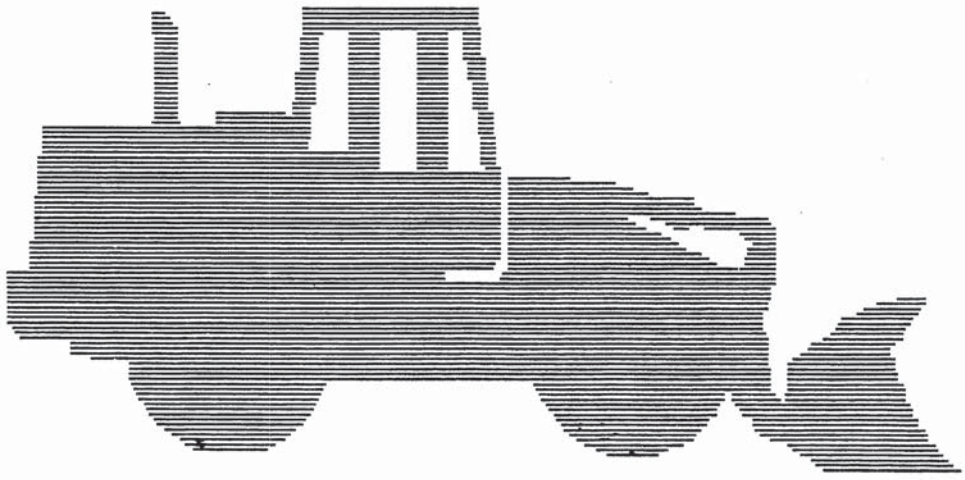
FIATALLIS®

FR160

Wheel Loader



Service Manual

Form 604.06.538 English

SAFETY RULES

Never travel a machine on a job site, in a congested area, or around people without a signal person to guide the operator.

In darkness, check area of operation carefully before moving in with machine. Use all lights provided. Do not move into area of restricted visibility.

Maintain clear vision of all areas of travel or work. Keep cab windows clean and repaired. Carry blade low for maximum visibility while traveling. Obtain and use fan blast deflectors where tractors are used a pusher tractors in tandem.

Transport a loaded bucket with the bucket as far tipped back and in as low a position as possible for maximum visibility, stability, and safest transport of the machine. Carry it at a proper speed for the load and ground conditions.

Carry the bucket low when traveling with a load.

Maintain a safe distance from other machines. Provide sufficient clearance for ground and visibility conditions. Yield right-of-way to loaded machines.

Avoid going over obstacles such as rough terrain, rocks, logs, curbs, ditches ridges, and railroad tracks whenever possible. When obstructions must be crossed, do so with extreme care at an angle if possible. Reduce speed - down-shift. Ease up to the break over point - pass the balance point slowly on the obstruction and ease down on the other side.

Cross gullies or ditches at an angle with reduced speed after insuring ground conditions will permit a safe traverse.

Be alert to soft ground conditions close to newly constructed walls. The fill material and weight of machine may cause the wall to collapse under the machine.

Operate at speeds slow enough to insure complete control at all times. Travel slowly over rough ground, on slopes or near drop offs, in congested areas or on ice or slippery surfaces.

Be alert to avoid changes in traction conditions that could cause loss of control. *DO NOT* drive on ice or frozen ground conditions when working the machine on steep slopes or near drop offs.

Keep the machine well back from the edge of an excavation.

Be especially careful when traveling up or down slopes. Position the bucket in such a way as to provide a possible anchorage on the ground in case of a slide.

When proceeding across a hill side proceed slowly. Never turn sharply up hill or down hill.

Avoid side hill travel whenever possible. Drive up and down the slope. Should the machine start slipping sideways on a grade, turn it immediately downhill.

In steep down hill operation, do not allow engine to over speed. Select proper gear before starting down grade.

There is no substitute for good judgement when working on slopes.

The grade of slope you should attempt will be limited by such factors as condition of the ground, load being handled, the type of machine, speed of machine and visibility.

NEVER COAST the machine down grades and slopes with the transmission in neutral on power shift machines, or clutch disengaged on manually shifted machines.

To reduce the danger of uncontrolled machine, choose a gear speed before proceeding down grade that will hold machine to proper speeds for conditions.

Operating in virgin rough terrain that includes previously mentioned hazards is called pioneering. Be sure you know how this is done. Danger from falling branches and upturning roots is acute in these areas.

When pushing over trees, the machine must be equipped with proper over head guarding. Never allow a machine to climb up on the root structure particularly while the tree is being felled. Use extreme care when pushing over any tree with dead branches.

Avoid brush piles, logs or rocks. *DO NOT DRIVE THE MACHINE ONTO BRUSH PILES, LOGS, LARGE ROCKS* or other surface irregularities that break traction with the ground especially when on slopes or near drop offs.

Avoid operating equipment too close to an over hang or high wall either above or below the machine. Be on the look out for caving edges, falling objects and slides. Beware of concealment by brush and under growth of these dangers.

Park in a non-operating and non-traffic area or as instructed. Park on firm level ground if possible. Where not possible, position machine at a right angle to the slope, making sure there is no danger of uncontrolled sliding movement. Set the parking brake.

Never park on an incline without carefully blocking the machine to prevent movement.

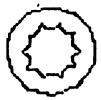
If parking in traffic lanes cannot be avoided, provide appropriate flags, barriers, flares and warning signals as required. Also provide advance warning signals in the traffic lane of approaching traffic.

Move the machine away from pits, trenches, overhangs and over head power lines before shutting down for the day.

When stopping operation of the machine for any reason, always return the transmission or hydrostatic drive control to neutral and engage the control lock to secure the machine for a safe start up. Set parking brake, if so equipped.

Never lower attachments or tools from any position other than seated in operator's seat. Sound the horn. Make sure the area near the attachment is clear. Lower the attachment slowly. *DO NOT USE* float position to lower hydraulic equipment.

CAPSCREW AND TORQUE VALUES

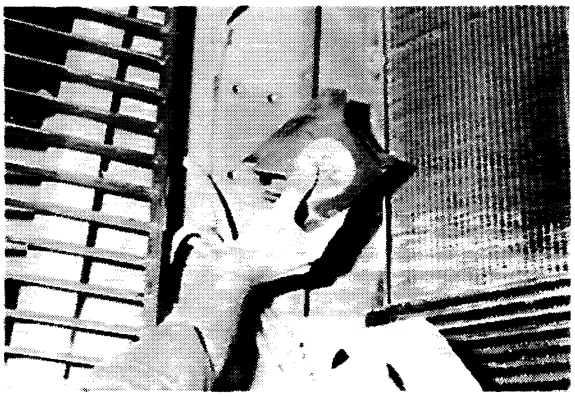
Capscrew Head Markings	SAE Grade Number	Capscrew Size									
		1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
Manufacturer's marks may vary		Threads per inch									
		20	18	16	14	13	12	11	10	9	8
		28	24	24	20	20	18	18	16	14	14
	1 or 2	Torque Ft-Lb									
		5	11	18	28	39	51	83	105	160	235
		6	13	20	30	41	55	95	115	175	250
	5	8	17	31	49	75	110	150	270	395	590
		10	19	35	55	85	120	170	295	435	660
	6 or 7	10	19	34	55	85	120	167	280	440	660
		12	21	38	61	95	130	187	300	480	730
	 8	12	24	44	70	105	155	210	375	605	910
		14	27	49	78	120	170	240	420	675	990

Notes:

1. Always use the torque values listed above when specific torque values are not available.
2. Do not use above values in place of those specified in other sections of this manual; special attention should be observed.
3. The above is based on use of clean, dry threads.
4. Reduce torque by 10% when engine oil is used as a lubricant.
5. Reduce torque by 20% if new plated capscrews are used.
6. Capscrews threaded into aluminum may require reductions in torque of 30% of more of Grade 5 capscrews torque and must attain two capscrew diameters of thread engagement.

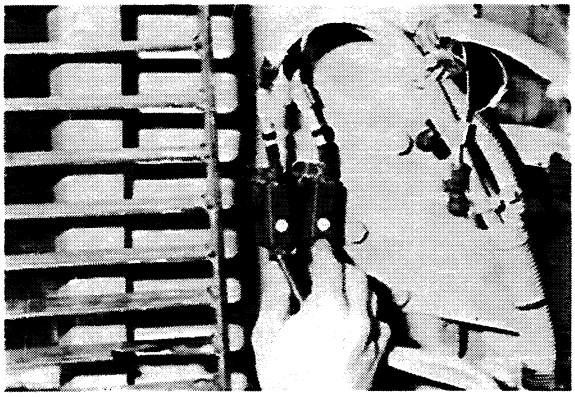
CAUTION:
If replacement capscrews are of a higher grade than originally supplied, adhere to torque specifications for that replacement.

1.4.1.16
Disconnect and tag the back-up alarm wire (163/000). Remove back-up alarm.



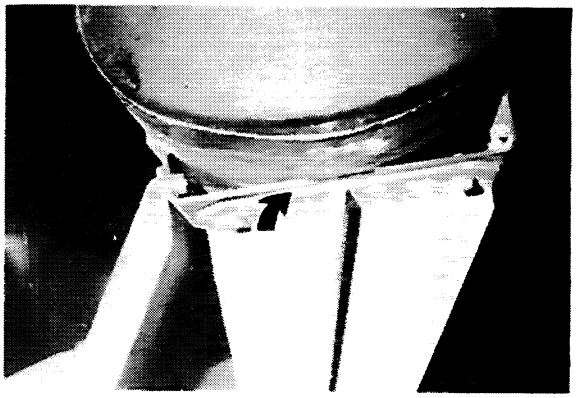
1.4.1.17
Disconnect and tag left (226) and right (225) rear lights. Remove the six (6) clamps attaching the wiring harness to the radiator guard.

1.4.1.18
Remove the two starting system protection fuses from the radiator guard.

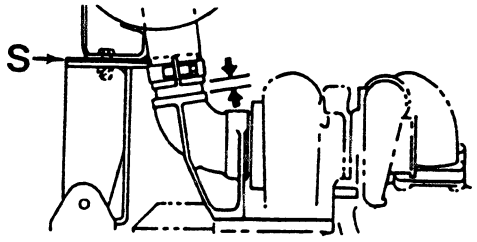


1.4.1.19
Remove the nut (36mm) attaching the master switch to the support.

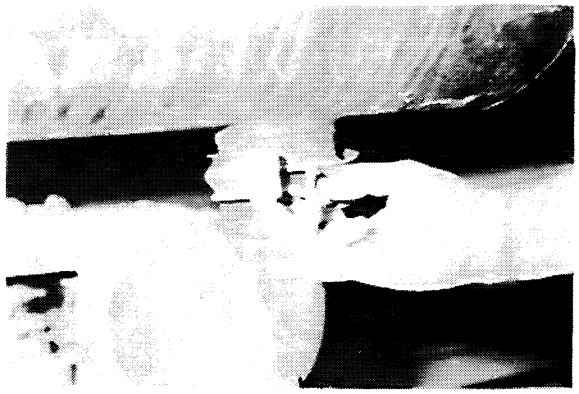
1.4.2.2.2
Install the original shim pack to the mounting bracket and install muffler over elbow at turbocharger. Install capscrews, lockwashers and nuts and tighten.



1.4.2.2.3
Measure the distance between the muffler pipe and the raised flange areas of the turbocharger elbow. This distance should be equal to but not less than 5 mm (0.20 in). Add or subtract the 1 mm shim plates at the mounting bracket until this distance is obtained.



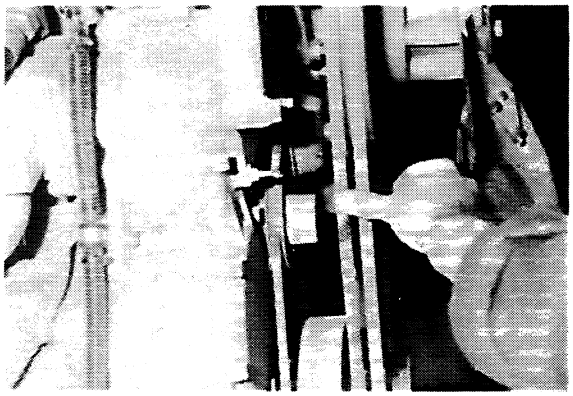
1.4.2.2.4
Tighten the clamp at the turbocharger elbow.



1.4.2.2.5
Tighten mounting capscrews, lockwashers and nuts.

NOTE: All capscrew and nut torques are standard unless otherwise indicated in Specifications.

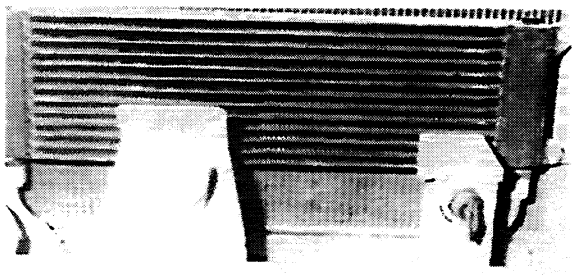
1.4.5.1.9
Installation is reverse procedure of removal. Be sure to install all washers and lockwashers to their original position. See Specifications for correct belt tensions.



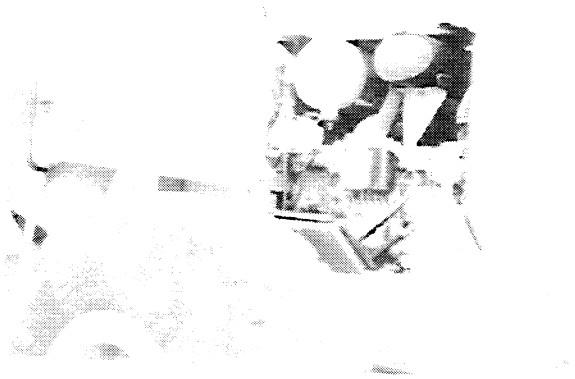
1.4.6 BELTS
1.4.6.1 REMOVAL
1.4.6.1.1
Turn master switch to the "OFF" position.

⚠ WARNING

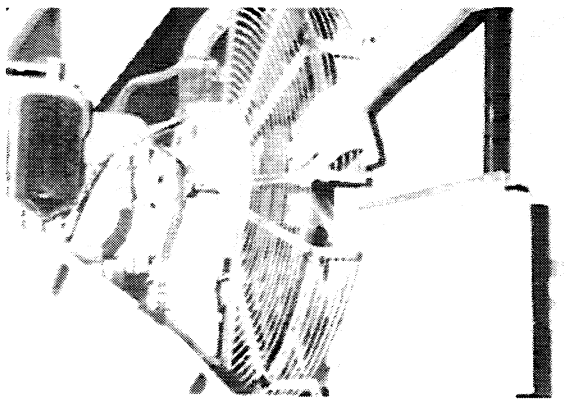
Always turn the master switch to the off position before cleaning, servicing or parking the machine to prevent injury.



1.4.6.1.2
Open left and right engine access doors.



1.4.6.1.3
Remove fan guards.

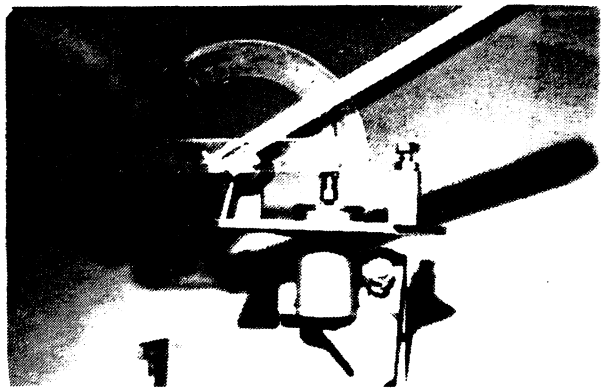


1.4.8.2.6
The remainder of the pedal assembly is not serviced separately, therefore, no further disassembly is required.

1.4.8.3 ASSEMBLY
1.4.8.3.1
Assembly is reverse procedure of disassembly with the following exception.

NOTE: All capscrew and nut torques are standard unless otherwise indicated in Specifications.

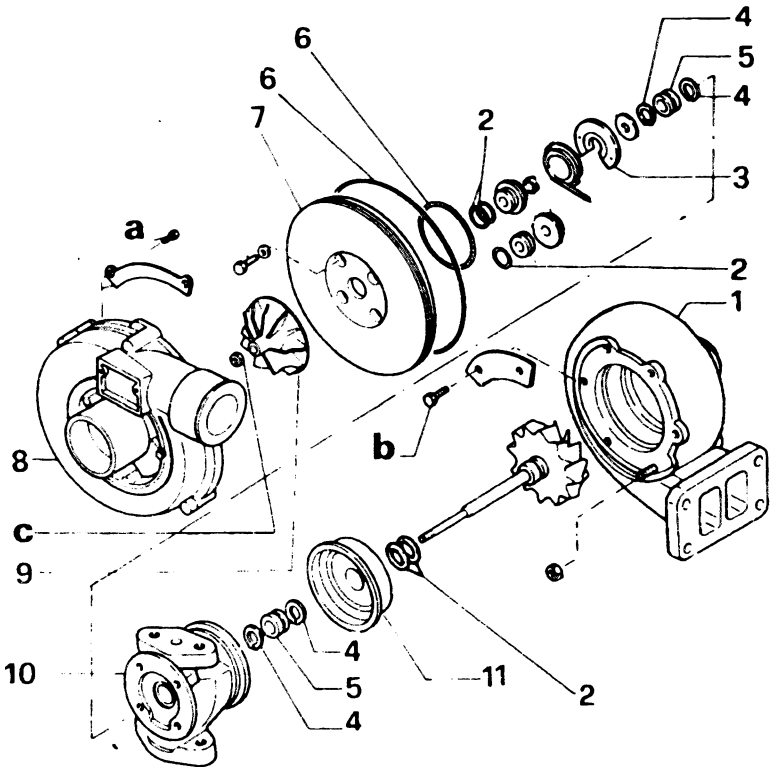
1.4.8.3.2
Prior to attaching the boot and connecting the tierod to the pedal, adjust the length of the tierod in order to obtain an angle of the pedal to the base of approximately 32°. Install the boot and connect the tierod to the pedal with pin and spring clip.



1.4 REPAIR PROCEDURES

NOTES

1.7 TURBOCHARGER

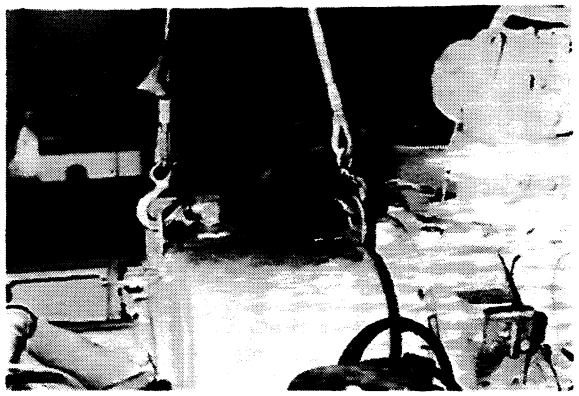


TURBOCHARGER COMPONENTS

a. Body (8) fixing screw - b. Body (1) fixing screw - c. Blower impeller (9) fixing nut - 1. Body, exhaust side - 2. Seal rings - 3. Thrust plate - 4. Circlips - 5. Bushes - 6. O-rings - 7. Intermediate plate - 8. Body, intake side - 9. Blower impeller - 10. Central body - 11. Shield cup.

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Control pressure too low at any speed	1. Defective indicator circuit. 2. Main pressure regulator valve stuck or out of adjustment. 3. Pressure loss due to excessive pump or valve wear.			1. Repair or replace parts as needed. 2. Set valve to specified pressure or replace damaged parts. 3. Replace worn parts.
Overheating	1. Low oil level or incorrect oil. 2. Heat exchanger or lines faulty or clogged. 3. Converter outlet pressure too high. 4. Converter outlet pressure too low.			1. Fill to proper level with specified oil. 2. Repair or replace parts as needed or clean. 3. Check torque converter regulating valve adjustment. 4. Check torque converter relief valve adjustment.
No operation in any speed	1. Low oil level or incorrect oil. 2. Faulty connection between engine and torque converter. 3. Control pressure too low. 4. Control lever faulty. 5. Damaged or worn parts within transmission.	4. 75297575 and 75297590	4. Check the circuit continuity.	1. Fill to proper level with specified oil. 2. Repair or replace damaged parts. 3. Repair or replace damaged parts. 4. Repair or replace damaged parts. 5. Repair or replace damaged parts.

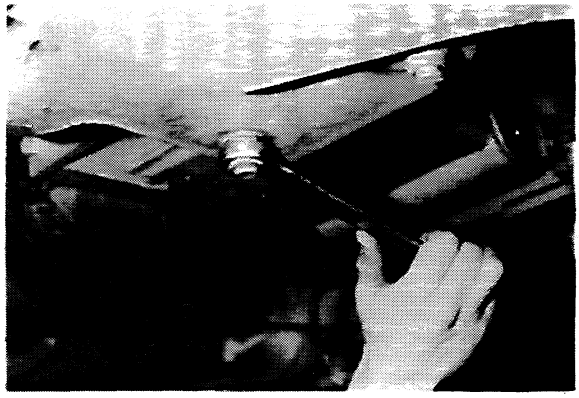
2.4.1.17
Install a lifting eye to the transmission and attach a chain and hoist as shown.



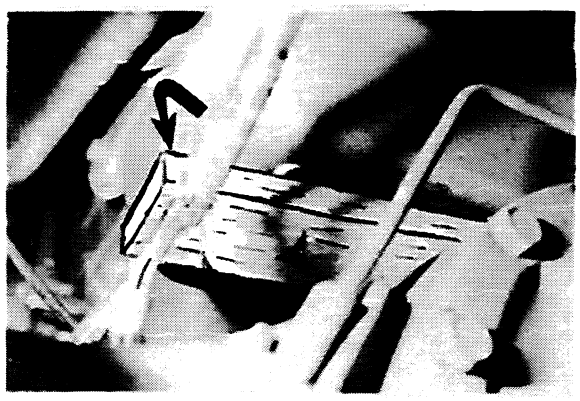
⚠ WARNING

Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

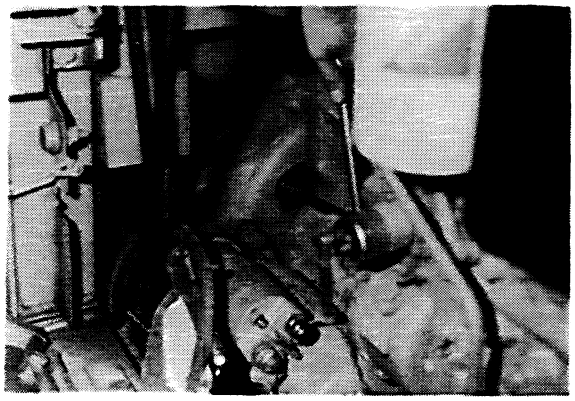
2.4.1.18
Remove the four capscrews attaching the mounting brackets to the frame.



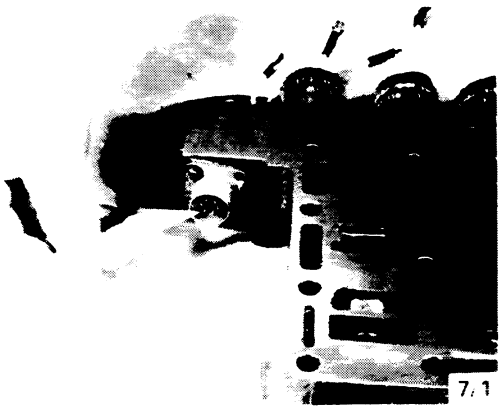
2.4.1.19
Lift the engine and transmission assembly and place a block between the flywheel housing and the rear axle support.



2.4.1.20
Remove the cover from the flywheel housing to gain access to the four capscrews attaching the converter flexplate to the flywheel. Bar the engine by rotating the fan blade. (Throttle cable and support bracket have been removed to gain easier access to the flexplate capscrews).

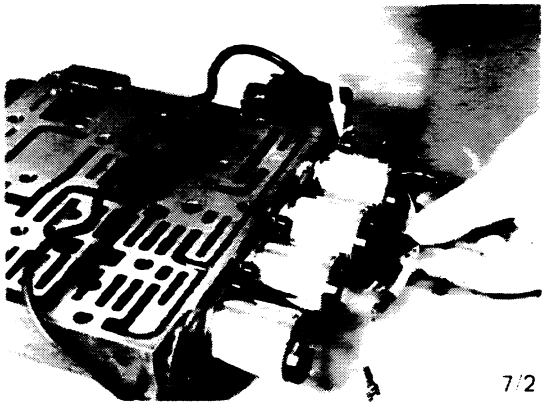


Insert cable harness (pay attention to the installation position, see arrow) and fasten by means of socket head screws.



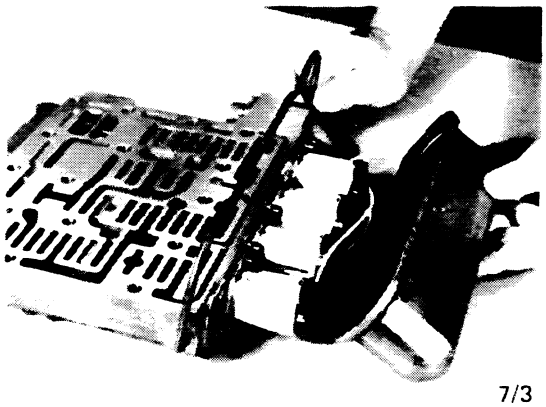
7/1

Fasten earth connecting cable (see arrow) and plug the single cables upon the solenoid valves.



7/2

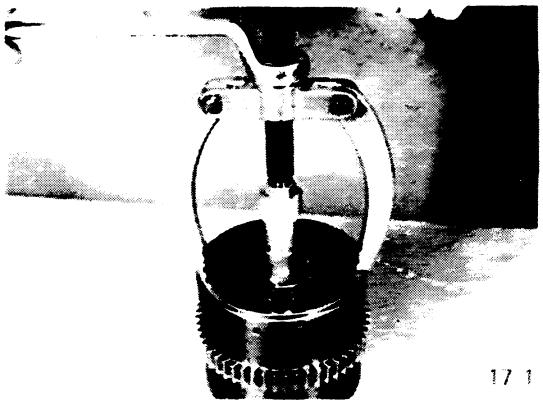
Insert O-ring into the cover and fix cover at the control unit by means of spring clip.



7/3

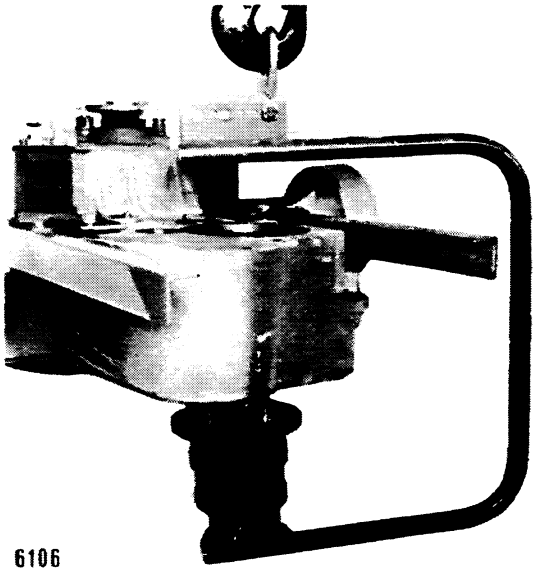
Install piston and spring into the valve body and limit the travel of the piston by means of adjusting pin.

Remove needle bearing out of the piston carrier.
Remove on the opposite side of the piston carrier the piston of the KV in the same way.



17 1

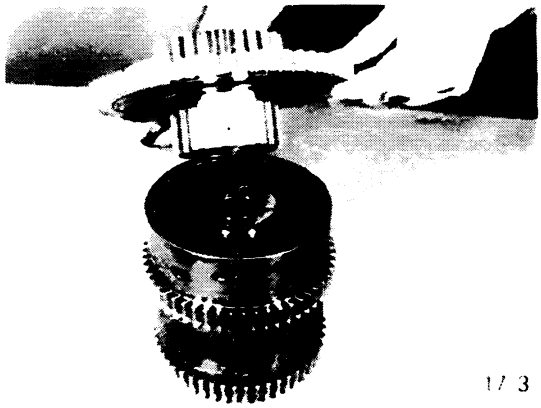
Take the clutch pack KR/K2 with thrust washers towards below out of the housing, using device 75297586 as shown in figure.



6106

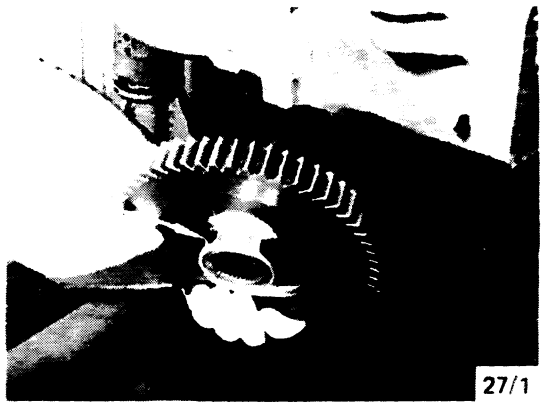
Disassemble clutch pack KR/K2

Remove spur gear 2nd speed with inserted bearings out of the plate carrier.
Pay attention to the arangement of bearings and washers !



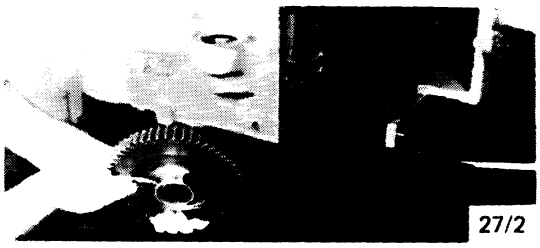
17 3

Illustration shows the spur gear with installed bearing inner race - see arrow !



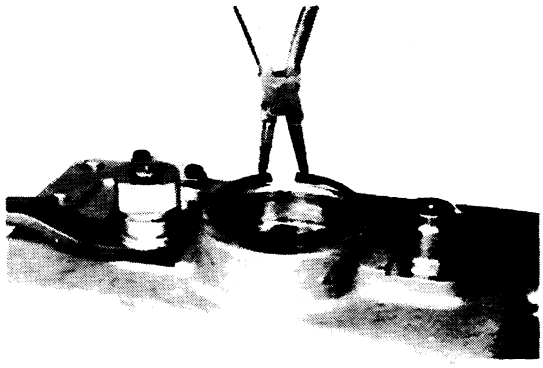
27/1

Insert the spur gear through the large housing bore into the installed roller bearing.



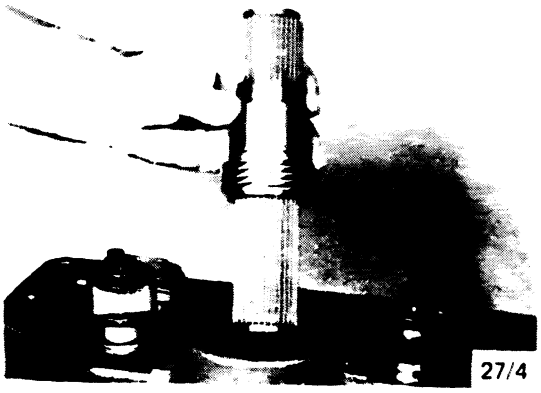
27/2

Engage circlip into the groove.



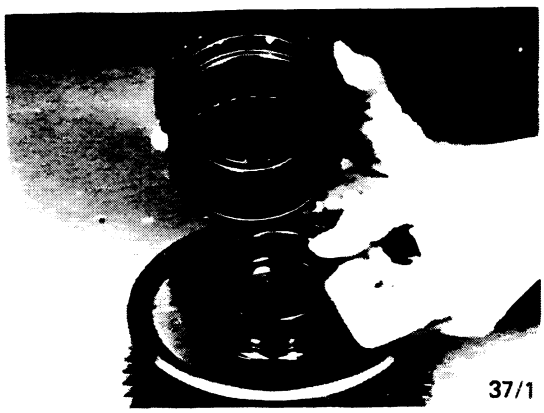
27/3

Place heated speedometer worm upon the drive shaft and introduce it into the spur gear.



27/4

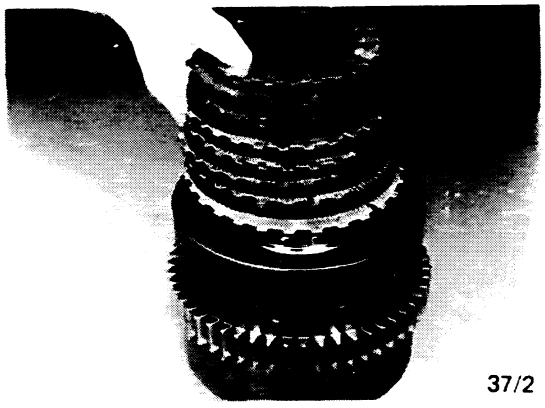
Place thrust plate upon the piston carrier and assemble spur gear K4.



37/1

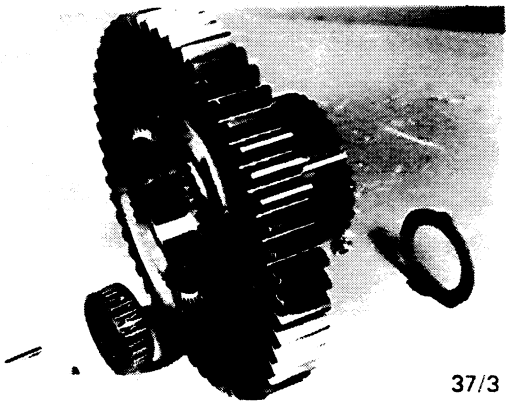
Install plate pack K3 (short hub side of piston carrier).

Repeat same steps as with K4 - see page 35.
Number of outer plates : 10.
Number of inner plates : 9.
See also Section 1 "Clutch assembly specifications", page 14 of this Manual.



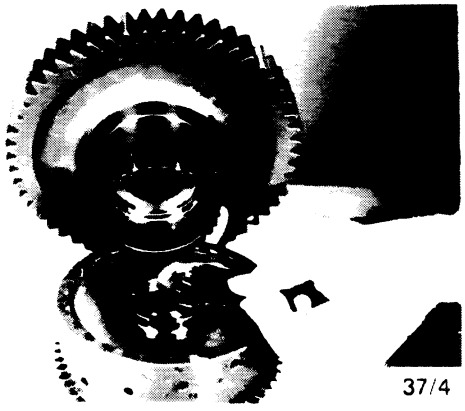
37/2

Illustration shows arrangement of the components in the spur gear K3.
Note : Install components with grease !



37/3

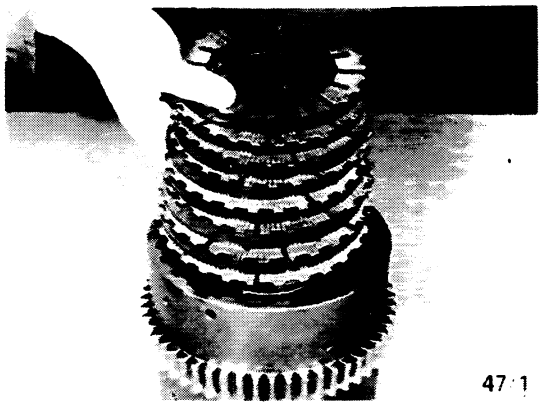
Install thrust plate and assemble spur gear.



37/4

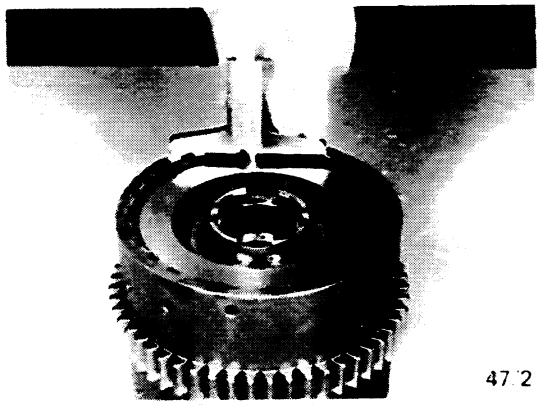
Assemble KV/K1 :
Complete piston carrier as with K3/K4 - see pages 33-34.

Assemble plate pack K1 (short hub of piston carrier) as follows :
Insert 1 outer plate th. = 2.00 mm and lay inner plate th. = 2.50 mm upon it.
Insert alternating the remaining outer plates (7 pieces) and inner plates (6 pieces) - see also Section for plate installation !
Install subsequently backing plate and fix plate pack by means of circlip.


47/1

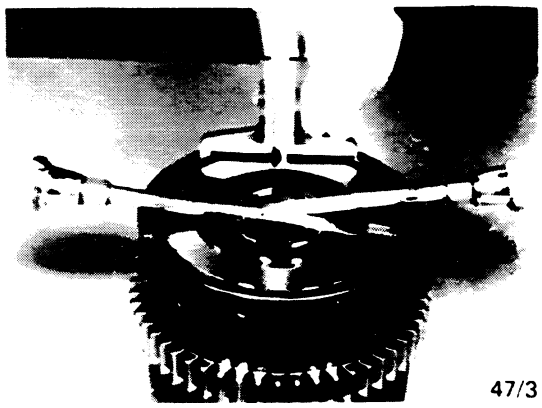
Check end play :
Determine dimension A from face/piston carrier to backing plate.

e.g. 5.50 mm


47/2

Position backing plate against snap ring until contact is obtained.
Measure dimension B from face/piston carrier to backing plate.

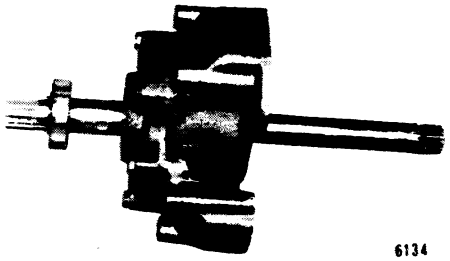
e.g. 3.30 mm


47/3

Insert adjusting spring - see arrow - into the groove of the ouput shaft.

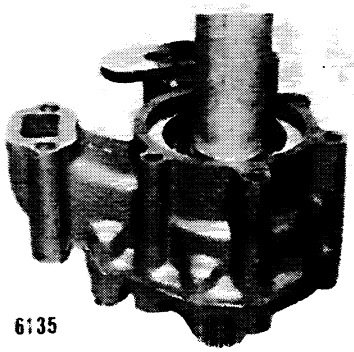
6133

Introduce pre-assembled output shaft into the pump and place bearing in the pump housing firmly against shoulder.

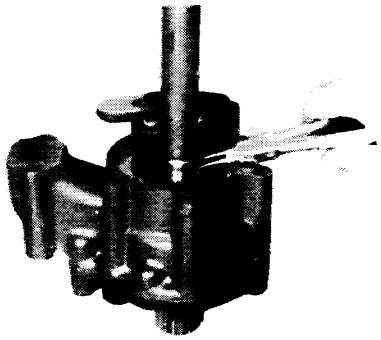


6134

Guide ball bearing over the end of the output shaft and place it firmly against shoulder.
Note : Closed bearing seat side on top !

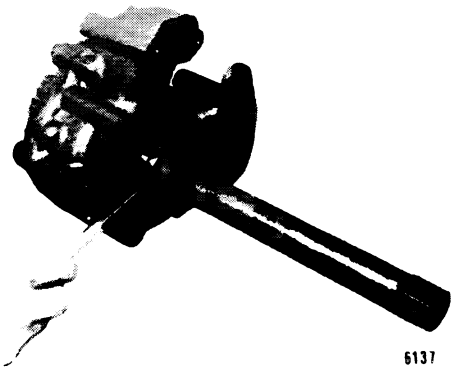


6135

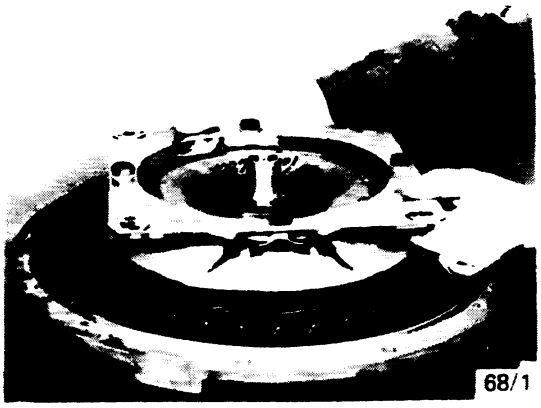


6136

Engage circlip, install rectangular ring into the recess and squeeze it into position.



6137

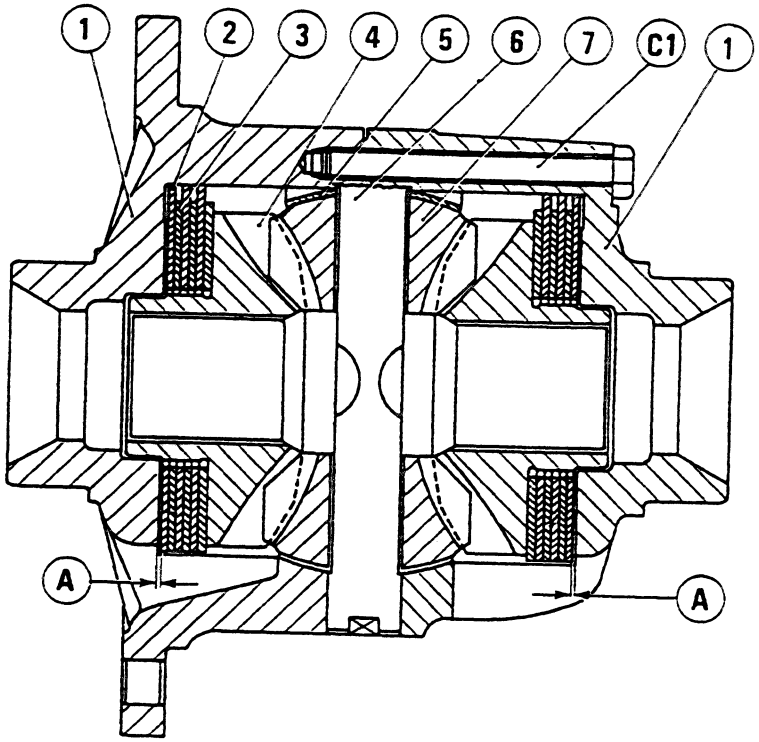

68/1

Rotate gearbox housing for 90°.
Guide converter assembly over the profiles of the splined shaft of the power take-off shaft, resp. of the drive shaft and position them against shoulder.
Note : Pay attention that the rectangular ring will not be damaged by the converter !

3.1 GENERAL DESCRIPTION

An optional differential super Max Trac may be in the FR160. This differential is torque proportioning and has a lock-up feature. Due to the shape of the gear teeth, whenever a torque to the gears is applied, there is a force trying to separate the gears. As the gears separate, the friction plates compress, trying to lock the side gear at the same speed as the bevel gear. Torque will be transferred to the non-slipping wheel to keep the machine propelled.

This Super Max-Trac differential has no detrimental affect on steering, no tire scuffing or no skidding.

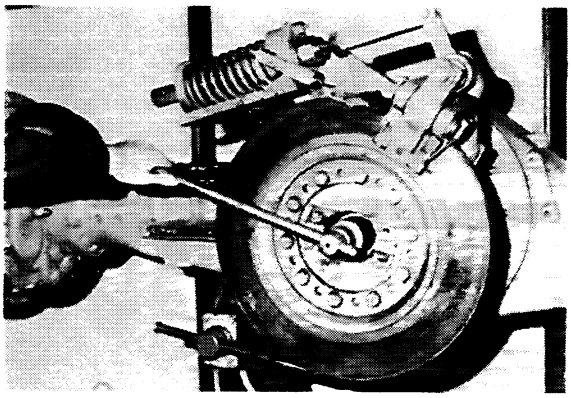


1. Case half
2. External tanged disc
3. Internal splined discs
4. Side gear
5. Thrust ring
6. Spider
7. Pinion gear

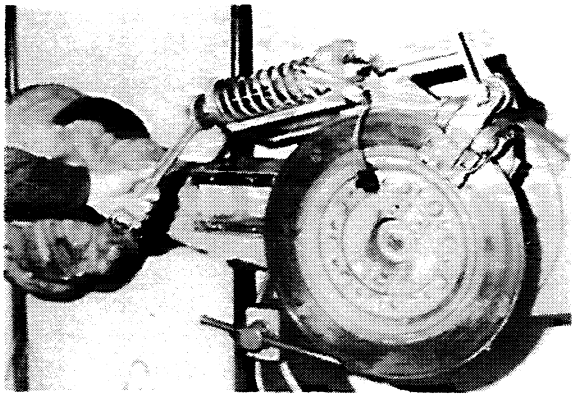
C_1 Capscrew

A End play

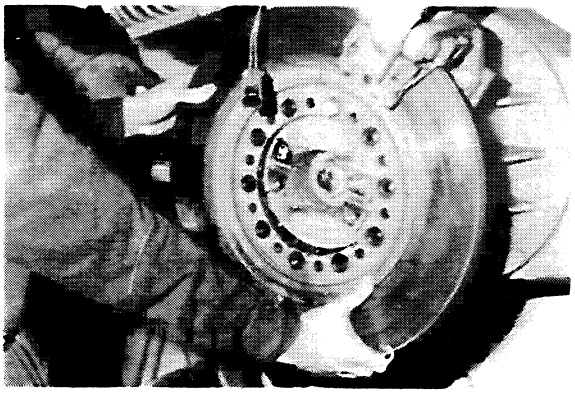
Loosen central nut after removing the two caulkings.



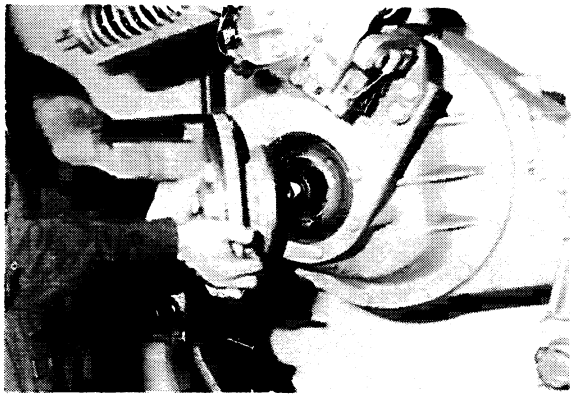
Remove spring nut fastener and loosen nut gradually; in same time loosen jam nut and brake adjusting screw.
NOTE - The spring is highly compressed !



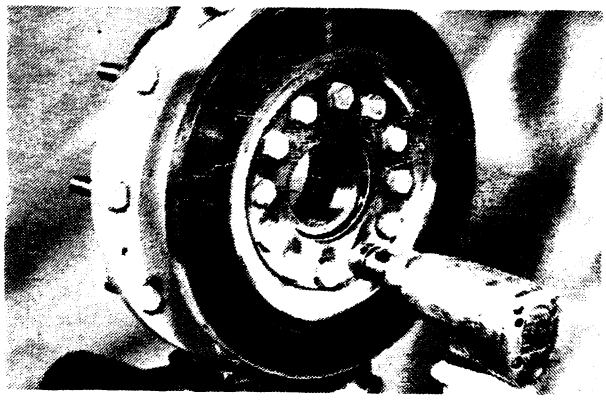
Loosen brake fixing screws and remove brake.



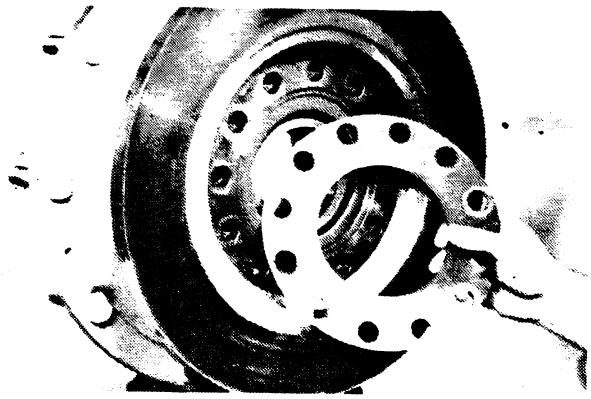
Remove central nut and extract driveshaft flange.



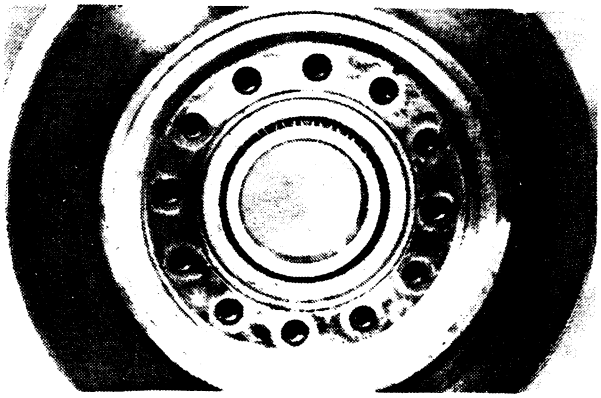
3.4.3.24
Remove capscrews from brake disc hub.



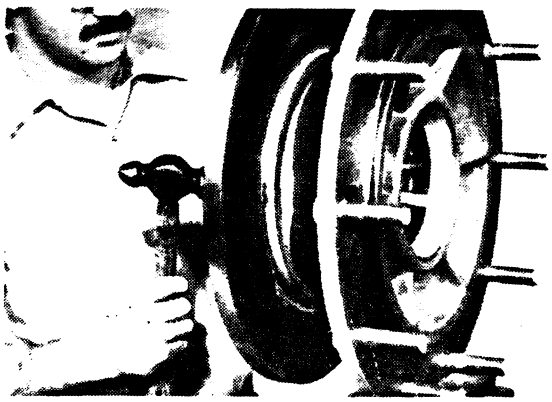
3.4.3.25
Remove seal shield.



3.4.3.26
Remove seal and small bearing.



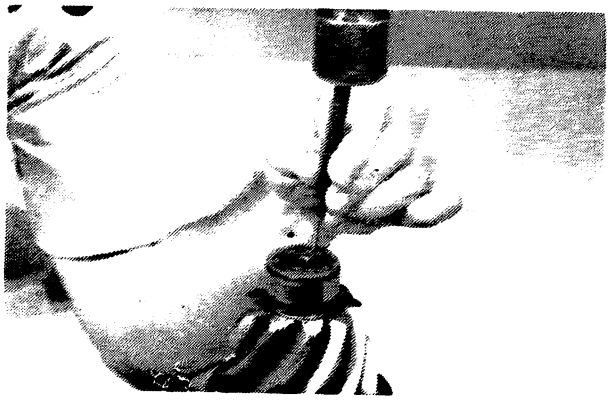
3.4.3.27
Remove large bearing race and small bearing race.



⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

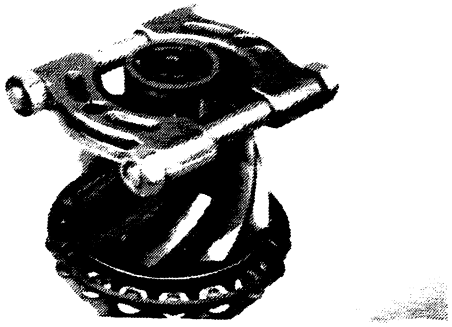
3.4.4.28
Remove stake indentations at pinion shank bearing race.



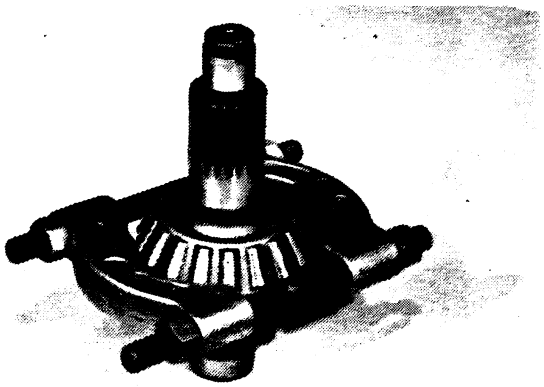
⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

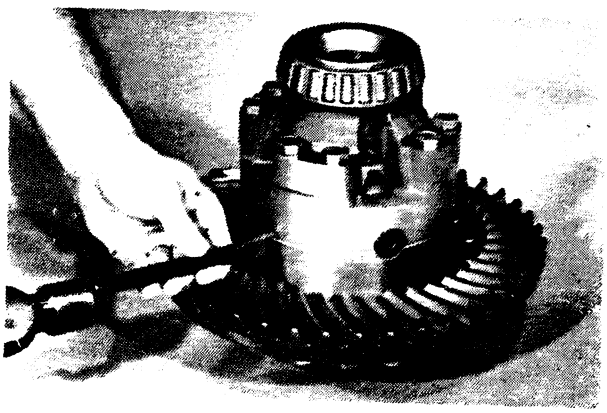
3.4.4.29
Use a split bearing puller to remove pinion shank bearing race.



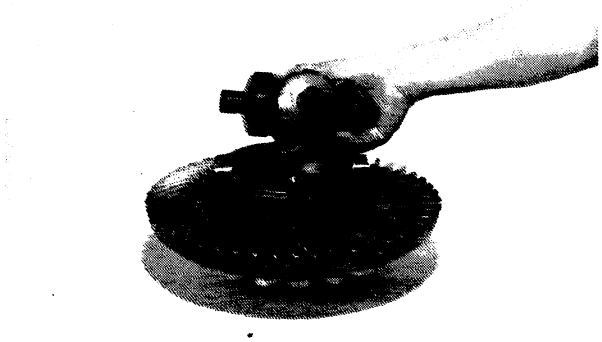
3.4.4.30
Use a split bearing puller to remove inner bearing.



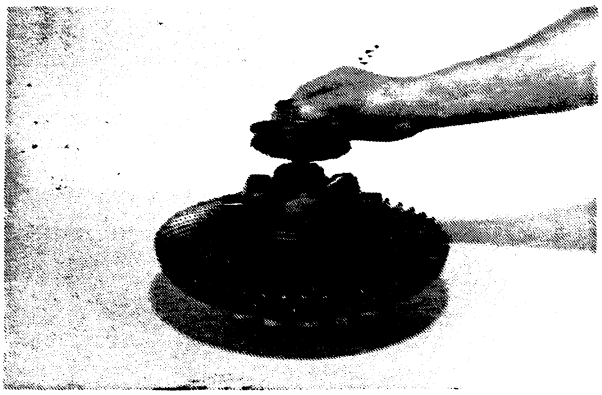
Standard differential (For "super Max-Trac" see 3.4.4.41)
3.4.4.31
Mark case halves so they can be reassembled in their original position.



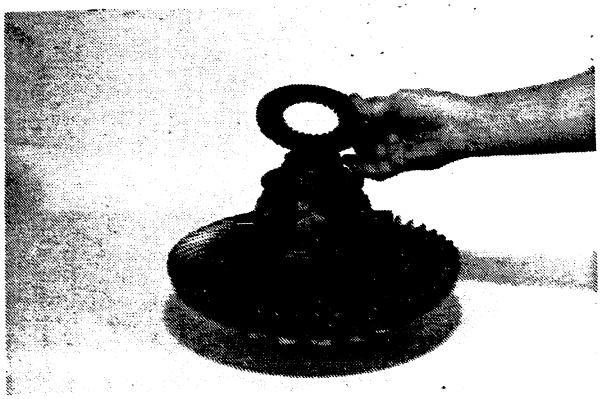
3.4.5.17
Install cross shaft assembly in case half.



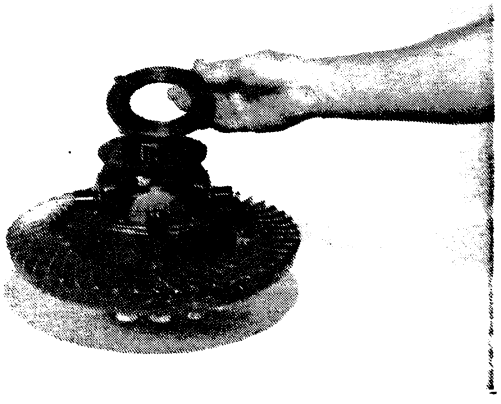
3.4.5.18
Install other side gear.



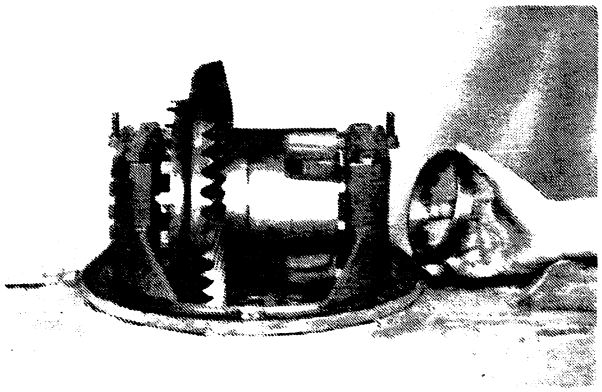
3.4.5.19
Install discC) with smooth side down.



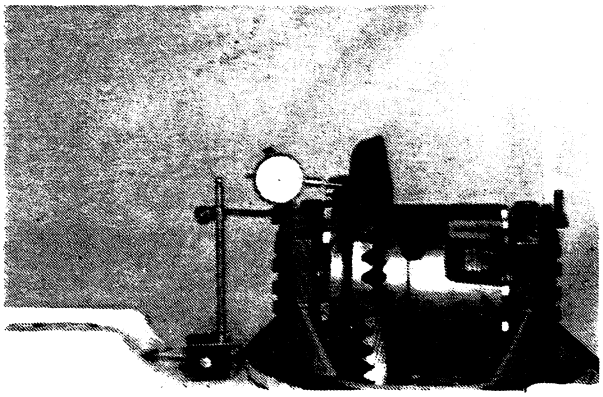
3.4.5.20
Install one disc(A)



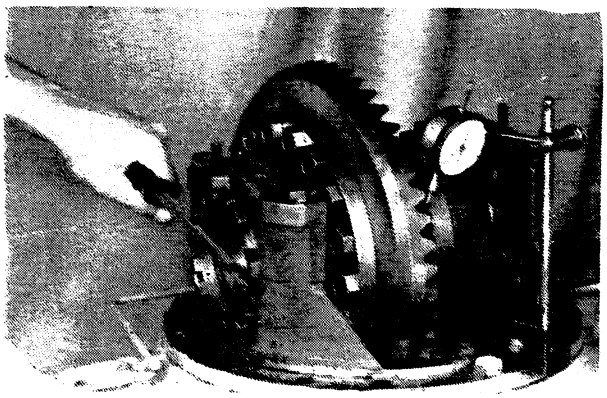
3.4.5.57
Install spanner nuts.



3.4.5.58
Place a dial indicator on the back side of ring gear. Tighten the two spanner nuts evenly as the ring gear is shifted to the right and left by using a pry bar. Acquire zero end play on the differential bearings.

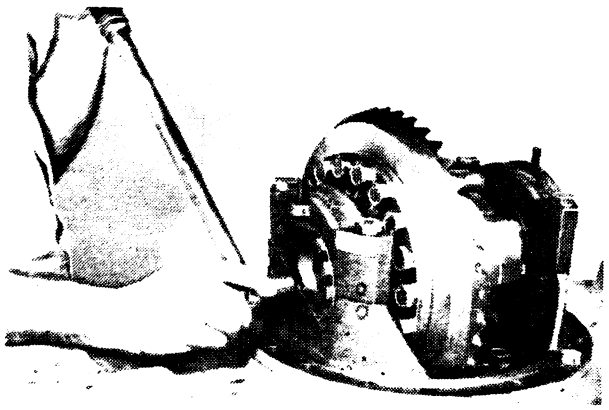


3.4.5.59
Check ring gear backlash by placing the dial indicator perpendicular to the outer face of one ring gear tooth about 5 mm (.25 in.) from the tooths outer edge. To adjust backlash, loosen one spanner nut and tighten the other the same amount. Repeat the measurement in three places.



3.4.5.60
Tighten both spanner nuts to the specified torque using the tool shown. Tighten one nut a small amount and then the other a like amount. Do not tighten one nut only as the backlash will be altered.

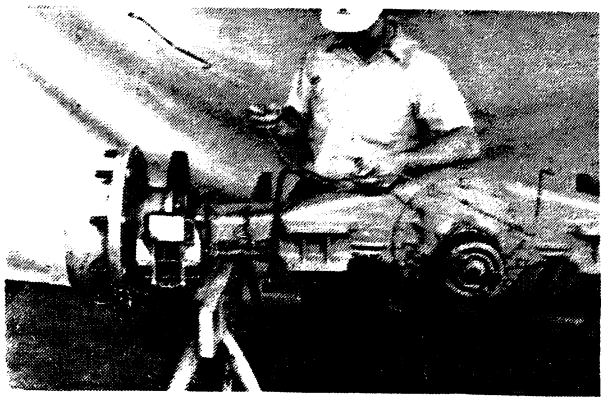
Tool dimensions are: 1/4" bar stock 5" long with a 3/4" nut welded in center.

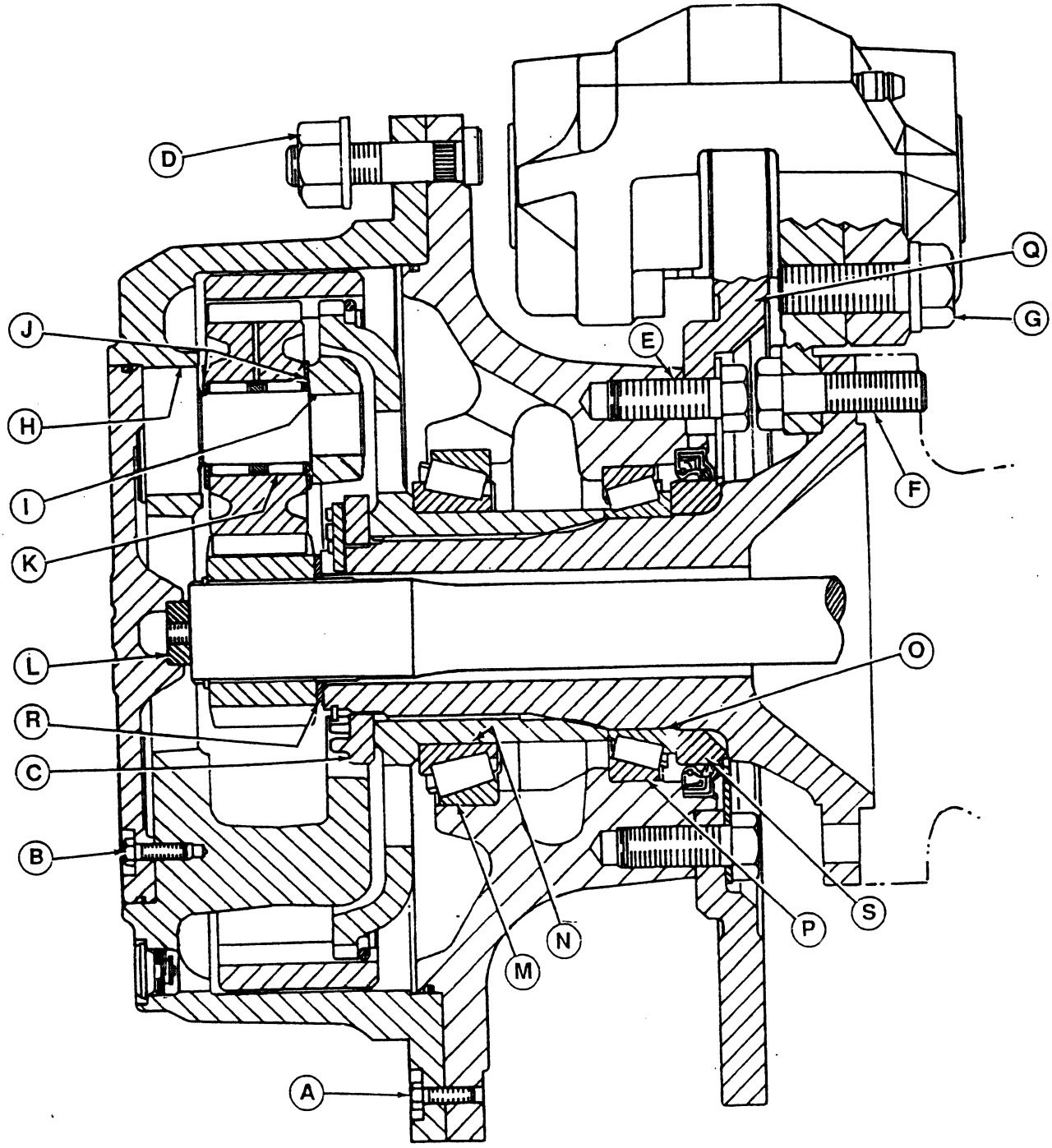


3.4.6.28
Coat capscrews with thread lock #75000776(#Loctite 222). Shoulder capscrew goes into the larger hole. (rear axle only)

3.4.6.29
Tighten capscrews to specified torque.

3.4.6.30
Install brake line on axle assembly.



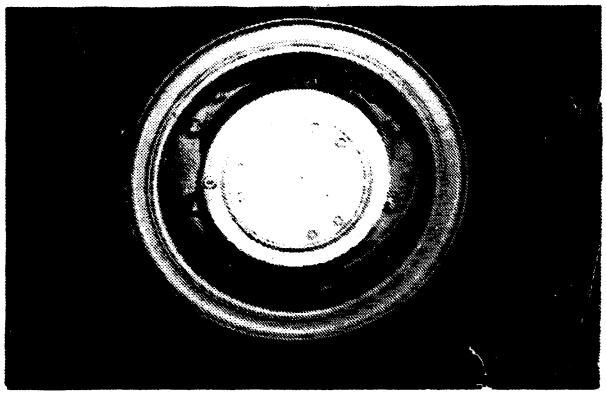


FRONT PLANEARY WHEEL END

SECTION 4
BRAKES

TABLE OF CONTENTS

4.3.4.4
The wheel should stop and unable to rotate. Repeat the rotation application five times. If the test shows that the wheel can be rotated during any of the brake applications, then one of the two brake accumulator is defective. There are four accumulators. Trace the hoses to determine which accumulator is defective.



4.3.4.5
Restart the machine and lower the wheels.

⚠ WARNING

Do not run the engine of this machine in closed areas without proper ventilation to remove deadly exhaust gasses.

Observe all start up and shut down procedures and *"WARNINGS"* listed in the operation and maintenance instruction manual.

This machine and its attachments are to be operated only by qualified operator seated in the operator's seat.

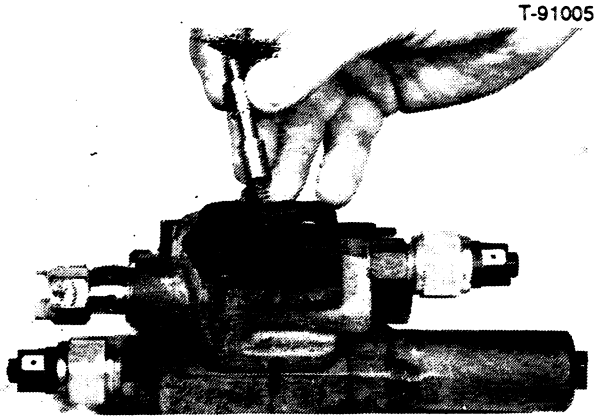
Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.

Replace seat belts every two years on open canopy units and every three years on machinery with cabs or at change of ownership.

4.4.2.2.13
Remove check valve and spring from cartridge.

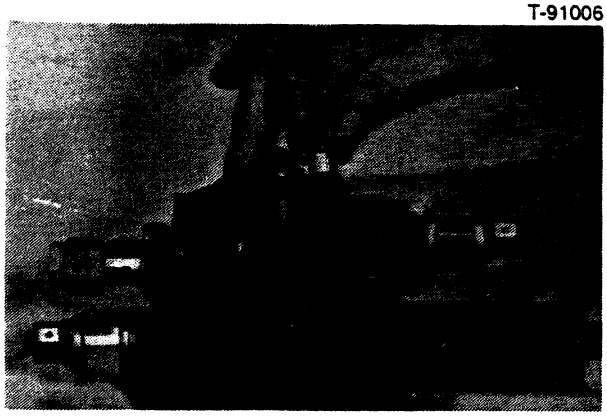
T-91005

4.4.2.2.14
Remove pressure regulator valve and spring, identify valve and spring with section from which it was removed.



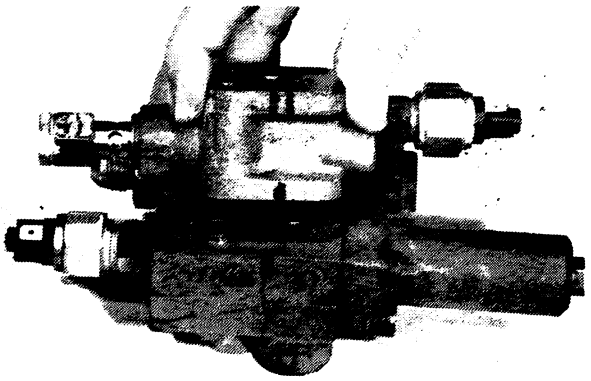
T-91006

4.4.2.2.15
Remove two (2) alignment dowel sleeves.

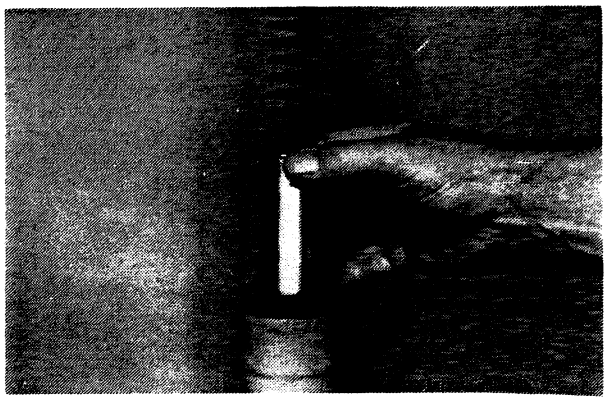


T-91004

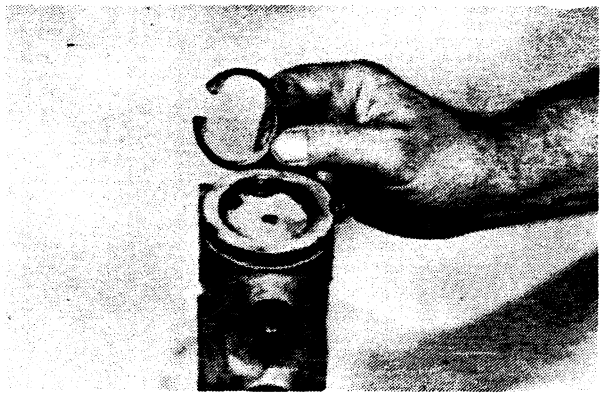
4.4.2.2.16
Remove second brake booster pressure regulating valve body section.



4.4.3.2.6
Remove second spring and piston (long piston).

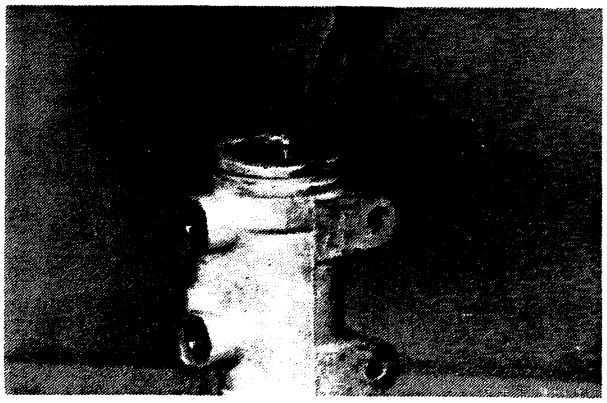


4.4.3.2.7
Remove outer retaining ring (hydraulic oil end of cylinder).

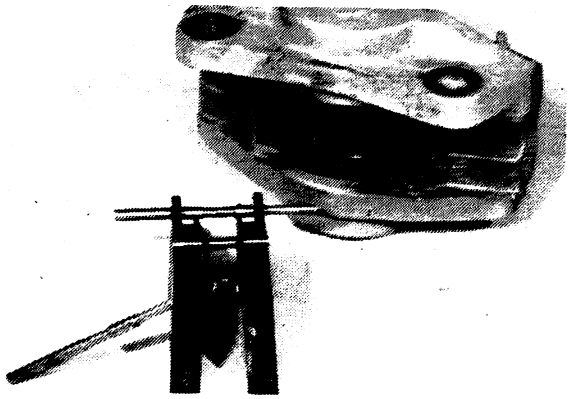


4.4.3.2.8
Remove end plug with seal ring (use 8mm bolt to pull plug)

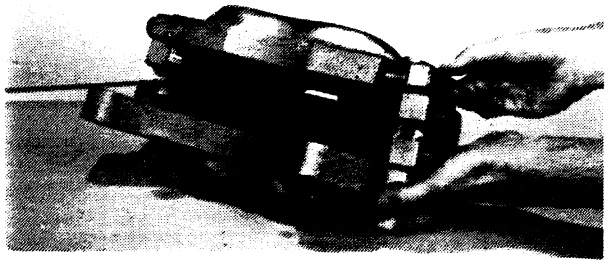
4.4.3.2.9
Remove inner retaining ring.



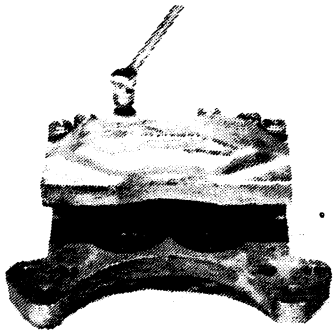
4.4.4.2.10
stall pads, spring, and pins.



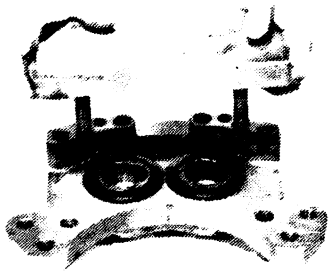
FRONT CALIPER DISASSEMBLY
4.4.4.3.1
Remove pad holder capscrews and remove pads.



4.4.4.3.2
Remove caliper halves capscrews.



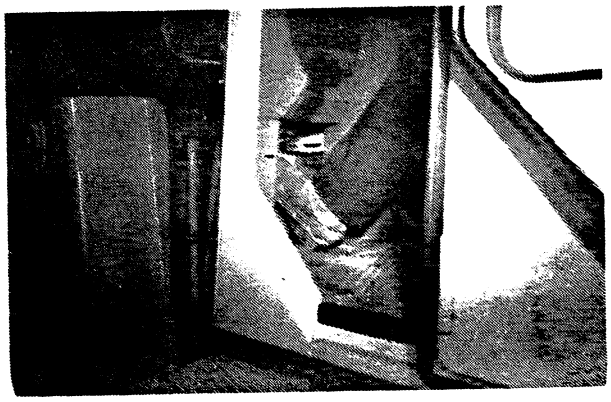
4.4.4.3.3
Lift the top half from the bottom half.



4.4.6.2.11

Turn ON master switch and start the machine. Pump the brake pedal to bleed any air from the hoses. Transfer the machine to an area allowing parking brake tests in all safety.

Apply the parking brake and shift transmission into third gear forward, then release the service brake pedal. Accelerate the engine to high idle speed and check if the parking brake "holds" the machine. In the affirmative the parking brake is effective, otherwise an adjustment of the control linkage at operating cylinder may be necessary.



⚠ WARNING

Do not run the engine of this machine in closed areas without proper ventilation to remove deadly exhaust gases.

Observe all start up and shut down procedures and **"WARNINGS"** listed in the Operation and Maintenance Instruction Manual.

This machine and its attachments are to be operated only by qualified operator seated in the operator's seat.

Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.

Replace seat belts every two years on open canopy units and every three years on machinery with cabs or at change of ownership.

4.6 TORQUES & SPECIFICATIONS

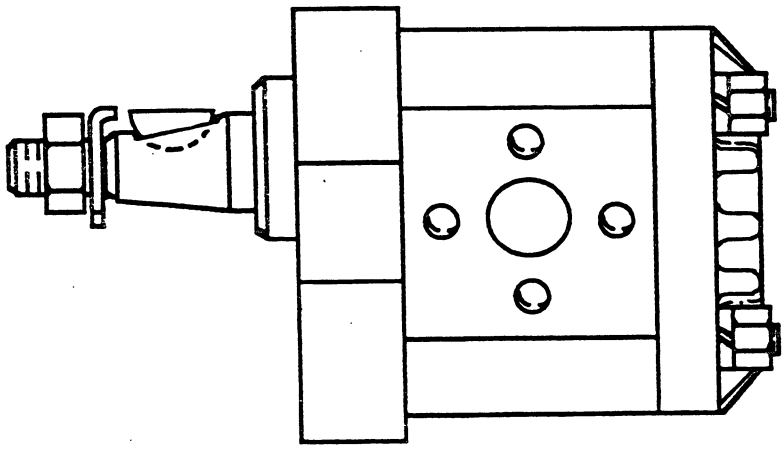
TORQUES

	daNm	Ft. lbs.
Master cylinder mounting capscrew	9	65
Wheel nuts	60	440
Parking brake cylinder mount	11	80
Brake caliper mount capscrews	60	440
Front brake bleeder screw	1.8-2.2	13-16
Front brake caliper half capscrews	35-40	260-295
Front caliper pad bracket capscrew	17-20	125-145
Rear brake bleeder screw	0.8-1.2	6-9
Rear brake caliper half capscrews	17-20	125-145
Rear caliper bleeder plug (with seal)	1.5-1.8	11-13

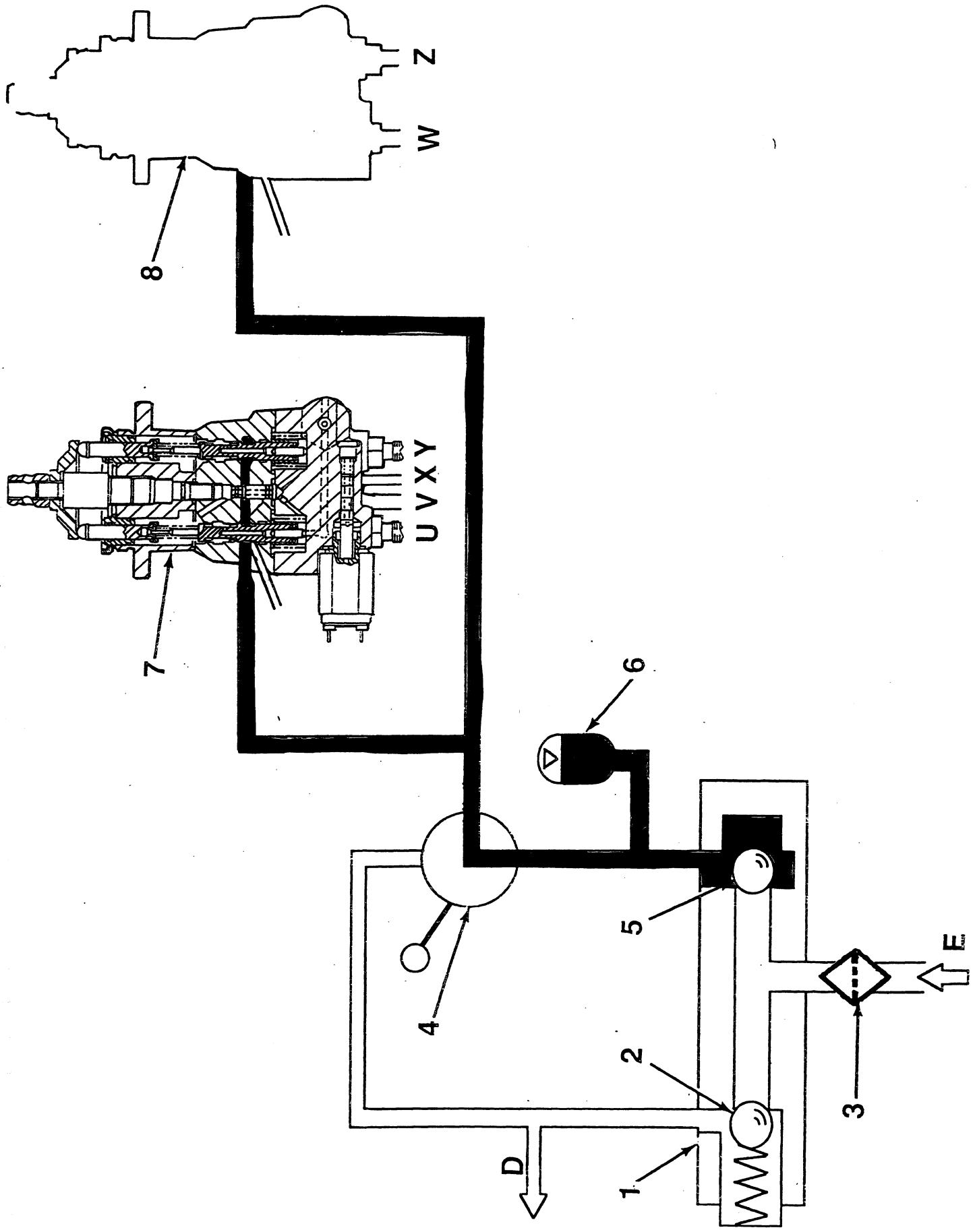
DIMENSIONS

	mm	in
Front axle brake disc nominal thickness	16	0.63
Front axle brake disc thickness after grinding	14	0.55
Rear axle brake disc nominal thickness	22	0.86
Rear axle brake disc thickness after grinding	20	0.78
Front axle brake pad thickness	16	0.63
Front axle brake wear limit	3	0.12
Rear axle brake pad thickness	13	0.51
Rear axle brake wear limit	3	0.12
Parking brake accumulator capacity	0.7 L	0.74 qt.
Damper accumulator capacity	0.75 L	0.8 qt.
Brake accumulator capacity (each)	1.4 L	1.5 qt.
Precharge pressure	60 bar	870 psi
Brake relief pressure	150 bar	2175 psi

4.6.1 BRAKE AND PILOTCIRCUIT PUMP



Pump/engine ratio	Rate
1:1,3	8.17 L/min (8.75 qt./min


Z
W
8
U V X Y
7
6
5
4
E
2
3
D
1

5.3.2 IMPLEMENT TESTING

5.3.2.1 MAIN RELIEF TESTING

5.3.2.1.1

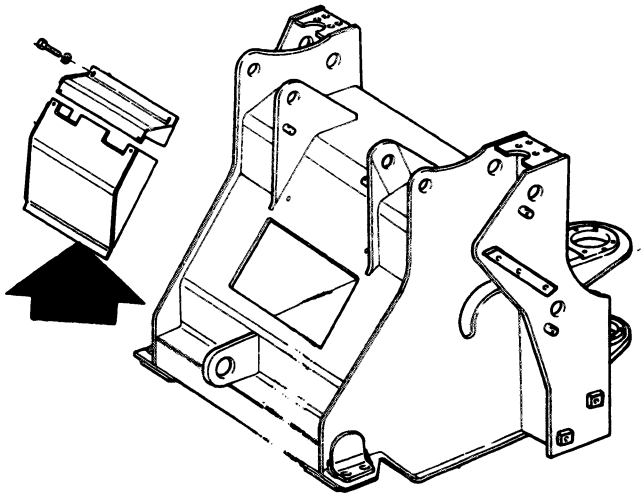
Whenever the implement system does not respond as it should and system pressure is thought to be the problem, a simple pressure check can identify the problem area within a few minutes.

5.3.2.1.2

Remove the cover between the two boom cylinders at the front of the machine.

⚠ WARNING

Always turn the master switch to the off position before cleaning, repairing, servicing, or parking the machine to prevent injury.

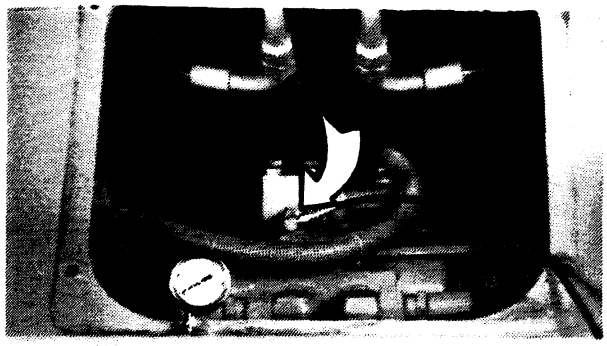


5.3.2.1.3

Connect a pressure gauge P/N 75300110 which can withstand 350 bar (5000 psi) to the implement test port. An adapter P/N 75300605 may need to be used.

5.3.2.1.4

Warm the machine's implement oil system to normal working conditions.



⚠ DANGER

Observe all start up and shut down procedures and **'WARNINGS'** listed in the operation and maintenance instruction manual.

Do not run engine or machine in closed areas without proper ventilation to remove deadly exhaust gases.

Machine and it's attachments are to be operated only by qualified operator seated in the operator's seat.

Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.

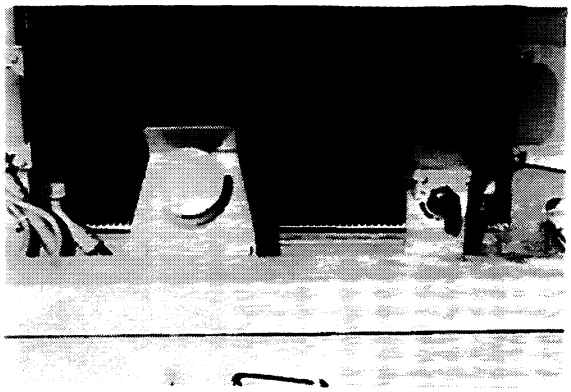
Replace seat belts every two years on open canopy units and every three years on machinery with cabs or at change of ownership.

5.4.2 PRIORITY VALVE

5.4.2.1
Turn off master switch.

⚠ WARNING

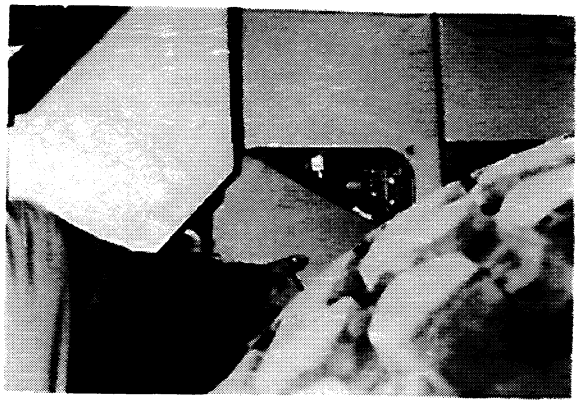
Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.



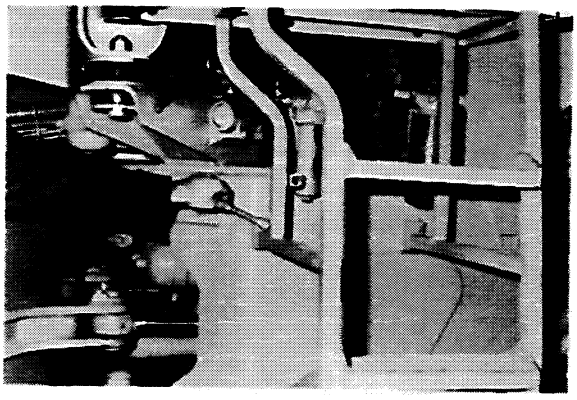
5.4.2.2
Drain the implement oil tank. See Section 5.4.10

⚠ DANGER

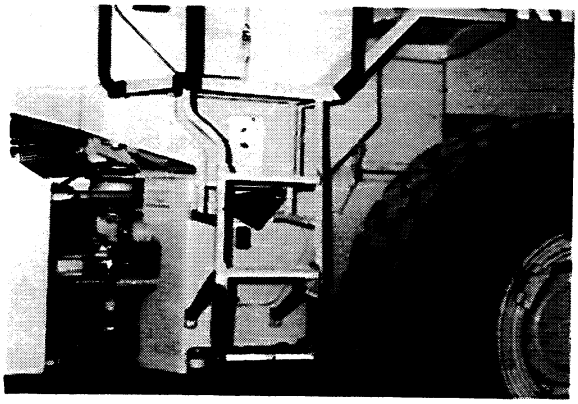
Fluid under pressure - Turn cap or cover slowly to relieve pressure before removing.



5.4.2.3
Remove step from left side of the machine.



5.4.2.4
Remove the access cover from left side of the machine.

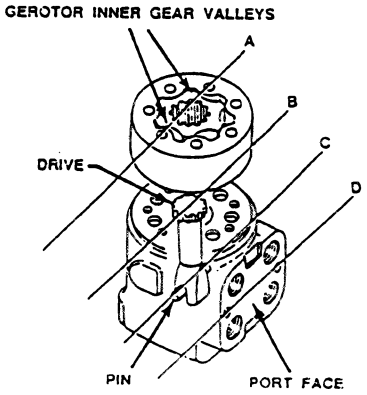


5.4.3.2.25
Install the control spool in the control sleeve. Rotate the spool slowly when installing it. Set the spool and sleeve on a bench. Align spring slots. Insert spring installation tool through the slots. Insert one end of the entire centering spring set into the tool.

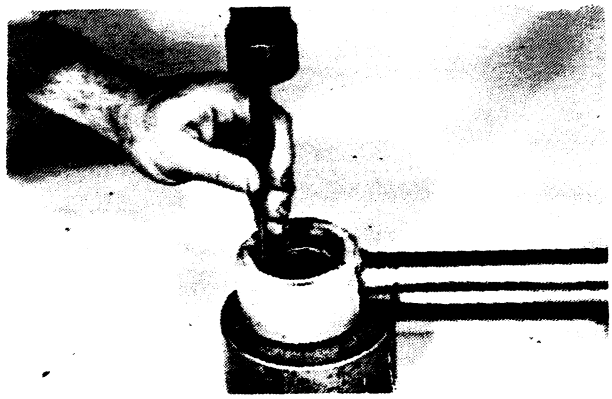
5.4.3.2.26
Installation tool can be made from an allen wrench that will fit through spring slots by slotting long end of the wrench to a depth of 12.7 mm (0.50 in) and a width of 3.175 mm (0.125 in).

5.4.3.2.27
Compress extended end of the spring set and push into spool sleeve assembly withdrawing tool at the same time. Center springs so they are down and flush with upper surface of the spool and sleeve assembly. Install pin until it is flush on both sides on the control sleeve.

5.4.3.2.28
To assure proper timing and alignment of the steering valve, note the parallel relationship of the reference lines A, B, C, and D.



5.4.4.13
Use a drift and a hammer to remove the bushing from the cylinder eye.

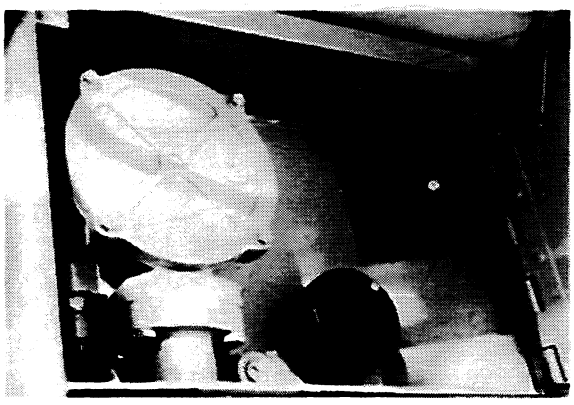


⚠ DANGER

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

5.4.4.14
Install one snap ring into the cylinder eye. Drive the bushing into the eye and install the other snap ring. Cylinder installation is the reverse of removal. Be sure capscrews are tightened to specified torque.

5.4.4.15
Fill the implement oil tank and operate the loader and test for leaks.



⚠ WARNING

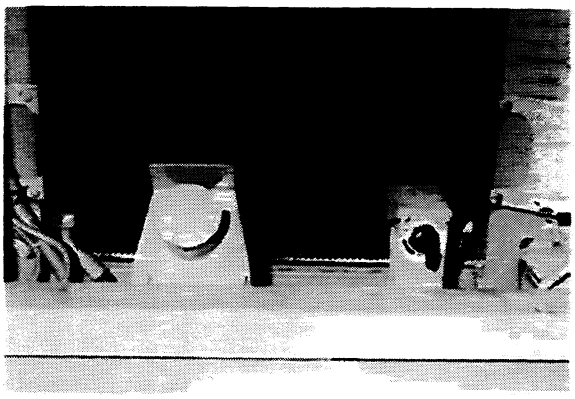
Do not run the engine of this machine in closed areas without proper ventilation to remove deadly exhaust gasses.
Observe all start up and shut down procedures and **"WARNINGS"** listed in the operation and maintenance instruction manual.
This machine and its attachments are to be operated only by qualified operator seated in the operator's seat.
Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.
Replace seat belts every two years on open canopy units and every three years on machinery with cabs or at change of ownership.

5.4.7 BUCKET CYLINDER REMOVAL

5.4.7.1
Position bucket flat on the ground.

⚠ DANGER

On machines having hydraulically, mechanically, and/or cable controlled equipment (such as excavators, loaders, dozers, scrapers, etc.). Be certain the equipment is lowered to the ground before servicing, adjusting and /or repairing. If it is necessary to have the hydraulically, mechanically and/ or cable equipment partially or fully raised to gain access to certain items, be sure the equipement is suitably supported by means other than the hydraulic lift cylinders, cable and/or mechanical devices used for controlling the equipment.



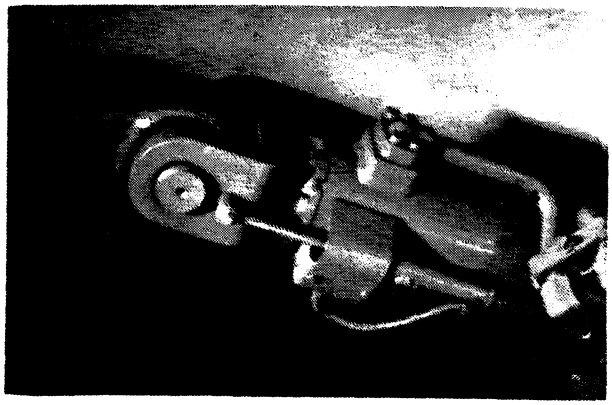
5.4.7.2
Turn off the master switch.

⚠ DANGER

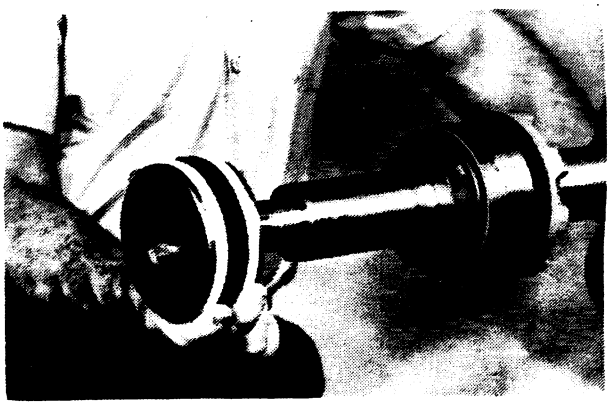
Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

5.4.7.3
Relieve all pressure on the bucket cylinders by moving the implement control lever side to side while the bucket is on the ground.

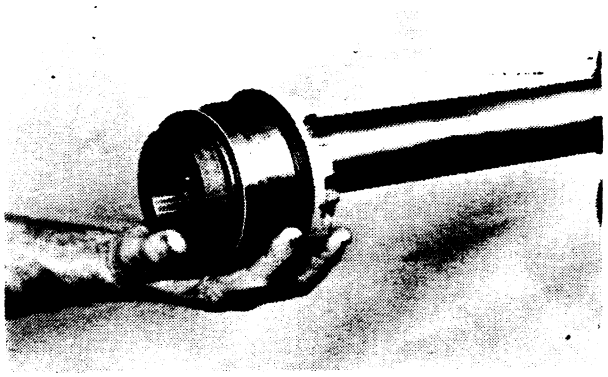
5.4.7.4
Remove the bucket kickout pickup switch from the cylinder if necessary.



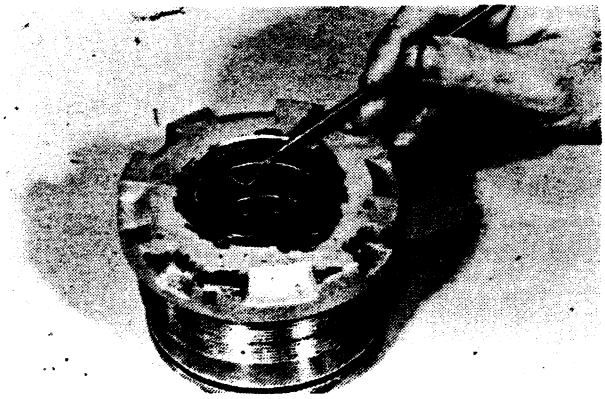
5.4.9.5
Remove the piston from the rod.



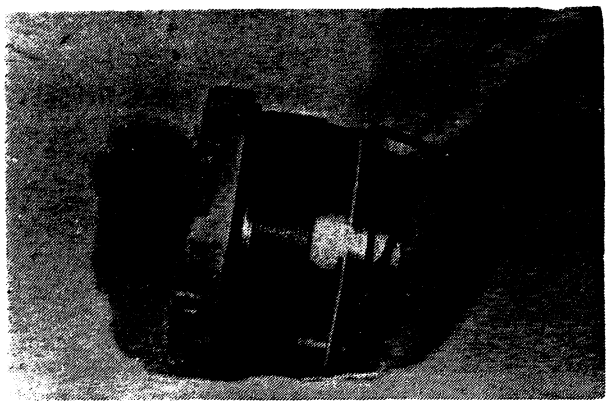
5.4.9.6
Remove the cylinder head from the rod.



5.4.9.7
Remove the three seals from the head's inner diameter.



5.4.9.8
Remove the seals from head's outer diameter.



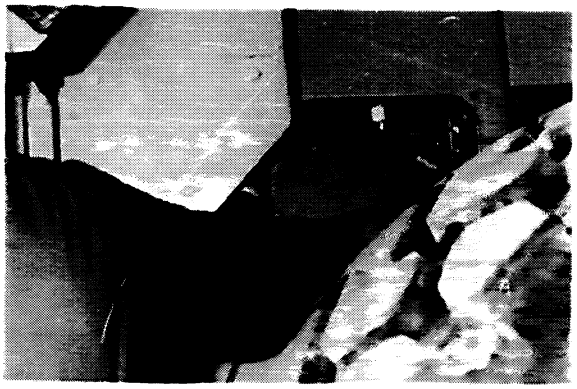
5.4 REBUILD PROCEDURES
IMPLEMENT

5.4.12 REMOVE PILOT CONTROL VALVE

5.4.12.1
Drain hydraulic tank.

⚠ WARNING

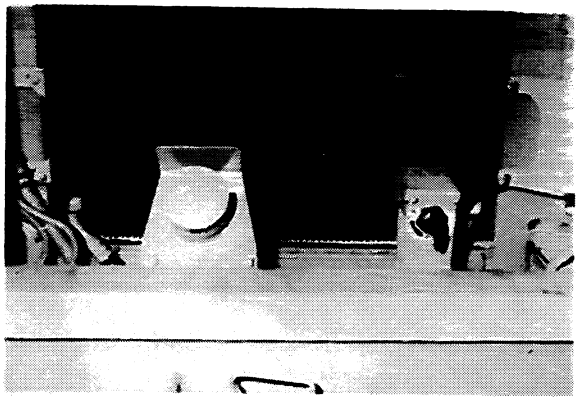
Fluid under pressure - Turn cap or cover slowly to relieve pressure before removing.



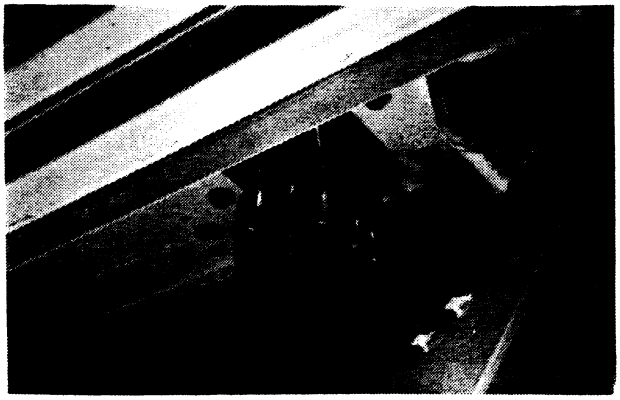
5.4.12.2
Turn off master switch.

⚠ WARNING

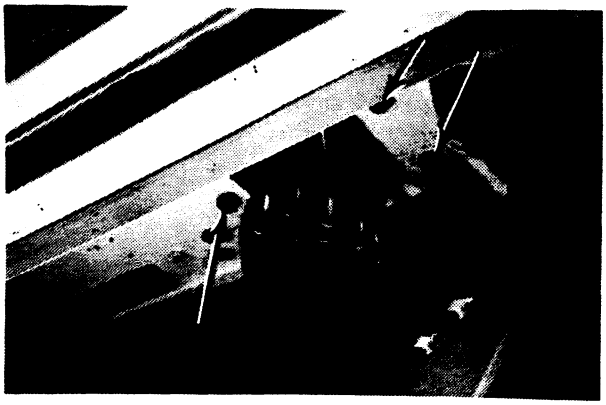
Always turn the master switch to the "OFF" position before cleaning, repairing, servicing or parking the machine to prevent injury.



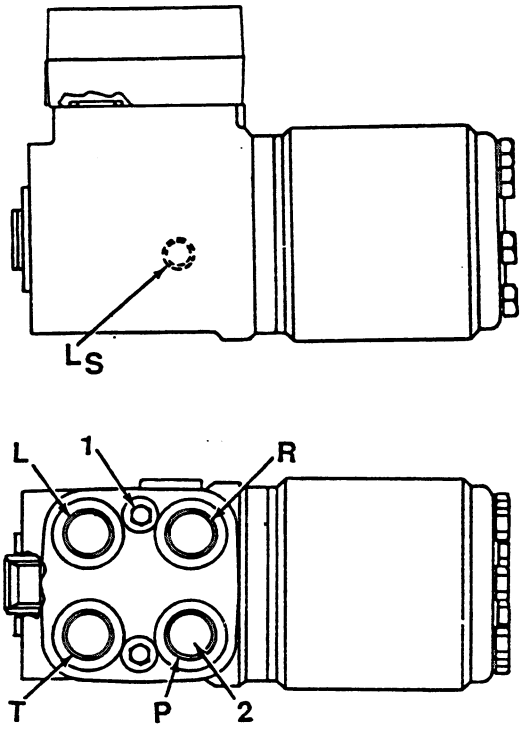
5.4.12.3
Mark and disconnect pilot control valve hoses below the cab.



5.4.12.4
Remove four capscrews holding pilot control tower.

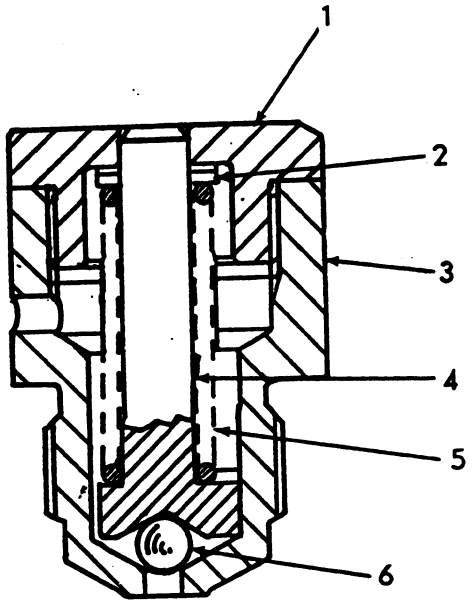


5.6.4 STEERING VALVE



Circuit relief valve settings	260 bar	3770 psi
Fitting torque	daNm	ft. lbs.
P	4-4.5	29-33
L	4-4.5	29-33
T	4-4.5	29-33
R	4-4.5	29-33
Ls	0.76-0.84	5.6-6.2
1	6-7	44-52
2	2.5-3.5	18-26

5.6.14 CIRCUIT RELIEF VALVE



1. Plug
2. Shims
3. Body
4. Pin
5. Spring
6. Ball

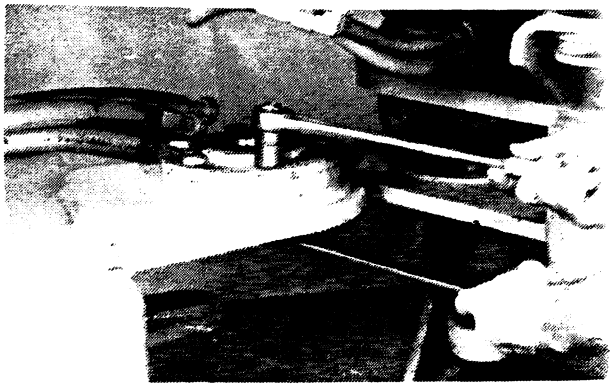
Calibrate the valve with shims so that the valve begins to open at 230 ±5 bar (3335 ± 70 psi) and 50 lit min (13 gpm) flow

	mm	in
1. Bore in plug for pin	10.150-10.240	0.3996-0.4031
4. O.D. of pin shaft	9.910-10.000	0.3901-0.3937
5. Return spring		
Free Length	55mm	2.16"
Load when compressed to 43 mm (1.7")	70.9-78.3 Kg	156-172 lbs.

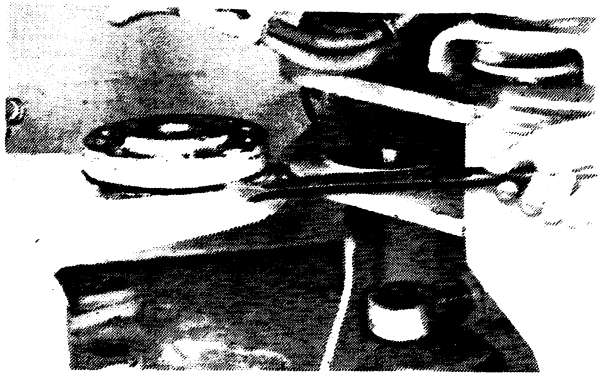
SECTION 6
BUCKET AND CHASSIS

TABLE OF CONTENTS

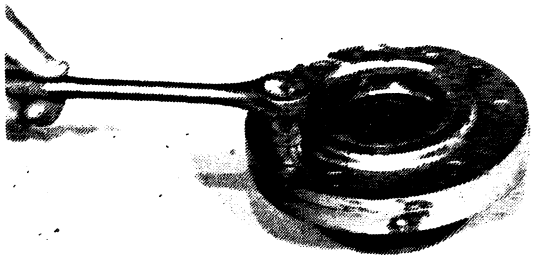
6.2.1.29
Remove the capscrews holding the bushing retainer to the hitch.



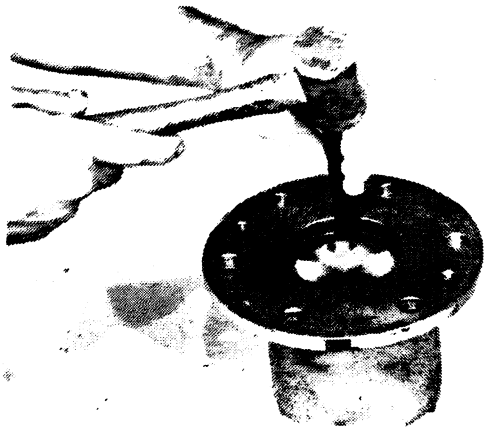
6.2.1.30
Pry the bushing retainer from the hitch.



6.2.1.31
Place the retainer on a clean work surface and remove the two capscrews holding the seal retainer to the bushing retainer.



6.2.1.32
Remove the seal from the retainer.

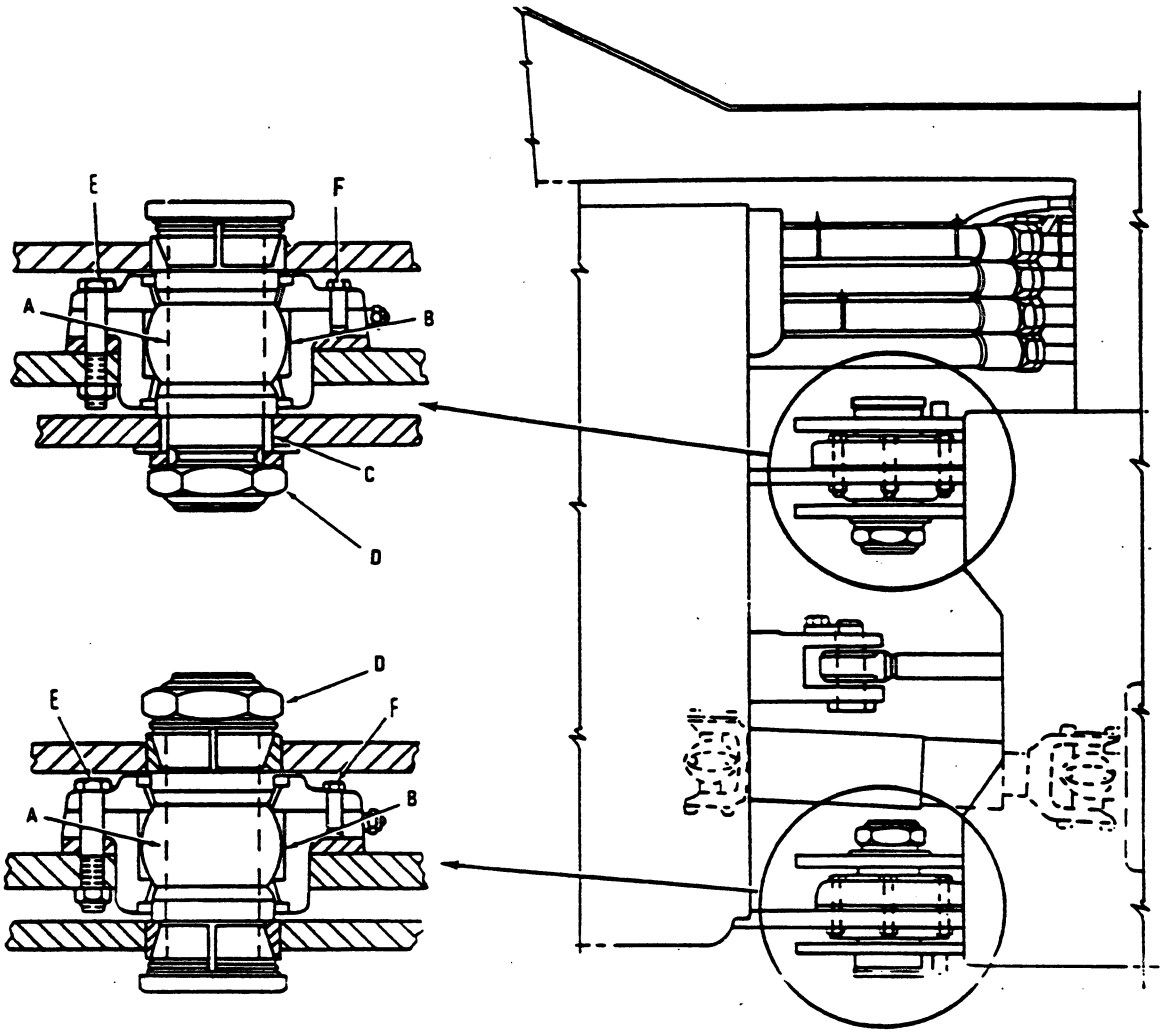


⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

6.4 SPECIFICATIONS

6.4.1 FRAME ARTICULATION



ITEM	DIMENSION	mm	in
A	Pivot pin O.D.	76.167-76.285	2.970-2.975
B	Self aligning bushing O.D.	120.632-120.650	4.749-4.750
C	Spacer O.D.	88.875-88.925	3.499-3.500
	Spacer I.D. (in frame)	76.225-76.275	3.000-3.002
ITEM	TORQUE	dNm	ft.lb
D	Nut	369-404	2703-2987
E	Capscrew	16.2-17.8	120-130
F	Capscrew	6.5	48

To rework the rear frame pivot pin bores observe the correct bore diameters as given below.

	mm	in
Lower Plate, upper pivot	88.875-88.925	3.499-3.500
All other pivot plates	107.950-108.050	4.250-4.253

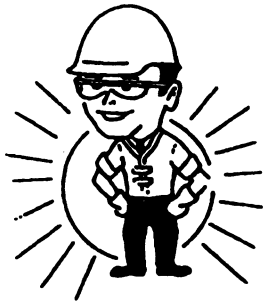
Study SAFETY RULES in the front of this manual thoroughly for the protection of machine and safety of personnel.

ELECTRICAL SCHEMATIC - NUMERIC LISTING

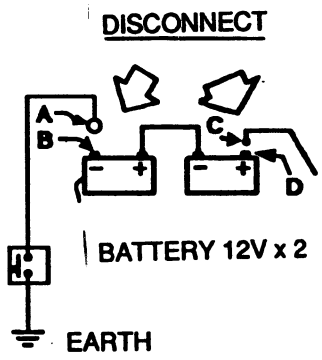
1 Batteries
2 Master switch
3 Starter motor
4 Starter relay switch contact
5 Fuel booster coil
6 Fuse 4 amp
7 Engine starting key switch
8 Starter relay solenoid
9 Transmission neutral start switch
10 Push button switch,cold weather starting aid
11 Cold weather starting aid valve
12 Fuel shutoff solenoid
13 Fuse link
14 Service relay
15 Light, right dash
16 Lights, indicator (incorporated in 25)
17 Light, right
18 Light, left TUV
19 Light, right tail
20 Fuse 4 amp
21 Light, left
22 Light, right
23 Fuse 4 amp
24 Diode
25 Light switch
26 Light, left tail
27 Light, right TUV
28 Light, plate
29 Light, left
30 Light, left dash
31 Light, left lower beam
32 Fuse 7.5 amp
33 Light, right lower beam
34 Light, left head
35 Fuse 7.5 amp
36 Light, right head
37 Light, indicator, head
38 Switch, dimmer and flash
39 Light, left front turn
40 Light, left front turn TUV
41 Light, Left rear turn
42 Fuse 7.5 amp
43 Fuse 7.5 amp
44 Switch, hazard
45 Light, right front turn
46 Light, right front turn TUV
47 Light, right rear turn
48 Indicator, turn signal
49 Flasher, electronic
50 Wiper motor, front
51 Fuse 7.5 amp
52 Switch, wiper and washer
53 Pump, front washer
54 Fuse 7.5 amp
55 Switch, wiper & washer rear
56 Wiper motor, rear
57 Pump, rear washer
58 Fuse 7.5 amp
59 Switch, cab flood lights
60 Indicator, cab flood light (incorporated in 59)
61 Light, cab right flood
62 Light, cab left flood
63 Fuse 7.5 amp
64 Switch, rear flood light
65 Light, right rear flood
66 Light, left rear flood
67 Indicator, rear flood light (incorporated in 64)
68 Fuse 7.5 amp
69 Switch, pressure, brake lights
70 Relay
71 Light, left brake
72 Light, right brake
73 Circuit breaker
74 Timer, emergency steering
75 Selector, transmission
76 Contact, clutch cut-off
77 Relay, backup alarm
78 Valves, transmission solenoid
79 Transmission neutral start relay
80 Relay, backup alarm
81 Fuse 7.5 amp
82 Alarm, backup
83 Switch, clutch cut-off

Study SAFETY RULES in the front of this manual thoroughly for the protection of machine and safety of personnel

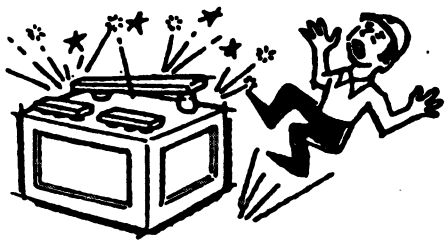
⚠ SAFETY PRECAUTIONS



⚠ CAUTION: Wear eye protection and remove rings, metal watch bands and other metal jewelry when working on the electrical system.



⚠ CAUTION: When checking or repairing the electrical parts, DISCONNECT THE EARTH LINE "A" from Minus Terminal "B" on the battery.
DISCONNECT CABLE "C" from PLUS TERMINAL "D".



⚠ CAUTION: NEVER LAY A METAL OBJECT on top of a battery as short circuit can result.

⚠ CAUTION: GAS FROM BATTERY ELECTROLYTE IS FLAMMABLE. Keep all sparks and fires away from the battery. When charging the battery, gas is created more rapidly.

⚠ CAUTION: GAS ACID IS HARMFUL ON CONTACT with the skin or materials.

Trouble - shooting

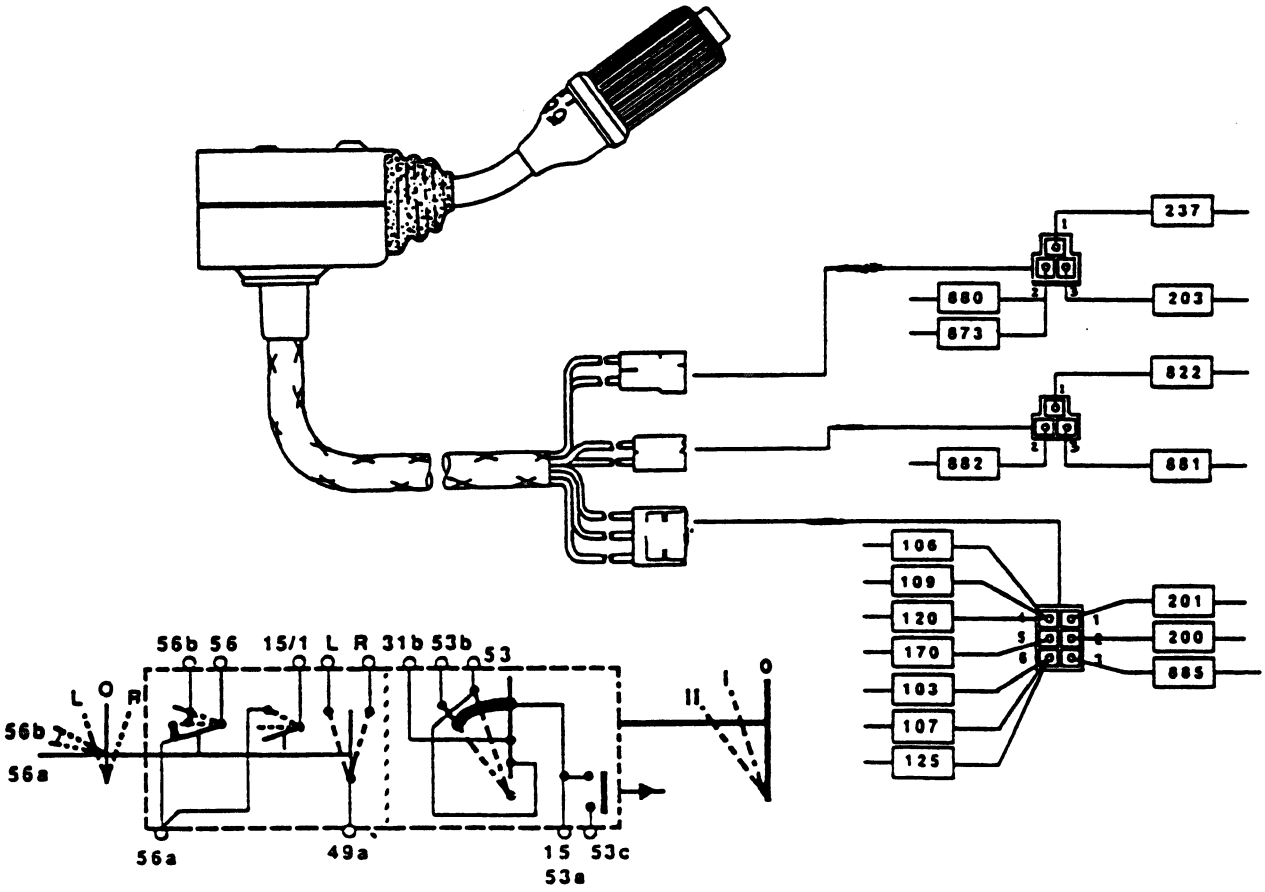
FAULT	CAUSE	REMEDY
Drive torque insufficient.	Check battery efficiency.	Re-charge or replace.
	Check all starting circuit connections : terminals battery, starter motor.	Re-connect or re-condition battery and starter connections.
	Check brushes for correct length, sliding action and spring load.	Service as required.
	Field windings shorted or grounded. Armature interrupted, shorted or grounded.	Replace.
	Commutator ovalized (out-of-round)	Replace.
Drive torque sufficient but starter does not turn.	Freewheel or solenoid faulty.	Replace.
The motor does not turn. No power drainage.	Interruzione della continuità elettrica negli avvolgimenti.	Check for wire cutting. Replace as required.
	No continuity in the wiring. Bad contat between brushes and commutator.	Check that brush springs are in working order and brushes are not worn-out. Replace as required.
Drive pinion does not engage.	Chipped ring gear.	Replace.

38 - SWITCH , DIMMER AND FLASH

52 - SWITCH , WIPER AND WASHER

Wire#

103 Position R to turn signal flasher lamp (right front) **45**
106 Position L to flasher switch **44**
107 Position R to flasher switch **44**
109 Position L to turn signal & flasher lamp (left front) **39**
120 Position L to turn signal & flasher lamp (left rear) **41**
125 Position R to turn signal & flasher lamp (right) **47**
170 Position 49 to flasher switch **44**
237 Position 1 to light switch, dash **25**
203 Position 3 to light switch, dash **25**
880 Position 2 to fuse block **C/51**
873 Position 2 to front wiper motor **50**
822 Position 3 to front wiper motor **50**
881 Position 3 to front wiper motor **50**
882 Position 2 to front wiper motor **50**
885 Position 3 to front & rear wiper pumps **57**

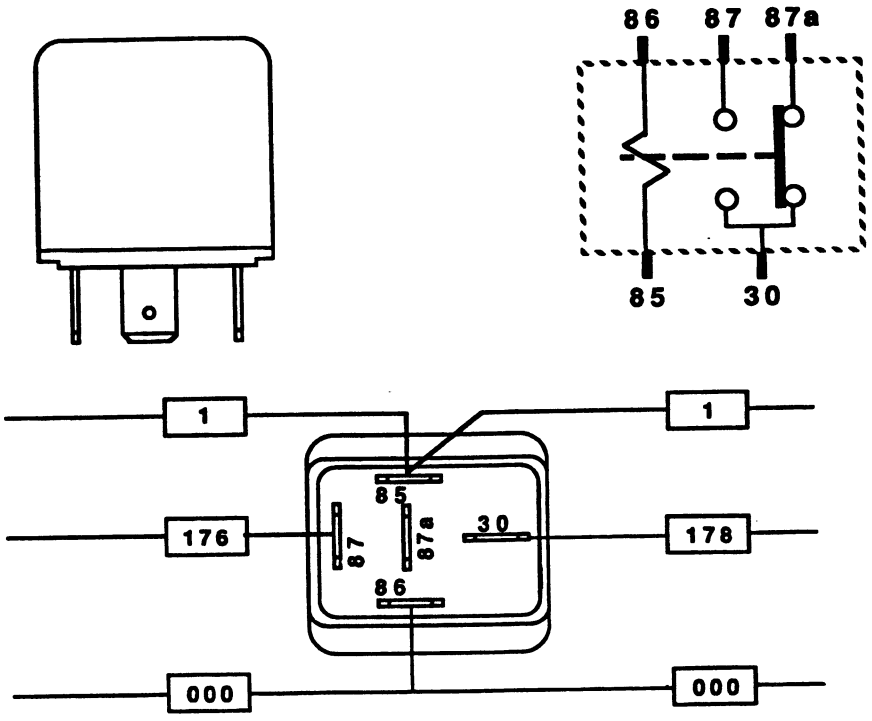


Location: right side of steering column below steering wheel

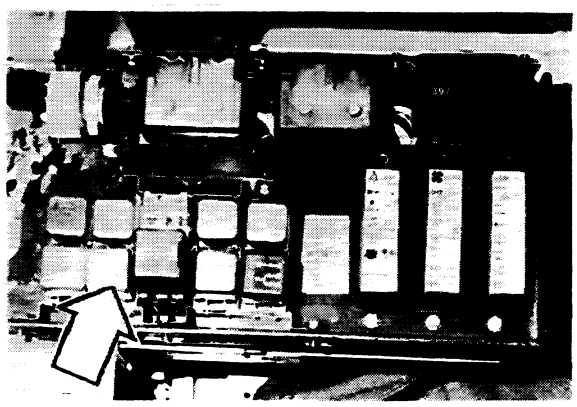
80 - RELAY, BACKUP ALARM

Wire #

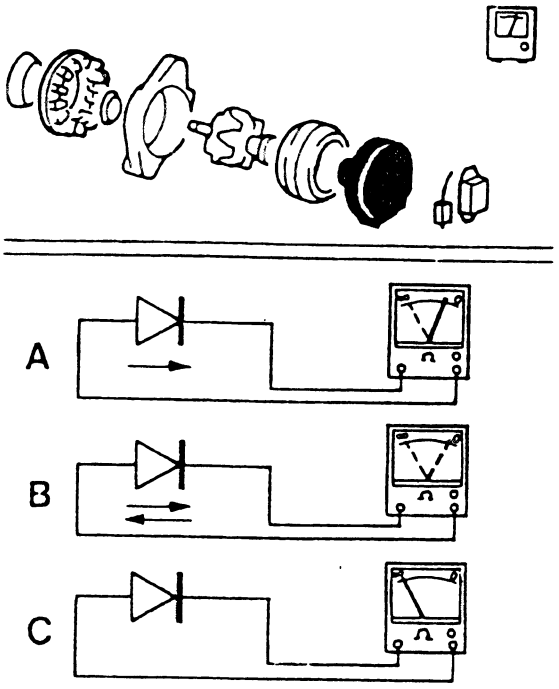
178 Position 30 to fuse block C/ 81
1 Position 85 to transmission controller 75
176 Position 87 to relay 77
000 Position 86 to relay 77 and to frame ground



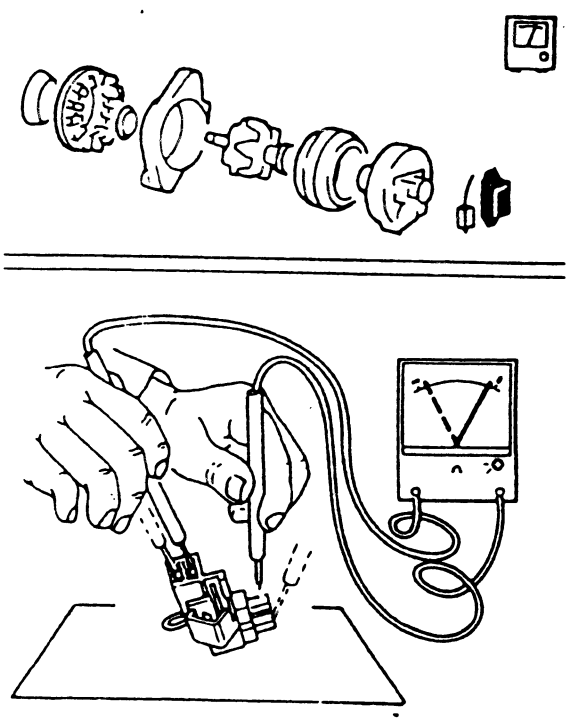
Location: on console in electrical compartment



Study SAFETY RULES in the front of this manual thoroughly for the protection of machine and safety of personnel



25 - Test diode integrity (by inverting the tester probes) scale Ω x1.
A- Diode is efficient.
B- Diode is shorted.
C- Diode is interrupted.

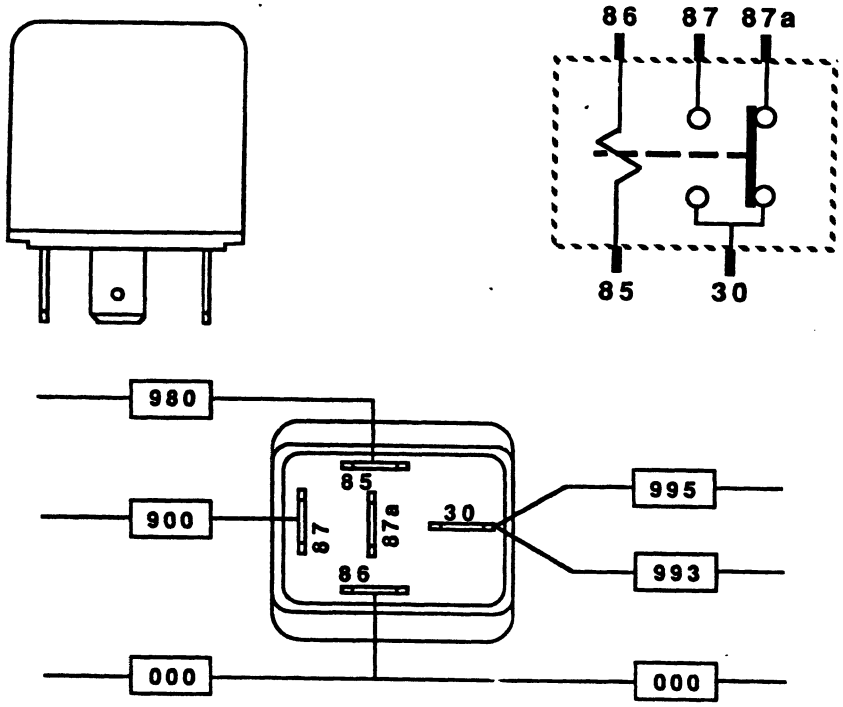


26 - Test brush holder integrity and insulation.

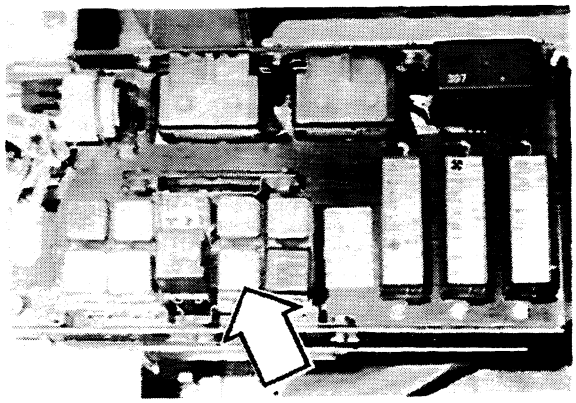
133 - RELAY (boom kick-out)

Wire #

900 Position 87 to electromagnetic boom kick-out solenoid **134**
993 Position 30 to fuse block **C/ 135**
995 Position 30 to boom kick-out inductive proximity switch **132**
980 Position 85 to boom kick-out inductive proximity switch **132**
000 Position 86 to frame ground

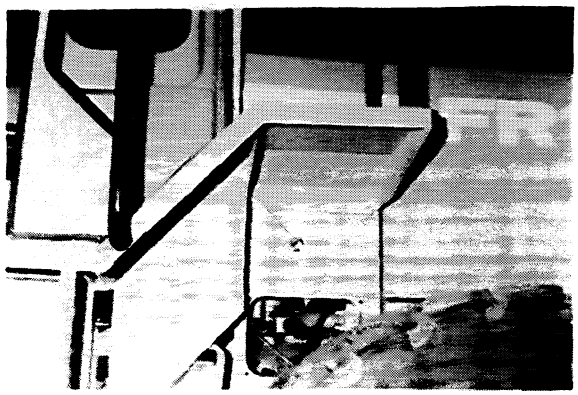


Location: on console in electrical compartment

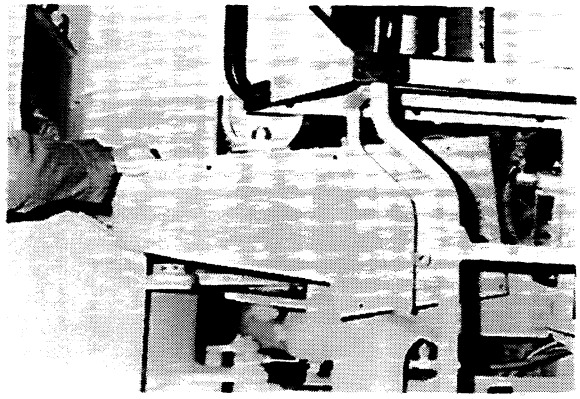


Study SAFETY RULES in the front of this manual thoroughly for the protection of machine and safety of personnel

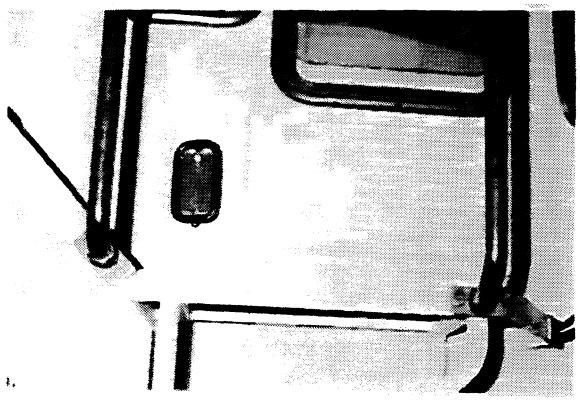
8.3.1.5
Remove the rear fender.



8.3.1.6
Remove cab corner panels on both sides.

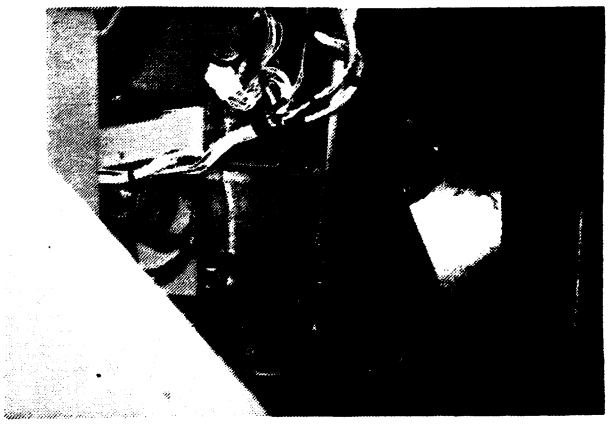


8.3.1.7
Remove platform and cab corner panel on the right side.

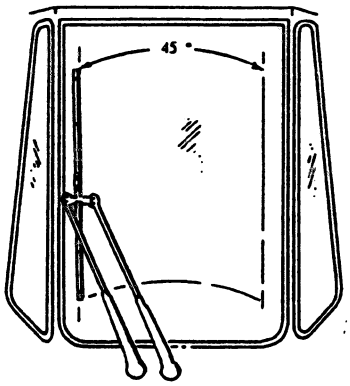


8.3.1.8
Remove the ladder and cab corner panel on the left side.

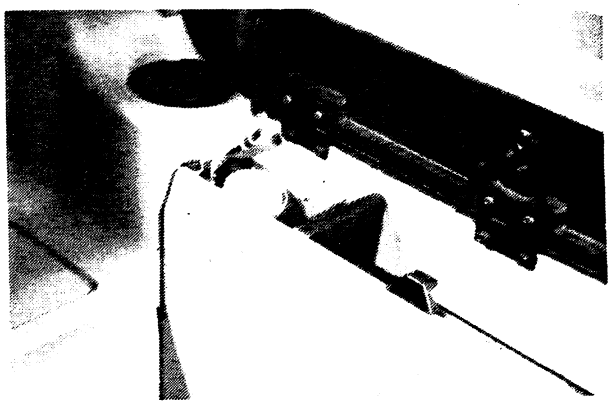
8.3.3.5 WINDOW WIPERS & WASHERS



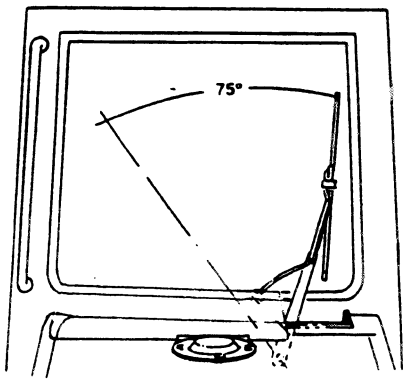
8.3.3.5.1
Front windshield wiper motor is located behind steering column inside cab.



8.3.3.5.2
Front wiper motor operates at two speeds (35 rpm - 55 rpm). Since motor rotates a complete 360°, the bell crank assembly allows for a 45° sweep of the wiper arm.



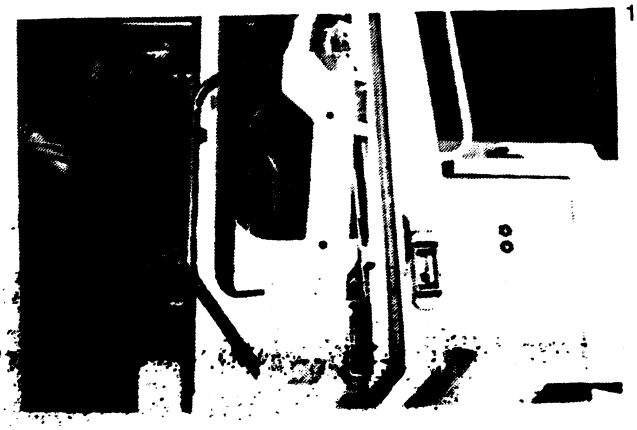
8.3.3.5.3
Rear windshield wiper motor is located under panel directly behind the operator's seat below the window.



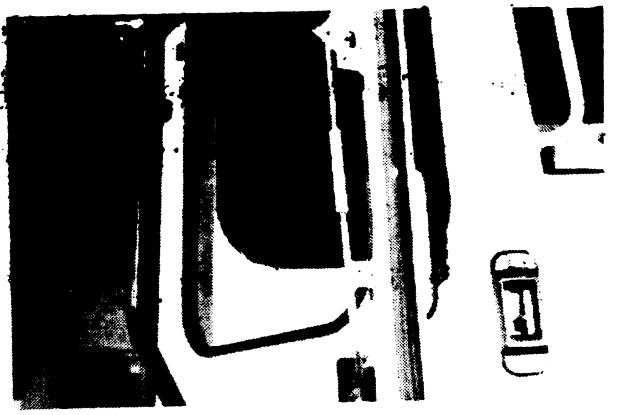
8.3.3.5.4
Rear wiper motor operates at a single speed. Internal gearing offers an oscillation of approximately 35 cycles per minute and a 75° sweep of the wiper arm.

8.3.3.7 DOOR

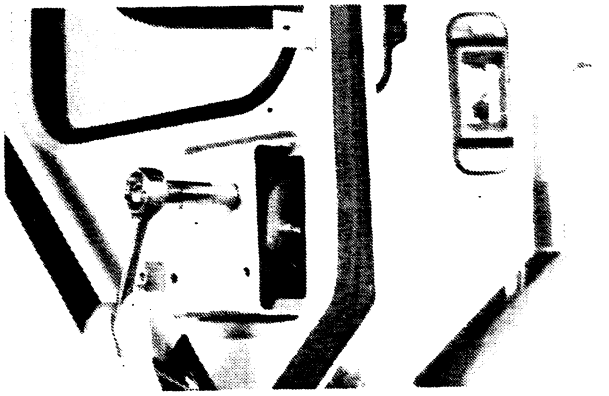
8.3.3.7.1
Remove latch cover from door.



8.3.3.7.2
Remove cotter pins securing adjusting rod to latch and handle; remove rod assembly.



8.3.3.7.3
Remove capscrews from handle mounting bracket. Remove bracket and handle from door.



8.3.3.7.4
Remove latch assembly from adjusting plate.