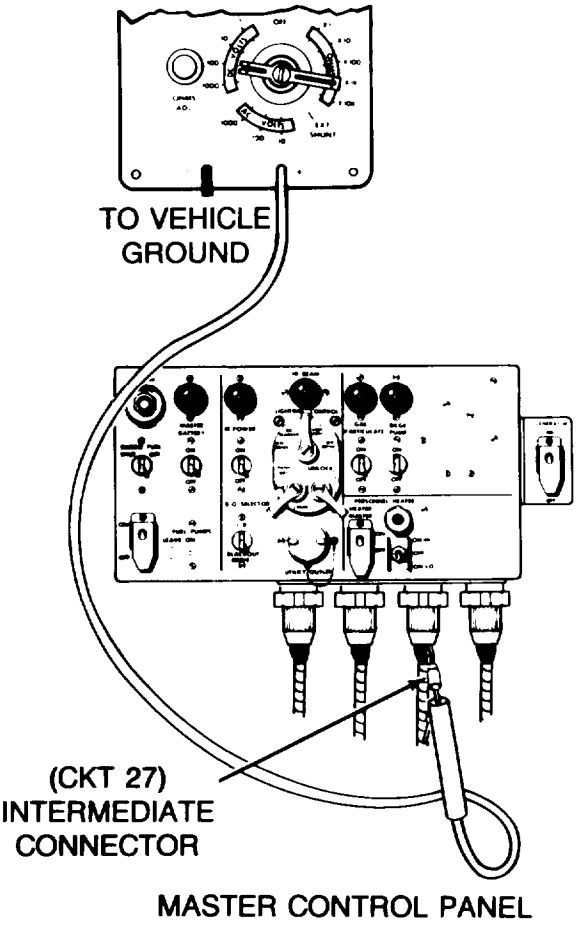
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

3 **Check hull front master harness (CKT 27) at intermediate connector for electrical power.**

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect hull front master harness connector to gage instrument panel.
- Install gage instrument panel (page 10-122).
- Disconnect intermediate connector (CKT 27) (located between gage instrument panel and master control panel).
- Connect red probe of meter to center contact (CKT 27) of hull front master harness intermediate connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

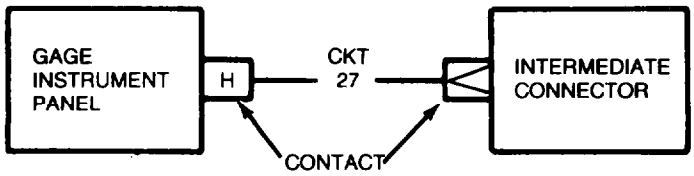


NO

YES

4

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 27) wire at rear of connector.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness (CKT 27) intermediate connector.**



TA142337

Symptom-40

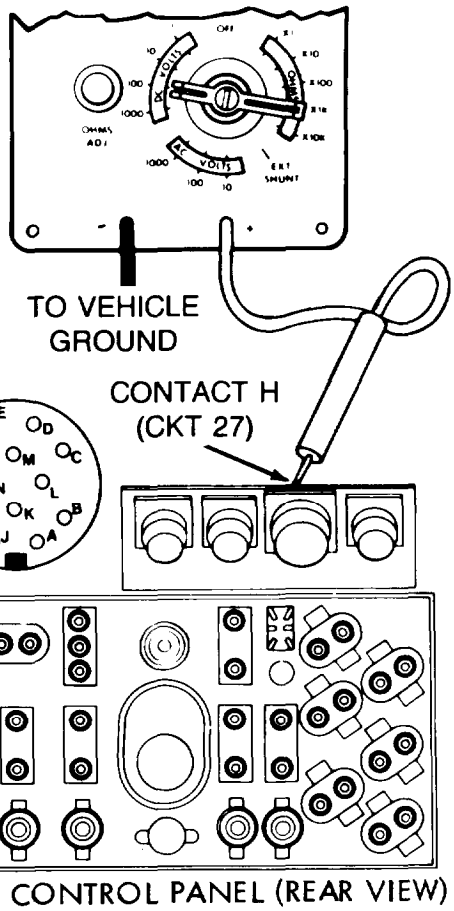
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

5 **Check master control panel accessories harness (CKT 27) at panel connector for electrical power.**

Technician (Driver's Station)

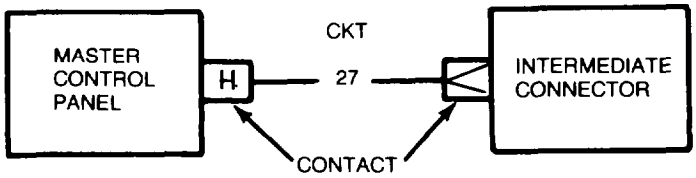
- Set MASTER BATTERY switch OFF.
- Connect hull front master harness (CKT 27) intermediate connector.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master control panel.
- Connect red probe of meter to contact H (CKT 27) of master control panel accessories harness connector.
- Connect black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



NO

YES



6

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 27) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness connector to master control panel.**
- **Install master control panel (page 10-47).**

TA142338

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

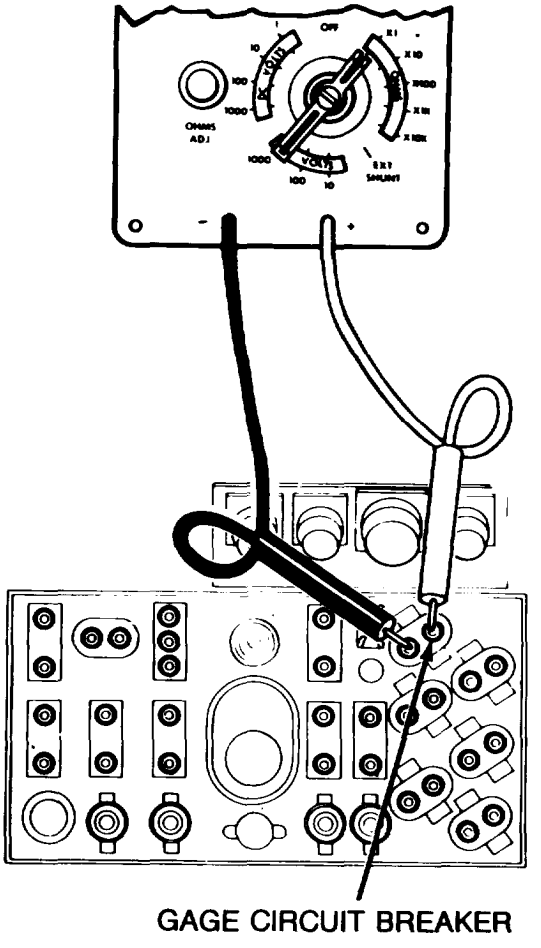
Symptom-40

7 **Check gage circuit breaker in master control panel for continuity.**

Technician (Driver's Station)

- Disconnect two electrical leads (CKT 27) from gage circuit breaker on master control panel.
- Connect one meter probe to each circuit breaker contact.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

8 **Replace gage circuit breaker (page 10-88).**

TA142339

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - GAGE
(Continued)

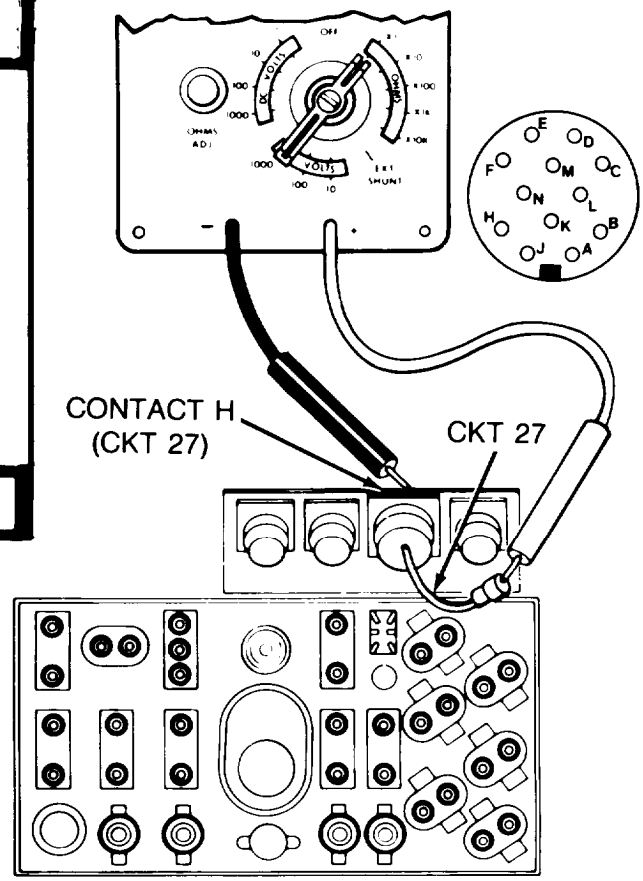
Symptom-40

9 **Check master control panel accessories harness (CKT 27) for continuity from panel connector to gage circuit breaker.**

Technician (Driver's Station)

- Connect red probe of meter to master control panel accessories harness connector (CKT 27) at gage circuit breaker.
- Connect black probe to contact H (CKT 27) of master control panel accessories harness panel connector.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO → **10** **Replace master control panel accessories harness (page 10-103).**

YES → **11** **Replace master control panel harness (page 10-111).**

All data on pages 4-720 thru 4-724 deleted. ■

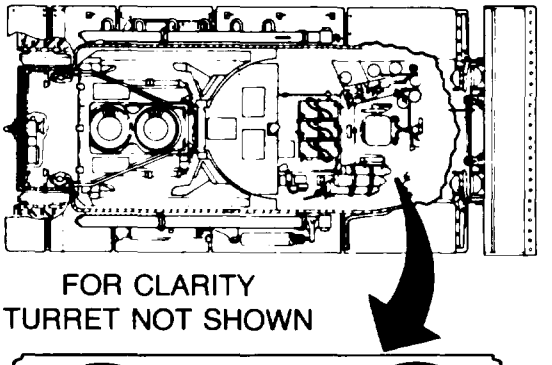
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

Symptom-41-2D

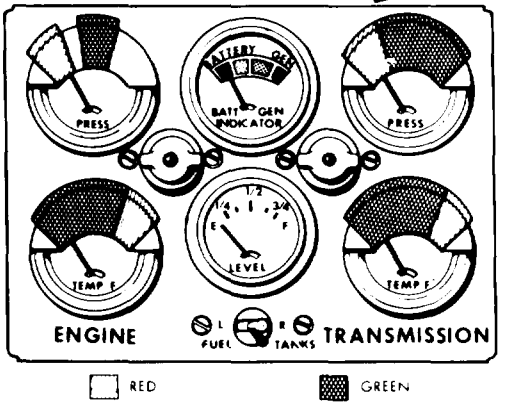
POWERPLANT WARNING LAMP WILL NOT COME ON (ENGINE NOT RUNNING). (2D ENGINE)

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



FOR CLARITY
TURRET NOT SHOWN



GAGE INSTRUMENT PANEL

1 **Check if indicator gages on gage instrument panel work normally with engine running.**

Second Technician (Driver's Station)

- Start engine.
- Check if indicators on gage instrument panel work normally.
- Stop engine.

Do indicator gages work normally with engine running?

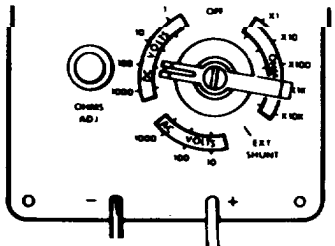
YES

NO

2 **See Symptom 40: ALL GAGES ON GAGE INSTRUMENT PANEL WILL NOT WORK (ENGINE RUNNING).**

TA142346

Symptom-41-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)



3 **Check hull front master harness (CKT 509L) at bulkhead electrical disconnect for electrical power.**

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10).
- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact N (CKT 509L) of hull front master harness connector at bulkhead electrical disconnect and black probe to ground.

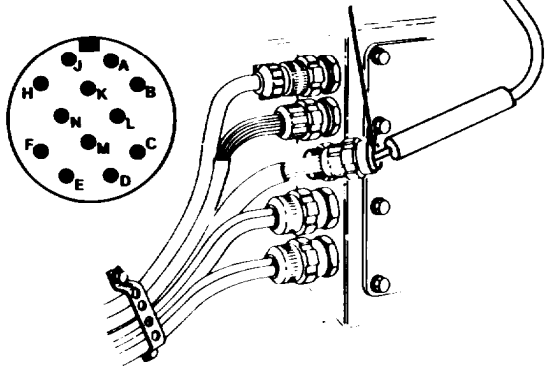
Second Technician (Driver's Station)

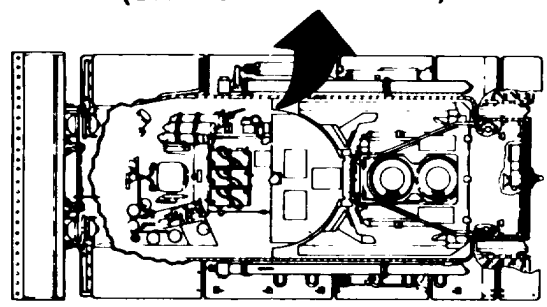
- Set MASTER BATTERY switch ON.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?





FOR CLARITY TURRET NOT SHOWN

YES

NO

4

- **Check POWERPLANT WARNING lamp for continuity.**
- **See Step (10).**

TA142347

Symptom-41-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

5 **Check engine electrical harness (CKT 509L) at engine oil low pressure switch for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Connect hull front master harness connector to bulkhead electrical disconnect.
- Manually traverse turret to gain access to engine access covers.
- Remove lower engine access cover (page 16-41).
- Disconnect engine electrical harness connector (CKT 509L) from engine low oil pressure switch.
- Connect red probe of meter to center contact of engine electrical harness connector and black probe to ground.

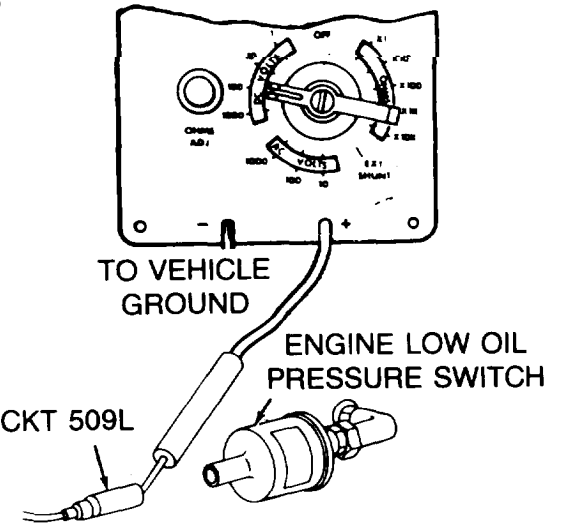
Second Technician (Driver's Station)

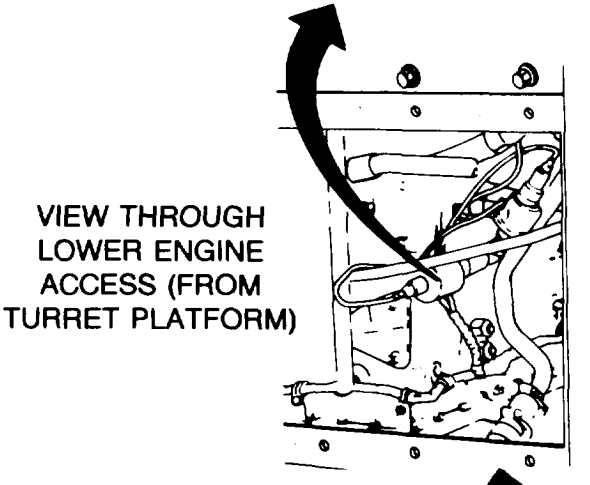
- Set MASTER BATTERY switch ON.

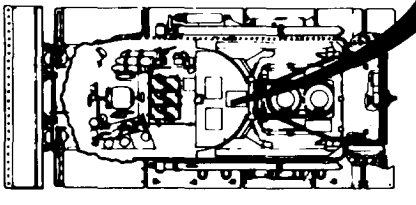
First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?







FOR CLARITY TURRET NOT SHOWN

NO

YES

6 **Replace engine low oil pressure switch (page 10-264).**

TA142348

Symptom-41-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

7 **Check engine accessory harness (CKT 509L) at engine disconnect for electrical power.**

First Technician (Turret)

- Connect engine electrical harness connector (CKT 509L) to engine low oil pressure switch.
- Manually traverse turret to gain access to left top deck grille doors.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

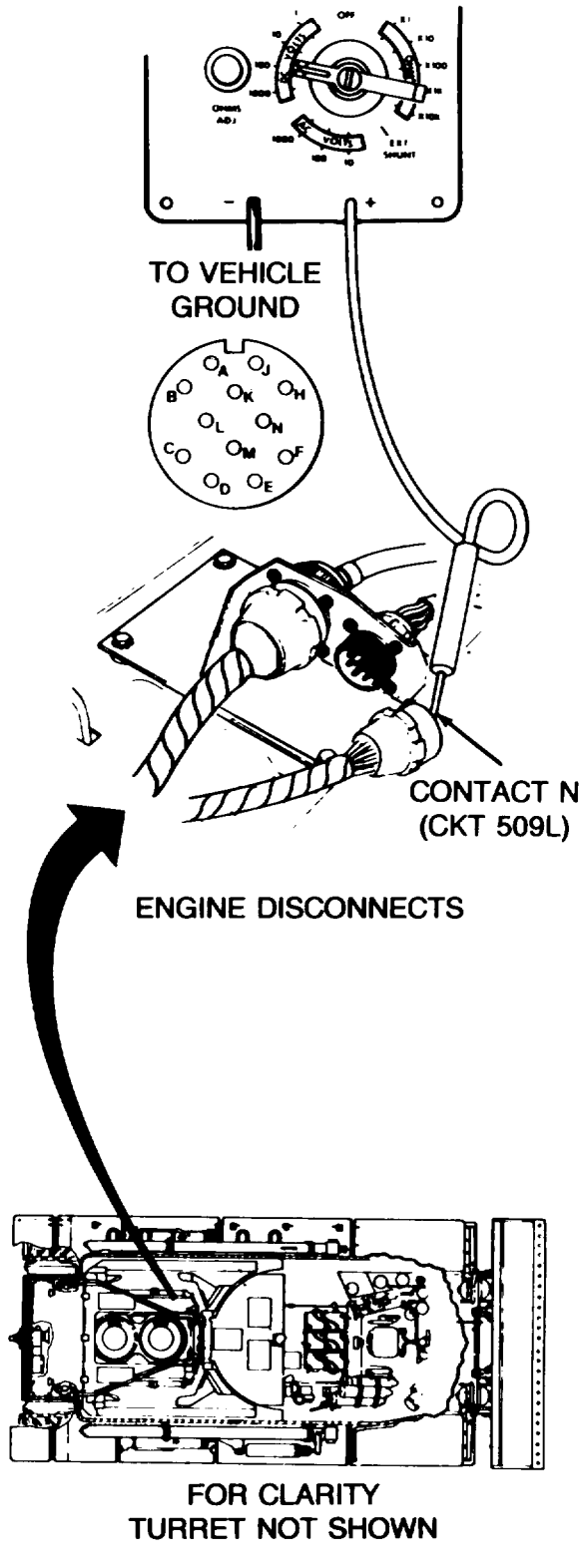
First Technician (Left Top Deck Grille Doors)

- Open left top deck grille doors.
- Disconnect engine accessory harness connector from engine disconnect.
- Connect red probe of meter to contact N (CKT 509L) of engine accessory harness connector and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Left Top Deck Grille Doors)



TA142349

Symptom-41-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

STEP (7) CONTINUED

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES

9 **Repair engine electrical harness (CKT 509L) (page 10-307).**

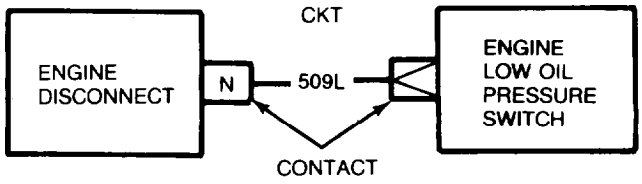
NO

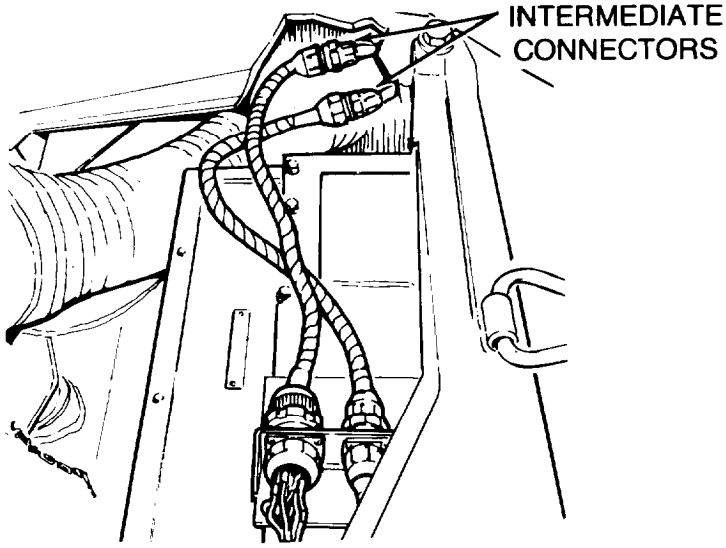
8

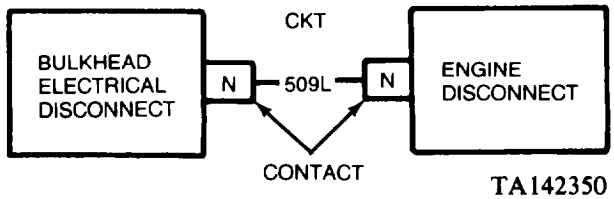
- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness extension (CKT 509L) for continuity from intermediate connector to connector of engine disconnect.**
- **See Step (13) .**

For harness without intermediate connector:

- **Inspect engine accessory harness (CKT 509L) at bulkhead electrical disconnect (contact N) and at engine disconnect (contact N) for bent/broken connector contacts or loose (CKT 509L) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**







TA142350

Symptom-41-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

FROM STEP 4

10 Check POWERPLANT WARNING lamp.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

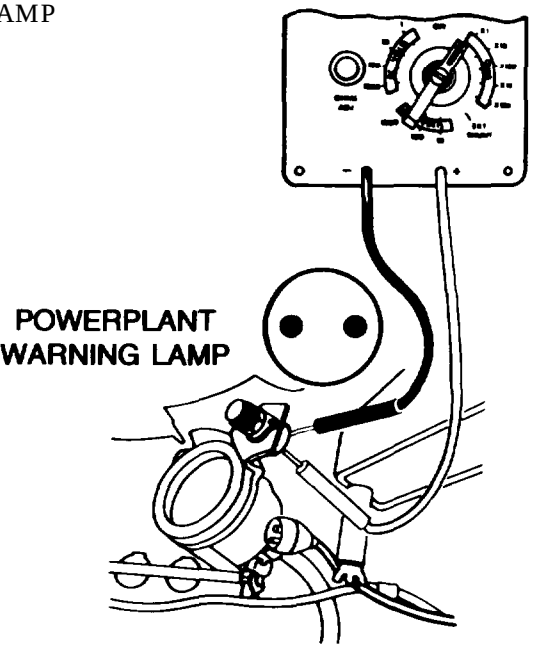
First Technician (Turret)

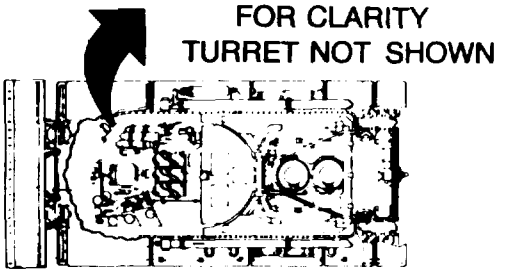
- Connect hull front master harness connector at bulkhead disconnect.

Second Technician (Driver's Station)

- Disconnect hull front accessory harness connector from powerplant warning lamp connector.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect two probes of meter to the two contacts of powerplant warning lamp connector.
- Check if meter indicates less than 50 ohms.

Does meter indicate less than 50 ohms?





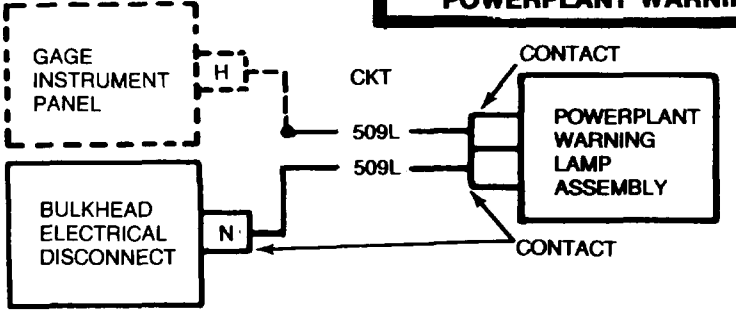
11 Replace powerplant warning lamp assembly (page 10-208).

NO

YES

12

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 509L) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to POWERPLANT WARNING lamp.**



TA142351

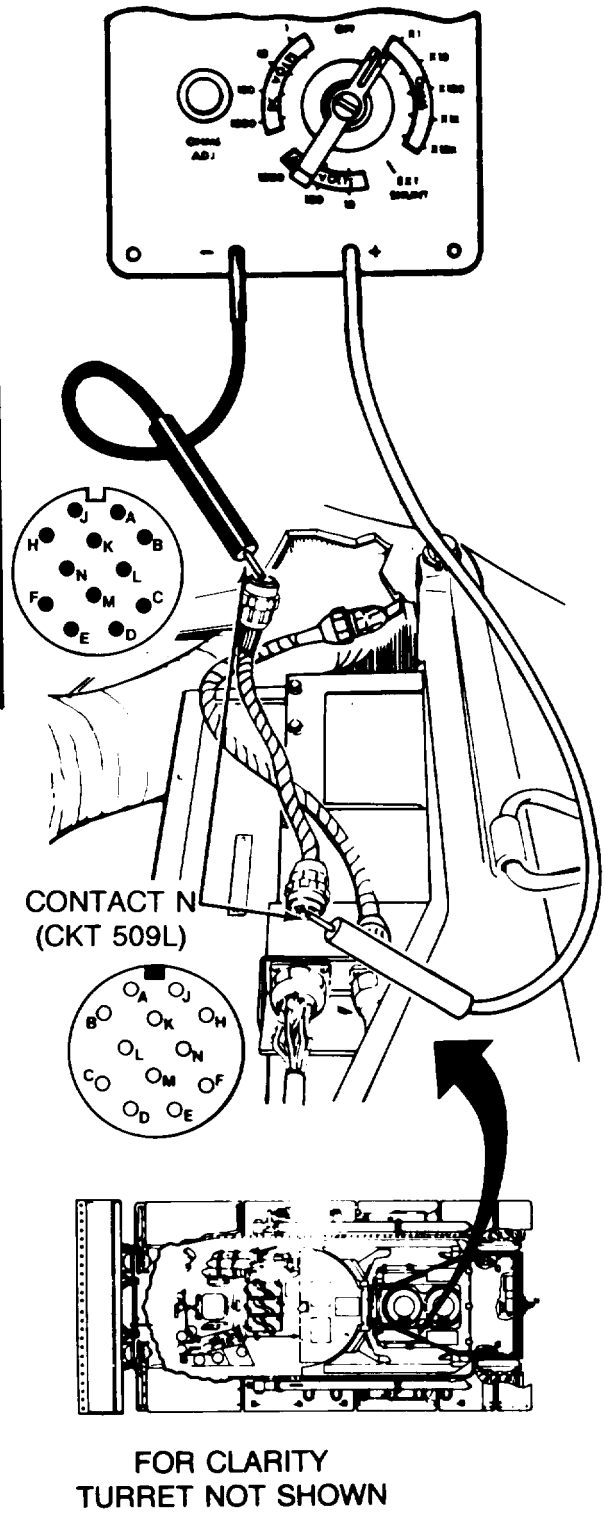
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

FROM STEP 8

13 Check engine accessory control harness extension (CKT 509L) for continuity from intermediate connector to connector of engine disconnect.

Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact N (CKT 509L) of extension harness connector at engine disconnect.
- Connect black probe of meter to contact N (CKT 509L) of extension harness at intermediate connector.



TA142352

Symptom-41-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

STEP (13) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

NO

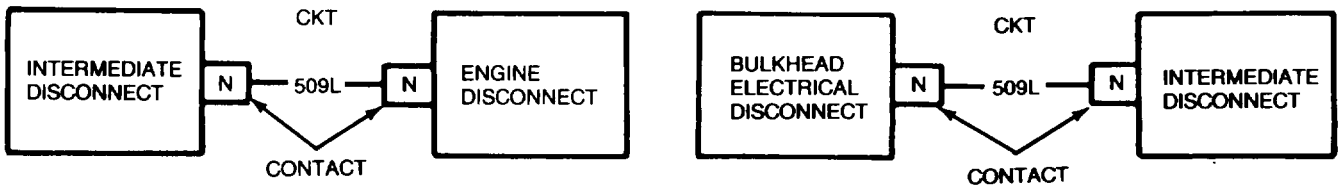
15

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 509L) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**

YES

14

- **Inspect engine accessory harness for bent/broken connecor contacts or loose (CKT 509L) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**



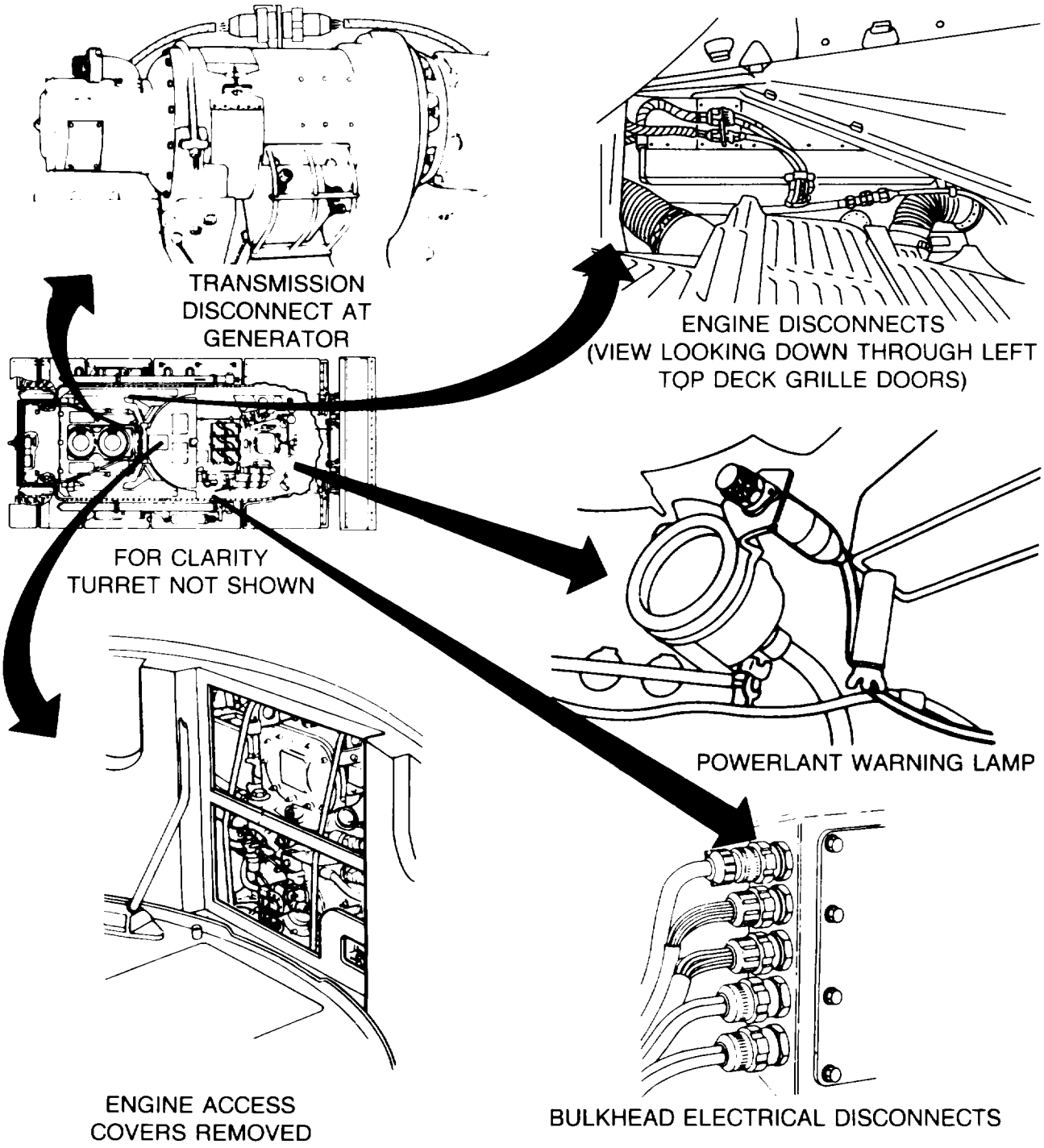
TA142353

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

Symptom-42-2D

POWERPLANT WARNING LAMP ON (ENGINE RUNNING - ALL GAGES READ NORMAL) (2D ENGINE).

LOCATER VIEW:



All data on pages 4-733 thru 4-740 deleted. ■

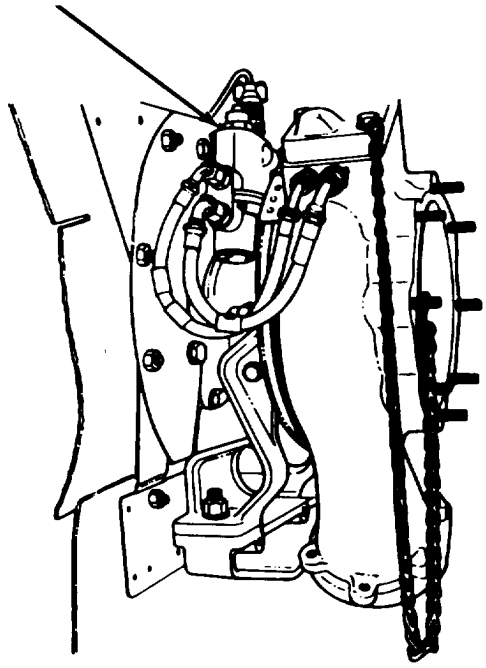
Symptom 42-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

POWERPLANT WARNING LAMP ON (ENGINE RUNNING - ALL GAGES READ NORMAL).

NOTE

- **This procedure is the same for the 2D or 2DA engine, except as noted.**
- **This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second tecnician.**

DUST DETECTOR
PRESSURE SWITCH



1 Check dust detector pressure switch(es) for tripped condition. (2DA engine only)

Second Technician (Driver's Compartment)

- Shut down engine (TM 9-2350-222-10).

First Technician (Top Deck)

- Open top deck grille doors (TM 9-2350-222-10).
- Check dust detector switch(es).

Is dust detector pressure switch(es) tripped?

NO

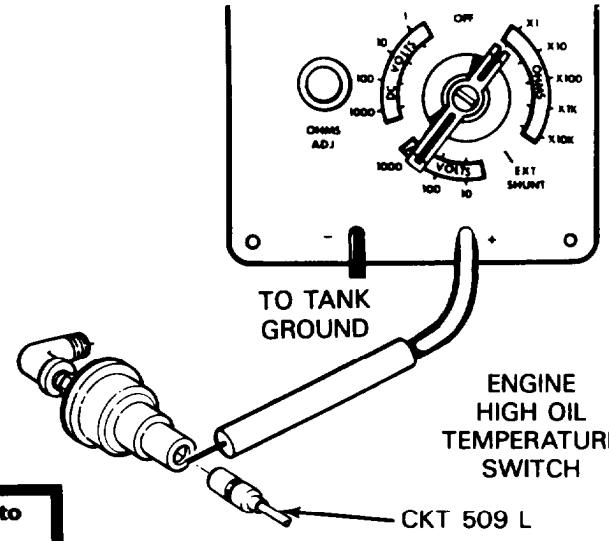
YES

Go to symptom 16.10.

TA248842

Symptom 42-2DA

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)



1.1 Check engine high oil temperature switch for short to ground (engine cold).

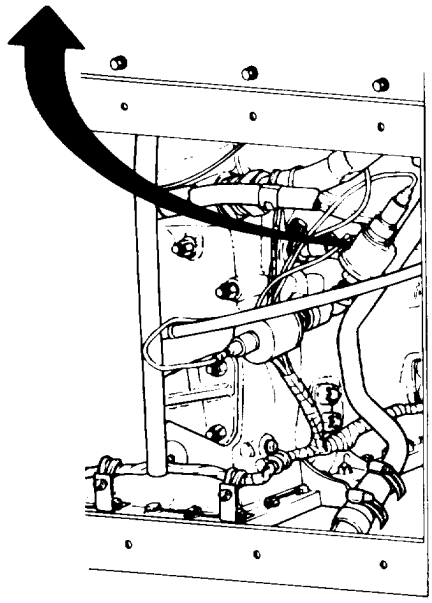
Second Technician (Driver's Compartment)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- **Manually traverse turret to gain access to engine access covers (TM 9-2350-222-10).**
- **Remove engine lower access cover (page 16-41).**
- Disconnect engine electrical harness connector (CKT 509L) from engine high oil temperature switch.
- **Set multimeter to OHMS X1 scale and zero meter or use STE/ICE Test No. 91 (page 4-92).**
- Connect red probe of meter to center contact of high oil temperature switch and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity, thereby indicating a short?



FRONT OF ENGINE
(VIEWED THRU LOWER ENGINE ACCESS DOOR)

NO

YES

2 Replace engine oil high temperature switch (page 10-262).

TA248843

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

Symptom-42-2D

3 Check transmission high oil temperature switch for short to ground (engine cold).

First Technician (Turret)

- Connect engine electrical harness connector to engine high oil temperature switch.

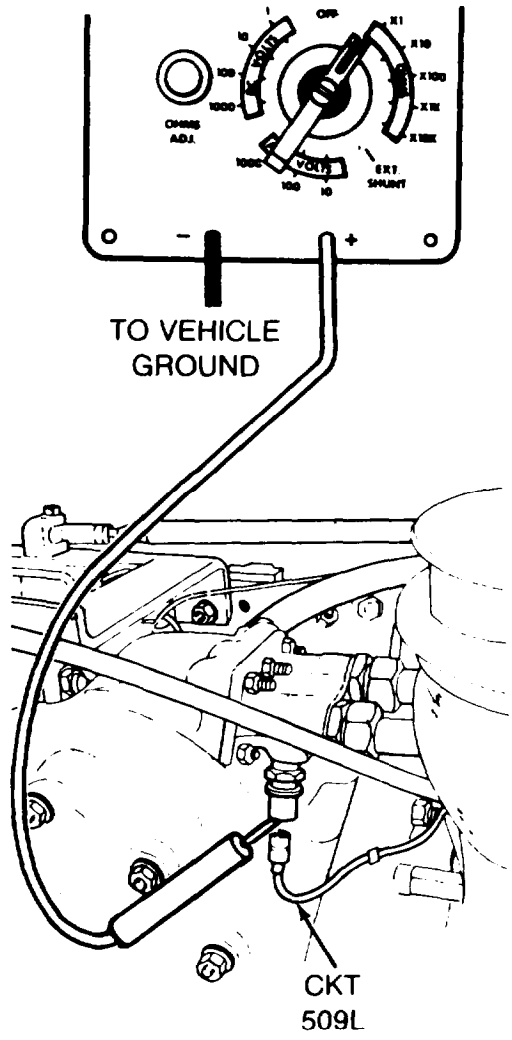
First and Second Technician (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

First Technician (Rear Grille Doors)

- Disconnect transmission harness connector (CKT 509L) from transmission high oil temperature switch.
- Connect red probe of meter to center contact of transmission high oil temperature switch and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity, thereby indicating a short?



TRANSMISSION HIGH OIL TEMPERATURE SWITCH (RIGHT SIDE)

NO

YES

4

- **Replace transmission high oil temperature switch (page 10-270).**
- **Install lower engine access cover (page 16-42).**

TA142364

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

Symptom-42-2D

5 **Check engine low oil pressure switch for short to ground.**

First Technician (Rear Grille Doors)

- Connect transmission harness connector to transmission high oil temperature switch.

First Technician (Turret)

- Disconnect engine electrical harness connector (CKT 509L) from engine low oil pressure switch.
- Connect red probe of meter to center contact of engine low oil pressure switch and black probe of ground.

Second Technician (Driver's Station)

- Start engine.

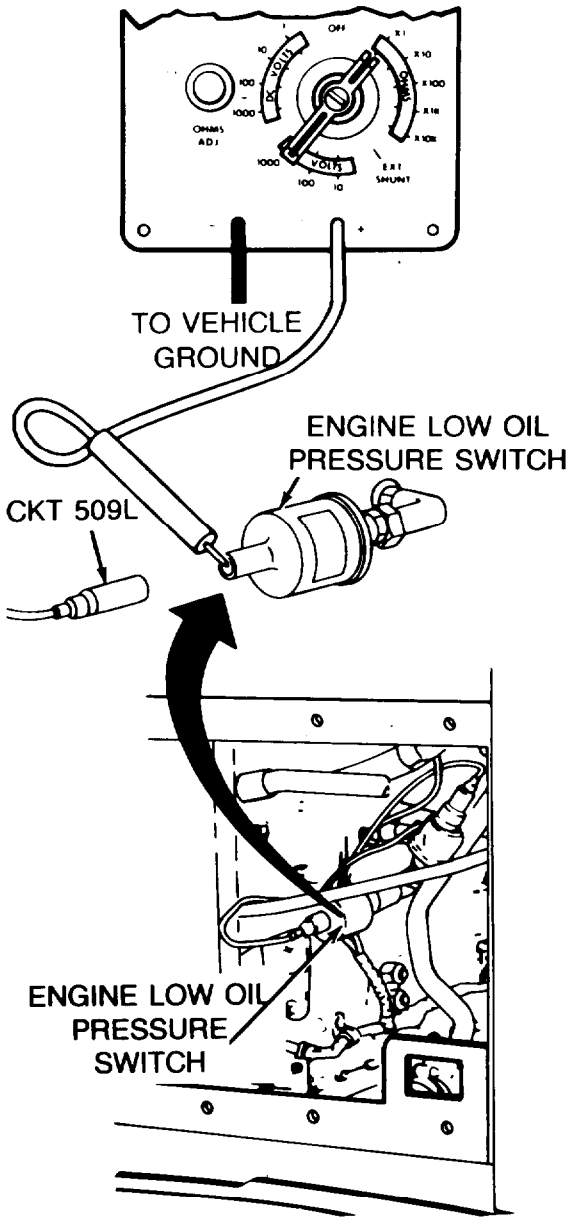
First Technician (Turret)

- Check if meter indicates continuity.

Second Technician (Driver's Station)

- Stop engine.

Did meter indicate continuity, thereby indicating a short?



NO

YES

6
- **Replace engine low oil pressure switch (page 10-264).**
- **Install transmission shroud (page 9-23).**

TA142365

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

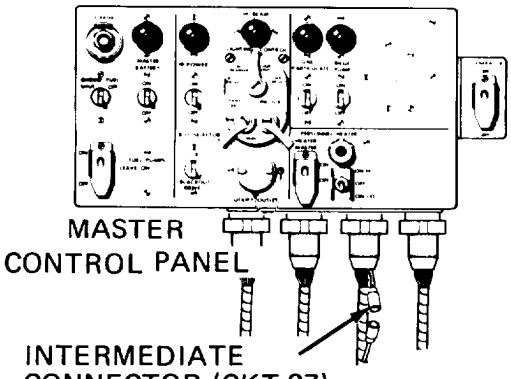
Symptom-42-2D

7 **Check hull front master harness (CKT 509L) at connector to POWERPLANT WARNING lamp for short to ground.**

Second Technician (Driver's Station)

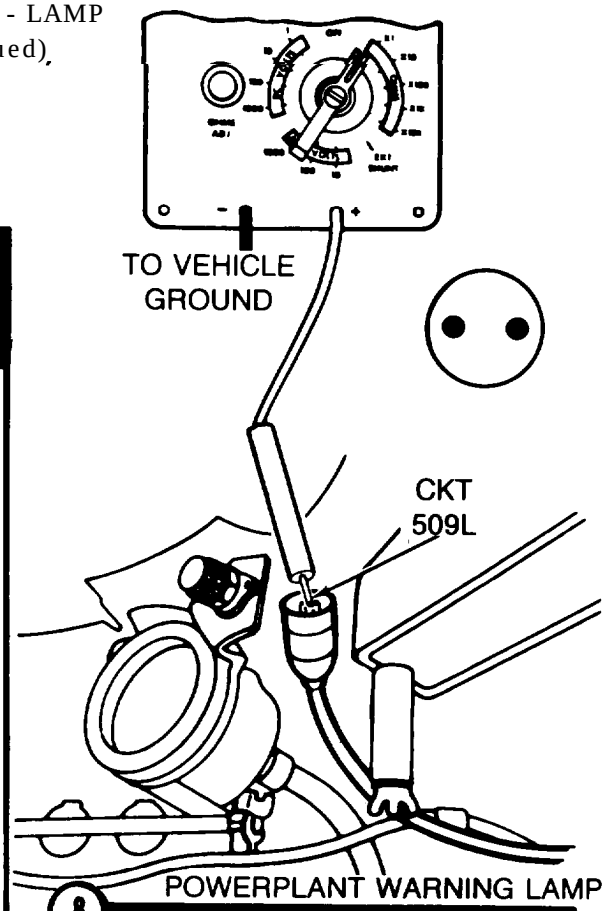
- Displace gage instrument panel (page 10-121).
- Disconnect hull front master harness connector from gage instrument panel.
- Disconnect intermediate connector (CKT 27) from hull front master harness at master control panel.
- Disconnect hull front master harness connector (CKT 509L) from powerplant warning lamp assembly.
- Connect red probe of meter to one of the contacts in hull front master harness connector (CKT 509L) and black probe to ground.
- Check if meter indicates continuity.
- Repeat check moving red probe of meter to other contact in hull front master harness connector.

Does meter indicate continuity during either check, thereby indicating a short?



YES

NO



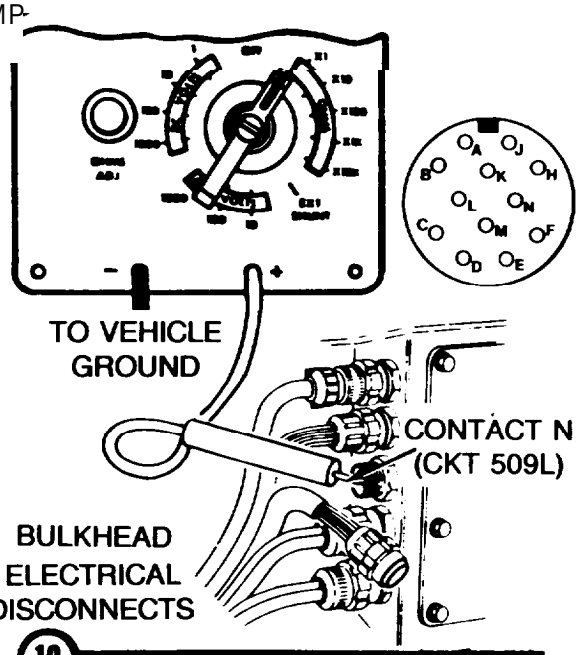
8

- **Replace powerplant warning lamp socket (page 10-208).**
- **Connect hull front master harness connector to gage instrument panel.**
- **Connect intermediate connector (CKT 27) to hull front master harness at master control panel.**
- **Connect engine electrical harness connector (CKT 509L) to engine low oil pressure switch.**
- **Install lower engine access cover (page 16-42).**
- **Install transmission shroud (page 9-23).**

TA142366

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

Symptom-42-2D



9 **Check engine accessory harness (CKT 509L) at bulkhead electrical disconnect for short to ground.**

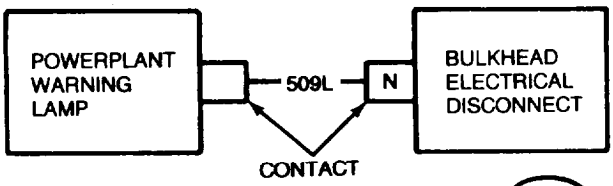
Second Technician (Driver's Station)

- Connect hull front master harness connector to gage instrument panel.
- Install gage instrument panel (page 10-122).
- Connect intermediate connector (CKT 27) to hull front master harness at master control panel.
- Connect hull front master harness connector (CKT 509L) to powerplant warning lamp assembly.

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Connect red probe of meter to contact N (CKT 509L) of engine accessory harness connector at bulkhead electrical disconnect and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity, thereby indicating a short?



YES

NO

10

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 509L) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**
- **Connect engine electrical harness connector (CKT 509L) to engine low oil pressure switch.**
- **Install lower engine access cover (page 16-42).**
- **Install transmission shroud (page 9-23).**
- **Connect hull front master harness to engine accessory harness at bulkhead disconnect.**

TA142367

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

Symptom-42-2D

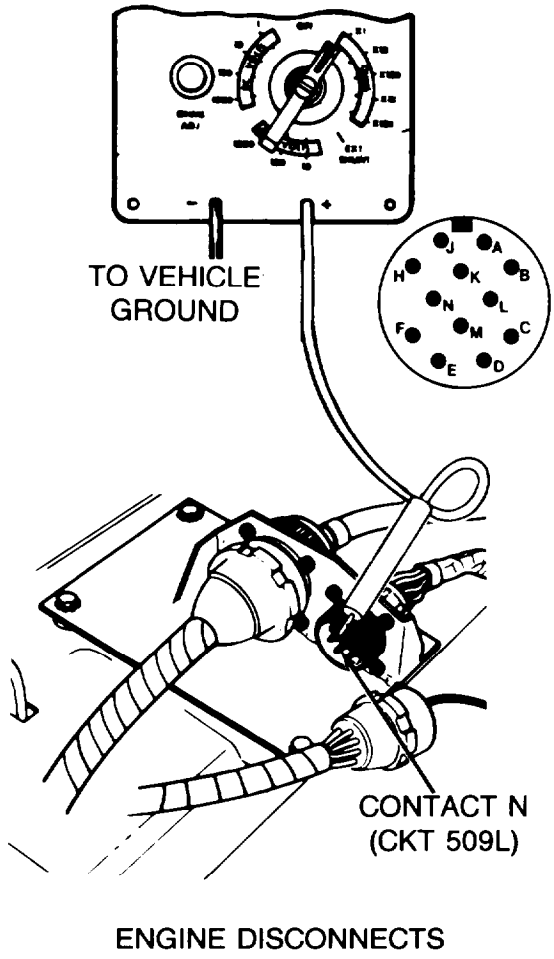
11 **Check engine electrical harness (CKT 509L) connector at engine disconnect for short to ground.**

First Technician (Turret)

- Connect hull front master harness connector to bulkhead electrical disconnect.
- Manually traverse turret to gain access to left top deck grille doors.

Second Technician (Left Top Deck Grille Doors)

- Open left top deck grille doors.
- Disconnect engine accessory harness connector from engine disconnect.
- Connect red probe of meter to contact N (CKT 509L) of engine electrical harness connector and black probe to ground.



TA142368

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

Symptom-42-2D

STEP (11) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity, thereby indicating a short?

YES

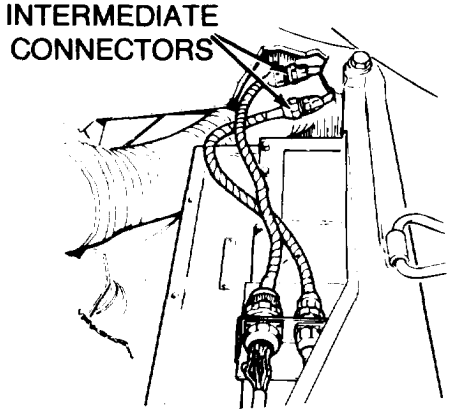
NO

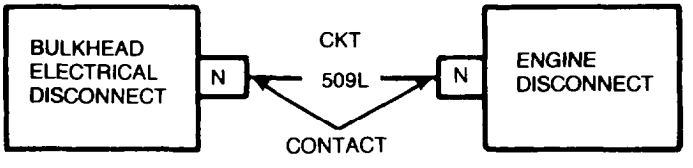
(12)

- **Check if engine accessory harness has intermediate connector. (Located above primary fuel filter in engine compartment).**
- **If harness has intermediate connector check engine accessory harness extension (CKT 509L) for continuity from intermediate connector to connector of engine disconnect.**
- **See Step (16).**

For harness without *intermediate connector*:

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 509L) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness connector to engine disconnect.**
- **Connect engine electrical harness connector (CKT 509L) to engine low oil pressure switch.**
- **Install lower engine access cover (page 16-42).**
- **Install transmission shroud (page 9-23).**





TA142369

Symptom-42-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

13 **Check engine electrical harness (CKT 509L) connector at transmission disconnect for short to ground.**

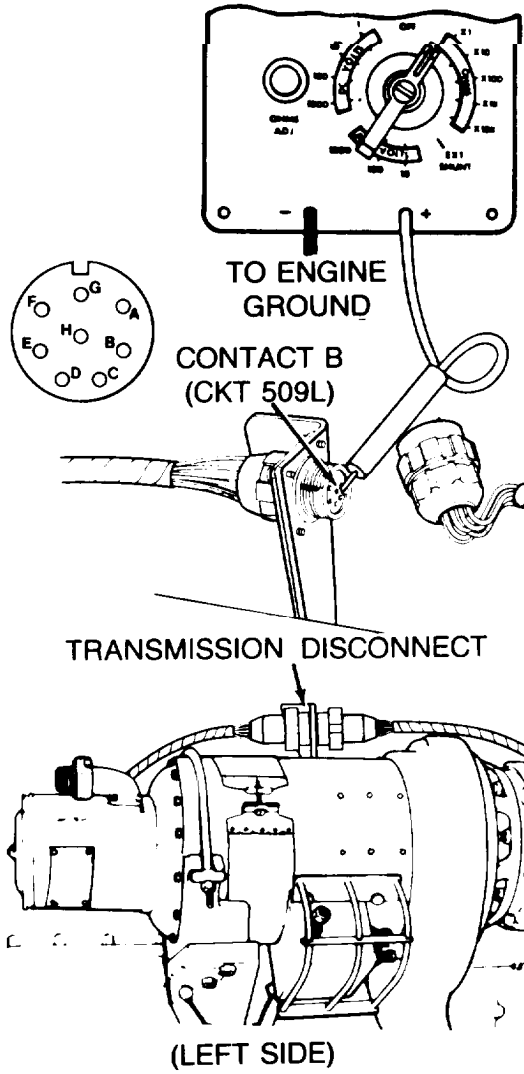
First Technician (Rear of Vehicle)

- Remove powerplant (page 5-1).

First Technician (Left Side of Engine)

- Disconnect transmission harness connector from transmission disconnect.
- Connect red probe of meter to contact B (CKT 509L) of engine electrical harness connector and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity, thereby indicating a short?

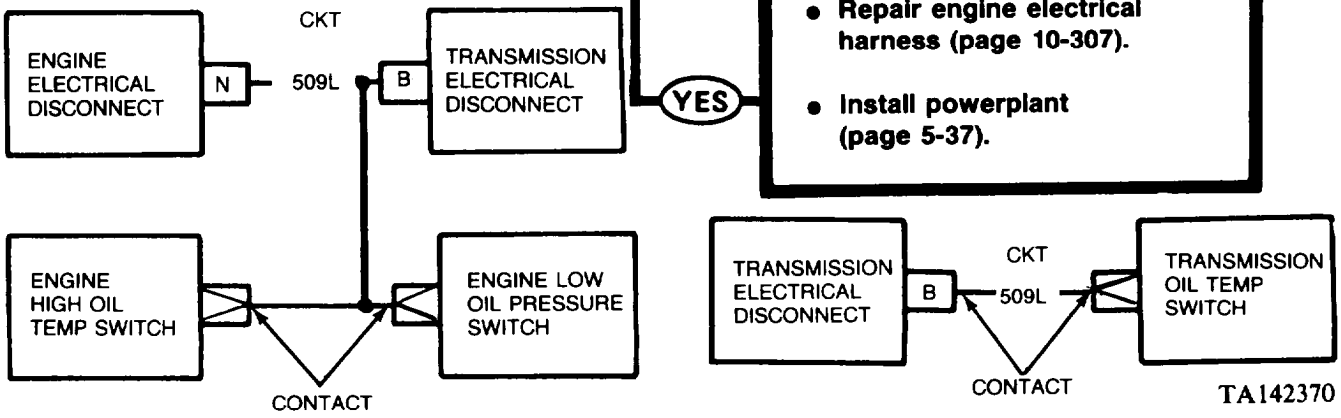


NO

14
- **Repair transmission harness (page 10-307).**
- **Install powerplant (page 5-37).**

YES

15
- **Repair engine electrical harness (page 10-307).**
- **Install powerplant (page 5-37).**



DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

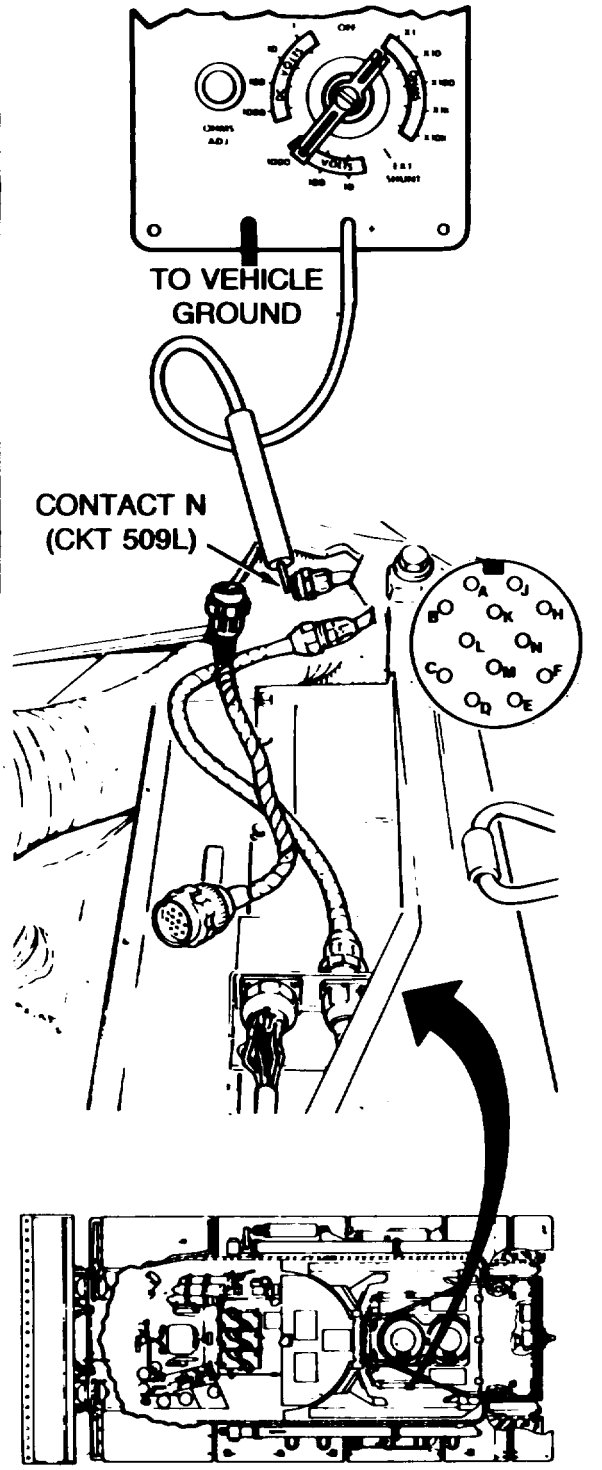
Symptom-42-2D

FROM STEP (12)

16 Check engine accessory harness (CKT 509L) at intermediate connector for short to ground.

Technician (Top Deck)

- Disconnect engine accessory harness at intermediate connector.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact N (CKT 509L) of engine accessory harness at intermediate connector and black probe to ground.



TA142371

Symptom-42-2D DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

STEP (16) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity, thereby indicating a short?

NO

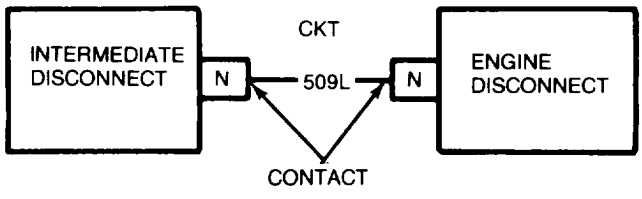
18

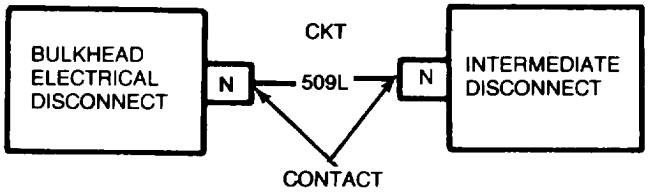
- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 509L) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness extension.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnects.**
- **Connect engine electrical harness connector to engine low oil pressure switch.**
- **Install lower engine access cover (page 16-42).**
- **Install transmission shroud (page 9-23).**

YES

17

- **Inspect engine accessory harness for bent/broken connector contacts or loose (CKT 509L) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective engine accessory harness.**
- **Connect engine accessory harness extension to intermediate connector and to engine disconnect.**
- **Connect engine electrical harness connector to engine low oil pressure switch.**
- **Install lower engine access cover (page 16-42).**
- **Install transmission shroud (page 9-23).**





TA142372

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

Symptom-43

MASTER BATTERY INDICATOR LAMP WILL NOT LIGHT (THERE IS POWER IN VEHICLE).

1 Check continuity between MASTER BATTERY switch and MASTER BATTERY indicator lamp (CKT 459A).

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect master battery harness lead (CKT 459A) from MASTER BATTERY switch.
- Disconnect master battery harness lead (CKT 459A) from MASTER BATTERY indicator lamp socket.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect one meter probe to each of the disconnected master battery harness leads.
- Check if meter indicates continuity.

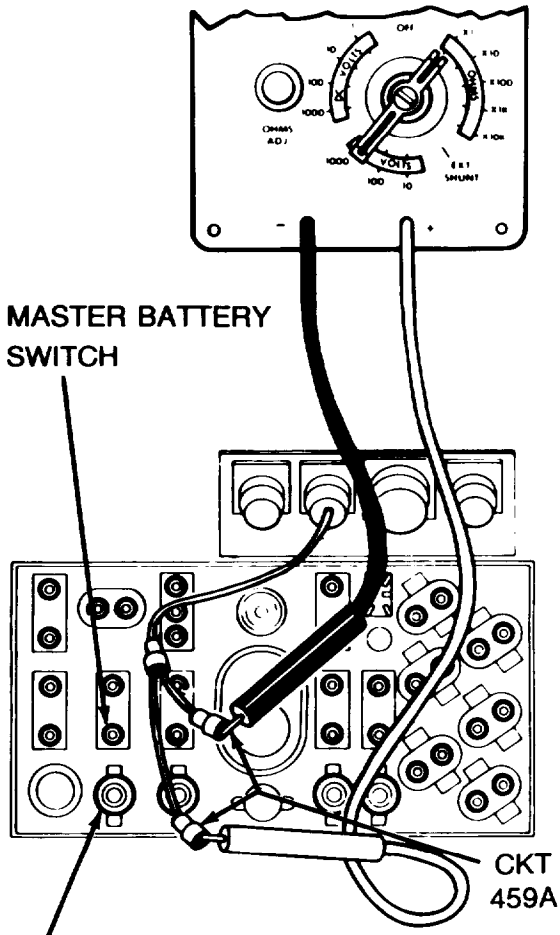
Does meter indicate continuity?

2 Replace master battery harness (page 10-107).

NO

3 Replace MASTER BATTERY indicator lamp socket (page 10-57).

YES



TA142373

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

Symptom-43.1

BILGE PUMP INDICATOR LAMP WILL NOT LIGHT (BILGE PUMP WORKS).

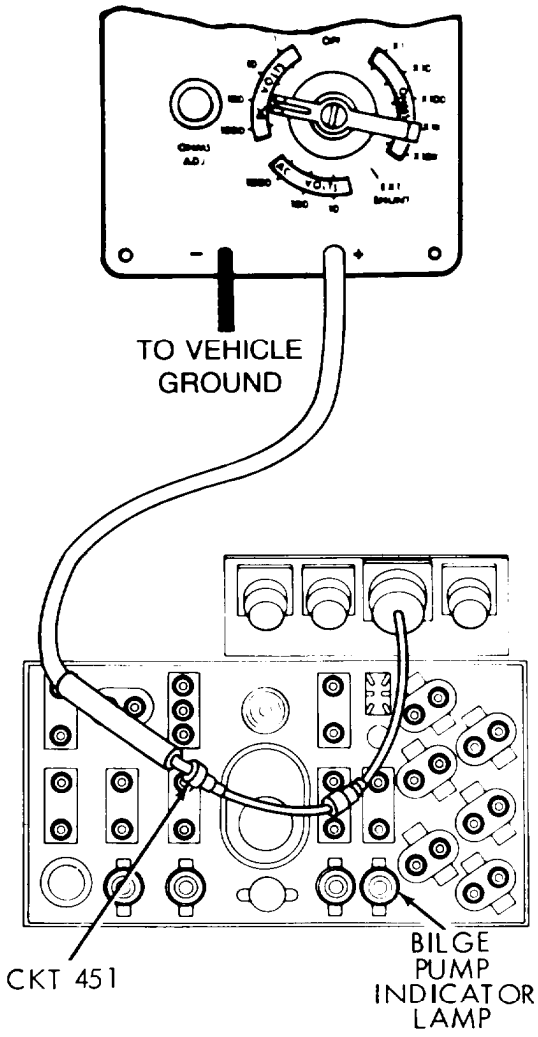
1

Check for electrical power to BILGE PUMP indicator lamp.

Technican (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect master control panel accessories harness connector (CKT 451) from BILGE PUMP indicator lamp.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89, (page 4-90).
- Connect red probe of meter to master control panel accessories harness connector (CKT 451) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set BILGE PUMP switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



MASTER CONTROL PANEL (REAR VIEW)

YES → **2** Replace BILGE PUMP indicator assembly (page 10-80).

NO → **3** Replace master control panel accessories harness page 10-103).

TA253121

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

Symptom-44

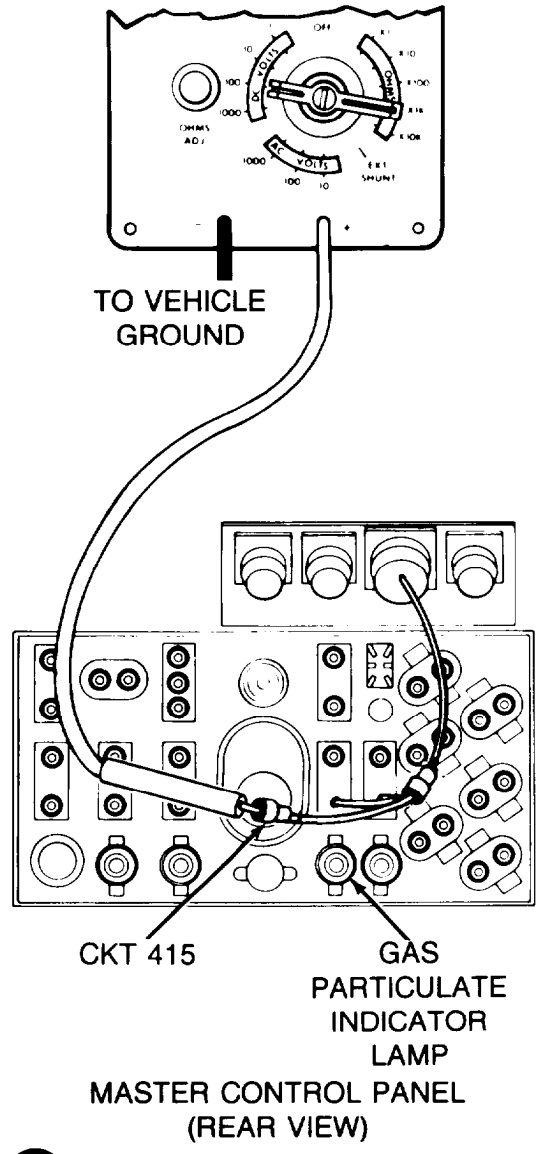
GAS PARTICULATE INDICATOR LAMP WILL NOT LIGHT (GAS PARTICULATE BLOWER WORKS).

1 Check for electrical power to GAS PARTICULATE indicator lamp.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect master control panel accessories harness connector (CKT 415) from GAS PARTICULATE indicator lamp.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to master control panel accessories harness connector (CKT 415) and black probe to ground.
- Set GAS PARTCULATE switch ON.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

2 Replace GAS PARTICULATE indicator assembly (page 10-76).

NO

3 Replace master control panel accessories harness (page 10-103).

TA142374

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

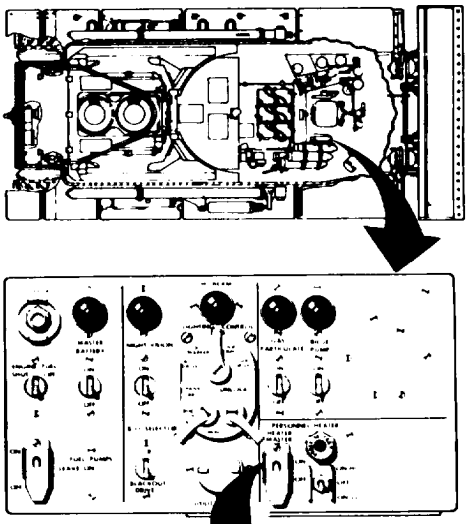
Symptom-45

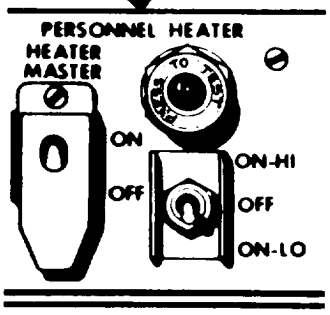
PERSONNEL HEATER INDICATOR LAMP WILL NOT LIGHT (PERSONNEL HEATER WORKS).

WARNING

Use extreme care when working with circuits 400 and 405. These circuits carry battery voltage at all times, whether MASTER BATTERY switch is ON or OFF.

FOR CLARITY TURRET NOT SHOWN





MASTER CONTROL PANEL

1 **Check if PERSONNEL HEATER indicator lamp lights during PRESS TO TEST check.**

Technician (Driver's Station)

- If heater is running, set PERSONNEL HEATER HI/LO switch OFF and wait 5 minutes for completion of heater purge cycle.
- If heater is not running, check that HEATER MASTER switch is ON.
- Push in PERSONNEL HEATER indicator lamp.

Does indicator lamp light?

YES

NO

2

- **Check (CKT 405) for power at indicator lamp socket.**
- **See Step (6).**

TA142375

Symptom-45

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

3 **Check (CKT 407) for continuity from indicator lamp (terminal 2) to PERSONNEL HEATER HI/LO switch (terminal 2).**

Technician (Driver's Station)

- Set HEATER MASTER switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness from master control panel.
- Remove 4 screws, nuts and washers from master control panel accessories harness connector and unmount connector from master control panel.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to terminal 2 of indicator lamp assembly (CKT 407).
- Connect black probe of meter to terminal 2 of PERSONNEL HEATER HI/LO switch (CKT 407).
- Check if meter indicates continuity.

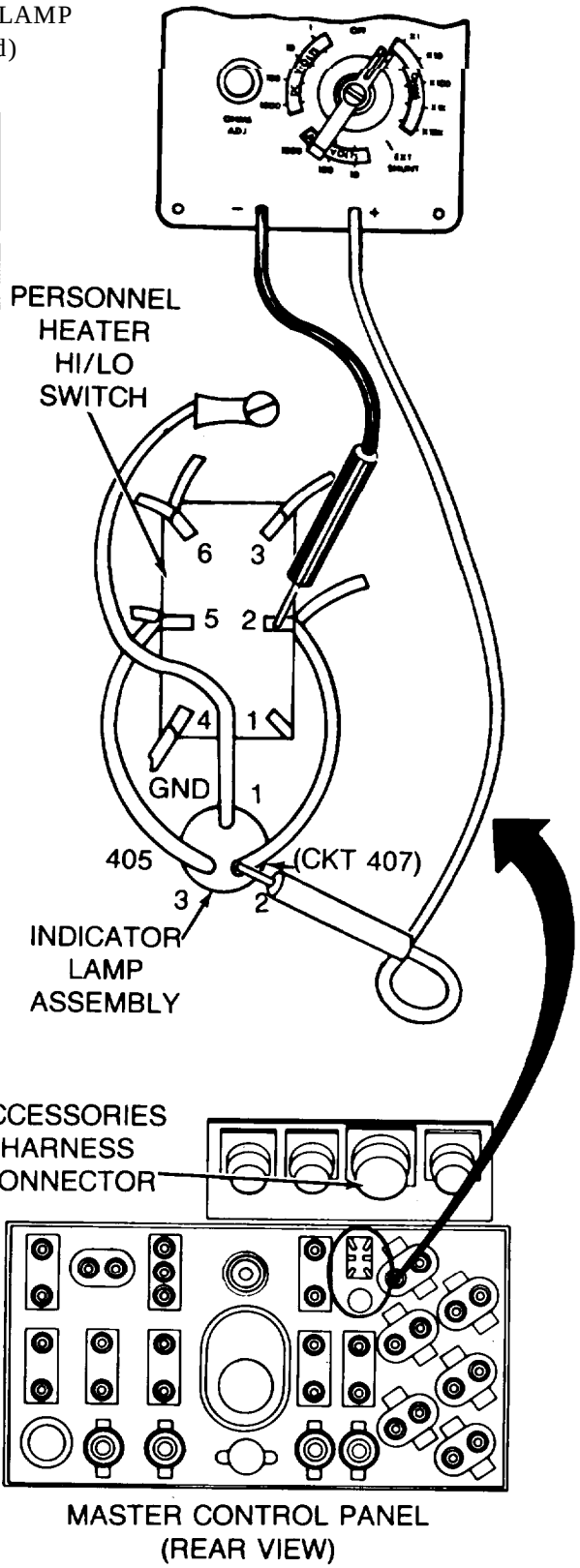
Does meter indicate continuity?

4 **Replace PERSONNEL HEATER indicator lamp electrical lead (CKT 407) (page 10-98).**

NO

5 **Replace PERSONNEL HEATER indicator lamp socket (page 10-120).**

YES



TA142376

DETAILED TROUBLESHOOTING PROCEDURE

INDICATOR - LAMP

(Continued)

Symptom-45

FROM STEP (2)

WARNING

Use extreme care when working with circuits 400 and 405. These circuits carry battery voltage at all times, whether MASTER BATTERY switch is ON or OFF.

6 Check for electrical power at PERSONNEL HEATER indicator lamp terminal 3 (CKT 405).

Technician (Driver's Station)

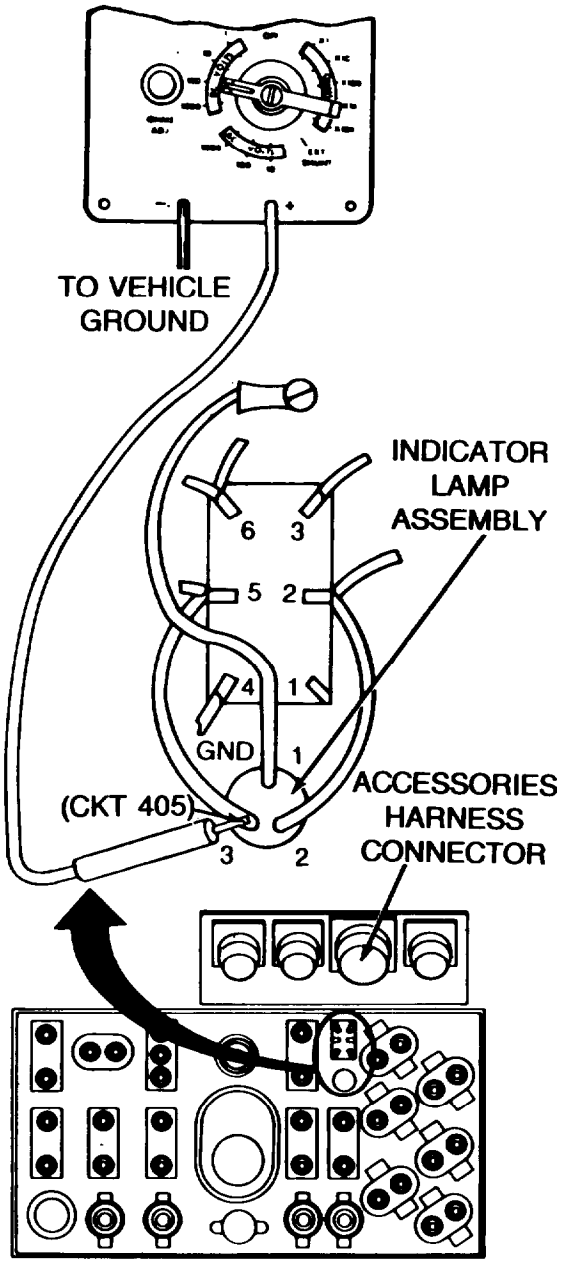
- Set HEATER MASTER switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness from master control panel.
- Remove 4 screws, nuts and washers from master control panel accessories harness connector and unmount connector from master control panel.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to teminal 3 of PERSONNEL HEATER indicator lamp assembly (CKT 405) and black probe to ground.
- Set HEATER MASTER switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES

NO

7 Replace PERSONNEL HEATER indicator lamp electrical lead (CKT 405) (page 10-98).



TA142377

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

Symptom-45

8 **Check PERSONNEL HEATER indicator lamp ground lead for continuity to ground.**

Technician (Driver's Station)

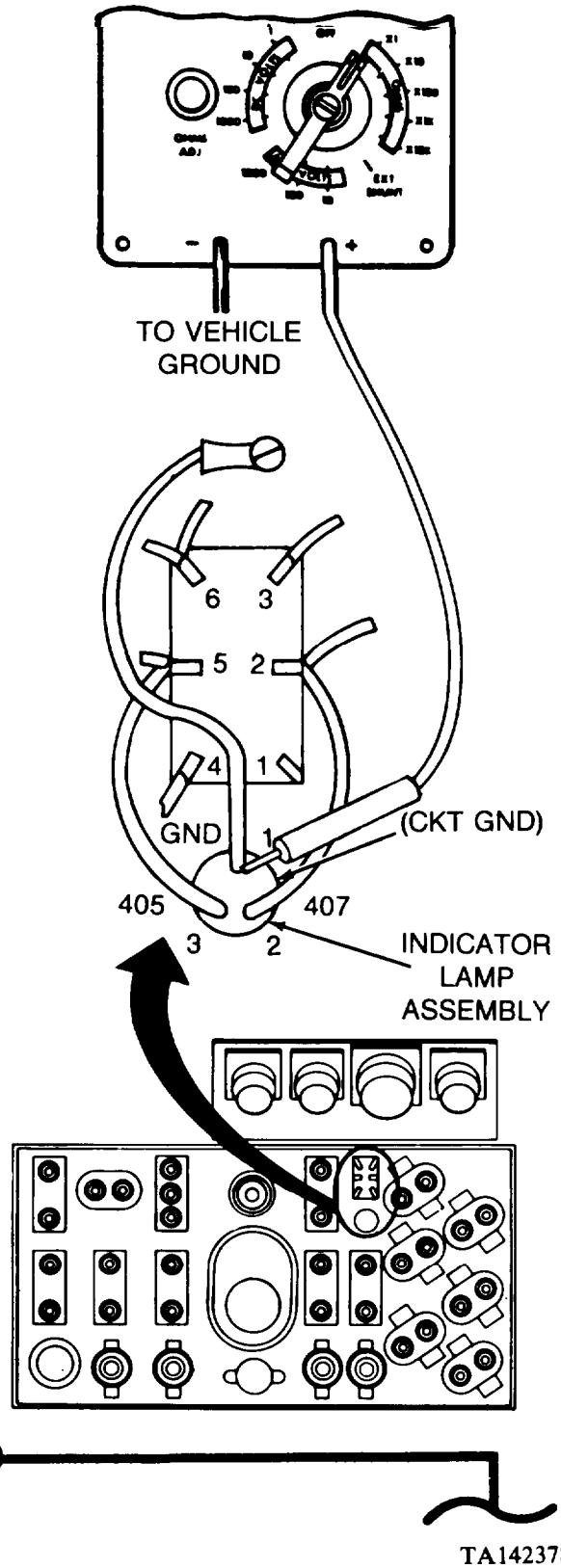
- Set HEATER MASTER switch OFF.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to terminal 1 of PERSONNEL HEATER indicator lamp assembly (CKT GND).
- Connect black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?

YES

NO

9 **Replace PERSONNEL HEATER indicator lamp socket (page 10-120).**



TA142378

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

Symptom-45

10 **Check PERSONNEL HEATER indicator lamp ground lead for proper connection.**

Technician (Driver's Station)

- Check if PERSONNEL HEATER indicator lamp assembly ground connection is loose or dirty.

Is ground connection loose or dirty?

11

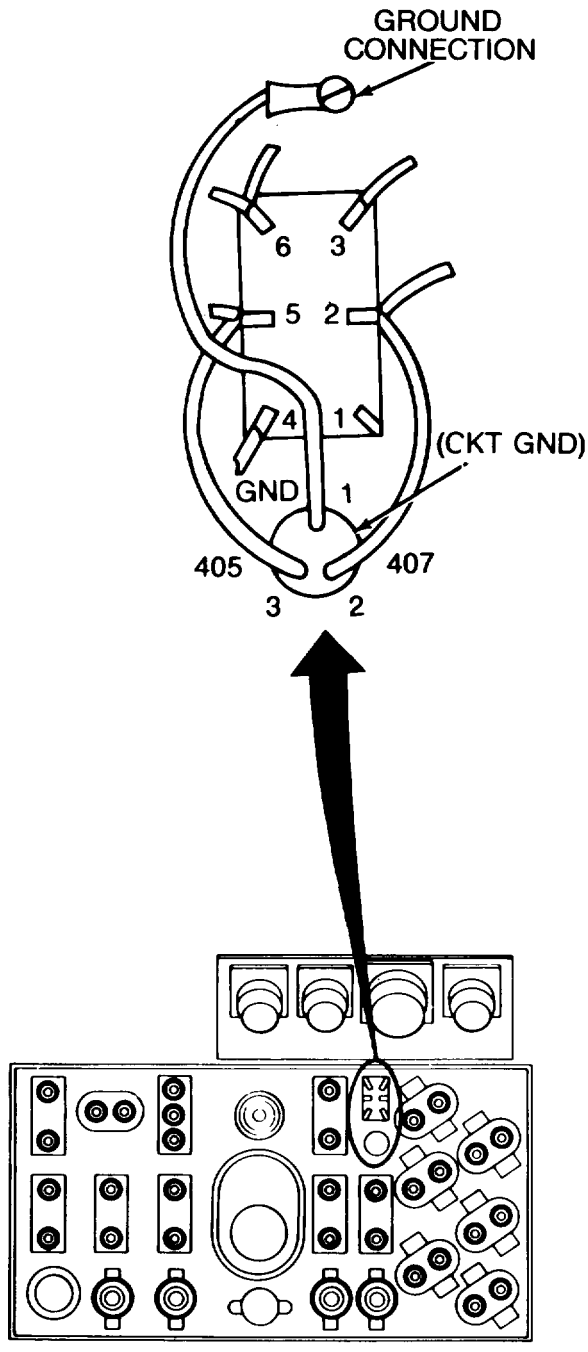
- **Clean and tighten loose ground connection.**
- **Install master control panel (page 10-47).**

YES

12

- **Replace PERSONNEL HEATER indicator lamp ground lead (page 10-98).**
- **Install master control panel (page 10-47).**

NO



TA142379

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

Symptom-46

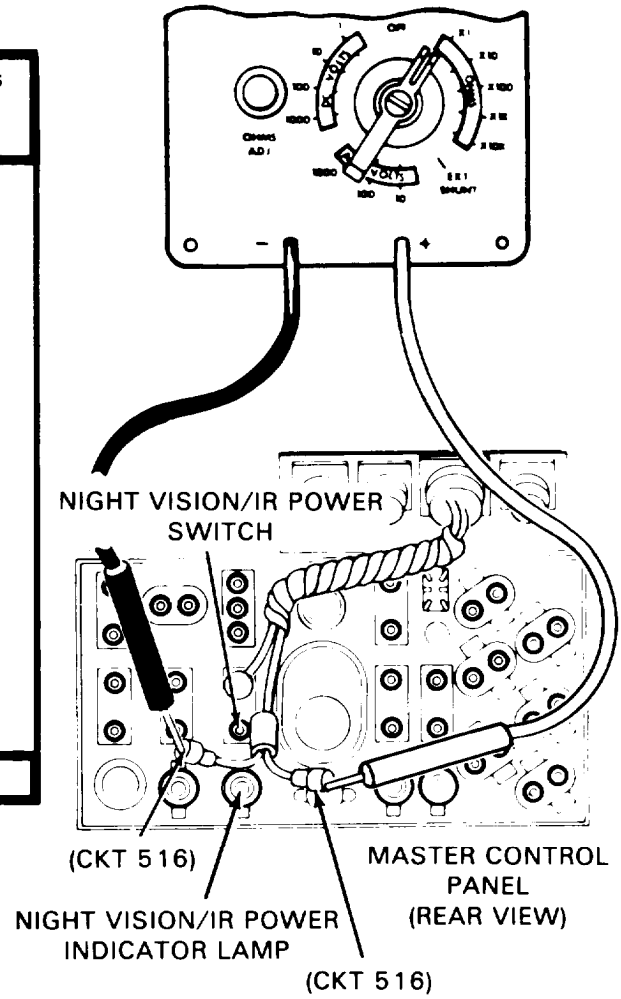
NIGHT VISION/IR POWER INDICATOR LAMP WILL NOT LIGHT (NIGHT VISION/IR PERISCOPE WILL WORK).

1 Check master control panel accessories harness (CKT 516) for continuity from NIGHT VISION/IR POWER switch to indicator lamp.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set NIGHT VISION/IR POWER switch OFF.
- Displace master control panel (page 10-45).
- Disconnect connectors (CKT 516) from indicator lamp and NIGHT VISION/IR POWER switch.
- Set meter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Place red probe of meter to indicator lamp cable connector and black probe to NIGHT VISION/IR POWER switch cable connector.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO → **2 Replace master control panel accessories harness (page 10-103).**

YES → **3 Replace NIGHT VISION/IR POWER indicator lamp socket (page 10-64).**

TA253122

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

Symptom-47

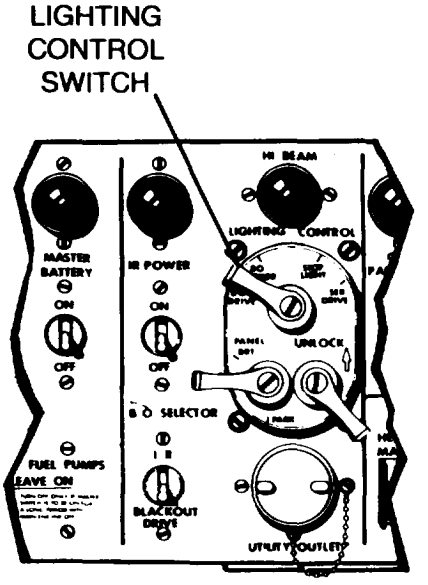
HIGH BEAM INDICATOR LAMP WILL NOT LIGHT WHEN WHITE SERVICE AND/OR B.O. SERVICE HIGH BEAM LAMPS ARE ON.

1 Check if HI BEAM indicator lamp will light when B.O. service lamps are on.

Technician (Driver's Station)

- Turn LIGHTING CONTROL switch lever to B.O. DRIVE.
- Set B.O. SELECTOR switch to IR.
- Set MASTER BATTERY switch ON.
- Check if HI BEAM indicator lamp is lit.
- Press and release foot DIMMER SWITCH.
- Check if HI BEAM indicator lamp is lit.

Is HI BEAM indicator lamp lit?



MASTER CONTROL PANEL

YES

NO

2
- **Check if HI BEAM indicator lamp will light when white service lamps are on.**

- **See Step 8.**

TA142381

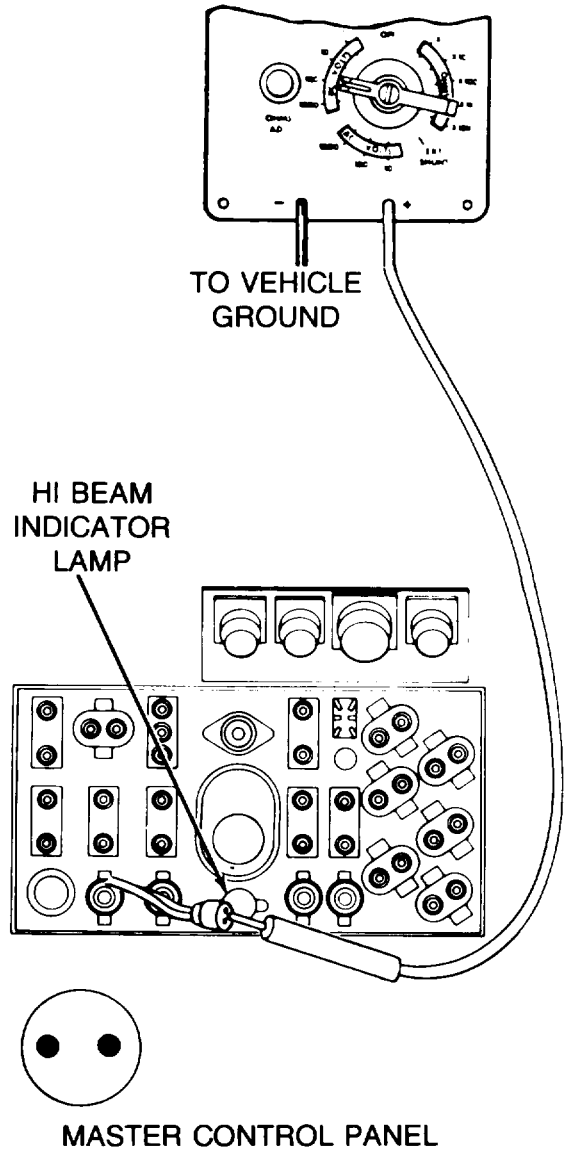
Symptom-47

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

3 **Check master control panel accessories harness (CKT 519), at connector to HI BEAM indicator lamp, for electrical power (white service lamps).**

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Turn LIGHTING CONTROL switch lever to SER DRIVE.
- Set PANEL light switch to BRT.
- Displace master control panel (page 10-45).
- Disconnect master control panel accessories harness connector from HI BEAM indicator lamp.
- Set multimeter to scale that will measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to one of the master control panel accessory harness connector contacts (CKT 519) at HI BEAM indicator lamp and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.
- Press and release foot DIMMER SWITCH.
- Check if meter indicates 18 to 30 volts dc.
- Repeat above check on other contact of master control panel accessories harness connector (CKT 519) at HI BEAM indicator lamp.



Does meter indicate 18 to 30 volts dc at either contact?

NO

YES

4 **Replace HI BEAM indicator lamp assembly (page 10-68).**

TA142382

Symptom-47

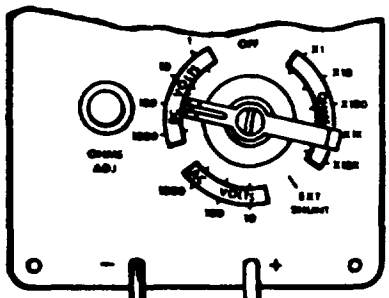
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

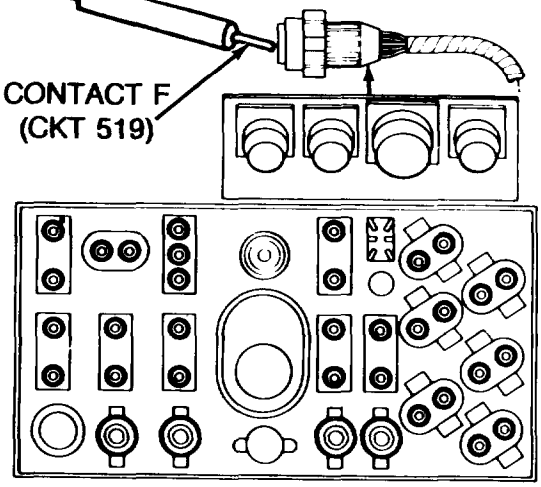
5 **Check contact F of hull front master harness connector (CKT 519) at master control panel for electrical power.**

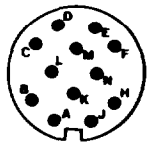
Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect master control panel accessories harness connector to HI BEAM indicator lamp.
- Disconnect hull front master harness connector from master control panel.
- Connect red probe of meter to contact F (CKT 519) of hull front master harness connector at master control panel and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?





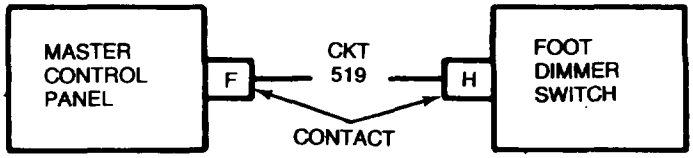


NO

6
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 519) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Install master control panel (page 10-47).**

YES

7 **Replace master control panel accessories harness (page 10-103).**



TA142383

Symptom-47
FROM STEP
2

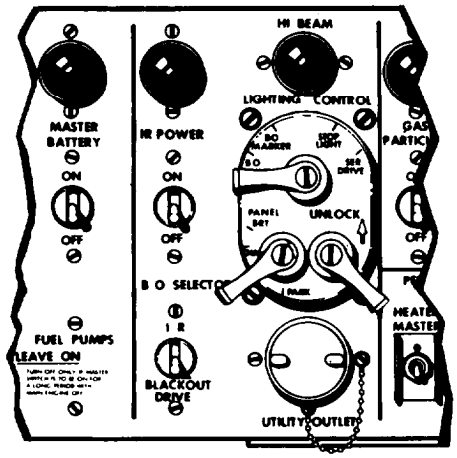
DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

8 **Check if HI BEAM indicator lamp will light when white service lamps are on.**

Technician (Driver's Station)

- Turn LIGHTING CONTROL switch to SER DRIVE.
- Set PANEL switch to BRT.
- Visually check if HI BEAM indicator lamp is lit.
- Press and release foot DIMMER SWITCH.
- Visually check if HI BEAM indicator lamp is lit.

Is HI BEAM indicator lamp lit?



YES

NO

9 **Replace HI BEAM indicator lamp assembly (page 10-68).**

TA142384

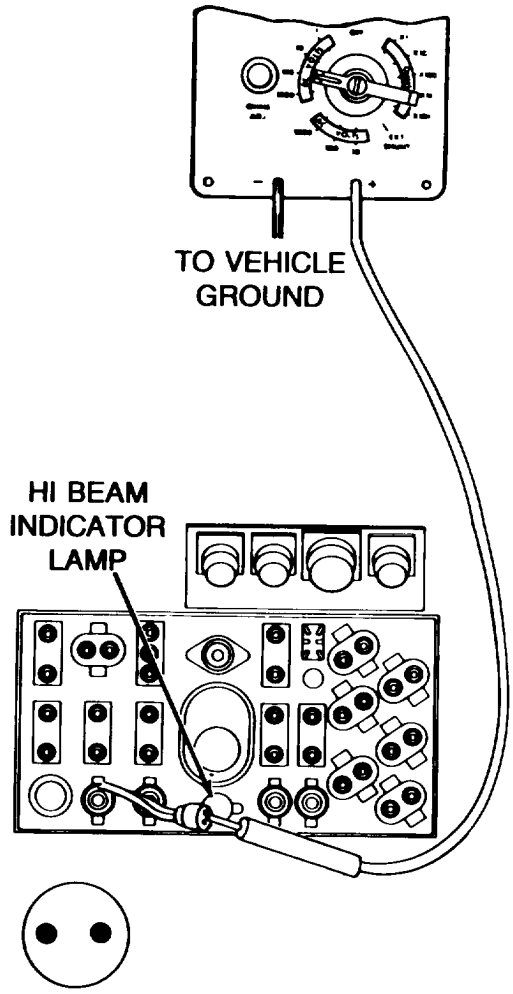
Symptom-47

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

10 **Check master control panel accessories harness (CKT 519), at connector to HI BEAM indicator lamp, for electrical power (B.O. service lamps).**

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Turn LIGHTING CONTROL switch lever to B.O. DRIVE.
- Set B.O. SELECTOR switch to IR.
- Displace master control panel (page 10-45).
- Disconnect master control panel accessories harness connector from HI BEAM indicator lamp.
- Set multimeter to scale that will measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to one of the master control panel accessories harness connector contacts (CKT 519) at HI BEAM indicator lamp and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.
- Press and release foot DIMMER SWITCH.
- Check if meter indicates 18 to 30 volts dc.
- Repeat above check on other contact of master control panel accessories harness connector (CKT 519) at HI BEAM indicator lamp.



Does meter indicate 18 to 30 volts dc at either contact?

NO

YES

11 **Replace HI BEAM indicator lamp assembly (page 10-68).**

TA142385

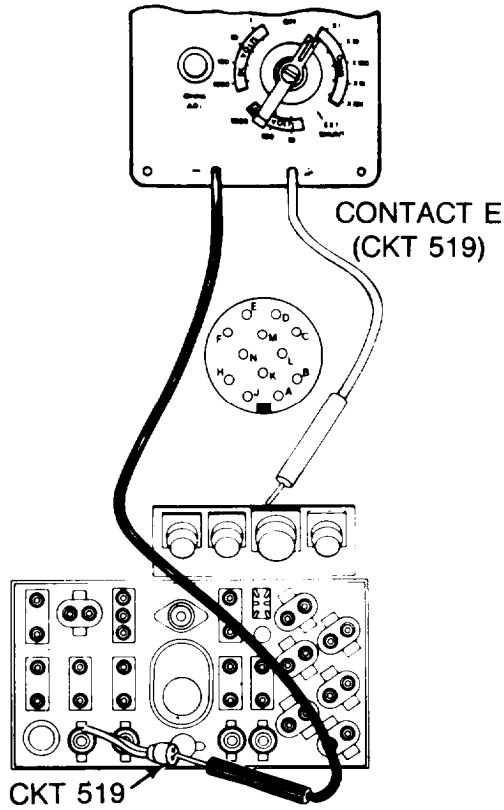
Symptom-47

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

12 **Check master control panel accessories harness (CKT 519) for continuity from contact E of master control panel connector to contacts of connector at HI BEAM indicator lamp.**

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect hull front master harness connector from master control panel.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact E (CKT 519) of master control panel accessories harness connector on master control panel.
- Connect black probe of meter to one of the master control panel accessories harness connector contacts (CKT 519) at HI BEAM indicator lamp.
- Check if meter indicates continuity.



TA142386

Symptom-47 DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

STEP (12) CONTINUED

- Repeat above check on other contact of master control panel accessories harness connector (CKT 519) at HI BEAM indicator lamp.

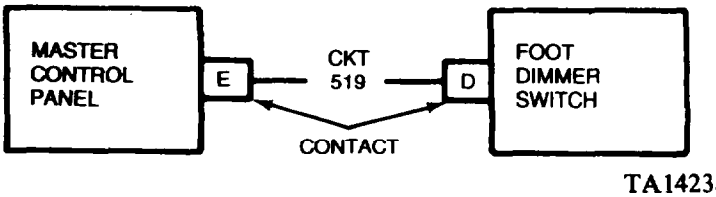
Does meter indicate continuity at either contact?

NO

13 Replace master control panel accessories harness (page 10-103).

YES

14
- Inspect hull front master harness for bent/broken connector contacts or loose (CKT 519) wire at rear of contacts.
- Repair connectors if defective (page 10-307).
- If connectors are not defective, notify support maintenance of a defective hull front master harness.
- Connect master control panel accessories harness connector to HI BEAM indicator lamp.
- Install master control panel.



TA142387

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

Symptom-48

SMOKE GENERATOR INDICATOR LAMP WILL NOT LIGHT (SMOKE GENERATOR WILL MAKE SMOKE).

1 Check SMOKE GENERATOR switch assembly for continuity.

Technician (Driver's Station)

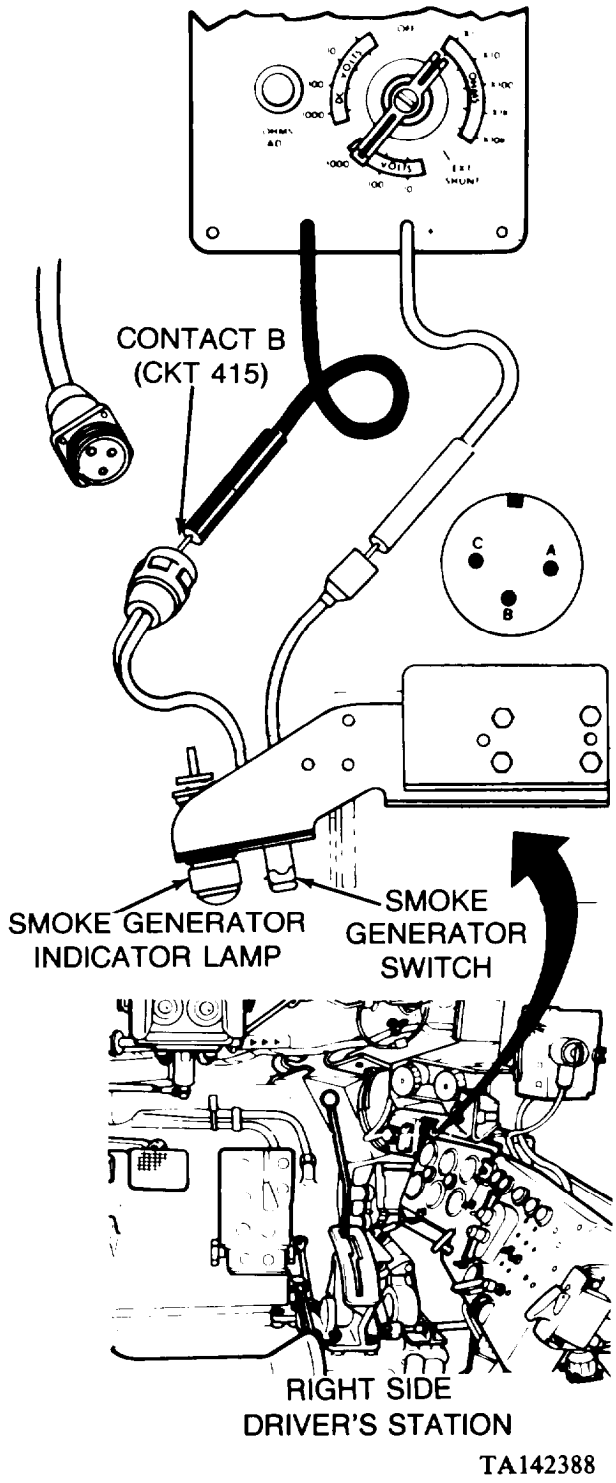
- Set MASTER BATTERY switch OFF.
- Set SMOKE GENERATOR switch OFF.
- Disconnect smoke generator switch connector from SMOKE GENERATOR indicator lamp.
- Disconnect smoke generator switch assembly connector from smoke generator switch harness connector.
- Set SMOKE GENERATOR switch ON.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to smoke generator switch connector.
- Connect black probe of meter to contact B (CKT 415) of smoke generator switch assembly connector.
- Check if meter indicates continuity.

Does meter indicate continuity?

2 Replace SMOKE GENERATOR switch (page 23-2).

NO

YES



TA142388

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP
(Continued)

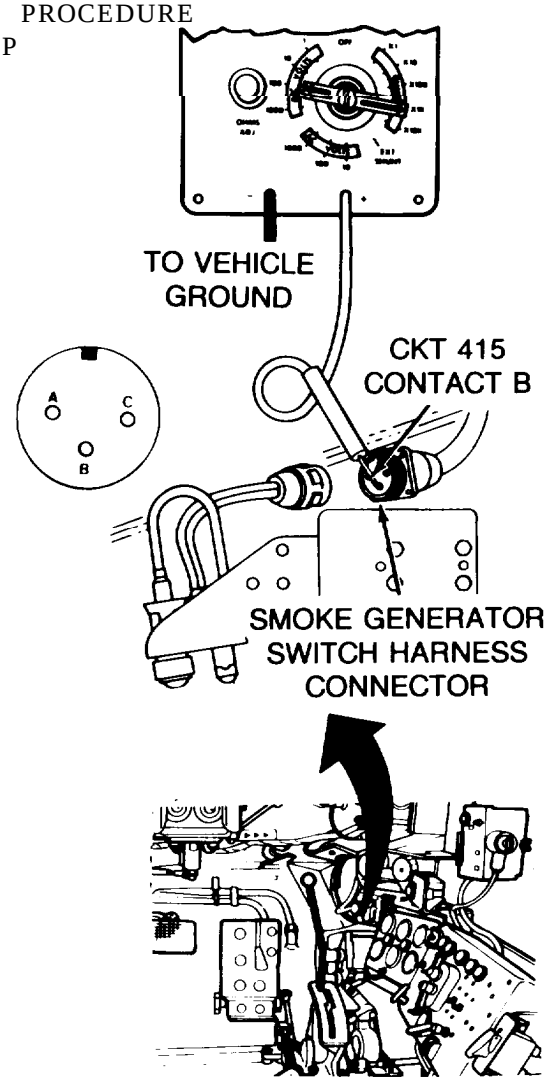
Symptom-48

3 **Check smoke generator switch harness (CKT 415) for electrical power.**

Technician (Driver's Station)

- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact B (CKT 415) of smoke generator switch harness connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

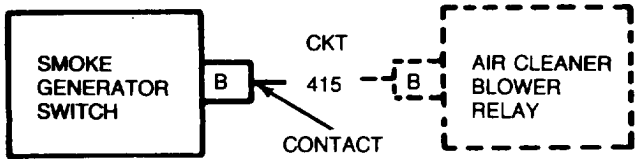


NO

4
- **Repair smoke generator switch harness (page 10-307).**
- **Reconnect smoke generator switch connector to SMOKE GENERATOR indicator lamp.**

YES

5 **Replace indicator lamp socket (page 23-8).**



TA142389

DETAILED TROUBLESHOOTING PROCEDURE
INDICATOR - LAMP

Symptom-49

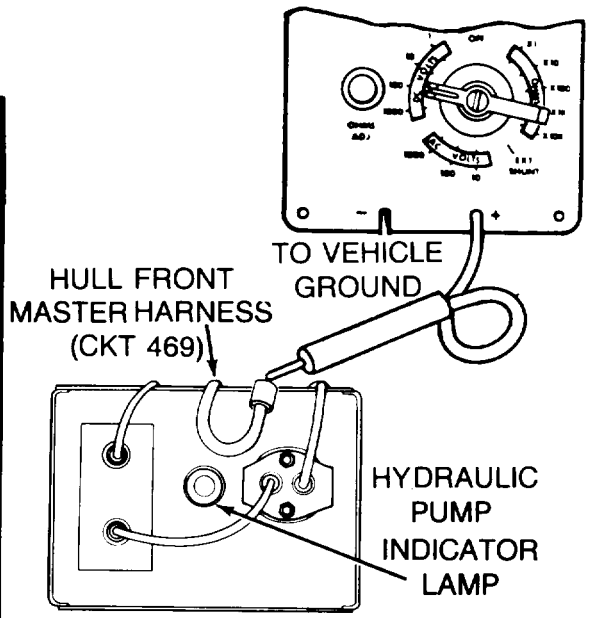
HYDRAULIC PUMP INDICATOR LAMP WILL NOT LIGHT (THERE IS HYDRAULIC POWER IN VEHICLE).

1 Check hull front master harness (CKT 469) hydraulic pump indicator lamp for electrical power.

Technician (Driver's Station)

- Displace hydraulic pump switch panel (page 10-159).
- Disconnect hull front master harness connector (CKT 469) from hydraulic pump indicator lamp.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to hull front master harness (CKT 469) hydraulic pump indicator lamp connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set FUEL PUMPS switch OFF.
- Set HYDRAULIC PUMP switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

2 Replace hydraulic pump (magnetic clutch) indicator lamp (page 10-161).

NO

3

- **Inspect hull front master harness for bent/broken connector contact or loose (CKT 469) wire at rear of connector.**
- **Repair connector if defective.**
- **If connector is not defective, notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness connector to hydraulic pump indicator lamp.**
- **Install hydraulic pump switch panel (page 10-159).**

TA142390

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS

Symptom-50

STATIC OR WHINING NOISE IN RADIO. (ELECTROMAGNETIC INTERFERENCE - EMI)

WARNING

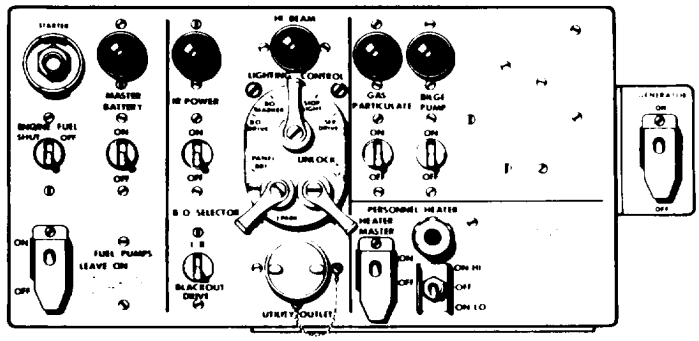
- **Clear turret area of personnel and equipment before setting ELEV/TRAV POWER switch ON.**

CAUTION

Turn vehicle RADIO SET off (TM 9-2350-222-10) before starting engine to prevent damage to communication equipment.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



MASTER CONTROL PANEL

1 Check if static is caused by vehicle electrical equipment (vehicle not moving).

Second Technician (Driver's Station)

- Start engine.
- Check that HEATER MASTER switch is set to ON.
- Set PERSONNEL HEATER HI/LO switch ON-LO.
- Check that LIGHTING CONTROL switch is OFF.
- Set IR POWER switch ON.

TA142391

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

Symptom-50

STEP (1) CONTINUED

First Technician (Turret)

- Turn vehicle RADIO SET ON (TM 9-2350-222-10).
- Set turret ELEV/TRAV POWER switch ON (TM 9-2350-222-10).
- Set control selector POWER switch ON (TM 9-2350-222-10) (See warning above Step (1)).
- Set turret ventilation BLOWER switch ON (TM 9-2350-222-10).
- Listen for static in radio helmet.

Can static be heard when vehicle electrical equipment is operating (vehicle not moving)?

YES

NO

(2)

- **EMI is a result of vehicle movement-check if EMI is caused by defective electrical connections in turret (vehicle moving).**
- **See Step (14) .**

TA142392

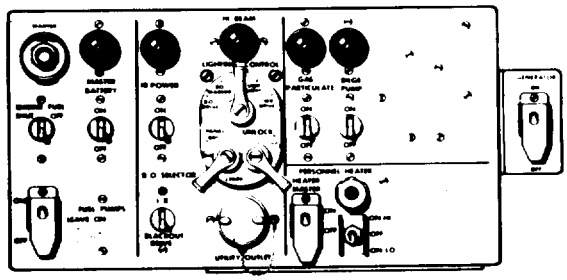
Symptom-50

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

3 **Check if static is caused by turret electrical equipment.**

First Technician (Turret)

- Set control selector POWER switch OFF. (TM 9-2350-222-10).
- Set turret ELEV/TRAV POWER switch OFF.
- Set turret ventilation BLOWER switch OFF.
- Listen for static in radio helmet.



Did static stop when turret electrical equipment was shutoff?

NO

YES

4

- **Turn vehicle RADIO SET OFF (TM 9-2350-222-10).**
- **Set PERSONNEL HEATER HI/LO switch OFF.**
- **Set IR POWER switch OFF.**
- **Stop engine.**
- **Notify turret mechanic of EMI problem.**

TA142393

Symptom-50 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

5 **Check if static is caused by infrared power supply.**

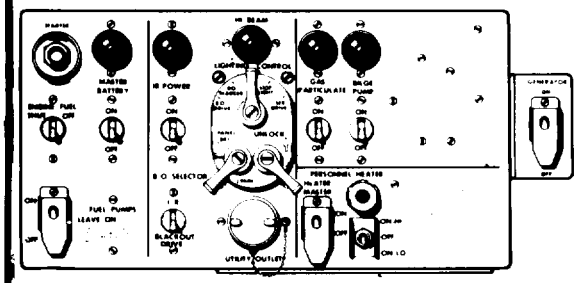
Second Technician (Driver's Station)

- Set IR POWER switch OFF.

First Technician (Turret)

- Wait two or three minutes for high voltage present inside IR power supply to discharge, then listen for static in radio helmet.

Did static stop when IR power supply was shut off?



NO

YES

6

- **Check if static is caused by defective ground strap on IR power supply.**
- **See Step (23) .**

TA142394

Symptom-50

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

7 **Check if static is a result of engine running.**

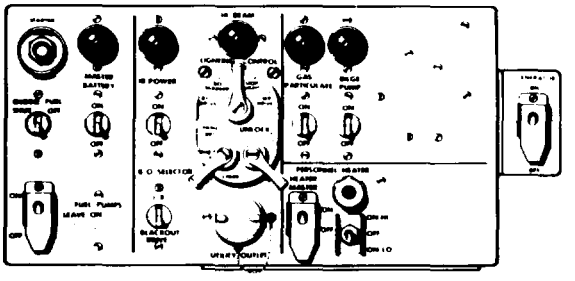
Second Technician (Driver's Station)

- Stop engine but do not set MASTER BATTERY, HEATER MASTER, PERSONNEL HEATER HI/LO switch OFF.

First Technician (Turret)

- Listen for static in radio helmet.

Did static stop when engine was shut off (thereby stopping air cleaner blower fans and generator)?



NO

YES

8

- **Check if static is caused by air cleaner blower fans.**
- **See Step (26) .**

TA142395

Symptom-50 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

9 **Check if static is caused by personnel heater.**

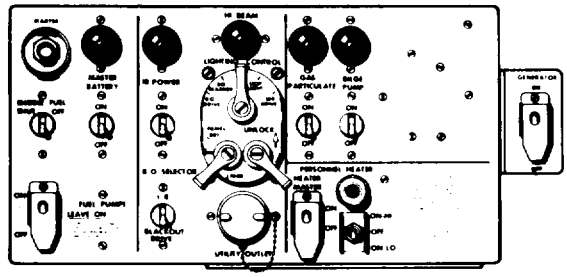
Second Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.

First Technician (Turret)

- After personnel heater blower fan stops running (about 5 minutes) listen for static in radio helmet.

Did static stop when personnel heater was shutoff?



NO

YES

10

- **Check if static is caused by personnel heater fuel pump.**
- **See Step (44) .**

TA142396

Symptom-50 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

11 **Check if static is caused by fuel tank's electrical fuel pumps.**

Second Technician (Driver's Station)

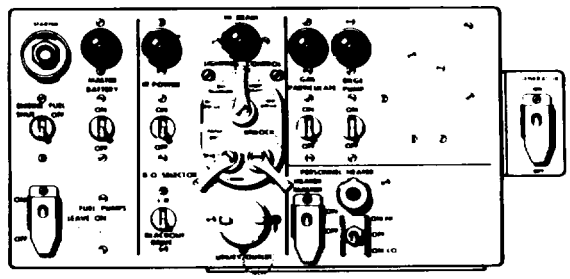
- Set FUEL PUMPS switch OFF.

First Technician (Turret)

- Listen for static in radio helmet.

Second Technician (Driver's Station)

- Set FUEL PUMPS switch ON.



Did static stop while fuel pumps were shutoff?

YES

12

- **Check if static is caused by right fuel tank electrical fuel pump.**
- **See Step (47) .**

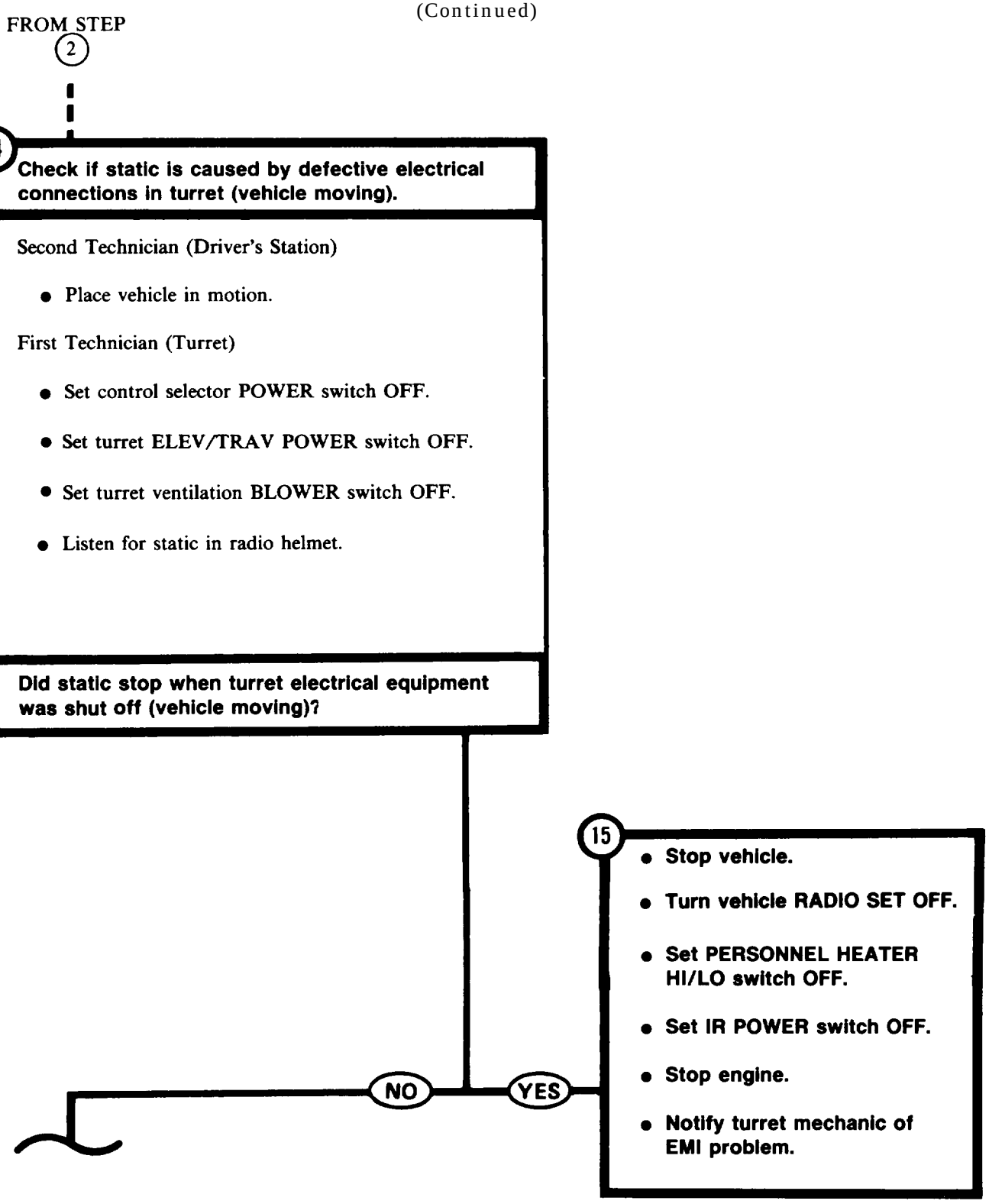
NO

13

- **Turn vehicle RADIO SET OFF.**
- **Notify support maintenance of EMI problem.**

TA142397

Symptom-50 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)



TA142398

Symptom-50 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

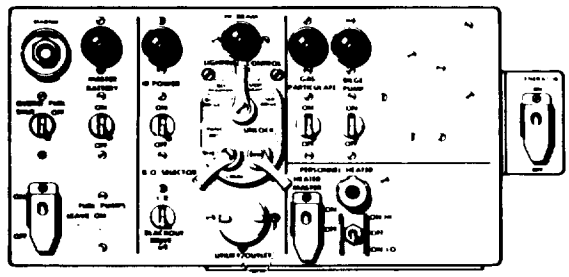
16 Check if static is caused by IR power supply (vehicle moving).

Second Technician (Driver's Station)

- Set IR POWER switch OFF.

First Technician (Turret)

- Wait two or three minutes for high voltage present inside IR power supply to discharge, then listen for static in radio helmet.



Did static stop when IR power supply was shut off (vehicle moving)?

NO

YES

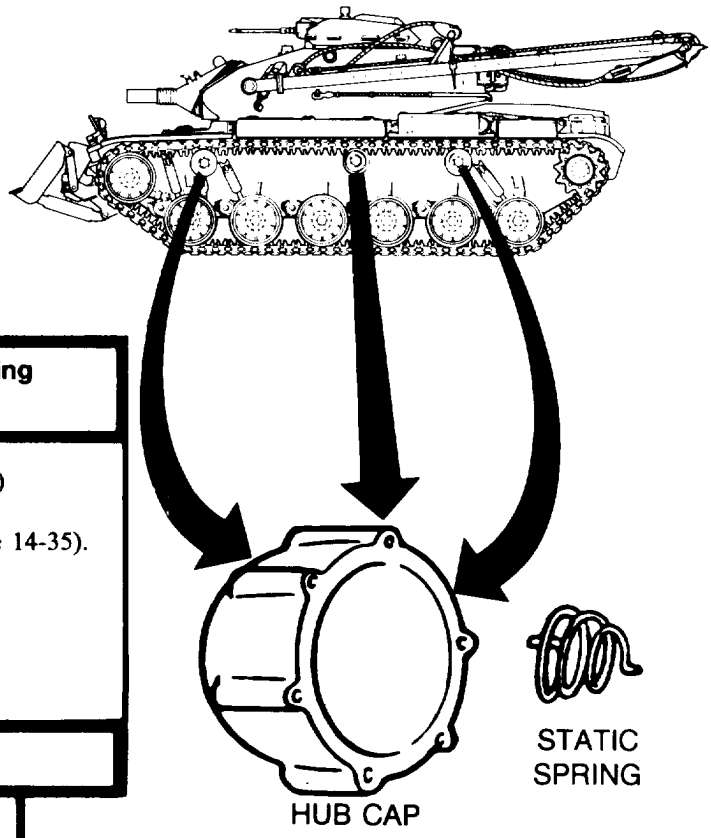
17

- **Stop vehicle.**
- **Check if static is caused by defective ground strap on IR power supply.**
- **See Step (23) .**

TA142399

Symptom-50

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)



18 Check if static is caused by broken or missing static springs in support rollers.

Both Technicians (Left and Right Side of Vehicle)

- Remove hub caps from support rollers (page 14-35).
- Check for broken and missing static springs.

Are any static springs broken or missing?

YES

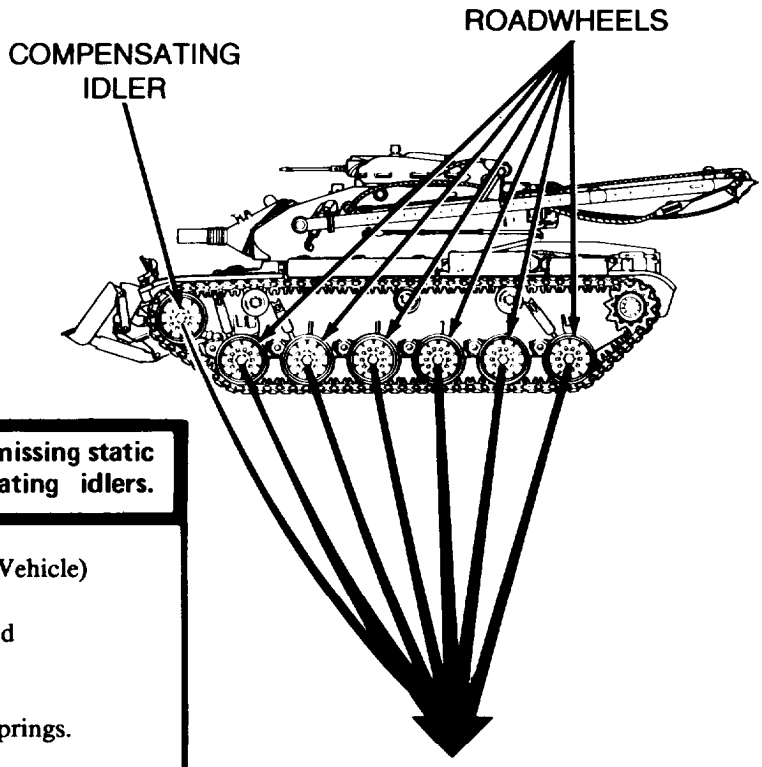
19 Replace broken and missing static springs (page 14-45).

NO

TA142400

Symptom-50

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

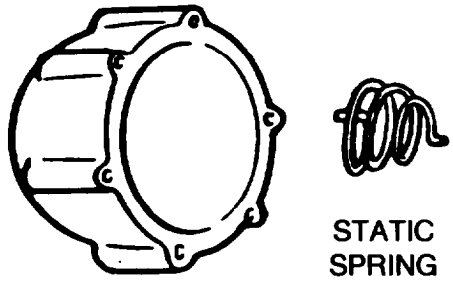


20 **Check if static is caused by broken or missing static springs in roadwheels and compensating idlers.**

Both Technicians (Left and Right Sides of Vehicle)

- Remove hub caps from roadwheels and compensating idlers (page 14-15).
- Check for broken and missing static springs.

Are any static springs broken or missing?



21

- **Notify support maintenance of EMI problem.**
- **Install hub caps (page 14-18).**

NO

YES

22 **Replace broken and missing static springs (page 14-15).**

TA142401

Symptom-50

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

FROM STEP (6) OR (17)

23 **Check if static is caused by defective ground strap on IR power supply.**

First Technician (Turret)

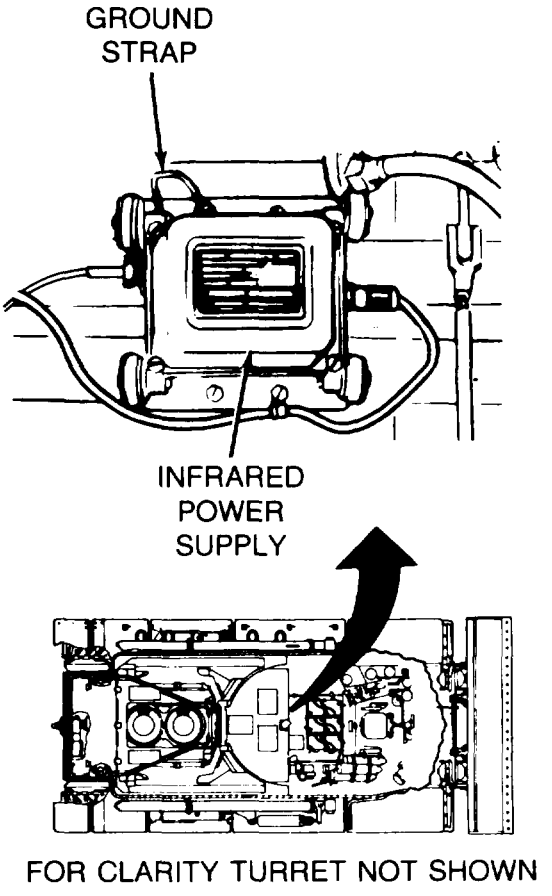
- Turn vehicle RADIO SET OFF (TM 9-2350-222-10).

Second Technician (Driver's Station)

- Stop engine.
- Set PERSONNEL HEATER HI/LO switch OFF.

First Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to infrared power supply (TM 9-2350-222-10).
- Check infrared power supply for loose ground strap connections or damaged ground strap.



FOR CLARITY TURRET NOT SHOWN

Is ground strap connection loose or ground strap damaged?

YES

24 **Clean and tighten loose ground strap connections. If ground strap connection is not loose, replace damaged ground strap (page 10-202).**

NO

25 **Replace infrared power supply (page 10-202).**

TA142402

Symptom-50

FROM STEP (8)

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

(26) Check if static is caused by air cleaner blower fans.

First Technician (Turret)

- Turn vehicle RADIO SET OFF.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to AIR CLEANER BLOWER FAN RELAY (TM 9-2350-222-10).
- Disconnect hull front master harness from AIR CLEANER BLOWER FAN RELAY.

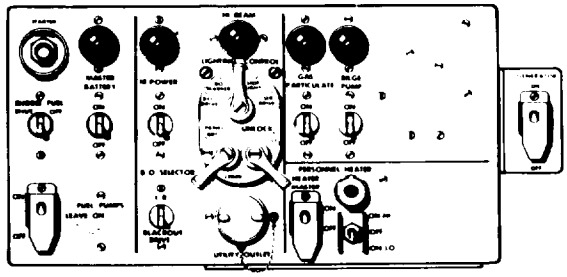
Second Technician (Driver's Station)

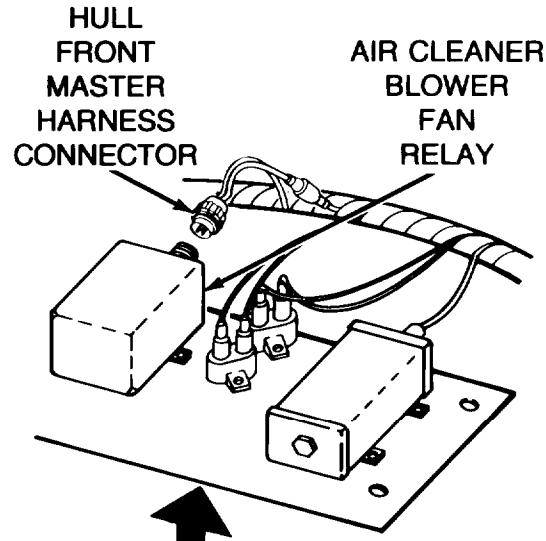
- Start engine.
- Set PERSONNEL HEATER HI/LO switch OFF.

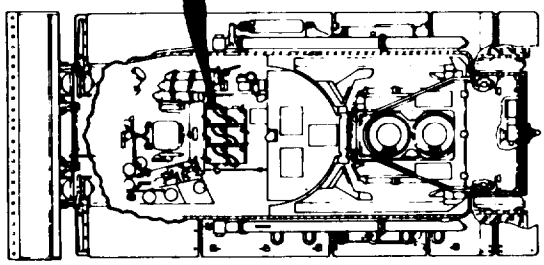
First Technician (Turret)

- Turn vehicle RADIO SET ON.
- Listen for static in radio helmet.

Did static stop when air cleaner blowers were shut off (engine running)?







FOR CLARITY TURRET NOT SHOWN

NO

YES

(27)

- **Check if static is caused by left or right air cleaner assembly.**
- **Top loader See Step (33) .**
- **Side loaders See Step (41) .**

TA142403

Symptom-50 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

28 **Check if static is caused by generator.**

First Technician (Turret)

- Turn vehicle RADIO SET OFF.

Second Technician (Driver's Station)

- Stop engine.
- Check that MASTER BATTERY switch is OFF.

First Technician (Turret)

- Connect hull front master harness back to the AIR CLEANER BLOWER FAN RELAY.

Second Technician (Driver's Station)

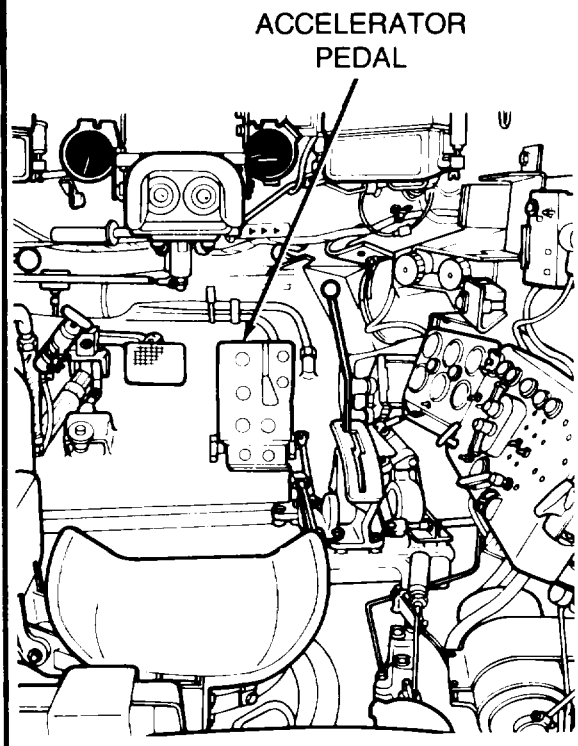
- Start engine.

First Technician (Turret)

- Turn vehicle RADIO SET ON.
- Listen for static in radio helmet.

Second Technician (Driver's Station)

- Press accelerator pedal for a few seconds and release.



DRIVER'S STATION

Does static sound like a whining noise that changes with engine speed?

YES

NO

29
- **Turn vehicle RADIO SET OFF.**
- **Stop engine.**
- **Notify support maintenance of EMI problem.**

TA142404

Symptom-50 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

30 **Check if static is caused by defective ground strap on generator.**

First Technician (Turret)

- Turn vehicle RADIO SET OFF.

Second Technician (Driver's Station)

- Stop engine.

Both Technicians (Top Deck)

- Remove powerplant (page 5-1).

First Technician (Powerplant, Generator Side)

- Check generator for loose ground strap connections or damaged ground straps.

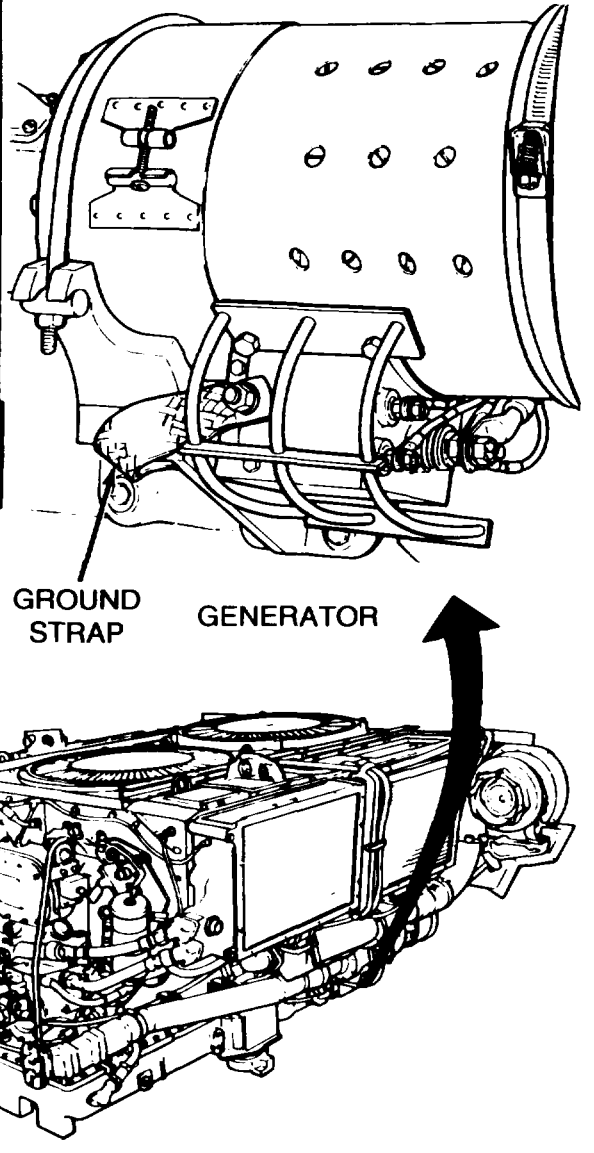
Are ground strap connections loose or ground strap damaged?

31 **Replace generator (page 10-4).**

NO

32 **Clean and tighten loose ground strap connection. If ground strap connections are not loose, replace damaged ground strap (page 10-12).**

YES



Symptom-50

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

FROM STEP (27)

NOTE
If your vehicle has side-loading air cleaners, see Step (41) .

(33) Check if static is caused by left air cleaner assembly.

First Technician (Turret)

- Turn vehicle RADIO SET OFF.

Second Technician (Driver's Station)

- Stop engine.
- Check that MASTER BATTERY switch is OFF.

First Technician (Turret)

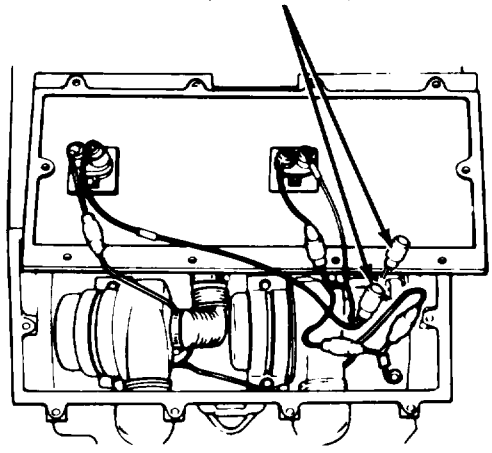
- Connect hull front master harness back to the AIR CLEANER BLOWER FAN RELAY.

First Technician (Left Air Cleaner)

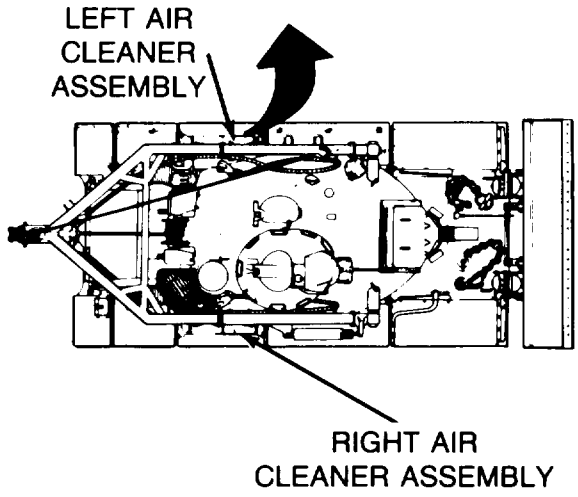
- Remove air cleaner blower fan cover, aluminum (page 7-131), or armored (page 7-148).
- Disconnect connector (CKT 415B) at left air cleaner assembly.

Second Technician (Driver's Station)

- Start engine.



AIR CLEANER BLOWER BOX (COVER OPEN)



TA142406

Symptom-50

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

STEP (33) CONTINUED

First Technician (Turret)

- Turn vehicle RADIO SET ON.
- Listen for static in radio helmet.
- Turn vehicle RADIO SET OFF.

Second Technician (Driver's Station)

- Stop engine.

First Technician (Left Air Cleaner)

- Connect connector (CKT 415B).

Did static stop when left air cleaner assembly was disconnected?

YES

(34)
- **Static caused by left air cleaner assembly.**
- **See Step (36) .**

NO

(35)
- **Static caused by right air cleaner assembly.**
- **See Step (36) .**

TA142407

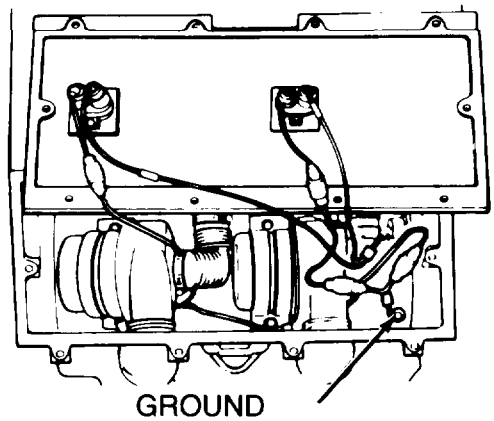
Symptom-50

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

FROM STEP (34) OR (35) (42) OR (43)

NOTE

This step is to be performed on the air cleaner assembly causing static. Electrical connections are the same on both left and right air cleaner assemblies.



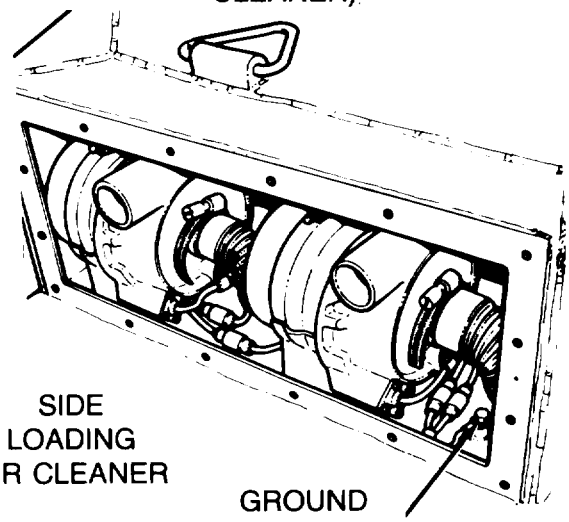
36 **Check if static is caused by loose ground connection.**

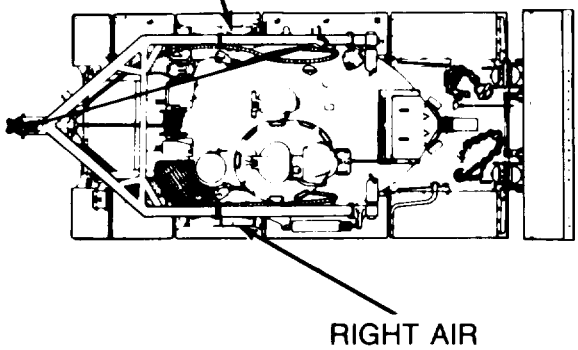
First Technician (Air Cleaner Assembly Causing Static)

- Remove cover from air cleaner housing (page 7-148) for armored; (page 7-131) for aluminum; (page 7-131) for side-loading.
- Check if ground connection is loose.

Is ground connection loose?

TOP LOADING
ARMORED AIR CLEANER
(ELECTRICAL CONNECTIONS ARE THE SAME ON ALUMINUM AIR CLEANER)





NO — YES

37

- **Clean and tighten loose ground connection.**
- **Install air cleaner housing cover (page 7-149) for armored; (page 7-132) for aluminum; (page 7-132) for side-loading.**

TA142408

DETAILED TROUBLESHOOTING PROCEDURE

SUPPORT SYSTEM - COMMUNICATIONS

(Continued)

Symptom-50

38 **Check if static is caused by left air cleaner blower fan.**

First Technician (Air Cleaner Assembly Causing Static)

- Disconnect air cleaner blower fan power lead connector (left side).

Second Technician (Driver's Station)

- Start engine.

First Technician (Turret)

- Turn vehicle RADIO SET ON.
- Listen for static in radio helmet.

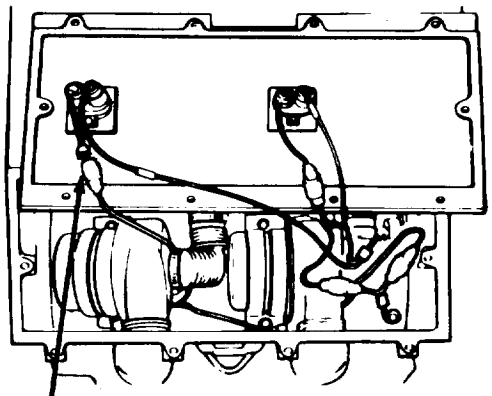
Did static stop when left air cleaner blower fan was disconnected?

YES

39
- **Replace air cleaner blower fan (left side), aluminum (page 7-124), or armored (page 7-140).**
- **Turn vehicle RADIO SET OFF.**

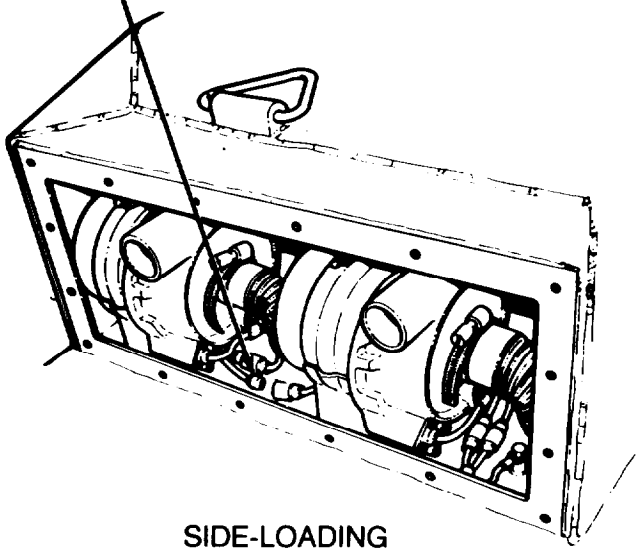
NO

40
- **Replace air cleaner blower fan (right side), aluminum (page 7-124) or armored (page 7-140).**
- **Turn vehicle RADIO SET OFF.**



ARMORED
AIR CLEANER
(COVER REMOVED)

BLOWER FAN POWER
LEAD CONNECTOR
(LEFT SIDE)



SIDE-LOADING
AIR CLEANER
(COVER REMOVED)

TA142409

Symptom-50

FROM STEP (27)

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

41 Check if static is caused by left air cleaner assembly.

First Technician (Turret)

- Turn vehicle RADIO SET OFF.

Second Technician (Driver's Station)

- Stop engine.
- Check that MASTER BATTERY switch is OFF.

First Technician (Turret)

- Connect hull front master harness back to the AIR CLEANER BLOWER FAN RELAY.

First Technician (Left Air Cleaner)

- Remove air cleaner blower fan cover, aluminum (page 7-131) or armored (page 7-148).
- Disconnect connectors (CKT 415B) at left air cleaner assembly.

Second Technician (Driver's Station)

- Start engine.

First Technician (Turret)

- Turn vehicle RADIO SET ON.
- Listen for static in radio helmet.
- Turn vehicle RADIO SET OFF.

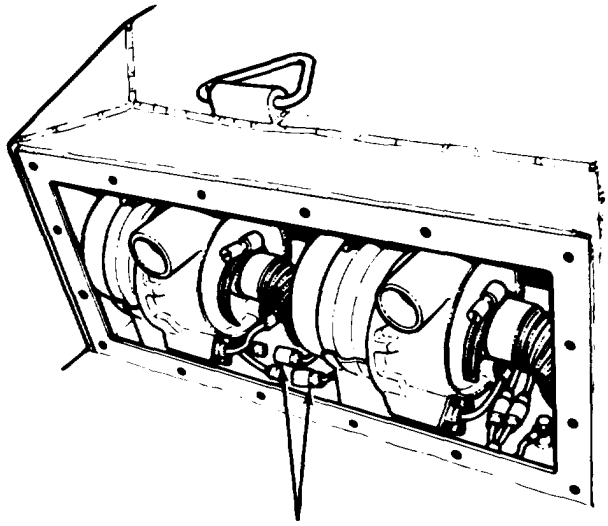
Second Technician (Driver's Station)

- Stop engine.

First Technician (Left Air Cleaner)

- Connect connectors (CKT 415B).

Did static stop when left air cleaner assembly was disconnected?



CONNECTORS
(CKT 415B)

NO

42

- **Static caused by right air cleaner assembly.**
- **See Step (36) .**

YES

43

- **Static caused by left air cleaner assembly.**
- **See Step (36) .**

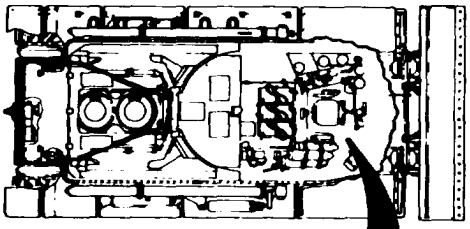
TA142410

Symptom-50

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

FROM STEP (10)

FOR CLARITY
TURRET NOT SHOWN



44 **Check if static is caused by personnel heater fuel pump.**

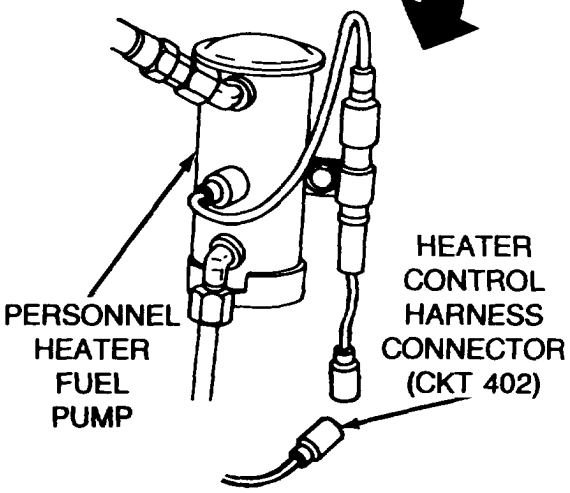
Second Technician (Driver's Station)

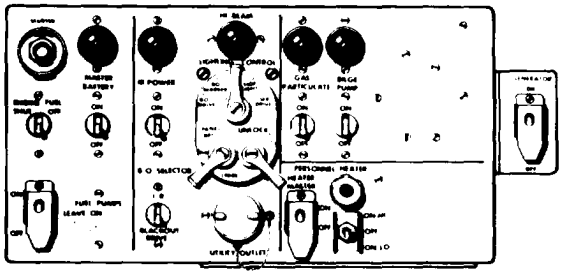
- Disconnect heater control harness connector from personnel heater fuel pump (CKT 402).
- Set PERSONNEL HEATER HI/LO switch ON-LO.

First Technician (Turret)

- Listen for static in radio helmet.

Did static stop when personnel heater fuel pump was disconnected?





NO

45

- **Set PERSONNEL HEATER HI/LO switch OFF.**
- **Connect heater control harness (CKT 402) at fuel pump.**
- **Replace personnel heater (page 19-19).**
- **Turn vehicle RADIO SET OFF.**

YES

46

- **Replace personnel heater fuel pump (page 7-67).**
- **Turn vehicle RADIO SET OFF.**

TA142411

Symptom-50

FROM STEP (12)

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)

47 **Check if static is caused by right fuel tank electrical fuel pump.**

First Technician (Turret)

- Open turret platform access door.
- Manually traverse turret to expose access plate for right fuel pump radio interference suppression capacitor and housing assembly (TM 9-2350-222-10).
- Remove access plate for right fuel pump radio interference suppression capacitor and housing assembly (page 10-402).

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Turn vehicle RADIO SET OFF.
- Disconnect electrical connector from capacitor and housing assembly.

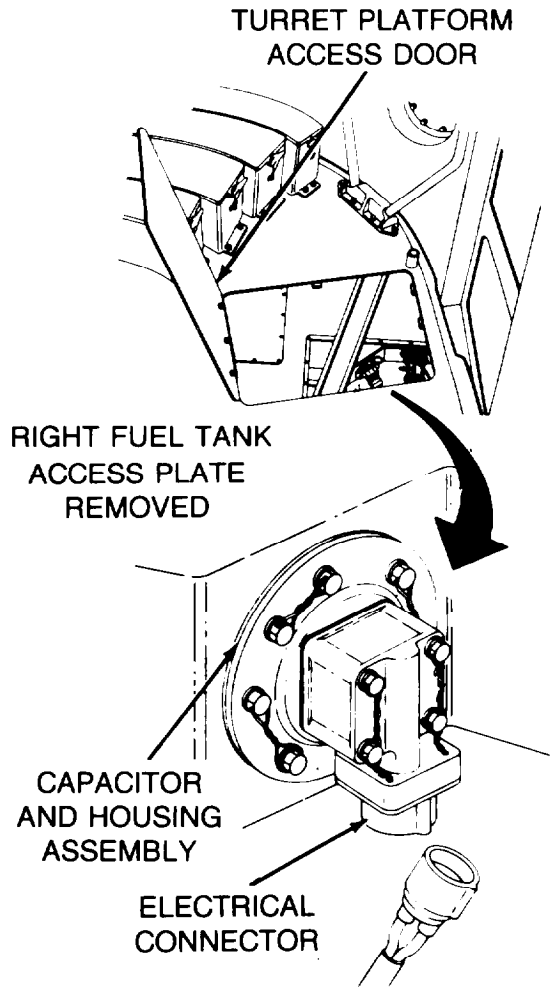
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

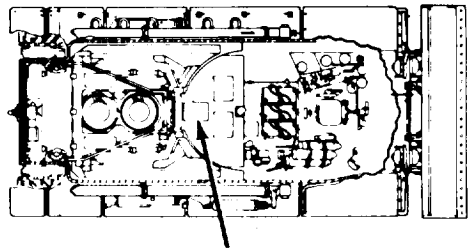
First Technician (Turret)

- Turn RADIO SET ON.
- Listen for static in radio helmet.

Did static stop when right fuel tank electrical fuel pump was disconnected?



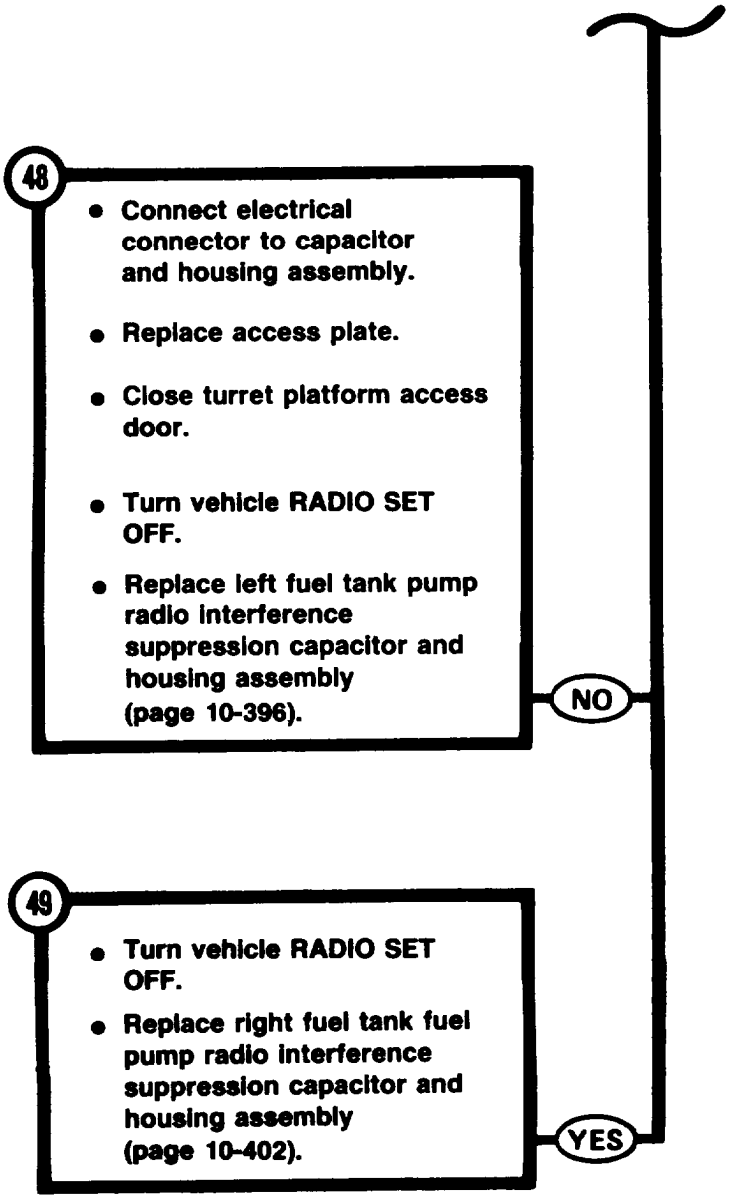
FOR CLARITY TURRET NOT SHOWI



ACCESS PLATE FOR RIGHT FUEL PUMP RADIO INTERFERENCE SUPPRESSION CAPACITOR AND HOUSING ASSEMBLY

TA142412

Symptom-50 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - COMMUNICATIONS
(Continued)



TA142413

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - DRAIN VALVES

Symptom-51

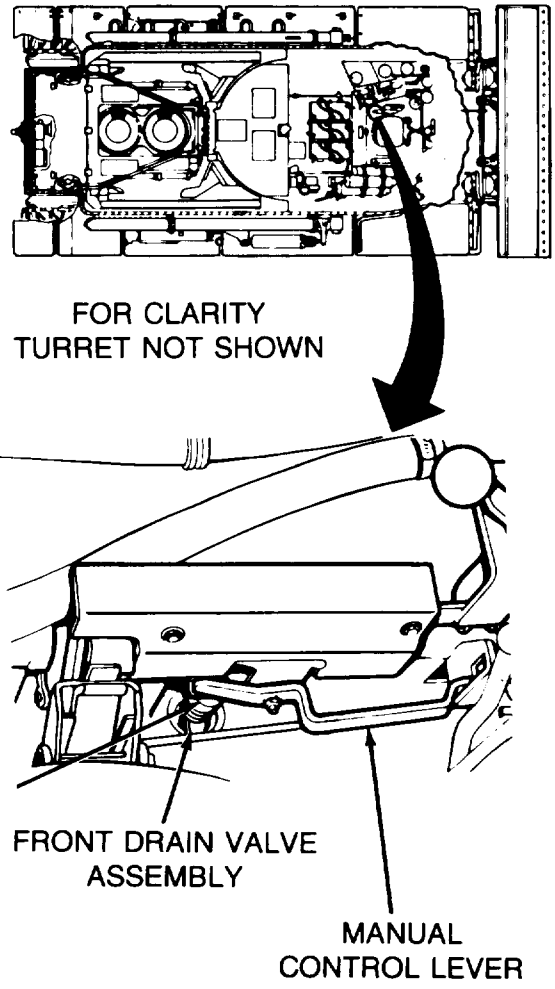
FRONT DRAIN VALVE WILL NOT WORK.

1 Check front drain valve and valve cage for binding or obstruction.

Technician (Driver's Station)

- Press down on front drain valve knob with thumbs and release.
- Repeat above step 3 or 4 times.
- Check if valve moves freely between CLOSED and OPEN positions and returns to CLOSED position when released.
- Check if valve is not obstructed from closing by foreign matter in valve.

Is valve binding or obstructed?



YES

2 Remove, clean, and inspect front drain valve assembly (page 16-141).

NO

3
- **Remove control lever.**
- **Clean control lever if rusted or corroded.**
- **Replace control lever if damaged (page 16-140).**

TA142414

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - DRAIN VALVES

Symptom-52

REAR DRAIN VALVE WILL NOT WORK

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check engine compartment drain valve control handle for binding.

Second Technician (Driver's Station)

- Disconnect rod end clevis from rear hull lever (page 16-170).
- Operate rear hull drain valve control lever between OPEN and CLOSE positions.
- Check control lever and bracket for binding or obstruction.

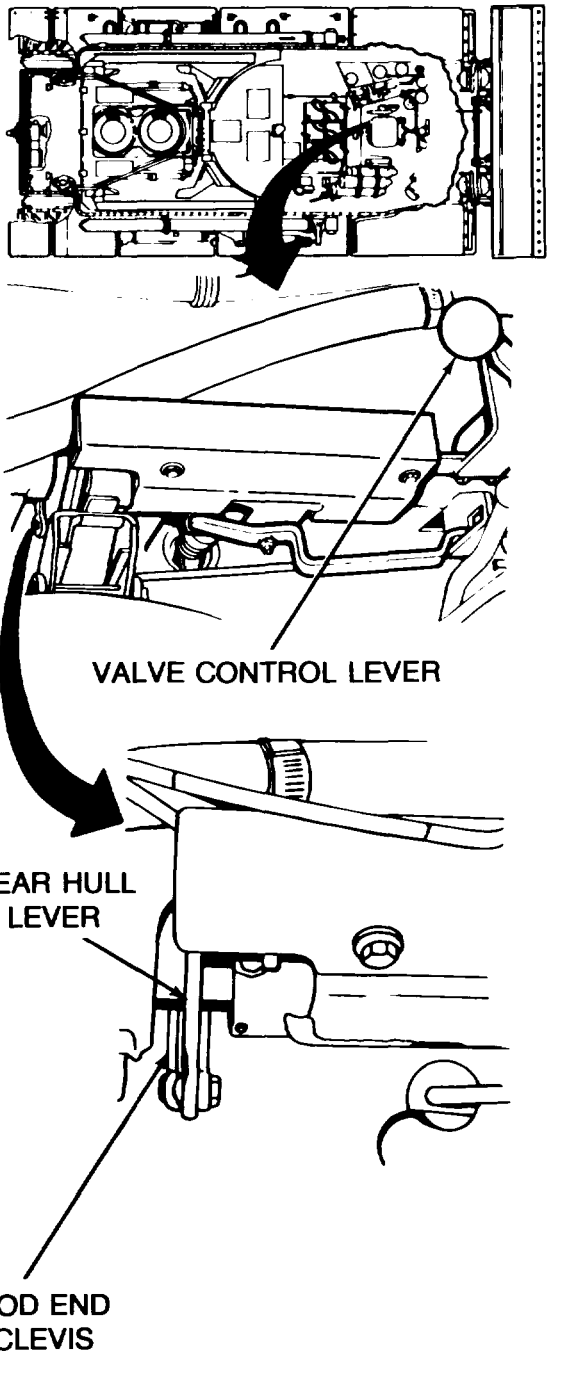
Is drain valve control handle binding or obstructed?

2 Remove, disassemble and inspect rear drain valve control lever assembly (page 16-169).

YES

NO

FOR CLARITY TURRET NOT SHOWN



TA142415

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - DRAIN VALVES
(Continued)

Symptom-52

3 Check rear drain valve intermediate connecting rods for obstructions.

Second Technician (Driver's Station)

- Connect rod end clevis to rear hull lever (page 16-173).

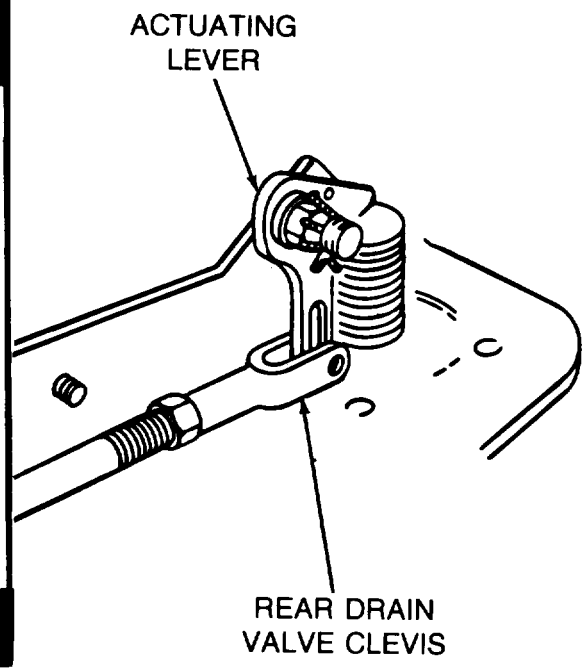
First Technician (Engine Compartment)

- Disconnect rear drain valve clevis from actuating lever (page 16-147).

Second Technician (Driver's Station)

- Move valve control lever between OPEN and CLOSE positions and check for binding or obstruction.

Is intermediate connecting rod obstructed?



NO

YES

4 Notify support maintenance of binding or obstructed intermediate rear drain connecting rods.

TA142416

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - DRAIN VALVES
(Continued)

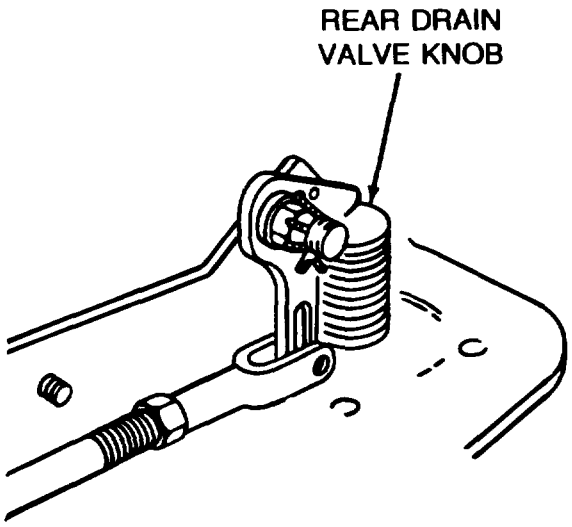
Symptom-52

5 **Check that rear drain valve will open and close.**

First Technician (Engine Compartment)

- Press down rear drain valve knob with thumbs and release.
- Repeat two or three times and check if rear drain valve is moving freely.

Will rear drain valve open and close?



YES

NO

6 **Remove, disassemble and inspect the rear drain valve assembly (page 16-169).**

TA142417

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - DRAIN VALVES
(Continued)

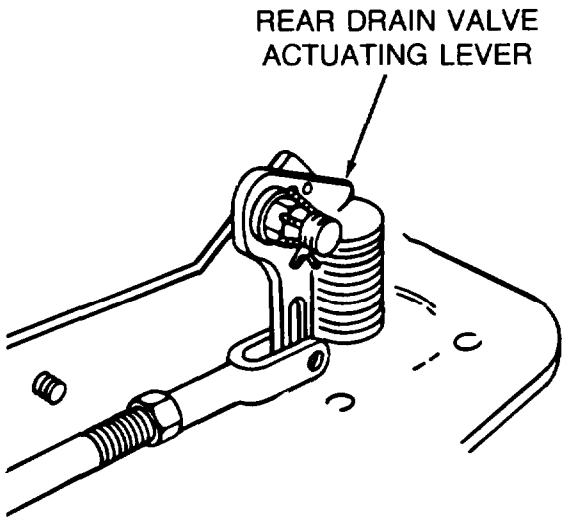
Symptom-52

7 **Check that rear drain valve actuating lever is not obstructed.**

First Technician (Engine Compartment)

- Operate rear drain valve by moving actuating lever by hand.
- Check if actuating lever moves freely.

Is actuating lever binding or obstructed?



8 **Remove, disassemble and inspect rear drain valve actuating lever (page 16-146).**

YES

9 **Perform rear drain valve linkage adjustment (page 16-162).**

NO

TA142418

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER

Symptom-53

FIXED FIRE EXTINGUISHER FAILS TO OPERATE WHEN FIRE-PULL HARD HANDLE IS PULLED

NOTE

Two different control valves have been used on the fire extinguisher. Although different in appearance check out is identical.

1 **Check interior release mechanism for binding in first shot cycle.**

Technician (Driver's Station)

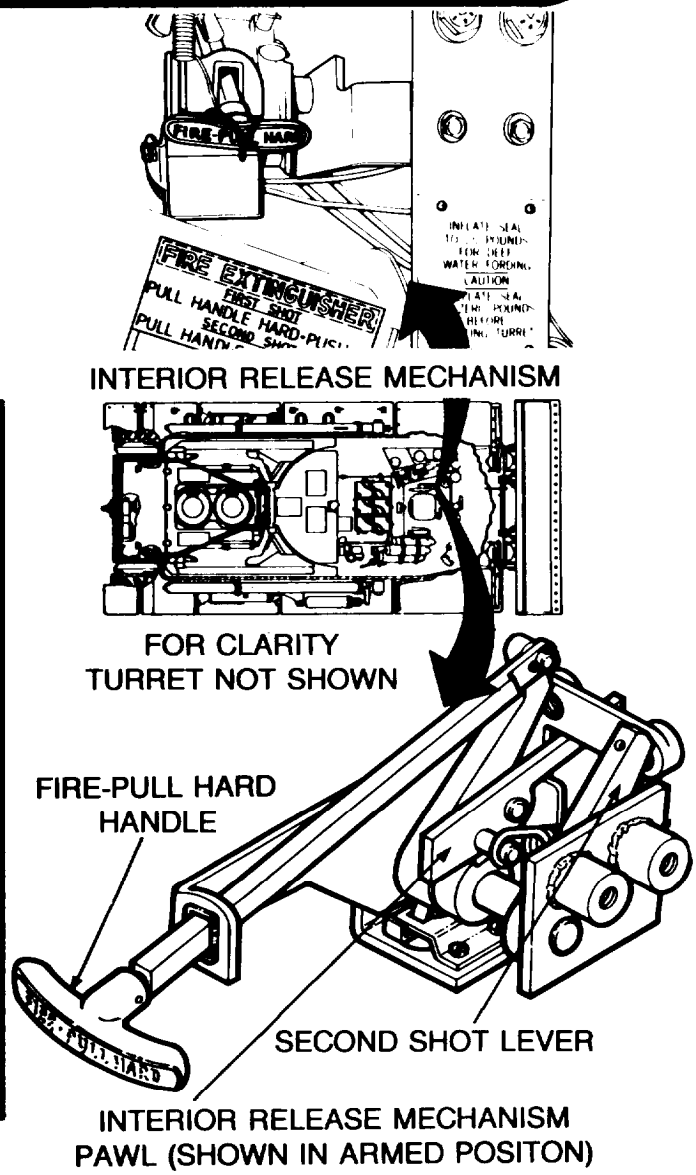
- Remove interior release mechanism (page 21-14).
- Arm release mechanism if not armed for first shot, by pulling FIRE-PULL HARD handle all the way out, holding pawl down and pushing handle all the way in.
- Pull interior FIRE-PULL HARD handle and observe action of interior release mechanism, pawl should go into the vertical position. Hold second shot lever to make sure that it does not move.
- Push in FIRE-PULL HARD handle all the way.

Did first shot mechanism work freely without binding?

YES

NO

2 **Repair interior release mechanism (page 21-14).**



TA142419

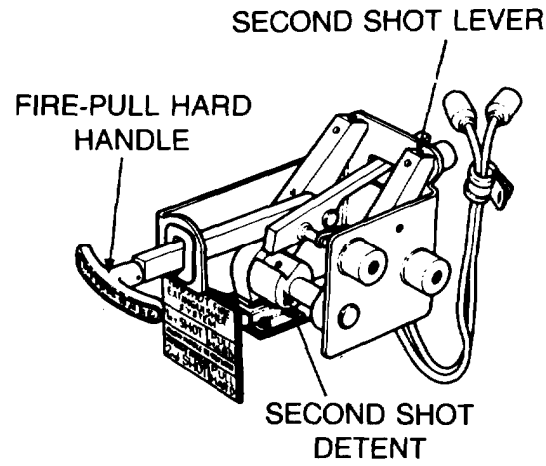
Symptom-53 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

3 **Check interior release mechanism for binding in second shot position.**

Technician (Driver's Station)

- Check if mechanism is ready for second shot with bottom part of pawl in second shot detent.
- Pull interior FIRE-PULL HARD handle and observe action of second shot mechanism, second shot lever should move as handle is pulled.

Did second shot mechanism work freely without binding?



INTERIOR RELEASE MECHANISM

YES

NO

4 **Repair interior release mechanism (page 21-14).**

TA142420

Symptom-53

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

5 **Check first shot control valve for extension of pin by using handle on control valve.**

Technician (Driver's Station)

NOTE

Do not install lead seals on interior release mechanism at this time.

- Install interior release mechanism (page 21-15).
- Disconnect two control valves (page 21-37).
- Return first shot control valve to SET position if not in SET position, by alining arrow on shaft with arrow on control valve.
- Remove safety pin and rotate handle on valve clockwise until it stops.
- Observe pin at the bottom of the valve for extension of 1/8 inch (0.3175 cm).

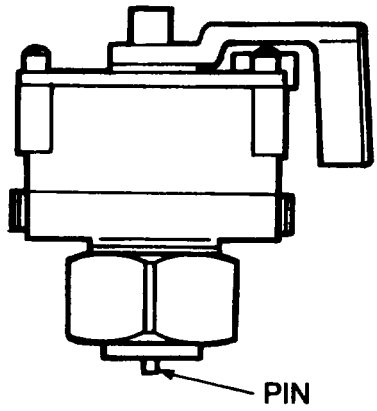
Did the valve operate freely and extend the pin?

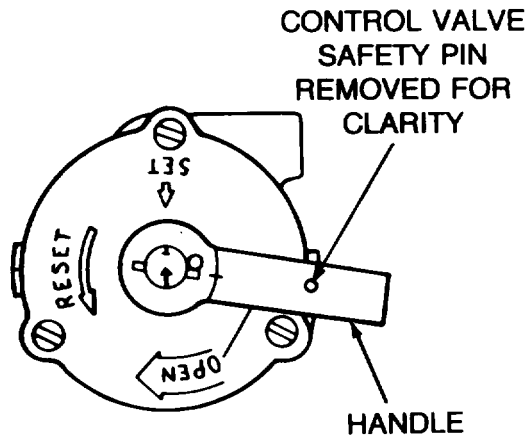
6

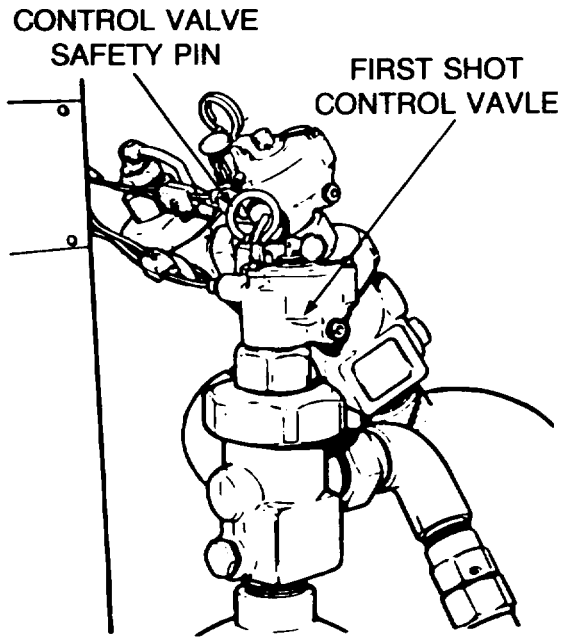
- **Repair first shot control valve (page 21-36).**
- **Install safety wire and lead seal on interior release mechanism (page 21-15).**

NO

YES







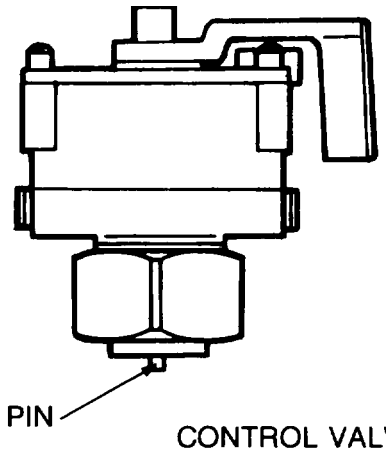
TA142421

Symptom-53

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

CAUTION

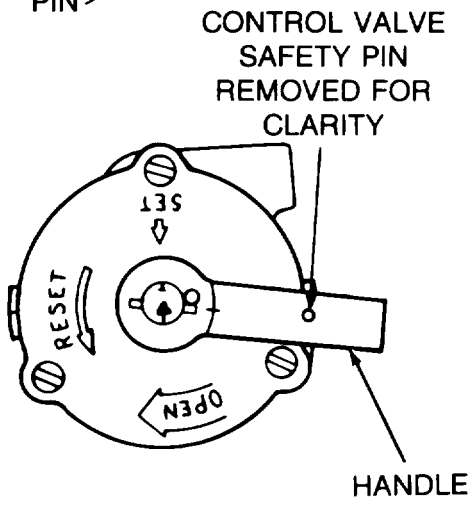
Do not engage control valve mounting nut to cylinder while doing this check.



7 Check operation of first shot control valve when interior FIRE-PULL HARD handle is pulled.

Technician (Driver's Station)

- Return first shot control valve to SET position.
- Hold control valve away from and above first shot cylinder.
- Pull FIRE-PULL HARD handle.
- Check if pin in control valve did extend.



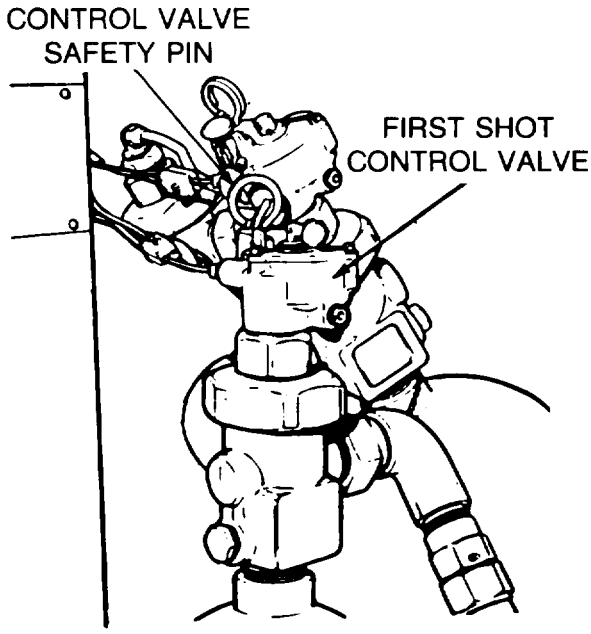
Did pin in control valve extend?

8

- **Replace first shot control cable between interior release mechanism and control valve (page 21-41).**
- **Install safety wire and lead seals on interior release mechanism (page 21-15).**

NO

YES



TA142422

Symptom-53

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

9 **Check second shot control valve for extension of pin when control valve handle is turned.**

Technician (Driver's Station)

- Return second shot control valve to SET position, if not in SET position.
- Remove control valve safety pin and turn handle on valve clockwise until it stops.
- Check if pin on bottom of control valve extends 1/8 inch (.3175 cm).

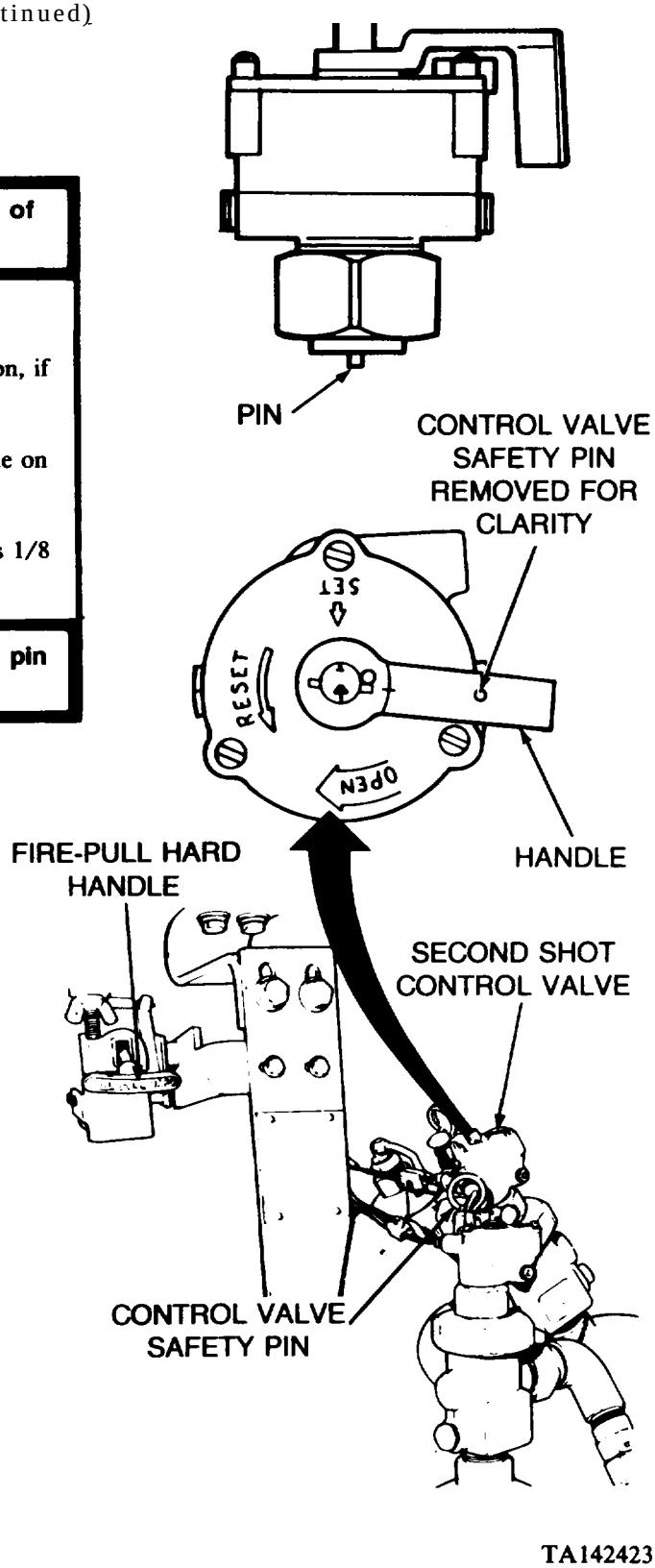
Did control valve operate freely and extend the pin 1/8 inch?

10

- **Repair second shot control valve (page 21-36).**
- **Install safety wire and lead seals on interior release mechanism (page 21-15).**

NO

YES



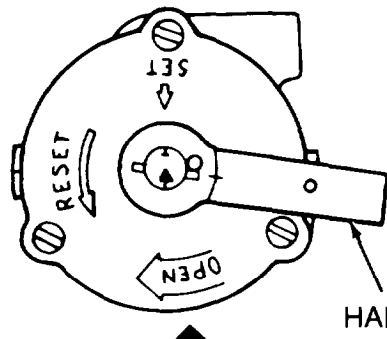
TA142423

Symptom-53

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

CAUTION

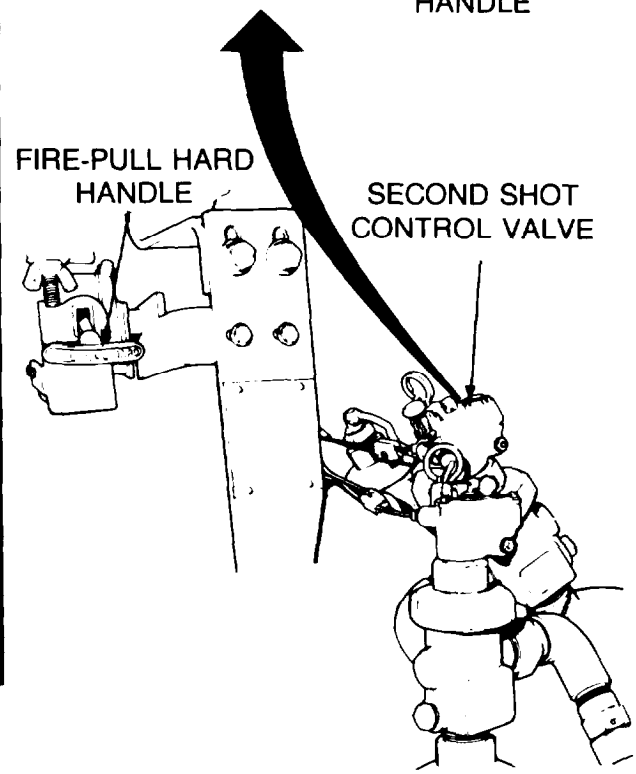
Do not engage control valve mounting nut to cylinder while doing this check.



11 **Check operation of second shot control valve when FIRE-PULL HARD handle is pulled.**

Technician (Driver's Station)

- Return second shot control valve to SET position.
- Hold control valve in position above second shot cylinder.
- Pull FIRE-PULL HARD handle.
- Check if pin in control valve did extend.
- Arm release mechanism for first shot.
- Return first and second shot control valves to SET position.



Did pin in the control valve extend?

YES

13

- **Replace fire extinguisher cylinders (page 21-49).**
- **Install safety wire and lead seals on interior release mechanism (page 21-15).**
- **Install safety wire and lead seals on first and second shot control valves (page 21-41).**

NO

12 **Replace second shot cable between FIRE-PULL HARD handle and control valve (page 21-36).**

TA142424

Symptom-54 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER

FIXED FIRE EXTINGUISHER FAILS TO OPERATE WHEN EXTERIOR FIRST SHOT OR SECOND SHOT HANDLES ARE PULLED.

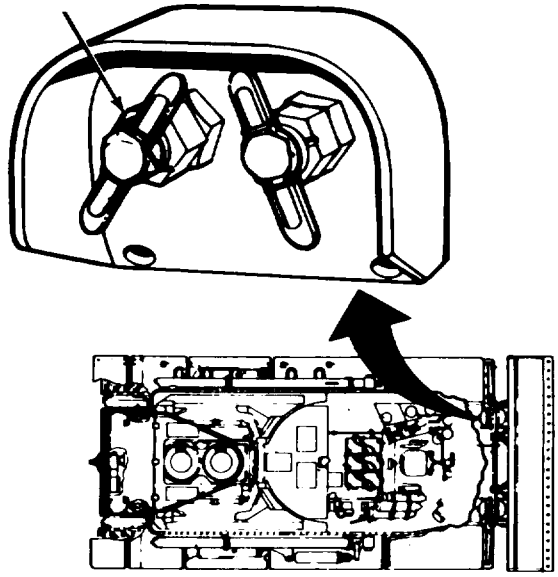
NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

NOTE

Two different control valves have been used on the fire extinguisher. Although different in appearance check out is identical.

FIRST SHOT HANDLE



1 Check if second shot handle was pulled.

Second Technician (Driver's Hatch)

- Visually check second shot handle for broken safety seal.

Was second shot handle pulled?

NO — YES

2 **See Step (12).**

3 Check first shot exterior handle for operation.

First Technician (Driver's Station)

- Disconnect first shot control valve (page 21-37)..
- Hold control valve away from and above first shot cylinder.

Second Technician (Driver's Hatch)

- Pull first shot exterior handle.
- Check if first shot exterior handle operates freely.

Did first shot exterior handle operate freely?

YES — NO

4 Replace cable between first shot exterior handle and first shot control valve (page 21-2).

TA142425

Symptom-54

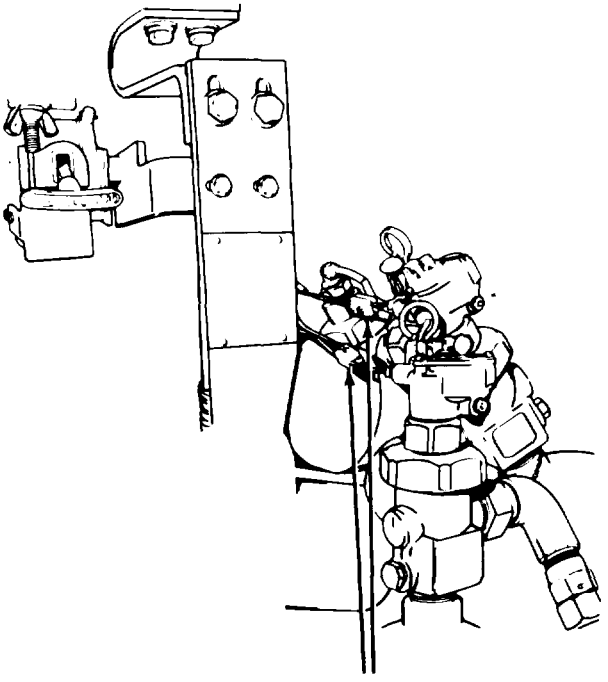
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

5 **Check first shot exterior cable connections at control valves for tightness.**

First Technician (Driver's Station)

- Hold control valves and pull hard on cables and cable connections to see if they are loose.

Are cable connections loose?



INTERIOR CONTROL CABLE CONNECTIONS

NO

YES

6

- **Tighten cable connections.**
- **Install safety wire and lead seals on control valve (page 21-41).**

TA142426

Symptom-54

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

7 **Check first shot control valve for extension of pin by using handle on control valve.**

First Technician (Driver's Station)

- Return first shot control valve to SET position.
- Remove safety pin and rotate handle on valve clockwise until it stops.
- Observe pin at the bottom of the valve for extension of 1/8 inch (.3175 cm).

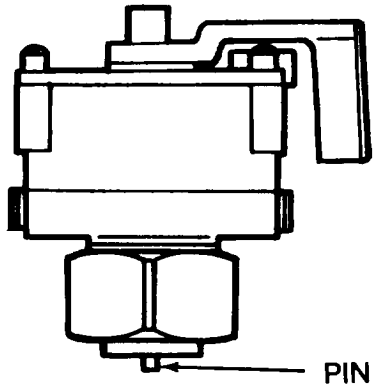
Did the valve operate freely and extend the pin?

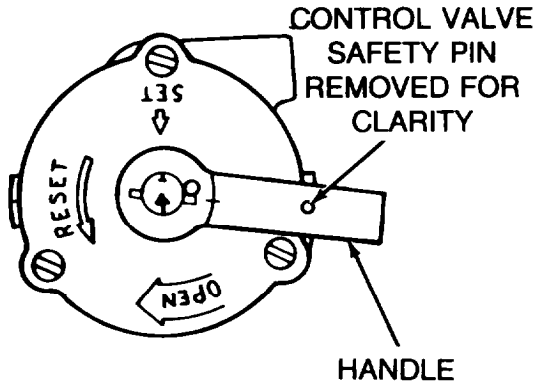
NO

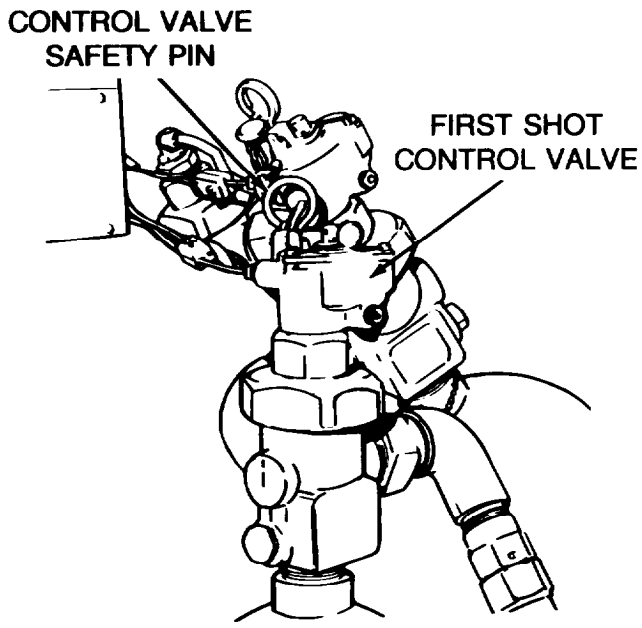
8

- **Repair first shot control valve (page 21-36).**

YES







TA142427

Symptom-54

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

CAUTION

Do not engage control valve mounting nut to cylinder while doing this check.

9 **Check operation of first shot control valve when exterior first shot handle is pulled.**

First Technician (Driver's Station)

- Return first shot control valve to SET position.
- Hold control valve away from and above first shot cylinder.

Second Technician (Driver's Hatch)

- Pull first shot exterior handle.

First Technician (Driver's Station)

- Check if pin in control valve did extend.

Did pin in control valve extend?

10

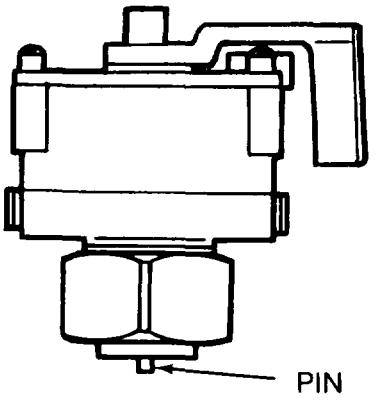
- **Repair first shot control valve (page 21-36).**
- **Install safety wire and lead seals on first shot control valve (page 21-41).**

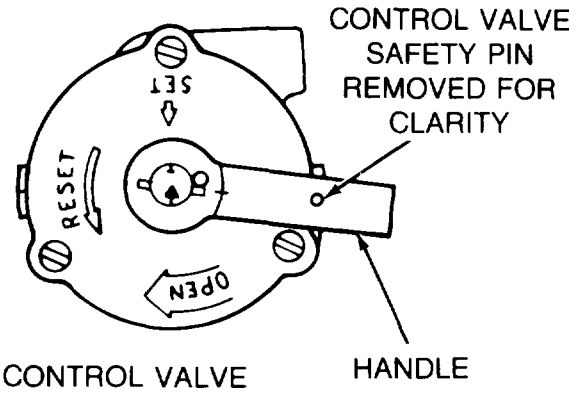
NO

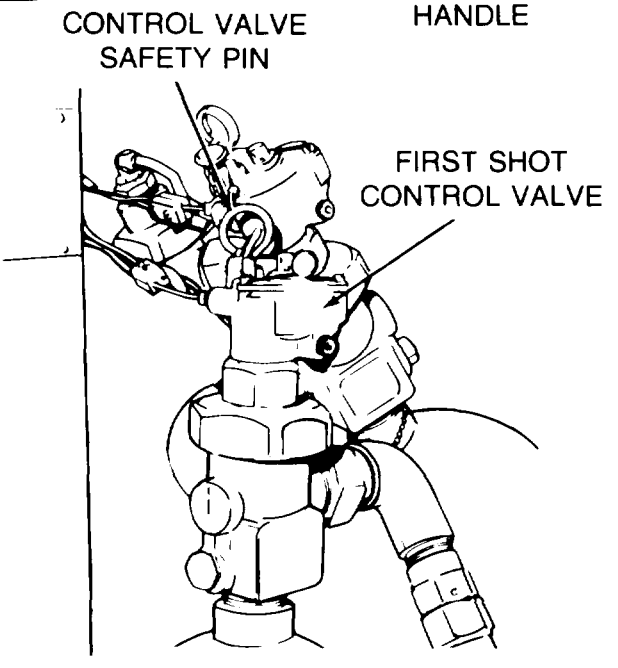
11

- **Replace fire extinguisher cylinder (page 21-49).**
- **Install safety wire and lead seal on first shot exterior handle.**
- **Install safety wire and lead seals on first shot control valve (page 21-41).**

YES







TA142428

Symptom-54

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

FROM STEP (2)

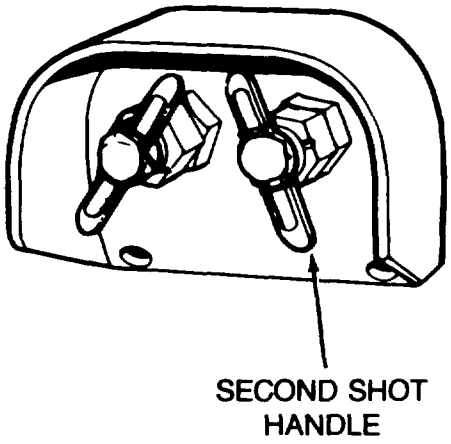
12 Check second shot exterior handle for operation.

First Technician (Driver's Station)

- Disconnect second shot control valve (page 21-37).
- Hold control valve away from and above second shot cylinder.

Second Technician (Driver's Hatch)

- Pull second shot exterior handle.
- Check if second shot exterior handle operates freely.



Did second shot exterior handle operate freely?

YES

NO

13 Replace cable between second shot exterior handle and second shot control valve (page 21-2).

TA142429

Symptom-54

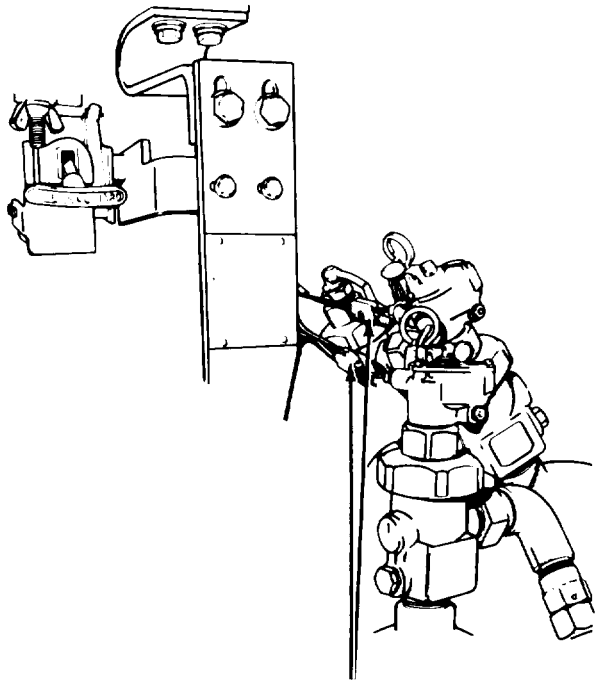
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

14 **Check second shot exterior cable connections at control valves for tightness.**

First Technician (Driver's Station)

- Hold control valves and pull hard on cables and cable connections see if they are loose.

Are cable connections loose?



INTERIOR CONTROL CABLE CONNECTIONS

NO

YES

15

- **Tighten cable connections.**
- **Install safety wire and lead seals on control valve (page 21-41).**

TA142430

Symptom-54

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

16 **Check second shot control valve for extension of pin by using handle on control valve.**

First Technician (Driver's Station)

- Return second shot control valve to SET position.
- Remove safety pin and rotate handle on valve clockwise until it stops.
- Observe pin at the bottom of the valve for extension of 1/8 inch (.3175 cm).

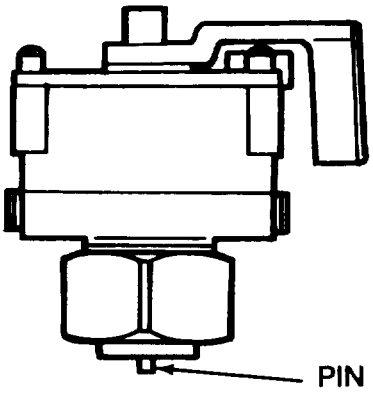
Did the valve operate freely and extend the pin?

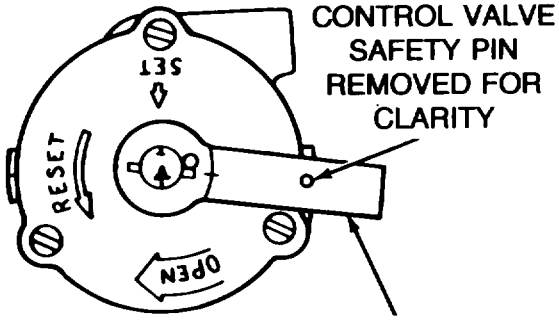
NO

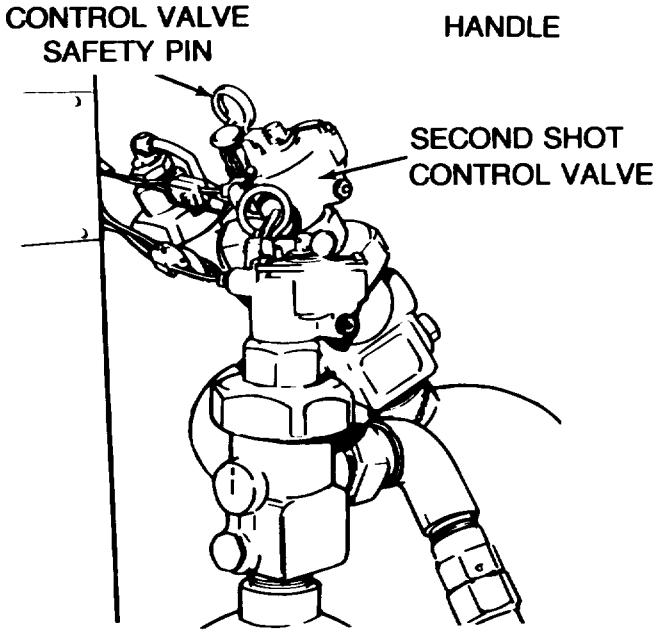
17

- **Repair second shot control valve (page 21-36).**

YES







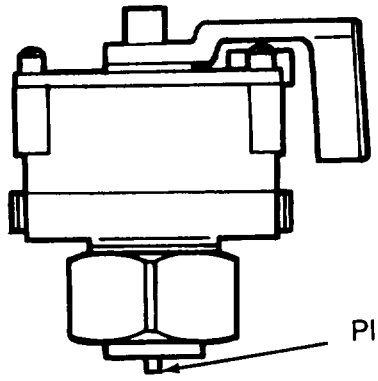
TA142431

Symptom-54

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

CAUTION

Do not engage control valve mounting nut to cylinder while doing this check.



18 **Check operation of second shot control valve when exterior second shot handle is pulled.**

First Technician (Driver's Station)

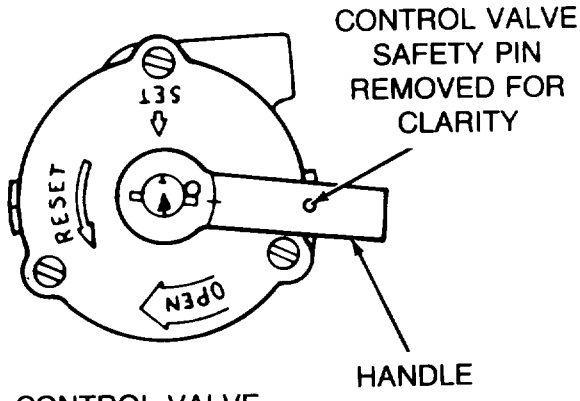
- Return second shot control valve to SET position.
- Hold control valve away from and above second shot cylinder.

Second Technician (Driver's Hatch)

- Pull second shot exterior handle.

First Technician (Driver's Station)

- Check if pin in control valve did extend.



Did pin in control valve extend?

19

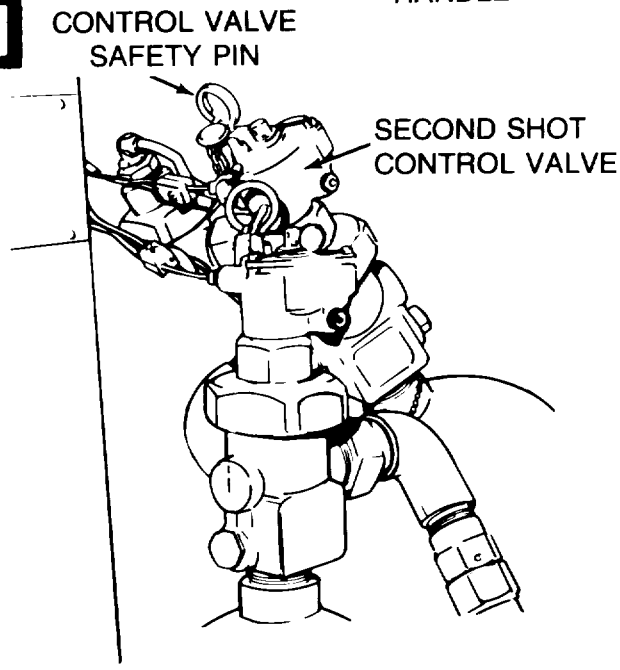
- **Repair second shot control valve (page 21-36).**

NO

20

- **Replace fire extinguisher cylinders (page 21-49).**
- **Install safety wire and lead seal on second shot exterior handle.**
- **Install safety wire and lead seal on second shot control valve (page 21-41).**

YES



TA142432

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER

Symptom-55

ENGINE DOES NOT STOP RUNNING WHEN FIRE-PULL HARD HANDLE IS PULLED (ENGINE FUEL SHUTOFF SWITCH ON MASTER CONTROL PANEL WILL WORK).

CAUTION

The control valve on each of three fire extinguisher cylinders must be removed to avoid firing system.

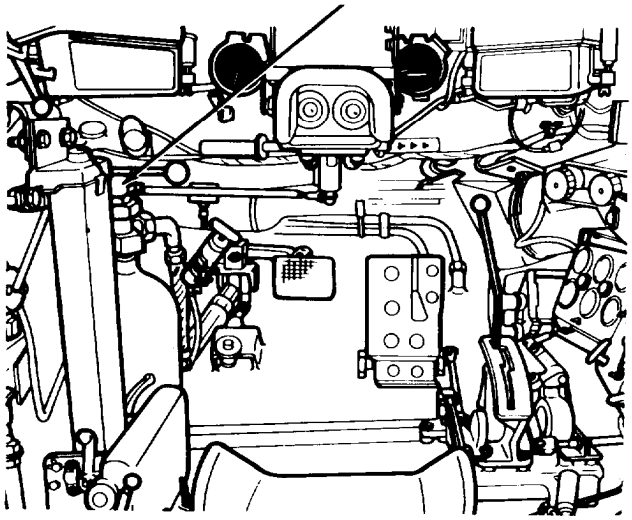
NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

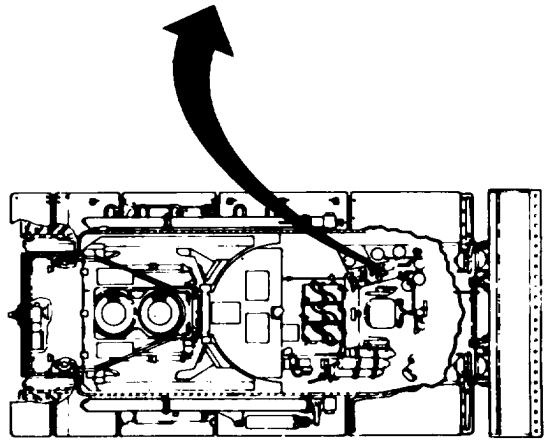
1 Listen for fire extinguisher relay to work when FIRE-PULL HARD interior control handle is pulled.

Second Technician (Driver's Station)

- Remove control valves from each of three fire extinguisher cylinders (page 21-37).



DRIVER'S STATION



FOR CLARITY TURRET NOT SHOWN

TA142433

Symptom-55

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

STEP (1) CONTINUED

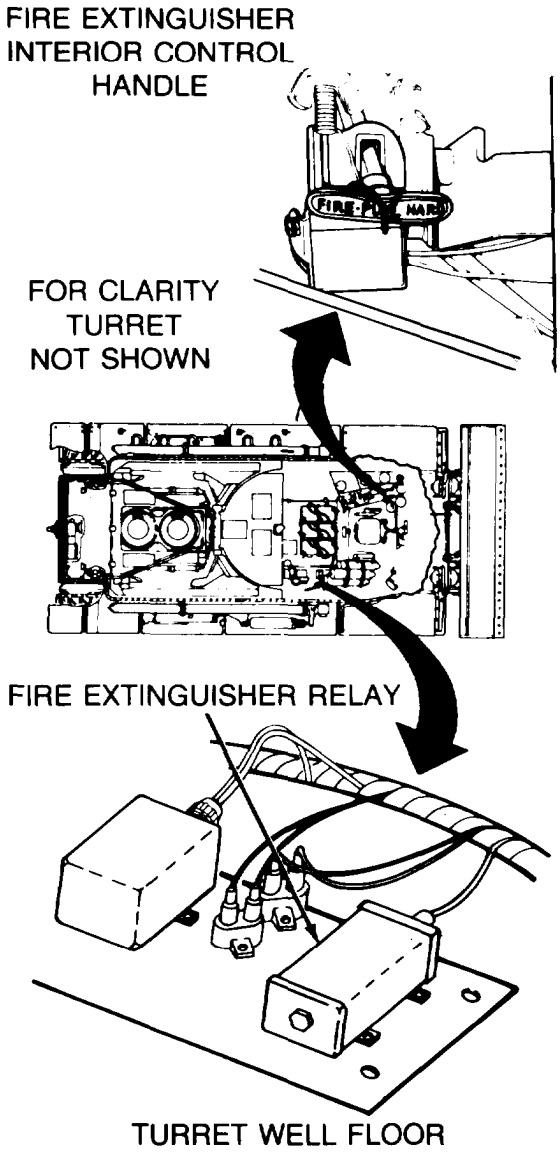
First Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Traverse turret to gain access to fire extinguisher relay (TM 9-2350-222-10).
- Listen for click sound from fire extinguisher relay when FIRE-PULL HARD interior control handle is pulled and another click 10 seconds later.

Second Technician (Driver's Station)

- Pull FIRE-PULL HARD interior control handle and release it.

Did relay close and stay closed for a minimum of 10 seconds.



NO

YES

(2)

- **Check hull front master harness (CKT 975A, 54A) for continuity from bulkhead connector to connector at fire extinguisher relay.**
- **See Step (14)**

TA142434

Symptom-55 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

3 Check hull power harness (CKT 975) at input to fire extinguisher relay circuit breaker for electrical power.

Second Technician (Driver's Station)

- Disconnect three battery ground cables from hull deck behind driver's seat (page 10-283).

First Technician (Turret)

WARNING

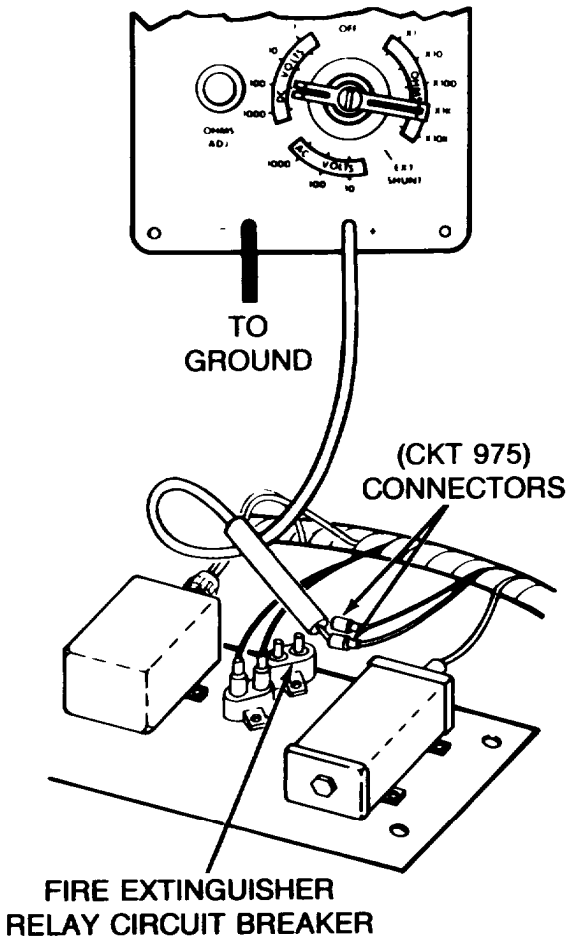
Use extreme care when working with circuit 975. This circuit carries battery voltage at all times whether MASTER BATTERY switch is ON or OFF.

First Technician (Turret)

- Disconnect both (CKT 975) connectors from fire extinguisher relay circuit breaker.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to one (CKT 975) connector and black probe to ground.

Second Technician (Driver's Station)

- Connect three battery ground cables to hull behind driver's seat.



TA142435

Symptom-55

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

STEP (3) CONTINUED

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.
- Connect red probe of meter to other (CKT 975) connector and repeat above check.

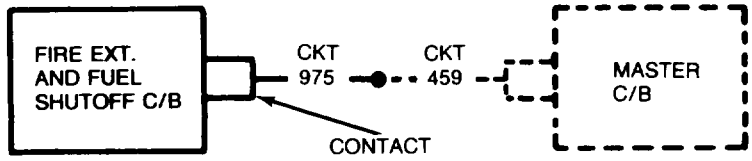
Does meter indicate 18 to 30 volts dc at one of the two (CKT 975) connectors?

YES

NO

(4)

- **Inspect hull power harness connectors for bent/broken contacts or loose (CKT 975) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a bad hull power harness.**



TA142436

Symptom-55

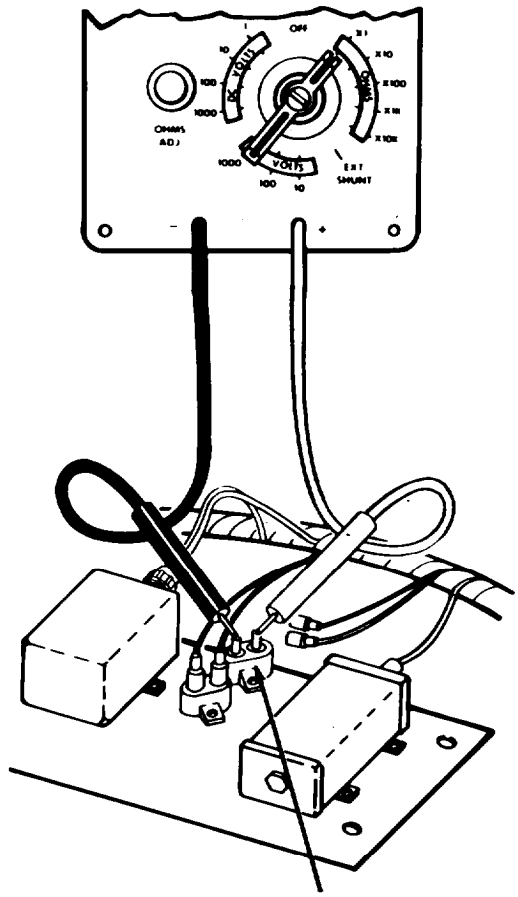
DETAILED TROUBLESHOOTING PROCEDURE'
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

5 **Check fire extinguisher relay circuit breaker for continuity.**

First Technician (Turret)

- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to one fire extinguisher relay circuit breaker contact and black probe to the other circuit breaker contact.
- Check if meter indicates continuity.

Does meter indicate continuity?



FIRE EXTINGUISHER
RELAY CIRCUIT BREAKER

YES

NO

6 **Replace fire extinguisher relay circuit breaker (page 10-182).**

TA142437

Symptom-55

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

7 Check hull front master harness connector (CKT 975) at fire extinguisher relay for electrical power.

Second Technician (Driver's Station)

- Disconnect three battery ground cables from hull deck behind driver's seat (page 10-283).

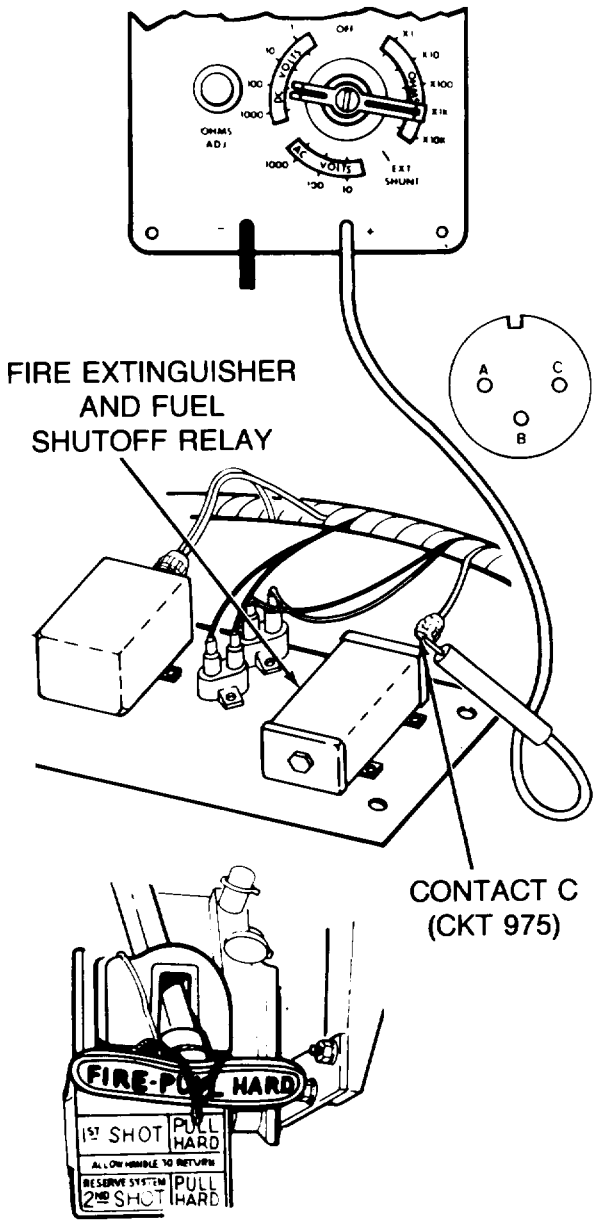
First Technician (Turret)

- Connect two (CKT 975) connectors to fire extinguisher relay circuit breaker.

WARNING

Use extreme care when working with circuit 975. This circuit carries battery voltage at all times whether MASTER BATTERY switch is ON or OFF.

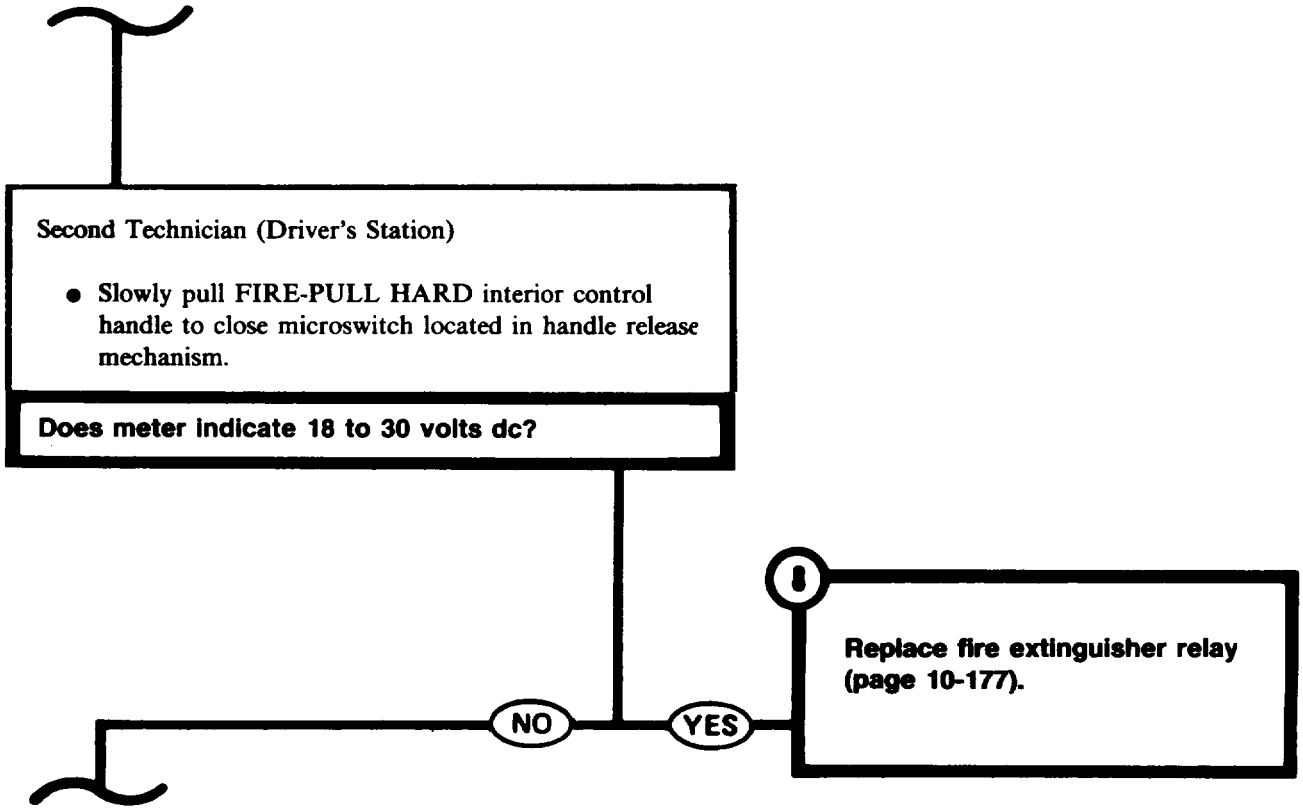
- Disconnect hull front master harness connector from fire extinguisher relay.
- Connect battery ground cables.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact C (CKT 975) at hull front master harness connector for fire extinguisher relay and black probe to ground.
- Check if meter indicates 18 to 30 volts dc when FIRE-PULL HARD interior control handle is pulled.



TA142438

Symptom-55

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)



TA142439

Symptom-55

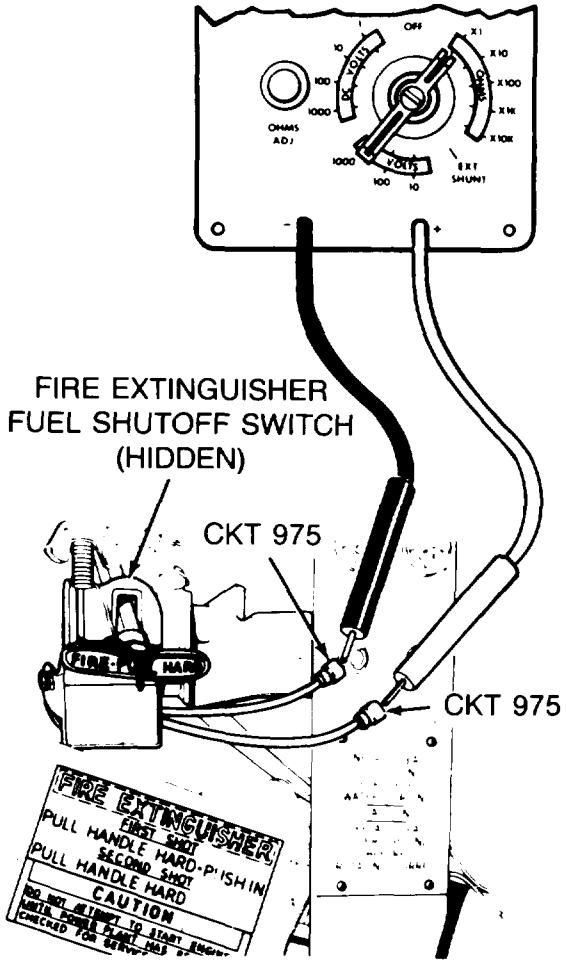
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

9 **Check fire extinguisher fuel shutoff switch for continuity.**

Second Technician (Driver's Station)

- Disconnect three battery ground cables from hull deck behind driver's seat (page 10-283).
- Disconnect two connectors (CKT 975) from fire extinguisher fuel shutoff switch leads.
- Set meter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect probes of meter to contacts of switch leads.
- Slowly pull FIRE-PULL HARD interior control handle to close microswitch located in handle release mechanism.
- Check if meter indicates continuity when driver's fixed fire extinguisher handle is pulled.

Does meter indicate continuity?



YES

NO

10

- **Adjust FIRE EXTINGUISHER pull handle to close mircroswitch (page 21-27).**
- **If this does not correct the problem, replace switch (page 21-14).**

TA142440

Symptom-55

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

11 **Check (CKT 975) from hull master harness connector at fire extinguisher fuel shutoff switch to contact B of fire extinguisher fuel shutoff relay connector for continuity.**

First Technician (Turret)

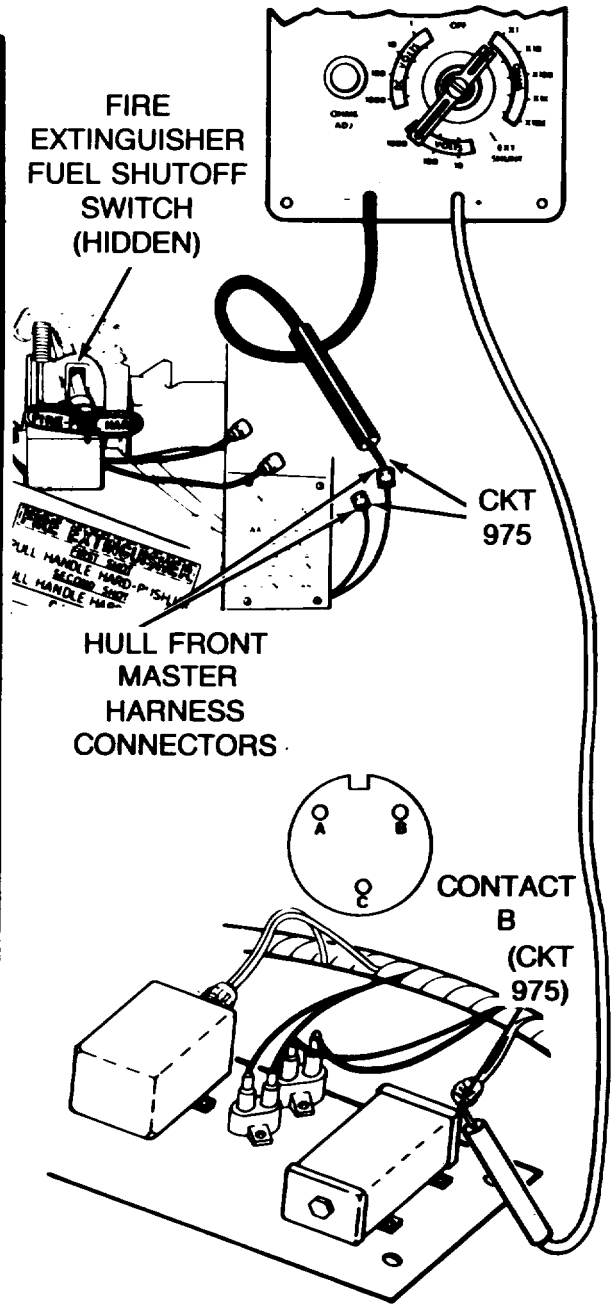
- Connect red probe of meter to contact B (CKT 975) at hull front master harness connector for fire extinguisher relay.

Second Technician (Driver's Station)

- Connect black probe of meter to one hull front master harness (CKT 975) connector at fire extinguisher fuel shutoff switch.
- Check if meter indicates continuity.
- Connect black probe in other (CKT 975) connector and repeat above check.
- Connect three battery ground cables to hull deck behind driver's seat (page 10-283).

First Technician (Turret)

- Install fire extinguisher relay connector.



TA142441

Symptom-55

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

STEP (11) CONTINUED

Second Technician (Driver's Station)

- Install three fire extinguisher control valves (page 21-41).

Does meter indicate continuity at one of the two connectors?

NO

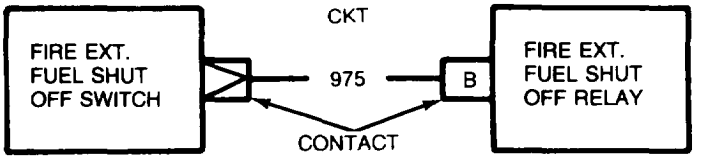
12

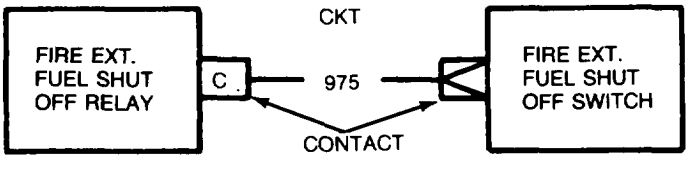
- **Inspect hull front master wiring harness for bent or broken connector contacts or loose (CKT 975) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad hull front master harness.**

YES

13

- **Inspect hull front master harness for bent or broken connector contacts or loose (CKT 975) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad hull front master harness.**





TA142442

Symptom-55 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

FROM STEP (2)

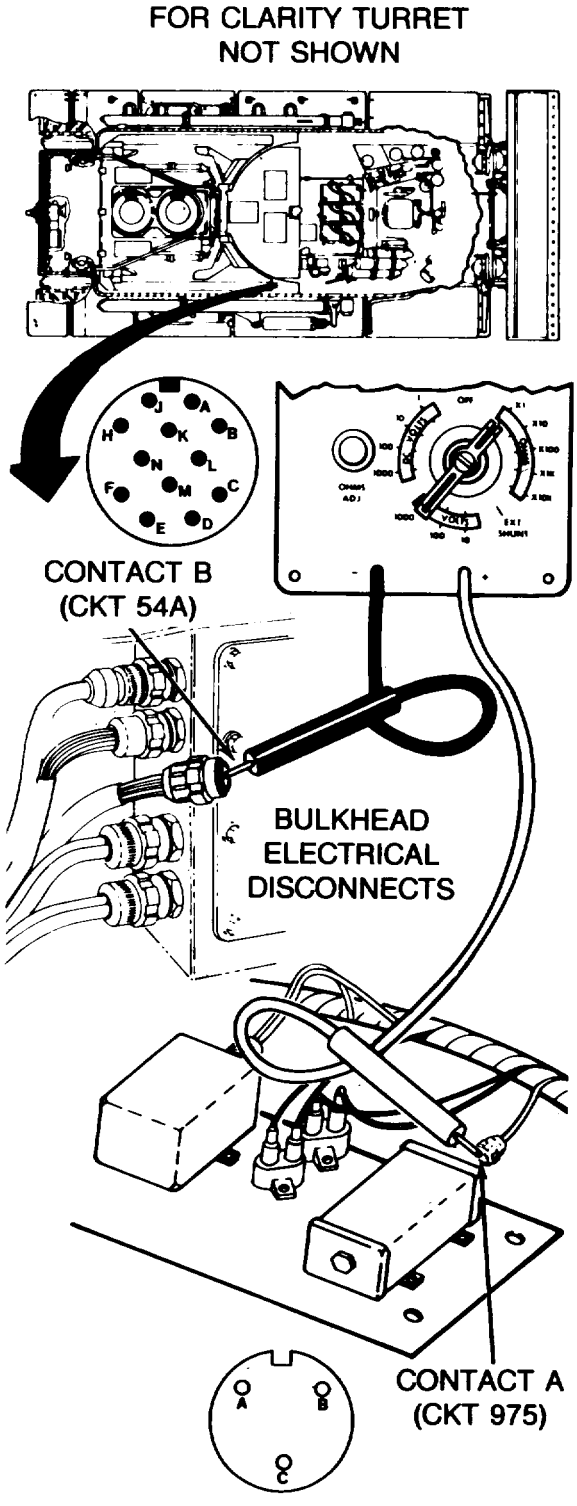
14 Check hull front master harness (CKT 975A, 54A) for continuity from bulkhead connector to connector at fire extinguisher relay.

Second Technician (Driver's Station)

- Disconnect three battery ground cables from hull deck behind driver's seat (page 10-283).

First Technician (Turret)

- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Disconnect hull front master harness connector from fire extinguisher relay.
- Connect black probe of meter to contact B (CKT 54A) of hull front master harness connector at bulkhead electrical disconnect.
- Connect red probe of meter to contact A (CKT 975A) at hull front master harness connector to fire extinguisher relay.



TA142443

Symptom-55 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - FIRE EXTINGUISHER
(Continued)

STEP (14) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

NO

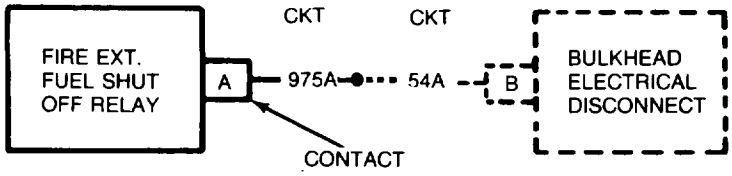
15

- **Inspect hull front master harness for bent or broken connector contacts or loose (CKT 975A) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad hull front master harness.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**
- **Connect battery ground cables (page 10-283).**

YES

16

- **Replace fire extinguisher relay (page 21-177).**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**
- **Connect battery ground cables (page 10-283).**



TA142444

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE

Symptom-56

DRIVER'S GAS PARTICULATE AIR TEMPERATURE WILL NOT ADJUST.

1 **Check hull front master harness (CKT 415C) at connector to driver's gas particulate air heater for electrical power.**

Technician (Driver's Station)

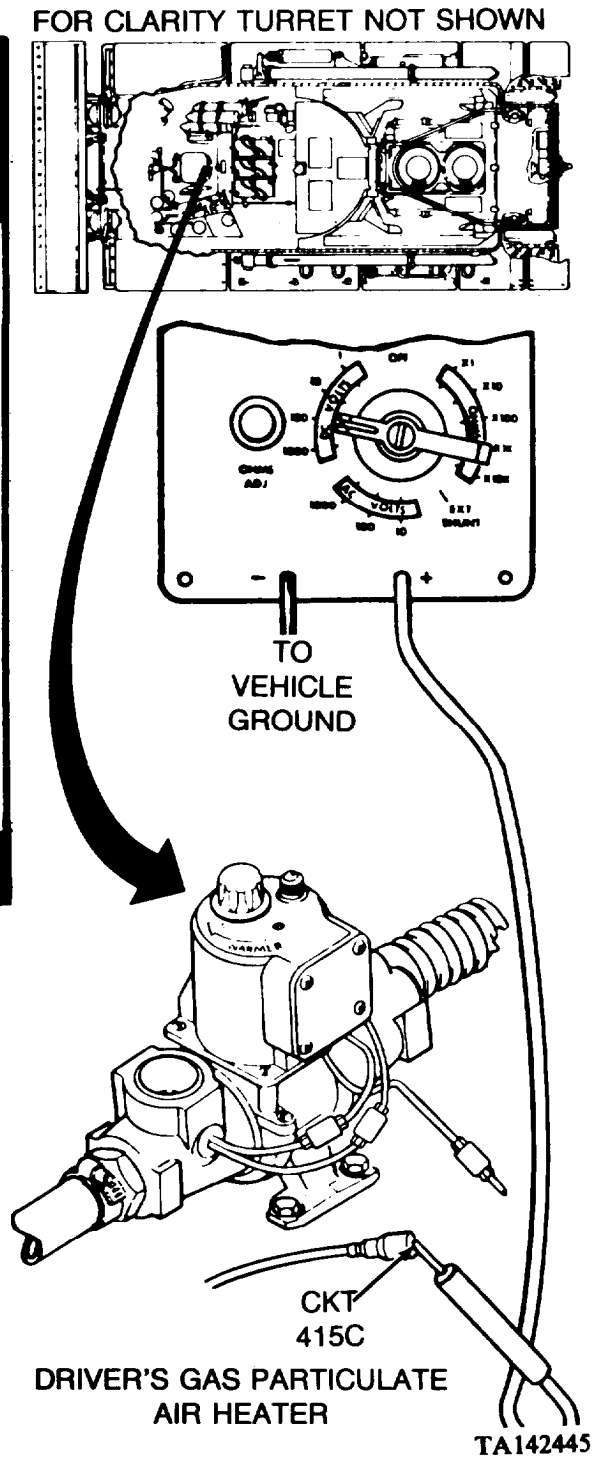
- Set MASTER BATTERY switch OFF.
- Disconnect hull front master harness connector (CKT 415C) from gas particulate air heater.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to hull front master harness connector (CKT 415C) at driver's gas particulate air heater and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set GAS PARTICULATE switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

2 **Replace driver's gas particulate air heater (page 22-12).**

YES

NO



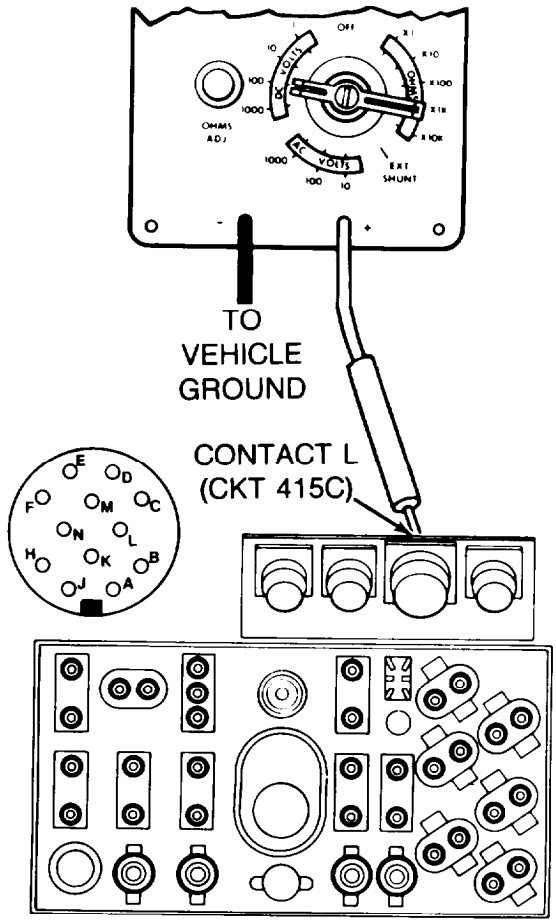
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

Symptom-56

3 Check master control panel accessories harness (CKT 415C) at panel connector for electrical power.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set GAS PARTICULATE FILTER switch OFF.
- Connect hull front master harness connector (CKT 415C) to gas particulate air heater.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master control panel.
- Connect red probe of meter to contact L (CKT 415C) of master control panel accessories harness connector and black probe to ground.
- Set MASTER BATTERY switch ON.



MASTER CONTROL PANEL
(REAR VIEW)

TA142446

Symptom-56

STEP (3) CONTINUED

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

- Set GAS PARTICULATE switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES

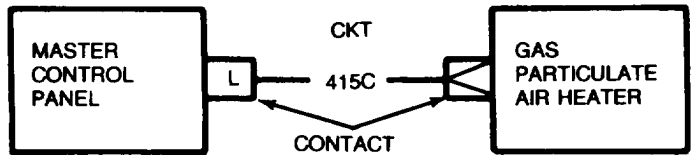
4

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 415C) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness to master control panel.**
- **Install master control panel (page 10-47).**

NO

5

Replace master control panel accessories harness (page 10-103).



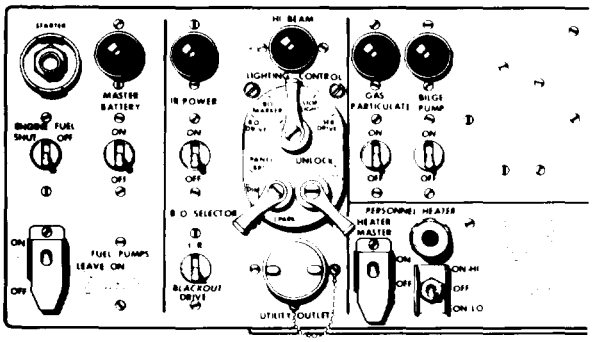
TA142447

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE

Symptom-57

DRIVER'S GAS PARTICULATE HOSE WILL NOT DELIVER SUFFICIENT AIRFLOW.

MASTER CONTROL PANEL



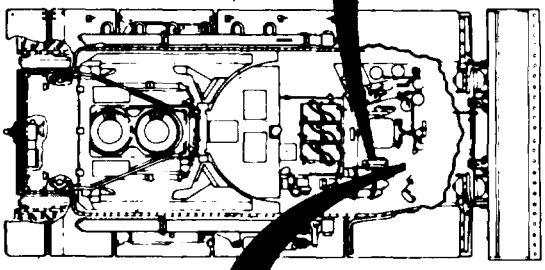
1 **Check if gas particulate blower motor works.**

Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set GAS PARTICULATE switch ON.
- Listen for sound of blower motor running.

Does blower motor work?

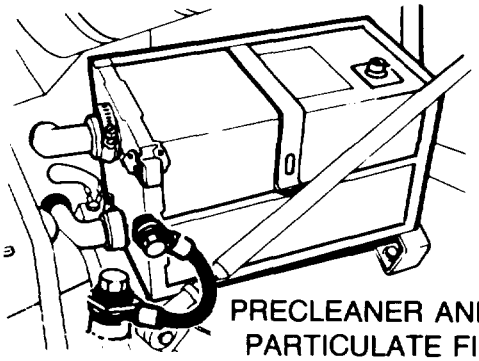
FOR CLARITY
TURRET NOT SHOWN



2 **See Symptom 58: GAS PARTICULATE BLOWER MOTOR WILL NOT RUN.**

NO

YES



PRECLEANER AND GAS PARTICULATE FILTER

TA142448

Symptom-57

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

WARNING

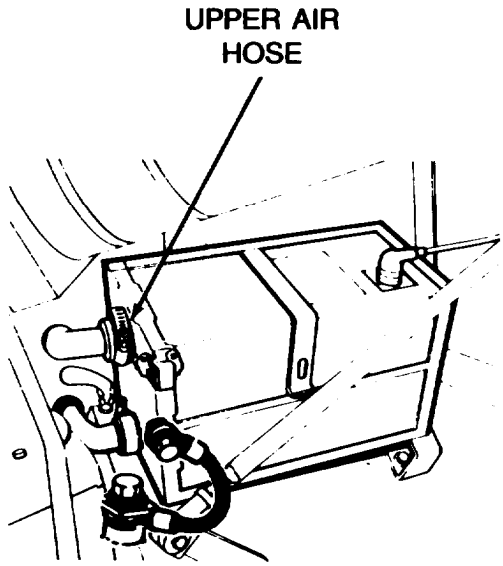
Unit commander or senior officer in charge of maintenance personnel assigned to remove and dispose of contaminated gas filters must prescribe necessary clothing (TM 10-277) to be worn during this operation. He must also prescribe necessary safety measures that must be followed including decontamination operation that must be performed before new gas filters are installed (TM 3-220).

3 **Check for restricted airflow at gas particulate filter air outlet.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Disconnect upper air hose from gas particulate precleaner (page 22-22).
- Set GAS PARTICULATE switch ON.
- Hold hand over filter unit outlet to upper air hose and check for free airflow.

Is there free airflow from filter unit?



YES

NO

4 **Inspect gas particulate filter (page 22-2).**

TA142449

Symptom-57

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

5 **Check for restricted airflow at inlet side of M18 gas filter.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Connect upper air hose to gas particulate precleaner.
- Disconnect air hose from inlet side of M18 gas filter (page 22-22).
- Set GAS PARTICULATE switch ON.
- Hold hand over disconnected end of air hose and check for free airflow.

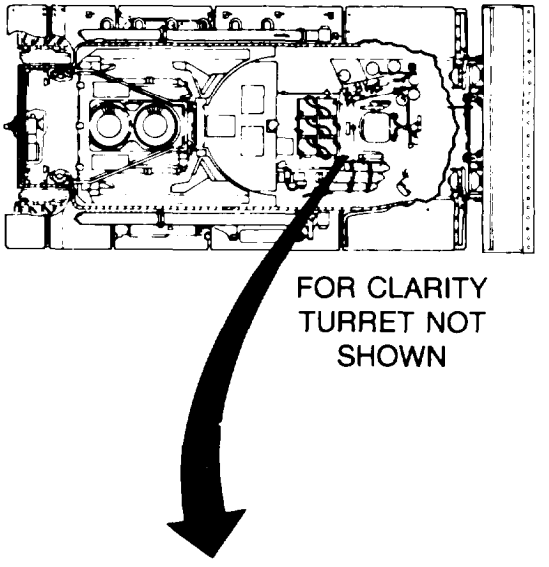
Is there free airflow to M18 gas filter?

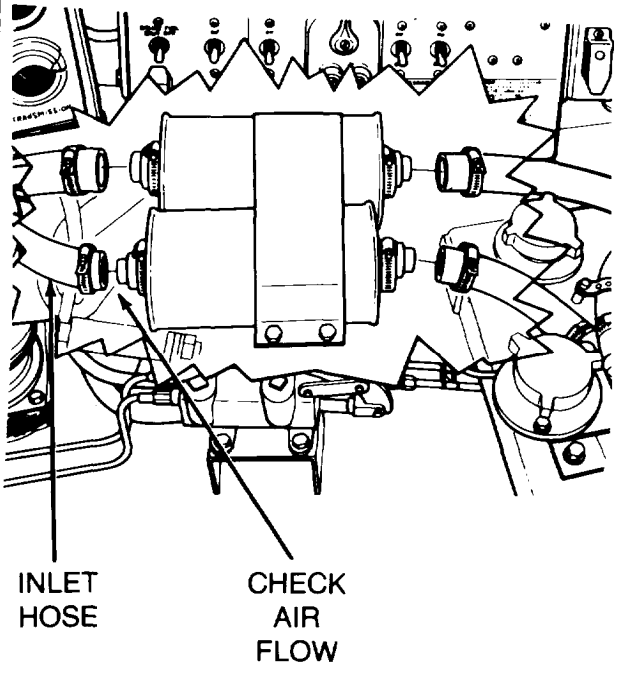
NO

6

- **Remove blockage from air hose coming from gas particulate precleaner to M18 filter.**
- **If blockage cannot be removed, replace hose (page 22-22).**

YES





TA142450

Symptom-57

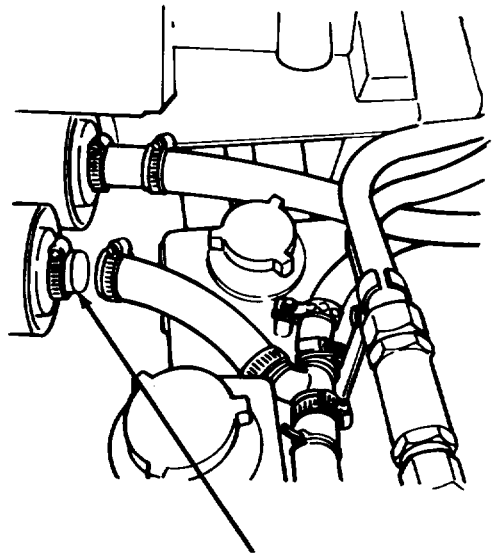
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

7 **Check for restricted airflow at outlet side of M18 gas filter.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Connect air hose to M18 gas filter inlet.
- Disconnect air hose from outlet side of M18 gas filter (page 22-24).
- Set GAS PARTICULATE switch ON.
- Hold hand over M18 gas filter outlet and check for free airflow.

Is there free airflow from M18 gas filter?



YES

NO

8 **Inspect M18 gas filters (page 22-2).**

TA142451

Symptom-57

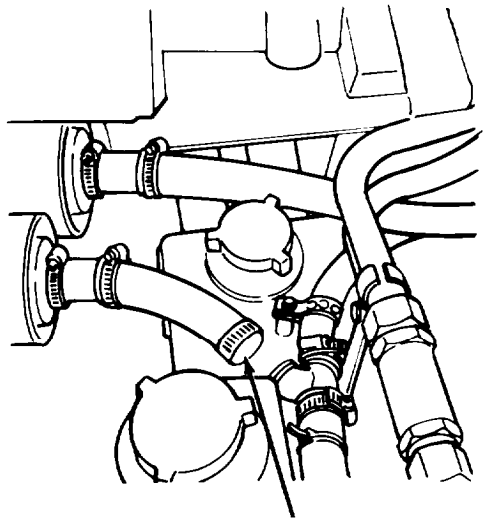
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

9 **Check for restricted airflow to outlet end of air hose from M18 gas filter to tee.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Connect air hose to M18 gas filter outlet.
- Disconnect air hose from inlet side of tee (page 22-24).
- Set GAS PARTICULATE switch ON.
- Hold hand over disconnected end of air hose.

Is there free airflow to tee?



CHECK AIR FLOW

YES

NO

10

- **Remove blockage from air hose coming from M18 filter.**
- **If blockage cannot be removed, replace hose (page 22-24).**

TA142452

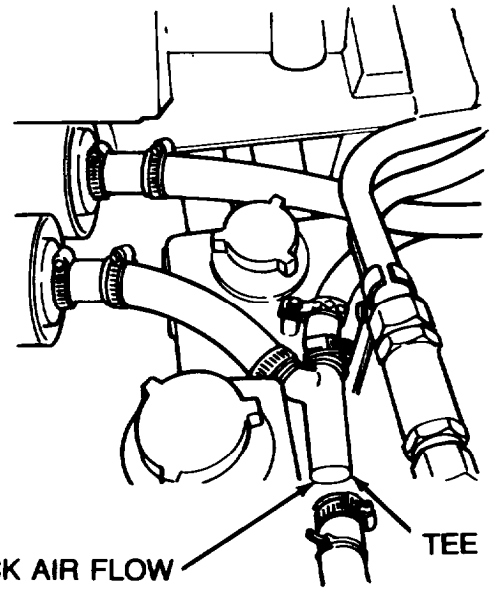
Symptom-57 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

11 **Check for restricted airflow at outlet side of tee.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Connect air hose to tee inlet.
- Disconnect air hose from outlet side of tee (page 22-24).
- Set GAS PARTICULATE switch ON.
- Hold hand over tee outlet and check for free airflow.

Is there free airflow from tee?



YES

NO

12 **Remove blockage from tee.**

TA142453

Symptom-57

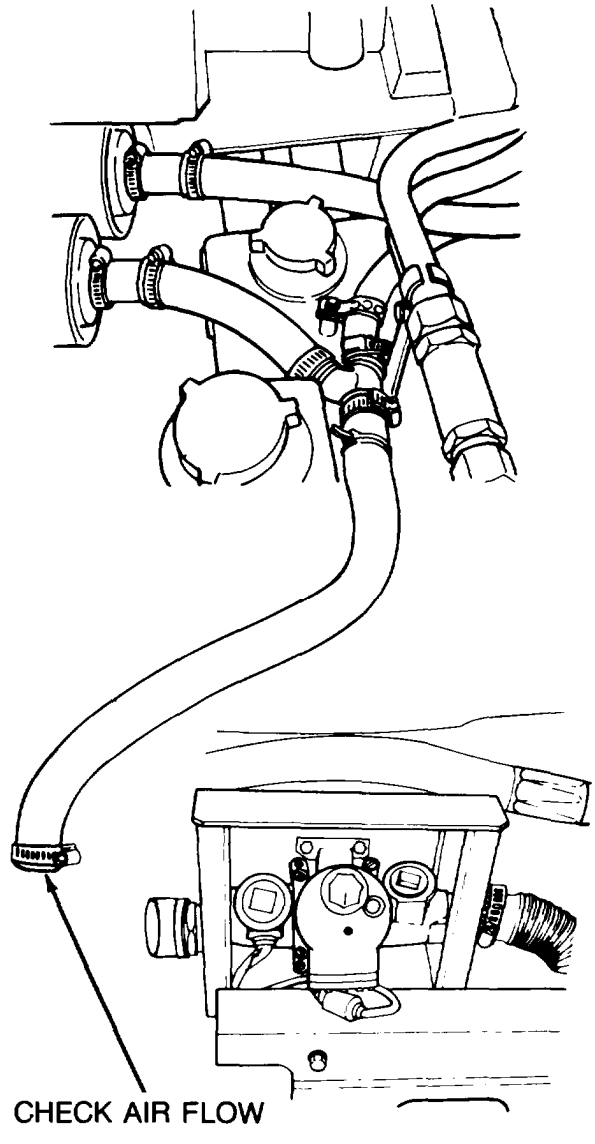
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

13 **Check for restricted airflow at inlet side of driver's gas particulate air heater.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Connect air hose to outlet side of tee.
- Disconnect hose from inlet side of driver's M3 air heater (page 22-24).
- Set GAS PARTICULATE switch ON.
- Hold hand over disconnected end of driver's air heater inlet hose and check for free air flow.

Is there free airflow from inlet hose?



YES

NO

14

- **Remove blockage from air hose going to M3 air heater.**
- **If blockage cannot be removed, replace hose (page 22-24).**

TA142454

Symptom-57

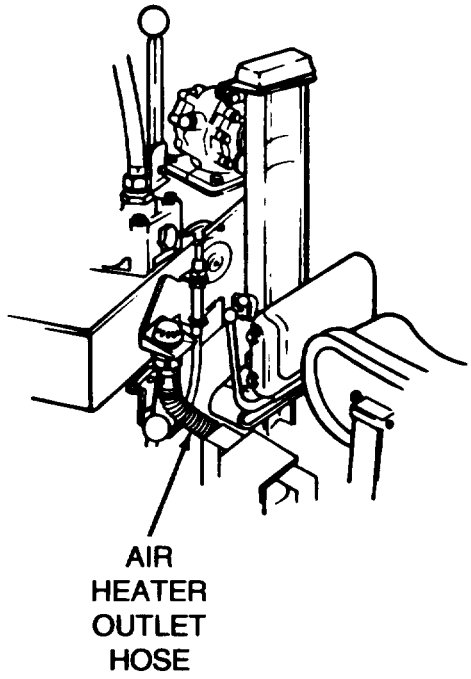
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

15 **Check for restricted airflow at outlet side of driver's gas particulate air heater.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Connect inlet hose to driver's gas particulate air heater.
- Disconnect outlet hose from driver's gas particulate air heater (page 22-24).
- Set GAS PARTICULATE switch ON.
- Hold hand over driver's gas particulate air heater outlet and check for free airflow.

Is there free airflow from outlet side of driver's gas particulate air heater?



YES

16

- **Remove blockage from driver's gas particulate air heater outlet hose reconnect hose.**
- **If blockage cannot be removed, replace M3 air heater outlet hose (page 22-22).**

NO

17

- **Remove blockage from driver's gas particulate air heater reconnect hose.**
- **If blockage cannot be removed, replace driver's M3 air heater (page 22-12).**

TA142455

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE

Symptom-58

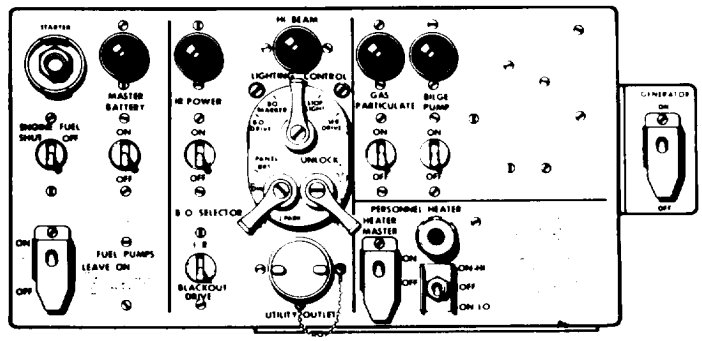
GAS PARTICULATE BLOWER MOTOR WILL NOT RUN.

1 **Check if GAS PARTICULATE indicator lamp will light.**

Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set GAS PARTICULATE switch ON.
- Visually check if GAS PARTICULATE indicator lamp is lit.

Is GAS PARTICULATE indicator lamp lit?



MASTER CONTROL PANEL

YES

NO

2

- **Check master control panel harness connector (CKT 920) at input to gas particulate circuit breaker for electrical power.**

- **See Step (11) .**

TA142456

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

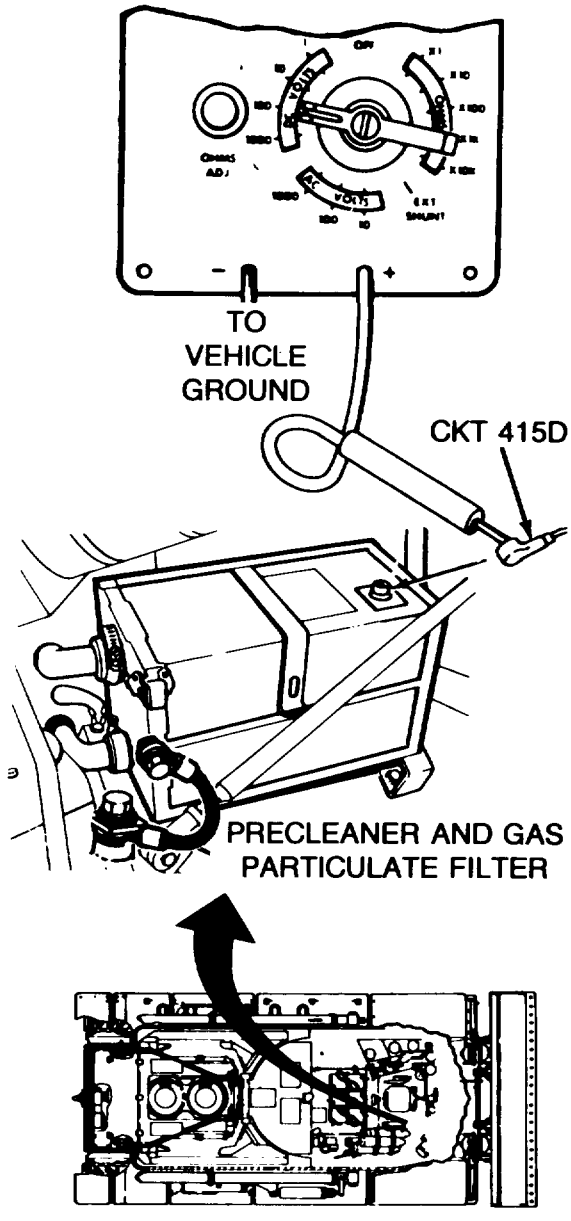
Symptom-58

3 **Check hull front master harness (CKT 415D) for electrical power to precleaner and gas particulate filter.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Set MASTER BATTERY switch OFF.
- Disconnect hull front master harness connector (CKT 415D) from precleaner and gas particulate filter assembly.
- Set multimeter to measure 18 to 30 volts dc. or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact of hull front master harness connector (CKT 415D) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set GAS PARTICULATE switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



FOR CLARITY TURRET NOT SHOWN

YES

NO

4
- **Check master control panel accessories harness (CKT 415D) at panel connector for electrical power.**

- **See Step (8).**

TA142457

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

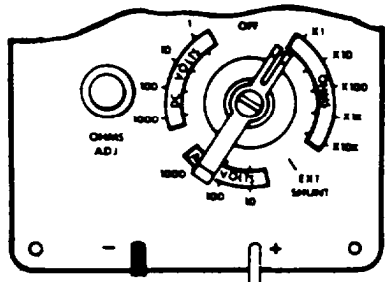
Symptom-58

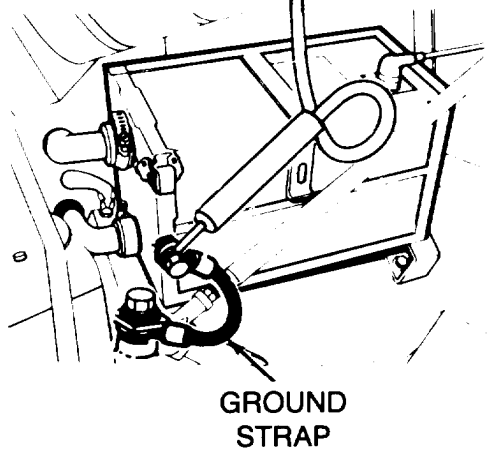
5 **Check continuity of ground strap at precleaner and gas particulate filter.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Set MASTER BATTERY switch OFF.
- Connect hull front master harness connector (CKT 415D) to precleaner and gas particulate filter.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to ground connection on precleaner and gas particulate filter and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?





6

- **Clean and tighten loose ground strap connections.**
- **If connections are not loose, replace damaged ground strap (page 22-2).**

NO

YES

7 **Replace precleaner and gas particulate filter assembly (page 22-2).**

TA142458

Symptom-58
FROM STEP 4

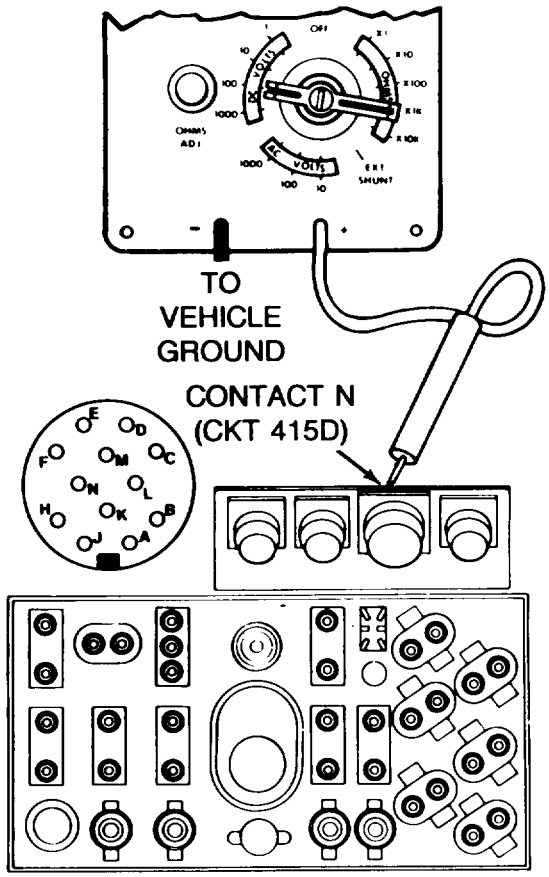
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

8 Check master control panel accessories harness (CKT 415D) at panel connector for electrical power.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set GAS PARTICULATE switch OFF.
- Connect hull front master harness connector (CKT 415D) to precleaner and gas particulate filter.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master control panel accessories harness connector.
- Connect red probe of meter to contact N (CKT 415D) of master control panel accessories harness connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set GAS PARTICULATE switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



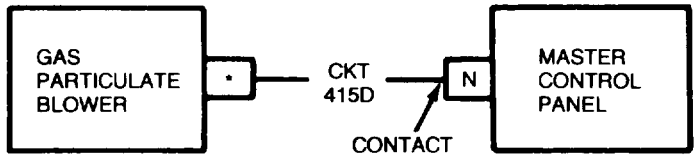
MASTER CONTROL PANEL
(REAR VIEW)

9
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 415D) at rear of connectors.**
- **Repair connector if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to master control panel.**
- **Install master control panel (page 10-47).**

YES

NO

10 Replace master control panel accessories harness (page 10-103).



*SINGLE CONTACT CONNECTOR

TA142459

Symptom-58

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

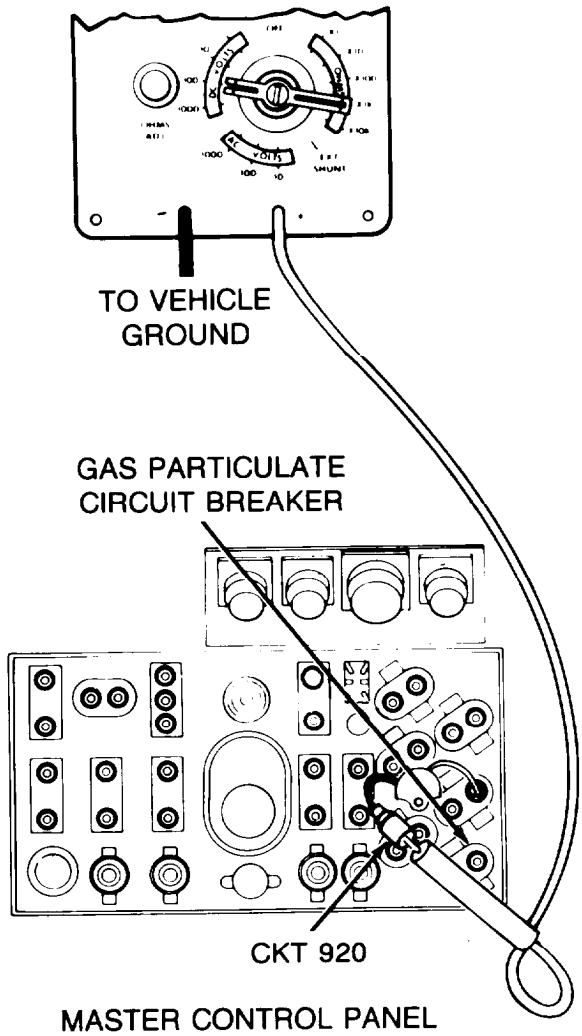
FROM STEP 2

11 **Check master control panel harness connector (CKT 920) at input to gas particulate circuit breaker for electrical power.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect master control panel harness connector (CKT 920) from gas particulate circuit breaker.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to master control panel harness connector (CKT 920) at gas particulate circuit breaker and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set GAS PARTICULATE switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

NO

12 **Replace master control panel harness (page 10-111).**

TA142460

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

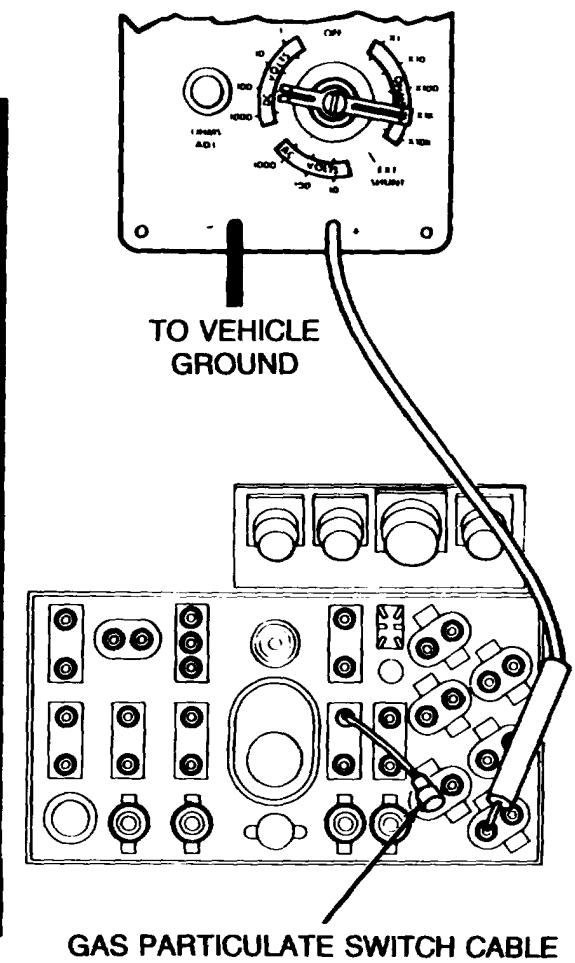
Symptom-58

13 **Check output side of gas particulate circuit breaker for electrical power.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Set MASTER BATTERY switch OFF.
- Connect master control panel harness connector (CKT 920) to gas particulate circuit breaker.
- Disconnect gas particulate switch cable from gas particulate circuit breaker.
- Connect red probe of meter to outlet side of gas particulate circuit breaker and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set GAS PARTICULATE switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

NO

14 **Replace gas particulate circuit breaker (page 10-85).**

TA142461

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

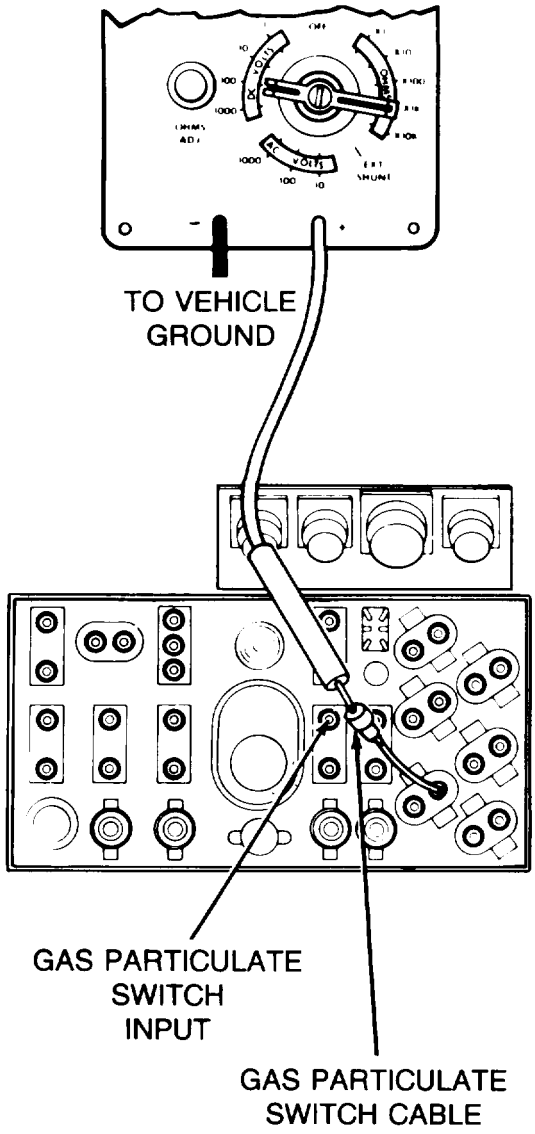
Symptom-58

15 **Check gas particulate switch cable at connector to GAS PARTICULATE switch for electrical power.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Set MASTER BATTERY switch OFF.
- Connect gas particulate switch cable to gas particulate switch.
- Disconnect gas particulate switch cable from gas particulate switch.
- Connect red probe of meter to disconnected end of gas particulate switch cable and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set GAS PARTICULATE switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

NO

16 **Replace gas particulate switch cable (page 10-116).**

TA142462

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - GAS PARTICULATE
(Continued)

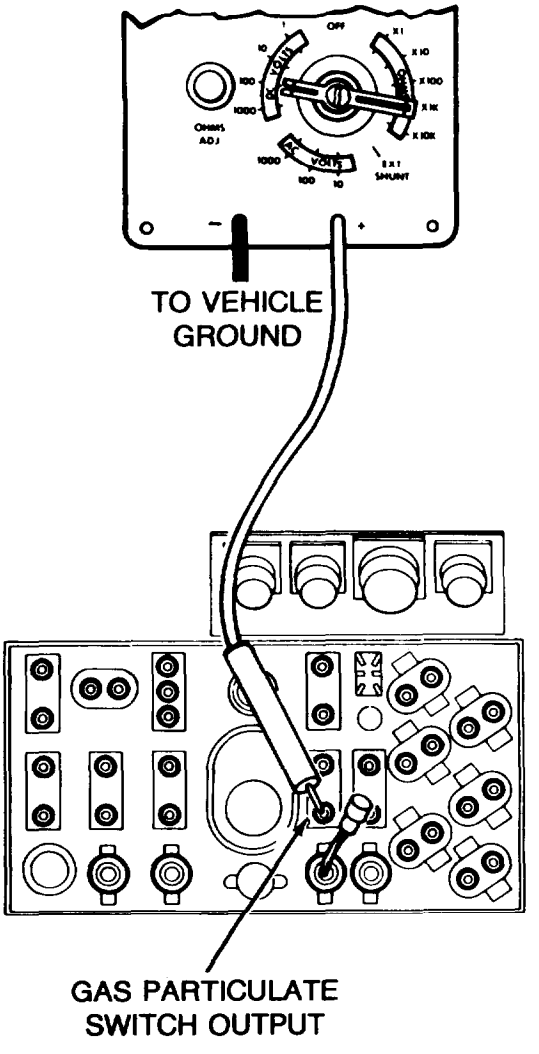
Symptom-58

17 **Check output side of GAS PARTICULATE switch for electrical power.**

Technician (Driver's Station)

- Set GAS PARTICULATE switch OFF.
- Set MASTER BATTERY switch OFF.
- Connect gas particulate switch cable to gas particulate switch.
- Disconnect master control panel accessories harness connector from GAS PARTICULATE switch.
- Connect red probe of meter to output side of GAS PARTICULATE switch (CKT 415) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set GAS PARTICULATE switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts?



NO → **18** **Replace GAS PARTICULATE switch (page 10-85).**

YES → **19** **Replace master control panel accessories harness (page 10-103).**

TA142463

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

Symptom-59

DRIVER'S DOMELIGHT WILL NOT LIGHT.

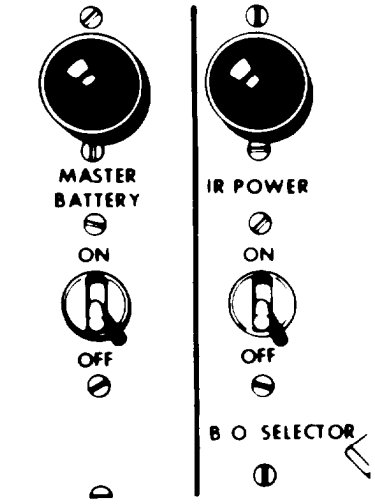
1 Check if NIGHT VISION/IR POWER indicator lamp will light.

Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set NIGHT VISION/IR POWER switch ON.
- Visually check if NIGHT VISION/IR POWER indicator lamp lights.

Does NIGHT VISION/IR POWER indicator lamp light?

MASTER CONTROL PANEL
(LOCATED ON DRIVER'S RIGHT)



NO

YES

2

- **See Symptom 72:**
- **NIGHT VISION/IR PERISCOPE WILL NOT WORK (NIGHT VISION/IR POWER INDICATOR LAMP WILL NOT LIGHT).**

TA253123

Symptom-59

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

3 **Check lead from variable resistor at domelight connector for electrical power.**

Technician (Driver's Station)

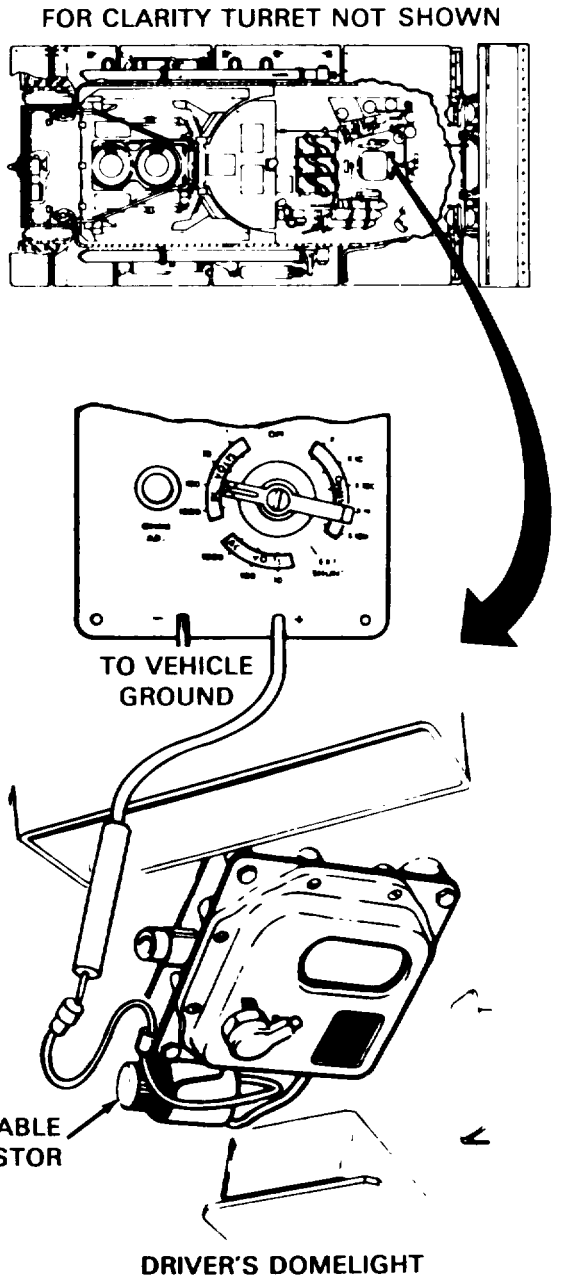
- Set MASTER BATTERY switch OFF.
- Set NIGHT VISION/IR POWER switch OFF.
- Disconnect variable resistor lead connector from domelight connector.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to center contact of variable resistor lead connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

NO

YES

4 **Replace driver's domelight (page 10-210).**



TA253124

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

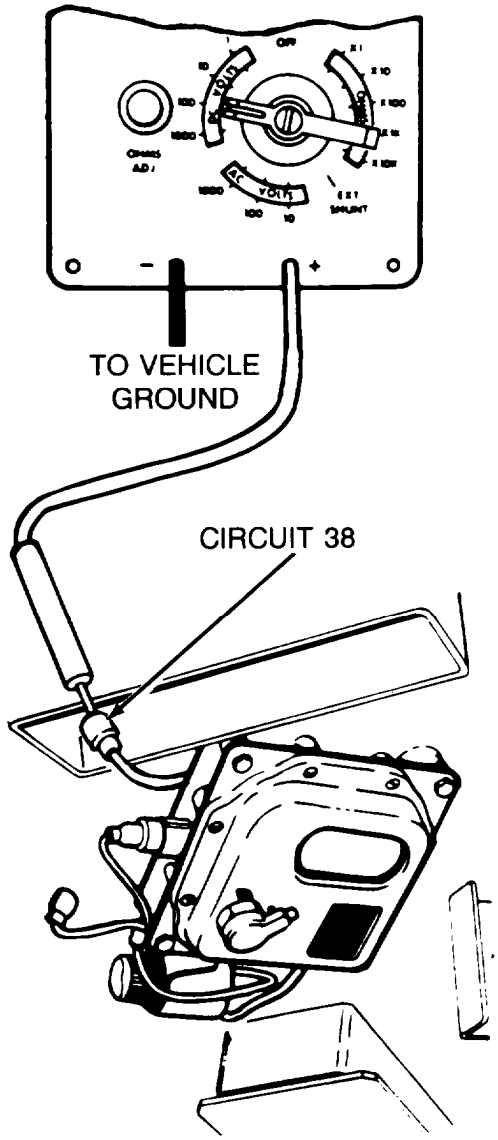
Symptom-59

5 **Check hull front master harness (CKT 38) at variable resistor lead for electrical power.**

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect variable resistor lead connector to domelight connector.
- Disconnect hull front master harness connector (CKT 38) from variable resistor lead connector.
- Connect red probe of meter to hull front master harness connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



NO

YES

6 **Replace variable resistor assembly (page 10-213).**

TA142466

Symptom-59

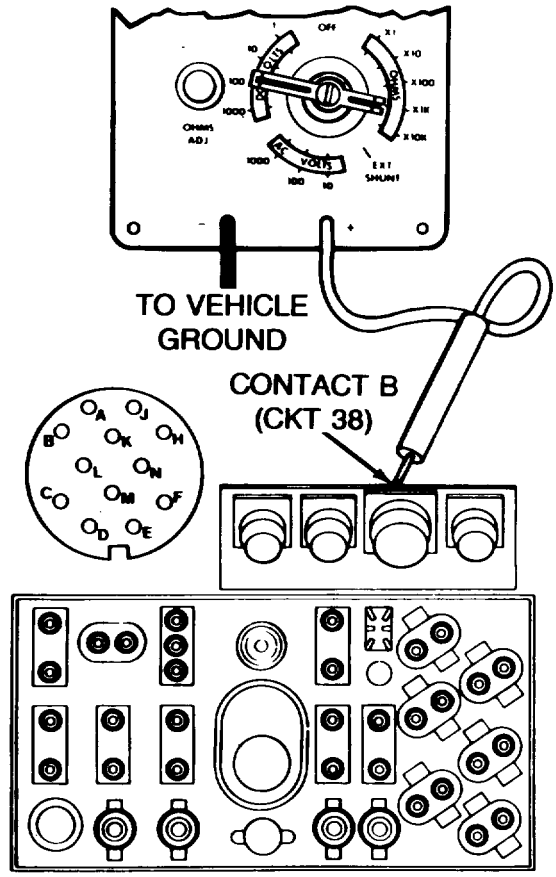
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

7 **Check for electrical power at master control panel accessories harness (CKT 38) panel connector.**

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect hull front master harness connector (CKT 38) to variable resistor lead connector.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master control panel.
- Connect red probe of meter to contact B (CKT 38) of master control panel accessories harness panel connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



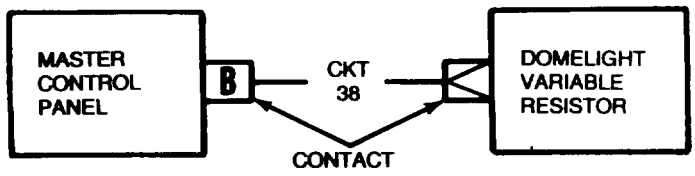
YES

9

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 38) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Install master control panel (page 10-47).**

NO

8 **Replace master control panel accessories harness (page 10-103).**



TA142467

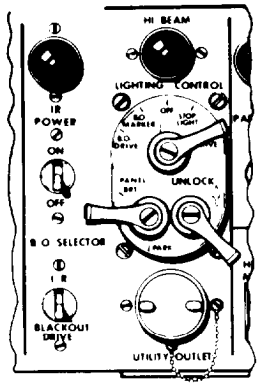
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

Symptom-60

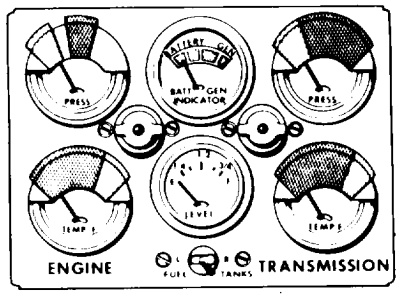
GAGE INSTRUMENT PANEL LAMPS WILL NOT LIGHT (PANEL LIGHT SWITCH AT BRIGHT).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



MASTER CONTROL PANEL



GAGE INSTRUMENT PANEL

1 Check if gage instrument panel lamps will light with PANEL LIGHT switch at DIM.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- On LIGHTING CONTROL switch turn ON-OFF lever to SER DRIVE and turn PANEL lever to DIM.
- Visually check if gage instrument panel lamps are lit.

Are gage instrument panel lamps lit?

YES → **2 Replace LIGHTING CONTROL switch (page 10-68).**

NO

TA142468

Symptom-60 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

3

Check if service stoplight will light.

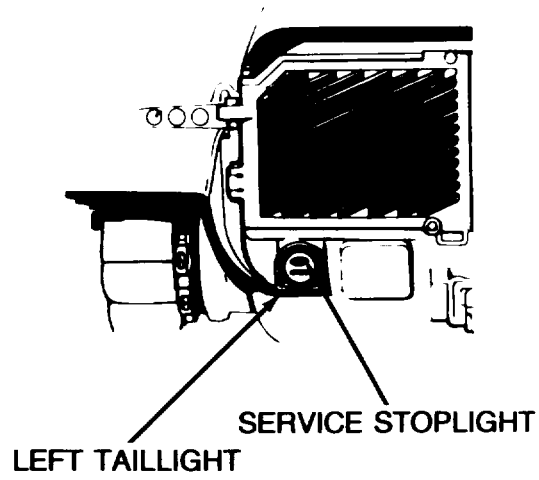
First Technician (Driver's Station)

- On LIGHTING CONTROL switch turn ON-OFF lever to STOP LIGHT and turn PANEL lever to BRT.
- Step on brake pedal and keep it pressed.

Second Technician (Rear Grille Doors)

- Visually check if service stoplight is working.

Does service stoplight light?



YES

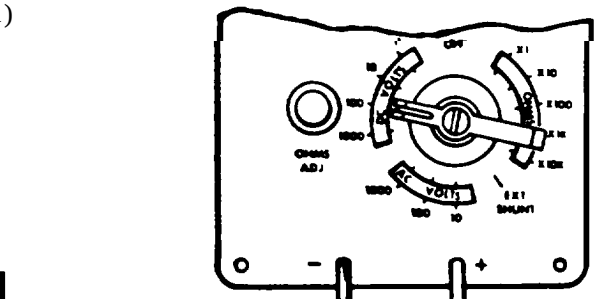
NO

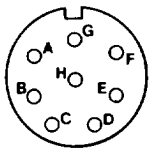
4

Replace LIGHTING CONTROL switch (page 10-68).

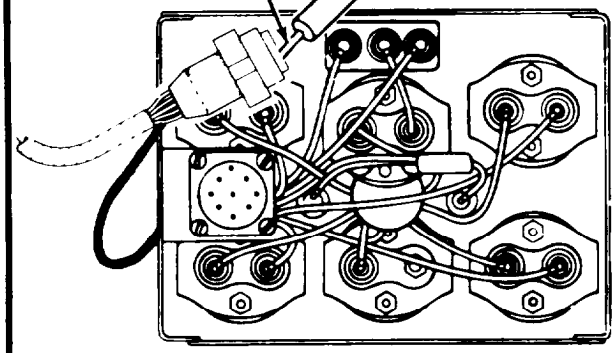
TA142469

Symptom-60 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)





CONTACT B
(CKT 40)



GAGE INSTRUMENT PANEL
(REAR VIEW)

5 **Check hull front master harness (CKT 40) at gage instrument panel for electrical power.**

First Technician (Driver's Station)

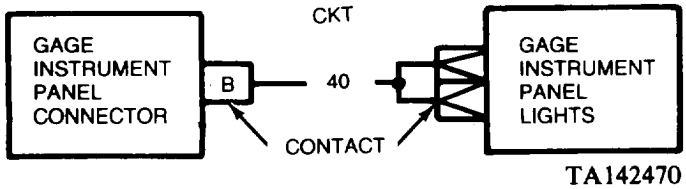
- Set MASTER BATTERY switch OFF.
- Displace gage instrument panel (page 10-121).
- Disconnect hull front master harness connector from gage instrument panel.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact B (CKT 40) of hull front master harness connector at gage instrument panel and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts.

Does meter indicate 18 to 30 volts?

NO

YES

6 **Repair gage instrument panel harness (CKT 40)(page 10-307).**



TA142470

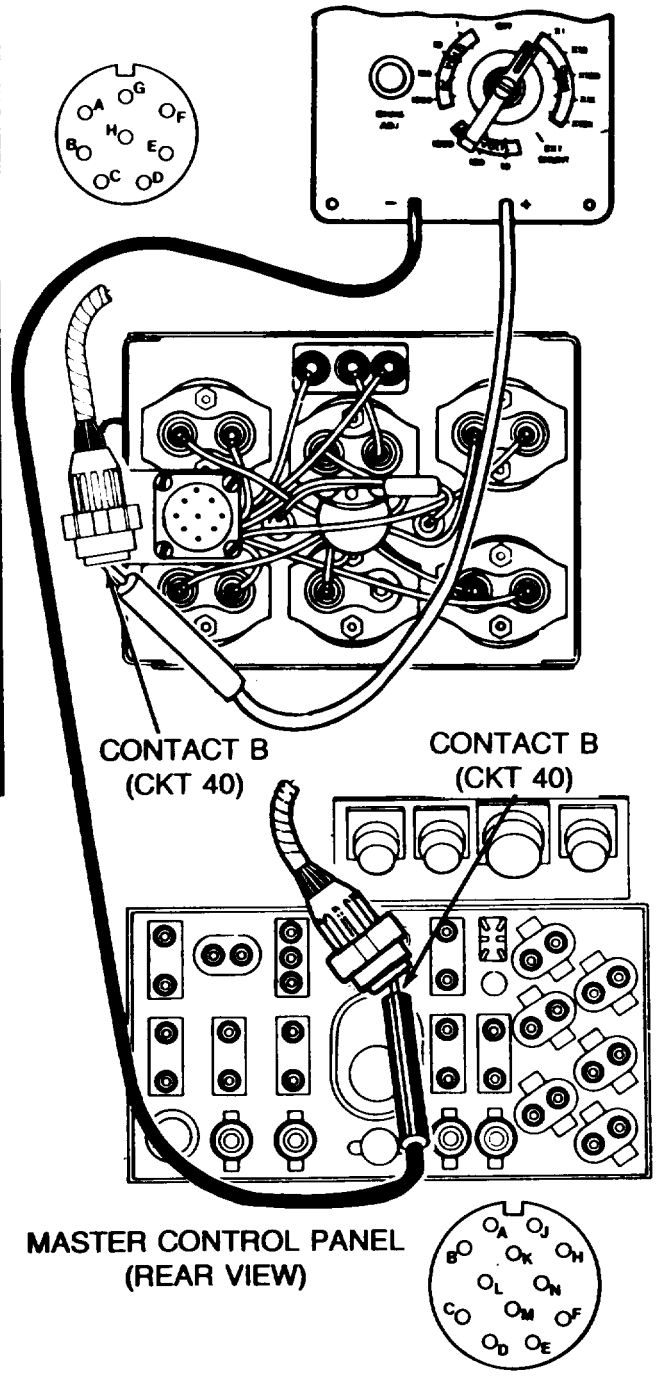
Symptom-60

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

7 Check hull front master harness (CKT 40) for continuity from connector at LIGHTING CONTROL switch to connector at gage instrument panel.

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT 40) of hull front master harness connector at gage instrument panel.
- Connect black probe to contact B (CKT 40) of hull front master harness connector at LIGHTING CONTROL switch.



TA142471

Symptom-60 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

STEP 7 CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

YES

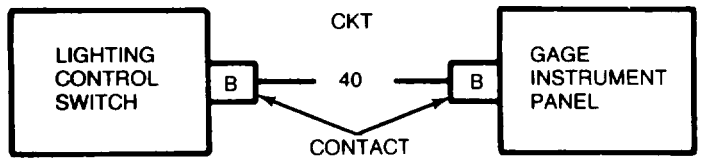
8

- **Replace LIGHTING CONTROL switch (page 10-68).**
- **Connect hull front master harness connector to gage instrument panel.**
- **Install gage instrument panel (page 10-122).**

NO

9

- **Inspect front hull master harness for bent/broken connector contacts or loose (CKT 40) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to gage instrument panel connector and to LIGHTING CONTROL switch.**
- **Install gage instrument panel (page 10-122).**
- **Install master control panel (page 10-47).**



TA142472

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

Symptom-61

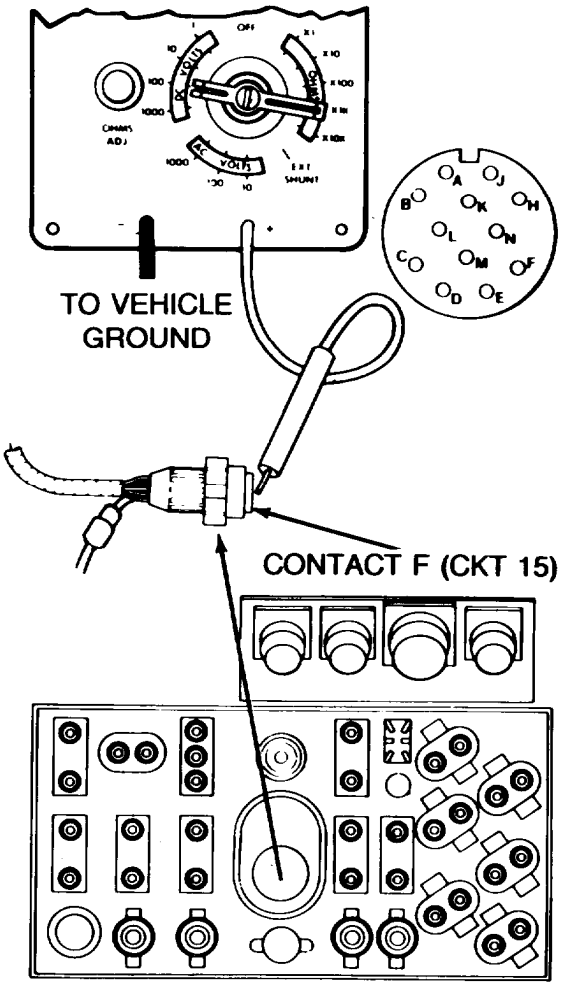
LIGHTS CONTROLLED BY LIGHTING CONTROL SWITCH WILL NOT LIGHT (PANEL SWITCH AT OFF, BRIGHT, OR DIM).

1 **Check hull front master harness (CKT 15) at LIGHTING CONTROL switch for electrical power.**

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact F (CKT 15) of harness connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

NO

2

- **Check hull front master harness (CKT 15) for continuity from intermediate connector to connector at LIGHTING CONTROL switch.**

- **See step (6).**

TA142473

Symptom-61

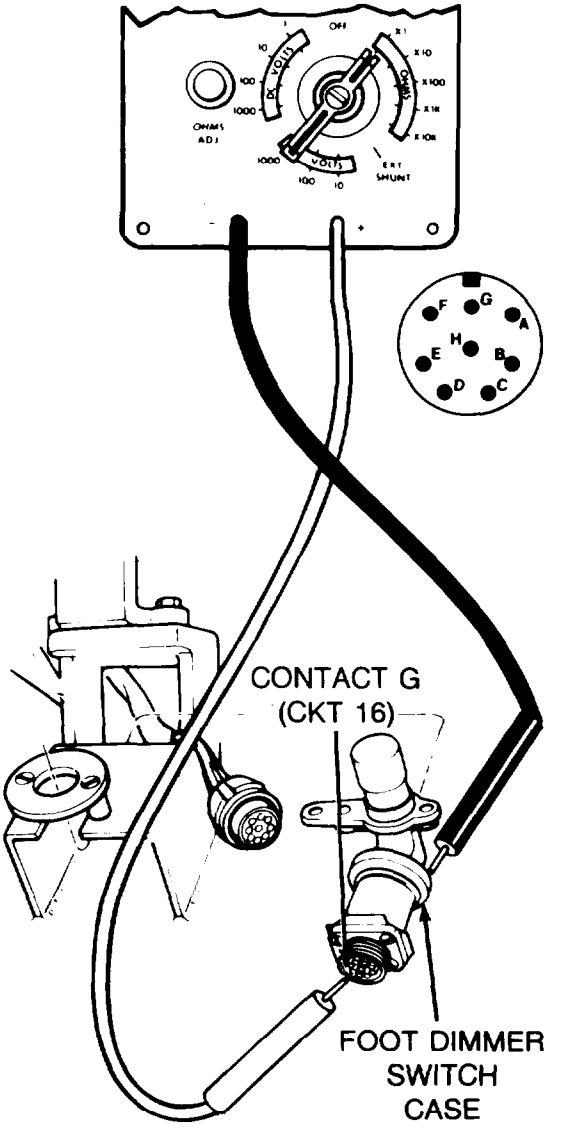
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

3 Check foot DIMMER SWITCH (CKT 16) for internal short.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Remove foot DIMMER SWITCH (page 10-207).
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact G (CKT 16) of foot DIMMER SWITCH connector and black probe to case of foot DIMMER SWITCH.
- Operate foot DIMMER SWITCH in both high and low beam positions.
- Check if meter indicates less than infinite resistance in either foot DIMMER SWITCH position.

Does meter indicate less than infinite resistance, thereby indicating a short?



FOOT DIMMER SWITCH

NO

4
- **Replace LIGHTING CONTROL switch (page 10-68).**
- **Install foot DIMMER SWITCH (page 10-207).**

YES

5
- **Replace foot DIMMER SWITCH (page 10-207).**
- **Install master control panel (page 10-47).**

TA142474

Symptom-61 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

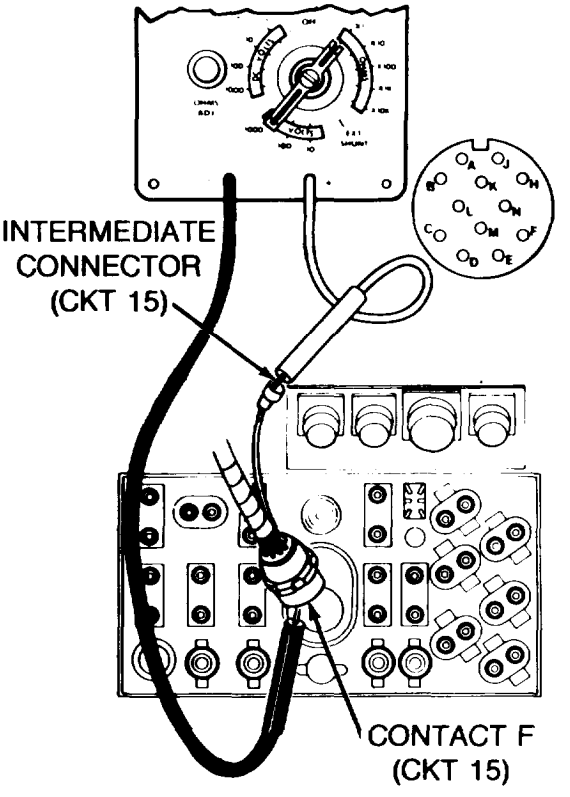
FROM STEP (2)

6 Check hull front master harness (CKT 15) for continuity from intermediate connector to connector at LIGHTING CONTROL switch.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect hull front master harness intermediate connector (CKT 15) from master control panel harness connector.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to center contact of hull front master harness (CKT 15) intermediate connector at LIGHTING CONTROL switch.
- Connect black probe of meter to contact F (CKT 15) of hull front master harness connector at LIGHTING CONTROL switch.
- Check if meter indicates continuity.

Does meter indicate continuity?

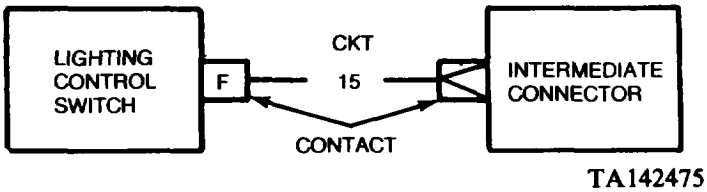


7 Replace master control panel harness (page 10-111).

YES

NO

8
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 15) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Install master control panel (page 10-47).**



TA142475

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

Symptom-62

PANEL AND DRIVE LIGHTS ARE VERY DIM OR WILL NOT LIGHT, WITH PANEL LIGHT SWITCH AT BRIGHT, DIM, OR PARK (LIGHTS ARE OK WITH PANEL LIGHT SWITCH AT OFF).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

(1) Check if vehicle lights work after disconnecting hull front master harness connector (CKT 40) from gage instrument panel.

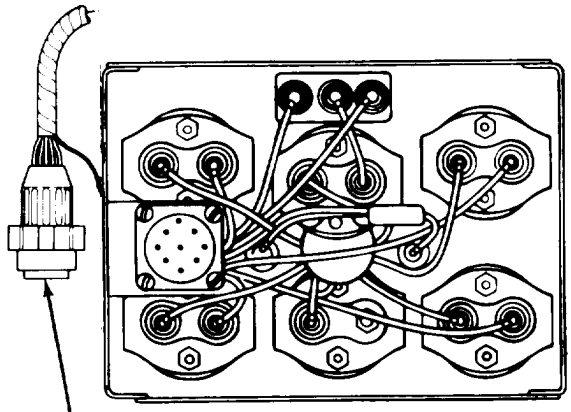
First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace gage instrument panel (page 10-121).
- Disconnect hull front master harness connector from gage instrument panel.
- Set MASTER BATTERY switch ON.
- On LIGHTING CONTROL switch turn ON-OFF lever to SER DRIVE and turn PANEL level to BRT.

Second Technician (Front of Vehicle)

- Visually check if service lights are working properly.

Are vehicle lights working properly?



GAGE INSTRUMENT PANEL (REAR VIEW)

HULL FRONT HARNESS CONNECTOR

YES

NO

(2)

- **Check hull front master harness (CKT 40) for continuity from connector at lighting control switch to connector at gage instrument panel.**

- **See Step (8).**

TA142476

Symptom-62

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

3 **Check if vehicle lights work after disconnecting gage instrument panel harness connectors (CKT 40) from both panel lights.**

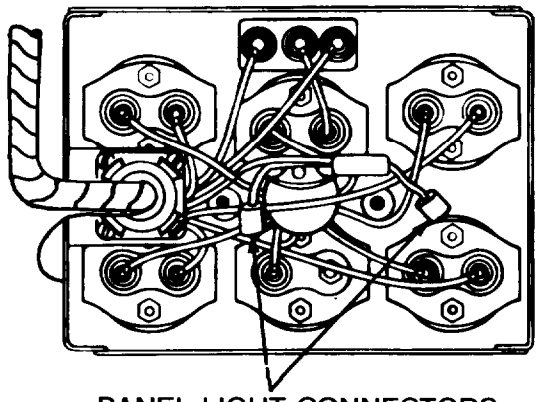
First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect hull front master harness connector to gage instrument panel.
- Disconnect gage instrument panel harness connectors (CKT 40) from both panel lights.
- Set MASTER BATTERY switch ON.

Second Technician (Front of Vehicle)

- Visually check if service lights are working properly.

Are vehicle lights working properly?

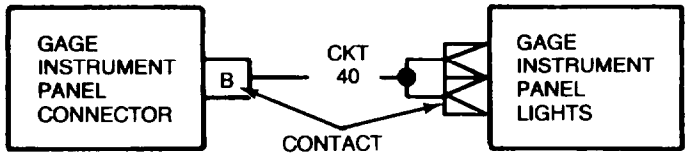


PANEL LIGHT CONNECTORS

YES

NO

4 **Repair gage instrument panel harness (CKT 40) (page 10-307).**



TA142477

Symptom-62

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

5 **Check if vehicle lights work after reconnecting gage instrument panel harness connector (CKT 40) to one of the panel lights.**

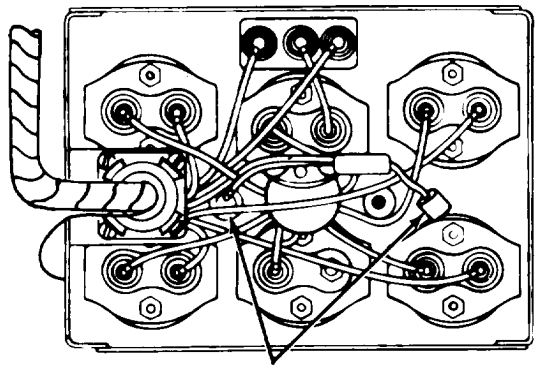
First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect gage instrument panel harness connector (CKT 40) to one of the panel lights.
- Set MASTER BATTERY switch ON.

Second Technician (Front of Vehicle)

- Visually check if service lights are working properly.

Are vehicle lights working properly?



PANEL LIGHT CONNECTORS

NO → **6** **Replace connected panel lamp socket (page 10-134).**

YES → **7** **Replace unconnected panel lamp socket (page 10-134).**

TA142478

Symptom-62

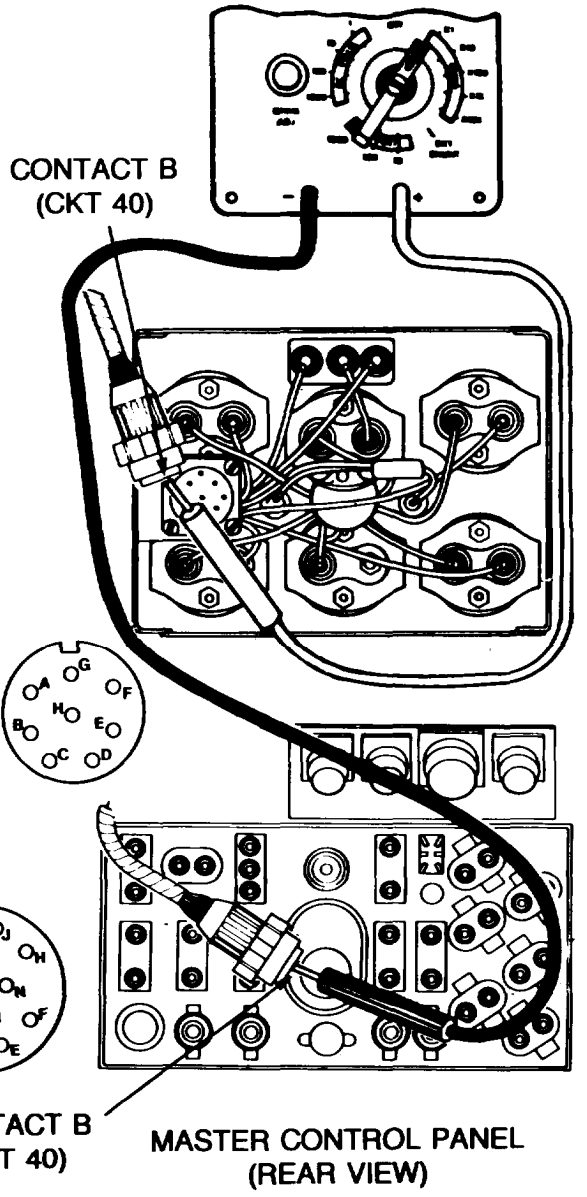
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

FROM STEP 2

8 Check hull front master harness (CKT 40) for continuity from connector at lighting control switch to connector at gage instrument panel.

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT 40) of hull front master harness connector at gage instrument panel.
- Connect black probe of meter to contact B (CKT 40) of hull front master harness connector at LIGHTING CONTROL switch.



TA142479

Symptom-62

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

STEP 8 CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

9

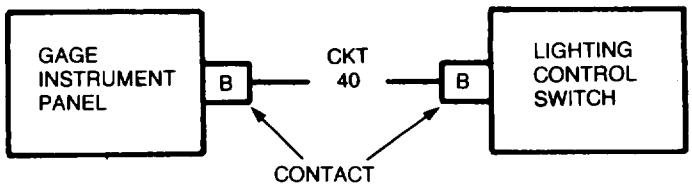
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 40) wire at rear of connectors.**
- **Repair connectors if defective switch (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness connectors to gage instrument panel connector and to LIGHTING CONTROL switch connector.**
- **Install gage instrument panel (page 10-122).**
- **Install master control panel (page 10-47).**

NO

YES

10

- **Replace LIGHTING CONTROL switch (page 10-68).**
- **Connect hull front master harness connector to gage instrument panel.**
- **Install gage instrument panel (page 10-122).**
- **Install master control panel (page 10-47).**



TA142480

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

Symptom-63

SERVICE STOPLIGHT WILL NOT LIGHT.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check if B.O. stoplight will light.

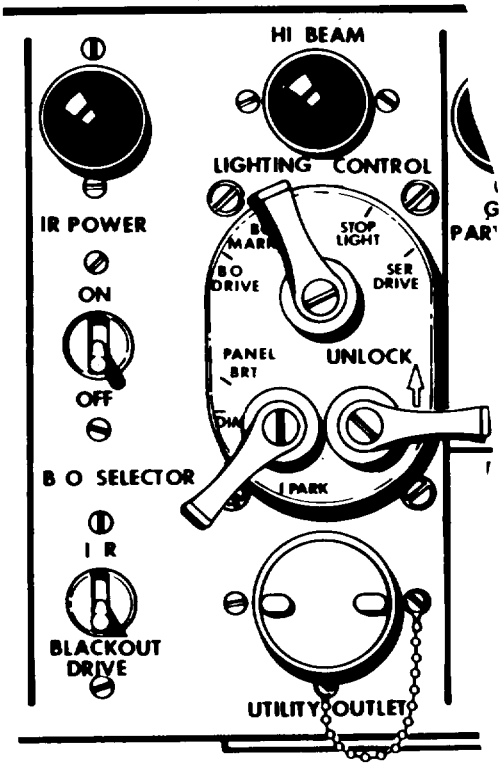
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- On LIGHTING CONTROL switch, turn LIGHTING CONTROL lever to B.O. MARKER.
- Press and hold brake pedal.

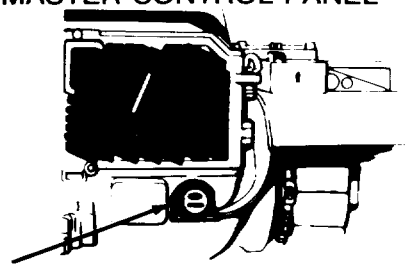
First Technician (Rear Grille Doors)

- Visually check if B.O. stoplight lights when brake pedal is pressed.

Does B.O. stoplight light?



MASTER CONTROL PANEL



B.O. STOPLIGHT

RIGHT TAILLIGHT

YES

NO

2

- **Check stoplight switch at brake master cylinder for continuity.**

- **See Step (10) .**

TA142481

Symptom-63

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

3 **Check rear accessory harness (CKT 22) at left taillight assembly for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First and Second Technician (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

First Technician (Rear Grille Doors)

- Disconnect rear accessory harness connector (CKT 22) from left taillight assembly.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to rear accessory harness connector (CKT 22) and black probe to ground.

Second Technician (Driver's Station)

- On LIGHTING CONTROL switch, turn LIGHTING CONTROL lever to STOPLIGHT.
- Set MASTER BATTERY switch ON.
- Press and hold brake pedal.

First Technician (Rear Grille Doors)

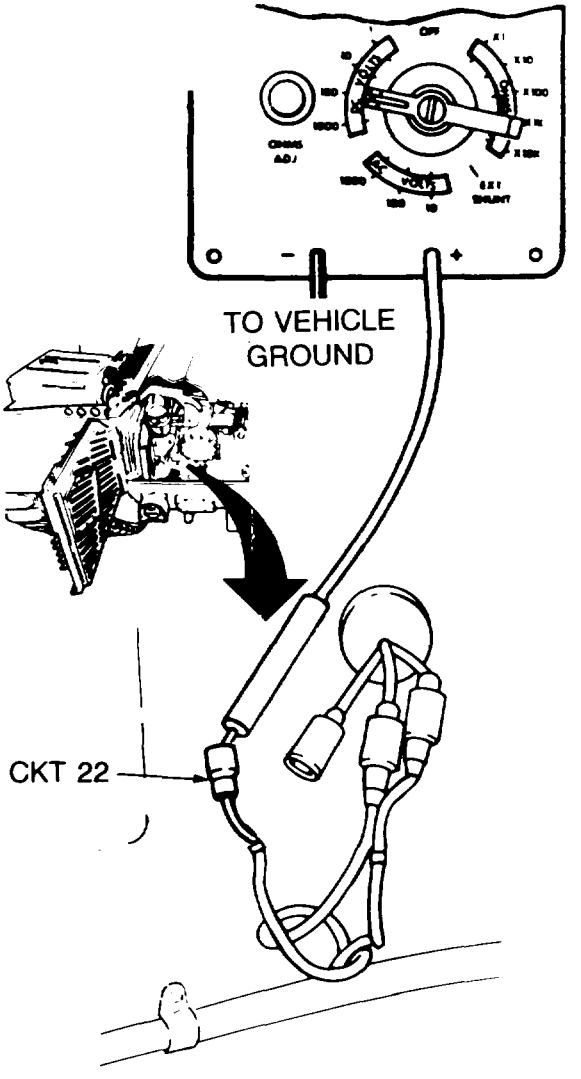
- Check if meter indicates 18 to 30 volts dc while brake pedal is pressed.

Does meter indicate 18 to 30 volts dc?

NO

YES

4 **Replace socket and wiring assembly in left taillight (page 10-229).**



TA142482

Symptom-63

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

5 Check hull front master harness (CKT 22) at bulkhead electrical disconnect for electrical power.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Rear Grille Doors)

- Connect rear accessory harness connector (CKT 22) to left taillight assembly.

First and Second Technician (Rear Grille Doors)

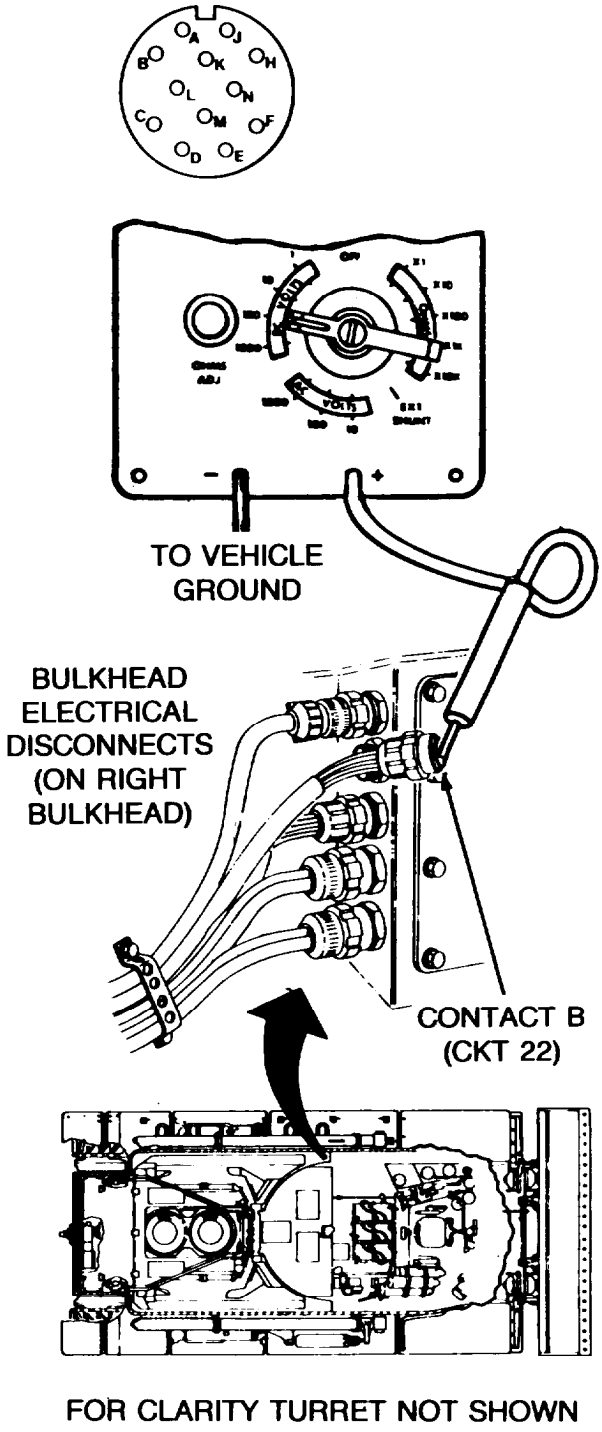
- Install transmission shroud (page 9-23).

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10).
- Disconnect hull front master harness connector from bulkhead electrical disconnects.
- Connect red probe of meter to contact B (CKT 22) of hull front master harness connector and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press and hold brake pedal.



TA142483

Symptom-63 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

STEP 5 CONTINUED

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc while brake pedal is pressed.

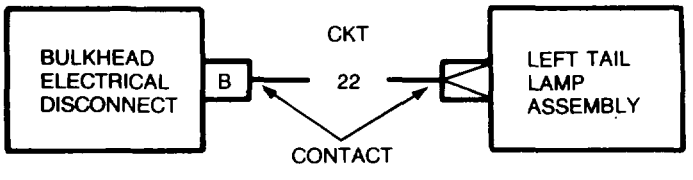
Does meter indicate 18 to 30 volts dc?

NO

YES

6

- **Inspect rear accessory harness for bent/broken connector contacts or loose (CKT 22) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective rear accessory harness.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142484

Symptom-63

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

7 Check hull front master harness (CKT 22) for continuity from bulkhead connector to connector at LIGHTING CONTROL switch.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch connector on master control panel.

First Technician (Turret)

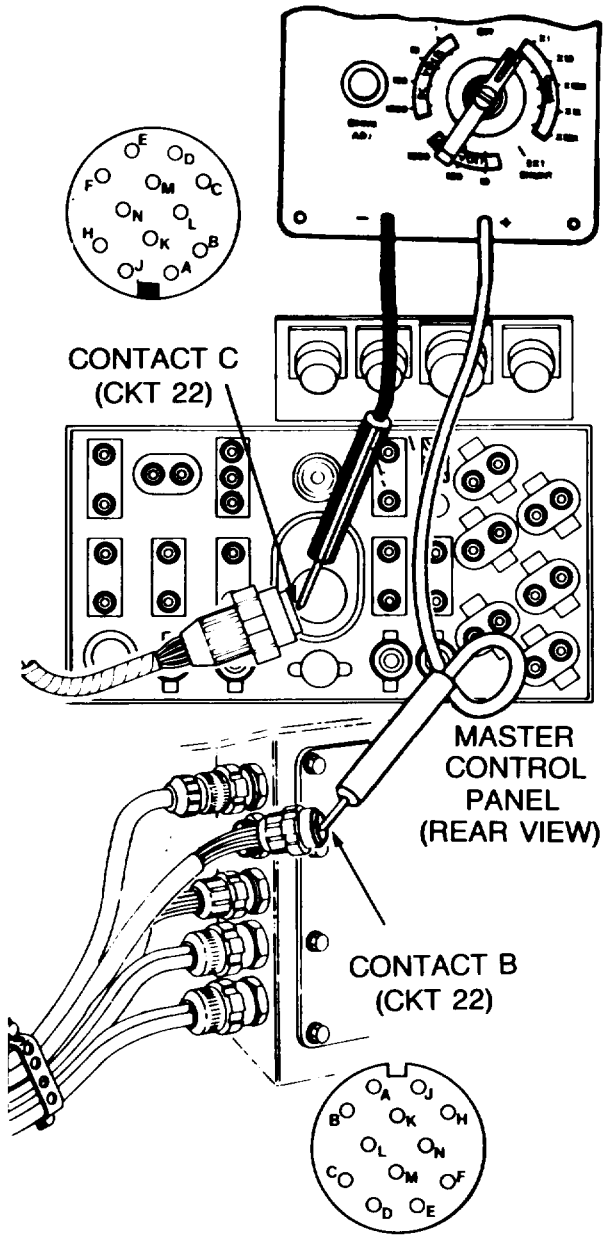
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).

Second Technician (Driver's Station)

- Connect black probe of meter to contact C (CKT 22) of hull front master harness connector at LIGHTING CONTROL switch.

First Technician (Turret)

- Connect red probe of meter to contact B (CKT 22) of hull front master harness connector at bulkhead electrical disconnect.



TA142485

Symptom-63 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

STEP 7 CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

YES

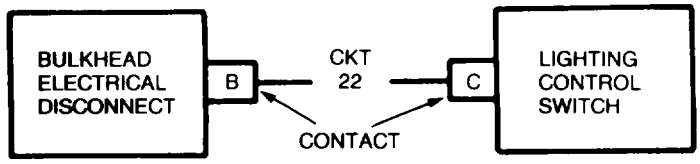
8

- **Replace LIGHTING CONTROL switch (page 10-68).**
- **Connect hull front master harness connector to rear accessory harness connector at bulkhead electrical disconnect.**

NO

9

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 22) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness connector to rear accessory harness connector at bulkhead electrical disconnect.**
- **Connect hull front master harness connector to LIGHTING CONTROL switch.**
- **Install master control panel (page 10-47).**



TA142486

Symptom-63

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

FROM STEP (2)

10 Check stoplight switch at brake master cylinder for continuity.

Second Technician (Driver's Station)

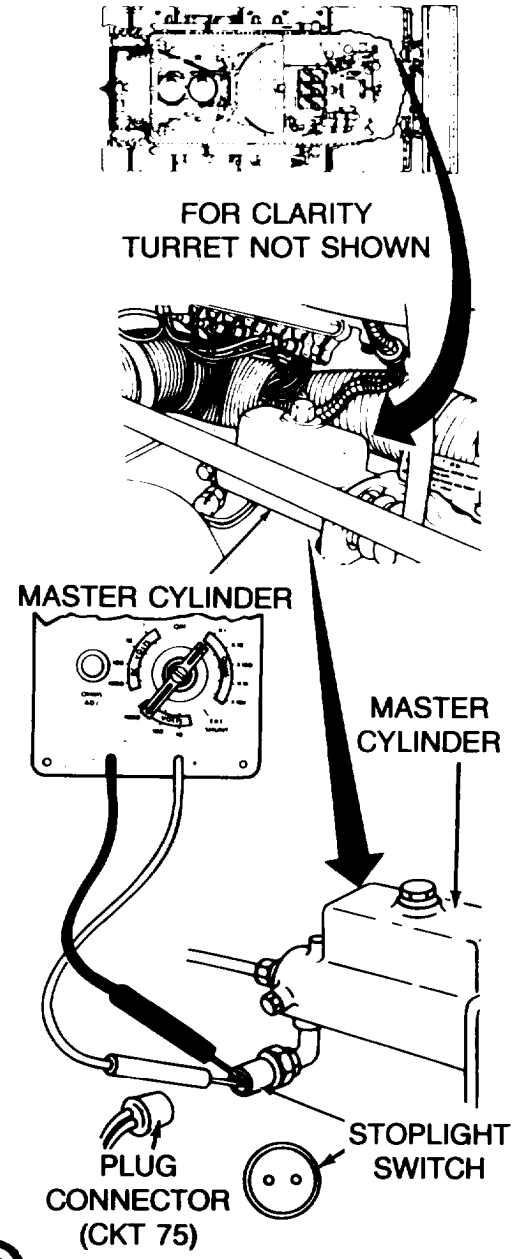
- Set MASTER BATTERY switch OFF.
- Disconnect hull front master harness connector (CKT 75) from master cylinder stoplight switch.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect two probes of meter to the two contacts of stoplight switch.
- Press and hold brake pedal.
- Check if meter indicates continuity while brake pedal is pressed.

Does meter indicate continuity?

YES

NO

11 Replace stoplight switch (page 13-45).



TA142487

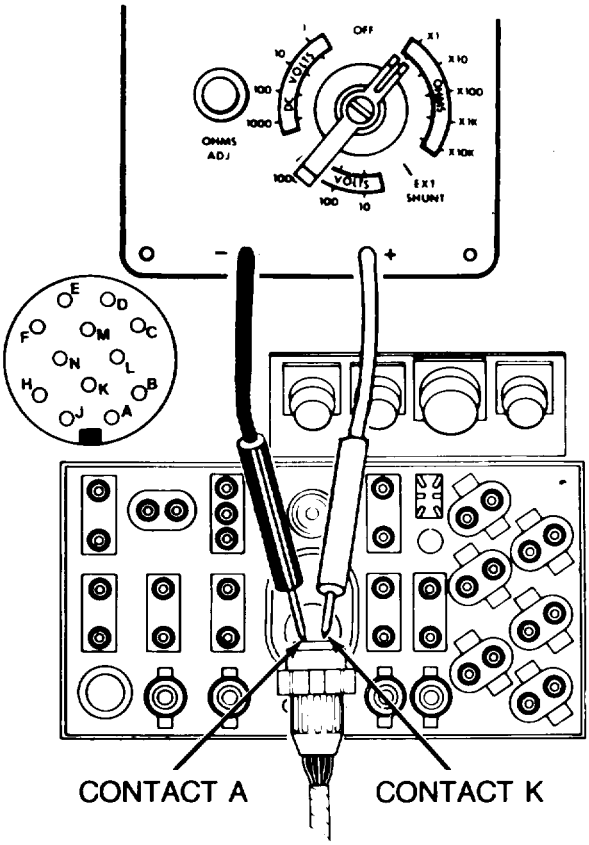
Symptom-63

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

12 **Check hull front master harness (CKT 75) connector at LIGHTING CONTROL switch for continuity from contact A to contact K.**

Second Technician (Driver's Station)

- Connect hull front master harness connector to master cylinder stoplight switch.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch connector on master control panel.
- Connect two probes of meter to contacts A and K (CKT 75) of hull front master harness at LIGHTING CONTROL switch connector.
- Press and hold brake pedal.



MASTER CONTROL PANEL
(REAR VIEW)

TA142488

Symptom-63

STEP (12) CONTINUED

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

- Check if meter indicates continuity while brake pedal is pressed.

Does meter indicate continuity?

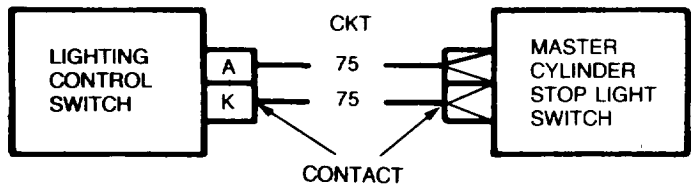
YES

13 **Replace LIGHTING CONTROL switch (page 10-68).**

NO

14

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 75) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness connector to LIGHTING CONTROL switch.**
- **Install master control panel (page 10-47).**



TA142489

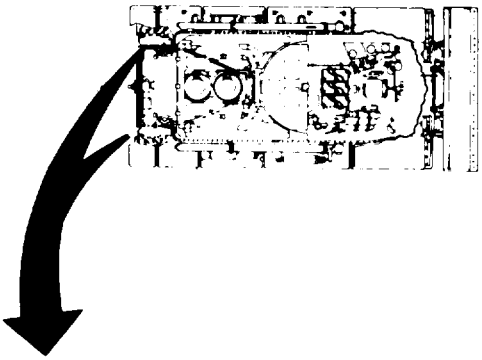
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

Symptom-64

B.O. STOPLIGHT WILL NOT LIGHT.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



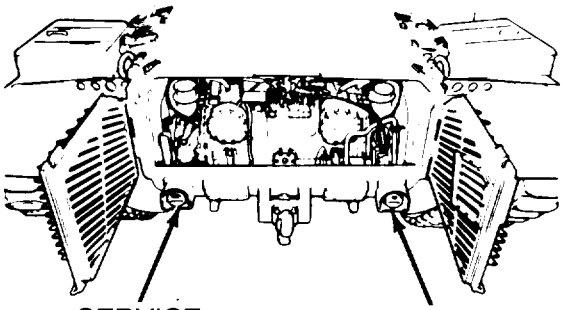
1 Check if service stoplight will light.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- On LIGHTING CONTROL switch, turn LIGHTING CONTROL lever to STOPLIGHT.
- Press and hold brake pedal.

First Technician (Rear Grille Doors)

- Visually check if service stoplight lights when brake pedal is pressed.



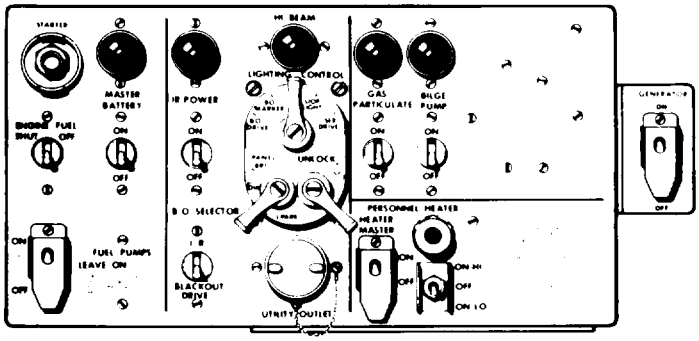
Does service stoplight light?

2

- **Check stoplight switch at brake master cylinder for continuity.**
- **See step (10).**

NO

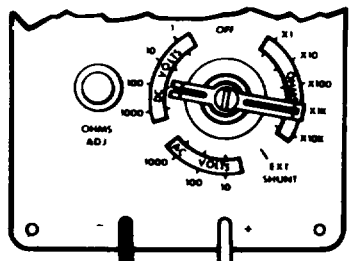
YES

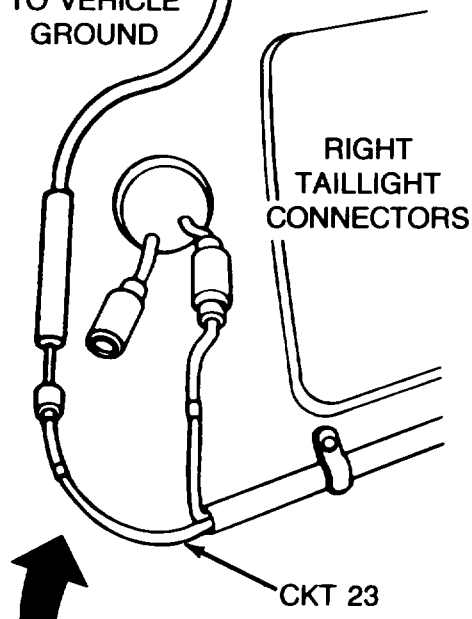


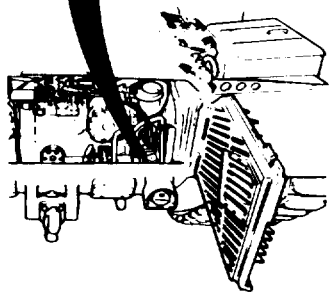
MASTER CONTROL PANEL

TA142490

Symptom-64 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)







3 Check rear accessory harness (CKT 23) at right taillight assembly for electrical power.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First and Second Technician (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

First Technician (Rear Grille Doors)

- Disconnect rear accessory harness connector (CKT 23) from right taillight assembly.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to rear accessory harness connector (CKT 23) and black probe to ground.

Second Technician (Driver's Station)

- On LIGHTING CONTROL switch, turn LIGHTING CONTROL lever to B.O. MARKER.
- Set MASTER BATTERY switch ON.
- Press and hold brake pedal.

First Technician (Rear Grille Doors)

- Check if meter indicates 18 to 30 volts dc while brake pedal is pressed.

Does meter indicate 18 to 30 volts dc?

NO

YES

4 Replace socket and wiring assembly in right taillight (page 10-223).

TA142491

Symptom-64

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

5 **Check hull front master harness (CKT 23) at connector to bulkhead electrical disconnect for electrical power.**

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10).

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Rear Grille Doors)

- Connect rear accessory harness (CKT 23) to right taillight assembly.

First and Second Technician (Rear Grille Doors)

- Install transmission shroud (page 9-23).

First Technician (Turret)

- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Connect red probe of meter to contact C (CKT 23) of hull front master harness connector at bulkhead electrical disconnect and black probe to ground.

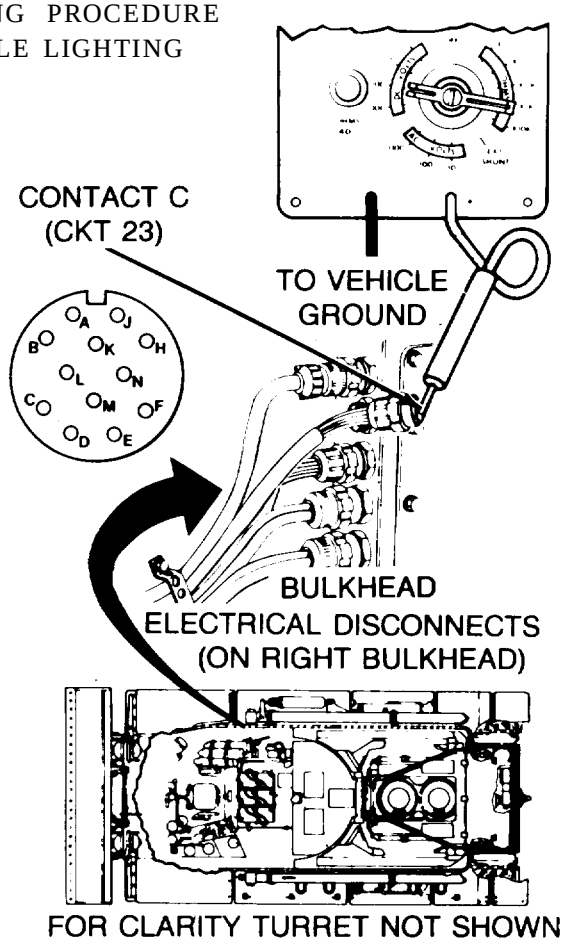
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Press and hold brake pedal.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc while brake pedal is pressed.

Does meter indicate 18 to 30 volts dc?

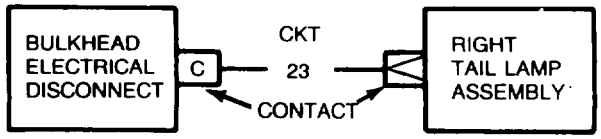


NO

6

- **Inspect rear accessory harness for bent/broken connector contacts or loose (CKT 23) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective rear accessory harness.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**

YES



TA142492

Symptom-64

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

7 Check hull front master harness (CKT 23) for continuity from connector at bulkhead electrical disconnect to connector at LIGHTING CONTROL switch.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch on master control panel.

First Technician (Turret)

- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).

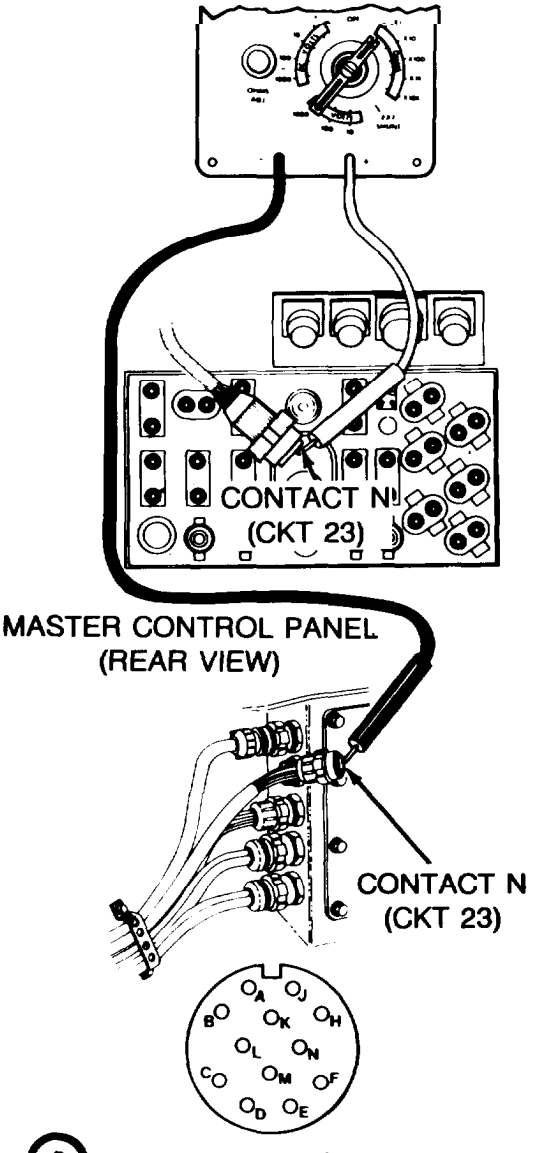
Second Technician (Driver's Station)

- Connect red probe of meter to contact N (CKT 23) of hull front master harness connector at LIGHTING CONTROL switch.

First Technician (Turret)

- Connect black probe of meter to contact N (CKT 23) of hull front master harness connector at bulkhead electrical disconnect.
- Check if meter indicates continuity.

Does meter indicate continuity?



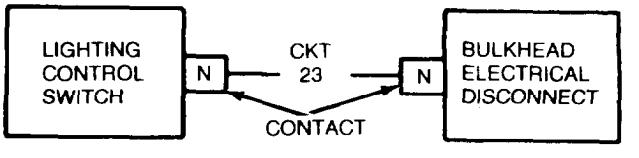
8

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 23) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Install master control panel (page 10-47).**

NO — YES

9

- **Replace LIGHTING CONTROL switch (page 10-68).**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142493

Symptom-64

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

FROM STEP (2)

10 Check stoplight switch at brake master cylinder for continuity.

Second Technician (Driver's Station)

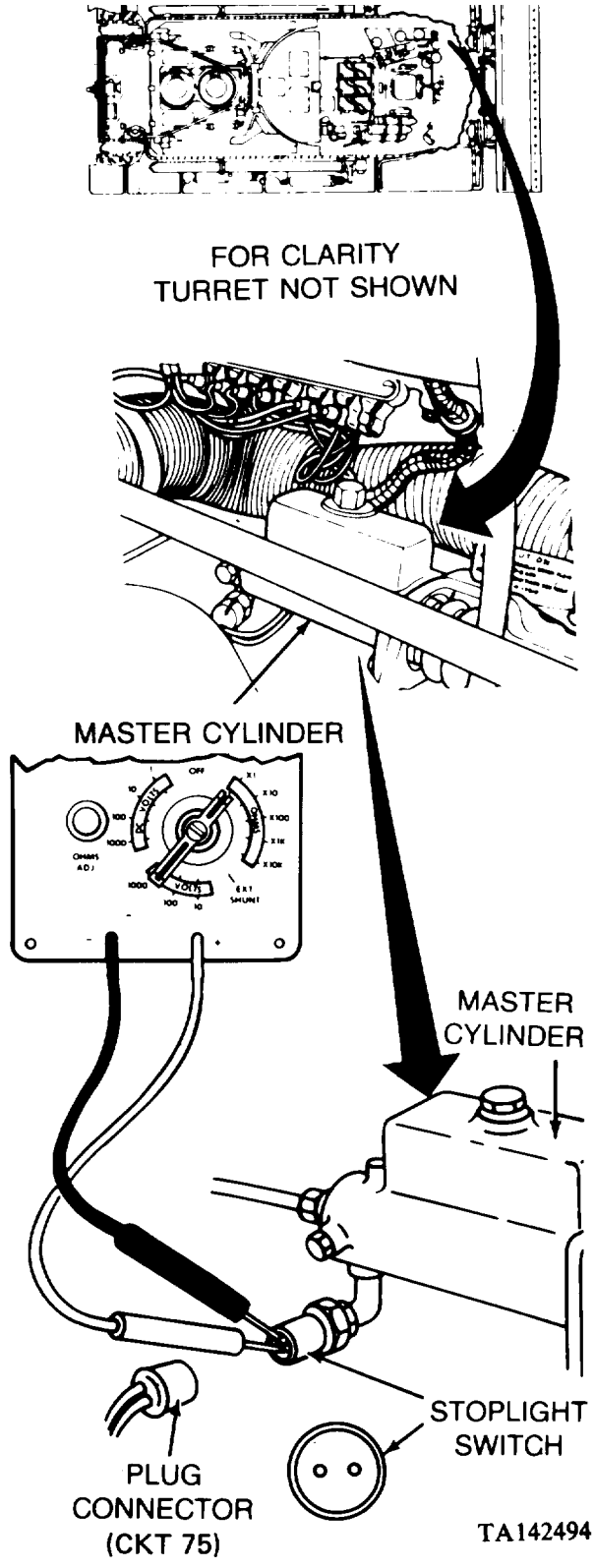
- Set MASTER BATTERY switch OFF.
- Disconnect hull front master harness connector from master cylinder stoplight switch.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect two probes of meter to the two contacts of stoplight switch.
- Press and hold brake pedal.
- Check if meter indicates continuity while brake pedal is pressed.

Does meter indicate continuity?

11 Replace stoplight switch (page 13-45).

NO

YES



Symptom-64

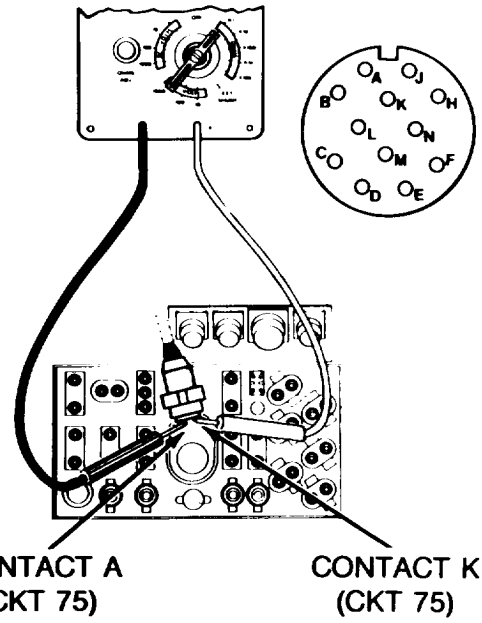
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

12 **Check front master harness (CKT 75) connector at LIGHTING CONTROL switch for continuity from contact A to contact K.**

Second Technician (Driver's Station)

- Connect hull front master harness connector to master cylinder stoplight switch.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch on master control panel.
- Connect two probes of meter to contacts A and K (CKT 75) of hull front master harness connector at LIGHTING CONTROL switch.
- Check if meter indicates continuity while brake pedal is pressed.

Does meter indicate continuity?

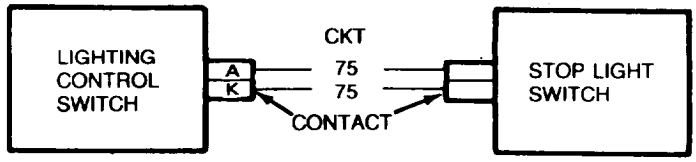


YES

13 **Replace LIGHTING CONTROL switch (page 10-68).**

NO

14
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 75) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Install master control panel (page 10-47).**



TA142495

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

Symptom-65

B.O. DRIVE LAMP WILL NOT LIGHT (IR SERVICE LAMPS WILL LIGHT).

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check left headlight base harness (CKT 19) connector for electrical power.

Second Technician (Driver's Station)

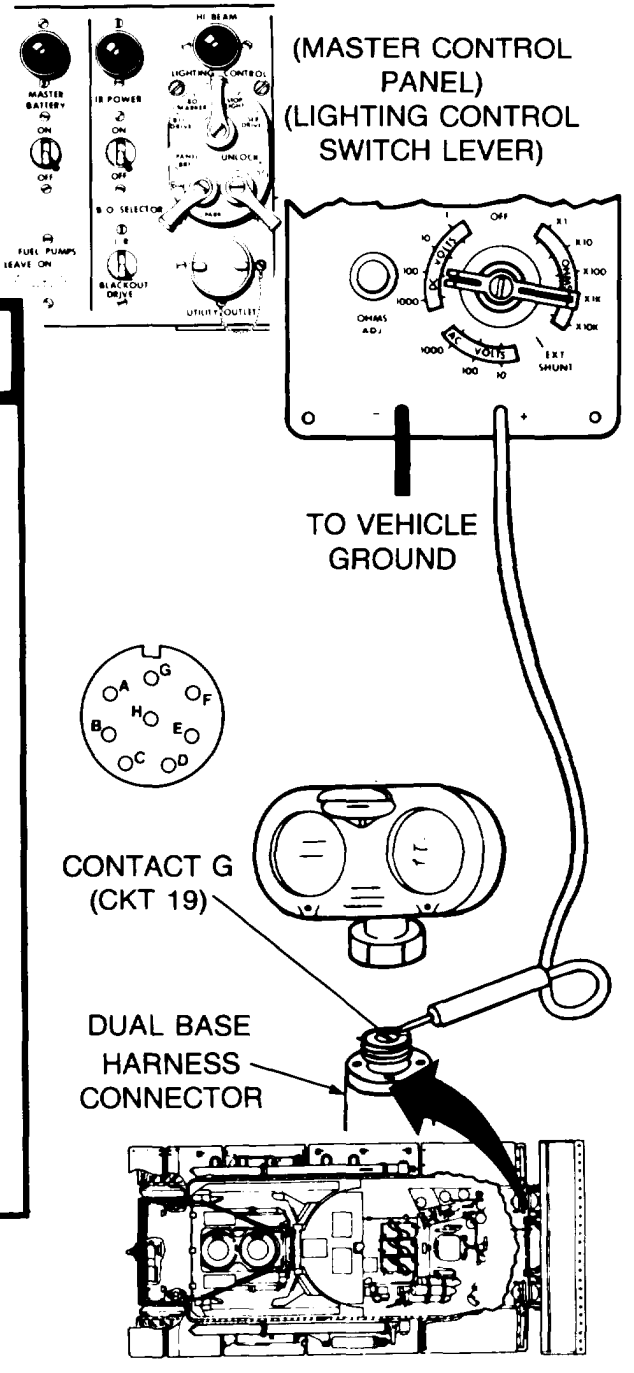
- Set MASTER BATTERY switch OFF.
- Set B.O. SELECTOR switch to BLACKOUT DRIVE.
- Turn LIGHTING CONTOL switch lever to B.O. DRIVE.

First Technician (Left Front of Vehicle)

- Disconnect left headlight assembly from dual base harness connector.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact G (CKT 19) of dual base harness connector and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.



TA142496

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

Symptom-65

STEP 1 CONTINUED

First Technician (Left Front of Vehicle)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES

2 **Replace left headlight assembly (page 10-238).**

NO

TA142497

Symptom-65

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

3 **Check hull front master harness (CKT 19) at connector to headlight base harness for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Left Front of Vehicle)

- Connect left headlight assembly to dual base harness connector.

Second Technician (Driver's Station)

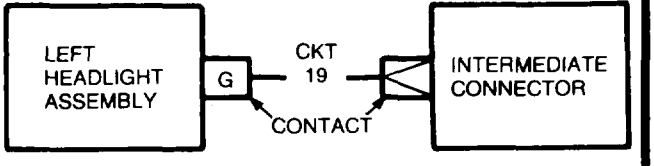
- Disconnect connector (CKT 19) of hull front master harness from headlight base harenss (located inside driver's compartment above brake master cylinder).
- Connect red probe of meter to hull front master harness connector (CKT 19) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

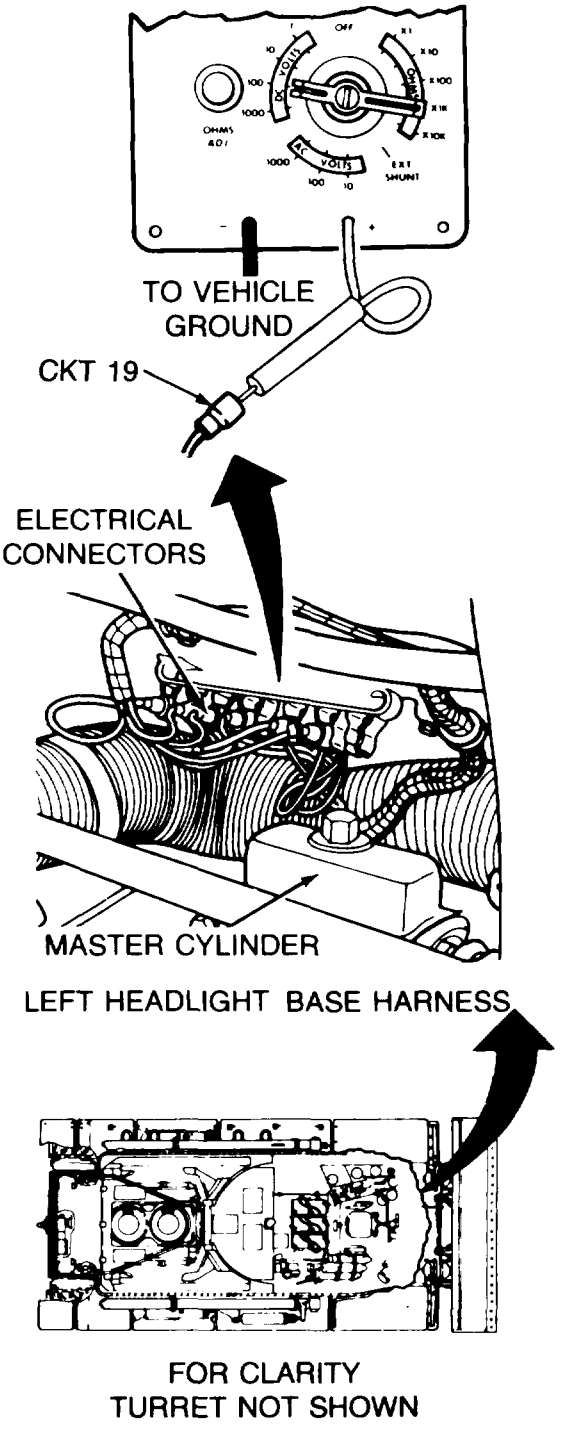
Does meter indicate 18 to 30 volts dc?

4 **Repair left headlight base harness (page 10-307).**

YES

NO

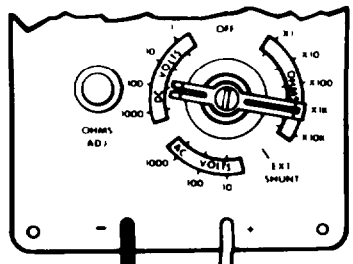




TA142498

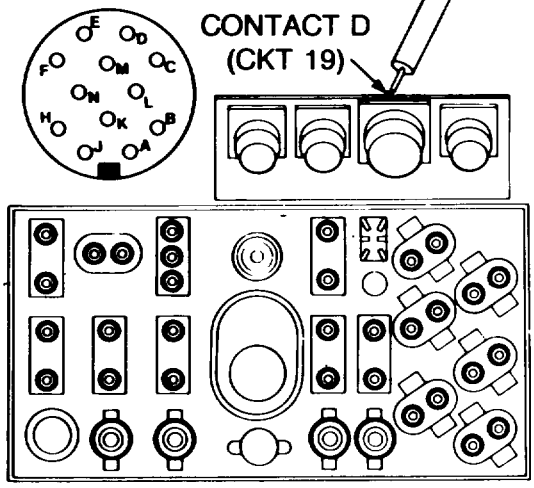
Symptom-65

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)



TO VEHICLE GROUND

CONTACT D (CKT 19)



MASTER CONTROL PANEL (REAR VIEW)

5 **Check master control panel accessories harness (CKT 19) panel connector for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect hull front master harness connector (CKT 19) to headlight base harness connector.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master control panel
- Connect red probe of meter to contact D (CKT 19) of master connector panel accessories harness panel connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

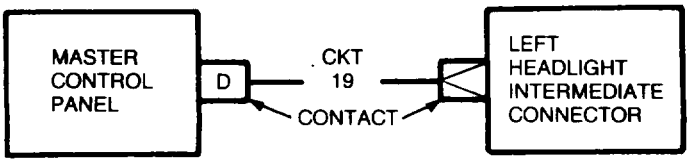
Does meter indicate 18 to 30 volts dc?

NO

YES

6

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 19) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Install master control panel (page 10-47).**



TA142499

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

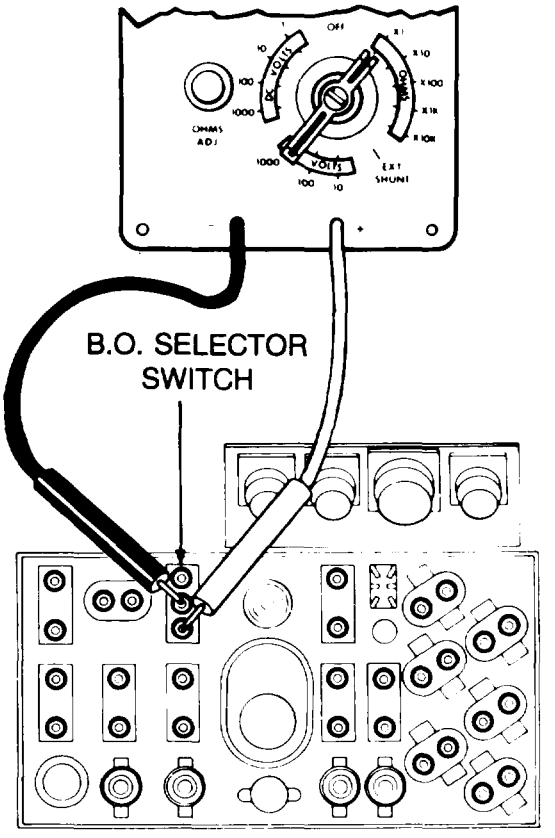
Symptom-65

7 **Check B.O. SELECTOR switch for continuity.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect hull front master harness connector to master control panel.
- Disconnect two connectors (CKT 19) from B.O. SELECTOR switch.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect probes of meter to contacts (CKT 19) of B.O. SELECTOR switch.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

8 **Replace master control panel accessories harness (page 10-103).**

NO

9 **Replace B.O. SELECTOR switch (page 10-72).**

TA142500

Symptom-66 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

BOTH B.O. TAILLIGHTS AND/OR BOTH B.O. MARKER LIGHTS WILL NOT LIGHT.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check if both B.O. marker lamps will light.

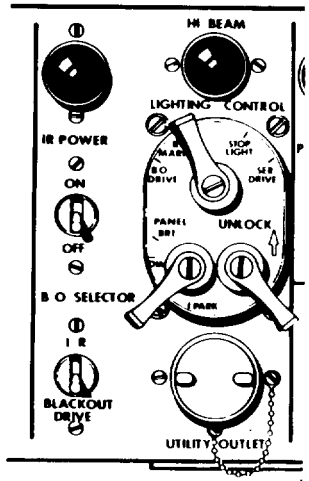
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Turn LIGHTING CONTROL switch to B.O. MARKER.

First Technician (Front of Vehicle)

- Visually check if B.O. marker lamps on both headlights are lit.

Are B.O. marker lamps in both headlight assemblies lit?



MASTER CONTROL PANEL
(DRIVER'S RIGHT)

B.O. MARKER
HEADLIGHT ASSEMBLY
(RIGHT SIDE SHOWN)

NO

YES

2

- **Check hull front master harness (CKT 24) connector at bulkhead electrical disconnect for electrical power.**
- **See Step (8).**

TA142501

Symptom-66

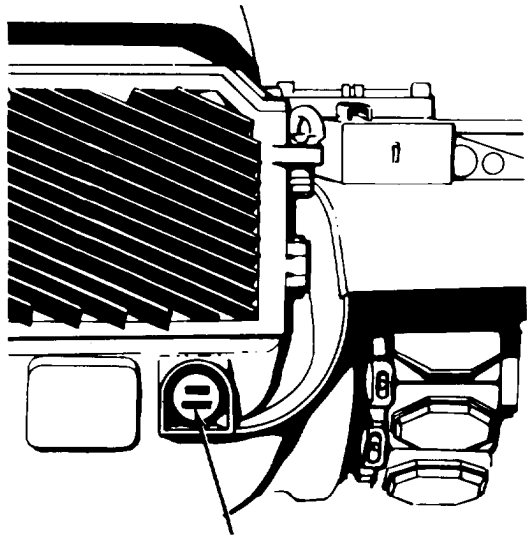
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

3 **Check if both B.O. taillights will light.**

First Technician (Rear of Vehicle)

Visually check if both B.O. taillight lamps are lit.

Are B.O. taillight lamps in both taillight assemblies lit?



B.O. TAILLIGHT
(RIGHT SIDE SHOWN)

NO

YES

4 **Notify support maintenance of a defective hull front master harness.**

TA142502

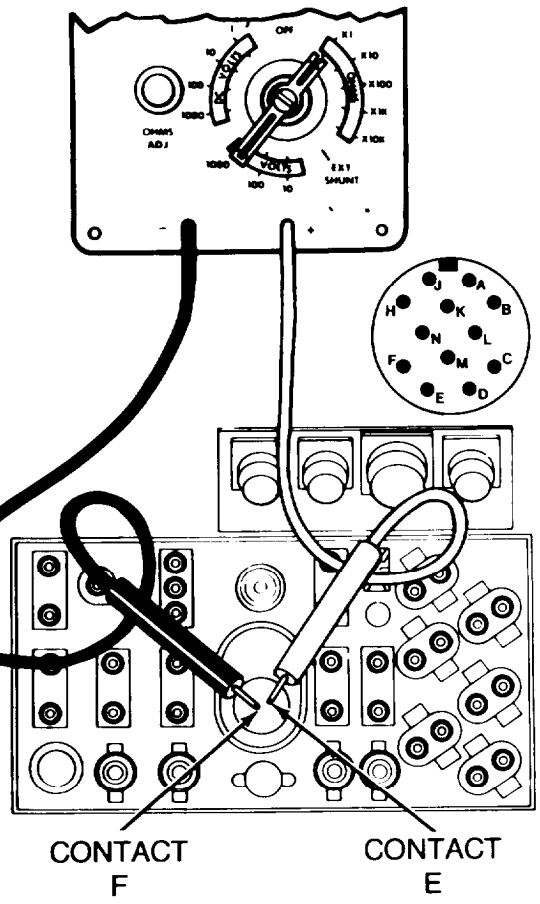
Symptom-66 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

5 **Check LIGHTING CONTROL switch for continuity from connector contact F (CKT 20-24).**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact E of LIGHTING CONTROL switch.
- Connect black probe of meter to contact F of LIGHTING CONTROL switch.
- Check if meter indicates continuity.

Does meter indicate continuity?



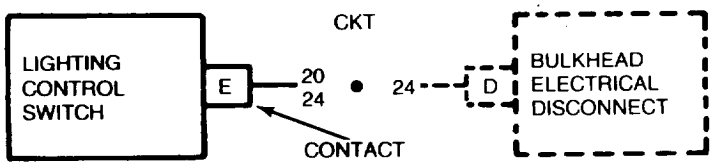
YES

6

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 20-24) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness to LIGHTING CONTROL switch.**
- **Install master control panel. (page 10-47).**

NO

7 **Replace LIGHTING CONTROL switch (page 10-68).**



TA142503

Symptom-66

DEAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

FROM STEP (2)

8 Check hull front master harness (CKT 24) connector at bulkhead electrical disconnect for electrical power.

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10).

Second Technician (Driver's Station)

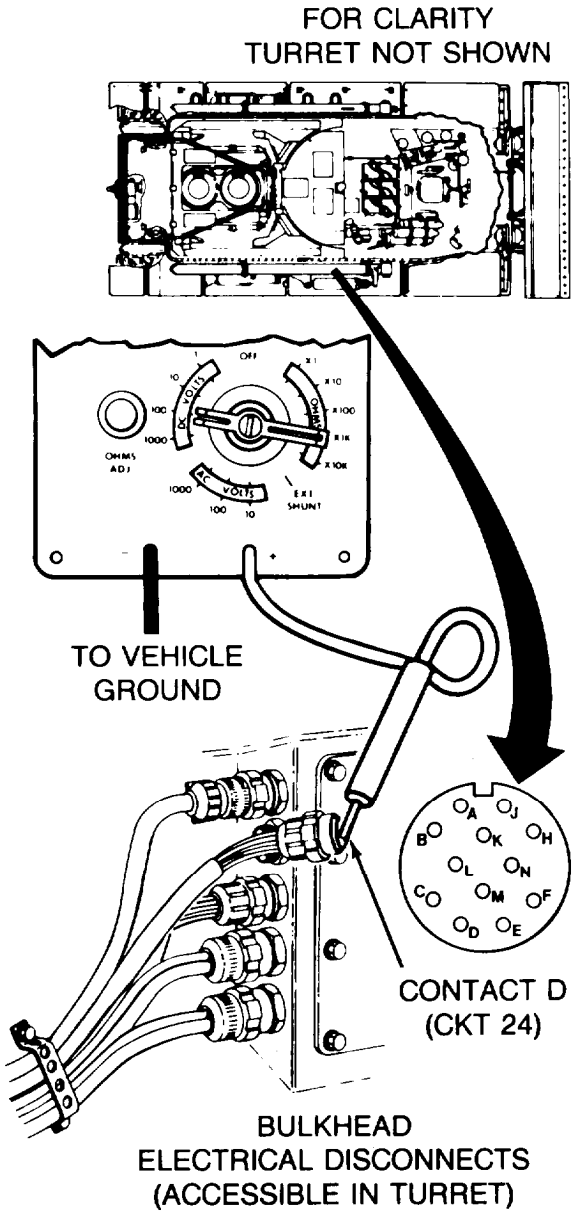
- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact D (CKT 24) of hull front master harness connector at bulkhead electrical disconnect and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.



TA142504

Symptom-66

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

STEP (8) CONTINUED

First Technician (Driver's Station)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

NO

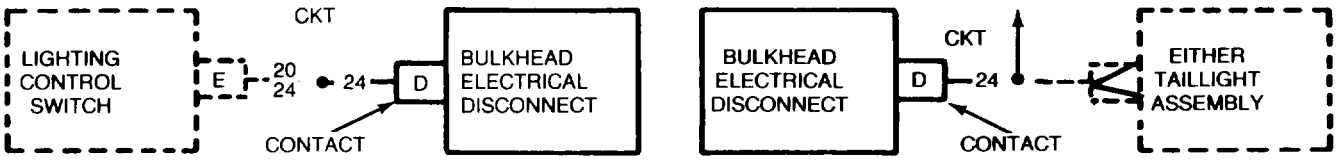
9

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 24) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector at bulkhead electrical disconnect.**

YES

10

- **Inspect rear accessory harness for bent/broken connector contacts or loose (CKT 24) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective rear accessory harness.**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142505

Symptom-67 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

ONE HEADLIGHT B.O. MARKER LAMP OR ONE TAILLIGHT B.O. MARKER LAMP WILL NOT LIGHT.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

(1) Check if one headlight B.O. marker lamp or one taillight B.O. marker lamp is not working.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- On LIGHTING CONTROL switch, turn LIGHTING CONTROL lever to B.O. MARKER.

First Technician (Front of Vehicle)

- Visually check headlights to see if one B.O. marker lamp is not lit.

First Technician (Rear of Vehicle)

- Visually check taillights to see if one B.O. marker lamp is not lit.

Is one headlight B.O. marker lamp or one taillight B.O. marker lamp not lit?

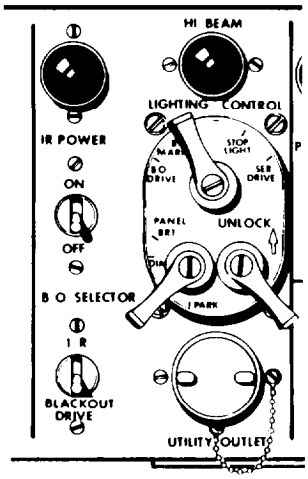
(2)

- **Check headlight base harness (CKT 20) connector, at headlight assembly that does not work, for electrical power.**

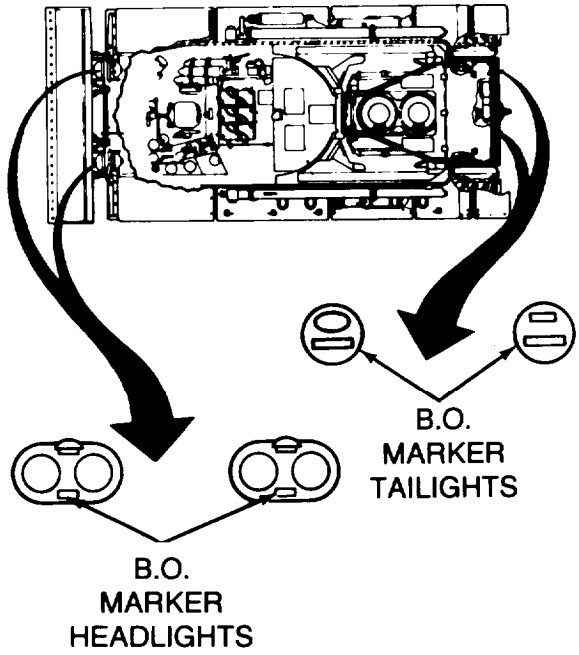
HEAD LIGHT

- **See Step (6).**

TAIL LIGHT



MASTER CONTROL PANEL



TA142506

Symptom-67

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

3 **Check rear accessory harness (CKT 24) at taillight that does not work for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First and Second Technician (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

First Technician (Rear Grille Doors)

- Disconnect rear accessory harness (CKT 24) connector from taillight assembly that does not work.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to rear accessory harness (CKT 24) connector and black probe to ground.

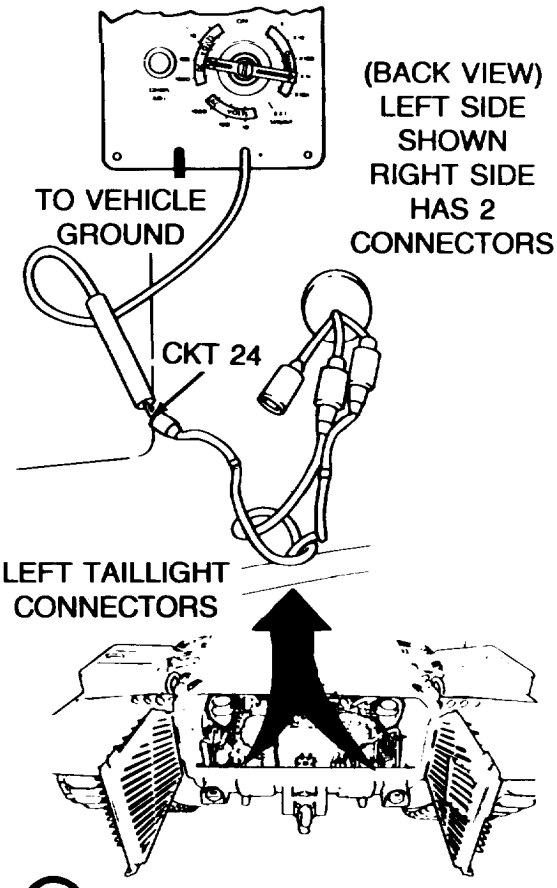
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Rear Grille Doors)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



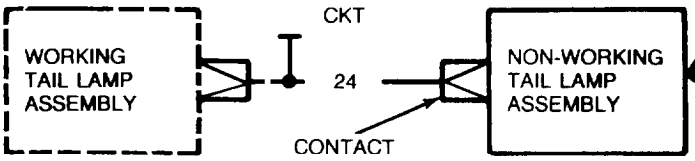
4 **Replace socket and wiring assembly (page 10-229).**

YES

NO

5

- **Inspect rear accessory harness for bent/broken connector contacts or loose (CKT 24) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective rear accessory harness.**
- **Connect rear accessory harness (CKT 24) connector to taillight assembly.**
- **Install transmission shroud (page 9-23).**



TA142507

Symptom-67

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

FROM STEP 2

6 Check headlight base harness (CKT 20) connector, at headlight assembly that does not work, for electrical power.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Front of Vehicle)

- Remove headlight assembly that does not work (page 10-238).
- Connect red probe of meter to contact F (CKT 20) of headlight base harness connector and black probe to ground.

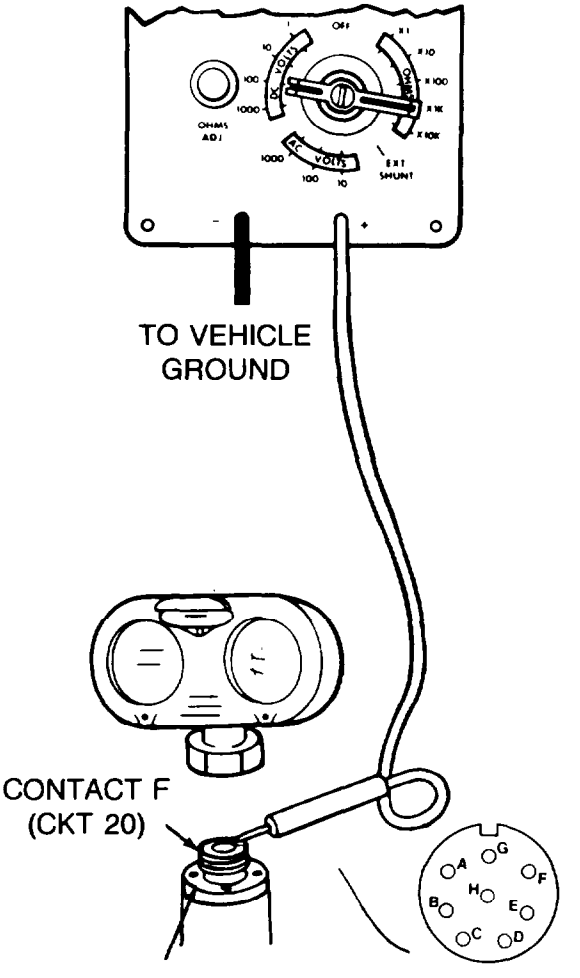
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Front of Vehicle)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



HEADLIGHT ASSEMBLY

NO

YES

7 Replace headlight assembly (page 10-238).

TA142508

Symptom-67

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

8 **Check hull front master harness (CKT 20) at headlight base harness to headlight assembly that does not work, for electrical power.**

Second Technician (Driver's Station)

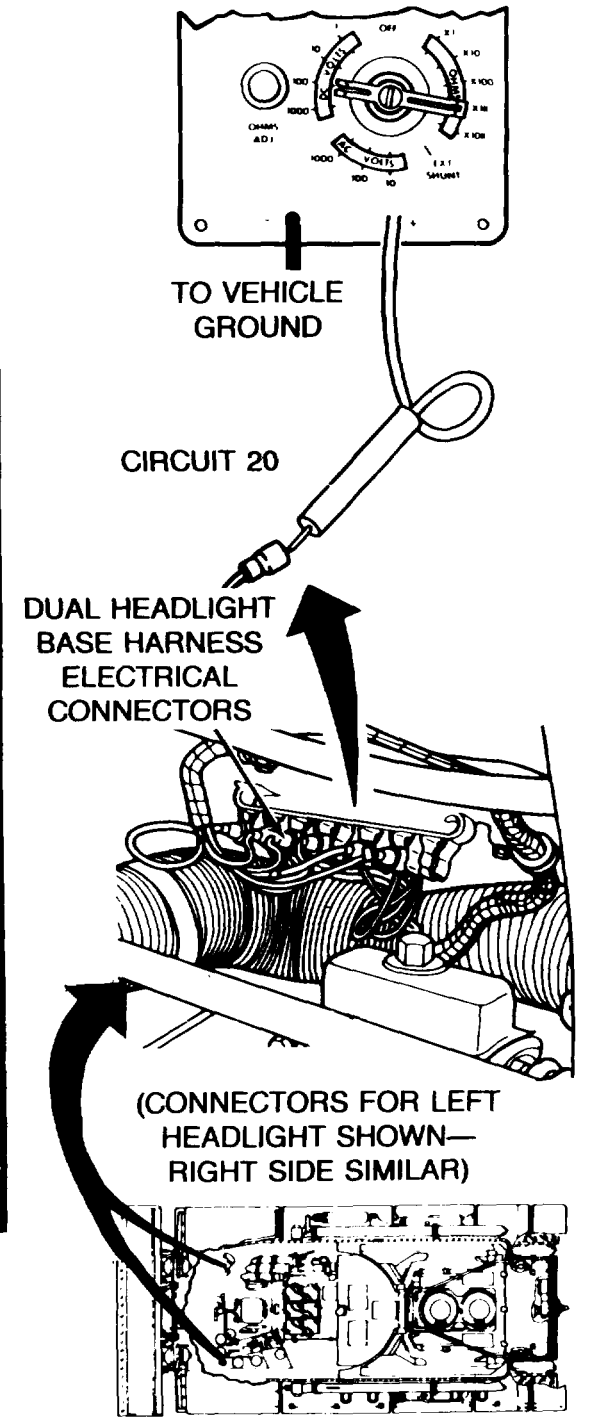
- Set MASTER BATTERY switch OFF.

First Technician (Front of Vehicle)

- Connect headlight assembly (page 10-238).

Second Technician (Driver's Station)

- If failure is in right service lamp, remove personnel heater (page 19-19).
- Locate (CKT 20) by checking marker bands and disconnect connector (CKT 20) of hull front master harness from headlight base harness connector. For left headlight, connector (CKT 20) is located in driver's station above master cylinder. For right headlight, connector (CKT 20) is located above and behind personnel heater.
- Connect red probe of meter to hull front master harness (CKT 20) connector and black probe to ground.
- Set MASTER BATTERY switch ON.



FOR CLARITY TURRET NOT SHOWN

TA142509

Symptom-67

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

STEP (8) CONTINUED

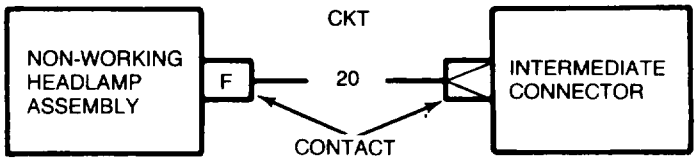
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES

9

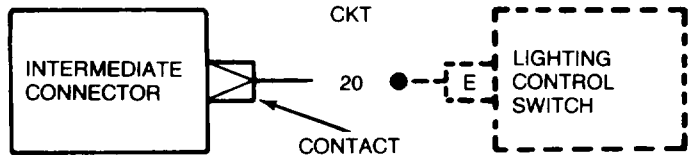
- **Repair headlight base harness (CKT 20) (page 10-307).**
- **If personnel heater has been removed install personnel heater (page 19-22).**



NO

10

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 20) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **If personnel heater has been removed install personnel heater (page 19-22).**
- **Connect hull front master harness to headlight base harness.**



TA142510

Symptom-68 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

HIGH BEAM OR LOW BEAM, IN ONE SERVICE HEADLIGHT LAMP, WILL NOT LIGHT OR SERVICE TAILLIGHT WILL NOT LIGHT (PANEL LIGHT SWITCH AT BRIGHT, DIM, OR OFF.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

(1) **Check if service taillight will light.**

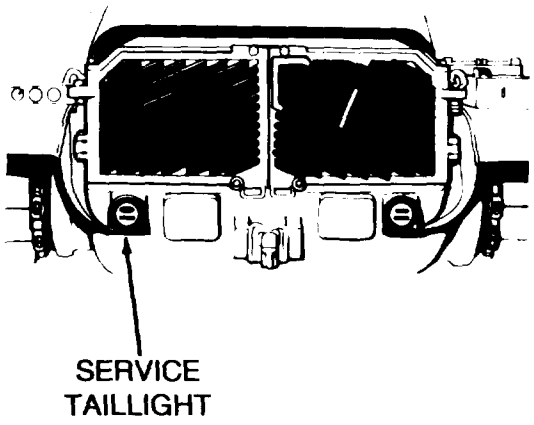
First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set LIGHTING CONTROL switch to SER DRIVE and PANEL switch to BRT.

Second Technician (Rear of Vehicle)

- Visually check if service taillight is working.

Does service taillight light?



NO

YES

(2)

- **Check if high beam or low beam in bad service headlight will not light.**
- **See Step (10).**

TA142511

Symptom-68

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

3 Check rear accessory harness (CKT 21) connector at left taillight for electrical power.

First and Second Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Rear Grille Doors)

- Disconnect rear accessory harness connector (CKT 21) from left taillight assembly.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to rear accessory harness connector (CKT 21) and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

First Technician (Rear Grille Doors)

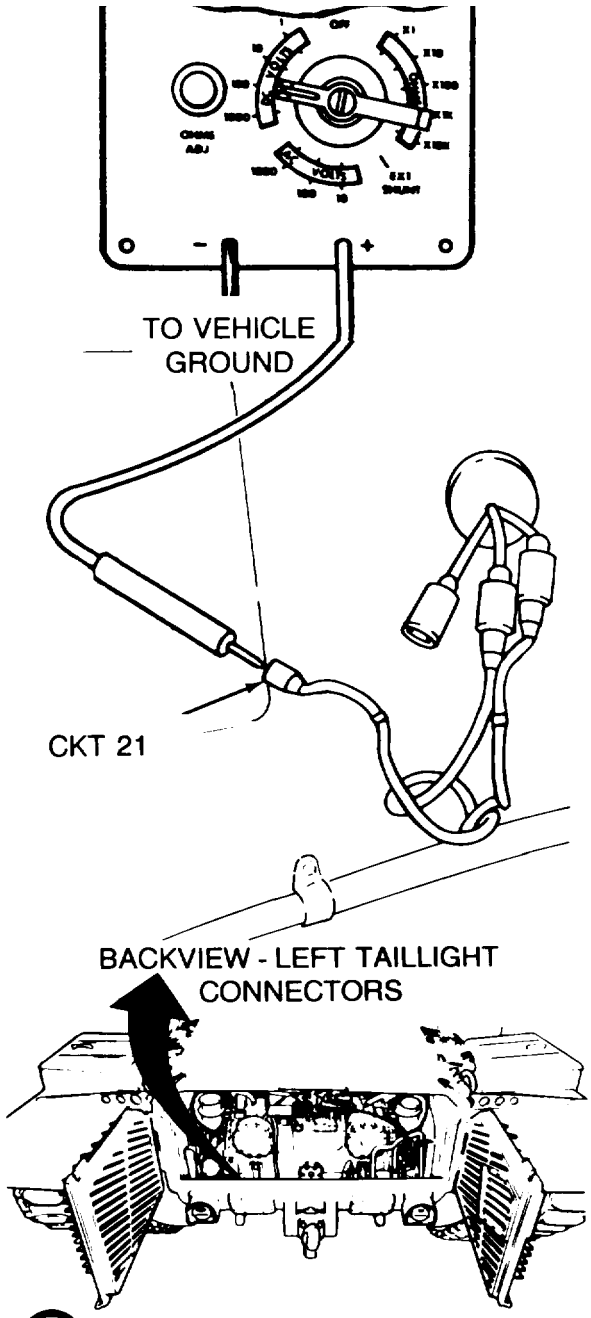
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

NO

YES

4 Replace socket and wiring assembly in left taillight (page 10-229).



TA142512

Symptom-68

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

5 Check hull front master harness (CKT 21) connector at bulkhead electrical disconnects for electrical power.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Rear Grille Doors)

- Connect rear accessory harness connector (CKT 21) to left taillight assembly.

First and Second Technicians (Rear Grille Doors)

- Install transmission shroud (page 9-23).

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10).
- Disconnect hull front master harness connector from bulkhead electrical disconnect.
- Connect red probe of meter to contact A (CKT 21) of hull front master harness connector at bulkhead electrical disconnect, and black probe to ground.

Second Technician (Driver's Station)

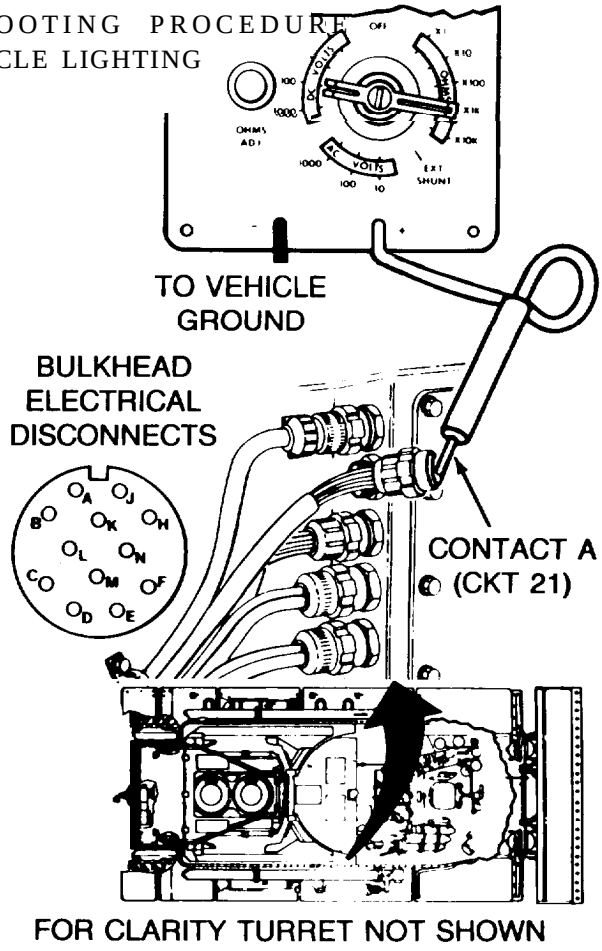
- Set MASTER BATTERY switch ON.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

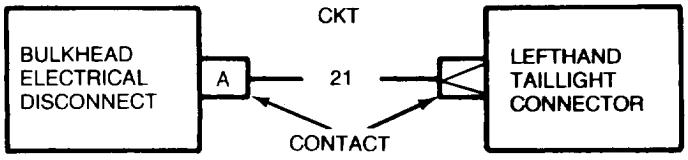
Does meter indicate 18 to 30 volts dc?

NO — YES



6

- **Inspect rear accessory harness for bent/broken connector contacts or loose (CKT 21) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective rear accessory harness.**
- **Connect hull front master harness to bulkhead electrical disconnect.**



TA142513

Symptom-68

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

7

Check hull front master harness (CKT 21) for continuity from connector at bulkhead electrical disconnect to connector at LIGHTING CONTROL switch.

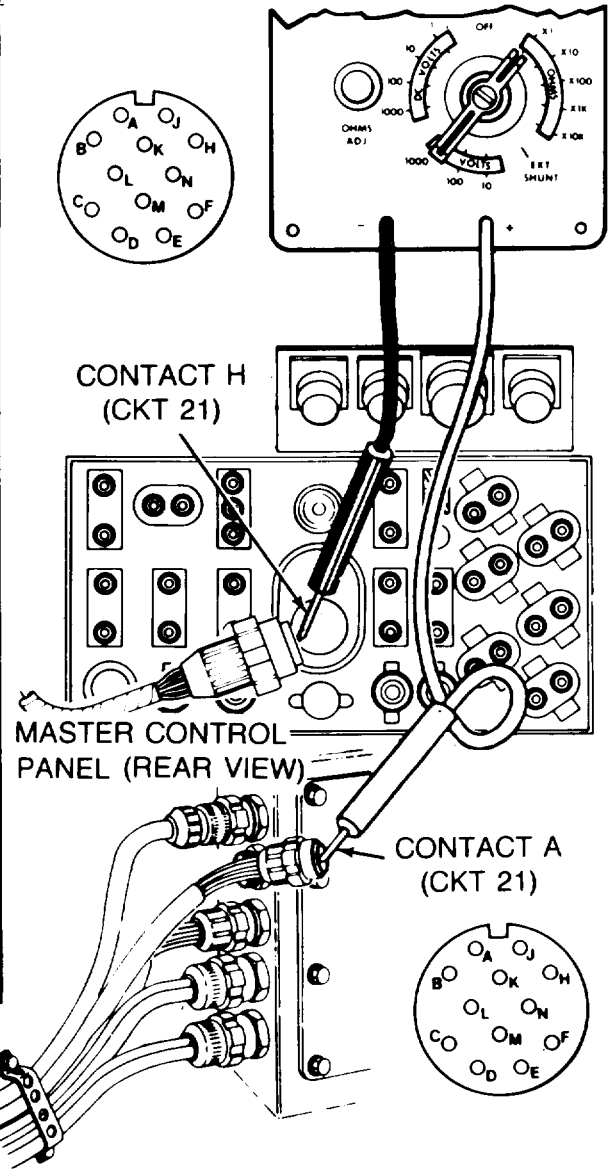
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch on master control panel.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect black probe of meter to contact H (CKT 21) of hull front master harness connector at LIGHTING CONTROL switch.

First Technician (Turret)

- Connect red probe of meter to contact A (CKT 21) of hull front master harness connector at bulkhead electrical disconnect.

Second Technician (Driver's Station)



TA142514

Symptom-68 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

STEP (7) CONTINUED

- Check if meter indicates continuity.

Does meter indicate continuity?

NO

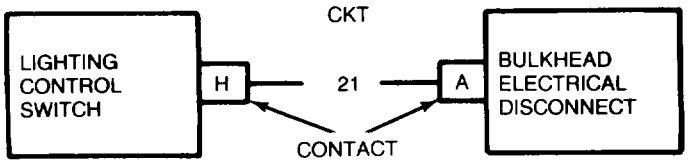
8

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 21) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connectors to LIGHTING CONTROL switch connector and bulkhead electrical disconnect.**
- **Install master control panel (page 10-47).**

YES

9

- **Replace LIGHTING CONTROL switch (page 10-68).**
- **Connect hull front master harness connector to bulkhead electrical disconnect.**



TA142515

Symptom-68

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

FROM STEP (2)

(10) **Check if high beam or low beam in bad service headlight lamp will not light.**

Second Technician (Front of Vehicle)

- Visually check if high beam or low beam in bad service headlight lamp will not light.

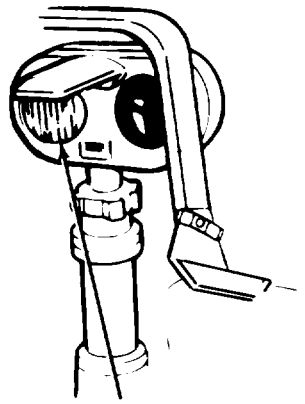
First Technician (Driver's Station)

- Press and release foot DIMMER SWITCH.

Second Technician (Front of Vehicle)

- Visually check if high beam or low beam in bad service headlight lamp will not light.

Which beam in service headlight lamp does not light?



SERVICE HEADLIGHT LAMP

LOW

HIGH

(11)

- **Check dual headlight base harness (CKT 17) connector at bad service headlight for electrical power.**

- **See Step (17).**

TA142516

Symptom-68 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

12 **Check dual headlight base harness (CKT 18) connector at bad service headlight for electrical power.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Front of Vehicle)

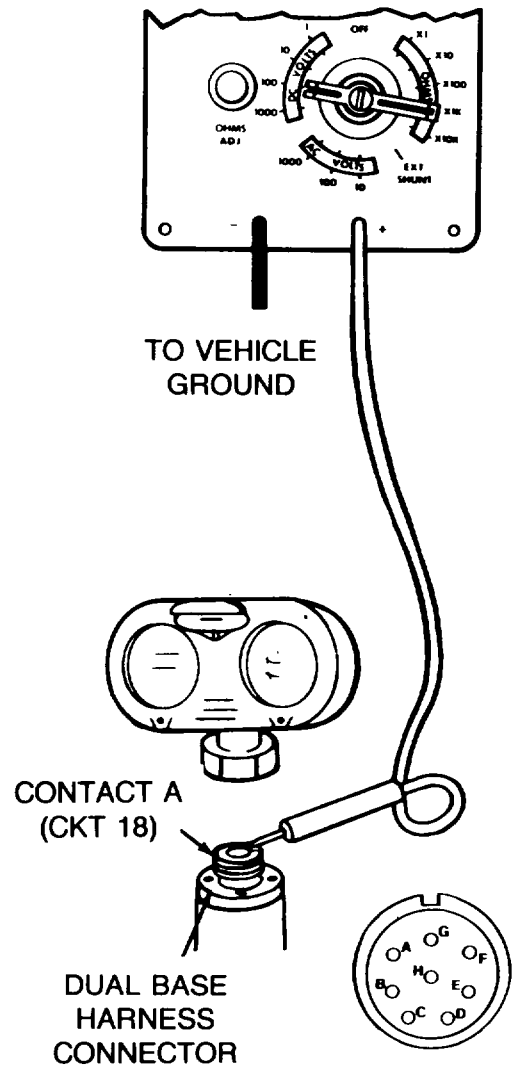
- Remove headlight assembly of bad service lamp (page 10-238).
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact A (CKT 18) of dual headlight base harness connector and black probe to ground.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

Second Technician (Front of Vehicle)

- Have first technician press and release foot DIMMER SWITCH two or three times.
- Check if meter indicates 18 to 30 volts dc.



Does meter indicate 18 to 30 volts dc in one of the foot DIMMER SWITCH positions?

NO

YES

13 **Replace bad headlight assembly (page 10-238).**

TA142517

Symptom-68

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

NOTE

If the problem is with the left side service lamp check the left side intermediate connectors. If the problem is with the right side service lamp, remove the personnel heater and check the right side intermediate connectors.

14 Check hull front master harness (CKT 18) at intermediate connector for electrical power.

First Technician (Driver's Station)

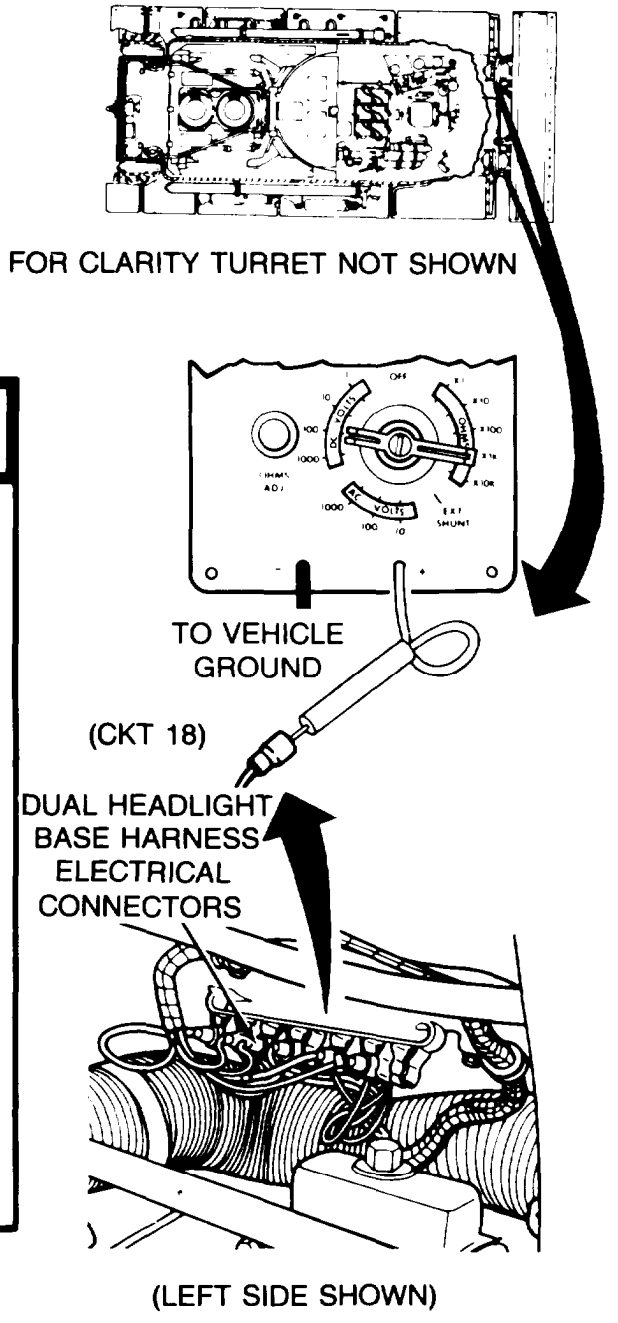
- Set MASTER BATTERY switch OFF.

Second Technician (Front of Vehicle)

- Install headlight assembly (page 10-238).

First Technician (Driver's Station)

- Locate CKT 18 by checking marker bands and disconnect connector (CKT 18) of hull front master harness from headlight base connector of bad service lamp. For left headlight, (CKT 18) is located in drivers station above master cylinder. For right headlight connector (CKT 18) is located above and behind personnel heater.
- Connect red probe of meter to hull front master harness connector (CKT 18) of bad service lamp and black probe to ground.
- Set MASTER BATTERY switch ON.



TA142518

Symptom-68 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

STEP (14) CONTINUED

- Press and release foot DIMMER SWITCH two or three times.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc in one of the DIMMER SWITCH positions?

NO

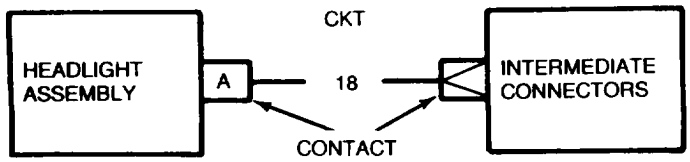
15

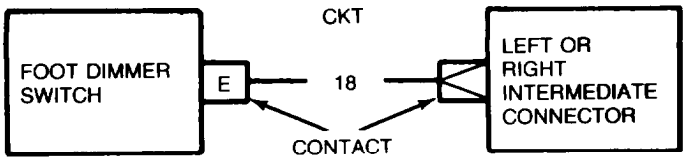
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 18) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness intermediate connector to dual headlight base harness connector.**

YES

16

Repair dual headlight base harness (page 10-307).





TA142519

Symptom-68

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

FROM STEP (11)

17 Check dual headlight base harness (CKT 17) connector at bad service headlight for electrical power.

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

Second Technician (Front of Vehicle)

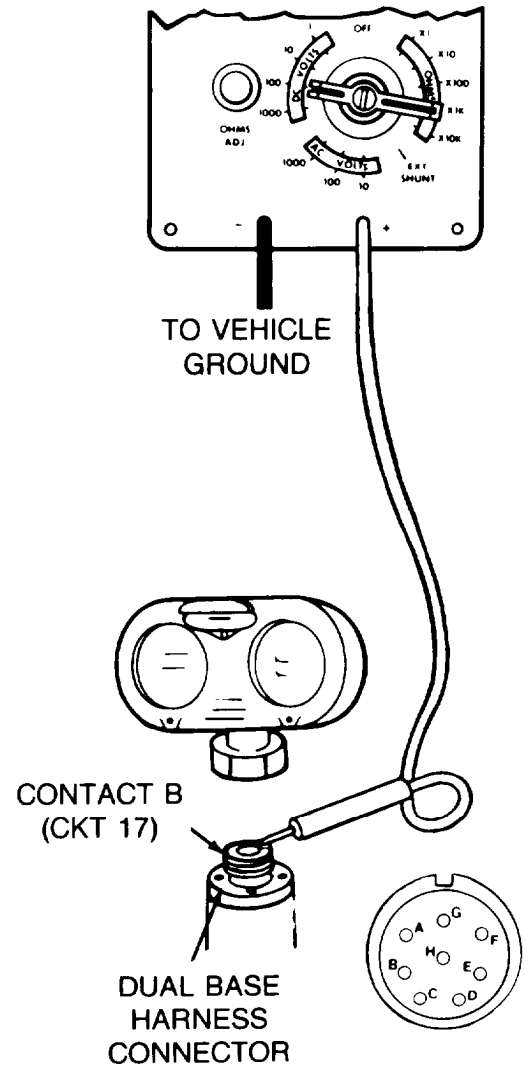
- Remove headlight assembly of bad service lamp (page 10-238).
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact B (CKT 17) of dual headlight base harness connector and black probe to ground.

First Technician (Driver's Station)

- Set MASTER BATTERY switch ON.

Second Technician (Front of Vehicle)

- Have first technician press and release foot DIMMER SWITCH two or three times.
- Check if meter indicates 18 to 30 volts dc.



Does meter indicate 18 to 30 volts dc in one of the foot DIMMER SWITCH positions?

NO

YES

18 Replace bad headlight assembly (page 10-238).

TA142520

Symptom-68

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

NOTE

If the problem is with the left side service lamps check the left side intermediate connectors. If the problem is with the right side service lamp remove the personnel heater and check the right side intermediate connectors.

19 Check hull front master harness (CKT 17) at intermediate connector for electrical power.

First Technician (Driver's Station)

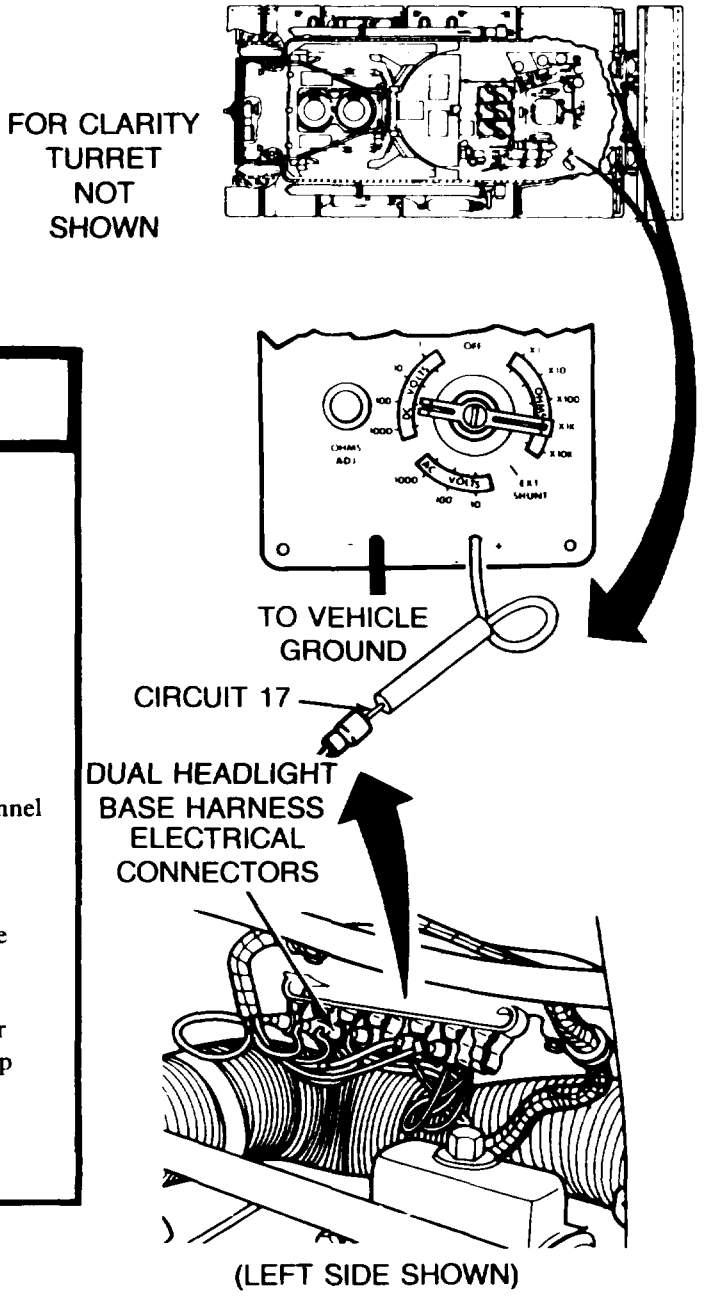
- Set MASTER BATTERY switch OFF.

Second Technician (Front of Vehicle)

- Install headlight assembly (page 10-238).

First Technician (Driver's Station)

- If failure is in right service lamp, remove personnel heater (page 19-19).
- Disconnect hull front master harness (CKT 17) intermediate connector from dual headlight base harness connector of bad service lamp.
- Connect red probe of meter to hull front master harness connector (CKT 17) of bad service lamp and black probe to ground.
- Set MASTER BATTERY switch ON.



TA142521

Symptom-68 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

STEP (19) CONTINUED

- Press and release foot DIMMER SWITCH two or three times.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc in one of the DIMMER SWITCH positions?

NO

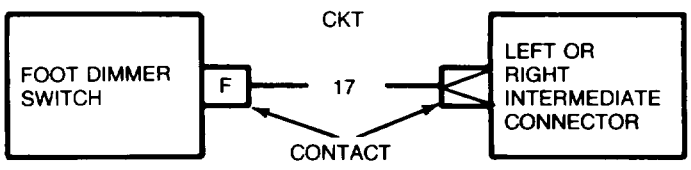
20

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 17) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness intermediate connector to dual headlight base harness connector.**

YES

21

Repair dual headlight base harness (page 10-307).



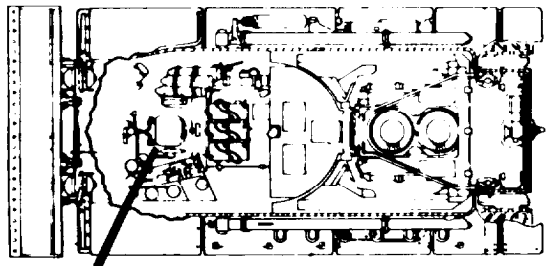
TA142522

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

Symptom-69

BOTH HIGH BEAM AND/OR BOTH LOW BEAM SERVICE LAMPS WILL NOT LIGHT (DIMMER SWITCH IN EITHER POSITION).

FOR CLARITY TURRET NOT SHOWN

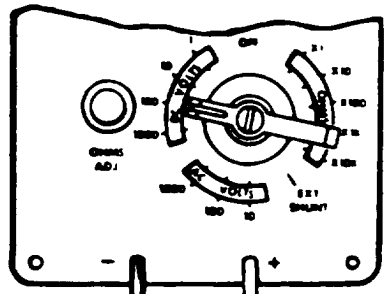


1 **Check hull front master harness (CKT 16) at foot DIMMER SWITCH for electrical power.**

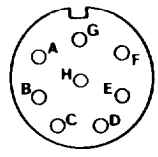
Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Remove foot DIMMER SWITCH. (page 10-207).
- Disconnect hull front master harness connector from foot DIMMER SWITCH.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact G (CKT 16) of hull front master harness connector at foot DIMMER SWITCH and black probe to ground.
- Set LIGHTING CONTROL switch to SER DRIVE and PANEL light switch to BRT.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

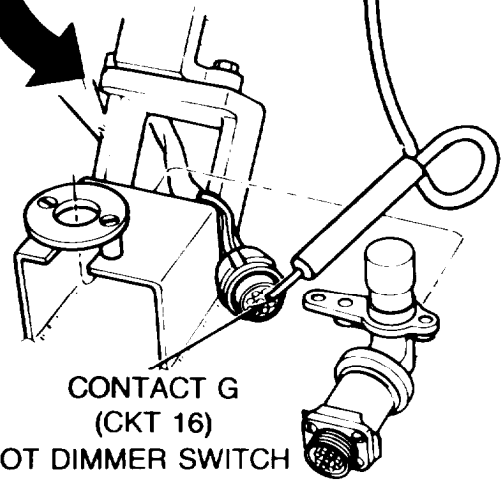
Does meter indicate 18 to 30 volts dc?



TO VEHICLE GROUND



CONTACT G
(CKT 16)
FOOT DIMMER SWITCH



NO

YES

2 **Check hull front master harness (CKT 16) for continuity from connector at LIGHTING CONTROL switch to connector at foot DIMMER SWITCH.**

- **See Step (8).**

TA142523

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

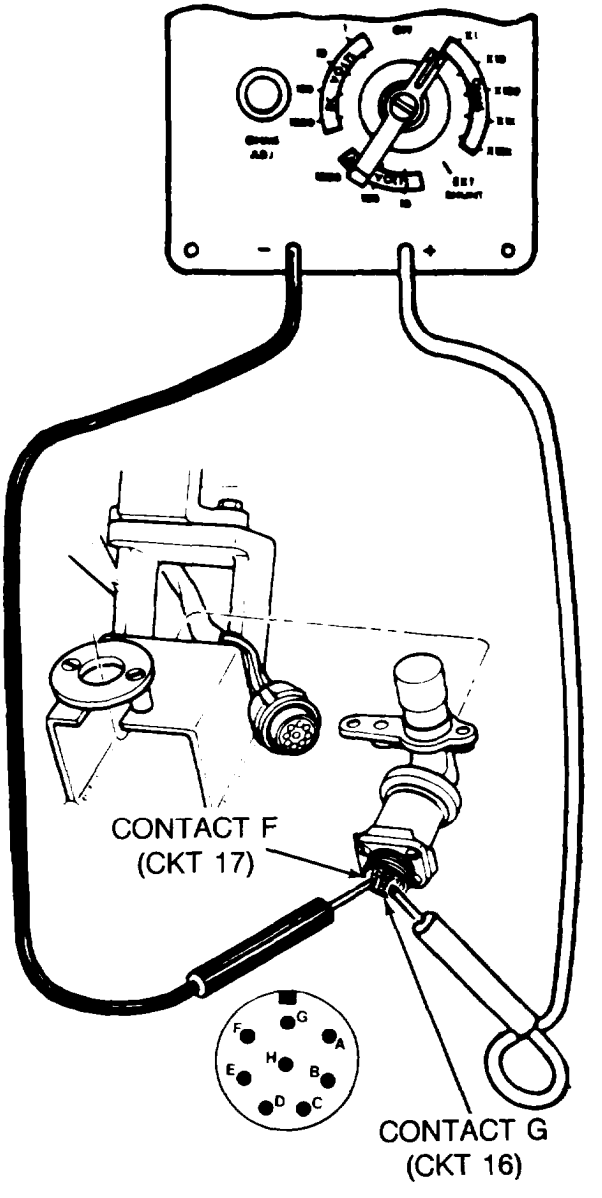
Symptom-69

3 **Check foot DIMMER SWITCH for continuity from contact F to contact G in both positions.**

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set multimmeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact G (CKT 16) of foot DIMMER SWITCH.
- Connect black probe of meter to contact F (CKT 17) of foot DIMMER SWITCH.
- Check if meter indicates continuity.
- Press and release foot DIMMER SWITCH.
- Check if meter indicates continuity.

Does meter indicate continuity in one switch position only?



YES

NO

4 **Replace foot DIMMER SWITCH (page 10-207).**

TA142524

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

Symptom-69

5 **Check foot DIMMER SWITCH for continuity from contact E to contact G in both switch positions.**

Technician (Driver's Station)

- Connect red probe of meter to contact G (CKT 16) of foot DIMMER SWITCH.
- Connect black probe of meter to contact E (CKT 18) of foot DIMMER SWITCH.
- Check if meter indicates continuity.
- Press and release foot DIMMER SWITCH.
- Check if meter indicates continuity.

Does meter indicate continuity in one switch position only?

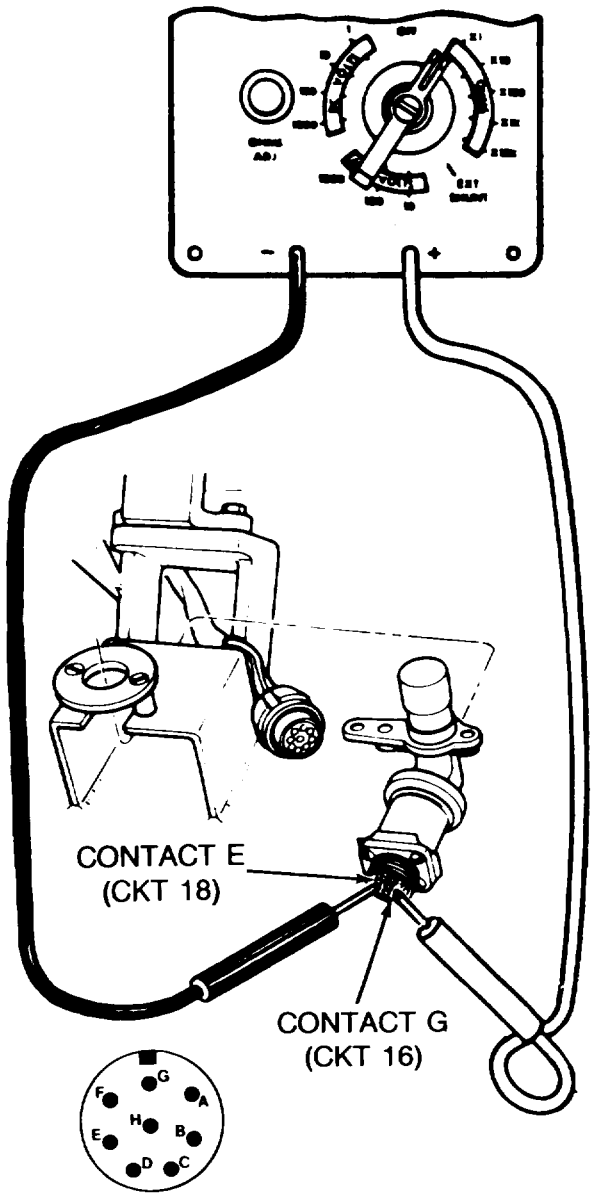
6 **Replace foot DIMMER SWITCH (page 10-207).**

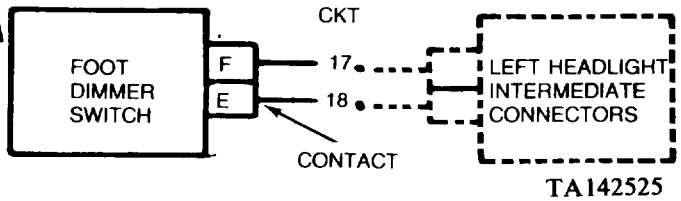
NO

7

- **Inspect hull front master harness (CKT 17 for high beam or CKT 18 for low beam) for bent/broken connector contacts or loose (CKT 17/18) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Install foot DIMMER SWITCH (page 10-207).**

YES





TA142525

Symptom-69

FROM STEP (7)

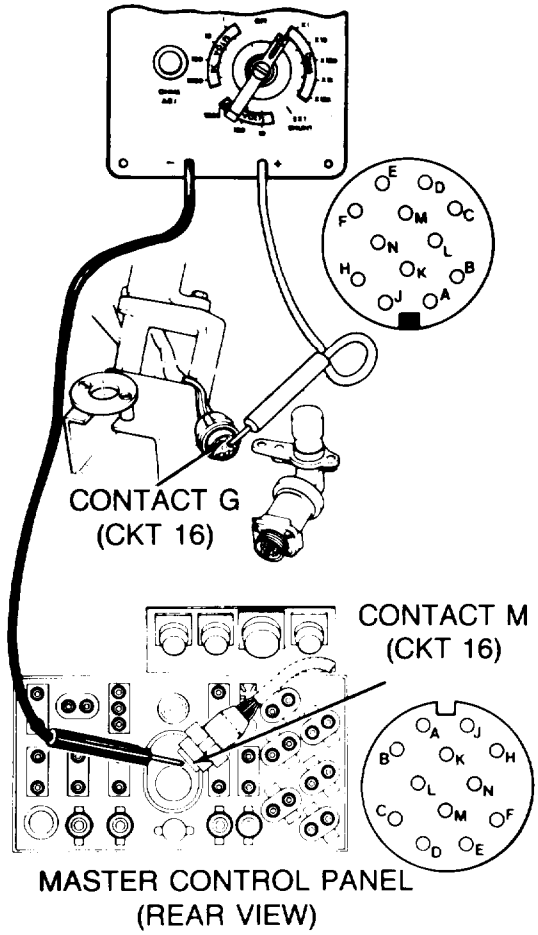
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

8 Check hull front master harness (CKT 16) for continuity from connector at LIGHTING CONTROL switch to connector at foot DIMMER SWITCH.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch on master control panel.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact G (CKT 16) of hull front master harness connector at foot DIMMER SWITCH.
- Connect black probe of meter to contact M (CKT 16) of hull front master harness connector at LIGHTING CONTROL switch.
- Check if meter indicates continutity.

Does meter indicate continuity?



9

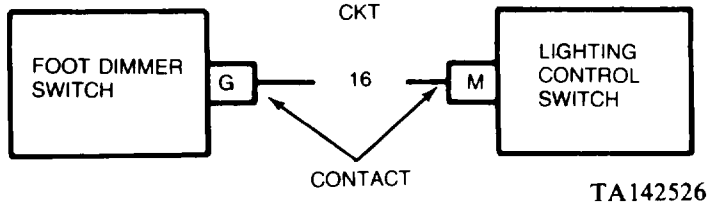
- **Inspect hull front master harness (CKT 16) for bent/broken connector contacts or loose connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Install foot DIMMER SWITCH (page 10-207).**
- **Install master control panel (page 10-47).**

NO

YES

10

- **Replace LIGHTING CONTROL switch (page 10-68).**
- **Install foot DIMMER SWITCH (page 10-207).**



TA142526

Symptom-70 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

BOTH HIGH BEAM OR BOTH LOW BEAM IR LAMPS WILL NOT LIGHT.

WARNING

Do not look into IR lamps to see if they are on—severe eye damage may result.

NOTE

To check if IR lamps are working, place hand over the lens. The lens will be warm when IR lamp is on.

1 Check foot DIMMER SWITCH for continuity from contact A to contact C in both switch positions.

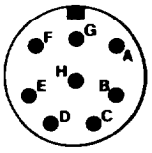
Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Remove foot DIMMER SWITCH (page 10-207).
- Disconnect hull front master harness connector from foot DIMMER SWITCH.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect probes of meter to contacts A and C of foot DIMMER SWITCH.
- Check if meter indicates continuity.
- Press and release foot DIMMER SWITCH.
- Check if meter indicates continuity.

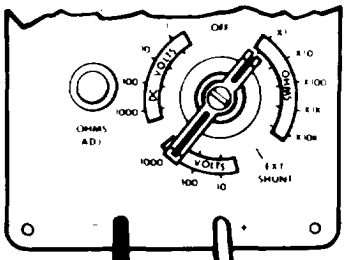
Does meter indicate continuity in one switch position only?

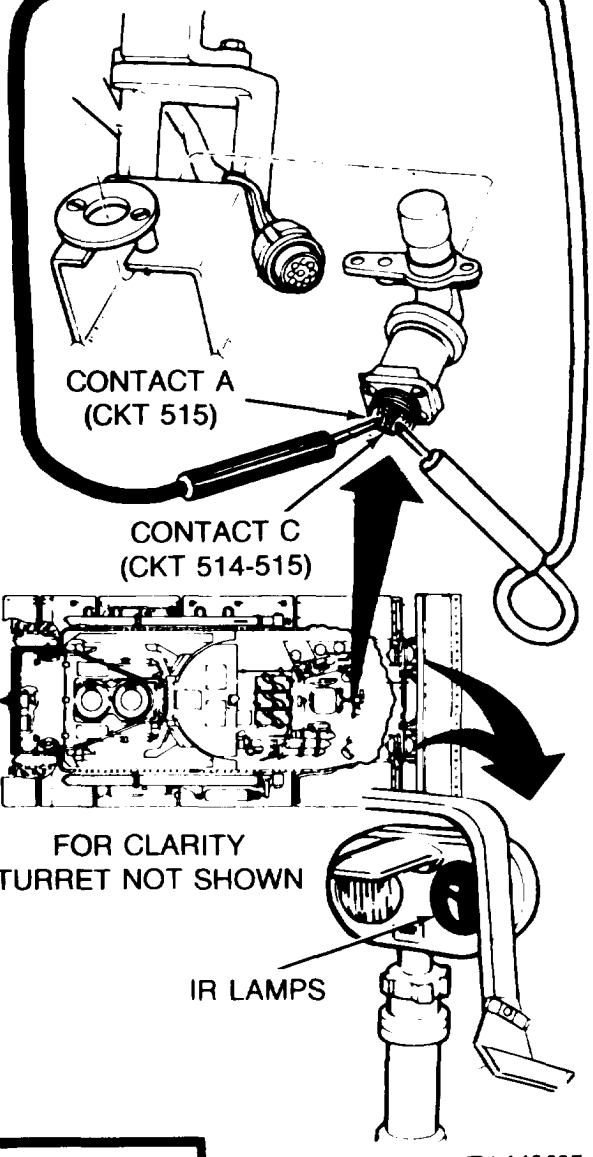
NO → **2 Replace foot DIMMER SWITCH (page 10-207).**

YES



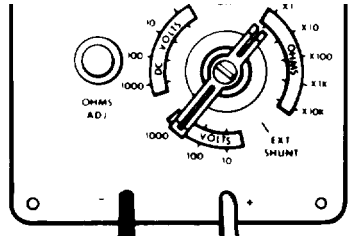
FOOT DIMMER SWITCH





TA142527

Symptom-70 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

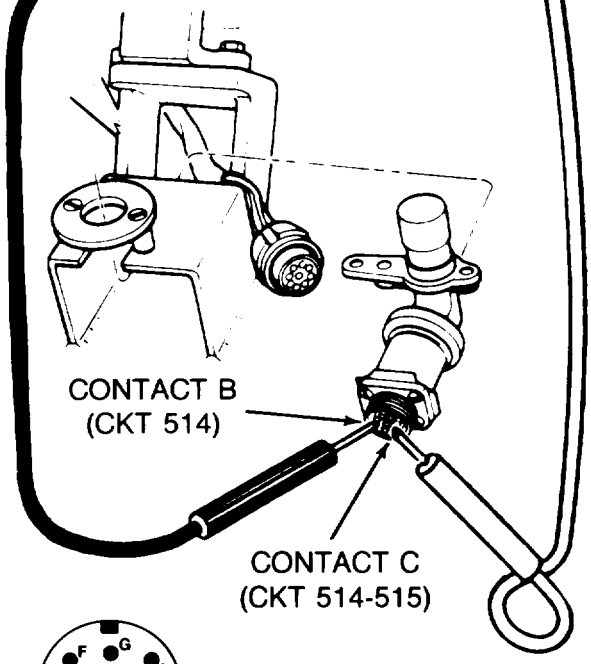


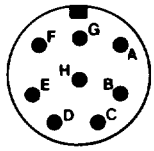
3 **Check foot DIMMER SWITCH for continuity from contact B to contact C in both switch positions.**

Technician (Driver's Station)

- Connect probes of meter to contacts C (CKT 514-515) and contact B (CKT 514) of foot DIMMER SWITCH.
- Check if meter indicates continuity.
- Press and release foot DIMMER SWITCH.
- Check if meter indicates continuity.

Does meter indicate continuity in one switch position only?





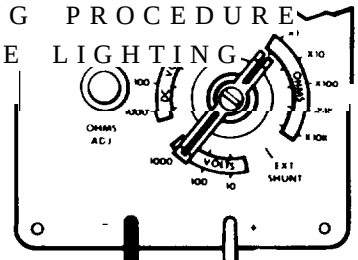
YES

NO

4 **Replace foot DIMMER SWITCH (page 10-207).**

TA142528

Symptom-70 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

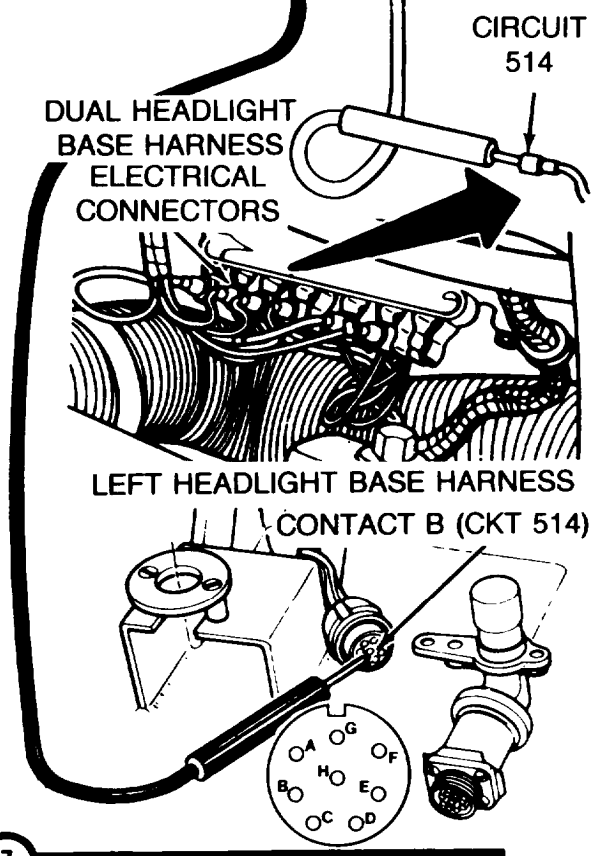


5 **Check hull front master harness (CKT 514) for continuity from intermediate connector to contact B of connector to foot DIMMER SWITCH.**

Technician (Driver's Station)

- Disconnect front master harness connector (CKT 514) from left headlight base harness.
- Connect red probe of meter to hull front master harness intermediate connector (CKT 514).
- Connect black probe of meter to contact B (CKT 514) of hull front master harness connector at foot DIMMER SWITCH.
- Check if meter indicates continuity.

Does meter indicate continuity?



6

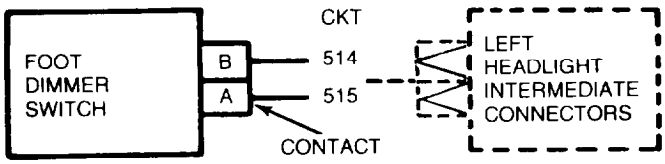
- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 514) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Install foot DIMMER SWITCH (page 10-207).**

NO

YES

7

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 515) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Install foot DIMMER SWITCH (page 10-207).**



TA142529

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING

Symptom-71

IR LAMPS WILL NOT LIGHT.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check if B.O. drive lamp will light.

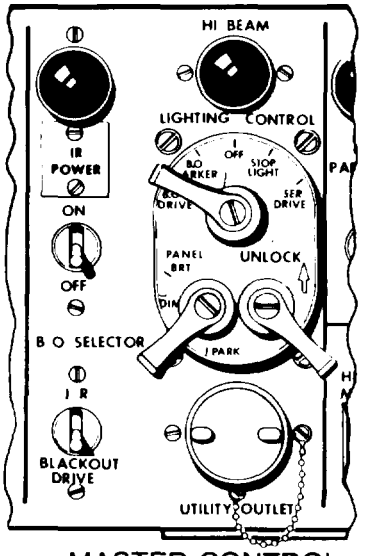
First Technician (Driver's Station)

- Ste MASTER BATTERY switch ON.
- Turn LIGHTING CONTROL switch to B.O. DRIVE.
- Set B.O. SELECTOR switch to BLACKOUT DRIVE.

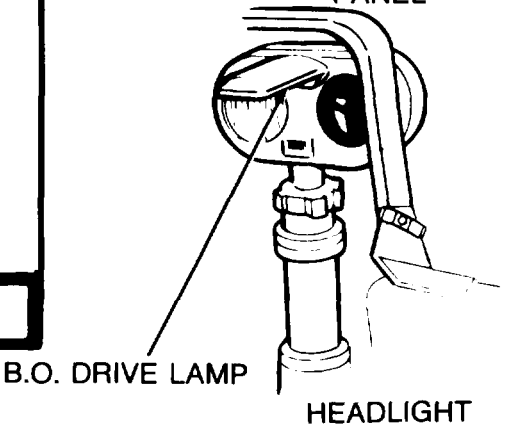
Second Technician (Front of Vehicle)

- Visually check if B.O. drive lamp is lit.

Does B.O. drive lamp light?



MASTER CONTROL PANEL



HEADLIGHT ASSEMBLY

YES

NO

2

- **Check if gage instrument panel lamps will light.**
- **See Step (12) .**

TA142530

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

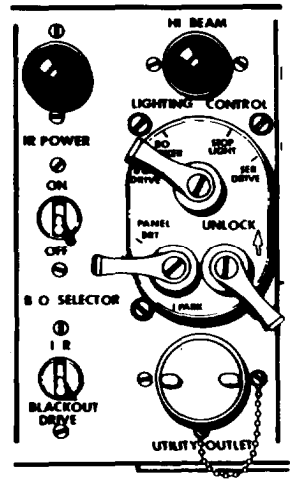
Symptom-71

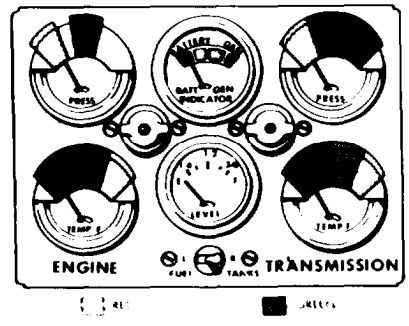
3 **Check if gage instrument panel lamps will light.**

First Technician (Driver's Station)

- Set LIGHTING CONTROL PANEL switch to DIM.
- Visually check if gage instrument panel lamps are lit.

Do gage instrument panel lamps light?





GAGE INSTRUMENT PANEL

YES

NO

4
- **Check hull front master harness (CKT 514-515) at connector to foot DIMMER SWITCH for electrical power.**
- **See Step (19)**

TA142531

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

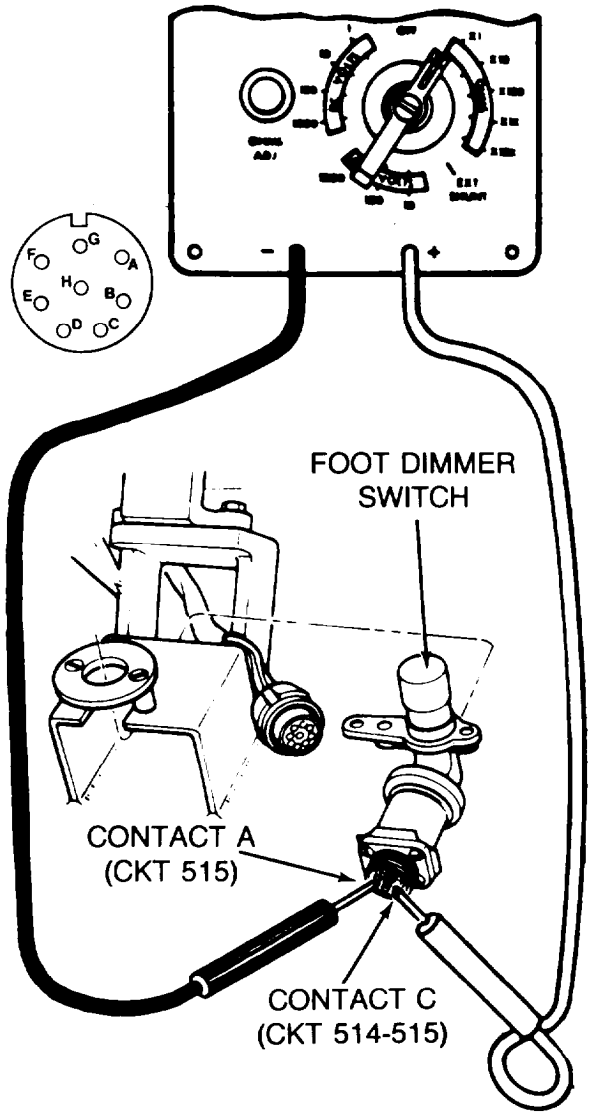
Symptom-71

5 **Check foot DIMMER SWITCH for continuity from contact A to contact C in both switch positions.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Remove foot DIMMER SWITCH (page 10-207).
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact C (CKT 514-515) and black probe to contact A (CKT 515) of foot DIMMER SWITCH connector.
- Check if meter indicates continuity.
- Press and release foot DIMMER SWITCH.
- Check if meter indicates continuity.

Does meter indicate continuity in one DIMMER SWITCH position?



YES

NO

6 **Replace foot DIMMER SWITCH (page 10-207).**

TA142532

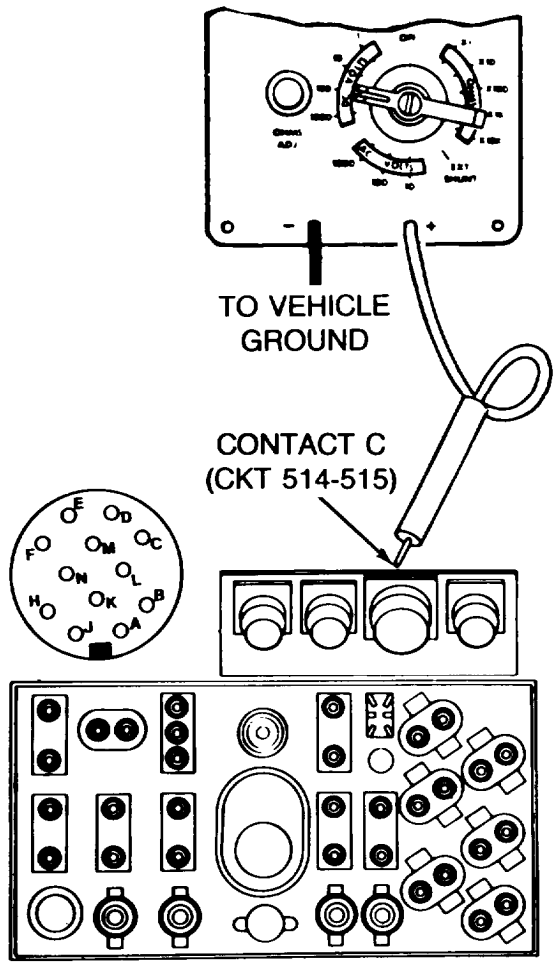
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

Symptom-71

7 Check master control panel accessories harness (CKT 514-515) at panel connector for electrical power.

First Technician (Driver's Station)

- Install foot DIMMER SWITCH (page 10-207).
- Set B.O. SELECTOR switch to IR.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master control panel.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact C (CKT 514-515) of master control panel accessories harness connector and black probe to ground.



MASTER CONTROL PANEL (REAR VIEW)

TA142533

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

STEP (7) CONTINUED

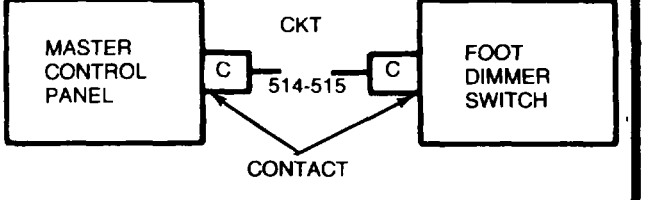
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES

(8)

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 514-515) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to master control accessories harness connector.**
- **Install master control panel (page 10-47).**



NO

TA142534

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

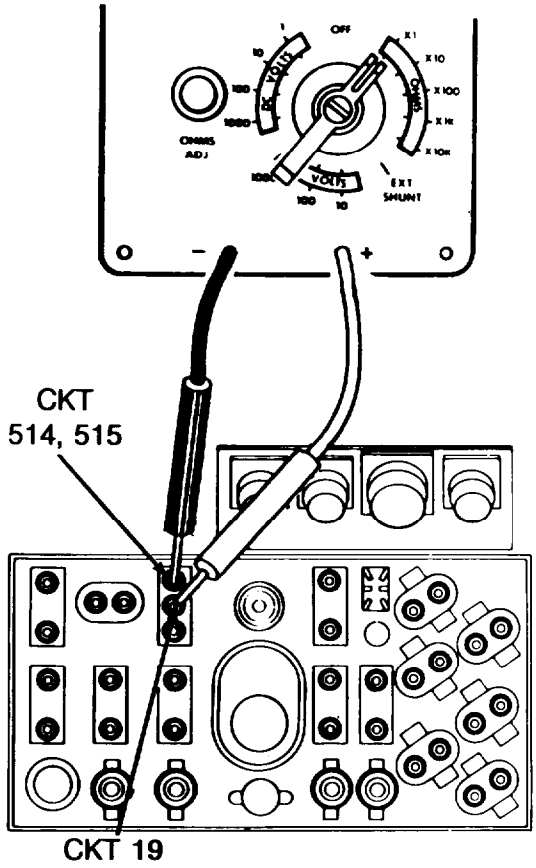
Symptom-71

9 **Check B.O. SELECTOR switch for continuity (switch in IR position).**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect master control panel accessories harness connectors (CKT 514-515 and CKT 19) from B.O. SELECTOR switch.
- Set multimeter to OHMS X1 scale, and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to center contact and black probe to top contact of B.O. SELECTOR switch.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO → **10** **Replace B.O. SELECTOR switch (page 10-72).**

YES → **11** **Replace master control panel accessories harness (page 10-103).**

TA142535

Symptom-71

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

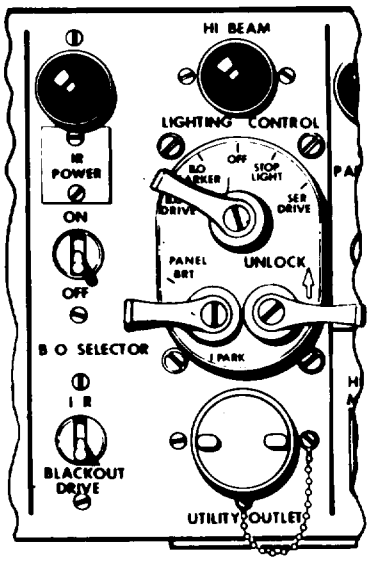
FROM STEP (2)

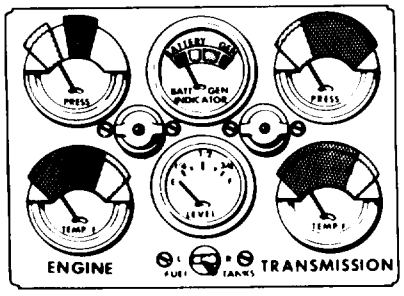
12 Check if gage instrument panel lamps will light.

First Technician (Driver's Station)

- Set LIGHTING CONTROL switch to DIM.
- Visually check if gage instrument panel lamps are lit.

Do gage instrument panel lamps light?





GAGE INSTRUMENT PANEL

YES

NO

13 Replace LIGHTING CONTROL switch (page 10-68).

TA142536

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

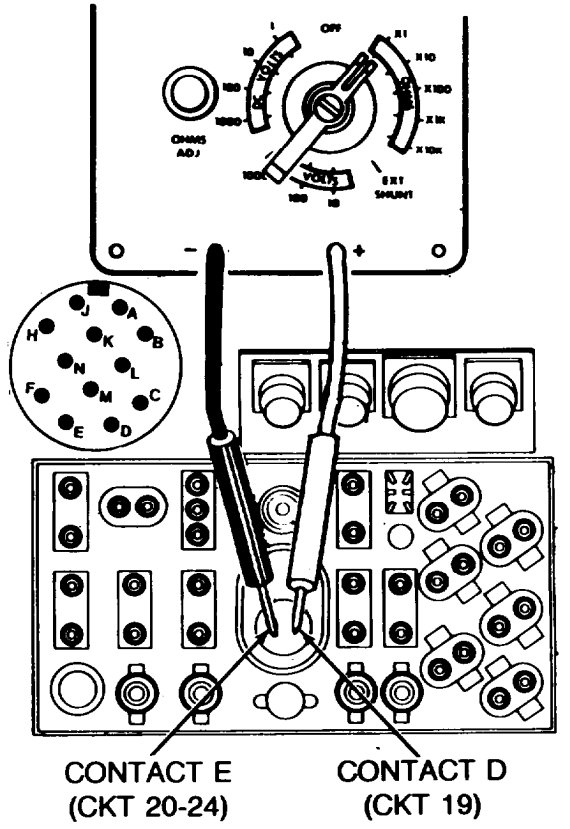
Symptom-71

14 **Check LIGHTING CONTROL switch for continuity between contacts D and E.**

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from LIGHTING CONTROL switch connector on master control panel.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact D (CKT 19) and black probe to contact E (CKT 20-24) of LIGHTING CONTROL switch connector.
- Check if meter indicates continuity.

Does meter indicate continuity?



MASTER CONTROL PANEL (REAR VIEW)

YES

NO

15 **Replace LIGHTING CONTROL switch (page 10-68).**

TA142537

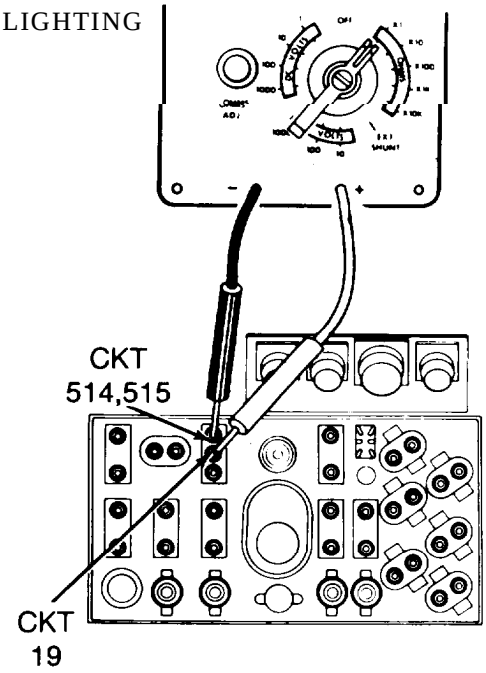
Symptom-71 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

16 **Check B.O. SELECTOR switch for continuity (switch in IR position).**

First Technician (Driver's Station)

- Set B.O. SELECTOR switch to IR.
- Disconnect master control panel accessories harness connectors (CKT 514-515 and CKT 19) from BO SELECTOR switch.
- Connect red probe of meter to center contact and black probe to top contact of B.O. SELECTOR switch.
- Check if meter indicates continuity.

Does meter indicate continuity?



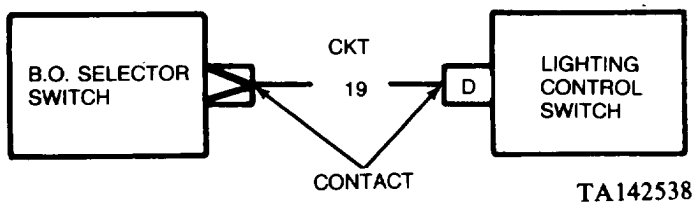
YES

17

- **Inspect hull front master harness for bent/broken connector contacts or loose (CKT 19) wire at rear of connectors (CKT 19) from B.O. SELECTOR switch to LIGHTING CONTROL switch.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to LIGHTING CONTROL switch connector on master control panel.**
- **Connect master control panel accessories harness connectors (CKT 514-515 and CKT 19) to B.O. SELECTOR switch.**
- **Install master control panel (page 10-47).**

NO

18 **Replace B.O. SELECTOR switch (page 10-72).**



TA142538

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

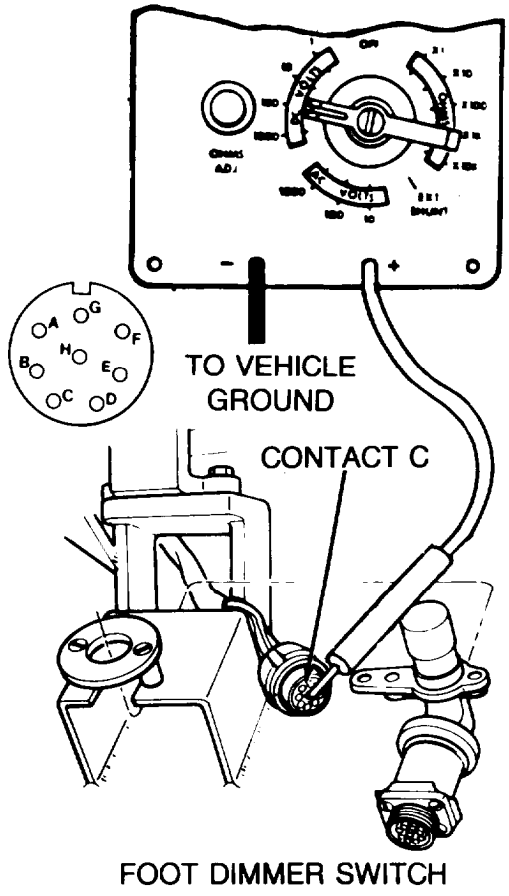
FROM STEP 4

19 Check hull front master harness (CKT 514-515) at connector to foot DIMMER SWITCH for electrical power.

First Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set B.O. SELECTOR switch to IR.
- Remove foot DIMMER SWITCH (page 10-207).
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact C (CKT 514-515) of hull front master harness connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 votls dc.

Does meter indicate 18 to 30 volts dc?



NO

YES

20 Replace foot DIMMER SWITCH (page 10-207).

TA142539

Symptom-71

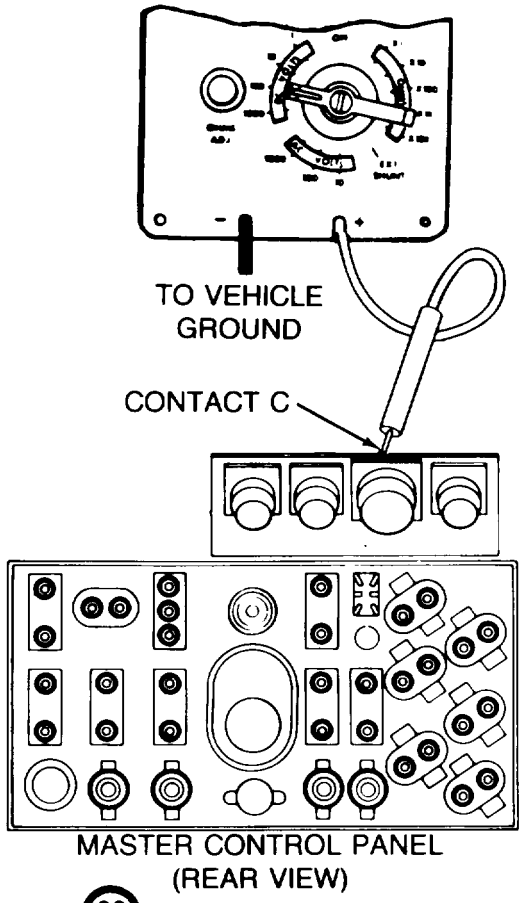
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - VEHICLE LIGHTING
(Continued)

21 **Check master control panel accessories harness (CKT 514-515) panel connector for electrical power.**

First Technician (Driver's Station)

- Install foot DIMMER SWITCH (page 10-207).
- Displace master control panel (page 10-45).
- Disconnect hull front master harness connector from master control panel accessories harness connector.
- Connect red probe of meter to contact C (CKT 514-515) of master control panel connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



MASTER CONTROL PANEL (REAR VIEW)

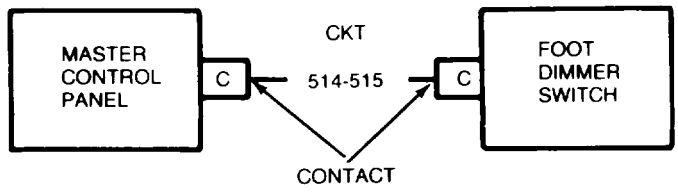
YES

NO

22 **Replace master control panel accessories harness (page 10-103).**

23

- **Inspect front master harness for bent/broken connector contacts or loose (CKT 514-515) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness connector to master control panel accessories harness connector.**
- **Install master control panel (page 10-47).**



TA142540

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE

NIGHT VISION/IR PERISCOPE WILL NOT WORK (NIGHT VISION/IR POWER INDICATOR LAMP WILL NOT LIGHT).

1 Check NIGHT VISION/IR POWER switch in master control panel for continuity.

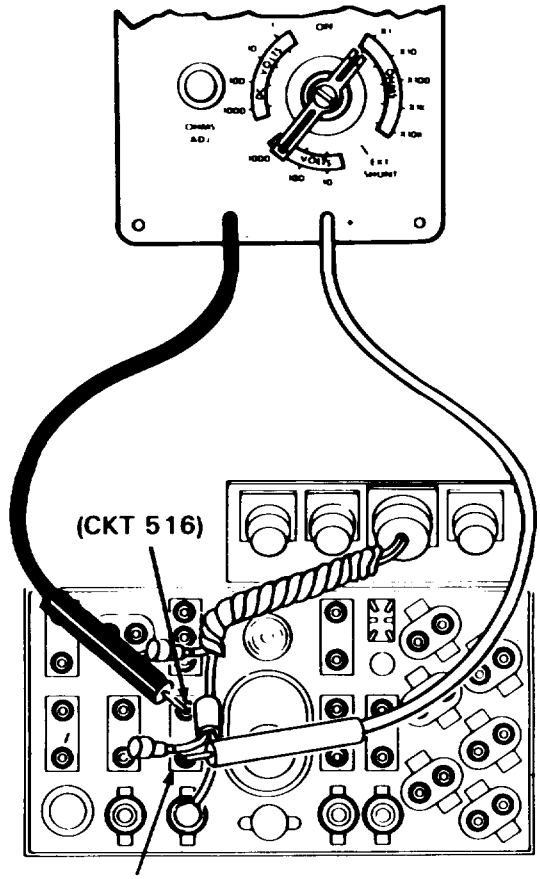
Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set NIGHT VISION/IR POWER switch OFF.
- Displace master control panel (page 10-45).
- Disconnect master control panel accessories harness leads (CKT 516) from NIGHT VISION/IR POWER switch.
- Set multimeter to OHMS X1 scale and zero meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to one contact or NIGHT VISION/IR POWER switch.
- Connect black probe of meter to the other contact of NIGHT VISION/IR POWER switch.
- Set NIGHT VISION/IR POWER switch ON.
- Check if meter indicates continuity.

Does meter indicate continuity?

NO → **2 Replace NIGHT VISION/IR POWER switch (page 10-64).**

YES



TA253125

Symptom-72

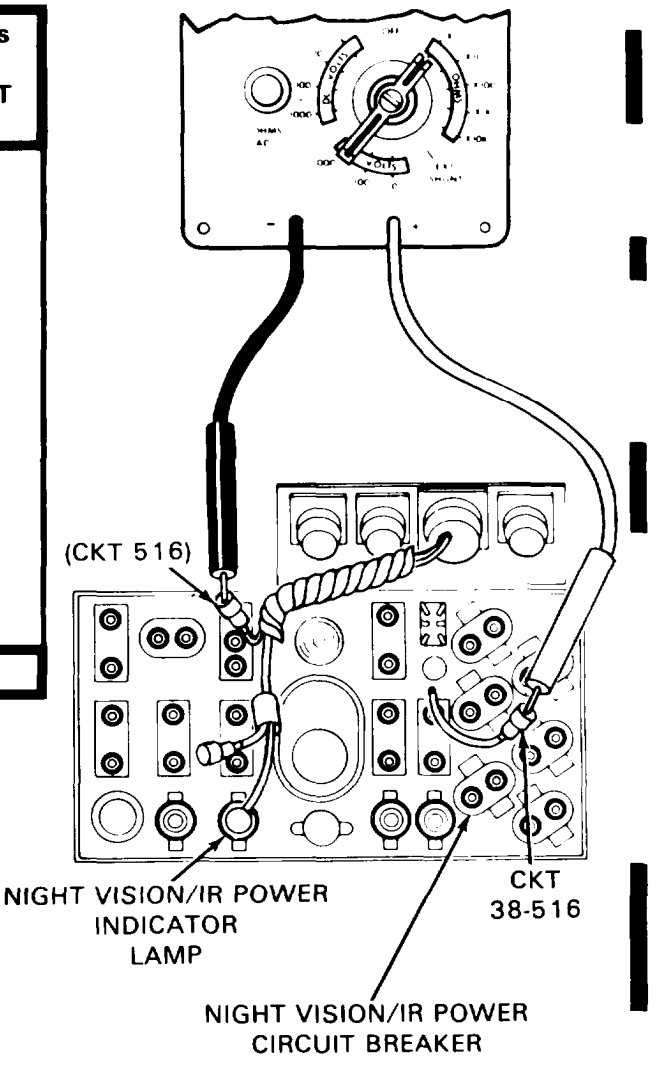
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE
(Continued)

3 **Check master control panel accessories harness for continuity between NIGHT VISION/IR POWER circuit breaker (CKT 38-516) and NIGHT VISION/IR POWER switch (CKT 516).**

Technician (Driver's Station)

- Disconnect master control panel accessories harness lead (CKT 38-516) from NIGHT VISION/IR POWER circuit breaker.
- Connect red probe of meter to accessories harness lead (CKT 38-516) at circuit breaker.
- Connect black probe of meter to accessories harness lead (CKT 516) at NIGHT VISION/IR POWER switch connector which does not feed to the NIGHT VISION/IR POWER indicator lamp.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO

YES

4 **Replace master control panel accessories harness (page 10-103).**

TA253126

Symptom-72

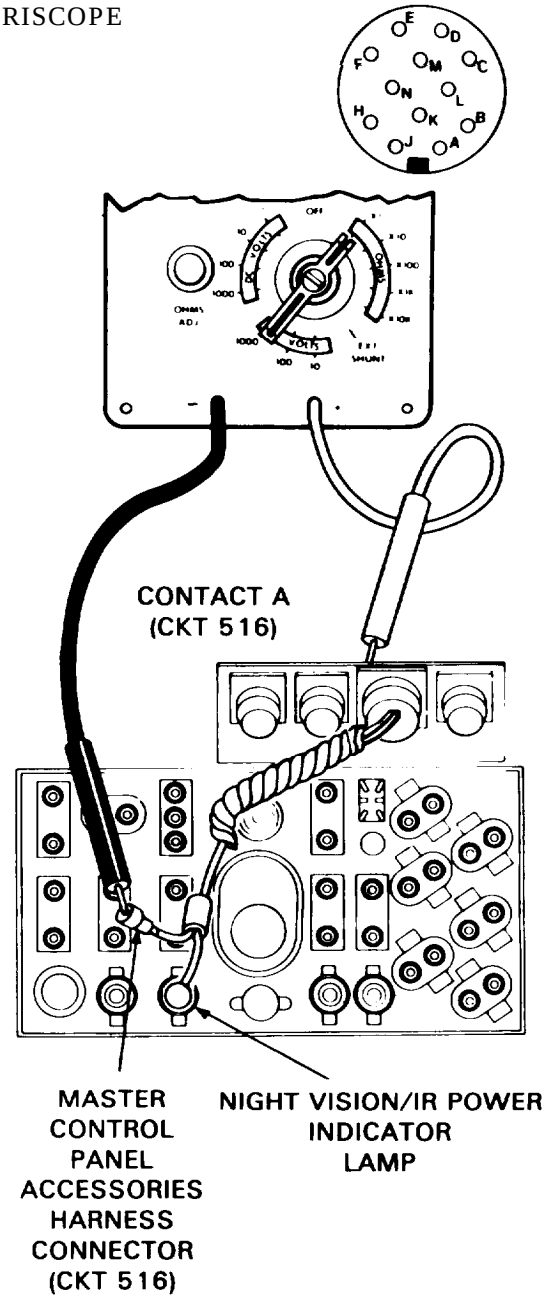
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE
(Continued)

5 **Check master control panel accessories harness (CKT 516) for continuity between panel connector and NIGHT VISION/IR POWER switch.**

Technician (Driver's Station)

- Disconnect hull front master connector from master control panel.
- Connect red probe of meter to contact A (CKT 516) of master control panel accessories harness connector.
- Connect black probe of meter to master control panel accessories harness connector (CKT 516) at NIGHT VISION/IR POWER switch which feeds to the NIGHT VISION/IR POWER indicator lamp.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO

6 **Replace master control panel accessories harness (page 10-103).**

YES

TA253127

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE
(Continued)

Symptom-72

7 Check NIGHT VISION/IR POWER circuit breaker for continuity.

Technician (Driver's Station)

- Connect master control panel accessories harness leads (CKT 516) to NIGHT VISION/IR POWER switch.
- Connect hull front master harness connector to master control panel.
- Disconnect master control panel harness lead (CKT 38-516A) from NIGHT VISION/IR POWER circuit breaker.
- Connect red probe of meter to other contact of circuit breaker.
- Connect black probe of meter to other contact of circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?

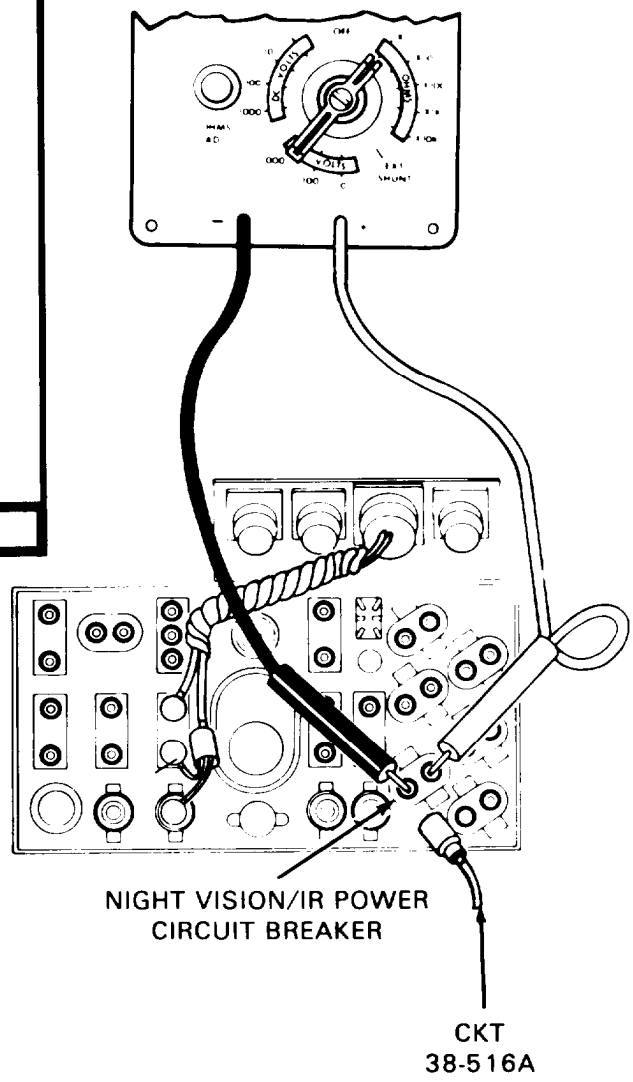
YES

8 Replace NIGHT VISION/IR POWER circuit breaker (page 10-85).

NO

9

- **Replace master control panel harness (page 10-111).**
- **Connect master control panel accessories harness (CKT 38-516) to NIGHT VISION/IR POWER circuit breaker.**



TA253128

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE

Symptom-73

IR PERISCOPE WILL NOT WORK (INDICATOR LAMP WILL LIGHT).

WARNING

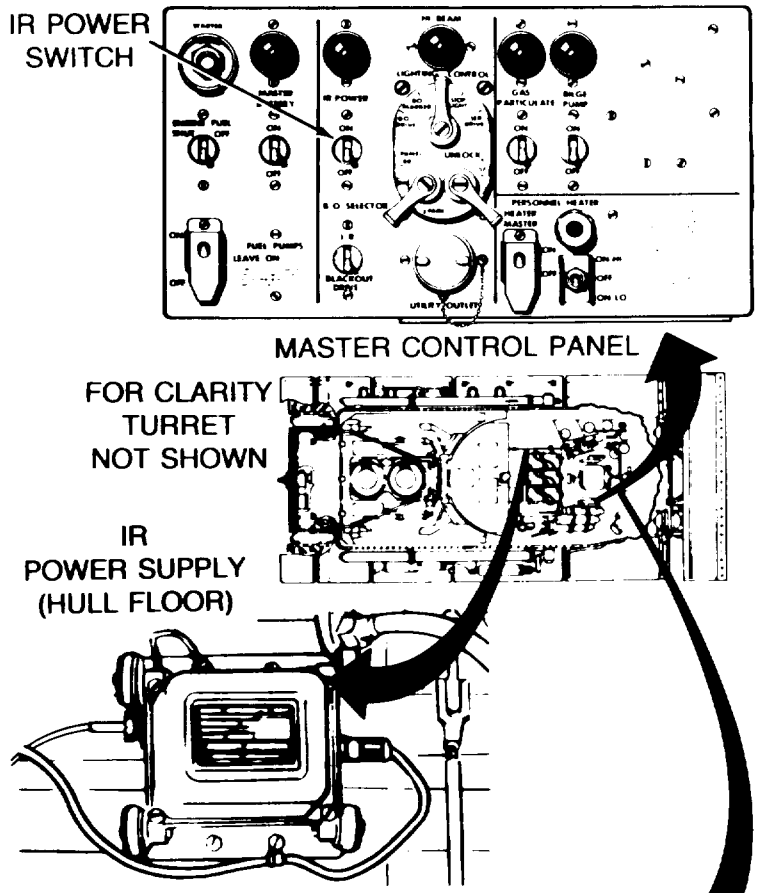
The IR power supply is a high voltage item. Injury to personnel or damage to M24 IR periscope could occur if MASTER BATTERY and IR POWER switches are ON when IR periscope power cable is being connected to, or disconnected from, IR periscope. Be sure to set MASTER BATTERY and IR POWER switches OFF before connecting or disconnecting cable.

CAUTION

Perform M24 IR periscope night vision viewer checks during darkness only. Do not expose IR periscope to direct sunlight.

NOTE

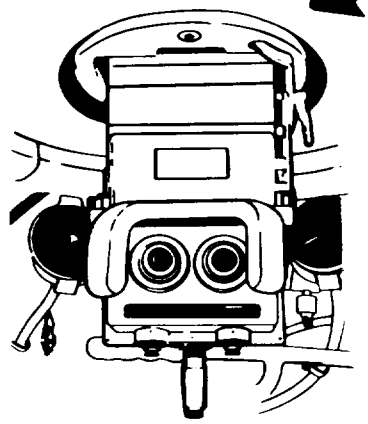
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



1 **Check hull front master harness connector (CKT 516) at IR power supply for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set IR POWER switch OFF.



M24 INFRARED (IR) PERISCOPE

TA142545

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE
(Continued)

Symptom-73

STEP (1) CONTINUED

First Technician (Turret)

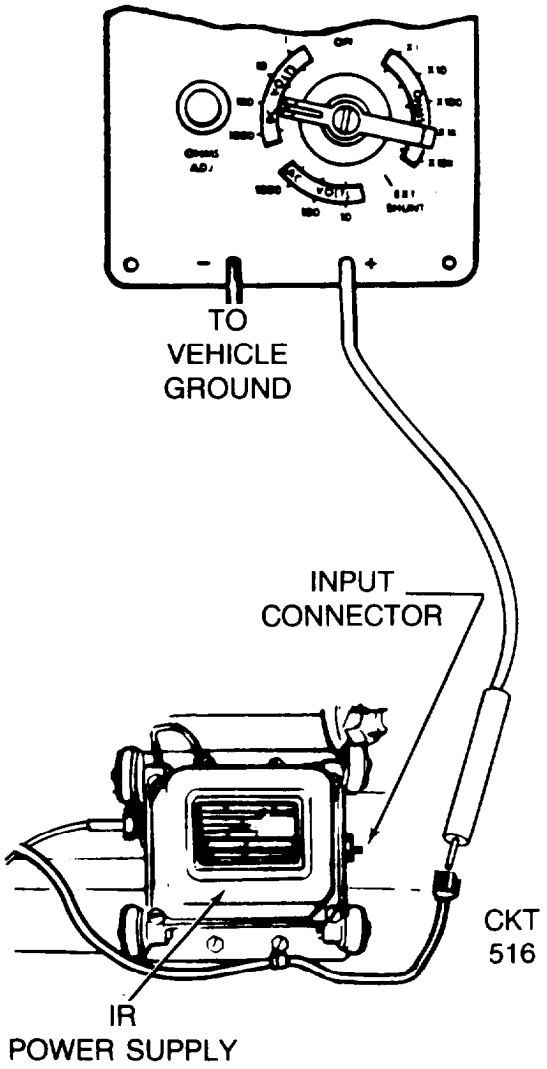
- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to IR power supply (TM 9-2350-222-10).
- Disconnect hull front master harness connector (CKT 516) from IR power supply input connector.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to hull front master harness connector (CKT 516) and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set IR POWER switch ON.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.



Does meter indicate 18 to 30 volts dc?

NO

YES

(2)

- **Check IR periscope power cable (CKT 517) for continuity.**
- **See Step (6).**

TA142546

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE
(Continued)

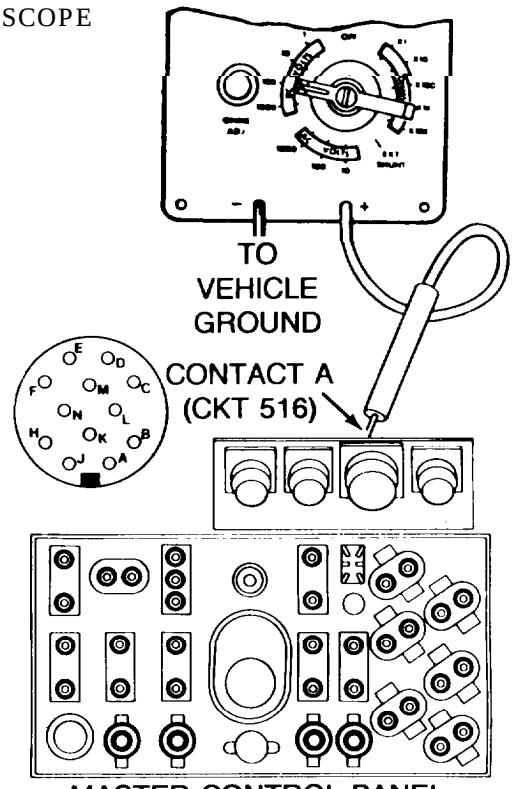
Symptom-73

3 **Check master control panel accessories harness connector (CKT 516) for electrical power.**

Second Technician (Driver's Station)

- Set IR POWER switch OFF.
- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness (CKT 516) from master control panel.
- Connect red probe of meter to contact A (CKT 516) of master control panel connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set IR POWER switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



MASTER CONTROL PANEL
(REAR VIEW)

5

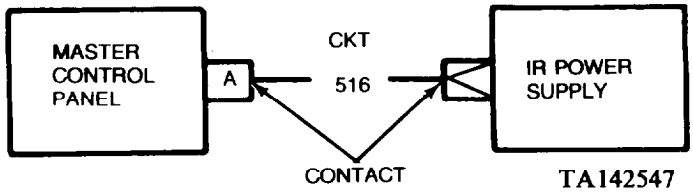
- **Inspect front master harness for bent/broken connector contacts or loose (CKT 516) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad front master harness.**
- **Connect hull front master harness connector to master control panel.**

YES

NO

4

- **Connect hull front master harness connector (CKT 516) to IR power supply input connector.**
- **Replace master control panel accessories harness (page 10-103).**



TA142547

Symptom-73
FROM STEP (2)

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE
(Continued)

WARNING

Wait two minutes after IR POWER switch is turned off before disconnecting IR periscope power cable. (High voltage is present at power cable for a few minutes after IR POWER switch is set OFF.

6 Check IR periscope power cable (CKT 517) for continuity.

Second Technician (Driver's Station)

- Set IR POWER switch OFF.
- Set MASTER BATTERY switch OFF.
- Disconnect IR periscope power cable connector (CKT 517) from IR periscope.

First Technician (Turret)

- Connect hull front accessories harness connector (CKT 516) to IR power supply input connector.
- Disconnect IR periscope power cable connector (CKT 517) from IR power supply output connector.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact at power supply end of IR power cable.

Second Technician (Driver's Station)

- Connect black probe to periscope end of IR power cable.

First Technician (Turret)

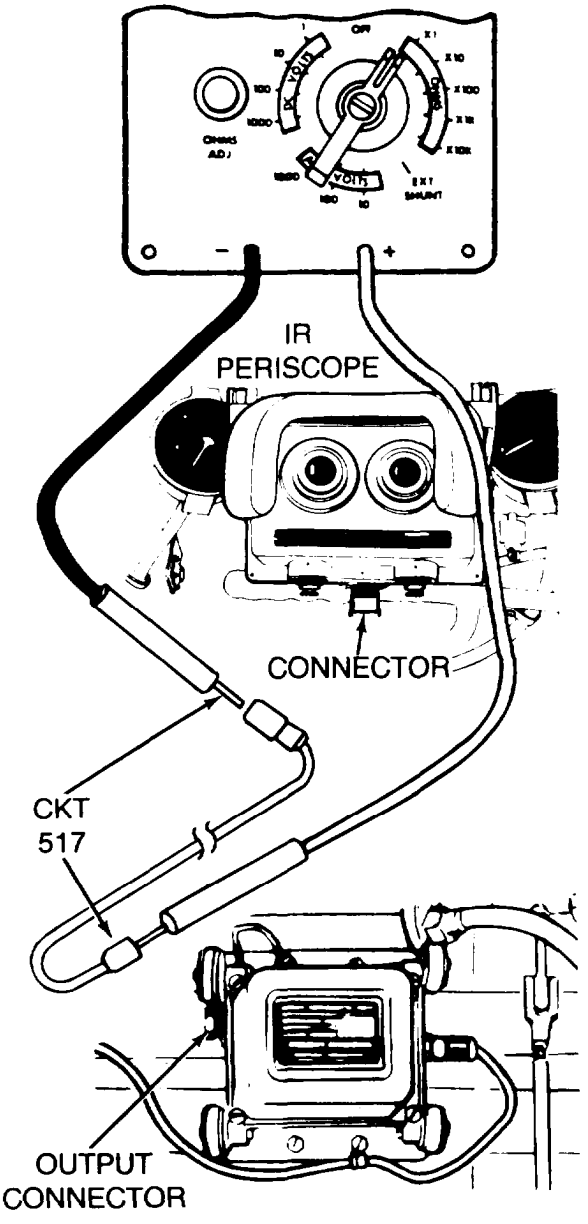
- Check if meter indicates continuity.

Does meter indicate continuity?

YES

NO

7 Notify support maintenance of bad IR periscope power cable (CKT 517).



TA142548

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE
(Continued)

Symptom-73

8 **Check operation of IR periscope by substituting it with a serviceable unit.**

Second Technician (Driver's Station)

- Obtain and install serviceable IR periscope (TM 9-2350-222-10).

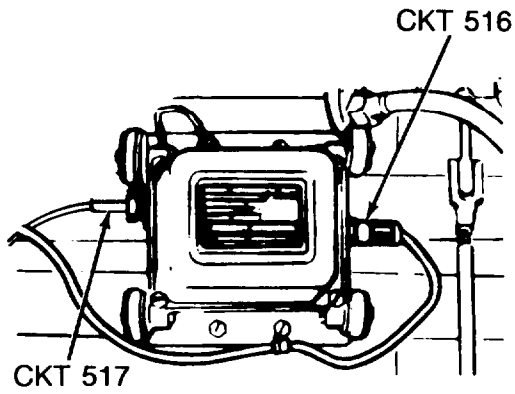
First Technician (Turret)

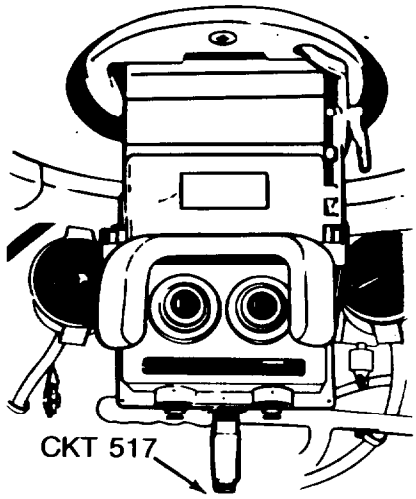
- Reconnect IR periscope power cable (CKT 517) to IR power supply.

Second Technician (Driver's Station)

- Connect IR periscope power cable (CKT 517) to IR periscope.
- Set MASTER BATTERY switch ON.
- Set IR POWER switch ON.
- Operate IR periscope (TM 9-2350-222-10).
- Check for clear image while looking through periscope eyepiece.

Can clear image be seen through eyepiece?





NO → **9** **Replace IR power supply (page 10-202).**

YES → **10** **Original IR periscope is unserviceable. Replace unserviceable IR periscope (TM 9-2350-222-10).**

TA142549

Symptom-73.1 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE

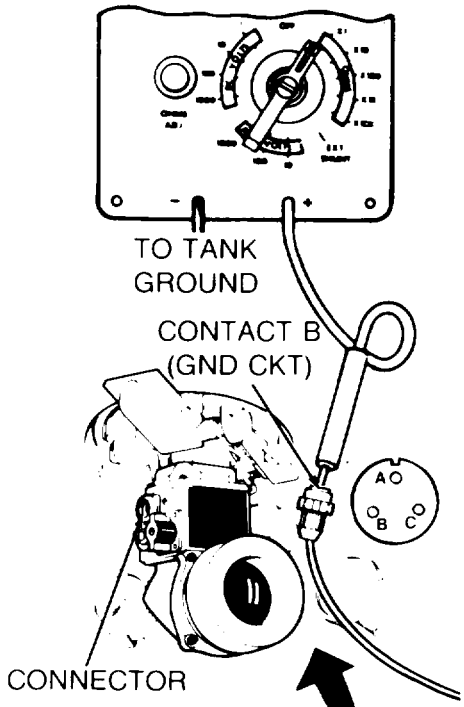
NIGHT VISION VIEWER WILL NOT WORK (NIGHT VISION INDICATOR LAMP WILL LIGHT).

1 **Check front accessory harness (CKT GND) connector at NIGHT VISION viewer for continuity to ground.**

Technician (Driver's Station)

- Set NIGHT VISION switch OFF.
- Set MASTER BATTERY switch OFF.
- Disconnect front accessory harness connector from night vision viewer.
- Set multimeter to OHMS X1 and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT GND) of front accessory harness connector and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?

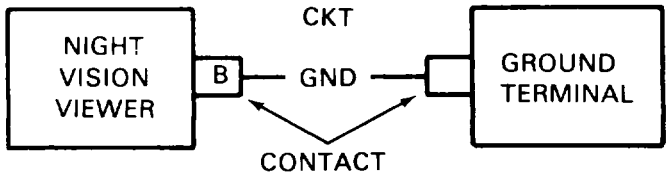


NO

YES

2

- **Inspect front accessory harness for bent/broken connector contacts or loose GND CKT wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective front accessory harness.**
- **Connect front accessory harness connector to NIGHT VISION viewer.**



TA253129

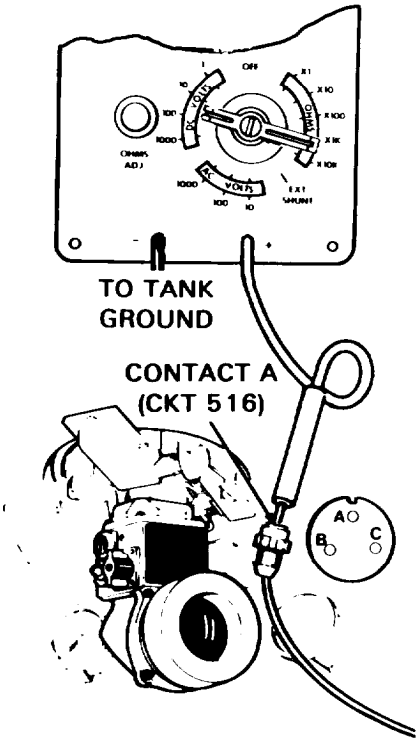
Symptom-73.1 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE
(Continued)

3 **Check front accessory harness (CKT 516) connector at NIGHT VISION viewer for electrical power.**

Technician (Driver's Station)

- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact A (CKT 516) of front accessory harness connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set NIGHT VISION switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



NO

YES

4 **Replace night vision viewer (TM 9-2350-222-10).**

TA253130

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERISCOPE
(Continued)

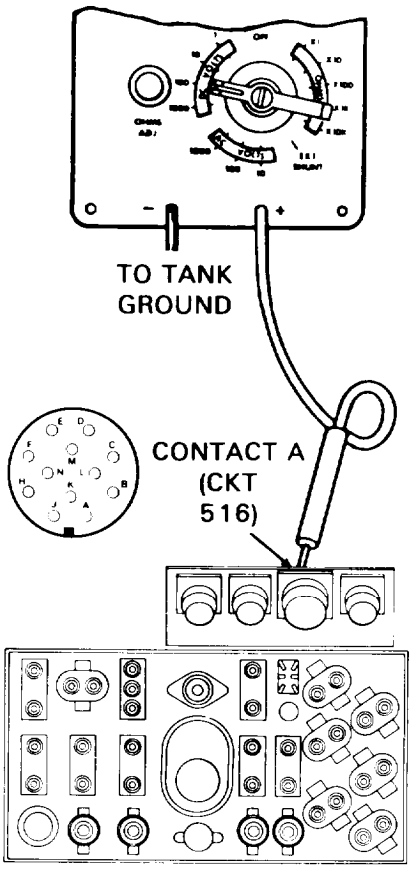
Symptom-73.1

5 **Check master control panel accessories harness (CKT 516) panel connector for electrical power.**

Technician (Driver's Station)

- Set NIGHT VISION switch OFF.
- Set MASTER BATTERY switch OFF.
- Connect front accessory harness connector (CKT 516) to NIGHT VISION device.
- Displace master control panel (page 10-45).
- Disconnect front accessories harness connector from master control panel.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact A (CKT 516) of master control panel accessories harness panel connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set NIGHT VISION switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

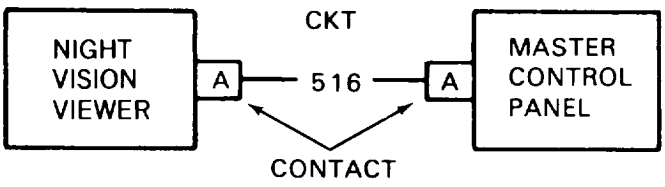


YES

6
- **Inspect front accessory harness for bent/broken connector contacts or loose CKT 516 wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance defective front accessory harness.**
- **Connect front accessory harness connector to master control panel.**
- **Install master control panel (page 10-47).**

NO

7 **Replace master control panel accessories wiring harness (page 10-103).**

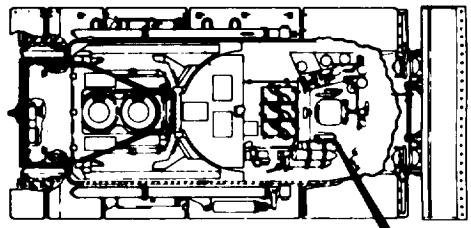


TA253131

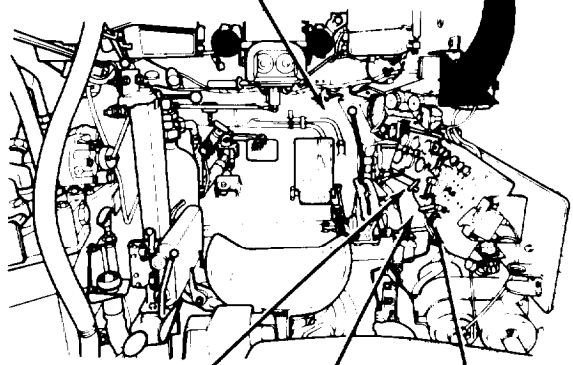
Symptom-74 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER

NO HEAT FROM PERSONNEL HEATER.

FOR CLARITY TURRET NOT SHOWN



PERSONNEL HEATER



MASTER BATTERY SWITCH

HEATER MASTER SWITCH

PERSONNEL HEATER HI/LO SWITCH

DRIVER'S STATION

1 Check if personnel heater blower motor is working.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set HEATER MASTER switch ON.
- Set PERSONNEL HEATER HI/LO switch ON-LO.
- Listen for sound of personnel heater blower motor running.
- Set PERSONNEL HEATER HI/LO switch ON-HI.
- Listen for sound of personnel heater blower motor.

Can personnel heater blower motor be heard?

YES

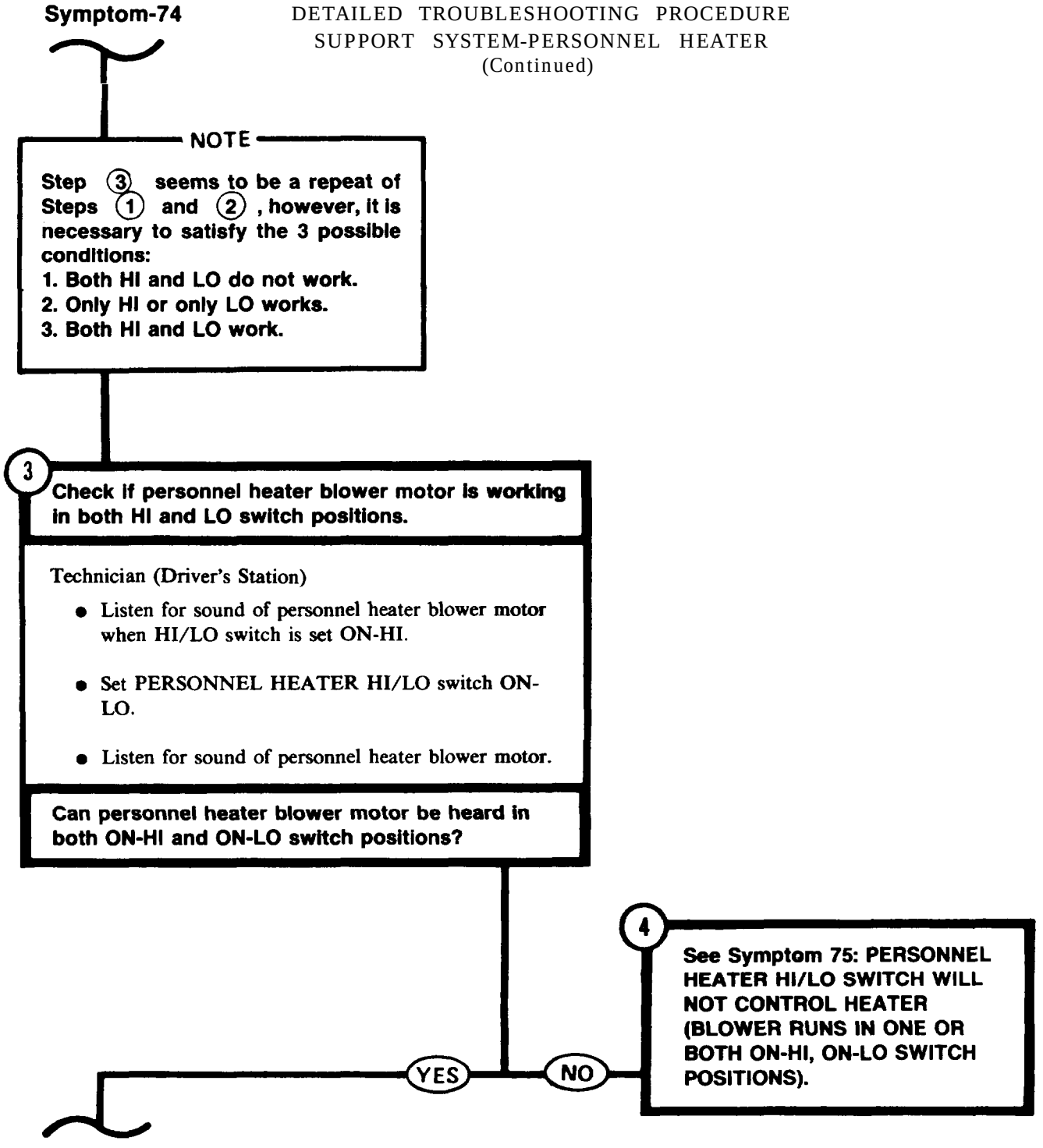
NO

2

- **Check if PRESS TO TEST indicator lights.**
- **See Step (23) .**

TA142550

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

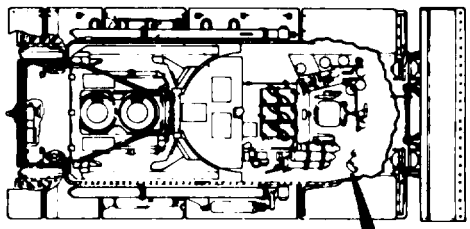


TA142551

Symptom-74

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

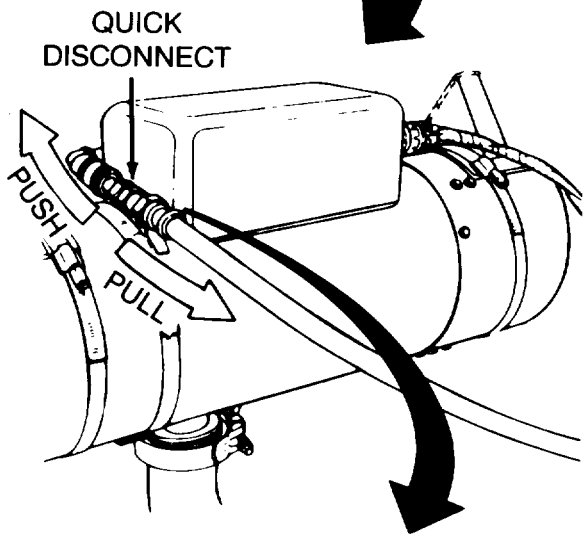
FOR CLARITY
TURRET NOT SHOWN



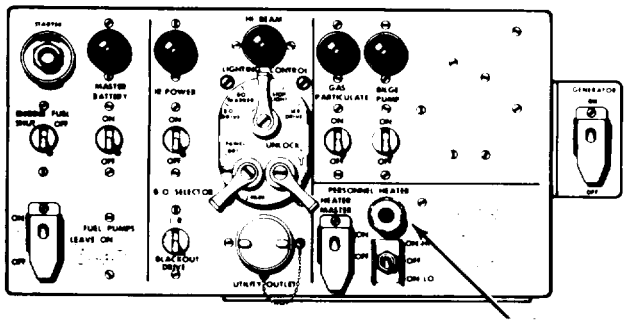
5 **Check for fuel flow to personnel heater.**

Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.
- Disconnect quick disconnect at personnel heater (push quick disconnect toward front of vehicle while pulling fuel line connector away from heater).
- Set HEATER MASTER switch ON.
- Set PERSONNEL HEATER HI/LO switch ON-LO.
- Hold fuel line connector over suitable container and press center of connector; check for fuel flow.

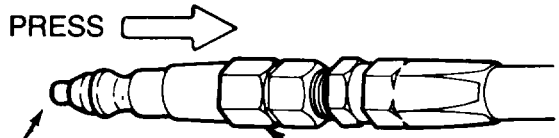


Does fuel flow from fuel line?



MASTER CONTROL PANEL

INDICATOR LAMP



PERSONNEL HEATER
QUICK DISCONNECT

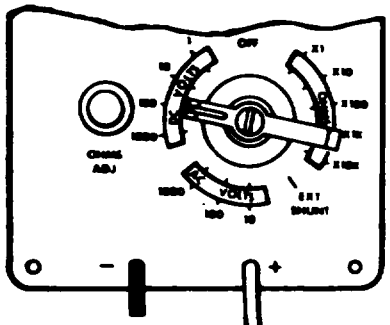
YES

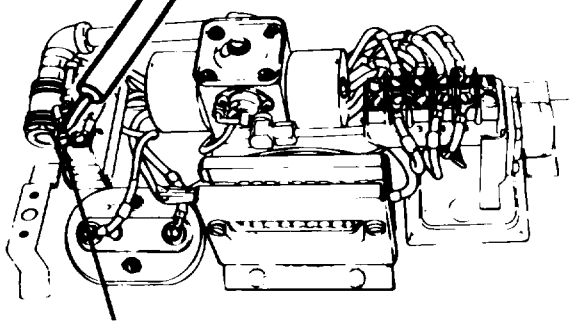
NO

6
- **Check fuel lines to personnel heater fuel pump for damage.**
- **See Step (16).**

TA142552

Symptom-74 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)



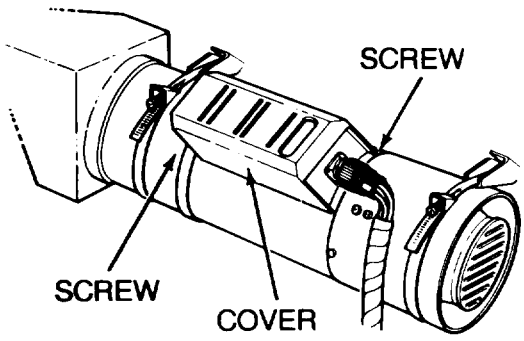


7 **Check for electrical power at left N.O. contact on the flame detector switch.**

Technician (Driver's Station)

- Set HEATER MASTER switch OFF.
- Loosen two screws and remove personnel heater cover.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to the left N.O. contact on the flame detector switch.
- Connect black probe to ground.
- Set HEATER MASTER switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

NO

8

- **Set HEATER MASTER switch OFF.**
- **Set PERSONNEL HEATER HI/LO switch OFF.**
- **Replace personnel heater cover.**
- **Replace personnel heater (page 19-19).**

TA142553

Symptom-74

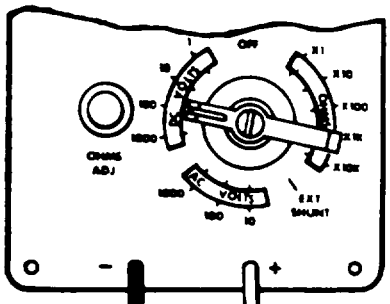
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

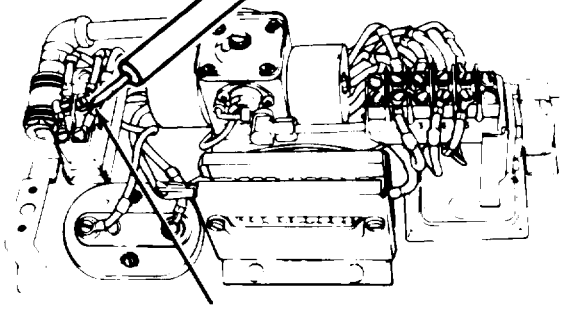
9 Check for electrical power at the right N.O. contact on flame detector switch.

Technician (Driver's Station)

- Set HEATER MASTER switch OFF.
- Connect red probe of meter to the right N.O. contact on the flame detector switch.
- Connect black probe of meter to ground.
- Set HEATER MASTER switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?





YES

NO

10

- **Set HEATER MASTER switch OFF.**
- **Set PERSONNEL HEATER HI/LO switch OFF.**
- **Replace flame detector switch (page 19-28).**
- **Connect personnel heater fuel line quick disconnect.**

TA142554

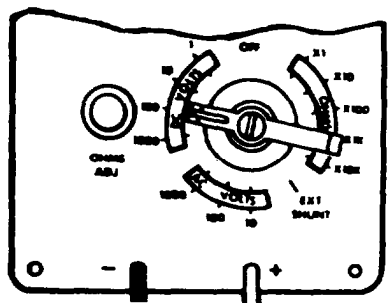
Symptom-74 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

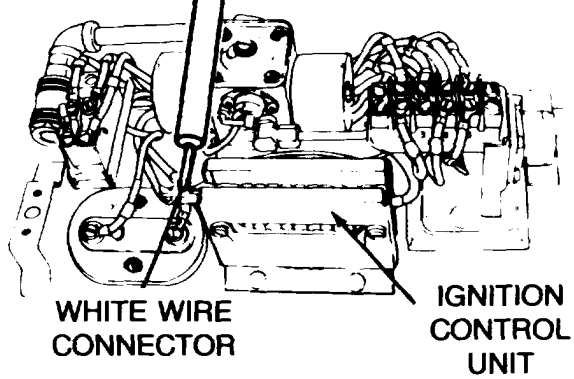
11 **Check for electrical power at white wire connector of ignition control unit.**

Technician (Driver's Station)

- Set HEATER MASTER switch OFF.
- Connect red probe of meter to the white wire connector of ignition control unit.
- Connect black probe to ground.
- Set HEATER MASTER switch ON.
- Check if meter indicates 8 to 10 volts dc.

Does meter indicate 8 to 10 volts dc?





YES

NO

12
- **Set HEATER MASTER switch OFF.**
- **Set PERSONNEL HEATER HI/LO switch OFF.**
- **Replace ignition control unit (page 19-30).**
- **Connect personnel heater fuel line quick disconnect.**

TA142555

Symptom-74

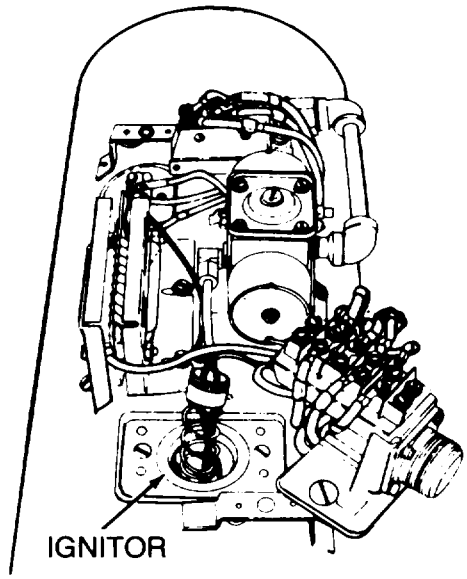
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

13 **Replace ignitor and check heater for proper operation.**

Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.
- Set HEATER MASTER switch OFF.
- Replace ignitor (page 19-24).
- Connect personnel heater fuel line quick disconnect.
- Operate personnel heater (TM 9-2350-222-10).

Does personnel heater operate correctly?



PERSONNEL HEATER
(IGNITOR REPLACEMENT)

YES

15 **Problem corrected, turn off personnel heater if no longer needed.**

NO

14
- **Set PERSONNEL HEATER HI/LO switch OFF.**
- **Set HEATER MASTER switch OFF.**
- **Remove new ignitor just installed and replace old ignitor in personnel heater.**
- **Replace personnel heater (page 19-19).**

TA142556

Symptom-74

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

FOR CLARITY
TURRET NOT SHOWN

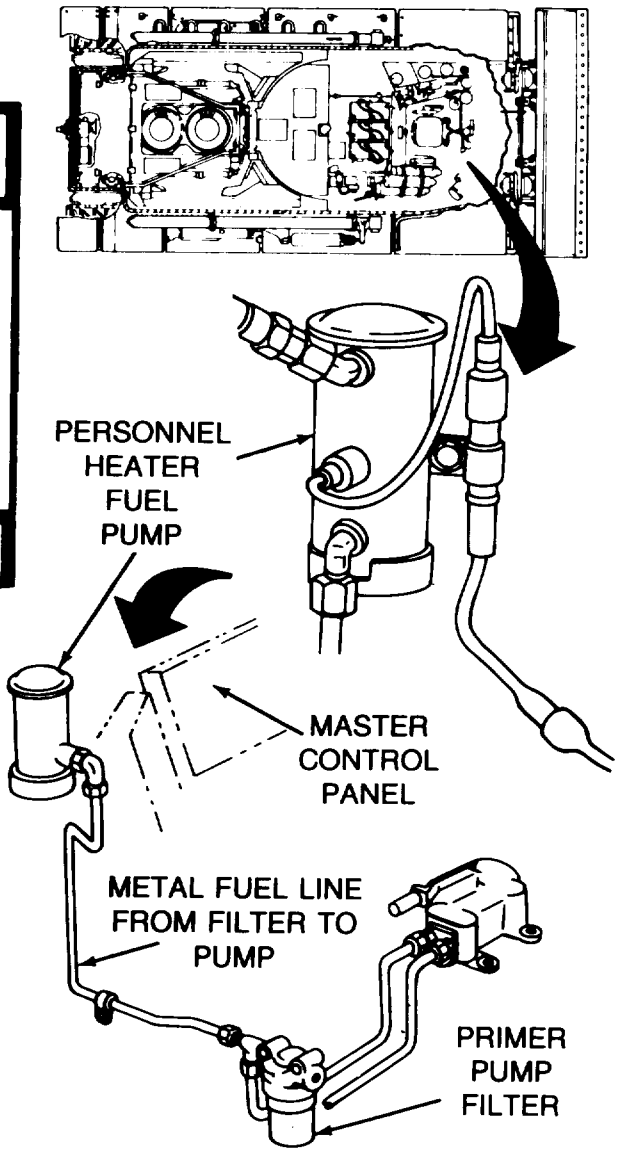
FROM STEP 6

16 **Check fuel line to personnel heater fuel pump for damage.**

Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.
- Set HEATER MASTER switch OFF.
- Check metal fuel line from primer pump filter personnel heater for damage.

Is fuel line damaged?



NO

YES

17
- **Replace fuel line from primer pump filter to personnel heater fuel pump (page 7-67).**
- **Connect fuel line quick disconnect at personnel heater.**

TA142557

Symptom-74

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

18 **Check fuel line to personnel heater for damage.**

Technician (Driver's Station)

- Check flexible fuel line from personnel heater fuel pump to personnel heater for damage.

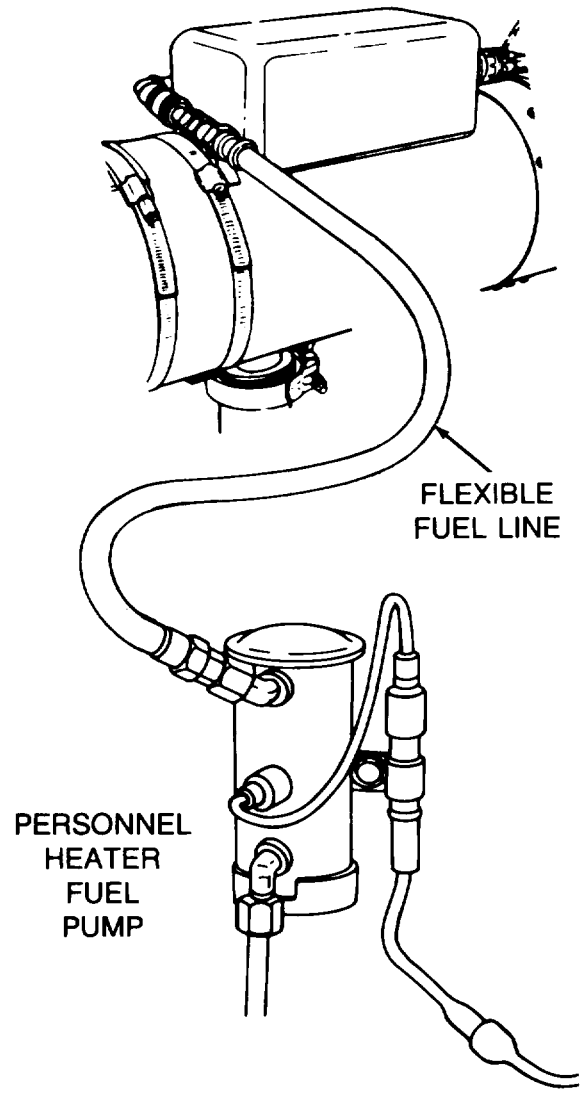
Is fuel line damaged?

NO

YES

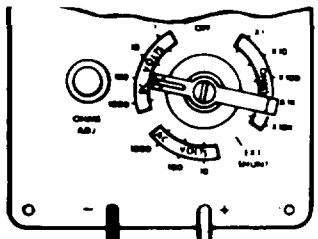
19 **Replace fuel line from personnel heater fuel pump to personnel heater (page 19-17).**

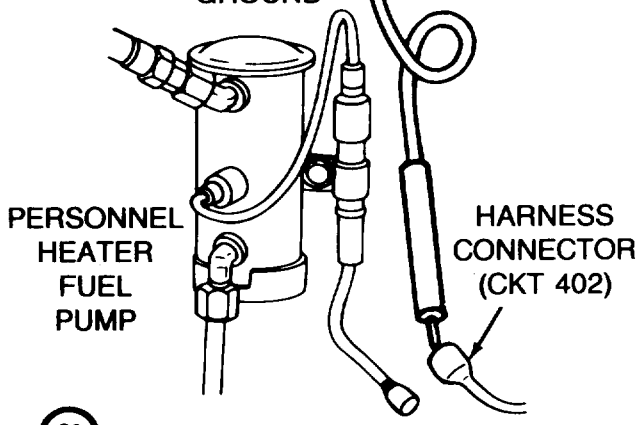
PERSONNEL HEATER



TA142558

Symptom-74 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)





20 **Check for electrical power at personnel heater fuel pump (CKT 402).**

Technician (Driver's Station)

- Disconnect harness connector in personnel heater fuel pumps' power lead.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to harness connector (CKT 402) and black probe to ground.
- Set HEATER MASTER switch ON.
- Set PERSONNEL HEATER HI/LO switch ON-LO.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

YES

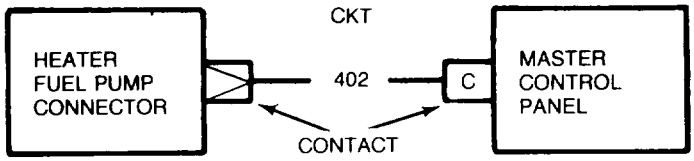
22

- **Set PERSONNEL HEATER HI/LO switch OFF.**
- **Replace personnel heater fuel pump (page 7-67).**
- **Connect fuel line quick disconnect at personnel heater.**

NO

21

- **Set PERSONNEL HEATER HI/LO switch OFF.**
- **Inspect heater control wiring harness for bent/broken connector contact or loose (CKT 402) wire at rear of connector.**
- **Repair connector if defective (page 10-307).**
- **If connector is not defective, notify support maintenance of bad heater control wiring harness.**
- **Connect harness connector at fuel pump (CKT 402).**
- **Connect fuel line quick disconnect at personnel heater.**



TA142559

Symptom-74 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

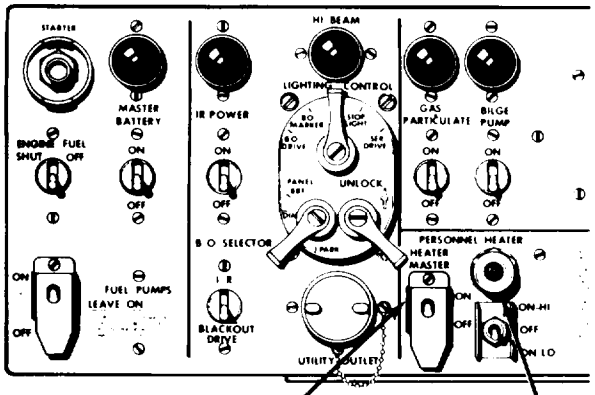
FROM STEP (2)

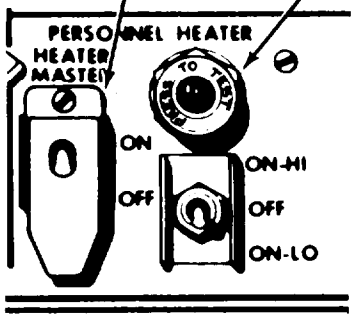
(23) Check if PRESS TO TEST indicator lights.

Technician (Driver's Station)

- Push in personnel heater PRESS TO TEST indicator.
- Check if PRESS TO TEST indicator lamp lights.

Does indicator lamp light?





MASTER CONTROL PANEL

YES

NO

(24)

- **Check for electrical power at hull power harness contact D (CKT 400).**
- **See Step (32) .**

TA142560

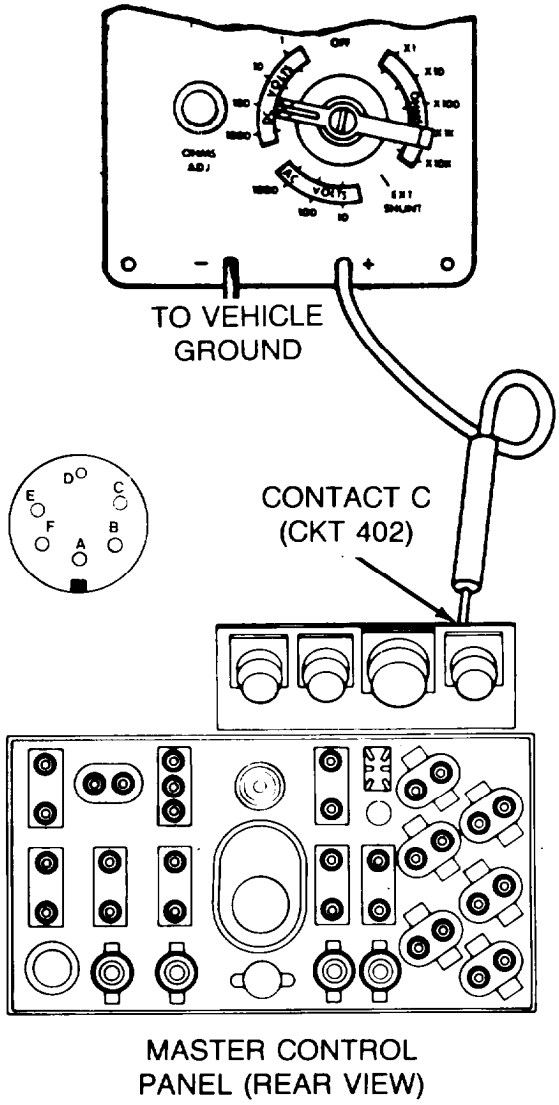
Symptom-74 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

25 **Check for electrical power at personnel heater harness panel connector contact C (CKT 402).**

Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.
- Set HEATER MASTER switch OFF.
- Displace master control panel (page 10-45).
- Disconnect heater control harness at master control panel.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to panel connector contact C (CKT 402) and black probe to ground.
- Set HEATER MASTER switch ON.
- Set PERSONNEL HEATER HI/LO switch ON-HI.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



MASTER CONTROL PANEL (REAR VIEW)

YES

NO

26
- **Check personnel heater harness for continuity from panel connector contact C (CKT 402) to PERSONNEL HEATER HI/LO switch terminal 6.**
- **See Step 39 .**

TA142561

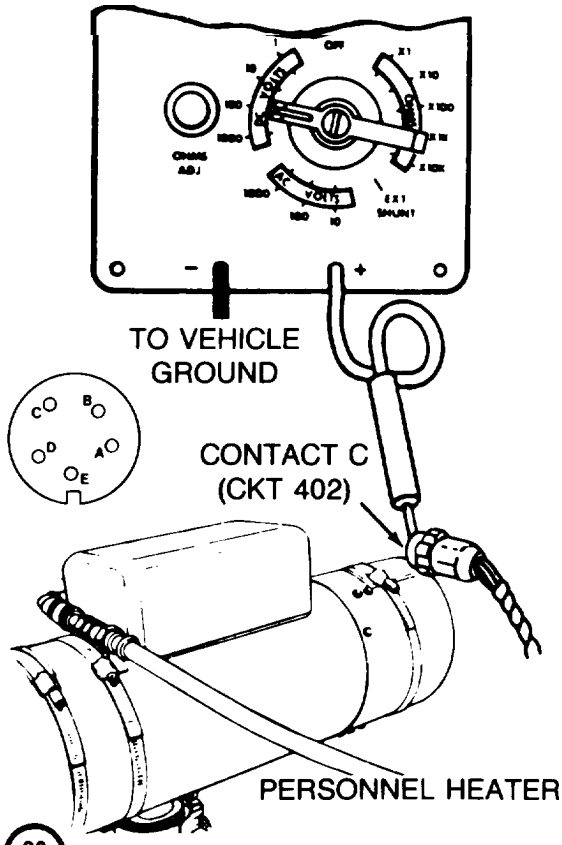
Symptom-74 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

27 **Check for electrical power at personnel heater harness connector, contact C (CKT 402).**

Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.
- Connect heater control harness at master control panel.
- Install master control panel (page 10-47).
- Disconnect heater control harness at personnel heater.
- Connect red probe of meter to harness connector contact C (CKT 402) and black probe to ground.
- Set PERSONNEL HEATER HI/LO switch ON-LO.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

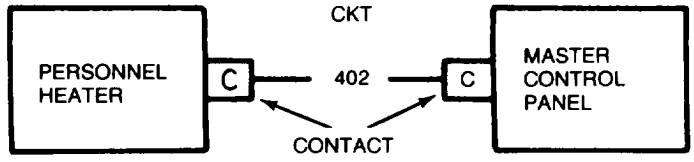


YES

NO

28

- **Set PERSONNEL HEATER HI/LO switch OFF.**
- **Inspect heater control harness for bent/broken connector contacts or loose (CKT 402) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad heater control harness.**



TA142562

Symptom-74

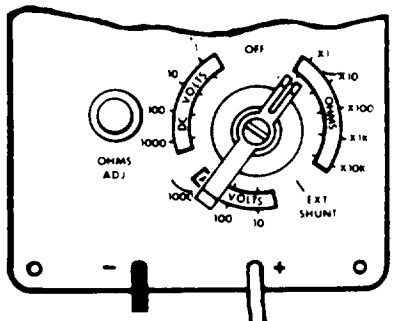
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

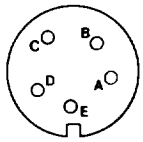
29 **Check personnel heater harness connector for continuity to ground at contact A (CKT GND).**

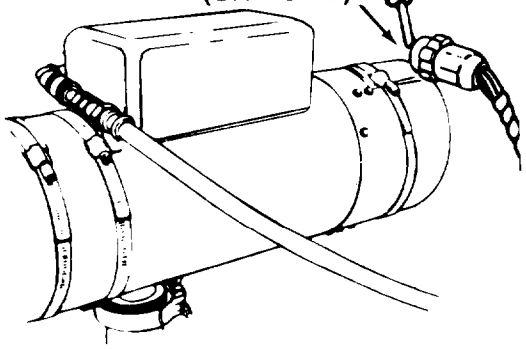
Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to personnel heater harness connector contact A (CKT GND) and black probe to ground.
- Check if meter indicates continuity.

Does meter indicate continuity?







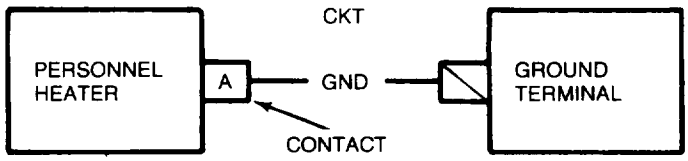
30

- **Inspect heater control harness for bent/broken connector contacts or loose (CKT GND) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of bad heater control harness.**

NO

YES

31 **Replace personnel heater (page 19-19).**



TA142563

Symptom-74 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

(24)

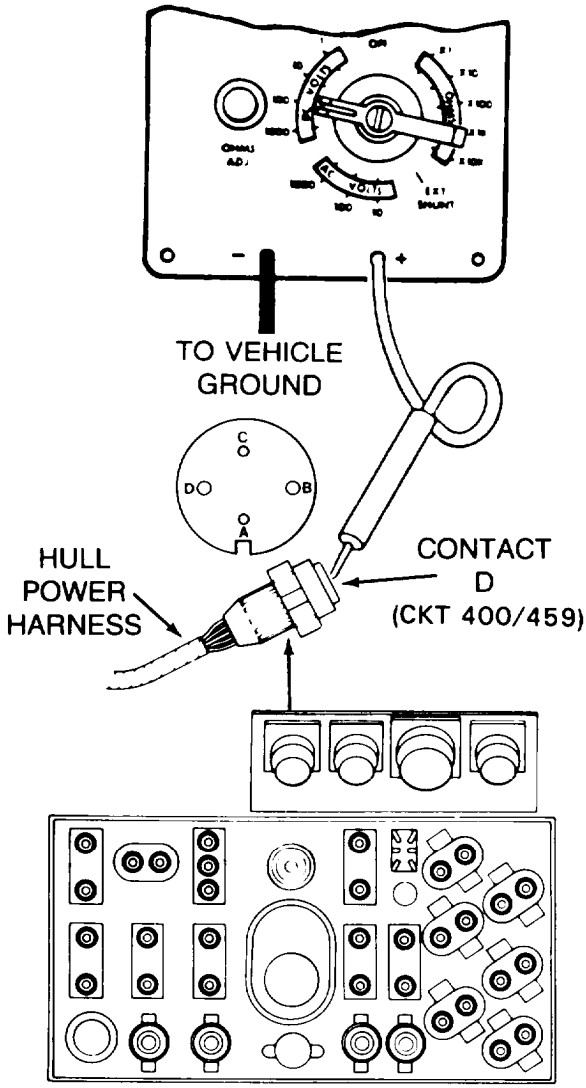
WARNING

Use extreme caution when working with circuit 400/459. This circuit carries battery voltage at all times, whether MASTER BATTERY switch is ON or OFF.

(32) **Check for electrical power at hull power harness contact D (CKT 400/459).**

Technician (Driver's Station)

- Set personnel heater HI/LO switch OFF.
- Set HEATER MASTER switch OFF.
- Disconnect three battery ground cable straps from floor plate behind driver's seat (page 10-283).
- Displace master control panel (page 10-45).
- Disconnect hull power harness connector from master control panel.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact D (CKT 400/459) of hull power harness connector and black probe to ground.
- Connect three battery ground cables to floor plate behind driver's seat (page 10-283).



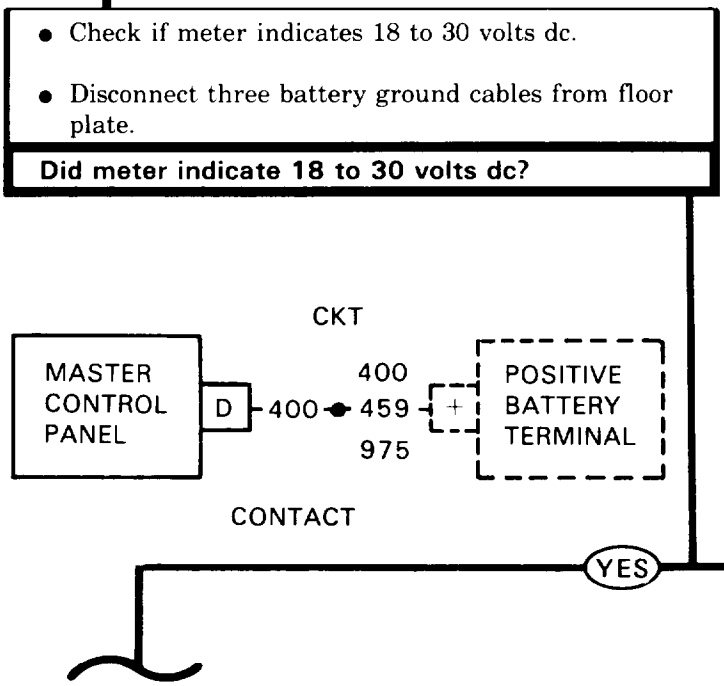
MASTER CONTROL PANEL
(REAR VIEW)

TA253132

Symptom-74 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
STEP (32) CONTINUED (Continued)

- Check if meter indicates 18 to 30 volts dc.
- Disconnect three battery ground cables from floor plate.

Did meter indicate 18 to 30 volts dc?



YES

NO

(33)

- Inspect hull power harness for bent/broken connector contacts or loose (CKT 400/459) wire at rear of connectors.
- Repair connectors if defective (page 10-307).
- If connectors are not defective, notify support maintenance of a defective hull power harness.
- Connect hull power harness.
- Install master control panel (page 10-47).
- Connect three battery ground cables to floor plate behind driver's seat (page 10-283).

TA253133

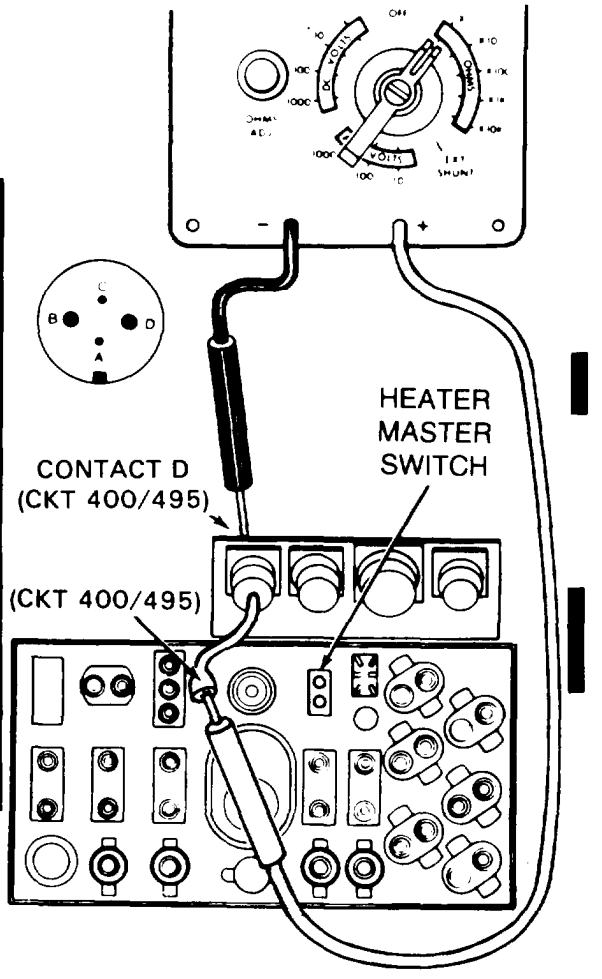
Symptom-74 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

34 Check master control panel harness (CKT 400/495) for continuity.

Technician (Driver's Station)

- At HEATER MASTER switch, disconnect connector coming from panel connector (CKT 400/495).
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to connector (CKT 400/495).
- Connect black probe of meter to panel connector contact D (CKT 400/495).
- Check if meter indicates continuity.

Does meter indicate continuity?



MASTER CONTROL PANEL
(REAR VIEW)

YES

NO

35
- **Replace master control panel harness (page 10-111).**
- **Connect three battery ground cables to floor plate behind driver's seat (page 10-283).**

TA253134

Symptom-74

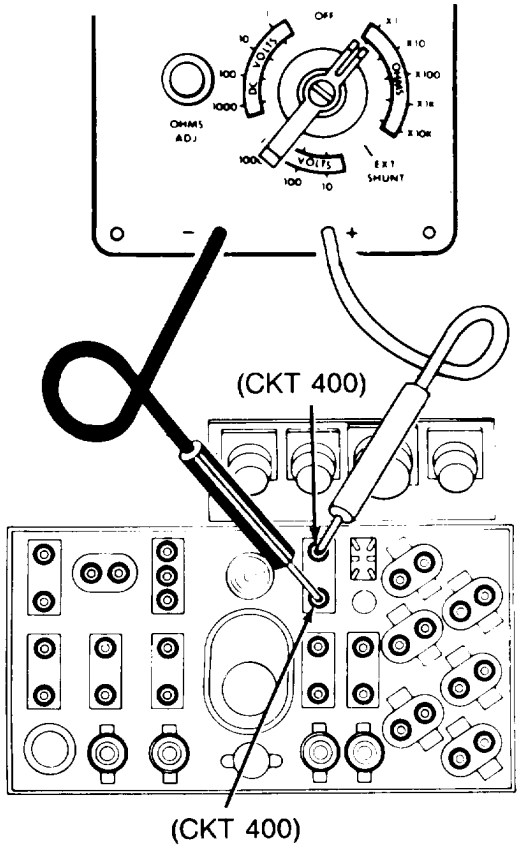
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

36 Check HEATER MASTER switch for continuity.

Technician (Driver's Station)

- Disconnect connector between HEATER MASTER switch and PERSONNEL HEATER HI/LO switch terminal 5 (CKT 400).
- Set HEATER MASTER switch ON.
- Connect red probe of meter to one connector of HEATER MASTER switch and black probe to the other switch connector.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO

37
- **Replace HEATER MASTER switch (page 10-91).**
- **Connect hull power harness at master control panel.**
- **Connect three battery ground cables to floor plate behind driver's seat (page 10-283).**

YES

38
- **Replace master control panel personnel heater harness (page 10-98).**
- **Connect connectors at HEATER MASTER switch.**
- **Connect hull power harness at master control panel.**
- **Connect three battery ground cables to floor plate behind driver's seat (page 10-283).**

TA142567

Symptom-74

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-PERSONNEL HEATER
(Continued)

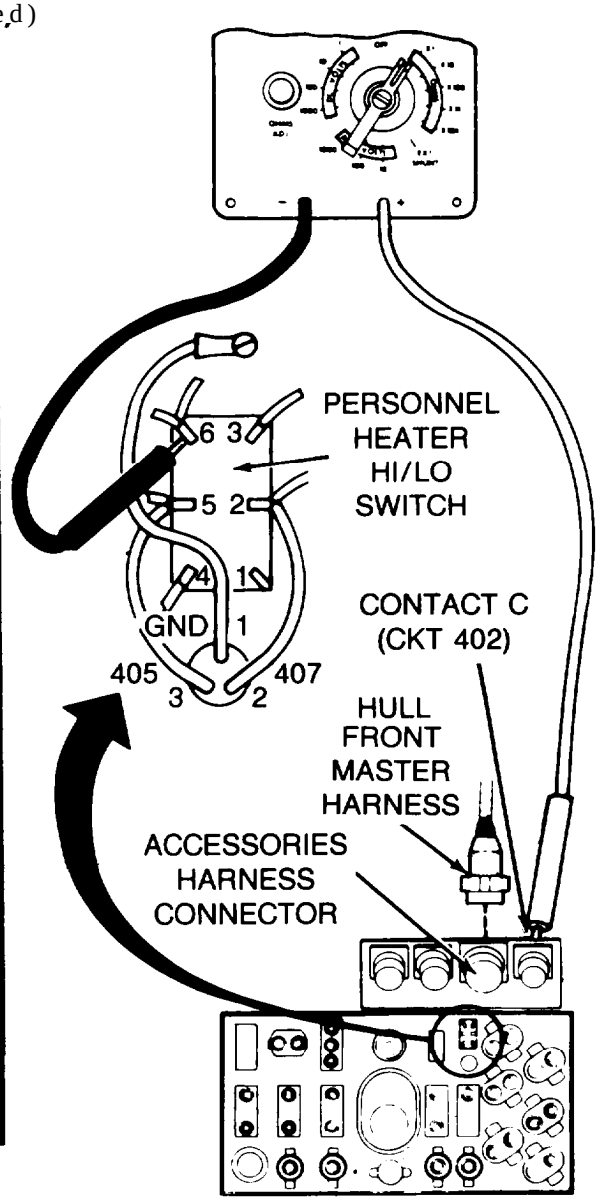
FROM STEP 26

39 **Check personnel heater harness for continuity from panel connector contact C (CKT 402) to PERSONNEL HEATER HI/LO switch terminal 6 (CKT 402).**

Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.
- Set HEATER MASTER switch OFF.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Disconnect hull front master harness from master control panel accessories harness connector.
- Remove four screws, nuts, and washers from master control panel accessories harness connector and unmount connector from master control panel.
- Connect red probe of meter to panel connector contact C (CKT 402).
- Connect black probe of meter to PERSONNEL HEATER HI/LO switch terminal 6 (CKT 402).
- Check if meter indicates continuity.

Does meter indicate continuity?



MASTER CONTROL PANEL (REAR VIEW)

YES → **40** **Replace PERSONNEL HEATER HI/LO switch (page 10-91).**

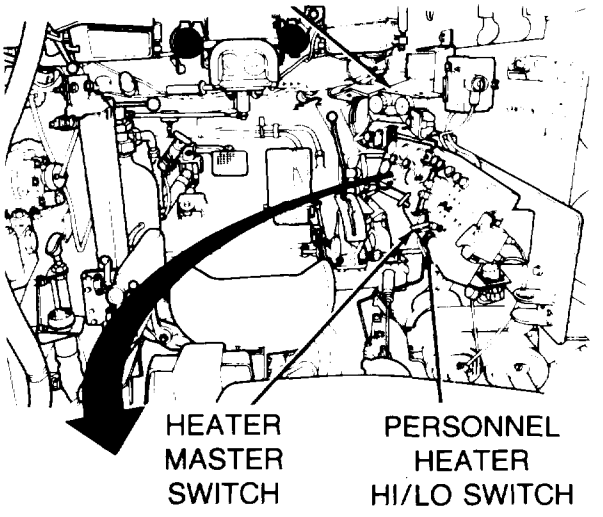
NO → **41** **Replace master control panel personnel heater harness (page 10-98).**

TA142568

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER

Symptom-75

PERSONNEL HEATER HI/LO SWITCH WILL NOT CONTROL HEATER (BLOWER RUNS IN ONE OR BOTH ON-HI, ON-LO SWITCH POSITIONS)

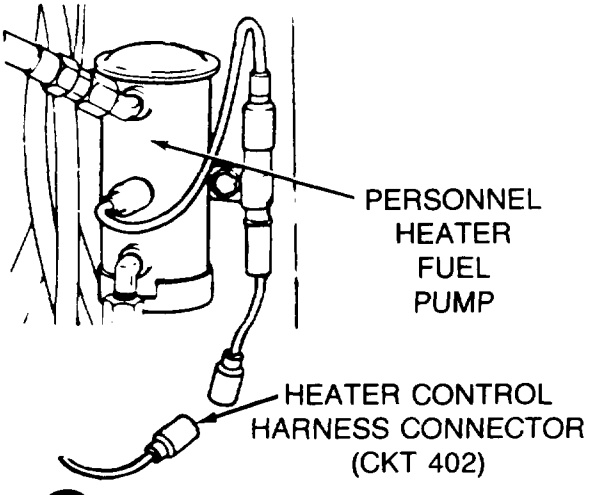


1 **Check for personnel heater blower running with personnel heater HI/LO switch in ON-LO position.**

Technician (Driver's Station)

- Set HEATER MASTER switch OFF.
- Disconnect heater control harness connector (CKT 402) from personnel heater fuel pump.
- Set HEATER MASTER switch ON.
- Set PERSONNEL HEATER HI/LO switch ON-LO.
- Check if personnel heater blower is running.

Is personnel heater blower running?



YES

NO

2

- **Check terminal 4 of PERSONNEL HEATER HI/LO switch for electrical power (personnel heater HI/LO switch ON-LO).**
- **See Step (14).**

TA142569

Symptom-75

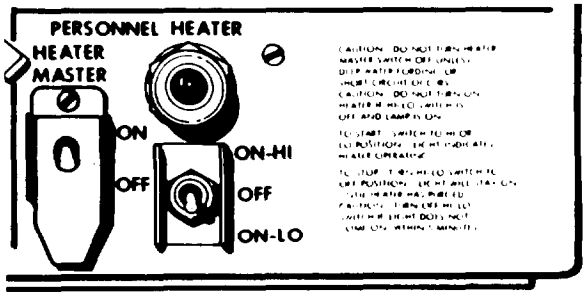
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

3 **Check for personnel heater blower running with PERSONNEL HEATER HI/LO switch in ON-HI position.**

Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch ON-HI.
- Check if personnel heater blower motor is running.

Is personnel heater blower running?



MASTER CONTROL PANEL

YES

NO

4
- **Replace PERSONNEL HEATER HI/LO switch (page 10-91).**
- **Connect heater control harness to personnel heater fuel pump.**

TA142570

Symptom-75

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

WARNING

Use extreme care when working with circuits 400 and 405. These circuits carry battery voltage at all times, whether MASTER BATTERY switch is ON or OFF.

5 Check heater control harness (CKT 405) at personnel heater for electrical power.

Technician (Driver's Station)

- Set HEATER MASTER switch OFF.
- Disconnect heater control harness connector from personnel heater.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact D (CKT 405) of heater control harness connector at personnel heater and black probe to ground.
- Set HEATER MASTER switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

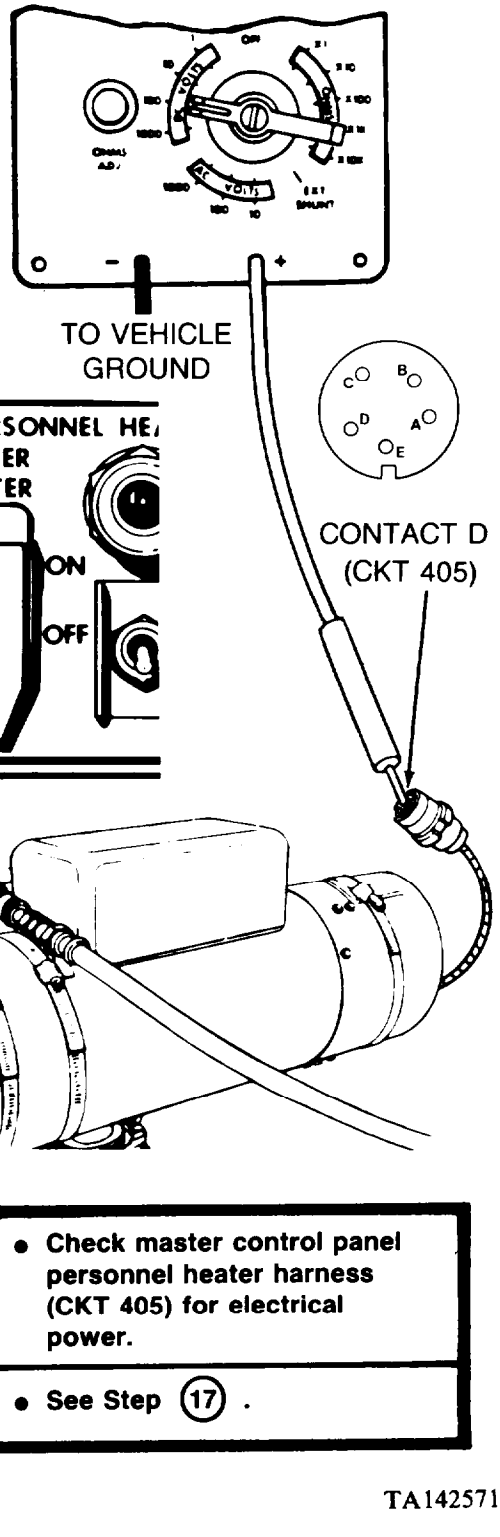
YES

NO

6

- **Check master control panel personnel heater harness (CKT 405) for electrical power.**

- **See Step (17) .**



TA142571

Symptom-75

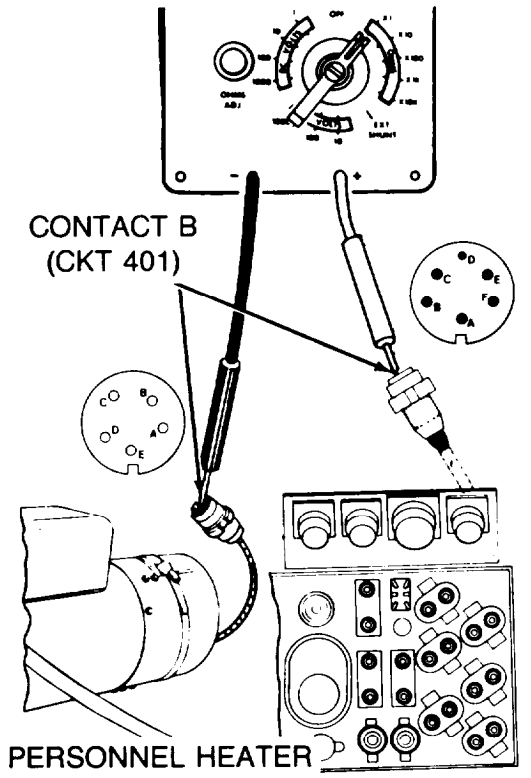
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

7 **Check personnel heater harness (CKT 401) for continuity between personnel heater and master control panel connectors.**

Technician (Driver's Station)

- Set HEATER MASTER switch OFF.
- Disconnect heater control harness connector from master control panel.
- Set multimeter to OHMS X1 scale and "zero" meter or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to contact B (CKT 401) of heater control harness connector at master control panel.
- Connect black probe of meter to contact B (CKT 401) of heater control harness connector at personnel heater.
- Check if meter indicates continuity.

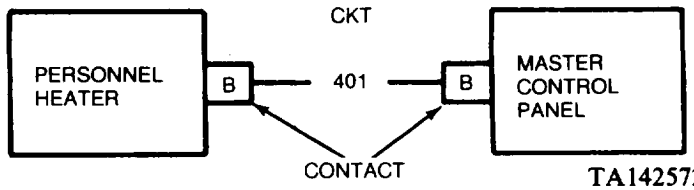
Does meter indicate continuity?



8
- **Inspect heater control harness for bent/broken connector contacts or loose (CKT 401) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective notify support maintenance of defective heater control harness.**
- **Connect heater control harness connector to master control panel and personnel heater.**

YES

NO



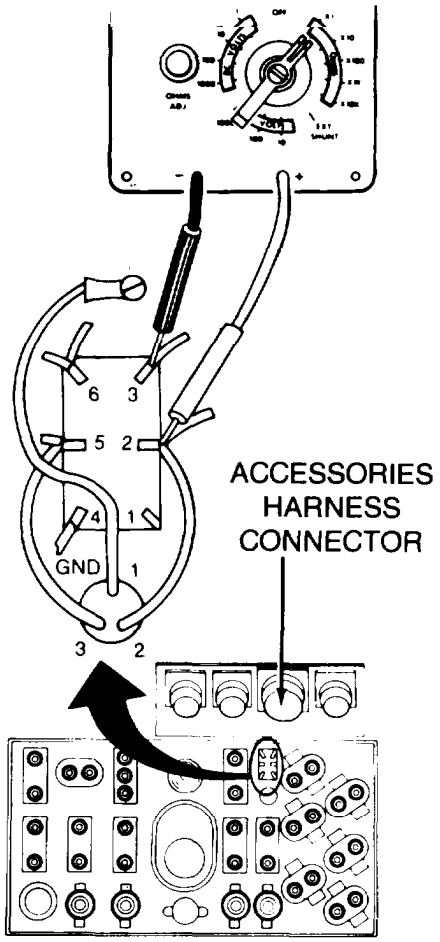
Symptom-75

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

9 **Check personnel heater HI/LO switch for continuity between terminals 2 and 3. (PERSONNEL HEATER HI/LO switch ON-HI).**

Technician (Driver's Station)

- Displace master control panel (page 10-45).
- Disconnect hull front master harness from master control panel.
- Remove four screws, nuts and washers from master control panel accessories harness connector and unmount connector from master control panel.
- Set PERSONNEL HEATER HI/LO switch ON-HI.
- Connect red probe of meter to HI/LO switch terminal 2.
- Connect black probe of meter to HI/LO switch terminal 3.
- Check if meter indicates continuity.



Does meter indicate continuity?

YES

NO

10

- **Replace PERSONNEL HEATER HI/LO switch (page 10-91).**
- **Connect heater control harness to personnel heater.**
- **Connect heater control harness to master control panel.**
- **Connect heater control harness to personnel heater fuel pump.**

TA142573

Symptom-75

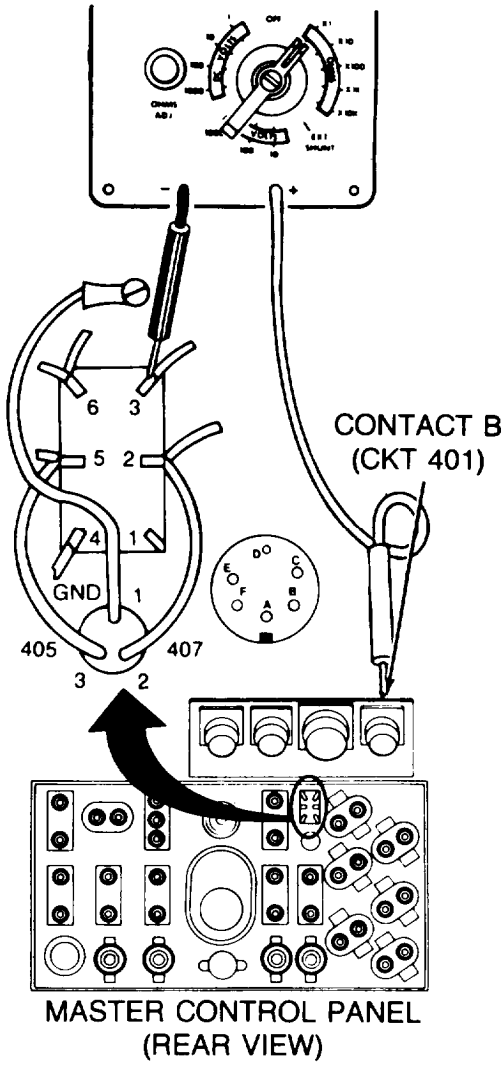
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

11 **Check master control panel personnel heater harness (CKT 401) for continuity.**

Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.
- Connect red probe of meter to contact B (CKT 401) of master control panel personnel heater harness connector.
- Connect black probe of meter to terminal 3 (CKT 401) of PERSONNEL HEATER HI/LO switch.
- Check if meter indicates continuity.

Does meter indicate continuity?



MASTER CONTROL PANEL
(REAR VIEW)

12

- **Replace master control panel heater harness (page 10-98).**
- **Connect personnel heater control harness to heater.**
- **Connect master control panel accessories harness connector to master control panel.**
- **Connect hull front master harness connector to master control panel.**
- **Connect heater control harness to heater fuel pump.**

NO

YES

13 **Replace personnel heater (page 19-19).**

TA142574

Symptom-75
FROM STEP 2

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

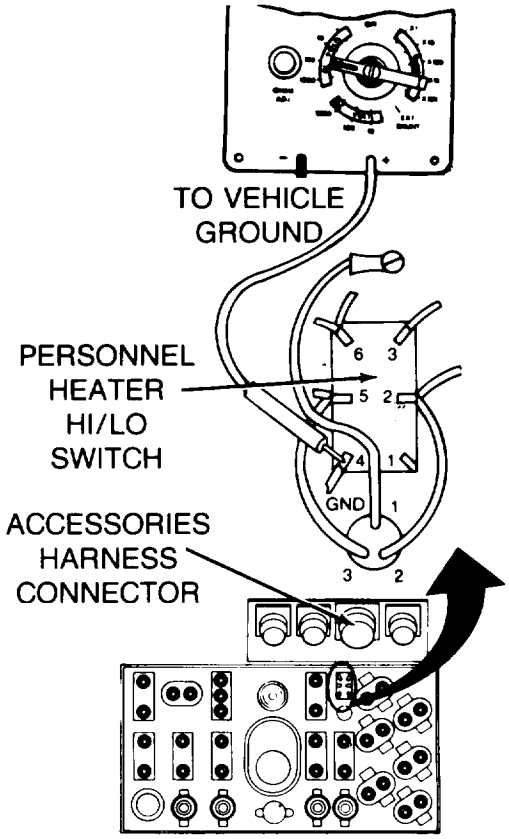
14 Check terminal 4 of personnel heater HI/LO switch for electrical power. (HI/LO switch set ON-LO).

Technician (Driver's Station)

- Set HEATER MASTER switch OFF.

  Displace master control panel (page 10-45).

- Disconnect hull front master harness from master control panel accessories harness connector.
- Remove four screws, nuts, and washers from master control panel accessories harness connector and unmount connector from master control panel. panel.
- Connect red probe of meter to PERSONNEL HEATER HI/LO switch terminal 4 and black probe to ground.
- Set HEATER MASTER switch ON.
- Set PERSONNEL HEATER HI/LO switch ON-LO.
- Check if meter indicates 18 to 30 volts dc.



MASTER CONTROL PANEL (REAR VIEW)

Does meter indicate 18 to 30 volts dc?

NO

15
- **Replace PERSONNEL HEATER HI/LO switch (page 10-91).**

  Connect personnel heater control harness connector to personnel heater fuel pump.

YES

16
- **Replace personnel heater switch jumper lead (page 10-98).**
- **Connect personnel heater control harness connector to personnel heater fuel pump.**

TA142575

Symptom-75

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

FROM STEP 6

WARNING

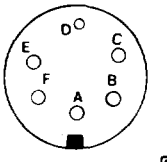
Use extreme care when working with circuits 400 and 405. These circuits carry battery voltage at all times, whether MASTER BATTERY switch is ON or OFF.

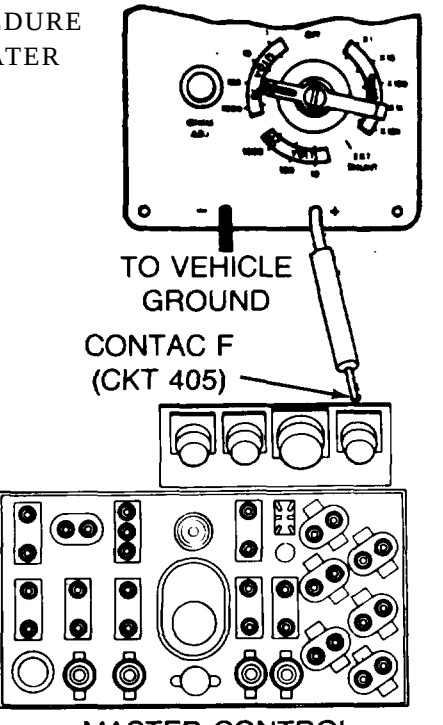
17 Check master control panel personnel heater harness (CKT 405) for electrical power.

Technician (Driver's Station)

- Set HEATER MASTER switch OFF.
- Displace master control panel (page 10-45).
- Disconnect heater control harness connector from master control panel.
- Connect red probe of meter to contact F (CKT 405) of personnel heater harness connector and black probe to ground.
- Set HEATER MASTER switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?





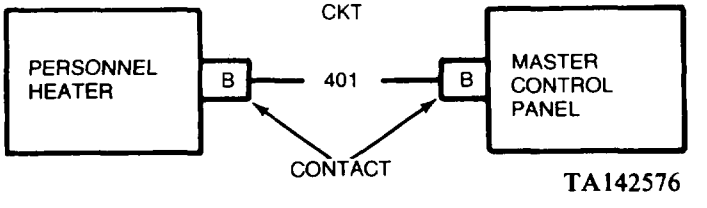
19

- **Inspect heater control harness for bent/broken connector contacts or loose (CKT 401) wire at rear of connectors.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective heater control harness.**
- **Connect heater control harness to master control panel.**

18

- **Replace master control panel personnel heater harness (page 10-98).**
- **Connect heater control harness to heater.**
- **Connect heater control harness to personnel heater fuel pump.**

NO — YES



TA142576

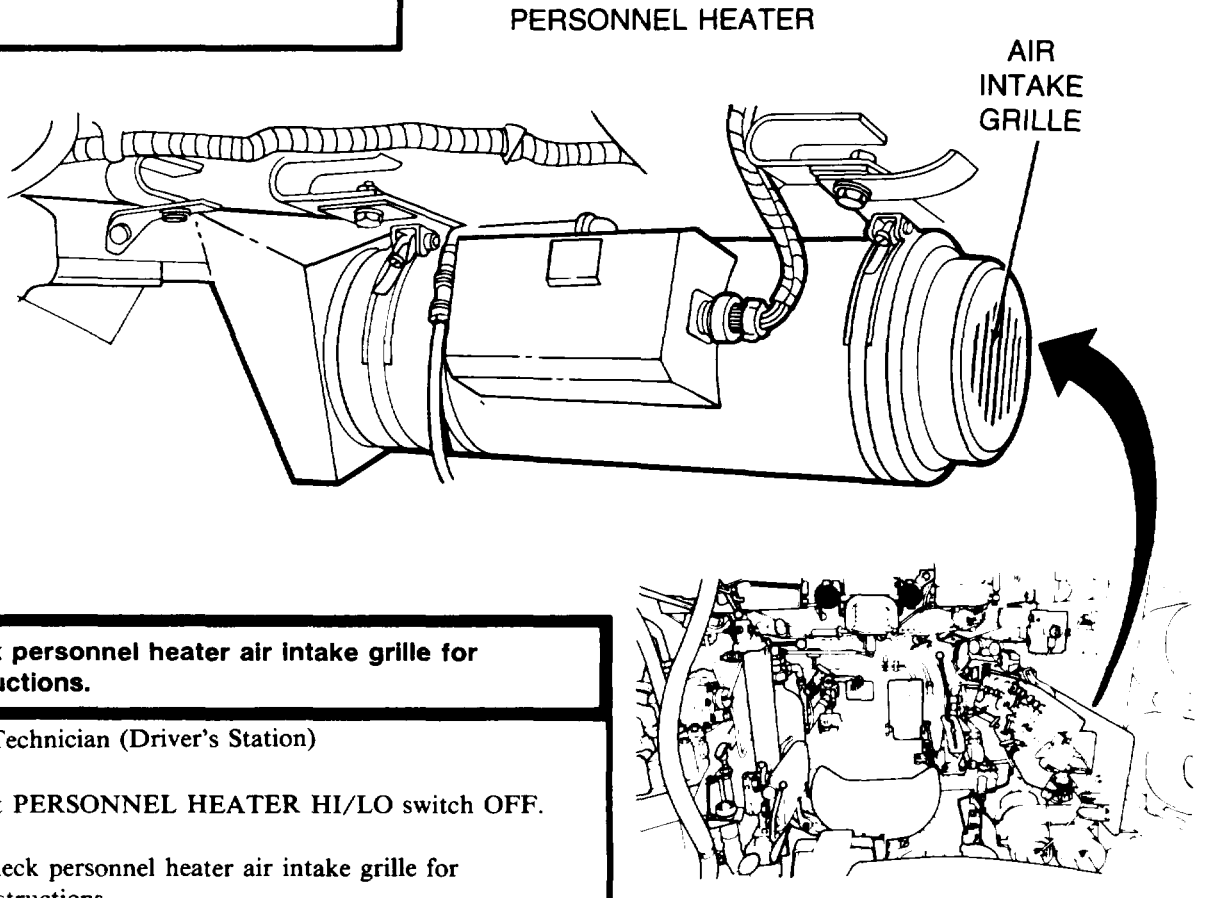
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER

Symptom-76

PERSONNEL HEATER STARTS, WORKS FOR A SHORT TIME, THEN STOPS

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



1 Check personnel heater air intake grille for obstructions.

First Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.
- Check personnel heater air intake grille for obstructions.

Is air intake grille obstructed?

NO

YES

2 Clear obstructions from air intake grille.

TA142577

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

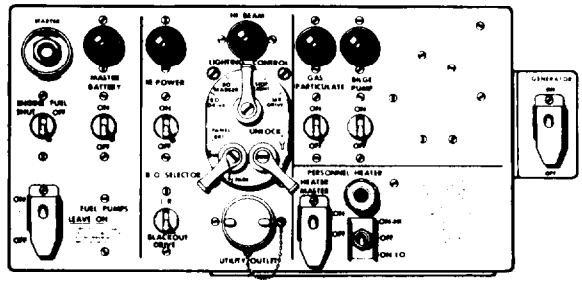
Symptom-76

3 **Check personnel heater duct for air flow at deflector.**

First Technician (Driver's Station)

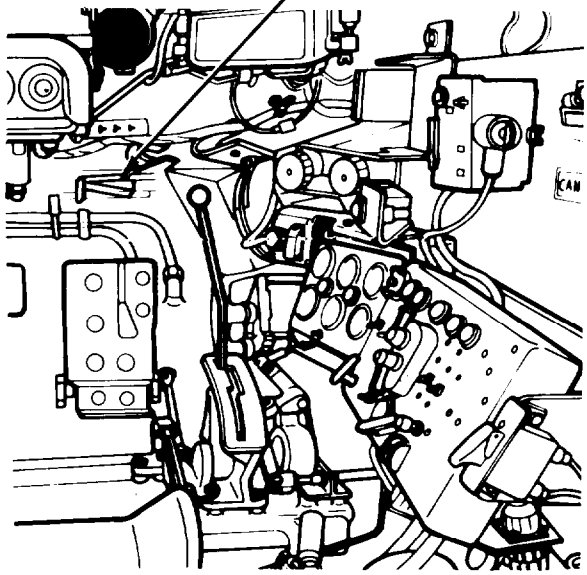
- Check that HEATER MASTER switch is set to ON.
- Set PERSONNEL HEATER HI/LO switch ON-LO.
- Place hand in front of heating duct deflector and check for air flow.

Is air flow present at deflector?



MASTER CONTROL PANEL

HEATING DUCT DEFLECTOR



YES

NO

4

- **Check heater duct for obstructions.**
- **See Step (8) .**

TA142578

Symptom-76

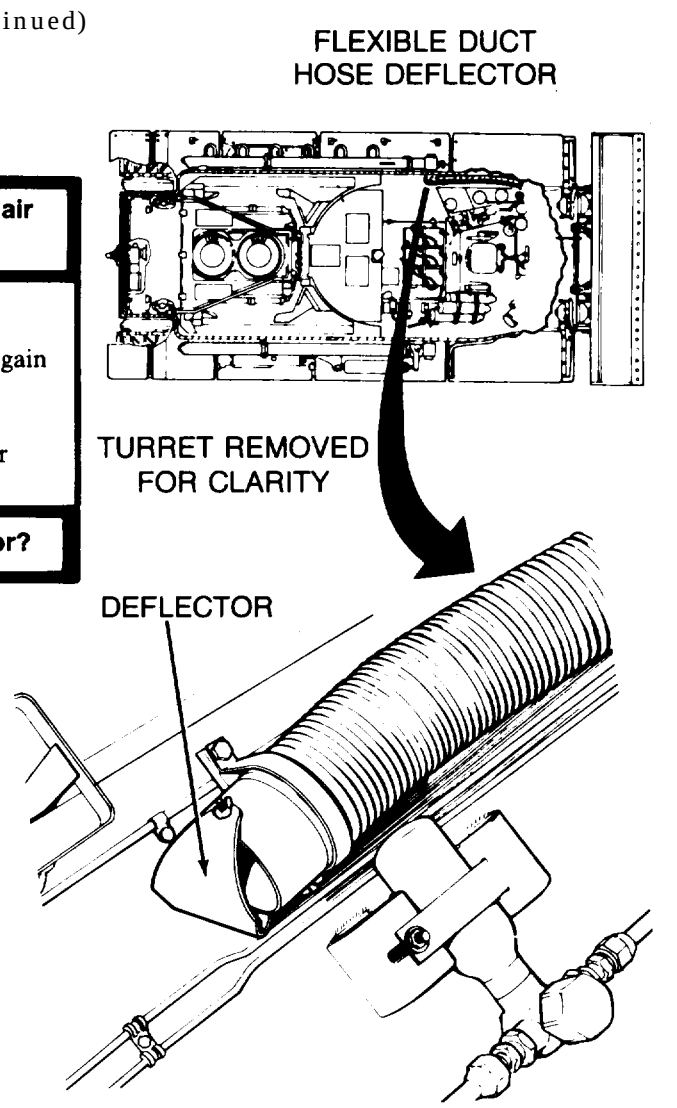
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

5 **Check personnel heater flexible duct hose for air flow at deflector.**

Second Technician (Turret)

- Manually traverse turret (TM 9-2350-222-10) to gain access to flexible duct hose deflector.
- Place hand in front of deflector and check for air flow.

Is air flow present at flexible duct hose deflector?



NO

6
- **Check flexible duct hose for obstructions or damage.**
- **See Step (11) .**

YES

7 **Replace personnel heater (page 19-19).**

TA142579

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

Symptom-76

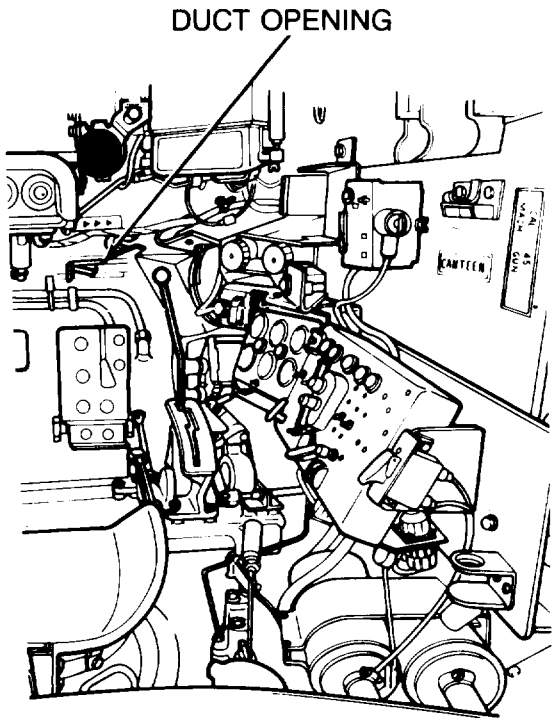
FROM STEP (4)

8 **Check heater duct for obstructions.**

First Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.
- Remove heater deflector (slide deflector out of its mounting slot by pulling deflector toward you).
- Look into duct opening and check for obstructions.

Are obstructions present in heater duct?



(DEFLECTOR REMOVED)

YES

9

- **Remove obstructions from heater duct.**
- **Install duct deflector.**

NO

10

- **Replace personnel heater (page 19-19).**
- **Install duct deflector.**

TA142580

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

Symptom-76

FROM STEP (6)

11 Check flexible duct hose for obstructions or damage.

First Technician (Driver's Station)

- Set PERSONNEL HEATER HI/LO switch OFF.

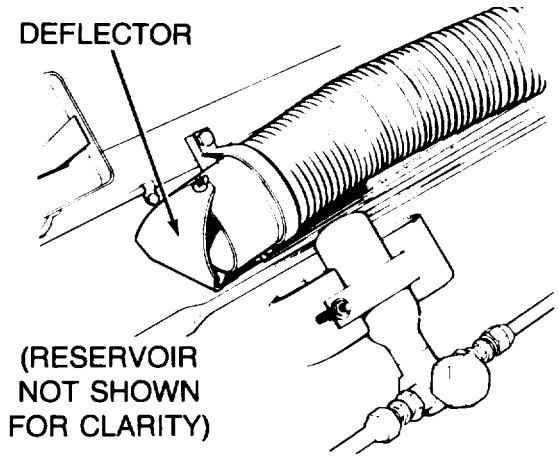
Second Technician (Turret)

- Push flexible duct hose deflector to one side and check end of hose for obstructions.
- Check behind reservoir for damage to flexible duct hose.

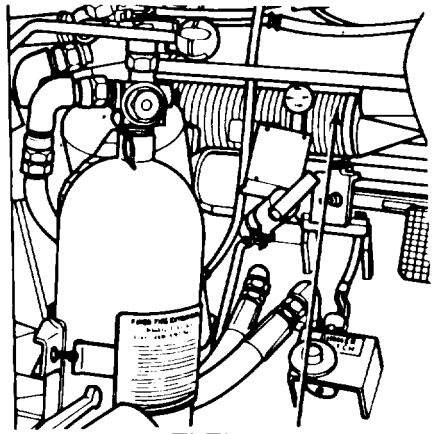
First Technician (Driver's Station)

- Check for damage to flexible duct hose.

Is flexible duct hose damaged or end of hose obstructed?



TURRET VIEW



LEFT FRONT DRIVER'S STATION

OBSTRUCTED

12 Remove obstructions from end of flexible duct hose.

DAMAGED

13 Replace personnel heater flexible duct hose (page 19-7).

TA142581

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER

Symptom-77

EXHAUST FUMES FROM PERSONNEL HEATER INSIDE VEHICLE.

WARNING

Exposure to exhaust fumes in an enclosed area can be dangerous to your health.

1 Check external exhaust tube for damage or obstructions.

Technician (Driver's Station)

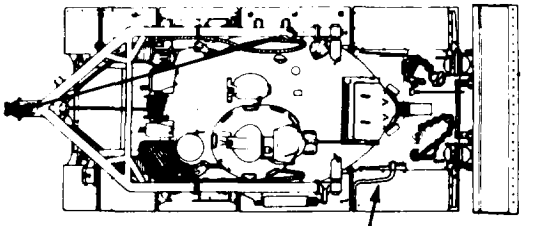
- Set PERSONNEL HEATER HI/LO switch OFF.
- Set MASTER BATTERY switch ON.

Technician (Turret)

- Set turret ventilation BLOWER switch ON (TM 9-2350-222-10) and allow blower motor to run until exhaust fumes are cleared from vehicle.
- Set turret ventilation BLOWER switch OFF.
- Set MASTER BATTERY switch OFF.

Technician (Right Front Fender)

- Look into opening of external exhaust tube and check for obstructions.
- Check external exhaust tube for damage.



EXTERNAL EXHAUST TUBE

Is external exhaust tube obstructed or damaged?

YES

2

- **Remove obstructions from external exhaust tube.**
- **If exhaust tube is not obstructed, replace damaged external exhaust tube (page 19-4).**

NO

TA142582

Symptom-77

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - PERSONNEL HEATER
(Continued)

3 **Check for loose coupling clamps on internal exhaust pipe.**

Technician (Driver's Station)

- Check if coupling clamp is loose at personnel heater.
- Check if coupling clamp is loose at hull feed through pipe.

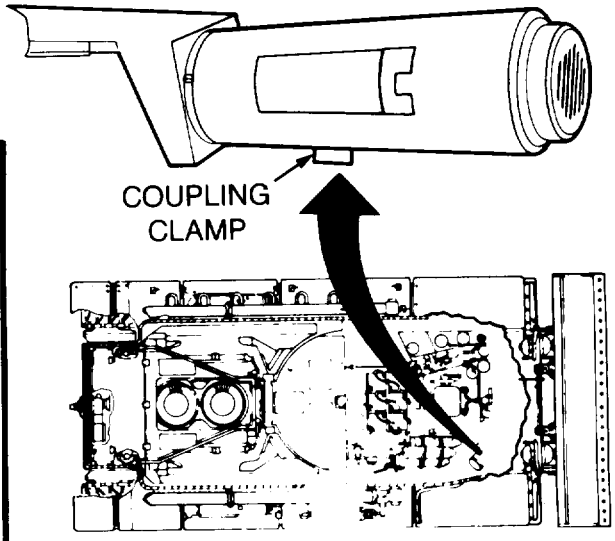
Are internal exhaust pipe coupling clamps loose?

4 **Tighten loose internal exhaust pipe coupling clamps (page 19-2).**

YES

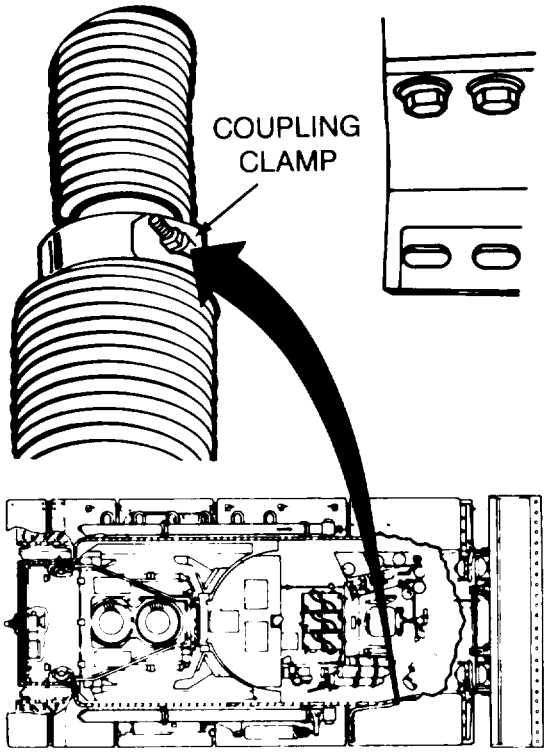
5 **Replace personnel heater (page 19-19).**

NO



FOR CLARITY TURRET NOT SHOWN

HULL FEED THROUGH PIPE
(RIGHT AMMO RACK
REMOVED FOR CLARITY)



TA142583

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR

Symptom-78

SMOKE GENERATOR WILL NOT WORK (NO SMOKE OR QUANTITY OF SMOKE IS NOT NORMAL).

WARNING

Never activate smoke generator in a building, closed area, or with personnel nearby.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check if smoke generator makes some white smoke.

First Technician (Turret)

- Manually traverse turret to gains access to right top deck grille doors (TM 9-2350-222-10).

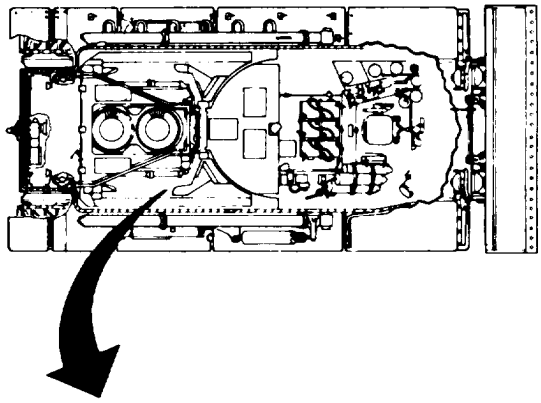
First Technician (Top Deck)

- Open right top deck grille doors.
- Make sure smoke generator manual fuel shutoff valve is in open position (screw slot in line with fuel line).

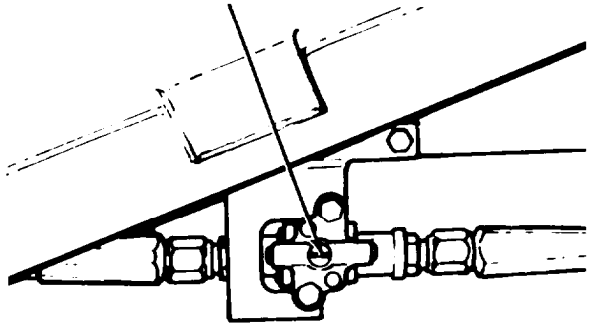
First Technician (Side of Vehicle)

- Note wind directions.
- Move to a safe position opposite of wind direction.

FOR CLARITY TUREET NOT SHOWN



SMOKE GENERATOR MANUAL FUEL SHUTOFF VALVE



TA142584

Symptom-78

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

STEP (1) CONTINUED

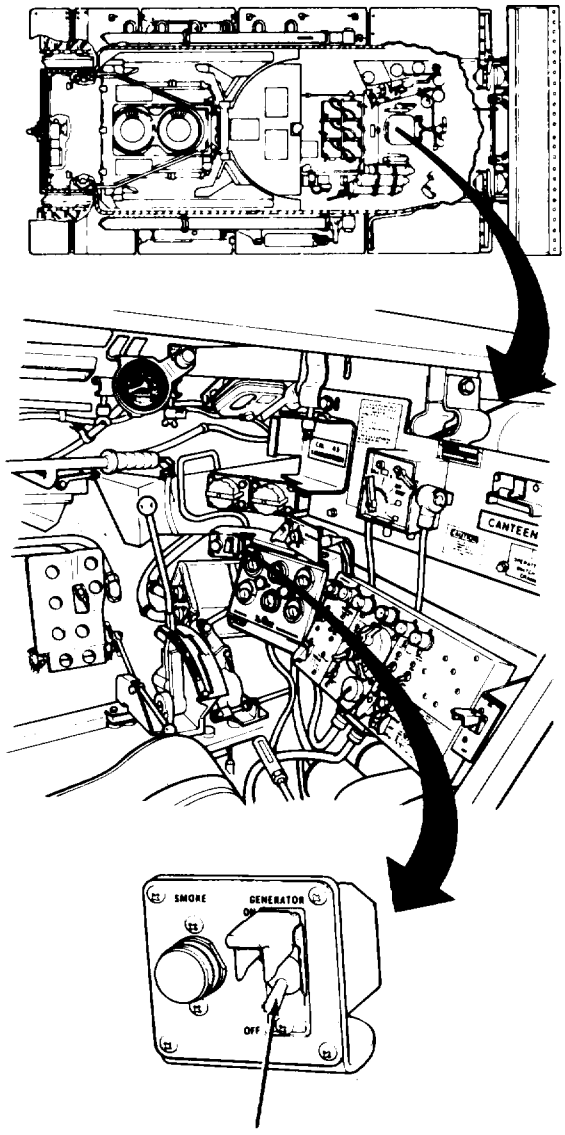
Second Technician (Driver's Station)

- Start engine and allow it to warm up.
- Set engine speed at 1600 RPM.
- Set SMOKE GENERATOR switch ON for ten seconds then to OFF.

First Technician (Side of Vehicle)

- Observe for white smoke emission from engine exhaust pipes.

Is white smoke emitted?



SMOKE GENERATOR SWITCH

NO

YES

(2) **Check fuel lines and fittings for leaks or damage.**

- **See Step (20) .**

TA142585

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

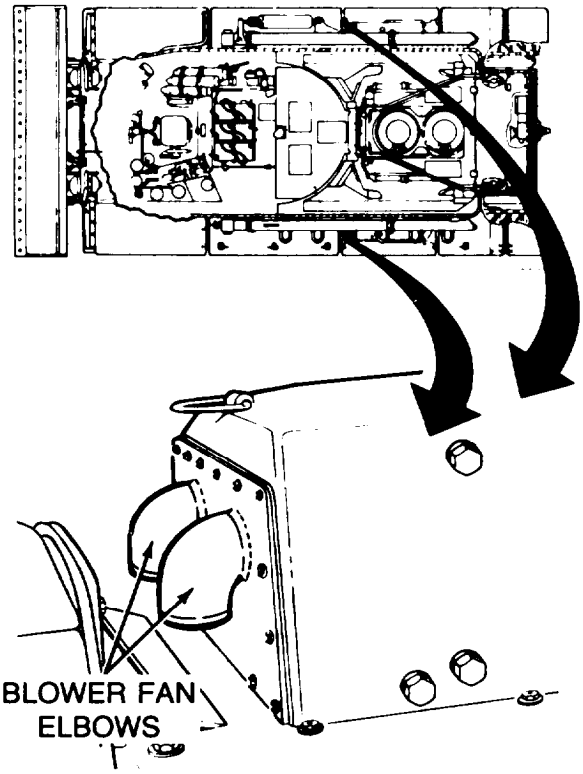
Symptom-78

3 **Check if any air cleaner blower motors are running.**

First Technician (Top Deck)

- Check if air exhaust can be felt at any of the four blower fan elbows.

Are any air cleaner blower fans running?



AIR CLEANER
(LEFT SIDE SHOWN)

YES

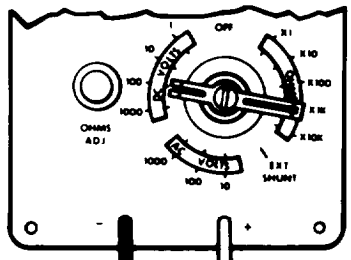
NO

4 **Refer to Symptom No. 14: ALL AIR CLEANER BLOWER FANS WILL NOT WORK.**

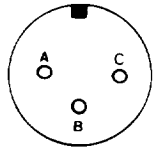
TA142586

Symptom-78

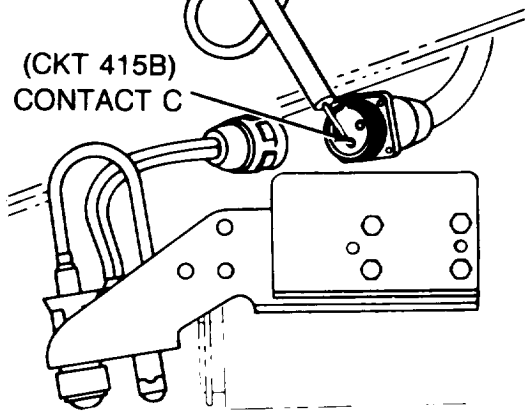
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)



TO VEHICLE GROUND



(CKT 415B) CONTACT C

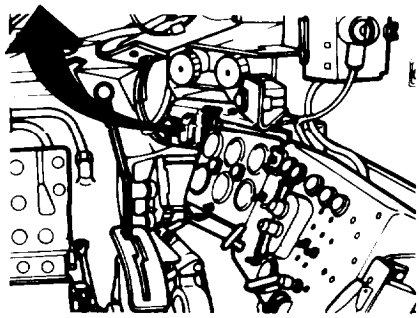


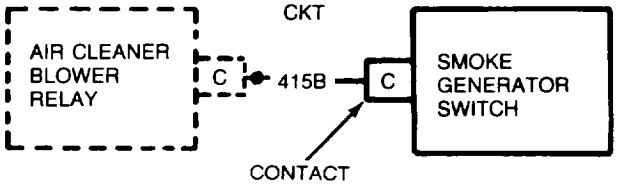
5 **Check smoke generator switch harness (CKT 415B) at SMOKE GENERATOR switch for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect smoke generator switch harness connector from SMOKE GENERATOR switch connector.
- Set multimeter to measure 18 to 30 volts dc, or STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact C (CKT 415B) of smoke generator switch harness connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?





YES

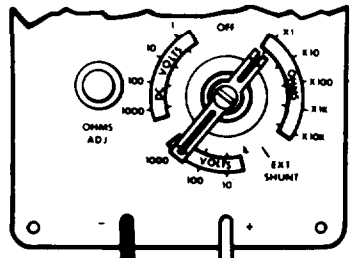
NO

6 **Repair smoke generator switch harness (CKT 415B) (page 10-307).**

TA142587

Symptom-78

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

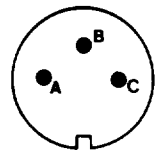


7 Check SMOKE GENERATOR switch assembly connector for continuity from contact A to contact C.

Second Technician (Driver's Station)

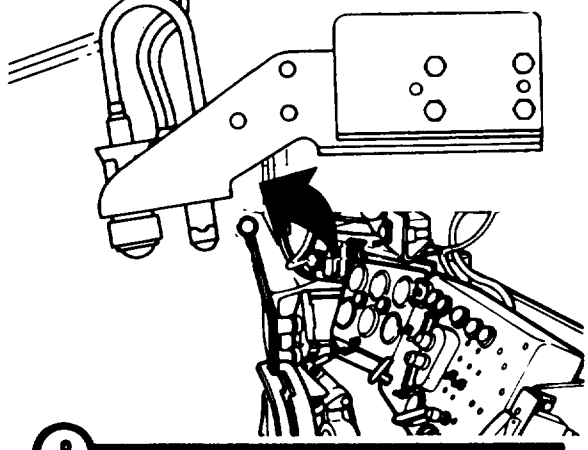
- Stop engine.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Set smoke GENERATOR switch ON.
- Connect red probe of meter to contact A of switch assembly connector.
- Connect black probe of meter to contact C of switch connector.
- Check if meter indicates continuity.

Does multimeter indicate continuity?



CONTACT A
(CKT 920A)

CONTACT C
(CKT 415B)



YES

NO

8 Replace SMOKE GENERATOR switch assembly (page 23-2).

TA142588

Symptom-78

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

9 **Check smoke generator switch harness (CKT 920A) for continuity from switch assembly to lead assembly at bulkhead electrical disconnect.**

First Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects.
- Disconnect smoke generator switch harness connector from (CKT 920A) lead assembly connector at bulkhead electrical disconnect.

Second Technician (Driver's Station)

- Set SMOKE GENERATOR switch OFF.
- Connect red probe of meter to smoke generator switch harness connector contact A (CKT 920A) at smoke GENERATOR switch.

First Technician (Turret)

- Connect black probe of meter to smoke generator switch harness connector at lead assembly (CKT 920A) at bulkhead electrical disconnect.

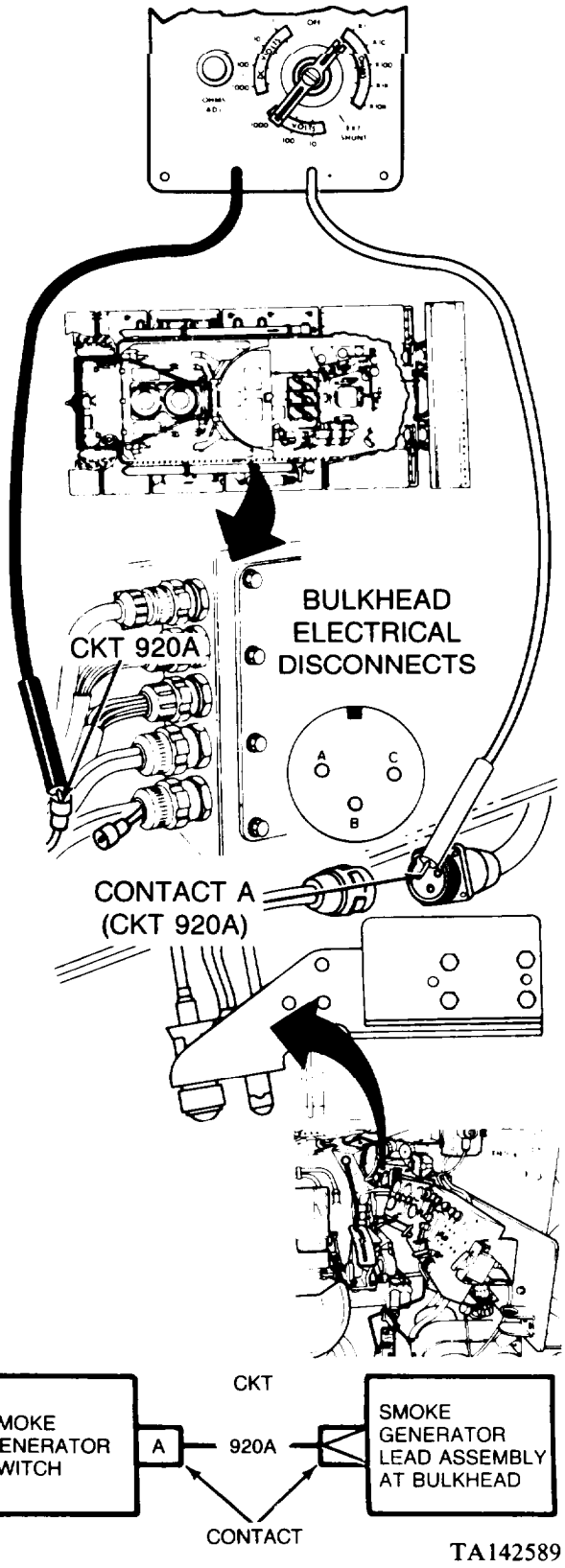
Second Technician (Driver's Station)

- Check if meter indicates continuity.

Does meter indicate continuity?

10 **Repair smoke generator switch harness (CKT 920A) (page 10-307).** — NO

YES



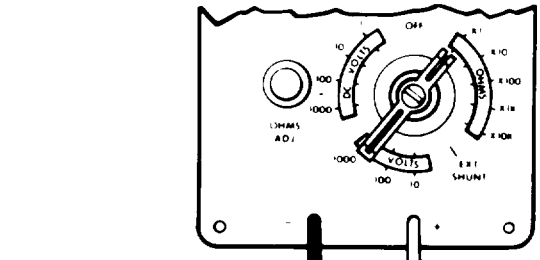
TA142589

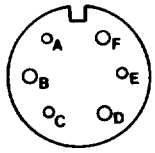
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

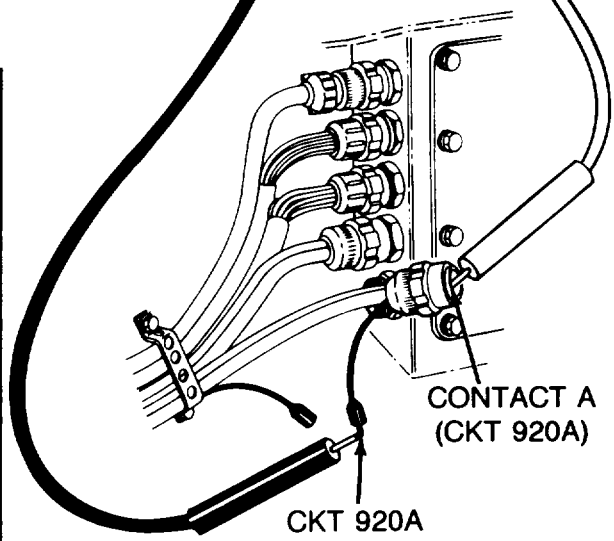
Symptom-78

WARNING

Use extreme care when working with circuit 81/82. This circuit carries battery voltage at all times whether MASTER BATTERY switch is ON or OFF.







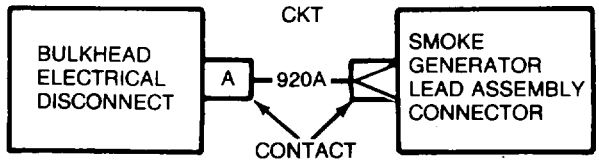
11 **Check (CKT 920A) lead through battery slave cable connector at bulkhead electrical disconnect.**

Second Technician (Driver's Station)

- Disconnect three battery ground cables from floor plate behind driver's seat (page 10-283).
- Reconnect smoke generator harness connector to switch connector.

First Technician (Turret)

- Disconnect starter relay cable from bulkhead electrical disconnect.
- Connect red probe of meter to starter relay cable connector (CKT 920A) at bulkhead electrical disconnect.
- Connect black probe of meter to lead assembly connector (CKT 920A) at bulkhead electrical disconnect.
- Check if meter indicates continuity.



Does meter indicate contiuity?

YES

NO

12 **Repair smoke generator lead assembly (page 10-307).**

TA142590

Symptom-78

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

13 **Check starter feed harness (CKT 920A) for continuity from bulkhead electrical disconnect to engine disconnect.**

Second Technician (Top Deck)

- Open right top deck grille doors.
- Disconnect starter feed harness connector from starter motor harness at engine disconnect.
- Connect jumper wire from starter feed harness connector contact A (CKT 920A) to ground.

First Technician (Turret)

- Connect (CKT 920A) lead connector at bulkhead electrical disconnect to smoke generator harness connector.
- Connect red probe of meter to starter feed connector contact A (CKT 920A) at bulkhead electrical disconnect and black probe to ground.
- Check if meter indicates continuity.

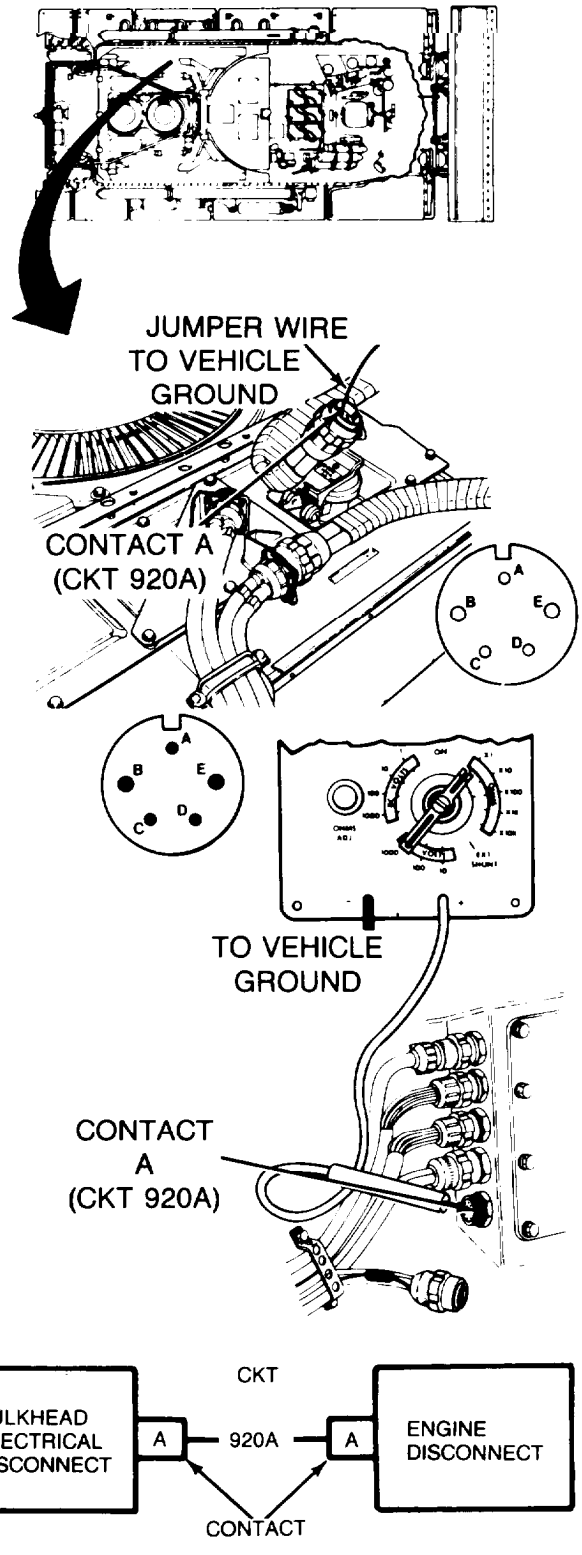
Does meter indicate continuity?

14 **Inspect starter feed harness for bent/broken connector contacts or loose (CKT 920A) wire at rear of connectors.**

- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective starter feed harness.**
- **Connect starter relay cable to bulkhead electrical disconnects.**
- **Connect starter feed harness connector to engine disconnect.**

NO

YES



TA142591

Symptom-78

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

15 **Check smoke generator engine harness (CKT 920A) for continuity from engine disconnect to both harness connectors at solenoid valves.**

First Technician (Turret)

- Connect starter relay cable to bulkhead electrical disconnect.

First and Second Technician (Rear of Vehicle)

- Remove transmission shroud (page 9-20).

First Technician (Rear of Vehicle)

- Disconnect both smoke generator engine harness connectors from the solenoid valves.
- Connect red probe of meter to contact A (CKT 920A) of one smoke generator engine harness connector at solenoid valves.

Second Technician (Top Deck)

- Connect black probe of meter to contact A (CKT 920A) of starter motor harness connector.

First Technician (Rear of Vehicle)

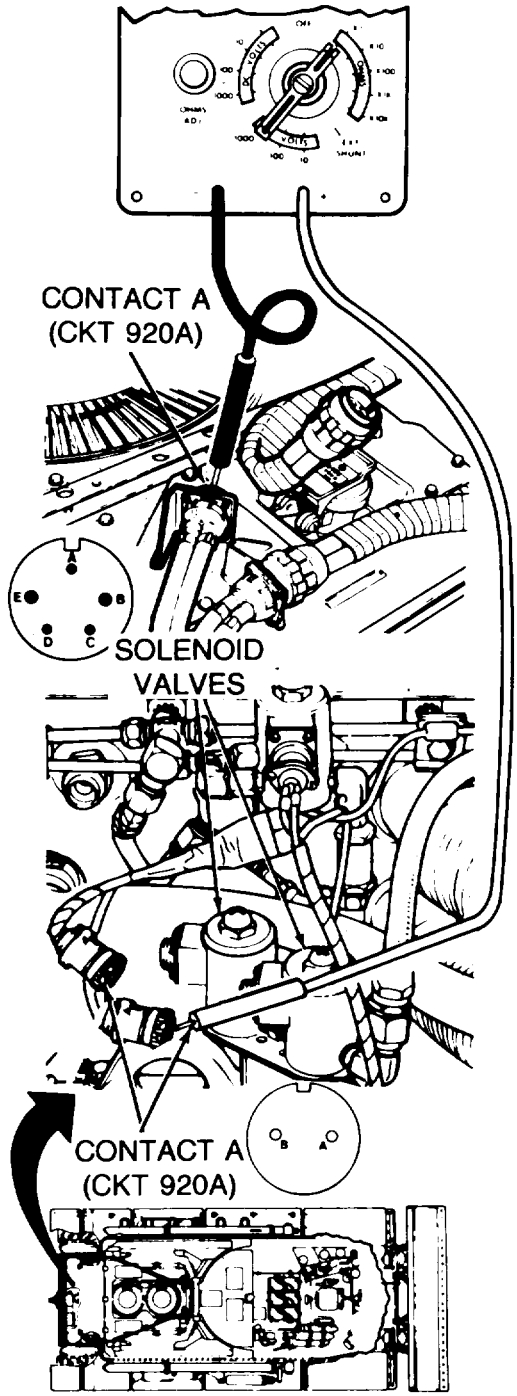
- Check if meter indicates continuity.
- Connect red probe of meter to contact A of other smoke generator engine harness connector at solenoid valves.
- Check if meter indicates continuity.

Does meter indicate continuity at both smoke generator engine harness connectors?

16 **Replace smoke generator engine harness (page 23-45).**

NO

YES



TA142592

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

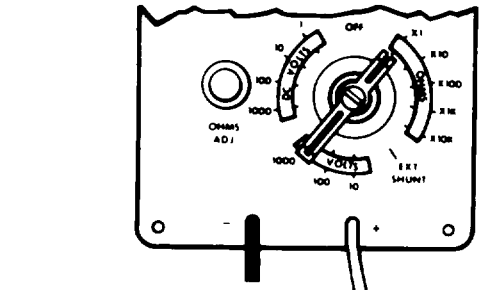
Symptom-78

17 **Check smoke generator engine harness (CKT GND) for continuity from both harness connectors at solenoid valves to ground.**

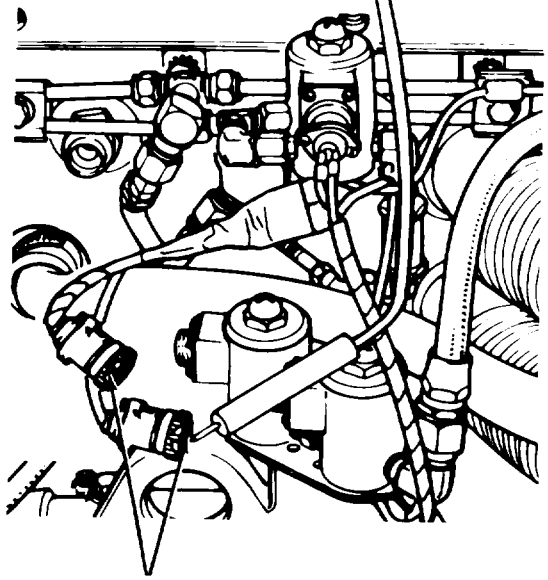
First Technician (Rear of Vehicle)

- Connect red probe of meter to contact B (CKT GND) of one smoke generator engine harness connector at solenoid valves and black probe to ground.
- Check if meter indicates continuity.
- Connect red probe of meter to contact B (CKT GND) of other smoke generator engine harness connector.
- Check if meter indicates continuity.

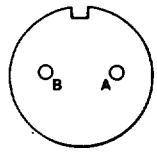
Does meter indicate continuity at both smoke generator engine harness connectors.



TO VEHICLE GROUND



CONTACT B (CKT GND)



YES

18
- **Replace both smoke generator solenoid valves (page 23-31).**
- **Connect starter feed harness to starter motor harness.**

NO

19
- **Replace smoke generator engine harness (page 23-45).**
- **Connect starter feed harness to starter motor harness.**

TA142593

Symptom-78

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

FROM STEP (2)

(20) Check fuel hoses and fittings for leaks or damage.

Second Technician (Driver's Station)

- Stop engine.

First and Second Technicians (Rear of Vehicle)

- Remove engine shroud (page 9-20).

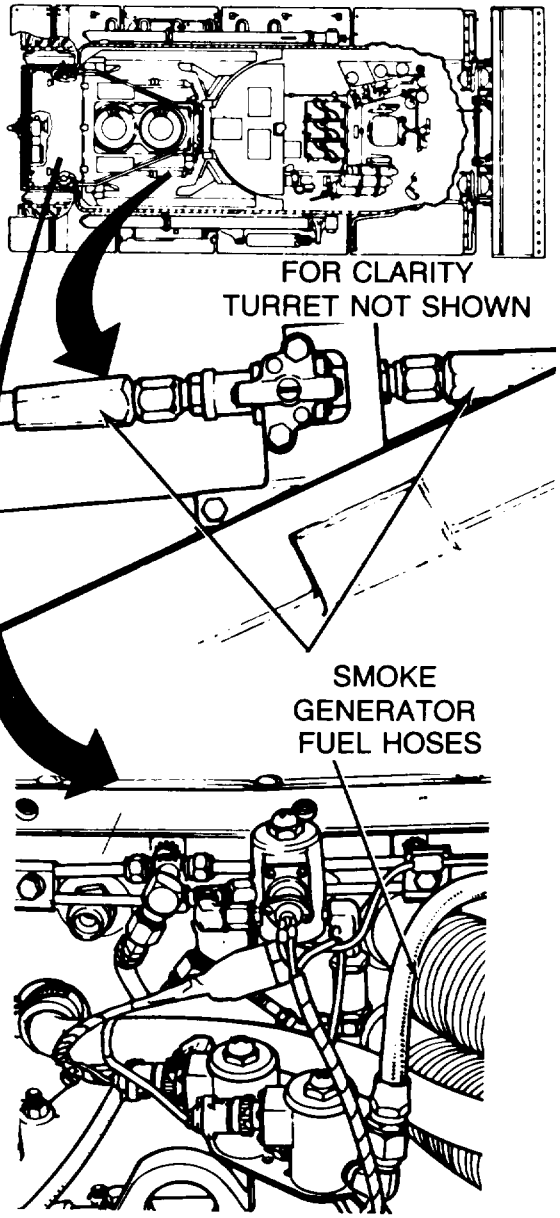
Second Technician (Driver's Station)

- Start engine.

First Technician (Top Deck)

- Check fuel hoses from smoke generator solenoids to front of engine for leaks or damage.

Are smoke generator fuel hoses leaking or damaged?



NO

YES

(21)

- **Tighten loose connections.**
- **Replace damaged hoses (page 23-18 and 23-22).**

TA142594

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

Symptom-78

22 **Check smoke generator hose from solenoid valves to tee for leaks or damage.**

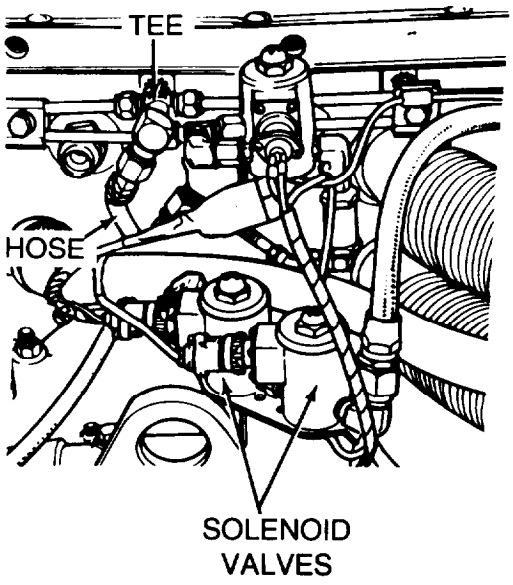
Second Technician (Driver's Station)

- Set engine speed at 1600 RPM.
- Set SMOKE GENERATOR switch ON.

First Technician (Rear of Vehicle)

- Check for leaks or damage in hose from solenoid valves to tee.

Is output hose leaking or damaged?



NO

YES

23

- **Tighten any loose fittings.**
- **Replace damaged hose (page 23-38).**

TA142595

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - SMOKE GENERATOR
(Continued)

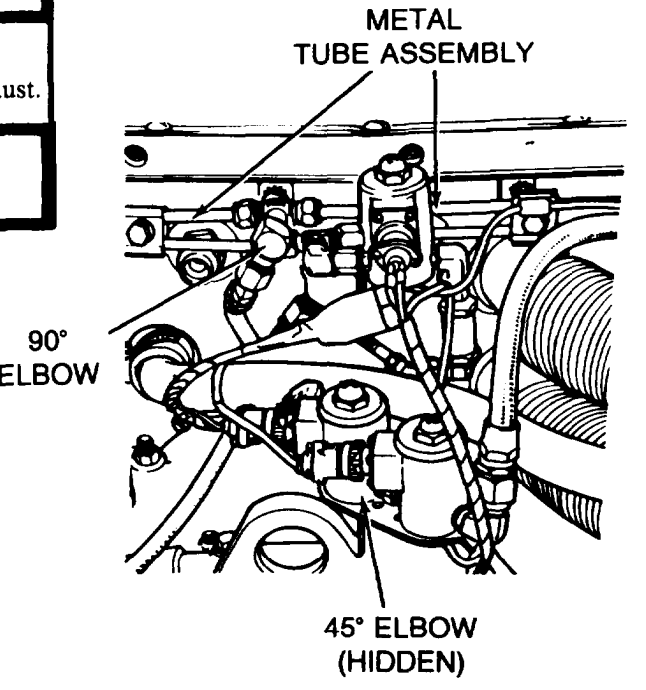
Symptom-78

24 **Check if white smoke is reduced or missing in only one exhaust.**

First Technician (Rear of Vehicle)

- Check amount of white smoke coming from each exhaust.

Is white smoke reduced or missing in only one exhaust?



YES

25

- **Remove tube assembly from defective side (page 23-40).**
- **If damaged, replace (page 23-40).**
- **If not damaged, run a small drill bit or stiff wire into exhaust end at tube to remove carbon or other restriction.**
- **Install tube assembly**

NO

26

- **Remove tee, 90° elbow, hose and 45° elbow (page 23-40).**
- **Check tee and elbows for restriction.**
  - **Remove restriction using a small drill bit or stiff wire.**
  - **Replace damaged parts (page 23-40).**
- **Install tee, 90° elbow hose and 45° elbow.**

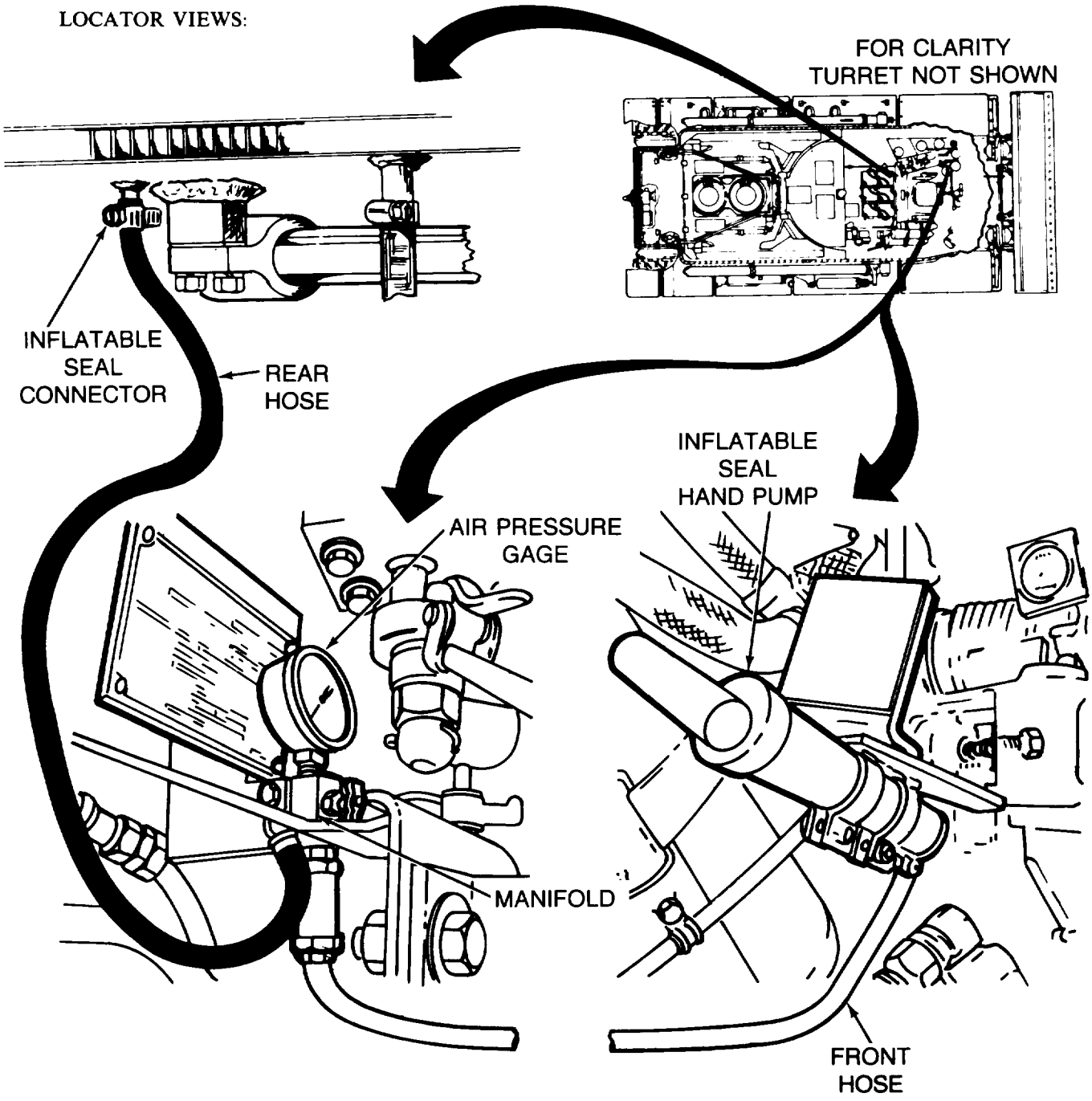
TA142596

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING

Symptom-79

HULL - TURRET INFLATABLE SEAL WILL NOT WORK (LEAKS WHEN FORDING).

LOCATOR VIEWS:



TA142597

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

Symptom-79

HULL - TURRET INFLATABLE SEAL WILL NOT WORK (LEAKS WHEN FORDING)

CAUTION

Do not traverse turret. If turret is traversed while hull-turret inflatable seal is inflated, damage to seal will result, causing seal to deflate.

(1) Check if hull-turret inflatable seal system can be pressurized.

Technician (Driver's Station)

- Close turret seal drain cock.
- Disconnect rear hose from flexible stem.
- Crimp and hold disconnected end of rear hose.
- Pump inflatable seal hand pump five times.
- Check air pressure gage.

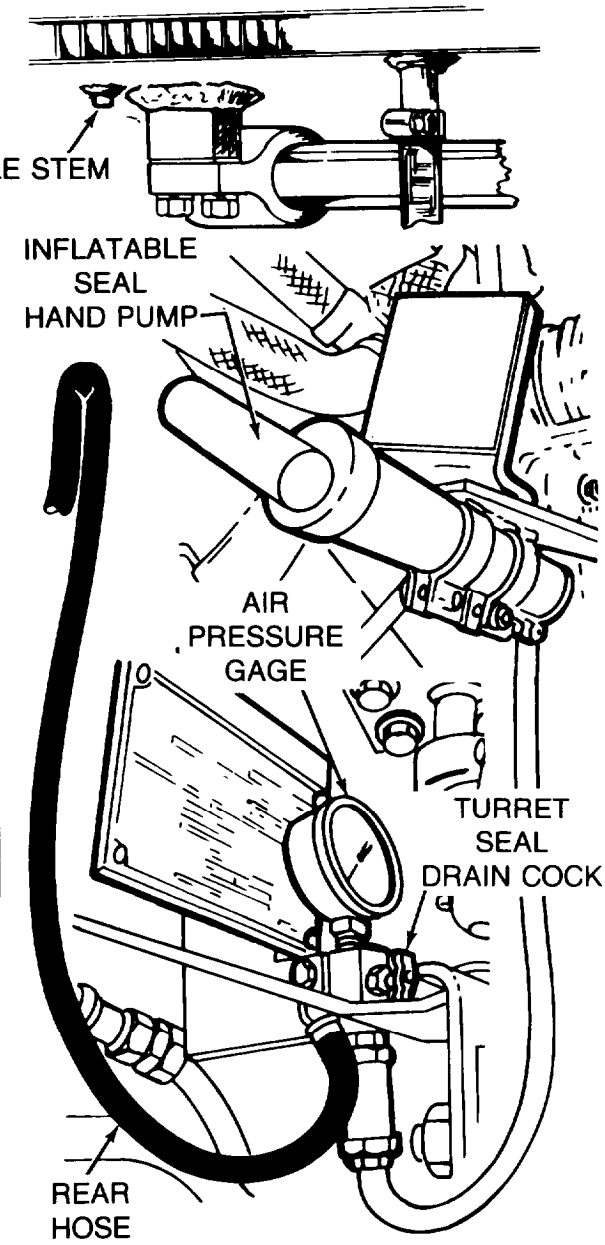
Does air pressure gage read more than 20 psi?

YES

(2)

- **Check if hull-turret inflatable seal will hold pressure.**
- **See Step (12).**

NO



TA142598

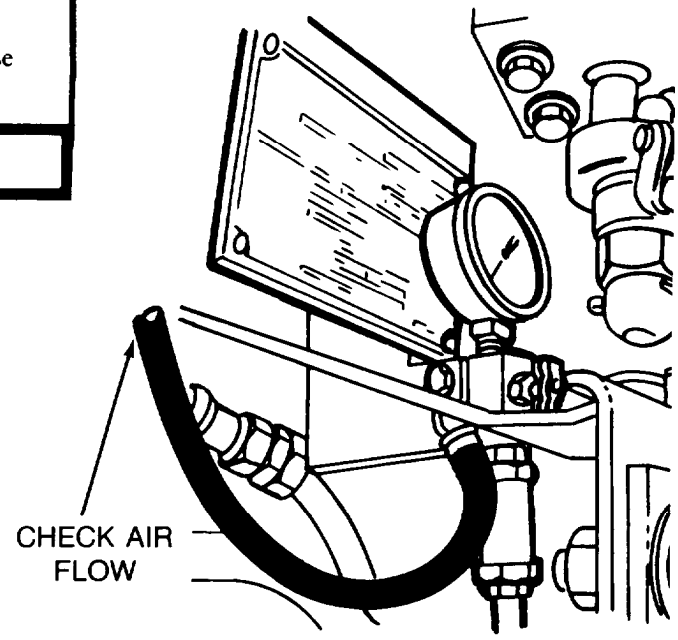
Symptom-79 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

3 Check if inflatable seal hand pump is pumping air to hull-turret inflatable seal connector.

Technician (Driver's Station)

- Release crimp on rear hose and listen for air escaping or feel for air flow at output of rear hose while operating hand pump.

Is air being pumped at output of rear hose?



NO

YES

4

- **Replace air pressure gage (page 16-45).**
- **Connect rear hose to flexible stem at hull-turret inflatable seal connector.**

TA142599

Symptom-79

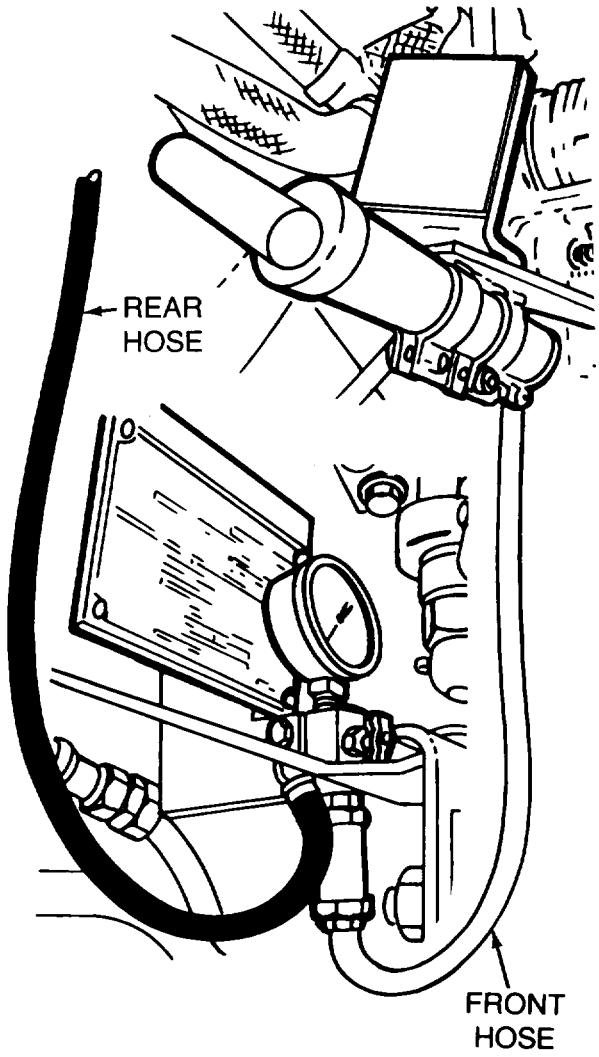
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

5 **Check front hose and rear hose for sharp bends or pinching.**

Technician (Driver's Station)

- Visually and manually inspect front hose and rear hose for sharp bends or pinching.

Is front or rear hose bent or pinched?



NO

YES

6

- **Correct by straightening bends and/or removing objects that are pinching hose.**
- **Connect rear hose to flexible stem at hull-turret inflatable seal connector.**

TA142600

Symptom-79

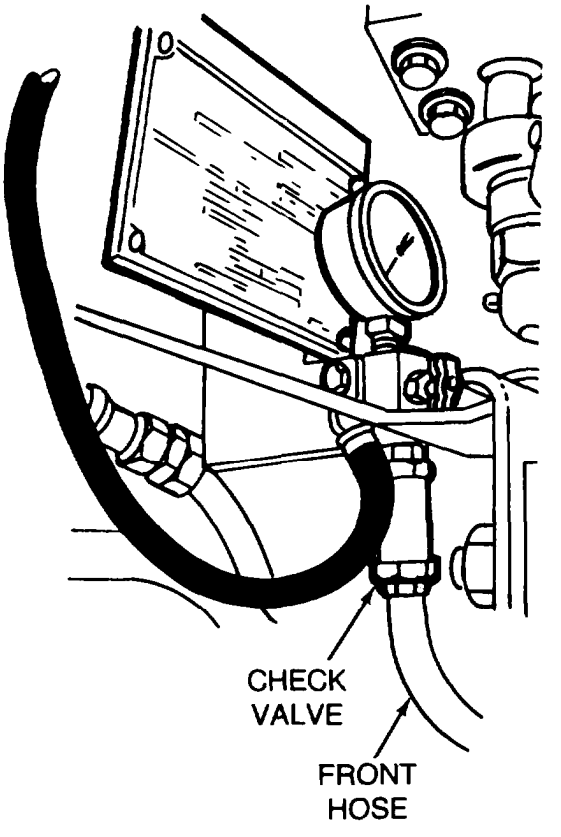
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

7 **Check if check valve is operating properly.**

Technician (Driver's Station)

- Connect rear hose to flexible stem at hull-turret inflatable seal connector.
- Disconnect front hose from check valve on manifold.
- Remove check valve from manifold (page 16-46).
- Blow through check valve in direction of arrow.
- Check if air flows through check valve.

Does air flow through check valve?



YES

NO

8 **Replace check valve (page 16-45).**

TA142601

Symptom-79

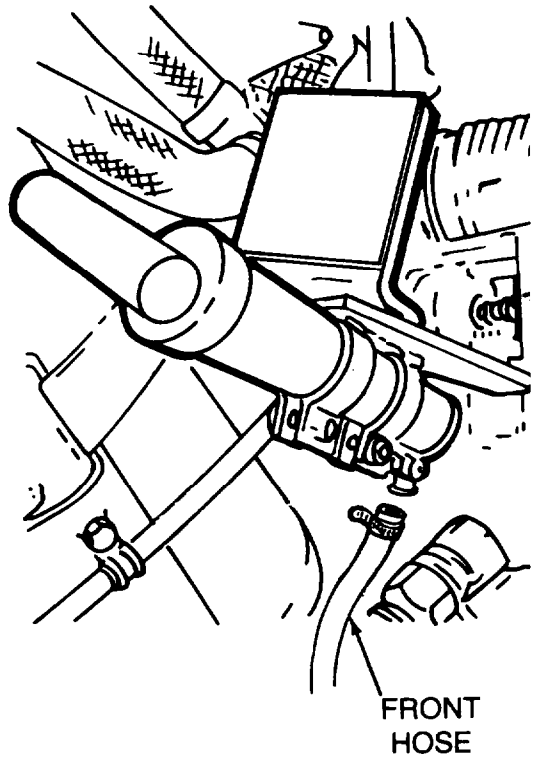
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

9 Check inflatable seal hand pump for proper operation.

Technician (Driver's Station)

- Install check valve in manifold (page 16-50).
- Disconnect front hose from inflatable seal hand pump.
- Pump hand pump and listen for air escaping and feel for air flow at output of hand pump.

Is hand pump pumping air?



NO

10

- **Replace inflatable seal hand pump (page 16-45).**
- **Install front hose.**

YES

11 Replace front hose (page 16-45).

TA142602

Symptom-79

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

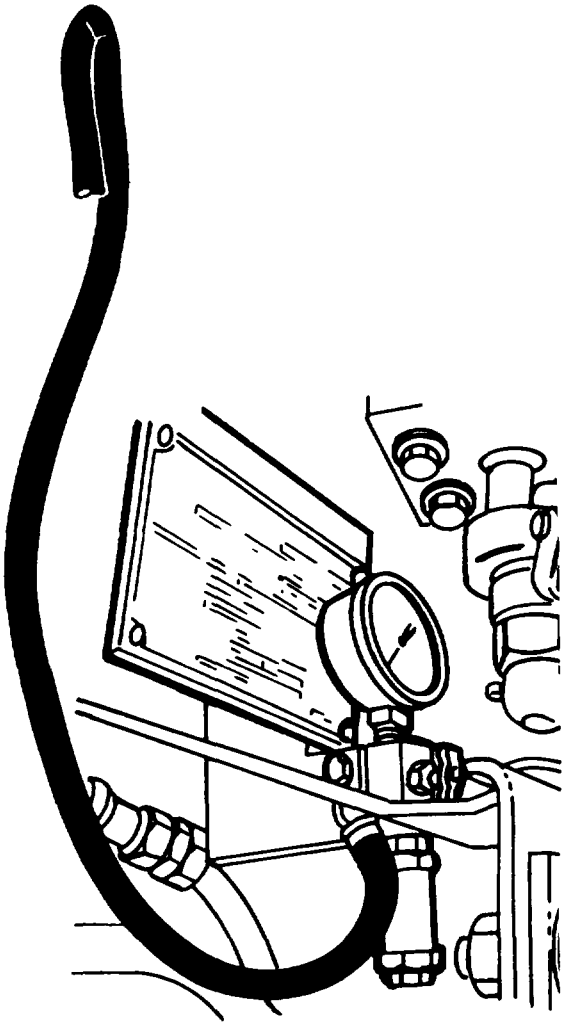
FROM STEP 2

12 Check if hull-turret inflatable seal will hold pressure.

Technician (Driver's Station)

- Continue to hold rear hose crimped for 5 minutes.
- Check if pointer on air pressure gage stays over 20 psi.

Does air pressure gage reading stay over 20 psi?



NO

YES

13 Notify support maintenance of defective hull-turret seal.

TA142603

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

Symptom-79

14 **Check hull-turret inflatable seal system for leaks.**

Technician (Driver's Station)

- Connect rear hose to flexible stem at hull-turret inflatable seal connector.
- Coat all connections with soap solution.
- Actuate inflatable seal hand pump until air pressure gage reads 20 psi.
- Check connections for air bubbles.

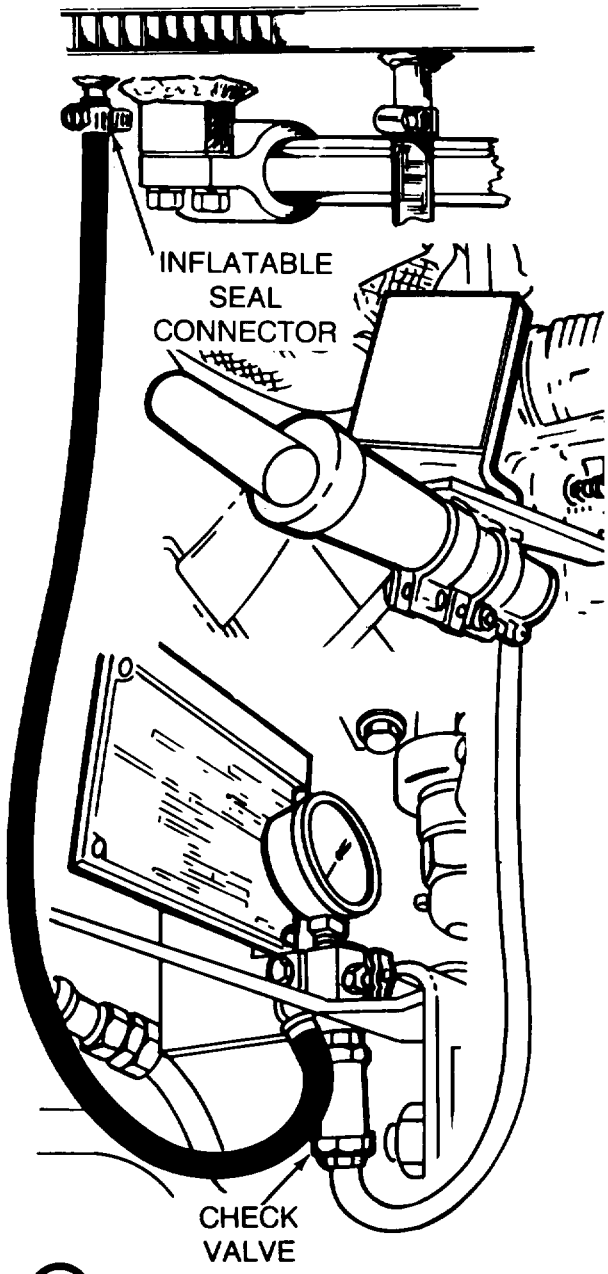
Are air bubbles formed at any connections?

NO

YES

15

- **Tighten loose hose connections and fittings.**
- **Apply thread sealer if necessary.**



TA142604

Symptom-79

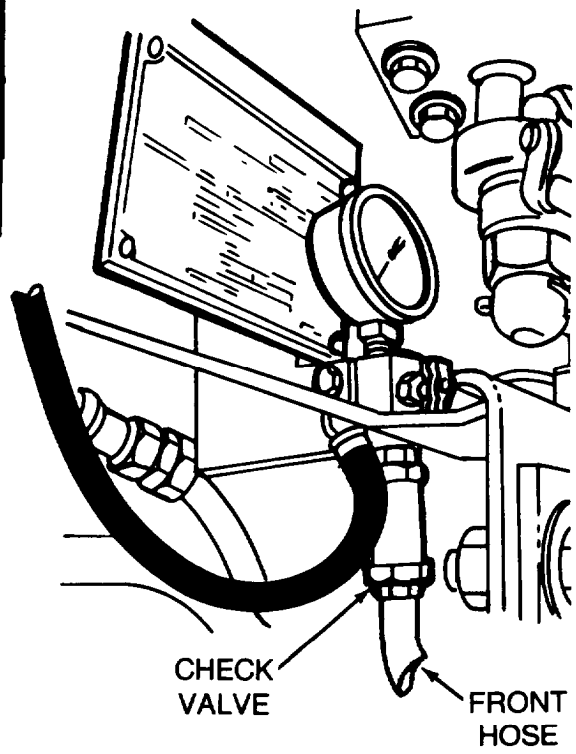
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

16 **Check if check valve is operating properly.**

Technician (Driver's Station)

- Disconnect front hose from check valve on manifold.
- Remove check valve from manifold.
- Blow through check valve against direction of arrow.
- Check that air does not flow through check valve.

Does check valve stop air flow?



YES → **17** **Replace rear hose (page 16-45).**

NO → **18** **Replace check valve (page 16-45).**

TA142605

Symptom-79.1 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING

BILGE PUMP WILL NOT WORK.

CAUTION

Do not operate bilge pump for more than 30 seconds unless water level is above top of intake screen.

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check if bilge pump will run.

Second Technician (Driver's Station)

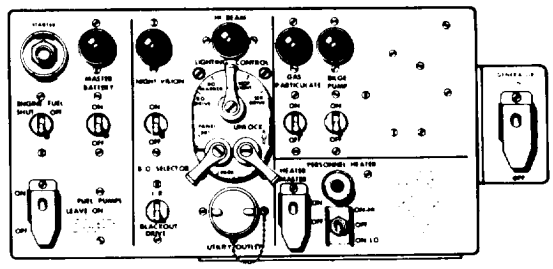
- Set MASTER BATTERY switch ON.
- Set BILGE PUMP switch ON.
- Listen for sound of BILGE PUMP motor.
- Set BILGE PUMP switch OFF.

Did bilge pump run?

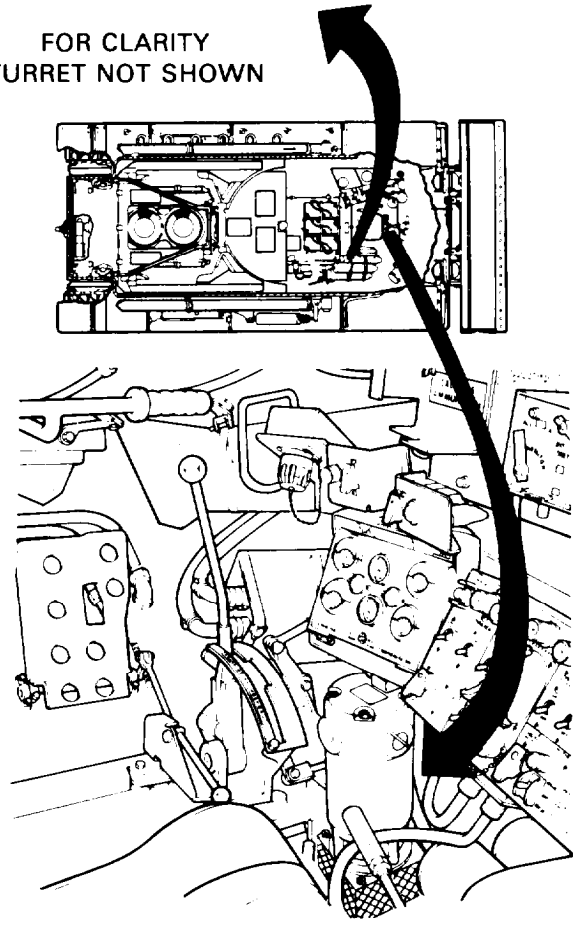
2 Clean and inspect bilge pump assembly (page 19.1-4). — YES

NO

MASTER CONTROL PANEL



FOR CLARITY
TURRET NOT SHOWN



BILGE PUMP ASSEMBLY

TA253135

Symptom-79.1

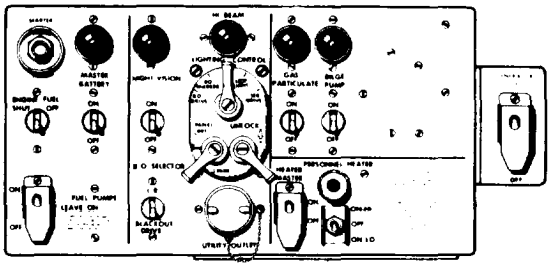
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

3 **Check if BILGE PUMP indicator lamp lights.**

Second Technician (Driver's Station)

- Set BILGE PUMP switch ON.
- Check if BILGE PUMP indicator lamp is lit.

Is BILGE PUMP indicator lamp lit?



YES

NO

4

- **Check bilge pump switch for continuity.**
- **See Step 26.**

TA253136

Symptom-79.1

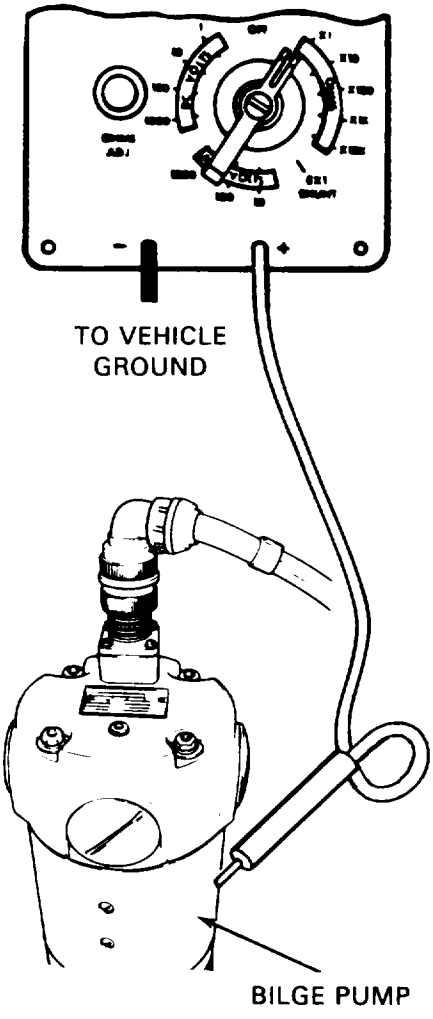
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

5 Check bilge pump for proper ground.

Second Technician (Driver's Station)

- Set BILGE PUMP switch OFF.
- Set MASTER BATTERY switch OFF.
- Set multimeter to OHMS X1 scale and zero meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to bilge pump body and black probe to ground.

Does meter indicate continuity?



YES

NO

6 Clean and tighten bilge pump mounting base (page 19.1-2).

TA253137

Symptom-79.1

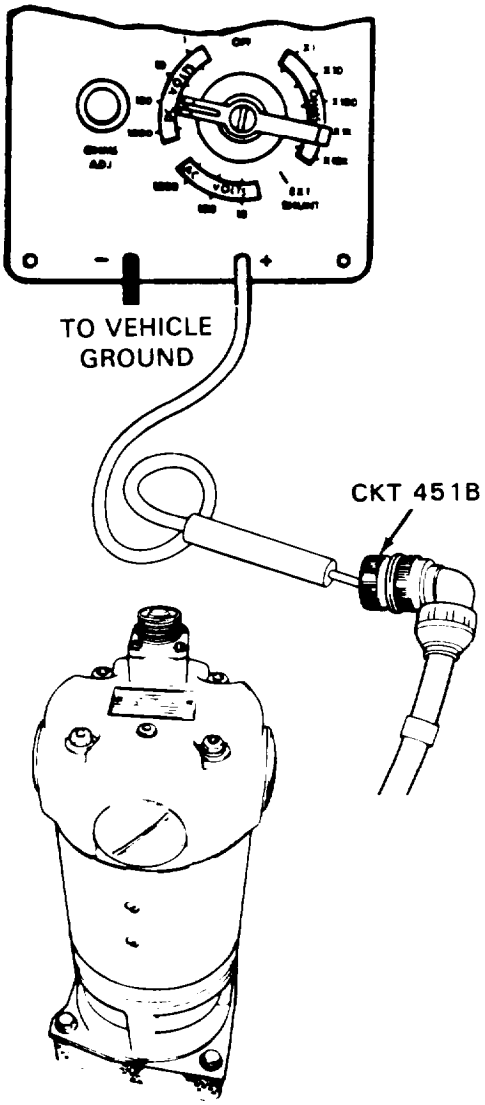
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

7 Check hull power harness (CKT 451B) at bilge pump for electrical power.

Second Technician (Driver's Station)

- Disconnect hull power harness connector from bilge pump.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to hull power harness connector contact (CKT 451B) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set BILGE PUMP switch ON.
- Check if meter indicates 18 to 30 volts dc.
- Set BILGE PUMP switch OFF.

Did meter indicate 18 to 30 volts dc?



NO

YES

8 Replace bilge pump (page 19.1-2).

TA253138

Symptom-79.1

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

9 **Check hull power harness (CKT 451B) for continuity from bilge pump to bilge pump relay.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set multimeter to OHMS X1 scale and zero meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to hull power harness connector contact (CKT 451B) at bilge pump.

First Technician (Turret)

- Open turret platform access door (TM 9-2350-222-10).
- Manually traverse turret to gain access to bilge pump relay (TM 9-2350-222-10).
- Disconnect hull power harness connector from bilge pump relay.
- Connect black probe of meter to contact A (CKT 451B) of hull power harness connector at bilge pump relay.

Second Technician (Driver's Station)

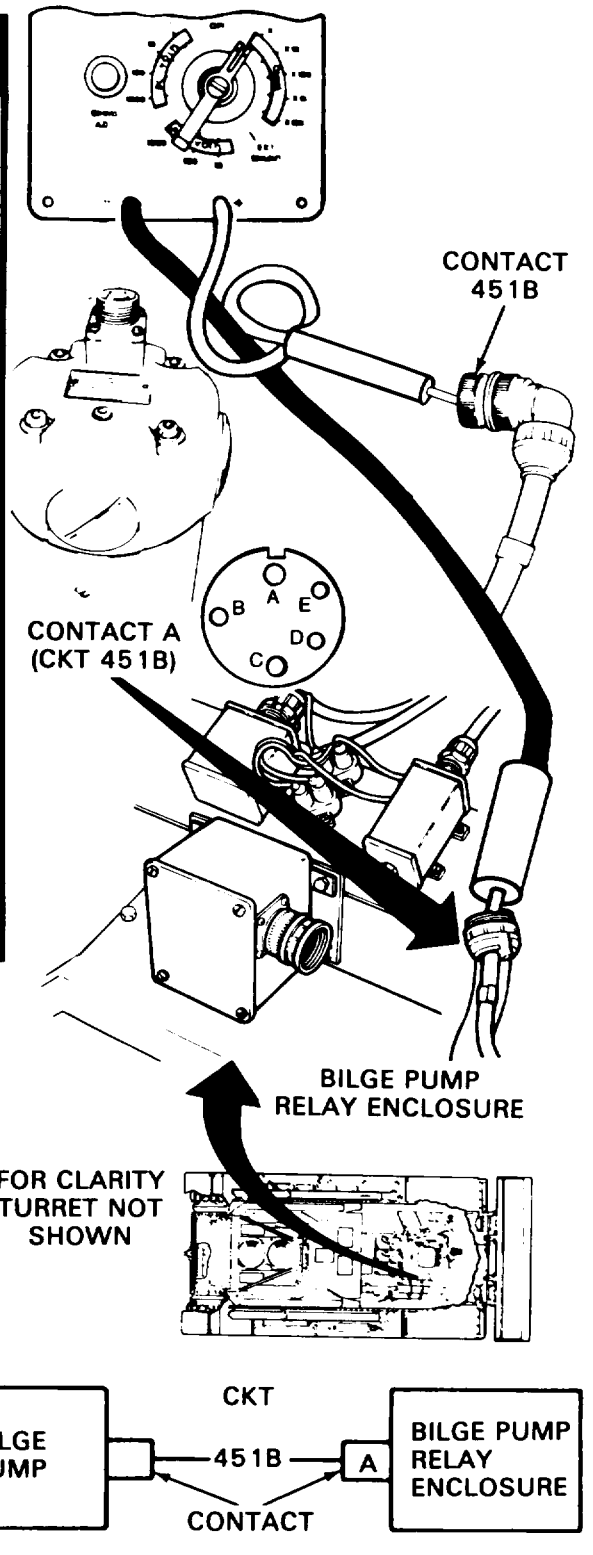
- Check if meter indicates continuity.

Does meter indicate continuity?

NO

10
- **Inspect hull power harness for bent/broken connector contacts or loose CKT 451B wire**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull power harness.**
- **Connect hull power harness connector to bilge pump relay and to bilge pump.**

YES



TA253139

Symptom-79.1

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

11 Check hull power harness (CKT 451) at bilge pump relay for electrical power.

Second Technician (Driver's Station)

- Connect hull power harness connector to bilge pump.

First Technician (Turret)

- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to contact B (CKT 451) of hull power harness connector at bilge pump relay and black probe to ground.

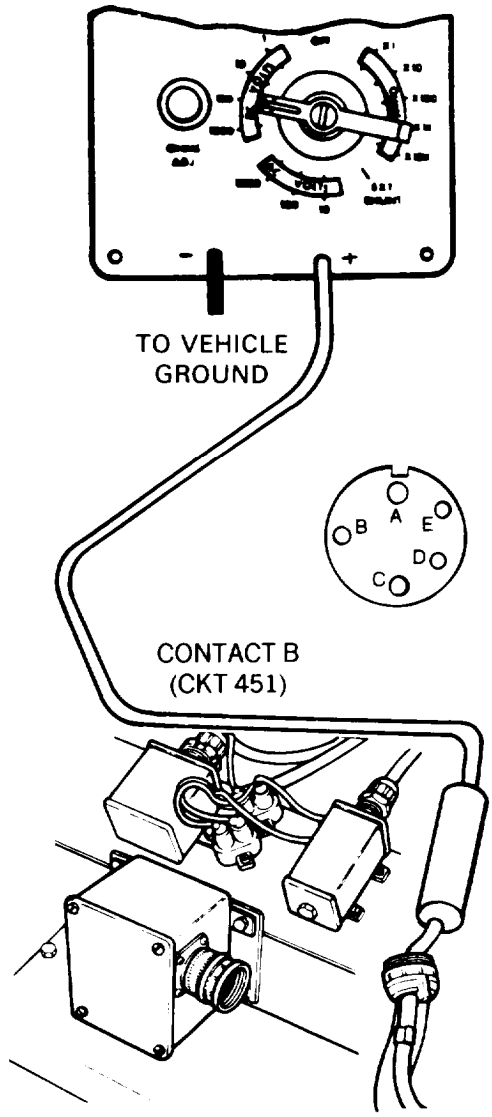
Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set BILGE PUMP switch ON.

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

NO

12

- **Check hull front master harness (CKT 451) for continuity from bilge pump intermediate connector to connector at master control panel.**
- **See Step 33.**

TA253140

Symptom-79.1

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

13 **Check hull power harness (CKT 450A) at bilge pump relay for electrical power.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Connect red probe of meter to contact C (CKT 450A) of hull power harness connector at bilge pump relay and black probe to ground.

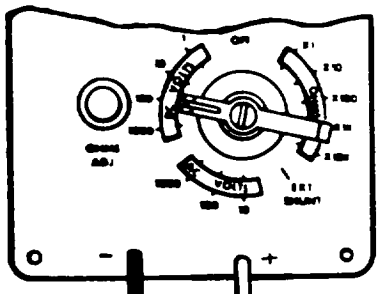
Second Technician (Driver's Station)

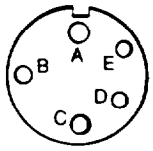
- Set MASTER BATTERY switch ON.

First Technician (Turret)

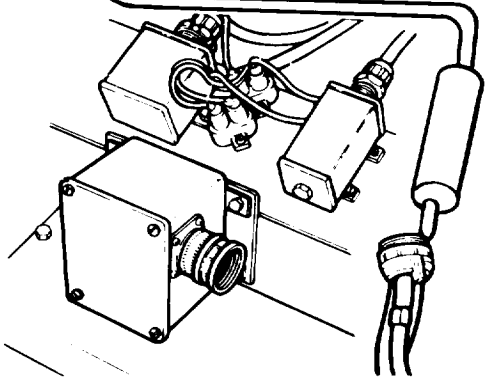
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?





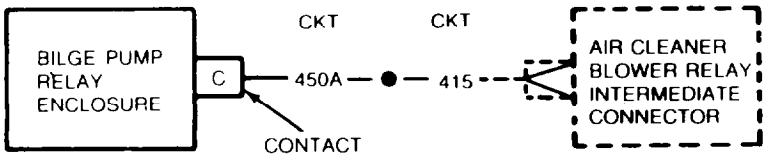
CONTACT C
(CKT 450A)



14

- **Inspect hull power harness for bent/broken connector contact or loose CKT 450A wire.**
- **Repair connectors if defective (page 10-307).**
- **If connector is not defective, notify support maintenance of a defective hull power harness.**
- **Connect hull power harness connector to bilge pump relay.**

NO — YES



TA253141

Symptom-79.1

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

15 **Check cable assembly inside bilge pump relay enclosure for continuity from contact C of bilge pump relay connector to input contact of bilge pump relay circuit breaker.**

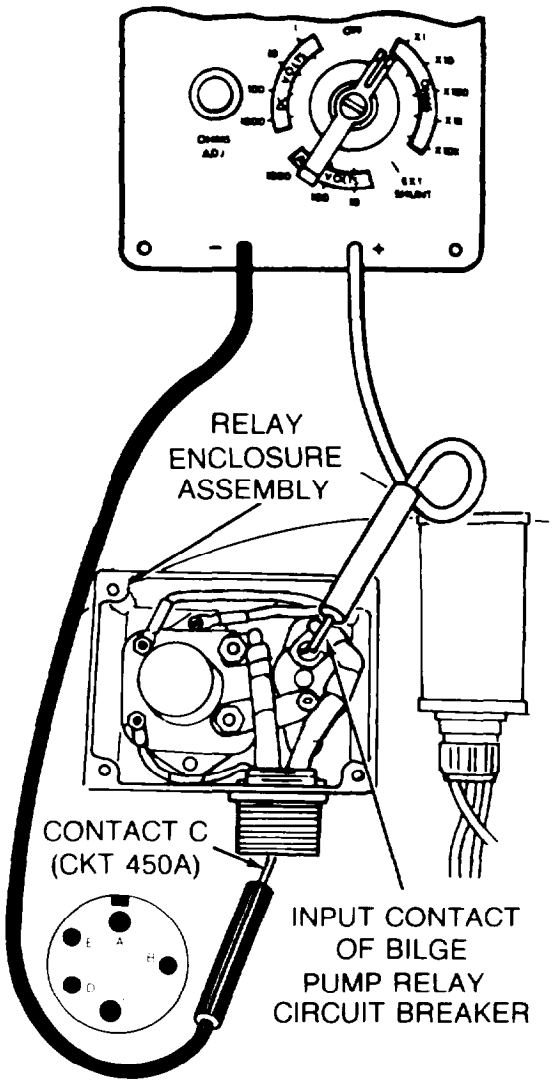
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.

First Technician (Turret)

- Set multimeter to OHMS X1 scale and zero meter or use STE/ICE Test No. 91 (page 4-92).
- Remove bilge pump relay enclosure cover.
- Connect red probe of meter to input contact of bilge pump relay circuit breaker.
- Connect black probe of meter to contact C (CKT 450A) of bilge pump relay connector.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

16 **Replace cable assembly (page 10-193).**

TA253142

Symptom-79.1

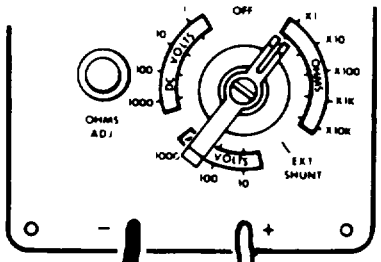
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

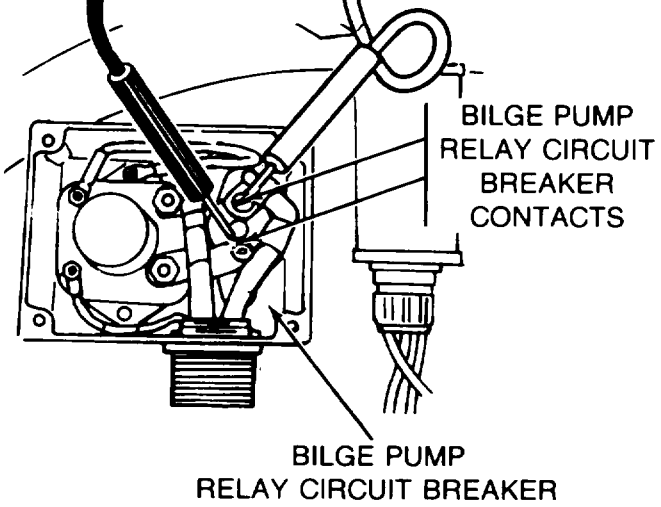
17 **Check bilge pump relay circuit breaker inside bilge pump relay enclosure for continuity.**

First Technician (Turret)

- Connect red probe of meter to one contact of bilge pump relay circuit breaker.
- Connect black probe of meter to other contact of bilge pump relay circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?





YES

NO

18

- **Replace bilge pump relay circuit breaker (page 10-190).**
- **Connect hull power harness connector to bilge pump relay.**

TA253143

Symptom-79.1

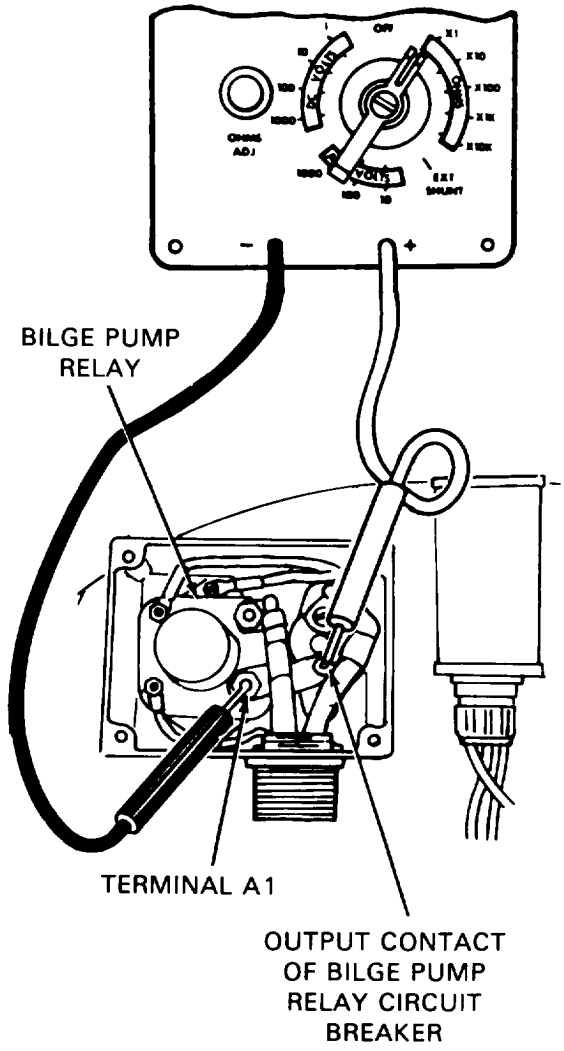
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

19 **Check bus bar inside bilge pump relay enclosure for continuity from terminal A1 of bilge pump relay to output side of bilge pump relay circuit breaker.**

First Technician (Turret)

- Connect black probe of meter to terminal A1 of bilge pump relay.
- Connect red probe of meter to output contact of bilge pump relay circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

20 **Replace bus bar/cable assembly (page 10-193).**

TA253144

Symptom-79.1

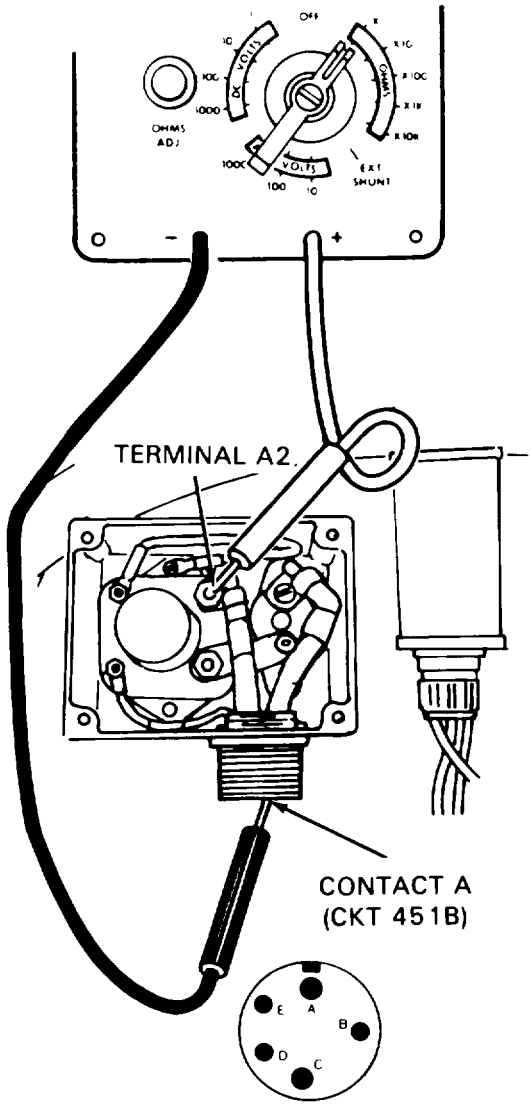
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

21 **Check cable assembly inside bilge pump relay enclosure for continuity from contact A of bilge pump relay connector to terminal A2 of bilge pump relay.**

First Technician (Turret)

- Connect red probe of meter to terminal A2 of bilge pump relay.
- Connect black probe of meter to contact A (CKT 451B) of bilge pump relay connector.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

22 **Replace bilge pump relay cable assembly (page 10-193).**

TA253145

Symptom-79.1

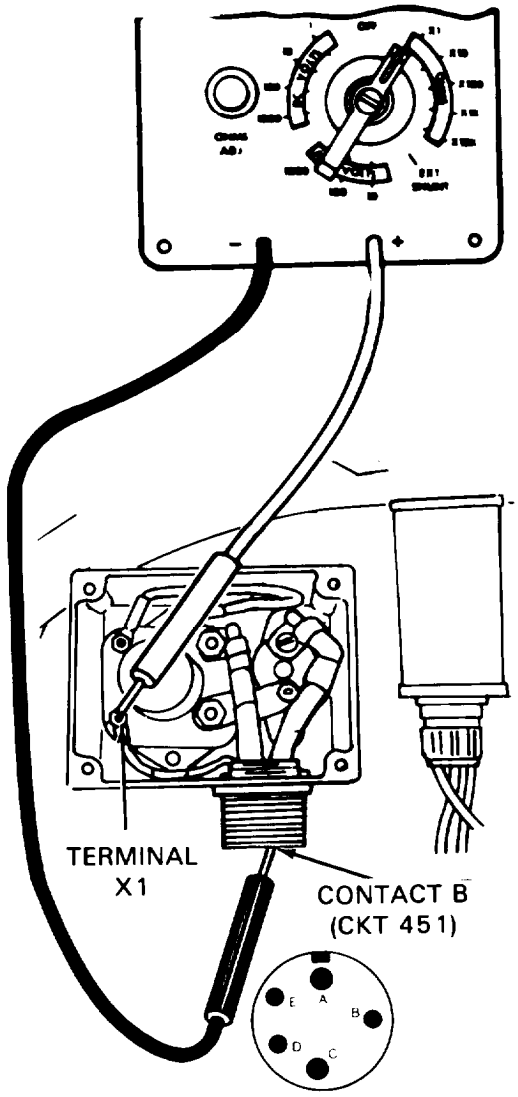
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

23 **Check cable assembly inside bilge pump relay enclosure for continuity from contact B of bilge pump relay connector to terminal X1 of bilge pump relay.**

First Technician (Turret)

- Connect black probe of meter to contact B (CKT 451) of bilge pump relay connector.
- Connect red probe to terminal X1 of bilge pump relay.
- Check if meter indicates continuity.

Does meter indicate continuity?



NO → **24** **Replace bilge pump cable assembly (page 10-193).**

YES → **25** **Replace bilge pump solenoid relay (page 10-197).**

TA253146

Symptom-79.1

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

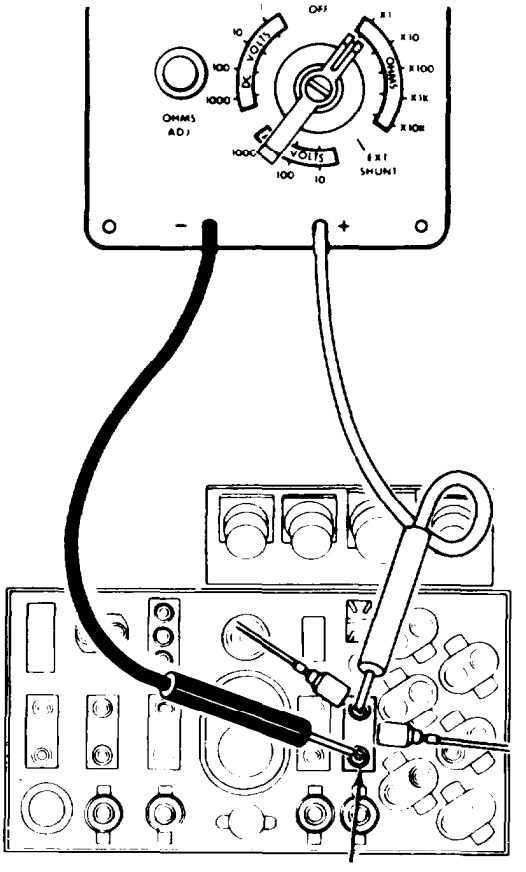
FROM STEP 4

26 Check BILGE PUMP switch for continuity.

Second Technician (Driver's Station)

- Set BILGE PUMP switch OFF.
- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect electrical connectors from BILGE PUMP switch.
- Set BILGE PUMP switch ON.
- Set multimeter to OHMS X1 scale and zero meter or use STE/ICE Test No. 91 (page 4-92).
- Connect meter probes to both switch connectors.
- Check if meter indicates continuity.

Does meter indicate continuity?



MASTER CONTROL PANEL
(REAR VIEW)

YES

NO

27 Replace bilge pump switch (page 10-80).

TA253147

Symptom-79.1

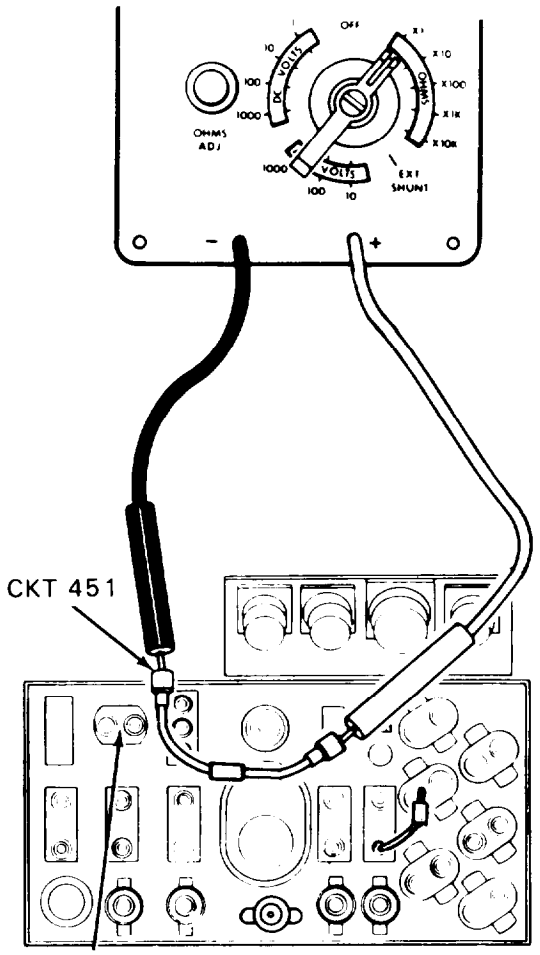
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

28 **Check master control panel bilge pump switch lead for continuity from bilge pump/gas particulate circuit breaker to the bilge pump switch.**

Second Technician (Driver's Station)

- Set BILGE PUMP switch OFF.
- Disconnect bilge pump switch lead assembly connector from bilge pump/gas particulate circuit breaker.
- Connect red probe of meter to lead connector (CKT 451) at switch.
- Connect black meter probe to lead connector at circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?



YES

NO

29

- **Replace master control panel bilge pump switch lead (page 10-116).**
- **Connect electrical connector to bilge pump switch.**

TA253148

Symptom-79.1

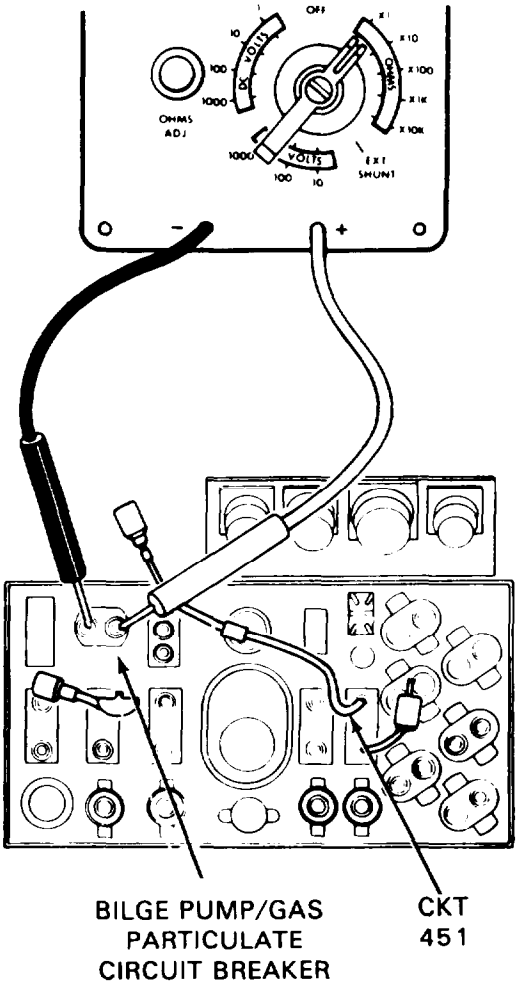
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

30 Check bilge pump/gas particulate circuit breaker for continuity.

Second Technician (Driver's Station)

- Connect CKT 451 and bilge pump switch lead connectors to bilge pump switch.
- Disconnect master control panel harness connector (CKT 920) from bilge pump circuit breaker.
- Connect probes of meter to contacts of bilge pump/gas particulate circuit breaker.
- Check if meter indicates continuity.

Does meter indicate continuity?



31 Replace bilge pump/gas particulate circuit breaker (page 10-85).

NO

YES

32
- **Replace master control panel harness (page 10-111).**
- ***Connect bilge pump switch lead connector to bilge pump/gas particulate circuit breaker.***

TA253149

Symptom-79.1 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

FROM STEP (12)

WARNING

Use extreme care when working with circuit 400-459. This circuit carries battery voltage at all times whether MASTER BATTERY switch is OFF or ON.

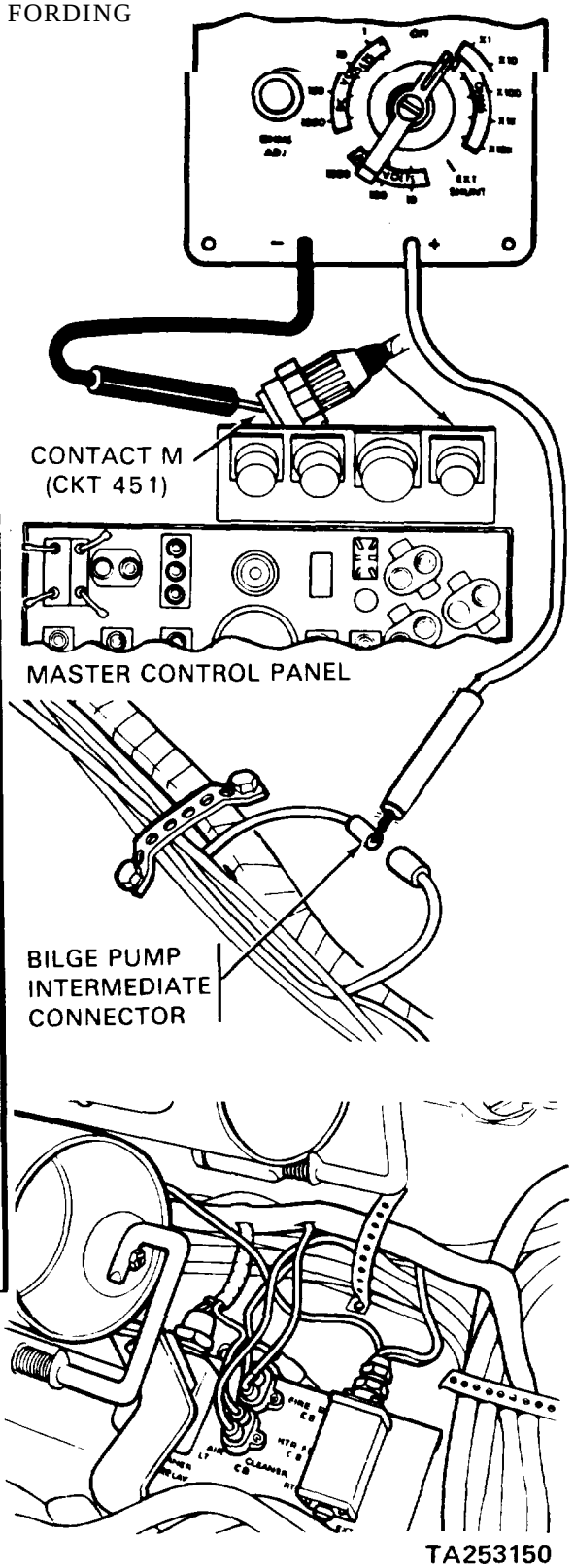
(33) Check hull front master harness (CKT 451) for continuity from bilge pump intermediate connector to connector at master control panel.

Second Technician (Driver's Station)

- Set BILGE PUMP switch OFF.
- Set MASTER BATTERY switch OFF.
- Displace master control panel (page 10-45).
- Disconnect hull front master harness from master control panel.
- Set multimeter to OHMS X1 scale and zero meter or use STE/ICE Test No. 91 (page 4-92).
- Connect black probe of meter to contact M (CKT 451) of hull front master harness connector at master control panel.

First Technician (Turret)

- Disconnect hull power harness (CKT 451) from hull front master harness at bilge pump intermediate connector.
- Connect red probe of meter to hull front master harness at bilge pump intermediate connector.



TA253150

Symptom-79.1 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
STEP CONTINUED (Continued)

Second Technician (Driver's Station)

- Check if meter indicates continuity.

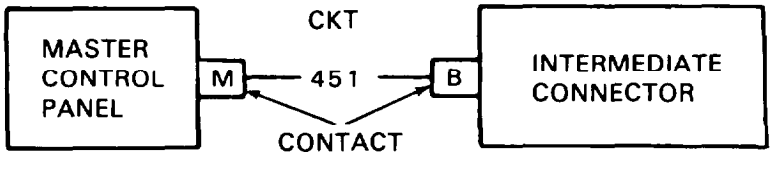
Does meter indicate continuity?

NO

(34) **Inspect hull front master harness for bent/broken connector contacts or loose CKT 451 wire.**

- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**

YES



TA253151

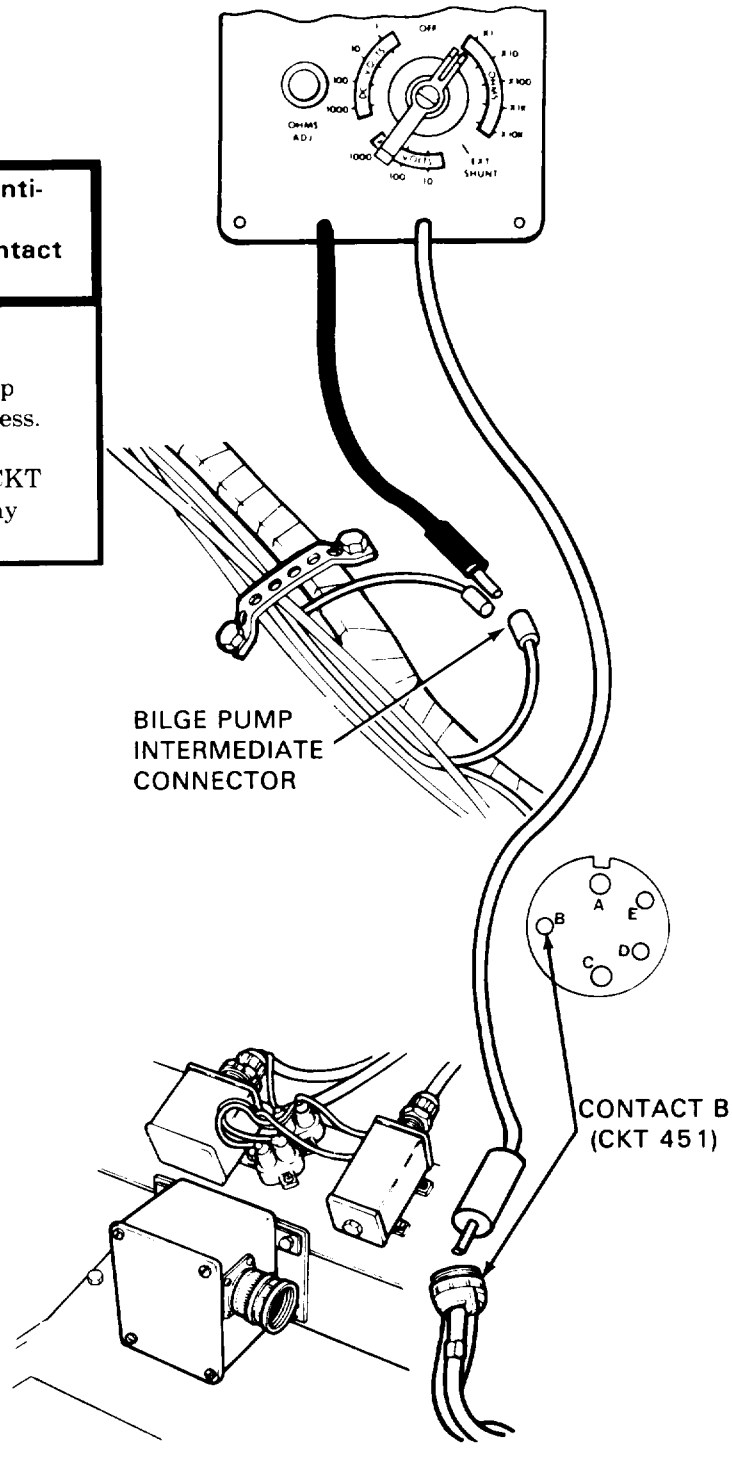
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

Symptom-79.1

35 **Check hull power harness (CKT 451) for continuity from bilge pump intermediate harness connector to bilge pump relay enclosure, contact B (CKT 451).**

First Technician (Turret)

- Connect black probe of meter to bilge pump intermediate connector of hull power harness.
- Connect red probe of meter to contact B (CKT 451) of hull power harness bilge pump relay enclosure.



Symptom-79.1 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - WATER FORDING
(Continued)

STEP (35) CONTINUED

First Technician (Turret)

- Check if meter indicates continuity.

Does meter indicate continuity?

NO

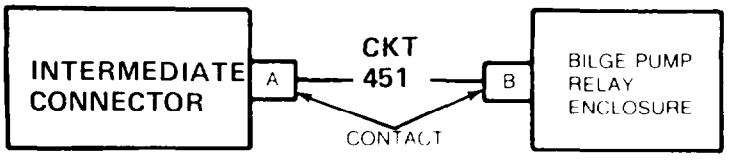
36

- **Inspect hull power harness for bent/broken connector contacts or loose CKT 451 wire.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull power harness.**
- ***Connect hull power harness* connector to bilge pump relay.**
- **Connect hull front master harness to master control panel and bilge pump intermediate connector.**
- **Install master control panel (page 10-46).**

YES

37

- **Replace master control panel harness (page 10-111).**
- **Connect hull power harness connector to bilge pump relay.**



TA253153

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC

Symptom-80

NO HYDRAULIC POWER IN HULL OR TURRET (INDICATOR LIGHT ON).

NOTE

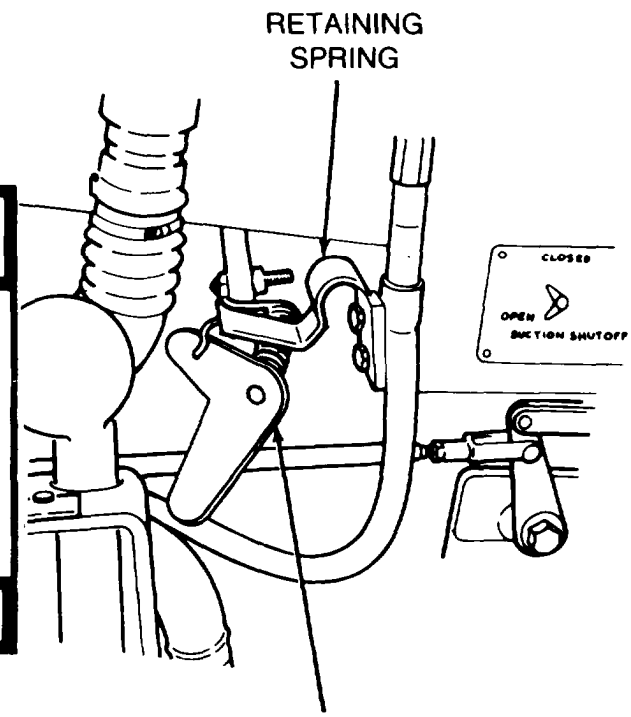
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check hydraulic reservoir SUCTION SHUTOFF valve for operation.

First Technician (Driver's Station)

- Release hydraulic reservoir SUCTION SHUTOFF valve retaining spring (TM 9-2350-222-10).
- Check if handle and shaft rotate into OPEN position.

Did valve handle and shaft go into ON position?



YES

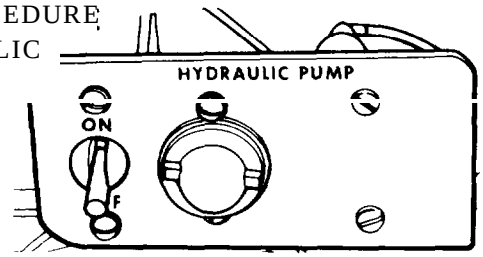
NO

2 Repair hydraulic SUCTION SHUTOFF valve (page 18-79).

TA142606

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

Symptom-80



HYDRAULIC PUMP PANEL
(DRIVER'S STATION)

3 **Check magnetic clutch for operation.**

Both Technicians (Rear Grille Doors)

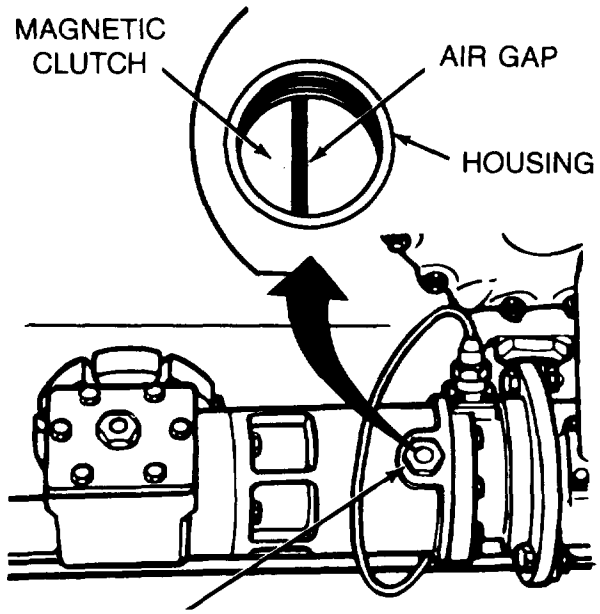
- Remove transmission shroud (page 9-20).

First Technician (Rear Grille Doors)

- Remove magnetic clutch oil filler plug.
- Check that air gap becomes smaller when HYDRAULIC PUMP switch is operated.

Second Technician (Driver's Station)

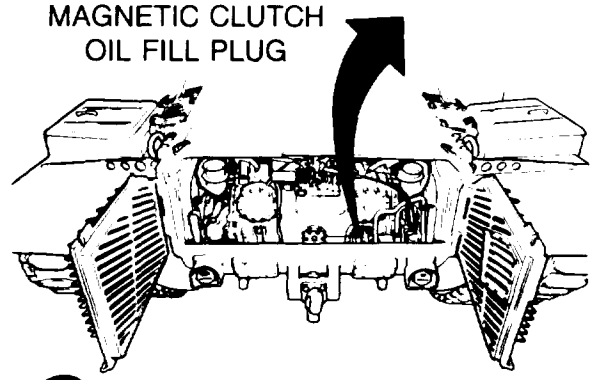
- Set MASTER BATTERY switch ON.
- Set HYDRAULIC PUMP switch ON (TM 9-2350-222-10).



Did air gap become smaller?

YES

NO



4 **Check for electrical power at rear accessory harness (CKT 469) magnetic clutch connector.**

See Step (14).

TA142607

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

Symptom-80

5 **Check for magnetic clutch to rotate when engine is cranked.**

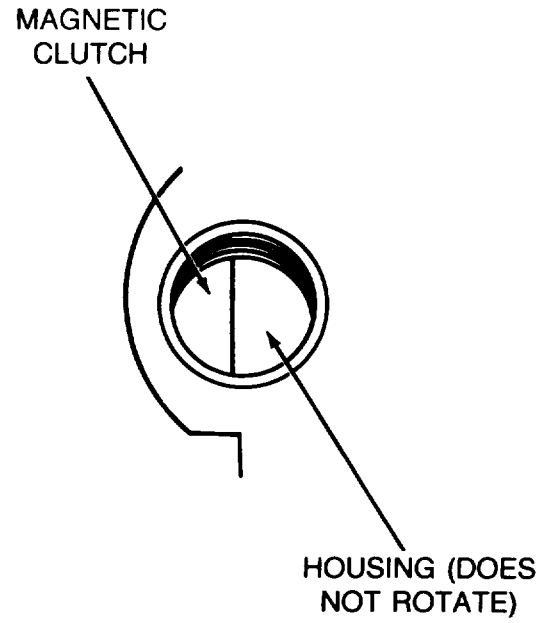
Second Technician (Driver's Station)

- Hold ENGINE FUEL SHUTOFF switch in UP position.
- Press STARTER switch and release after engine cranks.

First Technician (Rear Grille Doors)

- Look in magnetic clutch oil filler plug opening and check if magnetic clutch rotates when engine cranks.

Did magnetic clutch rotate?



YES

NO

6

- **Check for broken right angle drive.**
- **See Step (19) .**

TA142608

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

Symptom-80

7 Check for collapsed or leaking suction hose at hydraulic pump.

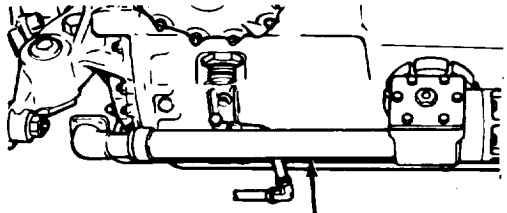
Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set HYDRAULIC PUMP switch OFF.

First Technician (Rear Grille Doors)

- Install oil filler plug in magnetic clutch housing.
- Check suction hose assembly, between pump and left side of transmission, for collapsed sections and leaks in hose and fittings.

Is hose assembly collapsed or leaking?



SUCTION HOSE
(PUMP CONNECTION
HIDDEN)

NO

YES

8

- **Replace collapsed or leaking hose and/or fitting packing (page 18-96).**

TA142609

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

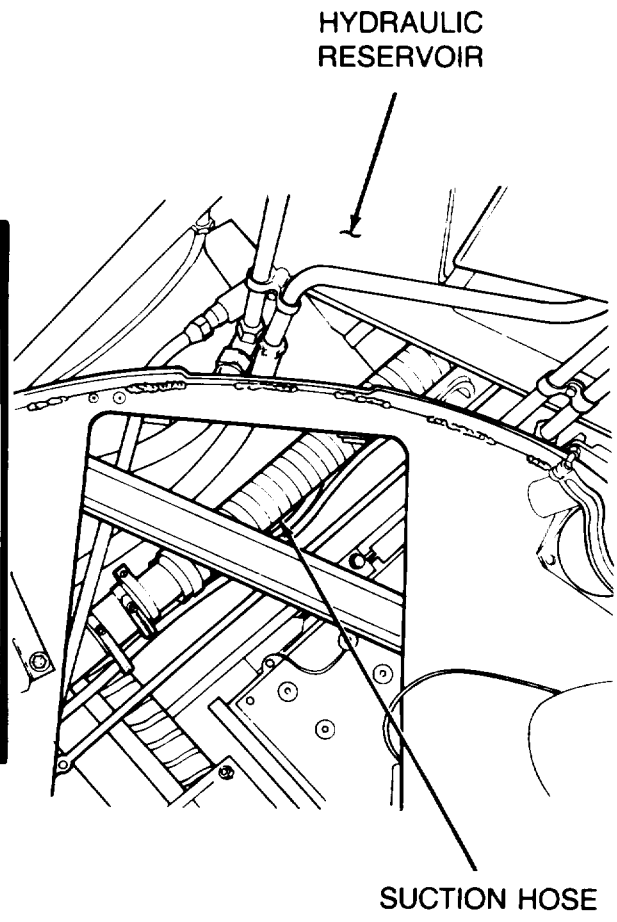
Symptom-80

9 **Check for collapsed or leaking suction hose asssembly at rear of hydraulic reservoir.**

First Technician (Turret)

- Open turret floor door (TM 9-2350-222-10).
- Manually traverse turret to gain access to rubber suction hose (TM 9-2350-222-10).
- Check suction hose for leaks, collapsed sections and/or leaking fittings.

Is hose assembly collapsed or leaking?



NO

YES

10

- **Replace collapsed or leaking hose and/or fitting packing (page 18-96).**
- **Install transmission shroud (page 9-23).**

TA142610

Symptom-80 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

WARNING

When pressure gage reads 2000 psi, or if relief valve dumps oil, immediately set HYDRAULIC PUMP switch OFF.

11 Check for hydraulic pressure at rear hydraulic filter outlet.

First Technician (Driver's Station)

- Place HULL-TURRET selector valve in TURRET (TM 9-2350-222-10).
- Remove rear hydraulic filter to HULL-TURRET selector valve tube assembly (page 18-58).
- Assemble pressure test kit (Item 35, Chapter 3, Section 1) as shown in illustration (page 4-992).
- Connect hose of test assembly to elbow at rear filter outlet.
- Close test assembly valve.
- Place one gallon container under test assembly relief valve.

WARNING

Do not hold test assembly during test. Position test assembly flat or straight on vehicle surface. If test assembly hose has a bend, it will straighten rapidly when hydraulic pressure is applied.

Symptom-80

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

STEP (11) CONTINUED

- Start engine and idle at 1200 rpm.
- Set HYDRAULIC PUMP switch ON.
- Check if pressure gage reads a minimum of 1000 psi.

Did gage indicate a minimum of 1000 psi?

WARNING

Do not disconnect pressure test assembly until pressure gage reads zero.

YES

(12)

- **Stop engine.**
- **Place container under test assembly valve. Slowly open valve to allow pressure to drop to zero.**
- **Remove pressure test assembly from rear filter.**
- **Replace HULL-TURRET selector valve (page 18-70).**

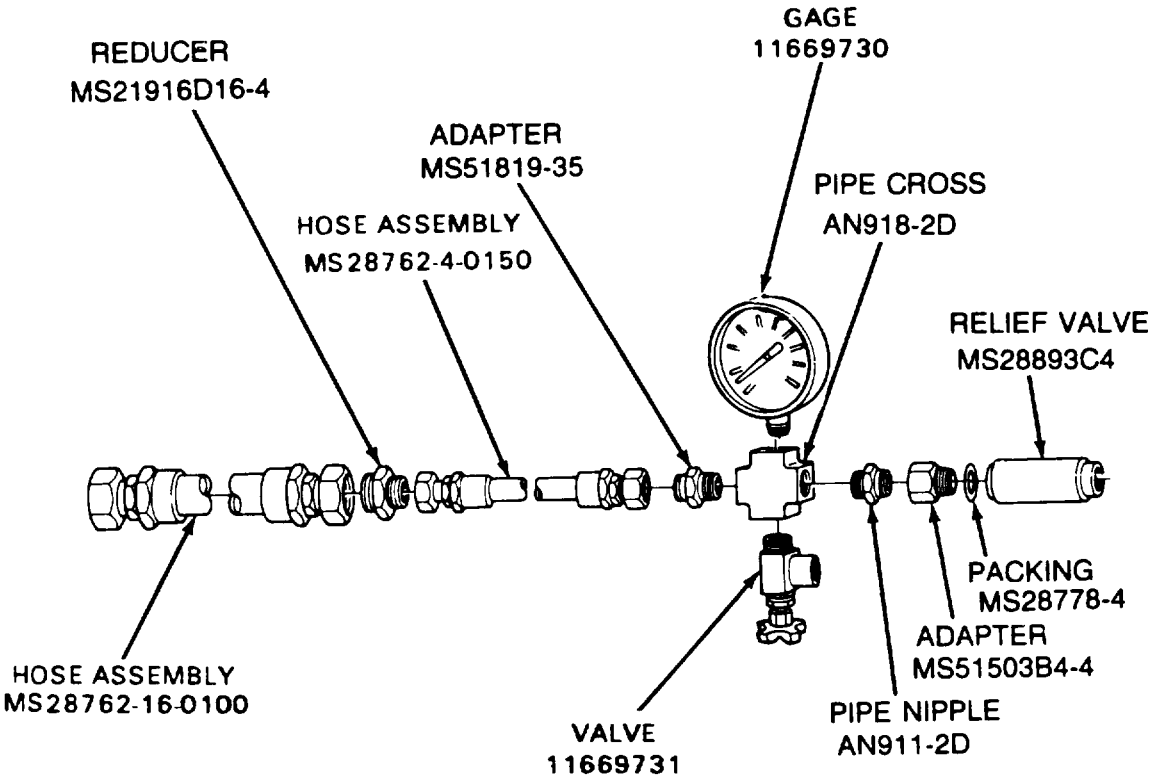
NO

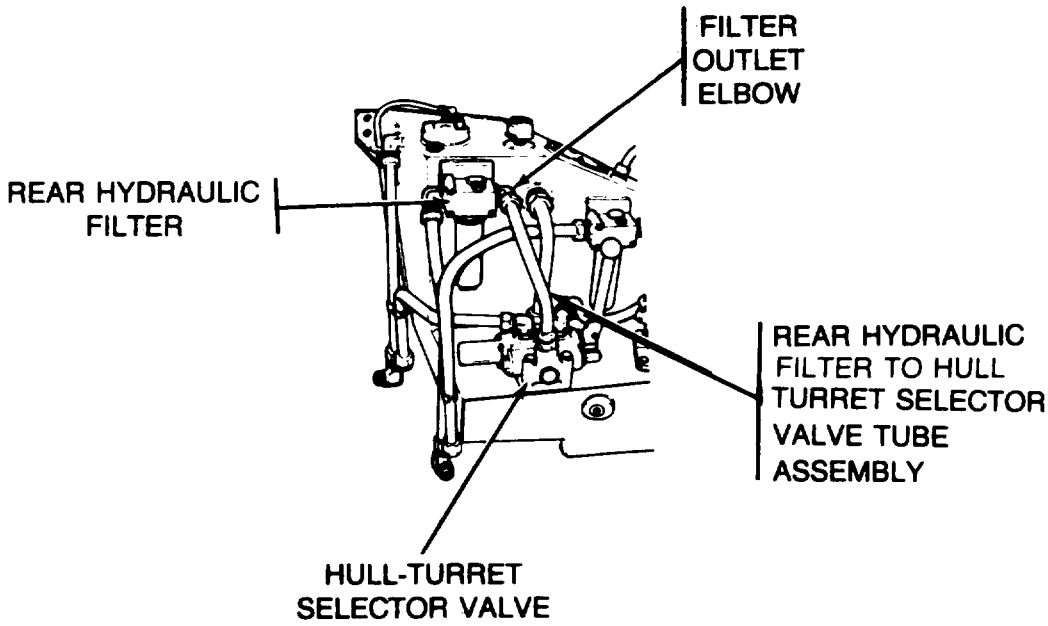
(13)

- **Stop engine.**
- **Place container under test assembly valve. Slowly open valve to allow pressure to drop to zero.**
- **Remove pressure test assembly from rear filter.**
- **Install rear hydraulic filter to HULL-TURRET selector valve tube assembly.**
- **Replace hydraulic pump (page 18-113).**

Symptom-80 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

ART FOR STEP 11





Symptom-80

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

FROM STEP 4

14 Check for electrical power at rear accessory harness magnetic clutch connector.

Second Technician (Driver's Station)

- Set HYDRAULIC PUMP switch OFF.

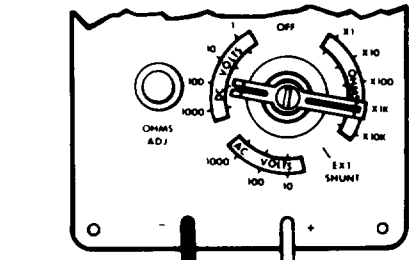
First Technician (Rear Grille Doors)

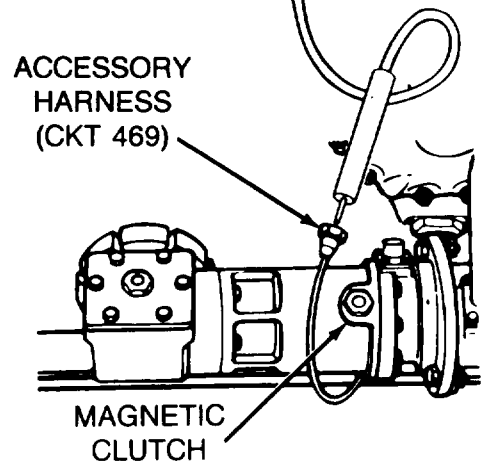
- Install oil filler plug in magnetic clutch.
- Disconnect rear accessory harness (CKT 469) connector from magnetic clutch.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to accessory harness magnetic clutch connector contact and black probe to ground.
- Check if meter indicates 18 to 30 volts dc when HYDRAULIC PUMP switch is set ON.

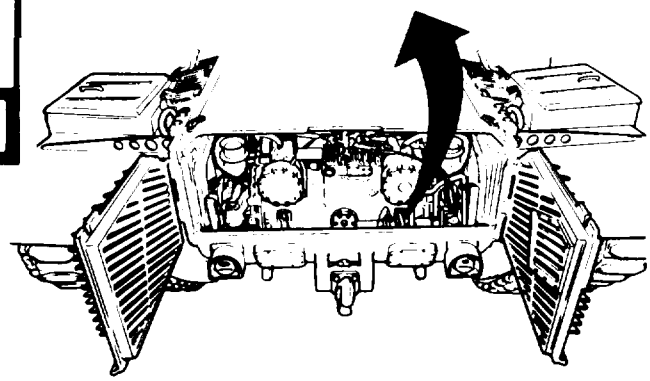
Second Technician (Driver's Station)

- Set HYDRAULIC PUMP switch ON.

Does meter indicate 18 to 30 volts dc?







NO

YES

15 Replace magnetic clutch (page 18-118).

TA142614

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

Symptom-80

16 **Check for electrical power at hull front master harness (CKT 469) bulkhead connector.**

Second Technician (Driver's Station)

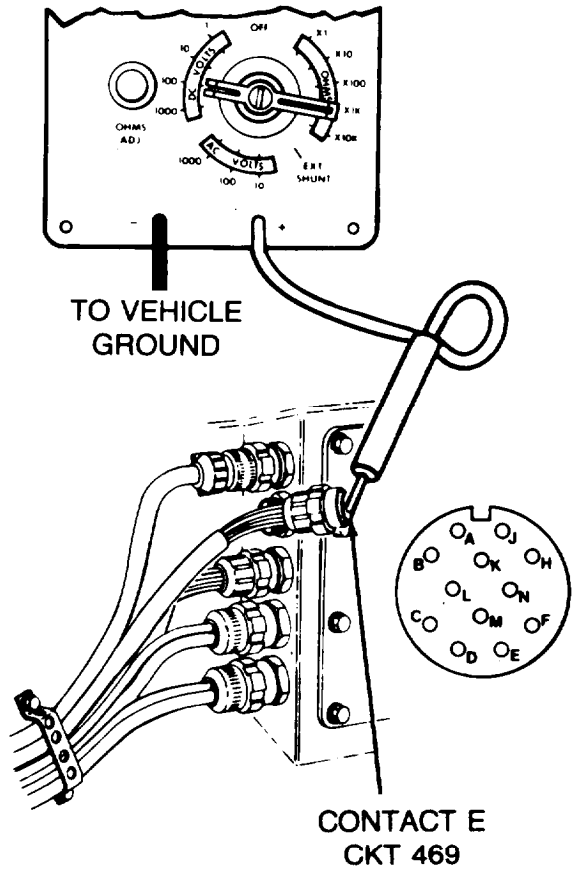
- Set HYDRAULIC PUMP switch OFF.
- Set MASTER BATTERY switch OFF.

Second Technician (Turret)

- Manually traverse turret to gain access to bulkhead electrical disconnects (TM 9-2350-222-10).
- Disconnect hull front master harness connector at bulkhead disconnect.
- Connect red probe of meter to contact E (CKT 469) and black probe to ground.

Second Technician (Driver's Station)

- Set MASTER BATTERY switch ON.
- Set HYDRAULIC PUMP switch ON.



TA142615

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

Symptom-80

STEP (16) CONTINUED

First Technician (Turret)

- Check if meter indicates 18 to 30 volts dc when HYDRAULIC PUMP switch is set ON.

Does meter indicate 18 to 30 volts dc?

NO

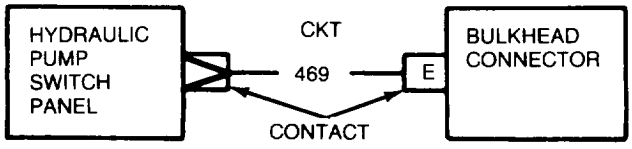
17

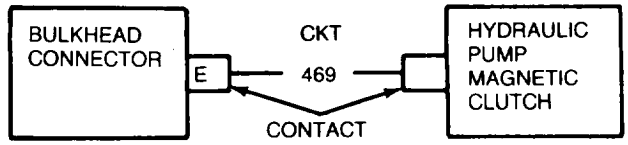
- **Set MASTER BATTERY switch OFF and HYDRAULIC PUMPS switch OFF.**
- **Inspect hull front master harness for bent/broken connector contacts (CKT 469) wire at rear of connector.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective hull front master harness.**
- **Connect hull front master harness to bulkhead disconnect.**
- **Connect rear accessory harness to magnetic clutch.**
- **Install transmission shroud. (page 9-23).**

YES

18

- **Set MASTER BATTERY switch OFF and HYDRAULIC PUMPS switch OFF.**
- **Inspect rear accessory harness for bent/broken connector contacts (CKT 469) wire at rear of the connector.**
- **Repair connectors if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of a defective rear accessory harness.**
- **Connect hull front master harness to bulkhead disconnect.**
- **Connect rear accessory harness to hydraulic pump.**
- **Install transmission shroud (page 9-23).**





TA142616

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

Symptom-80
FROM STEP

6

19 **Check for broken right angle drive.**

Second Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Set HYDRAULIC PUMP switch OFF.

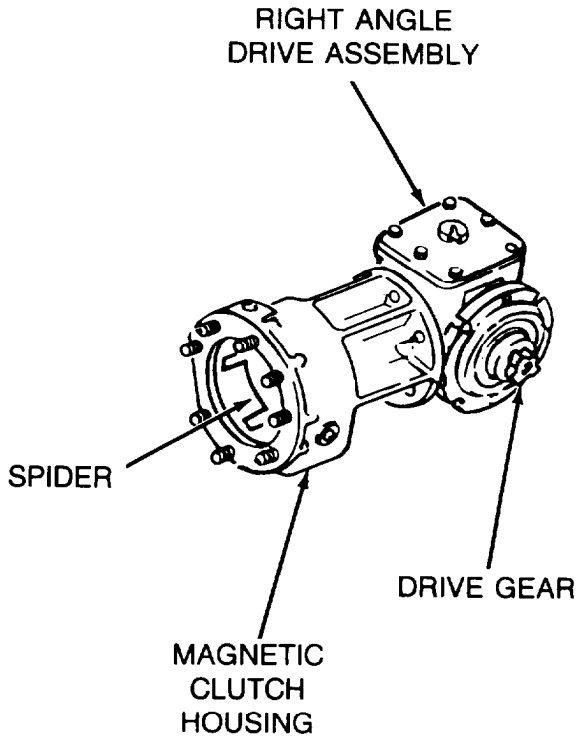
Both Technicians (Rear Grille Doors)

- Remove hydraulic pump assembly (page 18-113).
- Remove magnetic clutch (page 18-118).
- Rotate drive gear on right angle drive (page 18-108).
- Check if spider in magnetic clutch rotates when drive gear is rotated.

Did spider rotate?

20 **Replace magnetic clutch (page 18-118).** — YES

21 **Replace magnetic drive (page 18-118).** — NO



TA142617

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC

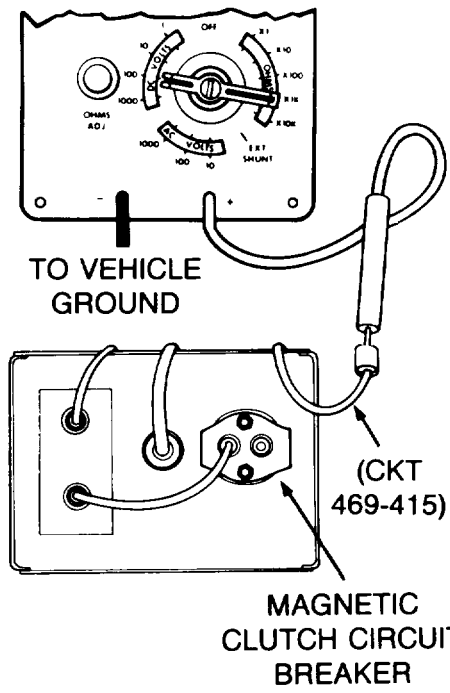
Symptom-81

NO HYDRAULIC POWER (HYDRAULIC PUMP INDICATING LAMP WILL NOT LIGHT).

1 Check hull front master harness (CKT 469) for electrical power at magnetic clutch circuit breaker connector.

Technician (Driver's Station)

- Displace hydraulic pump panel (page 10-159).
- Disconnect hull front master harness (CKT 469) connector from magnetic clutch circuit breaker.
- Set multimeter to measure 18 to 30 volts dc or use STE/ICE Test No. 89 (page 4-90).
- Connect red probe of meter to hull front master harness magnetic clutch circuit breaker connector (469-415) and black probe to ground.
- Set MASTER BATTERY switch ON.



HYDRAULIC PUMP PANEL (REAR VIEW)

TA142618

Symptom-81

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

STEP (1) CONTINUED

- Check if meter indicates 18 to 30 volts dc.

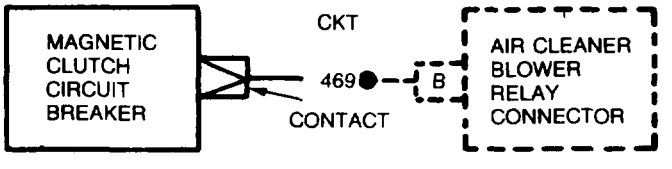
Does meter indicate 18 to 30 volts dc?

YES

NO

(2)

- **Inspect hull front master harness for bent/broken connector contacts (CKT 469) wire at rear of connector.**
- **Repair connector if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Connect hull front master harness (CKT 469) to magnetic clutch circuit breaker.**
- **Install hydraulic pump panel (page 10-159).**



TA142619

Symptom-81

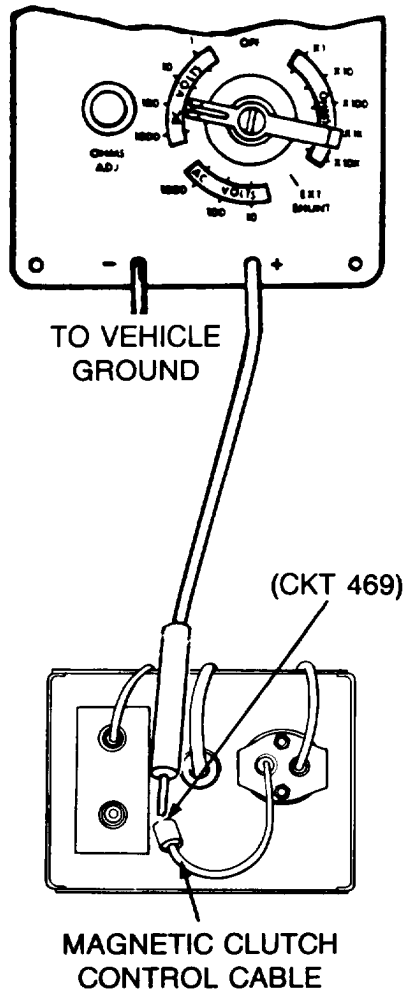
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

3 **Check for electrical power at magnetic clutch control cable HYDRAULIC PUMP switch connector.**

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Connect hull front master harness (CKT 469) connector to magnetic clutch circuit breaker.
- Disconnect magnetic clutch control cable connector from HYDRAULIC PUMP switch.
- Connect red probe of meter to magnetic clutch HYDRAULIC PUMP switch connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates between 18 and 30 volts dc.

Does meter indicate 18 to 30 volts dc?



YES

NO

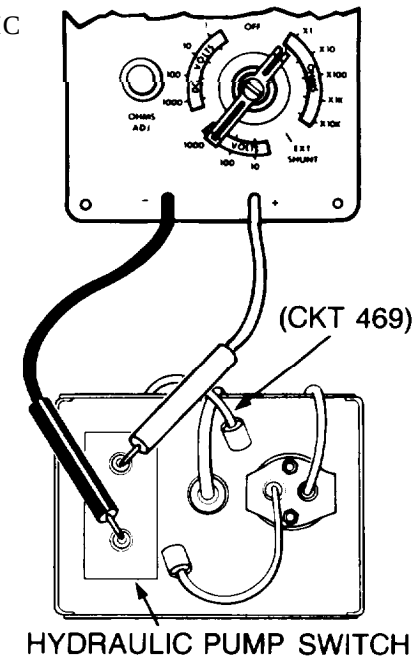
4

- **Check magnetic clutch control cable for continuity.**
- **See Step (8).**

TA142620

Symptom-81

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)



5 Check HYDRAULIC PUMP switch for continuity.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect hull front master harness CKT 469 connector from HYDRAULIC PUMP switch.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Set HYDRAULIC PUMP switch ON.
- Connect red probe of meter to one HYDRAULIC PUMP switch contact and black probe to the other.
- Check if meter indicates continuity.

Does meter indicate continuity?

NO

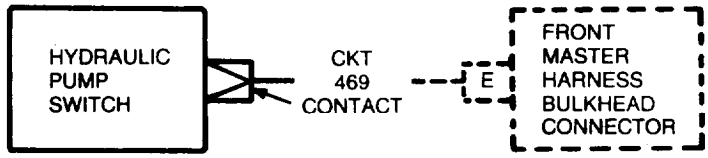
7

- **Replace HYDRAULIC PUMP (magnetic clutch control) switch (page 10-159).**

YES

6

- **Inspect hull front master harness for bent/broken connector (CKT 469) wire at rear of connector.**
- **Repair connector if defective (page 10-307).**
- **If connectors are not defective, notify support maintenance of defective hull front master harness.**
- **Connect magnetic clutch control cable to switch.**
- **Connect hull front master harness (CKT 469) to switch.**
- **Install hydraulic pump panel (page 10-159).**



TA142621

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

Symptom-81

FROM STEP 4

8 Check magnetic clutch control cable (CKT 469) for continuity.

Technician (Driver's Station)

- Set MASTER BATTERY switch OFF.
- Disconnect magnetic clutch control cable connector from magnetic clutch circuit breaker.
- Set multimeter to OHMS X1 scale and "zero" meter, or use STE/ICE Test No. 91 (page 4-92).
- Connect red probe of meter to one magnetic clutch cable connector and black probe to other.
- Check if meter indicates continuity.

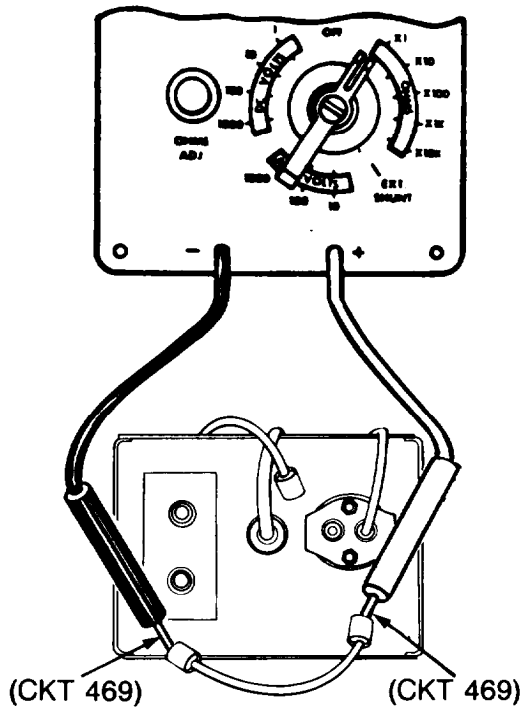
Does meter indicate continuity?

NO

9 Replace magnetic clutch control cable (page 10-160).

YES

10
- **Replace magnetic clutch circuit breaker (page 10-160).**
- **Connect magnetic control clutch cable to switch.**



TA142622

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC

Symptom-82

NO HYDRAULIC POWER TO TURRET (BULLDOZER BLADE RAISES AND LOWERS).

1 Check selector valve to slip ring tube assembly for leaks and damage.

First Technician (Driver's Station)

- Start engine and idle at 1200 rpm.
- Open HYDRAULIC SUCTION VALVE (TM 9-2350-222-10).
- Set HYDRAULIC PUMP switch ON (TM 9-2350-222-10).
- Place HULL-TURRET selector in TURRET (TM 9-2350-222-10).

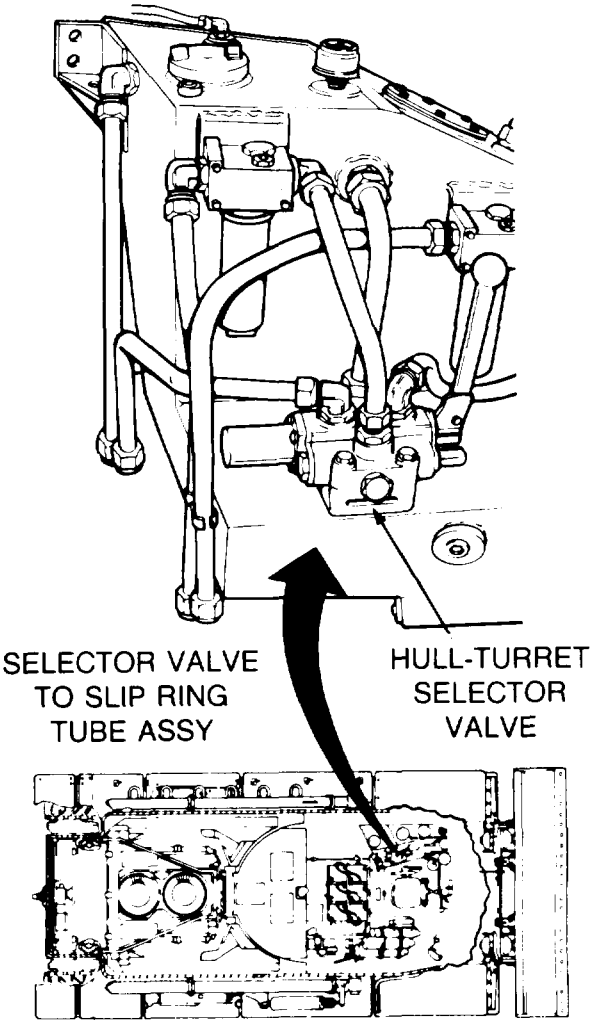
Second Technician (Turret)

- Place BOOM CONTROL valve in ERECT and hold. Release after check is complete (TM 9-2350-222-10).

First Technician (Driver's Station)

- Check selector valve to slip ring tube assembly for leaks.

Is selector valve tube assembly leaking or damaged?



FOR CLARITY TURRET NOT SHOWN

NO

YES

2 Tighten leaking fittings-if this does not stop leaks replace selector valve to slip ring tube assembly (page 18-88).

TA142623

Symptom-82

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC
(Continued)

3 **Check rear filter to selector valve tube assembly for leaks and damage.**

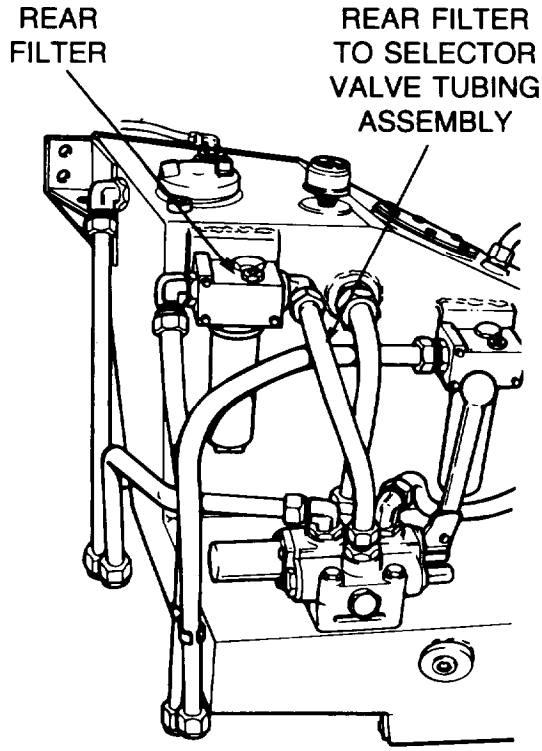
Second Technician (Turret)

- Place BOOM CONTROL valve in ERECT and hold.

First Technician (Driver's Station)

- Check rear filter to selector valve tube assembly for leaks and damage.

Is rear filter to selector valve tube assembly leaking or damaged?



YES

4 **Tighten leaking fittings. If this does not stop leaks or tube is damaged replace rear filter to selector valve assembly (page 18-67).**

NO

TA142624

Symptom-82

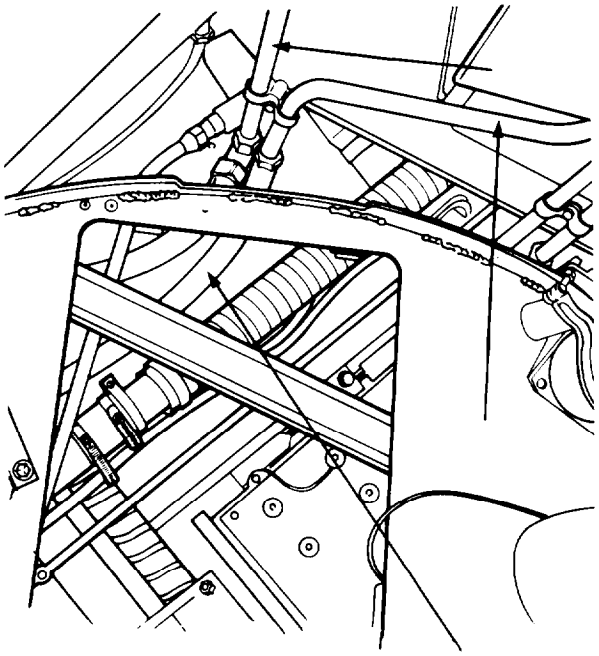
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC
(Continued)

5 **Check reservoir to slip ring flexible hose assembly for leaks and damage.**

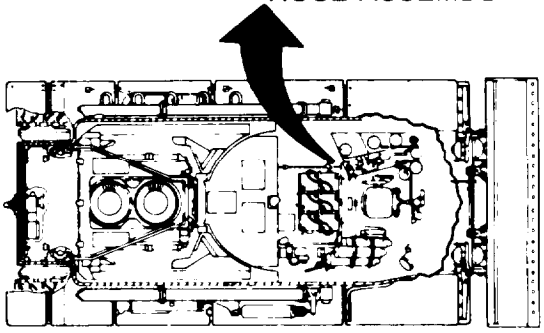
Second Technician (Turret)

- Open turret floor door (TM 9-2350-222-10).
- Traverse turret to gain access to turret hydraulic lines (TM-9-2350-222-10).
- Place BOOM CONTROL valve in STOW and hold, release after line is checked for leaks.
- Check reservoir to slip ring flexible hose assembly for leaks and damage.

Is flexible hose leaking or damaged?



RESERVOIR TO SLIP RING FLEXIBLE HOSE ASSEMBLY



FOR CLARITY TURRET NOT SHOWN

NO

YES

6 **Tighten leaking fittings. If this does not stop leak or hose is damaged replace reservoir to slip ring flexible hose assembly (page 18-88).**

TA142625

Symptom-82

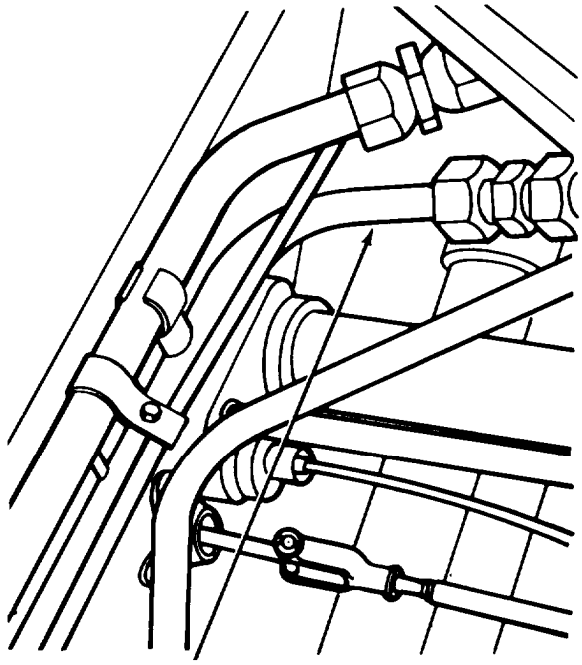
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC
(Continued)

7 **Check reservoir to slip ring tube assembly for leaks and damage.**

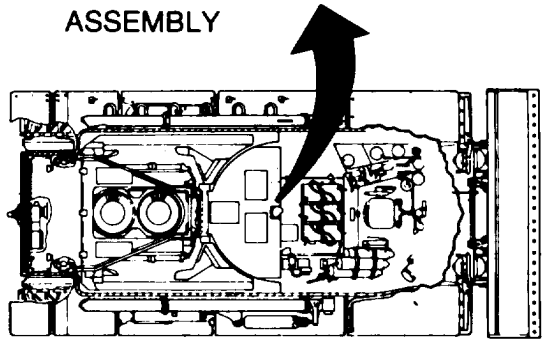
Second Technician (Turret)

- Traverse turret to gain access to reservoir to slip ring tube assembly.
- Place BOOM CONTROL valve in ERECT and hold. Release after check is complete.
- Check reservoir to slip ring tube assembly for leaks and damage.

Is tubing assemble leaking or damaged?



RESERVOIR TO SLIP RING TUBE ASSEMBLY



FOR CLARITY TURRET NOT SHOWN

NO

YES

8 **Tighten leaking fittings. If this does not stop leaks or tube is damaged replace reservoir to slip ring tube assembly (page 18-88).**

TA142626

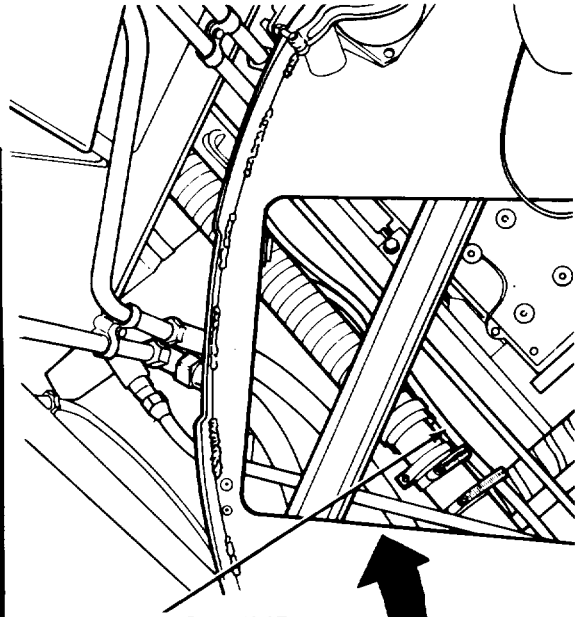
Symptom-82 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC
(Continued)

9 **Check hydraulic pump discharge tube (cover end) under turret floor for leaks or damage.**

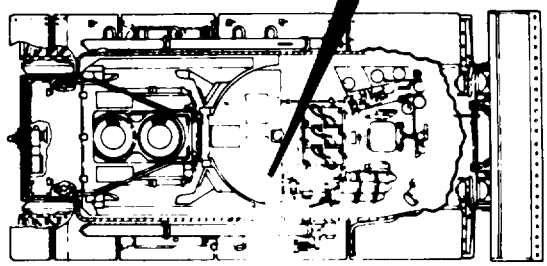
Second Technician (Turret)

- Traverse turret to gain access to tube assembly between bulkhead and rear filter check valve.
- Place BOOM CONTROL valve in ERECT and hold. Release after check is complete.
- Check hydraulic pump discharge tube assembly (Left Tube) between the bulkhead and rear filter check valve for leaks and damage.

Is tube assembly leaking or damaged?



HYDRAULIC PUMP DISCHARGE TUBE ASSEMBLY (LEFT TUBE)



FOR CLARITY TURRET NOT SHOWN

NO

YES

10 **Tighten leaking fittings. If this does not stop leak or tube is damaged replace hydraulic pump discharge, cover end, bulkhead to rear filter check valve tube assembly.**

TA142627

Symptom-82 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC
(Continued)

11 **Check flexible hose from rear filter check valve to tube as reservoir for leaks and damage.**

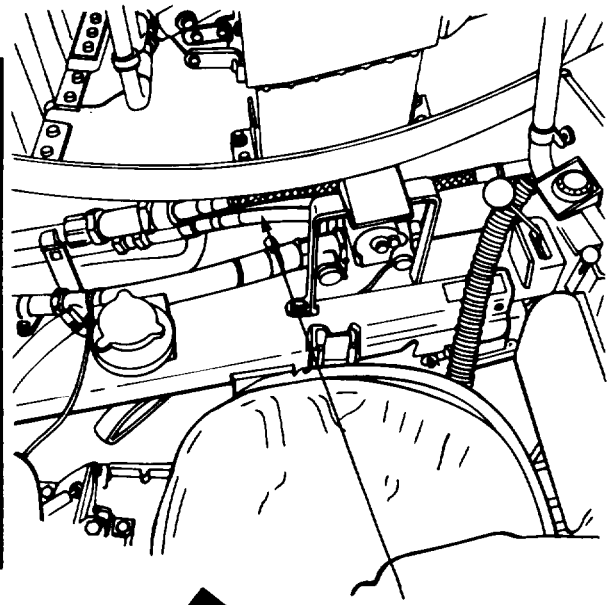
Second Technician (Turret)

- Place BOOM CONTROL valve in ERECT and hold. Release after check is complete.

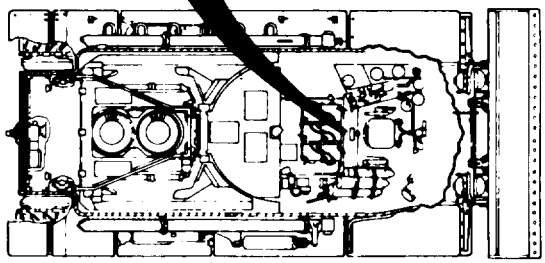
First Technician (Driver's Station)

- Check flexible hose from check valve to rear filter tube for leaks or damage.

Is flexible hose assembly leaking or damaged?



CHECK VALVE
TO REAR FILTER HOSE



FOR CLARITY TURRET NOT SHOWN

NO

YES

12 **Tighten leaking fittings. If this does not stop leak or hose is damaged replace hydraulic pump discharge check valve to front filter hose assembly (page 18-96).**

TA142628

Symptom-82 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC
(Continued)

13 **Check tubing from cover end of hydraulic pump for leaks.**

First Technician (Driver's Station)

- Set HYDRAULIC PUMP switch OFF.
- Stop engine.

Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

Second Technician (Driver's Station)

- Start engine and idle at 1200 rpm.
- Open HYDRAULIC SUCTION SHUTOFF valve.
- Set HYDRAULIC PUMP switch ON.
- Place HULL-TURRET selector valve in hull.
- Hold BULLDOZER CONTROL valve in RAISE until check is complete.

First Technician (Rear Grille Doors)

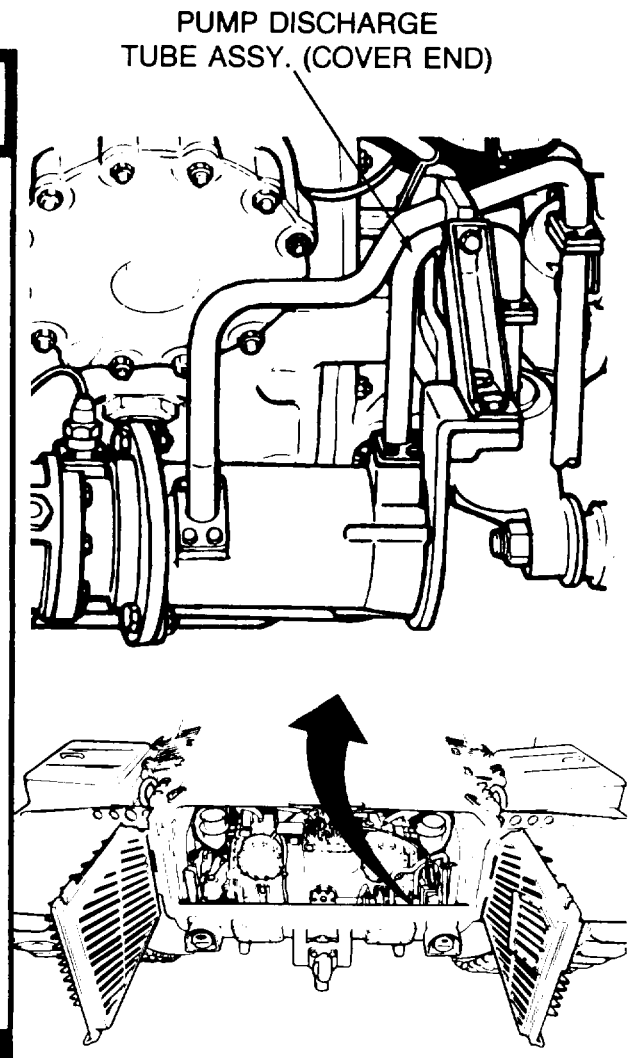
- Check if pump discharge tube at cover end of pump is leaking or damaged.

Is discharge tube leaking or damaged.

NO

YES

14 **Tighten leaking fittings. If leaks continue or tube is damage replace pump discharge tube assembly (page 18-96).**



TA142629

Symptom-82 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC
(Continued)

WARNING

When pressure gage reads 2000 psi, or if relief valve dumps oil, immediately set HYDRAULIC PUMP switch OFF.

15 **Check for hydraulic pressure at rear hydraulic filter outlet.**

Second Technician (Driver's Station)

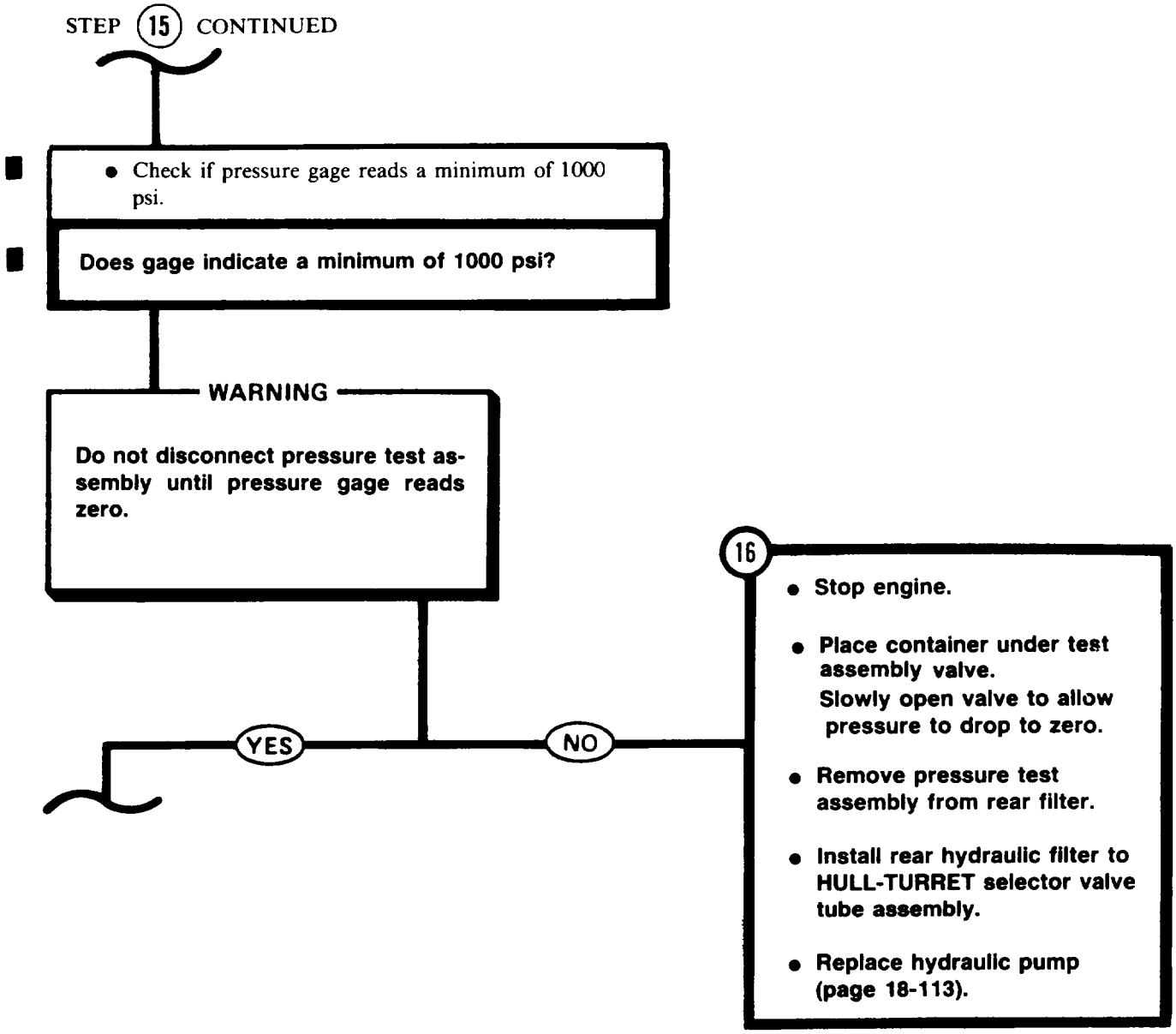
- Place HULL-TURRET selector valve in TURRET.
- Remove rear hydraulic filter to HULL-TURRET selector valve tube assembly.
- Assemble pressure test kit (Item 35, Chapter 3, Section 1) as shown in illustration (page 4-1011).
- Connect hose of test assembly to elbow at rear filter outlet.
- Close test assembly valve.
- Place one gallon container under test assembly relief valve.

WARNING

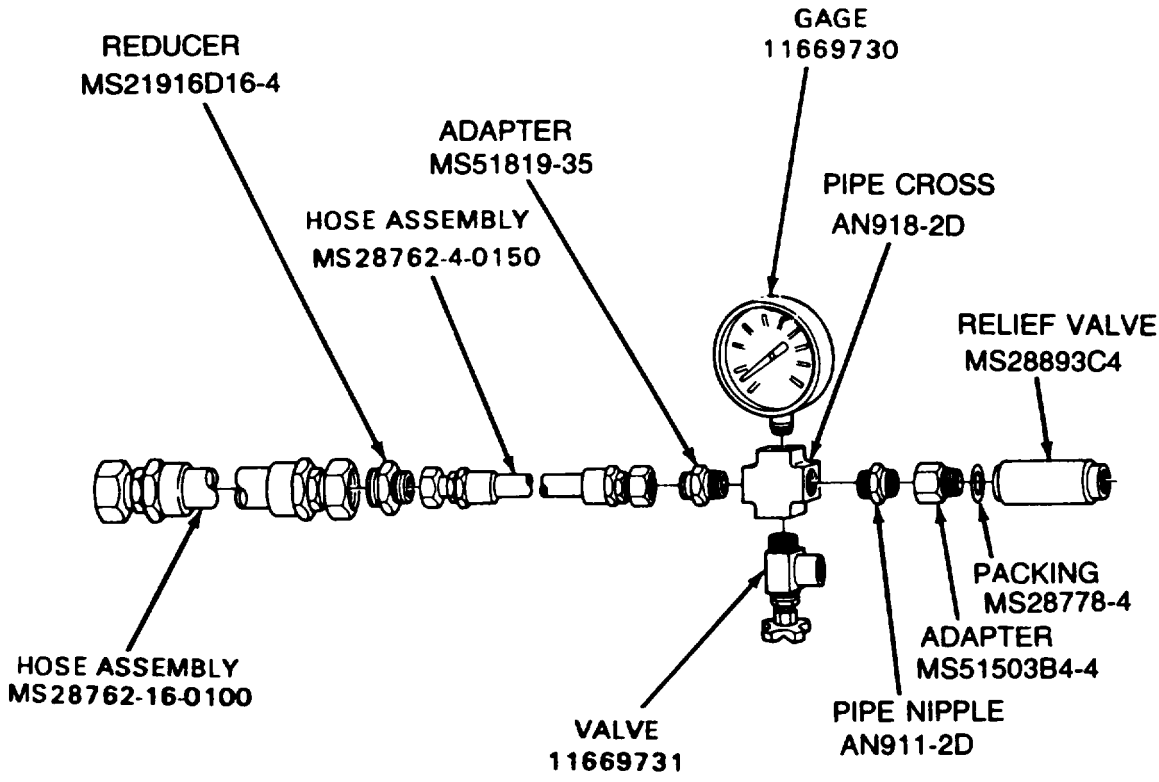
Do not hold test assembly during test. Position test assembly flat or straight on vehicle surface. If test assembly hose has a bend, it will straighten rapidly when hydraulic pressure is applied.

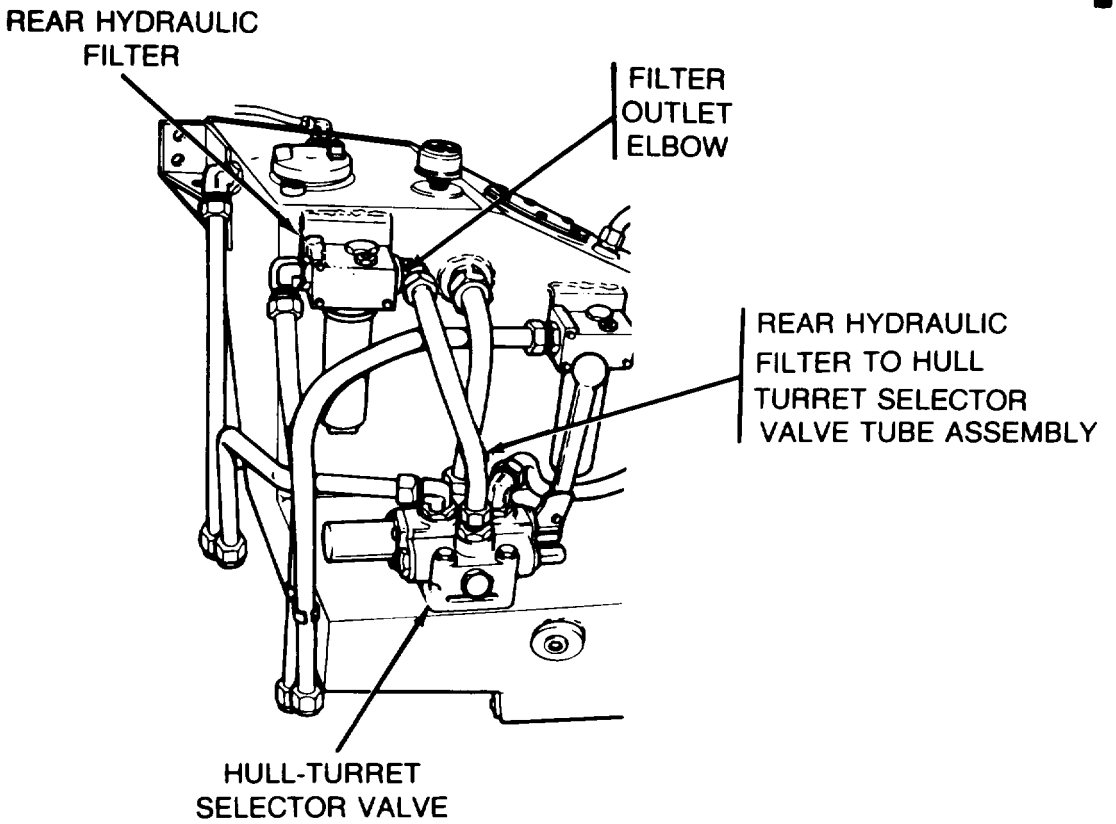
- Start engine and idle at 1200 RPM.
- Set HYDRAULIC PUMP switch ON.

Symptom-82 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC
(Continued)



Symptom-82 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC





Symptom-82

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC
(Continued)

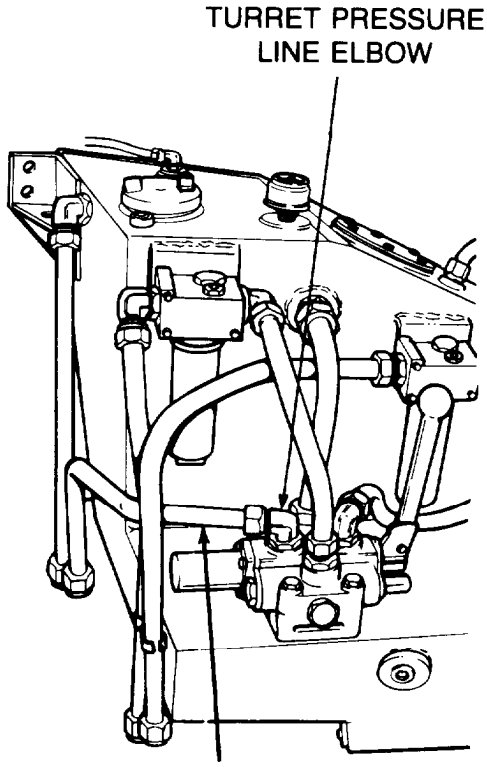
WARNING

When pressure gage reads 2000 psi, or if relief valve dumps oil, immediately set HYDRAULIC PUMP switch OFF.

17 Check hydraulic pressure at HULL-TURRET selector valve-turret pressure outlet.

Second Technician (Driver's Station)

- Set HYDRAULIC PUMP switch OFF.
- Stop engine.
- Place container under test assembly valve and slowly open valve to allow pressure to drop to zero.
- Remove test assembly from rear filter.
- Install rear filter to selector valve tube.
- Remove turret pressure line from HULL-TURRET selector valve.



DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM-HYDRAULIC
(Continued)

Symptom-82

STEP (17) CONTINUED

WARNING

Do not disconnect pressure test assembly until pressure gage reads zero.

- Install pressure test assembly on turret pressure line elbow.

NOTE

If pressure test assembly cannot be installed in previous step, loosen nut on turret pressure line elbow in valve. Rotate elbow away from reservoir and tighten nut.

- Start engine and idle at 1200 RPM.
- Set HYDRAULIC PUMP switch ON.
- Place HULL-TURRET valve in TURRET.
- Check if gage indicates a minimum of 1000 psi.

Does gage indicate a minimum of 1000 psi?

YES

18

- **Stop engine.**
- **Place container under test assembly valve. Slowly open valve to allow pressure to drop to zero.**
- **Remove pressure test assembly from HULL-TURRET selector valve.**
- **Install turret pressure line.**
- **See Turret Troubleshooting procedures.**

NO

19

- **Stop engine.**
- **Place container under test assembly valve. Slowly open valve to allow pressure to drop to zero.**
- **Remove pressure test assembly from HULL-TURRET selector valve.**
- **Replace HULL-TURRET selector valve (page 18-70).**

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC

Symptom-83

BULLDOZER BLADE OPERATION SLUGGISH IN BOTH DIRECTIONS

NOTE

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

1 Check hydraulic reservoir SUCTION SHUTOFF valve for operation.

First Technician (Driver's Station)

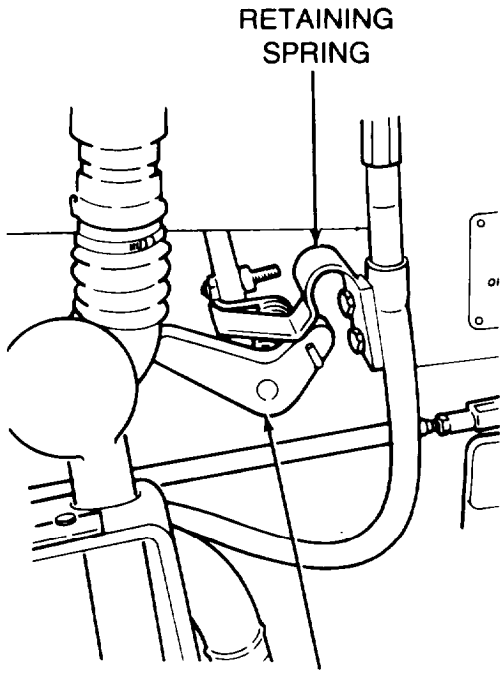
- Release hydrulic reservoir SUCTION SHUTOFF valve retaining spring.
- Check if handle and shaft rotate into ON position.

Did valve handle and shaft go into ON position?

YES

NO

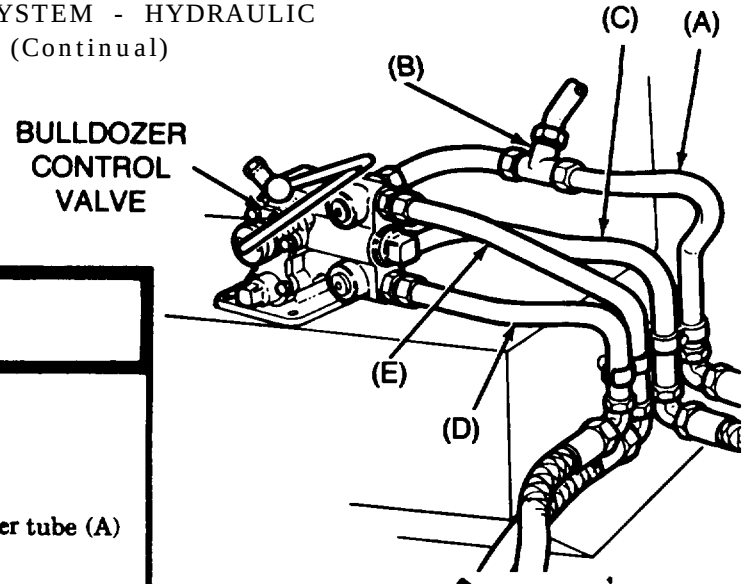
2 Repair Hydraulic SUCTION SHUTOFF Valve (page 18-78).

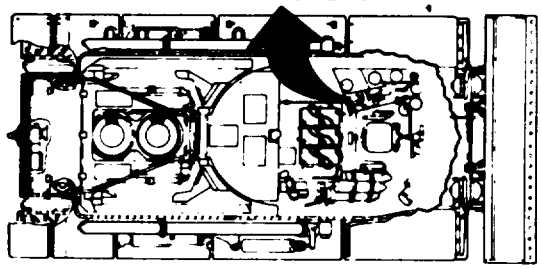


TA142635

Symptom-83

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continual)





FOR CLARITY TURRET NOT SHOWN

3 **Check BULLDOZER CONTROL VALVE tube assemblies for damage.**

Second Technician (Driver's Station)

- Visually check the following for damage.
  - Control valve tee to bulldozer right cylinder tube (A)
  - Control valve to tee tube (B)
  - Control valve to bulldozer left cylinder tube (C)
  - Control valve to bulldozer right cylinder tube (D)
  - Control valve to bulldozer left cylinder tube (E)

Are any tubes damaged?

NO

YES

4

- **If connections or any parts are damaged, replace the following as necessary:**

(A) Control valve tee to bulldozer right cylinder tube (page 18-45).

(B) Control valve to tee tube (page 18-45).

(C) Control valve to bulldozer left cylinder hose, tube (page 18-45).

(D) Control valve to bulldozer right cylinder hose, tube (page 18-45).

(E) Control valve to bulldozer left cylinder hose, tube (page 18-45).

TA142636

Symptom-83

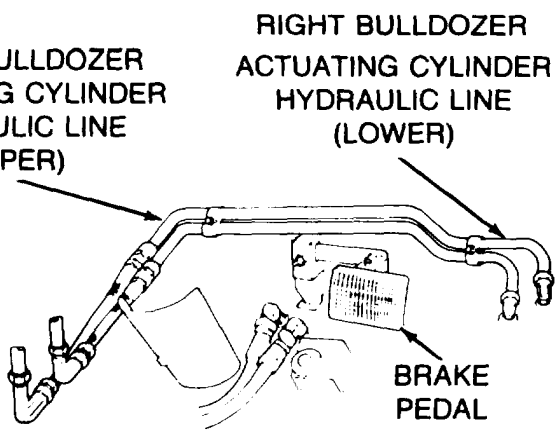
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

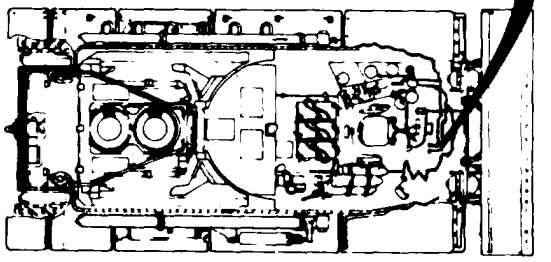
5 **Check metal tube assembly between BULLDOZER CONTROL VALVE hoses, and right bulldozer cylinder for damage.**

Second Technician (Driver's Station)

- Visually check the following for damage.
  - Right bulldozer actuating cylinder hydraulic line, upper.
  - Right bulldozer actuating cylinder hydraulic line, lower.

Are any tubes damaged?





FOR CLARITY
TURRET NOT SHOWN

NO

YES

6

- **If connections or any parts are damaged replace.**
  - **Right bulldozer actuating cylinder hydraulic line upper (page 18-34).**
  - **Right bulldozer actuating cylinder hydraulic line lower (page 18-34).**

TA142637

Symptom-83

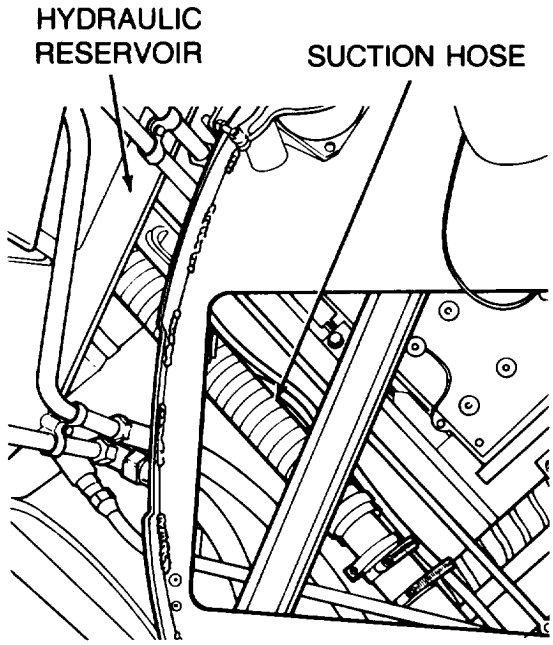
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

7 **Check for leaking suction hose at rear of reservoir.**

First Technician (Turret)

- Open turret floor door (TM 9-2350-222-10).
- Traverse turret to gain access to hydraulic suction hose (TM 9-2350-222-10).
- Check if suction hose is leaking.

Is suction hose leaking?



NO

YES

8

- **Replace packing in leaking fittings.**
- **Replace leaking or collapsed suction hose (page 18-91).**

TA142638

Symptom-83 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

9 **Check for collapsed suction hose at rear of reservoir.**

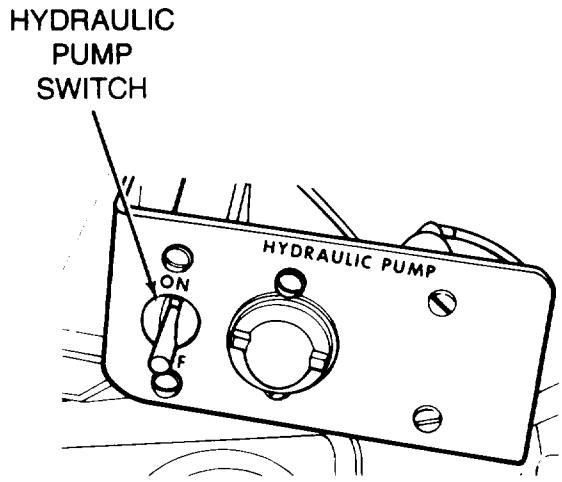
Second Technician (Driver's Station)

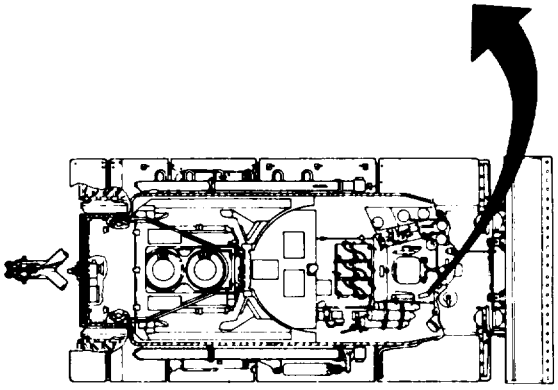
- Start engine idle at 1200 rpm.
- Set HYDRAULIC PUMP switch ON.

First Technician (Turret)

- Check suction hose at rear of reservoir for collapsing when HYDRAULIC PUMP switch is ON.

Is suction hose collapsed?





FOR CLARITY TURRET NOT SHOWN

NO

YES

10 **Replace suction hose (page 18-91).**

TA142639

Symptom-83 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

11 Check for leaking suction hose at hydraulic pump.

Second Technician (Driver's Station)

- Stop engine.
- Set HYDRAULIC PUMP switch OFF.

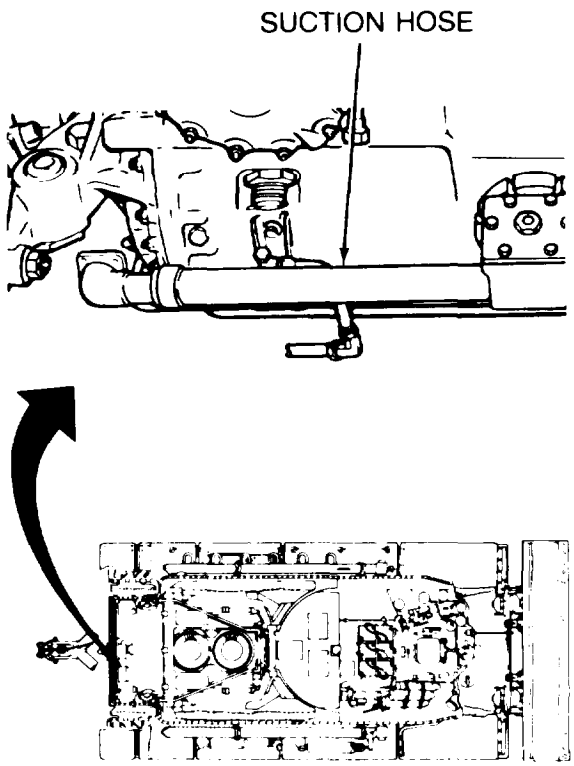
Both Technicians (Rear Grille Doors)

- Remove transmission shroud (page 9-20).

First Technician (Rear Grille Doors)

- Check for leaks in suction hose attaching fittings.

Is suction hose and/or fittings leaking?



NO

YES

12

- **Replace packing in leaking fittings (page 18-96).**
- **Replace leaking hose (page 18-96).**

TA142640

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

Symptom-83

WARNING

Do not change engine rpm or operate any controls when personnel are in rear grille door area.

WARNING

Do not go between grille doors until engine has been started, HYDRAULIC PUMP switch ON, and engine idle speed stabilized.

13 Check for collapsed suction hose at hydraulic pump.

Second Technician (Driver's Station)

- Start engine and idle at 1200 RPM.
- Set HYDRAULIC PUMP switch ON.

First Technician (Rear Grille Doors)

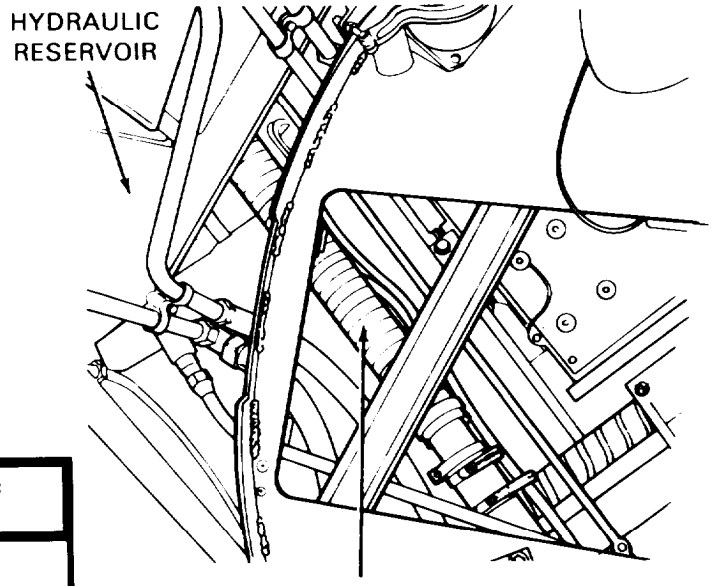
- Check suction hose to hydraulic pump for collapsing when hydraulic pump is running.

Is suction hose collapsed?

NO

YES

14 Replace suction hose (page 18-91).



TA253154

Symptom-83

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

15 **Check if bulldozer will raise front of vehicle.**

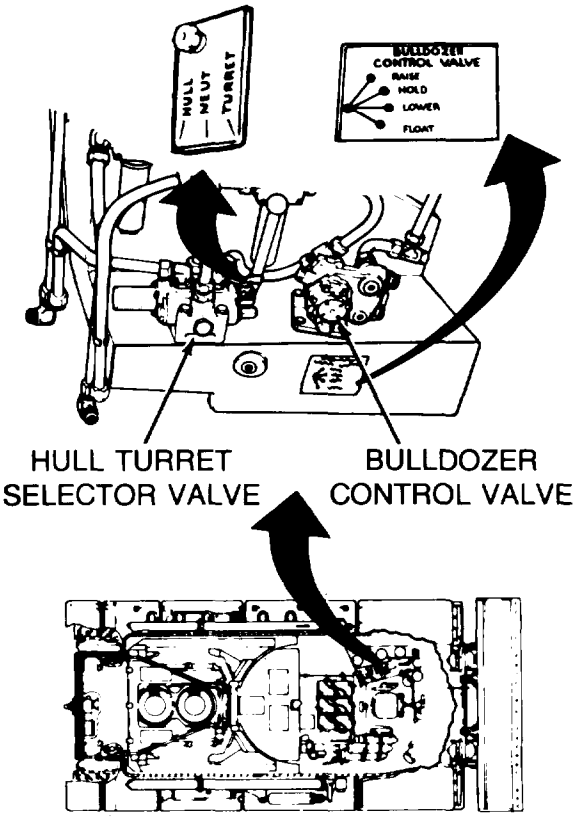
Second Technician (Driver's Station)

- Place HULL-TURRET selector valve in HULL.
- Place BULLDOZER CONTROL VALVE in LOWER.

First Technician (Forward Side of Vehicle)

- Check if bulldozer raises front of vehicle off ground.

Did bulldozer raise front of vehicle off ground?



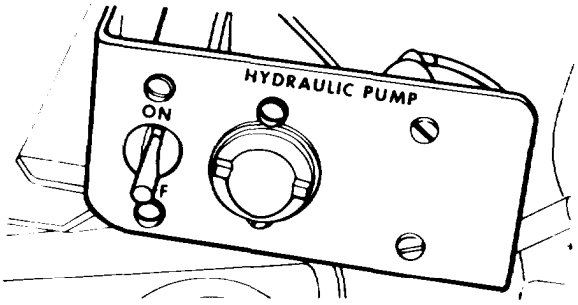
YES

NO

16 **See Symptom 87: BULLDOZER WILL NOT LOWER (DIG).**

TA142642

Symptom-83 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)



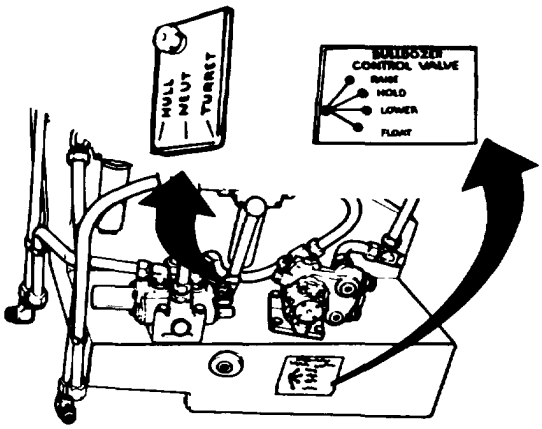
17 **Check if bulldozer will lower without hydraulic pressure.**

Second Technician (Driver's Station)

- Raise bulldozer to full up position.
- Place BULLDOZER CONTROL VALVE in HOLD.
- Place HULL-TURRET selector valve in NEUT.
- Set HYDRAULIC PUMP switch OFF.
- Place BULLDOZER CONTROL VALVE in LOWER.

First Technician (Forward Side of Vehicle)

- Check if bulldozer lowers by its own weight.



Did bulldozer lower?

YES

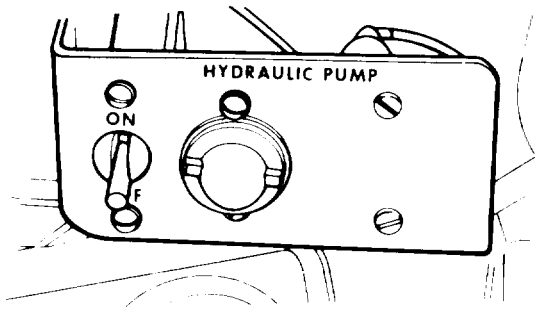
NO

18

- **Check for binding pivot pins.**
- **See Step (32).**

TA142643

Symptom-83 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)



19 **Check if boom will erect.**

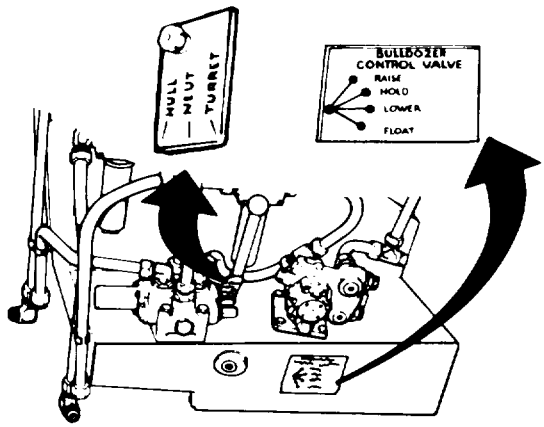
Second Technician (Driver's Station)

- Set HYDRAULIC PUMP switch ON.
- Place HULL-TURRET selector valve in TURRET.

First Technician (Turret)

- Erect boom (TM 9-2350-222-10).
- Check if boom erects.

Did boom erect?



YES — NO

20 **See Symptom 82: NO HYDRAULIC POWER TO TURRET (BULLDOZER BLADE RAISES AND LOWERS).**

TA142644

Symptom-83

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

WARNING

When pressure gage reads 2000 psi, or if relief valve dumps oil, immediately set HYDRAULIC PUMP switch OFF.

21 Check hydraulic pressure at front hydraulic filter.

First Technician (Turret)

- Stow boom (TM 9-2350-222-10).

Second Technician (Driver's Station)

- Place HULL-TURRET selector valve in NEUT.
- Set HYDRAULIC PUMP switch OFF.
- Stop engine.
- Place HULL-TURRET selector valve in TURRET.
- Remove tube between front hydraulic filter and tee to BULLDOZER CONTROL VALVE.
- Assemble pressure test kit (Item 35, Chapter 3, Section 1) as shown in illustration (page 4-1026).
- Connect hose of test assembly to union at front hydraulic filter outlet.
- Close test assembly valve.
- Place one gallon container under relief valve.
- Start engine and idle at 1200 rpm.

Symptom-83

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

STEP 21 CONTINUED

WARNING

Do not hold test assembly during test. Position test assembly flat or straight on vehicle surface. If test assembly hose has a bend it will straighten rapidly when hydraulic pressure is applied.

- Set HYDRAULIC PUMP switch ON.
- Check if gage indicates a minimum of 1000 psi.

Does gage indicate a minimum of 1000 psi?

YES

NO

WARNING

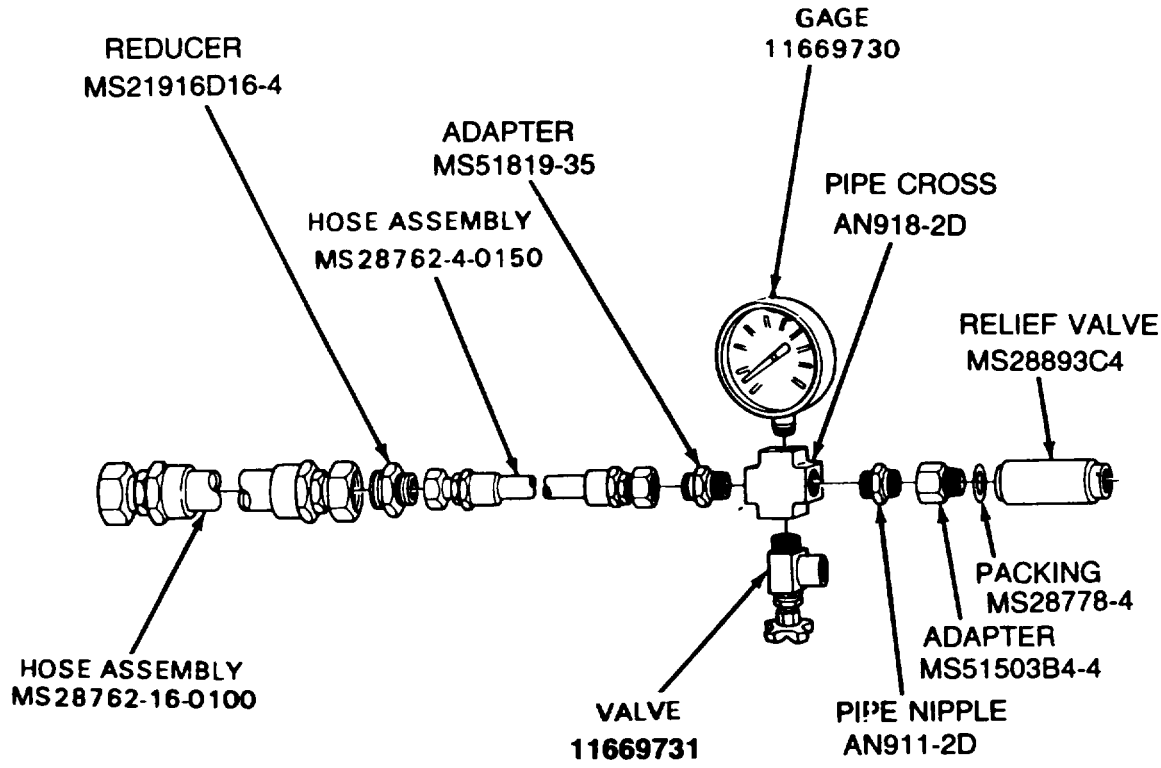
Do not disconnect pressure test assembly until pressure gage reads zero.

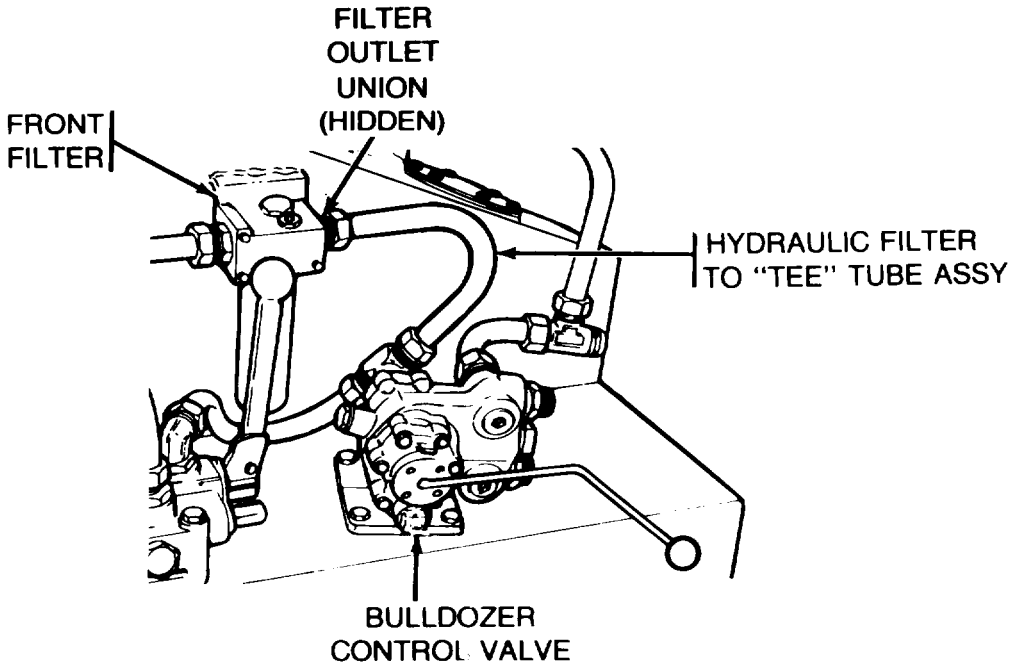
22

- **Stop engine.**
- **Place container under pressure test assembly valve and slowly open valve.**
- **After pressure has dropped to zero remove pressure test assembly.**
- **Install front hydraulic filter to tee tube assy.**
- **Replace bulldozer control valve (page 18-45).**

Symptom-83 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

ART FOR STEP 21





Symptom-83

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

WARNING

Do not disconnect pressure test assembly until pressure gage reads zero.

23 Check front fluid filter input shifting tube for leaks and damage.

Second Technician (Driver's Station)

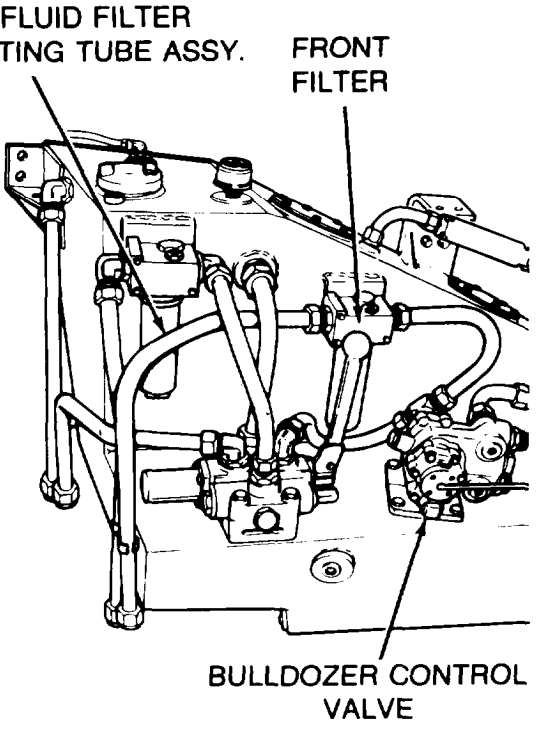
- Stop engine.
- Set HYDRAULIC PUMP switch OFF.
- Place container under test assembly needle valve and slowly open valve.
- After pressure has dropped to zero remove test assembly.
- Install front filter to tee tube assembly.
- Start engine and idle at 1200 rpm.
- Set HYDRAULIC PUMP switch ON.
- Place HULL-TURRET selector valve in HULL.
- Place BULLDOZER CONTROL VALVE in RAISE and hold in place until check is complete.
- Check if front fluid filter shifting tube is leaking or damaged.

Is tube leaking or damaged?

NO

YES

24 Tighten fittings if this does not stop leak or tube is damaged replace front fluid filter input shifting tube (page 18-56).



TA142648

Symptom-83

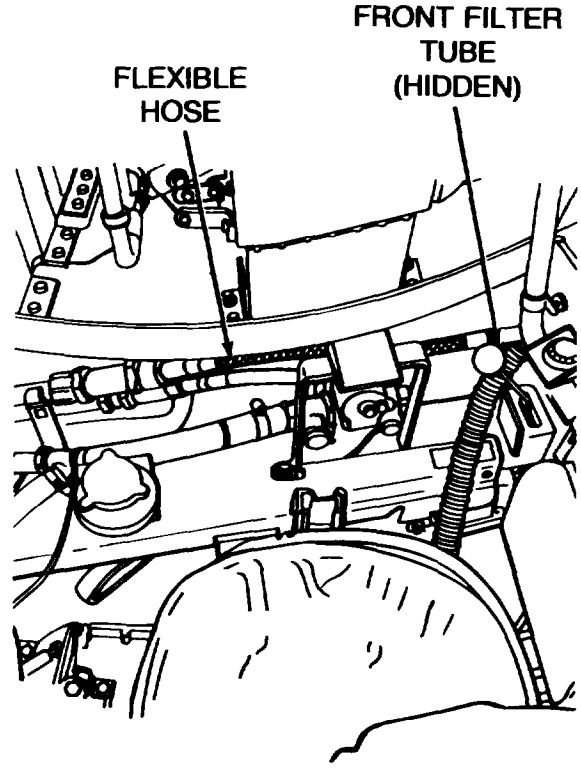
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

25 **Check flexible hose between front fluid filter input shifting tube and check valve for leaks and damage.**

Second Technician (Driver's Station)

- Place BULLDOZER CONTROL VALVE in RAISE and hold in place until check is complete.
- Check if flexible hose between front filter tube and check valve is leaking or damaged.

Is flexible hose leaking or damaged?



NO

YES

26 **Tighten leaking fittings. If this does not stop leak, replace hydraulic pump discharge check valve to front fluid filter hose assembly (page 18-45).**

TA142649

Symptom-83

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued

27 **Check both hydraulic pump discharge tubes under turret floor, between bulkhead and check valves for leaks and/or damaged.**

Second Technician (Driver's Station)

- Place BULLDOZER CONTROL VALVE in RAISE and hold in place until check is complete.

First Technician (Turret)

- Open turret floor door.
- Traverse turret to gain access to hydraulic pump discharge tubes.
- Check if tube assemblies are leaking or damaged.

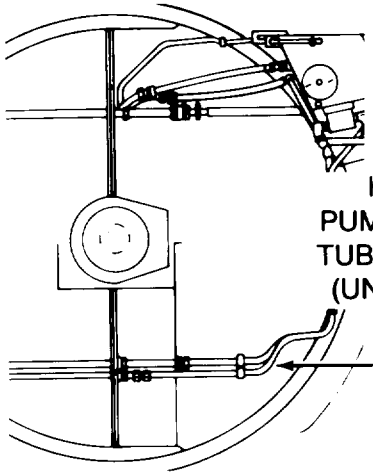
Are tube assemblies leaking or damaged?

Left Tube-Assembly

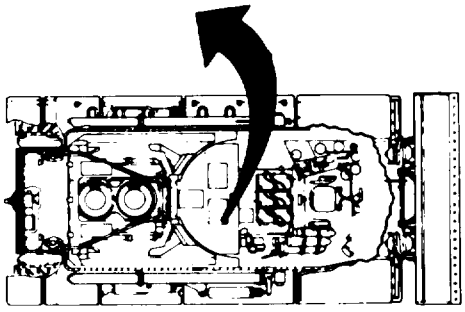
Cover end pump discharge bulkhead to rear filter check valve.

Right Tube-Assembly

Shaft end pump discharge bulkhead to front filter check valve.



HYDRAULIC PUMP DISCHARGE TUBE ASSEMBLIES (UNDER TURRET FLOOR)



FOR CLARITY TURRET NOT SHOWN

28 **Tighten leaking fittings if this does not stop leak or tubing is damaged replace the following as necessary.**

- **Shaft end pump discharge, bulkhead to front filter check valve, tube assembly (page 18-96).**
- **Cover end pump discharge bulkhead to rear filter check valve, tube assembly (page 18-96).**

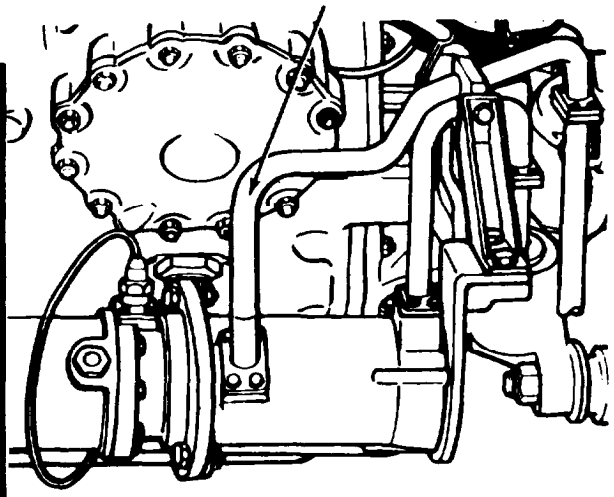
YES

NO

TA142650

Symptom-83 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

DISCHARGE TUBE
SHAFT END OF PUMP



29 **Check discharge, tube from shaft end of hydraulic pump for leaks and damage.**

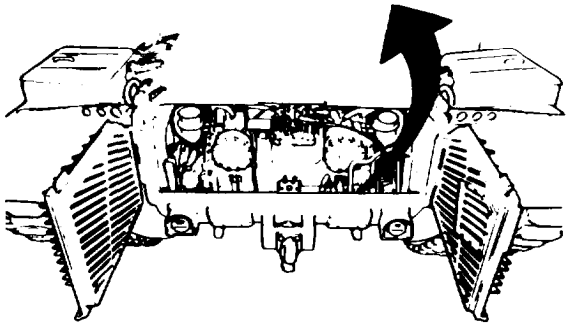
Second Technician (Driver's Station)

- Place BULLDOZER CONTROL VALVE in RAISE and hold in place until check is complete.

First Technician (Rear Grille Doors)

- Check if discharge tube from shaft end of pump is leaking or damaged.

Is discharge tube from shaft end of pump leaking or damaged?



NO

30 **Replace hydraulic pump (page 18-113).**

YES

31 **Tighten leaking fittings if this does not stop leak or tube is damaged replace hydraulic pump discharge, shaft end of pump tube assembly (page 18-96).**

TA142651

Symptom-83

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

FROM STEP 18

32 Check for bent or damaged push beam to actuating cylinder pins.

Second Technician (Driver's Station)

- Stop engine.

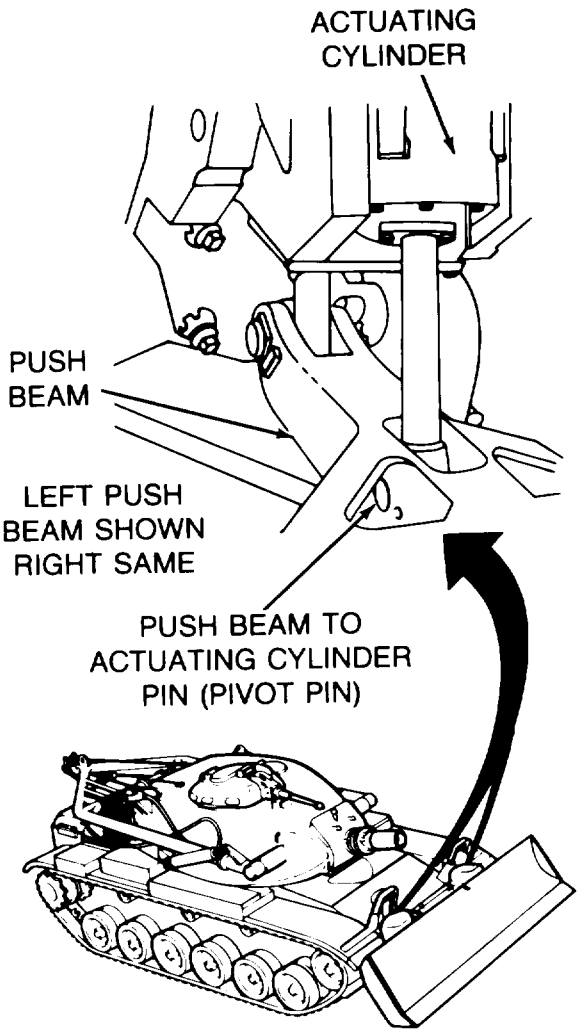
Both Technicians (Rear Grille Doors)

- Install transmission shroud (page 9-23).

Both Technicians (Bulldozer)

- Remove pivot pins from right and left push beams.
- Check if pivot pins are bent or damaged.

Are pivot pins bent or damaged?



NO

YES

33 Replace bent or damaged push beam to actuating cylinder pins (page 18-9).

TA142652

Symptom-83

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

34 Check bulldozer for freedom of movement with hydraulic actuating cylinders disconnected.

Second Technician (Driver's Station)

- Start engine and idle at 1200 rpm.
- Set HYDRAULIC PUMP switch ON.
- Place HULL-TURRET selector valve in TURRET.

First Technician (Turret)

- Erect boom and prepare to lift bulldozer blade with winch (TM 9-2350-222-10).

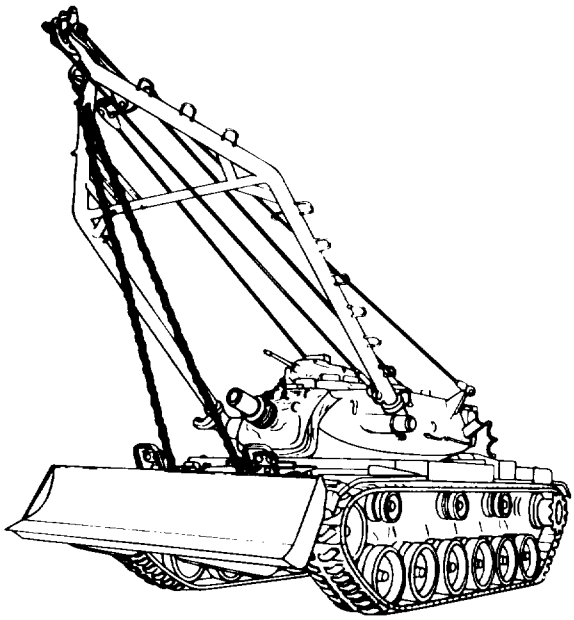
First Technician (Bulldozer)

- Connect winch cable to bulldozer blade (TM 9-2350-222-20).

First Technician (Turret)

- Raise bulldozer blade with winch.
- Place winch control in PAYOUT.
- Check if bulldozer blade lowers.

Did bulldozer lower?



YES

NO

35 Remove bulldozer blade, inspect attach fittings (page 18-10).

TA142653

Symptom-83

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

36 Check for binding hydraulic actuating cylinders.

First Technician (Bulldozer)

- Disconnect winch cable from bulldozer blade.

First Technician (Turret)

- Stow boom.
- Reel in winch.

Second Technician (Driver's Station)

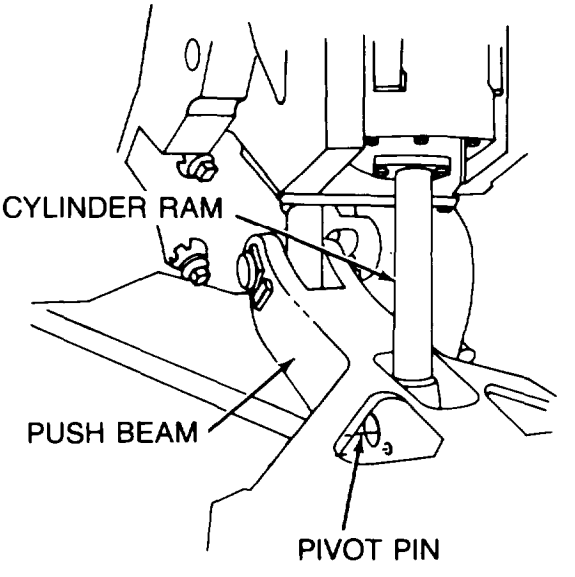
- Stop engine.
- Set HYDRAULIC PUMP switch OFF.
- Set HULL-TURRET selector valve in NEUT.

First Technician (Bulldozer)

- Install pivot pin in right push beam and cylinder ram (page 18-14).
- Check if bulldozer lowers rapidly when hydraulic pressure is removed from cylinder.

Second Technician (Driver's Station)

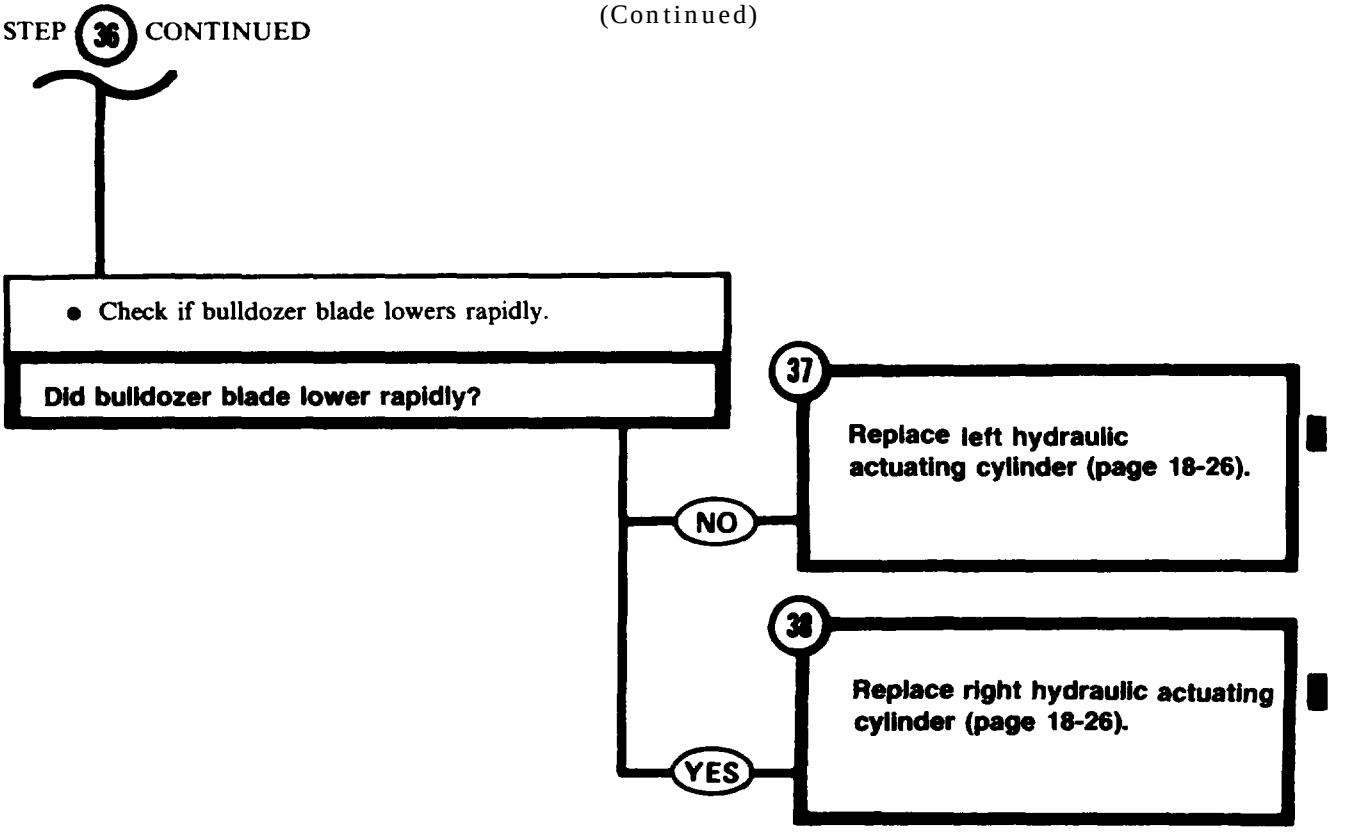
- Start engine and idle at 1200 rpm.
- Raise bulldozer blade and place BULLDOZER CONTROL VALVE in HOLD.
- Place HULL TURRET selector valve in NEUT.
- Set HYDRAULIC PUMP switch OFF.
- Place BULLDOZER CONTROL VALVE in LOWER.



TA142654

Symptom-83

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)



TA142655

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC

Symptom-84

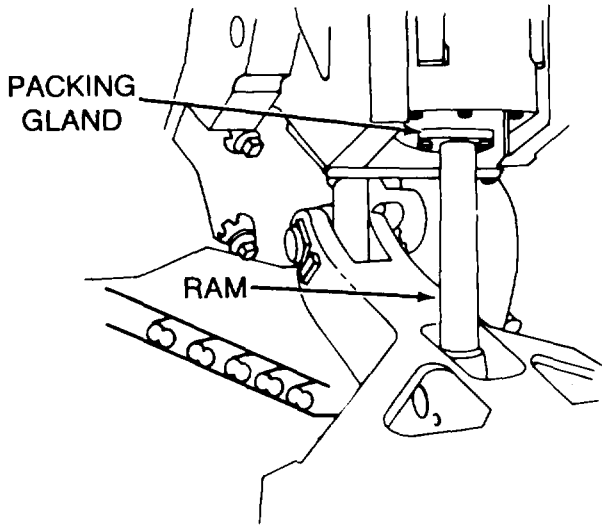
BULLDOZER BLADE CREEPS DOWN IN HOLD.

NOTE

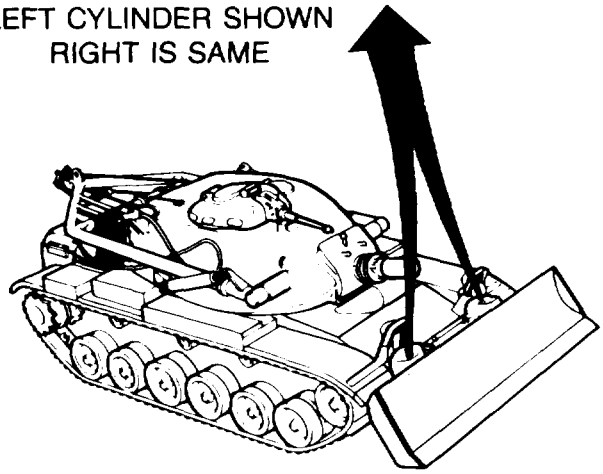
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

WARNING

Do not check cylinder rams for leaks until bulldozer blade has settled to ground.



LEFT CYLINDER SHOWN
RIGHT IS SAME



1 Check for leaks around left and right bulldozer actuating cylinder packing glands.

Second Technician (Driver's Station)

- Start engine.
- Operate bulldozer and place BULLDOZER CONTROL VALVE in HOLD when bulldozer blade is approximately 6-inches from ground.
- Stop engine.

First Technician (Bulldozer)

- After bulldozer blade has settled to ground, check for leaks around left and right bulldozer actuating cylinder at packing gland.

Are cylinders leaking at packing gland?

NO — YES

2 Tighten leaking packing gland. If this does not stop leak, replace bulldozer actuating cylinder (page 18-26).

TA142656

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

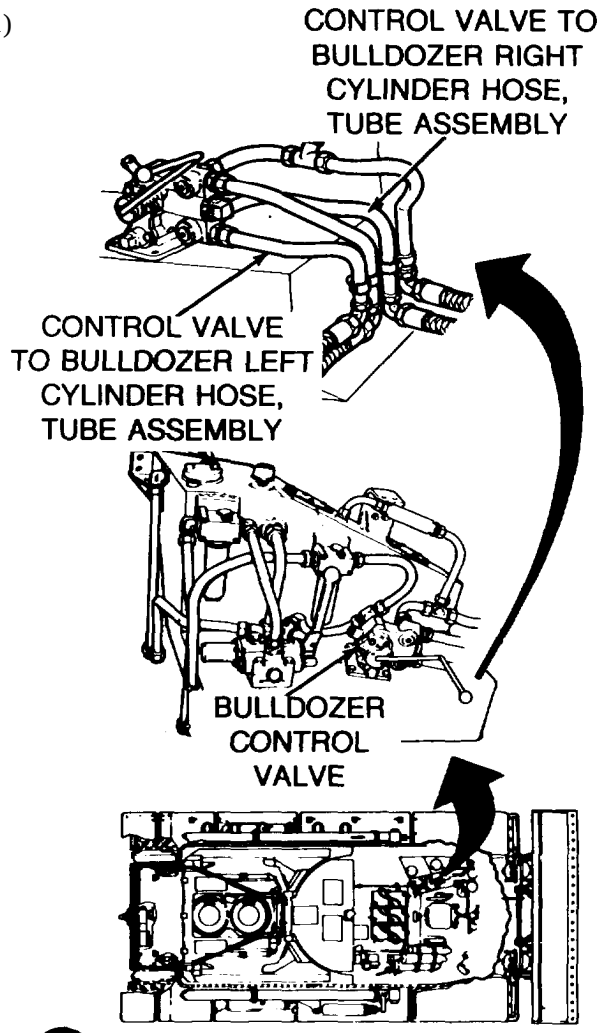
Symptom-84

3 **Check bulldozer raise lines for leaks at BULLDOZER CONTROL valve.**

First Technician (Driver's Station)

- Start engine.
- Raise bulldozer blade halfway and place BULLDOZER CONTROL VALVE in HOLD.
- Stop engine.
- Visually check the following for leaks or damage:
  - Control valve to bulldozer left cylinder hose tube assembly.
  - Control valve to bulldozer right cylinder hose tube assembly.

Are tube assemblies leaking?



NO

YES

4

- **Tighten leaking connections.**
- **If connections are still leaking or any parts damaged, replace the following as necessary:**
  - **Control valve to bulldozer left cylinder hose tube assembly (page 18-34).**
  - **Control valve to bulldozer right cylinder hose tube assembly (page 18-34).**

TA142657

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

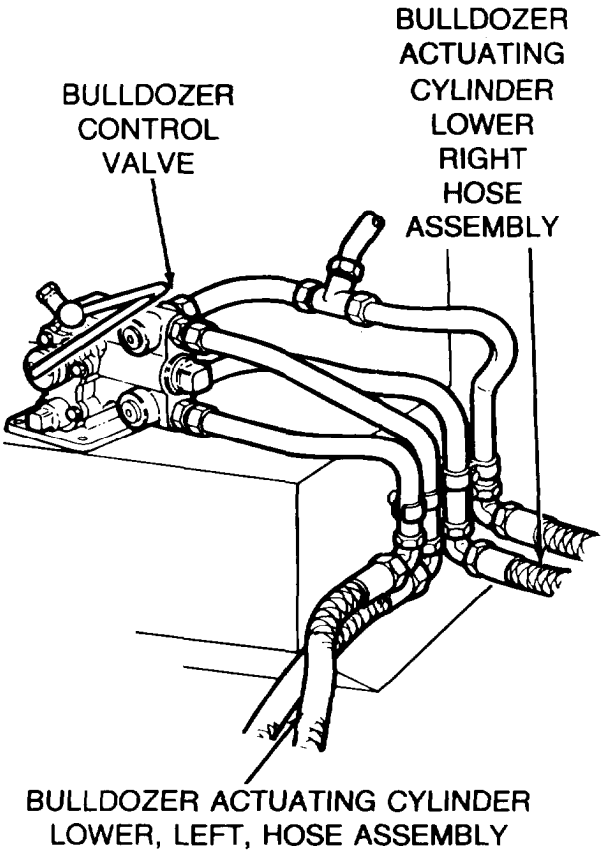
Symptom-84

5 **Check bulldozer raise hoses between bulldozer control valve, hull fittings and tube connections for leaks.**

First Technician (Driver's Station)

- Visually check the following for leaks or damage.
  - Bulldozer actuating cylinder hose lower, right.
  - Bulldozer actuating cylinder hose lower, left.

Are hose assemblies leaking or damaged?



NO

YES

6

- **Tighten leaking connections.**
- **If connections are still leaking or any parts are damaged, replace the following as necessary:**
  - **Bulldozer actuating cylinder lower, right hose assembly (page 18-34).**
  - **Bulldozer actuating cylinder lower, left hose assembly (page 18-34).**

TA142658

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

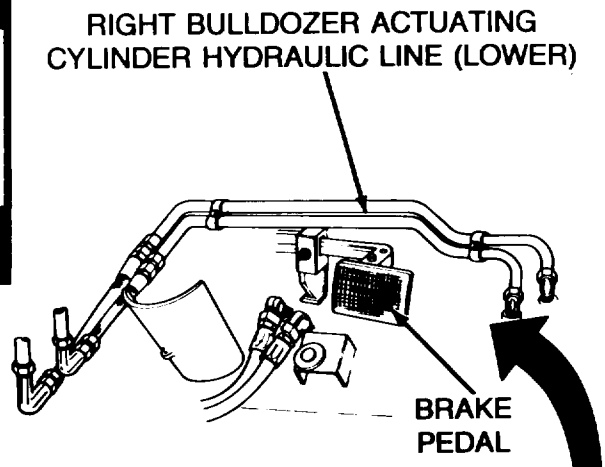
Symptom-84

7 **Check right bulldozer actuating cylinder hydraulic line (lower) for leaks in line and fittings.**

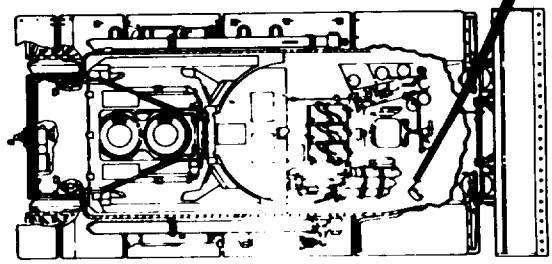
First Technician (Driver's Station)

- Check if tubing from bulldozer control valve hose to right cylinder is leaking.

Is tube assembly leaking?



FIRE EXTINGUISHER REMOVED FOR CLARITY



FOR CLARITY
TURRET NOT SHOWN

NO

YES

8 **Tighten leaking fittings. If this does not stop leak, replace right bulldozer actuating cylinder hydraulic line (lower) (page 18-34).**

TA142659

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

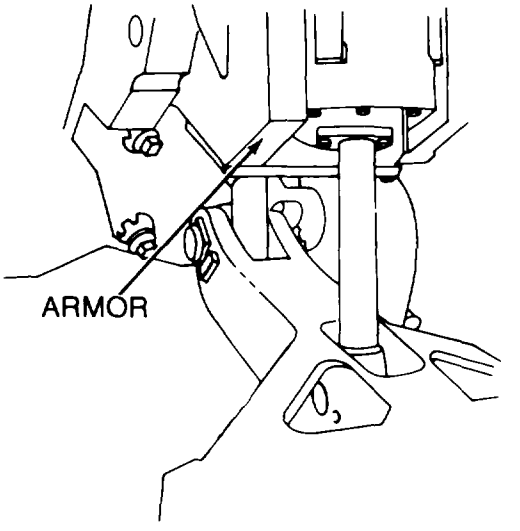
Symptom-84

9 **Check for oil leaks around right and left bulldozer actuating cylinder armor.**

First Technician (Bulldozer)

- Check if there is oil dripping from armor around right and left bulldozer actuating cylinder.

Is oil dripping from armor?



BULLDOZER ACTUATING CYLINDER
(LEFT SHOWN-RIGHT SIMILAR)

NO

YES

10

- **Check under armor for location of oil leak.**
- **See Step 16**

TA142660

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

Symptom-84

11 Check for internal leak in bulldozer hydraulic cylinders.

First Technician (Driver's Station)

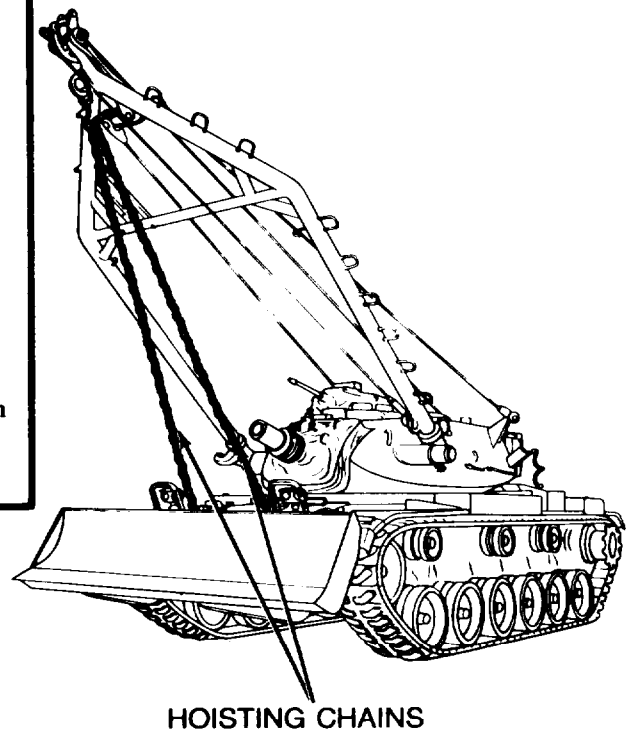
- Start engine.
- Provide hydraulic power to turret.

Second Technician (Turret)

- Erect boom (TM 9-2350-222-10).
- Payout winch to hoist bulldozer blade.

Second Technician (Bulldozer)

- Attach hoisting chains to winch cable and lifting eyes on top of bulldozer blade.



TA142661

Symptom-84

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

STEP (11) CONTINUED

First Technician (Driver's Station)

- Raise bulldozer blade and place BULLDOZER CONTROL VALVE in HOLD.

Second Technician (Turret)

- Reel in winch and hold bulldozer blade in raised position.

First Technician (Driver's Station)

- Stop engine.
- Remove fire extinguisher bottles (page 21-49).
- Place BULLDOZER CONTROL VALVE in FLOAT.
- After bulldozer blade weight is on winch cable, place BULLDOZER CONTROL VALVE in HOLD.
- Working as rapidly as possible, to prevent oil loss - disconnect left raise line hose from BULLDOZER CONTROL VALVE tubing.
- Install plug in left bulldozer hydraulic cylinder raise line hoses as shown.
- Start engine.
- Provide hydraulic power to turret.

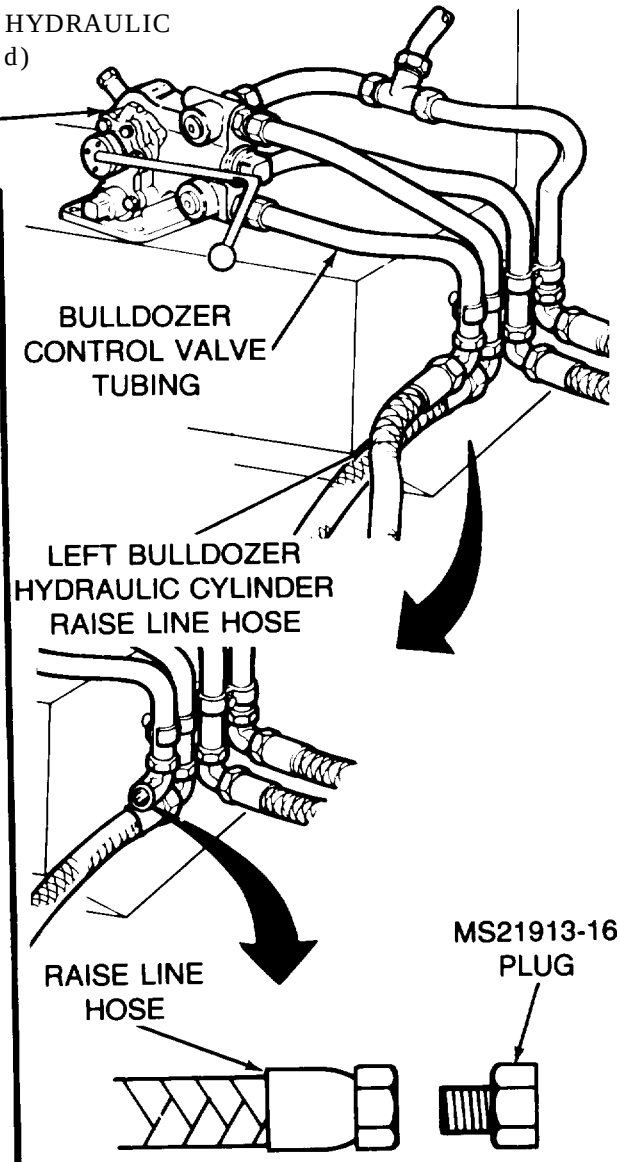
Second Technician (Turret)

- Payout winch cable until there is enough cable to allow bulldozer blade to lower to ground.
- Check if bulldozer blade stops and holds or continues to lower to ground.

Did bulldozer blade continue to lower to ground?

NO

YES



12

Replace left bulldozer actuating cylinder (page 18-26).

- **Remove plug from raise hose.**
- **Connect raise hose to BULLDOZER CONTROL VALVE.**
- **Install fire extinguisher bottles (page 21-51).**
- **Stow boom.**

TA142662

Symptom-84

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

13 Check for internal leak in right bulldozer hydraulic cylinder.

Second Technician (Turret)

- Reel in winch to support bulldozer blade.

First Technician (Driver's Station)

- Stop engine.
- Remove plug from left bulldozer hydraulic cylinder raise line hose.
- Connect left bulldozer hydraulic cylinder raise line hose to BULLDOZER CONTROL VALVE tubing.
- Start engine.
- Place BULLDOZER CONTROL VALVE in FLOAT.
- Provide hydraulic power to turret.

Second Technician (Turret)

- Payout winch until there is approximately two feet of slack in cable after bulldozer blade is on ground.

First Technician (Driver's Station)

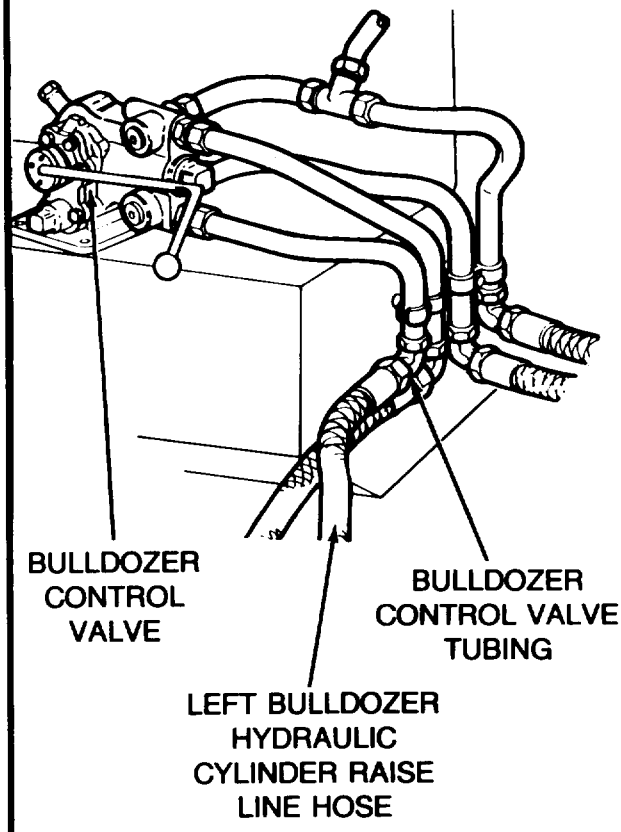
- Place HULL-TURRET selector valve in HULL.
- Raise and lower bulldozer blade five times to remove air from system.
- Place BULLDOZER CONTROL VALVE in FLOAT.
- Provide hydraulic power to turret.

Second Technician (Turret)

- Reel in winch and hold bulldozer blade in raised position.

First Technician (Driver's Station)

- Stop engine.
- Place BULLDOZER CONTROL VALVE in HOLD.



TA142663

Symptom-84

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

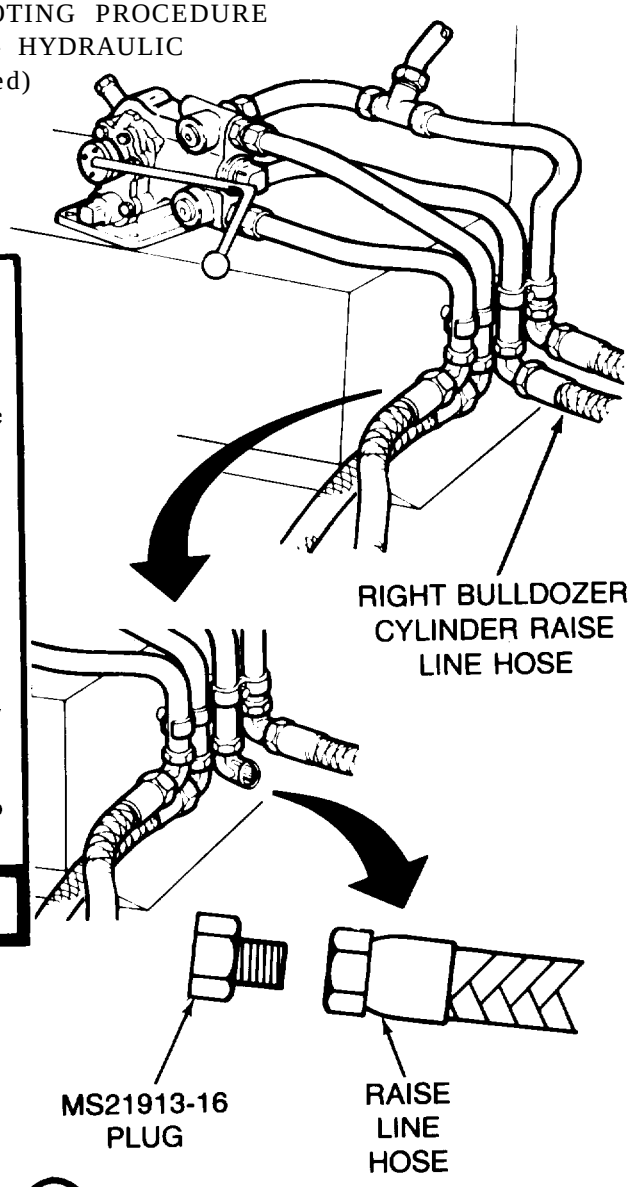
STEP (13) CONTINUED

- Working as rapidly as possible, to prevent oil loss - disconnect right raise line hose from BULLDOZER CONTROL valve tubing.
- Install plug in right bulldozer hydraulic cylinder raise line hose as shown.
- Start engine.
- Provide hydraulic power to turret.

Second Technician (Turret)

- Pay out winch cable until there is enough cable to allow bulldozer balde to lower to ground.
- Check if bulldozer blade stops and holds or continues to lower to ground.

Did bulldozer blade continue to lower to ground?



NO

14

- **Replace BULLDOZER CONTROL VALVE (page 18-45).**
- **Remove plug from raise hose.**
- **Connect raise hose to BULLDOZER CONTROL VALVE tube.**
- **Stow boom.**

YES

15

- **Replace right bulldozer actuating cylinder (page 18-26).**
- **Remove plug from raise hose.**
- **Connect raise hose to BULLDOZER CONTROL VALVE tube.**
- **Install fire extinguisher bottles (page 21-51).**
- **Stow boom.**

TA142664

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

Symptom-84
FROM STEP 10

16 Check for location of oil leak under armor.

First Technician (Driver's Station)

- Stop engine.

Both Technicians (Bulldozer)

- Remove armor from leaking bulldozer cylinder. (page 18-26).

First Technician (Driver's Station)

- Start engine.
- Set HYDRAULIC PUMP switch ON.
- Place HULL-TURRET selector in HULL.
- Place BULLDOZER CONTROL VALVE in RAISE.

Second Technician (Bulldozer)

- Visually check if hose or fittings between hull and fitting on cylinder is leaking.

Is hose or fittings leaking?

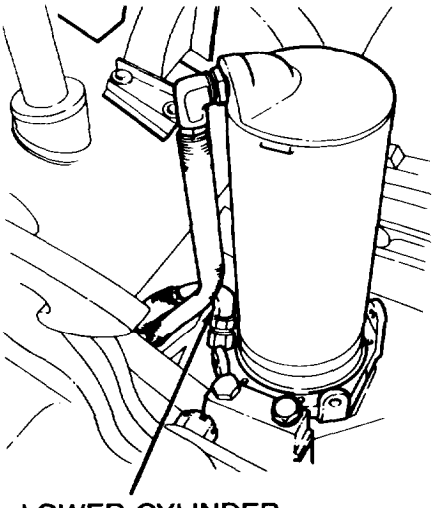
17 Replace leaking bulldozer actuating cylinder (page 18-26).

NO

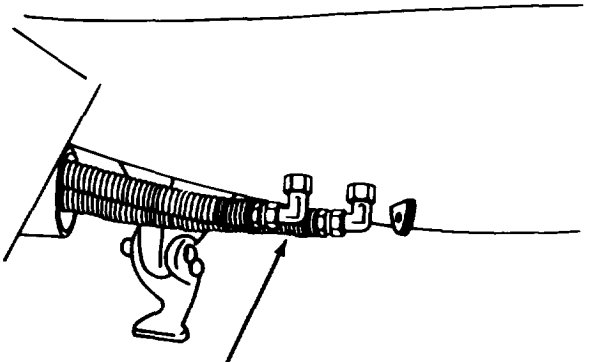
18 Tighten leaking fittings. If this does not stop leak, replace fittings and/or hose (page 18-26).

YES

BULLDOZER ACTUATING CYLINDER (ARMOR REMOVED)



LOWER CYLINDER HOSE



LOWER CYLINDER HOSE (HULL AREA)

TA142665

Symptom-85 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC

BULLDOZER BLADE WILL NOT FLOAT.

1 Check if bulldozer will float with raise and lower lines open.

First Technician (Driver's Station)

- Start engine.
- Lower bulldozer blade to ground.
- Set HYDRAULIC PUMP switch OFF.
- Place BULLDOZER CONTROL VALVE in FLOAT then in HOLD.
- Stop engine.
- Stuff rags around valve to absorb oil.
- Remove upper and lower plugs from BULLDOZER CONTROL VALVE.

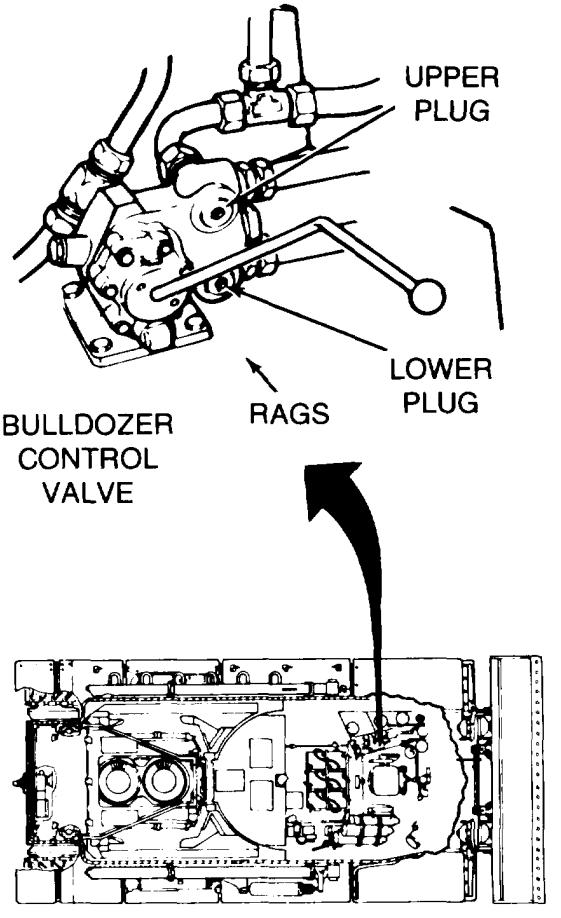
Second Technician (Front Right Side of Vehicle)

- Check if bulldozer blade floats when vehicle is driven forward.

First Technician (Driver's Station)

- Start engine.
- Drive vehicle forward for approximately 25 feet.

Did bulldozer blade float?



NO

YES

2 Replace BULLDOZER CONTROL VALVE (page 18-45).

TA142666

Symptom-85

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

3 **Check if bulldozer blade will float with right bulldozer actuating cylinder disconnected.**

First Technician (Driver's Station)

- Stop engine.
- Install plugs in bulldozer control valve.

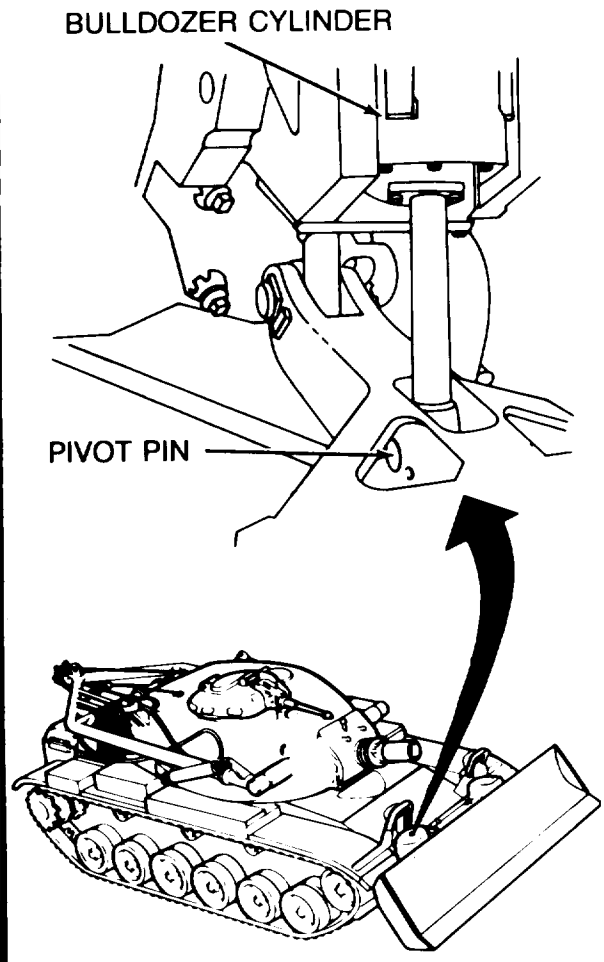
Second Technician (Bulldozer)

- Remove pivot pin from right bulldozer push beam.
- Check if bulldozer blade floats when vehicle is driven forward.

First Technician (Driver's Station)

- Start engine.
- Place BULLDOZER CONTROL VALVE in FLOAT.
- Drive vehicle forward for approximately 25 feet.

Did bulldozer blade float?



NO

YES

4

- **Check for crushed hydraulic lines to right bulldozer cylinder.**
- **See Step (8).**

TA142667

Symptom-85

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

5 **Check if bulldozer blade will float with both hydraulic cylinders disconnected.**

First Technician (Driver's Station)

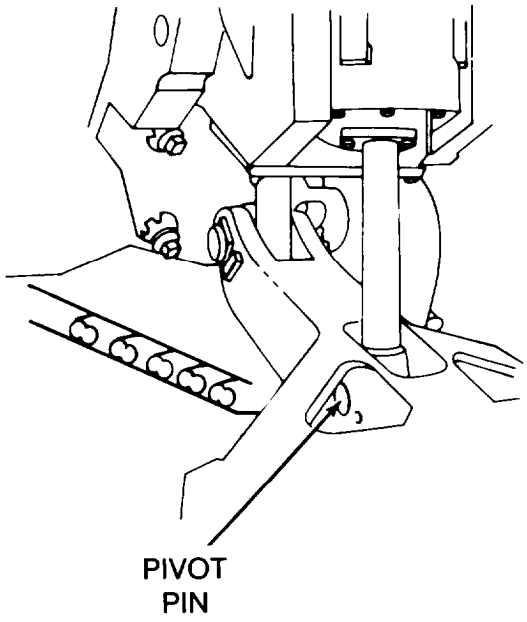
- Stop engine.

Second Technician (Bulldozer)

- Remove pivot pin from left bulldozer push beam.
- Check if bulldozer blade floats when vehicle is driven forward.

First Technician (Driver's Station)

- Start engine.
- Place BULLDOZER CONTROL VALVE in FLOAT.
- Drive vehicle ahead for approximately 25 feet.



Did bulldozer blade float?

NO

6 **Remove bulldozer blade. Inspect attached fittings (page 18-9).**

YES

7

- **Check for crushed hydraulic lines to left bulldozer cylinder.**
- **See Step (11).**

TA142668

Symptom-85

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

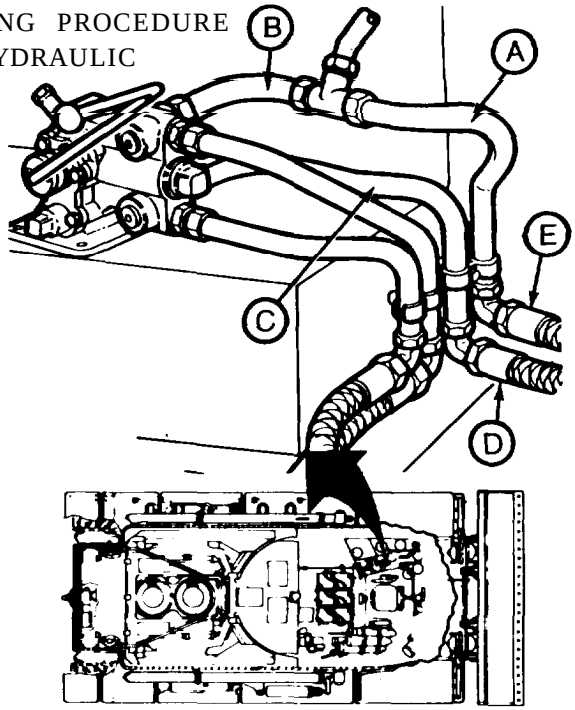
FROM STEP (4)

8 Check tube assemblies between bulldozer control valve and right bulldozer cylinder for leaks or damage.

First Technician (Driver's Station)

- Stop engine.
- Visually check the following for leaks or damage:
  - Control valve tee to bulldozer right cylinder (A).
  - Control valve to tee (B).
  - Control valve to right cylinder hose (C).
  - Bulldozer cylinder hose, lower (D).
  - Bulldozer cylinder hose, upper (E).

Are any tubes crushed?



FOR CLARITY TURRET NOT SHOWN

9

- **Tighten leaking connections.**
- **If connections are still leaking or any parts are damaged, replace the following as necessary:**
  - **Control valve to tee (A) to bulldozer right cylinder (page 18-45).**
  - **Control valve to tee (B) (page 18-45).**
  - **Control valve hose to right cylinder (C) (page 18-45).**
  - **Bulldozer cylinder hose, lower (D) (page 18-34).**
  - **Bulldozer cylinder hose, upper (E) (page 18-34).**
- **Install pivot pin in right cylinder (page 18-14).**

YES

NO

10

- **Check tubes between bulldozer control valve and right cylinder for crushed areas.**

- **See Step (14).**

TA142669

Symptom-85

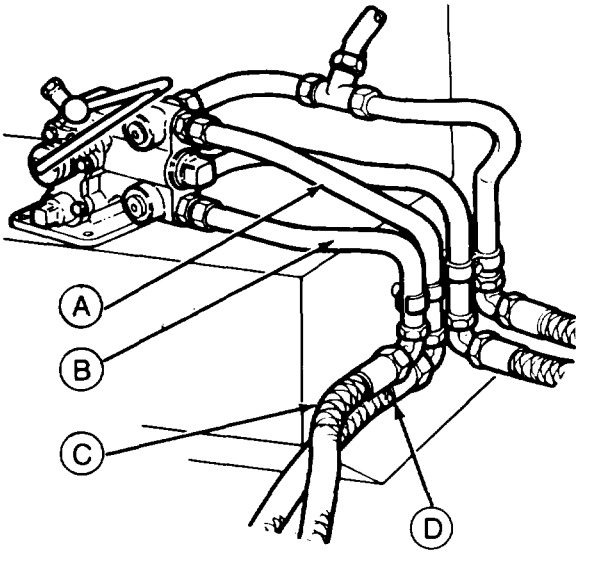
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

FROM STEP 7

11 Check tube and hose assemblies between bulldozer control valve and left bulldozer cylinder for leaks or damage.

First Technician (Driver's Station)

- Stop engine.
- Visually check the following for leaks or damage:
  - Control valve to right cylinder tube (A).
  - Control valve to left cylinder tube (B).
  - Bulldozer cylinder hose, lower (C).
  - Bulldozer cylinder hose, upper (D).



Are any tubes or hose assemblies damaged?

YES

12

- **Tighten leaking connections.**
- **If connections are still leaking or any parts are damaged, replace the following as necessary:**
  - **Control valve to left cylinder raise tube (A).**
  - **Control valve to left cylinder lower tube (B).**
  - **Bulldozer cylinder hose, lower (C).**
  - **Bulldozer cylinder hose, upper (D).**
- **Install pivot pins in left and right bulldozer cylinders (page 18-14).**

NO

13

- **Replace left bulldozer cylinder (page 18-26).**
- **Install pivot pin in right push beam (page 18-14).**

TA142670

Symptom-85

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

FROM STEP

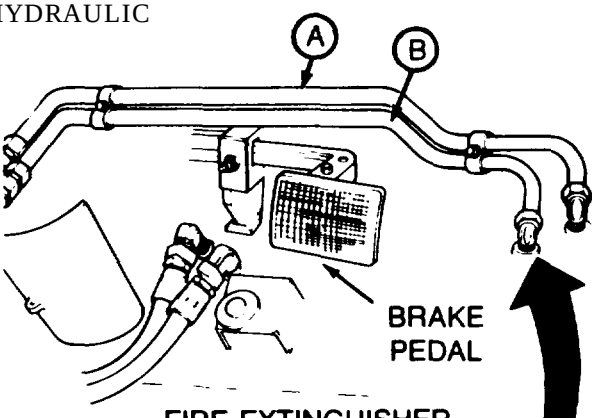
10

14 **Check metal tube assemblies between bulldozer control valve hoses and right bulldozer cylinder for leaks or damage.**

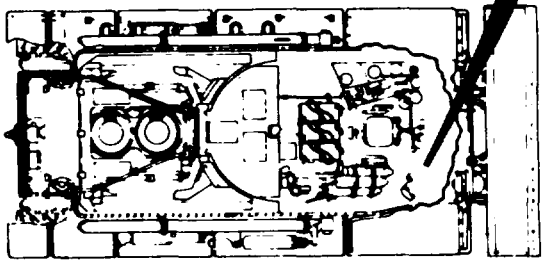
Second Technician (Driver's Station)

- Visually check upper (A) and (B) bulldozer hydraulic lines for leaks or damage.

Are any tubes damaged or leaking?



FIRE EXTINGUISHER REMOVED FOR CLARITY



FOR CLARITY TURRET NOT SHOWN

NO

16

- **Replace right bulldozer cylinder (page 18-26).**

YES

15

- **Tighten leaking connections.**
- **If connectors are still leaking or any parts are damaged, replace the following as necessary:**
  - **Right bulldozer cylinder hydraulic line upper (A) (page 18-34).**
  - **Right bulldozer cylinder hydraulic line lower (B) (page 18-34).**
- **Install pivot pin in right bulldozer cylinder (page 18-14).**

TA142671

Symptom-86 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC

BULLDOZER BLADE WILL NOT RAISE.

1

Check for hydraulic power to boom.

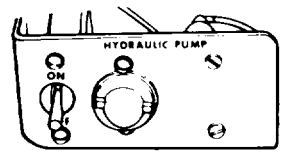
First Technician (Driver's Station)

- Start engine.
- Set HYDRAULIC PUMP switch ON.
- Place TURRET-HULL selector valve in TURRET.

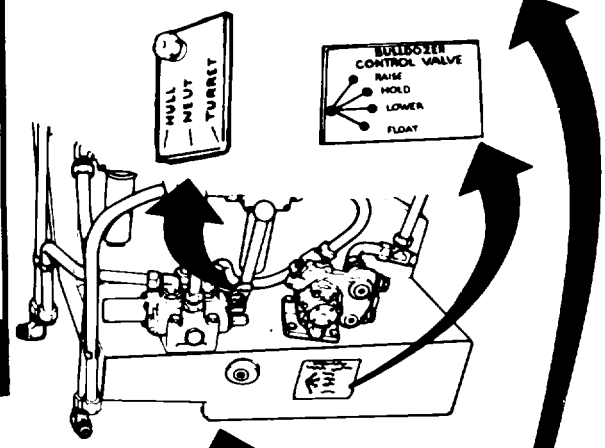
Second Technician

- Erect boom (TM 9-2350-222-10).

Did boom erect?

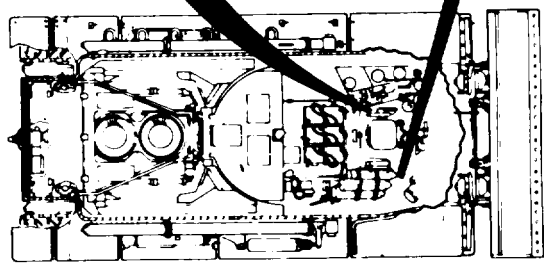


HYDRAULIC PUMP CONTROL PANEL



HULL TURRET SELECTOR VALVE

BULLDOZER CONTROL VALVE



FOR CLARITY TURRET NOT SHOWN

YES

NO

2

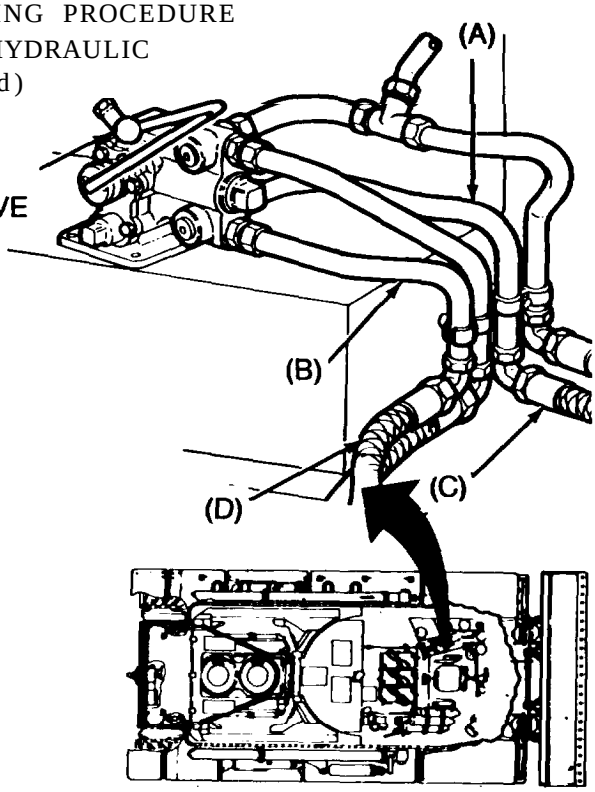
See Symptom 82, NO HYDRAULIC POWER TO TURRET (BULLDOZER BLADE RAISES AND LOWERS).

TA142672

Symptom-86

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

BULLDOZER
CONTROL VALVE



FOR CLARITY TURRET NOT SHOWN

3 **Check bulldozer raise lines in driver's station for leaks or damage.**

First Technician (Driver's Station)

- Place HULL-TURRET selector valve in HULL.
- Place BULLDOZER CONTROL VALVE in RAISE.
- Visually check the following for leaks or damage:
  - Control valve to right bulldozer cylinder hose (A).
  - Control valve to left bulldozer cylinder hose (B).
  - Bulldozer actuating cylinder hose, lower right (C).
  - Bulldozer actuating cylinder hose, lower left (D).

Are any lines leaking?

NO

YES

4

- **Tighten leaking connections.**
- **If connections are still leaking, or any parts are damaged, replace the following as necessary:**
  - **Control valve to right bulldozer cylinder hose (A) (page 18-45).**
  - **Control valve to left bulldozer cylinder hose (B) (page 18-45).**
  - **Bulldozer actuating cylinder hose, lower right (C) (page 18-34).**
  - **Bulldozer actuating cylinder hose, lower left (D) (page 18-34).**

TA142673

Symptom-86

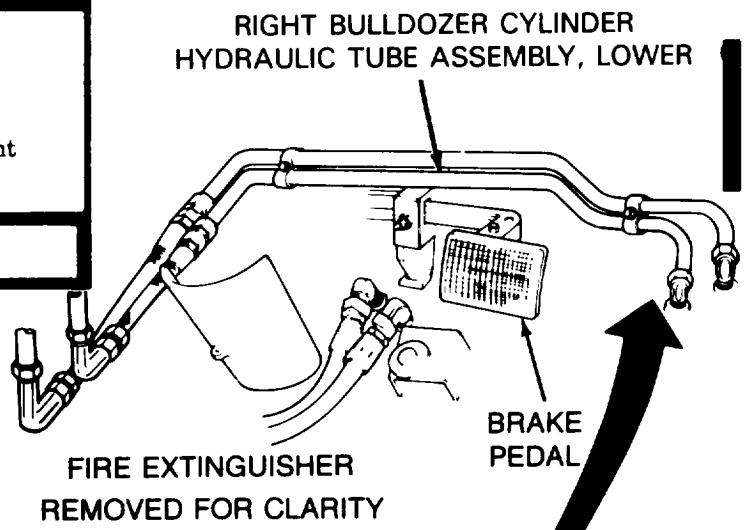
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

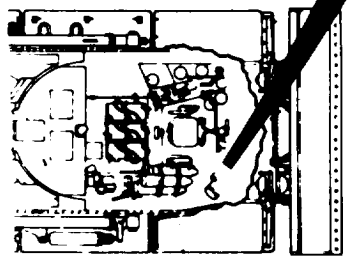
5 **Check right bulldozer actuating cylinder hydraulic tube assembly, lower, for leaks in line fittings.**

First Technician (Driver's Station)

- Visually check if tube assembly from BULLDOZER CONTROL VALVE hose to right cylinder is leaking or damaged.

Is tube assembly leaking?





FOR CLARITY
TURRET NOT SHOWN

NO

YES

6 **Tighten leaking fittings. If this does not stop leak, replace right bulldozer actuating cylinder hydraulic tube assembly, lower (page 18-34).**

TA142674

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

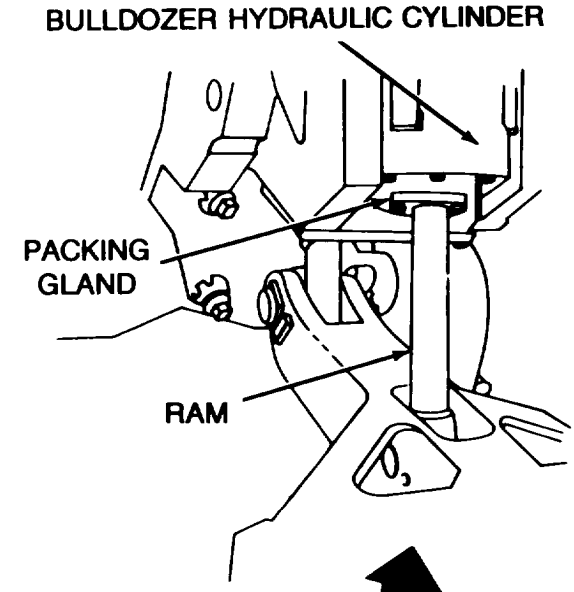
Symptom-86

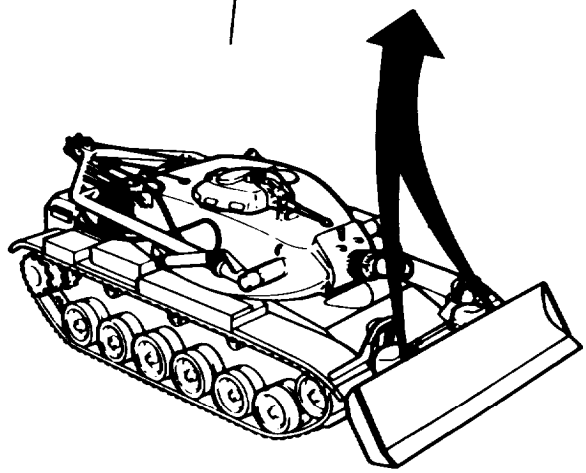
7 **Check bulldozer actuating cylinder for leaks at packing gland.**

Second Technician (Bulldozer)

- Visually check right and left bulldozer cylinders for oil leaking from packing glands.

Does oil leak from cylinder packing glands?





NO

YES

8 **Tighten packing gland. If this does not stop leak, replace cylinder (page 18-26).**

TA142675

Symptom-86

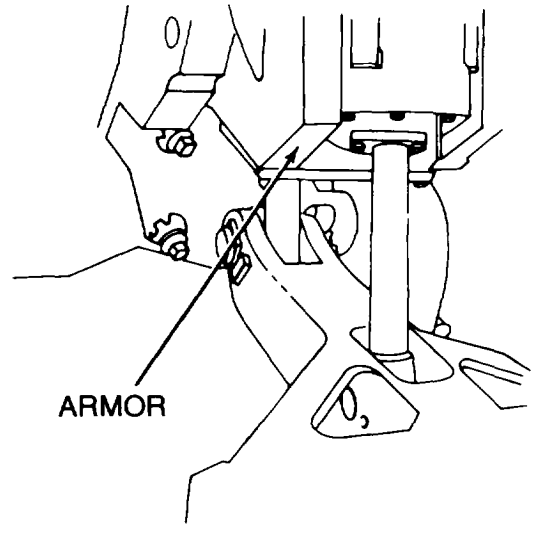
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

9 **Check if oil is leaking from under right and left bulldozer actuating cylinder armor.**

Second Technician (Bulldozer)

- Visually check if oil is leaking from under right or left cylinder armor.

Is oil leaking from under armor?



BULLDOZER ACTUATING CYLINDER
(Left shown-right similar)

YES

NO

10 **Replace BULLDOZER CONTROL valve (page 18-45).**

TA142676

Symptom-86

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

11 **Check for location of oil leak under armor.**

First Technician (Driver's Station)

- Stop engine.

Both Technicians (Bulldozer)

- Remove armor from leaking bulldozer cylinder.

First Technician (Driver's Station)

- Start engine.
- Set HYDRAULIC PUMP switch ON.
- Place HULL-TURRET selector in HULL.
- Place BULLDOZER CONTROL VALVE in RAISE.

Second Technician (Bulldozer)

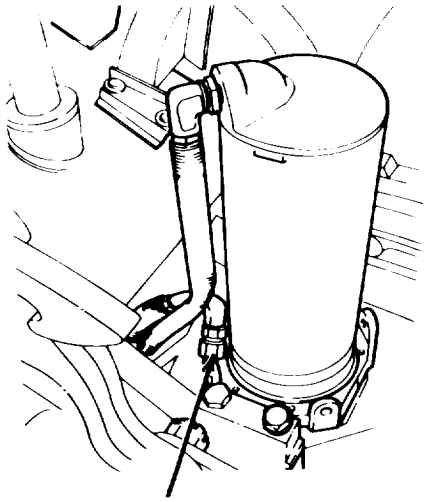
- Visually check if hose or fittings between hull and lower fitting on cylinder is leaking.

Are hose or fittings leaking?

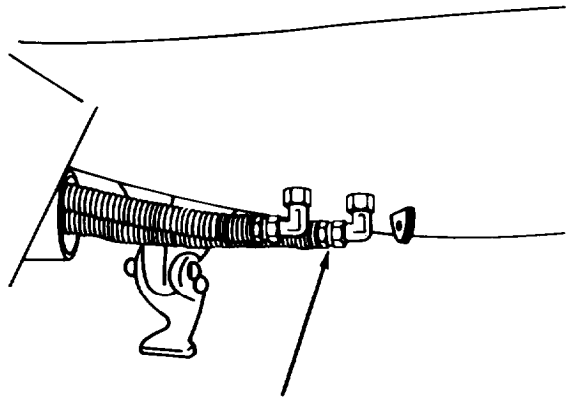
12 **Replace leaking bulldozer actuating cylinder (page 18-26).** — NO

13 **Tighten leaking fittings. If this does not stop leak, replace fittings and/or hose (page 18-26).** — YES

BULLDOZER ACTUATING CYLINDER (ARMOR REMOVED)



LOWER CYLINDER HOSE



LOWER CYLINDER HOSE (HULL AREA)

TA142677

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC

Symptom 87

BULLDOZER BLADE WILL NOT LOWER (DIG).

1 Check for hydraulic power to boom.

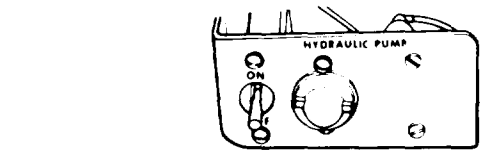
First Technician (Driver's Station)

- Start engine.
- Set HYDRAULIC PUMP switch ON.
- Place HULL-TURRET selector valve in TURRET.

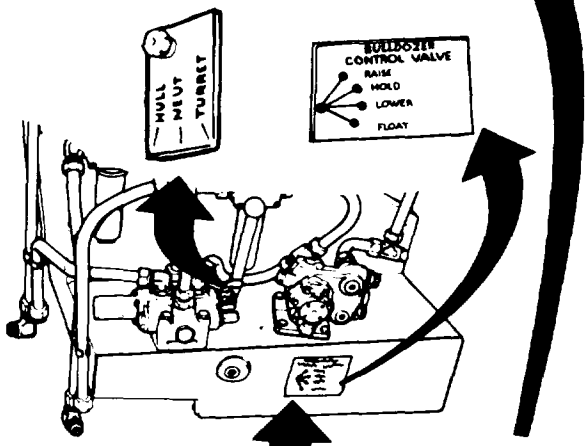
Second Technician (Turret)

- Erect boom (TM 9-2350-222-10).
- Check if boom erects.

Did boom erect?

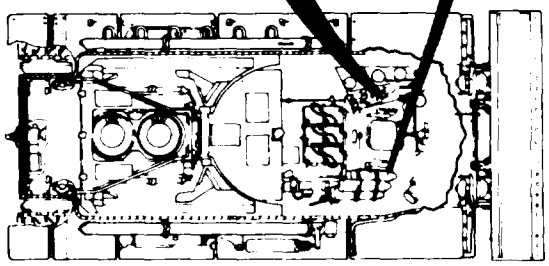


HYDRAULIC PUMP CONTROL PANEL



HULL TURRET SELECTOR VALVE

BULLDOZER CONTROL VALVE



FOR CLARITY TURRET NOT SHOWN

YES

NO

2 See Symptom 82, NO HYDRAULIC POWER TO TURRET (BULLDOZER BLADE RAISES AND LOWERS).

TA142678

Symptom 87

DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSYTEM - HYDRAULIC
(Continued)

3 Check for leaking hydraulic lines in driver's station.

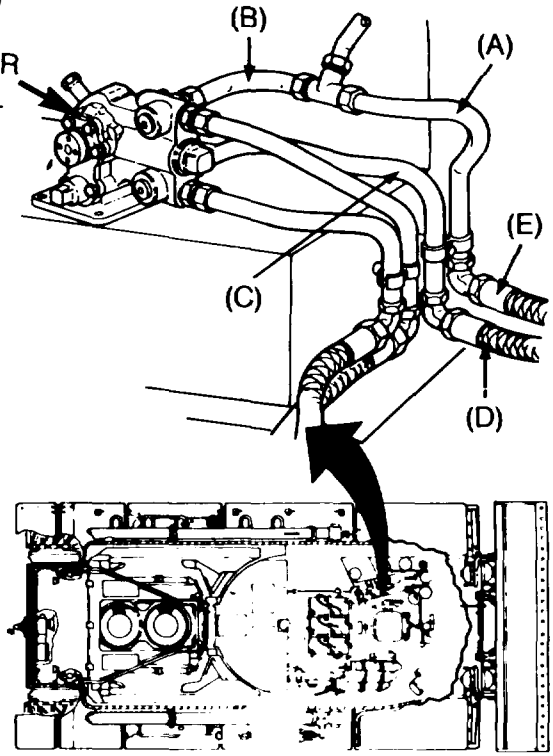
Second Technician (Turret)

- Stow boom.

First Technician (Driver's Station)

- Place HULL-TURRET selector valve in HULL.
- Place BULLDOZER CONTROL VALVE in LOWER.
- Visually check the following for leaks or damage:
  - Control valve tee to bulldozer right cylinder (A).
  - Control valve to tee (B).
  - Control valve to right cylinder hose (C).
  - Bulldozer cylinder hose, lower (D).
  - Bulldozer cylinder hose, upper (E).

Are any tube or hose assemblies leaking or damaged?



FOR CLARITY TURRET NOT SHOWN

NO

YES

4

- **Tighten leaking connections.**
- **If connections are still leaking or any parts are damaged, replace the following as necessary:**
  - **Control valve tee (A) to bulldozer right cylinder. (page 18-45).**
  - **Control valve to tee (B) (page 18-45).**
  - **Control valve hose to right cylinder (C) (page 18-45).**
  - **Bulldozer cylinder hose, lower (D) (page 18-34).**
  - **Bulldozer cylinder hose, upper (E) (page 18-34).**

TA142679

Symptom 87

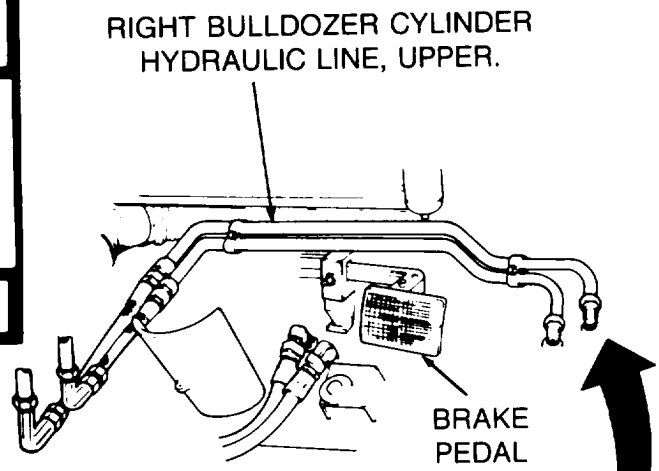
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

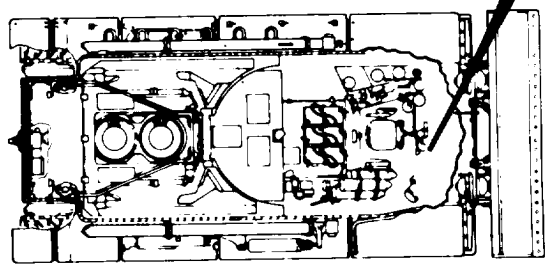
5 **Check for oil leaking at right bulldozer cylinder hydraulic line, upper.**

First Technician (Driver's Station)

- Visually check if right bulldozer cylinder hydraulic line, upper is leaking.

Is oil leaking from line?





FOR CLARITY
TURRET NOT SHOWN

NO

YES

6 **Tighten leaking fittings. If this does not stop leak, replace bulldozer cylinder hydraulic line, upper (page 18-34).**

TA142680

Symptom 87

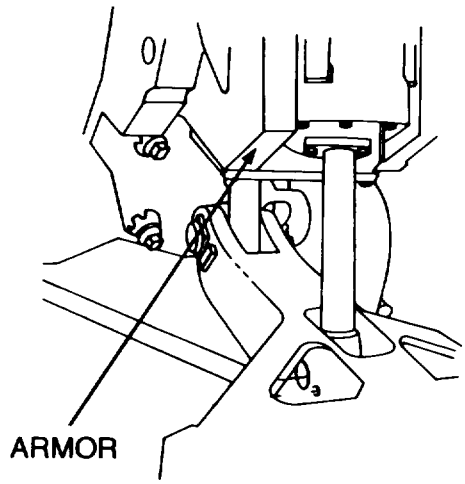
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

7 Check for oil leaking from under left and right bulldozer cylinder armor.

Second Technician (Bulldozer)

- Visually check if oil is leaking from under right or left bulldozer cylinder armor.

Is oil leaking from under armor?



BULLDOZER CYLINDER

NO

YES

8

- **Check for location of oil leaking under armor.**
- **See Step (12)**

TA142681

Symptom 87

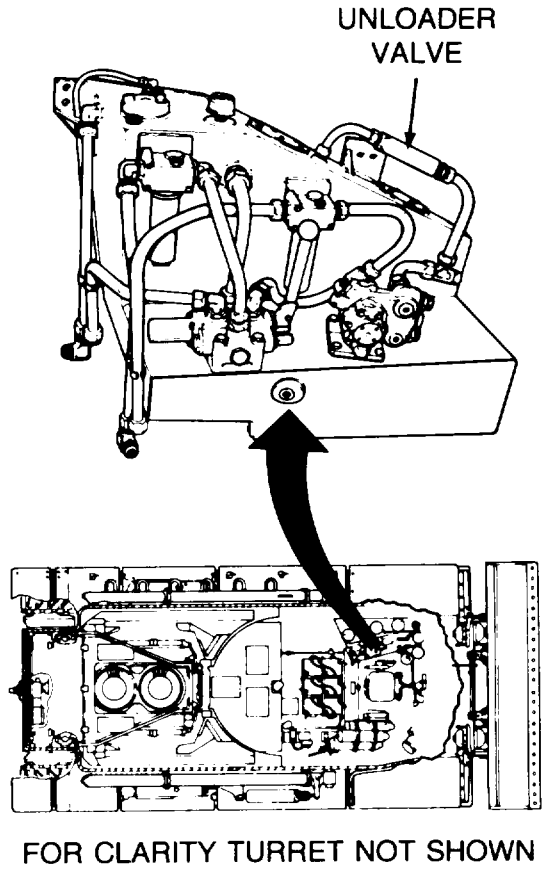
DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

9 **Checking for leaking unloader valve.**

First Technician (Driver's Station)

- Stop engine.
- Set HYDRAULIC PUMP switch OFF.
- Place HULL-TURRET valve in NEUT.
- Remove discharge line from unloader valve.
- Start engine.
- Place HULL-TURRET selector valve in HULL.
- Place BULLDOZER CONTROL valve in LOWER.
- Check if oil flows from unloader valve.

Did oil flow from unloader valve?



FOR CLARITY TURRET NOT SHOWN

NO → **10** **Replace bulldozer control valve (page 18-26).**

YES → **11** **Replace unloader valve (page 18-26).**

TA142682

Symptom 87 DETAILED TROUBLESHOOTING PROCEDURE
SUPPORT SYSTEM - HYDRAULIC
(Continued)

FROM STEP 8

12 Check for location of oil leak under armor.

First Technician (Driver's Station)

- Stop engine.

Both Technicians (Bulldozer)

- Remove armor from leaking bulldozer cylinders.

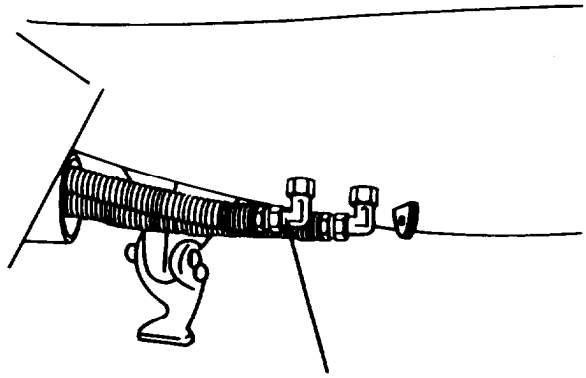
First Technician (Driver's Station)

- Start engine.
- Set HYDRAULIC PUMP switch ON.
- Place HULL TURRET selector in HULL.
- Place BULLDOZER CONTROL VALVE in LOWER.

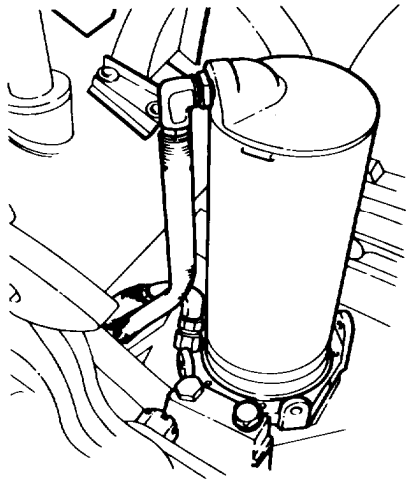
Second Technician (Bulldozer)

- Visually check if hose or fittings between top of cylinder and hull are leaking.

Are fittings or hose leaking?



CYLINDER FITTING
FRONT OF VEHICLE



BULLDOZER CYLINDER
ARMOR REMOVED

NO → **14 Replace leaking bulldozer cylinder (page 18-26).**

YES → **13**
- **Tighten leaking connections.**
- **If connections are still leaking or any parts are damaged, replace as necessary.**

TA142683

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

To be distributed in accordance with DA Form 12-37, Organizational Maintenance requirements for Combat Engineer, Full Track, M728.

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Date you fill out this form.

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TM9-2350-222-20-1-2	20 Feb 81	Combat Engineering Vehicle M728

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
3		2	
.09		51	
2-8			2-1
12	1-6a		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Item 10. Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.

Item 3. The NSN and P/N are not listed on the AMDF nor the MCRL. Request correct NSN and P/N be furnished.

Preventive Maintenance Checks and Services. Item 7 under "Items to be inspected" should be changed to read as follows: Firing linkage and firing mechanism pawl.

Since there are both 20- and 30- round magazines for this rifle, data on both should be listed.

SAMPLE

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER
M.J. Doe, s/sgt, 731-5316

SIGN HERE
M.J. Doe

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PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO

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DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

REVERSE OF DA FORM 2028-2

TEAR ALONG PERFORATED LINE

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

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 = 1,000,000 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

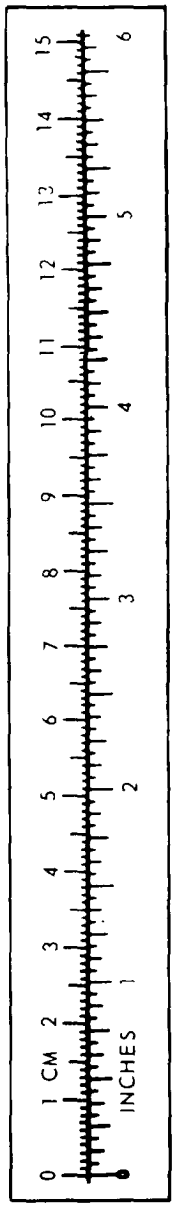
TEMPERATURE

$\frac{5}{9}(°F - 32) = °C$
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
$\frac{9}{5}\,°C + 32 = °F$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



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