TM 5-5420-204-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

# TECHNICAL MANUAL

# OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL FOR TRANSPORTER, MOBILE FLOATING ASSAULT BRIDGE/FERRY

(FMC CORPORATION, MODEL BF-FMC-1)

FSN 5420-877-8679

COMPONENT OF INTERIOR BAY UNIT

FSN 5420-010-5191

COMPONENT OF END BAY UNIT

FSN 5420-010-5192

HEADQUARTERS, DEPARTMENT OF THE ARMY

OCTOBER 1973

## WARNING
## DANGEROUS CHEMICALS

**are used in this equipment.**
**SERIOUS INJURY OR DEATH**

**may result if personnel fail to observe these safety precautions.**

**Exercise care when servicing batteries, to prevent electrolyte from splashing on skin or clothing. Wash contaminated skin areas with clear water and change clothing to avoid serious burns.**

## WARNING
## FIRE OR EXPLOSION HAZARD
## SERIOUS INJURY OR DEATH

**may result if personnel fail to observe these safety precautions.**
**Before connecting cables to batteries be sure all electrical switches are in OFF position.**
**Damage to wiring, lamps, and voltage regulator can be caused by flash current through electrical system.**
**Do not fill fuel tank while engine is running.**
**Provide metallic contact between the fuel container and fuel tank to prevent a static spark from igniting fuel.**
**Wipe or flush any spillage.**
**Volatile materials will not be brought aboard; electrical circuits will not be energized; fuel tanks will not be topped off; and engines will not be started before $CO_2$ fire fighting equipment is available and operative.**
**Observe NO SMOKING rules when refueling.**
**Do not work on live circuits. Tag circuit and warn other personnel not to energize the circuit.**
**Never use a blow torch or other similar means for heating fuel or oil lines.**
**Do not smoke or use an open flame in the vicinity when servicing batteries as hydrogen gas, an explosive is generated.**
**Use only distilled water to maintain battery electrolyte level.**

## WARNING
## ASPHYXIATION DANGER
## SERIOUS INJURY OR DEATH

**may result if personnel fail to observe these safety precautions.**
**Never operate the vehicle or personnel heater in an inclosed area.**
**Carbon monoxide is a deadly gas in the exhaust fumes of fuel burning heaters and internal combustion engines.**

## WARNING
## GASES OR AIR UNDER PRESSURE

**are used in the operation of this equipment.**

## SERIOUS INJURY OR DEATH

**may result if personnel fail to observe these safety precautions.**
**The shock absorber portion of the suspension cylinder is charged with nitrogen.**
**Be sure that all pressure is released before removing charging valve from the piston rod.**

TECHNICAL MANUAL
No. 5-5420-204-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., *13 October 1973*

# OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

# TRANSPORTER, MOBILE FLOATING

# ASSAULT BRIDGE / FERRY

# (FMC CORPORATION, MODEL BF-FMC-1)

## FSN 5420-877-8679

## COMPONENT OF INTERIOR BAY UNIT

## FSN 5420-010-5191

## COMPONENT OF END BAY UNIT

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*This manual supersedes TM-5-5420-204-12; 13 December 1967 including all changes.

# LIST OF ILLUSTRATIONS

# LIST OF TABLES

# CHAPTER 1

# INTRODUCTION

## Section I. GENERAL

### 1-1. Scope

These instructions are published for the use of personnel to whom the Transporter is issued. They provide information on the operation and organizational maintenance of the equipment. Also included are descriptions of main units and their function in relationship to other components. Numbers in parentheses following nomenclature callouts on illustrations indicate quantity, while numbers preceding callouts indicate preferred maintenance sequence.

### 1-2. Maintenance Forms and Records

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

### 1-3. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding General, U.S. Army Troop Support Command, ATTN: AMSTS-MPP, 4300 Goodfellow Boulevard, St. Louis, Missouri 63120.

### 1-4. Equipment Serviceability Criteria

Refer to TM 5-5420-204-ESC for serviceability criteria on transporter or superstructure.

### 1-5. Destruction of Army Material to Prevent Enemy Use

Method and priority of Destruction of Army Equipment to Prevent Enemy Use is covered in TM 750-244-3.

### 1-6. Administrative Storage of Equipment

When the Transporter must be prepared for administrative storage, comply with instructions contained in TM 740-90-1.

## Section II. DESCRIPTION AND DATA

### 1-7. Description

*a. General.*

(1) The Transporter, mobile floating assault bridge / ferry, consists of a self-propelled amphibious unit that can be rapidly linked together with other units, with minimum personnel (3 per unit) to form a continuous bridge and permit high volume stream crossing by equipment used in large scale military operations. For small scale operations, several units can be linked together to serve as self propelled ferries for making multiple stream crossings (fig. 1-1, 1-2 and 1-3).

| SHIPPING DIMENSIONS | |
|---|---|
| END BAY INSTALLED | |
| LENGTH | 507.5 INCHES |
| WIDTH | 144 INCHES |
| HEIGHT | 140.8 INCHES |
| WEIGHT | 53,950 POUNDS |

| SHIPPING DIMENSIONS | |
|---|---|
| TRANSPORTER ONLY | |
| LENGTH | 507.5 INCHES |
| WIDTH | 144 INCHES |
| HEIGHT | 126 INCHES |
| WEIGHT | 34,350 POUNDS |

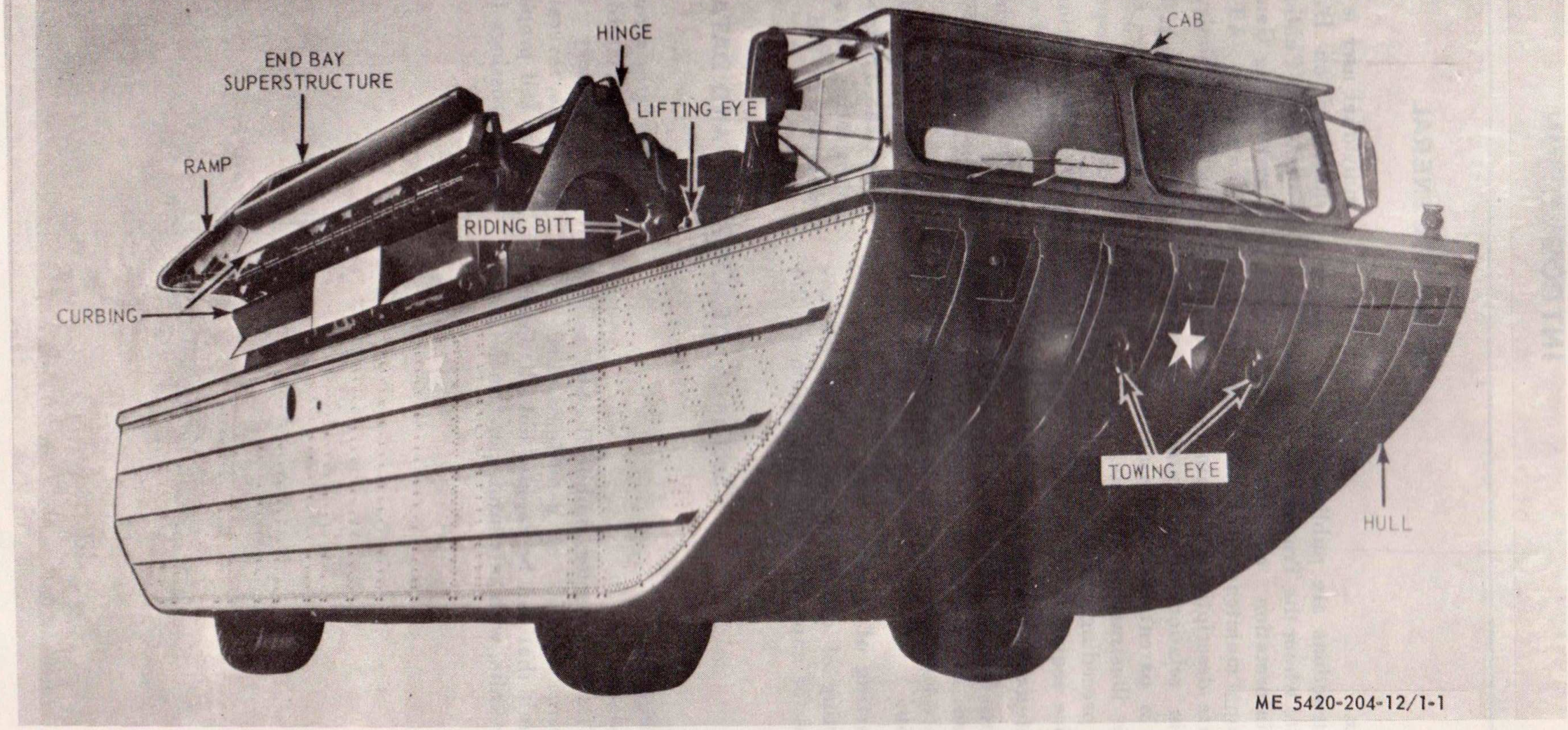



*Figure 1-1. Transporter, mobile floating assault bridge / ferry, with end bay superstructure installed, right front ¾ view, and shipping dimensions.*

| SHIPPING DIMENSIONS | |
|---|---|
| INTERIOR BAY INSTALLED | |
| LENGTH | 507.5 INCHES |
| WIDTH | 144 INCHES |
| HEIGHT | 126 INCHES |
| WEIGHT | 48,400 POUNDS |

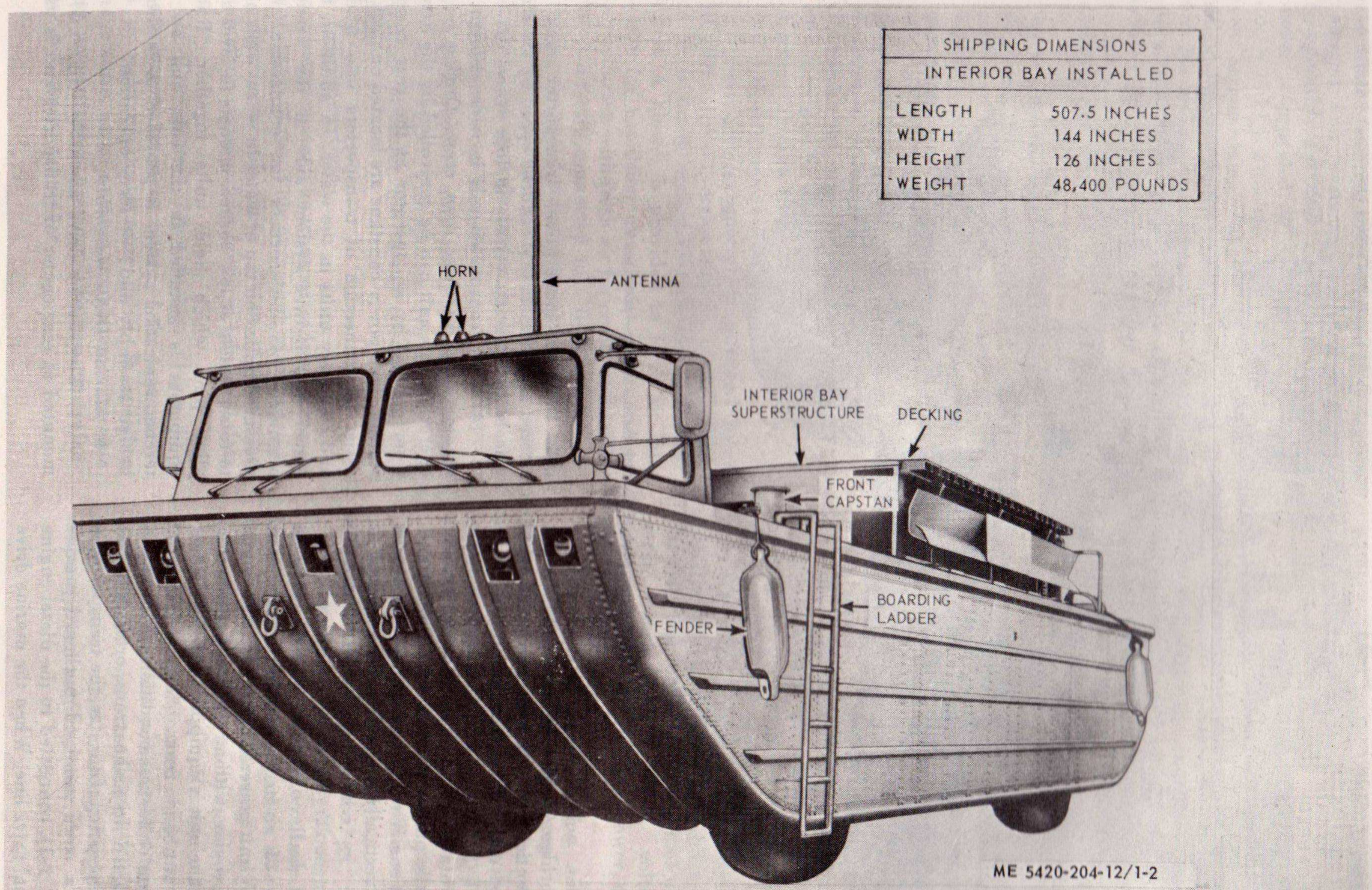



*Figure 1-2. Transporter, mobile floating assault bridge / ferry with interior bay superstructure installed, left front ¾ view, and shipping dimensions.*

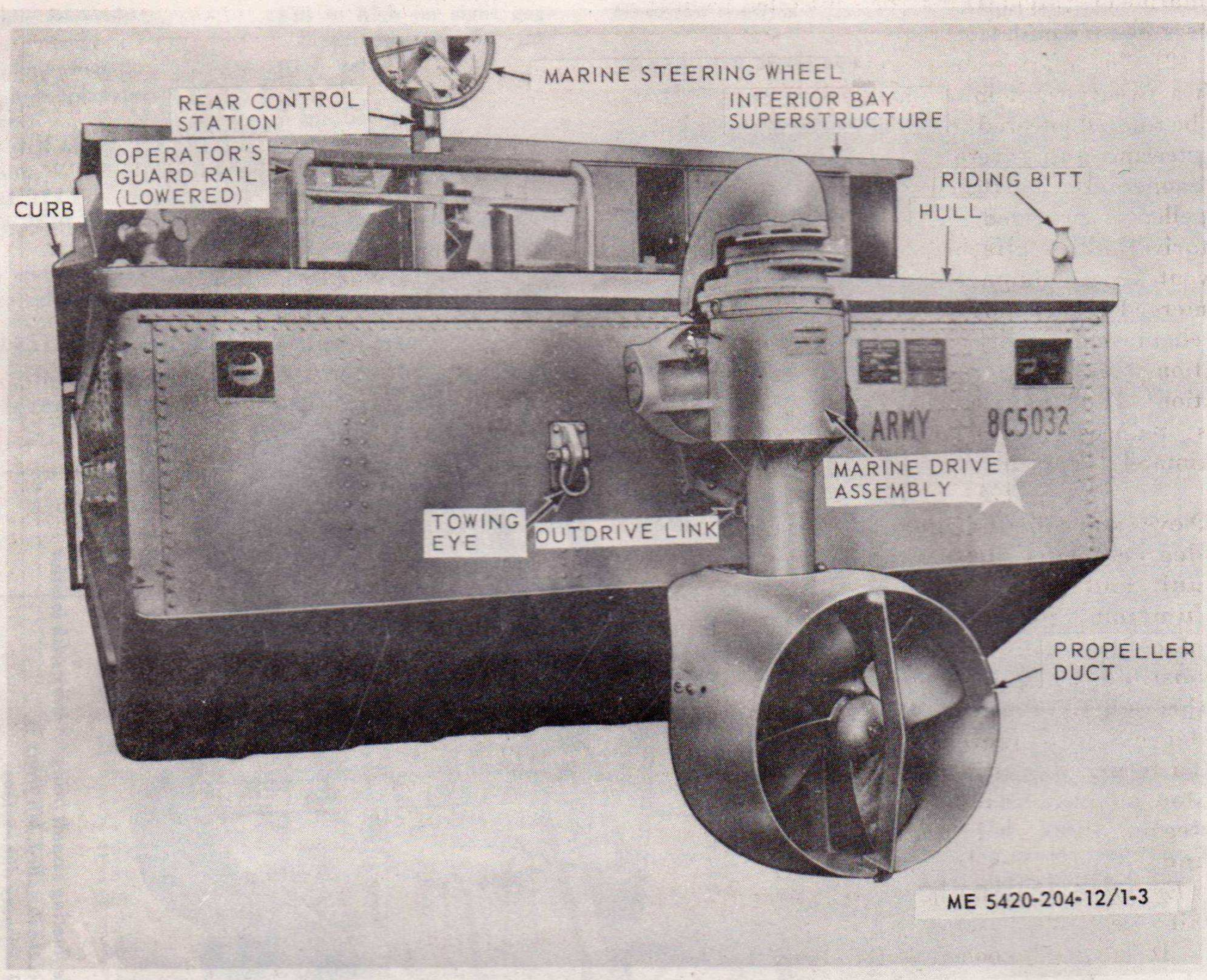



*Figure 1-3. Transporter, mobile floating assault bridge—ferry, with marine drive installed, left rear ¾ view.*

(2) The bridge / ferries are constructed of a number of identical transporters equipped with interior bay, or end bay superstructures (TM 5-5420-205-15). The superstructures are hydraulically rotated 90° on the transporter deck and hydraulically pinned together for bridging and ferrying operations. The folded ramp section of end bay units are vertically adjustable by means of a holding valve in conjunction with hydraulic cylinders, to meet varying shore conditions.

(3) The hull of the transporter is predominantly of riveted aluminum alloy construction. Each unit powered by a 335 HP (horse power) diesel engine with a six speed automatic transmission. The unit is equipped with four wheel drive, and front and rear wheel steering for maneuvering under adverse conditions. The wheels are fully retracted into the transporter hull for normal water operation. In water, the transporter is propelled by a stern mounted outboard marine drive unit (fig. 1-3), connected to the diesel engine by a mechanical drive line. When the marine drive unit becomes inoperative, transporter may be steered and propelled at reduced speed by lowering wheels and placing vehicle in four wheel drive.

(4) The transporter cab is wide enough to accommodate its three man crew. During water operation, this unit can be controlled by the driver from cab, or by an operator at the rear control station. Two power capstans are located on deck to assist in connection of transporters into bridge and / or ferry units in the water. In addition, the wheel well blower system aids in the vertical alignment of unit corners for connection. Air pressure applied on top of water in wheel wells acts to raise vehicle at low corner, enough to level and aline pins which hold units together. Radio equipment is installed in the cab, and an intercommunication system is provided to facilitate bridge assembly and / or ferry operation.

*b. Marine Drive Assembly.*

(1) The marine drive assembly, (fig. 1-3) is mounted at rear center of transporter and is used

for marine operation. It may be controlled from the drivers compartment or rear control station.

(2) The marine drive assembly is equipped with a twenty-eight inch, shrouded propeller that can be rotated (steered) three hundred sixty degrees for steering and reversing. For shallow or deep water operation, a sixteen inch vertical travel of the propeller is provided. A kick up safety device (outdrive link) is attached to the marine drive to prevent serious damage should the unit strike a submerged object during operation. For highway travel, the marine drive is moved to an elevated position (stow) and propeller is placed in reverse position (180° on propeller position indicator). This reduces overall length of vehicle approximately one foot.

**CAUTION**

**Never steer the marine unit through 720 degrees. This may damage the marine unit and the position indicator may function incorrectly. The operator must place the unit in the forward drive position by going from 180 degrees, through 135 degrees, 90 degrees and 45 degrees to 0 degrees on the indicator. To return the unit to the raised reverse stow position he must come back from 0 degrees through 45 degrees, 90 degrees, and 135 degrees to 180 degrees.**

*c. Engine.* The transporter is powered by a Detroit Diesel V-71 series engine, model 7083-7299. It is liquid cooled, V-type and has eight cylinders. A blower is provided to force air into cylinders for expulsion of exhaust gases and to supply cylinders with fresh air for combustion. The engine is directly connected to a fly-wheel torque converter, six speed automatic transmission and power divider assembly, which is used to lessen load shock and provide torque multiplication.

## 1-8. Difference in Models

This manual covers only the FMC Corporation Model BF-FMC-1 Transporter. No known unit differences exist for the model covered by this manual.

## 1-9. Tabulated Data

*a. Identification.* The transporter has 16 major identification plates. This paragraph gives location and description of these plates. Information contained on plates will be found in tabulated data *b* below.

(1) *Transporter Identification Plate.* This plate is located on stern (rear) of the transporter hull to right of the marine drive. It specifies nomenclature, serial number, maximum allowable speed, tire inflation pressure, tire size, manufacturer, and contract number.

(2) *Transporter Transportation Data Plate.* This plate is located on stern of the transporter hull to right of the marine drive. It specifies nomenclature, axle load, center of gravity, overall height, overall width, shipping cubage, shipping weight, shipping tonnage, and directions for reducing overall height.

(3) *Marine Drive Identification Plate.* This plate is located on propeller drive housing. It specifies federal stock number, nomenclature, manufacturer, contract number, serial number, date manufactured, end item used on nomenclature, federal stock number of end item, model of end item, and end item manufacturer.

(4) *Engine Identification Plate.* The engine identification plate is located on right valve cover. It specifies manufacturer, model number, unit number, maximum rpm (revolutions per minute)-no load, rated horsepower, continuous horsepower, and a listing of optional equipment by nomenclature and type number.

(5) *Engine Governor Identification Plate.* The engine governor identification plate is located on left side of the engine governor. It specifies manufacturer, type, and idle range.

(6) *Transmission Identification Plate.* This plate is located on left rear side of the transmission housing. It specifies model number, serial number, part number, and manufacturer.

(7) *Bilge Pump Identification Plate.* This plate is located on top of each bilge pump next to the electrical connector. It specifies model number, serial number, duty, type, volts, amperage, revolutions per minute, horsepower, order number, and manufacturer.

(8) *Capstan Identification and Instruction Plate.* This plate is located on top of each capstan. It specifies the direction of rotation, serial number, manufacturer, nomenclature, starting rope pull, running rope pull, oil capacity, type of oil, and lubrication intervals.

(9) *Wheel Well Air Blower Identification Plate.* This plate is located on end of the wheel well air blower housing. It specifies manufacturer, size, displacements, and serial number.

(10) *Wheel Well Air Blower Motor Identification Plate.* The wheel well air blower motor identification plate is located on side of the motor. It specifies manufacturer, part number, displacement, speed, and pressure rating.

(11) *Personnel Heater Identification Plate.* This plate is located on side of the personnel heater. It specifies nomenclature, model number, stock number, customer number, contract number, serial number, volts, starting amperage, running amperage and manufacturer.

(12) *Air Heater Pump Identification Plate.* The air heater pump identification plate is located on rear or non-driven end of the pump. It specifies manufacturer and type number.

(13) *Air Heater Pump Motor Identification Plate.* The air heater pump motor identification plate is located on side of motor. It specifies manufacturer, horsepower, amperes, voltage, speed, and part number.

(14) *Air Compressor Identification Plate.* This plate is located on side of the air compressor. It specifies model number, serial number, and manufacturer.

(15) *Main Hydraulic Pump Identification Plate.* This plate is located on side of the pump. It specifies manufacturer, part number, model number, direction of rotation, and serial number.

(16) *Wheel Suspension Cylinder Identification Plate.* This plate is located on the cylinder in the wheel well. It specifies federal stock number, nomenclature, manufacturer, contract number, serial number, inspected, date manufactured, end item used on nomenclature, federal stock number of end item, model of end item, and end item manufacturer.

(17) For the location and description of the interior bay and end bay superstructure identification plates refer to TM 5-5420-205-15.

*b. Tabulated Data.*

(1) *Transporter, Mobile Floating Assault Bridge / Ferry.*

| | |
|---|---|
| Manufacturer | FMC Corporation, San Jose, California |
| Federal stock number | 5420-877-8679 |
| Contract number | DA 11-184-AMC-737 (T) |
| Date manufactured | 1966 |
| Maximum allowable speed: | |
| Highway | 35 mph (miles per hour) |
| Off road | 10 mph |
| In water: | |
| Individual units | 10.5 mph |
| Four unit ferry (60 ton load) | 8 mph |
| Tire inflation pressure: | |
| Highway | 50 psi (pounds per square inch) |
| Off road | 25 psi minimum |
| Tire size | 18:00 x 25 |
| Axle load, transporter only: | |
| Front | 18,000 lbs (pounds) |
| Rear | 16,350 lbs |
| Axle load with interior bay superstructure: | |
| Front | 25,310 lbs |
| Rear | 23,090 lbs |
| Axle load with end bay superstructure: | |
| Front | 27,410 lbs |
| Rear | 26,540 lbs |
| Center of gravity, transporter only | 245.5 in. (inches) from bow of transporter and 65.7 in. from ground. |
| Center of gravity with interior bay superstructure installed | 250.3 in. from bow of transporter and 79.1 in. from ground. |
| Center of gravity with end bay superstructure | 251.3 in. from bow of transporter and 85.2 in. from ground. |

(2) *Engine.*

| | |
|---|---|
| Manufacturer | Detroit Diesel Engine Division, General Motors Corp., Detroit, Michigan |
| Model | 8 V-71 (7083-7299) |
| Type | Diesel |
| Revolutions per minute (rpm) no load | 2,450 |
| Number of cylinders | 8 |
| Firing order | 1L, 3R, 3L, 4R, 4L, 2R, 2L, 1R |
| Bore | 4¼ in. |
| Stroke | 5 in. |
| Total displacement | 567.5 cu in. (cubic inches) |

(3) *Engine Accessories.*

*(a)* Engine Oil Filter.

| | |
|---|---|
| Manufacturer | AC Spark Plug, Division General Motors Corporation |
| Type | Ful flow |
| Model | PM-13-5 |
| Element type | PF 132 |

*(b)* Fuel Filter.

| | |
|---|---|
| Manufacturer | AC Spark Plug, Division General Motors Corporation |
| Model | T-65 |
| Element type | TP 540X |

*(c)* Fuel Strainer.

| | |
|---|---|
| Manufacturer | AC Spark Plug, Division General Motors Corporation |
| Model | T-67 |
| Element type | T 552 |

*(d)* Engine Governor.

| | |
|---|---|
| Manufacturer | Detroit Diesel, Division General Motors Corporation |
| Type | DW-LS |
| Idle range | 400-450 rpm |

*(e)* Air Heater Pump.

| | |
|---|---|
| Manufacturer | John Barnes Corporation |
| Type | GC-1507BA5 |

*(f)* Air Heater Pump Motor.

| | |
|---|---|
| Manufacturer | Robbins and Meyers, Inc. |
| Horsepower | ½ |
| Amperes | 5.1 |
| Volts dc | 28 |
| Speed | 2,000 rpm |

### *(g)* Air Compressor.

| | |
|---|---|
| Manufacturer | Bendix Westinghouse |
| Model | TU-FLO-500 |
| Number of cylinders | 2 |
| Piston displacement at 1,250 rpm | 12 CFM (cubic feet per minute) |
| Minimum oil pressure required at idle speed | 5 psi |
| Minimum oil pressure required at governed speed | 15 psi |

### *(h)* Voltage Regulator.

| | |
|---|---|
| Manufacturer | Leece Neville Co., Cleveland, Ohio |
| Type | R0013392RP |
| Ordnance number | 8699744 |
| Military standard number | MS 51311-1 |
| Volts | 28 |
| Amperes | 100 |

### *(i)* Alternator.

| | |
|---|---|
| Manufacturer | Leece Neville Co., Cleveland, Ohio |
| Type number | A0015300GP |
| Ordnance number | 7954720 |
| Volts | 28 |
| Amperes | 100 |
| Rotation | Reversible |

### *(j)* Air Cleaner.

| | |
|---|---|
| Manufacturer | Donaldson Corporation |
| Model | SBG 16-0331 |
| Type | Dry |
| Maximum air flow | 900 CFM |
| Weight | 67 lbs |

### *(k)* Starting Motor.

| | |
|---|---|
| Manufacturer | Delco Remy Division General Motor Corporation |
| Model | 1113847 |
| Volts | 24 |

### *(l)* Rectifier.

| | |
|---|---|
| Manufacturer | Fanstell Metalurgical Corp. |
| Model | 28V-100A DC |
| Ordnance number | 10906314 |

### *(m)* Air Compressor Governor.

| | |
|---|---|
| Manufacturer | Bendix Westinghouse |
| Model | D-2 |

### *(n)* Fuel Pressure Switch By-Pass Switch.

| | |
|---|---|
| Type | Military Standard |
| Model number | 60 |
| Drawing number | MS25089 |

### (4) *Transmission.*

| | |
|---|---|
| Manufacturer | Allison Division General Motors Corporation |
| Model number | HT-70 |
| Number of power take offs | 2 |
| Maximum input speed | 2,300 rpm |
| Net flywheel input torque | 700 ft-lb (foot-pounds) |

### (5) *Transmission Oil Filter.*

| | |
|---|---|
| Manufacturer | AC Spark Plug Division General Motors Corporation |
| Type | Full Flow, PM-13-5 |
| Element type | PF132 |
| Working pressure | 60 psi |

### (6) *Batteries.*

| | |
|---|---|
| Model | 6 TN |
| Voltage | 12 |
| 20 hr rate at 80° F. (fahrenheit) | 100 amp hr |
| Specific gravity of electrolyte | 1.285 corrected to 80° F. |
| Cranking ability | 300 amps at —40° for 1.25 minutes |

### (7) *Bilge Pump.*

| | |
|---|---|
| Manufacturer | Piqua Machine and Manufacturing Company |
| Volts | 27.5 |
| Model | L-32-266 |
| Amperage | 20 |
| Type | Submersible |
| RPM | 6,500 |
| Series | 32-17 |
| Horsepower | 1/3 |
| Output capacity | 46 gpm (gallons per minute) 6 ft head |

### (8) *Capstans.*

| | |
|---|---|
| Manufacturer | Link Belt Company |
| Model | WD2104-18-A |
| Nomenclature | Car spotter |
| Starting rope pull | 6,000 lbs |
| Running rope pull | 3,000 lbs |
| Oil capacity | 5 qts (approximately) |
| Type of oil: | |
| Ambient temperatures | AGMA Lubricants |
| 0°to 40° F. | No. 5 |
| 41° to 90° F. | No. 7 comp. |
| 91°to 120° F. | No. 8 comp. |
| Lubrication intervals | After first 150 hours, then every 2,500 hours or 6 months of normal service. For service of severe nature, change oil every 1 to 3 months. |

### (9) *Service Brake Air Hydraulic Power Cylinder (Multipak).*

| | |
|---|---|
| Manufacturer | Bendix Westinghouse |

### (10) *Brake Master Cylinder.*

| | |
|---|---|
| Manufacturer | Minnesota Automotive, Incorporated |

### (11) *Brake Calipers.*

| | |
|---|---|
| Manufacturer | B. F. Goodrich Company |
| Model | 2-926 |

### (12) *Wheel Well Air Blower.*

| | |
|---|---|
| Manufacturer | Sutorbilt Corporation |
| Size | 3 LS |
| Displacement | .104 |

### (13) *Wheel Well Air Blower Motor.*

| | |
|---|---|
| Manufacturer | Vickers, Incorporated |
| Cu in. per revolution | 0.310 |
| Continuous speed | 3860 RPM |
| Maximum operating pressure for continuous duty | 3,000 psi |

### (14) *Personnel Heater.*

| | | |
|---|---|---|
| Manufacturer | Stewart Warner Corporation, Southwind Division, Indianapolis, Indiana | |
| Model | 8430-P-24 | |
| Voltage | 24 | |
| Amperage: | Above 30° F | Below 30° F. |
| Start | 17 | 20.5 |
| Run | 8 | 11.5 |
| Heat output: | | |
| High heat | 30,000 BTU (British Thermal Units Per Hour) | |
| Low heat | 14,000 BTU | |
| Fuel consumption rate: | | |
| High heat | 0.042 ± .005 lb / min (pound per minute) | |
| Low heat | 0.026 ± .005 lb / min | |

### (15) *Pump High Pressure Hydraulic Controlled Variable Displacement.*

| | |
|---|---|
| Manufacturer | The Weatherhead Company, Cleveland, Ohio |
| Model number | 408-00915-1 |
| Maximum continuous operating pressure | 3,000 psi |
| Operating speeds | 600 to 3,200 rpm |
| Maximum continuous operating speed | 2,000 rpm |
| Maximum intermittent operating speed | 3,200 rpm |
| Pump rating variable displacement | 0-35 gpm |
| Weight (dry) | 62 lbs |

### (16) *High Pressure Hydraulic Pump Power Take-Off.*

| | |
|---|---|
| Manufacturer | Chelsa Products |
| Model | BF 2442 |
| Assembly number | HY82CD-38H-170 |

### (17) *Low Pressure Hydraulic Pump.*

| | |
|---|---|
| Manufacturer | Vickers Incorporated, Detroit, Michigan |
| Series | V2230-6-5 |
| Model | S214 |
| Part number | 3CC-J6-20 |
| Output pressure | 2,250 psi |

### (18) *Wheel Suspension Cylinder.*

| | |
|---|---|
| Manufacturer | National Waterlift Division, Pneumo Dynamics |
| Model | 1860 |
| Operating pressure | 3,000 psi |
| Order number | 13207E1978 |

### (19) *Marine Drive.*

| | |
|---|---|
| Manufacturer | FMC Corporation, Northern Ordnance Division |
| Model | 3,000 |
| Maximum propeller rpm | 994 |

### (20) *Fixed Fire Extinguisher.*

| | |
|---|---|
| Manufacturer | Walter Kidde and Company, Incorporated |
| Model | 1CC3AA1800 |
| Fire extinguisher agent | Carbon dioxide |

### (21) *Portable Fire Extinguisher.*

| | |
|---|---|
| Manufacturer | Walter Kidde and Company, Incorporated |
| Model | FSN 4210-270-4512 |
| Fire extinguisher agent | Carbon dioxide |

### (22) *Differentials.*

| | |
|---|---|
| Manufacturer | Rockwell Standards Corporation Transmission and Axle Division, Detroit, Michigan |
| Type | High traction |
| Reduction ratio | 4.111 to 1.000 |

### (23) *Thermostatic Fan Drive.*

| | |
|---|---|
| Manufacturer | Schwitzer Corporation |
| Drive assembly | L-138473-PM144643 |
| Bracket number | A 139182 |

### (24) *Marine Drive Power Take-Off.*

| | |
|---|---|
| Manufacturer | Chelsa Products, 140 Buchanan Street, Chelsa, Michigan |
| Model | 85CM-44B-148 |
| Lubricant | MIL-L-2104, grade 80 |

### (25) *Flow Control Thermostat.*

| | |
|---|---|
| Manufacturer | Kysor Industrial |
| Model | D16000-190 |

### (26) *Tires.*

| | |
|---|---|
| Manufacturer | Goodyear Tire and Rubber Company |
| Type | Tubeless |
| Size | 18:00 x 25 |
| Ply | 16 |

### (27) *Front Hydraulic Steering Cylinder.*

| | |
|---|---|
| Manufacturer | Vickers Incorporated Division, Sperry Rand Corp. |
| Model number | SC22-12B1BX11 |
| Maximum operating pressure | 2,000 psi |

### (28) *Rear Hydraulic Steering Cylinder.*

| | |
|---|---|
| Manufacturer | Vickers Incorporated Division, Sperry Rand Corporation |
| Model number | S20B22-4AAZBX12B-11 |
| Maximum operating pressure | 2,000 psi |

(29) *Hydraulic Elevating Cylinder.*

| | |
|---|---|
| Manufacturer | FMC Corporation |
| Maximum operating pressure | 3,000 psi |

(30) *Marine Drive Hydraulic Stowage Cylinder.*

| | |
|---|---|
| Manufacturer | Lionel Pacific Incorporated |
| Model | 7-3159 |

(31) *Hydraulic Rear Steering Actuating Cylinder.*

| | |
|---|---|
| Manufacturer | FMC Corporation |
| Working pressure | 2,000 psi |

(32) *Low Pressure Hydraulic Fluid Filter.*

| | |
|---|---|
| Manufacturer | Gresen Manufacturing Company |
| Model | GFB-215 with No. 1571 spring |
| Working pressure | 100 psi maximum |

(33) *High Pressure Hydraulic Fluid Filter.*

| | |
|---|---|
| Manufacturer | Waterman Hydraulics |
| Rated pressure | 3,000 psi |
| Relief valve opens at: | 75 to 80 psi |
| Type | Full flow |
| Flow capacity | 30 gpm |

(34) *Windshield Wiper Motor.*

| | |
|---|---|
| Manufacturer | Sprague Devices Incorporated |
| Air consumption | .065 CFM at 80 psi |

(35) *Marine Drive Hydraulic Steering Motor.*

| | |
|---|---|
| Manufacturer | Vickers Incorporated |
| Model | MF-9-3911-30Z4C |
| Maximum operating pressure at continuous duty | 3,000 psi |

(36) *Marine Drive Hydraulic Elevating Motor.*

| | |
|---|---|
| Manufacturer | Vickers Incorporated |
| Model | MF-36-3909-25Z-2 |
| Maximum operating pressure | 3,000 psi |

(37) *Air Pressure Reducing Valve.*

| | |
|---|---|
| Manufacturer | Wagner Electric |
| Factory setting | 75 psi |
| Valve range | 40 to 100 psi |

(38) *3-Way Solenoid Valve.*

| | |
|---|---|
| Manufacturer | A. Schraders and Son Division of Scovill |
| Model | 972E |
| Electrical connector number | MS3102E10S-2P |
| Flow capacity | 60 CFM of air at 100 psi inlet pressure maximum |
| Volts dc | 24 |
| Amperes operating | 1.25 |

(39) *Plug Valve (Wheel Well Air).*

| | |
|---|---|
| Manufacturer | Republic Manufacturing Company |
| Model | 9-463-26 |

(40) *Hydraulic Flow Control Valve.*

| | |
|---|---|
| Manufacturer | Brand Hydraulics |
| Model | BGR56 Modified |
| Total capacity | 20 gpm |
| Proof pressure | 4,000 psi |

(41) *Solenoid Valve Assembly.*

| | |
|---|---|
| Manufacturer | Waterman Hydraulics |
| Model | 16362-LE-JT-6-24 Modified |
| Operating pressure | 3,000 psi |
| Voltage, dc | 24 |
| Flow capacity | 6 gpm |

(42) *Shuttle Steering Valve Assembly.*

| | |
|---|---|
| Manufacturer | Thompson Rand, Ross Gear Div. |
| Model | V 1006 |
| Normal flow rate | 3 gpm |
| Maximum flow rate | 6 gpm |
| Working pressure | 2,000 psi |
| Proof pressure | 3,500 psi |

(43) *Dimensions and Weights (fig. 1-1).*

*(a)* Transporter.

| | |
|---|---|
| Length | 507.5 in. |
| Width | 144 in. |
| Height: | |
| Less superstructure | 126 in. |
| With end bay superstructure | 140.8 in. |
| With interior bay superstructure | 126 in. |
| With cab and superstructure removed and wheels retracted | 91.1 in. |
| Weight: | |
| Less superstructure | 34,350 lbs |
| With end bay superstructure | 53,950 lbs |
| With interior bay superstructure | 48,400 lbs |

*(b)* End Bay Superstructure. Refer to TM 5-5420-205-15.

*(c)* Interior Bay Superstructure. Refer to TM 5-5420-205-15.

*(d)* Marine Drive.

| | |
|---|---|
| Length | 68.06 in. |
| Width | 34.5 in. |
| Height | 89.6 in. |
| Weight (wet) | 1,554 lbs. |

(44) *Capacities.*

| | |
|---|---|
| Fuel tanks (2) | 50 gal ea (each) |
| Engine crankcase | 17 qts (quarts) |
| Oil filters (2) | 2 qts ea |
| Oil cooler | 5 qts |
| Air compressor crankcase | 1.53 qts |
| Transmission: | |
| Initial fill | 8.75 gal (35 qts) |
| Refill | 6.5 gal (26 qts) |
| Marine drive | 11 qts |
| Front axle differential | 14 qts |
| Rear axle differential | 14 qts |
| Steering gear box | 3 pts (pints) |
| Radiator | 17½ gal |

Hydraulic reservoir ..... Fill to high on sight gage (approximately 54 gal)
Hydraulic system ..... 61½ gal
Wheel hub (planetary system) ..... 5 qts (ea wheel)
Wheel well air blower housing ..... 1 pt
Capstan (2) ..... 5 qts ea
Marine drive shaft ..... 1 qt, or fill to plug level when in stowed position
Wheel and suspension universal joints ..... 0.5 oz (ounce) (each joint)

(45) *Nut and Bolt Torque Data.*

*(a)* General Torque Specifications-Bolts and Screws.

| Size | Threads per inch | Standard heat-treaded bolts and screws torque value | Special heat-treated bolts, screws, allen-head screws, and self-locking capscrews torque value |
|---|---|---|---|
| 1/4 | 20 | 6—8 | 9—11 |
| | 28 | 8—10 | 10—12 |
| 5/16 | 18 | 15—18 | 17—20 |
| | 24 | 17—20 | 19—23 |
| 3/8 | 16 | 26—32 | 36—43 |
| | 24 | 33—40 | 41—49 |
| 7/16 | 14 | 42—50 | 54—65 |
| | 20 | 50—60 | 64—77 |
| 1/2 | 13 | 67—80 | 81—97 |
| | 20 | 83—100 | 96—115 |
| 9/16 | 12 | 85—100 | 103—123 |
| | 18 | 100—120 | 122—146 |
| 5/8 | 11 | 117—140 | 164—192 |
| | 18 | 134—160 | 193—225 |
| 3/4 | 10 | 180—210 | 284—325 |
| | 16 | 215—250 | 337—385 |
| 7/8 | 9 | 315—360 | 490—550 |
| | 14 | 372—425 | 575—650 |
| 1 | 8 | 445—500 | 685—770 |
| | 14 | 535—600 | 830—925 |

NOTE
All torque values are given in foot-pounds.

*(b)* Specific Torque Specifications.

Stub yoke capscrew ..... 300 ft-lbs
Double universal joint bearing cap machine screws ..... 90—100 ft-lbs
Wheel lug nuts ..... 320—350 ft-lbs.
Adapter for low pressure hydraulic pump to engine nuts ..... 15—20 ft-lbs.
High pressure hydraulic pump to transmission nut ..... 15—20 ft-lbs.
Marine drive unit to hull capscrews ..... 190 ft-lbs.

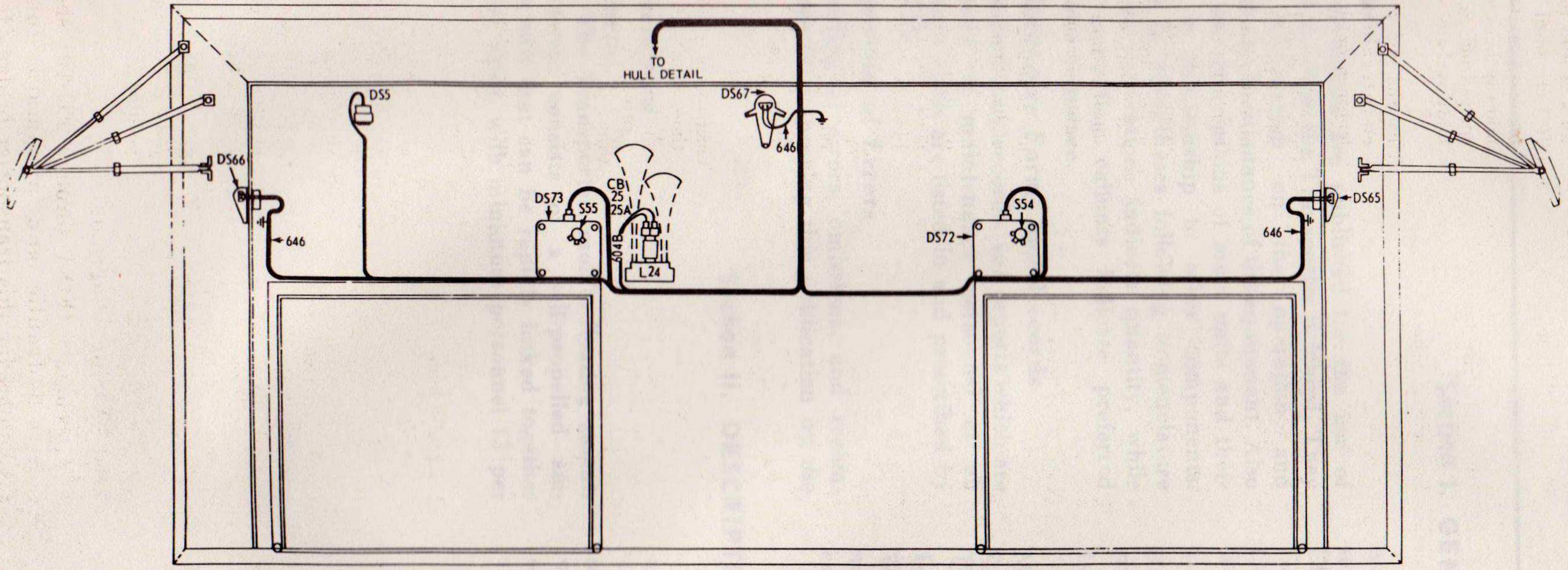
(46) *Adjustment Data.*

Intake and exhaust valve clearance ..... Adjust hot engine to 0.013 and 0.015.
Governor controls ..... Adjust idle speed or linkage as desired to sustain load.
Throttle and accelerator controls ..... Adjust idle screw so engine idles at 400 to 500 rpm.
Fan drive V-belts ..... Lift hub until belts will depress ⅜ to ½ inch midway between pulleys.
Alternator drive belts ..... Depress from ⅜ to ½ inch midway between pulleys.
Transmission shaft lever cable ..... Turn rod end clockwise or counterclockwise to lengthen or shorten.
Axle engage lever and cable ..... Turn clevis rod end clockwise to shorten or counterclockwise to lengthen.
Throttle valve control cable ..... Loosen or back off rod end locknut to lengthen, turn rod counterclockwise to shorten, turn clockwise, tighten locknut.
Handbrake lever and linkage ..... Turn adjusting knob on end of handbrake lever.
Steering gear ..... Loosen locknut on back side of housing and turn clockwise until a slight bind exists and back off for proper adjustment.
Drivers seat ..... For drivers with short legs, turn pedestal 180° so that pedestal post is near front of cab.
Wheel well blower control levers and linkage ..... Turn rod end ½ turn at a time, counterclockwise or clockwise to lengthen or shorten rod.
Air compressor governor ..... Adjust to 100 psi.
Air compressor drive belts ..... Depress from ½ to ¾ inch midway between pulleys.
Air horn ..... Turn the adjusting screw pm the horns to adjust sound.
Hydraulic pump control linkage ..... Turn rod end ½ turn counterclockwise to lengthen or clockwise to shorten.
Marine drive elevation (depth) transmitter ..... Adjust till indicator is exactly on full UP/DOWN mark.
Marine drive azimuth (Steering) transmitter ..... Adjust till aligned and indicates null (O) position.

## 1-10. Wiring Diagrams

*a.* Foldouts (FO-1 through FO-10) shows the electro-hydraulic and pneumatic functional schematics for this transporter bridge/ferry unit and can be found at the rear of this manual.

*b.* Figure 1-4 is the practical wiring diagram.




LEGEND

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 25A | WIRE LEAD | DS5 | MAGNETIC COMPASS | DS67 | MARINE NAVIGATIONAL LIGHT (BOW) | L24 | HORN SOLENOID |
| 646 | WIRE LEAD | DS65 | MARINE NAVIGATIONAL LIGHT (STARBOARD) | DS72 | DOME LIGHT | S54 | DOME LIGHT SWITCH |
| CB25 | LIGHTING SWITCH CIRCUIT BREAKER | DS66 | MARINE NAVIGATIONAL LIGHT (PORT) | DS73 | DOME LIGHT | S55 | DOME LIGHT SWITCH |
| | | | | | | ⊣⊢ | GROUND |

ME 5420-204-12/1-4

*Figure 1-4. Practical wiring diagram.*

# CHAPTER 2

# OPERATING INSTRUCTIONS

**WARNING**

**If equipment fails to operate, refer to troubleshooting procedures in Chapter 3.**

## Section I. OPERATING PROCEDURES

### 2-1. General

*a.* This section describes, locates, illustrates, and furnishes the operator / crew sufficient information about various controls and instruments for proper operation of transporter. Instructions are published for information and guidance of personnel responsible for operation of the transporter.

*b.* The operator must know how to perform every operation of which the transporter is capable. This section gives instructions on starting and stopping the transporter, operation of the transporter, and on co-ordinating basic motions to perform specific tasks for which the equipment is designed. Since nearly every job presents a different problem, the operator may have to vary given procedures to fit the individual job.

*c.* The transporter crew check list (para 2-6), lists the various checks and inspections that must be accomplished, the basic operational instructions for operator and crew. More coverage is contained in paragraphs 2-3 through 2-25 of this manual. Other instructions are contained in TM 5-210 (Military Floating Bridge Equipment) and FM 31-60 (River-Crossing Operations).

**CAUTION**

**Avoid unnecessary engine idling. Prolonged idling will result in temperature of engine coolant falling below specified operating range of 165° F to 185° F. Low operating temperatures causes development of several conditions detrimental to engine operation and life.**

### 2-2. Controls and Instruments

The purpose of controls and instruments and their normal and maximum reading are illustrated in figure 2-1.

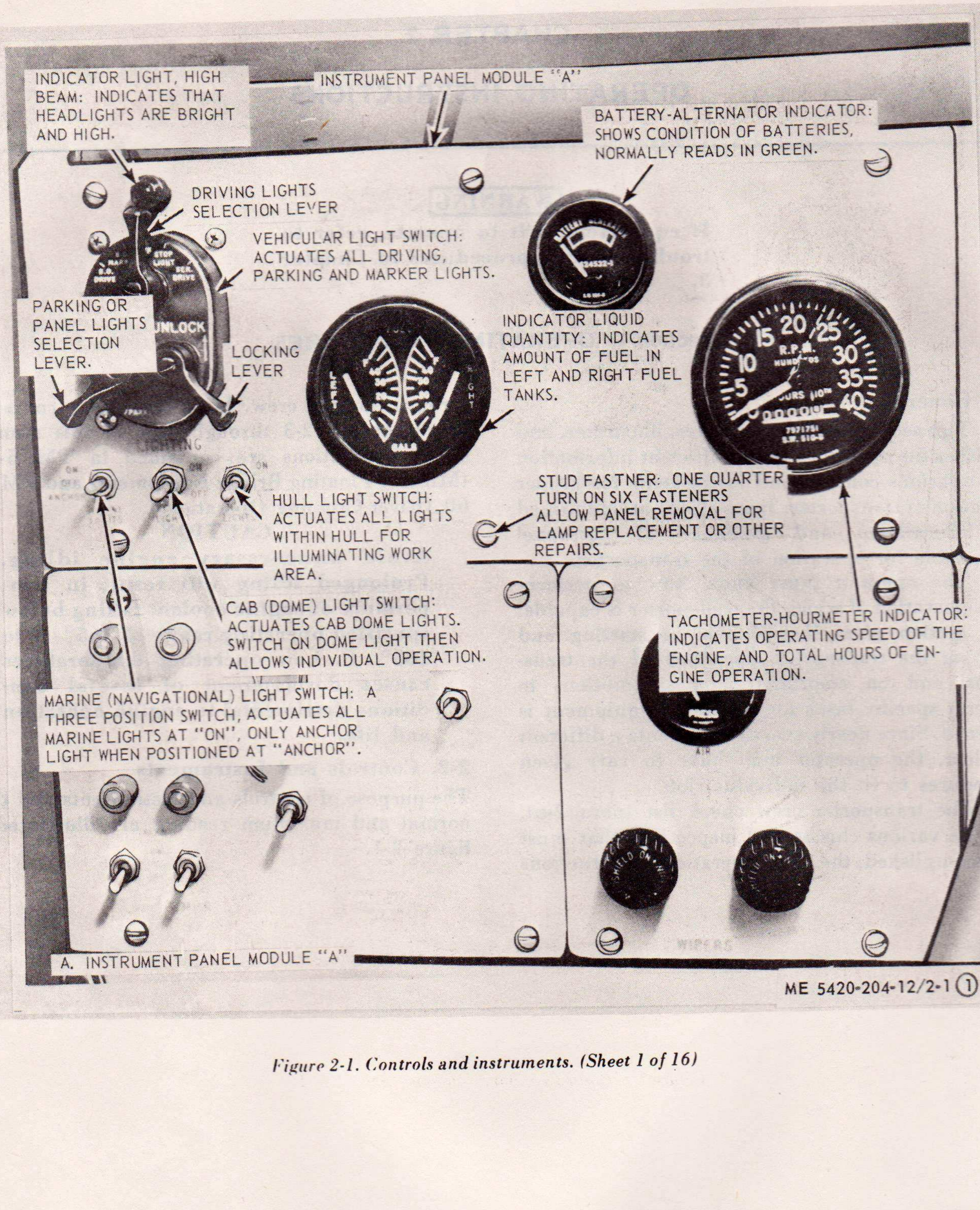
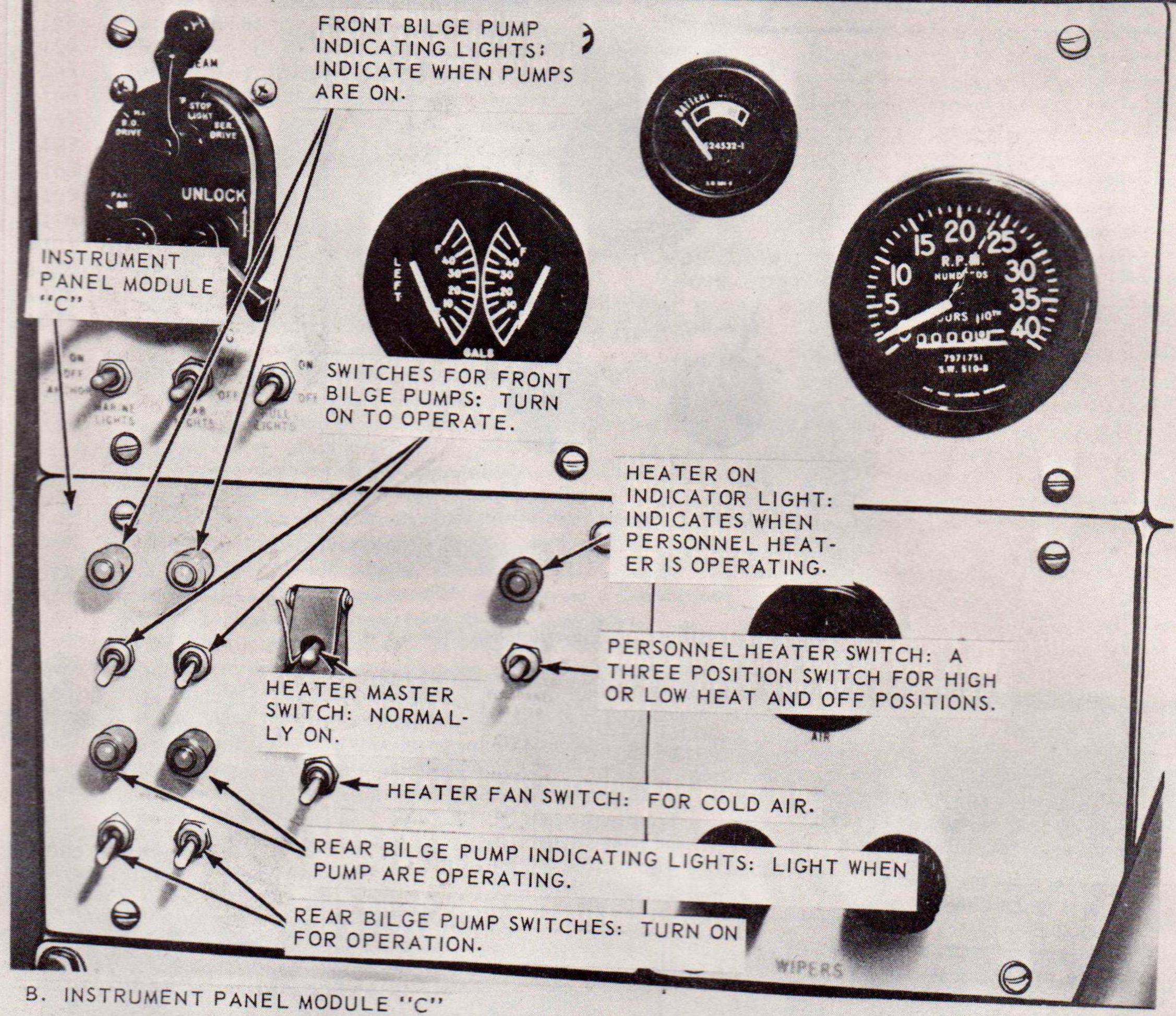



*Figure 2-1. Controls and instruments. (Sheet 1 of 16)*




B. INSTRUMENT PANEL MODULE "C"

ME 5420-204-12/2-1 (2)

*Figure 2-1. Controls and instruments. (Sheet 2 of 16)*

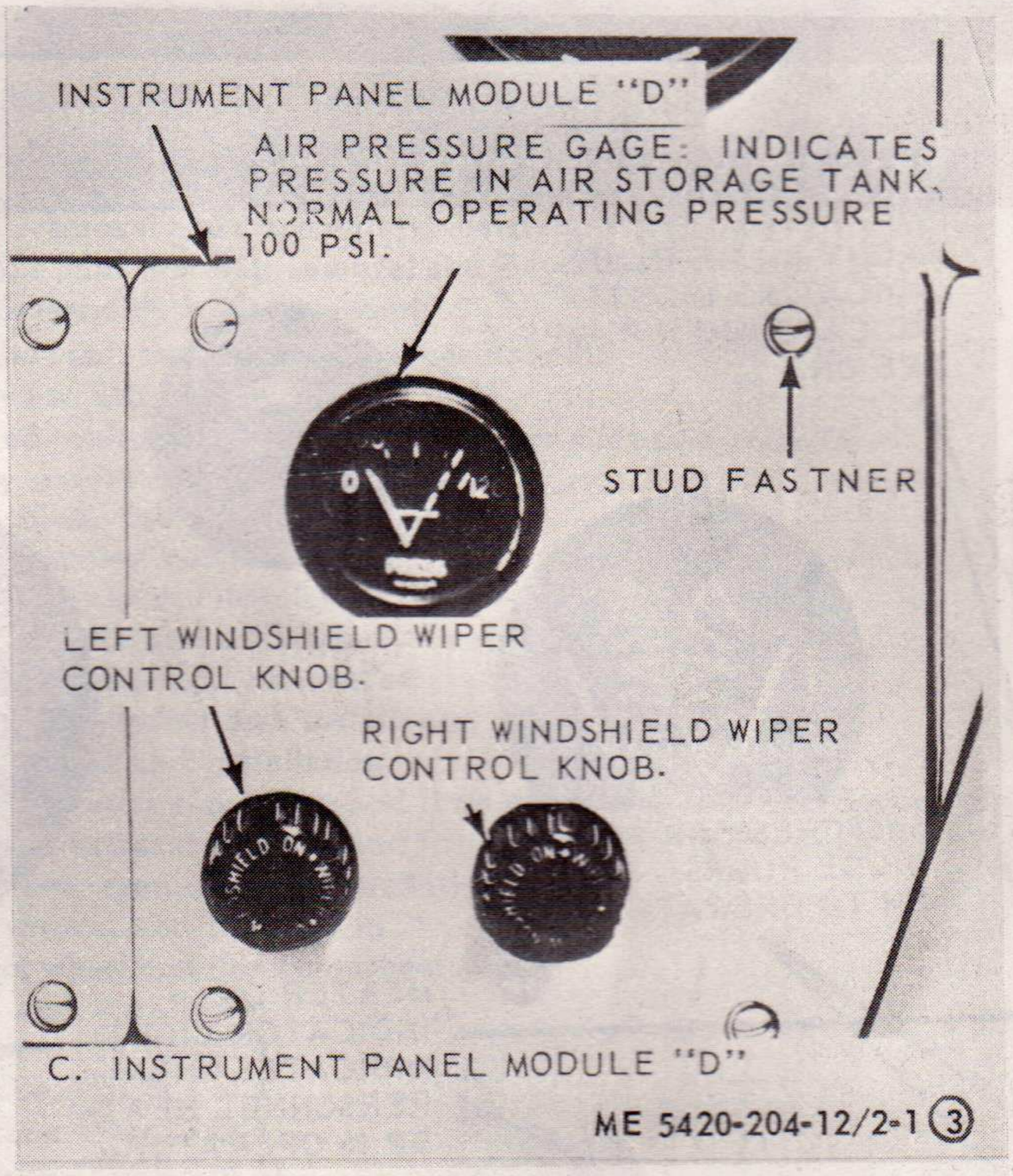



*Figure 2-1. Controls and instruments. (Sheet 3 of 16)*

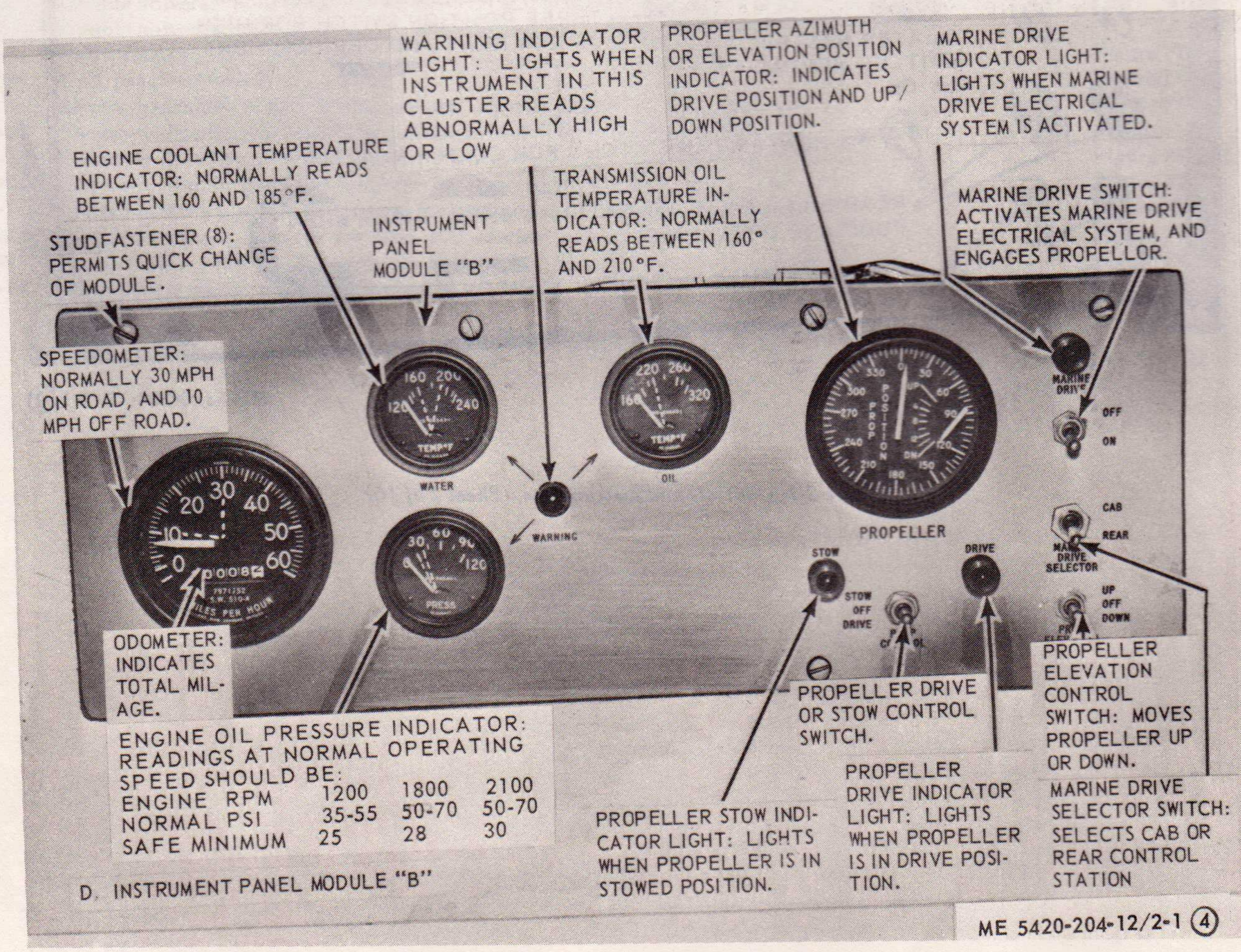



*Figure 2-1. Controls and instruments. (Sheet 4 of 16)*

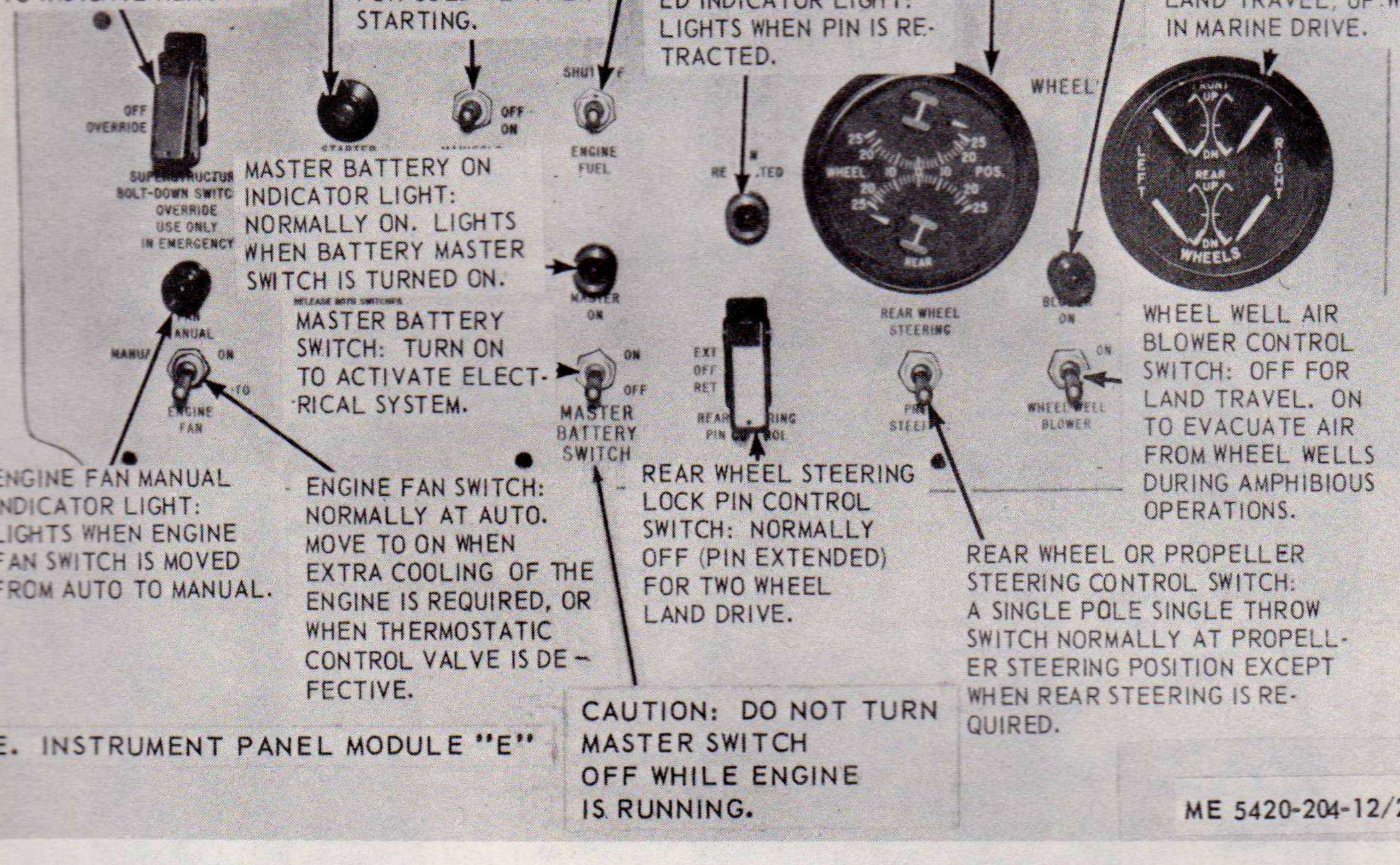



*Figure 2-1. Controls and instruments. (Sheet 5 of 16)*

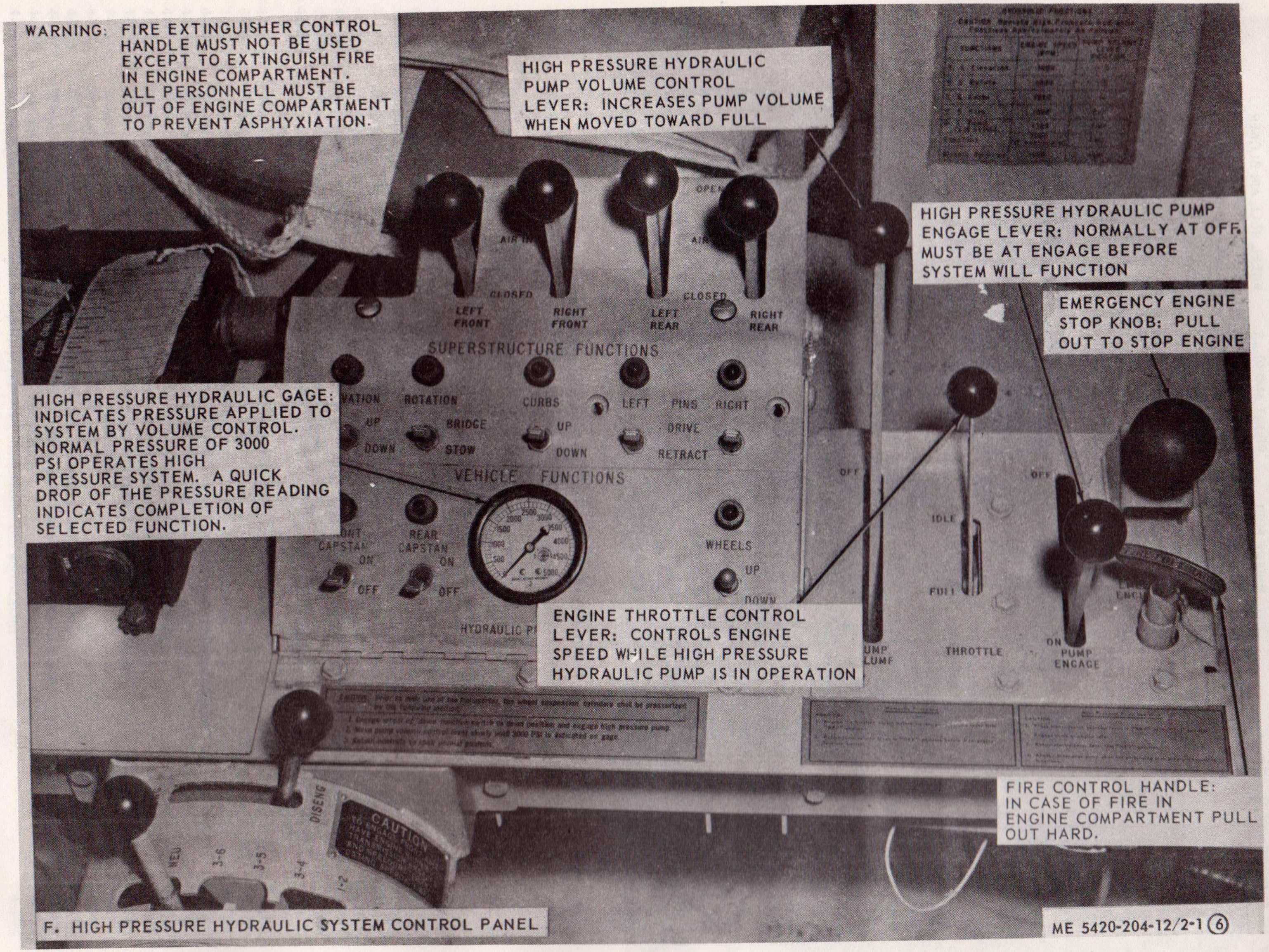
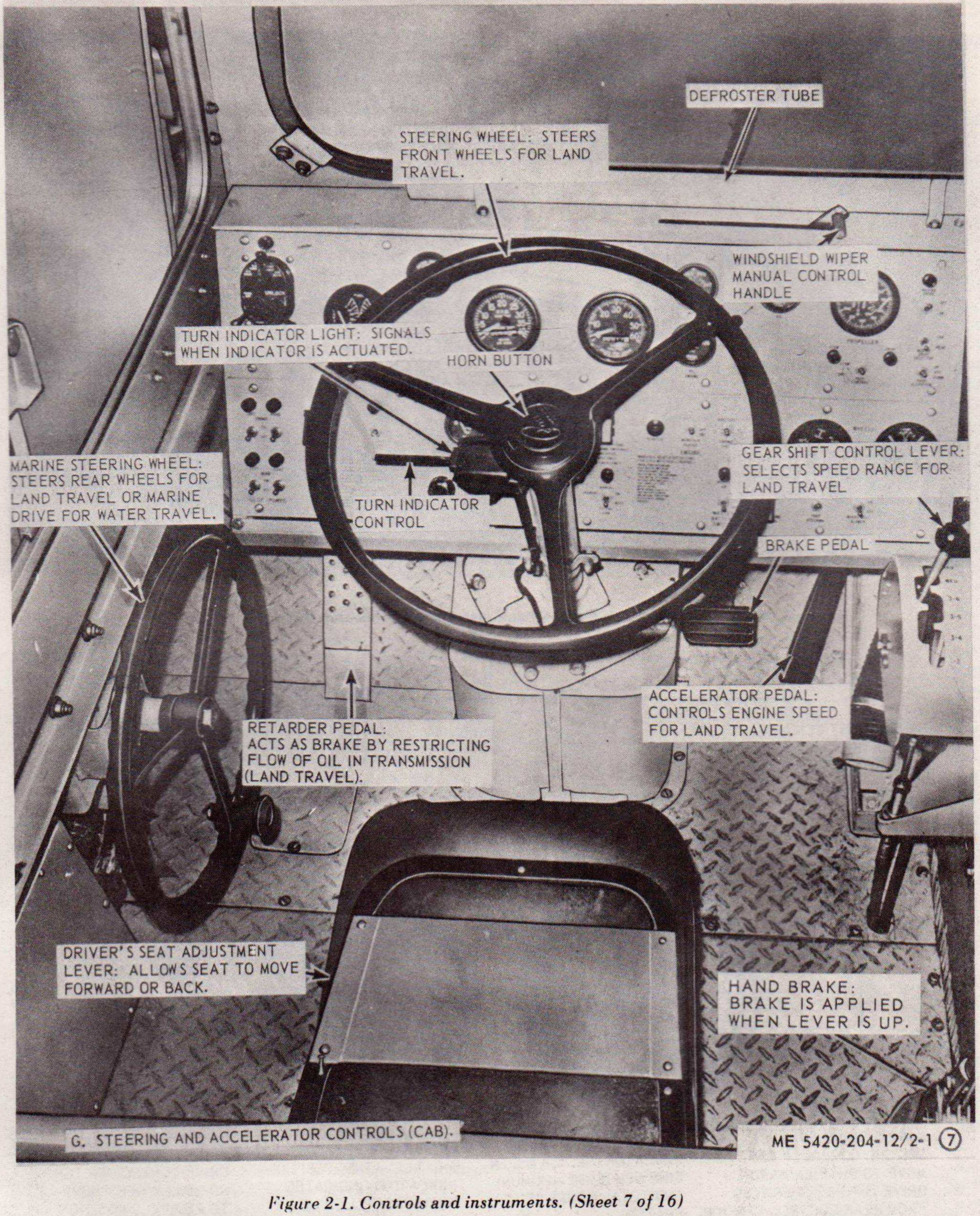



*Figure 2-1. Controls and instruments. (Sheet 6 of 16)*




G. STEERING AND ACCELERATOR CONTROLS (CAB).

ME 5420-204-12/2-1 (7)

*Figure 2-1. Controls and instruments. (Sheet 7 of 16)*

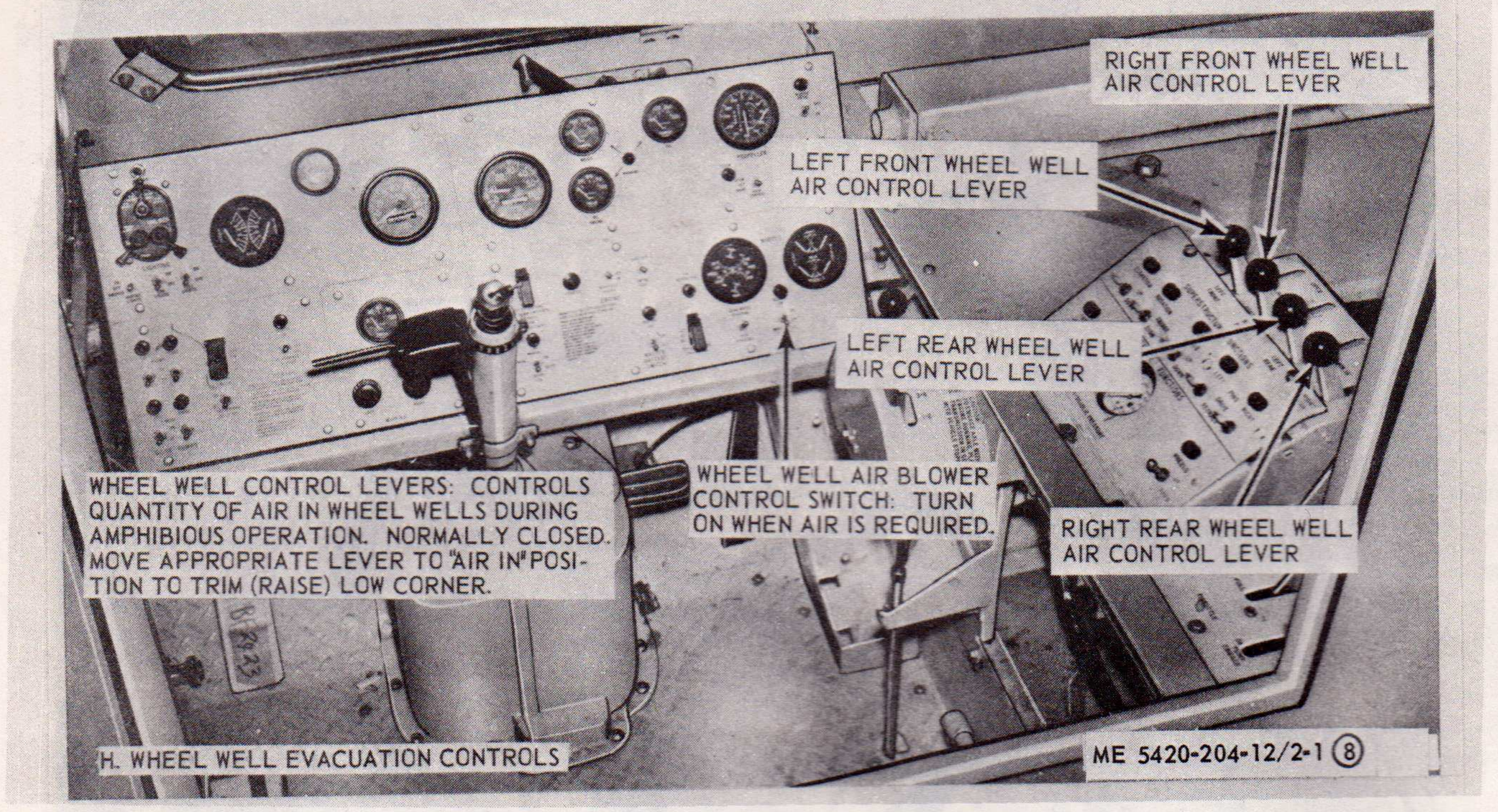



*Figure 2-1. Controls and instruments. (Sheet 8 of 16)*

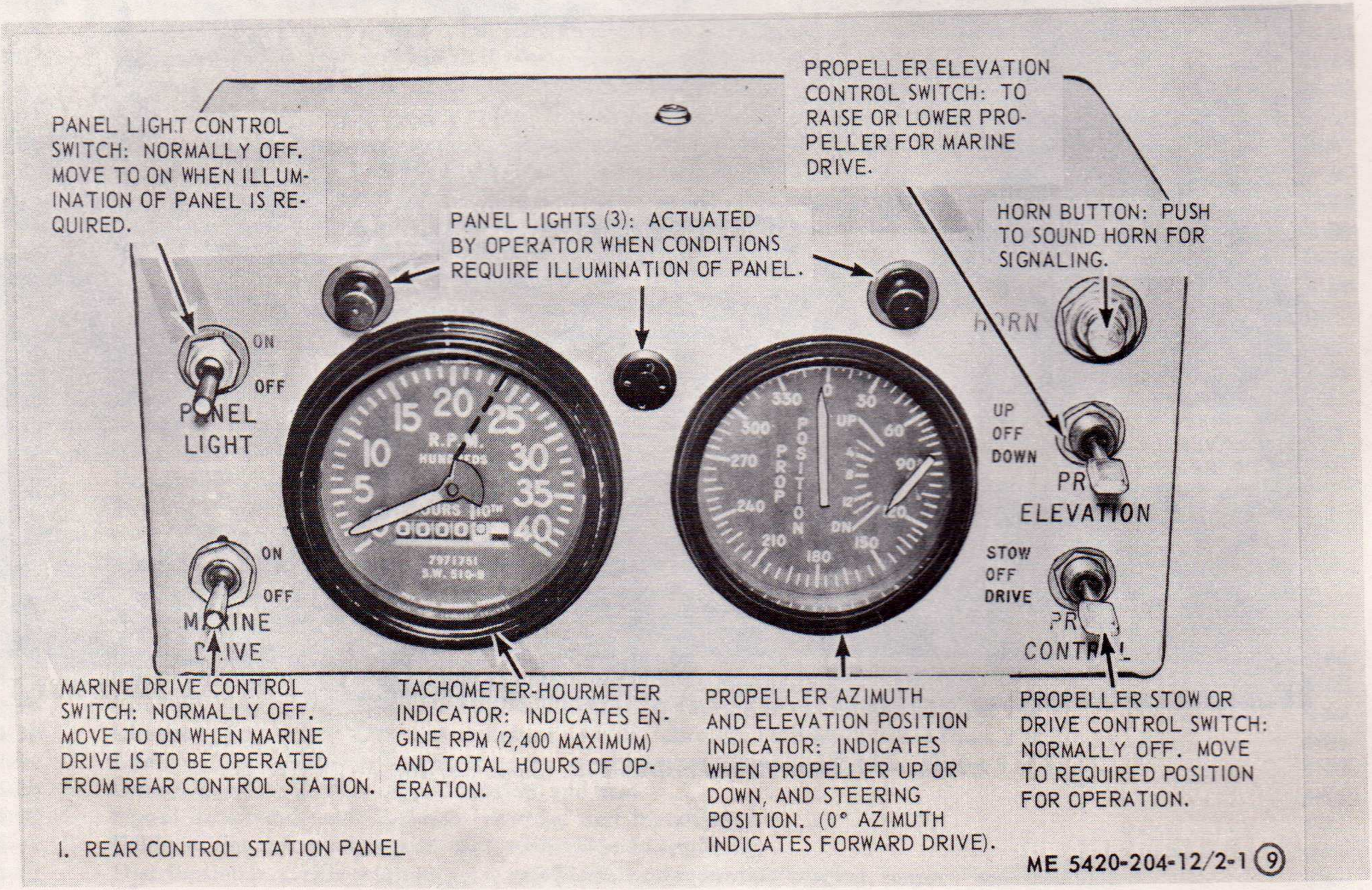



*Figure 2-1. Controls and instruments. (Sheet 9 of 16)*

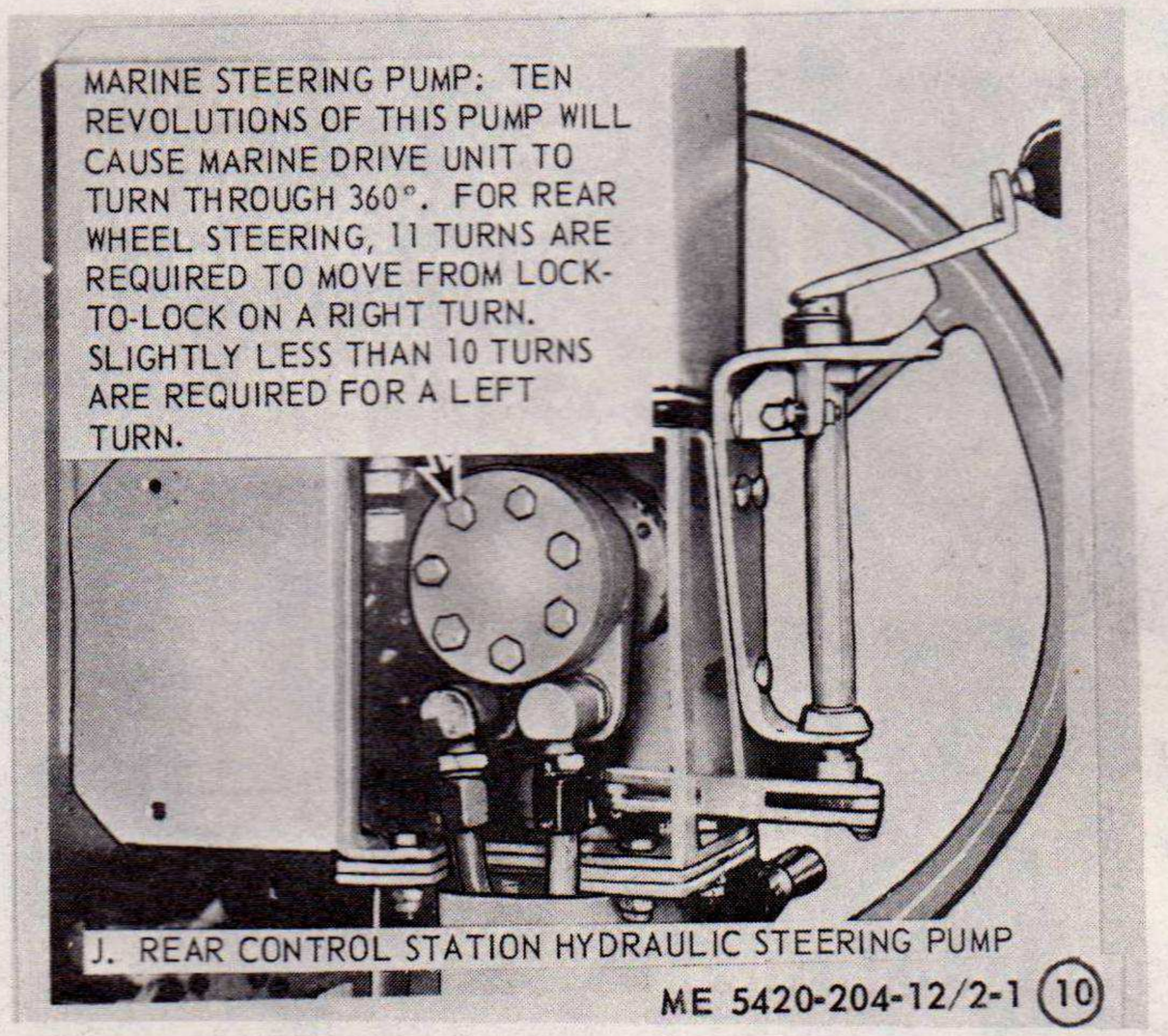



*Figure 2-1. Controls and instruments. (Sheet 10 of 16)*

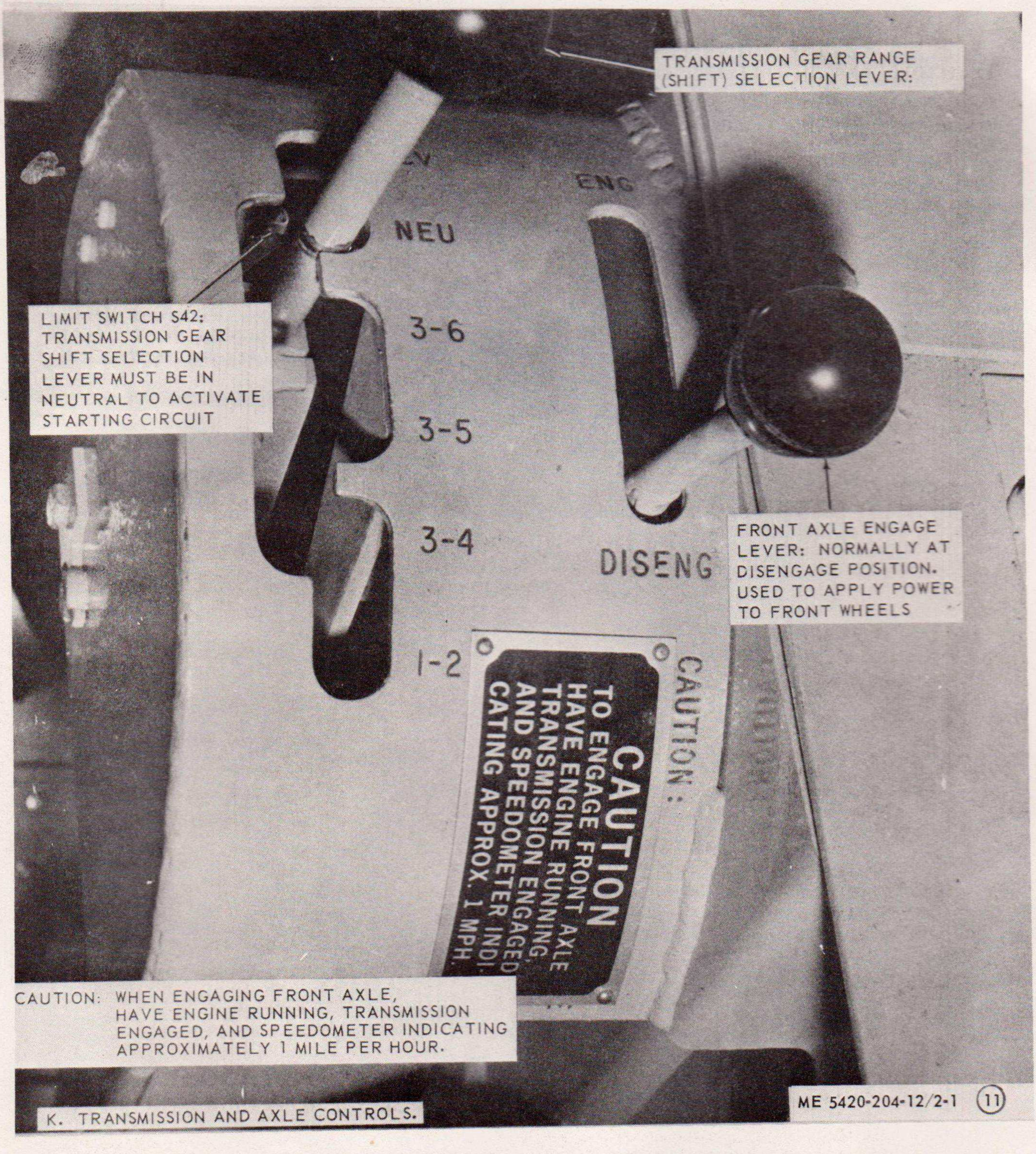



*Figure 2-1. Controls and instruments. (Sheet 11 of 16)*

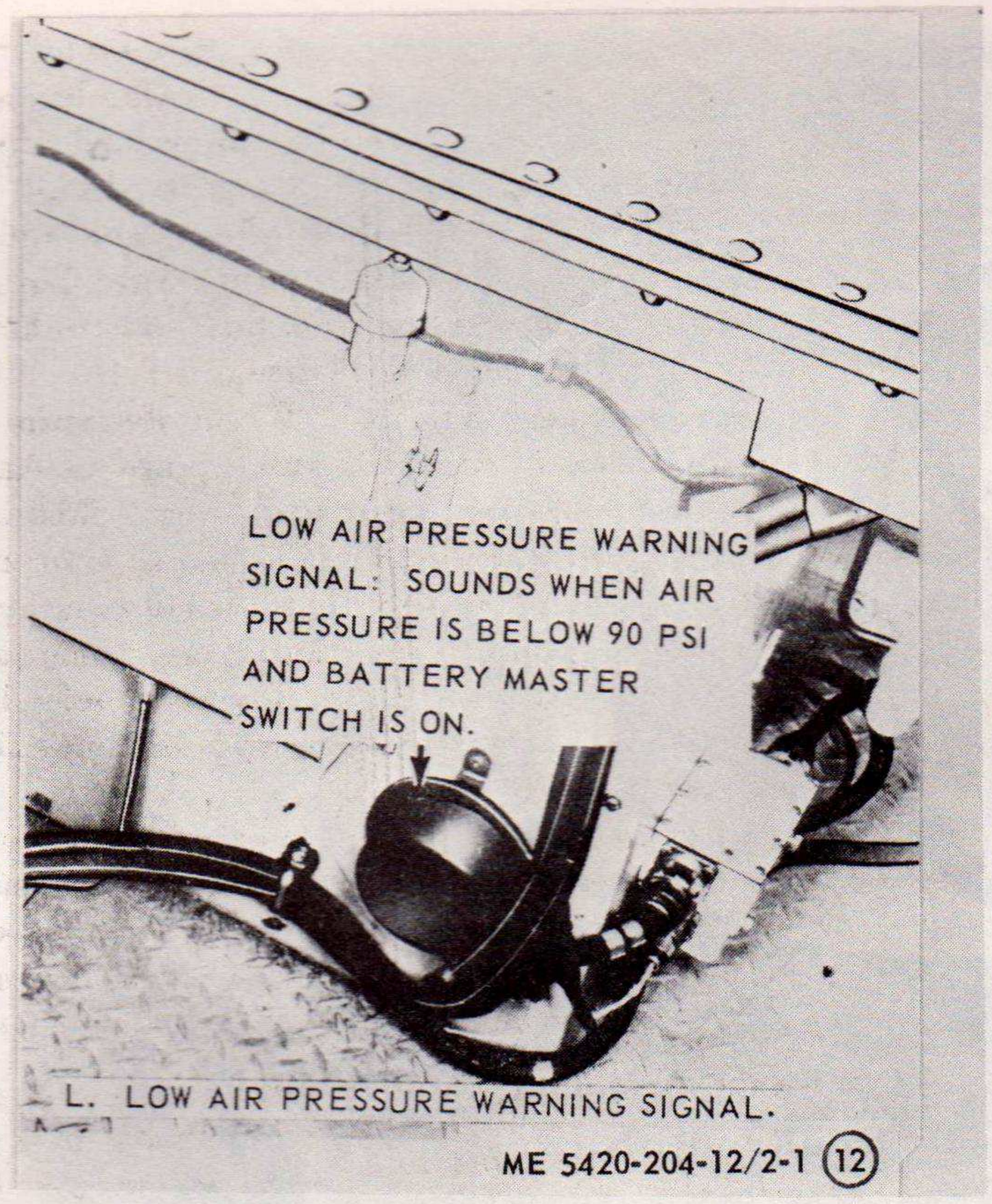



*Figure 2-1. Controls and instruments. (Sheet 12 of 16)*

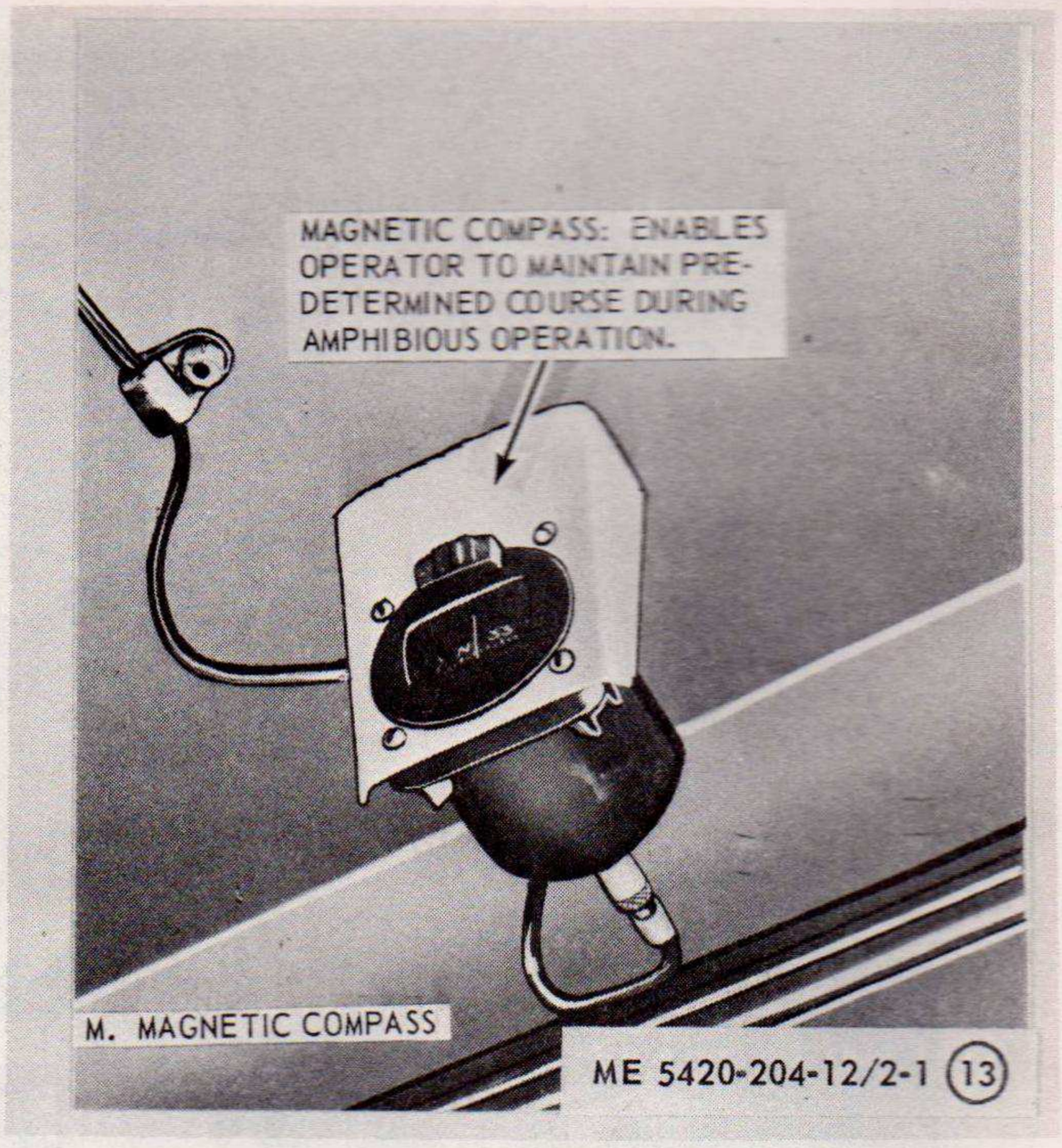



*Figure 2-1. Controls and instruments. (Sheet 13 of 16)*

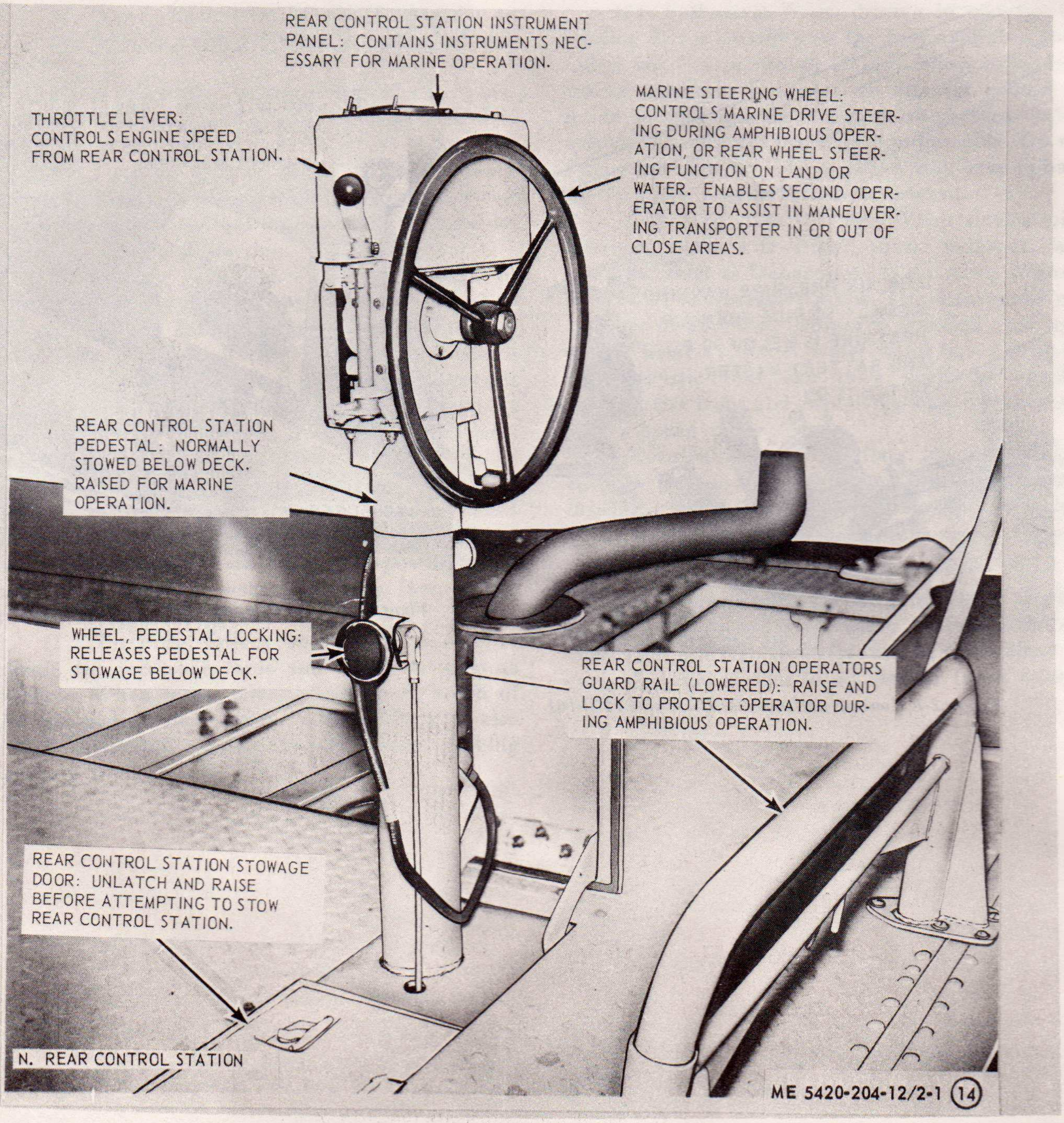
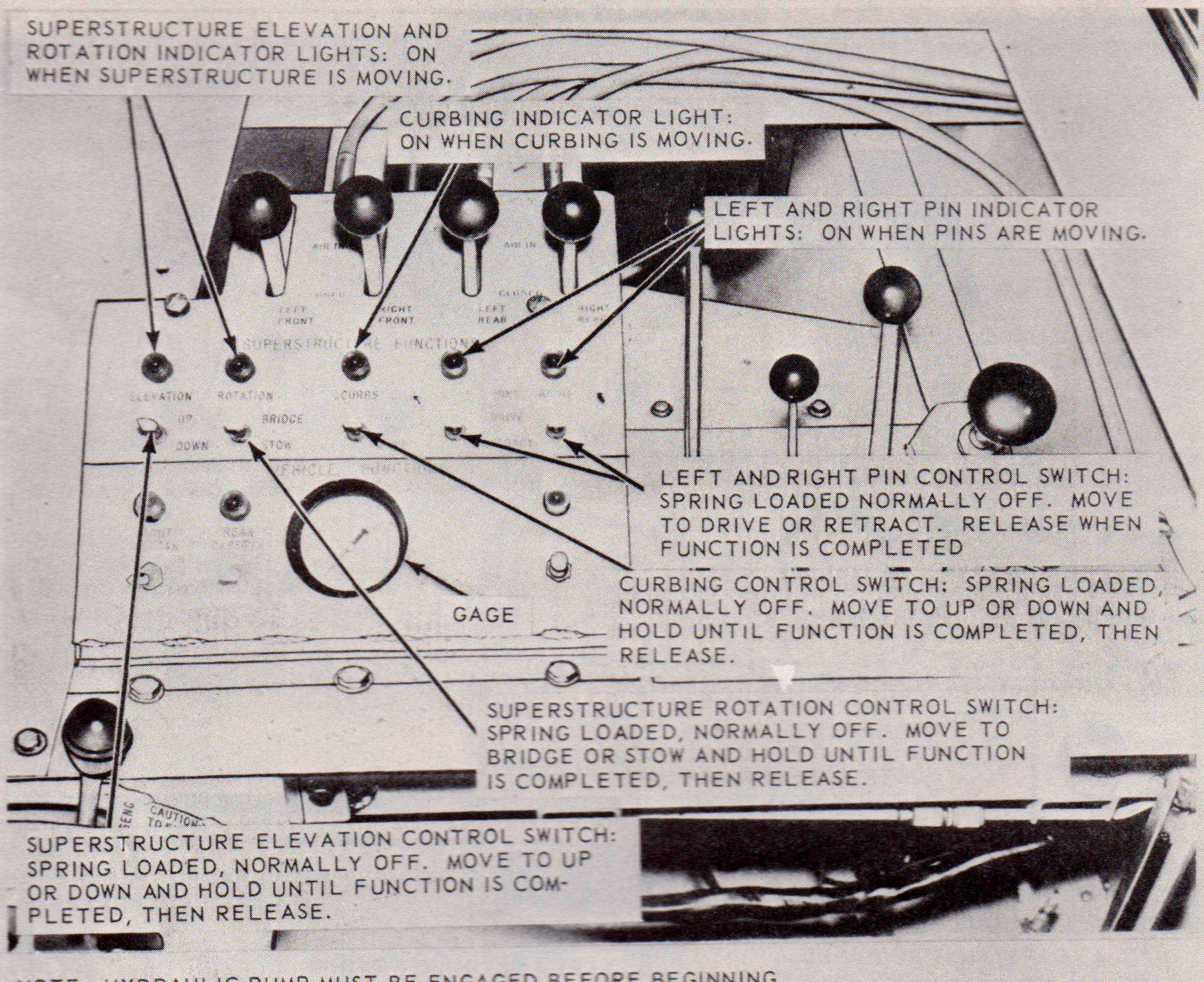



*Figure 2-1. Controls and instruments. (Sheet 14 of 16)*




NOTE: HYDRAULIC PUMP MUST BE ENGAGED BEFORE BEGINNING HYDRAULIC OPERATIONS. ALL HYDRAULIC FUNCTIONS ARE COMPLETED ONE AT A TIME. MOVE CONTROL SWITCH TO FUNCTION REQUIRED AND HOLD IN POSITION WHILE PULLING VOLUME CONTROL LEVER TOWARD "FULL". WHEN FUNCTION IS COMPLETED AS INDICATED BY A QUICK DROP OF PRESSURE READING ON GAGE, MOVE VOLUME CONTROL LEVER TO OFF, THEN RELEASE FUNCTION CONTROL SWITCH.

O. SUPERSTRUCTURE HYDRAULIC FUNCTION CONTROLS (INTERIOR BAY). ME 5420-204-12/2-1 (15)

*Figure 2-1. Controls and instruments. (Sheet 15 of 16)*

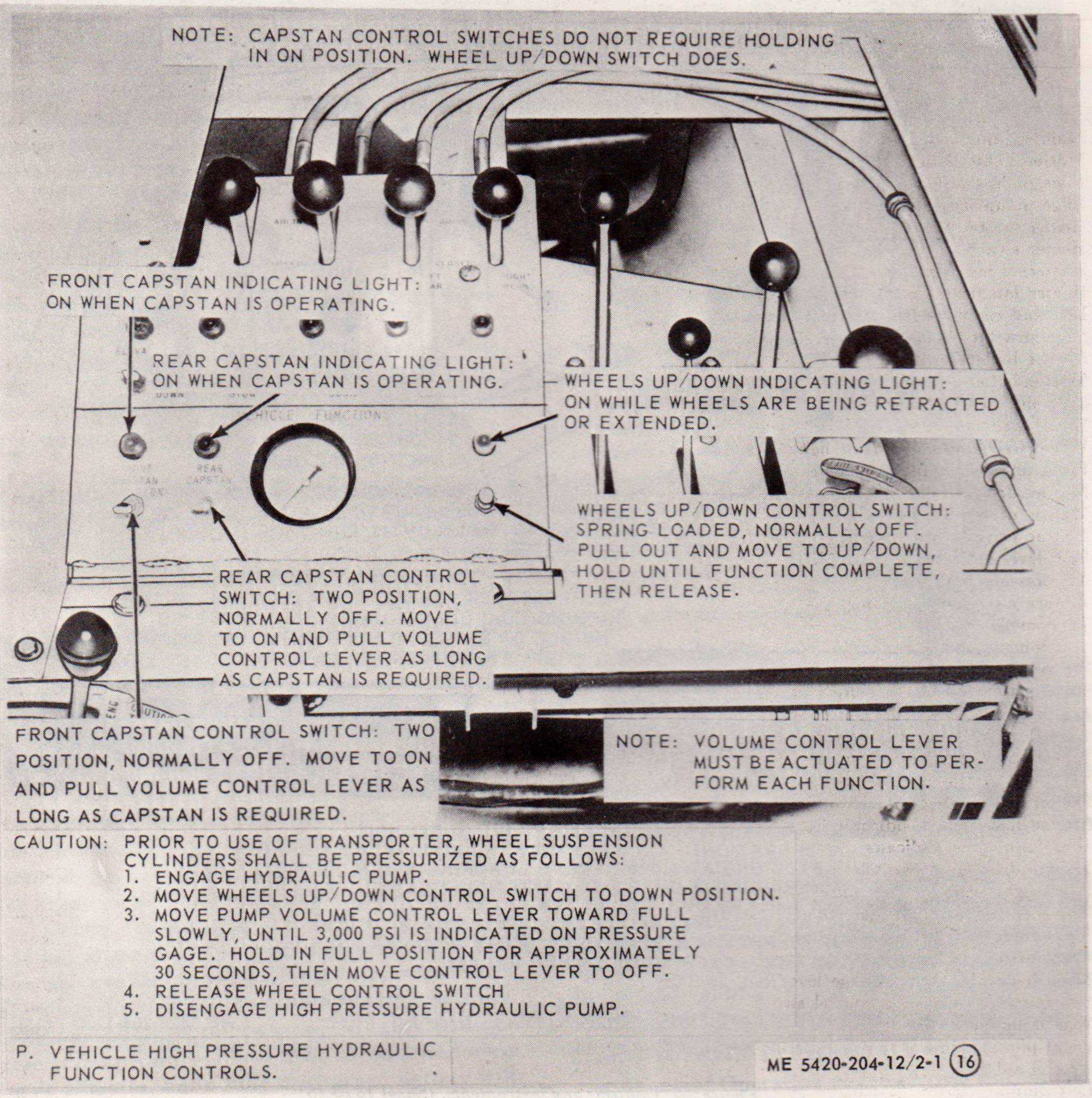



*Figure 2-1. Controls and instruments. (Sheet 16 of 16)*

**2-3. Starting**

*a. Preparation for Starting.*

(1) Refer to paragraph 3-3 and perform preventive maintenance checks and services.

(2) Lubricate Bridge Ferry Unit in accordance with current Lubrication Order (para 3-2).

(3) Refer to Table 2-1 for normal position of controls and instruments. Position all controls as indicated in Table 2-1 prior to starting engine.

**WARNING**

**Be sure that all controls are properly positioned before any attempt is made to start the unit. Refer unusual conditions to the proper authority for resolution. Failure to observe this warning may result in serious injury or death to personnel, or in damage to the unit.**

*Table 2-1. Normal Position of Controls and Instruments for Starting the Transporter*

| Nomenclature | Normal position | Location |
|---|---|---|
| Main lighting switch | All OFF and Locked | figure 2-1 |
| Marine lights switch | OFF | figure 2-1 |
| Bilge pumps off-on switches | OFF | figure 2-1 |
| Bilge pump indicator lights | OFF | figure 2-1 |
| Heater master switch | ON | figure 2-1 |
| Heater switch | OFF | figure 2-1 |
| Heater-on indicator light | OFF | figure 2-1 |
| Heater fan (cold air) switch | OFF | figure 2-1 |
| Left and right windshield wiper control knobs | OFF | figure 2-1 |
| Superstructure bolt-down override switch | OFF | figure 2-1 |
| Master battery switch | ON | figure 2-1 |
| Master battery switch indicator light | ON | figure 2-1 |
| Propeller steering rear wheel steering switch | PROP STEERING | figure 2-1 |
| Wheel well blower switch | OFF | figure 2-1 |
| Wheel well blower indicator light | OFF | figure 2-1 |
| Front and rear capstan switches | OFF | figure 2-1 |
| Marine drive off-on switch | CAB | figure 2-1 |
| Marine drive off-on switch | OFF | figure 2-1 |
| Marine drive indicator light | OFF | figure 2-1 |
| Fuel level indicator | "F" (full) | figure 2-1 |
| Air pressure indicator | 0 to 100 | figure 2-1 |
| Battery alternator indicator | Yellow or green | figure 2-1 |
| Tachometer-hourmeter | Zero rpm | figure 2-1 |
| Speedometer-odometer | Zero rpm | figure 2-1 |
| Water temperature indicator | 120° F | figure 2-1 |
| Transmission oil temperature indicator | 160° F—210° F | figure 2-1 |
| Warning indicator light | ON | figure 2-1 |
| Propeller position indicator (on main control panel) | UP and 180 degrees | figure 2-1 |
| Wheels position indicator | Front wheels depend on position.<br>Rear wheels, zero | figure 2-1 |
| Engine fan manual override switch | AUTO | figure 2-1 |
| Engine fan manual indicator light | OFF | figure 2-1 |
| Wheels up-down indicator | ALL DOWN | figure 2-1 |
| Marine drive off-on switch | OFF | figure 2-1 |
| Panel light switch (rear control station panel) | OFF | figure 2-1 |
| Propeller position indicator (on rear control panel) | UP and 180 degrees | figure 2-1 |
| Accelerator pedal | Idle | figure 2-1 |
| Transmission shift lever | NEU | figure 2-1 |
| Main hydraulic pump engage lever | OFF (disengaged) | figure 2-1 |
| Superstructure elevation control switch | Centered (between UP and DOWN) | figure 2-1 |
| Wheels up-down switch | Centered (between UP and DOWN) | figure 2-1 |
| Right pinning control switch (interior bay panel only) | Centered (between DRIVE and RETRACT) | figure 2-1 |
| Left pinning control switch | Centered (between DRIVE and RETRACT) | figure 2-1 |
| Ramp control switch (end bay unit only) | Centered (between FOLD and UNFOLD) | figure 2-1 |
| Superstructure rotation control switch | Centered (between BRIDGE and STOW) | figure 2-1 |
| Curbing control switch | Centered (between UP and DOWN) | figure 2-1 |
| Hydraulic pump volume control lever | OFF | figure 2-1 |
| Axle shift lever | DISENGAGED | figure 2-1 |
| Hand brake lever | APPLIED | figure 2-1 |

*b. Normal Starting.* Refer to figure 2-2 and start engine.

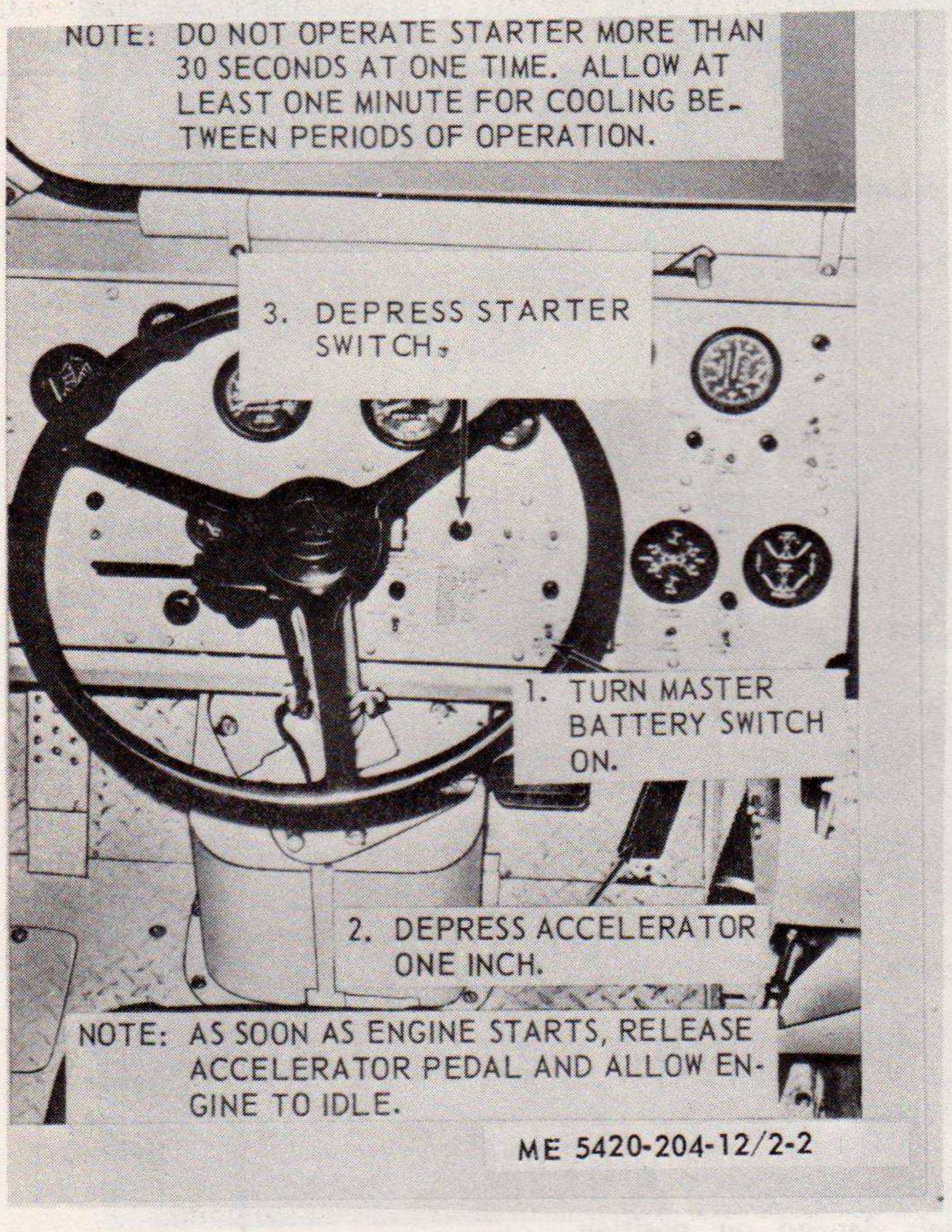



*Figure 2-2. Starting the engine.*

*c. Starting Engine by Slaving.*

(1) Refer to figure 2-3 for location of electrical connector receptacle.

(2) Turn master switch OFF on vehicle to be slaved.

(3) Connect slave cable to slaving vehicle, then to vehicle being slaved.

(4) Start engine as described in figure 2-2.

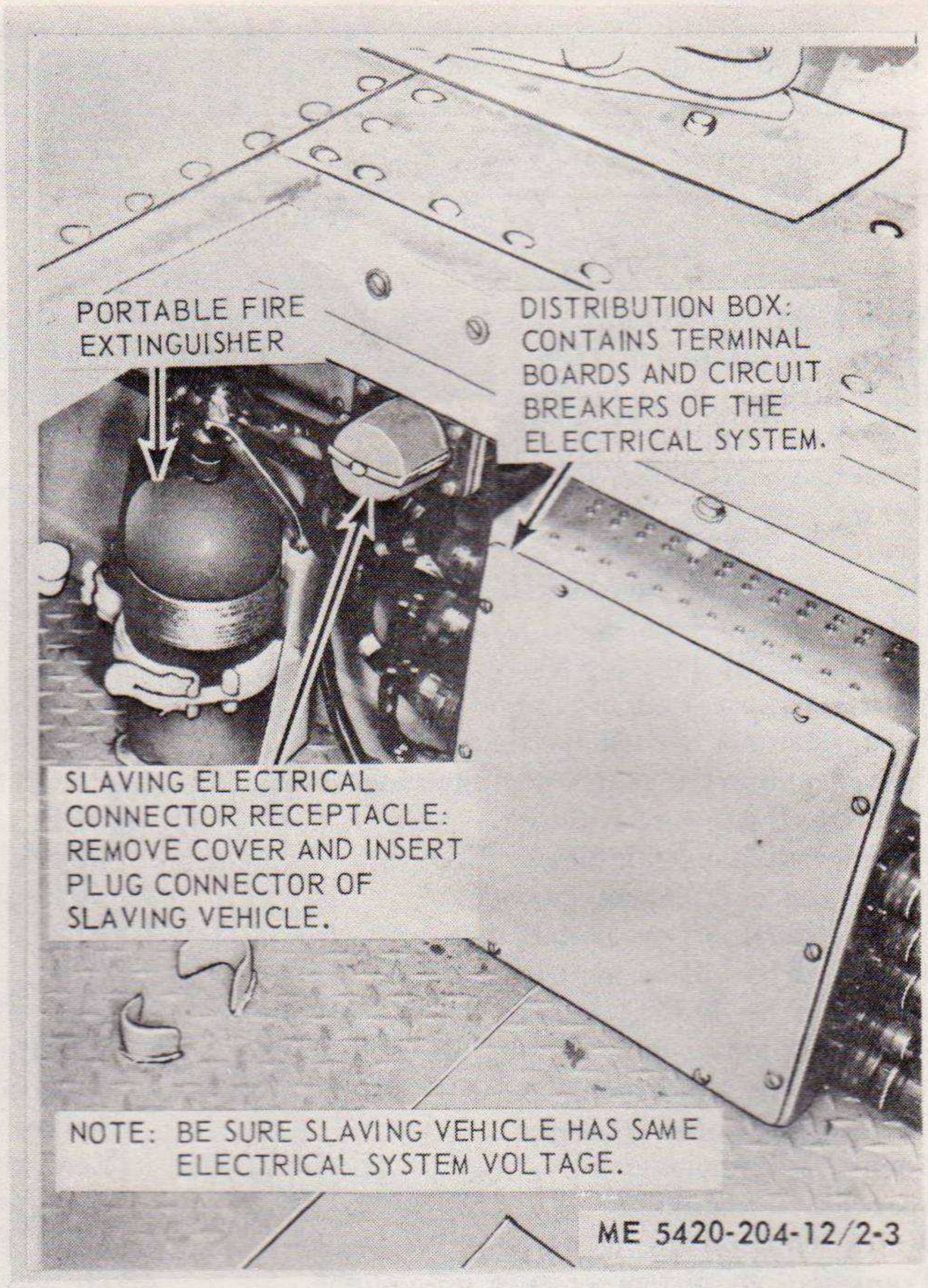



*Figure 2-3. Slave receptacle for starting engine, and distribution box, installed view.*

*d. Cold Weather Starting.* Refer to paragraph 2-19 for cold weather operating and starting instructions.

## 2-4. Stopping the Engine

*a. Normal Stopping.* Refer to figure 2-4 for normal stopping of engine procedure.

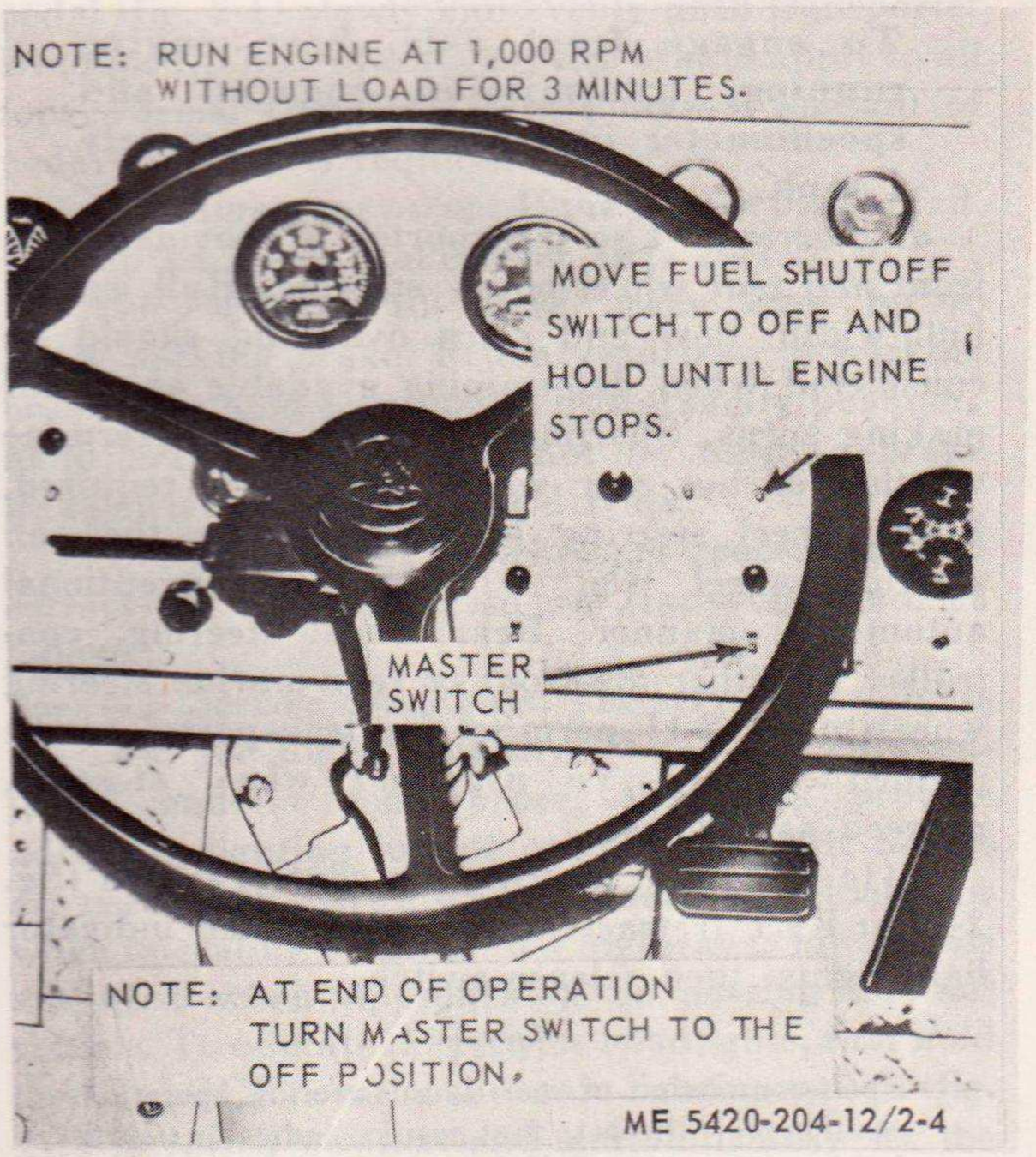



*Figure 2-4. Stopping the engine.*

*b. Emergency Engine Stopping.*

(1) Refer to figure 2-5 for emergency stopping instructions.

(2) After engine has been stopped by emergency procedure, the air inlet housing valve must be reset by hand. Refer to figure 2-6 for reset procedure.

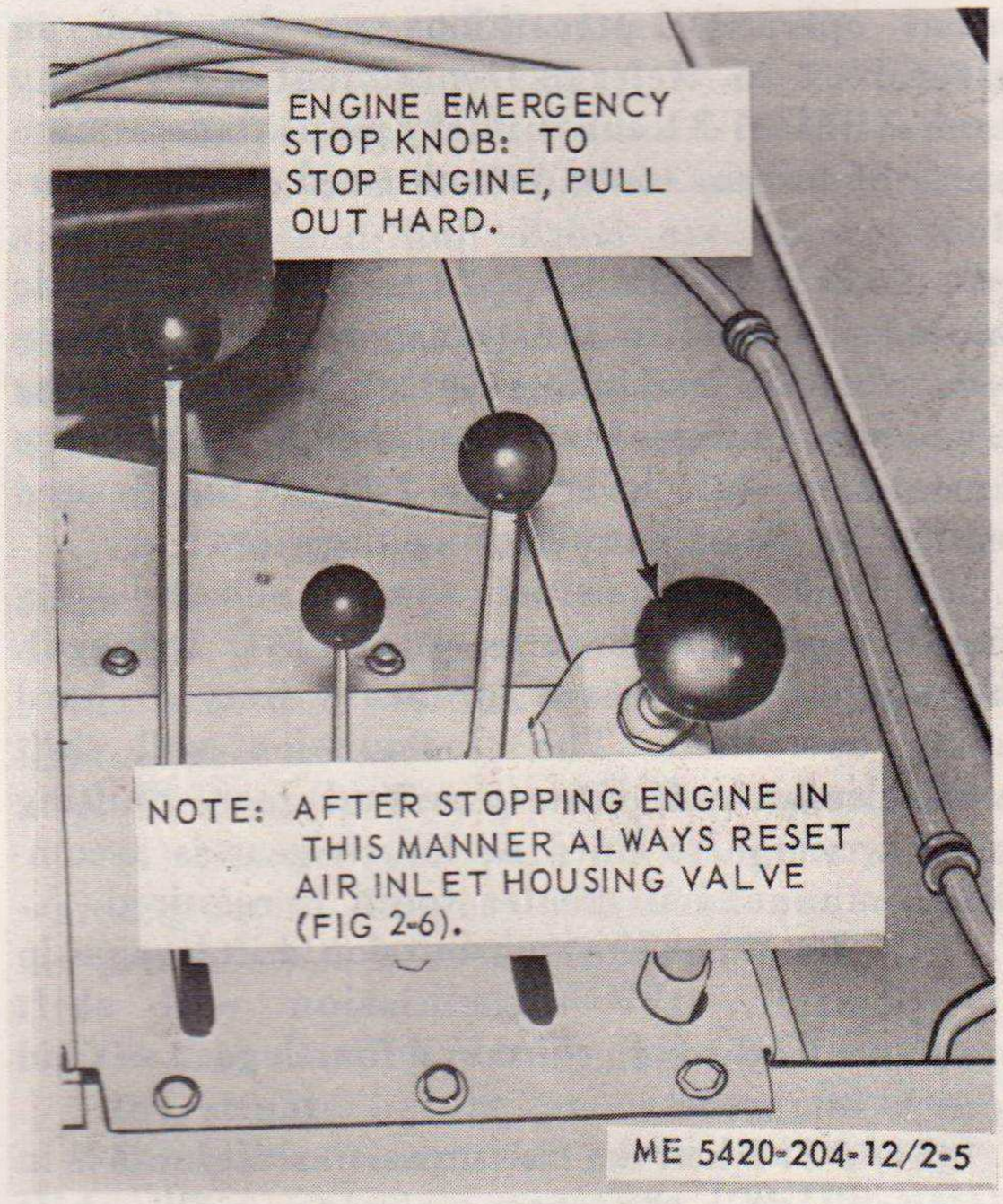



*Figure 2-5. Emergency engine stopping.*

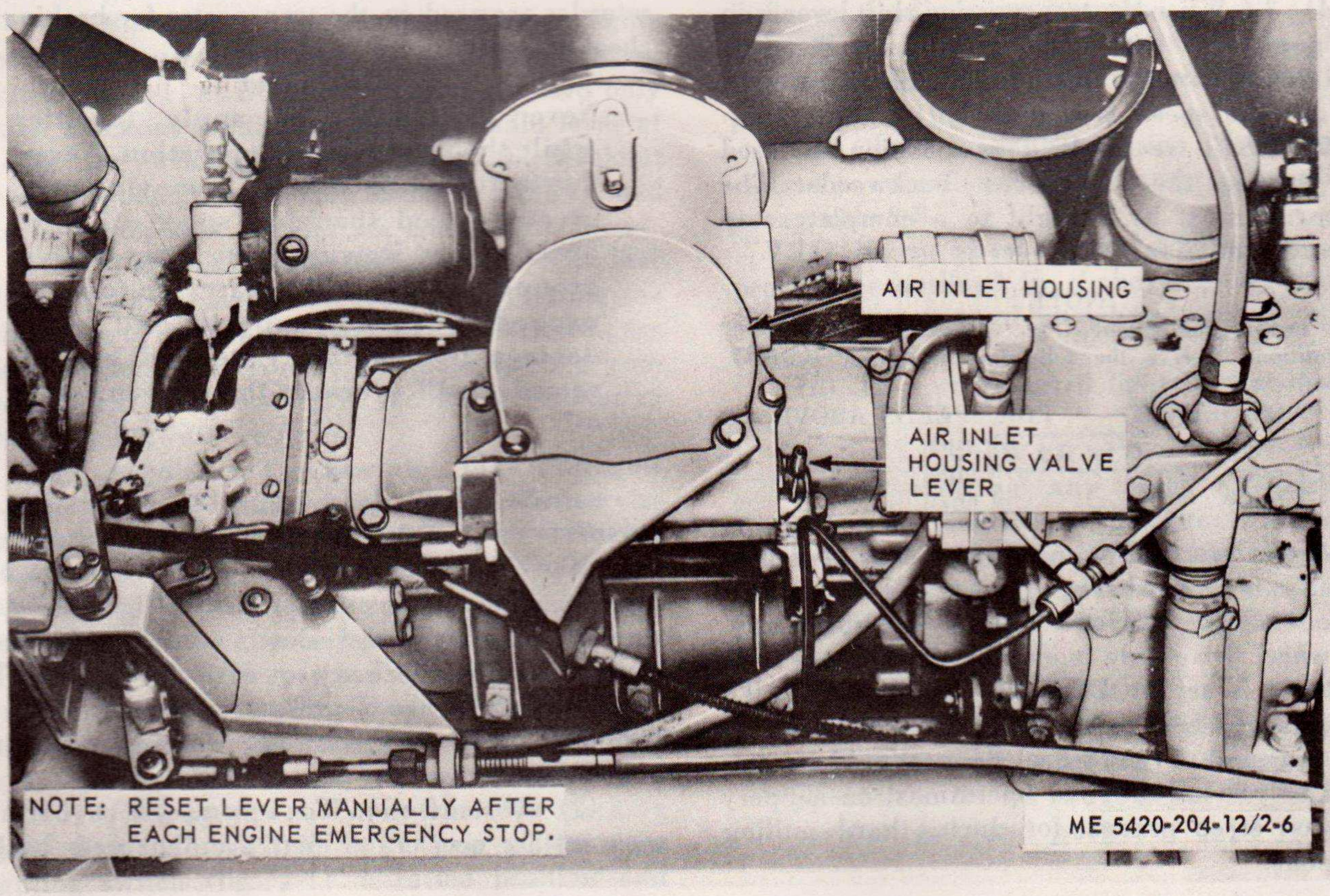



*Figure 2-6. Resetting air inlet housing valve.*

## 2-5. Operation of Equipment on Land

*a. General.* Methods employed to operate the transporter on highways and normal terrain are similar to those used in operating a conventional 4 x 4 truck; operation on sand, mud, or coral requires special operating precautions as described in paragraph 2-25. Refer to Department of the Army Manual FM 21-31 and military maps to determine nature of terrain to be encountered during operation.

*b. Transmission Shifting.* The automatic transmission used in the transporter provides six speeds forward and one reverse. Selection of the various speed ranges is accomplished by moving the transmission shift lever (fig. 2-1) to the desired position on quadrant. The positions are:

(1) *1-2.* This position can be selected only when the axle shift lever is set at ENG (engage). The 1-2 position is used for heavy duty or hard pulling operations. The transmission will shift automatically from first to second gear. Shifting from low range to third or fourth gear is accomplished manually if greater speed is required.

(2) *3-4.* When the transmission shift lever is in this position, the transmission will shift automatically through third and fourth gear as road speed is increased.

(3) *3-5.* When the transmission shift lever is in this position, the transmission will shift automatically through third, fourth, and fifth gears as road speed is increased.

(4) *3-6.* When the transmission shift lever is in this position, the transmission will shift automatically through third, fourth, fifth, and sixth gears as road speed is increased.

(5) *REV.* (reverse). This position is used when driving the transporter backwards. The transporter must be brought to a complete stop before transmission shift lever is set at "REV"

NOTE

To protect the engine from a forced overspeed condition, observe the following maximum shift speeds:

| DO NOT SELECT | FOR SPEEDS ABOVE |
|---|---|
| 3-5 range | 27 mph |
| 3-4 range | 19 mph |
| 1-2 range | 9 mph |

*c. Axle Shifting.* The transporter may be driven by front and rear wheels, or by rear wheels only; the front wheels cannot be driven independently. Rear wheel drive only is employed when the axle shift lever is set at DISENG (disengaged). To employ front wheel drive, move axle shift lever to ENG (engage). Front wheel drive should be employed only in off-the-road operations, on slippery roads, on steep grades, for during hard pulling operations.

CAUTION

**To engage front axle, have engine running, transmission engaged and speedometer indicating approximately 1 mph.**

*d. Steering.* The transporter is provided with front and rear wheel power steering. Hull length, hull width, bow and stern overhand should be considered when determining available space for making turns. Sharpness of turn will determine whether or not rear wheel steering is required. Front wheel steering is controlled by the cab steering wheel (fig. 2-1) in the conventional automotive manner. Rear wheel steering, controlled by either the front or rear marine steering wheels (fig. 2-1) permits the transporter to be pivoted sharply. To use rear wheel steering, proceed as follows:

(1) Hold rear steering pin control switch (fig. 2-1) at RET (retract) until pin retracted indicator light lights, then release switch.

NOTE

Upon completion of rear wheel steering operation, position rear wheels so that position indicator (fig. 2-1, sheet 5) reads ZERO, hold rear steering pin control switch at EXT position until rear wheels are locked, then release switch and guard.

(2) Set propeller steering-rear wheel steering switch (fig. 2-1) at REAR WHEEL STEERING.

*e. Braking.* A parking brake (hand brake), hydraulic service brakes (foot brakes), and a retarder are used on the transporter for braking or checking speed.

CAUTION

**Never downshift, or apply throttle, while the retarder is in operation. Never downshift while vehicle is moving at a greater speed than top speed of next lower range. Downshifting at excessive ground speed will cause engine to exceed governed speed and may damage the engine. Extended use of retarder will overheat the transmission oil.**

NOTE

Retarder may be applied in any range, but is more effective in the lower ranges.

(1) *Checking speed and down hill braking.* Release accelerator pedal (fig. 2-1) and depress retarder pedal slowly and evenly until transporter is checked to desired speed. The retarder pedal when depressed, acts as a brake to help slow vehicle to the lowest speed in the selected gear range.

(2) *Normal stop.* To accomplish a normal stop release accelerator pedal and depress brake

pedal (fig. 2-1) slowly and evenly until transporter is stopped. The hydraulic service brakes apply to all four wheels; therefore, only a normal amount of pedal pressure is required.

(3) *Emergency stop.* If the service brakes fail, pull up on hand brake lever (fig. 2-1).

(4) *Parking.* Pull hand brake lever up to apply parking brake. Primary purpose of parking brake is to hold transporter in stationary position; hand brake lever should not be used to brake transporter during normal driving.

*f. Use of Lights.* The operating procedures and correct use of lights used on transporter are as follows:

(1) *Service headlights.* The service headlights are used for night visibility. When properly adjusted and in good order, they will provide adequate lighting for all conditions. High beams are used when there are no approaching vehicles, or when operating on unlighted highways; low beams are used when approaching or passing another vehicle. To operate the service headlights, first hold the UNLOCK lever of the main lighting switch (fig. 2-1) in raised position and simultaneously set the main lever at SER DRIVE, then set the auxiliary lever at PANEL BRT or DIM. Lock levers by lowering UNLOCK lever. With the main lever set at SER DRIVE, the service taillight and service stoplight circuits are energized. High and low beams are controlled by depressing the dimmer switch (fig. 2-1).

(2) *Blackout driving lights.* These lights operate by setting the main lever of the lighting switch (fig. 2-1) at BO DRIVE, and are used only under blackout conditions. With the main lever of the lighting switch set at BO DRIVE, the blackout headlight, blackout marker, blackout taillight, and blackout stoplight circuits are energized.

(3) *Blackout marker lights.* Front and rear blackout marker lights are operated by setting the main lever of the lighting switch at BO MARK, are used during night convoy blackout driving conditions. Use of these lights facilitates estimating distances between vehicles.

(4) *Stoplights.* To operate the stoplights during normal daylight driving when the service headlights, blackout driving lights, or blackout marker light are not being used, hold the UNLOCK lever of the lighting switch in a raised position and simultaneously position the main lever at STOP-LIGHT to energize the service stop-light circuit. Relock UNLOCK lever. When the brake pedal is depressed, the service stoplights will light as a warning indication to rear-ward vehicles.

(5) *Parking lights.* To operate the parking lights, first hold the UNLOCK lever of the main lighting switch (fig. 2-1) in raised position and simultaneously set the main lever at SER DRIVE; then set the auxiliary lever at PARK. Relock UNLOCK lever.

(6) *Panel lights.* To operate instrument panel lights, unlock UNLOCK lever and place lighting switch main lever to BO DRIVE, BO MARK, STOPLIGHT, or SER DRIVE. To control brightness, position auxiliary lever at PANEL BRT or DIM (fig. 2-1). Relock UNLOCK lever.

(7) *Cab and hull lights.* Operation of cab dome lights and hull lights are controlled by switches on instrument panel (fig. 2-1). Turn these switches to ON position, then cab dome lights may be further controlled by individual switch on each light. Hull lights remain on until turned off at instrument panel.

(8) *Marine navigational lights.* To operate marine lights, position marine lights switch (fig. 2-1) at ON. This energizes all marine light. Placing switch at anchor position energizes only the anchor light at rear of deck.

*g. Driving the Transporter.* Proceed as follows:

(1) Start engine (para 2-3). Low air pressure warning device (buzzer) will sound until required air pressure has been attained.

**CAUTION**

**If the warning device does not sound, investigate before proceeding further. Do not attempt to move transporter until proper air pressure (90-100 psi) has been attained.**

(2) Insure that all engine and transmission indicator readings are normal.

(3) Insure that superstructure is properly stowed in accordance with instructions outlined in paragraph 2-10.

(4) Check to see that marine drive is properly stowed in accordance with instructions outlined in paragraph 2-8.

(5) If rear wheel steering is to be used, follow procedures outlined in *d* above. Wheel positions should be monitored on wheel position indicator (fig. 2-1).

(6) Turn on required lights as described in *f* above.

**WARNING**

**Before starting any road operations when the service headlights; blackout driving lights; or blackout marker lights are not being used, make certain that service stoplight circuit is energized.**

**CAUTION**

**Insure that cab doors are fully open, or fully closed during transporter operation. Doors must never be left in vertically folded position.**

(7) Set transmission shift lever (fig. 2-1) in position for desired speed range as described in *b* above.

(8) Release hand brake (fig. 2-1).

(9) Depress accelerator pedal slowly and evenly until transporter attains desired speed.

(10) Steer transporter as described in *d* above.

(11) Stop transporter as described in *c* above. Set transmission shift lever at NEU (neutral), apply hand brake and stop engine in accordance with procedures outlined in paragraph 2-4.

**CAUTION**

**If warning indicator light (fig. 2-1) lights at any time during operation of transporter, observe associated indicators to determine cause of trouble, and stop engine as quickly as convenient. Do not operate any marine function switches while transporter is in motion on land. Do not operate rear steering pin control switch while transporter is in motion.**

## 2-6. Transporter Crew Check List

*a. Before Operation Check for Land Operation.*

(1) *Driver.*

*(a)* Check with crewman and insure transporter has been lubricated in accordance with current lubrication order (para. 3-2).

*(b)* Insure that all preventive maintenance checks and services (para. 3-4) have been performed.

*(c)* Check the following items for proper operation:

Engine
Brakes
Steering
Lights
Windshield Wipers
Horn
Radio

*(d)* With engine running, check all gages for proper reading (fig. 2-1).

*(e)* Visually inspect drivers compartment for loose, missing, or broken equipment.

*(f)* Refer to paragraphs 2-19 through 2-26 for before operational checks when transporter is to be operated under unusual conditions.

(2) *Assistant Driver.*

*(a)* Visually inspect and insure that anchor, lifering, lines, fenders, and portable fire extinguishers are secure and undamaged.

*(b)* Inspect outside and inside of hull for damage, hydraulic system leaks, and missing or defective parts. Insure that engine compartment door is closed when operating transporter.

*(c)* Insure that safety stands and wheel chock blocks have all been removed from under hull.

*(d)* Remove canvas covers from front and rear hatch grilles, and properly stow.

*(e)* Stow the boarding ladder (para 4-24).

(3) *Crewman Check (Organizational).*

*(a)* Lubricate transporter in accordance with current lubrication order (para 3-2).

*(b)* Refer to paragraph 3-4 and perform all preventive maintenance checks and services.

**CAUTION**

**Always block transporter at jack point while performing maintenance in wheel wells or underneath the hull.**

*(c)* Visually inspect in wheel wells for damaged boots, seals, position transmitter electrical lead, breather hose, loose wheel lug nuts, suspension system, tires, etc. Remove any debris that may have lodged in the suspension system.

*b. Before Operation Check Before Entering Water.*

(1) *Driver.*

*(a)* Perform land operation checks in *a* above.

**CAUTION**

**The marine drive switch is not to be repositioned when engine speed exceeds 800 rpm, as unnecessary wear and damage will result.**

*(b)* Test marine drive controls from the cab.

NOTE

Make sure propeller steering / rear wheel steering switch is PROP STEERING, position.

*(c)* Move marine drive control switch (in cab) to REAR position.

*(d)* Engage front wheels to provide four wheel drive by use of axle shift lever (para 2-5-*c*).

NOTE

Insure that front-wheel drive is engaged prior to entering water. Leave engaged throughout amphibious operation and upon exiting water. It can be extremely difficult to engage front-wheel drive while transporter is in the water.

(2) *Assistant Driver.*

*(a)* Raise and secure the rear control station guard rail.

*(b)* Raise rear control station pedestal and secure the hatch cover.

*(c)* Install headset and microphone in rear control station intercommunication control panel.

*(d)* Check marine drive for proper operation in the following manner:

1. Move propeller control switch to DRIVE position.

2. Operate the prop elevation switch to lower and raise the propeller.

3. Refer to the caution in paragraph 1-7 *b* (2), then steer propeller through 360 degrees. Return to 0 degrees reading on position indicator by reversing steer direction.

**CAUTION**

**Never operate marine drive in excess of five minutes during check procedures.**

4. Operate engine at idle speed and leave marine drive switch in ON position.

5. Stow propeller.

6. Position marine drive switch at OFF position.

(3) *Crewman (Organizational).* Secure all drain plugs.

NOTE

Hull drain plugs are equipped with a stainless steel heli-coil insert to provide a non galling and non-corrosive thread for the drain plugs. Do not remove heli-coil inserts unless they are defective.

**WARNING**

**Always wear a life jacket for water operations. Water operation is inherently hazardous and failure to comply with this warning could result in injury or death to personnel. Remove life jacket before entering hull or engine room, to prevent it snagging on frame or moving mechanical parts.**

*c. Amphibious Operation Connect Up.*

(1) *Driver.*

*(a)* Apply hand brakes (fig. 2-1, Sheet 7)

*(b)* Place transmission shift lever in 3-5 range or reverse.

*(c)* Place main hydraulic pump engage lever at ENGAGE position to engage main hydraulic pump power takeoff.

*(d)* Place transmission shift lever in NEUT (neutral) position.

*(e)* Position the four air control valve levers (fig. 2-1, sheet 8) in the OPEN position, and wheel well blower switch at OFF position.

**CAUTION**

**Do not pull hydraulic pump volume control lever toward FULL before activating electrical functional switch for desired hydraulic function. Further, the pump volume control lever must be moved to the OFF position before electrical function switch is released. Failure to comply will cause serious damage to the equipment.**

*(f)* Hold superstructure elevation control switch in UP position, pull hydraulic pump volume control lever (fig. 2-1, sheet 6) toward FULL until superstructure is completely raised (on signal, when assured holddown bolts have been loosened). Move volume control lever to OFF, and release elevation control switch.

*(g)* With superstructure in raised position, hold superstructure rotation control switch in BRIDGE position, and pull pump volume control lever toward FULL until superstructure has been correctly rotated (on signal). Move volume control lever to OFF, and release rotation control switch.

*(h)* Hold superstructure elevation control switch in DOWN position, and pull pump volume control lever toward FULL until superstructure has lowered to rest on holding devices (on signal). Move pump volume control lever to OFF then release elevation control switch.

*(i)* Place front and / or rear capstan switch (es) in ON position. On signal, pull hydraulic pump volume control lever toward FULL as long as use of capstan(s) is required.

*(j)* When connecting to left side of the unit, perform the following operations:

1. Hold left pinning control switch in RETRACT position and pull pump volume control lever toward FULL until pins are retracted as indicated by 3,000 psi reading on high pressure hydraulic gage. Move volume control lever to OFF and release left pinning control switch.

NOTE

Trim vessel by use of wheel well air blower when necessary, as described in (m) below.

2. When connecting bridge beams are matched, hold left pinning control switch in DRIVE position (on signal) and pull pump volume control lever toward FULL until pinning has been completed as indicated by 3,000 psi reading on hydraulic high pressure gage. Move volume control lever to OFF and release left pinning control switch.

NOTE

This subparagraph for interior bay unit only.

*(k)* When connecting to right side of the unit perform the following operations:

1. Hold right pinning control switch in RETRACT position and pull volume control lever toward FULL until pins are retracted as indicated by a reading of 3,000 psi on hydraulic high pressure gage. Move volume control lever to OFF and release right pinning control switch.

2. When connecting bridge beams are matched, hold right pinning control switch in DRIVE position (on signal) and pull volume control lever toward FULL until pinning has been completed as indicated by a reading of 3,000 psi on hydraulic high pressure gage. Move volume control lever to OFF and release right pinning control switch.

*(l)* Place front and / or rear capstan control switch(es) in OFF position (on signal).

**CAUTION**

**Never turn wheel well air blower motor ON, unless at least one control lever is at AIR IN, or OPEN. Insure that wheel well air control valves are returned to**

**the CLOSED position except when using blower.**

*(m)* For assistance in connecting units (raising or lowering a corner) move the proper wheel well air control valve lever to AIR IN (fig. 2-1, sheet 8)position and place wheel well air blower motor switch at ON. The wheel well air blower indicating light will be energized when switch is ON. Trim the transporter as required, move air valve lever to CLOSED, then move air blower motor control switch to OFF. When corner is high (air trapped in wheel well) move valve control lever to OPEN slowly, closing it when corner is level.

NOTE

This subparagraph for end bay only.

**WARNING**

**Do not unfold ramp until end bay unit is securely pinned to at least one other unit, to avoid capsizing.**

*(n)* When operating an end bay unit, all procedures are similar to steps *(a)* through *(j)* above, step *(l* and *m )* above, and (o) through *(r)* below. This step operates ramp section as follows:

1. Hold ramp control switch in UP (unfold) position (on signal) and pull volume control lever toward FULL until ramp is completely unfolded.

2. Move volume control lever to OFF then release ramp control switch.

*(o)* Check wheel position indicator (left / right) (fig. 2-1, sheet 5) and insure that both indicators point at zero. Use steering wheel to correct as required, then hold wheels up / down switch in UP position and pull hydraulic pump volume control lever toward FULL until wheels are retracted as indicated by a reading of 3,000 psi on hydraulic high pressure gage. Continue to hold that pressure for about 30 seconds, then move volume control lever to OFF and release wheels up / down switch.

*(p)* Hold curbing control switch in UP position (on signal, after crewman has connected intercom to adjacent unit), and pull hydraulic volume control lever toward FULL until curbing is in UP position as indicated by a reading of 1,000 psi on hydraulic high pressure gage. Move volume control lever to OFF and release curbing control switch.

*(q)* Move main hydraulic pump engage lever to OFF and disengage the main hydraulic pump power take-off.

*(r)* Assure that wheel well air control valve levers are in CLOSED position, and blower motor control switch if OFF, except when blower is used to put air in wheel wells.

(2) *Assistant Driver Check.*

*(a)* Insure that marine drive OFF-ON switch located in cab has been moved to ON position.

*(b)* Insure that marine drive selector switch located in cab has been moved to REAR position.

*(c)* Place propeller control switch in DRIVE position.

*(d)* When sufficient water depth has been obtained, and grounding conditions are not suspected, hold propeller elevation control switch in DOWN position until indicator reads 8—12 inches of extension range, then release switch. When grounding conditions are suspected, a position indicator reading of 1-2 inches extension range is permissible.

**CAUTION**

**Reduce engine RPM to idle prior to engaging marine drive.**

*(e)* Place marine drive OFF-ON switch located on rear control station at ON position.

*(f)* Assume command of transporter by operating rear steering wheel and throttle control lever.

*(g)* Signal driver (with horn) when pins are seated.

(3) *Crewman.*

*(a)* Use the superstructure wrench and release the four superstructure holddown bolts.

*(b)* After superstructure rotation, secure the four holddown bolts, then stow superstructure wrench.

*(c)* Check pins to assure they are retracted.

*(d)* Secure line to riding bitt (fig. 2-7). Stand by to cast line to connecting unit.

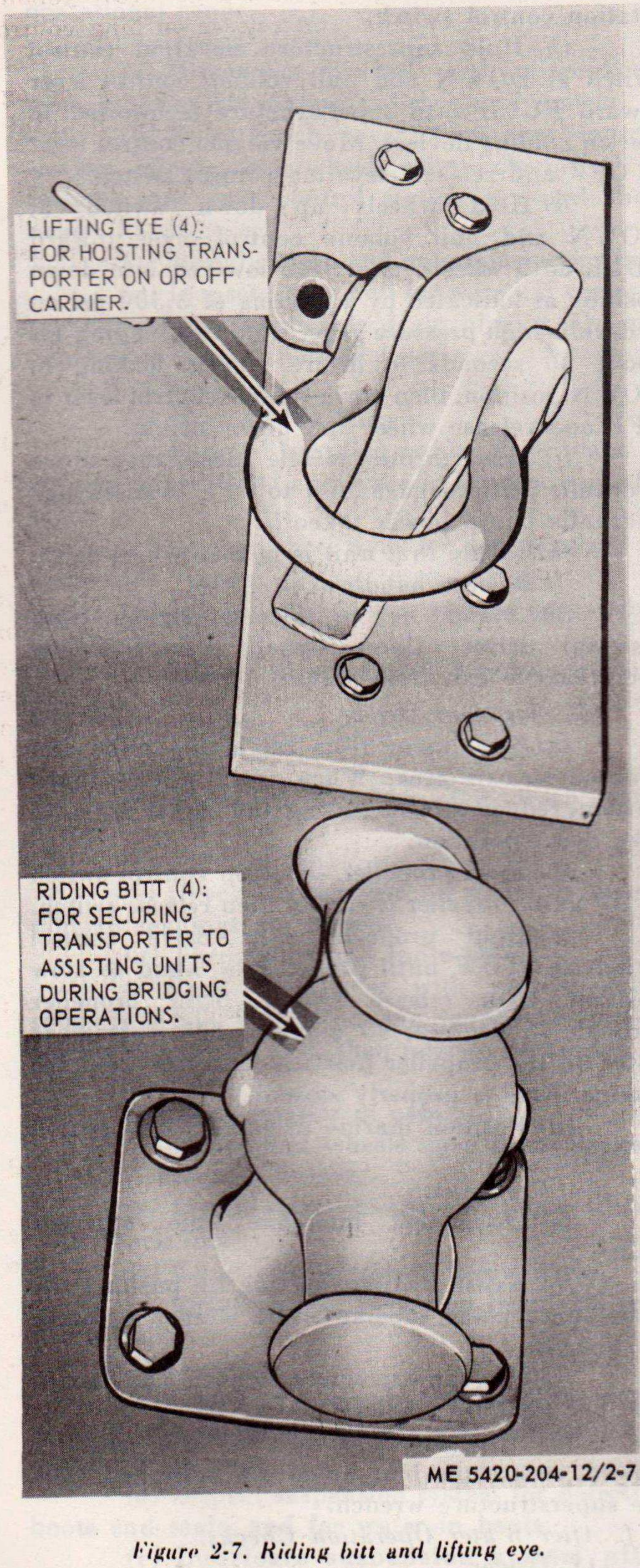



*Figure 2-7. Riding bitt and lifting eye.*

*(e)* Receive line from connecting unit and make four wraps (counterclockwise) around capstan (figure 2-8) being careful not to overlap the line.

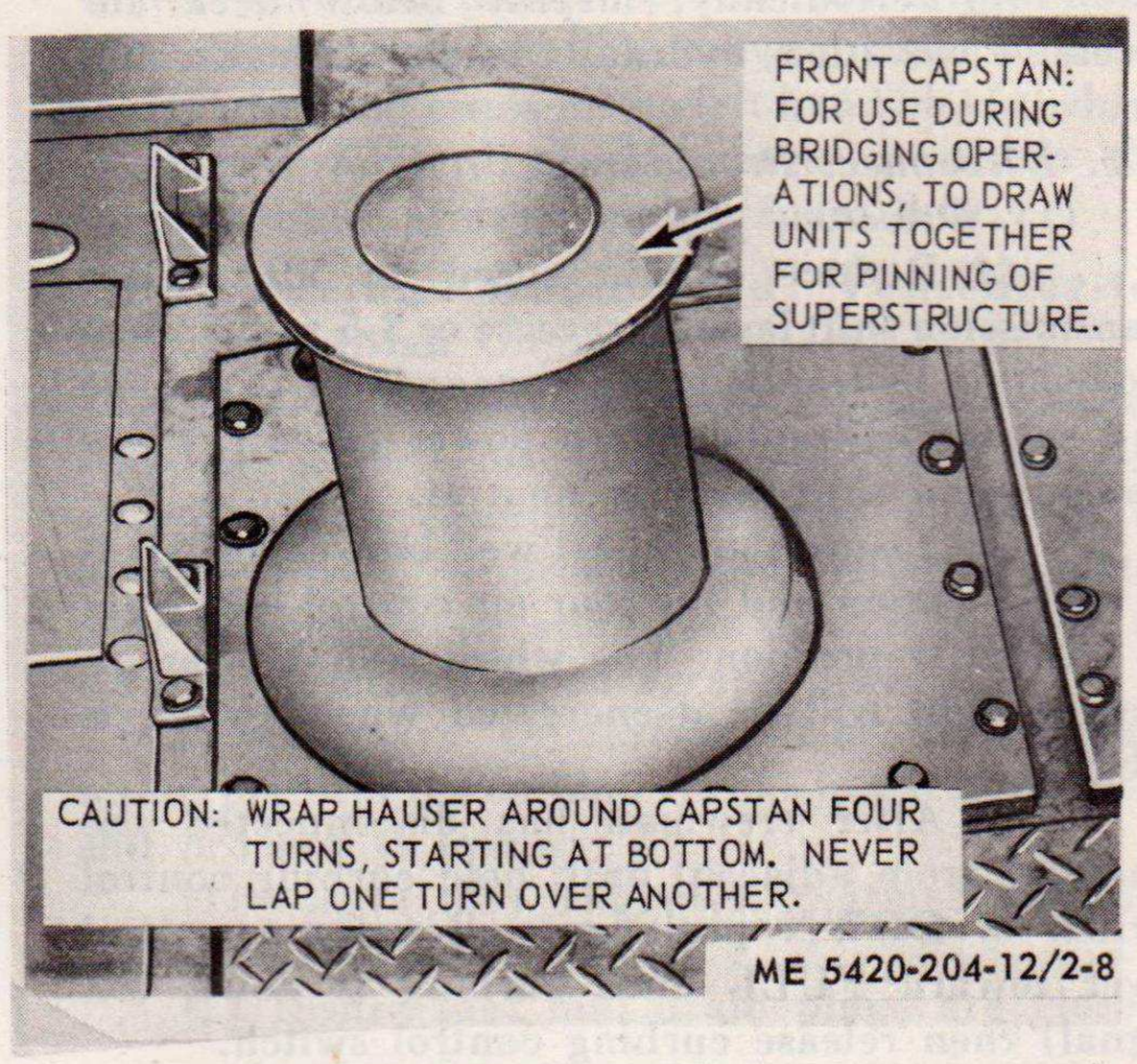



*Figure 2-8. Capstan.*

*(f)* Release line from capstan after pins are driven. Stow line attached to riding bitt.

*(g)* Connect intercom to the adjacent unit.

*(h)* Stand by to receive the next unit.

*d. During Operational Checks.*

(1) *Driver.*

*(a)* Check all instrument readings.

**CAUTION**

**Do not use bilge pumps unless water has accumulated in the hull.**

*(b)* Periodically, place bilge pump control switches (fig. 2-1, Sheet 2) at ON position to keep hull free of water. The four bilge pump indicator lights are energized when switches are ON.

(2) *Assistant Driver.*

*(a)* Upon orders from transporter commander, operate the unit.

*(b)* When approaching shore and the water is shallow, hold propeller elevation control switch in UP position until propeller is raised, then release switch.

**CAUTION**

**Never steer the marine unit through 720 degrees in same direction with propeller in a completely retracted or extended position. Marine drive may be damaged, and position indicator may fail to function correctly.**

(3) *Crewman.*

*(a)* Check superstructure holddown bolts to insure tightness

*(b)* Check connecting pins to assure they are not creeping.

*(c)* Periodically, inspect below deck for excessive vibration, hydraulic leaks, air leaks, and etc.

*c. Disconnect Procedure.*

(1) *Driver.*

*(a)* Reduce engine speed to idle, place transmission shift lever in reverse or 3-5 range, then move main hydraulic pump engage lever to engage and engage hydraulic pump power takeoff. Place transmission shift lever in neutral.

*(b)* Insure that wheel well blower switch is in OFF position and the four air control levers are in CLOSED position. The wheel well blower indicator light will be deenergized when switch is OFF.

*(c)* After crewman has disconnected the intercom from adjacent unit, hold curbing control switch in DOWN position, pull volume control lever toward FULL until curbing is down (on signal) then release curbing control switch.

NOTE

This subparagraph for interior bay only.

*(d)* Hold the left pinning control switch at RETRACT and pull volume control lever toward FULL until pins are retracted as indicated by a reading of 3,000 psi on hydraulic high pressure gage (on signal). Move volume control lever to OFF, then release left pinning control switch. Repeat this procedure for right pins, using the right pinning control switch.

NOTE

This subparagraph for end bay only.

**CAUTION**

**Never unpin from an interior bay unit until ramp is completely DOWN (folded) to avoid capsizing.**

*(e)* Hold ramp control switch at DOWN (fold) and pull hydraulic pump volume control lever toward FULL until ramp is completely DOWN (folded). Move volume control lever to OFF and release ramp control switch. Hold left pinning control switch at RETRACT and pull volume control lever toward FULL until pins are retracted as indicated by a reading of 3,000 psi on hydraulic high pressure gage. Move volume control lever to OFF and release left pinning control switch.

*(f)* Hold superstructure elevation control switch in UP position and pull volume control lever toward FULL until superstructure is completely raised (on signal, after the four holddown bolts have been released). Move volume control lever to OFF and release elevation control switch.

*(g)* With superstructure in raised position, hold rotation control switch at STOW, then pull volume control lever toward FULL until superstructure has been correctly rotated (on signal). Move volume control lever to OFF and release rotation control switch.

*(h)* Hold superstructure elevation control switch at DOWN and pull volume control lever toward FULL until superstructure is lowered to rest on holding devices. Move volume control lever to OFF and release elevation control switch.

*(i)* Hold wheels up / down switch at DOWN and pull volume control lever toward FULL until wheels have been lowered into down position as indicated by a reading of 3,300 psi on hydraulic high pressure gage. Hold this reading for about 30 seconds to insure wheels locking in DOWN position, then move volume control lever to OFF and release wheel up / down switch.

*(j)* Move throttle to idle speed, then move hydraulic pump engage lever to OFF to disengage hydraulic pump power takeoff.

*(k)* Insure that unit is in four wheel drive.

*(l)* Release handbrake.

*(m)* Stand by to receive signal from assistant driver. Upon signal, resume driver operations to exit from water.

(2) *Assistant Driver.*

*(a)* Steer away from remaining units and proceed to exit area. When front wheels touch bottom, reduce throttle setting and signal driver to take over operation.

*(b)* Hold propeller elevation control switch at UP until propeller is raised, then release switch.

*(c)* Hold propeller stow / drive control switch at STOW until propeller is raised to stow position, then release switch. Steer propeller through 45 degrees, 90 degrees, 135 degrees to 180° on the propeller position indicator, and the marine drive is properly stowed.

*(d)* Position marine drive OFF-ON switch at OFF.

(3) *Crewman.*

*(a)* Disconnect intercom from adjacent unit.

*(b)* Assist in disconnecting by pushing the units apart, using superstructure wrench or other implement.

*(c)* Use superstructure wrench and loosen the four holddown bolts.

*(d)* After superstructure has been properly stowed, secure the four holddown bolts and stow the superstructure wrench.

*f. After Water Operation Checks.*

(1) *Driver.*

*(a)* Place transmission shift lever in 1-2 forward range.

*(b)* Insure that front axle is engaged in four-wheel drive.

*(c)* When firm ground has been reached, disengage the front axle from four-wheel drive.

*(d)* Move transmission shift lever to proper operational range.

(2) *Assistant Driver.*

*(a)* Disconnect headset and microphone from rear control station radio control panel.

*(b)* Raise hatch cover, turn rear control station release handwheel counterclockwise to release, stow rear control station pedestal then secure hatch cover.

*(c)* Stow headset and microphone in cab.

*(d)* Inspect inside hull for water. If water is present, remove applicable drain plug(s). Do not damage or remove helicoil insert.

(3) *Crewman.*

*(a)* Stow all life jackets.

*(b)* Remove boarding ladder from place of stowage (para 4-24) and place in bracket over the side.

*(c)* Inspect wheel wells for debris lodged in suspension system.

*(d)* Inspect suspension system for visible damage.

*(e)* Inspect tires for cuts, breaks, or other damage.

*g. After Operation Check.*

(1) *Driver.*

*(a)* With aid from the crew, wash transporter.

*(b)* Fill fuel tanks.

*(c)* Check instruments on panel to insure that all readings are normal.

*(d)* Turn lights and radio OFF.

*(e)* Park transporter with marine drive properly in STOW position, and handbrake applied (except in extreme cold, then refer to paragraph 2-19*d* (2) (c) 1).

*(f)* Clean interior of cab.

*(g)* Insure that wheels have been blocked.

(2) *Assistant Driver.*

*(a)* Install safety stands and block wheels with chock blocks.

*(b)* Clean compartments below deck.

*(c)* Install canvas covers on front and rear hatch grilles.

(3) *Crewman.*

*(a)* Check oil level in hydraulic oil reservoir, engine, transmission, wheel well blower, and marine drive unit.

*(b)* Inspect suspension system for defective boots and seals, and for water in boots.

*(c)* Lubricate suspension system after everyday of water operation.

*(d)* Complete the performance of preventive maintenance checks and services.

*(e)* Inspect hull, including skids, for damage.

## 2-7. Converting End Bay from Right Hand to Left Hand Unit

When converting the transporter from a right hand to a left hand end bay unit, move rotation cylinder from right hand clevis to the left hand clevis, which is located forward of the center post, on the superstructure girder member (para 4-4).

## 2-8. Entering Water and Vehicular-to-Amphibian Changeover

*a. General.* Operation of the transporter when entering water covers two important phases; approach and entering water, and changing to marine drive. Approach and entering water generally entails operating over sand, mud, rock, or coral as described in paragraph 2-25.

*b. Preliminary Operations.* Prior to entering water, perform the on-land checks in paragraph 2-6 and proceed as follows:

(1) Insure that engine is warmed up and operating smoothly.

(2) Insure that hull drain plugs are closed.

NOTE

Do not start bilge pumps until necessary to remove water from hull.

(3) Turn rear control station cover fasteners aside, swing cover open and lift rear control station pedestal in upright position; assembly should lock in upright position.

(4) Insure that sufficient room exists for swinging propeller to the operation position.

**WARNING**

**Before performing step (5), insure that all personnel are clear of the propeller.**

(5) Move marine drive into operating position. This is accomplished by holding prop control switch (fig. 2-1) in DRIVE position. If this operation is done from cab, do not release switch lever until green propeller drive indicator light lights.

(6) To insure that marine drive is functioning properly, move marine drive OFF-ON switch on rear control station to ON position. Propeller blade should rotate. Allow propeller to rotate at idle speed for five minutes to permit lubricating oil to circulate through unit.

(7) Move marine drive OFF-ON switch to OFF position.

(8) Rotate marine drive to forward drive position and insure that propeller position indicator shows zero degrees.

(9) Return marine drive to stow position by moving propeller control switch to STOW (be sure propeller is at reverse position, 180° on position indicator).

(10) Deflate tires for operation on anticipated terrain as described in paragraph 2-25.

(11) Engage front wheel drive.

*c. Approach and Entering Water.*

(1) If sand, mud, or coral conditions are prevalent, refer to paragraph 2-25.

NOTE

Engage four-wheel drive. Do not disengage until unit has exited the water.

(2) Entry into the water will normally be made bow first and in straight ahead position. Speed should not exceed 5 mph and shift lever will be in 1-2 range.

(3) Swing marine drive from STOW to DRIVE position.

(4) Engage marine drive.

(5) Idle engine and engage high pressure hydraulic pump.

(6) Check for leakage.

**WARNING**

**If excessive leakage is indicated by an abnormal amount of water, start bilge pumps and return to land as quickly as possible.**

(7) Steer unit into water deep enough to gain full flotation and raise all wheels (steps (8) and (9) below).

(8) Move transmission shift lever to NEU (neutral) position to disengage vehicular drive, and apply hand brake.

NOTE

To activate wheels up / down switch, the wheel position indicator (fig. 2-1, sheet 5) must read zero degrees ± 4 degrees.

(9) Disengage marine drive momentarily, and raise wheels by moving wheels up / down switch to up and hold while moving volume control lever to full and holding it there until wheels are up as indicated by a reading of 3,300 psi on high pressure hydraulic gage. Hold switch on while making a long count to 30. This prevents unexpected collapse by insuring that wheels are locked in position.

(10) Engage marine drive.

*d. Trimming the Unit.*

(1) Move air control lever of low corner to AIR IN, or high corner to OPEN.

(2) Position wheel well blower switch (fig. 2-1) in ON position.

(3) Trim the Unit as required. Normal position for the levers is marked CLOSED. Moving a lever to AIR IN position will raise that corner of transporter. When high corner requires trim, moving lever to OPEN position will lower that corner of the transporter, by allowing trapped air to escape.

CAUTION

**Never turn wheel well air blower switch ON, unless at least one air control lever is at AIR IN or OPEN. Never leave control lever at AIR IN except while trimming low corner in actual operation, or short test of valve.**

## 2-9. Operating Transporter in Water

*a. Piloting from Cab Controls, Interior Bay Unit.* Proceed toward assembly site, using compass (fig. 2-1) for heading and propeller position indicator for direction of propeller thrust, steering the transporter with marine steering wheel located to left of driver. As assembly site is approached, head transporter upstream, as this will facilitate maneuvering into position for mating superstructures. Refer to *c* below for operating during mating procedures.

*b. Operating from Cab Controls, End Bay Unit.* Prior to entering water with an end bay unit, it must be prepared for either a right or a left hand end bay unit (para 4-4). All other operating procedures are the same as for an interior bay unit with the exception that the control switch that was used for superstructure right pinning will have a cover over it labeled RAMP, UP (unfold) DOWN (fold) (fig. 2-6). This switch is used to unfold the ramp after all transporters have been pinned together.

**WARNING**

**Do not attempt to unfold ramp unless end bay unit is pinned to another unit.**

*c. Operating from Rear Control Station.* The operator at rear control station has full control of marine drive unit by which he can energize the marine power take off. Raise and lower propeller, and place marine drive in either STOW or DRIVE positions. All of these functions are accomplished in the same manner as in operating from the cab control panel. The operator also has steering and throttle controls. Propeller movements are displayed on propeller position indicator which is identical to the one in cab. Operating should be accomplished from rear control station during mating procedures.

*d. Water Hazards.* As the transporter is being propelled through water under its own power, an object may be struck by the propeller. Should the force be great enough, shear pin in outdrive link will shear. When this occurs, a new shear pin in the outdrive link is required (para 3-30). In the event of shear pin failure, transporter can be propelled at low speeds, in both forward and reverse directions by lowering wheels and engaging fourwheel drive.

## 2-10. Superstructure Operations

*a. Interior Bay Unit.*

(1) While in water proceeding toward assembly site, elevate, rotate, lower and bolt-down superstructure.

NOTE

The superstructure cannot be rotated unless it has been elevated high enough to actuate the rotate disable limit switch. If for some reason superstructure will not raise when control switches are moved, determine cause. If fault is that one or more of the four superstructure elevate limit switches (para 4-65) is inoperative and all holddown bolts are know to be withdrawn, the superstructure boltdown override switch (fig. 2-1) can be moved to the OVERRIDE position; this will allow superstructure to be raised.

(2) Move interior bay unit transporter into position along side the transporter with which it is to be mated.

NOTE

Prepared lines of manilla rope are used to draw units together. The lines are 1¼ inch in diameter and approximately 50 feet in length with one end having a fixed loop. The units to be joined will be considered left and right using forward end as reference. There are two capstan switches (fig. 2-1) mounted on lower portion of hydraulic control panel. The capstans (fig. 2-1) are energized by placing applicable switch at ON position. Attach fixed loop one line on right front riding bitt (fig. 2-7) of the left hand unit and fixed loop of other line on left rear riding bitt of the right hand unit. Wrap loose ends of lines three or four turns around the forward and aft capstans of the opposing units in a counterclockwise direction starting at the bottom of capstan and working upward. Do not allow turns to overlap. These lines are used as guides for final positioning and for powering the units while joining superstructure girders together. When maneuvering units into position with the propeller, keep capstan lines under control by alternately tightening and loosening lines to enable the girders to be mated.

(3) When transporters are close enough together, throw lines from one vehicle to the other. These lines are to be turned around capstans and used as guide lines for final positioning of the units and for powering units while joining superstructure girders together.

(4) Maneuver transporter into position with propeller steering, and at the same time, keep lines under control, alternately tightening and loosening lines to enable girders to be mated. As soon as girders have slipped into position, pull tightly on capstan lines to bring girders together for pinning.

(5) Hold left pinning control switch and / or right pinning control switch (fig. 2-1) in DRIVE position, and pull on hydraulic pump volume control lever until girders are pinned together as indicated by a reading of 3,300 psi on high pressure hydraulic gage.

(6) Connect the intercommunication cable. The female connector is normally stowed in a dummy male receptacle; pull female connector out of dummy receptacle and engage it with mating receptacle on superstructure.

(7) Hold curbing control switch in UP position and pull volume control lever toward FULL until curbing is raised as indicated by a reading of 1,000 psi on hydraulic high pressure gage. Move volume control lever to OFF and release curbing control switch.

*b. End Bay Unit.* With the exception of ramp unfolding procedures, (where ramp curbing cannot be extended until ramp is partially unfolded), the bridging operations for the end bay unit are the same as those given in *a* above, for the interior bay unit. Ramp UP (unfolding) procedures are as follows:

WARNING

**Ramp must not be unfolded unless end bay is attached to at least one other transporter. Failure to comply will result in unit overturning.**

(1) Position ramp control switch (fig. 2-9) in UP (unfold) position and pull the hydraulic pump volume control lever. Ramp will unfold to its extended position in approximately one minute.

(2) Position curbing control switch in UP position.

(3) Inspect inside of hull for oil, water and / or air leaks.

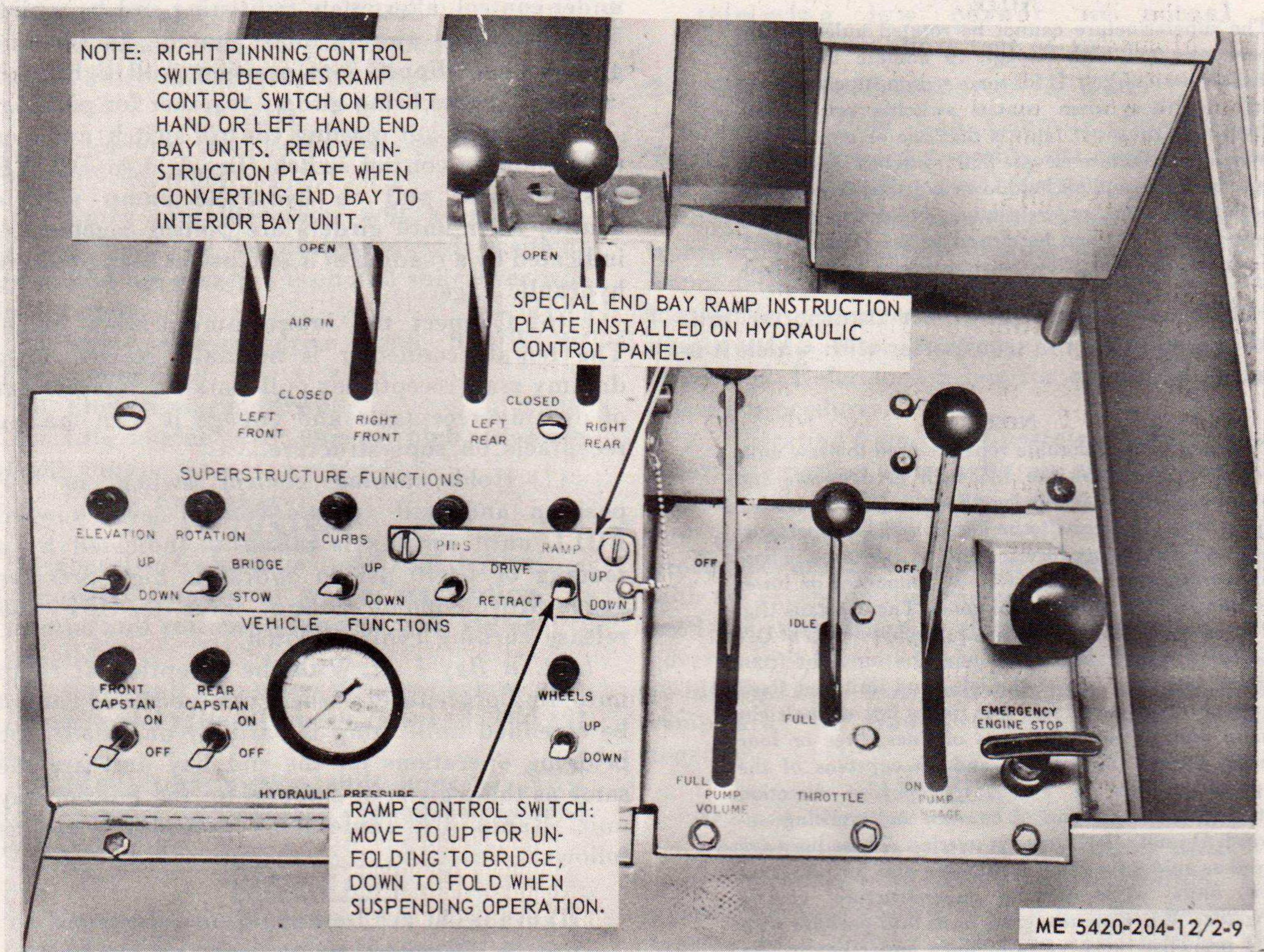



*Figure 2-9. End bay ramp control instruction plate installed.*

*c. Disconnecting Interior Bay Superstructure.* Disconnect intercommunication cable and stow female connector in dummy receptacle. Hold curbing control switch in DOWN position and pull hydraulic pump volume control lever to lower curbing. Hold right or left pinning switch in RETRACT position and allow superstructure to be parted. Repeat for the opposite side. Loosen the four hold-down bolts completely and hold superstructure elevation control switch at UP position and pull hydraulic pump volume control lever until superstructure is raised. Hold superstructure rotation control switch in STOW position and pull hydraulic pump volume control lever to rotate superstructure. Hold superstructure elevation control switch in DOWN position and pull hydraulic pump valve control lever and lower superstructure. Tighten the four hold-down bolts.

**WARNING**

**If interior bay is connected to an end bay unit, do not unpin until ramp has been folded.**

*d. Disconnecting End Bay Superstructure.* Disconnect the intercommunication cable and stow the female connector in the dummy receptacle. Hold curbing control switch (fig. 2-1) in the DOWN position and pull hydraulic pump volume control lever to lower curbing. Hold ramp switch in DOWN (fold) position and pull hydraulic volume pump control lever until ramp is DOWN (folded). Hold left pinning switch in RETRACT position and pull hydraulic pump volume control lever to remove pins and allow superstructures to be parted. Loosen the four hold-down bolts completely and raise superstructure. Rotate to STOW position. Place superstructure elevation control switch in DOWN position and lower to the hold-down castings. Tighten the four hold-down bolts.

## 2-11. Leaving Water and Amphibian to Vehicular Change-over

*a. General.* When transporter is fairly close to shore and preparing to leave water, perform the procedures listed in *b* and *c* below.

*b. Leaving Water Under Normal Condition.*

(1) Momentarily disengage marine drive.

(2) Lower and lock wheels in the drive position, the wheels up-down indicator (fig. 2-1) should indicate position wheels.

**CAUTION**

**Be certain that all wheels are down and locked. For assurance of wheels in down position, continue to pull the hydraulic pump volume control lever for 30 seconds after the high pressure gage registers maximum reading (3,000) psi, then move volume control lever to OFF, and release wheels up / down switch.**

(3) Disengage main hydraulic pump engage lever.

(4) Engage marine drive and steer unit into position for leaving water with the propeller. As vehicle approaches shallow water, move prop elevation control switch to UP and raise propeller. Select forward range (1-2). Insure front wheel drive is engaged and release hand brake. When wheels have made contact with shore and vehicle is under front wheel control, move marine drive control switch to OFF.

(5) Move prop control switch from DRIVE to STOW and stow marine drive.

(6) Drive vehicle from the water.

*c. Leaving Water Under Abnormal Conditions.* When sand, mud, coral or other abnormal conditions are expected, refer to paragraph 2-25.

## 2-12. Operation by Hydraulic Slaving

*a. General.* Each transporter is equipped with quick disconnect couplings (fig. 2-10) in the high pressure hydraulic system. When the engine, transmission, or high pressure hydraulic pump becomes disabled, another transporter may be used as a slave to operate wheels and superstructure functions for the disabled unit. The slaving hose and reservoir adapter cap (fig. 4-4) will interconnect the two units for this purpose, as described below.

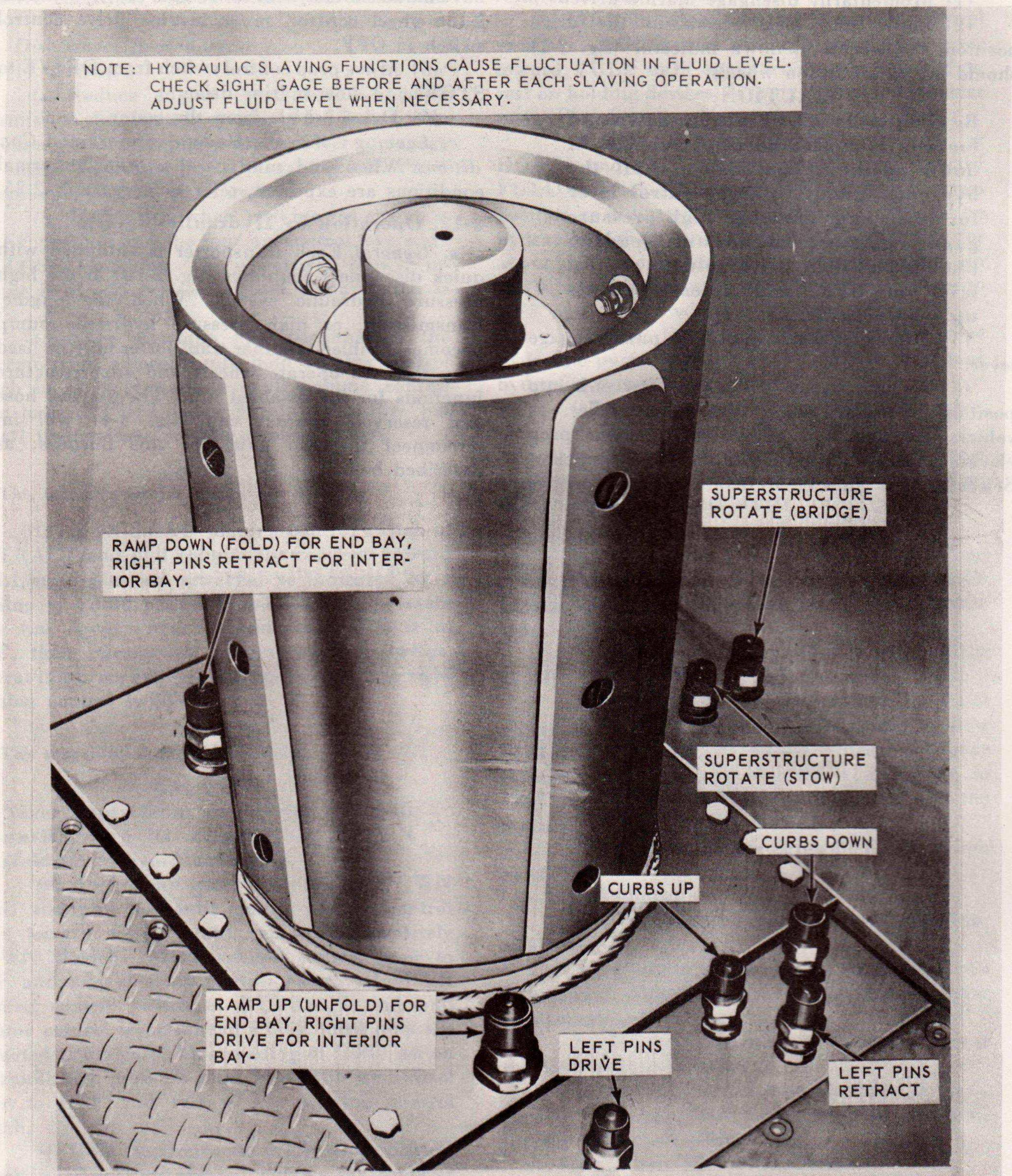



*Figure 2-10. Quick disconnect hydraulic couplings. (Sheet 1 of 4)*

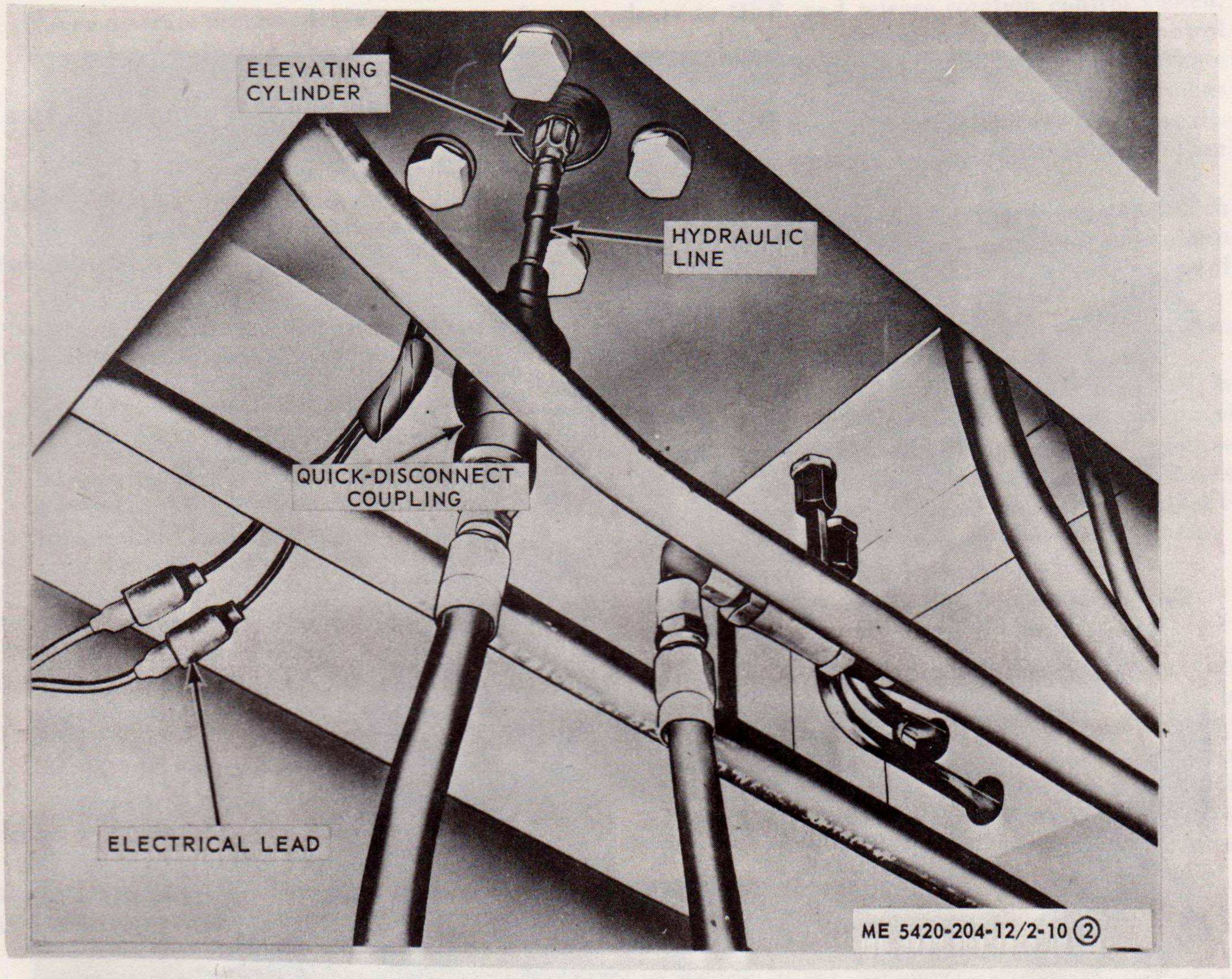



*Figure 2-10. Quick disconnect hydraulic couplings. (Sheet 2 of 4)*

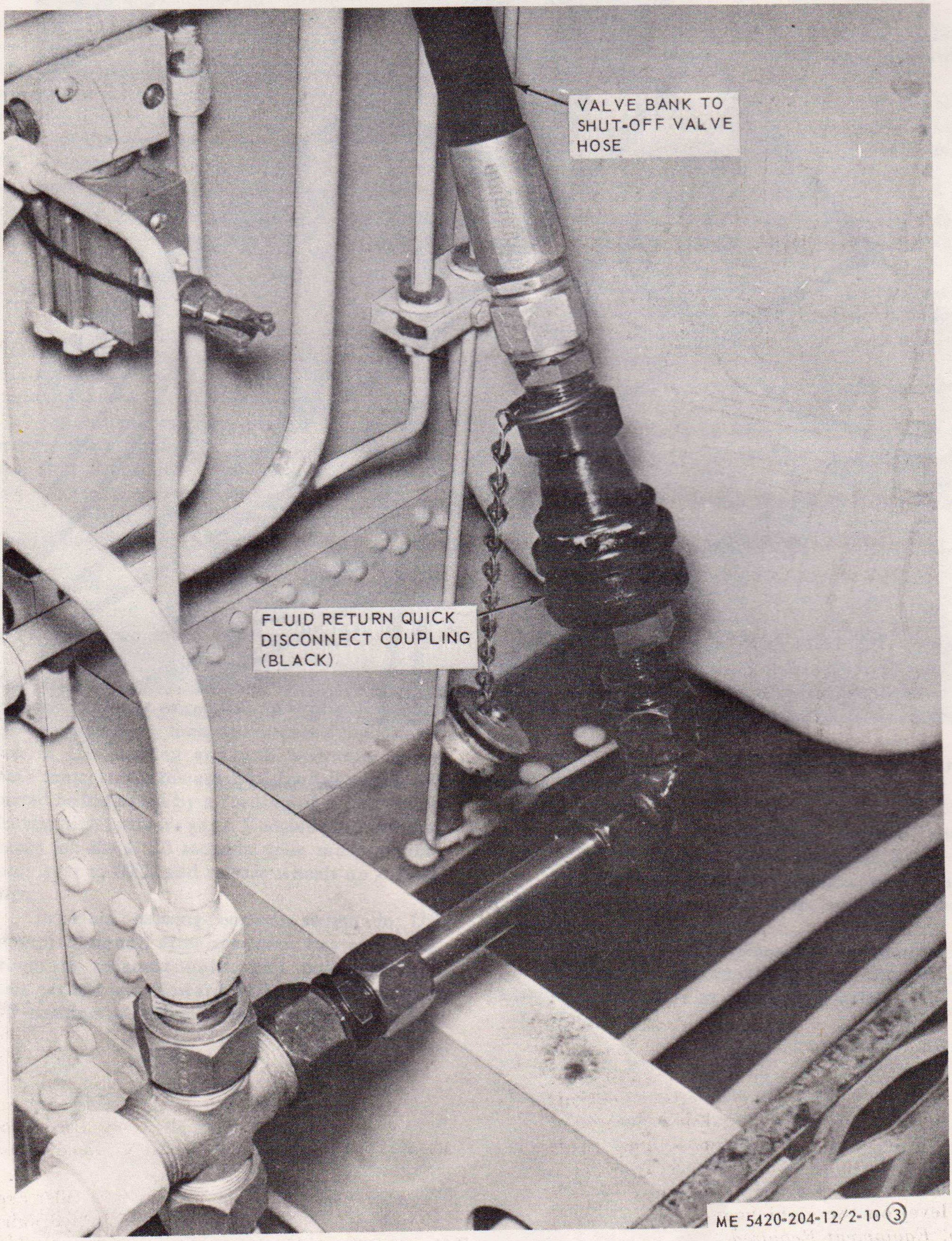



*Figure 2-10. Quick disconnect hydraulic couplings. (Sheet 3 of 4)*

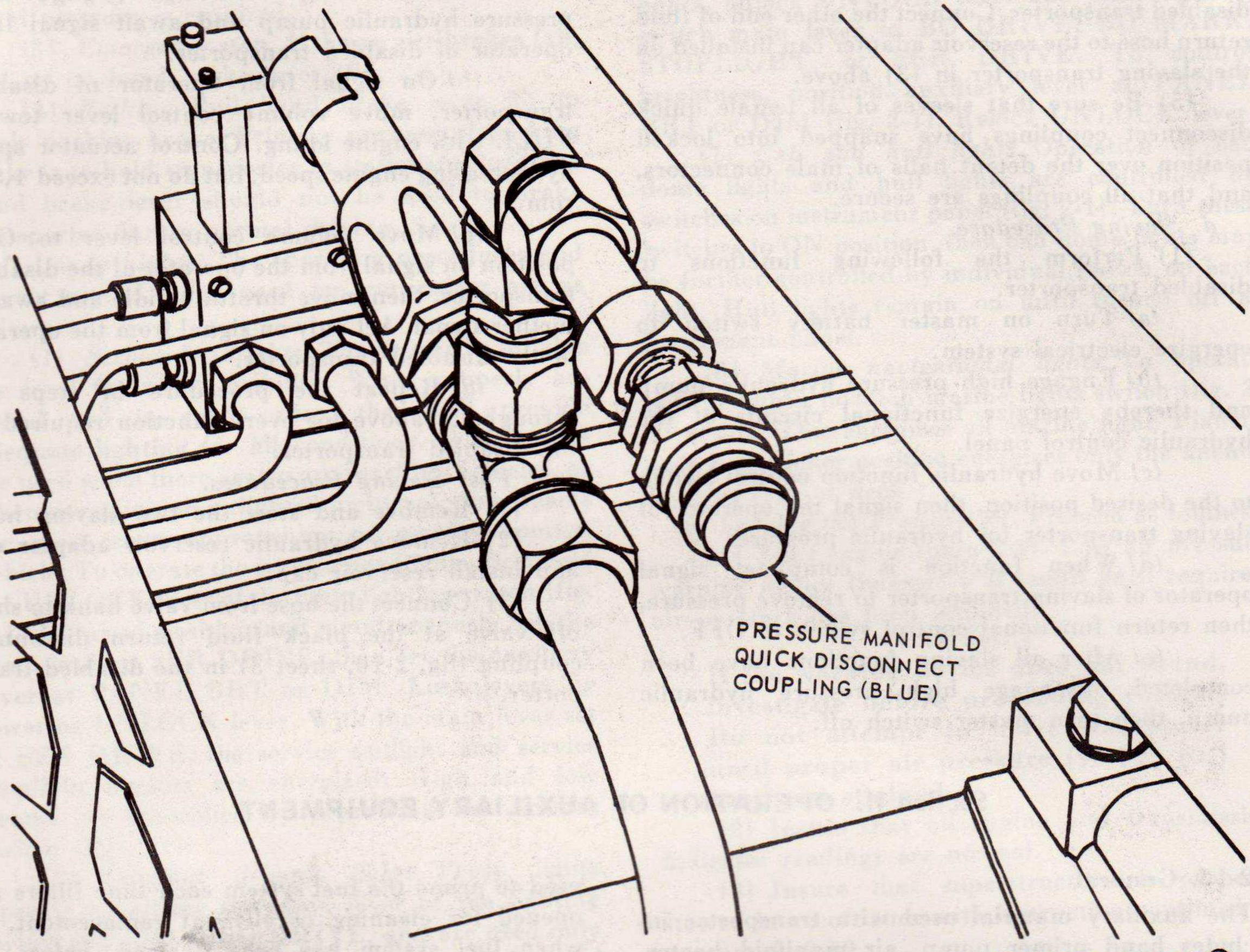



*Figure 2-10. Quick disconnect hydraulic couplings. (Sheet 4 of 4)*

**WARNING**

**Before, during, and after operation of each hydraulic function by slaving, adjust the oil level in the hydraulic oil reservoir of the slaving transporter. Do not delete the oil supply, nor allow the reservoir to overfill. When the reservoir oil level reaches a dangerously low level on the sight gage, stop the operation and add hydraulic oil. When the reservoir begins to overfill, signal the operator of the disabled transporter to turn on his rear capstan. Operate the rear capstan until the reservoir oil drops to a safe level on the sight gage.**

*b. Equipment Required.*

(1) Pressure hose (fig. 4-4, Sheet 2) 68 feet long, with blue fittings on both ends.

(2) Fluid return hose, 50 feet long, with unpainted or black fittings on both ends.

(3) Hydraulic reservoir adapter cap with male quick disconnect coupling.

*c. Connection Procedure.*

(1) Connect the 68 foot pressure hose (with blue fittings) to the pressure manifold quick disconnect coupling (fig. 2-10, sheet 4) in both the slaving and disabled transporters.

(2) Disconnect the hose from valve bank to shutoff valve at the black fluid return disconnect coupling (fig. 2-10, sheet 3) in the disabled transporter.

(3) Remove the hydraulic reservoir filler cap (fig. 3-9) from the slaving transporter hydraulic reservoir and install the reservoir adapter cap (fig. 4-4, sheet 2).

(4) Connect one end of the fluid return hose (fig. 4-4, sheet 2) to the black fluid return quick disconnect male coupling (fig. 2-10, sheet 3) in the disabled transporter. Connect the other end of fluid return hose to the reservoir adapter cap installed on the slaving transporter in (3) above.

(5) Be sure that sleeves of all female quick disconnect couplings have snapped into locked position over the detent balls of male connectors, and that all couplings are secure.

*d. Slaving Procedure.*

(1) Perform the following functions to disabled transporter.

*(a)* Turn on master battery switch to energize electrical system.

*(b)* Engage high pressure hydraulic pump and thereby energize functional circuits of the hydraulic control panel.

*(c)* Move hydraulic function control switch to the desired position, then signal the operator of slaving transporter for hydraulic pressure.

*(d)* When function is complete, signal operator of slaving transporter to remove pressure, then return functional control switch to OFF.

*(e)* After all slaving functions have been completed, disengage high pressure hydraulic pump, then turn master switch off.

(2) The slaving transporter operator will perform the following functions.

*(a)* With engine idling, engage high pressure hydraulic pump and await signal from operator of disabled transporter.

*(b)* On signal from operator of disabled transporter, move volume control lever toward FULL with engine idling. Control actuator speed by increasing engine speed, but do not exceed 1,500 rpm.

*(c)* Move volume control lever to OFF position on signal from the operator of the disabled transporter, then move throttle to idle and await a further signal. Act only on signal from the operator of the disabled transporter.

*(d)* Repeat the procedure in steps (a) through (c) above for every function required by the disabled transporter.

*e. Post Slaving Procedures.*

(1) Remove and stow the two slaving hose.

(2) Remove hydraulic reservoir adapter cap and install reservoir cap.

(3) Connect the hose from valve bank to shut-off valve at the black fluid return disconnect coupling (fig. 2-10, sheet 3) in the disabled transporter.

## Section II. OPERATION OF AUXILIARY EQUIPMENT

### 2-13. General

The auxiliary material used with transporter includes hand primer pump, air manifold heater, personnel heater, and portable fire extinguishers. Operation of this equipment is described in the paragraphs below. Reference is made to maintenance manuals as applicable.

### 2-14. Portable Fire Extinguishers (Carbon Dioxide Type)

*a. Description.* The portable carbon dioxide fire extinguisher is suitable for electrical and flamable liquid fires. Two carbon dioxide type, 5-pound, portable extinguishers are installed on transporter.

*b. Operation.* Remove fire extinguisher from its location; break seal; operate control valve, and direct stream at base of flame.

*c. Maintenance.* For maintenance of the fire extinguisher, refer to TM 5-687.

### 2-15. Hand Primer Pump Operation

*a. General.* The hand primer pump is installed in a by-pass fuel line just back of the radiator by the right front engine mounting bracket, and must be used to prime the fuel system each time filters are opened for cleaning or element replacement, or when fuel system has been drained, before attempting to crank engine.

*b. Operation.*

(1) Loosen pipe plug in filter cover.

(2) Turn knob of primer handle to release pin from detent.

(3) Operate primer handle with smooth strokes up and down until fuel flows from around pipe plug in filter cover, then tighten plug.

(4) Turn knob of primer handle until pin snaps into detent, securing handle in the closed position.

### 2-16. Air Heater Operation

*a. General.* When temperature is below freezing (+32° F) the air heater is used as an aid in starting the engine.

*b. Operation.* Refer to figure 2-11 and operate the air heater.

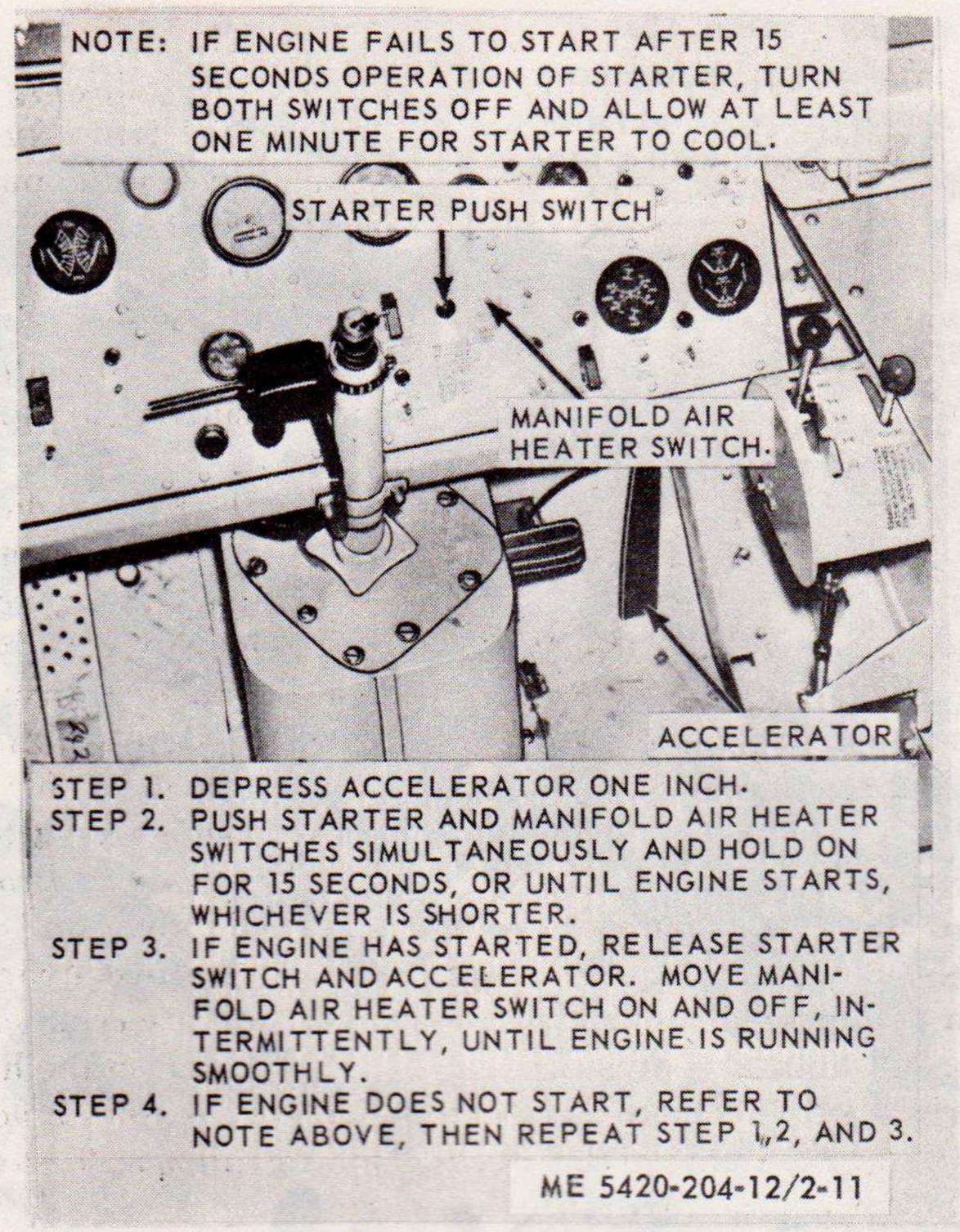



*Figure 2-11. Cold weather starting of engine.*

## 2-17. Personnel Heater Operation

*a. General.* The personnel heater is a combustion type heater operating independently on fuel drawn from regular transporter supply by a fuel pump that is controlled by a solenoid valve. Its heat is distributed thru a plenum to defroster tube and other outlets in cab.

*b. Operation.*

NOTE

Personnel heater switch is used to control normal operation of personnel heater.

**CAUTION**

**Do not turn heater switch ON if hi-lo switch is OFF and indicator light is energized.**

(1) *To start.* Move hi-lo switch (fig. 2-1, sheet 2) from OFF to lo or hi.

**CAUTION**

**Turn hi-lo switch OFF if indicator light is not energized within five minutes.**

(2) *To stop.* Move hi-lo switch to OFF position. The indicator light will remain energized until heater is purged of fuel.

**CAUTION**

**Leave heater master switch ON. Do not use for normal operation of personnel heater. Raise guard to turn switch OFF in case of an emergency.**

**WARNING**

**Failure to use the heater master switch for its intended purpose (Emergency Situation) will cause heater to emit excessive smoke and harmful exhaust fumes.**

## 2-18. Communication System

*a.* Description, location, cording diagrams. Installation and removal procedures for the communications equipment installed in the transporter (fig. 2-12).

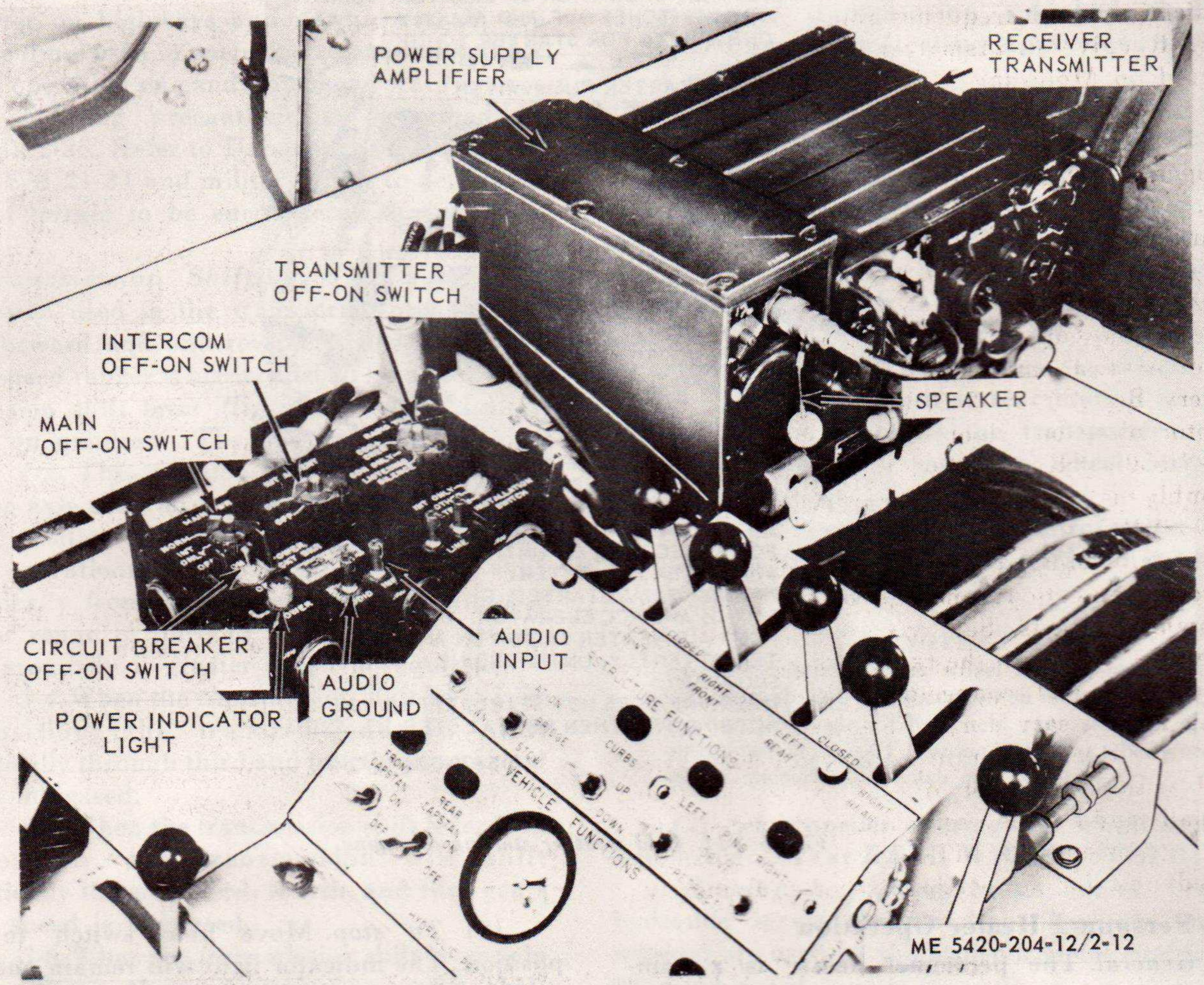



*Figure 2-12. Communications equipment installed.*

(1) Transporters are equipped with Radio Sets AN / VRC-46, AN / VRC-53 or AN / GRC-125 and Intercommunications Set AN / VIC-1 (V).

| *Radio Set* | *Basic Unit* | *Installation Unit* |
|---|---|---|
| AN / VRC-46 | 5820-892-0871 | 5820-082-4007 |
| AN / VRC-53 | 5820-086-7586 | 5820-082-4007 |
| AN / GRC-125 | 5820-086-7536 | 5820-082-4077 |
| AN / VIC-1 | 5830-856-3273 | 5830-738-6548 |

(2) The principal components of Radio Sets AN / VRC-46, AN / VRC-53 or AN / GRC-125 are listed as follows:

| *Principal Components* | *AN / VRC-46* | *AN / VRC-53* | *AN / GRC-125* |
|---|---|---|---|
| Receiver-Transmitter RT-524 / VRC | 1 | — | — |
| Mounting MT-1029 / VRC | 1 | 1 | 1 |
| Receiver-Transmitter RT-505 / PRC-25 | — | 1 | 1 |
| Amplifier-Power Supply AM-2060 / VR | 1 | 1 | 1 |
| Battery Box CY-2562 / PRC-25 | — | 1 | 1 |

*(a)* Radio Set AN / VRC-46, provides frequency modulated radio-telephone communication in the frequency range of 30 to 75.95 mcs. Receiver-transmitter RT-524 / VRC is secured on Mounting MT-1029 / VRC.

*(b)* Radio Set AN / VRC-53 or AN / GRC-125 (a vehicular AN / PRC-25), and FM portable set operating in the frequency range of 30 to 75.95 mcs, when installed in a vehicle uses same mounting (MT-1029 / VRC) and Antenna (AT-912 / VRC or AS-1729 / VRC) as Radio Set AN / VRC-46. The AN / VRC-53 or AN / GRC-125 is adapted for vehicular use by securing Receiver-Transmitter RT-505 / PRC-25, with Battery Box CY-2562 / PRC-25 attached, to an adaptor plate on which Amplifier-Power Supply AM-2060 / VR is mounted. The complete assembly is then secured on Mounting MT-1029 / VRC.

*(c)* Control boxes, audio accessories and intercommunication components are part of Intercommunications Set AN / VIC-1. All cable assemblies used with the radio sets are terminated in pin-and-socket connectors; thus, no internal wiring is necessary during installation.

*(d)* Receiver-Transmitter RT-124 / VRC (used with Radio Set AN / VRC-46) is tuned manually and houses a self-contained loud-speaker.

*(e)* Mounting MT-1029 / VRC is a steel framed unit for supporting Receiver-Transmitter RT-524 / VRC. Two (2) thumb screws engage two (2) clamps to two (2) hold-down tabs on the receiver-transmitter to secure it in position. A terminal box at the left rear of the mounting contains the power and control receptacles for cable connections.

*(f)* Receiver-Transmitter RT-505 / PRC-25 in a manually tuned lightweight unit. Battery Box CY-2562 / PRC-25 is attached to the RT-505 / PRC-25. This with AM-2060 / VR, which houses a self-contained speaker, lends itself to installation on Mounting MT-1029 / VRC for vehicular installation.

*b.* The Audio Frequency-Amplifier AM-1780 / VRC and Control Boxes C-2298 / VRC provide intercommunication facilities between crew members and adjacent vehicles when docked together. The AM-1780 / VRC has facilities for external field telephone.

*c.* All units are removable by disconnecting the interconnecting cables and the screws that secure them to their mounting brackets.

*d.* For installation, refer to installation instructions for Radio Sets AN / VRC-46, AN / VRC-53 or AN / GRC-125 per FSN: 7610-965-2401, and Intercommunications Set AN / VIC-1 (V) per FSN: 7610-965-2402.

## Section III. OPERATION UNDER UNUSUAL CONDITIONS

### 2-19. Operation in Extreme Cold

*a. Special Cold Weather Precautions.* In addition to operating instructions detailed in paragraphs 2-5 through 2-12, special cold weather precautions must be observed when starting and operating transporter during freezing temperatures.

(1) *Cold weather starting aid.* An air heater is provided for starting in temperatures as low as —24° F. Refer to figure 2-11 for starting the engine. If the engine has been cranking and suddenly stops, one crew member will push the fuel shut-off switch by-pass switch (fig. 2-13) and hold the button down, while the operator engages the starter switch until the engine starts.

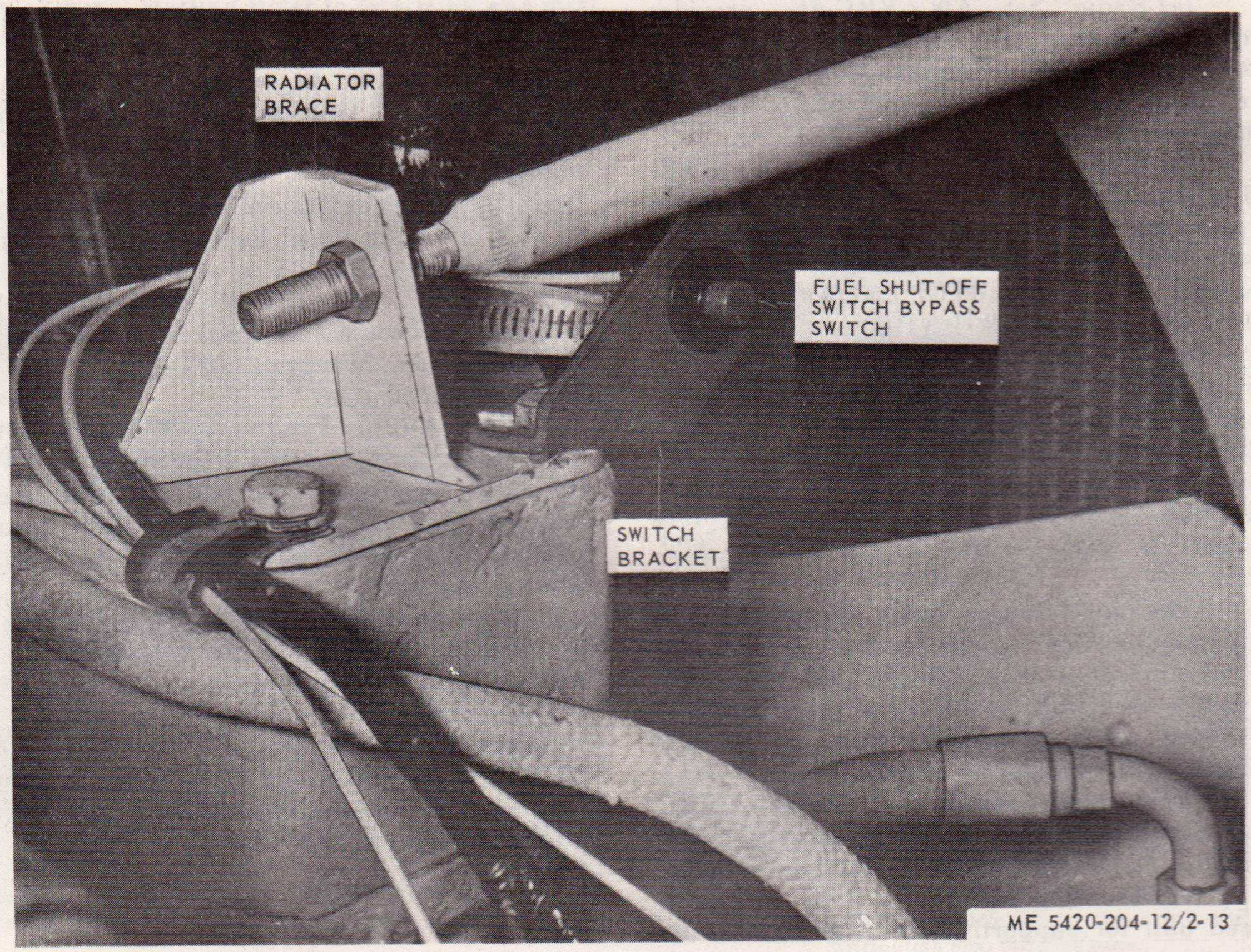



*Figure 2-13. Fuel shut off switch by-pass switch.*

(2) *Bilge Pump System.* If vehicle stands in freezing temperatures, any accumulation of water or moisture in pump system will quickly freeze. If pumps are not thawed prior to water operation, considerable damage might occur. To thaw bilge pumps and marine drive, first, open rear drain of front wheel well; then start and operate engine with all hatches closed, until thawing is completed. Be certain that all bilge pump inlet screens (fig. 2-14) are free and clean. Be certain all drains are open.

NOTE

Hot water can be used to expedite thawing process.

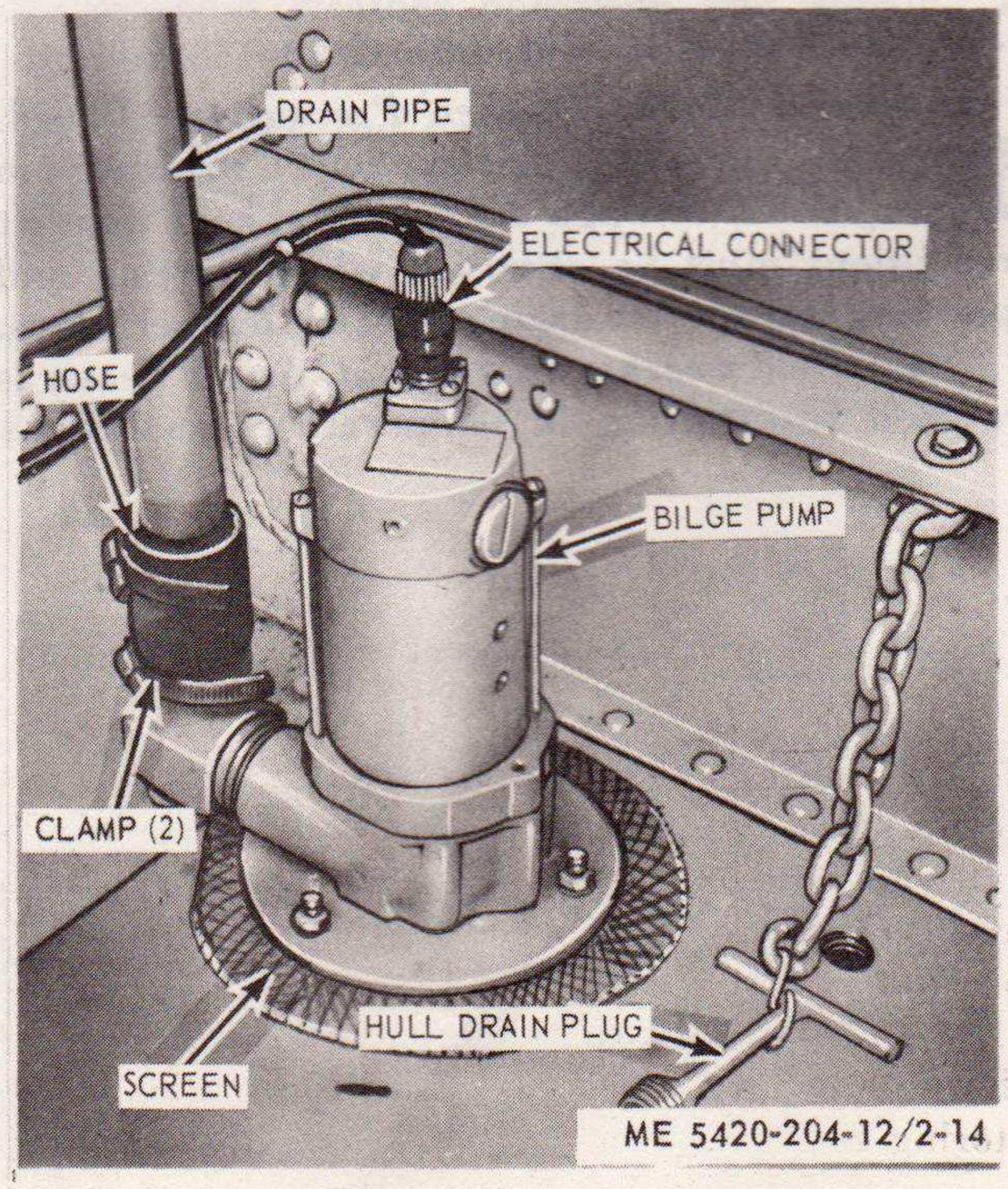



*Figure 2-14. Bilge pump installation (typical).*

(3) *After water operation precautions.*

*(a)* Pump bilge as dry as possible. Make sure all drains are open.

*(b)* Drain hull by removing all drain plugs. There are eight drain plugs, two near each wheel well, one forward and one at rear. Then reinstall all drain plugs, and wipe bilge dry with sponge or rags.

*(c)* Drain moisture from air reservoirs (para 4-176).

*(d)* Secure canvas covers over front and rear hatch grilles on deck to prevent entry of water, snow, or ice.

(4) *Before water operation precautions.* Do not attempt to operate vehicle until the following operations are accomplished:

*(a)* Visually inspect bilge pumps for ice formation.

*(b)* Insure that all ice formations in bilge and on marine drive have thawed. To that bilge and marine drive, refer to (2) above.

*(c)* Insure that the eight drain plugs on the bottom of the hull, front and rear of each wheel well, operate freely and are installed.

*b. Cold Weather Fuel and Lubricants.*

(1) *Fuel for low temperatures.*

*(a) Types.* Diesel fuel oils are graded and DF-2 (Regular), DF-1 (Winter), and DF-A (Arctic). For temperature ranges of —25° F to 20° F, use DF-1. For temperature ranges of —25° F to 65° F, use DF-A. Any commercial fuel oil in the above designated categories may be used providing they conform to Federal Specification VV-F-800. During cold weather engine operation, the cloud point (temperature at which wax crystals begin to form in fuel oil), must be below the lowest expected fuel temperature to prevent clogging of the fuel filter by wax crystals. For efficient combustion, winter grade fuel oil (DF-1) must meet the following requirements:

| Ambient Air Temp | 90 percent Boiling Point (Max) | Final Boiling Point (Max) | Cetane Number (Min) | Sulfur Content (Max) |
|---|---|---|---|---|
| Above —20 °F | 575° F | 625° F | 45 | 0.50% |

*(b) Storage and handling.* Due to condensation of moisture from the air, water will accumulate in tanks, drums, or containers. At extremely low temperatures, such water will form ice crystals and clog fuel lines unless the following precuations are taken:

1. Be sure that all containers are thoroughly clean, dry, and free from rust, before storing fuel in them.

2. If possible, after filling or moving a container, allow it to stand and settle for 24 hours before servicing vehicle fuel tank from it.

3. Keep all closures of containers tight to prevent snow, ice, dirt and other foreign matter from entering.

4. Wipe all snow or ice from dispensing equipment and from around fuel tank filler cap before removing cap to refuel vehicle. After filling tank, replace cap securely.

5. Drain fuel filter more frequently during cold weather to remove water and prevent freezing. Keep fuel tanks as full as possible and keep condensation at a minimum.

(2) *Lubricants.* Refer to current Lubrication Order for type of lubricant specified for cold weather operations.

(3) *Keeping crankcase oil fluid.*

*(a)* Several methods for keeping crankcase oil sufficiently fluid for proper lubrication are listed below. Preference should be given to the different methods in the order listed, according to the facilities available.

1. Keep vehicle in a heated enclosure when it is not being operated.

2. When engine is stopped, drain crankcase oil while it is still hot and store in a warm place until vehicle is to be operated again. If warm storage is not available, heat oil before refilling crankcase.

**CAUTION**

**Tag vehicle in a conspicuous place in driver's compartment to warn personnel that crankcase is empty.**
**Do not get oil too hot; heat only to point where barehand can be inserted without burning.**

3. If vehicle is to be kept out doors, and if crankcase cannot be drained, shelter the engine compartment with a tarpaulin. About 3 hours before engine is to be started, outside heat must be applied to crankcase.

*c. Protection of Cooling System.*

(1) Cooling system must be protected with antifreeze compound for operation below +32° F. The following instructions apply to use of antifreeze compound.

(2) Before adding antifreeze compound, it is necessary that cooling system be clean and completely free from rust. If cooling system has been cleaned recently, it may be necessary only to drain, refill with clean water, and again drain.

(3) All hoses must be inspected and replaced if deteriorated. Hose clamps, plugs, and draincocks are to be inspected and tightened if necessary.

(4) When cooling system is clean and tight, fill system with water to about one-third capacity; then add antifreeze compound, using proportions indicated in table 4-1. Ethylene glycol is the recommended antifreeze compound. Use denatured alcohol, grade 3 for emergencies. The system must be protected to at least 10° F below the lowest temperature expected.

(5) After adding antifreeze compound, fill with water to prescribed level; then start and warm up engine to normal operating temperature.

(6) Engine must then be stopped and the solution checked with a hydrometer, adding more antifreeze compound if required.

(7) Coolant must be inspected weekly for strength and color. Rusty solution should be drained, cooling system thoroughly cleaned, and new solution of the required strength added.

NOTE

It is essential that antifreeze solutions be kept clean. Use only containers and water that are free from dirt, rust, and oil.

*d. Maintenance During Cold Weather.*

(1) *General.* In preparing a vehicle for operation at subzero temperatures, special attention to details of electrical and mechanical maintenance will reduce difficulties encountered. Special attention to these details should be continued in scheduled maintenance throughout period of sub-zero operation.

(2) *Batteries.*

*(a)* Efficiency of batteries decrease sharply with decreasing temperatures, and becomes practically inoperative at —40° F. When batteries have been chilled to a temperature below —30° F, they should, preferably, be heated before attempting an engine start, unless warm slave batteries are available. See that batteries are always fully charged with a hydrometer reading between 1.245 and 1.255. A fully charged battery will not freeze at temperatures likely to be encountered even in artic climates, but a fully discharged battery will freeze and rupture at —5° F.

*(b)* Do not add water to a battery when it has been, or will be, exposed to sub-zero temperatures unless battery is to be charged immediately. If water is added and battery is not put on charge, the water will stay on top and freeze before it has a chance to mix with the electrolyte.

*(c)* Table 2-2 lists the freezing temperature of electrolyte at various specific gravities.

*Table 2-2. Specific Gravity*

| Specific gravity at 60° F | Freezing temp degrees F. | Specific gravity at 60° F | Freezing temp degrees F |
|---|---|---|---|
| 1.100 | +18 | 1.220 | —31 |
| 1.120 | +14 | 1.240 | —51 |
| 1.140 | +8 | 1.260 | —75 |
| 1.160 | —2 | 1.280 | —92 |
| 1.180 | —6 | 1.300 | —95 |
| 1.200 | —17 | | |

(3) *Other chassis points.*

*(a) Water pumps.* Prior to advent of cold weather, inspect water pumps and service if required.

*(b) Fuel system.* Drain fuel pump; drain and clean filters weekly, or more often according to conditions to remove water and dirt. Clean air heater electrode weekly, or more often depending upon conditions, making sure all corrosion is removed (para 4-210).

NOTE

After cleaning or draining filters, refer to paragraph 2-15 and prime fuel system before cranking engine.

*(c) Chassis.*

1. Brakes have a tendency to stick or bind when vehicles are parked at sub-zero temperatures. A blow torch may be used to warm these parts if they bind when attempting to move vehicle. Parking vehicle with brakes released will eliminate binding. Precautions must be taken, under these circumstances, to block wheels or otherwise prevent movement of vehicle.

2. Inspect vehicle frequently. Shock resistance of metals, or resistance against breaking, is greatly reduced at extremely low temperatures. Operation of vehicle on hard, frozen ground causes strain and jolting which will result in screws breaking or nuts jarring loose.

## 2-20. Operation in Extreme Heat

*a. General.* Operation of the vehicle during high temperature requires regular maintenance at shorter intervals, of cooling system units, filtering devices, air cleaners, electrical units, and air circulation ducts.

*b. Cooling System Maintenance.*

(1) *Cooling liquid.* Formation of scale and rust in cooling system occurs more often during operation in extremely high temperatures;

therefore, rust preventatives should always be added to cooling liquids. Use clean water only. Avoid use of water that contains alkali or other substances which may cause scale and rust to form.

(2) *Cleaning cooling system.* Cooling system should be thoroughly cleaned and flushed at frequent intervals (para 4-190) when operating in extremely high temperatures.

(3) *Fan belt and water pump.* Fan belt should be inspected at regular intervals and adjusted when necessary (para 4-198). Water pump must be kept in good operating condition.

(4) *Hose connections.* Check connections frequently for leaks.

*c. Battery Water Level.* In torrid zone, cell water level should be checked daily and replenished when necessary with pure distilled water. If this is not available, drinking water may be used. However, continuous use of water with high mineral content will eventually cause damage to battery and should be avoided.

## 2-21. Operation in Dusty or Sandy Areas

*a. General.* Take all necessary precautions to keep equipment clean and free of dust. Dust and sand, will cause an abrasive action on lubricated areas. Wash or wipe dust from equipment frequently.

*b. Protection.* Provide maximum protection for the equipment at all times. Take advantage of natural barriers whenever possible.

*c. Air Cleaner.* Air cleaner should be cleaned daily. Air cleaners should be cleaned immediately after any dust storm.

*d. Lubrication.* Lubricate transporter in accordance with instructions contained in current Lubrication Order.

## 2-22. Operation in Rainy or Humid Conditions

*a. General.* Take all necessary precautions to keep equipment clean and dry. Remove any accumulated rust or corrosion. Coat exposed areas with a suitable preservative and report condition to organizational maintenance.

*b. Lubrication.* Lubricate transporter in accordance with instructions contained in current Lubrication Order.

*c. Electrical System.* Keep all electrical wiring clean and dry. Inspect for loose or corroded contact surfaces. Clean contact surfaces as necessary and tighten loose connections.

## 2-23. Operation in Salt Water Areas

*a.* Operation in salt water requires special precautions to prevent deterioration of transporter and accessories. Rust and corrosion are greatly accelerated under salt water conditions. Wash transporter exterior after each exposure or operation in salt water.

*b. Engine.* After each operation, wipe exterior of engine dry. Keep engine compartment as dry as possible.

*c. Hull.* Examine hull frequently for signs of corrosion. Corrosion is most likely to occur at the engine exhaust outlet, bilge discharge openings, points subject to scraping and chafing and areas where foot traffic is greatest. Coat breaks in paint with a suitable preservative and repaint at earliest opportunity.

*d. Deck Hardware.* Examine all deck and superstructure couplings, handles, and all exposed components for signs of rust or corrosion. Keep all parts clean, painted, or lubricated as required.

*e. Accessories.* Examine the navigational running lights, bilge pumps, fire extinguishers, blower systems, pinning devices, and electrical connections for signs of corrosion or accumulation of salt deposits. Wipe accessories clean at frequent intervals and repaint or lubricate items as required for protection from salt water exposure.

## 2-24. Operation in Snow

NOTE

Reduce tire pressure to 25 psi.

*a.* To operate in snow, the operator must start forward in the highest gear range possible, and use only enough throttle to keep from stalling the engine. He must avoid spinning the wheels, for friction will melt snow and form ice. Once ice is formed under wheels it is difficult to move vehicle without "rocking" it back and forth to enlarge track and gain traction.

*b.* Once in motion, operator should avoid stopping on slopes, sharp turns, or application of excessive power.

*c.* Placing vehicle in four wheel drive and rear wheel steering, will enable operator to "oblique" out of some otherwise impossible positions.

## 2-25. Operating in Sand, Mud, or on Coral

*a. General.* Procedures for operating transporter in sand, mud, or on coral are similar to those given for operating on highways and normal terrain. General precautions to be observed while operating in sand, mud, or on coral are outlined in the following subparagraphs.

*b. Sand.* Observe the following precautions when operating transporter on sand:

(1) *Tire deflation.* Necessary tire deflation depends upon consistency of the sand. When driving on hard sand, tire pressure should be approximately 40 psi. When driving on soft sand, tire pressure should be approximately 30 psi.

NOTE

Minimum tire pressure for off-highway use is 25 psi.

(2) *Front wheel drive.* Employ front drive as described in paragraph 2-5 when operating in soft sand.

(3) *Shifting.* Maximum power of the transmission 1-2 speed range should be used if sand is extremely soft.

(4) *Driving across.* With tires properly deflated, travel over sand with full power and speed to avoid digging tires into the sand. When possible, avoid stopping and starting.

(5) *Digging in.* If wheels are permitted to spin, they will dig in. When progress is impaired to the point where spinning may occur, release accelerator; do not wait until wheels spin before releasing accelerator. Back up far enough to permit a good forward run, and go forward again, faster. It may be necessary to repeat this procedure several times.

(6) *Upgrades.* Travel upgrade on sand with the front wheels straight; never approach sand grades at an angle. When traveling over sharply rising sand dunes where there is a possibility of bottoming, keep the vehicle moving fast. Avoid straddling on crest of hills.

(7) *Turning.* Select smoothest available terrain for necessary turns and make as wide as possible. When front wheels are turned, much of the forward driving action is lost. There is also added resistance caused by all wheels making separate tracks.

(8) *Following.* When driving in convoy, the leading driver should pick the best available path. Other vehicles in convoy should follow in leader's tracks whenever possible; no attempt should be made to pull out or make another track unless vehicles ahead have made path impassable. Do not follow too close, as vehicle ahead may have to back up to make another attempt forward.

*c. Soft Mud and Marshes.* When determining routing, avoid soft sticky mud, marshes, and swamps; refer to Department of the Army Manual FM 21-31 and military maps. The transporter can pull out of any mud ordinarily traveled over by a truck; however, under water, mud has a gripping characteristic that can mire down a wheeled vehicle. Use front and rear drive with transmission in 1-2 speed range.

*d. Coral and Rocks.* Deflate tires to 30 psi. Engage front wheel drive and select 1-2 transmission range, and travel slowly. Maintain vigilance for sharp protuding rocks or coral heads.

## 2-26. Operation at High Altitudes

The efficiency of all internal combustion engines decrease as altitude is increased. This is a natural condition, but top efficiency may be maintained by more frequent service to air cleaner (para 4-200).

# CHAPTER 3

# OPERATOR'S / CREW MAINTENANCE INSTRUCTIONS

## Section I. LUBRICATION

### 3-1. Lubrication Instructions

This section contains lubrication instructions which are supplemental to, and not specifically covered in the lubrication order. For current lubrication order refer to DA Pamphlet 310-4.

### 3-2. Detailed Lubrication Information

*a. General.* Keep all lubricants in closed containers and store in a clean, dry place away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready to use.

*b. Cleaning.* Keep all external parts not requiring lubrication clean of lubricants. Before lubricating the equipment wipe all lubrication points after lubricating to prevent accumulation of foreign matter.

*c. Points of Lubrication.* Service the lubrication points at proper intervals (LO 5-5420-204-12-1 through LO 5-5420-204-12-5).

*d. OES Oil.*

(1) The crankcase oil level must be checked frequently, as oil consumption may increase.

(2) The oil may require changing more frequently than usual because contamination by dilution and sludge formation will increase under cold weather operating conditions.

*e. Operation After Lubrication.* Operate the transporter immediately after lubrication. Inspect oil filters and oil lines for evidence of leakage. When crankcase oil is changed, operate engine for at least five minutes, then check oil level. Add oil when necessary to maintain proper level.

## Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

### 3-3. General

To insure that the transporter is ready for operation at all times, it must be inspected systematically, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed are listed and described in paragraph 3-4. The item numbers indicate the sequence of inspection requirements which can be performed with a minimum of time and motion on the part of the operator / crew. Defects discovered during operation of the transporter shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation that would damage the equipment if operation were continued. All deficiencies and short comings will be recorded, together with the corrective action, on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest opportunity.

### 3-4. Preventive Maintenance Checks and Services

This paragraph contains a brief tabular listing of preventive maintenance checks and services which must be performed by operator / crew. The item numbers are listed in a logical numerical sequence prescribing a minimum of inspection requirements on the part of the individual. Begin the maintenance inspection by starting in the cab, continuing down through the front hatch and through the hull, out the rear hatch, and then around the transporter. Refer to table 3-1 and table 3-2 for the preventive maintenance checks and services.

*Table 3-1. Operator / Crew Preventive Maintenance Checks and Services*

B—Before Operation

A—After Operation

D—During Operation

Time required: 4.3 Man-Hrs.

Time required: .3 Man-Hrs.

| Interval and Sequence No. B | D | A | ITEM TO BE INSPECTED PROCEDURE | Work Time (M / H) |
|---|---|---|---|---|
| 1 | 32 | | LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER<br>NOTE<br>Visually inspect for evidence of lubricant and fuel leaks concurrently with the daily service checks. | 0.1 |
| 2 | 28 | | CONTROLS AND INSTRUMENTS<br>Inspect for visible damage and loose mountings. With unit operating, check for proper operation of gages and switches. Normal operating reading for instruments are shown in figure 2-1. | 0.2 |
| 3 | | | FIRE EXTINGUISHERS<br>Inspect for broken seals. Refer to paragraph 2-14. | 0.1 |
| 4 | | | WINDSHIELD AND WINDOW GLASS<br>Visually inspect for cracked glass or deteriorated seal. Report defects to organizational maintenance. | 0.1 |
| 5 | | | WINDSHIELD WIPER<br>Inspect blades for contact and serviceability (by using hand operating lever). | 0.3 |
| 6 | | | LIGHTS<br>Test switches for proper operation. Refer to paragraph 2-5*f*. | 0.1 |
| 7 | | | PERSONNEL HEATER<br>Visually inspect for signs of damage or leaking fuel. Refer to paragraph 3-10. | 0.1 |
| 8 | | | HAND BRAKE<br>Test handle for proper adjustment by release and reapplication to see that it snaps over center with a firm pressure. Move the adjustment knob if necessary. Refer to paragraph 3-13. | 0.1 |
| 9 | | | BRAKE FLUID RESERVOIR<br>Check level. Add fluid when necessary. Refer to paragrapn 3-15. | 0.1 |
| 10 | | | MAIN HYDRAULIC RESERVOIR<br>Check oil level gage. Add oil when necessary. (Fill to high mark.) Refer to paragraph 3-17. | 0.5 |
| 11 | | | BRAKE MASTER CYLINDER<br>Visually inspect for insecure mounting or leaks and test by foot pressure for proper operation. Report defects to organizational maintenance. Refer to paragraph 3-14. | 0.3 |
| 12 | | | AIR-HYDRAULIC POWER CYLINDER (MULTIPAK)<br>Visually inspect for leakage or insecure mounting. Report defects to organizational maintenance. | 0.1 |
| 13 | 29 | | BILGE PUMPS<br>Visually inspect for loose electrical leads mounting hardware, or clogged screens. Clean screen. Report other defects to organizational maintenance. | 0.1 |
| 14 | | | AIR RECEIVER AND STORAGE TANK<br>Open draincocks on bottom and drain all condensate. | 0.1 |
| 15 | | | FUEL TANKS (2)<br>Open valve and drain water or sediment. Add fuel as required. Inspect for leaks. Report defects to organizational maintenance. Refer to paragraph 3-25. | 0.1 |
| 16 | | | TRANSMISSION OIL LEVEL<br>Check oil level and add oil when necessary. | 0.4 |
| | 30 | | Check oil level with engine running.<br>(Change filter when oil is dirty). See lubrication order. Refer to paragraph 3-34. | |
| 17 | | | ENGINE OIL LEVEL<br>Check oil level dipstick and add oil when indicated low. See lubrication order. | 0.3 |
| 18 | | | ENGINE CRANKCASE BREATHER<br>Service engine crankcase breather. Refer to paragraph 3-29. | 0.1 |

| Interval and Sequence No. B | D | A | ITEM TO BE INSPECTED PROCEDURE | Work Time (M / H) |
|---|---|---|---|---|
| 19 | | | TRANSMISSION BREATHER<br>Service transmission breather. Refer to paragraph 3-33. | 0.1 |
| 20 | | | HYDRAULIC FLUID FILTERS<br>Check gages of line filters. When in red, change filter element. Refer to paragraph 3-18. | 0.5 |
| | | 33 | DRIVE LINE UNIVERSAL JOINTS<br>Visually inspect for missing hardware, leaking joints. Tighten loose bolts. Service as required per Lubrication Order. | 0.1 |
| 21 | | | AIR COMPRESSOR AND GOVERNOR<br>Visually inspect for loose mounting, leaking air, oil, or coolant lines. | 0.1 |
| 22 | | | RADIATOR<br>Check coolant level. Proper level is 2 inches below filler cap. Visually inspect for clogged air passages, cracked, or frayed hose. Refer to paragraph 3-20. | 0.1 |
| 23 | | | HULL<br>Inspect hull for loose, missing or corroded rivets, ruptured skin, open seams, or bent frame members. | 0.2 |
| 24 | | | FUEL TANK FILLER NECK CAP, STRAINER, GASKET AND BREATHER VENT<br>Inspect caps, gaskets, and strainer. Replace defective gasket. Clean breather vent screen. | 0.3 |
| 25 | 31 | | REAR CONTROL STATION<br>Visually inspect controls and instruments for damage or defect. (Report all defects to organizational maintenance). | 0.1 |
| 26 | | | SUPERSTRUCTURE<br>Refer to TM 5-5420-205-15 for Preventive Maintenance instructions on Superstructure items. | |
| 27 | | 34 | MARINE DRIVE<br>Visually inspect for signs of damage, leaking hydraulic lines or loose or damaged electrical connectors. Inspect sheer pin for security of installation. Inspect propeller and dust for visible damage. Report all damaged items to organizational maintenance. | 0.1 |
| | | 35 | WHEEL SUSPENSION DOUBLE UNIVERSAL JOINT<br>Remove check plug in boots and check for water. Report defective boot to organizational maintenance. Refer to paragraph 3-42. | 0.1 |

*Table 3-2. Operator / Crew Preventive Maintenance Checks and Services*

D / Daily

Time required: 0

W—Weekly

Time required: 2.1 Hrs.

| Interval and sequence No. D | W | Item to be inspected procedure | Work time (M / H) |
|---|---|---|---|
| | 1 | LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER | 0.5 |
| | 2 | BATTERIES<br>Tighten loose cables and mountings. Remove corrosion. Inspect for cracks and leaks. Remove caps and fill cells to 3/8 inch above plates. Clean vent holes in caps before reinstalling. In freezing weather, run engine at least one hour after adding water. Replace a cracked or defective battery. Refer to paragraph 3-16. | 0.3 |
| | 3 | ENGINE AIR CLEANER<br>Remove cup and filter weekly for cleaning except when operating in extremely dusty or sandy areas, then clean daily, or more often if required. Refer to paragraph 3-21. | 0.7 |
| | 4 | DRIVE BELTS<br>Inspect adjustment. Proper adjustment is 1/2 to 3/4 inch deflection midway between pulleys. Report frayed belt to organizational maintenance. | 0.1 |
| | 5 | DIFFERENTIAL<br>Check breather and oil level Refer to paragraph 3-38. | 0.1 |

| Interval and sequence No. D | Interval and sequence No. W | Item to be inspected procedure | Work time (M / H) |
|---|---|---|---|
| | 6 | WHEEL WELL AIR BLOWER AIR CLEANER<br>Check air cleaner filter (weekly, except when operating in dusty or sandy areas, then daily). | 0.3 |
| | 7 | AIR HEATER<br>Remove filter, clean and replace. Refer to paragraph 3-22. | 0.1 |

## Section III. TROUBLESHOOTING

### 3-5. General

*a.* This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the transporter. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine the probable causes and corrective actions to take. You should perform the tests / inspections and corrective actions in the order listed.

*b.* This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

### 3-6. Troubleshooting

Refer to table 3-3. This table provides troubleshooting instructions at the operator / crew maintenance personnel level.

*Table 3-3. Troubleshooting*

| MALFUNCTION<br>TEST OR INSPECTION<br>CORRECTIVE ACTION |
|---|
| ENGINE |
| 1. ENGINE FAILS TO CRANK. |
| Step 1. Check to see if master switch is *OFF*.<br>Turn master switch *ON* (fig. 2-1). |
| Step 2. Check for loose starter motor and battery electrical connections.<br>Tighten loose connections. |
| Step 3. Check for empty fuel tanks.<br>Refill tanks if empty or low. Prime fuel system (para 2-15) before cranking engine. |
| 2. ENGINE IS HARD TO START OR FAILS TO START. |
| Step 1. Check air cleaner for dirt.<br>Service air cleaner (para 3-21). |
| Step 2. Check to see if emergency shutoff valve is closed.<br>Reset emergency shutoff valve to open position (para 2-4) (fig. 2-6). |
| 3. ENGINE LACKS POWER. |
| Step 1. Check air cleaner for dirt.<br>Service air cleaner (para 3-21). |
| Step 2. Check for air leaks in fuel supply line.<br>Tighten line. |
| Step 3. Check to see if exhaust tubes or muffler is clogged.<br>Clear obstructions. |
| Step 4. Check for improper grade fuel oil in tanks.<br>Drain improper fuel. Service with correct grade (para 2-19*b*). Prime fuel system before cranking engine (para 2-15). |
| 4. ENGINE CRANKCASE PRESSURE EXCESSIVE. |
| Step 1. Check to see if crankcase breather is clogged.<br>Service breather (para 3-29). |
| 5. ENGINE LUBRICATING OIL CONSUMPTION EXCESSIVE. |
| Step 1. Check for leaks or loose oil lines.<br>Tighten loose connections. |
| 6. ENGINE LUBRICATING OIL PRESSURE INDICATED LOW. |
| Step 1. Check to see if engine oil level is low.<br>Refer to current lubrication order and fill crankcase (para 3-2). |

7. ENGINE WATER TEMPERATURE HIGH
Step 1. Check water level.
If water level is low, fill radiator (para 3-20).
Step 2. Check to see if cooling system is clogged.
Flush system (para 3-20).
8. ENGINE FAILS TO STOP AFTER FIRE EXTINGUISHER LIMIT SWITCH ACTUATION.
Step 1. Inspect limit switch to see if defective.
Use emergency stop knob to stop engine.
9. ENGINE STOPS SUDDENLY.
Step 1. Check to see if fuel shutoff valve is closed.
Open valve (para 4-206 and para 4-208).

TRANSMISSION

10. TRANSMISSION OIL TEMPERATURE TOO HIGH.
Step 1. Check to see if oil level is low.
Refer to current lubrication order and fill with proper oil (para 3-2).
Step 2. Check to see if oil level is too high.
Drain oil to proper level. (See LO, para 3-2).
Step 3. Check to see if coolant system is low.
Fill with water (para 3-20).
Step 4. Check to see if selected gear speed is running too slow.
Downshift to increase gear speed.
11. TRANSMISSION WILL NOT SHIFT.
Step 1. Check to see if oil level is low.
Refer to current lubrication order and service (para 3-2).
12. TRANSMISSION SLIPS.
Step 1. Check to see if oil level is low.
Refer to current lubrication order and service (para 3-2).
Step 2. Check to see if oil is foaming, improper oil, or is contaminated.
Refer to current lubrication order and service (para 3-2).
13. BATTERIES DISCHARGE RAPIDLY OR OVERHEAT.
Step 1. Check to see if electrolyte is low.
Refer to para 3-16 and service.
Step 2. Inspect to see if batteries are selfdischarging. Clean dust, dirt and electrolyte from top of batteries (para 3-16).
14. INSTRUMENTS INACCURATE OR INOPERATIVE.
Step 1. Check to see if master battery switch is *OFF*.
Turn switch *ON* (fig. 2-1).
Step 2. Check to see if instrument or transmitter ground is lost.
Refer to applicable system practical diagram (fig. 1-4 through 1-6), trace lead and insure that ground is made.
Step 3. Check for loose connector or broken electrical lead.
Tighten loose connection.
15. BATTERY ALTERNATOR INDICATOR FAILS TO INDICATE VOLTAGE WHEN ENGINE IS STOPPED, OR BATTERY CHARGING VOLTAGE WHEN ENGINE IS RUNNING.
Step 1. Check for loose wire lead, loose cable or defective lead or cable.
Tighten loose connections.
Step 2. Check for defective batteries.
Report defective batteries to organizational maintenance for replacement.
16. ELECTRICAL COMPONENT FAILS TO FUNCTION WHEN SWITCH IS ACTUATED.
Step 1. Check master battery switch to see if it is *OFF*.
Turn switch *ON*.
Step 2. Check for loose connector or wire lead.
Tighten loose connection.

***CAUTION***

**Leakage of hydraulic oil is a danger signal and immediate action must be taken to locate and correct condition. Complete loss of vehicle is possible, under certain conditions, when leakage is not eliminated.**

17. HYDRAULIC OIL LEAKS INTO HULL FROM SUPERSTRUCTURE.
Step 1. Check for leak in line, hose, fitting or other component.
Locate source of leakage. Tighten loose connections, fittings, hose, line or other component.

18. LOW AIR PRESSURE SIGNAL CONTINUES TO SOUND AFTER ENGINE HAS RUN SHORT TIME.
Step 1. Check to see if air compressor has not run long enough to build up pressure.
Run engine for 45 seconds. If pressure is not up then, check for loose belts.
Step 2. Check for leaks in tubing and fittings.
Tighten connections.

19. AIR PRESSURE INSUFFICIENT OR FAILS TO BUILD UP.
Step 1. Check if draincocks are open.
Close draincocks on reservoir and storage tank.
Step 2. Check to see if air cleaner is dirty.
Service air cleaner (para. 3-21).

20. WINDSHIELD WIPER MOTORS DO NOT OPERATE.
Step 1. Check for leaks, air line or fittings.
Tighten lines or fittings.
Step 2. Check for air pressure, if no pressure.
Check out trouble using 19 above.

21. ENGINE FAN DOES NOT OPERATE WHEN TEMPERATURE INDICATOR READS ABOVE 180° F. AND ENGINE FAN SWITCH IS AT AUTO.
Step 1. Check for loose electrical connector.
Tighten loose connector.
Step 2. Check for air pressure, it no pressure.
Check out trouble using 19.

22. HORN DOES NOT SOUND.
Step 1. Check for loose electrical connector.
Tighten loose connector.
Step 2. Check for loss in air pressure.
Check out trouble using 19.

23. ENGINE OVERSPEEDS WHEN HIGH PRESSURE HYDRAULIC PUMP IS ENGAGED.
Step 1. Check for loose connector.
Tighten connector.
Step 2. Check for loss of air pressure.
Check out trouble using 19.

24. AIR HEATER INOPERATIVE.
Step 1. Check to see if fuel filter is dirty or clogged with wax caused by use of improper grade fuel oil.
Service filter (para. 3-22). Service with proper fuel (para. 2-19-*b*).
Step 2. Check electrical lead to see if loose or defective.
Tighten loose lead.

25. VEHICLE BRAKES FAIL TO RELEASE.
Step 1. Check to see if pedal linkage is binding.
Free linkage.

26. BRAKE PEDAL TRAVEL EXCESSIVE OR SPONGY.
Step 1. Check to see if air pressure is low.
Operate engine 45 seconds to build up air pressure.
Step 2. Check for leaks in hydraulic lines or fittings.
Tighten loose lines or fittings.

27. VEHICLE BRAKE PEDAL HARD.
Step 1. Check for low pressure (more travel than normal).
Operate engine 45 seconds and build up pressure.
Step 2. Check to see if brake pedal linkage is binding.
Free linkage.

28. LOSS OF PEDAL AFTER APPLICATION
Step 1. Inspect to see if brakes are too hot.
Allow brakes to cool then recheck pedal.

29. BRAKES GRAB.
Step 1. Check to see if brake pedal linkage is binding.
Free linkage.

30. REAR WHEEL POSITION INDICATOR WANDERS FROM SIDE-TO-SIDE WHEN VEHICLE IS DRIVEN AND REAR WHEEL STEERING IS NOT IN USE.
Step 1. Check to see if rear wheel steering lock pin is not extended.
Position rear wheels forward, then move rear steering pin control switch (S23) (fig. 2-1) to EXTEND.

31. WHEEL SUSPENSION SYSTEM FAILS TO FUNCTION (WHEELS WILL NOT RETRACT).
Step 1. Check to see if wheel position is not straight ahead ($\pm 4°$).
Align wheel position until indicator shows them straight ahead.

32. WHEEL WELL BLOWER SYSTEM FAILS TO OPERATE.
Step 1. Check for oil leaks in motor, service line, tube or coupling.
Tighten loose tube or coupling.

33. MARINE DRIVE WILL NOT FUNCTION.
Step 1. Check circuit breaker CB4.
Test circuit breaker.
Step 2. Check for loose electrical lead or connector.
Tighten loose connections.

34. MARINE DRIVE SELECTOR INOPERATIVE.
Step 1. Check for loose electrical lead or connector.
Tighten loose connections.

35. PERSONNEL HEATER OVERHEATS AND STOPS BURNING.
Step 1. Check for clogged exhaust vent.
Clear vent.

36. HEAT OUTPUT TOO LOW.
Step 1. Check switch to see if on LO heat.
Turn switch to HI heat.

37. BLOWER RUNS BUT HEATER FAILS TO IGNITE AT LOW AMBIENT TEMPERATURE.
Step 1. Check for lack of fuel to heater.
Check fuel tank.
Step 2. Check for defective igniter.
Refer to para 3-10 for service.
Step 3. Check voltage to see if its too low.
If speed of blower motor is running slow, check battery voltage.

38. HEATER DOES NOT OPERATE WHEN CONTROL SWITCH IS TURNED ON.
Step 1. Check for loose electrical lead.
Tighten loose electrical connection.
Step 2. Check to see if heater smokes excessively and / or "bangs" upon starting.
When starting, always turn switch on LO heat.

## Section IV. MAINTENANCE PROCEDURES

### 3-7. General
The instructions in this section are published for the information and guidance of operator / crew in maintaining the transporter.

### 3-8. Cab Assembly
Refer to the lubrication orders and service as required.

### 3-9. Identification Plates Inspection
Refer to paragraph 1-9 for inspection of the identification plates.

### 3-10. Personnel Heater Igniter Service
Refer to figure 3-1 and service the personnel heater igniter.

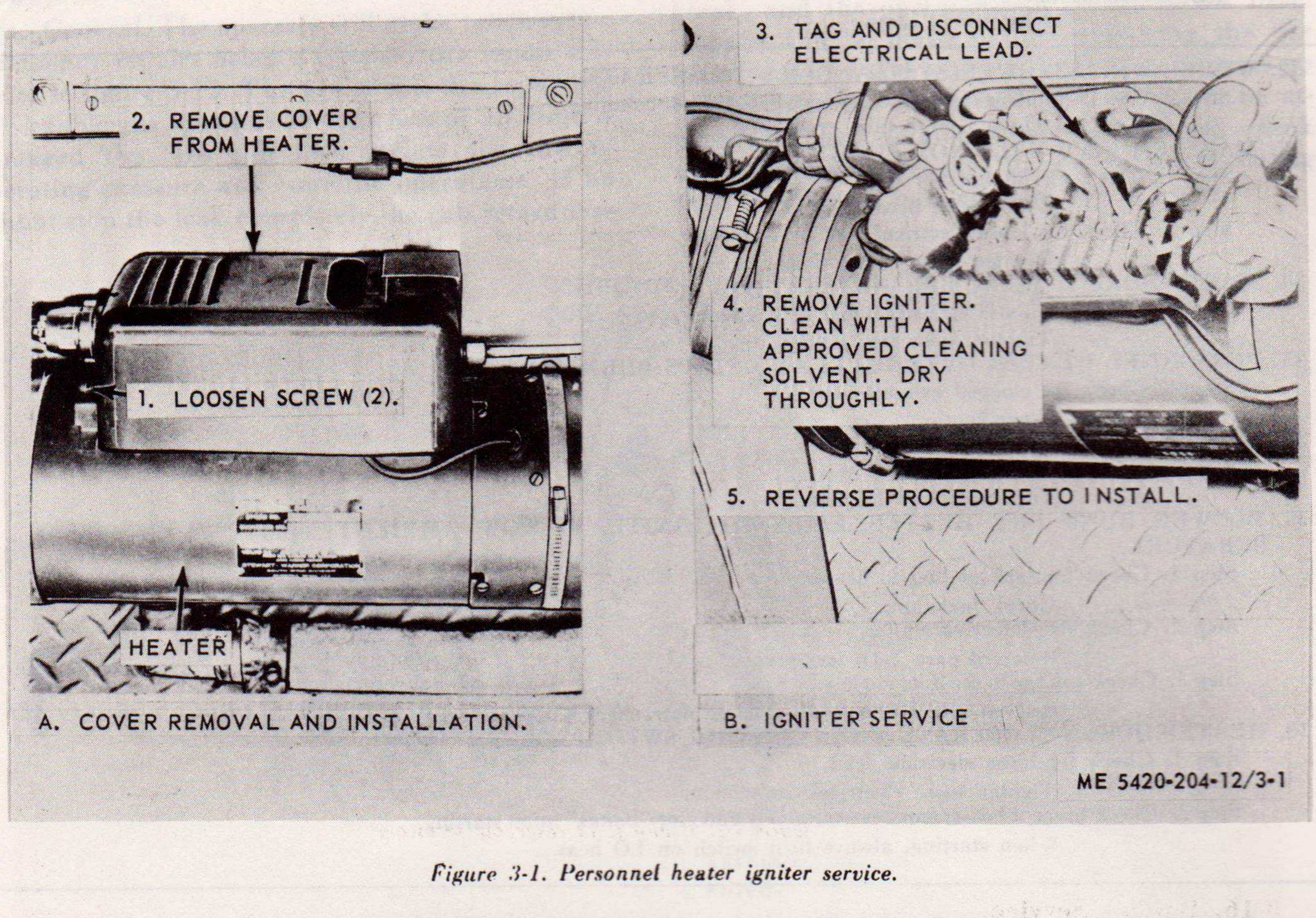



*Figure 3-1. Personnel heater igniter service.*

### 3-11. Splined Post Service

Refer to the lubrication orders and service as required.

### 3-12. Capstan Service

Refer to the lubrication orders and service as required.

### 3-13. Hand (Parking) Brake Service

Operator will make minor adjustment of hand brake (fig. 2-1) by turning knob on end of lever clockwise until moderate pressure is required to lift lever and lever snaps over center when applied, holding transporter immobile on a slope or against torque of transmission. When lever will not snap over center, backoff knob in a counterclockwise direction until adjustment will allow moderate lifting pressure to raise lever and snap it over center.

### 3-14. Hydraulic Brake System Test

*a.* Apply and release pressure on brake pedal three times. This will set adjustment mechanism in brake caliper, then with pressure released, check that brake discs (at differential) run free.

*b.* Apply and hold pressure on brake pedal for five minutes. While pressure is applied, check system for hydraulic fluid leaks.

*c.* Release pressure from pedal. After five minutes, check system for fluid leaks.

### 3-15. Hydraulic Brake Fluid Reservoir Service

Refer to figure 3-2 and service the brake fluid reservoir.

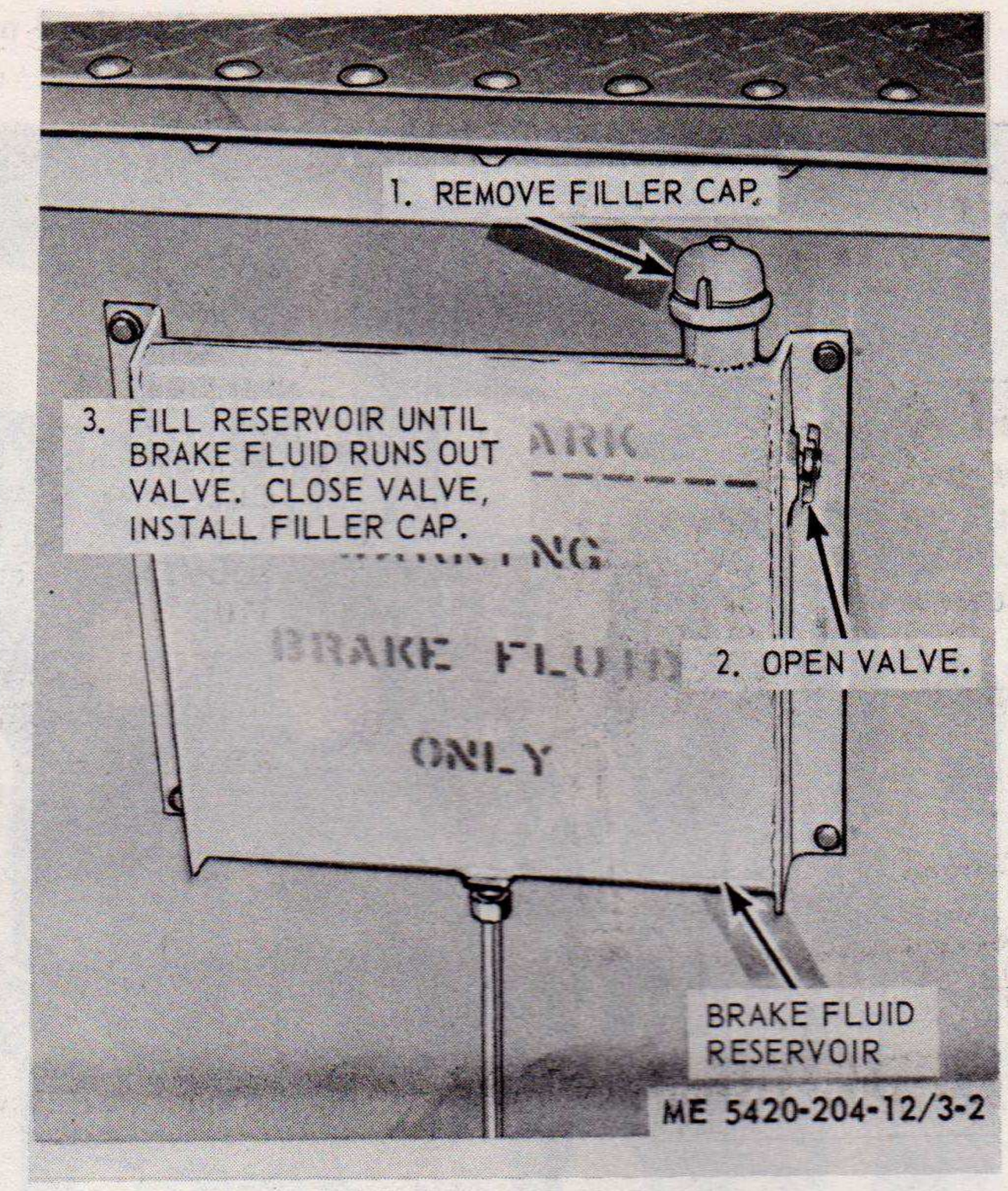



*Figure 3-2. Brake fluid reservoir service.*

## 3-16. Battery Service

Refer to figure 3-3 and service batteries.

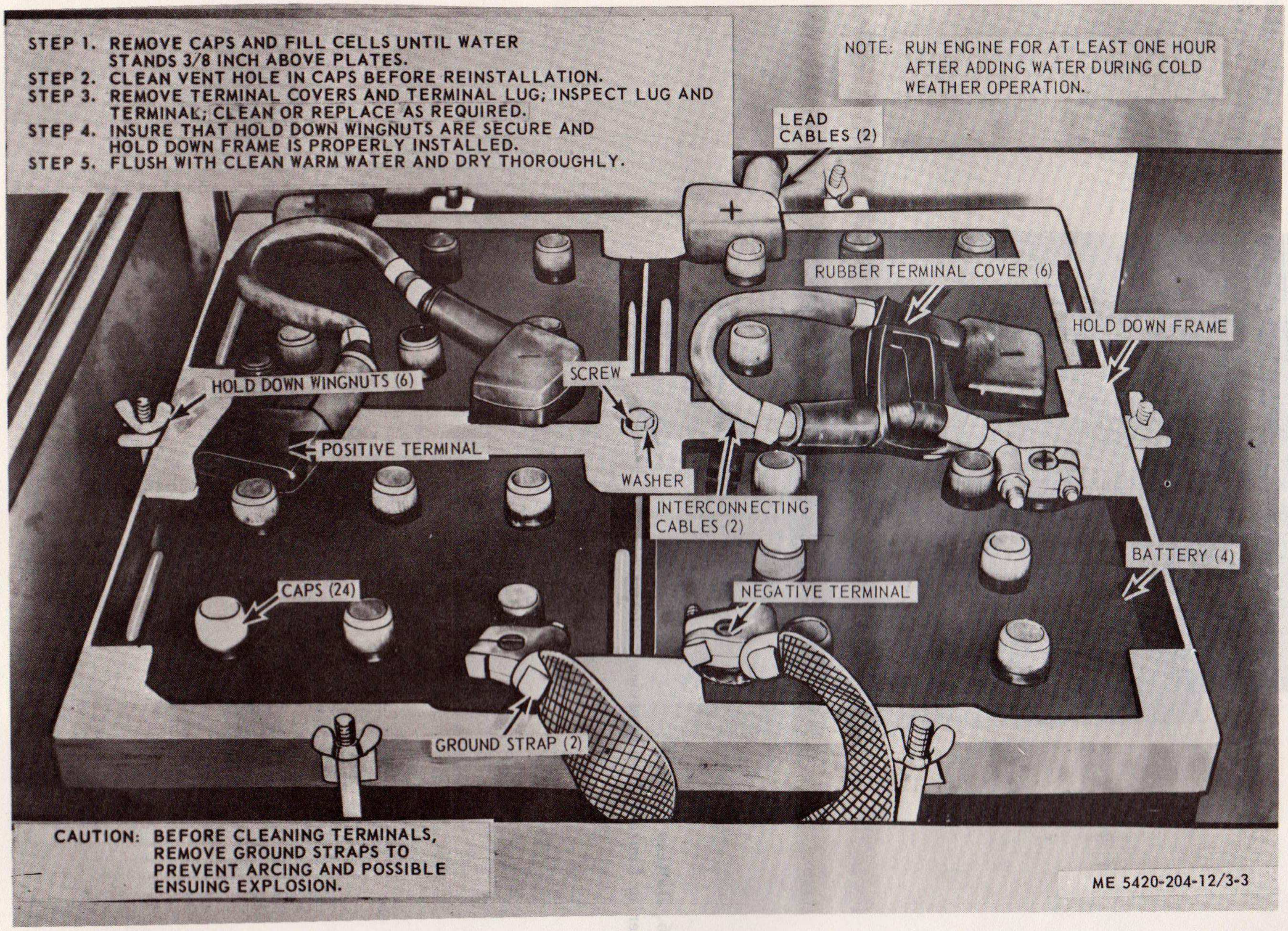
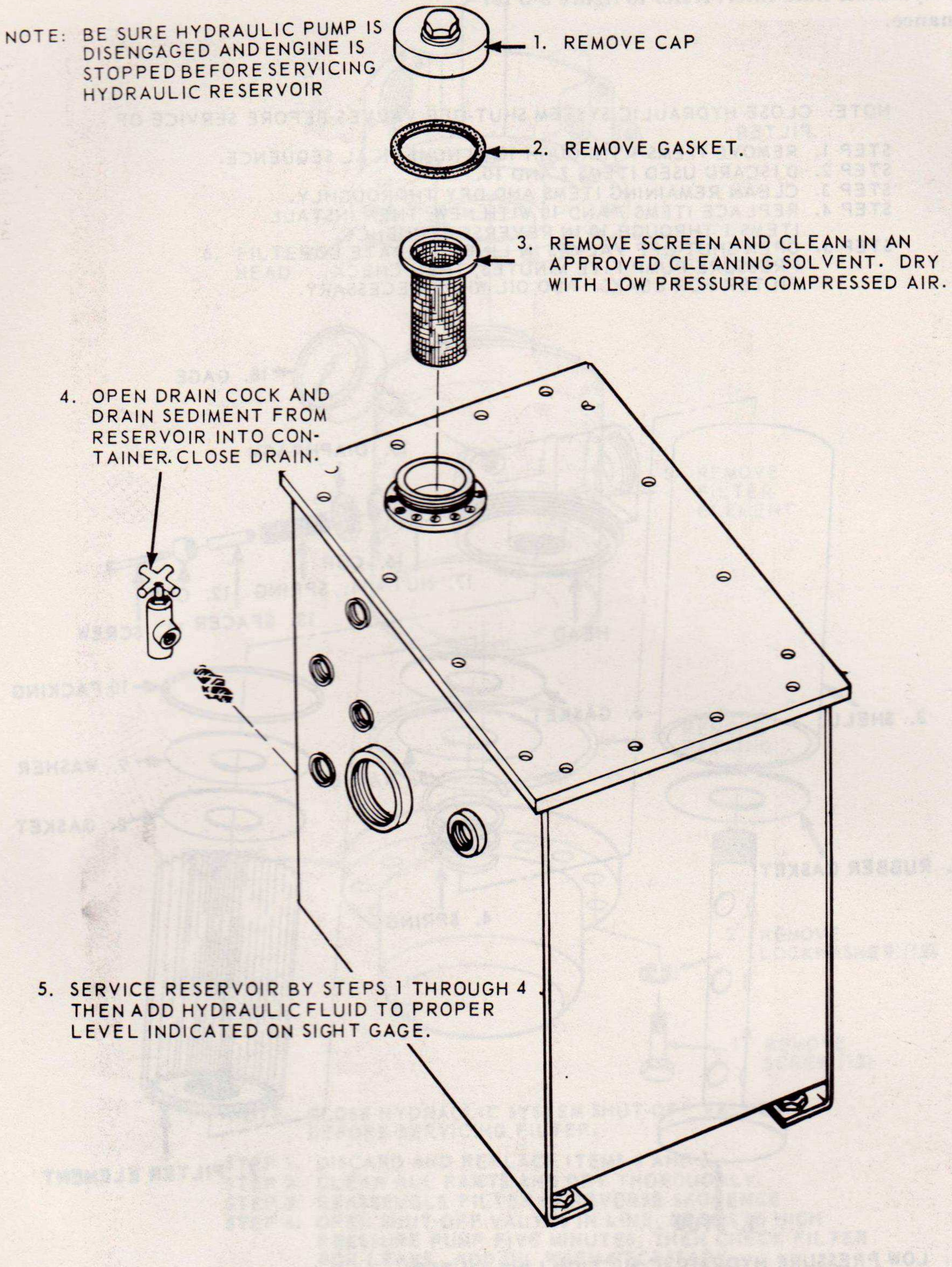



*Figure 3-3. Battery service.*

## 3-17. Hydraulic (Tank) Reservoir Service

Refer to figure 3-4 and service hydraulic reservoir.



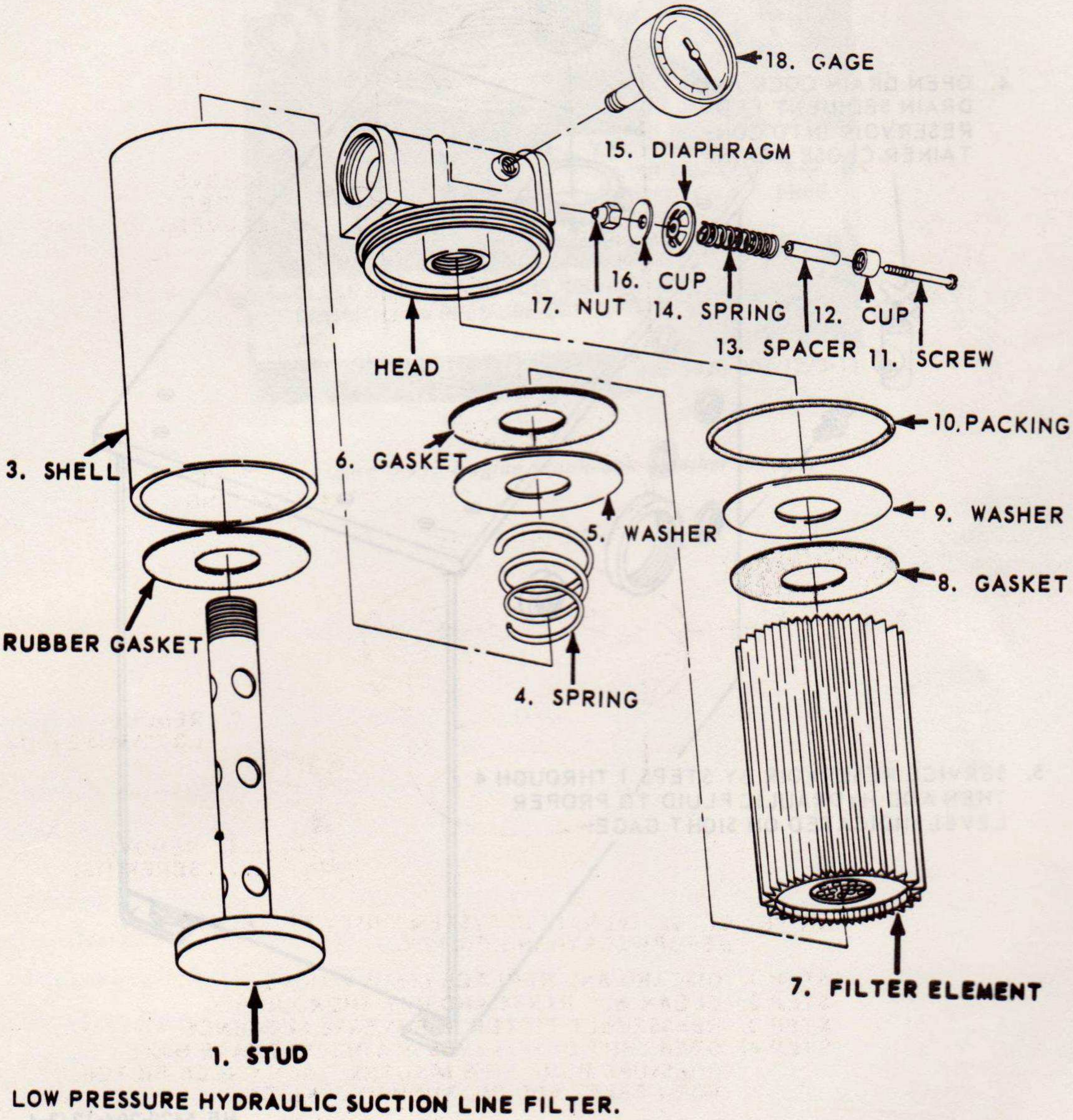

ME 5420-204-12/3-4

*Figure 3-4. Hydraulic reservoir service.*

## 3-18. Hydraulic Fluid Filters Service

When gage pointer is in the red, service the applicable hydraulic fluid filter. Refer to figure 3-5 for maintenance.

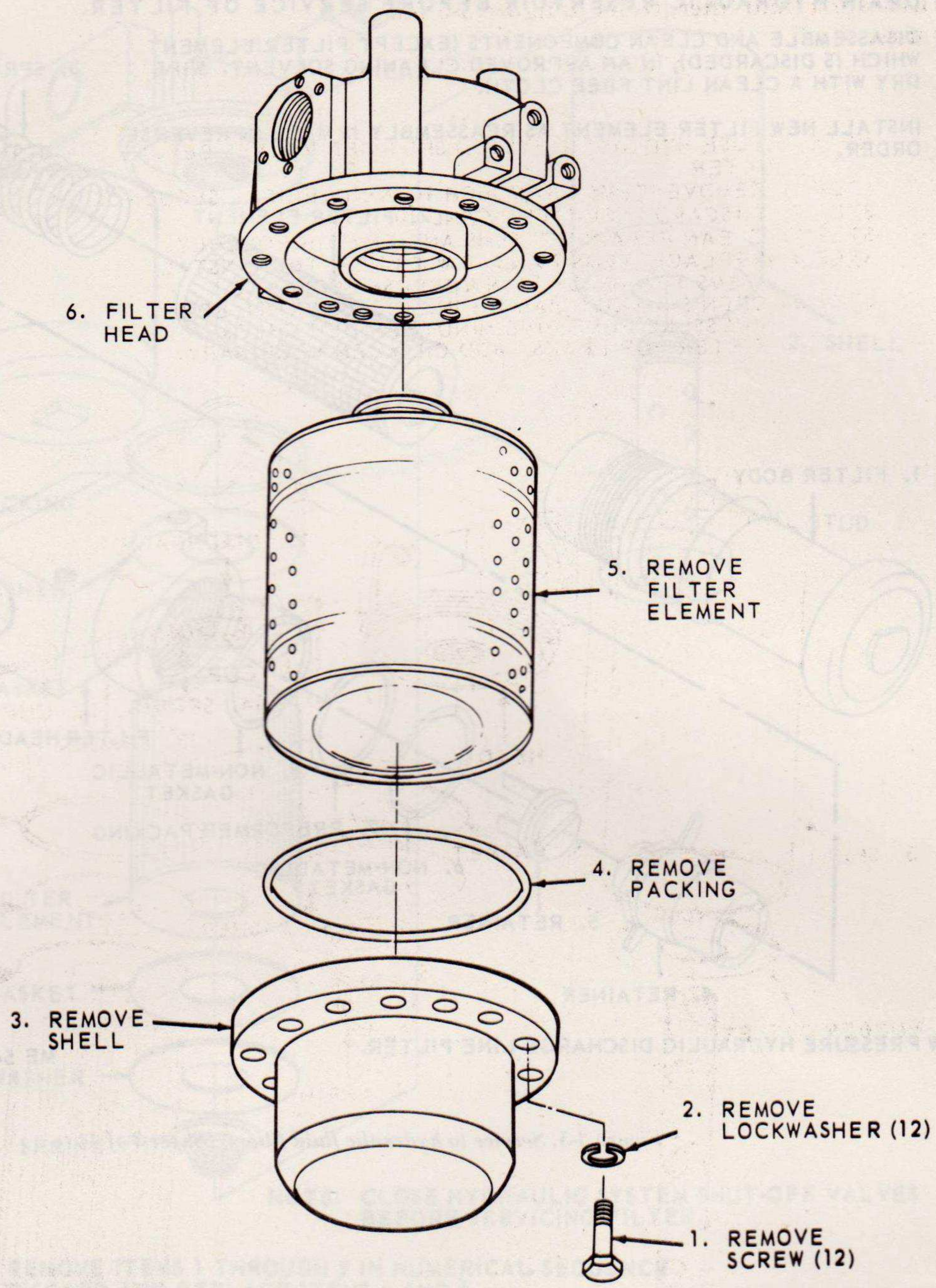
NOTE: CLOSE HYDRAULIC SYSTEM SHUT-OFF VALVES BEFORE SERVICE OF FILTER.
STEP 1. REMOVE ITEMS 1 THROUGH 10 IN NUMERICAL SEQUENCE.
STEP 2. DISCARD USED ITEMS 7 AND 10.
STEP 3. CLEAN REMAINING ITEMS AND DRY THOROUGHLY.
STEP 4. REPLACE ITEMS 7 AND 10 WITH NEW, THEN INSTALL ITEMS 1 THROUGH 10 IN REVERSE SEQUENCE.
STEP 5. OPEN SHUT-OFF VALVES IN LINE, OPERATE LOW PRESSURE PUMP FIVE MINUTES, THEN CHECK FILTER FOR LEAKS. ADD OIL WHEN NECESSARY.




A. LOW PRESSURE HYDRAULIC SUCTION LINE FILTER.

ME 5420-204-12/3-5 ①

*Figure 3-5. Service to hydraulic fluid filters. (Sheet 1 of 4)*




NOTE: CLOSE HYDRAULIC SYSTEM SHUT-OFF VALVES BEFORE SERVICING FILTER.

STEP 1. DISCARD AND REPLACE ITEMS 4 AND 5.
STEP 2. CLEAN ALL PARTS AND DRY THOROUGHLY.
STEP 3. REASSEMBLE FILTER IN REVERSE SEQUENCE
STEP 4. OPEN SHUT-OFF VALVES IN LINE, OPERATE HIGH PRESSURE PUMP FIVE MINUTES, THEN CHECK FILTER FOR LEAKS. ADD OIL WHEN NECESSARY.

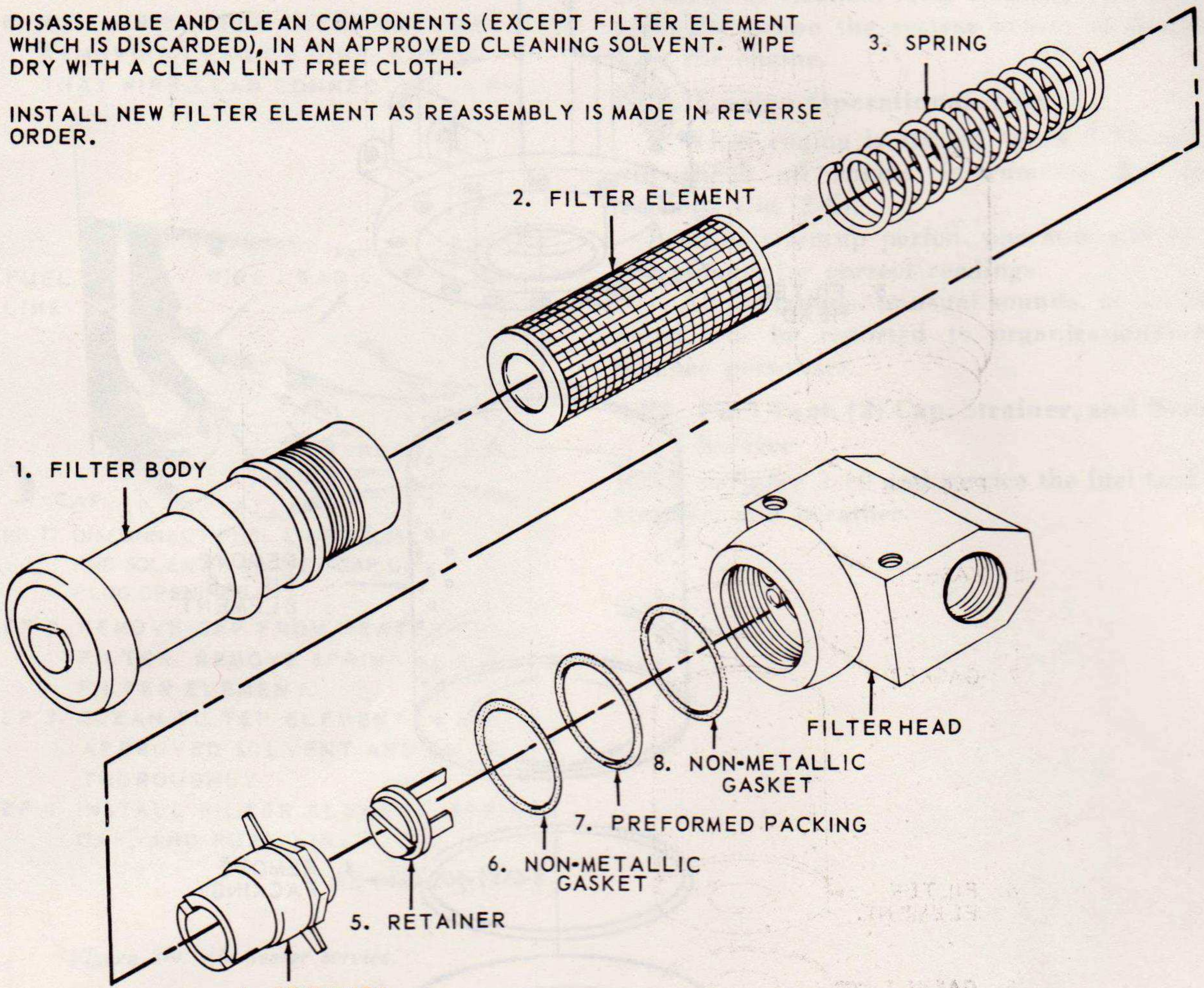
**B. HIGH PRESSURE HYDRAULIC DISCHARGE LINE FILTER.** ME 5420-204-12/3-5 ②

*Figure 3-5. Service to hydraulic fluid filters. (Sheet 2 of 4)*

NOTE: DRAIN HYDRAULIC RESERVOIR BEFORE SERVICE OF FILTER.

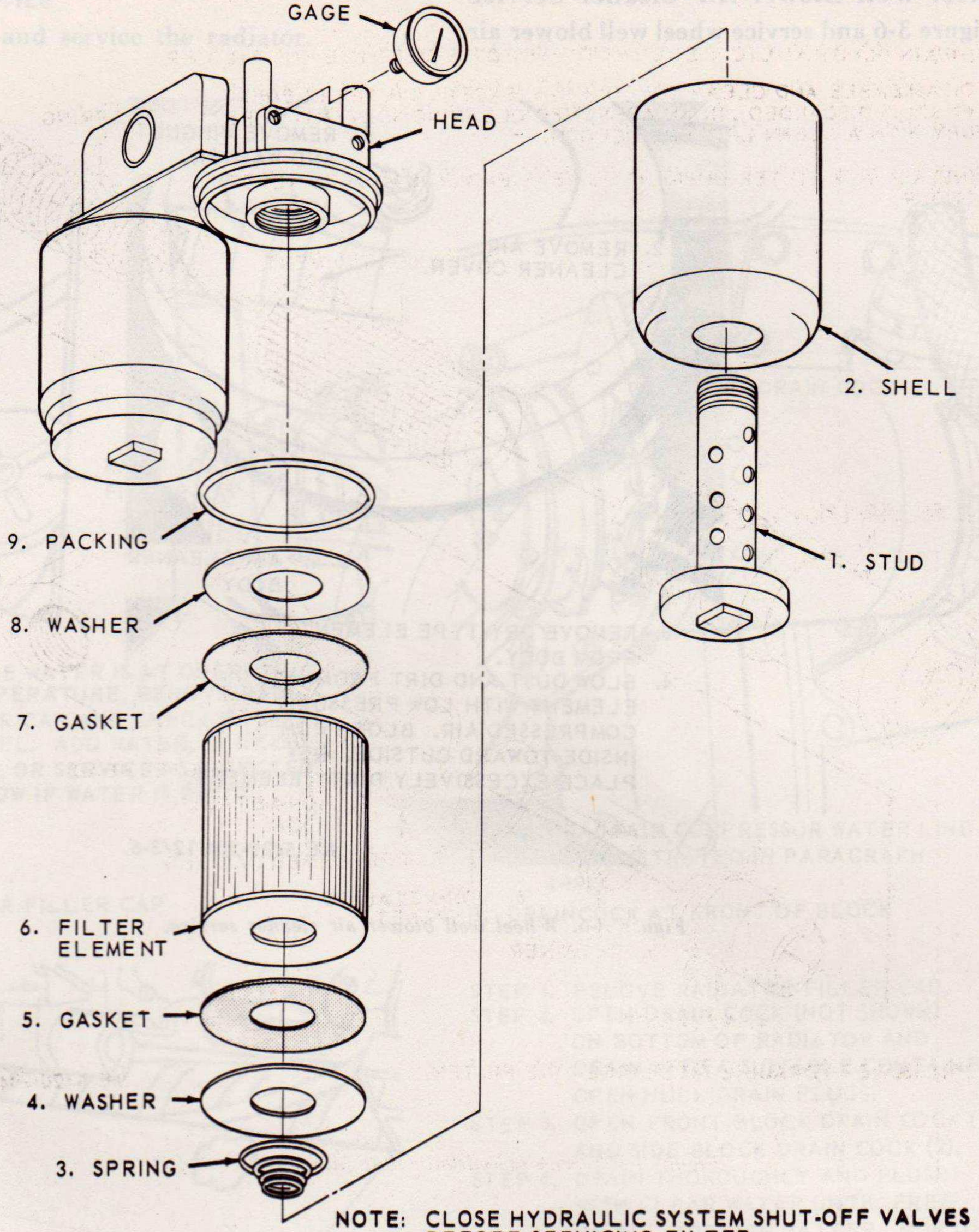
STEP 1. DISASSEMBLE AND CLEAN COMPONENTS (EXCEPT FILTER ELEMENT WHICH IS DISCARDED), IN AN APPROVED CLEANING SOLVENT. WIPE DRY WITH A CLEAN LINT FREE CLOTH.

STEP 2. INSTALL NEW FILTER ELEMENT AS REASSEMBLY IS MADE IN REVERSE ORDER.




C. LOW PRESSURE HYDRAULIC DISCHARGE LINE FILTER. ME 5420-204-12/3-5 ③

*Figure 3-5. Service to hydraulic fluid filters. (Sheet 3 of 4)*




NOTE: CLOSE HYDRAULIC SYSTEM SHUT-OFF VALVES BEFORE SERVICING FILTER.

STEP 1. REMOVE ITEMS 1 THROUGH 9 IN NUMERICAL SEQUENCE.
STEP 2. DISCARD AND REPLACE ITEMS 6 AND 9.
STEP 3. CLEAN REMAINING ITEMS AND DRY THOROUGHLY.
STEP 4. INSTALL ITEMS 1 THROUGH 9 IN REVERSE SEQUENCE.
STEP 5. REPEAT STEPS 1 THROUGH 4 FOR REMAINING FILTER SHELL.
STEP 6. OPEN HYDRAULIC SHUT-OFF VALVES IN LINE, OPERATE HIGH PRESSURE PUMP FOR FIVE MINUTES, THEN CHECK FILTER FOR LEAK. ADD OIL WHEN NECESSARY.

D. HIGH PRESSURE HYDRAULIC SUCTION LINE FILTER. ME 5420-204-12/3-5 (4)

*Figure 3-5. Service to hydraulic fluid filters. (Sheet 4 of 4)*

### 3-19. Wheel Well Blower Air Cleaner Service

Refer to figure 3-6 and service wheel well blower air cleaner.

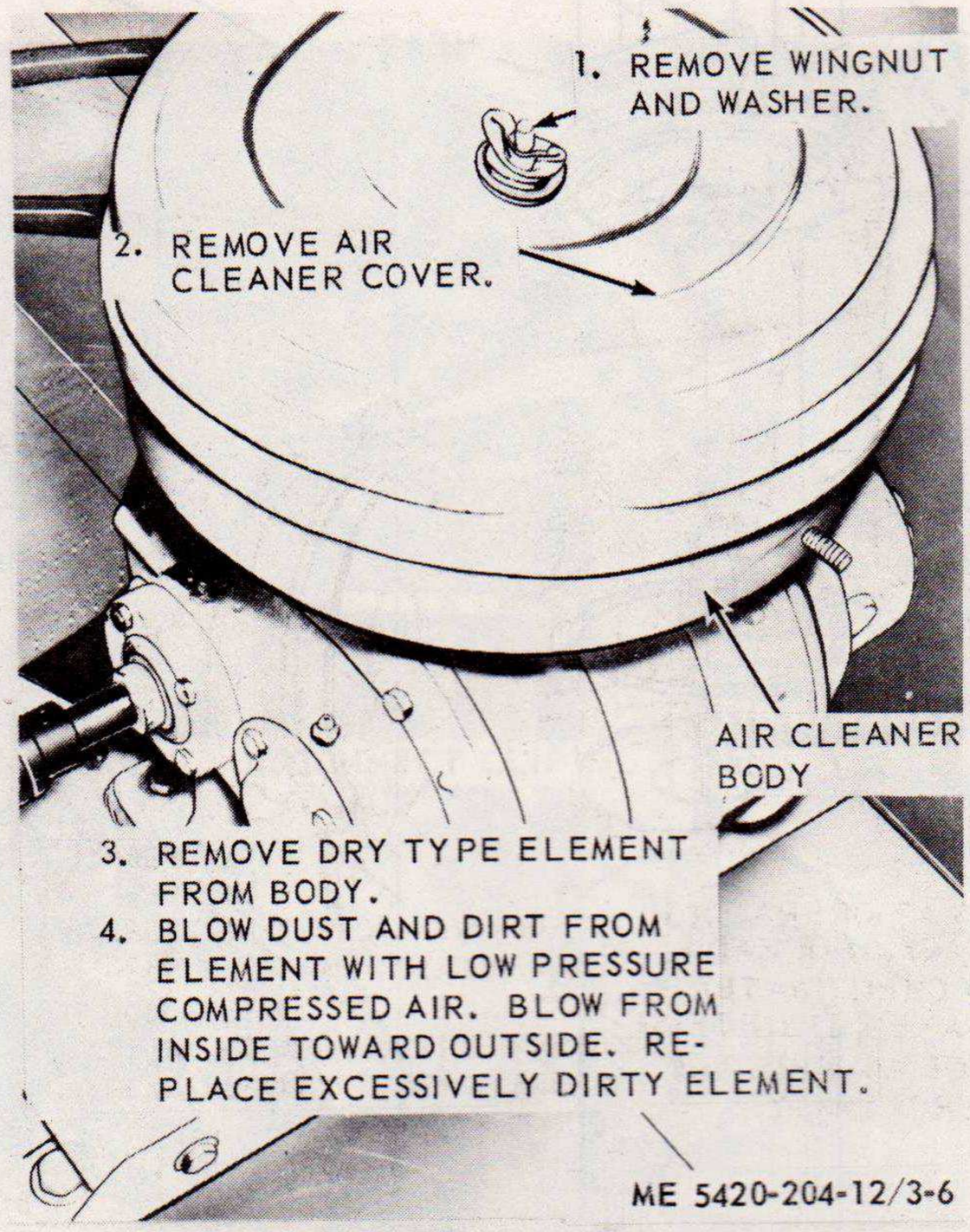
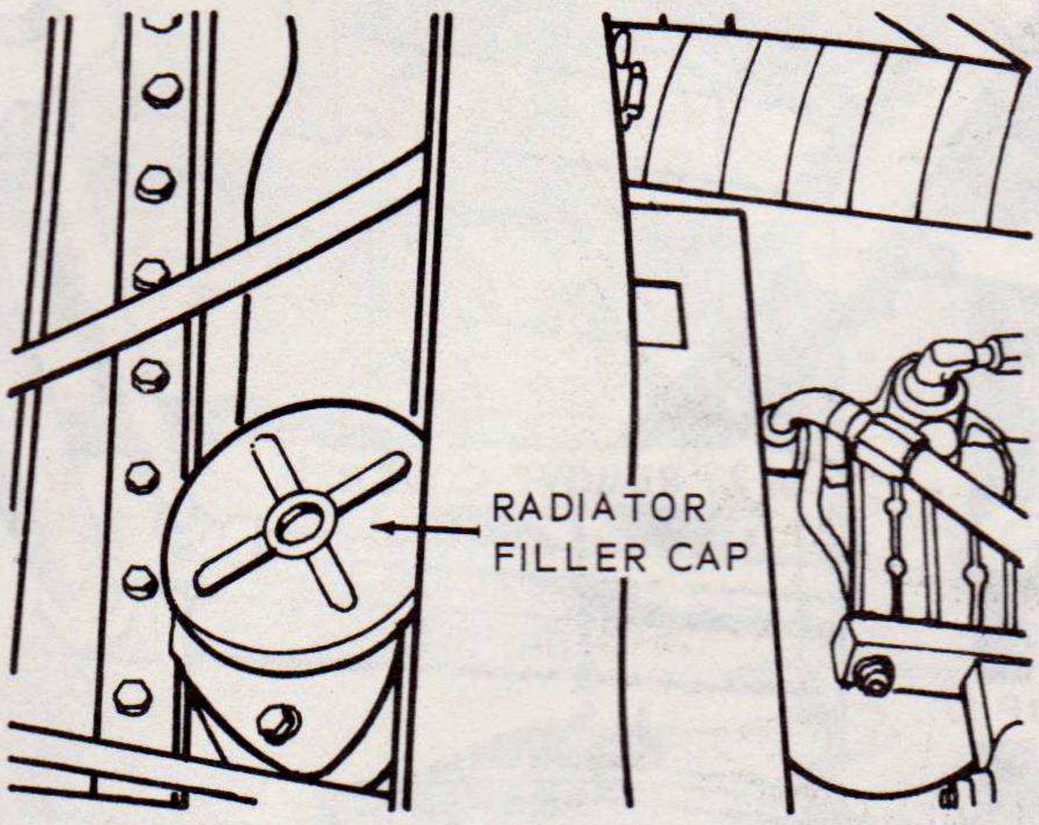



*Figure 3-6. Wheel well blower air cleaner service.*

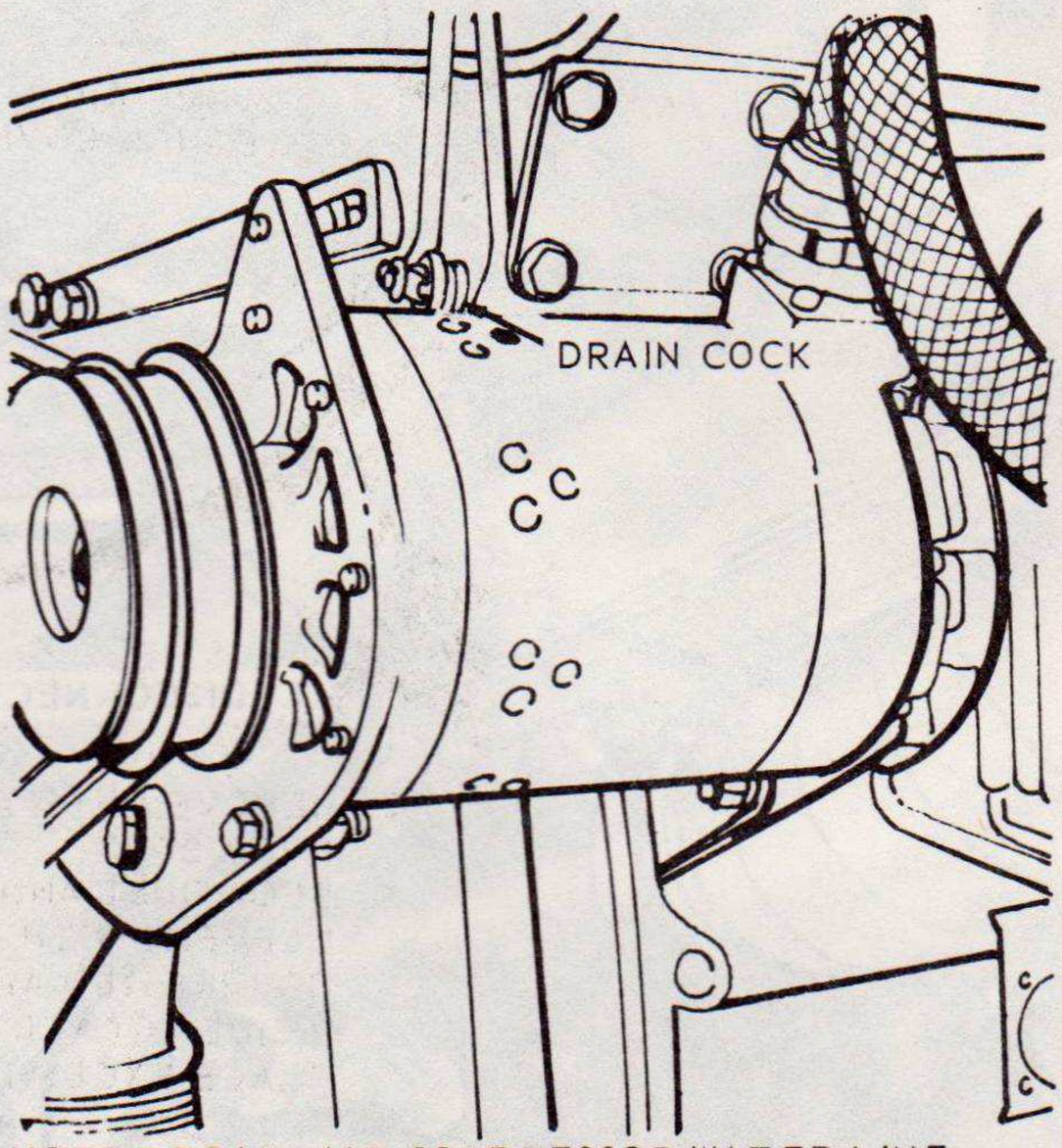
## 3-20. Radiator Service

Refer to figure 3-7 and service the radiator.



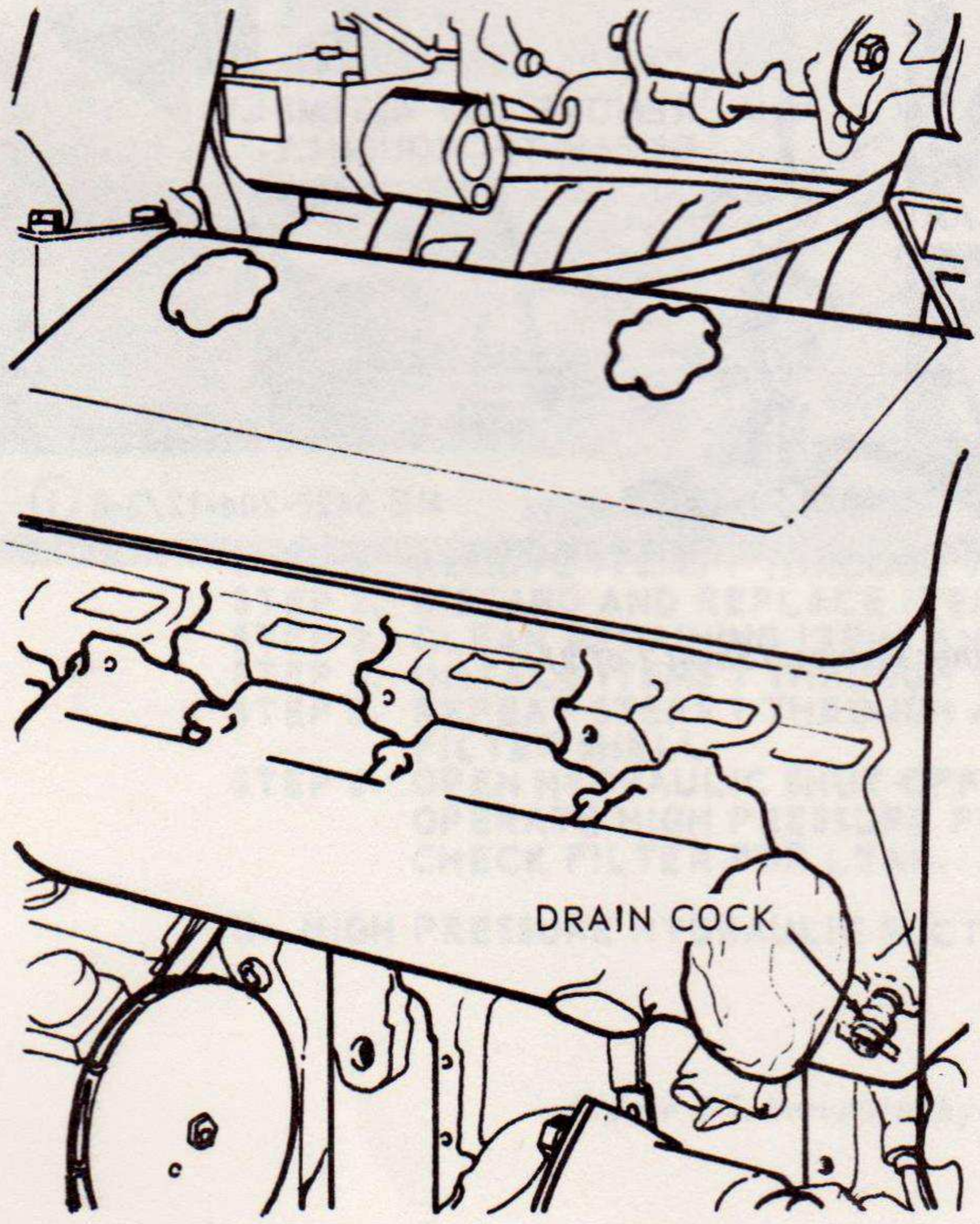

NOTE ; WHILE WATER IS AT OPERATING TEMPERATURE, REMOVE RADIATOR CAP AND CHECK WATER LEVEL. ADD WATER, IF NECESSARY, OR SERVICE AS DIRECTED BELOW IF WATER IS DIRTY.

A. RADIATOR FILLER CAP




NOTE; DRAIN AIR COMPRESSOR WATER LINE AS ILLUSTRATED IN PARAGRAPH 4-191.

B. DRAINCOCK AT FRONT OF BLOCK




STEP 1. REMOVE RADIATOR FILLER CAP.
STEP 2. OPEN DRAIN COCK (NOT SHOWN) ON BOTTOM OF RADIATOR AND DRAIN INTO A SUITABLE CONTAINER. OPEN HULL DRAIN PLUGS.
STEP 3. OPEN FRONT BLOCK DRAIN COCK (2) AND SIDE BLOCK DRAIN COCK (2).
STEP 4. DRAIN THOROUGHLY AND FLUSH WITH CLEAR WATER UNTIL FREE OF ALL FOREIGN MATTER. MOP UP ALL WATER FROM HULL.
STEP 5. CLOSE ALL DRAIN COCKS AND FILL RADIATOR UNTIL WATER LEVEL IS TWO INCHES BELOW FILLER CAP.
STEP 6. START ENGINE, RUN UNTIL WATER REACHES OPERATING TEMPERATURE, WATCHING FOR LEAKS. TIGHTEN LOOSE HOSE OR DRAIN COCKS. BE SURE RADIATOR FILL CAP IS SECURE.
STEP 7. RECHECK WATER LEVEL. ADD WATER IF NECESSARY.

C. DRAINCOCK AT SIDE OF BLOCK.

ME 5420-204-12/3-7

*Figure 3-7. Radiator service.*

## 3-21. Engine Air Cleaner Service

Refer to figure 3-8 and service the engine air cleaner.

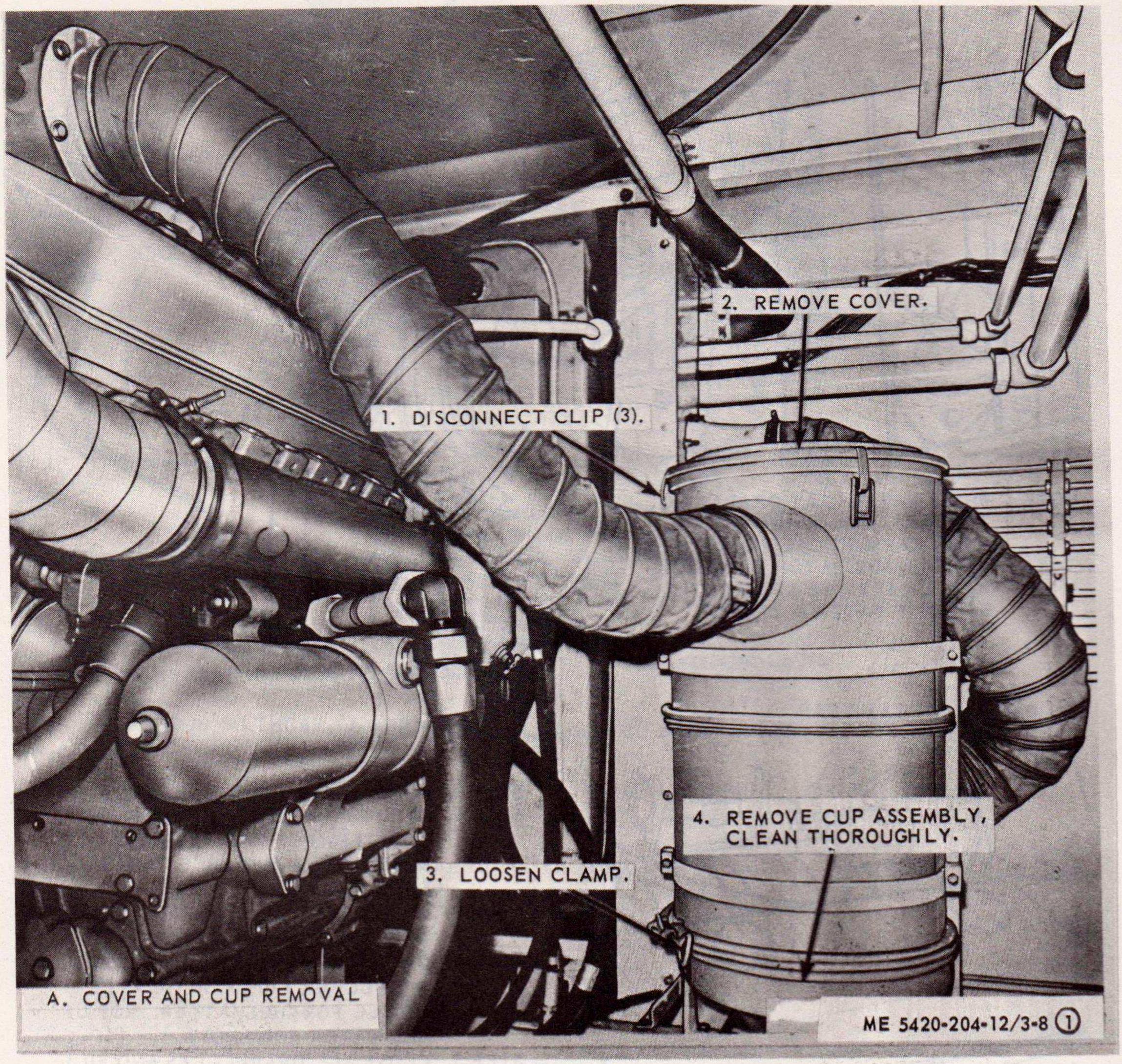
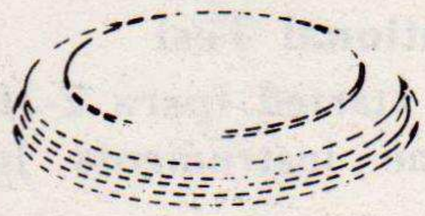
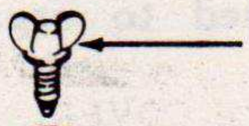


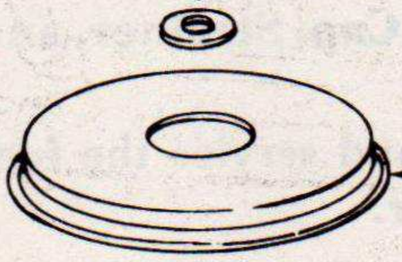

*Figure 3-8. Engine air cleaner service. (Sheet 1 of 2)*



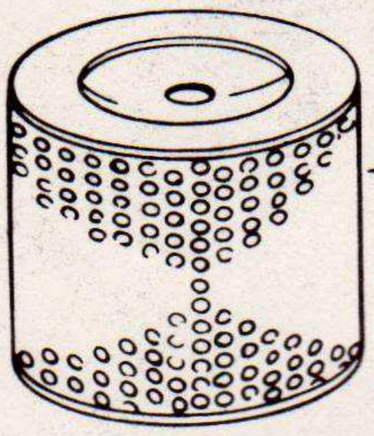
5. REMOVE GASKET



6. REMOVE SCREW AND WASHER

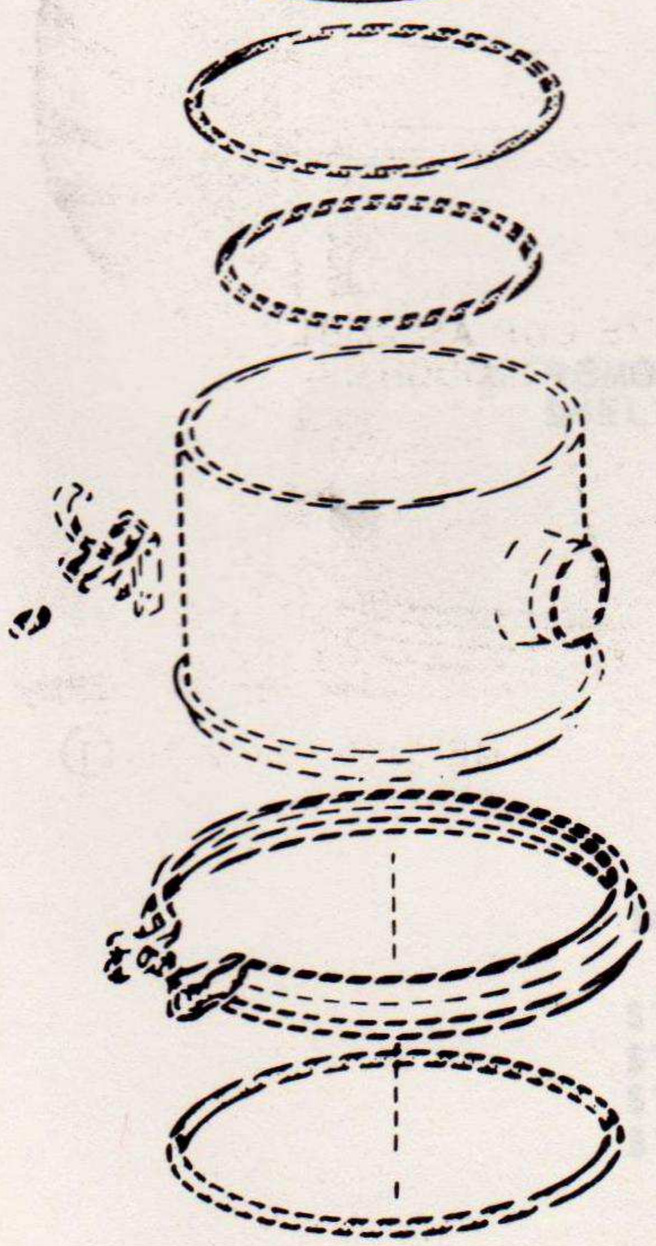


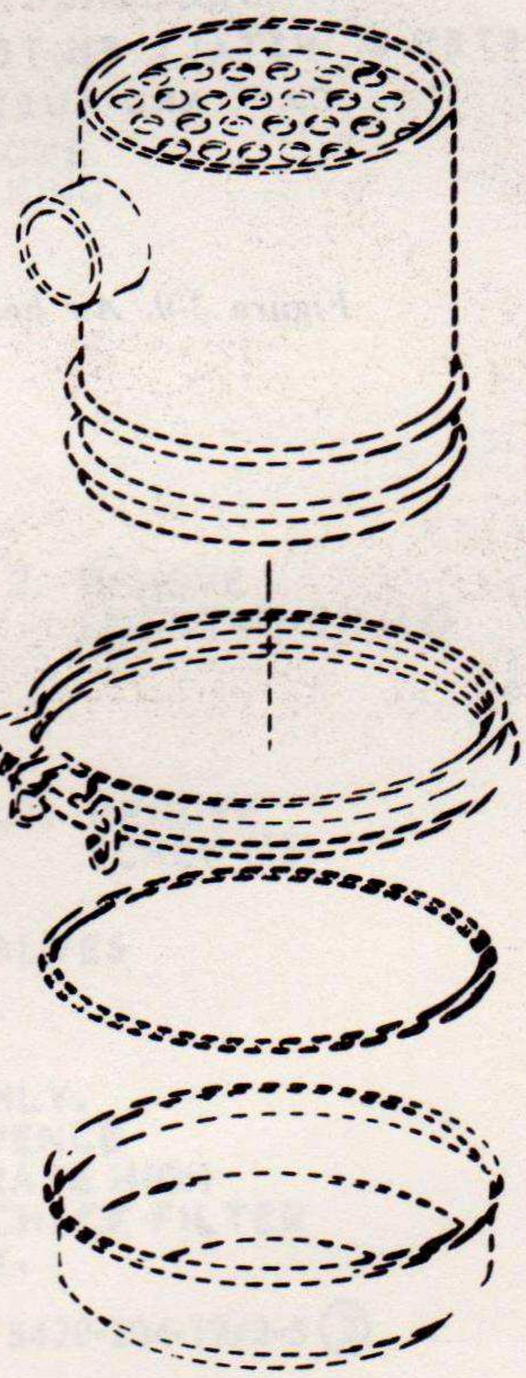
7. REMOVE COVER



8. REMOVE AND CLEAN FILTER ELEMENT.

NOTE: SERVICE AIR CLEANER AFTER EACH 50 HOURS OF OPERATION. CLEAN ALL PARTS WITH AN APPROVED CLEANING SOLVENT. DRY THOROUGHLY.





B. FILTER ELEMENT REMOVAL

ME 5420-204-12/3-8 ②

*Figure 3-8. Engine air cleaner service. (Sheet 2 of 2)*

## 3-22. Air Heater Service

Refer to figure 3-9 and service the air heater.

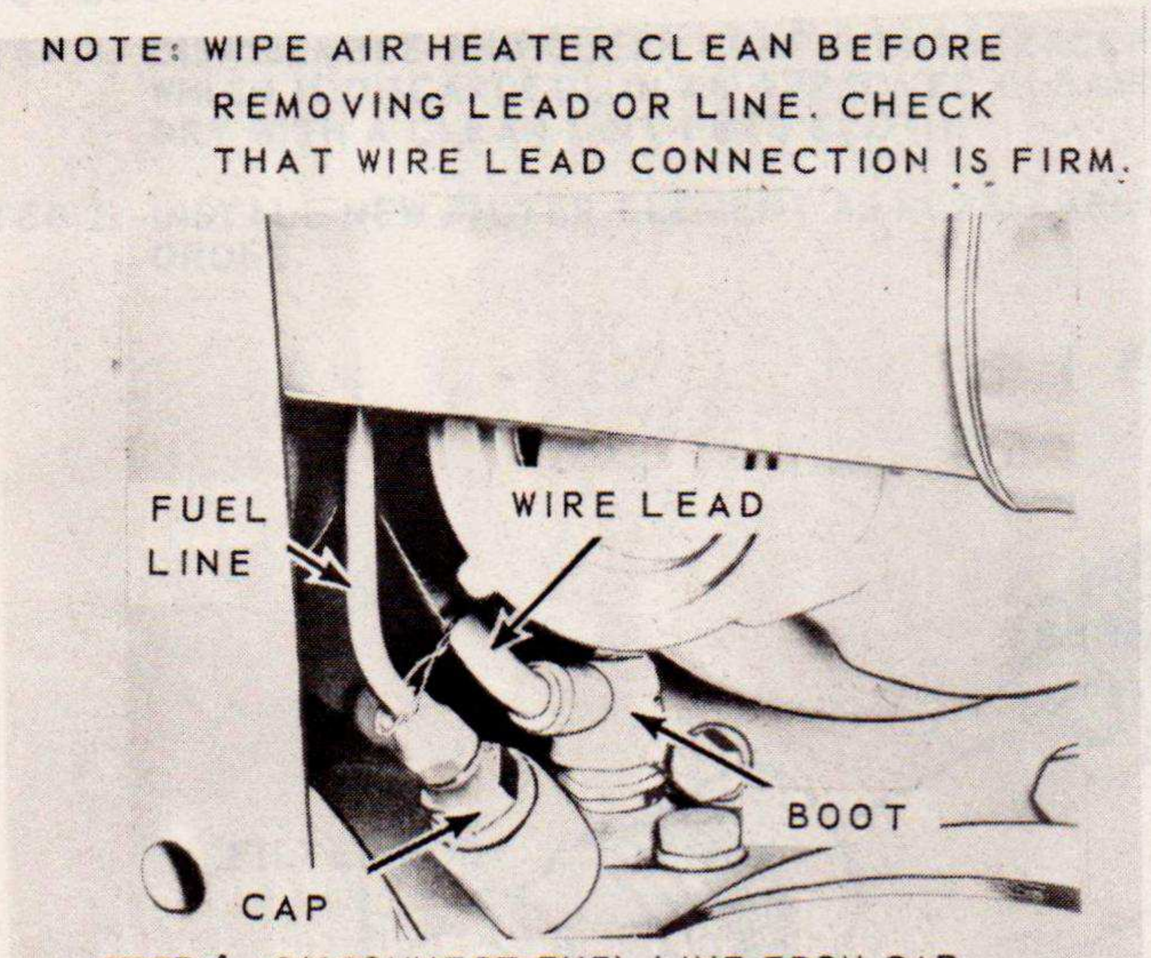



*Figure 3-9. Air heater service.*

## 3-23. Hand Pump Priming Test

Anytime fuel system lines are loosened, when filter or stainer is cleaned, refer to paragraph 2-15 and manually prime the system before attempting to start the engine.

## 3-24. Engine Operational Test

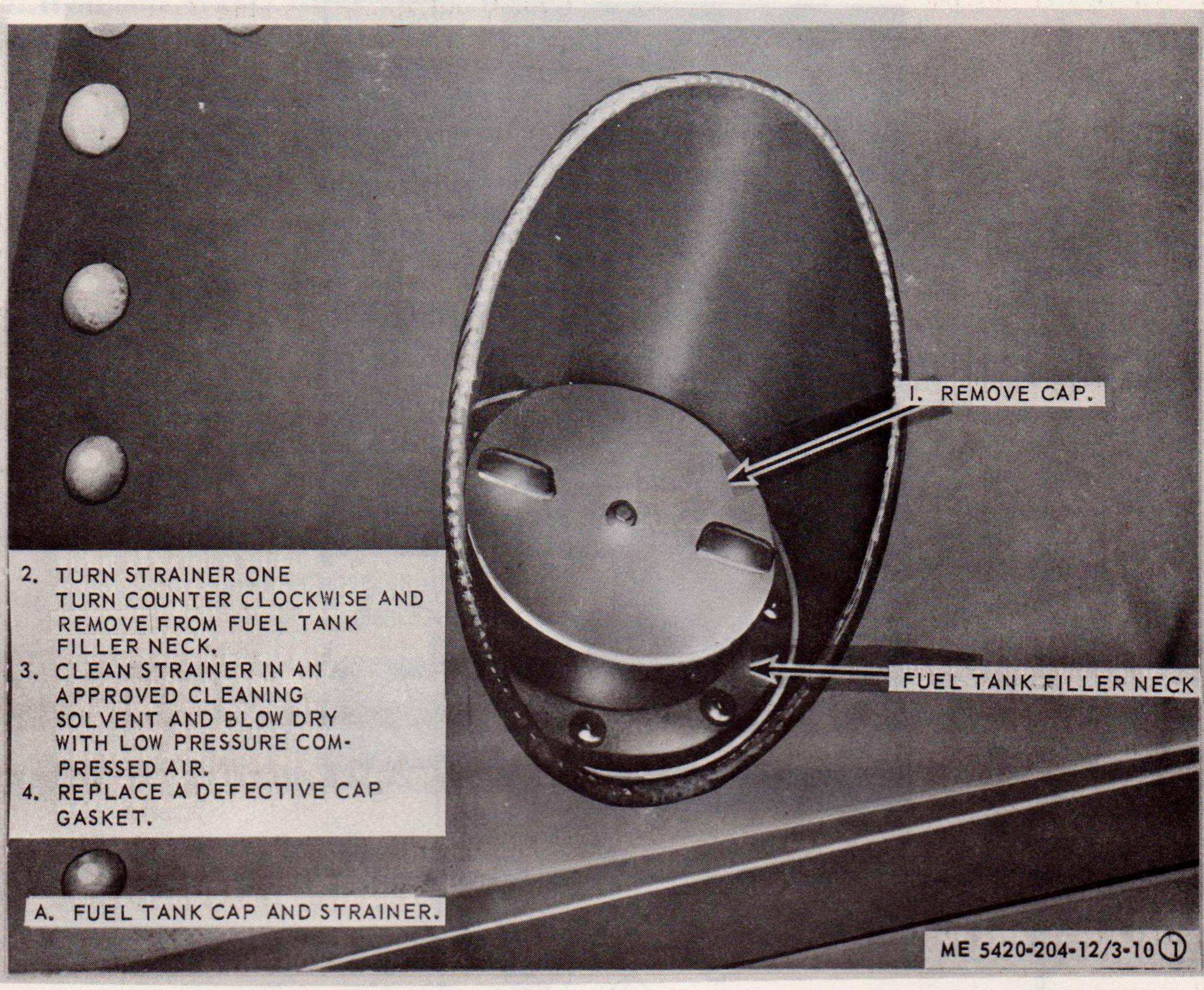
*a.* When engine is started (para 2-3), operator will check all engine instruments for correct readings (fig. 2-6).

*b.* After warmup period, operator will recheck instruments for correct readings.

*c.* All deviations, unusual sounds, or conditions noted will be reported to organizational maintenance personnel.

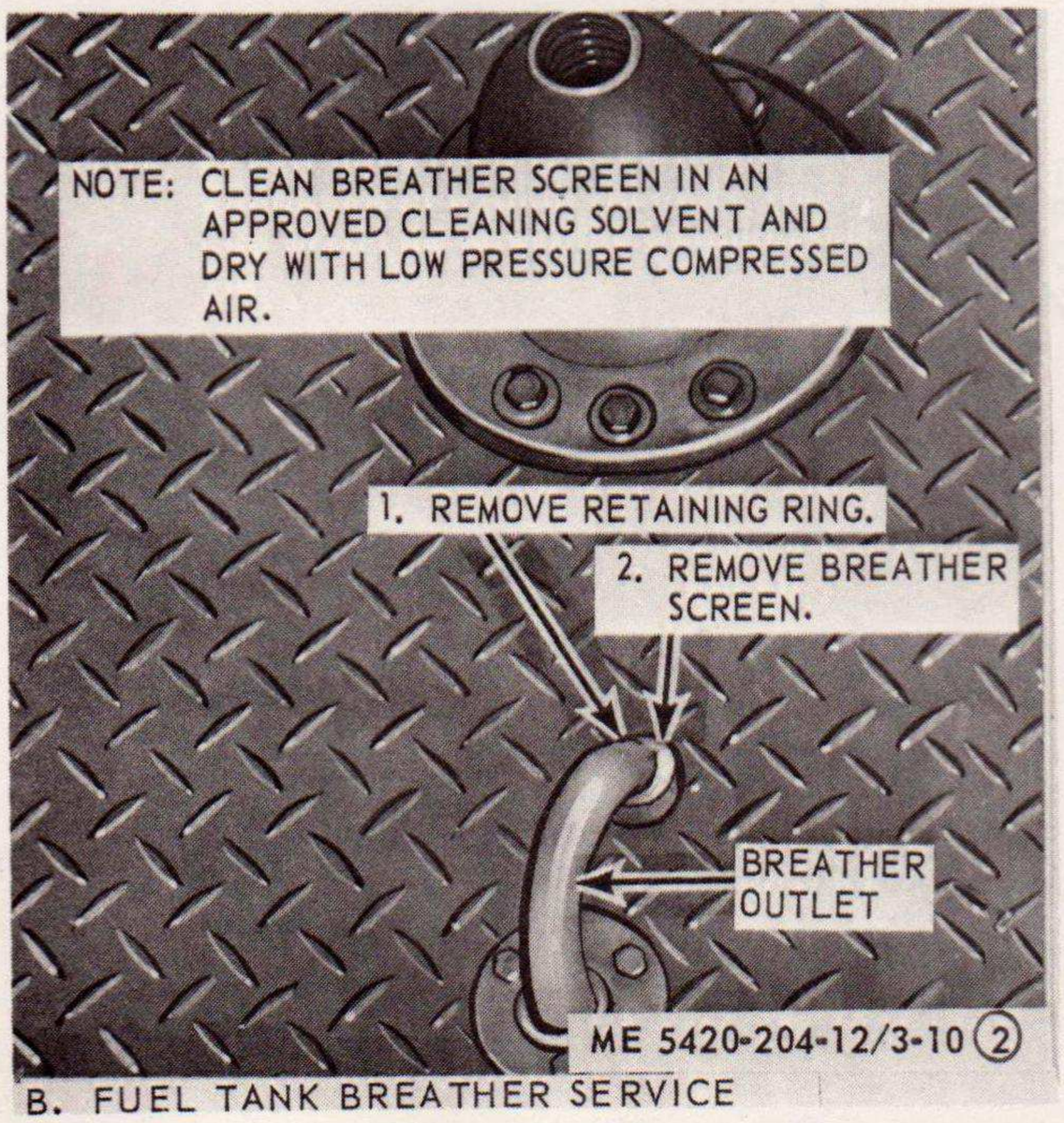
## 3-25. Fuel Tank (2) Cap, Strainer, and Breather Service

Refer to figure 3-10 and service the fuel tank cap, strainer, and breather.




A. FUEL TANK CAP AND STRAINER.

*Figure 3-10. Fuel tank cap, strainer and breather service. (Sheet 1 of 2)*




B. FUEL TANK BREATHER SERVICE

*Figure 3-10. Fuel tank cap, strainer and breather service. (Sheet 2 of 2)*

**3-26. Universal Joints, Marine Drive Assembly, Service**

Service as required per lubrication orders.

**3-27. Pillow Blocks, Marine Drive Assembly, Service**

Service as required per lubrication orders.

**3-28. Bearing, Marine Drive Assembly, Service**

Service as required per lubrication orders.

**3-29. Engine Crankcase Breather Service**

Refer to figure 3-11 and service the engine crankcase breather.

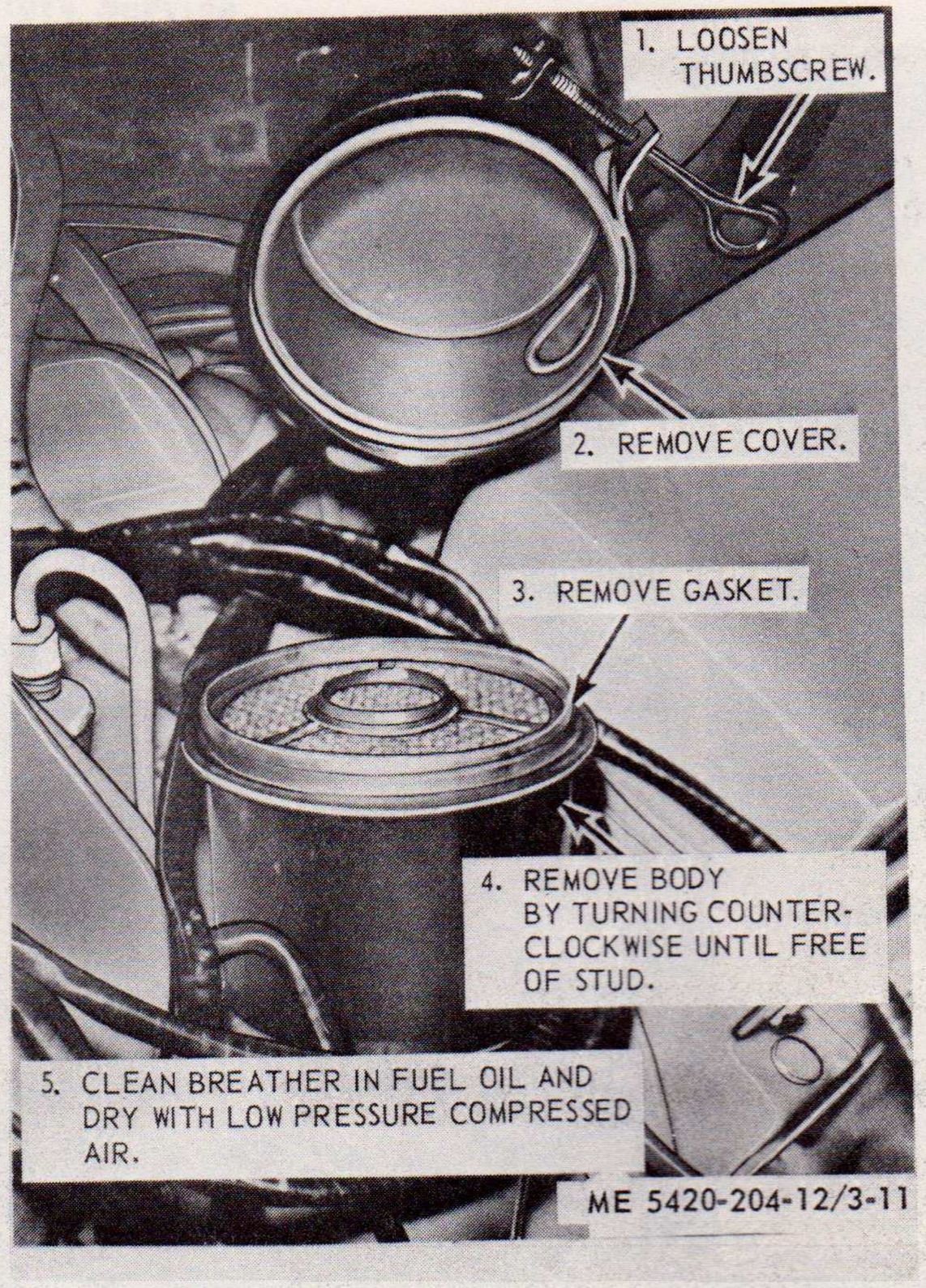



*Figure 3-11. Engine crankcase breather service.*

### 3-30. Outdrive Link Shear Pin Inspection and Replacement

Refer to figure 3-12 and replace the outdrive link shear pin, if shear pin appears loose.

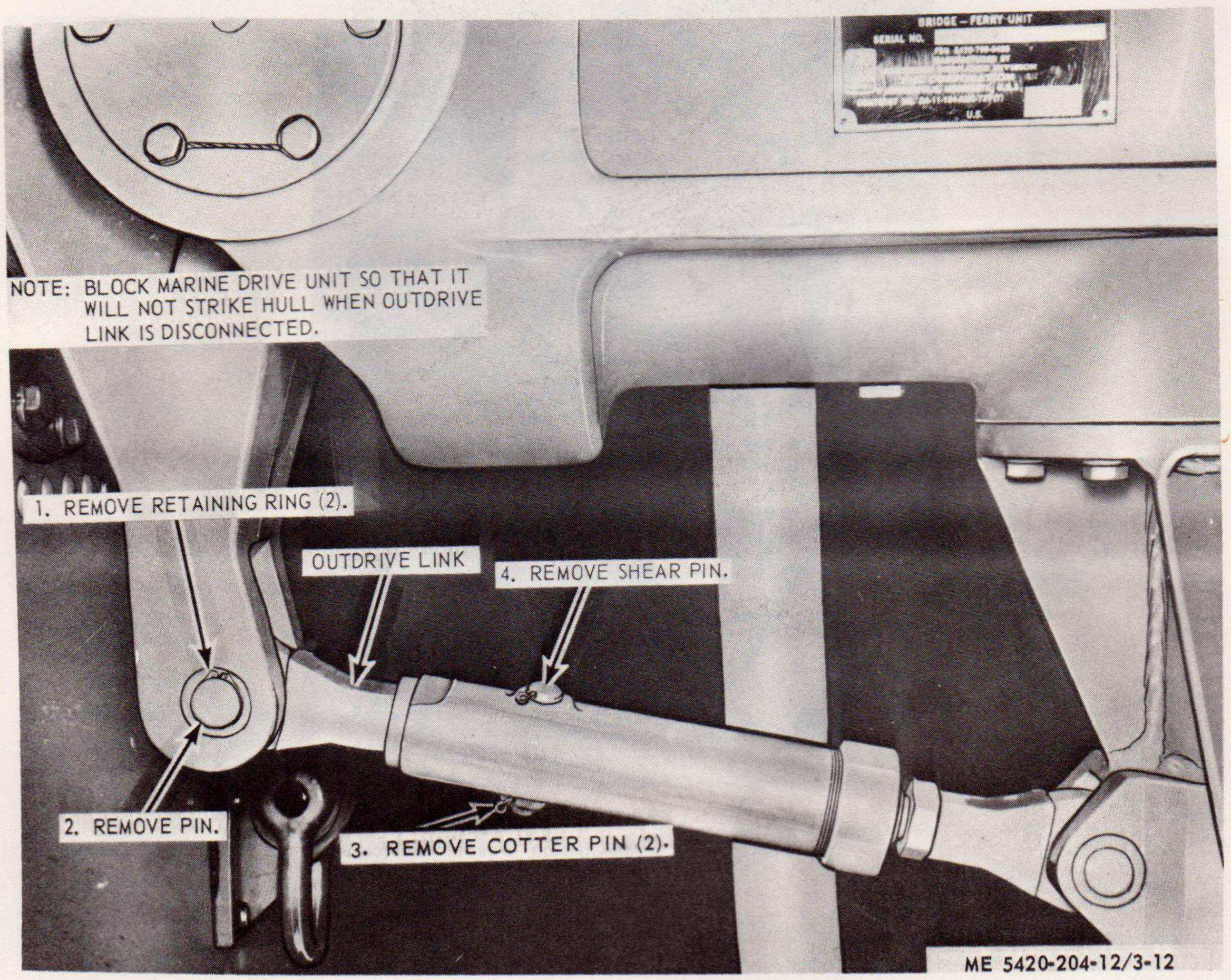



*Figure 3-12. Outdrive link shear pin replacement.*

**3-31. Drive Line Hanger Box Bearings Service**

Service as required per lubrication orders.

**3-32. Drive Line Carrier Bearings Service**

Service as required per lubrication orders.

**3-33. Transmission Breather Service**

Refer to figure 3-13 and service the transmission breather.

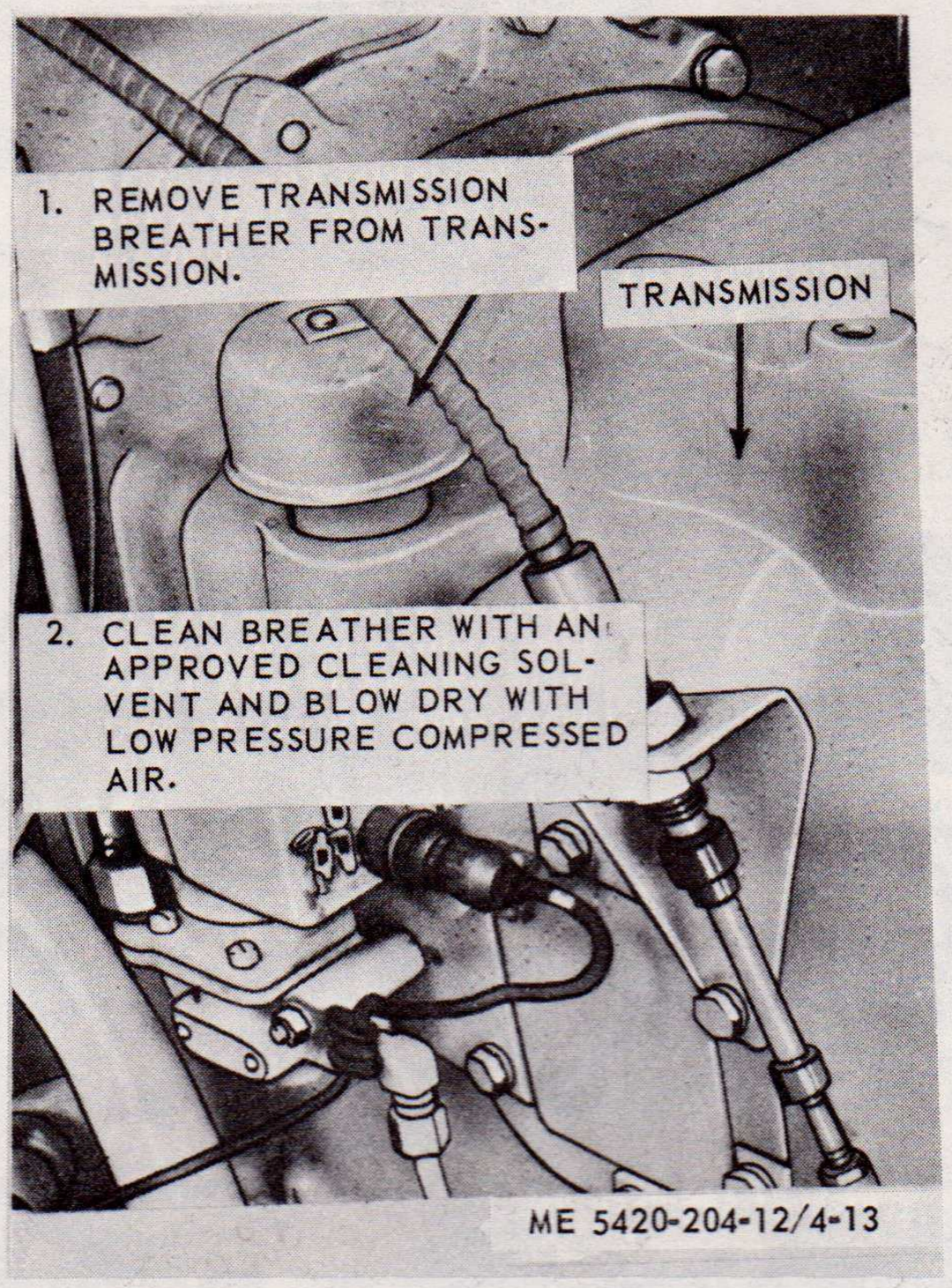



*Figure 3-13. Transmission breather service.*

## 3-34. Transmission Oil Filter Service

Refer to figure 3-14 and service transmission fluid filter.

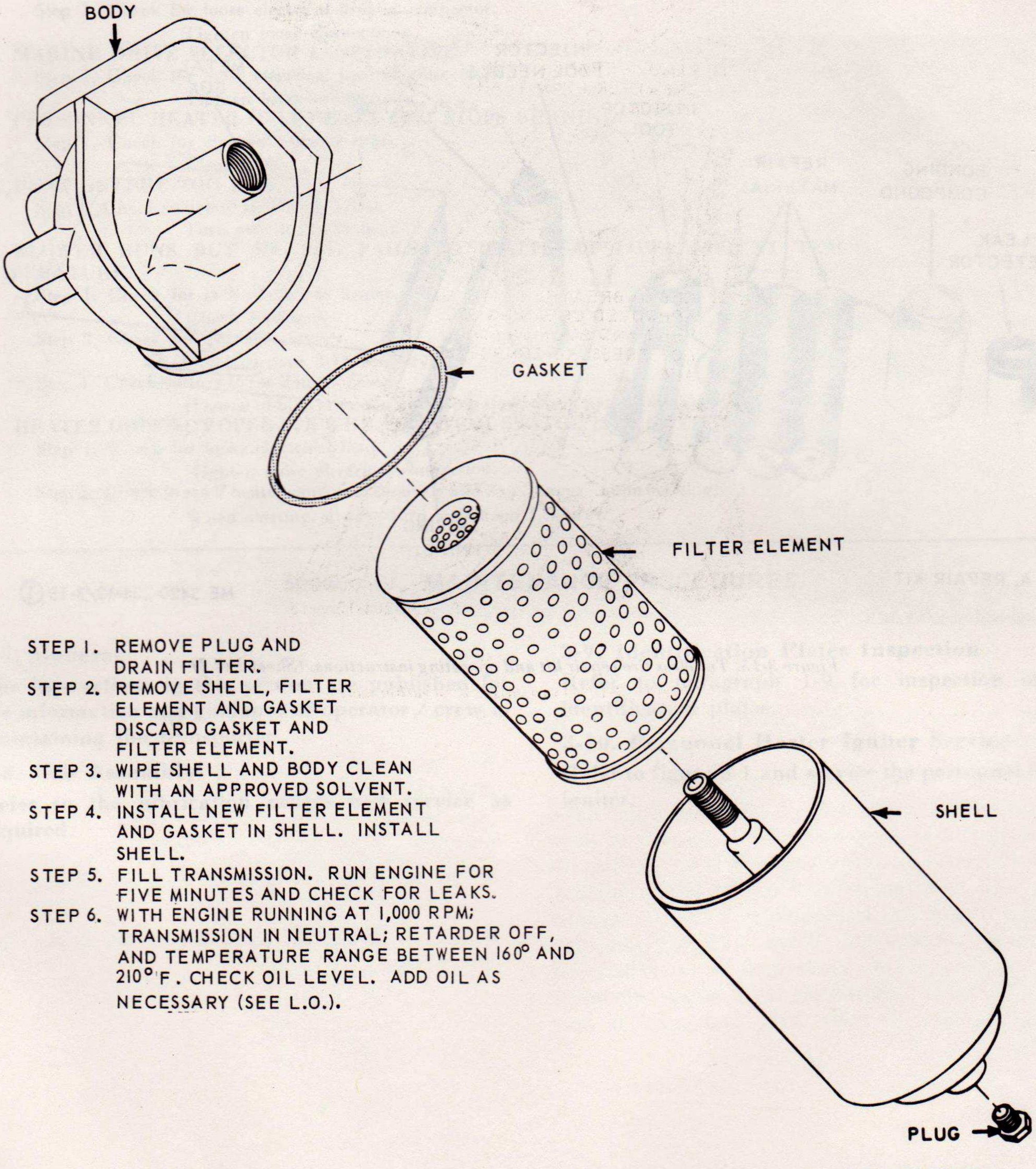



*Figure 3-14. Transmission oil filter service.*

### 3-35. Tubeless Tire Emergency Repairs

*a. General.* The operator will make tubeless tire emergency repairs using a tubeless tire repair kit. Refer to figure 3-15. The use of this tire repair kit will enable the operator to stop loss of air from a damaged tire. He can then inflate the tire to operating pressure and continue operations. If he cannot stop the leak completely, he can retard loss of air from a damaged tire so that the bead does not break, and the operator can return to his base. Repairs will be made without removing the tire from the wheel and with air in the tire. There is no limitation to the size of the repair that can be attempted. The operator should periodically check tire air pressure because uneven inflation among tires may be an indication of tire damage.

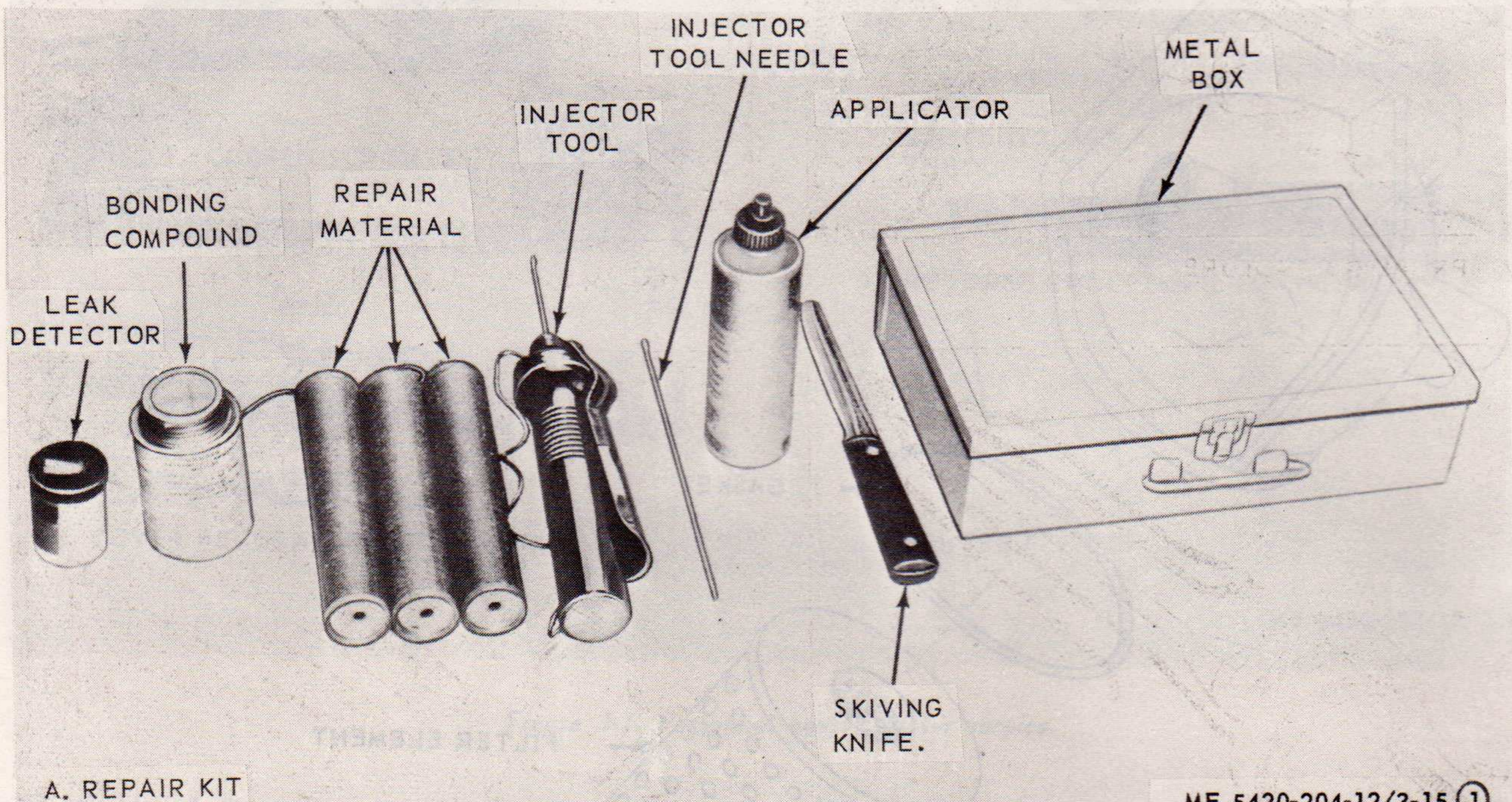
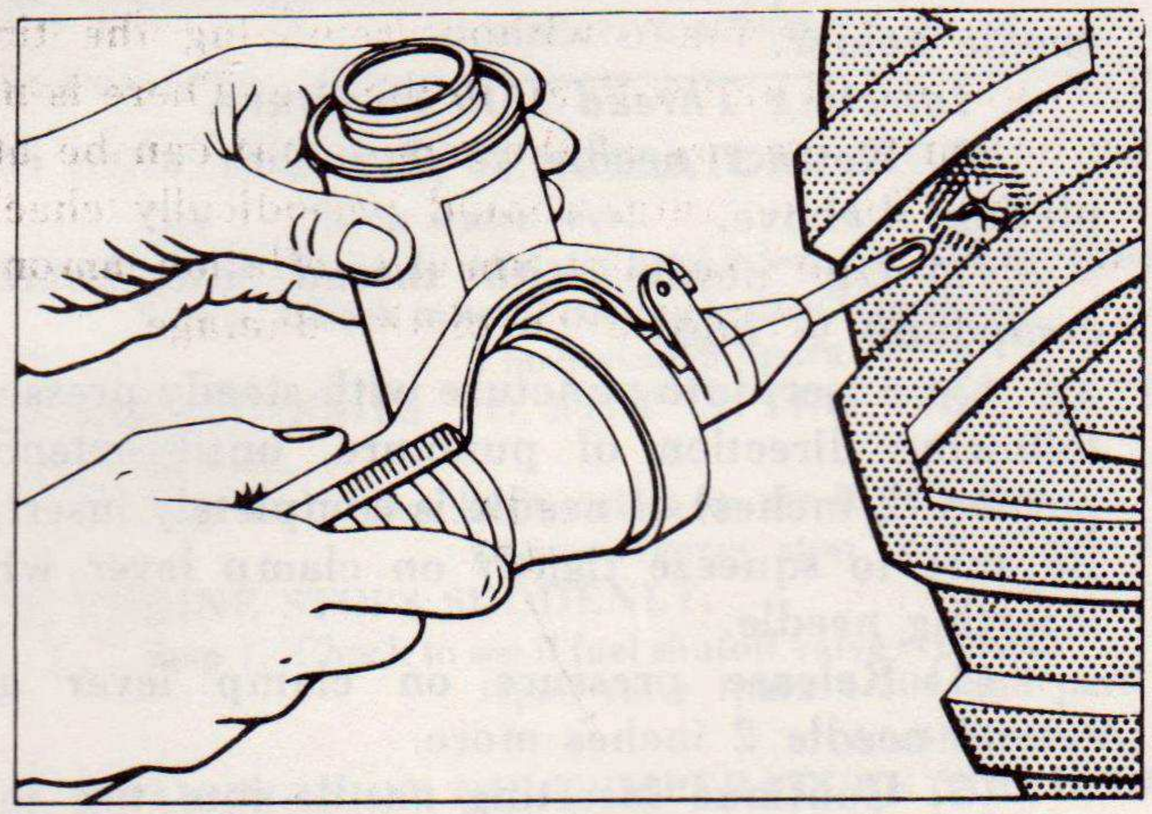
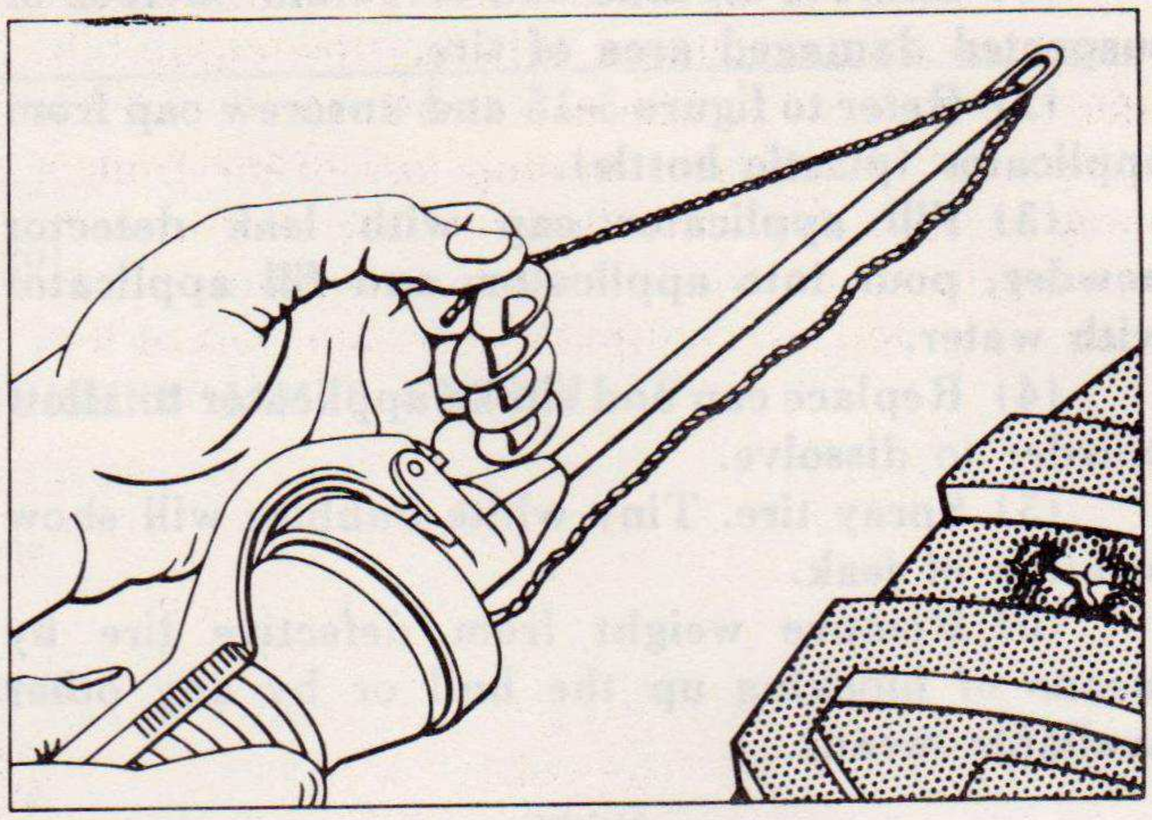


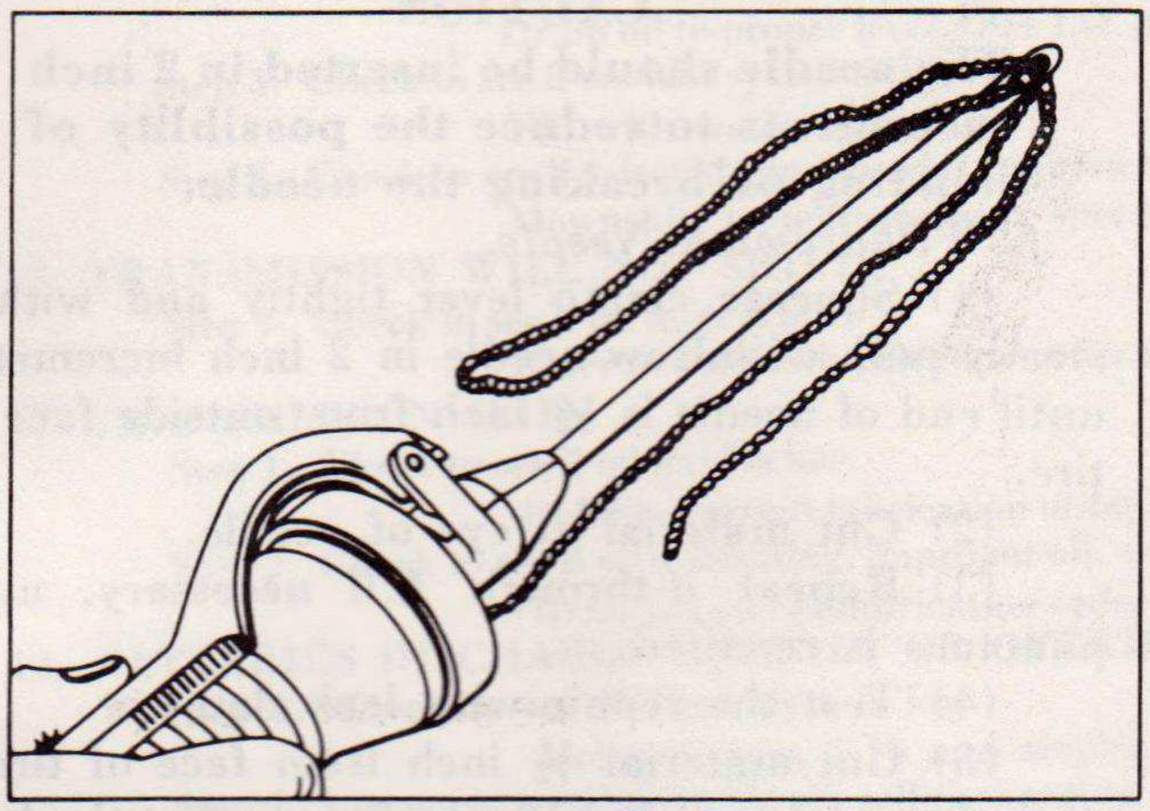

*Figure 3-15. Tubeless tire repair kit and operating instructions. (Sheet 1 of 2)*



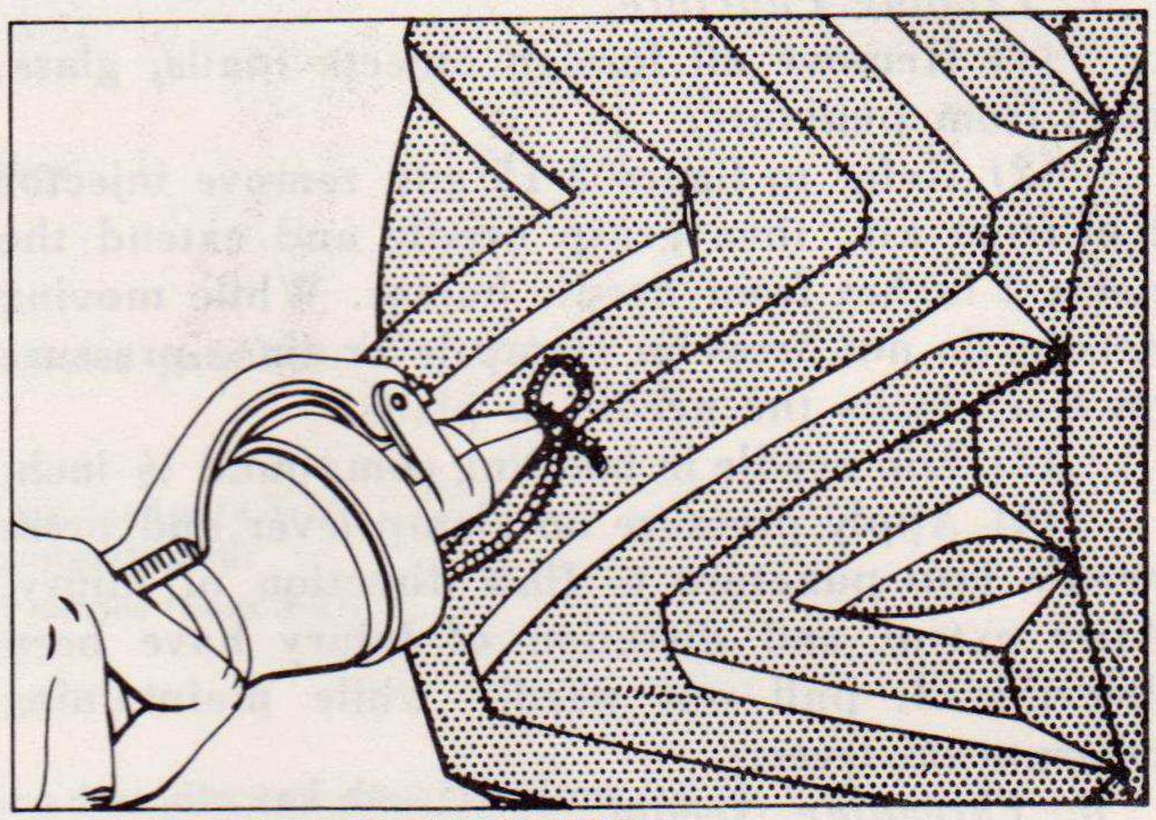
A. PROBING PUNCTURE



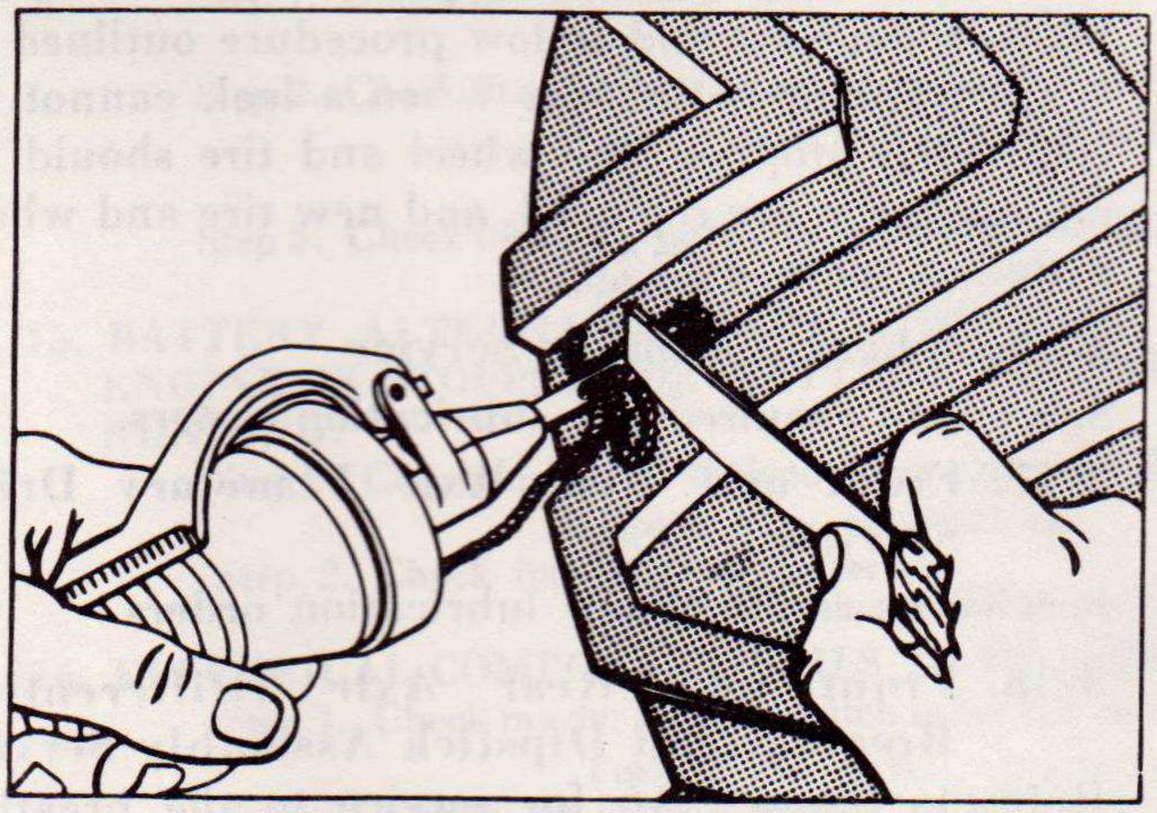
B. THREADING NEEDLE, SINGLE STRAND



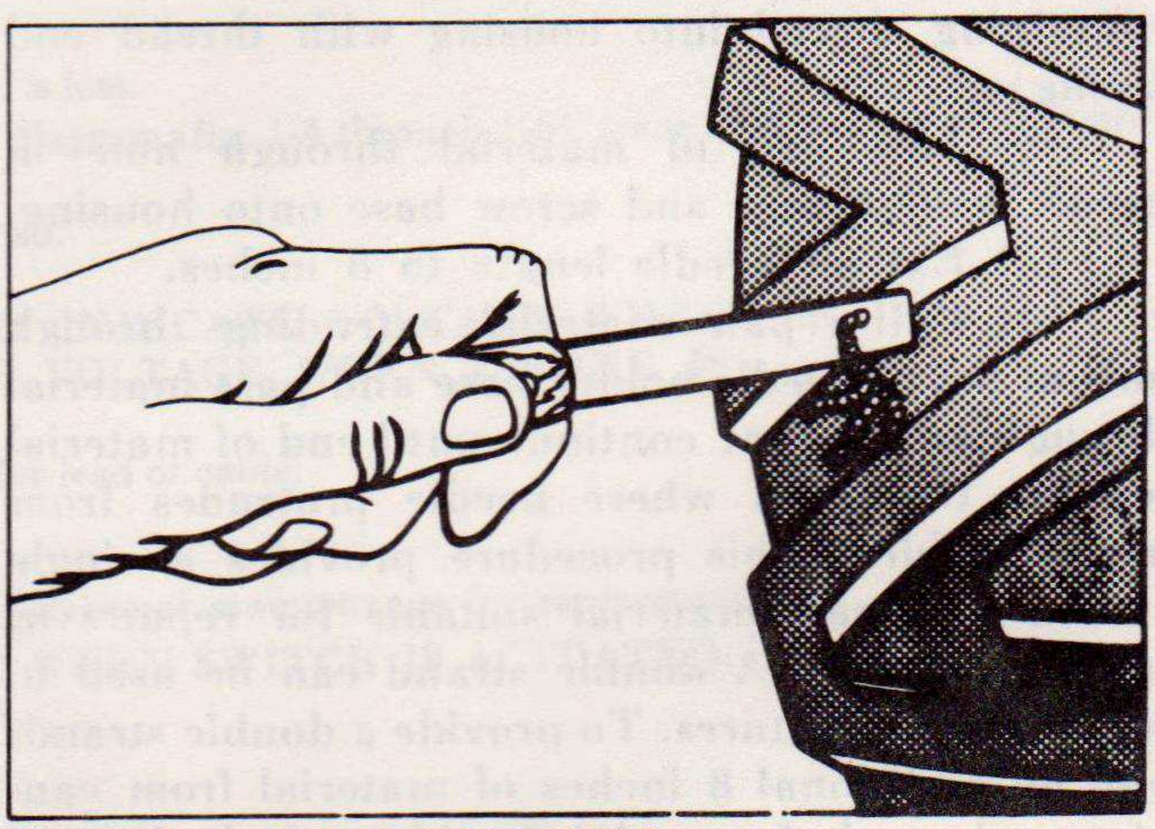
C. THREADING NEEDLE, DOUBLE STRAND



D. THREAD INTO PUNCTURE



E. CUTTING THREAD



F. TRIMMING EXCESS THREAD

B. OPERATING INSTRUCTIONS

ME 5420-204-12/3-15 ②

*Figure 3-15. Tubless tire repair kit and operating instructions. (Sheet 2 of 2)*

*b. Locating Leak.*

(1) Remove all mud and dirt from obvious or suspected damaged area of tire.

(2) Refer to figure 3-15 and unscrew cap from applicator (plastic bottle).

(3) Fill applicator cap with leak detector powder, pour into applicator, and fill applicator with water.

(4) Replace cap and shake applicator to allow powder to dissolve.

(5) Spray tire. Tiny white bubbles will show location of leak.

(6) Remove weight from defective tire by means of blocking up the hull or by any other available means.

NOTE

Be sure to check bead and valve for leaks.

*c. Probing Puncture.*

(1) Remove all foreign objects (nails, glass, etc.) from puncture.

(2) Refer to figure 3-15 and remove injector tool from kit; then grasp needle and extend the point 2 inches from needle holder. While moving needle, do not press on clamp lever since pressure on lever locks the needle in place.

(3) Dip needle in bonding compound ½ inch.

(4) Apply pressure on clamp lever and press needle into puncture to find direction of injury. After extent and direction of injury have been determined, pull out needle while maintaining pressure on lever.

*d. Threading Needle.*

(1) Unscrew cannister housing of injector tool from needle holder base and place plastic cannister containing thread into housing with thread end facing up.

(2) Pass end of material through hole in needle holder base and screw base onto housing.

(3) Extend needle length to 8 inches.

(4) Pull repair material extending through hole at top of needle holder base and pass material through needle eye; continue until end of material reaches the point where needle protrudes from needle holder. This procedure provides a single strand of repair material suitable for repairs of small punctures. A double strand can be used to repair large punctures. To provide a double strand, pull an additional 8 inches of material from cannister; the end of material should reach the base of injector tool. Then, double material back on itself and thread it through the needle eye from the direction opposite that in single strand, until end of thread is at point where needle protrudes from needle holder.

*e. Injecting Thread Into Puncture.*

(1) Retract needle to 2 inches after completing *d* above.

(2) Dip needle with thread into bonding compound ½ inch.

(3) Insert into puncture with steady pressure, following direction of puncture, until extended portion (2 inches) of needle is completely inserted. Be sure to squeeze tightly on clamp lever while inserting needle.

(4) Release pressure on clamp lever and extend needle 2 inches more.

(5) Continue inserting needle into tire in 2 inch increments until end of material is ½ inch from outside face of tire.

CAUTION

**The needle should be inserted in 2 inch increments to reduce the possiblity of bending or breaking the needle.**

*f. Withdrawing Needle.*

(1) Squeeze clamp lever tightly and with a steady pull, withdraw needle in 2 inch increments until end of needle is ½ inch from outside face of tire.

(2) Cut material at eye of needle.

(3) Repeat *d* through *f*, if necessary, until puncture is repaired.

(4) Test the repair with leak detector.

(5) Cut material ½ inch from face of tire.

*g. Inspection of Repair.* To insure that the leak is permanently sealed, the organizational mechanic will inspect the repair for three days. He will use the kit leak detector and follow procedure outlined in *b* (2) through (5) above. When a leak cannot be completely stopped, the wheel and tire should be removed, the tire replaced, and new tire and wheel installed (para 4-255).

### 3-36. Wheel Assembly Service

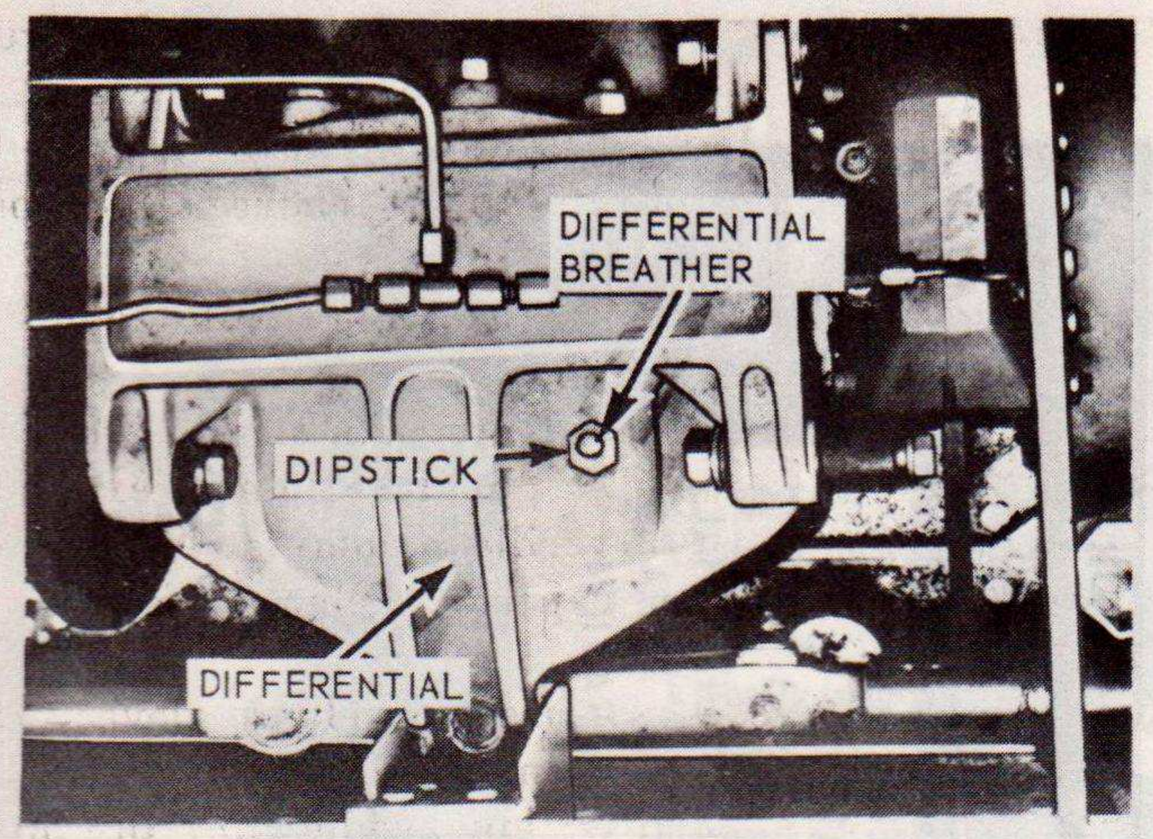
Service as required per lubrication orders.

### 3-37. Front and Rear Axle Planetary Drive Service

Service as required per lubrication orders.

### 3-38. Front and Rear Axle (Differential) Breather and Dipstick Assembly Service

Refer to figure 3-16 for service to the breather assembly. Lubricate per lubrication orders.




1. REMOVE DIFFERENTIAL BREATHER AND DIPSTICK BY TURNING COUNTERCLOCKWISE.
2. CLEAN BREATHER IN AN APPROVED CLEANING SOLVENT AND DRY THOROUGHLY. WIPE DIPSTICK CLEAN BEFORE MEASURING OIL LEVEL.
3. TO MEASURE OIL, BE SURE AND TURN BREATHER AND DIPSTICK DOWN FULLY ON THREADS, THEN REMOVE AND READ LEVEL.
4. ADD OIL WHEN NECESSARY TO BRING LEVEL TO 14 QUARTS (FULL).
5. INSTALL DIPSTICK AND SECURE BREATHER BY TURNING IT CLOCKWISE FULLY ON THREADS.

ME 5420-204-12/3-16

*Figure 3-16. Differential breather and dipstick service*

### 3-39. Front and Rear Axle Assembly Service

Service as required per lubrication orders.

### 3-40. Front and Rear Differential Assembly Service

Service as required per lubrication orders.

### 3-41. Suspension Assembly Control Arm

Service as required per lubrication orders.

### 3-42. Boots, Inner and Outer, for Double Universal Joints, Plug and Packing Inspection

The boot inspection plug is primarily an inspection plug, but may be used as a drain plug in the event water is found in the joint. By using the boot as a bellows, most of the water can be forced out of the inspection hole as a temporary expedient. When water is found inside the boot, remove small clamp, push boot back from pipe plug, remove pipe plug, install lubrication fitting, and purge the bearings with grease (see current lubrication order). Remove lubrication fitting, install pipe plug, position boot and tighten clamp. Repeat daily until maintenance problem has been corrected. Refer to figures 3-17 and 3-18 to remove inspection plug. Install in reverse order.

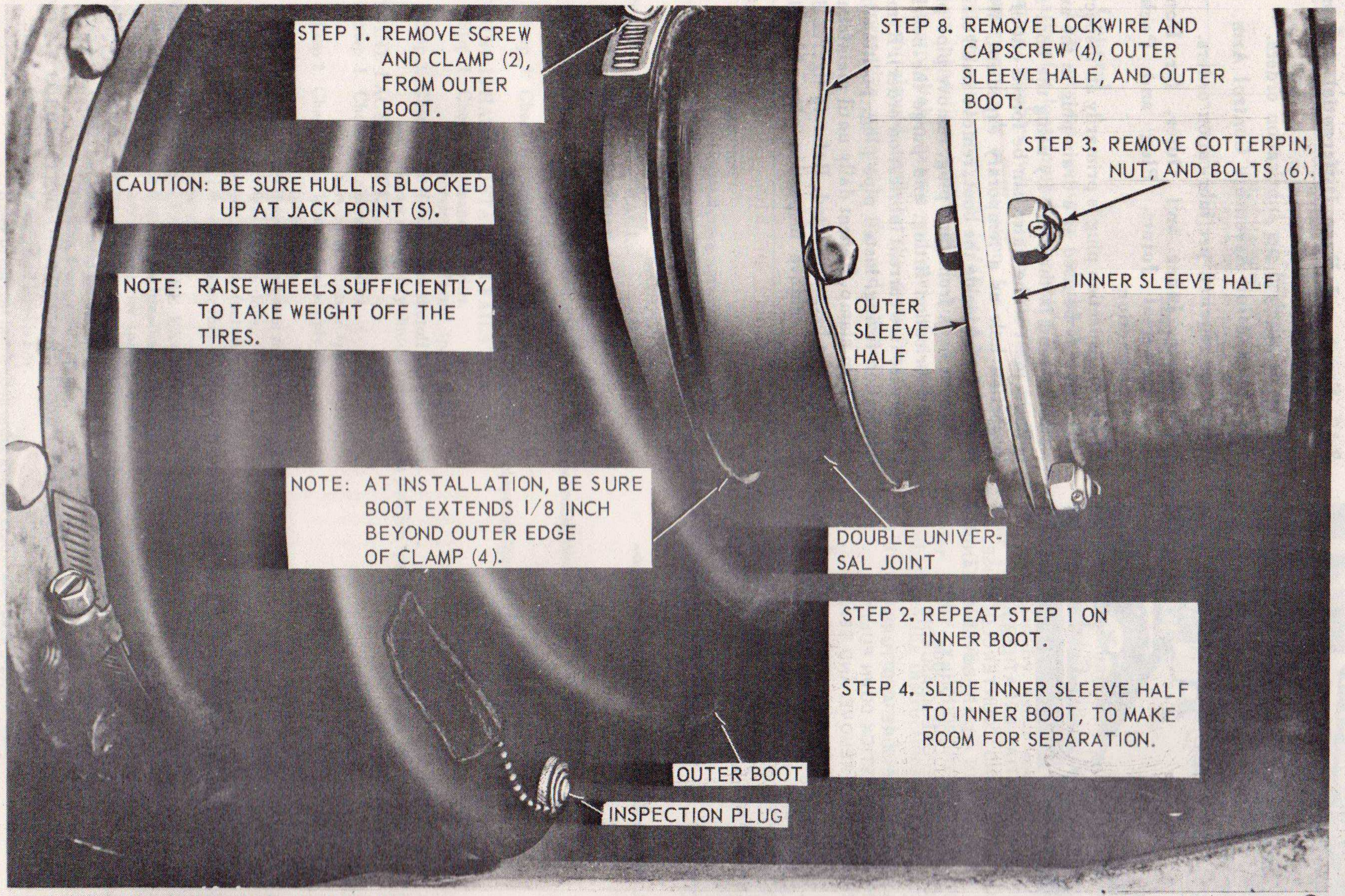
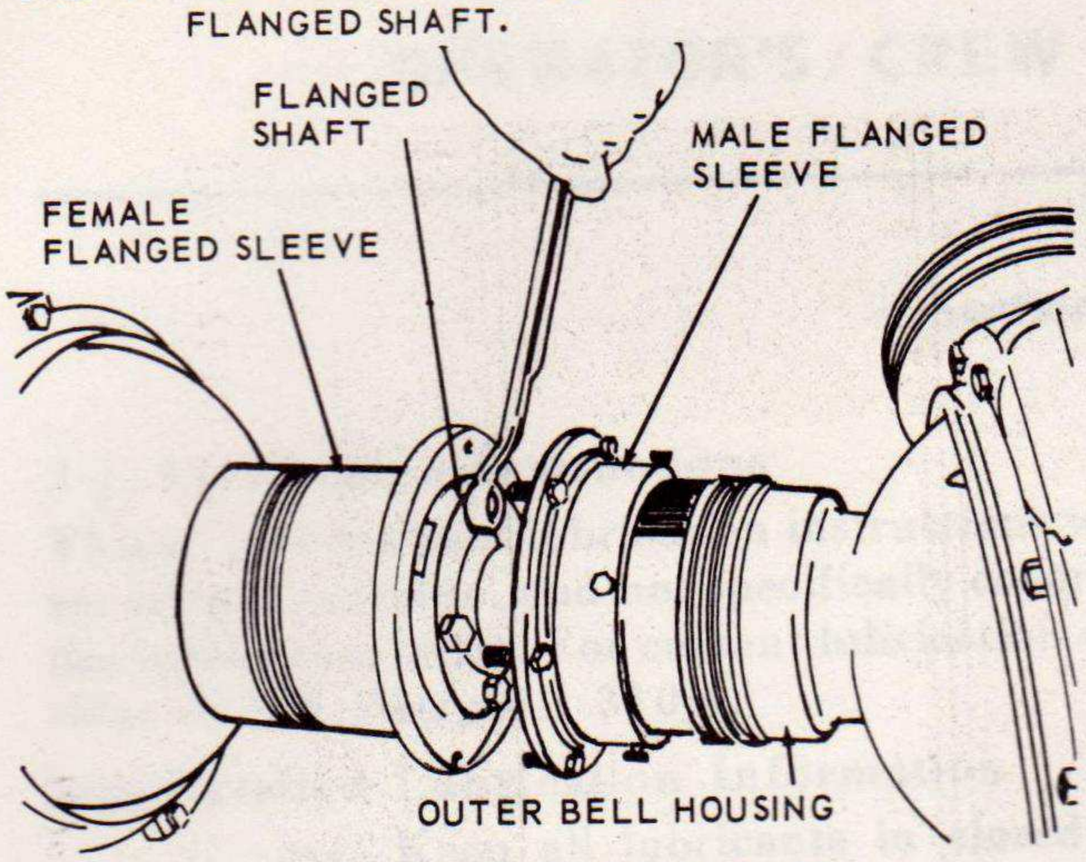



*Figure 3-17. Boots, inner and outer, double universal joint, removal and installation. (Sheet 1 of 2)*

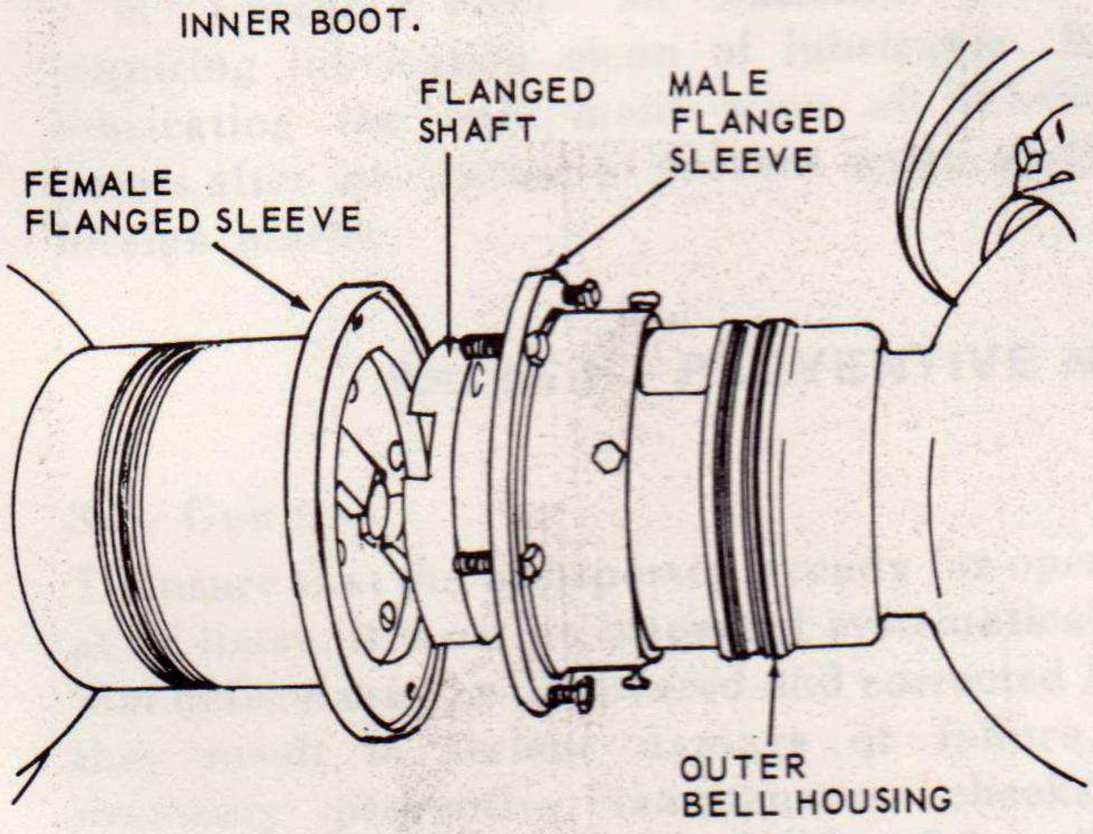
STEP 5. REMOVE FOUR CAPSCREWS FROM FLANGED SHAFT.




A. BREAKING THE JOINT

STEP 6. PRY FLANGE FROM SHAFT AND TURN STEERING KNUCKLE ENOUGH TO OPEN JOINT.

STEP 7. REMOVE INNER SLEEVE HALF AND INNER BOOT.




B. OPENING THE JOINT

ME 5420-204-12/3-17 ②

*Figure 3-17. Boots, inner and outer, double universal joint, removal and installation. (Sheet 2 of 2)*


NOTE: USE LOCK TITE ADHESIVE ON PACKING.
CAUTION: DO NOT GET ADHESIVE ON PLUG THREADS.

ME 5420-204-12/3-18

*Figure 3-18. Boot inspection plug and packing, removal and installation.*

**CAUTION**

**Do not reinstall inspection plug without a packing around the stem. Water will seep in more quickly, in greater amounts, and could cause extensive damage to the universal joints.**

# CHAPTER 4

# ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

## Section I. SERVICE UPON RECEIPT OF MATERIAL

### 4-1. Inspecting and Servicing Equipment

*a. General.* When a transporter is received, inspect all items for damage that may have occurred during shipping or setting-up operations. Particular attention should be directed toward loose or missing nuts, bolts, screws, drain plugs, draincocks, oil plugs, assemblies, subassemblies, or components that may be easily lost or broken in transit. The anchor, ring type life bouy and rope, and all other onboard equipment listed in basic issue items list, or packing lists, on new or used equipment should be similarly inspected and all discrepancies carefully noted.

*b. Batteries.* Batteries may be shipped separately, or installed for convenience, with the electrolyte shipped separately.

(1) If batteries are not installed, uncrate and install as directed in paragraph 4-124.

(2) If batteries are installed, remove filler caps and carefully fill each cell with electrolyte until level is 3 / 8 inch above plates. Replace filler caps.

**WARNING**

**Handle electrolyte with care. It is capable of inflicting severe burns. Solution contacting body must be washed off with fresh water immediately. Do not smoke or use open flame while servicing batteries. Batteries generate a hydrogen gas which is highly explosive.**

(3) For service to batteries, refer to paragraph 3-16.

(4) For testing of wet batteries, refer to TM 9-6140-200-15.

*c. Inspection.* The following areas will be carefully inspected for proper component attachment, or damaged components.

(1) *Marine drive.* Inspect inside hull for proper connection of propeller hydraulic stowage cylinder. With marine drive in stowed position, cylinder rod should be fully extended with cylinder against bump stop. Insure that area directly under cylinder and surrounding hydraulic hose is clear of all stowage equipment, thus permitting free movement of cylinder and hose during operation.

*(a)* Check all tube and hose connections for tightness.

*(b)* Inspect for proper connection of drive shaft to input shaft.

*(c)* Inspect for evidence of oil leakage at cylinder rods, hydraulic ports or connections.

*(d)* Inspect for loose components, broken castings, and bolt tightness.

*(e)* Inspect all exterior wiring harness for broken, frayed, or loose wires.

*(f)* Inspect all hydraulic tubing and hose for leaks or damage. Check that all flexible lines have adequate slack and will not interfere with, or be damaged by the marine drive unit when rotating from the stowed position.

*(g)* Inspect for evidence of oil leakage at all gaskets, seals, and plugs.

*(h)* Inspect for cracked, dented, or broken parts.

*(i)* Check that outdrive link is securely attached and that shear pin is properly installed.

*(j)* Inspect for proper connection and tightness of the double universal joint, all screws and bolts, bump stop, and propeller.

*(k)* Inspect propeller and propeller duct for dents, scratches, cracks, and straightness.

*(l)* Check towing eyes (front and rear) for any attached devices which would interfere with movement of transporter.

*(m)* Check top of transporter for any protrusions which would interfere with movement.

(2) *Power plant.* Inspect power plant for loose or broken components. Pay particular attention to radiator, engine, and transmission mounts to insure they were not damaged in shipment. Check air cleaner hose for breaks and proper connection. Check engine and transmission controls (retarder, throttle, power takeoff, handbrake, shift lever, front axle disconnect, and throttle linkage) for proper connection and adjustment.

*(a)* Check engine and transmission oil level and level of coolant in radiator.

NOTE

Transmission Oil Level Cold Check. The oil level should be at the full mark or above. Hot Check: The oil level must be checked immediately after moving the control lever through all ranges. This check must be made in neutral with engine operating at approximately 1,000 rpm and temperature of oil between 160 and 210 degrees fahrenheit. The oil level should read full.

*(b)* Inspect floor area around power plant for oil drippings that may indicate a leaky seal, or loose oil or fuel drain plug.

*(c)* Inspect exhaust system connections and insure that end tube end cap is free to operate.

*(d)* Inspect radiator fin area for damage or closure. Check hoses for cracks or leaks.

*(e)* Check tension for all engine accessory drive belts.

(3) *Hydraulic components, lines, and fittings.* Inspect all areas of hydraulic system for evidence of oil leakage including the following: Capstans; front and rear wheel passageway; engine compartment; behind wheel wells, and rear control station.

*(a)* Check that both hydraulic reservoirs are filled to proper level.

*(b)* Check that main hydraulic pump control lever is in DISENGAGED position before starting.

(4) *Suspension.* Inspect double universal joint seals and boots for damage or leaks.

(5) *Steering.* Check that all steering arms, rods, and connections are secure and in good condition.

(6) *Propeller and drive shafts.* Check that all drive and propeller shafts, universal joints, and propeller shaft hanger bearings (pillow block) are secure and in good condition.

(7) *Axles.* Inspect axle housing vents for damage or clogging, and wheel drive shaft boots for damage or looseness.

(8) *Wheels.* Check to insure that all wheel retaining lug nuts are installed and secure. Proper torque is from 320 to 350 foot pounds. Check and retorque all lug nuts at 25, 50, and 75 miles of operation after a wheel has been removed.

(9) *Miscellaneous.* Visually inspect and check the following items:

*(a)* Insure that all bilge pump inlet screens are free of debris.

*(b)* Inspect all exposed electrical terminals for security of attachment and freedom from corrosion. Pay particular attention to starter motor and battery connections.

*(c)* Check and insure that all position transmitters are secure and free of damage. These transmitters are located as follows: One per wheel well on upper suspension arm for up-down; one on each of front and rear bellcrank housing for land steering, and one each for marine drive elevation and steering located under cover of marine drive.

*(d)* Check the four superstructure hold down bolts and be certain they are secure and were not damaged during shipment.

NOTE

The superstructure must be raised before limit switches can be inspected. If bolts are loose at inspection, damage to limit switches within hold-down castings may have occured. Examine them closely when superstructure is first raised.

*(e)* Inspect main control panel for loose or broken wires or damaged components.

*(f)* Check actuation of neutral shift limit switch located under transmission shift selector handle. Limit switch is actuated when shift selector handle is placed in NEU (neutral) position.

*(g)* Inspect basic issue items for presence of all items listed, and for serviceability.

*d. Servicing the Equipment.* When a transporter is received, perform all preventive maintenance checks and services (para 4-12). Before filling fuel tanks, radiator, hydraulic reservoir, engine crankcase, transmission oil reservoir, or oil reservoir of any component, ensure that associated draincocks are closed, and all barrier material has been removed.

(1) *Filters.* Hydraulic filters are susceptible to easy contamination on new equipment. Check frequently and change elements after first 50 hours of operation.

(2) *Hydraulic reservoir.* The main hydraulic oil reservoir must be filled to level indicated on sight gage for the condition applicable. When all systems have been actuated, the level must be rechecked under the following conditions: Superstructure in land drive position; propeller stowed, and wheels down. Check level and add or drain to bring level to full wheels down mark.

CAUTION

**Maintain proper oil level at all times to prevent damage to various hydraulic components and to assure proper unit component operation.**

(3) *Marine drive.* Prior to use of marine drive unit check to insure lubrication of following points:

*(a)* Inside hull on stowage cylinder eye and trunnion cap.

*(b)* Outside hull with propeller in stowed position, check oil level in power input casting; double and single universal joints, and trunnion cap.

*(c)* With propeller in drive position, check oil in main drive unit.

(4) *Engine.* Check engine oil level. Refer to lubrication order for type oil to add when dipstick indicates level is low. Check gasket in oil filler cap for damage or deterioration. Check horizontally mounted engine oil filters on right side of engine for

oil leaks. Drain a small amount of oil from filters to check condition. Drain, replace filter element, and refill when dirty. Check and insure that belt tension of all accessory drives are properly adjusted. Check air cleaner by emptying dust cup on bottom of air cleaner. Inspect and clean upper air cleaner filter element, if necessary. Check hose for breaks, cracks, and proper clamp fastening.

(5) *Radiator and fan drive.* Check radiator hose for cracks, breaks, or leaks, and clamps for tightness. Check fan drive for clearance between blades and radiator shroud, and drive belt tension. Add coolant to radiator when necessary. Refer to table 4-1 for antifreeze requirements, and paragraph 2-19 for protection procedures for cooling system.

NOTE

This fan drive is thermostatically controlled. It is not driven by engine until coolant temperature reaches or exceeds 185° F, or the fan manual override switch is in MANUAL position.

(6) *Fuel system.* Moisture accumulates in fuel tanks and filters from condensation. Drain filters. Drain at least one point of fuel from each tank, or until all water has been drained from system. Fill fuel tanks by using top deck and side mounted fuel filler openings. Check fuel lines, connections, and breather line for leaks. Place crossover line valves in open position.

NOTE

When filters are cleaned and element replaced, prime system before attempting to start engine (para 2-15).

(7) *Transmission.* Check and fill transmission with oil in accordance with current lubrication order. Insure that drive shafts, power take off, and controls are mounted securely. Check all hose and tubing connections for tightness.

*Table 4-1. Freezing Points, Composition, and Specific Gravities of Military Antifreeze Materials*

| Lowest expected ambient temp °F | Pint of inhibited glycol per gal of coolant [1] | Compound, antifreeze arctic [2] | Ethylene glycoil coolant solution specific gravity at 68° F |
|---|---|---|---|
| +20 | 1½ | Issued full strength and ready mixed for 0 to —65° F temperature for both initial installation and replenishment of losses. | 1.022 |
| +10 | 2 | | 1.036 |
| 0 | 2¾ | | 1.047 |
| —10 | 3¼ | | 1.055 |
| —20 | 3½ | | 1.062 |
| —30 | 4 | | 1.067 |
| —40 | 4¼ | | 1.073 |
| —50 | Arctic antifreeze preferred | DO NOT DILUTE WITH WATER OR ANY OTHER SUBSTANCE. | |
| —60 | | | |
| —75 | | | |

1. Maximum protection is obtained at 60 percent by volume (4.8 pints of ethylene glycol per gallon of solution).

2. Military Specifications MIL-C-11755 Arctic type, nonvolatile antifreeze compound is intended for use in the cooling system of liquid cooled internal combustion engines. It is used for protection against freezing primarily in Arctic regions where the ambient temperature remains for extended periods close to —40 °F or drops below, to as low as —90° F.

3. Use an accurate hydrometer. To test hydrometer, use 1 part ethylene glycol antifreeze to 2 parts water. This should produce a hydrometer reading of 0°F.

NOTE

Fasten a tag near the radiator filler cap indicating the type antifreeze.

(8) *Tires.* Check and inflate tires to 50 psi for highway operation. Be certain that all valve caps are present and securely installed.

(9) *Suspension.* Insure that suspension joints are lubricated in accordance with current lubrication order.

NOTE

Lubricate suspension joints daily during amphibious operations.

(10) *Steering.* Refer to current lubrication order and lubricate all steering joints that are outside hull daily during amphibious operations.

## 4-2. Installation of Separately Packed Components

Normally there are no components packed separately. Loose items of equipment subject to loss, damage, or pilferage, may be boxed and secured on or near transporter. Such items should be unpacked and properly stowed during inspection and servicing of equipment on receipt.

## 4-3. Installation or Setting Up Instructions

*a. Unloading the Equipment.* The transporter may be shipped in an operative or non-operative condition. Procedures for unloading differ, depending on condition. Refer to TM 55-5420-204-10-1.

*b. Unloading by Hoisting from Carrier.*

(1) If transported by railway carrier, position flatcars on an isolated track or blocked siding, post end approaches to train with blue flag or light (to signal that men are working and that siding may not be entered).

(2) Position hoisting vehicle (capable of lifting a minimum of 50,000 pounds) so that boom point and hook are centered over hull.

(3) Remove canvas cover (if installed) and all tie-downs, blocking, and stripping that secures transporter to flatcar.

(4) Attach lifting sling (use sling spreader bar, if superstructure is installed) (fig. 4-1), remove transporter from flatcar, and position on as nearly level ground as possible.

NOTE

Heavy duty trusses or blocking may be used under transporter. When used, be certain that truss or blocks will not obstruct wheel movement when wheels are lowered.

**WARNING**

**Keep all personnel clear of hoisting operations. Attach guide lines to the bow and stern of the transporter. Prevent transporter from twisting or swinging while it is being lowered from the carrier.**

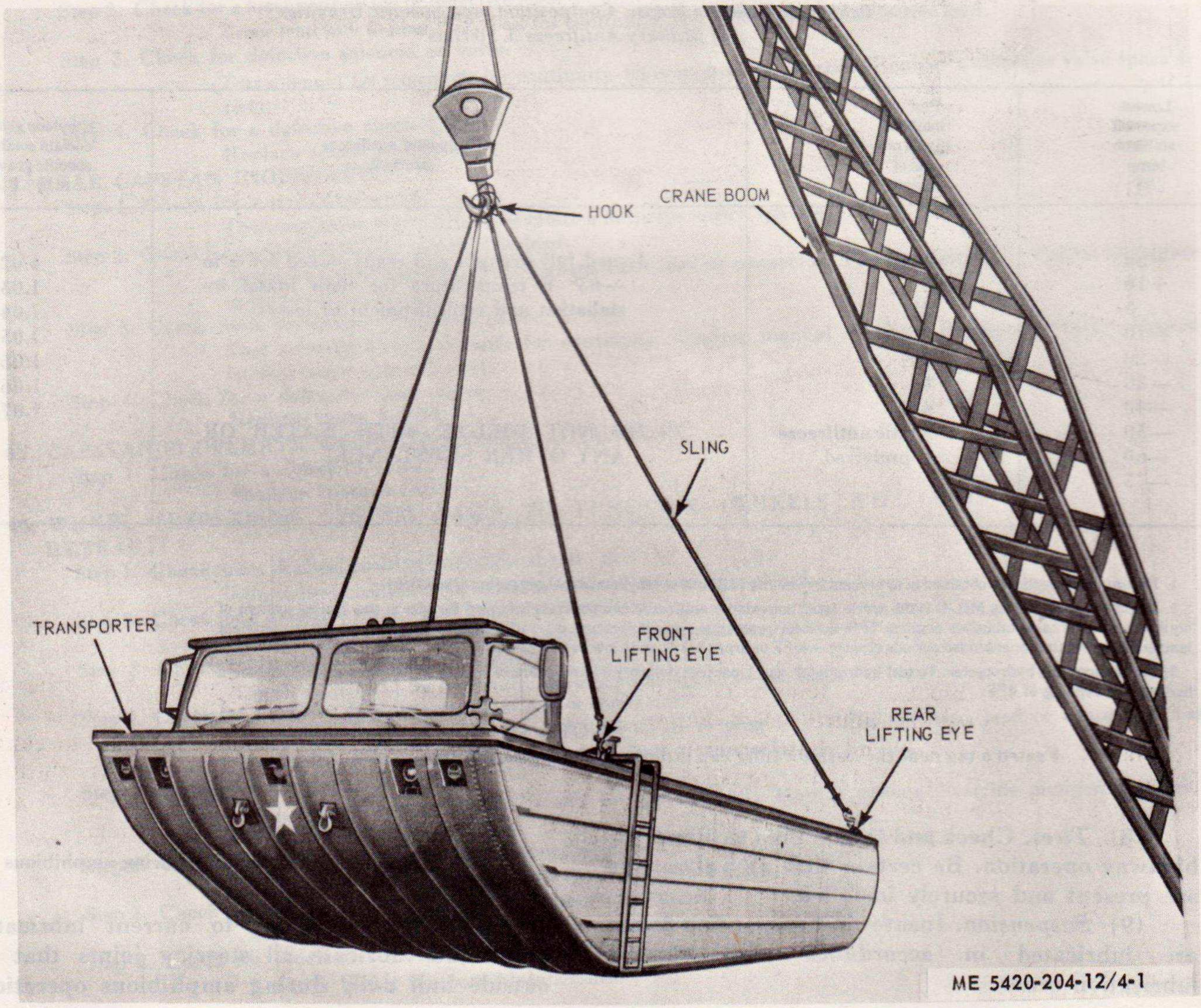



*Figure 4-1. Loading and unloading the transporter.*

(5) If superstructure has been removed from transporter for separate shipment, refer to TM 5-5420-205-15 for method of unloading or unpacking the superstructure.

(6) Position hoisting, vehicle at superstructure (fig. 4-2) in a manner similar to (2) above. Be sure sling is correctly attached according to type superstructure being installed.

NOTE

End bay superstructures are hoisted with same sling as the interior bay, with a link assembly clamp (table 4-2 and view Q of figure 4-4, sheet 7) positioned between sections at unhinged end to eliminate hazard of cylinder damage, should splined section drop away from ramp section. When using alternate method, be sure spreader bars of sling are properly placed to prevent damage.

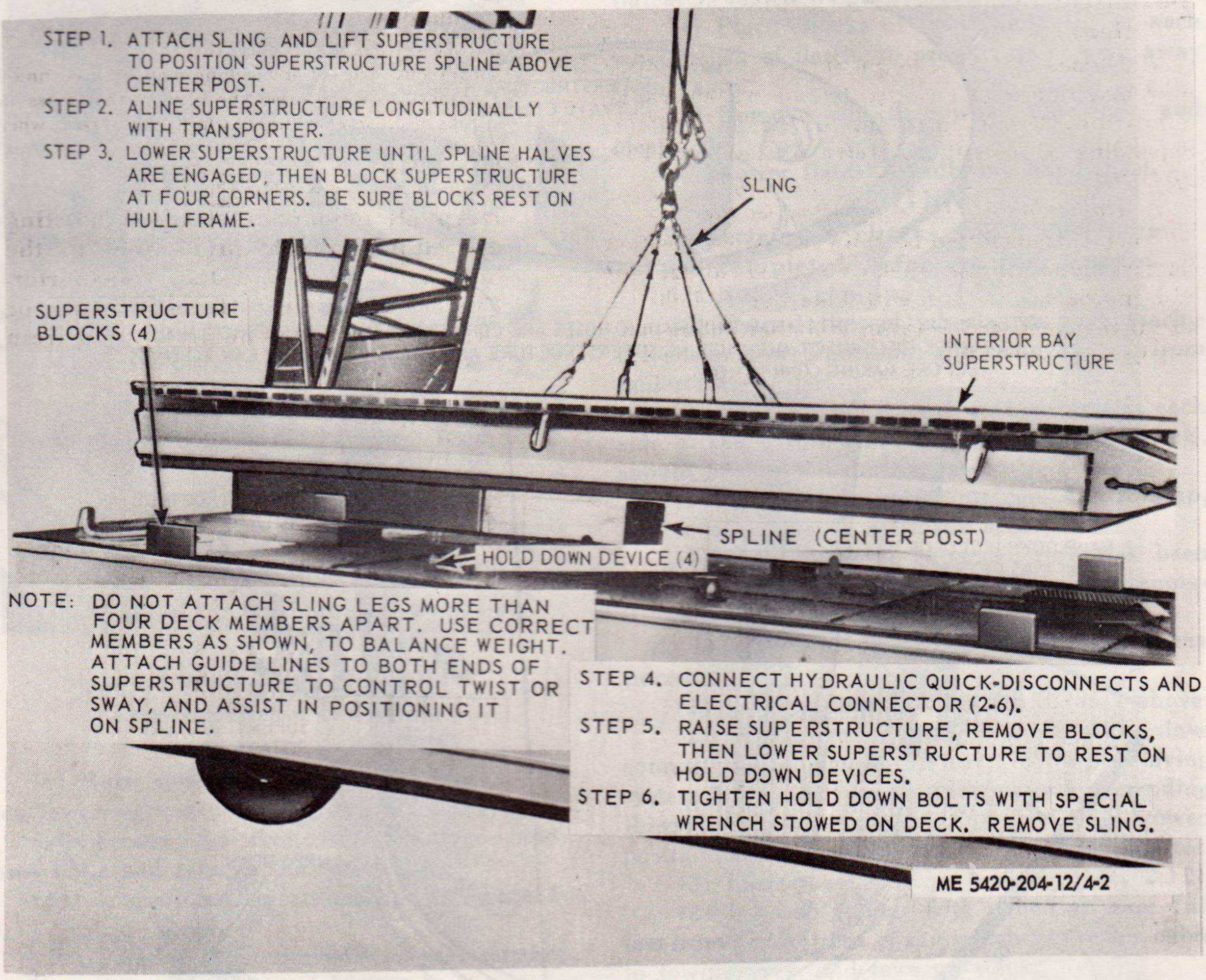



*Figure 4-2. Installing superstructure on transporter.*

(7) Position blocks at four safe blocking points as illustrated on figure 4-2 prior to installation of interior or end bay superstructure. Place a crew member beside the transporter hull where he can see both mating spline of superstructure and post of transporter. This man will control lowering of the superstructure by signals to the hoist operator and men in control of guide lines.

(8) Connect all hydraulic quick-disconnects and the electrical connector (fig. 4-3). Be certain that hydraulic hose from superstructure is mated to proper fitting on deck of transporter.

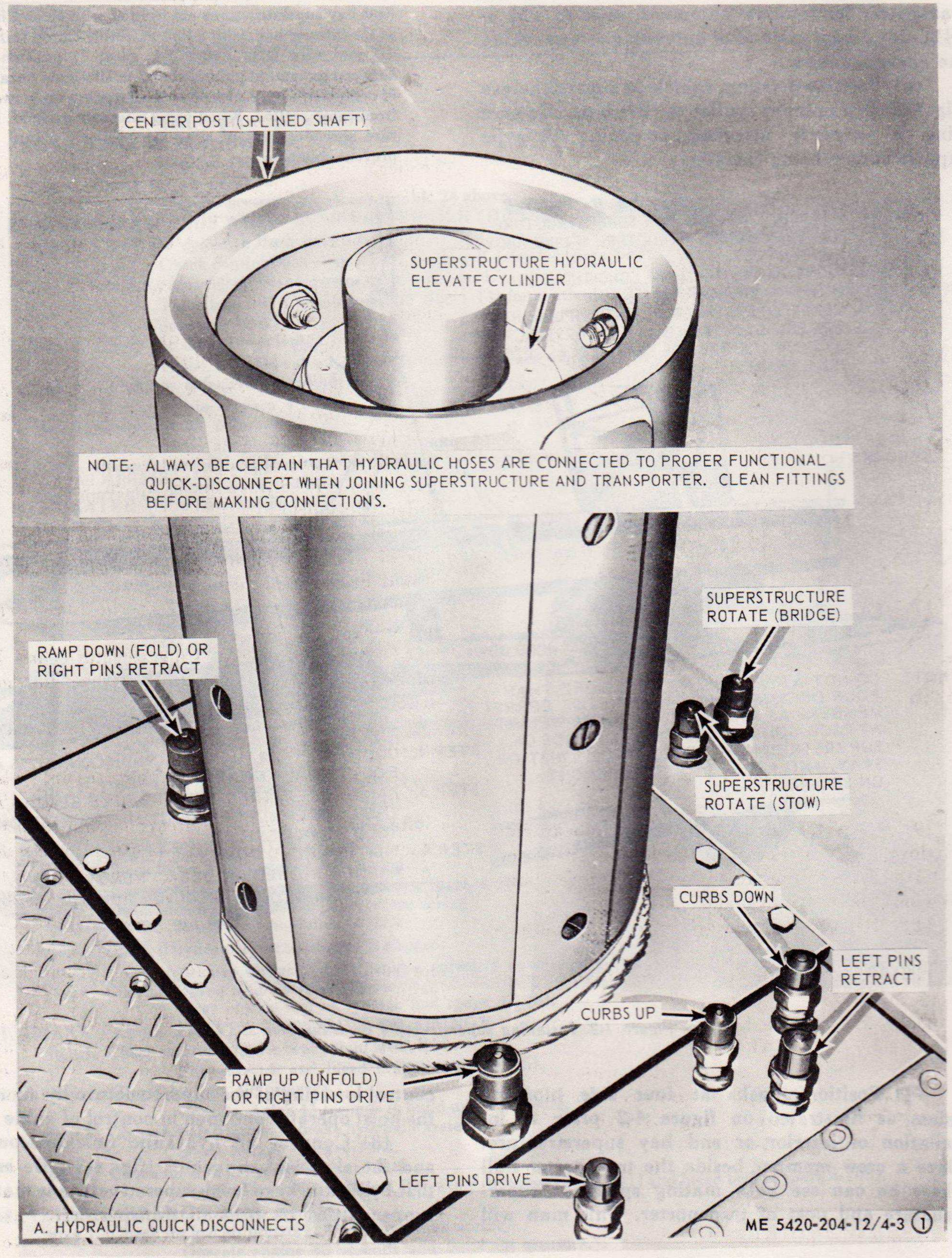



*Figure 4-3. Hydraulic quick-disconnect and electrical connectors. (Sheet 1 of 2)*

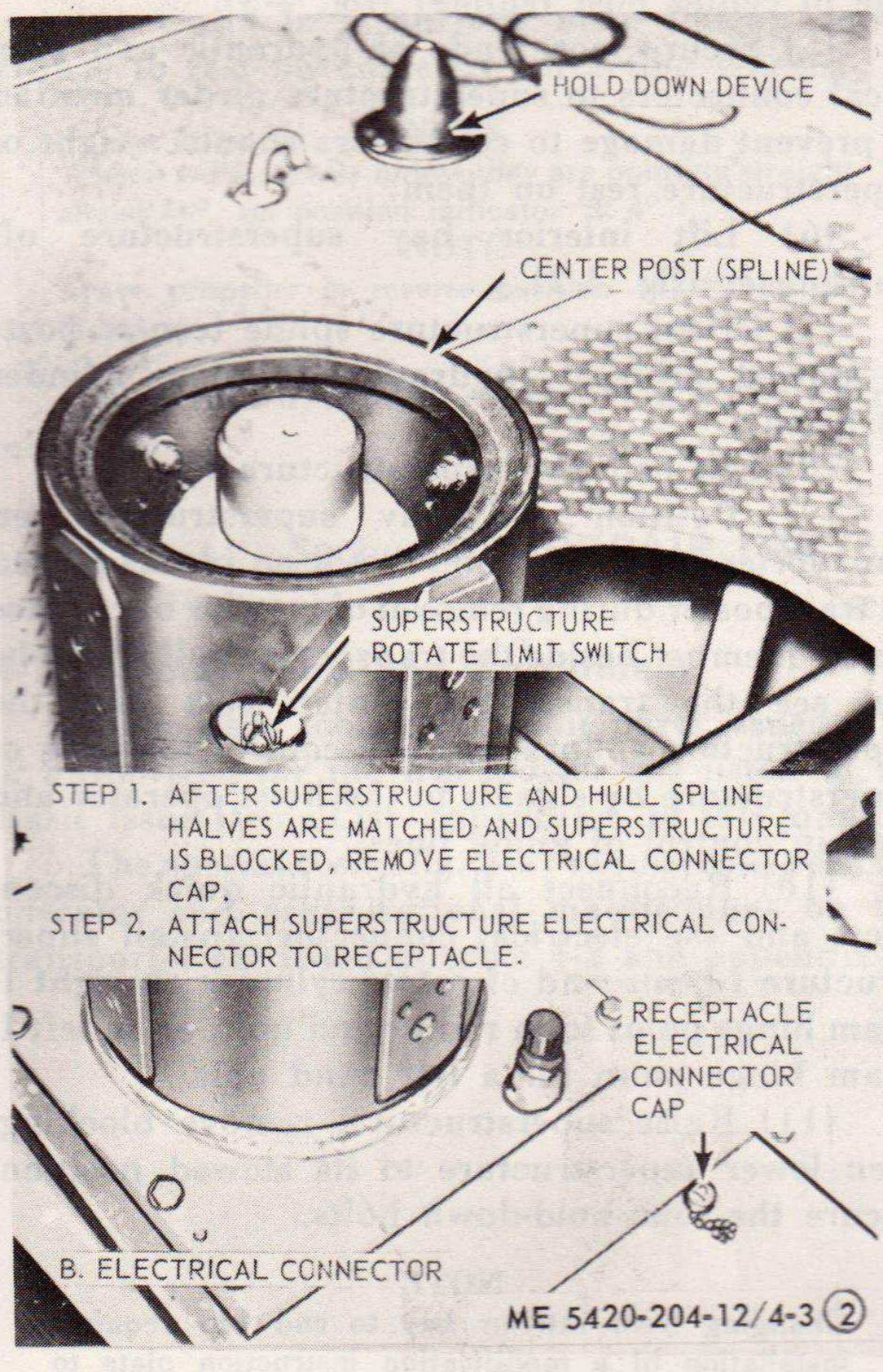



*Figure 4-3. Hydraulic quick-disconnect and electrical connectors. (Sheet 2 of 2)*

(9) Raise superstructure, remove blocks, and then lower superstructure to deck of transporter.

(10) Secure the four superstructure hold-down bolts and remove the lifting sling.

(11) Inspect and service transporter (para 4-1).

(12) Perform all preventive maintenance checks and services, (para 4-12).

(13) Start engine (para 2-3).

**CAUTION**

**Be certain that all checks and inspections are completed before starting engine, including filling of hydraulic reservoir (para 3-17).**

(14) Extend (lower) wheels, be certain marine drive is in stowed position, then drive transporter to operating or assembly area.

*c. Unloading by Drive-Off Method.*

(1) Position flatcar on siding with end ramp, preferably earthen, or where an end ramp may be constructed of crossties and three inch by eight inch timbers (planking).

(2) Block siding in manner described in *b* (1) above.

**CAUTION**

**Be certain that crossties of ramp are secure; that no timber span is greater than four feet, and that ramp is long enough to wash out top hump so vehicle will not scrape and stall.**

(3) Block ends of flatcar with crossties in a vertical position to eliminate hazard of tipping flatcar as vehicle weight passes over end of car.

(4) Place chocks at front and rear of each wheel truck of flatcar to prevent its moving away from ramp.

(5) Remove all tie-downs, blocking, and cleats.

(6) Lower flatcar handbrake handwheel.

**CAUTION**

**Be certain all checks and inspections are completed before staring engine.**

(7) Start engine (para 2-3).

(8) Extend (lower) wheels, be sure marine drive is in stowed position, and remove cleats from under transporter.

(9) Test brakes. Have crew members at each side of ramp with chocks ready to block wheels, should brakes fail during descent.

(10) Drive transporter off car, down ramp, and to operating or assembly area.

(11) In the event superstructure has been shipped separately, refer to *b* above, for superstructure handling instructions.

*d. Tow-off Method for Non-Operative Transporter.*

(1) Perform steps (1) through (6) in *c* above.

(2) Move similar type vehicle with slave connections alongside flatcar; connect slaving system (para 2-12); raise transporter by extending (lower) wheels; be sure marine drive is in stowed position, and remove cleats from under transporter.

(3) Disconnect slaving vehicle (para 2-12).

(4) Position vehicle with winch at least 100 feet from and in front of ramp, connect winch cable to towing eyes, and take up slack.

(5) Operator will test foot and handbrake for holding power, then signal winch operator to apply power. Crew members with chocks will position themselves at wheels so that wheels may be blocked should brakes fail.

**CAUTION**

**When no brake holding power is available on non-operative equipment, a second winch vehicle should be positioned at rear end, hooked up to rear towing eyes, to control progress down ramp.**

ramp, and to a suitable repair area.

**WARNING**

**Alert crew to danger of snapping cables. Keep all personnel not engaged in tow-off operations well back from operating area.**

### 4-4. Equipment Conversion

*a. General.* The transporter comes equipped with an end bay, or interior bay superstructure. End bay superstructures are arranged either for right or left hand operation. Interior bay superstructures all operate in a like manner. If an emergency, the transporter may be converted from an interior bay to an end bay, or vice versa, or from a left hand to right hand end bay should the transporter of one of these units become inoperable. Proceed as directed below.

*b. End Bay Conversion from Right Hand to Left Hand Unit.*

(1) Raise superstructure (para 2-6 *c* (1) (f)) and blockup all four corners.

(2) Move rotation cylinder from right hand clevis to left hand clevis, which is located on superstructure girder member, just forward of center post (spline).

(3) Remove blocking and lower superstructure into travel position. Secure superstructure to transporter deck with the four hold-down bolts.

(4) Make left hand unit of right hand unit by reversing steps (1) through (3) above.

*c. Converting Interior Bay to an End Bay.*

NOTE

When converting from end bay to interior bay drain 3 gallons of fluid from hydraulic reservoir. When converting from interior bay to end bay check fluid level and add as required.

(1) Unscrew four hold-down bolt assemblies, when superstructure is secured to transporter deck, by using special wrench stowed on deck (para 4-47).

(2) Raise superstructure; place blocking at four corners of deck, and lower superstructure onto blocks.

(3) Disconnect hydraulic quick disconnects located midship on deck (fig. 4-3)

(4) Disconnect electrical connector on port side of center post (spline) (fig. 4-3).

(5) Secure loose ends of hydraulic and electrical connectors to superstructure girder member to prevent damage to connectors should weight of superstructure rest on them.

(6) Lift interior bay superstructure off transporter (fig. 4-2).

(7) Orient superstructure spline (center post) to stowed position (hydraulic rotation cylinder retracted).

(8) Lift end bay superstructure (fig. 4-2).

(9) Position end bay superstructure on transporter center post and rest it on blocks placed on transporter during removal of interior bay. Place a crew member beside the transporter hull where he can see the transporter center post and the superstructure splines. He will control lowering of superstructure by signals to the hoist operator and men in control of guide lines.

(10) Reconnect all hydraulic quick disconnects and the electrical connector. Install superstructure I-beam end of rotate cylinder on right I-beam hinge point for a right hand unit, or on left I-beam hinge point for a left hand unit.

(11) Raise superstructure, remove blocking, then lower superstructure to its stowed position. Secure the four hold-down bolts.

NOTE

Changing from interior bay to end bay requires installation of a modification instruction plate to main hydraulic control panel. This plate is fastened to end of control panel by its stud fasteners when not in use. It should be installed to cover right pin DRIVE / RETRACT (fig. 2-1) and show RAMP UP (unfold) DOWN (fold).

NOTE

Should the necessity arise and conversion from interior bay to end bay be made, proper notations should be entered on all accounting and maintenance records to insure that transporter and its mating superstructure are reunited after the emergency has dissolved.

## Section II. MOVEMENT TO A NEW WORKSITE

### 4-5. Dismantling for Movement

*a. General.* For movement of transporter (under its own power) short distances to a new worksite, refer to paragraphs 2-5 and 2-6. Other methods of transportability are described in TM 55-5420-204-10-1.

*b. Preparation for Loading Operational Unit by Hoisting.* A transporter being shipped to a new worksite is considered temporarily out of service, and must be prepared for limited storage to prevent damage by corrosion and other deterioration during shipment. When unit is to be indefinitely stored after shipment, it will be prepared for such storage at its destination.

(1) Insure that radiator coolant contains proper amount of antifreeze for protection against lowest temperatures anticipated during movement period.

(2) Lubricate unit in accordance with current lubrication order.

(3) Be sure marine drive is in STOW position.

(4) On a level surface near flatcar, lower vehicle to rest on chine by retracting wheels.

NOTE

Wheels will not raise unless they are pointing straight ahead (0° on position indicator ± 4° ).

NOTE

Leave propeller in reverse position (180° on indicator).

(5) Drain hydraulic oil reservoir to below red indication.

NOTE

Hydraulic oil reservoir must be refilled before attempting to extend (lower) wheels after rail shipment.

(6) If superstructure is to be shipped separately, refer to TM 5-5420-205-15.

### 4-6. Reinstallation After Movement

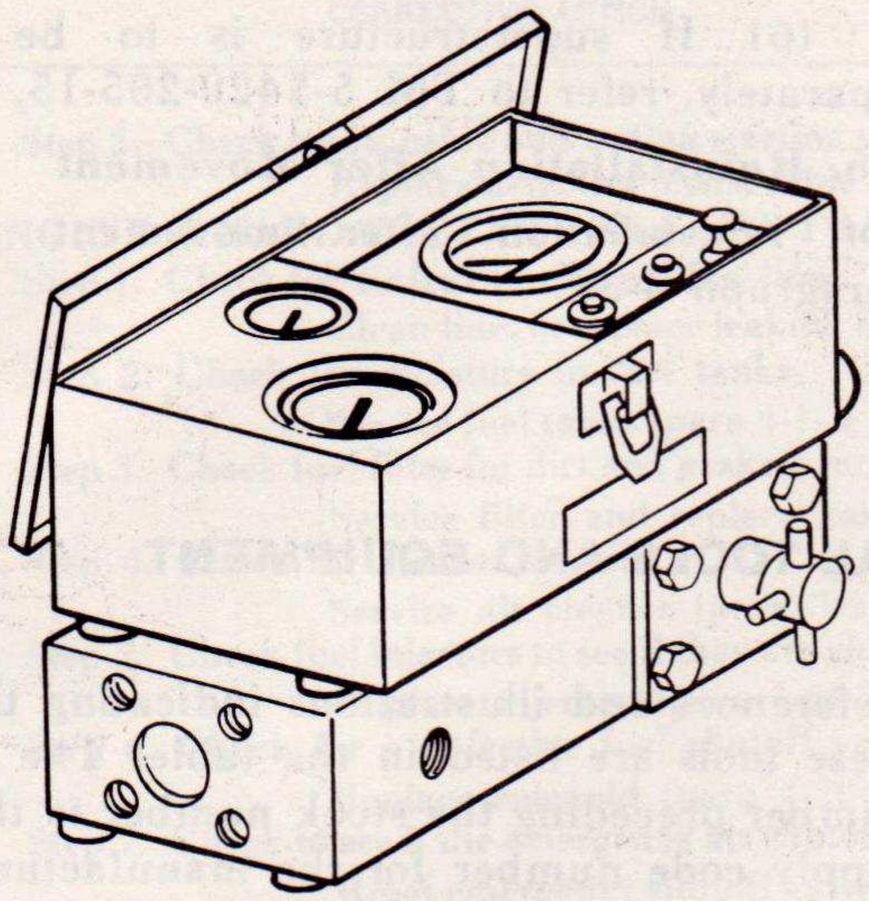
For reinstallation after movement refer to paragraph 4-3.

## Section III. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

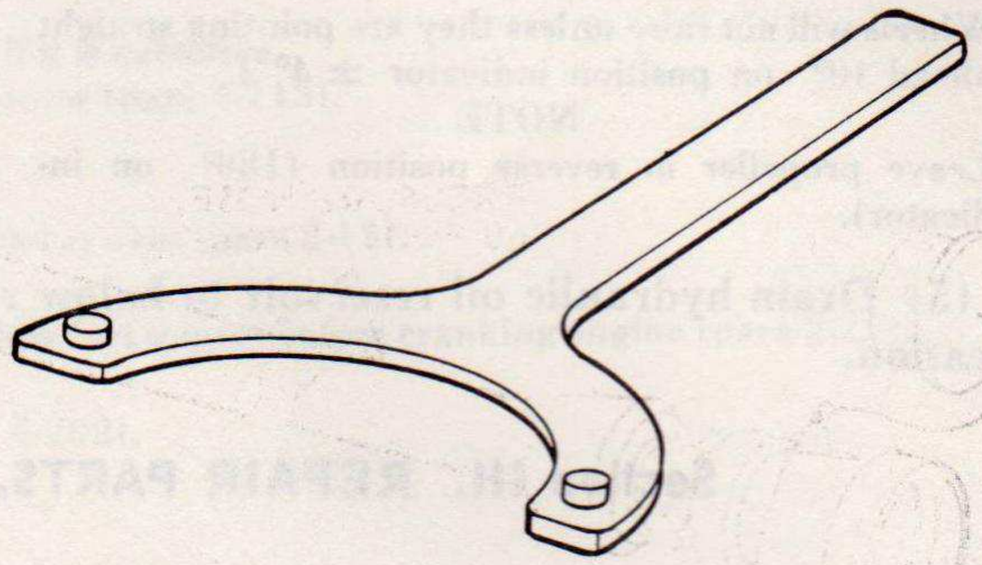
### 4-7. Special Tools and Equipment

*a.* Basic issue tools and repair parts issued with or authorized for the transporter are listed in the Basic Issue Items List, appendix C of this manual.

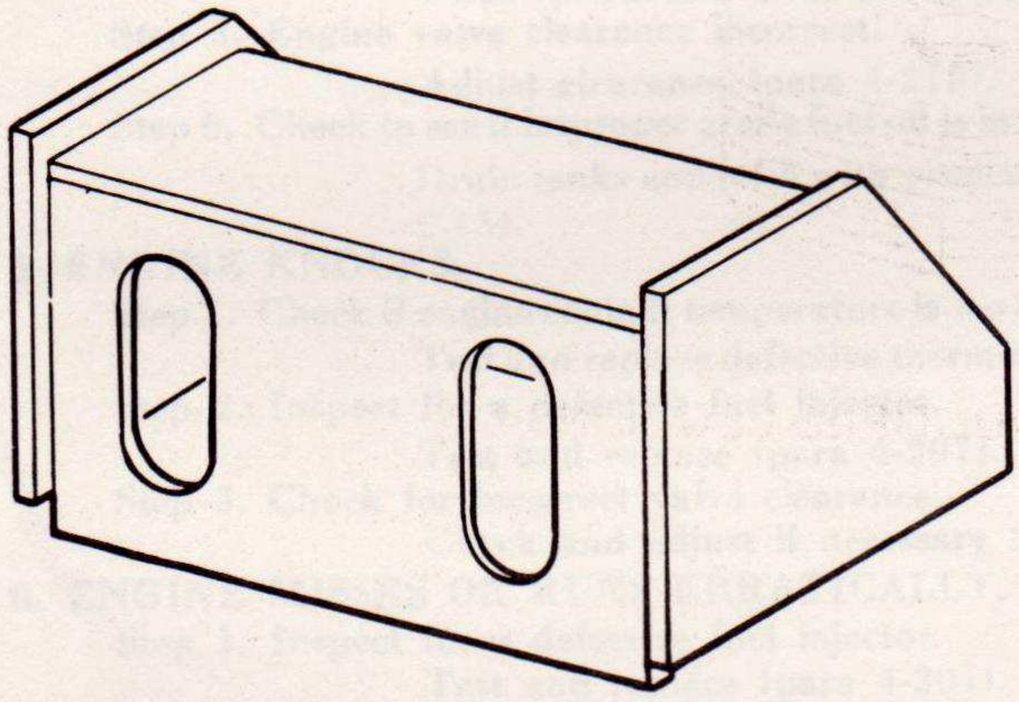
*b.* The special tools (fig. 4-4) required to perform operator and organizational maintenance on the transporter are listed in table 4-2 and appendix C. References and illustrations indicating the use of these tools are listed in the table. The five digit number preceding the stock number is the federal supply code number for the manufacturer of the tools. No special equipment is required by operator or organizational maintenance personnel for performing maintenance on the transporter.



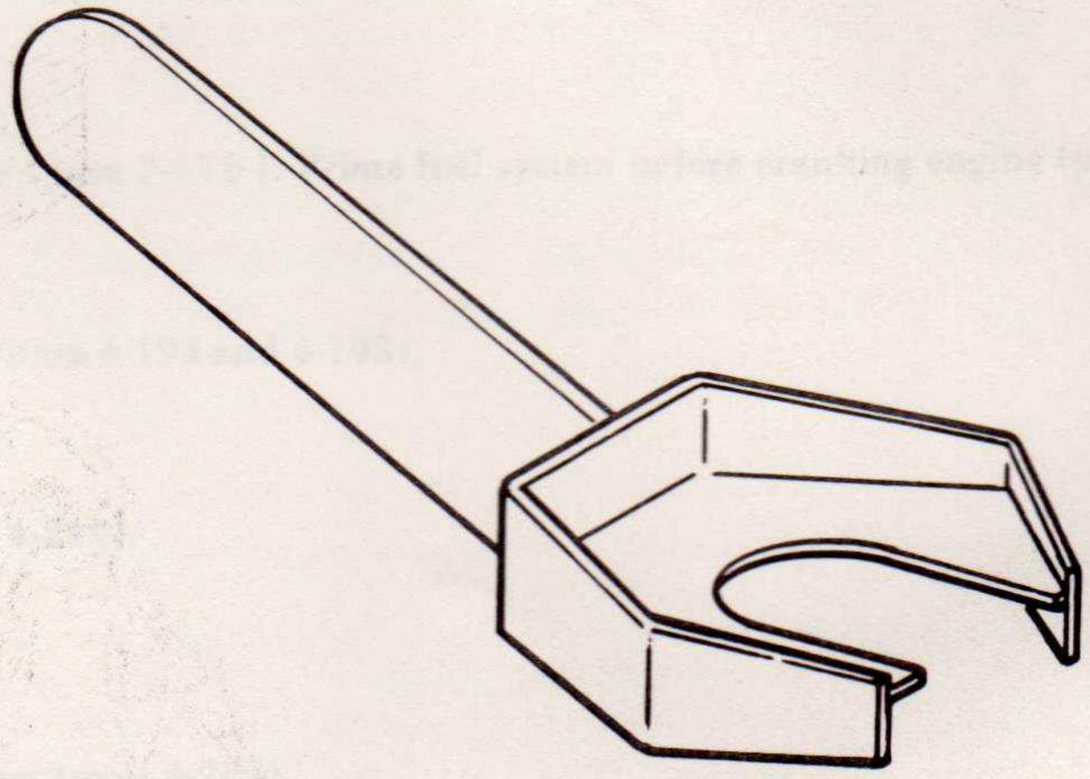
A. HYDRAULIC TEST STAND



B. SPANNER WRENCH



C. TRAILER OR WHEEL CHOCK



D. PACKING GLAND WRENCH



*Figure 4-4. Special tools. (Sheet 1 of 7)*

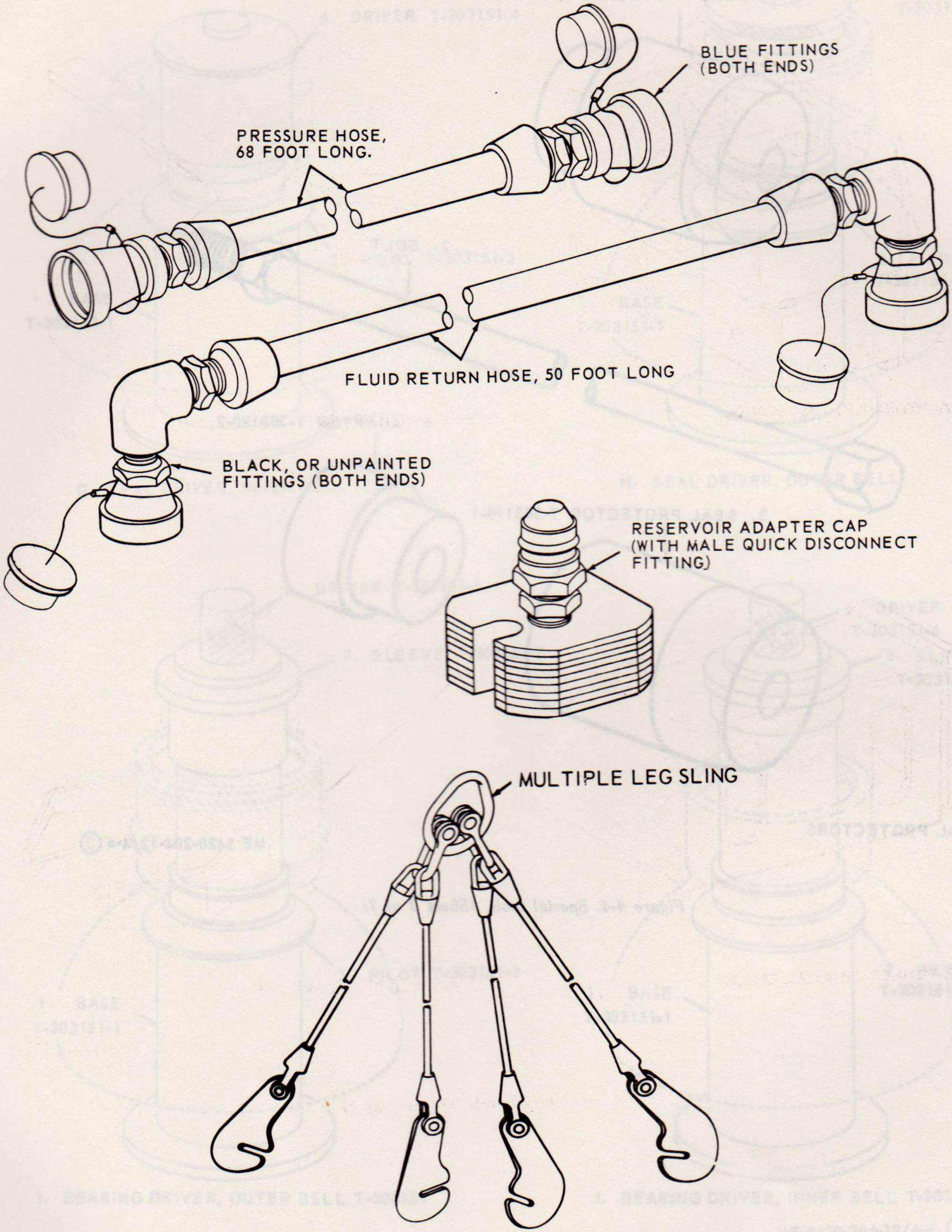
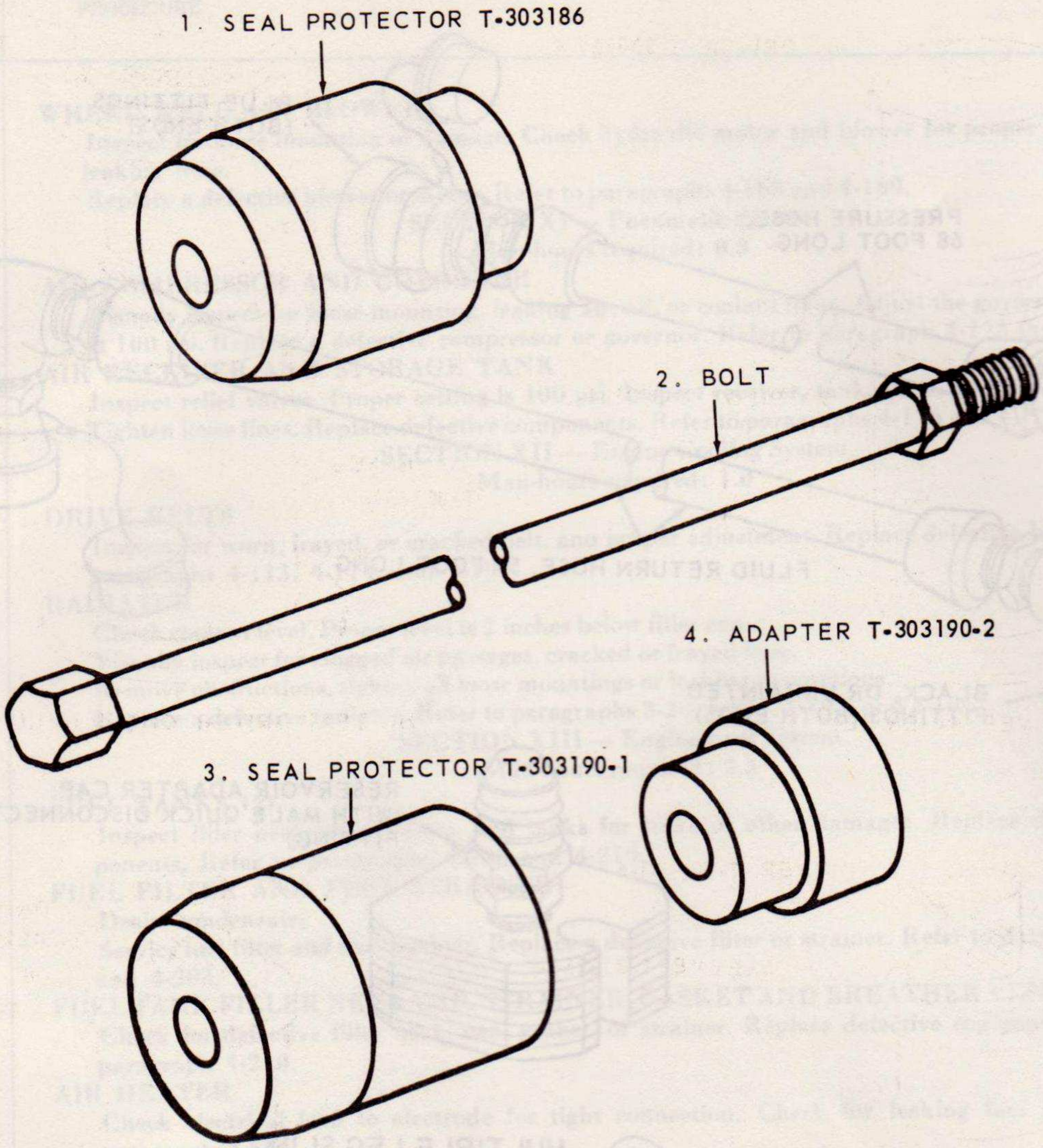




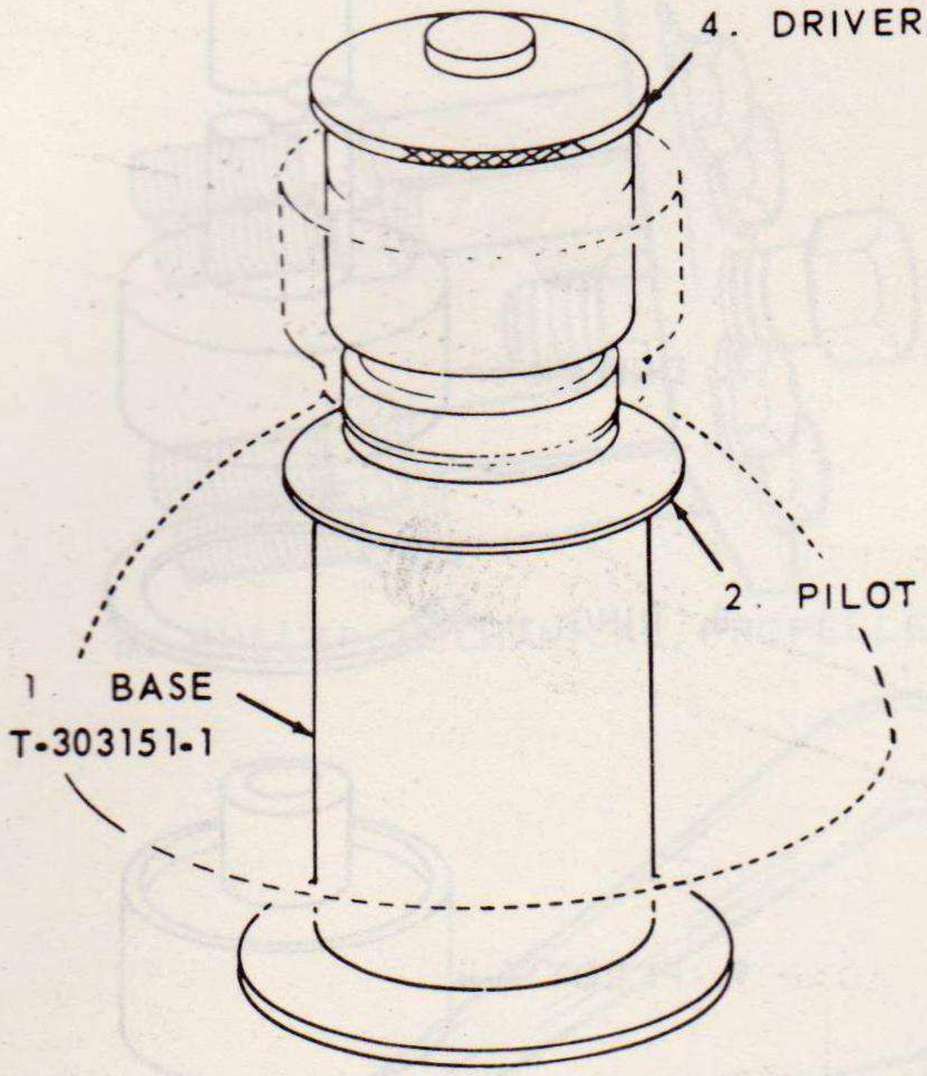

*Figure 4-4. Special tools. (Sheet 2 of 7)*



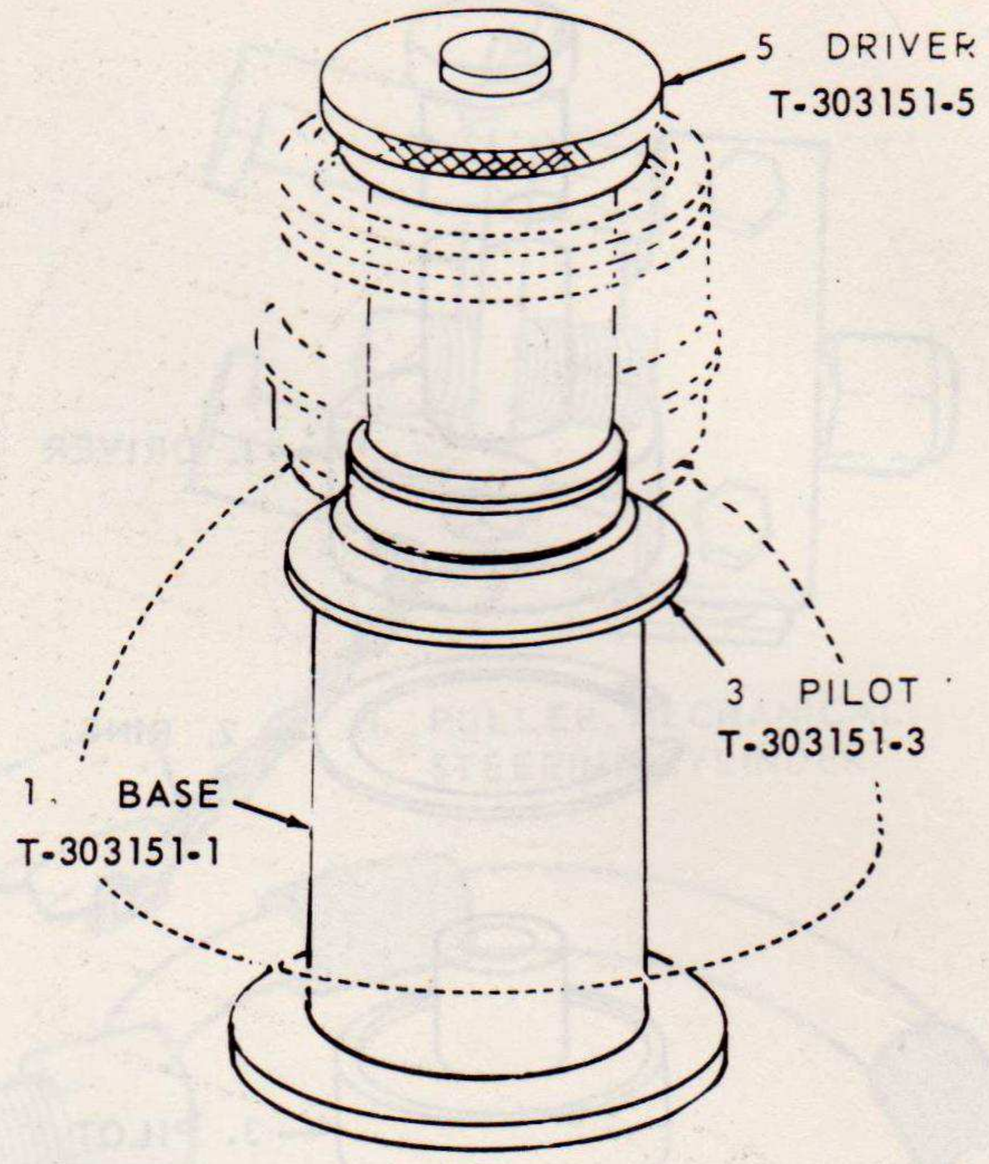

F. SEAL PROTECTORS

ME 5420-204-12/4-4 ③

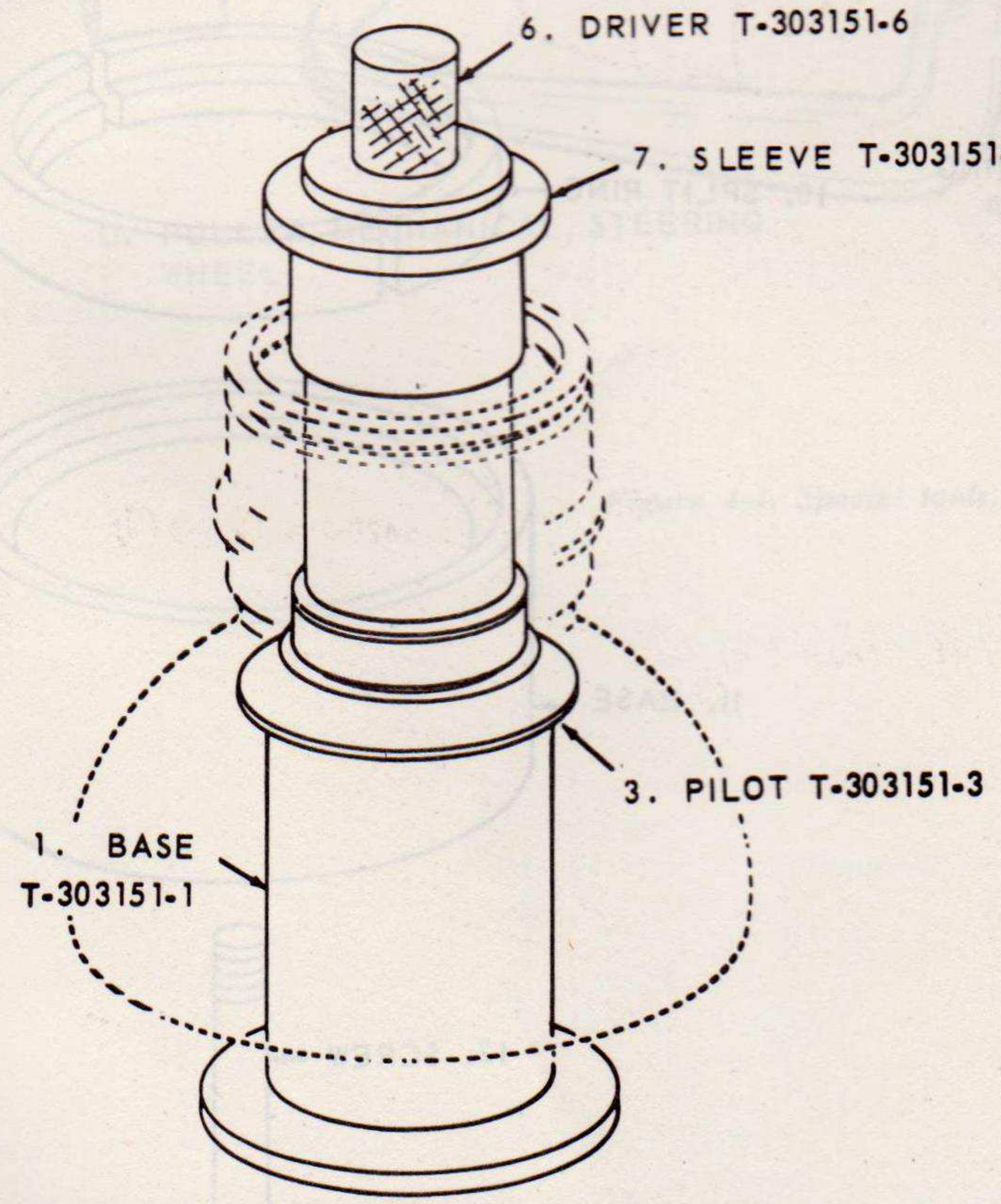
*Figure 4-4. Special tools. (Sheet 3 of 7)*



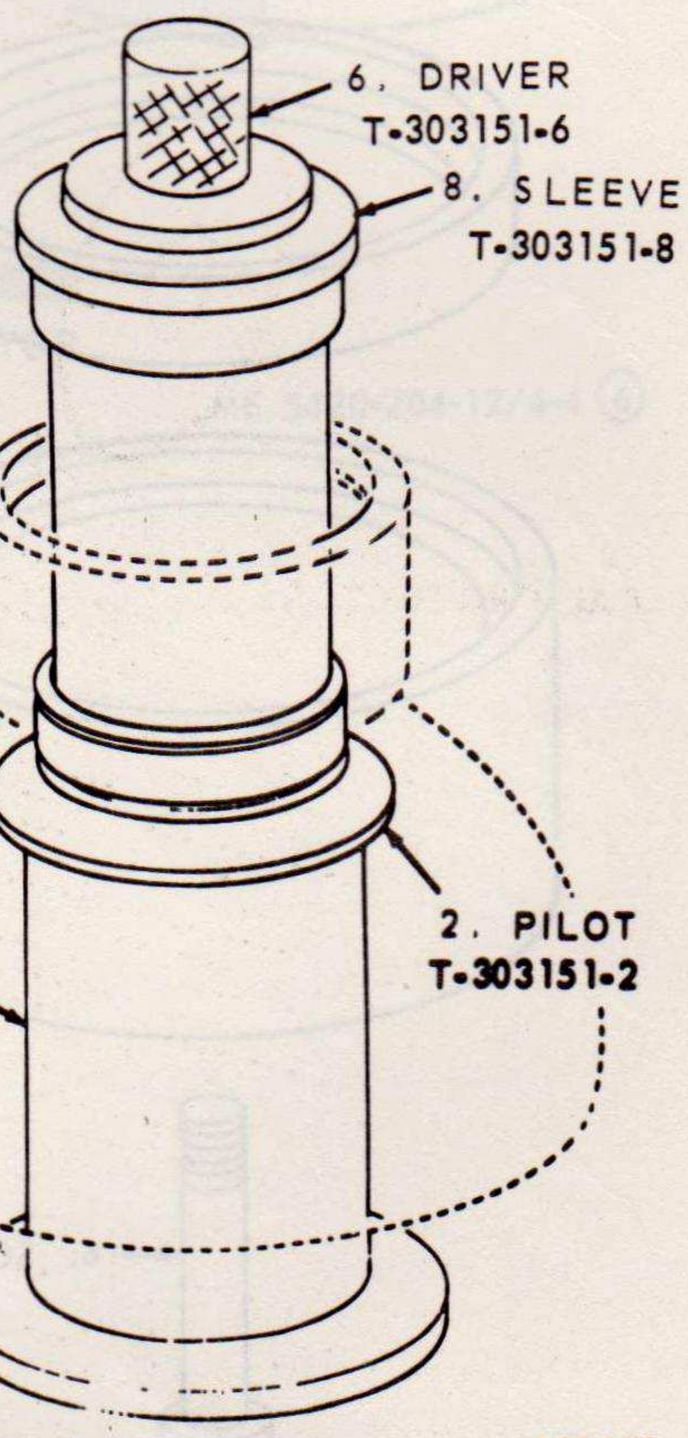

G. SEAL DRIVER, INNER BELL




H. SEAL DRIVER, OUTER BELL



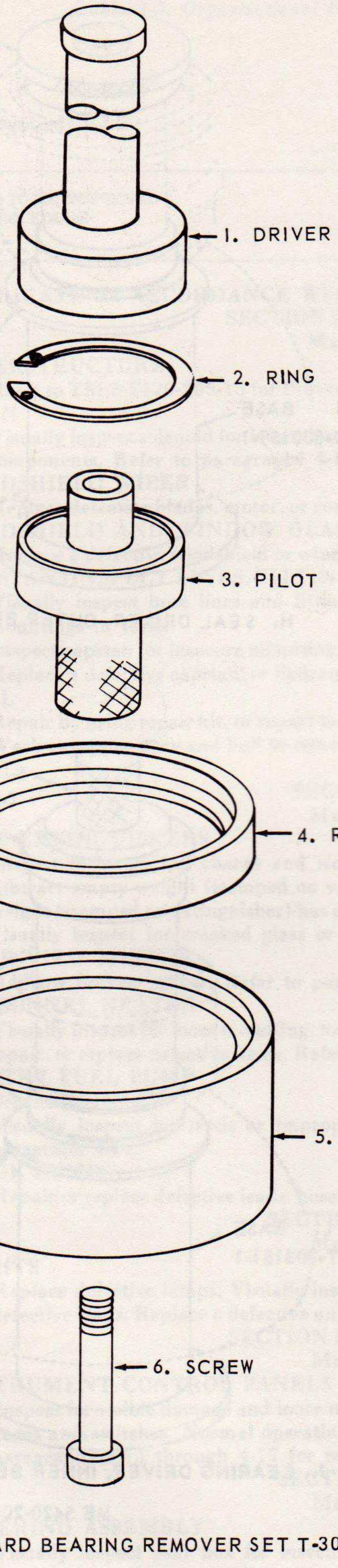

I. BEARING DRIVER, OUTER BELL T-303151



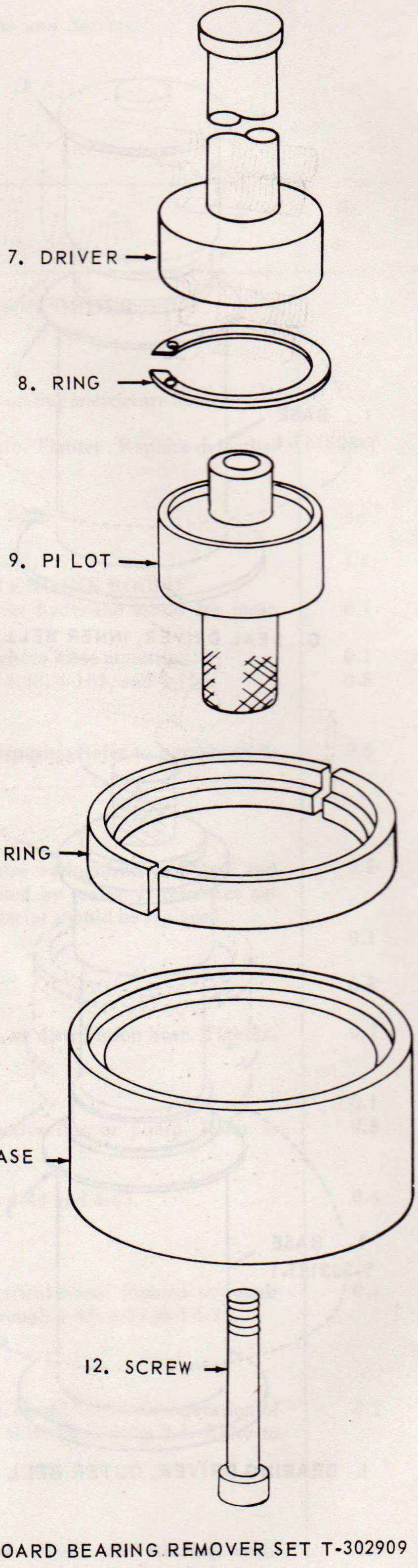

J. BEARING DRIVER, INNER BELL T-303151

ME 5420-204-12/4-4 ④

*Figure 4-4. Special tools. (Sheet 4 of 7)*



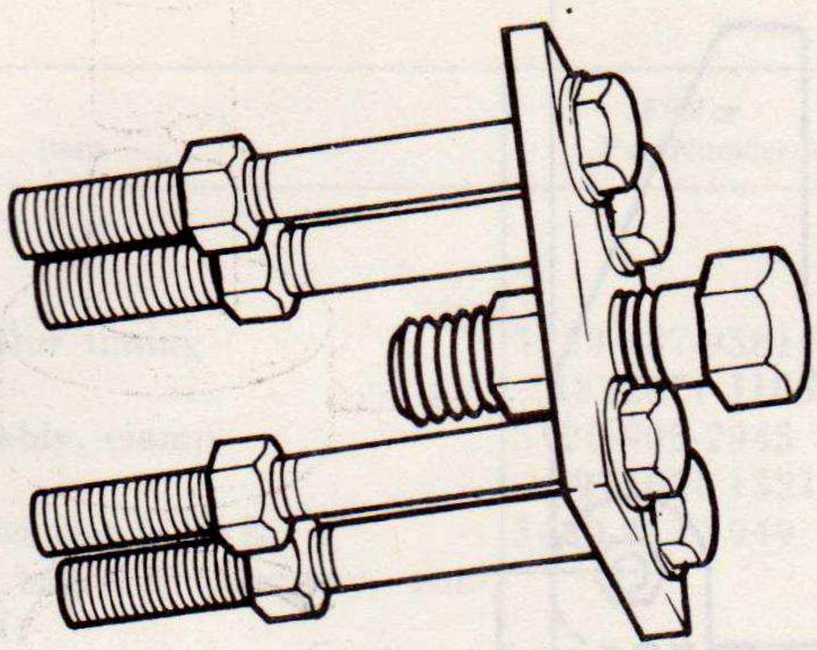

K. OUTBOARD BEARING REMOVER SET T-302908



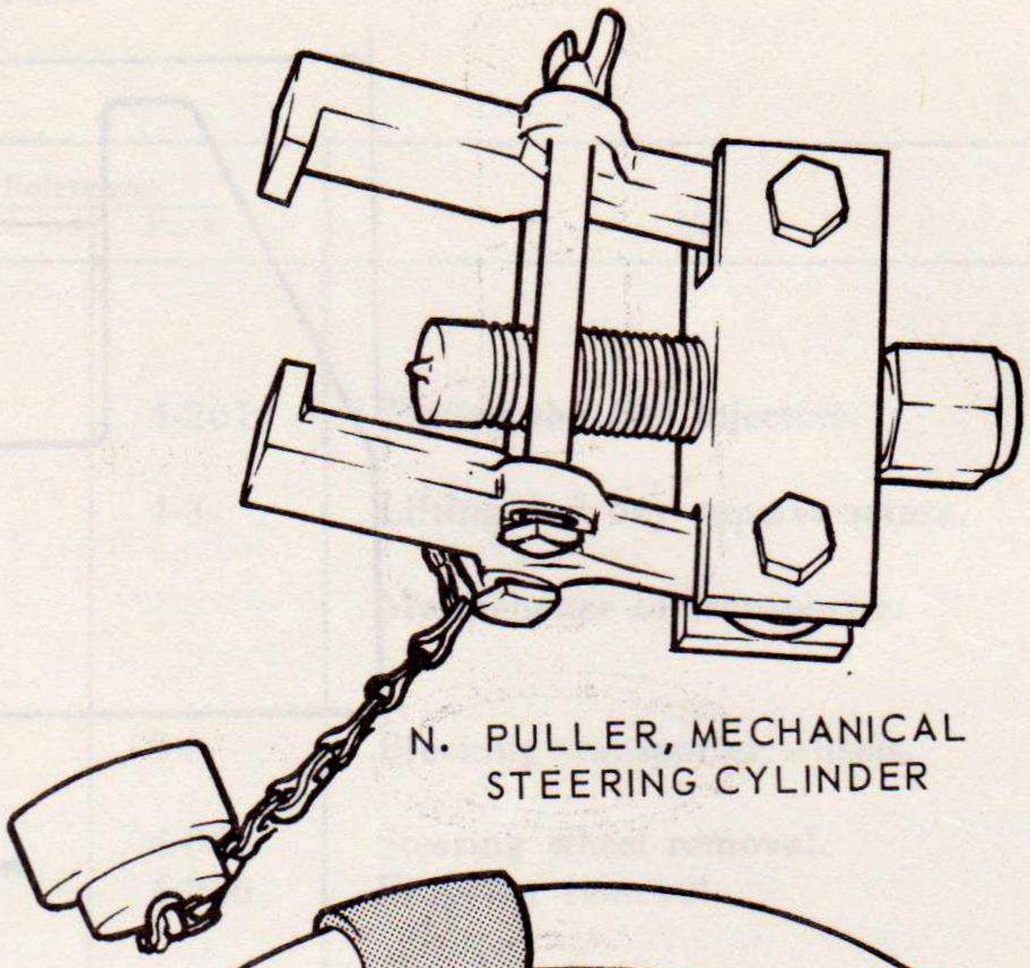

L. OUTBOARD BEARING REMOVER SET T-302909

ME 5420-204-12/4-4 (5)

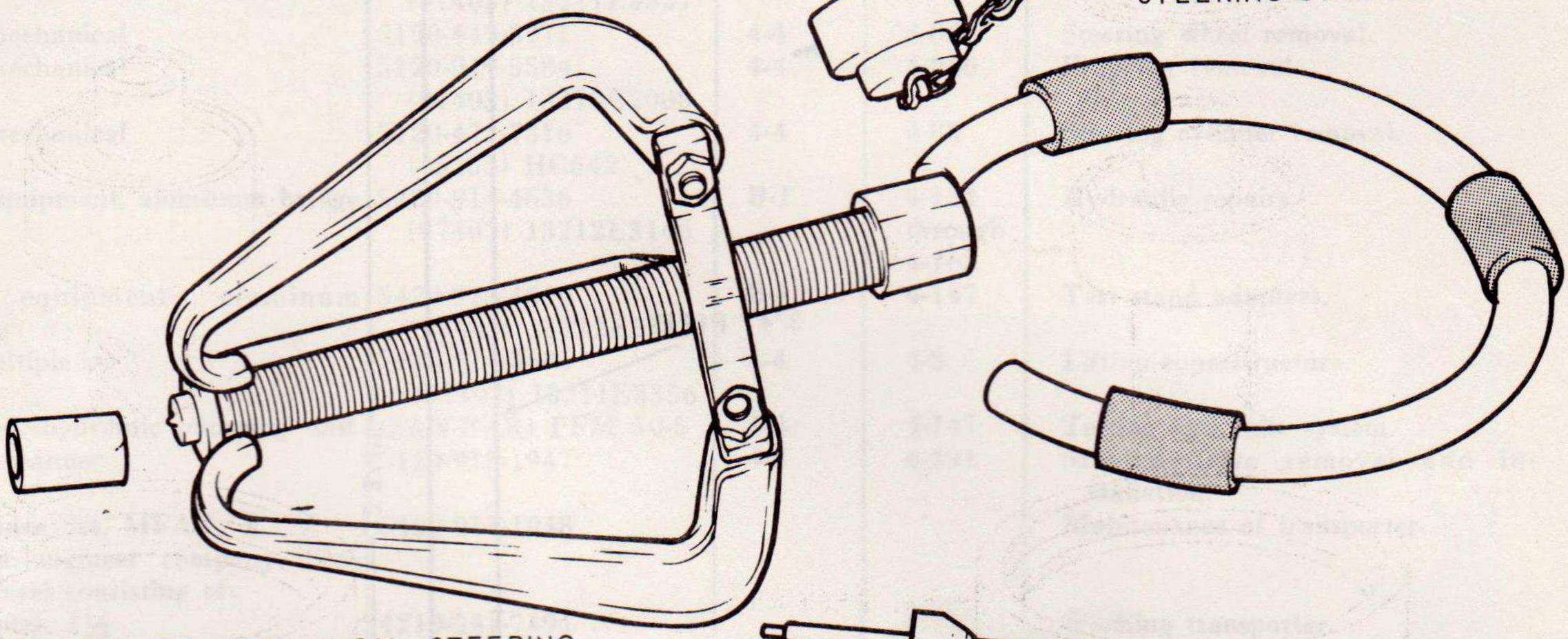
*Figure 4-4. Special tools. (Sheet 5 of 7)*



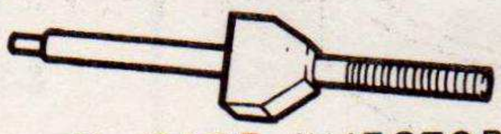
M. PULLER, MECHANICAL, PROPELLER



N. PULLER, MECHANICAL STEERING CYLINDER



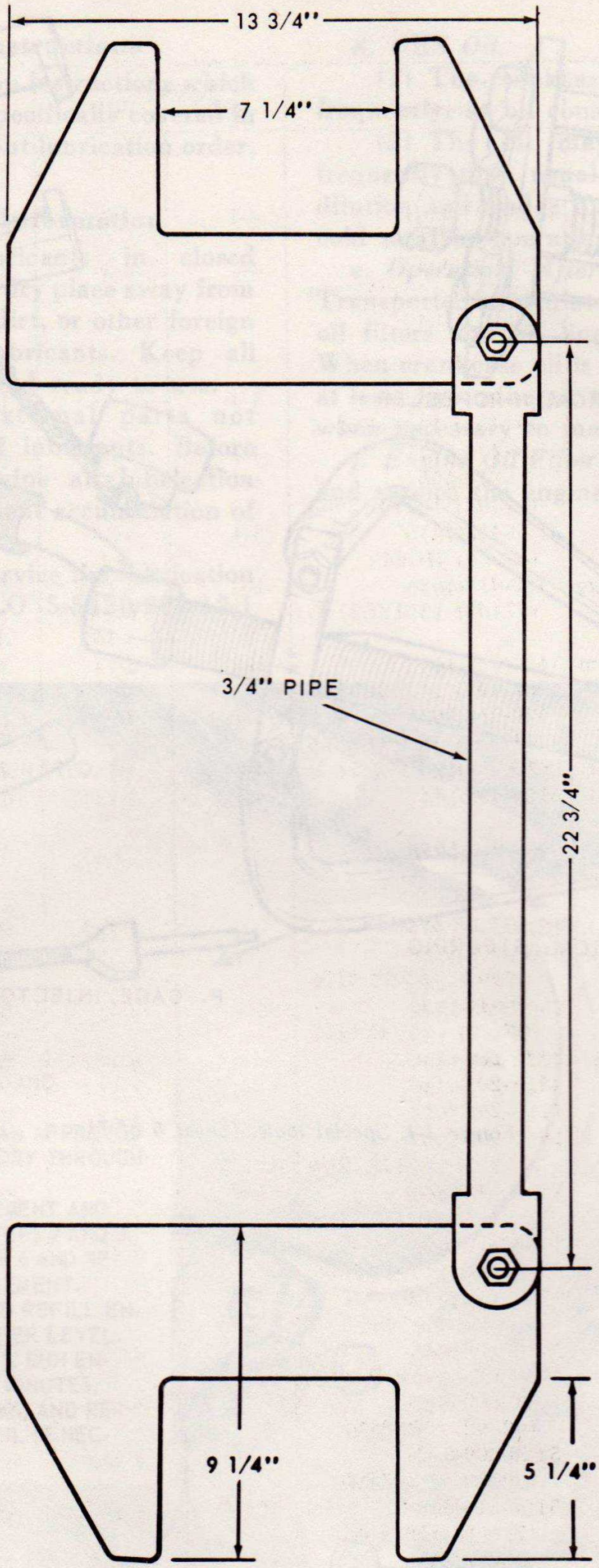
O. PULLER, MECHANICAL, STEERING WHEEL



P. GAGE, INJECTOR

ME 5420-204-12/4-4 (6)

*Figure 4-4. Special tools. (Sheet 6 of 7)*




Q. LINK ASSEMBLY CLAMP

ME 5420-204-12/4-4 (7)

*Figure 4-4. Special tools. (Sheet 7 of 7)*

## 4-8. Maintenance Repair Parts

Organizational maintenance repair parts are listed and illustrated in TM 5-5420-204-20P.

*Table 4-2. Special Tools*

| Item | FSN or Part Number | References Fig. | References Para | Use |
|---|---|---|---|---|
| Gage, injector timing | 5220-387-9581 (33287) J1853 | 4-4 | 4-207 | Timing the fuel injectors. |
| Link assembly, clamp | 5420-905-2945 (97403) 13211E3354 | 4-4 | 4-3 | Lifting end bay superstructure. |
| Maintenance Set MFAB / F | 5420-913-1949 | | | Maintenance of transporter. |
| Bridge or engineer company, consisting of: | | | | |
| Chock, wheel, trailer | 2540-912-1848 (97403) 13211E3357 | 4-4 | 2-6 | Blocking transporter wheels. |
| Puller, mechanical | 5120-449-3771 | 4-4 | 4-82 | Steering wheel removal. |
| Puller, mechanical | 5120-919-5584 (97403) 13213E2008 | 4-4 | 4-240 | Propeller removal. |
| Puller, mechanical | 5120-473-7316 (45255) HC642 | 4-4 | 4-88 | Steering cylinder removal. |
| Repair equipment, aluminum bridge | 5420-914-4636 (97403) 13212E3146 | B-1 | 4-134 through 4-165 | Hydraulic repairs. |
| Repair equipment, aluminum floating | 5420-914-4659 (97403) 13212E3145 | B-1 | 4-147 | Test stand adapters. |
| Sling, multiple-leg | 5420-914-5685 (97403) 13211E3356 | 4-4 | 4-3 | Lifting superstructure. |
| Test stand, hydraulic pumping unit | (SAN-BAR) PFM 50-5 | 4-4 | 4-147 | Testing hydraulic system. |
| Wrench, spanner | 5120-913-1947 | 4-4 | 4-231 | Marine drive removal and installation. |
| Maintenance Set, MFAB / F | 5420-913-1948 | | | Maintenance of transporter. |
| Bridge or engineer company, Sectional level consisting of: | | | | |
| Adapter, 1½ | 4210-541-7491 | | 4-117 | Washing transporter. |
| Cable assembly, special purpose | 6150-904-8780 (97403) 13207E2171 | 2-3 | 2-3*c* | Starting transporter by slaving. |
| Chock wheel, trailer | 2540-912-1848 (97403) 13211E3357 | 4-4 | 2-6 | Blocking wheels. |
| Hose assembly, rubber (discharge) | 4210-288-6809 | | 4-117 | Washing transporter. |
| Hose assembly, rubber (suction) | 4720-202-6731 | | 4-117 | Washing transporter. |
| Nozzle, 1½ in. to ½ in., 10 in. lg | 4210-240-1654 | | 4-117 | Washing transporter. |
| Propeller ship, bronze | 2010-905-2034 (97403) 13207E3006 | | 4-240 | Propeller replacement. |
| Slave assembly, hydraulic | 5420-910-7467 (97403) 13211E3355 | 4-4 | 2-12 | Slaving transporter hydraulically. |
| Sling, endless wire rope | 3940-905-2035 (97403) 13211E3360 | | 4-254 | Wheel removal. |
| Towbar, motor vehicle | 2540-378-2012 (81349) T-45043 | | | Towing disabled transporter. |
| Wheel assembly | 2530-949-0602 (97403) 13207E2001 | | 4-255 | Wheel exchange. |
| Protector, seal | 5120-809-8411 (90192) T-303186 | | 4-258 | Double universal joint repairs. |
| Protector, seal | 5120-809-8421 (90192) T-303190 | | 4-258 | Double universal joint repairs. |
| Valve spring compressor and injector remover | 5120-219-8400 (72582) J1227-01 | 4-189 | 4-207 | Removing fuel injectors and valve springs. |
| Wrench, fuel line nut, ½ in. | 5120-019-5232 (72582) J8932-01 | | 4-207 | Fuel line torque at injector installation. |
| Wrench, spanner, tie rod packing gland. | (97403) 13207E6451 | 4-4 | 4-93 | Tighten tie rod packing glands. |

## 4-9. General Lubrication Instructions

This section contains lubrication instructions which are supplemental to, and not specifically covered in the lubrication order. For current lubrication order, refer to DA Pamphlet 310-4.

## 4-10. Detailed Lubrication Information

*a. General.* Keep all lubricants in closed containers and store in a clean, dry place away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready to use.

*b. Cleaning.* Keep all external parts not requiring lubrication clean of lubricants. Before lubricating the equipment, wipe all lubrication points after lubricating to prevent accumulation of foreign matter.

*c. Points of Lubrication.* Service the lubrication points at proper intervals (LO 5-5420-204-12-1 through LO 5-5420-204-12-5).

*d. OES Oil.*

(1) The crankcase oil level must be checked frequently, as oil consumption may increase.

(2) The oil may require changing more frequently than usual because contamination by dilution and sludge formation will increase under cold weather operating conditions.

*e. Operation After Lubrication.* Operate the Transporter immediately after lubrication. Inspect oil filters and oil lines for evidence of leakage. When crankcase oil is changed, operate engine for at least five minutes, then check oil level. Add oil when necessary to maintain proper level.

*f. Engine Oil Filter Service.* Refer to figure 4-5 and service the engine oil filters.

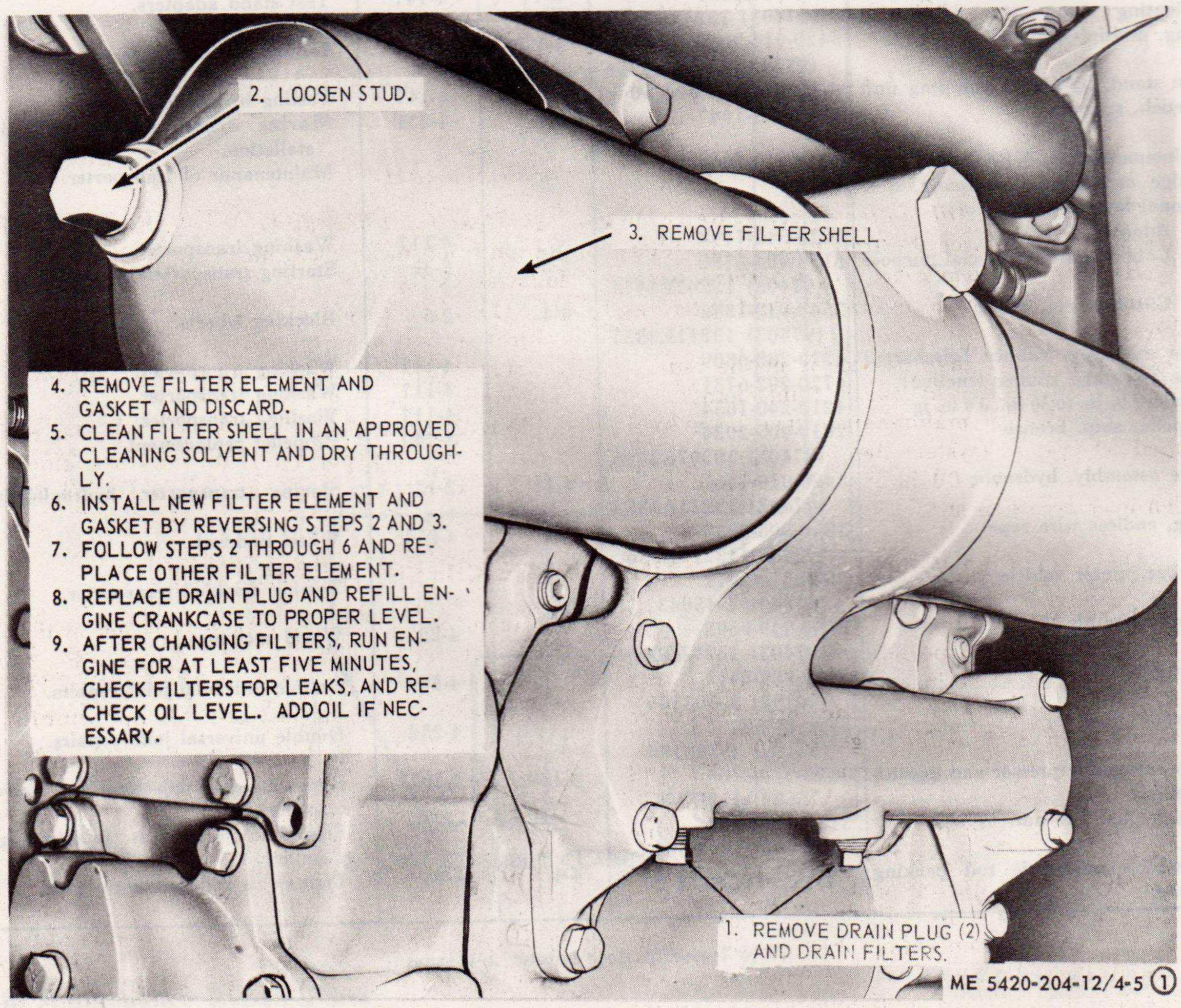



*Figure 4-5. Engine oil filter service. (Sheet 1 of 2)*

STEP 1. REMOVE TWO PIPE PLUG (1) AND DRAIN ENGINE OIL FILTERS.

STEP 2. REMOVE ITEMS (2) THROUGH (5) AND REMOVE COVER (ADAPTER) (6) AND TWO GASKETS (7).

STEP 3. REMOVE ITEMS (8) THROUGH (17) IN NUMERICAL ORDER.

STEP 4. REPEAT STEP 3 AND REMOVE REMAINING FILTER.

STEP 5. REMOVE ITEMS (18) THROUGH (20) TO REMOVE BYPASS VALVE (21).

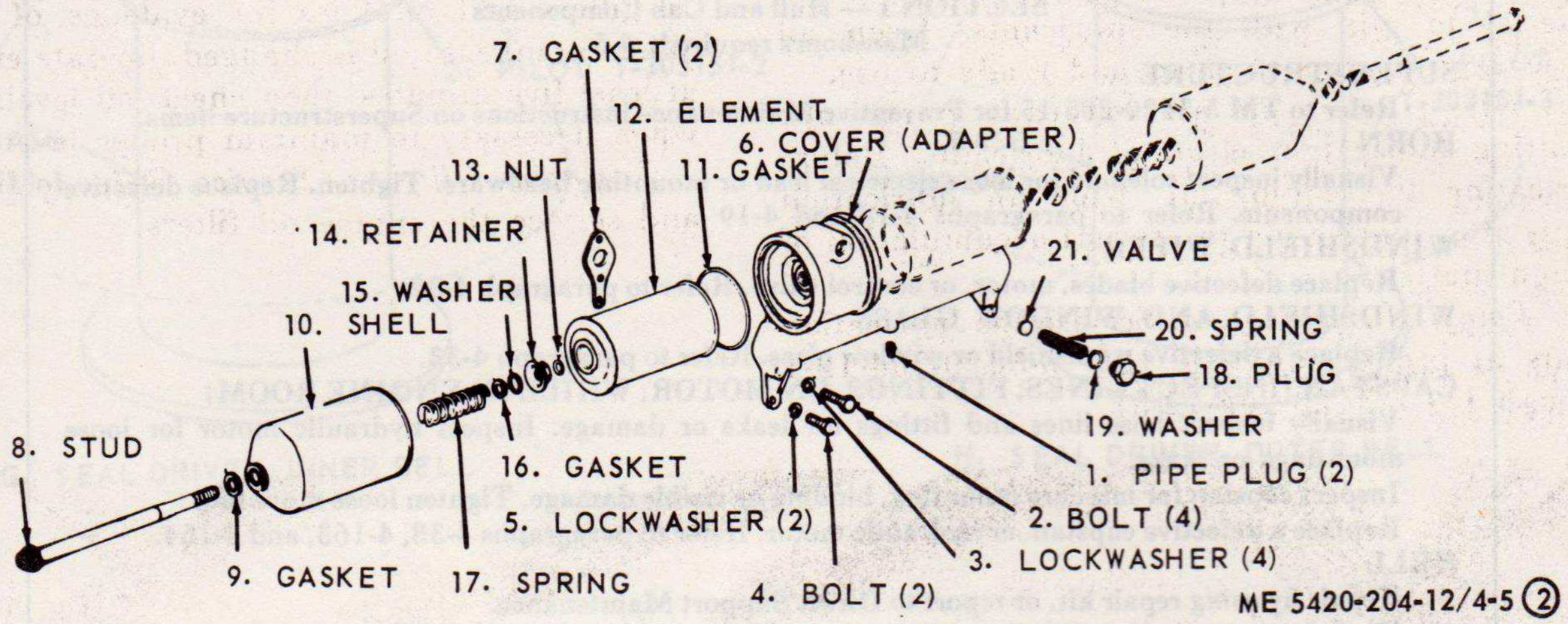



*Figure 4-5. Engine oil filter service. (Sheet 2 of 2)*

*g. Transmission Oil Filter Service.* Refer to figure 3-14 and service the transmission oil filter.

*h. Hydraulic System Fluid Filter Service.* Refer to figure 3-5 and service hydraulic fluid filters as follows:

(1) When gage pointer is in the red.

(2) At every hydraulic fluid change.

(3) When maintenance has been performed on system (system has been opened).

(4) Every 500 hours, or semi-annually, which ever comes first.

*i. Rear Control Station.* When the rear control station is not to be used, lubricate the throttle cam follower as follows:

(1) Lift control station cover and stow the rear control station pedestal.

(2) Move throttle control lever to full throttle position.

(3) Lubricate the throttle cam follower roller groove cable end sparingly with OE-10 engine oil.

(4) Lower and latch the control station cover.

## Section V. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

### 4-11. General

To insure that the transporter is ready for operation at all times, it must be inspected systematically, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed are listed and described in paragraph 4-12. The item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation of the transporter shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation that would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded, together with the corrective action taken, on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest possible opportunity.

### 4-12. Preventive Maintenance Checks and Services

This paragraph contains a tabulated listing of preventive maintenance checks and services which must be performed. The item numbers are listed consecutively by starting in cab, down front hatch through hull, out rear hatch, and then around unit. They indicate the sequence of minimum requirements. Refer to table 4-3 for the preventive maintenance checks and services.

*Table 4-3. Organizational Preventive Maintenance Checks and Services*

**Q—Quarterly**

**Total man-hours required: 27.2**

| Sequence Number | ITEM TO BE INSPECTED PROCEDURE | Work Time (M / H) |
|---|---|---|
| | **LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER** | |
| | **SECTION I — Hull and Cab Components** | |
| | **Man-hours required: 4.5** | |
| 1 | **SUPERSTRUCTURE** | |
| | Refer to TM 5-5420-205-15 for Preventive Maintenance instructions on Superstructure items. | |
| 2 | **HORN** | |
| | Visually inspect solenoid for loose electrical lead or mounting hardware. Tighten. Replace defective components. Refer to paragraphs 4-18 and 4-19 | 0.5 |
| 3 | **WINDSHIELD WIPER** | |
| | Replace defective blades, motor, or control valve. Refer to paragraph 4-32. | 1.0 |
| 4 | **WINDSHIELD AND WINDOW GLASS** | |
| | Replace a defective windshield or window glass. Refer to paragraph 4-33. | 1.5 |
| 5 | **CAPSTAN (INSPECT LINES, FITTINGS, ON MOTOR, WHILE IN ENGINE ROOM)** | |
| | Visually inspect hose lines and fittings for leaks or damage. Inspect hydraulic motor for loose mountings or leaks. | 0.1 |
| | Inspect capstan for insecure mounting, binding or visible damage. Tighten loose mounting. | 0.1 |
| | Replace a defective capstan, or hydraulic motor. Refer to paragraphs 4-38, 4-163, and 4-164. | 0.5 |
| 6 | **HULL** | |
| | Repair by using repair kit, or report to Direct Support Maintenance. | |
| | Wash superstructure and hull to remove any accumulation of mud deposits. Refer to paragraph 4-17. | 0.8 |
| | **SECTION II — Accessories** | |
| | **Man-hours required: 1.6** | |
| 7 | **FIRE EXTINGUISHERS** | |
| | Inspect to insure full charge and working condition. Weigh the fire extinguishers ($CO_2$) and subtract empty weight (stamped on valve body) from weight indicated by scales. If resultant net weight (stamped on extinguisher) has decreased 10% or more, cylinder(s) should be replaced. | 0.2 |
| | Visually inspect for cracked glass or deteriorated seal. | 0.1 |
| 8 | **REAR VIEW MIRROR** | |
| | Replace broken mirror. Refer to paragraph 4-40. | 0.3 |
| 9 | **PERSONNEL HEATER** | |
| | Visually inspect for loose mounting, loose or damaged electrical leads, or distribution hose. Tighten, repair, or replace defective items. Refer to paragraphs 4-41 and 4-42. | 0.2 |
| 10 | **HEATER FUEL PUMP** | |
| | Service screen. | 0.1 |
| | Visually inspect for leads or improper operation. Replace a defective line or pump. Refer to paragraph 4-42. | 0.3 |
| 11 | **BILGE PUMPS** | |
| | Repair or replace defective leads, hose, or pump. Refer to paragraphs 4-44 and 4-45. | 0.4 |
| | **SECTION III — Lighting System** | |
| | **Man-hours required: 0.3** | |
| 12 | **LIGHTS** | |
| | Replace defective lamps. Visually inspect for loose or damaged electrical leads. Tighten or repair defective leads. Replace a defective unit. Refer to paragraphs 4-56 through 4-63, 4-72 and 4-73. | 0.3 |
| | **SECTION IV — Controls and Instruments** | |
| | **Man-hours required: 0.1** | |
| 13 | **INSTRUMENT CONTROL PANELS** | |
| | Inspect for visible damage and loose mountings. With unit operating, check for proper operation of gages and switches. Normal operating reading for instruments are shown in figure 2-1. Refer to paragraphs 4-75 through 4-77 for maintenance. | 0.1 |
| | **SECTION V — Steering System** | |
| | **Man-hours required: 1.1** | |
| 14 | **STEERING ASSEMBLY** | |
| | Visually inspect gear box for insecure mounting, damage, or leaks. Insure that steering wheel maximum travel does not allow tire to rub chine. Adjust as necessary. Inspect for drag link, boot, and tierod for damage or looseness. Replace a worn end assembly. Service as required. Refer to paragraphs 4-79 through 4-93. | 0.5 |

| Sequence number | ITEM TO BE INSPECTED<br>PROCEDURE | Work Time (M / H) |
|---|---|---|
| 15 | REAR CONTROL STATION<br>Replace defective components. Refer to paragraphs 4-76 and 4-87. | 0.5 |
| 16 | REAR CONTROL STATION THROTTLE CAM<br>Check throttle cam for a drag or binding condition. Lubricate as instructed in paragraph 4-10*i*. | 0.1 |
| | SECTION VI — Brake System<br>Man-hours required: 6.1 | |
| 17 | HAND BRAKE<br>Visually inspect linkage for defects and brake shoes for excessive wear. Adjust brake shoes. Replace defective linkage or brake shoes.<br>Refer to paragraph 4-96 through 4-98. | 1.5 |
| 18 | BRAKE FLUID RESERVOIR<br>Check level. Add fluid when necessary. Visually inspect for leaks. Replace a defective reservoir.<br>Refer to paragraph 4-101. | 0.5 |
| 19 | BRAKE MASTER CYLINDER<br>Check linkage adjustment, oil level, and for leakage. Adjust linkage when necessary. Add fluid, or replace a defective master cylinder. Refer to paragraphs 4-99, 4-100, and 4-104. | 0.5 |
| 20 | AIR-HYDRAULIC POWER CYLINDER (MULTIPAK)<br>Tighten loose lines or electrical leads. Replace a defective multipak. Refer to paragraph 4-102. | 0.6 |
| 21 | BRAKE CALIPER<br>Check brake lining quarterly. Remove and inspect semi-annually. Refer to paragraph 4-106. | 3.0 |
| | SECTION VII — Fixed Fire Extinguisher System<br>Man-hours required: 0.5 | |
| 22 | FIXED FIRE EXTINGUISHERS<br>Remove control head before actuating handle. Weigh cylinders. Replace cylinders with 10% weight loss, (as stamped on cylinder). Refer to paragraph 4-107 through 4-110. | 0.5 |
| | SECTION VIII — Engine and Transmission Electrical System<br>Man-hours required: 1.7 | |
| 23 | BATTERIES<br>Tighten loose cables and mountings. Remove corrosion. Inspect for cracks and leaks. Remove caps and fill cells to 3/8 inch above plates. Clean vent holes in caps before reinstalling. In freezing weather, run engine at least one hour after adding water. Replace a cracked or defective battery. Refer to paragraphs 4-122, 4-123, and 4-124. | 1.1 |
| 24 | ALTERNATOR<br>Visually inspect for a loose mounting, loose belts or electrical lead. Tighten mounting. Repair defective leads. Tighten belts or replace belts in sets when one is defective. Refer to paragraph 4-113. | 0.3 |
| 25 | STARTER MOTOR<br>Visually inspect for loose or damaged electrical leads, or loose mounting hardware. Tighten loose leads or hardware. Repair or replace defective leads. Replace a defective starter motor. Refer to paragraph 4-115. | 0.3 |
| | SECTION IX — Hydraulic System<br>Man-hours required: 2.8 | |
| 26 | MAIN HYDRAULIC RESERVOIR<br>Visually inspect for cracks or leaks. Repair or replace defective lines or reservoir. Refer to paragraph 4-135. | 0.5 |
| 27 | HYDRAULIC FLUID FILTERS<br>Check filter lines and mounting for looseness or leaks. Tighten loose lines or mounting. Replace defective components. Refer to paragraph 3-18. | 0.5 |
| 28 | HIGH PRESSURE HYDRAULIC PUMP<br>Visually inspect power takeoff for loose mounting or drainage; leaking hose, a control rod adjustment. Tighten loose mounting or leaking hose. Adjust control. Replace defective components. Refer to paragraph 4-148. | 0.8 |
| 29 | LOW PRESSURE HYDRAULIC PUMP<br>Visually inspect for loose mounting or leaks. Tighten loose mounting or leaks. Replace defective components. Refer to paragraph 4-139. | 0.5 |
| 30 | HYDRAULIC SYSTEM COMPONENTS<br>Inspect all hydraulic system components for proper operation. Inspect and clean flow control valves at wheel well blower motor, capstans, and pinning circuits. Refer to paragraph 4-162. | 0.5 |
| | SECTION X — Wheel Well Evacuation System<br>Man-hours required: 0.7 | |
| 31 | WHEEL WELL AIR BLOWER AIR CLEANER<br>Check air cleaner filter (weekly, except when operating in dusty or sandy areas, then daily). Refer to paragraphs 2-21, 3-21, and 4-167. | 0.3 |

| Sequence number | ITEM TO BE INSPECTED PROCEDURE | Work Time (M×H) |
|---|---|---|
| 32 | WHEEL WELL AIR BLOWER | |
| | Inspect for loose mounting or damage. Check hydraulic motor and blower for proper operation or leaking hose. | 0.4 |
| | Replace a defective blower or motor. Refer to paragraphs 4-168 and 4-169. | |
| | SECTION XI — Pneumatic System | |
| | Man-hours required: 0.8 | |
| 33 | AIR COMPRESSOR AND GOVERNOR | |
| | Visually inspect for loose mounting, leaking air, oil, or coolant lines. Adjust the governor to cut out at 100 psi. Replace a defective compressor or governor. Refer to paragraph 4-173 through 4-178. | 0.6 |
| 34 | AIR RECEIVER AND STORAGE TANK | |
| | Inspect relief valves. Proper setting is 100 psi. Inspect receiver, tank, lines, and valves for leaks. Tighten loose lines. Replace defective components. Refer to paragraphs 4-176 and 4-177. | 0.2 |
| | SECTION XII — Engine Cooling System | |
| | Man-hours required: 1.0 | |
| 35 | DRIVE BELTS | |
| | Inspect for worn, frayed, or cracked belt, and proper adjustment. Replace defective belts. Refer to paragraphs 4-113, 4-174, and 4-199. | 0.3 |
| 36 | RADIATOR | |
| | Check coolant level. Proper level is 2 inches below filler cap. | 0.1 |
| | Visually inspect for clogged air passages, cracked or frayed hose. | |
| | Remove obstructions, tighten all loose mountings or leaking connections. | 0.1 |
| | Replace a defective radiator. Refer to paragraphs 3-20, 4-191, 4-193, and 4-196. | 0.5 |
| | SECTION XIII — Engine Fuel System | |
| | Man-hours required: 2.3 | |
| 37 | FUEL TANKS (2) | |
| | Inspect filler neck lines, valves, and tanks for leaks or other damages. Replace defective components. Refer to paragraphs 4-208 and 4-210. | 1.0 |
| 38 | FUEL FILTER AND FUEL STRAINER | |
| | Drain condensate. | |
| | Service fuel filter and fuel strainer. Replace a defective filter or strainer. Refer to paragraphs 4-202 and 4-203. | 0.4 |
| 39 | FUEL TANK FILLER NECK CAP, STRAINER, GASKET AND BREATHER VENT | |
| | Check for defective filler neck, cap, gasket, or strainer. Replace defective components. Refer to paragraph 4-210. | 0.2 |
| 40 | AIR HEATER | |
| | Check electrical lead to electrode for tight connection. Check for leaking fuel line. Refer to paragraph 4-211. | 0.1 |
| 41 | AIR HEATER COIL | |
| | Check air heater coil wire for cracks and breaks. Replace a defective coil or wire lead. Refer to paragraph 4-212. | 0.1 |
| 42 | AIR HEATER SOLENOID VALVE | |
| | Visually inspect for leaking fuel line or loose or damaged electrical lead. Replace damaged lead, line or solenoid valve. Refer to paragraph 4-214. | 0.2 |
| 43 | AIR HEATER PUMP AND MOTOR | |
| | Visually inspect for loose mounting, electrical lead, or other damage. Tighten loose mounting or electrical lead. Replace defective lead or pump and motor. Refer to paragraph 4-213. | 0.3 |
| | SECTION XIV — Engine | |
| | Man-hours required: 0.7 | |
| 44 | ENGINE OIL LEVEL | |
| | Refer to LO. Drain oil and refill. Check seal of filler cap. Refer to paragraph 4-10 and 4-222. | 0.7 |
| | SECTION XV — Propeller Drive Shafts, Vehicular and Marine | |
| | Man-hours required: 0.2 | |
| 45 | DRIVE LINE UNIVERSAL JOINTS | |
| | Visually inspect for missing hardware, leaking joints. Tighten loose bolts. Service as required per Lubrication Order. Refer to paragraphs 4-224 and 4-225. | 0.2 |
| | SECTION XVI — Marine Drive | |
| | Man-hours required: 1.8 | |
| 46 | MARINE DRIVE | |
| | Correct all defects noted by operator. Refer to lubrication order and service as required. Refer to paragraphs 4-226 through 4-242. | 0.5 |
| 47 | MARINE DRIVE PTO | |
| | Visually inspect engage solenoid valve for loose electrical leads or leaking lines, and PTO connection to propeller shaft. Tighten loose hardware or loose electrical leads. Replace defective solenoid valve or power take-off. Refer to paragraph 4-227 and 4-228. | 0.5 |

| Sequence number | ITEM TO BE INSPECTED PROCEDURE | Work Time (M / H) |
|---|---|---|
| 48 | MARINE DRIVE STEERING AND ELEVATING HYDRAULIC MOTORS<br>Visually inspect hydraulic lines to manifold for leaks or drainage. Replace defective line or motor. Refer to paragraphs 4-236 and 4-237. | 0.8 |
| | SECTION XVII — Transmission<br>Man-hours required: 0.4 | |
| 49 | TRANSMISSION OIL LEVEL<br>Refer to LO and service as required. Check for leaks. Service filter. Refer to figure 3-14. | 0.4 |
| | SECTION XVIII — Wheel Suspension System<br>Man-hours required: 0.6 | |
| 50 | WHEEL SUSPENSION DOUBLE UNIVERSAL JOINT<br>Replace defective boot. Relubricate after water operation. (see LO). Refer to paragraph 4-258. | 0.5 |
| 51 | AIR-OIL SUSPENSION CYLINDER<br>Visually inspect piston rod for surface condition and evidence of fluid leakage. Report to Direct support, for repair, and / or verification of shock absorber pressure. | 0.1 |

## Section VI. TROUBLESHOOTING

### 4-13. General

*a.* This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the transporter. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine the probable causes and corrective actions to take. You should perform the tests / inspections and corrective actions in the order listed.

*b.* This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

### 4-14. Troubleshooting

Refer to table 4-4. This table provides troubleshooting instructions at the organizational maintenance personnel level.

NOTE

Before you use this table, be sure you have performed all applicable operating checks.

*Table 4-4. Troubleshooting*

| MALFUNCTION<br>TEST OR INSPECTION<br>CORRECTIVE ACTION |
|---|
| **ENGINE** |
| 1. ENGINE FAILS TO CRANK. |
| Step 1. Check to see if master switch is defective.<br>Turn master switch ON (fig. 2-1). If inoperable replac, the defective switch S22 (para 4-75). |
| Step 2. Check to see if starter switch is defective.<br>Replace switch S19 (para 4-75). |
| Step 3. Check to see if starter motor solenoid is defective.<br>Test solenoid (para 4-116). Replace starter motor when solenoid is defective (para 4-115). |
| Step 4. Check to see if starter motor electrical connection is loose, lead or cable is defective, or motor is defective.<br>Tighten loose connections, replace defective lead, cable or replace defective starter motor (para 4-115). |
| Step 5. Test to see if batteries are discharged or defective.<br>Charge low batteries. Replace defective batteries (para 4-124). |
| Step 6. Check air intake hose on air cleaner, see if it has collapsed.<br>Remove hose (para 4-201) and operate without until one is obtained, if normal corrective action cannot be performed. |
| 2. ENGINE CRANKING SPEED LOW. |
| Step 1. Test to see if batteries are discharged or defective.<br>Charge low batteries, or replace batteries (para 4-124). |
| Step 2. Check viscosity of engine lubricating oil to see if it is too high.<br>Refer to current lubrication order (para 4-10) and service engine with proper lubricant. |

| MALFUNCTION<br>TEST OR INSPECTION<br>CORRECTIVE ACTION |
|---|

Step 3. Check leads, cable and testing starting motor to see if it is defective.
Replace defective leads, cable or starting motor (para 4-115).

3. ENGINE IS HARD TO START OR FAILS TO START.
Step 1. Check for air leak or clogged fuel line.
Clean line, or replace leaking line. Prime fuel system (para 2-15).
Step 2. Check for moisture in fuel tanks.
Service fuel tanks (para 4-1-*d* (6)) and prime fuel system before cranking engine (para 2-15).
Step 3. Check fuel filter for dirt and gaskets for wear.
Service filter and replace gaskets (para 4-202).
Step 4. Check air cleaner for dirt.
Service air cleaner (para 3-21).
Step 5. Check fuel injectors to see if they are clogged.
Replace injector (para 4-207).
Step 6. Check for a defective fuel shutoff valve.
Replace solenoid (para 4-206).
Step 7. Check to see if the emergency air shutoff valve is closed.
Reset emergency shutoff valve to open position (para 2-4) (fig. 2-6).

4. ENGINE LACKS POWER.
Step 1. Check air cleaner for dirt.
Service air cleaner (para 3-21).
Step 2. Check fuel filter and strainer for dirt.
Service fuel filter (para 4-202) and strainer (para 4-203). Prime fuel system before cranking engine (para 2-15).
Step 3. Check for air leaks in fuel supply line.
Tighten or replace line (para 4-208). Prime fuel system (para 2-15).
Step 4. Check to see if exhaust tube or muffler is clogged.
Clear obstruction or replace defective components (para 4-187 and 4-188).
Step 5. Engine valve clearance incorrect.
Adjust clearance (para 4-218).
Step 6. Check to see if improper grade fuel oil is in tanks.
Drain tanks and refill with proper grade (para 2-19*b*). Prime fuel system before cranking engine (para 2-15).

5. ENGINE KNOCKS.
Step 1. Check if engine coolant temperature is too high.
Test and replace defective thermostats (para 4-194 and 4-195).
Step 2. Inspect for a defective fuel injector.
Test and replace (para 4-207).
Step 3. Check for incorrect valve clearance.
Check and adjust if necessary (para 4-218).

6. ENGINE MISSES OR RUNS ERRATICALLY.
Step 1. Inspect for a defective fuel injector.
Test and replace (para 4-207).
Step 2. Check fuel filter or strainer for dirt.
Service fuel filter (para 4-202) or strainer (para 4-203).
Step 3. Check air cleaner for dirt.
Service air cleaner (para 3-21).
Step 4. Check for incorrect valve clearance.
Adjust valve clearance (para 4-218).
Step 5. Check for air leak in fuel lines.
Tighten or replace fittings and / or lines (para 4-208). Prime fuel system before cranking engine (para 2-15).

7. ENGINE EXHAUST SMOKEY.
Step 1. Check to see if improper grade fuel oil is in tanks.
Drain tanks and refill with proper grade (para 2-19-*b*). Prime fuel system before cranking engine (para 2-15).
Step 2. Check air cleaner for dirt or if air inlet hose is clogged.
Service air cleaner (para 3-21), and clear inlet of any obstruction.

8. ENGINE CRANKCASE PRESSURE EXCESSIVE.
Step 1. Check engine crankcase breather to see if it is clogged.
Service crankcase breather (para 3-29).

9. ENGINE LUBRICATING OIL CONSUMPTION EXCESSIVE.
Step 1. Check for leaks or defective external oil lines.
Tighten loose connections. Replace defective lines (para 4-221).
Step 2. Check accessory gaskets for defects.
Replace gaskets.

Step 3. Check for improper viscosity oil in crankcase.
Refer to current lubrication order and service with proper oil for operating conditions (para 4-10).

10. ENGINE LUBRICATING OIL PRESSURE INDICATED LOW.
Step 1. Check engine oil level to see if it is low.
Refer to current lubrication order and fill crankcase (para 4-10).
Step 2. Check for improper viscosity oil in crankcase.
Refer to current lubrication order and fill crankcase with proper grade oil (para 4-10).
Step 3. Check to see if oil pressure indicator is defective.
Replace indicator (para 4-75).
Step 4. Check for a defective transmitter.
Replace transmitter (para 4-133).

11. ENGINE WATER TEMPERATURE HIGH.
Step 1. Check water level to see if it is low.
Fill radiator (para 4-191).
Step 2. Check fan belts to see if they are loose or broken.
Adjust or replace belts (para 4-199).
Step 3. Check for defective thermostats.
Test. Replace a defective thermostat (para 4-194 and 4-195). When normal corrective action cannot be performed, remove thermostat(s) (para 4-195) and operate without until one is obtained.
Step 4. Check cooling system to see if it is clogged.
Flush system (para 4-191).
Step 5. Check for a defective water temperature indicator.
Replace indicator (para 4-75).

12. ENGINE FAILS TO STOP WHEN FUEL SHUTOFF SWITCH IS OPERATED.
Step 1. Check for a defective fuel shutoff switch.
Replace switch (para 4-75).
Step 2. Check for a defective fuel shutoff solenoid.
Replace solenoid (para 4-206).
Step 3. Check for an open fuel shutoff circuit.
Tighten loose connections; repair, or replace broken leads.

13. ENGINE FAILS TO STOP AFTER FIRE EXTINGUISHER LIMIT SWITCH ACTUATION.
Step 1. Check for a defective limit switch.
Use emergency stop knob to stop engine. Check switch S41 for continuity. Replace defective switch (para 4-71). Check circuit 975B for continuity. Tighten loose lead. Repair or replace defective lead.
Step 2. Check for a defective relay.
Test relay K4. Replace defective relay (para 4-112).
Step 3. Check for a defective fuel shutoff solenoid.
Replace solenoid (para 4-206).

14. ENGINE STOPS SUDDENLY.
Step 1. Check to see if fuel shutoff valve is closed.
Open valve (para 4-208).
Step 2. Check fuel supply.
If empty, service with fuel of proper grade (para 2-19*b*).
Step 3. Check for air supply.
If no air, service air cleaner (para 3-21).
Step 4. Check if emergency stop knob has been actuated.
Reset air inlet housing valve (fig. 2-6).

## TRANSMISSION

15. TRANSMISSION OIL TEMPERATURE TOO HIGH.
Step 1. Check for low oil level.
Refer to current lubrication order and fill with proper oil (para 4-10).
Step 2. Check for high oil level.
Drain oil to proper level (see LO, para 4-10).
Step 3. Check for low coolant system.
Service (para 4-191).
Step 4. Check to see if operating too slow in selected gear.
Downshift to increase gear speed.
Step 5. Check for defective oil temperature indicator.
Replace (para 4-75).
Step 6. Check for defective oil temperature transmitter.
Replace (para 4-130).
Step 7. Check to see if retarder partially applied.
Adjust (para 4-246).

Step 8. Check for defective internal parts.
Report condition to Direct Support Maintenance.
Step 9. Check for loose or defective oil line connection.
Tighten loose connection. Replace defective line (para 4-250).
Step 10. Check for a defective transmission oil pump.
Report defect to direct support maintenance.
Step 11. Check oil screen for dirt.
Remove and clean screen (para 4-251).

16. TRANSMISSION WILL NOT SHIFT.
Step 1. Check to see if shift linkage is improperly adjusted.
Adjust (para 4-244).

17. TRANSMISSION SLIPS.
Step 1. Check to see if shift linkage is improperly adjusted.
Adjust (para 4-244).

ELECTRICAL

18. BATTERIES DISCHARGE RAPIDLY OR OVERHEAT.
Step 1. Check for a defective battery alternator isolation relay.
Test and replace if defective (para 4-18).
Step 2. Check for a defective battery alternator auxiliary isolation relay.
Test and replace if defective (para 4-120).
Step 3. Check for a defective regulator or incorrect adjustment of the voltage regulator.
Test and replace if defective (para 4-117).

19. INSTRUMENTS INACCURATE OR INOPERATIVE.
Step 1. Check to see if master battery switch is OFF.
Turn switch ON (fig 2-1).
Step 2. Check for loose connector or broken electrical lead.
Tighten loose connection; repair or replace defective lead.
Step 3. Check for defective instrument.
Refer to applicable paragraph, test, and replace defective transmitter.
Step 4. Check for defective transmitter.
Refer to applicable paragraph, test, and replace defective transmitter.

20. BATTERY ALTERNATOR INDICATOR FAILS TO INDICATE VOLTAGE WHEN ENGINE IS STOPPED, OR BATTERY CHARGING VOLTAGE WHEN ENGINE IS RUNNING.
Step 1. Check for defective batteries (no voltage, engine stopped).
Replace batteries (para 4-124).
Step 2. Check for defective rectifier (no charging voltage, engine running).
Test and replace if defective (para 4-114).
Step 3. Check for defective reverse current relay.
Test voltage regulator and replace if defective (para 4-117).
Step 4. Check for defective voltage regulator (no charging voltage, engine running).
Replace (para 4-117).
Step 5. Check for defective alternator.
Test and replace if defective (para 4-113).

21. ELECTRICAL COMPONENT FAILS TO FUNCTION WHEN SWITCH IS ACTUATED.
Step 1. Check for loose connector or defective wire lead.
Tighten loose connection; repair, or replace defective lead.
Step 2. Check for defective electrical switch.
Replace applicable switch.
Step 3. Check for defective relay (if applicable to circuit).
Replace applicable relay.
Step 4. Check for defective electrical component or control.
Replace applicable component or control.
Step 5. Check for defective circuit breaker.
Replace applicable circuit breaker (para 4-49).
Step 6. Check for low voltage or defective batteries.
Check batteries and replace if defective (para 4-124).

HYDRAULIC

*CAUTION*

**Leakage of hydraulic oil is a danger signal and immediate action must be taken to locate and correct condition. Complete loss of vehicle is possible, under certain conditions, when leakage is not eliminated.**

22. HYDRAULIC OIL LEAKS INTO HULL FROM SUPERSTRUCTURE.

Step 1. Check for leak in line, hose, fitting, or other component.
Locate source of leakage. Tighten loose connections, fittings, hose, line or other component. Replace defective parts. Refer defects beyond organizational scope to Direct Support Maintenance.

PNEUMATIC

23. LOW AIR PRESSURE SIGNAL CONTINUES TO SOUND AFTER ENGINE HAS RUN SHORT TIME.

Step 1. Check to see if air compressor has not run long enough to build up pressure.
Run engine for 45 seconds; if pressure not up then, check for loose belts. Replace defective belts (para 4-174). Replace defective compressor (para 4-178).

Step 2. Check for defective low air pressure warning switch.
Replace (para 4-184).

Step 3. Check to see if compressor fails to build pressure.
Check that draincocks are closed (para 4-177).

Step 4. Check for leak in tube or fittings.
Tighten, or replace defective fittings or tubing (para 4-176).

Step 5. Inspect drive belts to see they are loose or defective.
Tighten or replace defective belts (para 4-174).

Step 6. Check to see if governor is out of adjustment or is defective.
Adjust or replace (para 4-173).

Step 7. Check for a defective air compressor.
Replace (para 4-178).

24. AIR PRESSURE INSUFFICIENT OR FAILS TO BUILD UP.

Step 1. Check if draincocks are open.
Close draincocks on reservoir and storage tank (para 4-177).

Step 2. Check for a dirty air cleaner.
Service (para 3-21).

Step 3. Check to see if air lines are clogged or broken.
Remove obstruction or replace line (para 4-176).

Step 4. Inspect drive belts to see if they are loose or defective.
Adjust, replace defective belts (para 4-174).

Step 5. Check to see if governor is out of adjustment or defective.
Adjust, replace if defective (para 4-173).

Step 6. Check for a defective air compressor.
Replace (para 4-178).

25. WINDSHIELD WIPER MOTORS DO NOT OPERATE.

Step 1. Check for a defective control valve.
Replace (para 4-75).

Step 2. Check for leak in air line or fitting.
Tighten or replace leaky line or fitting (para 4-176).

Step 3. Check for defective wiper motor.
Replace (para 4-32).

Step 4. Check for air pressure.
If no air pressure, check out trouble 24 above.

26. ENGINE FAN DOES NOT OPERATE WHEN TEMPERATURE INDICATOR READS ABOVE 180° F. AND ENGINE FAN SWITCH IS AT AUTO.

Step 1. Check for defective over-ride switch S56.
Test and replace (para 4-75).

Step 2. Check for a loose electrical connector or defective lead.
Tighten loose lead. Repair or replace defective lead.

Step 3. Check for defective air solenoid valve (L12).
Replace (para 4-181).

Step 4. Check for defective fan control thermostat.
Replace (para 4-194).

Step 5. Check for air pressure.
If no air pressure, check out trouble 24 above.

27. HORN DOES NOT SOUND.

Step 1. Horn out of adjustment.
Adjust (para 4-18).

Step 2. Check for defective switch S51 (cab) or S35 (rear control station).
Check continuity of switch S51. Replace defective switch (button) on steering column or button on rear control station instrument panel.

Step 3. Check for loose electrical connection or defective lead.
Trace leads 25 and 25A to solenoid L24 and check continuity (fig. 1-5 or 1-6). Tighten loose connection. Repair or replace defective lead.

Step 4. Check for defective solenoid L24.
Test, replace (para 4-19).
Step 5. Check for defective horn.
Replace (para 4-18).
Step 6. Check for air pressure.
If no air pressure, check out trouble 24 above.

28. ENGINE OVERSPEEDS WHEN HIGH PRESSURE HYDRAULIC PUMP IS ENGAGED.
Step 1. Check for defective limit switch.
Check continuity of switch LS2. Replace if defective (para 4-68).
Step 2. Check for loose electrical connector or defective lead.
Trace lead 607A to solenoid L11 (fig. 1-14) for continuity. Tighten loose connector. Repair or replace defective lead.
Step 3. Check for defective solenoid.
Check solenoid valve L11 for continuity. Replace (para 4-180).
Step 4. Check for defective air cylinder.
Replace (para 4-179).
Step 5. Check for air pressure.
If no air pressure, check out trouble 24.
Step 6. Inspect that the throttle valve control linkage had been improperly adjusted.
Adjust (para 4-248).

29. AIR HEATER INOPERATIVE.
Step 1. Check to see if the fuel filter is dirty or clogged with wax caused by use of improper grade fuel oil.
Service filter (para 3-22). Service with proper fuel (para 2-19*b*).
Step 2. Check for a loose or defective electrical lead.
Tighten loose lead. Replace defective lead.
Step 3. Check to see if electrode is fouled or defective.
Clean, adjust or replace (para 4-211).
Step 4. Check for defective air heater fuel pump.
Replace pump (para 4-213).
Step 5. Check if heater is operated improperly.
Refer to (para 2-16) (fig. 2-12), for operating instructions.
Step 6. Check for a defective air heater coil.
Replace coil (para 4-212).
Step 7. Check for a defective air heater solenoid valve.
Replace valve (para 4-214).

BRAKES

30. VEHICLE BRAKES FAIL TO RELEASE.
Step 1. Check to see if the pedal linkage is binding.
Free, repair or replace linkage (para 4-104).
Step 2. Check for a weak or broken pedal return spring.
Replace spring (para 4-104).
Step 3. Check if hydraulic line to calipers is clogged.
Remove obstruction or replace defective line (para 4-100).
Step 4. Check if master cylinder return line is clogged.
Clear obstruction or replace line (para 4-100).

31. BRAKE PEDAL TRAVEL EXCESSIVE OR SPONGY.
Step 1. Check master cylinder brake fluid level, if low.
Fill reservoir and bleed brakes (para 4-105).
Step 2. Check for low air pressure.
Operate engine 45 seconds to build up air pressure.
Step 3. Check for air trapped in brake hydraulic system.
Bleed brakes (para 4-105).
Step 4. Check for leak in hydraulic line of fitting.
Tighten loose line on fitting. Replace if defective (para 4-91) and bleed brakes (para 4-105).

32. VEHICLE BRAKE PEDAL HARD.
Step 1. Check for low air pressure (more travel than normal).
Operate engine 45 seconds and build up pressure.
Step 2. Check to see if pedal linkage is binding.
Free, repair or replace linkage (para 4-104).
Step 3. Check to see if hydraulic line to calipers is clogged.
Remove obstruction or replace defective line (para 4-100).

33. LOSS OF PEDAL AFTER APPLICATION.
Step 1. Inspect master cylinder to see if it is defective.
Replace (para 4-99).

34. BRAKES GRAB.
Step 1. Check if the brake pedal linkage is binding.
Free, repair or replace defective linkage (para 4-104).
Step 2. Check for a defective disc.
Report malfunction to Direct Support Maintenance.

35. HYDRAULIC SYSTEM FUNCTION IS NOT ATTAINED, OR FUNCTION INOPERATIVE.
Step 1. Check for a defective pump (volume control lever oscillates in operator's hand).
Replace pump (para 4-148).
Step 2. Check for a defective relief valve (piston held open by an obstruction).
Refer to paragraph on applicable valve, flush, adjust, or replace.

36. RAMP (END BAY) OR RIGHT PINNING ACTION (INTERIOR BAY) DOES NOT OPERATE.
Step 1. Check to see if switch S26 is defective.
Test and replace (para 4-77).
Step 2. Check for a loose or defective electrical lead or connector.
Trace lead 655 to plug P66 and lead 655A to plug P119. Tighten loose lead or connector. Test for continuity. Repair or replace defective lead.
Step 3. Check for a defective solenoid.
Test solenoids L14 and L15 receptacle for continuity (para 4-159). Replace defective valve.
Step 4. Check to see if control valve is open (piston stuck).
Operate manual override on end of solenoid (para 4-159). If this does not actuate valve replace (para 4-159).
Step 5. Check for a defective high pressure safety relief valve.
Refer to paragraph 4-150 and test, adjust, or replace valve.
Step 6. Check for a defective ramp / pinning cylinder.
Replace cylinder (TM 5-5420-205-15).

37. LEFT PINNING (DRIVE / RETRACT) FUNCTION INOPERATIVE.
Step 1. Check to see if switch S27 is defective.
Test continuity. Replace if defective (para 4-77).
Step 2. Check for loose electrical lead or defective connector.
Trace leads 654 and 654A to plugs P67 and P120. Tighten loose lead or connector. Test for continuity. Repair or replace defective lead.
Step 3. Check for a defective solenoid control valve.
Test continuity of solenoids L16 and L17. Operate manual override on end of solenoid. If this does not actuate valve, replace directional control valve (para 4-158).
Step 4. Check for a defective double pilot check valve (holding valve) 5766.
Refer to (para 4-157) and test, adjust or replace valve.
Step 5. Check for a defective rotation cylinder.
Replace (TM 5-5420-205-15).

38. CURBING FUNCTION INOPERATIVE.
Step 1. Check for a defective switch S28.
Test continuity and replace if defective (para 4-77).
Step 2. Check for a loose electrical lead or defective connector.
Trace leads 653 and 653A to plugs P68 and P117. Tighten loose lead or connector. Repair or replace a defective lead.
Step 3. Check for a defective solenoid or valve.
Test solenoids L18 and L19 for continuity. Operate manual override on end of solenoid. If this does not actuate valve, replace directional control valve (para 4-158).
Step 4. Check for a defective double safety relief valve.
Refer to para 4-154 and test, adjust or replace.
Step 5. Check for defective curbing hydraulic cylinders.
Replace (TM 5-5420-205-15).

39. SUPERSTRUCTURE WILL NOT ROTATE.
Step 1. Check for a defective switch S29.
Check continuity. Replace (para 4-77).
Step 2. Check for a loose electrical lead or defective connector.
Trace leads 652 to plug P118 and 652A to plug P63. Tighten loose lead or connector. Test for continuity. Repair or replace defective lead.
Step 3. Check for a defective solenoid or valve.
Test solenoid L22 or L23 at receptacle for continuity. Operate manual override on end of solenoid. If this does not actuate valve replace directional control valve (para 4-158).
Step 4. Check for a defective flow control valve.
Replace defective valve (para 4-162).

Step 5. Check for a defective double safety relief valve.
Refer to para 4-154 and flush, adjust or replace.
Step 6. Check for a defective rotation cylinder.
Replace (TM 5-5420-205-15).

40. SUPERSTRUCTURE WILL NOT ELEVATE.
Step 1. Check for defective switch S30.
Check continuity. Replace if defective (para 4-77).
Step 2. Check for a loose electrical lead or defective connector.
Trace leads 650 and 650A to plugs P62 and P122. Tighten loose lead or connector. Test for continuity. Repair or replace defective lead.
Step 3. Check for a defective solenoid or valve.
Test solenoids L20 and L21 at receptacle for continuity. Operate manual override on end of solenoid. If this does not actuate valve, replace directional control valve (para 4-158).
Step 4. Check for a defective pilot operated check valve.
Check valve operation. Replace defective valve (para 4-155).
Step 5. Check for a defective flow control valve.
Replace (para 4-162).
Step 6. Check for a defective superstructure elevating hydraulic cylinder.
Replace (para 4-152).

41. FRONT CAPSTAN INOPERATIVE
Step 1. Check for a defective switch.
Test continuity of switch S34. Replace a defective switch (para 4-77).
Step 2. Check for a loose connection or defective lead.
Trace lead 609 to plug P72. Test for continuity. Repair or replace a defective lead.
Step 3. Check for defective solenoid or valve.
Test solenoid L9 receptacle for continuity. Operate manual override. Replace a defective valve (para 4-164).
Step 4. Check for a defective check valve.
Replace (para 4-160).

42. REAR CAPSTAN INOPERATIVE
Step 1. Check for a defective switch.
Test continuity of switch S33. Replace a defective switch (para 4-77).
Step 2. Check for a loose connection or defective lead.
Trace lead 609A to plug P73. Tighten loose lead or connector. Test for continuity. Repair or replace defective lead.
Step 3. Check for a defective solenoid or valve.
Test solenoid L10 receptacle for continuity. Operate manual override. Replace defective solenoid control valve (para 4-164).
Step 4. Check for a defective check valve.
Replace (para 4-160).

43. CAPSTAN(S) OPERATE WITHOUT SWITCH ACTUATION.
Step 1. Check for a defective valve.
Replace (para 4-164).

44. WHEEL SUSPENSION SYSTEM FAILS TO FUNCTION (WHEELS WILL NOT RETRACT)
Step 1. Check to see if wheel position is straight ahead ( ± 4° ).
Aline wheel position until indicator shows them straight ahead.
Step 2. Check for a defective front wheel position transmitter.
Refer to (fig. 1-6), find plug P31 and by-pass transmitter (para 4-54).
Step 3. Check for a defective control switch.
Check switch S31 for continuity. Replace a defective switch (para 4-77).
Step 4. Check for a loose or defective electrical lead or connector.
Trace lead 657A to plug P71 and lead 657B to plug P117. Tighten loose lead or connector. Test continuity. Repair or replace defective lead or connector.
Step 5. Check for a defective solenoid.
Test continuity of solenoids L7 and L8 (para 4-152). Operate manual override plunger. Replace a defective valve (para 4-159).
Step 6. Check for a defective high pressure safety relief valve.
Test and replace a defective valve (para 4-150 or 4-153).
Step 7. Check to see if the wheel holding valve is out of adjustment.
Adjust (para 4-156).
Step 8. Check for a defective wheel suspension cylinder.
Refer to Direct Support Maintenance.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
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45. WHEEL WELL BLOWER SYSTEM FAILS TO OPERATE.

Step 1. Check for a defective switch.
Test switch S25. Replace a defective switch (para 4-75).

Step 2. Check for a loose or defective electrical lead or connector.
Trace lead 6-2A to plug P77 and test continuity. Tighten loose lead or connector. Repair or replace a defectiye connector.

Step 3. Check for a defective solenoid.
Test continuity of solenoid L26 (para 4-140). Operate manual override. If solenoid or valve is defective, replace valve (para 4-140).

Step 4. Check for a defective flow control (divider) valve.
Test and replace a defective valve (para 4-141).

Step 5. Check for a defective blower hydraulic motor.
Replace (para 4-168).

Step 6. Check for a defective air (plug) valve, or control linkage out of adjustment.
Replace a defective valve (para 4-170). Adjust linkage (para 4-171).

Step 7. Check to see if wheel well blower is defective.
Replace (para 4-169).

Step 8. Check for an oil leak in motor, service line, tube or coupling.
Tighten loose tube, or coupling. Replace a defective tube.

46. MARINE DRIVE WILL NOT FUNCTION.

Step 1. Check for a defective circuit breaker.
Test breaker CB4. Replace if defective (para 4-49).

Step 2. Check for a loose or defective electrical lead.
Tighten loose connections. Repair or replace defective lead 600.

Step 3. Check for a defective switch.
Test switch S9 (cab) or S39 (rear control station) for continuity. Replace defective switch (para 4-75 and 4-76).

Step 4. Check for a defective master relay.
Test relay K3 and replace if defective (para 4-112).

47. MARINE DRIVE SELECTOR INOPERATIVE.

Step 1. Check for a defective relay.
Check relays K10 and K11 for continuity. Replace defective switch S9 or S39 (para 4-75 or 4-76).

Step 2. Check for a loose or defective electrical lead or connector.
Tighten loose connections. Repair defective lead or connector.

Step 3. Check for a defective switch.
Test switches S9 or S39 (para 4-75 and 4-76). Replace defective switch (para 4-75 and 4-76).

Step 4. Check for a defective engaging solenoid.
Check solenoid L27 for continuity (para 4-227). Test leads 622 and 624 from relays K10 and K11. Tighten or repair lead, replace a defective solenoid (para 4-227).

48. PROPELLER CONTROL INOPERATIVE.

Step 1. Check for defective switch.
Test switches S6 and S37 for continuity (para 4-75 and 4-76). Replace a defective switch (para 4-75 and 4-76).

Step 2. Check for loose or defective electrical lead or connector.
Trace leads 600C, 610 and 611 from switches S6 and S37 to solenoids L28 and L29. Test for continuity. Tighten loose connection.

Step 3. Check for a defect solenoid.
Test solenoids L28 and L29, for continuity. Operate mechanical override plunger. If solenoid, or valve, does not operate, replace (para 4-143).

49. PROPELLER WILL NOT ELEVATE FROM, OR LOWER TO DRIVE.

Step 1. Check for a defective switch.
Check switches S7 and S36 for continuity. Replace if defective (para 4-75 and 4-76).

Step 2. Check for a loose or defective electrical lead or connector.
Trace leads 614 and 615 and test for continuity. Tighten or repair loose or defective lead.

Step 3. Check for a defective limit switch.
Check elevation transmitter (para 4-227). Be sure transmitter is grounded to mounting bracket. Replace a defective transmitter (para 4-234).

Step 4. Check to see if stop lugs are binding at extreme limit of travel.
Remove raise / lower motor (para 4-237), install socket on splined shaft and rotate in direction required to free the stop lugs.

50. MARINE STEERING DOES NOT FUNCTION.

Step 1. Check for a defective switch.
Test continuity of switch S24. Replace if defective (para 4-75).

Step 2. Check for loose or defective electrical lead or connector.
Trace leads 603 and 645 and test for continuity. Tighten loose lead or connector. Repair defective lead.

| MALFUNCTION<br>TEST OR INSPECTION<br>CORRECTIVE ACTION |
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Step 3. Check for a defective solenoid control valve.
Test solenoid L25 for continuity. Operate manual override plunger. Replace a defective valve (para 4-142).

Step 4. Check a defective relief valve.
Replace (para 4-89).

Step 5. Check for a defective propeller steering hydraulic motor.
Replace (para 4-236).

Step 6. Check for a defective shuttle valve.
Replace (para 4-91).

Step 7. Check for a defective steering pump.
Replace (para 4-85 and 4-86).

31. LAND STEERING POWER INOPERATIVE.

Step 1. Check for defective shuttle valve.
Replace (para 4-91).

Step 2. Check for defective steering cylinder.
Replace (para 4-88 and 4-90).

Step 3. Check to see if rear steering lockpin is inoperative.
Check switch S23 for continuity. Replace if defective (para 4-75). Test continuity of leads 603 and 603A. Tighten loose lead, repair a defective lead. Test continuity of switch LS1. Replace defective switch (para 4-70). Test leads 643 and 644 to solenoids L5 and L6 for continuity. Tighten or repair loose or defective lead. Test solenoids L5 and L6 (para 4-143). Operate manual override plunger. If valve defective replace (para 4-143).

Step 4. Check for a defective solenoid control valve.
Replace (para 4-143).

Step 5. Check for a defective safety relief valve.
Replace (para 4-89).

32. PERSONNEL HEATER OVERHEATS AND STOPS BURNING.

Step 1. Check to see the exhaust vent is clogged.
Clear vent.

Step 2. Check for a defective fuel control valve.
Replace fuel control valve (para 4-41).

33. HEAT OUTPUT LOW.

Step 1. Check to see if there is low fuel pressure.
Replace defective heater fuel pump (para 4-42).

Step 2. Check for a defective fuel control valve.
Replace valve (para 4-41).

34. BLOWER RUNS BUT HEATER FAILS TO IGNITE AT LOW AMBIENT TEMPERATURE.

Step 1. Check fuel supply for lack of fuel.
Check fuel pump, lines. Clean screen. Replace defective fuel pump (para 4-42).

Step 2. Check for a defective fuel control valve.
Replace valve (para 4-41).

Step 3. Check for a defective igniter.
Replace (para 4-41).

Step 4. Check for low voltage.
Check speed of blower motor. If running slow, check battery voltage. Charge or replace defective batteries (para 4-124).

35. HEATER DOES NOT OPERATE WHEN CONTROL SWITCH IS TURNED ON.

Step 1. Check for a defective switch.
Replace defective switch (para 4-75).

Step 2. Check for a defective igniter.
Replace (para 4-41).

Step 3. Check to see there is a lack of fuel pressure.
Check fuel supply and fuel pump. Replace defective pump (para 4-42).

Step 4. Check to see if heater smokes excessively and / or "bangs" upon starting.
Always start on LO heat. Check fuel control valve. Replace defective valve (para 4-41).

## Section VII. RADIO INTERFERENCE SUPPRESSION

### 4-15. General Methods Used to Attain Proper Suppression

Essentially, suppression is attained by providing a low resistance path to ground for stray currents. The methods used include shielding the ignition and high-frequency wires, grounding the frame with bonding straps, and using capacitors and