TECHNICAL MANUAL

OPERATING INSTRUCTIONS, ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL

INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR

GASOLINE ENGINE DRIVEN HYDRAULIC SYSTEMS TEST STAND TYPE D5-B

HEADQUARTERS, DEPARTMENT OF THE ARMY

19 SEPTEMBER 1975

CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *19 June 1980*

Operating Instructions, Organizational,
Direct and General Support Maintenance Manual
Including Repair Parts and Special Tools List

GASOLINE ENGINE DRIVEN
HYDRAULIC SYSTEMS TEST STAND
TYPE D5-B

TM 55-4920-373-14&P, 19 September 1975, is changed as follows:

1. Warning page is superseded as follows.

2. Remove and insert pages as indicated below.

	Remove pages	Insert pages
Chapter 1	1-1 and 1-2	1-1 and 1-2
Chapter 2	2-7 thru 2-10	2-7 thru 2-10

3. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

4. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

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Chief of Staff

Official:

J. C. PENNINGTON
***Major General, United* States Army**
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, Operator Maintenance Requirements for All Fixed and Rotor Wing Aircraft.

WARNING AND PRECAUTIONARY DATA

Personnel performing operations, procedures, and practices which are included or implied in this technical manual shall observe the following warnings. Disregard of these warnings and precautionary information can cause serious injury, death or destruction of material.

FUEL SYSTEM. Always provide a metal-to-metal contact between the container and fuel tank when filling the tank with fuel. This will prevent a spark from being generated as gasoline flows over the metal surfaces.

Never fill fuel tank while engine is in operation or hot, to avoid possibility of spilled fuel causing a fire.

CARBON MONOXIDE. Never operate engine in a closed building, unless the exhaust, which contains carbon monoxide, is piped outside. Inhalation of exhaust can cause serious illness or death.

FLUID BYPASS VALVE. Do not connect or disconnect any hoses with the fluid bypass valve closed and the test stand in operation.

BATTERY ACID. Battery electrolyte contains sulfuric acid and can cause severe skin burns. If the electrolyte comes in contact with the body, clothing or painted surfaces, rinse immediately with clean water.

ADJUSTMENTS ON CONNECTED EQUIPMENT. Never make adjustments on equipment while it is connected to the engine, unless ignition switch is turned to the OFF position. Turning over the equipment by hand during adjusting or cleaning might start the engine and equipment with it, causing serious injury to the operator.

WARNING

NOISE HAZARD. Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel; wear ear muffs or ear plug which are fitted by a trained professional.

Technical Manual
No 55-4920-373-14&P

Headquarters
Department of the Army
Washington, D. C., *19 September 1975*

OPERATING INSTRUCTIONS, ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST GASOLINE ENGINE DRIVEN HYDRAULIC SYSTEMS TEST STAND TYPE D5-B

LIST OF ILLUSTRATIONS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

SECTION I

GENERAL INFORMATION

1-1. GENERAL.

1-2. This publication is issued as the operating instructions, organizational, direct support and general support maintenance of the gasoline engine driven Hydraulic Test Stand TYPE D-5B, Stock Number 4920-144-5581 manufactured by United Manufacturing Company Division, UMC Electronics Company, North Haven, Connecticut, Manufacturer's designation is Test Stand, Hydraulic System, Gasoline Engine Driven, Type D-5B.

1-3. SCOPE.

1-4. The purpose of the test stand is to provide an external means to test and monitor aircraft hydraulic system component performance. This test stand is mobile, contains its own reservoir and provides manual regulation of volume and pressures of hydraulic fluid through a micro-filter without employing the aircraft's own power.

1-5. MAINTENANCE FORMS AND RECORDS.

1-6. 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.

1-7. REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS.

1-8. You can help improve this manual. If you find any mistake or if you know of a way to improve the procedure, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publication and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MTPS, 4300 Goodfellow Blvd., St. Louis, MO 63120. A reply will be furnished to you.

SECTION II

DESCRIPTION AND LEADING PARTICULARS

1-9. DESCRIPTION. (See figure l-l.)

1-10. The test stand is a self-contained, mobile, hydraulic testing unit. It is enclosed in a steel weather resistant cabinet, mounted on a trailer assembly. The trailer is equipped with individually suspended wheels, hand operated parking brakes, and a hinged tow bar to permit towing with a vehicle. Two main assemblies (items 1 and 2, figure 1-2) and associated hydraulic cables make up the test stand. (See figure 1-2 through 1-5.) The Unit Sub-Assembly (item 1, figure 1-2) contains all necessary components and assemblies to provide the required fluid flow at regulated pressures and monitoring devices. The Cabinet Assembly (item 2, figure 1-2), covers the test stand. It protects the internal assemblies from weather. Doors on the Cabinet Assembly allow access to internal assemblies and permit required ventilation during operation.

1-11. FUNCTION.

1-12. The function of major components assemblies of the test stand are described in tables 1-1 through 1-5 and the location is shown in figures 1-3 through 1-7.

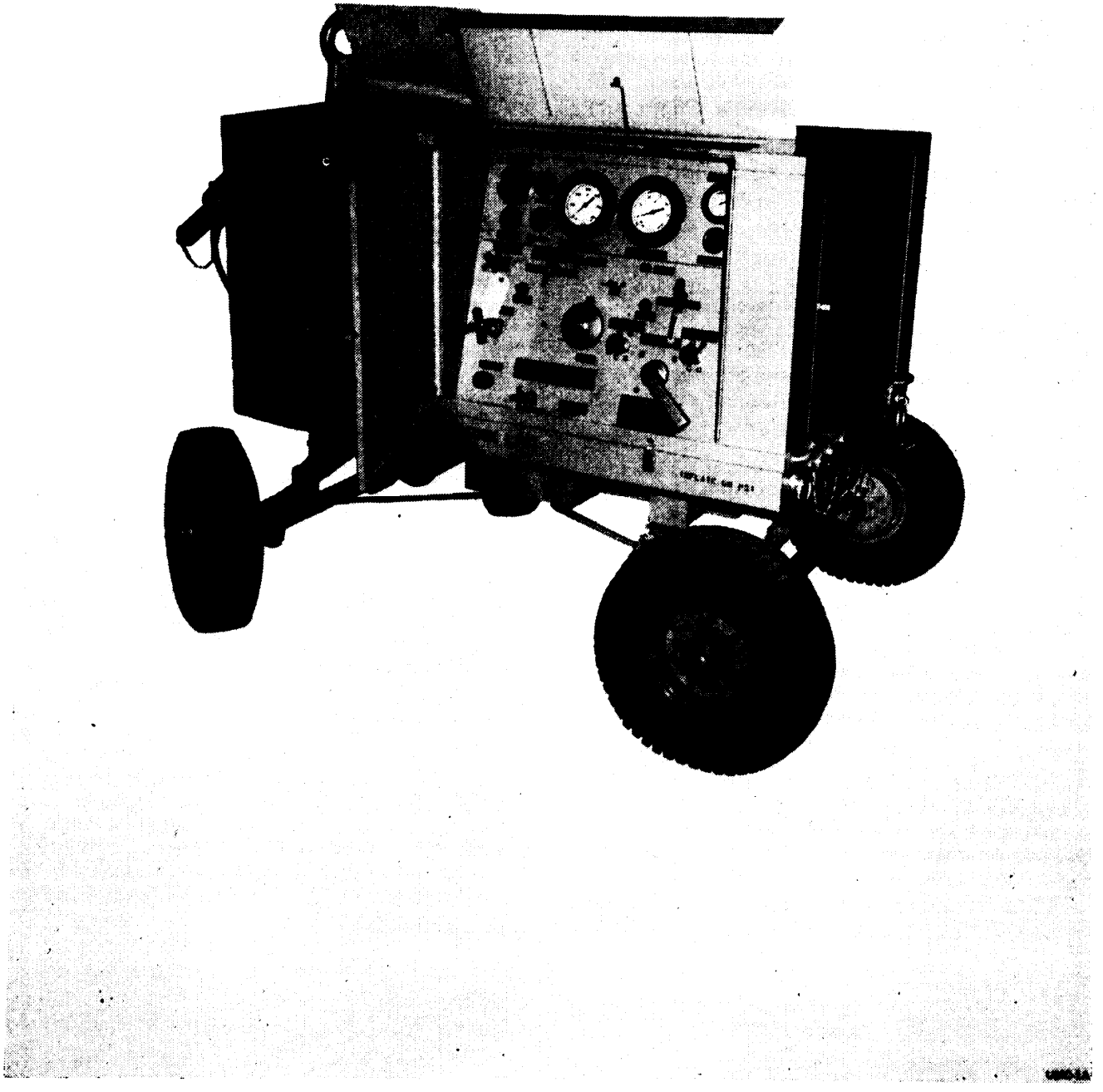
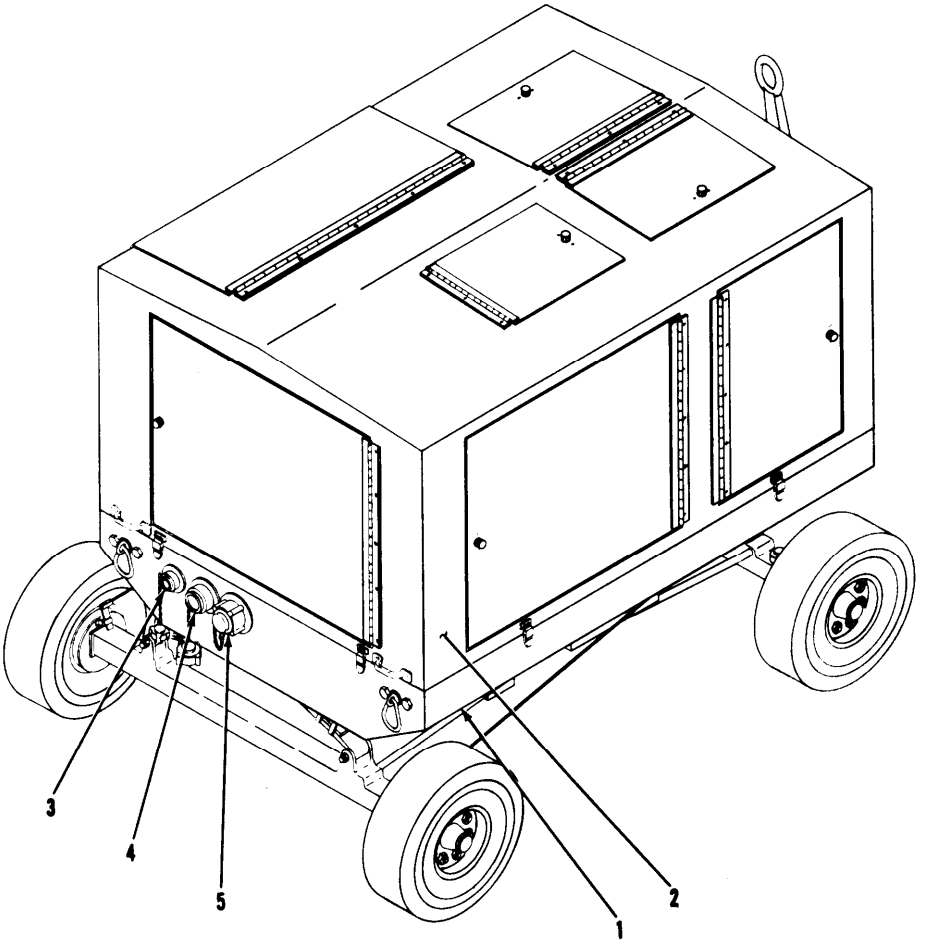


Figure 1-1. Hydraulic Test Stand, Type D-5B



KEY TO FIGURE 1–2

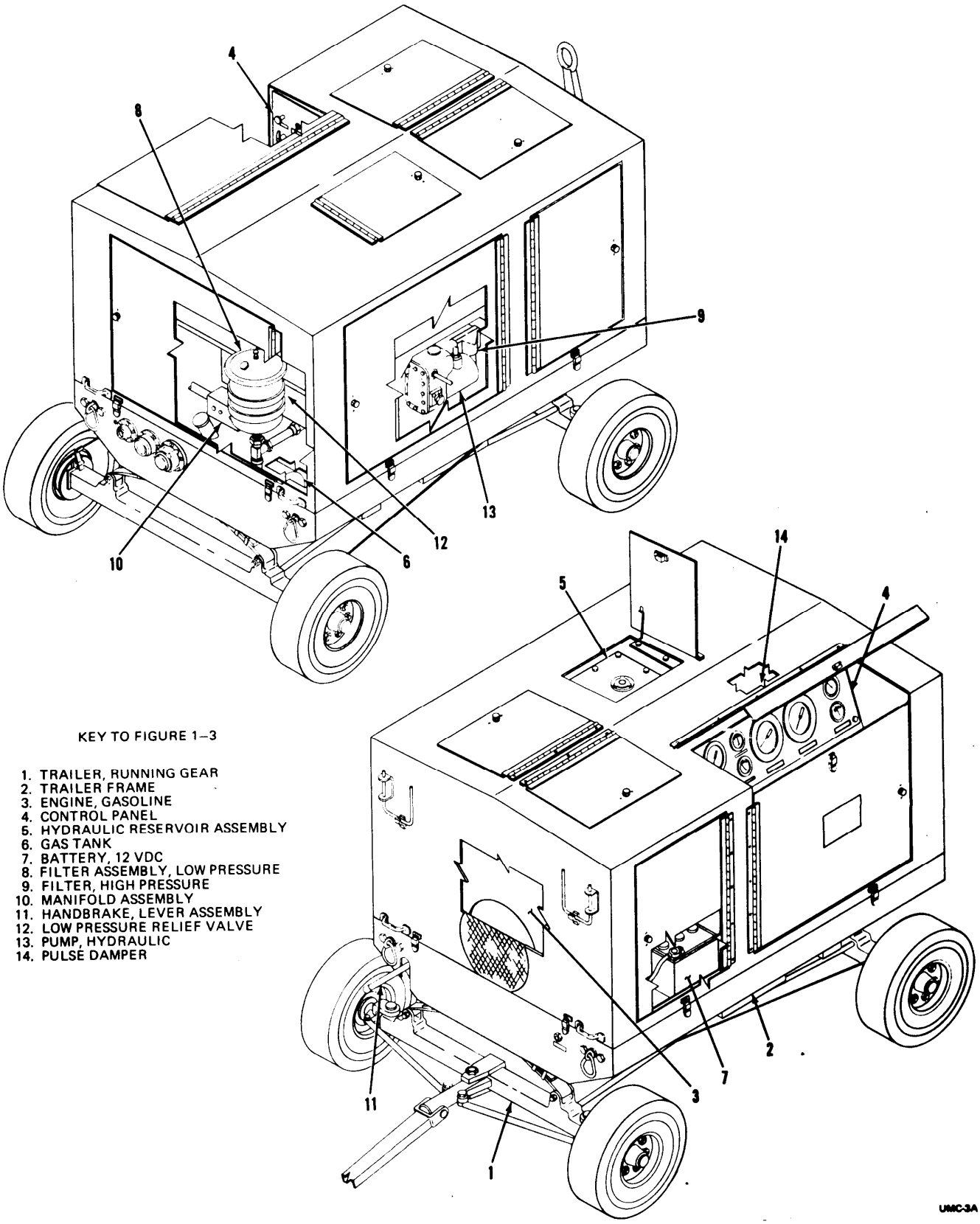
1. UNIT SUB-ASSEMBLY
2. CABINET ASSEMBLY
3. 1/2-INCH PRESSURE OUTLET
3. 3/4-INCH PRESSURE OUTLET
5. 1-INCH SUCTION RETURN

UMC-2A

Figure 1-2. Hydraulic Test Stand, Type D-5B, Major Assemblies.

TABLE 1-1. FUNCTION OF COMPONENT/ASSEMBLIES OF UNIT SUB-ASSEMBLIES

INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
1	1-3	Trailer, running gear	Allows relocation of test stand with vehicle
2	1-3	Trailer frame	Provides mounting of components/assemblies of test stand
3	1-3	Engine, gasoline	Drives high pressure hydraulic pump and generator for the charging circuit of battery
4	1-3	Control panel	Contains all controls to start engine, gages for monitoring purposes and hydraulic valves and controls to regulate hydraulic fluid volume, pressure and inlet and outlet flow
5	1-3	Hydraulic reservoir assembly	Contains hydraulic fluid for components/ systems under test
6	1-3	Gas tank	Holds gasoline to run engine for an extended period of time
7	1-3	Battery, 12 VDC	Provides initial dc power to start engine of test stand
8	1-3	Filter assembly, low pressure	Provides filtering of micronic particles of hydraulic fluid from test stand and unit under test
9	1-3	Filter, high pressure	Placed between the hydraulic pump and high pressure relief valve to micronically filter fluid from hydraulic pump
10	1-3	Manifold assembly	The manifold assembly, located on the suction inlet, contains the sensing bulb for the fluid temperature indicator and the thermoswitch to shutoff the engine when fluid temperature becomes excessive
11	1-3	Handbrake, lever assembly	Prevents test stand from rolling when brake is applied
12	1-3	Low pressure relief valve	Used to limit maximum pressure in the hydraulic system return line
13	1-3	Pump, hydraulic	Provides required hydraulic fluid delivery
14	1-3	Pulse damper	Absorbs sudden high increases in hydraulic fluid pressure, so that high pressure gage needle will not peg or indicate small erratic changes in fluid pressures



KEY TO FIGURE 1–3

1. TRAILER, RUNNING GEAR
2. TRAILER FRAME
3. ENGINE, GASOLINE
4. CONTROL PANEL
5. HYDRAULIC RESERVOIR ASSEMBLY
6. GAS TANK
7. BATTERY, 12 VDC
8. FILTER ASSEMBLY, LOW PRESSURE
9. FILTER, HIGH PRESSURE
10. MANIFOLD ASSEMBLY
11. HANDBRAKE, LEVER ASSEMBLY
12. LOW PRESSURE RELIEF VALVE
13. PUMP, HYDRAULIC
14. PULSE DAMPER

Figure 1-3. Components/Assemblies, Unit Sub-Assembly Location

TABLE 1-2. FUNCTION OF CABINET ASSEMBLY COMPONENTS

INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
1	1-4	Doors	Permits access to various assemblies/ components of unit sub-assembly and provides engine ventilation for air cooling
2	1-4	Hose assembly	Used to connect test stand to aircraft hydraulic system

TABLE 1-3. FUNCTION OF COMPONENTS OF l/2-INCH HOSE

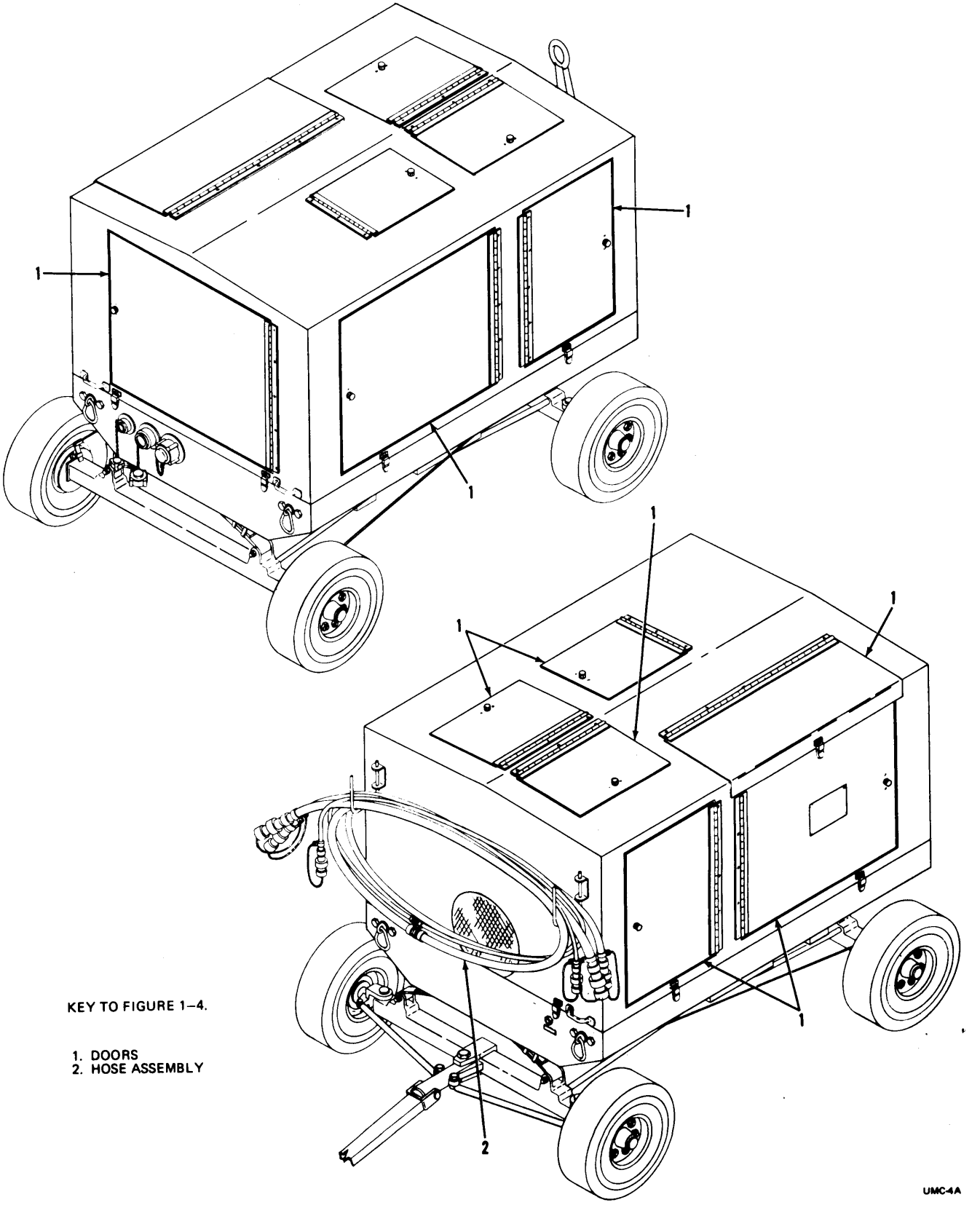
INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
1	1-5	Plug, dust	Prevents foreign particle entry while hose is not in use and damage to internal parts of coupling
2	1-5	Nut	Secures attachment of coupling on hose to coupling on test stand and unit under test
3	1-5	Coupling l/2-inch, part of	Attaches to test stand and to unit under test
4	1-5	Union	Couples two halves of hose together

TABLE 1-4. FUNCTION OF COMPONENTS OF 3/4-INCH HOSE

INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
1	1-6	Plug, dust	Prevents foreign particle entry and damage to internal side of coupling while hose is not in use
2	1-6	Nut	Secures attachment of coupling on hose to coupling on test stand and unit under test
3	1-6	Coupling 3/4-inch, part of	Attached to test stand and to unit under test

TABLE 1-5. FUNCTION OF COMPONENT OF 1-INCH HOSE

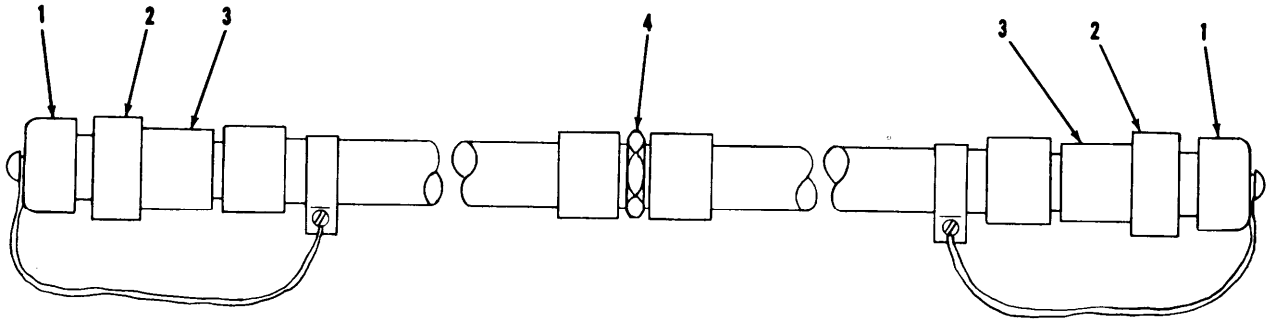
INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
1	1-7	Plug, dust	Prevents foreign particle entry and damage to internal side of coupling while hose is not in use
2	1-7	Nut	Secures attachment of coupling on hose to coupling on test stand and unit under test
3	1-7	Coupling 1-inch, part of	Attaches to test stand and to unit under test
4	1-7	Union	Couples two halves of hose together



KEY TO FIGURE 1–4.

1. DOORS
2. HOSE ASSEMBLY

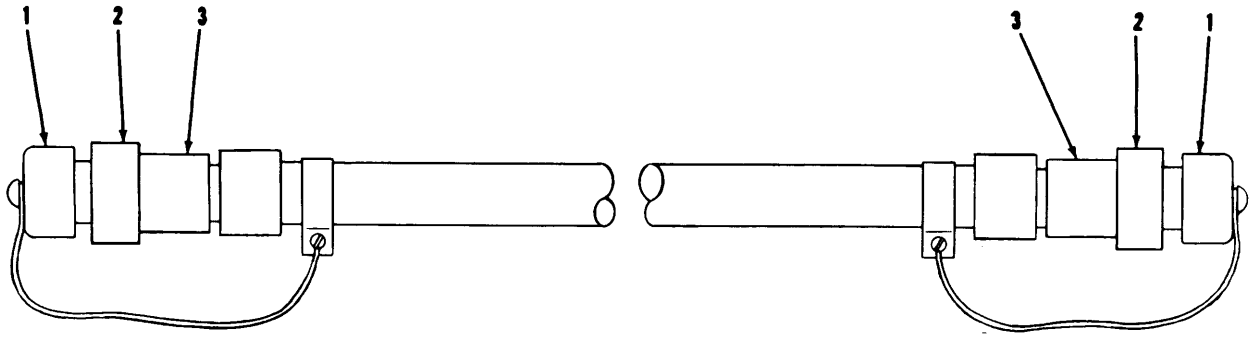
Figure 1-4. Cabinet Assembly, Component Location



KEY TO FIGURE 1–5.

1. PLUG, DUST
2. NUT
3. COUPLING 1/2-INCH, PART OF
4. UNION

Figure 1-5. Half-Inch Hydraulic Hose, Component Location



KEY TO FIGURE 1–6.

1. PLUG, DUST
2. NUT
3. COUPLING 3/4-INCH, PART OF

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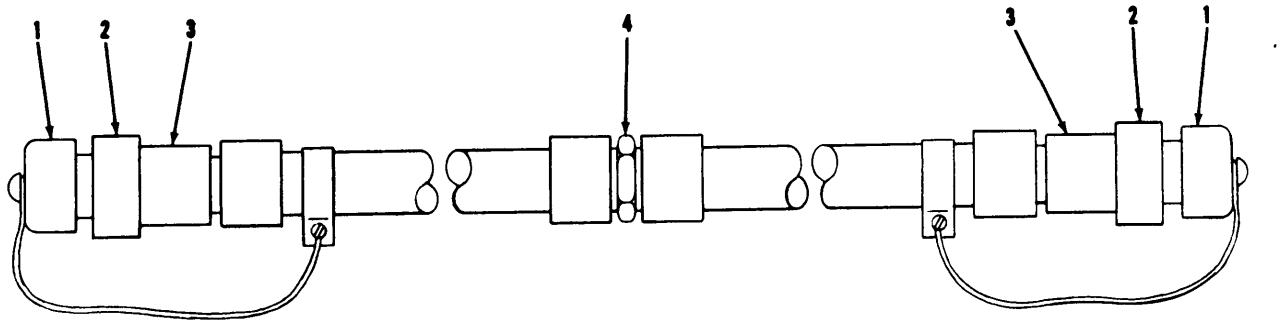
Figure 1-6. Three-Quarter-Inch Hydraulic Hose, Component Location



KEY TO FIGURE 1–7.

1. PLUG, DUST
2. NUT
3. COUPLING 1-INCH, PART OF
4. UNION

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Figure 1-7. One-Inch Hydraulic Hose Component Location

1-13. LEADING PARTICULARS.

1-14. Table 1-6 summarizes all pertinent capabilities and limitations applicable to the Type D-5B Test Stand.

TABLE 1-6. LEADING PARTICULARS

ITEM	CHARACTERISTICS
TRAILER AND CABINET	
Construction	Welded steel
Running Gear	Leaf spring suspension 6:00 x 9, 6 Ply rating tires inflated to 60 psi
Brake	Mechanical Type, hand set to hold at 805° incline in any direction
Steering	Knuckle type, pivot
Cabinet	Welded steel, weather resistant, hinged doors
HYDRAULIC SYSTEM	
Fluid Reservoir	
Construction	Aluminum
Capacity	20 U.S. gallons

TABLE 1-6. LEADING PARTICULARS (cont)

ITEM	CHARACTERISTICS
HYDRAULIC SYSTEM (cont)	
Fluid Specification	MIL-H-5606
High Pressure Pump	
Type	Axial piston variable stroke
Delivery	0 to 10 GPM from 0 to 3000 psi
	0 to 5 GPM from 3000 to 5000 psi
Rotation	Clockwise rotation facing shaft
FILTERS	
Low pressure	Replacement element AN6236-3 micronic type, 150 psi, 30 gal/min
High pressure	Replacement element AN6235-4A micronic type, 5000 psi, 12 gal/min
POWER PLANT	
Gasoline Engine	30.2 HP @ 1800 RPM, 4 cylinder, 4 cycle, V-type governor, air cooled
Gasoline Tank	14 gallons
Engine Crank Case	5 quarts
OPERATING RANGE	
Altitude	Sea level to 6,000 feet
Ambient Temperature	-20° to +125°F (-29° to +52°C)
Humidity	95 to 100 percent
Deflection	8.5° in any plane from horizontal position
LUBRICATION	MIL-G-3278A, MIL-G-10924A, MIL-L-15015A, MIL-L-15719A
ELECTRIC START	12 volt battery, ignition and start switch including voltage regulator
ELECTRIC WIRING	Overload protected

TABLE 1-6. LEADING PARTICULARS (cont)

ITEM	CHARACTERISTICS
PHYSICAL DATA	
Overall Length	77 1/2 inches excluding two bar
Overall Width	56 inches
Overall Height	54 inches
Weight (empty)	2500 lbs (approximately)
HOSES	
Hose one inch ID	Suction (input) armored, hydraulic
Hose 3/4 inch ID	Output, armored, hydraulic
Hose 1/2 inch ID	Output, armored, hydraulic
TOWING SPEED	20 mph (Maximum) on improved roads and 10 mph on unimproved roads

SECTION III

TEST EQUIPMENT, SPECIAL TOOLS AND CONSUMABLE MATERIALS

1-14. SPECIAL TOOLS AND TEST EQUIPMENT.

1-15. There are no special tools or test equipment required.

1-16. CONSUMABLE MATERIALS.

1-17. Table 1-7 lists all the consumable materials needed to maintain the Type D-5B Test Stand.

TABLE 1-7. CONSUMABLE MATERIALS

ITEM NUMBER	NOMENCLATURE	MILITARY SPECIFICATION
1	Solvent	PP-S-661
2	Fluid, hydraulic	MIL-O-5606
3	Hydraulic oil, preservative	MIL-O-6083A
4	Corrosion preventative compound	MIL-C-6529A
5	Barrier material, water resistant	MIL-B-131
6	Tape, pressure sensitive	PPP-T-60
7	Desiccant	MIL-D-3464

CHAPTER 2

OPERATING INSTRUCTIONS

SECTION I

GENERAL INFORMATION

2-1. GENERAL.

2-2. In this chapter, Section II; Controls and Instrumentation, will familiarize the operator of the test stand with the individual function of operation controls and gages. Section III; Preliminary Instructions, will provide necessary instructions before the test stand is actually started up and used for test. Section IV; Operating Details, will provide the three modes of operation of the test stand.

SECTION II

CONTROLS AND INSTRUMENTATION

2-3. CONTROLS AND INSTRUMENTATION. (See figures 2-1 and 2-2.)

2-4. Table 2-1 lists functions of controls, gages and indicators of the main control panel. Table 2-2 lists all controls and their function of the start up panel.

TABLE 2-1. MAIN PANEL CONTROLS, GAGES AND INDICATORS

INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
1	2-1	High pressure relief valve	Adjustable by-pass type relief valve. It serves as a safety device, protecting the hydraulic system under test from excessive pressure. A knurled locknut is provided to secure valve after adjustment
2	2-1	High pressure bypass valve	Provides a means of directing the pump output back to the suction return. Used in setting up fluid flow in conjunction with the high pressure relief valve setting and the pump compensator setting
3	2-1	Low pressure filter differential indicator, LPΔP	Illuminates when the low pressure filter differential fluid reaches 10 psi; indicating necessity of filter element replacement

TABLE 2-1. MAIN PANEL CONTROLS, GAGES AND INDICATORS (cont)

INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
4	2-1	Fluid pressure gage shut off, valve	Shuts off fluid to the high pressure gage if it is desired to connect an external calibrating gage to the fluid pressure gage calibrating port. Valve must always be open during operation
5	2-1	Engine oil pressure gage	Direct reading pressure actuated gage with dial marked OFF-XX-ON. Normal oil pressure is when needle is between XX-ON or ON
6	2-1	Tachometer hour meter	A dual instrument to indicate 0-2500 RPM of engine speed and the hour meter portion to indicate elapsed operating time of test stand
7	2-1	Fuel level gage	Indicates amount of gasoline fuel in tank of test stand. A full tank is for four hours or more of operation
8	2-1	Ammeter	Direct reading dc current meter with a 30-0-30 ampere range located in the battery charging circuit. Normal reading during operation is when needle sits to right of the zero
9	2-1	Fluid pressure gage	High pressure fluid gage with direct reading of 0-6000 psi. Measures output pressure of the test stand
10	2-1	Suction pressure gage	Direct indicating dual gage, capable of reading 0 to 30 inches Hg of vacuum and 0-150 psi pressure
11	2-1	Fluid temperature gage	Indicates temperature of hydraulic fluid at a range of -20 to +250°F, with a red warning zone beginning at +160° F. The fluid should never be allowed to rise above +160°F
12	2-1	Reservoir fluid level indicator	Indicates level of hydraulic fluid in reservoir

TABLE 2-1. MAIN PANEL CONTROLS, GAGES AND INDICATORS (cont)

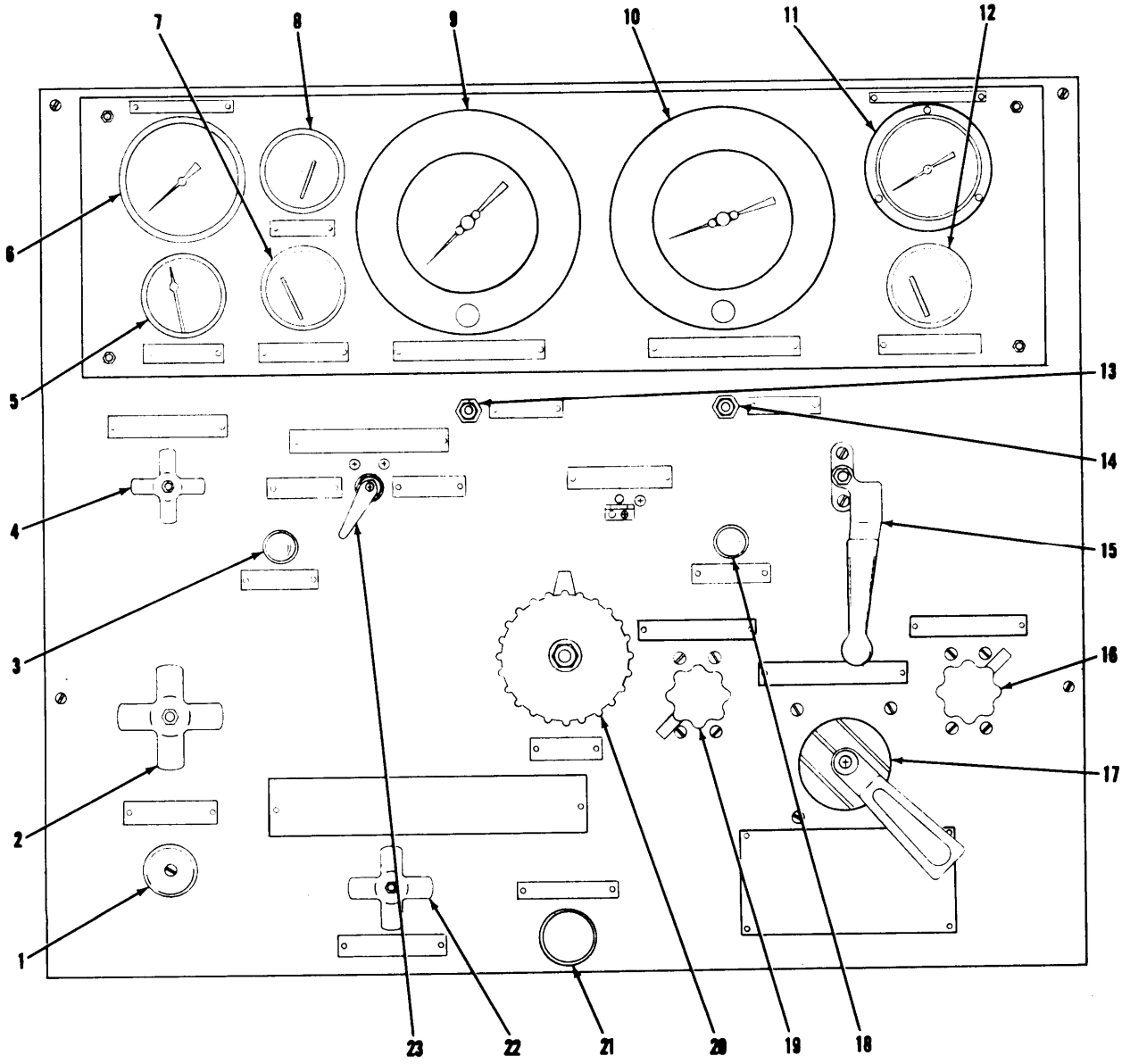
INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
13	2-1	High pressure calibration port	Provides a means of connecting an external gage for calibration purpose. The cap on this port shall always be securely fastened
14	2-1	Suction pressure calibration port	Provides a means of connecting an external gage for calibration purpose. The cap on this port shall always be securely fastened
15	2-1	Reservoir shutoff valve	Provides means to shut off the test stand reservoir when an external reservoir is to be used
16 & 19	2-1	Flow control valve 1/2" outlet and 3/4" outlet	Pressure balanced valves to control flow of hydraulic fluid from test stand. A locking device is included for each valve to lock control knob in the selected position
17	2-1	Outlet selector valve, three position	Provide a means of selecting either the 1/2-inch or 3/4-inch outlet connection of the test stand, to direct output of pump to the outlet selected
18	2-1	High pressure filter differential indicator, HPAP	Illuminates when the high pressure filter differential fluid reaches 40 psi; indicating necessity of filter element replacement
20	2-1	Volume control	Positions the cam plate of the pump to obtain desired volume output. A locking device is provided to secure the control in the desired volume position
21	2-1	Pressure compensator control	Provides means for adjustment to obtain the desired discharge pressure. A locking device is provided to secure the control at the desired test stand output pressure

TABLE 2-1. MAIN PANE L CONTROLS, GAGES AND INDICATORS (cont)

INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
22	2-1	Compensator shutoff valve	Used to isolate the pump compensator from the hydraulic system and in establishing setting of high pressure relief valve. When closed, valve revents the hydraulic high pressure pump from compensating and therefore, allows the pump to go to maximum pressure
23	2-1	Suction pressure filter out, three position control	In the closed position, the suction pressure gage is shut off. In the filter-out position, the pressure at the low pressure filter outlet is monitored and when in the Filter- in position, the filter inlet pressure is monitored. This switch allows monitoring pressure drop across the low pressure filter

TABLE 2-2. STARTUP PANEL CONTROLS

INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
1	2-2	Choke control	Manually operated and closes the butterfly in the carburetor when pulled out, enriching the fuel mixture for starting the engine
2	2-2	Ignition switch	Manual on-off switch. In the OFF position the engine magneto is grounded. With the ignition switch in the ON position, the magneto is ungrounded and 12 VDC is applied to the electrical circuit
3	2-2	Throttle with turn-to-lock control	Push-pull, twist-to-lock control to set the speed governor for desired engine speed



KEY TO FIGURE 2–1

1. HIGH PRESSURE RELIEF VALVE
2. HIGH PRESSURE BYPASS VALVE
3. LOW PRESSURE FILTER DIFFERENTIAL INDICATOR, LPΔP
4. FLUID PRESSURE GAGE SHUTOFF (VALVE)
5. ENGINE OIL PRESSURE, GAGE
6. TACHOMETER HOUR METER
7. FUEL LEVEL, GAGE
8. AMMETER
9. FLUID PRESSURE GAGE
10. SUCTION PRESSURE GAGE
11. FLUID TEMPERATURE GAGE
12. RESERVOIR FLUID LEVEL INDICATOR
13. HIGH PRESSURE CALIBRATION PORT
14. SUCTION PRESSURE CALIBRATION PART
15. RESERVOIR SHUTOFF VALVE
16. FLOW CONTROL VALVE 1/2" OUTLET
17. OUTLET SELECTOR VALVE, 3-POS
18. HIGH PRESSURE FILTER DIFFERENTIAL INDICATOR, HPΔP
19. FLOW CONTROL VALVE 3/4" OUTLET
20. VOLUME CONTROL
21. PRESSURE COMPENSATOR, CONTROL
22. COMPENSATOR SHUTOFF VALVE
23. SUCTION PRESSURE FILTER OUT, 3-POS. CONTROL

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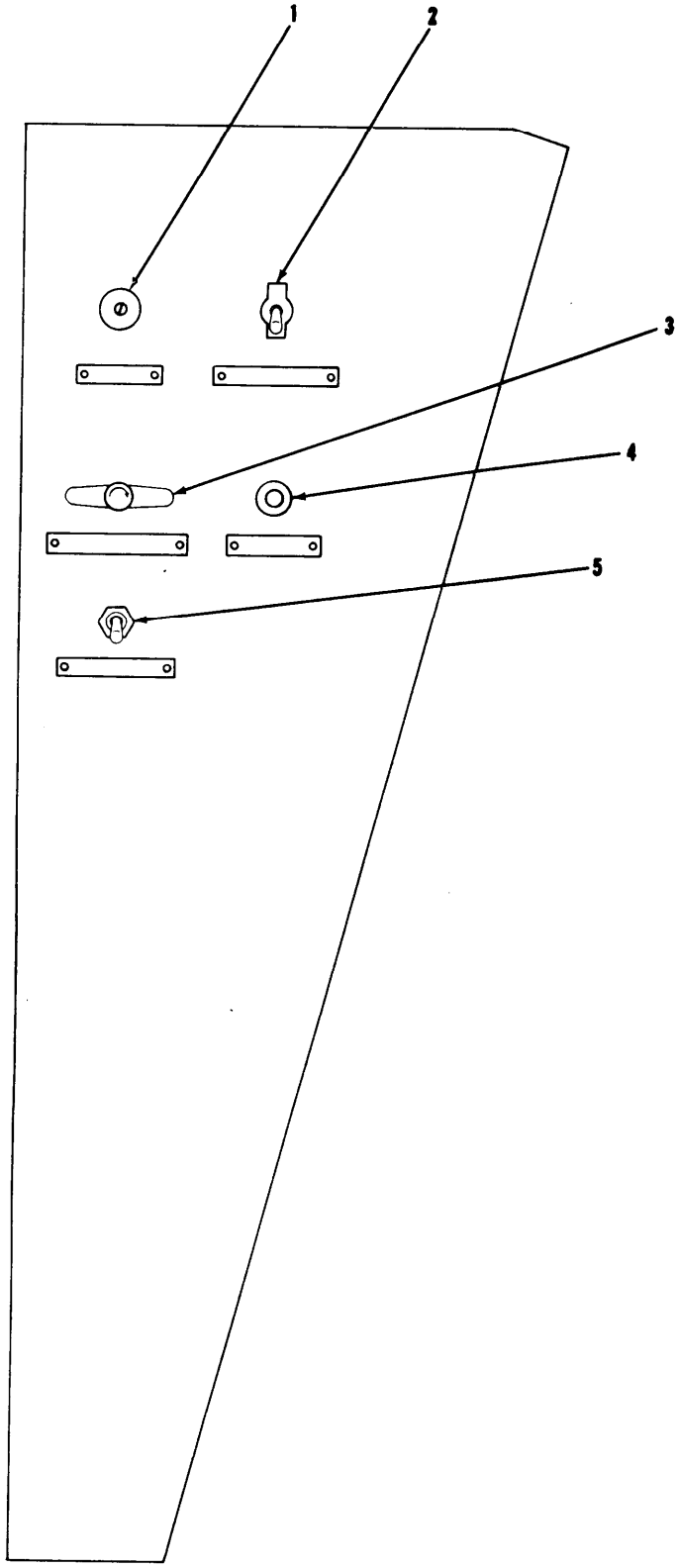
Figure 2-1. Main Control Panel



KEY TO FIGURE 2-2

1. CHOKE CONTROL
2. IGNITION SWITCH
3. THROTTLE CONTROL
4. FUSE
5. STARTER SWITCH

UMC-15A

Figure 2-2. Start-Up Panel

TABLE 2-2. STARTUP PANEL CONTROLS (cont)

INDEX NO.	FIGURE NO.	DESCRIPTION	FUNCTION
4	2-2	Fuse, 10 amperes	Provided to protect the electrical circuitry from overloads or short circuits
5	2-2	Starter switch, momentary on type	When held in the up position (on) the starter solenoid is energized applying momentary 12 VDC to the starter, which then starts the engine

SECTION III

PRELIMINARY INSTRUCTIONS

WARNING

Keep 10 feet clear of aircraft engines and fuel tank areas. Never operate engine in a closed building unless exhaust is piped out to prevent carbon monoxide poisoning.

2-4. PRELIMINARY SETUP.

2-5. To make the preliminary setup, position the test stand to the desired area of aircraft location and perform the following:

1. Set parking brake lever of test stand securing the test stand.

2. Open all engine compartment doors and control panel door.

3. Connect the appropriate coupling valves of hoses between the test stand and the aircraft to be tested. Refer to Section IV, for appropriate hose connections and test to be performed.

4. Assure quantity of fuel level in gas tank is sufficient to perform entire test desired. A full gas tank will provide for a minimum of 4 hours of continuous operation.

CAUTION

Leave engine compartment top and side doors open and secured during engine operation.

2-6. Perform the preliminary positioning of valves and controls (see figure 2-1) as follows:

1. Turn pressure compensator control (21) CCW to open.

2. Turn compensator shutoff valve (22) CCW to open.

3. Turn flow control valves (16 and 19) CW to close.

4. Turn high pressure relief valve (1) CCW to open.

5. Turn fluid pressure gage shutoff valve (4) CCW to open.

6. Place reservoir shutoff valve control (15) CCW to horizontal position to open.

7. Turn high pressure bypass valve (2) CCW to open.

8. Set suction pressure valve (23) to filter out position vertical position.

9. Turn Volume Control (20) CCW.

SECTION IV

OPERATING DETAILS

WARNING

Keep 10 feet clear of aircraft engine and fuel tank area.

2-7. GENERAL.

2-8. There are three modes of operating the test stand as pertains to fluid flow from the test stand to the system under test and return to the test stand. These are as follows:

1. Mode-1. Flow out of the l/2-inch outlet and return through the 3/4-inch outlet to the test stand reservoir. For this mode the following valves must be positioned during operation as follows: (See figure 2-1.)

Outlet selector valve (17) to the 1/2-inch outlet

Reservoir shut-off valve (15) open

3/4-inch flow control valve (3/4) open during operation

Flow control by use of the l/2-inch flow control valve (16)

2. Mode-2. Flow out of the 3/4-inch outlet and return through the l/2-inch outlet to the test stand reservoir. For this mode the following valves must be positioned during operation as follows: (See figure 2-1.)

Outlet selector valve (17) to the 3/4-inch outlet

Reservoir shut-off valve (15) open

l/2-inch flow control valve (16) open during operation

Flow control by use of the 3/4-inch flow control valve (19)

3. Mode-3. Flow out through either the l/2-inch outlet or the 3/4-inch outlet, return through the l-inch suction return. Test stand reservoir may be either in the system or out of the system if aircraft reservoir is being used. For this mode the following valves must be positioned during operation as follows: (See figure 2-1.)

Outlet selector valve (17) to either the l/2-inch outlet or 3/4-inch outlet

Flow control by use of the 1/2-inch flow control valve (16) or 3/4-inch flow control valve (19) dependent upon which outlet is used

Reservoir shut-off valve (15) open if test stand reservoir is being used or closed if external reservoir is being used

WARNING

Do not connect or disconnect hoses while system is under pressure or with fluid bypass valve closed.

2-9. HOSE CONNECTIONS. Connect the appropriate hoses from the test stand to the respective connectors on the system to be tested. Hose fittings not in use during test stand operation should be capped.

2-10. ENGINE START UP. Start up engine on test stand as follows:

WARNING

Noise hazard. Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel; wear ear muffs or ear plug which are fitted by a trained professional.

1. Insure that all valves are positioned as described in paragraph 2-6.

2. Insure that high pressure bypass valve (item 2, figure 2-1) is in the full open position, allowing engine to be started under no load condition.

3. Pull out and keep out the positive action ground switch (item 3, figure 2-3) located at the bottom of the engine magneto end cover.

4. Pull choke control (item 1, figure 2-2) out approximately midway.

5. Pull throttle (item 3, figure 2-2) and twist to lock to one-quarter open position.

6. Set ignition switch to ON position (item 2, figure 2-2).

7. Set the starter switch (item 5, figure 2-2) to up position and hold until engine starts, then release switch.

8. Open choke slowly by pushing control in until engine is running normally with the choke pushed in toward the fully open position.

9. Adjust engine speed between 1000 and 1400 RPM as indicated by tachometer (item 6, figure 2-1) using throttle. Run engine for approximately ten minutes to warm engine up to normal operating temperature.

10. Observe normal oil pressure. This is indicated by the oil pressure gage (item 5, figure 2-1) which shall indicate between XX- and -ON, or in the ON position.

11. Observe ammeter (item 8, figure 2-l). The ammeter should indicate slightly to right from center of scale.

12. After engine warm -up, increase engine speed using throttle, to 2000 RPM as indicated by the tachometer and lock throttle.

2-11. OPERATION. (See figure 2-1.)

2-12. Set the test stand into operation as follows:

NOTE

Review applicable manuals for the system under test. Always observe the fluid pressure gage and suction pressure gage for erratic or abnormal indication.

WARNING

Do not connect or disconnect hoses while system is under pressure or with fluid by-pass valve in the closed position.

CAUTION

Do not reposition outlet selector valve with fluid by-pass valve in the closed position.

1. Assure that all valves are positioned as described in paragraph 2-6.

2. Position the outlet selector valve (item 17, figure 2-1.) to the l/2-inch outlet, or the 3/4-inch outlet, as required, for the mode established for operation.

3. Close the compensator shut-off valve (item 22, figure 2-1) turning it CW.

4. Adjust pump volume control (item 20, figure 2-1) to desired GPM as indicated by the fluid flow indicator (item 10) turning handle CW to increase flow and CCW to decrease flow. Lock pump volume control (item 20) after obtaining desired flow.

5. Slowly close the high pressure bypass valve (item 2, figure 2-1) turning handle in CW direction.

6. Adjust high pressure relief valve (item 1, figure 2-1) to relieve pressure at approximately 200 psi above the maximum system pressure of the system under test. Pressure will be indicated by the fluid pressure gage (item 9).

7. Open compensator shutoff valve (item 22, figure 2-1) fully, turning control CCW. The fluid pressure gage (item 9) will drop to some low pressure.

8. Adjust the pressure compensator control (item 21, figure 2-1) in a CW direction as required, until the fluid pressure gage (item 9) indicates a pressure slightly higher than the maximum of system pressure under test. Lock the control knob in this position.

9. Open the high pressure bypass valve (item 2, figure 2-1) by turning control CCW.

10. Dependent upon the mode of operation, (see section IV, paragraph 2-8) position the flow control valves as required.

11. Close the high pressure bypass valve (item 2, figure 2-1) by turning CW and proceed with applicable test procedures as specified.

12. It may be necessary to readjust the flow control valve, pressure compensator and volume control to obtain exact conditions.

2-13. To shutdown the test stand, proceed as follows:

1. Open the high pressure bypass valve (item 2, figure 2-1) by turning control CCW.

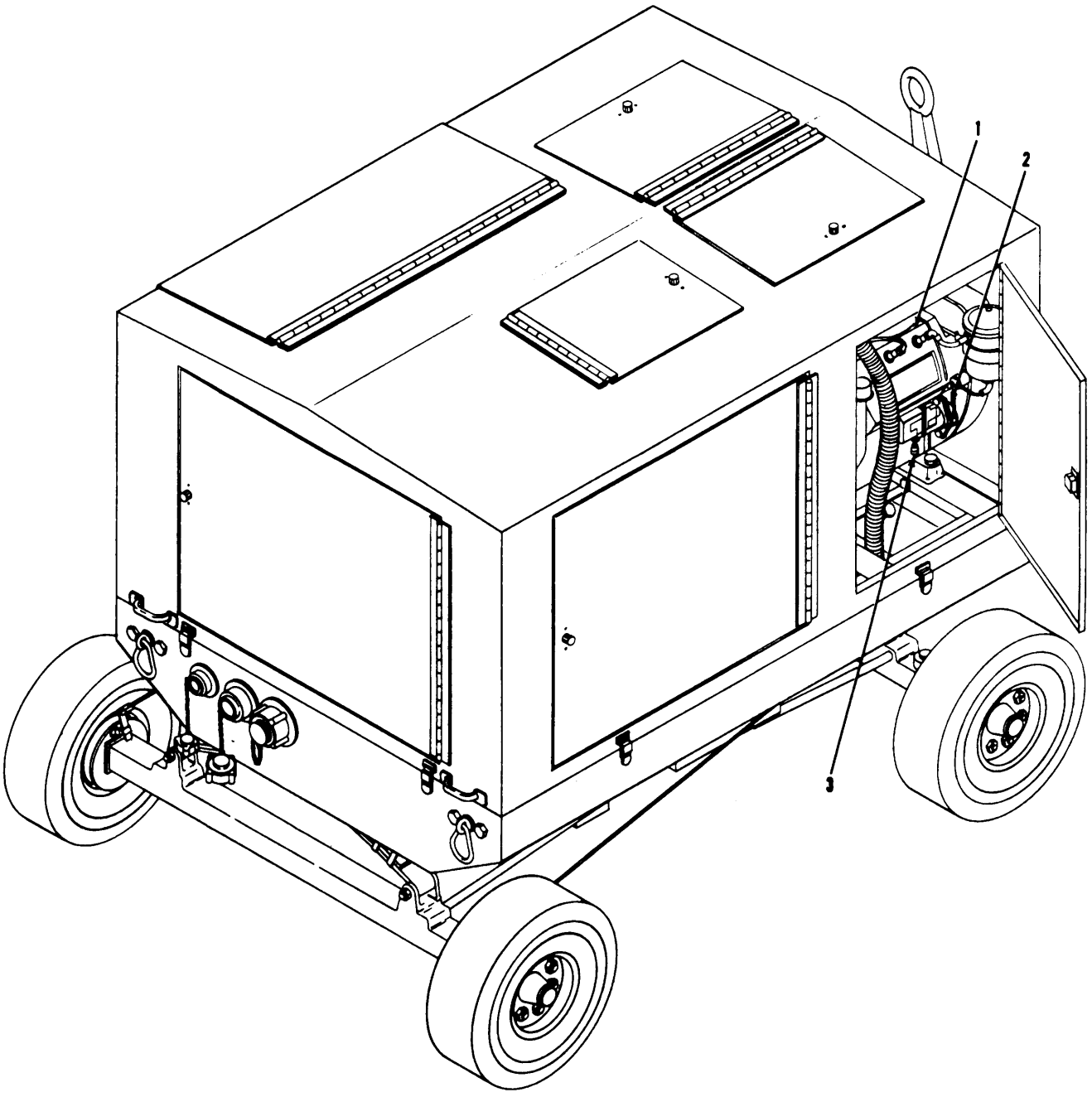
2. Reduce the system pressure under test by turning pressure compensator control (item *21*, figure 2-1) CCW and as indicated by fluid pressure gage (item 9).

3. Close both flow control valves (item 16 and 19, figure 2-1) by turning CW.

4. Idle the engine of test stand for approximately five minutes.

5. Set the ignition switch (item *2*, figure 2-2) to OFF.

6. Remove hoses between test stand and system under test.



Key to Figure 2-3

1. Gas Engine
2. Magneto
3. Ground Switch - Postive Action

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Figure 2-3. Magneto Control

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CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

SECTION I

PREPARATION FOR INSTALLATION STORAGE AND SHIPMENT

3-1. PREPARATION FOR INSTALLATION.

3-2. UNCRATING. To unload the test stand from its shipping container proceed as follows: (See figure 3-1.)

1. Disconnect tie-down straps.

2. Where a lifting device of suitable capacity (over 3000 lbs.) is available, connect cable slings to lifting eyebolts and lift the test stand from its carrier.

3-3. UNPACKING. To unpack the test stand proceed as foIlows:

1. Remove pressure sensitive tapes from seams, doors, panels screen and ventilation ducts.

2. Remove barrier material from ventilation ducts and screens.

3. Remove bags of desiccant from inside test stand housing.

4. Remove pressure sensitive tapes from all sealed openings.

3-4 CLEANING.

1. Use solvent (item 1, table 1-7) for removal of preservatives from exterior surfaces of the equipment.

2. With a low pressure air source blow away remaining dust or loose packing material from test stand.

3-5. PREINSTALLATION INSPECTION. Carefully inspect the test stand for possible damage during shipment. Make certain that:

1. All gages and controls on the control panels are undamaged and not missing or loose. (See figures 2-1 and 2-2.)

2. All major components of the test stand are undamaged, securely mounted and not missing. (See figures 1-2 and 1-3.)

3. Tubing is undamaged and all fittings tightly connected throughout the hydraulic and fuel line system.

4. All hand operated controls and switches operate freely.

5. All electrical connections are secured.

6. All four tires display absence of deep cuts, fabric breaks or excessive wear.

7. Tires are inflated to 60 psi (approximately).

8. Correct all deficiencies or report defects to organizational maintenance.

3-6. PRELIMINARY LUBRICATION. Check engine oil and points of lubrication as listed in table 3-5. Ensure initial lubrication exists at all specified points.

3-7. BATTERY. The battery, furnished with the test stand but shipped separately shall be activated shortly before installation as follows:

WARNING

Do not add acid. Battery generates explosive gages; keep sparks, flames and hot glowing objects away. Ventilate area while charging. Battery becomes hot during activation. Wear gloves if handled before cooling.

1. Remove knock-out tool from under Initial Fill Cap.

2. Open flip caps. Using knock-out tool, break seal in each vent tube. Do not retrieve sealing discs. Close flip caps.

3. Remove Initial Fill Caps. Break seals with tool. Keep fingers out of openings, do not retrieve discs.

4. Pour cold tap water slowly into each opening until filled to bottom of opening. Maximum power is obtained by slowly pouring a little water

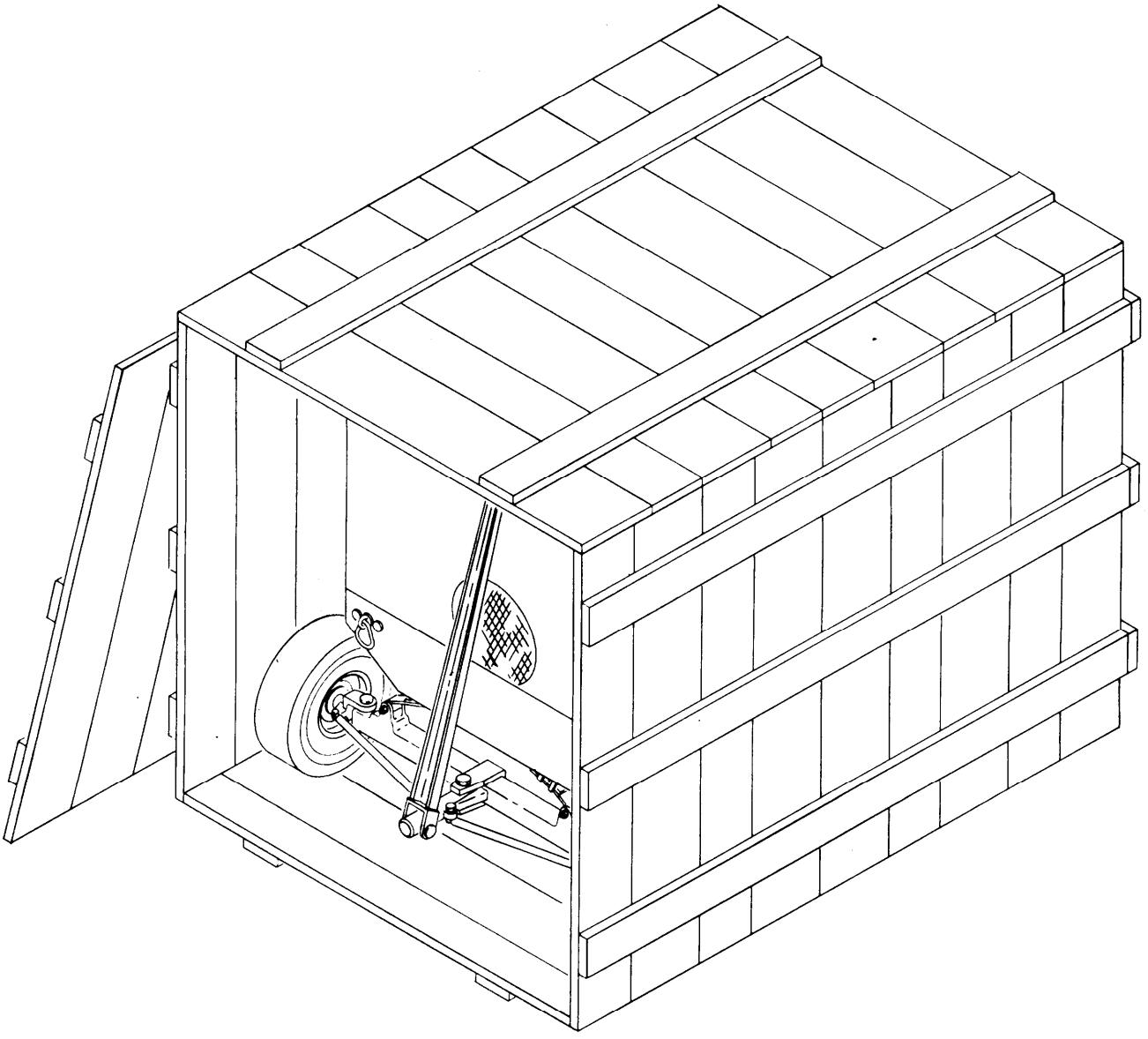

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Figure 3-1. Test Stand Packing/Unpacking

in each opening and then repeating until aIl ceils are filled. Any available water may be used but contaminated water might shorten battery life. Sea water should be used only in an emergency and only in a well ventilated area.

5. Reopen flip caps, check that liquid level is at bottom of vent tube in each cell. If not, add water in initial fill opening to bring liquid level to bottom of vent tube. Do not overfill.

6. Replace the Initial Fill Cap filler plugs securely; never remove again.

7. Charging is not normally needed before installation. If battery fails to crank engine, it is probably due to rapid filling. Allow a fifteen to thirty minute wait.

8. If battery still fails to crank, remove from test stand and charge as follows:

a. Charge battery with 12 VDC at a rate of three amperes for approximately ten hours.

b. Perform four consecutive hourly readings upon completion of battery charge, observing the specific gravity with a hydrometer. Each cell of a properly charged battery shall indicate a specific gravity of 1.285 to 1.300. A discharged cell has a specific gravity of 1.150 to 1.175. Intermediate values indicate the relative proportion of a full charge. The voltage reading shall be 12 ±1.2 VDC.

9. Reinstall battery in test stand.

3-8. FUEL SYSTEM. Fill the gasoline engine fuel system with Specification MIL-G-3056 or MIL-F-5572 grade fuel.

WARNING

Always provide earth grounding to filling container and test stand fuel tank before filling tank, to prevent sparks. Do not fill near flames or glowing hot objects.

1. Insure the shutoff cock (See figure 3-2.) is opened and check the fuel strainer for leaks.

3-9. HYDRAULIC SYSTEM. To prepare the hydraulic system, proceed as follows:

1. Drain any preservative fluid (item 3, table 1-7) from the system by removing drain plug, from the low pressure filter. Replace plug.

2. Fill test stand reservoir with hydraulic fluid, (item 2, table 1-7) by removing caps from filter neck on hydraulic reservoir.

3. When hydraulic reservoir fluid level indicator (item 12, figure 2-1) registers full, stop filling reservoir.

NOTE

Do not overfill the hydraulic reservoir. The expansion space in the reservoir is necessary for satisfactory test stand operation.

4. Open test stand reservoir shutoff valve (item 15, figure 2-l).

5. Open bleed valve on low pressure filter (item 8, figure 1-3).

6. A steady flow of fluid indicates absence of air. Close bleed valve when this occurs.

NOTE

If difficulty is experienced in bleeding, the probable cause is a clogged filter element. Check and replace filter element in accordance with paragraph 3-9.

7. Connect 1/2 inch hose to 1/2 inch test stand outlet.

8. Open 1/2-inch flow control valve (item 16, figure 2-1).

9. Set selector outlet valve (item 17, figure 2-1) from vertical position to 1/2 inch position.

10. Remove cap from test stand reservoir filler neck.

11. Remove coupling from opposite end of connected 1/2 inch hose and insert into reservoir filler taking care not to damage the strainer screen and prepare to pump fluid into reservoir.

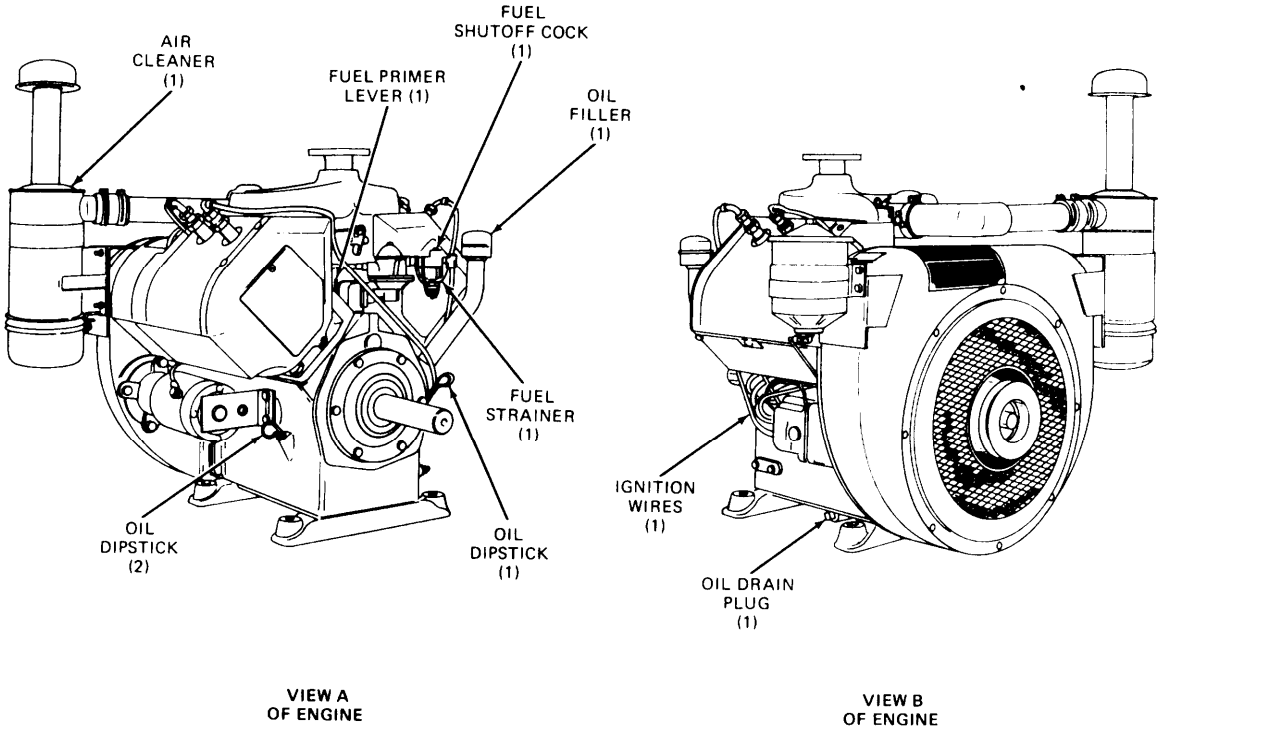
12. Set fluid volume control (item 20, figure 2-1) at 2 GPM and zero pressure as registered by the fluid pressure gage (item 9, figure 2-1).

13. Start up test stand (refer to Chapter 2; Section IV, paragraph 2-10 and 2-11 as applicable) and pump fluid through system back into reservoir (item 5, figure 1-3) until no trace of air is observed.

14. Shut down the test stand (refer to Chapter 2, Section IV paragraph 2-13).

15. Remove hose from reservoir, reconnect coupling removed from hose and disconnect hose from test stand.

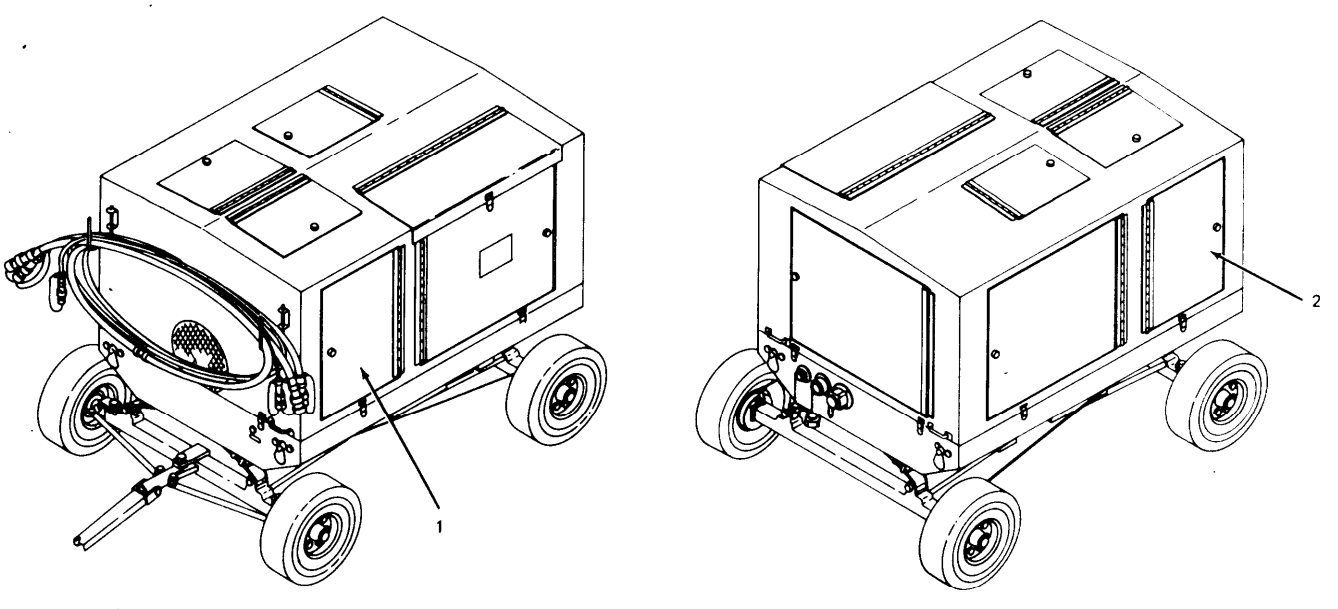
16. Check for hydraulic fluid leaks.



VIEW A OF ENGINE

VIEW B OF ENGINE

NOTE: THE NUMBERS IN PARENTHESES CORRESPOND TO AN ACCESS DOOR NUMBER ON THE TEST STAND BELOW.



VIEW A OF TEST STAND

VIEW B OF TEST STAND

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Figure 3-2. Test Stand Engine and Access Points

3-10. PREPARATION FOR STORAGE.

3-11. FUEL SYSTEM. To drain the gasoline fuel system, proceed as follows.

WARNING

Always provide earth grounding to container and test stand before draining to prevent sparks. Do not drain near flames or glowing hot objects.

1. Insure engine is cooled off.

2. Insure shutoff cock is opened. (See figure 3-2).

3. Drain gasoline into a suitable container.

4. Leave fuel tank cap off for approximately fifteen minutes to dissipate gasoline fumes.

5. Start engine and allow to run until engine stops on its own accord.

6. Replace fuel tank cap.

3-12. HYDRAULIC SYSTEM. To drain the hydraulic system proceed as follows:

1. Prepare to catch hydraulic fluid into a container that has a capacity of approximately 30 gallons.

2. Remove drain plug (item 8, figure 1-3) from bottom of low pressure filter, catching fluid in container. Replace drain plug.

3. Drain the hydraulic pump (item 13, figure 1-3) removing drain plug located at the lower right hand corner of the pump case. Replace drain plug.

4. Refill the system with preservative hydraulic oil, (item 3, table 1-7).

3-13. BATTERY. To remove the battery from the test stand, refer to paragraph 3-40.

WARNING

Battery electrolyte contains sulfuric acid and can cause severe burns. In case of contact with electrolyte, rinse area with clean water immediately. Battery cells contain gases, keep flames and glowing hot objects away.

3-14. LUBRICATION. To prepare the engine for lubrication before storage, proceed as follows:

1. Drain gasoline engine crankcase oil at the pan drain plug. Replace drain plug. (See figure 3-2.)

2. Fill crankcase with corrosion preventative compound, (Item 4, table 1-7) to the full level as indicated by dip stick (see figure 3-2).

3-15. PREPARATION FOR SHIPMENT.

3-16. Normally the test stand does not require an external container; however, if test stand was shipped in a container, reuse the same container.

3-17. PACKING. To pack the test stand proceed as follows:

1. Accomplish all steps within Chapter 3, Section I, paragraph 3-10.

2. Place several bags of desiccant, (item 7, table 1-7) within the cabinet interior.

3. Cover all trailer openings with water resistant barrier material, (item 5, table 1-7) attaching and sealing with pressure sensitive tape, (item 6, table 1-7).

4. Seal seams, doors, panels and other small openings with pressure sensitive water resistant tape, (item 6, table 1-7).

3-18. CRATING. To crate the test stand proceed as follows:

1. Attach the test stand to the container using the tie down straps.

2. Where a lifting device of suitable capacity (over 3000 lbs.) is available, connect cable slings to lifting eyebolts and lift the stand into its carrier.

3. If no lifting device is available, prepare a ramp to the carrier and roll the test stand into its carrier.

3-19. SPECIAL FORMS. Prepare an appropriate document as shown in figure 3-3, and attach to unit being stored or shipped.

PRESERVATION, PACKAGING, PACKING AND MARKING REQUIREMENTS

NOMENCLATURE		STOCK NUMBER	
		PART NUMBER	
NET WEIGHT	DIMENSIONS	GROSS WEIGHT	CUBIC FEET

All specifications and standards applicable to the requirements herein shall be the issue in effect on date of invitation for bids.

PACKAGING

☐ LEVEL A ☐ LEVEL C

☐ PACKAGING SHALL BE IN ACCORDANCE WITH SPECIFICATION MIL-P-116, THE FOLLOWING DETAILED REQUIREMENTS SHALL APPLY:

UNIT PKG QTY	METHOD	PRESERVATIVE	WRAP	DUNNAGE	CONTAINER

☐ PRESERVATION AND PACKAGING SHALL BE SUCH AS TO PREVENT DETERIORATION OR DAMAGE DURING HANDLING AND SHIPMENT TO THE FIRST DESTINATION.

☐ OTHER.

PACKING ☐ LEVEL A ☐ LEVEL C

☐ ITEMS SHALL BE PACKED IN CONTAINERS CONFORMING TO SPECIFICATION NO.

☐ PLYWOOD USED SHALL BE STANDARD GRADE WITH EXTERIOR GLUE OF U.S. PRODUCT STANDARD PS1-66. THIS PLYWOOD SHALL HAVE THE GRADE STAMP OF AN APPROVED TESTING AGENCY. FURTHER, PLYWOOD SHALL BE SURFACE TREATED IN ACCORDANCE WITH SPECIFICATION TT-W-572. WOOD CLEATED PLYWOOD CONTAINERS SHALL BE CONSTRUCTED WITH THE TOP INVERTED SO AS TO PROVIDE A FLUSH TOP SURFACE FOR WATER RUNOFF.

☐ ITEM SHALL BE PACKED IN A MANNER TO INSURE CARRIER ACCEPTANCE AND SAFE DELIVERY AT DESTINATION. CONTAINERS SHALL BE IN ACCORDANCE WITH UNIFORM FREIGHT CLASSIFICATION RULES OR REGULATIONS OF OTHER CARRIERS APPLICABLE TO THE MODE OF TRANSPORTATION.

☐ OTHER.

MARKING

☐ a. IN ADDITION TO ANY SPECIAL MARKING REQUIRED BY THE CONTRACT OR ORDER, SHIPMENT SHALL BE MARKED IN ACCORDANCE WITH STANDARD MIL-STD-129D, WITH CHANGE NOTICE 1 THRU 9, "MARKING FOR SHIPMENT AND STORAGE," DATED 28 DECEMBER 1964 THE SERIAL NUMBER AND THE CONTROL NUMBER OF DA FORM 2410 SHALL BE MARKED ON THE UNIT CONTAINER

☐ b. ADDITIONAL MARKING REQUIREMENTS. EACH INTERIOR PACKAGE SHALL BE MARKED ON AT LEAST TWO (2) SIDES WITH A SILHOUETTE OF THE AIRCRAFT. (WHERE THE SIZE OF THE UNIT CONTAINER IS TOO SMALL TO PERMIT THE APPLICATION OF TWO (2) LABELS, A SINGLE LABEL SHALL BE APPLIED. IF THE PACKAGE IS TOO SMALL FOR ONE (1), NONE WILL BE REQUIRED.) WHEN THE UNIT CONTAINER IS THE SHIPPING CONTAINER AND THE ITEM IS PACKED "LEVEL A", EACH CONTAINER SHALL BE MARKED ON TWO (2) SIDES, TOP AND ONE (1) END WITH A SILHOUETTE OF THE AIRCRAFT. THE SIZE OF THE SILHOUETTE MAY VARY, BUT WILL BE LARGE ENOUGH TO FACILITATE EASY VISUAL IDENTIFICATION WITHOUT OBSCURING OTHER MARKINGS. THE CONTRACTING OFFICER WILL SUPPLY LABELS ON REQUEST. THE NOMENCLATURE OF THE MAJOR COMPONENTS SHALL BE EXTENDED TO INDICATE THE END ITEM APPLICATION AND THE POSITION OF THE PART: e.g., GEAR BOX, MAIN FOR (APPLICABLE AIRCRAFT); WING ASSEMBLY, RIGHT, FOR (APPLICABLE AIRCRAFT).

☐ c. MATERIEL CONDITION MARKING SHALL BE APPLIED IN ACCORDANCE WITH PARAGRAPH 5.5.17 OF MIL-STD-129. A MATERIEL CONDITION TAG OF THE APPLICABLE TYPE WILL BE SECURELY ATTACHED DIRECTLY TO ALL UNINSTALLED OR STORED AERONAUTICAL OR AIR DELIVERY ITEMS. WHEN SUCH ITEMS ARE PLACED OR STORED IN CARTONS, PACKAGES, CRATES OR METAL SHIPPING CONTAINERS, A DUPLICATE MATERIEL CONDITION TAG OR LABEL WILL BE SECURELY ATTACHED TO THE EXTERIOR OF THE PACKAGE OR CONTAINER IN SUCH A MANNER THAT WILL AFFORD MAXIMUM PROTECTION FROM HANDLING AND WEATHER. TAGS WILL BE COMPLETED EITHER BY TYPEWRITTEN OR PRINTED BLACK LEAD PENCIL ENTRIES. ITEMS OF A COMMON OR NONTECHNICAL NATURE (i.e., COMMON HARDWARE, BULK MATERIALS, ETC.) THE SERVICEABILITY OF WHICH IS OBVIOUS, AND THE IDENTITY AND INSPECTION REQUIREMENTS ADEQUATELY INDICATED BY COMMERCIAL TAGS, LABELS OR MARKINGS, MAY BE RECEIVED, STORED, ISSUED OR SHIPPED WITHOUT MATERIEL CONDITION TAGS.

Figure 3-3. Preservation, Packaging, Packing and Marking Requirements Document

SECTION II

INSPECTION AND SERVICING

3-20. INSPECTIONS.

3-21. Inspection requirements are listed in table 3-1. This inspection consists of daily inspections which shall be performed before and/or after a day's operation as specified, and is visual in nature. Servicing required during the daily inspection is kept to a minimum. Intermediate and periodic inspections will be accomplished at intervals of 50 and 100 hours and shall be performed by personnel at the direct and general support maintenance levels. Refer to tables 3-2 and 3-3 for these inspection requirements.

TABLE 3-1. DAILY INSPECTION REQUIREMENT

ITEM	DAILY INSPECTION	REQUIREMENTS
1. Hydraulic reservoir	Preinspect Postinspect	Check fluid level; refill if necessary. Inspect for leaks, paying particular attention to hydraulic line connections for loose connections or damage. Correct or report discrepancies
2. Fuel system	Preinspect Postinspect	Check fuel level; refill if necessary. Inspect for leaks paying particular attention to fuel line connections for loose connections or damage
Fuel strainer	Preinspect Postinspect	Inspect bowl of strainer for dirt or water accumulation; clean if necessary. Correct or report discrepancies
3. Engine	Preinspect Postinspect	Check oil level; refill if necessary. Inspect for leaks near oil filter and crankcase drain plug. Correct or report discrepancies
4. Battery	Preinspect Postinspect	Check electrolyte level; refill with water if necessary. Inspect battery terminals for loose or broken connection. Inspect terminals for excessive corrosion. Correct or report discrepancies
5. Cabinet interior	Preinspect Postinspect	Check all wiring for breaks, worn insulation and connections for security
6. Trailer	Preinspect Postinspect	Check tires for 60 psi; inflate if necessary. Inspect tire for deep cuts and excessive wear. Correct or report discrepancies
7. Gage panel and controls	Preinspect Postinspect	Check for broken glass, bent indicating dials or other obvious discrepancies. Report discrepancies. Check that all controls move freely and are securely in place

TABLE 3-1. DAILY INSPECTION REQUIREMENT (cont)

ITEM	DAILY INSPECTION	REQUIREMENTS
8. Test stand	Postinspect	Start and operate test stand and check for high pressure hydraulic leaks, Check that maximum hydraulic pressure (3000 psi) is obtainable at maximum G. P. M. Check temperature and flow indications. (Refer to chapter 2. section IV.)

TABLE 3-2. INTERMEDIATE INSPECTION REQUIREMENTS

ITEM	INTERMEDIATE INSPECTION	REQUIREMENT
General	50 hrs	APPEARANCE. Inspect the general appearance of the equipment, paying particular attention to cleanliness. BEFORE-OPERATION SERVICES. Perform the services listed in daily before-operation services (table 3-1)
Lubrication fittings	50 hrs	LUBRICATION. Inspect for missing or damaged lubrication fittings and inspect for indications of improper lubrication. Lubricate as necessary in accordance with the lubrication chart. Replace missing or damaged fittings. Correct all oil or grease leaks
Crankcase	50 hrs	Inspect lubricant level in engine crankcase. Inspect for oil and grease leaks.
Manifold	50 hrs	Inspect for leaks, loose mounting and defective gaskets. Tighten loose mounting bolts and nuts. During the first weekly servicing of a new or reconditioned engine, inspect all head bolts for tightness. Let engine warm up to normal operating temperature and tighten all loose bolts from 25 to 32 ft. lbs. torque
Muffler	50 hrs	Inspect for leaks, loose mounting and defective gaskets. Tighten loose mounting bolts and nuts. During the first weekly servicing of a new or reconditioned engine, inspect all head bolts for tightness. Let engine warm up to normal operating temperature and tighten

TABLE 3-2. INTERMEDIATE INSPECTION REQUIREMENTS (cont)

ITEM	INTERMEDIATE INSPECTION	REQUIREMENTS
Muffler - (cont)		all loose bolts from 25 to 32 ft. lbs. torque
Valve mechanism	50 hrs	If the valves are noisy or loss of power is noticed, inspect the condition of the valve mechanism Remove valves covers and adjust valve lifter clearance if necessary. The correct clearance for the valve lifters is 0.0080 inch for the intake valves and 0.0160 inch for the exhaust valves. Replace cover gaskets if defective
Magneto	50 hrs	Inspect the ignition magneto for loose mounting bolts and wiring connections. Correct any deficiencies noted. Remove the end cap and inspect the distributor cap for cracks, and corroded terminals. Examine the breaker point gap. The correct gap is 0.015 inch at full separation of points
Spark plugs	50 hrs	Inspect the spark plugs for looseness, bad connections, and dirty or broken insulators. Replace damaged spark plugs. Clean dirty plugs and set the gap to 0.0300 inch
Starter motor	50 hrs	Inspect the mounting of the starter motor for loose connections. Examine the brushes, brush holders and springs. Inspect the commutators for dirt and scoring
Alternator	50 hrs	Inspect for proper operation, tight connections and secure mounting
Voltage regulator	50 hrs	Inspect for proper operation, tight connections, and secure mounting. The regulator should allow an appreciable charge to go into the battery after the starter is used. After the battery is fully charged, the ammeter should read only a slight charge

TABLE 3-2. INTERMEDIATE INSPECTION REQUIREMENTS (cont)

ITEM	INTERMEDIATE INSPECTION	REQUIREMENT
Voltage regulator-(cont)		Tighten loose mounting nuts and connections. Adjust or replace a defective regulator
Control panel	50 hrs	Inspect control panel for secure mounting of shock mounts. Insure presence of shock mounts
Gages and meters	50 hrs	Examine the condition of all gages. See that all gages indicate correctly and that the glass is not cracked or broken. Tighten loose mounting screws and connections. Replace any defective or damaged gage See that all meters are securely mounted and operating properly and that the glass is not cracked or the indicators are not bent or broken. Tighten loose mounting screws and replace any defective or damaged meter
Control valves	50 hrs	Inspect all control valves for packing leaks and proper operation. See that handwheels are securely mounted Tighten packing or replace as required. Replace a defective or damaged control valve
Tires	50 hrs	Inspect all tires for underinflation, abnormal or uneven wear, cuts, embedded foreign matter, and missing valve caps. Remove any foreign matter from tires. See that tires are inflated to correct pressure and all valve caps are in place
Wheels	50 hrs	Inspect for loose wheel mounting bolts. Inspect wheel bearings for proper adjustment. Tighten loose wheel bolts and adjust wheel bearings as required
Axle	50 hrs	Inspect the axle assemblies for secure mounting and proper alinement. Inspect the springs for cracks, breaks and weakened condition. Tighten all axle mounting bolts. Aline the front wheels as required. Replace defective springs

TABLE 3-2. INTERMEDIATE INSPECTION REQUIREMENTS (cont)

ITEM	INTERMEDIATE INSPECTION	REQUIREMENT
Brake assembly	50 hrs	Inspect the brake assembly for correct adjustment. Inspect the cables for secure mounting. Tighten all brake assembly mounting bolts and adjust the brakes
High pressure filter assembly	50 hrs	Inspect the filter for dirty or clogged condition resulting in excessive pressure drop. Remove and replace the filter element
Thermoswitch	50 hrs	Inspect the thermoswitch for correct temperature response and for secure installation Replace a defective or damaged thermoswitch

TABLE 3-3. PERIODIC INSPECTION REQUIREMENT

ITEM	PERIODIC INSPECTION	REQUIREMENT
	100 hrs	APPERANCE. Inspect the general appearance of the equipment, paying particular attention to cleanliness BEFORE-OPERATION SERVICES. Perform the services listed in daily before-operation services (table 3-1)
Lubrication fittings	100 hrs	LUBRICATION. Inspect for missing or damaged lubrication fittings and inspect for indications of improper lubrication. Lubricate as necessary in accordance with the lubrication chart. Replace missing or damaged fittings. Correct all oil or grease leaks
Crankcase	100 hrs	Inspect lubricant level in engine crankcase. Inspect for oil and grease seals; seals
Oil seals	100 hrs	Inspect for defective or damaged oil seals
Markings and fittings	100 hrs	Inspect for legibility of identification markings
Paint	100 hrs	Inspect for chipped paint, exposed and rusty metal

TABLE 3-3. PERIODIC INSPECTION REQUIREMENT (cont)

ITEM	PERIODIC INSPECTION	REQUIREMENT
Cylinder heads	100 hrs	Inspect for leaks, loose mounting and defective gaskets. Tighten loose mounting bolts and nuts. During the first weekly servicing of a new or reconditioned engine, inspect all head bolts for tightness. Let engine warm up to normal operating temperature and tighten all loose bolts from 25 to 32 ft. lbs. torque
Manifold	100 hrs	Inspect for leaks, loose mounting and defective gaskets. Tighten loose mounting bolts and nuts. During the first weekly servicing of a new or reconditioned engine, inspect all head bolts for tightness. Let engine warm up to normal operating temperature and tighten all loose bolts from 25 to 32 ft. lbs. torque
Muffler	100 hrs	Inspect for leaks, loose mounting and defective gaskets. Tighten loose mounting bolts and nuts. During the first weekly servicing of a new or reconditioned engine, inspect all head bolts for tightness. Let engine warm up to normal operating temperature and tighten all loose bolts from 25 to 32 ft. lbs. torque
Valve mechanism	100 hrs	If the valves are noisy or loss of power is noticed, inspect the condition of the valve mechanism. Remove valves' covers and adjust valve lifter clearance if necessary. The correct clearance for the valve lifters is 0.0080 inch for the intake valves and 0.0160 inch for the exhaust valves. Replace cover gaskets if defective COMPRESSION TEST. Remove the spark plugs and test the cylinder compression by turning the engine over several times to stabilize gage reading. If the gage reading varies more than 10 pounds between the four cylinders, inspect the cylinder head bolts for tightness

TABLE 3-3. PERIODIC INSPECTION REQUIREMENT (cont)

ITEM	PERIODIC INSPECTION	REQUIREMENT
Valve mechanism - (cont)		Tighten any loose bolts and retest. If low compression or a variation in compression persists, the trouble lies with the cylinder head gasket, valves, or piston rings. Correct all deficiencies
Spark plugs	100 hrs	Inspect the spark plugs for looseness, bad connections, and dirty or broken insulators Replace damaged spark plugs. Clean dirty plugs and set the gap to 0.0300 inch
Magneto	100 hrs	Inspect the ignition magneto for loose mounting bolts and wiring connections. Correct any deficiencies noted Remove the end cap and inspect the distributor cap for cracks, and corroded terminals. Examine the breaker point gap. The correct gap is 0.015 inch at full separation of points
Starter motor	100 hrs	Inspect the mounting of the starting motor for loose connections. Examine the brushes, brush holders and springs. Inspect the commutators for dirt and scoring Tighten loose mounting bolts Replace starter brushes worn to one half their original length
Alternator	100 hrs	Check operation of alternator as specified in Chapter 4, section II, paragraph 4-6
Voltage Regulator	100 hrs	Inspect for proper operation, tight connections, and secure mounting. The regulator should allow an appreciable charge to go into the battery after the starter is used. After the battery is fully charged, the ammeter should read only a slight charge Tighten loose mounting nuts and connections Adjust or replace a defective regulator

TABLE 3-3. PERIODIC INSPECTION REQUIREMENT (cont)

ITEM	PERIODIC INSPECTION	REQUIREMENT
Control panel	100 hrs	Inspect control panel for secure mounting of shock mounts. Insure presence of shock mounts
Gages and meters	100 hrs	Examine the condition of all gages. See that all gages indicate correctly and that the glass is not cracked or broken Tighten loose mounting screws and connections. Replace any defective or damaged gage See that all meters are securely mounted and operating properly and that the glass is not cracked or the indicators are not bent or broken Tighten loose mounting screws and replace any defective or damaged meter
Control valve	100 hrs	Inspect all control valves for packing leaks and proper operation. See that handwheels are securely mounted. Tighten packing or replace as required. Replace a defective or damaged control valve
Tires	100 hrs	Inspect all tires for under inflation, abnormal or uneven wear, cuts, embedded foreign matter, and missing valve caps Remove any foreign matter from tires. See that tires are inflated to correct pressure and all valve caps are in place
Wheels	100 hrs	Inspect for loose wheel mounting bolts. Inspect wheel bearings for proper adjustment Tighten loose wheel bolts and adjust wheel bearings as required
Axle	100 hrs	Inspect the axle assemblies for secure mounting and proper alinement. Inspect the springs for cracks, breaks and weakened condition Tighten all axle mounting bolts. Aline the front wheels as required. Replace defective springs

TABLE 3-3. PERIODIC INSPECTION REQUIREMENT - Continued

ITEM	PERIODIC INSPECTION	REQUIREMENT
Brake assembly	100 hrs	Inspect the brake assembly for correct adjustment. Inspect the cables 'for secure mounting Tighten all brake assembly mounting bolts and adjust the brakes
Hydraulic pump	100 hrs	Inspect the hydraulic pump for loose mounting bolts and hydraulic connections. See that the drive coupling is securely mounted and alined Tighten all mounting bolts and loose or leaking connections. Replace a defective drive coupling
Hose assemblies	100 hrs	Inspect the hydraulic hose assemblies for loose connections. Inspect the hose for cracks, breaks, and for frayed or rotten fabric covering Tighten hose connections and replace any defective hose assembly
Tubing	100 hrs	Inspect all tubing for cracks, breaks. and distortion. Tighten all tube connections. Replace any damaged or defective tube or fitting
High pressure filter	100 hrs	Inspect the filter for dirty or clogged condition resulting in excessive pressure drop. Remove and replace the filter element
Thermoswitch	100 hrs	Inspect the thermoswitch for correct temperature response and for secure installation Replace a defective or damaged thermoswitch

3-22. **SERVICING.**

3-23. To service the test stand follow instructions listed in tables 3-4 and 3-5.

TABLE 3-4. SERVICING DAILY

SYSTEM	COMPONENT AND LOCATION	REQUIREMENT
Electrical	Battery (item 7, figure 3-4)	Open battery caps, replenish with water
	Ignition Wires (See figure 3-2)	Check for proper connections, tighten if necessary
Hydraulic	Fluid Reservoir (item 5, figure 1-3)	Check that reservoir is full, replenish if necessary (table 3-2)
Engine	Crankcase (See figure 3-2)	Check dip stick for oil level. Replenish if necessary (table 3-1) and (paragraph 3-24)
	Fuel strainer (figure 3-2)	Check for foreign matter and water
Miscellaneous	Fuel tank	Check gas gage for amount, refill if necessary. (paragraph 3-8)
	Tires	Check tire pressure, refill to proper pressure if necessary
	Access Door Hinges (figure 1-4)	Check for free movement, lubricate if necessary (table 3-2) and (paragraph 3-5, a.)
	Draw Bar (figure 1-4)	Check for free movement, lubricate if necessary (table 3-2) and (paragraph 3-22)

3-24. LUBRICATION SERVICING INSTRUCTION. For proper care of lubricant containers, replace their respective covers and store in a clean, dry area. Keep all foreign matter out of lubricants, exercising care by not leaving cans opened.

TABLE 3-5. LUBRICANTS

LOCATION	TEMPERATURE RANGE (Fahrenheit) (Military Specification) Above +32° to +40°	+40° to -10°	0°F to -65°
Engine Crankcase Air Cleaner	SAE 30 (MIL-L-2104)	SAE 10 (MIL-L-2104)	Engine Oil Sub Zero MIL-L-10295
Flow Indicator	2190	2110	2075
Draw Bar Assembly	2190	2110	2075
Door Hinges and Latches	2190	2110	2075

TABLE 3-5. LUBRICANTS (cont)

LOCATION	TEMPERATURE RANGE (Fahrenheit) (Military Specification) Above +32 °to +40°	+40° to -10°	0°F to -65°
Wheel Bearings	GAA Grease	GAA Grease	GAA Grease
Tie Rod Ends	(MIL-G-10924C)	(MIL-G-10924C)	(MIL-G-10924C)
Spindles			

SECTION III

PREVENTATIVE MAINTENANCE

3-25. GENERAL.

3-26. To insure equipment is ready for operation, systematic inspections are performed (table 3-l). Defects found shall be corrected before serious damage occurs. Detailed information on repair and replacement of authorized parts at the organizational level, are described in Section V of this Chapter. Other normal preventative maintenance shall consist of Cleaning, Lubrication and Extreme Environmental maintenance.

3-27. CLEANING. The cleaning of the test stand shall be accomplished as specified in Chapter 3; paragraph 3-4.

3-28. LUBRICATION. To accomplish proper lubrication proceed as follows:

1. Use an approved cleaning solvent (item 1, table 1-7) to wipe all surfaces clean surrounding the point of application before applying lubricant.

2. Operate the test stand (Chapter 2; Sections III and IV) for five minutes immediately after lubrication. Inspect the oil filter for leaks and correct defect as necessary.

3. Stop test stand operation (Chapter 2; Section IV, paragraph 2-13) wait five minutes, and recheck the oil filter. Add specified oil as listed in table 3-5 to bring oil level to full mark.

4. For proper care of lubricant containers, replace their respective covers and store in a clean dry area. Keep all foreign matter out of lubricants, exercising care by not leaving cans opened.

3-29. EXTREME ENVIRONMENTAL MAINTENANCE.

3-30. EXTREME COLD. Proceed with the following steps:

1. Lubricate the test stand as specified in table 3-5.

2. Keep the electrolyte at the proper level in the battery and the battery fully charged (Chapter 3; Section I, paragraph 3-7).

CAUTION

Keep engine running to charge and circulate added water to battery. Otherwise, water added will freeze and crack battery case.

3. Close engine access doors as required to maintain satisfactory engine operating temperature.

4. Insure oil in air cleaner is filled with the proper grade as specified in table 3-5.

5. Keep fuel tank full to prevent accumulation of condensation.

3-31. EXTREME HEAT. Proceed with the following steps:

1. Set up the test stand in a well ventilated area and keep all access doors open during operation.

2. Lubricate engine as specified in table 3-5.

3. Keep engine shrouding, cylinder heads, fins and the air opening in the housing free of dirt and obstructions.

4. Keep fuel tank full to prevent accumulation of condensation.

3-32. DUSTY OR SANDY AREAS. Proceed with the following steps:

1. Lubricate test stand in accordance with table 3-5. Exercise extreme care during lubrication to prevent dust or sand contaminating lubricants, grease gun, oil containers and fittings.

2. Protect test stand from dust and sand. Keep test stand clean and free of foreign matter.

3. Cover test stand with a tarpaulin when not in use.

4. If possible, wet down surrounding area of operating site keeping down dust and sand.

5. Clean engine air cleaner every two to four hours. Clean as necessary.

3-33. RAINY OR HUMID CONDITIONS. Proceed with the following steps:

1. Lubricate test stand in accordance with table 3-5.

2. Keep fuel tank full to prevent accumulation of condensation.

3. Keep electrical components clean and dry. Watch closely for evidence of fungus growth and remove promptly.

4. Cover test stand with tarpaulin or similar protection when not in use.

3-34. SALT WATER AREAS. Proceed with the following steps:

1. Lubricate test stand in accordance with table 3-5.

2. Wipe all exposed areas frequently, clean off salt water deposits with clear water and wipe dry.

3. Coat all exposed machined metal surfaces with a thin film of oil.

4. Retouch or repaint damaged paint surfaces to prevent corrosion of exposed metal.

5. Cover test stand with a tarpaulin or similar protection when not in use.

3-35. HIGH ALTITUDE AREA. Proceed with the following steps:

1. The amount of oxygen delivered to the carburetor is reduced when operating at high altitudes. Reduce the amount of fuel admitted by the carburetor by adjusting the fuel mixture. Refer to direct or general support as may be applicable for adjustment.

2. Keep air cleaner clean to assure maximum air passage to the carburetor.

SECTION IV

OPERATIONAL CHECKOUT

3-36. GENERAL.

3-37. In this section the operational checkout of the test stand is listed in tables 3-6 through 3-9. The performance check tables are in the order of test stand startup to shutdown as described in Chapter 2. Remove, repair or replacement instructions applicable at organizational level are described in Section V of this Chapter.

TABLE 3-6. PRELIMINARY PERFORMANCE CHECKS

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
1	Set parking brake	Test stand not free to roll	Test stand wheels will not lock, wheels continue to roll freely. Faulty handbrake assembly. Faulty handbrake rod or faulty brake shoes on rear wheels	Ship test stand and report discrepancy to direct or general support maintenance as applicable
2	Open access doors of cabinet assembly and lock in open position	Doors open freely and are able to be locked into position	Door latches can not be opened and locks can not be positioned in place keeping doors open due to defective latches, hinges and locking bars	Ship test stand and report discrepancy to direct or general support maintenance as applicable
			Door latches, hinges and locking bars sticking due to lack of lubrication	Lubricate frozen latches, hinges and locking bars as per table 3-5
3	Connect each hose assembly to respective test stand coupling, then remove unwanted hose(s)	Hose coupling locks to coupling on test stand	Hose coupling can not be attached to test stand coupling due to defective coupling on hose or test stand	Ship test stand and report discrepancy to direct or general support maintenance as applicable
	Connect each hose assembly to respective test stand coupling, then remove unwanted hose(s)	Hose coupling locks to coupling on test stand	Hose coupling can not be attached to test stand coupling due to defective coupling on hose or test stand	Ship test stand and report discrepancy to direct or general support maintenance as applicable
	Connect opposite end of hose assembly(s) to respective coupling on system under test	Opposite hose coupling locks to system under test coupling	Hose coupling can not be attached to system under test due to defective coupling on hose	Ship test stand and report discrepancy to direct or general support maintenance as applicable
4	Fill gas tank to full capacity	Fuel gage indicates full	Fuel gage does not indicate, gage broken. Fuel gage indicates partially filled tank, due to faulty calibration	Ship test stand and report discrepancy to direct or general support maintenance as applicable

TABLE 3-6. PRELIMINARY PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
5	Turn pressure compensator control (item 21, figure 2-1) to full CCW position to open	Pressure compensator control moves freely to CCW direction	Pressure compensator control binds or can not be turned in CCW direction due to defective valve	Ship test stand and report discrepancy to direct or general support maintenance as applicable
6	Turn compensator shutoff valve (item 23, figure 2-1) to full CCW position to open	Compensator shutoff valve turns freely to CCW direction	Compensator shutoff valve binds or can not be turned in CCW direction due to defective valve	Ship test stand and report discrepancy to direct or general support maintenance as applicable
7	Turn flow control valve (item 16, figure 2-1) to full CW position to close	Flow control valve turns freely to CW direction	Flow control valve binds or can not be turned in CW direction. Valve defective	Ship test stand and report discrepancy to direct or general support maintenance as applicable
8	Turn flow control valve (item 19, figure 2-1) to full CW position to close	Flow control valve turns freely to CW direction	Flow control valve binds or can not be turned in CW direction. Valve defective	Ship test stand and report discrepancy to direct or general support maintenance as applicable
9	Turn high pressure relief valve (item 1, figure 2-1) to full CCW position to open	High pressure relief valve turns freely to CCW direction	High pressure relief valve binds or can not be turned in CCW direction. Valve defective	Ship test stand and report discrepancy to direct or general support maintenance as applicable
10	Turn fluid pressure gage shutoff valve (item 4, figure 2-1) to full CCW position to open	Fluid pressure gage shutoff valve turns freely to CCW direction	Fluid pressure gage shutoff valve binds or can not be turned in CCW direction. Valve defective	Ship test stand and report discrepancy to direct or general support maintenance as applicable
11	Set reservoir shutoff valve control (item 15, figure 2-1) to full CCW position (horizontal) to open	Reservoir shutoff valve control turns freely to CCW (horizontal) direction	Reservoir shutoff valve control binds or can not be turned in CCW (horizontal) direction, Valve defective	Ship test stand and report discrepancy to direct or general support maintenance as applicable

TABLE 3-6. PRELIMINARY PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
12	Turn high pressure bypass valve (item 2, figure 2-1) to full CCW position to open	High pressure bypass valve turns freely to CCW direction	High pressure bypass valve binds or can not be turned in CCW direction. Valve defective	Ship test stand and report discrepancy to direct or general support maintenance as applicable
13	Set suction pressure valve (item 23, figure 2-1) to FILTER OUT position (vertical position) and FILTER IN. Return valve to FILTER OUT	a. Suction pressure valve sets freely to FILTER OUT position (vertical) and FILTER IN position. b. LPΔP indicator lamp not illuminated	a. Suction pressure valve binds or can not be set to FILTER OUT or FILTER IN b. LPΔP indicator lamp illuminated Probable cause: Low pressure filter clogged	Ship test stand and report discrepancy to direct or general support maintenance as applicable

TABLE 3-7. ENGINE START UP PERFORMANCE CHECKS

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
1	Pull and keep out positive action ground switch (item 3, figure 2-3)	Positive action ground switch pulls out and remains out	Positive action ground switch does not pull out, engine will not start. Defective positive action switch on magneto assembly	Ship test stand and report discrepancy to direct or general support maintenance as applicable
2	Pull choke control (item 1, figure 2-2) to full out position and then reset to approx. midway position	Choke control pulls to full out position and can be set to approximately midway position	Choke control does not pull out or pulls out only partially. Probable cause, defective carburetor or stuck cable to carburetor linkage. Choke control binds when pulled out. Probable cause: defective or stuck choke to carburetor or stuck carburetor linkage	Ship test stand and report discrepancy to direct or general support maintenance as applicable

TABLE 3-7. ENGINE START UP PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
3	Pull throttle (item 3, figure 2-2) straight out to full out position (fully opened) and reset to approximately one-quarter position. Twist to right and release to lock into position	Throttle pulls to full out and can be set to approximately one-quarter position, locking throttle when released	Throttle does not pull to full out position and can not be locked to one-quarter position. Probable cause: jammed throttle cable or jammed throttle linkage carburetor	Ship test stand and report discrepancy to direct or general support maintenance as applicable
4	Set ignition switch (item 2, figure 2-2) to ON position	Ignition switch sets to ON position and remains in ON position	Ignition switch can not be set to on position. Probable cause: defective switch	Ship test stand and report discrepancy to direct or general support maintenance as applicable
5	Set starter switch (item 5, figure 2-2) to up position, hold momentarily and release switch until engine starts	Engine starts to crank and then starts up	1. Engine will not crank. Probable cause: a. Ignition switch in OFF position b. Battery cables loose or terminal connections corroded c. Battery discharged d. Starter solenoid defective or wiring disconnected on terminals	1. a. Set ignition switch to ON and hold starter switch to up position b. Tighten battery cables to terminal and clean off terminals c. Service battery (refer to Chapter 3, Section I, Paragraph 3-7) d. Tighten loose or disconnected wiring Ship test stand and report all other discrepancies to direct or general support maintenance as applicable
			2. Engine cranks but will not start running. Probable cause: a. carburetor flooded b. loose connections on spark plugs or magneto	2. a. Wait 10 minutes before starting engine again b. Tighten loose wiring, or reconnect spark plug and magneto wiring

TABLE 3-7. ENGINE START UP PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
5 (cont)			c. Same as step 5, Abnormal Indication b. through d.	c. See step 5, above, rective action 1. b. through 1. d. Report all other discrepancies and ship test stand to direct or general support maintenance
6	Open choke slowly (item 1, figure 2-2) pushing control	Engine will start running smoothly at desired RPM. Check RPM on tachometer (item 6, Figure 2-1)	1. Engine stops suddenly. Probable cause: a. Carburetor flooded b. Fuel tank empty c. Water, dirt or gum in fuel strainer d. Air cleaner clogged	1. a. Wait 10 minutes and start up engine again as noted in step 5 b. Check test stand fuel supply, replenish if empty c. Clean fuel strainer d. Service air cleaner
			2. Engine runs erratic Probable cause: Carburetor out of adjustment or foreign matter in fuel tank	2. Report all discrepancies and ship test stand to direct or general support maintenance as applicable
			3. Engine exhaust smokey (black) Probable cause: defective engine components Engine exhaust smokey (white) Probable cause: carburetor adjustment off	3. Report discrepancy and ship test stand to direct or general support maintenance as applicable

TABLE 3-7. ENGINE START UP PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
6 (cont)			4. Test stand fuel consumption too high. Probable cause: a. Choke control too far out b. Air cleaner clogged c. Fuel leaks	4. a. Reset choke - pushing same home b. Service air cleaner c. Report discrepancy and ship test stand to direct or general support maintenance as applicable
7	Let engine warm up (10 min. approximately to normal operating temperature	Observe normal engine oil pressure on oil pressure gage (item 5, figure 2-1). Indication shall be between XX and ON. (May also indicate ON)	Oil pressure indicator gage indicates abnormal oil pressure. Probable cause: 1. insufficient engine lubrication 2. oil filter clogged	1. Check engine crank-case oil level (see figure 3-2) and service if necessary as per table 3-3 2. Report discrepancy and ship test stand to direct or general support maintenance as applicable
8	Raise engine speed to 2000 RPM using throttle and lock to this speed (item 3, figure 2-2)	Observe raised RPM on tachometer (item 6, figure 2-1)	Unable to raise engine RPM as seen on tachometer, Probable cause: defective gage, defective carburetor	Report discrepancy and ship test stand to direct or general support as applicable

TABLE 3-8. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
1	Test 1 Open reservoir shutoff valve (item 15, figure 2-1) and position outlet selector valve (item 17, Figure 2-1) to the 3/4 inch outlet.	Able to open reservoir shutoff valve Able to position outlet selector valve	Unable to open reservoir shutoff valve Unable to position outlet selector valve Probable cause: defective selector valve	Ship test stand and report discrepancies to direct or general support maintenance as applicable

TABLE 3-8. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3 (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
1 (cont)	Test 2 Open reservoir shutoff valve (item 15, figure 2-1) and position outlet selector valve (item 17, Figure 2-1) to the 1/2 inch outlet	Able to open reservoir shutoff valve Able to position outlet selector valve	Unable to open reservoir shutoff valve Unable to position outlet selector valve Probable cause: defective valve	Ship test stand and report discrepancies to direct or general support maintenance as applicable
	Test 3 Open reservoir shutoff valve (item 15, figure 2-1) and position outlet selector valve to the 1/2 inch or 3/4 inch outlet as applicable	Able to open reservoir shutoff valve Able to position outlet selector valve	Unable to open reservoir shutoff valve Unable to position outlet selector valve Probable cause: defective valve	Ship test stand and report discrepancies to direct or general support maintenance as applicable
2	Test 1, 2 and 3 Close compensator shutoff valve (item 22, figure 2-1) turning control slowly in CW direction	Able to close compensator shutoff valve	Unable to close compensator shutoff valve Probable cause: defective valve	Ship test stand and report discrepancies to direct or general support maintenance as applicable
3	Adjust pump volume control (item 20, figure 2-1) to desired GPM, turning handle in CW direction to increase flow and in CCW direction to decrease flow. Lock pump volume control after obtaining desired flow	Hydraulic pump pumping selected GPM as indicated on suction flow gage (item 10, figure 2-1) Fluid Pressure gage (item 9, figure 2-1) will indicate a low level pressure reading below 1,000 psi	Hydraulic pump pumping less than selected GPM as indicated on flow indicator. Probable cause: 1. Volume control not adjusted properly 2. Compensator shutoff valve not fully closed 3. Insufficient hydraulic fluid 4. Clogged low pressure filter	1. Readjust volume control 2. Close shutoff valve 3. Replenish hydraulic fluid (refer to chapter 3, Sect. I, para. 3-9) 4. Report all other discrepancies and ship test stand to direct or general support maintenance as required

TABLE 3-8. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3 (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
4	Slowly close high pressure bypass valve (item 2, figure 2-1) turning handle in CW direction	Able to close high pressure bypass valve	Unable to close high pressure bypass valve	Ship test stand and report discrepancy to direct or general support maintenance as applicable
5	Adjust high pressure relief valve (item 1, figure 2-1) to relieve pressure of system under test to 200 psi above system under test pressure	Fluid pressure gage (item 9, figure 2-1) indicates up to 200 psi pressure above system under test	Fluid pressure gage indicates above 200 psi of system under test. Probable cause: 1. high pressure relief valve improperly adjusted 2. high pressure relief valve defective	Slowly open high pressure bypass valve (item 2, figure 2-1). Shut down system test and report discrepancy to direct or general support maintenance as required
6	Open compensator shutoff valve (item 22, figure 2-1) fully turning control in CCW direction	Fluid pressure gage (item 9, figure 2-1) decreases to some low reading under 1000 psi	Unable to open shutoff valve. Probable cause: defective shutoff valve	Shut down test stand. Ship and report discrepancy to direct or general support maintenance as applicable
7	Adjust pressure compensator control (item 21, figure 2-1) in CW direction as required to obtain desired pressure.	Fluid pressure gage (item 9, figure 2-1) will now indicate the selected system pressure	Unable to adjust pressure compensator control. Probable cause: defective pressure compensator	Report discrepancy and ship test stand to direct or general support maintenance as required
			Fluid pressure gage (item 9, figure 2-1) indicates other than system pressure. Probable cause: defective pressure compensator control or defective gauge	Report discrepancy and ship test stand to direct or general support maintenance as required
8	Open high pressure bypass valve (item 2, figure 2-1) turning control in CCW direction	Fluid pressure gage (item 9, figure 2-1) will decrease to some low reading.	Fluid pressure gage (item 9, figure 2-1) remains at same indication. Probable cause: defective high pressure bypass valve	Shut test stand down. Report discrepancy and ship test stand to direct or general support maintenance as applicable

TABLE 3-8. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3 (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
9	Insure positioning of selector outlet valve (item 17, figure 2-1) to desired outlet position (refer to step 1)			
10	Open 1/2-inch and 3/4-inch flow control valves (items 16 and 19, figure 2-1) for tests 1 and 2 (as desired return lines) Open either 1/2-inch or 3/4-inch flow control valve (items 16 and 19, figure 2-1) for test 3 as required			
11	Close high pressure bypass valve (item 2, figure 2-1) turning control in CW direction	Hydraulic test stand high pressure output safetied by selected compensator setting	Fluid pressure gage (item 9, figure 2-1) rises above 200 psi system pressure under test. Probable cause: 1. defective high pressure relief valve (item 1, figure 2-1) 2. high pressure shutoff valve (item 4, figure 2-1) improperly set or broken 3. fluid pressure gage (item 9, figure 2-1) out of calibration	Shut test stand down. Report discrepancy and ship test stand to direct or general support maintenance as applicable
		Hydraulic fluid enters system under test	Fluid not entering system under test. Probable cause: 1. defective selector outlet valve 2. defective flow control valve (outlet side) 3. hydraulic system under test has fluid blockage	
		Hydraulic fluid returns from system under test	Fluid not returning from system under test. Probable cause: 1. defective flow control valve (inlet side)	

TABLE 3-8. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3 (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
11 (cont)			2. defective selector outlet valve 3. hydraulic system under test has fluid blockage	
12	Readjust if necessary flow control valves (items 16 and 19, figure 2-1), step 11; pressure compensator (item 21, figure 2-1), step 7; and volume control (item 20, figure 2-1), step 3 to obtain exact conditions			

TABLE 3-9. TEST STAND SHUTDOWN PERFORMANCE CHECKS

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
1	Open high pressure bypass valve (item 3, figure 2-1) turning control in CCW direction	Decrease in fluid pressure gage (item 9, figure 2-1) indication	Fluid pressure gage (item 9, figure 2-1) remains at same pressure indication. Probable cause: defective high pressure bypass valve (item 3, figure 2-1)	Ship and report discrepancies to direct or general support maintenance as applicable
2	Turn pressure compensator control (item 21, figure 2-1) in CCW direction to open	Reduced system pressure	System pressure under test does not decline as indicated on fluid pressure gage (item 9, figure 2-1) Probable cause: defective pressure compensator	Ship and report discrepancies to direct or general support maintenance as applicable
3	Close both flow control valves (items 16 and 19, figure 2-1) turning controls in CW direction	Able to close valves, shutting off hydraulic fluid to and from test stand to system under test	Unable to close valve (items 16 and 19, figure 2-1) Probable cause: defective valves	Close hydraulic fluid reservoir valve (item 15, figure 2-1). Set outlet selector valve to position of defective flow control valve

TABLE 3-9. TEST STAND SHUTDOWN PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
3 (cont)				Ship and report discrepancies to direct or general support maintenance as applicable
4	Idle engine of test stand for approximately 5 min. adjusting throttle (item 3, figure 2-2)	Test stand engine idles smoothly	Test stand stalls out consistently. Probable cause: 1. defective fuel pump (fig. 3-2) 2. clogged fuel strainer (fig. 3-2) 3. defective carburetor adjustment	Ship and report discrepancies to direct or general support maintenance as applicable
5	Set ignition switch to OFF position (item 2, figure 2-2)	Test stand engine stops	Test stand continues operation for several minutes. Probable cause: 1. defective ignition switch 2. high engine temperature	Ship and report discrepancies to direct or general support maintenance as applicable
6	Remove hoses between test stand and system under test	Able to remove hoses	Unable to remove hose(s). Probable cause: defective coupling	Ship and report discrepancies to direct or general support maintenance as applicable

SECTION V

REPAIR AND REPLACEMENT OF AUTHORIZED PARTS

3-38. REMOVAL AND REPLACEMENT

3-39. The following components are authorized for removal and replacement of the organizational level.

3-40. BATTERY. (See figure 3-4) Remove and replace the battery as follows:

1. Remove nut (1) and washer (2) from hook bolt (3) holding battery cover (4) over battery.

2. Remove battery terminal adapters (5 and 6) positive side first, from battery terminal, by loosening nut on adapter.

3. Remove the remaining battery terminal adapter (ground) from battery terminal by loosening nut on adapter.

4. Remove defective battery and replace with a good battery.

5. Clean new battery terminals and both battery terminal adapters with a stiff wire brush.

6. Install both battery terminal adapters onto battery terminals.

7. Tighten each nut on battery terminals until they are secured in place and will not move.

8. Replace battery cover over battery, by inserting ends of hook bolts through holes in cover.

9. Secure battery cover with washer and nut to each hook bolt.

3-41. AIR CLEANER. (See figure 3-5.) Disassemble the air cleaner and service as follows:

1. Remove the air intake cap (4).

2. Loosen the thumbscrew (5) and remove the oil cup (6) from the air cleaner assembly.

3. Discard the oil in the oil cup. Wash the oil cup and air intake in an approved cleaning solvent (item 1, table 1-7) and dry thoroughly.

4. Fill the oil cup the level mark with clean oil of the proper grade. Refer to the lubrication table 3-5. Install the oil cup on the air cleaner body and tighten the thumbscrew to secure.

5. Install the air intake cap on the top of the air cleaner assembly.

3-42. TIRE. (See figure 3-6.) To remove the tire from the test stand proceed as follows:

1. Relieve weight on tire by hoisting corner of test stand with jack or appropriate instrument.

2. Remove five lug nuts (1) and washers (2).

3. Remove tire (3) with tube and rim assembly from test stand.

CAUTION

Before proceeding ensure that tire tube is completely deflated by removing valve cap (6) and valve stem (7).

4. Remove five nuts (8) washers (9) and bolts (l0).

5. With a tire iron or other prying tool, separate two wheel halves (5 and 11). Remove tire and deflated tube.

6. To replace tire and tube, place deflated tube within tire.

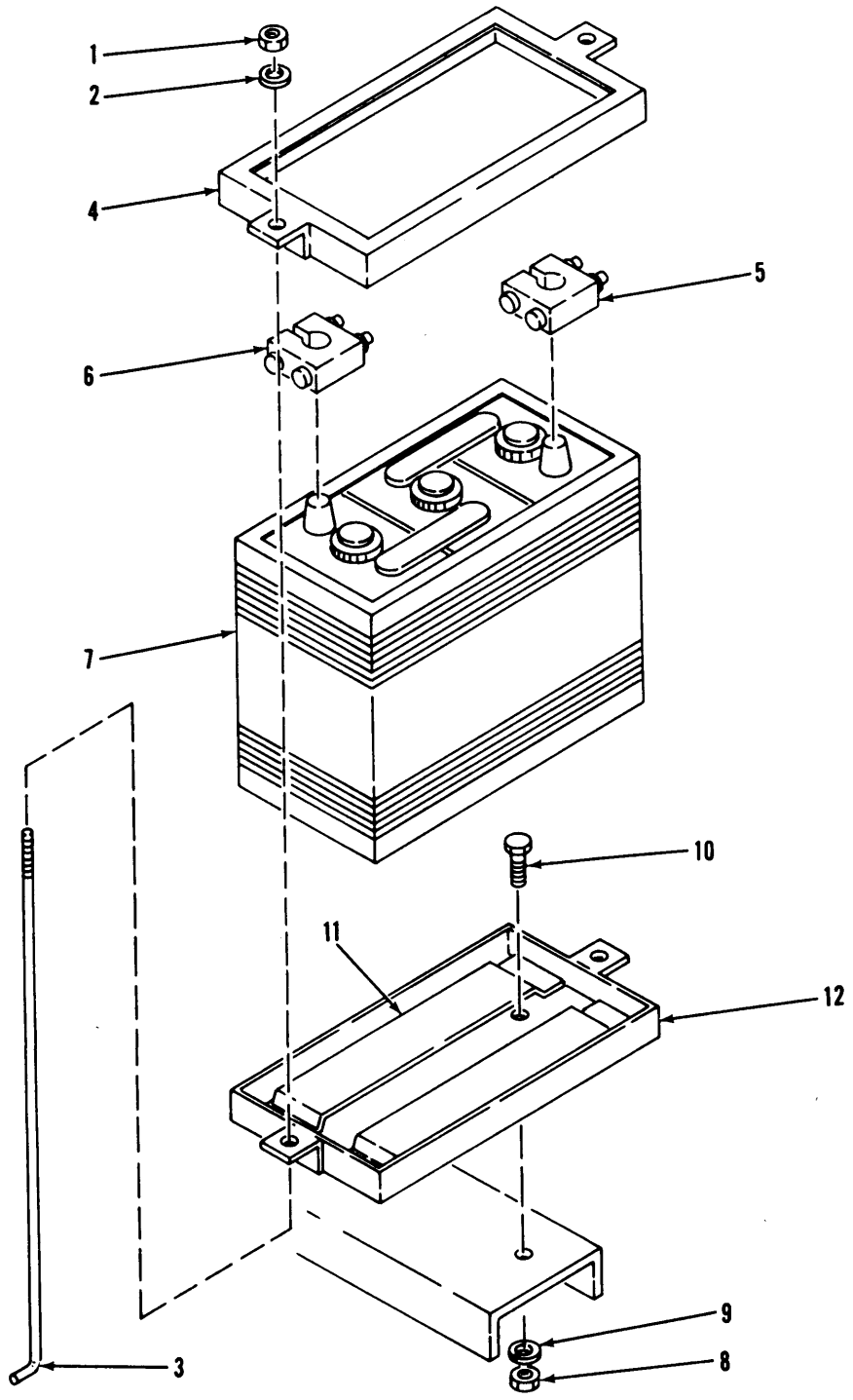
7. Insert rim halves. It may be necessary to lubricate rim surfaces in order to slide tire on.

8. Using nuts, bolts and washers, fasten rim halves together.

9. Replace assembled tire and rim over axle spindle and mount with lug nuts and washers.

10. Before replacing valve stem and cap, inflate tube to remove internal wrinkles and creases. Allow air to escape.

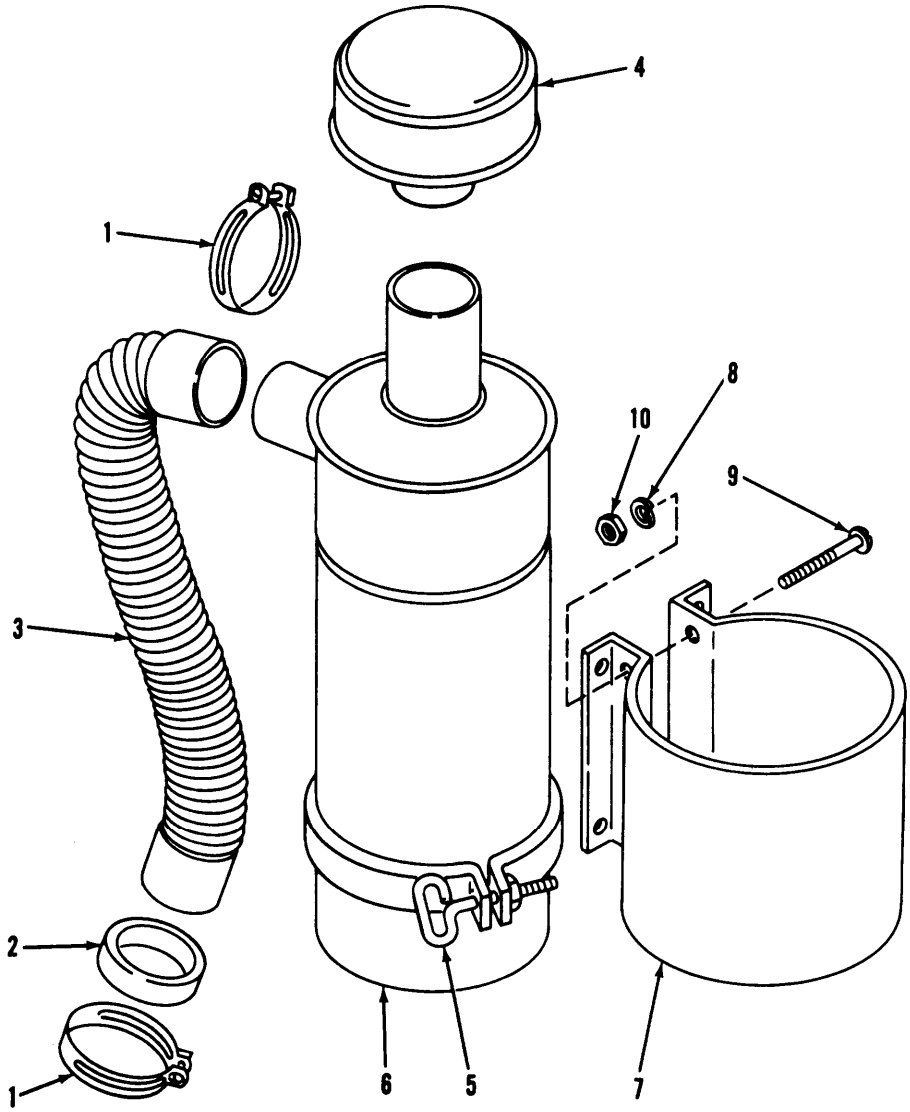
11. Replace valve stem and cap and inflate tube to 60 psi.



1. Nut
2. Lockwasher
3. Hook bolt
4. Hold down cover
5. Terminal adapter
6. Terminal adapter
7. Storage battery
8. Nut
9. Lockwasher
10. Screw
11. Support
12. Battery tray

UMC-23A

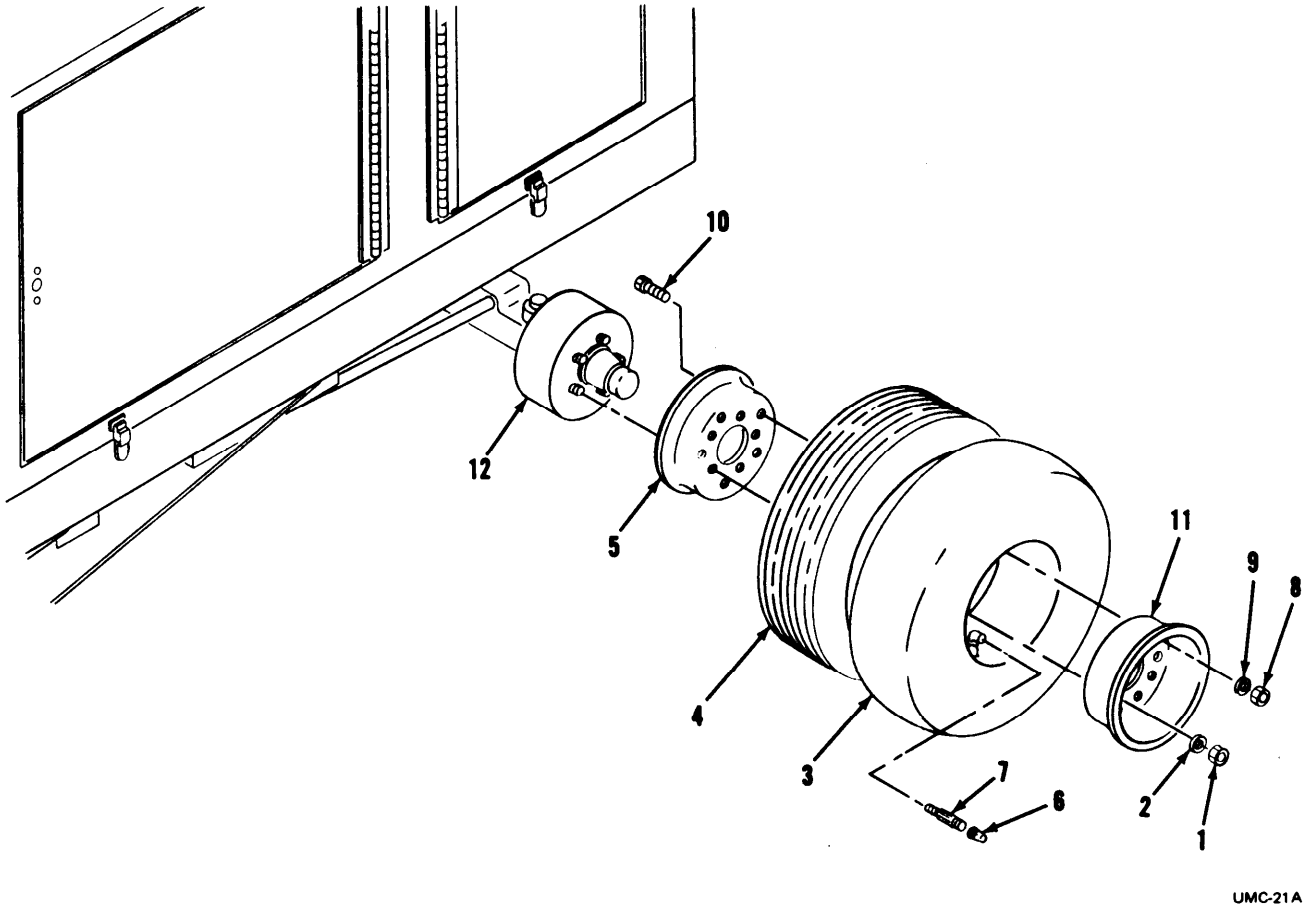
Figure 3-4. Battery, Removal and Replacement.



UMC-24A

1. Clamp
2. Spacer
3. Hose
4. Cap
5. Thumbscrew
6. Oil cap
7. Mounting band
8. Lockwasher
9. Screw
10. Nut

Figure 3-5. Air Cleaner Disassembly.



1. Nut
2. Washer
3. Tube
4. Tire
5. Wheel half
6. Valve cap
7. Valve stem
8. Nut
9. Washer
10. Bolt
11. Wheel half
12. Brake drum

Figure 3-6. Tire and Tube Removal and Replacement.

CHAPTER 4

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

SECTION I

PREPARATION FOR MAINTENANCE STORAGE AND SHIPMENT

4-1. GENERAL.

4-2. Preparation for maintenance storage and reshipment at the direct and general support maintenance level is identical to organizational maintenance level. Refer to Chapter 3, Section I for details.

SECTION II.

CHECKOUT AND ANALYSIS

4-3. CHECKOUT INSTRUCTIONS.

4-4. Tables 4-1 through 4-4 list detail performance checks at the direct or general support maintenance facility. Figure 4-1 illustrates various test setups to accomplish the performance checks. For probable cause and corrective actions refer to Abnormal Indication and Corrective Action columns in checkout procedures following. Determination of exact failure is accomplished through trouble analysis, paragraph 4-3 Repair procedures required for specific units are listed under one or more of four functional groups in Chapter 4, Section III.

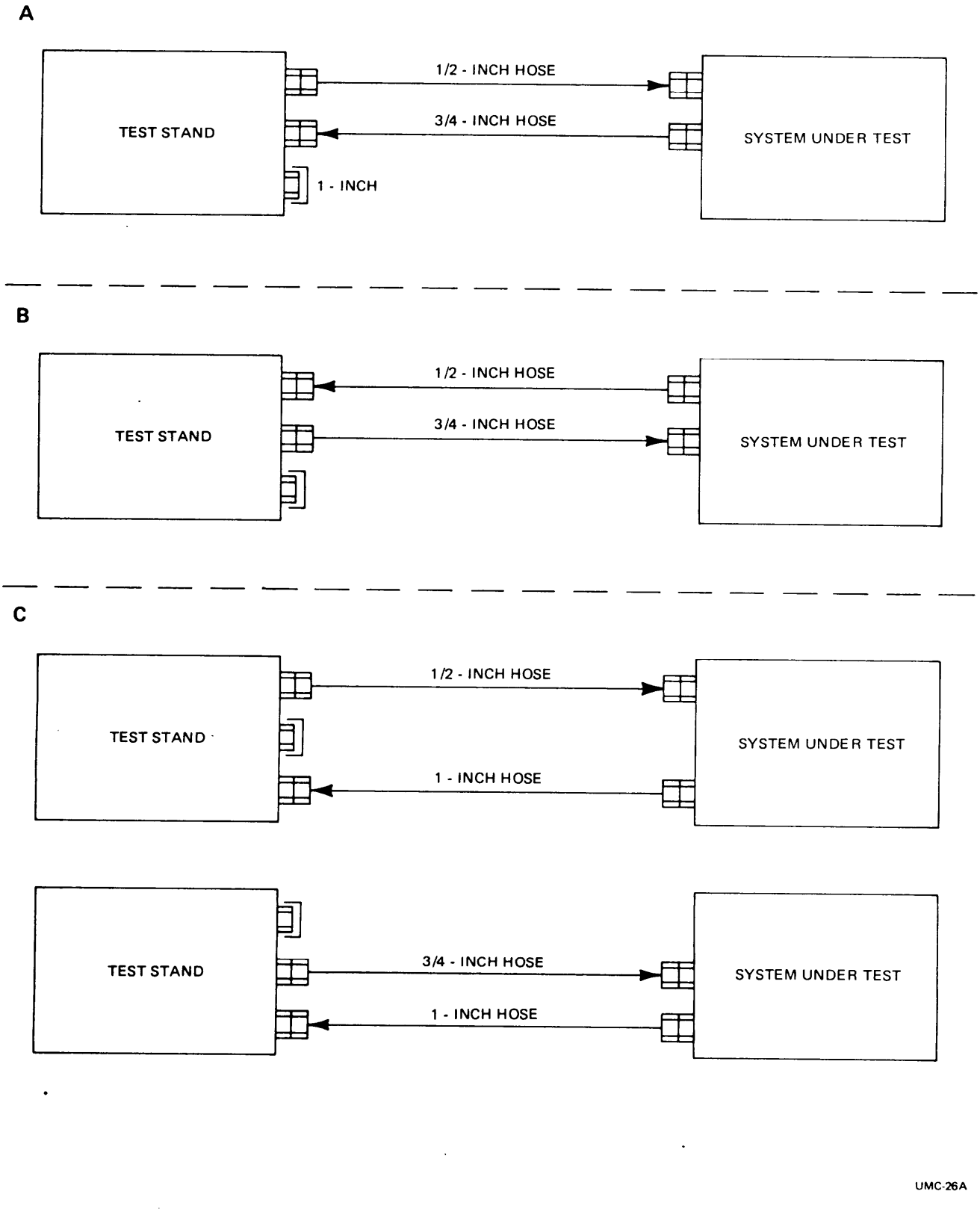


Figure 4-1. Test Setups for Tests 1, 2, and 3

TABLE 4-1. PRELIMINARY PERFORMANCE CHECKS

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	[redacted]	[redacted]	RRECTIVE CTION
1	Set parking brake	Test stand not free to roll	Test stand wheels will not wheels continue to roll fre 1. Faulty handbrake asse 2. Faulty handbrake rod 3. Faulty brake shoes on wheels		1. 2. 3.	pect, test, adjust replace at direct port maintenance pect, test or replace required at direct port maintenance
2	Open access doors of cabinet assembly and lock in open position	Doors open freely and are able to be locked into position	Door latches can not be op and locks can not be posit in place keeping doors ope to defective: 1. Latches 2. Hinges 3. Locking bars		1 2 3 1	pect, test and replace required at direct port maintenance pect, test and replace required at direct port maintenance place as required at ect support intenance place as required at ect support intenance
3	Connect each hose assembly to respective test stand coupling, then remove unwanted hose(s). (See figure 4-1)	Hose coupling locks to coupling on test stand	1. Hose coupling can not attached to test stand coupling due to defect coupling on hose or te stand		2	place defective hose direct support maintenance as may be plicable
	Connect opposite end of hose assembly(s) to respective coupling on system under test. (See figure 4-1)	Opposite hose coupling locks to system under test coupling	2. Hose coupling can not attached to system un test due to defective coupling on hose			place defective hose direct support maintenance as may be plicable

TABLE 4-1. PRELIMINARY PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
4	Fill gas tank to full capacity	Fuel gage indicate full	Fuel gage does not indicate, 1. Gage broken Fuel gage indicates partially filled tank, due to 2. faulty calibration	1. Replace broken gage at direct support maintenance (paragraph 4-11)
5	Turn pressure compensator control (item 21, figure 2-1) to full CCW position to open	Pressure compensator control moves freely to CCW direction	Pressure compensator control binds or can not be turned in CCW direction due to defective control	Test and adjust at direct support maintenance. Replace if defective at general support maintenance
6	Turn compensator shutoff valve (item 23, figure 2-1) to full CCW position to open	Compensator shutoff valve turns freely to CCW direction	Compensator shutoff valve binds or can not be turned in CCW direction due to defective valve	Adjust and replace as applicable at direct support maintenance. Repair and overhaul at general support maintenance
7	Turn flow control valve (item 16, figure 2-1) to full CW position to close	Flow control valve (item 16) turns freely to CW direction	Flow control valve (item 16) binds or can not be turned in CW direction. Valve defective	Adjust and replace as applicable at direct support maintenance. Repair and overhaul at general support maintenance
8	Turn flow control valve (item 19, figure 2-1) to full CW position to close	Flow control valve (item 19) turns freely to CW direction	Flow control valve (item 19) binds or can not be turned in CW direction. Valve defective	Adjust and replace as applicable at direct support maintenance. Repair and overhaul at general support maintenance
9	Turn high pressure relief valve (item 1, figure 2-1) to full CCW position to open	High pressure relief valve turns freely to CCW direction	High pressure relief valve binds or can not be turned in CCW direction. Valve defective	Adjust and replace as applicable at direct support maintenance. Repair and overhaul at general support maintenance

TABLE 4-1. PRELIMINARY PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
10	Turn fluid pressure gage shutoff valve (item 4, figure 2-1) to full CCW position to open	Fluid pressure gage shutoff valve turns freely to CCW direction	Fluid pressure gage shutoff valve binds or can not be turned in CCW direction. Valve defective	Replace at direct support maintenance
11	Set reservoir shutoff valve control (item 15, figure 2-1) to full CCW position (horizontal) to open	Reservoir shutoff valve control turns freely in CCW (horizontal) direction	Reservoir shutoff valve control binds or can not be turned in CCW (horizontal) direction. Valve defective	Adjust and replace as applicable at direct support maintenance. Repair and overhaul at general support maintenance
12	Turn high pressure bypass valve (item 2, figure 2-1) to full CCW position to open	High pressure bypass valve turns freely to CCW direction	High pressure bypass valve binds or can not be turned in CCW direction. Valve defective	Adjust and replace as applicable at direct support maintenance. Repair and overhaul at general support maintenance
13	Set suction pressure valve (item 24, figure 2-1) to FILTER OUT position (vertical position) and FILTER IN. Return valve to FILTER OUT	Suction pressure valve sets freely to FILTER OUT position (vertical) and FILTER IN position	Suction pressure valve binds or can not be set to FILTER OUT or FILTER IN	Adjust and replace as applicable at direct support maintenance. Repair and overhaul at general support maintenance

TABLE 4-2. ENGINE START UP PERFORMANCE CHECKS

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
1	Pull and keep out positive action ground switch (item 3, figure 2-3)	Positive action ground switch pulls out and remains out	Positive action ground switch does not pull out, engine will not start. Defective positive action switch no magneto assembly	Replace at direct support maintenance

TABLE 4-2. ENGINE START UP PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
2	Pull choke control (item 1, figure 2-2) to full out position and then reset to approximately midway position	Choke control pulls to full out position and can be set to approximately midway position	Choke control does not pull out or pulls out only partially. Probable cause: 1. Defective carburetor 2. Stuck cable to carburetor linkage 3. Choke control binds when pulled out probable cause defective or stuck choke cable to carburetor or stuck carburetor linkage	1. Adjust or replace as applicable at direct support maintenance. Repair and overhaul at general support maintenance 2. and 3. Test, adjust and/or replace as applicable choke cable to carburetor linkage at direct support maintenance
3	Pull throttle (item 3, figure 2-2) straight out to full out position (fully opened) and reset to approximately one-quarter position. Twist to right and release to lock into position	Throttle pulls to full out and can be set to approximately one-quarter position, locking throttle when released	Throttle does not pull to full out position and can not be locked to one-quarter position, probable cause: 1. Jammed throttle cable 2. Jammed throttle linkage 3. Carburetor	1. and 2. Test, adjust and/or replace as applicable throttle cable to carburetor linkage at direct support maintenance (paragraph 4-13) 3. Repair and overhaul carburetor at general support maintenance (paragraph 4-17)
4	Set ignition switch (item 2, figure 2-2) to ON position	Ignition switch sets to ON position and remains in ON position	Ignition switch can not be set to on position, probable cause: defective switch	Replace at direct support maintenance (paragraph 4-12)
5	Set starter switch (item 5, figure 2-2) to up position, hold momentarily and release switch until engine starts	Engine starts to crank and then starts up	1. Engine will not crank. Probable cause: a. Ignition switch in OFF position (item 2, figure 2-2) b. Battery cable(s) broken c. Starter switch or wiring defective d. Starter solenoid or wiring defective e. Battery discharged	a. Set ignition switch to ON (hold starter switch to up position) b. Test and replace battery cable as required at direct support maintenance c. Test and replace starter switch and/or wiring to and from starter switch

TABLE 4-2. ENGINE START UP PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
5 (cont)				at direct support maintenance d. Test and replace starter solenoid and/or wiring to and from starter solenoid as required at direct support maintenance e. Replace or charge battery
			2. Engine cranks but will not start running, probable cause: a. Carburetor flooded b. Carburetor defective c. Spark plugs defective (item 4, figure 4-4) d. Magneto defective (item 1, figure 4-2) e. Battery discharged	a. Wait ten minutes before attempting start. Repeat start of engine by insuring ignition switch is set to ON position and hold starter switch momentarily to up position until engine starts to crank b. Adjust or replace carburetor as required at direct support maintenance. Repair and overhaul carburetor at general support maintenance c. Replace defective spark plugs at direct support maintenance d. Replace defective magneto at direct support maintenance e. Replace or charge battery

TABLE 4-2. ENGINE START UP PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
6	Open choke slowly (item 1, figure 2-2) pushing control	Engine will start running smoothly at desired RPM see tachometer (item 6, figure 2-1)	1. Engine stops suddenly, probable cause: a. Carburetor flooded b. Defective carburetor c. Defective air cleaner d. Thermal switch on manifold defective insufficient hydraulic fluid in test stand e. Insufficient fuel	a. Wait ten minutes and start up engine again as noted in step 5 b. Adjust or replace carburetor as required at direct support maintenance. Repair and overhaul carburetor at general support maintenance (paragraph 4-17) c. Repair defective air cleaner at direct support maintenance d. Replace thermal switch on manifold at direct support maintenance e. Service with fuel
			2. Engine runs erratic, probable cause: a. Carburetor out of adjustment Defective carburetor b. Foreign matter in fuel tank c. Foreign matter in fuel strainer d. Defective fuel pump	a. Adjust or replace carburetor as required at direct support maintenance (paragraph 4-13). Repair and overhaul carburetor at general support maintenance (paragraph 4-17)

TABLE 4-2. ENGINE START UP PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
6 (cont)				b. Flush fuel tank or replace damaged fuel tank at direct support maintenance
				c. Replace fuel strainer at direct support maintenance
				d. Replace fuel pump at direct support maintenance (paragraph 4-13)
				Repair fuel pump at general support maintenance (paragraph 4-17)
			3. a. Engine exhaust smokey (black), probable cause: defective internal engine components	a. Inspect, replace, repair and overhaul at general support maintenance as required
			b. Engine exhaust smokey (white), probable cause: carburetor out of adjustment	b. Adjust or replace carburetor as required at direct support maintenance (paragraph 4-13)
			c. Carburetor defective	c. Repair and overhaul carburetor at general support maintenance as required (paragraph 4-17)
			4. Test stand fuel consumption too high, probable cause: a. Choke control on carburetor out of adjustment b. Air cleaner clogged c. Fuel leaks out from tubing, fittings and hose assemblies	a. Adjust carburetor at direct support maintenance (paragraph 4-5(c) (3)) b. Replace air cleaner at direct support maintenance

TABLE 4-2. ENGINE START UP PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
6 (cont)				c. Replace defective tubing, fittings, and/or hose assemblies of test stand at direct support maintenance as required (paragraph 4-13)
7	Let engine warm up (10 minutes approximately) to normal operating temperature	Observe normal engine temperature on oil pressure gage (item 5, figure 2-1. Indication shall be between XX and ON (may also indicate ON)	Oil pressure indicator gage indicates abnormal oil pressure, probable cause: a. Insufficient engine lubrication b. Oil filter clogged (item 2, figure 4-2) c. Oil pressure gage defective (item 5, figure 2-1)	a. Drain and refill with oil as listed in table 3-5 at direct support maintenance b. Replace oil filter at direct support maintenance and drain crankcase oil. Refill crankcase with oil as specified in table 3-5 c. Test and replace oil pressure gage at direct support maintenance
8	Raise engine speed to 2000 RPM using throttle and lock to this speed (item 3, figure 2-2)	Observe raised RPM on tachometer (item 6, figure 2-1)	Engine RPM increases but gage does not indicate rise in RPM, probable cause: 1. Defective RPM gage 2. Defective carburetor or adjustment off	1. Remove and replace tachometer at direct support maintenance 2. Adjust carburetor at direct support maintenance if ineffective replace at direct support maintenance and repair and overhaul at general support maintenance

TABLE 4-3. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
1	Test 1 (Figure 4-1, B) Open reservoir shutoff valve (item 15, figure 2-1) and position outlet selector valve (item 17, Figure 2-1) to the 3/4 inch outlet	Able to open reservoir shutoff valve Able to position outlet selector valve	Unable to open reservoir shutoff valve Unable to position outlet selector valve. Probable cause: defective valve	Adjust and replace at direct support maintenance Repair and overhaul at general support maintenance
	Test 2 (Figure 4-1, A) Open reservoir shutoff valve (item 15, figure 2-1) and position outlet selector valve (item 17, Figure 2-1) to the 1/2 inch outlet	Able to open reservoir shutoff valve Able to position outlet selector valve	Unable to open reservoir shutoff valve Unable to position outlet selector valve. Probable cause: defective valve	Adjust and replace at direct support maintenance Repair and overhaul at general support maintenance
	Test 3 (Figure 4-1, C) Open reservoir shutoff valve (item 15, figure 2-1) and position outlet selector valve to the 1/2-inch or 3/4-inch outlet as applicable	Able to open reservoir shutoff valve Able to position outlet selector valve.	Unable to open reservoir shutoff valve Unable to position outlet selector valve. Probable cause: defective valve	Adjust and replace at direct support maintenance Repair and overhaul at general support maintenance

TABLE 4-3. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3 (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
2	Test 1, 2 and 3 Close compensator shutoff valve (item 22, figure 2-1) turning control slowly in CW direction	Able to close compensator shutoff valve	Unable to close compensator shutoff valve, probable cause: defective valve	Adjust and replace at direct support maintenance Repair and overhaul at general support maintenance
3	Adjust pump volume control (item 20, figure 2-1) to desired GPM, turning handle in CW direction to increase flow and in CCW direction to decrease flow Lock pump volume control after obtaining desired flow	Hydraulic pump pumping selected GPM as indicated (item 10, figure 2-1) Fluid pressure gage (item 9, figure 2-1) will indicate a low level pressure reading below 1000 psi Indicator lamp LP Δ P (item 3, figure 2-1) not illuminated	Hydraulic pump pumping less than selected GPM as indicated on flow indicator, probable cause: 1. Volume control not adjusted properly 2. Compensator shutoff valve not fully closed 3. Insufficient hydraulic fluid 4. Indicator lamp LP Δ P (item 3, figure 2-1) illuminated, probable cause: clogged low pressure filter	1. Readjust volume control 2. Close compensator shutoff valve 3. Replenish hydraulic fluid in accordance to Chapter 3, Section I, paragraph 3-9 4. Replace low pressure filter (item 7, figure 4-3) at direct support maintenance
4	Slowly close high presuure bypass valve (item 2, figure 2-1) turning handle in CW direction	Able to close high pressure bypass valve	Unable to close high pressure bypass valve	Adjust and replace high pressure bypass valve at direct support maintenance Repair and overhaul high pressure bypass valve at general support maintenance

TABLE 4-3. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3 (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
5	Adjust high pressure relief valve (item 1, figure 2-1) to relieve pressure of system under test to 200 psi above system under test pressure	Fluid pressure gage (item 9, figure 2-1) indicates a pressure up to 200 psi pressure above system under test	Fluid pressure gage indicates above 200 psi pressure of system under test, probable cause: 1. High pressure relief valve improperly adjusted 2. High pressure relief valve defective	1. Slowly open high pressure bypass valve (item 2, figure 2-1). Shut down system under test and adjust or replace high pressure relief valve as applicable at direct support maintenance 2. Ship replaced valve to general support maintenance for repair and overhaul
6	Open compensator shutoff valve (item 22, figure 2-1) fully turning control in CCW direction	Fluid pressure gage (item 9, figure 2-1) decreases to some low reading under 1000 psi	Unable to open shutoff valve, probable cause: defective shutoff valve	Shut down system under test and adjust or replace compensator shutoff valve as applicable at direct support maintenance Repair and overhaul compensator shutoff valve at general support maintenance
7	Adjust pressure compensator control (item 21, figure 2-1) in CW direction as required to obtain desired pressure	Fluid pressure gage (item 9, figure 2-1) indicates selected system pressure	Unable to adjust pressure compensator control. Probable cause: defective pressure compensator Fluid pressure gage (item 9, figure 2-1) indicates other than system pressure 1. Defective pressure compensator control 2. Defective gauge	1. Test and adjust pressure compensator valve at direct support maintenance Replace the pressure compensator valve at general support maintenance

TABLE 4-3. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3 (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
7 (cont)				2. Replace pressure gauge
8	Open high pressure bypass valve (item 2, figure 2-1) turning control in CCW direction	Fluid pressure gage (item 9, figure 2-1) will decrease to some low reading	Fluid pressure gage (item 9, figure 2-1) remains at same indication, probable cause: defective high pressure bypass valve	Refer to step 4 for corrective action
9	Insure positioning of selector outlet valve (item 17, figure 2-1) to desired outlet position (refer to step 1)			
10	Open 1/2-inch and 3/4-inch flow control valves (items 16 and 19, figure 2-1) for tests 1 and 2 (as desired return lines) Open either 1/2-inch or 3/4-inch flow control valve (items 16, 19 figure 2-1) for test 3 as required			

TABLE 4-3. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3 (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
11	Close high pressure bypass valve (item 2, figure 2-1) turning control in CW direction	Hydraulic test stand high pressure output safetied by selected compensator setting	Fluid pressure gage (item 9, figure 2-1) rises above 200 psi system pressure under test, probable cause: 1. Defective high pressure relief valve (item 1, figure 2-1) 2. High pressure shutoff valve (item 4, figure 2-1) improperly set or broken 3. Fluid pressure gage (item 9, figure 2-1) out of adjustment	Shut down test stand and; 1. Adjust and replace high pressure relief valve at direct support maintenance 2. Adjust and replace high pressure shutoff valve at direct support maintenance Repair and overhaul either defective high pressure relief valve or high pressure shutoff valve as applicable at general support maintenance 3. Remove and replace fluid pressure gage at direct support maintenance
		Hydraulic fluid enters system under test	Fluid not entering system under test, probable cause: 1. Defective selector outlet valve 2. Defective flow control valve (outlet side) 3. Hydraulic system under test has fluid blockage because of closed reservoir hydraulic fluid shutoff valve	Shut down test stand and: 1. Adjust and replace selector outlet valve a direct support maintenance 2. Adjust and replace flow control valve at direct support maintenance Repair and overhaul either defective valve as applicable at general support maintenance 3. Open reservoir hydraulic fluid shutoff valve

TABLE 4-3. MAIN CONTROL PANEL HYDRAULIC PERFORMANCE CHECKS DURING TESTS 1, 2 AND 3 (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
11 (cont)		Hydraulic Fluid returns from system under test	Fluid not returning from system under test, probable cause: 1. Defective flow control valve (inlet side) 2. Defective selector outlet valve 3. Hydraulic system under test has fluid blockage because of closed reservoir hydraulic fluid shutoff valve	Shut down test stand and 1. Adjust and replace flow control valve at direct support maintenance 2. Adjust and replace selector outlet valve at direct support maintenance Repair and overhaul either defective valve as applicable at general support maintenance 3. Open reservoir hydraulic fluid shutoff valve
12	Readjust if necessary flow control valve (items 16 and 19, figure 2-1), step 11; pressure compensator (item 21, figure 2-1), step 7; and volume control (item 20, figure 2-1), step 3 to obtain exact conditions			

TABLE 4-4. TEST STAND SHUTDOWN PERFORMANCE CHECKS

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
1	Open high pressure bypass valve (item 3, figure 2-1) turning control in CCW direction	Decrease in fluid pressure gage (item 9, figure 2-1) indication	Fluid pressure gage (item 9, figure 2-1) remains at same pressure indication, probable cause: 1. Defective high pressure bypass valve (item 3, figure 2-1) 2. Gage defective	Shut down test stand 1. Adjust and replace high pressure bypass valve at direct support maintenance Repair and overhaul high pressure bypass valve at general support maintenance

TABLE 4-4. TEST STAND SHUTDOWN PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
1 (cont)				2. Replace high pressure gage at direct support maintenance
2	Turn pressure compensator control (item 21, figure 2-1) in CCW direction to open	Reduces system pressure	System pressure under test does not decline as indicated on fluid pressure gage (item 9, figure 2-1), probable cause: defective pressure compensator	Shut down test stand The pressure compensator control is an integral component of the pump and shall be tested and adjusted at direct support maintenance. Replace pressure compensator control at general support maintenance
3	Close both flow control valves (items 16 and 19, figure 2-1) turning controls in CW direction	Able to close valves, shutting of hydraulic fluid to and from test stand to system under test	Unable to close valves (items 16 and 19, figure 2-1), probable cause: defective valves	Close hydraulic fluid reservoir valve (item 15, figure 2-1). Set outlet selector valve opposite to position of defective flow control valve Shut down test stand. Adjust and replace affected flow control valve at direct support maintenance. Repair and overhaul flow control valve as applicable at general support maintenance
4	Idle engine of test stand for approximately 5 minutes adjusting throttle (item 3, figure 2-2)	Test stand engine idles smoothly	Test stand stalls out consistently, probable cause: 1. Defective fuel pump (item 7, figure 4-2) 2. Clogged fuel strainer (item 8, figure 4-2) 3. Defective carburetor adjustment	Shut down test stand and: 1. Replace fuel pump at direct support maintenance (paragraph 4-13) Repair fuel pump at general support maintenance (paragraph 4-17)

TABLE 4-4. TEST STAND SHUTDOWN PERFORMANCE CHECKS (cont)

STEP	ACTION	NORMAL INDICATION	ABNORMAL INDICATION	CORRECTIVE ACTION
4 (cont)				2. Replace fuel strainer at direct support maintenance 3. Adjust or replace carburetor at direct support maintenance as applicable Repair and overhaul carburetor at general support maintenance (paragraph 4-17)
5	Set ignition switch to OFF position (item 2, figure 2-2)	Test stand engine stops	Test stand continues operation for several minutes, probable cause: 1. Defective ignition switch 2. High engine temperature	Shut down test stand 1. Replace ignition switch at direct support maintenance 2. Check engine magneto at support maintenance (paragraph 4-13)
6	Remove hoses between test stand and system under test	Able to remove hoses from test stand and system under test	Unable to remove hoses, probable cause: defective couplings	Remove and replace couplings of test stand and system under test as applicable at direct support maintenance Replace couplings of test stand and furnish new hoses as applicable at direct support maintenance

4-5. TROUBLE ANALYSIS.

4-6. ELECTRICAL SYSTEM. Proceed to analyze the following components for defects as follows:

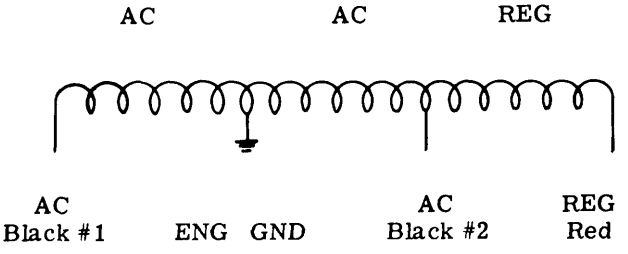
1. Ignition Wire Assembly.

a. Check ignition wire with multimeter.

b, Check from terminal to terminal to determine continuity. Zero reading indicates broken conductor.

2. Alternator. The alternator is comprised of the stator and rotor. The rectifier module although external to the alternator is an integral component of the alternator.

a. To Check Stator. Use an ohmmeter with R x 1 scale (minimum sensitivity of 20,000 ohms/ volts), and check continuity as follows:



NOTE

Wire numbers indicated for probe connections are for convenience only and are not indicated on the connectors.

b. To Check 25 Amp Stator;

Meter Probe Connections + -	Set VOM To R x 1 Scale And Observe	Replace Stator
Black #1 to Black #2	0.40 ohm	∞ Indicates Open Circuit.
Black #1 to ENG GND	0.20 ohm	
Black #2 to ENG GND	0.20 ohm	
Black #1 to Red	3.20 ohms	
Black #2 to Red	2.80 ohms	

APPROX

Stator Identification: 25 amp - 5/8" wide flange

c. To check the magnetic rotor, observe that each separate cut between rotor electro-magnets are free of foreign particles, and that they are not worn down in any way.

d. To check Rectifier Module, Part No. YJ-58. The rectifier module can be distinguished from the regulator by the three lead wires instead of two and the identification decal. Use an ohmmeter and static check continuity as follows:

METER PROBE CONNECTIONS + -	METER INDICATION
White Lead to Black #1	No Continuity
Black #1 to White Lead	Continuity
White Lead to Black #2	No Continuity
Black #2 to White Lead	Continuity

NOTE

Continuity shall be in one direction only. If readings are not as indicated, replace module.

e. To Check Regulator Module Part No. YJ-60 for 25 amp. The regulator module is distinguished from the rectifier module by the number and color of lead wires, and the identification decal. The 25 amp regulator has BLACK and RED lead wires. Use an ohmmeter and static check continuity as follows:

METER PROBE CONNECTIONS + -	METER INDICATION	REPLACE MODULE
RED to ENG GND	NO CONTINUITY	CONTINUITY
ENG GND to RED	NO CONTINUITY	CONTINUITY
RED to BLACK	NO CONTINUITY	CONTINUITY
BLACK to RED	NO CONTINUITY	CONTINUITY
BLACK to ENG GND	NO CONTINUITY	CONTINUITY
ENG GND to BLACK	CONTINUITY	NO CONTINUITY

4-7. HYDRAULIC SYSTEM. Perform the following steps to determine the condition of the hydraulic system.

1. Examine all tubing for punctures or leaks.

2. Examine all couplings for signs of leakage or corrosion.

3. Examine hoses for punctures or leaks. Be especially cautious where hoses bend or rub against metal or sharp edges.

4. Examine filters for signs of leakage or corrosion.

5. Start engine (Chapter II, Section IV) and perform Test 1, Test 2 and Test 3.

Ensure that all conditions are satisfactory according to the instructions.

4-8. ENGINE. Perform the following steps to determine the condition of the engine.

1. Examine engine shrouds to insure that they are firmly secured.

2. Inspect fan grill for obstructions such as dirt or foreign objects.

3. Open inspection covers at rear end of cylinder head shrouds and look for signs of oil leakage around valve covers. Replace inspection covers.

4. Check that starting motor, magneto, exhaust manifold, oil filter, carburetor, fuel strainer, and air cleaner are all securely fastened to their mounting locations.

5. Examine carburetor, oil filter, and fuel strainer for signs of leakage.

6. Examine the mating of the starting motor to the engine front plate for signs of oil leakage.

7. Remove oil dipstick and check for proper oil level.

8. Check each ignition wire to ensure that they are securely connected at the magneto end and the spark plug end.

9. Check engine mounting bolts to ensure that engine is firmly secured to test stand trailer frame.

10. Ensure that there is a sufficient amount of fuel to run engine.

11. Start engine (Chapter 2, Section IV). Engine should start easily, within 2 or 3 crankshaft revolutions.

12. With engine running, check that normal operating speed (2250 RPM Idle) can be attained with no difficulty.

13. Observe engine exhaust. There should be no evidence of heavy black smoke or white smoke. Normally the exhaust should emit small amounts of gray or light black smoke.

14. Listen for unusual noises, such as loud knocking or sharp metal-against-metal sounds.

15. While engine is running recheck all gaskets for signs of leakage. Refer to steps (5.) and (6.).

SECTION III

REPAIR PROCEDURES

CAUTION

Prior to making repairs, disconnect both leads from the battery.

4-9. REMOVAL AND DISASSEMBLY.

4-10. Remove and disassemble the components listed at the direct or general support maintenance level as required.

4-11. ELECTRICAL SYSTEM. Remove and disassemble the electrical system components as follows:

1. Ignition Wire Assembly. To remove the ignition wire assembly proceed as follows:

a. Unscrew one nut from the top of each spark plug (item 4, figure 4-2).

b. Unscrew one nut from each of the four terminals located on the magneto (item 1, figure 4-2).

c. Remove one screw and lockwasher through clip holding ignition wire to engine and remove ignition wires.

d. Replace defective ignition wire(s) as required.

2. Starter Motor. To remove the starter motor (item 12, figure 4-2) proceed as follows:

a. Disconnect cable from starter motor terminal.

h. Remove two nuts and lockwashers from starter support bracket (item 11, figure 4-2).

c. Hold starter motor with hand to relieve weight on bolts. Remove three bolts with lockwashers holding starter motor into engine.

d. Pull starter motor out of engine.

e. Remove starter support bracket from motor removing one screw and plain washer.

f. Replace defective starter motor with a known good motor.

3. Ammeter. To remove the ammeter (item 8, figure 2-1) proceed as follows:

a. Remove two nuts from two studs located on rear of ammeter.

b. Remove from each set of studs the electrical wiring and mark wires in order of removal.

c. Remove three screws from meter mounting flange and push gage. Handle ammeter carefully.

d. Replace ammeter with a known functional and calibrated ammeter.

4. Reservoir Fluid Level Indicator. To remove the reservoir fluid level indicator (item 12, figure 2-1) proceed as follows:

a. Remove three nuts from rear of reservoir level indicator studs.

b. Remove each set of wires from studs marking each set of wires and stud.

c. Remove three screws from gage mounting flange and push gage from panel. Handle gage carefully.

d. Replace gage with a known good calibrated gage.

5. Fuel Level Gage. To remove the fuel level gage (item 7, figure 2-1) proceed with instructions given for reservoir fluid level indicator paragraph 4-11, step 4.

6. Electrical Wiring Cables. To remove the electrical wiring/cables proceed as follows:

a. For electrical leads that are not within a laced or taped harness, disconnect the lead from each end and mark each lead.

b. For electrical wires that are laced or taped within a harness, disconnect both ends of the wire and cut one or both ends free from connection or soldered wire (refer to step c).

c. If lead to be removed cannot be snaked out of harness let old wire remain in harness.

7. Starter/Ignition Switch. To remove the starter/ignition switch (item 5, figure 2-2) proceed as follows:

a. For either switch remove the lugs from the switch terminals marking wire(s) and terminal as they are disconnected.

b. With a wrench back off the hex nut and washer located at the rear of the panel.

c. Remove the knurled round nut located on the front of the control panel.

d. Pull out the switch from the control panel and replace with a new one.

4-12. HYDRAULIC SYSTEM. To remove components of the hydraulic system, first drain hydraulic fluid (Chapter 3, Section I, paragraph 3-12) and proceed as follows:

1. Tubing, Hoses, and Fittings. To remove tubing, hoses and fittings, proceed as follows:

a. Place identification marking or tag on each section of tubing or hose to be removed.

b. Disconnect coupling using appropriate size wrenches.

c. Fittings are removed with an appropriate sized wrench after removing or disconnecting hose or tubing.

CAUTION

Care should be exercised during these procedures to avoid bending or denting tubes.

2. Hydraulic Pump. To remove the hydraulic pump (item 5, figure 4-3) it will be necessary to first remove the hydraulic fluid reservoir. Refer to step 3 below and proceed as follows:

a. Remove tubing, hoses, and fittings from the pump as required.

b. Note attitude of pump mounting. It is turned 15° to a level plane. Mark pump housing, mounting bracket, and engine housing to insure proper orientation during installation.

c. Remove pressure compensator control knob and insert screw with same thread size into compensator tubing to restrain plunger and ball bearings.

d. Remove volume control wheel and locking device.

Remove necessary hydraulic tubing so pump may be moved forward.

f. Remove flow indicator assembly from pump.

g. Remove coupling cover by removing snap ring on engine side of coupling and slide cover over engine shaft to unmesh gears.

h. Remove four bolts securing pump to bracket and list pump off chassis.

i. If pump is defective, replace with known functioning pump.

3. Hydraulic Fluid Reservoir. To remove the hydraulic fluid reservoir (item 1, figure 4-3) proceed as follows:

a. Release 8 quick disconnect fasteners (2 on each of four sides) to release cabinet assembly from trailer frame.

b. Lift cabinet assembly off of trailer frame.

c. Disconnect fluid outlet line from reservoir.

d. Remove nuts and lockwashers from four mounting bolts.

e. Remove reservoir.

f. Repair or replace reservoir as required.

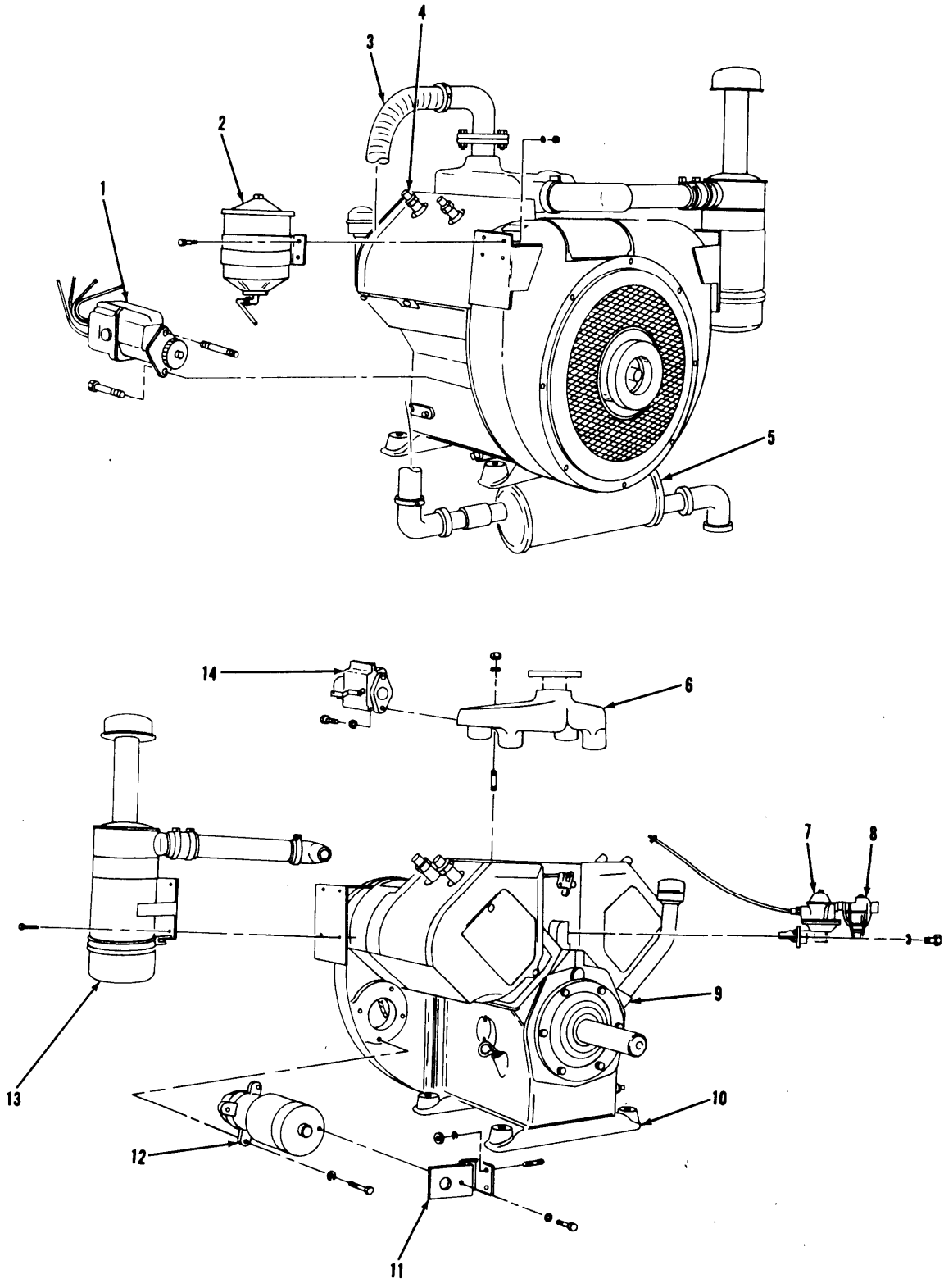
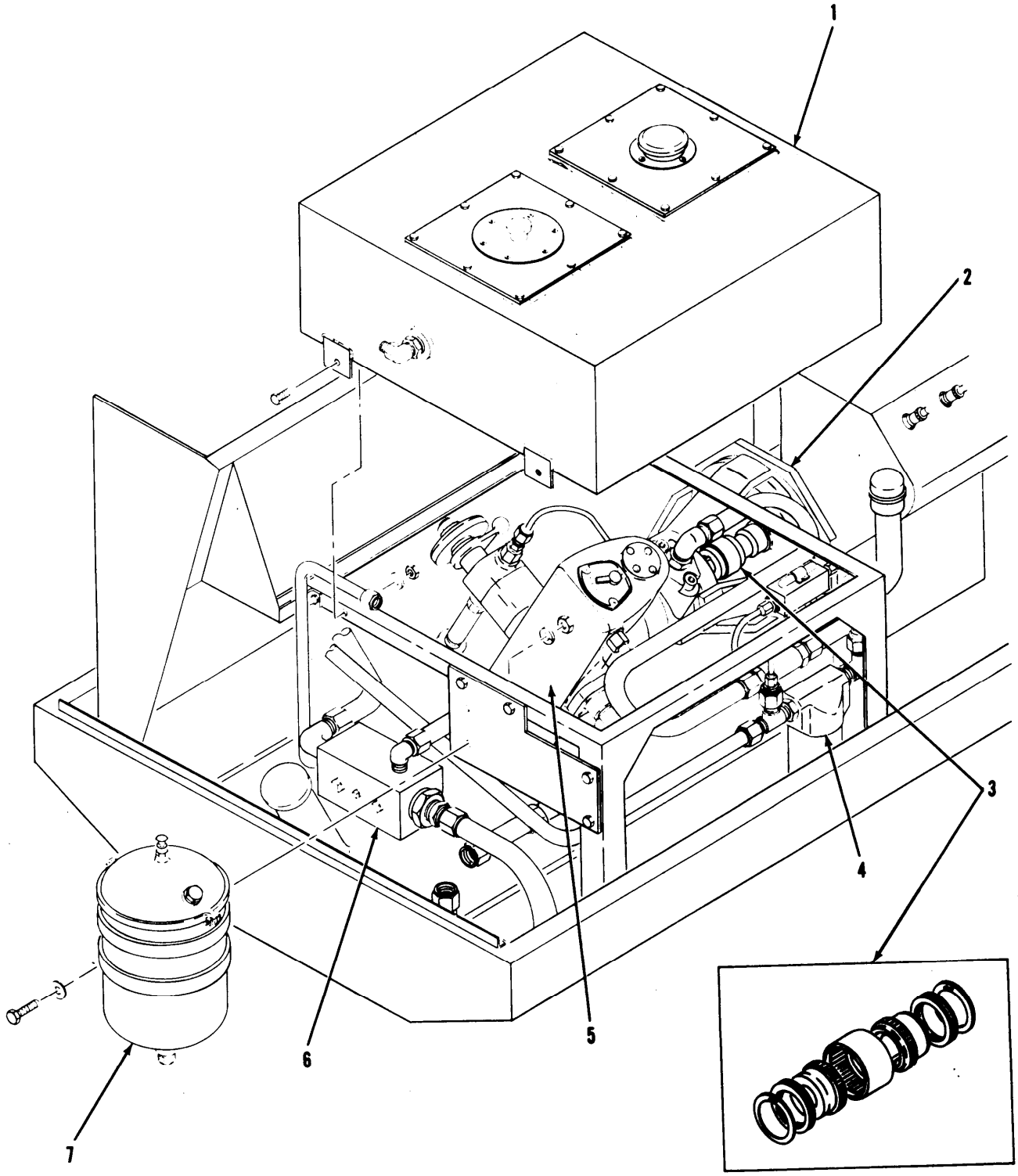


Figure 4-2. Minor Engine Components Removal



1. Hydraulic fluid reservoir
2. Pump mounting bracket
3. Pump coupling assembly
4. High pressure filter
5. Hydraulic pump
6. Manifold
7. Low pressure filter

Figure 4-3. Hydraulic System Components Removal

4. Low Pressure Filter Assembly. To remove the low pressure filter assembly (item 7, figure 4-3) proceed as follows:

a. Disconnect inlet and outlet couplings using an appropriate sized wrench.

b. Remove four bolts securing mounting bands to test stand frame. Support filter removing these bolts.

c. Repair or replace inoperative filter.

5. High Pressure Filter Assembly. To remove the high pressure filter assembly (item 4, figure 4-3) proceed as follows:

a. Disconnect two bypass couplings for the switch on top of the filter.

b. Disconnect inlet and outlet tube couplings.

c. Remove high pressure filter assembly.

d. Repair or replace filter.

6. Hydraulic Fluid Manifold. To remove the hydraulic fluid manifold (item 6, figure 4-3) proceed as follows:

a. Disconnect five hydraulic tube couplings from manifold ports.

b. Disconnect wiring from temperature switch.

c. Remove manifold.

d. Repair or replace with serviceable part.

4-13. ENGINE. The following procedures describe removal of major engine or engine-related components for repair or replacement.

1. Air Shrouding. To remove air shrouding (item 7, figure 4-4) proceed as follows:

a. Remove four ignition wires from spark plugs by removing one lock nut from each spark plug.

b. Number two and number three ignition wires are each clamped to the air shrouding by one screw which is also a shroud mounting screw. On each side, remove this screw plus six others and remove cylinder head air shrouds.

NOTE

The removal of these shrouds provides easy access to spark plugs.

c. Unfasten mounting screws and remove fan and engine shroud (item 7, figure 4-4).

d. Repair or replace damaged shrouding.

2. Spark Plugs. To remove and replace spark plugs (item 1, figure 4-4) proceed as follows:

a. Remove nut securing ignition wire to spark plug.

b. Using appropriate size socket wrench, remove spark plug from cylinder head. If shrouds have been removed, an open end or box-type wrench may be used.

c. Clean and gap spark plug or replace as required. Gap should be 0.030".

3. Magneto. To remove the magneto (item 1, figure 4-2) proceed as follows:

a. Disconnect four ignition wires by removing one locknut for each one. Tag and mark each wire for identification.

b. Remove ground wire at about the middle of the housing by removing screw and washer.

c. Remove condenser wire on top rear of magneto.

d. Supporting magneto, remove bolt at bottom of mounting flange and one nut at top and remove magneto.

e, Replace with serviceable magneto as required.

4. Oil Filter Assembly. To remove the oil filter assembly (item 2, figure 4-2) proceed as follows:

a. Disconnect two oil lines. One at bottom of filter and one on the side near the top.

b. Supporting filter remove four screws securing two mounting bands to fan shroud.

c. Clean filter, replace element, repair filter or replace assembly as required.

5. Fuel Strainer. To remove the fuel strainer (item 8, figure 4-2) proceed as follows:

a. Release knurled nut at bottom of fuel strainer.

b. Remove strainer gasket, bowl and screen.

c. Carefully unscrew strainer housing from attaching fitting.

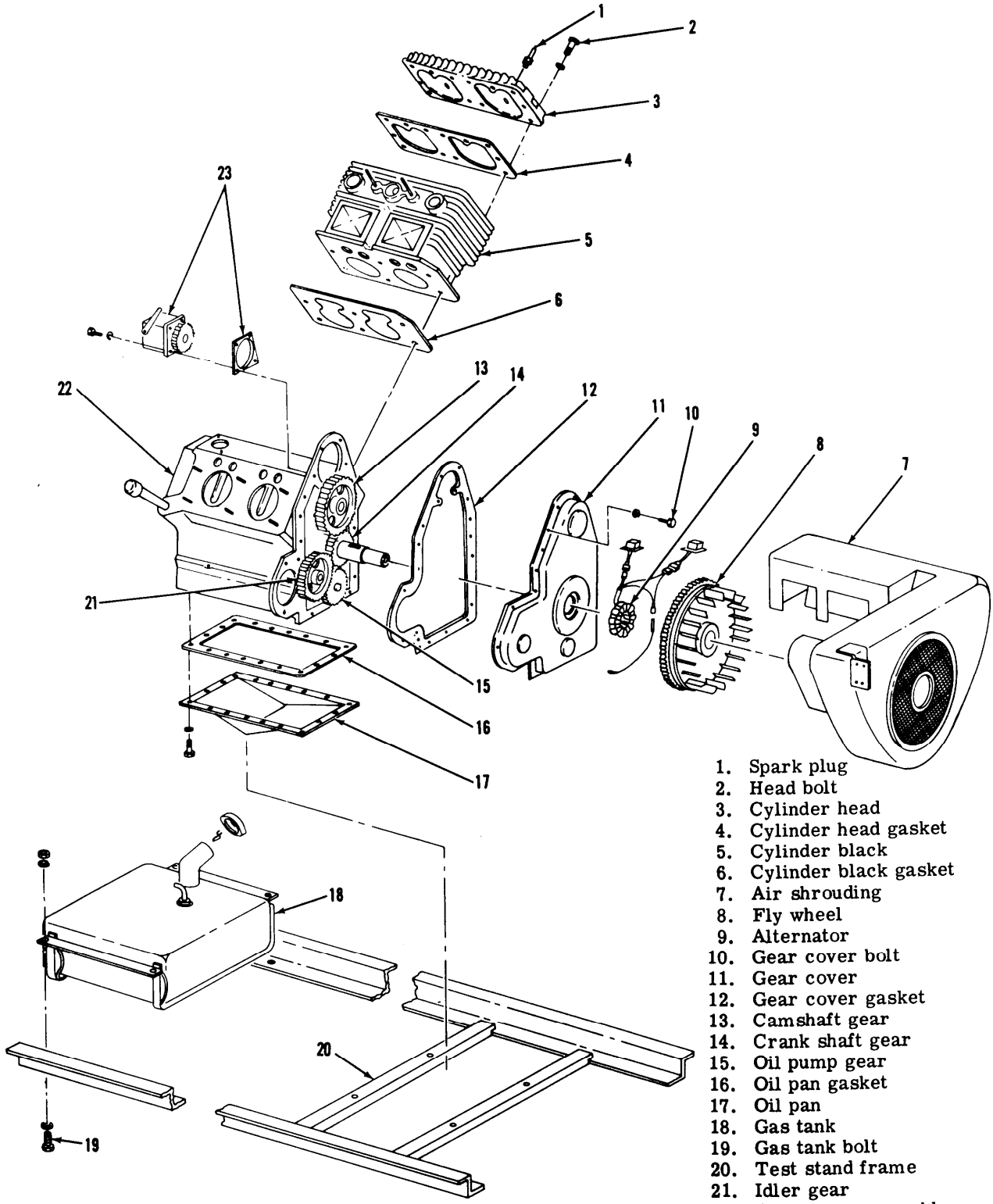


Figure 4-4. Engine Disassembly and Removal

d. Clean unit thoroughly. Replace gasket and damaged parts.

6. Fuel Pump. To remove the fuel pump (item 7, figure 4-2) proceed as follows:

a. Disconnect inlet and outlet fuel lines.

b. Remove two bolts securing fuel pump mounting flange to engine block.

c. Repair or replace with serviceable unit as required.

7. Carburetor. To remove the carburetor, (item 14, figure 4-2) proceed as follows:

a. Disconnect fuel lines.

b. Disconnect carburetor throttle and choke control cables.

c. Remove two mounting bolts while supporting unit and remove carburetor.

d. Repair or replace with serviceable unit as required.

8. Governor. To remove the governor (item 23, figure 4-4) proceed as follows:

a. Remove governor control spring.

b. Disconnect governor oil line.

c. Disconnect carburetor control linkage.

d. Disconnect tachometer cable.

e. Remove four bolts mounting governor to engine front plate and remove governor and gasket.

f. Repair or replace with serviceable unit as required. Replace gasket.

9. Cylinder Head. To remove the cylinder head (item 3, figure 4-4) proceed as follows:

a. Remove spark plugs (item 1, figure 4-4).

b. Remove 14 head bolts (item 2, figure 4-4).

c. Remove cylinder head and gasket (item 4, figure 4-4). It may be necessary to insert a flat instrument to pry cylinder head free.

CAUTION

If it becomes necessary to pry cylinder head, use caution to avoid scoring machine mating surfaces.

d. Clean and repair, or replace cylinder head with serviceable part, as required.

10. Cylinder Block. To remove cylinder block (item 5, figure 4-4), proceed as follows:

a. Remove cylinder head and gasket.

b. Remove mounting bolts while supporting cylinder block.

c. Remove cylinder block and gasket (item 6, figure 4-4).

d. Clean and repair or replace cylinder block as required.

11. Flywheel. To remove the flywheel (item 8, figure 4-4), proceed as follows:

a. Remove fan shroud (item 7, figure 4-4).

b. Remove flywheel locknut and washer.

c. Slide flywheel off driveshaft.

d. Clean and repair, or replace flywheel with serviceable unit as required.

12. Flywheel Alternator. To remove flywheel alternator (item 9, figure 4-4), proceed as follows:

a. Remove fan shroud (item 7, figure 4-4).

b. Remove flywheel (item 8, figure 4-4).

c. The plugs to the regulator module, rectifier module, and ammeter wire may be disconnected.

d. Remove the regulator module and rectifier module by removing two screws on each unit.

e. Remove the ammeter wire.

f. Remove the stator by removing four mounting screws and lockwashers.

g. Repair alternator, or replace damaged components as required.

13. Engine Gear Cover. To remove engine gear cover (item 11, figure 4-4), proceed as follows:

a. Remove fan shroud (item 7, figure 4-4).

b. Remove flywheel.

c. Remove alternator assembly (item 9, figure 4-4).

d. Remove ten mounting bolts along perimeter of gear cover.

e. Remove gear cover. If it is necessary to pry gear cover off, use a thin, flat metal instrument but exercise caution to prevent scoring machined mating surface.

f. Remove gear cover gasket (item 12, figure 4-4).

14. Oil Pan. To remove oil pan (item 17, figure 4-4), proceed as follows:

a. Remove 18 bolts securing oil pan to crank case.

b. Drop and remove oil pan (item 17, figure 4-4) and oil pan gasket (item 16).

c. Clean and repair oil pan, replace gasket or replace damaged oil pan, as required.

15. Gas Tank. To remove gas tank (item 18, figure 4-4) proceed as follows:

a. Remove all components of hydraulic system as described in paragraph 4-12.

b. Insure that gas tank has been emptied.

c. Disconnect fuel line.

d. Remove four bolts (item 19, figure 4-4) securing tank to test stand frame (item 20.)

e. Remove gas tank.

f. Clean and repair, or replace damaged tank with serviceable unit.

16. Crankcase Assembly. To remove crankcase assembly (item 22, figure 4-4), proceed as follows:

a. Remove shrouding (item 7, figure 4-3), as described in step 1.

b. Remove ignition wires as described in paragraph 4-11, step 1.

c. Remove spark plugs (item 1, figure 4-4), as described in step 2.

d. Remove magneto (item 1, figure 4-2), as described in step 3.

e. Remove oil filter assembly (item 2, figure 4-2), as described in step 4.

f. Remove fuel strainer (item 8, figure 4-2), as described in step 5.

g. Remove fuel pump (item 7, figure 4-2), as described in step 6.

h. Remove carburetor (item 14, figure 4-2), as described in step 7.

i. Remove governor (item 23, figure 4-4), as described in step 8.

j. Remove cylinder head (item 3, figure 4-4), as described in step 9.

k. Remove two cylinder blocks (item 5, figure 4-4), as described in step 10.

1. Remove flywheel (item 8, figure 4-4), as described in step 11.

m. Remove flywheel alternator (item 9, figure 4-4), as described in step 12.

n. Remove engine gear cover (item 11, figure 4-4), as described in step 13.

o. Remove oil pan (item 17, figure 4-4), as described in step 14.

p. Remove four engine mounting bolts and remove crankcase assembly from test stand frame.

q. Clean and repair crankcase, or replace with serviceable unit.

4-14. DETAIL REPAIR INSTRUCTIONS.

4-15. ELECTRICAL SYSTEM. To repair components of the electrical system, proceed as follows:

1. Ignition Wire Assembly. To repair the ignition wire assembly proceed as follows:

a. Replace damaged end connectors.

b. Using an approved insulating tape, wrap all insulation breaks. Use at least 4 layers of tape over the break.

c. Replace ignition wire with a serviceable wire if damaged beyond repair.

2. Alternator. To repair alternator proceed as follows:

a. Replace inoperative regulator module on rectifier module with a part in known working condition.

b. Replace regulator or rectifier module if case is broken.

c. Replace broken wires or broken connectors.

d. Replace stator if continuity is zero indicating open winding. Refer to paragraph 4-6.

e. Replace stator if test indicates grounded winding. Refer to paragraph 4-6.

3. Starter Motor. To repair the starter motor proceed as follows:

a. Remove end plates and inspect bearings. Replace damaged bearings.

b. Replace inoperative Bendix assembly.

c. Clean armature and inspect commutator segments. Gouged or scored commutator must be turned in a lathe. Mica separators must be cut down to insure insulation between segments. Ship unit to Depot Maintenance for these procedures.

d. Replace defective brushes.

4-16. HYDRAULIC SYSTEM. The following instructions provide repair procedures for hydraulic system components.

1. Pump. To repair the pump proceed as follows:

a. Disassemble hydraulic pump.

b. Examine all gaskets and seals. Replace any defective gaskets or seals.

c. Replace all parts that show wear, corrosion, or scoring.

d. Replace defective bearings, or end plates with scored machined surfaces.

e. Thoroughly clean all metal parts of pump.

2. High Pressure Filter. To repair high pressure filter, proceed as follows:

a. Disassemble filter.

b. Discard element and gasket.

c. Thoroughly clean parts.

d. Replace dented or punctured case.

e. Replace top case if fitting threads are damaged.

f. Install new gasket and element.

3. Low Pressure Filter. To repair the low pressure filter, proceed as follows:

a. Disassemble filter.

b. Discard gasket and element.

c. Thoroughly clean all parts.

d. Replace ruptured or dented case.

e. Replace fittings if threads are damaged.

f. Install new gasket and element.

4-17. ENGINE. The following instructions provide repair procedures for the engine and major components or accessories.

1. Magneto. To repair the magneto, proceed as follows:

a. Disassemble magneto.

b. Replace defective gears.

c. Replace defective capacitor.

d. Replace defective end cap gasket or capacitor mounting gasket.

e. Replace dented or ruptured casing parts.

f. Replace defective bearings and bearing mounts.

g. If magneto is damaged beyond repair, ship unit to Depot and replace with known serviceable unit.

2. Fuel Pump. To repair fuel pump, proceed as follows:

a. Disassemble fuel pump.

b. Discard gaskets and seals.

c. Clean all parts thoroughly.

d. Replace all casing parts that are damaged beyond repair.

e. Replace damaged fuel line fittings.

f. Install new gaskets and seals.

3. Carburetor. To repair carburetor, proceed as follows:

a. Disassemble carburetor.

b. Discard gaskets and seals.

c. Replace damaged float and fuel valve needle.

d. Replace all springs.

e. Replace all casing parts damaged beyond repair.

f. Replace fuel line fittings if threads are damaged.

g. Install new gaskets and seals during reassembly.

4. Governor. To repair governor, proceed as follows:

a. Disassemble governor.

b. Replace damaged gear.

c. Replace defective bearings.

d. Replace worn flyweight pivot pins.

e. Replace threaded fittings if threads are damaged.

f. Reassemble governor.

5. Cylinder Head. To repair cylinder head, proceed as follows:

a. Clean cylinder head thoroughly.

b. Clean machined mating surfaces of all remaining particles of gasket material.

c. Refinish machined surfaces with fine emery cloth to remove minor scratches.

d. If cylinder head has deep scratches in machined surfaces or is cracked, it must be replaced with a head in serviceable condition.

6. Cylinder Block and Components. To repair cylinder block and components, proceed as follows:

a. Remove valves and valve springs from cylinder block.

b. Clean parts thoroughly.

c. Refinish machined mating surfaces and valve seats on block with fine emery cloth.

d. Refinish seating surfaces on valves with fine emery cloth.

e. Valves that show evidence of burning must be replaced with equivalent parts in serviceable condition.

f. If valve seats in block are burned, they must be machined either .020" or .040" and oversized valves of commensurate size installed.

g. A cracked block must be replaced by one in serviceable condition.

h. Reassemble cylinder block.

7. Crankcase Assembly. To repair crankcase assembly, proceed as follows:

a. Remove oil pan and gasket.

b. Clean all parts thoroughly.

c. Ruptured oil pan must be replaced with one in serviceable condition.

d. All studs with damaged threads must be replaced with serviceable studs.

e. If crankcase is cracked, replace it with a unit in serviceable condition.

f. Replace damaged piston, connecting rod, or connecting rod bearing.

g. Replace worn piston rings.

h. Reassemble crankcase assembly.

SECTION IV

REASSEMBLY AND ALIGNMENT

4.18. GENERAL. The reassembly and alignment of components described in this section are arranged in the same functional sequence as described in Section III of Chapter 4.

4-19. ELECTRICAL SYSTEM. To install the components of the electrical system proceed as follows:

1. Ignition Wire Assembly. To install the ignition wire assembly proceed as follows:

a. Feed new ignition wire through clip removed from old ignition wire.

b. Attach each ignition wire in proper order; taking length into consideration from spark plug to magneto terminal and secure nut of each wire to appropriate terminal on magneto.

c. Screw nut on opposite end of ignition were to appropriate spark plug and secure nut.

d. Insert screw and lockwasher of each clip into engine, securing each ignition wire into place.

2. Alternator. To install the alternator (item 9, figure 4-2), proceed as follows:

a. Slide stator over crank shaft and attach to gear cover with 4 screws and l roll pin.

b. Attach regulator module and rectifier module to gear cover with 2 screws each,

c. Check that regulator (black wires) and rectifier (red and black) module connectors are securely connected to stator leads.

d. Connect ammeter wire to ammeter and to stator connector.

e. Slide flywheel on crankshaft and carefully fit rotor portion over alternator stator.

f. Secure flywheel with locknut and washer.

3. Starter Motor. To install the starter motor (item 12, figure 4-2) proceed as follows:

a. Attach starter motor support bracket to motor with a plain washer and screw, but do not tighten.

b. Insert starter motor into engine and secure with three lockwashers and bolts, insuring starter motor engages with engine flywheel.

c. Insert starter motor support bracket holes through studs in engine and secure bracket with lockwashers and nuts.

d, Secure screw attaching starter motor support bracket to starter motor.

e. Reconnect starter cable to starter motor terminal with lockwasher and screw, Insure cable is secured to starter motor and starter solenoid on opposite end.

4. Ammeter. To install the ammeter (item 8, figure 2-1) proceed as follows:

a. Fasten the two screws through mounting flange and secure to gage panel.

b. Insert in order of removal the two sets of marked wiring onto the two studs of the ammeter.

c. Secure wiring to studs of ammeter with nuts.

5. Reservoir Level Indicator. To replace the reservoir level indicator proceed as follows:

a. Place new indicator into control panel and secure into place with three screws.

b. Place each set of wires removed onto studs of indicator as noted on the marked wires.

c. Secure the three sets of wires on their studs of the indicator with one nut on each stud.

6. Fuel Level Indicator. To replace the fuel level indicator, proceed with instructions given in step 5 for reservoir level indicator.

7. Electrical Wiring Cables. To install the electrical wiring cables, proceed as follows:

a. For electrical leads that are not within a laced or taped harness attach to each end of the lead a lug identical to the one used on the removed lead.

b. Follow standard procedures for cutting, tinning, and attaching lugs.

c. For electrical leads that are within a laced or taped harness measure approximate length of wire required for replacement insuring proper gauge is used and add one extra foot in length.

d. Cut back the insulation approximately 1/2-inch on the wire to be replaced and the new wire.

e. Tin each end of exposed wire, and cut one half the diameter of each soldered end.

f. Place each cut half together end to end on top of each other and solder both wires together.

g. Cut away excess stray ends to make a smooth surface.

h. Disconnect the opposite end of the lead to be removed and gently pull that end, causing the new wire to follow the replaced wire in its place, until the new wire extends the required distance for termination at each end.

i. Cut and trim back insulation of lead sufficiently for attachment of required lugs on each end, or for soldering if required.

j. Tin trimmed portion of wire and insert proper lug at ends of lead.

k. Attach lugs to proper points of termination.

8. Starter/Ignition Switch. To replace the starter/ignition switch (item 5, figure 2-2) proceed as follows:

a. Insure that hex nut and external tooth lockwasher are placed on switch shaft before inserting switch shaft through control panel.

b. Insert switch into control panel and place the round knurled nut onto it so that the nut is flush with switch end of shaft.

From the back side of the control panel take up slack of the hex nut on switch shaft until the switch is in proper vertical position and secure until tight.

d. Reconnect the removed wires onto the switch terminals as marked and secure.

4-20. HYDRAULIC SYSTEM COMPONENTS. The following procedures describe installation procedures for hydraulic system components.

1. Pump. To install the pump (item 5, figure 4-3) proceed as follows:

NOTE

The hydraulic pump must be installed before installing the fluid reservoir.

a. Position pump in chassis so that orientation marks made during disassembly (paragraph 4-12) line up.

b. Secure pump to chassis with four bolts.

c. Slide coupling cover over pump shaft so gears mesh and secure with snap ring.

d. Install flow indicator on pump.

e. Connect all hydraulic tubing and fittings removed during disassembly (paragraph 4-12).

f. Replace volume control wheel and locking device.

g. Remove screw from compensator tubing and install control knob.

2. Fluid Reservoir. To replace the fluid reservoir (item 1, figure 4-3) proceed as follows:

a. Position reservoir on mounting frame.

b. Attach reservoir to frame with 4 bolts and nuts.

c. Connect hydraulic lines and level indicator line.

3. Lines, Tubing, Fitting, Hose Assembly. To attach lines, tubing, fitting and hose assemblies, proceed as follows:

a. Select next line, tube, fitting or hose according to identification tag attached during disassembly.

b. Install each component in the order removed.

4. Low Pressure Filter Assembly. To replace the low pressure filter assembly (item 7, figure 4-3) proceed as follows:

a. Mount filter to test stand frame with 4 bolts and nuts.

b. Connect hydraulic inlet and outlet lines.

5. High Pressure Filter Assembly. To replace the high pressure filter assembly (item 4, figure 4-3) proceed as follows:

a. Connect inlet and outlet hydraulic lines while supporting filter.

b. Connect switch and switch bypass lines.

4-21. ENGINE. To replace engine components, proceed as follows:

1. Crankcase and Components. To replace the crankcase and components (item 22, figure 4-4) proceed as follows:

a. Attach engine mounts to crankcase assembly.

b. Position crankcase assembly and engine mounts in place on the frame.

c. Attach engine mounts to frame.

2. Cylinder Block and Components. To replace the cylinder block and components (item 5, figure 4-4), proceed as follows:

a. Install new gasket on crankcase assembly.

b. Position cylinder block over studs on crankcase assembly.

c. Fasten cylinder block to crankcase with nuts using standard torquing procedures.

d. Adjust valve tappets in cylinder block so that in their lowest position, the intake valves have a clearance of 0.008" and exhaust valves have a clearance of 0.016".

3. Cylinder Head. To replace cylinder head (item 3, figure 4-4), proceed as follows:

a. Install new gasket on cylinder block.

b. Position cylinder head on block.

c. Install mounting bolts and secure cylinder head using standard torquing procedures. Torque bolts 25 to 32 foot pounds. Retorque bolts when engine has warmed up.

4. Governor. To replace the governor (item 23, figure 4-4) proceed as follows:

a. Install new gasket.

b. Support governor and mount with 4 bolts to engine front plate.

c. Attach carburetor control linkage.

d. Connect engine oil line.

e. Hook governor control spring in hole number 9 on control lever.

f. Adjust the governor by screwing the ball joint stud on the control rod until there is about 1/16" clearance between the throttle lever and the stop pin on the carburetor.

5. Carburetor. To replace the carburetor (item 14, figure 4-2), proceed as follows:

a. Install new gasket on manifold.

b. Position carburetor and secure with 2 bolts.

c. Connect fuel line.

d. Connect choke and throttle control cables.

e. When engine is running, adjust carburetor needle valve for best low speed operation.

6. Fuel Pump. To replace the fuel pump (item 7, figure 4-2), proceed as follows:

a. Install new gasket to fuel pump adapter.

b. Hold fuel pump in place and attach with 2 mounting bolts.

c. Connect fuel outlet line to carburetor.

7. Fuel Strainer. To replace the fuel strainer (item 8, figure 4-2) proceed as follows:

a. Insert and tighten brass connector fitting into fuel pump.

b. Install fuel strainer on brass connector fitting.

c. Connect fuel inlet line.

8. Oil Filter Assembly. To r lace the oil filter assembly (item 2, figure 4-2) proceed as follows:

a. Supporting filter canister, mount to shroud frame with 4 bolts and nuts.

b. Connect 2 oil lines.

c. Insure that each oil line is properly connected to engine.

9. Magneto. To replace and time the magneto (item 1, figure 4-2) proceed as follows:

a. Remove screen over flywheel air intake to expose timing marks on flywheel (X) and on shroud.

b. Remove number 1 spark plug and turn engine over with handcrank while holding finger over open spark plug hole.

c. When air blows out of hole, continue turning engine until the flywheel mark is lined up with the air shroud mark. Leave engine in this position.

d. Insert ignition wire into number 1 connection on magneto. Hold other end of wire about 1/8" away from magneto body.

e. Turn magneto gear in clockwise direction to trip the impulse coupling until the number 1 terminal sparks.

f. Mount the magneto to the engine, meshing the gears.

g. Tighten nut and capscrew securing magneto to engine.

h. Connect remaining ignition wires and ground wire.

10. Spark Plugs. To replace the spark plugs (item 1, figure 4-4) proceed as follows:

a. Insert spark plug into threaded opening on cylinder head.

b. Tighten spark plug 25 to 30 foot pounds torque.

c. Connect ignition wire to plug.

4-22. MISCELLANEOUS. Proceed to:

1. Fuel Tank. To replace the fuel tank (item 18, figure 4-4) proceed as follows:

NOTE

The fuel tank must be installed before installing the hydraulic pump, fluid reservoir, or any other hydraulic components.

a. Position fuel tank to frame and fasten with 4 bolts and nuts.

b. Connect fuel line.

c. Connect fuel indicator.

2. Wheels/Tire/Tubing. To replace the wheels, tire and tube refer to Chapter 3, Section IV, paragraph 3-42.

3. Brake Drum and Hub. To replace the brake drum and hub (item 12, figure 3-6), proceed as follows:

a. Slide brake drum over axle spindle and brake assembly.

b. Insert bearing.

c. Install washer and castellated locknut.

d. Tighten locknut until brake drum turns with slight bind.

e. Back locknut off until next cotter pin hole in spindle is lined up with hole on castellated nut.

f. Install cotter pin.

g. Replace assembled wheel.

APPENDIX A

MAINTENANCE ALLOCATION CHART

A-1. PURPOSE.

The purpose of the maintenance allocation chart is to provide all activities with maintenance functions to be performed at each level of maintenance.

A-2. DEFINITIONS.

a. Column 1, Group number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Functional group. Column 2 lists the noun names of components, assemblies, subassemblies, and modules on which maintenance is authorized'.

c. Column 3, Maintenance functions. Maintenance functions will be limited to and defined as follows:

1. Inspect. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

2. Test, To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

3. Service. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

4. Adjust. To rectify to the extent necessary to bring into proper operating range.

5. Align. To adjust specified variable elements of an item to bring to optimum performance.

6. Install. To set up for use in an operational environment such as an emplacement, site, or vehicle.

7. Replace. To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

8. Repair. To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

9. Overhaul. To restore an item to a completely serviceable condition as prescribed by . maintenance serviceability standards prepared and published for the specific item to be overhauled.

10. Rebuild. To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

11. Symbols. The symbol, O, F, H, or D placed in the appropriate column indicates the level responsible for performing that particular mainte - nance function. The symbol "%%" which applies to organizational maintenance indicates that the particular maintenance function may be performed provided it is specifically authorized by the direct support maintenance officer. Use of the symbol will apply only to replacement of major assemblies and time-consuming operations which are within the capabilities of organization but over which control by the commodity commands is considered essential. In no case will the direct support maintenance officer require the accomplishment of a "% %" maintenance function by an organization or unit, and in no case will a "% %" function authorize stockage of parts at organizational level.

d. Column 4, Tools and equipment. This column will be used to specify, by code, those tools and test equipment required to perform the designated function.

e. Column 5, Remarks. Self-explanatory.

A-3. GENERAL.

a. A maintenance function assigned to a maintenance level, which for any reason is beyond its capability, becomes the responsibility of the next higher maintenance level.

b. The authority to perform a maintenance function does not constitute authority to requisition or otherwise secure necessary repair parts as specified in current supply directives.

A-4. DEVIATIONS.

a. Normally, there will be no deviations from the assigned maintenance level. In cases of

operational necessity, a maintenance function assigned to a maintenance e level may, on a one-time basis and at the request of the lower maintenance level, be authorized to the lower maintenance level by the maintenance officer of the level to which the function is assigned.

b. The furnishing of special tools, equipments, and the like, required by the lower maintenance level to perform this function, will be the responsibility of the level to which the function is assigned.

A-5. ADDITIONAL INFORMATION.

a. Changes in the maintenance allocation chart will be based on continuing evaluation and analysis by responsible technical personnel and on DA Form 2407 (Maintenance e Request) received from field activities.

b. All maintenance prescribed herein will be performed in accordance with applicable publications.

c. In any instance of conflict with current tool and equipment list or current supply manuals, this maintenance allocation chart will be the final authority. Each such instance should be promptly reported by DA Form 2407.

MAINTENANCE ALLOCATION CHART FOR
D-5B HYDRAULIC TEST STAND

Group No.	Functional Group	Maintenance Function											Tools and Equipment	Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
00	Test Stand, Hydraulic Systems, Gasoline Engine Drive, Model D-5B	0						0			H			
01	Electrical System													
	Battery	0	0	0					0					
	Ignition Wire Assembly	0	0	0					F	F				
	Alternator	0	F	F					F	H				
	Voltage Regulator	0	F		F				F					
	Rectifier Unit	0	F		F				F					
	Starter Motor	0	F						F	H				
	Thermo Switch	0			F				F					
	Ammeter	0							F					
	Reservoir Level Indicator	0							F					
	Fuel Level Indicator	0							F					
	Electrical Wiring and Cables	0	F						F					
	Starter Switch		F						F					
	Starter Solenoid		F						F					
02	Hydraulic System													
	Pump	0	F	F					F	H	H			
	Compensator Control	0	F		F				H					
	Valves	0			F				F	H	H			
	Fluid Reservoir	0		0					F					
	Lines, Tubing, Fittings, Hose Assy's.	0							F					
	Low Pressure Filter Assembly	0		0					F					
	High Pressure Filter Assemblies	0		0										
	Fluid Flow Indicator						*		F					
	Pressure Gages	0					*		F					
	Temperature Gage	0							F					
	Manifold	0							H					

MAINTENANCE ALLOCATION CHART FOR
D-5B HYDRAULIC TEST STAND (cont)

Group No.	Functional Group	Maintenance Function											Tools and Equipment	Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
03	Engine													
	Cylinder Block and Compressor	H							H	H	H			
	Crankcase and Compressor	H		0					H	H	H			
	Governor	0			F				F	H				
	Fuel Pump	0		0					F	H				
	Oil Filter Assembly	0		0					F					
	Magneto	0	0	0	0				F					
	Spark Plugs	0	0	0	0				F					
	Fuel Strainer	0	0						F					
	Air Cleaner	0		0						F				
	Carburetor Cables (Choke and Throttle)	0	F		F				F					
	Carburetor	0			F				F	H	H			
	Oil Temperature Gage	0	F						F					
04	Miscellaneous													
	Fuel Tank	0		0					F	H				
	Tire	0		0					F	F				
	Tube	0		0					F	F				
	Wheels	0							F					
	Brake Drum and Hub	0		0					F					
	Brake Assembly	F	F		F				F					
	Axel and Steering Assembly	F		0						F				
	Brake Rod	F	F						F					
	Hose 1/2-inch, 3/4-inch and 1-inch	0	F						F					

APPENDIX B

REPAIR PARTS AND SPECIAL TOOLS LIST
(Current as of 22 January 1975)

Section I. INTRODUCTION

B-1. Scope.

This appendix lists repair parts; required for performance of direct support, general support and depot maintenance of the Test Stand,. Hydraulic Systems, P/N 7454.

B-2. General.

This Repair Parts and Special Tools List is divided into the following sections:

a. Section II. Repair Parts List. A list of repair parts authorized for use in the performance of maintenance.

b. Section III. Special Tools List. (Not Applicable)

c. *Section IV. National Stock Number and Part Number Index.* A list, in ascending numerical sequence, of all National stock numbers appearing in the listings, followed by a list, in alphanumeric sequence, of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance.

B-3. Explanation of Columns.

The following provides an explanation of columns found in the tabular listings:

a. Illustration. This column is divided as follows:

(1) *Figure Number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item Number.* The number used to identify each item called out in the illustration.

b. Source, Maintenance and Recoverability Codes (SMR).

(1) *Source Code.* Source codes are assigned to support items to indicate the manner of acquiring support items for maintenance, repair or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

Code		*Definition*
PA	---	Item procured and stocked for anticipated or known usage.
PB	---	Item procured and stocked for insurance purpose because essentiality dictates that a minimum quantity be available in the supply systems.
PC	---	Item procured and stocked and which otherwise would be coded PA except that it is deteriorative in nature.
XB	---	Item is not procured or stocked. If not available through salvage, requisition.
XD	---	A support item that is not stocked. When required, item will be procured through normal supply channels.

NOTE

Cannibalization or salvage may be used as a source of supply for any items source coded above except those coded XD, and aircraft support items as restricted by AR 700-42.

(2) *Maintenance Code.* Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

Code		*Application/Explanation*
F	——	Support item is removed, replaced, used at the direct support level.

H —— Support item is removed, replaced, used at the general support level.

D —— Support items that are removed, replaced, used at depot, mobile depot, specialized repair activity only.

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i. e., all authorized maintenance functions). This position will contain one of the following maintenance codes:

Code	*Application/Explanation*
D	—— The lowest maintenance level capable of complete repair of the support item is the depot level.
Z	—— N on reparable. No repair is authorized.

(3) *Recoverability Code.* Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the Uniform SMR Code format as follows:

Code	*Definition*
Z	—— Nonreparable item. When unserviceable, condemn and dispose at the level indicated in position 3.
D	—— Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level.

c. National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

d. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards and inspection requirements, to identify an item or range of items.

NOTE

When a stock numbered item is requisitioned, the repair part received may have a different part number than the partial

e. Federal *Supply Code for Manufacturer (FSCM).* The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

f. Description. Indicates the Federal item name and, if required, a minimum description to identify the item.

g. Unit of Measure (U/M). Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr, etc.).

h. Quantity Incorporated in Unit. Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable (e.g., shims, spacers, etc.).

B-4. Special Information. (Not Applicable)

B-5. How to Locate Repair Parts.

a. When National Stock Number or Part Number is Unknown:

(1) *First.* Find the illustration covering the group to which the repair part belongs.

(2) *Second.* Identify the repair part on the illustration and note the illustration figure and item number of the repair part.

(3) *Third.* Using the Repair Parts Listing, find the figure and item number noted on the illustration.

b. When National Stock Number or Part Number is Known.

(1) *First.* Using the Index of National Stock Numbers and Part Numbers, find the pertinent National stock number or part number. This index is in ascending NSN sequence followed by a list of part numbers in ascending alphanumeric sequence, cross-referenced to the illustration figure number and item number.

(2) *Second.* After finding the figure and item number, locate the figure and item number in the repair parts list.

B-6. Abbreviations. (Not Applicable)

(1) ILLUSTRATION (A) FIG NO	(B) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
B-1	-		4920-00-144-5581	7454	22680	TEST STAND,HYDRAULIC SYSTEM			
						SECTION II REPAIR PARTS LIST			
						GROUP 01 ELECTRICAL SYSTEM			
B-2	1	89236	22680	CONTROL PANEL			1		
B-2	1	PBFZZ	5310-00-761-6882	MS35690-402	96906	.NUT,PLAIN,HEXAGON		EA	8
B-2	2	XDFZZ		741414	22680	.MOUNT,RESILIENT		EA	4
B-2	3	PBFZZ	6210-00-803-9882	02-91180-9	87034	.LIGHT,INDICATOR		EA	2
B-2	4	PBFZZ	6240-00-792-4196	1815	24455	.LAMP		EA	2
B-2	5	PBFZZ	6620-00-470-3219	6468074	70040	.GAGE,TACHOMETER		EA	1
B-2	6	PBFZZ	6625-00-420-8623	YE2	66289	.AMMETER		EA	1
B-2	7	XDFZZ		34001	75915	.FUSE 10AMP		EA	1
B-2	8	PBFZZ	5930-00-605-1582	MS35059-23	96906	.SWITCH,TOGGLE		EA	1
B-2	9	PBFZZ	5930-00-655-1522	MS35058-23	96906	.SWITCH,TOGGLE		EA	1
B-2	10	PBFZZ	2990-00-818-3962	VE527WV	66289	.CONTROL ASSEMBLY: THROTTLE		EA	1
						IGNITION CABLES			
B-3	1	PBFZZ	2920-00-941-6108	MS51011-13	96906	LEAD AND CONDUIT: NO. 1&4		EA	2
B-3	2	PBFZZ	2920-00-924-2042	MS51011-14	96906	LEAD AND CONDUIT: NO. 2		EA	1
B-3	3	PBFZZ	2920-00-887-1289	MS51011-10	96906	LEAD AND CONDUIT: NO. 3		EA	1
B-3	4	PBFZZ	5930-00-224-5668	YC9A	66289	SWITCH,PUSH-PULL: GROUND		EA	1
						STARTER MOTOR			
B-3	1	PBFZZ	5930-00-224-5668	YC9A	66289	STARTER,MOTOR: SEE FIG.B-18 FOR BREADOWN		EA	1
						BATTERY RETAINER			
B-4	1	PBFZZ	5310-00-880-7744	MS51967-5	96906	NUT,PLAIN,HEXAGON		EA	2
B-4	2	PBFZZ	5310-00-167-0820	AN960-516	88044	WASHER,FLAT		EA	2
B-4	3	XDFZZ		89280	22680	STUD,PLAIN		EA	2
B-4	4	XDFZZ		HD27	71174	RETAINER,BATTERY		EA	1
						GROUP 02 HYDRAULIC SYSTEM			
B-2	1					CONTROL PANEL			1
B-2	11	PBFZZ	6620-00-698-6700	RS11	66289	.GAGE,PRESSURE,DIAL INDICATING		EA	1
B-2	12	PBFZZ	4820-00-254-5849	1-1758-14R	86768	.VALVE,FLOW CONTROL		EA	2
B-2	13	PBFZZ	4820-00-150-8116	MV430S	09990	.VALVE,GLOBE		EA	2
B-2	14	XDFZZ		MV830S	09990	.VALVE,GLOBE		EA	1
B-2	15	XBFZZ		132798	22680	.VALVE,ROTARY		EA	1

(1) ILLUSTRATION (A) FIG NO	(B) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
B-2	16	XBFZZ		105HD1-4	13174	.COCK,PLUG		EA	1
B-2	17	PBFZZ	4730-00-278-5006	AN929-4	88044	.CAP,TUBE		EA	2
B-2	18	PBFZZ	5310-00-282-7823	MS24400D4	96906	.NUT,PLAIN,HEXAGON		EA	2
B-2	19	PBFZZ	4730-00-715-0018	MS24393D4	96906	.NIPPLE,TUBE		EA	2
B-2		XDFZZ		690-1-4B	68768	DAMPER,PULSATION: HIGH PRESSURE GAGE LIME		EA	1
						HIGH PRESURE FILTER			
B-5		PBFZZ	4330-00-288-6907	MS28720-12	96906	FILTER,FLUID,PRESSURE		EA	1
B-5	1	PAFZZ	4330-00-277-3274	AB6235-4A	88044	.FILTER ELEMENT,FLUID PRESSURE		EA	1
B-5	2	PCFZZ	5330-00-807-8993	MS28775-228	96906	.PACKING,PREFORMED		EA	1
B-5	3	PAFZZ	5330-00-582-1542	MS28774-228	96906	.RETAINER,PACKING		EA	1
B-5		PBFZZ	5930-00-134-5722	1202PS	30839	SWITCH,PRESSURE: HIGH PRESSURE FILTER LINE		EA	1
						LOW PRESSURE FILTER			
B-6		PBFZZ	4920-00-829-7781	63080	81321	FILTER,FLUID,PRESSURE		EA	1
B-6	1	PBFZZ	4330-00-804-1541	AN6236-3	88044	.FILTER ELEMENT,FLUID PRESSURE		EA	1
B-6	2	PBFZZ	5310-00-196-6695	AN6238-1	88044	.WASHER,FLAT		EA	2
B-6	3	PBFZZ	2910-00-424-7431	15002	81321	.COCK,SHUT OFF		EA	1
B-6	4	PBFZZ	4730-00-826-7567	AN929A16	88044	.CAP,TUBE		EA	1
B-6	5	XDFZZ		89262	22680	.TEE,PIPE TO TUBE		EA	1
B-6	6	PBFZZ	4730-00-278-5126	MS20826-4D	96906	.TEE,PIPE TO TUBE		EA	1
B-6	7	PBFZZ	4730-00-186-9492	AN816-16D	88044	.ADAPTER,STRAIGHT,PIPE TO TUBE		EA	1
B-6	8	PBFZZ	4730-00-449-7203	C3109X20X16	79470	.BUSHING,PIPE		EA	2
B-6	9	XDFZZ		9587M58	39428	STRAP,WEBBING		EA	3
B-6		PBFZZ	5930-00-134-5721	1201PS	30839	SWITCH,PRESSURE: LOW PRESSURE FILTER LINE		EA	1
						MANIFOLD ASSEMBLY			
B-7				48232	22680	MANIFOLD ASSEMBLY			1
B-7	1	XDFZZ		101920	22680	.MANIFOLD,HYDRAULIC		EA	1
B-7	2	PBFZZ	4730-00-287-1027	MS20822-12D	96906	.ELBOW,PIPE TO TUBE		EA	2
B-7	3	PBFZZ	4730-00-520-8934	AN912-7J	88044	.BUSHING,PIPE		EA	1
B-7	4	PBFZZ	4730-00-221-2137	MS20913-2S	96906	.PLUG,PIPE		EA	1
B-7	5	PBFZZ	4730-00-287-1025	MS20822-16D	96906	.ELBOW,PIPE TO TUBE		EA	2
B-7	6	PBFZZ	4730-00-186-9492	AN816-16D	88044	.ADAPTER,STRAIGHT,PIPE TO TUBE		EA	1
B-7	7	PBFZZ	4730-00-278-2681	AN910-4D	88044	.COUPLING,PIPE		EA	1
B-7	8	PBFZZ	4730-00-222-1839	MS51846-58	96906	.NIPPLE,PIPE		EA	1
B-7		XDFZZ		20110	73168	SWITCH,THERMOSTATIC		EA	1
						HYDRAULIC RESERVOIR			
B-8				48228	22680	RESERVOIR ASSEMBLY			1
B-8	1	PBFZZ	4730-00-287-1025	MS20822-16D	96906	.ELBOW,PIPE TO TUBE		EA	2

(1) ILLUSTRATION (A) FIG NO	(B) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
B-8	2	XDFZZ		CD297	79502	.CAP,FILLER		EA	1
B-8	3	XDFZZ		72430	22680	.SCREEN,FILTER		EA	1
B-8	4	XDFZZ		12098-98	81321	.FILTER,BREATHER		EA	1
B-8	5	PBFZZ	6680-00-078-2619	391A	57733	.TANK UNIT,UNIVERSAL		EA	1
B-8		XDFZZ		101HD1-2-3-8	30327	VALVE,SHUTOFF: DRAINLINE		EA	1
						HYDRAULIC PUMP			
B-9		XDFZZ		89234	22680	BRACKET,PUMP MOUNTING		EA	1
B-9				015-16817	16954	PUMP,HIGH PRESSURE			1
B-9	1	PBDZZ	5310-00-186-0966	W07	43334	.WASHER,KEY		EA	3
B-9	2	PBHZZ	5330-00-631-4045	35-18064Z	16954	.GASKET		EA	1
B-9	3	PBFZZ	5335-00-584-0266	MS28784-10	96906	.PACKING,PREFORMED		EA	3
B-9	4	PBFZZ	4920-00-652-6977	35-18530Z	16954	.SPRING,HOLD DOWN		EA	1
B-9	5	PBDZZ	5330-00-292-0570	MS28775-210	96906	.PACKING,PREFORMED		EA	1
B-9	6	XBHZZ		35-15032Z	16954	.GASKET		EA	2
B-9	7	PBHZZ	5330-00-987-9123	035-22731	16954	.GASKET		EA	6
B-9	8	PBHZZ	5330-00-987-9122	035-11900	16954	.GASKET		EA	1
B-9	9	PBHZZ	4320-00-631-1645	35-12421Y	16954	.BEARING,BARREL		EA	1
B-9	10	PBFZZ	4920-00-324-1756	035-45998	16954	.PISTON,CONTROL		EA	1
B-9	11	PBFZZ	5360-00-779-0200	035-12289	16954	.SPRING,HELICAL,COMPRESSION		EA	1
B-9	12	PBDZZ	5340-00-650-9237	035-13976	16954	.SEAT,HELICAL SPRING		EA	1
B-9	13	PBDZZ	4320-00-650-9236	035-13977	16954	.PISTON,PRESSURE CONTROL		EA	1
B-9	14	PBDZZ	4320-00-712-4639	035-22051	16954	.SPRING,COMPRESSION		EA	1
B-9	15	XBHZZ		035-14007	16954	.HANDWHEEL		EA	1
B-9	16	PBHZZ	4920-00-960-1104	035-18001	16954	.SCREW,ADJUSTING		EA	1
B-9	17	XBHZZ		035-17914	16954	.STOP,CONTROL		EA	1
B-9	18	PBDZZ	5360-00-977-2405	035-22404	16954	.SPRING,HELICAL,COMPRESSION		EA	1
B-9	19	PBDZZ	5330-00-088-5141	035-12592	16954	.GASKET		EA	1
B-9		PBHZZ	4820-00-491-3144	458-12S2-6	86768	VALVE,CHECK: PUMP LINE		EA	1
B-9		XBFZZ		89249	22680	SLEEVE,VOLUME CONTROL		EA	1
B-9		XBFZZ		89248	22680	SHAFT,VOLUME CONTROL		EA	1
B-9		PBFZZ	5330-00-839-5820	MS24665-134	96906	PIN,COTTER: PIVOT,PUMP INDICATOR		EA	1
B-9		XDFZZ		12S	75665	COUPLING,GEAR: PUMP TO ENGINE		EA	1
B-9		XDFZZ		48221	22680	CONTROL,PRESSURE ASSEMBLY		EA	1
B-9		PBFZZ	3110-00-277-0119	MS19060-21	96906	.BALL BEARING		EA	2
						GROUP 03 ENGINE			
B-10		XDFDD		MVG4D366517	66289	ENGINE,GASOLINE		EA	1
						CYLINDER BLOCK AND COMPRESSOR			
B-10	1	PBFZZ	2990-00-816-5714	VE435E	66289	CONTROL ASSEMBLY: CHOKE		EA	1

(1) ILLUSTRATION (A) FIG NO	(B) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
B-10	2	PBHZZ	5330-00-292-3984	QB83	66289	RETAINER,PACKING		EA	1
B-10	3	XBFZZ		AB77B2S1	66289	CYLINDER HEAD		EA	2
B-10	4	PBFZZ	5330-00-399-6984	QD631	66289	GASKET		EA	2
B-10	5	PBFZZ	2920-00-810-7082	MS51009-1	96906	SPARK PLUG		EA	4
B-10	6	PBFZZ	2990-00-993-0447	WD50A	66289	MUFFLER,EXHAUST		EA	1
B-10	7	PBFZZ	5930-00-775-7577	YC66DS1	66289	SWITCH,THERMOSTATIC		EA	1
B-10	8	XBFZZ		AA90A2S1	66289	CYLINDER BLOCK ASSEMBLY		EA	2
B-10	9	PBFZZ	5330-00-536-8804	QD482	66289	.GASKET: VALVE COVER		EA	2
B-10		PBFZZ	5330-00-986-1793	Q27	66289	GASKET SET: VALVE GRINDING		EA	1
						GOVERNOR			
B-11		PBHZZ	2990-00-624-9956	T84H1	66289	GOVERNOR,ENGINE		EA	1
B-11	1	PBFZZ	5315-00-010-6749	PL21	66289	.KEY,WOODRUFF		EA	1
B-11	2	PBFZZ	5360-00-201-2031	PM76	66289	.SPRING,HELICAL,EXTENSION		EA	1
B-11	3	PBFZZ	6680-00-253-5721	6454458	70043	SHAFT ASSEMBLY: TACHOMETER		EA	1
						MAGNETO			
B-12		PBFZZ	2920-00-574-9437	FMXZE4B7	21387	MAGNETO,IGNITION		EA	1
B-12	1	PBFZZ	2920-00-142-0888	A2437AX	82796	.CONTACT SET,DISTRIBUTOR		EA	1
B-12	2	XDFZZ		L2474E	82796	.BLOCK,DISTRIBUTOR		EA	1
						OIL PUMP			
B-13		PBHZZ	4320-00-353-5884	K95L	66289	PUMP,ROTARY		EA	1
B-13	1	PBFZZ	5330-00-765-2842	QD535A	66289	.GASKET		EA	1
B-13	2	PBHZZ	2805-00-332-3722	RD112	66289	.STRAINER,ELEMENT,SEDIMENT		EA	1
						CRANKSHAFT,PISTON AND CONNECTING ROD			
B-14	1	PBHZZ	2805-00-388-6653	RSMS13957-1	81336	RING SET: STANDARD SIZE		EA	4
B-14	2	PBHZZ	2805-00-554-9255	MS13957-1	96906	PISTON,INTERNAL COMBUSTION ENGINE: STANDARD SIZE		EA	4
B-14	2	PBHZZ	2805-00-554-9822	MS13957-2	96906	PISTON,INTERNAL,COMBUSTION ENGINE: 0.020 OVERSIZE		EA	4
B-14	2	PBHZZ	2805-00-540-5299	MS13957-3	96906	PISTON,INTERNAL,COMBUSTION ENGINE: 0.040 OVERSIZE		EA	4
B-14	3	PBHZZ	2805-00-605-1491	DA66B1S1	66289	ROD ASSEMBLY,CONNECTING		EA	4
B-14	4	PBHZZ	3110-00-100-4162	ME98	66289	BEARING,ROLLER,TAPERED		EA	2
						CARBURETOR			
B-15		PBFZZ	2910-00-255-2298	VH69A	96152	CARBURETOR,FLOAT		EA	1
B-15	1	XBFZZ		65-172	96152	.FLOAT,BOWL		EA	1
B-15	2	PBFZZ	5330-00-522-5358	16A105	96152	.GASKET		EA	1
B-15	3	PBFZZ	2910-00-429-2155	30-666	96152	.FLOAT AND LEVER		EA	1
B-15	4	XBFZZ		47-395	96152	.NOZZLE,MAIN		EA	1

(1) ILLUSTRATION (A) FIG NO	(B) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
B-15	5	PBFZZ	2910-00-364-4996	233-536	96152	.VALVE AND SEAT		EA	1
						CAMSHAFT AND FUEL PUMP			
B-16	1	PBFZZ	2805-00-366-6248	FR101	66289	PLUNGER,CAMSHAFT THRUST		EA	1
B-16	2	PBFZZ	5360-00-366-6249	PM108	66289	SPRING,HELICAL,COMPRESSION		EA	1
B-16	3	PBFZZ	2805-00-524-9552	EA112	66289	CAMSHAFT,ENGINE		EA	1
B-16	4	PBFZZ	2910-00-339-4836	LP38FS1	66289	PUMP,FUEL		EA	1
B-16		PBFZZ	5330-00-654-4275	Q18B	66289	GASKET SET		EA	1
						OIL FILTER			
B-17				F21P	73370	FILTER,OIL			1
B-17	1	PBFZZ	5310-00-282-9555	11581	73370	.WASHER,FLAT		EA	1
B-17	2	PBFZZ	5330-00-599-1285	11582-2	73370	.WASHER,NONMETALLIC		EA	1
B-17	3	PAFZZ	2940-00-141-9025	C21PL	73370	.FILTER ELEMENT,FLUID PRESSURE		EA	1
						STARTER MOTOR			
B18		XDFZZ		PG515A	19728	BRACKET,STARTER		EA	1
B18		PBFZZ	2920-00-014-7039	MBG4141T	19728	STARTER,ENGINE		EA	1
B18	1	PBFZZ	2920-00-353-7422	MZ1024AD	19728	.BAND,COVER		EA	1
B18	2	XDFZZ		28MBG2012BS	19728	.BRUSH SETE		EA	1
B18	3	XDFZZ		MZ19CS	19728	.SPRING,EXTENSION		EA	1
B18	4	PBFZZ	3110-00-007-6344	28MZ1360A	19728	.BEARING ASSEMBLY		EA	1
B18	5	PBFZZ	2920-00-408-9310	480187	72850	.DRIVE ASSEMBLY		EA	1
B18	6	PBFZZ	3120-00-294-4115	MZ364	19728	.BEARING,SLEEVE		EA	1
B18	7	PBFZZ	2920-00-604-7774	MZ358	19728	.CAP,BEARING		EA	1
B18		PBFZZ	2920-00-364-5974	5380307	19207	.WICK		EA	1
B18	8	XDFZZ		28MBG2411T	19728	.ARMATURE ASSEMBLY		EA	1
B18	9	XDFZZ		MU54	19728	.WASHER,THRUST		EA	1
B18	10	PBFZZ	5330-00-508-1111	069WP16	80201	.SEAL,PLAIN ENCASED		EA	1
B18	11	PBFZZ	5330-00-559-6862	MZ359A	19728	.GASKET		EA	1
						GROUP 04 MISCELLANEOUS			
						DRUM AND HUB			
B19	1	PBFZZ	3110-00-275-0283	15123-15245	60038	BEARING,BOILER,TAPERED: FRONT		EA	4
B19	2	PBFZZ	3110-00-100-5301	24780-24720	60038	BEARING,ROLLER,TAPERED: REAR		EA	4
						FUEL TANK			
B20				48230	22680	TANK,FUEL			1
B20	1	XDFZZ		89263	22680	.CAP,TANK		EA	1
B20	2	XDFZZ		72432	22680	.STRAINER,FUEL		EA	1

(1) ILLUSTRATION (A) FIG NO	(B) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
B20	3	XDFZZ		101467	22680	.GASKET		EA	1
B20	4	XDFZZ		18669	22680	.COUPLING,TANK		EA	1
B20	5	PBFZZ	6680-00-435-4228	385B	57733	.SENDER,FUEL GAGE		EA	1
B20	6	PAFZZ	4730-00-221-2139	MS20913-4S	96906	.PLUG,PIPE		EA	2
						HOUSING AND HOSE ASSEMBLY			
B-21	1	PBFZZ	5305-00-269-3211	MS90725-60	96906	SCREW,CAP,HEXAGON HEAD		EA	8
B-21	2	PBFZZ	1670-00-294-2954	48B7796	80086	RING ASSEMBLY,CARGO TIE DOWN		EA	4
B-21	3	XDFZZ		SCB83314-2CE	98003	CATCH,CLAMPING		EA	9
B-21	4	XDFZZ		44-1-2-0	94222	FASTENER,ADJUSTMENT		EA	8
B-21	5	PBFZZ	4730-00-540-0392	TB155S4-8D	00624	COUPLING,HALF,QUICK DISCONNECT: 1/2 IN		EA	1
B-21	6	PBFZZ	3340-00-594-7136	155S7-8D	00624	CAP,PROTECTIVE,DUST AND MOISTURE SEAL: 1/2 INC		EA	1
B-21	7	PBFZZ	4730-00-541-1115	TA155S4-12D	00624	COUPLING,HALF,QUICK DISCONNECT: 3/4 IN		EA	1
B-21	8	PBFZZ	4730-00-561-1544	155S7-12D	00624	CAP,QUICK DISCONNECT: 3/4 IN		EA	1
B-21	9	PBFZZ	4730-00-541-1116	TA155S4-16D	00624	COUPLING,HALF,QUICK DISCONNECT: 1 IN		EA	1
B-21	10	PBFZZ	4730-00-546-4736	155S7-16D	00624	CAP,QUICK DISCONNECT: 1 IN		EA	1
B-21	11			48224	22680	HOSE ASSEMBLY: 1/2 IN			1
B-21	12	PBFZZ	5340-00-576-5545	155S9-8D	00624	.PLUG,PROTECTIVE,DUST AND MOISTURE SEAL		EA	2
B-21	13	PBFZZ	4730-00-098-4273	E155-25-8D	00624	.NUT,UNION		EA	2
B-21	14	XDFZZ		T150S1-8D	00624	.COUPLING ASSEMBLY		EA	2
B-21	15	PBFZZ	5340-00-106-0552	MS21104D12	96906	.CLAMP,LOOP		EA	2
B-21	16			48225	22680	HOSE ASSEMBLY: 3/4 INC			1
B-21	17	PBFZZ	5340-00-561-1545	155S9-12D	00624	.PLUG,PROTECTIVE,DUST AND MOISTURE		EA	2
B-21	18	PBFZZ	4730-00-098-4274	E155-25-12D	00624	.NUT,UNION		EA	2
B-21	19	PBFZZ	5340-00-989-4573	EAB700D16	81996	.CLAMP,LOOP		EA	2
B-21	20			48226	22680	HOSE ASSEMBLY: 1 IN			1
B-21	21	PBFZZ	4730-00-348-2012	145S9-16D	00624	.COUPLING HALF,SELF-SEALING		EA	2
B-21	22	PBFZZ	4730-00-433-3230	E145-25-16D	00624	.NUT,UNION		EA	2
B-21	23	PBFZZ	4730-00-849-9329	145S5-16D	00624	.COUPLING HALF,QUICK DISCONNECT		EA	2

SECTION III
SPECIAL TOOLS LIST
(NOT APPLICABLE)

SECTION IV. NATIONAL STOCK NUMBER AND PART NUMBER INDEX

STOCK NUMBER	FIGURE NUMBER	ITEM NUMBER	STOCK NUMBER	FIGURE NUMBER	ITEM NUMBER
1670-00-294-2954	B-21	2	4820-00-254-8116	B-2	12
2805-00-332-3722	B-13	2	4820-00-491-3144	B-9	
2805-00-366-6248	B-16	1	4920-00-144-5581	B-1	
2805-00-388-6653	B-14	1	4920-00-324-1756	B-9	10
2805-00-524-9552	B-16	3	4920-00-652-6977	B-9	4
2805-00-540-5299	B-14	2	4920-00-829-7781	B-6	
2804-00-554-9255	B-14	2	4920-00-960-1104	B-9	16
2805-00-554-9822	B-14	2	5305-00-269-3211	B-21	1
2805-00-605-1491	B-14	3	5310-00-167-0820	B-4	2
2910-00-255-2298	B-15		5310-00-186-0966	B-9	1
2910-00-339-4836	B-16	4	5310-00-196-6695	B-6	2
2910-00-364-4996	B-15	5	5310-00-282-7823	B-2	18
2910-00-424-7431	B-6	3	5310-00-282-9555	B-17	1
2910-00-429-2155	B-15	3	5310-00-761-6882	B-2	1
2920-00-014-7039	B-3	4	5310-00-880-7744	B-4	1
2920-00-014-7039	B-18		5315-00-610-6749	B-11	1
2920-00-142-0888	B-12	1	5315-00-839-5820	B-9	
2920-00-353-7422	B-18	1	5330-00-088-5141	B-9	19
2920-00-364-5974	B-18		5330-00-292-0570	B-9	5
2920-00-408-9310	B-18	5	5330-00-292-3984	B-10	2
2920-00-574-9437	B-12		5330-00-399-6984	B-10	4
2920-00-604-7774	B-18	7	5330-00-508-1111	B-18	10
2920-00-810-7082	B-10	4	5330-00-522-5358	B-15	2
2920-00-887-1289	B-3	3	5330-00-536-8804	B-10	9
2920-00-924-2042	B-3	2	5330-00-559-6862	B-18	11
2920-00-941-6108	B-3	1	5330-00-582-1542	B-5	3
2940-00-141-9025	B-17	3	5330-00-584-0266	B-9	3
2990-00-624-9956	B-11		5330-00-599-1285	B-17	2
2990-00-816-5714	B-10	1	5330-00-631-4045	B-9	2
2990-00-818-3962	B-2	10	5330-00-654-4275	B-16	
2990-00-993-0447	B-10	6	5330-00-765-2842	B-13	1
3110-00-007-6344	B-18	4	5330-00-807-8993	B-5	2
3110-00-100-4162	B-14	4	5330-00-986-1793	B-10	
3110-00-100-5301	B-19	2	5330-00-987-9122	B-9	8
3110-00-275-0283	B-19	1	5330-00-987-9123	B-9	7
3110-00-277-0119	B-9		5340-00-106-0552	B-21	15
3120-00-294-4115	B-18	6	5340-00-561-1545	B-21	17
4320-00-353-5884	B-13		5340-00-576-5545	B-21	12
4320-00-631-1645	B-9	9	5340-00-594-7136	B-21	6
4320-00-650-9236	B-9	13	5340-00-650-9237	B-9	12
4320-00-712-4639	B-9	14	5340-00-989-4573	B-2	19
4330-00-277-3274	B-5	1	5360-00-201-2031	B-11	2
4330-00-288-6907	B-5		5360-00-366-6249	B-16	2
4330-00-804-1541	B-6	1	5360-00-779-0200	B-9	11
4730-00-098-4273	B-21	13	5360-00-977-2405	B-9	18
4730-00-098-4274	B-21	18	5930-00-134-5721	B-6	
4730-00-186-9492	B-6	7	5930-00-134-5722	B-5	
4730-00-186-9492	B-7	6	5930-00-224-5668	B-3	4
4730-00-221-2137	B-7	4	5930-00-655-1522	B-2	9
4730-00-221-2139	B-20	6	5930-00-655-1582	B-2	8
4730-00-222-1839	B-7	8	5930-00-775-7577	B-10	7
4730-00-278-2681	B-7	7	6210-00-803-9882	B-2	3
4730-00-278-5006	B-2	17	6240-00-792-4196	B-2	4
4730-00-278-5126	B-6	6	6620-00-470-3219	B-2	5
4730-00-287-1025	B-7	5	6620-00-698-6700	B-2	11
4730-00-207-1025	B-8	1	6625-00-420-8623	B-2	6
4730-00-287-1027	B-7	2	6680-00-078-2619	B-8	5
4730-00-348-2012	B-21	21	6680-00-253-5721	B-11	3
4730-00-433-3230	B-20	22	6680-00-435-4228	B-21	5
4730-00-449-7203	B-6	8			
4730-00-520-8934	B-7	3			
4730-00-540-0392	B-21	5			
4730-00-541-1115	B-21	7			
4730-00-541-1116	B-21	9			
4730-00-546-4736	B-21	10			
4730-00-561-1544	B-21	8			
4730-00-715-0018	B-2	19			
4730-00-826-7567	B-6	4			
4730-00-849-9329	B-21	23			
4820-00-150-8116	B-12	13			

SECTION IV. NATIONAL STOCK NUMBER AND PART NUMBER INDEX

PART NUMBER	FSCM	FIG NUMBER	ITEM NUMBER
AA90A2S1	66289	B-10	8
AB77B2S1	66289	B-10	3
AN6235-4A	88044	B-5	1
AN6236-3	88044	B-6	1
AN6238-1	88044	B-6	2
AN816-16D	88044	B-6	7
AN816-16D	88044	B-7	6
AN910-4D	88044	B-7	7
AN912-7J	88044	B-7	3
AN929-4	88044	B-2	17
AN929A16	88044	B-6	4
AN960-516	88044	B-4	2
A2437AX	82796	B-12	1
CD297	79502	B-8	2
C21PL	73370	B-17	3
C3109X20X16	79470	B-6	8
DA66B1S1	66289	B-14	3
EAB700D16	81996	B-2	19
EA112	66289	B-16	3
E155-25-12D	00624	B-21	18
E145-25-16D	00624	B-21	22
E155-25-8D	00624	B-21	13
FMXZE4B7	21387	B-	/
FR101	66289	B-16	1
F21P	73370	B-17	/
HD27	78174	B-4	4
K95L	66289	B-13	/
LP38FS1	66289	B-16	4
L2474E	82796	B-12	2
MBG4141T	19729	B-3	4
MBG4141T	19729	B-18	/
ME98	66289	B-14	4
MS13957-1	96906	B-14	2
MS13957-2	96906	B-14	2
MS13957-3	96906	B-14	2
MS19060-21	96906	B-9	/
MS20822-12D	96906	B-7	2
MS20822-16D	96906	B-7	5
MS20822-16D	96906	B-8	1
MS20826-4D	96906	B-6	6
MS20913-2S	96906	B-7	4
MS20913-4S	96906	B-20	6
MS21104D12	96906	B-21	15
MS24393D4	96906	B-2	19
MS24400D4	96906	B-2	8
MS24665-134	96906	B-9	/
MS28720-12	96906	B-53	/
MS28774-228	96906	B-5	3
MS28775-210	96906	B-9	5
MS28775-228	96906	B-5	2
MS28784-10	96906	B-9	3
MS35058-30	96906	B-2	9
MS35059-23	96906	B-2	8
MS35690-402	96906	B-2	1
MS51009-1	96906	B-10	4
MS51011-10	96906	B-3	3
MS51011-13	96906	B-3	1
MS51011-14	96906	B-3	2
MS51846-58	96906	B-7	8
MS51967-5	96906	B-4	1
MS90725-60	96906	B-21	1
MU54	19728	B-18	9
MVG4D366517	66289	B-10	/
MV430S	9990	B-2	13
MV830S	09990	B-2	14
MZ1024AD	19728	B-18	1
MZ19CS	19728	B-18	3
MZ358A	19728	B-18	7
MZ359A	19728	B-18	11
MZ364	19728	B-18	6
PG515A	19728	B-18	/
PL21	66289	B-11	1
PM108	66289	B-16	2
PM76	66289	B-11	2
QB83	66289	B-10	2
QD482	66289	B-10	9
QD535A	66289	B-13	1
QD631	66289	B-10	4
Q18B	66289	B-16	/
Q27	66289	B-10	/
RD112	66289	B-13	2
RSMS13957-1	81336	B-14	1
RS11	66289	B-2	11
SCB83314-2CE	98003	B-21	3
TA155S4-12D	00624	B-21	7
TA155S4-16D	00624	B-21	9
TB155S4-8D	00624	B-21	5
T150S1-8D	00624	B-21	14
T84H1	66289	B-11	/
VE435E	66289	B-10	1
VE527WV	66289	B-2	10
VH69A	96152	B-15	/
WD50A	66289	B-10	6
W07	43334	B-9	1
YC66DS1	66289	B-10	7
YC9A	66289	B-3	4
YE2	66289	B-2	6
015-16817	16954	B-9	/
02-91180-9	87034	B-2	3
035-11900	16954	B-9	8
035-12289	16954	B-9	11
035-12592	16954	B-9	19
035-13976	16954	B-9	12
035-13977	16954	B-9	13
035-14007	16954	B-9	15
035-17914	16954	B-9	17
035-18001	16954	B-9	16
035-22051	16954	B-9	14
035-22404	16954	B-9	18
035-22731	16954	B-9	7
035-45998	16954	B-9	10
069WP16	80201	B-18	10
1-1758-14R	86768	B-2	12
101HD-2-3-8	30327	B-8	/
101467	22680	B-20	3
101920	22680	B-7	1
105HD1-4	13174	B-2	16
11581	73370	B-17	1
11582-2	73370	B-17	2
12S	75665	B-9	/
1201PS	30839	B-6	/
1202PS	30839	B-5	/
12098-98	81321	B-8	4
132798	22680	B-2	15
145S5-16D	00624	B-21	23
145S9-16D	00624	B-21	21
15002	81321	B-6	3
15123-15245	60038	B-19	1
155S7-12D	00624	B-21	8
155S7-16D	00624	B-21	10
155S9-12D	00624	B-21	17
155S7-8D	00624	B-21	6
155S9-8D	00624	B-21	12
16A105	96152	B-15	2
1815	24455	B-2	4
18669	22680	B-20	4
20110	73168	B-7	/
233-536	69152	B-15	5
24780-24720	60038	B-19	2
28MBG2012BS	19728	B-18	2

SECTION IV. NATIONAL STOCK NUMBER AND PART NUMBER INDEX

PART NUMBER	FSCM	FIG NUMBER	ITEM NUMBER	PART NUMBER	FSCM	FIG NUMBER	ITEM NUMBER
28MBG2411T	19728	B-18	8				
28MZ1360A	19728	B-18	4				
30-666	96152	B-15	3				
341001	75915	B-2	7				
35-12421Y	16954	B-9	9				
35-15032Z	16954	B-9	6				
35-18064Z	16954	B-9	2				
35-18530Z	16954	B-9	4				
385B	57733	B-20	5				
391A	57733	B-8	5				
44-1-2-0	94222	B-21	4				
458-12S2-6	86768	B-9					
47-395	96152	B-15	4				
48B7796	80086	B-21	2				
48018/	72850	B-18	5				
48221	22680	B-9					
48224	22680	B-21	11				
48225	22680	B-21	16				
48226	22680	B-21	20				
48228	22680	B-8					
48230	22680	B-20					
48232	22680	B-7					
5380307	19207	B-18					
63080	81321	B-6					
6454458	70043	B-11	3				
64680/4	70040	B-2	5				
65-1/2	96152	B-15	1				
690-1-4B	86768	B-2					
72430	22680	B-8	3				
72432	22680	B-20	2				
741414	22680	B-2	2				
7454	22680	B-1					
89234	22680	B-9					
89236	22680	B-2					
89248	22680	B-9					
89249	22680	B-9					
89262	22680	B-6	5				
89263	22680	B-20	1				
89280	22680	B-4	3				
958/M58	39428	B-6	9				

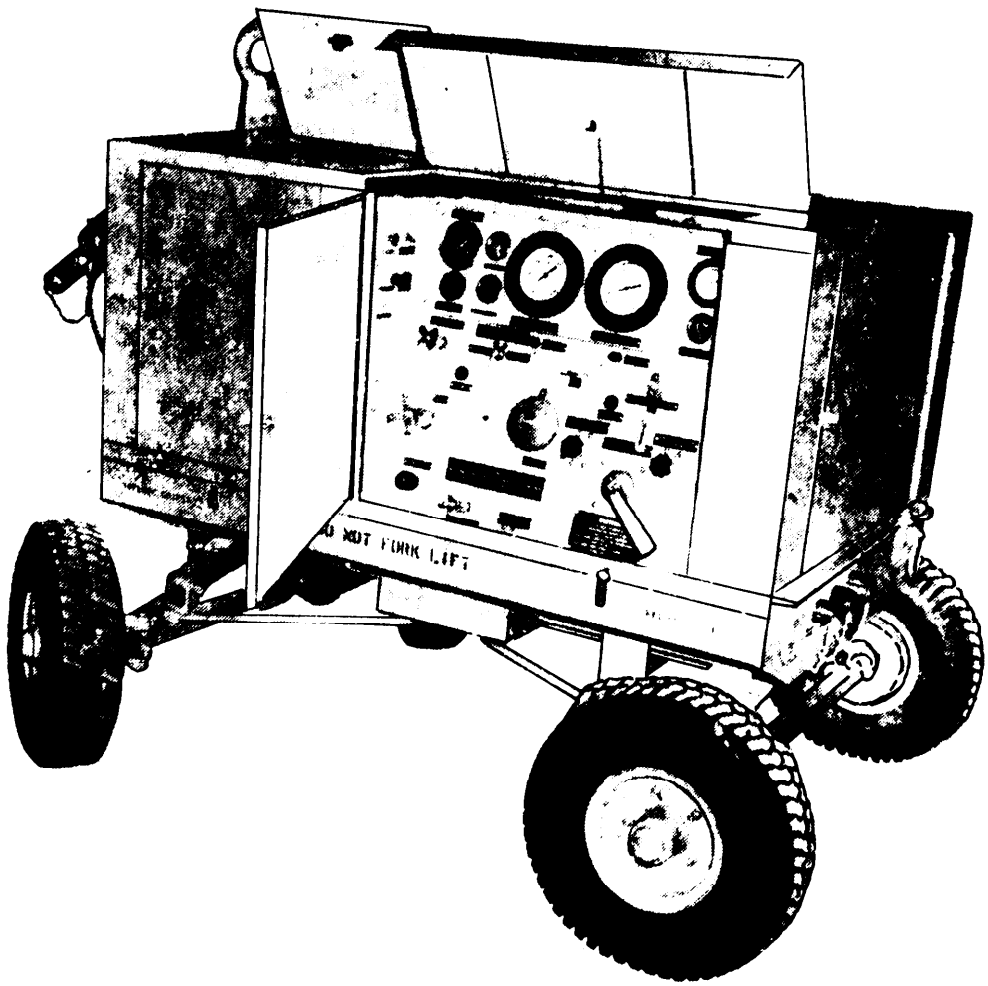


Figure B1. Hydraulic Test Stand.

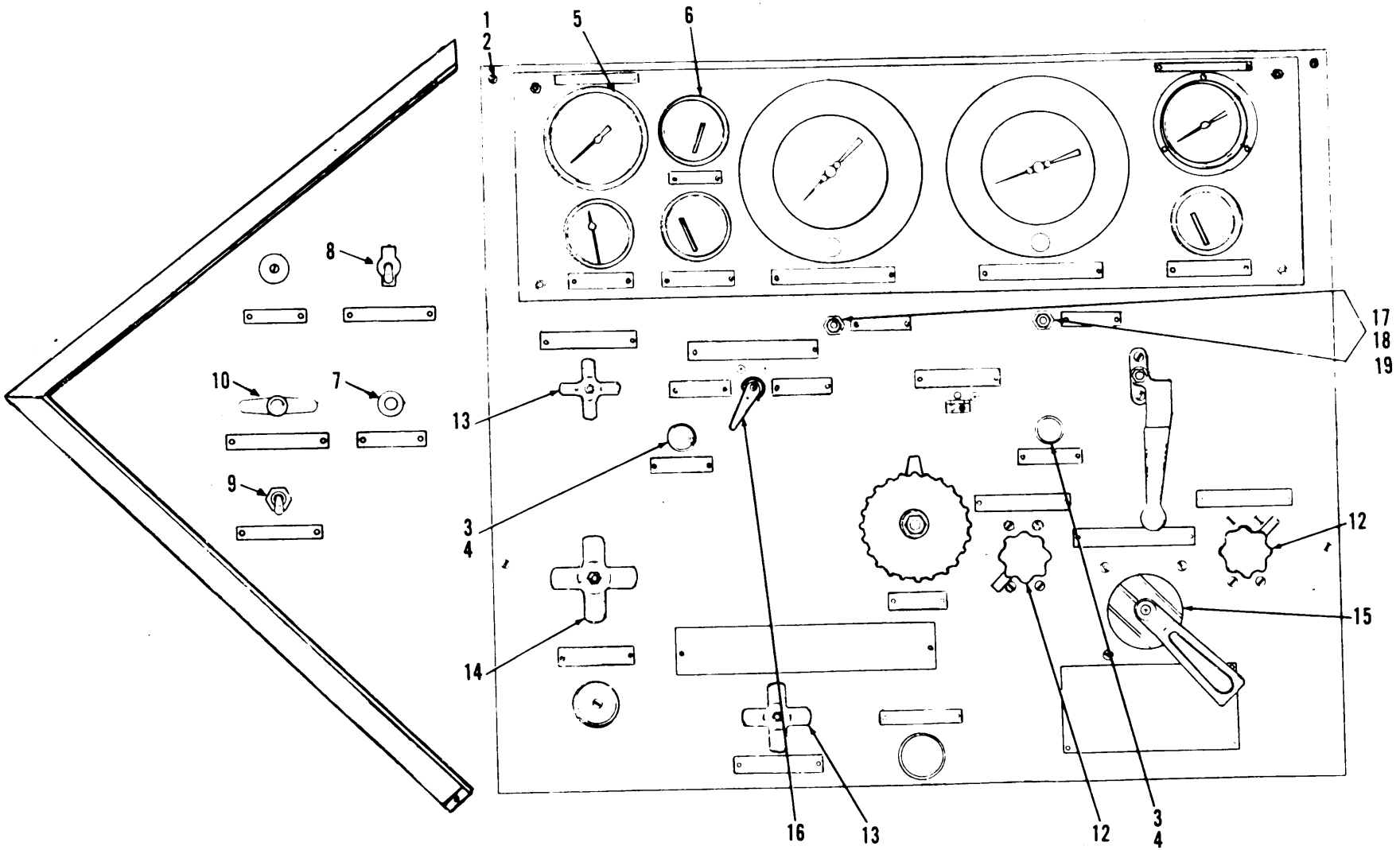


Figure B2. Control Panel.

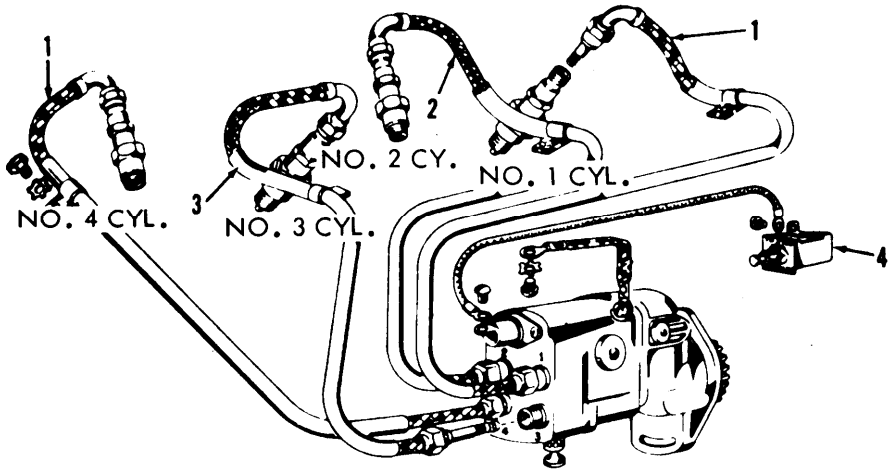


Figure B3. Ignition Cables.

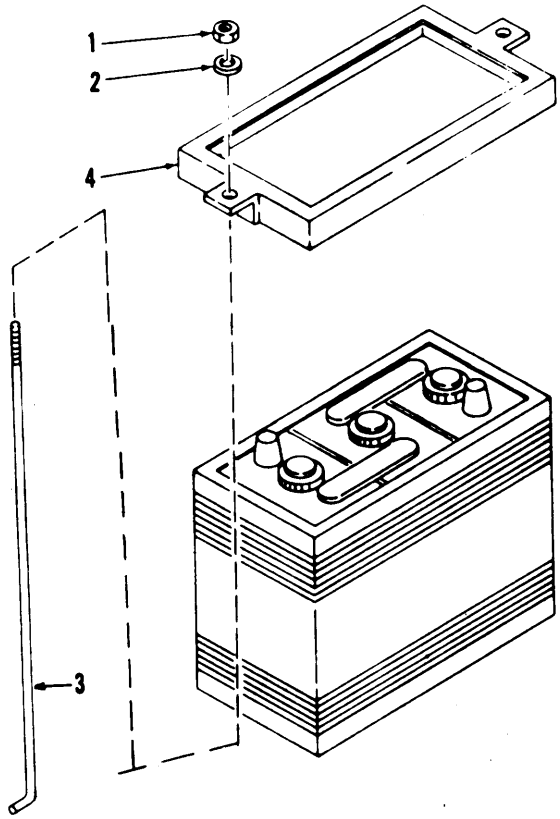


Figure B4. Battery Retainer.

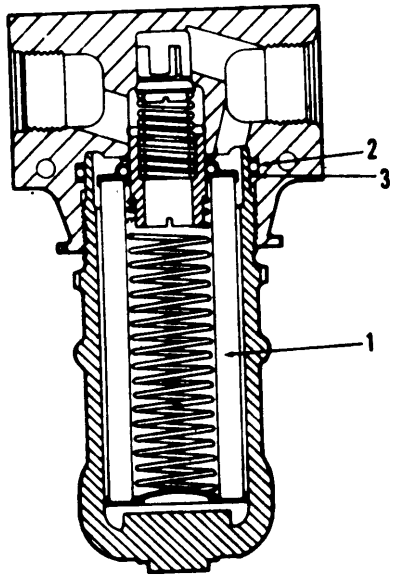


Figure B5. High Pressure Filter.

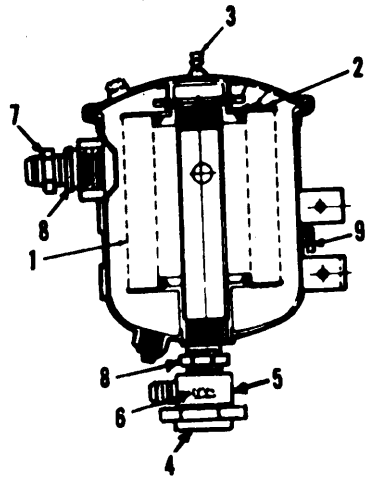


Figure B6. Low Pressure Filter

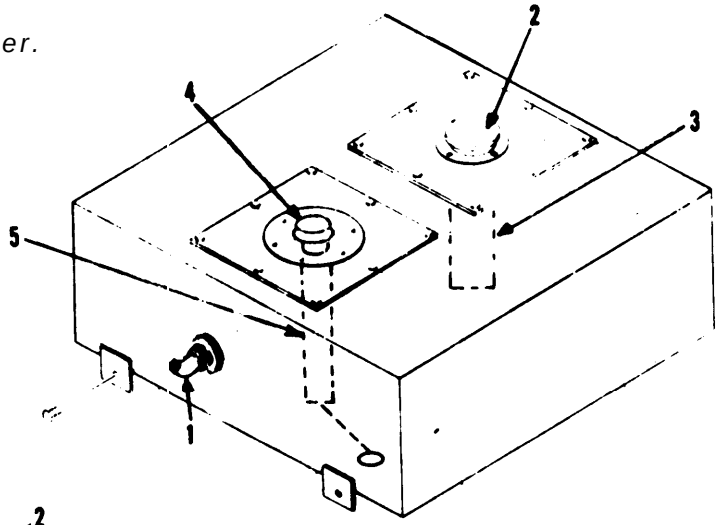


Figure B8. Hydraulic Reservoir.

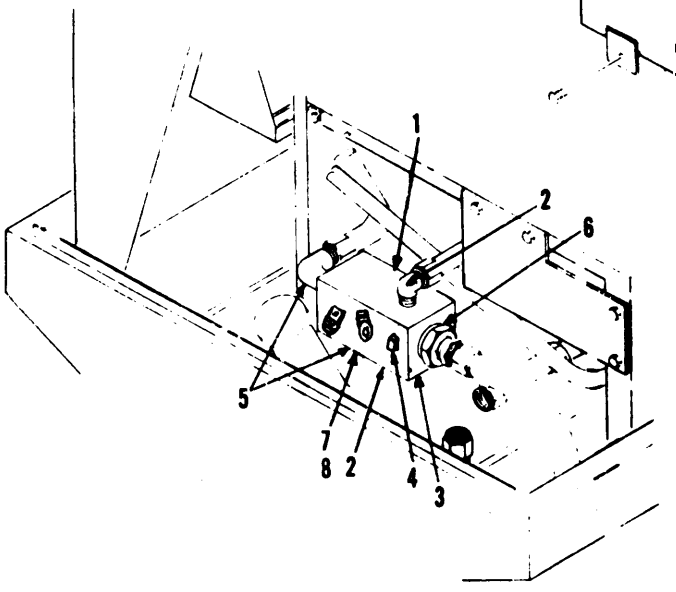


Figure B7. Manifold Assembly.

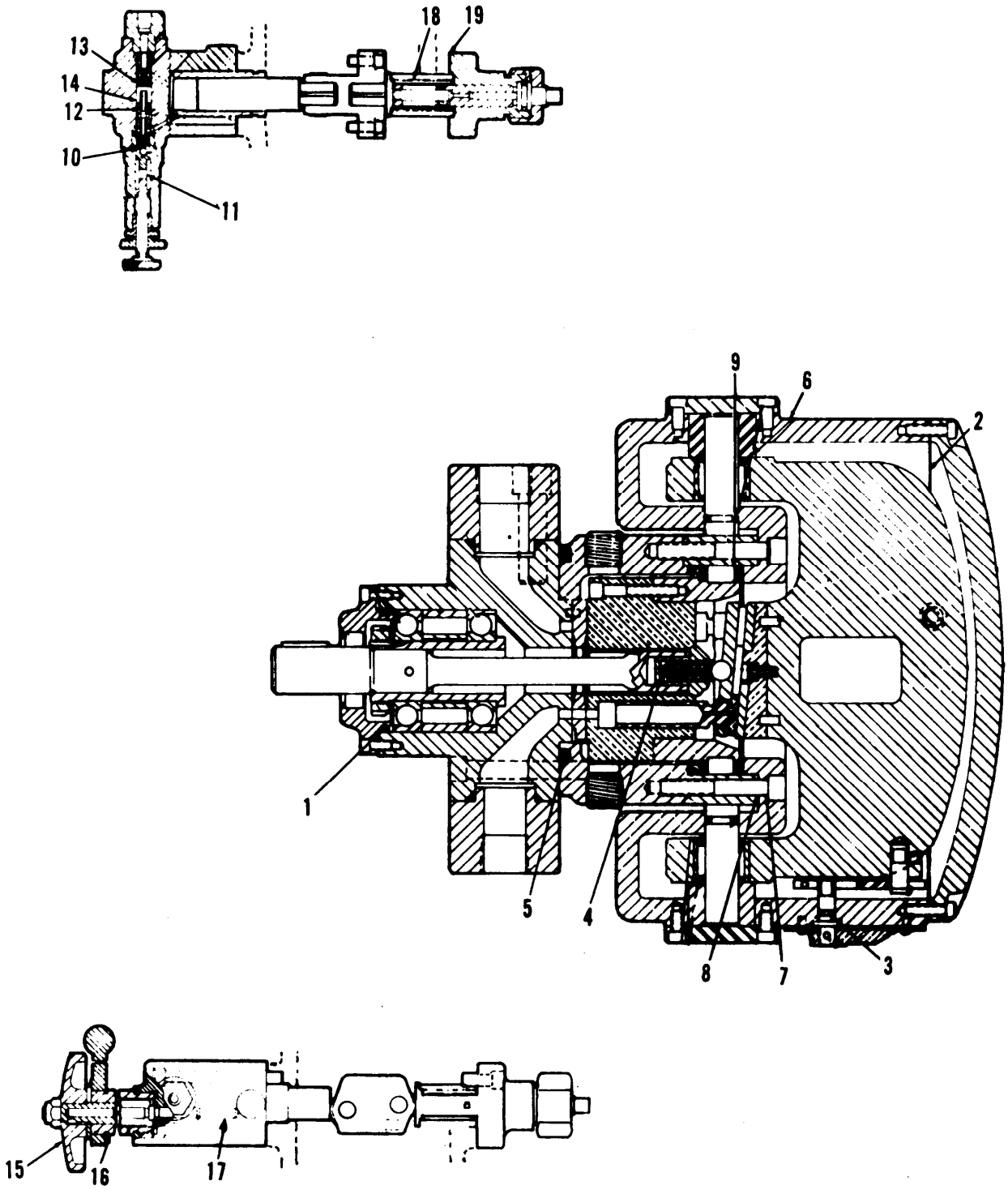


figure B9. Hydraulic Pump.

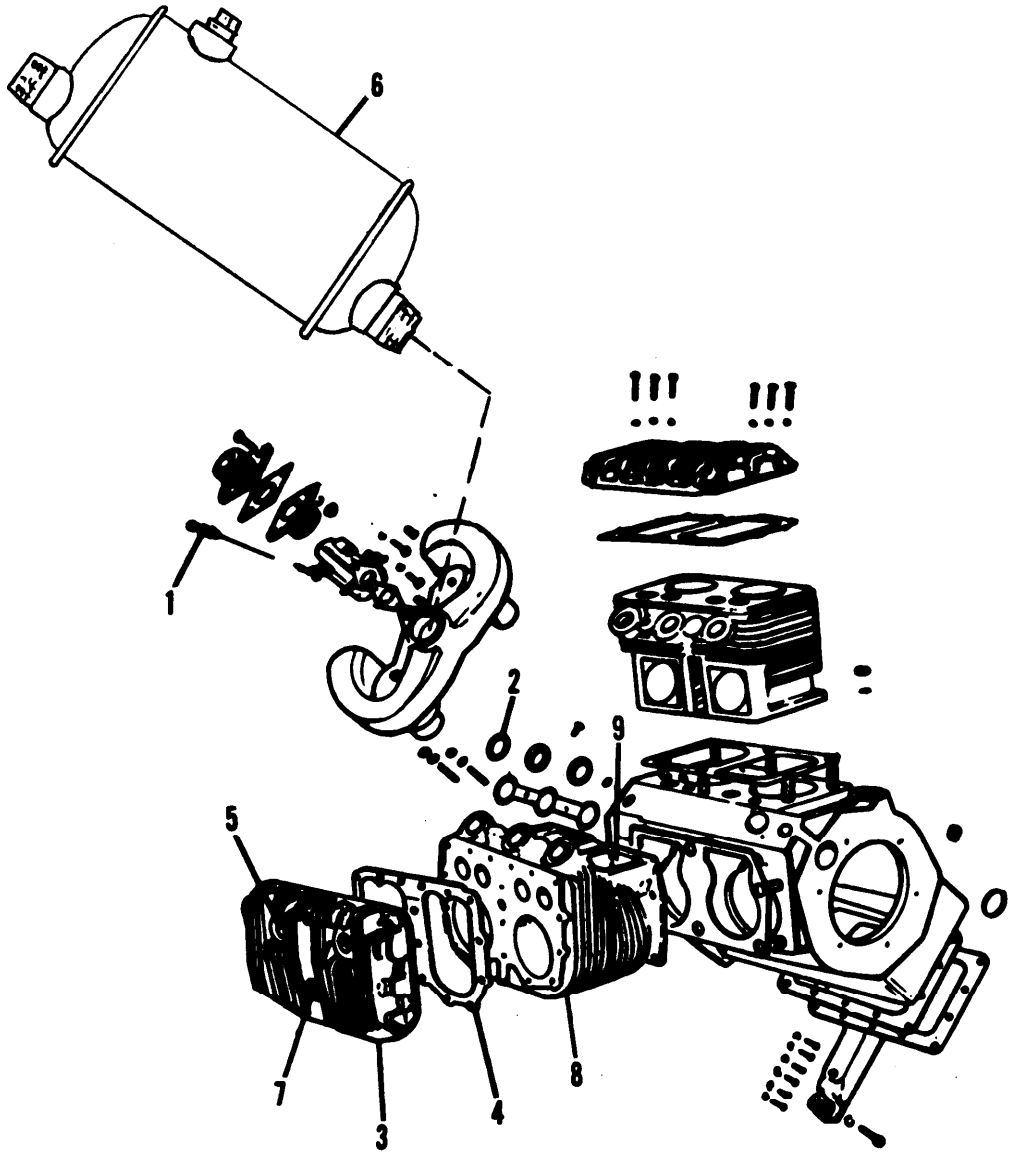


Figure B10. Cylinder Block and Compressor.

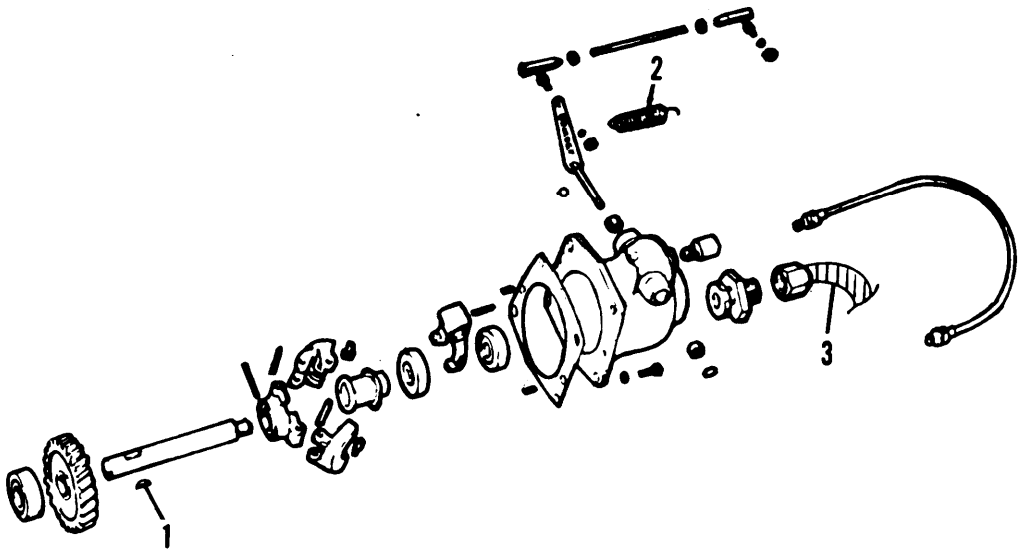


Figure B11. Governor.

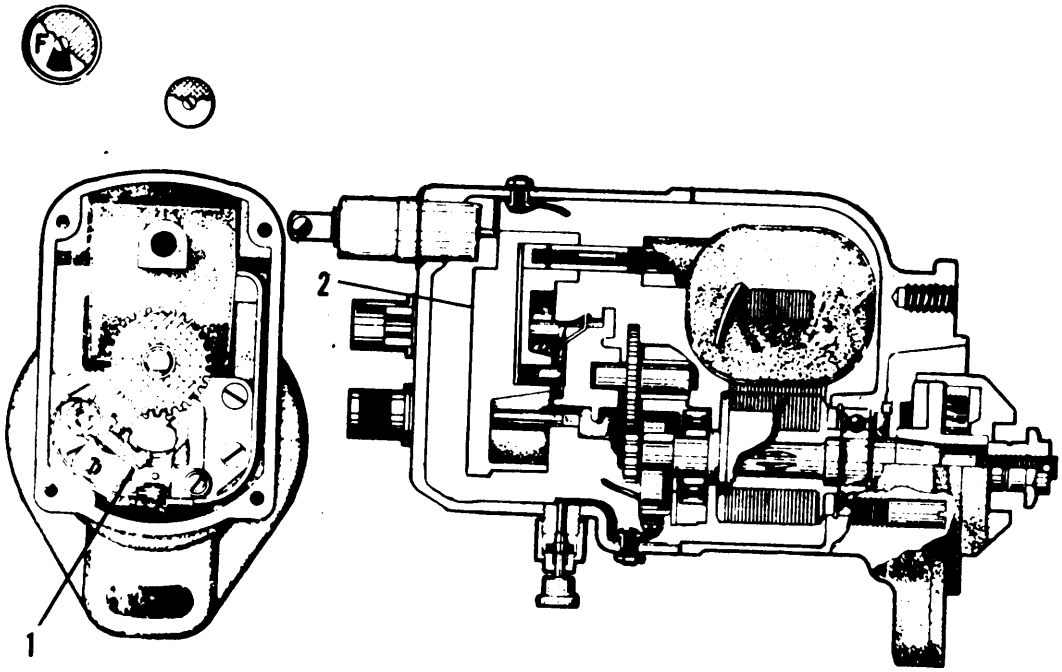


Figure B12. Magneto.

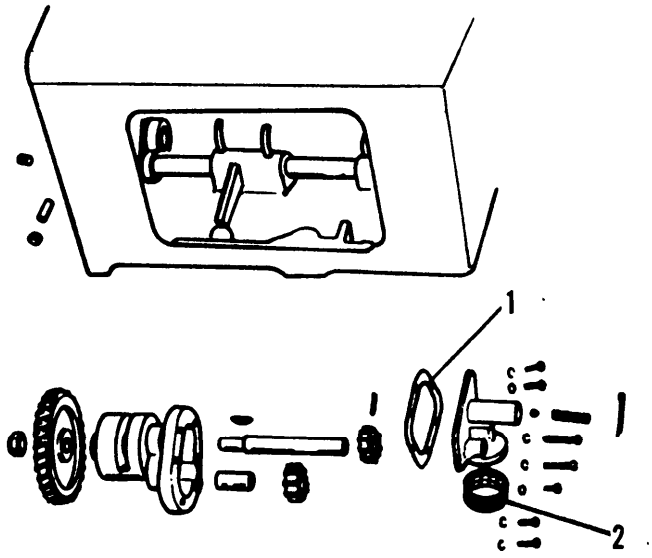


Figure B13. Oil Pump.

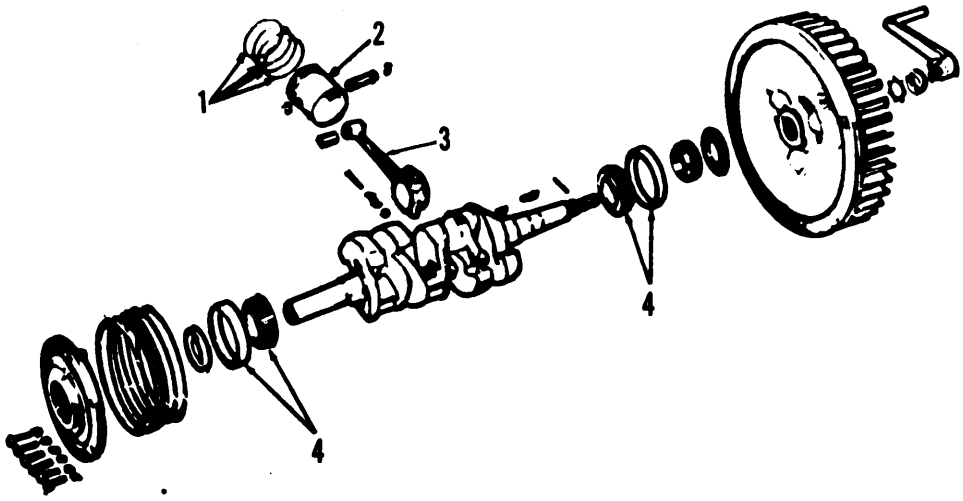


Figure B14. Crankshaft Piston and Connecting Rod.

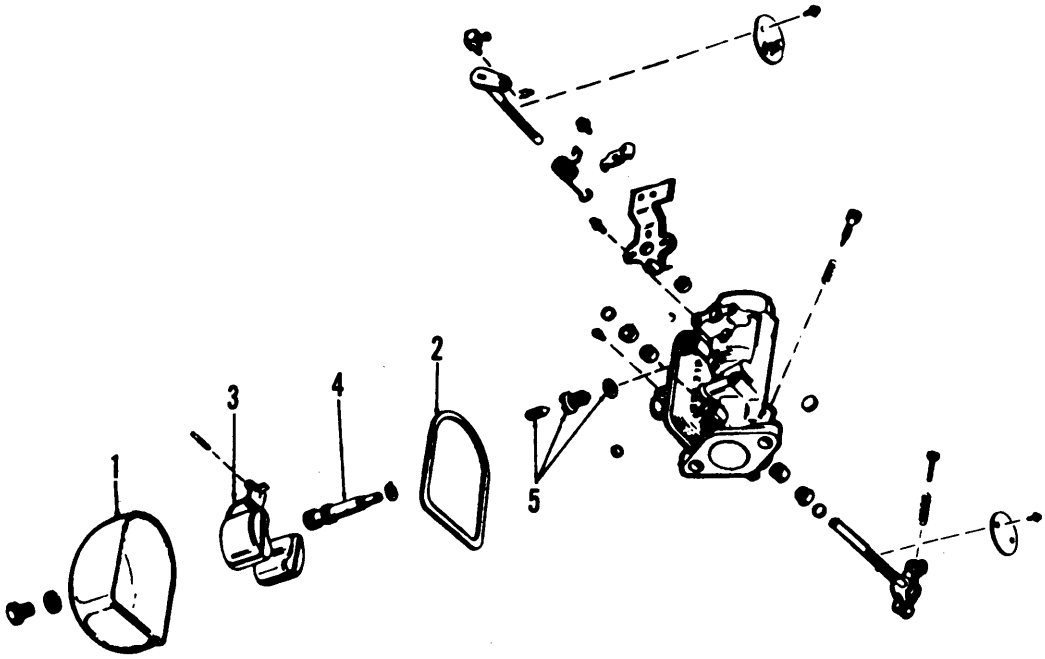


Figure B15. Carburetor.

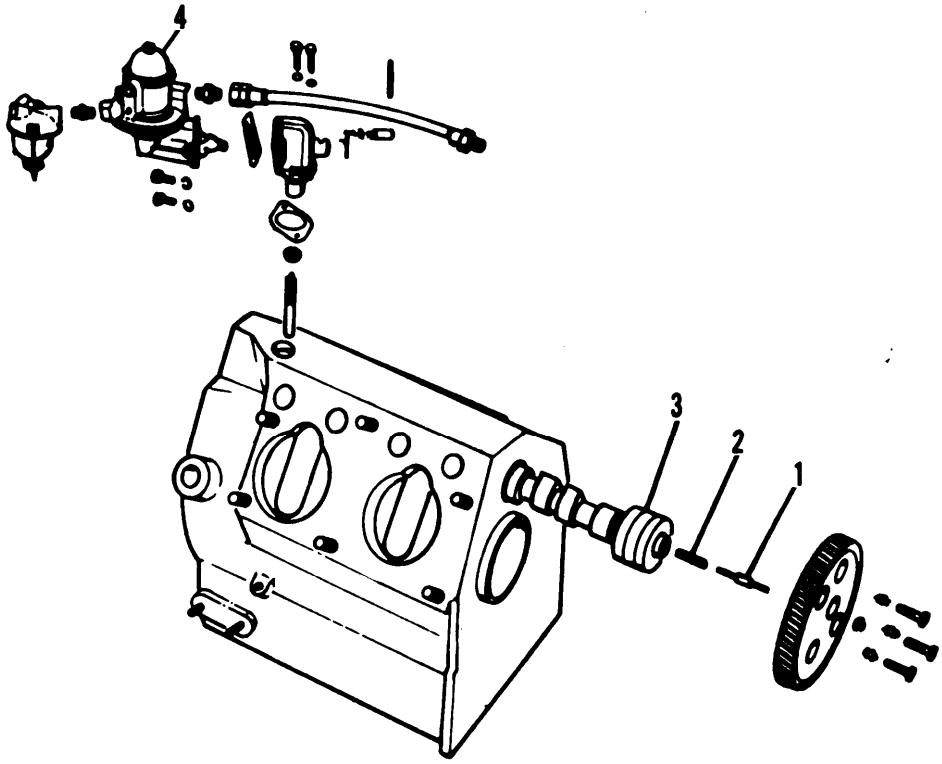


Figure B16. Camhaft and Fuel Pump.

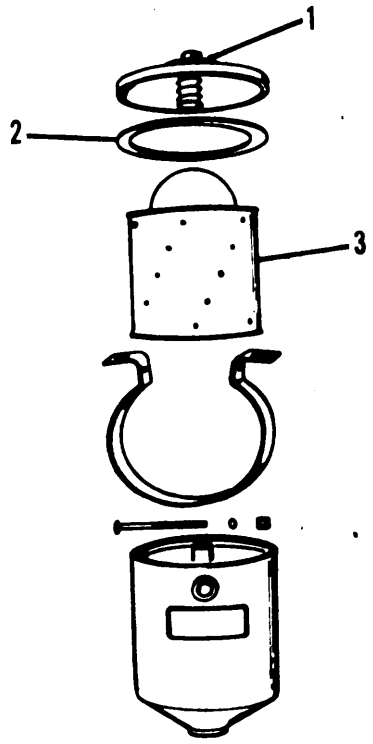


Figure B17. Oil Filter.

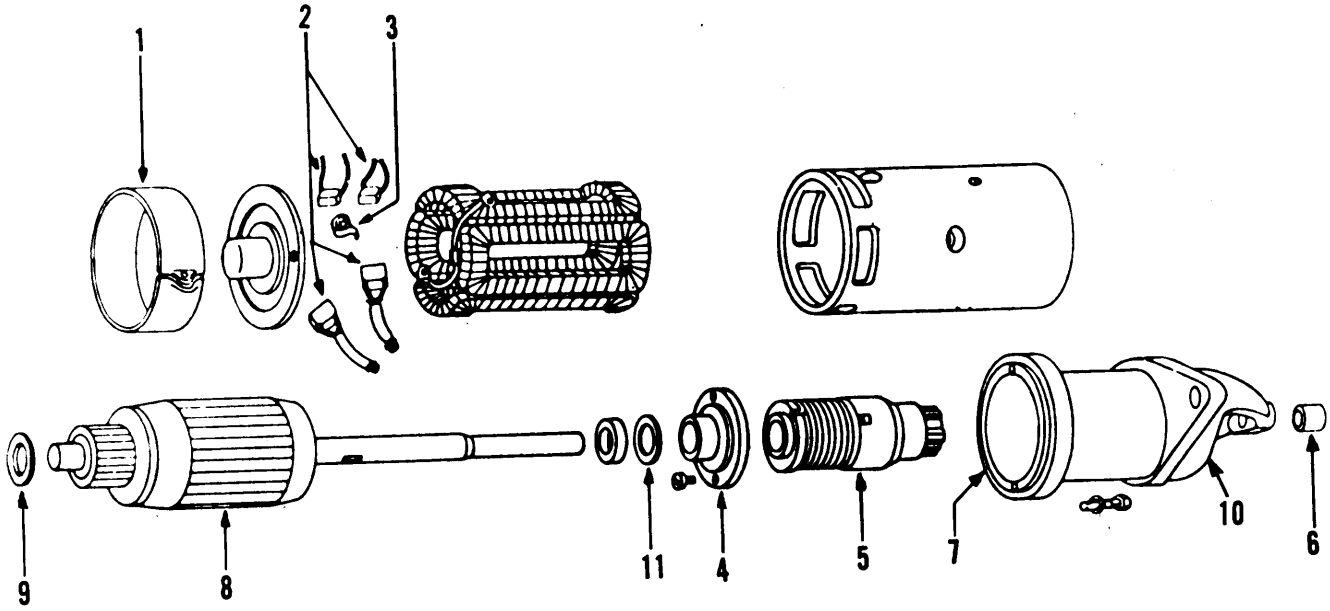


Figure B18. Starter Motor.

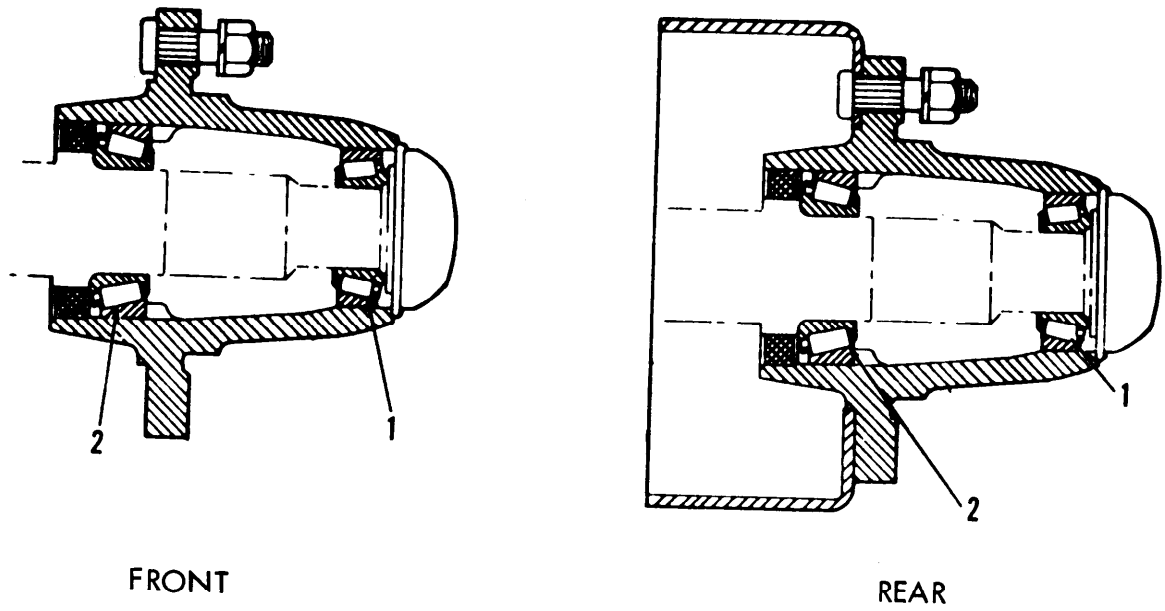


Figure B19. Drum and Hub.

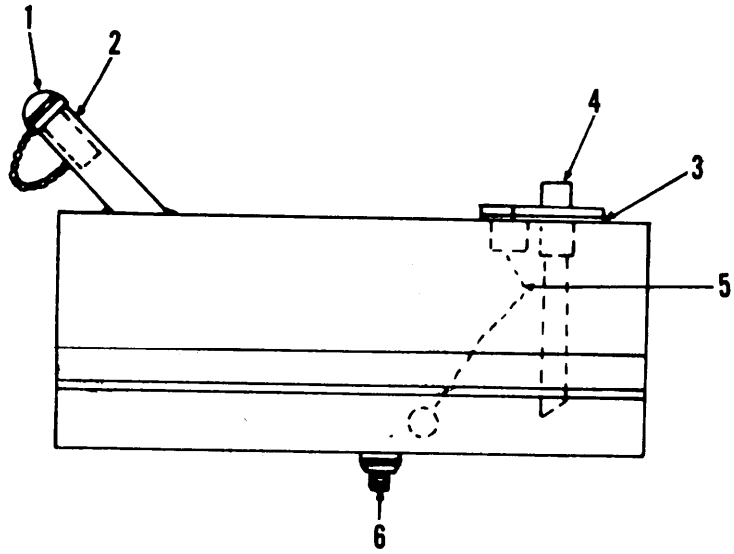


Figure B20. Fuel Tank.

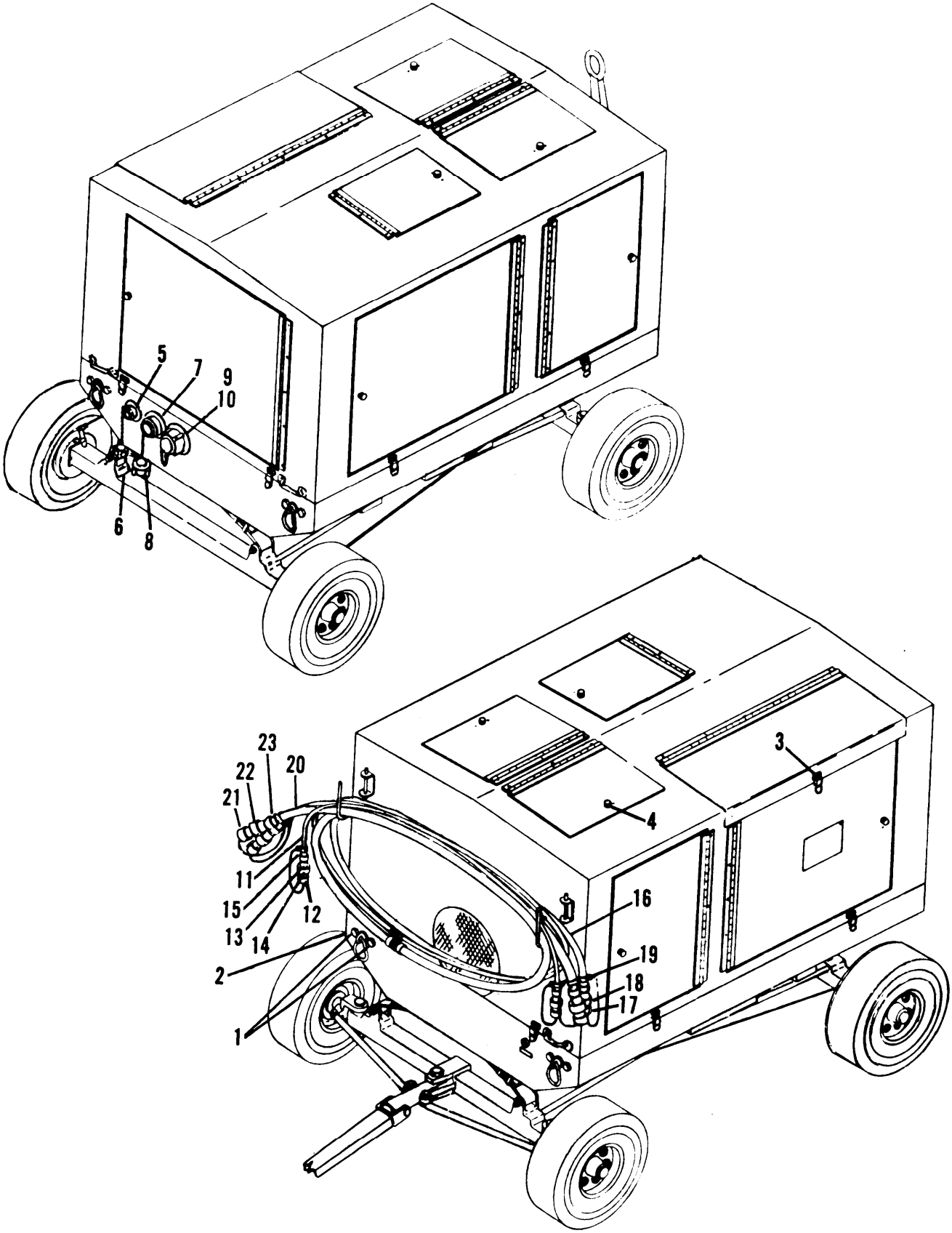


Figure B21. Housing and Hose Assembly.

ALPHABETICAL INDEX

ALPHABETICAL INDEX (cont)

ALPHABETICAL INDEX (cont)

ALPHABETICAL INDEX (cont)

This manual is published for the use of all concerned.

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army
Chief of Staff

Official:
PAUL T. SMITH
Major General, *United States Army*
The Adjutant General

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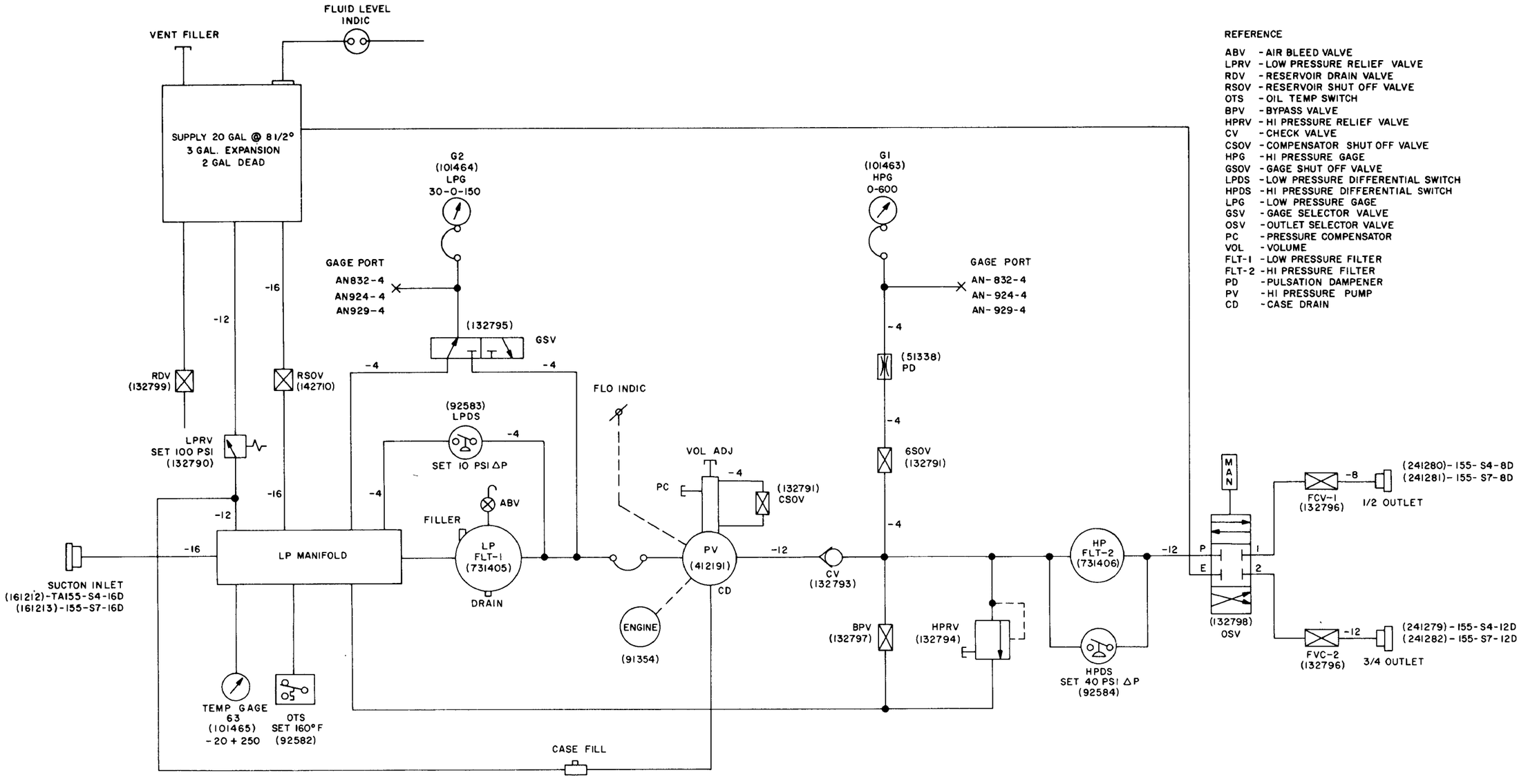

REFERENCE

ABV - AIR BLEED VALVE
LPRV - LOW PRESSURE RELIEF VALVE
RDV - RESERVOIR DRAIN VALVE
RSOV - RESERVOIR SHUT OFF VALVE
OTS - OIL TEMP SWITCH
BPV - BYPASS VALVE
HPRV - HI PRESSURE RELIEF VALVE
CV - CHECK VALVE
CSOV - COMPENSATOR SHUT OFF VALVE
HPG - HI PRESSURE GAGE
GSOV - GAGE SHUT OFF VALVE
LPDS - LOW PRESSURE DIFFERENTIAL SWITCH
HPDS - HI PRESSURE DIFFERENTIAL SWITCH
LPG - LOW PRESSURE GAGE
GSV - GAGE SELECTOR VALVE
OSV - OUTLET SELECTOR VALVE
PC - PRESSURE COMPENSATOR
VOL - VOLUME
FLT-1 - LOW PRESSURE FILTER
FLT-2 - HI PRESSURE FILTER
PD - PULSATION DAMPENER
PV - HI PRESSURE PUMP
CD - CASE DRAIN

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UMC-17A

Figure 2-4. Schematic, Hydraulic Test Stand Type D-5B

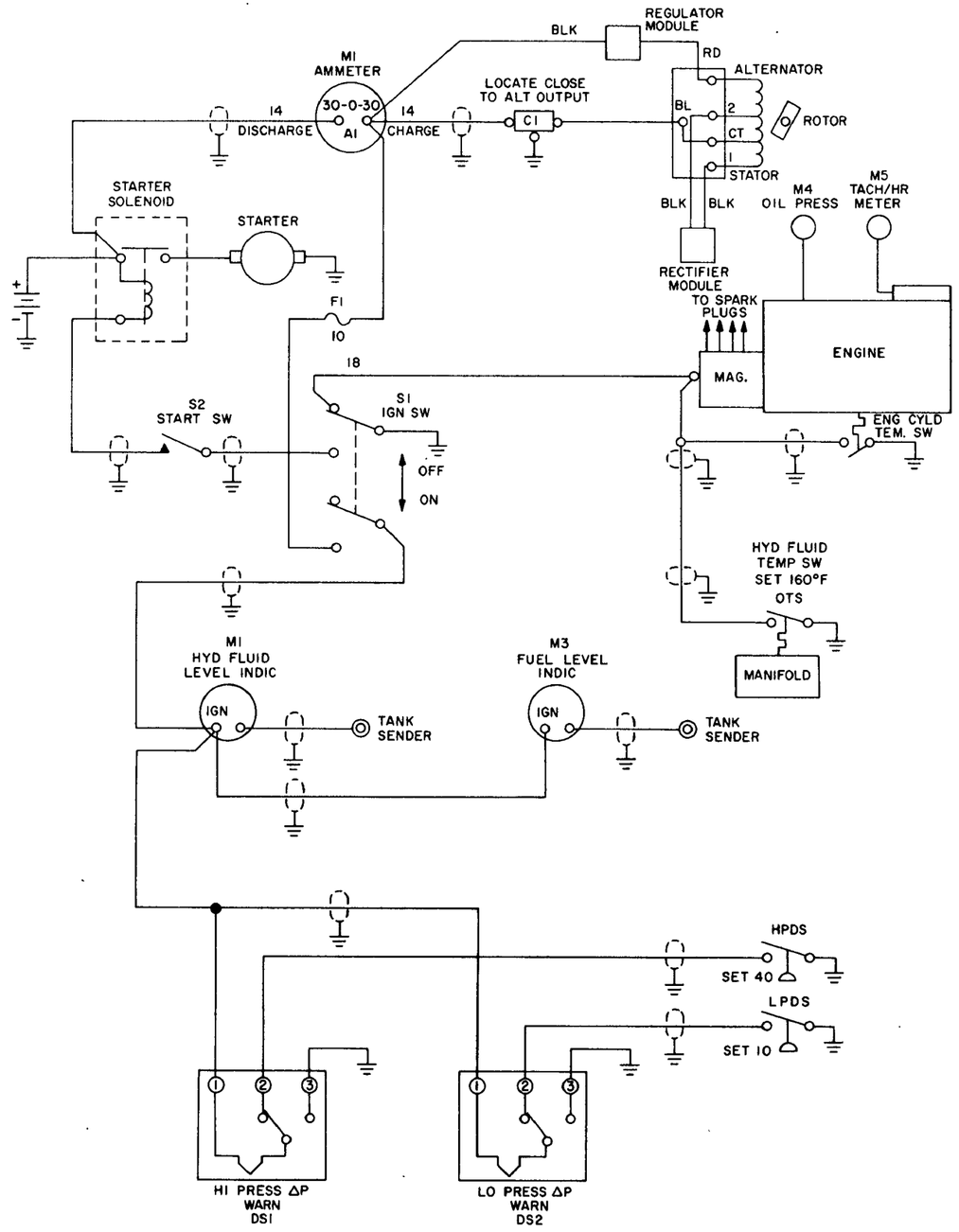

Figure 2-5. Schematic, Electrical, Hydraulic Test Stand Type D-5B

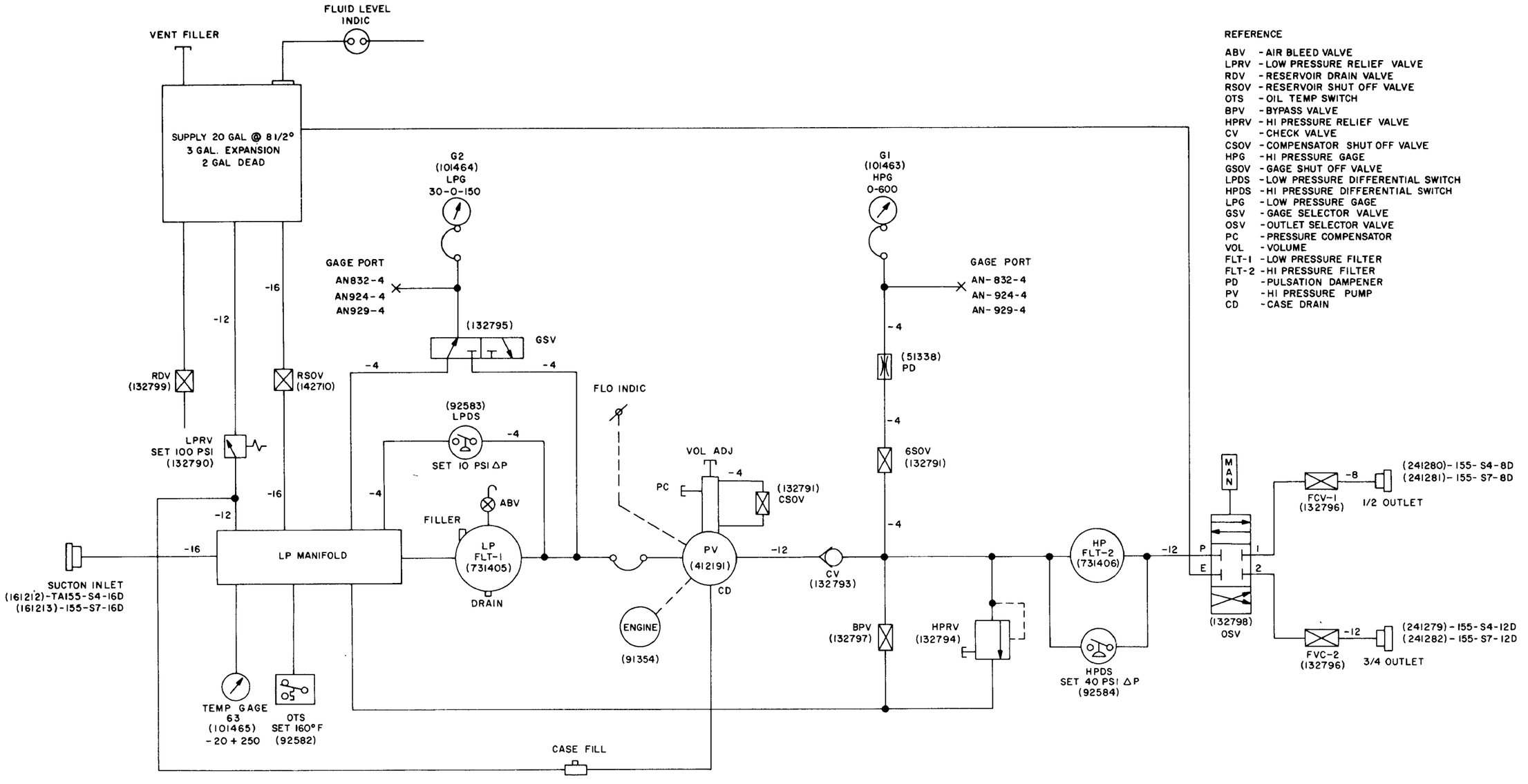

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Figure 2-4. Schematic, Hydraulic Test Stand Type D-5B