TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT

MAINTENANCE MANUAL

RECOVERY VEHICLE, FULL TRACKED: MEDIUM, M88A1

NSN 2350-00-122-6826

This copy is a reprint which includes current pages from Changes 1 through 6.

HEADQUARTERS, DEPARTMENT OF THE ARMY

28 JANUARY 1977

C 8

CHANGE

NO. 8

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 18 August 1998

Direct Support and General Support
Maintenance Manual
For
RECOVERY VEHICLE,
FULL-TRACKED:
MEDIUM, M88A1
(NSN 2350-00-122-6826)

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2-1 and 2-2	2-1 and 2-2
2-7 thru 2-12	2-7 thru 2-12
2-23 and 2-24	2-23 and 2-24
2-47 and 2-48	2-47 and 2-48
2-65 and 2-66	2-65 and 2-66
2-73 and 2-74	2-73 and 2-74
2-77 and 2-78	2-77 and 2-78
4-13 and 4-14	4-13 and 4-14
4-19 thru 4-28	4-19 thru 4-28
A-1 (A-2 blank)	A-1 (A-2 blank)
None	B-l thru B-9 (B-10 blank)
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Direct Support and General Support
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For
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2-7 thru 2-12	2-7 thru 2-12
2-15 thru 2-18	2-15 thru 2-18
2-23 and 2-24	2-23 and 2-24
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3-49 thru 3-52	3-49 and 3-50
4-7 thru 4-14	4-7 thru 4-14
4-17 thru 4-28	4-17 thru 4-22
A-1 and A-2	A-1 and A-2
Index-1 thru Index-8	Index-i thru Index-9

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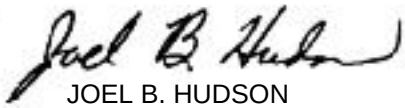

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iii thru vi	iii thru vi
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1-13 thru 1-16	1-13 thru 1-16
2-27 and 2-28	2-27 and 2-28
2-45 thru 2-48	2-45 thru 2-48
3-17 and 3-18	3-17 and 3-18
3-18.1 thru 3-18.32	None
3-18.33 and 3-18.34	3-18.33 and 3-18.34
3-19 and 3-20	None
3-21 and 3-22	3-21 and 3-22
Index 1 thru index 7 (Index 8 blank)	Index 1 thru Index 7 (Index 8 blank)

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Direct Support and General Support Maintenance Manual

For

RECOVERY VEHICLE, FULL TRACKED: MEDIUM, M88A1

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2-7 through 2-10	2-7 through 2-10
2-17 and 2-18	2-17 and 2-18
2-29 through 2-36	2-29 through 2-36
2-61 and 2-62	2-61 and 2-62
3-3 and 3-4	3-3 and 3-4
3-17 and 3-18	3-17 and 3-18
3-18.1 and 3-18.2	3-18.1 and 3-18.2
3-19 through 3-22	3-19 through 3-22
3-25 and 3-26	3-25 and 3-26
3-27 through 3-32	None
3-43 and 3-44	3-43 and 3-44
Index 1 through Index 10	Index 1 through Index 10

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2-17 through 2-22	2-17 through 2-22
2-25 and 2-28	2-25 and 2-28
2-35 and 2-36	2-35 and 2-36
2-47 and 2-48	2-47 and 2-48
2-55 and 2-56	2-55 and 2-56
2-61 through 2-64	2-61 through 2-64
2-71 through 2-74	2-71 through 2-74
3-17 and 3-18	3-17 and 3-18
3-18,1 through 3-18.4	3-18.1 through 3-18.4
3-18.33 and 3-18.34	3-18.33 and 3-18.34
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4-19 and 4-20	4-19 and 4-20
Index 1 through Index 6	Index 1 through Index 6
None	Index 7 through Index 10
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Direct Support and General Support

Maintenance Manual

For

RECOVERY VEHICLE, FULL TRACKED:

MEDIUM, M88A1

(NSN 2350-00-00-122-6826)

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1- I through 1-16	1-1 through 1-16
2-3 through 2-14	2-3 throug 2-14
None	2-14.1 though 2-14.3
2-17 through 2-20	2-17 through 2-20
2-23 through 2-28	2-23 through 2-28
2-43 through 2-52	2-43 through 2-52
2-55 through 2-60	2-55 through 2-60
2-63 through 2-70	2-63 through 2-70
2-73 and 2-74	2-73 and 2-74
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None	3-18.1 through 3-18.34
3-25 through 3-32	3-25 through 3-32
3-35 and 3-36	3-35 and 3-36
3-43 and 3-44	3- 43 and 3-44
4-1 and 4-2	4-1 and 4-2
4-5 through 4-20	4-5 through 4-20
None	4-20.1 through 4-20.3
Index 1 through Index 7	Index 1 through Index 6

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Direct Support and General Support Maintenance Manual

RECOVERY VEHICLE FULL TRACKED: MEDIUM, M66A1 (NSN 2350-00-122-6826)

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v	v
4-27	4-27 and 428
Index 5 and Index 6	Index 5 and Index 6

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WARNING

CARBON MONOXIDE POISONING CAN BE DEADLY

CARBON MONOXIDE ISA COLORLESS, ODORLESS, DEADLY FOISONOUS 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, COMA. PERMANENT BRAIN DAMAGE OR DEATH CAN RESULT FROM SEVERE EXPOSURE.

IT OCCURS IN THE EXHAUST FUMES OF FUEL-BURNING HEATERS AND INTERNAL-COMBUSTION ENGINES AND BECOMES DANGEROUSLY CONCENTRATED UNDER CONDITIONS OF INADEQUATE VENTILATION. THE FOLLOWING PRECAUTIONS MUST BE OBSERVED TO INSURE THE SAFETY OF PERSONNEL WHENEVER THE PERSONNEL HEATER, MAIN, OR AUXILIARY ENGINE OF ANY VEHICLE IS OPERATED FOR MAINTENANCE PURPOSES OR TACTICAL USE.

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

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

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

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

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS ADEQUATE VENTILATION.

WARNING

HIGH VOLTAGE

is used in the operation of some equipment.

SERIOUS INJURY

may result if personnel fail to observe safety precautions. Learn the areas containing high voltage in each piece of equipment. Be careful not to contact high voltage connections when installing or operating this equipment. Before working on electrical equipment, harnesses, battery cables or starter cables turn master switch to OFF position and disconnect battery ground cables.

OBSERVE THE WARNING NOTES THROUGHOUT THIS MANUAL.

WARNING

DO NOT STAND ON ENGINE DECK WHILE OPERATING THE BOOM.

WARNING

PERSONNEL MUST STAY CLEAR OF ENGINE AND APU EXHAUST AREAS DURING AND IMMEDIATELY AFTER ENGINE OPERATIONS. CONTACT WITH THESE AREAS CAN CAUSE SEVERE BURNS. SMOKE GENERATOR TOXIC FUMES SHOULD NOT BE INHALED. CLEAR THE AREA OF ALL PERSONNEL AND KEEP THE VEHICLE DOWN-WIND OF INSTALLATION DURING TEST.

Direct Support and General Support
Maintenance Manual
For
RECOVERY VEHICLE
FULL TRACKED:
MEDIUM, M88A1
(NSN 2350-00-122-6826)

TECHNICAL MANUAL
NO. 9-2350-256-34-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 JANUARY 1977

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You can help improve this manual. If you find any mistakes 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, US Army Tank-automotive and Armaments Command, ATTN: AMSTA-IM-MMAA, Warren, MI 48397-5000. A reply will be furnished to you. You may also provide DA Form 2028-2 information to TACOM via datafax or e-mail. TACOM's datafax number for AMSTA-IM-OPIT is (810) 5746323 and the e-mail address is: tacom-tech-pubs@cc.army mil

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List of Illustrations

CHAPTER 1

INTRODUCTION

Section 1. GENERAL

1-1. Scope

a. This manual contains instructions for direct and general support maintenance for the Recovery Vehicle, Full Tracked: Medium, M88A1 (fig. 1-1 and 1-2). It contains descriptions of and procedures for removal, disassembly, inspection, repair, assembly and test which are normally beyond the scope of repair at the using organizational level.

Figure 1-1. Recovery vehicle, full tracked: medium, M88A-left front view.

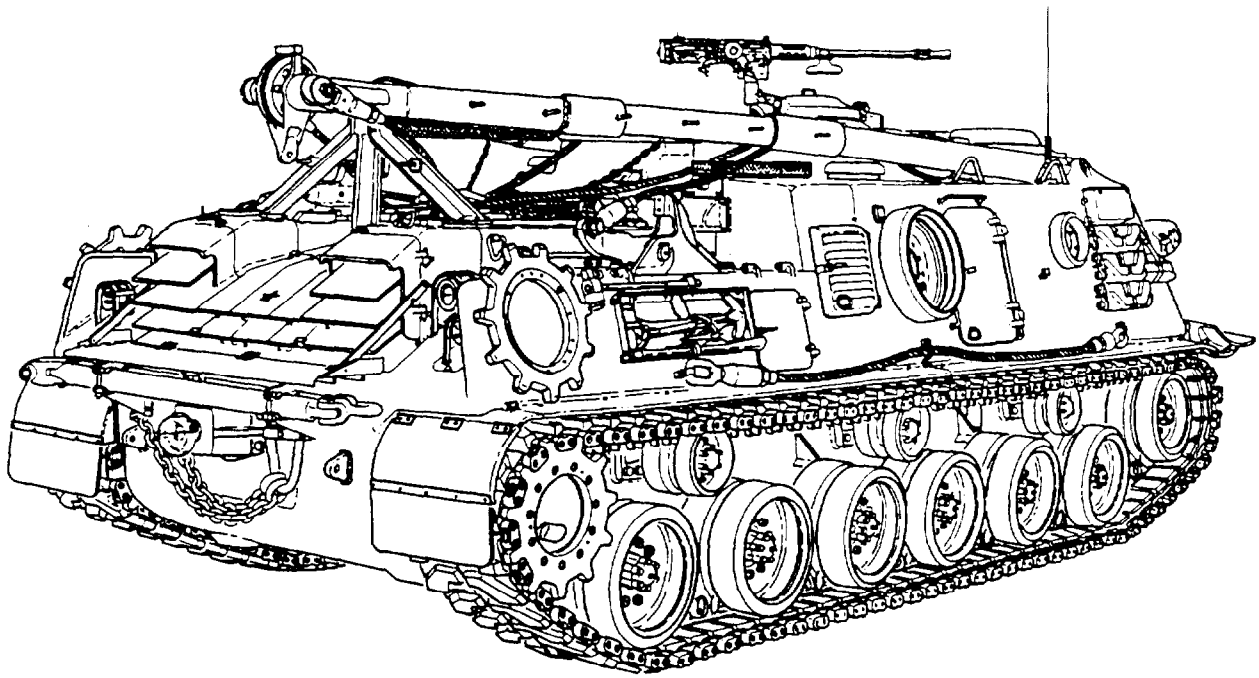


Figure 1-2. Recovery vehicle. full tracked: medium. M88A1-right rear view.

b. Other publications pertinent to the operation, maintenance and repair of the Recovery Vehicle, Full Tracked: Medium, M88A1, are listed in appendix A.

c. The prescribed maintenance responsibilities will apply as reflected in the Maintenance Allocation Chart (TM 9-2350-256-20).

1-2. Forms, Records and Reports

a. General. Responsibility for the proper execution of forms, records and reports rests upon the commanding officer of all units maintaining this equipment. However, the value of accurate records must be fully appreciated by all persons responsible for their compilation, maintenance and use. Records, reports and authorized forms are normally utilized to indicate the type, quantity and condition of materiel to be inspected, to be repaired or to be used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of materiel in the hands of troops and for delivery of materiel requiring further repair to shops in arsenals, depots, etc. The forms, records and reports establish the work required, the progress of the work within the shops and the status of the materiel upon completion of repair.

b. Au thorized Forms. No forms other than those approved for the Department of the Army will be used. For a complete listing of all forms refer to DA Pam 310-2 and TM 38-750.

c. Field Report of Accidents. The reports necessary to comply with the Army safety program are listed in AR 385–40. These reports are required whenever accidents involving injury to personnel *or* damage to materiel occur.

d. Report of Unsatisfactory Equipment and Materiels. Any suggestions pertinent to the improvement, safety or correction of unsatisfactory performance of equipment and materials are to be reported on DA Form 2407 in accordance with instructions contained in TM 38-750.

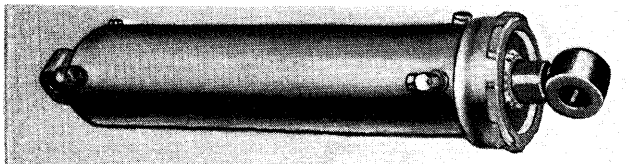
NOTE

Do not report all failures that occur. Report only repeated or recurrent failures or malfunctions which indicate unsatisfactory design or material. However, reports will always be made in the event that exceptionally costly equipment is involved.

Section II DESCRIPTION AND DATA

1-3. Description

a. General. The Recovery Vehicle, Full Tracked: Medium, M88A1 is a medium armored, full track laying, low silhouette vehicle that performs hoisting, winching and towing operations for tanks and other vehicles. The vehicle also supports medium and light tank units to effect battlefield recovery. Further detailed descriptions of the individual assemblies and components covered for replacement and/or repair in this manual will be found in pertinent chapters. General operating and maintenance descriptions are found in TM 9-2350-256-10, Operator's Manual, and TM 9-2350-256-20, Organizational Maintenance Manual. The general location of major components, assemblies and auxiliaries is shown in figure 1-3.



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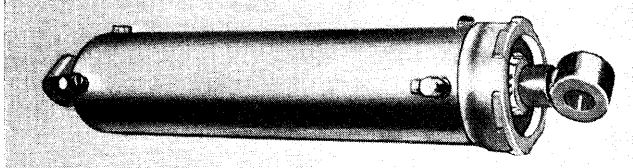
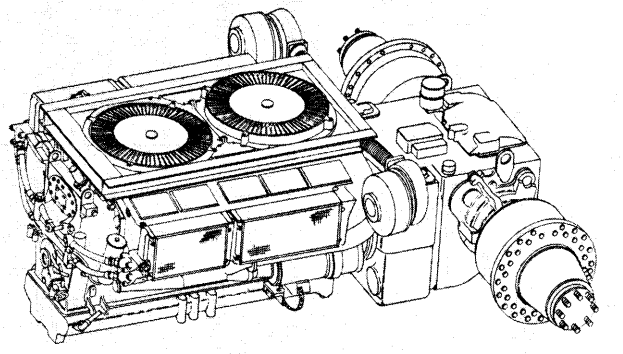
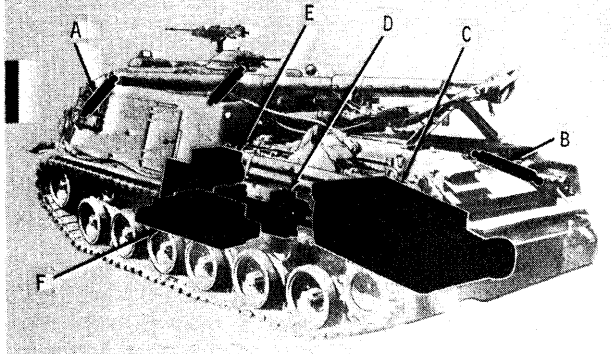
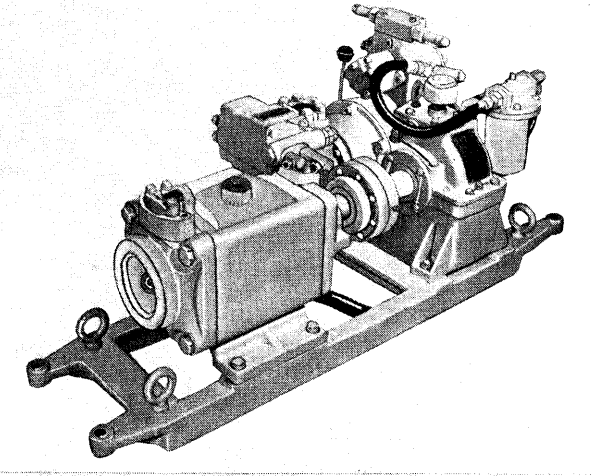


B. BOOM STAYLINE ACTUATING CYLINDERS.

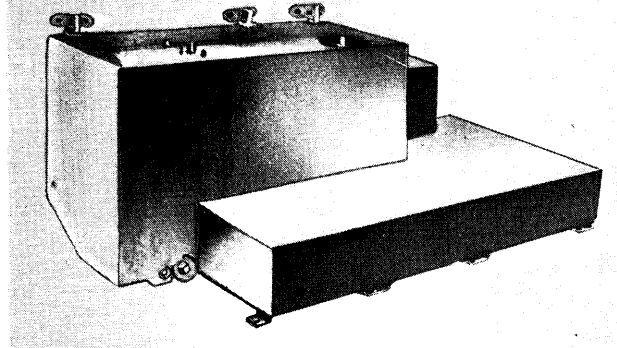


C. POWERPLANT.

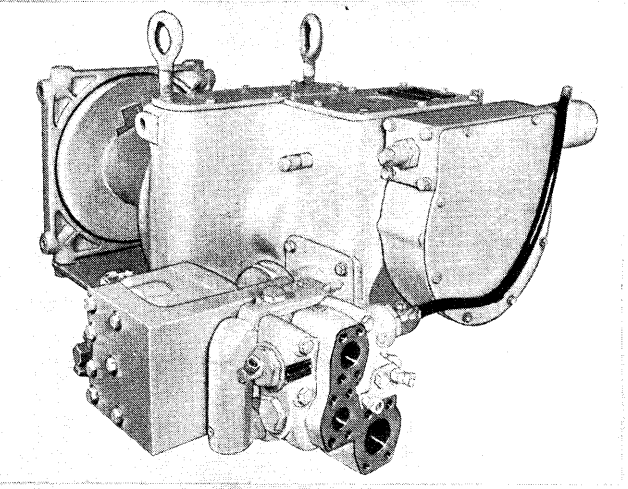




D. MECHANICAL TRANSMISSION AND MAIN HYDRAULIC PUMP.



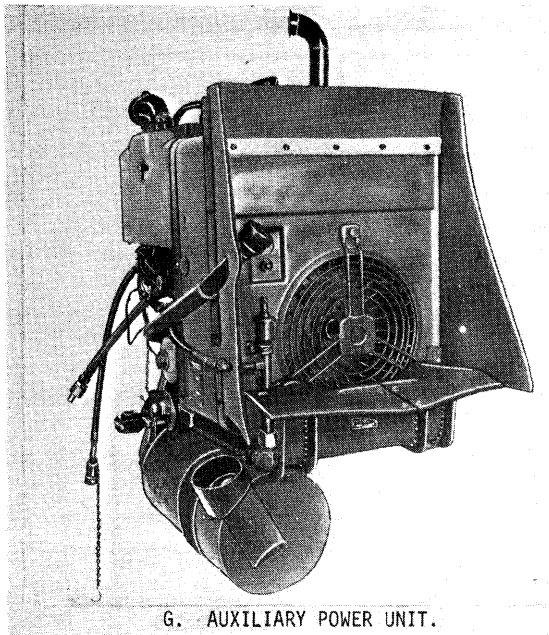
F. FORWARD FUEL TANK.



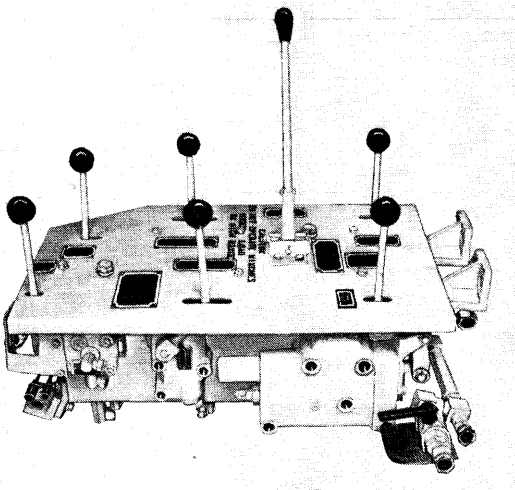
E. HOIST WINCH.

TA039243

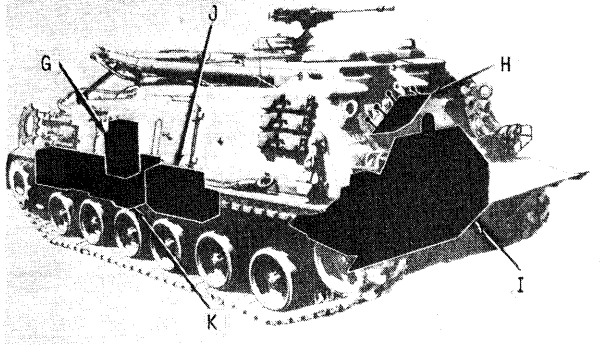
Figure 1-3. Location of major components, assemblies and auxiliaries (Sheet 1 of 7).

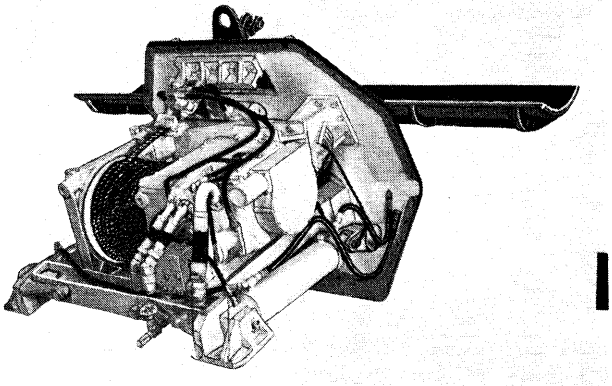


G. AUXILIARY POWER UNIT.

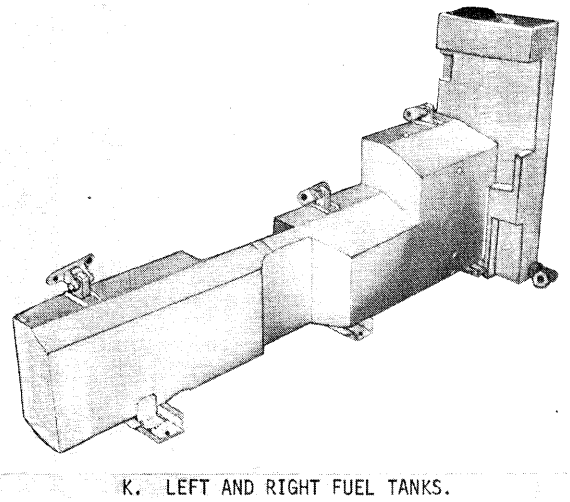


H. HYDRAULIC CONTROL PANEL (SUBPLATE).

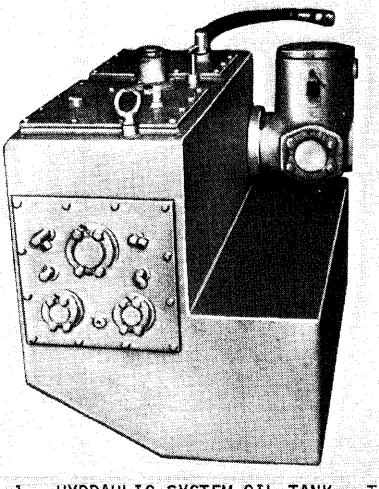




I. MAIN WINCH AND SPADE.

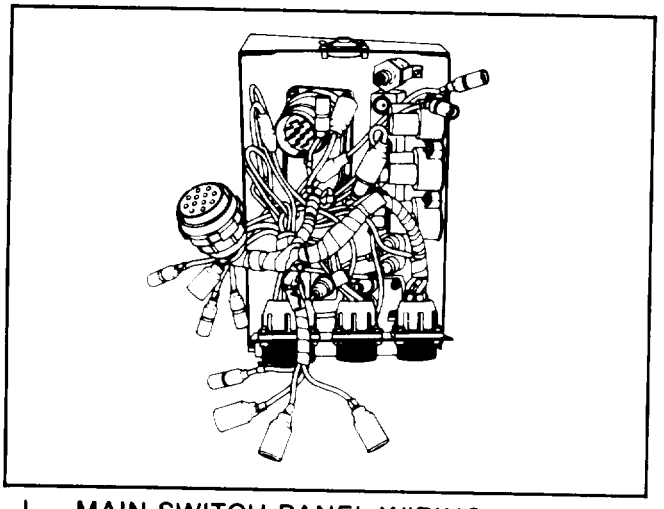


K. LEFT AND RIGHT FUEL TANKS.

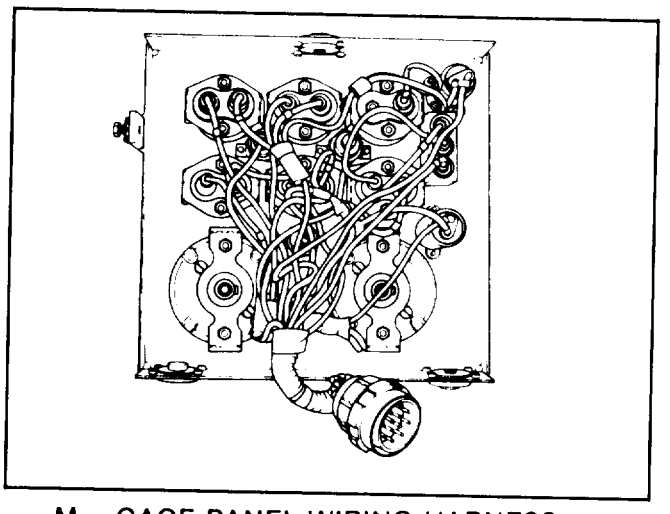


J. HYDRAULIC SYSTEM OIL TANK. TA039244

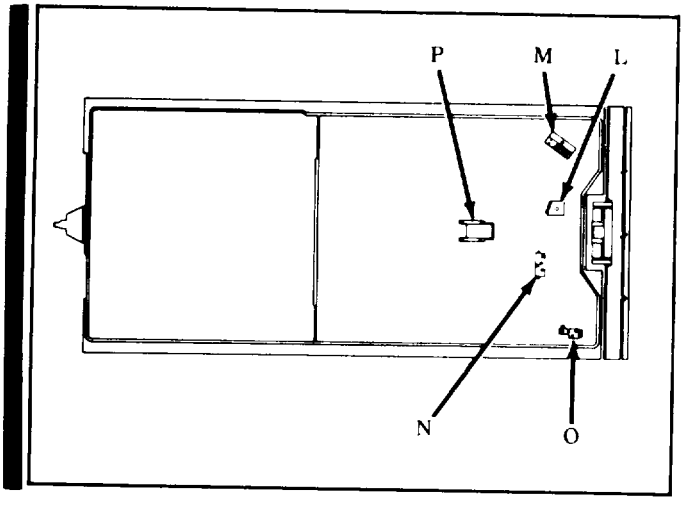
Figure 1-3. Location of major components, assemblies and auxiliaries (Sheet 2 of 7).

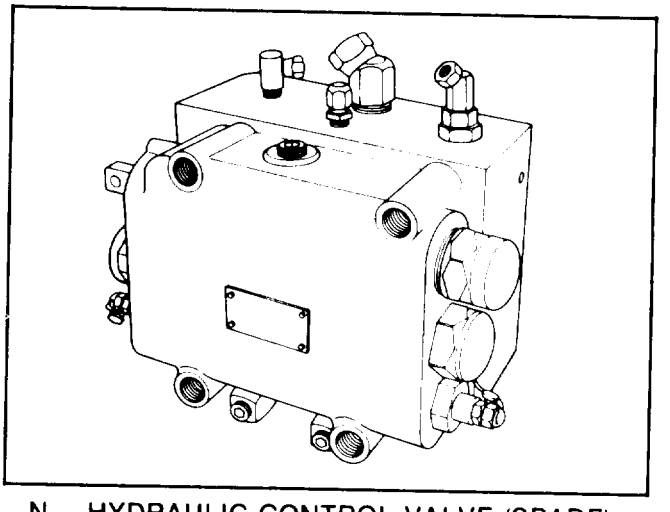


L. MAIN SWITCH PANEL WIRING HARNESS.

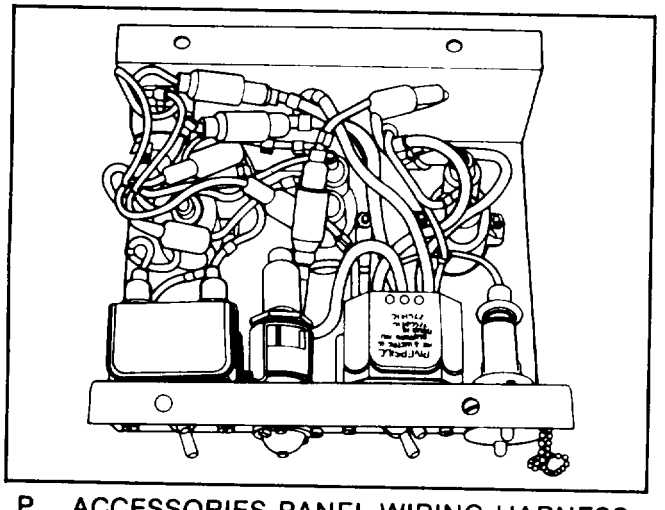


M. GAGE PANEL WIRING HARNESS.

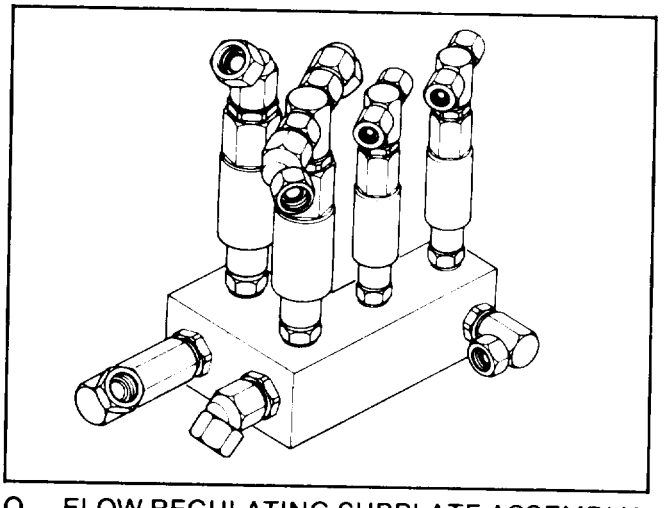




N. HYDRAULIC CONTROL VALVE (SPADE).



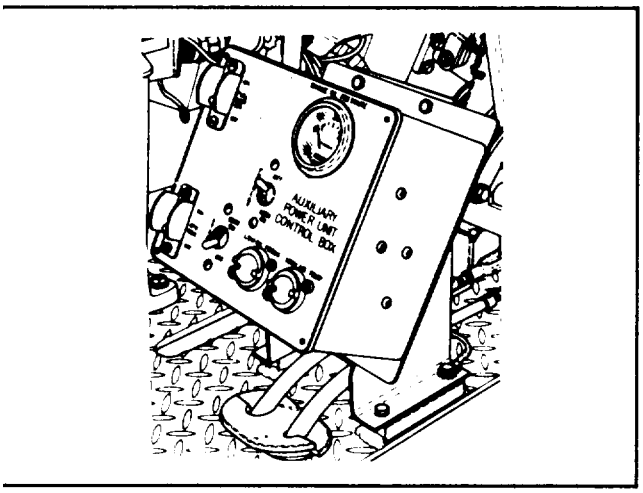
P. ACCESSORIES PANEL WIRING HARNESS.



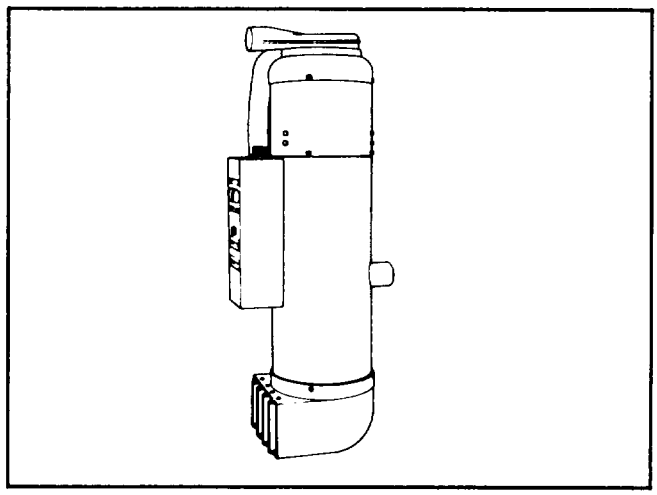
O. FLOW REGULATING SUBPLATE ASSEMBLY.

Figure 1-3. Location of major components, assemblies and auxilianes (Sheet 3 of 7).

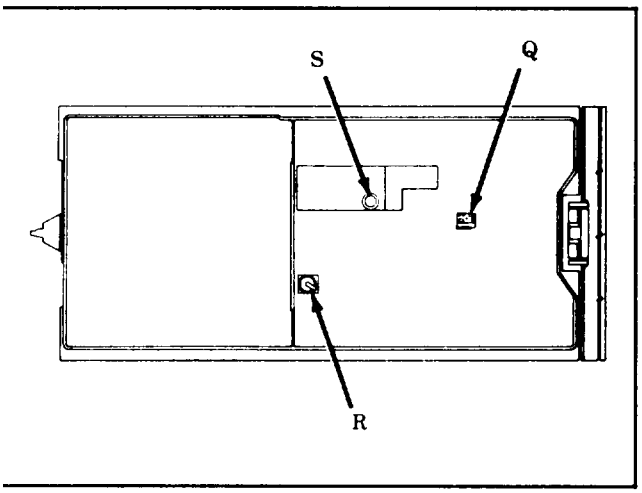
TA171778

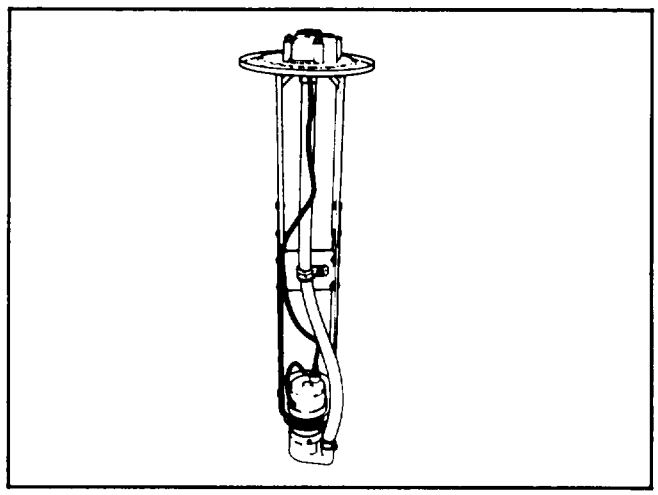


Q. AUXILIARY POWER UNIT CONTROL BOX.



R. PERSONNEL HEATER.



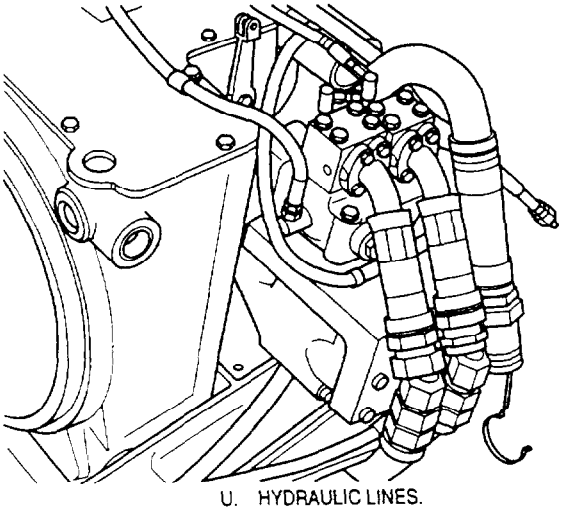


S. FUEL PUMP.

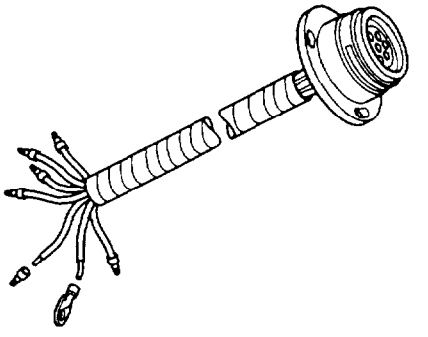
T. DELETED

Figure 1-3. Location of major components, assemblies and auxiliaries *(Sheet* 4 ***of*** 7).

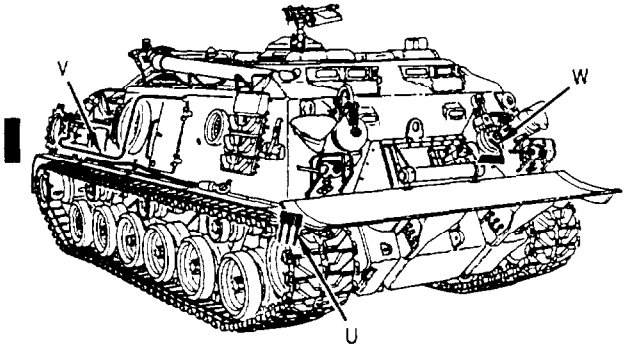
TA171779

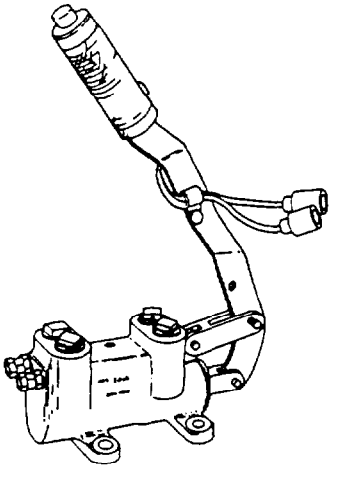


U. HYDRAULIC LINES.



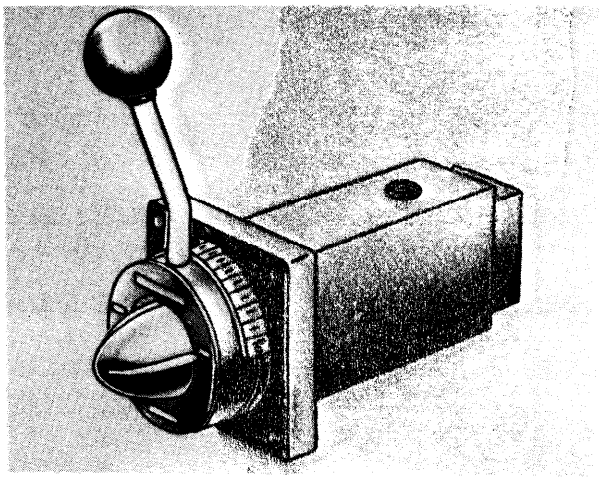
V. HULL WIRING HARNESS.





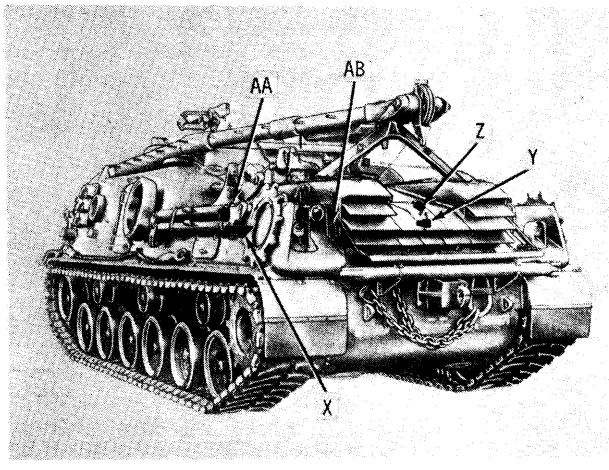
W. PRIMER PUMP.

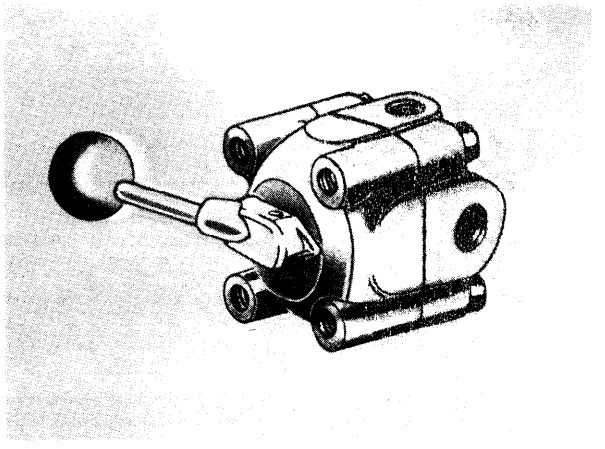
Figure 1-3. Location of major components, assemblies, and auxiliaries (Sheet 5 of 7).



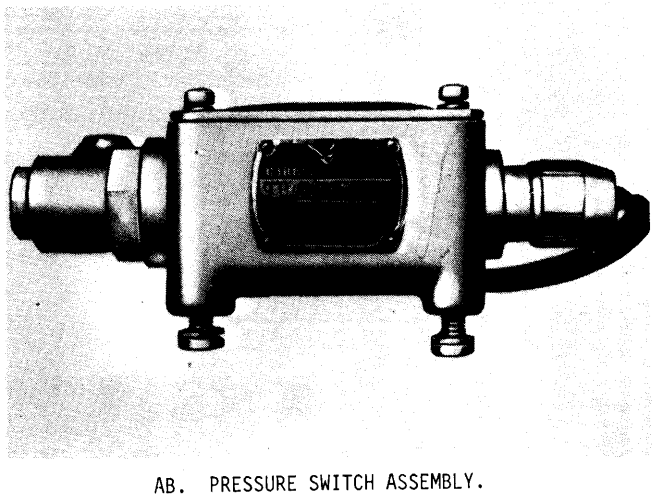
X. DELETED

Y. ADJUSTABLE FLOW HYDRAULIC REGULATOR.

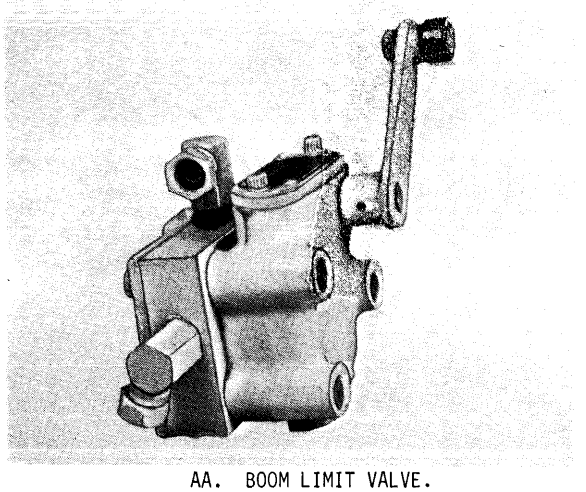




Z. FUEL PUMP MOTOR CONTROL VALVE.



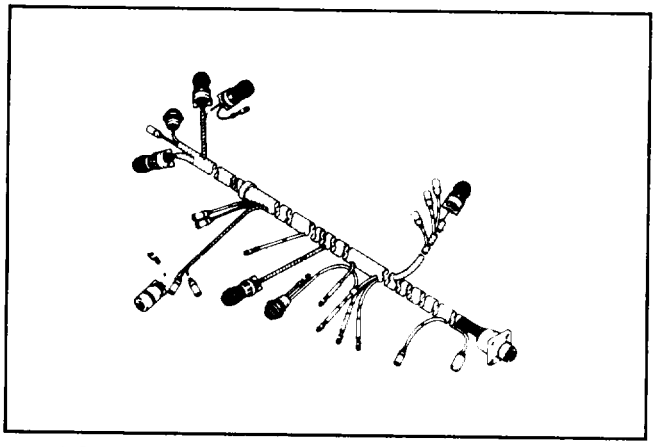
AB. PRESSURE SWITCH ASSEMBLY.



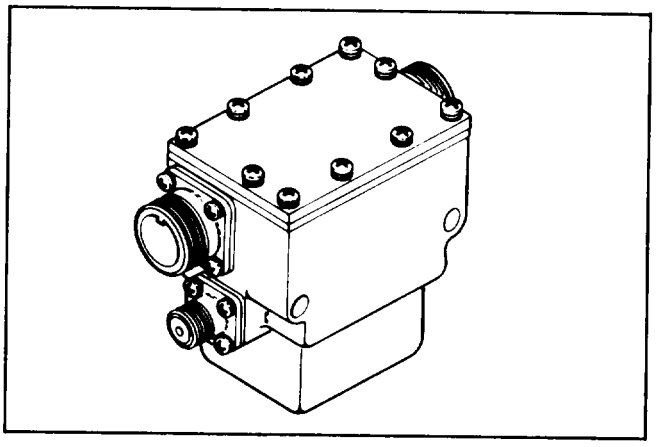
AA. BOOM LIMIT VALVE.

TA171395

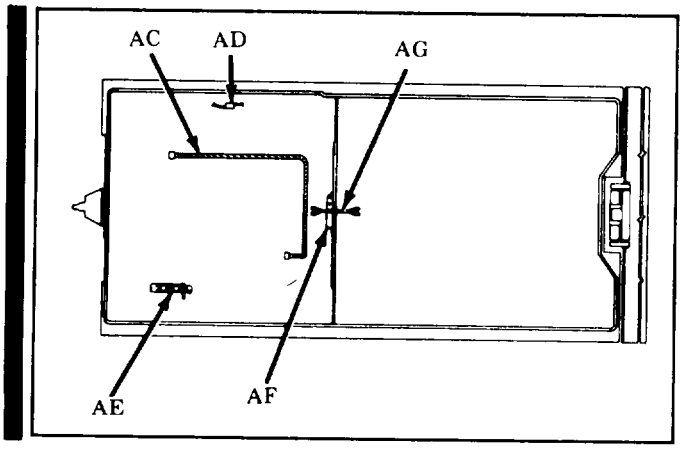
Figure 1-3. Location of major components, assemblies, and auxiliaries (Sheet 6 of 7).

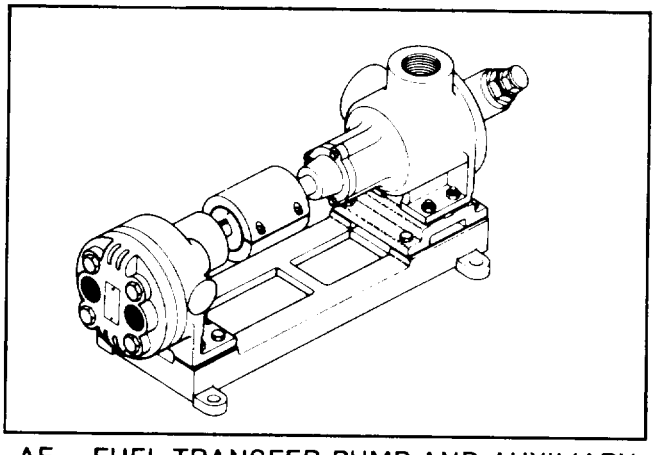


AC. POWERPLANT WIRING HARNESS.

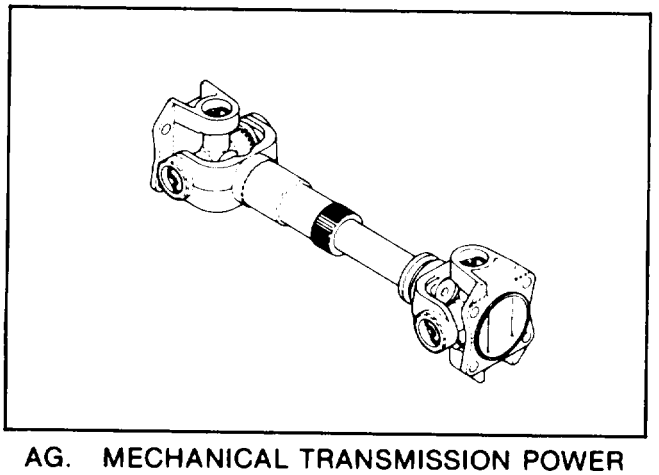


AD. MASTER RELAY.

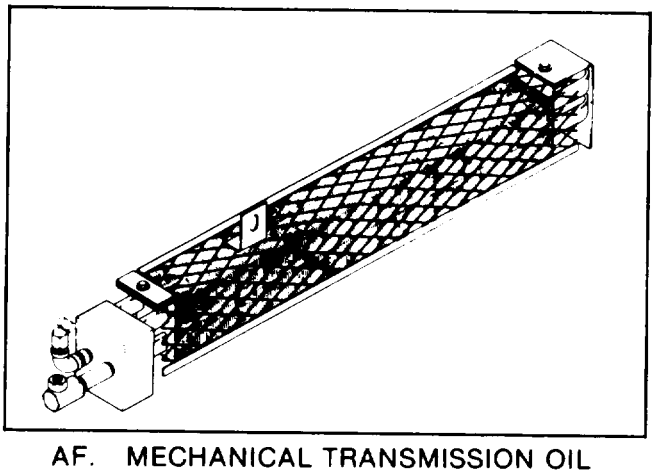




AE. FUEL TRANSFER PUMP AND AUXILIARY HYDRAULIC MOTOR.



AG. MECHANICAL TRANSMISSION POWER TAKEOFF SHAFT.



AF. MECHANICAL TRANSMISSION OIL COOLER.

Figure 1-3. Location of major components, assemblies and auxiliaries (Sheet 7 of 7).

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b. Powerplant The powerplant is composed of the Continental Model AVDS-1790-2DR air-cooled, 12-cylinder, diesel engine and the Allison (GM) Model XT-1410-4 cross-drive transmission. The powerplant is removed and installed as a unit. Separation of engine from transmission center section is performed after the powerplant has been removed from the vehicle. The powerplant supplies electrical power through a generator and motive power through the output reduction units.

c. Fuel System. The fuel system includes liquid fuel (diesel) storage and delivery system. Fuel storage consists of three separate fuel tanks. Fuel is fed to the engine by an electric pump through a system of hoses and valves. Fuel is strained at the tank filler openings as the tanks are filled, and filtered through separate and renewable filter elements as it is fed to the engine. Combustion air is cleaned by two air cleaners and driven into the engine intake manifolds by two turbosuperchargers.

d. Fuel Tanks. All tanks are of a welded steel construction. The left rear tank contains the filler cap and filter assembly. Fuel level sending units are contained within the right rear and forward tanks. An electric fuel pump is located in the forward fuel tank sump cavity, allowing complete drainage of the tank before tank removal. All tanks are interconnected and shock mounted. Grounding straps are provided to assure discharge of any static electricity which might accumulate.

e. Fuel Pump. The electric fuel pump located in the forward fuel tank sump cavity is a centrifugal pusher-type pump designed for submerged operation. It is hermetically sealed and contains a 24-volt dc motor to operate the pump. A strainer is provided as an integral part of the pump assembly for efficient fuel filtering. The fuel pump is shock mounted in a support assembly which suspends the pump in the fuel tank and also provides a housing for fuel and electrical connections.

f. Purge Pump. The purge pump (fig. 3-8) handle is located on the floor to the left of the driver's position. The purge pump is used to pump air from the fuel lines and to facilitate engine starting in cold weather.

g. Vehicle Electrical Systems.

(1) *Main Engine Generator System.* During periods of main engine operation, the vehicle electrical system derives its power from a 300-ampere, 28-volt dc generator and is driven by the main engine. This generator also serves to charge the vehicle batteries during periods of main engine operation.

The vehicle battery system consists of six 12-volt, 100-ampere-hour batteries connected in series-parallel to supply 24 volts dc to the electrical system when the generator is not running. A solid state voltage regulator serves to maintain a constant generator output voltage of 28 +0.7 volts dc when the generator is powering the electrical system and charging the vehicle batteries. Control of the electrical system is maintained by the driver through a series of instruments and switches mounted on control panels in the driver's area. A system of electrical harnesses interconnects the various components of the vehicle electrical system. Waterproof connections are provided for harnesses and components.

(2) *Auxiliary Generating System.* The auxiliary generating system consists of a dc voltage generator (fig. 4-1) driven by a diesel engine. A solid-state voltage regulator serves to maintain a constant generator output voltage of 28 ± 0.7 volts dc when the generator is powering the system and charging the batteries. This voltage regulator has an internal current limiting circuit which the APU generator interpole (APU regulator plug pin E) voltage to 0.48 + 0.03 vdc. This corresponds to a nominally regulated generator output of 160 amps dc, with a maximum generator output of 180 amps dc.

(3) *New Dual Voltage Regulator System.* The main and auxiliary engine can be operated together or individually as desired to recharge the vehicle batteries.

(a) With the new dual voltage regulator system, during periods of cold weather starting, the auxiliary engine can now be started and left running to aid the vehicle battery charge condition, while attempting to start the main engine.

(b) Deleted.

(c) Deleted.

(d) Deleted.

(e) Deleted. ■

(4) Deleted

(5) Deleted ■

(6) Deleted

(7) *Harnesses.* The cables and wires carrying the electrical circuits, serving the various components of the electrical system, are assembled into harnesses. These carry the interconnecting splices in protective covering and incorporate various types of terminals. These terminals make positive and secure electrical connections at the various points served by the harness and provide for easy connection and disconnection without splicing or soldering.

h. Transmission and output Reduction Units.. The Allision Model XT-1410-4 cross-drive transmission is a combined transmission and steering unit. It consists of a basic transmission unit package to which has been added the torque-converter package (front), steering-clutch packages (both sides). The output-together with the sprocket hubs, make out the output reduction units. The outer flange of each output-reduction-gear output shaft assembly carries 10 studs for attaching the sprocket hub. The transmission provides a fluid torque converter connection between engine and final drive ant three selective gear ration forward and one ratio in reverse. Repair information is contained in TM 9-2520-215-34, Direct and General Support Maintenance for Transmission, Cross-Drive Assembly (Allison Model XT-1410-4).

i. Tracks and Suspension. The track laying system includes 12 dual road wheels (six on each side) that ride on the two 84-link tracks. Two double sprocket hubs power the tracks. Two compensation idler dual wheels and six track support dual rollers (three on each side) make up the balance of the track laying portion of the track and suspension system. The road wheels are mounted on suspension arms which bear the weight of the vehicle. Torsion bars, anchored to the hull at one end and to each suspension arm at the other, provide spring action for the suspension arms. An adjustable link, between each Compensating idler wheel arm and front road wheel arm, provides for adjustment of track tension. Shock absorbers at the first, second and sixth road wheels limit the rate of suspension arm movement at those points. Double volute bumper springs at the first and sixth road wheel arms provide cushioning during maximum road wheel arm travel. Refer to TM 92350-256-10, Operator's Manual, and TM 9-2350-256-20, Organizational Maintenance Manual, for replacement and repair instructions

j Hull and Cab. The hull and cab are constructed of cast armor and armor plate welded into a single unit. Armor is distributed to protect the crew and equipment against small-arms fire, medium artillery shell fragments and 20-pound antitank mines. Hull bottom armor is equivalent to that of current medium tanks. The hull is equipped with an armored, turret-type cupola that provides a mount for the caliber 0.50 machinegun. Additional armament stowed in the cab consists of two M16 or M14 rifles, two submachineguns and 10 LAW rockets. Four formfitting, padded, adjustable seats are provided for the four-person crew. Two removable pedestal stools accommodate two passengers. The two-shot fixed fire extinguisher system may be operated from inside or outside the vehicle. Two portable fire extinguishers are mounted in the crew compartment. Stowage racks for tools and other equipment are located at various points inside the cab. Stowage facilities for track sections, cables, tow bars and various recovery tools and equipment are provided on the outside of the hull and cab. A crew access door is located on teach side of the cab. Two escape hatches in the front roof area of the cab are provided for the drive and mechanic. One escapee hatch at the rear roof area of the cab is provided for the rigger. The commander's escape hatch is located in the cupola. Six M17 periscopes provide forward and partial side indirect vision for the driver and mechanic during daylight and night driving. One M17 periscope provides indirect rearward vision for the rigger. Four direct vision blocks, tow at front ant two at rear of cab, provide vision for driver, mechanic and rigger. Six direct vision blocks in the cupola base afford 360-degree vision for the commander. An AN/WS-2(V)1A passive night viewer may be installed in the driver's hatch when blackout operations are required.

k. Winch, Power Takeoff, Hoist and Spade. A hydraulically operated broom, hoist winch, main winch and spade comprise the basic recovery equipment of the vehicle. they are powered by the main hydraulic pump which is operated by a mechanical transmission driven by a power takeoff from the

main engine. An auxiliary hydraulic pump supplieshydraulic power for emergency and/or sup plementaryuse in operation of the recovery equipment. Refer toRM 9-2350-256-10, Operator's Manual, TM9-2350-256-20, Organizational Maintenance Manual, and TM 9-2350-256-34-2, Direct and General SupportMaintenance Manual: Winch, Power Takeoff andHoist System, for additional description, operation, maintenance and repair information.

l. Deleted.

m. Miscellaneous Accessories. Items of equipment installed by the manufacturer, depot or creware listed in the Components and Support Item List(CASIL). See TM 9-2350-256-10, Operator's Manual, for list and instructions for use.

1-4. Tabulated Data

a. General

Armament ..... one caliber 0.50 Browning machinegun. M2, heavy barrel, flex; one machinegun mount A555ec38 or A88; two caliber 7.62 mm, M14 or 5.56 mm, M16, two caliber 0.45 sub-machineguns, M3A1 with equipment: 10 LAW rockets

Crew 4

Engine ..... diesel, V12, 4-cycle, air cooled model AVDS-1790-2DR

Transmission ..... combination transmission, differential, steer and brake system: model XT-1410-4: gears - 3 forward and 1 reverse

Weight:

Gross (vehicle fully loaded with crew, passengers and payload) . . . . . 112,000 lb

Net (vehicle with no crew or payload) . . . . . 105,000 lb

Cargo (crew and maximum payload) . . . . . 7,000 lb

b. Vehicle

Dimensions:

Length ..... 315-1/2 in,

Width ..... 135 in.

Height ..... 123 in.

Ground clearance ..... 17 in.

Ground pressure . . . . . 10.9 psi

Electrical system:

Battery power ..... 24 volt

Generator power . . . . . 28 ±0.7 vdc

Batteries ..... six 12 volt

Capacities (refill approximate):

Fuel tanks . . . . . 400 gal

Forward tank ..... 252 gal

Right rear tank ..... 74 gal

Left rear tank . . . . . 74 gal

Main engine crankcase (refill) . . . . . 16.5 gal

Transmission ..... 17 gal

Main winch ..... 11 gal

Hoist winch ..... 3 gal

Auxiliary power unit ..... 3-1/2 qt

Hydraulic system ..... 95 gal

Mechanical transmission ..... 1 gal

Tracks and Suspension:

Shoes on each track section 84

Track support rollers (pairs) 6

Road wheel and arm assemblies (pairs) 12

Suspension ..... Torsion-bar type

c. Performance:

Vehicle speed (max.) ..... 26 mph

Fuel consumption ..... 0.7 mpg

Cruising range ..... 300 miles

Allowable oil consumption, main engine (maximum) ..... 0.2 gal per hour

Fording depth (max. without kit) ..... 56 in.

Fording depth (max. with kit) ..... 102 in.

Grade ascending ability (max.) ..... 60 percent

Grade descending ability (max.) ..... 60 percent

Vertical obstacle vehicle will climb (forward direction only) ..... 42 in.

Maximum trench crossing width ..... 103 in.

Turning circle (right or left) ..... pivot

Boom capacity ..... 25 tons

Vehicle hoisting capacity:

Spade ..... 6 tons

Spade up (with lockout blocks -4 part line) . . . .20 tons

Spade down -4 part line . . . . . 25 tons

Boom lift height:

8 ft. reach ..... 19 ft

4 ft. reach ..... 25 ft

Hoist winch:

Cable size ..... 5/8 in. dia, 200 ft long

I.ine pull and speed - 4 part line:

Bare drum . . . . . 50,000 lb at 9 fpm

Full drum . . . . . 30,000 lb at 13 fpm

Main winch:

Cable size . . . . . 1-1/4 in. dia, 200 ft long

Line pull and speed:

Bare drum . . . . . 90,000 lb at 20 fpm

Full drum . . . . . 51.400 lb at 42 fpm

Draw bar pull ..... 90.000 lb

Hydraulic wrench . . . . . TM 9-5130-338-12&P

d. Periscope.

Periscope M 17 (7 included):

Magnification 1X

Periscope offset . . . . . short

Field of view . . . . . 50 degree vertical, 150 degree horizontal

e. Passive Night Viewer, AN/VVS-2(V)1A (1 included):

Field of view:

Width . . . . . 800 roils (45°)

Height . . . . . 680 roils (38°)

Depth of field 15 ft. to infinity

Focus . . . . . fixed

f. *Auxiliary Equipment*

Fire extinguisher:

E'ortable (2 included):

Type . . . . . carbon dioxide

Capacity:

Volume ..... 218 cu in.

Weight ..... 5 lb

Weight (fully chargedl ..... 15.5 lb

Fixed (2 banks):

Type . . . . . carbon dioxide

Capacity:

Volume ..... 505 cu in.

Weight ..... 10 lb

Weight (fully charged) ..... 45 lb

Communication equipment:

Radio set and interphone, consisting of AN/VRC-44, ANVWVRC-46, or ANVRC-64 with

TM 9-2350-256-34-1

suppressor MX-7778A and interphone AN/V RC-1(V)(4 controls)

Auxiliary Power Unit:

- Part number 11671436
- System battery voltage . . . . . 24 vdc
- System operating voltage . . . . . 28 vdc ± 0.7 with fully charged batteries (i.e. charging current less than 50 amps)
- Cooling air at 2000 rpm (in vehicle) . . . . . 416 cu ft./rein.
- Height . . . . . 35 in.
- Width . . . . . 18.75 in.
- Length . . . . . .29.75 in.
- Weight . . . . . 516.5 lb

Auxiliary Engine:

- Manufacturer . . . . . ONAN
- Model . . . . . DJBMA
- Part number 11671394
- Type . . . . . 2 cylinder, 4 cycle, diesel
- Cooling system . . . . . air cooled by direct drive centrifugal blower
- Bore . . . . . 3.250 in. diameter
- Stroke . . . . . 3.625 in.
- Compression ratio 19:1
- Horsepower (500 ft elevation at 115°F . . . . . 10.8 at 2000 rpm
- Fuel, diesel VV-F-8OO
- Oil capacity, including 1/2 qt. for filter . . . . . 3-1/2 qt
- Dry weight . . . . . 310 lb (approximate)

Auxiliary Generator:

- Manufacturer . . . . . Teledyne Continental Motors
- Part number MS51004-1
- Type . . . . . 28 vdc, 300 ampere, engine accessory
- Rated speed . . . . . 25006500 rpm
- Overspeed . . . . . .8000 rpm
- Cooling system . . . . . direct driven blower
- Weight . . . . . .94 lb

Auxiliary Hydraulic Pump:

- Manufacturer . . . . . Warner-Motive Div. of Borg W'arner Corp.
- Model . . . . . P2-5AH2-1-L.
- Part number 11671411
- Type . . . . . fixed displacement (0.58 cu in./rev)
- Rated pressure . . . . . 2000 psi
- Inlet oil temperature . . . . . 145°F/155°F
- Inlet pressure . . . . . 5 in. Hg vacuum
- Delivery at 2000 engine rpm (3000 pump rpm) . . . . . 6.9 gpm min.
- Weight . . . . . 4.33 lb

CHAPTER 2

DIRECT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

2-1. General

Tools, equipment and maintenance parts over and above those available to the using organization level are supplied to direct and general support maintenance units for maintaining and repairing the vehicle.

2-2. Parts

Maintenance parts are listed in TM 9-2350-256-34P-1, TM 9-2350-256-34P-2, TM 9-2520-215-34P (transmission) and TM 9-2815-220-34P (main engine), which are the authorities for requisitioning replacements. The supply, maintenance and recoverability code (SMR) indicated for each item determines if a component is to be replaced and/or repaired and the level responsible for replacement and/or repair. It is important that careful troubleshooting be used to determine, whenever possible, what parts are to be replaced before the component is torn down for repair.

2-3. Common Tools and Equipment

Standard and commonly used tools and equipment having general application are authorized for issue by TA and TOE.

2-4. Special Tools and Equipment

The special tools and equipment, listed in table 2-1 and illustrated in figure 2-1, are the only special tools and equipment necessary to perform the maintenance operations described in this technical manual. Refer to TM 9-2350-256-34P-1 and TM 9-2350-256-34P-2 for special tools and equipment allocations and requisitioning authority.

Refer to Appendix B for fabricated items.

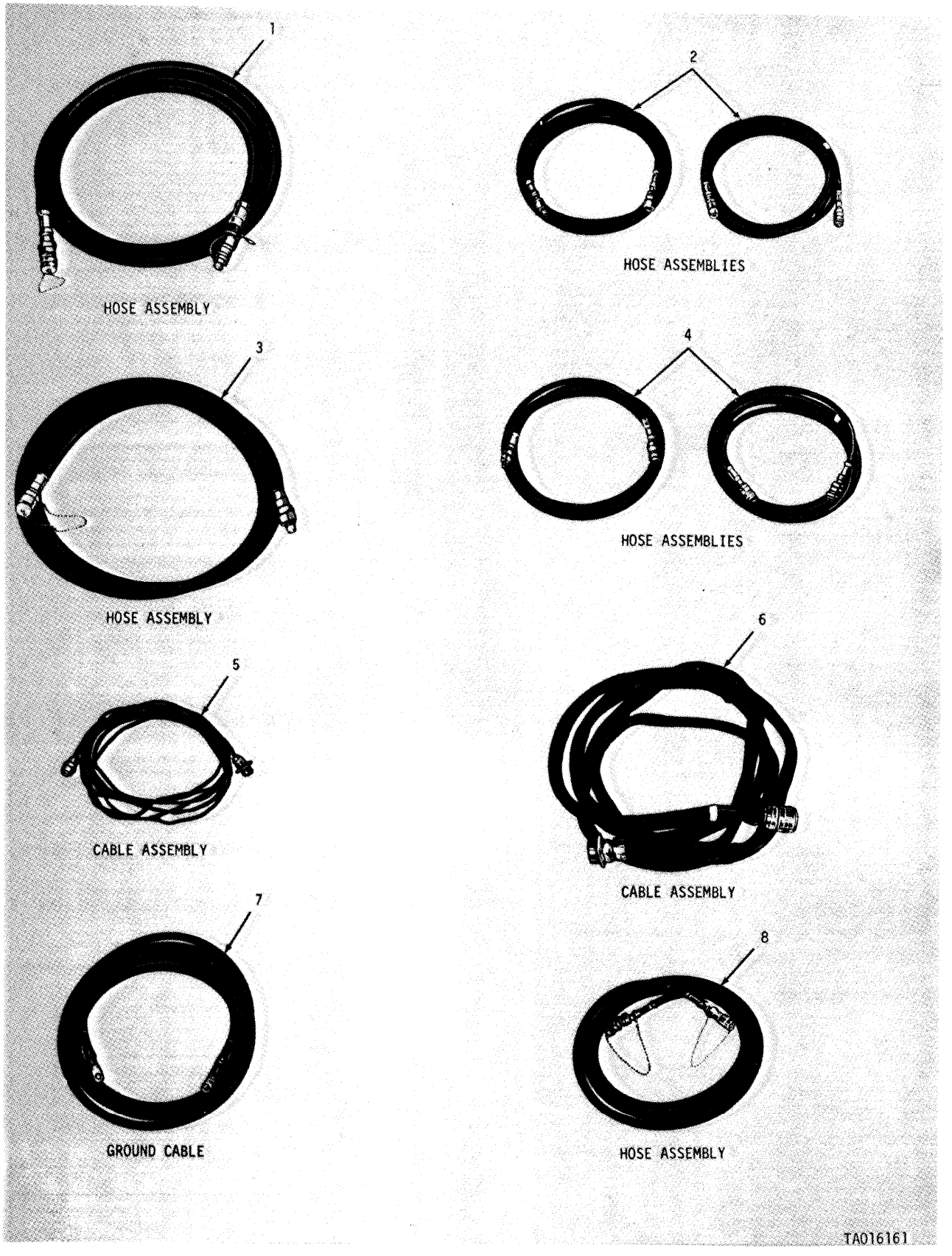

Figure 2-1. Special tools and equipment (Sheet 1 of 3).

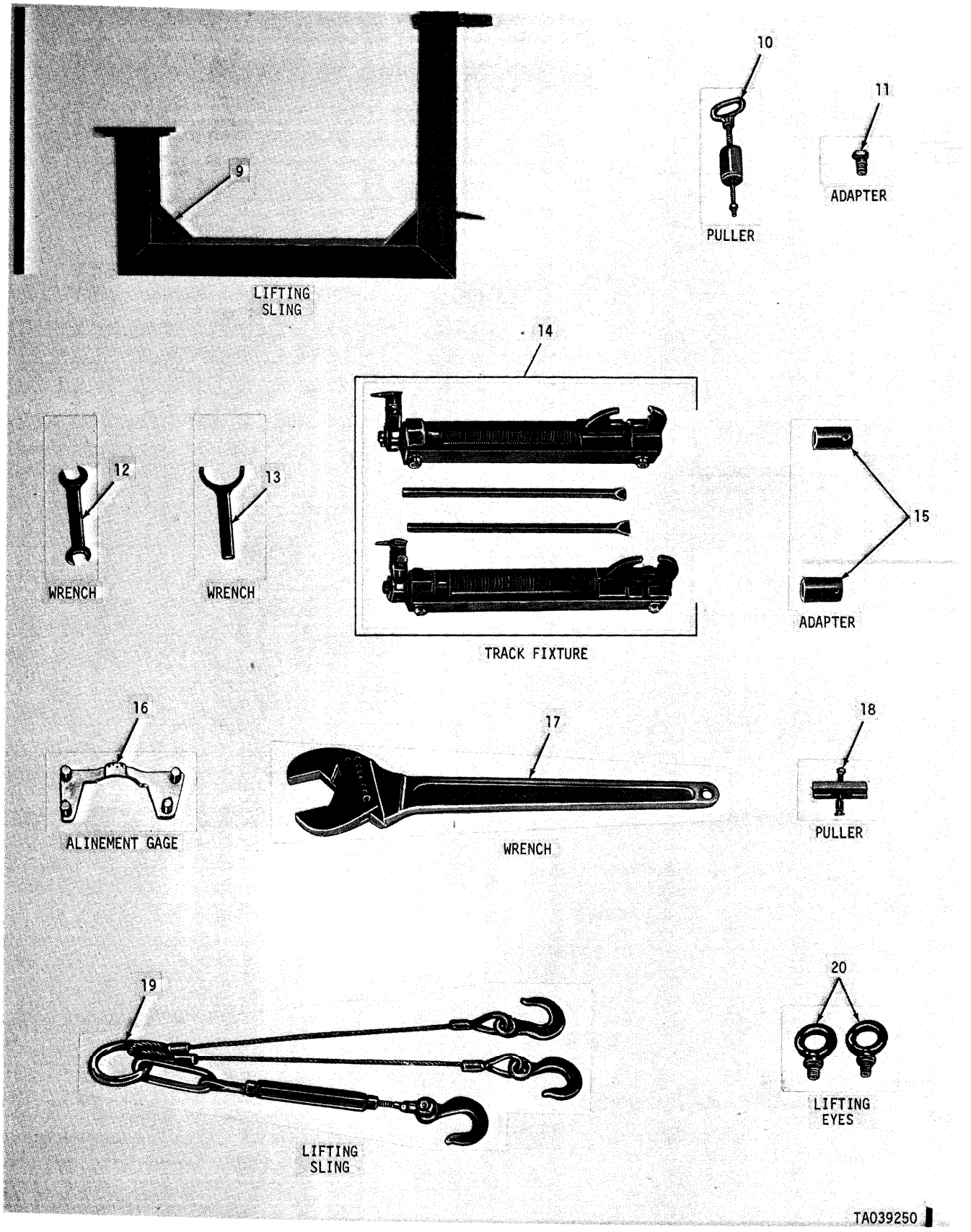

Figure 2-1. Special tools and equipment (Sheet 2 of 3).

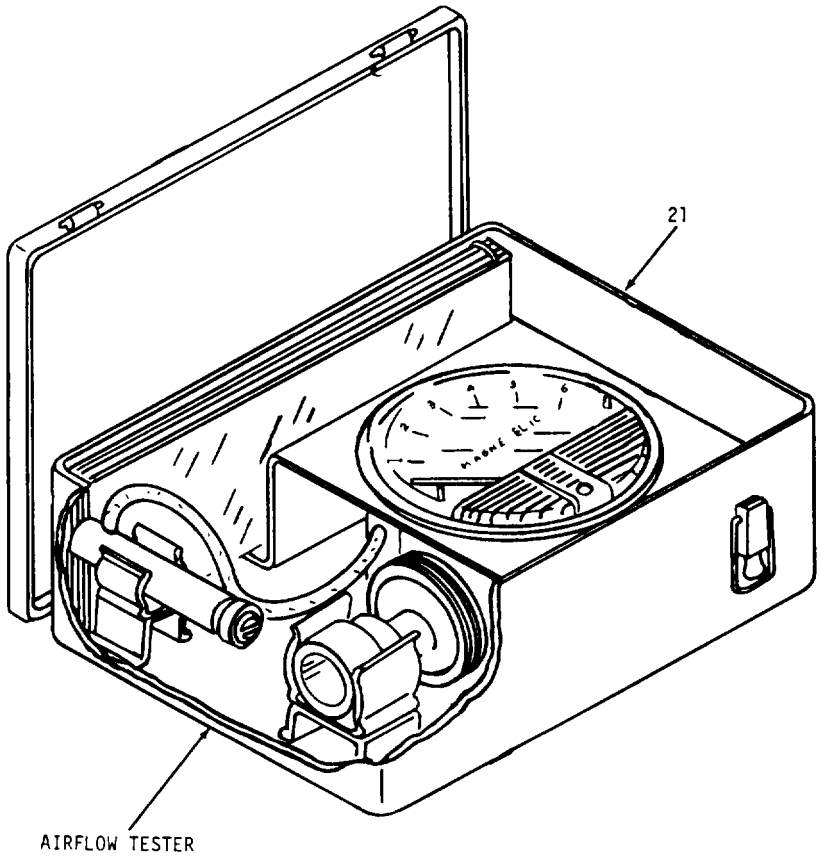

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Figure 2-1. Special tools and equipment (Sheet 3 of 3).

Table 2-1. Special Tools List

Nomenclature	National stock No.	Reference 1 tern, Fig.	Para	Use
Auxiliary power unit				
Cable, ground	2590-00-6223 (8708290)	7, 2-1	*4-2f*	Test run outside vehicle.
Cable assembly, power electrical	2590-00-614-7544 (11671581-3)	6, 2-1	*4-2f*	Test run outside vehicle.
Cable assembly, power electrical	2590-00-614-7545 (11671581-4)	5, 2-1	*4-2f*	Test run outside
Gage, alinement	(11671961)	16, 2-1	*4-2b*	Aline drive sprocket.
Hose assembly, nonmetallic	4720-00-617-6929 (11671580-1)	2, 2-1	*4-2f*	Test run outside vehicle; fuel tank to fuel pump line and fuel filter to injection pump line (2 per operation).
Hose assembly, nonmetallic	4720-00-619-9706 (11671580-2)	4, 2-1	*4-2f*	Test run outside vehicle; engine to fuel tank return line 11671065-15 and fuel pump hose 11671065-22 to primary fuel filter (2 per operation).
Hose assembly, nonmetallic	4720-00-619-9691 (11671580-3)	1, 2-1	*4-2f*	Test run outside vehicle; hydraulic pump section line from bulkhead coupling to suction line 11671065-21
Hose assembly, nonmetallic	4720-00-619-9689 (11671580-4)	8, 2-1	*4-2f*	Test run outside vehicle; pressure switch line hydraulic pump to pressure line 11671065-16
Hose assembly, nonmetallic	4720-00-619-9681 (11671580-5)	3, 2-1	*4-2f*	Test run outside vehicle; hydraulic pump line to discharge line 11671065-19
Puller, mechanical; flywheel and sprocket	5120-00-613-6775 (11671732)	18, 2-1	*4-2b*	Remove drive sprocket.
Suspension				
Adapter, socket wrench	5120-00-632-5797 (7026898)	15, 2-1	2-12	Attaching power wrench to fisture 5120-00-605-3962 (2 per operation).
Fixture	5120-00-605-3926 (8741739)	14. 2-1	2-12	Track connecting; used with 5120-00 - 632-5797 Adapter, Socket Wrench (2 per operation).
Wrench	5120-00-277-6470 (GGG-W-631)	17, 2-1	2-12	Track tension adjusting; refer to TM9-2350-256-10.
Gas-particulate filter unit				
Airflow tester	6680-00-436-4212 (ES-77-2120)	21, 2-1	3-80	Testing air flow of the gas-particulate filter unit
Miscellaneous				
Adapter	5120-00-767-9102 {10867497)	11, 2-1	2-24 2-29	Remove hydraulic cylinder pins used with puller 5120-00-310-4668.
Sling aseembly, lifting	4910-01-046-8944 (11672258)	9, 2-1	2-30	Removal of hydraulic control panel (subplate) and mechanical transmission and hydraulic pump an suspension,
Lifting eye, vehicle	4910-00-766-1963 (10884605)	20, 2-1	2-30 2-35	Remove hydraulic control panel (1 per operation), and hoist winch (2 per operation}.
Fuller	5120-00-310-4669 (8708712)	10, 2-1	2-24 2-29	Remove hydraulic cylinder pins; used with adapter 5120-00-767-9102.
Sling, lifting	4910-00-473-7556 (7081593)	19, 2-1	2-15 2-18 2-19 2-24 2-30 2-35	Remove rear fuel tanks, hoist winch, hydraulic control panel (subplate), auxiliary power unit and mechanical transmission and hydraulic pump (TM 9-2350-256-20).
Wrench	5120-09-777-9099 (10884603)	13, 2-1	2-22	Level winder cylinder adjusting nut (TM 9-2350-256-20).
Wrench	5120-00-555-0060 (8395504)	12, 2-1,	2-30	Hydraulic line fittings (TM 9-2350-256-20).

Section II. TROUBLESHOOTING

NOTE

Information in this section is for use by direct support and general support (DS/GS) maintenance personnel in conjunction with and as a supplement to the troubleshooting section in the organizational maintenance manual. It provides continuation of instructions where a remedy in the organizational manual refers to DS/GS maintenance personnel for corrective action.

2-5. scope

a. This section contains troubleshooting or malfunction information and tests for locating and correcting most of the troubles which may develop in the Recovery Vehicle, M88A1. Each malfunction or trouble symptom for an individual component, unit or system is followed by a list of tests or inspections necessary for you to determine probable causes and suggested corrective actions for you to remedy the malfunction.

b. This manual cannot list all possible malfunctions that may occur or all tests or inspections, and corrective actions. If a malfunction is not listed (except when malfunction and cause are obvious) or is not corrected by listed corrective actions, you should notify higher level maintenance.

c. Table 2–2 lists the common malfunctions that you may find during the operation or maintenance of the M88A1 or its components. You should perform the tests/inspections and corrective actions in the order listed.

NOTE

Before you use this table, be sure you have performed all normal operational checks. If you have a malfunction which is not listed in this table, notify the next higher level of maintenance.

NOTE

Refer to TM 9-2350-256-34-2 for troubleshooting main and auxiliary hydraulic systems.

Table 2-2. Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
FUEL TANKS
1. FUEL LEAKING FROM FORWARD FUEL TANKS Inspect forward fuel tank for cracks or open seams. Fuel leaking thru a small crack can usually be detected by dust clingjng to the wet area. a. If leaking area is accessible without removing the fuel tank: (1) Drain the fuel system (TM 9-2350-256-20, Medium Recovery Vehicle, M88A1). (2) Close fuel valves to left and right rear fuel tanks. (3) Remove the armor cover under the hull to expose the forward fuel tank drain plug. Remove the drain plug. (4) Remove electric intank fuel pump (TM 9-2350-256-20, Medium Recovery Vehicle, M88A1). (5) Slush tank interior with methy lene chloride (pure) or chemical cleaner as specified in TB 750-1047, Elimination of Combustibles From Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks, to remove residual fuel, dirt, sediment and other foreign matter. Drain and air dry tank. (6) Weld cracked area as required. (7) Close forward fuel tank bypass valve and drain valve. Install drain plug in bottom of tank. (8) Install electric fuel pump (TM 9-2350-256-20, Medium Recovery Vehicle, M88A1). (9) Disconnect the fuel vent hope on top of the forward fuel tank. (10) Connect an air hose and suitable gage to the disconnected vent opening in the forward fuel tank, apply 3-4 psi internal air pressure. (11) Apply soapy water solution, consisting of liquid soap diluted with 20-40% water, to all exterior surfaces of tank and inspect for air bubble formation. (12) Mark location of any bubble formation, release air pressure, rinse and dry tank and weld the marked area. (13) Repeat points (10), (11), and (12) if required. b. If leaking area is inaccessible with the fuel tank installed: (1) Drain the fuel system (TM 9-2350-256-20, Medium Recovery Vehicle, M88A1). (2) Remove the forward fuel tank from the vehicle (TM 9-2350-256-20, Medium Recovery Vehicle, M88A1). (3) Slush tank interior with methylene chloride (pure) or chemical cleaner as specified in TB 750-1047, Elimination of Combustibles From Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks, to remove residue] fuel, dirt, sediment and other foreign matter. Drain and air dry tank.

Table 2-2. Troubleshooting- Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
FUEL TANKS-Continued
(4) Inspect tank for any obvious cracks or open seams. Inspect mounting brackets, mounts and cushions for cracks or breaks. Weld assembly and components as required
(5) Close all openings with temporary plugs or other closures and apply 3-4 psi internal air pressure.
(6) Apply soapy water solution, consisting of liquid soap diluted with 20-40% water, to all exterior surfaces of tank and inspect for air bubble formation.
(7) Mark location of any bubble formation. rinse and dry tank and weld the marked areas
(8) Repeat points (5), (6), and (7) if required.
(9) The electric intank fuel pump and other fittings and accessories may be assembled on the ranks either before or after installation of the tanks in the vehicle. Refer to TM 9-2350-256-20, Medium Recovery Vehicle, M88A1 for installation instructions.
2. FUEL LEAKING FROM RIGHT AND/OR LEFT REAR FUEL TANK
Step 1. Remove the engine deck (TM 9-2350-256-20, Medium Recovery Vehicle, M88A1) . Inspect fuel tank for cracks or open seams Fuel leaking from a small crack can usually be detached by dust clinging to the wet area
Step 2. If fuel leak cannot be detected or repaired with powerplant installed in vehicle. remove the fuel tank. (For removal of left rear fuel tank, refer to para. 2-16) (For removal of right rear furl tank, refer to para. 2-19).
Step 3. If fuel leak cannot be detected or repaired with fuel tank installed in vehicle. remove the powerpack (TM 9-2350-256-20).
a. Drain the fuel system (TM 9-2350-256-20, Medium Recovery Vehicle. M88A1.
b. Slush tank interior with methylene chloride (pure) or chemical cleaners as specified in TB 750-1047. Elimination, of Combustibles From Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks, to remove residual fuel. dirt. sediment, and other foreign matter. Drain and dry fuel tank
c. Inspect tank for any obvious cracks or open seams. Inspect mounting brackets, mounts, and cushions for cracks and breaks. Weld assembly and components as required.
d. Close all openings with temporary plugs or other closures and apply 3-4 psi internal air pressure.
e. Apply soapy water solution, consisting of liquid soap diluted with 20-40% water. to all exterior surfaces of tank and inspect for air bubble formation.
f. Mark location of any bubble formation. rinse and dry tank and weld the marked areas.
g. Repeat d. e. and f. if required.
PURGE PUMP
3. MAIN ENGINE MANIFOLD HEATERS DO NOT WORK
Check manifold heater switch and associated wiring Refer to Fault Isolation Diagram, fig 2-23, TM 9-2350-256-20, Medium Recovery Vehicle, M88A1.
Repair or replace defective components or parts (para 3-27 and 3-28)
4. PURGE PUMP DIFFICULT TO PUMP OR DOES NOT PUMP
Disassemble purge pump (para 3-26). Clean all parts in mineral spirits paint thinner or drycleaning solvent. Inspect all components for cracks. distortion, and/or evidence of excessive wear
Replace all defective components.
ELECTRICAL SYSTEM
5. BATTERY-GENERATOR INDICATOR READS IN YELLOW OR LOWER RED REGION WITH MAIN ENGINE RUNNING AND MAIN GENERATOR IN SYSTEM (GENERATOR CUTOUT SWITCH CLOSED)
Step 1. Check for defective switching relay box. Refer to Fault Isolation Diagram, fig. 2-35, TM 9-2350-256-20, Medium Recovery Vehicle, M88A1.
Repair or replace switching relay box (para 3-47).
Step 2. Check for defective main generator armature relay. Refer to Fault Isolation Diagram, fig. 2-35, TM 9-2350-256-20. Medium Recovery Vehicle, M88A1.
Repair or replace main generator armature relay (para 3-46).
6. BATTERY-GENERATOR INDICATOR READS IN YELLOW OR LOWER RED REGION WITH APU ENGINE RUNNING AND APU GENERATOR SWITCH ON. (MAIN ENGINE NOT RUNNING).
Step 1. Deleted
Step 2. Deleted
Step 3. Check for defective APU generator switch. Refer to Fault Isolation Diagram, fig. 2-39, TM 9-2350-256-20, Medium Recovery Vehicle, M88A1.
Replace switch, if defective (para 3-45).
Step 4. Check for defective hydraulic pressure switch. Refer to Fault Isolation Diagram fig. 2-38, TM 9-2350-256-20, Medium Recovery Vehicle. M88A1.
Adjust or replace pressure switch (para 3-63).
Step 5. Check for damaged or defective APU generator (para 4-2d). Refer to Fault Isolation Diagram, fig. 2-35, TM 9-2350-256-20. Medium Recovery Vehicle, M88A1.
Replace defective generator (para 4-2b).

Table-22 Troubleshooting-Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ELECTRICAL SYSTEM-Continued

7. BATTERY GENERATOR INDICATOR READS IN BOTTOM OF LOWER RED REGION (NO DEFLECTION) WITH MASTER SWITCH ON Check for defective master relay. Refer to Fault Isolation Diagram, TM 9-2350-256-20, Medium Recovery Vehicle, M88A.1.
   Repair or replace master relay (para. 3-46).
8. ALL CIRCUITS DEAD EXCEPT PERSONNEL HEATER, MASTER RELAY LAMP, AND SLAVE RECEPTACLE Check main power bus. Refer to Fault Isolation Diagram, TM 9-2350-256-20, Medium Recovery Vehicle, M88A1.
   Repair or replace defective components.
9. Deleted
10. INFRARED SYSTEM (DRIVER'S PERISCOPE) FAILS TO OPERATE

Check for defective high voltage power pack. Refer to Fault Isolation Diagram, TM 9-2350-256-20, Medium Recovery Vehicle, M88A1.
   Replace infrared power pack, if defective (para. 2-21).

MECHANICAL TACHOMETER AND SPEEDOMETER

11. MECHANICAL TACHOMETER OR SPEEDOMETER FAILS TO REGISTER
   Step 1. Check for flexible shaft ends that might have twisted off.
      Replace flexible shaft assembly, if defective (para 2-20).
   Step 2. Check 900 drive adapter for stripped threads.
      Repair or replace adapter (para 3-40).

AUXILIARY POWER UNIT

12. ENGINE FAILS TO CRANK
   Step 1. Check for defective starting system components and/or associated wiring. Refer to Fault Isolation Diagram, TM 9-2350-256-20, Medium Recovery Vehicle, M88A1.
      Repair or replace defective starting system components and/or associated wiring (para 2.-15a. 2-21b, 2-21c, 3-48, and 4-2b of TM 9-2350-256-34-1 and para. 2-58 of TM 9-2815-221-34&P, Engine. Diesel Industrial Type, Model DJBMA).
   Step 2. Attempt to turn engine over using a 5/8 inch. 112 inch square drive socket. extension and torque wrench set for 70 lb-ft on the flywheel mounting screw. located at the center of the flywheeL If engine turns over. recheck electrical system using Fault Isolation Diagram, TM 9-2350-256-20, Medium Recovery Vehicle M88A1. If engine fails to turn over, drain oil from APU crankcase. Remove crankcase and drive sprocket (para 4-2).
      a If engine will not turn over with 70 lb-ft of torque applied to flywheel mounting screw, repair or replace APU engine (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
      b. If engine will turn over with 70 lb-ft or less of torque applied to flywheel mounting screw, inspect generator and hydraulic pump for seizure. Replace defective components.
13. ENGINE CRANKS BUT FAILS TO START
   Step 1. Check fuel shutoff switch, fuel solenoid. and associated wiring. Refer to Fault Isolation Diagram.
      TM 9-2350-256-20, Medium Recovery Vehicle, M88A1.
      Repair or replace defective components (para. 3-45 and TM 9-2815-221-34&P. Engine, Diesel. Industrial Type, Model DJBMA).
   Step 2. Open the bleeder valve on the primary fuel filter and allow all the diesel fuel to drain from the filter. Have an assistant attempt to start the APU. If fuel is pumped from the filter. close the valve.
      If no fuel is pumped from the filter. replace the fuel pump (TM 9-2815-221-34&P, Engine, Diesel. Industrial Type, Model DJBMA).
   Step 3. Remove the APU armor cover (TM 9-2350-256-20, Medium Recovery Vehicle, M88A1}. Loosen, but do not remove, one of the two high pressure fuel tubes from the fuel injection pump. Have an assistant attempt to start the APU.
      a If no fuel is pumped from the loosened fuel tube, replace the fuel injector pump (TM 9-2815-221-34&P, Engine, Diesel Industrial type, Model DJBMA).
      b. If fuel is pumped from the loosened fuel tube, check the fuel injector nozzles (TM 9-2815-221-34&P. Engine, Diesel Industrial Type, Model DJBMA).
14. ENGINE HARD TO START
   Step 1. Remove APU armor cover (TM 9-2350-256-20, Medium Recovery Vehicle, M88A1).
   Step 2. Test fuel injector pump (TM 9-2815-221-34&P, Engine, Diesel Industrial Type, Model DJBMA).
      Replace fuel injector pump if defective (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
   Step 3. Test fuel injector nozzles (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
      Replace fuel injector nozzles if defective (TM 9-2815-221-34&P, Engine, Diesel. Industrial Type, Model DJBMA).
   Step 4. Check engine timing (TM 9-2815-221-34&P, Engine, Diesel Industrial Type, Model DJBMA).
      Retime engine (TM 9-2815-221-34&P, Engine, Diesel Industrial Type, Model DJBMA).
   Step 5. Check valve clearance (TM 9-2815-221-34&P, Engine, Diesel. Industrial Type, Model DJBMA).
      Adjust valve clearance (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type. Model DJBMA).

Table 2-2. Troubleshooting-Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AUXILIARY POWER UNIT-Continued

Step 6 Check engine compression (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type. Model DJBMA).
Replace engine TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).

15. ENGINE HARD TO START I?: COLD WEATHER
Step 1 Check for defective preheat components and/or associated wiring. Refer to Fault Isolation Diagram, TM 9-2350-156-20. Medium Recovery Vehicle, M88A1.
Repair or replace defective preheat components and/or associated wiring (para. 2-17, 2-58. and 3-8 of TM 9-2815-221-34&P, Engine. Diesel. Industrial Type, Model DJBMA).

16. ENGINE STARTS BUT FAILS TO KEEP RUNNING
Step 1. Remove APU armor cover (TM 9-2350-256-20, Medium Recovery Vehicle. M88A1).
Step 2. Check fuel pump pressure (TM 9-2615-221-34&P, Engine, Diesel. Industrial Type. Model DJBMA).
Replace fuel pump (TM 9-2815-221-34&P Engine. Diesel. Industrial Type, Model DJBMA).
Step 3. Test fuel injector pump (TM 9-2815-221-34&P Engine, Diesel, Industrial Type, Model DJBMA).
Replace fuel injector pump (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type. Model DJBMA).
Step 4. Test fuel injector nozzles (TM 9-2815- 221-34&P, Engine, Diesel. Industrial Type. Model DJBMA).
Replace fuel injector nozzles (TM 9-2815-221-34&P, Engine, Diesel. Industrial Type. Model DJBMA).
Step 5. Check valve clearance (TM 9-2815-221-34&P, Engine. Diesel, Industrial Type. Model (DJBMA).
Adjust valves (TM 9-2815-221-34&P, Engine. Diesel. Industrial Type. Model DJBMA).

17. ENGINE OVERHEATS
Step 1 Remove APU from vehicle (para 2-15A)
Remove and *clean* oil cooler (TM 9-2815-221-34&P Engine. Diesel, Industrial Type. Model DJBMA).

18. ENGINE MISFIRES, LACKS POWER OR EMITS BLACK SMOKE
Step 1. Check engine for proper rpm setting (TM 9-2815-221-34&P Engine, Diesel, Industrial Type, Model DJBMA).
Adjust rpm setting if required (TM 9-2815-221-346-P Engine, Diesel, Industrial Type, Model DJBMA).
Step 2 Remove XPU armor cover and side panel (TM 9-2350-256-20, Medium Recovery Vehicle, M88A1).
Step 3. Check glow plugs and lead wires using Fault Isolation Diagram, TM 9-2350-256-20. Medium Recovery Vehicle, M88A1.
Repair or replace defective parts (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Mode1 DJBMA).
Step 4. Test fuel injector pump (TM 9-2815- 221-34&P, Engine, Diesel, Industrial Type. Model DJBMA).
Replace fuel injector pump if defective (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type. Model DJBMA).
Step 5. Test fuel injector nozzles if defective (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type. Model DJBMA).
Replace fuel injector nozzles if defective (TM 9-2315-221-34&P, Engine. Diesel. Industrial Type. Model DJBMA).
Step 6. Check engine timing (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type. Model DJBMA).
Retimeengine if required (TM 9-2815-221-34&P. Engine, Diesel, Industrial Type. Model DJBMA).
Step 7. Check valve clearance (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type. Model DJBMA).
Adjust valve clearance (TM 9-2815-221-34&P, Engine. Diesel, Industrial Type. Model DJBMA).
Step 8. Check engine compression (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
Replace engine (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type. Model DJBMA).

19. ENGINE KNOCKS
Step 1. Remove APU armor cover (TM 9-2350-256-20, Medium Recovery Vehicle, M88A1).
Step 2. Check engine timing (TM 9-2815-221-34&P, Engine, Diesel. Industrial Type. Model DJBMA).
Retime engine (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type. Model DJBMA).
Step 3. Check valve clearance (TM 9-2815-221-34&P Engine, Diesel, Industrial Type. Model DJBMA).
Adjust valve clearance (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
Step 4. Test fuel injector pump (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
Replace fuel injector pump if defective (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
Step 5. Test fuel injector nozzles (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
Replace fuel injector nozzles (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
Step 6. If cause of engine knocks cannot be corrected by above steps, replace engine (para 4-2b).

20. ENGINE USES EXCESSIVE OIL AND EMITS LIGHT BLUE SMOKEY EXHAUST
Step 1. Check air intake system for restrictions.
Remove all restrictions.
Step 2. Operate APU with hydraulic system selector control lever in AUX position for fifteen minutes.
If light blue smokey exhaust continues, replace engine (para 4-2b).

21. HIGH AIR TEMPERATURE LIGHT ON APU CONTROL BOX FAILS TO OPERATE PROPERLY
Check for defects in electrical circuit. Refer to Fault Isolation Diagram, TM 9-2350-256-20, Medium Recovery Vehicle. M88A1.
Repair or replace defective components.

22. LOW OIL PRESSURE LIGHT IN APU CONTROL BOX FAILS TO OPERATE PROPERLY
Check for defects in electrical circuit. Refer to Fault Isolation Diagram, TM 9-2350-756-20. Medium Recovery Vehicle, M88A1.
Repair or replace defective components.

Table 2-2 Troubleshooting-Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AUXILIARY POWER UNIT-Continued

23. OIL PRESSURE GAGE GAILS TO OPERATE
Check for defect in electrical circuit. Refer to Fault Isolation Diagram, TM 9-2350-256-20, Medium Recovery Vehicle, M88A1.
Repair or replace defective components.
24. BATTERY-GENERATOR INDICATOR READS IN YELLOW OR LOWER RED REGION WITH APU ENGINE RUNNING AND APU GENERATOR SWITCH ON
Step 1. Deleted
Step 2. Deleted
Step 3. Check for defective APU generator switch. Refer to Fault Isolation Diagram. TM 9-2350-256-20. Medium Recovery Vehicle, M88A1.
Replace switch, if defective (para 3-45).
Step 4. Check for defective hydraulic pressure switch. Refer to Fault Isolation Diagram, TM 9-2350-256-20, Medium Recovery Vehicle, M88SA1.
Adjust or replace pressure switch (para 3-63).
Step 5. Check for damaged or defective APU generator (para 4-2d). Refer to Fault Isolation Diagram. TM 9-2350-256-20,
Medium Recovery Vehicle, M88A1.
Replace defective generator (para 4-2bl.
25. BATTERY-GENERATOR INDICATOR READS IN YELLOW OR LOWER RED REGION WITH APU ENGINE RUNNING AND APU GENERATOR SWITCH ON WITH NO AUXILIARY HYDRAULIC PRESSURE
Step 1. Remove APU from vehicle (para 4-2b). Remove rear chain housing cover from APU, (para 4-2b). Inspect drive chain and gear
Replace if defective (TM 9-2815-221-34&P. Engine, Diesel Industrial Type, Model DJBMA).
26. ENGINE DOES NOT OPERATE AT 2000 + 100 RPM UNDER LOAD CONDITIONS
Step 1. Check fuel system for air.
Bleed air from fuel system.
Step 2. Operate APU with hydraulic system selector control lever in AUX position for fifteen minutes.
Step 3. Check governor linkage (TM 9-2815-221-34&P, Engine, Diesel Industrial Type, Model DJBMAI.
Repair. replace, or adjust governor linkage as required (TM 9-2815-221-34&P, Engine, Diesel Industrial Type Model DJBMAI.
Step 4. Check engine timing (TM 9-2815-221-34&P. Engine, Diesel Industrial Type, Model DJBMA). Retime engine (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
Step 5. 'Test fuel injector pump (TM 9-2815-221-34&P, Engine, Diesel Industrial Type, Model DJBMA).
Replace fuel injector pump if defective (TM 9-2815-221-34&P. Engine, Diesel, Industrial Type, Model DJBMA).
Step 6. Test fuel injector nozzles (TM 9-2815-221-34&P, Engine, Diesel Industrial Type, Model DJBMA).
Replace fuel injector nozzles if defective (TM 9-2815-221-34&P, Engine, Diesel Industrial Type, Model DJBMA).
Step 7. Check valve clearance (TM 9-2815-221-34&P, Engine, Diesel Industrial Type, Model DJBMA).
Adjust valve clearance (TM 9-2815-221-34&P. Engine, Diesel Industrial Type, Model DJBMA).
Step 8. Check engine compression (TM 9-2815-221-34&P, Engine, Diesel, Industrial Type, Model DJBMA).
Replace engine (TM 9-2815-221-34&P, Engine, Diesel Industrial Type, Model DJBMA).

■ 27 through 35 Deleted.

Section I II. GENERAL MAINTENANCE

2-6. Lubrication

Lubrication instructions for the M88A1 are contained in TM 9-2350-256-10 and TM 9-2350-256-20.

2-7. Lockwire and Sealing Compound

Locking wire is to be installed by the double twist method. Apply sealing compound, NSN 8030-00-543-4384, to all pipe threads during installation.

2-8. Torque Values

Torque data for the specific hardware applications required in various vehicle installations is specified in the applicable sections of this manual.

2-9. Deck Covers, Grilles, Doors and Cab Subfloor Plates

Various deck covers, grilles, doors and cab subfloor plates must be removed prior to removal of many components. To locate deck covers, grilles, and doors, refer to figure 2-2. To locate cab subfloor plates, refer to figure 2-3. Refer to figures 2-50 and 2-51 for removal and installation of subfloor plates #1 and #23. Refer to TM 9-2350-256-20 for removal and installation instructions of all other subfloor plates.

2-9.1. Service Intervals-Personnel Heater

Refer to table 2-3 for recommended periodic service intervals for the personnel heater.

Table 2-3. Recommended Periodic Service Intervals

Hours of Operation	*Service*	Reference
JCvery 100 Hours	Check fuel supply	Paragraph 3-34c.
	Inspect wires for worn or broken insulation. Check that all connectors are tight.	
	Check air inlets for clogging. Remove debris and tighten loose duct connections.	
Every 200 hours (At ambients below 0°F.)	Inspect igniter.	Paragraph *3-356 (3).*
Every 400 hours	Remove and clean flame detector switch.	Paragraph *3-356(4).*
	Remove and clean burner.	Paragraph 3-34e. Remove the burner as described in paragraph 3-33c(8) and clean it to remove deposits and carbon.
	Inspect igniter.	Paragraph *3-35b(3).*
Every 800 to 1000 hours	Overhaul the heater	Paragraphs 3-33 thru 3-36

Legend for fig. z-2:

1 Auxiliary power unit access cover
2 Auxiliary power unit access door
3 Right front engine deck air inlet door
4 Right front intermediate engine deck air inlet door
5 Engine deck right door
6 Right intermediate engine deck airinlet grille
7 Right rear intermediate engine deck air inlet door
8 Right rearengine deck airinlet door
9 Right stayline hydraulic cylinder access cover
10 Cover, deepwater fording exhaust–right
11 Engine deck right exhaust door
12 Engine exhaust deflector
13 Engine deck right center exhaust door
14 Engine deck left center exhaust door
15 Engine deck left exhaust door
16 Cover, deep water fording exhaust—left
17 Left stayline hydraulic cylinder access cover
18 Left rear engine deck air inlet door
19 Left rear intermediate engine deck air inlet door
20 Left intermediate engine deck air inlet grille
21 Left intermediate engine deck air inlet door
22 Left front intermediate engine deck air inlet door
23 Center left front engine deck air inlet grille
24 Left front engine deck air inlet door
25 Left front, front engine deck air inlet door
26 Fuel tank filler neck cover
27 Center left front intermediate engine deck air inlet grille
28 Center front engine deck air inlet grille
29 Center right front engine deck air inlet grille
30 Engine oif check access door
31 Engine oif filler tube access door
32 Engine deck transmission right front access door
33 Engine deck transmission right rear access door
34 Engine deck transmission center front access door
35 Engine deck transmission left rear access door
36 Engine deck transmission left front access door

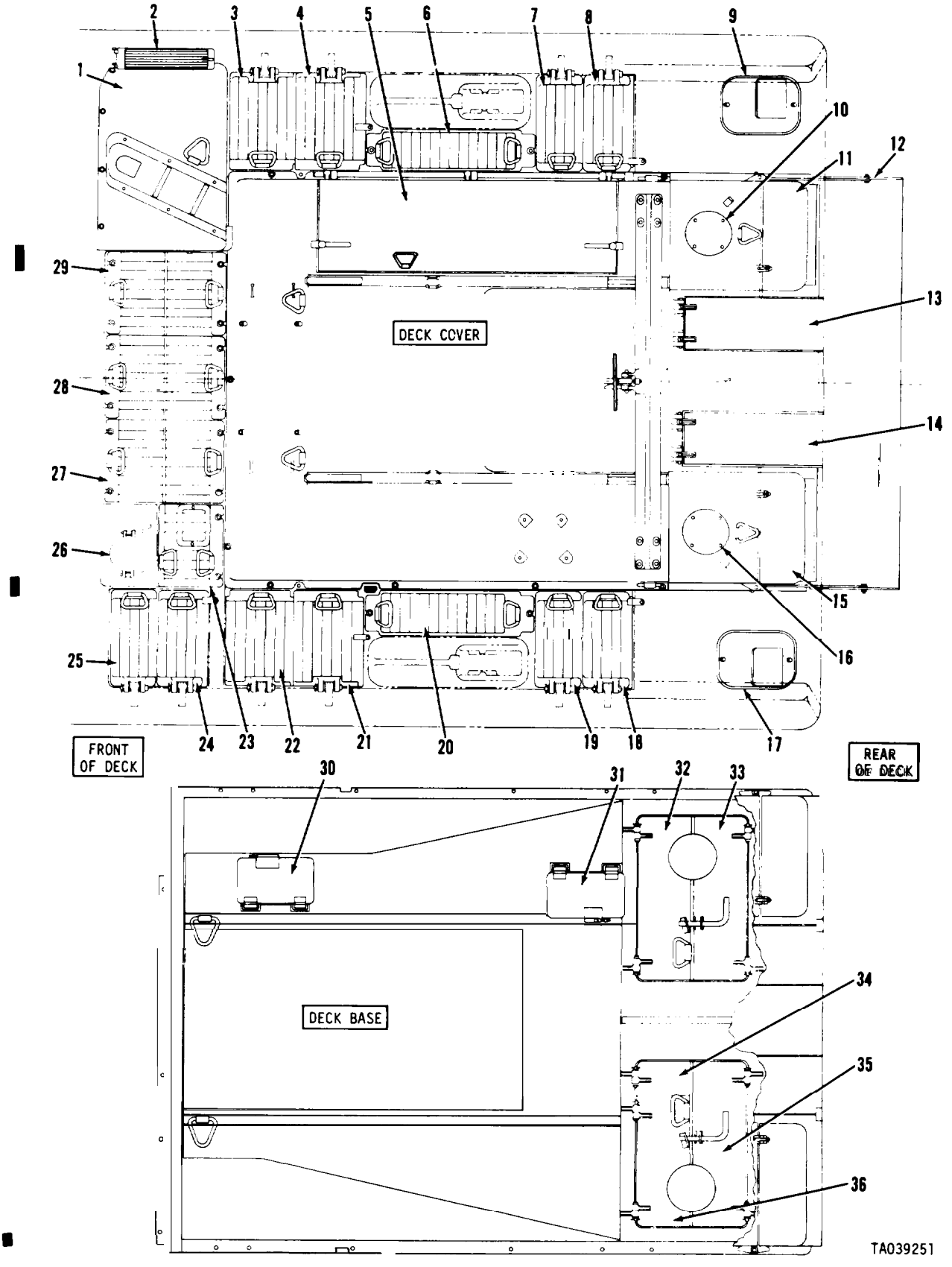


Figure 2-2. Deck covers, grilles and doors–schematic ***diagram.***

Legend for fig. 2-3:

1 Right side front floor plete
2 Right front access floor plate
3 Right front floor plate rear access
4 Hydraulic valve forward intermediate right floor plate
5 U-35 winch center right floor plate
6 Intermediate rear right floor plate
7 Rear right side floor plate
8 Hydraulic connections access cover
9 Rear intermediate right floor plate
10 Rear intermediate right access floor plate
11 Hydraulic line intermediate rear right center floor plate
12 Rear center floor plate
13 Rear left side intermediate floor plate
14 Stowage basket center left floor plate
1S Rear left side floor plate
16 Intermediate rear left side floor plate
17 Intermediate rear left center floor plate
18 Center rear floor plate
19 Center forward floor plate
20 Intermediate rear left access floor plate
21 Stowage basket forward intermediate left floor plate
22 Floor and light mount plate
23 Left side front floor plate
24 Hydraulic valve forward intermediate right *floor* plate

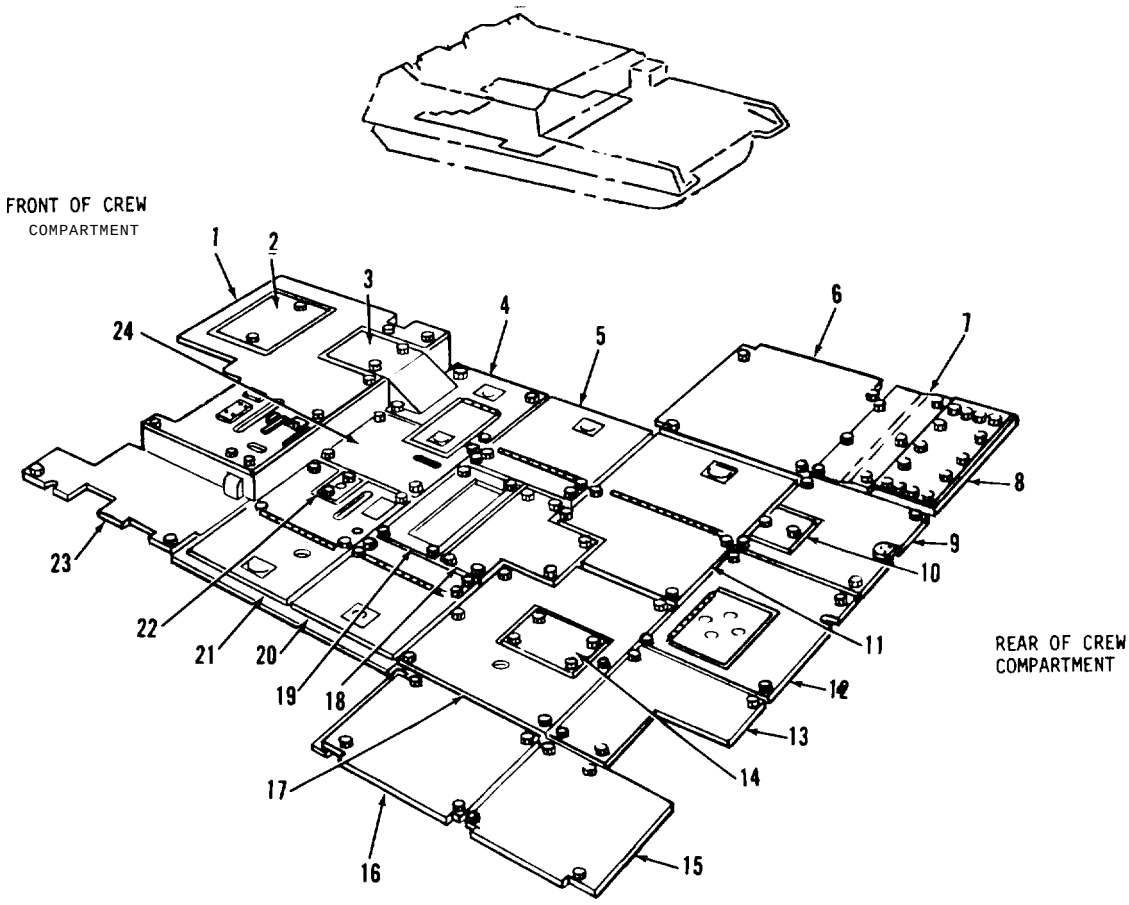


Figure 2-3. Cab sub floor plates—schematic diagram

Section IV. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS AND AUXILIARIES

2-10. Preparation for Removal and Installation

a. The vehicle should be cleaned as thoroughly inside and out as is advisable for the time available and the operations to be performed. The affected component and the adjscent area should be cleaned in any case.

b. Remove any items of on-vehicle equipment, armament or vehicular components which may interfere with efficient operation, Where disconnection of lines will result in loss of fluid, close any shutoff valves which may be in the system and, where possible, have a container available to catch fluid issuing from the lines at the disconnect points. Open hull and engine compartment drain valves to drain off accumulated water, fuel or oil. If complete disassembly of the vehicle is to be performed, pump out and/or drain fuel tanks. While the component is out of the vehicle, clean the exposed hull or compartment areas thoroughly.

CAUTION

Do not operate hydraulic system when any hydraulic lines are disconnected.

c. See that all tools required are readily available. Make sure that any spare parts which may be required are available. Provide envelopes, covers, tarpaulins, line plugs or other material which may be required for protection of the vehicle and exposed components until repairs are made. Provide small parts containers, tags or electric wire and terminal markers, as required.

d. Provide hoisting or lifting equipment for heavy components and see that supports, benches or stands are made ready to receive the components when they are removed.

e. Sufficient personnel should be available for the operation and they should be thoroughly advised of their duties before work is started. Provide all personnel with any protective equipment which may be required, such as goggles, special clothing, gloves, etc. See that all unassigned personnel are clear of the immediate working area.

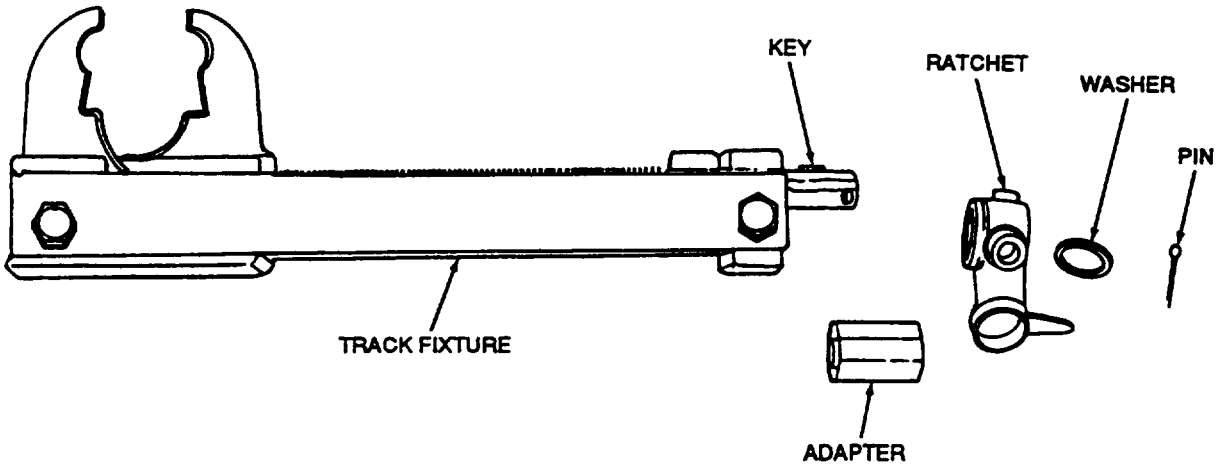
2-11. Fenders

Refer to TM 9-2350-256-20 for removal and installation instructions.

2-12. Suspension Systems

a. Refer to TM 9-2350-256-10 for removal and installation of tracks. Refer to TM 9-2350-256-20 for removal and installation of hub and sprocket assemblies, compensating idler assemblies, road wheels and hubs, torsion bars, road wheel arms, torsion bar anchors, road wheel arm housings, shock absorbers, bumper springs, track support roller assemblies and output reduction drives.

b. To facilitate the removal of the tracks, disassemble track fixture (table 2-1) and attach the fixture adapter (table 2-1). Use the hydraulic imp act wrench with the fixture and adapter when separating the vehicle tracks. See figure 2-4 for fixture disassembly instructions. Refer to TM 9-2350-256-10 for operating instructions on the hydraulic impact wrench.



DISASSEMBLY INSTRUCTIONS:

1. REMOVE COTTER PIN, WASHER AND RATCHET FROM TRACK FIXTURE. DO NOT REMOVE KEY FROM SHAFT END.
2. INSTALL IMPACT WRENCH ADAPTER ON SHAFT END. TIGHTEN SET SCREW ON ADAPTER.

Figure 24. Disassembly of track fixture for use with hydraulic impact wrench adapter.

2-13. Seats

Refer to TM 9-2350-256-20 for removal, repair and installation of seats.

■ **2-14. Deleted**

2-15. Auxiliary Power Unit .

a. *removal* Remove the APU as shown in figure 2-6.Have a test fixture available to support the APU outside the vehicle (para. 4-2).

b. Service and Test. Whenever the APU is out of the vehicle, clean the fuel filter sediment bowl (View I, fig. 2-6). Prior to installing the unit in the vehicle perform the testing and adjustment procedures described in paragraph 4-2(f).

NOTE

Prior to installation, the starter/generator must meet a locked rotor torque test of 30 lb-ft. output torque for an input voltage of 15 volts applied to both fields and armature circuits.

c Installation. Install the APU in reverse order of removal

Figure 2-5. Personnel heater fuel filter and air duct hose-removal and installation

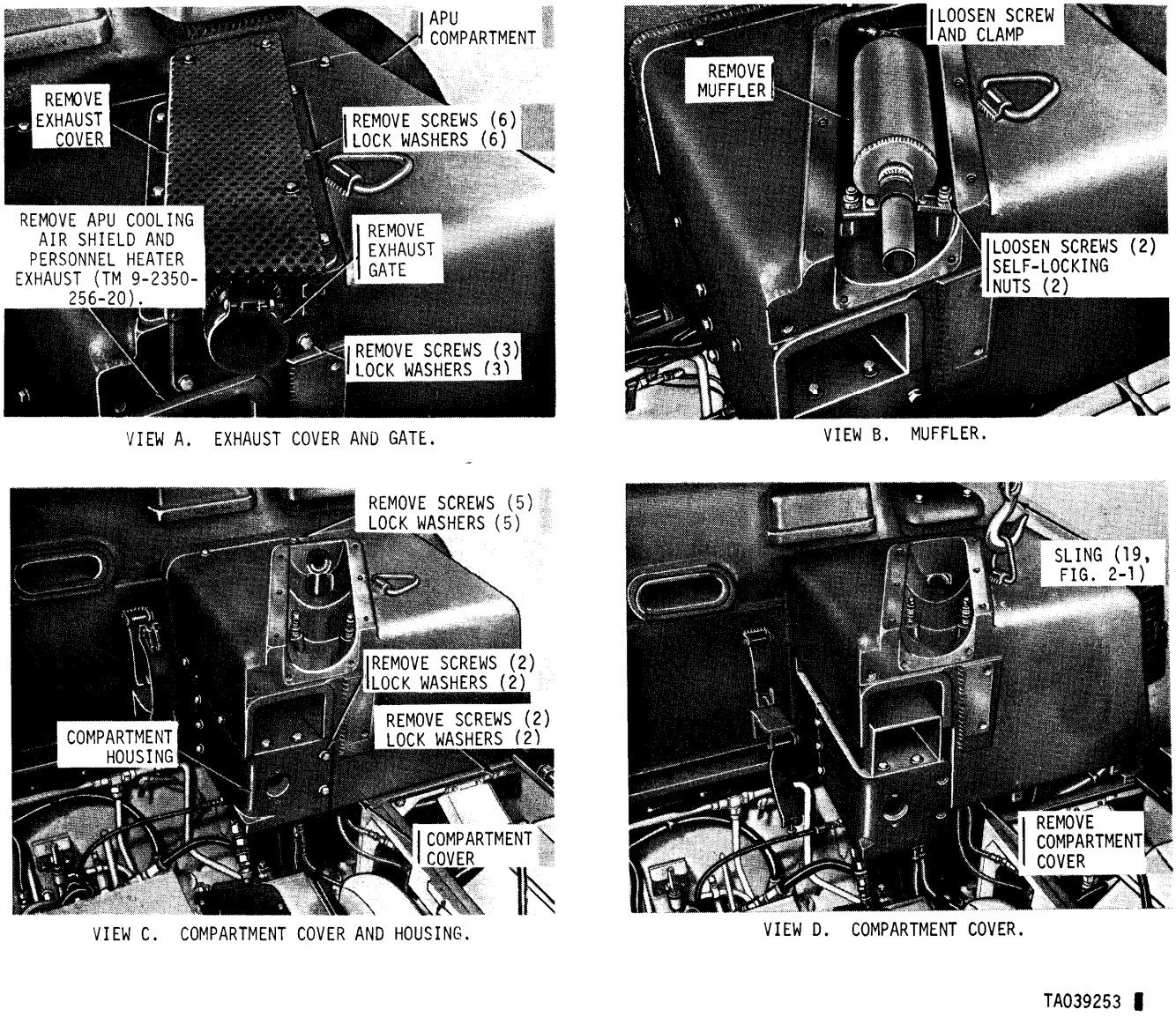


Figure 2-6. Auxiliary power unit-removal and installation (Sheet 1 of 3).

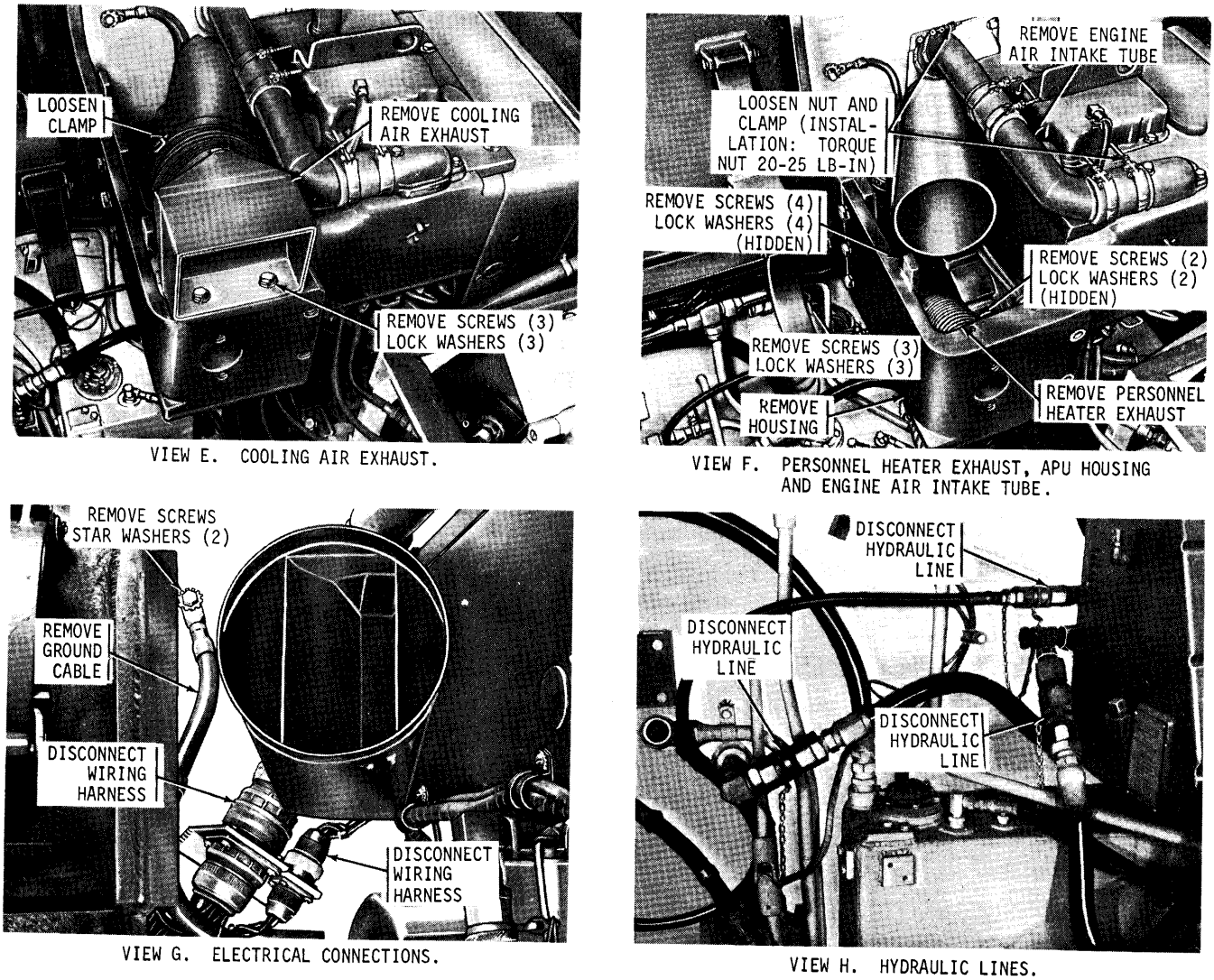
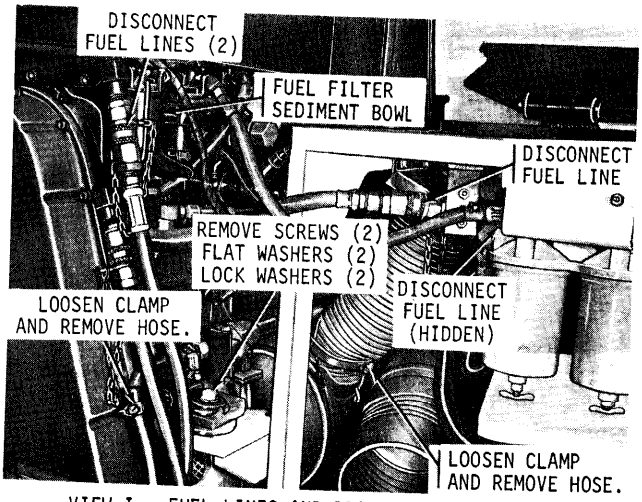
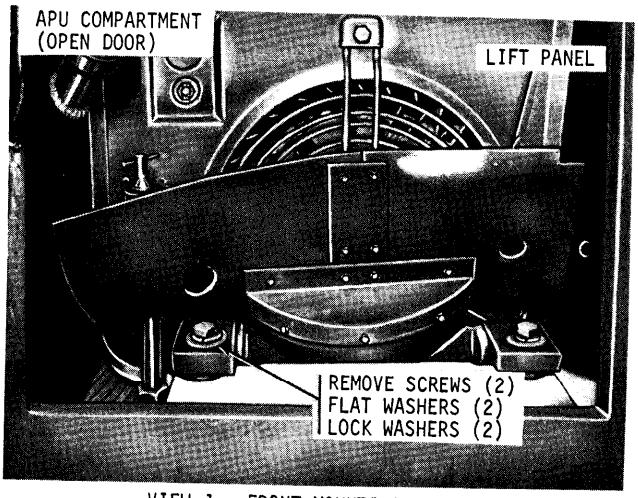


Figure 2-6. Auxiliury power unit-removal and installation (Sheet 2 of 3).

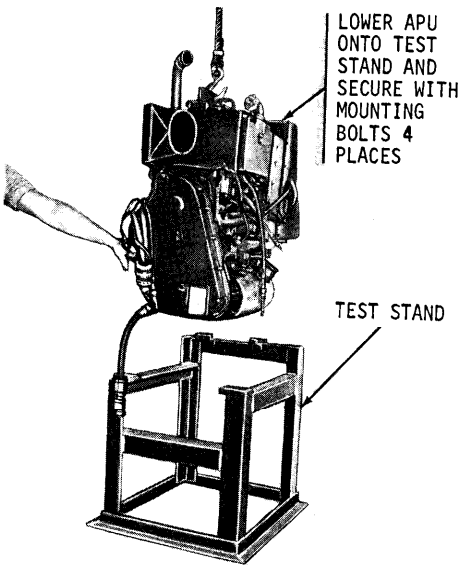


VIEW I. FUEL LINES AND REAR MOUNTING SCREWS.



VIEW J. FRONT MOUNTING SCREWS.

VIEW K. AUXILIARY POWER UNIT REMOVAL.



VIEW L. APU TEST STAND.

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Figure 2-6. Auxiliary power unit-removal and installation (Sheet 3 of 3).

2-15.1. AuxiliaryPower Unit and Main Engine Both Inoperable

If the auxiliary power unit and main engine are both inoperable, refer to TM 9-2350-256-20 for boom elevating instructions.

WARNING

Elevating the hoisting boom when both the auxiliary power unit and main engine are inoperable is a safety hazard and may cause injury to personnel.

2-16. Powerplant

a, Removal. Refer to TM 9-2350-256-20 for removal and installation instructions and for separating the transmission from the main engine.

b. Main Engine Fuel Pump. Refer to TM 9-2350-256-20 for removal, installation and test of the main fuel pump and the main engine fuel injector pump.

2-17. Controls and Linkages

Refer to TM 9-2350-256-20 for disassembly, repair and installation of the steer and shift, service brake and accelerator controls and linkages.

2-18. Left Rear Fuel Tank

a. General. Before removing any fuel tank, drain or pump out tank to remove all fuel (TM 9-2350-256-20). Leave tank vents or filler cap open to allow fuel vapors to escape.

Perform work out doors whenever possible.

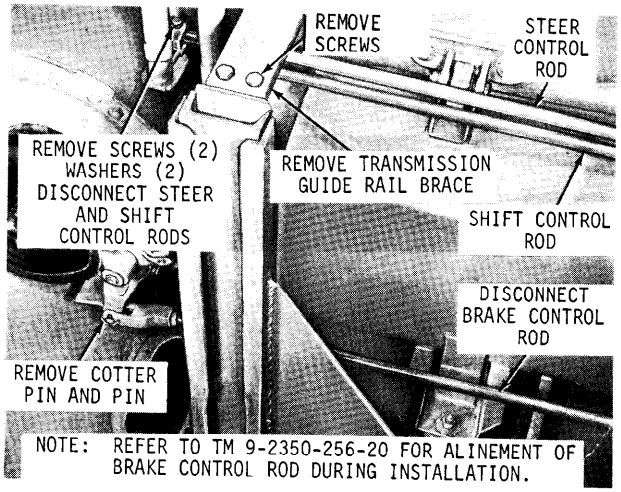
WARNING

Fuel vapor is highly explosive. Every precaution should be used to prevent striking sparks and to keep open flame away from the vicinity of the vehicle when removing fuel tanks,

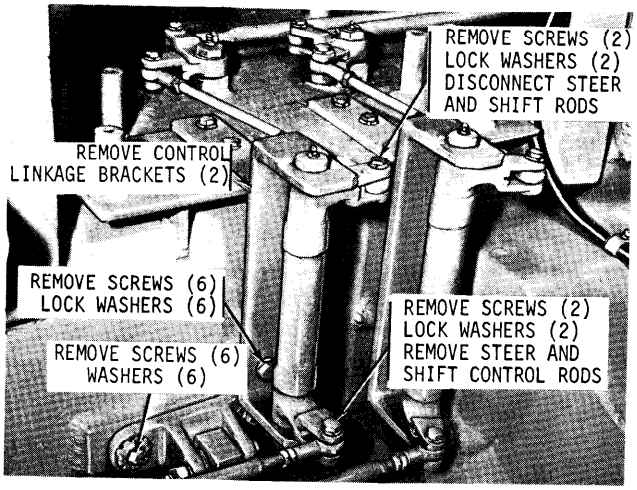
b. Removal. Prior to removal of the left rear fuel tank, remove the engine deck and powerplant (TM 9-2350-256-20), Remove the left rear fuel tank as shown in figure 2-7.

NOTE

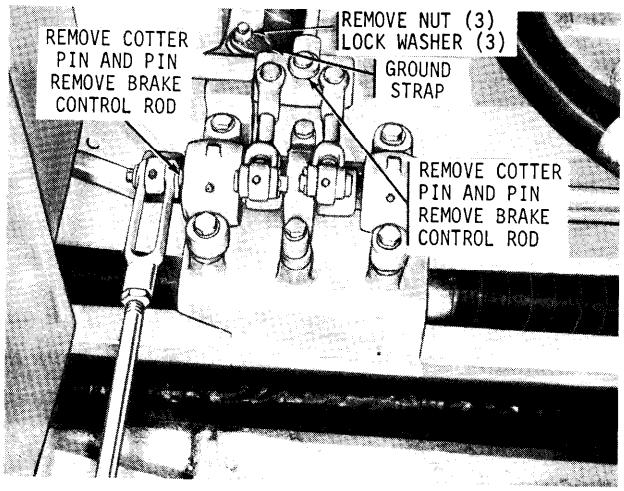
Fittings and accessories may be removed for ventilation purposes before the tank is removed. Refer to TM 9-2350-256-20.



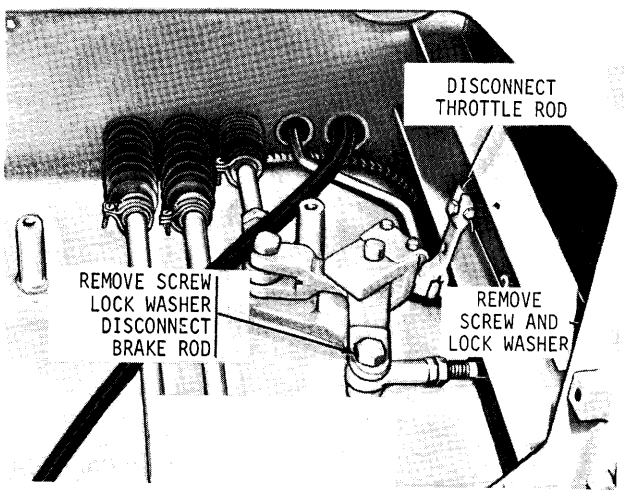
VIEW A. CONTROL LINKAGE AND BRACE.



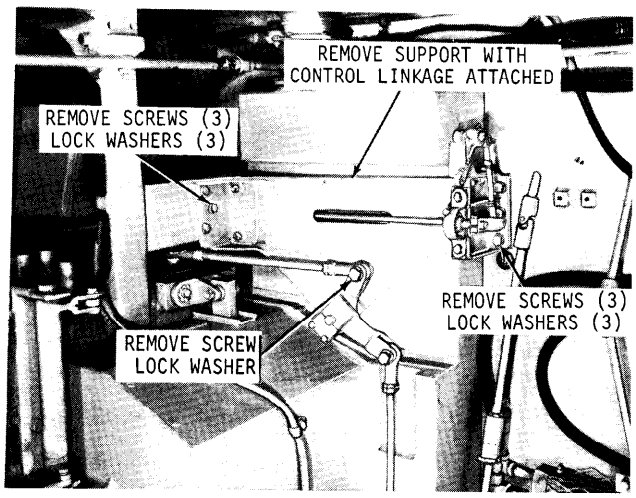
VIEW B. CONTROL LINKAGE BRACKETS AND TANK ATTACHING HARDWARE.



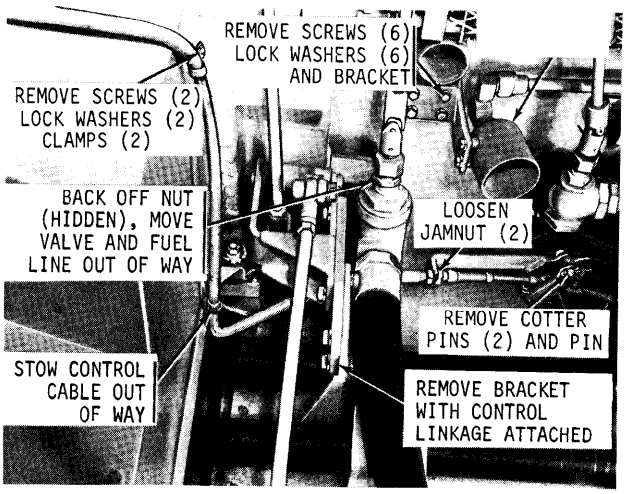
VIEW C. BRAKE CONTROL LINKAGE AND TANK ATTACHING HARDWARE.



VIEW D. BRAKE AND THROTTLE CONTROL.



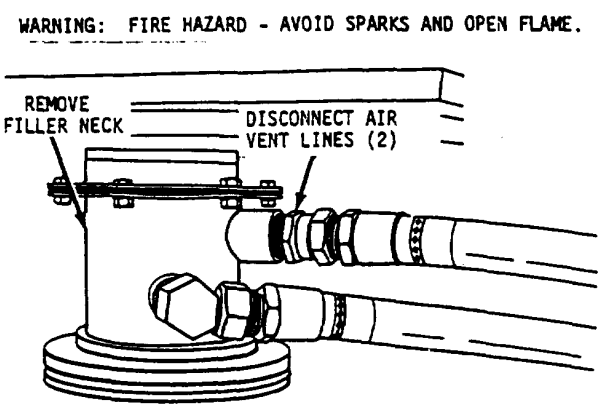
VIEW E. CONTROL ROD SUPPORT.



VIEW F. FUEL LINE, CONTROL CABLE AND CONTROL LINKAGE BRACKET.

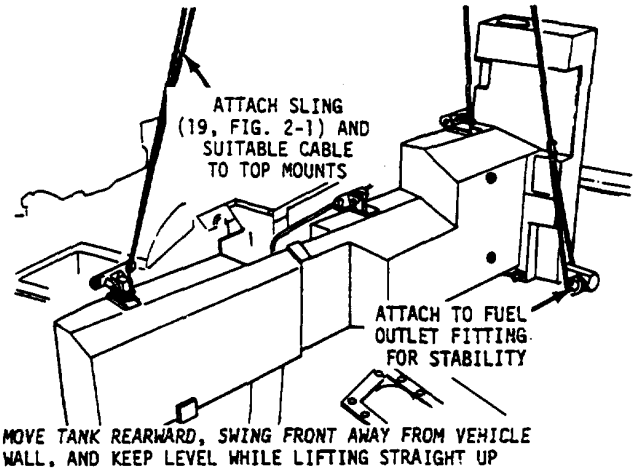
TA016144

Figure 2-7. Left rear fuel tank–removal and installation (Sheet 1 of 2).

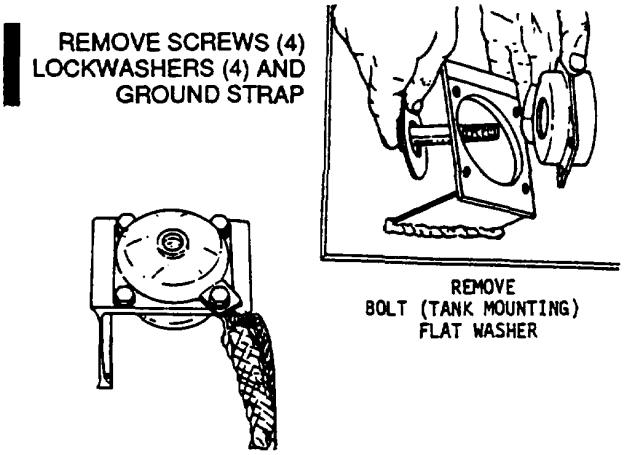


NOTE: USE TAPE OR OTHER MATERIAL TO COVER TANK AND LINE OPENINGS. DO NOT STUFF WITH RAGS.

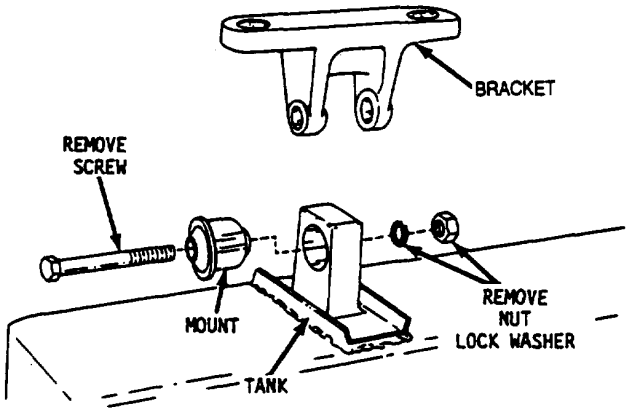
VIEW G. FUEL LINES AND FILLER NECK (REF. TM 9-2350-256-20).



VIEW H. REMOVING TANK.



VIEW I. REPLACING TANK FLOOR MOUNT CUSHIONS. (TYPICAL FOR RIGHT REAR AND FORWARD TANKS).

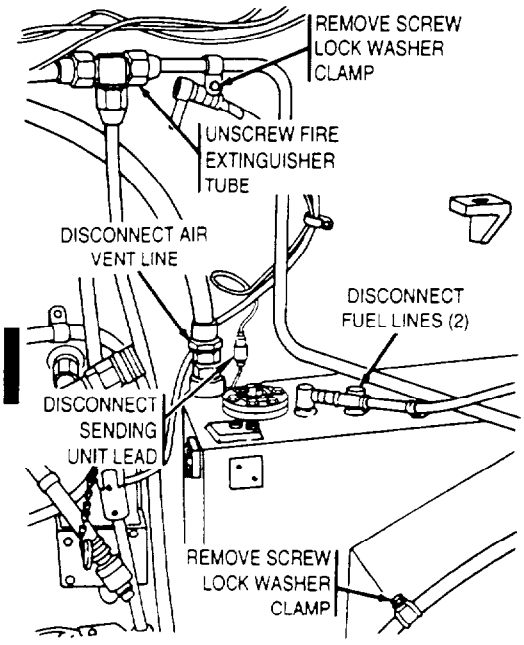


VIEW J. REPLACING TANK UPPER MOUNT CUSHIONS. (TYPICAL OF RIGHT REAR AND FORWARD TANKS)

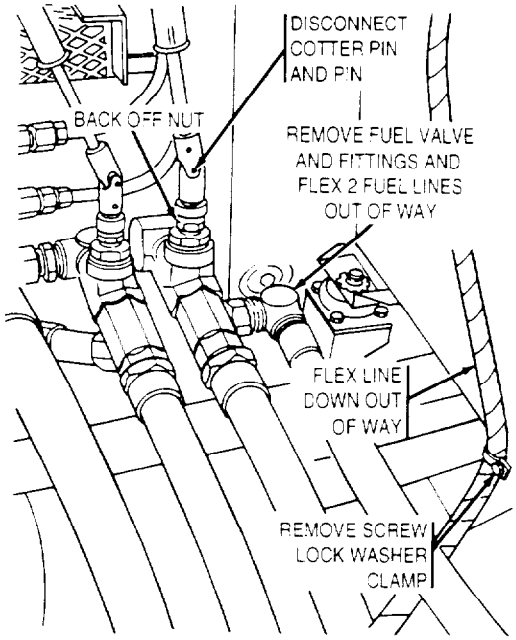
Figure 2-7 Left rear fuel tank removal and installation(Sheet2 of 2).

c Installation Install the left rear fuel tank in reverse order of removal

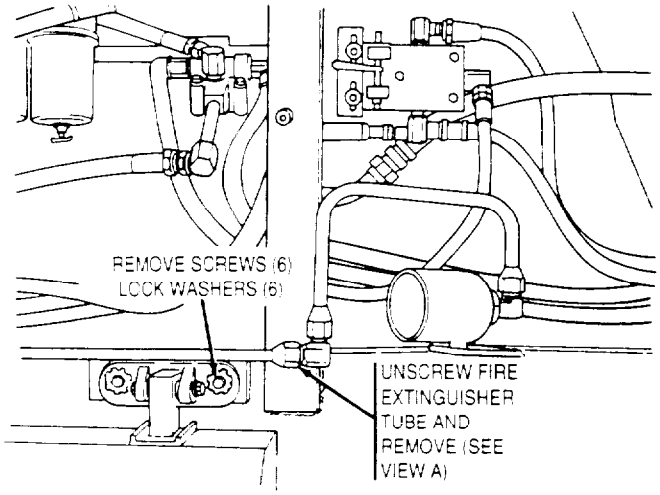
2-19. Right Rear Fuel Tank Procedure for removal and installation of the right rear fuel tank is essentially the same as for left fuel tank (para 2-18 a and *b)* except there is no filler neck to remove and the sending unit may be removed and installed while the tank is either in or out of the vehicle. The auxiliary power unit must be removed prior to removal of the right rear fuel tank (para 2-15). Remove or install the right rear fuel tank as shown in figure 2-8.



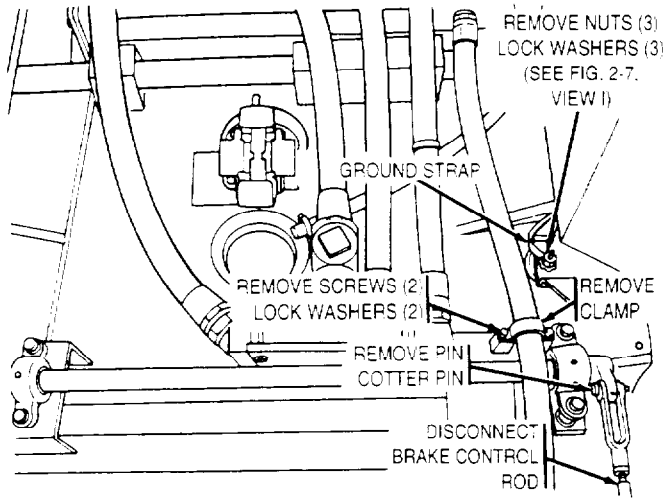
VIEW A. WIRING, LINES, TUBE.



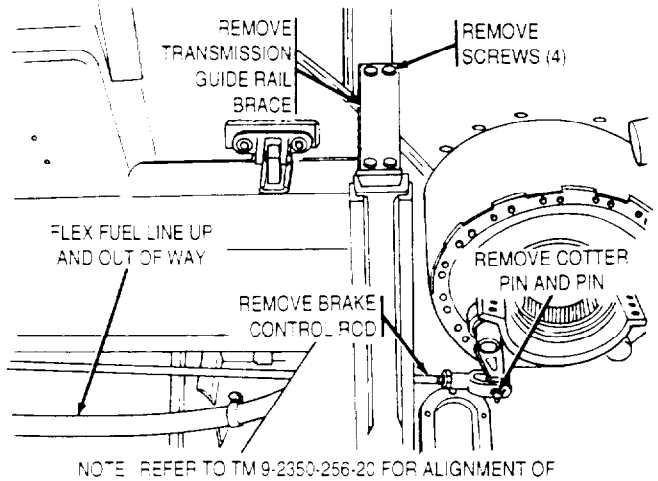
VIEW B. FUEL LINES.



VIEW C. TOP MOUNTS AND TUBE.



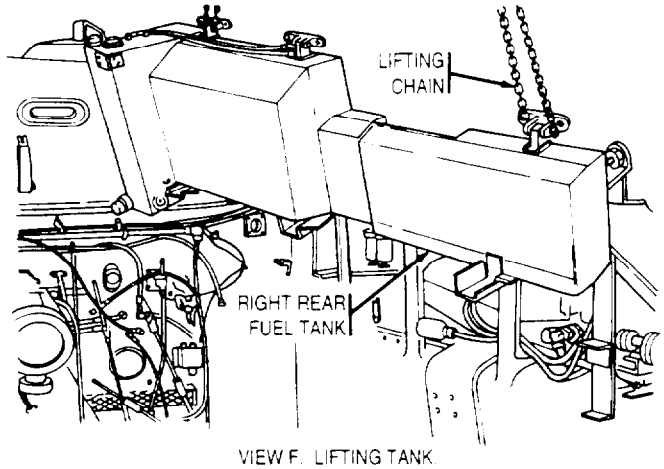
VIEW D. BOTTOM MOUNTS, CONTROL ROD, FUEL LINE CLAMP.



NOTE REFER TO TM 9-2350-256-20 FOR ALIGNMENT OF BRAKE CONTROL ROD DURING INSTALLATION.

VIEW E. CONTROL ROD AND BRACE.

REMOVAL: MOVE TANK REARWARD AND AWAY FROM WALL.
INSTALLATION: REVERSE TANK MOVEMENT.



VIEW F. LIFTING TANK.

Figure2-8. Right rearfuel tank--removal and installation

2-20. Mechanical Tachometer and Speedometer Assembly

Deleted

Figure 2-9. Deleted.

2-21. Electrical Components

a. General. The electrical components allocated for replacement by direct and general support maintenance personnel are the high voltage power pack, bilge pump electrical system components and the miscellaneous leads and wiring harnesses comprising the vehicle electrical installation. The circuit number of each cable is shown on a metal band attached to the junction of terminal end of each cable. Refer to TM 9-2350-256-20 for a listing of the circuit numbers assigned to the vehicle and for the vehicle wiring diagram.

WARNING

Certain precautions must be observed when removing electrical components. Accidental contact of metal tools between battery or starter cables and the frame of the vehicle causes a direct short circuit resulting in arcing and instant heating of the tool to red hot. This can cause painful burns on the hands and serious damage to tools, vehicle components and batteries. Moreover, the overloaded battery may explode, spraying hot acid and sharp fragments over the surrounding area. The correct procedure when removing electrical equipment, harnesses, leads or cables is to first turn off the master switch and then disconnect the battery ground cables. Protect the ground cables from accidental contact with the battery terminals. When the work has been completed, connect the battery ground cables last.

CAUTION

When removing harnesses, leads and cables, check circuit number markers. If any are missing, illegible or damaged to the extent that they might come off, tag cables with correct circuit numbers (refer to applicable wiring or schematic diagrams in this chapter or the vehicle wiring diagram in TM 9-2350-256-20) prior to disconnecting them.

b. Deleted.

Figure 2-10. Deleted.

c Deleted.

Figure 2-11. Deleted.

d Deleted.

e. Bilge Pump Circuit Breaker to Switch Panel Lead Assembly.

(1) *Removal.* Remove lead assembly as shown in figure 2-13.
(2) *Disassembly.* Disassemble lead assembly as shown in figure 3-20.
(3) *Assembly.* Assemble lead assembly in reverse order of disassembly.
(4) *Installation.* Install lead assembly in reverse order of removal.

Figure 2-12. Deleted.

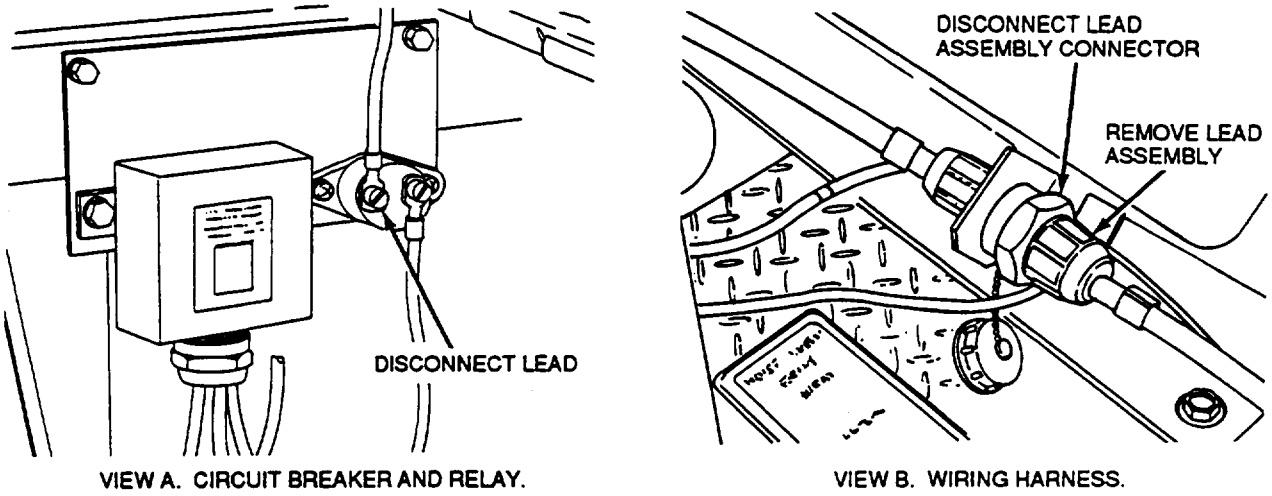


Figure 2-13. Bilge pump circuit breaker to switch panel lead assembly--.removal and installation.

f. Deleted

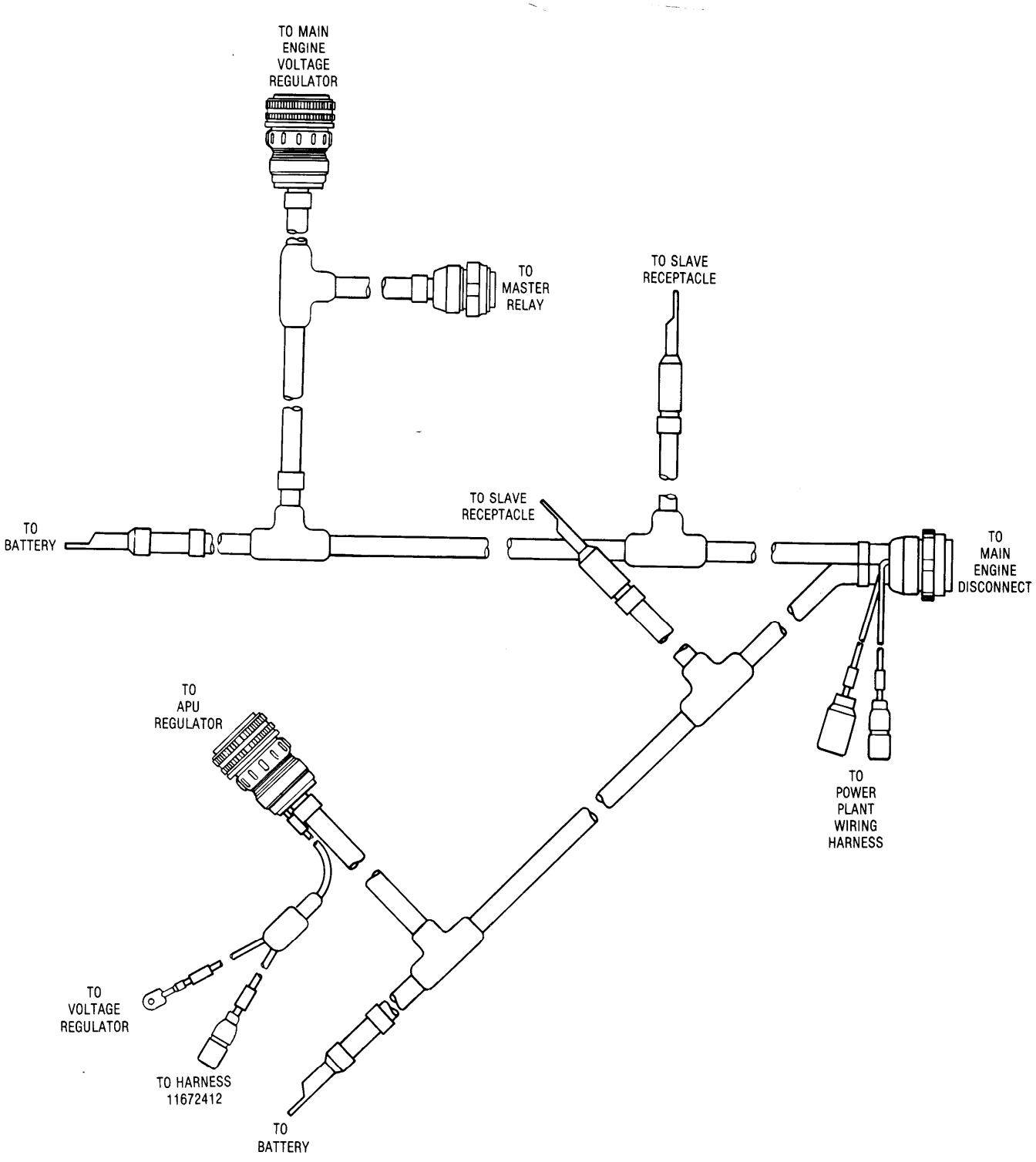


Figure 2-14. Batteries to master relay, main engine and APU, voltage regulators, main engine disconnect and slave receptacle cable assembly—removal and installation.

Legend for fig. 2-14: Deleted

g. Emergency Flasher Circuit (No. 325) Wiring Harness.

(1) *Removal*

(a) Disconnect the harness from the left front red flasher indicator lamp. Remove the shell, washer, and ferrule from the cable (fig. 3-20) so that cable can slide through narrow opening.

(b) Remove interfering components as required for access at various points. Disconnect cable connectors, loosen. or remove any cable clamps and remove wiring harness.

(2) *Installation*

(a) Replace missing or defective chassis grommets.

(b) Install wiring harness in reverse order of removal, threading the cable through to the front red flasher indicator lamp without the connector installed.

(c) Install the ferrule, washer, and shell as shown in figure 3-20 and connect to the indicator lamp.

h. Powerplant Wiring Harness.

(1) *Removal* Prior to removal of the powerplant wiring harness, remove engine deck assembly (TM 9-2350-256-20). Remove interfering components as required for access. Remove powerplant wiring harness as shown in

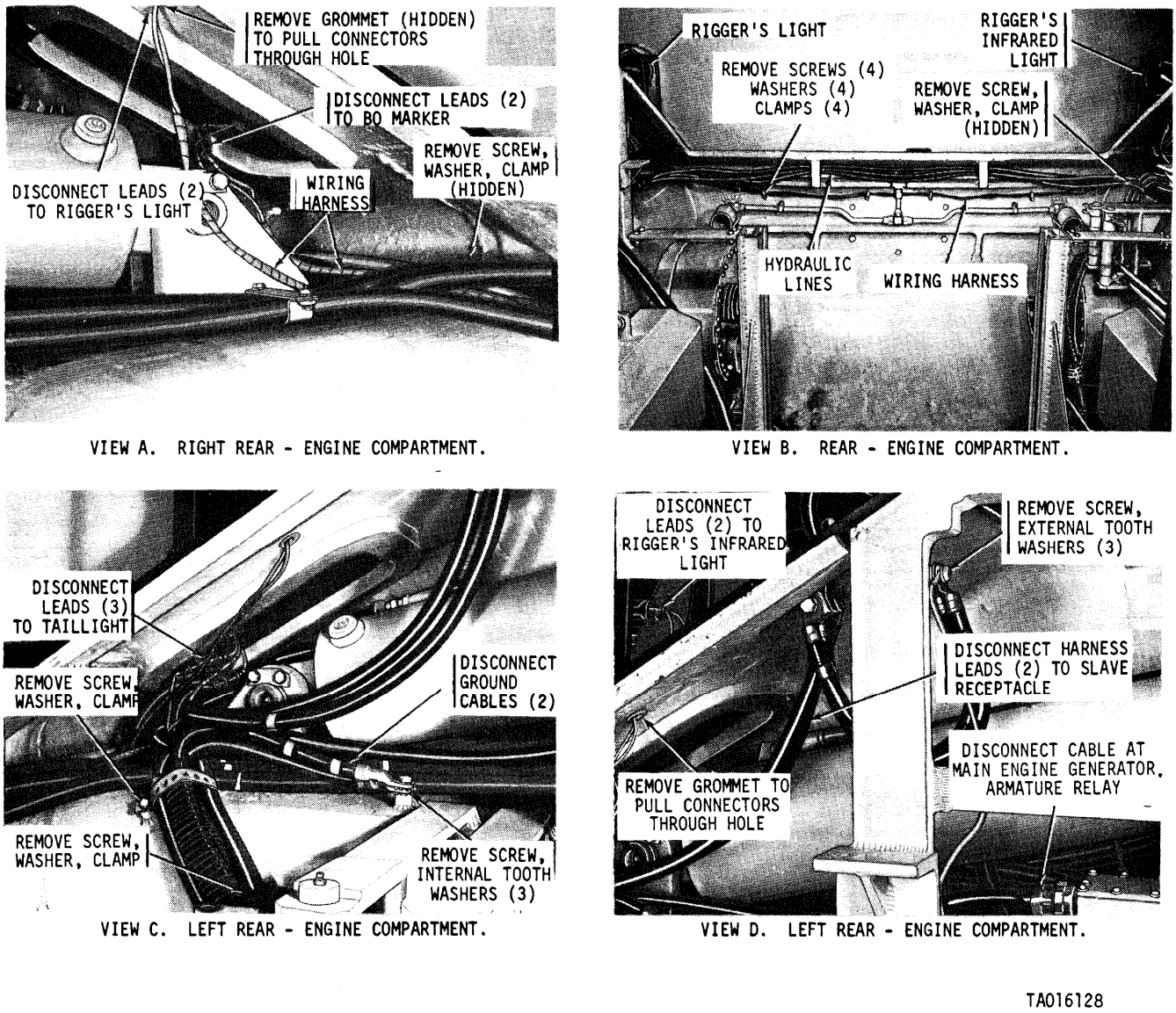
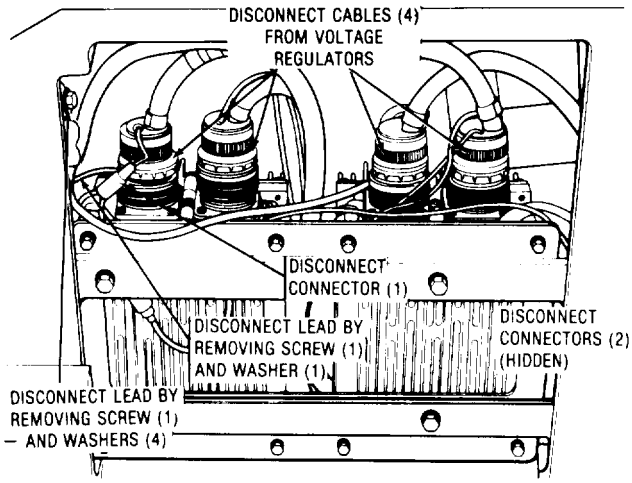
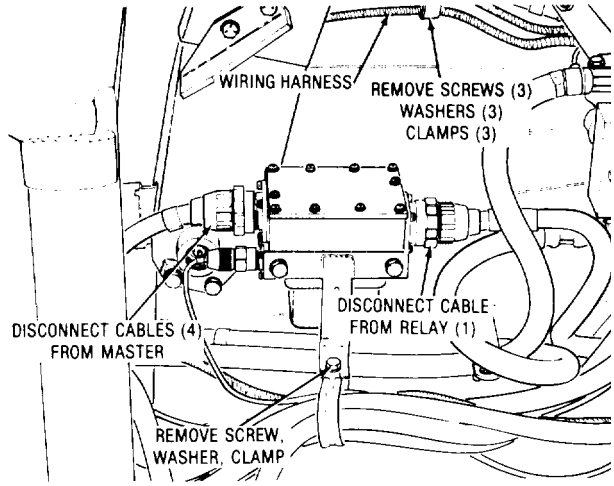


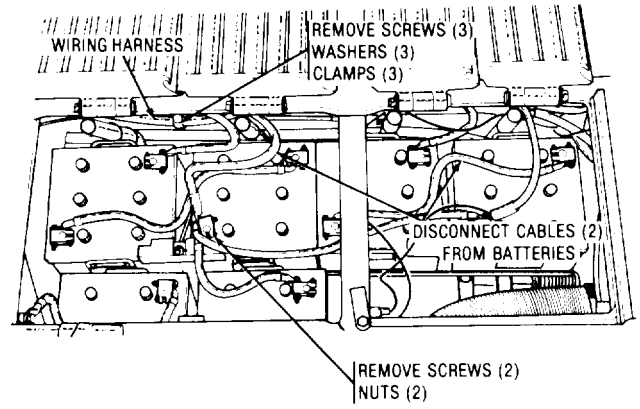
Figure 2-15. Powerplant wiring harness–remoual and installation. (Sheet 1 of 2).



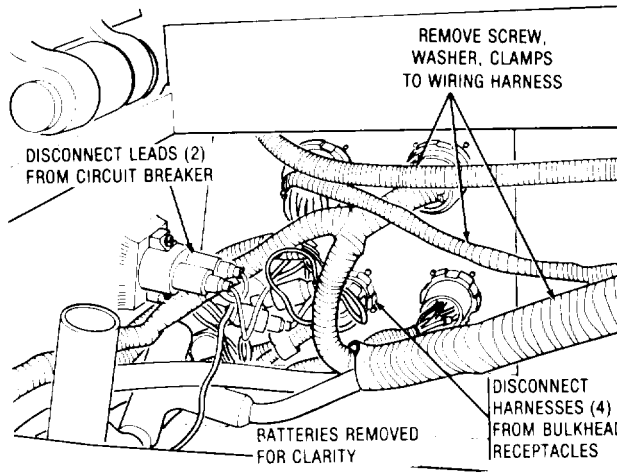
VIEW E. LEFT SIDE REAR - ENGINE COMPARTMENT.



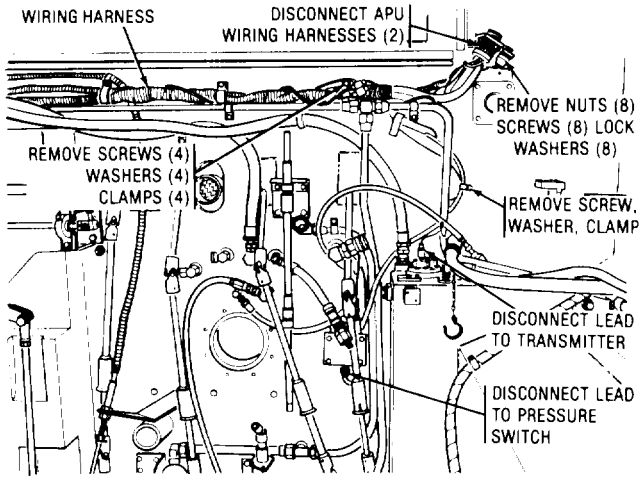
VIEW F. LEFT SIDE CENTER - ENGINE COMPARTMENT



VIEW G. LEFT SIDE FRONT - ENGINE COMPARTMENT.



VIEW H. LEFT SIDE FRONT CORNER - ENGINE COMPARTMENT.



VIEW I. RIGHT FRONT - ENGINE COMPARTMENT.

TA171399

Figure 2-15. Powerplant wiring *harness– removal and installation (Sheet 2 of 2)*

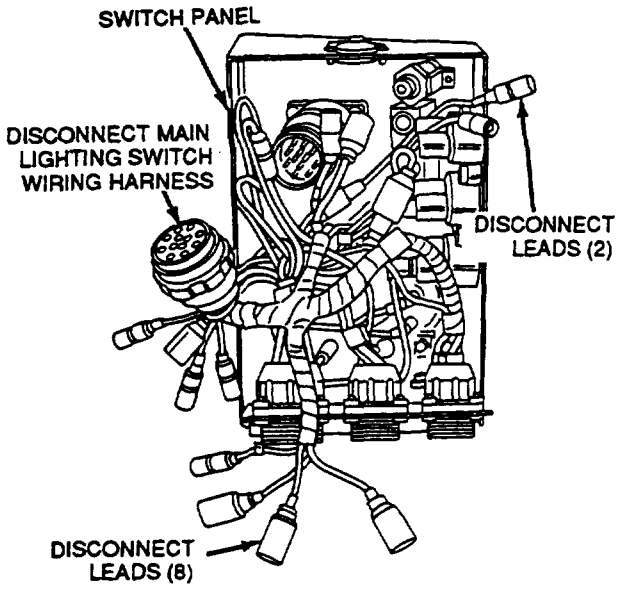
(2) *Installation.* Install the powerplant wiring harness in reverse order of removal, replacing missing or defective grommets.

i Deleted

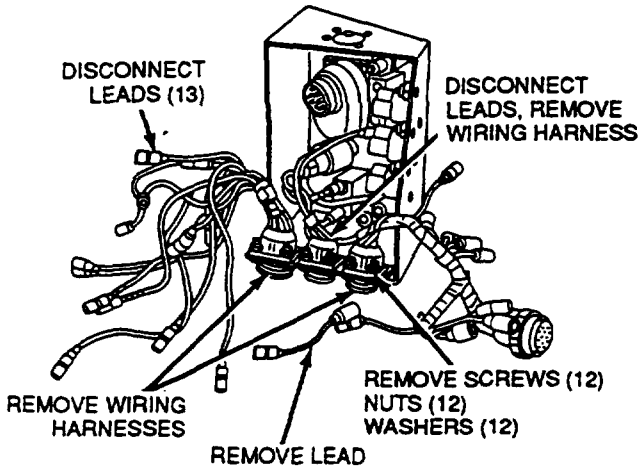
(2) *Deleted.*

■ *k. Main Lighting and Blackout Switch Wiring Harness.*

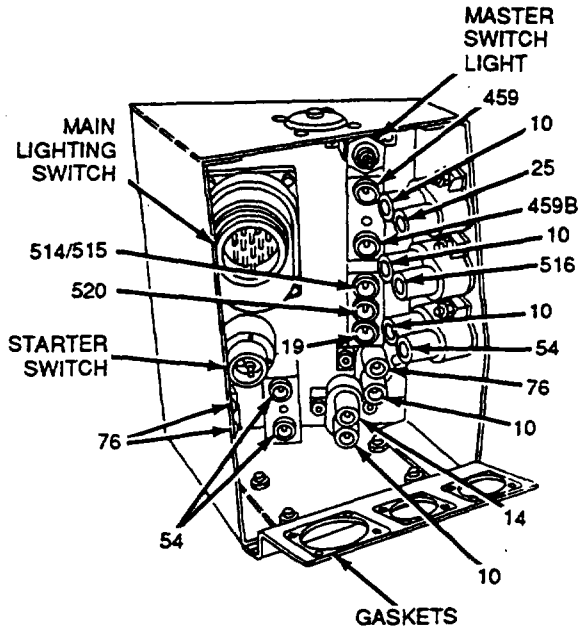
(1) *Removal.* Prior to removing the switch panel wiring harnesses and leads, remove the switch panel from the vehicle (TM 9-2350-256-20), Remove three leads (No. 520 connecting No. 520 from the light switch panel connector to the blackout selector, No. 54 from fuel shutoff switch to circuit breaker, and No. 76 from fuel pump switch to circuit breaker) and remove three wiring harnesses as shown in figure 2-18.



VIEW A. MAIN LIGHTING SWITCH WIRING HARNESS.

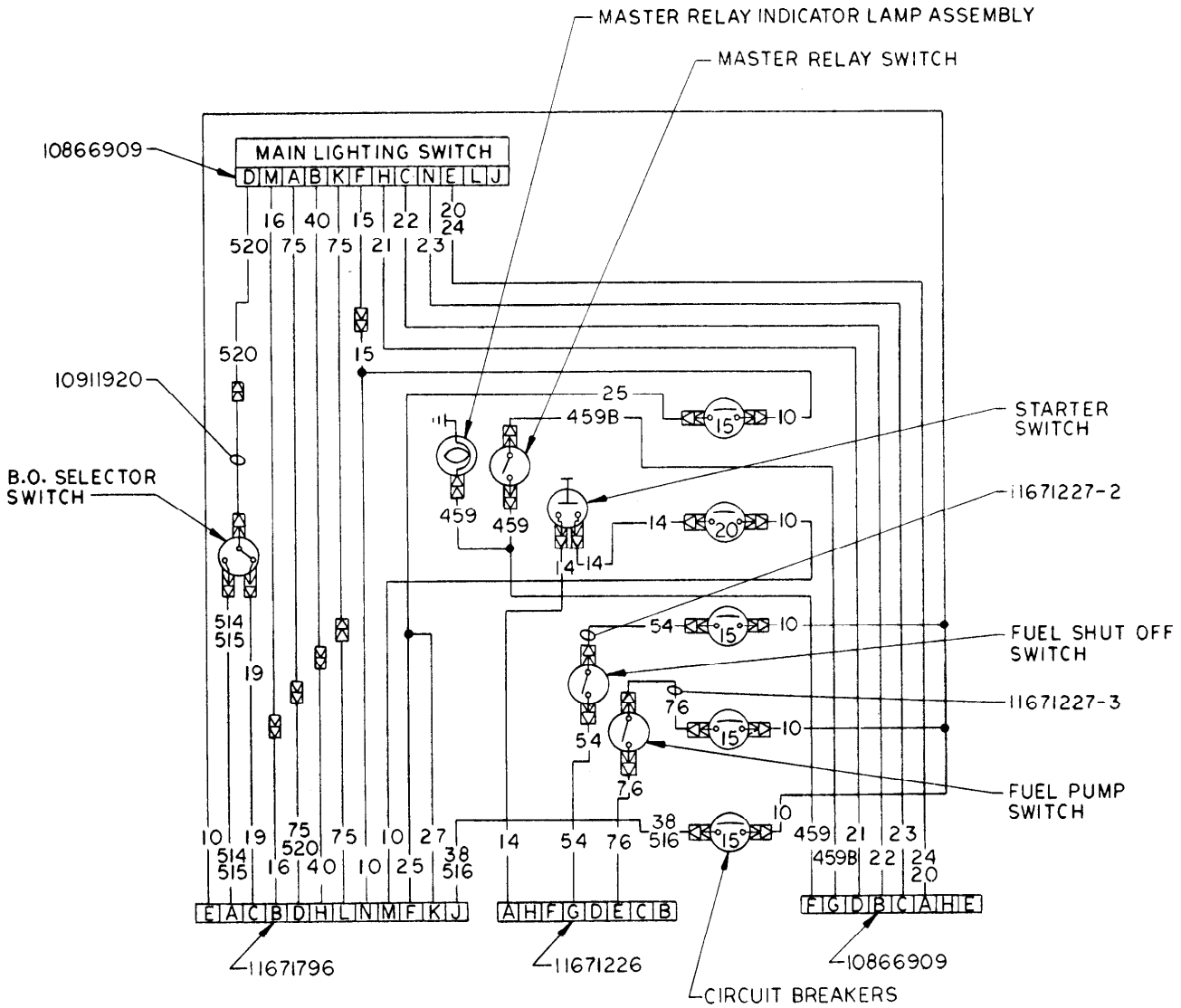


VIEW B. WIRING HARNESSES AND LEADS.



VIEW C. MAIN SWITCH PANEL—REAR VIEW.

Figure 2-18. Main lighting and blackout switch wiring harness—removal and installation (Sheet 1 of 2).



View D. Switch panel wiring diagram.

TA015992

Figure 2-18. Main switching panel wiring harness and leads–removal and installation (Sheet 2 of 2).

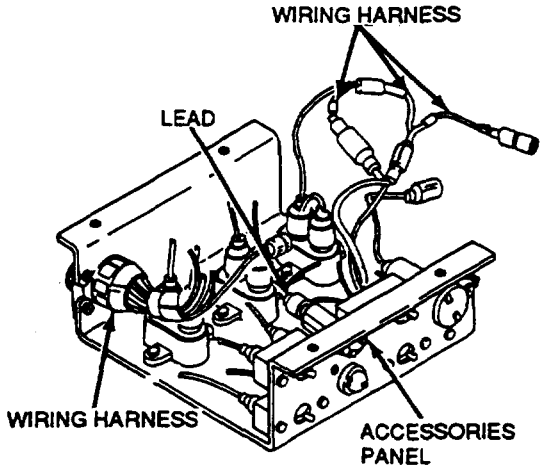
(2) *Installation.* Install the switch panel wiring harnesses and leads in reverse order of removal, being careful to match circuit number markers to the correct receptacles as shown in View C, figure 2-18.

l. Accessories Panel Wiring Harness and Leads.

(1) *Removal.* Prior to removing the accessories panel wiring harness and leads, remove the accessories panel from the vehicle (TM 9-2350-256-20). Remove the wiring harness assembly and leads as shown in figure 2-19.

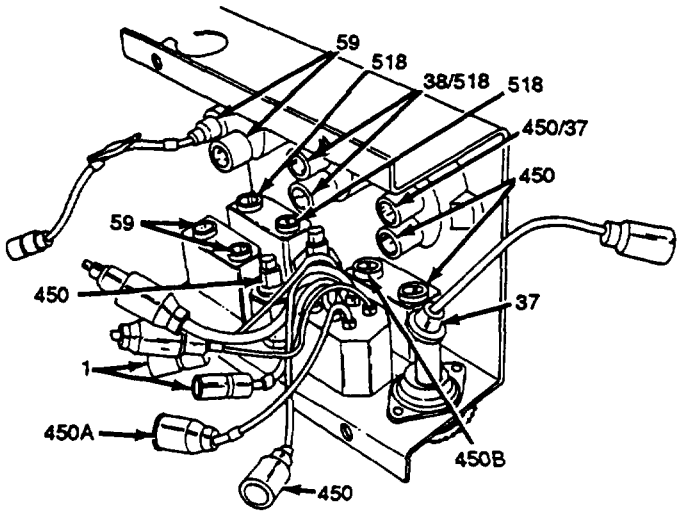
(2) Disassembly. Disassemble the wiring harness assembly and leads as shown in figure 320.

(3) *Assembly.* Assemble the wiring harness assembly and leads in reverse order of disassembly.



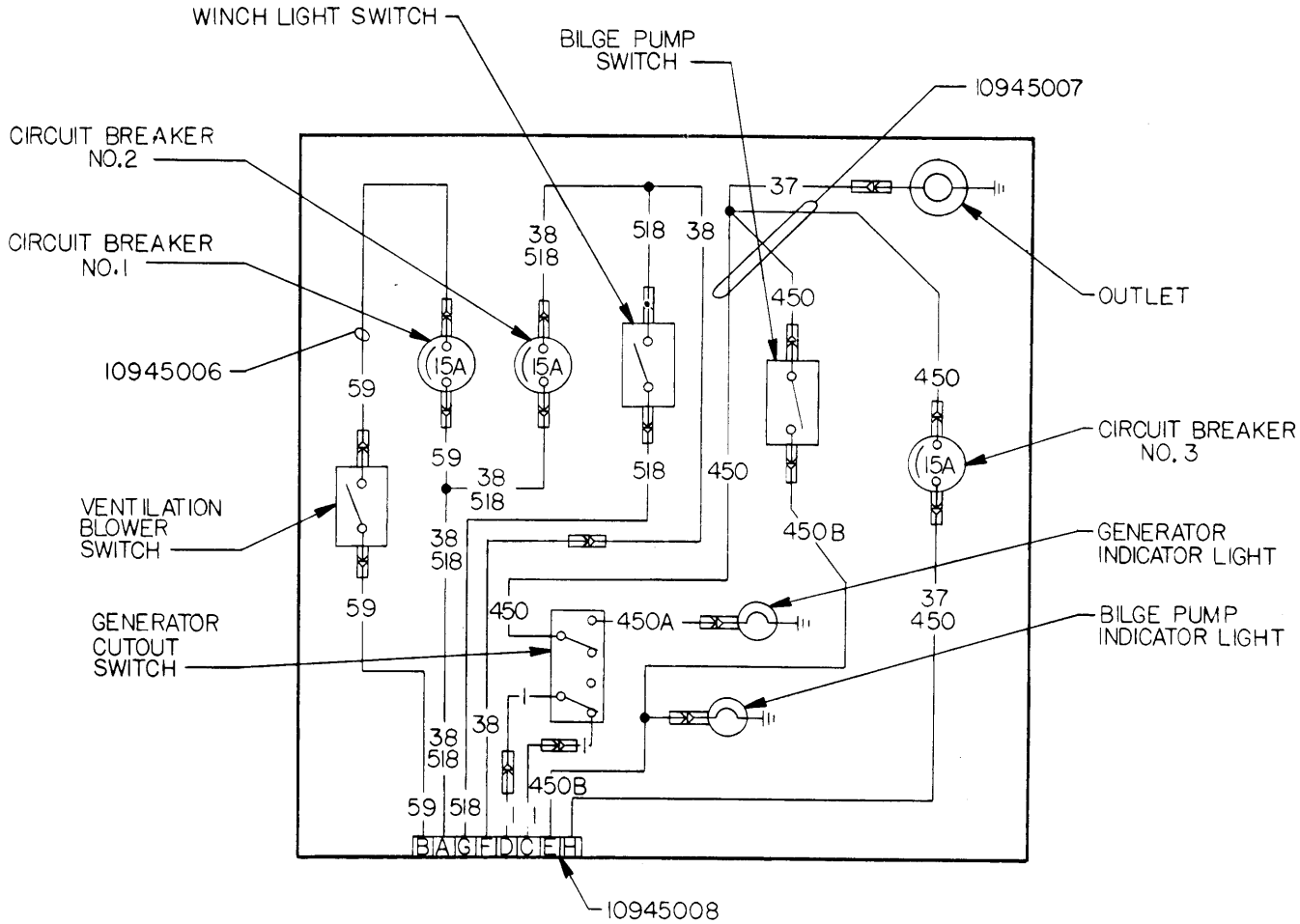
VIEW A. ACCESSORIES PANEL WITH WIRING HARNESS AND LEADS INSTALLED.

NOTE: UNIDENTIFIED PLUGGED LEADS NOT USED.



VIEW B. ACCESSORIES PANEL—REAR VIEW.

Figure 2-19. Accessories panel wiring harness wad leads--removal and installation (Sheet 1 of 2).



View C. Accessories panel wiring diagram.

TA016014

Figure 2-19. Accessories panel wiring harness and leads–removal and installation (Sheet 2 of 2).

(4) Installation. Install the accessories panel leads and wiring harness in reverse order of removal, being careful to match circuit number markers to the correct receptacles as shown in View B, figure 2-19.

m Miscellaneous Individual Wiring Harnesses, Leads and Cables. '

(1) G*eneral* The various wiring harnesses, leads and cables comprising the powerplant and hull main wiring harnesses can be removed individually. Refer to paragraphs 2-21 f and g for those requiring special handling.

(2) *Removal* Remove interfering components as required for access at various points. Disconnect cable connectors, loosen or remove any cable clamps and remove wiring harness, lead or cable.

(3) *Installation* Install wiring harness, lead or cable, tighten or install cable clamps and connect cable connectors in reverse order of removal.

Always take care that the cables being connected bear the same circuit numbers.

n. Storage Batteries. Refer to TM 9-2350-256-20 for removal and installation instructions for the vehicle storage batteries.

2-22. Main Winch Cable a *Removal.* Pay out cable (TM 9-2350-256-10) prior to removing it from the vehicle. Refer to TM 9-2350-256-20 for removal and installation instructions for main winch.

b. Installation.
Check cable level winding on winch drum by operating winch and inspecting cable as it winds on drum. If cable does not spool evenly and fully across the drum, adjust level cylinder piston travel (TM 9-2350-256-20).

2-23. Hoist Winch Cable

a. Removal Pay out cable (TM 92350-256-10) prior to removing it from vehicle.

b *Installation.* Refer to TM 9-2350-256-20 for removal and installation instructions for hoist winch cables.

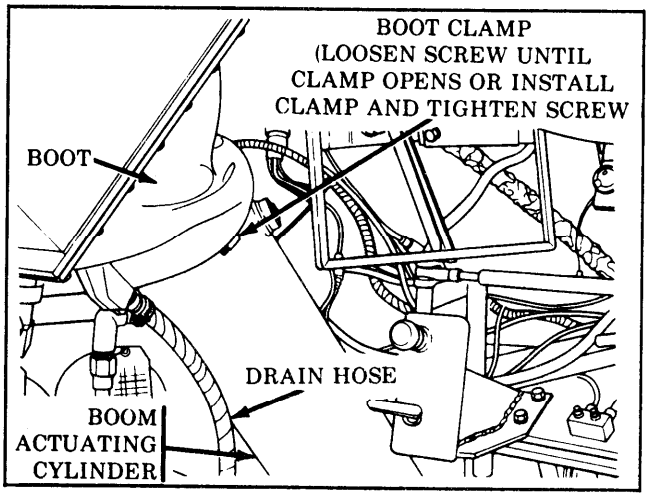
2-24. Hoisting Boom Assembly

NOTE

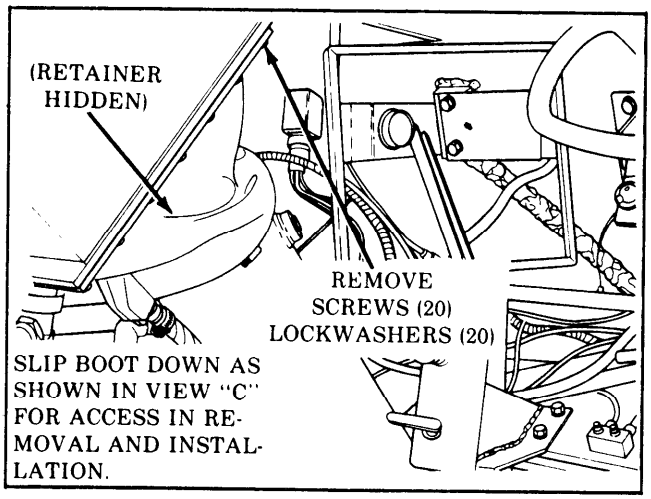
LOAD TEST REQUIREMENT

a. Load testing of hoist winch and boom is mandatory, prior to use, under any of the following conditions:
   (1) When new.
   (2) Following any repairs, disassembly and assembly, adjustments, or parts replacement, of hoist winch or boom.
   (3) When 'modifications are made that could affect the strength or lifting capabilities of the vehicle.
b. Load testing will be accomplished by support maintenance activities.
c. Refer to TM 92350-256-34-2 for detailed step-by-step procedure.

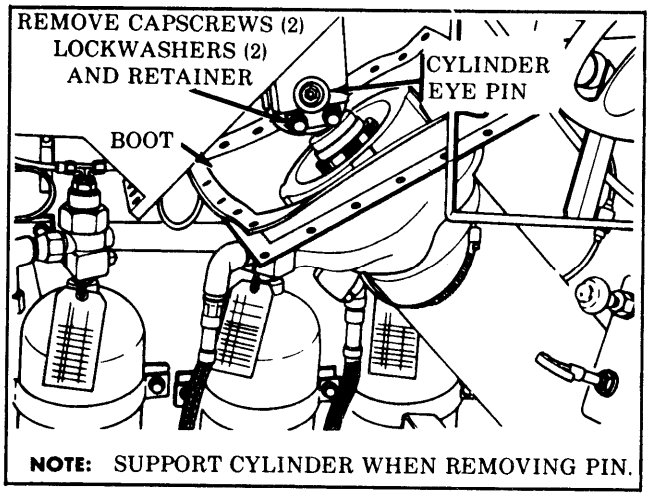
a.. Removal Remove the hoisting boom assembly as shown in figure 2-21.



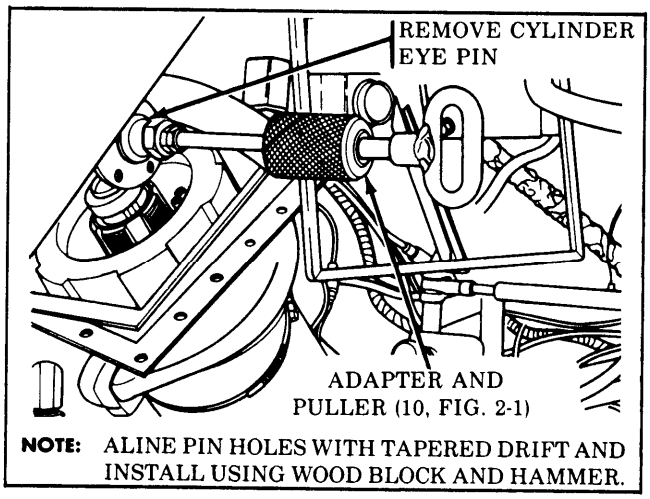
VIEW A. BOOT CLAMP AND DRAIN HOSE.



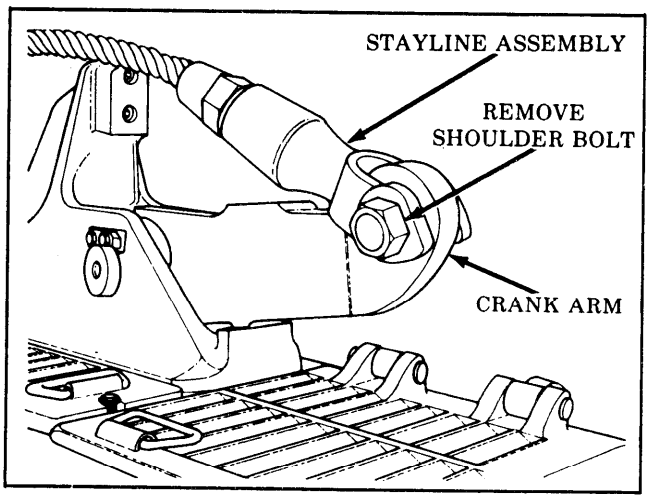
VIEW B. POSITION BOOT FOR ACCESS.



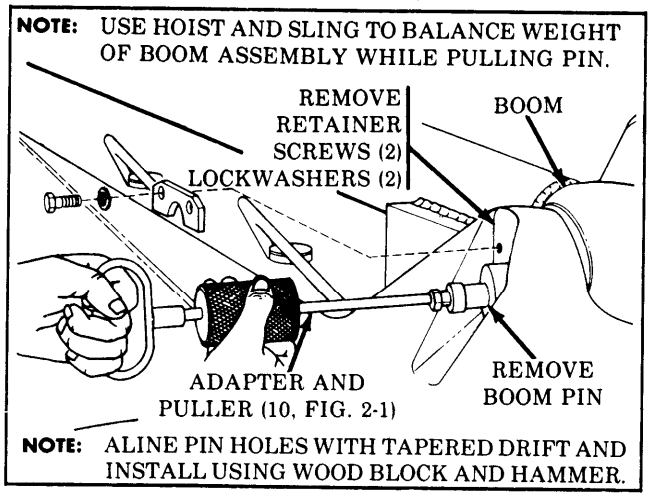
VIEW C. PIN RETAINER.



VIEW D. CYLINDER PIN (UPPER).



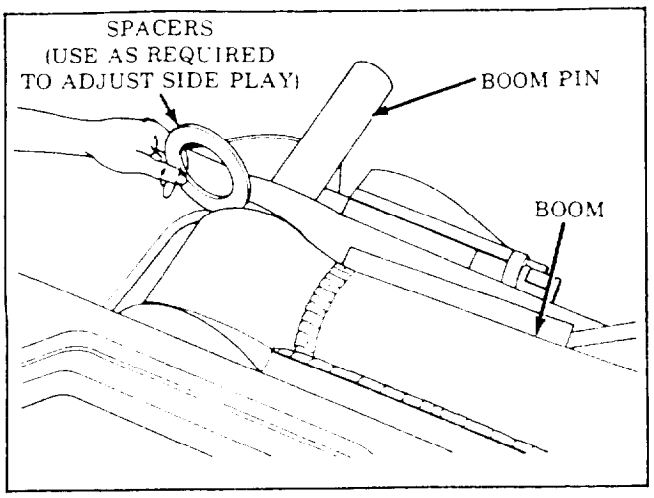
VIEW E. DISCONNECT STAYLINE.



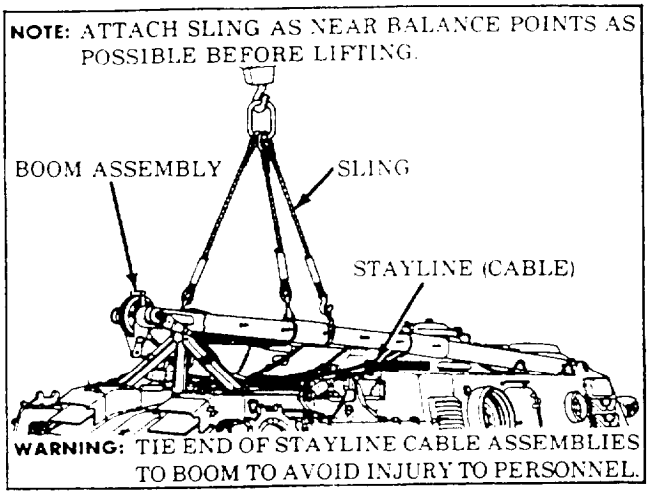
VIEW F. BOOM PIN.

Figure 2-21. Hoisting boom - removal and installation (Sheet 1 of 2).

TA171781



VIEW G. SPACER WASHER



VIEW H. BOOM

Figure 2-21. Hoisting boom removal and installation (Sheet 2 of 2).

b. Installation. Install the hoisting boom assembly in reverse order of removal.

NOTE

If boot (fig. 2-21. views B and C) is replaced. use part number 11673351 and adhere joining strips at installation using adhesive type II, specification MMM-A-121 or MMM-A-1617.

2-24.1. Hoisting Boom Removal

WARNING

Removal of hoisting boom when both the main engine and auxiliary power unit engine are inoperable is a safety hazard and may cause injury to personnel.

a. Removal. Remove boom in accordance with figure 2-21.

(1) After powerplants are operable, start hydraulic system and exercise the boom cylinders through their entire stroke to purge all air from cylinders.

b. Installation. Install hoisting boom assembly in reverse order of removal.

2-24.2. Elevating Hoisting Boom

Deleted

2-25. Main Winch and Spade Assembly

NOTE

a. Load testing of main winch is mandatory prior to use. under any of the following conditions:

(1) When new.

(2) Following any repairs. disassembly and assembly, adjustments, or parts replacement.

(3) When modifications are made that could affect the strength or lifting capabilities of the vehicle.

b. Load testing will be accomplished by support maintenance activities.

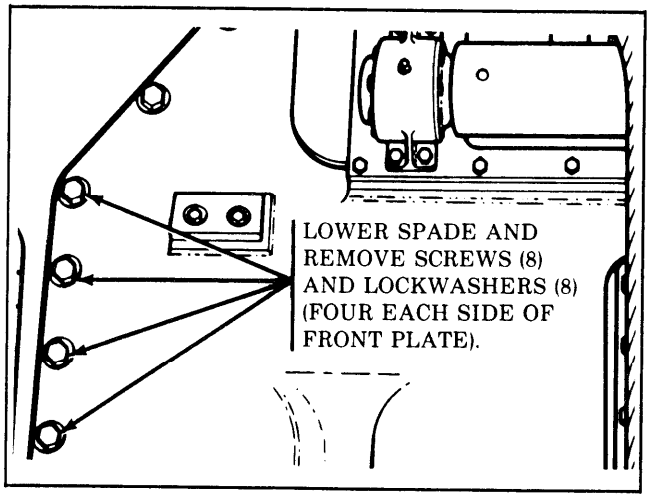
c. Refer to TM 9-2350-256-34-2 for detailed step-by-step procedure.

NOTE

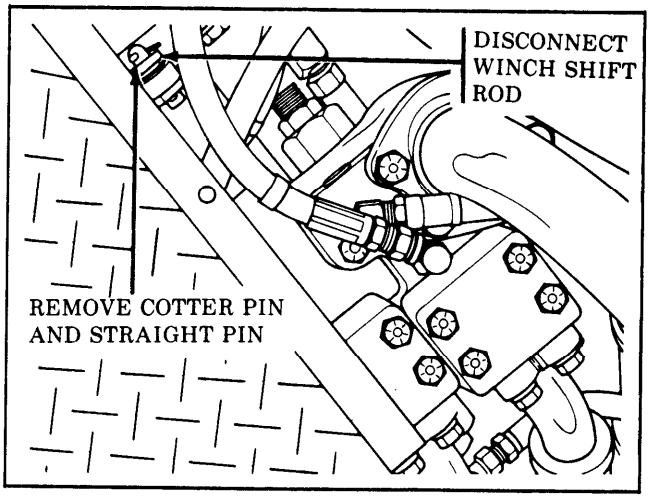
If your vehicle has main winch assembly 8739010-11 or 8739010-1, send winch assembly to depot maintenance for removal of anti-chatter kit.

a. *Removal* Prior to removing the main winch and spade, remove subfloor plates 2. 3, 4 (fig. 2-3) and open doors of subfloor plates 3, 21 (fig. 2-3). Remove the winch cable (para 2-22). Remove the main winch and spade assembly as shown in figure 2-22.

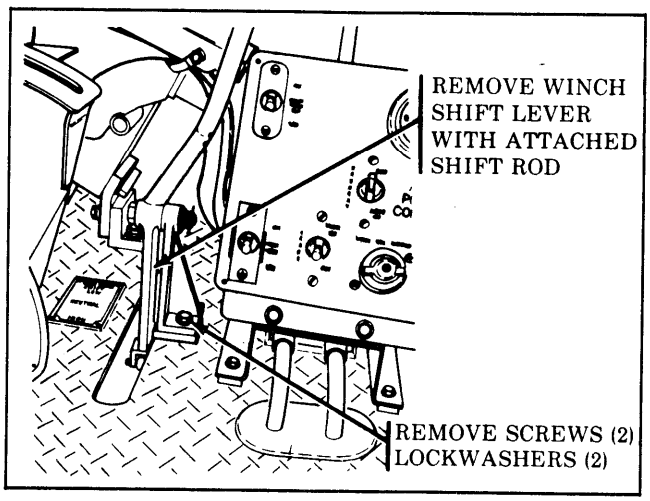
TA171782



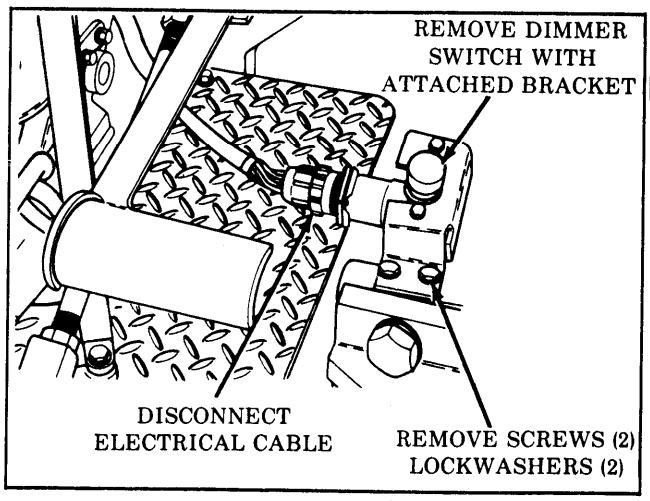
VIEW A. LOCK SPADE.



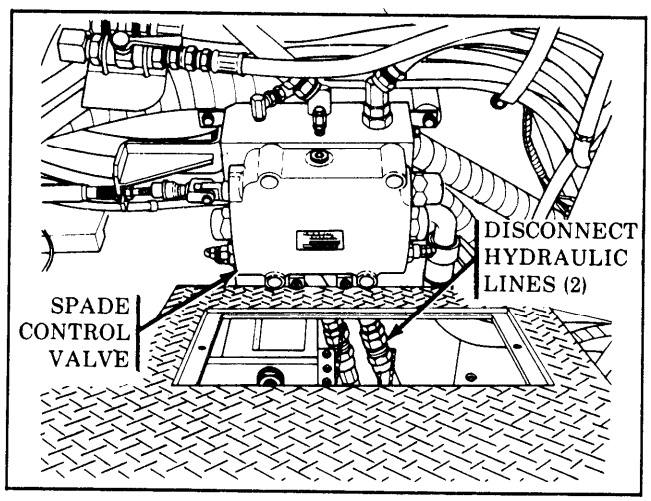
VIEW B. WINCH SHIFT ROD.



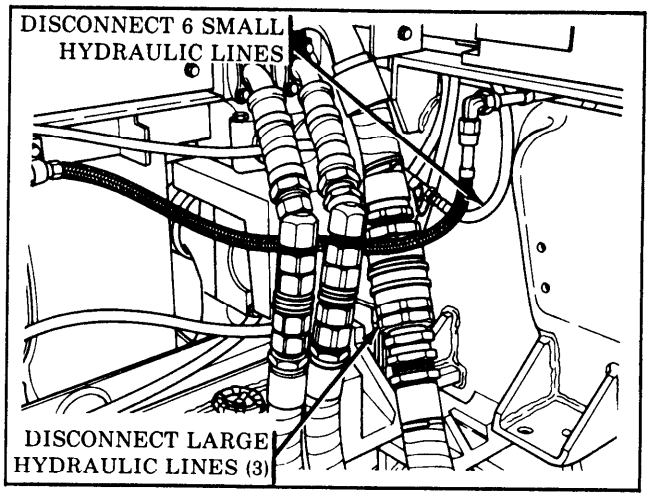
VIEW C. WINCH SHIFT LEVER.



VIEW D. DIMMER SWITCH.



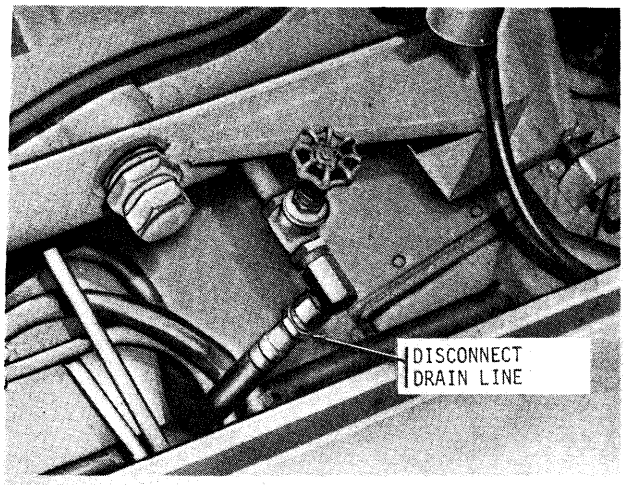
VIEW E. HYDRAULIC LINES.



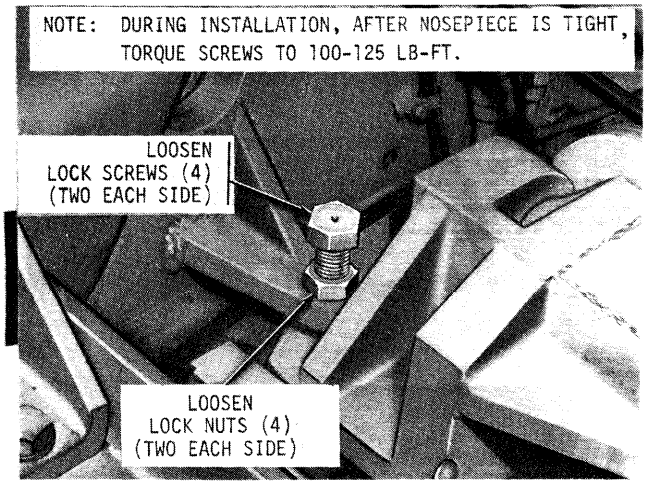
VIEW F. HYDRAULIC LINES.

Figure 2-22. Main winch and spade assembly - removal and installation (Sheet 1 of 2).

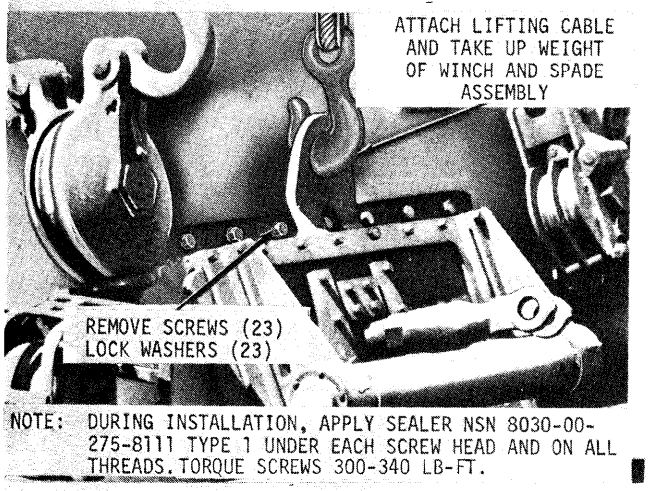
TA171783



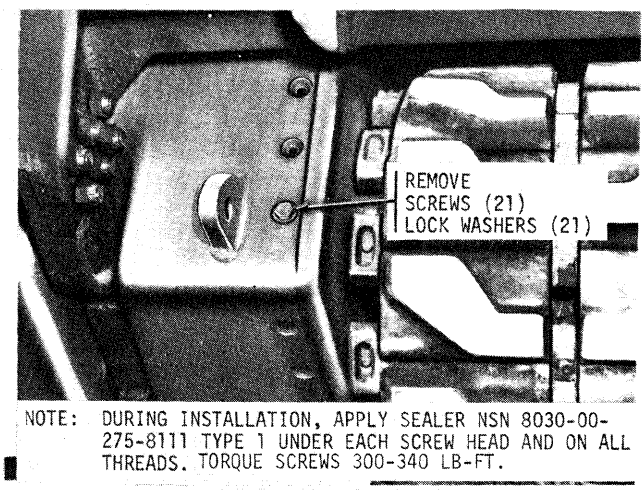
VIEW G. DRAIN LINE.



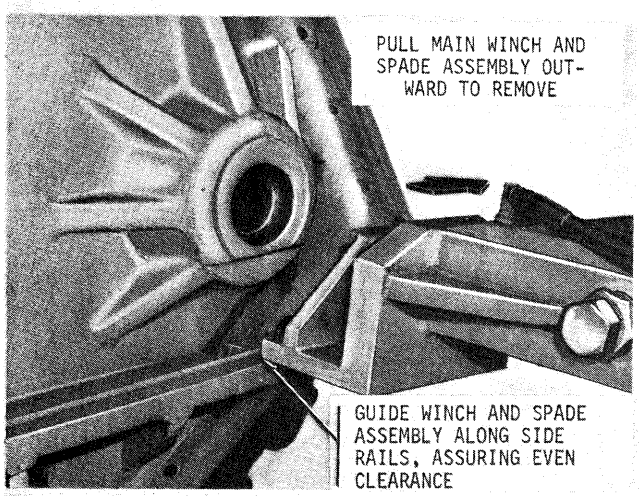
VIEW. H. SUPPORT



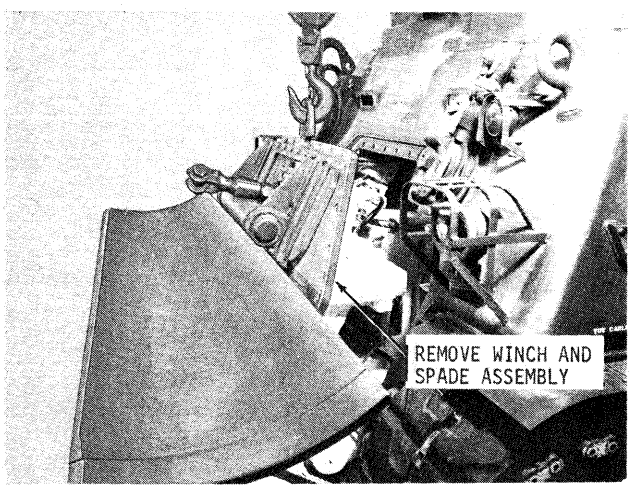
VIEW I. NOSEPIECE.



VIEW J. NOSEPIECE.



VIEW K. REMOVING WINCH AND SPADE ASSEMBLY.



VIEW L. REMOVING WINCH AND SPADE ASSEMBLY.

TA039257

Figure 2-22. Main winch and spade assembly– removal and installation (Sheet 2 of 2).

b. Installation. Install the main winch and spade assembly in reverse order of removal, coating mating surfaces with sealant tape, 10894309. Install the winch cable (para 2-22).

2-26. Main Winch Motor

NOTE

Use Hydraulic Motor Kit, 11672160 on retrofitted vehicles when replacing a motor which is not a Dennison Model No. M4E-185-3N00-B101-M40712. Remove subfloor plates 3, 4, 24 (fig. 2-3). Remove and install the main winch motor as shown in figure 2-23.

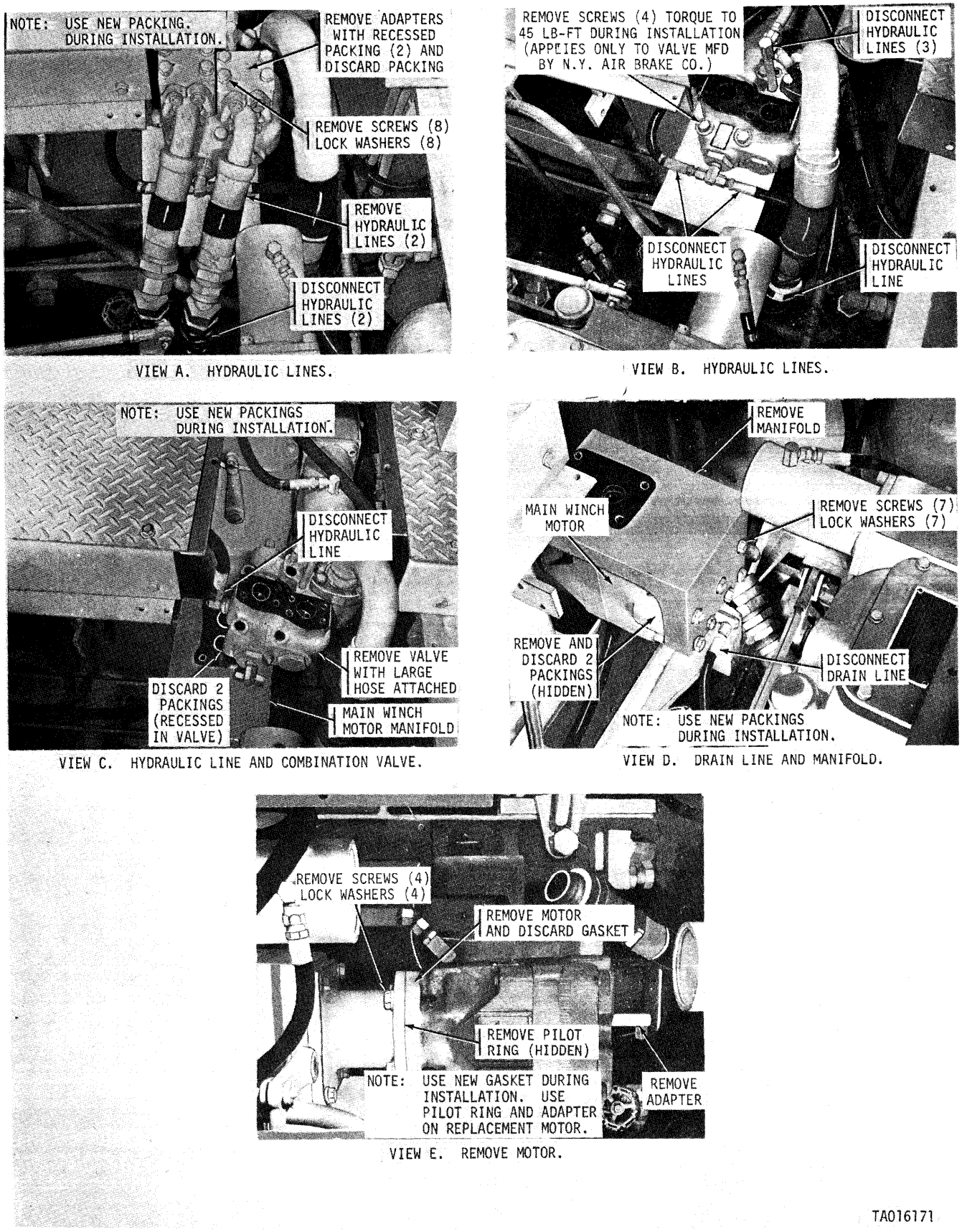


Figure 2-23. Main winch motor-removal and installation.

2-27. Main Winch Level Winder Arm Assembly

Remove and install the level winder arm assembly as shown in figure 2-24.

2-28. Spade Lock Control

The spade lock control components are accessible without removing the main winch and spade. Refer to TM 9-2350-256-20 for removal, repair and installation instructions.

2-29. Boom and Stayline Actuating Cylinder Assemblies and Stayline Actuating Cylinder Crank Arms

a. Boom Stayline Actuating Cylinders.

(1) *Removal.* Prior to removing the boom stayline actuating cylinders, raise boom (TM 9-2350-256-10) so that cylinder pistons are retracted and remove engine deck (TM 9-2350-256-20). Remove access plates 9, 17 (fig. 2-2). Remove boom stayline actuating cylinders as shown in figure 2-25.

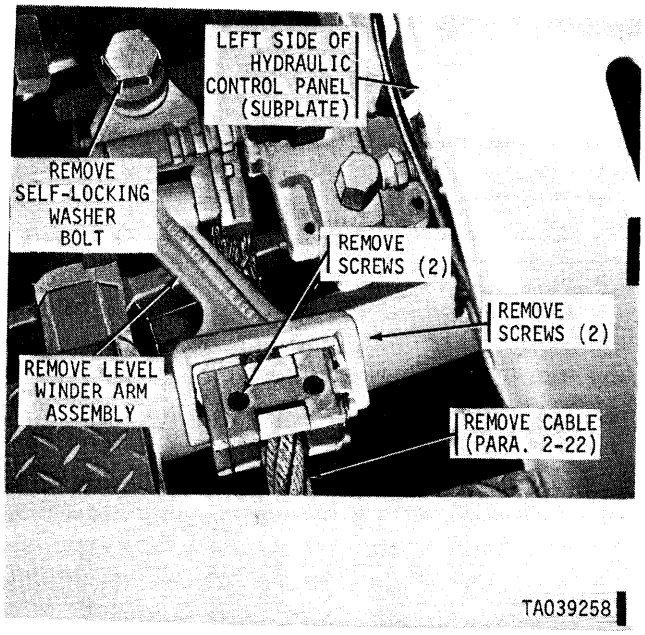


Figure 2-24. Main winch cable and level winder arm assembly—removal and installation.

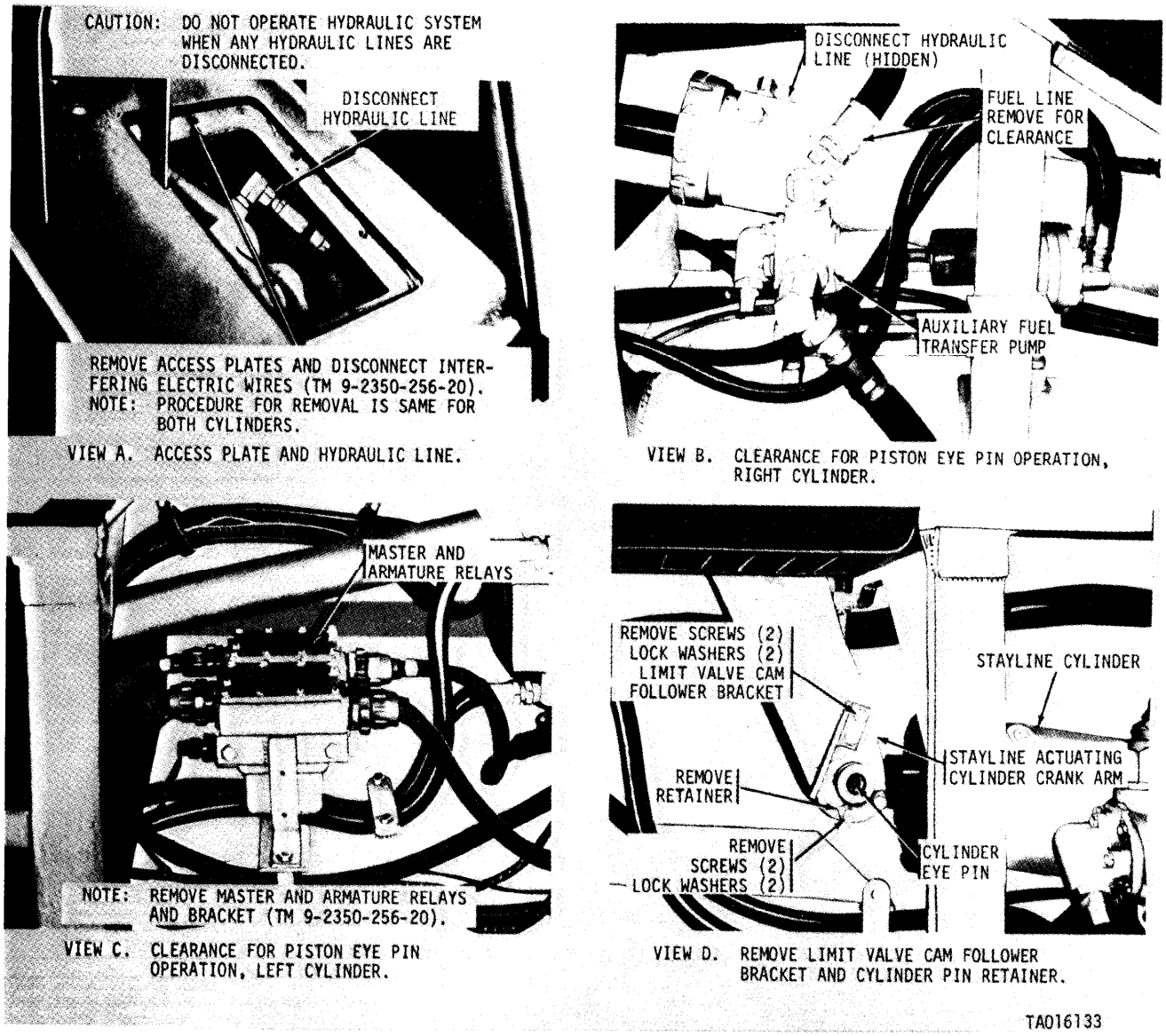


Figure 2-25. Boom stayline actuating cylinders — removal and installation (Sheet 1 of 2).

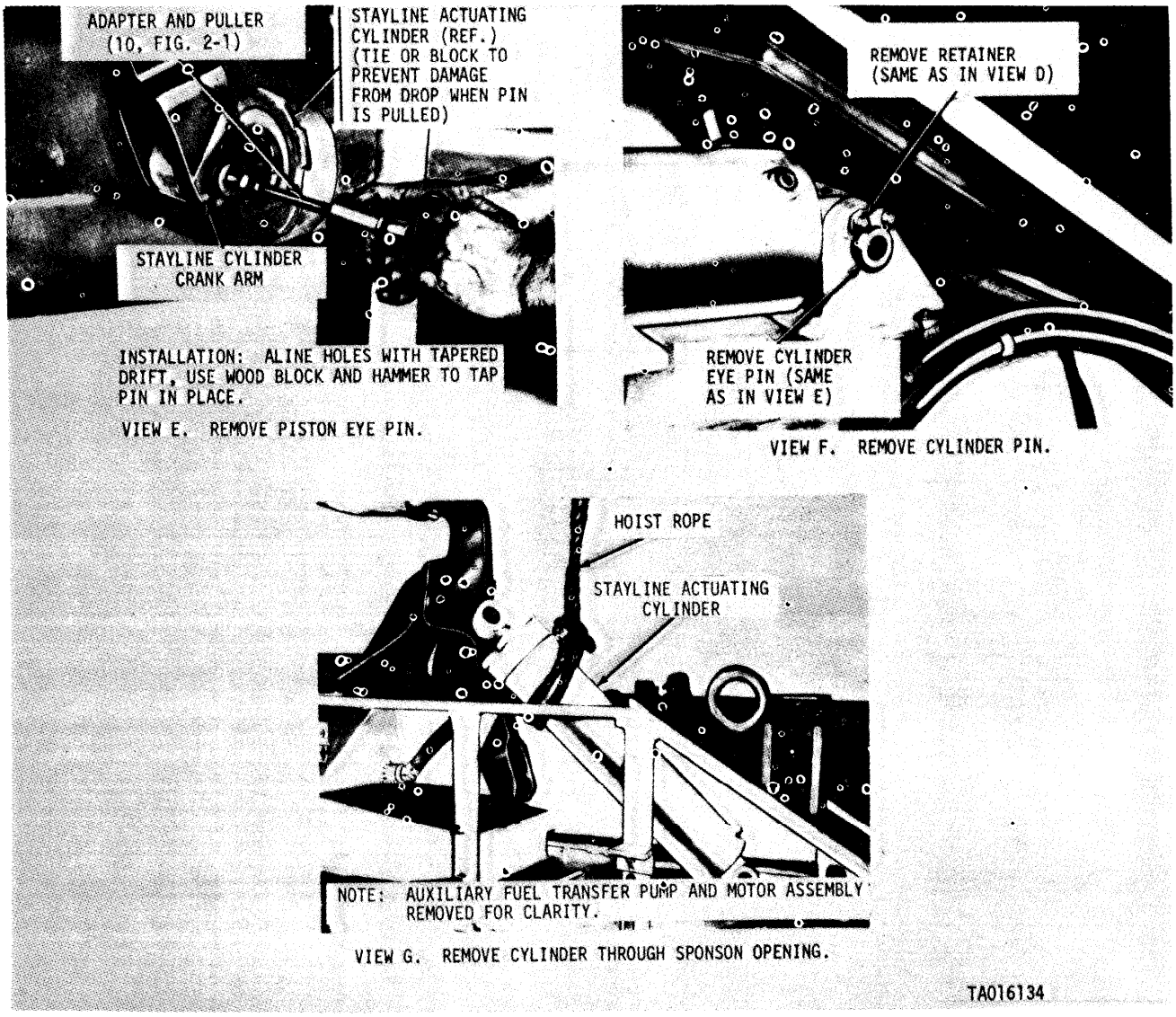


Figure 2-25. Boom stayline actuating cylinders–removal and installation (Sheet 2 of 2).

(2) Installation. Install boom stayline actuating cylinders in reverse order of removal.

b. Boom Actuating Cylinders.

(1) *Removal.*

(a) Procedure for removal and installation of the boom actuating cylinders is the same as for the stayline actuating cylinders except for their location on the vehicle. Prior to removal of the boom actuating cylinders, remove driver's and mechanic's seats for working clearance (TM 9-2350-256-20).

NOTE

Hoist cylinders through driver's and mechanic's hatches.

(b) Remove boom actuating cylinder pistol: eye pins as shown in figure 2-21, and removes boots from cylinders.

(c) Introduce hoist rope or chain through mechanic's or driver's hatch and support weight of cylinder while removing cylinder pin.

(d) Remove cylinder pins in same manner as piston eye pins (refer to figure 2-21) and disconnect hydraulic lines. Refer to figure 2-26 for access to right side.

(e) While guiding by hand, hoist cylinder out driver's or mechanic's hatch.

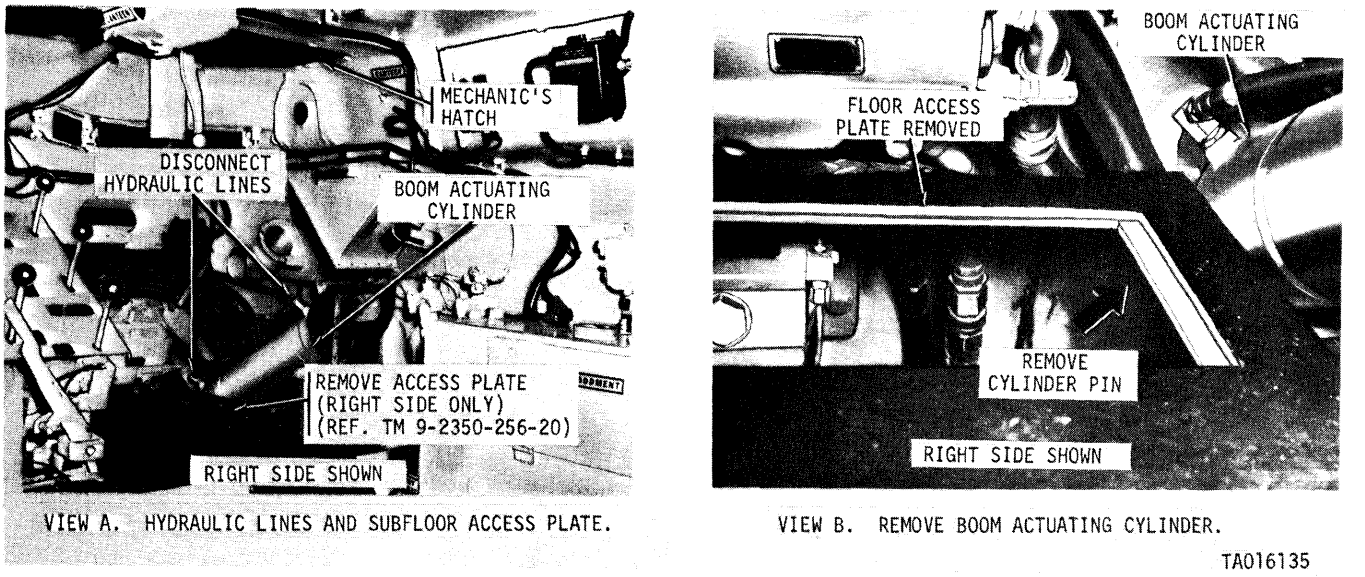


Figure 2-26 Boom actuating cylinders -Removal and installation access to right side.

(2) *Installation.* Reverse removal procedure but start hydraulic system and exercise boom cylinders through their entire stroke to purge all air from cylinders prior to installing piston eye pins.

c. Boom Stayline Actuating Cylinder Crank Arms.

(1) *Removal.* Prior to removal of the boom stayline actuating cylinder crank arms, remove engine deck assembly (TM 9-2350-256-20). Place suitable wood block in front of air intake covers and lower boom onto blocks. Remove boom staylines (View E, fig. 2-21) and boom stayline actuating cylinders (fig. 2-25). In View A of figure 2-25, install a hose on hydraulic line connections for draining fluid into suitable container. Prior to View *D,* place crank arms in the up position. Proceed with Views D and E on figure 2-25. Remove boom stayline actuating cylinder crank arms as shown in figure 2-27.

(2) *Installation.* Install the boom stayline actuating cylinder crank arms in reverse order of removal,

2-30. Hydraulic Control Panel (Subplate) Assembly and Control Valves

a. General. The seven control valves comprising part of the main hydraulic subplate assembly can be removed and replaced individually if defective. Refer to TM 9-2350 -256-34-2 for description and operation of these valves. Removal and installation of these individual valves, as well as of the main hydraulic subplate assembly as a unit, are described and illustrated in the following sections of this paragraph.

b. Hydraulic Control Panel (Subplate) Assembly. Prior to removal of the hydraulic subplate assembly, remove the shift control (TM 9-2350-256-20), APU control box and mechanic's seat (TM 9-2350-256-20). Remove the hydraulic subplate assembly as shown in figure 2-28.

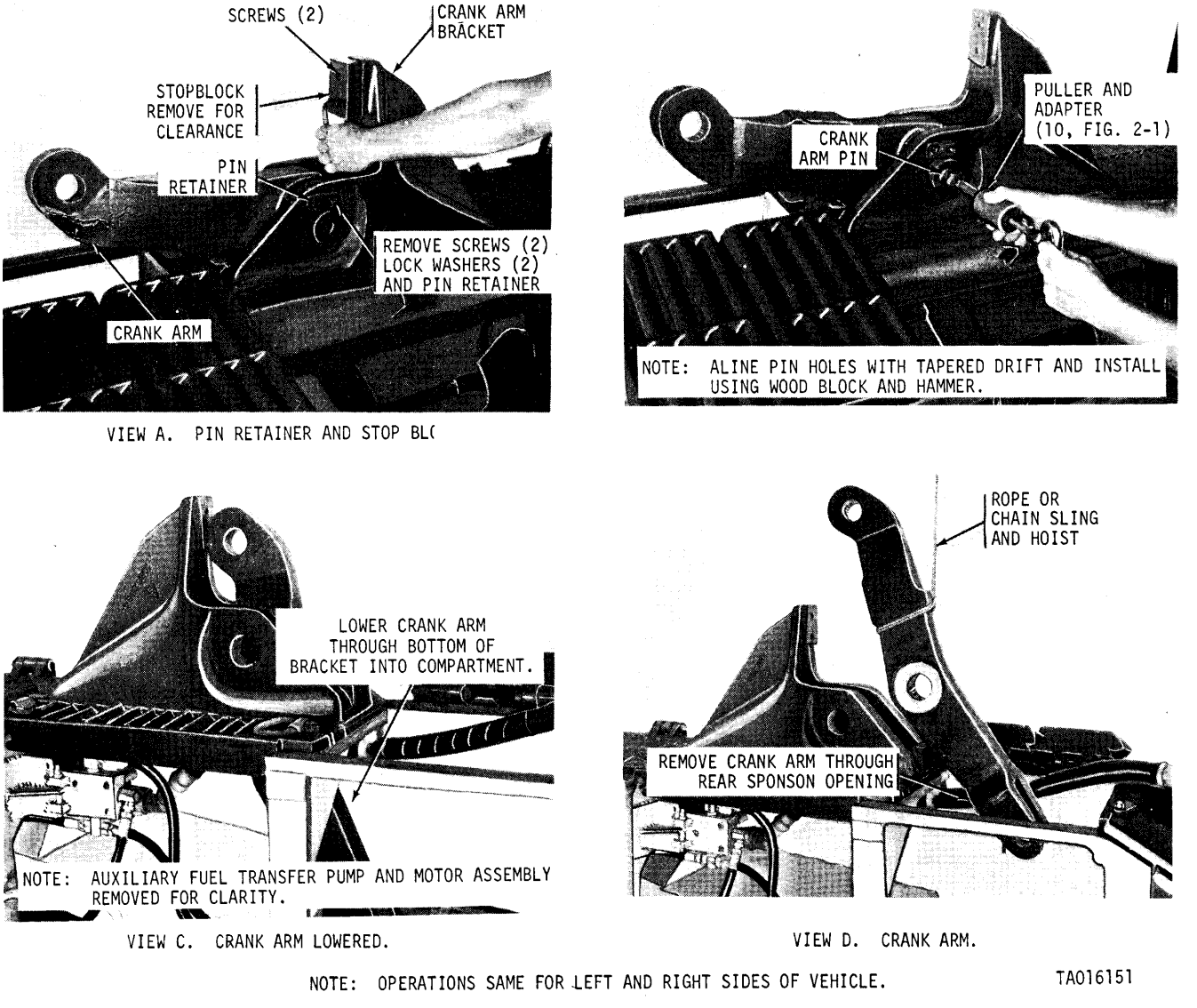
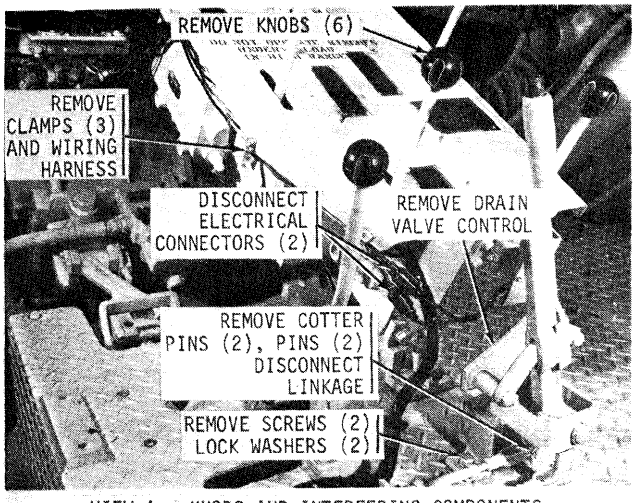
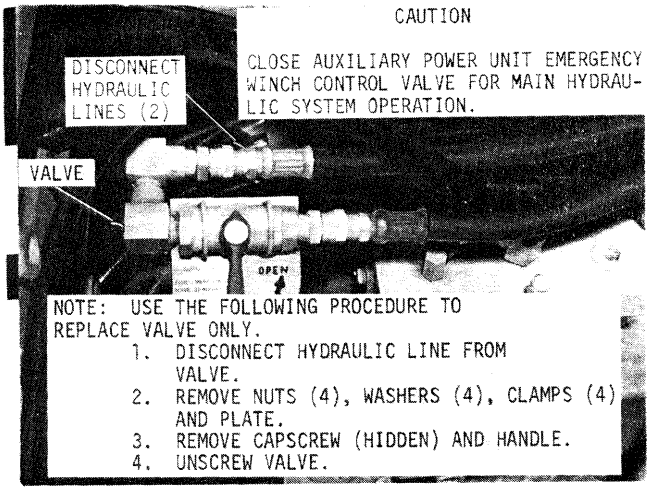


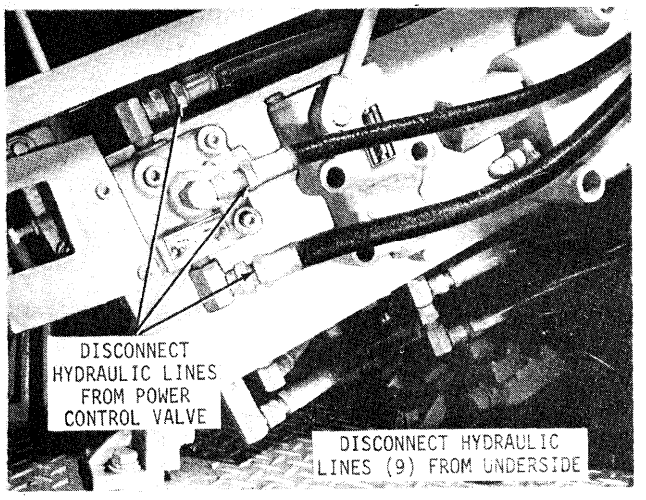
Figure 2-27. Boom stayline actuating cylinder crank arms-removal and installation.



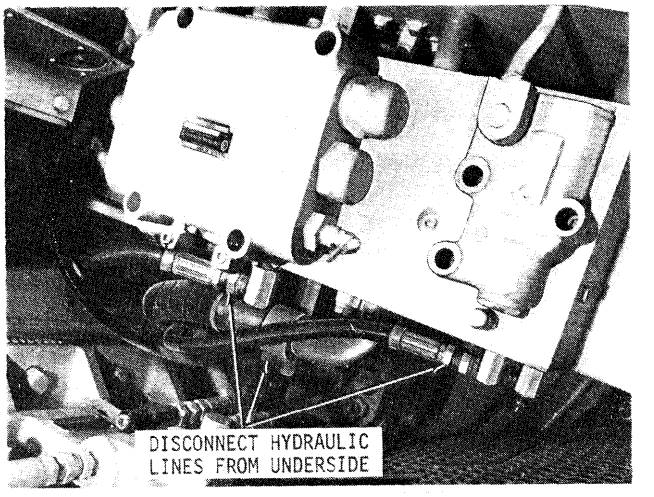
VIEW A. KNOBS AND INTERFERING COMPONENTS.



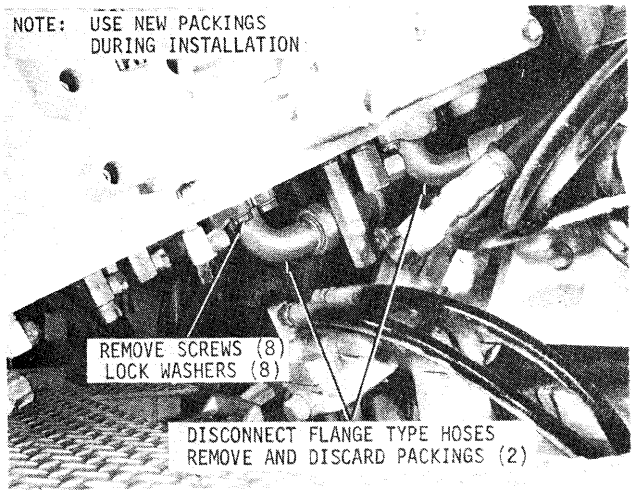
VIEW B. APU EMERGENCY WINCH CONTROL VALVE.



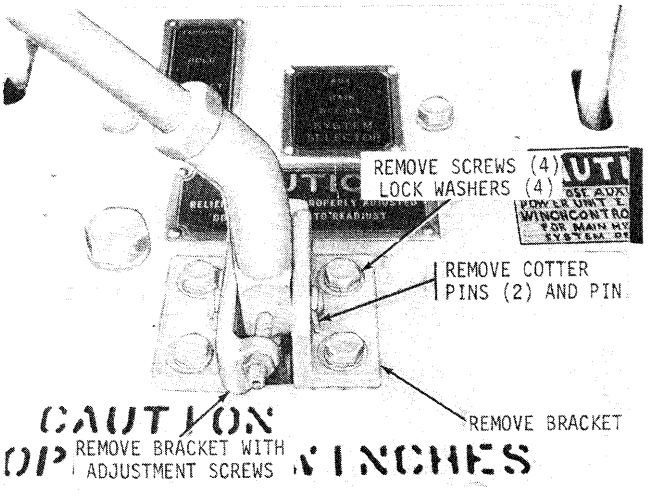
VIEW C. HYDRAULIC LINES - RIGHT SIDE.



VIEW D. HYDRAULIC LINES - LEFT SIDE.



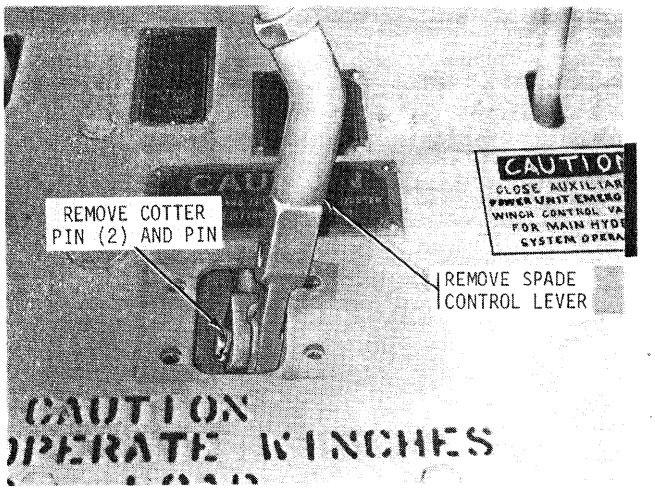
VIEW E. HYDRAULIC LINES - RIGHT SIDE.



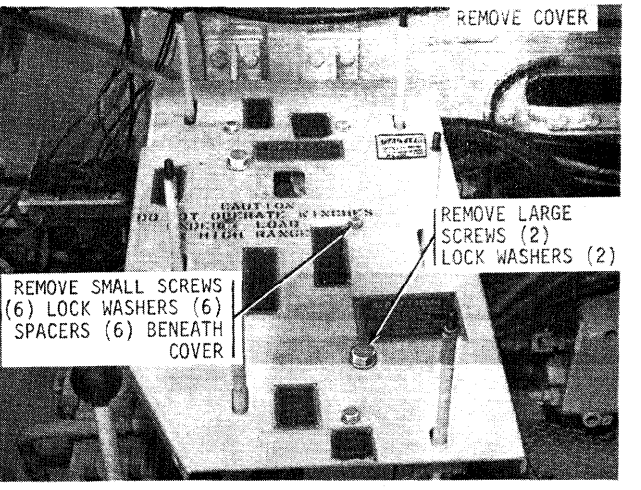
VIEW F. SPADE CONTROL LEVER BRACKETS.

TA039259

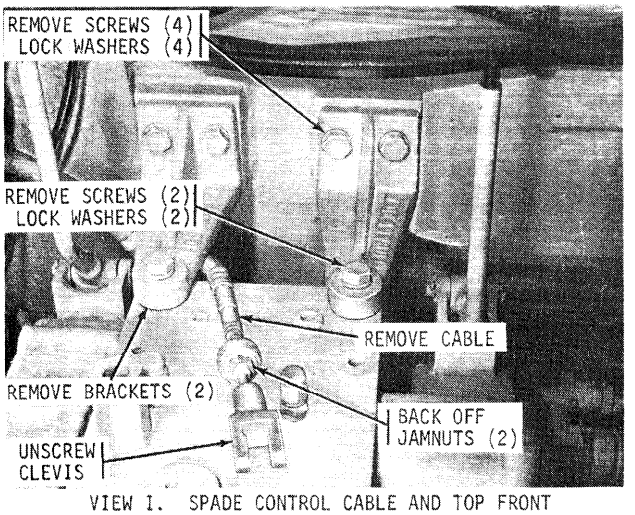
Figure 2-28. Hydraulic control panel (subplate) assembly–removal and installation (Sheet 1 of 3).



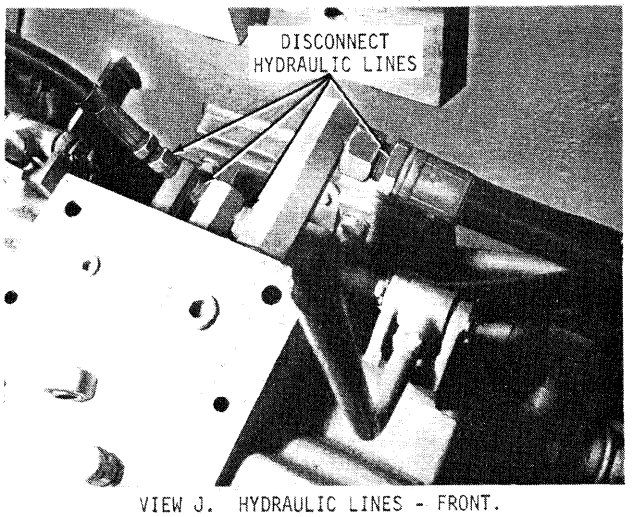
VIEW G. SPADE CONTROL LEVER.



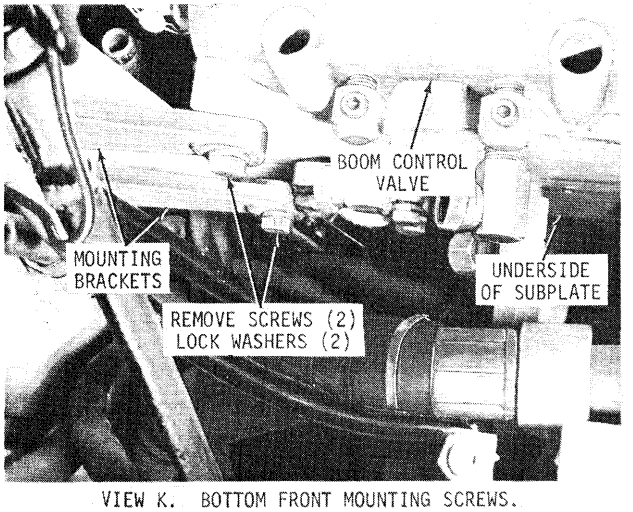
VIEW H. COVER.



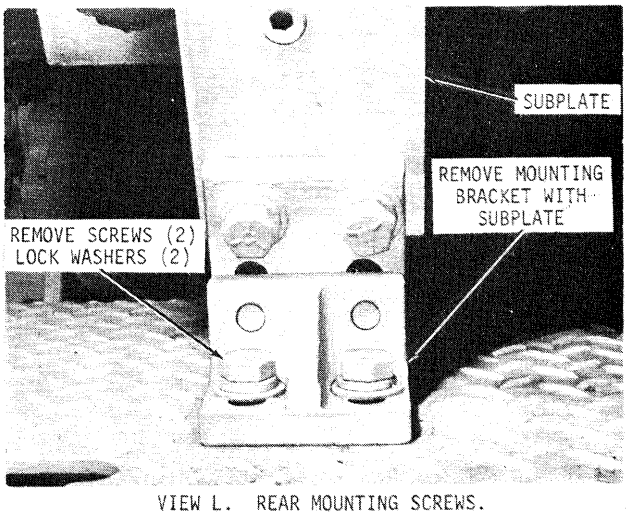
VIEW I. SPADE CONTROL CABLE AND TOP FRONT MOUNTING BRACKETS.



VIEW J. HYDRAULIC LINES - FRONT.



VIEW K. BOTTOM FRONT MOUNTING SCREWS.



VIEW L. REAR MOUNTING SCREWS.

TA039260

Figure 2-28. Hydraulic control panel (subplate) assembly–removal and installation (Sheet 2 of 3).

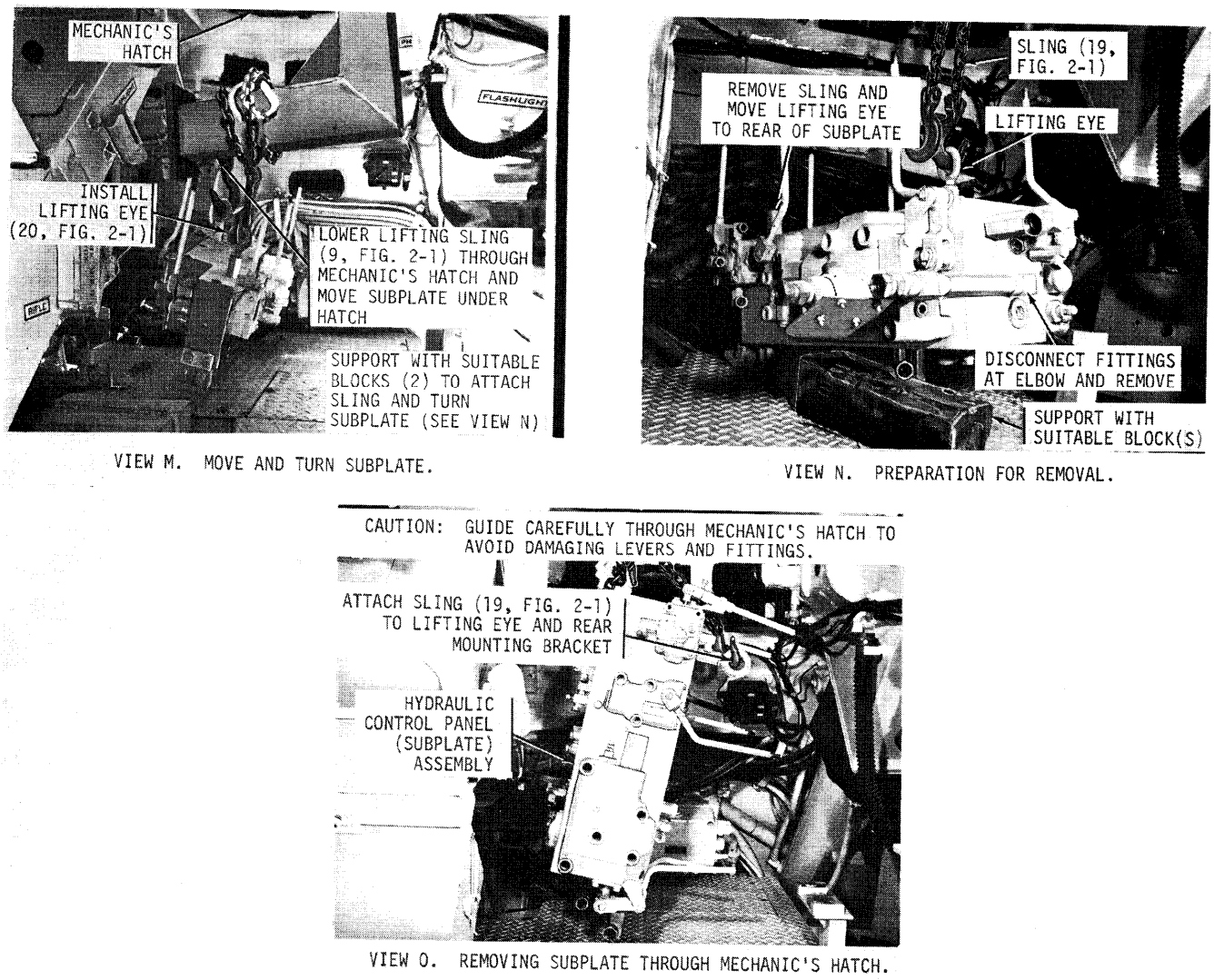


Figure 2-28. Hydraulic control panel (Subplate) assembly-removala and installation (Sheet 3 of 3).

c. Auxiliary Power Unit Emergency Winch Control Valve. Remove and install the auxiliary power unit emergency winch control valve as shown in ViewB,figure 2-28.

CAUTION

Close auxiliary power unit emergency winch control valve for main hydraulic system operation.

d. System SelectorValve. Remove and install the system selector valve as shown in figure 2-29.

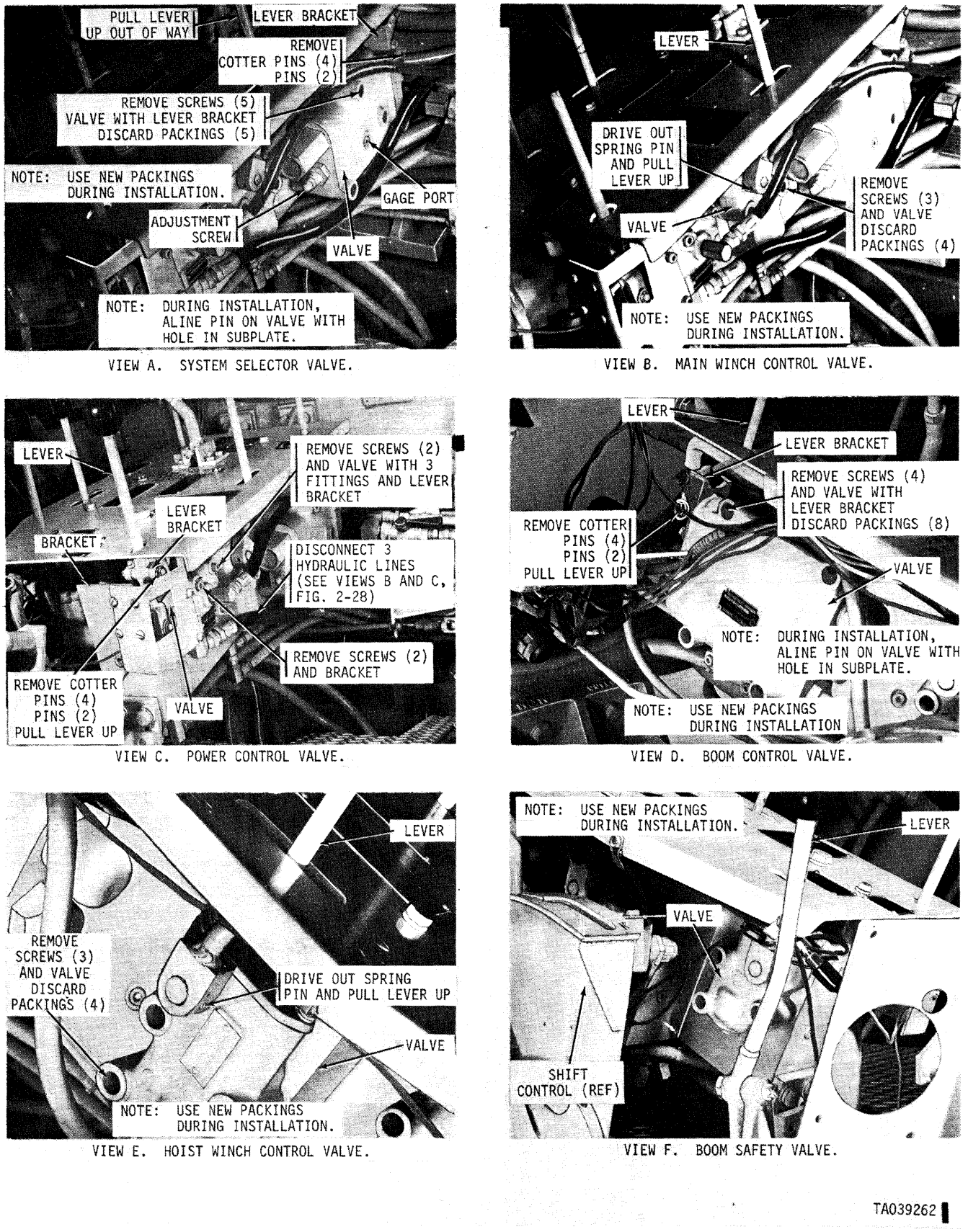


Figure 2-29. Hydraulic valves on control panel (subplate) assembly -removal and installation.

e. Main Winch Control Value. Remove and install the main winch control valve as shown in figure 2-29.

f. *Power Control Valve.* Remove and install the power control valve as shown in figure 2-29.

g. Boom Combination Control Valve. Remove and install the boom combination control valve as shown in figure 2-29.

h. Hoist Winch Control Valve. Prior to removal of the hoist winch control valve, remove the shift control (TM 9-2350-256-20). Remove and install the hoist winch control valve as shown in figure 2-29.

i. Boom Safety Control Valve. Remove and install the boom safety control valve as shown in figure 2-29.

2-31. Mechanical Transmission Power Takeoff Drive Shaft

a. Removal. Prior to removing the mechanical transmission power takeoff (PTO) drive shaft, remove deck grilles 27, 28, and 29 (fig. 2-2) and subfloor plate 12 (fig. 2-3). Disconnect interfering lines and cables as necessary for access and remove the mechanical transmission PTO drive shaft as shown in figure 2-30.

NOTE

IF NECESSARY TO TURN PROPELLER SHAFT TO REACH SCREWS, TURN MASTER SWITCH TO ON POSITION. HOLD FUEL SHUTOFF SWITCH IN OFF POSITION AND TOUCH STARTER SWITCH. WHEN SCREWS ARE IN POSITION FOR REMOVAL, TURN MASTER SWITCH TO OFF POSITION.

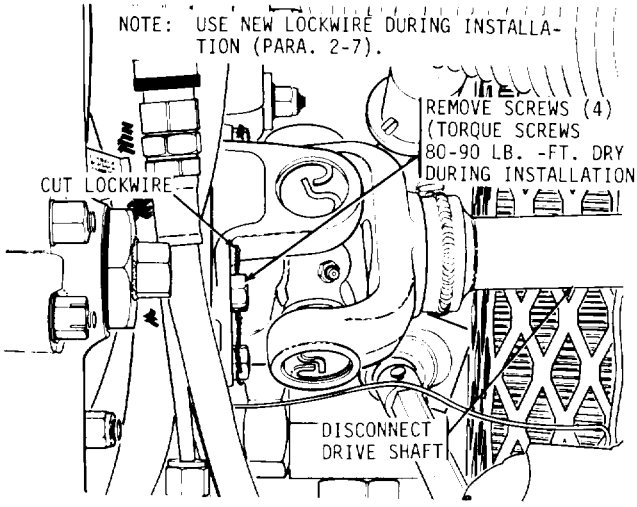
b. Installation. Install the mechanical transmission PTO drive shaft in reverse order of removal.

2-32. Mechanical Transmission and Main Hydraulic Pump Assembly

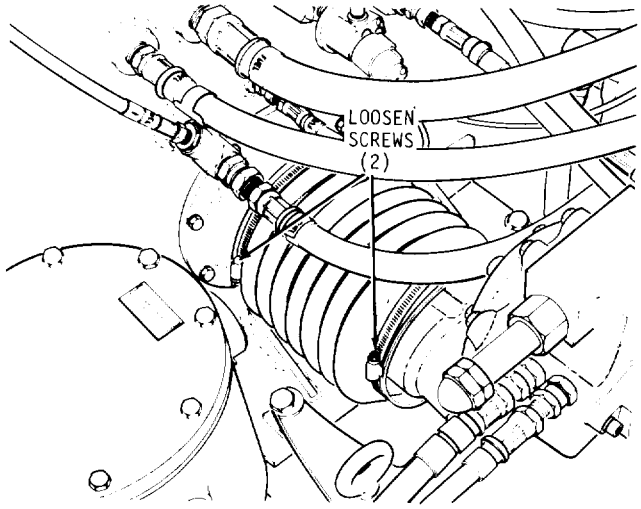
a. Removal. Prior to removing the mechanical transmission and main hydraulic pump assembly, remove the following components from the vehicle (TM 9-2350-256-20): cupola and cupola plate assembly, oddment trays, boxes, racks or baskets, as required for clearance and to prevent damage, commander's seat, passenger seats, and subfloor plates 11, 12 (with rigger's seat attached), 13, 14, 17, and 18 (fig. 2-3). Remove the mechanical transmission and main hydraulic pump assembly as shown in figure 2-31.

NOTE

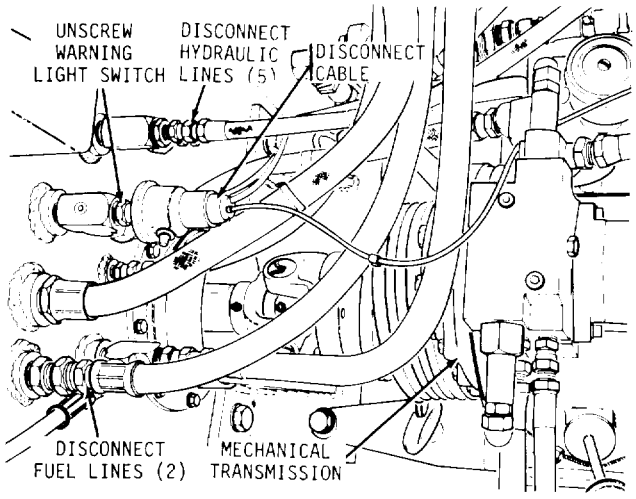
IF NECESSARY TO TURN PROPELLER SHAFT TO REACH SCREWS, TURN MASTER SWITCH TO ON POSITION. HOLD FUEL SHUTOFF SWITCH IN OFF POSITION AND TOUCH STARTER SWITCH. WHEN SCREWS ARE IN POSITION FOR REMOVAL. TURN MASTER SWITCH TO OFF POSITION.



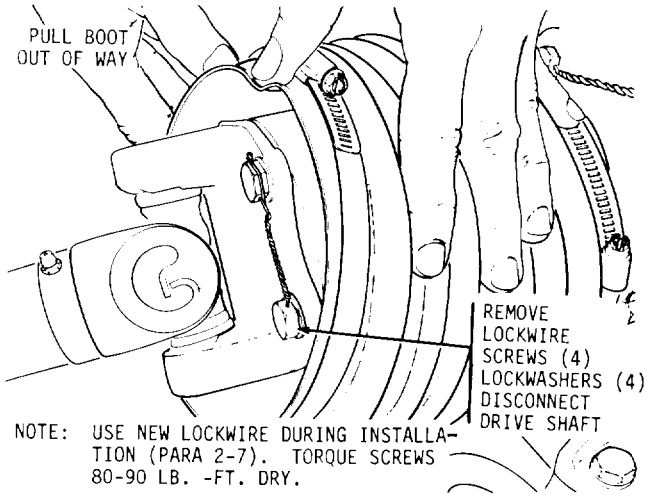
VIEW A. DRIVE SHAFT FROM MAIN ENGINE.



VIEW B. UNIVERSAL BOOT.



VIEW C. BULKHEAD CONNECTIONS FOR ACCESS.



VIEW D. DRIVE SHAFT FROM TRANSMISSION.

TA171402

Figure 2-30. Mechanical transmission power take off drive shaft—removal and installation.

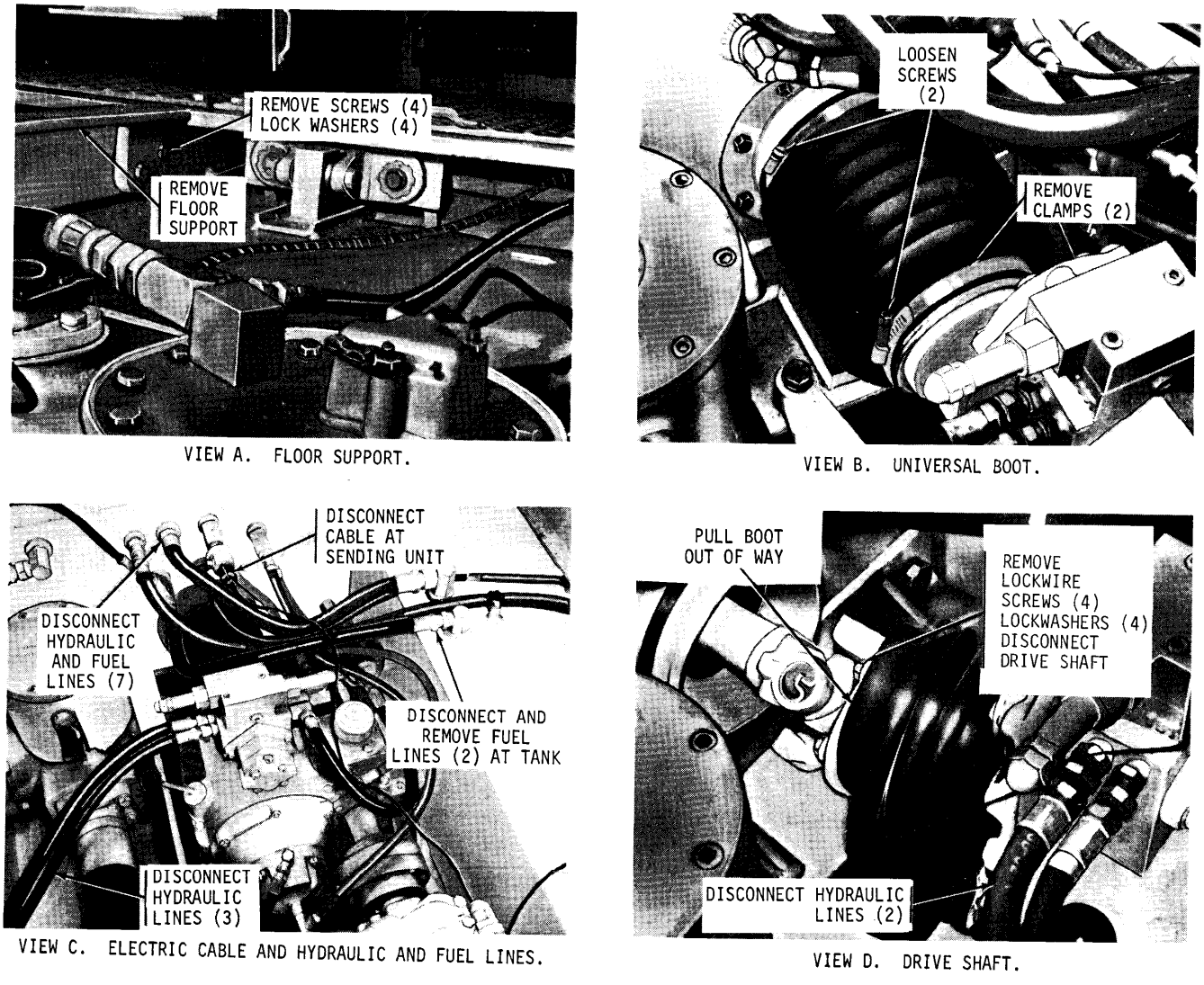
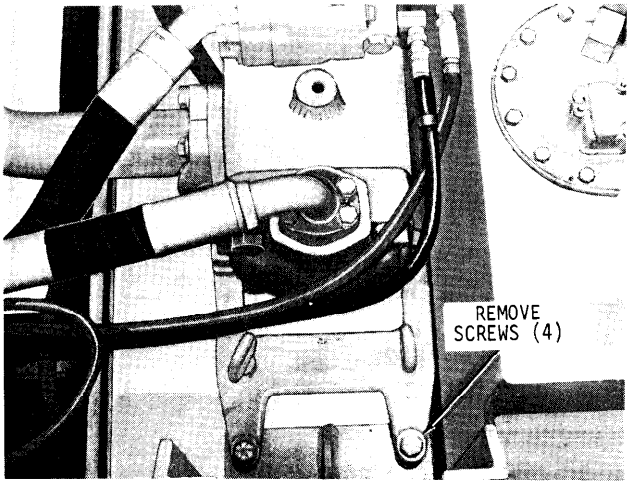


Figure 2-31. Mechanical transmission and main hydraulic pump assembly–removal and installation (Sheet 1 of 2).

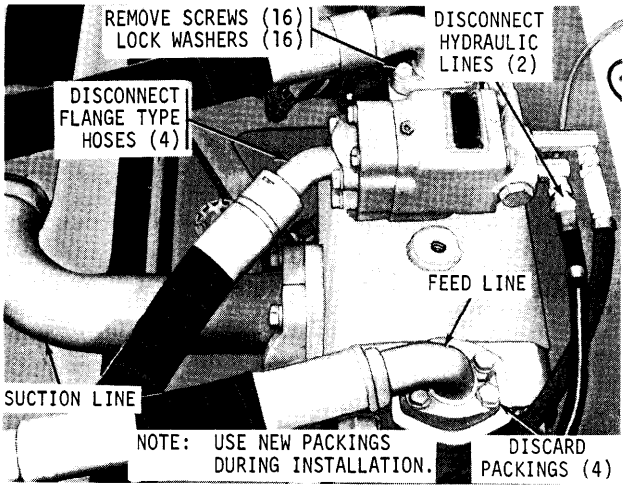
b. Installation. Install the mechanical transmission and main hydraulic pump assembly in reverse order of removal, Refer to TM 9-2350-256-20 for test of mechanical transmission oil pressure.

2-33. Mechanical Transmission Oil Cooler Assembly and Lines

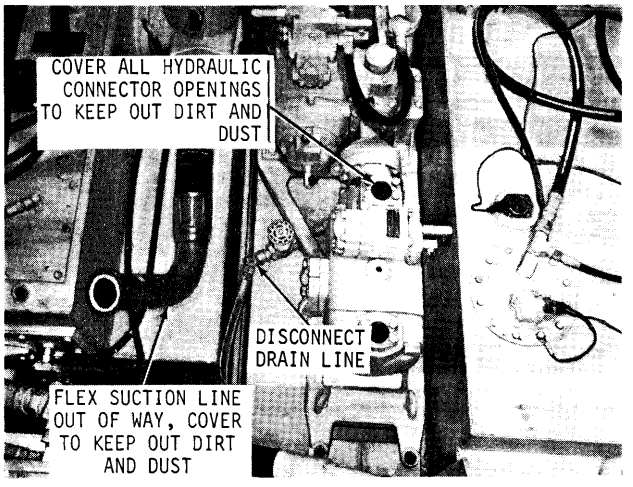
a. Removal. Prior to removal of the mechanical transmission oil cooler assembly and lines, remove power pack. Remove the mechanical transmission oil cooler assembly and oil lines as shown in figure 2-32.



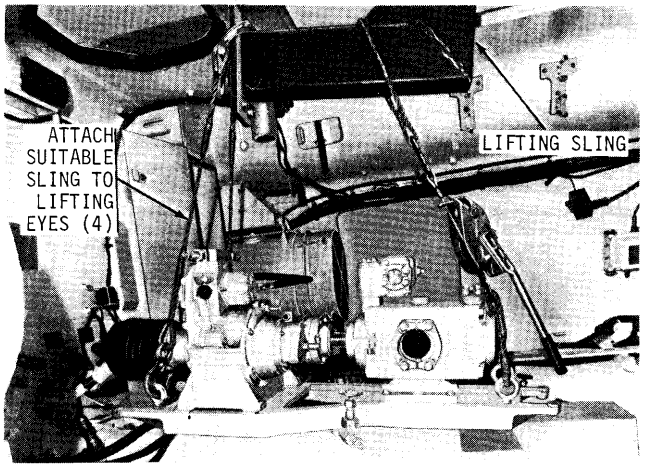
VIEW E. MOUNTING BOLTS.



VIEW F. HYDRAULIC LINES.



VIEW G. DRAIN LINE.



VIEW H. REMOVE MECHANICAL TRANSMISSION AND PUMP ASSEMBLY THROUGH CUPOLA PLATE OPENING.

TA171216

Figure 2-31. Mechanical transmission and main hydraulic pump assembly–removal and installation (Sheet 2 of 2).

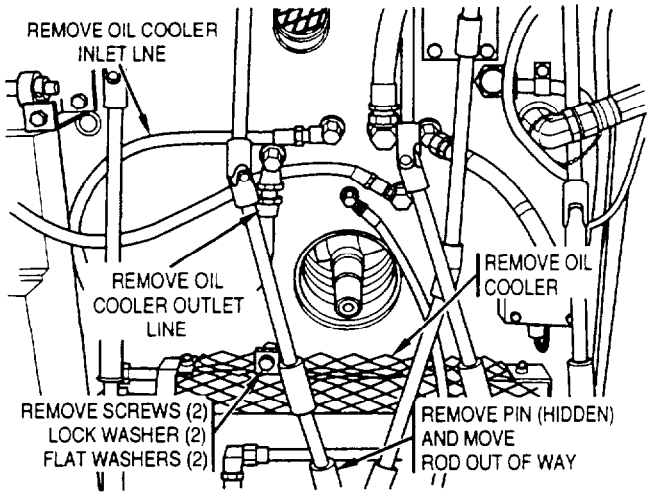


Figure 2-32. Mechanical transmission oil cooler assembly *and lines-removal and installation.*

b. Installation. Install the mechanical tran smission oil cooler assembly and lines in reverse order of removal.

2-34. Main Hydraulic Pump Unloading Valve

Prior to removing the main hydraulic pump unloading valve, remove subfloor plates 11, 12 and 14 (fig. 2-3) Remove and install the main hydraulic pump unloading valve as shown in figure 2-33.

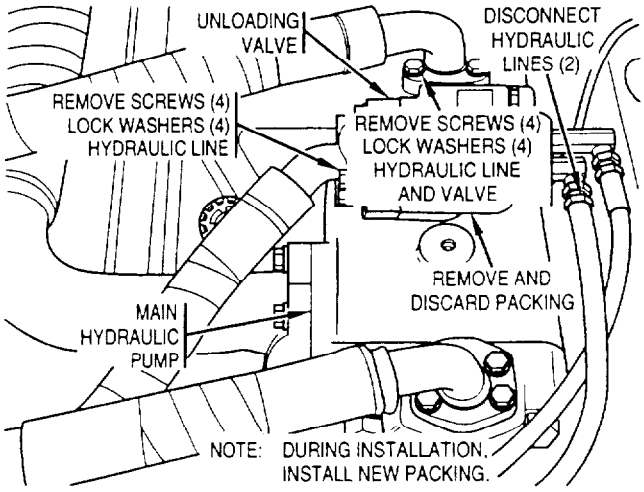


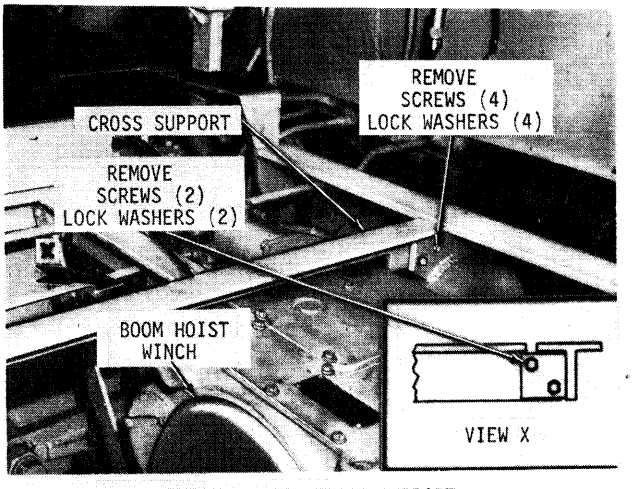
Figure 2-33. Main hydraulic pump unloading valve - removal and installation.

NOTE

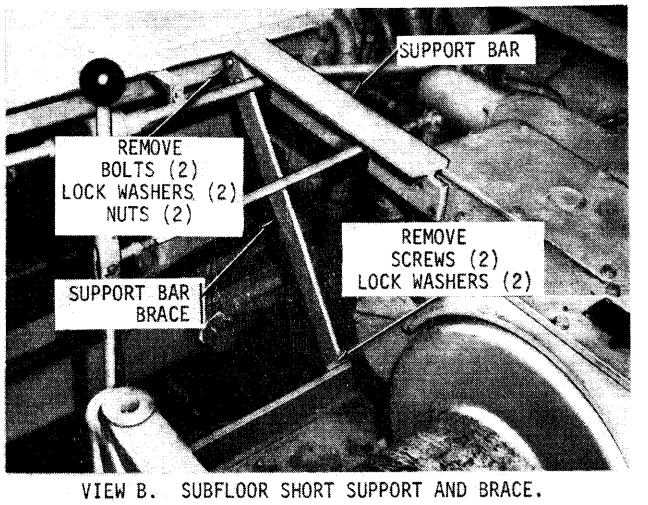
If your vehicle has hoist winch assembly 8739009-11 or 8739009-1, send winch assembly to depot maintenance for removal of anti-chatter kit.

2-35. Hoist Winch Assembly

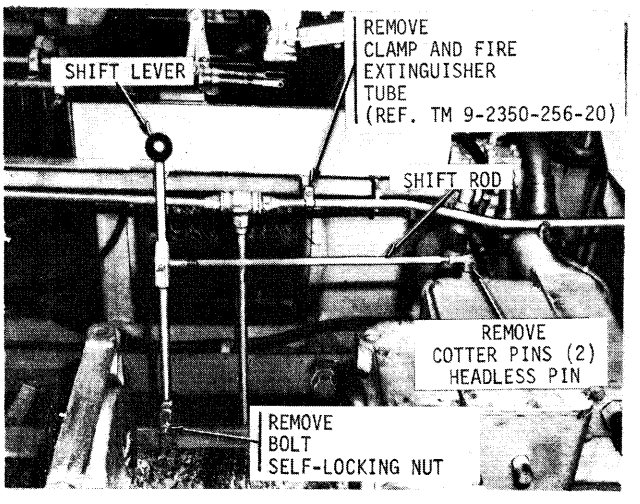
a. Removal. Prior to removing the hoist winch assembly, remove the hoist winch cable (para 2-231. Remove the cupola and cupola plate. commander's seat and hoist winch cable chute (TM 9-2350-256-20,. Remove any oddment trays. racks and baskets, as required. to allow clearance and prevent damage. Remove subfloor plates 4, 5, 11, 17, 18, 19, 20, 21. and 24 (fig. 2-3). Remove hoist winch assembly as shown in figure 2-34.



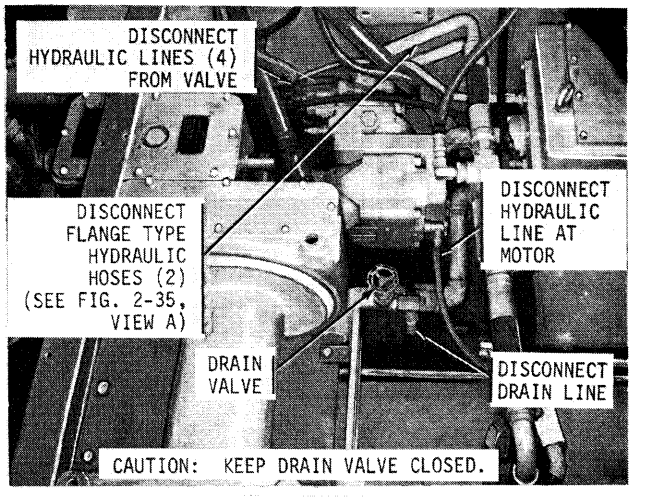
VIEW A. SUBFLOOR CROSS SUPPORT.



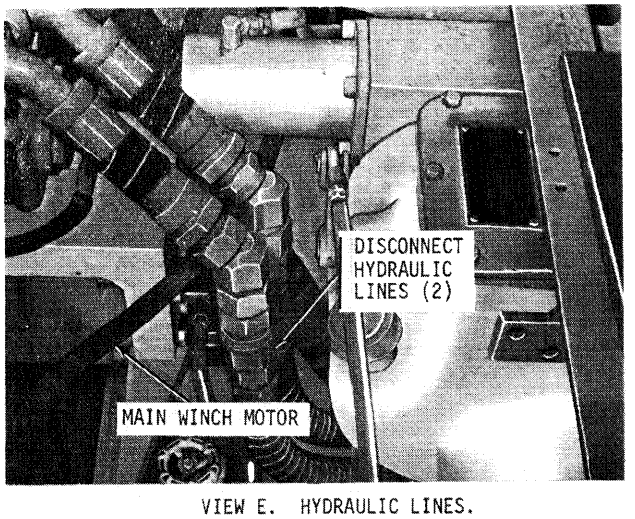
VIEW B. SUBFLOOR SHORT SUPPORT AND BRACE.



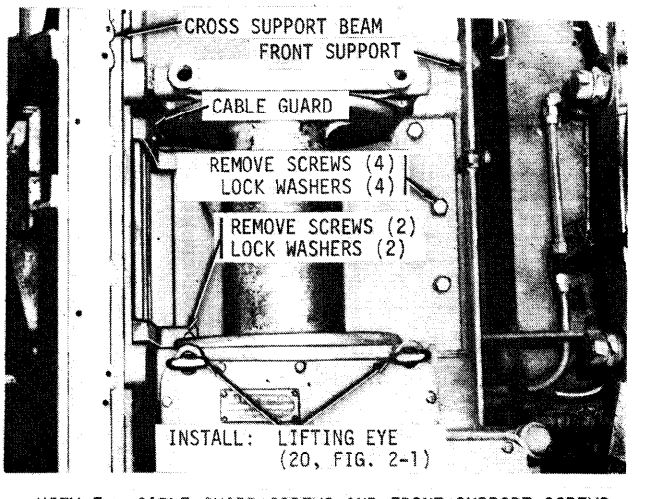
VIEW C. SHIFT ROD, LEVER AND CO_2 TUBE.



VIEW D. HYDRAULIC LINES.



VIEW E. HYDRAULIC LINES.



VIEW F. CABLE GUARD SCREWS AND FRONT SUPPORT SCREWS.

TA016163

Figure 2-34. Hoist winch assembly–removal and installation (Sheet 1 of 2).

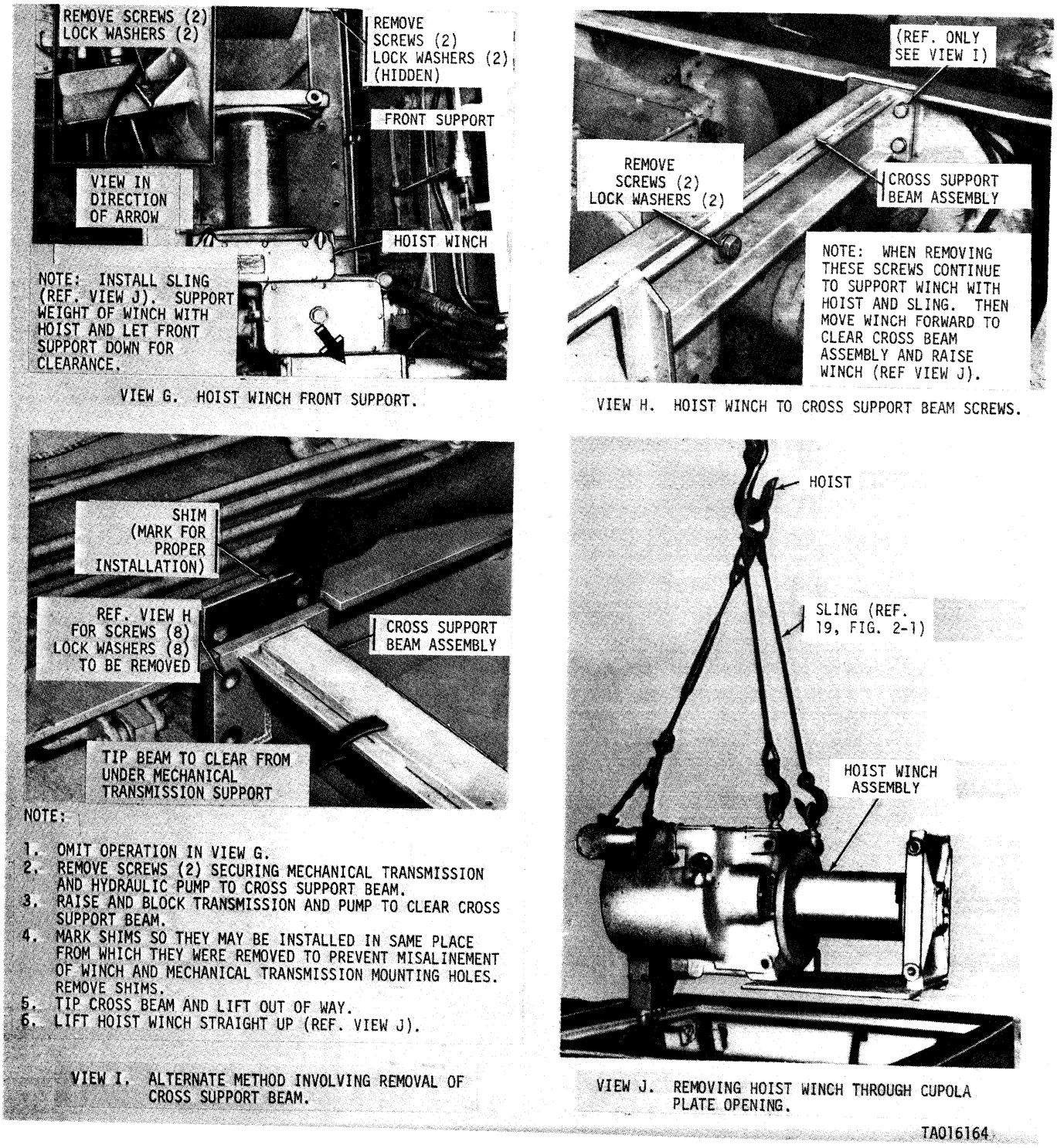


Figure 2-34. Hoist winch assembly–removal and installation (Sheet 2 of 2).

b. Installation. Install the hoist winch assembly in reverse order of removal.

2-36. Hoist Winch Counterbalance Valve

a. Removal. Remove subfloor plates 5, 11 (fig. 2-3). Remove the hoist winch counterbalance valve as shown in figure 2-35.

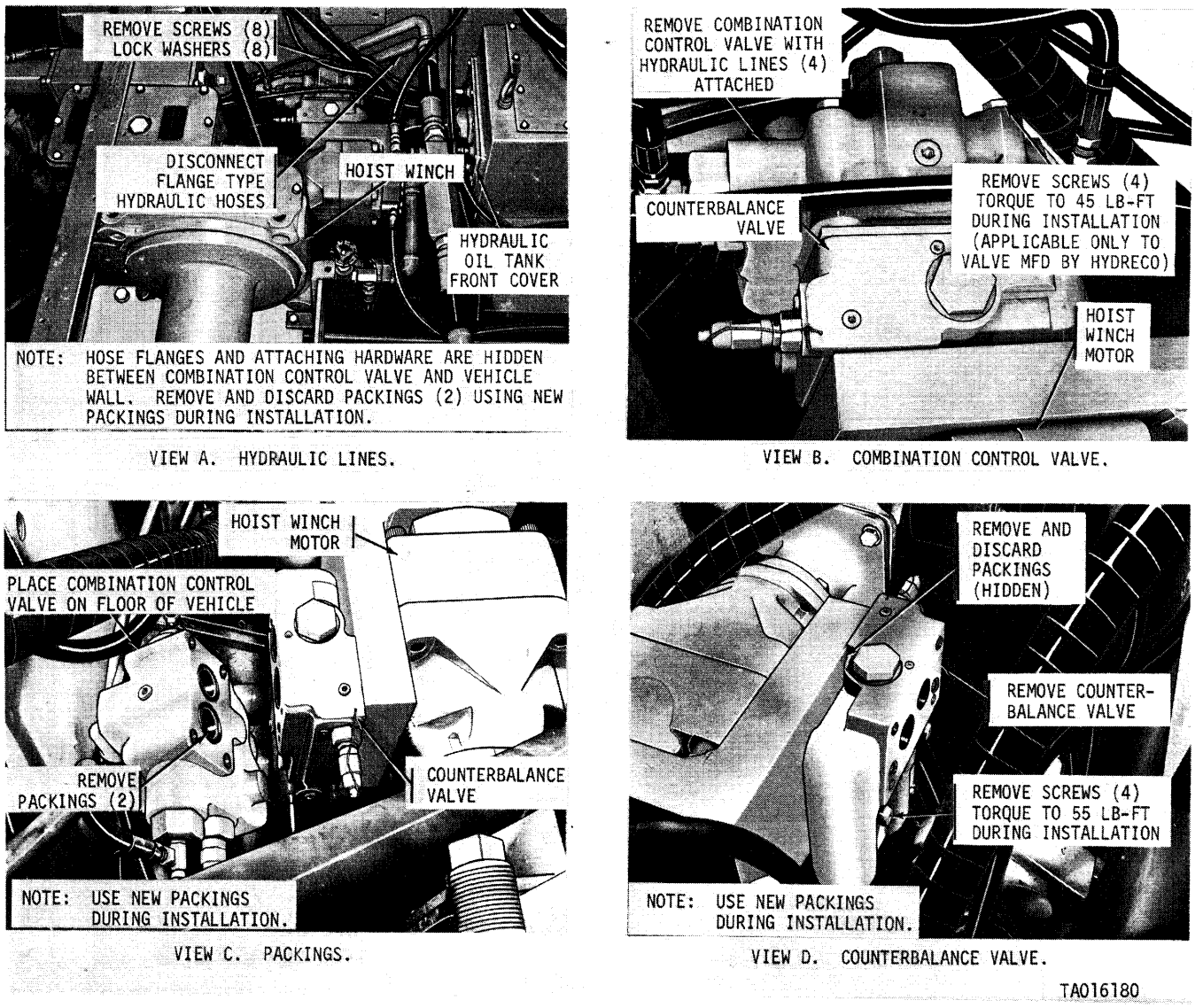


Figure 2-35. Hoist winch counterbalance valve–removal and installation.

b. Installation. Install the hoist winch counterbalance valve in reverse order of removal.

2-37. Hoist Winch Motor

NOTE

Use Hydraulic Motor Kit, 11672161 on retrofitted vehicles when replacing a motor which is not a Dennison Model No. M4E-185-3N00-B101-M40712.

a. Removal. Prior to removing the hoist winch motor, remove the hoist winch counterbalance valve (para 2-36). Remove the hoist winch motor as shown in figure 2-36.

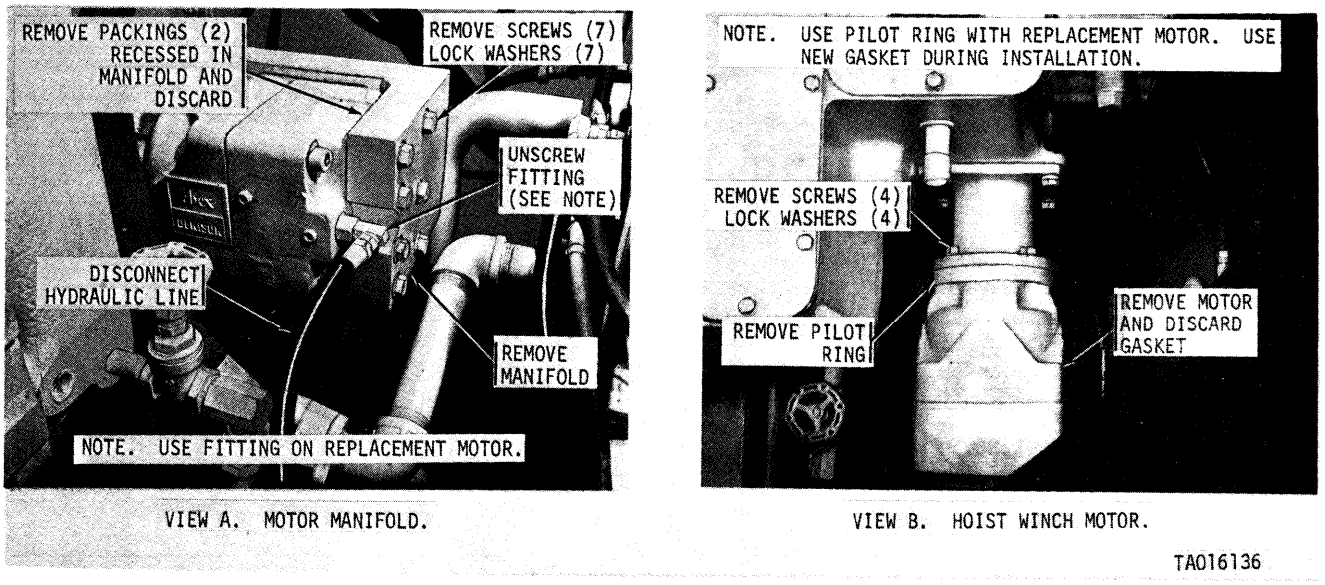


Figure 2-36. Hoist winch motor—removal and installation.

b. Installation. Install the hoist winch motor and manifold in reverse order of removal.

2-38. Main Winch and Hoist Winch Brake Cylinders

a. General. The main winch and hoist winch brake cylinders are identical and are replaced in the same manner. Remove subfloor plate 2 (fig. 2-3) for access to the main winch brake adjusting screw and open subfloor plate 5 (fig. 2-3) for access to the hoist winch brake adjusting screw. The brake adjusting screw, which compresses the brake cylinder springs, must be loosened prior to removal of the brake cylinder and readjusted after installation.

b. Removal. Remove subfloor plate 3 (fig. 2-3) for main winch brake cylinder and plate 4 for hoist winch brake cylinder access. Remove the main winch or hoist winch brake cylinder as shown in figure 2-37.

c. Test. Prior to installation, test the main winch or hoist winch brake cylinder as shown in View C, figure 2-37.

d. Installation. Install the main winch or hoist winch brake cylinder and adjust in reverse order of removal.

2-39. Main Winch and Hoist Winch Brake Band Assemblies

a. General. The main winch and hoist winch brake band assemblies are removed and replaced in the same manner. Remove subfloor plate 2 (fig. 2-3) for access to the main winch brake adjusting screw and subfloor plate 5 (fig. 2-3) for access to the hoist winch brake adjusting screw. The brake adjusting screw (View B, fig. 2-38), which compresses the brake cylinder springs, must be loosened prior to removing the brake band assembly and readjusted during installation.

b. Removal, Remove subfloor plate 1 (fig. 2-3) for access to the main winch brake band assembly or plate 5 (fig. 2-3) for the hoist winch brake band assembly. Remove and install brake band assemblies as shown in figure 2-38.

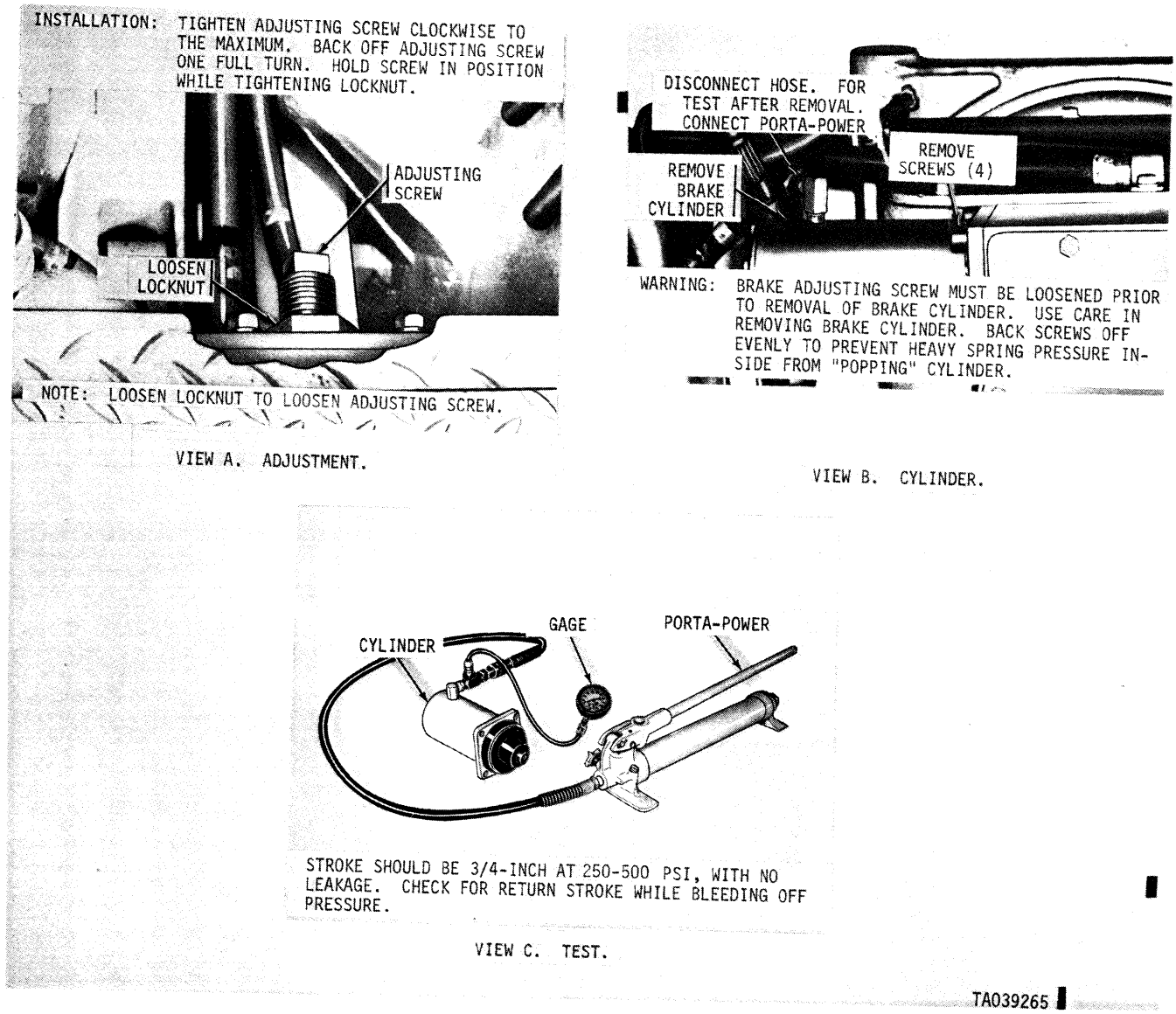


Figure 2-37. Winch brake cylinder—removal test, installation and adjustment.

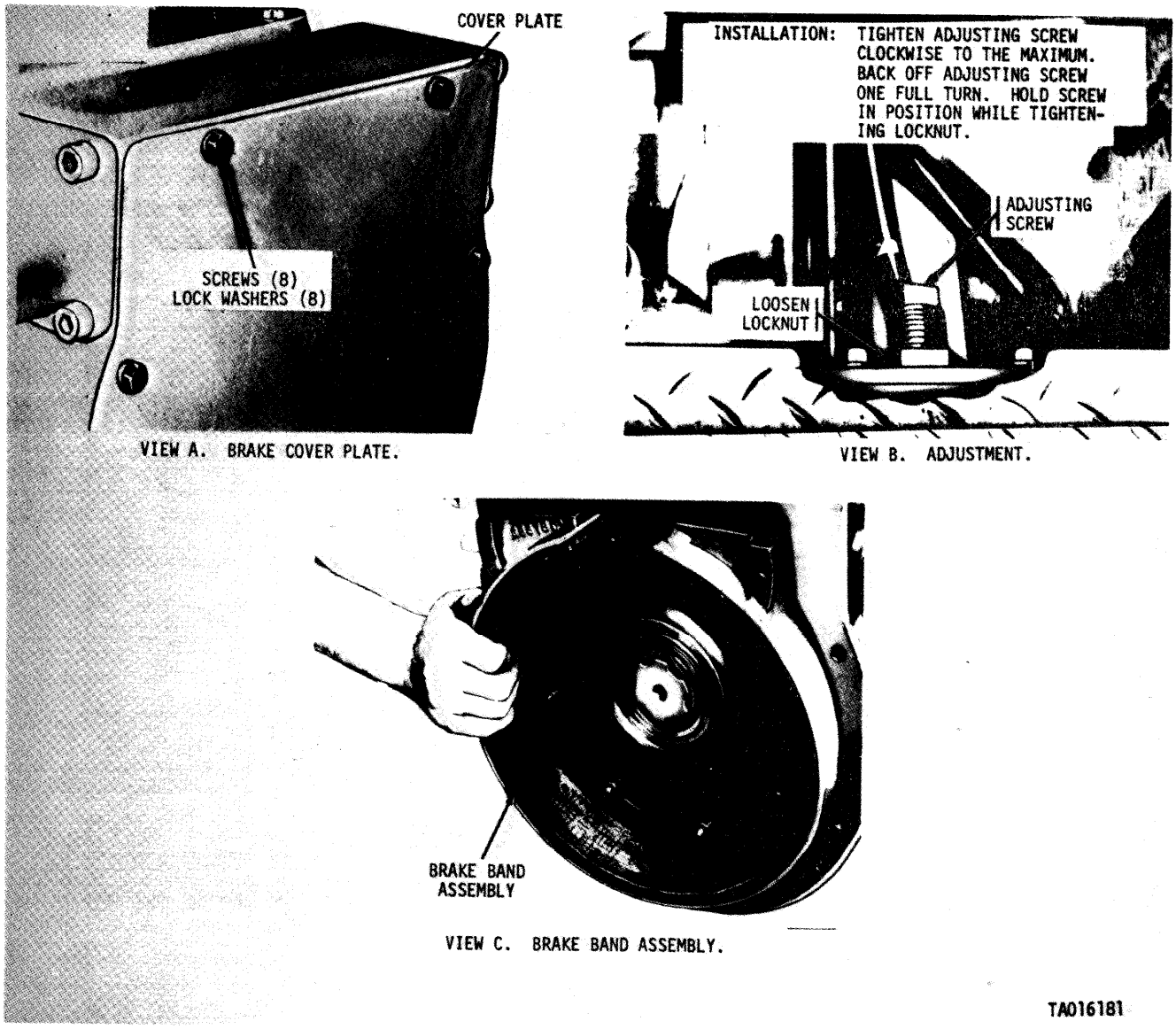


Figure 2-38. Winch brake band assemblies—removal and installation,

2-40. Hydraulic System Oil Tank Assembly.

a. General. All hydraulic oil tank accessories can be replaced with the tank installed in the vehicle. Refer to paragraphs 2-41, 2-42, and 2-43 for removal of the filter, strainer, covers and fittings on the top front cover. Refer to TM 9-2350-256-20 for removal oft he gage rod, drain valve, lifting bolts and fittings on front cover and top rear cover.

b. Removal. Prior to removing the oil tank assembly, remove cupola and cupola plate, rigger's seat and necessary subfloor plates (TM 9-2350-256-20). Drain the hydraulic system oil tank assembly and remove as shown in figure 2-39.

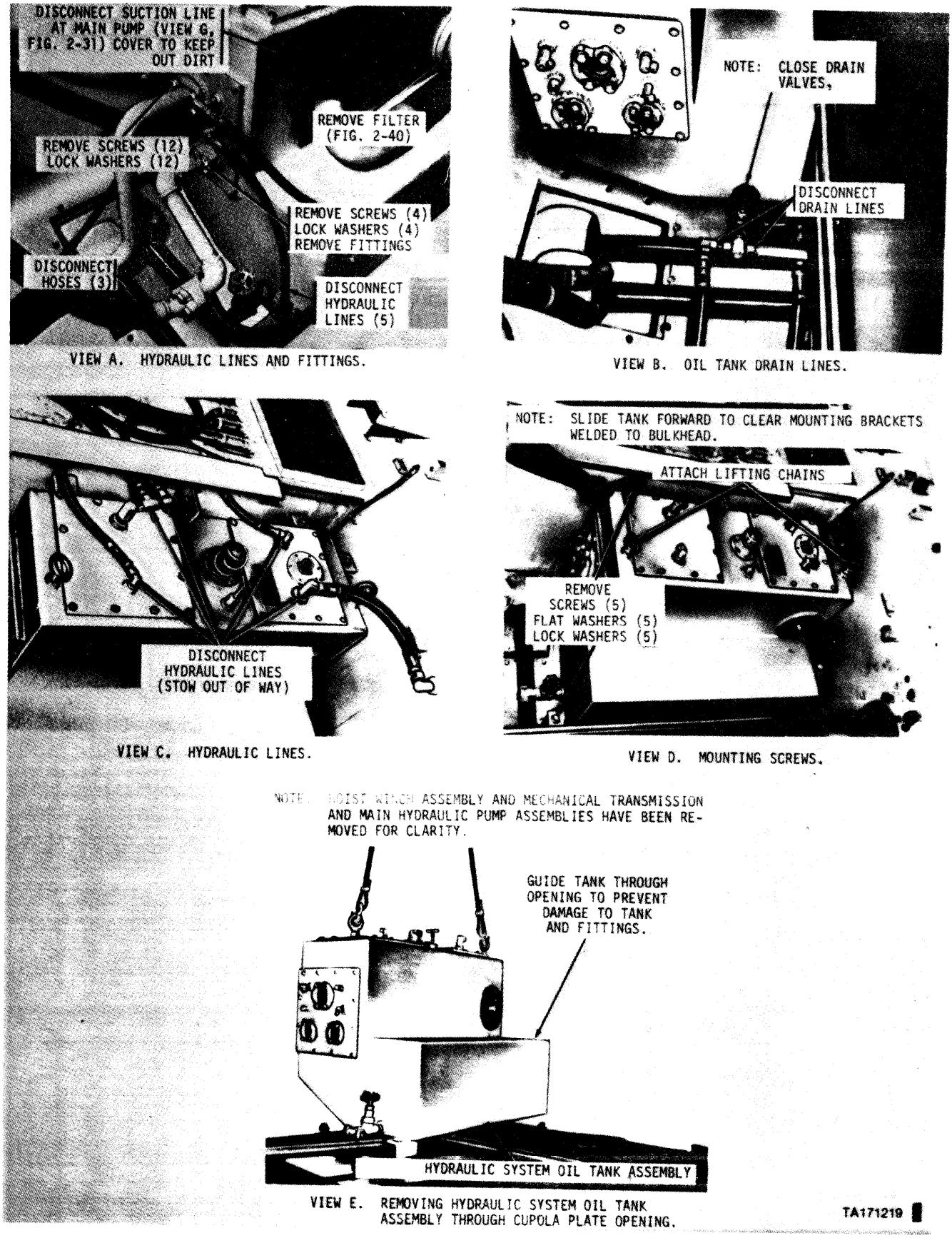


Figure 2-39. Hydraulic system oil tank-removal and installation.

c. Installation. Install the hydraulic system oil tank in reverse order of removal. Fill tank (TM 9-2350-256-20).

2-41. Deleted

drain the oil tank below the level of the filter and remove subfloor plates 9, 19 (fig. 2-3) for access. Remove the hydraulic system oil filter from the oil tank as shown in figure 2-30.

2-42. Deleted

2-43. Hydraulic Oil Tank Cover Assemblies and Suction Pipe

a. Hydraulic Oil Tank Top Couer Assemblies.

(1) *Removal.* Prior to removing the oil tank front and rear top cover assemblies, remove subfloor plates 9, 10, 11 (fig. 2-3), disconnect five hydraulic lines (View C, fig. 2-39) and remove fittings (TM 9-2350-256-20). Remove the oil tank top cover assemblies as shown in figure 2-42.

(2) Installation. Install the hydraulic oil tank front and rear top cover assemblies in reverse order of removal.

b. Hydraulic Oil Tank Front Cover Assembly.

(1) Removal. Prior to removing the oil tank front cover assembly, remove subfloor plate 11 (fig. 2-3), dram the tank below the level of the cover, disconnect hydraulic lines (View A, fig. 2-39) and remove fittings (TM 9-2350-256-20). Remove the oil tank front cover assembly in the same manner as the top cover assemblies (fig. 2-42).

(2) lnstallation. Install the oil tank front cover assembly in reverse order of removal and fill tank (TM 9-2350-256-20).

c. Hydraulic 0i1 Tank Suction Pipe.

(1) Removal. The suction pipe is located inside the oil tank directly behind the oil filter. Prior to removing the suction pipe, drain the oil tank below the level of the filter and remove the top rear tank cover *(a* above). Remove four screws and lock washers and the two split flanges holding the suction pipe. Remove the suction pipe and packing.

(2) *Installation.* Install the suction pipe and packing in reverse order of removal and refill the tank (TM 9-350-256-20).

2-44. Forward Fuel Tank Assembly

NOTE

The tank may be stripped of all fittings, fuel - pump and sending unit, while installed, for ventilation purposes (TM 9-2350-256-20).

a. Prior Operations. Prior to removal of the forward fuel tank, perform the following operations:

(1) Remove commander's and rigger's seats, hoist winch cable chute and the drain valve controls and control lever bracket (TM 9-2350-256-20). Remove subfloor plates 3. 5, 9, 10, 11, 12. 13, 14, 17, 18, 20. 21, 22 and 24 (fig. 2-3).

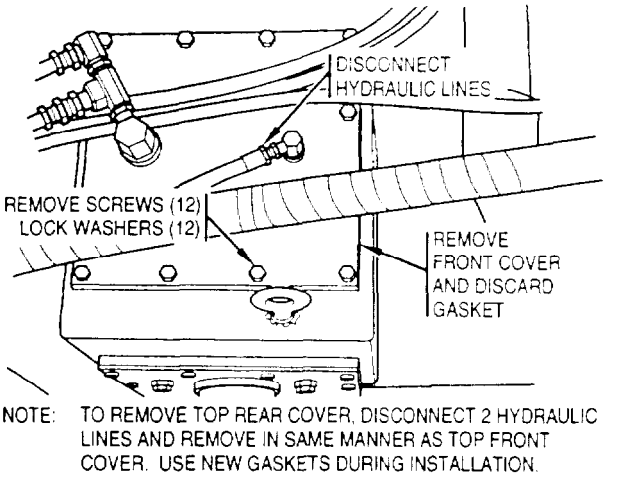


Figure 2-42. Hydraulic oil tank top covers - removal and installation.

(2) Remove main winch and spade assembly (para 2-25) and hoist winch assembly (para 2-35). Remove mechanical transmission and hydraulic pump assembly (para 2-32) and hydraulic system oil tank assembly (para 2-40).

(3) Disconnect mechanical transmission power takeoff drive shaft at main engine and remove shaft entirely (fig. 2-30).

(4) Remove auxiliary power unit control box and bracket and the shift and throttle control components mounted on floor plates (TM 9-2350-256-20). Remove any stowage racks and boxes interfering with removal of the tank (TM 9-2350-256-20).

(5) Support rear (lower) end of hydraulic control panel (subplate) by opening operator's and mechanic's hatches and looping a chain through the hatches. Secure the chain to lower end of panel to support it. Remove attaching bolts at rear support bracket and remove subfloor plate 1 (fig. 2-3).

b. Remoual. Remove the forward fuel tank assembly as shown in figure 2-43.

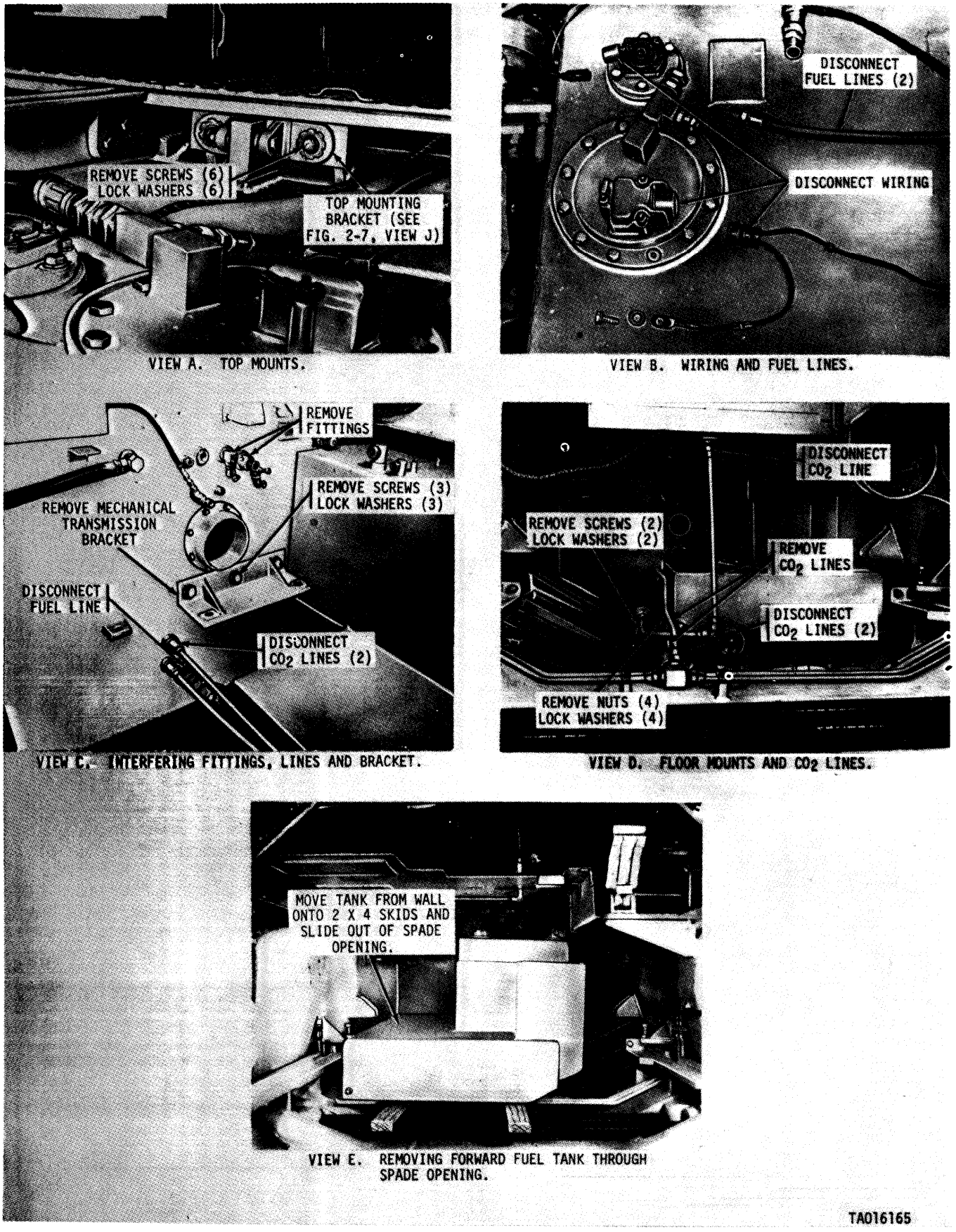
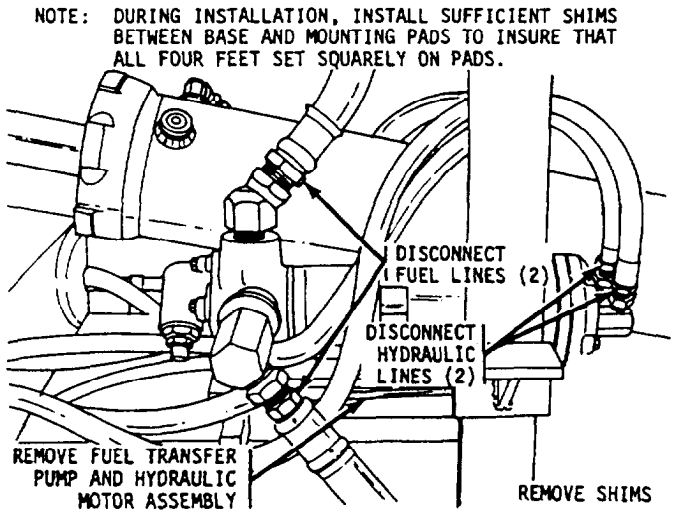


Figure 2-43. Forward fuel tank—removal and installation.

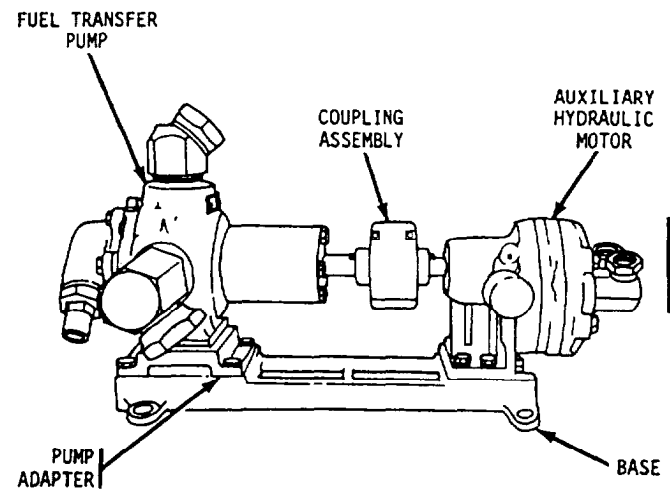
c. Installation. Install the forward fuel tank in reverse order of removal.

2-45. Fuel Transfer Pump and Auxiliary Hydraulic Motor Assembly

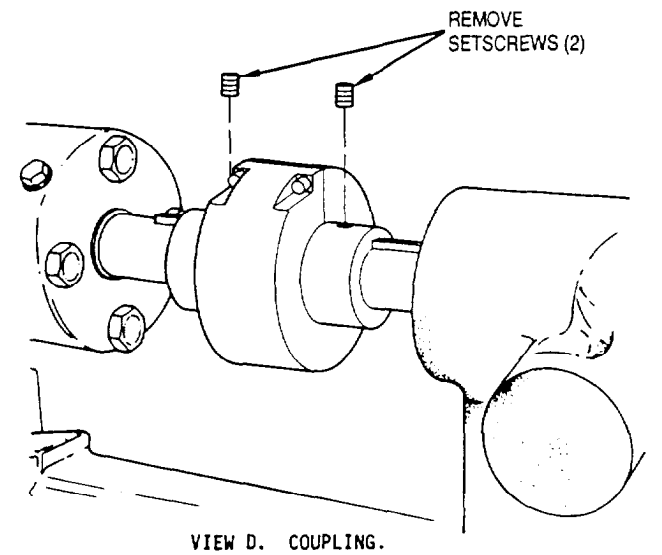
a. Removal. Prior to removing the fuel transfer pump and auxiliary hydraulic motor assembly, remove engine deck (TM 9-2350-256-20) and open deck doors 7 and 8 (fig. 2-2). Remove the fuel transfer pump and motor assembly as shown in figure 2-44.



VIEW A. HYDRAULIC LINES.



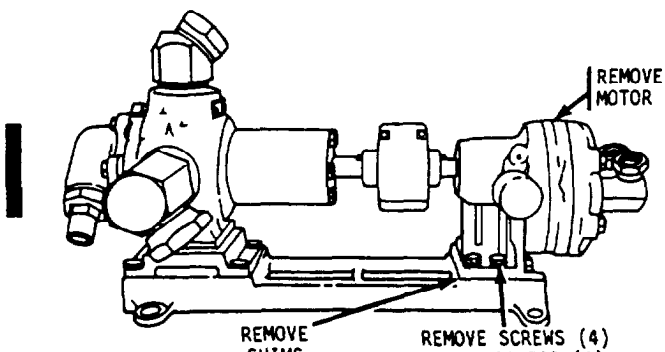
VIEW B. FUEL TRANSFER PUMP AND MOTOR ASSEMBLY.



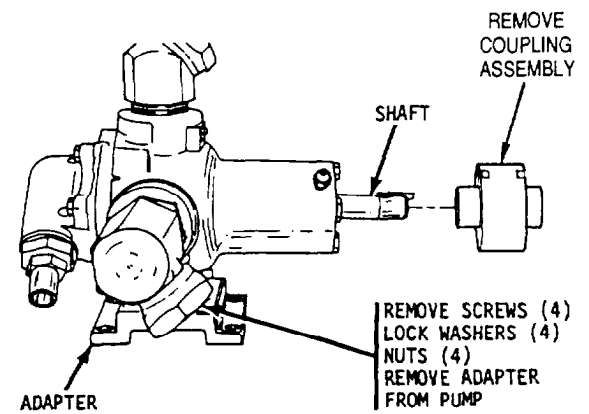
VIEW C. DELETED.

VIEW D. COUPLING.

NOTE: DURING INSTALLATION, INSTALL SUFFICIENT SHIMS BETWEEN BASE AND MOTOR AND PUMP ADAPTER TO ASSURE SPROCKET ALINEMENT.



VIEW E. ADAPTER.



VIEW F. COUPLING.

Figure 2-44. Fuel transfer pump and auxiliary hydraulic motor assembly-remoual and installation.

b. Installation. Install the fuel transfer pump and auxiliary hydraulic motor assembly in reverse order of removal.

2-46. Miscellaneous Hydraulic Components

a. General. Various miscellaneous valves located at several points about the vehicle, together with hydraulic lines and fittings, are considered collectively as a major component in the removal and installation procedure. The removal and installation of each component is described and illustrated in the following sections of this paragraph. Remove interfering components as required for access for various points.

NOTE

Prior to disconnecting any hydraulic lines, refer to paragraph 2-10b.

b. Lines and Fittings.

(1) *Identification.* Hydraulic lines and fittings and the points of support and method of attaching the supports are shown in TM 9-2350-256-20. The lines connecting units of the vehicle's hydraulic system consist primarily of the flexible high-pressure rubber hose and metal fittings. For identification, each hose is marked with its part number in one place and its code number at 36-inch intervals along its length. Code numbers and port routing of each hydraulic line are listed in TM 9-2350-256-20. Refer to TM 9-2350-256-34-2 for schematic diagrams identifying and locating ports.

(2) *Removal and Installation.* Refer to TM 9-2350-256-20 for removal and installation of hydraulic lines and fittings.

c. Pressure Switch Assembly. Refer to TM 9-2350-256-20 for removal and installation instructions.

d. Fuel Transfer Pump and Auxiliary Hydraulic Motor Assembly Motor Control Valve. Open engine deck doors 3 and 4 (fig. 2-3) to remove and install the auxiliary hydraulic motor control valve as shown in figure 2-45.

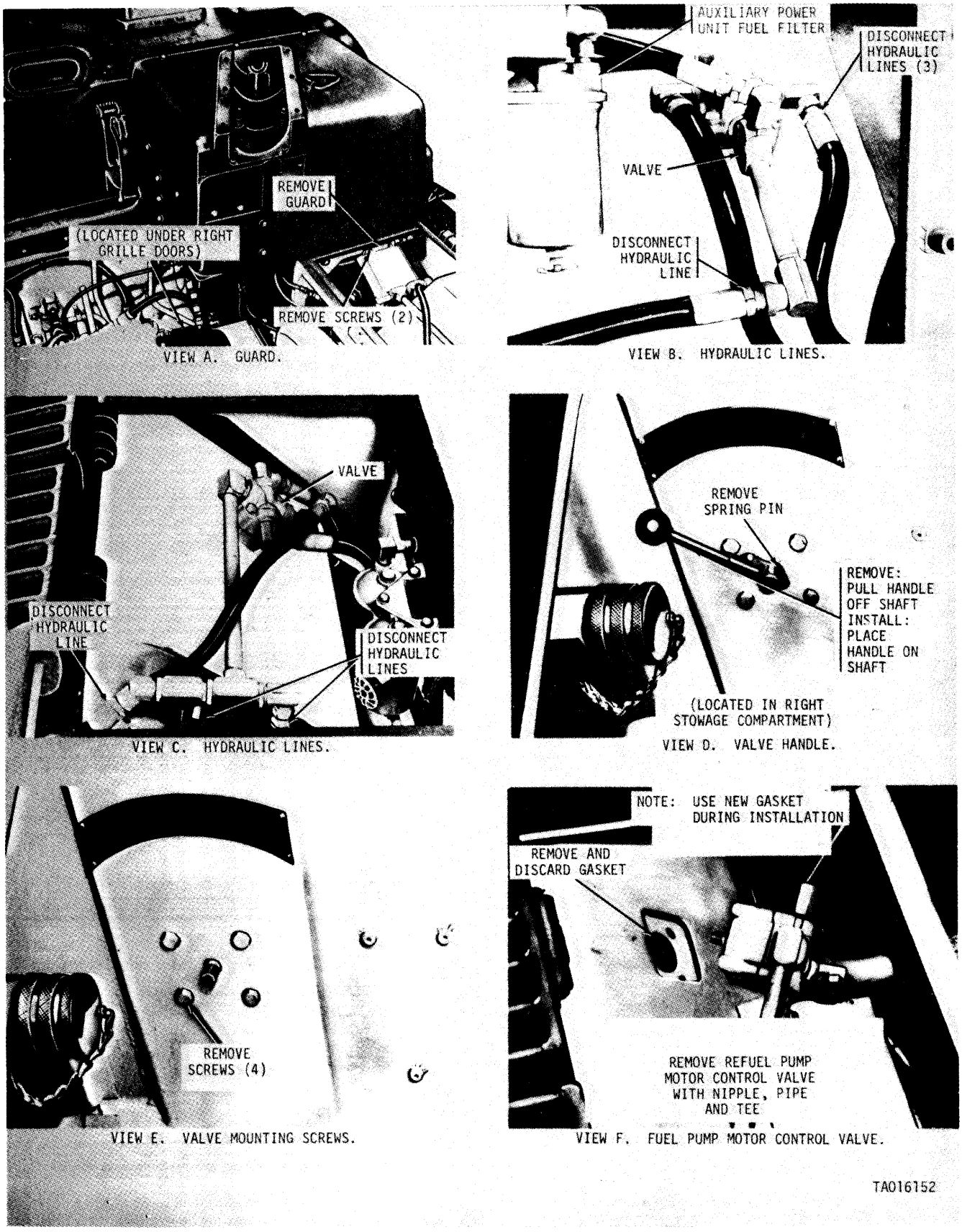


Figure 2-45. Fuel transfer pump and auxiliary hydraulic motor assembly motor control valve—removal and installation.

e. Adjustable Flow Hydraulic Regulator. The hydraulic lines to be disconnected from the adjustable flow hydraulic regulator are located under deck grilles 3 and 4 (fig. 2-2). Remove and install the adjustable flow hydraulic regulator as shown in figure 2-46.

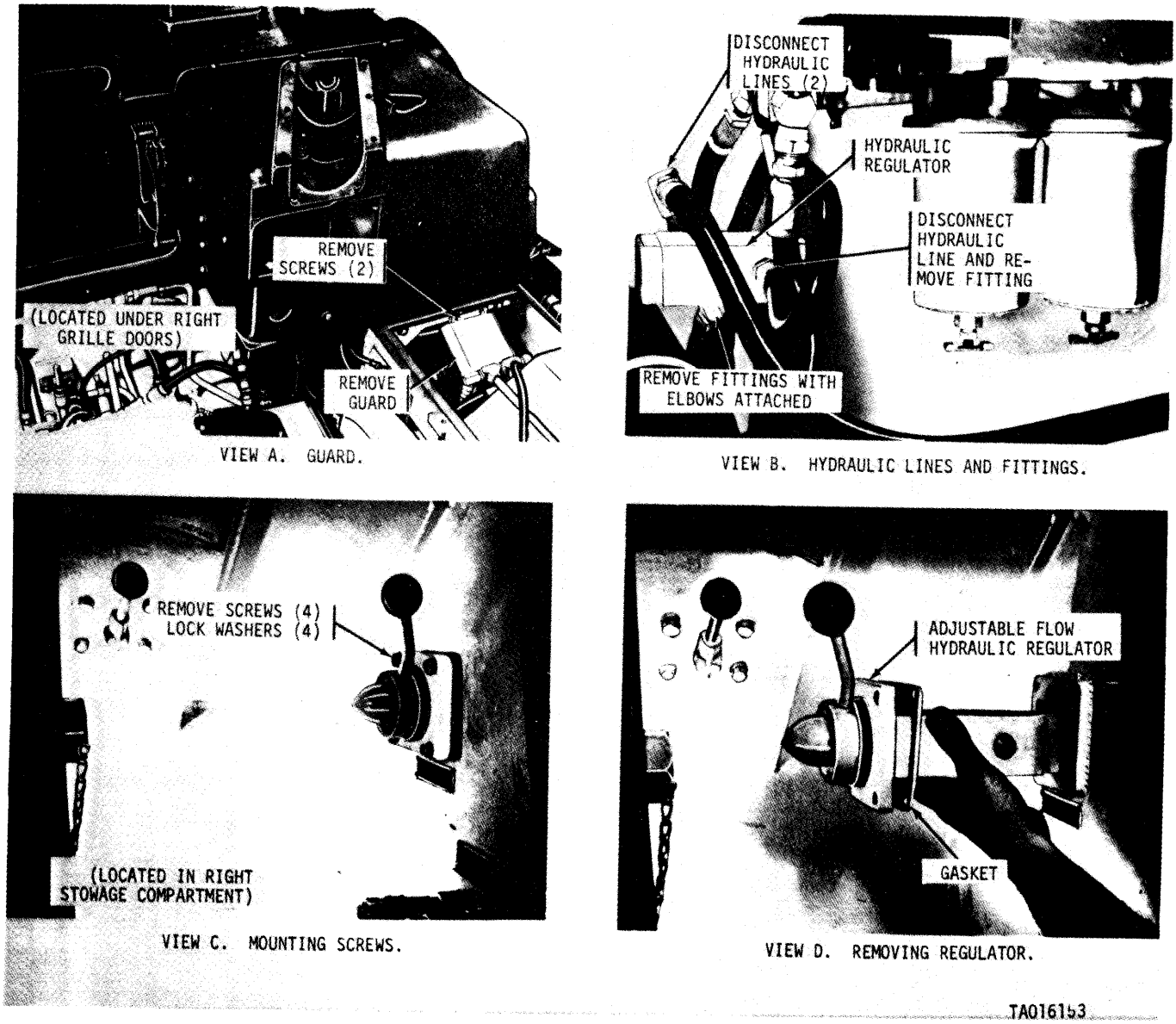


Figure 2-46. Adjustable flow hydraulic regulator- removal and installation.

f. Spade Subplate and Control Valve Assembly. The spade control valve can be removed from the subplate and replaced without removing the sub plate assembly from the vehicle. Remove and install the spade subplate and valve assembly or the spade control valve only as shown in figure 2-47.

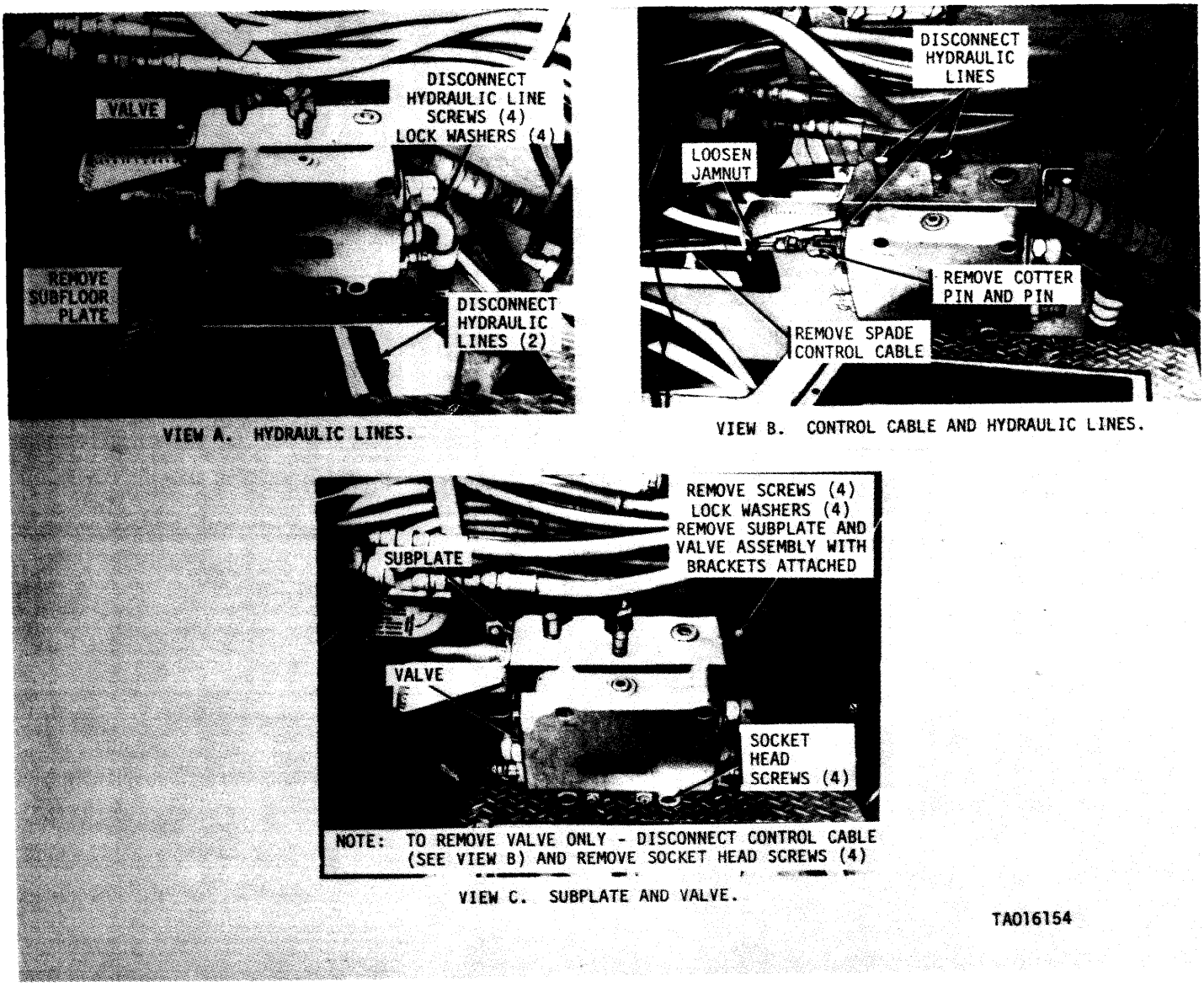


Figure 2-47. Spade subplate and control valve assembly—removal and installation.

g. Spade Cable Control Assembly.

(1) *Removal.* Remove the spade control cable as shown in Views F, G, H and I of figure 2-28 and View B of figure 2-47.

(2) *Installation.* Install the spade control cable in reverse order of removal.

(3) *Adjustment,* Install new cable keeping jamnuts (View B, fig. 2-47) loose for adjustment. Center spade control lever and tighten jamnuts. To adjust lever travel:

(a) Loosen jamnuts on adjustment screws (View F, fig. 2-28).

(b) Backoff adjustment screws.

(c) Move spade control lever completely back. Adjust screw until it touches lever and add one full turn. Tighten jamnut.

(d) Repeat step *(c)* with lever completely forward. Adjust front adjustment screw until it touches lever and add one full turn. Tighten jamnut.

h. Flow Regulating Subplate Assembly. Remove and install the flow regulating subplate assembly as shown in figure 2-48.

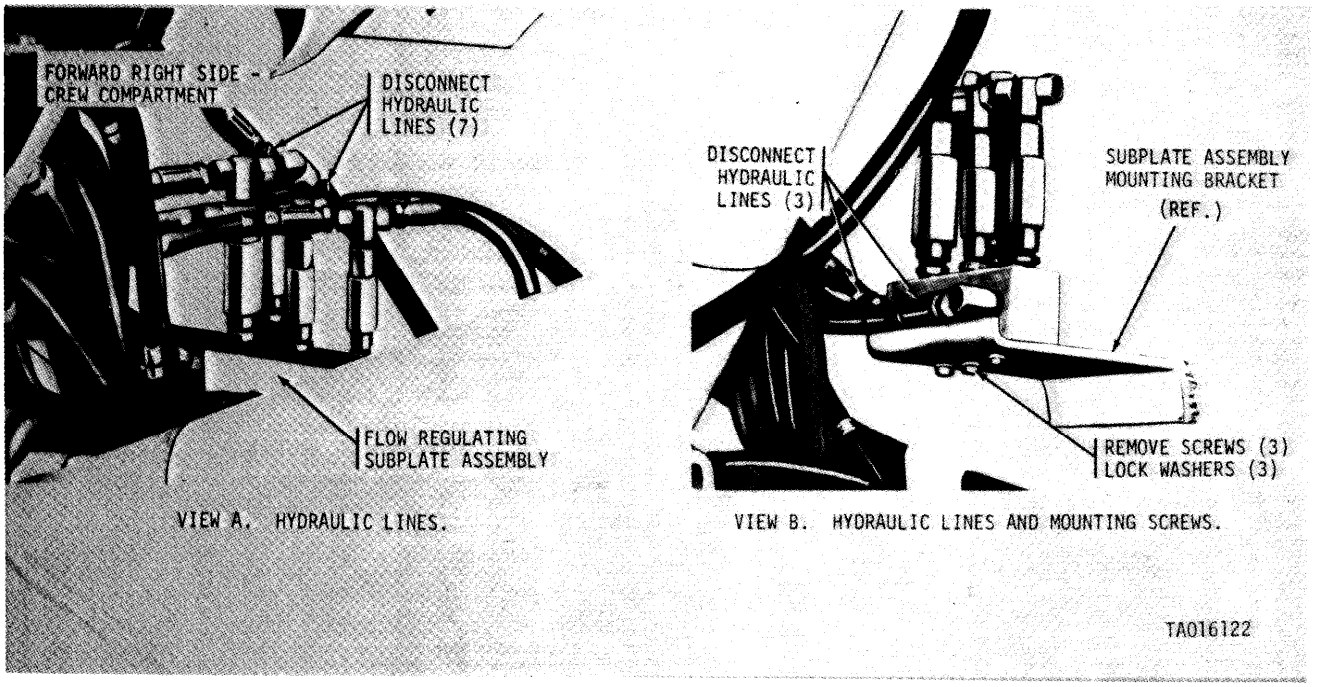


Figure 2-48. Flow regulating subplate assembly–removal and installation.

i. Boom Limit Pilot Valves. Prior to removal of the boom limit valves, remove deck grilles 6 and 20 (fig. 2-2). Remove and install the boom limit valves as shown in figure 2-49. Refer to TM 9-2350-256-20 for adjustment instructions.

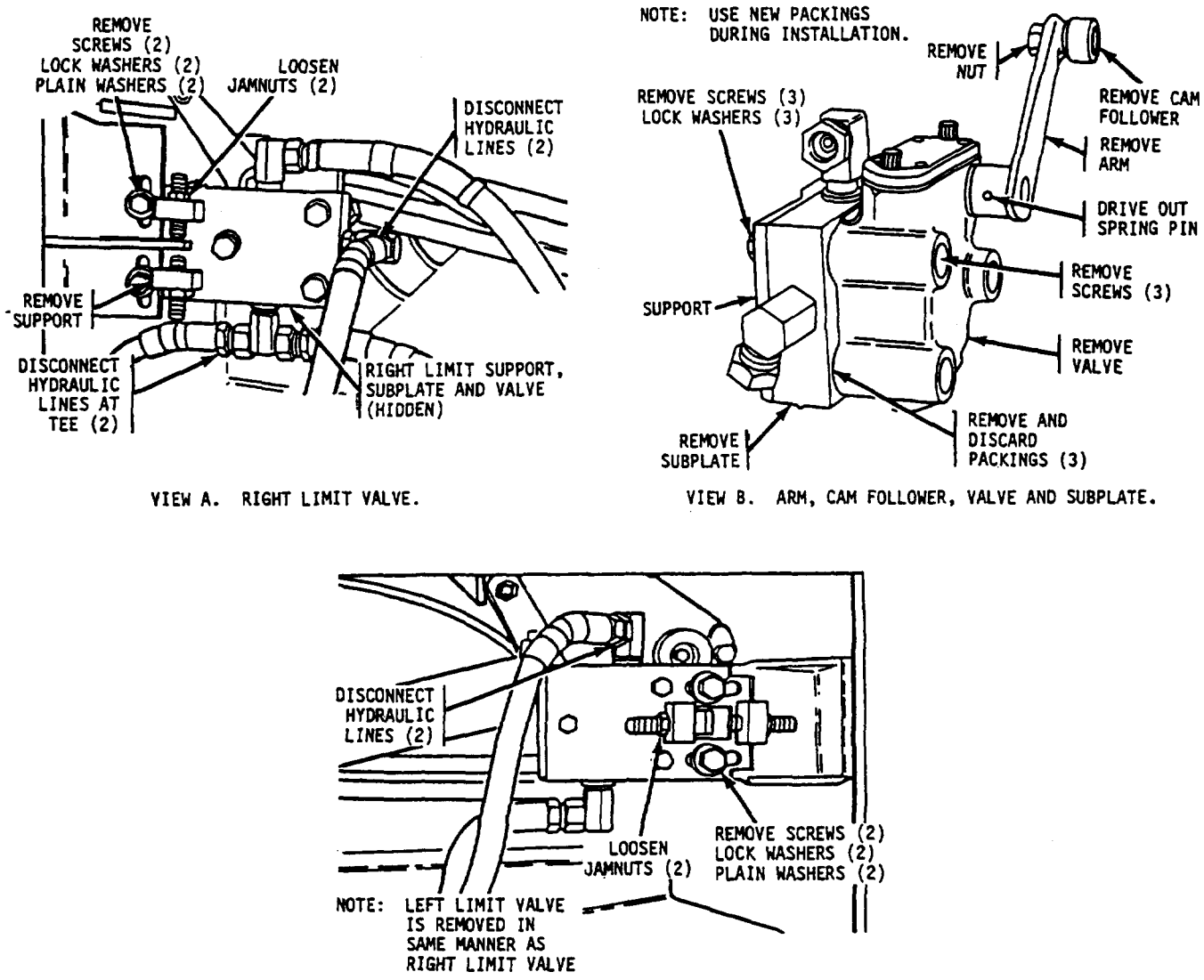


Figure 2-49. Boom limit pilot valves-removal and installation

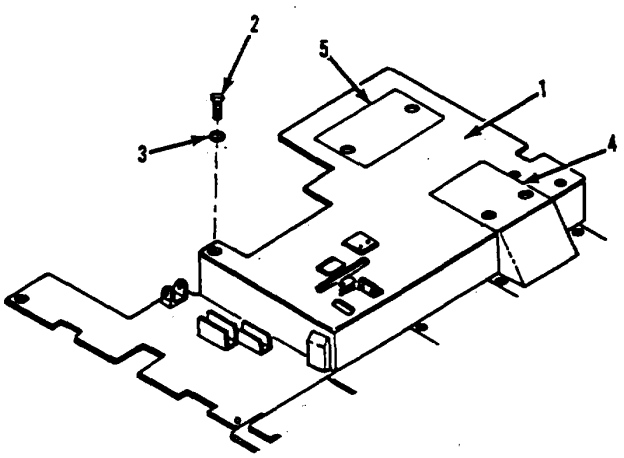


Figure 2-50. Right-side front floor plate--removal and installation

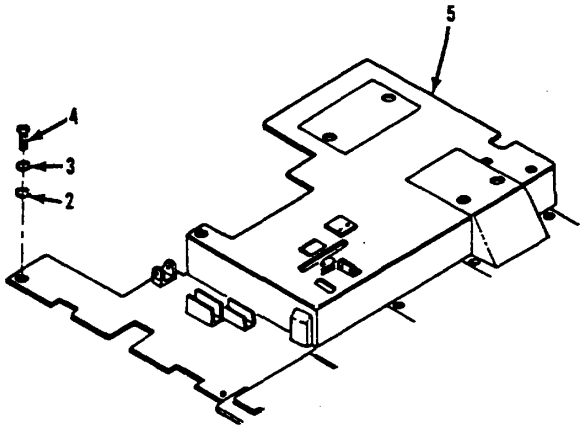


Figure 2-51. Left side front floor plate removal and installation

2-47. Right-Side Front Floor Plate

NOTE

Refer to figure to locate cab subfloor plates.

a. Removal. Prior to removing the right-side -j front floor plate, remove hydraulic control panel (subplate) assembly as shown in figure 2-28, and right-front access floor plate, right-front floor plate rear access, APU control box and shifting controls and linkage as shown in TM 9-2350-256-20.

Remove right-side front floor plate as shown in figure 2-50.

b. Installation. Install the right-side front floor plate in reverse order of removal.

1 Right-side front floor plate
2 Screw (7)
3 Lockwasher (7)
4 Right-front floor plate rear access
5 Right-front &access floor plate

2-48. Left-Side Front Floor Plate

NOTE

Refer to figure 2-3 to locate cab subfloor plates.

a. *Removal.* Prior to removing the left-side front floor plate disconnect wiring harness from dimmer switch and remove right-side front floor plate (figure 2-50). Remove left-side front floor plate as shown in figure 2-5L

b. Installation. Install the left-side front floor plate in reverse order of removal.

1 Left-side front floor plate
2 Flat *washer* (2)
3 Lockwasher (2)
4 Screw (2)
5 Right-side front floor plate

CHAPTER 3

REPAIR OF RECOVERY VEHICLE, FULL TRACKED: MEDIUM, M88A1

Section 1. REPAIR OF HULL ASSEMBLIES

3-1. Description

The hull and cab are constructed of cast armor and armor plate welded into a single unit. Padded seats are provided in the cab for the crew and passengers. Doors and hatches are located around the vehicle for crew access and stowage compartments.

3-2. Seals and Linings

a. General. Repair of the various rubber insulation seals and linings installed on the vehicle consists of replacing those that are worn.

b. Rubber Sealing Strips on Acetylene Compartment Door.

(1) Remove the old seal and discard. Clean the area thoroughly by scraping off old adhesive and then removing dirt, grease and other foreign matter with a wire brush.

(2) Apply fresh rubber base adhesive (NSN 8040-00-281-1972 or NSN 8040-00-843-3461) and wait until adhesive becomes slightly tacky.

(3) Press new seal (NSN 9390-00-247-2335) firmly into place and clean any excess adhesive from surface of seal.

(4) Allow adhesive to thoroughly dry before closing door.

c. Lining of Fire Extinguisher Bracket Arms. Refer to TM 9-2350-256-20 for removal and installation and for repair of the fire extinguisher bracket assembly. When replacing the lining of the arm assemblies, use the old lining as a pattern and cut to the same size. Set the rivet tangs below the lining surface so that the surface is smooth. Peen over properly to hold securely in place.

3-3. Pads

a. Rocket Ammunition Storage Box Pads. Repair of the sponge rubber strips in the ammunition storage box is the same as for the acetylene compartment door seals (para. *3-2 b),* except that the new strips are cut to the proper size from sheets. Use the old strip as a pattern and cut to the same size. Refer to paragraph 3-2 for repair instructions.

b. Vision Cupola Padding Assembly.

(1) *Disassembly.* Refer to TM 9-2350-256-20 for removal and installation. Disassemble the vision cupola padding assembly as shown in figure 3-1.

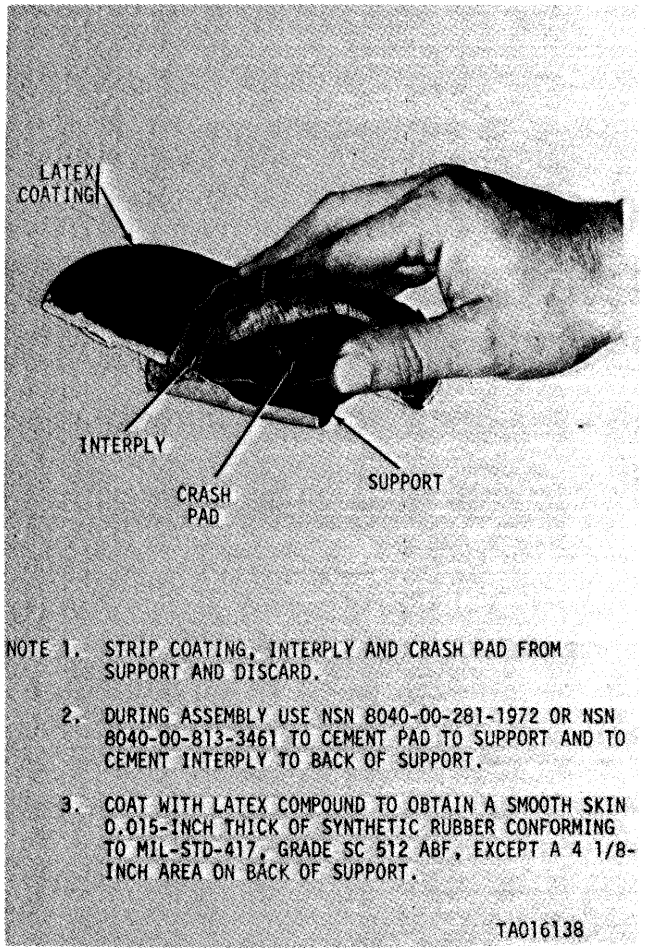


Figure 3-1. Vision cupola padding assembty–repair.

(2) *Cleaning.* Scrape dirt and adhesive from the support and clean with a wire brush. Clean with dry cleaning solvent or mineral spirits paint thinner and dry .

(3) *Inspection and Repair.* Inspect the support for cracks, distortion, breakage or other damage that would impair its use. If defective, replace entire padding assembly.

(4) *Assembly.* Assemble the vision cupola padding assembly in reverse order of disassembly.

Section II. REPAIR OF POWERPLANT

3-4. Description.

Refer to TM 9-2815-220-34 for description and operation of the Continental Model AVDS-1790-2DR engine. Refer to TM 9-2520-215-34 for description and operation of the Allison-GM Model XT-1410-4 cross-drive transmission.

3-5. Removal.

Refer to TM 9-2350-256-20 for instructions on removing the powerplant from the vehicle.

REMOVING / INSTALLING TRANSMISSION

Special Tools:

Sling (Tool ref 141, App B)

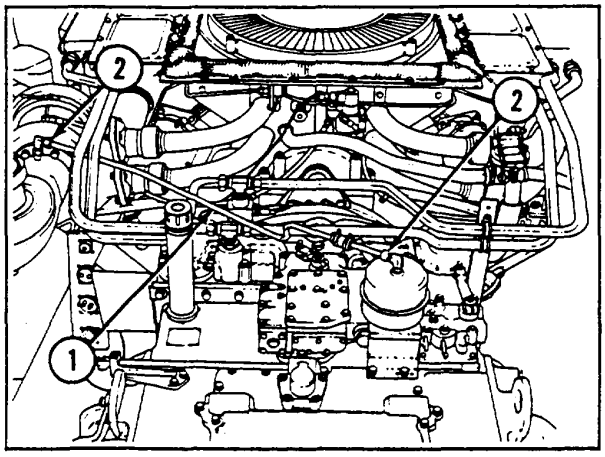
NOTE

Discard all lockwashers, lockwires, cotter pins, packings, gaskets, and seals. Replace with new parts during installation.

NOTE

Remove powerplant (page 3-7) from vehicle before performing separation of engine and transmission.

REMOVAL



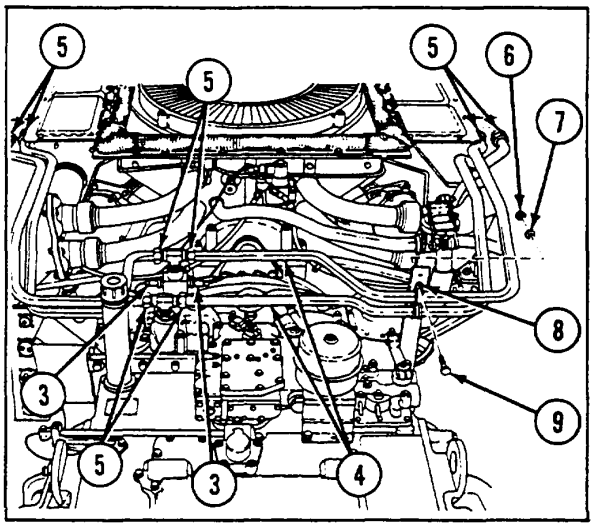
1 Remove transmission breather tube (1) by loosening one coupling nut (2) at each end.

3-6. Disassembly.

a. Main Engine and Transmission Separation.

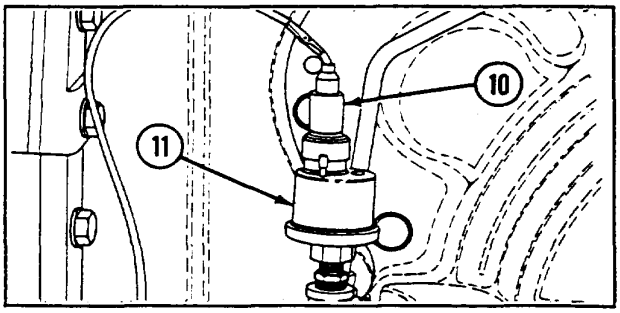
For instructions on separating the main engine from the transmission, refer to the instructions below. If just the transmission is to be repaired or replaced, it is not necessary to remove the wiring harness and accessories from the engine.

b. Wiring Harness and Accessories. Remove all accessory items necessary to work on the engine and transmission (TM 9-2350-256-20). Remove wiring harnesses and cables as shown in figure 3-2. Figure 3-3 shows the main engine wiring diagram.

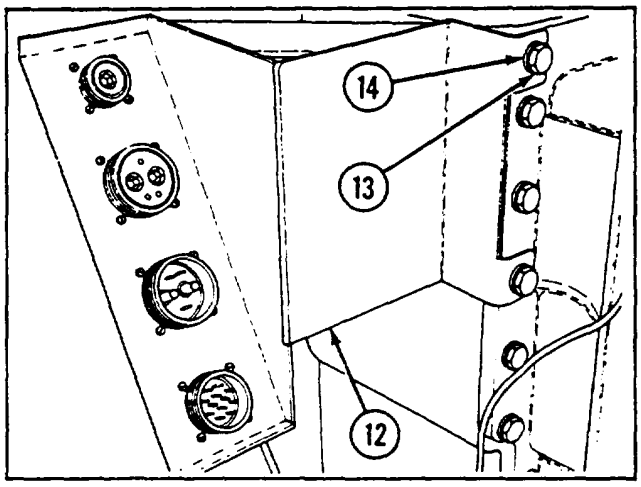


2 Disconnect two electrical harness connectors (3).

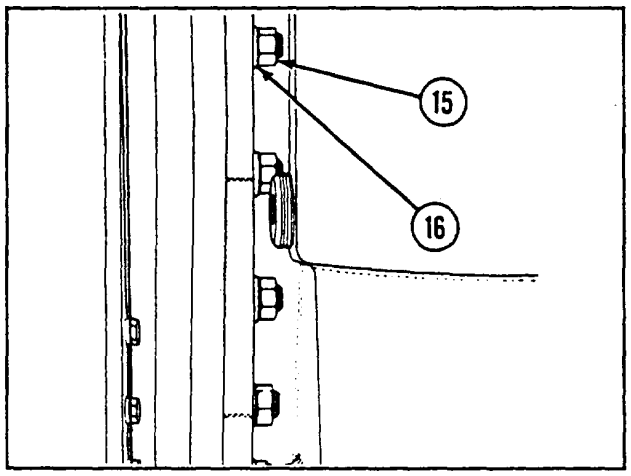
3 Remove four transmission oil cooler lines (4) by loosening on each, two nuts (5), and removing two nuts (6), two flat washers (7), two loop clamps (8), and two screws (9).



4 Disconnect electrical harness connector (10) at transmission oil pressure sending unit (11).



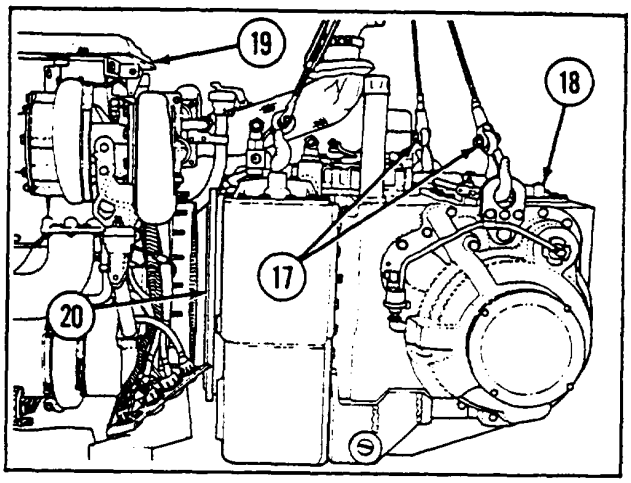
5 Remove engine wiring harness bracket (12) by removing two screws (13) and two lockwashers (14).



CAUTION

Prior to disconnecting transmission from engine, install lifting sling (Tool ref 141, App B).

6 Disconnect transmission from engine by removing 24 nuts (15) and 24 lockwashers (16).



7 Using sling(17), remove transmission (18) from engine (19).

8 Remove and discard gasket (20).

INSTALLATION

1 Install sling (17) on transmission (18).

2 Install new gasket (20) between transmission (18) and engine (19).

NOTE

When installing the 24 nuts, do not tighten until all nuts have been installed.

3 Secure transmission (18) to engine (19) using 24 lockwashers (16) and 24 nuts (15).

4 Install wiring harness bracket (12) with two screws (13) and two lockwashers (14).

5 Connect electrical harness connector (10) to transmission oil pressure sending unit (11).

6 Install four transmission oil cooler lines (4), by tightening on each two nuts (5), and securing two of the lines to transmission bracket with two screws (9), two loop clamps (8), two flat washers (7), and two nuts (6).

7 Connect two electrical harness connectors (3).

8 Install transmission breather tube (1) by tightening one coupling nut (2) at each end.

9 Install powerplant.

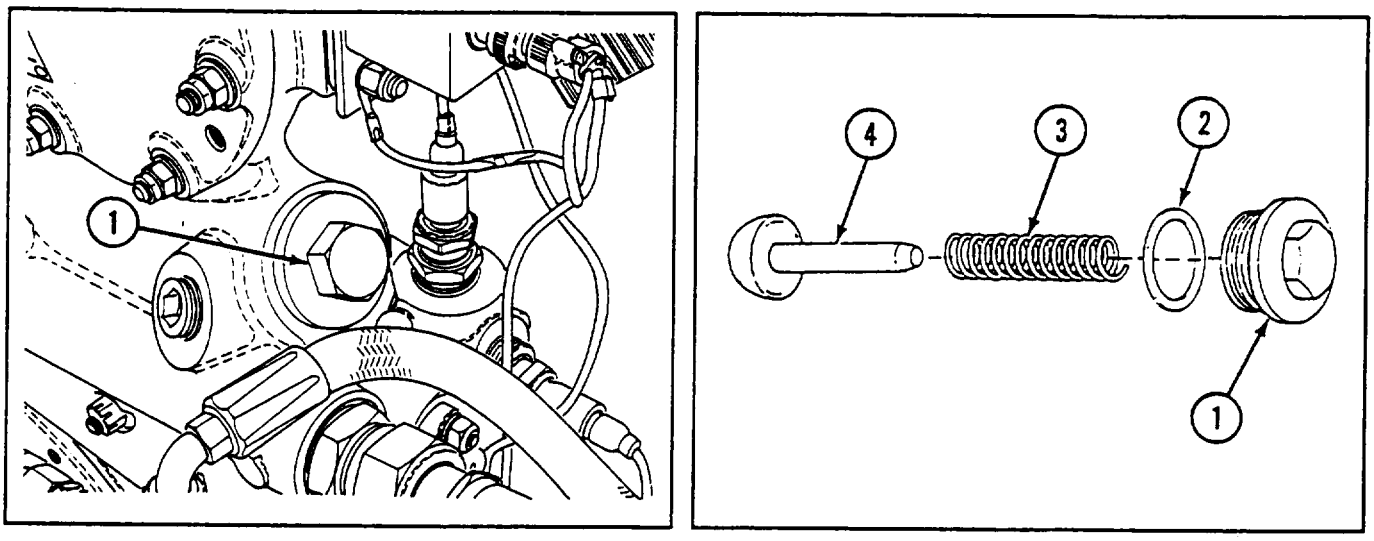
3-6.1 OIL FILTER BYPASS VALVE

THIS TASK COVERS
a. Removal b. Installation

INITIAL SET-UP
Part:
Gasket (Appendix G, item 84, TM 9-2350-256-20)
Equipment Condition:
Grille doors removed (see paragraph 9-57, TM 9-2350-256-20)

a. REMOVAL

Remove oil filter bypass valve plug (1), gasket (2), spring (3), and plunger (4).



b. INSTALLATION

Install plunger (4), spring (3), new gasket (2), and oil filter bypass valve plug (1).

3-6.2 OIL PRESSURE REGULATOR VALVE

THIS TASK COVERS

a. Removal b. Installation

INITIAL SET-UP

Part:

- Gasket (Appendix G, item 57, TM 9-2350-256-20)
- Nuts, self-locking (2) (Appendix G, item 165, TM 2350-256-20)

Equipment Condition:

Grille doors removed (see paragraph 9-57, TM 9-2350-256-20)

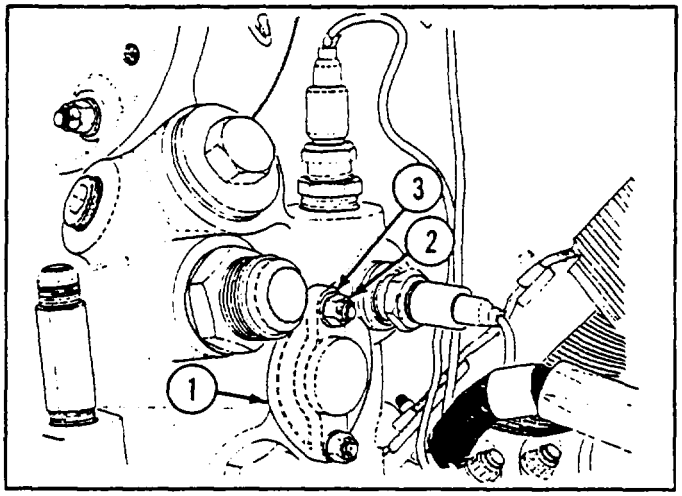
a. REMOVAL

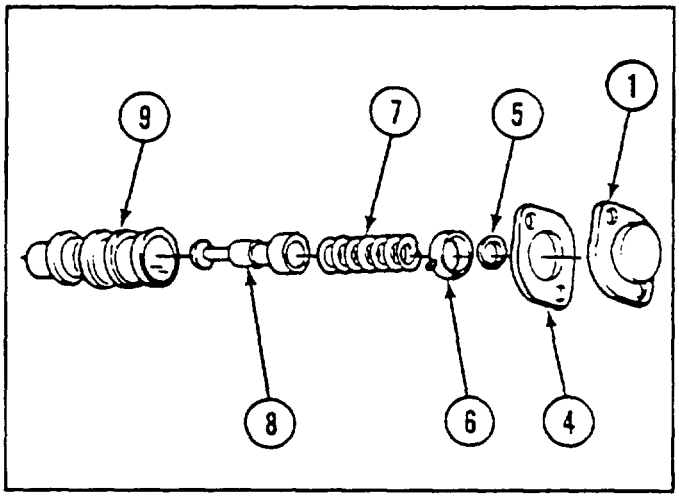
CAUTION

Oil pressure regulator valve cover is spring loaded. Exercise care when removing cover.

1 Remove oil pressure regulator valve cover (1) by removing two self-locking nuts (2) and two flat washers (3).

2 Remove gasket (4), washer (5), plate (6), spring (7), plunger (8), and oil pressure sleeve (9).





b. INSTALLATION

1 Install oil pressure sleeve (9), plunger (8), spring (7), plate (6), washer (5), and new gasket (4).

2 Install oil pressure regulator valve cover (1) with two new self-locking nuts (2) and two flat washers (3).

c. Transmission Oil Breather Tube Assembly. Refer to TM 9-2350-256-20 for removal and installation instructions. Disassemble the oil breather tube assembly as shown in figure 3-4.

DISASSEMBLY:
REMOVE CLAMPS (5) AND HOSE (6).
BACK NUTS (2) OFF TUBES (3 AND 7) AT HOSE ENDS.

ASSEMBLY :
ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY, LEAVING NUTS (2) BACKED OFF.

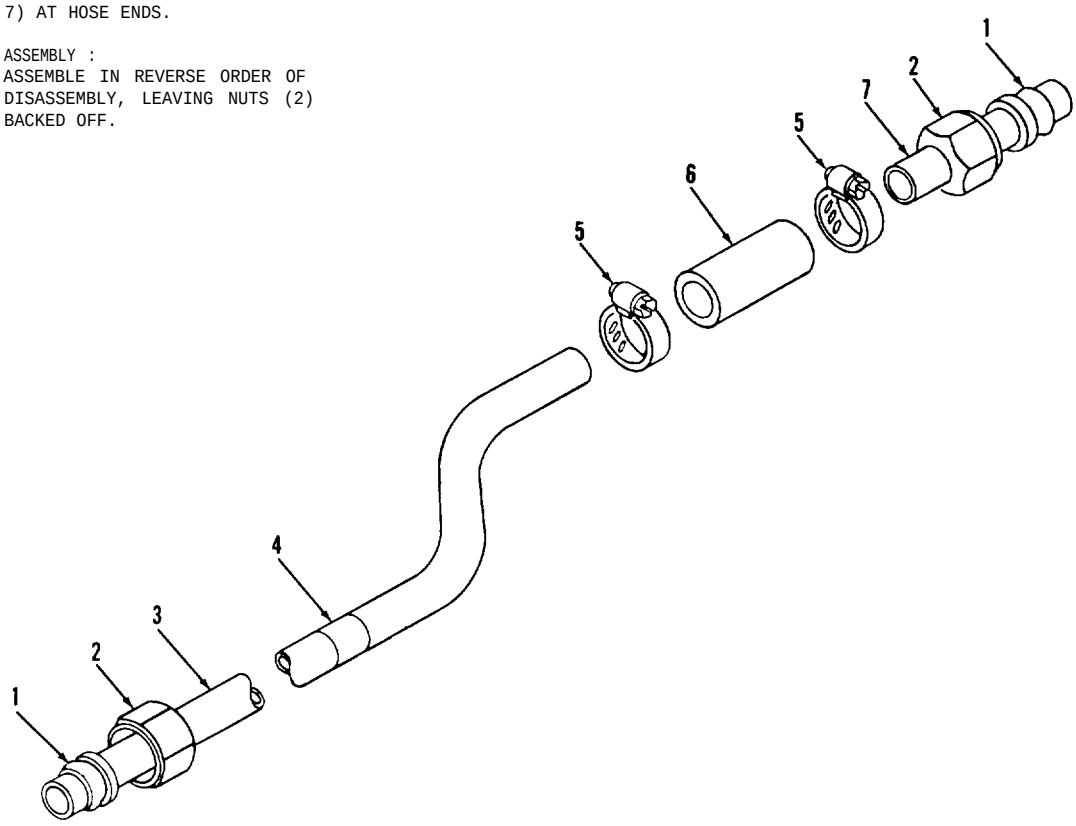


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Figure 3-4. Transmission oil breather tube assembly–disassembly and assembly.

Legend for fig. 3-4:
1 Sleeve (2)
2 Nut (2)
3 Tube
4 Marker
5 Clamp
6 Hose
7 Tube

d. Transmission Lockup Control (Throttle) Linkage Rod Assembly. Refer to TM 9-2350-256-20 for removal and installation instructions. Disassemble the lockup control rod assembly as shown in figure 3.5.

DISASSEMBLY:
LOOSEN JAMNUTS (2 AND 4) AND REMOVE BEARINGS (1 AND 5) FROM ROD (3). REMOVE JAMNUTS FROM BEARINGS.

ASSEMBLY :
ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY, SCREWING BEARINGS LOOSELY INTO ROD WITH JAMNUTS BACKED OFF.

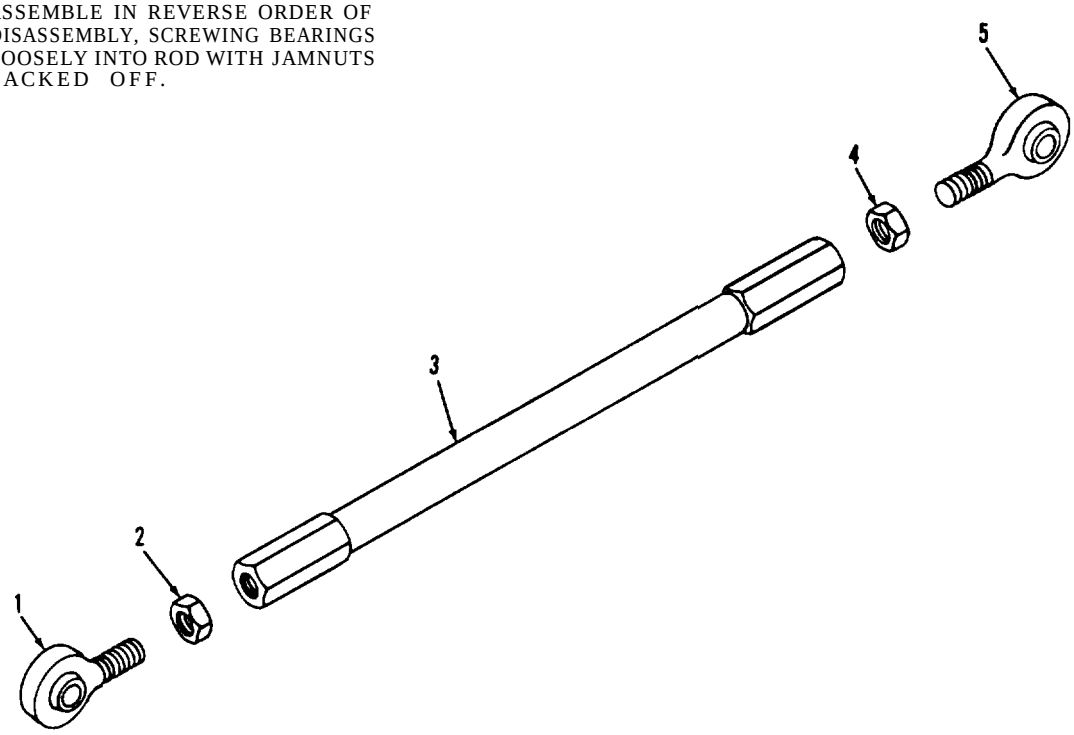

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Figure 9-5. Transmission lockup control linkage rod assembly–disassembly and assembly.

Legend for fig. 3-5:
1 Bearing
2 Jamnut
3 Rod (with ends)
4 Jamnut
5 Bearing (left hand thread)

3-7. Cleaning and Inspection

a. Clearning.

(1) Wash hoses and harnesses in a mild soap solution, rinse with clean water and dry with compressed air.

(2) Clean all metal parts with drycleaning solvent or mineral spirits paint thinner. Use a wire brush where necessary and dry with compressed air.

b. Inspection.

(1) Inspect engine, transmission, wiring harness and all accessories for breaks, leaks, damage, excessive wear, missing parts or unserviceable condition.

(2) Check the following for the transmission oil breather tube (fig. 3-4) and lockup control linkage rod (fig. 3-5):

(a) Rods and rod ends for cracks or distortion.

(b) Leading edge of sleeve (1, fig. 3-4) should be at least 1/8 inch from end of tube and close to *or* touching tube.

(c) Back of sleeve (1, fig. 3-4) should be in contact with tube.

(d) Sleeve (1, fig. 3-4) for evidence of wear and distortion.

(e) Hose (6, fig. 3-4) for fraying, cracks or excessive wear.

(f) Clamps, connecting and pivot parts for excessive wear.

(g) Threaded parts for moss threading and nicks.

3-8. Repair or Replacement

a. Refer to TM 9-2815-220-34 for engine repair or TM 9-2520-215-34 for transmission repair. If the engine or transmission is to be replaced, record the action on DA Form 2408.10, Equipment Component Register.

b. Refer to TM 9-2350-256-20 for instructions on repairing the main engine wiring harness and cables.

c. Refer to TM 9-2350-256-20 for instructions on repairing the main engine and transmission accessories removed for powerplant inspection or replacement.

d. Replace all defective parts on the transmission oil breather tube and lockup control linkage rod assemblies, If any one of the rods or sleeves (fig. 3-4 and 3-5) is defective, replace the entire assembly.

3-9. Assembly

a. Rejoin the main engine and transmission (TM 9-2350-256-20) .

b. Assemble all items removed from the powerplant, Install the accessories and wiring harness and cables in reverse order of removal.

3-10. Installation

Refer to TM 9-2350-256-20 for instructions on installing the powerplant in the vehicle.

Section III. REPAIR OF FUEL TANKS

3-11. Description

The fuel tanks are of a welded steel construction. The left rear tank contains the filler cap and filter assembly. The right and forward tanks contain liquid quantity sending units. The electric fuel pump is housed in the forward tank.

3-12. Removal

(Refer to paragraphs 2-18, 2-19 and 2-44 for instructions on removing the left rear, right rear and forward fuel tanks respectively.

3-13. Disassembly

a. Left Rear Fuel Tank. Remove the filler tube and strainer (TM 9-2350-256-20) if they were not removed prior to removal of the tank.

b. Right Rear Fuel Tank. Remove the transmitter (TM 9-2350-256-20) if it was not removed prior to removal of the tank.

c. Forward Fuel Tank. Remove the transmitter and electric fuel pump (TM 9-2350-256-20) if they were not removed prior to removal of the tank. Unscrew the magnetic drain plug from the bottom, clean it of all particles, inspect for thread damage and replace on tank prior to cleaning tank.

3-14. Cleaning

a. General, When a tank is repaired for leaks it is necessary to clean, inspect and test it. Coordinate the following cleaning procedures with the inspection and tests in paragraph 3-15. Clean other tank components with drycleaning solvent or mineral spirits paint thinner and dry with compressed air.

b. Procedure.

(1) Slush tank interior with methylene chloride (pure) or chemical cleaner as specified in TB 750-1047, Elimination of Combustibles From Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks, to remove residual fuel, dirt, sediment and foreign matter.

(2) Drain and air dry. Reclean magnetic drain plug if necessary.

3-15. Inspection, Test and Repair

a. Inspect tank for cleanliness. Repeat cleaning procedures (para. 3-14) if necessary.

b. Inspect tank for any obvious cracks or open seams. Inspect mounting brackets, mounts and cushions for cracks or breaks. Weld assembly and components as required.

c. Inspect tank inlets and outlets for thread damage and repair with a thread chaser as required.

d. Test for leaks as follows:

(1) Close all openings with temporary plugs or other closures and apply 3-4 psi internal air pressure.

(2) Apply soapy water solution, consisting of liquid soap diluted with 20-40 % water, to all exterior surfaces of tank and inspect for air bubble formation.

(3) Mark location of any bubble formation, rinse and dry tank and weld the marked areas (TM 9-237).

e. Repeat step *d*.

3-16. Assembly

The electric pump and other fittings and accessories may be assembled on the tanks either before or after installation of the tanks in the vehicle. Refer to paragraph 3-13. Refer to TM 9-2350-256-20 for installation instructions.

Section IV. REPAIR OF ELECTRIC FUEL PUMP

3-17. Description

The fuel pump is located in the forward fuel tank sump cavity and is a centrifugal pusher-type pump designed for submerged operation. It operates by power from a 24-volt dc motor contained in the pump assembly.

3-18. Removal.

Remove and install the fuel pump according to instructions found in TM 9-2350-256-20.

3-19. Disassembly.

Disassemble the electric fuel pump as shown in figure 3-6. Refer to TM 9-2350-256-20 for disassembly instructions for the terminal assembly.

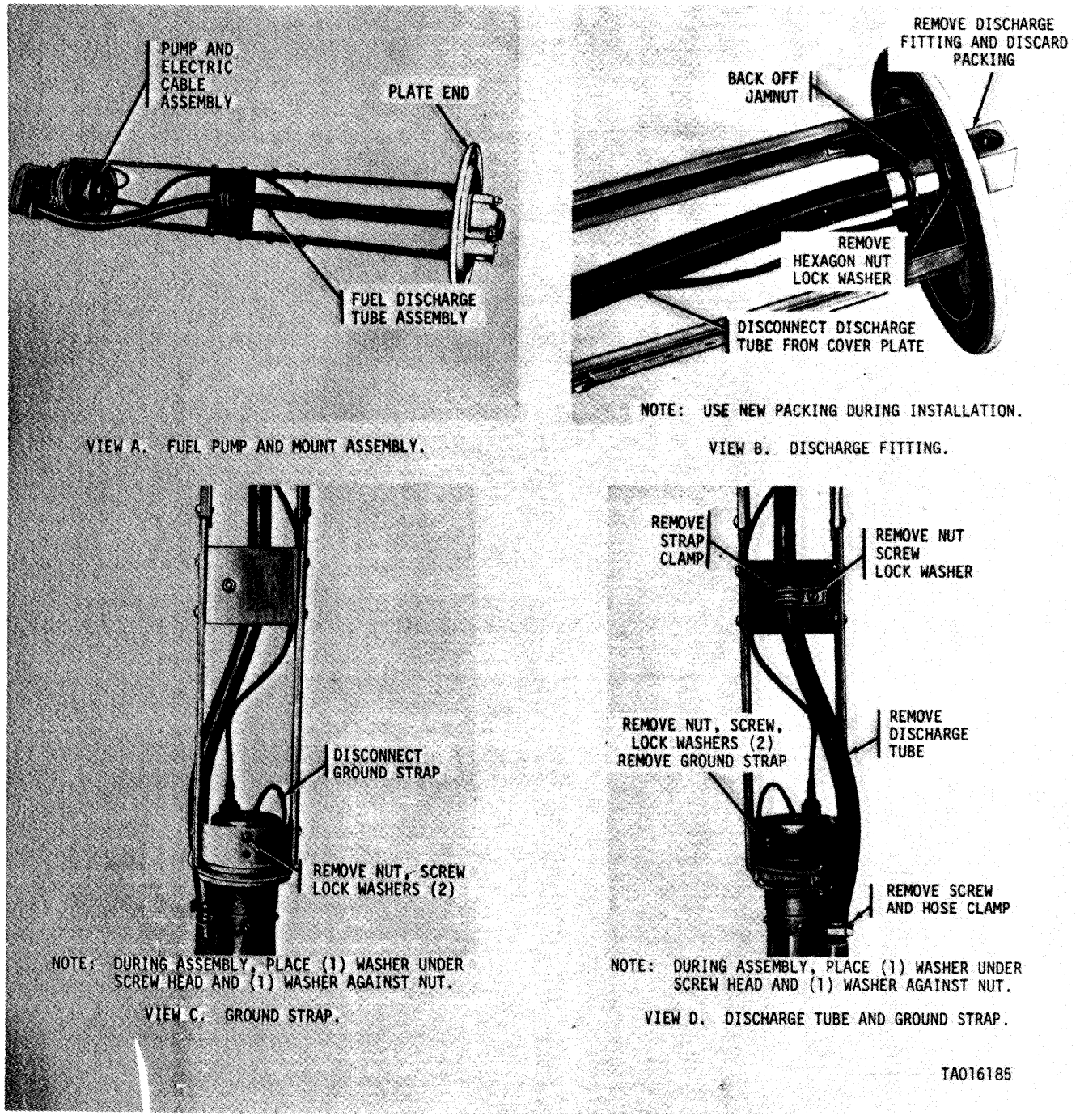
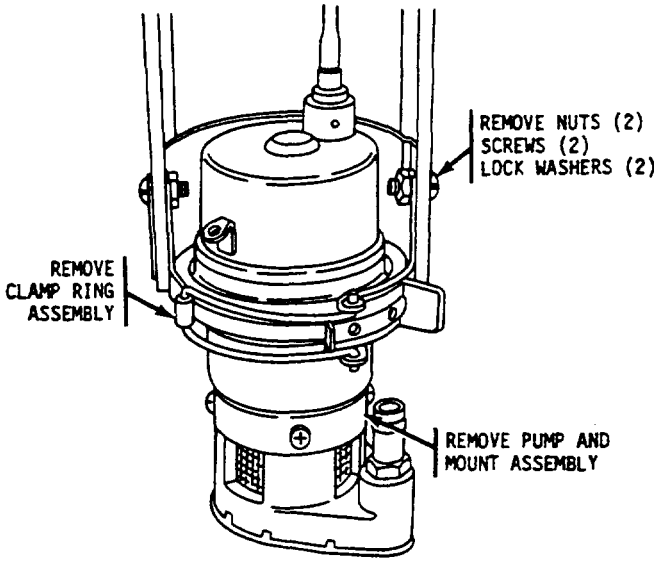


Figure 3-6. Electric fuel pump and mount assembly–disassembly and assembly (Sheet 1 of 2).



VIEW H. PUMP AND CABLE ASSEMBLY

Figure 3-6. Electric fuel pump and mount assembly-disassembly and assembly (Sheet 2 of 2).

3-20 Cleaning.
After disassembly and before inspection, clean metal parts in clean diesel fuel or drycleaning solvent. Clean tube in mild soap solution. Carefully blow out and dry each part with compressed air.

3-21. Inspection and Repair

a. Inspection

(1) Inspect pump for cracks, distortion and warpage.

(2) Inspect cable for cuts, damage and continuity.

(3) Inspect tube assembly for cracks and other evidence of excessive wear in tube and for damage to swivel end.

(4) Check continuity of ground cable and inspect for cuts or other damage.

(5) Inspect welded and support parts for cracks, distortion and breakage.

(6) Inspect threaded parts for nicks, moss threading and excessive wear.

(7) Inspect polarizing pin, terminal pin assembly, connector housing and pin assembly and fuse block for nicks, cracks, distortion and other dam age that would impair their use.

(8) Inspect other terminal assembly components for tears, cracks, hardening and other damage that would impair their use.

b. Repair.

(1) Replace pump and electric cable assembly if continuity check of cable shows it to be grounded or if there is any evidence of damage that would impair ites use.

(2) Repair dents or distortions. Weld cracks and breaks in" metal parts where practical. Replace defective parts if badly damaged.

(3) Repair threaded parts with a thread chaser if practical or replace defective parts.

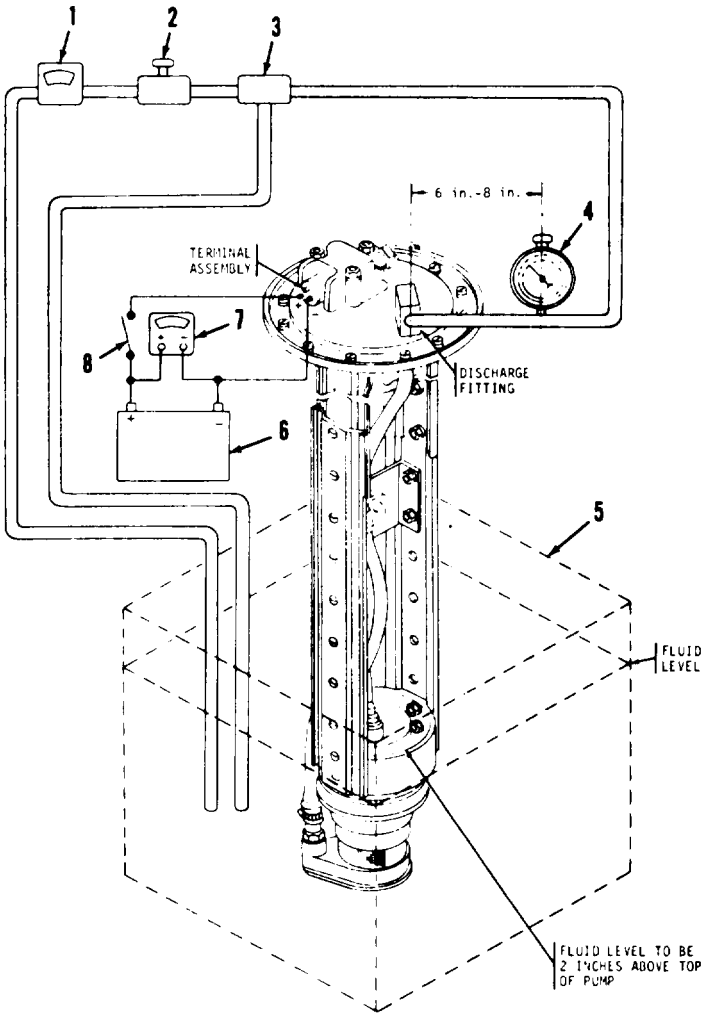
(4) Replace any other defective parts.

3-22. Assembly

Assemble electric fuel pump and mount assembly in reverse order of disassembly.

3-23. Tests

Prior to installation in the vehicle, test the electric fuel pump and mount assembly for performance as shown in figure 3-7.



VAPOR CAN EXPLODE FROM ELECTRIC ARC. DO NOT OPERATE 'PUMP BY CONNECTING OR DISCONNECTING CLIPS. USE A SWITCH

EQUIPMENT REQUIRED:		DESCRIPTION:
1.	FLOWMETER	0-10 GPH ± 2% OF SCALE READING.
2.	ADJUSTABLE FLOW REGULATOR	0-10 PSI.
3.	RELIEF VALVE	10 PSI.
4.	PRESSURE GAGE (TAP SHALL BE IN A 0.5 INCH I. D. DISCHARGE LINE, 6-8 INCHES FROM PUMP DISCHARGE FITTING)	0-10 PSI ± 2% OF SCALE READING.
5.	RESERVOIR	TO SUIT (FLUID LEVEL MUST BE MINIMUM OF 2 INCHES AB0VE PUMP).
6.	ADJUSTA8LE DC POWER SOURCE	OUTPUT CAPABILITY O-28 VDC @ 5 AMPERES,
7.	DC VOLTMETER	MUST MEASURE 17.5 - 28 VDC TO WITHIN AN ACCURACY OF O. 25%.
8.	SPST TOGGLE SWITCH	MS39061-1 (24 VDC, 24 AMP).
	TEST FLUID	FUEL VV-F-800.
	HOSE, PIPING AND FITTINGS	TO SUIT.

NOTE

TO DETERMINE POLARITY OF THE TERMINAL ASSEMBLY PINS, FACE THE PUMP AND MOUNT ASSEMBLY SO THAT THE DISCHARGE FITTING IS TO THE RIGHT AND THE TERMINAL TO THE LEFT WITH THE LONG CENTER (POLARIZING) PIN AT THE TOP OF THE TERMINAL AND THE SCREW AT THE BOTTOM. THE POSITIVE (HOT) PIN IS ON THE LEFT SIDE OF THE TERMINAL AND THE NEGATIVE (GROUND) PIN IS ON THE RIGHT SIDE.

TEST AFTER REASSEMBLY OF FUEL PUMP

1. ASSEMBLE TEST EQUIPMENT TO PUMP WITH SWITCH (8) OPEN AND SUBMERGE PUMP IN TEST FLUID (FUEL VV-F-800) SO THAT TEST FLUID COVERS PUMP BY AT LEAST 2 INCHES.

2. ADJUST POWER SUPPLY FOR 27.5 ± 0.1 VDC. CLOSE SWITCH (8) AND READJUST POWER SUPPLY IF NECESSARY.

3. OPERATE PUMP AT 27.5± 0.1 VDC. RATED FLOW SHOULD BE 22029 GPH (3.67 ± 0.15 GPM)-AT 3.75 PSI.

4. REPEAT STEP 2 FOR AN 18 + 0.1 VDC POWER SUPPLY.

5. OPERATE PUMP AT 18 ± 0.1 VDC. RATED FLOW SHOULD BE 80 ± 3 GPH (1.33 ˙.05 GPM) AT 2.50 PSI.

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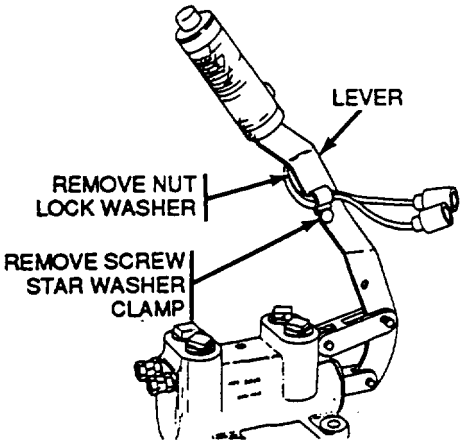
Figure 3-7. Electric fuel pump test.

Section V. REPAIR OF PURGE PUMP

3-24. Description
The purge pump is used to pump air from the fuel lines and to operate the engine manifold heaters for cold weather starting.

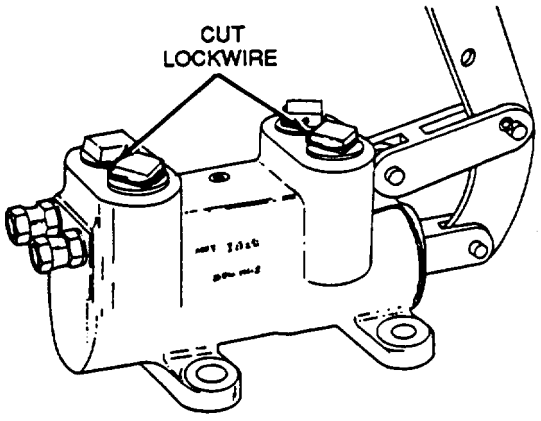
3-25. Removal
Refer to TM 9-2350-256-20 for instructions on removing and installing the purge pump.

3-26. Disassembly
Disassemble the pump as shown in figure 3-8. Refer to TM 9-2350-256-20 for instructions on further disassembly of the pump.

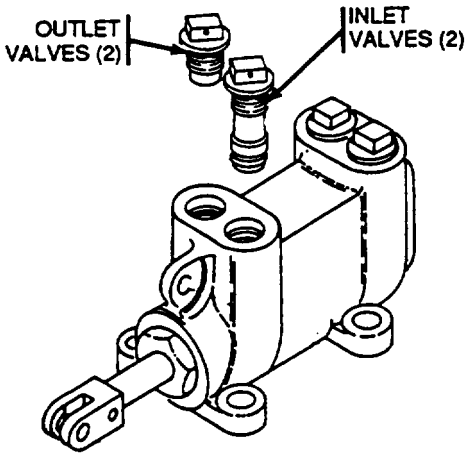


NOTE: BE CAREFUL NOT TO DAMAGE SWITCH LEADS WHEN REMOVING HANDLE.

VIEW A. PURGE PUMP HANDLE.

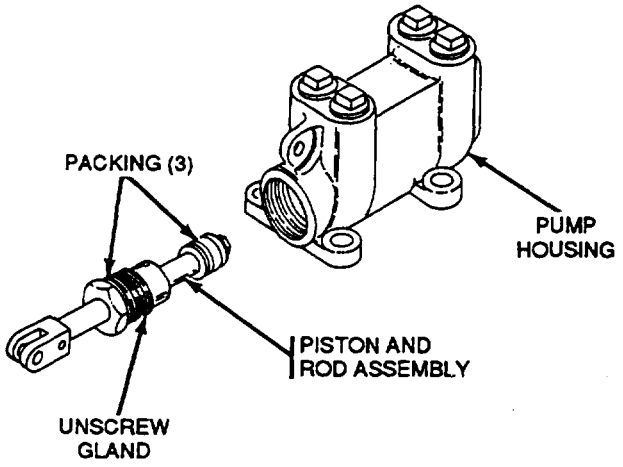


VIEW C. PURGE PUMP LEVER AND ROCKER LINK.



VIEW D. INLET AND OUTLET VALVE ASSEMBLIES.

Figure 3-8. Purge Pump-disassembly and assembly (Sheet 1 of 2).



VIEW G. PISTON AND ROD ASSEMBLY.

Figure 3-8. Purge pump-disassembly and assembly (Sheet 2 of 2).

3-27. Cleaning

a. Clean dirt and other foreign matter from all metal parts in dry-cleaning solvent or mineral spirits paint thinner. Dry with compressed air.

b. Clean dirt from ferrules on switch leads if necessary.

3-28. Inspection and Repair

a. Inspection.

(1) Inspect switch leads for cuts or other damage.

(2) Check switch for electrical continuity and switching action.

(3) Inspect threaded parts for stripping, cross threading and other evidence of excessive wear.

(4) Inspect all components for cracks, distortion and other evidence of excessive wear.

b. Repair. Replace all defective components.

3-29. Assembly

Assemble the purge pump in reverse order of disassembly using new packings.

3-30. Tests

Install the purge pump in vehicle (TM 9-2350-256-20) and test by using normal operating procedures as described in TM 9-2350-256-10.

Section VI. TRANSMISSION OIL FILTER

3-31. Description

Located on each side of the top of the converter housing are identical two-element filter assemblies. The right-side assembly filters all the oil pumped by the input-pressure oil pump that is located immediately below the filter cavity in the converter housing. The left-side assembly filters all oil returning from the torque converter before distribution to the lubrication system.

Each filter assembly consists of a head assembly and two element assemblies. Each head assembly consists of a head, relief valve, two springs, a valve seat, and snap ring. Each filter element is replaceable as a unit

3-32. Operation

The filter assemblies are bolted vertically into the converter housing cavities. Oil to be filtered is pumped into the cavities surrounding the filters. The filter elements are hollow disks of fine mesh wire screen. Oil flows into the elements and into the perforated tube on which the elements are stacked. Foreign matter in the oil collects on the outer surfaces of the filter elements.

Filtered oil flows up the perforated tubes, through the filter heads and into the converter housing.

Should the filter packs become clogged, pressure in the filter cavities will rise until the relief valves open. When the relief valves open, oil flows directly into the hydraulic system.

3-33. Removal

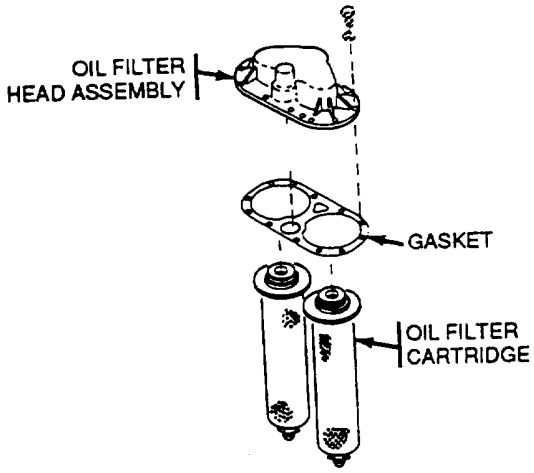
Refer to TM 9-2350-256-20 for removal and installation of transmission oil filters.

3-34. Disassembly

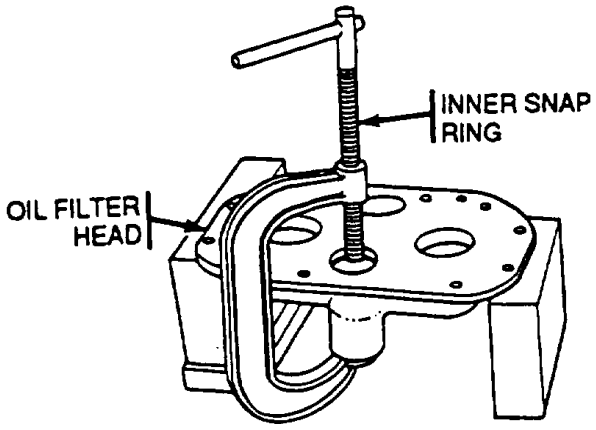
Refer to figure 3-9 for disassembly of transmission oil filter.

3-35. Assembly

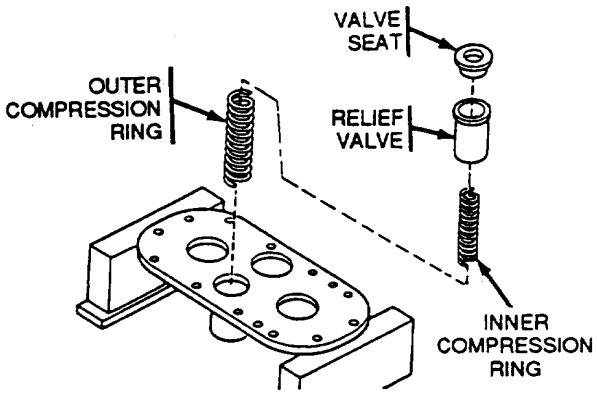
Assemble the oil filter in reverse order of disassembly.



VIEW A. OIL FILTER



VIEW B. OIL FILTER HEAD ASSEMBLY



VIEW C. OIL FILTER HEAD ASSEMBLY

Figure 3-9. Transmission oil filter assembly disassembly and assembly.

Section VII. REPAIR OF ENGINE COOLING FAN

3-36. Description

The engine cooling fans are attached to hubs and are mounted on shafts that are driven by the engine-driven fan drive clutch assembly. The hub and fan assemblies are balanced, but each assembly can be replaced without affecting the balance of the complete unit. Both hub and fan assemblies are interchangeable.

3-37. Removal and Installation

Refer to TM 9-2350-256-20 for removal and installation of engine cooling fans.

3-38. Disassembly

Refer to figure 3-10 for disassembly of engine cooling fans.

3-39. Assembly

Assemble the engine cooling fans in reverse order of removal.

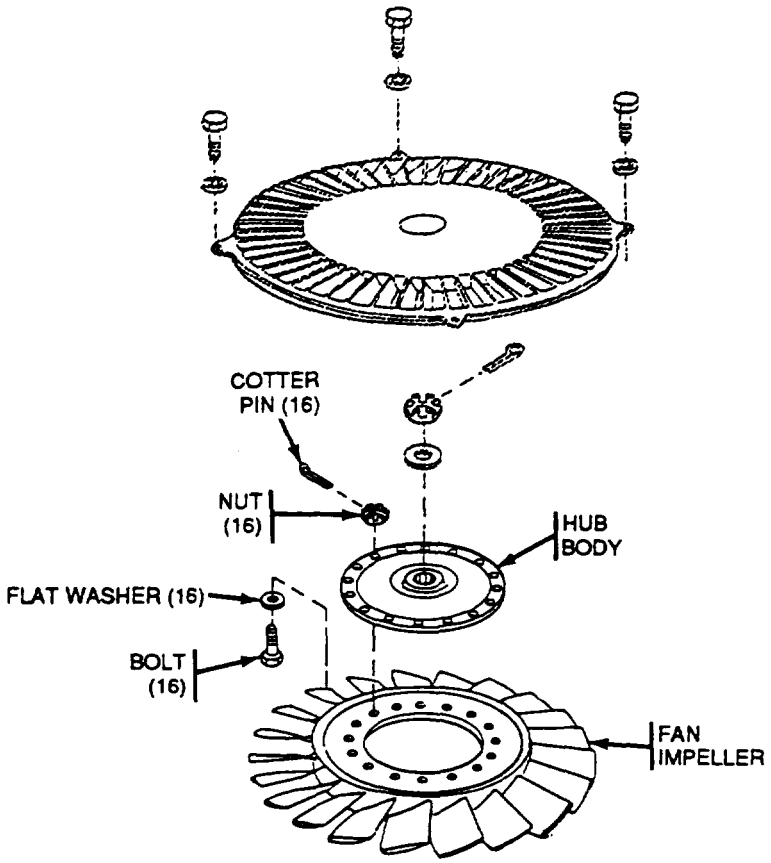


Figure 3-10. Engine cooing fan assembly disassembly and assembly.

Figure 3-10.2. Deleted.

(d) Remove the guard assembly (16) by releasing the two fasteners attaching the guard to the heater housing (28). Cut the two cable assembly straps (37).

(b) Remove two flag terminals on one end of the ignition control (25). Remove two motor leads marked 2 and 4 by removing two screws (42) on the terminal strip of the electrical inlet assembly (36).

(c) Remove four screws (2) that secure the blower assembly (1) to the heater housing (28).

(d) Feed motor leads and voltage limiter lead through grommet (33) and slide blower assembly from the heater.

(e) Refer to figure 3-10.3 and disassemble the blower assembly as follows:

Legend for figure 3-10.3:

1 Screw
2 Air inlet louver
3 Blower housing assembly
4 Screw
5 Voltage limiter assembly
6 Ventilation blower wheel assembly
7 Motor
8 Bracket
9 Screw
10 Secondary blower cover assembly
11 Nut
12 Combustion blower wheel assembly
13 Diode mounting assembly
14 Nut
15 Nut
16 Cable assembly strap
17 Cable assembly
18 Screw
19 Screw
20 Spacer sleeve
21 Washer
22 Resistor
23 Screw
24 Motor power lead

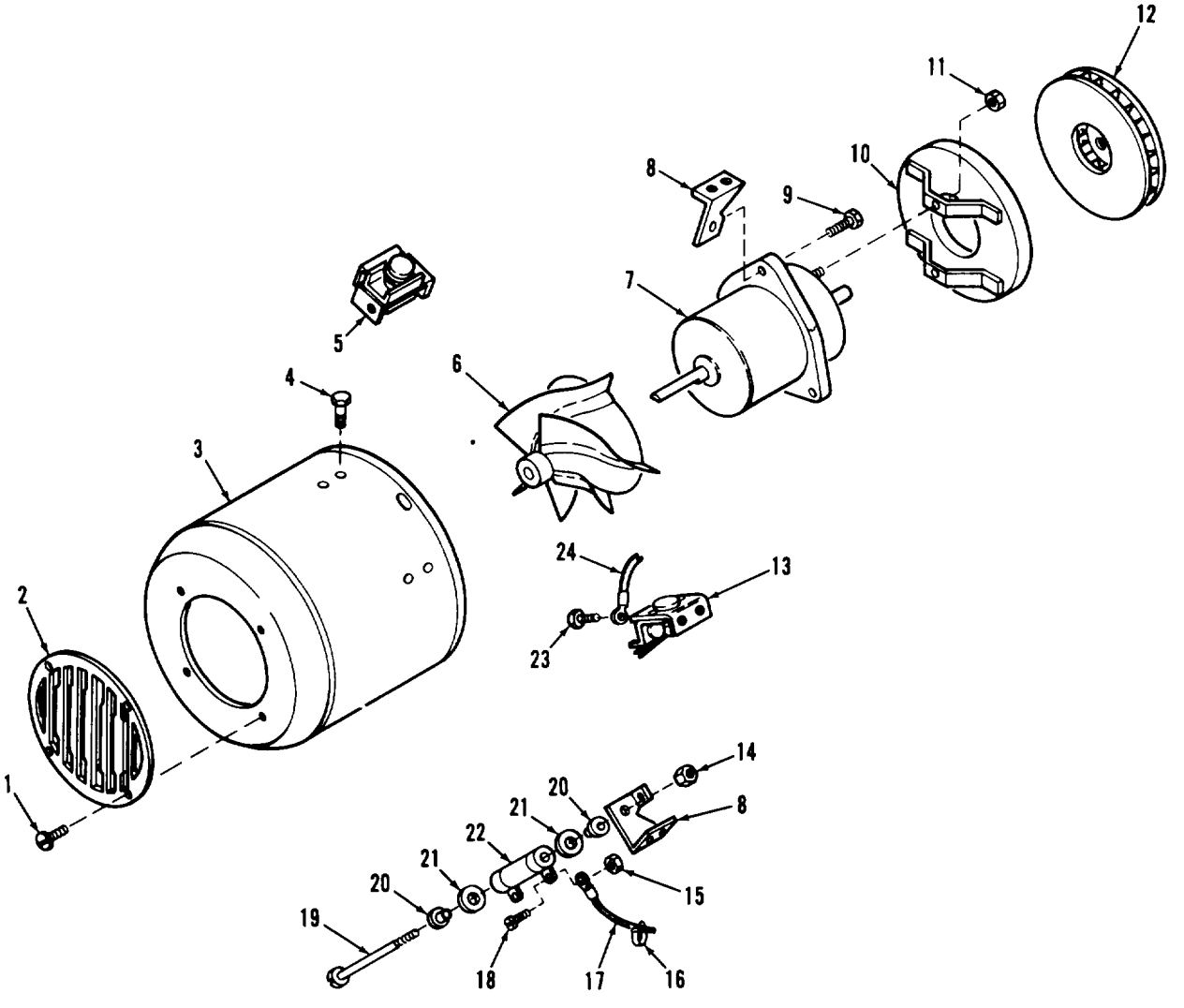


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Figure 3-10.3. Blower assembly–disassembly and assembly.

1 Remove the four screws (1) which secure the air inlet louver (2) to blower housing assembly (3), and remove the louver.

2 Remove the setscrew that secures the combustion blower wheel (12) to the end of the motor shaft; remove the blower wheel. Remove the two nuts (11) and remove the secondary blower cover assembly (10) from studs of the motor.

3 Clip and remove the cable assembly strap (16). Remove the three screws (9) which secure the flange of the motor (7) to the motor mounting brackets (8).

4 Remove six screws (4) securing the motor mounting brackets (8) to the mounting flange and blower housing assembly (3). Remove two of the brackets; the resistor and cable assembly (items 14 through 22) remain attached to the third bracket.

5 Remove the four screws (4) securing the diode mounting assembly (13) and voltage limiter (5) to the mounting flange and blower housing assembly. Pull out the connected motor (7), diode mounting assembly, voltage limiter, and resistor to remove them from the flange and blower housing assembly.

6 Loosen the setscrew in the collar of the ventilation blower wheel assembly (6) and pull the blower wheel from the motor shaft.

7. Remove the screw which secures the diode mounting assembly ground lead to the motor housing. Remove the screw (23) which secures the motor power lead to the diode mounting assembly; disconnect the lead.

8 Disconnect the cable assembly (17) and diode mounting assembly lead from the resistor (22) by removing the screws (18) and nuts (15).

9 Remove nut (14) from screw (19) that secures resistor (22) from screw (19).

(2) *Electrical inlet assembly (fig. 3-10.2)*

NOTE

It is rarely necessary to remove the electrical inlet assembly unless the assembly itself is damaged, or the heater is being completed overhauled. It is not necessary to completely remove the electrical inlet assembly to remove the burner or heat exchanger.

(a) Remove the guard assembly (16) by releasing the two fasteners attaching the guard to the heater housing (28).

(b) Cut the two cable assembly straps (37) which bundle the cable assemblies (38, 40, 43) together. Remove screws (42) as necessary to disconnect the wires from the terminal strip.

(c) Remove the igniter ground from the terminal (31) on the heater housing. Remove the nut (29) from the grounding stud on the heater housing and pull off the inlet assembly grounding lead, the lockwashers (30 and 32), and the terminal (31).

(d) Remove lead from connector D on receptacle to terminal on flame detector switch (21) by removing screw (20) in the switch terminal.

(e) Loosen two fasteners and remove electrical inlet assembly.

(3) *Igniter (fig. 3-10.2).*

(a) Loosen the two Dzus fasteners which secure the guard assembly (16) to the top of the heater; remove the guard.

(b) Disconnect electrical cable at the heater.

(c) Loosen the two Dzus fasteners which secure the electrical inlet assembly (36) to the heater housing (28). Pull the inlet assembly up, disengage it from the igniter leads and the fuel tube (5) and swing it out of the way without disconnecting any wires or removing the cable from the plug-in connector.

(d) Push down on the top of the igniter (9), rotate it 1/8 turn counterclockwise, and pull it out to remove it from the heater, The igniter can be removed without disconnecting the leads.

(e) Remove the seal (35) from the top of the heater housing,

(4) *Flame detector switch (fig. 3-10.2).*

(a) Loosen the two Dzus fasteners which secure the guard assembly (16) to the top of the heater; remove the guard.

(b) Check that the four wires to the flame detector switch (21) are labeled, and disconnect the wires by removing the four screws (20).

(c) Use an open-end wrench to unscrew the compression nut (22) which secures the flame detector switch to the heat exchanger (15). Pull the switch straight out to remove it.

(5) *Ouerheat switch (fig. 3-10.2).*

(a) Loosen the two Dzus fasteners which secure the guard assembly (16) to the top of the heater; remove the guard.

(b) Check that the two wires to terminals 9 and 30 are labeled, and disconnect them from the overheat switch (24) by removing screws (19).

(c) Remove the two screws (18) which secure the overheat switch to the top of the heater and remove the switch.

(6) *Fuel control value.*

(a) Bleeding. The fuel lines and fuel control valve body must be bled whenever the fuel system runs dry, or if service is performed on the fuel lines or fuel filter. Bleed as follows:

1 Bleed the fuel system up to the heater by loosening the fuel connection where it enters the valve body. Let the fuel drip out until it is free of bubbles, then reconnect the fuel line.

2 Slide a piece of 3/16 ID tubing over the

nipple on the end of the bleed valve stem (37, fig. 3-10.4) on the fuel control valve. Open the bleed valve with a 1/4-inch wrench and turn the control switch to START.

3 Let the system bleed until the fuel is free of air bubbles. Tighten the bleed valve and shut off the heater.

NOTE

The fuel must flow past the shut-off solenoid before it reaches the bleed valve. Therefore, the shut-off solenoid must be energized to bleed the valve body.

(b) Removal (fig. 3-10.2).

1 Loosen the two Dzus fasteners which secure the guard assembly (16) to the top of the heater, and remove the guard.

2 Disconnect the fuel supply line from the IN port on the fuel control valve (26), and plug the line to prevent excessive siphoning of fuel. Unscrew the compression nut (6) and disconnect the fuel tube (5) from the control valve outlet elbow.

3 Cut the two cable assembly straps (37) which bundle the wires together. Remove the control valve leads 3 and 5 from the terminal strip on the electrical inlet assembly (36); disconnect lead 30 from the overheat switch (24).

4 Remove the two screws (27) on one side of the control valve mounting bracket, and loosen the third screw. Disengage the fuel tube from the elbow and pull off the fuel control valve.

5 Refer to figure 3-10.4 and disassemble the fuel control valve as follows:

Legend for fig. 3-14.4:

2 Mounting bracket
3 Screw
4 Outer plate
5 Insulator plate
6 Packing
7 Plate
8 Plate
9 Packing
10 Coil assembly
11 Elbow
12 Insulator
13 Sleeve
14 Wire
15 Screw
16 Cable assembly
17 Thermostat
18 Valve body
19 Valve core
20 Screw
21 Adjusting screw
22 Spring
23 Diaphragm cap
24 Diaphragm assembly
25 Packing
26 Valve spring
27 Gasket
28 Sleeve and core assembly
29 Solenoid cup
30 Washer
31 Coil assembly
32 Screw
33 Screw
34 Plunger assembly
35 Plunger
36 Valve seal
37 Bleed valve stem
38 Inlet screen

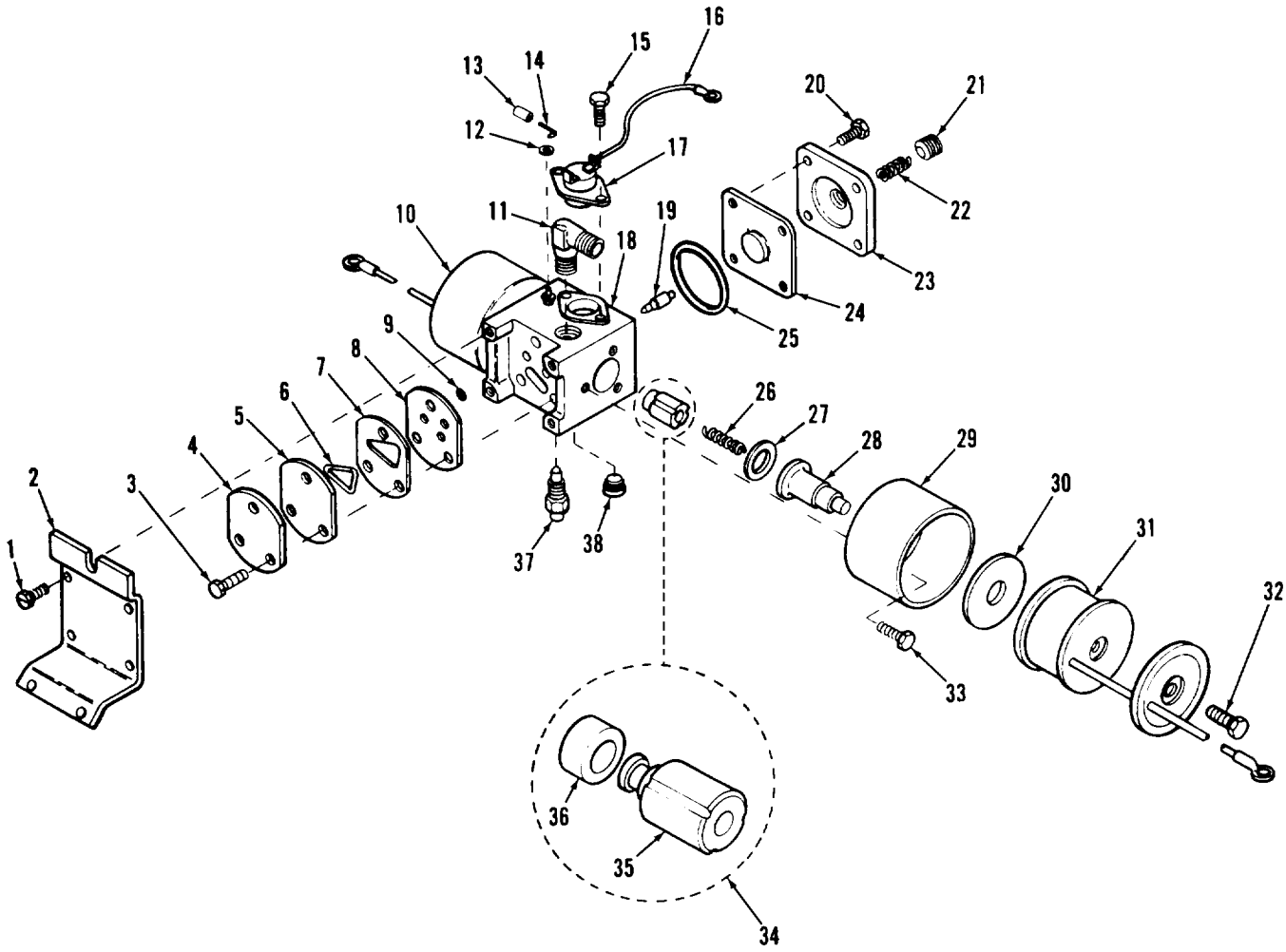

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Figure 3-10.4. Fuel control ualue-disassembly and assembly.

WARNING

Do not attempt to disassembly or repair fuel control valve unless facilities are available to conduct the flow test described in paragraph 3-36b(1)(h). An improperly calibrated valve can cause 'excessive fuel to build up in and around the heater assembly, creating a fire hazard.

a. Remove mounting bracket (2) by removing four screws (1) that secure it to the valve body (18).

b. Remove three screws (3) and remove the outer plate (4), insulator plate (5), preformed packing (6), 3-hole plate (7), and restriction orifice plate (8). Pull three small preformed packings (9) out of recesses in valve body.

CAUTION

Handle the orifice plate with care. Do not drop it. Do not force any object through the orifice plate openings. The slightest distortion in the plate or orifices will interfere with proper operation of the fuel control valve.

c. Remove adjusting screw (21) and spring (22). Remove four screws (20) and remove diaphragm cap (23), diaphragm assembly (24) and preformed packing (25). Unscrew valve core (19) and remove it.

d. Remove restriction solenoid and valve assembly by removing screw (32). Pull out coil assembly (31) and washer (30). Remove three screws (33) in bottom of solenoid cup (29). Remove solenoid cup and pull out sleeve and core assembly (28), gasket (27), valve spring (26), and plunger assembly (34). Remove valve seal (36) from bottom of plunger (35).

e. Repeat d above to disassemble shut-off solenoid and valve assembly, except pull out coil assembly (10) instead of coil assembly (31).

f. Remove bleed valve stem (37) and inlet screen (38) and valve body (18).

g. To remove thermostat, unsolder wire (14) from the electrical terminal on the valve body. Slide off the insulating sleeve (13) and the insulator (12). Remove two screws (15) that secure the thermostat (17) to valve body, and remove the thermostat. If the thermostat is being replaced, unsolder the cable assembly (16) from terminal on thermostat.

h. Unscrew elbow (11) to remove it from valve body (18).

(7) Ignition control (fig. 3-10.2).

(a) Loosen the two Dzus fasteners which secure the guard assembly (16) to the top of the heater; remove the guard.

(b) Cut the two cable assembly straps (37) which bundle the wires together. Disconnect the igniter lead and the voltage limiter lead from one end of the ignition control (25). If necessary to provide access to the wires, remove the fuel control valve ((6)(b) above).

(c) Disconnect the ignition control lead from one of the NO contacts on the flame detector switch (21). Remove the two screws (17) on the outer edge of the ignition control, and loosen the two remaining screws. Pull off the ignition control.

(8) Burner assembly (fig. 3-2).

(a) Remove blower assembly ((1) above).

(b) Loosen the two fasteners which secure the electrical inlet assembly (36) to the heater housing (28), and swing it out of the way.

(c) Remove the igniter (9) as described in (3) above. Remove the seal (35) from the top of the heater housing.

(d) Remove the screw (4) which secures the igniter tube and bracket (8) to the secondary blower housing (3) and pull out the tube to remove it.

(e) Disconnect fuel tube (5) by loosening compression nuts (6) at fuel control valve (26) and at burner (10); pull out tube.

(f) Slide secondary blower housing (3) out of heat exchanger assembly (15).

(g) Remove six screws (39) that secure the burner (10) to heat exchanger, and pull out burner.

(h) Refer to figure 3-10.5 and disassemble the burner as follows:

Legend for fig. 3-10.5:

1 Nut
2 Nut
3 Washer
4 Plate and bushing assembly
5 Yarn wick
6 Washer
7 Washer
8 Washer
9 Fuel vaporizer
10 Washer
11 Washer
12 Fuel vaporizer shield
13 Screw
14 Burner cup and stud assembly

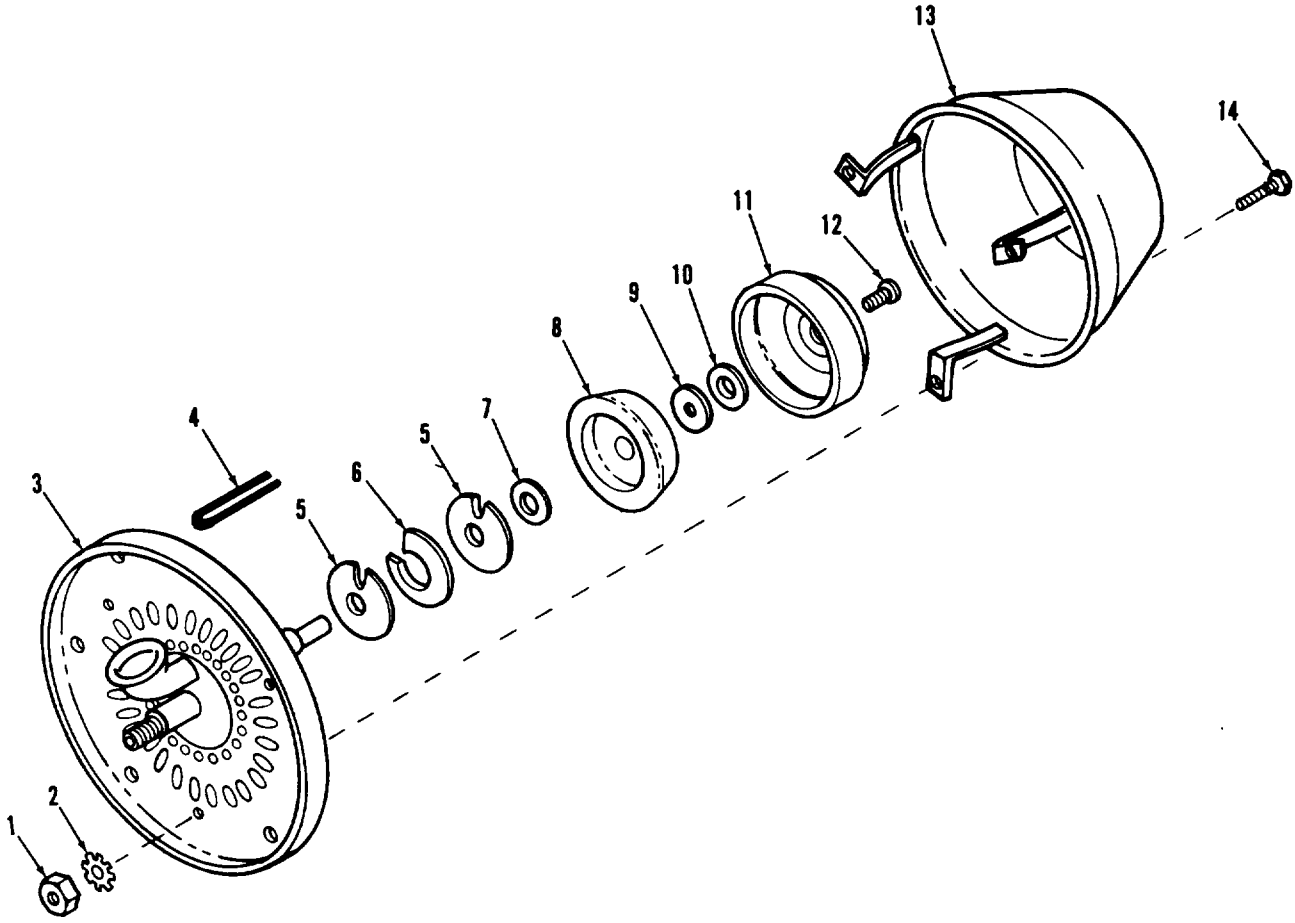

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Figure 3-10.5. Burner assembly–disassembly and assembly.

1 Remove six nuts (1 and 2) and flat washers (3) from studs on burner cup and stud assembly (14). Remove burner cup from plate and bushing assembly (6).

2 Remove screw (13) and pull off fuel vaporizer shield (12), and washers (10 and 11). Detach yarn wick (5) from with support in plate and bushing assembly (4). Remove fuel vaporizer (9), retaining washer (8), notched washer (6), slotted washer (7), and second notched washer (6).

(9) Heat exchanger (fig. 3-10.2).

(a) If the heat exchanger (15) is being removed for heater overhaul, remove the following components to facilitate cleaning of the heater housing:

1 Ignition control ((7) above.)

2 Fuel control valve ((6) above).

3 Overheat switch ((5) above).

4 Electrical inlet assembly ((2) above).

(b) Remove burner assembly ((8) above.

(c) Remove the flame detector switch ((4) above).

(d) Disconnect ground lead assembly (12, fig. 3-10.2) from heat exchanger (15) by removing attaching screw (11).

(e) Remove four screws (34) holding together the seam of the heater housing (28). Spread heater housing and slide out heat exchanger (15).

(f) Remove the ground lead (12) from the heater housing (28) by removing the nut (14) and lockwasher (13).

(g) If the grommet (33) is worn or damaged, remove it from the heater housing.

3-34. Cleaning

WARNING

Be careful when using cleaning solutions and solvents. Do not expose skin to solvents or inhale their vapors. Many cleaning agents are toxic, and contact with them or their vapors may cause illness or death. Wear protective clothing and devices, and ensure adequate ventilation while using cleaning agents.

a. Clean dirt and foreign matter from all exterior metal parts with drycleaning solvent or mineral spirits paint thinner and dry with compressed air.

b. Clean air inlet hose and rubber seals in a mild soap solution, rinse and dry.

c. Clean the fuel filter in the inlet line to prevent the collection of moisture and the formation of ice during cold weather. Follow the manufacturer's recommendations.

CAUTION

Do not attempt to operate the heater without a fuel filter, or with the fuel filter element removed. The filter element prevents the entry of dirt, ice crystals, wax, and other contaminants which can easily plug the tiny orifices in the fuel control valve.

d. Clean blower housing, ventilating blower wheel, combustion blower wheel, secondary blower cover assembly, motor mounting brackets, and exterior of motor with a cloth dampened with cleaning solvent.

e. Clean the burner and heat exchanger. The burner has been designed to eliminate excessive buildup of carbon and other deposits within the combustion chamber. However, buildup can occur under unusual operating conditions or if other components are malfunctioning. A minor carbon buildup may be removed by operating the heater at near maximum voltabe and restricting outlet airflow to maintain the temperature of the heat exchanger at or near an overheat condition. The operate the heater on LO long enough to permit the excess combustion air to burn out soot and carbon. Repeat this cycle several times.

(1) If this procedure faills to clean the heat exchanger enough to restore performance, or if the burner or heat exchanger require further service, remove the heat exchanger as described in paragraph 3-33c(9), and then remove as much of this deposit as possible, using a flexible scraper. Remove combustion residue from inside heat exchanger by soaking this assembly in a 20 percent by weight solution of ammonium acetate at a temperature of 1800 F., for a period of 5 to 10 hours. Flush out exchanger with water after cleaning, and dry with compressed air.

(2) For units which have been burning other types of fuel, such as diesel fuel, JP-4, etc., water should be used to flush the heat exchanger. Use compressed air to dry the inside of the heat exchanger and remove all traces of water before heat exchanger is reinstalled in the heater.

f. Wipe all non-metallic parts of fuel control valve with a clean, dry cloth. Clean metallic parts except the orifice plate with a cloth dampened with cleaning solvent. Take care not to saturate electrical windings or insulation with solvent. Dry all parts thoroughly. Clean orifice plate holes and orifice plate with solvent and compressed air. Inspect for cleanliness with a magnifier.

CAUTION

Do not force any tool or object through the orifice plate openings. The slightest distortion in these calibrated holes will change the factory calibrated rate of fuel flow.

g. To clean the flame detector switch, refer to

paragraph 3-33c(4) and remove this switch h-em heater.

(1) Next, remove the adjusting screw and pivot the microswitch on its bracket to provide access to the ceramic rod. Invert the flame detector switch assembly and remove the ceramic rod.

(2) With the switch assembly inverted, rap on the side of the tube with a screwdriver blade to jar loose oxides and dirt. Continue rapping until no more oxides fall out of the tube.

h. To clean the overheat switch, refer to paragraph 3-33c(5) and remove this switch.

(1) Clean the points by sliding a piece of clean white bond paper between them. Use a soft bristle brush to brush off loose dust and dirt.

CAUTION

Do not use sandpaper, emery cloth, or other abrasive material to clean switch points.

i. Clean all electrical components and nonmetallic parts with a clean cloth. Remove greasy and gummy deposits with cleaning solvent. Clean all metallic parts with a cloth dampened with solvent.

1 **3-35. Inspection and Repair**

a. Air Control Assembly, Deflector, and Exterior Components.

(1) *Inspection*

(a) Inspect air inlet hose for fraying, cracks and other signs of excessive wear.

(b) Inspect heater for any damage that would impair its use.

(c) Inspect fuel filter for leaks, cracks, and other damage that would impair its use.

(d) Inspect copper tubing for cracks, dents, obstruction and other signs of excessive wear.

(e) Inspect seals for cracks, tears, hardening and other signs of excessive wear.

(f) Inspect threaded parts for nicks and cross threading.

(g) Inspect saddles on bulkhead for cracks, breakage, and other signs of excessive wear.

(h) Inspect all metal parts for cracks distortion, open weld seams and other damage that would impair its use.

(2) *Repair.*

(a) Repair damaged threads with a thread chaser, if practical, or replace threaded parts that are defective.

(b) Weld open seams and other damaged areas of metal parts if practical (TM 9-237). Replace defective metal parts not repairable by welding.

(c) Replace all other defective parts.

b. Personnel Heater Components.

(1) *Blower assembly (fig. 3-10.3).*

(a) Inspect blower wheels for cracks, distortion, and bent or broken blades. Replace if damaged.

(b) Inspect all wiring for broken or burned insulation, damaged terminals, or broken wires. Replace damaged wiring.

(c) Test the resistor for continuity, and inspect the ceramic insulator for cracks, burned areas and other damage. Replace the resistor if it is open circuited or damaged.

(d) Inspect the voltage limiter for cracks, distortion, signs of overheated components, or other damage, Replace if defective. Test the voltage limiter as follows:

1. The following test equipment is required:

a. 24 volt dc power supply, 5 ampere minimum capacity.

b. Two on-off switches.

c. Two resistors, 50 watt minimum, one 6 ohm and one 10 ohm.

d. Two 0 to 30 volt dc voltmeters.

NOTE

The voltage limiter can be tested while it is still installed in the assembled heater. Just make sure that the heater housing is connected to the same ground as the meters and resistor, and perform the test as described below.

2. Connect test equipment as shown in test schematic, figure 3-10.6.

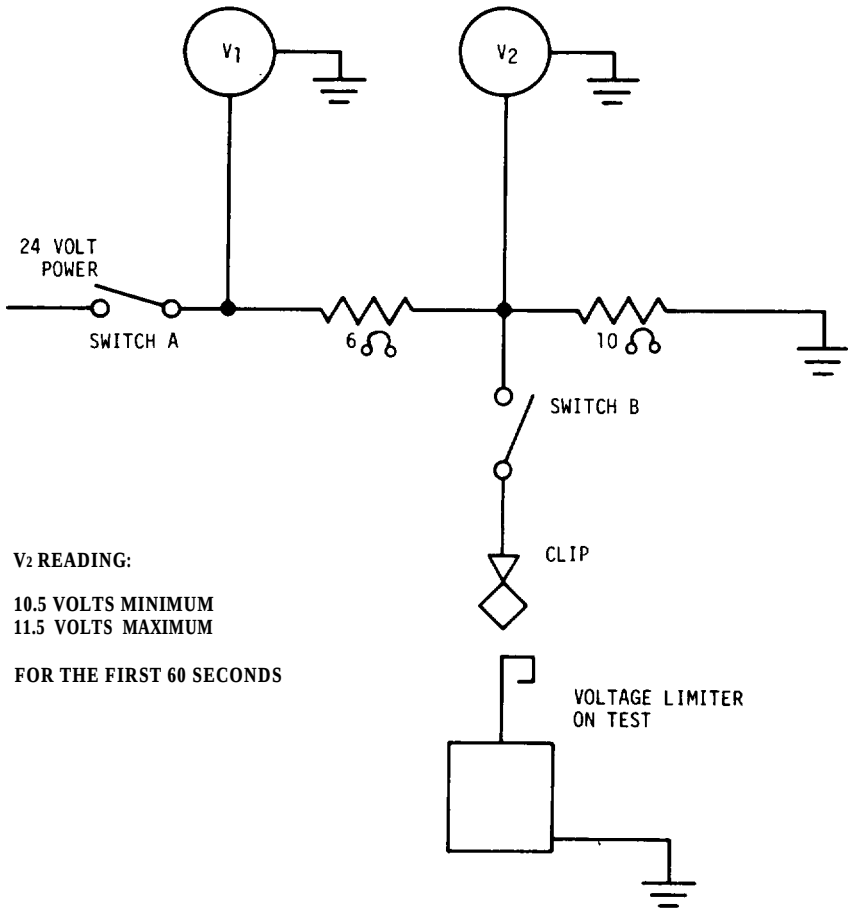

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Figure 3-10.6. Test schematic for voltage limiter.

3. Energize the power supply and turn on switch A. Adjust power supply to read 24 volts at V,.

4. Ground the voltage limiter on test through its mounting bracket. Clip switch B to the flag terminal.

5. Turn on switch B and observe the volage on meter V_2. The voltage must be 10.5 volts minimum to 11.5 volts maximum.

NOTE

The voltage limiter must act instantly to control the voltage at meter V_2 and must remain steady at the control point. If the unit is left energized for longer than 60 seconds, a further decline in control voltage may be observed. This is not cause for rejection.

6. If the voltage does not fall within specifications, or if control is erratic or intermitent, voltage limiter must be replaced.

7. Turn off power supply and switches A and B. Remove voltage limiter from test equipment and install voltage limiter at reassembly.

(e) Test diode assembly as follows:

1. Identify the three diode assembly leads:

a. Lead marked 4 with connects to terminal 4 on terminal strip mounted on electrical inlet assembly.

b. Lead marked GRD which connects to motor housing to ground the diode assembly.

c. Unmarked lead which connects to one side of resistor.

2. Use an ohmmeter or ohms test function of a multitester. Touch one test probe to the terminal on the diode assembly. Touch the other test probe to the No. 4 lead terminal. Note the meter reading. Reverse the polarity of the test probes and note the meter reading. Resistance must be very high with one polarity and zero or very low with the other polarity.

3. Repeat this test with the unmarked lead. Results must be the same.

4. To test the ground diode, touch one test lead to the mounting leg of the diode assembly. Touch the other test probe to the GRD lead terminal. Note the meter reading. Reverse the polarity of the test probes and note the meter reading. Resistance must be very high with one polarity and zero or very low with the other polarity.

5. If readings are high or low in both directions for one or more of the diode assembly leads, replace the entire diode assembly. Diodes are not serviceable individually.

(2) Electrical inlet assembly (fig. 2-10.2). Inspect the electrical inlet assembly (36) for cracks, damaged connector, chipped or broken terminal strip, missing screws, and defective fasteners; replace a defective electrical inlet assembly.

(3) Igniter (fig. 3-10.2)

(a) With the igniter leads still connected to the ignition control and ground, reconnect the electrical cable to the receptacle and disconnect the fuel shutoff solenoid lead from terminal 30 on the overheat switch (to shut off fuel and avoid flooding the burner), then move the control switch to START and hold it until igniter element glows.

CAUTION

If the igniter has been removed from the heater it must be tested at 10 volts or less. Voltage in excess of 10 volts will destroy the igniter in a short time.

(b) Carefully examine the glowing igniter. An igniter which has hot spots, uneven coil spacing, and hot and cool coils, has deteriorated significantly from its origiaal condition and should be replaced.

(c) Ignition wick inspection.

1. With the igniter removed, look into the igniter tube and inspect the condition of the ignition wick (5, fig. 3–10.5) using a flashlight if necessary. The wick should be dry, unbroken, and white or nearly white. The strands should be about 1/16 inch thick.

2. If the strands are thin or broken, remove the burner assembly as described in paragraph 3-33c(8) and repair or replace the burner.

3. If the wick is wet, the burner is flooded. Disconnect the shutoff solenoid lead at terminal 30 on the overheat switch. Reinstall the igniter and hold the control switch in the START position for several minutes. A white, smoke-like fuel vapor will flow from the exhaust until the heater lights. When the heater lights, reconnect the shut-off solenoid lead to terminal 30.

(4) Flame detector switch (fig. 3-10.7).

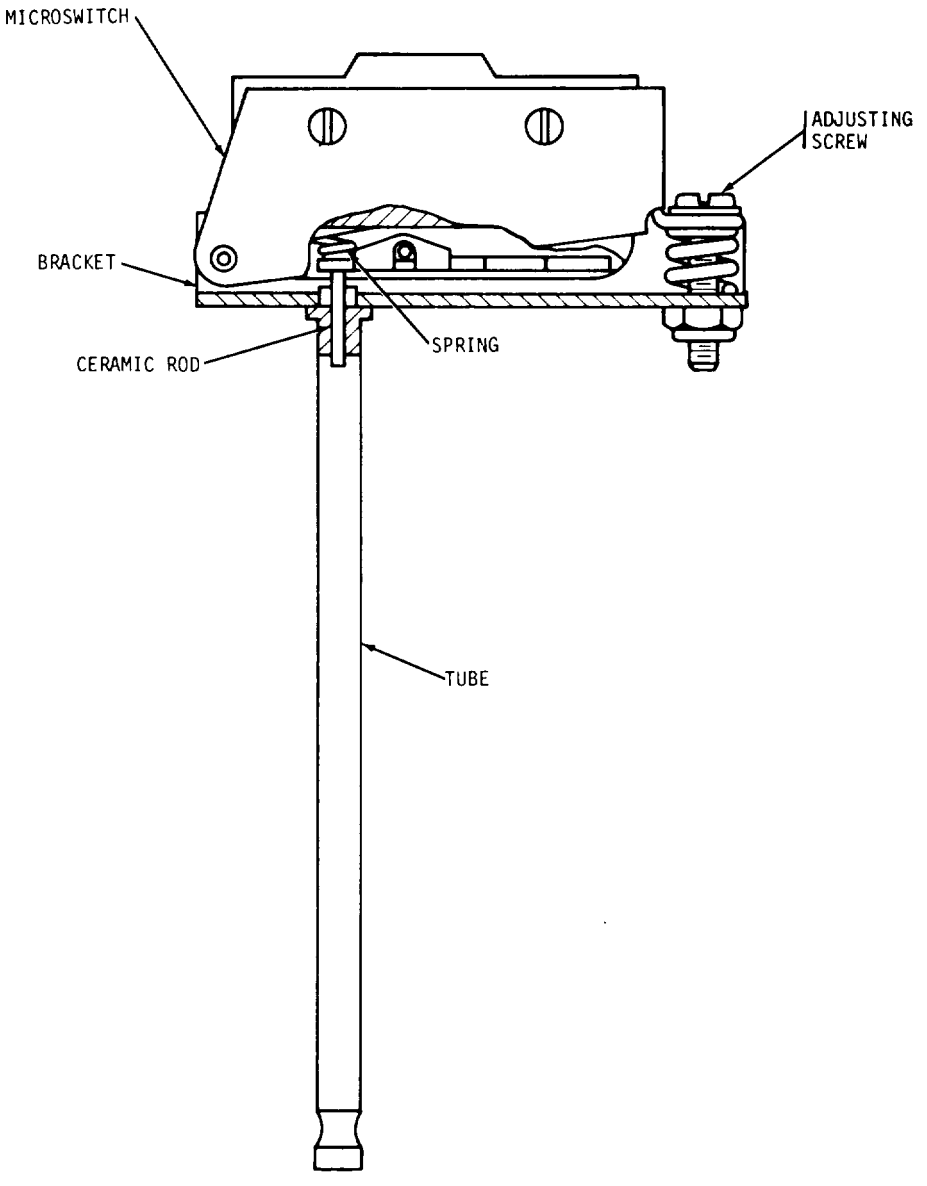

Figure 3-10.7. Flame detector switch—showing components.

(a) Inspect the flame detector switch for cracks, heat distortion of the sensor tube, damaged terminals, and other visible damage. Clean, test, and adjust the flame detector switch as described below.

(b) Remove the adjusting screw and pivot the microswitch on its bracket to provide access to the ceramic rod. Invert the flame detector switch assembly and remove the ceramic rod.

(c) With the switch assembly inverted, rap on the side of the tube with a screwdriver blade to jar loose oxides and dirt. Continue rapping until no more oxides fall out of the tube.

(d) If the operation of the microswitch is questionable, test it for continuity. With the microswitch folded back, there must be continuity across the NC contacts until the actuator on the bottom of the switch is depressed; then there must be continuity across the NO contacts.

NOTE

When the flame detector switch is assembled and properly adjusted, the ceramic rod depresses the actuator to close the NO contacts. When the switch is at room temperature, there must be continuity across the NO contacts.

(5) Overheat switch (fig. 3-10.2). Inspect the contact points for burning, pitting, scratches, and other damage. Replace the overheat switch if the points are defective.

WARNING

Do not attempt to bend the blade or the contact arm. Do not change the setting of the adjustment screw.

(6) Fuel Control Valve (fig. 3-10.4).

(a) Clean fuel control valve parts as instructed in paragraph *3-34f.*

(b) Inspect electrical parts for cracks, burned windings or leads, signs of overheating, and other damage; replace damaged parts.

(c) Check the fit of the plunger assembly (34) in the sleeve and core assembly (28). It must slide freely without excessive play. Check the sealing end of the plunger for scoring or damage; replace damaged parts.

(d) Inspect the valve body for rough or scored seating surfaces, damaged threads, cracks, or other damage replace if defective. If there are no visible defects, check the heating element in the valve body as follows:

1 Test equipment required:

a. 24-volt power supply, 10 ampere minimum capacity.

b. Momentary contact switch.

c. O to 10 ampere ammeter.

2 Connect the power supply ground lead to the valve body. Connect the ammeter between the switch and the electrical terminal on the valve body. Connect power to the other side of the switch.

3 Close the momentary contact switch for a few seconds. Current as measured by the ammeter must be between 3.7 and 4.7 amps.

CAUTION

Do not apply current for longer than five seconds. If more than one check is required, allow 10 minutes cooling time between tests.

4 If heating element is being tested with the thermostat still connected, and if current draw is less than 3.7 amps, the solder joint may be defective. Repair it and retest. If it still fails, replace the fuel control valve as an assembly.

5 If amperage is greater than 4.7 amps, the heater element is shorted. The fuel control valve must be replaced as an assembly.

(e) Check the electrical continuity through the solenoid coil assemblies (31). Continuity must exist.

(f) Check the thermostat (17) for cracks, loose or damaged terminals, and distortion. The thermostat must close when temperature is reduced to between *43°* and *57°F.* It must open when temperature rises to between *65°* and *75°F.* If thermostat operation is questionable, it can be checked using a multimeter set to the ohms function, while chilling the thermostat with ice. Do not immerse in-fluids. Body temperature can be used to provide enought heat to warm it to above 75° F. to check the opening point. Replace a defective thermostat.

(g) Inspect all other parts for cracks, distortion, corrosion, and other damage; replace damaged parts.

(7) Ignition control (fig. 3-10.2).

Inspect the ignition control assembly (25) for cracks, loose or damaged terminals, or other damage. Check for overheating or breaks in the electrical continuity path. Replace if defective.

(8) Burner assembly (fig. 3-10.4).

(a) If the heater has been operation for 400 hours or more since it was new or since the last burner replacement, it is recommended that the complete burner assembly be replaced. After this amount of use, distortion and erosion of the burner cup and the fuel vaporizer shield usually make replacement of the burner advisable to ensure efficient combustion and maximum heat output.

(b) Inspect the burner cup and stud assembly (14) and fuel vaporizer shield (12) for cracks, distortion, and erosion. Replace the complete burner as an assembly if the cup or shield is defective.

(c) Inspect the plate and bushing assembly (4) for cracks, loose fuel feed bushing or igniter pocket, distortion, erosion of holes, and other damage.

Replace the complete burner as an assembly if the plate and bushing assembly is defective.

(9) Heat exchanger (fig. 3-10.2).

(a) Inspect the heat exchanger (15) for leaks, cracks, and carbon deposits. The interior of a unit which has been burning leaded gasoline will contain a deposit of lead by-products. Clean the heat exchanger as instructed in paragraph 3-34e.

(b) Check for warping of inner passages, or bulging of the heater plate. Replace the heat exchanger if warping *or* bulging is excessive, or if any part is burned through.

(c) Small cracks may be repaired by welding, provided they are accessible and the heat exchanger is otherwise in good condition. Do not attempt to repair large cracks, or to straighten a deformed heat exchanger.

WARNING

Carefully inspect the heat exchanger, and repair or replace it if damaged. Exhaust gases are directed through the heat exchanger. These gases contain carbon monoxide, a colorless, odorless, deadly poisonous gas. Cracks or holes in the heat exchanger permit the exhaust gases to enter the heated compartment. This can result in the serious illness or death of personnel in the compartment. Never take chances with a defective heat exchanger.

(d) When welding cracks in the heat exchanger, Type 310 weld rod is preferred, although Type 349, 321, or 347 may be used. Before welding, it is very important to clean *all* combustion deposits away from the area to be welded, since deposits in the exchanger can contaminate the weld to such an extent that a tight weld is almost impossible. Keep weld beads as small as possible, preferably not over 1/8 inch.

(10) Miscellaneous heater parts (fig. 3-10.2).

(a) Inspect the guard assembly (16) for cracks, dents, distortion, loose or defective fasteners, and other damage; replace a damaged guard assembly.

(b) Inspect the secondary blower housing (3) for cracks, distortion, loose weldments, and other damage; replace damaged parts.

(c) Inspect the heater housing assembly (28) for cracks, dents, distortion, missing weld nuts, broken studs, broken weldments, and other damage; replace a damaged housing.

3-36. Reassembly and Installation

a. Reassembly of Air Control Assembly. Refer to figure 3-10.1 and reassemble the air control assembly.

b. Personnel Heater Components.

(1) *Fuel control valve reassembly* (fig. 3-10.4).

(a) Install the elbow (11) on the valve body (18), and position it as shown in figure 3-10.8).

(b) If the thermostat (17, fig. 3-10.4) was removed, position it on the valve body and secure with two screws (15). Install the wire (14), making sure the insulator (12) and insulating sleeve (13) are in place before soldering the wire to the heater and thermostat terminals. Solder the cable assembly (16) to the other thermostat terminal.

(c) Install seal (36) on plunger (35) and insert valve spring (26) in the plunger assembly. Insert assembled spring and plunger into sleeve and core assembly (28). Position gasket (27) and sleeve and core assembly (28) on valve body, and install solenoid cup (29) with three screws (33) to retain part. Repeat to install plunger assembly (34) on other side.

(d) Screw valve core (19) in valve body. Install new preformed packing (25) in recess in valve body. Install diaphragm assembly (24) and diaphragm cap (23). Fasten with four screws (20). Insert diaphragm spring (22) in adjusting screw (21) and install parts in diaphragm cap.

CAUTION

Do not attempt to replace the valve core (19) with an automobile tire valve core. Despite their similarity of appearance, a tire valve has not been designed for use with the fuels used in this heater, and will deteriorate rapidly if installed in the fuel control valve instead of valve core furnished for the fuel control valve.

(e) Install three small preformed packings (9) into recesses in valve body. Set restriction orifice plate (8) and 3-hole plate (7) in place and install preformed packing (6). Install insulator plate (5) and outer plate (4) and fasten with three screws (3).

(f) Install washer (30) and coil assembly (31) in restriction solenoid cup and fasten with screw (32). Repeat with the coil assembly (10) in the shut-off solenoid cup. See fig. 3-10.8 for proper orientation of these coils in the valve body.

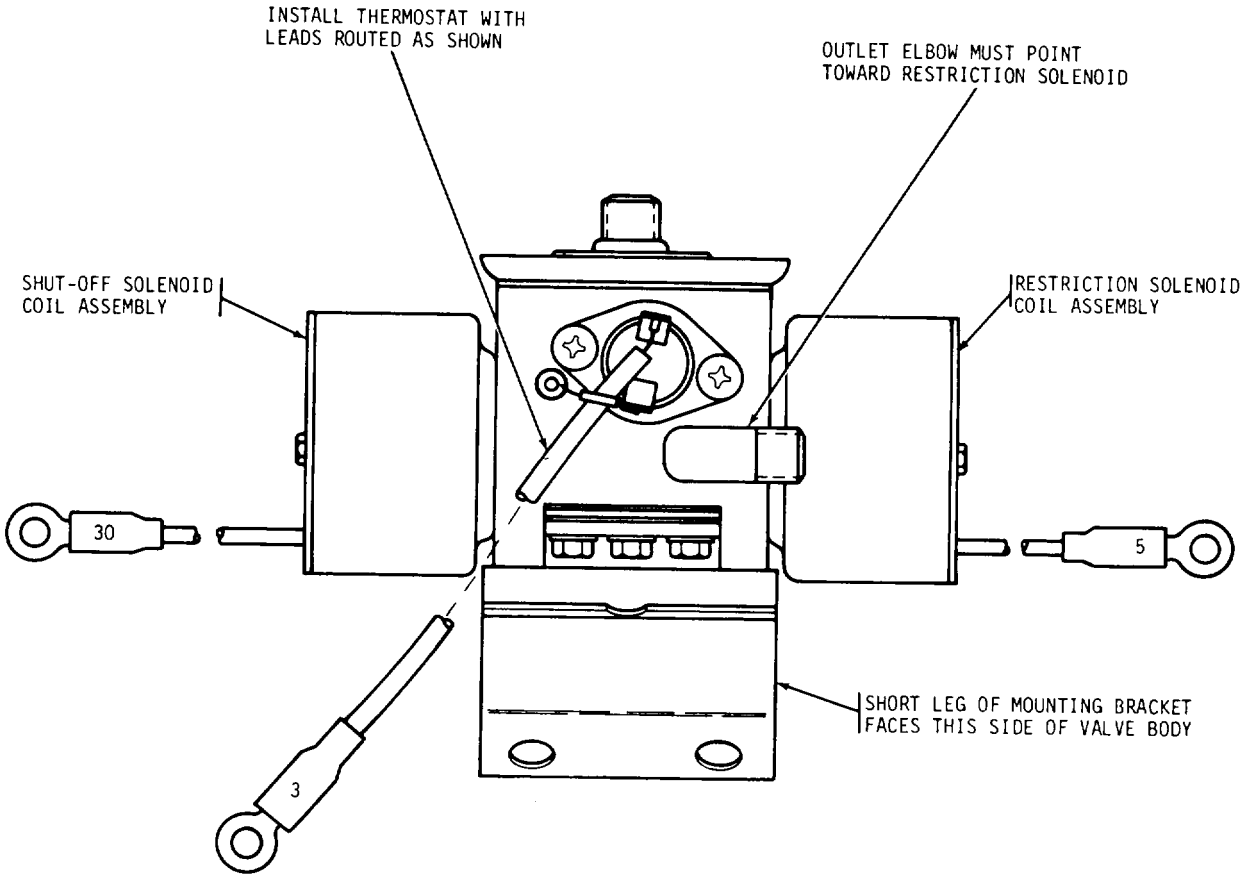

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Figure 3-10.8. Fuel control ualue identifying solenoid positions.

CAUTION

Do not overtighten the coil assembly attaching screw. Excessive torque will stretch the sleeve and core assembly and raise the solenoid pull-in voltage.

(g) Press the inlet screen (38, fig. 3-10.4) into the fuel inlet, and screw the valve stem (37) into the valve body. Install the mounting bracket (2) on the valve body as shown in figure 3– 10.8, and secure with four screws (1, fig. 3-10.4).

(h) Test the fuel control valve flow rate as follows:

1. Connect the fuel tube (5, fig. 3-10.2) to the fuel control valve outlet elbow, and tighten the compression nut (6). Clamp the assembled valve and fuel tube to a stand or work bench as necessary to simulate the position the fuel control valve will assume when it is installed on the heater, and the heater is installed in a vehicle.

CAUTION

The test must be performed while the valve is in a position as close as possible to its position on the installed heater. Rotating the valve after it has been adjusted will alter the amount of head against which the regulating valve has been set and can significantly alter the flow rate.

2. Connect a supply of fuel under a pressure of 3 to 5 psi to the fuel control valve IN port, and connect the test leads as shown in figure 3-10.9. Place a container under the open end of the fuel tube and apply fuel pressure.

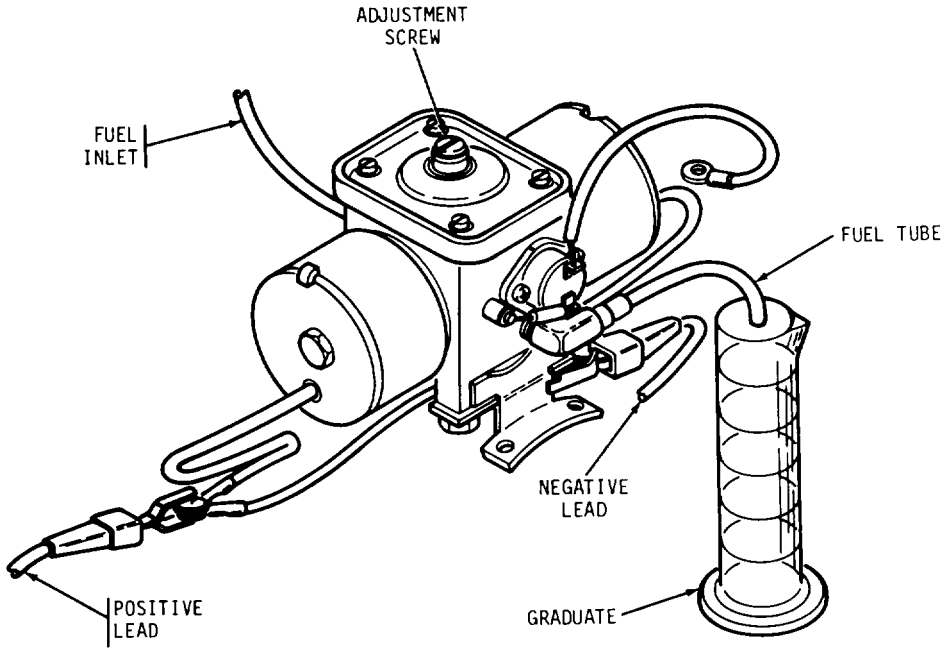

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Figure 3-10.9. Fuel control value test setup.

3 Energize the solenoids and open the bleed valve (37, fig. 3– 10.4). Close the bleed valve when the fuel flowing from it is free of air bubbles. Place a graduate under the end of the fuel tube and start timing the flow. Timing interval must be no less than one minute.

4 At the end of the timing interval, turn off the solenoid switch and place the graduate on an accurate balance to measure the contents. The amount of fuel must be 0.080 ± 0.005 pound per minute for high heat (both solenoids energized). If the flow is not within limits, turn the adjusting screw (21, fig. 3-10.4) clockwise to increase the flow or counterclockwise to decrease the flow, and retest.

5 After the high-heat fuel flow has been adjusted within limits, seal the adjusting screw with G.E. Glyptal varnish No. 1201.

6 Disconnect the test lead to the restriction solenoid lead (No. 5), energize the shut-off solenoid, and measure the low-heat flow. Low-heat flow rate must be 0.044 ± 0.003 pound per minute.

a. If the low-heat flow is above 0.047 pound per minute, the orifice plate is defective. Replace the fuel control valve as an assembly.

b. If the low-heat flow is below 0.041 pound per minute, disassemble the fuel control valve and clean the orifice plate and control valve body as described in paragraph 3-34f. Reassemble the valve and retest.

(2) *Burner reassembly* (fig. 3-10.5).

(a) Assemble a notched washer (6), slotted washer (7), and second notched washer (6) over fuel feed bushing on plate and bushing assembly (4). Press retaining washer (8) over bushing assembly to shoulder on bushing, extrusion facing away from the other washers.

(b) A new fuel vaporizer (9) is supplied with the ignition wick (5) already inserted in the hold of a vaporizer with excess length for assembly. Place pre-assembled wick and vaporizer over the fuel feed bushing so the wick will lie in the slot. Use a piece of thin wire to pull the looped end of the wick through the eye of the wick support. Remove the wire and hook the wick into the wick support. See figure 3-10.10.

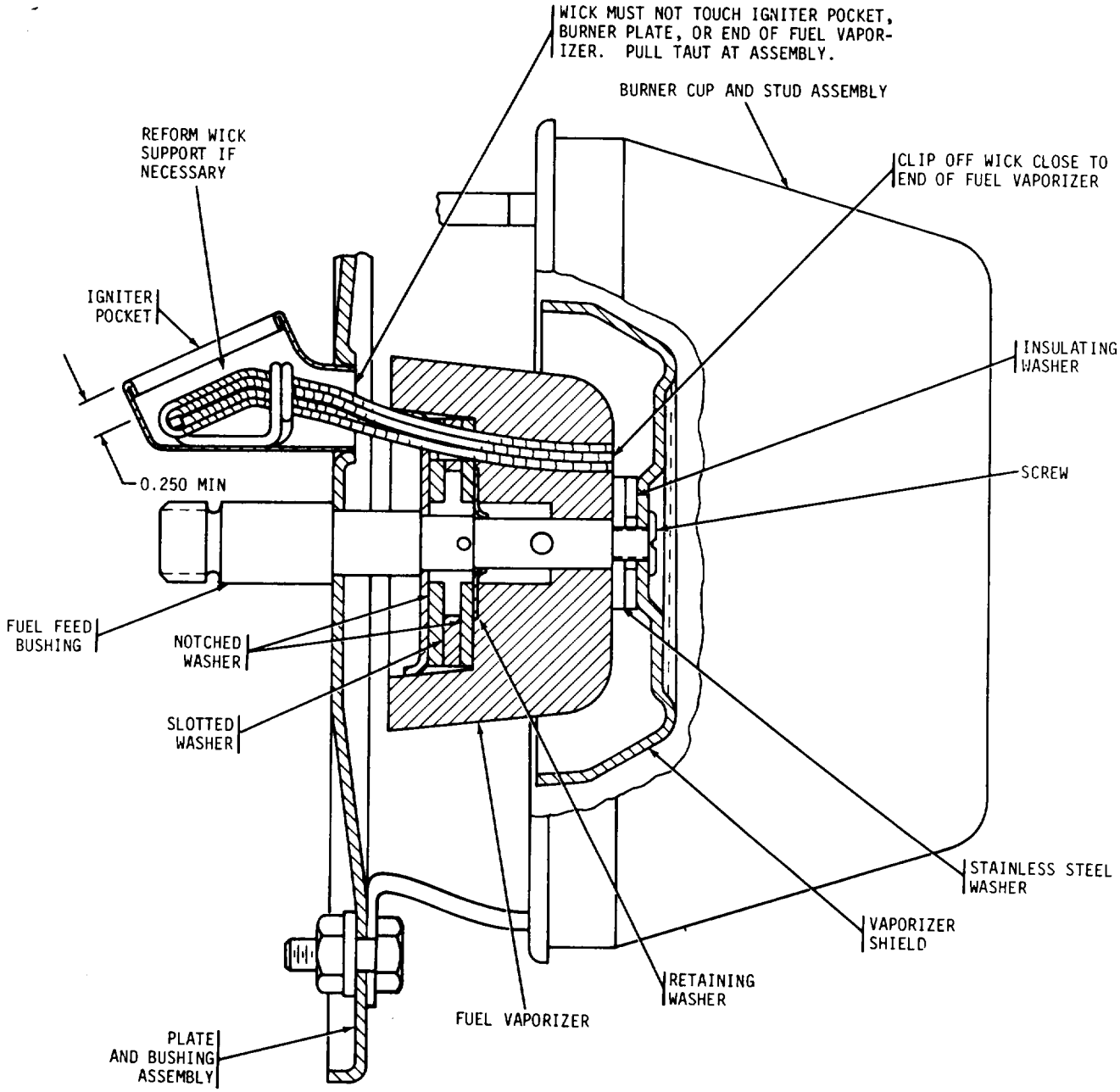


Figure 3-10.10. Cutaway view of burner.

(c) Hold the vaporizer firmly against the retaining washer and pull the wick back through the vaporizer until the wick is taut. Clip off excess wick close to the smaII end of the vaporizer.

(d) Insert screw through hole in fuel vaporizer shield and slide the insulating washer (11) and flat washer (10) onto screw on inside of vaporizer shield. Attach this assembly to the plate and bushing assembly by tightening screw. If the assembly fails to tighten the vaporizer firmly in position, install a second insulating washer (11) between vaporizer and flat washer (10).

NOTE

When assembled, the fuel vaporizer must be held firmly in place against the retaining washer. The wick must be positioned so that it does not touch any part of the plate and bushing assembly except the wick support.

(e) Slide studs of burner cup and stud assembly (14) through proper holes in plate and bushing assembly (4). Slide three flat washers (3) over studs and secure with three nuts (2) and three lock nuts (1).

(f) Reform wick support in igniter pocket as required to maintain l/4-inch gap between wick and end of the igniter pocket, as shown in figure 3-10.10.

(3) *Blower reassembly (fig. 3-10.3).*

(a) Install the ventilation blower wheel assembly (6) on the motor shaft and tighten the set-screw until it is snug.

(b) Assemble the resistor (22) and associated parts (19 through 22) on one of the motor mounting brackets (8).

(c) Reconnect the wires to the diode mounting assembly (13), resistor (22), and motor (7).

CAUTION

Do not operate the motor without the diode assembly ground lead secured to the motor housing. This diode protects the diode assembly from damage caused by voltage spikes generated when the motor is deenergized.

(d) Install the voltage limiter assembly (5, figure 3-10.3), diode mounting assembly (13), and resistor mounting bracket (8) in the blower housing assembly (3), using screws (4). Refer to figure 3-10.11 for correct assembly positions. Not all the leads will reach if the components are not installed as shown.

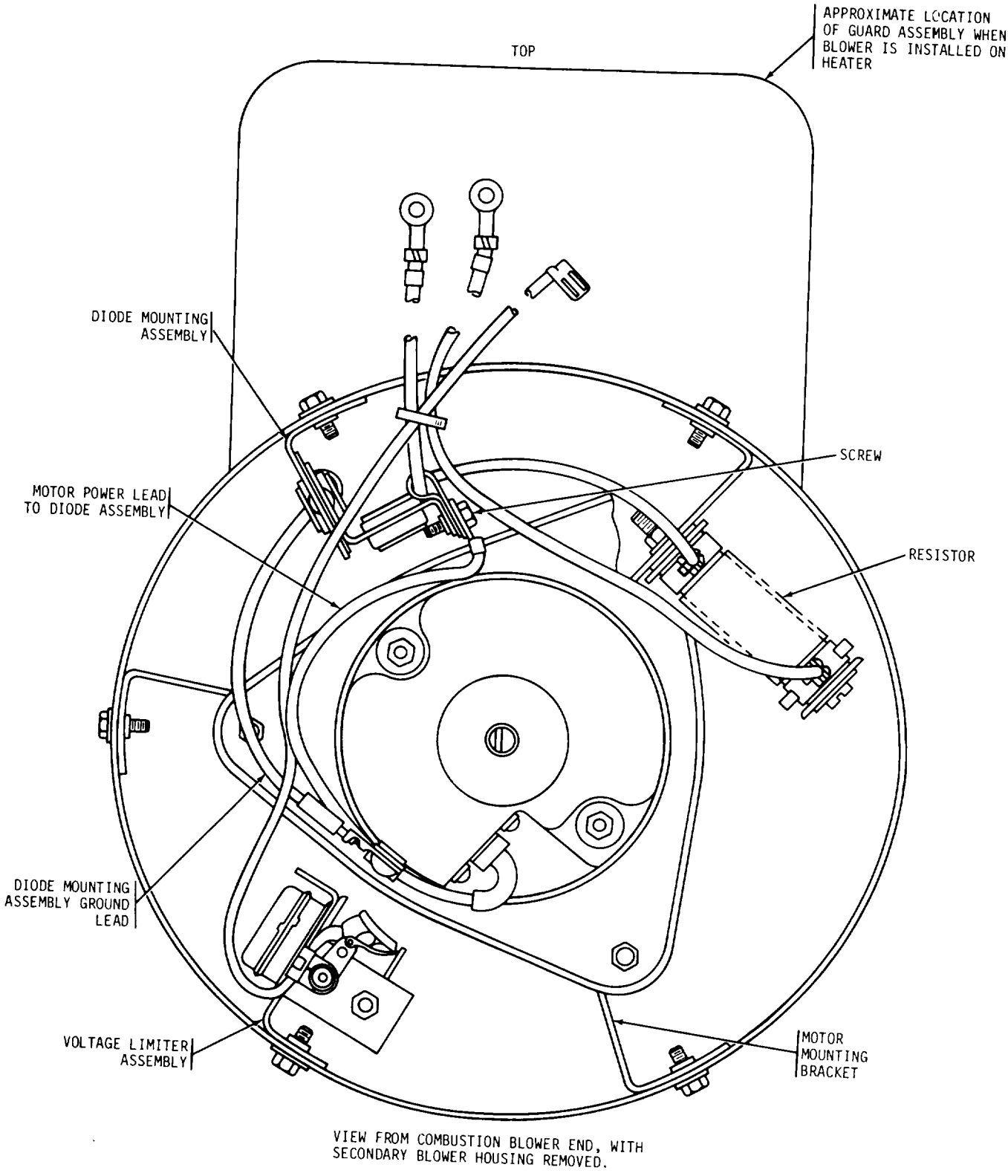


Figure 3-10.11 Diode assembly, voltage limiter, and resistor installation.

(e) Install the two remaining motor mounting brackets (8, fig. 3-10.3) with screws (4).

(f) Slide the motor into position as shown in figure 3-10.11 making sure that the screw which attaches the diode mounting assembly ground lead is in line with the voltage limiter. Secure the motor flange to the mounting brackets with three screws (9, figure 3-10.3).

(g) Bundle together the three leads and tie them with a cable assembly strap (16) or lacing cord.

(h) Loosen the setscrew in the ventilation blower wheel assembly (6) and reposition the wheel on the motor shaft to achieve the specified clearance between the blower wheel and the blower housing assembly (3), as shown in figure 3-10.12. Tighten the setscrew to secure the adjustment.

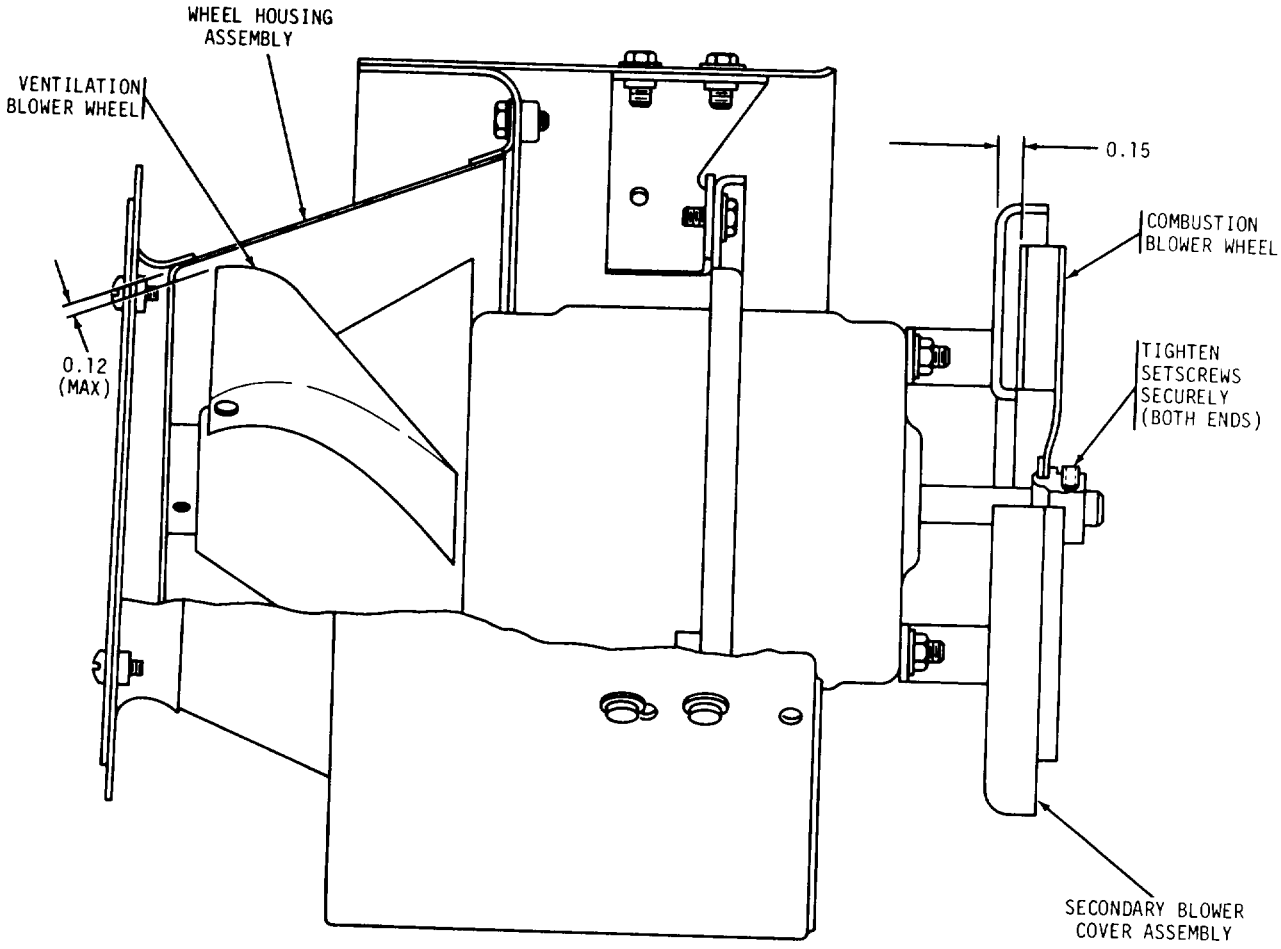


Figure 3-10.12. Blower assembly showing blower wheel clearance.

(i) Position the secondary blower cover assembly (10, fig. 3-10.3) on the motor and secure with nuts (11). Slide the combustion blower wheel (12) onto the motor shaft. Adjust the clearance between the blower wheel and secondary blower cover assembly as shown in figure 3-10.12, and tighten the setscrew securely. A 5132-inch allen wrench makes a good gage for this clearance.

(j) Install air inlet louver (2, fig. 3-10.3) with four screws (1).

(k) Rotate the blower shaft to make sure that it rotates freely without scraping or binding.

(l) After assembly, test the blower assembly to ensure that it will function properly in the heater assembly. Proceed as follows:

1. The following test equipment is required:

a. DC power supply manually variable from 18 to 28 volts, with a 15 ampere capacity at 24 volts.

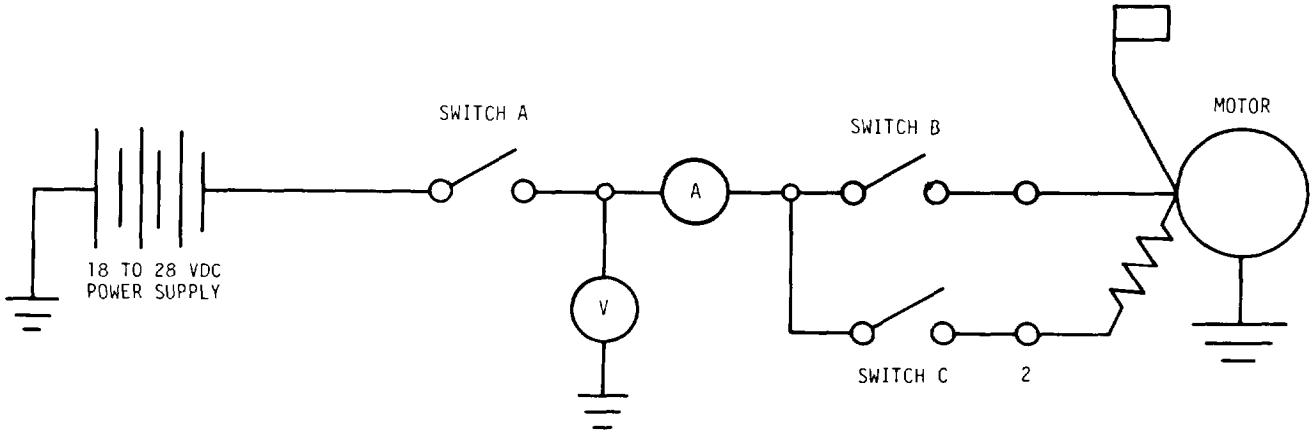
b. Three on-off switches.

c. 0 to 30 volt dc voltmeter.

d. 0 to 15 ampere dc ammeter.

e. Stroboscope type tachometer for determining blower speed.

2. Connect equipment to blower as shown in test schematic, figure 3-10.13.



COMPONENT	SWITCH A	SWITCH B	SWITCH C	VOLTS	CURRENT (AMPERES) MAX	RPM
MODEL 10560B24 HEATER	ON	ON		24	11.5	6000 MIN 6800 MAX
	ON		ON	24	*	*
*Blower must run, but speed and current need not be checked.						

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Figure 3-10.13. Test schematic for blower assembly.

3. Energize power supply and turn on switches A and B. Manually adjust voltage to 20 and then to 28 volts, and allow blower to run 15 to 30 seconds at each voltage. Blower must run freely. Overhaul blower if there is evidence of binding or wear, or if there is any noise which would indicate rough or defective bearings.

4. With switches A and B still closed, adjust power supply to 24 volts. Ammeter should read as indicated in figure 3-10.13. Determine blower speed with tachometer. Speed must be within indicated range.

5. Turn off switch B and turn on switch C. Wait 20 to 30 seconds for blower to slow down. The blower must run smoothly and steadily, but it is not necessary to check motor speed or current draw.

6. Turn off switches A and C, and shut off power. Disconnect blower from test equipment.

(m) If voltage limiter was not tested during blower overhaul, test it now before reassembly. Follow procedure described in paragraph 3-35b(1)(d). Voltage limiter may be tested without removing it from blower housing since flag terminal is accessible. Voltage limiter is grounded through blower housing.

(4) Heat exchanger assembly installation (fig. 3-10.2).

(a) Connect one end of the ground lead assembly (12) to the heater housing (28), and secure with a nut (14) and lockwasher (13).

(b) Spread the heater housing assembly and insert the heat exchanger assembly (15) in the housing. Install the four screws (34) that secure the housing seam.

(c) Connect the other end of ground lead assembly (12) to the heat exchanger and secure with screw (11).

(5) *Flame detector switch installation (fig. 3-10.7).*

(a) Insert the ceramic rod (fig. 3-10.7) into the tube. Flip the microswitch back into position and install the adjusting screw.

(b) Slowly turn in the adjusting screw (fig. 3-10.7) until the switch just clicks, then exactly ½ turn more. Secure the adjustment by sealing the adjusting screw with G.E. Glyptal varnish, No. 1201.

(c) Install the flame detector switch (21, fig. 3-10.2) in the heater and tighten the compression nut (22) on the underside of the switch, making sure that the switch assembly is positioned crosswise to the axis of the heater so that the guard can be installed.

(d) Connect the wires to the NC and NO) contacts on the switch and secure with the screws (20).

(6) *Igniter installation (fig.* 3-10.2).

(a) Be sure the seal (35) is seated in the top of the heater housing (28).

(b) If a new igniter is being installed, connect the shorter lead to the ground terminal (31) on the top of the heater. Connect the longer lead to the ignition control (25).

(c) Install the igniter (9) in the igniter tube (8). Use a screwdriver with a long, thin blade to press the element end of the igniter firmly into the igniter tube to ensure that the igniter is firmly seated.

(d) Press the igniter down and turn it clockwise to engage the pin on the top of the igniter with the slots in the igniter tube. Reinstall the electrical inlet assembly (36) and secure with the Dzus fasteners.

(e) Reconnect electrical cable to the heater.

NOTE

If the igniter requires frequent replacement, test the operation of the voltage limiter as described in paragraph 3-35b(1)d. An inoperative voltage limiter allows surges of high voltage from the ignition control to damage the igniter and shorten its life.

(7) *Ignition control installation (fig. 3-10.2).*

(a) Slide the new ignition control (25) under the two loosened screws (17), install the remaining two screws, and tighten all four screws.

(b) Route the ignition control lead through the bundle of wires and connect it to the flame detector switch (21). If the fuel control valve (26) was removed, reinstall it, as below, and bundle the wires with two cable assembly straps (37) or lacing cord, one on each side of the fuel control valve mounting bracket.

(c) Connect the igniter lead and voltage limiter lead to the spade terminals on the ignition control.

(8) *Fuel control valve installation (fig. 3-10.2).*

(a) Slide the fuel control valve mounting bracket under one screw (27) and engage the fuel tube (5) in the outlet elbow on the control valve. Start the compression nut (6) on the elbow, then install and tighten the remaining two screws (27). Tighten the compression nut. Check that all the loose wires are retained between the fuel control valve mounting bracket and the heater housing.

(b) Connect leads 3, 5, and 30.

(c) Bundle the wires and secure them with two cable assembly straps (37) or lacing cord, with one strap on each side of the control valve mounting bracket.

(d) Connect the fuel supply line to the IN port

on the control valve body, and bleed the fuel line and valve body as described in paragraph 3-33c(6).

(9) *Overheat switch (fig. 3-10.2).*

(a) Install the overheat switch (24) on the heater and secure with the two screws (18).

(b) Connect the wires to the terminals on the top of the switch and secure with the two screws (19).

(10) *Electrical inlet assembly installation (fig. 3-10.2).*

(a) Connect the lead from connector D on the receptacle to the terminal on the flame detector switch (21) by installing a screw (20).

(b) If the igniter has been removed, install it as described in b(6) above.

(c) Install terminal (31) and washers (30 and 32) on the grounding stud on the heater housing. Connect the electrical inlet assembly ground lead from connector terminal A to the grounding stud and secure with nut (29). Install the igniter ground on terminal (31).

(d) Install the electrical inlet assembly on the heater housing and secure by tightening the two fasteners.

(11) *Burner assembly installation (fig. 3-10.2).*

(a) Position burner assembly (10) so that the burner assembly flange engages the flange in the heat exchanger (15); secure with six screws (39).

(b) Position the secondary blower housing (3) on the heat exchanger assembly (15) so that it fits snugly against the burner assembly. The neck on the housing must aline with the hole in the heater housing.

(c) Connect the fuel tube (5) to the fuel bushing on the burner assembly (10), and to the fuel control valve outlet elbow.

(d) Install the igniter tube and bracket (8) in the heater, and check that it seats properly in the igniter pocket on the burner assembly (10). Secure the tube to the secondary blower housing (3) with the screw (4).

(e) Install the igniter (b(6) above.

(12) *Blower assembly installation (fig. 3-10.2).*

(a) Feed the three leads from the blower assembly (1) through the hole in the heater housing (28). Slide the grommet (33) onto the leads and work the grommet into the hold in the heater housing,

(b) Position the blower assembly on the heater housing so that the leads are toward the top of the housing, as shown in figure 3-10.11. Aline the slotted mounting holes with the tapped holes in the heater housing and secure the blower assembly by installing and tightening the four screws (2, fig. 3-10.2).

(c) Make all necessary electrical connections.

(d) Install the guard assembly (16, fig. 3-10.2) and secure by tightening the two fasteners.

c. Deflector Installation. Install the deflector on the personnel heater as shown in figure 3-9.

d. Air Control Assembly Installation. Install the air control assembly on the personnel heater as shown in figure 3-9.

e. Personnel Heater Assembly Installation. Refer to TM 9-2350-256-20 for instructions on installation of the personnel heater assembly in the vehicle.

3-36.1. Testing

a. Subassembly Tests. Before conducting tests of the assembled heaters, the following tests and calibrations should have been performed during disassembly for repairs. If they were not performed at that time, do them before the beater assembly is tested.

(1) Flame detector switch calibration. See paragraph 3-36b(5).

(2) Blower speed test, See paragraph 3-36b(3)(1).

(3) Voltage limiter test. See paragraph *3-35* b(1)(d).

(4) Fuel control valve flow test and calibration. See paragraph *3-36 b(1)(h).*

b. Test Equipment.

(1) DC power supply manually adjustable from 18 to 30 volts, with a continuous 15-amp capacity.

(2) Two on-off switches.

(3) A normally open (NO) 24-volt relay, 20-amp capacity.

(4) 0 to 20 amp dc ammeter.

(5) 0 to 30 volt dc voltmeter (V1).

(6) 0 to 20 volt dc voltmeter (V2).

(7) 24-volt pilot lamp.

(8) Connector to mate with receptacle on heater.

(9) Filtered supply of No. 2 diesel fuel (Federal Spec. VV-F-800 Grade II), supplied at 5 ± 1/2 psig.

(10) A pyrometer duct constructed to the dimensions shown in figure 3-10.14 and fitted with a thermometer or pyrometer which reads up to 600°F.

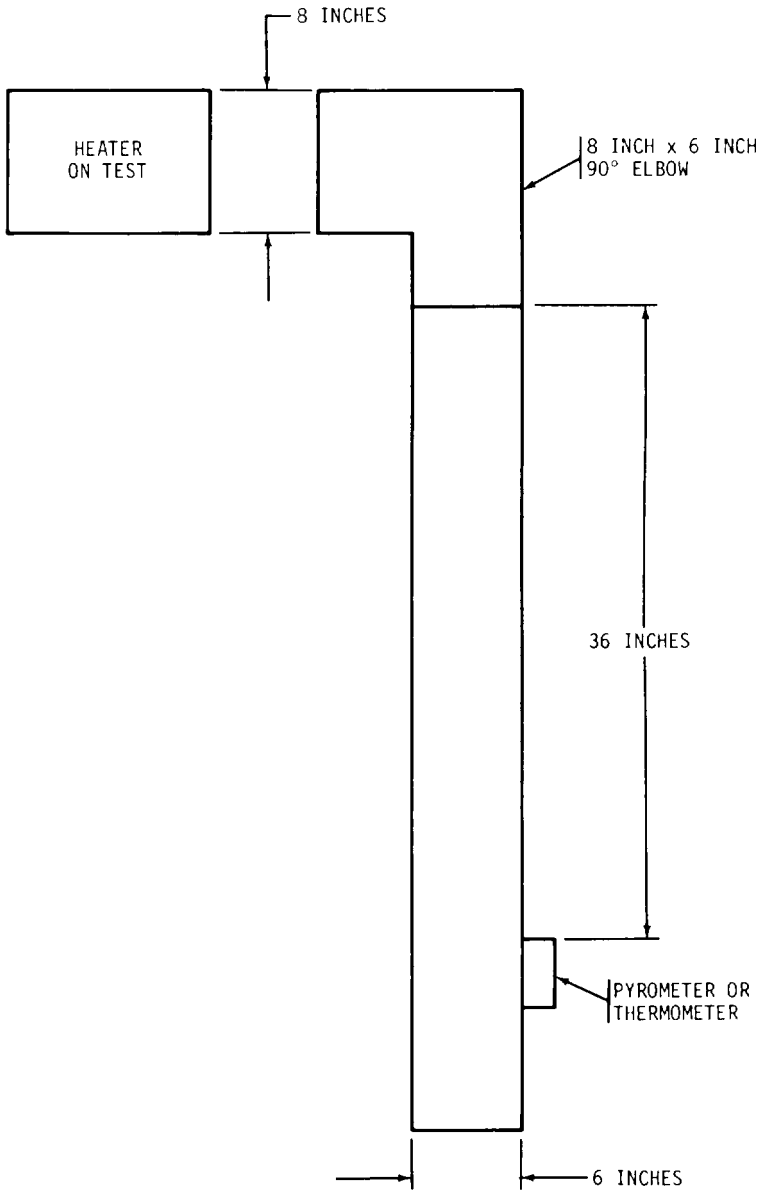


Figure 3-10.14. *Pyrometer duct dimensions.*

c. Test Setup.

(1) Mount the heater on the test stand in the same position it will be in when installed for use.

(2) Turn off all electrical switches.

(3) Connect fuel supply to the fuel control valve of heater.

(4) Fasten the pyrometer duct to the outlet end of the heater.

(5) Connect meter V2 to igniter lead on ignition control (terminal with two wires).

(6) Connect remaining electrical equipment as shown in test schematic, figure 3-10.15.

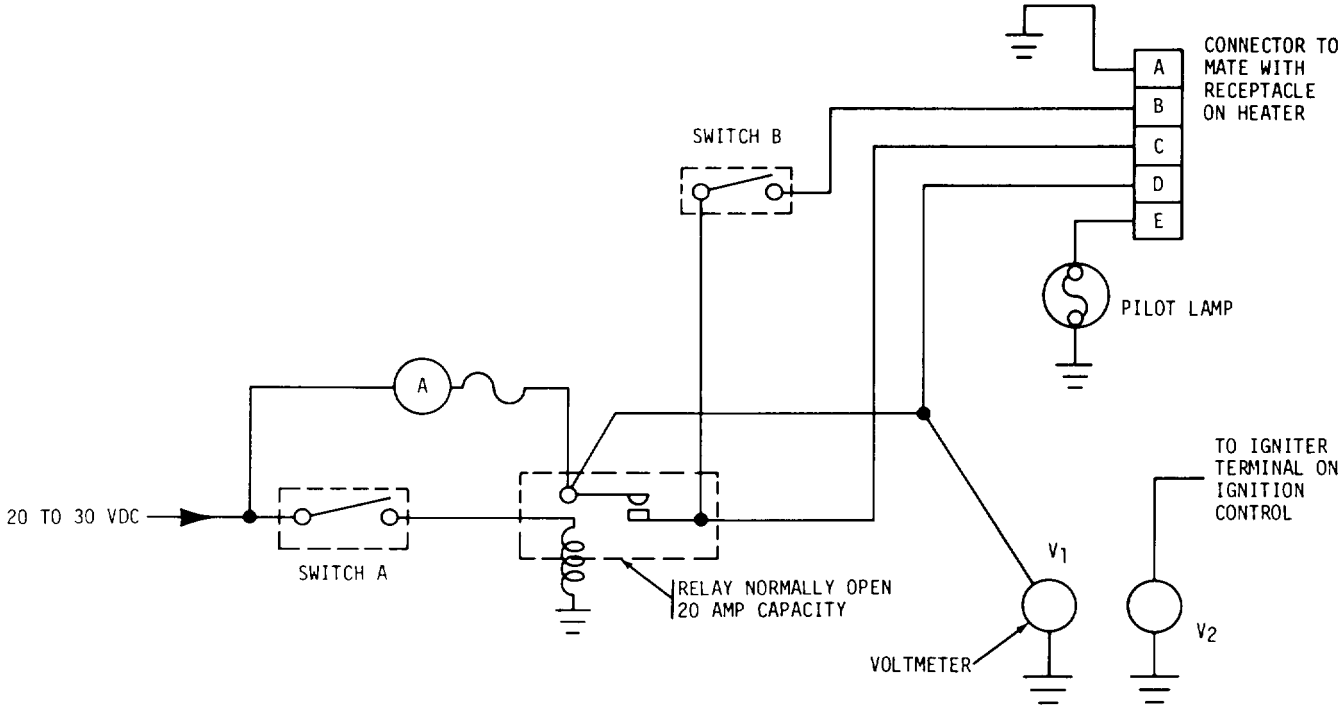


Figure 3-10.15. Tet schematic for complete heater assembly.

d. Test Procedure.

(1) Energize power supply and adjust to read 20 volts on V1, Open valve to the fuel supply.

(2) Leave switch B in the off position (LO), and turn switch A. Make the following observations during starting cycle:

(a) Ignition time. Ignition of this heater maybe inaudible when burning diesel fuel. Ignition must occur within 75 seconds maximum. If exact ignition time cannot be determined, flame detector switch crossover (indicated by pilot lamp lighting up) must be the determining factor. Flame detector switch must light pilot lamp within 105 seconds.

(b) Electric current as measured by ammeter must be 12.5 amperes or less.

NOTE

The fuel control valve contains a fuel heater which may be energized in ambients below 70° F, drawing an extra 3.5 to 4.7 amperes. If this occurs, disconnect the thermostat lead (No, 3 from the fuel control valve) from the terminal strip on the heater and retest,

(3) Immediately after flame detector switch trips, turn on switch B (heater on HI). Adjust power supply to read 24 volts on voltmeter V_1, and observe the ammeter during running cycle. Electric current must be 10.5 amperes maximum.

(4) Let heater run for two minutes, and inspect exhaust. No smoke should be visible.

NOTE

Visible smoke after two minutes of operation is not acceptable. Check for low voltage, a slow-running motor, or improperly calibrated fuel control valve. Some visible white smoke is normal until the flame detector switch trips.

(5) Restrict air flow into the ventilating air blower until the overheat switch opens. Read the temperature of the switch on the thermometer. Overheat cutout temperature must be 350° to 500° F.

(6) Remove ventilating air restriction. Heater should resume burning without requiring a return to the start cycle.

(7) Adjust power supply to read 30 volts on voltmeter V1 and turn off switch B. Allow heater to run for at least one minute. It must continue to burn smoothly.

(8) Adjust power supply to read 24 volts on voltmeter V, and turn off switch A to shut off heater. Observe the time required for blower to shut off. Purge time must be between 80 and 150 seconds.

(9) If heater does not meet specifications, repair and retest,

(10) Shut off power supply and fuel. Allow heater to cool to a temperature at which it is easy to handle. Disconnect the fuel and electrical connections and remove the pyrometer duct. Remove heater from test stand.

Section VII.

Deleted

Paragraphs 3-37 through 3-41.

Deleted

Section VIII. REPAIR OF ELECTRICAL COMPONENTS

3-42. General

The following paragraphs in this section cover the repair of miscellaneous items of electrical equipment. Organizational maintenance has the responsibility for repair and replacement of all electrical components except wiring harnesses and leads, master and armature relay and housing assemblies, generator switching relay box, high voltage power-pack and bilge pump electrical system components. Repair and replacement of these items is the responsibility of direct and general support maintenance personnel.

3-43. Description

For a description of the electrical components discussed in this section, refer to paragraph 1-3g.

3-44. Storage Batteries

WARNING

Handle batteries with care. Battery acid is extremely hazardous.

Refer to TM 9-2350-256-20 for removal, installation and service. Refer to TM 9-6140-200-14 for repair instructions.

3-45. Auxiliary Power Unit Control Box

Deleted.

Figure 3-11. Deleted.

(p) Deleted.
(q) Deleted.

3-48. Wiring Harness

a. Removal. Refer to paragraph 2-21 or TM 9-2350-256-20 for removal and installation instructions of wiring harnesses.

b. Disassembly.

(1) Unwrap or cut tape which binds the wires or cables to the old harness.

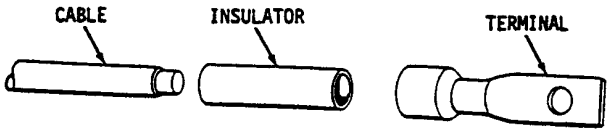
(2) Lay out the old harness with all splices exposed, so that it can be used as a model for building the new harness.

(3) Tag or otherwise identify all wires or cables.

(4) Remove all cable connectors.

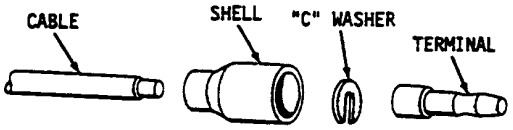
c. Inspection.

(1) *Shell and Terminal Assemblies.* Refer to A, B and C, figure 3-20.



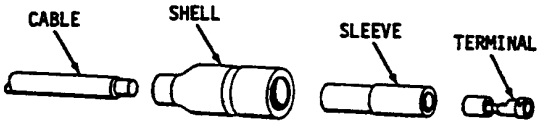
1. STRIP CABLE INSULATION EQUAL TO DEPTH OF TERMINAL WELL.
2. SLIDE INSULATOR OVER CABLE
3. INSERT CABLE INTO TERMINAL WELL, AND CRIMP.
4. SLIDE INSULATOR OVER CRIMPED END OF TERMINAL.

A - TERMINAL-TYPE CABLE CONNECTOR



1. STRIP CABLE INSULATION EQUAL TO DEPTH OF TERMINAL WELL.
2. SLIDE SHELL OVER CABLE.
3. INSERT CABLE INTO TERMINAL WELL, AND CRIMP.
4. PLACE "C" WASHER OVER CABLE AT CRIMPED JUNCTION AND SLIDE SHELL OVER "C" WASHER AND TERMINAL.

B - MALE CABLE CONNECTOR



1. STRIP CABLE INSULATION EQUAL TO DEPTH OF TERMINAL WELL.
2. SLIDE SHELL AND SLEEVE OVER CABLE.
3. INSERT CABLE INTO TERMINAL WELL, AND CRIMP.
4. SLIDE SHELL AND SLEEVE OVER TERMINAL.

C - FEMALE CABLE CONNECTOR (WITH SLEEVE)

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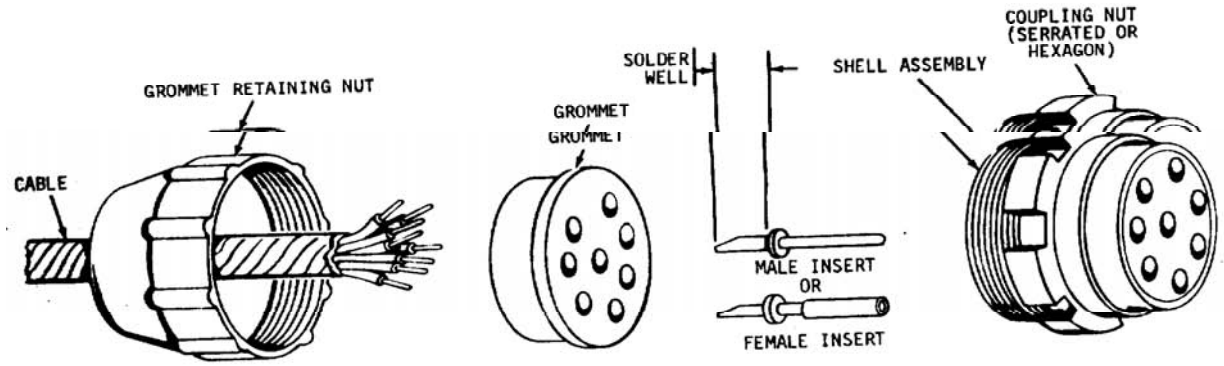
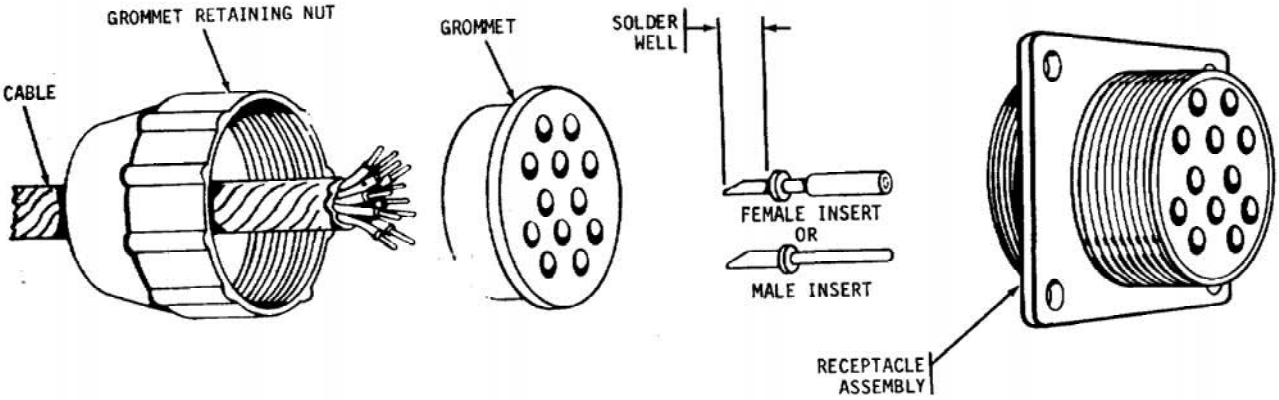
Figure 3-20. Wiring harness cable connectors repair (Sheet 1 of 2).



1. STRIP CABLE INSULATION EQUAL TO DEPTH OF SOLDER WELLS OF INSERTS.
2. PASS CABLE ENDS THROUGH GROMMET RETAINING NUT, GROMMET AND COUPLING NUT, INSERT INTO SOLDER WELLS OF INSERTS AND SOLDER. (TB SIG 222)
3. SLIDE GROMMET OVER INSERTS AND PRESS INTO SHELL ASSEMBLY UNTIL SEATED.
4. THREAD GROMMET RETAINING NUT TO SHELL ASSEMBLY UNTIL SEATED.

D. Plug assemblies



1. STRIP CABLE INSULATION EQUAL TO DEPTH OF SOLDER WELLS OF INSERTS.
2. PASS CABLE ENDS THROUGH GROMMET RETAINING NUT AND GROMMET, INSERT INTO SOLDER WELLS OF INSERTS AND SOLDER. (TB SIG 222)
3. SLIDE GROMMET OVER INSERTS AND PRESS INTO RECEPTACLE ASSEMBLY UNTIL SEATED.
4. THREAD GROMMET RETAINING NUT INTO RECEPTACLE UNTIL SEATED.

E. Receptacle assemblies

NOTE 1. DO NOT DISTORT SKIRTS OF TERMINAL WHEN CRIMPING TO CABLE.

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NOTE 2. IN PLUG AND RECEPTACLE ASSEMBLIES PLUG ALL SPARE GROMMET HOLES WITH ROD (NSN 9390-00-180-7289).

Figure 3-20. Wiring harness cable connectors–repair (Sheet 2 of 2).

(a) Inspect for cracks, tears, cuts, chips and gouges.

(b) Inspect for condition of material and discard parts showing any sign of hardening.

(2) *Plug and Receptacle Assemblies.* Refer to D and E, figure 3-20. Inspect for cracks, dents, bent inserts, cross threading and damage that would impair their serviceability.

d. Repair.

(1) *General.* Before repairing a harness, clean thoroughly of dirt and other accumulations with a brush and clean water. Dry and perform the following inspection prodcdures.

(a) Inspect harness for frayed areas.

(b) Inspect individual leads for cuts and other evidence of excessive wear and for missing, damaged and illegible circuit number and part number markers.

(c) Inspect all cable connectors as described in paragraphs *c*(1) and *c*(2) above.

(2) *Procedure.*

(a) Tape frayed areas.

(b) Remove defective leads and replace, reusing cable connectors (fig. 3-20) where possible. Use spare harness leads, if present, as replacement or cut a new length of cable of proper gage and assemble into the harness (refer to para. *e* (2) below).

(c) Remove the disassemble damaged and defective connectors and install new connector parts (fig. 3-20).

(d) Replace missing, damaged and illegible circuit number and part number markers.

e. Assembly.

(1) General. Continuity checks are performed during the fabrication procedure. The following sections of this paragraph provide procedural instructions for step-by-step assembly and for splicing and wrapping. Figure 3-20 provides instructions for assembly of connectors to cables.

(2) *Procedure.*

(a) Using the pattern of the old harness, cut new cable to the required lengths and complete all splices. Spliced cables must be adequately insulated and the insulation must be sealed to the insulation of each cable. Wrap with ¾ -inch black plastic sheet tape-type insulation or use heat-shrinkable promolded covers when available.

(b) Make a continuity check of each cable and splice, using an ohmmeter.

(c) Assemble connectors to cables as identified in disassembly (see fig. 3-20).

(d) Make another continuity check between opposite ends of cables through appropriate connector pins.

(e) Wrap splices and wrap cables into harness bundle with tape. Use plastic electrical insulation tape and bind cables together with one half overlapping turns in the same manner that the old harness was wrapped.

(f) Locate the attach required circuit number and part number markers, using the old harness as a pattern.

f. Test. The test of a wiring harness is performed during assembly.

3-49. Deleted

Section IX. REPAIR OF HYDRAULIC COMPONENTS

3-50. Description

The hydraulic system is comprised of an operating boom, main winch, hoist winch, spade and associated valves and subassemblies. This system is powered by the main hydraulic pump which is driven by the mechanical transmission. The transmission derives its power through the power takeoff (PTO) shaft coupled to the front end of the engine. The auxiliary hydraulic system provides supplementary power for auxiliary equipment operation and emergency power to assist in recovery operations.

3-51. Main Winch and Hoist Winch Cables

a. Removal. Refer to TM 9-2350-256-20 for removal and installation instructions.

b. Repair. Refer to TM 9-2350-256-34-2 for inspection and repair instructions.

3-52. Hoisting Boom

a. Removal. Refer to paragraph 2-24 for removal and installation instructions.

b. Repair. Refer to TM 9-2350-256-34-2 for inspection and repair instructions.

3-53. Main Winch and Spade Assembly

a. Removal. Refer to paragraph 2-25 for removal and installation instructions.

b. Repair. Refer to TM 9-2350-256-34-2 for inspection and repair instructions.

3-54. Main Winch Level Winder Arm Assembly

a. Removal. Refer to paragraph 2-27 for removal and installation instructions.

b. Repair. Refer to TM 9-2350-256-34-2 for inspection and repair instructions.

3-55. Hydraulic Control Panel Assembly and Control Valves.

a. Removal. Refer to paragraph 2-30 for removal and installation instructions.

b. Repair. Refer to TM 9-2350-256-34-2 for inspection and repair instructions.

3-56. Mechanical Transmission Power Takeoff Drive Shaft

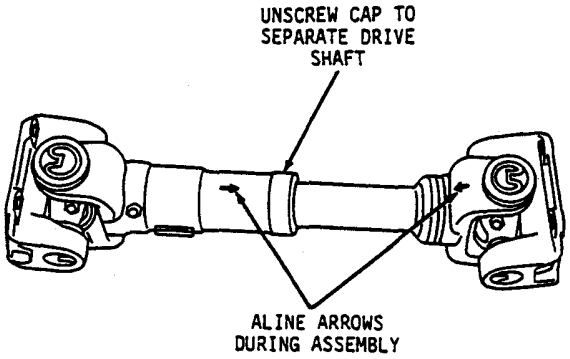
a. Removal. Refer to paragraph 2-31 for instructions on removing the drive shaft.

b. Disassembly. Disassemble the drive shaft as shown in figure 3-22.

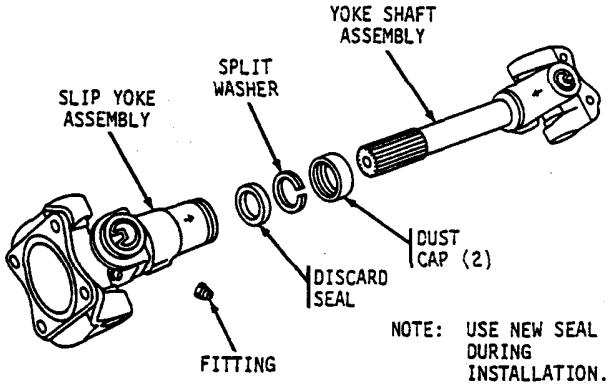
c. Inspection. Inspect all parts for cracks, distortion, breakage, and other evidence of damage that would impair their use.

d. Assembly. Assemble the drive shaft in reverse order of disassembly (figure 3-22).

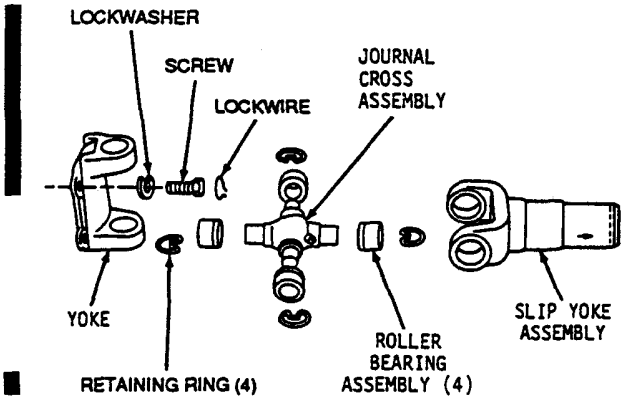
e. Installation. Refer to paragraph 2-31 for installation of the drive shaft.



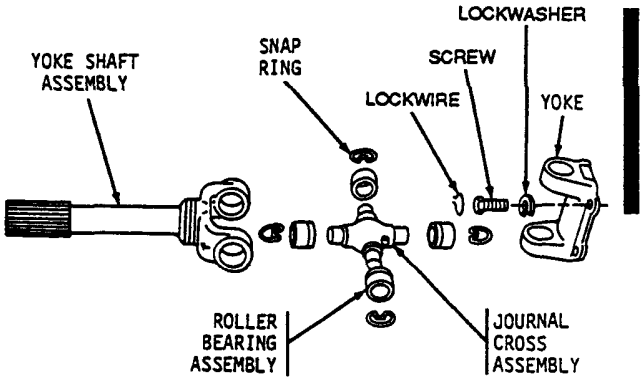
VIEW A. PTO DRIVE SHAFT.



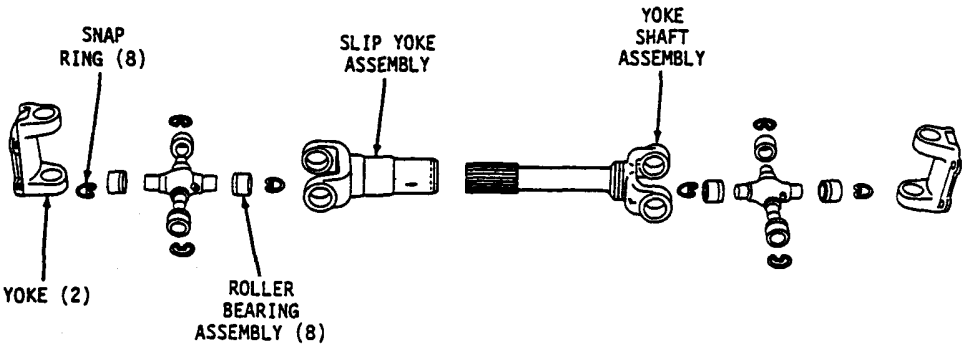
VIEW B. SEPARATION OF SLIP YOKE AND YOKE SHAFT ENDS.



VIEW C. JOURNAL CROSS ASSEMBLY - SLIP YOKE.



VIEW D. JOURNAL CROSS ASSEMBLY - YOKE SHAFT END.



VIEW E. PTO DRIVE SHAFT DISASSEMBLED.

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Figure 3-22. Mechanical transmission power takeoff drive shaft-disassembly and assembly.

3-57. Mechanical Transmission Oil Cooler Assembly.

a. Removal. Refer to paragraph 2-33 for instructions on removal and installation.

b. Disassembly. Disassemble the oil cooler assembly as shown in figure 3-23.

c. Cleaning. Clean dirt and other foreign material from all parts with drycleaning solvent or mineral spirits paint thinner, followed by wire brushing where necessary. Dry with compressed air.

d. Inspection and Repair.

(1) *Inspection.*

(a) Inspect oil cooler for cracks, distortion, breakage, and other damage that might cause leakage or otherwise impair its use.

(b) Inspect threaded parts for nicks, cross threading, and other evidence of excessive wear.

(c) Inspect guard assembly for broken welds, cracks, and other damage that would impair its use.

(2) *Repair.* Replace any parts that are defective.

e. Assembly. Assemble the mechanical transmission oil cooler assembly in reverse order of disassembly.

3-58. Mechanical Transmission and Main Hydraulic Pump Assembly

a. Removal. Refer to paragraph 2-32 for removal and installation instructions.

b. Repair. Refer to TM 9-2350-256-34-2 for inspection and repair instructions.

3-59. Hoist Winch Assembly

a. Removal. Refer to paragraph 2-35 for removal and installation instructions.

b. Repair. Refer to TM 9-2350-256-34-2 for inspection and repair instructions.

3-60. Main and Hoist Winch Brake Band Assemblies

a. Removal. Refer to paragraph 2-39 for removal and installation instructions.

b. Disassembly. Disassemble the brake band assembly as shown in figure 3-24.

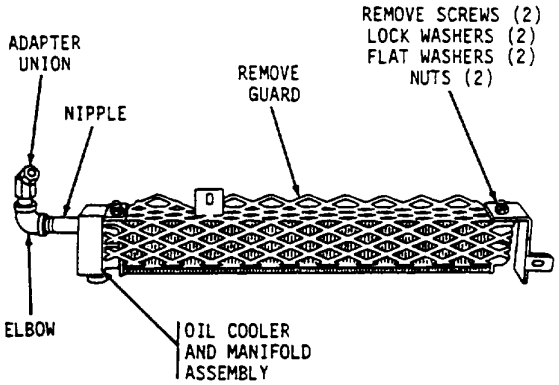

Figure 3-23. Mechanical transmission oil cooler assembly-disassembly and assembly.

c. Cleaning. Clean dirt and other foreign material from all parts with drycleaning solvent or mineral spirits paint thinner, followed by wire brushing where necessary. Dry with compressed air.

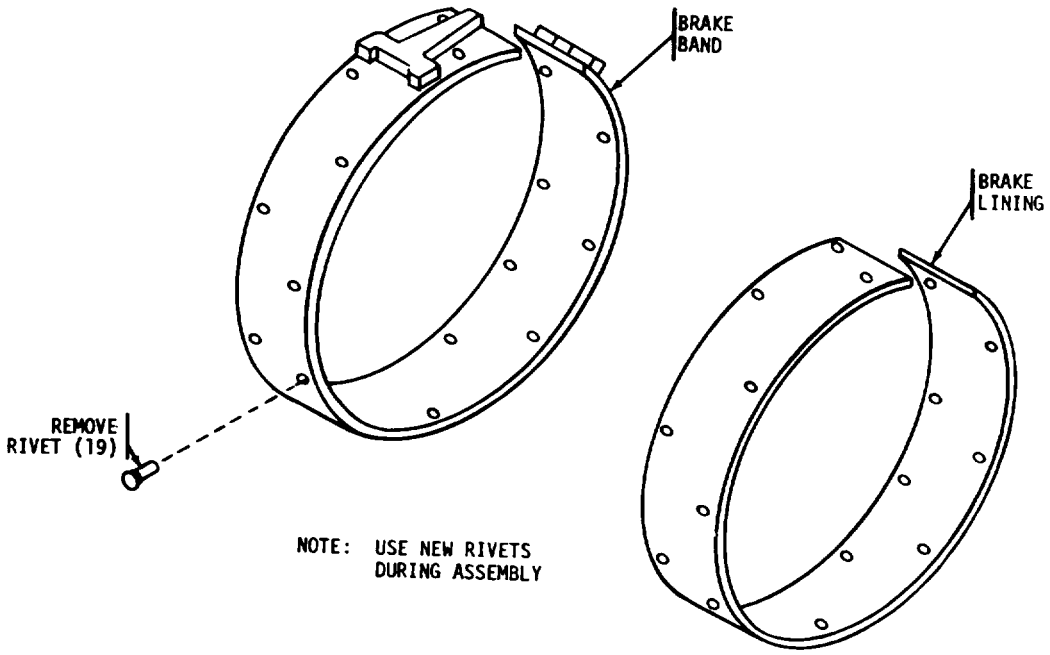

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Figure 3-24. Main and hoist winch bide band assembly-disassembly and assembly.

c. Cleaning. Clean brake band and brake drum surfaces with drycleaning solvent or mineral spirits paint thinner.

d. Inspection. Inspect the brake lining for wear and damage.

e. Repair. Replace worn or unserviceable brake linings or bands.

f. Assembly. Assemble the brake band assembly in reverse order of disassembly. Use new rivets (19 for each assembly) to hold the brake lining to the band.

3-61. Hydraulic System Oil Tank Assembly

a. Removal. Refer to paragraph 2-40 for removal and installation instructions.

b. Repair. Refer to TM 9-2350-256-34-2 for inspection and repair instructions.

3-62. Hydraulic Oil Tank Cover Assemblies and Suction Pipe

a. Removal. Refer to paragraph 2-43 for removal and installation instructions.

b. Repair. Refer to TM 9-2350-256-34-2 for inspection and repair instructions. Replace the suction pipe if defective.

3-63. Pressure Switch

a. Removal. Refer to TM 9-2350-256-20 for removal and installation instructions.

b. Tests and Adjustments.

(1) *General.* The switch should open when hydraulic pressure of 235 A 3 psi is applied and should close when the pressure drops to ap proximately 221 ± 8 psi. Paragraphs 3-63b(2) and (3) contain instructions for testing and adjusting the pressure switch.

(2) *Test.*

(a) Connect the pressure switch to the porta-power pump and pressure gage and connect an ohmmeter to the two electrical leads on the pressure switch as shown in figure 3-25.

Legend for fig. 3-25:
1 Pressure gage (7950330)
2 Ohmmeter
3 Pressure switch
4 Tee fitting
5 Ports-power pump

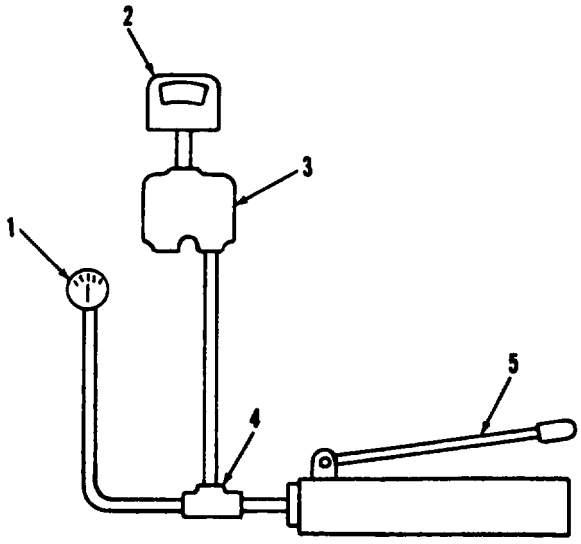

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Figure 3-25.. Pressure switch assembly test arrangement.

NOTE

Ohmmeter shall read "0" ohms with no hydraulic pressure applied. If ohmmeter does not read “0”, replace the pressure switch and perform the test and adjustment procedure on a new pressure switch.

(b) Actuate pump and slowly raise pressure to 235 ± 3 psi while watching ohmmeter. The pressure switch should open (ohmmeter reads infinity) at this pressure. If it does not or if it opens before this pressure is reached, adjust the pressure siwtch as instructed in paragraph 3-63(3).

(c) Slowly relieve pressure until switch closes (ohmmeter reads “0”). The pressure gage should read 221 ± 8 psi at this point, If it does not, replace switch and perform the test and adjustment procedure on a new pressure switch.

(d) Again raise the pressure slowly to 235 ± 3 psi to check repeatability of switch. It should open again at this pressure. If it does not, replace the switch and perform the test and adjustment procedure on a new pressure switch.

(e) Relieve pressure, disconnect test equipment and install pressure switch (TM 9-2350-256-20) .

(3) *Adjustment.* Refer to paragraph 3-63b(1) and (2).

(a) Pressure switch has not opened when a pressure of 235 ± 3 psi is reached.

1 Loosen switch setscrew and apply 235 psi hydraulic pressure.

2 While maintaining pressure at 235 psi, slowly turn switch adjustment screw counterclockwise until the ohmmeter reads infinity. If switch cannot be adjusted in this manner, replace switch and perform the complete test and adjustment procedure on a new pressure switch.

3 Test action of switch by performing steps (c) and (d) of the test procedure above.

4 Tighten switch setscrew, relieve pressure, disconnect test equipment and install pressure switch (TM 9-2350-256-20).

(b) Pressure switch opens before a pressure of 235 ± 3 psi is reached.

1 Loosen switch setscrew and apply 235 psi hydraulic pressure.

2 While maintaining pressure at 235 psi, slowly turn switch adjustment screw clockwise until ohmmeter reads “0”. If the ohmmeter does not read "0" when the adjustment screw is turned fully clockwise, replace switch and perform the complete test and adjustment procedure on a new. switch.

3 Very slowly back off the adjustment screw (turn counterclockwise) until the ohmmeter reads infinity.

4 Test action of the switch by performing steps (c) and (d) of the test procedure.

5 Tighten switch setscrew, relieve pressure, disconnect test equipment and install pressure switch (TM 9-2350-256-20).

3-64. Spade Subplate and Control Valve Assembly

a. Removal. Refer to paragraph *2-46f* for removal and installation instructions.

b. *Repair.* Refer to TM 9-2350 -256-34-2 for inspection and repair instructions.

3-65. Flow Regulating Subplate Assembly

a. Removal. Refer to paragraph 2-46h for removal and installation instructions.

b. Repair. Refer to TM 9-2350 -256-34-2 for inspection and repair instructions.

3-66. Main Winch Motor

a. Removal. Refer to paragraph 2-26 for removal and installation instructions.

b. Repair. Replace the motor if it is defective.

3-67. Hoist Winch Motor

a. Removal. Refer to paragraph 2-37 for removal and installation instructions.

b. Repair. Replace the motor if it is defective.

3-68. Boom and Stayline Actuating Cylinder Assemblies and Stayline Actuating Cylinder Crank Arms

a. Removal. Refer to paragraph 2-29 for removal and installation instructions.

b. Repair. Replace cylinders and crank arms if they are defective.

3-69. Main Hydraulic Pump Unloading Valve

a. Removal. Refer to paragraph 2-34 for removal and installation instructions.

b. Repair. Replace the valve if it is defective.

3-70. Hoist Winch Counterbalance Valve

a. Removal. Refer to paragraph 2-36 for removal and installation instructions.

b. Repair. Replace the valve if it is defective.

3-71. Main Winch and Hoist Winch Brake Cylinders

a. Removal, Refer to paragraph 2-38 for removal and installation instructions.

b. Repair. Replace the cylinders if they are defective.

3-72. Hydraulic System Oil Filter

a. Removal. Refer to paragraph 2-41 for removal and installation instructions.

b. Repair. Replace the filter if it is unserviceable.

3-73. Hydraulic Oil Tank Strainer (Filter)

a. Removal. Refer to paragraph 2-42 for removal and installation instructions.

b. Repair. Replace the strainer if it is damaged and unserviceable.

3-74. Fuel Transfer Pump and Auxiliary Hydraulic Motor Assembly

a. Removal. Refer to paragraph 2-45 for removal and installation instructions.

b. Repair. Replace the pump, motor and associated parts which are unserviceable.

3-75. Lines and Fittings

a. Removal. Refer to paragraph 2-46b for removal and installation instructions.

b. Repair. Replace parts that are damaged, worn or otherwise unserviceable.

3-76. Fuel Transfer Pump and Auxiliary Hydraulic Motor Assembly Motor Control Valve

a. Removal. Refer to paragraph 2-46*d* for removal and installation instructions.

b. Repair. Replace the valve if it is defective.

3-77. Spade Cable Control Assembly

a. Removal. Refer to paragraph 2-46*g* for removal and installation instructions.

b. Repair. Replace any parts that are damaged and unserviceable.

3-78. Boom Limit Pilot Valves

a. Removal. Refer to paragraph 2-46i for removal and installation instructions.

b. Repair. Replace the valves if they are defective.

3-79. Hydraulic Hose Connecting Panel Assembly

a. Removal. Refer to paragraph 2-46*j* for removal and installation instructions.

b. Repair. Replace the connecting panel if it is damaged and unserviceable.

3-80. Deleted

Section X. REPAIR OF FIRE EXTINGUISHER STOWAGE BOXES AND BRACKETS

3-81. Description

The fire extinguisher system is comprised of eight 10-pound cylinders, cylinder control valve, remote control connectors, two dual-pull mechanisms, extinguisher lines, seven nozzles with cables, and two interior remote control pull handles with cables, and an engine shutoff switch. The cylinders are mounted in banks of four on each side of the cab interior.

3-82. Removal and Installation

Refer to TM 9-2350-256-20 for removal and installation of fire extinguisher stowage boxes and brackets.

3-83. Disassembly

Refer to figure 3-28 for disassembly of fire extinguisher stowage box.

3-84. Assembly

Assemble the fire extinguisher stowage box in reverse order of disassembly.

Legend for figure 3-28:

1 Nut (2)
2 Lockwasher
3 Rod connector
4 Rivet (2)
5 Fixed Arm Assembly
6 Nut
7 Lockwasher
8 Retaining trap
9 Connecting link
10 Straight pin
11 Cotter pin
12 Rod end clevis
13 Mounting bracket

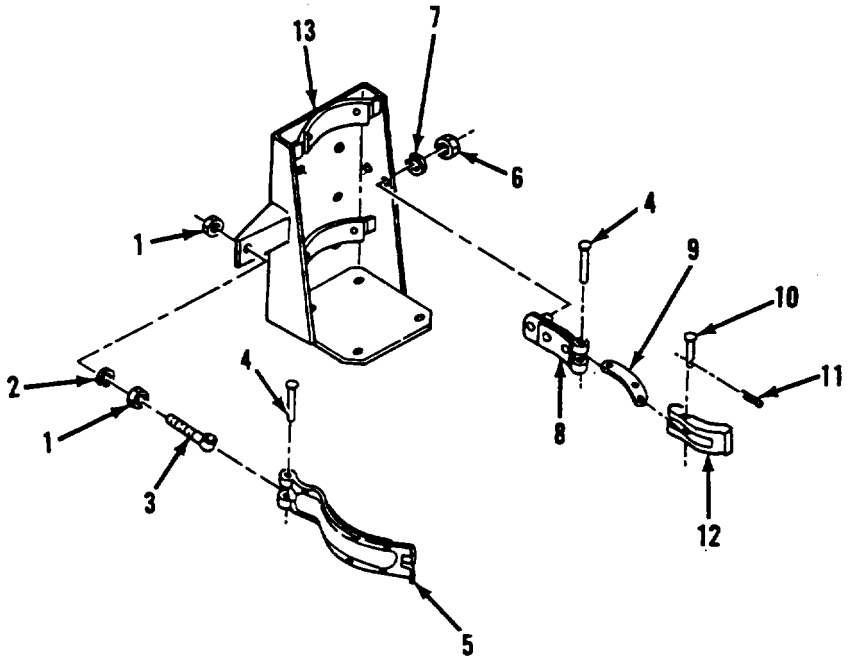

Figure 3-28. Fire extinguisher stowage boxes-disassembly and assembly

b. Adjustment. Use a screwdriver to adjust the airflow by opening the filter unit air regulator (fig. 3-27). Turn clockwise to close and counterclockwise to open.

NOTE

Some filter unit precleaners do not have an adjustable air regulator. If airflow cannot be adjusted to between 3 and 41/2 cfm, the purifier assembly must be replaced.

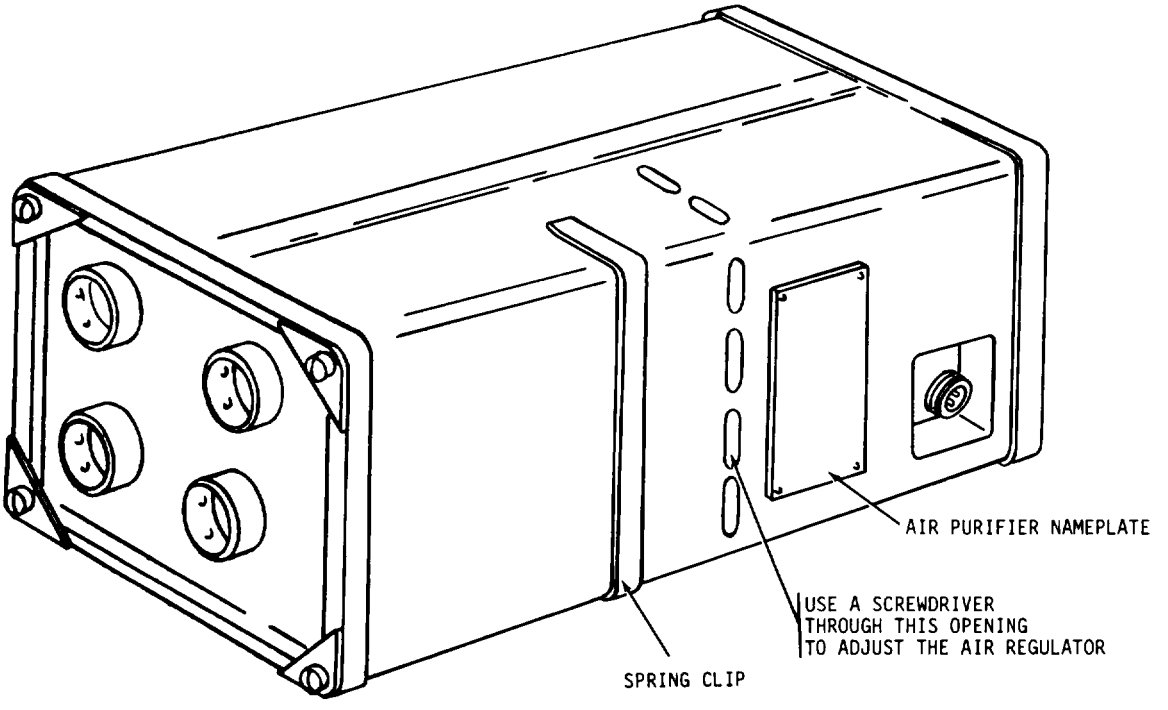

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Figure 3-27. *Gas-particulate filter unit– test and adjust.*

CHAPTER 4

MAINTENANCE OF MATERIEL USED IN CONJUNCTION WITH MAJOR ITEM

Section 1. AUXILIARY POWER UNIT

4-1. Description

a. General. The auxiliary power unit (fig. 4-1) consists of an air-cooled diesel engine with a chain case, generator (which is also used as a starter), and hydraulic pump mounted to it. The chain case covers three sprockets and a drive chain. With a support and mounts, the engine, generator/starter and pump form a compact unit which fits into the right forward corner of the vehicle engine compartment. The generator electrical system is designed to supply a maximum of approximately 150 amperes of current at approximately 28 volts dc to charge the vehicle batteires. The pump supplies pressure at 2000 ± 50 psi to the auxiliary hydraulic system.

Legend for fig. 4-1:

1 Engine combustion air inlet
2 Exhaust tube
3 Governor speed adjustment screw
4 Crankcase oil gage rod
5 Auxiliary generator cooling duct
6 Auxiliary generator
7 Support and mount
8 Fuel injection nozzle tubes
9 Lifting eye
10 Fuel injection pump
11 Panel
12 Oil pressure sending unit
13 Retainer
14 Oil filter
15 Low oil pressure switch
16 Crankcase oil drain valve
17 Fuel line
18 Fuel line connections
19 Fuel pump filter bowl
20 Fuel transfer pump
21 Engine cooling air outlet duct
22 Access cover
23 Lead to high air temperature warning light switch
24 Accessory drive case
25 Accessory drive case vent
26 Hydraulic hose connection
27 Accessory drive case oil fill
28 Ground cable
29 Accessory drive case oil drain
30 Hydraulic hose
31 Wiring harness
32 Auxiliary hydraulic pump
33 Starter relay

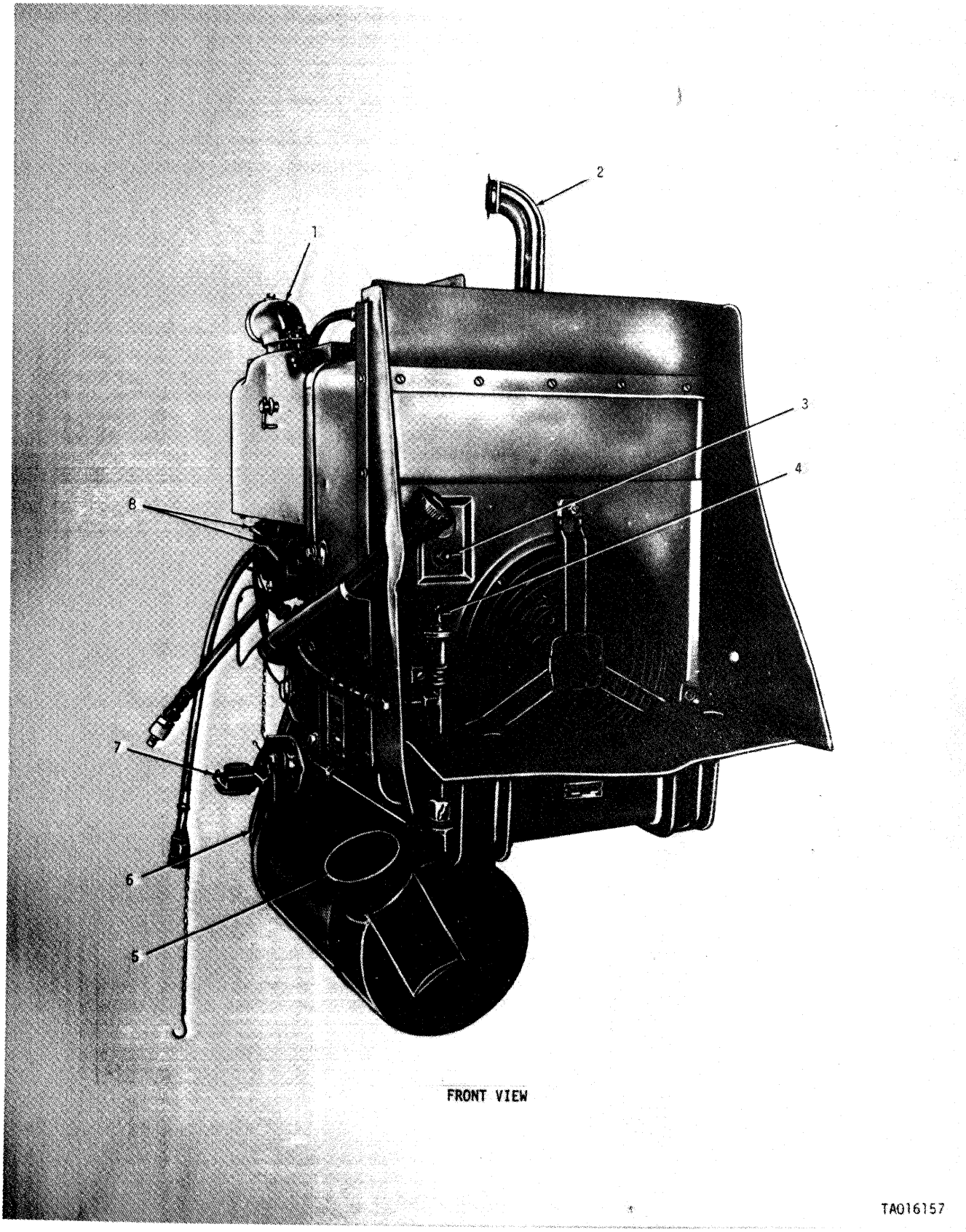


Figure 4-1. Auxiliary power unit (Sheet 1 of 3).

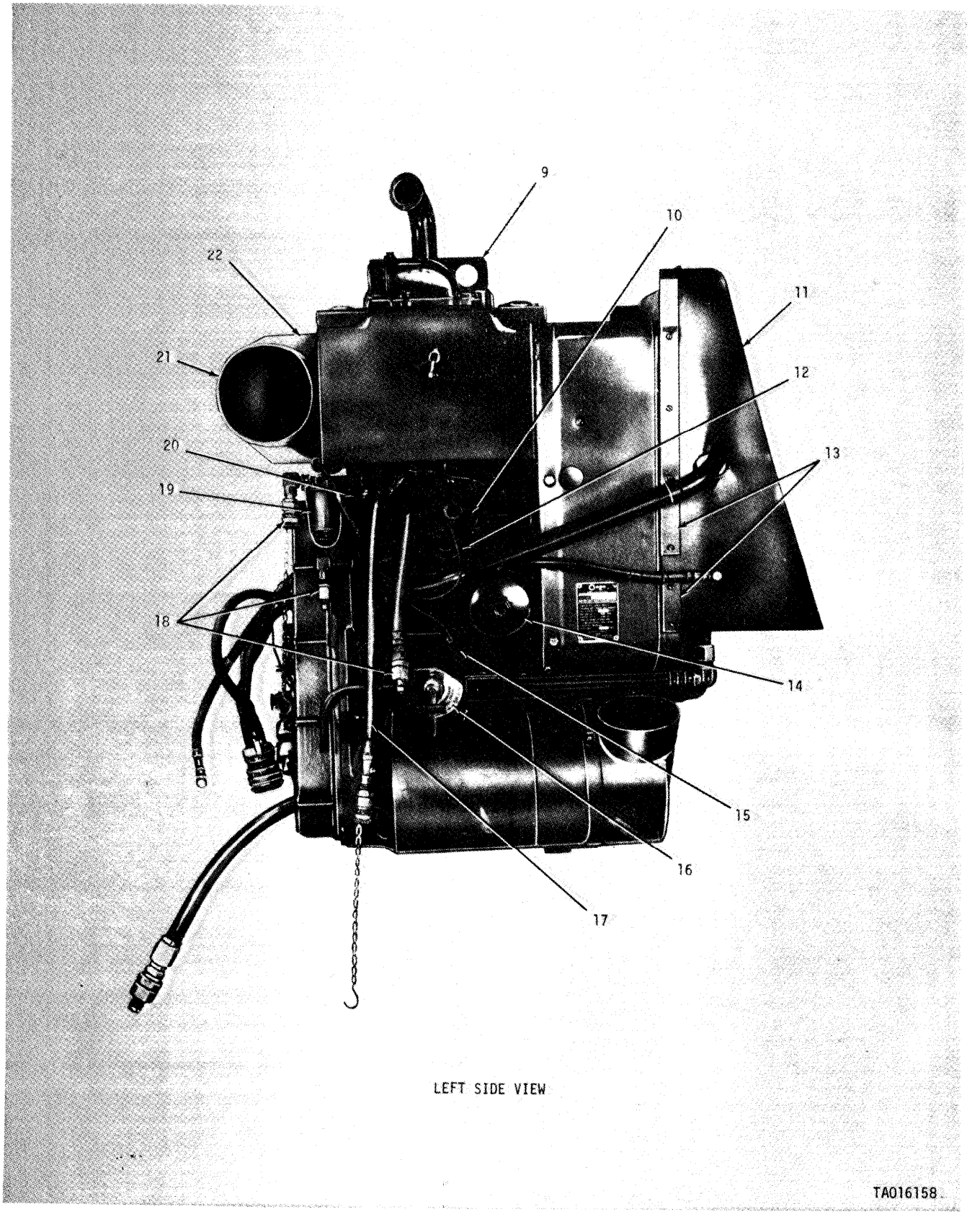


Figure 4-1. Auxiliary power unit (Sheet 2 of 3).

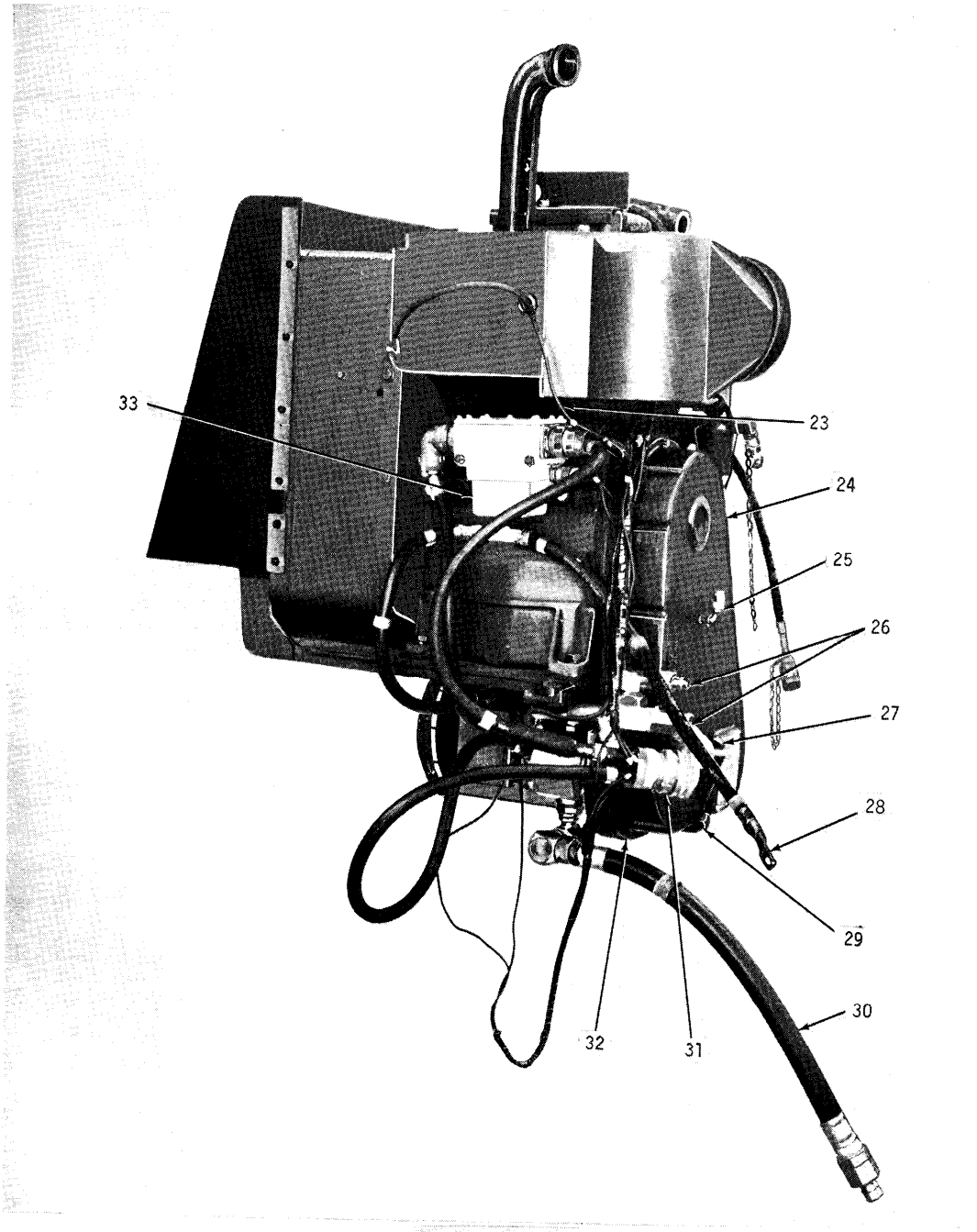


Figure 4-1. Auxiliary power unit (Sheet 3 of 3).

b. Starting System. The generator, which is coupled to the engine by a drive chain, also serves the dual role as a starter. When the preheat switch is held in the closed (ON) position, and the generator switch is open (OFF), one side of the preheat relay energizing coil on the APU engine is grounded through the preheat switch and a set of APU generator switching relay contacts. This causes the preheat relay contacts to close since the opposite side of the energizing coil is connected directly to the vehicle bus voltage, Power is then supplied through the closed preheat relay contacts to the preheater, the APU generator/starter field winding, and to one side of the starter switch circuit. When the starter switch is closed, it completes the APU starter relay coil circuit, and bus power is supplied to the APU generator/starter armature circuit through these relay contacts, thus motorzing the generator/starter to start the engine. Therefore, both the preheat and starter switches must be closed (ON), and the generator switch must be open (OFF), in order to start the API-J. Since the preheat relay energizing coil ground circuit is passed through the set of APU switching relay contacts (as mentioned above), the preheat relay cannot activate if the generator switch is on. The reason for this circuit arrangement is to prevent vehicle bus voltage from being applied to the voltage regulator field through the preheat relay contacts, thus damaging the regulator when the generator switch is on (field circuit from generator to regulator closed) and the preheat switch is activated (bus voltage applies to generator field winding).

c. *Lubrication.* A gear-type pump draws oil from the crankcase and delivers it through a replaceable oil filter to the engine. Normal oil pressure should be 25 psi or higher under normal operating conditions. An oil pressure switch will activate a low oil pressure warning light on the auxiliary power unit control box if the oil pressure drops below 14 ± 2 psi. A crankcase drain valve is provided with a handle so that the lubricating oil can be drained without removing the unit from the vehicle.

d. Governor. A constant speed governor is set to maintain engine speed at 2000 ± 100 rpm. The governor uses a ball and cup mechanism on the camshaft gear as the sensing device. A yoke resting on the cup connects to an arm and spring mechanism controlling the trottle lever. Any change in engine speed is transmitted from the cup to the yoke and to the throttle. An adjusting screw is provided on the front of the unit to adjust the speed by changing the spring tension.

e. *Fuel system.* The fuel system consists basically of a primary and secondary fuel filter, fuel transfer pump, fuel injection pump and two fuel injection nozzles. The transfer pump operates off the camshaft, drawing fuel from the supply tank and delivering it through the two filters to the injection pump. The injection pump meters and delivers the fuel at high pressure to the nozzles.

f. Electrical System. The generator/starter is mounted to the chain case and engine housing and driven by the engine through a roller chain and drive sprocket. The output is controlled automatically by a voltage regulator and current limiting device. A detailed description of the auxiliary generating system is contained in paragraph 1-3g(2).

g. *Hydraulic System.* The pump is mounted to the chain case and driven by the engine. It supplies the pressure for the auxiliary hydraulic system. This system powers the refuel pump and impact wrench and also supplies power for emergency operation of the boom, spade and winches. A detailed description of the auxiliary hydraulic system is contained in TM 9-2350-256-34-2.

4-2. Repair

a. General.

(1) *Current limiter calibration.* Whenever the auxiliary generator, voltage regulator, APU assembly, or relay box, is replaced or the auxiliary engine is replaced or repaired, the rheostat in the switching relay box must be adjusted to limit the auxiliary generator output current to approximately 150 amperes with the APU in the vehicle. TM 9-2350-256-20 provides instructions for calibrating the current limiter. I

(2) *Test fixture.* The auxiliary engine must be placed on a stand to operate it outside the vehicle (groundhopping). Refer to figure 4-2 for information on constructing a test fixture to support the APU during groundhopping tests.

Legend for figure 4-2:

Item	Name	Qty	Size (inches)	Material
1	Base angle	2	2.00 x 2.00 x o.25 x 27.44lg	steel
2	Base angle	2	2.00 x 2.00 x 0.25 x 24.75 lg	steel
3	Support angle	2	2,00 x 2.00 x 0.25 x 23.06 lg	steel
4	Support angle	2	2.00 x 2.00 x 0.25 x 28.25 lg	steel
5	Support angle	1	2.00 x 2.00 x 0.25 x 19.38 lg	steel
6	Support angle	3	2.00 x 2.00 x 0.25 x 20.10 lg	steel
7	Gusset	4	0.25 x 1.75 x l.75 lg	hr steel
8	Pad	2	0.75 x 3.00 x 2.88 lg	hr steel
9	Pad	1	0.75 x 2.25 x 2.00 lg	hr steel
10	Pad	1	0.75 x 2.25 x 3.00 lg	hr steel
11	Support angle	1	2.00 x 2.00 x 0.25 x 19.38 lg	steel

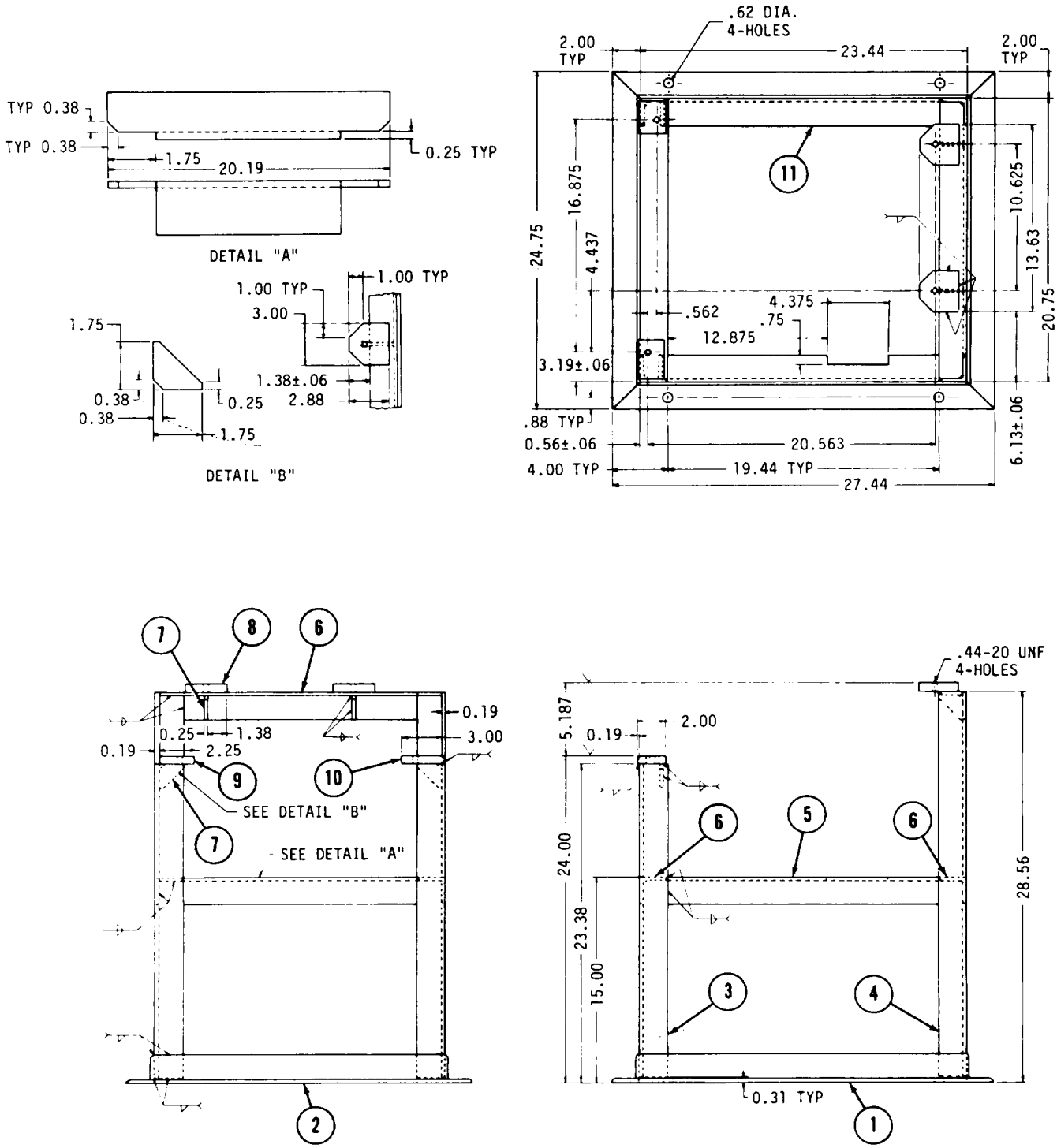


Figure 4-2. Test stnnd for auxiltiry power unit.

(3) *Generator/starter brushes.* When replacing the generator/starter, or its brushes, the brushes should be sanded according to procedures in d.1 below.

b. Disassembly.

(1) *General.* Refer to paragraph 2-15 for removal and installation instructions. Refer to TM 9-2815-221-34&P for repair of the diesel engine assembly and to TM 9-2350-256-20 for components not covered in this manual. Figure 4-3 with legend identifies the components of the APU and provides an index to the step-by-step removal (fig 4-5) of each part during disassembly. Figure 4-4 provides a schematic guide to the connection of the wiring harnesses, the high air temperature switch lead and the ground leads.

Legend for figure 4-3:

1 Screw (I)
2 Lockwasher (I)
3 Plate (K)
4 Bushing (K)
5 Key (K)
6 Sprocket (K)
7 Chain (K)
8 Screw (O)
9 Lockwasher (O)
10 Chain case (I, P)
11 Gasket
12 Drain tube (Q)
13 Clamp (R)
14 Washer (R)
15 Screw (R)
16 Flared tube connector (Q)
17 Coupling half (Q)
18 Coupling half (Q)
19 Retainer (Q)
20 Bushing(Q)
21 Hose assembly (C)
22 Coupling half (C)
23 Elbow (C)
24 Nipple (C)
24.1 Bracket
24.2 Washer
24.3 Screw
24.4 Nut
24.5 Washer
25 Adapter union (C)
26 Nipple (C)
27 Adapter (C)
28 Packing (C)
29 Pump (B)
30 Screw (B)
31 Lockwasher (B)
32 Packing (C)
33 Adapter (C)
34 Adapter union (C)
35 Elbow (C)
36 Pump adapter (Y)
37 Washer (W)
38 Screw (W)
38.1 U-Bolt
39 Tee (C)
40 Valve(C)
41 Adapter (C)
42 Coupling half (C)
43 Screw (W, Y)
44 Duct (N)
44.1 Air duct hose
44.2 Clamp
45 Generator (U)
46 Support strap (N)
47 Pin (N)
48 Cotter pin (N)
49 Bearing (Z)
50 Sprocket wheel (Z)
51 Deleted
52 Gasket (Z)
53 Bearing retainer (Y)
54 Oil seal (Z)
55 Stud (X)
56 Washer(Y)
57 Nut (V)
58 Sprocket wheel (Z)
59 Deleted
60 Lockwasher (H)
61 Screw (H)
62 Instruction plate (H)
63 Screw (H)
64 Plug (H)
65 Gasket (H)
66 Plug (H)
67 Elbow (H)
68 Breather assembly (H)
69 Chain cover (H)
70 Gasket (H)
71 Screw (R)
72 Lockwasher (R)
73 Retainer (R)
74 Panel (R)
75 Screw (D)
76 Duct (D)
77 Diesel engine (P, S)
78 Manufacturer's nameplate (R)
79 Panel (R)
80 Retainer (R)
81 Screw (S)
82 Lockwasher (S)
83 Support (S, T)
84 Mount (T)
85 Elbow (Q)
86 Coupling half (Q)
87 Coupling (Q)
87.1 Screw
87.2 Lockwasher
873 Screw
87.4 Lockwasher
87.5 Grommet
87.6 Clamp(2)

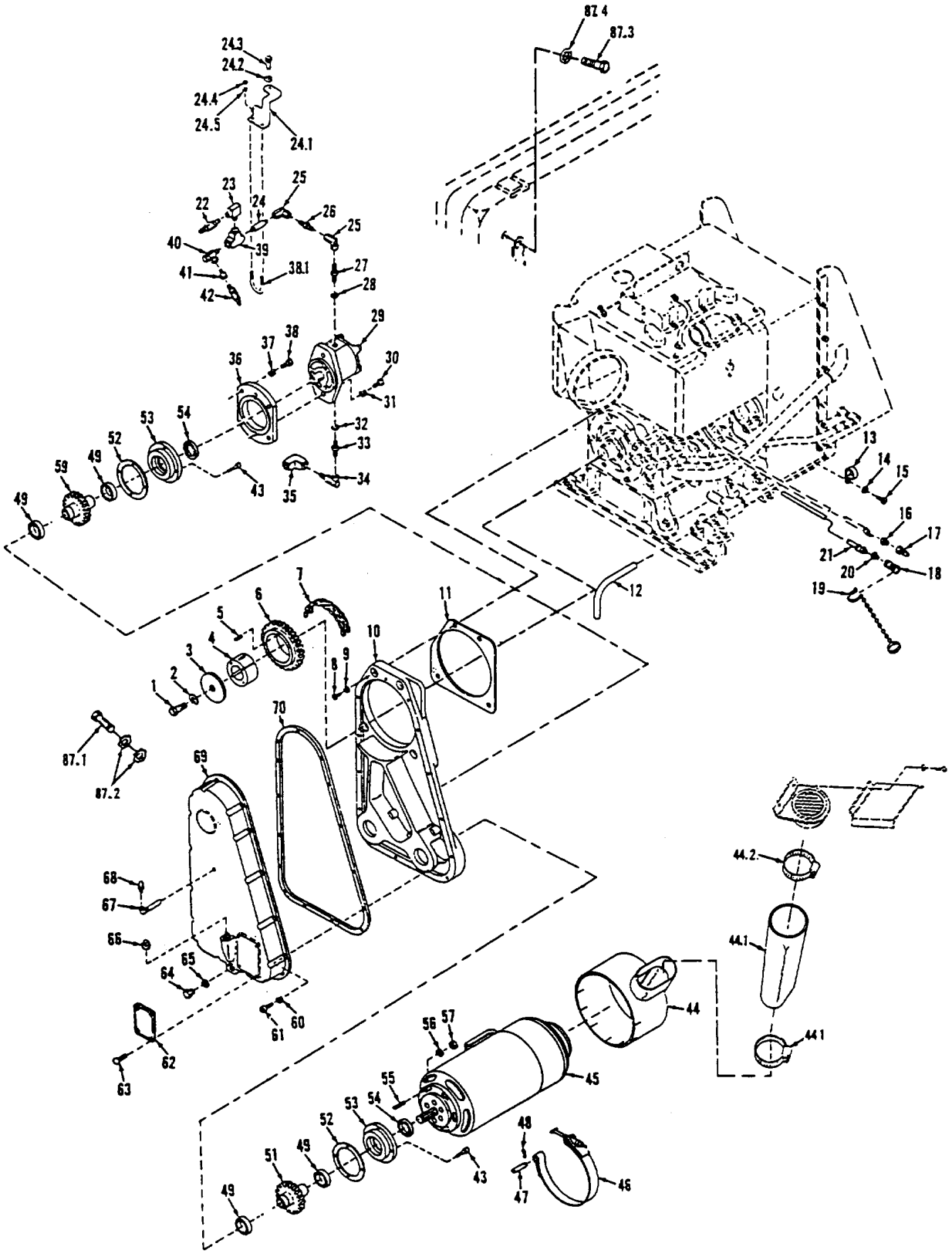


Figure 4-3. Auxiliary power unit-exploded view (Sheet 1 of 3).

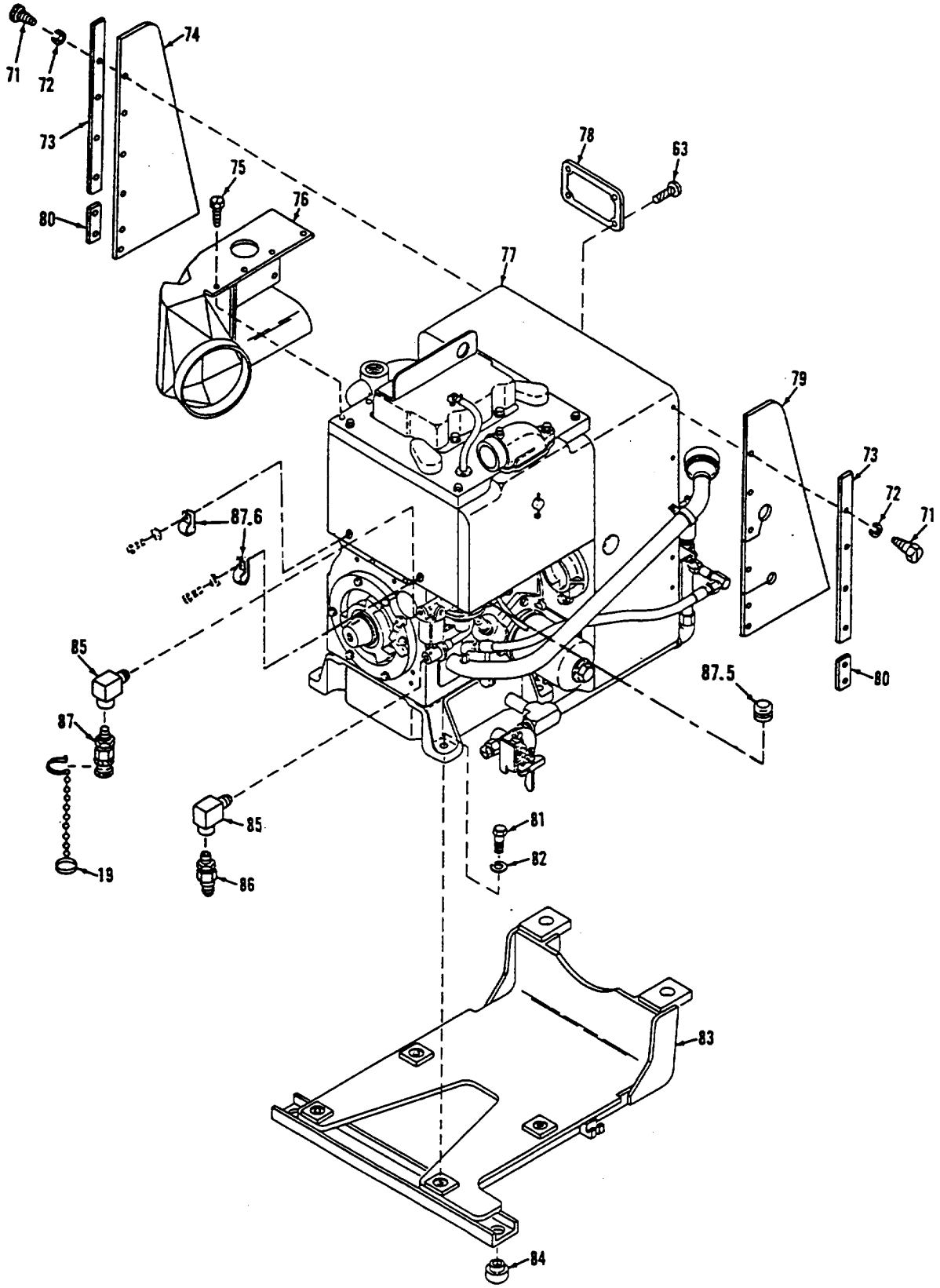
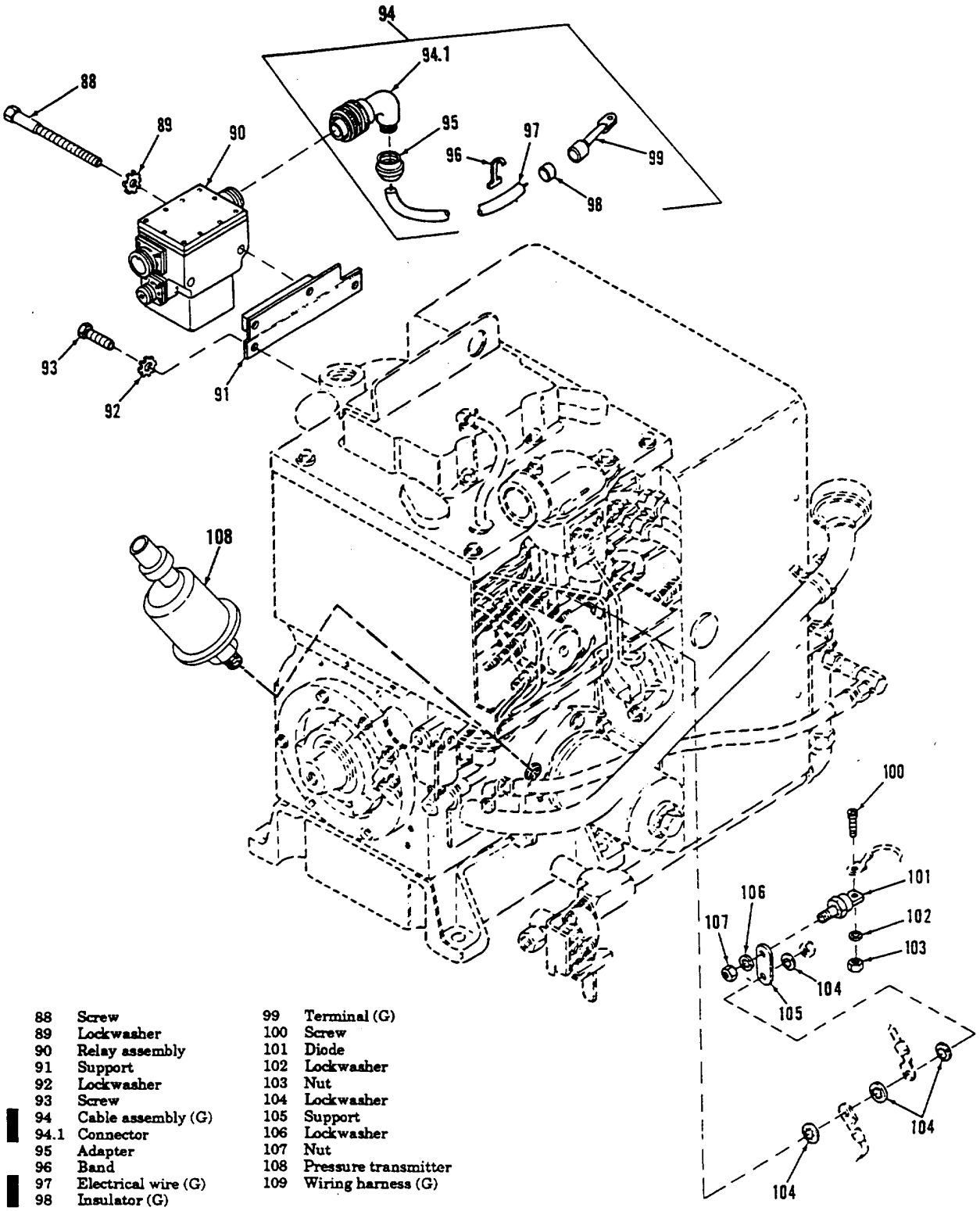


Figure 4-3. Auxiliary power unit-unit-exploded view (Sheet 2 of 3).



88	Screw	99	Terminal (G)
89	Lockwasher	100	Screw
90	Relay assembly	101	Diode
91	Support	102	Lockwasher
92	Lockwasher	103	Nut
93	Screw	104	Lockwasher
94	Cable assembly (G)	105	Support
94.1	Connector	106	Lockwasher
95	Adapter	107	Nut
96	Band	108	Pressure transmitter
97	Electrical wire (G)	109	Wiring harness (G)
98	Insulator (G)		

Note: The letters in parentheses refer to figure 4-5 view.

Figure 4-3. Auxiliary power unit-exploded view (Sheer 3of 3).

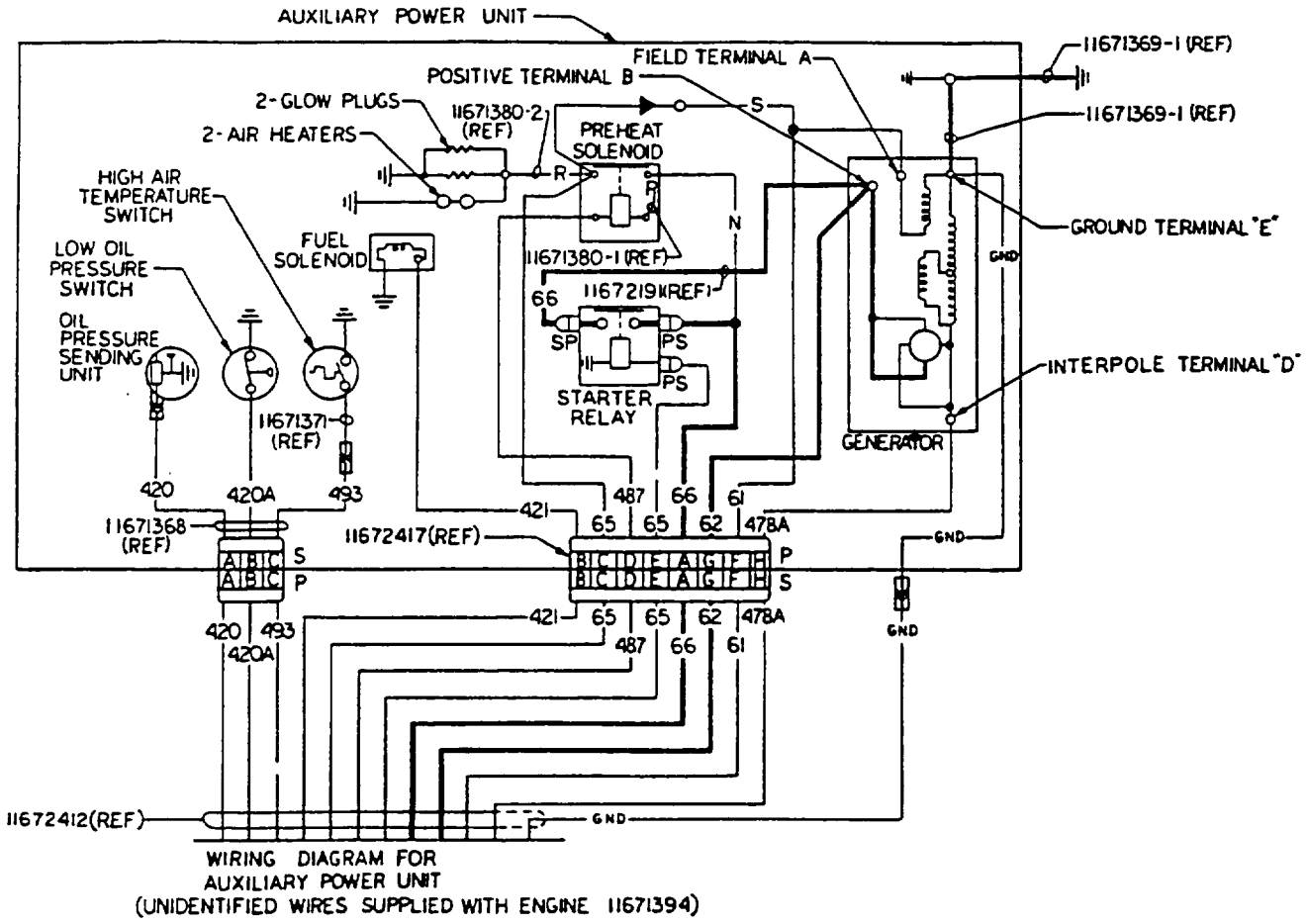
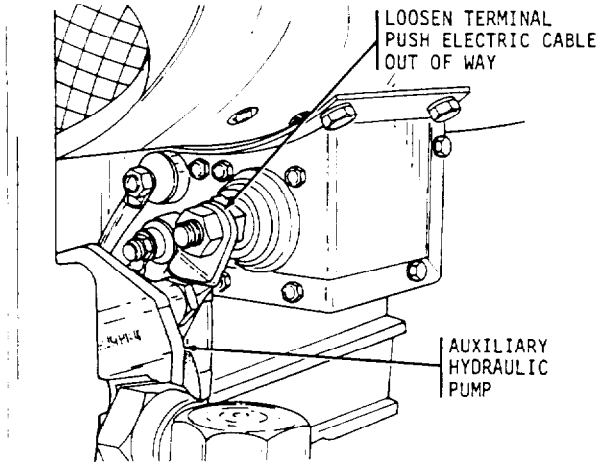
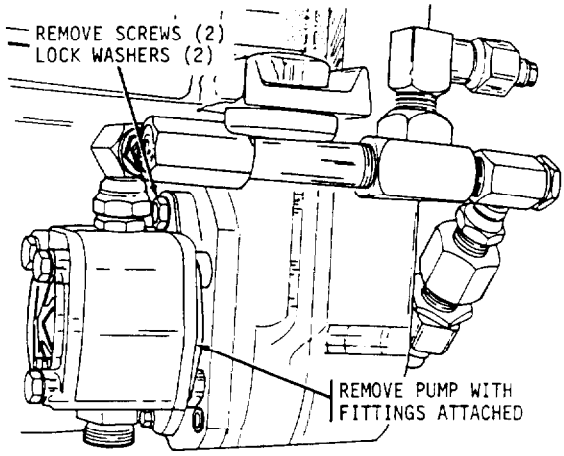


Figure 4-4. Auxiliary power unit wiring diagram.

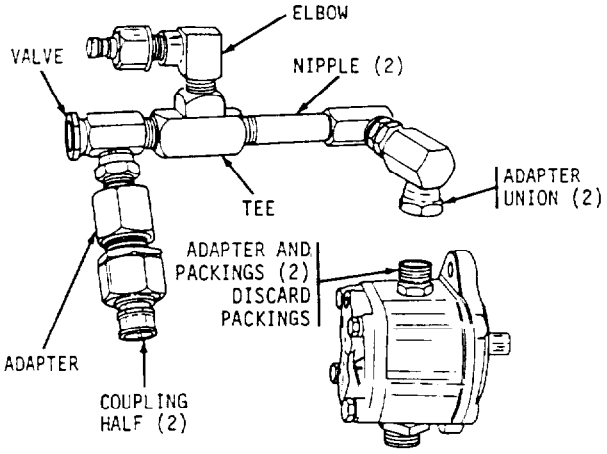
(2) *Procedure.* If the chain cover is to be removed, drain the oil from the chain case (TM 9-2350-256-20). Disassemble the APU as shown in figure 4-5. Refer to paragraph 3-48 for repair of the wiring harnesses. If the general condition of the individual cables, insulation and terminal connectors of a harness is such that repair becomes practically and economically inadvisable, replace the harness.



VIEW A. CLEARANCE FOR AUXILIARY HYDRAULIC PUMP.

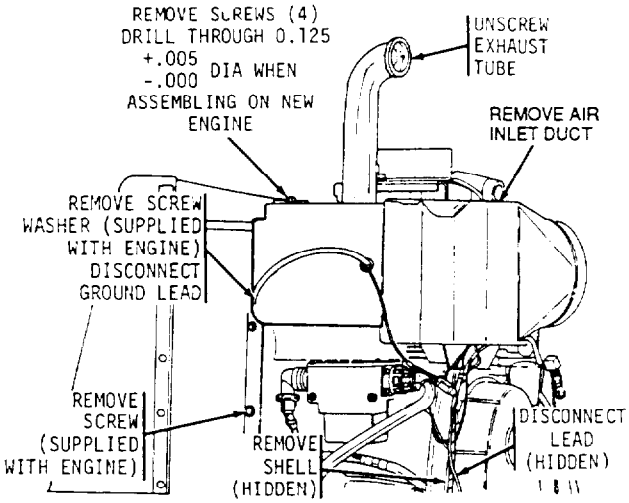


VIEW B. AUXILIARY HYDRAULIC PUMP AND FITTINGS.



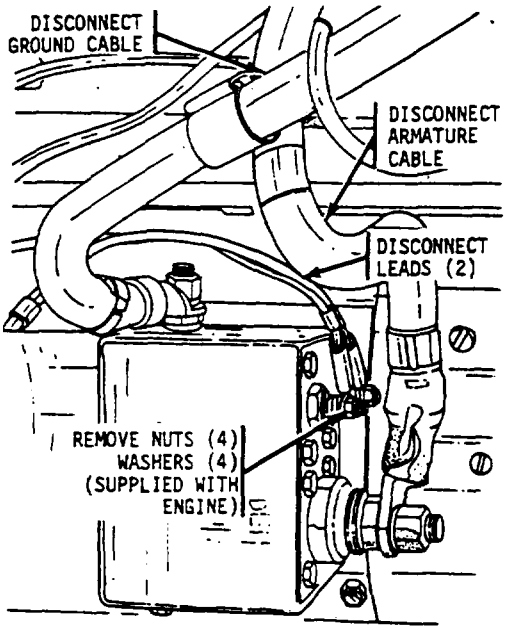
NOTE: USE NEW PACKINGS DURING INSTALLATION.

VIEW C. HYDRAULIC FITTINGS.

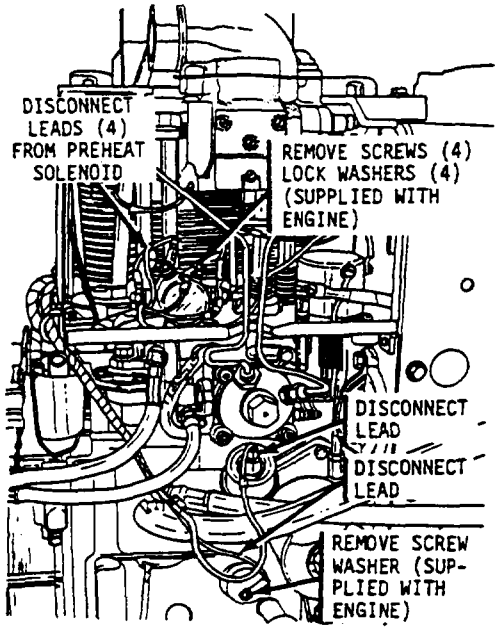


VIEW D. ENGINE COOLING AIR DUCTS.

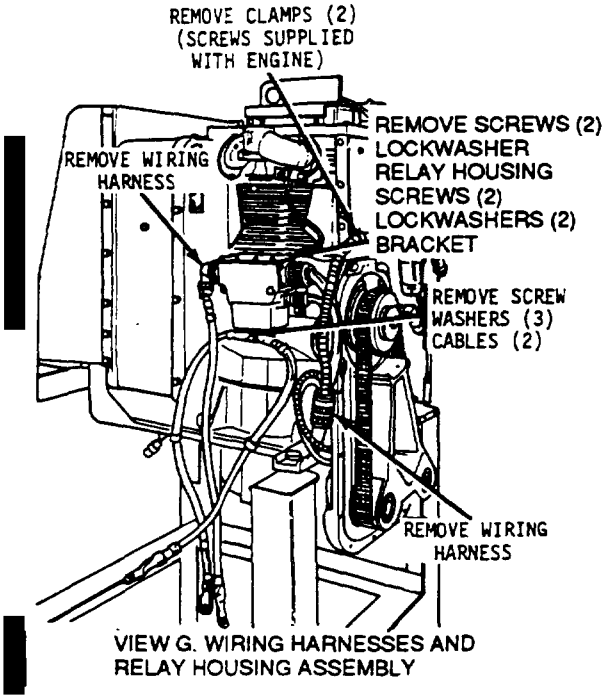
Figure 4-5. Auxiliary power unit-disassembly and assembly (Sheet 1 of 6).



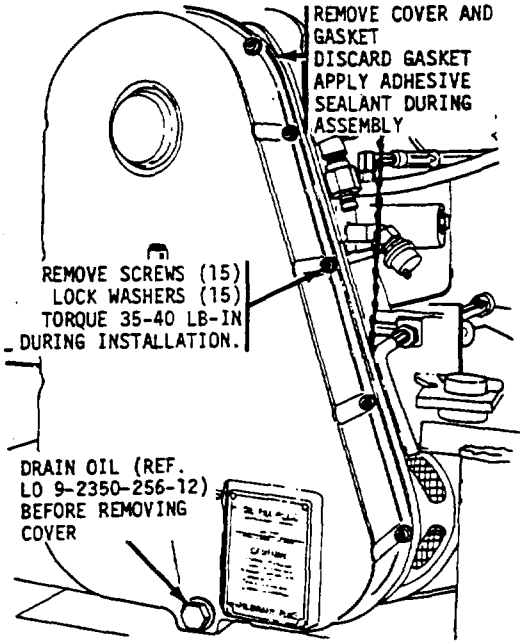
VIEW E. GENERATOR ELECTRICAL CONNECTIONS.



VIEW F. LEFT SIDE ELECTRICAL CONNECTIONS.

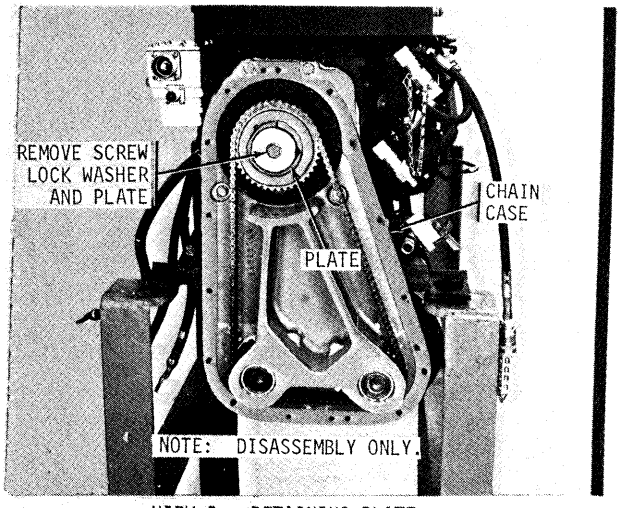


VIEW G. WIRING HARNESSES AND RELAY HOUSING ASSEMBLY

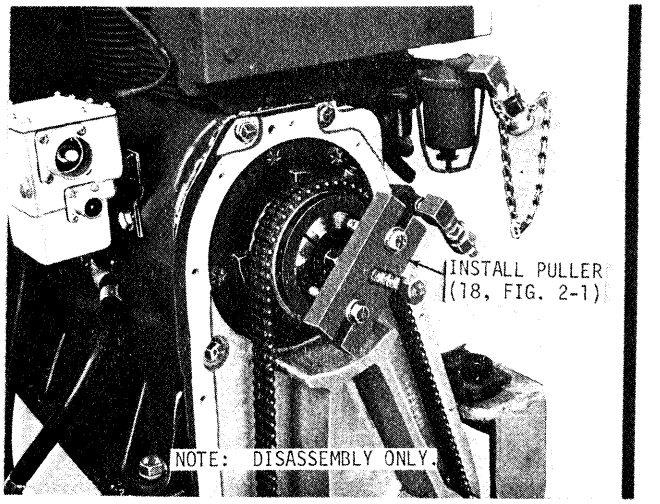


VIEW H. CHAIN CASE COVER.

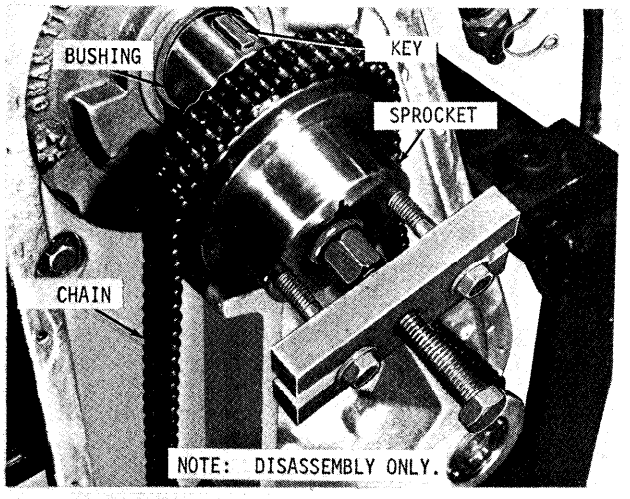
Figure 4-5. Auxiliary power unit-disassembly and assembly (Sheet 2 of 6).



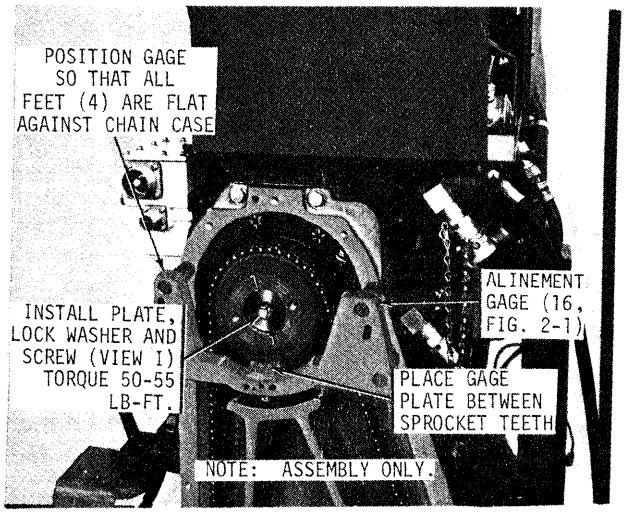
VIEW I. RETAINING PLATE.



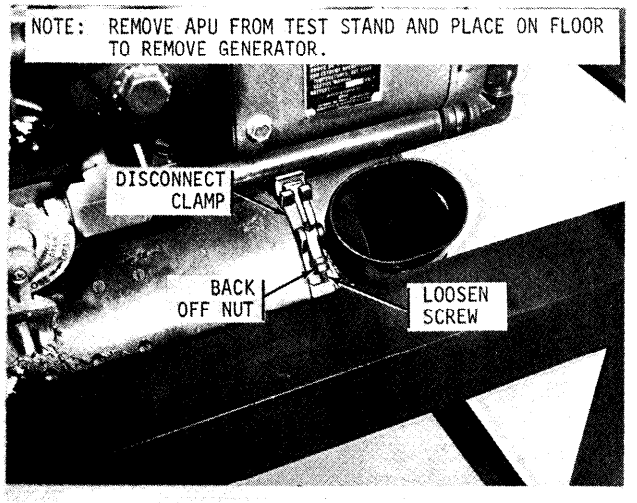
VIEW J. INSTALL PULLER.



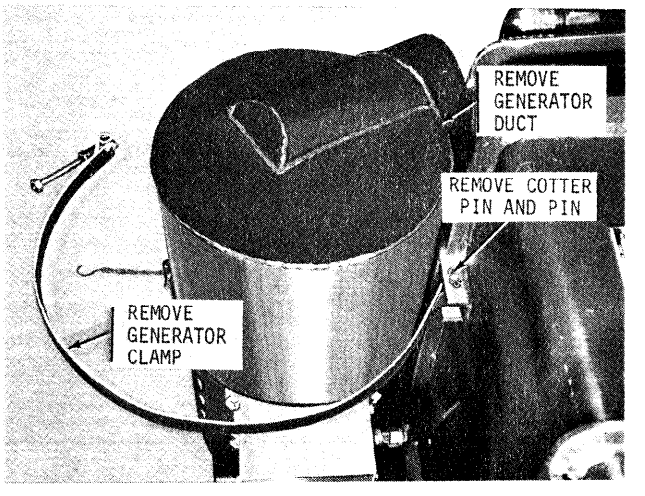
VIEW K. REMOVING SPROCKET AND CHAIN.



VIEW L. ALINING SPROCKET AND CHAIN.



VIEW M. GENERATOR CLAMP.



VIEW N. GENERATOR CLAMP AND DUCT.

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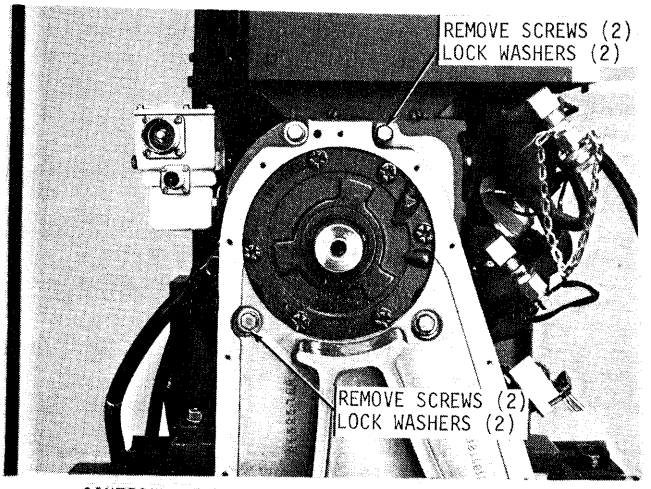
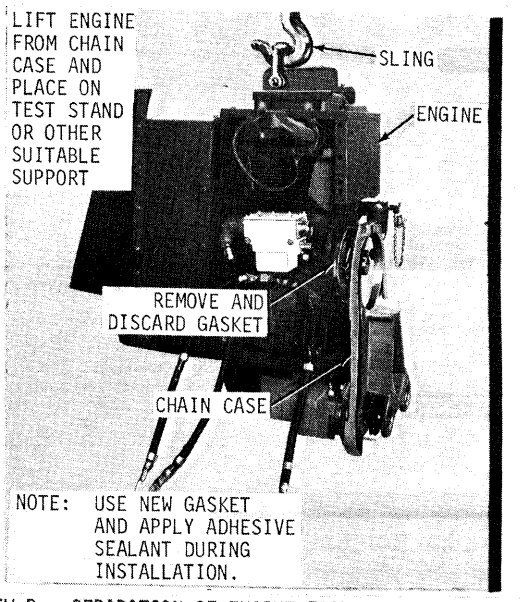
Figure 4-5. Auxiliary power unit–disassembly and assembly (Sheet 3 of 6).

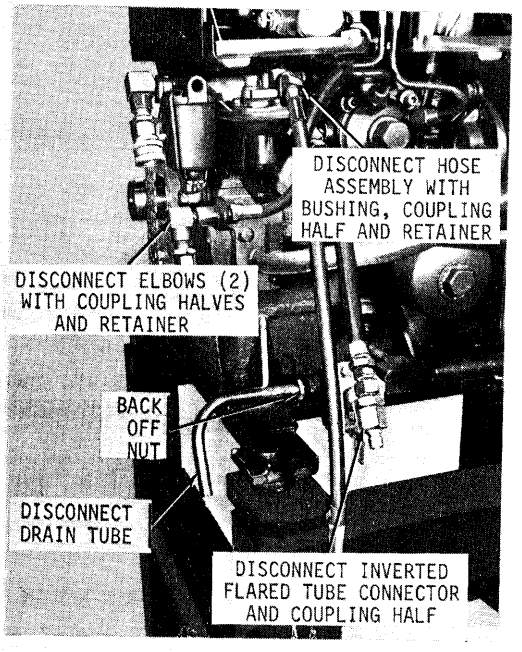


CAUTION: ATTACH SUITABLE SLING TO LIFTING EYE TO SUPPORT WEIGHT OF ENGINE WHILE REMOVING SCREWS.

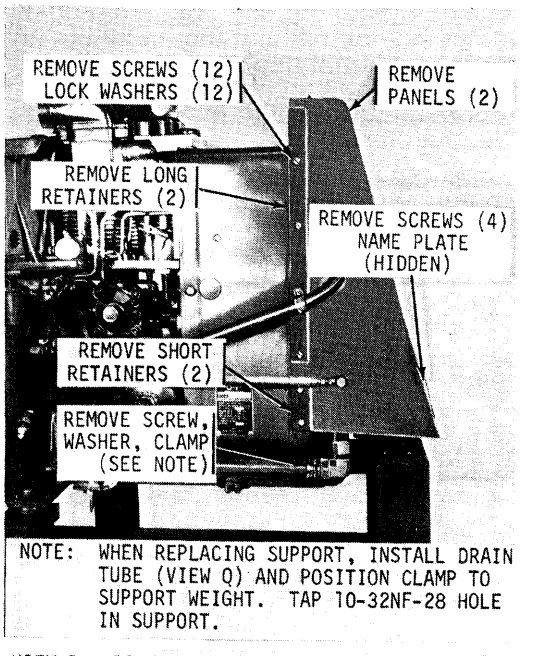
VIEW O. SEPARATION OF ENGINE FROM CHAIN CASE AND GENERATOR.



VIEW P. SEPARATION OF ENGINE FROM CHAIN CASE AND GENERATOR.



VIEW Q. FUEL LINE CONNECTIONS AND DRAIN TUBE.



VIEW R. PANELS AND CRANKCASE DRAIN CLAMP.

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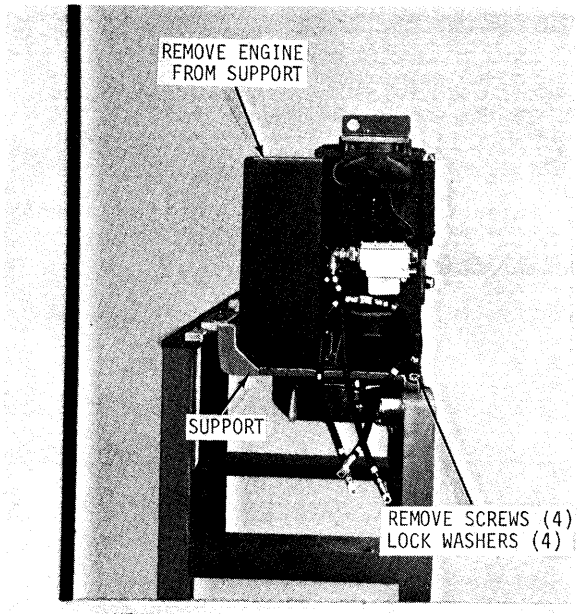
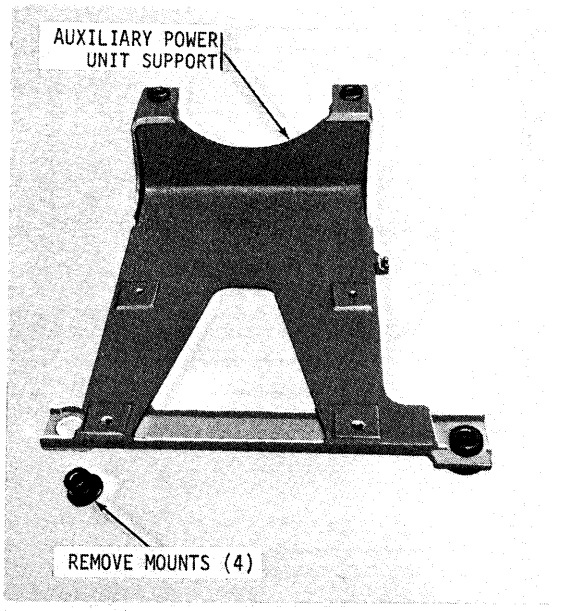
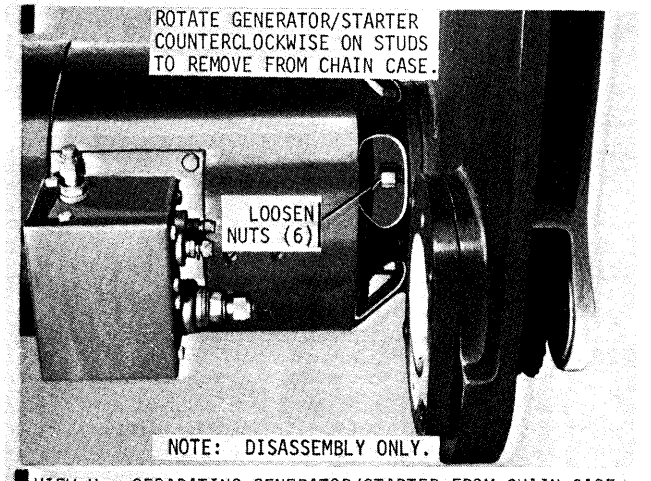
F'igure 4-5. Auxiliary power unit-disassembly and assembly (Sheet 4 of 6).



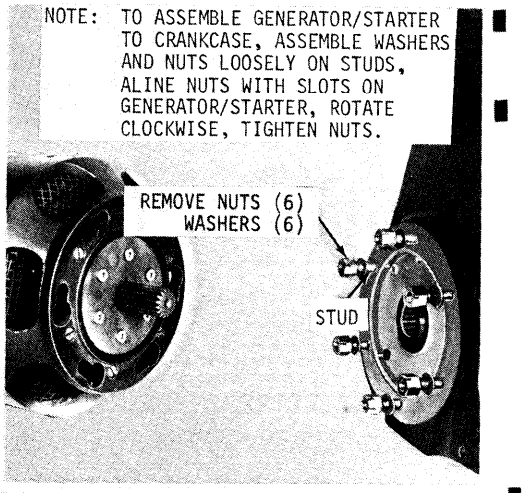
VIEW S. AUXILIARY ENGINE FROM SUPPORT.



VIEW T. APU SUPPORT AND MOUNTS.



VIEW U. SEPARATING GENERATOR/STARTER FROM CHAIN CASE.



VIEW V. NUTS, WASHERS AND ASSEMBLING GENERATOR/ STARTER TO CHAIN CASE.

NOTE: WHEN REPLACING THE GENERATOR/STARTER, OR ITS BRUSHES, SAND THE BRUSHES ACCORDING TO PROCEDURES IN PARAGRAPH 4-2d.1.

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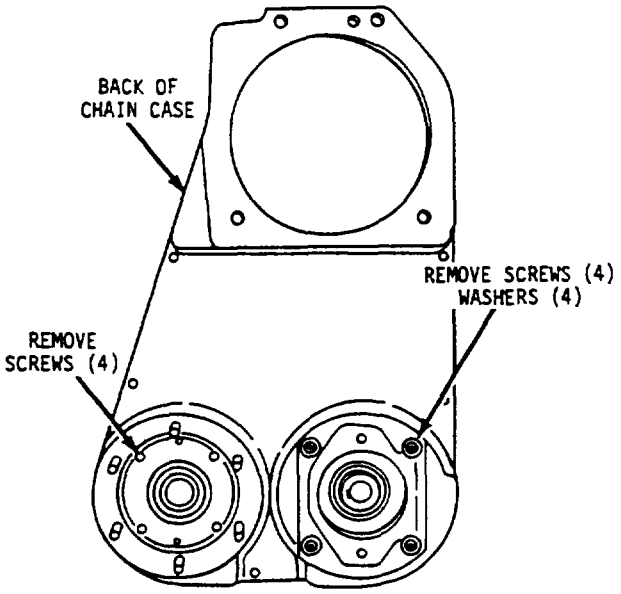
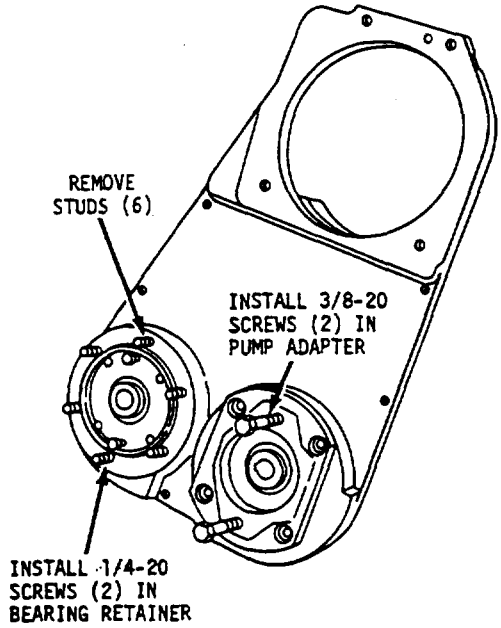
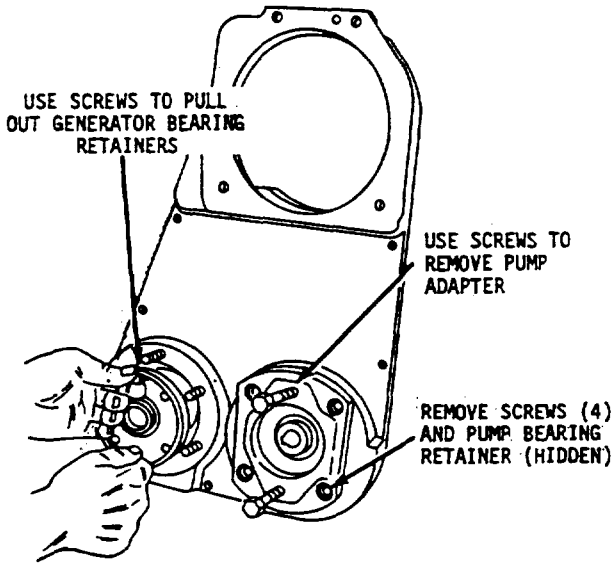
Figure 4-5. Auxiliary power unit–disassembly and assembly (Sheet 5 of 6).



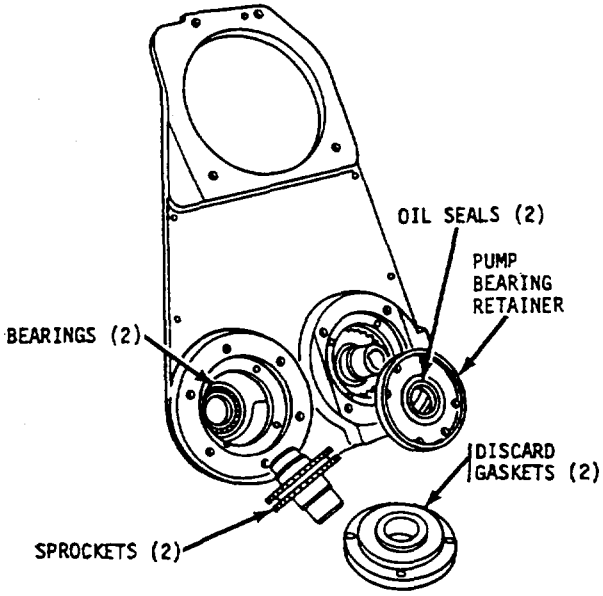
VIEW W. SCREWS AND LOCK WASHERS.



VIEW X. STUDS.



VIEW Y. BEARING RETAINERS AND PUMP ADAPTER.



NOTE: USE NEW GASKETS AND ADHESIVE SEALANT DURING INSTALLATION.

VIEW Z. GASKETS, OIL SEALS, SPROCKETS AND BEARINGS.

Figure 4-5. Auxiliary power unit-disassembly and assembly (Sheet 6 of 6).

c. Cleaning.

(1) Scrape cork gasket and silicone adhesive from all areas. Clean with a wire brush, then with drycleaning solvent or mineral spirits paint thinner. Dry with compressed air.

(2) Clean dirt and other foreign material from all metal parts with drycleaning solvent or mineral spirits paint thinner. Dry with compressed air.

(3) Remove dirt and other foreign material from electrical leads and connectors with a wire brush and clean water. Dry with compressed air.

d. Inspection and Repair.

(1) *Inspection.*

(a) Inspect support, mounts, cooling duct, chain case and chain cover for cracks, distortion and breakage.

(b) Inspect threaded parts for nicks, cross threading and other evidence of excessive wear.

(c) Inspect drive chain for cracks, breakage and other evidence of wear which could cause breakage.

(d) Inspect hose and hose assemblies for fraying, cracks, distortion and other evidence of excessive wear.

(e) Inspect sprockets for damaged teeth, cracks, distortion and other damage which would impair their use.

(f) Check continuity of electrical leads and inspect for cuts, damaged connectors and other evidence of excessive wear.

(g) Inspect panels, gaskets, and grommets on engine for cracks, tears, and hardening.

(h) Inspect hydraulic pump, generator and other parts for damage that would impair their use.

(2) *Repair.*

(a) Replace support, mounts, cooling duct, chain case and chain cover if not repairable by welding.

(b) Repair damaged threads with a thread chaser or replace threaded parts that are defective.

(c) Replace damaged lead wires and connectors (fig 3-20).

(d) Replace any other parts that are defective.

d.1. Generator/Starter Brush Sanding Procedure. To seat the brushes sufficiently, and eliminate hard-starting problems, when replacing the generator/starter, or its brushes, sand the brushes according to the following procedure.

(1) Remove generator/starter from the auxiliary power unit (View U, fig 4-5).

(2) Remove brush guard band from generator/starter.

(3) Remove screw to brush lead wire.

(4) Move aside brush retainer springs (View B, fig 4-5.2) sufficiently to clear brushes. A screwdriver or stiff piece of wire bent into a hook shape can be used to accomplish this.

(5) Remove both brushes in any one brush set, and insert a piece of sandpaper (about 2" wide and 180 grit) beneath empty brush holder (View C).

(6) Insert only one brush back into holder (View D), and while pressing down on top of the brush lightly, move it back and forth in the holder, and against the sandpaper until the entire face of the brush is sanded. This only requires about a dozen firm strokes of the brush against the sandpaper.

(7) Replace brush set back into the brush holder.

(8) Replace brush retainer springs on top of brush.

(9) Replace brush lead wire using its respective mounting screw.

(10) Repeat (3) through (9) above for all six brush sets in the generator/starter.

(11) Replace brush guard band.

(12) Replace generator/starter onto auxiliary power unit (View V, fig 4-5).

e. *Assembly.* Assemble the auxiliary power unit in reverse order of disassembly, applying sealing compound (NSN 8030-00-543-4384) to all pipe threads except swivel fittings. During assembly, apply silicone RTV Type I adhesive sealant (NSN 8040-00-225-4548) to gaskets, aline sprockets and tap or drill hole as required (fig 4 - 5).

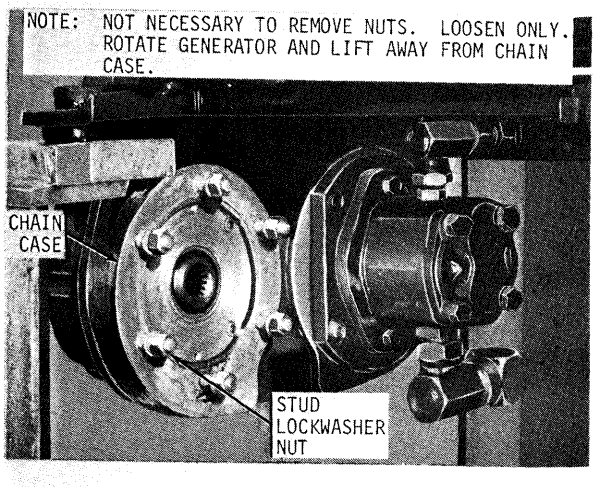
f. Tests and Adjustments.

(1) *General.* All testing and adjusting of the auxiliary power unit must be accomplished with the unit outside the vehicle. A test stand (fig. 4-2) is required. Calibration of the current limiter is to be done in the vehicle. Refer to TM 9-2350-256-20.

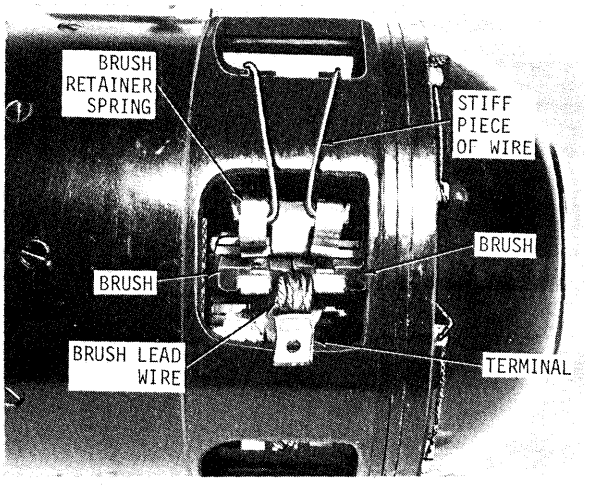
(2) Test outside vehicle.

(a) Make sure that all lines, cables, accessories and other components are properly installed, tightened and adjusted. Fill chain case and crankcase to the proper levels (TM 9-2350-256-10) if required.

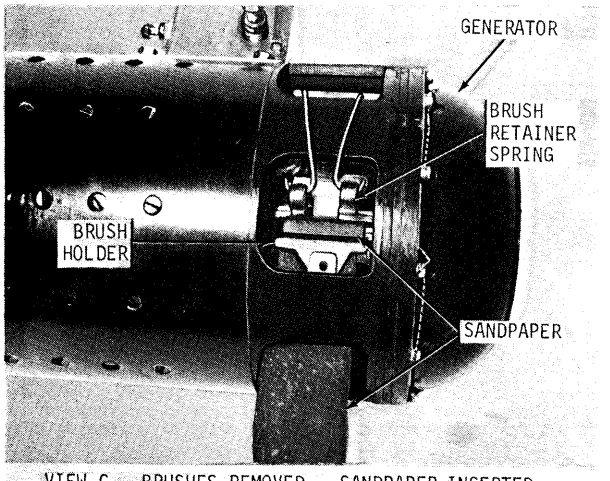
(b) Using a ground cable assemblies and seven hose assemblies provided for the test run outside the vehicle (table 2-1), fuel lines and hydraulic system as shown in figure 4-6.



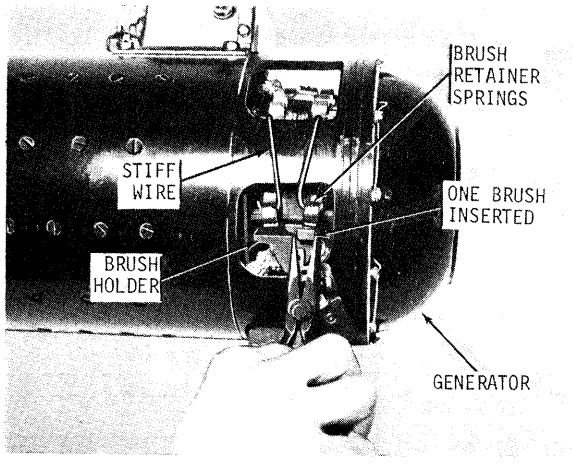
VIEW A. APU WITH GENERATOR/STARTER REMOVED.



VIEW B. BRUSH RETAINER SPRINGS AND BRUSHES.



VIEW C. BRUSHES REMOVED - SANDPAPER INSERTED.



VIEW D. INSERTING BRUSH FOR SANDING.

TA039300

Figure 4-5.2. Generator/starter brush sanding procedure.

1	To APU fuel transfer pump (11671580-1)	NSN 4720-00-617-6929
2	Fuel return (11671580-2)	NSN 4720-00-619-6929
3	From transfer pump to fuel filter (11671580-2)	NSN 4720-00-619-6929
4	From fuel filter to APU fuel injector pump (11671580-1)	NSN 4720-00-617-6929
5	Pump to pressure switch (11671580-4)	NSN 4720-00-619-9689
6	Pump to vehicle system (11671580-5)	NSN 4720-00-619-9681
7	From reservoirto hydraulic pump (11671580-3)	NSN 4720-00-619-9691
8	Wiring harness (11671581-4)	NSN 2590-00-614-7545
9	Wiring harness (11671581-3)	NSN 2590-00-614-7544
	Ground cable (8708290)	NSN 2590-00-521-6223

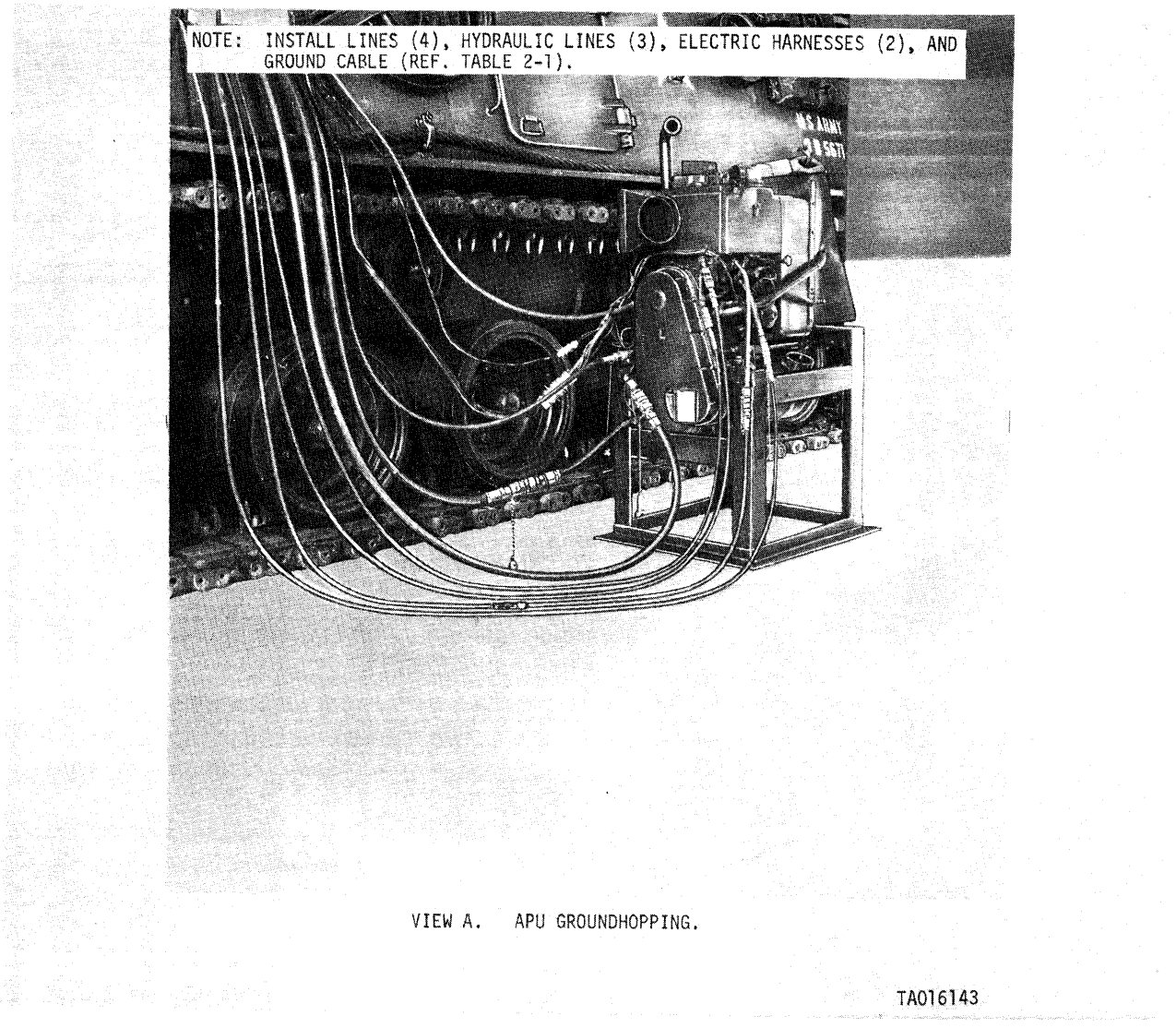


Figure 4-6. Auxiliary power unit test run outside vehicle (Sheet 1 of 2).

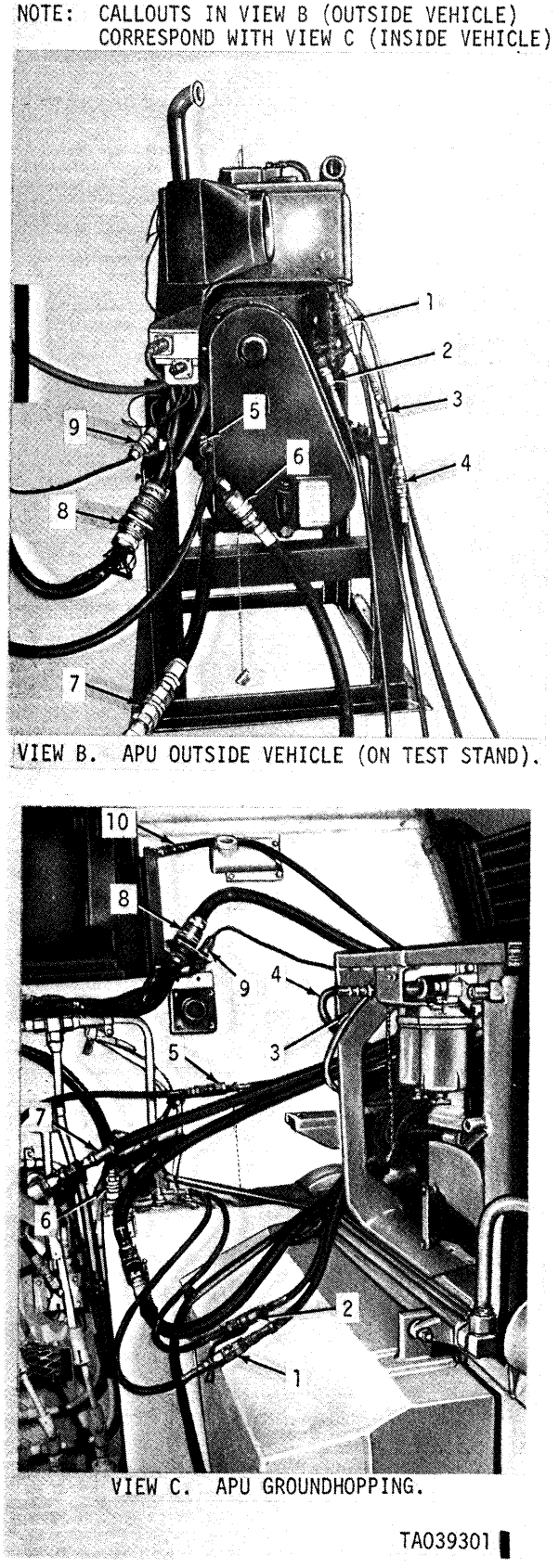


Figure 4-6. Auxiliary power unit test run outside vehicle (Sheet 2 of 2).

(c) Start the auxiliary engine and allow a three-minute warmup period with no load on the generator or pump. Then check the engine speed with a hand tachometer or stroboscope. Adjust to 2000 ± 100 rpm, if necessary, in the following manner.

1. Locate the governor speed adjustment screw on the front of the engine (3, fig. 4-1).

2. Loosen locknut and turn screw slowly until tachometer or stroboscope reads 2000 ± 100 rpm.

3. Carefully tighten locknut so that the tachometer or stroboscope reading does not change.

(d) Stop engine, check crankcase oil and fill to proper level (LO 9-2350-256-12) if required.

(e) Install a pressure gage in the gage port of the system selector valve on the hydraulic control panel (subplate) assembly (View A, fig. 2-29).

(f) Start the auxiliary engine, place the manual shutoff valve in NORMAL OPERATION position, place the system selector valve in AUXILIARY position. Check the pressure gage to confirm a hydraulic load on the auxiliary pump of 2000 ± 50 psi. Adjust the system selector valve relief valve with the adjusting screw (View A, fig. 2-29), if necessary, to obtain a pressure reading of 2000 ± 50 psi.

(g) Operate the auxiliary engine for 10 minutes with a 2000 ± 50 psi load on the auxiliary hydraulic pump and no load on the generator.

(h) Check all points for leakage (TM 9-2305-256-20) and correct any other defects. Return the system selector valve position to the MAIN position and shut off engine.

(i) Connect a multimeter between the generator armature terminal and ground (set meter on DC voltage mode—50 volt range).

(j) DELTED

(k) DELETED

(l) Turn on the generator switch momentarily and note the generator output voltage on the multimeter. Voltage should increase slightly when the generator switch is turned on. If not, remove the cap from the switching relay box assembly in the vehicle. Loosen the rheostat locking nut and turn the adjusting screw slowly clockwise until the voltage on the multimeter increases slightly. If voltage does not increase, troubleshoot the system. I

NOTE

Current limiter rheostat must be calibrated when the auxiliary power unit is reinstalled in the vehicle.

(m) Turn off generator.

(n) Turn off engine.

(3) *Test inside vehicle.*

(a) Make sure that all lines, cables, accessories and other components are properly installed, tightened and adjusted. Fill chain case and crankcase to the proper levels (LO 9-2350-256-12) if required.

(b) Start the auxiliary engine and allow a three-minute warmup period with no load on the generator or pump. Then check the engine speed with a hand tachometer or stroboscope. Adjust to 2000 ± 100 rpm, if necessary, in the following manner.

1 Locate the governor speed adjustment screw on the front of theengine (3, fig. 4-1).

2 Loosen locknut and turn screw slowly until tachometer or stroboscope reads 2000 ± 100 rpm.

3 Carefully tighten locknut so that the tachometer or stroboscope reading does not change.

(c) Stop engine, check crankcase oil and fill to proper level (TM 9-2350-256-10) if required.

(d) Install a pressure gage in the gage port of the system selector valve relief valve, place the manual shutoff valve in NORMAL OPERATION position and place the system selector valve in AUXILIARY position.

(e) Check the pressure gage to confirm a hydraulic load on the auxiliary pump of 2000 ± 50 psi. If necessary, adjust the system selector valve relief valve with the adjusting screw (view A, fig. 2-29) to obtain a pressure reading of 2000 ± 50 psi. Check engine rpm for 2000 ± 100 rpm. If engine rpm is below 2000 ± 100, troubleshoot.

(f) Continue to operate the auxiliary engine for 10 minutes with a 2000 ± 50 psi load on the auxiliary hydraulic pump and no load on the generator.

(g) Check all points for leakage (TM 9-2350-256-20) and correct any other defects. Return system selector valve to MAIN position and shut off engine.

(h) Calibrate the current limiter as per paragraph 3-47. With the load applied as stated in step (i) of paragraph 3-47f(3), verify that the engine speed remains within 2000 ± 100 rpm. If not, readjust the governor speed control. If the engine cannot maintain 2000 ± 100 rpm under generator load, troubleshoot.

Section II. Deleted

Section III. Deleted

CHAPTER 5

FINAL INSPECTION

5-1. General

A final inspection will be performed on all items repaired or replaced to determine whether all necessary work has been accomplished and to determine whether repairs have been performed satisfactorily. This inspection involves visual checks, checks with test instruments, operational checks, safety checks, or any combination thereof necessary to insure that the equipment has been restored to a completely serviceable condition *for* return to the user or to stock.

5-2. Specific Procedures

Specific checks to be performed on items repaired or replaced are contained in the component repair or installation instructions.

APPENDIX A

REFERENCES

A-l. Publication Indexes

The following indexes should be consulted frequently for latest changes or revisions of references listed in this appendix and for new publications relating to the material covered in this technical manual.

Index of administrative Publications	DA Pam 310-1
Index of blank forms	DA Pam 310-2
Index of DOCTRINAL, TRAINING, and organizational publications	DA Pam 310-3
Index of technical manuals, technical bulletins, supply manuals (types 7, 6 and 9), supply bulletins and lubrication orders	DA Pam 310-4
Index of supply catalogs and supply manuals (excluding types 7, 8 and 9)	DA Pam 310-6
US Army equipment index of Modification work orders	DA Pam 310-7

A-2. Publications Referenced

The following publications are referenced within this manual.

Accident reporting and records	AR 385-40
Deleted.	
Elimination of combustibles from interiors of metal or plastic gasoline or diesel fuel tanks	TB 750-1043
Solder and soldering	TB SIG-222
Rigging	TM 5-725
Welding: theory and application	TM 9-237
Operator's manual for recovery vehicle, full tracked: medium, M88A1 (2350-00. 122-6826)	TM 9-2350-256-10
Organizational maintenance manual for recovery vehicle, full tracked: medium, M88A1 (2350-00-122-6826)	TM 9-2350-256-20
Direct support and general support maintenance manual for recovery vehicle, full tracked: medium, M88A1 (2350-00-122-6826) winch, power takeoff and hoist system	TM 9-2350-256-34-2
Direct and general support and depot maintenance for transmission, cross-drive assembly (allison model XT-1410-4)	TM 9-2520-215-34
DS and GS maintenance manual for engine with container: turbosupercharged, diesel, fuel injection, 90-degree "V" type, air-cooled 12-cylinder, assembly; models AVDS-1790-2C; 2815-00-410-1203 and AVDS-1790-2D, 2815-00410-1204	TM 9-2815-220-34
Direct support and general support maintenance manual (including repair parts and special tools list) engine, diesel, industrial type, model DJBMA (2815-00-6158740)	TM 9-2815-221-34&P
Painting instructions for field use	TM 9-2851
Operator and organizational maintenance manual for lead-acid storage batteries	TM 9-6140-200-14
The Army maintenance management system (TAMMS)	TM 38-750

APPENDIX B

FABRICATED TOOLS AND EQUIPMENT

Section I. INTRODUCTION

B-1. scope

This Appendix includes instructions for fabricating items locally. All materials needed to fabricate items are listed in the bill of material. Illustrations are provided following the bill of material.

B-2. Explanation of Columns

a Column 1-Nomenclature. This column gives the name of the item to be fabricated.

b. Column 2-Reference or part no. This column gives the reference or part number assigned to the item to be fabricated.

c. Column 3- Material Required. This column provides a list of the materials needed to fabricate the irem

Section II. FABRICATED TOOLS AND EQUIPMENT LIST

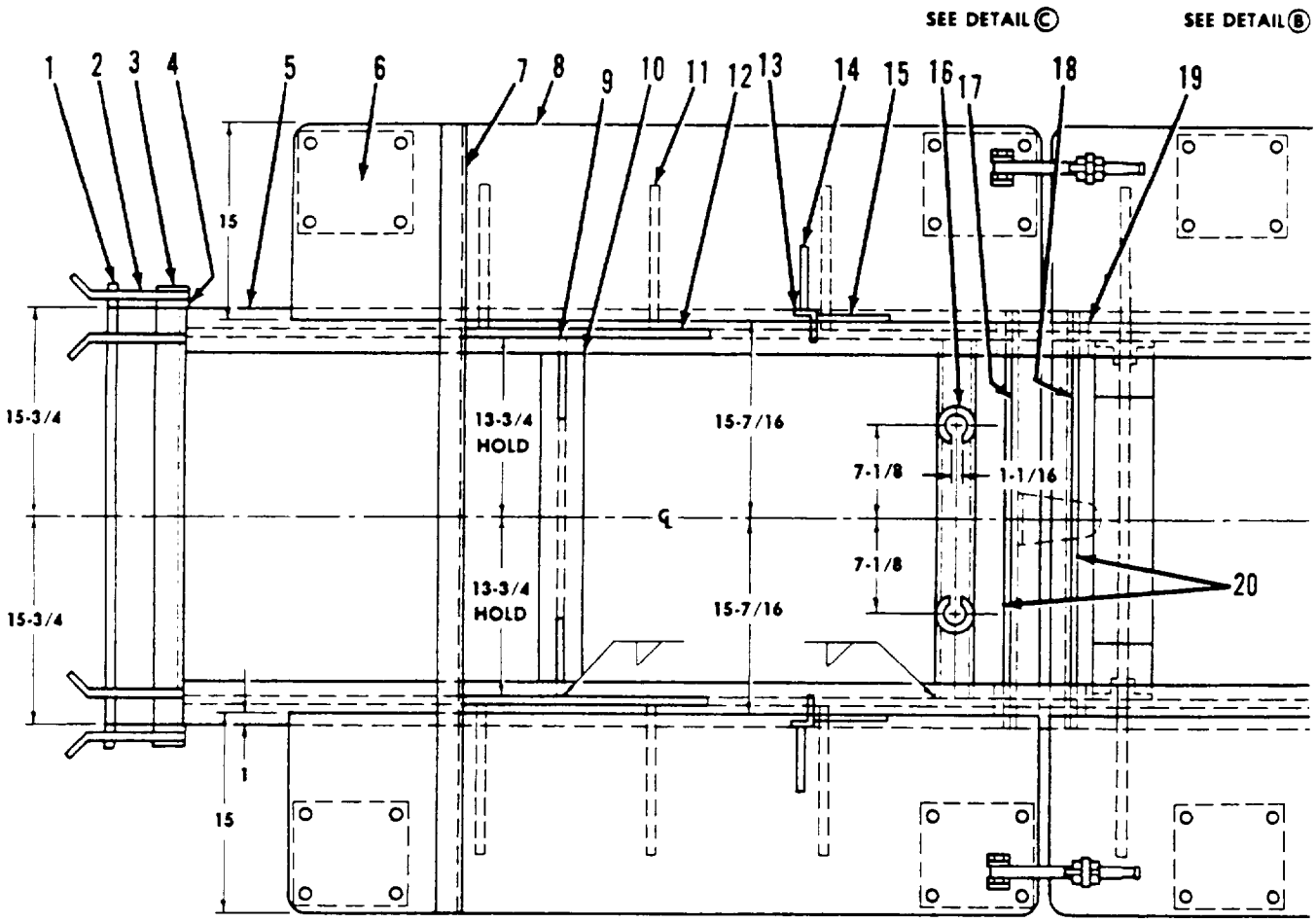
Nomenclature	Reference or part no	Material Required
Engine and transmission cart (fabricate in accordance with Table B-1).	Table B-1	See bill of material

Table B-1 Bill of Material

Ref. no.	Qty	Description	Material
1	2	Rod 0.75 dia x 34 in. lg	cr steel
2	8	Bracket 4 x 0.25 x 9 in lg	hr steel
3	2	Plate 1.50 x 0.37 x 2.25 in. lg	hr steel
4	1	Channel C 6 x 10.5 lb x 31.50 in.lg	steel
5	2	Beam S 6 x 12.50 lb x 62 in. lg	steel
6	8	Caster, dual. 360° swivel	
7	1	Channel C 6 x 10. 50 lb x 59. 50 in. lg	steel
8	2	Plate 15 x 0.75 x 56 in. lg	hr steel
9	2	Gussett 6 x 0.62 x 6 in. lg	hr steel
10	1	Beam S 6 x 12.50 lb x 28 in. lg	steel
11	12	Gusset 5.50 x 0.62 x 11 in. lg	hr steel
12	2	Plate, cradle 12.75 x 0.62 x 18 in. lg	hr steel
13	2	Guide, angle 2 x 2 0. 25 x 8 in. lg	steel
14	2	Gusset 5.25 x 0.67 x 5.25 in lg	hr steel
15	2	Gusset 2.50 x 0.62 x 5.50 in.lg	hr steel
16	2	Post. rest 2.75 od x 0.75 id x 1.62 in lg. mech tbg	steel
17	1	Channel C 6 x 10.50 lb x 31.50 in. 1g (See Detail C)	steel
18	1	Channel C 6 x 10.50 lb x 31.50 in lg (See Detail C)	stee1
19	2	Plate locator 2 x 0 75 x 7.50 in lg (See Detail B).	(.50C-Sil) steel
20	2	Plate, reinf 6 x 0.50 x 31.50 in. lg (See Detail C)	hr steel
21	1	Channel. boxed 4 x 28 in. lg.	steel
22	1	Locator 3.50 dia x 6 in. lg (See Detail A)	AISI-4140 steel
23	2	Plate 15 x 0.75 x 27 in. lg	hr steel
24	1	Beam S 6 x 12.50 lb x 28 in. lg	steel
25	1	Pad 2.25 x 3 x 16 in. lg	steel
26	2	Beam S 6 x 12.50 lb x 71.37 in. lg	steel
27	8	Clip, angle 2 x 2 x 0.25 x 4.50 in. lg	steel

Table B-1. Bill of Material-Continued

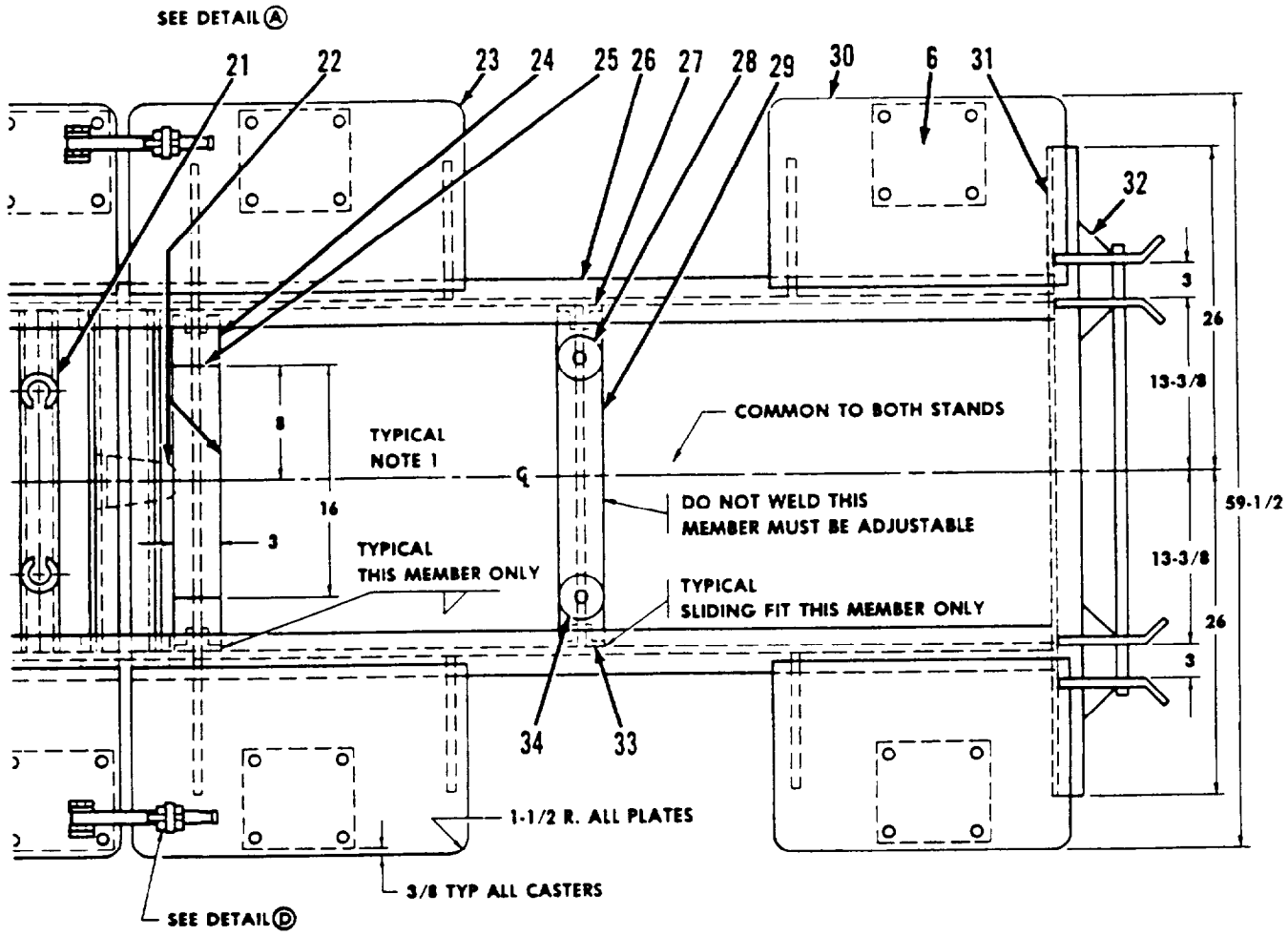
Ref no.	Qty.	Description	Material
28	1	Post, rest 3 od x 0.62 id x 4.75 in. lg. mech tbg	steel
29	1	Beam S 6 x 12.50 lb x 28 in. lg	steel
30	2	Plate 15 x 0.75 x 23 in. lg	hr steel
31	1	Channel C 6 x 10.50 lb x 52 in. lg	steel
32	6	Gusset 3 x 0.25 x 3 in. lg	hr steel
33	2	Plate, guide 3 x 0.75 x 3.50 in. lg	hr steel
34	1	Post, rest 3 od x 1 id x 4.75 in. lg. mech tbg	steel
35	2	Pm 1/2 dia x 1 75 in. lg	hr steel
36	2	Rod end 1 dia x 0.75 in lg	cr steel
37	2	Post 2 x 0.50 x 3 in. lg (See Detail D)	hr steel
38	2	Rod, adj 0.75 dia x 10.50 in. lg. 6.25-10 UNC thd (See Detail D)	cr steel
39	4	Nut, hex slotted 0.75-10 UNC	steel
40	2	Pin 0.50 dia x 7 in lg (See Detail E)	hr steel
41	2	Chain, safety 12 in lg. Spec. RR-C-271. Type II. CL6	steel
42	2	Stand, fulcrum 1.50 x 0.37 x 16 m. lg (See Detail D)	hr steel



NOTE

1. C_L CASTERS IS C_L SWIVEL RADIUS (9-1/2 R).
2. DIMENSION CHECK MUST BE MADE BEFORE FINAL WELDING IS DONE.
3. CASTERS MUST SWIVEL 360° PIN FRONT ONLY.
4. ADJUSTABLE ACCORDING TO ENGINE CASE HOLES.
5. PLACE PINS IN HOLES WHEN COUPLED.
6. DO NOT SCALE DRAWING.
7. ALL DIMENSIONS SHOWN ARE IN INCHES.

Figure B-1. Engine and transmission cart - M88A1 (Sheet 1 of 6).



NOTE

ITEM 25 MUST ALINE WITH ENGINE CASE HOLES.

Figure B-1 Engine and transmission cart- M88A1 (Sheet 2 of 6)

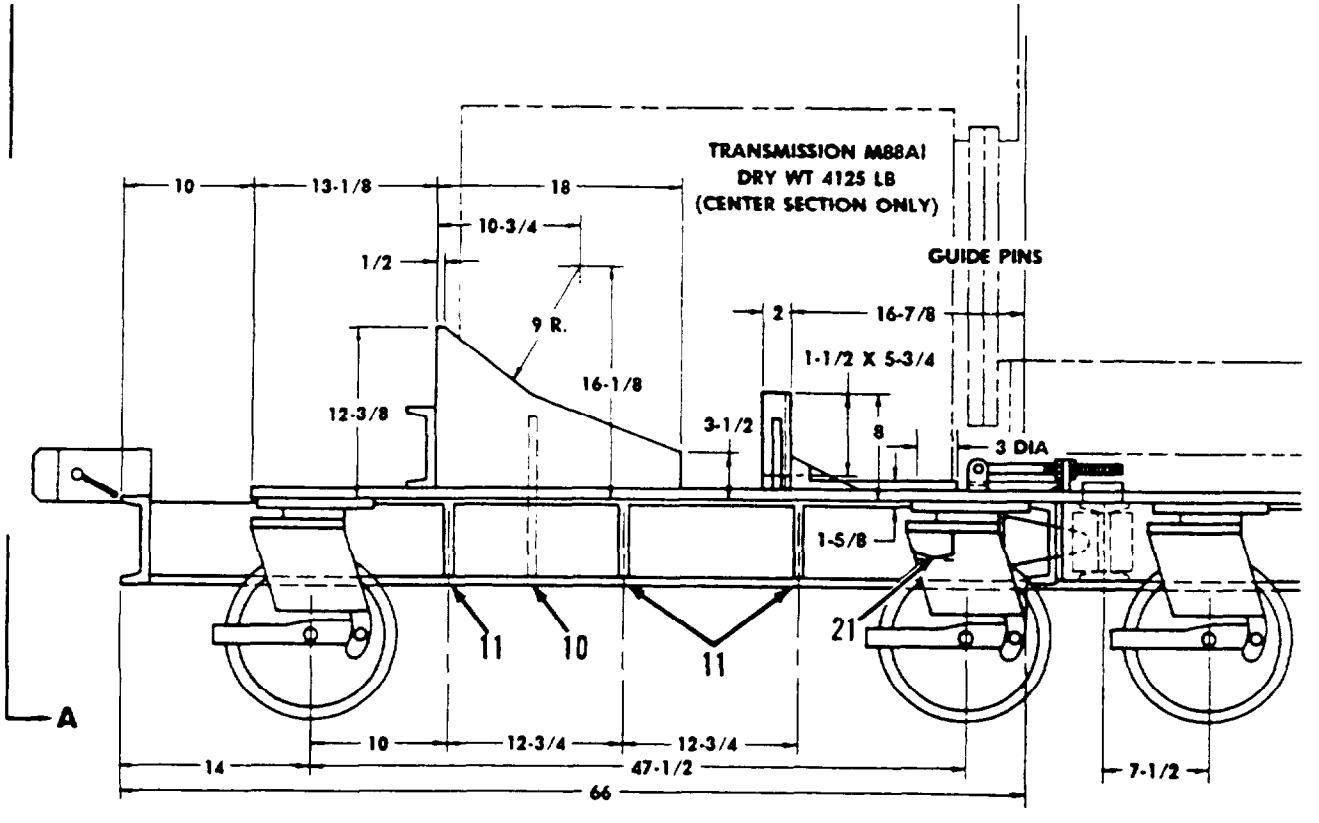


Figure B-1. Engine and transmission cart - M88A1 (Sheet 3 of 6).

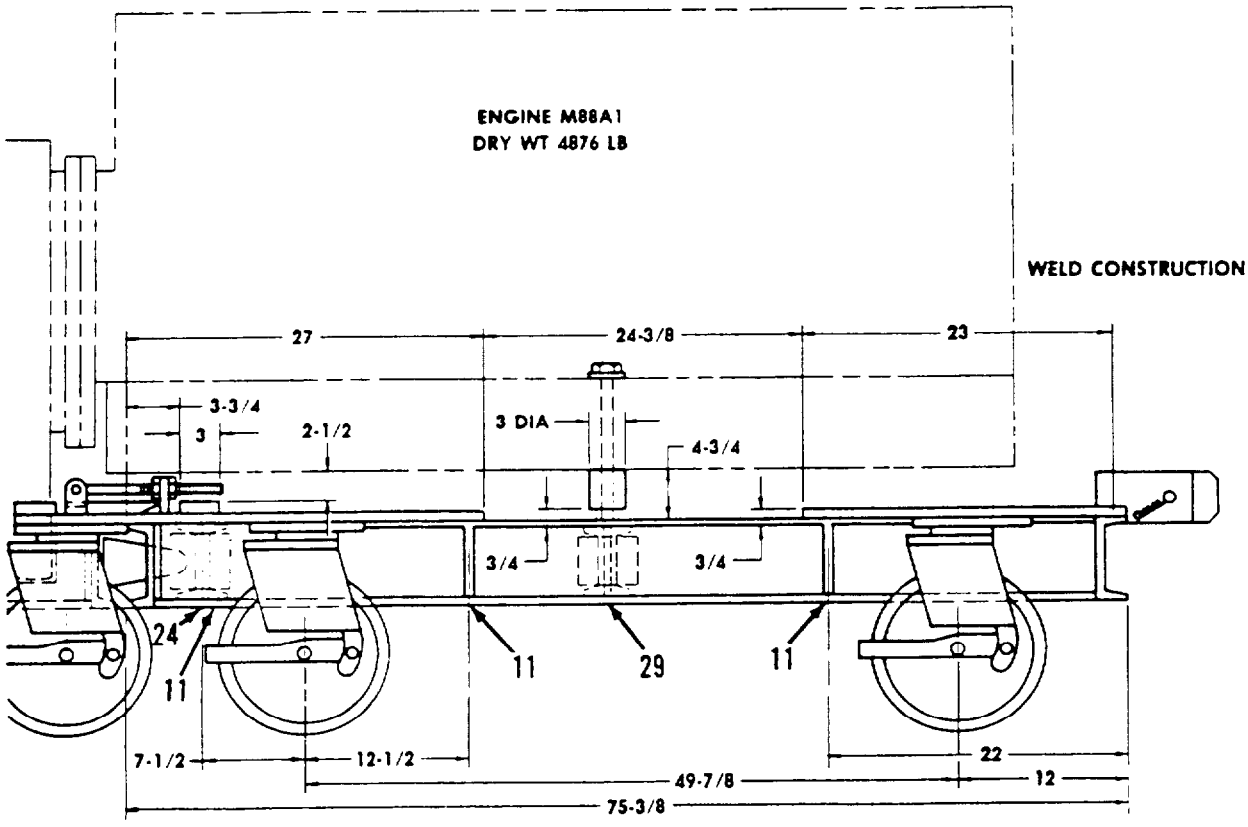


Figure B-1. Engine and transmission cart - M88A1 (Sheet 4 of 6).

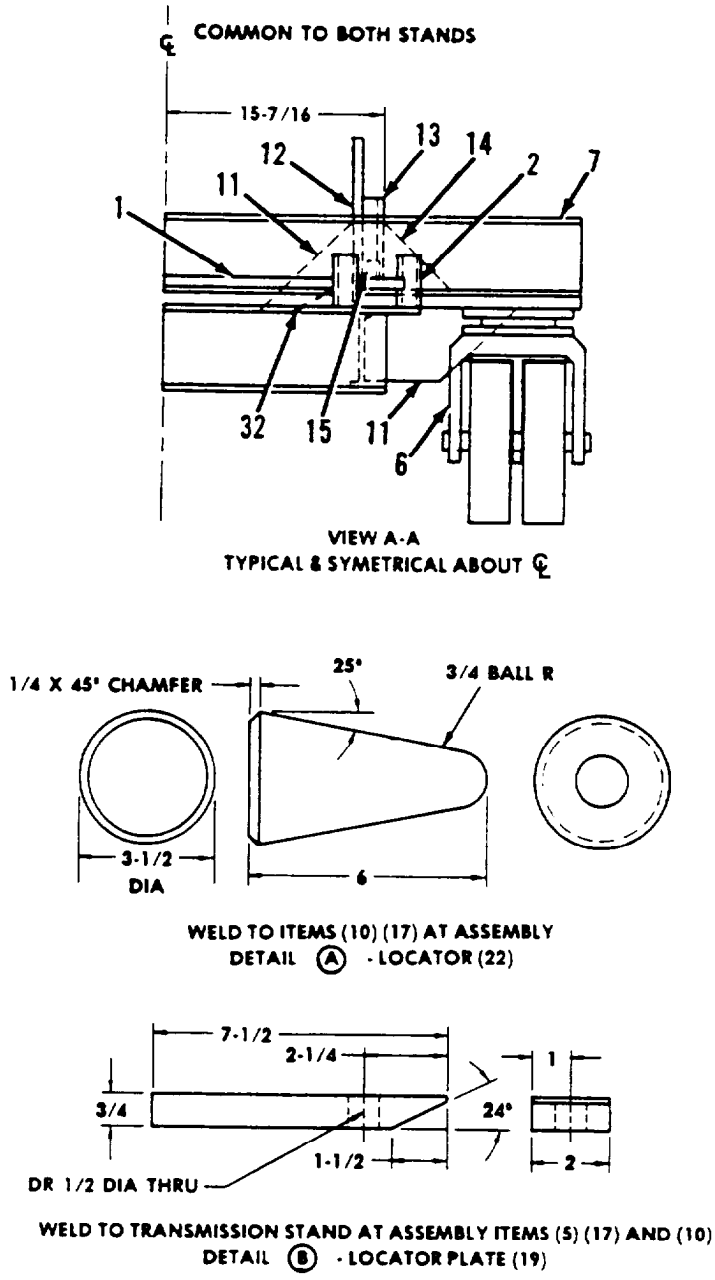
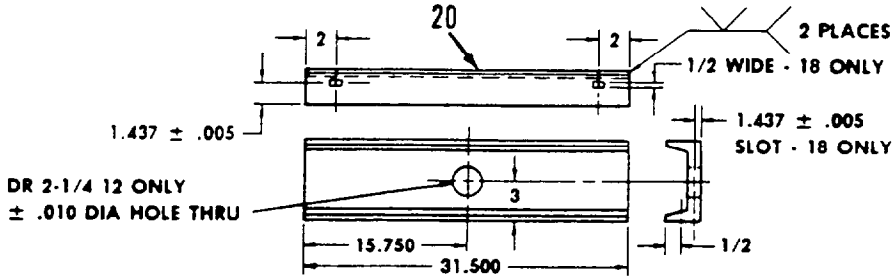
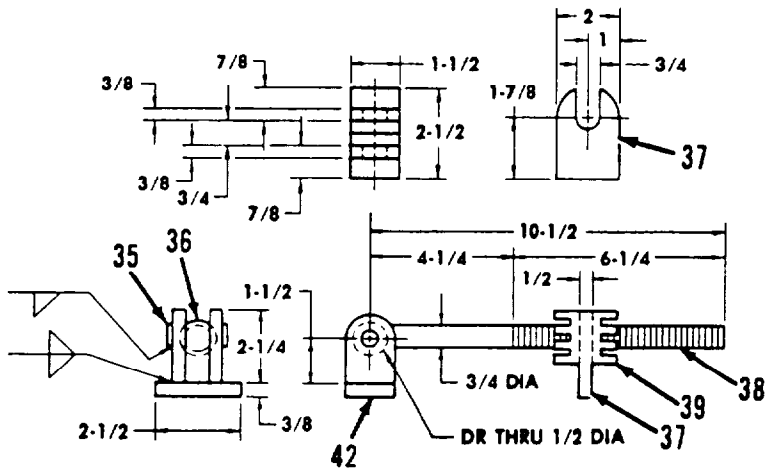


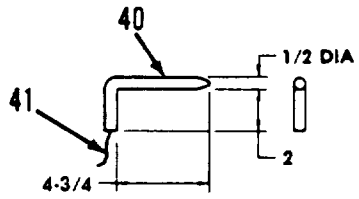
Figure B-1. Engine and transmission cart - M88A1 (Sheet 5 of 6).



18 CHANNEL - WELD ON PLATE 20 - HOLES AS SHOWN
17 CHANNEL - WELD ON PLATE 20 - OMIT ALL HOLES
DETAIL Ⓒ - ITEMS (17) (18) AND (20)



WELD ROD END (36) TO ROD (38)
DETAIL Ⓓ - LOCKING DEVICE



DETAIL Ⓔ - PIN

Figure B-1. Engine and transmission cart- M88A1 (Sheet 6 of 6).

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General United States Army
Chief of Staff

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INDEX — Continued

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TM 9-2350-256-34-1	28 January 1977	Recovery Vehicle, Full Tracked, Medium M88A1

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1-8	1-5			Line 1. NSN 5330-00-520-8403 should be changed to 4730-00-520-8403.
1-11		1-3		Item 6. "Retainer" should be changed to "Packing."
2-7		2-8		Item 3. Should be reversed with item 7.

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TEAR ALONG PERFORATED LINE

THE METRIC SYSTEM AND EQUIVALENTS

UNCLEAR MEASURE

1 Centimeter = 10 Millimeter = 0.01 Meters = 0.3837 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 Shorl Tons

UQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 700 Sq. Millimeters = O 155 Sq Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.3$6 Sq. Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu, Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,0002000 Cu. Centimeters = 35.31 Cu. Feet

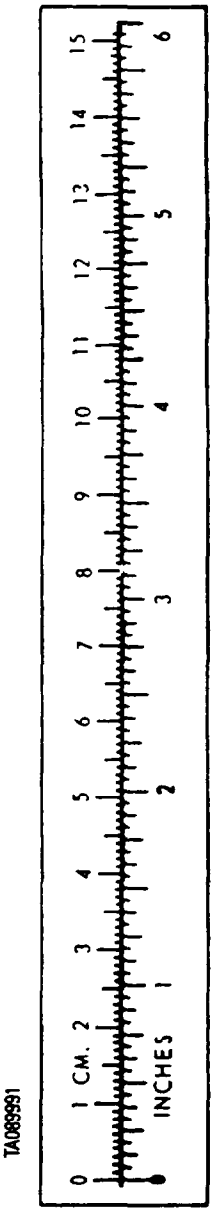
TEMPERATURE

5/9(°F -32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2" Calsius
32° Fahrenheit is equivalent to 0° Celsius
9/5(°C + 321 = °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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