TECHNICAL MANUAL

OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS

FOR
DISTRIBUTOR, BITUMINOUS MATERIAL
TRUCK MOUNTED, 1500 GALLON (CCE)
E.D. ETNYRE & CO. MODEL D-60
(NSN 3895-00-090-0434)
SERIAL NUMBERS
J-4401-through J-4430
J-4801 through J-4830
J-5661 through J-5690

HEADQUARTERS, DEPARTMENT OF THE ARMY

JUNE 1993

WARNING

CARBON MONOXIDE (EXHAUST GAS) CAN KILL YOU

Carbon monoxide is without color or smell, but can kill you Breathing air with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Brain damage or death can result from heavy exposure. Carbon monoxide occurs In the exhaust fumes of fuel-burning heaters and internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of no air movement. Precautions must be followed to ensure crew safety when the personnel heater or main or auxiliary engine of any vehicle is operated for any purpose.

1. DO NOT operate personnel heater or engine of vehicle in a closed place unless the place has a lot of moving air.

2. DO NOT idle engine for long periods without ventilator blower operation. If tactical situation permits, open hatches.

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

4. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected crew to fresh air, keep warm; DO NOT PERMIT PHYSICAL EXERCISE, if necessary, give artificial respiration and get immediate medical attention.

5. BE AWARE; neither the gas particulate filter unit nor the field protection mask for nuclear-biologlcal-chemlcal protection will protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS
GOOD VENTILATION.

WARNING

Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read "NO SMOKING WITHIN 50 FEET OF VEHICLE."

WARNING

Fuel and oil are slippery and can cause falls. To avoid injury, wipe up spilled fuel or oil with rags.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in a well-ventilated area If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water

WARNING

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

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working around the tank or other vehicles. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

WARNING

Operation and maintenance of the bituminous distributor can be hazardous The distributor uses fuels and heated liquid materials that are volatile.

Numbered triangles appearing in the manual coincide with the numbered precautions below. They indicate precautions that must be observed when performing specific tasks.

1. Always have dry, chemical type, fire extinguishers readily available and in working order. Make sure the extinguishers are full of chemical and properly pressurized. Make sure that extinguisher inspections dates are not exceeded. The extinguishers can become inoperable over extended periods of time because the chemical can settle into a hard cake.

2. The first week after receiving the distributor, and then monthly thereafter, check all body mounting tie downs and fasteners.

3. Lighted cigarettes, and other sources of combustion such as flame and spark, must be kept away from open manholes and overflow vents.

4. Sparks from engine exhaust can ignite volatile gases.

5. Stay clear of rotating drives when the distributor is operating. They can entangle you in the machine 6. Use gloves or insulating material to prevent burns when handling spray bars, sections or hoses.

7. Check the 3-inch overflow tube every month and clean if required. This prevents tube from becoming clogged.

8. Always open the manhole slowly, thus safely releasing pressure in the tank 9. All pipe and hose connections must be secure before operating valves. This eliminates leaks and spraying of hot bitumen on personnel.

10. Keep the distributor clean. A safely operating unit requires periodic cleaning.

11. Keep area clear of sparks and open flame when spraying material with volatile cutbacks. This reduces fire hazard.
12. Do not stand in locations that will be sprayed with liquid bitumen should spray bar valves be accidentally opened.

13. The fill line cap and connection must be securely attached before operating the intake valve lever.

14. TUC bar must be off, and it must remain off, when the bar is rotated upward.

15. Spray bar on-off operation with air will cause the quadrant control lever to move rapidly. Stay clear of the lever at all times.

16. When moisture Is in the tank, do not load with material that is heated higher than 200 degrees F. Allow a small amount of hot material to circulate In the bar before filling the tank when moisture is present in the spray bar or circulating system. This prevents foaming.

17. Do not heat material above 200 degrees F. when It contains moisture.

18. When heating material, and whenever possible, position the distributor broadside to the wind.

19. Do not use gasoline in place of required kerosene or fuel with generating and low pressure burners. To do so results In extreme fire and explosion hazards.
20. Cover flues at least 6 inches before heating material to prevent explosion 21. Reserve enough space in the tank to allow for expansion of material when It is heated.

22. Do not remove material from the tank while burners are In operation, or when automatic burner controls are set to operate.

23. Do not operate burners unattended, or while the distributor is in transit or in a confined area.

24. Do not heat material In a leaking tank.

25. Use a torch, not matches or a cigarette lighter, to light burners.

26. Always light the inside burner first. Do not reach across a lit burner to light an inside burner.

27. When burners go out, allow flues to ventilate before again lighting the burners.

28. Do not heat material above the manufacturer’s recommended temperature

29. When handspraying material, keep the gun in proper position and be aware of other personnel who could be sprayed with the hot material

TECHNICAL MANUAL
No. 5-3895-356-14&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 17 June 1983

OPERATOR'S. ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS) FOR DISTRIBUTOR, BITUMINOUS MATERIAL TRUCK MOUNTED, 1500 GALLON (CCE) E.D. ETNYRE & CO. MODEL D-60 (NSN 3895-00-090-0434)

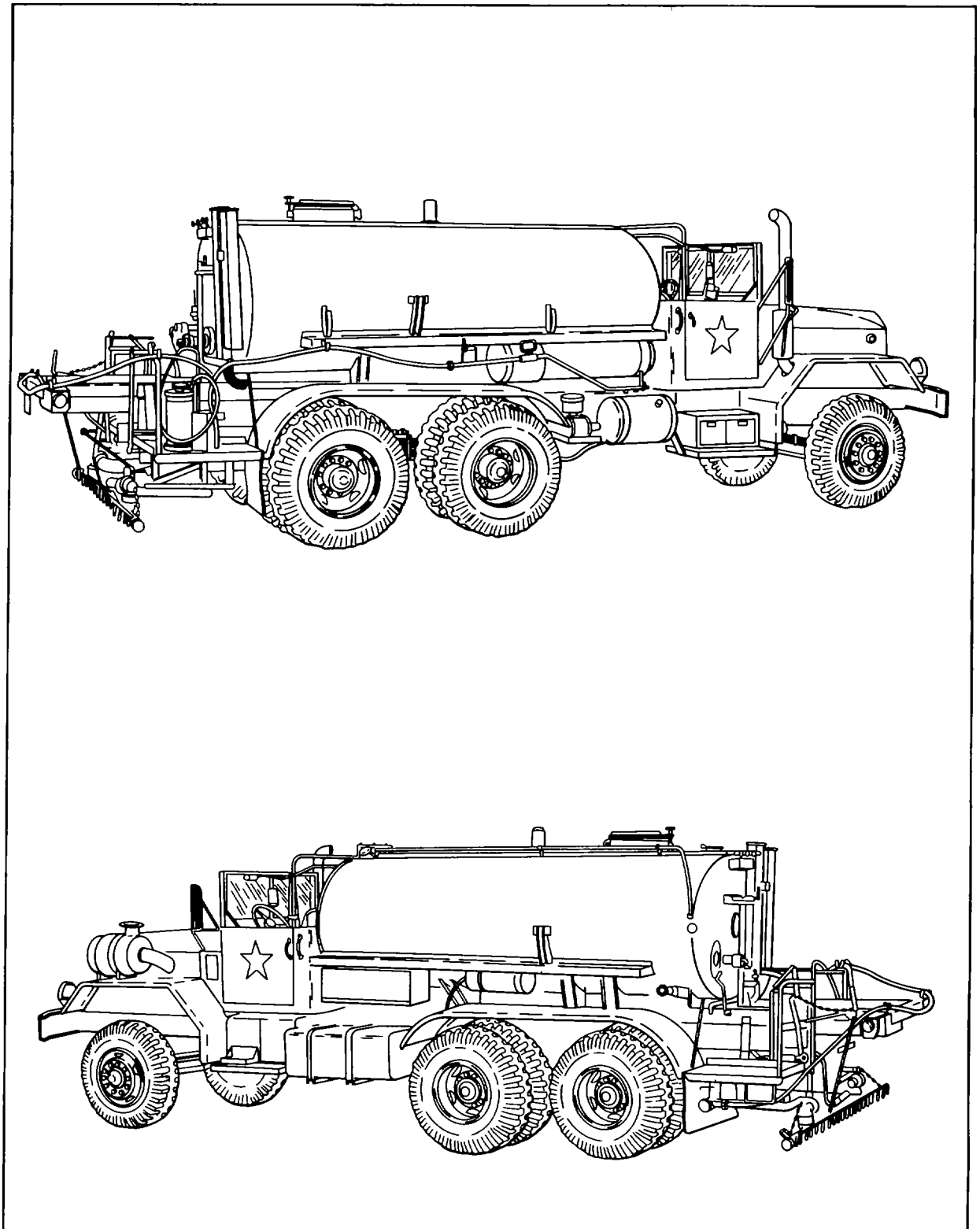
REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MBP, Warren, MI 48090.

This technical manual is an authentication of the manufacturer's commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

NOTE

This technical manual is a compilation of latest data from numerous commercial booklets and supplements supplied with the D60 during a multi-year buy ending in 1976. In keeping with the manufacturer's policy for indicating deletions, partially obliterated narrative and Illustrations Indicate deletions from the previous Issue of booklets. Manufacturer's parts list Is employed in this manual.



E.D. ETNYRE & CO. Model D-6
BITUMINOUS MATERIAL DISTRIBUTOR
NSN 3895-00-090-0434

Figure 1

DESCRIPTION AND DATA

a. General. The E. D. Etnyre & Co., Inc. Bituminous Distributor, Model MIL-D60 consists of a storage tank with a low pressure heating system, and hydraulic-powered pumping unit and an adjustable spray bar for distributing bituminous material. The equipment is mounted on a truck (fig. 1) It is normally operated by a crew of two men; a driver in the truck cab and an operator stationed on the rear platform.

b. Material Storage Tank. The 1633 gallon capacity storage tank is elliptical in shape and Is made of welded steel. It contains a surge plate which prevents sudden shifting of contents and also supports the heating flues. The flues are securely supported by the surge plate to eliminate vibration and allow for expansion and contraction. Insulation consisting of 2" fibrous glass material prevents loss of heat.

c. Heating System. The storage tank heating system consists of two low-pressure atomizing burners. They are mounted at the rear of the tank with ignition tiles located in the heating flues The burners are supplied with combustion air and fuel by a combination burner blower and burner fuel pump which is operated through a clutch driven by a V-belt from the PTO drive line. A hand clutch disengages the blower when the burners are not m operation.

d. Power Unit. Hydrostatic transmission, consisting of

1. Pump Infinitely variable displacement pump with a minimum displacement of 4 5 cubic inches per revolution, axial piston type
2. Motor Fixed displacement motor with a minimum displacement of 4.83 cubic inches, axial piston type.

e. Bituminous Pump. This heavy duty gear type pump is covered by a housing and is driven by a hydrostatic transmission through a double univeral joint with overload protection The pump has a delivery capacity of 400 gallons per minute, and supplies material to the 24 foot spray bar with sufficient pressure to produce an even, fan-like spray from all nozzles at any specified rate between 0.10 gallons and I 0 gallons per square yard.

f. Hand Spray A hand spray gun and hose are provided for the operator to spray small areas, and areas which are inaccessible with the spray bar

g. Burners
Manufacture . .....Hauck Mfg. Co.
Model No..... .....580A
Type..... Low Pressure atom izing type

h. Material Storage Tank
Capacity ..... 1500 gal (gallons)
Overage for expansion.....9%
Manhole. ..... 20 inch diameter
Overflow..... 3 inch pipe
Tank gage .....Mechanical Float Type
Thermometer .....Armored Pencil 600° F.

i. Spray Bar
Length of Center Section .....8 foot
Length of Extensions .....1 foot and 2 feet
Total 24 feet

j. Nozzles
Type .....Fan
Thread..... 1/2" N.P T
Slot..... 1/8 inch
Spacing ..... .4 inch

k. Bituminous Pump Data
Make .....E D Etnyre & Co., Inc.
Model .....P 1ST
Operating Pressure..... 20 psi
Output Capacity .....400 gpm

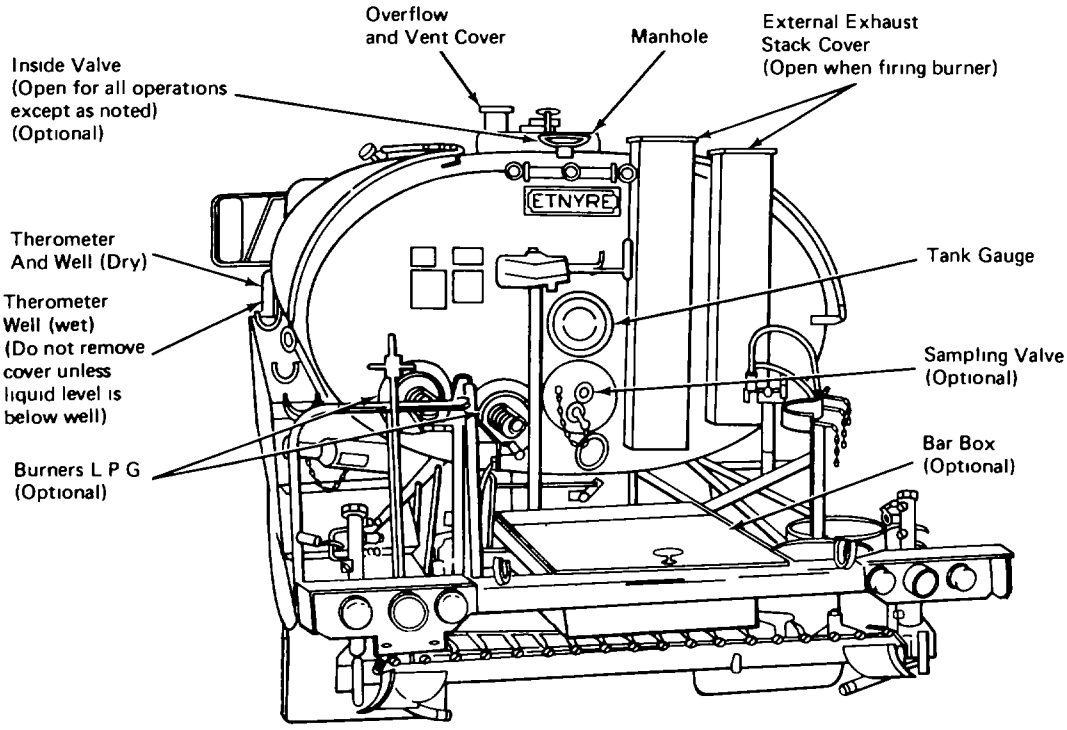
l. Burner System

Fuel Consumption
(maximum operation) 12 gal. per hr.
Fuel Consumption
(minimum operation) 1-1/2 gal. per hr.
(3/4 gal. per hr. each burner)

m. Capacities
Fuel tank, burner.....36 gal.
Material storage tank .....1633 gal.
Portable burner tank .....4 gal.
Hydraulic Reservoir.....20 gal

n. Dimensions and Weights- Distributor and Truck
Overall length..... 335 inches
Overall width ..... 97 inches
Overall height..... 116 inches
Net weight, empty ..... 26,000 lbs
Net weight, filled..... 39,000 lbs
Shipping volume.....2,181 cu/ft
Shipping tonnage .....13 tons

GENERAL INDENTIFICATION



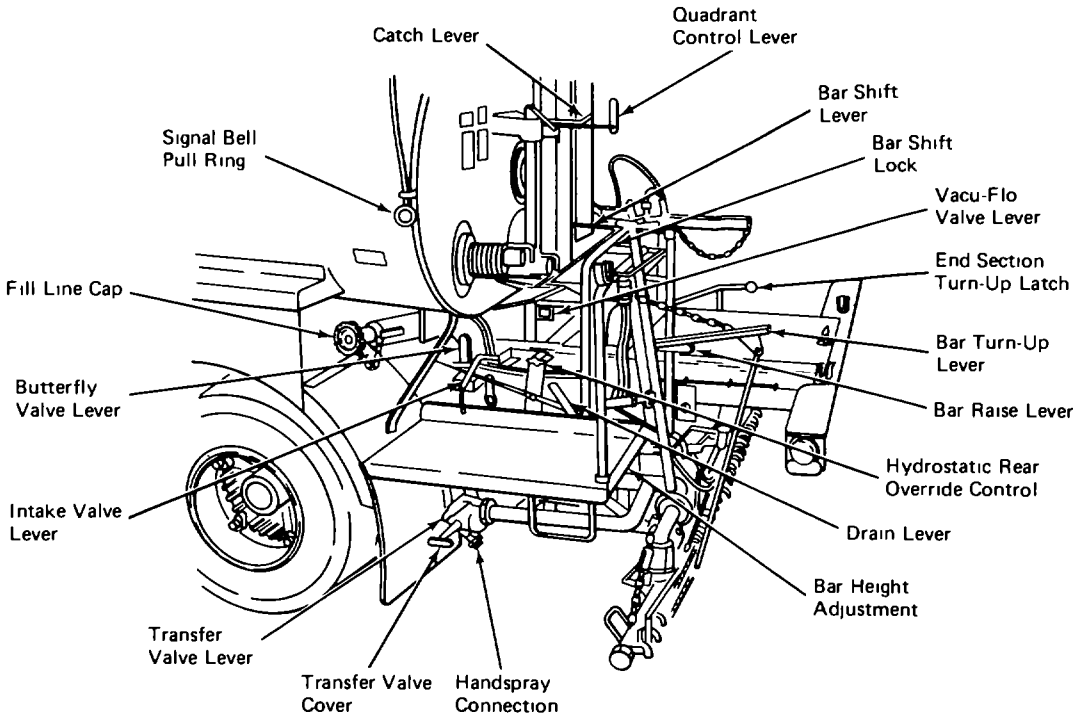


Figure 2

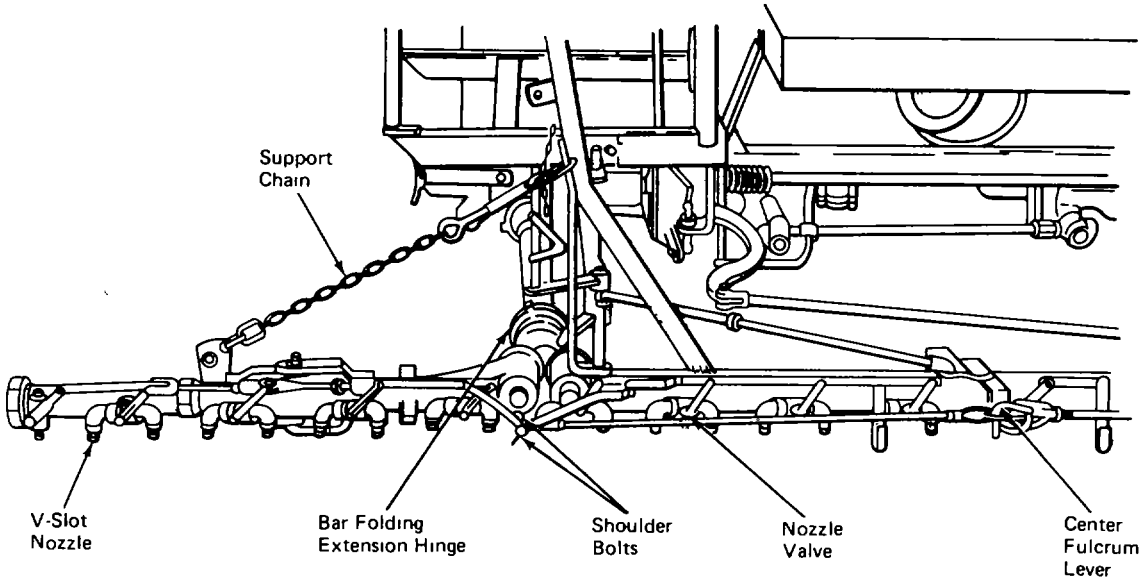


Figure 3

"TUC" SPRAY BAR

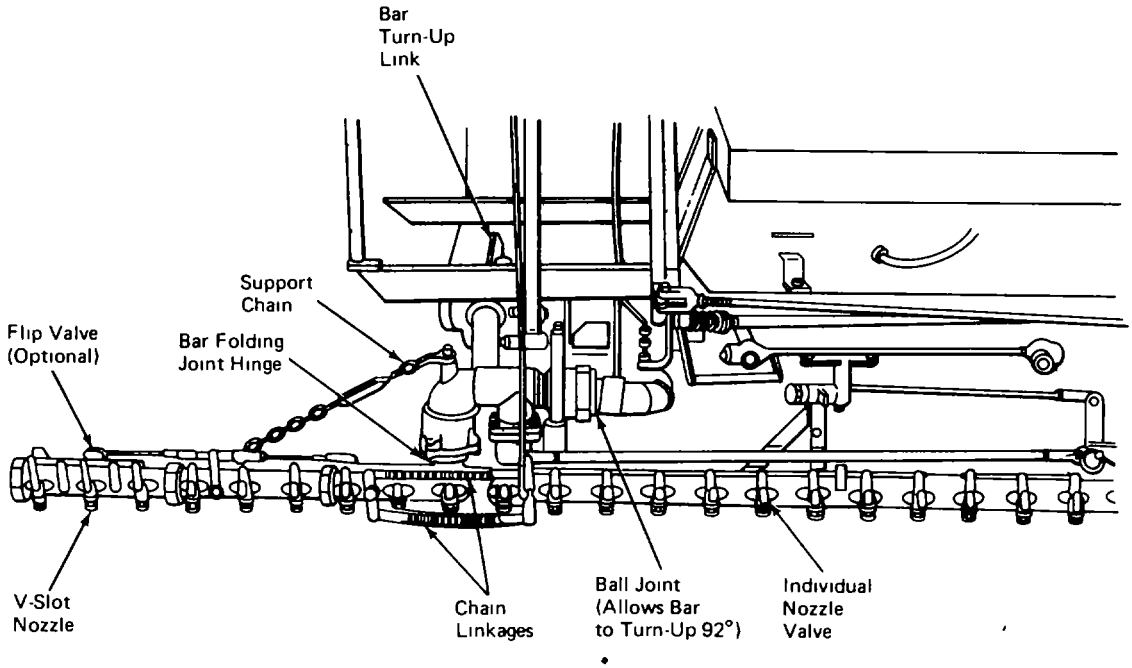


Figure 4

POWER CONTROLS AND COMPONENTS

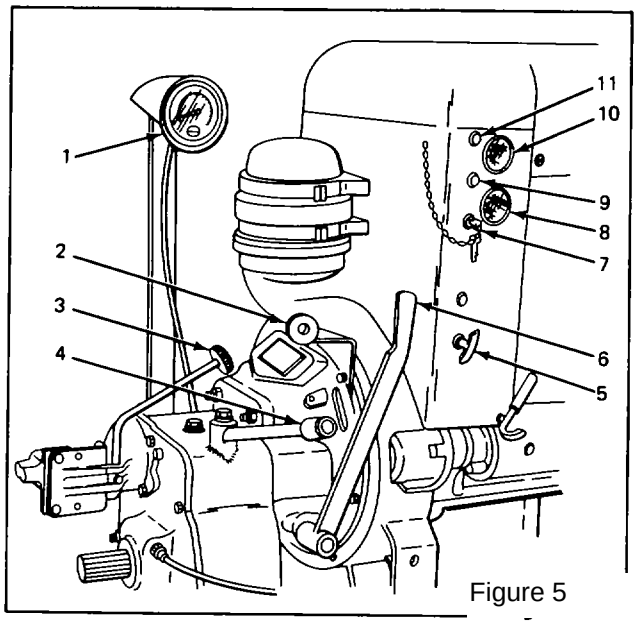


Figure 5

1. Pump Tachometer (G.P.M.)
2. Governor Control
3. Fuel Pump and/or Blower Clutch Lever
4. Gear Shift
5. Choke
6. Main Clutch Lever
7. Ignition Switch
8. Temperature Gauge
9. Starter Switch
10. Oil Pressure Gauge
11. Generator Indicator Light

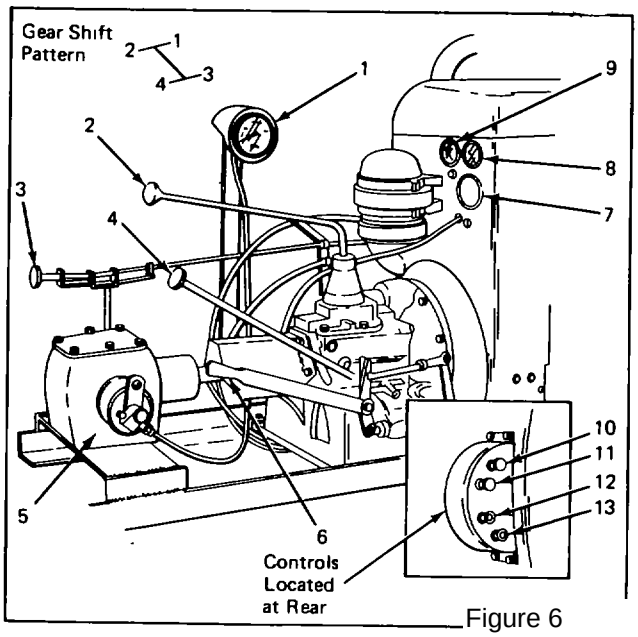


Figure 6

1. Pump Tachometer (G.P.M.)
2. Gear Shift
3. Governor Control
4. Fuel Pump and/or Blower Clutch lever
5. Angle Drive
6. Main Clutch Lever
7. Generator Indicator Light
8. Temperature Gauge
9. Oil Pressure Gauge
10. Starter Switch
11. Ignition Switch
12. Choke
13. Throttle

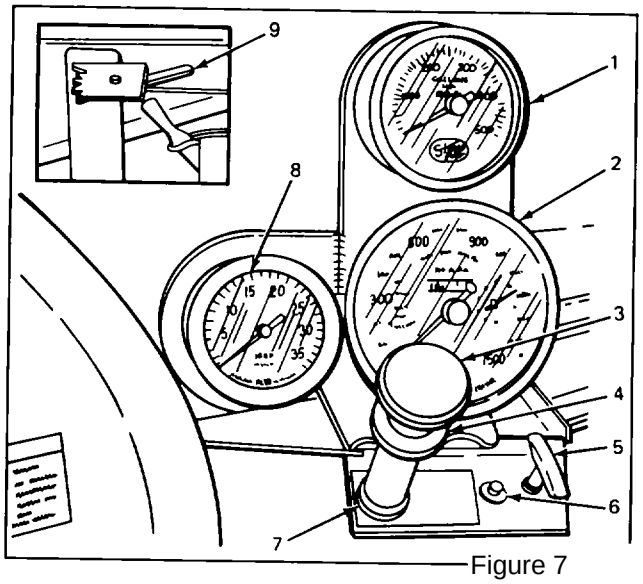


Figure 7

HYDROSTATIC CONTROLS (CAB MOUNTED)

1. Pump Tachometer (G P M)
2. Recording Bitumeter
3. Main Hydraulic Control
4. Fine Control Knob
5. Override Control
6. High Temperature Light
7. Lock Ring
8. P T O Tachometer R P M (Automatic Transmissions Only)
9. Hydrostatic Rear Override Control

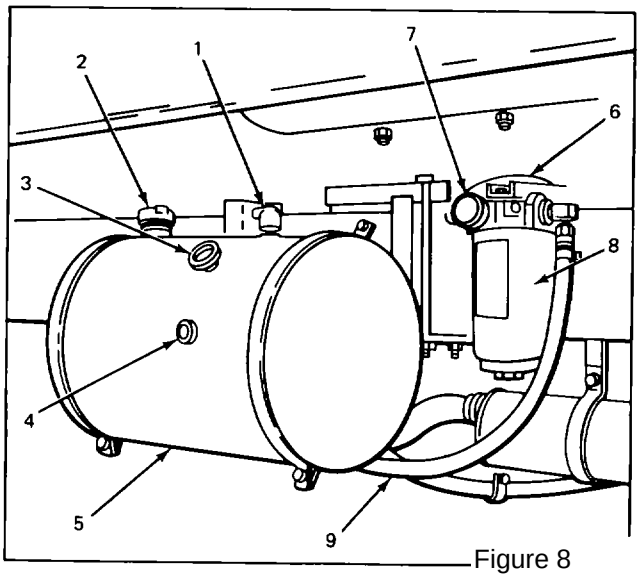
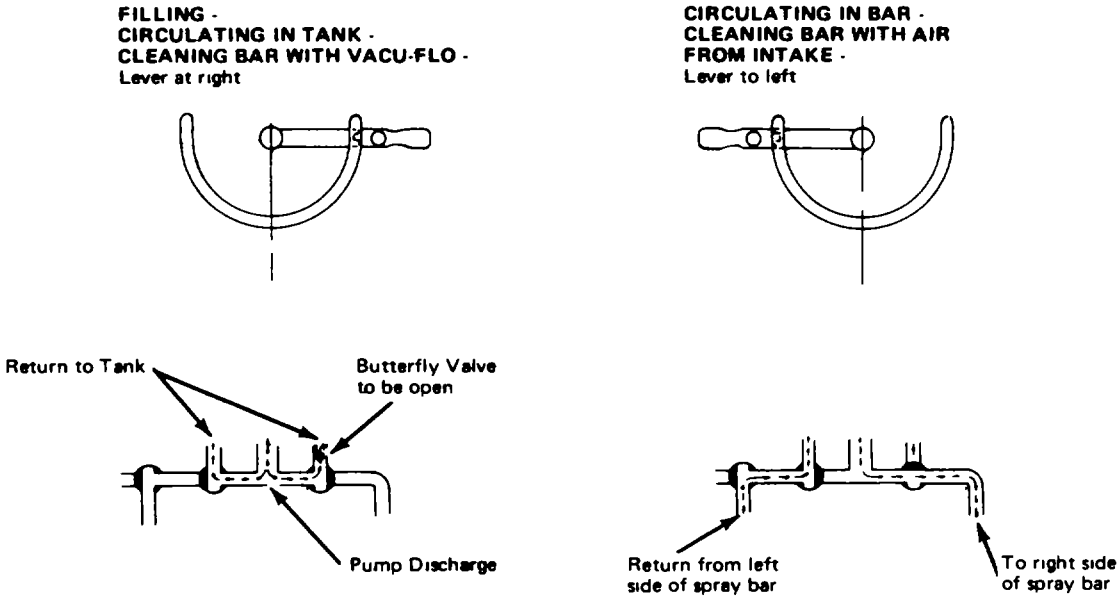


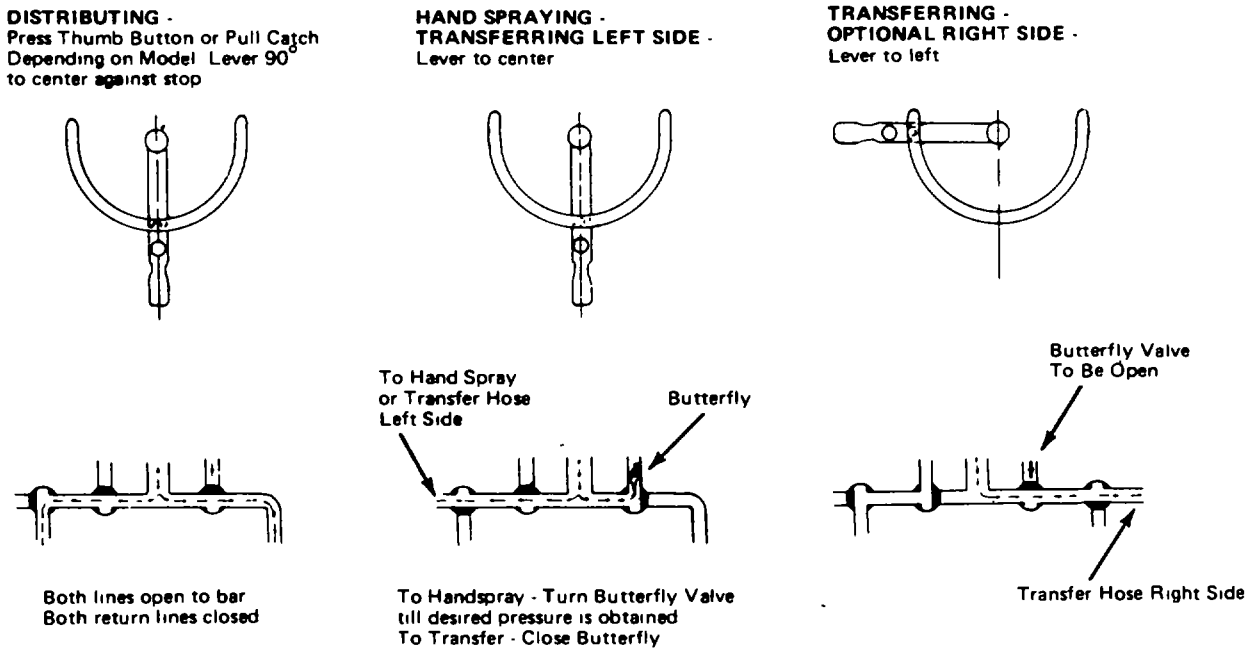
Figure 8

HYDROSTATIC RESERVOIR AND FILTER

1. Air Vent
2. Fill Cap
3. Hydraulic Oil0 Temperature Gauge
4. Oil Level Sight Glass Filter
5. Hydraulic Reservoir
6. Hydraulic Line Filter to Pump
7. Vacuum Gauge
8. Filter
9. Hydraulic Line Reservoir to

CONTROL VALVE AND OPERATING LEVER POSITIONS





VALVE POSITIONS CORRESPOND TO LEVER POSITIONS SHOWN ABOVE

Figure 9

BITUMINOUS MATERIAL APPLICATION CHART (Identical to Computator data)

Gal. Per Sq. Yd	Noz-zle Size	Bitum-eter Counter Reading	Pump Rate of Flow Indicator Readings in GPM															
			8 Ft Bar	9 Ft Bar	10 Ft. Bar	11 Ft Bar	12 Ft Bar	13 Ft Bar	14 Ft Bar	15 Ft Bar	16 Ft Bar	17 Ft. Bar	18 Ft Bar	19 Ft Bar	20 Ft Bar	21 Ft. Bar	22 Ft Bar	24 Ft Bar
.10	1/8	900	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
.10	3/16	1350	120	135	150	165	180	195	210	225	240	255	270	285	300			
20	1/8	450	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
20	3/16	675	120	135	150	165	180	195	210	225	240	255	270	285	300			
.25	1/8	360	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
.25	3/16	540	120	135	150	165	180	195	210	225	240	255	270	285	300			
.30	1/8	300	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
.30	3/16	450	120	135	150	165	180	195	210	225	240	255	270	285	300			
.40	1/8	225	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
.40	3/16	340	120	135	150	165	180	195	210	225	240	255	270	285	300			
.50	1/8	180	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
50	3/16	270	120	135	150	165	180	195	210	225	240	255	270	285	300			
60	1/8	150	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
.60	3/16	225	120	135	150	165	180	195	210	225	240	255	270	285	300			
.70	1/8	130	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
70	3/16	195	120	135	150	165	180	195	210	225	240	255	270	285	300			
.75	1/8	120	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
75	3/16	180	120	135	150	165	180	195	210	225	240	255	270	285	300			
.80	1/8	110	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
80	3/16	170	120	135	150	165	180	195	210	225	240	255	270	285	300			
.90	1/8	100	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
90	3/16	150	120	135	150	165	180	195	210	225	240	255	270	285	300			
1 00	1/8	90	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
1.00	3/16	135	120	135	150	165	180	195	210	225	240	255	270	285	300			
1.10	1/8	80	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
1 10	3/16	120	120	135	150	165	180	195	210	225	240	255	270	285	300			
1 20	1/8	75	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
1 20	3/16	110	120	135	150	165	180	195	210	225	240	255	270	285	300			
1.25	1/8	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
1 25	3/16	105	120	135	150	165	180	195	210	225	240	255	270	285	300			
1.50	1/8	60	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
1.50	3/16	90	120	135	150	165	180	195	210	225	240	255	270	285	300			
1 75	1/8	50	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
1 75	3/16	80	120	135	150	165	180	195	210	225	240	255	270	285	300			
2.00	1/8	45	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
2.00	3/16	70	120	135	150	165	180	195	210	225	240	255	270	285	300			
2 50	1/8	35	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
2 50	3/16	55	120	135	150	165	180	195	210	225	240	255	270	285	300			
3 00	1/8	30	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	240
3 00	3/16	45	120	135	150	165	180	195	210	225	240	255	270	285	300			

Figure 10

PREPARING FOR OPERATION

1. Tighten all bolts on unit that may have loosened in transit On engine driven units check oil in power unit Export units are processed to prevent corrosion m shipment. These engines should be turned over several times, then drained, flushed out and refilled with proper crankcase oil for operating conditions. Check water level in radiator and gear lubricant in transmission. Refer to engine owner's manual for detailed engine instructions

2. Check oil level m air cleaners Lubricate all control linkage bearings and joints with light oil On front engine models with double universal joint, lubricate joints with No 2M-AG grease On rear engine models equipped with collapsible square coupling apply a few drops of cylinder oil to couplings On hydrostatic models check that fluid level In hydraulic reservoir Is above sight gauge level.

Note If hydraulic oil becomes too hot, red light on control pedestal will go on. Fluid temperature should not exceed 180 degrees If light remains on for more than 60 seconds Discontinue pumping and check for plugged bitumen lines and/or frozen bitumen pump

3. Turn control levers to "Drain" position to remove any testing oil or condensation from circulating system Close drain control levers

4. Install nozzles m spray bar and adjust so that angle between slot and bar centerline Is approximately 30 degrees. A special wrench for this purpose Is m the tool b

5. Lower spray bar and adjust so that nozzles are about 12" from road when tank is empty At this height, spray fans will properly overlap for triple lap coverage Under heavy wind conditions It may be necessary to lower bar further

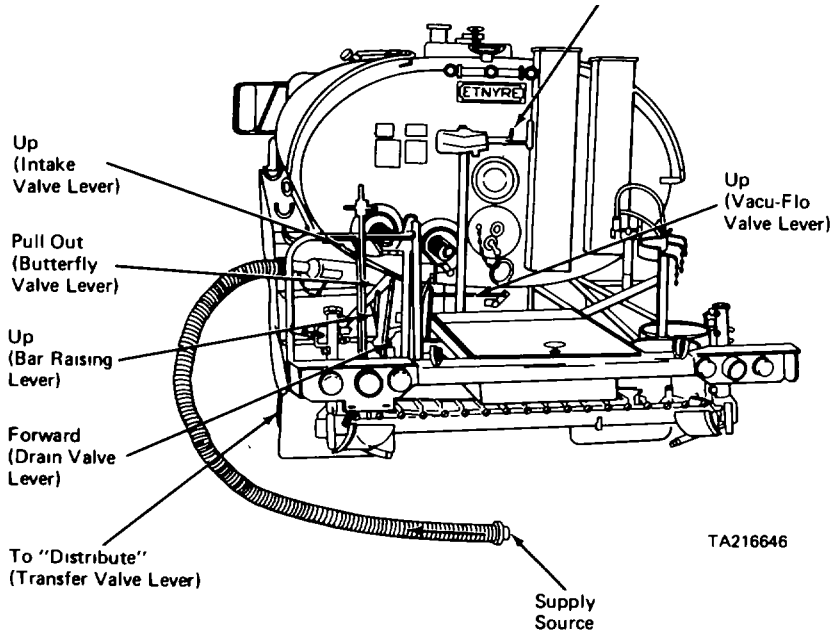
5

6. On engine drive units, start engine, set at fast idle speed, shift trans mission to either high or low gear, and engage clutch easily to be sure pump is free and all parts and instruments are m proper working order Do not operate the pump for long periods without bitumen to supply lubrication On Hydrostatic model, pull up cab hydraulic control and push in override control located at rear platform Start truck engine in neutral and engage P T O Carefully pull out override control at rear, making sure pump is free and working easily Push in rear override control and push down cab hydraulic control, again operating pump to be sure pump tachometer and controls are in proper working order Pull up cab control and disengage P.T O when finished with check Do not operate pump for long periods without bitumen to supply lubrication 7 Check pump discharge and fill line strainers for contamination 8 Do not use water to test distributor operation

WARNING

5

A Remain clear' of rotating drives when unit is m operation to prevent becoming entangled machine.



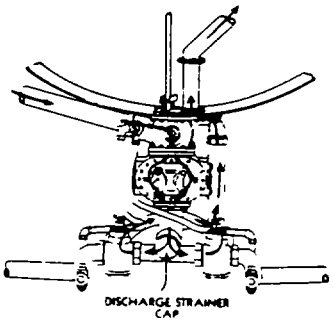


Figure 11

1. Check filling line and pump discharge strainers and clean as needed Always use strainers (Note Page 10) .

13 2. Be sure all connections between Distributor and source of supply are tight, as air leaks will reduce vacuum and slow down filling operation The Vacu-Flo valve is to be turned so that the lever is up.

3. When connecting to tank car, connect 3-way valve to tank car coupling and then connect hose to this valve You can then shut off tank car from underneath and pump suction will clean bitumen from hose by drawing air through vent m valve

4. Bitumen in supply tank should be heated sufficiently so that it will not set up in the hose or Distributor circulating system.

5. If pump, bar, and circulating system was not drained and flushed after previous use, heat thoroughly before trying to start pump Do not try to break loose a frozen pump on engine drive models by slipping or sudden engagement of the clutch. When handing heavier bitumens It may also be necessary to preheat the circulating system so that the first material to enter the pump will not be chilled sufficiently to stop the pump. A portable burner is available for perheating the circulating system An opening is provided at the lower rear of the circulating system housing for the burner

4 6. units equipped with engine exhaust heating, it is possible to heat the pump and circulating system by exhaust gases This is accomplished by positioning the butterfly valve on the exhaust pipe to the heating position It is recommended that the valve be returned to the normal exhaust position after sufficient heating is obtained

16 7. Distributor is to be filled with hot bitumen, proceed cautiously

17 if there is any moisture m the tank, or ,if emulsion was used in the previous load Dow-Corning DC-200 may be used to prevent foaming One ounce of DC-200 should be adequate for 1800 gallons of asphalt Additional DC-200 may be obtained from E D Etnyre & Co

8. To operate pump on engine models, start engine, set at fast idle, shift transmission to high gear and engage clutch easily Adjust pump speed by adjusting engine governor control On hydrostatic models engage P T 0 with cab hydraulic control up, truck transmission m neutral, and engine at fast idle Pull out override control for desired Distributor pump speed Insufficient pump speed may require increase in truck engine R P M 9 Operate pump at maximum speed where It will run quietly, higher speeds will not load thick material fast Normally 150 GPM is best loading speed Light or heavy materials at spraying temperatures may be

loaded at faster pump speeds. Maximum 240 G.P.M.

20 10. If you plan on heating material further in Distributor, allow sufficient space for expansion

Filling Through Manhole

1. Always use manhole strainer

3 unless you are sure that material is free of all foreign material (Note Below).,

2. If you do not want material to enter pump and circulating system, have intake valve lever in extreme Up, position. On units with inside closing valve operated by handwheel on top of tank at rear, close valve by turning wheel clockwise.

20 3. If you pct to heat material further in Distributor, allow sufficient space for expansion.

16 4. If Distributor i to be filed with hot bitumen, proceed cautiously if there is any moisture in tank, or if emulsion was used in the previous load. Dow-Corning DC-200 may be used to prevent foaming.

Discharge Strainer

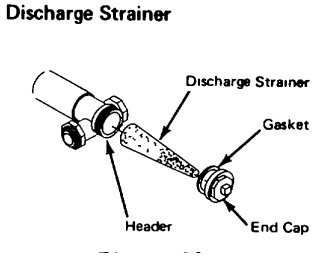


Figure 12

Should pump fail to function properly check, clean and reinstall discharge strainer (Note The discharge filter often becomes clogged when the manhole strainer is not used, or when rags and other debns are allowed to enter the tank through the manhole)

Inlet Strainer

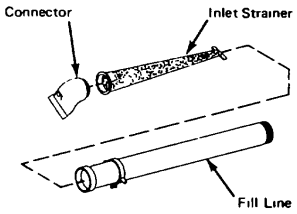


Figure 13

Should pump fail to suck properly check, clean and reinstall inlet strainer

WARNING

3 Lit cigarettes or other ounces of combustion must remain clear of open manholes or overflow vents to reduce fire hazard.

4 Sparks from engine exhaust can be a source of Ignition to volatile gases.

7 Monthly check and f necessary clean 3" overflow tube to insure tube has not become clogged.

13 Fill line cap or connection must be securely attached before operating intake valve lever to eliminate momentary discharge.

16 If moisture is present m tank, do not load with material having a temperature over 200 degrees F. When filling unit m which moisture may be present m the spray bar or circulating system, allow a small portion of hot material to circulate m bar before fining tank thus prevent foaming

17 If moisture is present do not heat material over 200 degrees F A

20 Cover flues at least 6" before heating material to prevent explosion

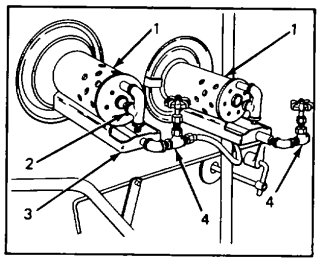
HEATING BITUMEN IN DISTRIBUTORS

High Pressure Generating Burners

1 10 18 21 27

1. Use clean, moisture-free kerosene 19

2. On engine drive units to operate fuel pump, disengage engine clutch, engage fuel pump clutch, then reengage engine clutch On hydrostatic 5



HIGH PRESSURE GENERATING BURNERS

1 Burners
2 Vaporizing Plug
3 Pan
4 Flow Control Needle Valves

Figure 14

drive units the fuel pump is driven off of the hydrostatic pump drive line and regulated by a pressure relief valve A bypass valve is provided to divert fuel around the pressure regulator and should be opened when burners are not required

3. Circulating bitumen in tank while heating is recommended for faster heating and reduced carbon formation on flues Only when the asphalt pump is "frozen" is it acceptable to operate burners without circulating material However, in this case free the asphalt pump by applying heat to pump housing and start circulating as soon as possible

4. Correct fuel pressure should be between 45 and 60 PS I If less, inspect valve in line from tank to pump, strainers, etc for possible obstructions If you are sure pump is getting sufficient fuel, then check pressure relief valve. An adjusting screw with lock nut is inside of dome-shaped cap 20

5. Do not light burners unless you are sure flues are covered at least 6" the full length of the tank On tanks having "High-Low" flues It is necessary to cover only the lower flue when using the lower (or inside) burner 6 Open covers on heat exhaust stacks

7. To light burners, spread wick m pan so that fire will be under coil and vaporizing plug, hold finger over vaporizing plug to prevent fuel from squirting into flue, open needle valve slightly and shut off when pan is 1/4 full Ignite wick and wait until gas issues from vaporizing plug, then open needle valve slightly If coil is generating properly, an almost colorless gas will issue from vaporizing plug Open valve more as necessary to obtain a bright orange flame (Note On units having retractable burners, remove holding pin and transfer burner from traveling position in flue to firing position) 26 25

8. A short blue flame that is easily extinguished indicates over-generation in the coils, caused by too small vaporizing plug opening, or carbon formation in coil Particles of carbon can be cleared from vaporizing plug while burner is in operation with burner cleaner furnished with unit If flame is still short and blue, bore out vaporizing plug with No 51 drill 9 A yellow smoky flame indicates that needle valve is open too far, causing under-generation. It can also be the result of t

10. Do not leave burners unattended.

11. Do not heat bitumen over maximum spraying temperature recommended by supplier 23

12. Do not remove material from tank while burners are in operation or automatic burner controls are set to operate 28

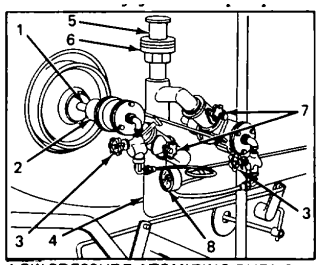
13. When burners are not in use, close heat exhaust stack cover to prevent loss of heat and to keep water from entering stack opening.

Low Pressure Atomizing Burners

1 10 18

1. Clean , moisture-free fuel is important Use kerosene, fuel oil or diesel fuel Do not use gasoline.

2. The blower and fuel pump are an integral unit and engaging the blower will also engage the fuel pump. 5



LOW PRESSURE ATOMIZING BURNERS

1 Burner Tip
2 Burner
3 Needle Flow Valves
4 Low Pressure Air Supply Line
5 Air Relief Valve
6 Weights
7 Butterfly Valves Figure 15
8 Air Pressure Gauge

Figure 15

On engine drive unit to operate the blower disengage engine clutch, engage blower drive clutch, then reengage engine clutch.

On hydrostatic units the blower is driven by one of three methods

1) The blower can be driven off the hydraulic pump drive pump with a V-belt and is engaged by operating the lever on the blower clutch
2) An auxiliary hydraulic motor blower drive is available which is engaged by turning the motor control valve to the "ON" position
3) An independent engine drive is available to operate the blower and is engaged by starting the engine.

On trailer mounted units and some truck mounted units, the blower Is driven by operating a separate engine drive

3. Circulating bitumen in tank while heating is recommended for faster heating and reduced carbon formation on flues Only when the asphalt pump is "frozen" is it acceptable to operate burners without circulating material However, in this case free the asphalt pump by applying heat to pump housing and start circulating as soon as possible

4. Air pressure should be sufficient to slightly raise air relief valve. Excess engine speed will raise relief valve too much, causing excessive pressure. Do not increase weights on air relief valve or wire weights down.

5. Fuel pressure should not be excessive High fuel pressure will make needle valve adjustment more sensitive Recommended pressure is 10 to 15 P.S.I Pressure is determined by pressure relief valve located in return line. An adjusting screw and lock nut are inside dome-shaped cap.

6. Do not light burners unless you are sure flues are covered at least 6" the full length of tank On tanks having "High-Low" flues it is necessary to cover only the lower flue with 6" of material when using the lower (or inside) burner

7. Open covers on heat exhaust stacks

8. To light burners, first turn air * butterfly valves to No 1 or No. 2 open position, light torch and hold under burner tip, turn needle valve about one-half turn. Burner should ignite Immediately. If it does not, turn off needle valve and wait until vapor is exhausted from flues, then try again The correct opening of the needle valve is determined by fuel pressure. Experience is the only way of determining the amount for your particular unit Flame at first will be yellow and smoky Adjust the fuel valve so that' flame is bright orange with slight smoke in exhaust More-fuel will be needed as flues and tank contents heat up. Keep opening fuel adjustments for slight smoke in exhaust

Important

If burner goes out, turn off fuel valve immediately and do not attempt to relight until vapor is exhausted from flues'

9. For larger flame, increase air butterfly valve opening and fuel valve in equal increments, always keeping mix that will give slight smoke to exhaust

10. Nozzle of burner is adjustable for amount of secondary air desired Normally the secondary air is in the full open position However, on some smaller units it may be desirable to reduce the amount of secondary air Light burner and turn this nozzle until you secure the type of flame you desire.

11. Do not leave burners unattended.

12. Do not heat bitumen over maximum spraying temperature recommended by supplier

13. Do not remove material from tank while burners are in operation or automatic burner controls are set to operate

14. To shut off burners, turn fuel off before stopping blower or turning off air .

15. When burners are not m use, close heat exhaust stack cover to prevent loss of heat and to keep water from entering stack opening

Liquid Petroleum Burners

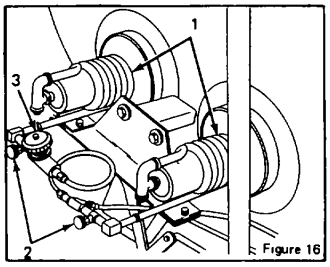
1. The burners are designed for use with liquid only and must not be used with vapor

2. Circulating bitumen m tank while heating is recommended for faster heating and reduced carbon formation on flues Only when the asphalt pump is "frozen" is It acceptable to operate burners without circulating material However, in this case free the asphalt pump by applying heat to pump housing and start circulating as soon as possible

3. Do not light burners unless you are sure flues are covered at least 6" the full length of tank On tanks having "High-Low" flues It is necessary to cover only the lower flue with 6" of material when using the lower (or inside) burner

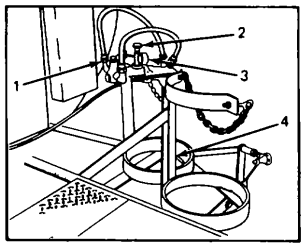
4. Open covers on heat exhaust stacks

5. Before lighting burner, be sure hand valve at burner is closed tight



LIQUID PETROLEUM BURNERS A)
1. Burners
Figure 16

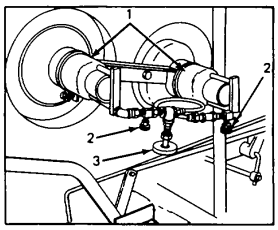
2. Blow and Pilot Hand Valve
3, Auxiliary Shut-Off Hand Valve



LIQUID PETROLEUM BOTTLE RACKS AND CONTROLS
1. Manual Throwover Manifold Valve
2. Burner Pressure Regulator Control
3. Regulated Pressure Gauge
4 Bottle Rack
Figure 17

6. The valve on the supply tank or bottle should be opened only a quarter of a turn so that it may be closed quickly m case of a leak.

7. After opening the supply valve ,and checking quickly for leaks, light ,the burners As soon as the burner is ht, open the hand valve at the burner to the full position. No preheating is necessary



LIQUID PETROLEUM BURNERS (B) 1 Burners
2 Blow and Pilot Hand Valves
3 Auxiliary Shut-off Hand Valve
Figure 18

(Caution The burner must be ht before opening hand valve at the burner This valve has a built in by-pass and permits only enough gas to escape to operate as a pilot or stand-by. This by-pass hole must be kept open to prevent damage to the gauge and supply lines After shutdown and before relighting burner, valve at burner must be closed)

8. Open supply valve at tank or bottle fully and regulate pressure so that the gauge reads between 25 to 40

P.S.I. (A) Burner or between 20 and 25 P.S.I. (B) Burner, using the lower pressure setting for shorter tanks.

28 9. Adjust fire with hand valve at burner

23 10. Do not leave burners unattended.

11. Do not heat material beyond 28 -manufacturers recommended temperature

12. Do not remove material from tank while burners are in operation or 22 automatic burner controls are set to operate

13. To completely shut down burners, close valve at supply tank or bottle However, if it is desired to use only the lower burner, the upper burner can be shut off by closing the auxiliary hand valve on the line between burners Burners will continue to burn until fuel in the lines has been consumed.

Special Notes When burner is operating properly the first two coils, or bottom side of burners and all of the feed lines and fittings back to the pressure regulator will frost over If they do not frost over, it shows that the burner is operating on vapor instead of liquid and this must be corrected immediately or you will damage the burner.

In case trouble is experienced with the pressure regulator freezing up, it is due to moisture in the gas and this can be overcome by adding 1 pint of genuine absolute Anhydrous Menthanol (99 85% pure) per 100 gallons of fuel when tank is filled.

Always keep tank valve closed when tank or bottle is empty

14. When burners are not m use, close covers of heat exhaust stacks to prevent loss of heat and to keep water from entering stack opening

15. On L.P.G. burners equipped with optional automatic outfire protection, follow the standard L P G lighting instructions, except *depress the control overide switch* and manually light the burners. After 30 to 60 seconds the safety switch should hold and the burners will stay lit

Should either burner "flame out" the whole system will automatically shut down. To relight, repeat the above lighting procedure.

16. On L.P.G. burners equipped with the optional temperature limiting control, see instructions below.

1. Open L.P G. bottle shut-off valve and allow automatic iginitors to light pilots

2. Adjust valves at burners such that one or both burners will operate as desired.

3 Set temperature limiter to desired level.

4. Before pushing start button check to insure BOTH pilots are lit. DO NOT push start button unless both pilots are lit and have been operating for a minimum of one minute If either pilot is not lit, wait until automatic igniters relight pilots Allow sufficient time (approximately 30 seconds) for pilot sensors to cool and turn on automatic ignitors

5. Once it is confirmed that both pilots are lit, push start button to light main burners At this time adjust burner pressure to between 25 to 40 P.S.I., using the lower pressure setting for shorter tanks

6. When material in tank has reached desired temperature burners will automatically stop

7. Burners can be relit only when material m the tank has cooled sufficiently for the temperature limiter to come ON and the start button is pushed Again check to insure both pilots are functioning prior to pushing start button

8. Before moving distributor, close L P G bottle shut-off valve and allow pilots to burn all fuel from supply lines.

WARNING

1 Always have dry chemical type extinguisher available and in condition.

5 Remain clear of rotating drives when units is m operation to prevent becoming entangled m machine

10 Keep unit clean for safety and operation.

18 When heating material, position unit broadside to wind, if possible

19 Use of gasoline instead of required kerosene or fuel oil on generating or low pressure burners will result in an extreme fire hazard

20 Cover flues at least 6" before heating material to prevent explosion.

21 Allow sufficient space in tank for expansion of material when heating k

22 Do not remove material from tank while burners are in operation or automatic burner controls are set to operate

23 Do not operate burners unattended or while vehicle Is m transit or m confined area.

25 Use torch (not match or lighter) to ignite burner for personnel safety

26 Ignite inside burner first Do not reach across a ht burner to reignite inside burner

27 When burners go out, allow flues to ventilate before reignition

28 Do not heat material beyond manufacturers recommended temperature

CIRCULATING IN TANK

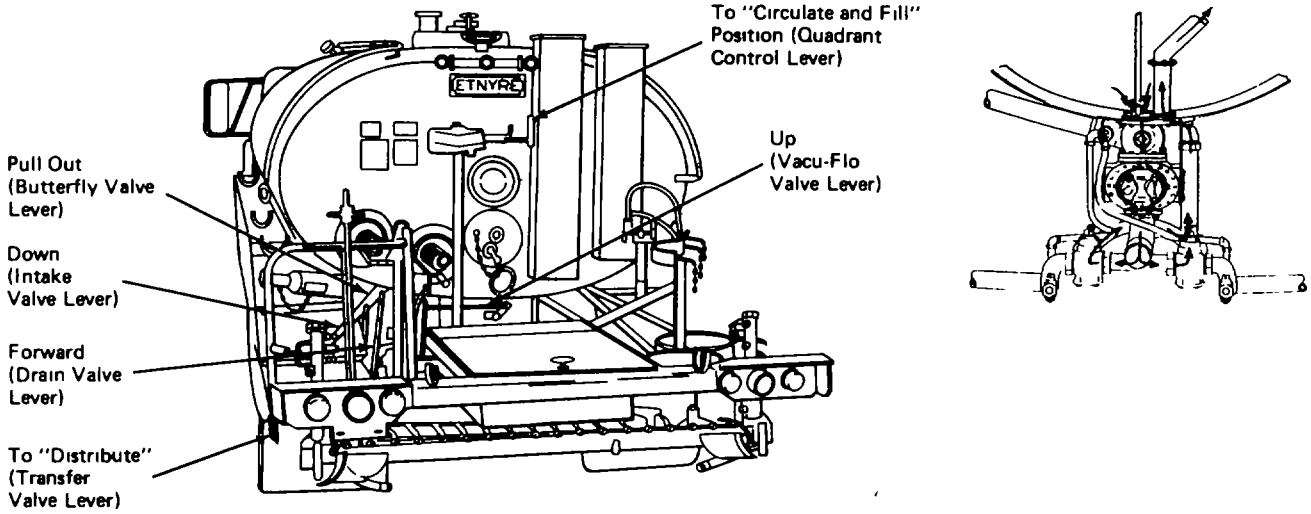


Figure 19.

For Heating

Material will heat more rapidly if circulated m tank when burners are operating Circulate at 100 to 160 G P.M.

Setting Engine Governor Or Hydrostatic Controls

To set engine governor or hydrostatic controls for spraying requirements when circulating m tank, pump speed should be

10 to 15 G P M. per foot of bar length
with 1/8" nozzles

Example
160 to 240 G.P.M. for 16 foot spray bar length.
15 to 20 G P.M per foot of bar length with 3/16" nozzles.
Example
240 to 320 G P.M. for 16 foot spray bar length
7 to 10 G.P.M per foot of bar length with 3/32" nozzles
Example
112 to 160 GP M. for 16 foot spray bar length

Engine Drive

To set engine governor for spraying requirements.

With material circulating in tank regulate governor setting until desired pumping rate appears on pump tachometer

WARNING

3 Lit cigarettes or other sources of combustion must remain clear of open manholes or overflow vents to reduce fire hazard

5 Remain clear of rotating drives when unit is m operation to prevent becoming entangled m machine.

13 Fill line cap or connection must be securely attached before operating intake valve lever to eliminate momentary discharge

CIRCULATING IN BAR

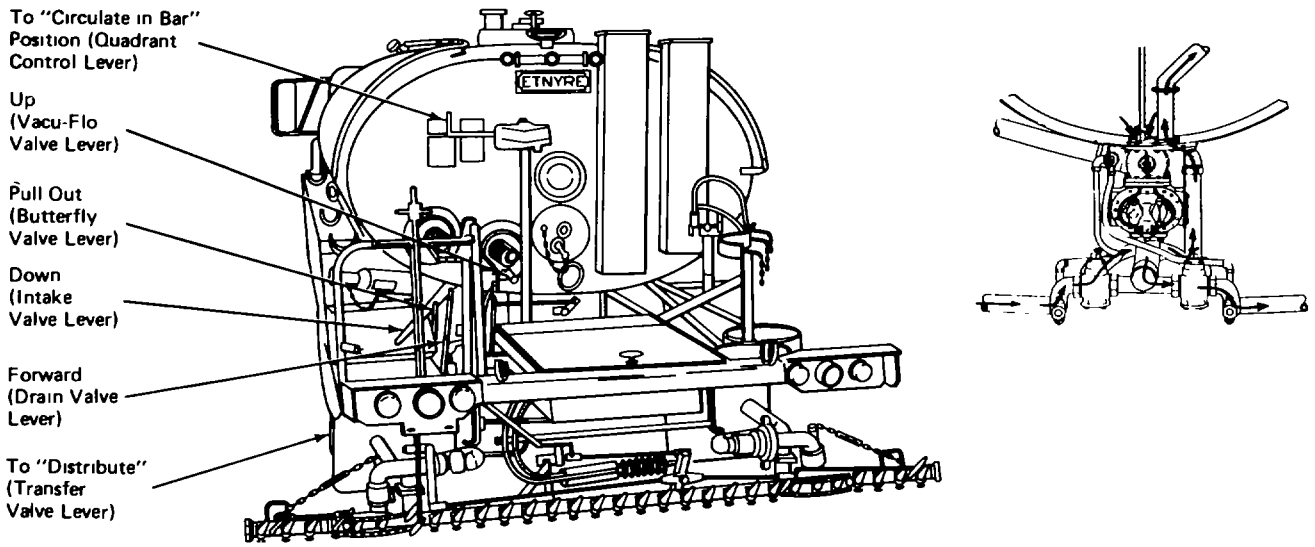


Figure 20.

GENERAL

Circulate long enough to insure removal of all air from bar and to heat valves.

PUMP SPEED SHOULD NOT EXCEED 160 G.P.M.

Material will circulate in ends with extensions folded or in spraying position.

Engine Drive

Partially close throttle if governor is set over 160 G.P.M.

DO NOT CHANGE GOVERNOR SETTING.

Hydrostatic Drive

Prior to circulating m bar, pull main hydraulic control knob if Distributor pump tachometer reads over 160 G.P M. to reduce pressure in spray bar

DO NOT CHANGE CONTROL KNOB STOP SETTING.

WARNING

3 Lit cigarettes or other sources of combustion must remain clear of open manholes or over flow vents to reduce fire hazard

5 Remain clear of rotating drives when unit is m operation to prevent becoming entangled in machine.

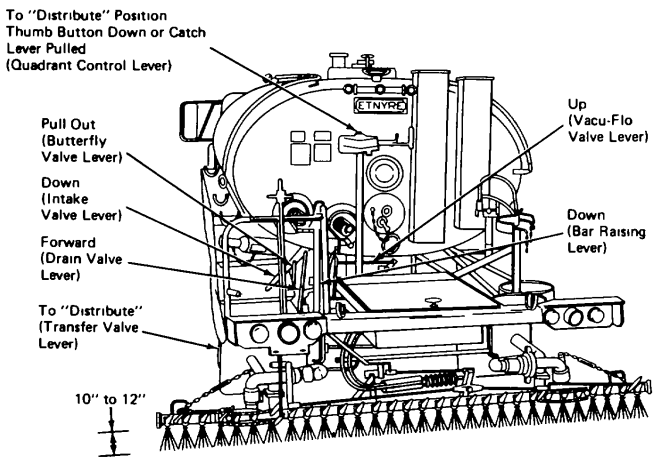
6 Use gloves or insulated material when handling spray bar, sections, or hoses to prevent burns

9 All pipe and hose connections must be secure before operating valves to eliminate leaks which may spray hot bitumen on other personnel

12 Do not stand m a location such that accidental opening of spray bar valves will cause contact with bitumen spray with resulting bums

14 "TUC" bar must be off and remain off when bar is rotated upward

SPRAYING



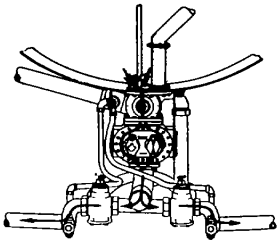


Figure 21.

GENERAL

1. Correct spray cannot be obtained unless bitumen is heated to proper spraying temperature Cold bitumen will not give sharp spray edges and will cause streaking.

2. See page 14 "Circulating m Tank" for setting proper pump speeds Higher pump speeds will cause excessive fogging of spray If higher pump and truck speeds are desired use larger nozzles Lower pump speeds will cause fan to sag, with heavy edges

3. Nozzle slot should make an angle of approximately 30 degrees with bar centerline and every nozzle should be at the same angle

4. Nozzle height of 12" above road will give triple lap coverage

5. With "FC" spray bars do not throw control lever to spraying position if end section is folded without first removing shoulder bolt at hinge that controls extension valves.

6. Dram and flush out pump, bar and circulating system after each days use, unless oil is so light that it will not set up when cold.

7. Clean pump outlet strainer weekly.

Engine Drive Models

1. If throttle was partially closed to limit pump speed to 160 G.P M for circulating in bar, re-open to proper governor setting Immediately before beginning to spray

2. To spray, push thumb button down, or pull catch lever, depending on control style, and move quadrant control lever from "Circulate in Bar" position to "Distribute" position On units with one man control, lock thumb button down with "T" shaped lever provided *

3. To stop spraying, return quadrant control lever to "Circulate in Bar" position Release thumb button or catch lever, if spraying operation is completed Reduce throttle setting if pump speed exceeds 160 G P.M.

Hydrostatic Models

1. Engage truck transmission in gears previously determined for proper application speeds

2. Push hydraulic cab control down against stop (if it was pulled up to reduce pump speed to 160 G P M for circulating in bar). Immediately put truck in motion

3. To spray, push quadrant control lever button down, or pull catch lever, depending on control style, and move lever from "Circulate m Bar" position to "Distribute" position On units with one-man control, lock thumb button down with "T" shaped lever provided *

4. While spraying, momentarily drive at dry run speed to check that bitumeter and pump tachometer readings are still at the predetermined ratio. You will apply the desired rate per square yard regardless of variation in road speed

5. To stop spraying, return quadrant control lever to "Circulate in Bar" position Release thumb button or catch lever if spraying operation is completed Pull up hydraulic cab control if pump speed exceeds 160 G.P M.

WARNING

5 Remain clear of rotating drives when unit is m operation to prevent becoming entangled m machine

7 Monthly check and If necessary clean 3" overflow tube to insure tube has not become clogged

11 Keep area clear of open flame or sparks when spraying material with volatile cutbacks to reduce fire hazard

15 Spray bar on-off operation with air will cause control lever on quadrant to move rapidly Remain clear at all times to prevent injury.

*Thumb button or catch lever is used only to engage control for turning spray bar valves on and off

SHOULDER SPRAYING'

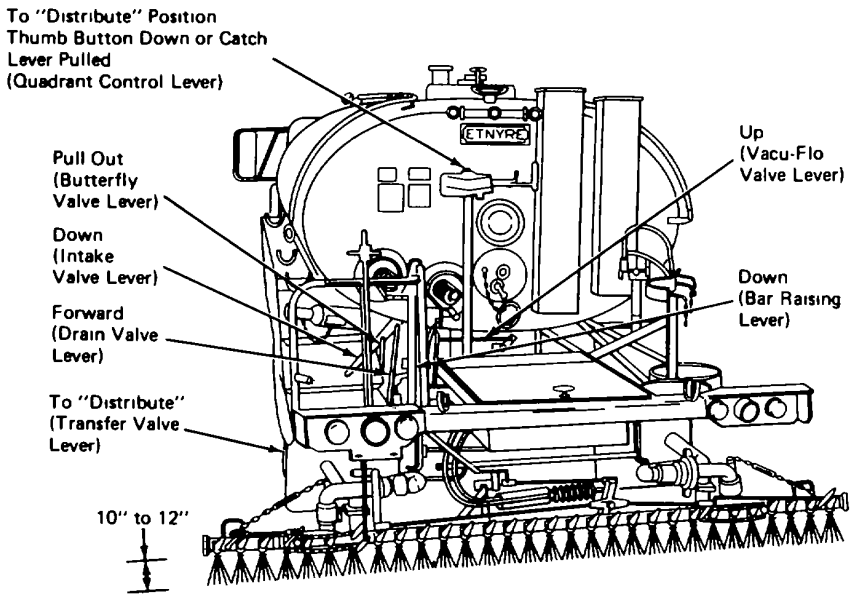


Figure 22

1. Two special shoulder spraying control links are provided The longer link is used to spray shoulders on the left, the shorter link for shoulders on the right To use - disconnect Standard Control Links from center fulcrum and place them in hanger on center control bars

2. Place appropriate shoulder link on center fulcrum

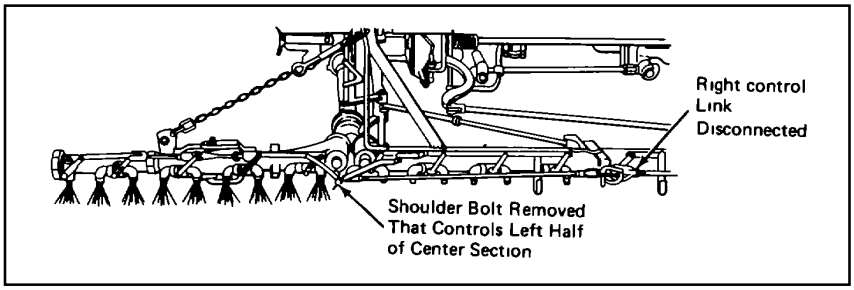


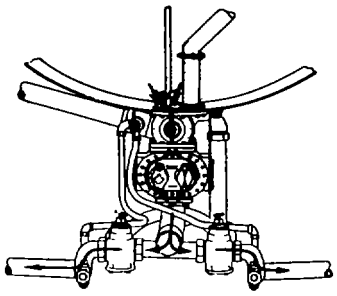
Figure 23.

1. Disconnect control linkage for side not to spray by removing corresponding pin in center fulcrum.

2. On side to spray, remove shoulder bolt connecting control linkage that connects to center section bus bar. This disconnects half of center section that would otherwise spray

3. Follow normal spraying procedures

4. To spray center 6 foot section only, remove both shoulder bolts controlling valves in end sections.



3. Remove pull pin on connecting link between center half and outer bar section on side that is to spray 4. Follow normal spraying procedure

5. To spray center 6 foot section only, remove pull pins from connecting links between center and outer bar sections

6. On units with "TUC" bars equipped with flip valves on hinge section and/or hook sections it is necessary to disengage flip levers out to the control toggle on hook section before installing the shoulder spray linkage

WARNING

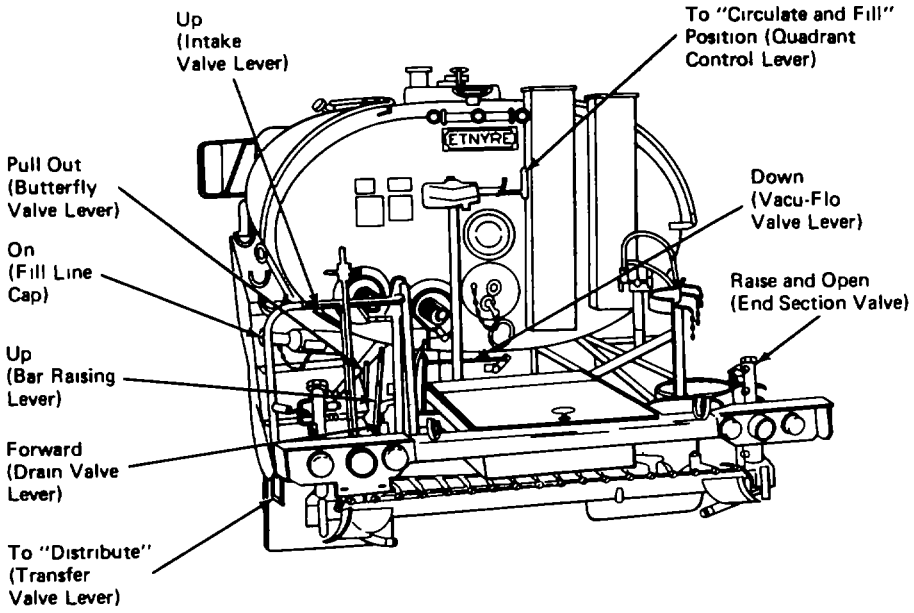
6 Remain clear of rotating drives when unit is m operation to prevent becoming entangled m machine

7 Monthly check and if necessary clean 3" overflow tube to insure tube has not become clogged

11 Keep area clear of open flame or sparks when spraying material with volatile cutbacks to reduce fire hazard.

15 Spray bar on-off operation with air will cause control lever on quadrant to move rapidly Remain clear at all times to prevent injury.

DRAWING MATERIAL IN BAR BACK TO TANK



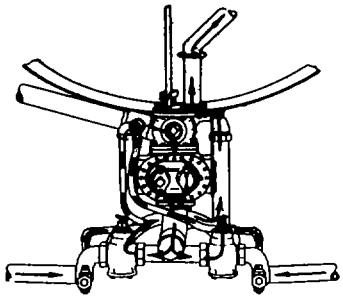


Figure 24

1. Move quadrant control to "Circulate and Fill" position

2. Close intake valve by raising lever.

3. Open Vacu-Flo valve by turning lever down.

4. Raise spray bar by bringing up bar raising lever With "TUC" spraybar, turn bar up by raising bar turn-up lever. Raise spray bar end sections (both model bars)

5. Run pump at 10 G.P M per foot of bar.

6.After drawing material back for approximately 2 minutes, open end valves, allowing air to enter system. For maximum cleaning turn Vacu-Flo valve to left and to right when sound of pump indicates bar is empty.

7. When draw back is completed, turn Vacu-Flo valve lever up to close

WARNING

5 Remain clear of rotating drives when unit is in operation to prevent becoming entangled m machine.

6 Use gloves or insulated material when handling spray bar, sections, or hoses to prevent burns

13 Fill line cap or connection must be securely attached before operating intake valve lever to eliminate momentary discharge

14 A"TUC" bar must be off and remain off when bar Is rotated upward

HAND SPRAYING AND PUMP-OFF

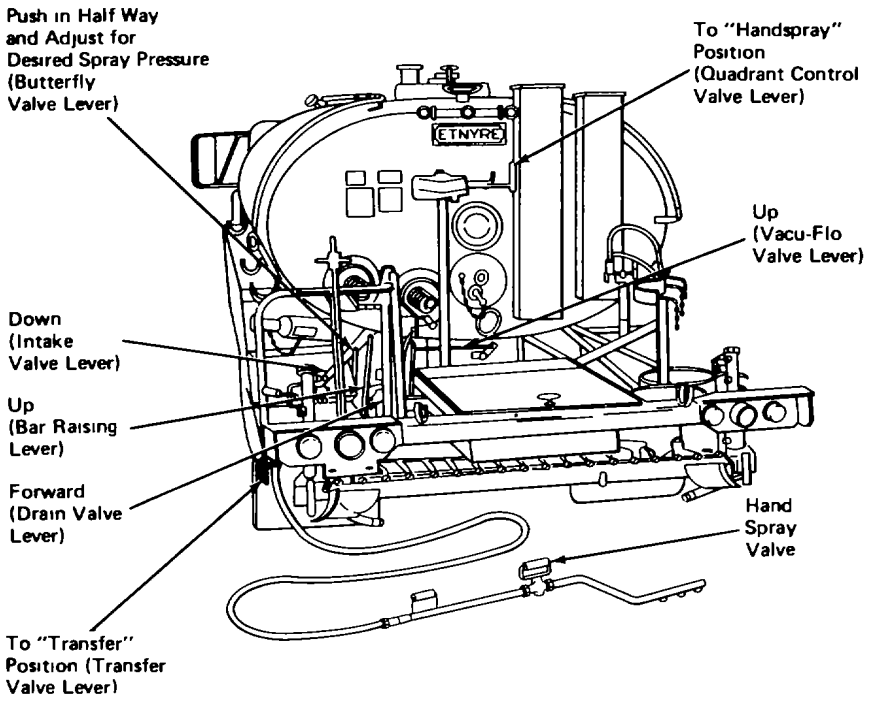


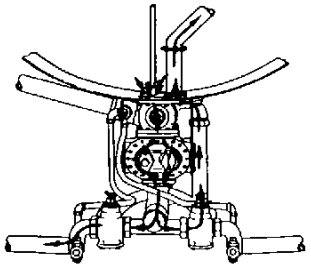
Figure 25

1. Connect hand spray hose or pump-off line to transfer valve.
2. Move transfer valve lever from "Distribute" to "Hand spray" position (m).
3. Run pump at 80 to 100 G.P.M.
4. For hand spraying move butterfly valve to "Hand spray" position. For pump-off move butterfly valve to "Transfer" position.
5. Move quadrant lever to "Hand spray" position.
6. Open intake valve by moving Intake Lever down. When pumping off check to insure all valves in pump-off line between distributor and storage tank are open before moving Intake Lever down.
7. Turn hand spray valve 90 degrees on hand spray gun for spraying.

8 Adjust hand spray pressure with butterfly valve Push in lever to increase, pull out to decrease.

When through hand spraying or pumping off 1 Pull butterfly valve lever out.

2. For pump-off close valve at storage tank soon after pulling butterfly valve out.
3. Shut intake valve by moving lever up.
4. Move quadrant lever to "Circulate and Fill" position
5. Suck back hand spray hose and gun on pump-off line by turning Vacu-Flo valve lever to the left position. After approximately 1 minute crack hand spray valve or open pumpoff line If through hand spraying for the day, crack hand spray valve with nozzles submerged in flushing oil, use 3 quart can supplied
6. Turn Transfer Valve lever back to "Distribute "
7. Disconnect pump-off line
8. Turn Vacu-Flo lever straight up to normal position
9. To blow out hand spray, if desired after spraying, raise intake valve lever, remove filling cap, open hand spraying valve and push butterfly valve lever in against stop Add flushing oil if desired.



WARNING

Remain clear of rotating drives when unit is in operation to prevent becoming entangled in machine

5

6 Use gloves or insulated material when handling spray bar, sections, or hoses to prevent burns

7 Monthly check and if necessary clean 3" overflow tube to insure tube has not become clogged

11 Keep area clear of open flame or sparks when spraying material with volatile cutbacks to reduce fire hazard

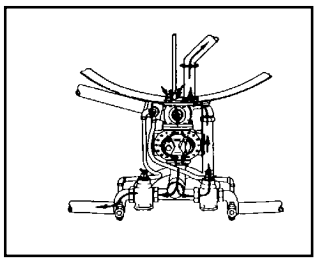
12 Do not stand in a location such that accidental opening of spray bar valves will cause contact with bitumen spray with resulting burns

13 Fill line cap or connection must be securely attached before operating intake valve lever to eliminate momentary discharge

14 "TUC" bar must be off and remain off when bar is rotated upward

29 When hand spraying, maintain gun m proper position and be aware of other personnel

TRANSFERRING FROM SUPPLY SOURCE TO STORAGE



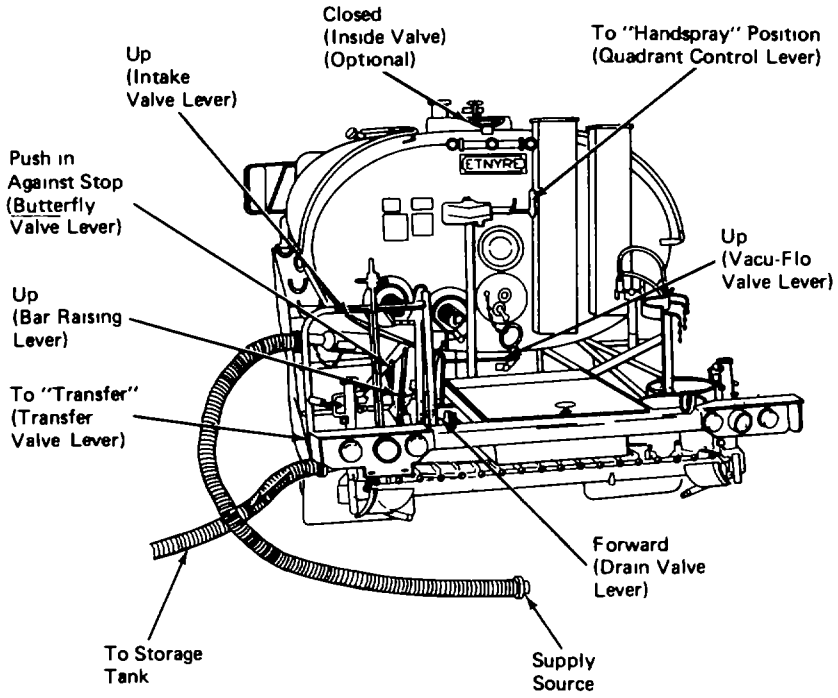


Figure 26

1. Hook up hose from supply source to the filling connection Be sure connections are tight

2. Hook up hose from storage to transfer connection Be sure connections are tight

3 Move transfer valve to "Handspray" position.

4. Push butterfly valve lever in against stop

5. Move intake valve lever up, opening valve.

6. Move quadrant control lever to "Hand spray" position (When using optional right hand transfer valve, move quadrant control lever to "Circulate in Bar" position.)

7. Run pump at maximum speed where it will run quietly. Normally 150 G P.M Is best transfer speed

8. When through transferring, turn transfer valve lever to "Distribute" position (to left on left transfer valve and to right on optional right transfer valve) Pull butterfly valve lever back out against stop

Note If oil enters Distributor tank when transferring, butterfly valve is not closed tight

WARNING

5 Remain clear of rotating drives when unit is m operation to prevent becoming entangled m machine.

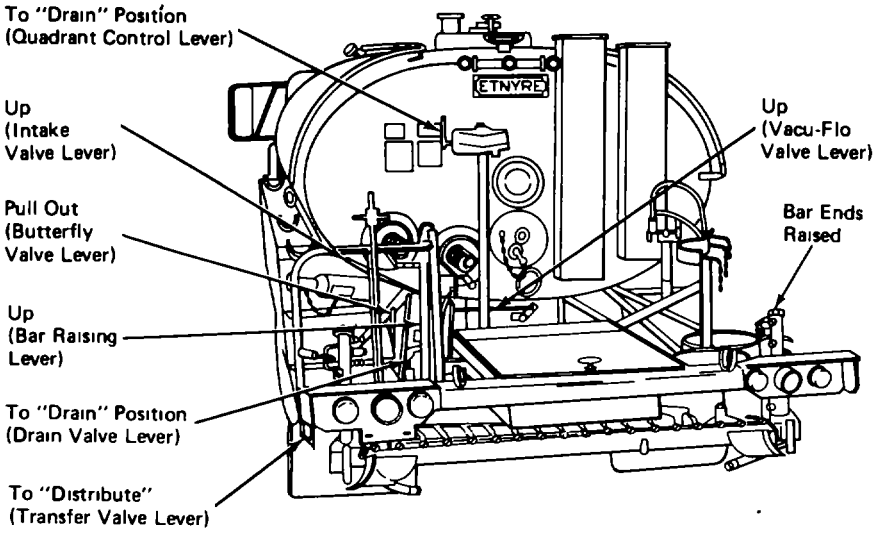
6 Use gloves or insulated material when handling spray bar, sections, or hoses to prevent burns

7 Monthly check and If necessary clean 3" overflow tube to insure tube has not become clogged

9 All pipe and hose connections must be secure before operating valves to eliminate leaks which may spray hot bitumen on other personnel

13 Fill line cap or connection must be securely attached before operating intake valve lever to eliminate momentary discharge.

DRAINING CIRCULATIN SYSTEM AND SPRAY BAR



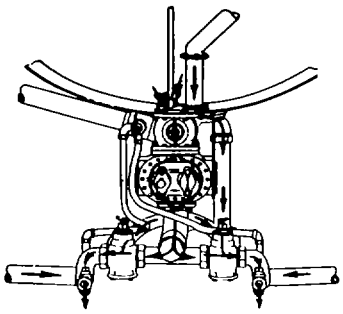


Figure 27

1. Raise Spray Bar and fold up end sections, with "TUC" bar, turn up bar before folding end sections

2 Turn Vacu-Flo valve lever up.

3 Pull out butterfly valve lever

4 Turn transfer valve lever to "Dlstnbute" position

5. If tank is also to be drained, pull intake valve lever down If equipped with inside closing valve, open by turning counter-clockwise.

6. Turn quadrant lever to "Drain" position

7. Pull the drain valve lever rearward to "Dram" position

8. It is necessary to run the pump for complete drainage of circulating system Normal draining speed is low idle

9. When draining operation is completed, push forward dram valve lever and turn quadrant control lever to "Circulate In Bar" position.

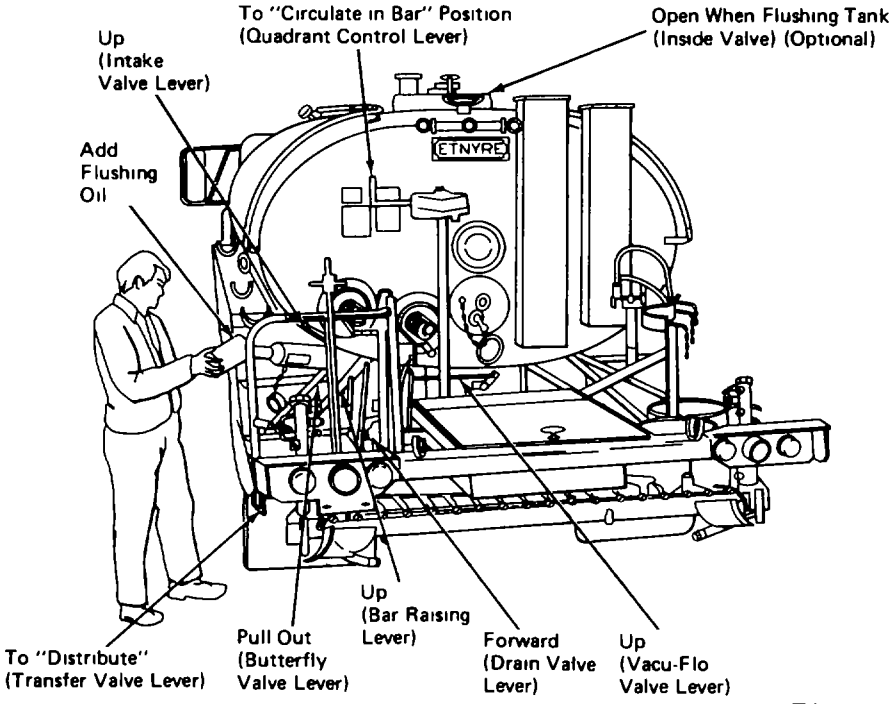
WARNING

3 Lit cigarettes or other sources of combustion must remain clear of open manholes or overflow vents to reduce fire hazard

5 Remain clear of rotating drives when unit is in operation to prevent becoming entangled in machine.

7 Monthly check and If necessary clean 3" overflow tube to insure tube has not become clogged.

FLUSHING BAR, CIRCULATING SYSTEM AND TANK



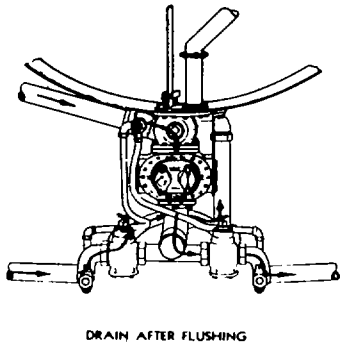


Figure 28

1. After draining circulating system, put quadrant control lever to "Circulate m Bar" position

2. Intake valve lever should be in Up position

3. Run pump at low idle

4. Put 3 quarts of flushing oil in filling line, using can provided If tank is to be flushed leave intake valve closed (Lever Up) until 5 or more gallons of flushing oil are introduced, then push lever down, opening intake valve

Note After flushing operations, drain residual material before subsequent recirculaton.

WARNING

3 Lit cigarettes or other sources of combustion must remain clear of open manholes or overflow vents to reduce fire hazard

5 Remain clear of rotating drives when unit is in operation to prevent becoming entangled m machine

7 Monthly check and if necessary clean 3" overflow tube to insure tube has not become clogged

10 Keep unit clean for safety and operation

HYDRODSTATIC DRIVE OPERATION

The hydrostatic drive consists of a variable output pump driven by the truck P.T 0 which m turn drives the distributor asphalt pump with a hydrostatic motor. Thus once the correct ratio between ground speed and pump flow rate Is established for a given transmission setting, the truck ground speed may be varied without affecting the application rate.

Dry run establishment of correct ratio between pump flow rate and ground speed

1. Determine from the computator the correct ground speed (F P.M) and pump flow rate (G.P M) for the desired spray bar length (FT) and application rate (GAL /SQ YD).

2. Place quadrant control lever in "Circulate in Tank" position.

3. Pull hydraulic control knob to upper most position (see General Identification Page).

4. Lower ground speed tachometer drive wheel (5th wheel).

5. Engage truck P T O.

6. Select truck transmission and if required, auxiliary and rear axle setting, to give adequate ground speed and power for the desired application rate More than one attempt may be necessary before the proper gear setting is determined which will prevent jerky forward truck motion and still supply adequate power and speed for the terrain.

7. Now, while driving the distributor forward at the speed (F P.M.) previously determined from the computator, push the hydraulic control knob down until the asphalt pump flow rate (G.P M) is equal to the gallonage determined from the computator.

8. The control knob should be held in this position by turning the fine control tube up until it is against the bottom of the hydraulic control knob Then lock the tube in place with the brass lock ring.

9. Now that a dry run has been completed you may wish to record the truck gear setting, spray bar length, application rate and engine tachometer R P M so the application rate can be duplicated in the future by merely using the truck engine tachometer to establish the proper pump flow rate An "Etnyre Shot Guide" has been provided for this purpose Also see section on "Recording Settings With Hydrostatic Drive" for additional "Shot Guide" instructions.

To Spray

1. Lower spray bar to spraying position.

2. Adjust spray bar length to previously determined length.

3. Engage truck power take off.

4. Place quadrant control m "Circulate in Bar" position ready to spray NOTE Prior to placing quadrant control in "Circulate in Bar" position decrease pump flow rate, if necessary, to a maximum of 160 G P.M. by raising the hydraulic control knob.

5. Engage truck transmission in gears previously determined for proper application speed.

6 Bring truck speed up until pump flow rate is at least 3/4 of the original determined flow rate Upon reaching starting point, if necessary push hydraulic control knob down against stop and turn on spray bar.

7. Once started the operator may drive up to a speed at which the pump flow rate (GPM) is 1 1/2 times greater or down to a speed at which the flow rate (G P M) Is 3/4 of the original determined flow (G P M) Above the high speed excessive fogging starts to occur and below the low limit, insufficient flow results m a fan which is less than full width.

8. Upon completion of shot, turn off spray bar and If necessary decrease pump flow rate to a maximum of 160 G P M This Is done to prevent excessive pressure in the spray bar when not spraying

.

RECORDING SETTINGS WITH HYDROSTATIC DRIVE

1. Enter distribution rate m space at lower left of chart.
2. Enter corresponding distributor speed in space at lower center of chart.
3. Enter bar length in left column of chart.
4. Enter pump discharge rate in second column of chart.
5. Make a dry run at indicated distributor speed, noting the truck R.P M., transmission, gear, and rear axle setting that provides best operation at the required speed. (On units provided with two-speed P.T O. Or auxiliary transmissions, space is provided for these settings also.) Maintain distributor speed and set hydraulic control in accordance with instruction Enter the data m the appropriate column of chart.
6. Whenever a repeat of the distribution rate is called for with a previously-recorded bar length, it is only necessary to reset the pump discharge rate to the corresponding engine R.P.M. with unit stationary. (All other settings must also correspond).
7. Use a different chart for each distribution rate. In time all necessary settings will be recorded.

Additional charts available m the "Etnyre Shot Guide" Copies may be obtained by writing E D Etnyre & Co., 200 Jefferson St, Oregon, Illinois 61061.

Bar Length	Pump Discharge	Truck Eng. RPM	Tran. Gear	P.T.O. Gear	Rear Axle Gear	Aux. Tran. Gear
16 FT	160 GPM	1310	1	—	HIGH	—
24 FT	240 GPM	1310	1	—	HIGH	—
		SAMPLE				

Dist. Rate 0.3 GAL/YD^2 Dist. Sp 300 FPM

Dist. Rate 0.3 GAL/YD^2 Dist. Sp 300FPM

Figure 29

Bar Length	Pump Discharge	Truck Eng. RPM	Tran. Gear	P.T.O. Gear	Rear Axle Gear	Aux. Tran Gear

Dist Rate _____ Dist. Sp _____

Bar Length	Pump Discharge	Truck Eng. RPM	Tran. Gear	P.T.O. Gear	Rear Axle Gear	Aux. Tran. Gear

Dist .Rate _____ Dist. Sp _____

HYDROSTATIC MOTOR PRESSURE ADJUSTMENT

Equipment required for pressure check

1. 5000 P.S.I. pressure gauge.
2. 2 Ft. length of high pressure hose to fit gauge fitting and adaptor
3. Anchor adaptor No 4BC4UFS or 6 BC4UFS or equivalent.*
4. Anchor "O"-ring No. 383-4 or M-383-6 or equivalent.*
5. Etnyre shim kit No. 740064.
6. Vaseline or petroleum jelly.

INITIAL PRESSURE CHECK

1. On bottom of hydraulic motor remove right hand, 9/16" plug.
2. In this opening install a minimum capacity 5000 P.S.I. gauge using appropriate Anchor adaptor and "O"- ring with high pressure hose.
3. Lock hydraulic motor by one of the two following means and take a pressure reading.

A. MATERIAL IN DISTRIBUTOR TANK

1. Set distributor controls on "Hand Spray" position See section on "Hand Spraying" for additional information
2. Transfer valve control (under left operators platform) remains in distribute position.
3. Accelerate to a minimum 100 G.P.M reading on pump tachometer Close hand spray pressure control "Butterfly Valve" slowly until hydraulic motor stops Highest reading on gauge is by-pass pressure setting on hydraulic motor.

B. EMPTY DISTRIBUTOR TANK

1. On instrument stand in truck cab pull pump control knob to its uppermost position. Adjust fine control tube up until it is against bottom of hydraulic control knob.
2. At the rear of distributor lock universal coupling between Etnyre pump and hydraulic

*Select appropriate adaptor and "O"-ring for the hydraulic motor

motor with a pipe wrench of sufficient length to lay against left distributor frame.

3. If truck engine has tachometer, set to minimum of 1000 R P M. If not, set truck engine at fast Idle.
4. Engage P T.O
5. Pull out rear override control until hydraulic motor pressure registers the highest reading This is by-pass pressure.

PRESSURE EVALUATION

With pressure gauge installed and hydraulic motor locked as indicated above determine if by-pass pressure is actually low. If pressure Is not low consult "Trouble Shooting" section of this manual for other items which may cause hydraulic motor to turn slow or not at all If pressure is low check the following two items before attempting to increase relief pressure.

1. Air drawn into the hydraulic oil will cause it to appear milky m color and result m low system pressure To overcome this, check for air leaks at four connections in the line from oil reservoir to filter to hydraulic pump. Tighten fittings to eliminate leaks

2. Next check pump and motor case drain rate Maximum drain rate is one-half (1/2) gallon per minute per 1000 P S I For example if the initial pressure reading was 3000 P S I, the maximum allowable flow rate would be 1 1/2 G.P M

A. Pump case drain flow rate check

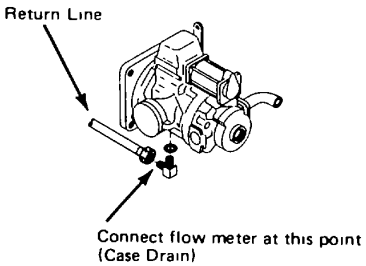


Figure 30

1. Disconnect case return line indicated above.
2. Attach flow meter as noted or direct dram flow into a container of known volume for a given period of time, Then from dividing volume by time, a flow rate can be determined. If this flow rate is above maximum allowed, pump is worn internally and should be replaced before proceeding

B. Motor case drain flow rate check

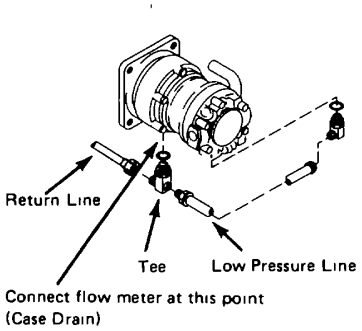


Figure 31

1. Disconnect low pressure line at motor tee If flow from this line Is directed into a clean dry container the oil may be saved and returned to the reservoir Extreme care should be taken to insure that while this line is disconnected the hydraulic system is not accidentally pumped dry resulting m a damaged system
2. Disconnect return line and remove tee from motor
3. Connect flow meter as indicated above or direct flow from tee port (case dram) into a container of known volume for a given period of time Then from dividing volume by time a flow rate can be determined. If this flow rate is above maximum allowed motor is worn internally and should be replaced before proceeding

HYDRAULIC MOTOR RELIEF PRESSURE ADJUSTMENT

If pump and motor case dram rate and air leaks are not a problem, proceed to adjust hydraulic motor relief pressure as outlined below

First, determine which of the three types of hydrostatic motor has been installed on your distributor Then adjust pressure as indicated for the particular motor involved

TYPE I HYDRAULIC MOTOR

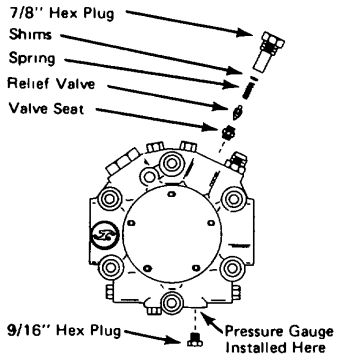


Figure 32

1. Of the two 7/8" plugs, located on top of the motor, remove the one nearest the universal coupling between motor and Etnyre asphalt pump.
2. Exercise care m removal of this plug, spring, shims and relief valve Should valve and spring fall into discharge port, they may be retrieved with a pencil magnet.
3. Add required number of shims so as to increase pressure to recommended level of 4000 to 4500 P S I Pressure may be increased at the rate of 50 P I per one thousandth (001") of shim.
4. Before replacing plug, apply a dab of petroleum jelly or vaseline on end of tube to prevent valve, spring and shims from dropping out
5. Re-check pressure and make additional adjustments if necessary
6. Remove gauge and replace 9/16" plug

TYPE II HYDRAULIC MOTOR

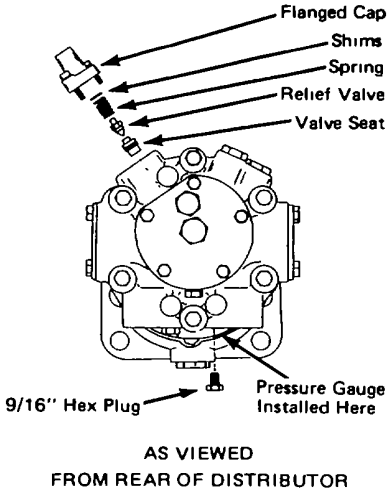


Figure 33

1. Remove flanged cup casting located as shown on rear of hydraulic motor This contains relief valve, spring and shims
2. Add required number of shims so as to increase pressure to recommended level of 4000 to 4500 P S.I Pressure may be increased at the rate of 50 PSI per one thousandth (001") of shim.
3. Before replacing apply dab of petroleum jelly or vaseline on assembly to prevent RELIEF valve and spring from dropping out.
4. Re-check pressure and make additional adjustments If necessary
5. Remove gauge and replace 9/16" plug.

TYPE III HYDRAULIC MOTOR

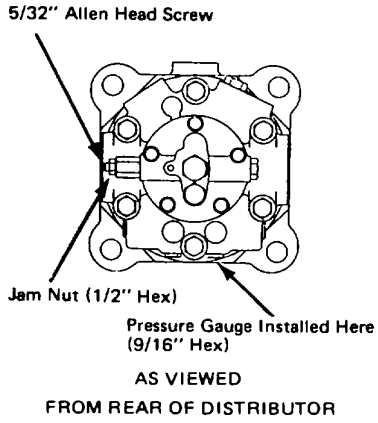


Figure 34

1. Loosen jam nut (1/2" hex) and turn 5/32" Allen head screw m so as to increase pressure A pressure increase of 800 PSI per turn may be expected
2. Increase pressure to recommended level of 4000 to 4500 P S.I
3. Retighten jam nut while holding screw.
4. Remove gauge and replace 9/16" hex plug

CAUTION

1. Throughout the entire operation, hands , parts, tools and immediate area *must* be kept clean Introduction of foreign material into the system may damage or hinder its operation.

2. Do not operate the hydraulic motor at maximum by-pass pressure for extended periods of time since this will cause overheating of hydraulic oil and result in system damage

3. Recommended relief pressure 4000 to 4500 P.S.I

4. For accessibility, removal of bar box or center platform is recommended.

SPRAY BAR VALVE ADJUSTMENT

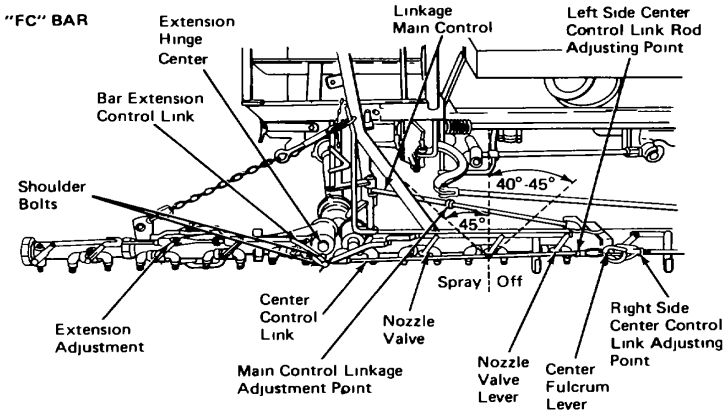


Figure 35

Note Quadrant lever is identified on Page 6.

1. Nozzle valve levers should be 40 degrees to 45 degrees to right of vertical when quadrant control lever is to the left in "Circulate m Bar" position and 45 degrees to left of vertical when lever is in "Distribute" position

2. Nozzle valve levers should start to move when quadrant lever is moved 1" or less More movement indicates worn linkage that should be replaced

3. Shoulder bolts that connect bar extension control link to center control link should center on extension hinge when valves are In "Off" position

If any discrepancy is found in the preceeding, correct by completing the following spray bar nozzle valve adjustment procedure

A. Disconnect main control linkage and both center control linkages from center fulcrum lever.

B. Align left side shoulder bolt to center of extension lunge A rod inserted through shoulder bolt hole to extension hinge will aid in checking alignment If necessary, heat and bend bar extension control link to obtain proper alignment. Verify proper alignment by raising bar with rod or shoulder bolt in place-nozzle valves should not move.

C. Check for proper nozzle valve lever travel on center section extension and any additional extensions The valve levers should move 45 degrees to the left of vertical and 40 degrees to 45 degrees to the right of vertical Adjust if necessary

D. Connect left center control linkage and adjust for proper left center section nozzle valve lever travel

E. Repeat steps B, C and D for the right side of bar

F. Finally, adjust at main control linkage, relationship of nozzle valve lever position to quadrant control position, per item one

Do not fold extensions when valves are turned on Do not attempt to spray center of bar with extensions folded without removing shoulder bolts controlling extensions

---

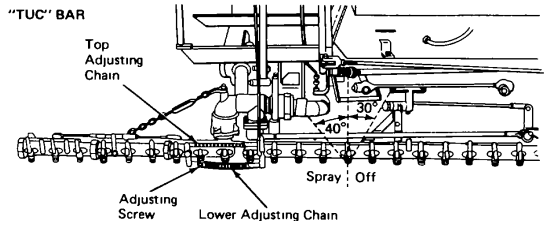


Figure 36

Note Quadrant lever Is identified on Page 6.

1. Fold extensions back and adjust control linkage in center section so that valve levers are vertical when quadrant lever Is 1" to left of 45 degree position

2. Throw quadrant lever to left and right against stops and check throw of nozzle valve levers Nozzle valve levers should turn through approximately 30 degrees to right of rees to left.

3. Work extension nozzle valves to check for binding, then throw valve levers 30 degrees to right of vertical (off position) Turn quadrant lever to extreme left position ("Circulate in Bar") Return extensions to the forward straightened position The adjustable connecting chains on the upper left and lower right should become tight but should not cause movement of the extension valve levers If movement occurs or chains are not tight, make the corresponding adjustment having first disconnected the chains on the lower left and upper right

4. Throw quadrant lever to spray position and extension valve levers to 40 degrees left of vertical In this position the lower left and upper right chains should be tight Since the lever arms operating the chains are of different lengths, the lower left and upper right will be loose when valves are thrown to "Circulate In Bar" position, and the upper left and lower right will be loose In the "Distribute" position When adjusted per above, valves should work easily and there should be no overload on the chain pins.

LUBRICATION CHART

ETNYRE SITUMINOUS DISTRIBUTOR
ENGINE UNIT - HYDROSTATIC UNIT

INTERVAL	POINT	IDENTIFICATION	LUBRICANT	QUANTITY
30 DAYS	1	Bell Mechanism	EO-	Sparingly
	2	Manhole Cover	EO’	Sparingly
	3	Inside Valve Handwheel	EO-	Sparingly
	4	Spray Bar Controls	EO-	Sparingly
	5	Tachometer Cable	GO	Fill
	6	Bar Turn Up Bearings	MPG	Sparingly
	7	Bar Carrying Mechanism	EO- & MPG	Sparingly
	8	Transmission	#90OM-ATG	1-3/4 Qts
	9	Pump Coupling	#2M-AG	Sparingly
	10	Bitumeter Wheel	EO*	Sparingly
	11	Bitumeter Cable	GO	Fill
	12	Air Relief Valve	EO’	Sparingly
	25	Flip Valve Lever	MPG	Sparingly
DAILY	13	Oil Bath Air Cleaner Engine & Blower	EO	Fill to Line
	14	Blower Gear Case	EO	7 Oz.
	15	Blower Clutch Drive	EO-	Sparingly
	16	Drive Universals	#2M-AG	Sparingly
	17	Control Linkage	EO*	Sparingly
	18	Pump Universal	#2M-AG	Sparingly
	19	Tachometer Drive Chain	EO’	Sparingly
	20	Hydraulic Reservoir	HTF	% Full"’
	21	Gasoline Engine		See Eng Manual
	22	V-Belt Sheave Idler Brg	KER	Wash Twice Yearly
	23	Hydraulic Oil Filter		Replace if vacuum gauge shows in red area
	24	Pump Discharge Strainer		Clean Weekly
ANNUALLY	26	Pump Spline Fitting Yoke	#67-71	Sparingly

#67-71: Anti-seize Compound
#2M-AG: #2 Molub Alloy Grease
#9OM-ATG: #i90 Molub Alloy Transmission Grease
MPG: Multipurpose Type Grease
HTF: Hydraulic Transmission Fluid - Type A
GO: Graphite Oil
EO: Engine Crankcase Oil
EO* Engine Crankcase Oil/Applied W/Oil Can
KER: Kerosene

NOTE On units with one man air controls - fill line oiler, located on outlet side of air reservoir, with light oil as needed Also wipe cylinder rods clean and lightly oil Drain water from air reservoir daily

**"Fill completely for winter storage This will prevent condensation in reservoir Drain down to thermometer hole prior to use

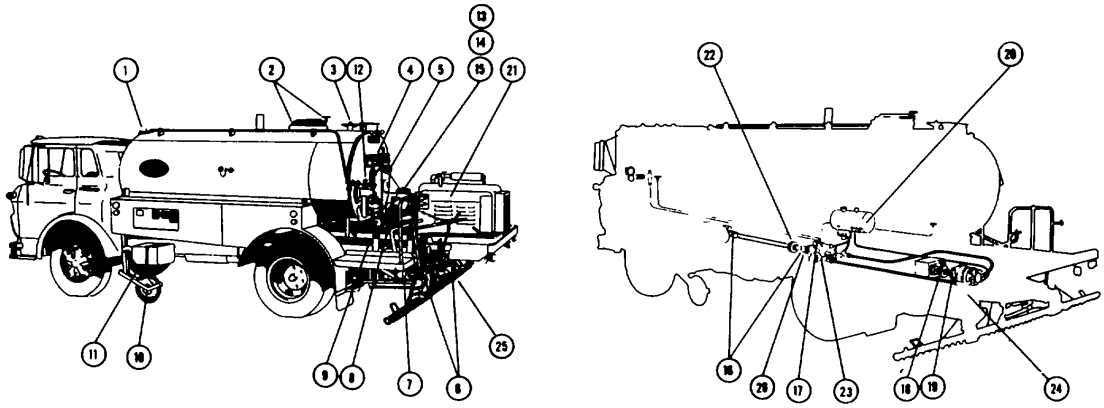


Figure 37

TROUBLE SHOOTING

IF SPRAY FOGS: Pump speed too fast for size of nozzle. Check "CIRCULATING IN TANK" page for proper relationship.

IF SPRAY STREAKS: Pump speed too slow, nozzles not at proper angle; spray bar at improper height above ground or material temperature too low. Material should have a Saybolt Furol viscosity from 25 to 60 seconds.

IF SPRAY LACKS PRESSURE. Pump speed too slow or one of control valves m incorrect position. To correct valve position, lift control quadrant and turn valve plugs to position relative to levers as shown on drawing on Page 6. Check discharge strainers.

IF ALL NOZZLES DO NOT CUT OFF: Adjust linkages so that all spray bar valve levers are in appropriate position. See Page 27.

IF LEFT CONTROL VALVE LEAKS AT TOP: Circulating in Bar at too great pump speed.

IF INTAKE VALVE LEAKS: Tighten spring on operating shaft. If leak persists, valve may be scratched or scored and relapping is necessary.

IF NOZZLE VALVES STICK OR LEAK: Bar pressure tends to keep them tight. To loosen, rap end of plug stem To stop leaks, remove valve from bar and lap plug into case

IF QUADRANT LEVER SLOWS PUMP WHEN MOVING FROM "CIRCULATE IN TANK" TO CIRCULATE IN BAR": Open butterfly valve by pulling on control link.

IF QUADRANT LEVER TURNS WHEN MOVING FROM "CIRCULATE IN BAR" TO "SPRAY": Check relation of Quadrant lever position with nozzle valve lever **HARD** position as described on page 27

IF MATERIAL DOES NOT CIRCULATE PROPERLY IN BAR: Check inner circulating tubes, particularly where they at sections

IF APPLICATION RATE VARIES:

1. Use measuring stick for accurate readings
2. Tank must be level when reading measuring stick.
3. Check pump tachometer. Each revolution of asphalt pump is 0.61 gallons.

Tachometer head may be checked at speedometer shop. 500 R.P.M. - 204 G.P M.

4. Check bitumeter. Use measured distance and stop watch Drive at constant speed Bitumeter head may be checked at speedometer shop 1000 R.P M - 1000 F.P.M.

5. Thumb button on quadrant lever must be down and engaged when rotating from "Circulate m Bar" to "Distribute". On air control units, thumb button should be held down with "T" shaped catch. On units with single control shaft, pull engagement lever outward.

6. On single shaft controls, check to insure inside lever remains in the "Circulate in Bar" position when hand control lever is moved to the "Distribute" position after the engagement lever has been pulled to engage the outside lever. One of the two conditions indicated below may cause inside lever not to remain m "Circulate in Bar" position.

A. Set screws in the inside lever may have been turned m against the center shaft. If so, back screws out until they engage the center tube without contacting the center shaft.

B. Possibly, corrison between the outside tube, inside tube and center shaft, may cause the inside lever to be pulled around with the outside lever Lubrication between these shafts should overcome this difficulty.

7. On units with inside valve, handwheel must be rotated counterclockwise to full open position.

8. Check discharge strainer on pump outlet.

9. Engine governor or hydrostatic control knob must be firmly positioned. Bitumen pump output must be established when circulating in tank

10. Quadrant levers and shafts must operate freely and not cause abnormal movement of other components.

IF PUMP WILL NOT TURN OR TURNS SLOWLY:

1. Asphalt material below pumping temperature
2. Air leak in suction line from reservoir to filter to inlet of charge pump on back of hydraulic pump
3. Defective pump or motor, check for excessive case drain
4. Hydraulic system pressure low, raise pressure
5. Low oil level in reservoir
6. Spray bar control valves set improperly.

IF HYDRAULIC OIL OVERHEATS:

1. Asphalt material below pumping temperature
2. Air leak m suction line from reservoir to filter to inlet of charge pump on back of hydraulic pump.
3. Low oil level in reservoir
4. Spray bar control valves set Improperly

INSTALLATION PROCEDURE

I. PREPARATION OF TRUCK CHASSIS

A. Chassis Components to be Removed Prior to Assembly of Distributor Components.

Since asphalt distributors tend to be an integral part of the truck chassis, it is often necessary to remove non-essential chassis elements to facilitate mounting of distributor components The components to be removed, left and right rear glad hands, tool box, and brackets, left and right front tiedown brackets and rearmost crossmember are noted in Fig.38. Note, upon removal of chassis glad hands, plug air supply lines so as to insure air for chassis brakes Before removing necessary bolts and rivets to slide out the rear most crossmember, care should be taken to insure the electrical wiring harness and glad hand air lines are not damaged Next remove necessary bolts and rivets to dismount the remaining previously noted items

B. Power Take-Off Installation

A six bolt single speed double gear power take off (P T.O.) is supplied for mounting on the right side of the main truck transmission (Note, this Is to be mounted on the main transmission not on the rearmost auxiliary) Drain transmission grease into a clean dry container prior to attempting P T.O installation Then remove mounting boss cover plate, install mounting studs, and attach P TO gear box (Fig. 76) Install (032") spacer and secure P TO to transmission case with top and bottom nuts torqued to 30-35 lb/ft. Remove shifter cover and check to insure P T.O gear backlash is .006" to 012" Add or subtract P.T.O. gaskets as necessary to obtain desired backlash Usually one (1) gasket will be required As a general rule, a .010" gasket will change backlash approximately 006" and a 020" gasket will change backlash 012" Now operate P T O momentarily and check for noise If P T 0 whines, it may be mounted too tight (too little backlash), add gaskets A clatter indicates loosness (too much backlash), remove gaskets Add or subtract gaskets until proper backlash has been determined and the P T.O operates quietly Note As transmission and P T O have no lubrication at this time, running should be for as short a time as possible Assemble remaining mounting nuts and torque 30-35 lb/ft Reinstall shifter cover At this time, replace transmission grease being careful not to contaminate grease Then operate P T.O for 5-10 minutes and check for leaks and noise Next, assemble hydraulic pump drive line to P.T 0. output shaft(Fig. 39) Secure PTO drive yoke to output shaft with drive yoke set screw. Later, this drive line will be used for hydraulic pump positioning.

C. Hydraulic Pump Assembly and Mounting

Attach upright supports to hydraulic pump with four (4) 3/4 X 2 bolts as seen In Fig. 40.Next attach cable supports to right hand pump support using two (2) 3/8 X 1 bolts Assemble pump drive yoke and drive line pulley onto pump input shaft. Slip blower drive belt over pulley and allow to hang loose Lower pump and supports into area where pump is to be mounted Attach P.T 0. drive shaft, (Fig. 41) to pump input shaft with four (4) 3/8 X 1 bolts Locate pump so as to give straightest drive line configuration while still clearing chassis members With upright supports held vertical (using a carpenters level) bring frame cross over support forward until it just touches the rear side of the upright supports Weld uprights to cross over support Next weld upright gussets in place as seen m Fig. 40. Install four (4) 1/2 X 12 tie down bolts and tighten securely. Finally install pump upright stabilizer rod as seen in F. 41 & 45. As a final check, observe P.T 0. output shaft and pump input shaft for excessive skew angle (i.e. shafts are not parallel when viewed from right side of chassis)

D. Blower Mounting

Mount blower as seen in Fig. 42 to blower mounting frame with four (4) 3/8 X 1 1/2 bolts such that eye bolts can be used to tighten blower drive belt See Fig. 43 also. Slip blower drive clutch onto blower input shaft and tighten clutch set screw Next attach blower frame to blower mounting bracket with four (4) 1/2 X 1 1/4 bolts, centering frame on bracket (F. 42 & 43) Bring blower, frame and bracket up against chassis frame as seen in Fig. 42, being careful to align blower drive pulley with P T.O drive line pulley. Mark location of four (4) blower mounting bracket holes on truck chassis, remove blower and drill four (4) 17/32 holes In chassis frame at marked locations.

Slip blower drive belt onto drive clutch and drive line pulley Attach blower bracket to chassis with four (4) 1/2 X 1 1/4 bolts and use lateral adjustment In bracket to make final alignment of P.T.O drive line pulley and blower drive pulley. At this time tighten all blower mounting frame and bracket bolts. Finally weld blower clutch anchor to mounting frame (Fig. 42), install inlet air filter and discharge elbow connector.

E. Hydraulic Reservoir Mounting

A completed hydraulic reservoir mounting can be seen in F. 42 & 44. To complete mounting, first remove reservoir from shipping skid and locate mounting bracket on chassis frame to give adequate blower drive clutch and chassis clearance (Fig. 42). Attach mounting bracket to chassis frame using 5/8" "Hook" bolts on front bracket and two (2) 1/2 X 5 bolts with channel clips on rear bracket (Fig. 44). Install suction line tee, nipple, thermo switch, breather, thermometer and oil sight glass as seen Fig. 45.

F. Hydraulic Filter Location

Attach filter element to mounting bracket with two (2) 5/16 X 1 bolts and place bracket in bench vise Install suction and discharge reducing bushings and elbows (F. 42 & 45). Locate filter on chassis frame (Fig. 42) and attach with two (2) 1/2 X 12" bolts and mounting clips

G. Fifth Wheel Mounting

Assemble fifth wheel upright channel to mounting bracket with two (2) 1/2 X 1 1/2 bolts (Figure 4) .Next locate mounting bracket to chassis frame (Fig.44) and attach using a 1/2" "U" bolt Tighten nuts securely

H. Cab Instruments

1. Mounting

Locate instrument -post floor bracket (Fig. 46) and secure to floor with four (4) number 14 X 1" drill screws Thread jam nut onto lower end of instrument post, turn post into floor bracket and tighten jam nut. Next thread a 5/8" nut onto upper end of instrument post, slide 5/8" lock washer, control mounting bracket and dash support bracket over post Turn instrument mounting bracket nut onto instrument post until bracket is secure. Control mounting bracket and dash support bracket should be free to rotate at this time If not, loosen nut which was threaded onto upper end of post Loosen floor bracket jam nut and orient instruments so as to face driver and re-tighten jam nut. Locate control mounting bracket and dash support bracket (F. 46 & 47). Secure dash support bracket to truck dash with two (2) number 14 X 1" drill screws Install hydraulic oil temperature warning light as seen in Fig. 46 .Thread a 20 foot length of 14 Ga. (Orange) lead wire through 1/4" loom Drill a 1/2" hole in chassis floor located as shown in Fig. 47 for the warning light lead wire. After running wire and loom through previously located hole, connect one terminal of warning light to thermo switch on hydraulic reservoir (Fig. 45).

2. Flexible Cable Installation

First drill two (2) 7/8 holes in cab floor as seen in .Fig. 47 for flexible cable to pass through. Slip rubber grommet over upper end of 252" pump tachometer cable, feed lower end through hole in floor of cab and attach upper end to pump tachometer Next slip rubber grommet over upper end of 144" bitumeter (fifth wheel) cable, feed lower end through hole in floor of cab and attach upper end to ground speed indicator Press grommets into cab floor holes around cables Lay pump tachometer cable along inside right hand chassis frame (Fig. 48) being careful to keep cable clear of hot areas and rotating drive components Secure cable in place with self-locking ties (Fig. 47). Next feed fifth wheel cable to angle adapter on fifth wheel(Fig. 44) .Again, care should be taken to keep cable clear of direct contact with hot chassis components and rotating drive components

I. Installation of Controls

1. Power Take-Off Controls

Locate P T O control bracket on floor of chassis cab (Fig.46). Use four (4) number 14 X 1 drill screws to attach bracket to cab floor. Drill 5/8" hole in cab floor for control cable directly below P T.O. cable mounting hole. Feed cable down through bracket and cab floor hole Drop upper end of cable below bracket and thread jam nut onto upper end of cable before forcing cable up through hole in bracket. Assemble a second nut onto upper end of cable and tighten to hold cable in place Reinstall cable knob. Attach lower end of cable so that P T O is fully engaged when cable know is up Care should be taken to insure that the P T.O cable is clear of hot engine components and rotating shafts. Secure cable to chassis with self-locking ties

2. Hydraulic Pump Controls

Attach cable support bracket to right chassis frame using two (2) 1/2 X 1 1/2" bolts as seen in Fig. 44. Holes for this bracket were made available when brackets for tool box were removed.

Next feed micro control cable up through 7/8" hole in cab floor to control mounting bracket. Slip rubber grommet over upper end of cable Thread jam nut onto upper end, push cable through control bracket, turn on second]am nut and secure control cable to control bracket, turn on second jam nut and secure control cable to control bracket. Refer to Fig. 49 for assembly arrangement.

Next turn lock ring and position tube onto upper end of cable. Finally, install cable jam nut and knob. At lower end of cable use two lock nuts to locate and secure attaching stud on control cable so as to align stud with cable support bracket hole (Fig. 49). Attach override control assembly to lower end of control cable core. In turn connect override assembly to control linkage and finally to upper most hole in pivot lever assembly. Then install front override control cable and attach to lowest hole in pivot lever (Fig. 49). Connect pump control linkage to first hole below center hole in pivot lever with pump control lever Finally attach rear override cable to upper most hole in pivot lever, and place along inside of right hand chassis frame (Fig. 48). Again secure cable in place with self-locking ties

3. Electrical Switches and Controls

Mount cab control switches to dash using (2) number 14 X 1" drill screws (Fig. 61).

J. Hydraulic Hose Attachment

1. High Pressure Hose Attachment

While the distributor is still skid mounted, remove the rear bar carrier box and attach the 3/4" high pressure hoses to the hydraulic motor (Figure 50). Thread the right hand hose forward between asphalt pump and distributor frame extensions and lay m carriers provided on cross stringers between tank legs. Repeat a similar procedure for the left hand hose. Care should be taken to keep hoses clear of rotating or moving distributor components Also, leave dust covers on pump end of hoses.

2. Suction and Return Hose

Connect 3/4" suction hose from reservoir tee to inlet side of filter (F. 42 & 45). A 3/4" male pipe barb fitting will be on the reservoir end and 37 degrees swivel female fitting on the filter end. A similar hose arrangement for the line between the filter discharge and pump suction port are to be used

Connect one end of the 3/4" gray return hose to return port in the reservoir (Fig. 45) and lay hose along inside of right hand chassis frame channel.

K. Frame Extension Assembly

Bolt extension plates to chassis frame (Figure 51) using four (4) 1/2 X 1 1/2" bolts. The extension plate holes will match with existing holes made available in the frame by removal of the rear crossmember Slip frame extension channel over extension plate such that the extension channel is flush with top of chassis frame. Hold in place with a "C" clamp and weld extension channel to extension plate. Do this procedure for both sides of chassis frame WARNING: DO NOT WELD TO CHASSIS FRAME.

II. MOUNTING OF DISTRIBUTOR ON TRUCK CHASSIS

A. Placement of Distributor

Remove distributor from skid Remove fenders and rear support blocks from the distributor in preparation for placement of distributor onto chassis.

Check to insure distributor frame blocks are taped to leg support channels as seen in Fig. 52. Slip distributor onto chassis (Fig. 52) being careful not to damage vacu-flo tubes with under side of frame members. Note clearance between vacu-flo tubes and underside of chassis frame (Fig. 50) is normal for standard mounting procedure. Locate distributor such that lifting eye on rear bogie assembly (located midway between rear axles) aligns with cable guard channel on side of distributor (Fig. 53). Also at this time see Fig. 1 for a completed distributor installation. When this is accomplished slide rear support blocks between chassis, and distributor frame Locate rear support blocks(Fig. 53) Lower distributor front leg support channels onto chassis frame.

Using four (4) 1/2 X 22 tie down bolts, frame clips and mounting springs, secure both left and right front distributor channel supports to chassis frame (Fig. 54). Weld frame clips to top of leg support channel for both sides Next using four (4) 1/2 X 18" tie down bolts and frame clips, secure the distributor to chassis frame at second distributor support and half way between the fourth and fifth supports. See Fig. 52 & 53 for support

numbering and tie down location. Next weld side stops to leg support channels to prevent side motion of distributor on chassis (Fig. 55). At this time bolt distributor rear frame supports to chassis extensions using a single 1/2 X 1 1/2 bolt for each side as seen in .Fig. 56. Then weld frame support on both sides to distributor frame extension (Figure 56) . Reassemble fenders to distributor as seen in Figure 57.

B. Completing Necessary Distributor Chassis Hook-Ups

1. Rear Override Control

Attach rear override cable to override control (Fig. 49). Complete connection with pivot lever m vertical position and override control handle in position closest to distributor frame (Fig. 75) .

2. Hydraulic System Lines

Attach right and left hand high pressure hose to respective sides of hydraulic pump(Fig. 40).Remove dust covers from hydraulic motor ports and assemble 1/2" return hose between high pressure pilot relief port and case dram ports (Fig. 45 and 56) .Then attach 3/4" return hose to return tee on bottom of hydraulic motor (Figure 56).

3. Air Supply Lines

Using 3/8" air hose tap into truck air reservoir (Fig. 58), and connect to pressure regulator valve See Fig. 59 for general air system arrangement.

4. Electrical Lines

A. Distributor Air Controls

Using a quick connector attach black wire of 9 ampere Inline fuse to lead number 54 of truck ignition switch (Fig. 60 & 61). Connect red lead wire of line fuse to pole terminal of bar shift switch. With a second quick connector, attach red line from high temperature light to red wire running between inline fuse and pole of latteral shift switch.

Remove knock-out and install grommet (Figure 74) for electrical controls wiring harness Next, thread distributor controls wiring harness on front of distributor under floor of cab and through firewall grommet Make connections as indicated m Fig. 60. Secure harness to chassis with self-locking ties.

B. Distributor and Chassis Lights

At side marker light location seen in figure 62, drill a 1/2" hole and install a rubber grommet. Feed lead wire for clearance right through grommet and attach right base to engine hood side panel with three (3) number 14 X 1" drill screws Repeat same procedure for left marker light Bring lead wires together at main harness connector as seen in Fig.74 and join with a quick connector. Using a second quick connector, attach remaining brown lead wire to the number 75A lead just above the main connector (Fig. 74). At this time install an amber reflector below each side marker right as seen in Fig. 62 with two (2) number 14 X 1 drill screws

Cut chassis rear light wiring harness and connect distributor light wiring harness as shown m Figure 63 Since the chassis wiring harness is not color coded, it will be necessary to use a test light or volt-ammeter to identify which chassis wire is to be used for connection to the appropriate distributor wire The clearance and tail light (brown) right stop turn (green) and left stop turn (yellow) wire are identified m Figure 64.

5. Burner Fuel and Air Line Assembly

Loosen fuel pump position set screws and locate pump ports (Figures 65 & 42). Retighten set screws and assemble fuel pressure gage, full flow valve, and supply line strainer to pump (Fig. 65) . Next attach a 3/8" hose from the fuel tank dip tube to the supply line strainer inlet (Fig. 57). From the "OUT" port of the full flow valve attach a 3/8" hose to the fuel tank return spud Finally attach a 3/8" burner supply hose from the pressure gauge cross port to the burner fuel supply line mounted on right side of distributor Connect the blower air discharge port to distributor burner air supply line using 1 1/2" flexible hose. Secure hose at both ends by placing a 1/4 X 3/4 round head screw with a 1/4" flat washer between the first and second wire spiral into a hole In the pump discharge port tube and the burner air supply line.

6. Pump Tachometer Shaft Attachment

Attach pump tachometer flexible shaft to tachometer drive, located right of hydraulic motor and on the same level as the motor output shaft centerline (Fig. 75). At this time reinstall the bar carrier box as seen in .Figure 67.

UNIT CHECK OUT

I. HYDRAULIC SYSTEM START-UP AND ADJUSTMENT

Fill hydraulic reservoir with clean type "A" transmission fluid to thermometer hole level Place the micro control knob (Figure 9) m upper most position (Hold In place with lock tube). Next, start truck engine and with transmission In neutral, engage P.T O by pulling "Pump" knob to upper most position At this time, adjust pump control linkage such that no motor rotation occurs even at 2000 R P M. engine speed (Pump control lever will be straight up and down). Note, check for motor rotation at double universal joint (Fig. 75) between hydraulic motor and asphalt pump input shaft. Next, pull front override control and note if pump tachometer gives a reading of pump rotation (flow) If there is no indication of flow, re-check to insure control cable is attached to chain In lowest pivot lever hole Clockwise rotation of asphalt pump input shaft, is an indication the pump control lever Is being rotated in the wrong direction. Review pump control linkage connection. The asphalt pump input shaft should always rotate counter clockwise when standing at the rear of distributor looking towards cab end of chassis Repeat a similar check for the rear override control Again check for indication of flow and counter clockwise rotation of pump shaft. Care should be taken not to operate distributor asphalt pump for extended periods since only residual testing oil remains in the pump at this time

II. OPERATION AND INSPECTION OF DISTRIBUTOR SYSTEMS

A. Burner Controls

Fill distributor burner fuel tank with clean kerosene, fuel oil or diesel fuel Pull micro control knob to upper most position and engage P T.O Tighten blower drive belt using eye bolts such that drive clutch engages easily while P T O is operating but still provides sufficient belt tension to operate blower Engage blower drive clutch Increase truck engine speed until sufficient blower speed is obtained to just slightly lift air relief valve weights (Fig. 66). Now referring to Fig. 65, remove acorn nut from full flow valve, loosen jam nut and adjust regulator screw in or out as required, to obtain a fuel pressure of 15 to 20 P S.I on pressure gauge Before lighting burners, check for fuel leakage at all fittings Tighten as necessary Open exhaust stack covers Adjust secondary air supply to full open position by turning burner nozzle outward. To light burners (Fig. 66), turn air butterfly valve on inside burner to open position, light torch and hold under burner tip, turn needle valve about 1/2 turn open. If burner does not ignite within two (2) seconds, turn off fuel needle valve and wait until gas fumes have been forced from flues by blower air If after repeating the lighting procedure a number of times, without success, check to insure all lines are connected as shown In Fig. 65, and all adjustments are made as outlined above before attempting to relight Upon successful lighting of inside burner, light outside burner using the same procedure as indicated previously The main objective of this check is to insure burners are connected properly Operate burners only long enough to insure proper functioning Extended operation without material in tank will damage flues

B. Electrical Controls

Start truck engine and allow 5 minutes for distributor system air pressure to stabalize Note pressure on system gauge (Fig. 59). With spray bar end sections disengaged from turn-up latches as seen in Fig. 67,, check to insure cab mounted switches actuate respective functions as indicated. Bar turn-up should cause the spray bar to rotate 90 degrees about the carry arm support bearings Fifth wheel lift should cause the fifth wheel to raise and lower. With shift lock disengaged bar shift will move the spray bar eight (8) inches either side of a center position. To test bar on-off, move the quadrant control (Fig. 67) to the "Circulate in Bar" position and pull catch lever so as to engage outer most quadrant lever After holding bar on-off switch momentarily in "ON" position, all valve levers should be located in the "Spray" position as seen in Fig. 68. Repeat a similar check for rear electrical controls

C. Distributor and Truck Lights

Place chassis light switch in "ON" position Check to insure all clearance, identification and tall lights are operating at this time Place turn signal lever in left turn position and check to insure front and rear turn signal lamps are operating. Repeat same procedure for right side Depress brake pedal and check to insure both rear stop lights function. If any lights should fail to function, check respective bulbs before attempting to check wiring (Fig. 64).

D. Manual Control

Place distributor control lever in "Fill from supply source" position (Fig. 69). Engage P T.O., set micro control to 100 G P M. flow, open supply source valve and draw into the distributor approximately 100 gallons of testing oil (Relatively clean used engine oil of SAE grade 40 would be satisfactory) Close supply source valve, reduce pump flow to zero and disconnect fill hose at distributor Replace fill line cap and locate distributor levers and spray bar ends for circulate in bar position (Figure 33) Engage P T O and set micro control to 100 G.P M At this time, check for leaks m spray bar and lines from asphalt pump. Tighten fittings and valves where necessary. Note, a small amount of leakage may occur from ball joints until hot asphaltic material has circulated through spray bar After eliminating leaks, place distributor control levers in draw-back position (Fig. 71) so as to draw all oil back into the tank

III. DRY RUN CHECK OUT

A. Operation of Distributor Controls

First with bar turned up and ends latched in place, move distributor levers to circulate in tank position (Fig. 72). Next, let fifth wheel down and with P T.O. engaged drive distributor forward at a steady speed of 300 ft/min. While driving at this steady speed, adjust micro control until pump flow rate is 100 gal/min Hold micro control in this location by turning lock tube up against under side of micro control knob After locking knob in place, increase distributor ground speed to 450 ft/min Pump flow rate should be 150 gal/min. Next, decrease speed to 200 ft/min and flow rate should drop to 75 gal/min. If these ground speeds and flow rates do not correspond, check for air leaks in suction line between hydraulic reservoir and pump suction port Tighten fittings as necessary Air in hydraulic oil will cause it to appear milky If this is not a problem, check ground speed indicator dial, 1000 R P M. input equals 1000 FPM reading Therefore, if R P.M. of say an electric drill press, for example, is known to be 600 R P M., then the ground speed indicator should read 600 ft/mm. when driven by the drill press. If ground speed indicator, (bitumeter) checks satisfactory proceed to check pump flow indicator.

500 R P.M. input equals 204 gal/min. For example, with a 600 R P M input speed, again from an electric drill press or other source, the pump flow indicator should read 244 gal/min. (600/500 X 204 = 244). Replace indicators as necessary.

B. Final Inspection

Check oil level in hydraulic reservoir and add if necessary With distributor circulating in tank at 200 G P.M., and hydraulic oil at operating temperature, check to insure suction on filter is not in red zone. If suction indicates in red zone, replace filter element Place distributor control levers m "draw back" position (Fig. 71) to draw all material back into tank Pump test oil back into supply source as instructed in Fig. 73 for "pump off" procedure Open dram valves after pump-off by placing drain valve lever m rear most position This will remove most residual test oil from distributor system. Finally, drain burner fuel from supply tank by opening petcock on bottom of tank

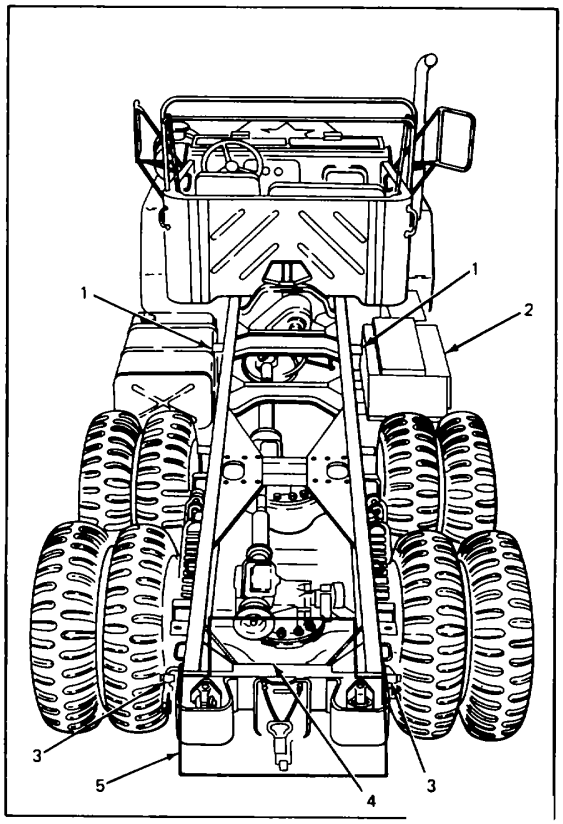


Figure 38

Chassis Components to be Removed

1. Left and Right Tie Down
2. Tool Box
3. Glad Hands
4. Wiring Harness
5. Rear Cross Member

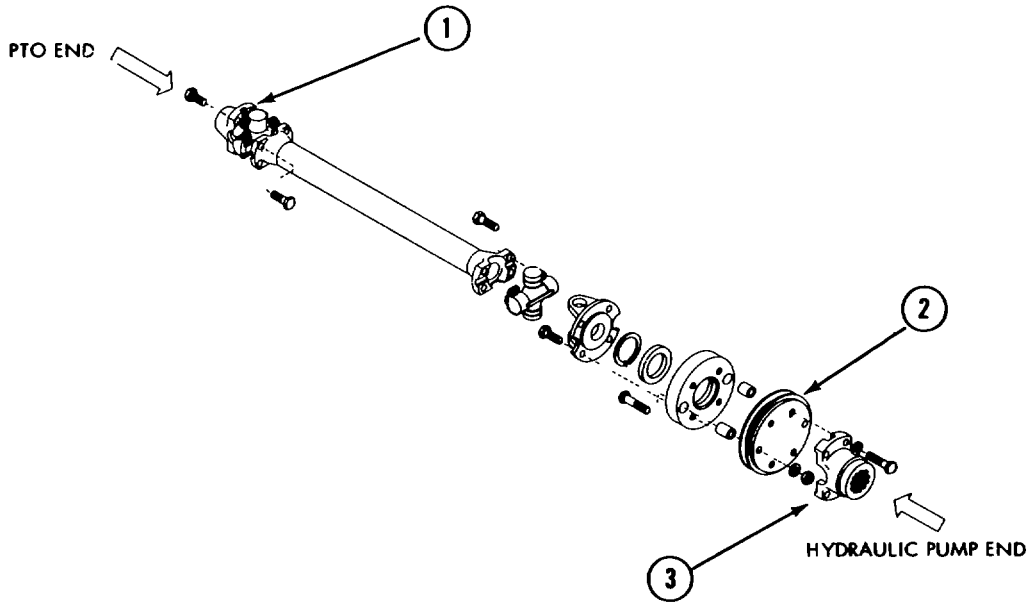


Figure 39

Hydraulic Pump Drive Line

1. P T O Drive Yoke
2. Drive Line Pulley
3. Pump Drive Yoke

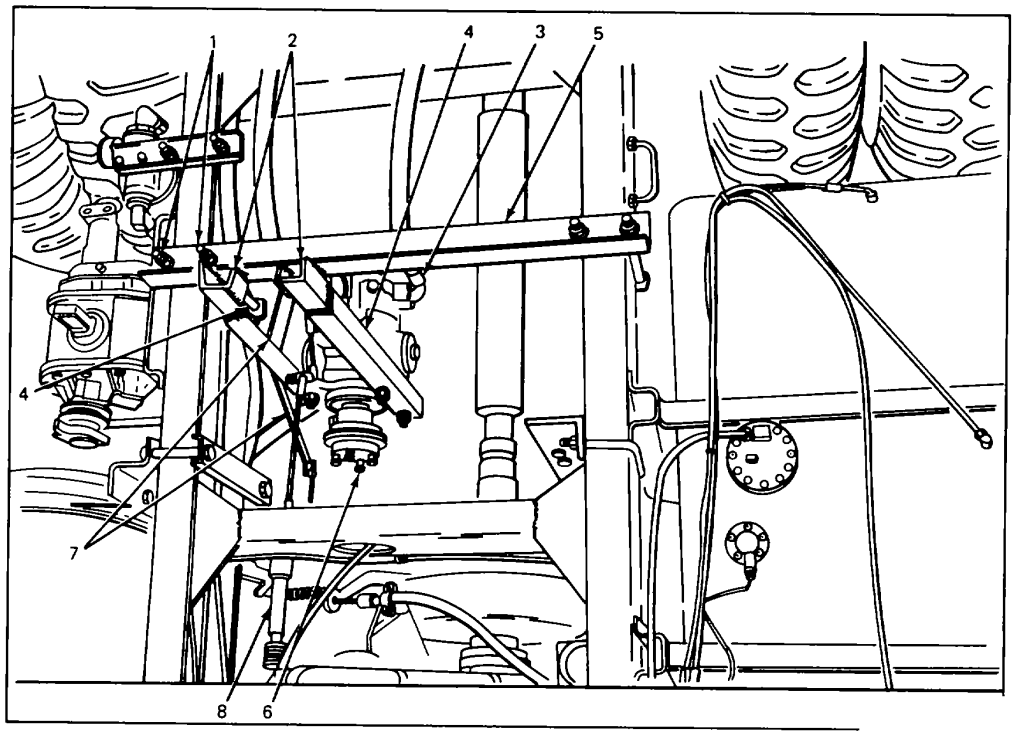


Figure 40

1. Tie Down Bolts
2. Upright Gussets
3. High Pressure Hoses
4. Upright Support
5. Frame Cross Over Support
6. Blower Drive Pulley
7. Cable Supports
8. Override Control Assembly

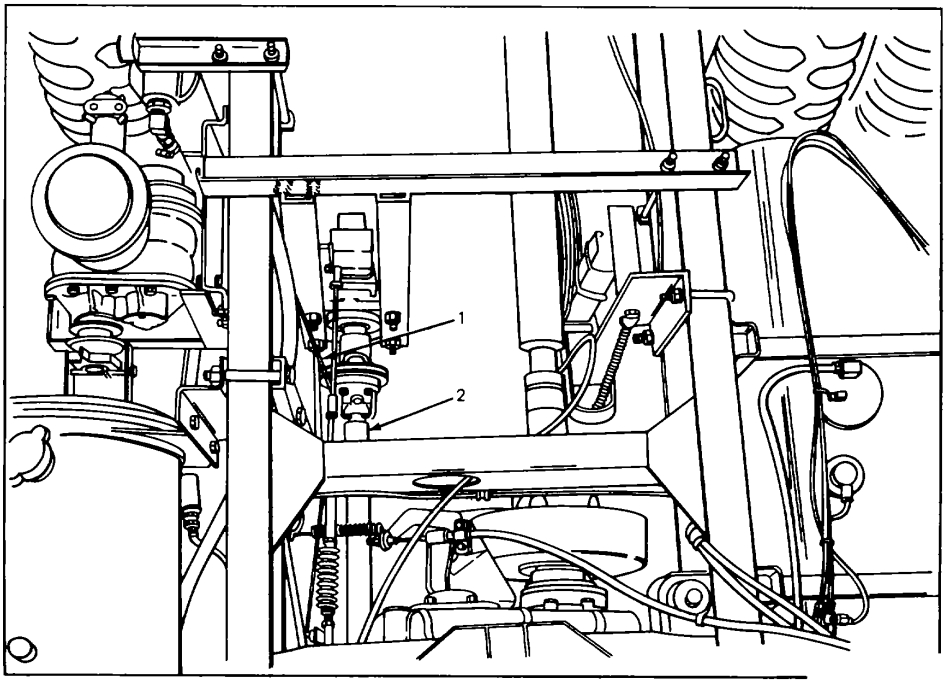


Figure 41
PTO Drive Shaft to Pump Input Shaft
1. Stabilizer Rod
2. P T O Drive Line

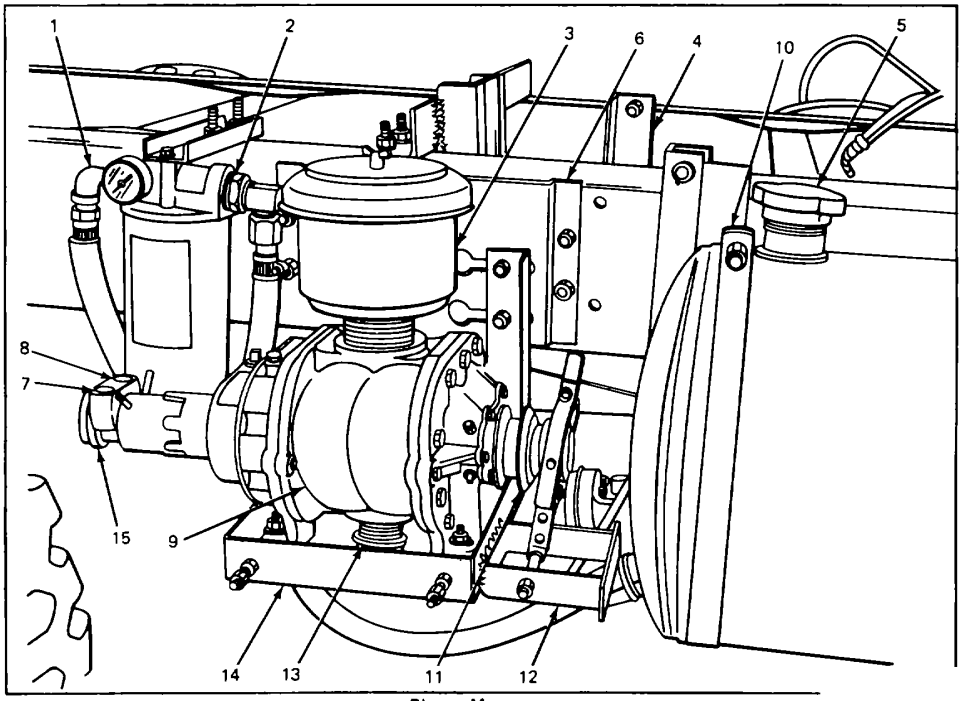


Figure 42
Blower Mounting

1. Discharge Side of Filter
2. Inlet Side of Filter
3. Air Filter
4. Reservoir Mounting Bracket
5. Fill Cap
6. Blower Mounting Bracket
7. Suction Port
8. Discharge Port
9. Blower
10. Hydraulic Reservoir Mounting Band
11. Blower Drive Clutch and Pulley
12. Clutch Anchor
13. Elbow Connector
14. Blower Mounting Frame
15. Fuel Pump

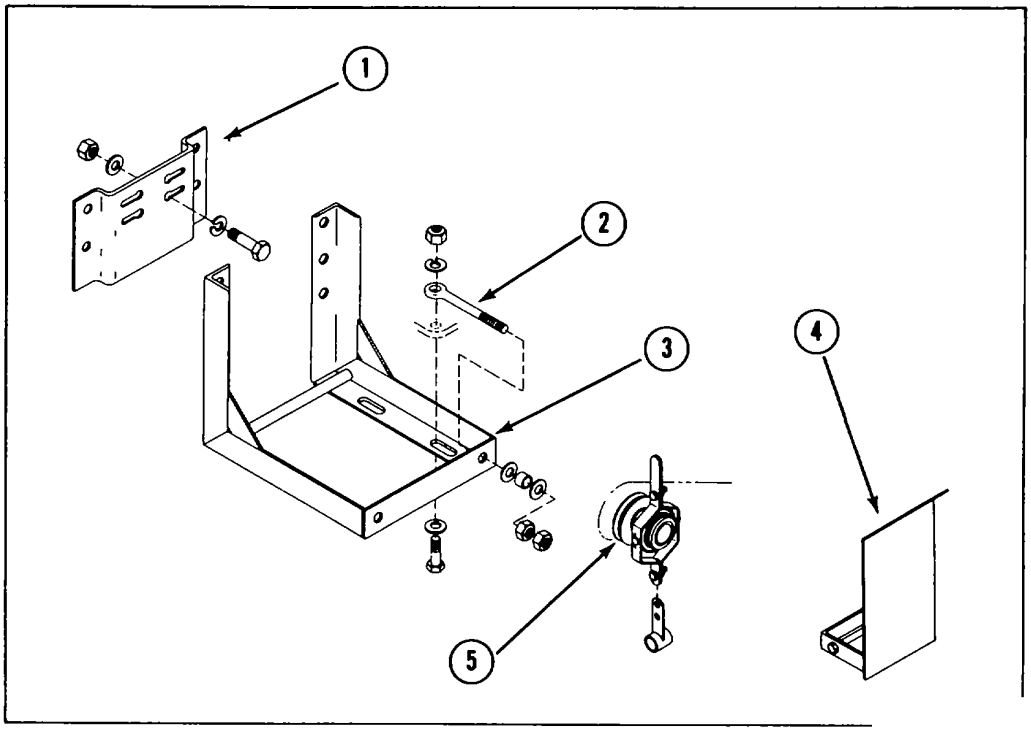


Figure 43
Blower Mounting Bracket and Frame

1. Blower Mounting Bracket
2. Eye Bolt
3. Blower Mounting Frame
4. Drive Clutch Anchor
5. Blower Drive Clutch and Pulley

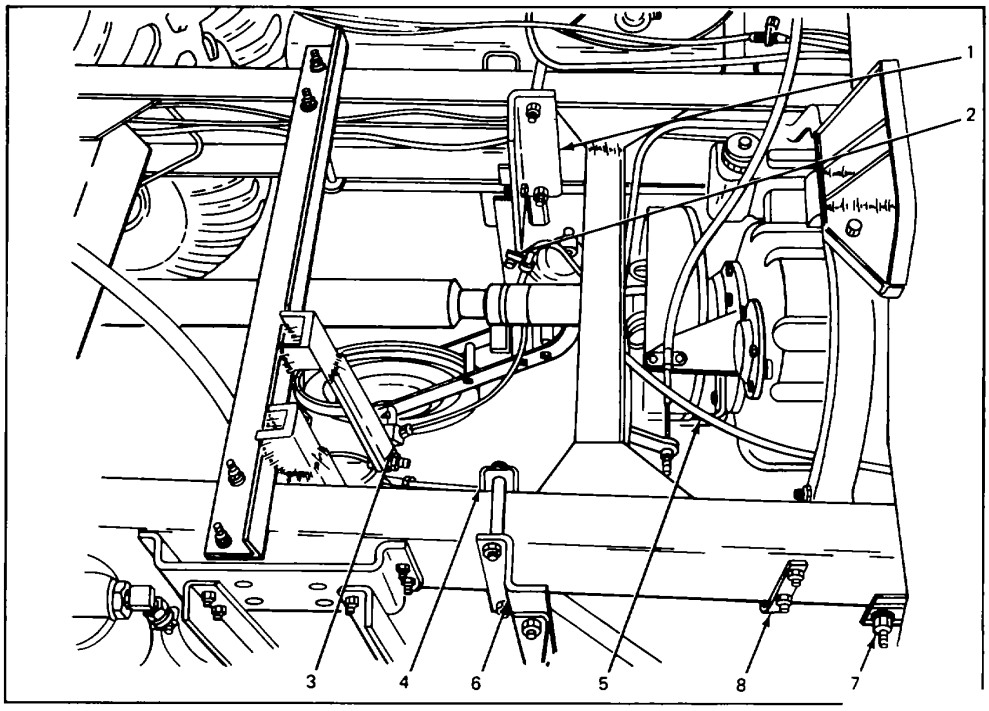


Figure 44
Hydraulic Reservoir Mounting

1. Fifth Wheel Mounting Bracket
2. Fifth Wheel Upright Channel
3. Angle Adaptor
4. Reservoir Channel Clip
5. Fifth Wheel Flexible Shaft
6. Reservoir Mounting Bracket
7. "Hook'," Bolt
8. Cable Support Bracket

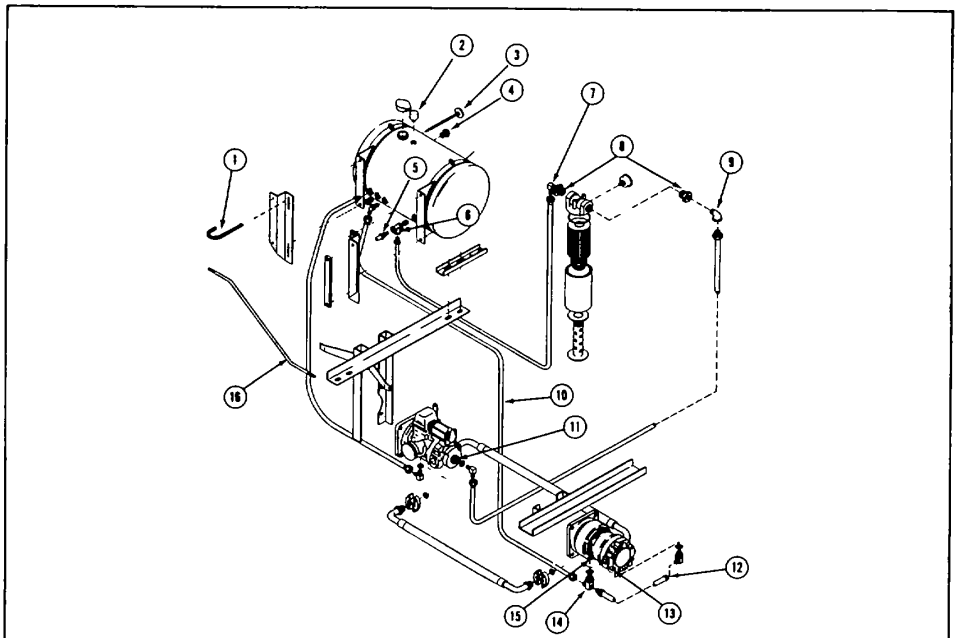


Figure 45
Hydrostatic Drive - Piping and Installation

1. "Hook" Bolt
2. Breather
3. Thermometer
4. Oil Level Glass
5. Thermo Switch
6. Suction Line Tee
7. Suction Elbow
8. Reducing Bushing
9. Discharge Elbow
10. 3/4 Inch Return Line Hose
11. Pump Suction Port
12. 1/2 Inch Return Line
13. High Pressure Pilot Relief Port
14. Return Tee
15. Case Drain Port
16. Stabilizer Rod

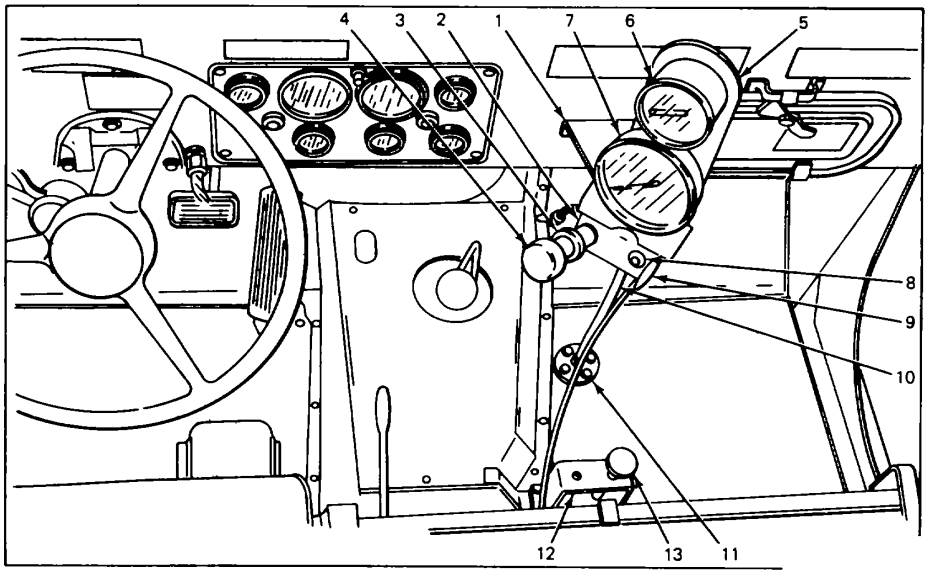


Figure 46
Cab Mounted Instruments

1. Dash Support Bracket
2. Control Mounting Bracket
3. Lock Tube
4. Micro Control
5. Instrument Mounting Bracket
6. Pump Tachometer
7. Ground Speed Indicator
8. Oil Temperature Warning Light
9. Front Override
10. Instrument Post
11. Instrument Post Floor Bracket
12. P T O Floor Bracket
13. PTO Engaging Knob

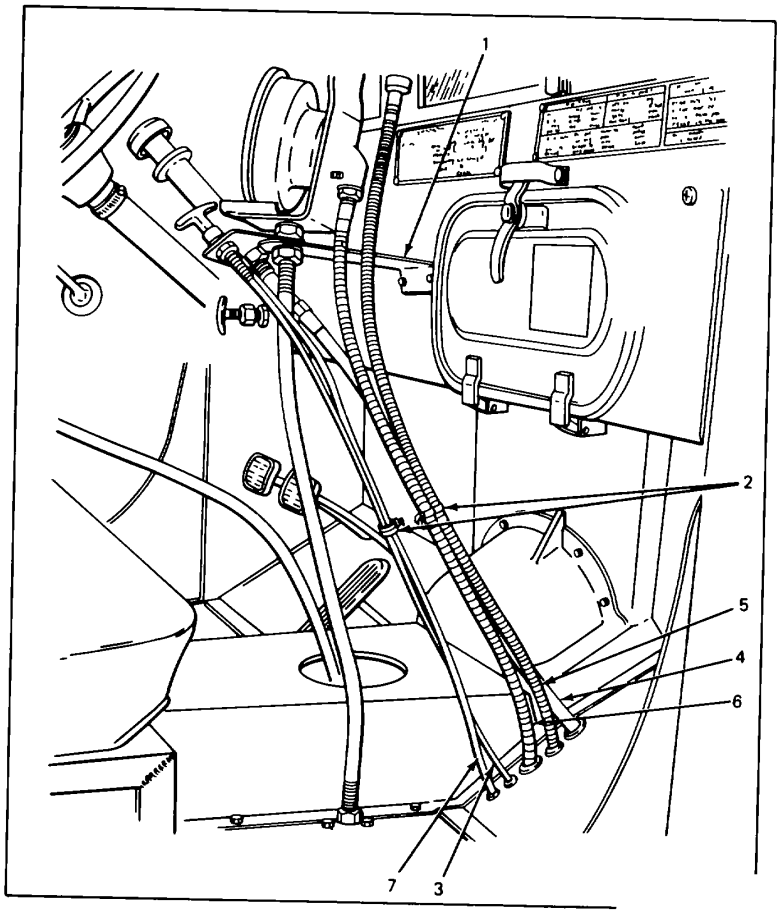


Figure 47
Flexible Cable Installation

1. Dash Support Bracket
2. Self Locking Tie
3. Front Override Cable
4. Micro Control Cable
5. Pump Tachometer Flexible Cable
6. Bitumeter Flexible Cable
7. Thermo Switch Lead Wire

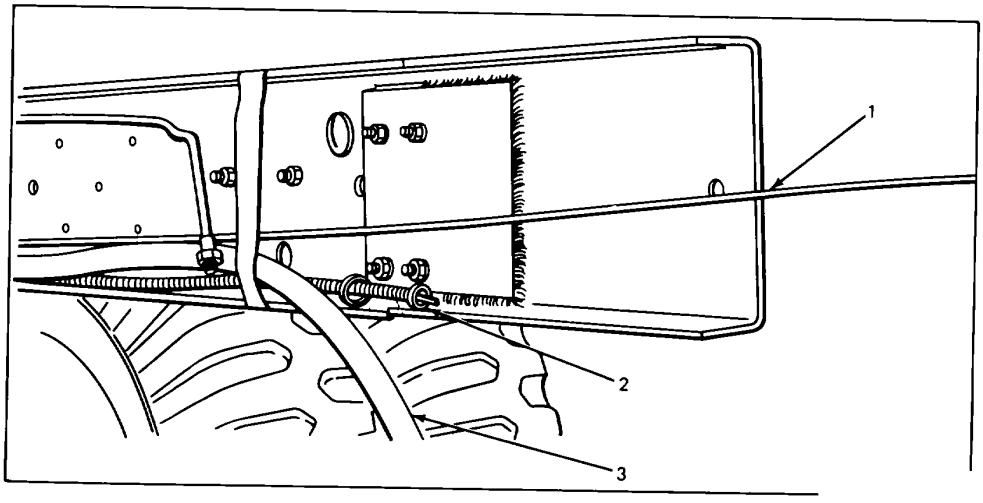


Figure 48
Pump Tachometer Shaft Installation

1. Rear Override Cable
2. Flexible Pump Tachometer Shaft
3. Return Line Hose

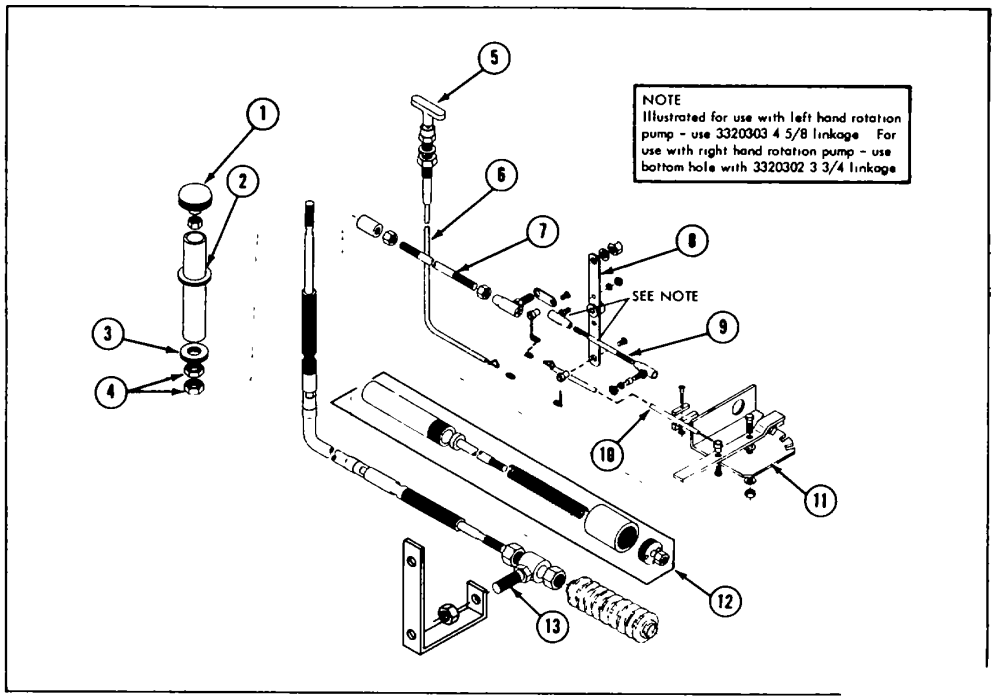


Figure 49
Hydrostatic Controls

1. Micro Control Knob
2. Lock Tube
3. Lock Ring
4. Jam Nuts
5. Front Override Control
6. Override Control Cable
7. Control Linkage
8. Pivot Lever
9. Pump Control Linkage
10. Rear Override Cable
11. Rear Override Control
12. Override Control Assembly
13. Attaching Stud

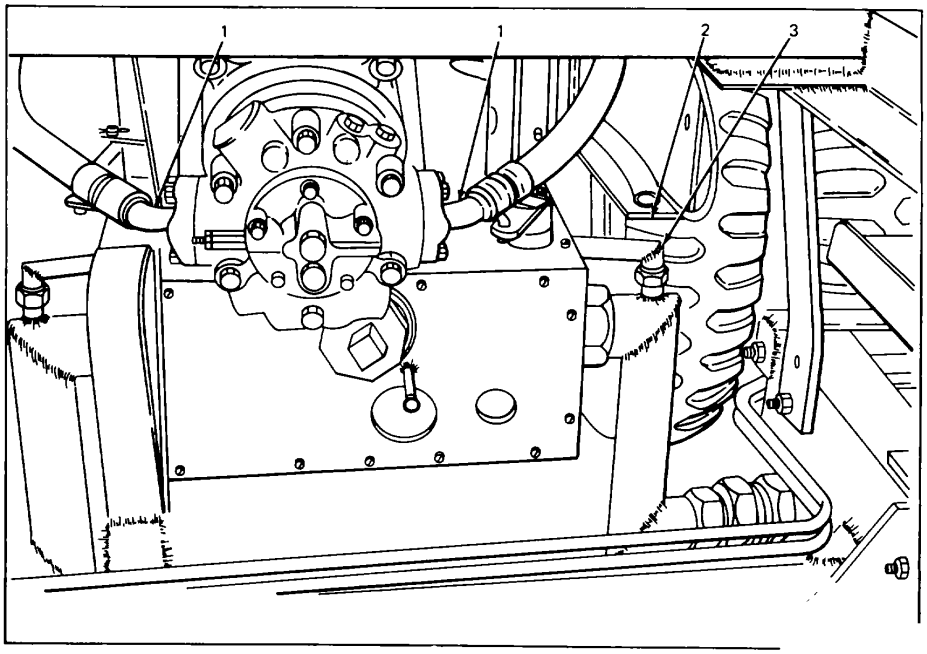


Figure 50
Vacu-Flow Clearance

1. High Pressure Hose Connections
2. Underside of Frame
3. Vacu-Flo Tube

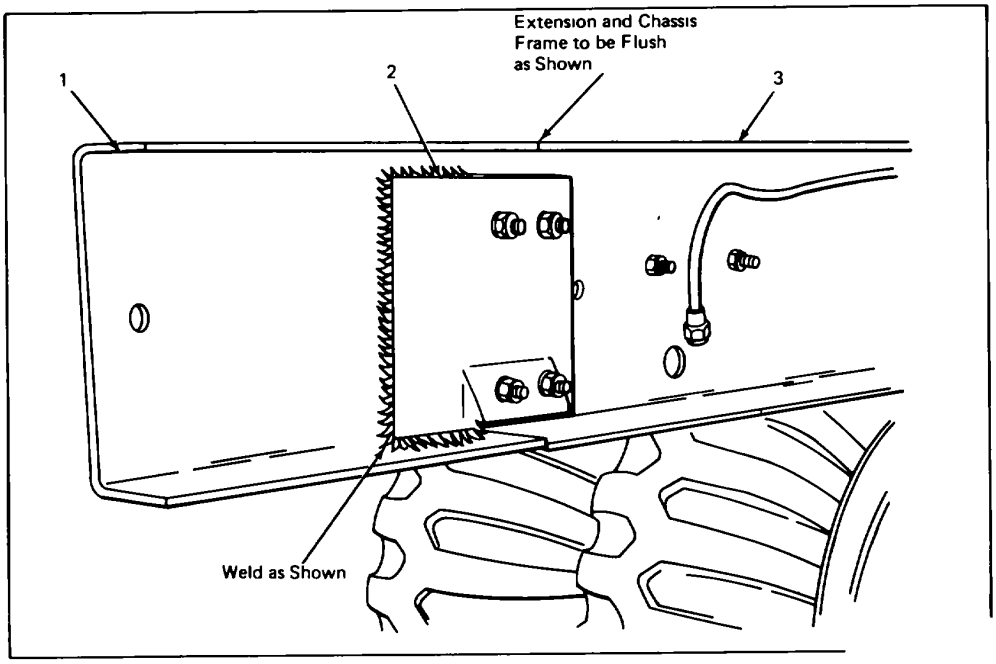


Figure 51
Frame Extension

1. Extension Channel
2. Extension Plate
3. Chassis Frame

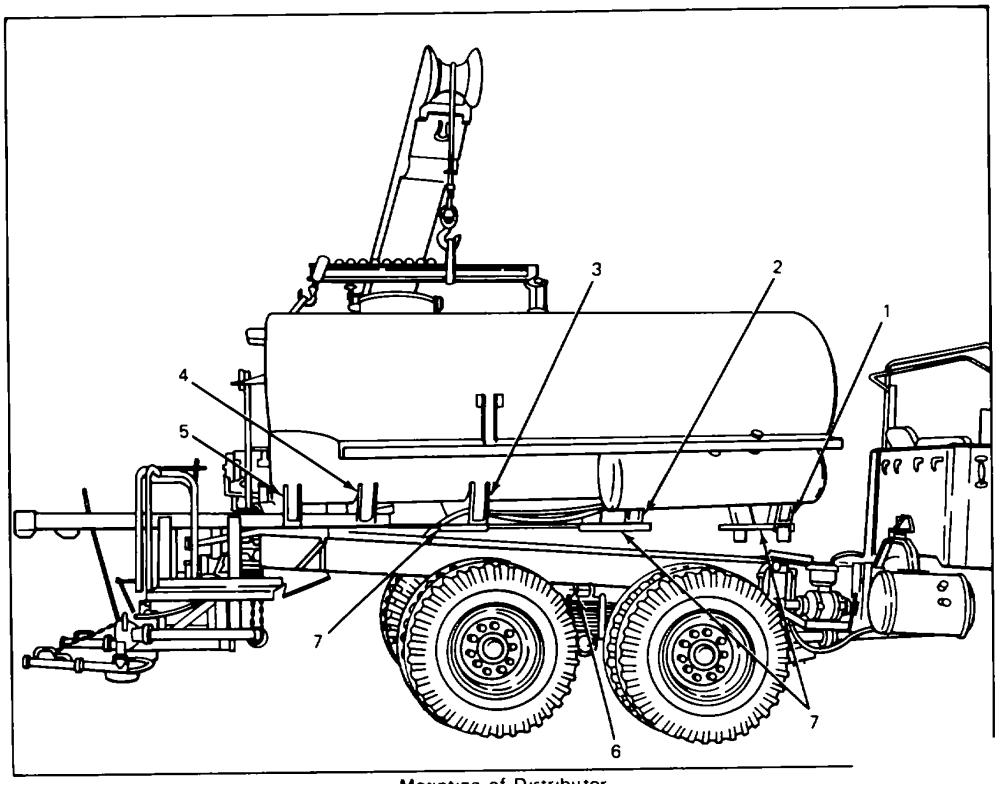


Figure 52
Mounting of Distributor

1. Support
2. Support
3. Support
4. Support
5. Support
6. Chassis Lifting Eye
7. Distributor Frame Blocks

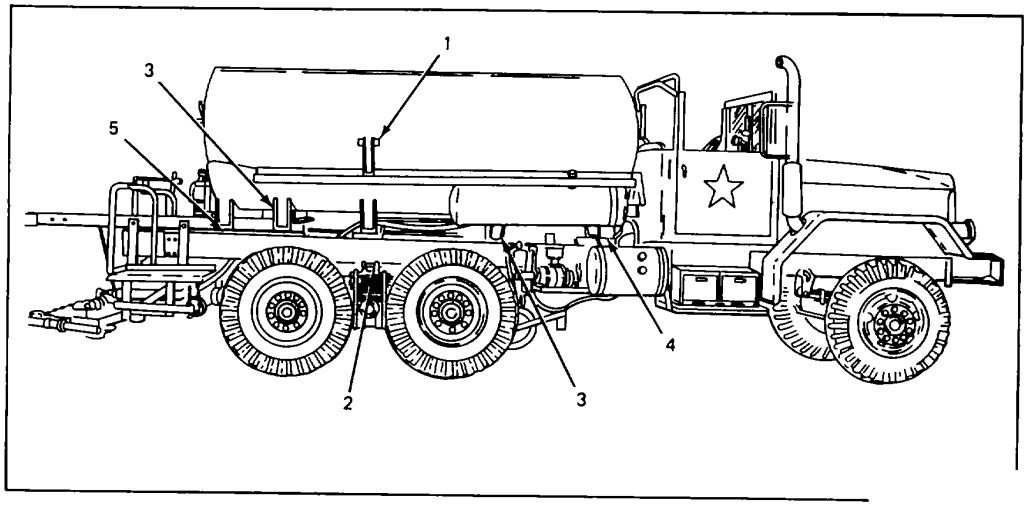


Figure 53
Distributor Placed on Chassis Frame

1. Cable Guard Channel
2. Lifting Eye
3. Tie Down Location Without Springs
4. Tie Down Location With Springs
5. Rear Support Block

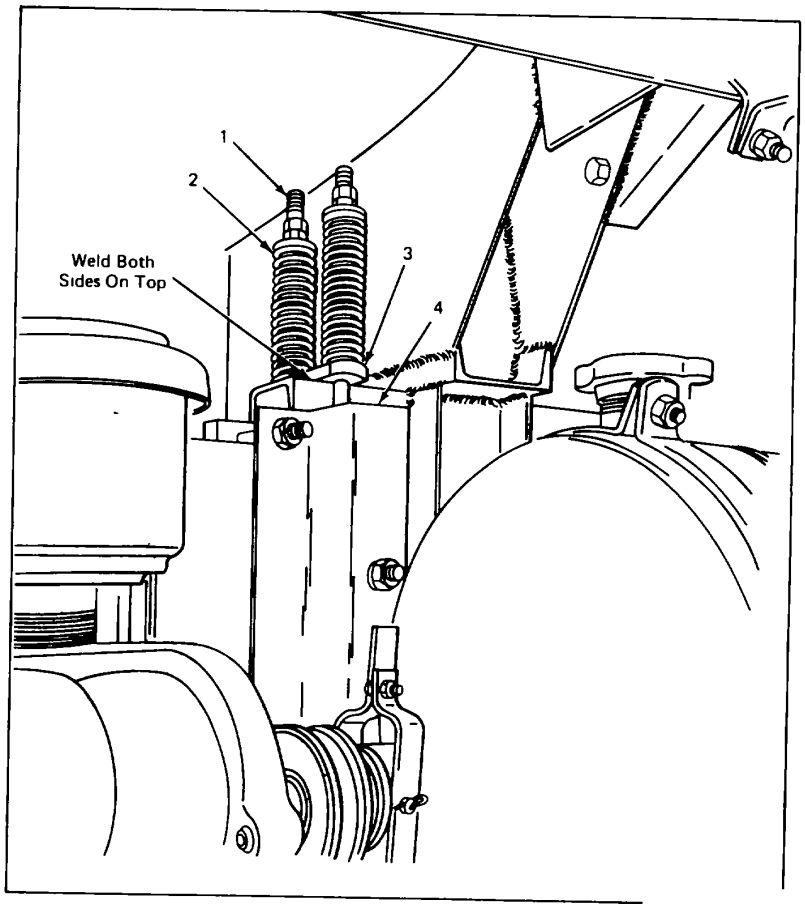


Figure 54
Securing Distributor Channel Supports to Chassis Frame

1. Tie Down Bolts
2. Mounting Spring
3. Frame Clips
4. Distributor Support Channel

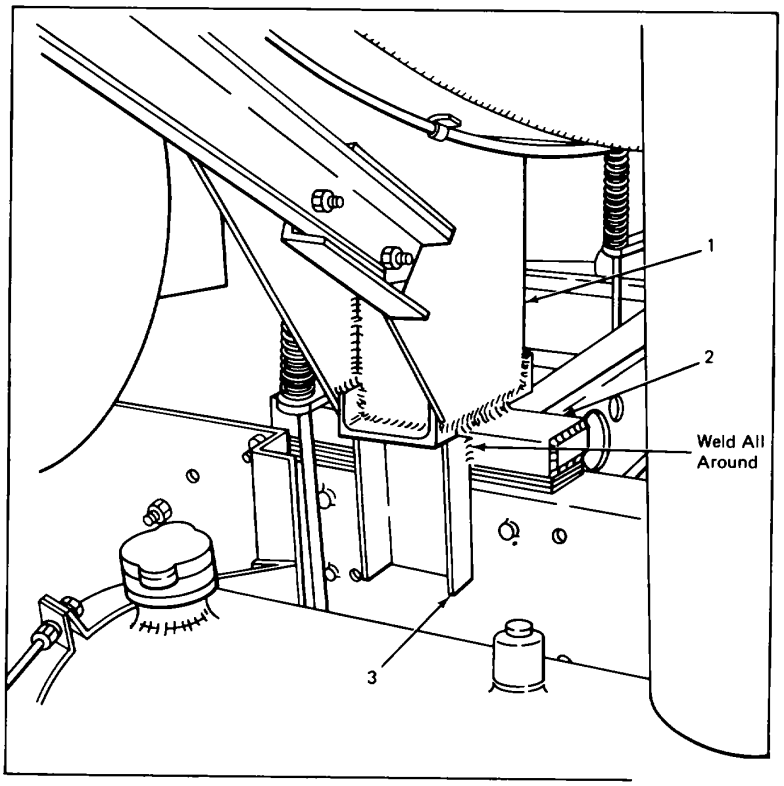


Figure 55
Weld Side Stops to Leg Support Channels

1. Leg
2. Leg Support Channel
3. Side stops

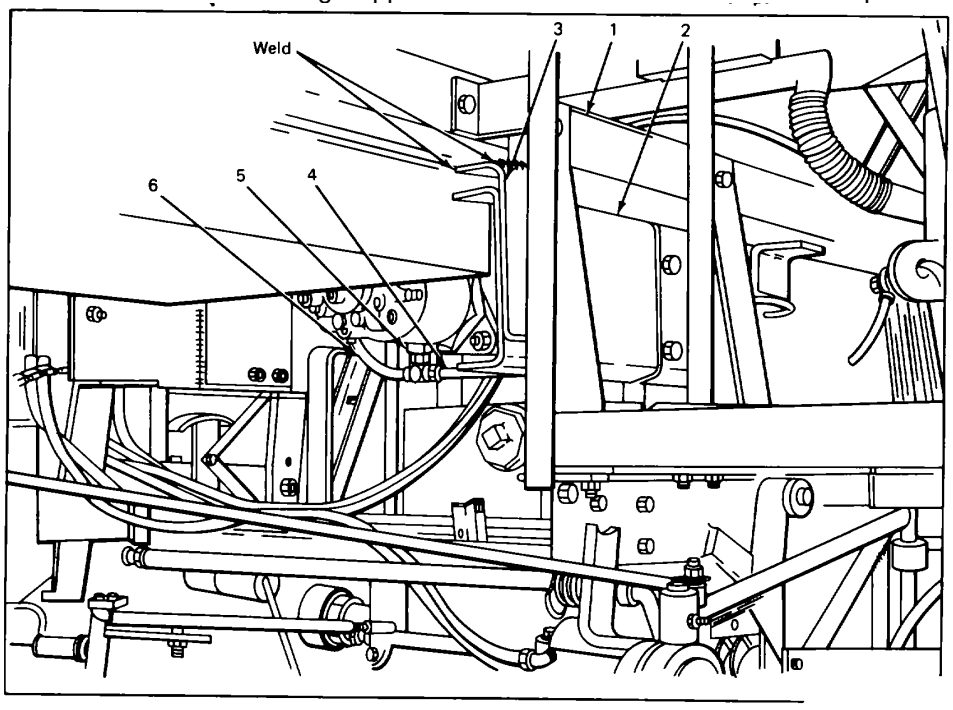


Figure 56
Bolt Distributor Rear Frame Supports to Chassis Extensions

1. Distributor Frame Extension
2. Chassis Frame Extension
3. Distributor Rear Frame Support
4. 3/4 Inch Return Line Hose
5. Case Drain Port
6. 1/2 Inch Return Line Hose

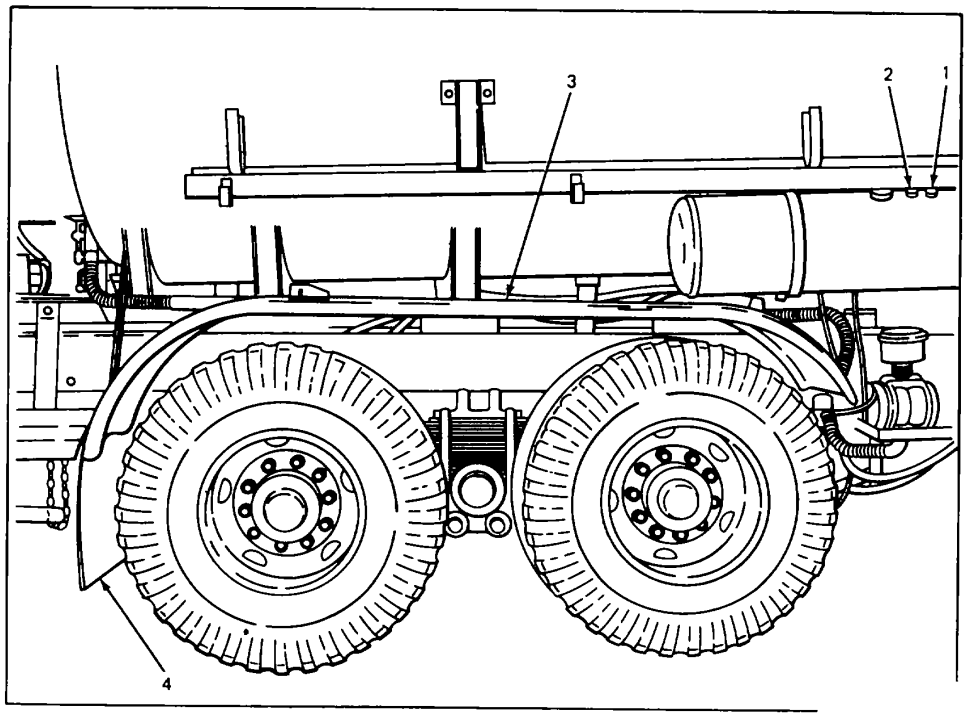


Figure 57
Burner Fuel and Air Line Assembly

1. Fuel Reservoir Dip Tube
2. Reservoir Return Spud
3. Rear Fenders
4. Mud Flaps

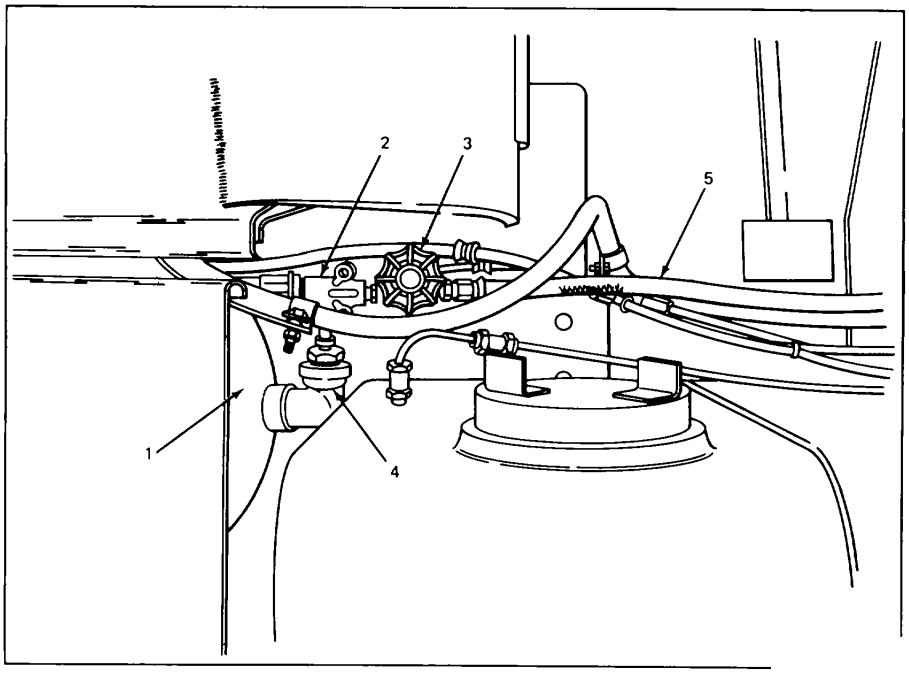


Figure 58
Air Supply Lines

1. Chassis Air Reservoir
2. Pressure Regulating Valve
3. Shut-Off Valve
4. Street Elbow
5. 3/8 Inch Supply Hose

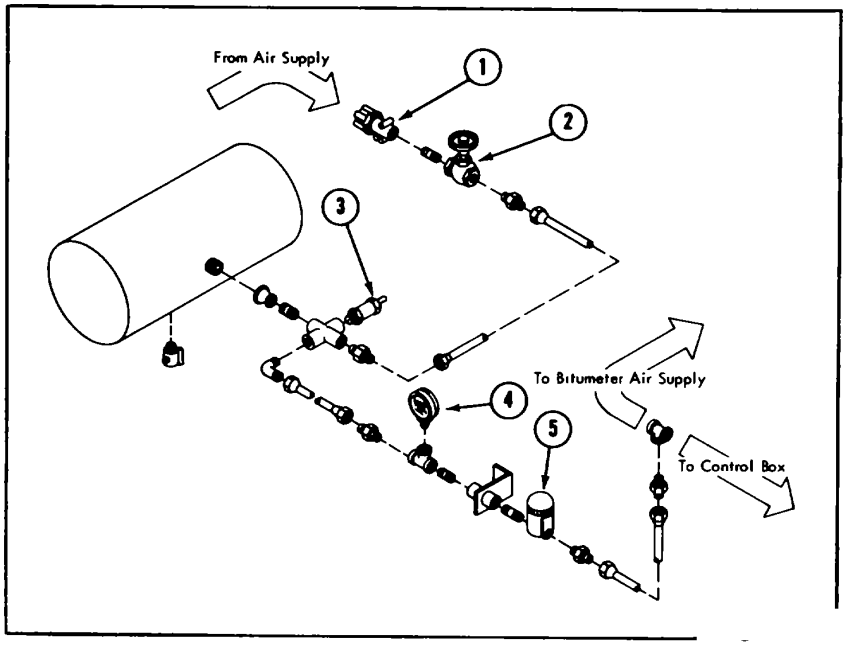


Figure 59
Air System Lines and Reservoir

1. Pressure Regulator Valve
2. Shut-Off Valve
3. Pressure Relief Valve
4. System Pressure Gauge
5. System Oiler

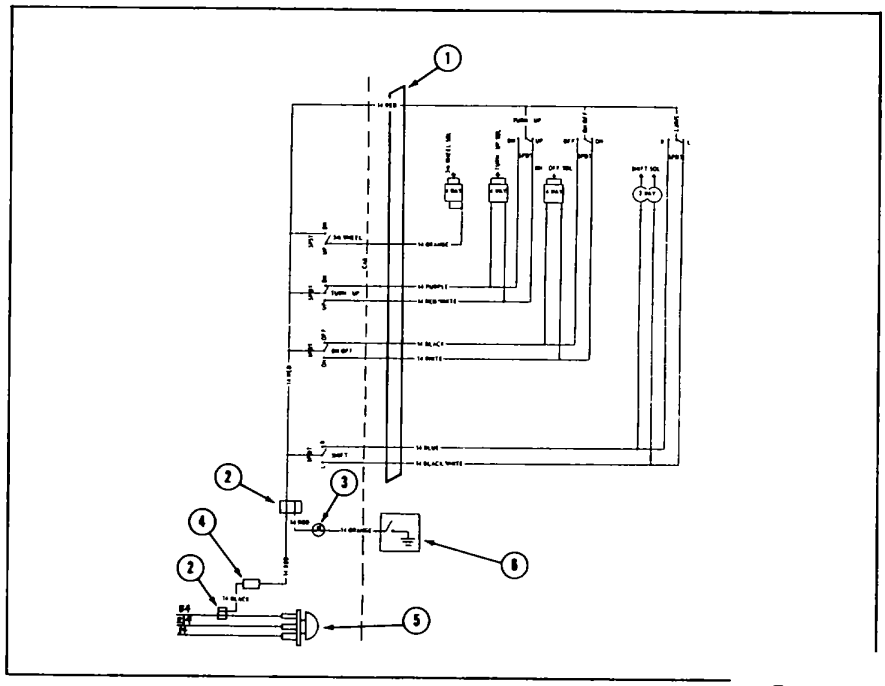


Figure 60
Electrical Controls Wiring Diagram

1. Distributor Electrical Controls Wiring Harness
2. Scotch Lock Connector Num ber 6126 47
3. High Temperature Light
4. 9AmpFuse
5. Chassis Ignition Switch No 54 No 214 No 14
6. Thero-Switch

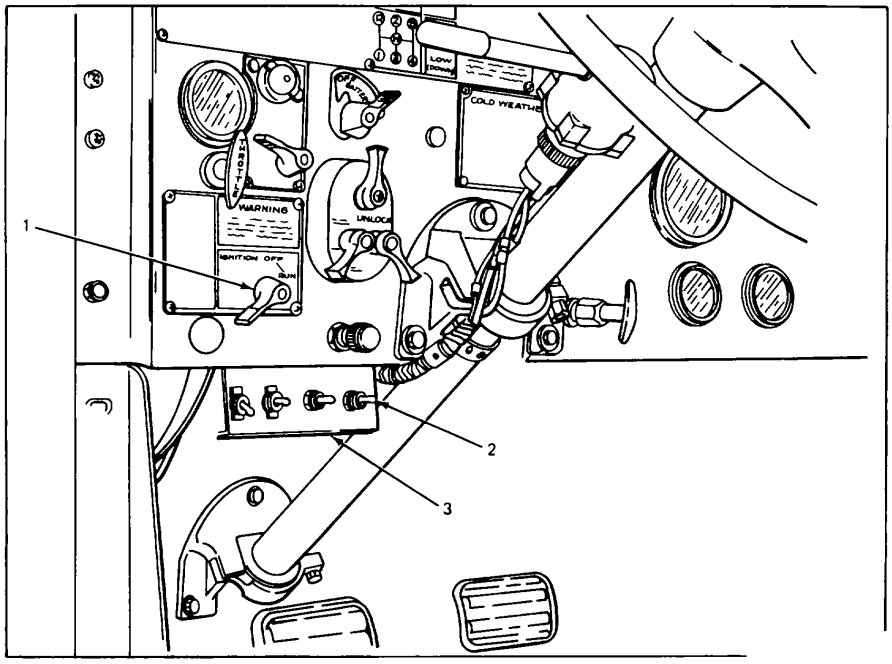


Figure 61
Ignition, Bar, and Cab Control Switches

1. Chassis Ignition Switch
2. Bar Shift Switch
3. Cab Control Switches

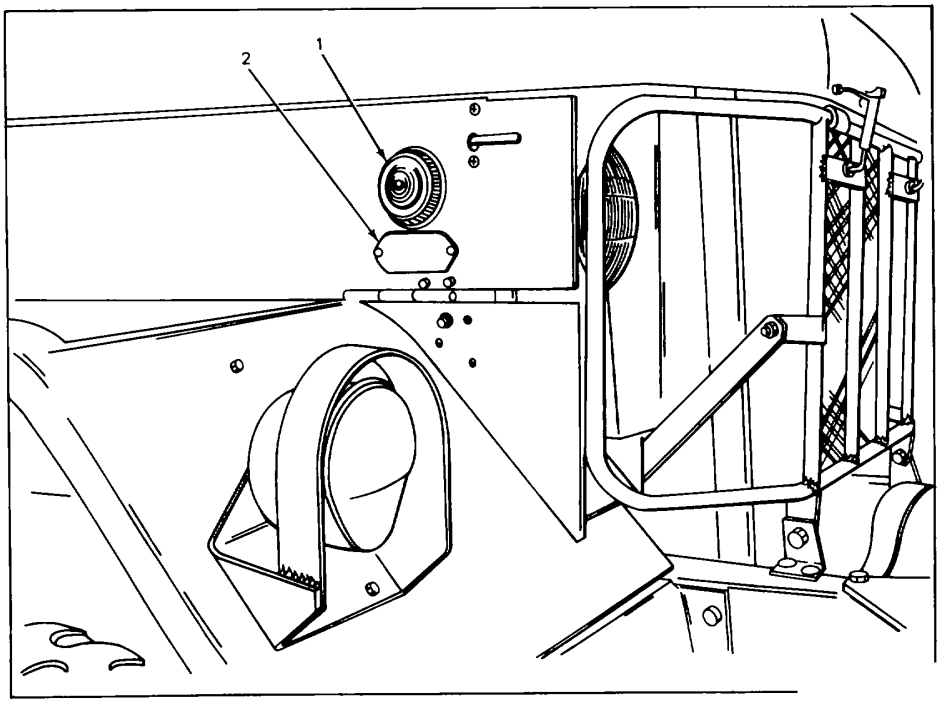


Figure 62
Side Clearance Light and Reflector

1. Side Clearance Light
2. Reflector

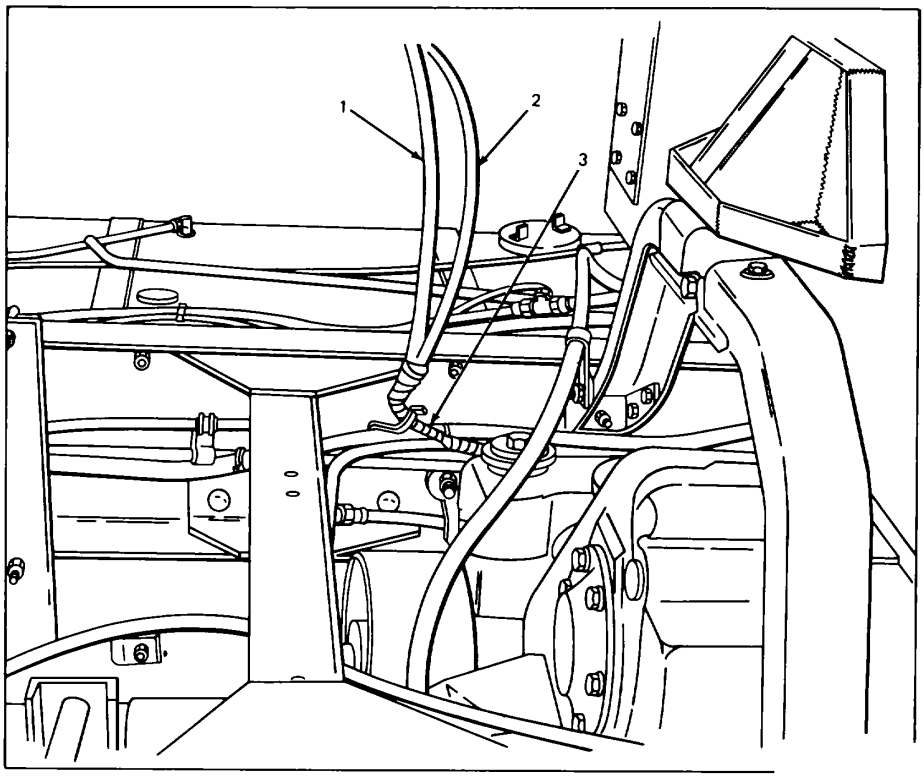


Figure 63
Distributor and Chassis Wiring Harness

1. Distributor Wiring Harness
2. Distributor Front Identiflca-tion Light Lead Wire
3. Chassis Wiring Harness

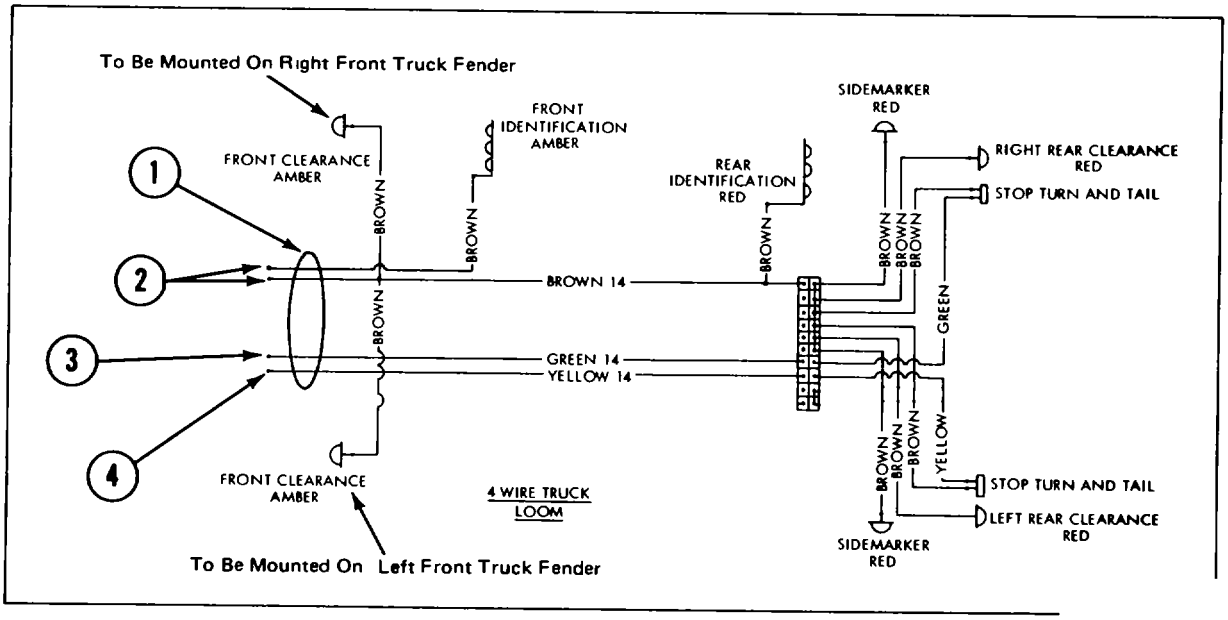


Figure 64
Distributor Wiring Diagram

1. Distributor Light Wiring Har-ness
2. Clearance and Identification Light
3. Right Turn and Stop Light
4. Left Turn and Stop Light

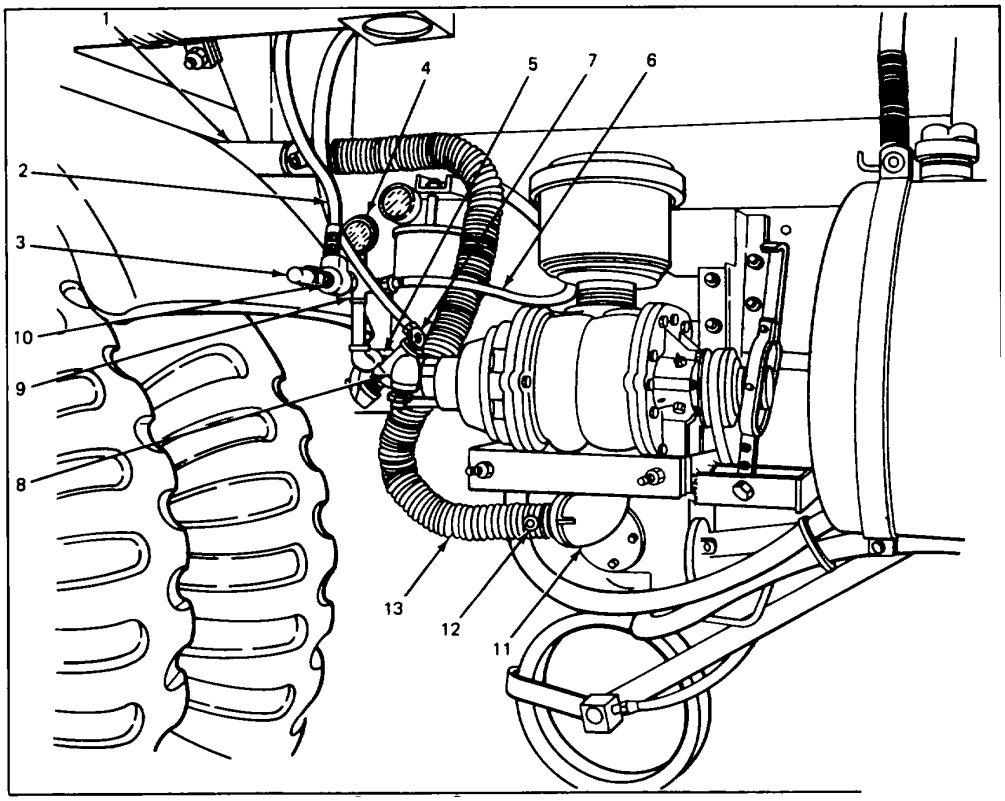


Figure 65
Burner Components

1. Burner Supply Line
2. Fuel Return Line
3. Acorn Nut
4. Fuel Pressure Gauge
5. Pump Position Screw
6. Burner Fuel Supply Line
7. Fuel Supply Line
8. Supply Line Strainer
9. Pressure Gauge Cross Port
10. Full Flow Valve
11. Blower Discharge Elbow
12. Holding Screw
13. Low Pressure Air Supply Line

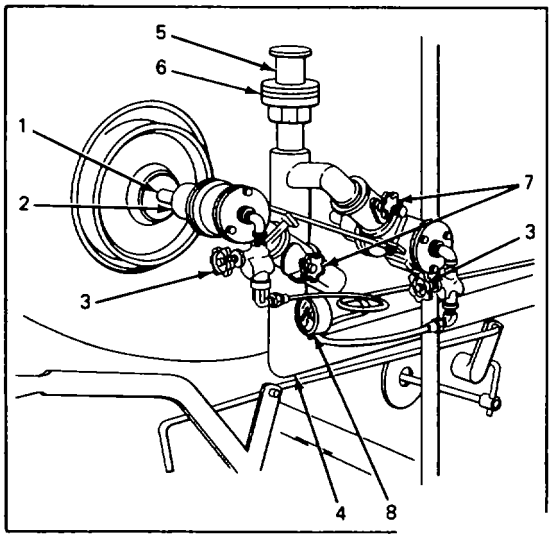


Figure 66
Low Pressure Burner Controls

1. Burner Tip
2. Burner
3. Needle Flow Valves
4. Low Pressure Air Supply Line
5. Air Relief Valve
6. Weights
7. Butterfly Valves
8. Air Pressure Gauge

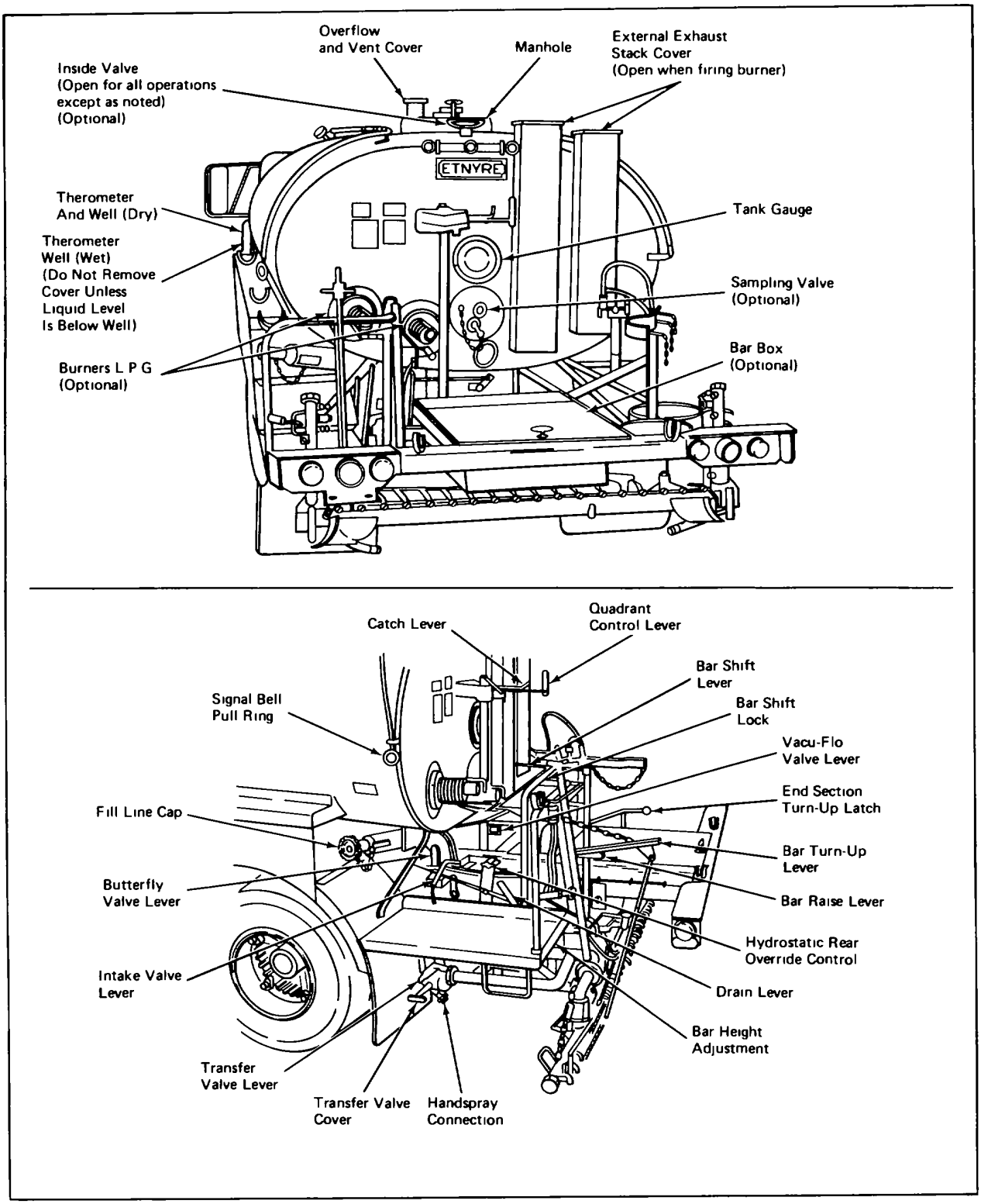


Figure 67

General Identification

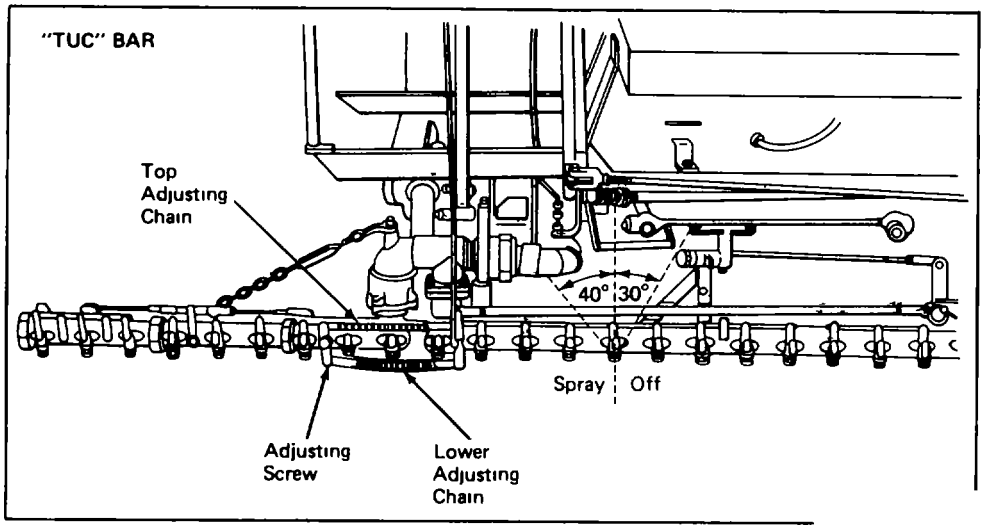


Figure 68
"Tuc" Bar

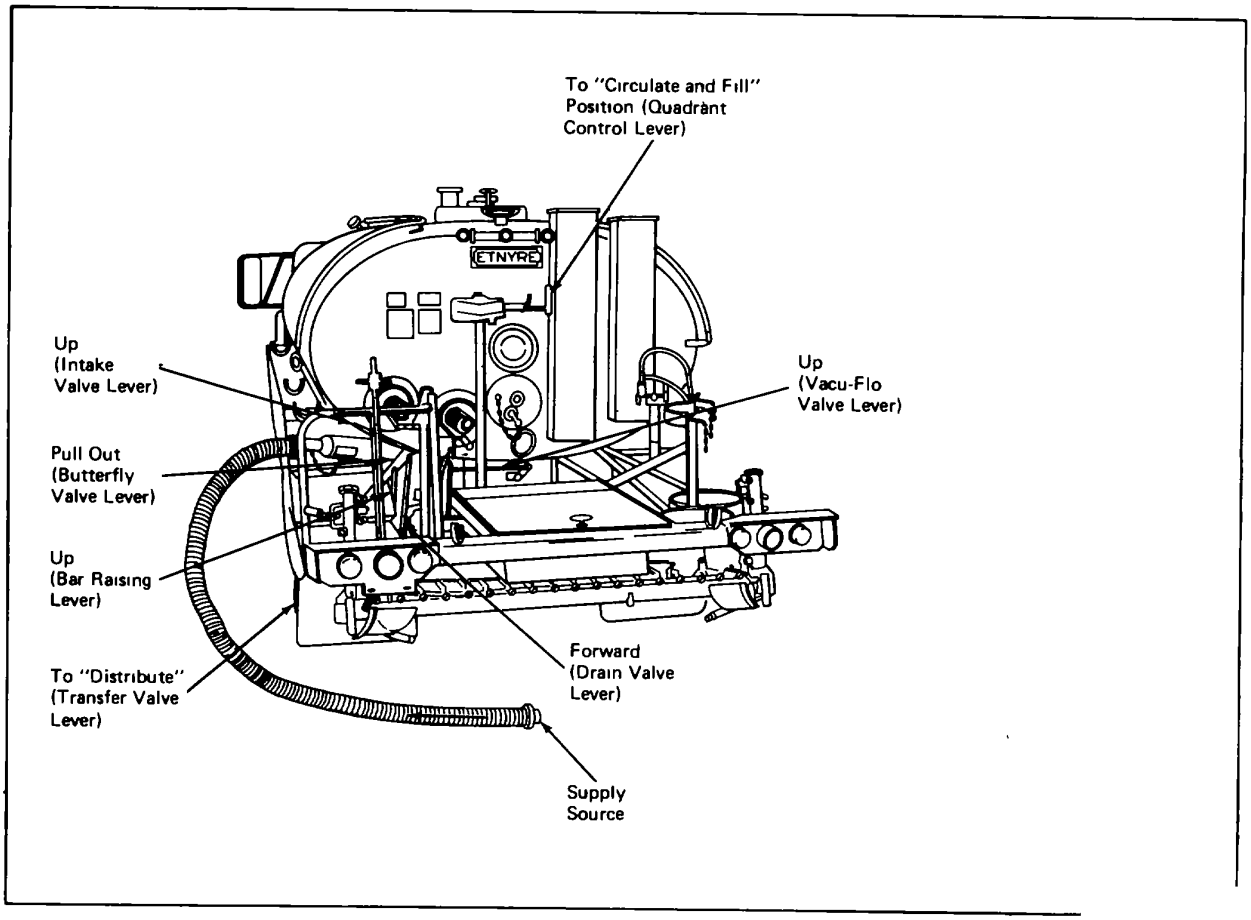


Figure 69

Filling From Supply Source

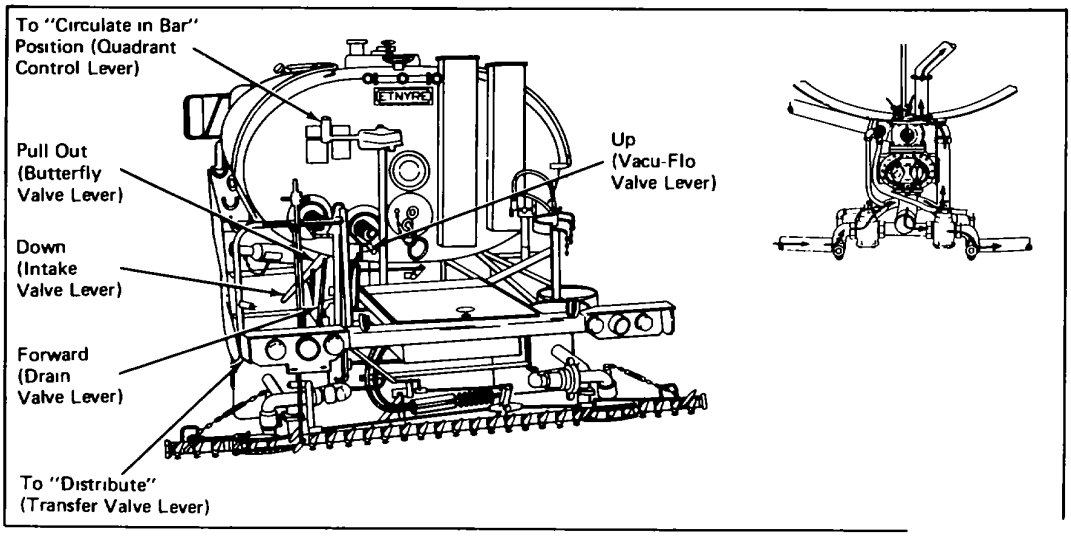


Figure 70.
Circulating in Bar

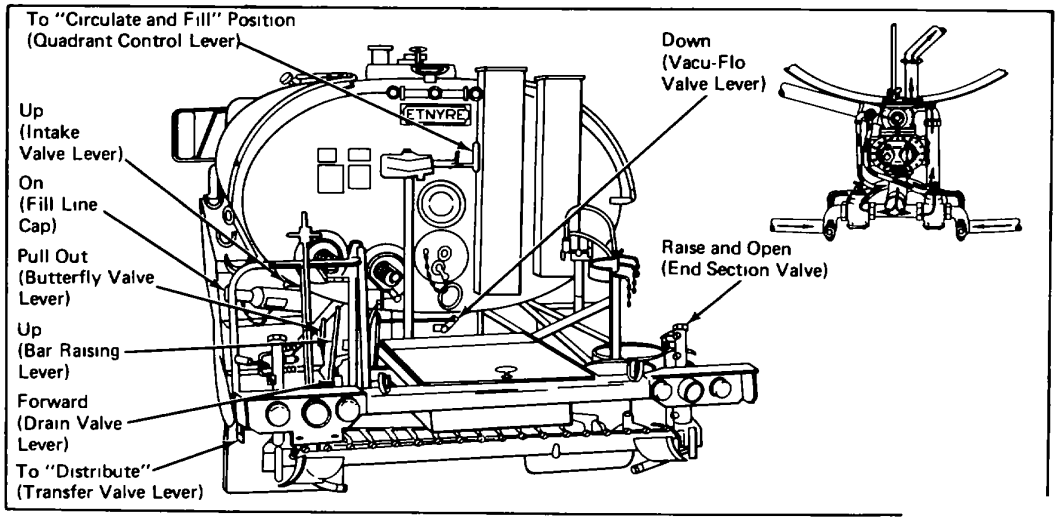


Figure 71
Drawing Material in Bar Back to Tank

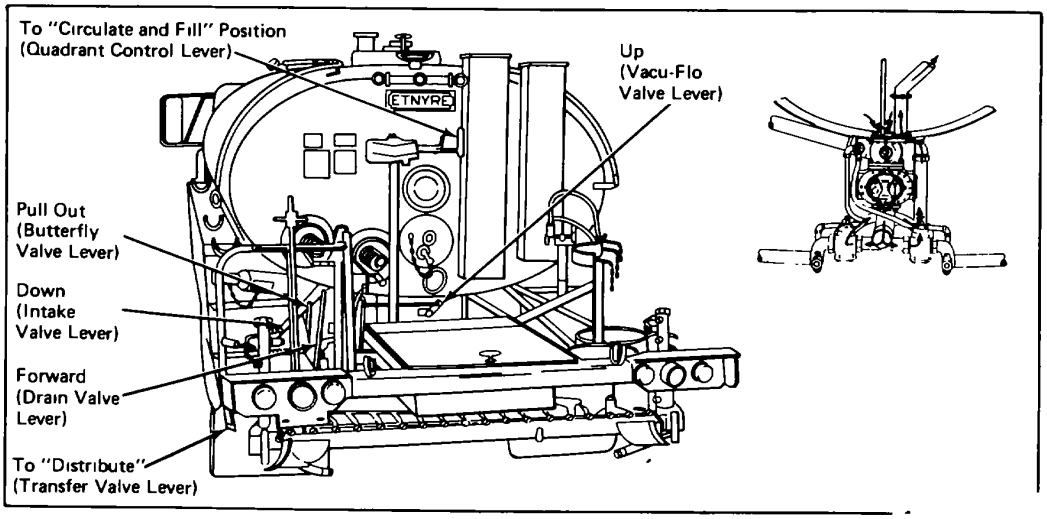
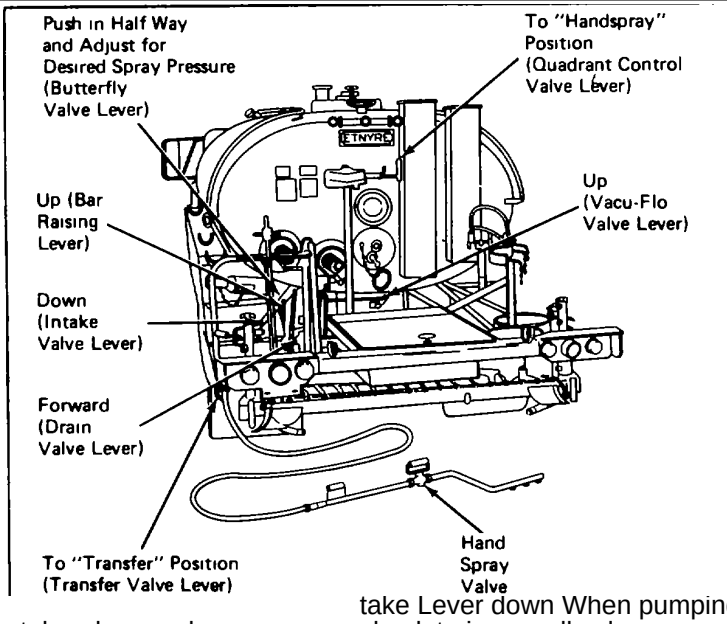
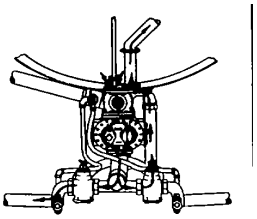


Figure 72
Circulating in Tank





1. Connect hand spray hose or pump-off hne to transfer valve.
2. Move transfer valve lever from "Distribute" to "Hand spray" position (in).
3. Run pump at 80 to 100 GPM
4. For hand spraying move butterfly valve to "Hand spray" position For pump-off move butterfly valve to "Transfer" position
5. Move quadrant lever to "Hand spray" position
6. Open intake valve by moving Intake Lever down When pumping off check to insure all valves m pump-off line between distributor and storage tank are open before moving Intake Lever down.
7. Turn hand spray valve 90 degrees on hand spray gun for spraying
8. Adjust hand spray pressure with butterfly valve Push in lever to mcrease, pull out to decrease

When through hand spraying or pumping off

1. Pull butterfly valve lever out
2. For pump-off close valve at storage tank soon after pulling butterfly valve out.
3. Shut intake valve by moving lever up.
4. Move quadrant lever to "Circulate and Fill" position.
5. Suck back hand spray hose and gun on pump-off line by turning Vacu-Flo valve lever to the left posltion. After approximately 1 minute crack hand spray valve or open pump off line If through hand spraying for the day, crack hand spray valve with nozzles submerged in flushing oil, use 3 quart can supplied.
6. Turn Transfer Valve lever back to "Distribute "
7. Disconnect pumpoff line
8 Turn Vacu-Flo lever straight up to normal position
9. To blow out hand spray, if desired after spraying, raise intake valve lever, remove filing cap, open hand spraying valve and push butterfly valve lever m against stop Add flushing oil If desired.

Figure 73.
Handspraying and Pump- Off

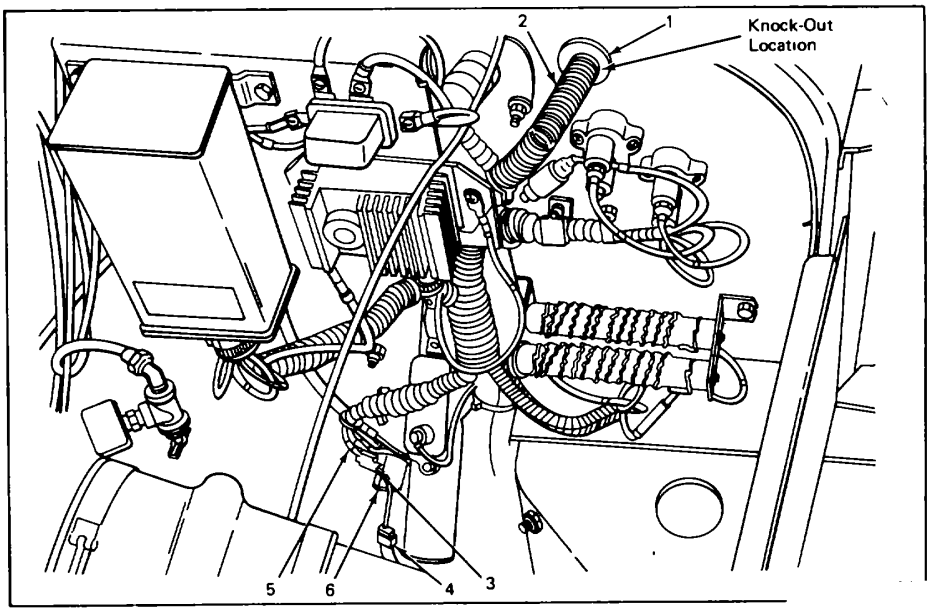


Figure 74.

1. Grommet
2. Electrical Controls
3. Quick Connector (Attach to No 75A Lead
4. Quick Connector (to Join Side Marker Light Leads)
5. Number 75A Lead
6. Main Harness Connector

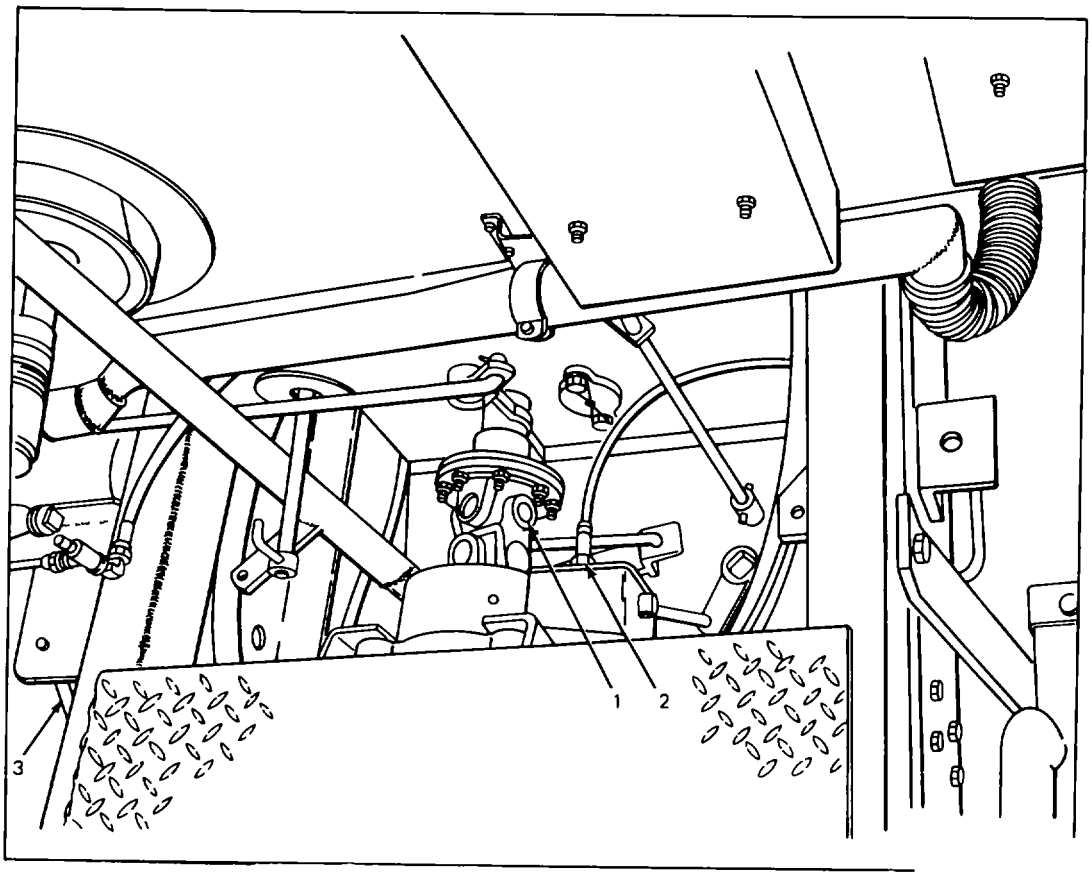


Figure 75.
Pump Tachometer Shaft and Start-Up Adjustments

1. Double Universal Joint
2. Pump Tachometer Flexible Shaft
3. Override Control Handle

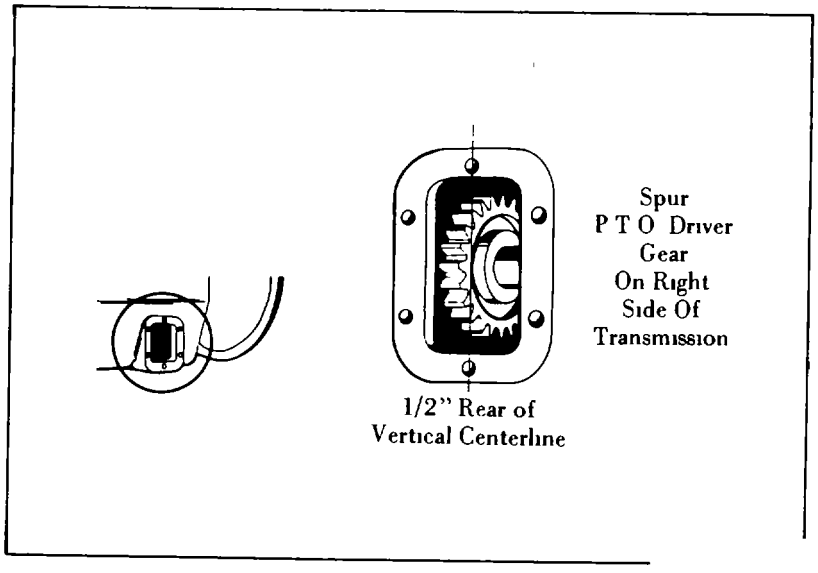


Figure 76.
Typical Views of Transmission PT O Apertures When Aperture Plate is Removed

MAINTENANCE
ASPHALT PUMP

PUMP REMOVAL

a. Remove universal joint (hydraulic motor to asphalt pump)

b. Remove suback valve lines (Items 72 & 73 page 158.

c. Remove flange bolts from header lines (bottom of item 46 page 158

d. Remove bolts holding pump to intake valve.

e. Remove pump.

PUMP DISASSEMBLY

a. Remove packing gland (2, fig. 77)

b. Remove bolts from end plates and remove end plates (6, 12).

c. Remove the impeller set from the housing (11) and remove the impeller (10) from the shaft (8).

d. Remove the driven shaft (22) from the impellers.

PUMP CLEANING, INSPECTION AND REPAIR

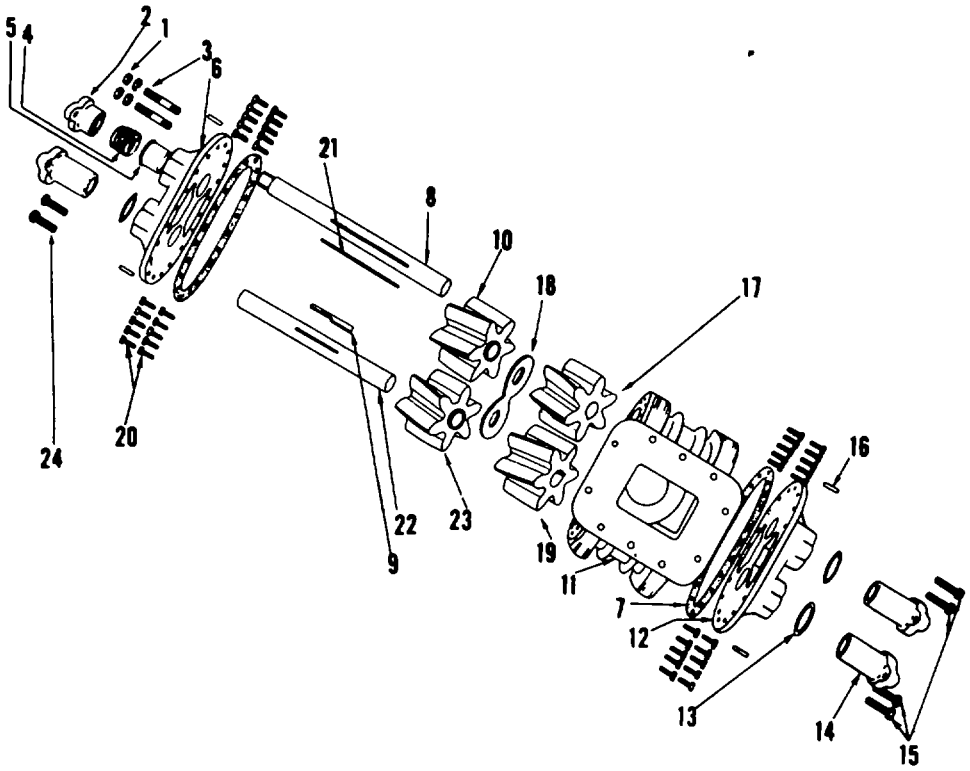
a. Clean all parts thoroughly.

b. Inspect for cracks, breaks, bends, corrosion, distortion and damaged threads

c. Repair or replace damaged parts.

PUMP ASSEMBLY AND INSTALLATION

Assemble pump in reverse order and install.



1 Nut	9 Key	17 Impeller
2 Gland	10 Impeller	18 Plate
3 Stud	11 Housing	19 Impeller
4 Packing	12 Plate	20 Cap screw
5 Sleeve bearing	13 Gasket	21 Key
6 Plate	14 Sleeve bearing	22 Drive shaft
7 Gasket	15 Bolt	23 Impeller
8 Driving shaft	16 Tapered pin	24 Screw

Fig. 77. Pump Assembly Exploded View

BURNER SYSTEM

GENERAL

The burner fuel system includes a fuel tank, pump, fuel lines with a strainer, shut off valve and pressure relief valve. The burner fuel tank is mounted on the right side of distributor. The fuel pump is mounted on the burner air blower and is driven by a blower shaft through a coupling. The burners are mounted on the left rear side of the storage tank.

BURNER FUEL LINES

a. Remove the Fuel Lines. Remove the tube nuts (2, Fig. 78) securing the tube assemblies (3) to the adapters (5) and remove the tube nuts from the tee fitting of the fuel supply line. Remove the tube assembly. Remove the adapters from the elbows (4) and remove the elbows from the left and right fuel burner valves (6) and (8).

b. Clean ana inspect. Repair or replace damaged parts.

c. Reassemble in reverse order.

BURNER FUEL LINE STRAINER

a. Removal

(1) Remove the pipe plug and drain the fuel from the lines.

(2) Remove the reducer bushing and slip the strainer out. See figure 80.

b. Clean and inspect. Replace or repair damaged parts.

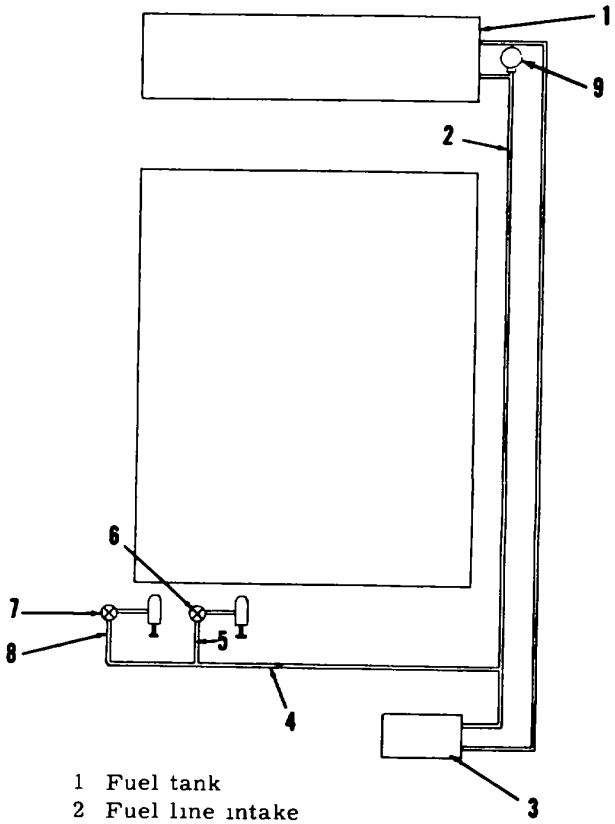
c. Reassemble in reverse order

BURNER VALVE STRAINER

a. Removal. Remove the cap and strainer (1, Fig. 81) assembly and gasket from the burner fuel valve.

b. Clean and inspect. Repair or replace damaged parts.

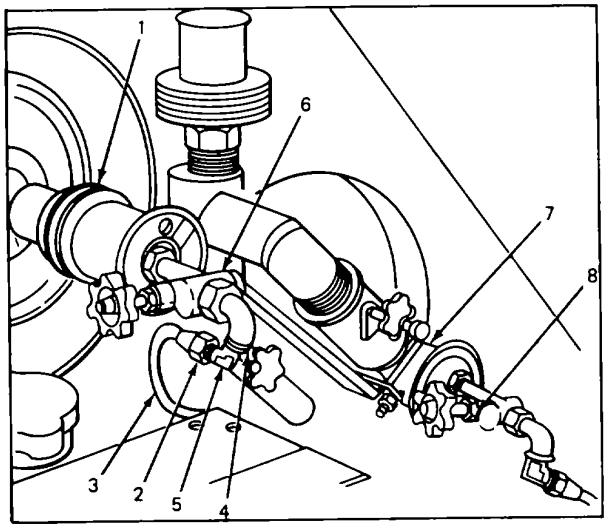
c. Reassemble in reverse order.



1 Fuel tank
2 Fuel line intake
3 Fuel pump
4 Fuel line outlet
5 Right burner fuel line
6 Right burner fuel valve
7 Left burner fuel valve
8 Left burner fuel line
9 Fuel pressure gage

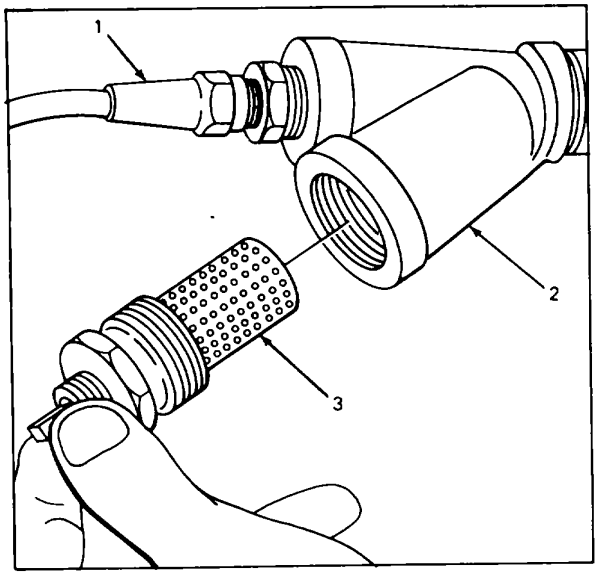
Figure 78. Burner Fuel System Diagram

BURNER SYSTEM (continued)



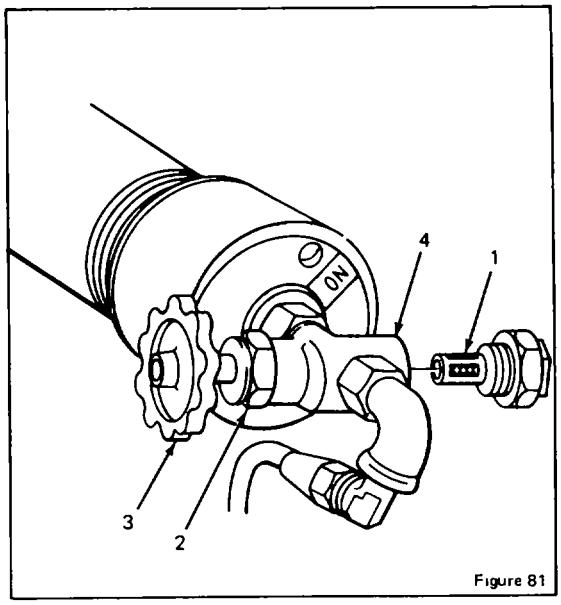
1 Left burner
2 Nut
3 Fuel line
4 Elbow
5 Adapter
6 Left fuel valve
7 Right burner
8 Right fuel valve

Figure 79. Burner Fuel Line Removal Points



1 Fuel line
2 Body
3 Strainer

Figure 80. Burner Fuel Line Strainer Removal



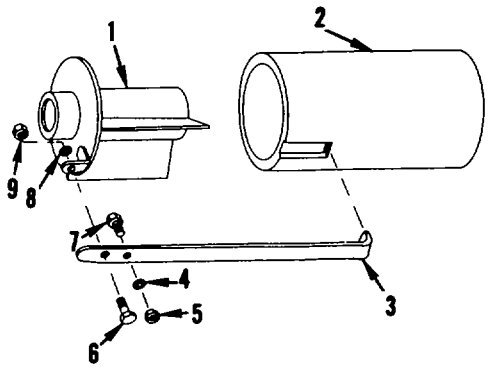
1 Strainer
2 Nut
3 Handle
4 Valve

Figure 81. Burner Valve Strainer Removal

BURNER ASSEMBLY

BURNER ASSEMBLY DESCRIPTION

The burner assembly consists of the fuel lines and valves, the air lines and valves, two atomizing burners and combustion chambers. Each burner contains a body, an inner air nozzle, an outer air nozzle and an oil injector tube. The injector tube is mounted inside the outer air nozzle. Air from the blower enters the inner air nozzle through slots which give it a rotary motion. The oil tube is positioned so that the tip is at the point where the rotating air is at its maximum velocity and breaks up the oil and causes it to atomize. The resulting mixture leaves the end of the inner nozzle through a constricted opening where it is joined at a 450 angle by a second stream of air from the outer air nozzle. This produces further atomization of the fuel oil and gives direction and velocity to the flame. The air and fuel lines are provided with relief valves and controls to regulate the flame.



1	Combustion block	6	Bolt
2	Combustion tube	7	Cap screw
3	Holder	8	Lockwasher
4	Lockwasher	9	Nut
5	Nut		

Figure 82. Combustion Tubes

BURNER ASSEMBLY REMOVAL

a. Burner Removal

(1) Remove the machine screw (34) securing the flexible air hose (35, (Fig. 83) to the manifold (27).

(2) Remove the air hose from the blower.

(3) Remove the two tubes that secure the fuel tubes to the elbows.

(4) Remove the fuel lines.

(5) Remove handwheel and valve assemblies.

(6) Remove the burner assemblies.

b. Ignition Tile Removal

(1) Remove the three screws (Fig. 82) and remove the two cover plates and the two tiles.

BURNER DISASSEMBLY

a. Remove the street elbows from the valve bodies. (10, Fig. 83).

b. Remove the handwheel (3).

c. Remove the packing nut (4) and the valve stem (7) from the valve body. Remove the packing and the washer from the valve stem.

d. Remove the valve bodies (8) from the strainers (9).

e. Remove the two bushings (22) from the inner air nozzles (17) and remove the tips (20) from the injector tubes (21) and the tubes from the bushings.

f. Remove the two plates (18) and the inner nozzles.

g. Remove the two stops (15) from the nozzle bodies (16).

h. Remove the two stop plates (13) from the nozzle bodies.

BURNER ASSEMBLY (continued)

i. Remove the two outer air nozzles (11) from the bodies.

j. Remove the two bodies from the pipe nipples (23).

k. Remove the angle bracket from the pipe nipples.

l. Remove the t o pipe nipples from butterfly valves (24) and remove the butterfly valves from the manifold.

m. Remove the air pressure gage and the air pressure relief valve from the manifold (31).

n. Remove the valve cap (29) and weights (30) from the valve body (25).

BURNER ASSEMBLY CLEANING, INSPECTION, AND REPAIR

a. Clean all parts with an approved cleaning solvent, and dry thoroughly.

b. Inspect all parts for breaks, cracks, bends, wear, corrosion, distortion or damaged threads.

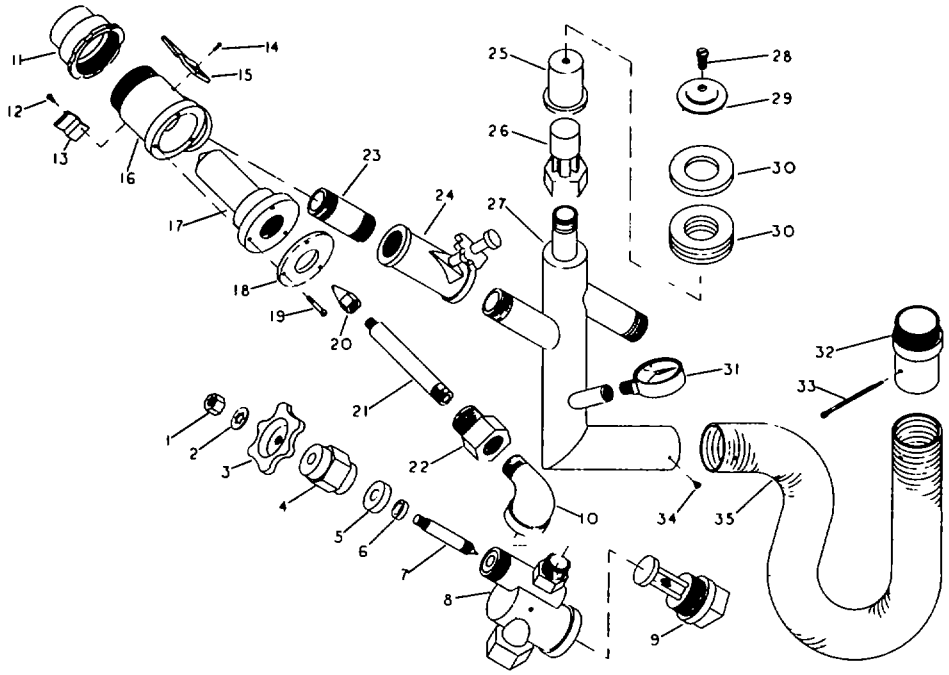
c. Repair or replace all defective parts.

BURNER REASSEMBLY

Reassemble in reverse order of assembly.

BURNER ASSEMBLY INSTALLATION

Install Burner in reverse order to removal.



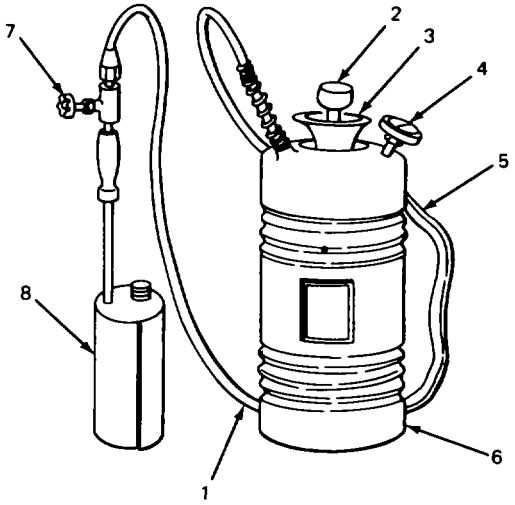
1 Nut
2 Lockwasher
3 Hand wheel
4 Packing nut
5 Packing
6 Washer
7 Valve stem
8 Valve
9 Strainer
10 Street elbow
11 Outer air nozzle
12 Screw
13 Stop
14 Screw
15 Stop
16 Body-nozzle
17 Inner air nozzle
18 Plate
19 Screw
20 Tip
21 Tube - injector
22 Bushing
23 Pipe nipple
24 Butterfly valve
25 Body
26 Relief Valve
27 Manifold
28 Screw
29 Cap
30 Weights
31 Pressure gage
32 Adapter
33 Cotter pin
34 Screw
35 Hose

Figure 83. Burner and Air Tubes

PORTABLE BURNER

PORTABLE BURNER CONTROLS AND INSTRUMENTS

a. Portable Burner Pressure Gage. The portable burner pressure gage (4, fig. 84) is located on the top of the portable burner fuel tank (6). This gage is graduated in 5 psi divisions from 0 to 60 psi. The normal operating pressure is 45 psi.



1 Hose
2 Pump handle
3 Filling funnel
4 Pressure gage
5 Shoulder strap
6 Burner fuel tank
7 Burner control valve
8 Burner

Figure 84. Portable Burner Assembly

b. Portable Burner Control Valve and Pump Handle
   (1) The portable burner control valve (7) is located at the end of the hose (1). This valve controls the flow of fuel to the burner (8).
   (2) The portable burner pump handle (2) is located in the filling funnel (3). This handle is used to pump air into the portable burner fuel tank (6).

PORTABLE BURNER USE

The portable burner is used to heat the lines. valves, and the bituminous pump when material has congealed.

OPERATING THE PORTABLE BURNER

a. Remove the portable burner from its stowed position on the platform on the right side of the distributor.

b. Remove the pump barrel cap and pump, and fill the burner fuel tank to three-fourths full with clean diesel fuel. Install the pump barrel cap and secure.

c. Remove the four machine screws and slide the burner off the burner coil.

d. Install the vaporizing jet marked T in the plug holder.

e. Install the shell and secure with the four machine screws.

f. Pump air into the burner fuel tank by pulling and pushing the pump handle until the pressure gage registers 45 psi.

g. Hold the burner in a horizontal position. Open the burner control valve three-quarters of a turn. Fill the preheating pan with fuel, then close the burner control valve.

h. Light the fuel by dropping a small piece of lighted rag or waste into the preheating pan.

WARNING

Do not light burner in a confined area.

i. Allow the fuel to burn until it is almost consumed, then open the burner control valve one-third of a complete turn. This should produce a steady blue flame after it has been operating for at least 1 minute. When the burner shoots liquid or burns with a sluggish yellow, and smoky flame, shut the burner control valve off and repeat operations in g and h above.

j. Maintain pressure of 45 psi in the

burner fuel tank during operation by pumping. See f above.

k. When the flame burns with spasmodic roars or pulsates, turn the burner control valve slowly toward "close" until the flame is even.

l. Shut off burner with control valve.

m. Allow the burner to cool before stowing It on the platform.

n. Periodically clean the burner. Remove the four machine screws and slide the shell off the burner coil. Remove the vaporizing jet and open the burner control valve to permit raw diesel fuel to flush the burner. Close the burner control valve and wipe the burner coil with a clean cloth. Replace the vaporizing jet and slide the shell over the burner coil. Install and tighten the machine screws.

o. A few drops of lubricating oil applied to the air vent hole in the pump barrel cap will keep the pump lubricated.

Burner Removal and Disassembly

(1) Remove the portable burner from the carrier to repair or replace parts.

(2) Remove the hose (16, fig. 85) from the adapter (17) and remove the adapter from the tank (1).

(3) Remove the pump assembly (4) by turning counter-clockwise and lifting it from the tank (1).

(4) Pour the remaining fuel from the tank.

(5) Turn the pressure gage (3) counter-clockwise and remove tank.

(6) Remove the strap (2) from tank.

(7) Remove the hose (16) from the valve body and remove the valve body from the coil assembly (6).

(8) Deleted

(9) Remove the three screws (7 and 10) and nuts (12), securing the burner shell (8) to the burner coil (6). Remove the burner shell from the coil.

(10) Slide the plate (16) off the burner assembly.

(11) Remove the vaporizing jet (13) from the plug holder (14) and the plug holder from the burner coil (6).

(12) Remove the nut and lock washer securing the control knob to the needle valve.

(13) Remove the packing nut and gasket securing the needle valve to the valve body (5). Remove the needle valve from the valve body.

b. Clean and inspect. Repair or replace damaged parts.

c. Reassemble in reverse order.

REGULATING PUMP SAFETY
CHECK VALVE.

a. Close the control valve on the burner and with the tank three-fourths full of fuel, pump air into the tank until the pressure gage registers its maximum reading of 45 psi.

b. Remove the pump and adjust the safety check valve (5, fig. 86),

c. To adjust the safety check valve, loosen the Nut (4, fig. 86) and turn rod (3) counter-clockwise while holding the safety check valve (5) to reduce the pressure. Turn the rod clockwise to increase the pressure.

d. Secure the setting by tightening nut (4) against the safety check valve (5).

PORTABLE BURNER (continued)

1 Tank
2 Strap
3 Pressure gage
4 Pump assembly
5 Valve
6 Burner coil
7 Screw
8 Burner shell
9 Rivet
10 Screw
11 Preheating pan
12 Nut
13 Nozzle
14 Plug holder
15 Plate
16 Hose
17 Adapter
18 Cleaning needle

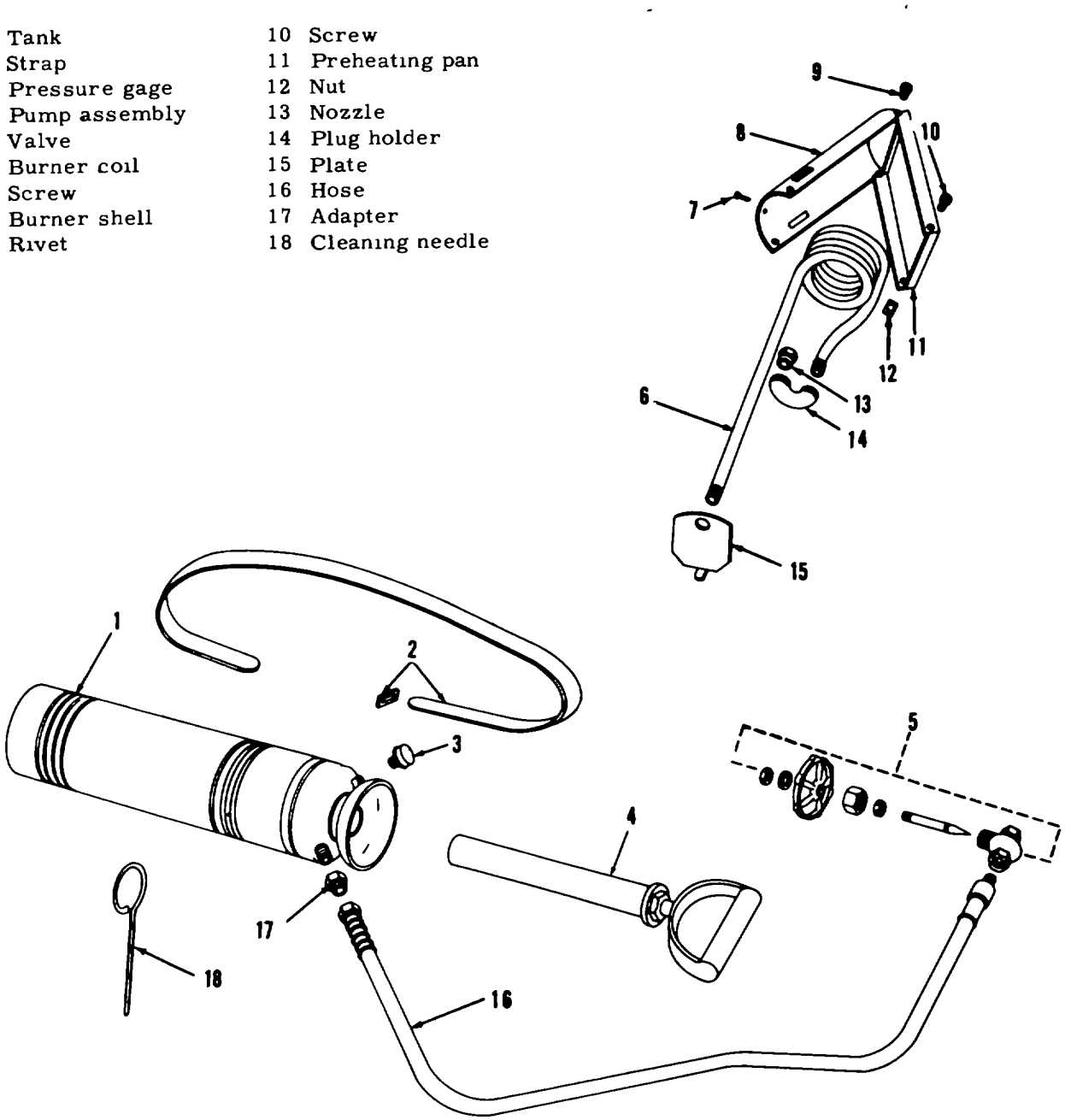
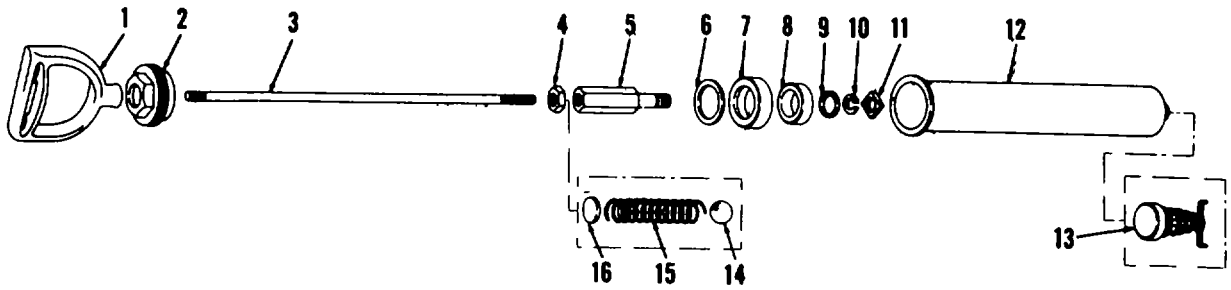


Figure 85. Portable Burner Assembly



1 Handle
2 Cap
3 Rod
4 Nut
5 Body (check valve)
6 Washer
7 Cup
8 Washer
9 Washer
10 Washer
11 Washer
12 Cylinder
13 Valve
14 Ball
15 Spring
16 Washer

Figure 86. Portable Burner Pump Assembly

TESTING THE PORTABLE BURNER TANK

At six month intervals, pressure test the portable burner tank as follows:

a. Remove the pressure gage (3, fig. 85) and replace with an airtight plug.

b. Remove the pump assembly (4) and pour the remaining fuel out. Replace the pump assembly with an airtight plug.

c. Remove the hose(16) and replace it with a water hose that will withstand 100 pounds pressure.

d. Run water at 100 pounds pressure into the tank. Fill the tank.

e. Wipe outside of tank dry. Check for leaks. Replace tank if it leaks.

f. Release pressure, remove plugs and drain tank.

g. Inspect tank for cracks and bulges.

h. Reassemble.

BLOWER ASSEMBLY

BLOWER DESCRIPTION

The blower consists of two impellers with shaft, timing gears, cylinder, headplates, gear housing and a pump support. The cylinder and headplates are bolted together to form an airtight housing in which the impellers rotate. Rotation of the impellers creates a pumping action, sucking air through an air cleaner and forcing the air out of the housing discharge port.

BLOWER REMOVAL

a. Remove the lines from the burner fuel pump.

b. Remove the air hose from the blower

c. Remove the screws, washers and nuts holding the blower to the mounting bracket. Remove the blower

BLOWER DISASSEMBLY

a. Remove the burner fuel pump. See figures 87 and 247.

b. Remove drain cock and oil seal from housing.

c. Remove the pulley from the impeller shaft.

d. Remove the gear housing (19, F. 87).

e. Remove the two spur gears (16).

f. Remove the gear end, headplate (14).

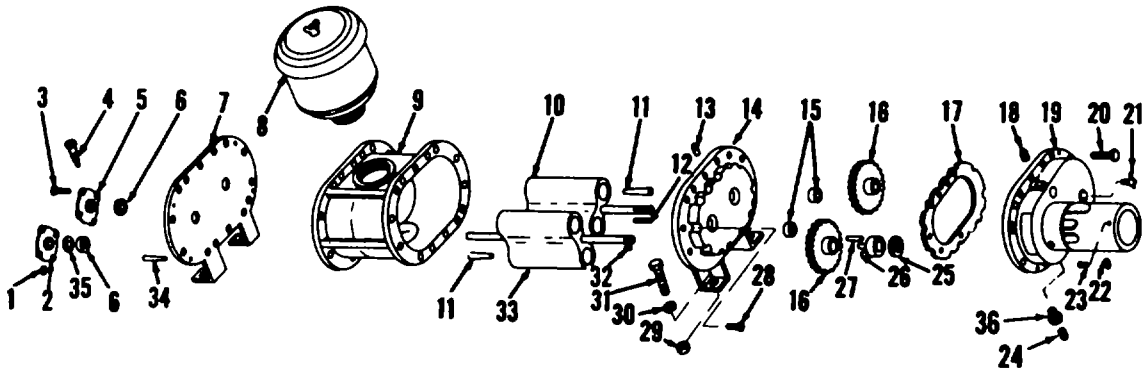
g. Remove the drive cover and the end housing cover (7).

BLOWER CLEANING
AND INSPECTION

Clean all parts thoroughly. Inspect all parts for wear, damage, cracks or breaks.

BLOWER REPAIR, ASSEMBLY
AND INSTALLATION

Repair or replace all worn or damaged parts. Assemble blower in reverse order. Reinstall blower.



1 Plug	13 Cap	25 Retainer
2 Cover	14 Plate	26 Coupling
3 Screw	15 Bearing	27 Pin
4 Fitting - lub.	16 Gear	28 Screw
5 Cover	17 Gasket	29 Nut
6 Bearing	18 Plug	30 Washer
7 Plate	19 Housing	31 Screw
8 Air cleaner	20 Screw	32 Key
9 Cylinder	21 Cock	33 Shaft and impeller
10 Shaft and impeller	22 Plug	34 Pin
11 Pin	23 Set screw	35 Retainer
12 Key	24 Plug	36 Adaptor

Figure 87. Blower Assembly

BLOWER DRIVE AND CLUTCH

BLOWER DRIVE DESCRIPTION

The blower unit (fig. 88) Is belt-driven from a sheave (13) on the power take-off shaft of the PTO drive line. The V-belt is driven by a hand operated clutch mounted on the blower shaft. The blower is engaged by pushing the clutch lever (20) towards the belt drive and disengaged by pushing the lever away.

BLOWER DRIVE BELT REMOVAL

a. Loosen the blower unit mounting screws and nuts in order to release the tension on the V-belts from the power take-off sheave on the PTO drive line.

b. Remove belt.

c. Reassemble in reverse order

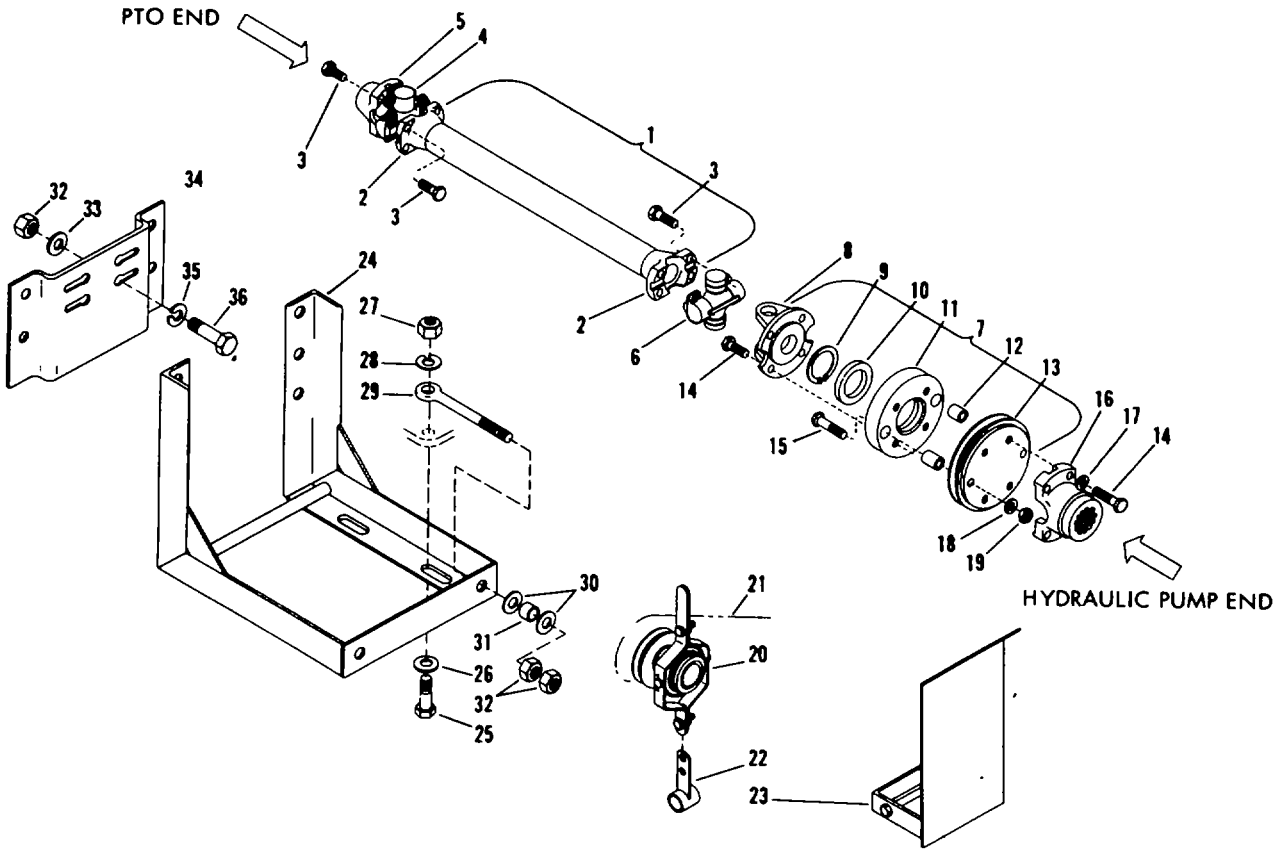


Figure 88. Blower Drive And Clutch

BURNER FUEL PUMP

BURNER FUEL PUMP DESCRIPTION

The burner fuel pump is mounted on the blower housing and is blower shaft driven through a coupling. The pump consists of a housing, rotor with shaft, idler head with pin and idler. The idler rotates on an eccentric pin on the head which is bolted on the housing. The rotor with shaft is mounted in the housing so the rotor engages the idler. The opposite end of the shaft is mounted with packing, packing gland, spring and nut. The rotor and idler creates a pumping action which sucks oil into the intake part and expels it through the outlet port.

BURNER FUEL PUMP REMOVAL

a. Remove the twn tube nuts (1, Fig. 89) from the elbows (2) and remove the drain plug (8).

b. Remove the drain plug (10) from the gear housing (11) and drain the oil.

c. Remove the ten cap screws (14) securing the gear housing (11) to the blower (5). Remove the gear housing and the gasket (4) from the blower.

d. Remove the two setscrews (7) that secure the pump assembly to the gear housing.

e. Remove the setscrews (2, fig. 90) from the coupling (3) and the key (16) from the shaft (11).

f. Remove the assembly from the gear housing.

BURNER FUEL PUMP DISASSEMBLY

a. Remove the six cap screws (15, fig. 90) securing the head (14) to the pump housing (10). Remove the head and gasket (13) from the housing.

b. Remove the gear (12) from the head and remove the impeller and shaft (11) from the housing (10).

c. Remove the packing nut (4), spring (5), and the retainer (6) from the pump housing (10).

d. Remove the packing (7 and 8), the sleeve bearing (9) from the housing.

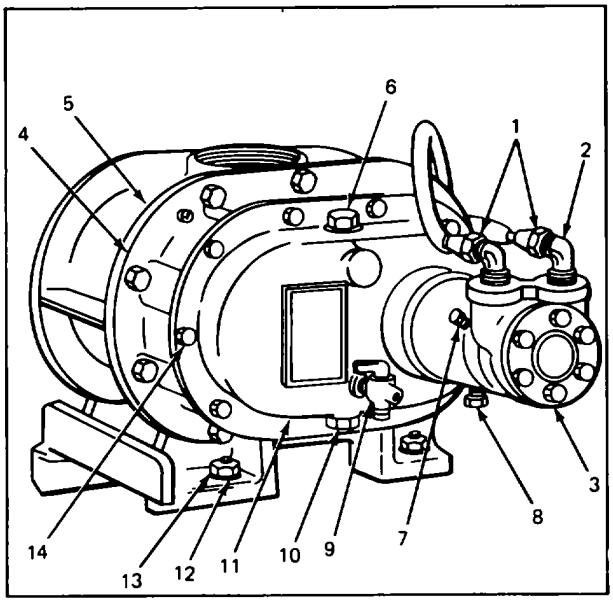
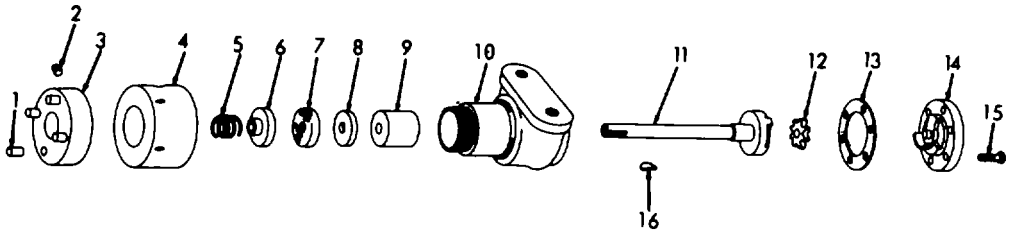


Fig. 89. Burner Blower and Fuel Pump

1 Tube nut	8 Drain plug
2 Adapter	9 Level cock
3 Burner fuel pump	10 Drain plug
4 Gasket	11 Gear housing
5 Blower	12 Lockwasher
6 Plug	13 Nut
7 Set screw	14 Cap screw

BURNER FUEL PUMP (continued)



1 Pin	5 Spring	9 Sleeve bearing	13 Gasket
2 Setscrew	6 Retainer	10 Pump housing	14 Head
3 Coupling	7 Packing	11 Impeller and shaft	15 Cap screw
4 Packing nut	8 Packing	12 Gear	16 Woodruff key

Figure 90. Burner Fuel Pump-exploded View

BURNER FUEL PUMP CLEANING, INSPECTION, AND REPAIR

a. Clean all parts except the packing with an approved cleaning solvent and dry thoroughly.

b. Inspect all parts for cracks, bends, breaks, wear, corrosion, distortion or damaged threads.

c. Repair or replace all defective parts, and replace all gaskets.

BURNER FUEL PUMP REASSEMBLY

a. Install the sleeve bearing (9, fig 90) and the impeller and shaft (11) in the housing (10).

b. Install the gear (12) on the head (14) and place the head and gaskets (13) in position on the pump housing (10) and secure with the six cap screws (15).

c. Install the packing rings (7 and 8) and the retainer (6) on the shaft (11) and push the packing rings into position in the pump housing (10) with the retainer.

d. Install the spring (5) and the packing nut (4) on the shaft (11) and tighten the nut until the shaft will not rotate freely. Then loosen the packing nut until the shaft rotates freely.

e. Check the shaft for end play, one of two gaskets (13) may be removed if excessive end play is noticed Check the shaft for free rotation and end play after removal of gaskets.

BURNER FUEL PUMP INSTALLATION

a. Insert the fuel pump (3, fig. 89) into the gear housing (11) and secure with the two setscrews (7), Install the drain plug (8).

b. Install the key (16, fig. 90) and the coupling (3) on the end of the shaft (11) and secure the coupling with the setscrews (2).

c. Place the gear housing (11 fig. 89) and gaskets(14)In position on the blower (5) and secure with the ten cap screws.

d. Install the drain plug(10) in the gear housing (11) and lubricate.

e. Install the two tube nuts (1) on the elbows(2).

f. Operate the pump and check for leaks.

SPRAY BAR ASSEMBLY

SPRAY BAR ASSEMBLY DESCRIPTION

The spray bar assembly consists of the spray bar, spray bar extensions, and caps, valves, hinge joints and linkages. The bar is divided into three sections having the center section and two end sections mounted on hinge joints. The spray bar can be adjusted in length by adding or removing spray bar extensions.

SPRAY BAR REMOVAL

a. Remove the spray bar sections and ball joints from center section spray bar disconnect left and right feed line.

b. Disconnect the valve actuator arm shaft from center section spray bar.

c. Remove upper and lower pins at the ends of the carrying arms.

SPRAY BAR DISASSEMBLY

a. Remove end caps if necessary (Figure 91).

b. Remove all linkages, bars, clips and toggles, fulcrum lever and swivel bearing.

c. Disconnect left and right hinge sections.

d. Disassemble right and left hinge sections including removal of nozzle valves.

e. Disassemble center section including removal of nozzle valves.

f. Disassemble nozzle valves.

SPRAY BAR CLEANING, INSPECTION, AND REPAIR

a. Clean all parts with an approved cleaning solvent and dry thoroughly

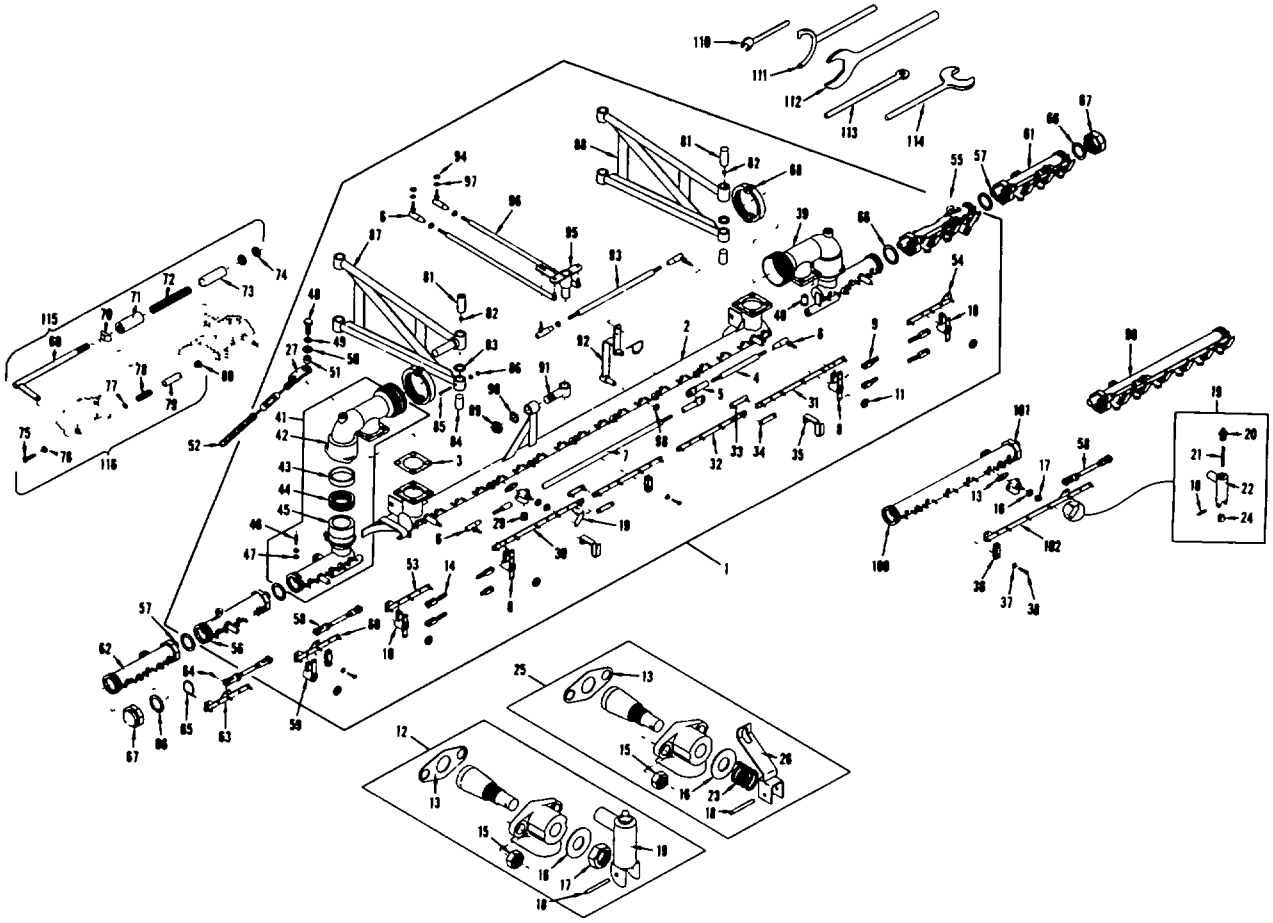
b. Inspect all parts for cracks, bends, breaks, wear, corrosion, distortion, or damaged threads

c Repair or replace all defective parts

d. Reassemble spray bar In reverse order to disassembly.

e. Install spray bar in reverse order.

SPRAY BAR ASSEMBLY (continued)



1 Center section - complete
2 Center tube - flip
3 Gasket
4 Short rod
5 Rod end
6 Ball joint
7 Long rod
8 Toggle with flips
9 Chain - complete
10 Toggle with flips
11 Washer
12 Flip valve - center tube
13 Gaskets
14 Chain assembly-turn off
15 Lock nut
16 Washer-brass
17 Lock nut
18 Drive lock pin
19 Disconnect lever
20 Zerk fitting
21 Spring
22 Lever
23 Gasket
24 Plunger
25 Flip valve-hinge section
26 Lever assembly
27 Holder
29 Nozzle
30 Outboard bar
31 Outboard bar
32 Inboard bar
33 Connector
34 Connector
35 Clip
36 Guide lever
37 Flat washer
38 Capscrew
39 Hinge section-right-flip
40 Stop
41 Hinge section-left-flip
42 Elbow-left shown
43 Ring
44 Chevron packing-set
45 Swivel-left-flip
46 Stud
47 Hex nut
48 Capscrew
49 Lockwasher
50 Flat washer
51 Spacer
52 Support Chain
53 Control bar-left
54 Control bar-right
55 Hook section-right-flip
56 Hook section-left-flip
57 Inner tube- 1 foot
58 Link
59 Toggle
60 Control bar-left
61 Section-1 foot-right-flip

Figure 91. Spray Bar Assembly

SPRAY BAR ASSEMBLY (continued)

62 Tube-i foot -left -flip
63 Control bar -left
64 Drilled rivet
65 Pin
66 Gasket
67 Cap end
68 Ring
69 Link
70 Rocker
71 Outer spring cover
72 Outer spring
73 Inner spring cover
74 Hex nut
75 Capscrew
76 Jam nut
77 Flat washer
78 Spring
79 Piston
80 Lock
81 Upper pin
82 Steel ball
83 Brass washer
84 Lower pin
85 Round head machine screw
86 Hex nut
87 Carrying arm-left
88 Carrying arm-right
89 Castle nut
90 Washer
91 Swivel bearing
92 Fulcrum lever
93 Rod
94 Hex nut
95 Swivel toggle
96 Link
97 Lockwasher
98 Washer
99 Section-2 foot-right-flip
100 Tube-2 foot-right-flip
101 Inner tube-2 foot-section
102 Control bar-left
110 Nozzle wrench
111 Barco wrench
112 Union nut wrench
113 Holding wrench
114 Bar union wrench
115 Return spring
116 Return piston

Figure 91. Spray Bar Assembly - Continued

WIRING DIAGRAM - ELECTRIC - AIR CONTROLS

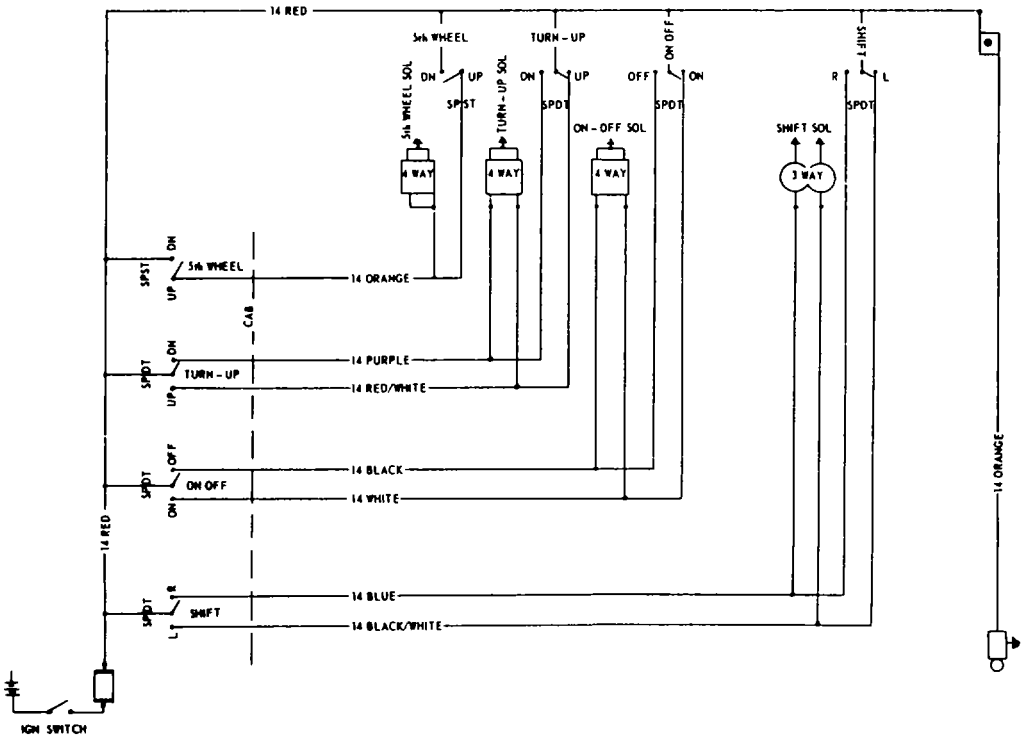


Figure 92.

WIRING DIAGRAM - LIGHTING

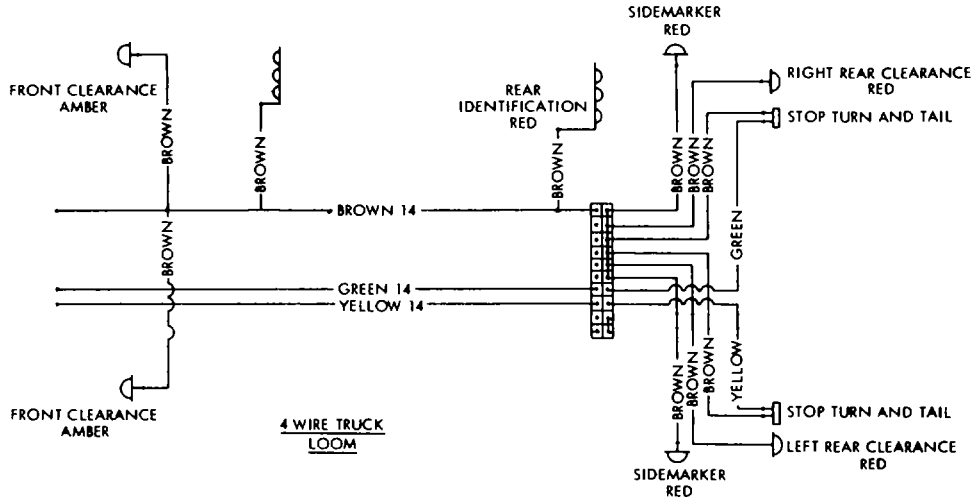


Figure 93.

AIR CONTROL RESERVOIR AND PIPING

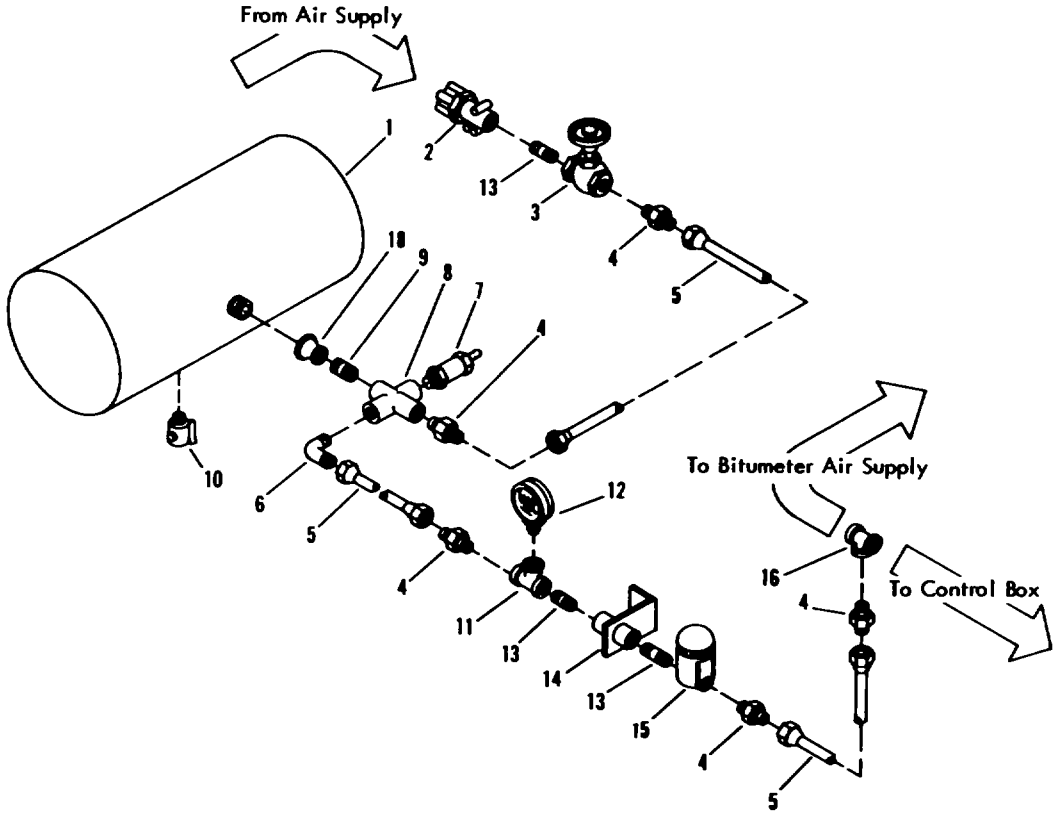


Figure 94.

AIR CONTROL BOX ASSEMBLY - MULTIPLE CONTROLS

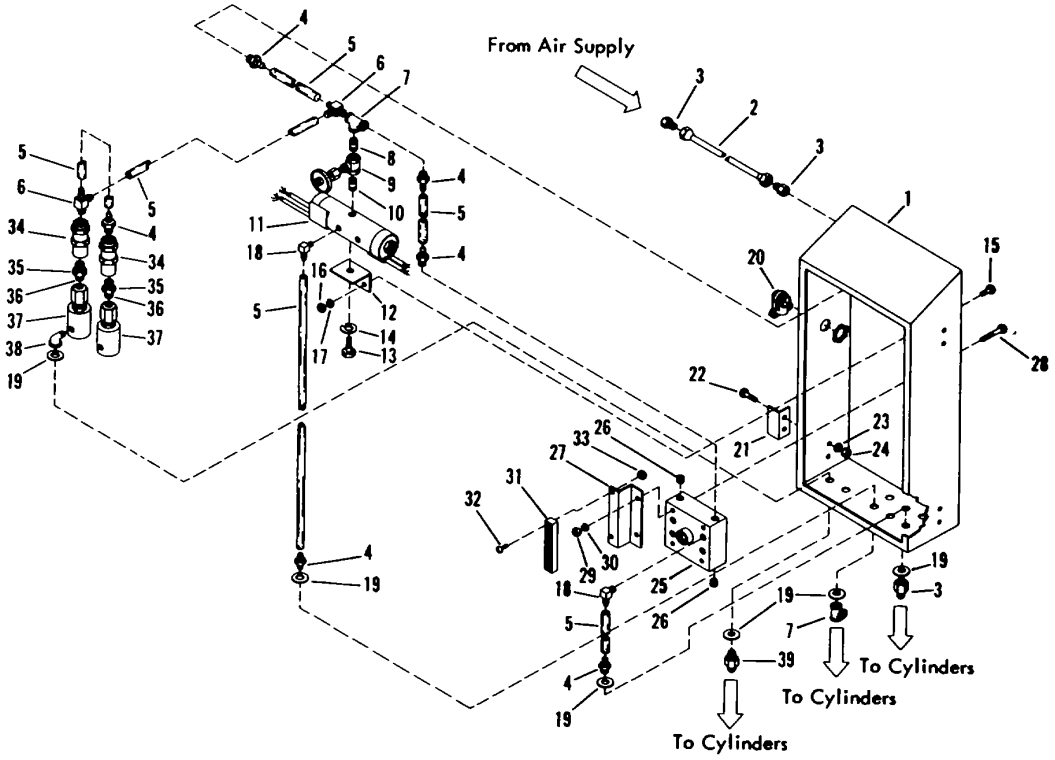


Figure 95.

ON AND OFF AIR CONTROL INSTALLATION
(Used When Other Controls Are Present)

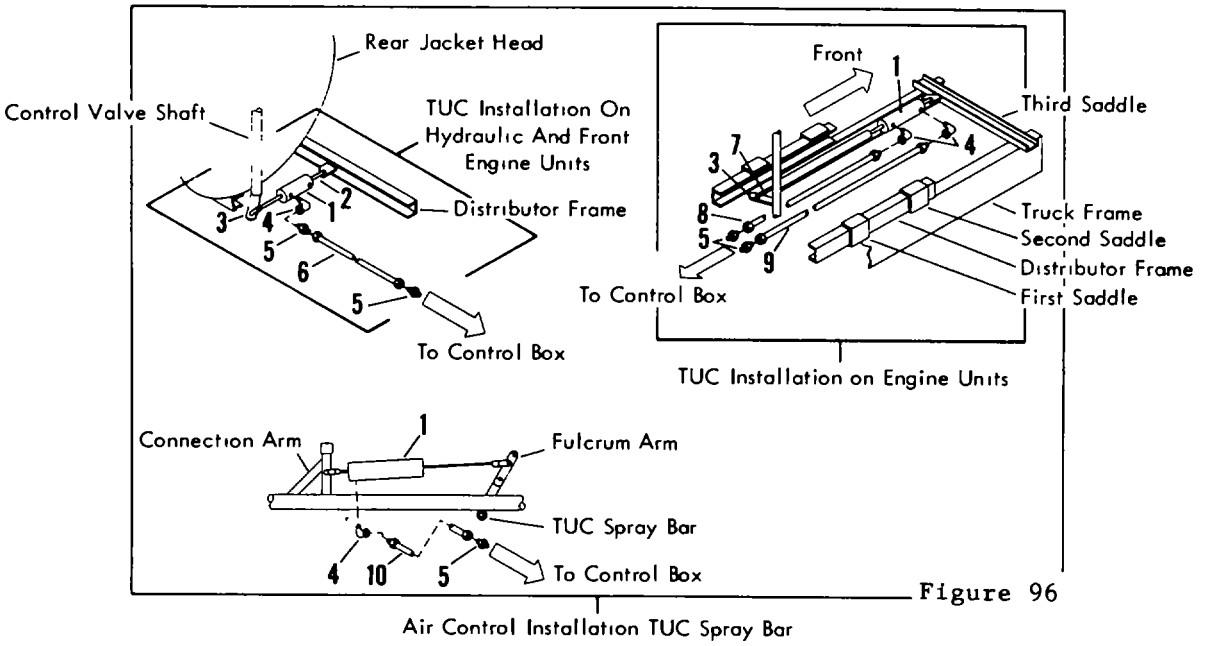


Figure 96.

CONTROL - BITUMETER - RAISE AND LOWER

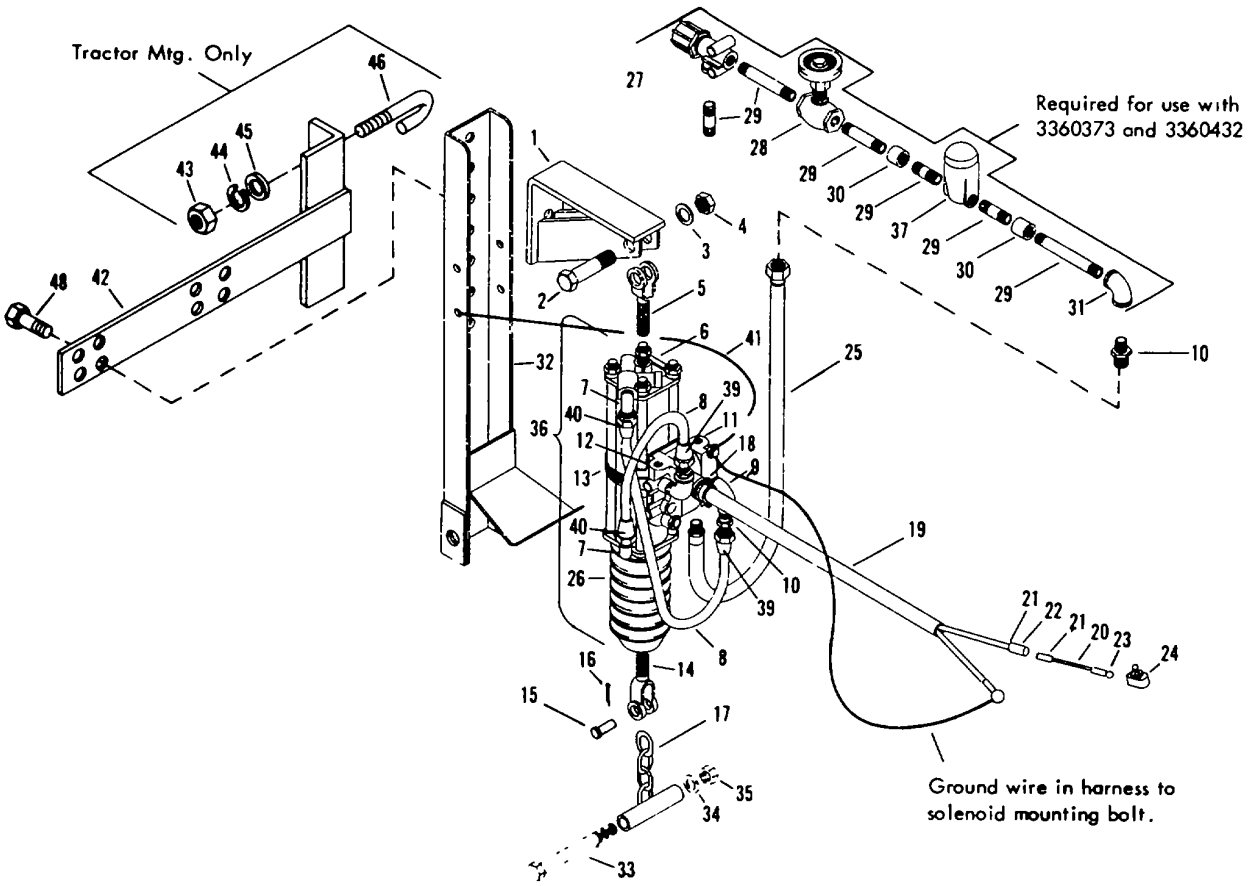


Figure 97.

CONTROL - BAR TURN UP

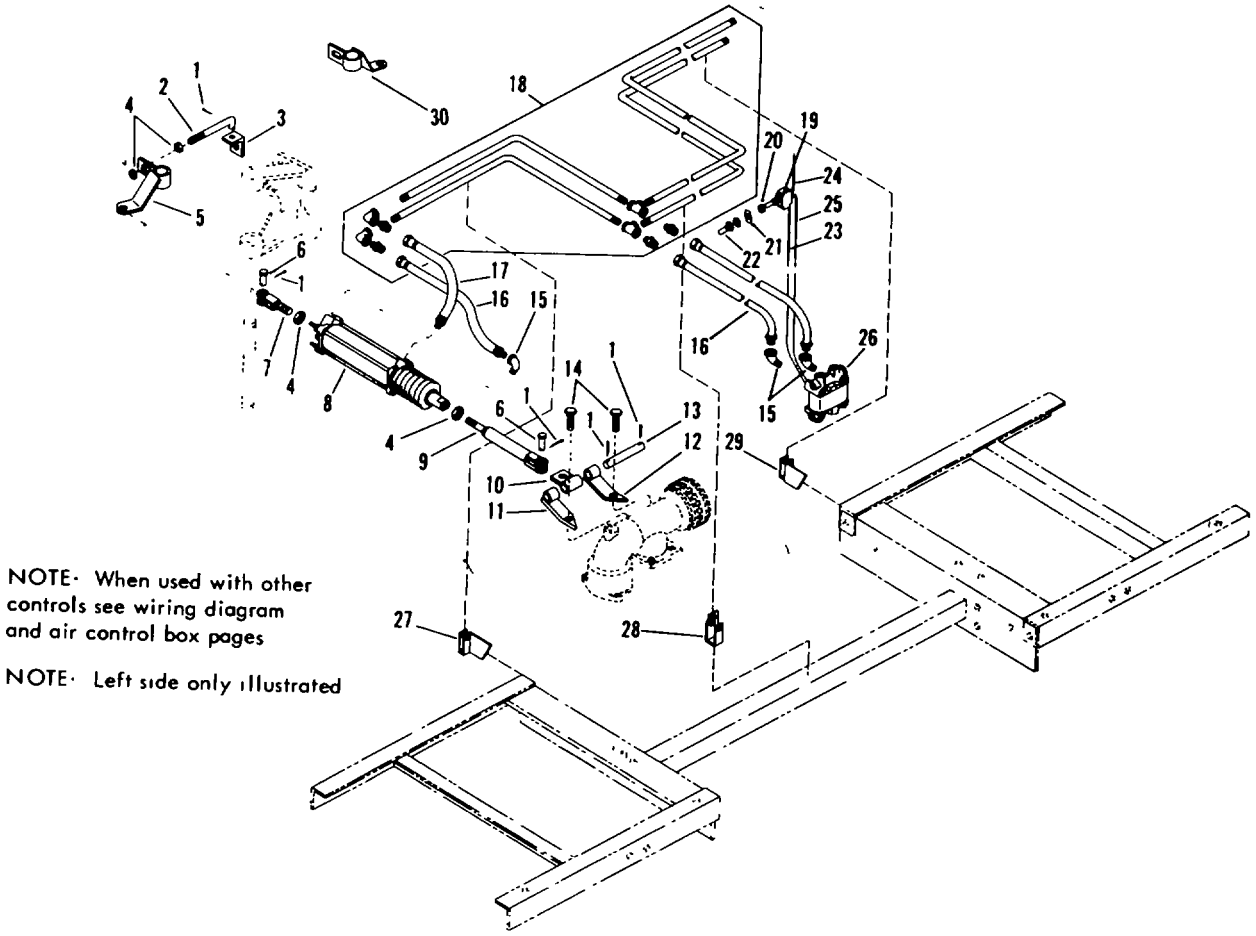


Figure 98.

CONTROL - BAR SHIFTING

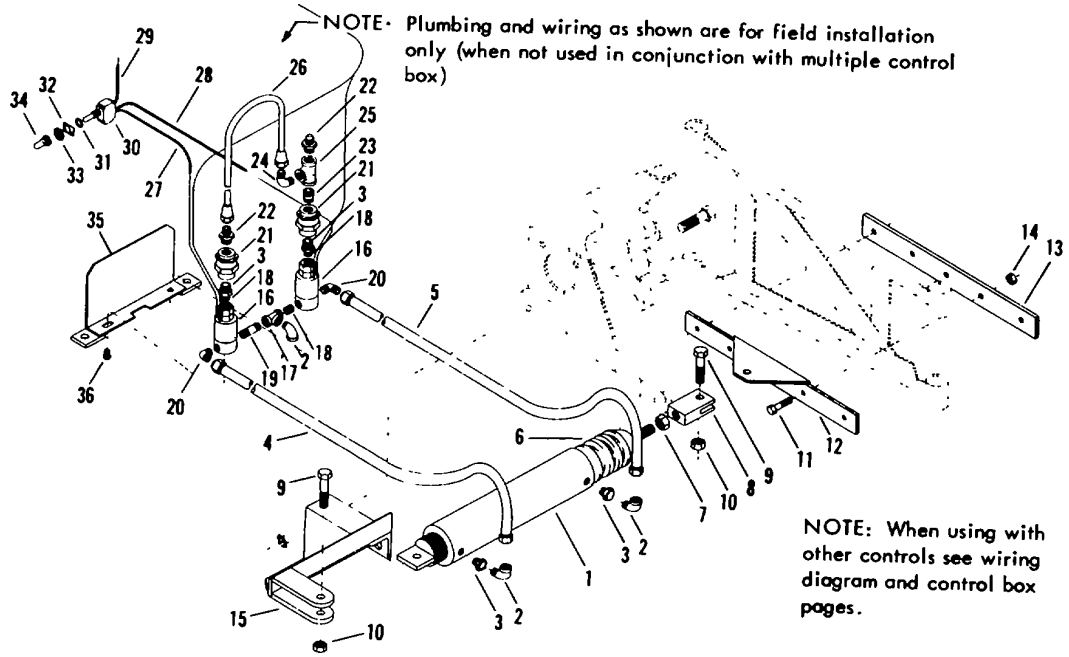


Figure 99

ETNYRE BITUMINOUS DISTRUBUTOR
HYDROSTATIC UNIT

INTERVAL	POINT	IDENTIFICATION	LUBRICANT	QUANTITY
	1	Bell Mechanism	EO*	Sparingly
	2	Manhole Cover	EO*	Sparingly
				3 Deleted.
	4	Spray Bar Controls	EO*	Sparingly
	5	Tachometer Cable	GO	Fill
30 DAYS	6	Bar Turn Up Bearings	MPG	Sparingly
	7	Bar Carrying Mechanism	EO' & MPG	Sparingly
				8 Deleted
	9	Pump Coupling	#2M-AG	Sparingly
	10	Bltumeter Wheel	EO*	Sparingly
	11	Bltumeter Cable	GO	Fill
	12	Air Relief Valve	EO'	Sparingly
	25	Flip Valve Lever	MPG	Sparingly
	13	Oil Bath Air Cleaner		
		Engine & Blower	EO	Fill to Line
	14	Blower Gear Case	EO	7 Oz
	15	Blower Clutch Drive	EO*	Sparingly
	16	Drive Universals	02M-AG	Sparingly
	17	Control Linkage	EO'	Sparingly
	18	Pump Universal	02M-AG	Sparingly
DAILY	19	Tachometer Drive Chain	EO*	Sparingly
	20	Hydraulic Reservoir	HTF	3/4 Full**
				21 Deleted
	22	V-Belt Sheave Idler Brg	KER	Wash Twice Yearly
	23	Hydraulic Oil Filter		Replace If vacuum gauge shows in red area
	24	Pump Discharge Strainer		Clean Weekly
ANNUALLY	26	Pump Spline Fitting Yoke	#67-71	Sparingly

#67-71: Anti-seize Compound
#2M-AG: #F2 Molub Alloy Grease
590M-ATG #90: Molub Alloy Transmission Grease
MPG: Multipurpose Type Grease
HTF: Hydraulic Transmission Fluid - Type A
GO: Graphite Oil
EO: Engine Crankcase Oil
EO*: Engine Crankcase Oll/Applied W/Oil Can
KER: Kerosine

NOTE: On units with one man air controls - fill line oiler, located on outlet side of air reservoir, with light oil as needed. Also wipe cylinder rods clean and lightly oil. Drain water from air reservoir daily

**Fill completely for winter storage. This will prevent condensation in reservoir. Drain down to thermometer hole prior to use

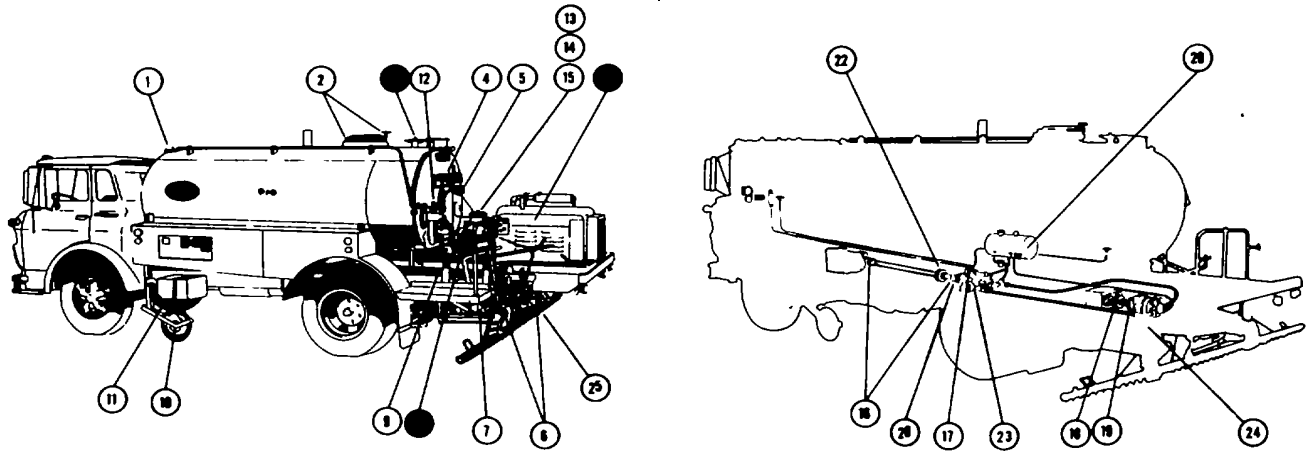


Figure 100.

ASPHALT PUMP

BITUMINOUS PUMP FAILS TO DELIVER RATED CAPACITY

Probable cause	Probable remedy
Worn or damaged impeller	Replace Impeller
Damaged pump bearing	Replace bearing

NOISY PUMP OPERATION

Probable cause	Probable remedy
Impeller loose on shaft	Replace Impeller or shaft
Worn pump shaft bushings	Replace the bushings
Shaft seal defective	Replace the seal

PUMP WILL NOT TURN OR TURNS SLOWLY

Probable cause	Probable remedy
Asphalt material below pumping temperature	Reheat to pumping temperature
Air leak in suction line from hydraulic reservoir to filter to Inlet of charge pump on back of hydraulic pump	Tighten all connections
Defective hydraulic pump or motor Check for excessive case drain .	Replace defective pump or motor
Hydraulic system pressure low	Increase motor by-pass pressure to 4500 P.S.I.
Low oil level m reservoir	Replenish oil (type A)
Spray bar control valves set Improperly	Reset controls

BURNERS

BURNERS INOPERATIVE OR OPERATING IMPROPERLY

Probable cause	Probable remedy
Clogged fuel lines	Drain and clean the lines
Faulty valves	Repair valves
Fuel pump inoperative	Repair fuel pump

FIFTH WHEEL

FIFTH WHEEL FAILS TO RAISE

Probable cause	Probable remedy
Wheel frame bending or bent	Repair the wheel frame

Loose Air Connection	Tighten
Defective Solenoid	Replace
Defective Wiring -	Check connections
Defective Cylinder Shaft Seal	Replace

FIFTH WHEEL FAILS TO LOWER

Probable cause	Probable remedy
Wheel frame binding or bent	Repair the wheel frame
Loose air connection	Tighten
Defective Solenoid	Replace
Defective Wiring	Check Connections

GAUGES

BITUMETER COUNTER INOPERATIVE

Probable cause	Probable remedy
Drive cable broken	Replace
Defective adapter	Replace adapter
Faulty tachometer	Replace

BITUMETER COUNTER POINTER WHIPS

Probable cause	Probable remedy
Fifth wheel broken	Replace
Defective recording bltumeter	Replace the bltumeter
Drive cable binding	Lubricate or replace

QUADRANT

QUADRANT LEVER SLOWS OR STOPS PUMP WHEN MOVING FROM "CIRCULATE IN TANK" TO "CIRCULATE IN BAR"

Probable cause	Probable remedy
Butterfly valve partially closed	Open butterfly valve by pulling on control link
Linkage out of adjustment	Check relation of quadrant lever position with nozzle lever position (See page 10) Manual)
Transfer valve in handspray position	Set transfer valve in distribute position

TROUBLE SHOOTING (continued)

SPRAY PATTERN

SPRAY FOGS

Probable cause	Probable remedy
Pump speed too fast for size of nozzle	Check "Circulating in Tank", page 14, for proper relationship

SPRAY STREAKS

Probable cause	Probable remedy
Pump speed too slow	Check "Circulating in Tank" , page 14, for proper relationship.
Nozzles not at proper angle	Adjust with nozzle wrench
Spray bar at improper height above ground	Adjust spray bar to give nozzle height 12" above road
Material temperature too low	Heat material to highest temperature recommended for spraying material

SPRAY LACKS PRESSURE

Probable cause	Probable remedy
Pump speed too slow	Check "Circulating in Tank" s Page 14, for proper relationship
One of control valves m incorrect position	Lift quadrant and turn valve plugs to position relative to levers as shown on page 6. Manual
Discharge strainer plugged	Remove and clean

APPLICATION RATE VARIES

Probable cause	Probable remedy
Improper reading of tank contents	Use measuring stick for accurate readings. Tank must be level when reading measuring stick.
Defective pump tachometer	Repair or replace Each revolution of asphalt pump is 0.61 gallons Tachometer head may be checked at speedometer shop. 500 R.P.M. 204 G.P.M.
Defective bitumeter	Repair or replace. Use measured distance and stop watch Drive at constant speed. Bitumeter head maybe checked at speedometer shop. 1000 R.P.M. - 1000 F.P.M
Catch lever on quadrant not pulled	Pull catch lever outward
Discharge strainer plugged	Remove and clean discharge strainer on pump outlet (see page 10.)
Hydrostatic control not firmly positioned	Adjust and tighten
Hydrostatic override control partially engaged	Return override to neutral position

TROUBLE SHOOTING (continued)

SPRAY BAR

DIFFICULTY IN RAISING SPRAY BAR END SECTIONS IN VERTICAL POSITIONS

Probable cause	Probable remedy
Hinge joint inoperative	Adjust or replace retaining rings and packings
Damage linkage	Repair or replace

ALL NOZZLES DO NOT CUT OFF

Probable cause	Probable remedy
Linkage out of adjustment or worn	Repair or replace linkage so that all spray bar levers are in appropriate position (see page 27) . of Operators Manual).

SPRAY BAR DOES NOT SHIFT PROPERLY

Probable cause	Probable remedy
Loose connections	Tighten
Defective Solenoid	Replace
Defective Wiring	Check connections
Shift lock engaged	Disengage
Linkage damaged	Repair

SPRAY BAR DOES NOT RAISE & TURN-UP PROPERLY

Probable cause	Probable remedy
Loose connections	Tighten
Defective Solenoid	Replace
Defective Wring	Check connections

INSUFFICIENT FLOW THROUGH SPRAY BAR

Probable cause	Probable remedy
Pump fails -	Repair pump
Damaged lines	Replace

SPRAY BAR DOES NOT CIRCULATE

Probable cause	Probable remedy
Spray bar full of cold material	Heat spray bar with portable burner
Valve lever in wrong position	Adjust valve lever
Damaged inner circulating tube	Replace damaged section
Inner circulating tubes out of round	Check inner circulating tubes, particularly where they join at sections

SPRAY BAR DOES NOT TURN-UP PROPERLY

Probable cause	Probable remedy
Loose Air Connections	Tighten

TROUBLE SHOOTING (continued)

Linkage damaged or needs cleaning	Clean with an approved solvent or replace
Defective Solenoid	Replace
Defective Wlring	Check Connections

VALVES

LEFT CONTROL VALVE LEAKS AT TOP

Probable cause	Probable remedy
Worn packing	Replace packing
Circulating m Bar at too great pump speed	Pump speed should not exceed 160 R P M. when circulating in bar

INTAKE VALVE LEAKS

Probable cause	Probable remedy
Insufficient spring tension	Tighten spring on operating shaft
Scratched or scored valve	Relap valve

NOZZLE VALVES STICK OR LEAK

Probable cause	Probable remedy
Bar pressure tends to keep them tight	To loosen, rap end of plug stem
Valves scratched or scored	Remove valve from bar and lap plug into case
Insufficient clearance between plug and case	Loosen adjusting nut

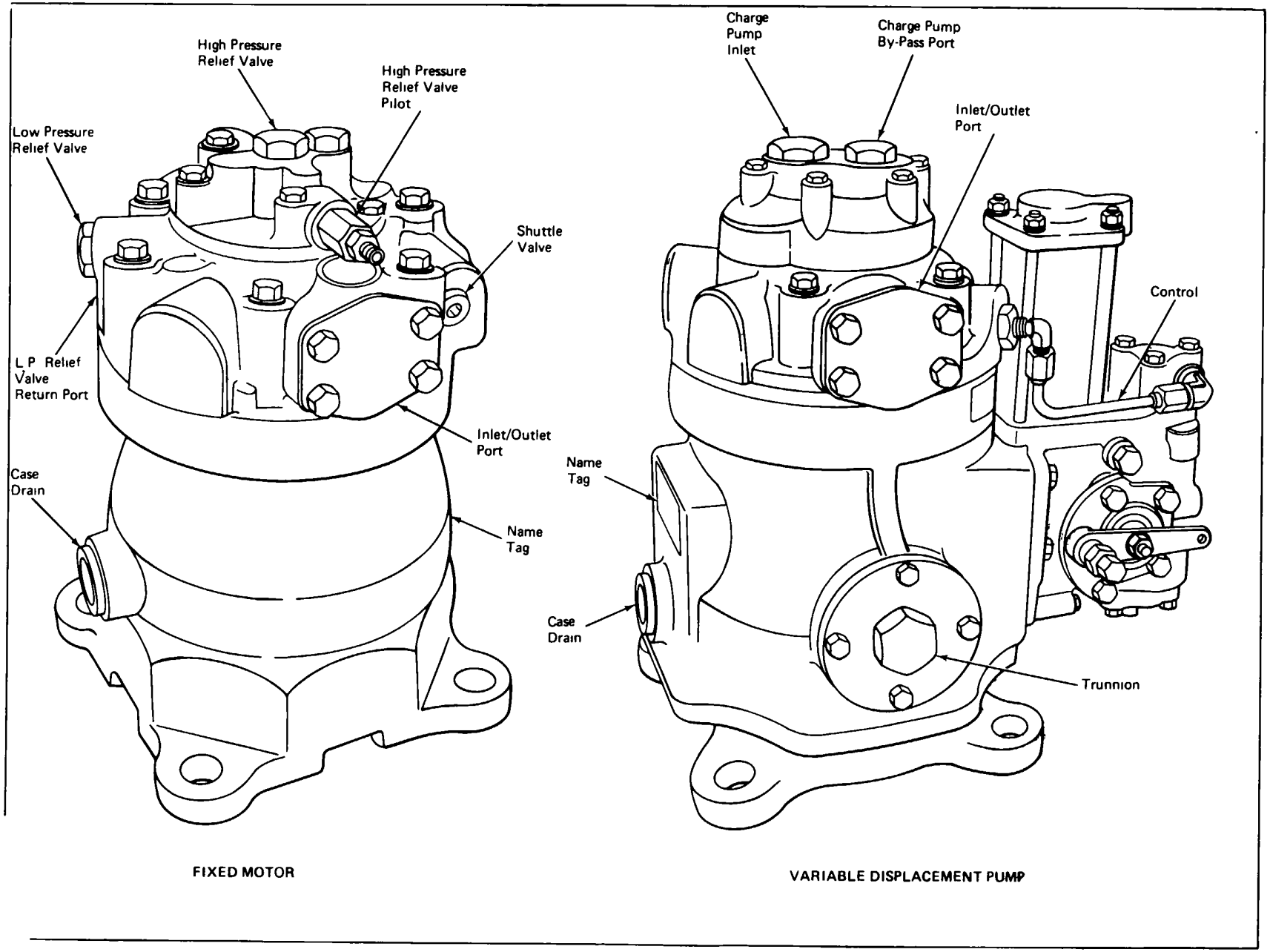

High Pressure Relief Valve
High Pressure Relief Valve Pilot
Low Pressure Relief Valve
Shuttle Valve
L P Relief Valve Return Port
Inlet/Outlet Port
Case Drain
Name Tag
FIXED MOTOR
Charge Pump Inlet
Charge Pump By-Pass Port
Inlet/Outlet Port
Control
Name Tag
Case Drain
Trunnion
VARIABLE DISPLACEMENT PUMP

Figure 101.

THE BASIC DYNAPOWER TRANSMISSION SYSTEM

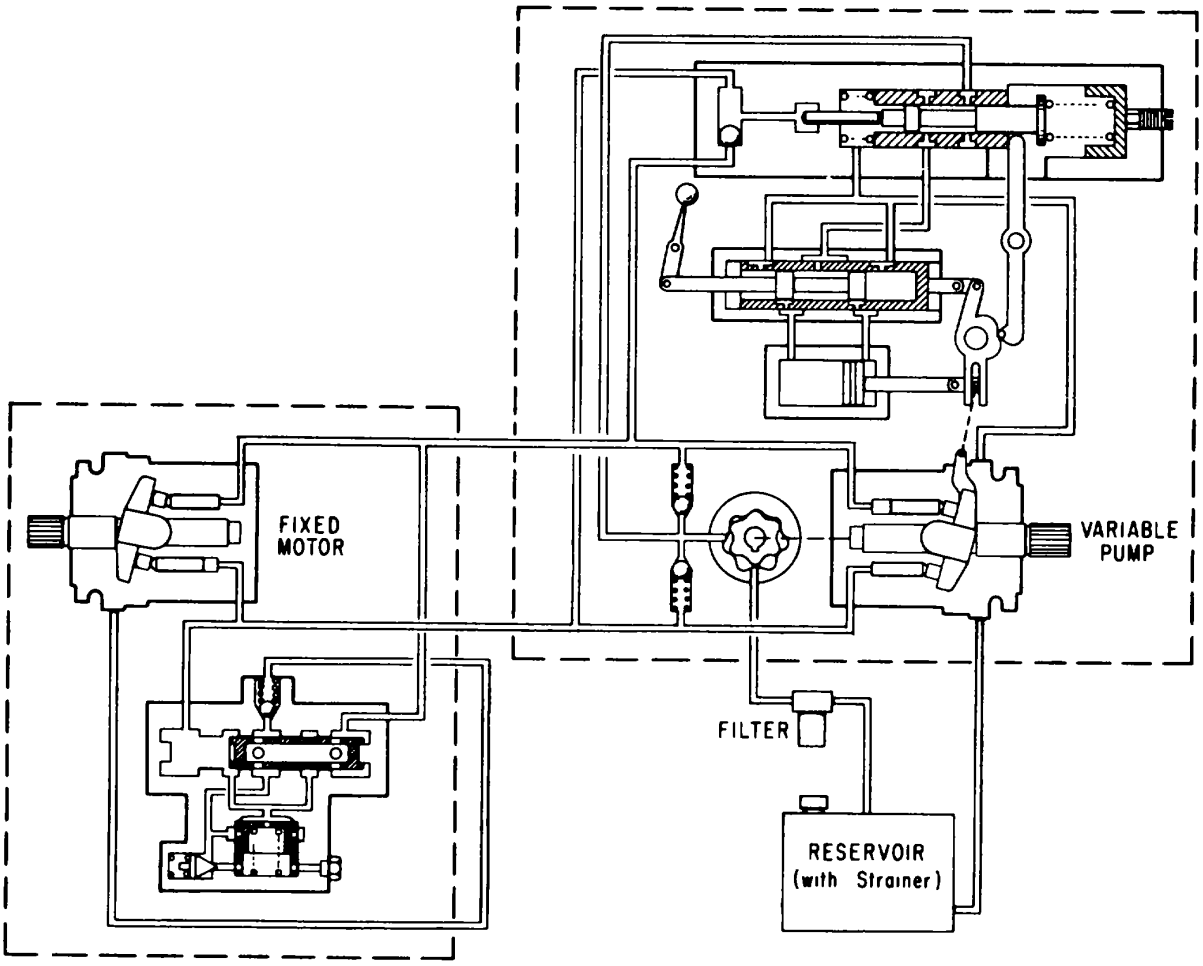


Figure 102.

Dynapower variable pump, fixed motor schematic.

A. Description

The Dynapower hydrostatic transmission uses a closed circuit hydraulic system capable of "over center" operation. The inlet and discharge ports of a variable-displacement, axial-piston pump are connected to the discharge and inlet ports of an axial-piston motor (fixed or variable) by hose or tubing. The two main hoses must be of high pressure type, capable of withstanding working pressures up to 5000 PSI; all other hoses can be of low pressure type.

See Figure 101

The pump may be driven by any conventional source of power: diesel, gasoline or electric. The hydraulic motor may be of fixed or variable displacement. When a variable motor is used, it would also require its own control unit. However, a fixed-displacement hydraulic motor is referred to in this manual unless otherwise noted.

Other components of the system are: a filter and reservior system, the fluid itself, a cooler (if required), the connection from the hydraulic pump to the power source, the connection from the hydraulic motor to the output and the linkage to the pump control (and motor control, if a variable motor is used).

Plumbing and associated hardware have been minimized by building the charge pump and check valves into the pump cover. The high and low pressure relief valves and the shuttle valve are built into the motor. Therefore, no separate hoses or connections are needed for these items.

B. Operation

The pump operating control changes the amount and direction of flow. When the pump's variable cam is moved from neutral, oil flows from the pump to the motor through the main system lines. This causes the motor to rotate. The oil discharged from the motor is returned directly to the inlet of the pump.

Moving the pump control through neutral (over center) to the reverse position causes the motor to reverse direction by changing the side of the system develop high pressure fluid. Either side of the system can be the high pressure side. System valving provides proper operation and protection automatically when the system reverses.

Oil is supplied directly from the reservoir, through the filter, to the charge pump. It is discharged through one of the two check valves to charge the row pressure side of the system. This same oil also supplies pressure for the control, makeup and cooling oil to the closed system and inlet pressurization. Pressurization is maintained by the low pressure relief valve which relieves excess oil to the reservoir.

See Figure 101.

The pilot-operated high pressure relief valve protects the system from oversurges or extremely high-starting pressures. In order not to deplete the closed system of oil, this high pressure relief valve discharges to the low pressure side of the system.

A pressure-actuated shuttle valve is used to direct both high and low pressure to the respective relief valves. When one line is high pressure, it moves the shuttle valve towards the flow pressure side; this in turn ports the high pressure to its relief valve. At the same time it ports the low pressure side to its relief valve. It is also the valve used to direct the high pressure relief valve discharge to the low pressure side of the system.

The ability of the pump to go "over center" has eliminated the need for four-way valves for reversing the motor.

C. Basic Care of the System

FLUID

The Dynapower transmission is designed to use and is warranted with Type A suffix A automatic transmission fluid as there are no fluids designed for 5000 PSI operation.

All other fluids should be submitted to the factory for possible approval on specific applications.

Check Reservior: Fluid supply should always be at specified level. If necessary to add, use correct type of filtered or strained oil. Reservoir should be checked every 4-5 hours on the first day of use, twice a day for the first week and every day thereafter.

Check for External Leaks: Hoses and fittings should be checked regularly for leaks. Watch for cracks or wear replace when indicated.

Change: Oil should be changed if color of hydraulic fluid changes, and once a year in any case. Use filtered or strained oil of correct type.

CAUTION

Running the system with an inadequate oil supply can cause damage to the parts. Reservoir should be checked daily for presence of water or emulsification of oil. It presence is noted, completely drain and flush system. Refill with NEW oil. (Filter or strain as directed above.)

FILTER:

Under no circumstances should the suction filter on the Dynapower charge pump be allowed to by-pass, thus permitting contaminants to enter the closed loop.

Those filter units which have a by-pass feature should have a spring or block installed to prevent any by-passing.

Prior approval of the filter element manufacturer should be obtained for this type of installation in the remote possibility that the element might collapse under vacuum.

If it is determined by the filter element manufacturer that the by-pass feature must be incorporated, the unit should have an 8-10 PSI minimum by-pass.

Note

If system contains a shut-off valve, (this is highly recommended) in the line between the filter and the reservoir, make doubly certain it is open again prior to starting.

Change: Change filter after first 25 hours; then after each 600 hours, or more frequently if dirt conditions of the particular installation make it desirable. If indicator-type filter is used, change when indicator shows need.

Also: If a magnetic filter or screen is installed in the reservoir outlet, check and clean when changing filter element.

CAUTION

Before re-starting system, check oil supply level in the reservoir. Damage can occur if system is run with an inadequate oil supply. Make sure shut-off valve is open.

OPERATION INSPECTION

Make a daily inspection of the entire installation.

CLEANING

If it becomes obvious that cleaning is necessary, then remove complete system and flush with low pressure steam or solvent. Upon completion of an overhaul operation, flush system as directed above before reinstallation.

Note

Never use pressures or heat sufficient to damage the hoses or other rubber parts of the system. When steam is used, precautions must be taken to remove all moisture from the system.

TROUBLE SHOOTING GUIDE

This chart is designed to provide a quick diagnosis of the malfunction and the corrective action to be taken. Its use will shorten maintenance time appreciably.

Malfunction	Probable Cause	Hot to Determine	Corrective Action	Page	Steps
1. Loss of Oil Inspect for external leakage under load	Fittings	Check for loose hose fittings	Tighten fittings		
	Hose or Tubing	Check for cracked or worn spots in hose or tubing	Replace hose or tubing		
	Gaskets	Check motor shaft seal retainer gasket	Replace gasket as necessary	121	13
		Check gasket between pump housing and control assembly	Replace gasket as necessary	106	
		Check gasket between control housing and control arm assembly	If leakage is noted, replace gasket and control seal	106	6
	Seals	Remove motor shaft seal assembly and check seal	Replace seal as necessary	120	12 & 13
		Remove pump shaft seal assembly and check seal	Replace seal as necessary and gasket	94	18
		Remove control seal plate and check seal	Replace seal as necessary	106	6
	O-Rings				
	O-Rings on high pressure plugs (motor)	Remove plug and check O-Ring (2 Plugs)	Replace O-Ring	116	3
	O-Ring on shuttle valve plugs (motor)	Remove plug and check O-ring (2 Plugs)	Replace O-Ring	116	2
	O-Ring on low pressure relief valve plug (motor)	Remove low pressure relief valve assembly and check O-Ring	Replace O-Ring	116	
	Square-Ring on shaft seal retainer assembly	Remove seal retainer and inspect for cuts or abrasions	Replace Square-Ring	94	18
2. Loss of Control	Low Oil Level	Check reservoir	Replenish to proper level		
	Plugged Oil Filter	Remove filter housing and check filter	Replace filter element		

Malfunction	Probable Cause	Hot to Determine	Corrective Action	Page	Steps
2 Loss of Control Continued	0 Ring between pump housing and control assembly	Remove control assembly from pump housing and check O Ring	ReplaceO Ring	106	3
	Insufficient oil supply	Check for plugged lines or dirty filter	Clean or replace as necessary		
		Check oil level in reservoir	Add oil as necessary		
	Check valve malfunction	Check for sticking valves	Rework or replace as necessary	90	4
	Charge pump malfunction	See pump overhaul sections		89	1 thru 3
	Relief valve malfunction	See "loss of pressure" above			
	Control linkage malfunction	Check external linkage for loose or broken connections	Repair or replace as necessary		
	Internal failure	Check internal mechanism Actuate control lever If no response, check for.			
		A Broken lever arm or pin Item 35, Fig. 12	Replace lever arm assembly	92	7
		B. Feed back lever broken or not properly assembled on cam lever pin	Replace valve sleeve	107	7
		H. Damaged piston O-Rings Item 46, .Fig. 171	Replace O-Ring		
3 Excessive noise, cavitation and internal damage	Filter	Check for dirty filter	Replace filter		
	Inlet line	Check Inlet line for collapsed wall or other restrictions	Clean hose or replace as necessary		

Malfunction	Probable Cause	Hot to Determine	Corrective Action	Page	Steps
3. Excessive noise, cavitation and internal damage Continued	Oil	Check oil for excessive viscosity	Replace as necessary		
		Check for water in oil	Replace as necessary - check heat exchanger for possible leaks		
	Contamination	Check case drain line for steel or brass particles	Unit probably beyond field repair. Remove and overhaul		
	Air in oil	Check inlet line for leaks	Tighten fittings or replace as necessary		
		Check oil level in reservoir	Add oil as necessary Maintain oil level above level of return line		
4. Overheating	Excessive internal wear	Check case drain. Volume should not exceed ½ GPM per 1000 psi working pressure per unit	Unit probably beyond field repair. Remove and overhaul.		
	Relief valves	Check relief valve setting	Set relief valves a minimum of 500 psi above normal operating pressure or 500 psi above override control setting, whichever is highest	129	C4
5. Loss of Pressure	Relief valve malfunction	Check pressure with motor stalled at points indicated below. Pressure should be within 100 psi of value on name plate	Adjust relief valve or replace as necessary		

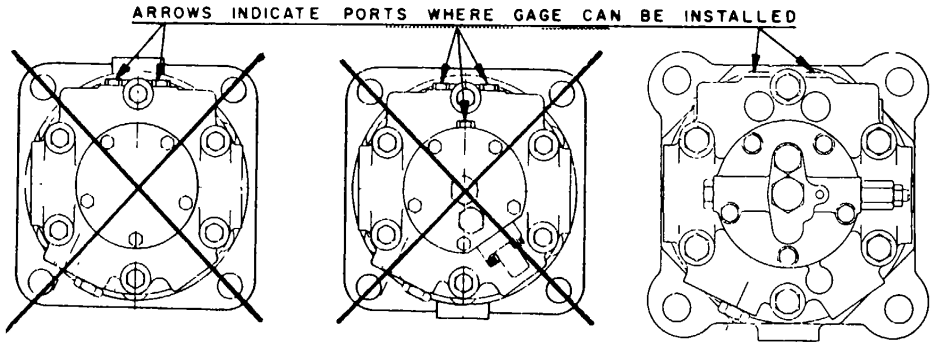


Figure 103.

Remove high pressure relief valve assembly and check for cut O-Rings	Replace or adjust as necessary	115	C-2
Check small hole in high pressure relief valve for burrs or contamination	If plugged, clean or replace as necessary	115	C-2

Malfunction	Probable Cause	Hot to Determine	Corrective Action	Page	Steps
	Air in oil	See Paragraph 3			
	Charge pump malfunction	Charge pump pressure should be at least 25 psi per 1000 psi working pressure with normal case drain flows. See Paragraph 4.	Replace as necessary	9	1 thru 3

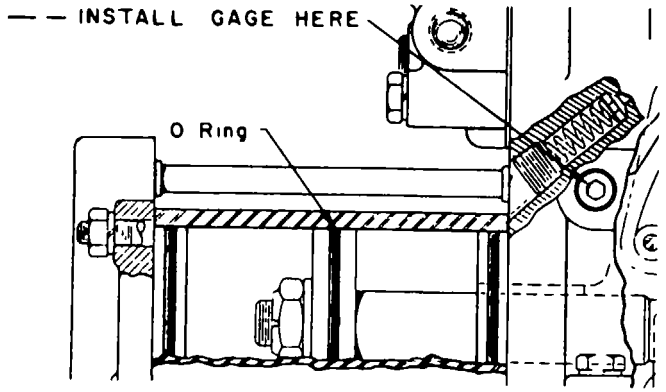


Figure 104

PUMP OVERHAUL - MODEL 45

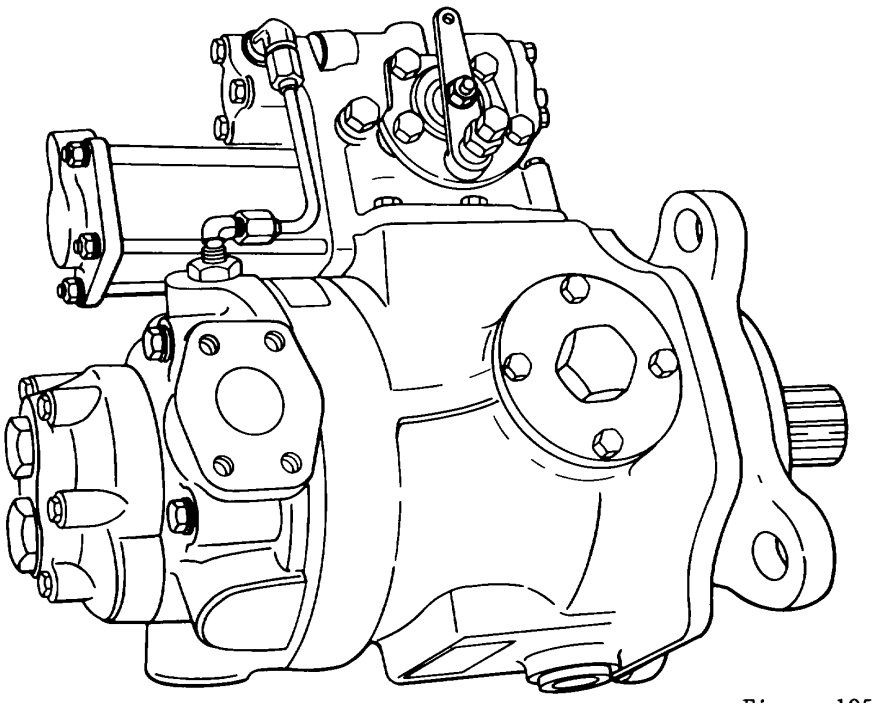


Figure 105.

This section contains an illustrated, step-by-step procedure for the complete disassembly and reassembly of the Dynapower Phase III, Model 45 and Model 60 pumps. Additional information for servicing Dynapower units no longer in production is included where applicable.

Service procedures for the Model 45 and Model 60 units are alike in all respects. Only when replacing the cover, block, pistons, return plate, mounting flange and cam stop is it necessary that the displacement of the unit be known. Photographs are included, where necessary, to establish the identity of the units being serviced. Individual parts and numbers are available from your Dynapower representative.

ALL PART NUMBERS IN PARENTHESIS FOLLOWING THE PART NAMES REFER TO THE INDIVIDUAL PARTS AS IDENTIFIED IN FIGURE 236 EXCEPT AS NOTED.

GENERAL INSTRUCTIONS

A. Dynapower parts and work area must be kept absolutely clean at all times. The Dynapower unit must be cleaned externally with a commercial solvent or steam and dried with compressed air before the unit is removed from the application.

B. Most service operations are carried out with the pump in a shaft down position. A seven inch square block of wood, 4" thick with a 2" round center hole, may be used as a platform upon which the pump may be positioned. A similar size hole in a work bench surface may be utilized as can the corrugated cardboard spacer packed at the end of a new Dynapower pump.

C. If complete disassembly is anticipated, the control assembly must be removed.

D. When performing minor service work, do not remove bearings, dowel pins or cylinder block components unless they exhibit signs of galling, scratches, or excessive wear. On major overhaul, replace all bearings, seals, gaskets, tablocks (16), wear plates (20) and bronze crescent clips (14).

E. Upon completion of service operations, be sure to follow instructions in page 130 for restarting the system.

PUMP DISASSEMBLY

1. Place the pump in a shaft down position. Remove hex bolts (11) and lock washers (6). Lift off charge pump cover (10) See Fig. 236.

Remove .charge pump inlet port plate (45), shim gasket(s) (43) and O-ring (44). See Fig. 236.

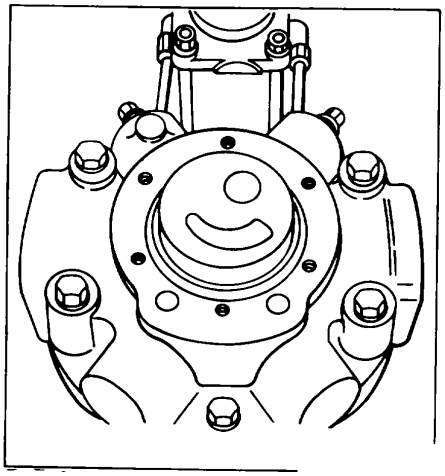


Figure 106.
Charge pump upper valve plate.

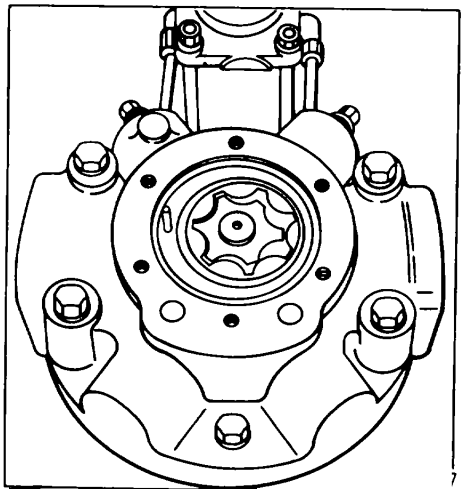


Figure 107.
Charge pump eccentric, inner and outer gerotor

2. Remove charge pump spacer assembly (48), which includes the spacer and a dowel pin. Do not remove the dowel pin from the spacer assembly unless damaged. Note the relationship of the lower valve plate (42), upper valve plate (45), and spacer assembly (48) which is determined by the alignment of the dowel pin with the recessed hole in the inner face of the charge pump cover (10). This relationship must be preserved upon reassembly to insure the proper function of the charge pump. Remove charge pump assembly (47) consisting of inner and outer rotor. See Fig. 108.

3. Remove pin (46) from shaft (1). Lift out lower charge pump valve plate (42) and, using a screw driver, remove O ring (41). See Fig. 109.

4. Remove control sense lines (8) (if applicable) from tube fittings (9). Remove check valve assemblies consisting of check valve plugs (61), O-rings (62), valve springs (60) and plungers (59). See Fig. 110.

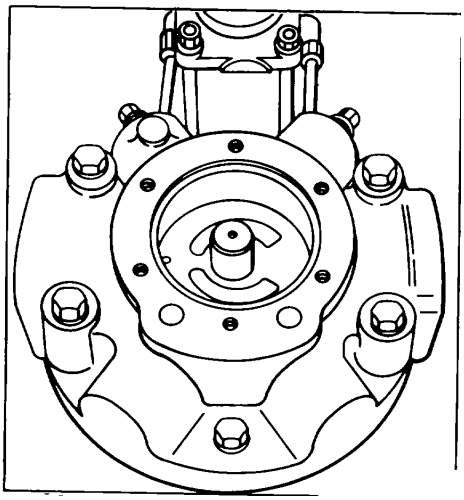


Figure 108.
Charge pump lower valve plate.

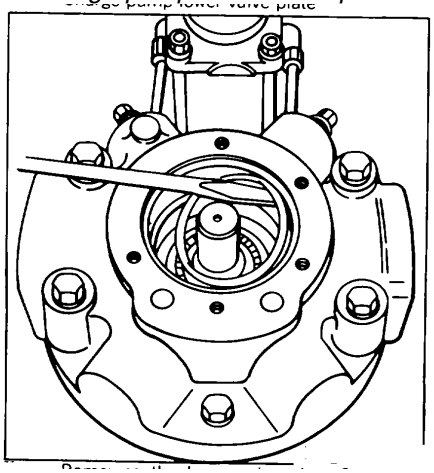


Figure 109.
Removing the lower valve plate O-ring.

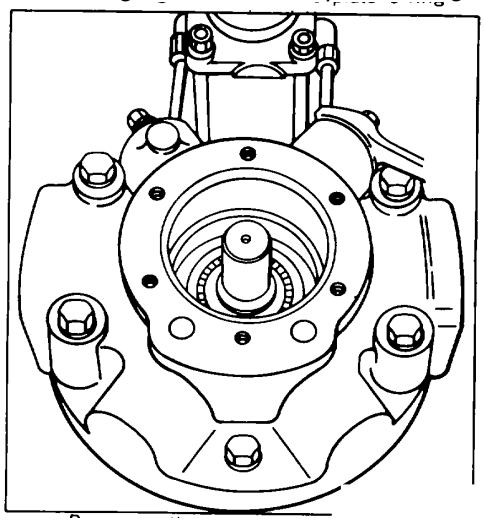


Figure 110
Removing the control sense lines

5. Mark the housing (8) and cover (9) to insure proper orientation upon reassembly. A scratch in the paint across the housing/cover parting line may be used. See .Fig. 111.

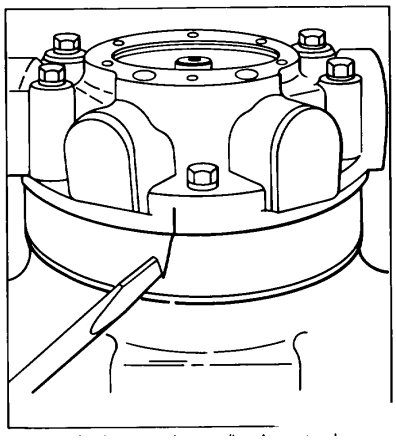


Figure 111.
Marking across the cover/housing parting line

Remove hex bolts (40 & 22) (2 short, 4 long) and lock washers (4). Lift off the pump cover (9). If the cover should stick to the housing, jar loose with a soft faced hammer. Remove O-ring (38) and cover gasket (39) from pump cover. See Fig. 112.

CAUTION

It is important that every precaution be taken to protect the bronze face on the cover from damage. <u>Never</u> lay the cover down on the bronze face. <u>Do not</u> allow miscellaneous parts or tools to come in contact with the bronze face. A nick or scratch resulting from a moments' carelessness can easily damage a cover beyond repair.

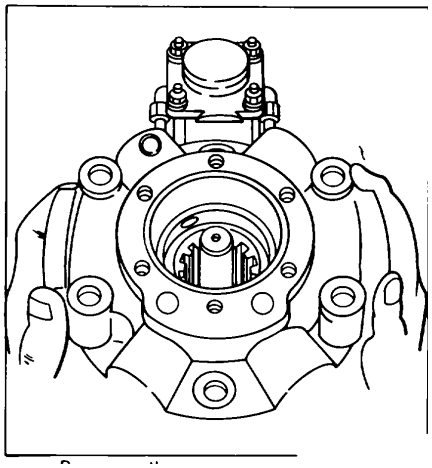


Figure 112.
Removing the pump cover
.Figure 112.

NOTE:

Pump displacement can be confirmed by one of the two methods described below:

a. In the area of the trade mark, cast in the cover, will be stamped a "6" or a "4" denoting a Model 60 or a Model 45 respectively. See Fig. 113

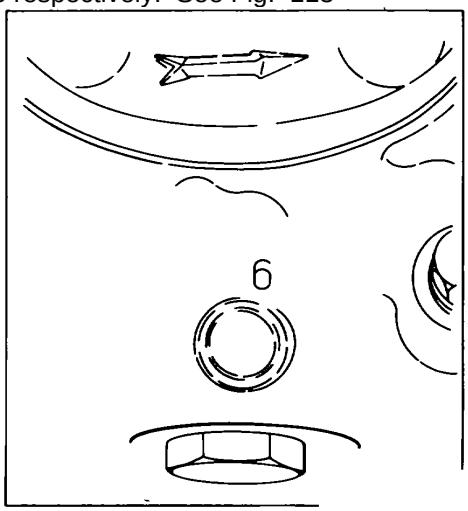


Figure 113.
Displacement identification stamp

b. Measure the width of the cover kidney, near the mid point, as illustrated. See Fig.114.

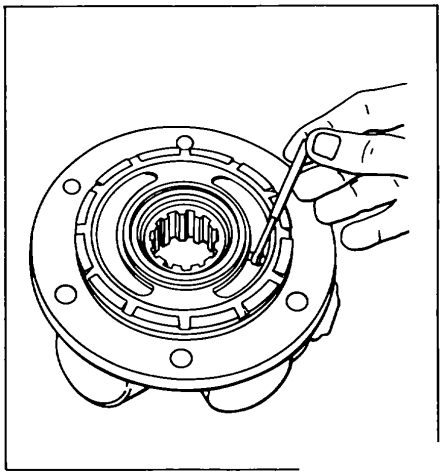


Figure 114.
Measuring kidney width

If the width is .34 Inches approximately, the pump is a Model 45.

If the width is .40 inches approximately, the pump is a Model 60.

6. Inspect the cover roller bearing (50) for galling of the rollers, roughness, or fracture of the cage. If any of these conditions exist, press the roller bearing (50) from the pump cover (9).

If the roller bearing (50) is removed from the cover, then the inner race must also be replaced, as they are a matched set.

NOTE:

Control assembly must be removed from pump at this point to proceed to Step 7.

7. Using an Allen wrench, remove Allen socket head cap screws (28) from the cam control lever assembly (35). Remove lever assembly from cam (12). See Fig. 115.

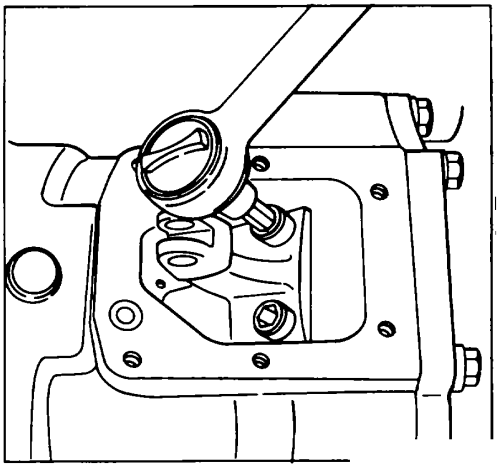


Figure 115.
Removing cam lever arm

8. From the sides of the housing (8) remove hex bolts (5) and lock washers (6). Pull out trunnions (7) and thrust washers (27) as shown in Fig. 116.

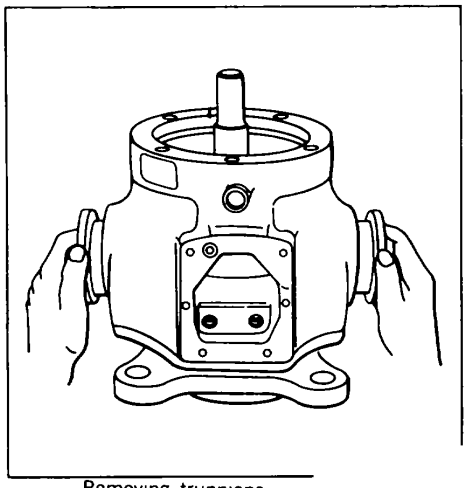


Figure 116.
Removing trunnions

9. Remove hex bolts (3) and lock washers (4) from using (8).

EXCEPTION

On older units, nuts and lock washers are removed from studs. Do not remove studs from housing unless damage is evident.

10. Remove housing (8) as shown in Fig. 14 by lifting housing straight up until all internal parts are cleared. Do not disturb internal parts during this operation.

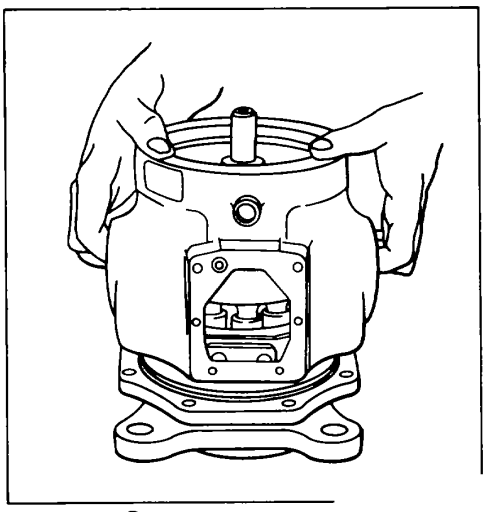


Figure 117.
Removing housing

11. Lift off rotating group consisting of parts (12, 18, 19, 20, 34, 37, 51, 52, 53, 54,) from mounting flange (2). See Fig. 118.

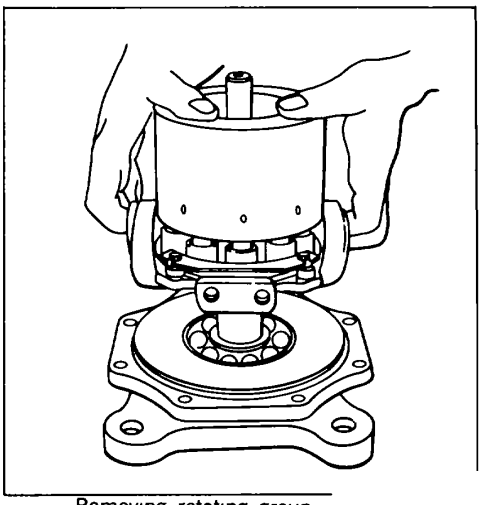


Figure 118.
Removing rotating group

12. At the factory each block is marked to indicate cylinder bore number one., Mark piston number one with felt pen or a similar devise as a convenient method of preserving the bore/piston relationship. See Fig. 119.

Remove cylinder block (37) by lifting straight up until piston assemblies are cleared.

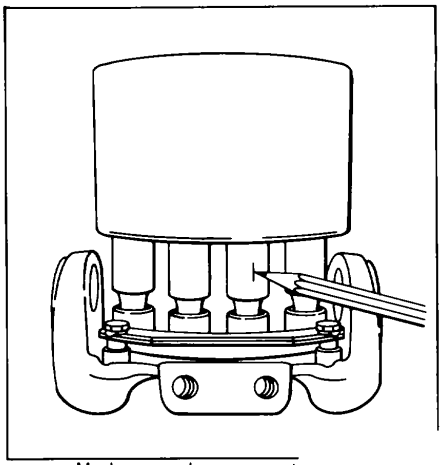


Figure 119.
Marking number one piston

Upon reassembly, all used pistons must be returned to their respective bores.

13. Examine the block assembly (37) for excessive wear or damage.

Cylinder bores that exhibit only slight burnishing of the bronze liners are acceptable for reuse.

If the bores exhibit galling or any other irregularity in the running surface that can be felt with the fingernail, the cylinder block must be discarded.

If there is evidence that the bronze liners have begun to pull out of the steel block, the block must also be discarded.

Examine the upper running face of the block. Circular wear patterns or phonographing that cannot be felt with the fingernail are normal.

If the block is acceptable for reuse in all other respects, several passes of the block over 500 grit emery paper on a flat lap surface is recommended to put the block face in a like-new condition. If circular wear patterns can be felt with the fingernail, grind or lap the running face as necessary to remove the wear pattern keeping the face parallel to the original face. Lap the reworked face on 500 grit emery as described above to remove the mat finish.

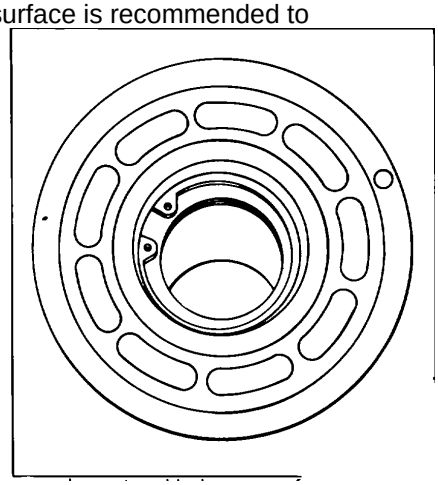


Figure 120.
Inspecting block running face

Clean the block thoroughly in a commercial degreaser, such as trichloroethylene and blow dry with clean compressed air. Check tolerance of refinished block outlined in Fig. 121 If the reworked block does not meet tolerances, discard the block.

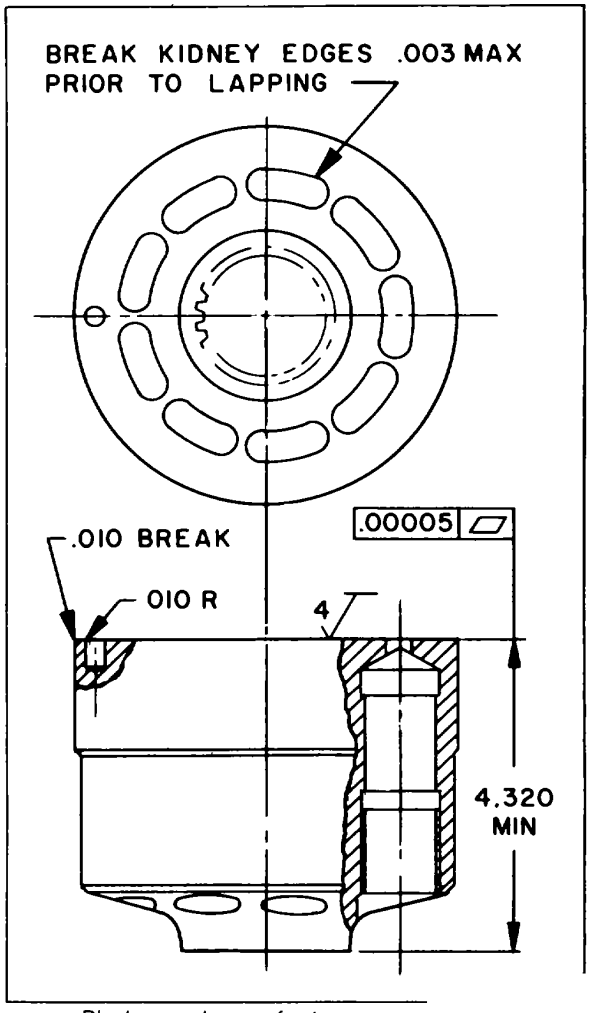


Figure 121.
Block rework specifications

If damage is evident to spring or spring retainers, use an arbor press to remove retaining ring (51). CAUTION must be exercised in removing block spring (53) since it is under considerable compression. Using a plug 13/4" in diameter, compress block spring (53) until all tension is removed, from retaining ring (51). Using truarc pliers, remove retaining ring (51) and gradually release arbor press until block spring (53) is fully extended. Remove outer spring retainer (52), block spring (53) and inner spring retainer (54) from cylinder block (37).

14. Remove two hex bolts (17) two tab lock washers (16) and remove one clip (15), one bearing plate (14), and two spacers (13). See Fig 112. Inspect bearing plate (14). If wear is evident or there are scratches in the bearing surface, discard bearing plate and replace. If beating plate (14) must be discarded, disassemble other return plate spacer and discard second bearing plate. If bearing plate (14) is reuseable, do not disassemble second return plate spacer, assembly.

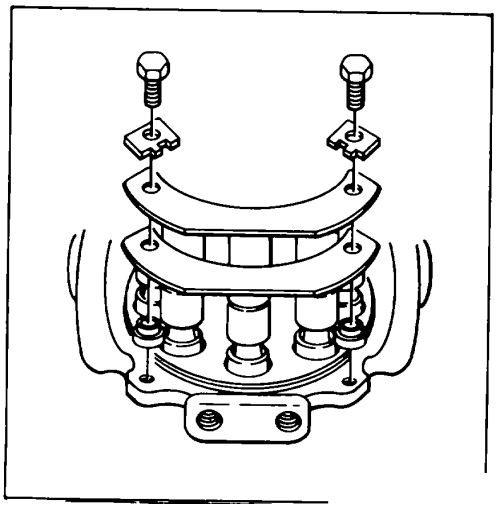


Figure 122.
Return plate spacer disassembly

EXCEPTION

On older units, remove two hex bolts (A) tab lock washers (B) and return plate guides (C). See Fig. 123.

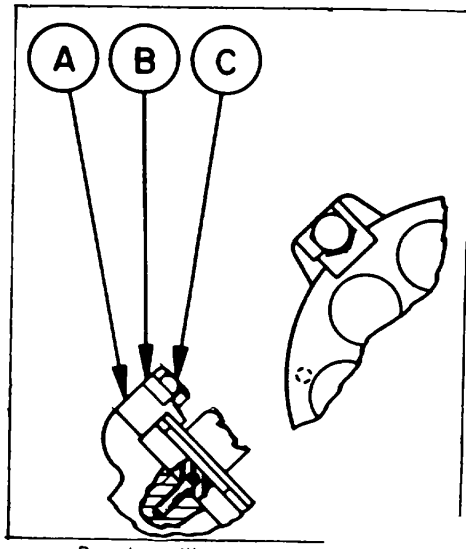


Figure 123.
Pre phase III return plate guides

15. Slip out piston return plate (19) and piston assemblies (18). Pick wear plate (20) from cam assembly (12). See Fig. 124.

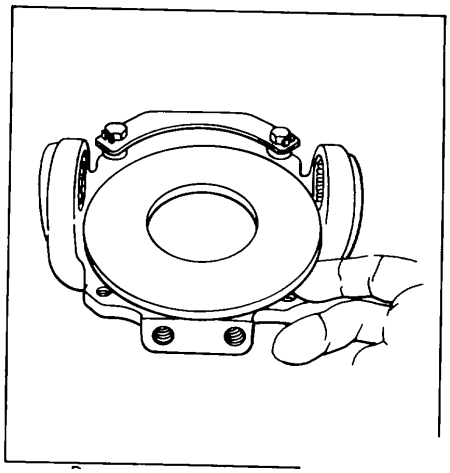


Figure 124.
Removing cam reaction plate

16. Inspect cam assembly (12) for damage. Remove any burrs or nicks from the face of the cam with a fine stone. Inspect trunnion bearings (23) for galling, roughness, or cracked cages. If damaged, press trunnion bearings from cam (12) using an arbor press and a plug 11/2" in diameter.

NOTE:

On a major overhaul, replace trunnion bearings (23), regardless of conditions, as described above.

17. Remove O ring (31) from flange (2). See Fig. 125.

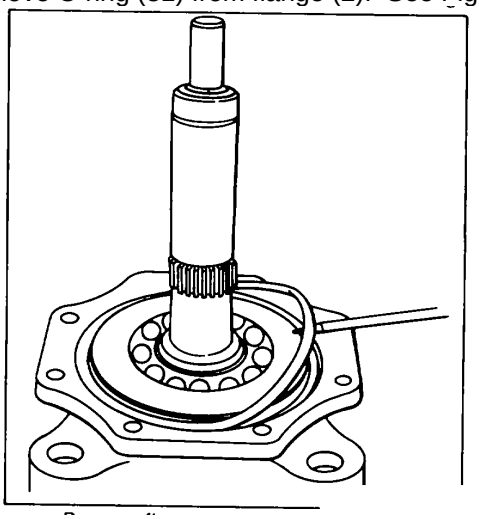


Figure 125.
Removing flange square ring

18. Reverse mounting flange (2) and remove four hex bolts (3) (six where applicable) and lock washers (6). See Fig. 126.

If the shaft seal retainer (57) has two 1/4" threaded pulling holes, use two 1/4" bolts and screw into-threaded holes until the gasket seal is broken.

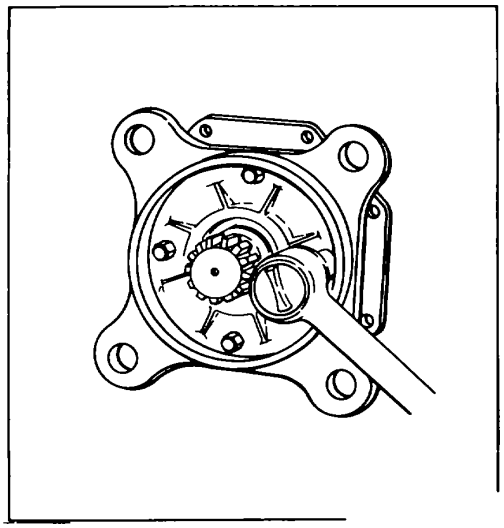


Figure 126.
Removing shaft seal retainer bolts

If shaft seal retainer (57) does not contain the two 1/4" threaded holes, tap the sides of the bolt hole counterbores lightly to break the gasket seal. Using a screw driver, remove seal assembly (57) See Fig. 127.

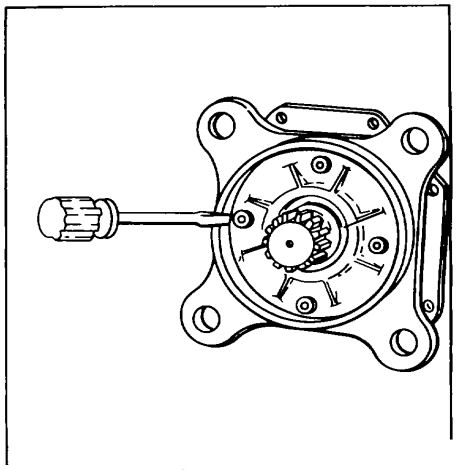


Figure 127.
Removing shaft seal retainer

19. Remove shaft seal (56) from retainer (57) using an arbor press and a 21/2" plug.

20. Remove square ring (29) from flange.

EXCEPTION

In the absence of the O ring and groove, remove retainer gasket (A) from retainer (B) or flange (C). See Fig. 128.

21. Remove pump shaft and assembled parts (1, 30, 55, 49 and inner race of 50) by pulling straight up from mounting flange (2), as shown in Fig.129.

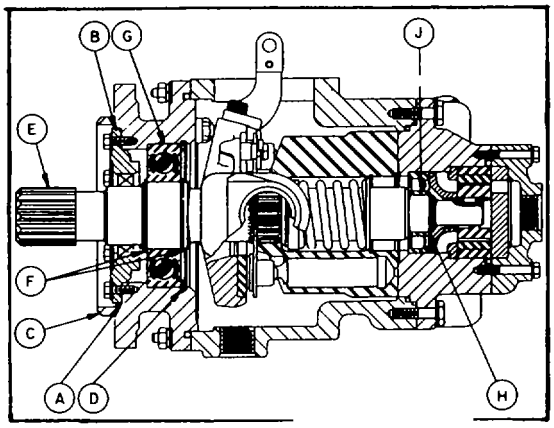


Figure 128.
Pre Phase III pump cross section drawing

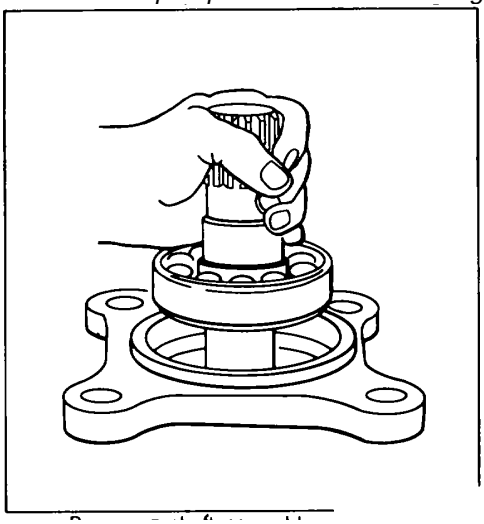


Figure 129.
Removing shaft assembly

EXCEPTION

On units with an 8 inch square flange (pre Phase III) the shaft is removed from the back of the flange. See Fig. 128.

A. Reverse mounting flange (C) and remove retainer ring (D) using truarc pliers.

B. Remove pump shaft (E) and assembled parts (F, G, H, and J) by pulling shaft (E) straight up from back of mounting flange (C).

22. Inspect ball bearing (30) for galling, roughness or cage cracks. If damage is evident, remove retaining rings (55) (or F is applicable) using truarc pliers and press ball bearing (30) from shaft.

23. Inspect the inner race of roller bearing (50) (or J if applicable) for galling or roughness. If no damage is apparent and if no damage was observed when the outer race was inspected in Step 7, then it is not necessary to remove the inner race from the shaft.

If, on the other hand, damage to either the inner or outer .race is observed, BOTH must be

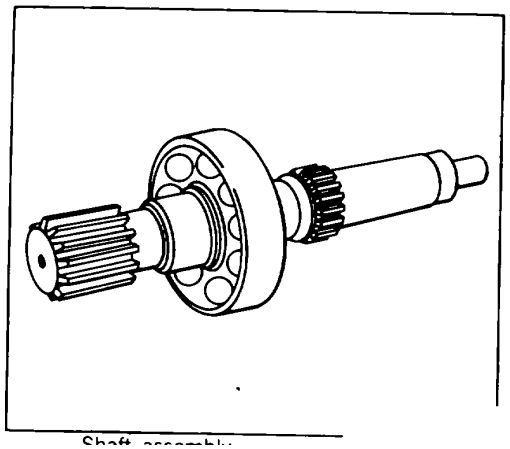


Figure 130.
Shaft assembly

replaced. The inner and outer race are serviceable as a matched set only. Remove retainer ring (49). Slip inner race from shaft (1).

This completes disassembly of the Dynapower pump.

PUMP ASSEMBLY

Keep Dynapower parts and work area absolutely clean at all times.

Shaft and bearing failures are often of a fatigue type. If the pump has had considerable service life, replace these parts as they may be close to the fatigue point. Use new gaskets and seals, except as noted.

1. Inspect pump shaft (1) for excess wear or damage. If either spline shows damage or if bearing journal or seal surface shows galling, scoring or heat discoloration, replace shaft.

2. If inner and outer race of roller bearing (50) are not damaged or worn, assemble inner race on shaft (1) with retaining ring (49) using truarc pliers. If either inner or outer race is damaged, replace bearing as a set only! Install new inner race as described above.

3. If previously removed, install inner retainer ring (55). Inspect old ball bearing. If galled or damaged, press new ball bearing (30) on pump shaft (1). Ball bearing (30) should seat against inner retainer ring (55). CAUTION should be exercised not to deform inner retainer ring by forcing bearing (30) against it. If deformed, back bearing (30) off and reseat. Care should be taken to support inner race of ball bearing (30) in arbor press while pressing in shaft (1). Heating the ball bearing in hot oil will aid in a smooth bearing installation. Install outer retaining ring (55).

4. Install pump shaft assembly (1, 30, 55, 49 & inner race of 50) through the front face of the mounting flange (2). See Fig.131. The ball bearing (30) should fit snugly in the. flange (2). If ball bearing (30) doesn't seat easily, heat mounting flange (2) in hot oil and seat ball bearing in proper position. Do not drive the ball bearing (30) into place. Do not use the shaft seal retainer (57) to force bearing into seat. Check bearing (30) for free running by rotating shaft (1).

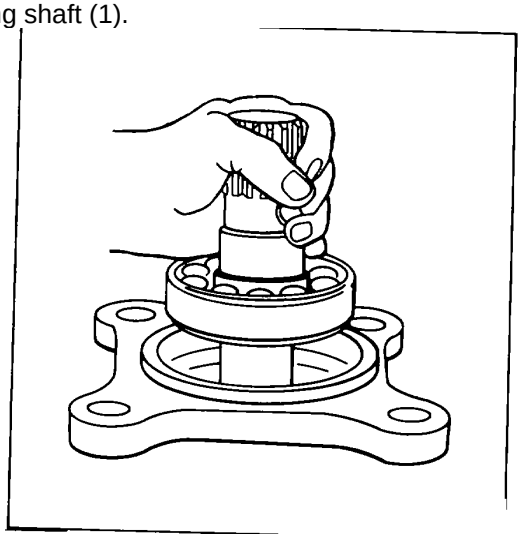


Figure 131.
Installing pump shaft assembly

EXCEPTION

On units with an 8 inch square flange, the shaft assembly is installed through the back face of the flange. See Fig. 128.

A. Install pump shaft (E) and assembled parts (F, G, H & J) from back of flange using procedure as described in Step (4) above.

B. Using truarc pliers, install retaining ring (D) in adapter.

5. Press a new shaft seal (56) into the retainer (57) using an arbor press with a 21/2 inch plug and loctite sealant. Fill cavity between oil lip and wiper lip approximately 3/4 full with Litholene Multi-Purpose grease. Install new square ring (29) in flange (2). To prevent possible cuts or abrasion, the square ring (29) should be lightly coated with a multi-purpose grease. Wrap shim stock or other thin material around shaft spline and carefully slide shaft seal (56) and retainer (57) over pump shaft (1).

EXCEPTION

In the absence of square ring shoulder, place new gasket (A) over pump shaft (E) and proceed as in Step (6). See Fig. 128.

6. Line up bolt holes and secure seal assembly (57) to flange (2) with hex bolts (58) and lock washers (6). Torque bolts to 132 in. lbs. See Fig. 132.

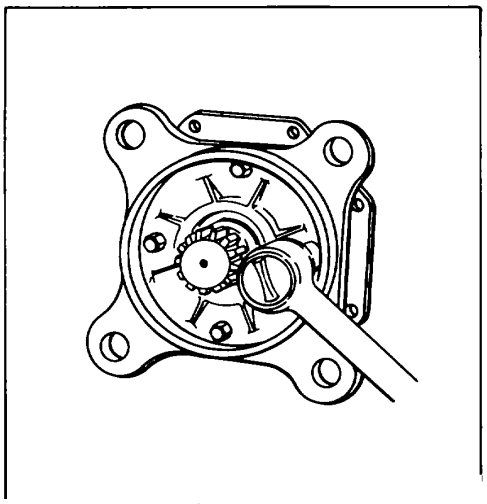


Figure 132.
Installing shaft seal retainer

7. If trunnion bearings (23) were removed from cam (12) during disassembly, install new trunnion bearings (23) using an arbor press and a 11/2 inch plug, pressing against the lettered side of the trunnion bearing. It is extremely important that the bearing be started straight into the bore. If the bearing cocks at any time during assembly, remove and discard the bearing. Support the cam lug on the under side to avoid bending the lug. Outer face of trunnion bearing (23) should be pressed flush with outer face of cam (12).

8. Examine wear plate (20). Circular patterns burnished on the surface of the cam plate are normal. If circular patterns on the wear plate are extensive and can be felt with the fingernail, or if angular scratches are evident, the plate must be discarded. See Fig. 133.

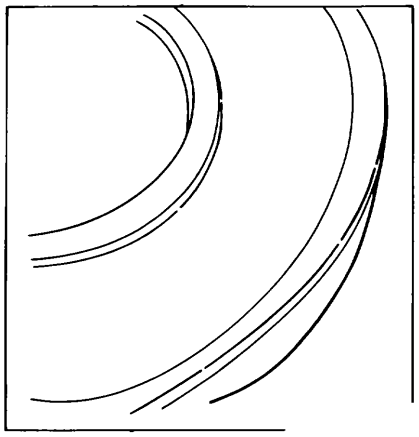


Figure 133.
Inspecting cam reaction plate

9. Match up dowl pin (34) in cam (12) with dowel pin hole in wear plate (20) and seat wear plate (20) in cam(12) See Fig.134.Check proper seating by pushing down on first one edge and then the opposite edge of the wear plate in a rocking motion. If any looseness is felt, remove cam plate and completely clean and compressed air dry both the cam (12) and wear plate (20) to remove any foreign particles from beneath wear plate. Reposition wear plate in came (12) and repeat above procedure. If wear plate (20) refuses to seat properly, check plate for flatness and replace if necessary.

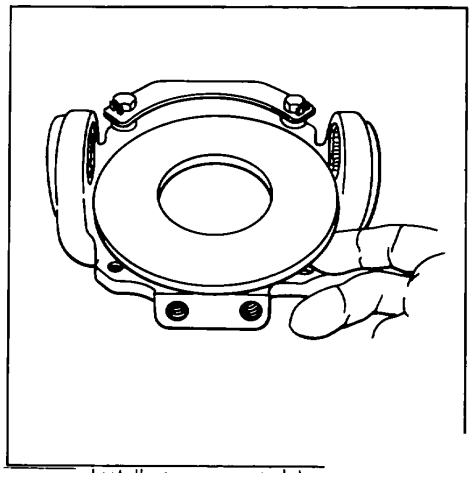


Figure 134.
Installing cam wear plate

10. With a push-pull motion, check for free play between bronze shoe and steel piston body. If any play can be felt, the piston must be discarded. Inspect bronze piston shoes (18). During normal service, a dulling of the running surface is to be expected. If large scratches, that can be felt with a fingernail, are present, see Fig.135, make several short passes over 500 grit emery paper on a lap surface.

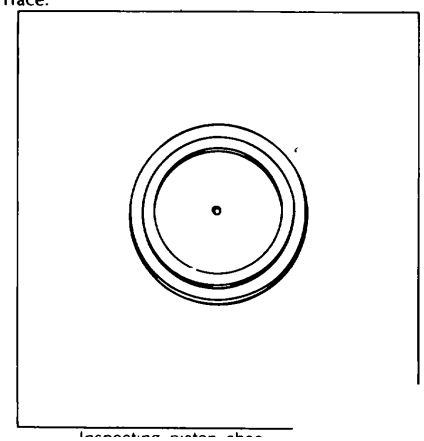


Figure 135.
Inspecting piston shoe

ON THE LAST FEW PASSES, PLACE 5-6 SHEETS OF EMERY PAPER AS A CUSHION UNDER THE TOP SHEET TO OBTAIN THE PROPER EDGE SHARPNESS. Check the reworked piston shoe (18) with

tolerance limits in Fig. 33. If piston shoe (18) does not fall within tolerance limits, discard reworked piston and replace.

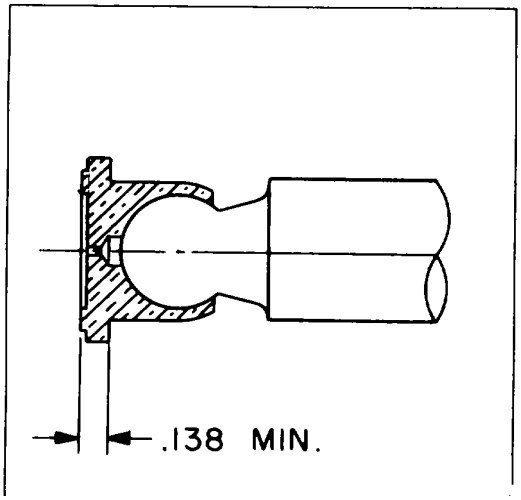


Figure 136.
Piston shoe rework tolerance

Check piston shoe for iron or steel particles imbedded in the running surface. If present, discard the piston.

Often, large scratches on the piston shoe running surface will "heal over" if placed back in service. It is recommended, however, that all piston shoes with badly scratched running surfaces be either reworked within tolerance limits or replaced.

NOTE:

Dynapower units may be encountered with either two groove or three groove pistons. See Fig. 137.

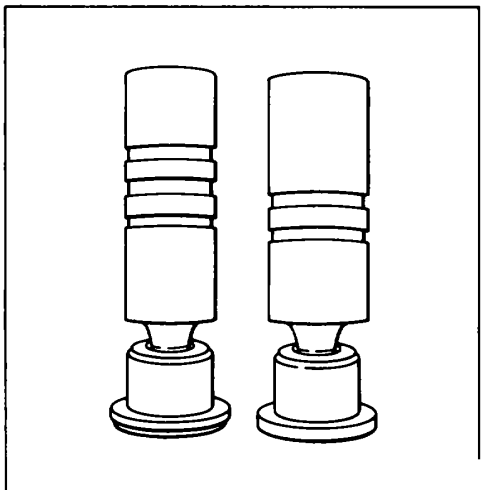


Figure 137.
Two groove and two groove pistons

Units supplied from the factory with two groove pistons may be refitted with three groove pistons as a nine piece set only.

In a like manner, units supplied with three groove pistons may be refitted with two groove pistons again only as a nine piece set. Two groove and three groove pistons must not be mixed in the same unit.

NOTE:

Model 45 and 60 pistons are easily identified by characteristic piston shoe running surface configurations. See Fig. 138.

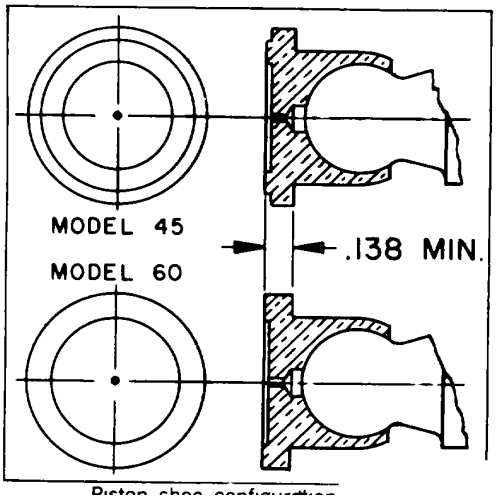


Figure 138.
Piston shoe configuration

11. Inspect steel piston body. If any galling is apparent or if any irregularities can be felt with the fingernail, the piston must be discarded. See Fig. 35. If damage is apparent, check the corresponding cylinder block bore (12) for similar damage.

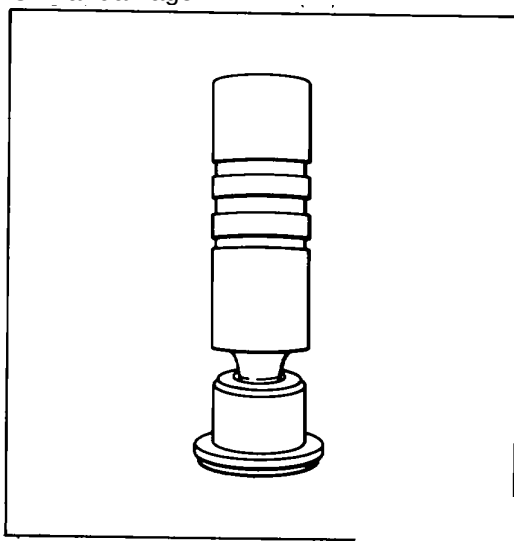


Figure 139.
Inspecting piston body

Inspect piston return plate (19) for heat discoloration or cracks. Check for flatness. If discolored, cracked or distorted, replace with a new return plate. See Fig. 140.

12. Install piston assemblies (18) in piston return plate (19). Used pistons must be so positioned in

the return plate to allow placement of pistons in their respective cylinder block bores as described in Step 12, Page 92.

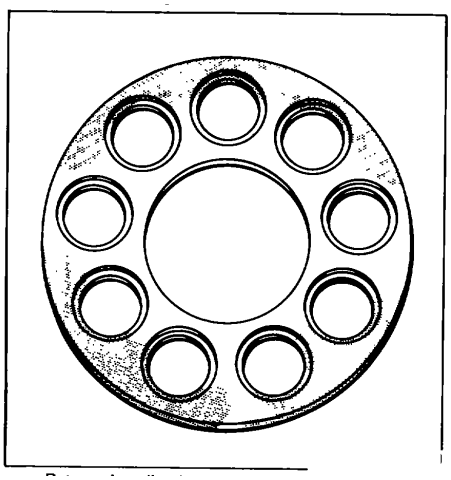


Figure 140.
Return plate discolored by heat

13. If piston return plate spacer assemblies (13, 14, 15, 16, & 17) were both disassembled in Step 15, Page 14, reassemble two spacers (13) one bearing plate (14), one clip (15), two new tab lock washers (16) and two hex bolts (17). Do Not tighten bolts (17).

EXCEPTION

On older units, assemble two hex bolts (A), two new tab lock washers (B), and two return plate guides (C). Do Not tighten bolts. See Fig. 123.

14. Spread a light film of oil over the surface of the wear plate (20) and slide piston (18)/return plate (19) assembly into place.

15. Assemble second of two spacer assemblies. Install two spacers (13), one bearing plate (14), one clip (15), two new tab lock washers (16), and two hex bolts (17). See Fig.141.Torque four hex bolts (17) to 156 in. lbs. Check clearance between each piston shoe and wear plate surface. Clearance should not be less than .003 or more than .007 in. Clearance of .0015 to .003 are acceptable ONLY if the rotating group spins freely by hand with no binding or tight spots. Turn up tab locks (16).

EXCEPTION

On older units assemble two hex bolts (A), two new tab lock washers (B) and two return plate guides (C). Torque four hex bolts (A) to 156 in. lbs. and check tolerance as described above. Turn up tab locks (B). See Fig. 123.

16. If cylinder block (37) was completely disassembled in Step 13. Page 93, proceed with block reassembly as follows: Install the inner spring retainer (54), block spring (53) and outer spring retainer (52) in cylinder block (37). Place block in an arbor press and compress block spring 153i. Install spring retainer (51). Gradually release spring (53) until it seats against retainer ring (51).

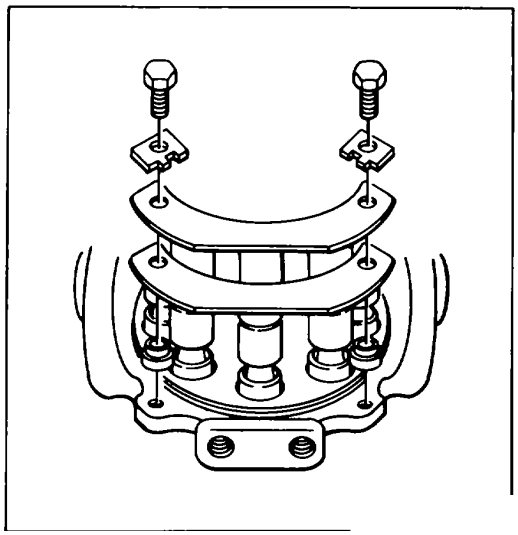


Figure 141.
Return plate spacer assembly

17. Position pistons (18) in cam assembly to stand erect. Spread a thin film of oil over the inner surface of the block (37) piston bores and very carefully lower the block (37) over the piston assemblies. CAUTION should be exercised to return used pistons to their original bores. A slight rotary motion of the block will often aid in positioning the block over the pistons. DO NOT force the block over the piston assemblies. See Fig. 142.

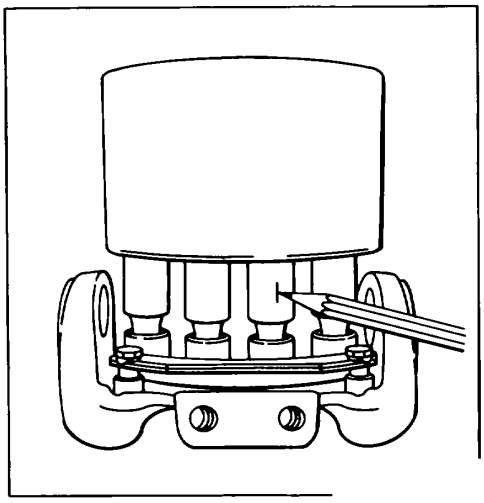


Figure 142.
Rotating group assembly

18. Lower rotating group consisting of cam. pistons and block assembly over pump shaft (1) and on to mounting flange (2) See Fig.143) Rotate cam assembly (12) to accept trunnions 17) through holes in the housing 18).

19. Install new O-ring a31 on mounting flange (2). Lower housing 18) carefully oxer rotating group

and on to flange (2) being carefull not to disturb the assembled, internal parts. See Fig. 144. Install hex nuts (3) and lock washers (4) and torque to 450 in. lbs.

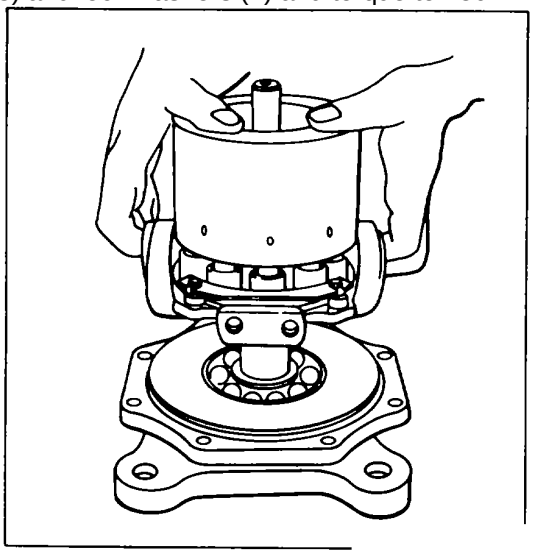


Figure 143.
Position rotating group

20. Inspect the trunnions (7). Small nicks or burrs can be removed with 500 grit emery cloth. If galling or scoring can be felt with the fingernail, the trunnion should be discarded. See Fig. 145.

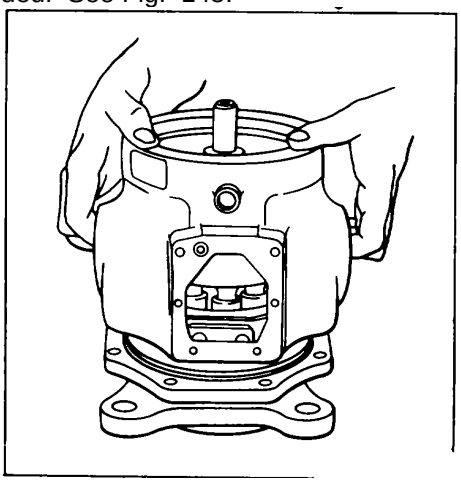


Figure 144.
Positions pump housing

21. Assemble new trunnion thrust bearings (27) and gaskets (24) on trunnions (7). Insert a large screw driver through the cam lever opening in the housing and between the cam assembly and the back face of the flange. A slight downward pressure on the screw driver will lift the cam assembly into position to allow insertion of the trunnion.

Do not drive or torce trunnions into position. If the trunnions do not slide easily into place, rotate the trunnions slowly back and forth while repositioning the cam with the screw driver until the trunnions seat properly. See Fig.146. Install eight hex bolts (5 and lock washers (6) in trunnions and torque to 132 in. lbs.

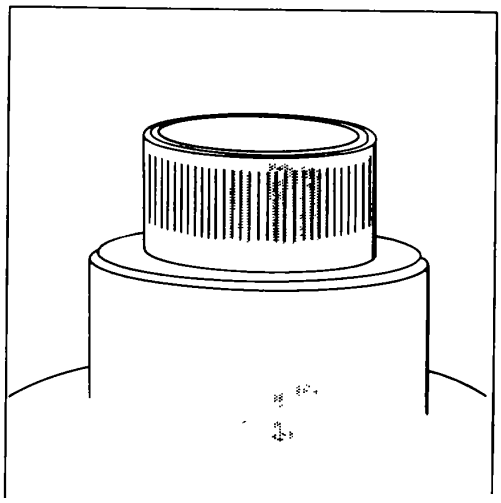


Figure 145.
Inspecting trunnions

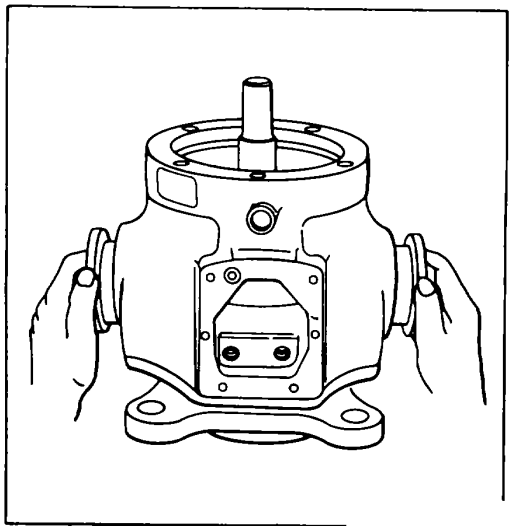


Figure 146.
Installing trunnions

22. Inspect cam lever bolt holes being certain they are clean and dry. Install lever assembly (35) including dowel pin (36). Apply Loctite, Grade D, to allen head cap screw threads (28), install screws and torque screws to 1040 in. lbs. See Fig. 147.

23. Inspect pump cover (9) bronze face for signs of cavitation, excess wear, contamination or other damage. See Fig. 148.

If circular wear patterns cannot be felt with a fingernail and if there are no nicks, scratches or other surface blemishes, one or two passes across 500 grit emery paper on a lap surface will put the bronze face in like-new condition. If scratches or the wear pattern can be felt with a fingernail, use 500 grit emery as described above and continue to make passes

until wear pattern or scratches can no longer be felt. Removal of scratches that may cross the lands on either side of the kidney ports is extremely critical. Every effort must be made to remove them.

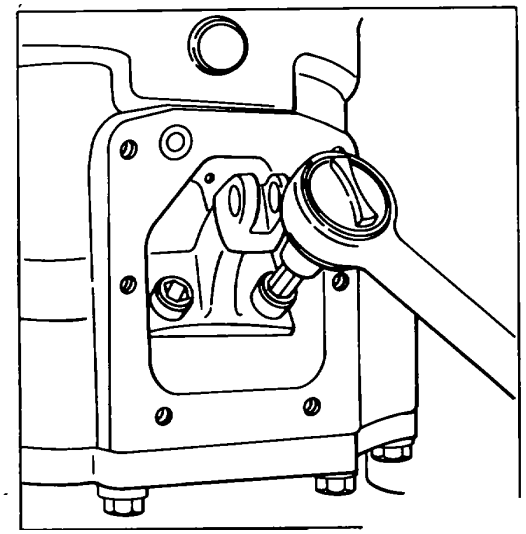


Figure 147.
Installing cam actuator arm

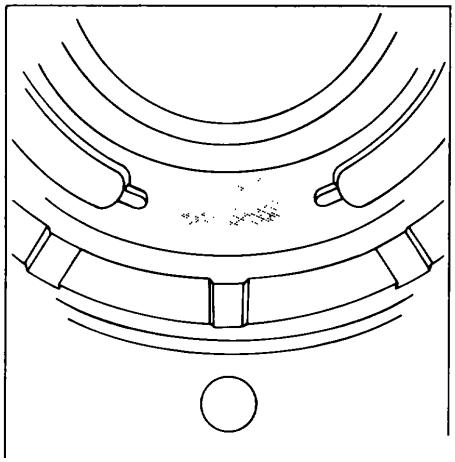


Figure 148.
Inspecting pump cover

Wash reworked cover in a solvent or commercial degreaser, such as Trichlonolthylene, and dry with compressed air. Check against tolerances in Fig.149 If the reworked cover does not fall within the tolerance limits it must be discarded.

24. If outer race of roller bearing (50) was removed during disassembly or if the inner race was removed and replaced, install outer race in pump cover using an arbor press and plug of proper size.

It is important that if either the inner or outer race is to be replaced, the entire bearing be replaced.

25. Apply vaseline to new O-ring (38) and position on the cover (9). Fill pistons with new transmission oil allowing a small excess oil to spill over the face of the block (37).

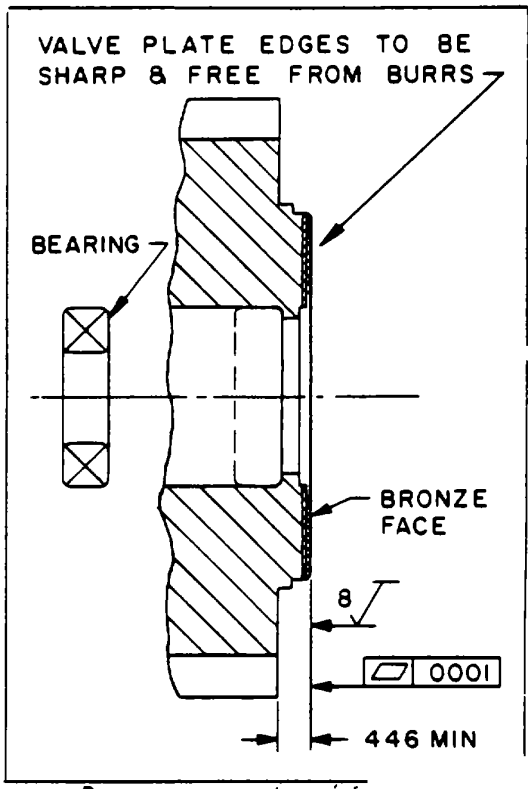


Figure 149.
Pump cover rework specifications

26. Place new gasket (39) on housing and position cover as shown in Fig.150utilizing reference marks in housing and cover. To operate properly, the cover must be assembled in its original position. Install six hex bolts (40) and lock washers (4). Torque bolts opposite one another to 450 in. lbs.

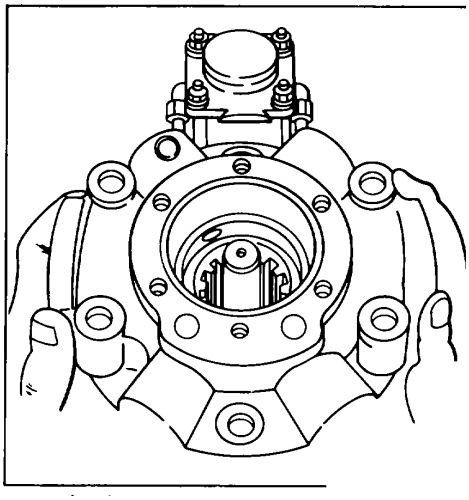


Figure 150.
Installing pump cover

27. Visually inspect two check valve plungers (59). If free of nicks, burrs or a seating pattern that can be felt with a fingernail, the plungers need not be replaced. Install new O-rings (62) on check valve plug (61). Place plungers (59) and springs (60) in

cover (9). Apply vaseline to O-rings (62) and install plugs (61) in cover.

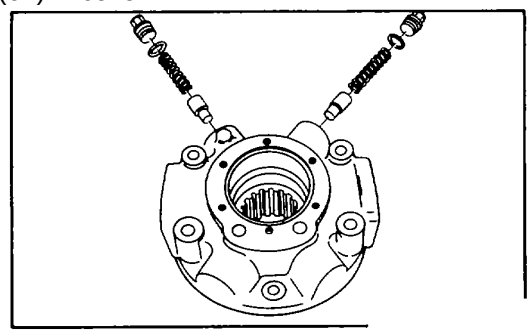


Figure 151.
Pump cover with assembled parts

28. Visually inspect upper (45) and lower (42) valve plates. If circular wear patterns can be felt, discard both the upper and lower plate. See Fig. 152.

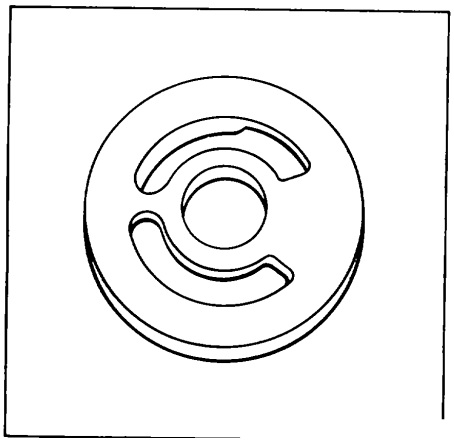


Figure 152.
Inspecting charge pump upper valve plate

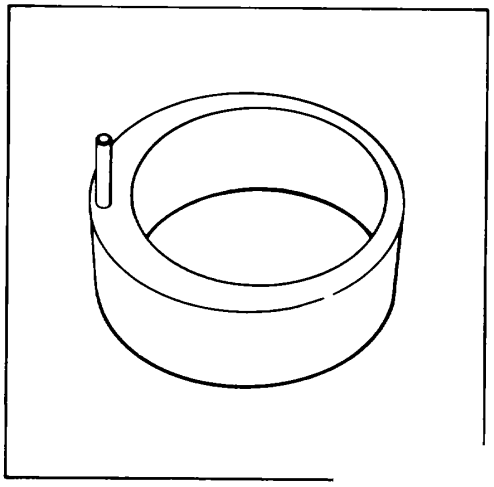


Figure 153.
Inspecting charge pump eccentric

If wear patterns cannot be felt. inspect valve plates for nicks and burrs. Rub flat faces and the outside edge with 500 grit emery paper on a lap surface to remove any high spots. Inspect charge pump spacer assembly (48). If any galling or excessive wear is apparent, discard the spacer assembly (48). See Fig.153.Remove any burrs with a hard Arkansas stone or equal to remove 'any nicks from the flat faces.

29. Position O-ring (41) over cover bearing (50). Lubricate the entire charge pump cavity with clean transmission oil.

30. Install lower valve plate (42) over cover bearing (50) and O-ring (41). See Fig. 154.

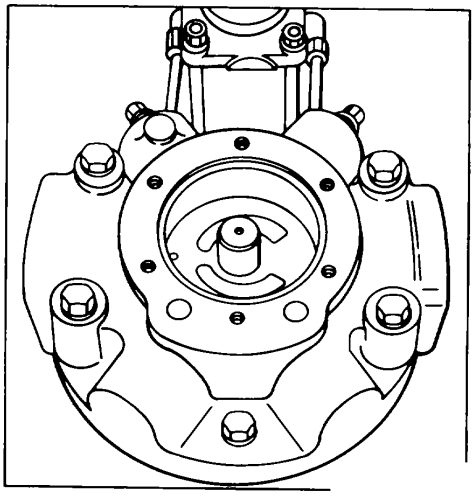


Figure 154.
Charge pump lower valve plate

31. Inspect charge pump inner and outer rotor (47) for damage or excess wear. If inner or outer rotor are scratched or galled, the gears must be replaced as a set. See Fig. 155.

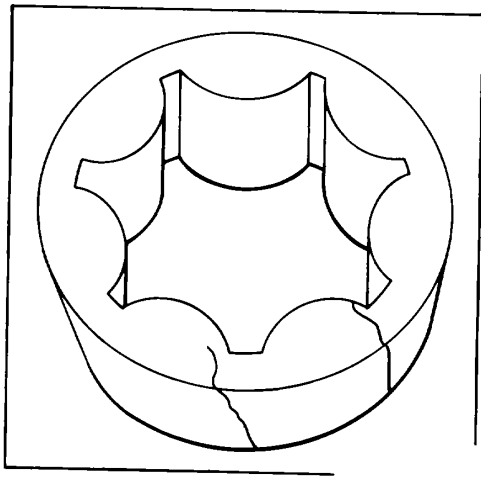


Figure 155.
Inspecting outer rotor

Rotate one gear within the other to check for free action. If action seems stiff in a particular area, use a hard Arkansas stone and lightly touch up the gear edges. Re-check for free rotation.

32. Position key (46) in shaft keyway. Install charge

pump gears (47) over keyway on shaft (1). Check for proper key engagement by attempting to rotate inner gear on shaft. If gear turns on shaft, remove gear, reposition key and repeat installation of gears.

33. Install the charge pump spacer (48) over the charge pump gears (47) positioning the short end of the roll pin in the lower charge pump valve plate. See Fig. 156.

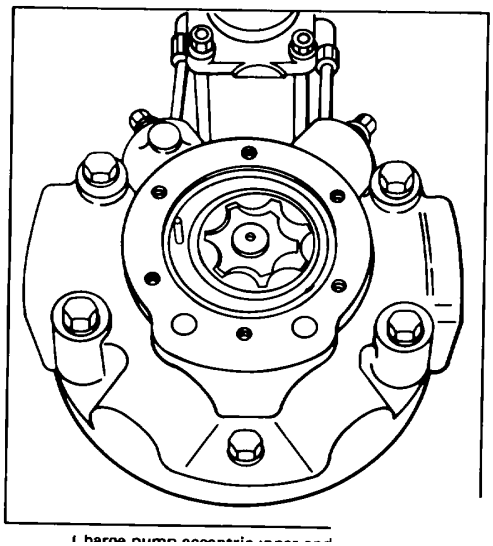


Figure 156.
Charge pump eccentric inner and outer gerotor

Use a depth gauge to confirm .001-.0035 clearance between the top of the charge pump spacer (48) and the top of the charge pump gears (47). See Fig.157.

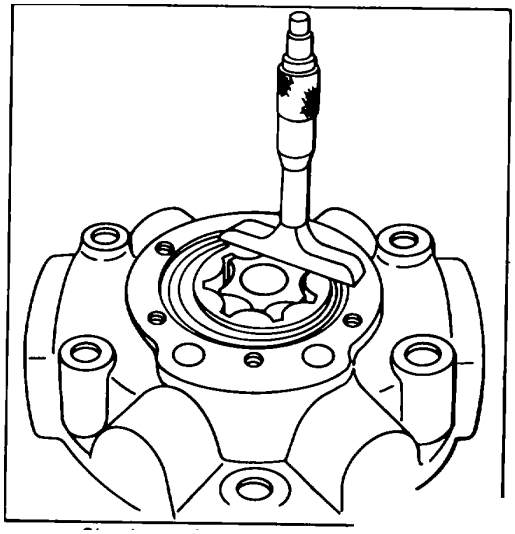


Figure 157.
Checking charge pump clearance

34. Install new 0-ring (44) to outside of charge pump spacer (48). The direction of pump rotation is indicated by an arrow cast on the charge pump cover.

Install upper valve plate, over roll pin in spacer assembly (48). See Fig. 158..

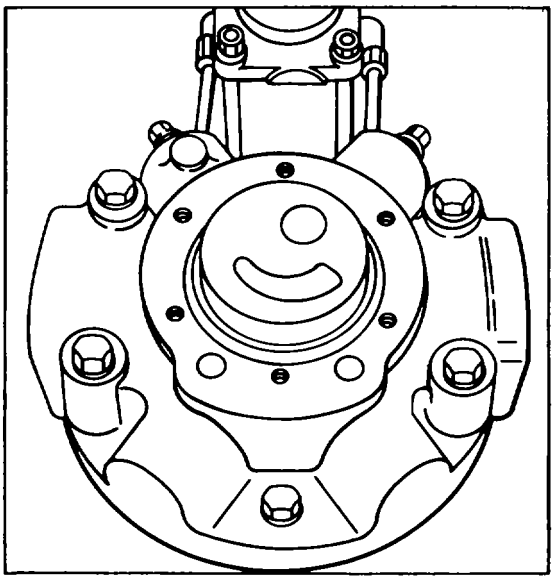


Figure 158
Charge pump upper valve plate

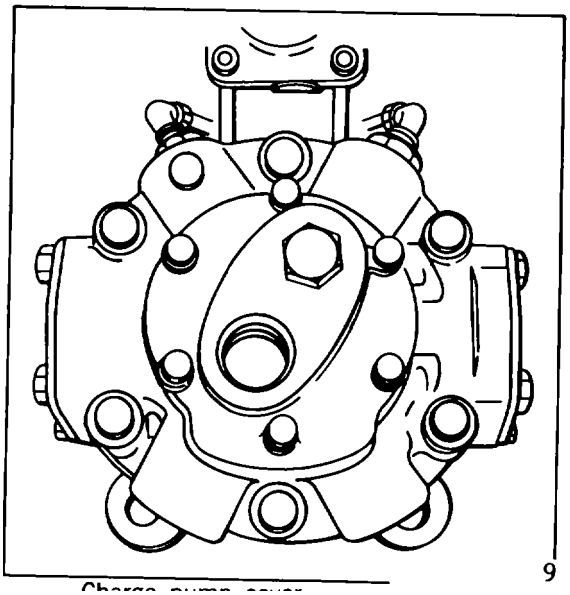


Figure 159.
Charge pump cover

38. Rotate pump shaft (1) to check for binding in the charge pump. If shaft will not turn, remove charge pump cover (10) and upper valve plate (45). Re-check charge pump tolerances as described in

Step 33 and replace charge pump if necessary.

This completes reassembly of the Dynapower Pump.

C. ROTATION CHANGE

Dynapower pumps are assembled at the factory to operate in one direction only as indicated by the arrow on the charge pump cover. To change rotation of the Dynapower pump, the charge pump must be refitted with parts of opposite rotation. Parts necessary to change rotation are packaged in KIT form and are available through your Dynapower representative. Change of rotation procedures are similar for both single ported and dual ported charge pumps.

Additional notes are included where variations in procedure may be encountered.

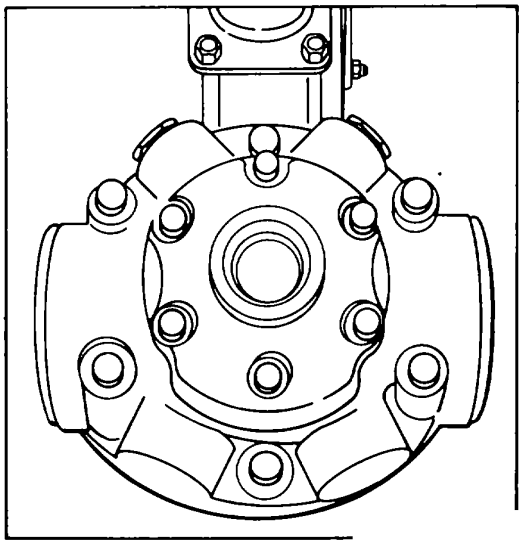


Figure 160.
Single ported charge pump cover

a. Remove six hex bolts (11), lock washers (6), and charge pump cover (10).

b. Peel shim(s) (43) from pump cover and discard.

c. Remove charge pump upper valve plate (45).

d. Without removing any additional parts, rotate the charge pump assembly 180° utilizing the roll pin in the charge pump spacer assembly (48). Often, a moderate resistance is met when rotating the charge pump assembly. This is normal and should be of no concern.

e. On single ported charge pumps only, invert charge pump upper valve plate (45) and place it on the charge pump assembly so that the original upper face is now in a downward position and the open kidney remains adjacent to the pump cover feed holes. See Fig. 161.

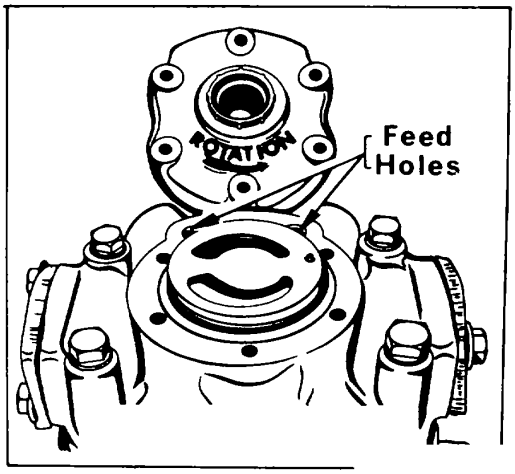


Figure 161.
Upper valve plate with single ported charge pump cover

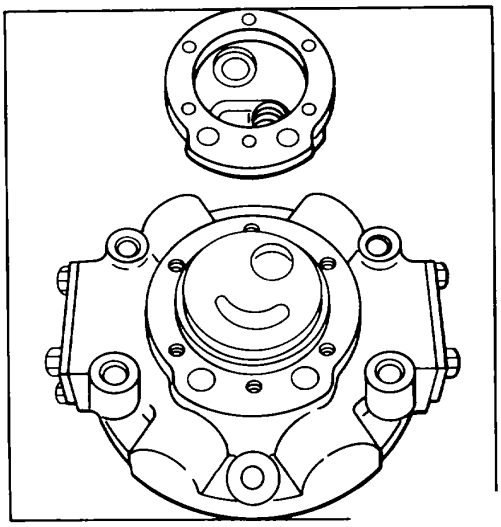
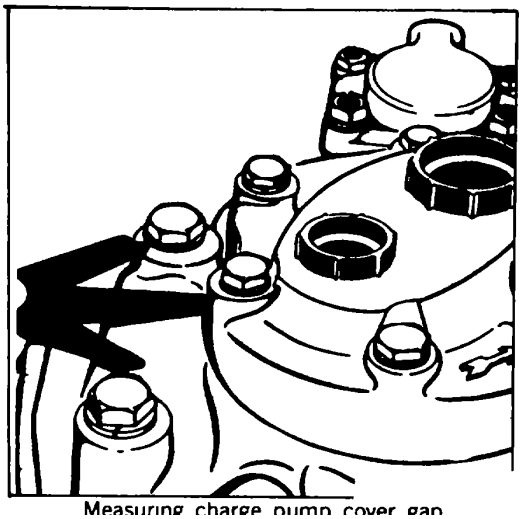


Figure 162.
Charge pump with cover

f. Install a new charge pump cover (10) with a rotation arrow indicating the desired rotation.

g. With a feeler gauge, measure the gap between the charge pump cover (10) and the main cover (9) in a minimum of four places. See Fig. 163.



Measuring charge pump cover gap

Figure 163.
Measuring charge pump cover gap

h. Remove the charge pump cover (10) and install shim(s) of a thickness 0.002" greater than the maximum measured gap. Shims are color coded as follows:

Shims	
Amber–-	.001" thick
Red—	.002" thick
Green–-	.003" thick
Blue–-	.005"thick

Charge pump cover shims.
Figure 164.

1. Install cover (10) with six hex bolts and lock washers and torque to 132 in. lbs.

NOTE:
The name tag should now be altered to record the change in rotation. This is done by changing the pump part number.

All pumps with an odd part number are left hand rotation, as viewed from the cover end.

All pumps with an even part number (with zero considered an even number) are right hand rotation, as viewed from the cover end.

If the six digit part number is even (for example, 895004) and the charge pump has been changed to left hand rotation, as viewed from the cover end, then the part number should be changed to the next **higher** number (in this example, 895005).

If the six digit part number is odd (for example, 895027) and the charge pump has been changed to right hand rotation, as viewed from the cover end, then the part number should be changed to the next **lower** number (in this example, 895026).

On units with 890*** series numbers, an "R" or "L" should be counterstamped over the original rotation designation. For example, a 45R becomes a 45L or a 60LHP becomes a 60RHP upon rotation change.

OVERHAUL - LONG DIFFERENTIAL PRESSURE COMPENSATED OVERRIDE CONTROL

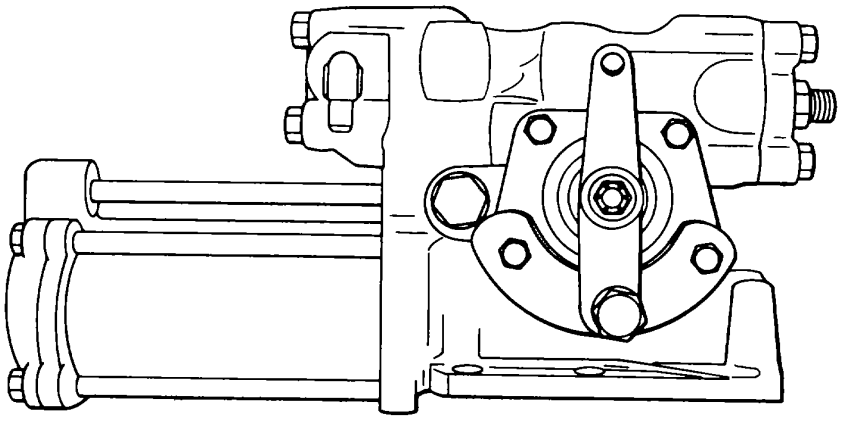


Figure 165.

The following procedure details the removal and overhaul of the standard horsepower control with adjustable neutral detent.

This procedure is also applicable to the low pressure servo control and the short differential pressure compensated override control. When servicing either of these control types, omit the appropriate steps where indicated.

ALL PART NUMBERS IN PARENTHESIS FOLLOWING THE PART NAMES REFER TO TO THE INDIVIDUAL PARTS AS IDENTIFIED IN FIGURE 238 EXCEPT AS NOTE D.

CONTROL DISASSEMBLY

1. Remove lock nut (41), washer (40) and lever assembly (82) Remove two cap screws (76), two lock washers (25) Fig. 166.

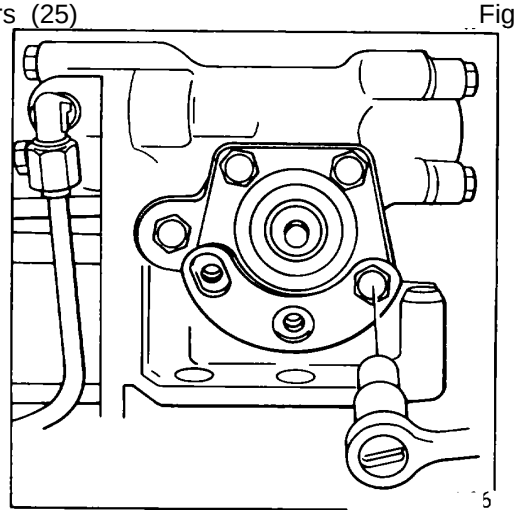


Figure 166.
Fig. 166. Removing adjustable neutral detent

2. Remove six bolts (4 short, 2 long) items (28) & (38), and six lock washers (63).

3. Lift control assembly from pump housing, breaking the seal with gasket (65). Care should be taken to avoid bending the feedback lever (22) by swinging it to one side, as illustrated in Fig.167 before proceeding to Step 4. Remove O-ring (70).

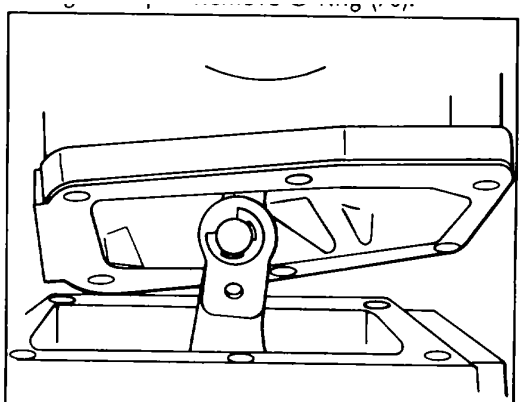


Figure 167.
Cam actuator arm and valve sleeve

4. With a small screwdriver, remove E-ring (71) from the side of the cam arm opposite the counterbore. A clean shop rag should be positioned around the cam arm to prevent the loss of the E-ring into the pump housing. See Fig. 168.

5. Remove clevis pin (73) with 2nd E-ring and slip the control link (72) from the cam lever. Remove gasket (65) from control housing.

6. Remove two cap screws (74) and two lock washers (25). Slip seal plate assembly (42) off over control valve (23).

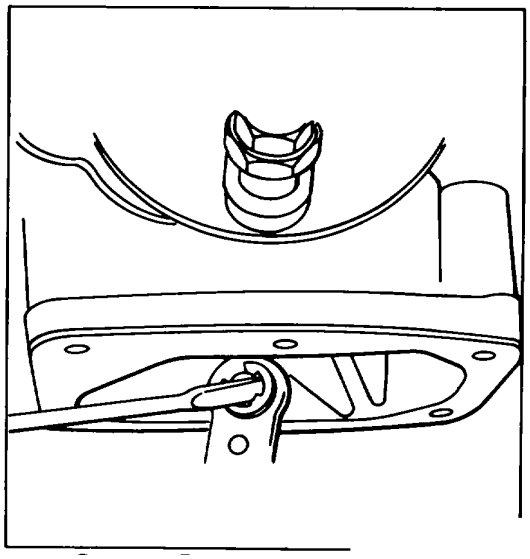


Figure 168.
Removing E-ring

7. Slide servo valve spool (23) from control housing (57) and remove servo valve sleeve (22) out through the bottom of the control housing (57). See Fig.169. Proceed to Step 13 if servicing a Low Pressure Servo Control.

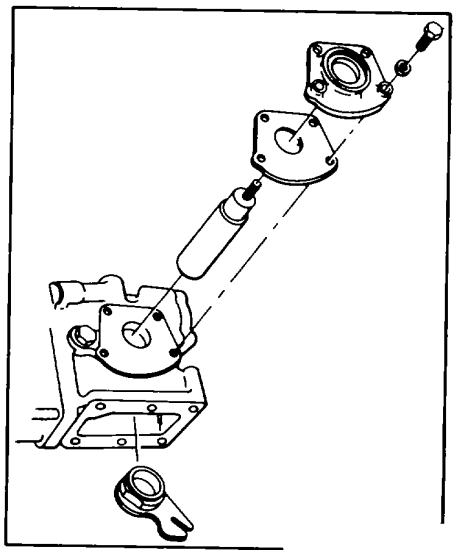


Figure 169.
Control valve spool with valve sleeve

13. Carefully, remove four hex nuts (12) and lock washers. (13). Lift off cylinder cover (43) including O-ring (46). Pull transfer tube (17) and two O-rings (14) from the seat in either the control housing (57) or the cylinder cover (43). See Fig. 170.

Figure 170.
Cylinder cover with transfer tube

14. Remove servo tube (16) with servo plunger assembly, from control housing (57). Slide the servo plunger assembly (45) and (67) from servo tube (16) and remove two O-rings (46), one from the piston (45) and one from the control housing (57). See Fig. 171.

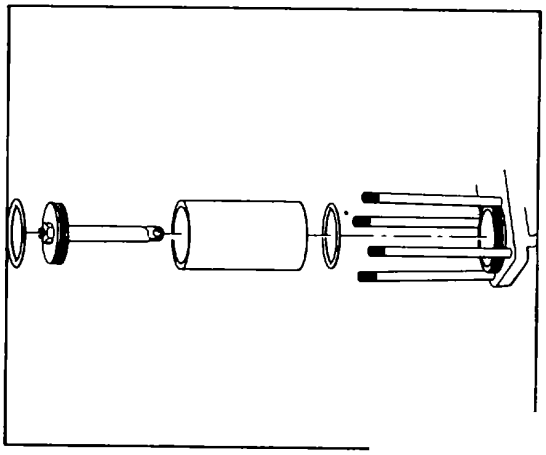


Figure 171.
Cylinder with servo plunger

15. Remove selflocking nut (44), washer (66), and piston (45) from rod assembly (67).

16. Inspect servo studs (15). Remove only if the threads have been damaged or if the studs are twisted or broken.

17. Remove four hex bolts (24), lock washers (25), housing cover (26), and gasket (27). See Fig. 172.

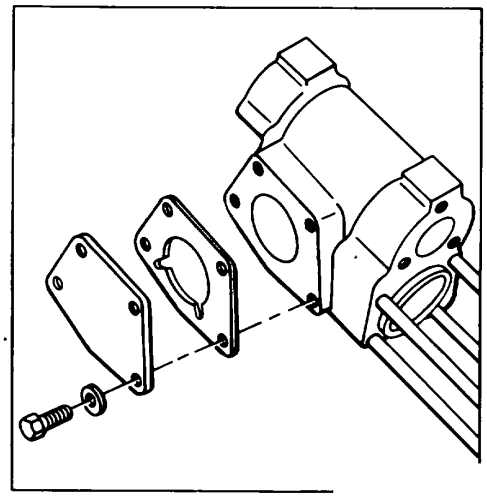


Figure 172.
Control housing cover

Omit Step 18 if servicing a Low Pressure Servo or Short Differential Pressure Compensated Override Control.

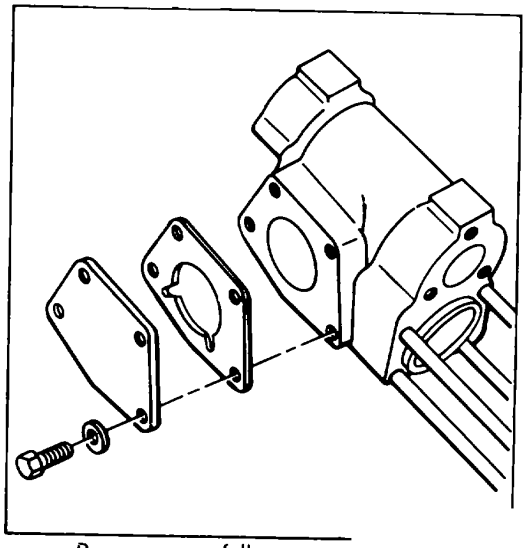


Figure 173.
Removing cam follower

19. If necessary, the orifice (53) may be removed by first removing stud (15) to gain access to pipe plug (51). With an Allen wrench, remove pipe plug (51), spring (52), and orifice (53). See Fig. 174.

This completes disassembly of the horsepower control.

CONTROL ASSEMBLY

Keep the work area and all parts absolutely clean. Remove all old oil and grease from parts prior to reassembly.

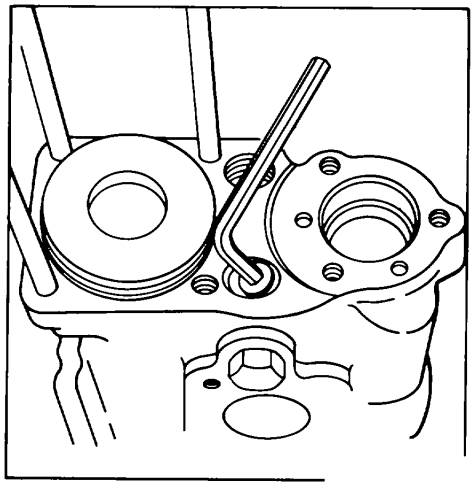


Figure 174.
Removing orifice

During reassembly, check all moving parts for smooth operation. It is essential that there be no binding or interference between any internal moving parts.

This procedure is also applicable to the low pressure servo control and the short differential, pressure compensated override control. When servicing either of these control types, omit the appropriate steps where indicated.

1. Inspect servo rod bushing (68).

2. If removed during disassembly, install orifice (53) and spring (52) with plug (51) using Loctite pipe sealant. Torque plug down tight. See Fig. 175

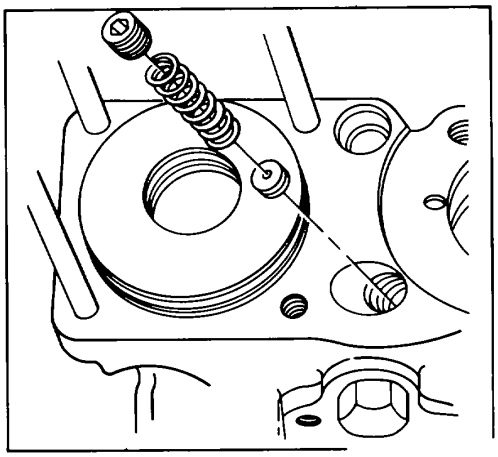


Figure 175.
Plug, spring & orifice

NOTE:

Omit Step 3 and 4 if servicing a Low Pressure Servo Control.

Omit Step 3 if servicing a Short Differential Pressure Compensated Override Control.

5. Install housing cover (26) with four cap screws (24), lock washers (25), and a new gasket (27). If one cap screw (24) was prepared with tape in Step 4, be certain it is positioned at the end of the cam follower pivot through hole). See Fig. 176. Torque cap screws to 132 in. lbs.

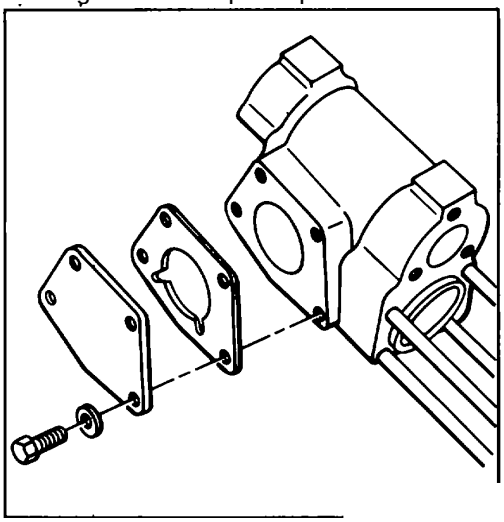


Figure 176.
Control housing cover

6. If removed during disassembly, inspect four studs (15) for damaged threads, bends, twists or cracks and replace if necessary. Use Loctite sealant, Grade 3, on coarse threaded end of studs and install in housing (57). Torque studs down tight.

7. Inspect piston (45) for nicks or scratches around the perimeter. If observed, replace piston (45). Inspect link end of rod assembly (67) for cracks. Replace rod assembly (67) if cracks are found. Install piston (45) on rod assembly (67) with washer (66) and selflocking nut (44). Torque selflocking nut (44) to 420 in. lbs.

8. Install three new O-rings (46) on housing (57), piston (45), and cylinder cover (43). Install servo plunger assembly in control housing (57).

9. Lubricate the entire inner surface of cylinder tube (16) with clean transmission oil. Install cylinder tube (16) over servo piston assembly (45) and seat tube (16) against housing (57). See Fig. 177.

10. Install two new O-rings (14) on each end of transfer tube (17). Lubricate the ends of the transfer tube (17) and insert in cylinder cover (43). Install cylinder cover (43) with new O-ring (46) and transfer tube over studs (15) and seat into end of servo

tube (16). See Fig. 79. Care must be taken not to damage transfer tube O-ring (14) as the transfer tube (17) is being positioned in control housing (57). Install four lock washers (13) and hex nuts (12) on studs (15) and torque to 72 in. lbs. Care should be taken to torque the hex nuts (12) gradually and in sequence to insure proper seating of the cylinder cover (43) and to minimize the possibility of twisting a stud to the breaking point.

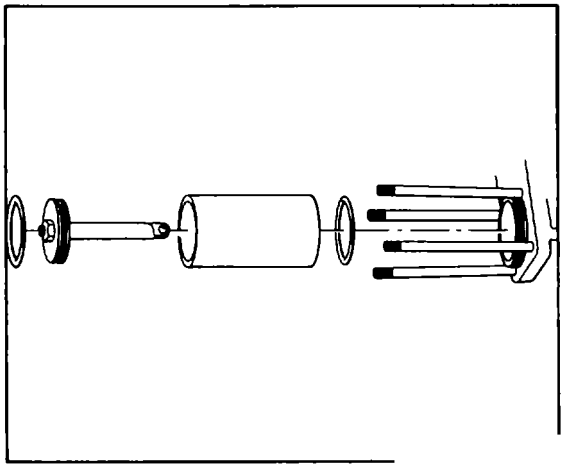


Figure 177.
Cylinder with servo plunger

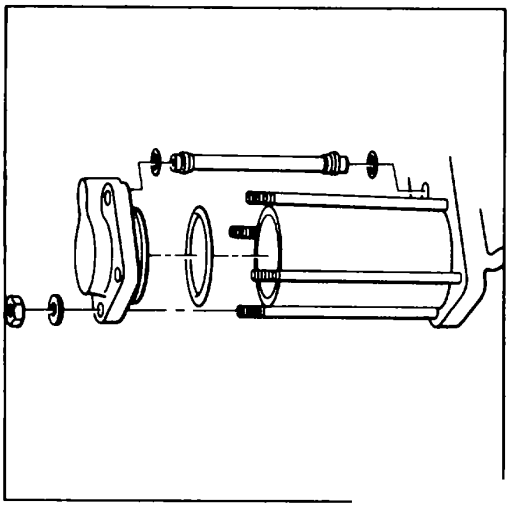


Figure 178.
Cylinder cover with transfer tube

NOTE:

If servicing a Low Pressure Servo Control, proceed to Step 18.

18. Inspect ball seat in elbow fittings. If seat is damaged, replace the fitting. Install steel ball (49) in end cap (34). Wrap threads of pipe fitting(s) (1) or (7) with Teflon tape and install in end cap (34).

19. Insert servo valve sleeve (22) up through the bottom of the control housing. Lubricate servo valve spool (23) with clean transmission oil and insert into control housing through valve sleeve (22). Check for free movement. Any roughness may be removed with 500 grit emery cloth. See Fig. 179.

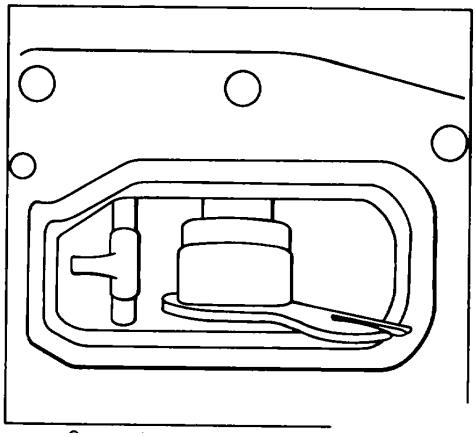


Figure 179.
Servo valve sleeve in position

20. Using seal plate (42) and a new seal (39), fill the cavity between seal lips half full with Litholene multi-purpose grease. Position seal, plate and gasket (27) on control housing, being cautious not to damage the lip seal. Install upper two cap screws (74) and lock washers (25). See Fig. 85. Torque to 132 in. lbs.

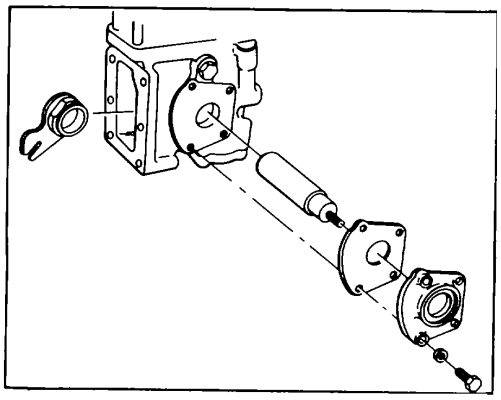


Figure 180.
Control valve spool with cam follower.

21. Position detent spring (80) and steel ball (81) in lever assembly (82). Place lever assembly (82) and assembled parts on valve spool (23) with washer (40) and a new selflocking nut (41). Turn in adjusting screw (79) until spring (80) holds ball (81) in hole in detent plate (75).

NOTE:

To check servo action, introduce compressed air to internal feed port. Actuate valve sleeve (22)

forward and backward from detented position to confirm free travel to servo plunger.

22. Place a new gasket (65) on pump (or -motor) housing using a thin coat of clean transmission oil to hold it in place.

23. Position control housing (57) so that rod link (72) slips into slot in pump cam arm. Place a clean shop rag around the cam arm and insert clevis pin (73) with one new E-ring (71) attached in counterbored side of cam arm and through rod link (72). Install the 2nd new E-ring on clevis pin (73).

See Fig. 181.

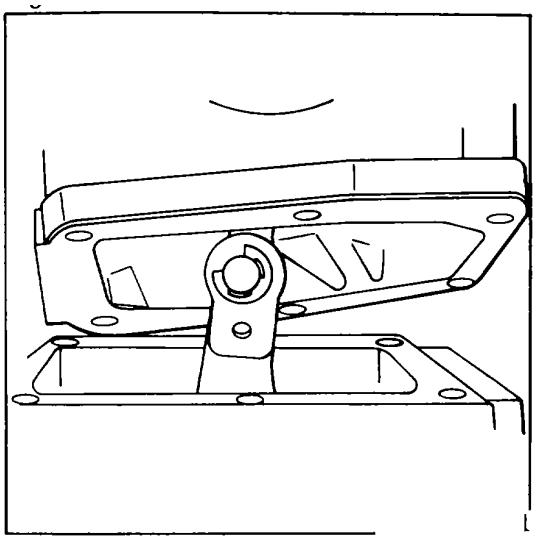


Figure 181.
Cam actuator arm & cam follower.

24. Install new O-ring (70) in seat on pump (or motor) housing using a thin coat of grease to hold it in place.

25. Install control assembly to pump (or motor) using four short and two long hex bolts (items 28 & 38) and six lock washers, **making sure the slot in the valve sleeve assembly (22) is positioned over the pin on the cam lever assembly** and that the O-ring (70) is properly seated. Torque 6 hex bolts to 132 in. lbs.

26. Install two cap screws (76), two spacer (77), two lock washers (25) and detent plate (75). (If one of two cap screws (76) was wrapped with tape in Step 3, be certain it is positioned at the end of the cam follower pivot through hole and opposite cap screw (24) prepared in a similar manner) tighten cap screws (76) by hand; do not torque tight.

MOTOR OVERHAUL -MODEL 48

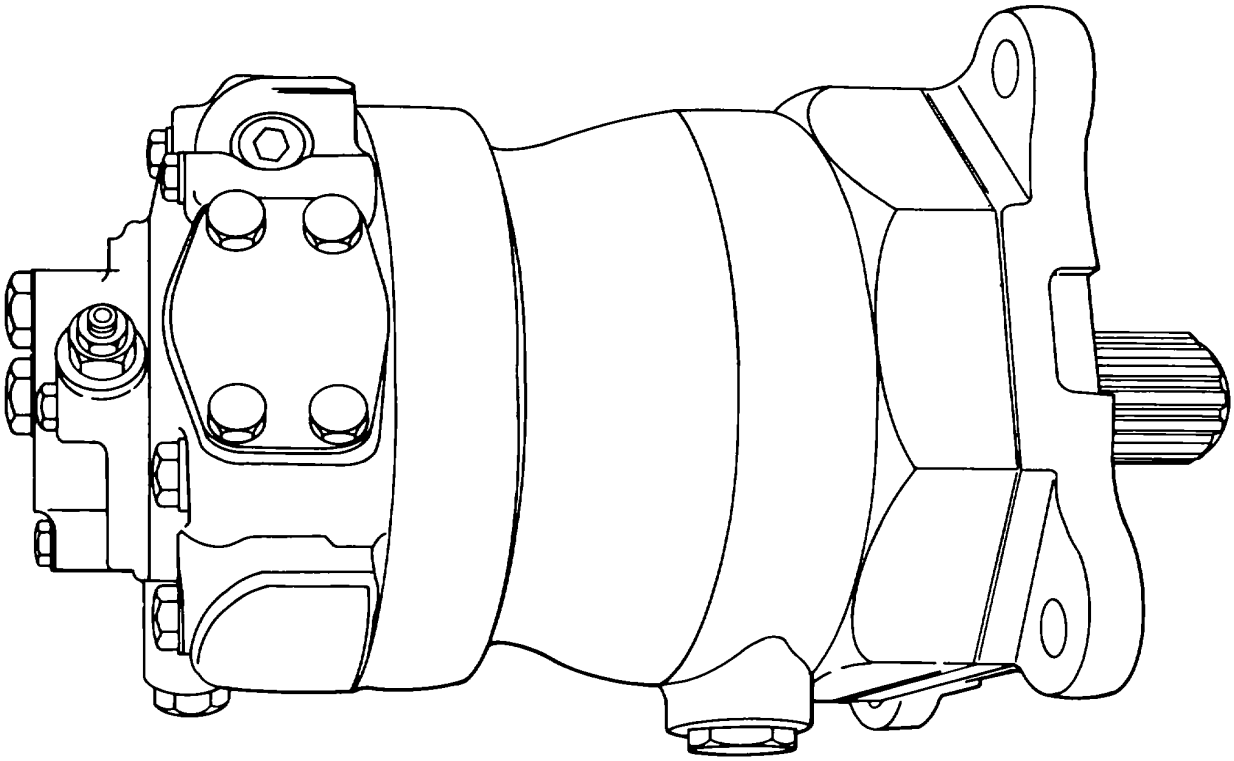


Figure 182.

This section contains an Illustrated step-by-step procedure for the complete disassembly, overhaul and reassembly of the Dynapower Models 48 and 60 Phase III fixed motor Additional information for servicing variable motors, as well as models no longer in production is included where applicable.

Service procedures for the Model 48 and Model 60 units are alike in all respects. Only when replacing the cover, block, pistons, return plate, mounting flange and cam stop is it necessary that the displacement of the unit be known. Photographs are included where necessary to establish the identity of the units being serviced. Individual parts and numbers are available from your Dynapower representative.

ALL PART NUMBERS IN PARENTHESES FOLLOWING THE PART NAMES REFER TO THE INDIVIDUAL PARTS AS IDENTIFIED IN FIGURE 235 EXCEPT AS NOTE
D

GENERAL INSTRUCTIONS

A. Dynapower parts and work area must be kept absolutely clean at all times The Dynapower unit must be cleaned externally with a commercial degreaser or steam and dried before hoses are disconnected and before the unit Is removed from the application.

B. Most service operations are carried out with the motor in a shaft down position. A seven inch square block of wood, four inches thick with a two inch round center hole may be used as a platform upon which the motor may be positioned.
A similar size hole in a work bench surface may be utilized as can the corrugated cardboard spacer packed at the end of a new Dynapower motor.

C. When performing minor service work, do not remove bearings, dowel pins, or cylinder block components unless they exhibit signs of galling, scratching, or excessive wear On major overhauls, replace all bearings regardless of condition.

D. Upon completion of service operations, be sure to follow instructions in Section 00 for restarting the system.

Dynapower motors have been manufactured with 3 basic high pressure relief valve configurations. To begin motor disassembly, identify relief valve configuration from photos below and proceed as instructed

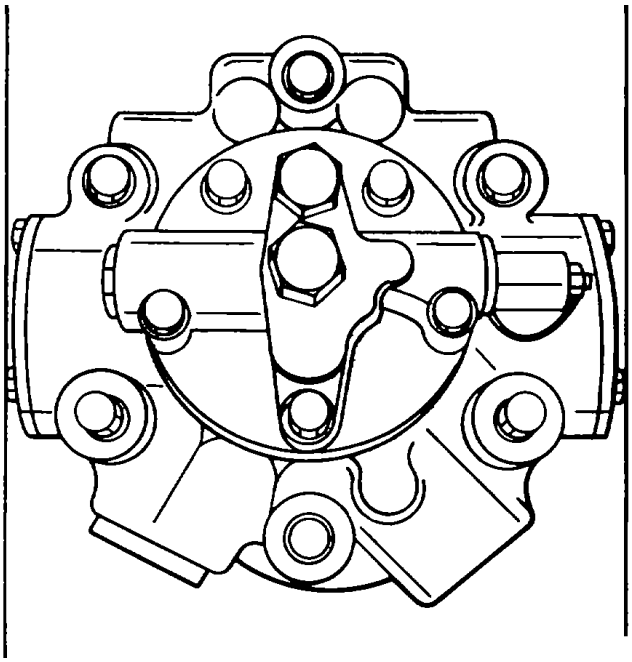


Figure 183.

Phase Ill Motor cover

Proceed to Paragraph C, Page 115.

Proceed to Paragraph B, Page 34, Step 1.

Type III

C. All part reference numbers refer to Fig 184 except as noted.

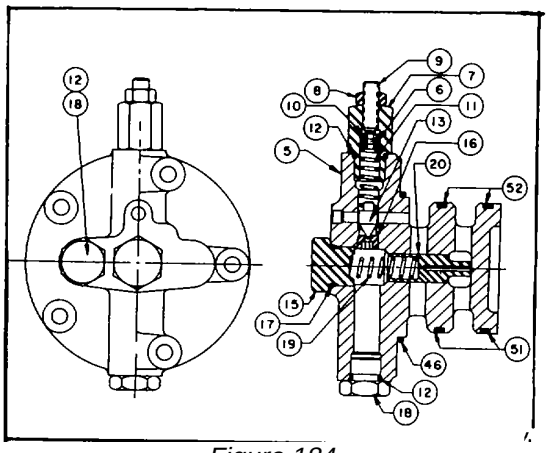


Figure 184.
Phase III adjustable h. p. relief valve.

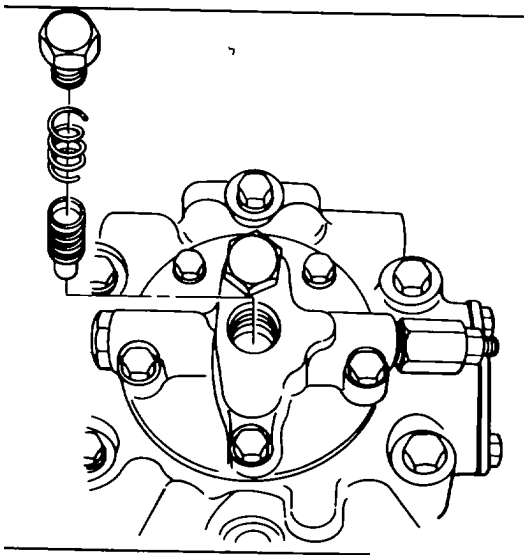


Figure 185.
High pressure relief valve

C-1. Place motor in a shaft down position.

C-2. Remove high pressure relief valve plug (15), O-ring (17), spring (19), and plunger (20).

C-3. Remove spring seat (7) taking care not to disturb seat (7), hex nut (8), screw (9) relationship If parts (7), (8), and (9) are removed as a unit, the high pressure relief valve setting will remain the same upon reassembly.

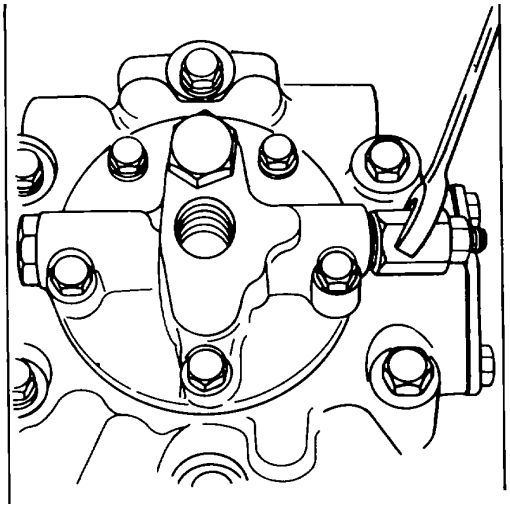


Figure 186.

Removing high pressure pilot valve

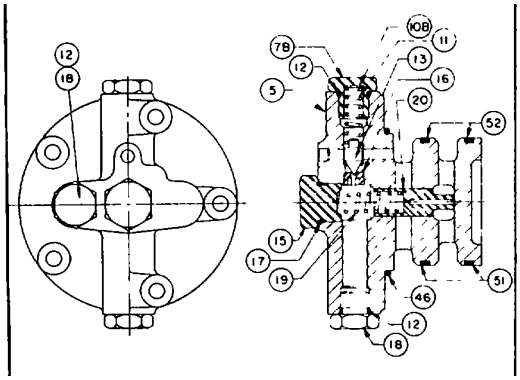


Figure 187.

Phase III non-adjustable high pressure relief valve

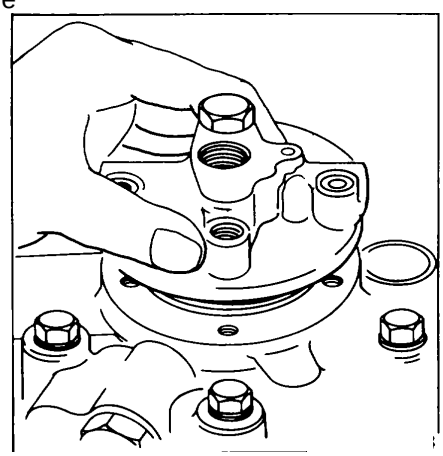


Figure 188.

Removing high pressure relief valve body

EXCEPTION

Units no longer In production may have a nonadjustable high pressure pilot valve spring seat (7B) (See Fig 187). Remove spring seat (7B) and shim(s) (10), O-ring (12), spring (11), and valve pilot (13) and proceed to Step 5.

C-4 Remove Inner spring seat (10), O-ring (6), pilot spring (11), and valve pilot (13).

C-5 Inspect pilot valve seat (16) If damaged, replace body assembly (5) Do not attempt to remove valve seat (16) from valve body (5).

C-6 Remove 3 hex bolts (50), 2 hex bolts (48), and 5 lock washers (47). Lift valve body (5) from motor cover (4) See Fig 188.

C-7 Remove O-ring (46), back-up rings (51), and O-rings (52).

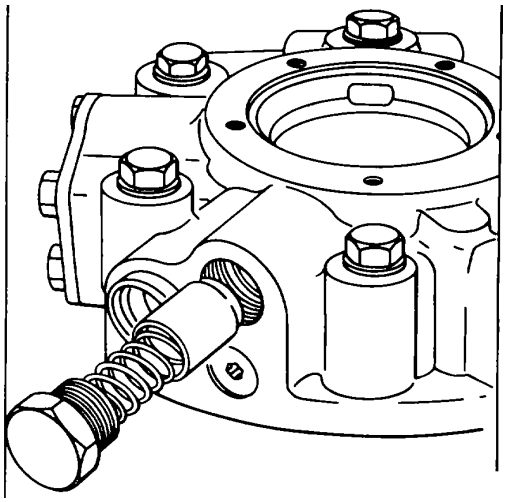


Figure 189.
Removing low pressure relief valve

MOTOR DISASSEMBLY

1. Remove low pressure relief valve plug (73) O-ring (17), spring (62), and plunger (61). See Fig 189.

2. Remove shuttle valve plugs (35) and O-rings (17). Slide shuttle (32) from cover (4) See Fig 190.

NOTE:

Spring centering shuttle plugs (29) and O-ring (17) should be removed as an assembly Plug (28) spring (30), and plunger (31) should not be removed from plug (29) unless damaged. If damaged, remove plug (28) and slide spring (30) and plunger (31) from plug (29).

3 Unless leakage is experienced, do not remove plugs (33) or O-rings (34) If leaking, replace O-rings(34).

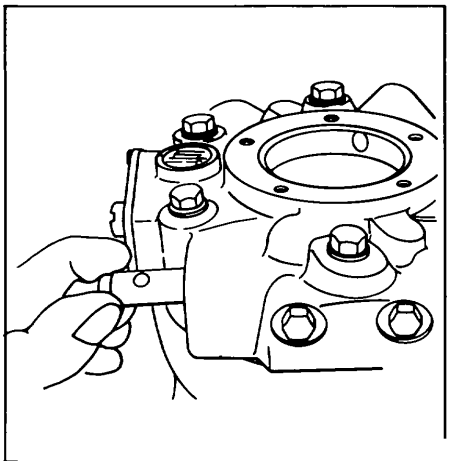


Figure 190.
Removing shuttle valve

4. If cover (4) is to be removed it Is important that the cover/housing relationship be preserved Mark both the housing and cover In such a way that, upon reassembly, the relationship can be maintained For example, a scratch In the paint across the cover/housing parting line can be used See Fig 190.

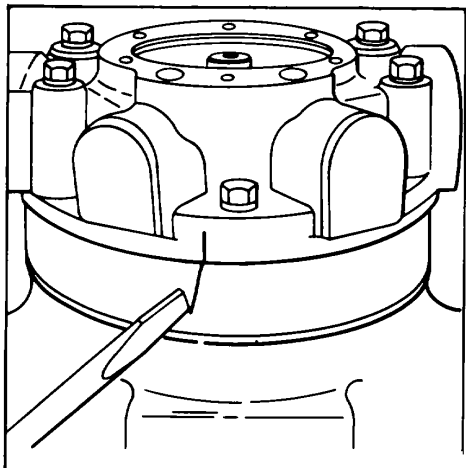


Figure 191.
Marking across cover/housing parting-line

5. Remove six hex bolts (45) and lock washers (37) Lift cover (4) from housing (3) If the motor cover should stick to housing, jar It loose with a soft-faced hammer Remove gasket (53) from housing (3) or cover face (4) See Fig 192.

It is important that every precaution be taken to protect the bronze face on the cover from damage **NEVER** lay the cover down on the bronze face. **DO NOT** allow parts or tools to come in contact with the bronze face A nick or scratch resulting from a moments' carelessness can easily damage a cover beyond repair.

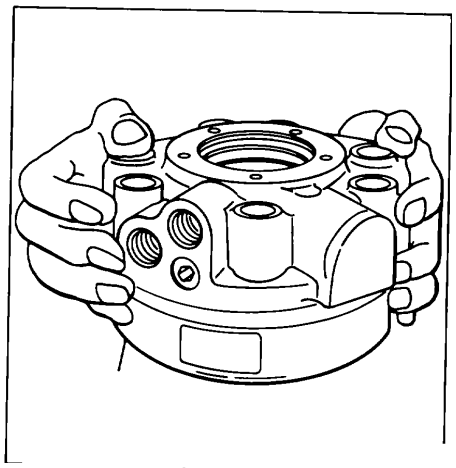


Figure 192.
Removing motor cover

NOTE

Motor displacement can be confirmed by either of the two methods described below:

a. In the area of the trade mark, cast in the cover, will be stamped a "6" or a "4" denoting a Model 60 or a Model 48 respectively. See Fig 193.

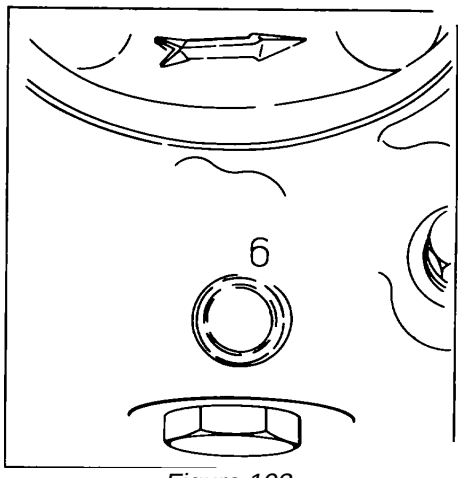


Figure 193.
Displacement Identification stamp

b Measure the width of the cover kidney near the mid point See Fig 194.

If the width is 34 inches approximately, the motor Is a Model 48.
If the width Is 40 inches approximately, the motor is a Model 60.
6. Inspect cover roller bearing (44) for excessive wear, galling or roughness If damaged, remove bearing outer race from cover with an arbor press and a 17/e inch diameter plug. If roller

bearing is removed, then the Inner race must also be removed (See Step 16) as they are serviced as a matched set only If no damage Is evident, do not remove outer or inner race and proceed to the next step.

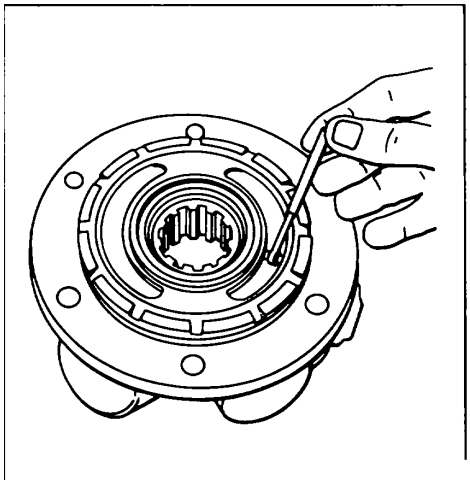


Figure 194.
Measuring kidney width

NOTE:

In the case of a variable motor, It Is necessary to remove the control assembly before disassembly can proceed. (See Section V, Paragraph 1, Page 26).

7. Remove eight hex bolts (36) and lock washers (37) See Fig 195.

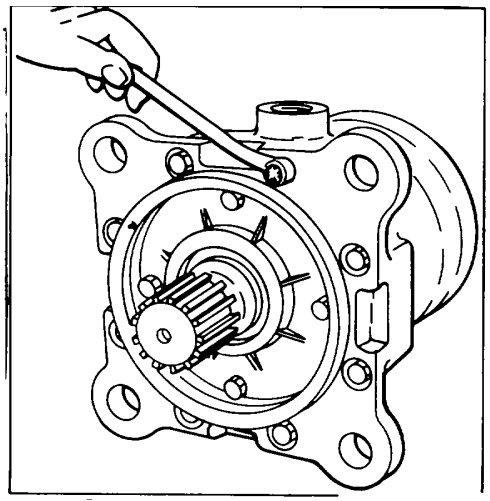


Figure195.
Removing housing bolts

Lift off housing (3) from mounting flange (2). See Fig.196.Remove O-ring (56).

On variable motors, it Is necessary to remove the trunnions and cam lever assembly before the housing can be removed.

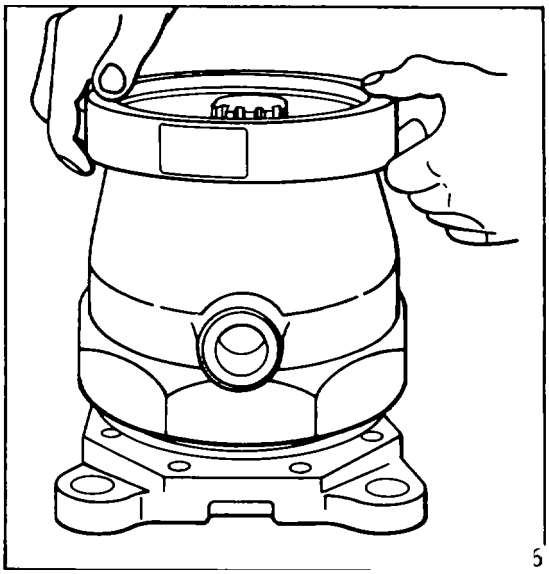


Figure 196.
Removing housing

a. Remove Allen head cap screws (G) and lever assembly (P).

b. Remove the hex bolts (W) and lock washers (X) and slip the trunnions (T) from the housing (Y). DO NOT pry the trunnions from the housing. If the trunnions do not slide out easily, rotate the trunnions back and forth as they are withdrawn.

c. Remove hex bolts (D) and lock washers (E). Lift housing (Y) from mounting flange (F) and remove O-ring (Z).

8. At the factory, each cylinder block Is marked o indicate cylinder bore number one. Mark piston

number one as a method of preserving the bore/ piston relationship See Fig 109. All used pistons must be returned to their respective bores upon reassembly.

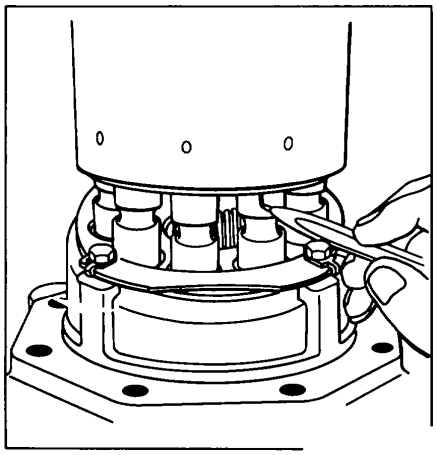


Figure 197.
Marking number one piston

Remove the cylinder block (40) by lifting It straight up off the piston assemblies See Fig. 198.

Examine the block assembly (37) for excessive wear or damage

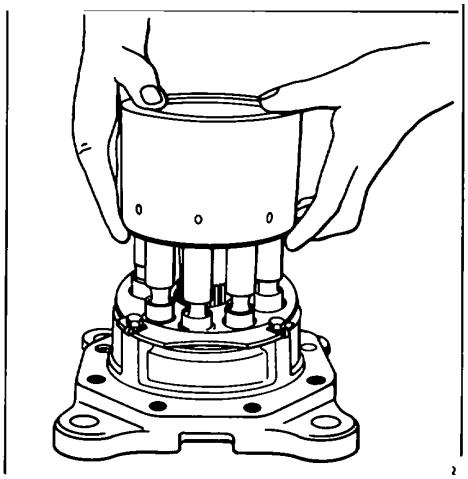


Figure 198.
Removing cylinder block.

Cylinder bores that exhibit only slight burnishing of the bronze liners are acceptable for reuse If the bores exhibit galling or any other Irregularity In the running surface that can be felt, the cylinder block must be discarded. If there is evidence that the bronze liners have begun to pull out of the steel block, the block must also be discarded

Examine the upper running face of the block. See Fig 199. Circular wear patterns or photographing that cannot be felt with the fingernail are normal.

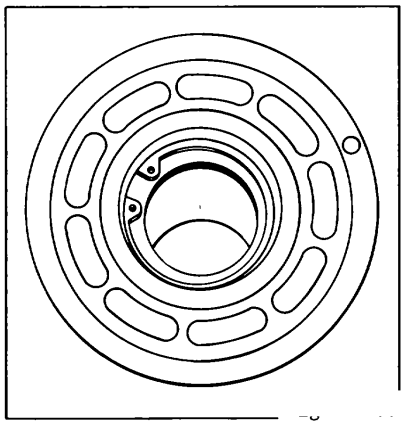


Figure 199.

Inspecting cylinder block

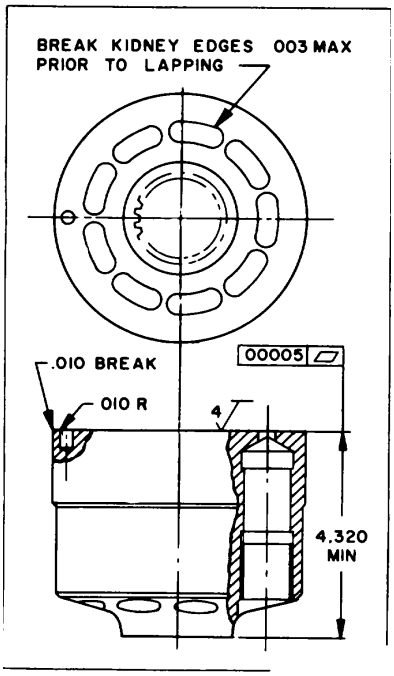


Figure 200.
Cylinder block rework specifications

If the block is acceptable for reuse in all other respects, several passes of the block over 500 grit emery paper on a lap table, is recommended to put the block face in a like-new condition. If circular wear patterns can be felt with the fingernail, grind the running face as necessary to remove the wear pattern keeping the face parallel to the original face Lap the reworked face on 500 grit emery as.

described above to remove the mat finish Clean the block thoroughly in a commercial degreaser such as trichloroethylene and blow dry with compressed air Check tolerance of refinished block as outlined in Fig 200. If reworked block does not meet the tolerances, discard block.

If damage is evident to spring or spring retainers, use an arbor press to remove retaining ring (43). CAUTION must be exercised in removing block spring (41) since it is under considerable tension Using a plug 13/4 inches in diameter, compress block spring (41) until all tension is removed from retaining ring (43) Using truarc pliers, remove retaining ring (43) and gradually release arbor press until block spring (41) is fully extended Remove outer spring retainer (42), block spring (41), and inner spring retainer (54) from cylinder block (40).

9. From the high side of the cam, remove two hex bolts (27), two tab lock washers (21), one clip (26), one bearing plate (25), and two spacers (22) See Fig 201.

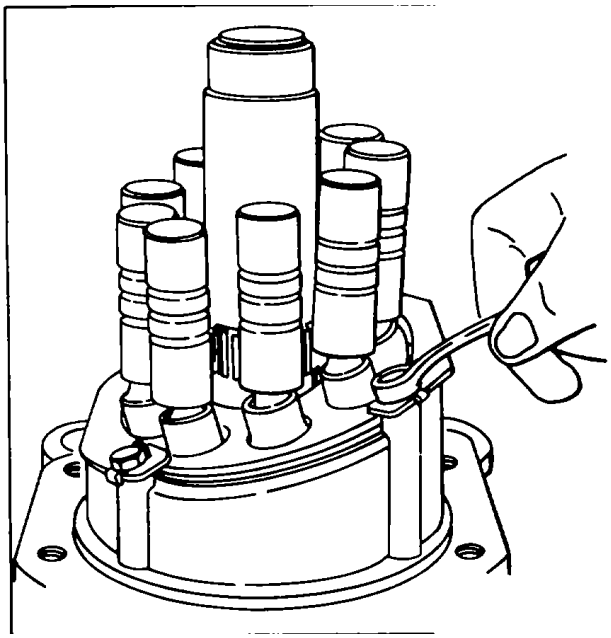


Figure 201.
Removing return plate guide

Inspect bearing plate (25) If wear pattern can be felt, disassemble the other spacer assembly and replace both bearing plates (25).

10. Lift out piston return plate (24) and piston assemblies (55). See Fig. 202. If damage Is evident to either pistons (55) or return plate (24), remove pistons from return plate.

11. Lift our wear plate (23). See Fig. 203.

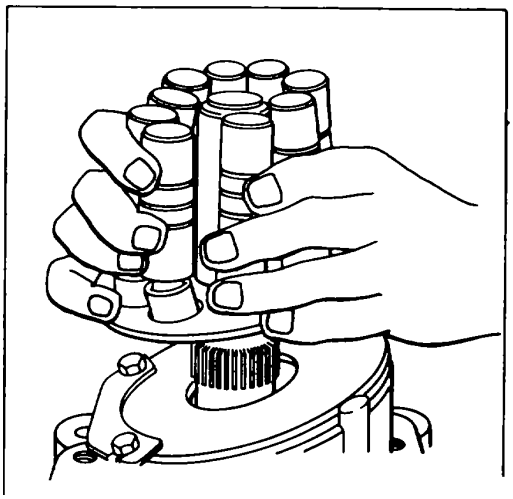


Figure 202.
Removing pistons and return plate

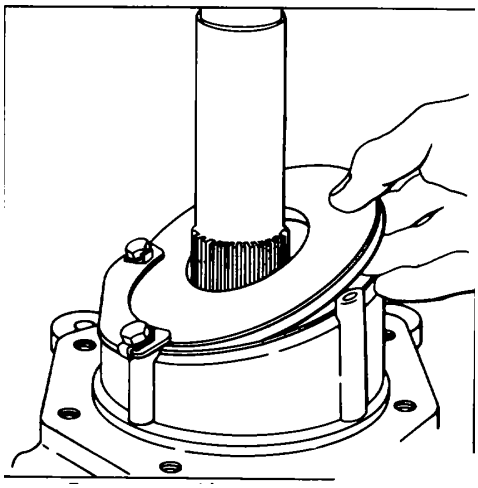


Figure 203.
Removing cam plate reaction

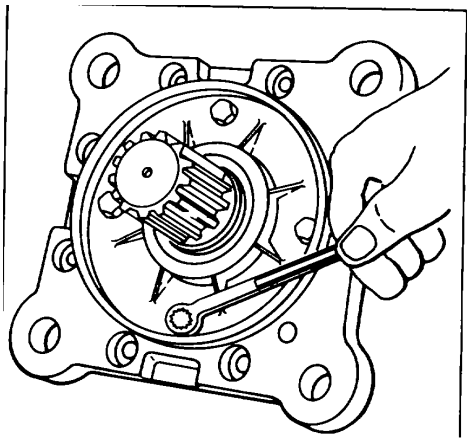


Figure 204.

Removing shaft seal retainer bolts
12 Invert shaft/adapter assembly. Remove four hex bolts (48) and lock washers (47). See Fig. 204.

13. Using a small screwdriver, remove shaft seal assembly (60) from mounting flange (2) See Fig 117. Remove O-ring (57) Press shaft seal from retainer using an arbor press and a 21/2 inch plug.

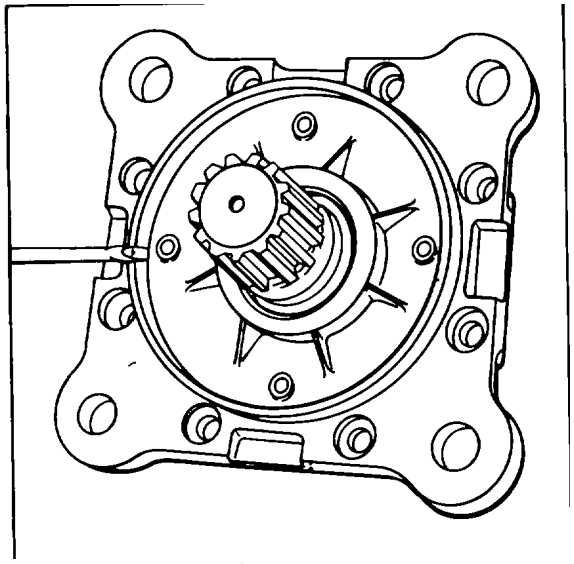


Figure 205.
Removing shaft seal retainer

14 Remove motor shaft (1) and assembled parts ((38), (58), (49) and inner race of (44)), by pulling straight up from mounting flange as shown in Fig 206.

15. Inspect ball bearing (38) for galling, roughness or cage cracks. If damaged, remove retaining rings (58) using truarc pliers and press ball bearing (38) from shaft (1).

16. Inspect inner race of roller bearing (44) for galling or roughness. If no damage is apparent and no damage was observed when the outer race was inspected, do not remove inner race from shaft If damage was observed on either the inner or outer race, both must be replaced Remove retaining ring (49) and slide inner race of bearing (44) from shaft (1).
This completes disassembly of the Dynapower motor.

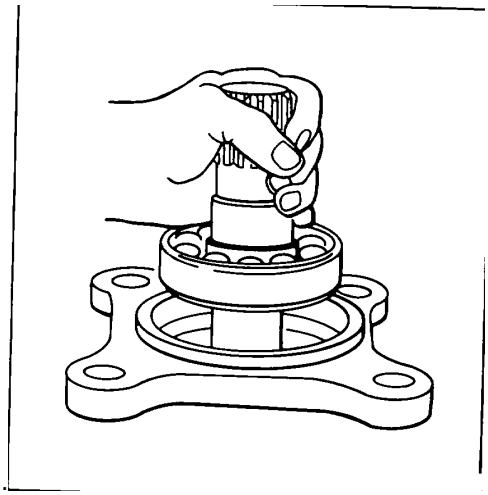


Figure 206.
Removing motor shaft assembly

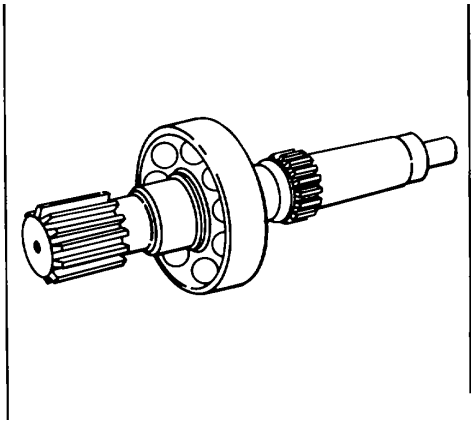


Figure 207.
Motor shaft assembly

MOTOR ASSEMBLY

GENERAL INSTRUCTIONS

Keep Dynapower parts and work area absolutely clean at all times

Shaft and bearing failures are often of a fatigue type. If the motor has had a lot of use, replace these parts as they may be near the fatigue point.

Use new gaskets and seals, except as noted.

1. If either Inner or outer race of roller bearing (44) Is rough or galled, replace inner race and outer race as a matched set only Place new inner race on shaft (1) and install retainer ring (49).

2. If previously removed, install inner retainer ring (58). If damaged, install a new ball bearing (38)

on motor shaft (1). using an arbor press CAUTION should be exercised not to deform Inner retainer ring (58) when ball bearing (38) is seated against it If this occurs, back the ball bearing (38) oft and reseat Care should be taken to support the inner race in the arbor press to prevent deformation of the ball bearing Heating the bearing In hot oil will aid In a smooth bearing installation Install outer retainer ring (58).

3. Install motor shaft assembly (1, 38, 58, 49 and inner race of bearing 44) through the front face of the mounting flange(2) See Fig. 208.

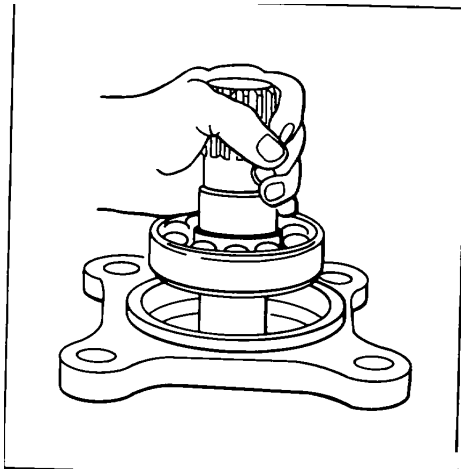


Figure 208.
Installing motor shaft assembly

The ball bearing (38) should fit snugly In the flange (2) If the ball bearing (38) doesn't seat easily, heat the mounting flange (2) in hot oil and seat ball bearing (38) In proper position DO NOT drive the ball bearing (38) into place DO NOT use the shaft seal retainer (60) to force the ball bearing into the seat.

After ball bearing (38) is seated, check for free running by rotating shaft (1).

c Install shaft seal (I) and retainer (H) with retainer gasket (E), hex bolts (G), and lock washers (F).

4 Coat the seal 0 D with Loctite pipe sealant and press new shaft seal (59) into retainer (60) using an arbor press and 21' Inch plug Fill cavity In shaft seal between oil lips approximately 34ftull with Litholene multi-purpose grease. Install new O-ring (57) in flange (2). To prevent possible cuts or abrasion. the O-ring 157) should be lightly coated with a multi-purpose grease

5. Wrap slim stock or other thin material around shaft spline and carefully slide shaft seal (59) and retainer (60) Into place over motor shaft (1).

6. Secure seal retainer (60) with hex bolts (48) and Lock washers (47) Torque to 132 In. lbs. See Fig 209.

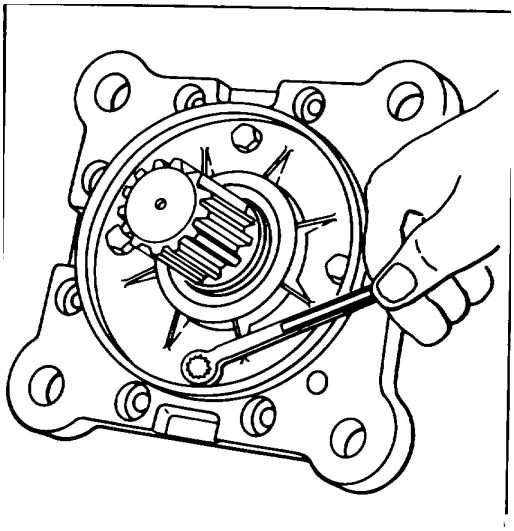


Figure 209.
Installing shaft seal retainer

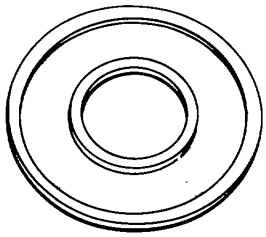


Figure 210.

Inspecting cam wear plate

7 Examine wear plate (23) Circular patterns burnished on the surface of the cam plate are normal

If the circular patterns on the wear plate are extensive and can be felt with the fingernail or If angular scratches are evident. the plate must be discarded. See Fig. 210.

8. Match up dowel pin (39) in cam assembly with hole in wear plate (23) and seat plate (23) In cam. See Fig.21 1.

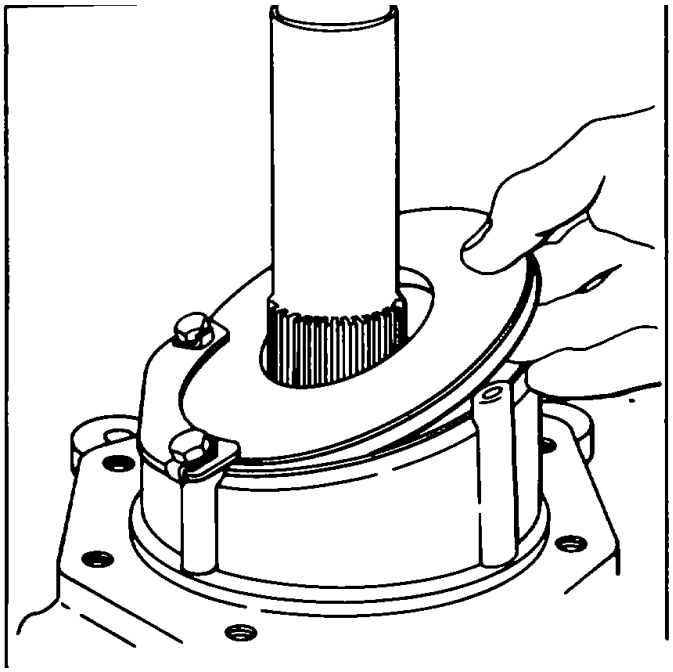


Figure 211.
Fig. 123 Installing cam reaction plate

Check for proper seating by pushing down on first one edge and then the other in a rocking motion. If any looseness is felt, remove the cam plate (23) and clean the cam assembly and wear plate to remove any foreign particles from beneath the wear plate. Reposition wear plate (23) and again check for proper seating. If cam plate still does not seat properly, check plate (23) for flatness and replace if necessary.

9. Check clearance between bronze piston shoe and steel piston body (55). With a push-pull motion check for free play between shoe and body. If any free play can be felt, the piston must be replaced.

10. Inspect the bronze piston shoe running surface. During normal service, a dulling of the running surface is to be expected. If large scratches are present, make several short passes over 500 grit emery paper on a lap table See Fig. 212.

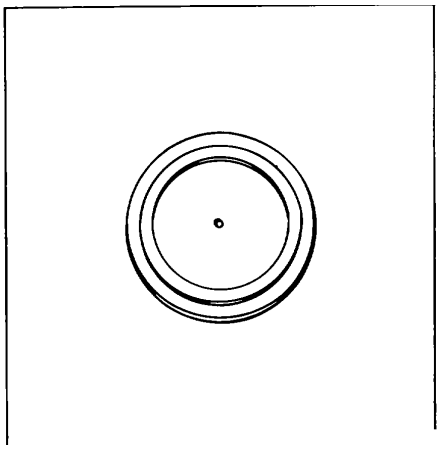


Figure 212.
Inspecting piston shoe

ON THE LAST FEW PASSES, PLACE 5-6 SHEETS OF EMERY PAPER AS A CUSHION UNDER THE TOP SHEET TO OBTAIN THE PROPER EDGE SHARPNESS. Check the reworked piston shoe against the tolerance limits in Fig. 213. If the piston does not fall within the tolerance limits, It must be discarded.

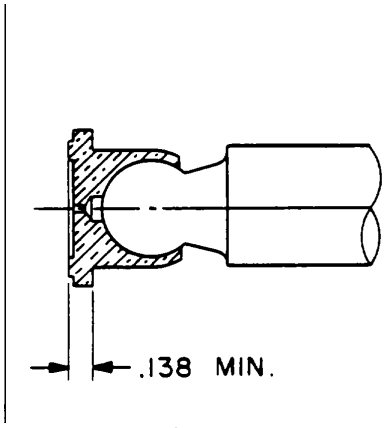


Figure 213.
Fig 125. Piston shoe rework tolerance

NOTE:

Often, large scratches on the piston shoe running surface will "heal over" If placed back In service. It is recommended however, that all piston shoes with badly scratched running surfaces be either reworked within tolerance limits or replaced.

11. Inspect steel piston body If any galling Is apparent or If any Irregularities can be felt, the piston must be discarded. If damage Is present, check corresponding cylinder block bore (40) for similar damage See Fig. 214.

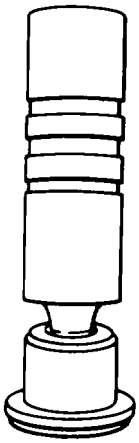


Figure 214.
Inspecting piston body

NOTE:

Dynapower units may be encountered with either two groove or three groove pistons See Fig 215.

Units supplied from the factory with two groove pistons may be refitted with three groove pistons as a nine piece set only.

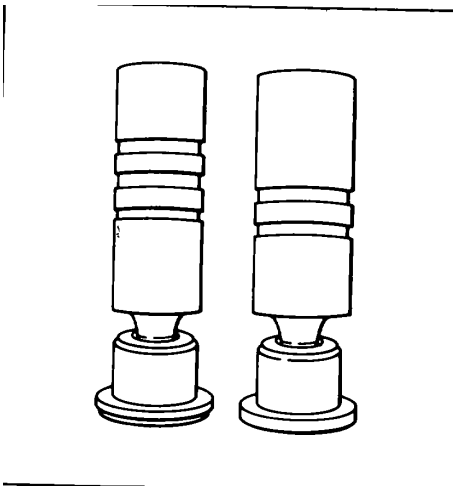


Figure 215.

Three groove and two groove pistons

In a like manner, units supplied with two groove pistons may be refitted with three groove pistons again only as a nine piece set Two groove and three groove pistons must not be mixed in the same unit.

Model 48 and 60 pistons are easily identified by characteristic piston shoe running surface configurations See Fig 216.

12. Inspect piston return plate (24) for heat discoloration or cracks. Check for flatness. If distorted, discolored or cracked, replace with a new return plate.

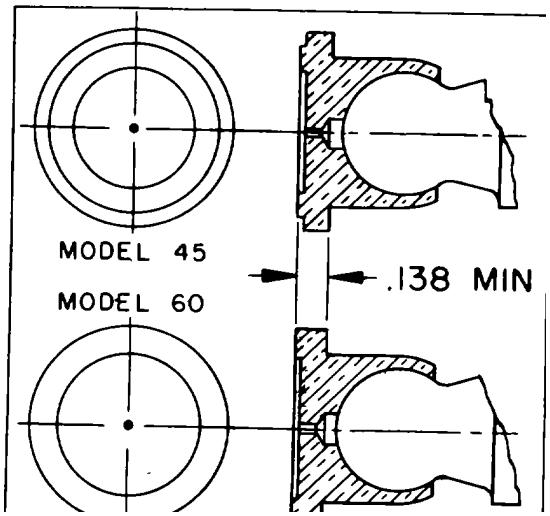


Figure 216.
Piston shoe configurations

13. Install piston assemblies (55) in return plate (24). Used pistons must be so positioned in the return plate to allow placement of the pistons in their respective cylinder block bores (See Page 118 Step 8).

14. If both piston return plate spacer assemblies (21, 22, 25, 26, and 27) were disassembled in Step 15, install two spacers (22), one bearing plate (25), one clip (26), two new tab lock washers (21), and two hex head bolts (27). Do not tighten bolts (27).

15. Spread a light film of oil on the surface of the wear plate (23) and slide piston (55)/return plate (24) assembly into place. See Fig 217.

16. Assemble the second of the two spacer assemblies. Install two spacers (22), one bearing plate (25), one clip (26), two new tab lock washers (21), and two hex bolts (27). See Fig 218. Torque four hex bolts (27) to 156 in lbs. Check clearance between each piston shoe and wear plate surface Clearance should not be less than .003 in nor more than .007 in Clearances of from 0015 to .003 are acceptable only if the rotating group spins freely by hand with no binding or tight spots Turn up four tab locks (21).

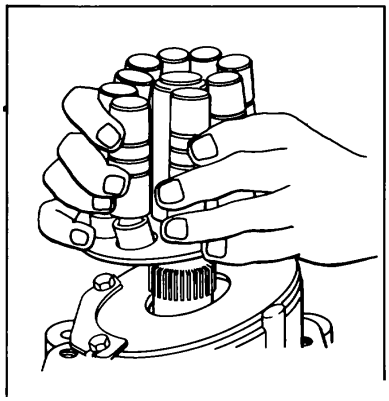


Figure 217.
Installing pistons & return plate

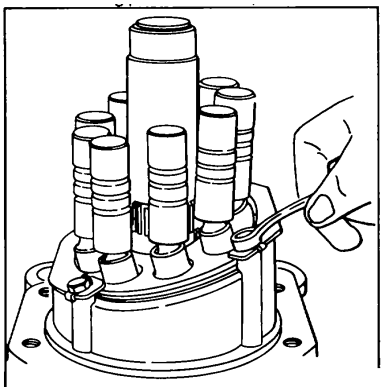


Figure 218.
Installing return plate clips

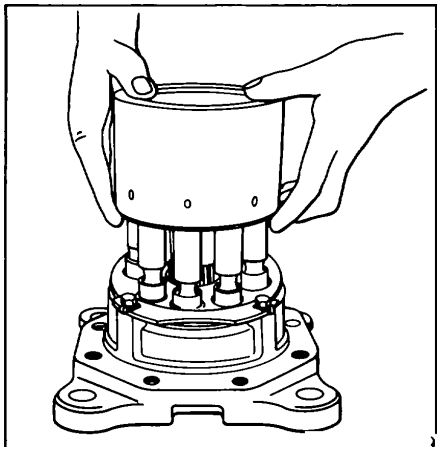


Figure 219.
Installing block assembly

17. If cylinder block was completely disassembled, proceed with the block as follows. Install the inner spring retainer (54), block spring (41) and outer spring retainer (42) in cylinder block (40). Place block (40) in an arbor press and compress block spring (41) Install snap ring (43) Gradually release the spring (41) until It seats against snap ring (43).

18. Spread a thin film of oil over the inner surface of the nine piston bores Stand the pistons (55) in an erect position and carefully lower the block assembly (40) over them being sure to return the used pistons to their respective bores Do not force the block over the pistons. A slight rotary motion of the block assembly will aid in positioning the pistons in the cylinder bores See Fig. 219.

19. Install O-ring (56) on adapter (2) Lower housing (3) over rotating group onto adapter (2) being careful not to disturb assembled parts See Fig 220. Secure housing to adapter with hex bolts (36) and lock washers (37).

Figure 220.
Installing housing

a. On variable motors, lower the cam assembly (B) and rotating group (C) 'over motor shaft (S).

b. Install O-ring (Z) on adapter (F) and lower housing (Y) over assembled parts Secure housing (Y) to adapter (F) with hex bolts (D) and lock washers (E) and torque to 450 in. lbs

c. Inspect trunnions (T) for galling or scratches.
Small nicks or burrs may be removed with 500 grit emery cloth. Trunnions with large scratches or irregularities that can be felt with the fingernail should be discarded

d. Assemble new trunnion thrust bearings (U) and gaskets (V) on trunnions (T) Using a large.

20. Inspect the motor cover (4) bronze face for signs of cavitation, excessive wear, contamination or other damage. See Fig 221. If circular wear patterns cannot be felt with a fingernail and if there are no nicks, scratches or other damage, one or two passes across 500 grit emery paper on a lap table, will put the bronze face in like-new condition.

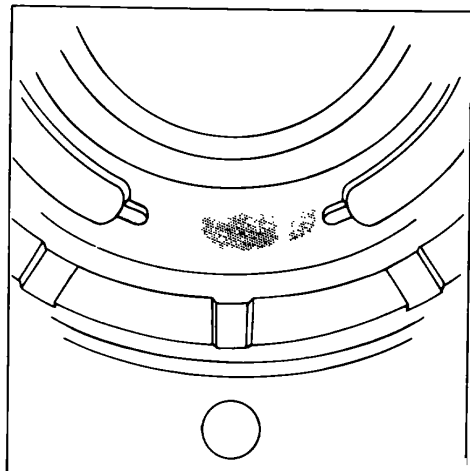


Figure 221.
Inspecting motor cover

If scratches or the wear pattern can be felt, pass across 500 grit emery cloth as described above until scratches can no longer be felt Every effort must be made to remove any scratches that cross the lands on either side of the kidneys.

Degrease the cover in a commercial degreaser, such as trichloroethylene and blow dry with compressed air Check the reworked cover against tolerances in Fig 222. If the cover does not fall within tolerance limits, it must be discarded.

21 If outer race of roller bearing (44) was removed from the cover (4) during disassembly, or If. the Inner race was removed and replaced, install outer race in the motor cover using an arbor press and plug of proper size.

It is Important that the roller bearing (44) be replaced as a set only. If either race was replaced, the entire bearing must be replaced.

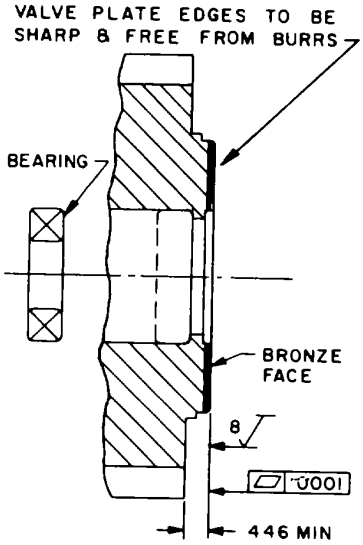


Figure 222.
Cover rework specifications

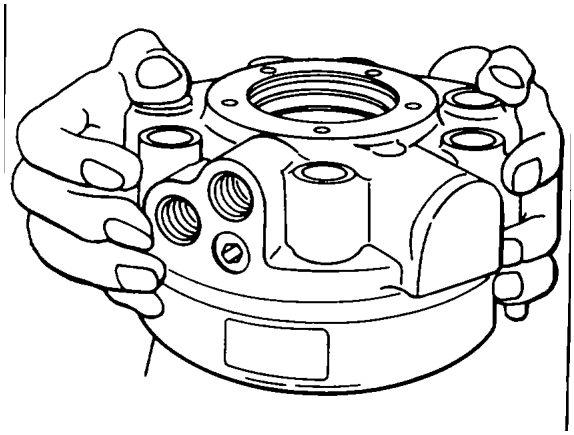


Figure 223.
Installing motor cover

22. Fill pistons (55) with new transmission oil allowing a small excess to spill over the face of the block (40).

23 Place a new gasket (53) on housing and position cover (4), utilizing reference marks In housing and cover Install six hex bolts (45) and lock washers (37) and torque bolts In an opposite pattern to 450 In lbs. See Fig 223.

24. If previously removed, Install two plugs (33) with new O-rings (34).

25. Install shuttle (32) in cover (4) See Fig 224.

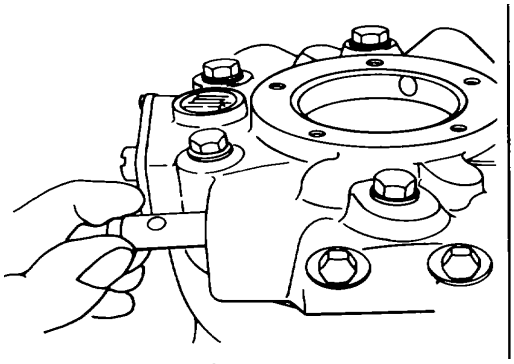


Figure 224.
Installing shuttle valve

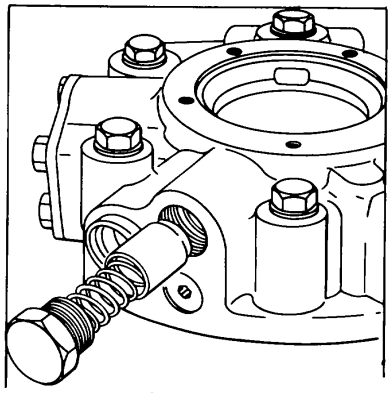


Figure 225.
Installing low pressure relief valve

Check for free movement from side to side If any tightness is felt, remove any nicks or burrs with 500 grit emery It Is essential to the proper operation of the relief valve system that the shuttle valve operate freely Install shuttle plugs (35) with new O-rings (17).

26. Inspect low pressure relief valve plunger (61) for scratches, nicks or burrs. Burnishing of the plunger at the point of contact with the seat is normal If wear can be felt, replace the plunger (61) Install the plunger (61), spring (62), a new O-ring (17), and relief valve plug (73) See Fig 225.

NOTE:

Units' of recent manufacture utilize male shuttle valves with female shuttle plugs Older units used female shuttle valves and male shuttle plugs Where it becomes necessary to replace either the shuttle or the plugs, be certain the faulty piece Is replaced with one of a like kind.

Dynapower motors have been manufactured with three high pressure relief valve configurations as illustrated below To complete assembly, identify relief valve configuration and proceed as Instructed.

TYPE III

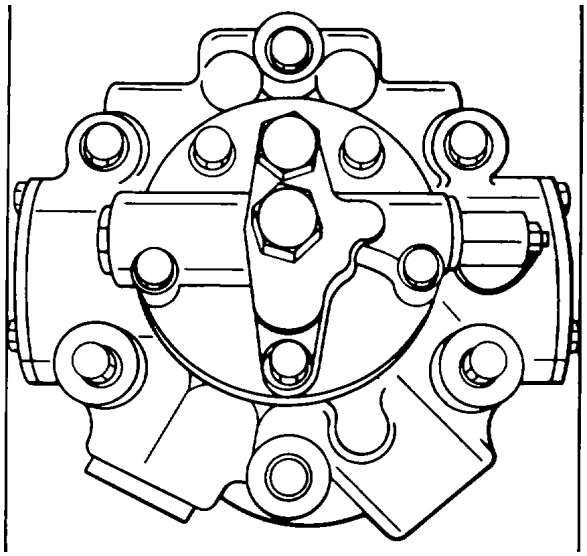


Figure 226.
Phase III motor cover

See Paragraph C below.

Type III

See Fig 235.

C-1 Install O-rings (52) and back up rings (51) being certain that they are installed In the manner Illustrated Install new O-ring (46). See Figs 229 and 235.

C-2 Insert relief valve body in motor cover and secure with hex bolts (48 & 50) and lock washers (47) Torque to 132 in lbs See Fig 227.

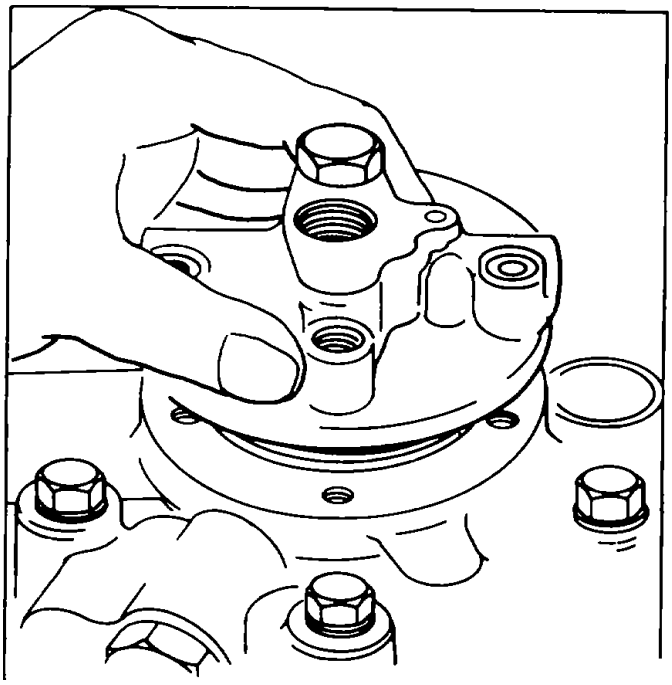


Figure 227.
Installing high pressure relief valve body

C-3 Inspect high pressure relief valve pilot (13) Under normal usage, a seating pattern will burnish on face of pilot (13) If seating pattern can be felt or If the pilot is damaged In any way, It must be replaced See Fig 228.

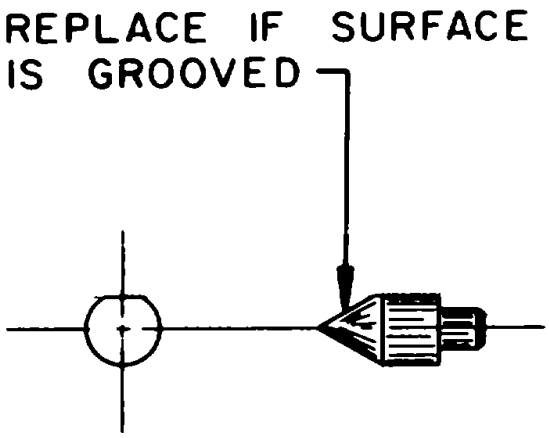


Figure 228.

Inspecting high pressure pilot valve

C-4 Install high pressure relief valve pilot (13), spring (11), inner spring seat (10), and a new O-ring (6) See Fig. 229.

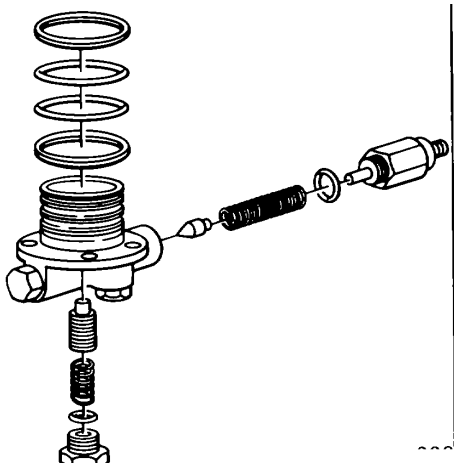


Figure 229.
High pressure relief valve and pilot

Secure with spring seat assembly (7, 8, 9) being careful not to disturb the seat, hex nut, screw relationship See Fig. 230.

5. Inspect high pressure relief valve plunger (20). Check for free movement In relief valve body If any tightness is felt, rework as necessary to remove nicks, scratches or Irregularities

Check valve body against tolerance limits in Fig 146. Install plunger (20), spring (19), a new O-ring (17) and secure with spring seat (15).

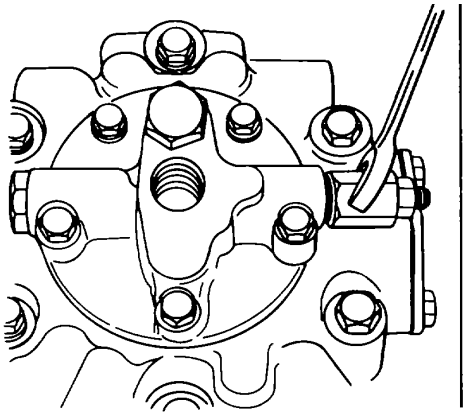


Figure 230.

Installing high pressure pilot valve

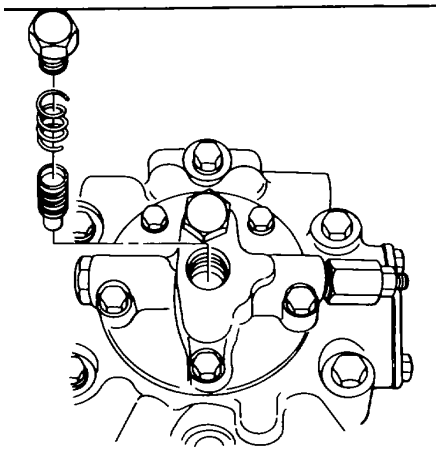


Figure 231.
High pressure relief valve

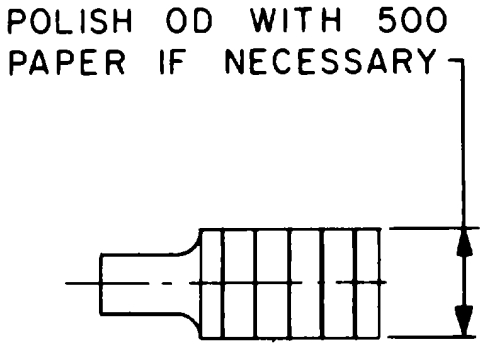


Figure 232.
Inspecting high pressure relief valve

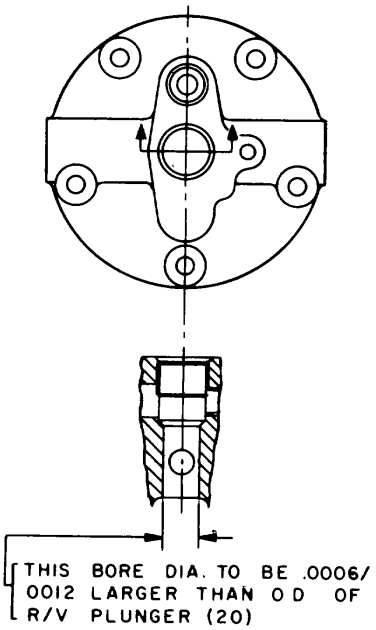


Figure 233.
High pressure relief valve tolerance

This completes reassembly of the Dynapower motor.

PRECAUTIONS FOR RE-STARTING SYSTEM

Certain precautions should be taken prior to restarting your system after completion of a maintenance operation.

All of the procedures below should be followed If a complete overhaul of your system was performed Some of the more basic repairs do not require adherence to all of these procedures, however, you should review the material below and follow those steps which are pertinent.

A. ROTATION CHECK

Make a careful comparison of the direction of rotation of your power source with reference to the direction of rotation shown by the arrow on the Dynapower charge pump cover It is absolutely essential that direction of rotation of power source be the same as that shown by the arrow on the charge pump cover.

CAUTION

No matter whether your power source is diesel, gasoline, steam or electric, no matter If Its direction is clockwise or counterclockwise - if the direction of your power source rotation Is not the same as the direction shown on the charge pump cover plate - DO NOT PROCEED WITH THE INSTALLATION - IF YOU DO, DAMAGE TO THE SYSTEM WILL OCCUR.

B. COUPLING FIT

Your couplings, both pump and motor, must be a snug, slip fit on the drive shaft Mounting flanges must be concentric They also must be at right angles to both the drive shaft and the output shaft Check for concentricity and angle tolerance. When you use semiflexible couplings, maintain tolerances normally required by the type connection you employ If you make a direct coupling from the power shaft to the pump shaft, you must use a dial indicator In this case, tolerances must be within 0.001 in total indicator run-out Do not proceed with installation until complying with stated coupling fit tolerances.

C. MOUNTING

After the above conditions have been met, mount the pump First grease the coupling with noncorrosive grease, then bolt the pump to Its mounting flange Follow the same procedure for mounting the motor, first greasing the coupling and then bolting the motor to its mounting flange.

D. USE GOOD HYDRAULIC PRACTICES

Be sure the interiors of reservoir, connections and fittings are perfectly clean

E. BEFORE OPERATION

Be sure all lines and connections are set up according to your system layout

F. BE SURE SYSTEM IS FULL

Completely fill the reservoir, being sure that all the fluid goes through the mesh or gauze strainer Loosen fitting, and bleed the line at the charge pump enough to check for presence of hydraulic fluid The fluid must have arrived at this point to assure that the system can be started without being damaged If no fluid Is present, It may be necessary to apply air pressure to the tank Do not apply more than 10 PSI If oil still Is not present, check the entire line for possible plugging.

G. DISCONNECT LOAD

If possible, disconnect the motor coupling from whatever shaft it Is attached to, so that the transmission may be started without putting an excessively heavy load on it Disconnecting the load at some other point beyond the motor or employing other means of minimizing load on the system also are acceptable Now - be sure the pump control lever is In neutral position Recheck power source rotation to assure It matches with rotation indicated on the cover of the charge pump.

H. STARTING THE INSTALLATION

After the previous requirements have been met, start the power source. Hold the RPM to low Idle speed If possible for approximately two minutes.

CAUTION

If lines are long, keep a close check on fluid level in reservoir. Damage can occur If there Is not an adequate supply of oil in the system itself

I. FIRST START

Move your Dynapower pump control lever slowly into the forward or reverse position. Assuming you do get Immediate motor response, run the system slowly in both directions for 10 or 15 minutes to bleed all the remaining air from the system. If there Is no motor output, shut off the system and refer to the Trouble Shooting Chart, Page-77 for possible causes. if motor direction does not correspond to direction of rotation designed for movement of control lever, high pressure lines must be switched on the pump or motor. Check control lever linkage for no binding and complete 60° movement, or stop-to-stop.

J. SYSTEM RUN-IN

During the low-speed run-in In both directions, noise level of the pump and motor will decrease steadily as air continues to bleed from the system After about 15 minutes of running, check the fluid level in the reservoir If the bleeding of the system has caused a large drop in the reservoir level, add more oil to bring it up to the point required. Be sure to filter or strain this added oil in the manner previously outlined.

K. FULL SCALE RUN-IN

Then, if possible, operate your Dynapower under actual working conditions Test for peak performance under the heaviest loads you may encounter; check for smoothness of starts and stops In both directions under extreme loads and light loads Try quick starts and stops; try slow ones. Check for steadiness of power flow throughout the entire range of system speed. Finally, go over all connections, checking for possible leaks and tighten as required. Check the fluid supply in the reservoir again, and refill to proper level

Your Dynapower system Is now on full scale operating status. Remember - keep your system absolutely clean at all times.

TEST PROCEDURE
Models 45 Pump and Motor

After major overhaul, the following test should be conducted A test stand schematic Is included. See Fig.234.Complete test stands and power units are available through Dynapower Systems, Kalamazoo, Michigan

A Test Conditions
1. Fluid - Type A suffix a transmission fluid or equivalent.
2 Fluid - temperature - ambient to 1400
3 Inlet pressure
a Model 45 - 100 psig
4 Shaft rotation as indicated on the charge pump cover

B. Pump Schedule
1 If pump is equipped with an override control, disconnect sense lines and cap at pump check valves.
2 Start electric drive motor and adjust speed to meet the following schedule, measuring flows and case leakage where indicated.

Time	RPM	PSI	Cam Position
5mn	1180	500	Full Forward
5min	1780	1000	Full Forward
10min	1780	3000	Full Forward
Measure Flow	1780	3000	Full Forward
10min	1180	4500	Full Forward
Measure Flow	1780	3000	Full Forward
10min	1780	3000	Full Reverse
Measure Flow	1780	3000	Full Reverse
10min	1180	4500	Full Reverse
Measure Flow	1780	3000	Full Reverse

Measured flow must meet the following requirements

Model 45 Pump

RPM	Mm GPM	Max GPM	Max Case Leakage
1780	32.25min	34.5max	1.2GPM

.1 GPM is allowable for case drain increase after 4500 psi run If unit has more than 1 GPM increase, run an additional overload run (10 min, 1180 RPM, 4500 psi) Recheck the case dram flow If the flow remains the same, or drops, and is within the allowable limits, the unit is acceptable

3 Detent Adjustment

Position detent lever in neutral and run at 1180 RPM Close pressure valve torque equal pressure at both discharge port pressure gauges Tighten detent lever bolts Open pressure valve and move the detent lever forward. Return detent lever to neutral and check for equal pressures at discharge ports Repeat this in reverse position, return to neutral and recheck Readjust detent plate if necessary Reconnect sense tubes and set control.

C Motor Schedule (Test as a Pump)

1. Adjust reservoir pressure to approximately 160 psig Adjust high pressure relief valve pilot to permit operation to 5000 psi

3 Start electric drive motor and adjust speed to meet the following schedule, measuring flows and case leakage where indicated

Time	RPM	PSI	Oil Temp
5min	1180	500	1400 F.
5 min	1780	1000	1400 F.
10 min	1780	3000	1400 F.
Measure Flow	1780	3000	1400 F.
10min	1180	4500	1400 F.
Measure Flow	1780	3000	1400 F.

Reverse rotation and repeat above schedule
Measured flow must meet the following requirements

RPM	Min GPM	Max GPM	Max Case Leakage
1760	Model 48 34.6 min	Fixed Motor 37.2 max	1.0 GPM

.1 GPM is allowable for case drain Increase after 4500 psi run If unit has more than 1 GPM increase, make an additional overload run (10 min, 1180 RPM, 4500 psi) Recheck the case dram flow If the flow remains the same, or drops, and Is within the allowable limits, the unit is acceptable.

4. While operating at 1180 $\pm$ 50 RPM, close discharge valve and set high pressure relief valve pilot 100 $\pm$ 50 psig above the value Indicated on the name tag. (For example, 896000-45 Indicates a 4500 psi relief valve setting, 89600040 indicates a 4000 psi relief valve setting, and so forth) Cycle 10-12 times between relief valve cut off point and 2000 psi below Allow temperature to return to 1400 and check cut off point If setting has changed, reset to 100 $\pm$ 50 psi above required setting and repeat above cycling conditions, rechecking to insure that the setting Is maintained.

5. If motor has an override control and no cam stop or a 0° cam stop, connect sense tubes and adjust as outlined on Page 35, Item C.

If motor has an override control and a cam stop other than a 0°, a special test procedure is required

D Pump and Motor Cover Break-in

1. When replacing the cover on a pump or motor, the following break-in procedure must be followed to insure maximum performances from the new cover

2. The following schedules may be modified by terminating the break-in procedure at the maximum pressure experienced on the application.

3. Procedures are included for break-in on the application or a test stand Operating conditions, other than those specified below, are as outlined in "A Test Conditions" Page 131.

4. Electric Motor Drives and Engine Driven Test Stands.

Start drive, adjust speed to 1750 R P M and run in pump to the following schedule

TIME	DISCHARGE PRESSURE	CAM
5 Min	500 PSI	FULL CAM FORWARD
10MIN	1000PSI	FULL CAM FORWARD
10MIN	2000 PSI	FULL CAM FORWARD
10MIN	3000 PSI	FULL CAM FORWARD
10MIN	1000PSI	FULL CAM BACK
10MIN	2000PSI	FULL CAM BACK
10MIN	3000PSI	FULL CAM BACK
10MIN	4000 PSI	HALF CAM BACK
10MIN	5000 PSI	HALF CAM BACK
10MIN	4000 PSI	HALF CAM FORWARD
10MIN.	5000 PSI	HALF CAM FORWARD

Fixed motors may be broken in as the 2nd unit of a standard transmission while breaking In a variable pump, as outlined above

5. Engine Driven Vehicle
   Pumps and motors on the vehicle, are to be broken into the following procedure
   a. With the pump m neutral, start the engine and hold at hall throttle for five minutes
   b. With the vehicle operating on flat terrain and with the engine at half throttle, operate the pump at full displacement forward for ten minutes
   c. Repeat (b) with full displacement in reverse
   d. Repeat (b) and (c) with full engine throttle
   e. Select a moderate grade and repeat (b), (c), & (d) above
   f. Select the maximum grade the vehicle will operate on and repeat (d) above

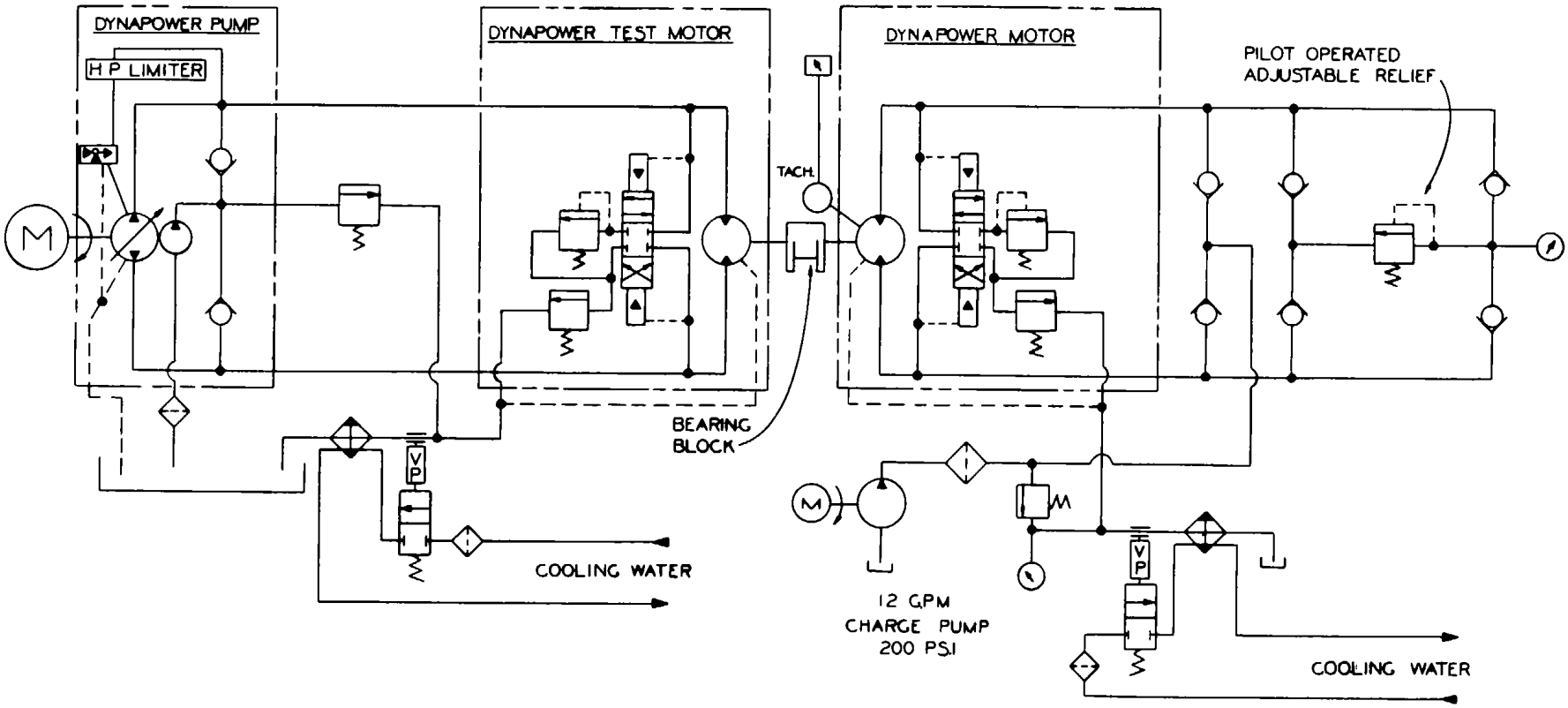


Figure 234.

Test and schematic

PARTS

WARRANTY

E. D. Etnyre & Co. guarantees for o period of one year from the date of the shipment to repair or replace, F. O. B. its factory, any part which requires replacement due to defect in material or workmanship, but will not be responsible for consequential damages or any further loss by reason of such defect. This guarantee does not cover products that were not manufactured by E. D. Etnyre & Co. except to the extent of the guarantee given by the actual manufacturer.

DYNAPOWER -
MODEL 48 FIXED MOTOR
PARTS CUTAWAY DRAWING

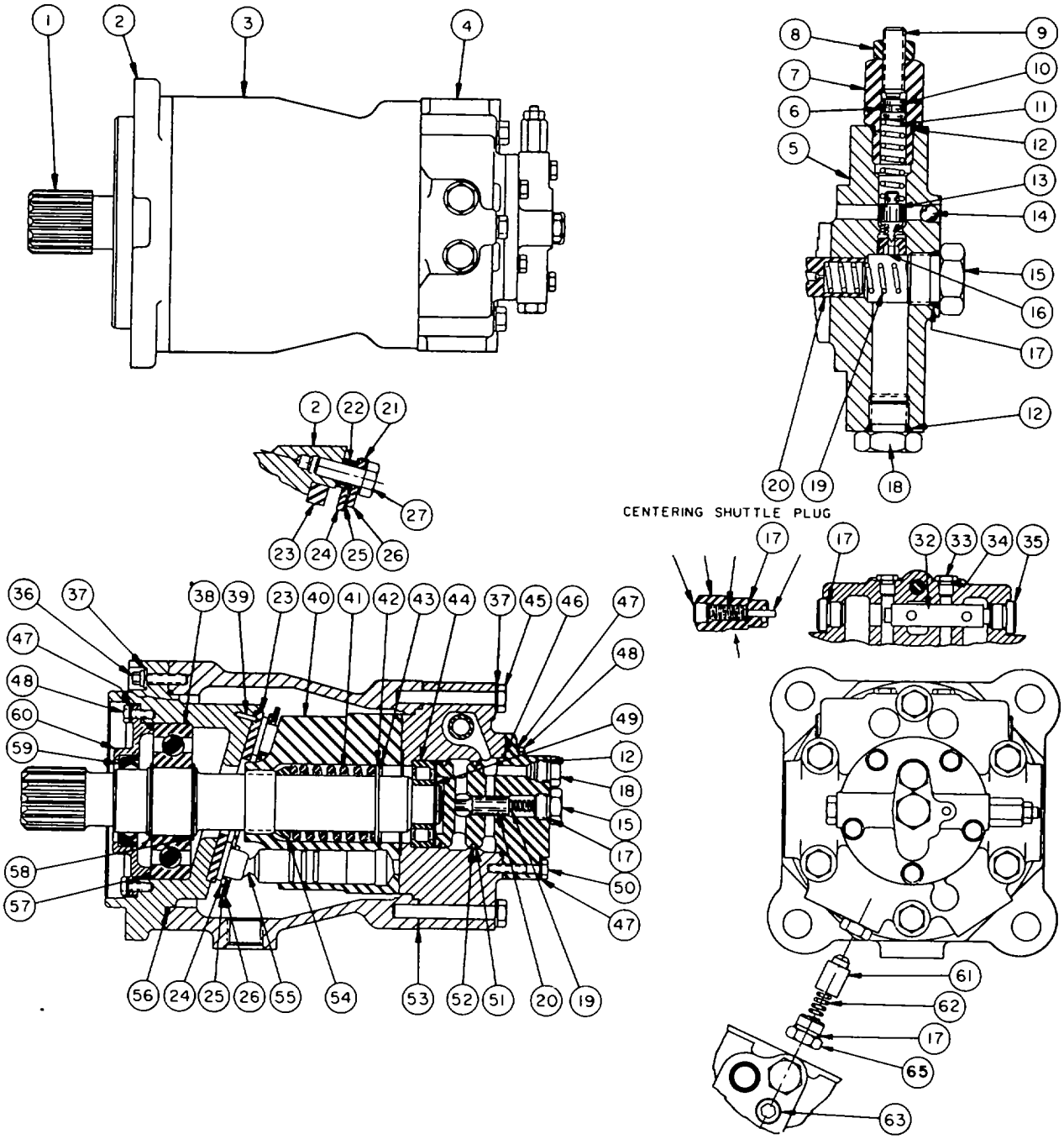


Figure 235.

KEEP

IT

CLEAN

PARTS LIST

841190	1	SHAFT
830230	2	FLANGE ASSEM (Includes Item 39)
841188	3	HOUSING
840245	4	COVER
830028	5	BODY ASSEM (Includes Items 14 B 16)
871010	6	0 - RING
841279	7	SPRING SEAT
870563	8	HEX NUT
872732	9	SCREW
841278	10	SPRING SEAT
841255	11	SPRING
871014	12	O-RING - 3Req'd
840811	13	VALVE
872305	14	BALL
840037	15	PLUG
840975	16	SEAT
871114	17	O-RING-4Req'd
872675	18	PLUG - 2Req'd
840138	19	SPRING
841180	20	PLUNGER
841163	21	TAB LOCK WASHER-4Req'd
841321	22	SPACER - 4Reqd
841226	23	PLATE
841225	24	PLATE
850060	25	BEARING PLATE - 2 Req'd
850061	26	CLIP - 2 Req'd
870151	27	HEX BOLT - 4Reqd
830219	32	VALVE ASSEM
840146	33	PLUG - 2 Req'd
871012	34	0 - RING - 2 Req'd
841113	35	PLUG - 2 Req'd
872734	36	SCREW - 8 Req'd
870492	37	LOCK WASHER - 14 Req'd
870642	38	BEARING
870045	39	PIN
830150	40	BLOCK ASSEM
840022	41	SPRING
840023	42	SPRING RETAINER
870103	43	RETAINING RING
870648	44	BEARING
870264	45	HEX BOLT - 6Req'd
871146	46	O - RING
870480	47	LOCK WASHER - 9 Req'd
870150	48	HEX BOLT - 6Req'd
870101	49	RETAINING RING
870210	50	HEX BOLT - 3Req'd
870653	51	BACK UP RING - 2 Req'd
871140	52	O - RING - 2 Req'd
840073	53	GASKET
840021	54	SPRING RETAINER
830003	55	PISTON ASSEM - 9Req'd
875163	56	O - RING
875243	57	O- RING
870102	58	RETAINING RING - 2Req'd
870106	59	SEAL
830231	60	SEAL ASSEM (Includes item 59)
840035	61	PLUNGER
840134	62	SPRING
872495	63	PLUG
840037	65	PLUG

Dynapower phase lII motor Cutaway drawing

DYNAPOWER
MODEL 45 VARIABLE PUMP
PARTS CUTAWAY DRAWING

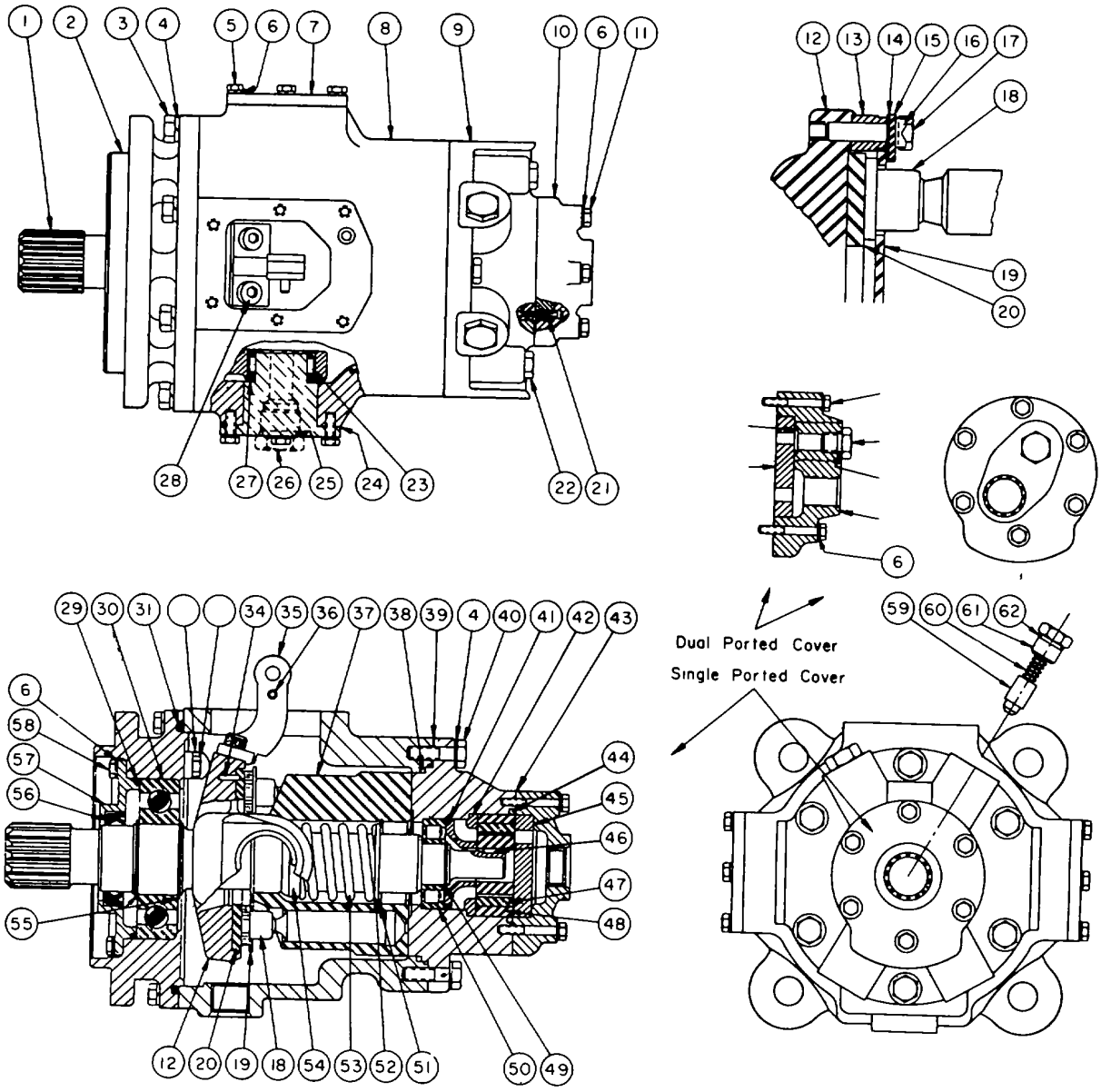


Figure 236.

KEEP

IT

CLEAN

PARTS LIST

841247	1	SHAFT			
841277	2	FLANGE			
870194	3	HEX BOLT - Req'd			
870492	4	LOCK WASHER - 14 Req'd			
870160	5	HEX BOLT - 8Reqd			
870480	6	LOCK WASHER - 18 Req'd			
840756	7	TRUNNION- PORTED 2Reqd			
840024	8	HOUSING			
840063	9	COVER			
840120	10	{COVER - CW Rot			
870220	11	HEX BOLT - 6 Req'd			
830245	12	CAM ASSEMBLY (Includes items 23 B 34)			
841248	13	SPACER - 4 Req'd			
850060	14	BEARING PLATE - 2Reqd			
850061	15	CLIP - 2 Req'd			
841163	16	TAB LOCK WASHER - 4Reqd			
870181	17	HEX BOLT - 4RE'O			
830003	18	PISTON ASSEM - 9Req'd			
841225	19	PLATE			
841226	20	PLATE			
870092	21	PIN			
870264	22	HEX BOLT - 4 Req'd			
-870647	23	BEARING - 2 Req'd			
840031	24	GASKET 2 Req'd			
871212	25	O-RING - 2Req'd			
872678	26	PLUG - 2Req'd			
840029	27	BEARING- 2Req'd			
870377	28	CAP SCREW - 2 Req'd			
875243	29	O- RING			
870642	30	BEARING			
875261	31	O- RING			
870045	34	PIN			
830201	35	LEVER ASSEM (Includes item 36)			
840067	36	PIN			
830150	37	BLOCK ASSEM			
871158	38	O-RING			
840073	39	GASKET			
870194	40	HEX BOLT - 2Req'd			
871140	41	O-RING			
840038	42	VALVE			
		GASKET	001	Amber	870305
	43	"	002	Red	870306
		"	003	Green	870307
		"	004	Blue	870308
871231	44	O- RING			
840185	45	PLATE			
871054	46	PIN			
830091	47	ROTOR			
830041	48	SPACER ASSEM (Includes item 21)			
870101	49	RETAINING RING			
870648	50	BEARING			
870103	51	RETAINING RING			
840023	52	SPRING RETAINER			
840022	53	SPRING			
840021	54	SPRING RETAINER			
870102	55	RETAINING RING - 2Re'd			
870106	56	SEAL			
830231	57	SEAL ASSEM (Includes item 56)			
870150	58	HEX BOLT - 4 Req'd			
840035	59	PLUNGER - Req'd			
840036	60	SPRING - 2Req'd			
840037	61	PLUG - 2Req'd			
871114	62	O-RING - Req'd			

Dynapower phase Em pump cutaway drawing

DYNAPOWER
MODEL 45 HORSEPOWER CONTROL
PARTS CUTAWAY. DRAWING

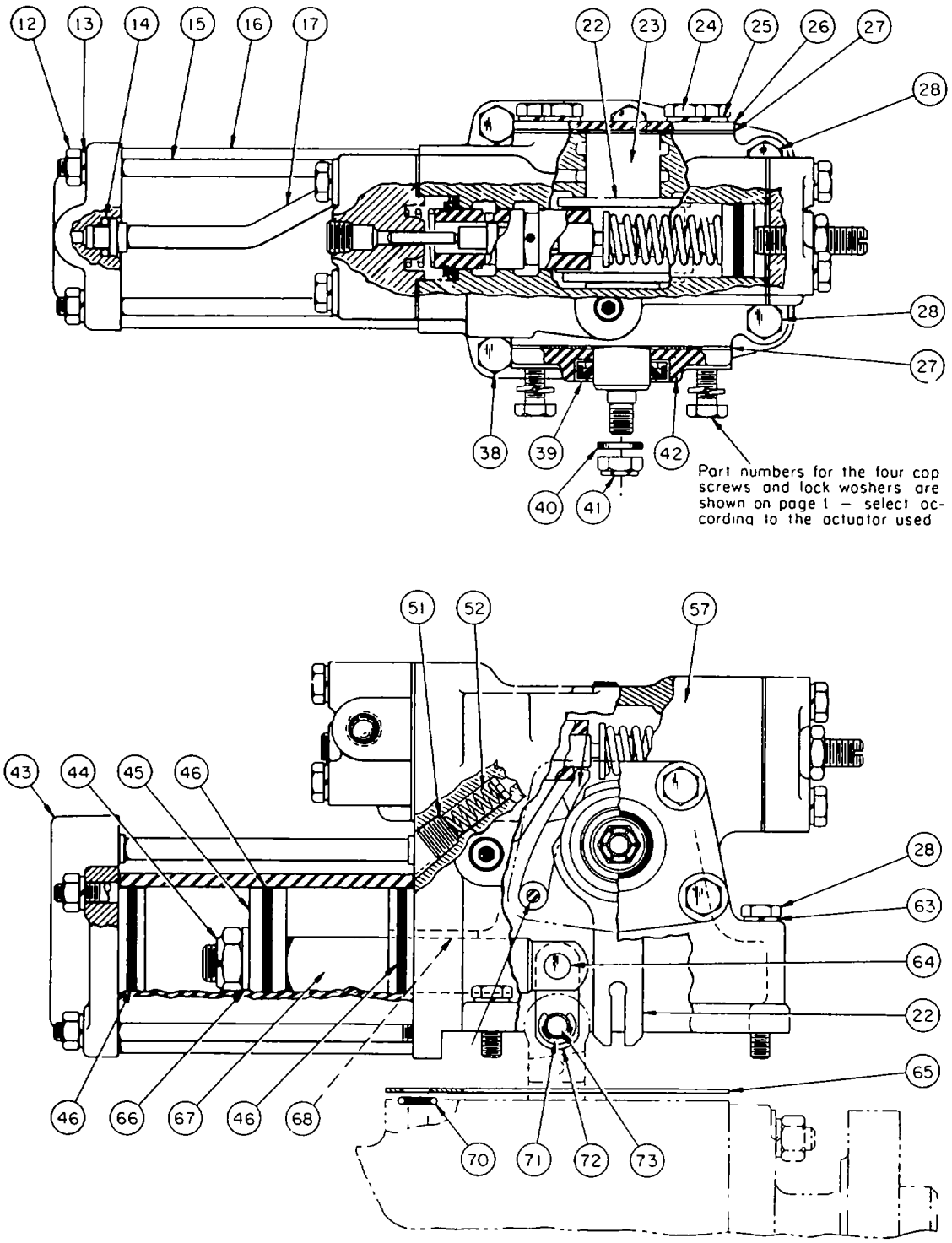
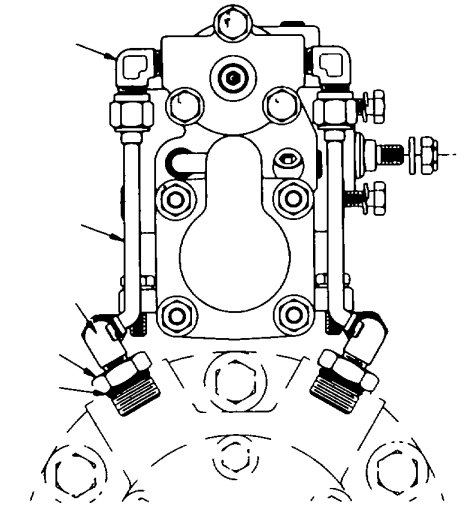
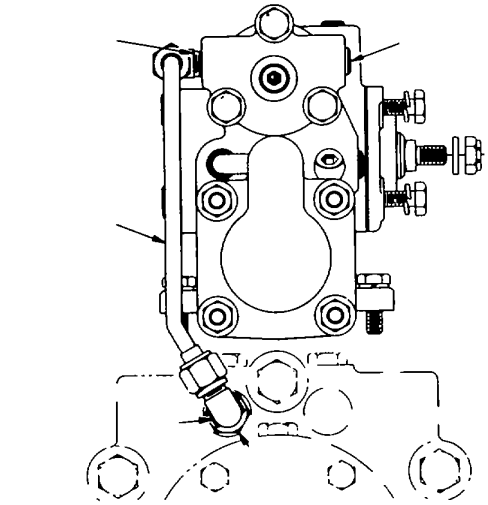


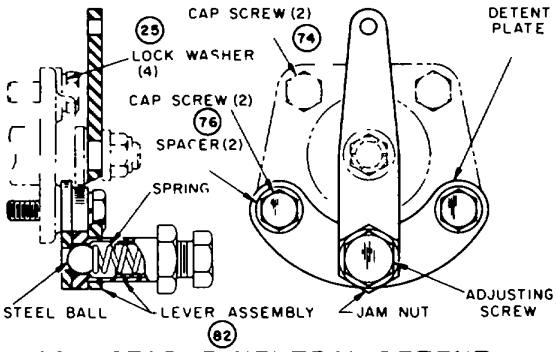
Figure 237.



Used with SINGLE or DUAL PORTED CHARGE PUMP COVER



Used with a RELIEF VALVE TYPE COVER

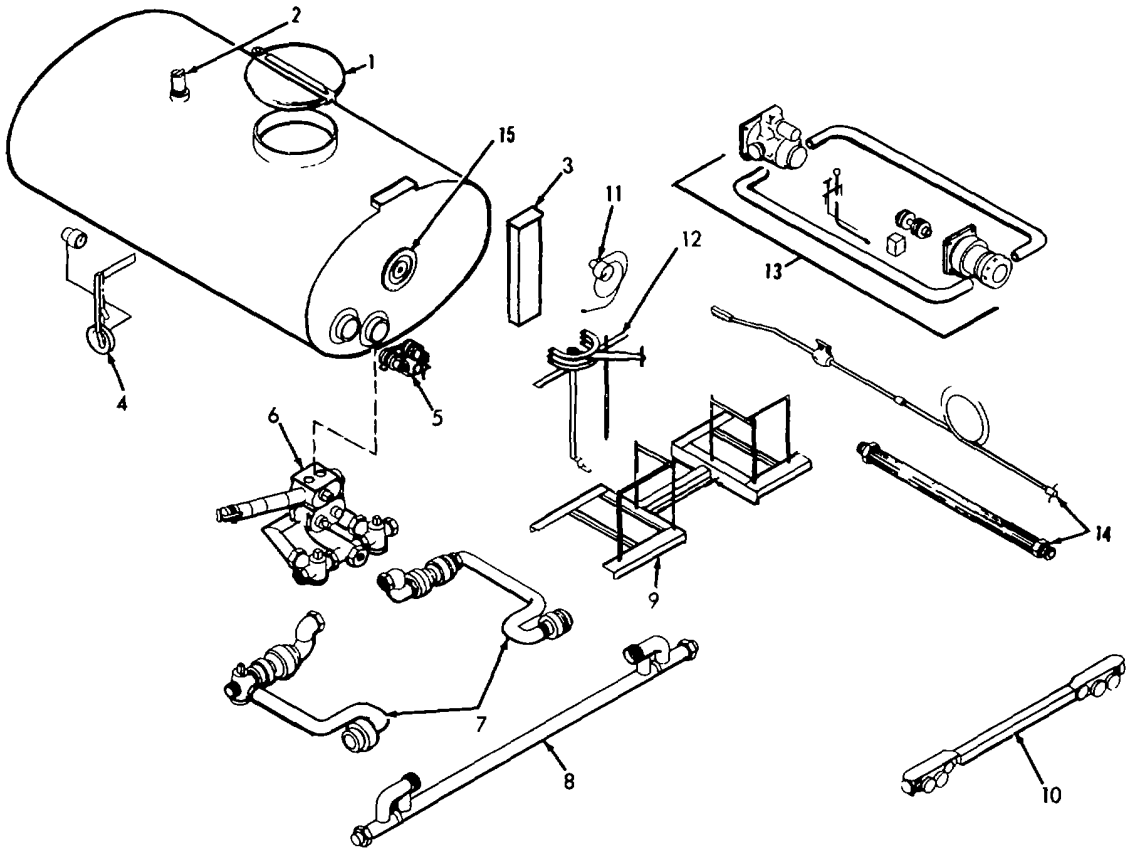


PARTS LIST

870561	12	HEX NUT (4 REQ'D)
870480	13	LOCK WASHER (4 REQ'D)
871011	14	O-RING SEAL (2 REQ'D)
840304	15	STUD (4 REQ'D)
840298	16	CYLINDER TUBE
830080	17	TRANSFER TUBE ASSEMBLY
830017	22	VALVE SLEEVE ASSEM
830018	23	CONTROL VALVE
870140	24	CAP SCREWS (4 REQ'D)
870480	25	LOCK WASHER (4 REQ'D)
840087	26	HOUSING COVER
840088	27	GASKET (2 REQ'D)
870230	28	CAP SCREW (2 REQ'D)
870160	38	CAP SCREW (4 REQ'D)
870115	39	LIP SEAL
840125	40	WASHER
870705	41I	SELF-LOCKING NUT
830028	42	SEAL PLATE ASSEMBLY (Includes item 39)
840299	43	CYLINDER COVER
870709	44	SELF- LOCKING NUT
840297	45	PISTON
871133	46	O-RING SEAL(3REQ'D)
872493	51	PIPE PLUG
840613	52	ORIFICE SPRING
830119	57	CONTROL HOUSING
870480	63	LOCK WASHER (6 REQ'D)
	64	PIN (Included with item 67)
840058	65	GASKET
840288	66	WASHER
830067	67	ROD ASSEMBLY (Includes Items 64 B 72
	68	BUSHING (Included with item 57)
871011	70	O-RING SEAL
870100	71	RETAINING RING
	72	LINK (Included with item 67)
840059	73	CLEVIS PIN
840140	74	CAP SCREW (2 REQ'D)
840140	76	CAP SCREW (2 REQ'D)
840419	82	LEVER ASSEM

ADJUSTABLE NEUTRAL DETENT *Figure 238.*

Dynapower long differential override control cutaway drawings



Ref	Decription
1	Manhole
2	Overflow
3	External Smoke Stacks
4	Bitumeter
5	Burners
6	Circulating System
7	Distributing Lines
8	Spray Bar
9	Subframe
10	Bumper
11	Pump Tachometer
12	Quadronts
13	Hydraulic
14	Miscellaneous Items
15	Tank Gauge

Figure 239.

MANHOLE - 20 INCH

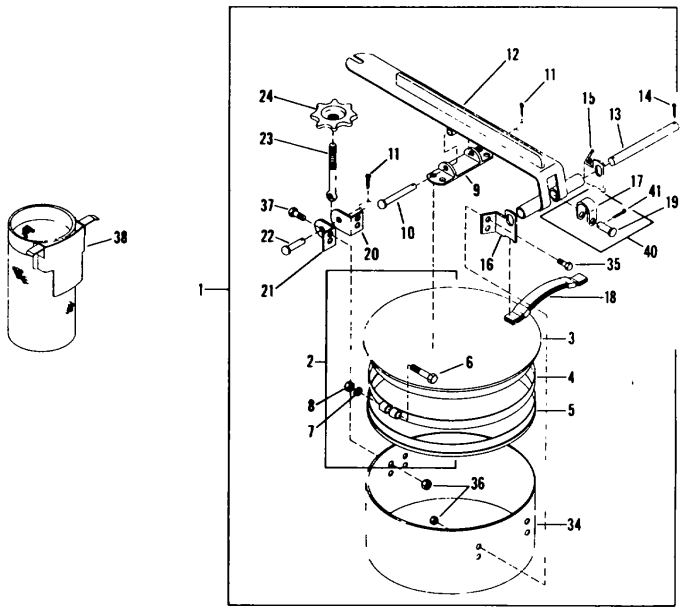


Figure 240

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3300135	1	MANHOLE ASSEMBLY COMPLETE	16	3300019	1	HINGE BRACKET-RIGHT
				17	3300154	1	SLEEVE YOKE
				18	3300151	1	RELEASE SPRING
				19	3300294	1	SLEEVE YOKE PIN
2	3300301	1	MANHOLE COVER COMPLETE	20	33001*8	I	LATCH BEARING-LEFT
				21	3J00149	1	LATCH BEARING-RIGHT
				22	3300293	1	LATCH PIN
3	3300142	1	COVER ASSEMBLY	23	3300150	1	LATCH BOLT
				24	3300120	1	HAND WHEEL
4	3300146	1	RETAINER RING ASSEMBLY				
5	6600334	1	GASKET				
6	012083	1	HEX BOLT 5/16 X 2 3/4				
7	0120214	1	LOCK WASHER b/16				
8	0120376	1	HEX NUT 5/16				
9	3300122	1	BEARING ASSEMBLY				
10	3300125	1	COVER PIN				
11	0103373	3	COTTER PIN 3/32 X 3/4				
12	3300136	1	TONGUE ASSEMBLY	34	3300156	1	MANHOLE COLLAR-20 INCH
13	3300121	1	HINGE PIN	35	0120741	4	CAP SCREW 5/16 x 3/4
14	0103385	2	COTTER PIN 1/8 X 1	36	0120368	16	HEX NUT 5/16
15	3300018	1	HINGE BRACKET-LEFT	37	0122017	8	CAP SCREW 5/16 X 1
				38	3390173	1	STRAINER-SHALL
				40	3300152	1	SLEEVE YOKE ASSEMBLY
				41	010386	1	COTTER PIN 1/8 X 1 1/4

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

SUBFRAME - TUC BAR

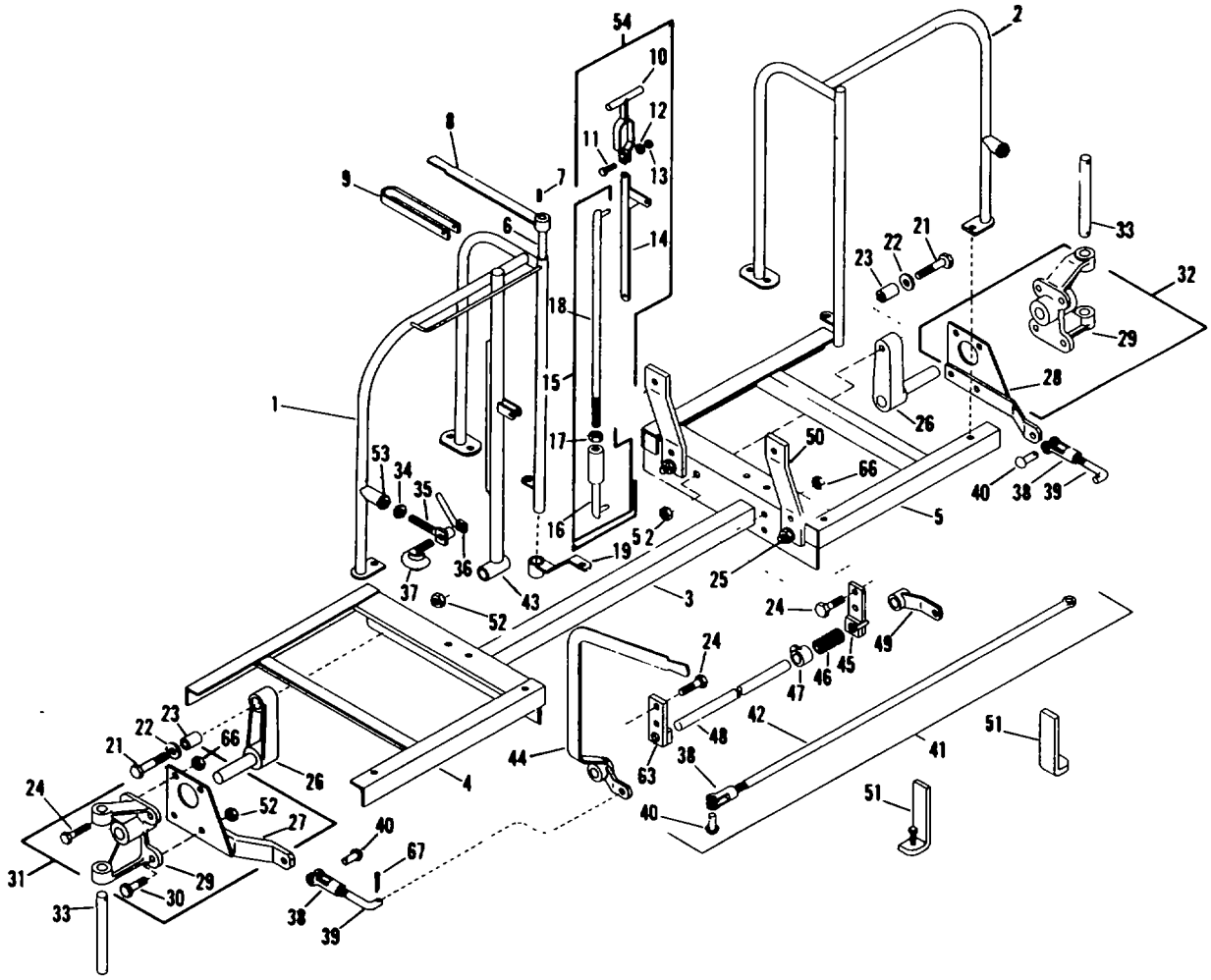


Figure 241

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

SUBFRAME - TUC BAR

REF	PART	QTY.	DESCRIPTION
1	3350301	1	LEFT GUARD RAIL
2	3351257	1	RIGHT GUARD RAIL
3	3310347	1	CENTER PLATFORM ASSEMBLY
4	3310354	1	PLATFORM WITH ANGLE UP-LEFT
5	3310359	1	PLATFORM WITH ANGLE UP-RIGHT
6	3350272	1	SHIFTING SHAFT
7	6000011	1	KEY
8	3351059	1	LEVER
9	3350046	1	LOCK
10	3350497	1	CATCH ASSEMBLY
11	0122027	1	CAP SCREW 5/16 NC X 1 1/4
12	0120214	1	LOCK WASHER 5/16
13	0120376	1	HEX NUT 5/16 NC
14	3350495	1	LEVER ASSEMBLY
15	3350501	1	LINK ASSEMBLY
16	3351173	1	TURNBUCKLE ASSEMBLY
17	0124**3	1	JAM NUT 9/16 NC
18	3350502	1	ROD LINK
19	3350270	1	SHIFTING ARM ASSEMBLY
20	3350053	2	BUSRING ASSEMBLY (INCL ITEMS 21-23,64,651 NS
21	0428715	2	CAP SCREW 5/8 NC X 4
22	0130999	2	FLAT WASHER 11/16 X 1 3/4
23	3350054	2	BUSHING
24	0122433	4	CAP SCREW 1/2 NC X 1 1/2
25	0428217	2	CAP SCREW 5/8 NC X I 1/2
26	3350064	2	BAR CARRYING SHAFT ASSEMBLY
27	3350010	1	LEFT ARM ASSEMBLY
28	3350011	1	RIGHT ARM ASSEMBLY
29	3350007	2	YOKE
30	0428694	4	CAP SCREW 5/8 NC X 2 1/4
31	3350008	1	YOKE-LEFT
32	3350009	1	YOKE-RIGHT
33	3350047	2	SWIVEL PIN
34	0220086	2	HEX NUT 3/4 NC
35	3350340	2	SUPPORT ASSEMBLY
36	3350795	2	WING NUT
37	3350347	2	HOOK ASSEMBLY
38	6000367	2	ROD END
39	3351134	2	BAR RAISING LINK
40	6000403	3	DRILLED RIVET
41	3350261	1	SHIFTING ROD ASSEMBLY
42	3350269	1	SHIFTING ROD
43	3350499	1	POST ASSEMBLY
44	3350881	1	BAR RAISINS LEVER ASSEMBLY
45	3350904	1	BEARING BLOCK-RIGHT
46	3350908	1	SPRING-RIGHT
47	3350887	1	ARM ASSEMBLY-CENTER BALANCE
48	3350045	1	SHAFT
49	3350885	1	BAR RAISE ARM ASSEMBLY
	3310265	1	BRACKET HANGER (8-10 INCH DROPS)
	3310221	1	HANGER-SUBFRAME-TRLR UNITS
51	3350901	2	BAR STOP
52	6100070	8	LOCK NUT 5/8 NC
53	3350349	2	BAR HOLD CLAMP TUBE AS6
54	3350494	1	TURN UP LEVER ASSEMBLY
63	3350903	1	BEARING BLOCK-LEFT
66	6100068	8	LOCKNUT 1/2 NC
67	0103385	2	COTTER PIN 1/8 X 1

NS-NOT SHOWN

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

HYDROSTATIC DRIVE - PIPING AND INSTALLATION

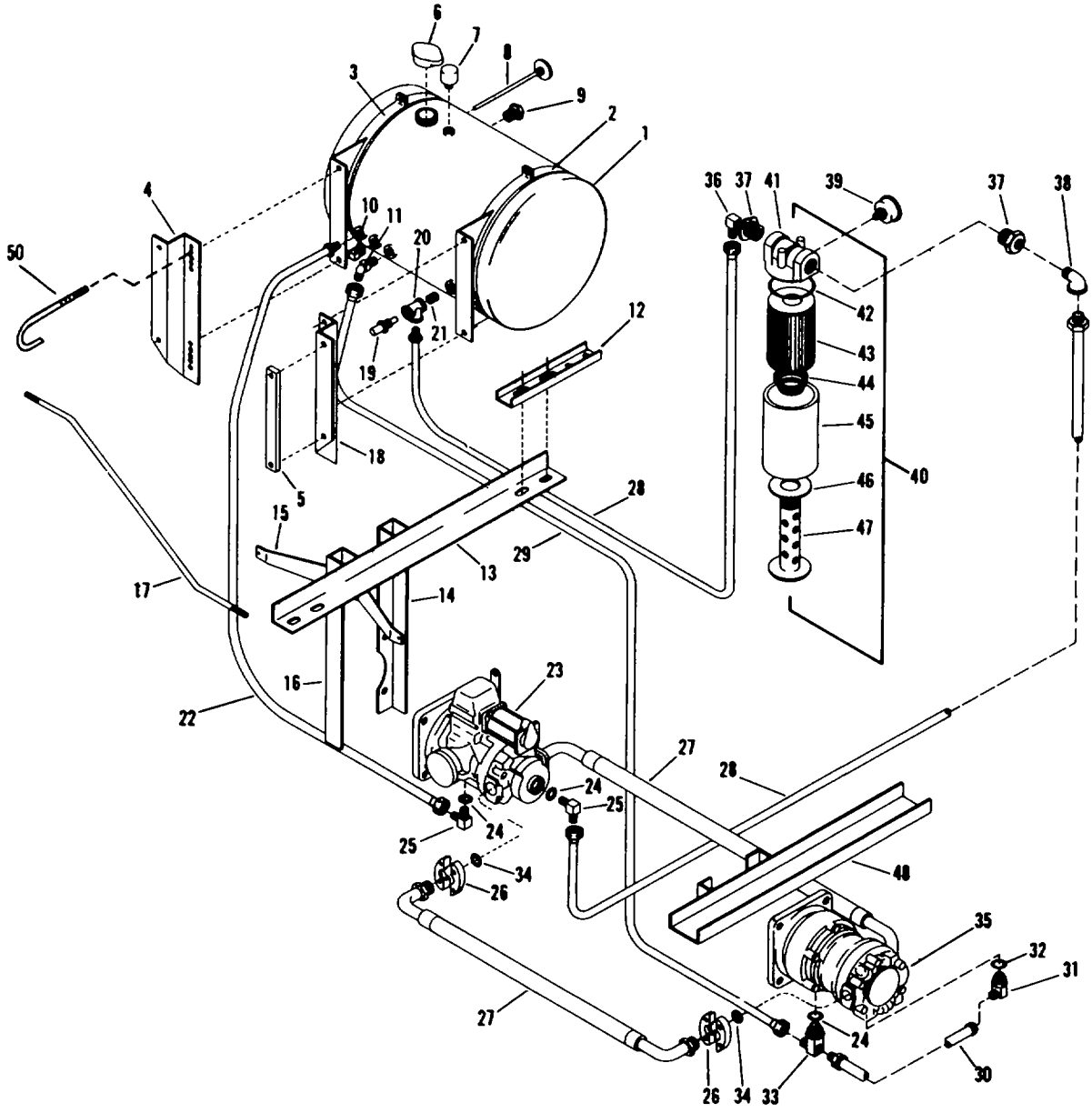


Figure 242

SPECIFY UNIT SERIAL NO., PART NO., & PART DESCRIPTION

HYDROSTATIC DRIVE - PIPING AND INSTALLATION

REF	PART	QTY.	DESCRIPTION
1	28J4401	1	TANK ASSEMBLY
2	3320322	1	MOUNTING CLAMP-RIGHT
3	3320323	1	MOUNTING CLAMP-LEFT
4	3320813	1	FRAME BRACKET-LEFT
5	3320814	1	BAR CLIP
6	3330026	1	CAP-NON VENTED
7	6600223	1	BREATHER
8	6500039	1	THERMOMETER
REPAIR			
9	6600224	1	OIL LEVEL GLASS
10	0219199	1	PLUG 1/2
11	9*02828	1	ELBOW
12	O4J4401	1	MOUNTING CHANNEL
13	3320273	1	HANGER
14	OIJ4401	1	HYD PUMP MTG ANGLE-RIGHT
15	3320367	2	OVERRIDE BRACKET
16	02J4401	1	HYD PUMP MTG ANGLE-LEFT
17	O6J*44O	1	ROD (SPECIFY LENGTH
18	03J4401	1	FRAME BRACKET-RIGHT
19	6600237	1	THERMO SWITCH
	6700072	1	REPLACEMENT BULB FOR LIGHT IN CA8 NS
20	0125988	1	TEE 3/*
21	0192470	1	NIPPLE 1/2 X 1 3/8
22			
	3320872	1	HOSE ASM RESVR PUMPAJ FT
23			
	6600215	1	HYDRAULIC PUMP-RH ROTATION
24	0274249	3	O-RING 3/A
25	9410979	2	ADAPTER UNION
26	6600236	8	SPLIT FLANGE
27			
	6600231	2	HOSE-13 FT
28	3320861	1	SUCTION HOSE ASM-2 FT
	3320862	1	SUCTION ASM-3 FT
29			
	3320881	1	HOSE ASH RESVR HTR-16 FT
30	3320889	1	HOSE ASSEMBLY
31	9410977	1	ELBOW
32	0274247	1	O-RING
33	3320893	1	ELBOW
34	027*253	4	O-RING
35	66002(14	1	HYDRAULIC MOTOR
36	9420867	1	ELBOW
37	6200036	2	BUSHING
38	0141621	1	STREET EL80I-3/4
39	7420042	1	INDICATOR
40	6600225	1	FILTER ASSEMBLY
41	7420136	1	HEAD-PLUGGED
42	7420004	1	O-RING
43	7420007	1	FILTER ELEMENT
44	7420046	1	SPRING
45	7420076	1	HOUSING
46	7420008	1	SEAL
47	7420009	1	CENTER POST
48	3320268	1	HANGER
49	3360304	2	U-BOLT NS
	7010028	AR	PUMP REPAIR KIT NS
	7010031	AR	MOTOR REPAIR KIT NS
	7010032	AR	HYDPUMPTOP CONTROL
			KIT N8
	7420112	AR	ROTATION CHANGE KIT NS
50	3360304	2	HOOK BOLT

AR-AS REQUIRED
NS-NOT SHOWN

SPECIFY UNIT SERIAL NO PART NO, & PART DESCRIPTION

DRIVE LINE - PTO TO HYDRAULIC PUMP

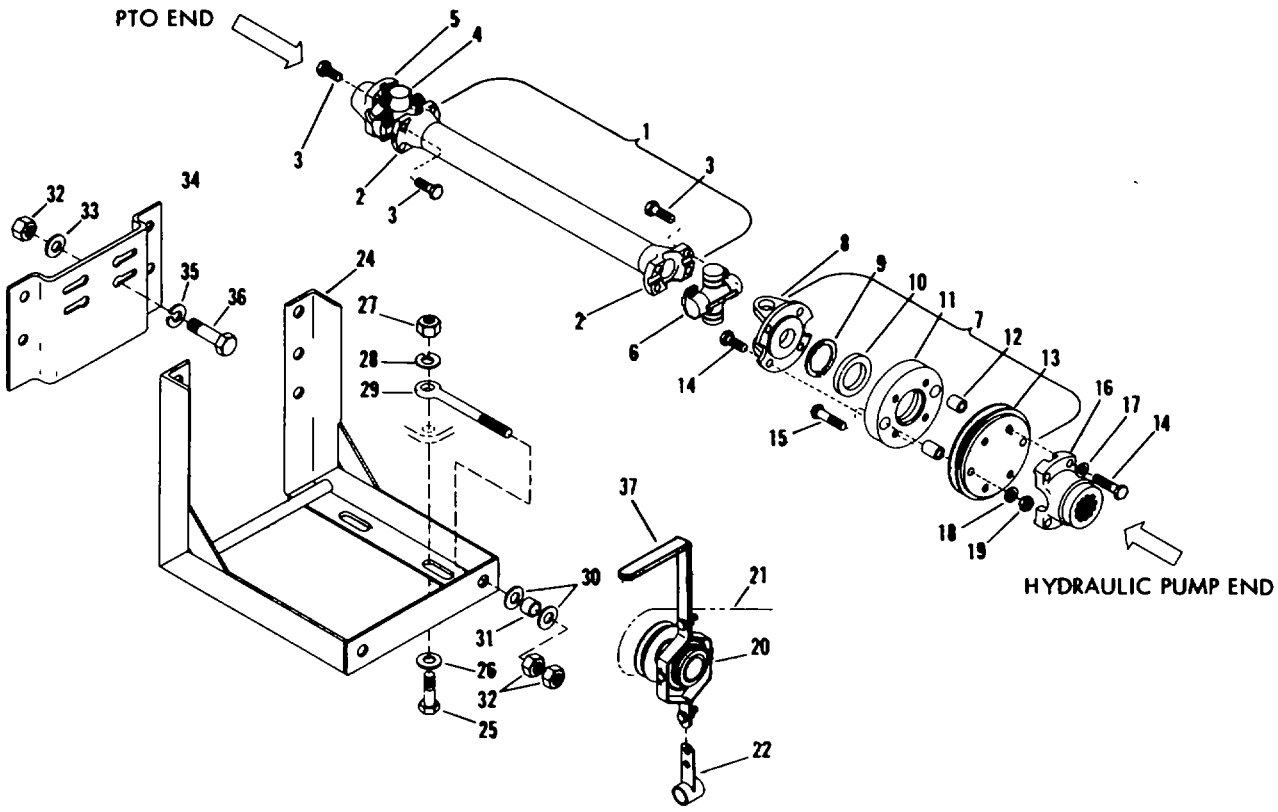


Figure 243

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

DRIVE LINE - PTO TO HYDRAULIC PUMP

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	11J4401	1	DRIVE LINE ASSEMBLY TUBE LENGTH 45 1/2 IN				
2	6440031	2	WELD YOKE				
3	6000487	12	CAP SCREW 5/16 X 3/4 NT				
4	6440026	1	CROSS AND BEARING ASSEMBLY				
5	6440033	1	YOKE- 1/4 BORE				
6	6440025	1	CROSS AND BEARING ASSEMBLY				
7	3320336	1	SHEAR ADAPTER ASSEMBLY				
8	6440024	1	FLANGE YOKE				
9	6000443	1	SNAP RING				
10	3170081	1	RETAINING RING				
11	4050127	1	FEMALE SHEAR ADAPTER				
12	3170052	2	SHEAR BUSHING				
13	3320797	1	MALE SHEAR ADAPTER ASSEMBLY				
14	0120233	8	CAP SCREW 3/8 NC X 1				
15	0121940	2	CAP SCREW 1/4 NC X 1 3/4				
16	6440035	1	FITTING YOKE				
17	0120382	6	LOCK WASHER 3/8				
18	0120380	2	LOCK WASHER 1/4				
19	0120375	2	HEX NUT 1/4 NC				
20	3320741	1	CLUTCH WITH ZU FORK				
21	6435039	1	V-BELT 5/8 x 57 IN NS				
22	3320681	1	ARM ASSEMBLY				
24	3320371	1	BLOWER MOUNTING ASSEMBLY				
25	0120918	4	CAP SCREW 3/8 NC X 1 1/2				
26	0120388	4	FLAT WASHER 3/8				
27	0120377	4	HEX NUT 3/8 NC				
28	0120382	4	LOCK WASHER 3/8				
29	3300150	2	LATCH BOLT				
30	0120390	4	FLAT WASHER 1/2				
31	3350852	2	SPACER				
32	0120378	8	HEX NUT 1/2 NC				
33	0120390	4	FLAT WASHER 1/2 X 1 3/8				
34	3320895	1	BRACKET-BLOWER MTG PHYD UNITS				
35	0120384	8	LOCK WASHER 1/2				
36	0120426	8	CAP SCREW 1/2 NC X I 1/4				
37	30J4401	1	CLUTCH HANDLE				

NS-NOT SHOWN

SPECIFY UNIT SERIAL NO., PART HO, & PART DESCRIPTION

CONTROLS - HYDROSTATIC SYSTEM

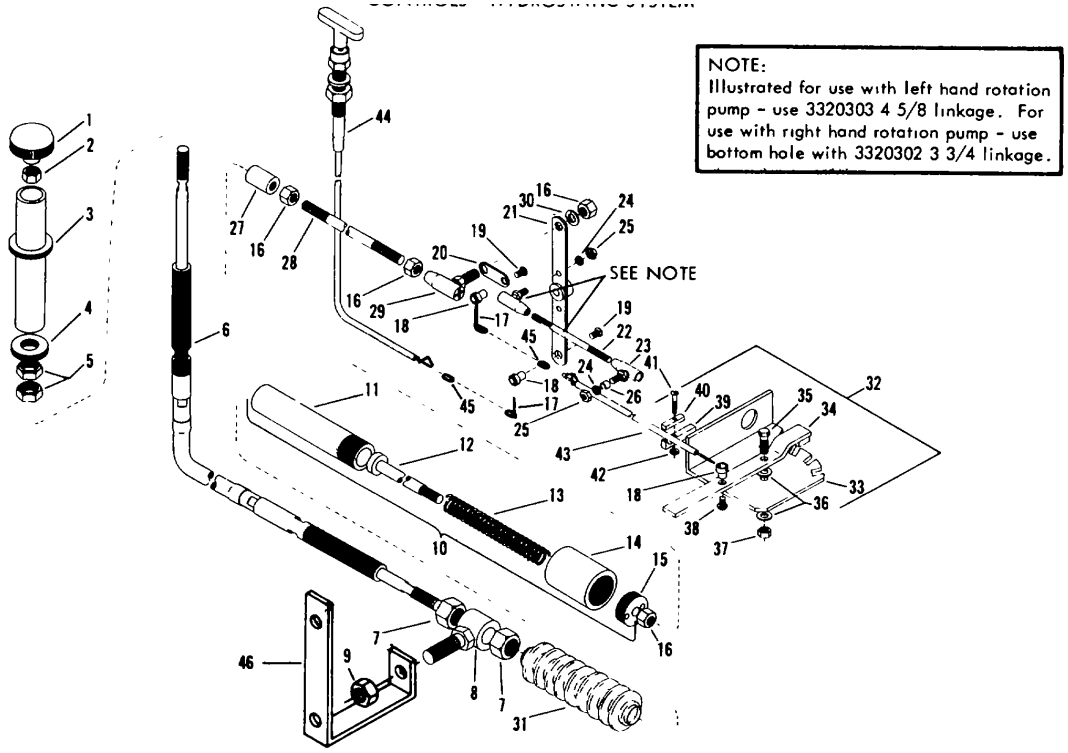


Figure 244

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3320228	1	SHIFTING KNOB	25	0121358	2	HEX NUT 5/16 NF
2	0120369	1	HEX NUT 3/8 NF	26	3320304	1	BUSHING
3	3320284	1	VERNIER ASSEMBLY	27	3320307	1	CONNECTOR
4	3320288	1	KNURLED NUT	28	09J44O01	1	LINK- LENGTH 10 IN
5	0124944	2	JAM NUT 5/8 NF	29	9422787	1	SWIVEL JOINT 5/16
6	3320613	AR	CABLE 10 FT	30	010214	1	LOCK WASHER 5/16
7	012Olt358	2	HEX NUT 5/I NF	31	6600222	1	BELLOWS
8	3320308	1	LOCKING BUSHING ASSEMBLY	32	332015	1	OVERRIDE CONTROL
BRACKET							
9	0120378	2	HEX NUT 1/2 NC				ASSEMBLY
10	3320289	1	OVERRIDE CONTROL ASSEMBLY	33	3320819	1	CONTROL FRAME ASSEMBLY
11	3320290	1	800Y	34	3330816	1	ARM ASSEMBLY
12	3320291	1	ROD	35	0121887	1	HEX BOLT 1/4 X 3/4
13	3320296	1	SPRING	36	0446179	2	TYPE A WASHER 1/4
14	332024	1	PACKING GLAND	37	9418936	1	LOCK NUT
15	3320295	1	PACKING NUT	38	0445938	1	SLOTTED MACH SCREW
16	0120368	4	HEX NUT 5/16 NF				10-32 X 3/8
17	0103362	2	COTTER PIN 1/16 X 3/4	39	3320821	1	CABLE CLAMP BLOCK
18	3320034	3	THROTTLE TOP	40	3320822	1	CABLE CLAMP PLATE
19	0132892	2	MACHINE SCREW 10-32 X 1/4	41	0436754	1	SLOTTED MACH SCREW
20	3320721	1	LINK				10-32 X 1
21	3320299	1	LEVER ASSEMBLY	42	0120614	1	MACHINE NUT 10-32
22	3320302	1	CONNECTING ROD 3 3/4	43	6400073	AR	CABLE
			(SEE NOTE)	44	6400047	1	THROTTLER CONTROL CABLE
23	6000409	2	SWIVEL JOINT				ASSEMBLY 18 FT
24	0120217	2	LOCK WASHER 5X16	45	3320302	2	CONTROL CABLE CHAIN
				46	05J4401	1	CABLE ASM BRACKET
							AR-AS REQUIRED

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

HYDRAULIC UNIVERSAL AND TACHOMETER DRIVE

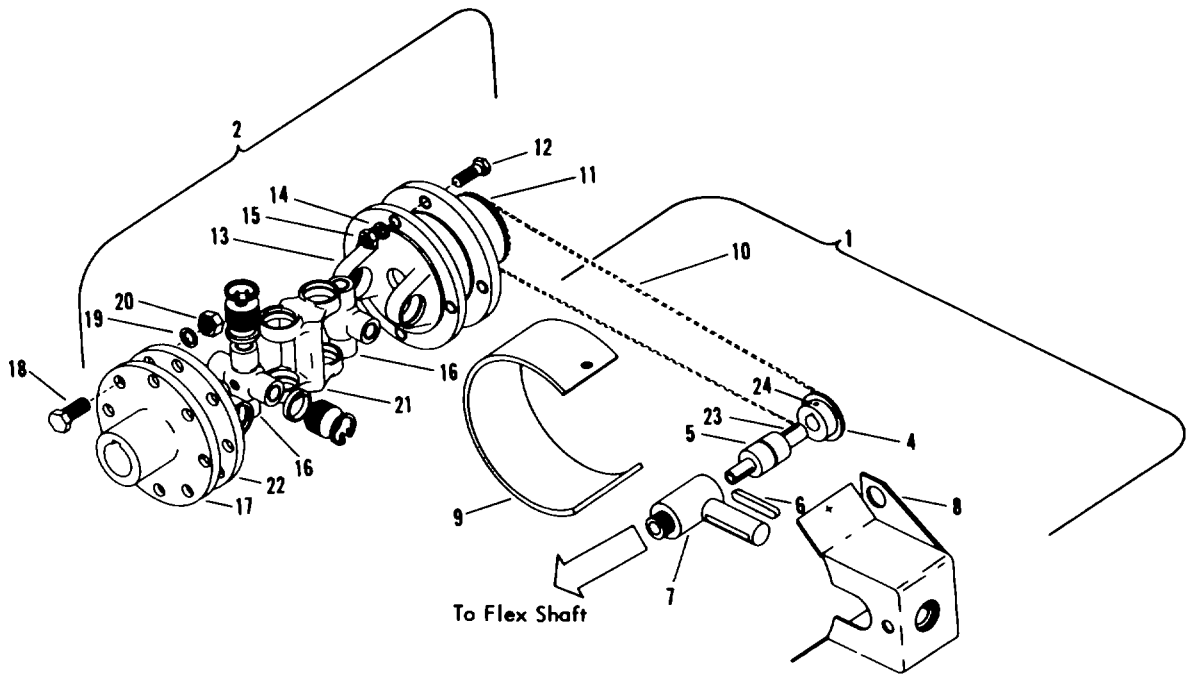


Figure 245

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3320368	1	TACHOMETER DRIVE (INCL ITEMS 4-10)	12	0121913	3	CAP SCREW 1/4 NC X I 1/4
				13	6440043	1	FLANGE YOKE
				14	0120310	3	LOCK WASHER 1/4
				15	0120367	3	HEX NUT 1/4 NC
2	6440021	1	UNIVERSAL DRIVE	16	6440103	2	JOURNAL AND BEARING KIT
				17	6440040	1	COMPANION FLANGE
4	6430081	1	SPROCKET-24 TOOTH	18	0123774	8	CAP SCREW 5/16 X I 1/4
5	3320343	1	BEARING	19	0120214	8	LOCK WASHER 5/16
6	6000303	1	KEY 1/* SG x 2 3/8	20	0120369	8	HEX NUT 5/16 NF
7	3320340	1	BEARING HOUSING	21	6440048	1	DOUBLE CENTER
8	3320363	1	HOUSING	22	6440047	1	FLANGE YOKE
9	3320339	1	COVER	23	3100302	1	KEY
10	3320892	1	CHAIN	24	0128228	1	SET SCREW 3/8 NC X 3/4
11	3320714	1	FLANGE WITH SPROCKET				

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

BURNERS - LOW PRESSURE

For serial numbers J4801 thru J4830, see supplement no. 3, figure 275, page 192.

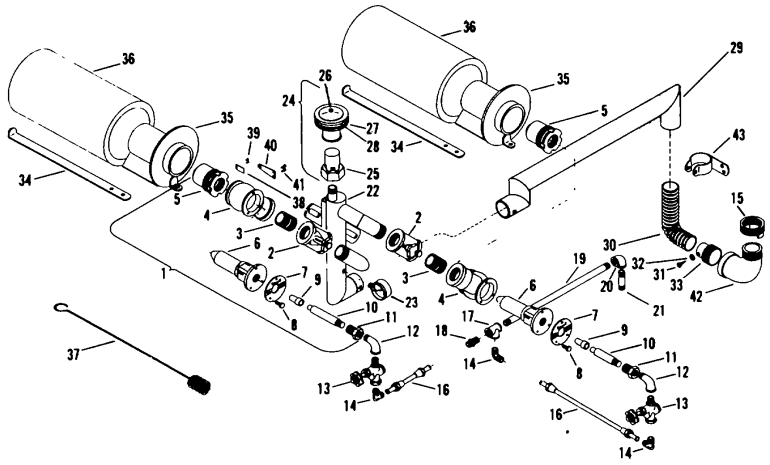


Figure 246

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3330308	2	BURNER (INCL ITEMS 4-11, 40-43)	26	0110582	1	RD HO SCREW 10-24 X 3/8
2	6600204	2	VALVE	27	3330074	1	RET ASSEMBLY
3	0219359	2	NIPPLE 1/4 X 3	28	7430064	4	RING NS
4	6500051	2	BODY	29	33305*6	1	BURNER TUBE ASM-RR ENGINE
5	3330310	2	NOZZLE	30	12J4401	1	HOSE
6	7700037	2	NOZZLE	31	9426196	1	RD HO SCREW 1/4-14 X 3/4
7	7700068	2	PLATE	32	0120386	1	FLAT WASHER 1/4
8	7700040	6	SCREW	33	3330202	1	ADAPTER
9	7700039	2	TIP	34	3330061	2	HOLDER
10	7700038	2	BODY	35	3330062	2	BLOCK
11	7700067	2	BUSHING	36	6500041	2	TUBE
12	0105423	2	STREET ELBOW 1/* X 90 DEG	37	3330077	1	BURNER LIGHTER
13	6600205	2	VALVE INCLUDING STRAINER	38	7700041	2	STOP
	7700042	2	STRAINER NS	39	7700069	4	MACHINE SCREW
14	0142664	3	CONNECTOR 5/16 T x 1/4 NPT	40	3330311	2	HEAD LOCK
15	6200047	1	REDUCING BUSHING 2-2 1/2	41	0132930	4	MACHINE SCREW 10-32 X 1 1/2
16	9250128	2	COPPER TUBING (SPECIFY LENGTH)	42	0218220	1	STREET ELBOW 2 X 90 DEG
17	0105417	1	TEE 1/4	43	3330214	1	CRADLE ASSEMBLY
18	0110200	1	CONNECTOR 5/16 T X 1/4 NPT				
19	6200204	1	NIPPLE 1/4 X 3				
20	0105413	1	ELBOW 1/4 X 90 DEG				
21	0119920	1	NIPPLE 1/4 X 2				
22	33304*4	1	FEED TUBE 44-66 RAD TANK				
23	6600198	1	PRESSURE GAUGE				
24	3330073	1	AIR RELIEF VALVE				
25	743006b	1	VALVE				NS-NOT SHOWN

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

BLOWER - 6600313

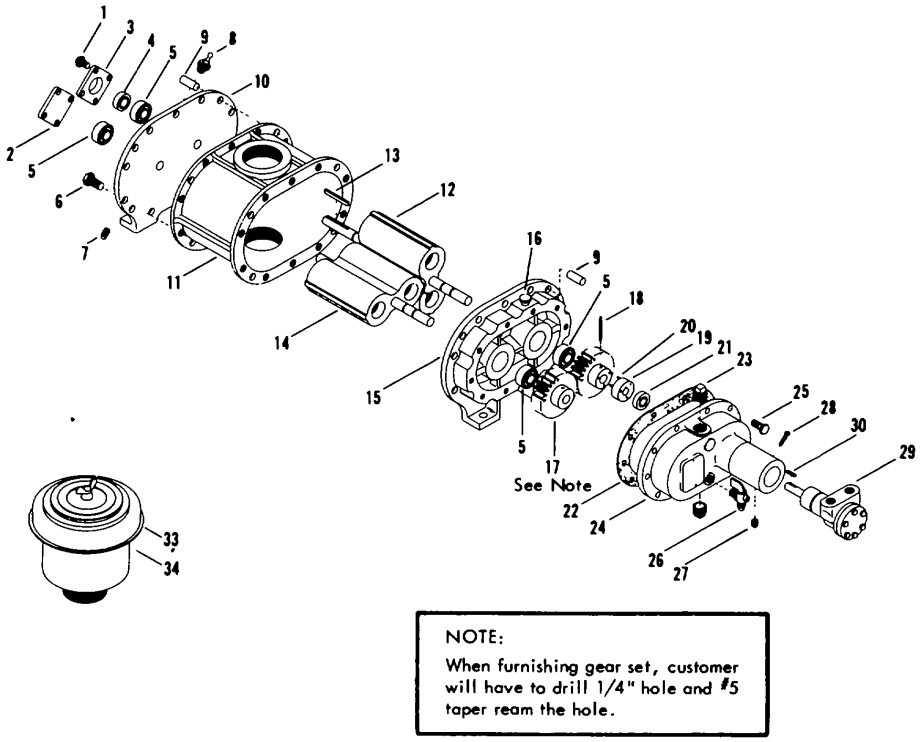


Figure 247

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	0120854	8	CAP SCREW 1/4 NC X 5/8	24	7030021	1	SUPPORT
2	7030033	1	CLOSED END COVER	25	7030042	18	CAP SCREW
3	7030032	1	OPEN END COVER	26	7030035	1	OIL LEVEL COCK
4	7030023	1	OIL RETAINER	27	7030036	1	PLUG
5	7030030	4	SEAL BEARING	28	7030045	2	SQUARE HEAD SET SCREW
6	7030041	20	CAP SCREW	29	7030029	1	OIL PUMP
7	7030043	2	PLUG	30	7030027	1	KEY
8	7030037	2	ZERK				
9	7030044	8	TAPER PIN				
10	7030016	1	HEADPLATE-REAR	33	6600136	1	OIL BATH FILTER-REAR ENGINE
11	7030017	1	CYLINDER	34	6600154	1	ELEMENT NS
12	7030018	1	IMPELLER SHAFT				
13	7030038	1	KEY				
14	7030019	1	IMPELLER SHAFT				
15	7030028	1	HEAD PLATE-FRONT				
16	7030040	1	VENT CAP				
17	703002U	1	TIMING GEAR				
18	7030039	2	TAPER PIN				
19	7030025	1	OIL PUMP COUPLING				
20	7030024	3	DRIVE PIN				
21	7030031	1	OIL RETAINER				
22	7030026	1	GASKET				
23	7030034	2	PLUG				NS-NOT SHOWN

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

BURNERS - PORTABLE GENERATING

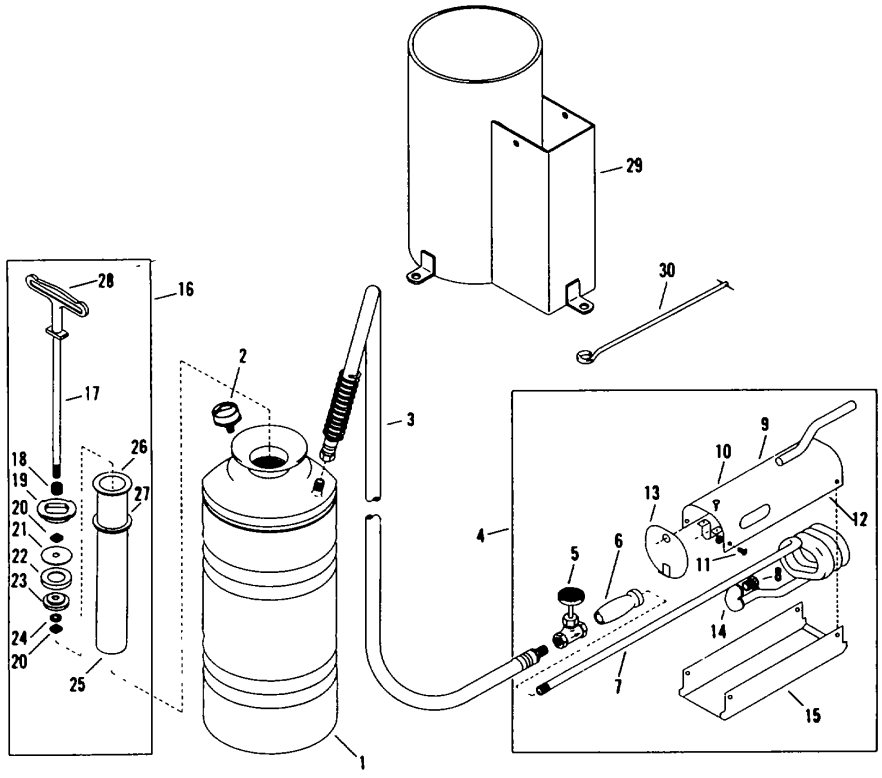


Figure 248

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	6500053	1	PORTABLE BURNER-LESS 29-30	16	3330462	1	AIR PUMP
	7700086	1	TANK	17	7700089	1	ROD
	7700050	1	CARRYING STRAP-NS	18	7700090	1	SPRING
2	7700046	1	PRESSURE GAUGE	19	7700091	1	CAP
3	7700065	1	BURNER HOSE-6 FT	20	7700092	2	NUT
4	3330447	1	PORTABLE BURNER ASM	21	7700056	1	WASHER
5	7700024	1	VALVE	22	7700057	1	WASHER
6	7700025	1	HANDGRIP	23	7700058	1	WASHER
7	7700087	1	COIL	24	7700060	1	WASHER
8				25	7700062	1	VALVE-NOT SHOWN
				26	7700048	1	BARREL
	7700030		DIESEL FUEL PLUG	27	7700047	1	GASKET
				28	7700093	1	HANDLE
9	3330461	1	SHELL	29	3330277	1	BURNER CARRIER ASM
10	7700035	2	SHEET METAL SCREW	30	6500048	1	NEEDLE
11	7700027	2	MACHINE SCREW-WITH NUT				
12	7700034	2	RIVET				
13	7700026	1	PLATE				
14	7700028	1	PLUG HOLDER				
15	7700032	1	PAN				

SPECIFY UNIT SERIAL NO, PART NO., & PART DESCRIPTION

PUMP HOUSINGS

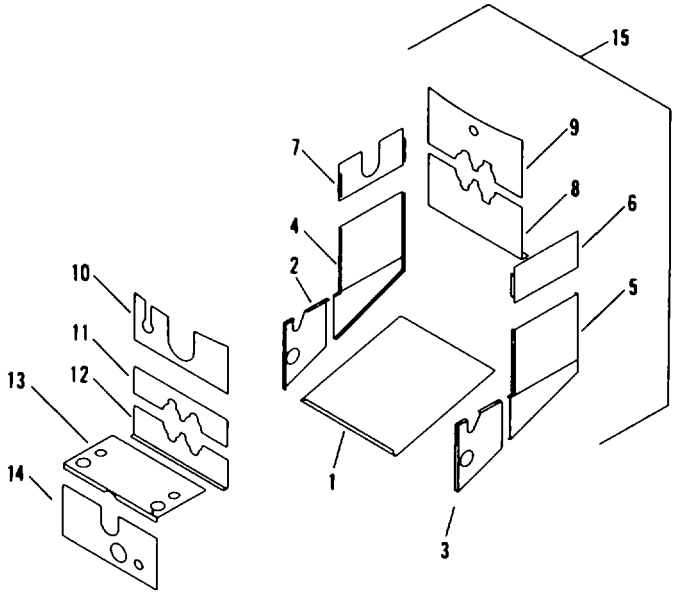


Figure 249

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3330040	1	BOTTOM SECTION	14	3330037	1	HOUSING ASM CONT VLV
2	3330045	1	BOTTOM SECTION-LEFT REAR	15	3330031	1	HOUSING ASSEMBLY P-15
3	3330049	1	BOTTOM SECTION-RIGHT REAR				
4	3330042	1	LOWER LEFT SIDE ASSEMBLY				
5	3333007	1	LOWER RIGHT SIDE ASSEMBLY				
6	33300*6	1	LEFT TOP SECTION				
7	3330041	1	RIGHT HOUSING SECTION				
8	3330032	1	BOTTOM FRONT SECTION				
9	3330033	1	TOP FRONT SECTION				
10	3330034	1	TOP REAR SECTION				
11	3330035	1	TOP REAR SECTION				
12	3330036	1	BOTTOM REAR SECTION				
13	3330039	1	TOP SECTION CONT VLV HSG				

SPECIFY UNIT SERIAL NO PART NO & PART DESCRIPTION

DISTRIBUTING LINES - TUC BAR

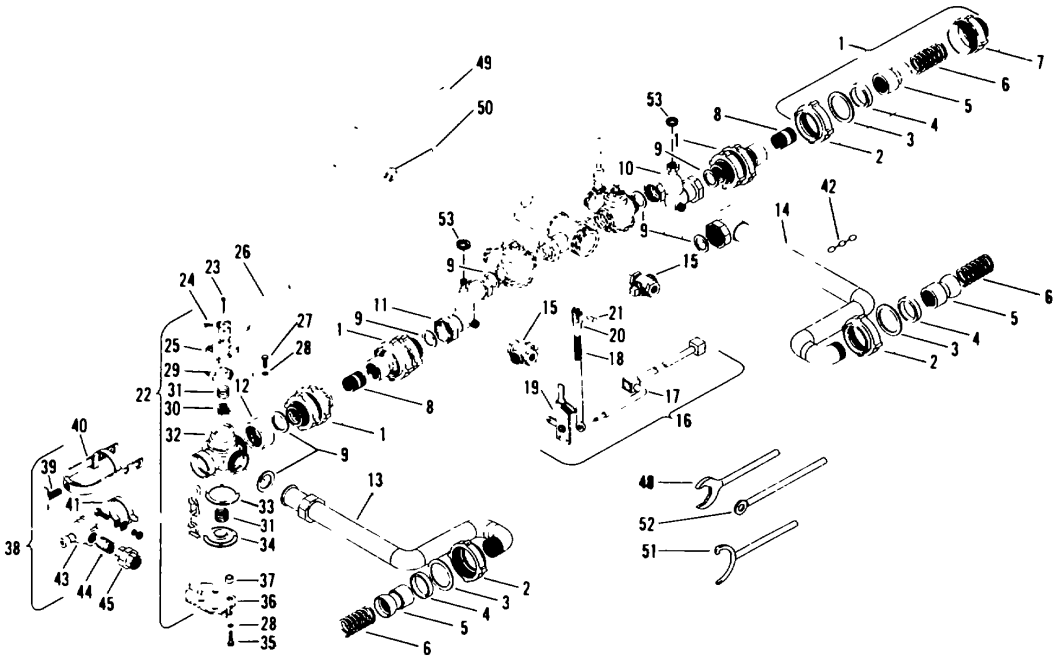


Figure 250

REF	PART	QTY.	DESCRIPTION
1	3350058	6	BALL JOINT
2	3350062	6	NUT
3	6000252	6	GASKET
4	6600258	6	GASKET
5	6600259	6	BALL
6	3351186	6	SPRING
7	3350059	*	CASE
8	6200106	2	SHORT NIPPLE
9	660020b	8	GASKET
12	3350063	1	NUT
13	3350326	1	LEFT LINE ASSEMBLY
14	3350329	1	RIGHT LINE ASSEMBLY
15	3340992	2	URAIN VALVE
16	3340210	1	QUADRANT ASM (INCL ITEM 151
17	3340979	1	CROSS SHAFT
18	3340219	1	CONNECTING LINK
19	3340211	1	QUADRANT
20	3340220	1	YOKE
21	6000398	1	DRILLED RIVET
22	3340666	1	3-WAY VALVE
23	0103411	1	COTTER PIN 3/16)X 2
24	0184365	1	SET SCREW 3/8 NC X 1
25	3350337	1	LEVER STOP
26	3350338	1	HAND LEVER
27	0122017	2	CAP SCREW 5/16 NC X 1
28	0120214	6	LOCK WASHER 5/16
29	3340028	1	GLAND
30	3340023	1	PACKING
31	3340046	2	SPRING
32	3340664	1	VALVE CASE
33	3340027	1	GASKET
34	3340026	1	PLATE
35	0122027	4	CAP SCREW 5/16 NC X 1 1/4
36	3350296	1	SUPPORT BRACKET
37	3340171	4	BUSHING
38	7230079	1	ADAPTER ASM-DIST LINE, TUC BAR
39	3380042	1	HANDLE
40	3340867	1	HINGE CLAMP ASSEMBLY
41	3340671	1	CLAMP RING ASSEMBLY
42	3351243	1	RIGHT CARRYING CHAIN
43	3380074	1	HANDSPRAY ADAPTER
44	0127874	1	CLOSE NIPPLE I X I 1/2
45	6000416	1	UNION
48	3380092	1	UNION WRENCH ASSEMBLY
49	3380079	1	UNION NUT WRENCH ASSEMBLY
50	6000376	1	NOZZLE WRENCH
51	3J80081	1	SPANNER WRENCH ASSEMBLY
52	3380090	1	PIN ASSEMBLY
53	6600341	2	GASKET

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

PUMP P-15

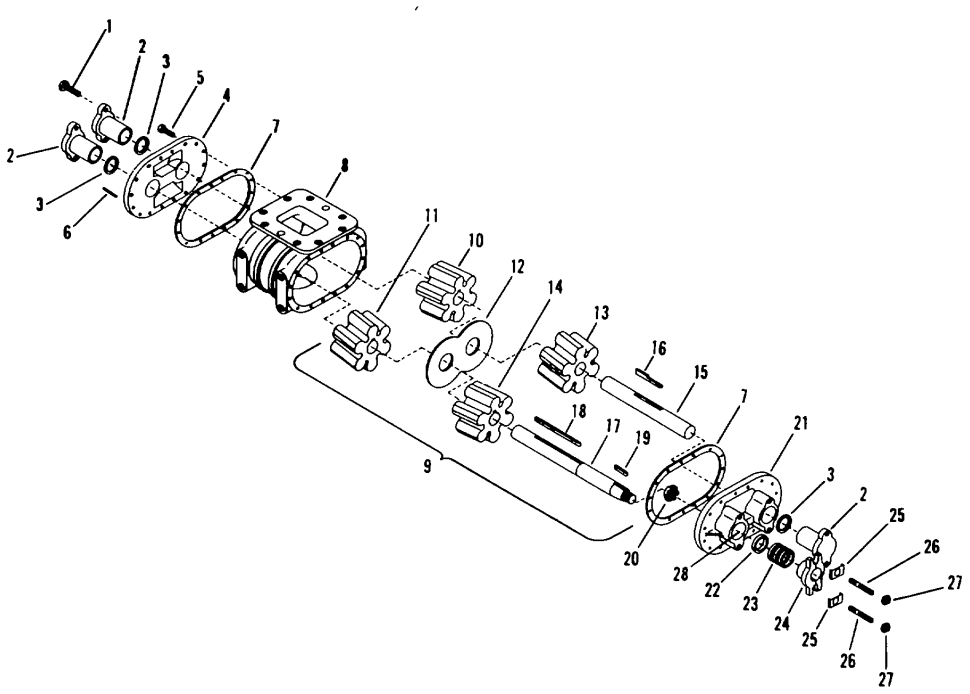
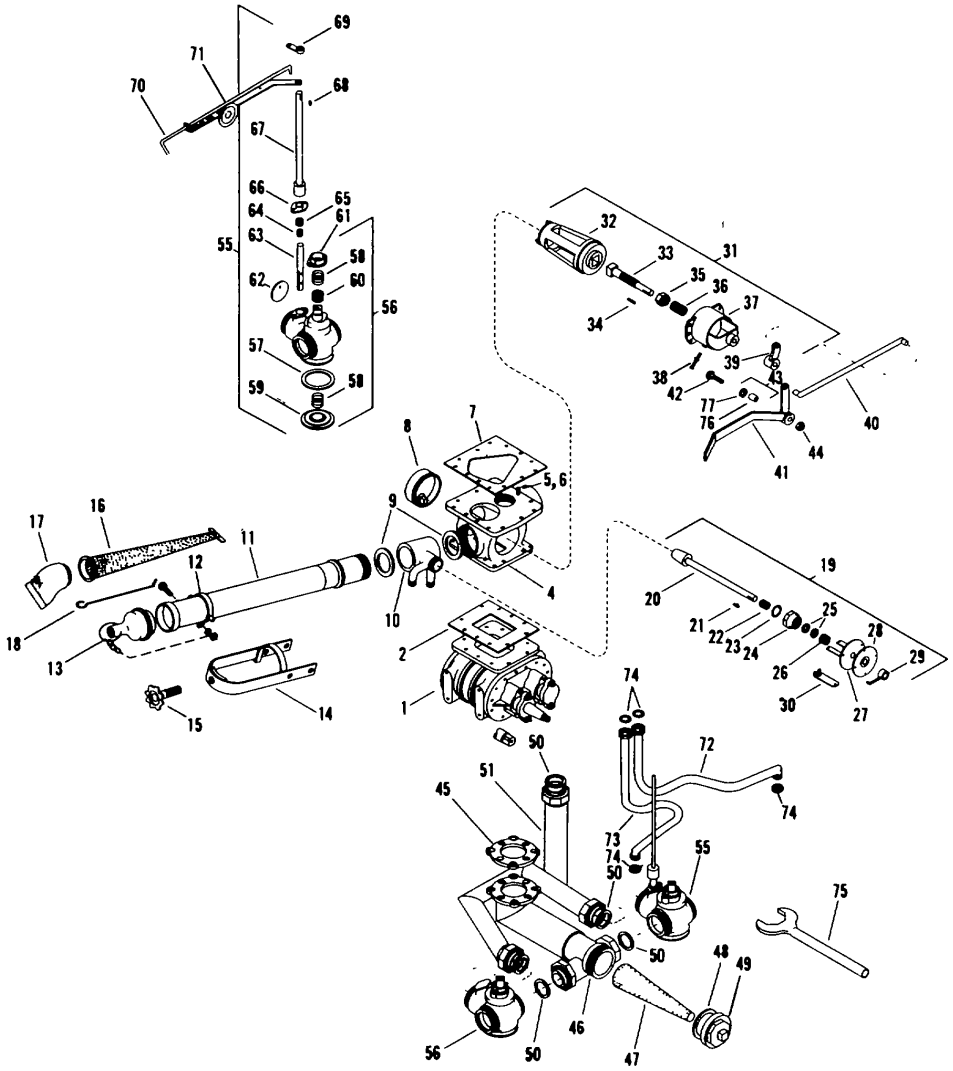


Figure 251

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
	3340645	1	PUMP WITH TAPERED SHAFT	26	6600311	2	STUD
1	6000573	6	CAP SCREW	27	6100069	2	LOCK NUT
2	3340286	3	BLIND BEARING	28	3340294	1	WEARING SLEEVE
3	6600308	3	GASKET				
4	3340281	1	FACE PLATE				
5	0120233	40	CAP SCREW 3/8 NC X I				
6	0103615	4	TAPER PIN 5S X 1 1/4				
7	3340287	2	GASKET				
8	3340267	1	PUMP CASE				
9	3340271	1	IMPELLER SET				
10	3340279	1	IMPELLER				
11	3340277	1	IMPELLER				
12	3340298	1	DIVISION PLATE				
13	3340275	1	IMPELLER WITH SHOULDER				
14	3340272	1	IMPELLER WITH SHOULDER				
15	3340289	1	IDLER SHAFT				
16	3340300	1	KEY				
17	3340293	1	SHAFT-TAPERED END				
18	6000466	1	KEY				
19	6000468	1	KEY				
20	6440018	1	CASTLE NUT				
21	3340283	1	FACE PLATE				
22	3340305	1	LATTERN RING				
23	6600310	5	PACKING				
24	3340307	1	PACKING GLAND				
25	3340308	2	PACKING GLAND RETAINER				

SPECIFY UNIT SERIAL NO., PART NO, & PART DESCRIPTION

CIRCULATING SYSTEM WITH V16 INTAKE VALVE



Note: Items 4 and 32 note sold separately.

Figure 252

SPECIFY UNIT SERIAL NO, PART NO , & PART DESCRIPTION

CIRCULATING SYSTEM WITH V16 INTAKE VALVE

REF	PART	QTY.	DESCRIPTION
1	3340645	1	PUMP WITH TAPERED SHAFT
2	3340386	1	GASKET
6	0125250	1	CASTLE NUT NS
7	3340411	1	GASKET
8	3340823	1	SPOUT
9	6600339	2	GASKET
10	3340618	1	VALVE BODY SLEEVE
11	33*0405	1	FILL LINE (INCL ITEM 121
12	3340671	1	RING ASSEMBLY
13	3380388	1	CAP ASSEMBLY
14	3340867	1	HINGE CLAMP ASSEMBLY
15	3340033	1	CLAMP ASSEMBLY
16	3340004	1	STRAINER
17	3340040	1	CONNECTOR
18	3390030	1	STRAINER HOOK
19	3340575	1	VALVE ASSEMBLY INCL ITEM 10
20	3340424	1	PLUG ASSEMBLY
21	0103646	1	WOODRUFF KEY 3/4 X 1/8
22	3340045	1	SPRING
23	6600340	1	GASKET
24	3340*23	1	CAP
25	600029b	2	RING
26	3330029	1	PACKING GLAND
27	33*0432	1	DISC ASSEMBLY
28	3340433	1	DIAL
29	3340429	1	LEVER
30	3330030	1	WRENCH
31			
	3340409	1	VALVE ASM-66 IN RADIUS TANK {INCL ITEMS 4-7, 32
32	3340385	1	PLUG
33	3350036	1	STEM
34	6000465	1	KEY
35	6100090	1	NUT
36	3360169	1	SPRING
37	3340491	1	BEARING ASSEMBLY
38	0271501	1	HEX NUT
	0102913	1	SET SCREW
39	3351169	1	ARM ASSEMBLY
40	3351166	1	LINK
41	3351178	1	LEVER ASSEMBLY
42	0122472	1	CAP SCREW 1/2 NC X 2 1/2
43	3320849	1	SLEEVE ASSEMBLY
44	0120378	1	HEX NUT 1/2 NC
45	3340048	1	GASKET
46	33*0050	1	HEADGEAR
47	3340003	1	STRAINER
48	6600210	1	GASKET
49	3340074	1	HEADER CAP
50	6600208	5	GASKET
51	3340158	1	LINE
55	3340231	1	RIGHT CONTROL VALVE (NOT INCL ITEMS 69a70).
56	3340199	1	LEFT CONTROL VALVE (INCL ITEMS 58-61)
57	3340027	1	GASKET
58	3340046	2	SPRING
59	3340026	1	PLATE
60	3340029	1	PACKING
61	3340028	1	GLAND
62	3340025	1	BUTTERFLY DISC
63	3340024	1	BUTTERFLY STEM
64	3340045	1	SPRING
65	3340023	1	PACKING
66	3340022	1	GLAND
67	3380059	1	STEM
68	3100284	1	KEY
69	3380062	1	LEVER ASSEMBLY
70	3380111	1	SHAFT
71	3380112	1	BUTTERFLY VALVE CONTROL
72	3340499	1	RIGHT TUBE
73	3340502	1	LEFT TUBE
74	6600341	4	GASKETS
75	3380079	1	WRENCH
76	3320850	1	SLEEVE
77	0130999	1	WASHER 11/16 X 1 3/4

U.S.-UNIT SERIAL NUMBER
NS-NOT SHOWN

SPECIFY UNIT SERIAL NO PART NO. & PART DESCRIPTION

TUC SPRAY BAR ASSEMBLY
All Flip Valves

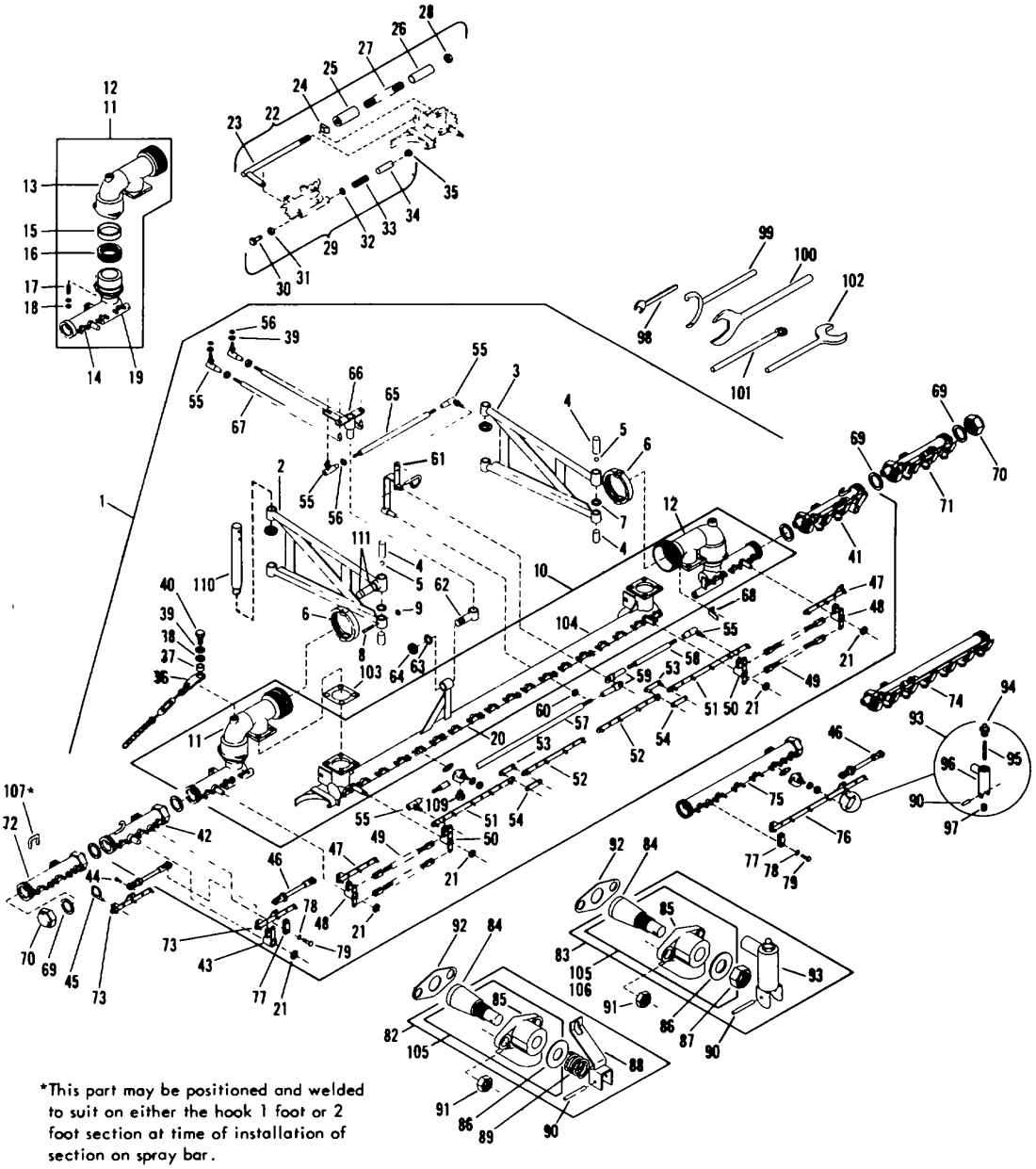


Figure 253

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

REF	PART	QTY.	DESCRIPTION
1	3350580	1	CENTER SECTION ASSEM8LY WITH ALL FLIP
ASSEMBLY			
2	3350331	1	CARRYING ARM ASSEMBLY-LEFT
3	3350332	1	CARRYING ARM ASSEMBLY-NIGHT
4	3350138	4	CARRYING ARM PIN
5	6000290	76	BALL
6	3350135	2	OUTER RING
LINK			
7	6100015	4	BRASS WASHER
8	0103063	4	ROUND HEAD MACHINE SCREW 1/4-20 X 2
9	0120375	4	LOCKNUT 1/4-eU
10	3350520	1	CENTER TUBE FLIP VALVE ASH
NS			
			WITH STUDS
11	7230124	1	STO HINGE SECTION ASM-LEFT
LEFT			
12	7230125	1	STO HINGE SECTION ASM-NIGHT
13	7230126	1	ELBOW ASSEMBLY WITH BALL JOINT-LEFT
LIGHT			
	7230127	1	ELBOW ASSEMBLY WITH BALL JOINT--RIGHT NS
14	3350545	1	EXTENSION ASSEMBLY-LEFT
	3350546	1	EXTENSION ASSEMBLY-RIGHT
15	3350131	1	RING SPACER
16	6000265	1	PACKING
17	6000697	3	STUD
18	0124829	6	JAM NUT 3/8 NC
19	7230115	1	FLIP SWIVEL ASH PISTON KIT LT.
	7230116	1	FLIP SWIVEL ASH PISTON KIT RT
20	3350521	1	CENTER TUBE STD VALVE ASH WITH STUDS
21	6000571	AR	RETAINING RING
22	3350641	2	RETURN SPRING ASSEMBLY
ASH			
23	3350399	2	LINK ASSEMBLY
24	3350398	2	ROCKER
25	3350404	2	OUTER SPRING COVER ASSEMBLY
26	3350406	2	INNER SPRING COVER ASSEMBLY
27	3350403	2	SPRING
28	0124589	2	HEX NUT 5/8 NC
29	7230112	2	PISTON RETURN LOCK ASSEMBLY
30	0122433	2	HEX CAP SCREW 1/2 NC X 1 1/2
31	0120283	2	JAM NUT 1/2 NC
32	0120386	2	FLAT WASHER b/16
33	3310353	2	SPRING
34	3350396	2	PISTON
35	3350393	2	LOCK
36	3350262	2	CAIN HOLDING ASSEMBLY
37	3350264	2	SLEEVE
38	0120389	2	FLAT WASHER 7/16
39	0120383	2	LOCK WASHER 7/16
40	0122267	2	HEX CAP SCREW 7/16 NC X 1 ¼
41	3350493	1	HOOK SECTION ASM-LEFT NS
	3351250	1	HOOK SECTION ASSEMBLY-RIGHT
42	3351251	1	1FOOT HOOK SECTION TUBE ASHLT
	3351252	1	1 FOOT HOOK SECTION TUBE ASH RT
43	3350294	1	TOGGLE ASSEMBLY
ASSEMBLY			
44	6000423	AR	RIVET 1/4 X J/4
45	3350708	AR	PULL PIN
46	3350567	AR	ADJUSTING LINK ASSEMBLY
47	3350119	1	CONTROL BAR ASSEMBLY-LEFT
	3350120	1	CONTROL BAR ASSEMBLY-RIGHT
48	3350563	1	TUC BAR BALL JOINT TOGGLE ASHLT
	3350564	1	TUC BAR BALL JOINT TOGGLE ASM RT
49	3350228	4	CHAIN CONTROL ASSEMBLY
50	3350560	1	TUC BAR CENTER TUGGLE AS LT
	3350561	1	TUC BAR CENTER TOGGLE ASM RT
51	3350155	2	OUTBOARD BAR ASSEMBLY
52	3350157	2	INBOARD BAR ASSEMBLY
53	3350159	2	CONNECTING LINK ASSEMBLY
54	3350160	2	CONNECTING LINK
55	0107376	6	BALL JOINT 7/16
56	0271506	AR	HEX NUT 7/16 NF
57	3350182	1	LONG CONTROL ROD
58	3350177	1	SHORT CONTROL ROU
59	3350178	2	ROD END ASSEMBLY
60	3350194	1	WASHER
61	3350169	1	FULCRUM LEVER ASSEMBLY
62	3350183	1	SWIVEL BEARING
63	3350195	1	WASHER
64	0427646	1	CASTLE NUT
65	3350192	1	ADJUSTMENT CONTROL ROD
66	3350186	1	SWIVEL TOGGLE ASSEMBLY
67	3350261	2	ADJUSTMENT CONNECTOR
68	3350583	1	BAR HINGE SECTION STOP
69	6000251	AR	COPPER ASBESTOS GASKET
70	3350737	2	SPRAY BAR END CAP
71	3350490	AR	1 FOOT FLIP SECTION-RIGHT
	3350489	AR	1 FOOT FLIP SECT1014-LEFT
72	3351254	AR	1 FOOT FLIP TUBE ASH RT NS
	3351253	AR	1 FOOT FLIP TUBE ASH
73	3350226	AR	VALVE CONTROL BAR ASH RT NS
	3350225	AN	VALVE CONTROL BAR ASM LEFT
74	3350492	AR	2 FOOT FLIP SECTION-
	3350491	AR	2 FOOT FLIP SECTION-LEFT NS
75	3351245	R	2 FOOT FLIP TUBE ASH RT NS
	3351244	AR	2 FOOT FLIP TUBE ASM LEFT
	3350545	AR	2 FOOT FLIP TUBE ASH LEFT
76	3350205	AR	VALVE CONTROL BAR ASH RT NS
	3350204	AR	VALVE CONTROL BAR ASH LEFT
77	3350324	AR	DETACH LEVER UI
78	0120388	AR	FLAT WASHER 3/8
79	0122181	AR	CAP SCREW 3/8 NC X 2
12	3350572	2	TUC CORNER SWIVEL VALVE
83	3350579	18	CENTER TUBE FLIP VALVE ASH
	3350488	AR	FLIP END SECTION VALVE ASH
84	3350454	AN	VALVE PLUG
85	3350577	AR	NOZZLE VALVE CENTER BODY
	3350453	AR	NOZZLE VALVE SECTION BODY
86	3351480	AR	WASHER
87	6100091	AR	LOCK NUT 1/2 NF
88	3350573	AR	VALVE LEVER ASSEMBLY
89	3350704	2	VALVE SPRING
90	0443139	AR	GROOVE 5/32 X 3/4
91	0120376	AR	HEX NUT 5/16 NC
92	3350316	AR	GASKET
93	3351241	AR	DETACH LEVER ASSEMBLY
94	0127800	AR	ZERK 1/8 X 11/16
95	3350319	AR	SPRING
96	3350318	AR	LEVER
97	3350325	AR	PLUNGER
98	6000376	1	NUMBER5ARMSTRONG WRENCH
99	3380081	1	BALL JOINT SPANNER WRENCH ASSEMBLY
100	3380079	1	2INCH UNION NUT WRENCH ASM
101	3380090	1	ALIGNING PIN ASSEMBLY
102	3380092	1	11/2 UNION WRENCH
103	3350553	2	GASKET
104	7230118	1	FLIP CENTER TUBE ASSEMBLY WITH STUDS
105	3351572	1	TUC VALVE ASM 1.156 RADIUS
106	3351573	1	TUC VALVE AS 1.4062 RADIUS
107	3350346	1	BRACKET
109			
	3351011	AR	NOZZLE 1/8
110	3350047	2	SWIVEL PIN
111	6100121	2	RETAINING RING

AR-AS REQUIRED
NS-NOT SHOWN

QUADRANT - TUC BAR - EXTERNAL STACKS

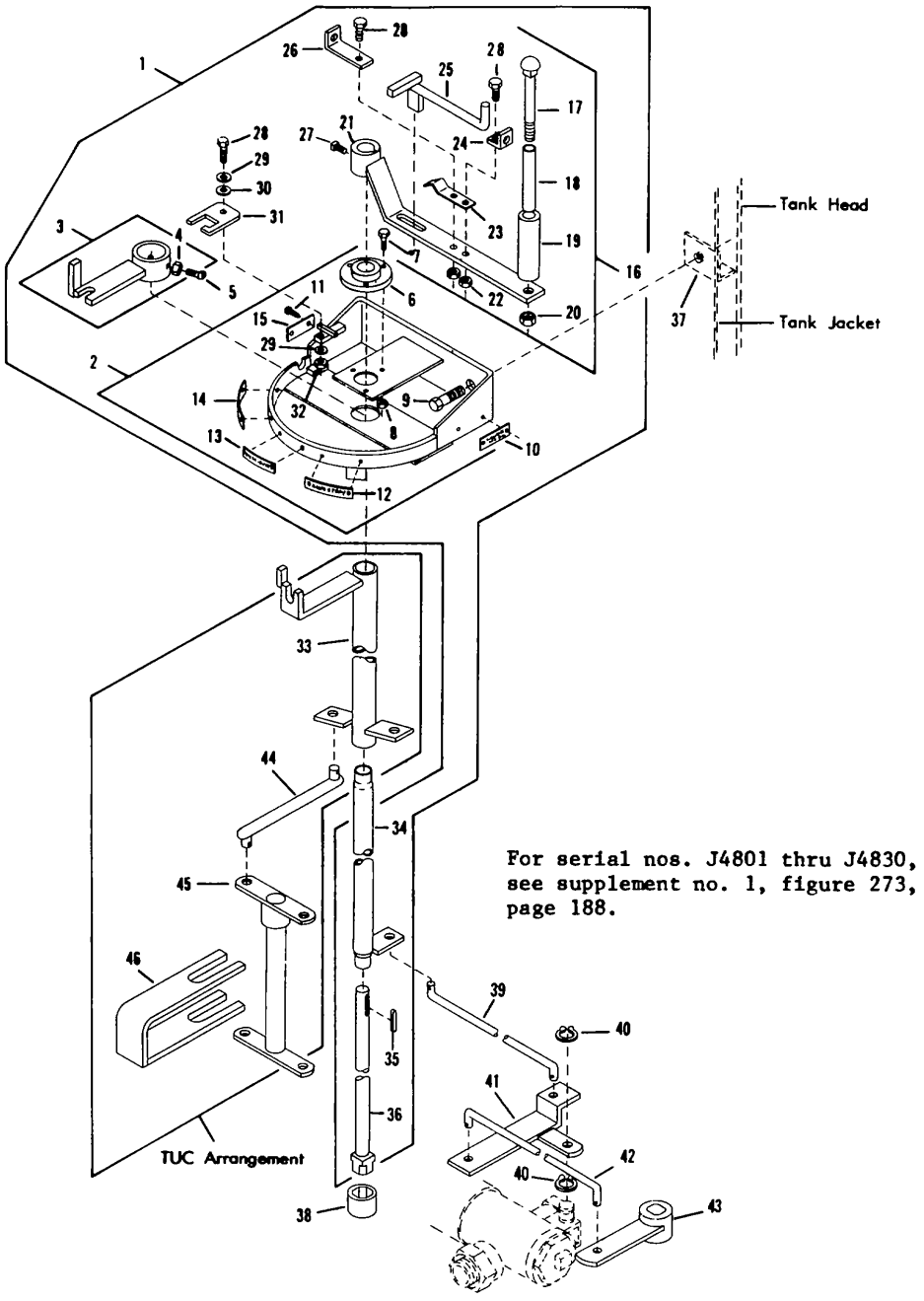


Figure 254

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

QUADRANT - TUC BAR - EXTERNAL STACKS

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3351276	1	TUC QUADRANT ASH COMPLETE				
2	3351277	1	QUADRANT ASSEMBLY (ITEM 9 NOT INCL)				
3	3351293	1	INNER ACTUATING PIPE LEVER ASSEMBLY				
4	0120377	2	HEX NUT 3/8				
5	0106850	2	SET SCREW 3x8 X 1				
6	3350001	1	BEARING				
7	0121900	5	CAP SCREW 1/4 X 1				
8	9418936	3	LOCK NUT 1/4 NC				
9	0122408	2	CAP SCREW 1/2 x 1				
10	3360174	1	CIRCULATE AND FILL NAME PLATE				
11	0145377	10	DRIVE SCREW				
12	3360175	1	HANDSPRAY NAME PLATE				
13	3360176	1	DISTRIBUTE NAME PLATE				
14	3360173	1	DRAIN NAME PLATE				
15	336047*	1	CIRCULATE IN BAR NAME PLATE				
16	3351285	1	QUADRANT HANDLE ASSEMBLY				
17	3350917	1	CARRIAGE BOLT 1/2 x 5				
18	3350918	1	BUS-NG				
19	3350919	1	Hub				
20	610006H	1	LUCK NUT 1/2				
21	3351286	1	HUB AND HANDLE ASSEMBLY				
22	9418936	2	LUCK NUT 1/4 NC				
23	3380056	1	CLIP SPRING				
24	33b1289	1	RETAINER-LEFT				
25	3351290	1	HANDLE ASSEMBLY				
26	3351288	1	RETAINER-RIGHT				
27	0102892	1	SET SCREW 3/8 X 1/2				
28	0121900	3	CAP SCREW 1/* NC X I				
29	0120386	2	FLAT WASHER 1/4				
30	6100247	1	WAVE WASHER				
31	335160*	1	LATCH				
32	0120395	1	HEX NUT 1/4 NC				
33	335129	1	OUTER QUADRA CUNT LENTIL PIPE ASSEMBLY				
34	3351606	1	INNER QUADRANT CONTROL PIPE ASSEMBLY				
35	6000005	1	KEY 1/4 SO X 1 1/4				
36	3351067	1	LEFT OPERATING SHAFT				
37	3351283	1	QUADRANT MOUNTING BRACKET ASSEMBLY				
38	3J50906	1	SQUARE COUPLING				
39	3351608	1	LINKAGE				
40	6000571	2	SNAP RING				
41	3351590	2	TOGGLE ASSEMBLY				
42	3350855	1	LINKAGE				
43	3351599	1	ARM ASSEMBLY				
44	3351607	1	LINKAGE				
45	3350244	1	JACK SHAFT ASM 18 IN				
46	3350257	1	GUIDE				

SPECIFY UNIT SERIAL NO, PART NO & PART DESCRIPTION

BOX - BAR SECTION

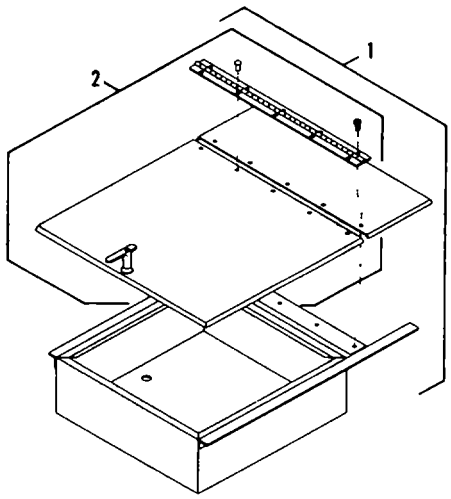


Figure 255

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3320687	1	KEROSENE BATH SECTION CARRIER				
2	3320686	1	LID ASSEMBLY				

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

AIR CONTROL RESERVOIR AND PIPING

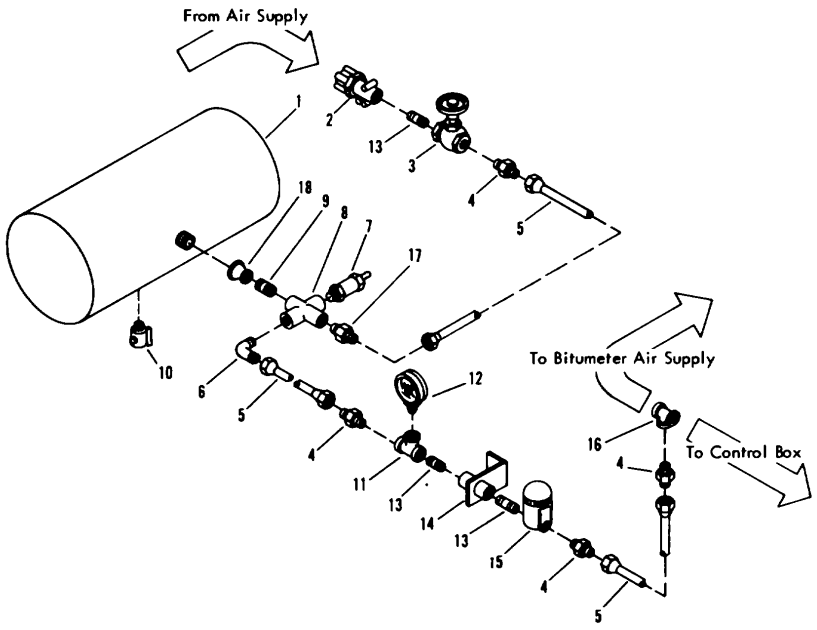
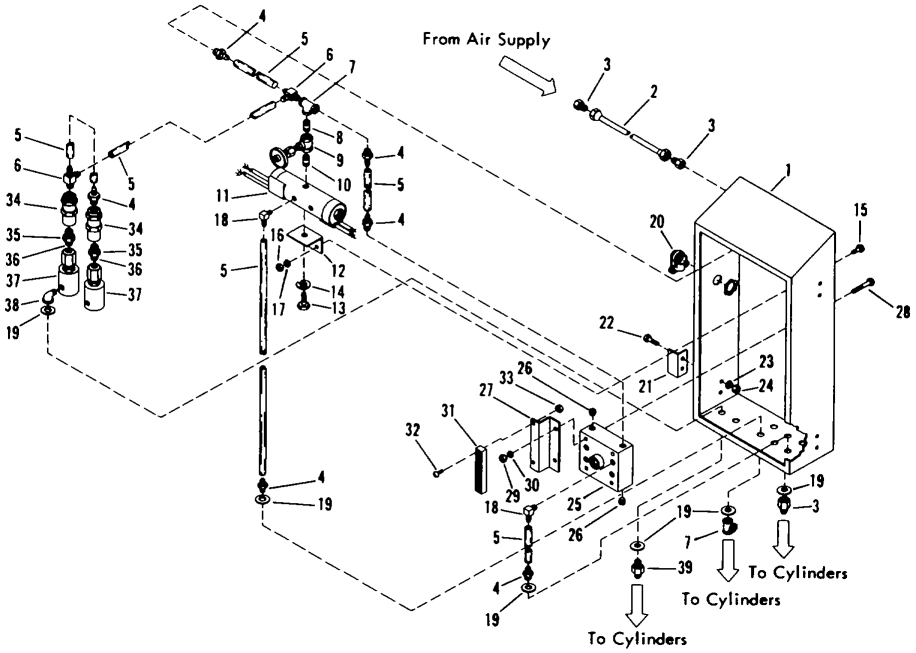


Figure 256

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3360165	1	RESERVOIR				
2	6600304	1	PRESSURE REGULATOR VALVE				
3	6600194	1	GLOBE VALVE				
4	0118750	4	CONNECTOR 1/4 FPT X 3/8				
5	9250129	3	COPPER TUBING ASSEMBLY (SPECIFY LENGTH)				
6	6200172	1	ELBOW 3/8 MPT X 3/8 T				
7	6600299	1	SAFETY VALVE				
8	0115193	1	CROSS 3/8				
9	0121207	1	CLOSE NIPPLE 3/8				
10	6600162	1	PETCOCK				
11	0218233	1	REDUCING TEE 1/4 X 1/4 X 3/8				
12	6600168	1	PRESSURE GAGE				
13	0105407	3	NIPPLE 1/4 X 1 1/2				
14	3330239	1	REGULATOR BRACKET ASSEMBLY				
15	6600137	1	LINE OILER				
16	0105417	1	TEE 1/4				
17	6200174	1	CONNECTOR 3/8 NPT X 3/8 T				
18	0144093	1	REDUCING COUPLING 3/4 X 3/8				

SPECIFY UNIT SERIAL NO, PART NO , & PART DESCRIPTION

AIR CONTROL BOX ASSEMBLY - MULTIPLE CONTROLS



NOTE.

The above illustration shows those parts and fittings generally common to a multiple air control installation Individual box construction can be generally realized by adding to, or subtracting from, 'the parts illustrated

Figure 257

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

AIR CONTROL BOX ASSEMBLY - MULTIPLE CONTROLS

REF	PART	QTY.	DESCRIPTION
1	3360594	1	CONTROL BOX ASSEMBLY
	3360437	1	CONTROL BOX COVER
	3360438	2	COVER GASKET-SHORT NS
	3360439	2	COVER GASKET-LUNG NS
2	3360656	1	HOSE ASSEMBLY
3	0121323	AR	HALF UNION 1/4 FPT X 3/E TB
4	6700366	AR	MINI-BARB 3/8 X 1/4
5	8114014	AR	POLE TBG 3/8 SPECIFY LGTH)
6	6600803	2	DBL BARB TEE 1/4 PIPE X 3/8 TUBE
7	0105417	AR	TEE 1/4
8	0105407	1	NIPPLE 1/4 X 1 1/2
9	6600194	1	GLOBE VALVE 1/4
10	01054U5	1	NIPPLE 1/4 X //8
11	6600840	1	ON AND OFF VALVE
12	3360648	1	MOUNTING ANGLE
13	0122408	1	HEX CAP SCREW 1/2 NC X 1
14	0120384	1	LOCK WASHER 1/2
15	0120706	AR	HEX CAP SCREW'I/4 NC X 1/2
16	0120375	2	HEX NUT 1/4 NC
17	012038U	2	LOCK WASHER 1/4
18	6700477	AR	MINI-BARR ELBOW 3/8 X 1/4
19	0120389	AR	FLAT WASHER 1/2 TYPE A
20	6700310	1	CONNECTOR 90 DEG X 3/8 x 1/2
21	3360436	4	MOUNTING ANGLE
22	0120706	8	HEX CAP SCREW 1/4 NC X 1/2
23	0120380	8	LOCK WASHER 1/4
24	0120375	8	HEX NUT 1/4 NC
25	660041	AR	TURN UP VALVE
26	0143997	AR	SOCKET HEAD PIPE PLUG 1/4 NPT
27	3360508	AR	TERMINAL BLOCK MOUNTING BRACKET
28	0121960	AR	HEX CAPSCREW 1/4 NC X 2 1/2
29	0120375	AR	HEX NUT 1/4 NC
30	0120380	AR	LOCK WASHER 1/4
31	3160001	AR	TERMINAL BLOCK
32	0132760	AR	MACHINE SCREW 8-32 X 1/2
33	0120622	AR	MACHINE SCREW NUT 8-32
34	6600294	2	CHECK VALVE
35	0119931	2	REDUCING BUSHING 3/8 X 1/4
36	0105405	2	CLOSE NIPPLE 1/4
37	6600842	2	SOLENOID VALVE,5H1Fr
38	0105423	2	STREET ELBOW 1/4
39	0118750	2	HALF UNION 1/4 X 3/8

AR-AS REQUIRED
NS - NOT SHOWN

SPECIFY UNIT SERIAL NO PART NO & PART DESCRIPTION

TUC ON AND OFF AIR CONTROL INSTALLATION
(Used When Other Controls Are Present)

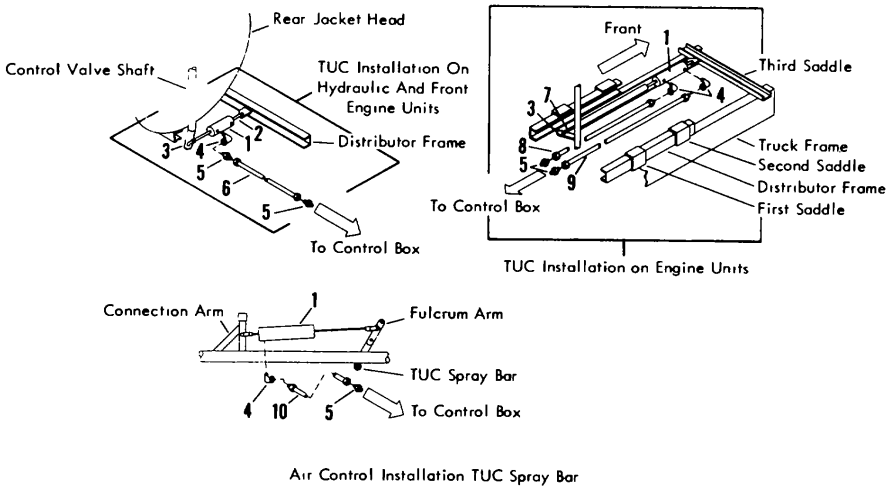


Figure 258

REF	PART	QTY.	DESCRIPTION
	3360416		TUC BAR AIR CONTROL ASSEMBLY COMPLETE
1	6600301	AN	AIR CYLINDER
	7420016	AR	CYLINDER REPAIR KIT NS
	6600293	AN	CYLINDER BUOT NS
	6600296	AR	YOKE NS
	6600295	AN	YOKE PIN NS
	3360369	AR	YOKE 3 3/8 NS
2	3320411	AR	CONNECTING LINK
3	3360059	AR	ARM
4	010523	AR	STREET ELBOW 1/4
5	6600305	AR	CONNECTOR 1/4 MPT X 3/8 T
6	3360656	2	HOSE ASSEMBLY
7	9250004	AR	LINK SPECIFY LENGTH
	3360055	AR	GUIDE NS
	0271506	AR	HCX NUT 7/16 NF NS
8	3360623	1	HOSE ASSEMBLY
9	3J60624	1	HOSE ASSEMBLY
10	3360654	2	HOSE ASSEMBLY

NOTE:

This page and pages 165 and 166 constitute a complete air control installation.

AR-AS REQUIRED
NS-NOT SHOWN

SPECIFY UNIT SERIAL NO, PART NO, PART DESCRIPTION

CONTROL - BAR SHIFTING - TUC AND FC - SHORT CYLINDER

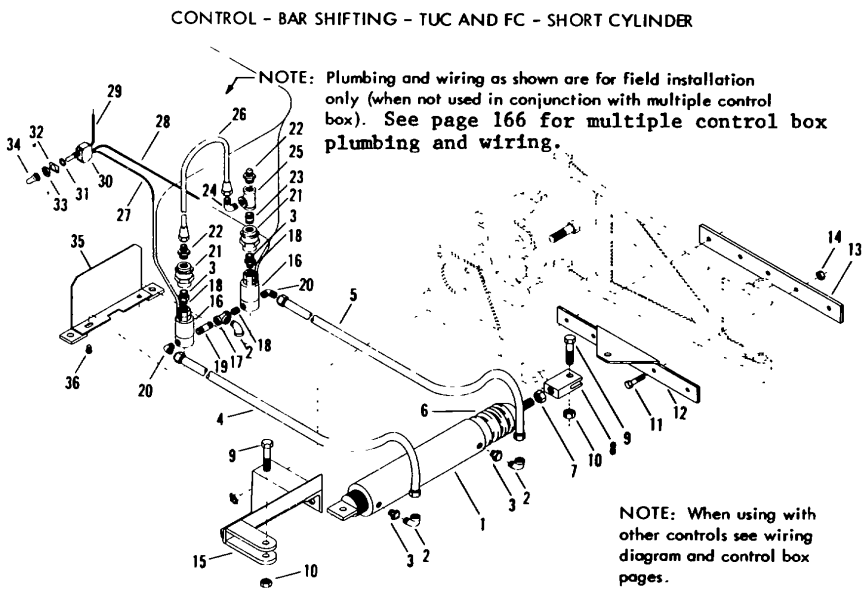


Figure 259

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
	3360477	1	BAR SHIFT INSTALLATION	30	6700161	1	SWITCH
1	6600140	1	AIR CYLINDER	31	6000100	1	LOCK NUT
2	0105423	3	STREET ELBOW 1/4	32	3360103	1	PLATE
3	0119931	4	REDUCING BUSHING 3/8 X 1/4	33	6000103	1	NUT
4	3360567	1	RT HOSE ASM-USE AS SHOWN	34	6700164	1	TOGGLE TIP-REAR ONLY
	3360569	1	RT HOSE ASM-USE WITH CENTER	35	3360411	1	SOLENOID BRACKET FOR
FIELD							
			CONTROL BOX				INSTALLATION
5	3360566	1	LT HOSE ASM-USE AS SHOWN	36	0132908	3	MACHINE SCREW 10-32 X
1/2							
	3360570	1	LT HOSE ASM-USE WITH CENTER CONTROL BOX				
6	6600293	1	BOOT				
7		1	3/4 JAM NUT-WITH ITEM I				
8	6000216	1	CLEVIS				
9	0122293	2	CAP SCREW 7/16 NC X 1 3/4				
10	9418981	2	LOCK NUT 7/16 NC				
11	0122145	5	CAP SCREW 3/8 NC x 1 1/4				
12	3360397	1	CONNECTOR PLATE				
13	3360399	1	PRESSURE PLATE				
14	0120377	5	HEX NUT 3/8 NC				
15	3360405	1	CYLINDER MOUNTING BRACKET				
16	6600842	2	SOLENOID VALVt-24 VOLT				
17	0105417	1	TEE 1/X				
18	0105405	3	CLOSE NIPPLE 1/4				
19	0119920	1	NIPPLE 1/4 X 2				
20	0118755	2	ELBOW 3/8 T x 1/4 NPT				
21	6600294	2	CHECK VALVE				
22	6200174	2	HALF UNION				
23	0121207	1	CLOSE NIPPLE 3/8				
24	6200179	1	ELBOW 3/8 T x 3/8 4PT				
25	0120280	1	TEE 3/8				
26	9250129	AR	COPPER TUBING-SPECIFY LENGTH				
27	9250211	AR	BLACK AND WHITE WIRE SPECIFY LENGTH				
28	9250205	AR	RED WIRE SPECIFY LENGTH				
29	9250208	AR	BLUE WIRE-SPECIFY LENGTH				AR-AS REQUIRED

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

CONTROL - BITUMETER - RAISE AND LOWER

For serial nos. J4801 thru J4830, see supplement no. 2, figure 274, page 190.

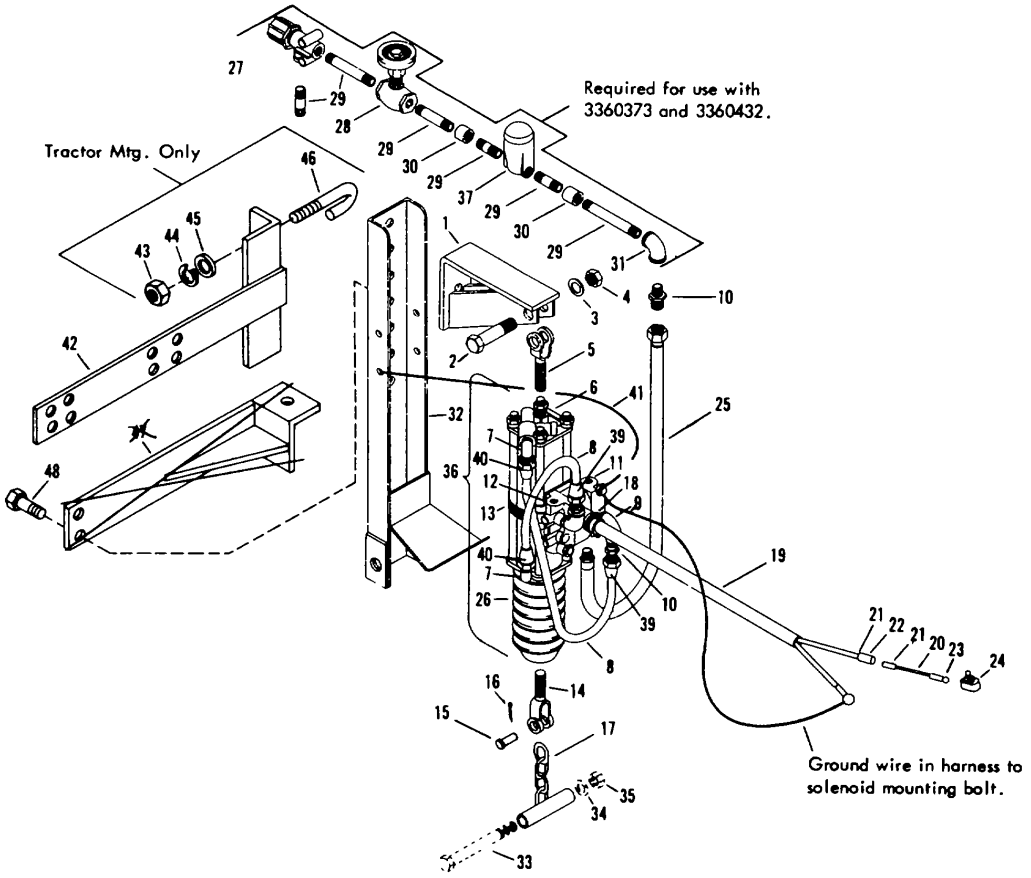


Figure 260

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

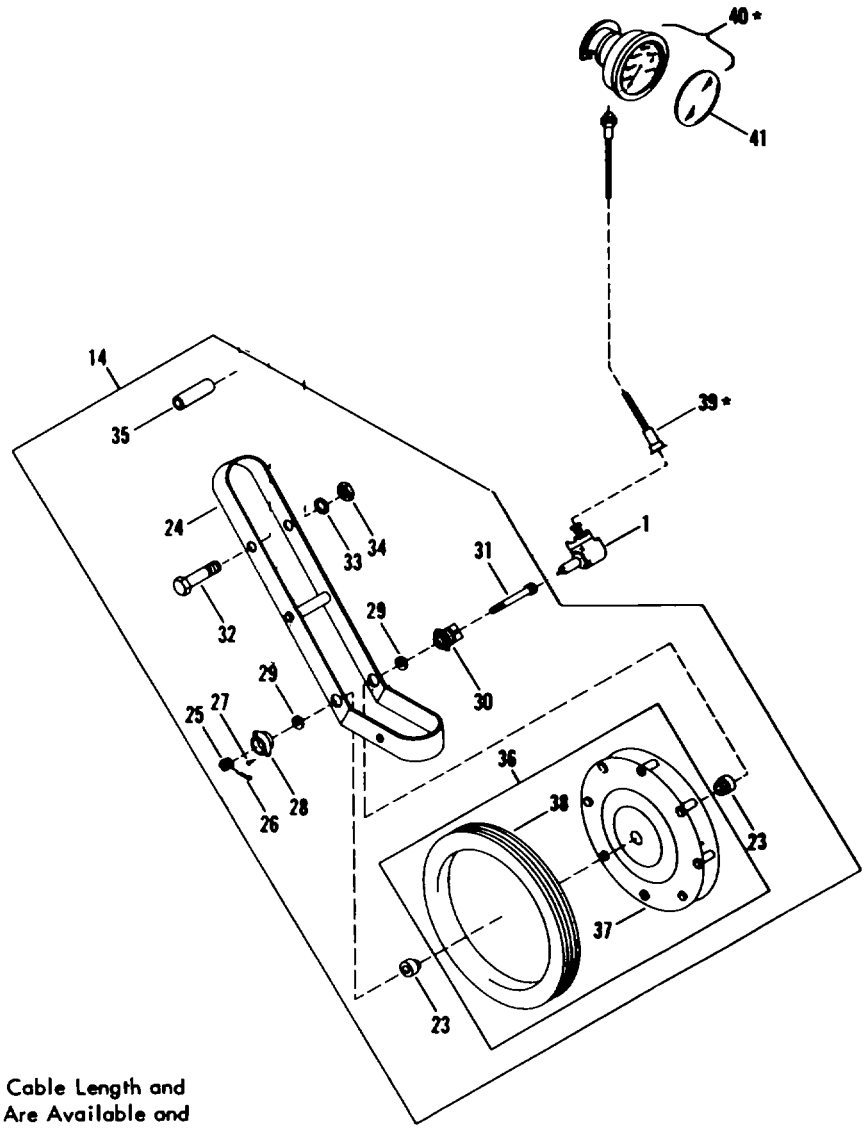
CONTROL - BITUMETER - RAISE AND LOWER

REF	PART	QTY.	DESCRIPTION
	3360371	1	BIT ELEC AIR ASn-12v TRACK
1	3360039	1	MOUNTING BRACKET ASSEMBLY
2	0122320	1	CAP SCREW 7/16 NC X 2 1/2
3	0120383	1	LOCK WASHER 7/16
4	0271501	1	HEX NUT 7/16 NC
5	6600296	1	YOKE
6	6600301	1	AIR CYLINDER
7	0118755	2	CONNECTOR 3/8
8	6700363	AN	TUBING 3/8 SPECIFY LENGTH}
9	0105423	2	STREET ELBOW 1/4 x 90 UEGO
10	01187bO0	3	CONNECTOR 3/8T X 1/4 NPT
11	66O00843	1	SOLENOID VALVE-24 VOLT DC
12	3360052	1	MOUNTING BRACKET ASSEMBLY
13	6000088	1	HOSE CLAMP
14	3360367	1	YOKE
15	6600295	1	PIN
16	0103384	1	COTTER PIN 1/8 x 3/4
17	3360360	1	RAISING SLEEVE ASSEMBLY
18	6700015	1	CONNECTION
19	8108008	1	FIBRE LOOM
20	9250204	2	ORANGE WIRE (SPECIFY LENGTH)
21	6700129	2	PLUG SHUR
22	67001d8	1	RECEPTACLE
23	6700153	2	TERMRING
24	6700255	1	TOGGLE SWITCH
25	336U116	1	HOSE ASSEMBLY
26	6600293	1	BOOT
27	6600304	1	PRESSURE VALVE
28	6600194	1	GLOBE VALVE
29	9250052	4	THREADED PIPE
(			SPECIFY LENGTH)
30	0187395	2	PIPE COUPLING 1/4
31	0105413	1	ELBOW 1/4 X 90 DEG
32	3360264	1	BRACKET
33	0190628	1	CAPSCREW 5/16 NC X 4 1/I
34	0120214	1	LOCK WASHER b/16
35	0120376	1	NUT 5/16 NC
36	7420077	1	AIR CYLINDER-12 VOLT
	7420078	1	AIR CYLINDER-6 VOLT
37	6600137	1	OILER
38	7420016	1	CYLINDER REPAIR KIT NS
39	6700477	2	ELBOW 3/8 TUBE X 1/4 NP
40	6700366	2	CONNECTOR MINI BARB 3/8 T x 1/4 MP
41	8101501	2	WHITE GROUND WIRE 15 INCH
42	3360363	1	WHEEL BRACKET ASSEMBLY
43	0124589	2	NUT 5/8 NC
44	0121574	2	LUCK WASHER 5/8
45	0130999	2	FLAT WASHER 5/8
46	3360304	2	HOOK BOLT
48	0122433	2	SCREW 1/2 NC X I 1/2
	0120384	2	LOCK WASHER 1/2 NS
	0120387	2	NUT 1/2 NC NS

AR-AS REQUIRED
NS-NOT SHOWN

SPECIFY UNIT SERIAL NO, PART NO & PART DESCRIPTION

BITUMETER ASSEMBLY
Chassis Mount



*More Than One Cable Length and Bitumeter Head Are Available and Must be Specified When Ordering Complete Bitumeter Assembly.

Figure 261

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

BITUMETER ASSEMBLY
For Chassis Mount

REF	PART	QTY.	DESCRIPTION
1	6460011	1	ADAPTER
23	3360345	2	BUSHING
24	3360282	1	FORK ASSEMBLY
25	0125233	1	SLOTTED LOCK NUT 3/8 NF
26	0103374	1	CUTTER PIN 3/32 X 1
27	0132760	4	SCREW 8-32 X 1/2
28	3360344	1	OUTER BEARING
29	6420035	2	BEARING
30	3360347	1	BLARING
31	3360281	1	SPRINDLE
32	0111300	1	SCREW 1/2 NC x 4 1/2
33	0120384	AR	LOCK WASHER 1/2
34	6100068	AR	LOCK NUT 1/2 NC
35	3360284	1	SPACER
36	3360632	1	TIRE AND WHEEL ASSEMBLY
37	3360312	1	WHEEL ASSEMBLY
38	6450060	1	TIRE
39			
	6460021	1	CABLE 144 INCHES
	785000b	1	CABLE CORE 144 INCHES
40	6460014	1	ENGLISH HEAD
42	336034*	AR	REPAIR KIT (INCL ITEMS 23,25-31)

For serial nos. J4801 thru J4830, see supplement no. 2, figure 274, page 190.

AR=AS REBURIED

SPECIFY UNIT SERIAL NO, PART NO , & PART DESCRIPTION

CONTROL - BAR TURN UP - FOR TUC

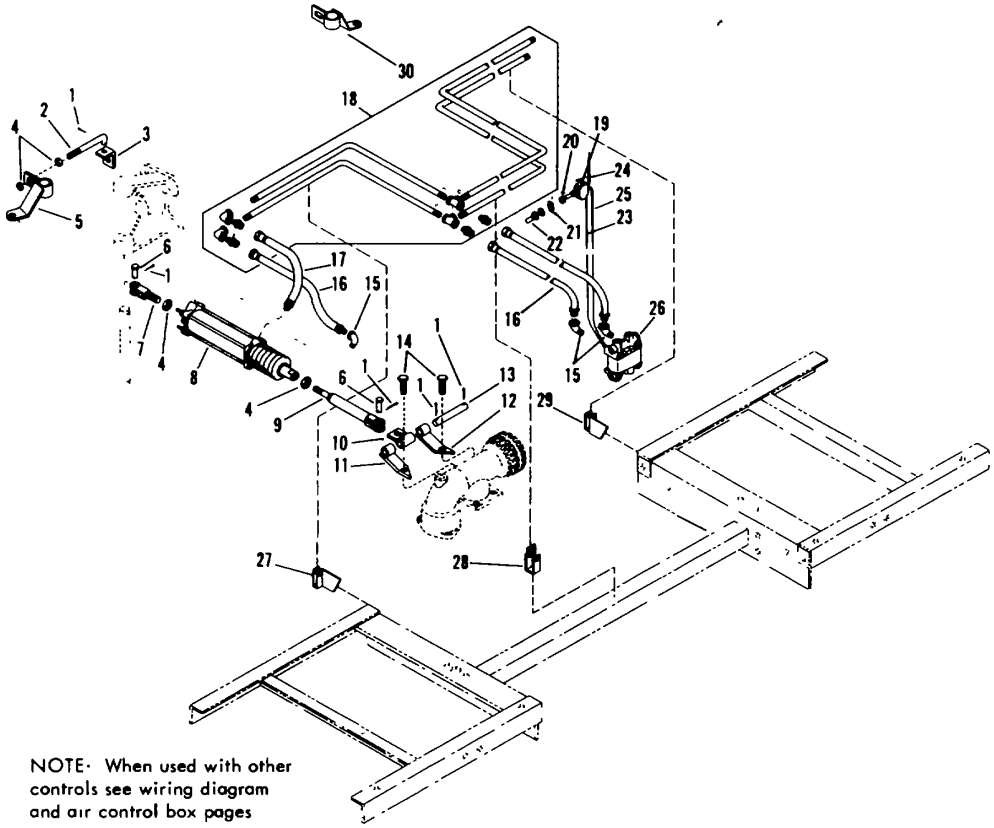


Figure 262.

REF	PART	QTY.	DESCRIPTION
	3360563		BAR TURN UP ASSEMBLY-RIGHT SIDE OF ASSEMBLY NUT SHOWN
1	010337*	6	COTTER PIN 3/32 X 1
2	336056*	2	ADJUSTING LINK
3	3360553	2	ADJUSTMENT MOUNT
4	0120371	8	HEX NUT 1/2 NF
5	3360559	1	BRACKET ASSEMBLY SIDE
6	6600295	4	PIN
7	6600296	2	YOKE
8	6600301	2	AIR CYLINDER
	6600293	AR	AIR CYLINDER BOOT
9	3360550	2	EXTENSION ASSEMBLY
10	3360554	2	CONNECTOR ASSEMBLY
11	3360561	2	PIVOT PLATE ASSEMBLY-LEFT
12	3360556	2	PIVOT PLATE ASSEMBLY-RIGHT
13	3360552	2	PIVOT PIN
14	0122459	4	CAP SCREW 1/2 NC X 2
15	0105423	4	STREET ELBOW 1/4 X 90 DEG
16	3360573	4	HOSE ASSEMBLY
17	3360574	2	HOSE ASSEMBLY
18	3360466	2	PIPING ASSEMBLY
19	6700162	1	SWITCH
20	6000100	1	LOCK NUT
21	6000101	1	PLATE-UP-DOWN
22	6700164	1	TOGGLE TIP
239250213		AR	RED AND WHITE WIRE (SPECIFY LENGTH)
24	9250205	AR	RED WIRE (SPECIFY LENGTH)
25	92S0210	AR	PURPLE WIRE SPECIFY LENGTH)
26	6600841	1	SOLENOID 24 VOLT
27	33 0184	1	SUPPORT ASSEMBLY-LEFT
28	2630074	1	SUPPORT ASSEMBLY-CENTER
29	3330185	1	SUPPORT ASSEMBLY-RIGHT
30	3360558	1	BRACKET ASSEMBLY-RT SIDE

AR=AS REQUIRED
NS=NOT SHOWN

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

PUMP TACHOMETER

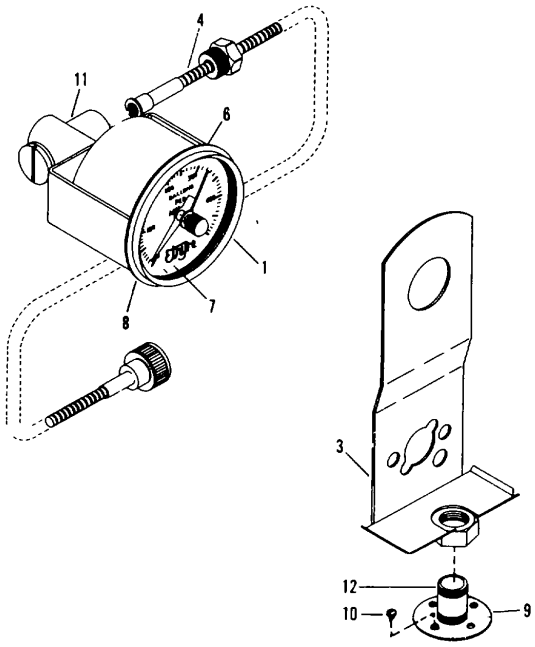


Figure 263.

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	6460009	1	TACHUMETER HEAD-GALLONS				
3	3320310	1	TACHOMETER BRACKET ASH HYD				
4	6460060	1	CABLE-252 INCHES				**For serial nos. J4801 thru J4830, see supplement no. 5, figure 276, page 193.**
6	6600330	1	O=RING NS				
7	7850057	1	HEAD LENS				
8	6000374	1	BEZEL				
9	3320315	I	TACH STAND FOOT ASSEMBLY				
10	0144759	4	SELF TAPPING SCREW L 14 X 1				
11	6460015	1	ADAPTER				
12	3320314	1	TACH STAND LEG				

NS=NOT SHOWN

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

TANK GAUGE - REAR -WITH ROTATING INDICATOR

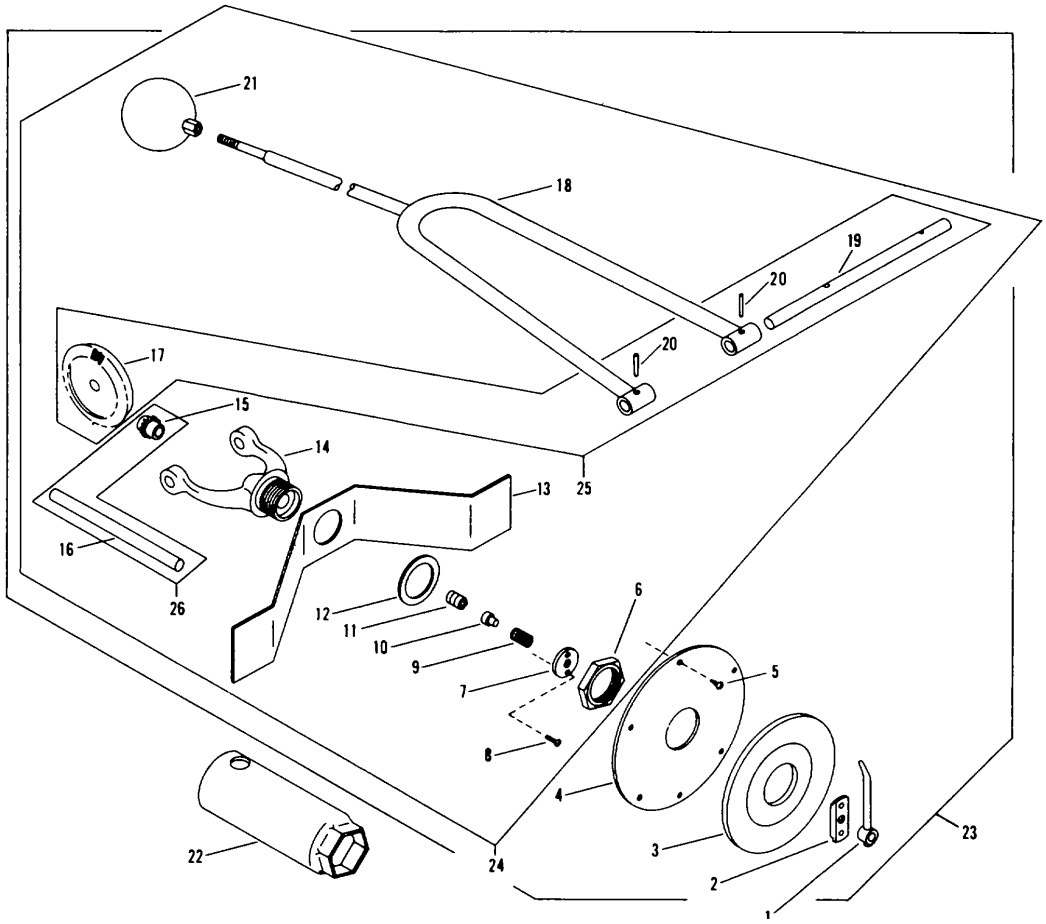


Figure 264.

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3360190	1	INDICATOR	18	3360215	1	34 INCH STEM
2	3360202	1	BEARING PLATE				
3	3360194	1	DIAL				
4				19	3360185	1	FLOAT SHAFT
	3360199	1	PLATE-MILD STEEL	20	0103564	2	TAPER RIN NUMBER I X 1
5	9426128	6	SHEET METAL SCREW	21	6600335	1	FLOAT
6	3360186	1	CLAMP NUT	22	3380080	1	WRENCH
7	3360195	1	PACKING PLATE	23			
8	0132760	2	MACHINE SCREW 8-32 X 1/2				
9	3360192	1	PACKING SPRING		3360588	1	TANK GAGE ASM-34 IN STEEL
10	3360187	1	PACKING SLEEVE				
11	3360204	1	PACKING				
12	6600336	1	GASKET				
13				24			
	3360203	1	SPACER-INTERNAL STACKS NS		3360210	1	FLOAT STEM ASM-34 IN
14	3360193	1	FLOAT BRACKET				
15	6425009	1	BEVEL GEAR FOR 34 IN STEM	25	3360184	1	SHAFT ASSEMBLY
16	3360189	1	SHAFT	26	3360188	1	INDICATOR AND SHAFT ASM
17	6425001	1	GEAR FOR 34 IN STEM				

SMOKE STACKS - EXTERNAL

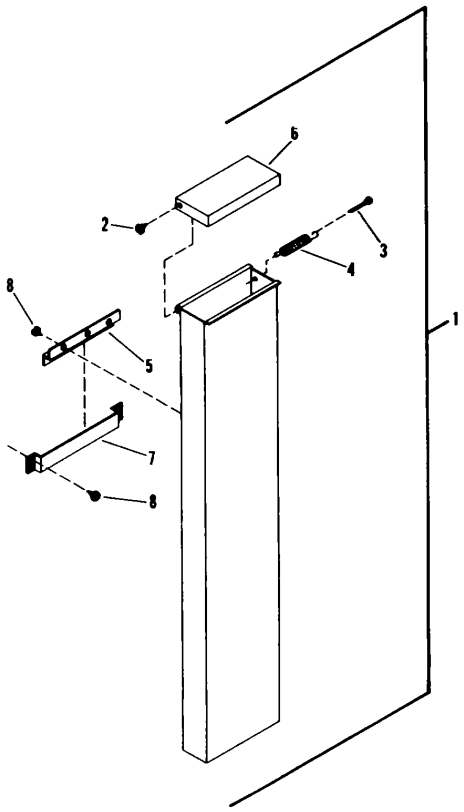


Figure 265.

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1							
	3380198	1	SMOKE STK ASM-43 IN-SS-6 FL				
	3380202	1	SMOKE STK ASM-*8 IN-SS-6 FL				
2	0144768	2	SCREW				
3	0103386	2	COTTER PIN				
4	3330050	1	SPRING				
5	3380135	1	HOOK				
6	3380140	1	COVER				
7	3380136	1	BRACKET				
8	O144744	7	SELF TAPPING SCREWS £14 X 3/4				

SPECIFY UNIT SERIAL NO , PART NO & PART DESCRIPTION

LOOM BUMPER ASSEMBLY

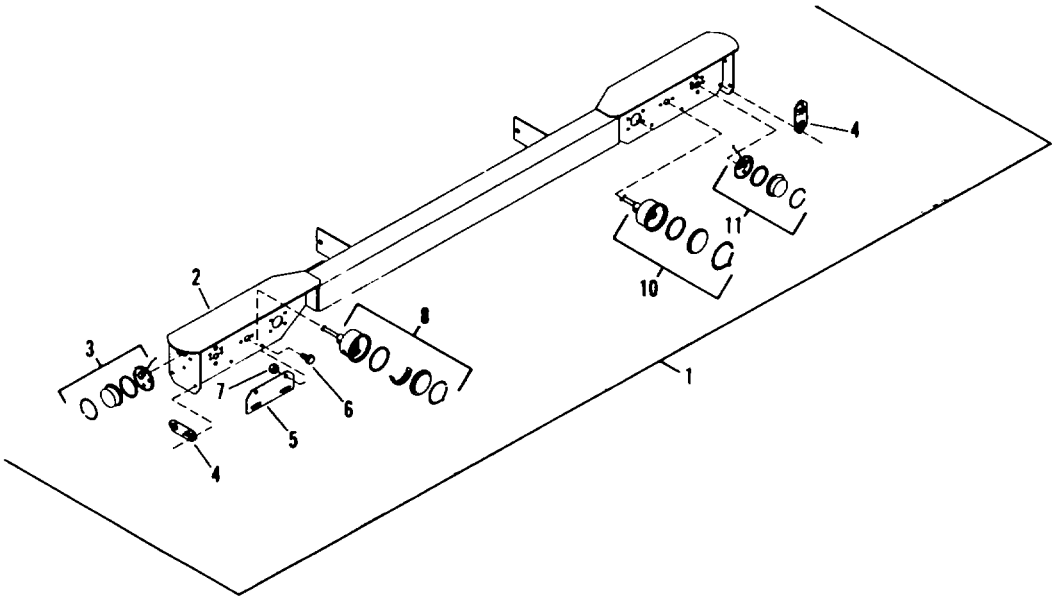


Figure 266.

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

LOOM BUMPER ASSEMBLY

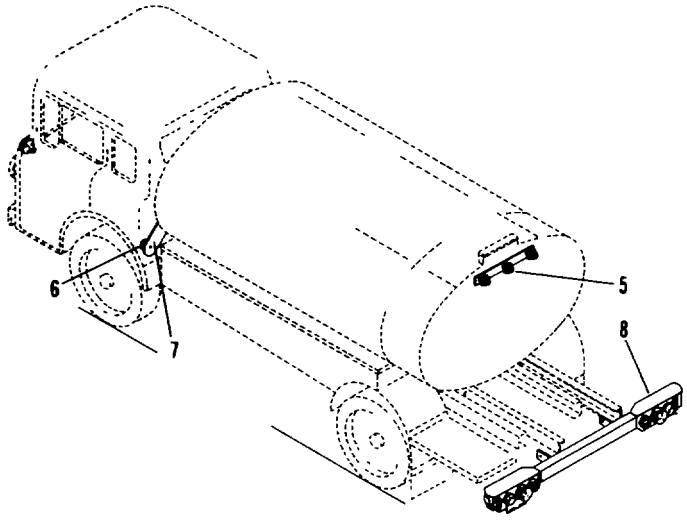
REF	PART	QTY.	DESCRIPTION
1	3310907	1	BUMPER ASM Wl1h LIGHTS-4 WIRE-COMPLETE
2	3310901	1	BUMPER ASSEMBLY
3	6700033	4	MARKER LAMP ASSEMBLY
	6700035	AR	GASKET
	6700034	AR	LENS-RED
	6700316	AN	LENS RETAINING RING
4	6000685	4	REFLECTOR-RED
5	3310897	1	LICENSE MOUNTING BRACKET
6	0120706	2	HEX CAP SCREW 1/4 NC X 1/2
7	9418936	2	HEX NUT 1/4 NC
8	6700390	1	STOP, TAIL, TURN, AND LICENSE LIGHT ASSEMBLY
	7500007	AR	GASKET
	7500006	AR	LENS-CLEAR
	6700450	AR	LENS-RED
	7500008	AR	LENS RETAINING RING
10	6700391	1	STOP, TAIL AND TURN LIGHT A4M
	7500007	AR	GASKET
	6700450	AR	LENS-RED
	7500008	AR	LENS RETAINING RING
11	0447835	AR	PAN HEAD SELF TAPPING SCREW 10--32 X 1/2 NS
		7	BULB -CLEARANCE LAMP GE NO 1251 -NOT SHOWN
		2	BULB-STOP, TAIL AND TURN LAMS GE NO 1662 =NOT SHOWN

For serial nos. J5661 thru J5690,see supplement no. 6, figure 277, page 194.

AR-AS REBURIED
NS=NOT SHOWN

SPECIFY UNIT SERIAL NO, PART NO. & PART DESCRIPTION

IDENTIFICATION AND CLEARANCE LIGHTS - ENVIRONMENTAL AND LOOM



LOOM SYSTEM

Figure 267.

REF	PART	QTY.	DESCRIPTION
5	6700040	1	LOOM IDENTIFICATION LIGHT ASM
	6700041	AR	LENS-RED
6	6700031	2	LOON CLEARANCE LIGHT ASM
			AR-AS REQUIRED
	6700035	AR	GASKET
	6700032	AN	LENS-AMBER
	6700316	AR	LENS RETAINING RING
7	3370048	2	BRACKET
8	3310907	1	LOOM BUMPER ASM WITH LIGHTS-4 WIRE-TRUCK MT

MISCELLANEOUS

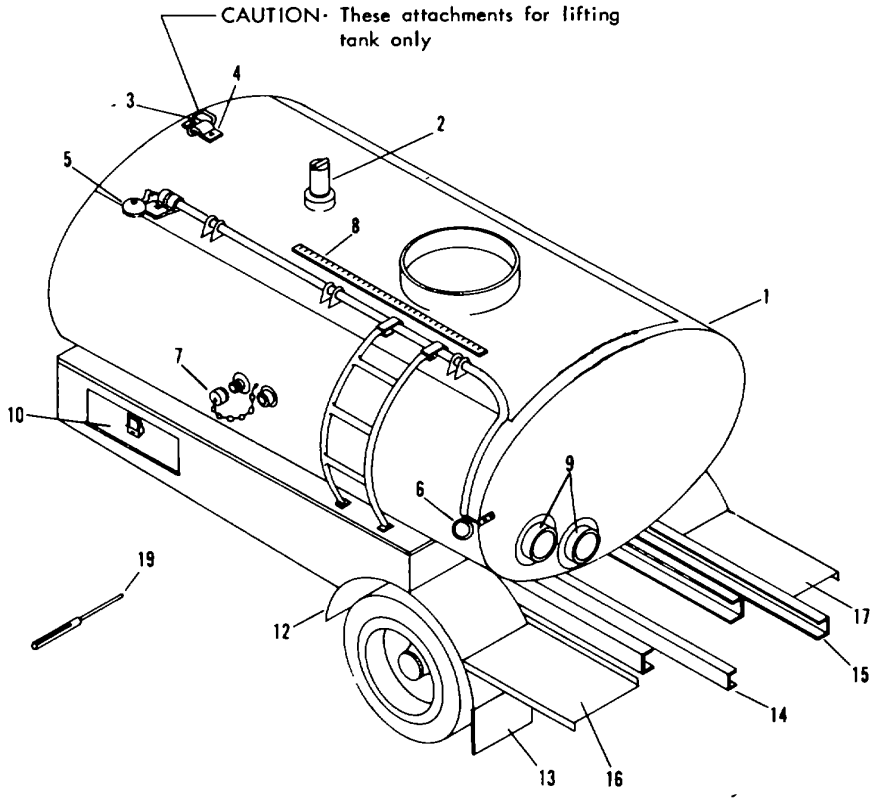


Figure 268.

REF	PART	QTY.	DESCRIPTION
1	3300768	1	RR JKT HD-STEEL
2	3300024	1	DOME
3	3300106	2	LIFTING EYE RING
4	3300104	2	LIFTING EYE BRACKET
5	3390058	1	BELL AND BRACKET ASSEMBLY
6	3390061	1	BELL CABLE AND RING
7	3300038	1	THERMOMETER CAP
8	3390434	1	MEASURING STICK, DIAL 1640
9	3330200	2	OUTER RING
	3330201	2	INNER RING
10	3310087	1	TOOL BOX DOOR
	3310080	1	TOOL BOX WITHOUT DOOR 36 IN NS
	3310095	1	TOOL BOX WITHOUT DOOR *8 IN NS
	2610034	1	TOOL BOX 12 X 36 NS
12	24-J401	2	FENDER TANDEM (SAX SHOWN)
13	6450095	2	MUD FLAPS
14			
	3310749	1	LT FRAME ASM-HYD MTR
15			
	3310750	1	RT FRAME ASM-HYD MTR
16	22JI401	1	LT PLATFORM
17	23J4401	1	RT PLATFORM
19	6500034	1	PENCIL THERMOMETER-F

NS=NOT SHOWN

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

FUEL TANK AND LINES - TOP DRAW

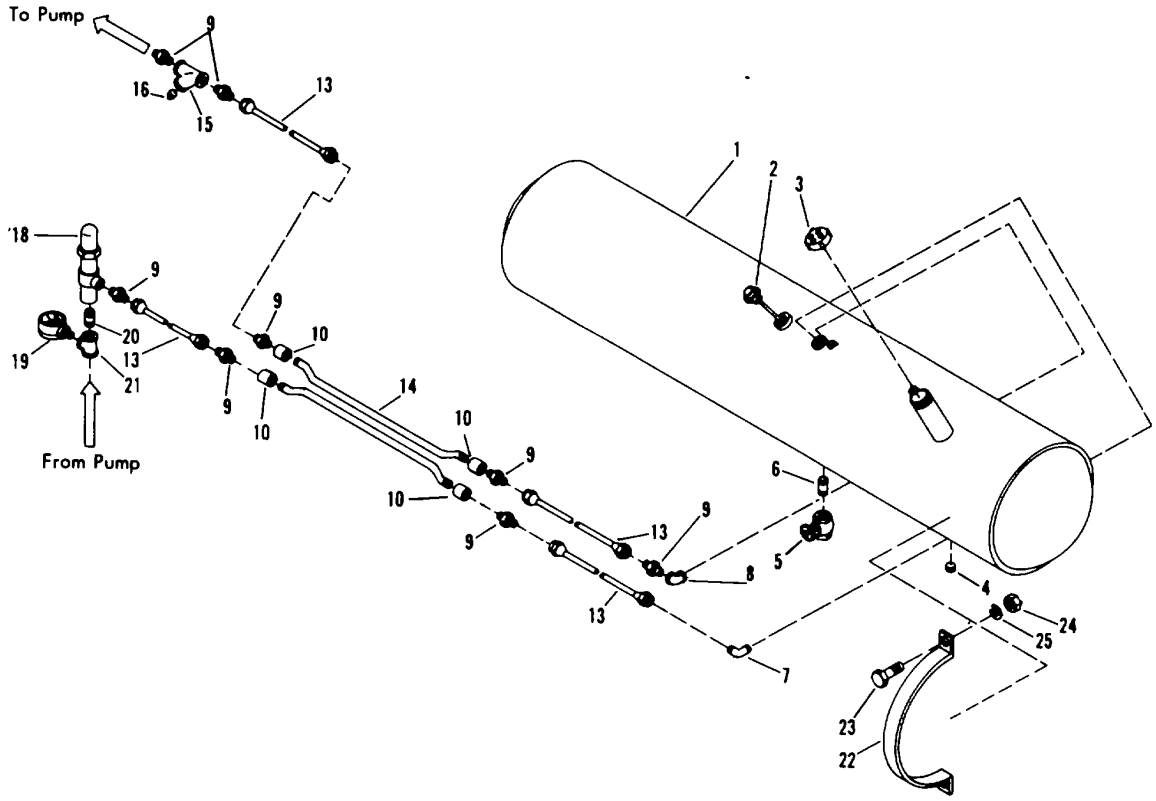


Figure 269.

SPECIFY UNIT SERIAL NO, PART NO., & PART DESCRIPTION

FUEL TANK AND LINES - TOP DRAW

REF	PART	QTY.	DESCRIPTION
1			
	08J4401	1	TANK ASM 14 X 54-1 COMPT
2			
	3331102	1	GAUGE ASM 14 IN TANK
3	6100235	1	FILLING CAP
4	0143997	1	S6 SOCKET PIPE PLUG 1/4
5	6600194	1	GLOBE VALVE 1/4
6	0105405	1	CLOSE NIPPLE 1/4
7	0118755	1	ELBOW 1/4 PIPE x 3/8 TUBE
8	0105413	2	ELBOW 1/*
9	0118750	8	CONNECTOR 1/4 PIPE X 3/8T
10	0187395	6	PIPE COUPLING 1/4
13	9250129	4	COPPER TUBING 3/8 (SPECIFY LENGTH)
14			
	3330465	AR	FUEL LINE PE-90O IN
15	6600199	1	SEDIMENT STRAINER
16	0219191	1	PIPE PLUG 3/8
18	6600197	1	RELIEF VALVE
19	6600196	1	PRESSURE GAGE
20	0121207	1	CLOSE NIPPLE 3/8
21	0218233	1	TEE 1/4 X 1/4 X 3/8
22			
	3311022	2	SUPPORT BAND-14 IN TANK
23	0122459	4	CAP SCREW 1/2 NC X 2
24	0120371	4	HEX NUT 1/2 NC
25	0120384	4	LOCK WASHER 1/2

AR=AS REQUIRED

SPECIFY UNIT SERIAL NO, PART NO., & PART DESCRIPTION

MISCELLANEOUS ATTACHMENTS

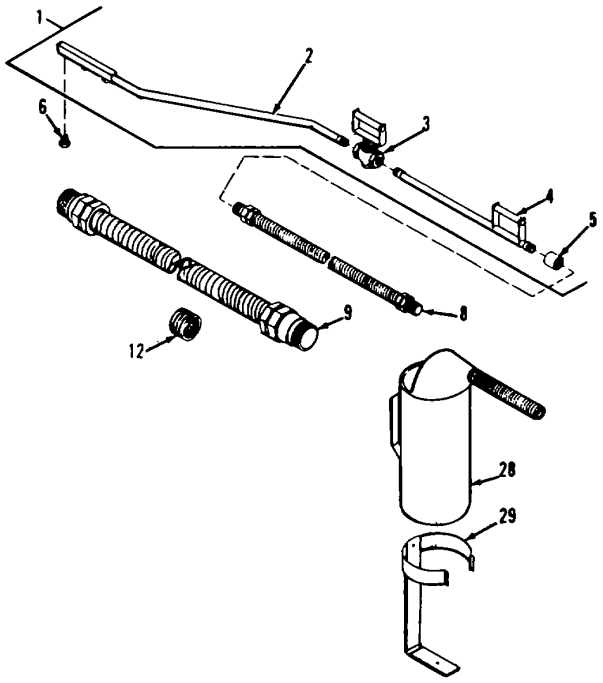


Figure 270.

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3380017	1	HANDSPRAY GUN	29	3390008	1	CLAMP ASSEMBLY
2	3380024	1	OFFSET TUBE ASSEMBLY				
3	3380392	1	VALVE AND HANDLE				
4	3380022	1	TUBE ASSEMBLY				
5	0128137	1	COUPLING I INCH				
	3351009	3	NOZZLE 5/16				
8	66002	1	HOSE I IN TA 25 FT STEEL				
9	6600273	2	HOSE 3 IN TA MALE COUPLING				
12	7220028	1	ASBESTOS CORD-1 LB SPOOL				
28	3390002	1	WASHOUT CAN-3 QUART		AR=AS REQUIRED		

SPECIFY UNIT SERIAL NO, PART NO & PART DESCRIPTION

WIRING DIAGRAM - LIGHTING - LOOM SYSTEM

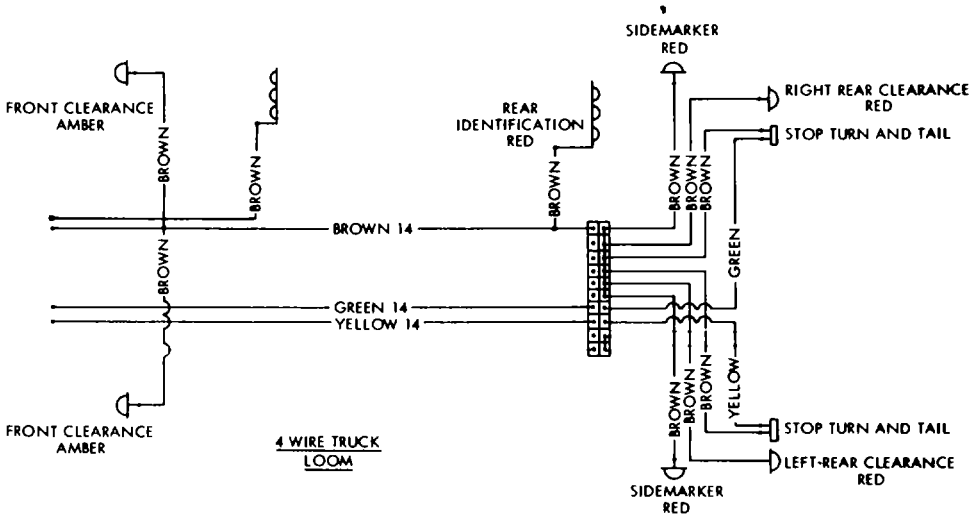


Figure 271.

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

WIRING DIAGRAM - ELECTRIC - AIR CONTROLS - FC AND TUC BARS

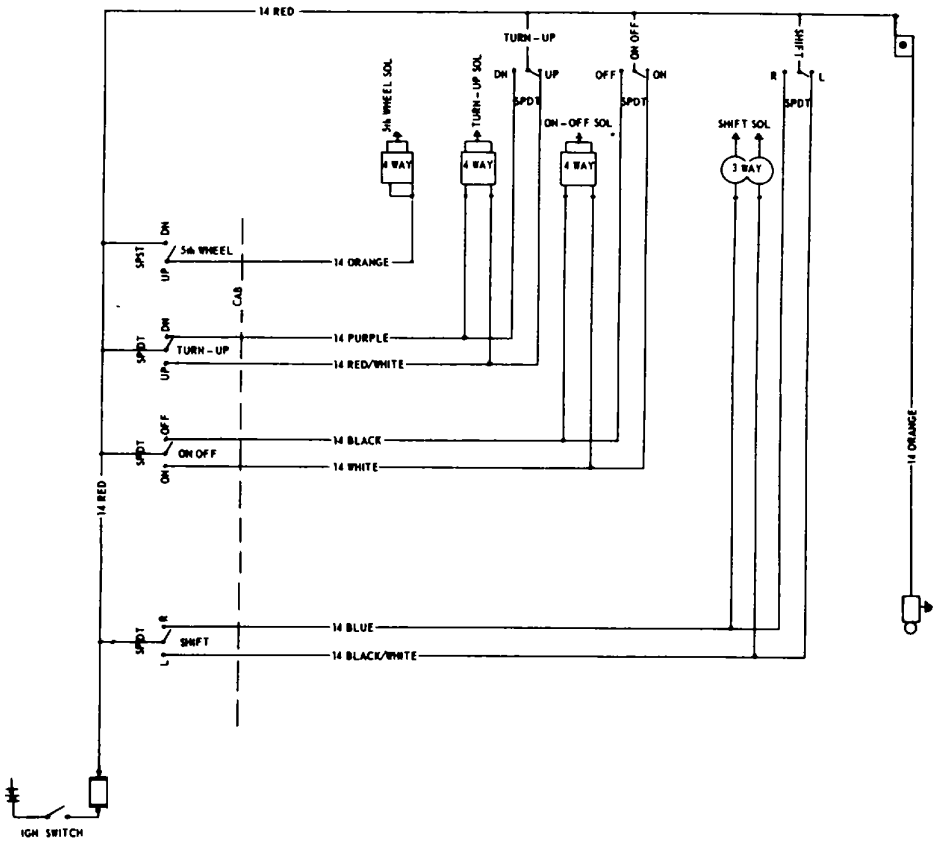


Figure 272.

Note: Front and rear controls for all functions are shown. If only one control (front or rear) is desired, delete the switch and wires from the other controls.

NOTE: DELETE TURN-UP CIRCUIT WHEN USED ON FC SPRAY BAR.

SPECIFY UNIT SERIAL NO, PART NO. & PART DESCRIPTION

Model D-60

PARTS SUPPLEMENT

Serial Numbers J-4801 thru J4830

S/N J4801 thru J4830
QUADRANT - TUC BAR - EXTERNAL STACKS

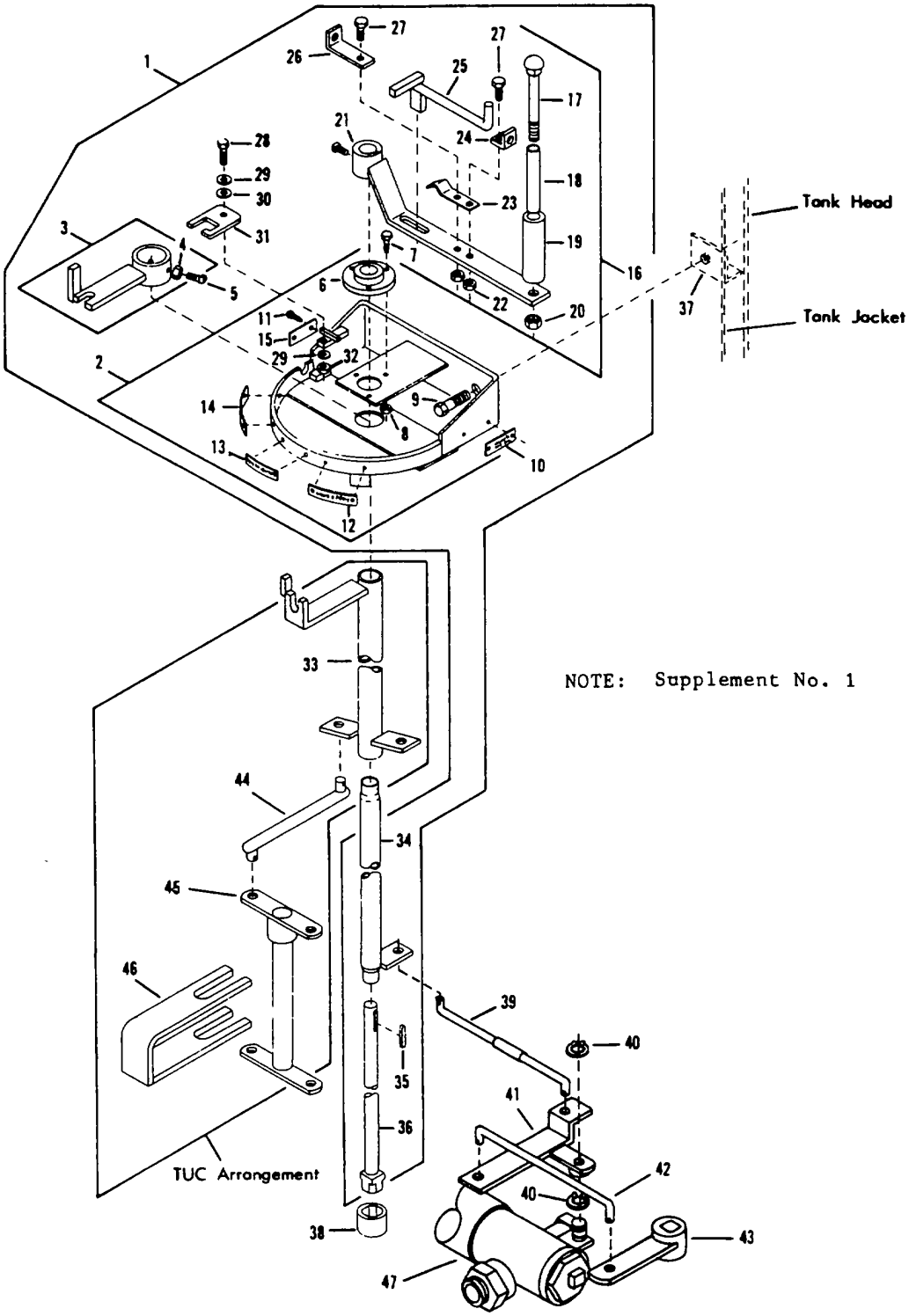


Figure 273.

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

QUADRANT - TUC BAR - EXTERNAL STACKS

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	3451276	1	TUC QUADRANT ASM COMPLETE				
2	3351277	1	QUADRANT ASSEMBLY (ITEM 9 NOT INCL)				
3	3351293	1	INNER ACTUATING PIPE LEVER ASSEMBLY				
4	0120377	2	HEX NUT 3/8				
5	01U6850	2	SET SCREW 3/8 x 1				
6	3350001	1	BEARING				
7	0121900	5	CAP SCREW 1/4 x 1				
8	9418936	3	LOCK NUT 1/4 NC				
9	0122408	2	CAP SCREW 1/2 x 1				
10	3360174	1	CIRCULATE AND FILL NAME PLATE				
11	0145377	10	DRIVE SCREW				
12	33601 75	1	HANDSPRAY NAME PLATE				
13	3360176	1	DISTRIBUTE NAME PLATE				
14	3J60173	1	DRAIN NAME PLATE				
15	3360474	1	CIRCULATE IN BAR NAME PLATE				
16	3351285	1	QUADRANT HANDLE ASSEMBLY				
17	3350917	1	CARRIAGE BOLT 1/2 X 5				
18	3350918	1	BUSHING				
19	3J50919	1	HUB				
20	6100068	1	LUCK NUT 1/2				
21	3351286	1	HUB AND HANDLE ASSEMBLY				
22	9418936	2	LUCK NUT 1/4 NC				
23	3360056	1	CLIP SPRING				
24	3351289	1	RETAINER-LEFT				
25	3351290	1	HANDLE ASSEMBLY				
26	3351288	1	RETAINER-RIGHT				
27	0102892	2	SET SCREW 3/8 x 1/2				
28	0121900	1	CAP SCREW 1/4 NC X 1				
29	0120386	2	FLAT WASHER 1/4				
30	6100247	1	WAVE WASHER				
31	3351604	1	LATCH				
32	0120395	1	HEX NUT 1/4 NC				
33	3351299	1	OUTER QUADRANT CONTROL PIPE ASSEMBLY				
34	3351606	1	INNER QUADRANT CONTROL PIPE ASSEMBLY				
35	6000005	1	KEY 1/4 50 x 1 1/4				
36	3351067	1	LEFT OPERATING SHAFT				
37	3351283	1	QUADRANT MOUNTING BRACKET ASSEMBLY				
38	3J50906	1	SQUARE COUPLING				
39	3351617	1	LINKA6E				
40	6000571	2	SNAP RING				
41	3351590	2	TOGGLE ASSEMBLY				
42	3350855	1	LINKAGE				
43	3351599	1	ARM ASSEMBLY				
44	3351607	1	LINKAGE				
45	3350244	1	JACK SHAFT ASM 18 IN				
46	3350257	1	GUIDE				
47	3340050	1	P-15 HEADER ASSEMBLY				

SPECIFY UNIT SERIAL NO, PART NO, & PART DESCRIPTION

S/N J4801 thru J4830
BITUMETER ASSEMBLY

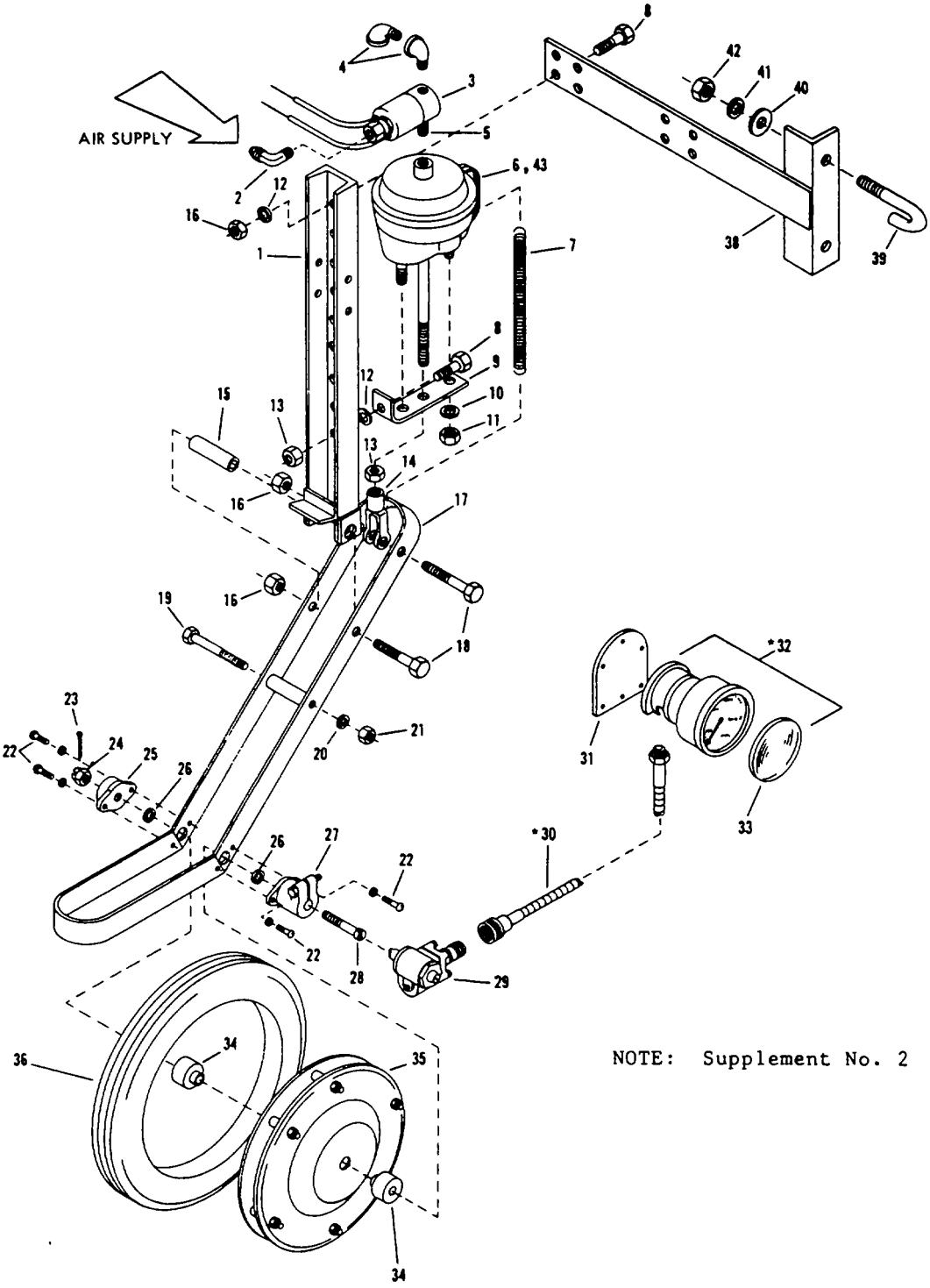


Figure 274.

SPECIFY UNIT SERIAL NO., PART NO., & PART DESCRIPTION

BITUMETER ASSEMBLY

REF	PART	QTY.	DESCRIPTION
1	3360264	1	Support Assembly
2	0118755	1	Elbow 1/4 NPTF x 3/8 Tube
3	6600538	1	Solenoid Valve
4	0105423	2	Street Elbow 1/4 x 90 Degrees
5	0105407	1	Pipe Nipple 1/4
6	3360673	1	Air Chamber
7	3360672	1	Spring
8	0122433	3	Cap Screw 1/2 x 1 1/2 NC
9	3360671	1	Mounting Bracket
10	0120383	2	Lock Washer 7/16
11	0271501	2	Hex Nut 7/16 NC
12	0120384	3	Lock Washer 1/2
13	0120371	2	Hex Nut 1/2
14	6600845	1	Yoke
15	3360284	1	Spacer
16	6100068	4	Lock Nut 1/2 NC
17	3360282	1	Fork Assembly
18	0111300	2	Cap Screw 1/2 NC x 4 1/2
19	0190628	1	Cap Screw 5/16 NC x 4 1/2
20	0120214	1	Lock Washer 5/16
21	0120376	1	Hex Nut 5/15 NC
22	0132760	4	Machine Screw 1/4 x 1/2
23	0103374	1	Cotter Pin 3/32 x 1
24	0125233	I	Slotted Lock Nut 3/8 NF
25	3360344	1	Outer Bearing
26	6420035	2	Bearing
27	3360347	1	Clamp Bearing
28	3360281	1	Spindle
29	6460011	1	Adaptor
30	6460047	1	Cable 144 Inches
31	3360317	1	Bitumeter Head Mounting Plate
32	7850095	1	English Head
33	7850010	AR	Glass
34	3360345	2	Bushing
35	3360312	1	Wheel Assembly
36	6450060	1	Tire
37	3360348	AR	Repair Kit (Incl Items 22 - 28 and 34) N/S
38	3360363	1	Wheel Bracket Assembly
39	3360304	2	Hook Bolt
40	0130999	2	Flat Washer 5/8
41	0121574	2	Lock Washer 5/8
42	0124589	2	Hex Nut 5/8 NC
43	7420145	1	Air Chamber Diaphram N/S

REF	PART	QTY.	DESCRIPTION

AR - As Required
N/S - Not Shown

SPECIFY UNIT SERIAL NO., PART NO., & PART DESCRIPTION

S/N J4801 thru J4830
BURNERS - LOW PRESSURE

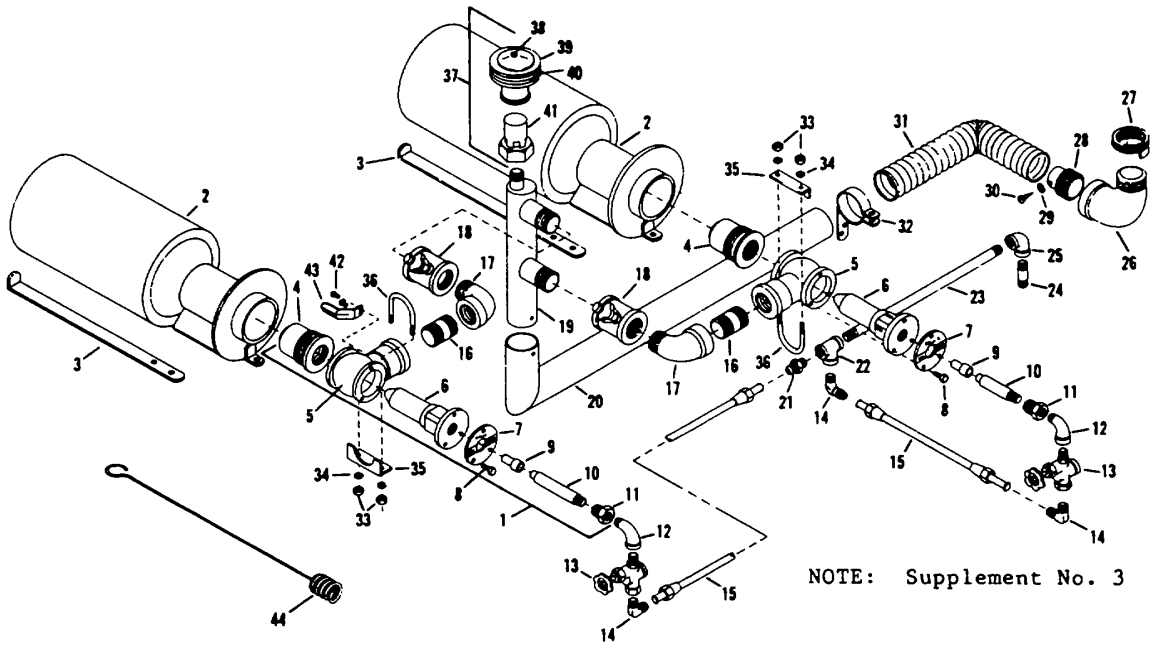


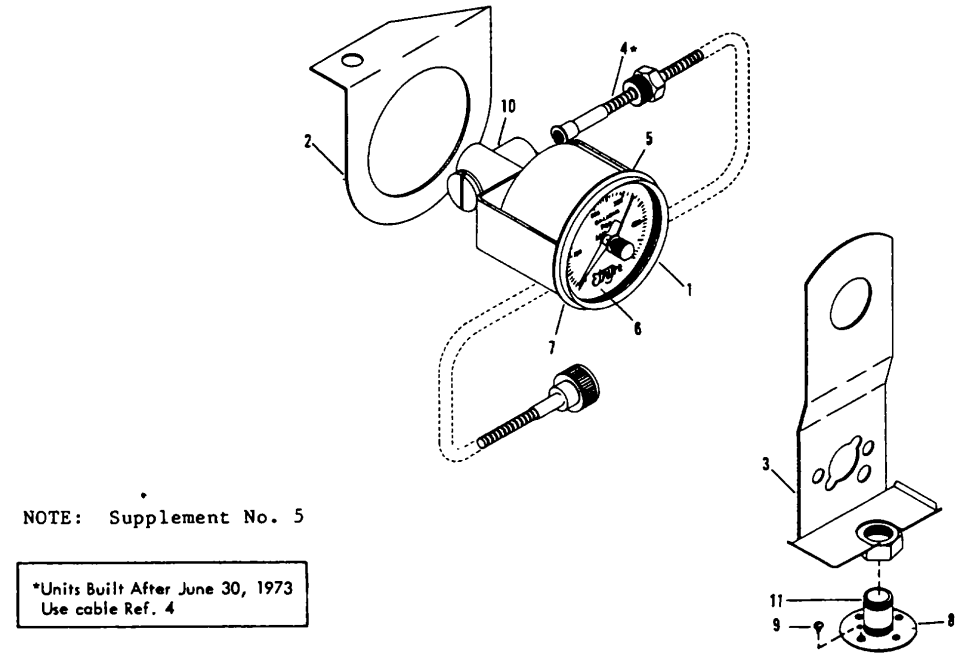
Figure 275.

REF	PART	QTY.	DESCRIPTION
1	3331143	2	Burner Asm - Complete (Including items 4 - 11, 42 and 43)
2	6500041	2	Tube-Combustion
3	3330061	2	Holder-Combustion Tube
4	3330310	2	Nozzle-Outer Air
5	6500051	2	Body-Hauck 1580-A2
6	7700037	2	Nozzle-Hauck 580-A1
7	7700068	2	Plate-Hauck 580-24
8	7700040	6	Screw-Hauck 580-A6
9	7700039	2	Tip-Hauck 580-A5
10	7700038	2	Body-Hauck 580-A3
11	7700067	2	Bushing-Hauck 580-A7
12	0105423	2	Elbow-Pipe, 90, ST, 25 NPT, PN
13	6600205	2	Vlv- 25, Needle, Hauck (Incl Strainer)
	7700042	2	Strainer-Hauck 580-A22 - N/S
14	0142664	3	Elbow-90, .31 Tube x .25 NPTF
15	9250128	2	Tube Asm-Cop .31 OD x W/O Long (Specify Length)
16	0219359	2	Nipple - 1.25 x 3.00, LG, PN (96" Rod Tank)
17	0111001	2	Elbow-Pipe, 90, ST, 1.25 NPT, PN
18	6600204	2	Vlv-1.25 Butfly, Hauck 0580-A25
19	3330045	1	Tube Asm-Feed, Low Pressure
20	3330546	1	Burn Tube Asm-Hauck RR Eng
21	0110200	1	Connector- .31 OD x .25 FPT
22	0105417	1	Tee-Pipe, .25 NPT, PN
23	6200204	1	Nipple - .25 x 34, 40, PN
24	0119920	1	Nipple - .25 x 2.00, LG, PN
25	0105413	1	Elbow-Pipe, 90, .25 NPT, PN
26	0218220	1	Elbow-Pipe, 45, ST, 2.00 NPT, PN
27	6200047	1	Bushing-Pipe, Face, 2 50 x 2 NPT, PN
28	3330202	1	Adaptor Asm-Blower Discharge
29	0120386	1	Washer-Float, .25A, PD
30	9426132	1	Screw-Top, PNSL, 0 25 x 0 75, AB, PD
31	6309094	1	Tubing-FXH,2 OD/FT - Specify Length
32	3330214	1	Cradle Assembly-Hauck Burner
33	9413946	4	Nut-Hex, Lock, 0 25 NC, EA, PD
34	0120380	4	Washer-Lock, Helical Spring, .25
35	3330218	2	Clamp-Burner, Hauck Burner
	3330219	1	Bar-Support, Hauck Burner N/S
36	3330220	2	U Bolt-Hauck Burner
37	3330073	1	Valve Assembly-Air Relief
38	0436730	1	Screw-Mach, PNSL, 10 NC x 0 38, PD
39	3330074	1	Disc-Air Relief Valve
40	7430064	4	Ring-Air Relief Valve-NS
41	7430065	1	Valve-Air Relief Valve
42	0132930	4	Screw-Mach, PNSL, 10NF x 1.50, PD
43	3330311	2	Heed Lock-Burner
44	3330077	1	Lighter Assembly-Burner

N/S= Not Shown

SPECIFY UNIT SERIAL NO., PART NO., & PART DESCRIPTION

S/N J4801 thru J4830
PUMP TACHOMETER



NOTE: Supplement No. 5

*Units Built After June 30, 1973
Use cable Ref. 4

Figure 276.

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
1	7150094	1	TACHOMETER HEAD-GALLONS				
2	3360349	1	BRACKET				
3	3320310	1	TACHOMETER BRACKET ASM HYD				
4	6460060	1	CABLE-252 INCHES				
5	6600330	1	O=RING NS				
6	7850057	1	HEAD LENS				
7	6000374	1	BEZEL				
8	3320315	1	TACH STAND FOOT ASSEMBLY				
9	0144759	4	SELF TAPPING SCREW r 14 X 1				
10	7850092	1	ADAPTER				
11	3320314	1	TACH STAND LEG				

NS=NOT SHOWN

SPECIFY UNIT SERIAL NO., PART NO., & PART DESCRIPTION

S/N J5661 thru J5690
LOOM BUMPER ASSEMBLY

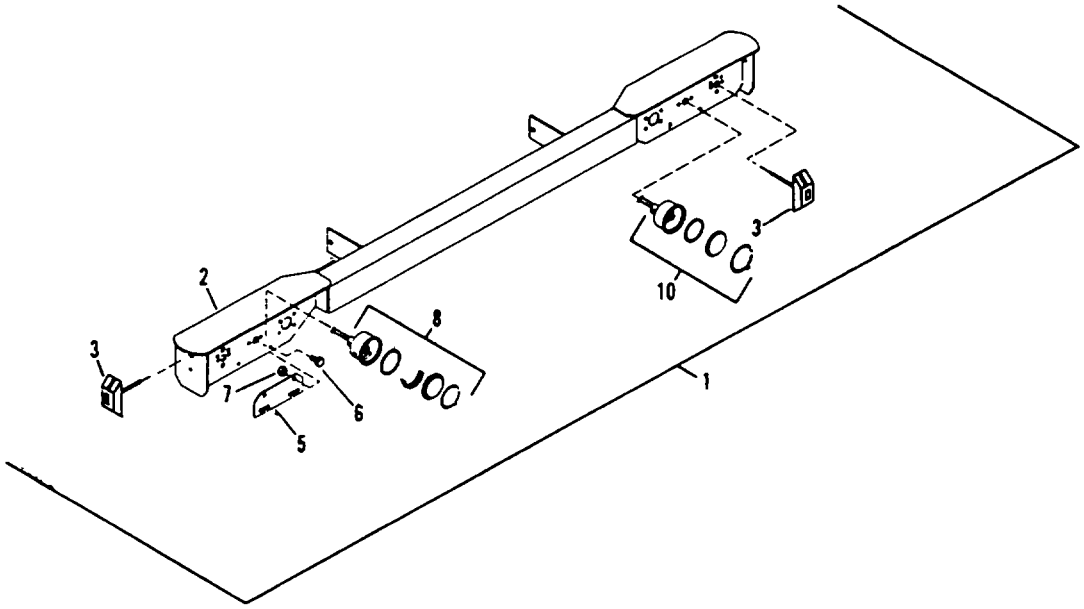


Figure 277.

SPECIFY UNIT SERIAL NO, PART NO., & PART DESCRIPTION

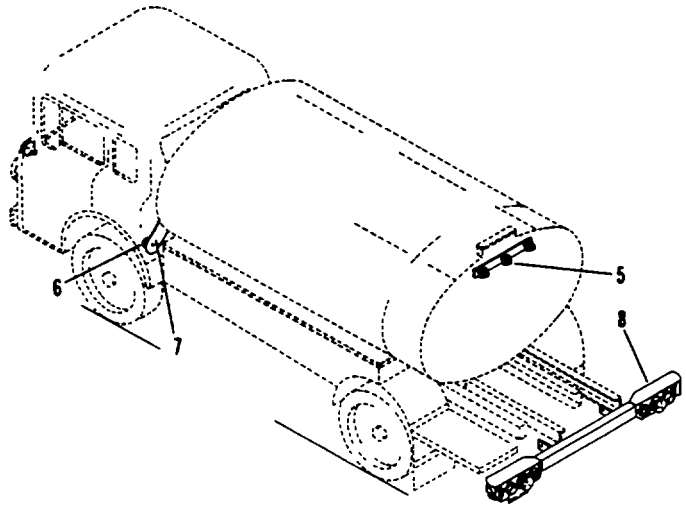
S/N J5661 thru J5690
LOOM BUMPER ASSEMBLY

REF	PART	QTY.	DESCRIPTION
1	3310907	1	BUMPER ASH WITH LIGHTS- 4 WIRE-COMPLETE
2	3310901	1	BUMPER ASSEMBLY
3	6700854	4	LIGHT-CLEAR, W/ REFLECTOR-RED
5	3310897	1	LICENSE MOUNTING BRACKET
6	0120706	2	HEX CAP SCREW 1/4 NC X 1/2
7	9418936	2	HEX NUT 1/4 NC
8	6700390	1	STOP, TAIL, TURN, AND LICENSE LIGHT ASSEMBLY
	7500007	AR	GASKET
	7500006	AR	LENS-CLEAR
	6700450	AR	LENS-RED
	7500008	AR	LENS RETAINING RING
10	6700391	1	STOP, TAIL AND TURN LIGHT ASH
	7500007	AR	GASKET
	6700450	AR	LENS-RED
	7500008	AR	LENS RETAINING RING
11	0447835	AR	PAN HEAD SELF TAPPING SCREW 10-32 X 1/2 NS
33		7	BULB-CLEARANCE LIGHT GE NO. 1251 - NS
34		2	BULB- TOP, TAIL + TURN LAMPS GE NO. 1662 - NS

AR=AS REQUIRED
NS=NOT SHOWN

SPECIFY UNIT SERIAL NO., PART NO., & PART DESCRIPTION

IDENTIFICATION AND CLEARANCE LIGHTS LOOM



LOOM SYSTEM

Figure 278.

REF	PART	QTY.	DESCRIPTION	REF	PART	QTY.	DESCRIPTION
					6700035	AR	GASKET
5	6700040	1	LOOM IDENTIFICATION LIGHT ASM		6700032	AR	LENS-AMBER
6	6700041	AN	LENS-RED		6700316	AR	LENS RETAINING RING
6	670085	2	LIGHT-CLEARANCE W/REFLECTOR-AMBER	7	3370048	2	BRACKET
				8	3310907	1	LOOM BUMPER ASM WITH LIGHTS-4 WIRE-TRUCK MT

AR=AS REBURIED

SPECIFY UNIT SERIAL NO., PART NO., & PART DESCRIPTION

INDEX
PART NO. TO FIGURE/ITEM/PAGE NOS.

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
CP-35N-4	80195	NOT SHOWN			2520-00-217-9322 PARTS KIT
F140-07	80195	NOT SHOWN			2940-00-358-4636 FILTER ELEM
GE1251	80195	266	NOT SHOWN	178	
GE1251	80195	277	33 (NS)	194	
GE1662	80195	266	NOT SHOWN	178	
GE1662	80195	277	34 (NS)	194	
HAF14-40	80195	NOT SHOWN			4720-00-228-1216 HOSE ASSY
MS15570-125	96906	NOT SHOWN			6240-00-019-0877 LAMP, INCAND
N1178A	06721	NOT SHOWN			4820-00-740-8795 VALVE, SAFETY
NC-256	97634	NOT SHOWN			2590-00-125-5456 BOOT
NP5029021	70434	NOT SHOWN			4820-00-836-1598 VALVE, REG
12MCS16SF90-16S	97403	NOT SHOWN			4720-00-125-5393 HOSE ASSY
13220E8460	NOT SHOWN				6220-01-056-8363 PARTS KIT
830003	02892	235	55	136	
830003	02892	236	18	138	
830017	02892	237	22	140	
830018	02892	237	23	140	
830028	02892	235	5	136	
830038	02892	237	42	140	
830041	02892	236	48	138	
830067	02892	237	67	140	
830080	02892	237	17	140	
830091	02892	236	47	138	
830119	02892	237	57	140	
830150	02892	235	40	136	
830150	02892	236	37	138	
830201	02892	236	35	138	
830219	02892	235	32	136	
830230	02892	235	2	136	
830231	02892	235	60	136	
830231	02892	236	57	138	
830245	02892	236	12	138	
840021	02892	235	54	136	
840021	02892	236	54	138	
840022	02892	235	41	136	
840022	02892	236	53	138	
840023	02892	235	42	136	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
840023	02892	236	52	138	
840024	02892	236	8	138	
840029	02892	236	27	138	
840031	02892	236	24	138	
840035	02892	235	61	136	
840035	02892	236	59	138	
840036	02892	236	60	138	
840037	02892	235	15	136	
840037	02892	235	65	136	
840037	02892	236	61	138	
840038	02892	236	42	138	
840058	02892	237	65	140	
840059	02892	237	73	140	
840063	02892	236	9	138	
840067	02892	236	36	138	
840073	02892	235	53	136	
840073	02892	236	39	138	
840087	02892	237	26	140	
840088	02892	237	27	140	
840125	02892	237	40	140	
840134	02892	235	62	136	
840138	02892	235	19	136	
840140	02892	237	74 & 76	140	
840146	02892	235	33	136	
840185	02892	236	45	138	
840245	02892	235	4	136	
840288	02892	237	66	140	
840297	02892	237	45	140	
840298	02892	237	16	140	
840299	02892	237	43	140	
840304	02892	237	15	140	
840419	02892	237	82	140	
840613	02892	237	52	140	
840756	02892	236	7	138	
840811	02892	235	13	136	
840975	02892	235	16	136	
841113	02892	235	35	136	
841126	02892	236	20	138	
841163	02892	235	21	136	
841163	02892	236	16	138	
841180	02892	235	20	136	
841188	02892	235	3	136	
841190	02892	235	1	136	
841225	02892	235	24	136	
841225	02892	236	19	138	
841226	02892	235	23	136	
841247	02892	236	1	138	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
841248	02892	236	13	138	
841255	02892	235	11	136	
841277	02892	236	2	138	
841278	02892	235	10	136	
841279	02892	235	7	136	
841321	02892	235	22	136	
850060	02892	235	25	136	
850060	02892	236	14	138	
850061	02892	235	26	136	
850061	02892	236	15	138	
870045	02892	235	39	136	
870045	02892	236	34	138	
870092	02892	236	21	138	
870100	02892	237	71	140	
870101	02892	235	49	136	
870101	02892	236	49	138	
870102	02892	235	58	136	
870102	02892	236	55	138	
870103	02892	235	43	136	
870103	02892	236	51	138	
870106	02892	235	59	136	
870106	02892	236	56	138	
870115	02892	237	39	140	
840120	02892	236	10	138	
870140	02892	237	24	140	
870150	02892	235	48	136	
870150	02892	236	58	138	
870151	02892	235	27	136	
870160	02892	236	5	138	
870160	02892	237	38	140	
870181	02892	236	17	138	
870194	02892	236	3	138	
870194	02892	236	40	138	
870210	02892	235	50	136	
870220	02892	236	11	138	
870230	02892	237	28	140	
870264	02892	235	45	136	
870264	02892	236	22	138	
870305	02892	236	43	138	
870306	02892	236	43	138	
870307	02892	236	43	138	
870308	02892	236	43	138	
870377	02892	236	28	138	
870480	02892	235	47	136	
870480	02892	236	6	138	
870480	02892	237	13	140	
870480	02892	237	25	140	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
870480	02892	237	63	140	
870492	02892	235	37	136	
870492	02892	236	4	138	
870561	02892	237	12	140	
870563	02892	235	8	136	
870642	02892	235	38	136	
870642	02892	236	30	138	
870647	02892	236	23	138	
870648	02892	235	44	136	
870648	02892	236	50	138	
870653	02892	235	51	136	
870705	02892	237	41	140	
870709	02892	237	44	140	
871010	02892	235	6	136	
871011	02892	237	14	140	
871011	02892	237	70	140	
871012	02892	235	34	136	
871014	02892	235	12	136	
871054	02892	236	46	138	
871114	02892	235	17	136	
871114	02892	236	62	138	
871133	02892	237	46	140	
871140	02892	235	52	136	
871140	02892	236	41	138	
871146	02892	235	46	136	
871158	02892	236	38	138	
871212	02892	236	25	138	
871231	02892	236	44	138	
872305	02892	235	14	136	
872493	02892	237	51	140	
872495	02892	235	63	136	
872675	02892	235	18	136	
872678	02892	236	26	138	
872732	02892	235	9	136	
872734	02892	235	36	136	
875163	02892	235	56	136	
875243	02892	235	57	136	
875243	02892	236	29	138	
875261	02892	236	31	138	
01J4401	80195	242	14	146	
0102892	80195	254	27	162	
0102892	80195	273	27	188	
0103063	80195	253	8	160	
0103362	80195	244	17	150	
0103373	80195	240	11	143	5315-01-082-9159
0103374	80195	261	26	172	
0103374	80195	262	1	174	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
0103374	80195	274	23	190	
0103384	80195	260	16	170	
0103385	80195	240	14	143	5310-01-083-6597
0103385	80195	241	67	144	5310-01-083-6597
0103386	80195	240	41	143	
0103386	80195	265	3	177	
0103411	80195	250	23	156	
0103564	80195	264	20	176	
0103615	80195	251	6	157	
0103646	80195	252	21	158	
0105405	80195	259	18	169	
0105405	80195	269	6	182	
0105405	80195	257	10	166	
0105405	80195	257	36	166	
0105407	80195	256	13	165	
0105407	80195	257	8	166	
0105407	80195	274	5	190	
0105413	80195	246	20	152	
0105413	80195	260	31	170	
0105413	80195	269	8	182	
0105413	80195	275	25	192	
0105417	80195	246	17	152	
0105417	80195	256	16	165	
0105417	80195	259	17	166	
0105417	80195	259	17	169	
0105417	80195	275	22	192	
0105423	80195	246	12	152	4730-00-246-9215
0105423	80195	257	38	166	4730-00-246-9215
0105423	80195	258	4	166	4730-00-246-9215
0105423	80195	259	2	169	4730-00-246-9215
0105423	80195	260	9	170	4730-00-246-9215
0105423	80195	262	15	174	4730-00-246-9215
0105423	80195	274	4	190	4730-00-246-9215
0105423	80195	275	12	192	4730-00-246-9215
0106850	80195	254	5	162	
0106850	80195	273	5	188	
0107376	80195	253	55	160	3040-01-083-2834
0110200	80195	246	18	152	
0110200	80195	275	21	192	
0111001	80195	275	17	192	
0111300	80195	261	32	172	
0111300	80195	274	18	190	
0110582	80195	246	26	152	
0115193	80195	256	8	165	
0118750	80195	256	4	165	
0187395	80195	269	10	182	
0118750	80195	257	39	166	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
0118750	80195	260	10	170	
0118750	80195	269	9	182	
0118755	80195	259	20	169	
0118755	80195	260	7	170	
0118755	80195	269	7	182	
0118755	80195	274	2	190	
0119920	80195	246	21	152	
0119920	80195	259	19	169	
0119920	80195	275	24	192	
0119931	80195	257	35	166	
0119931	80195	259	3	169	
0120214	80195	240	7	143	
0120214	80195	241	12	144	
0120214	80195	244	30	150	
0120214	80195	245	19	151	
0120214	80195	250	28	156	
0120214	80195	260	34	170	
0120214	80195	274	20	190	
0120217	80195	244	24	150	5301-01-083-6490
0120233	80195	243	14	148	
0120233	80195	251	5	157	
0120280	80195	259	25	169	
0120367	80195	245	15	151	
0120368	80195	240	36	143	
0120368	80195	244	16	150	
0120368	80195	245	20	151	
0120369	80195	244	2	150	5310-01-084-1179
0120371	80195	262	4	174	5310-01-083-1609
0120371	80195	269	24	182	5310-01-083-1609
0120371	80195	274	13	190	5310-01-083-1609
0120375	80195	243	19	148	5310-01-083-0796
0120375	80195	253	9	160	5310-01-083-0796
0120375	80195	257	16	166	5310-01-083-0796
0120375	80195	257	24	166	5310-01-083-0796
0120375	80195	257	29	166	5310-01-083-0796
0120376	80195	240	8	143	5310-01-083-6470
0120376	80195	241	13	144	5310-01-083-6470
0120376	80195	253	91	160	5310-01-083-6470
0120376	80195	260	35	170	5310-01-083-6470
0120376	80195	274	21	190	5310-01-083-6470
0120377	80195	243	27	148	5310-01-083-0151
0120377	80195	254	4	162	5310-01-083-0151
0120377	80195	259	14	169	5310-01-083-0151
0120377	80195	273	4	188	5310-01-083-0151
0120378	80195	243	32	148	
0120378	80195	244	9	150	
0120378	80195	252	44	158	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
0120380	80195	243	18	148	5310-01-083-0799
0120380	80195	245	14	151	
0120380	80195	257	17	166	
0120380	80195	257	23	166	
0120380	80195	257	30	166	
0120380	80195	275	34	192	5310-01-083-0799
0120382	80195	243	17	148	
0120382	80195	243	28	148	
0120383	80195	253	39	160	5310-01-083-0800
0120383	80195	260	3	170	5310-01-083-0800
0120383	80195	274	10	190	5310-01-083-0800
0120384	80195	243	35	148	5310-01-083-3240
0120384	80195	257	14	166	5310-01-083-3240
0120384	80195	260	48 NOT SHOWN	170	5310-01-083-3240
0120384	80195	261	33	172	5310-01-083-3240
0120384	80195	269	25	182	5310-01-083-3240
0120384	80195	274	12	190	5310-01-083-3240
0120386	80195	246	32	152	
0120386	80195	253	32	160	
0120386	80195	254	29	162	
0120386	80195	273	29	188	
0120386	80195	275	29	192	
0120387	80195	260	48 NOT SHOWN	170	
0120388	80195	243	26	148	5310-01-083-1540
0120388	80195	253	78	160	5310-01-083-1540
0120389	80195	253	38	160	
0120389	80195	257	19	166	
0120390	80195	243	30	148	5310-01-083-0798
0120390	80195	243	33	148	5310-01-083-0798
0120395	80195	254	32	162	
0120395	80195	273	32	188	
0120426	80195	243	36	148	
0120614	80195	244	42	150	5310-01-082-9526
0120622	80195	257	33	166	5310-01-083-7033
0120706	80195	257	15	166	
0120706	80195	257	22	166	
0120706	80195	266	6	178	
0120706	80195	277	6	194	
0120741	80195	240	35	143	
0120823	80195	253	31	160	
0120854	80195	247	1	153	
0120918	80195	243	25	148	3895-00-886-2863
0121207	80195	256	9	165	
0121207	80195	259	23	169	
0121207	80195	269	20	182	
0121323	80195	257	3	166	
0121358	80195	244	7	150	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
0121358	80195	244	25	150	
0121574	80195	260	44	170	5310-01-083-0801
0121574	80195	274	41	190	5310-01-083-0801
0121887	80195	244	35	150	
0121900	80195	254	7	162	
0121900	80195	254	28	162	
0121900	80195	273	7	188	
0121900	80195	273	28	188	
0121913	80195	245	12	151	5305-00-489-1093
0121940	80195	243	15	148	
0121960	80195	257	28	166	
0122017	80195	240	37	143	
0122017	80195	250	27	156	
0122027	80195	241	11	144	
0122027	80195	250	35	156	
0122083	80195	240	6	143	
0122145	80195	259	11	169	
0122181	80195	253	79	160	
0122267	80195	253	40	160	
0122293	80195	259	9	169	
0122320	80195	260	2	170	
0122408	80195	254	9	162	
0122408	80195	257	13	166	
0122408	80195	273	9	188	
0122433	80195	241	24	144	5305-01-083-0003
0122433	80195	253	30	160	5305-01-083-0003
0122433	80195	260	48	170	5305-01-083-0003
0122433	80195	274	8	190	5305-01-083-0003
0122459	80195	262	14	174	
0122459	80195	269	23	182	
0122472	80195	252	42	158	
0123774	80195	245	18	151	
0124589	80195	253	28	160	5310-01-083-0797
0124589	80195	260	43	170	5310-01-083-0797
0124589	80195	274	42	190	5310-01-083-0797
0124829	80195	253	18	160	
0124843	80195	241	17	144	
0124944	80195	244	5	150	
0125233	80195	261	25	172	
0125233	80195	274	24	190	
0125250	80195	252	6	158	
0125988	80195	242	20	146	
0127800	80195	253	94	160	4730-01-082-8815
0127874	80195	250	44	156	
0128137	80195	270	5	184	4730-01-763-0701
0128228	80195	245	24	151	
0130999	80195	241	22	144	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
0130999	80195	252	77	158	
0130999	80195	260	45	170	
0130999	80195	274	40	190	
0132760	80195	257	32	166	
0132760	80195	261	27	172	
0132760	80195	264	8	176	
0132760	80195	274	22	190	
0132892	80195	244	19	150	
0132908	80195	259	36	169	
0132930	80195	246	41	152	
0132930	80195	275	42	192	
0141621	80195	242	38	146	
0142664	80195	246	14	152	
0142664	80195	275	14	192	
0143997	80195	257	26	166	
0143997	80195	269	4	182	
0144093	80195	256	18	165	
0144744	80195	265	8	177	
0144759	80195	263	10	175	
0144759	80195	276	9	193	
0144768	80195	265	2	177	
0145377	80195	254	11	162	
0145377	80195	273	11	188	
0184365	80195	250	24	156	
0187395	80195	260	30	170	
0190628	80195	260	33	170	
0190628	80195	274	19	190	
0192470	80195	242	21	146	
02J4401	80195	242	16	146	
0218220	80195	246	42	152	
0218220	80195	275	26	192	
0218233	80195	256	11	165	
0218233	80195	269	21	182	
0219191	80195	269	16	182	
0219199	80195	242	10	146	
0219359	80195	246	3	152	
0219359	80195	275	16	192	
0220086	80195	241	34	144	
0271501	80195	252	38	158	5310-01-082-8718
0271501	80195	260	4	170	
0271501	80195	274	11	190	5310-01-082-8718
0271506	80195	253	56	160	5310-01-082-9359
0271506	80195	258	NOT SHOWN	166	5310-01-082-9359
0274247	80195	242	32	146	
0274249	80195	242	24	146	5330-01-083-0080
0274253	80195	242	34	146	5330-01-006-2277
01J4401	80195	242	14	146	
03J4401	80195	242	18	146	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
04J4401	80195	242	12	146	
0427646	80195	253	64	160	
0428217	80195	241	25	144	
0428694	80195	241	30	144	
0428715	80195	241	21	144	
0436730	80195	275	38	192	
0436754	80195	244	41	150	
0443139	80195	253	90	160	5315-00-150-4836
0445938	80195	244	38	150	
0446179	80195	244	36	150	
0447835	80195	266	11	178	
0447835	80195	277	11	194	
05J4401	80195	244	46	150	
06J4401	80195	242	17	146	
08J4401	80195	269	1	182	
09J4401	80195	244	28	150	
11J4401	80195	243	1	148	
12J4401	80195	246	30	152	
1518	80195	NOT SHOWN			6240-00-877-3405 LAMP INCAND
2A4111-8	80195	NOT SHOWN			4320-00-444-9013 PUMP, ROTARY
22J4401	80195	268	16	181	
23J4401	80195	268	17	181	
24J4401	80195	268	12	181	
2610034	80195	268	NOT SHOWN	181	
2630074	80195	262	28	174	
28J4401	80195	242	1	146	
30J4401	80195	243	37	148	
3100284	80195	252	68	158	
3100302	80195	245	23	151	
3160001	80195	257	31	166	5940-01-082-7447
3170052	80195	243	12	148	
3170081	80195	243	10	148	
3300018	80195	240	15	143	
3300019	80195	240	16	143	
3300024	80195	268	2	181	3895-00-160-6403
3300038	80195	268	7	181	3895-00-493-8795
3300104	80195	268	4	181	
3300106	80195	268	3	181	
3300120	80195	240	24	143	5340-00-627-4729
3300121	80195	240	13	143	
3300122	80195	240	9	143	3895-00-150-1514
3300125	80195	240	10	143	5315-01-083-6851
3300135	80195	240	1	143	
3300136	80195	240	12	143	
3300142	80195	240	3	143	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3300146	80195	240	4	143	5340-01-084-1059
3300148	80195	240	20	143	3895-00-150-1515
3300149	80195	240	21	143	3895-00-150-1516
3300150	80195	240	23	143	
3300150	80195	243	29	148	
3300151	80195	240	18	143	
3300152	80195	240	40	143	
3300154	80195	240	17	143	
3300156	80195	240	34	143	
3300293	80195	240	22	143	
3300294	80195	240	19	143	5315-00-425-6954
3300301	80195	240	2	143	
3300768	80195	268	1	181	
3310080	80195	268	NOT SHOWN	181	
3310087	80195	268	10	181	
3310095	80195	268	NOT SHOWN	181	
3310265	80195	241	50	144	
3310353	80195	253	33	160	5360-01-082-9375
3310358	80195	241	4	144	
3310359	80195	241	5	144	
3310749	80195	268	14	181	
3310750	80195	268	15	181	
3310897	80195	266	5	178	
3310897	80195	277	5	194	
3310901	80195	266	2	178	
3310901	80195	277	2	194	
3310907	80195	266	1	178	
3310907	80195	267	8	180	
3310907	80195	277	1	194	
3310907	80195	278	8	196	
3311022	80195	269	22	182	
3320034	80195	244	18	150	
3320228	80195	244	1	150	5355-00-702-0149
3320268	80195	242	48	146	
3320273	80195	242	13	146	
3320284	80195	244	3	150	
3320288	80195	244	4	150	
3320289	80195	244	10	150	
3320290	80195	244	11	150	
3320291	80195	244	12	150	
3320294	80195	244	14	150	
3320295	80195	244	15	150	
3320296	80195	244	13	150	
3320299	80195	244	21	150	
3320302	80195	244	22	150	
3320302	80195	244	45	150	
3320304	80195	244	26	150	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3320307	80195	244	26	150	
3320308	80195	244	8	150	
3320310	80195	263	3	175	
3320310	80195	276	3	193	
3320314	80195	263	12	175	
3320314	80195	276	11	193	
3320315	80195	263	9	175	
3320315	80195	276	8	193	
3320322	80195	242	2	146	
3320323	80195	242	3	146	
3320336	80195	243	7	148	
3320339	80195	245	9	151	
3320340	80195	245	7	151	
3320343	80195	245	5	151	
3320363	80195	245	8	151	
3320367	80195	242	15	146	
3320368	80195	245	1	151	
3320371	80195	243	24	148	
3320411	80195	258	2	166	
3320613	80195	244	6	150	
3320681	80195	243	22	148	
3320686	80195	255	2	164	
3320687	80195	255	1	164	
3320714	80195	245	11	151	
3320721	80195	244	20	150	
3320741	80195	243	20	148	
3320797	80195	243	13	148	
3320813	80195	242	4	146	
3320814	80195	242	5	146	
3320815	80195	244	32	150	
3320816	80195	244	34	150	
3320819	80195	244	32	150	
3320821	80195	244	39	150	
3320822	80195	244	40	150	
3320849	80195	252	43	158	
3320850	80195	252	76	158	
3320861-2FT	80195	242	28	146	4720-00-125-5453
3320862-3FT	80195	242	28	146	4720-00-441-5928
3320872	80195	242	22	146	
3320881	80195	242	29	146	4920-00-144-4974
3320889	80195	242	30	146	
3320892	80195	245	10	151	3020-01-053-2581
3320893	80195	242	33	146	
3320895	80195	243	34	148	"
3330026	80195	242	6	146	
3330029	80195	252	26	158	
3330030	80195	252	30	158	5120-01-090-7734

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3330031	80195	249	15	155	
3330032	80195	249	8	155	
3330033	80195	249	9	155	
3330034	80195	249	10	155	
3330036	80195	249	12	155	
3330037	80195	249	14	155	
3330039	80195	249	13	155	
3330040	80195	249	1	155	
3330041	80195	249	7	155	
3330042	80195	249	4	155	
3330045	80195	249	2	155	
3330045	80195	275	19	192	
3330046	80195	249	6	155	
3330047	80195	249	5	155	
3330049	80195	249	3	155	
3330050	80195	265	4	177	
3330061	80195	246	34	152	
3330061	80195	275	3	192	
3330062	80195	246	35	152	
3330073	80195	246	24	152	
3330073	80195	275	37	192	
3330074	80195	246	27	152	
3330074	80195	275	39	192	
3330077	80195	246	37	152	4530-00-160-5729
3330077	80195	275	44	192	
3330184	80195	262	27	174	
3330185	80195	262	29	174	
3330200	80195	268	9	181	
3330201	80195	268	9	181	
3330202	80195	246	33	152	
3330202	80195	275	28	192	
3330214	80195	246	43	152	
3330214	80195	275	32	192	
3330218	80195	275	35	192	
3330219	80195	275	NOT SHOWN	192	
3330220	80195	275	36	192	
3330239	80195	256	14	165	
3330277	80195	248	29	154	
3330308	80195	246	1	152	
3330310	80195	246	5	152	
3330310	80195	275	4	192	
3330311	80195	246	40	152	
3330311	80195	275	43	192	
3330444	80195	246	22	152	
3330447	80195	248	4	154	
3330461	80195	248	9	154	
3330462	80195	248	16	154	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3330465	80195	269	14	182	
3330546	80195	246	29	152	
3330546	80195	275	20	192	
3331102	80195	269	2	182	
3331143	80195	275	1	192	
3340003	80195	252	47	158	
3340004	80195	252	16	158	
3340022	80195	252	66	158	
3340023	80195	250	30	156	
3340023	80195	252	65	158	
3340024	80195	252	63	158	
3340025	80195	252	62	158	
3340026	80195	250	34	156	
3340026	80195	252	59	158	
3340027	80195	250	33	156	
3340027	80195	252	57	158	
3340028	80195	250	29	156	
3340028	80195	252	61	158	
3340029	80195	252	60	158	
3340033	80195	252	15	158	
3340040	80195	252	17	158	
3340045	80195	252	22	158	
3340045	80195	252	64	158	
3340046	80195	250	31	156	
3340046	80195	252	58	158	
3340048	80195	252	45	158	
3340050	80195	252	46	158	
3340050	80195	273	47	188	
3340074	80195	252	49	158	
3340158	80195	252	51	158	
3340171	80195	250	37	156	
3340199	80195	252	56	158	
3340210	80195	250	16	156	
3340211	80195	250	19	156	
3340219	80195	250	18	156	
3340220	80195	250	20	156	
3340231	80195	252	55	158	
3340267	80195	251	8	157	
3340271	80195	251	9	157	
3340272	80195	251	14	157	
3340275	80195	251	13	157	
3340277	80195	251	11	157	
3340279	80195	251	10	157	
3340281	80195	251	4	157	
3340283	80195	251	21	157	
3340289	80195	251	15	157	
3340293	80195	251	17	157	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3340294	80195	251	28	157	
3340298	80195	251	12	157	
3340300	80195	251	16	157	
3340305	80195	251	22	157	
3340307	80195	251	24	157	
3340308	80195	251	25	157	
3340385	80195	252	32	158	
3340386	80195	252	2	158	
3340405	80195	252	11	158	
3340409	80195	252	31	158	
3340411	80195	252	7	158	
3340423	80195	252	24	158	
3340424	80195	252	20	158	
3340429	80195	252	29	158	
3340432	80195	252	27	158	
3340433	80195	252	28	158	
3340491	80195	252	37	158	
3340499	80195	252	72	158	
3340502	80195	252	73	158	
3340575	80195	252	19	158	
3340618	80195	252	10	158	
3340645-(P15)	80195	251		157	4320-00-779-2359
3340645	80195	252	1	158	
3340664	80195	250	32	156	
3340666	80195	250	22	156	
3340671	80195	250	41	156	
3340671	80195	252	12	158	
3340823	80195	252	8	158	
3340826	80195	251	2	157	
3340867	80195	250	40	156	
3340867	80195	252	14	158	
3340992	80195	250	15	156	
3350001	80195	254	6	162	
3350001	80195	273	6	188	
3350007	80195	241	29	144	
3350008	80195	241	31	144	
3350009	80195	241	32	144	
3350010	80195	241	27	144	
3350011	80195	241	28	144	
3350045	80195	241	48	144	
3350046	80195	241	9	144	
3350047	80195	241	33	144	
3350047	80195	253	110	160	
3350053	80195	241	20	144	
3350054	80195	241	23	144	
3350058	80195	250	1	156	
3350059	80195	250	7	156	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3350062	80195	250	2	156	
3350063	80195	250	12	156	
3350064	80195	241	26	144	
3350119	80195	253	47-LEFT	160	
3350120	80195	253	47-RIGHT	160	
3350131	80195	253	15	160	
3350135	80195	253	6	160	
3350138	80195	253	4	160	
3350155	80195	253	51	160	
3350157	80195	253	52	160	
3350159	80195	253	53	160	
3350160	80195	253	54	160	
3350169	80195	253	61	160	
3350177	80195	253	58	160	
3350178	80195	253	59	160	
3350182	80195	253	57	160	
3350183	80195	253	62	160	
3350186	80195	253	66	160	
3350192	80195	253	65	160	
3350194	80195	253	60	160	
3350195	80195	253	63	160	
3350204	80195	253	76-LEFT	160	
3350205	80195	253	76-RIGHT	160	
3350225	80195	253	73-LEFT	160	
3350226	80195	253	73-RIGHT	160	
3350228	80195	253	49	160	
3350244	80195	254	45	162	
3350244	80195	273	45	188	
3350257	80195	254	46	162	
3350257	80195	273	46	188	
3350261	80195	253	67	160	
3350262	80195	253	36	160	
3350264	80195	253	37	160	
3350268	80195	241	41	144	
3350269	80195	241	42	144	
3350270	80195	241	19	144	
3350272	80195	241	6	144	
3350294	80195	253	43	160	
3350296	80195	250	36	156	
3350301	80195	241	1	144	
3350316	80195	253	92	160	
3350318	80195	253	96	160	
3350319	80195	253	95	160	
3350324	80195	253	77	160	
3350325	80195	253	97	160	
3350326	80195	250	13	156	
3350329	80195	250	14	156	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3350331	80195	253	2	160	
3350332	80195	253	3	160	
3350337	80195	250	25	156	
3350338	80195	250	26	156	
3350340	80195	241	35	144	
3350346	80195	253	107	160	
3350347	80195	241	37	144	
3350349	80195	241	53	144	
3350393	80195	253	35	160	
3350396	80195	253	34	160	
3350398	80195	253	24	160	
3350399	80195	253	160		
3350403	80195	253	27	160	
3350404	80195	253	25	160	
3350406	80195	253	26	160	
3350453	80195	253	85-SECTION	160	
3350454	80195	253	84	160	
3350488	80195	253	83-END	160	
3350489	80195	253	71-LEFT	160	
3350490	80195	253	71-RIGHT	160	
3350491	80195	253	74-LEFT	160	
3350492	80195	253	74-RIGHT	160	
3350493	80195	253	41-LEFT	160	
3350494	80195	241	54	144	
3350495	80195	241	14	144	
3350497	80195	241	10	144	
3350499	80195	241	43	144	
3350501	80195	241	15	144	
3350502	80195	241	18	144	
3350520	80195	253	10	160	
3350521	80195	253	20	160	
3350545	80195	253	14-LEFT	160	
3350546	80195	253	14-RIGHT	160	
3350553	80195	253	103	160	
3350560	80195	253	50-LEFT	160	
3350561	80195	253	50-RIGHT	160	
3350563	80195	253	48-LEFT	160	
3350564	80195	253	48-RIGHT	160	
3350567	80195	253	46	160	
3350572	80195	253	82	160	
3350573	80195	253	88	160	
3350577	80195	253	85-CENTER	160	
3350579	80195	253	83-CENTER	160	
3350580	80195	253	1	160	
3350583	80195	253	68	160	
3350641	80195	253	22	160	
3350704	80195	253	89	160	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3350708	80195	253	45	160	
3350737	80195	253	70	160	
3350795	80195	241	36	144	
3350852	80195	243	31	148	
3350855	80195	254	42	162	
3350855	80195	273	42	188	
3350881	80195	241	44	144	
3350885	80195	241	49	144	
3350887	80195	241	47	144	
3350901	80195	241	51	144	
3350903	80195	241	63	144	
3350904	80195	241	45	144	
3350906	80195	254	38	162	
3350906	80195	273	38	188	
3350908	80195	241	46	144	
3350917	80195	254	17	162	
3350917	80195	273	17	188	
3350918	80195	254	18	162	
3350918	80195	273	18	188	
3350919	80195	254	19	162	
3350919	80195	273	19	188	
3351009	80195	270	6	184	4730-00-248-4370
3351011	80195	253	109	160	
3351059	80195	241	8	144	
3351067	80195	254	36	162	
3351067	80195	273	36	188	
3351134	80195	241	39	144	
3351166	80195	252	40	158	
3351169	80195	252	39	158	
3351173	80195	241	16	144	
3351178	80195	252	41	158	
3351189	80195	250	6	156	
3351241	80195	253	93	160	
3351244	80195	253	75-LEFT	160	
3351245	80195	253	75-RIGHT	160	
3351250	80195	253	41-RIGHT	160	
3351251	80195	253	42-LEFT	160	
3351252	80195	253	42-RIGHT	160	
3351253	80195	253	72-LEFT	160	
3351254	80195	253	72-RIGHT	160	
3351276	80195	254	1	162	
3351276	80195	273	1	188	
3351277	80195	254	2	162	
3351277	80195	273	2	188	
3351283	80195	254	37	162	
3351283	80195	273	37	188	
3351285	80195	254	16	162	
3351285	80195	273	16	188	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3351286	80195	254	21	162	
3351286	80195	273	21	188	
3351288	80195	254	26	162	
3351288	80195	273	26	188	
3351289	80195	254	24	162	
3351289	80195	273	24	188	
3351290	80195	254	25	162	
3351290	80195	273	25	188	
3351293	80195	254	3	162	
3351293	80195	273	3	188	
3351299	80195	254	33	162	
3351299	80195	273	33	188	
3351480	80195	253	86	160	
3351572	80195	253	105	160	
3351573	80195	253	106	160	
3351590	80195	254	41	162	
3351590	80195	273	41	188	
3351599	80195	254	43	162	
3351599	80195	273	43	188	
3351604	80195	254	31	162	
3351604	80195	273	31	188	
3351606	80195	254	34	162	
3351606	80195	273	34	188	
3351607	80195	254	44	162	
3351607	80195	273	44	188	
3351608	80195	254	39	162	
3351617	80195	273	39	188	
3360036	80195	252	33	158	
3360039	80195	260	1	170	
3360052	80195	260	12	170	
3360055	80195	258	NOT SHOWN	166	
3360059	80195	258	3	166	
3360103	80195	259	32	169	
3360116	80195	260	25	170	
3360165	80195	256	1	165	
3360169	80195	252	36	158	
3360173	80195	254	14	162	
3360173	80195	273	14	188	
3360174	80195	254	10	162	
3360174	80195	273	10	188	
3360175	80195	254	12	162	
3361076	80195	254	13	162	
3360175	80195	273	12	188	
3360176	80195	273	13	188	
3360184	80195	264	25	176	
3360185	80195	264	19	176	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3360186	80195	264	6	176	
3360187	80195	264	10	176	
3360188	80195	264	26	176	
3360189	80195	264	16	176	
3360190	80195	264	1	176	
3360192	80195	264	9	176	
3360193	80195	264	14	176	
3360194	80195	264	3	176	
3360195	80195	264	7	176	
3360199	80195	264	4	176	
3360202	80195	264	2	176	
3360203	80195	264	13	176	
3360204	80195	264	11	176	
3360210	80195	264	24	176	
3360215	80195	264	18	176	
3360264	80195	260	32	170	
3360264	80195	274	1	190	
3360281	80195	261	31	172	
3360281	80195	274	28	190	
3360282	80195	261	24	172	
3360282	80195	274	17	190	
3360284	80195	261	35	172	
3360284	80195	274	15	190	
3360304	80195	242	49	146	
3360304	80195	242	50	146	
3360304	80195	260	46	170	
3360304	80195	274	39	190	
3360312	80195	261	37	172	
3360312	80195	274	35	190	
3360317	80195	274	31	190	
3360344	80195	261	28	172	
3360344	80195	274	25	190	3120-01-097-7752
3360345	80195	261	23	172	
3360345	80195	274	34	190	
3360347	80195	274	27	190	
3360347	80195	261	30	172	
3360348	80195	261	42 W/23, 25-31	172	
3360348	80195	274	37	190	
3360349	80195	276	2	193	
3360360	80195	260	17	170	
3360363	80195	260	42	170	
3360363	80195	274	38	190	
3360367	80195	260	14	170	
3360369	80195	258	NOT SHOWN	166	
3360371	80195	260	ELEC ASSY	170	
3360397	80195	259	12	169	
3360399	80195	259	13	169	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
3360405	80195	259	15	169	
3360411	80195	259	35	169	
3360416	80195	258	TUC ON/OFF AIR	166	
3360436	80195	257	21	166	
3360437	80195	257	NOT SHOWN	166	
3360438	80195	257	NOT SHOWN	166	
3360439	80195	257	NOT SHOWN	166	
3360466	80195	262	18	174	
3360474	80195	254	15	162	
3360474	80195	273	15	188	
3360477	80195	259	INSTL	169	
3360508	80195	257	27	166	
3360550	80195	262	9	174	
3360552	80195	262	13	174	
3360553	80195	262	3	174	
3360554	80195	262	10	174	
3360556	80195	262	12	174	
3360558	80195	262	30	174	
3360559	80195	262	5	174	
3360561	80195	262	11	174	
3360564	80195	262	2	174	
3360566	80195	259	5 AS SHOWN	169	
3360573	80195	262	16	174	
3360574	80195	262	17	174	
3360588	80195	264	23	176	
3360594	80195	257	1	166	
3360623	80195	258	8	166	
3360624	80195	258	9	166	
3360632	80195	261	36	172	
3360648	80195	257	12	166	
3360654	80195	258	10	166	
3360656	80195	257	2	166	
3360656	80195	258	6	166	
3360563	80195	262	BAR TURNED ASSY	174	
3360567	80195	259	4 AS SHOWN	169	
3360569	80195	259	4 CTR BOX	169	
3360570	80195	259	5 CTR BOX	169	
3360671	80195	274	9	190	
3360672	80195	274	7	190	
3360673	80195	274	6	190	
3370048	80195	267	7	180	
3370048	80195	278	7	196	
3380017	80195	270	1	184	
3380022	80195	270	4	184	
3380024	80195	270	2	184	
3380042	80195	250	39	156	
3380056	80195	254	23	162	

INDEX (Continued)

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
6000295	80195	252	25	158	
6000303	80195	245	6	151	
6000367	80195	241	38	144	
6000374	80195	263	8	175	
6000374	80195	276	7	193	
6000376	80195	253	98	160	5120-01-090-7923
6000379	80195	250	50	156	
6000398	80195	250	21	156	
6000403	80195	241	40	144	
6000409	80195	244	23	150	
6000416	80195	250	45	156	
6000423	80195	253	44	160	
6000443	80195	243	9	148	
6000465	80195	252	34	158	
6000466	80195	251	18	157	
6000468	80195	251	19	157	
6000487	80195	243	3	148	
6000571	80195	253	21	160	
6000571	80195	254	40	162	
6000571	80195	273	40	188	
6000573	80195	251	1	157	
6000685	80195	266	4	178	
6000697	80195	253	17	160	
6100015	80195	253	7	160	
6100068	80195	254	20	162	
6100068	80195	261	34	172	
6100068	80195	273	20	188	
6100068	80195	274	16	190	
6100068	80195	241	66	144	
6100069	80195	251	27	157	
6100070	80195	241	52	144	
6100090	80195	252	35	158	
6100091	80195	253	87	160	
6100121	80195	253	111	160	
6100235	80195	269	3	’182	
6100247	80195	254	30	162	
6100247	80195	273	30	188	
6200036	80195	242	37	146	
6200047	80195	246	15	152	
6200047	80195	275	27	192	
6200106	80195	250	8	156	
6200172	80195	256	6	165	
6200174	80195	256	17	165	
6200174	80195	259	22	169	
6200179	80195	259	24	169	
6200204	80195	246	19	152	
6200204	80195	275	23	192	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
6309094	80195	275	31	192	
6425001	80195	264	17	176	
6420035	80195	261	29	172	
6420035	80195	274	26	190	
6425009	80195	264	15	176	
6430081	80195	245	4	151	
6435039	80195	243	21	148	
6440018	80195	251	20	157	
6440021	80195	245	2	151	
6440024	80195	243	8	148	
6440025	80195	243	6	148	
6440026	80195	243	4	148	
6440031	80195	243	2	148	
6440033 1 1/4	80195	243	5	148	
6440033 1 1/8	80195	243	5	148	
6440035	80195	243	16	148	
6440040	80195	245	17	151	
6440043	80195	245	13	151	
6400047	80195	244	44	150	3040-01-060-7084
6440047	80195	245	22	151	
6440048	80195	245	21	151	
6400073	80195	244	43	150	
6440103	80195	245	16	151	
6450060	80195	261	38	172	2610-00-444-2116
6450060	80195	274	36	190	
6450095	80195	268	13	181	
6460009	80195	263	1	175	
6460011	80195	261	1	172	
6460011	80195	274	29	190	
6460014	80195	261	40	172	3895-00-406-7218
6460015	80195	263	11	175	
6460021	80195	261	39	172	
6460047	80195	274	30	190	6680-01-036-8513
6460060	80195	263	4	175	
6460060	80195	276	4	193	
6500034	80195	268	19	181	
6500039	80195	242	8	146	3895-00-136-5066
6500041	80195	246	36	152	
6500041	80195	275	2	192	
6500048	80195	248	30	154	5315-01-079-6367
6500051	80195	246	4	152	
6500051	80195	275	5	192	
6500053	80195	248	1	154	
6600136	80195	247	33	153	
6600137	80195	256	15	165	
6600137	80195	260	37	170	
6600140	80195	259	1	169	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
6600154	80195	247	34	153	
6600162	80195	256	10	165	
6600168	80195	256	12	165	6685-01-055-0828
6600194	80195	256	3	165	
6600194	80195	257	9	166	
6600194	80195	260	28	170	
6600194	80195	269	5	182	
6600196	80195	269	19	182	
6600197	80195	269	18		4810-00-160-6654
6600198	80195	246	23	152	
6600199	80195	269	15	182	
6600204	80195	246	2	152	
6600204	80195	275	18	192	
6600205	80195	246	13	152	
6600205	80195	275	13	192	
6600208	80195	250	9	156	
6600208	80195	252	50	158	
6600210	80195	252	48	158	
6600214	80195	242	35	146	4320-00-779-1766
6600215	80195	242	23	146	
6600222	80195	244	31	150	
6600223	80195	242	7	146	
6600224	80195	242	9	146	
6600225	80195	242	40	146	
6600231	80195	242	27	146	
6600236	80195	242	26	146	
6600237	80195	242	19	146	
6600246	80195	270	8	184	
6600258	80195	250	4	156	
6600259	80195	250	5	156	
6600273	80195	270	9	184	
6600290	80195	253	5	160	
6600293	80195	258	NOT SHOWN	166	
6600293	80195	259	6	169	
6600293	80195	260	26	170	
6600293	80195	262	8	174	
6600294	80195	257	34	166	
6600294	80195	259	21	169	
6600295	80195	258	NOT SHOWN	166	
6600295	80195	260	15	170	
6600295	80195	262	6	174	
6600296	80195	258	NOT SHOWN	166	
6600296	80195	260	5	170	
6600296	80195	262	7	174	
6600299	80195	256	7	165	
6600301	80195	258	1 INCL 7	166	
6600301	80195	260	6	170	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
6600301	80195	262	8	174	
6600304	80195	256	2	165	4810-01-026-6208
6600304	80195	260	27	170	
6600305	80195	258	5	166	
6600308	80195	251	3	157	
6600310	80195	251	23	157	
6600311	80195	251	26	157	
6600330	80195	263	6	175	
6600330	80195	276	5	193	
6600334	80195	240	5	143	
6600335	80195	264	21	176	
6600336	80195	264	12	176	
6600339	80195	252	9	158	
6600340	80195	252	23	158	
6600341	80195	250	53	156	
6600341	80195	252	74	158	
6600538	80195	274	3	190	
6600803	80195	257	6	166	
6600840	80195	257	11	166	
6600841	80195	257	25	166	
6600841	80195	262	26	174	
6600842	80195	257	37	166	
6600842	80195	259	16	169	
6600843	80195	260	11	170	
6600845	80195	274	14	190	
6700015	80195	260	18	170	
6700016	80195	266	3	178	
6700031	80195	267	6	180	
6700032	80195	267	6	180	
6700032	80195	278	6	196	
6700033	80195	266	3	178	
6700034	80195	266	3	178	
6700035	80195	266	3	178	
6700035	80195	267	6	180	
6700035	80195	278	6	196	
6700040	80195	267	5	180	
6700040	80195	278	5	196	
6700041	80195	267	5	180	
6700041	80195	278	5	196	
6700072	80195	242	19-NOT SHOWN	146	
6700128	80195	260	22	170	
6700129	80195	260	21	170	
6700153	80195	260	23	170	
6700161	80195	259	30	169	
6700162	80195	262	19	174	5930-00-108-5387
6700164	80195	259	34	169	
6700164	80195	262	22	174	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
6700255	80195	260	24	170	
6700310	80195	257	20	166	
6700316	80195	267	6	180	
6700316	80195	278	6	196	
6700363	80195	260	8	170	
6700366	80195	257	4	166	
6700366	80195	260	40	170	
6700390	80195	266	8	178	
6700390	80195	277	8	194	
6700391	80195	266	10	178	
6700391	80195	277	10	194	
6700450	80195	266	8	178	
6700450	80195	266	10	178	
6700450	80195	277	8	194	
6700450	80195	277	10	194	
6700477	80195	257	18	166	
6700477	80195	260	39	170	
6700854	80195	277	3	194	
6700855	80195	278	6	196	
7010028	80195	242	49 NOT SHOWN	146	
7010031	80195	242	49 NOT SHOWN	146	
7010032	80195	242	49 NOT SHOWN	146	
7030016	80195	247	10	153	
7030017	80195	247	11	153	
7030018	80195	247	12	153	
7030019	80195	247	14	153	
7030020	80195	247	17	153	
7030021	80195	247	24	153	
7030023	80195	247	4	153	
7030024	80195	247	20	153	
7030025	80195	247	19	153	
7030026	80195	247	22	153	
7030027	80195	247	30	153	
7030028	80195	247	15	153	
7030029	80195	247	29	153	
7030030	80195	247	5	153	
7030031	80195	247	21	153	
7030032	80195	247	3	153	
7030033	80195	247	2	153	
7030034	80195	247	23	153	
7030035	80195	247	26	153	
7030036	80195	247	27	153	
7030037	80195	247	8	153	
7030038	80195	247	13	153	
7030039	80195	247	18	153	
7030040	80195	247	16	153	
7030041	80195	247	6	153	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
7030042	80195	247	25	153	
7030043	80195	247	7	153	
7030045	80195	247	28	153	
7070044	80195	247	9	153	
7220028	80195	270	12	184	
7230079	80195	250	38	156	
7230112	80195	253	29	160	
7230115	80195	253	19-LEFT	160	
7230116	80195	253	19-RIGHT	160	
7230118	80195	253	104	160	
7230124	80195	253	11	160	
7230125	80195	253	12	160	
7230126	80195	253	13	160	
7230127	80195	253	NOT SHOWN	160	
7420004	80195	242	42	146	
7420007	80195	242	43	146	
7420008	80195	242	46	146	
7420009	80195	242	47	146	
7420112	80195	242	NOT SHOWN	146	
7420016	80195	258	NOT SHOWN	166	
7420016	80195	260	38	170	
7420042	80195	242	39	146	
7420046	80195	242	44	146	
7420076	80195	242	45	146	
7420077	80195	260	36	170	
12-VOLT					
7420078	80195	260	36	170	
			6-VOLT		
7420136	80195	242	41	146	
7420145	80195	274	43	190	
7430064	80195	246	28	152	
7430064	80195	275	40	192	
7430065	80195	246	25	152	
7430065	80195	275	41	192	
7500006	80195	266	8	178	
7500006	80195	277	8	194	
7500007	80195	266	8	178	
7500007	80195	266	10	178	
7500007	80195	277	8	194	
7500007	80195	277	10	194	
7500008	80195	266	8	178	
7500008	80195	266	10	178	
7500008	80195	277	8	194	
7500008	80195	277	10	194	
7700024	80195	248	5	154	
7700025	80195	248	6	154	
7700026	80195	248	13	154	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
7700027	80195	248	11	154	
7700028	80195	248	14	154	
7700030	80195	248	8	154	
7700032	80195	248	15	154	
7700034	80195	248	12	154	
7700035	80195	248	10	154	
7700037	80195	246	6	152	
7700037	80195	275	6	192	
7700038	80195	246	10	152	
7700038	80195	275	10	192	
7700039	80195	246	9	152	
7700039	80195	275	9	192	
7700040	80195	246	8	152	
7700040	80195	275	8	192	
7700041	80195	246	38	152	
7700042	80195	246	13 NOT SHOWN	152	
7700042	80195	275	13 NOT SHOWN	192	
7700046	80195	248	2	154	
7700047	80195	248	27	154	
7700048	80195	248	26	154	
7700050	80195	248	1 NOT SHOWN	154	
7700056	80195	248	21	154	
7700057	80195	248	22	154	
7700058	80195	248	23	154	
7700060	80195	248	24	154	
7700062	80195	248	25	154	
			NOT SHOWN		
7700065	80195	248	3	154	
7700067	80195	246	11	152	
7700067	80195	275	11	192	
7700068	80195	246	7	152	
7700068	80195	275	7	192	
7700069	80195	246	39	152	
7700086	80195	248	1	154	
7700087	80195	248	7	154	
7700089	80195	248	17	154	
7700090	80195	248	18	154	
7700091	80195	248	19	154	
7700092	80195	248	20	154	
7700093	80195	248	28	154	
7850005	80195	261	39	172	
7850010	80195	261	41	172	
7850010	80195	274	33	190	
7850057	80195	263	7	175	
7850057	80195	276	6	193	
7850092	80195	276	10	193	
7850094	80195	276	1	193	

INDEX (Continued)

PART NO.	FSCM	FIG. NO.	ITEM NO.	PAGE NO.	NSN
7850095	80195	274	32	190	
8101501	80195	260	41	170	
8108008	80195	260	19	170	
8114014	80195	257	5	166	
892578	80195	NOT SHOWN			4320-00-217-5202 PUMP, HYD
9250004	80195	258	7	166	
9250052	80195	260	29	170	
9250128	80195	246	16	152	
9250128	80195	275	15	192	
9250129	80195	256	5	165	
9250129	80195	259	26	169	
9250129	80195	269	13	182	
9250204	80195	260	20	170	
9250205	80195	259	28	169	
9250205	80195	262	24	174	
9250208	80195	259	29	169	
9250210	80195	262	25	174	
9250211	80195	259	27	169	
9250213	80195	262	23	174	
9402828	80195	242	11	146	
9410977	80195	242	31	146	
9410979	80195	242	25	146	
9413946	80195	275	33	192	
9418936	80195	244	37	150	
9418936	80195	254	8	162	
9418936	80195	254	22	162	
9418936	80195	266	7	178	
9418936	80195	273	8	188	
9418936	80195	273	22	188	
9418936	80195	277	7	194	
9418981	80195	259	10	169	
9420867	80195	242	36	146	
9422787	80195	244	29	150	
9426128	80195	264	5	176	
9426132	80195	275	30	192	
9426196	80195	246	31	152	
3293 & 3293-10	80195	NOT SHOWN			3930-00-136-5066 FILTER ELEM
		237	68 W/ITEM 57	140	
		237	64 W/ITEM 67	140	
		237	72 W/ITEM 67	140	

APPENDIX A

GENERAL

MAINTENANCE FORMS AND RECORDS.

Department of the Army forms and procedures used for equipment maintenance shall be those prescribed by TM 38750, The Army Maintenance Management System (TAMMS).

DESTRUCTION TO PREVENT ENEMY USE

Refer to TM 750-244-3

ADMINISTRATIVE STORAGE

Refer to TM-90-1.

APPENDIX B

MAINTENANCE ALLOCATION CHART FOR DISTRIBUTOR, BITUMINOUS MATERIAL, TRUCK MOUNTED 1500 GALLON (CCE)

Section I. INTRODUCTION

1. General: This Maintenance Allocation Chart designates responsibility for performance of maintenance repair functions at specified maintenance levels.

a. Section I is a general explanation and definition of terms.

b. Section II shows the maintenance level responsible and estimated work measurement time for specific functions.

c. Section III lists common tool sets and the special tools, test and support equipment required for each maintenance function shown in Section II.

2. Explanation of Columns in Section II:

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, Component/Assembly: Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance Is authorized.

c. Column 3, Maintenance Functions: Column 3 lists the functions to be performed on the Item listed in Column 2

d. Column 4, Maintenance Category Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. The number of man-hours specified by the "work time" figure represents the average time required to restore an Item to a serviceable condition under typical field operating conditions This time includes preparation time, troubleshooting time, and quality assurance/quality control time In addition to the time required to perform the specific tasks identified for the maintenance functions authorized In the maintenance allocation chart. The subcolumns are.

C - Operator/Crew
O - Organizational
F - Direct Support
H - General Support
D - Depot

e. Column 5, Tools and Equipment: Column 5 specifies by code, those common tool sets (not Individual tools) and special tools, test, and support equipment required to perform the designated function

3. The maintenance functions are defined as follows:

a. Inspect. To determine the serviceability of an Item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination

b. Test: To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards

c. Service. Operations required periodically to keep an Item In proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies

d. Adjust: To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align: To adjust specified variable elements of an Item to bring about optimum or desired performance

f. Calibrate: To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install: The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace: The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart I. Repair The application of maintenance services (inspect, test, service, adjust, align, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (components or assembly, end item, or system.

j. Overhaul: That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e. DMWR) in appropriate technical publications Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild: Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards Rebuild Is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/ miles, etc) considered in classifying Army equipments/components.

MAINTENANCE ALLOCATION CHART
FOR
DISTRIBUTOR, BITUMINOUS MATERIAL, TRUCK MOUNTED
1500 GALLON (CCE)

SECTION II. ASSIGNMENT OF MAINTENANCE FUNCTIONS

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQUIPMENT
06	ELECTRICAL SYSTEM							
0608	Toggle Switches	Replace		0.5				
	Solenoid Valves	Replace		1.0				
		Repair			1.0			
0609	Lights and Directional Signals	Replace		0.5				
		Repair		0.5				
0610	Sending Units	Replace		0.5				
0613	Chassis Wiring Harness	Replace		1.5				
		Repair		1.0				
15	FRAME AND ATTACHMENTS							
1501	Loom Bumper Assembly	Replace		1.5				
		Repair			1.5			
	Subframe, Spray Bar	Replace			2.0			
		Repair			2.0			
18	BODY							
1802	Fenders and Platforms	Replace		2.0				
		Repair			2.0			
1808	Tool Box	Replace		1.0				
		Repair			1.5			
22	ACCESSORY ITEMS							
2202	Bell Assembly	Replace		0.5				
		Repair		0.5				
	Hand Spray Gun	Service	0.5					
		Replace		0.5				
		Repair		0.5				
	Asphalt Hose and Connector	Inspect	0.2					
		Replace		0.5				
		Repair		0 5				
2210	Data Plates	Replace			1.0			
24	HYDRAULIC SYSTEM							
2401	Hydraulic Pump Drive Line	Replace		1.0				
		Repair			1.0			
	Hydraulic Pump	Replace			1.5			
		Repair			2.0			
		Overhaul				4.0		

MAINTENANCE ALLOCATION CHART
FOR
DISTRIBUTOR, BITUMINOUS MATERIAL, TRUCK MOUNTED
1500 GALLON (CCE)

SECTION II. ASSIGNMENT OF MAINTENANCE FUNCTIONS

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQUIPMENT
	Hydraulic Motor	Replace			1.5			
		Repair			2.0			
		Overhaul				4.0		
2403	Hydraulic Controls	Service		0.5				
		Adjust		1.0				
		Replace			2.0			
		Repair			2.0			
2406	Hydraulic Filter Assy	Service		0.3				
		Replace			1.0			
		Repair			1.0			
	Hydraulic Filter Element	Replace		0.4				
	Hydraulic Lines/Fittings	Replace			1.0			
		Repair			1.0			
2408	Hydraulic Tank	Service		0.5				
		Replace			1.5			
		Repair			1.5			
43	AIR SYSTEM							
4316	Air Lines/Fittings	Replace		1.5				
		Repair		1.0				
4317	Air Control Box Assy	Replace			1.5			
		Repair			1.0			
4318	Air Cylinders, Spray Bar	Service		0.5				
		Replace			1.5			
		Repair			1.0			
	Air Cylinder, Bitumeter	Service		0.5				
		Replace			1.5			
		Repair			1.0			
4321	Air Control Reservoir	Service		0.1				
		Replace			1.0			
47	GAGES AND MEASURING DEVICES							
4701	Tachometer, Asphalt Pump	Replace			1.0			
	Tachometer Drive	Replace			1.5			
	Ground Speed Indicator	Replace			1.0			
	Ground Speed Indicator Drive	Replace			1.5			
4702	Hydraulic/Air System Gages	Replace			1.0			
	Tank Gage, Liquid	Replace			1.0			1
		Repair			1.0			
4704	Bitumeter	Replace			1.0			
	Bitumeter, Shaft Assy	Replace			1.0			

MAINTENANCE ALLOCATION CHART
FOR
DISTRIBUTOR, BITUMINOUS MATERIAL, TRUCK MOUNTED
1500 GALLON (CCE)

SECTION II. ASSIGNMENT OF MAINTENANCE FUNCTIONS

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQUIPMENT
	Bitumeter, Fifth Wheel	Service		0.4				
		Replace		1.0				
		Repair		1.0				
55	PUMPS							
5500	Asphalt Pump	Replace			1.5			
		Repair				3.0		
5501	Impellers, Shafts, Bearings	Replace			3.0			
	Packing	Replace			2.0			
5507	Pump, Universal Drive	Service		0.5				
		Replace		1.5				
		Repair			2 0			
60	BURNERS							
6004	Burner Fuel Pump	Service		0.5				
		Replace		1.0				
		Repair			2.0			
		Overhaul				4.0		
6005	Burner Assembly	Service		0.5				
		Replace		0.5				
		Repair			1.0			
	Valves, Air Nozzle and Injector	Service	0.5					
		Replace		1.0				
		Repair			1.5			
	Portable Burner	Inspect		0.3				
		Service		0.5				
		Repair		1.0				
6007	Burner Fuel Tank	Service	0.5					
		Replace		1.0				
		Repair			1.5			
	Fuel Tank Relief Valve and Strainer	Replace		0.5				
	Fuel Tank Lines and Fittings	Replace		1.0				
		Repair		1.0				
6008	Blower Assembly	Replace		1.5				
		Repair			1.5			
		Overhaul				3.0		
	Blower Drive Clutch/Pulley	Service		0.5				
		Replace		1.5				
		Repair		2.0				

MAINTENANCE ALLOCATION CHART
FOR
DISTRIBUTOR, BITUMINOUS MATERIAL, TRUCK MOUNTED
1500 GALLON (CCE)

SECTION II. ASSIGNMENT OF MAINTENANCE FUNCTIONS

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQUIPMENT
	Blower Drive Belt	Adjust		0.3				
		Replace		0.5				
	Blower Air Cleaner	Service		0.5				
6010	Smoke Stacks	Service	0.5					
		Replace		1.0				
		Repair			1.5			
6011	Combustion Chamber	Replace		2.0				
		Repair			1.5			
	Combustion Block	Replace		1.0				
		Repair			1.0			
73	ASPHALT EQUIPMENT							
7317	Spray Bar	Inspect	0.5					
		Service		0.5				
		Adjust		1.0				
		Replace		2.0				
		Repair			3.0			
	Quadrant Assembly	Service		0.5				
		Replace		1.0				
		Repair		1.5				
	Control Valves	Replace		1.0				
7318	Tank	Inspect	0.3					
		Service	1.0					
		Repair			2 0			
	Valves, Transfer/Filling	Replace		1.5				
	Valves, Intake/Dual Control	Replace		1.5				
	Lines/Fittings and Strainers	Service	1.0					2
		Replace		1.5				
		Repair		1.5				

MAINTENANCE ALLOCATION CHART
FOR
DISTRIBUTOR, BITUMINOUS MATERIAL, TRUCK MOUNTED
1500 GALLON (CCE)

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
		NOTE: The following special tools are overpacked with the end item They are Illustrated in the parts manual (D60). All other maintenance functions can be performed with the tools and test equipment currently available to using and support units		
1	F	Wrench, Socket	5120-01-090-7655	3380080 (81095)
2	C, O, F	Wrench, Nozzle	5120-01090-7923	6000376 (81095)
2	C, O, F	Pin Assembly	5120-01-090-7656	3380090 (80195)
2	C, O, F	Wrench, Union, 2inch	5120-01-090-7921	3380079 (80195)
2	C, O, F	Wrench, Spanner Ball Joint Assy	5120-01-090-7735	3380081 (80195)
2	C, O, F	Wrench, Union 1 1/2 inch	5120-01-090-7922	3380092 (80195)
2	C, O, F	Hook, Strainer	5120-00425-6920	3390030 (80195)

APPENDIX C

BASIC ISSUE ITEMS LIST (CCE)

NOMENCLATURE:
MANUFACTURER:
SERIAL NUMBER RANGE :

DATE

(1) MFR PART NO.	(2) MFR FED CODE	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QUANTITY FURNISHED W/EQUIP
		None for the Distributor See TM 9-2320-260-10 for Chassis.		

APPENDIX C (CONT)

DISTRIBUTOR, BITUMINOUS MATERIAL, TRUCK MOUNTED 1500 GALLON (CCE)

ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) SMR CODE	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION REF NO. & MFG CODE / USABLE ON CODE	(4) UNIT OF MEAS	(5) QUANTITY AUTHOR.
		NOTE: The following are overpacked with the end item		
PFOZZ		Lighter, Burner 333077 (80195)	ea	1
PFOZZ		Needle, Portable, Burner 6500048 (80195)	ea	1
PFOZZ		Hook, Strainer 33390030 (80195)	ea	1
PFOZZ		Wrench 3330030 (80195)	ea	1
PFOZZ		Wrench, Union Nut 3380079 (80195)	ea	1
PFOZZ		Wrench, Union 3380092 (80195)	ea	1
PFOZZ		Wrench, Nozzle 6000376 (80195)	ea	1
PFOZZ		Wrench, Spanner 3380081 (80195)	ea	1
PFOZZ		Pin 3380080 (80195)	ea	1
PFOZZ		Stick, Measuring Dial No. 1607 3390434 (80195)	ea	1
PFOZZ		Can, 3 quart washout 3390002 (80195)	ea	1
		C2		

APPENDIX C (CONT)

DISTRIBUTOR, BITUMINOUS MATERIAL, TRUCK MOUNTED 1500 GALLON (CCE)

ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) SMR CODE	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION REF NO. & MFG CODE / USABLE ON CODE	(4) UNIT OF MEAS	(5) QUANTITY AUTHOR.
		NOTE: The following are overpacked with the end item		
XBOZZ		Lighter, Burner 333077 (80195)	ea	1
PFOZZ	5315-01-079-6367	Needle, Portable, Burner 6500048 (80195)	ea	1
PFOZZ	5120-00425-6920	Hook, Strainer 3390030 (80195)	ea	1
PFOZZ	512001-090-7734	Wrench 3330030 (80195)	ea	1
PFOZZ	5120-01-090-7921	Wrench, Union Nut 3380079 (80195)	ea	1
PFOZZ	5120-01-090-7922	Wrench, Union 3380092 (80195)	ea	1
PFOZZ	5120-01-090-7923	Wrench, Nozzle 6000376 (80195)	ea	1
PFOZZ	5120-01-090-7735	Wrench, Spanner 3380081 (80195)	ea	1
PFOZZ	5120-01-090-7656	Pin 3380090 (80195)	ea	1
XBOZZ		Stick, Measuring Dial No. 1607 3390434 (80195)	ea	1
XBOZZ		Can, 3 quart washout 3390002 (80195)	ea	1

APPENDIX D
PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Maintenance Forms and Records

Every mission begins and ends with the paperwork. There isn't much of it, but you have to keep it up The forms and records you fill out have several uses:

1. They are a permanent record of the services, repairs, and modifications made on your equipment.

2. They are reports to organizational maintenance and to your commander

3. They are a checklist for you when you want to know what is wrong with the equipment after Its last use, and whether those faults have been fixed. For the information you need on forms and records, see TM 38-750.

Preventive Maintenance Checks and Services

When you do your PREVENTIVE MAINTENANCE, take along the tools you need to make all the checks, including a rag or two

WARNING

Dry cleaning solvent SD-2, used to clean parts, is potentially dangerous to personnel and property. Do not use near open flame or excessive heat Flash point of the solvent is 138°F.

1. Keep It clean: Dirt, grease, oil and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry-cleaning solvent (SD-2) to clean metal surfaces Use soap and water when you clean rubber or plastic material

2. Bolts, nuts and screws: Check them all for obvious looseness, missing, bent, or broken condition You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around bolt heads If you find one you think is loose, tighten it or report It to organizational maintenance.

3. Welds Look for loose or chipped paint, rust, or gaps where parts are welded together If you find a bad weld, report It to organizational maintenance

4. Electric wires and connectors: Look for cracked or broken insulation (bare wires) and loose or broken connectors Tighten loose connectors and make sure the wires are in good shape.

5. Hoses and fluid lines: Look for wear, damage and leaks. Make sure clamps and fittings are tight. Wet spots Indicate leaks Also, a stain around a fitting or connector could mean a leak. If a leak comes from a loose fitting or connector, tighten It If something is broken or worn out, report it to organizational maintenance It is necessary for you to know how fluid leakage affects the status of your equipment The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment Learn, then be familiar with them and REMEMBER WHEN IN DOUBT, NOTIFY YOUR SUPERVISORI

Leakage Definitions

CLASS I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops
CLASS II	Leakage of fluid great enough to form drops but not enough to cause drops to drip from Item being checked/inspected
CLASS III	Leakage of fluid great enough to form drops that fall from the item being checked/inspected

CAUTION

Equipment operation is allowable with minor leakage (Class I or II). However, consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor. When operating with Class r or II leaks, continue to check fluid levels as required in your PMCS. Class III leaks should be reported to your supervisor or to organizational maintenance.

Operator/Crew Preventive Maintenance Checks and Services

1. Do your (B) PREVENTIVE MAINTENANCE just before you operate the equipment. Pay attention to the CAUTIONS and WARNINGS.

2. Do your (D) PREVENTIVE MAINTENANCE during operation (During operation means to monitor the equipment while It Is actually being used).

3. Do your (A) PREVENTIVE MAINTENANCE right after operating the equipment. Pay attention to the CAUTIONS and WARNINGS.

4. Do your (W) PREVENTIVE MAINTENANCE weekly.

5. Do your (M) PREVENTIVE MAINTENANCE once a month.

6. If something doesn't work, troubleshoot It with the Instructions in your manual or notify your supervisor

7. Always do your PREVENTIVE MAINTENANCE in the same order, so It gets to be a habit Once you've had some practice, you'll spot anything wrong In a hurry.

8. If anything looks wrong and you can't fix It, write It on your DA Form 2404. If you find something seriously wrong, report It to organizational maintenance RIGHT NOW.

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE:CHECK FOR AND HAVE REPAIRED, FILLED OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/ AVAILABLE IF:
						NOTE: 1. Perform weekly as well as before PMCSs if: a. You are the assigned operator, but have not operated the equipment since the last weekly. b. You are operating the equipment for the first time. 2. Refer to TM 9-2320-260-10 to perform PMCSs on your truck chassis. **WARNING:** Operation while wet may cause the asphalt to boil and create a potential fire hazard **CAUTION:** Allow sufficient space in tank for expansion of material when heating. **CAUTION:** Remain clear of rotating drives when unit is in operation to prevent becoming entangled in machine.	

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE:CHECK FOR AND HAVE REPAIRED, FILLED OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/ AVAILABLE IF:
						Fire Extinguisher	
1		X				Check for missing or broken seal, low charge	Missing, seal broken, indicator in recharge range.
						Electrical System	
2				X		Visually inspect wiring and connectors for damage or fraying.	
						Distributor Body (General)	
3	X					Visually check interior of tank for moisture If present perform moisture removal operation (Page 9, 10, 21 and 22).	
4	X					Visually inspect material storage tank and sub-frame for obvious damage or broken welds.	Cracked or broken welds
5					X	Check all mounting tie-downs and fasteners.	
6	X					Check for evidence of leakage (fuel, oil bitumen and hydraulic fluid) on or under vehicle.	Class III leak or evidence of fuel leaks.
7					X	Visually inspect manhole strainer If It's clogged, clean It	
8	X					Check tank gage (low material).	

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL					ITEM TO BE INSPECTED PROCEDURE:CHECK FOR AND HAVE REPAIRED, FILLED OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A	W	M		
						Burner System	
14	X					Check burner fuel lines for evidence of leaks.	Class I, II or III leak.
15	X					Check blower drive belt.	Cracked, missing
16		X				Check air pressure gage for 10 to 15 PSI.	Indicator is inoperative or gage does not show pressure
17		X				Check fuel pressure gage for 10 to 15 PSI.	Indicator is inoperative or gage does not show pressure.
18				X		Check blower air cleaner. If dirty, clean it (Page 65).	
19				X		Check burner valve strainer. If dirty, clean it. (Page 57).	
						Portable Burner	
20	X					Check burner tank and lines for evidence of leaking and proper operation	Class I, II or III leak.
21		X				Check burner gage for operation pressure of 45 PSI.	
						Bitumeter Wheel Assembly	
22	X					Check Bitumeter wheel for secure mounting and proper operation.	
23		X				Check air line for leaking.	
24		X				Check recording Bitumeter for predetermined rate Inoperative.	

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE:CHECK FOR AND HAVE REPAIRED, FILLED OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/ AVAILABLE IF:
						WARNING: When heating material, exposed flues may cause an explosion or damage flues	
						a. When using lower flue to heat material, tank gage should show a minimum of 525 gallons or flue covered by at least 6 inches the full length of tank.	
						b. When using upper flue to heat material, tank gage should show a minimum of 825 gallons or flue covered by at least 6 inches the full length of tank	
9				X		Check discharge and inlet strainers. If clogged, clean and reinstall strainers (Page 10).	
						Hydraulic System	
10	X					Check hydraulic tank and lines for proper fluid level and/or leaks If low, fill to level line.	Class III leak.
11	X					Check hydraulic pump and controls for proper operation	Inoperative
12		X				Check that hydraulic filter suction is not in the red zone.	Indicator in red zone or in-operative
13		X				Hydraulic oil high temperature warning Indicator in cab comes on or tank gage reaches a temperature above 180°F.	

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE:CHECK FOR AND HAVE REPAIRED, FILLED OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/ AVAILABLE IF:
						WARNING	
						If moisture is present in system, do not heat material over 2000F.	
						CAUTION	
						Use gloves or insulated material when handling spray bar, sections or hoses to prevent burns.	
						Spray Bar	
25		X				Check that spray bar positions itself whenever control switches are activated.	Inoperative.
26		X				Check that spray bar is at correct height above road bed (12 Inches).	
27			X			Clean and flush pump, spray bar and circulating system with flushing oil	

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-QUARTERLY S-SEMIANNUALLY A-ANNUALLY B-BIENNIALLY H-HOURS MI-MILES

ITEM NO	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED PERFORM ALL OPERATOR PMCS FIRST
	Q	S	A	B	H	MI	
							Electrical System
1		X					Check wiring harness for corrosion and bare wires Replace defective wiring (Page 49).
2	X						Check all lights for proper operation Replace defective lamps and lights
							Distributor Body
3	X						Check material storage tank, sub-frame, tie-down, tool box and fasteners for obvious damage, weld breaks, missing items. Repair or notify DS Maintenance IAW MAC.
4	X						Check that manhole cover seals properly Repair as needed. (Page 143).
5		X					Check overflow pipe. Clean any material build up from pipe
6	X						Check accessory items, bell, hand spray gun, asphalt hose and connector. Repair as needed.
							Hydraulic System and Asphalt Controls
7		X					Check all hydraulic lines and fittings If damaged, replace.
8	X						Check and service all control linkage If damaged, replace
							Burner Fuel Systems
9		X					Check fuel lines and fittings If damaged, replace.
10			X				Check burner fuel tank holding straps If damaged, repair or replace.
11			X				Dram and clean burner fuel tank

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-QUARTERLY S-SEMIANNUALLY A-ANNUALLY B-BIENNIALLY H-HOURS MI-MILES

ITEM NO	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED PERFORM ALL OPERATOR PMCS FIRST
	Q	S	A	B	H	MI	
12	X						Check and clean burner valve strainer (2 each) (Page 57).
13	X						Check and clean pump supply line strainer. (Page 50).
14	X						Check heater burners and flues for insecure mounting. Repair as needed.
15		X					Check burner assembly air hose for leaks. Replace if damaged.
16	X						Check and service portable burner vaporizing coil and jet. If damaged, replace.
17		X					Check smoke stack cover spring for damage and check operation Replace spring if necessary.
							Bitumeter Wheel Assembly
18		X					Check air lines and fittings. If damaged, replace.
19	X						Check power line and ground on solenoid for corrosion and bare wires Replace defective wires.
20	X						Check that Bitumeter wheel positions itself when activated. Adjust or repair as needed (Page 173 and 191).
							Blower Drive Assembly
21	X						Check blower/hydraulic drive shaft and u-joint. If damaged, replace.
22	X						Check blower drive belt. If damaged, replace. Adjust belt for 1/2 inch deflection midway between pulleys.

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Q-QUARTERLY S-SEMIANNUALLY A-ANNUALLY B-BIENNIALLY H-HOURS MI-MILES

ITEM NO	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED PERFORM ALL OPERATOR PMCS FIRST
	Q	S	A	B	H	MI	
							Spray Bar Assembly
23	X						Check that spray bar positions itself whenever control is activated. Adjust as needed. (Page 27)
24		X					Check safety chains. Replace as necessary.
25	X						Check relation of quadrant lever position with nozzle position Adjust linkage as needed
26		X					Check spray bar linkages, bars, toggles, fulcrum lever, nozzles and swivel bearing. If damaged, replace.
							Air Control, Cables and Cylinders
27			X				Inspect air control box assembly for corrosion, air leaks, bare wires. Repair bare wires and air leaks. Report control box malfunction to DS Maintenance.
28		X					Inspect cylinders If damaged, report to DS Maintenance
29			X				Check recording Bitumeter cable operation and service it
30			X				Check pump tachometer cable operation and service it
31	X						Check fire extinguisher for broken seal, low charge and proper mounting. If damaged or low charge replace
							General Lubrication
32	X						Quarterly perform all daily and monthly service as stated in TM 5-3895-356-14&P.

APPENDIX E

MAINTENANCE AND OPERATING SUPPLY LIST (CCE)

NOMENCLATURE: DISTRIBUTOR, BITUMINOUS MATERIAL, TRUCK MOUNTED, 1500 GAL (CCE) LESS CARRIER	MAKE: ETNYE	MODEL: D60

MFR PART NO:	NSN: 3895-00-090-0434	SERIAL NO. RANGE: All Serial Numbers	DATE:

(1) COMPONENT APPLICATION	(2) MFR PART NO. OR NAT'L STOCK NO.	(3) DESCRIPTION	(4) QTY REQ F/INITIAL OPN	(5) QTY REQ F/8 HOURS OPN	(6) NOTES
Tachometer Cable	9150-00-209-8087	Lubricating Oil Graphite, 1 pint	See Note (1)	See Note (1)	(1) Refer to Lubricating Chart for application and replenishment intervals.
Bitumeter	9150-00-209-8087	Lubricating Oil, Graphite, 1 pint	See Note (1)	See Note (1)	
Blower Oil Bath Air Cleaner	9150-00-2566411	Lubricating Oil, 5 gal, DE/HDD	See Note (1)	See Note (1)	
Blower Gear Case	9150-00-246-7923	Lubricating Oil, 5 gal, DE/HDD	7 oz.	See Note (1)	
Hydraulic Reservoir is not	9150-00-574959	Hydraulic, Transmission Fluid Type A, Suffix A, 5 gal HTF, (See Note (2))	20 gal.	See Note (1)	(2) OE/HD010 conforming to MIL-L-2104 may be used if HTF Type A, Suffix A available
Pump Coupling	9150-00-935-7127	Grease # 2 Molub Alloy grease, 1 lb. can	See Note (1)	See Note (1)	

APPENDIX F

PRESCRIBED LOAD LIST (PLL)

END ITEM: Distributor, Bituminous Material, Truck Mounted, 1500 Gal (CCE) **MAKE:** Etnyra **MODEL:** D-60

MFR PART NO: N/A **NSN:** 3895-00-090-0434 **SERIAL NUMBERE RANGE:** J4401 And Up **DATE:** Aug 76

SMR CODE	NATIONAL STOCK NUMBER	PART NUMBER	FSCM	PART DESCRIPTION	U/M	QTY OF PARTS REQ'D FOR NO. OF END ITEMS PLL 1-5	ASL 1-5	ASL 6-20	ASL 21-50
PAOZZ	3030-00-822-0611	MS51067-57 6435039	96906 80195	V-Belt, Blower Drive V-Belt, Blower Drive	ea	1			
PAOZZ	3895-00-248-4370	3351009	80195	Nozzle, Handspray Gun 5/16"	ea	5			
PAOZZ	3930-00-136-5066	3293 7420007	02249 80195	Element, Filter, Hyd Fluid Element, Filter, Hyd Fluid	ea	1			
PAOZZ	2940-00-358-4636	F140-07 6600154	00736 80195	Element, Blower Air Cleaner ea 1 Element, Blower Air Cleaner					
PAOZZ	6240-00-019-0877	1251	24455	Lamp, Incandescent 24-V Clearance Light	ea	3			
PAOZZ	6240-00-877-3405	1662	08806	Lamp, Incandescent 28-V Stop and Tall Light	ea	2			

APPENDIX F

AUTHORIZED STOCKAGE LIST (ASL)

END ITEM: Distributor, Bituminous Material, Truck Mounted, 1500 Gal (CCE) **MAKE:** Etnyra **MODEL:** D-60

MFR PART NO: N/A **NSN:** 3895-00-090-0434 **SERIAL NUMBERE RANGE:** J4401 And Up **DATE:** Aug 76

SMR CODE	NATIONAL STOCK NUMBER	PART NUMBER	FSCM	PART DESCRIPTION	U/M	QTY OF PARTS REQ'D FOR NO. OF END ITEMS PLL 1-5	ASL 1-5	ASL 6-20	ASL 21-50
PAOZZ	3895-00-228-1216	FG4-40 7700065	27695 80195	Hose Assembly, Burner Hose Assembly,, Burner	ea		2	2	3
PAOZZ	3895-00-248-4370	3351009	80195	Nozzle, Handspray Gun 5/t6"	ea		8	10	10
PAOZZ	4820-00-836-1598	277147 6600304	06853 80195	Valve, Pressure Regulator Valve, Pressure Regulator	ea		2	2	2
PAOZZ	4820-00-740-8795	N1178A 6600299	06721 80195	Valve, Safety, Air Reservoir Valve, Safety, Air Reservoir	ea		1	T	1
PAOZZ	3930-00-136-5066	3293 7420007	02249 80195	Element, Filter, Hyd Fluid Element, Filter, Hyd Fluid	ea		3	3	4
PAOZZ	4720-00-125-4763	12J4401	80195	Hose, Air Insulated, 18" lg, 2" dia.	ea		1	1	1
PAOZZ	4530-00-160-5729	3330077	80195	Lighter, Burner	ea		2	2	3
PAOZZ	2940-00-358-4636	F140-07 6600154i	00736 80195	Element, Blower Air Cleaner Element, Blower Air Cleaner	ea		1	2	3
PAOZZ	2590-00-125-5456	NC256 6600293	06721 80195	Boot, Air Cylinder Boot, Air Cylinder	ea		2	2	3
PAOZZ	5930-00-108-5387	6700162	80195	Switch, Spagy Bar Turn up	ea		1	1	2
PAOZZ	2630-00-585-5921	2078A 6450060	78394 80195	Tire, Bitumeter Assy (Solid Rubber)	ea		1	1	2

APPENDIX F

AUTHORIZED STOCKAGE LIST (ASL)

END ITEM: Distributor, Bituminous Material, Truck Mounted, 1500 Gal (CCE) **MAKE:** Etnyra **MODEL:** D-60

MFR PART NO: N/A **NSN:** 3895-00-090-0434 **SERIAL NUMBERE RANGE:** J4401 And Up **DATE:** Aug 76

SMR CODE	NATIONAL STOCK NUMBER	PART NUMBER	FSCM	PART DESCRIPTION	U/M	QTY OF PARTS REQ'D FOR NO. OF END ITEMS PLL 1-5	ASL 1-5	ASL 6-20	ASL 21-50
PAOZZ	6220-00-421-4199	6700033	80195	Lamp Assembly, Marker	ea		1	2	3
PAOZZ	3895-00-160-3345	3390408	80195	Computator	ea		2	3	4
PAOZZ	3030-00-822-0611	MS51067-57 6435039	96906 80195	V-Belt, Blower Drive V-Belt, Blower Drive	ea		2	3	5
PAOZZ	2910-00-981-3204	40099-2 6600222	04638 80195	Bellows, Rubber Bellows, Rubber	ea		1	2	3
PAOZZ	3895-00-862-0367	6500039	80195	Thermometer, Hyd Tank	ea		1	1	2
PAOZZ	4720-00-125-5393	6600231	80195	Hose Assembly, Hyd, 13 ft	ea		1	1	2
PAOZZ	4720-00-125-5453	3320861	80195	Hose Assembly, Hyd, 2 ft	ea		1	1	2
PAOZZ	4720-00-441-5928	3320862	80195	Hose Assembly, Hyd, 3 ft	ea		1	1	2
PAOZZ	4720-00-144-4974	3320881	80195	Hose Assembly, Hyd, 16 ft	ea		1	1	2
PAOZZ	6685-00-574-7538	1876 7700046	27695 80195	Gauge, Pressure, Portable Burner Gauge, Pressure, Portable Burner	ea		2	2	3
PAOZZ	6240-00-019-0877	1251	24455	Lamp, Incandescent, 24 V Clearance Light	ea		4	6	8
PAOZZ	6240-00-877-3406	1662	08806	Lamp, Incandescent, 28 V	ea		4	6	8

INDEX

Page

A

B

C

INDEX

Page

D

E

INDEX

Page

F

G

H

I

INDEX

Page

L

M

INDEX

INDEX

Page

INDEX

Page

T

U

V

W

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

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

Distribution:

To be distributed in accordance with DA Form 12-25B, Operator's Maintenance requirements for Bituminous.

*U.S. GOVERNMENT PRINTING OFFICE: 1993 - 342-421/62539

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches

1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches

1 Kilometer = 1,000 Meters = 0.621 Miles

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches

1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet

1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches

1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces

1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

TEMPERATURE

5/9 (°F -32) = °C

212° Fahrenheit is equivalent to 100° Celsius

90° Fahrenheit is equivalent to 32.2° Celsius

32° Fahrenheit is equivalent to 0° Celsius

9/5 C° +32 = F°

WEIGHTS

1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces

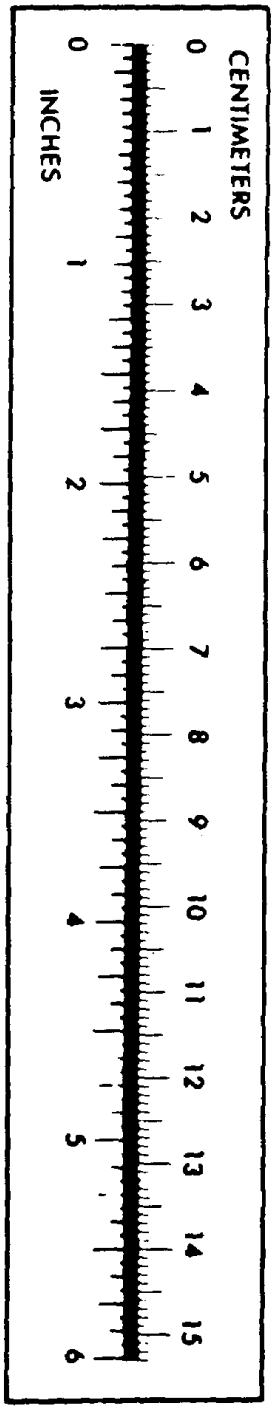
1 Kilogram = 1,000 Grams = 2.2 Lb.

1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds Per Square Inch	Kilopascals	6.895
Miles Per Gallon	Kilometers Per Liter	0.425
Miles Per Hour	Kilometers Per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds Per Square Inch	0.145
Kilometers Per Liter	Miles Per Gallon	2.354
Kilometers Per Hour	Miles Per Hour	0.621



PIN: 053138-000

This fine document...

Was brought to you by me:

Liberated Manuals -- free army and government manuals

Why do I do it? I am tired of sleazy CD-ROM sellers, who take publicly available information, slap “watermarks” and other junk on it, and sell it. Those masters of search engine manipulation make sure that their sites that sell free information, come up first in search engines. They did not create it... They did not even scan it... Why should they get your money? Why are not letting you give those free manuals to your friends?

I am setting this document FREE. This document was made by the US Government and is NOT protected by Copyright. Feel free to share, republish, sell and so on.

I am not asking you for donations, fees or handouts. If you can, please provide a link to liberatedmanuals.com, so that free manuals come up first in search engines:

<A HREF=http://www.liberatedmanuals.com/>Free Military and Government Manuals</A>

- Sincerely
  Igor Chudov
  http://igor.chudov.com/
- Chicago Machinery Movers