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Service Manual

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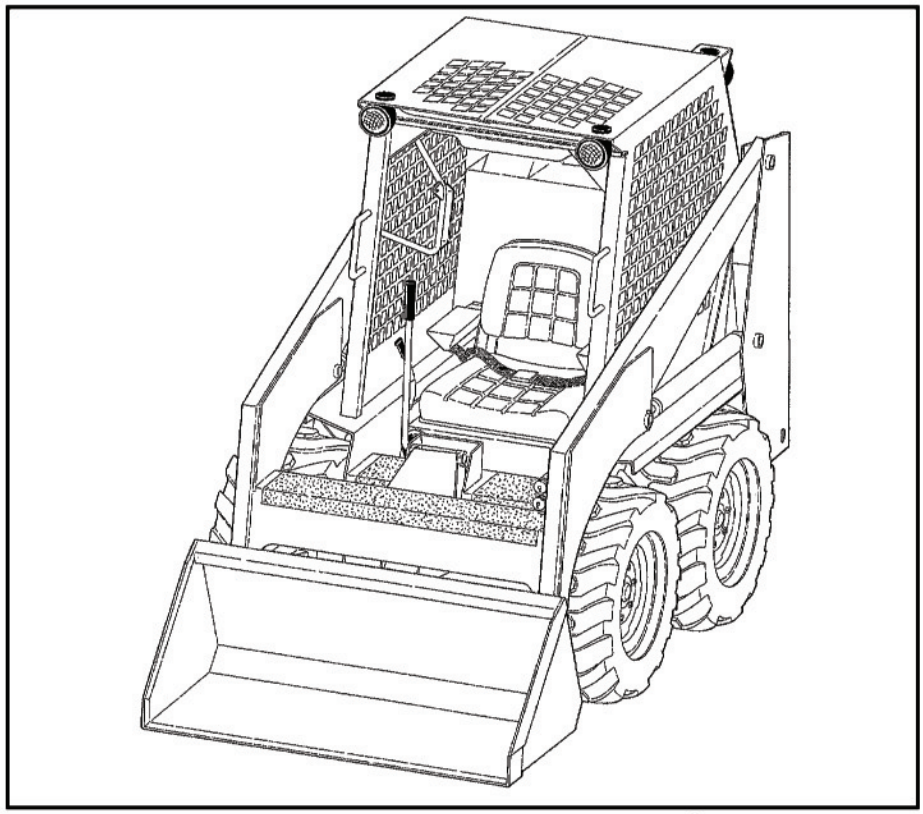


MELROE
INGERSOLL-RAND

6556407 **(6-12)**

Printed in U.S.A.

bobcat®

1–1 INTRODUCTION

1–1.1 Symbols

⚠ WARNING

This symbol is on the machine and used in this manual for an identification of warning. When this symbol is shown, look for possible danger to personnel. Carefully read and follow the instructions on this symbol.

IMPORTANT

This symbol is used as an identification for possible damage to equipment when you work on a specific part of the machine. Carefully read and follow the instructions on this symbol.

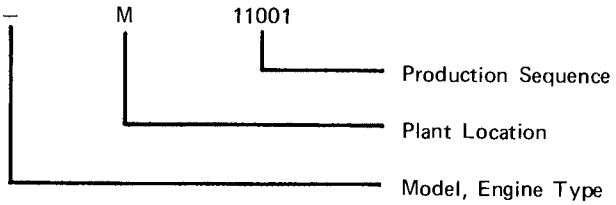
1–1.2 Serial Number Identification

It is important to make correct reference to the serial number of the loader when you make repairs or are ordering parts. Early or later models (identification made by "Lot") sometimes use different parts, or it may be necessary to use a different procedure in doing a specific job. Make reference to the parts manual for identification information.

1–1.3 Loader Serial Number

The plate for the serial number of the loader is inside the left upright (Fig. 1–1).

The serial number is made up as follows:



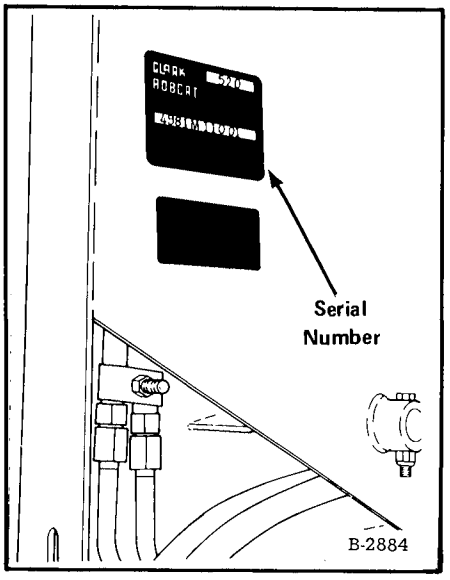
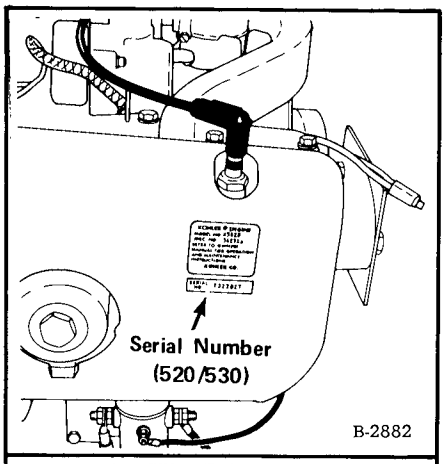


Fig. 1–1 Loader Serial Number



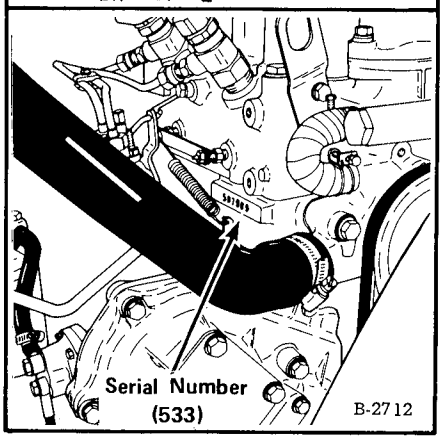


Fig. 1–2 Engine Serial Numbers

1–1.4 Engine Serial Number

The Kohler (520/530) engine serial number is located on the blower housing, at the right side of the engine (Fig. 1–2).

The ISUZU engine (533) engine serial number is on the left side of the engine, above the injection pump (Fig. 1–2).

(3) Open the upper valve (Fig. 1–28, Item 2). Remove the reservoir fill cap (Fig. 1–29) and add recommended fluid. When the fluid flows from the upper valve, close the valve and install the fill cap.

1–16.2 Hydraulic/Hydrostatic Fluid Replacement

Remove the fluid from the hydraulic reservoir and replace it with new approved fluid after every 1000 hours of operation, or sooner, if the fluid is dirty.

To remove fluid from the reservoir:

(1) Remove the hose from the outlet elbow on the oil cooler (long hose) and put the end into a clean reservoir (Fig. 1–30).

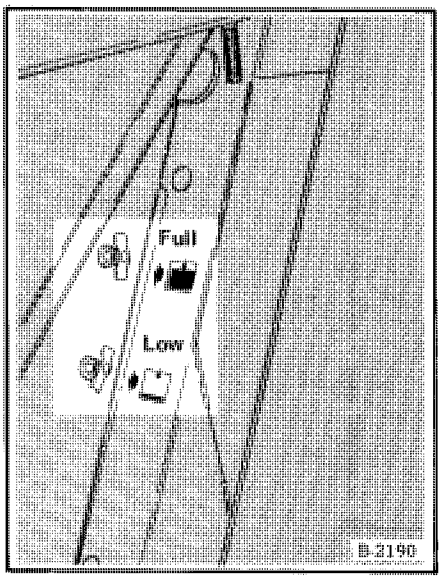


Fig. 1–28 Hydraulic Reservoir Level Check

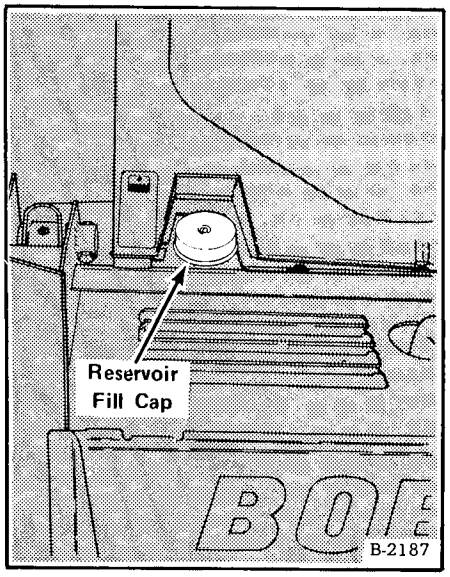


Fig. 1–29 Hydraulic Reservoir Fill Point

(2) After all fluid has been removed, connect the hose to the cooler.

(3) Remove the spring clip and remove the screen from the reservoir filler pipe (Fig. 1–31). Wash the screen in clean solvent and install it in the filler pipe. (Clean the reservoir screen only when necessary.)

(4) Open the upper valve at the side of the reservoir (Fig. 1–28, Item 2). Add recommended fluid (about 4 gallons [15 Ltrs.]) to the reservoir. When fluid flows at the open valve, close the valve and install the filler cap.

1–17 HYDRAULIC FILTER REPLACEMENT

Replace the hydraulic filter element after every 100 hours of operation, or sooner, if necessary (indicated by illuminated "tran" light).

To replace the element:

(1) Remove the element (Fig. 1–32). (Use an open reservoir to catch leaking fluid.)

(2) Clean the element contact area of the filter housing.

(3) Put oil on the rubber gasket on the new filter element.

(4) Install the element. Tighten it until it is hand tight only.

(5) Start the loader engine and check for leaks.

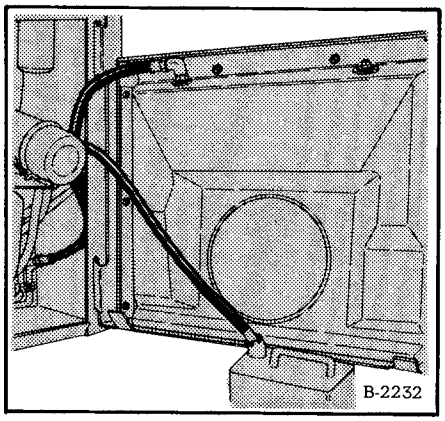


Fig. 1–30 Draining Reservoir (520, 530)

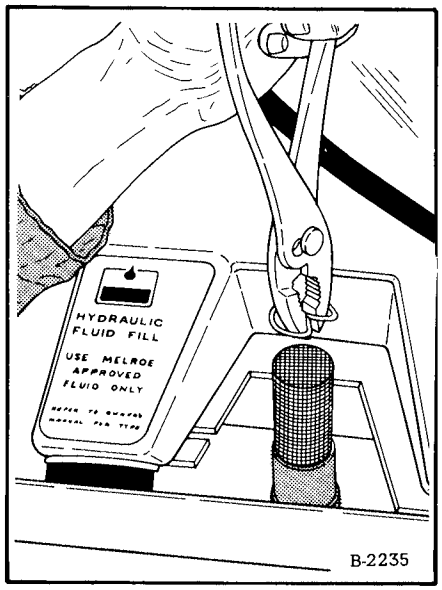


Fig. 1–31 Removing Filler Pipe Section

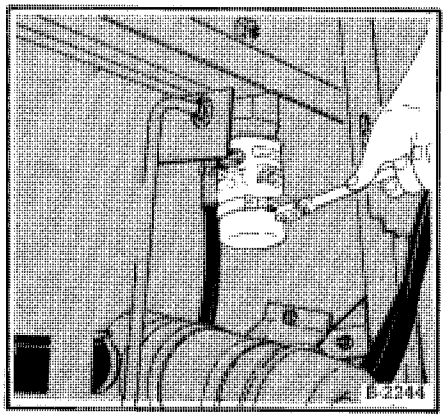


Fig. 1–32 Remove Hydraulic Oil Filter

1–18 FINAL DRIVE TRANSMISSION (CHAINCASE)

The chaincase is the housing for the final drive sprockets and chains. The chaincase is filled with the same fluid as the hydraulic/hydrostatic transmission.

To check the fluid level:

(1) Put loader on a level surface.

HYDRAULIC FLOW CHART

520 (All)
530 (S/N 13,999 & Below)
533 (S/N 12,999 & Below)

HYDRAULIC FLOW CHART

530 (S/N 14,001 & Above)

533 (S/N 13,001 & Above)

CHART A

SLOW HYDRAULIC OR NO HYDRAULIC POWER TO ALL CIRCUITS

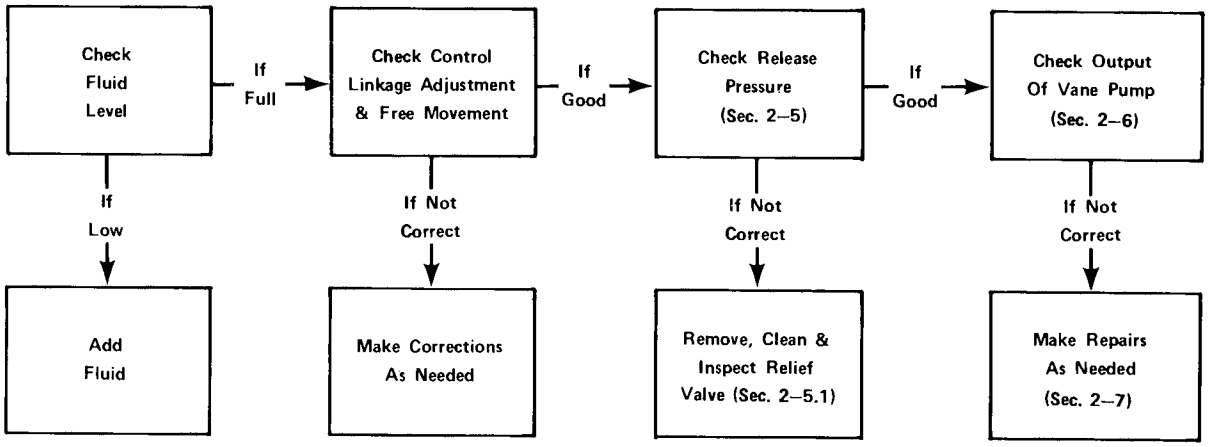
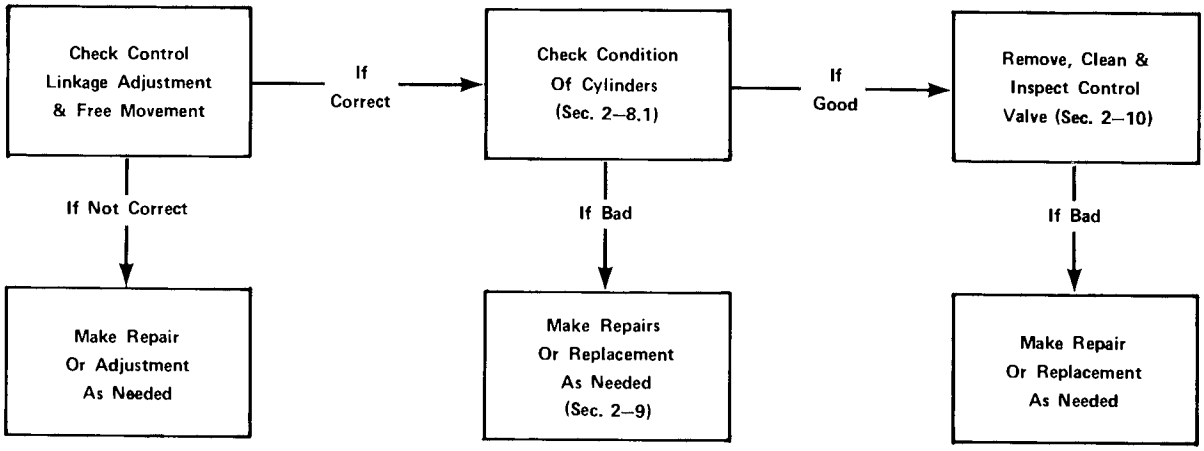


CHART B

SLOW HYDRAULIC OR NO HYDRAULIC POWER TO ONE CIRCUIT ONLY. CYLINDERS MOVE WITH CONTROLS IN NEUTRAL POSITION.



3 HYDROSTATIC SYSTEM

3–1 HYDROSTATIC CIRCUIT (Fig. 3–1)

Fluid from the hydraulic control valves goes to the hydrostatic filter and then to the hydrostatic pumps. If the pressure to the filter is too high (oil too thick, as in cold weather starting), the by-pass valve in the port block will open and let fluid return to the inlet of the hydraulic pump.

Fluid which goes to the hydrostatic pumps keeps the lines from the pumps to the motors full of fluid. Fluid enters the system through the replenishing valves. Fluid which leaks (internally) from the pumps returns to the hydraulic vane pump, through an internal passage.

Fluid which leaks internally from the hydrostatic motors goes to the oil cooler. From the oil cooler, the fluid returns to the inlet of the hydraulic (vane) pump.

If the pressure of the fluid supply to the hydrostatic pumps is too low (filter is dirty or one of the pumps has wear), the pressure switch at the filter will close and illuminate the "Trans" light on the dash panel.

If the fluid becomes too hot, the switch at the port block will close and illuminate the "Trans" light.

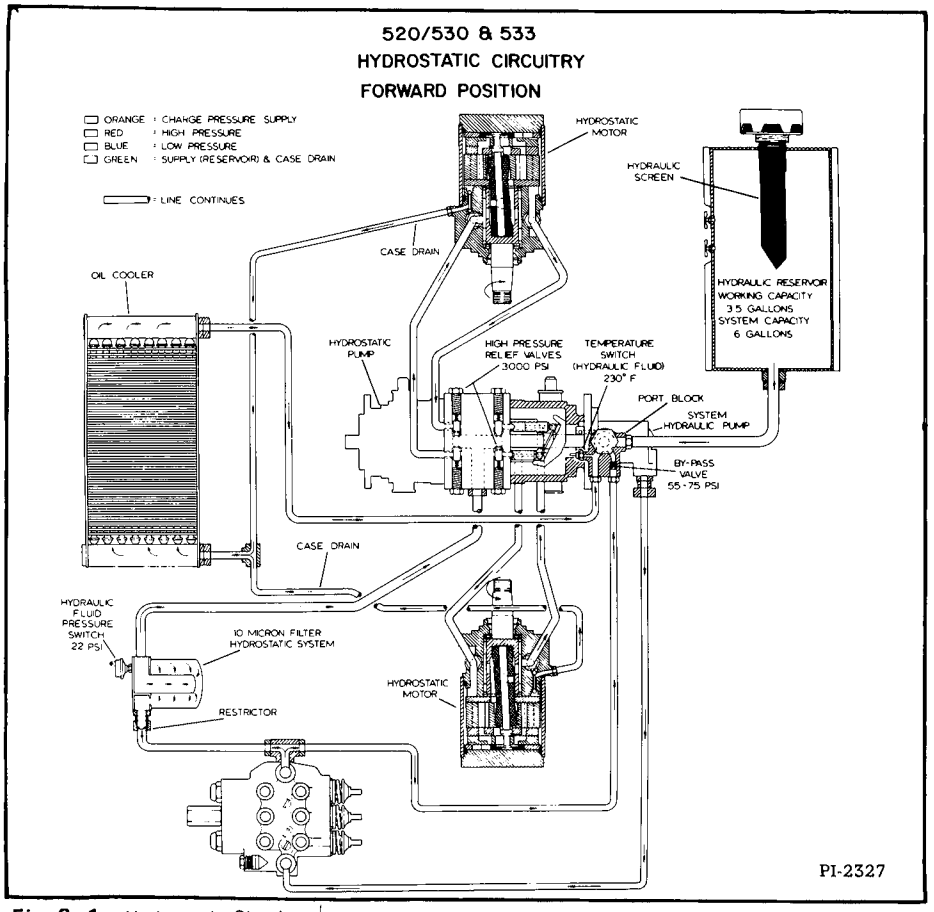


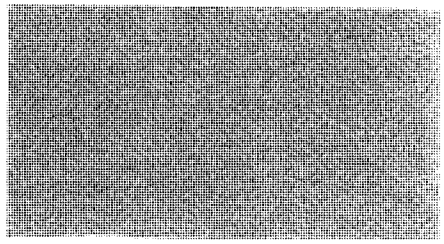
Fig. 3–1 Hydrostatic Circuitry

There is a restrictor orifice (Fig. 3–2) which protects the filter from damage from sudden increases in pressure. This orifice is in location at the control valve end of the filter tubeline (1) on 520 S/N 12,299 and below. On 520 S/N 12,300 and above and all 530, 533's, the orifice is located at the inlet tubeline to the 10 micron filter (2).

3–2 TROUBLESHOOTING CHART

PROBLEM	CHART NO.	CORRECTION
No drive on one side in one direction.	None	Check for hydraulic leaks. Check steering linkage, check replenishing valves (Sec. 3–4.1).
No drive on either side.	A	Check fluid level and steering linkages, make replacement of filter, inspect by-pass. Check vane pump. Check restrictor.
No drive, one side, both directions.	B	Check linkage. Check for pump or motor damage.
Machine does not move in a straight line.	C	Check dia. and size of tires steering linkage, see Chart B.

NOTE: If the "Trans" light is illuminated, check which sender is actuating the light by removing the wire at the pressure sender switch. If the light is still illuminated, the temperature sender is actuating the light because fluid is too hot. If the light goes out when the pressure sender wire is removed it is an indication of loss of hydrostatic charge pressure.



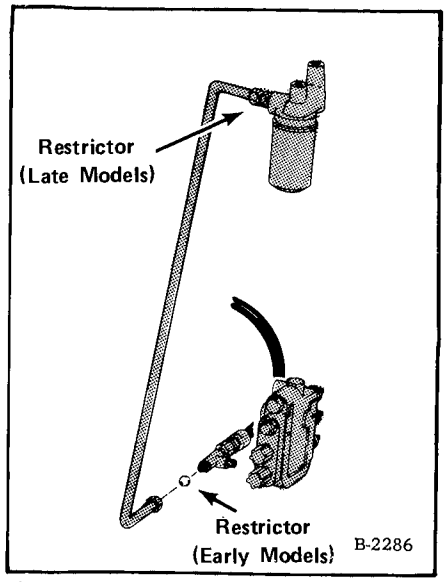


Fig. 3–2 Restrictor At Filter Inlet

3—10 STEERING LINKAGE

3—10.1 Adjustment (Old Style Linkage)

(1) Put the machine on jackstands.

⚠WARNING

Be sure that the tires are off the floor and are not hitting jackstands.

NOTE: The nuts that hold the steering linkage can become loose (Fig. 3—43, Item 1). Tighten the nut to 25 - 28 ft.-lbs. (33,8 - 37,9 Nm) torque.

(2) Disconnect the steering levers from the control rod.

(3) Start the engine and run it at idle RPM. Adjust the rear pintle arm first. Loosen the pintle arm stops (Fig. 3—42, Item 1). Adjust the pintle arms (Item 2) so that the axles do not turn. Slide the stops against the pintle arms and tighten the bolts.

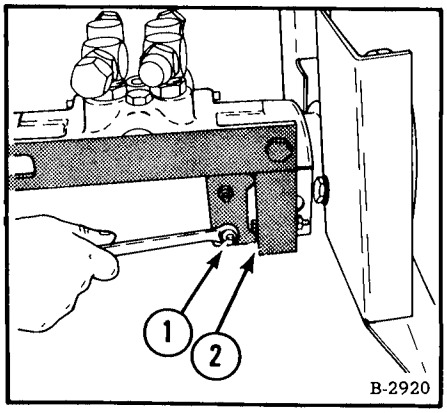


Fig. 3—42 Loosen Pintle Arm Stops

(4) The centering spring (Fig. 3—44, Item 1) must have enough force to hold the pintle arms in the neutral position. Adjustment to the spring is made by turning the nut (Item 2).

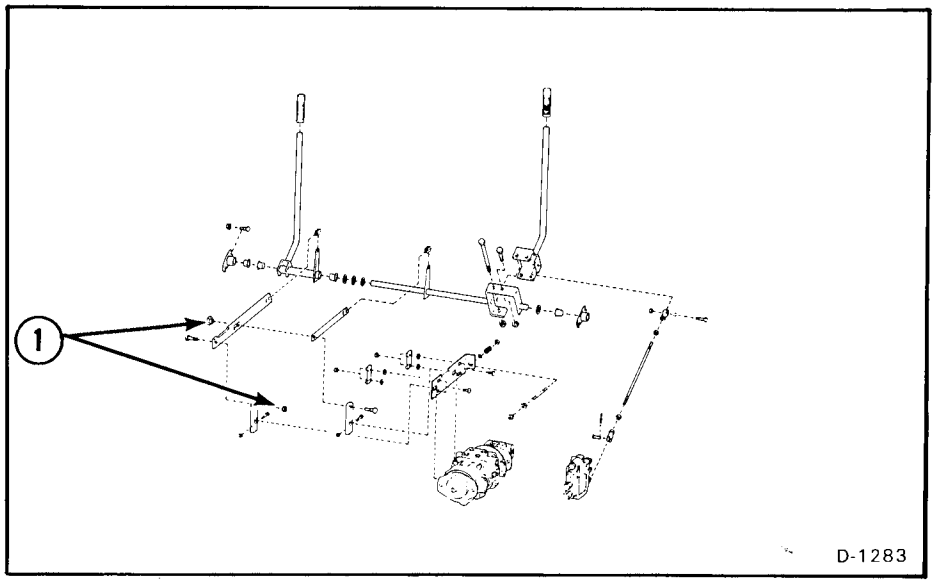


Fig. 3—43 Steering Controls

NOTE: Current production loaders (530; S/N 12034 & above and 533; S/N 12000 & above) have improved steering linkage and pedal control parts. You can replace these parts with "improved" parts. (See your Parts Manual or microfiche for parts.)

3—10.2 Adjustment (New Style Linkage)

To adjust for neutral position (Fig. 3—45).

(1) Put the machine on jackstands.

⚠WARNING

Be sure that the tires are off the floor and are not hitting jackstands.

(2) Move the left steering lever until the tires do not turn (neutral). Adjust rear pintle bar so that the bar is tight against both lobes of pintle lever and tighten the bolt first to 28 ft.-lbs. (38 Nm) torque.

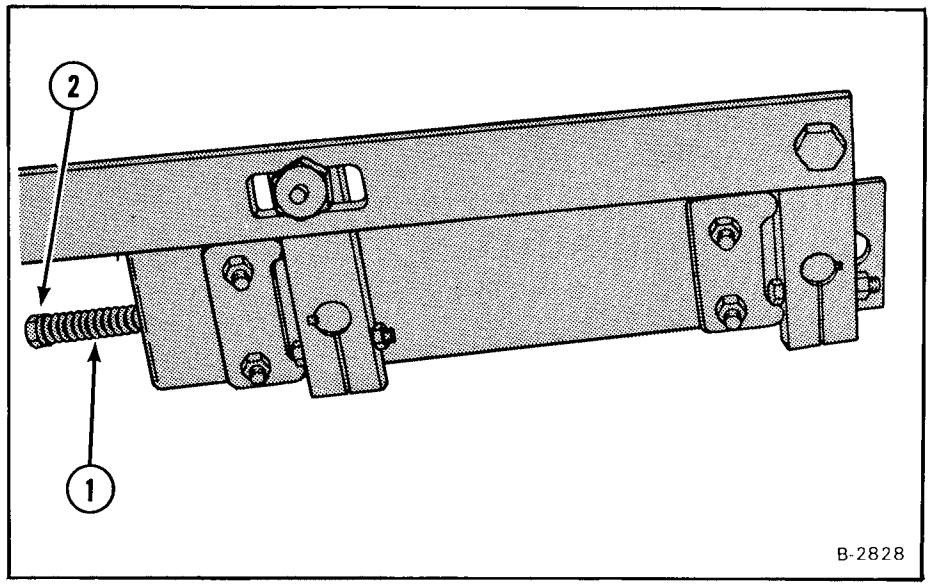


Fig. 3—44 Centering Spring Assembly

5 MAIN FRAME

5–1 REMOVAL OF ROPS (Operator Guard) (Fig. 5–1)

(1) Stop the engine and activate the hydraulic controls to release hydraulic pressure in the system.

(2) Fasten a chain hoist to the ROPS.

(3) Remove the two (2) bolts from the front corners of the ROPS.

(4) Remove the two (2) bolts from the rear corners of the ROPS.

(5) Disconnect the wiring harness.

(6) Lift the ROPS from the Bobcat.

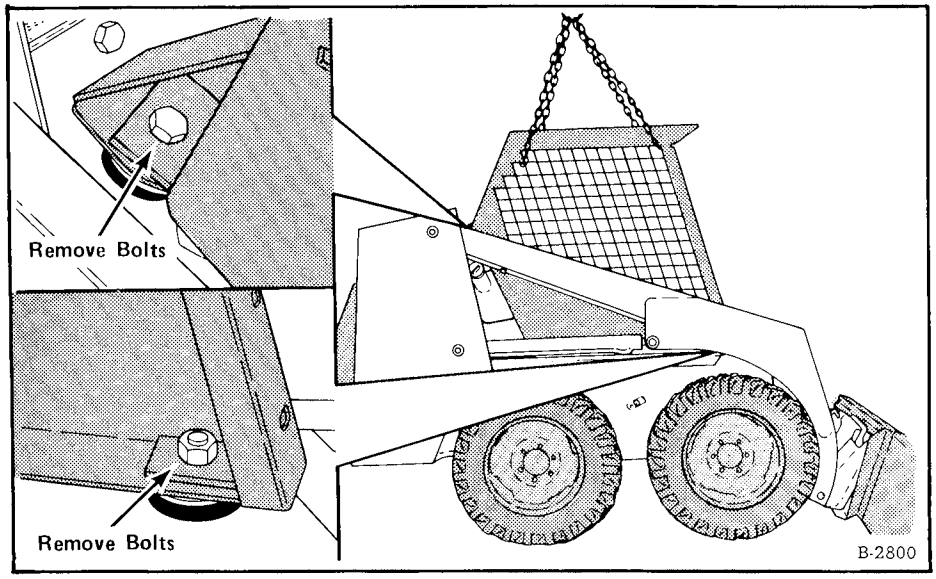


Fig. 5–1 Remove The ROPS

⚠ WARNING

Be sure to install holddown bolts and washers when installing the ROPS (Fig. 5–2).

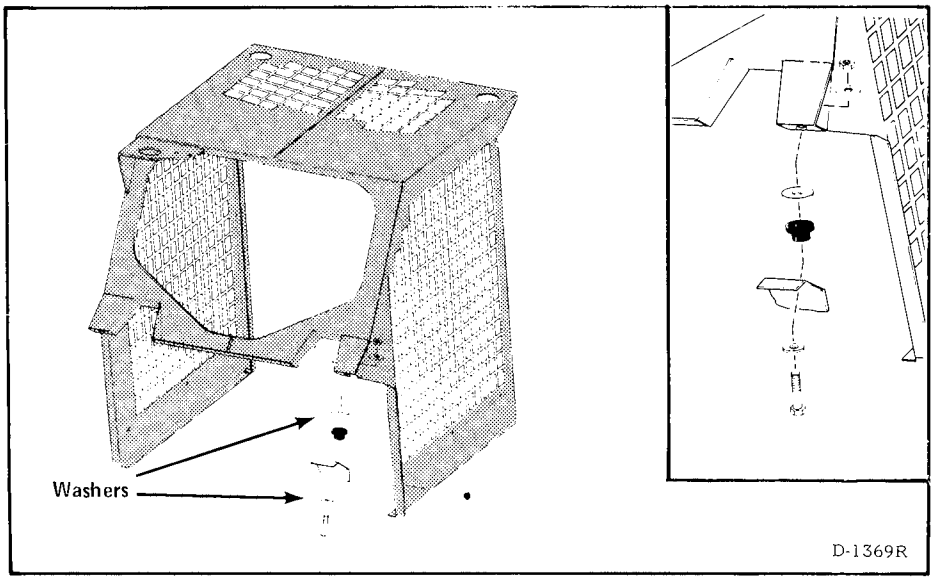


Fig. 5–2 Install Holddown Bolts

5–2 REPLACEMENT OF PIVOT PINS (Fig. 5–3)

(1) Stop the engine and activate the hydraulic controls to release hydraulic pressure in the system.

(2) Fasten a chain hoist to the lift arms.

(3) Remove the bolt in the pivot pin.

(4) Use a punch and hammer to remove the pivot pins.

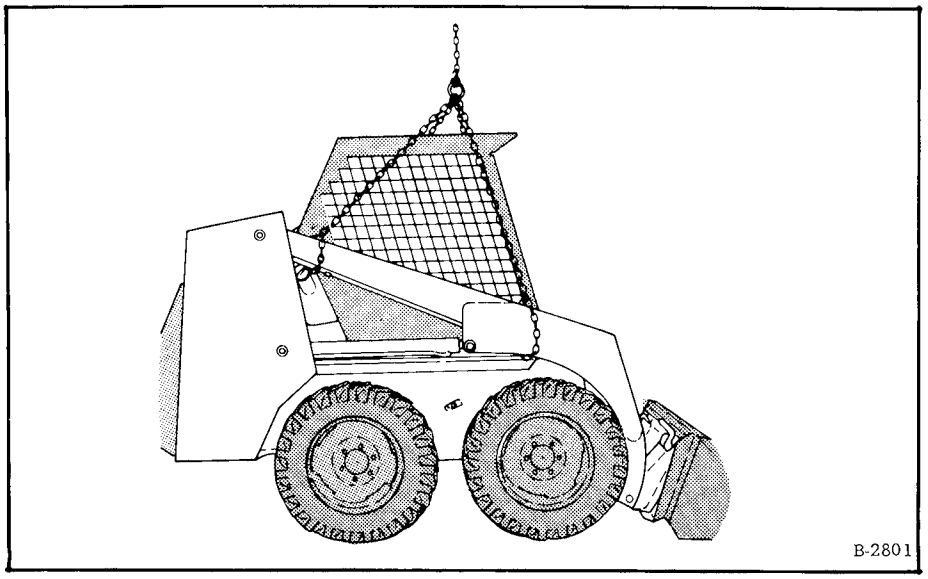


Fig. 5–3 Liftarm Removal

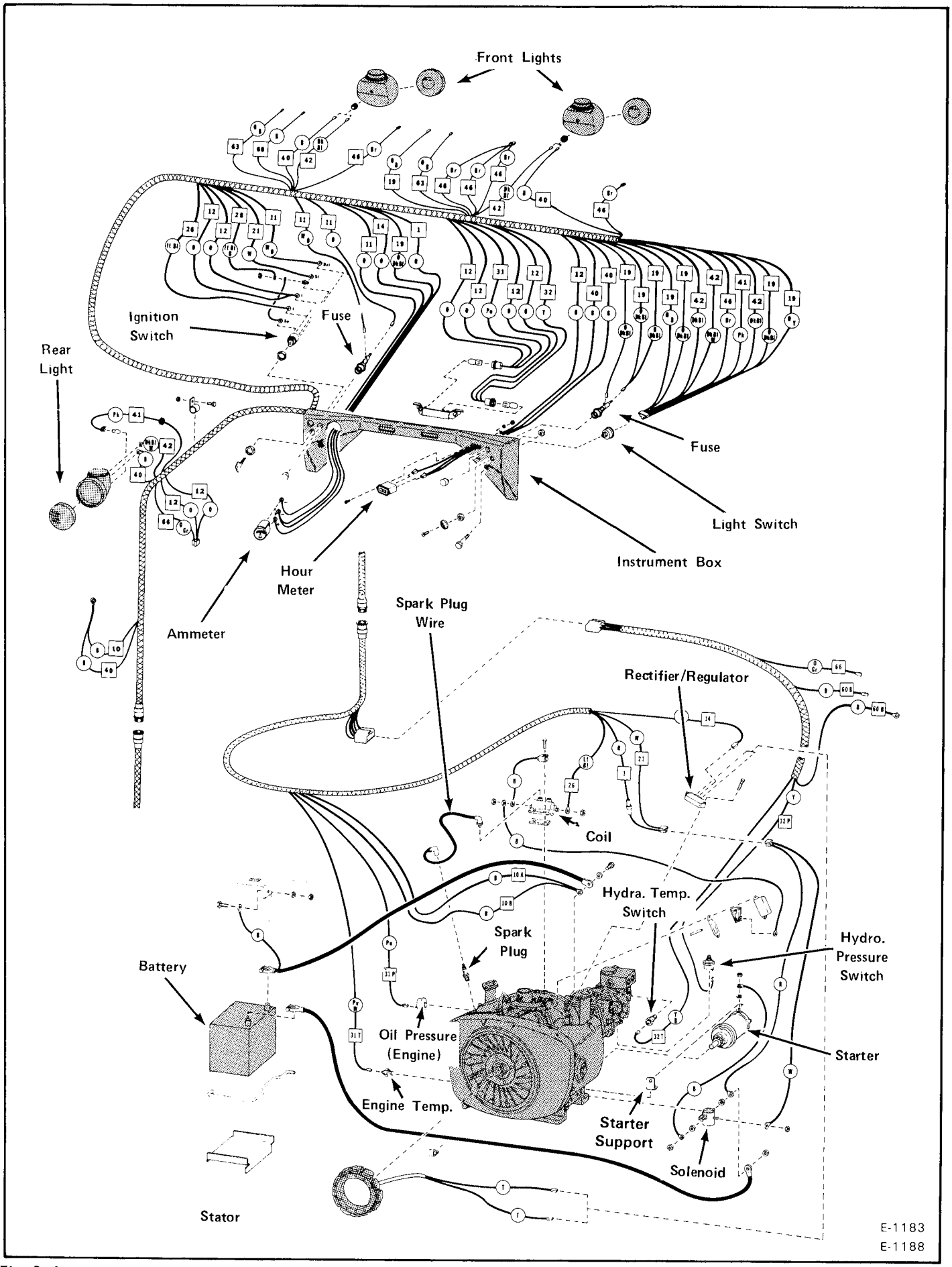


Fig. 6–4 Electrical System (530 Loader)

6–7.2 Checking the Starter

Armature

(1) Make a visual check of the commutator for rough or burned surface and if necessary, polish with a fine sand paper. Turn the commutator in a lathe if it is rough or taper wear is over maximum.

Standard outside diameter	1.73" (41 mm)
Minimum allowable diameter	1.61" (41 mm)

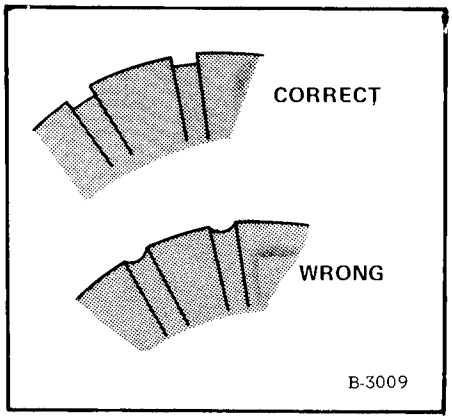


Fig. 6–27 Aramture Undercut

Measure the outside diameter of the commutator at several locations with an outside micrometer and compare the highest micrometer indication with lowest indication to find the amount of wear. Correction is necessary if the amount of wear is beyond the value indication for need of servicing.

Value indication for need of servicing	above .016" (0.44 mm)
Finishing accuracy	.002" (0.05 mm)

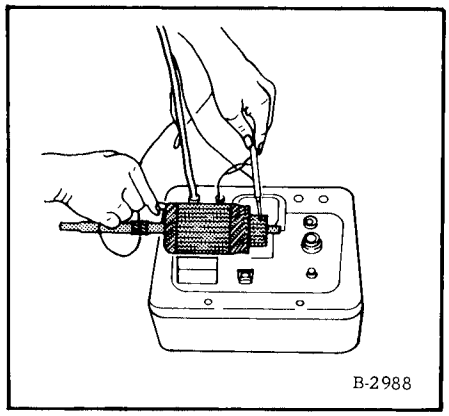


Fig. 6–28 Armature Insulation Test

(2) Measure the depth of the undercut mica on the commutator (Fig. 6–27). Correction is necessary, if the measured values are beyond the value indication for need of servicing.

Value indication for need of servicing	above .008" (0.2 mm)
Standard depth	.020" - .031" (0.5 - 0.8 mm)

(3) Armature coil insulation test:

Test for insulation between the commutator segments using a growler tester (Fig. 6–28). If the light of the growler illuminates, the coils are poorly insulated and the armature needs replacement.

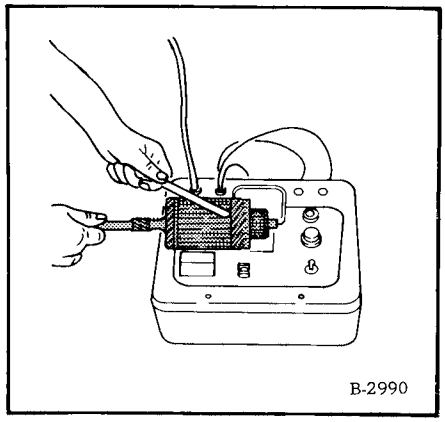


Fig. 6–29 Armature Coil Short Test

(4) Testing of the armature coils for shorts:

Put the armature on the growler and turn the armature on the growler slowly while holding a hacksaw blade or a strip of steel over the sections of the armature core (Fig. 6–29). If there is vibration of the hacksaw blade or a strip of steel, or if it is pulled, the armature coils are shorted and the armature needs replacement.

(5) Armature coil continuity test:

Make a continuity test between the commutator sections using a growler (Fig. 6–30). If the light of the growler does not illuminate when the tester wires are connected across the commutator sections, the coil circuit is open and armature needs replacement.

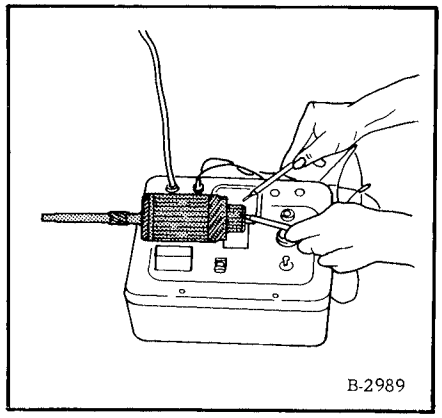


Fig. 6–30 Armature Coil Continuity Test

7—7.3 Camshaft and Tappets

The gear cover must be removed to remove the camshaft gear. Remove all of the bolts which hold the gear cover plate in place. Remove the cylinder heads and valves. Turn the camshaft to push the tappets out of the way and slide the shaft out of the engine.

NOTE: If the camshaft is worn, also replace the tappets. To replace the tappets, the oil pan must be removed.

7—8 OIL PUMP AND RELIEF VALVE

The relief valve for oil pressure is under the No. 1 cylinder (Fig. 7—17). The oil pressure is adjusted by loosening the jam nut and turning the screw with an allen wrench. Oil pressure is checked with engine idling and oil at operating temperature. If the oil pressure can not be adjusted, either the bearings or the pump has a defect.

If oil pump has a defect, a replacement must be made. To remove the pump, remove the oil pan and take off the strainer. Then, remove the flywheel and gear cover. Remove 2 bolts which hold the pump in place and lift out the pump (Fig. 7—18).

7—8.1 Adjust Gear Clearance for Engine Oil Pump

When installing the oil pump on the 520 and 530 engine, it is important to adjust the clearance between the oil pump gear and the crankshaft gear. The clearance between the gears is .005" to .009" (0,127 to 0,228 mm). A feeler gauge or a dial indicator can be used.

To Set Clearance With Feeler Gauge:

(1) After oil pump is installed, do not tighten the mounting bolts.

(2) Use a .007" (0,177 mm) feeler gauge and adjust the clearance between the oil pump and crankshaft gear (Fig. 7—16a). Tighten the mounting bolts.

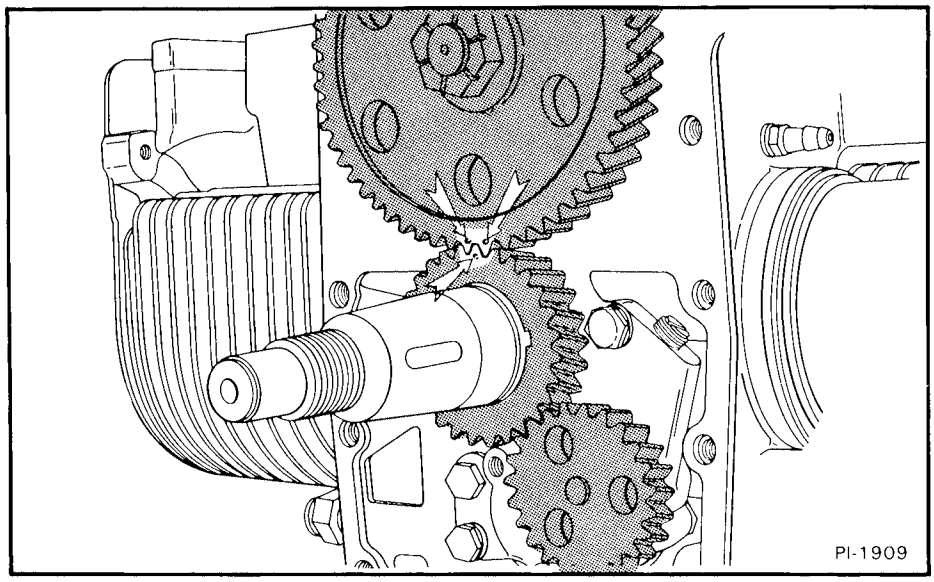


Fig. 7—16 Alignment of the Crank and Cam Gear Marks

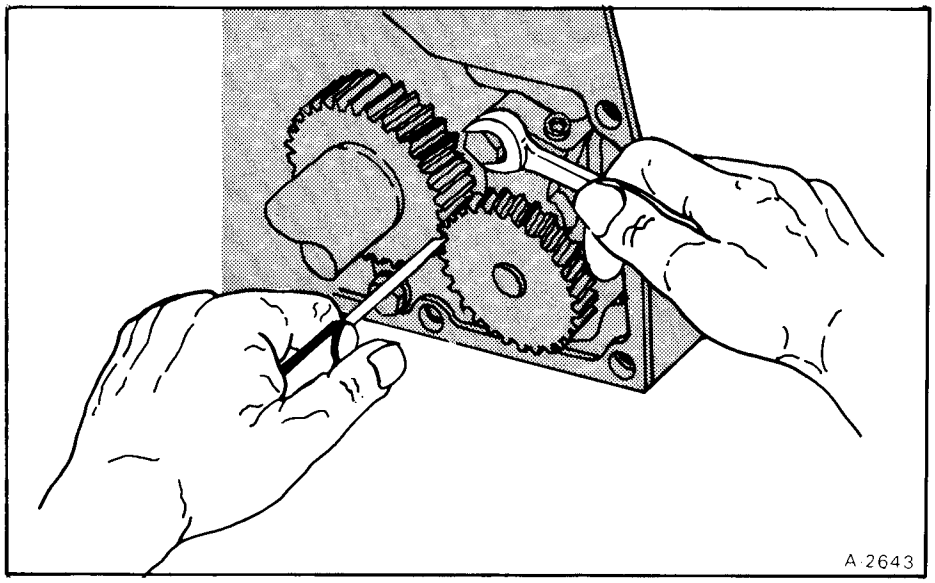


Fig. 7—16a Adjusting Oil Pump Gear With Feeler Gauge

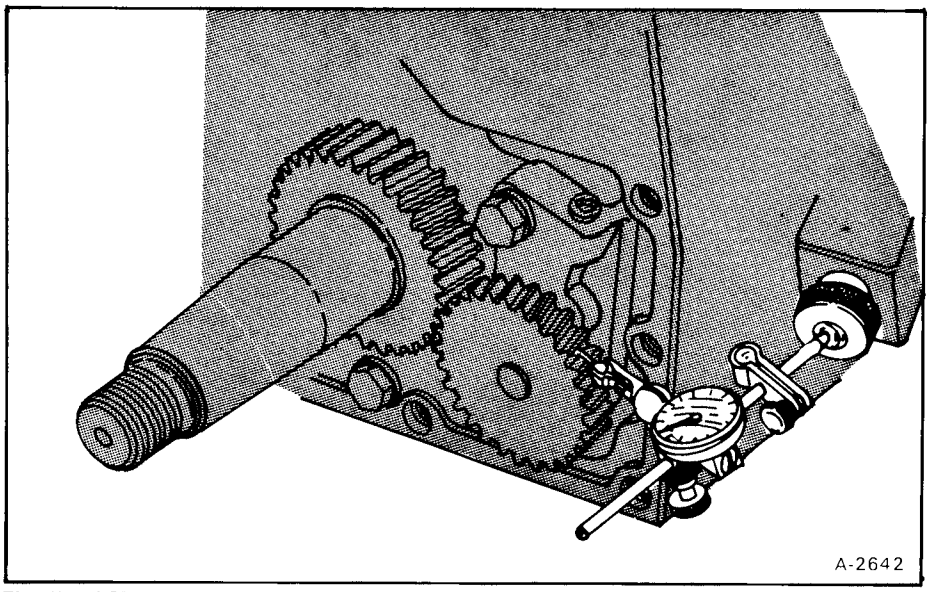


Fig. 7—16b Adjusting Oil Pump Gear With Dial Indicator

(2) Check the hot plug fitting areas for cracks and damage and make replacement of the cylinder head assembly if there is any damage condition to the cylinder head. High spots or pieces on the hot plug seat area can cause poor fitting of the hot plug.

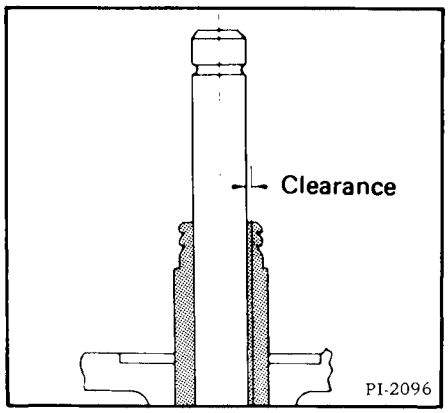


Fig. 8–19 Check Valve Stem Wear

8–5.3 Inspection of the Valves and Valve Guides

(1) Check for amount of wear of the valve stems in the valve guides (Fig. 8–19).

(2) Use a micrometer to measure the outside diameter of the valve stems at locations A, B and C (Fig. 8–20).

8–5.4 Inspection and Correction of the Valve Seats

(1) Check the valve seats for wrong contact or damage and correct or replace as necessary. Before correcting the valve seat, check the valve guide and install a new guide, when necessary.

(2) Cut the valve seat using seat cutters of correct specification so that the contact width is correct (Fig. 8–21 & 8–22).

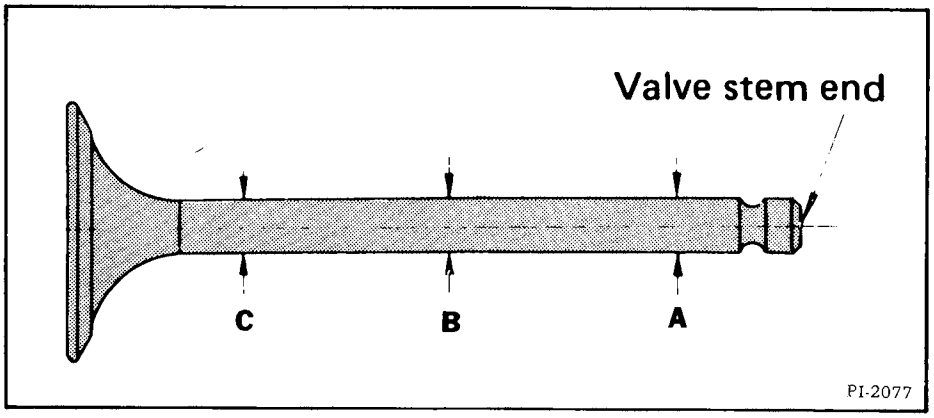


Fig. 8–20 Measure Outside Diameter of Valve Stems

NOTE: When cutting the valve seat use a guide rod of correct diameter.

(3) If the amount of valve seat depth is over the value indication for need of servicing, replace the valve seat insert (Fig. 8–23).

(4) Procedure for replacement of the valve seat insert.

a. Use an oxy-acetylene cutting and welding torch to heat the opposed 2 portions of the inner face of the valve seat insert until red hot (700 - 800°C). Let the insert cool for 3 to 5 minutes. Use a screwdriver to remove the valve seat insert.

b. Remove carbon and metal deposit from the insert bores in the cylinder head. Measure the diameters of the insert bores and select the inserts according to the specifications section.

(5) Press the insert all the way into the bottom of the insert bore. Then grind the seat face.

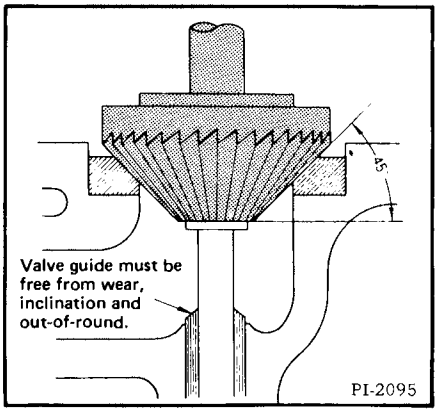


Fig. 8–21 Using Valve Seat Cutters

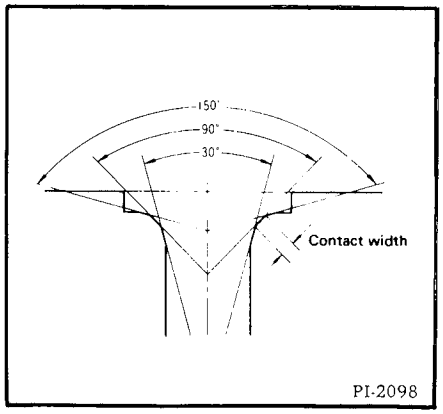


Fig. 8–22 Cutting to Correct Contact Width

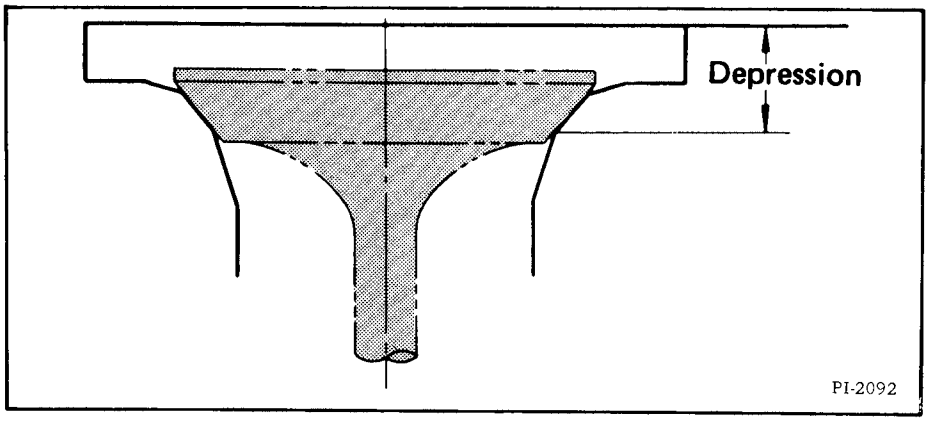


Fig. 8–23 Check for Correct Valve Seat Depth

8–14 DISASSEMBLY, INSPECTION AND ASSEMBLY OF THE OIL PUMP (Fig. 8–55)

(1) Disconnect the oil pipe (Fig. 8–55A).

(2) Remove the strainer case and pump cover. Then, remove the vane.

(3) Remove the pin which holds the pinion.

(4) Pull out the pin and remove the rotor.

(5) Remove the rotor shaft.

(6) Assemble the parts in the reverse order of disassembly.

(7) When assembling operation is completed, check that the rotor shaft turns smoothly.

8–14.1 Inspection

(1) Make a visual check of the vane, rotor and pinion gear for wear. Install new parts if the amount of wear is over specifications.

(2) Measure the clearance between the rotor, vane and cover. (See Specifications Section.) Make replacement of either the rotor or the vane if the measured amount is over the limit for servicing (Fig. 8–56).

(3) Use a feeler gauge to measure the tip clearance between the rotor and vane. Make replacement of the rotor assembly if the measured clearance is over the standard limit (Fig. 8–57).

(4) Measure the clearance between the rotor shaft and pump body. Replace the parts if the clearance is over the limit for servicing (Fig. 8–58).

8–15 DISASSEMBLY, INSPECTION AND ASSEMBLY OF THE OIL FILTER ASSEMBLY

8–15.1 Disassembly and Assembly (Fig. 8–59)

(1) Remove the oil filter assembly and remove the filter element by turning it counterclockwise.

(2) Remove the relief valve and overflow valve.

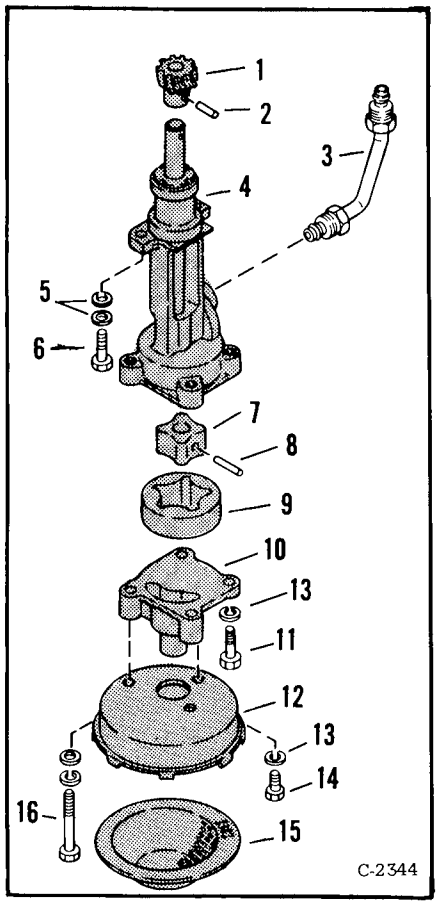


Fig. 8–55 Oil Pump Assembly

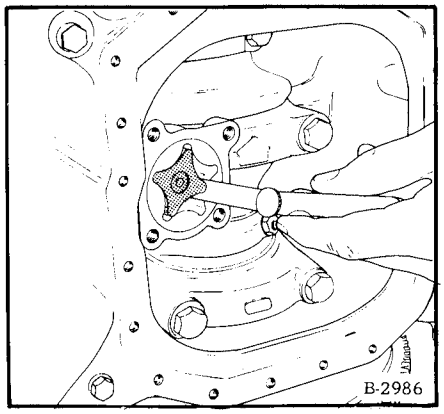


Fig. 8–57 Check Rotor & Vane Clearance

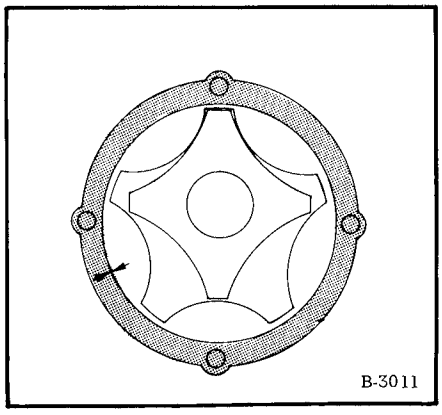


Fig. 8–58 Check Oil Pump & Rotor Clearance

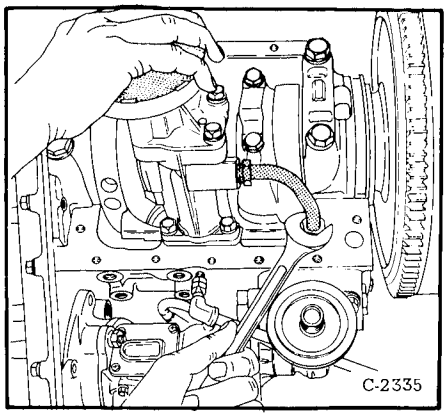


Fig. 8–55A Disconnect the Oil Pipe

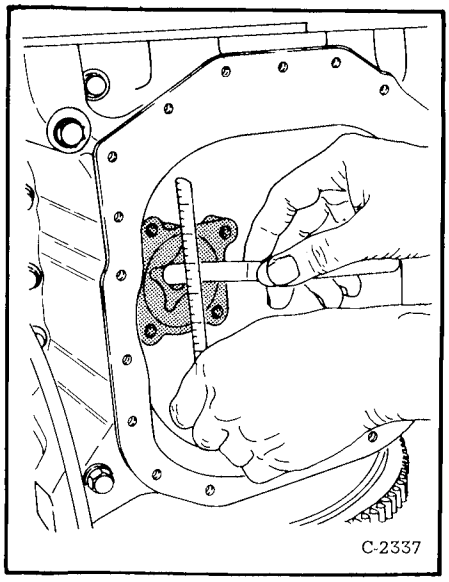


Fig. 8–56 Check for Oil Pump Wear

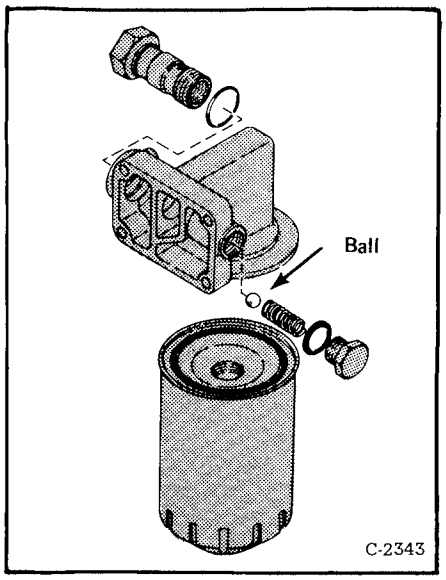
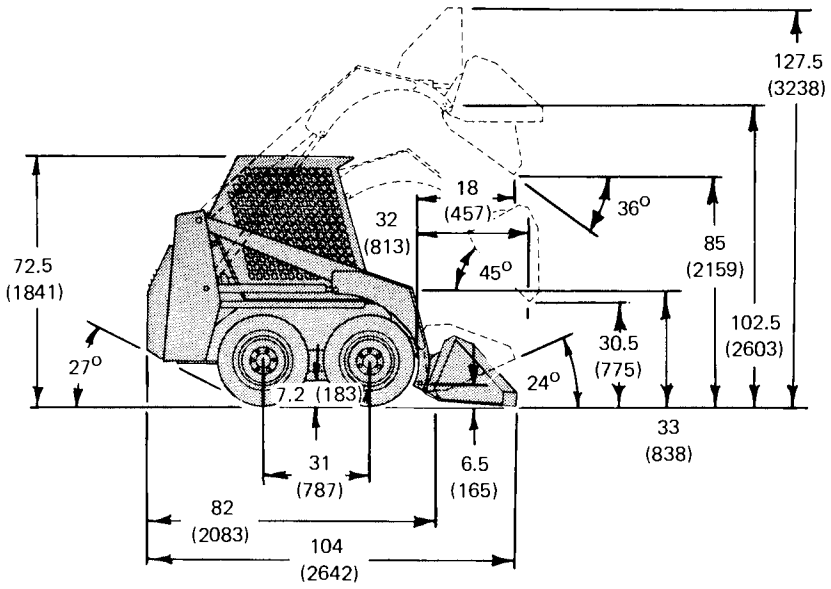
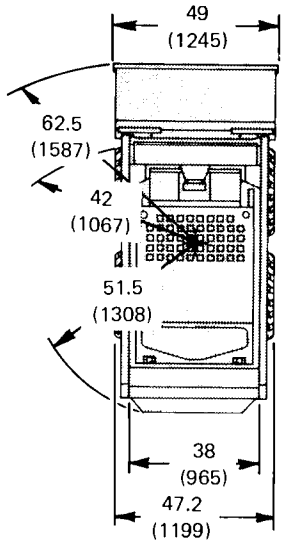


Fig. 8–59 Oil Filter Assembly





PI-2218

Dimensions are given for loader equipped with dirt bucket. And may vary with other bucket types. All dimensions are shown in inches. Respective metric dimensions are given in millimeters enclosed by parentheses.

Where applicable, specifications conform to ICED & SAE standards and are subject to change without notice.

9–4.1 Operating Specifications

Operating Weight . . 3300 lbs. (1500 kg)
Rated Capacity . . . . . 800 lbs. (363 kg)
Cycle Time:
Lift . . . . . 4.0 sec.
Lower . . . . . 3.0 sec.
Tilt . . . . . 2.5 sec.
Rollback . . . . . 2.0 sec.
Travel Speed . . 0 - 5.5 MPH (8,9 Km/hr)
Controls:
Vehicle . . . . Steering, direction, speed controlled by two hand levers. R.H. lever moves sideways to control auxiliary hydraulic circuit.
Loader . . . . . Hydraulic lift and tilt controlled by left and right foot pedals.

9–4.2 ENGINE

Make and Model . . . . . ISUZU 2AA1
Type . . . . . 2 cylinder diesel engine
Fuel . . . . . #2 Diesel
Horsepower . . . . . 19 Bhp (14 Kw) at 2500 RPM
Maximum Torque . . . 40 ft.-lbs. (54 Nm) at 2000 RPM
Bore and Stroke . . . . . 3.38 x 3.30" (86 x 83 mm)
Displacement . . . . . 60 $in.^3$ (1 L)
Cooling System . . . . . Liquid
Air Filter . . . . . Replaceable dry type
Crankcase Ventilation . External Breathing

9–4.3 ELECTRICAL

Generator . . . . . 37 ampere, open
Starter . . . . . 12 volt gear drive
Battery . . . . . 12 volt
Fuse . . . . . On dash panel

9–4.4 HYDRAULIC SYSTEM

Pump . . . . . Engine driven vane-type
System Design . Series - open center valve
System Release Pressure . . . . 1500 psi (10343 kPa)
Pump Volume, @ 2500 RPM . . 8.33 gpm (32 1/min.)
Hydrostatic Charge Pressure . . 55 - 75 psi (379 - 517 kPa)
Filters . . 10 micron for hydrostatic drive. Filter screen in reservoir fill for hydraulic system.
Cylinders . . . . . Doubleacting

Function	Tilt	Lift
Bore	3.0 (76,20)	2.0 (50,80)
Stroke	12.4 (314,96)	22.2 (563,88)
Rod	1.50 (38,10)	1.25 (31,75)

9–4.5 POWER TRAIN

Transmission . . . Both sides independent. Infinitely variable hydrostatic primary drive. Single chain reduction final drive.

9–4.6 CAPACITIES

Fuel Tank . . . . . 11 gal. (41,6 L)
Chaincase . . . . . 4 gal. (15 L)
Hydraulic Reservoir . . . . . 3.5 (13 L) (System: 5.5 gal. [21 L])
Engine Oil . . . . . 4 qts. (3,8 L)
Cooling System . . . . . 10 qts. (94,6 L)

9–4.7 TIRES

Standard . . . . 5.70 x 15,55 psi (379 kPa)
Flotation . . . . . 8.50 x 15,33-37 psi (240 kPa)

ALPHABETICAL INDEX

CLARK Melroe Division

bobcat

530 - 004
Bulletin No.

31 JULY 79
Date

SERVICE BULLETIN

AFFECTING:

Product BOBCAT LOADER

Model 520, 530 and 533

Serial No.

Manual No. 6556407

ROUTE TO ATTENTION

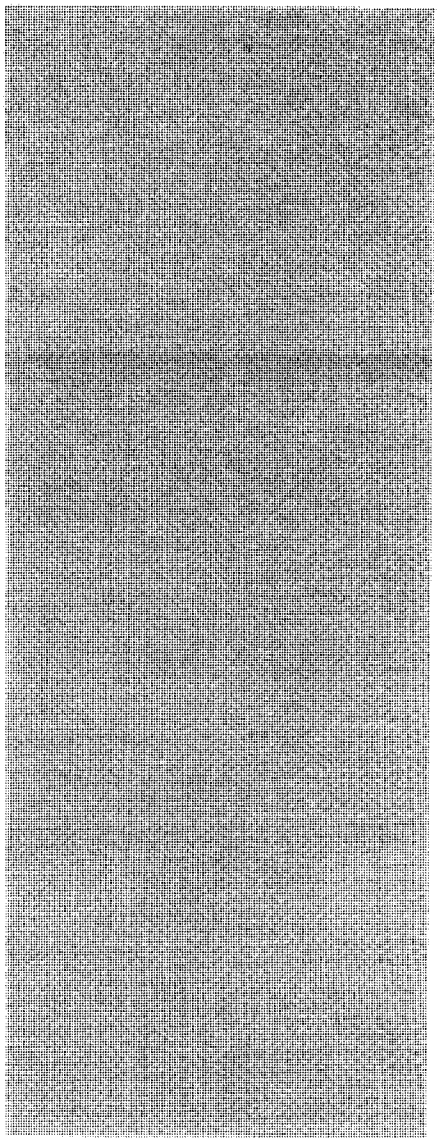
PARTS MANAGER ☑
SERVICE MANAGER ☐
SALES MANAGER ☐

SUBJECT: **REVISION TO THE SERVICE MANUAL**

The attached pages are a revision to the 520, 530 and 533 Service Manual (P/N 6556407 [10-78]. There are three pages to this Service Bulletin.

Remove the following pages in the Service Manual and put in the revised pages.

Remove	Put In
Revised Mar 79 7—5, 7—6	Revised June 79 7—5, 7—6
Added 7—9	Revised June 79 7—9
9—3, Revised Mar 7—9, 9—4	9—3, Revised June 79, 9—4



Refer To Bulletin No.(s) _____

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