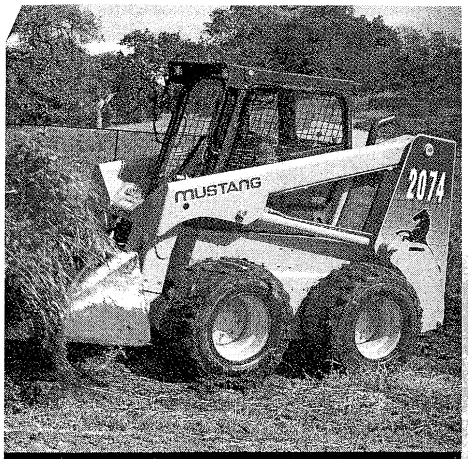


MUSTANG

332, 342
442, 552

SERVICE MANUAL

PART #087-00184

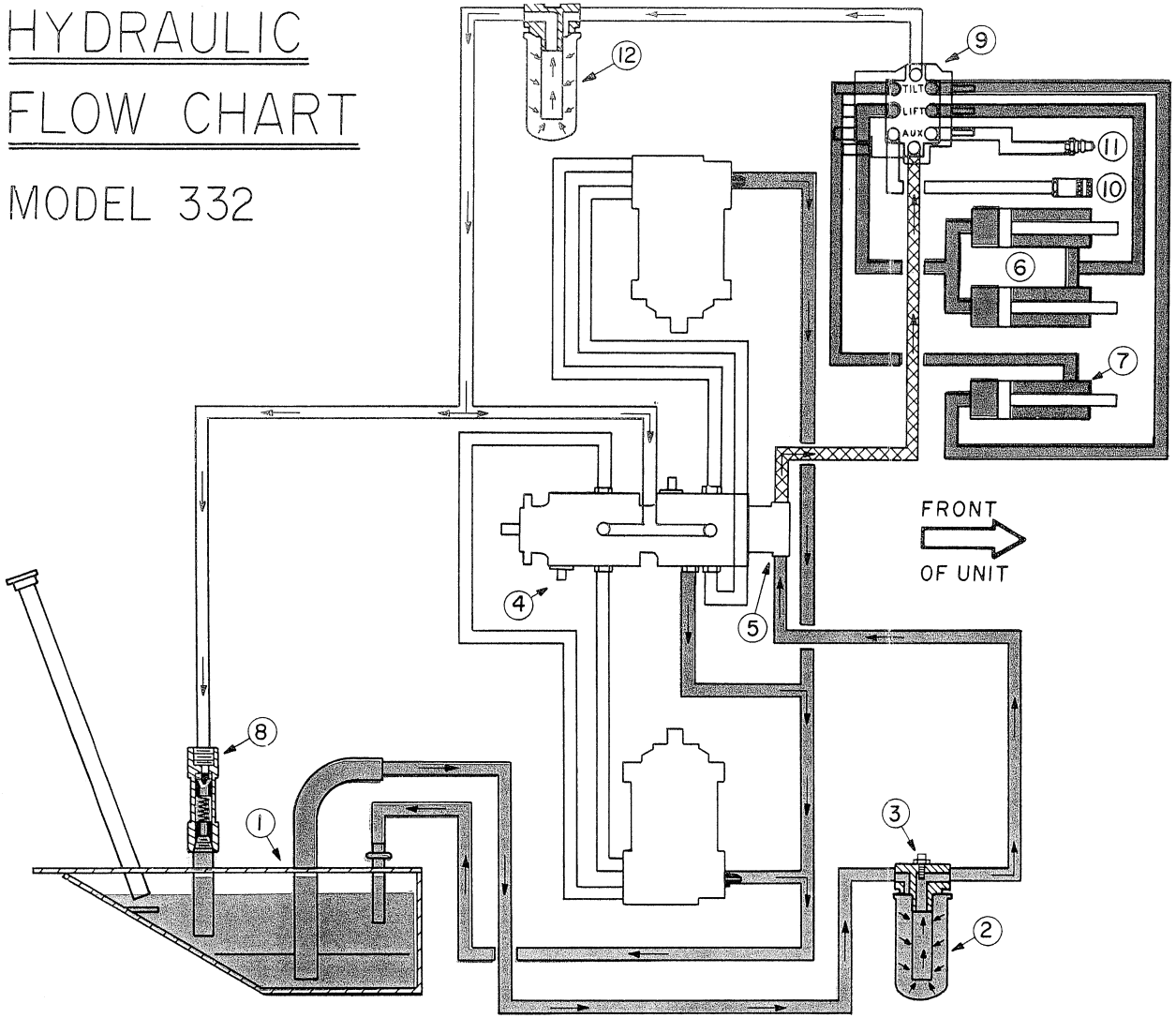
MUSTANG®
Mustang Manufacturing Company, Inc. A Gehl Company

1880 Austin Road, P.O. Box 547
Owatonna, MN 55060
Phone: (507) 451-7112
Fax: (507) 451-8209
www.mustangmfg.com

Printed in U.S.A

HYDRAULIC FLOW CHART

MODEL 332



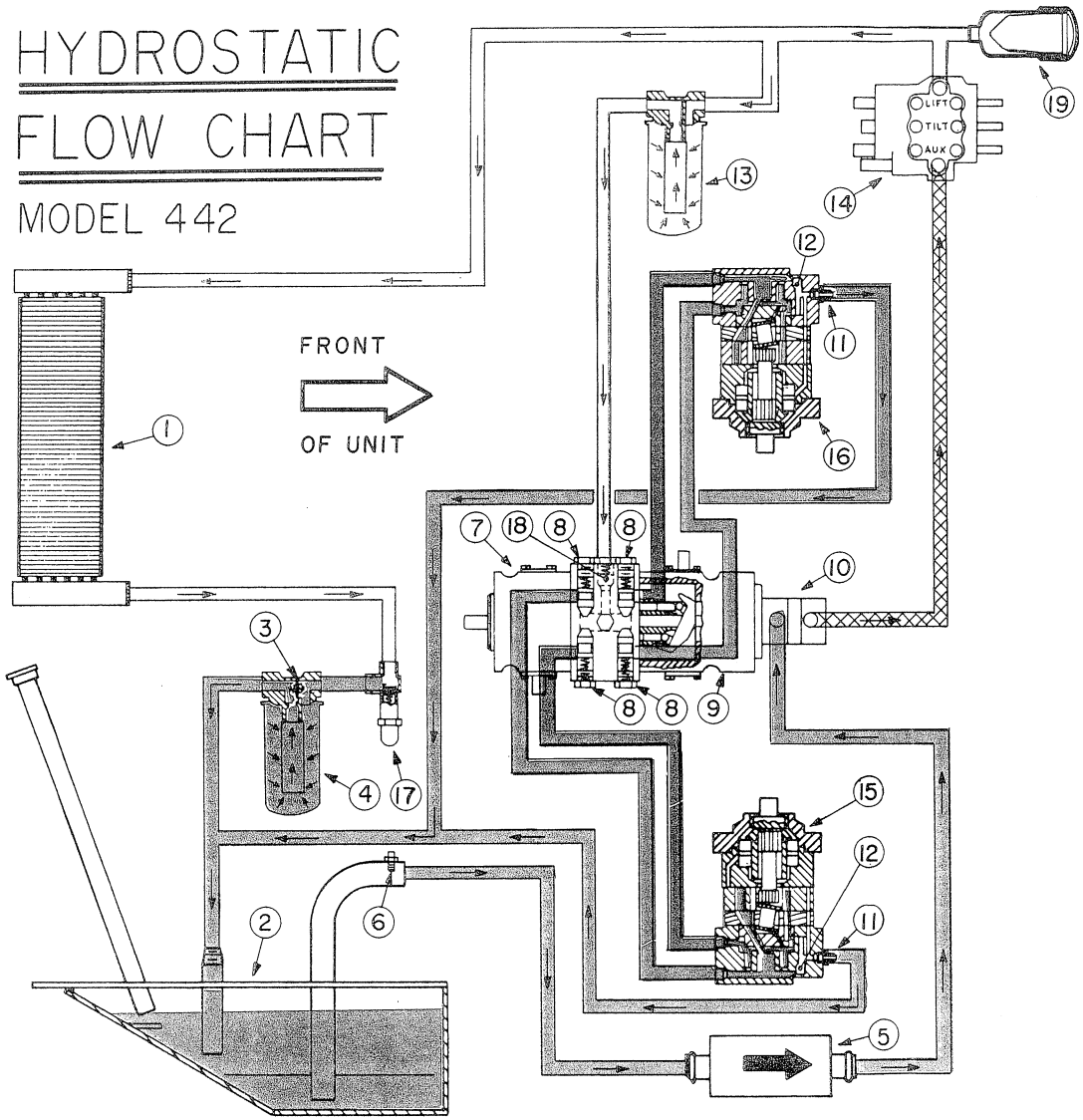
LEGEND

1. RESERVOIR, Capacity: 9 Gal. (34.1 L)
2. SUCTION SCREEN, 100 Mesh
3. TEMPERATURE SWITCH, HYDRAULIC OIL 225° F (107° C)
4. TANDEM PUMP
5. GEAR PUMP, 7.5 GPM (28.2 L/min)
6. LIFT CYLINDERS
7. TILT CYLINDERS
8. CHARGE RELIEF VALVE, 70 PSI [4.70 Bar]
9. CONTROL VALVE, 2000 PSI (136.00 Bar) MAIN RELIEF
10. AUXILIARY COUPLER, FEMALE
11. AUXILIARY COUPLER, MALE (PRESSURE OUT WITH AUX VALVE IN DETENT)
12. CHARGE AND RETURN CIRCUIT FILTER, 7 Micron

RED--EXTEND CYLINDER
BLUE--RETRACT CYLINDER
GREEN--CASE DRAIN AND RESERVOIR
YELLOW-CHARGE PRESSURE
CONTROL VALVE SUPPLY PRESSURE

HYDROSTATIC FLOW CHART

MODEL 442



LEGEND

1. OIL COOLER
2. RESERVOIR, Capacity: 12 Gal. (45.4 L)
3. BY-PASS VALVE, 25 PSI (1.70 Bar)
4. RETURN FILTER, 7 Micron
5. SUCTION SCREEN, 100 Mesh
6. TEMPERATURE SWITCH, HYDRAULIC OIL 225°F (107°C)
7. REAR HYDRO PUMP (RIGHT SIDE DRIVE)
8. REPLENISHING CHECK AND RELIEF VALVE, 4000 PSI (272.00 Bar)
9. FRONT HYDRO PUMP (LEFT SIDE DRIVE)
10. VANE PUMP, 14.5 GPM (55.1 L/min)
11. BLEED-OFF RESTRICTOR FITTING, .078 Inch (1.98mm) ORIFICE
12. BLEED-OFF SHUTTLE VALVE
13. CHARGE FILTER, 7 Micron
14. CONTROL VALVE, 2250 PSI (153.00 Bar) MAIN RELIEF
15. RIGHT SIDE HYDRO MOTOR
16. LEFT SIDE HYDRO MOTOR
17. CHARGE RELIEF VALVE, 145 PSI (9.86 Bar)
18. CENTER BLOCK RELIEF VALVE, 225 PSI (15.3 Bar) (NORMALLY DOES NOT OPEN)
19. ACCUMULATOR, NITROGEN PRECHARGE - 125 PSI (8.50 Bar)

RED--FORWARD PRESSURE
BLUE-REVERSE PRESSURE
GREEN--CASE DRAIN AND RESERVOIR
YELLOW--CHARGE PRESSURE
CONTROL VALVE SUPPLY PRESSURE

Specifications

332 Kubota engine

Model	D950-B
Type	Vertical, water-cooled 4 cycle diesel engine
Number of Cylinders	3
Bore and Stroke	75 x 70 mm 2.95 x 2.76 in.
Total Displacement	927 cm^3 56.6 cu. in.
Intake and Exhaust Valve Clearance	
When Cold	0.145 to 0.185 mm 0.0057 to 0.0073 in.
Brake Horsepower	
DIN 6270-NA	12.5kW/3000rpm - 17.0ps/3000rpm
DIN 6270-NB	13.6kW/3000rpm - 18.5ps/3000rpm
DIN 70020-NF	15.1kW/3000rpm - 20.5ps/3000rpm
SAE Gross H.P.	16.0kW/3000rpm - 21.5HP/3000rpm
SAE Intermittent H.P.	14.5kW/3000rpm - 19.5HP/3000rpm
SAE Cont. H.P.	12.7kW/3000rpm - 17.0HP/3000rpm
Maximum Speed RPM	2850 RPM
Minimum Speed RPM	1000 RPM
Maximum Torque	55.6Nm, 5.67kgf·m, 41.0 ft-lbs/1800rpm
Combustion Chamber	Spherical Type
Fuel Injection Pump	Bosh Type K Mini Pump
Plunger Bore	5 mm 0.197 in.
Governor	Centrifugal Ball Mechanical Governor
Injection Nozzle Type	"Throttle" Type
Injection Timing	25° BTDC
Injection Pressure	13.7MPa - 140kgf/cm^2 - 1990 psi
Compression Ratio	22
Lubricating System	Forced Lubrication by Rotor-type Pump
Lubricating Oil Filter	Full Flow Paper Filter (Cartridge type)
Oil Pressure Adjustment	Ball type valve.
Lubricating Oil Capacity with Filter	4.6 liters 1.22 U.S. gals
Cooling System	Pressurized Radiator, Forced Circulation (with pump)
Starting System	Electric Starting with Cell Starter
Battery	12V
Starting Support Device	By Glow Plug in Combustion Chamber
Dynamo for Charging	12V, 150W
Fuel	Diesel Fuel No. 2-D
Weight (Dry)	814N - 83.1kg - 183 lbs
Injection Order	1-2-3
Direction of Rotation-Counterclockwise (viewed from flywheel side)	
Application	General Power Source

332 Onan engine

Number of Cylinders	2
Displacement	60 cu. in.
Cylinder Bore	3 9/16 inch (90.48 mm)
Piston Stroke	3 inch (76 mm)
Horsepower--NHC (Pressure Cooled)	25 BHP @3600 rpm
Compression Ratio	7.0 to 1
Ventilation Required (cfm @3600 rpm) NHC	1080 (30.59 m^3)
Oil Capacity	3 1/2 quart (3.3 litre)
Oil Capacity with Filter Change	4 quart (3.8 litre)
Maximum Speed RPM	2850 RPM
Minimum Speed RPM	1000 RPM
Starting	Electric
Combustion air	80 (2.27 m^3)
Fuel	Gasoline (Unleaded or Regular Grade)
Fuel Pump	Diaphragm, 4 ft. (1.24 m) lift
Battery	12 Volt

TUNE-UP SPECIFICATIONS

Spark Plug Gap	.025 inch (0.64 mm)
Breaker Point Gap	.016 inch (0.41 mm)
Ignition Timing	20° BTC
Valve Clearance (Cold)	
Intake	.003 inch (0.08 mm)
Exhaust	.012 inch (0.30 mm)

DIMENSIONS AND CLEARANCES

All clearances given at room temperature of 70°F.
All dimensions in incnes unless otherwise specified.
All metrics given in parentheses.

	MINIMUM	MAXIMUM
Valve Stem in Guide--Intake	0.0010 (0.03 mm)	0.0025 (0.06 mm)
Valve Stem in Guide--Exhaust	0.0025 (0.06 mm)	0.0040 (0.10 mm)
Valve Spring Length		
Free Length	1.662 (42.21 mm)	
Compressed Length	1.375 (34.93 mm)	
Valve Spring Tension (lb.)		
Open	71 (32 kg)	79 (36 kg)
Closed	38 (17 kg)	42 (19 kg)
Valve Seat Bore Diameter		
Intake	1.5545 (39.48 mm)	1.5655 (39.76 mm)
Exhaust	1.2510 (31.78 mm)	1.2520 (31.80 mm)
Valve Seat Diameter		
Intake	1.569 (39.85 mm)	1.570 (39.88 mm)
Exhaust	1.255 (31.88 mm)	1.256 (31.90 mm)
Valve Stem Diameter		
Intake	0.3425 (8.70 mm)	0.3430 (8.71 mm)
Exhaust	0.3410 (8.66 mm)	0.3415 (8.67 mm)
Valve Guide Diameter (I.D.)	0.344 (8.74 mm)	0.346 (8.79 mm)
Valve Lifter Diamter	0.7475 (18.99 mm)	0.7480 (19.00 mm)
Valve Lifter Bore	0.7505 (19.06 mm)	0.7515 (19.09 mm)
Valve Seat Interference Width	1/32 (0.794 mm)	3/64 (1.191 mm)
Valve Face Angle		44°
Valve Seat Angle		45°
Valve Interference Angle		1°
Crankshaft Main Bearing	0.0025 (0.06 mm)	0.0038 (0.10 mm)
Crankshaft End Play	0.005 (0.13 mm)	0.009 (0.23 mm)
Camshaft Bearing	0.0015 (0.04 mm)	0.0030 (0.08 mm)
Camshaft End Play	0.003 (0.08 mm)	
Camshaft Lift	0.300 (7.62 mm)	
Camshaft Bearing Diameter	1.3760 (34.95 mm)	1.3770 (34.98 mm)
Camshaft Journal Diameter	1.3740 (34.90 mm)	1.3745 (34.91 mm)
Rod Bearing (Forged Rod)	0.0005 (0.01 mm)	0.0023 (0.06 mm)
Connecting Rod End Play (Ductile Iron)	0.002 (0.05 mm)	0.016 (0.41 mm)
Timing Gear Backlash	0.002 (0.05 mm)	0.003 (0.08 mm)
Oil Pump Gear Backlash	0.002 (0.05 mm)	0.005 (0.13 mm)
Piston to Cylinder, Strut Type (measured below oil-controlling ring--90° from pin) Clearance	0.0015 (0.04 mm)	0.0035 (0.09 mm)
Piston Without Strut	0.0065 (0.165 mm)	.0095 (0.241 mm)
Piston Pin Diameter	0.7500 (19.05 mm)	0.7502 (19.06 mm)
Piston Pin in Piston	Thumb Push Fit	
Piston Pin in Rod	0.0001 (0.0025 mm)	0.0005 (0.13 mm)
Top 1	0.0955 (2.43 mm)	0.0965 (2.45 mm)
Top 2	0.0955 (2.43 mm)	0.0965 (2.45 mm)
Top 3	0.1880 (4.78 mm)	0.1890 (4.80 mm)
Piston Ring Gap in Cylinder	0.010 (0.25 mm)	0.020 (0.50 mm)
Piston Ring Side Clearance (Top compression ring only)	0.006 (0.15 mm)	
Crankshaft Main Bearing Journal-Standard Size	1.9992 (50.78 mm)	2.0000 (50.8 mm)
Main Bearing Diameter	2.0015 (50.84 mm)	2.0040 (50.90 mm)
Main Bearing Clearance	0.0015 (0.04 mm)	0.0043 (0.11 mm)
Crankshaft Rod Bearing Journal-Standard Size.	1.6252 (41.28 mm)	1.6260 (41.30 mm)
Cylinder Bore--Standard Size	3.5625 (90.49 mm)	3.5635 (90.51 mm)

not loose and the unit has adequate charge pressure, then the pumps and/or motors must be disassembled and repaired or replaced.

In some cases, it is not necessary or even desirable to check the pressure in a hydrostatic power loop, but it is necessary when it must be determined if the problem is in the motor or pump. If any pressure or flow measurements are done in the power loop, ALL components used, such as gauges, meters, hoses and fittings, must be able to operate safely at 5000 psi, and must be CLEAN. When using a flow meter in the power loop, care must be taken so that the meter is not hooked up into the system backwards or the high loop pressure will blow up the flow meter.

If a pump or motor has failed, the corresponding pump or motor MUST be removed and cleaned also. A motor and a pump share contamination through the closed power loop. Therefore, it is not normally important to determine which of the components has failed before disassembling. Both units are possibly damaged and should be disassembled, inspected, cleaned and repaired. In some cases it may not be necessary to disassemble both pumps and both motors, but it is best in order to remove any possibility of contamination.

One of the major areas of dirt entry into a vehicle hydraulic system is the rod seal (wiper) on the hydraulic cylinders. Tests have shown that wear-out of a rod seal can increase the amount of contaminant entering the hydraulic system by more than tenfold. A high contamination level can be generated very quickly in the field if entering contaminant is allowed to circulate and regenerate more contaminant. Topping off of a reservoir under field conditions without dumping a large amount of dirt into the oil is very difficult. All oil added to the system should be clean. Scheduled maintenance, use of specified filters and good assembly practices will result in prolonged service life of the hydraulic components.

It is VITAL that the area around a joint be clean when disassembling and

HYDRAULIC SYSTEM

Hydraulic Cylinder Inspection

A nick on a cylinder shaft can cause seal damage in the cylinder gland and cause external leaks. Occasionally check the shaft by running your hand up and down the length of it. This is particularly important when handling gravel, stone, or scrap metal. Shaft inspection can detect nicks or scratches before they are large enough to damage the cylinder gland seals. Carefully dress down any nicks or scratches on a cylinder shaft with a fine carborundum stone.

Pinholes at either of the cylinder ports can cause external leaks. Pinholes can be welded by gas or electric arc welding*. When welding cylinders at the base end, extend the cylinder to prevent heating and weakening of the piston seals. Loosen the fluid port fitting to relieve any pressure resulting from heat. When welding at the rod end of the cylinder, disassemble the cylinder to prevent damage to seals in the gland. Use a low hydrogen type welding rod (#7018).

*Suggestion: Correct welding of a pin hole leak is to start weld a distance from the pin hole and work toward and across the pin hole so weld heat will burn oil out of hole before the weld arc reaches the pin hole area. Remember: Pressure must be released within cylinder prior to welding.

When using an arc welder, do not apply the ground clamp to the cylinder shaft. This would cause a burned spot on the shaft.

 WARNING! ALWAYS disconnect battery when welding on machine.

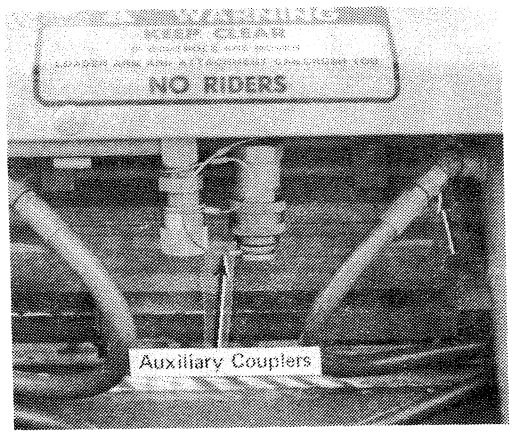
A dented cylinder barrel can cause the piston to be worn flat and will **result in internal damage and cause leakage. If this happens, it is not** economical to repair the cylinder in most cases. Replace the cylinder with a new one.

HYDRAULIC SYSTEM PRESSURE CHECKS

Hydraulic Relief Pressure Check

This test is taken using a pressure gauge that will operate safely at 3000 psi, install the gauge into one of the auxiliary couplers. Start the unit and run engine at full R.P.M. and activate the auxiliary hydraulics to go over "relief", take a reading and compare it with the specifications that are listed below.

MODEL	LIFT/TILT RELIEF (±50)
332	1950 psi
342	2100 psi
442	2250 psi
552	2400 psi



If the relief pressure reading indicates other than specified, the following items need to be checked into:

1. The control valve relief cartridge is sticking or seals may be defective.
2. Control valve or parts of valve (internal components) need replacement.
3. Relief cartridge is out of adjustment.
4. Hydraulic gear/vane pump is malfunctioning (see procedure for checking charge pressure on page 31).

HYDROSTATIC TRANSMISSION CHECKS

Hydrostat Relief Valve Check

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

1. Either one of the two relief valves on side affected has "failed open".

2. Or you are losing the complete volume of oil by internal leakage (slippage) or external loss.

If the relief valve fails, the unit will generally move in one direction but not in the other (forward or reverse). It is unlikely that both relief valves will fail at the same time. Such failure can be checked by "switching" relief valves from one side to the other.

If the unit slows down or will not move in either direction, oil may be going back to the reservoir by internal slippage of the hydrostatic pumps, failure of the drive motors, or a ruptured line or joint may be causing external loss of oil. External loss of oil should be checked prior to checking into the closed loop system.

Hydrostat Closed Loop Check

This check can be done when there is a total loss of drive (both sides) or when there is loss of drive on one side of the unit and the relief valves have been checked (switching of valves). This check will aid the mechanic in deciding whether or not the failure is due to the closed loop system or the chain drive operation in the chain case.

1. Block machine up.

2. Lock brake (40-50 pounds of force needed to engage).

3. Start unit, operate "T" bar slightly in forward and reverse.

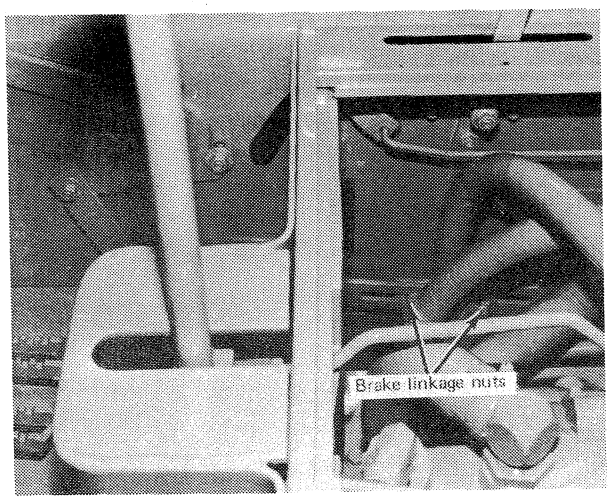
4. If "resistance or snap-back" is felt in operating "T" bar, this is a good sign that hydrostat is functioning properly. Shut unit down, remove chain case cover and inspect chain drive operation for damage.

5. If a "dead or soft" feeling is noticed when operating "T" bar, slippage is occuring within the closed loop system, shut unit down, remove and inspect the hydrostatic pumps. If unsure of failure, verify by performing hydrostat system pressure check as described in the following section.

6. If contamination is found within the hydrostat, you MUST follow through and inspect the corresponding drive motor(s) for damage also. A pump and motor do share contamination within a closed loop system.

WHEEL DRIVE SYSTEM

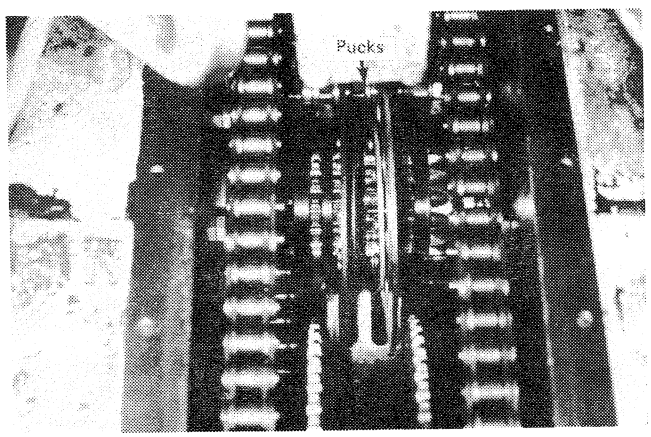
Brake Adjustment/Brake Component Tips



For proper brake adjustment for all units, the hardware connecting the front and rear brake links can be loosened (see photo) and links repositioned in order to obtain the required 40-50 lbs. pull on the hand lever.

NOTE: If a lesser amount of "pull" is set for engagement of the brake, this may enable brake to engage partially during operation of machine without the operator being aware of it. Drag on the brake system will occur which may result in premature wear of brake pucks.

Internal adjustment of the brake caliper assembly is initially "preset" at the factory, but if you are unable to adjust the external linkage any more to attain proper brake engagement, inspection of the internal component positioning may be needed.

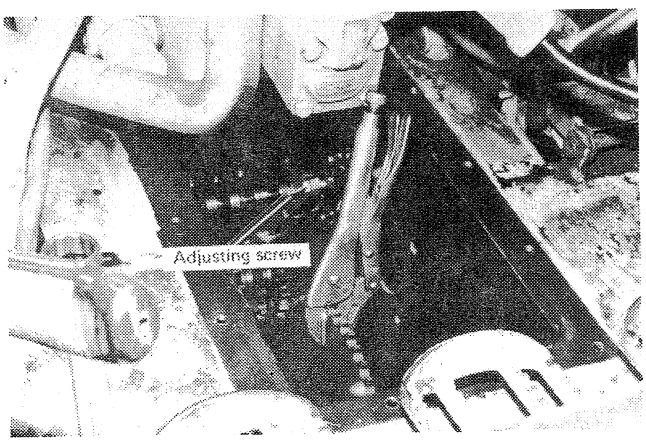


1. Check the brake disc spacing between pucks when the brake is locked into position.

2. Brake discs should have at least 1/16 inch clearance to the brake caliper weldment "pads" (see photo).

3. If the discs are rubbing or are positioned less than 1/16 inch, the adjusting screw within the caliper weldment will need to be loosened.

4. Turn screw "in or out" to obtain enough clearance. Be sure and "jam" nut of adjusting screw against welded nut of the caliper weldment after you have made the adjustment.



WHEEL DRIVE SYSTEM

Replacement of Drive Chain (80HK) Model 552

NOTE: If the chain needs replacement or breaks clean and has not buckled up around axle, you may be able to connect the replacement chain to the old chain and feed throughout the chain case without much difficulty, being able to save a considerable amount of time.

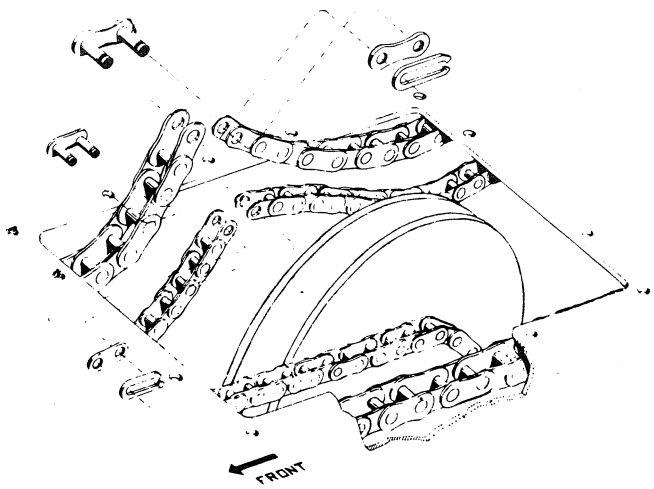
1. Put machine on safe blocks, remove wheels and side covers of unit.

2. Drain chain case oil, remove seat and "T" bar assembly, remove chain case cover and gasket.

3. Clean area around idler arm assembly (on side of unit requiring chain replacement, loosen the large nuts only enough to enable assembly to slide.

4. Remove primary chain (50HK), brake caliper, hydraulic drive motor and chain guide assembly.

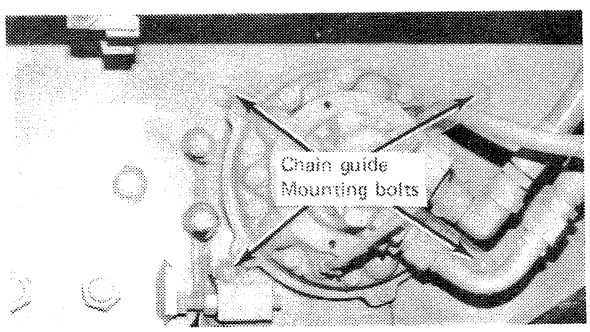
5. Using a wire (light gauge wire, approx. 3 ft. long) to pull and guide chain. Locate replacement chain on top of front axle sprocket, rotate axle, and feed the chain around axle and over center reduction sprocket, under idler sprocket and then under rear axle sprocket and around to front of the machine.



6. If needed, a chain puller may be used to assist in bringing chain together to install connecting link.

   Install connecting link as shown in drawing with the retaining clip towards the inside of the machine and open ends rearward.

   If unable to bring chain ends together, a "knuckle" in the chain has occured around axle sprocket or idler sprocket, chain will have to be pulled out enough to eliminate "knuckle" and then re-routed again.

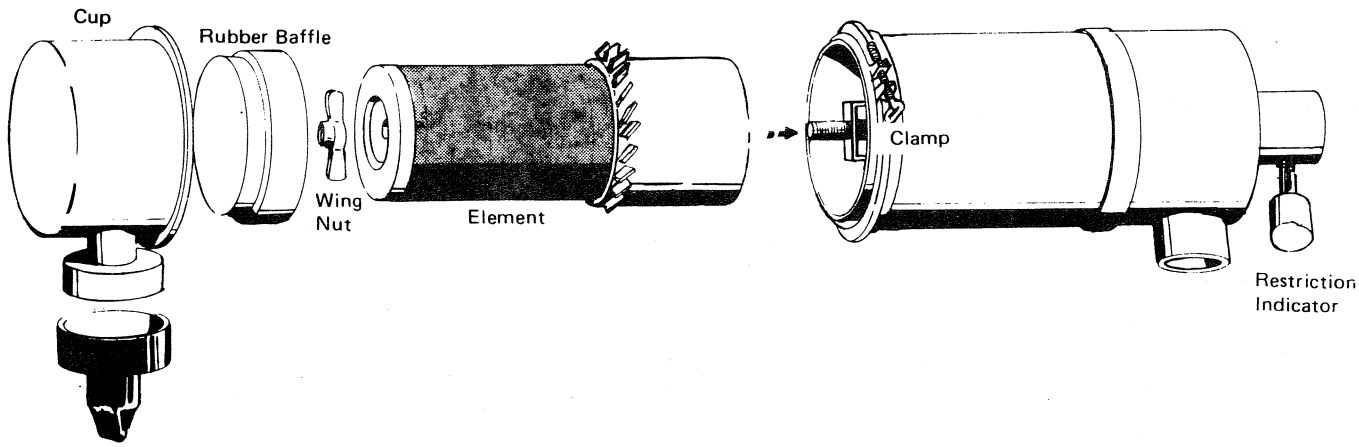


7. Install chain guide assembly, coat both sides of seal washers with Silastic Sealant and place under head of each carriage bolt. Tighten nuts, apply hammer blow to head of each bolt and retighten.

Air Cleaner (cont)

8. After cleaning, inspect element for damage by placing a bright flashlight inside the filter. Discard any filter that shows the slightest repture. Replace element with only Mustang replacement element. Do not install a shorter element!.

9. Inspect filter element gasket for damage. Replace element if gasket is missing or damaged.

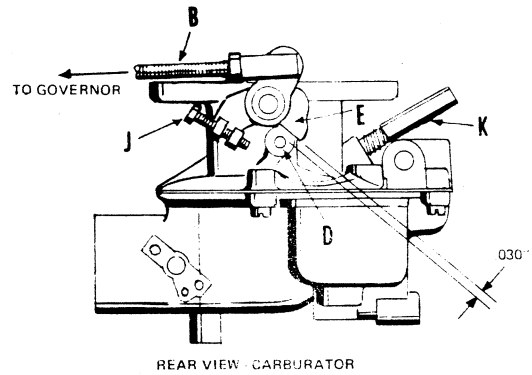


Cooling System (Model 332 only, Onan engine)

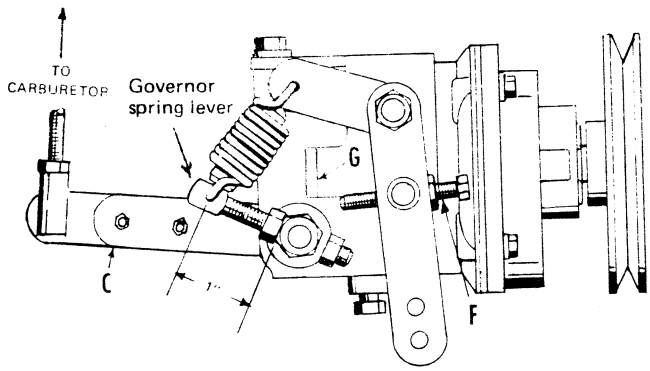
The covers over the cylinders and heads on the Onan engine should be periodically removed, so the cooling fins may be cleaned.

This is especially important when you are operating in very dusty conditions.

ENGINE FUEL SYSTEM



REAR VIEW - CARBURATOR



TOP VIEW - GOVERNOR

FIGURE A

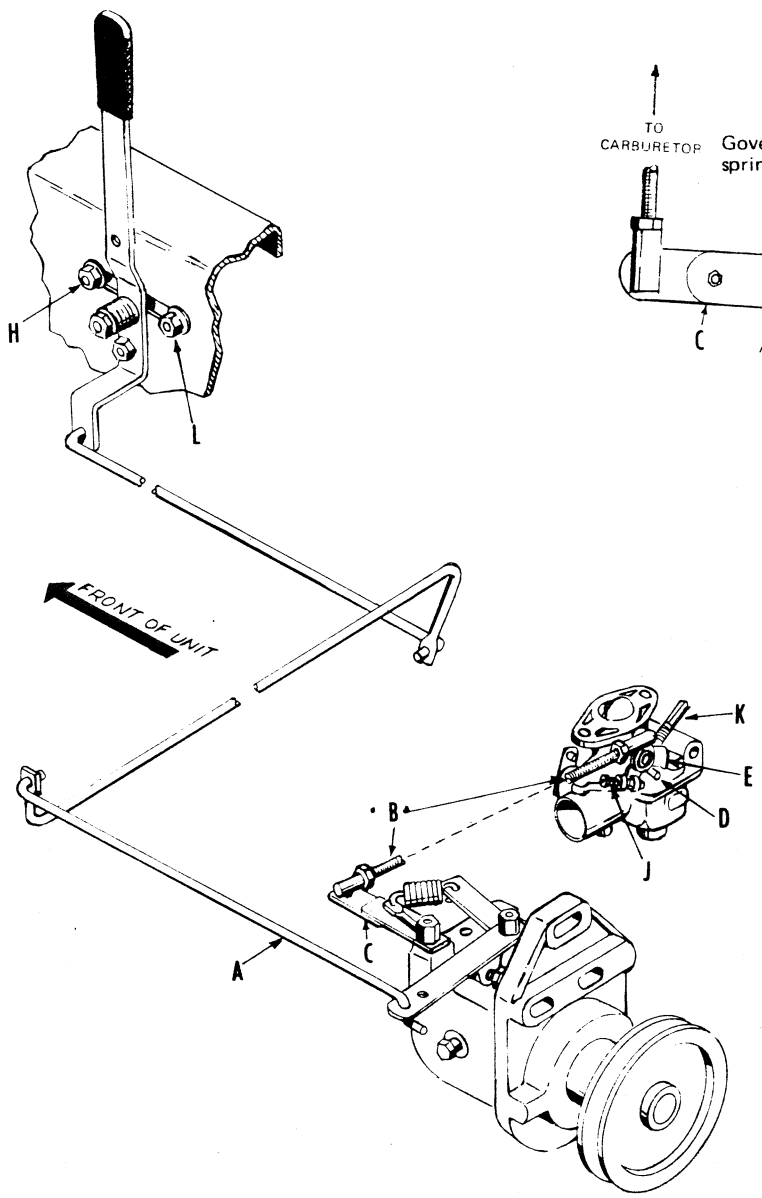


FIGURE "B"

Testing Battery

Battery condition should be determined first, it is vital to the testing of starting circuit problems to have the battery fully charged and free of shorted or dead cells. Use the following test to determine voltage available at battery.

1. Attach positive (+) voltmeter lead to positive (+) battery lead. Attach negative (-) voltmeter lead to negative (-) battery terminal.

2. Crank engine.

3. Voltmeter should read at least 9 volts. If above the minimum, continue testing. If below minimum, replace or recharge the battery.

Testing the Starting Circuit

Starting circuit problems can be divided into two general areas. The power circuit consists of the battery and starting motor, and the control circuit consists of the relay (diesel only), neutral start switches, key switch, 30 amp fuse, and wiring.

With key switch on "start", you can expect one of five thing to occur if the starting circuit is defective:

1. "Nothing Happens"- there is no "click" indicating that the solenoid contacts did not close.

2. An audible "click" in the solenoid is heard, but the starting motor does not operate.

3. The starting motor is running, but the engine does not turn over.

4. The starting motor turns over the engine slowly or erratically.

5. The engine starts but the starting motor drive does not disengage from the flywheel.