

MUSTANG

930
940
960

MUSTANG SKID STEER LOADER Includes E-Series

SERVICE MANUAL

PART #000-12909

REVISED JULY 1998

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MUSTANG®
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SPECIFICATIONS
930 GENERAL SPECIFICATIONS

UNIT DESCRIPTION

Model:	930 Mustang
Manufacturer:	MUSTANG MANUFACTURING COMPANY INC.

ENGINE SPECIFICATIONS

Make:	Yanmar Diesel
Model:	3TN82E
Displacement:	83 CID (1362 cc)
Max. HP (Mfg. rating):	35 (26.1 kw) @ 3600 RPM
HP @ Governed RPM:	28 HP (20.6 kw) @ 2800 RPM
Max. No-Load RPM	2800 RPM
Fuel Injection:	Direct
Number of Cylinders:	3
Bore and Stroke:	3.23 x 3.39 (82 x 86 mm)
Cooling Medium:	Liquid
Torque (ft. lbs.)	62.2 @ 2000 RPM (84 nm)
Electrical System:	12 Volt
Alternator:	35 Amp
Battery (Group Class):	31
(Cold crank rating):	625 Amps
Fuel Shut Off:	Manual
Air Cleaner:	Replaceable dry cartridge type with provision for dual element

FLUID CAPACITIES

Cooling System:	6.5 qts. (6.1 L)
Fuel Tank:	14.3 gal. (54 L)
Engine Oil:	5 qts. (4.7 L)
Oil spec.	SAE Class CC 15W-40
Chain Case:	8 gal. (30.28 L) (4 per side)
Oil spec.	ISO 32 or 68
Hydraulic System	14.5 gal. (54 L)
Oil spec.	ISO 32 or 68

HYDRAULIC SYSTEM

Pressure Relief:	2000 PSI (136 Bar)
Control Valve Make:	Victor Dukes
Spool Sections:	3 Spool
Pump Make:	Vickers
Pump Type:	Double Gear
Pump Output:	12 GPM (45 L/m)
Filters:	(1) screen - 100 mesh (1) 7 micron return (1) 7 micron charge inlet
Auxiliary Control:	Hand Lever

TRANSMISSION and FINAL DRIVES

Type:	Hydrostatic
Make:	Vickers
Model:	TA1919
System Relief Setting:	4500 PSI (310 Bar)
Charge Pressure Relief Setting:	180 PSI (12 Bar)
Drive Motors (type):	Geroller
Make:	Eaton
Model:	4000
Final Drive Chains	
Reduction from motors:	#60 HK
Reduction to axles:	#80 HK
Travel Speed:	0-4.1 MPH (6.56 km/h)
Steering:	T-Bar (Single Lever)
Turning Radius:	360 degrees in its own length
Axle Type:	Forged
Diameter:	2.4" (60.9 mm)
Axle Torque:	3860 ft. lbs. (5211 nm)

HYDRAULIC CYLINDERS

	LIFT	TILT
Number:	2	2
Cylinder Type:	Double Acting	Double Acting
Bore Diameter:	2.50" (63.5 mm)	3" (76.2 mm)
Rod Diameter:	1.50" (38.1 mm)	1.25" (31.8 mm)
Stroke:	28.38" (721 mm)	11.25 (286 mm)

OPERATING SPECIFICATIONS

Load Rating (SAE):	1100 lbs (500 kg)
Tipping Load (SAE):	2200 lbs. (1000 kg)
Breakout (Lift):	2700 lbs (1225 kg)
(Tilt):	3500 lbs (1588 kg)
Raising time:	5.5 seconds
Lowering time:	3.5 seconds
Dumping time:	1.6 seconds
Roll back time:	2.4 seconds
Operating Weight:	5080 lbs (2309 kg)
Shipping Weight:	4489 lbs. (2020 kg)
Weight Distribution	
Rear:	3556 lbs (1613 kg) 70%
Front	1522 lbs. (690 kg) 30%
Braking System:	3 way braking system, hydrostatic, and wet disc type parking/emergency brake activated by hand lever.

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MUSTANG SKID-STEER LOADER
50 HOUR CHECK LIST

This check will require approximately 3 hours labor.

GENERAL AND VISUAL

YES	NO	
☐	☐	Do lift arm stops work properly?
☐	☐	Are brakes adjusted and functioning properly?
☐	☐	Are the neutral start interlocks working and adjusted correctly?
☐	☐	Is there any damage to the ROPS?
☐	☐	Are all parts of the ROPS installed and fastened securely?

DO NOT RUN MACHINE WITHOUT OPERATOR IN SEAT AND SEAT BELT FASTENED. MAKE SURE EVERYONE IS CLEAR OF MACHINE!

ENGINE

☐	☐	Is high and low RPM set properly?
☐	☐	Do choke, throttle, governor, and other controls function properly?
☐	☐	Are all belts aligned, and adjusted correctly? (alternator, governor, etc.)
☐	☐	Are all connections to the air cleaner tightened and installed properly?
☐	☐	Is the air cleaner element in good condition and installed correctly?
☐	☐	Has engine oil and filter been changed?

ELECTRICAL

☐	☐	Are all warning lights and gauges operating properly?
☐	☐	Does the hour meter function properly?
☐	☐	Do operating lights work properly?
☐	☐	Is battery in good condition and connections tight?
☐	☐	Is wiring harness routed correctly and are all connections secure?

FLUID LEVELS

☐	☐	Is coolant at proper level?
☐	☐	Is hydraulic oil at correct level? (chain case separate)
☐	☐	Are there any leaks on this Mustang?
☐	☐	Are all grease zerks installed and lubricated?
☐	☐	Have hydraulic and hydrostatic oil filters been changed?
☐	☐	Drain and refill chaincases.

OPERATE MUSTANG ONLY FROM OPERATOR'S SEAT WITH SEAT BELT FASTENED AND ALL GUARDS IN PLACE.

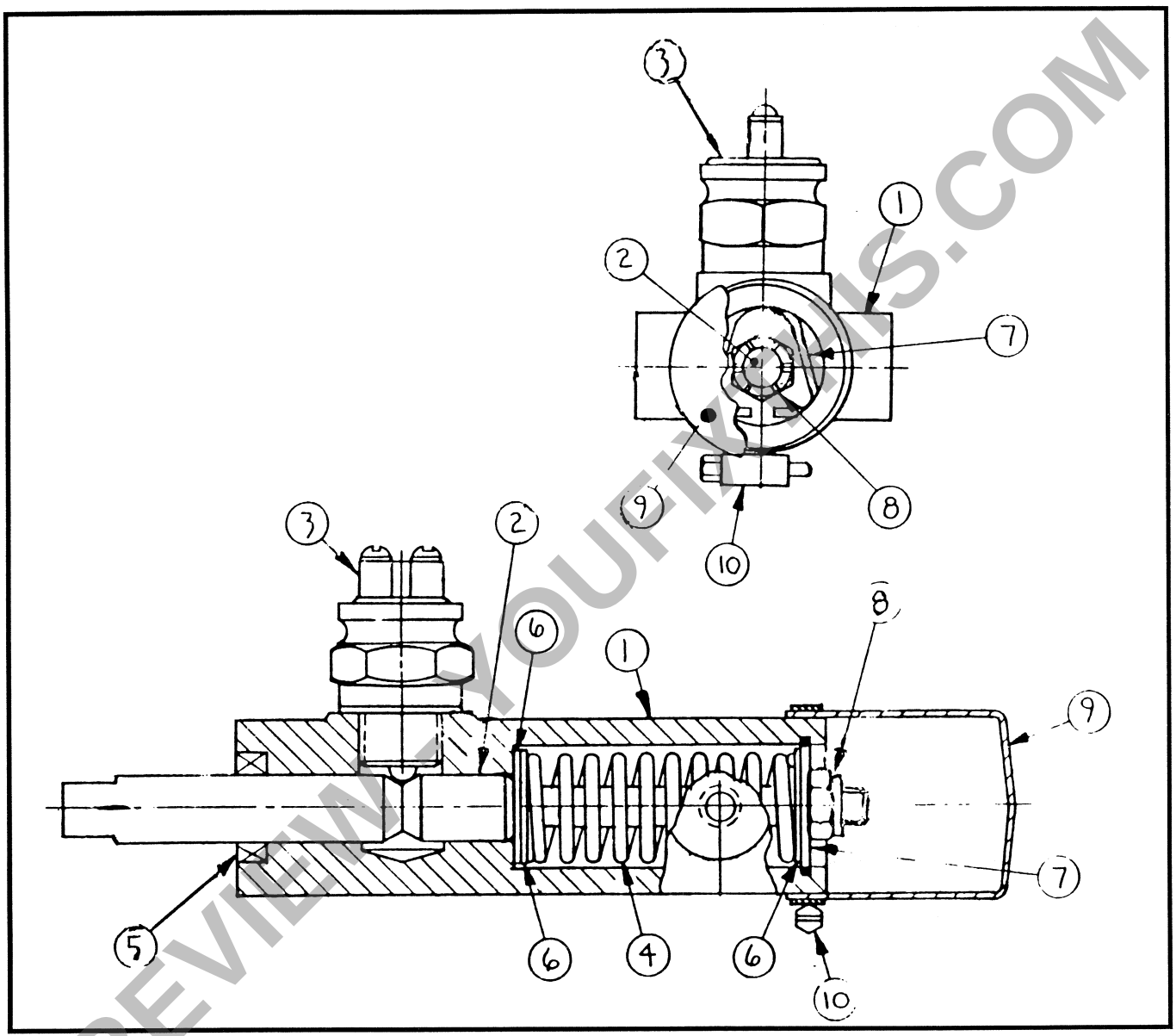
OPERATIONAL AND DRIVE SYSTEM

☐	☐	Are foot pedal linkages properly set for lift, tilt and auxiliary?
☐	☐	Is the hydrostatic control linkage adjusted properly and working freely?
☐	☐	Do all hydraulic functions work smoothly, does machine drive smoothly at full RPM?
☐	☐	Do lift arm and Fast-A-Tach cycle without interference?
☐	☐	Are all drive chains adjusted properly?
☐	☐	Has machine been inspected for loose or missing bolts?
☐	☐	Is seat belt foot pedal lock functioning properly?
☐	☐	Are wheel bolts torqued properly?
☐	☐	Are tire pressures correct?
☐	☐	Are the built in safety guards under safety recommendations in the Operator's Manual all in their places?
☐	☐	Have there been any alterations to the safety guards?
☐	☐	Are all decals in good condition and at their proper location?
☐	☐	All above procedures were done with owner, operator or maintenance personnel present to insure proper procedures.

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STEERING CONTROLS
NEUTRAL CENTERING DEVICES
Diagram



1. Neutral Centering Housing
2. Neutral Centering Rod
3. Neutral Start Switch
4. Compression Ring*
5. Seal
6. Flat Washer
7. Snap Ring
8. Lock Nut
9. Dust Cap
10. Hose Clamp

*All parts of Neutral Centering Devices are common between models except for the spring and quantity of washers. Be sure to refer to the parts manual for identification.

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E-SERIES
FUEL SOLENOID
(930A - 940)

Removal:
1) For easier access, remove engine oil dipstick mounting bolt at intake manifold and pull dipstick tube out of engine block and set aside.
2) Remove fuel filter mounting bolt allowing fuel filter to hang down and away from engine.
3) Remove the (2) two 1/4 inch cap screws mounting solenoid to the solenoid mounting bracket. Lower solenoid allowing it to rest against the engine block and unplug from wire harness.

NOTE: Solenoid bracket can be removed at this time if bracket replacement is necessary. (See figure 9-6)

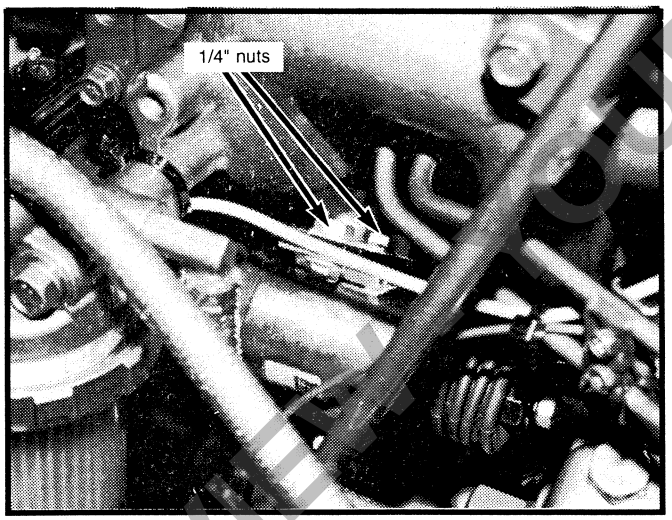


Figure 9-6

4) Remove cotter pin from injection pump shut-off lever and slide solenoid towards engine to remove from shut-off lever.

Installation:
1) Thread fuel shut-off connecting link onto threaded end of fuel solenoid. Install jam nut and tighten.

2) Slide solenoid link onto pin of the injection pump shut-off lever and install cotter pin.

NOTE: Link must be installed with 90 degree bend to solenoid pointing away from engine block. DO NOT CONNECT SPRING ON PUMP SHUT-OFF LEVER. Fuel Solenoid will not operate properly if this is connected.

3) Align mounting holes of solenoid to holes in solenoid mounting bracket and install 1/4 inch cap screws and nuts. Finger tighten only.

4) Plug wire connector into wire harness.

Adjustment:
1) Set mode switch to "red" mode.

2) Momentarily engage ignition key to "start" then return key to "on". DO NOT ALLOW ENGINE TO START.

3) With key "on" and solenoid engaged ensure solenoid has moved shut-off lever to full on. Align solenoid with injection pump.

4) Tighten solenoid mounting bolts. DO NOT EXCEED 5 FT./LBS. (4 Nm) TORQUE.

5) Start engine and shut-off. Check operation at idle and again at full engine RPMs.

If engine runs okay at full RPM but does not shut off when switch is shut off:
a. Check that fuel shut-off lever return spring is disconnected. Spring will counteract spring in solenoid if connected.

b. Check angle of alignment with solenoid. A side load on the solenoid will affect proper linkage travel.

c. Reposition solenoid slightly away from injection pump.

If engine shuts off but does not run at full RPM.
a. Check solenoid positioning. Move closeer to injection pump for full on.

b. Check solenoid alignment. A slight side load will affect proper linkage travel.

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HYDRAULIC SYSTEM
TROUBLESHOOTING (continued)

SYMPTOM	POSSIBLE CAUSE
Oil overheats	Operator holds valves open too long, causing relief valve to open Incorrect system relief valve pressure (See procedure for checking lift relief on page 4-4) Contaminated oil Due to attachment connected to the auxiliary lines
Foot controls stick or work hard	Misalignment of control linkage or pedal linkage binding Contaminated valve Foreign matter in spool bore Scored valve bore or bent spool
Engine stalls while using hydraulics	Load beyond hydraulic system capacity Incorrect relief valve pressure (See procedure for checking lift relief psi on page 4-4) Operator holding valve over relief

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HYDRAULIC SYSTEM
LIFT CIRCUIT LEAK DOWN TEST

1. Install a 0-2000 PSI (0-137.9 bar) pressure gauge (Tee in) at cylinder base end circuit.
2. Roll the bucket all the way back. Raise the lift arm approximately 5 inches (127 mm) and shut engine off. Have a second person add weight to the bucket to obtain 1000 PSI (68.9 bar) on gauge. Measure the distance from the rod end of the cylinder barrel to cylinder lift arm pin. After ten minutes remeasure the distance and compare cylinder rod movement with the chart below:

RATE OF MOVEMENT IN 10 MINUTES

	930	940	960
Dukes Valve	1.245 in. 31.6 mm	1.245 in. 31.6 mm	.941 in. 23.9 mm
Gresen Valve	N/A-	.996 in. 25.3 mm	.768 in. 19.5 mm

If the rate of movement is less than the chart, the machine is within specifications and no further checks are necessary. If the rate of movement is greater than the chart, check out the cylinders, one at a time, following steps 3-7.

3. Jack up the lift arm so the cylinders have no pressure on them.
4. Remove one of the base end hoses and install 0-2000 PSI (0-137.9 bar) pressure gauge at the cylinder port. Plug or cap the hose.
5. Remove the jack. Add weight to the bucket until the gauge reads 1000 PSI (68.9 bar). Work the lift pedal back and forth to relieve any pressures in the rest of the system. Do this periodically to relieve any pressures which may build on cylinder not being tested.
6. Note movement of the cylinder. If the cylinder travels more than 1/4 inch (6.4 mm) in 10 minutes it is leaking excessively and should be repaired.
7. Repeat steps 3-6 to test the other cylinder.
8. If both cylinders check out within the specifications (1/4 inch per 10 minutes at 1000 PSI {68.9 bar}), and leak down rate is excessive, the control valve is at fault.

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CAUTION: Excessive valve spool travel into valve body will possibly damage the O-rings.

3. After assembly check for operation of spring center. Push down on screw. This should compress the spring and it should return when released. Apply a medium coating of lubricant (Lubriplate or similar) over the spring and spacer.

4. Place end cap assembly, align the mounting holes, install mounting screws and torque to 203 ft. lbs. (304 Nm) and check valve for correct operation.

SPOOL SEAL REPLACEMENT
(See figure 4-10)

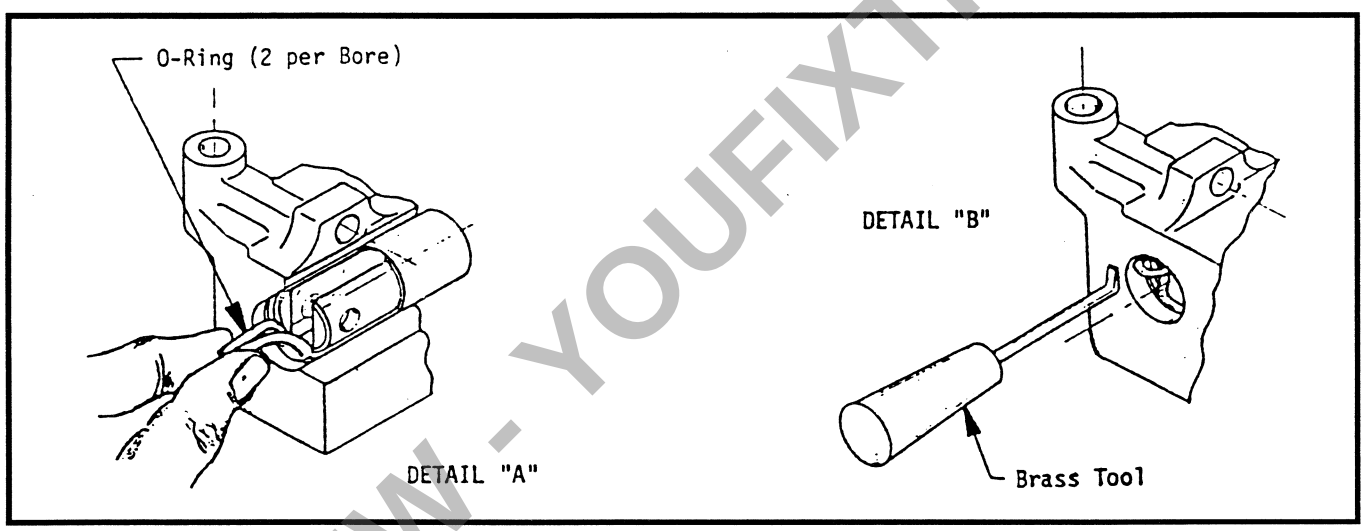


Figure 4-10

1. Remove end cap and spring assembly.

2. Remove valve spool from valve body.

3. Using a brass tool, remove O-rings from valve body. Care must be taken not to scratch the bore and not to contaminate the bore with any foreign matter. Now clean and dry the spool with a suitable solvent.

4. Insert clevis end (or tang) into back end of valve body until even with back end of O-ring groove on front of valve body. Now pinch lubricated O-ring so it can be inserted into body as per Detail "A." Take care not to cut or nick O-rings during installation. Insert part of O-ring into groove and let loose. Now with a brass tool help force O-ring into groove as per detail "B."

5. Rotate spool, pushing and pulling it until back edge of spool is in line with back edge of O-ring groove on cap end of valve. Repeat same procedure for installing O-ring as above. After the O-ring is installed, push and rotate spool until edge of spool is aligned with back surface of casting. Reassemble end cap assembly as per instructions on page 4-17.

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HYDROSTATIC DRIVE SYSTEM
HYDROSTATIC SYSTEM CHECKS
Directional Check / Relief Valve Combination

Each directional check/relief valve in the Vickers hydrostatic pump performs two functions. The large coned end of the valve seats against a machined surface in the valve block and serves as a check valve directing charge pressure to the low pressure (inlet) side of the piston pump. The small center cone is the high pressure relief protecting the system from producing internal pressure greater than 4500 PSI (310.2 bar).

There are four directional check/relief valves located in the valve block of the hydrostatic piston pump, one for each of the outlet ports of the two piston pumps. Each port has a casting number for identification.

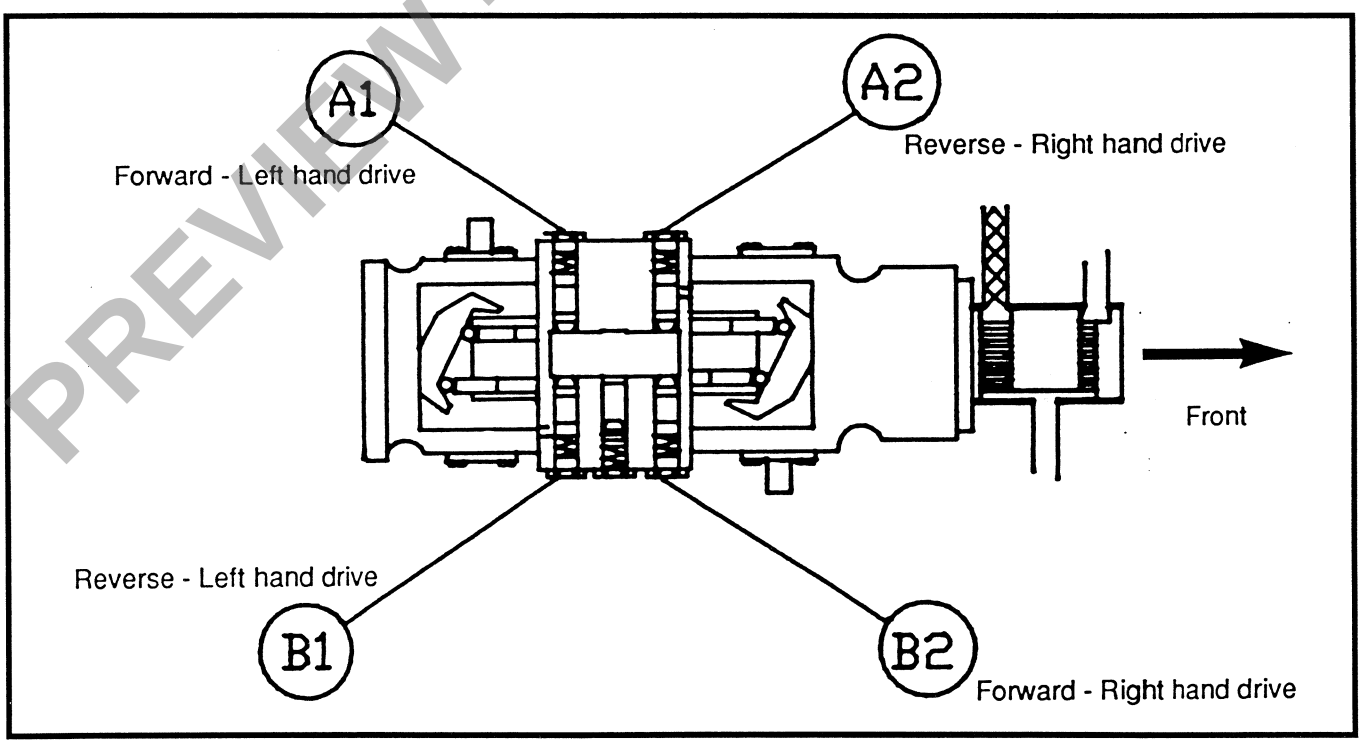
#	Direction	Side Driven
A-1	Forward	Left hand drive (rear pump)
B-1	Reverse	Left hand drive (rear pump)
B-2	Forward	Right hand drive (front pump)
A-2	Reverse	Right hand drive (front pump)

Loss of drive on one side of the unit indicates that one side of the hydrostatic drive system is not developing adequate pressure. Three reasons for loss of pressure are as follows:

1. One of the pressure relief valves protecting that side has failed.
2. Hot oil shuttle valve on the drive motor is sticking. (See Drive Motor Checks, page 5-7)
3. Excessive oil is being lost by internal leakage due to damage in the hydrostatic drive system.

If one relief valve fails, normally the machine will have good power in one direction but not the other (on one side of the machine). It is possible, but very rare, that two relief valves would fail at the same time. Such failure can be checked by simply switching relief valves from one side to the other.

If the machine will not move in either direction, oil may be going back to the reservoir through internal leakage from the hydrostatic pumps, or drive motors. It is also possible that a ruptured line may be causing external oil loss. All external leaks should be repaired prior to checking the internal workings of a hydrostatic drive system.



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GENERAL INFORMATION
TORQUE SPECIFICATIONS AND PROCEDURES
Hoses & Fittings

PROCEDURE FOR INSTALLING J.I.C. (SAE 37° flare) FITTINGS

1. Tighten nut finger tight until it bottoms out on the seat.
2. Optional: Mark a line lengthwise on the nut and extend it onto the adaptor. Use an ink pen or marker.
3. Using a wrench, rotate the nut to tighten. Turn the nut the amount shown in the chart below, by flats or torque readings.

Hose & Tubing Diameter	Rotate No. of Hex Flats See Note No. 1
1/4	2 1/2
5/16	2 1/2
3/8	2
1/2	2
5/8	1 1/2 - 2
3/4	1
1	3/4 - 1
1 1/4	3/4 - 1
1 1/2	1/2 - 3/4

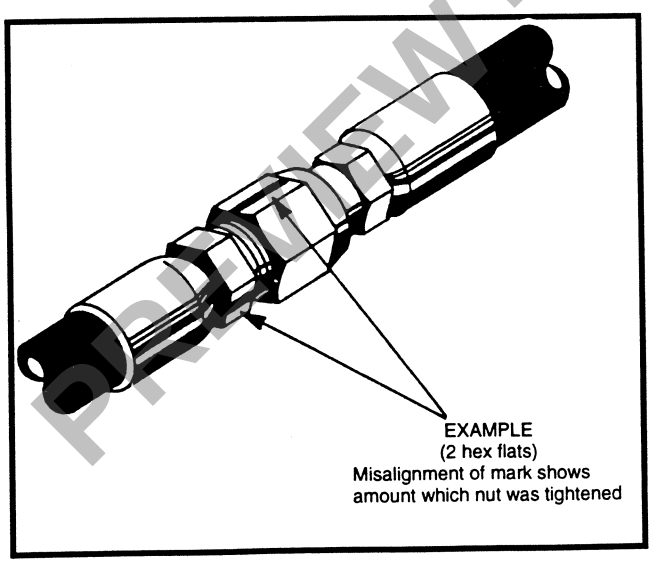


Figure 2-5

NOTE: Misalignment of marks will show how much the nut was tightened and that it has been tightened.

Hose & Tubing Diameter	Torque in Foot-Pounds Minimum	Maximum
1/4	8	12
5/16	12	17
3/8	15	25
1/2	25	42
5/8	37	58
3/4	50	83
1	75	117
1-1/4	108	175
1 - 1/2	180	250

PROCEDURE FOR INSTALLING "O" RING FITTINGS

1. Jam nut and washer must be to the back side of the smooth portion of the elbow adaptor.
2. Lubricate the "O" ring. VERY IMPORTANT!
3. Thread adaptor into port until washer bottoms onto spot face.
4. Position elbows by backing up the adaptor (counterclockwise).
5. Tighten jam nut.

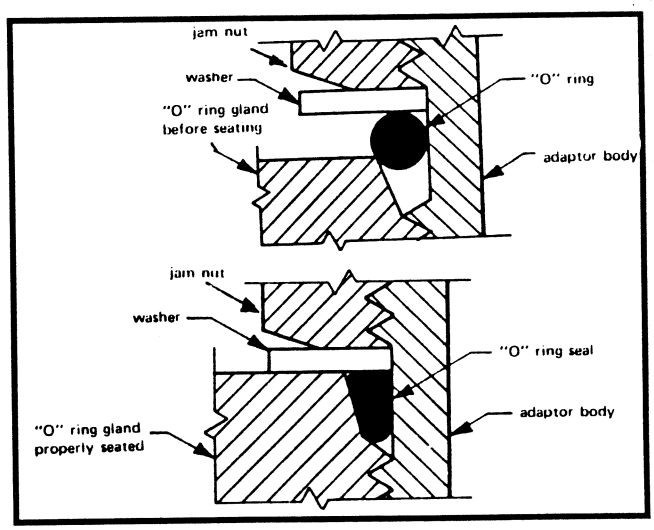


Figure 2-6

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