

# MICHIGAN

## OPERATORS MANUAL

### No. 2944-R1 Model 75B Articulated Tractor Shovel

Information contained herein pertains to  
Machine Serial Numbers listed below:

75B CUMMINS — 443A101 and After

75B G.M. — 447A101 and After

Record Your Machine Serial Number and Engine  
Model Specification and Serial Number Here

Machine Serial 447A-220

Engine Model DETROIT 1043-7000 S/N ~~447A-220~~ 447A-220

Engine Serial 4A0195151

## CLARK EQUIPMENT COMPANY



## TO OWNERS

The purpose of this manual is to serve as a guide to the proper operation, lubrication and minor adjustment of the MICHIGAN Tractor Shovel. Study this manual carefully before starting or operating the machine the first time. Become familiar with all controls and procedures, and keep the manual on the machine for handy reference.

You have purchased this MICHIGAN Tractor Shovel with the expectation that it would give you long and faithful service. In its construction we have taken every precaution to see that you get an efficient, long lived, satisfactory machine. It is our sincere hope that you derive from its operation the full measure of value and utility which you looked forward to when purchasing it.

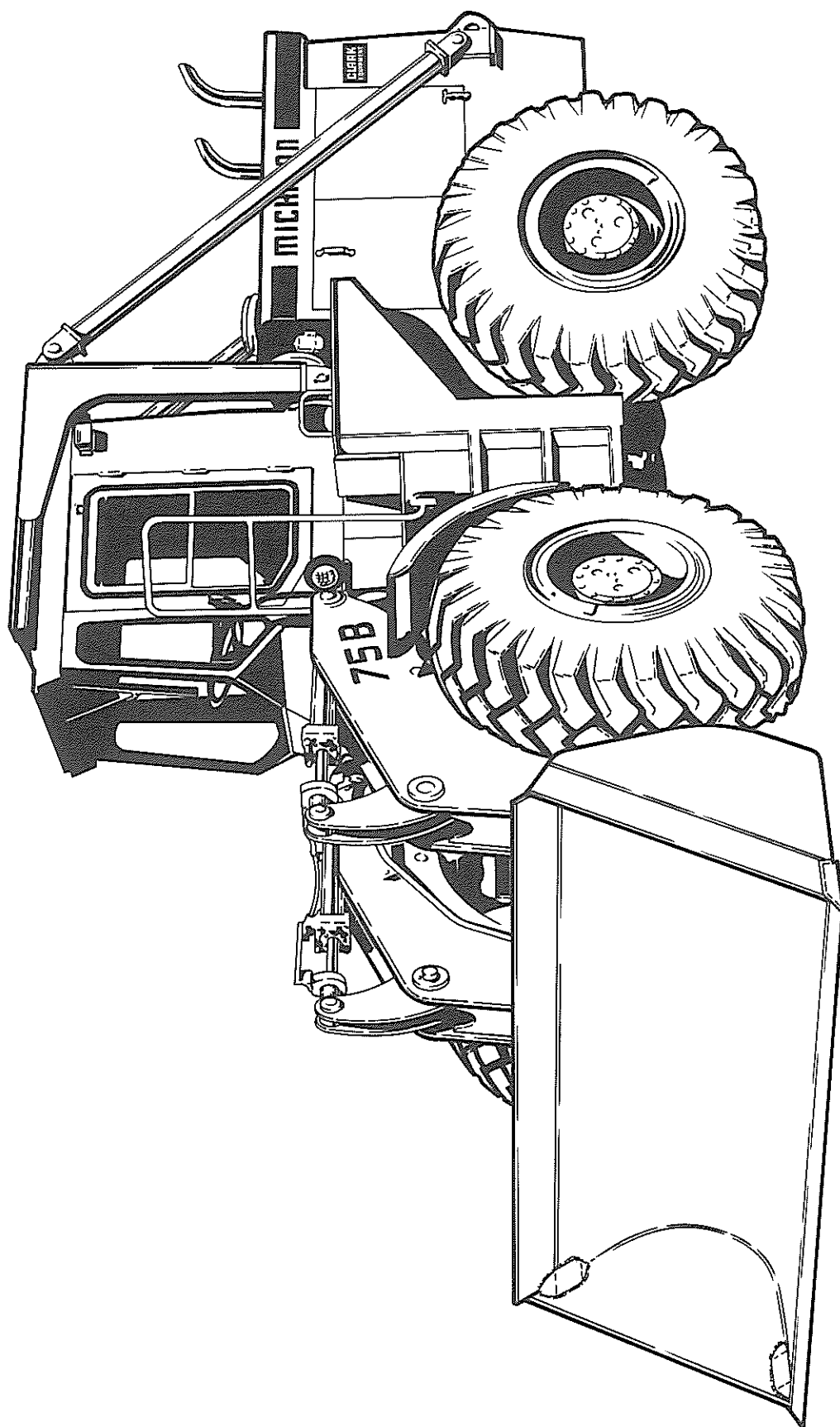
For these reasons, we take the liberty of suggesting that your MICHIGAN Tractor Shovel will always respond at its best with considerate treatment and care. The slight outlay in personal attention and cost required to give it regular and proper lubrication, inspection at stated intervals, and such adjustments as may be indicated, will repay you many times in low cost operation and trouble-free service.

Whenever repair or replacement of component parts is required, only Clark-approved parts as listed in the applicable parts manual should be used. Use of "will-fit" or non-approved parts may endanger proper operation and performance of the equipment. The Clark Equipment Company does not warrant repair or replacement parts, nor failures resulting from the use thereof, which are not supplied by or approved by the Clark Equipment Company.

**CLARK EQUIPMENT COMPANY**

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**MODEL 75B ARTICULATED TRACTOR-SHOVEL**

TS-13579

## GENERAL DESCRIPTION

MICHIGAN Articulated Tractor Shovels are constructed for rugged heavy-duty industrial and commercial applications. They are specifically engineered for maximum ease of operation to move the greatest amount of material in the shortest possible time.

Drive power is from the engine through a Clark torque converter, to a Clark power shifted transmission, to Clark axle assemblies. Universal slip-joint drive shaft assemblies are used between power transfer units.

Axle assemblies are Clark all wheel drive, spiral bevel ring gear and pinion, with further gear reduction provided by planetary gear sets within the wheel hubs.

Constant four-wheel drive provides additional tractive effort and power for any operating condition. Effortless hydraulic power steering is provided, utilizing two double acting steering cylinders, one at each side between front and rear frames.

Service brakes provide braking effort on all four wheels, with a cable controlled mechanical parking brake mounted on the drive line.

Numerous quick-change attachments are available as optional accessory equipment, enabling one to increase the usefulness of the machine for a variety of different operations.

For more complete specifications refer to Specifications and Service Data in the rear of this manual.

### DATA PLATES

Data plates and decals used throughout the machine aid in its safe efficient operation; others give service instructions. Read all instruction plates before starting and operating the machine.

### AREA WARNING DECAL

The warning decal as shown in Figure 1 is located on the surfaces of both sides of front frame. Safety links should be attached between front and rear frames when servicing the

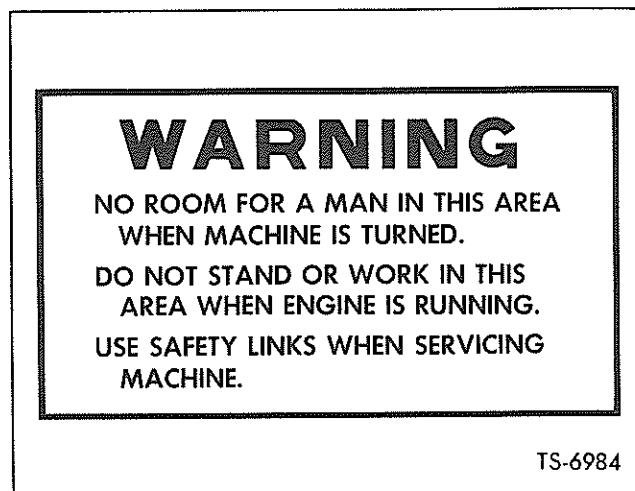


Fig. 1. Area Warning Decal

machine. Service personnel must stay out of these areas when the engine is running, or the machine is in motion, as there is not enough space for a man in the area when machine is turned.

### MACHINE SERIAL NUMBER PLATE

The machine serial number plate gives model number and serial number of machine. See Figure 2. Serial number of machine also is stamped in one-half inch numerals beneath right hand upper pivot assembly, and on the rear beneath the wrap around.

IMPORTANT: ALWAYS GIVE SERIAL NUMBER OF MACHINE WHEN ORDERING PARTS.

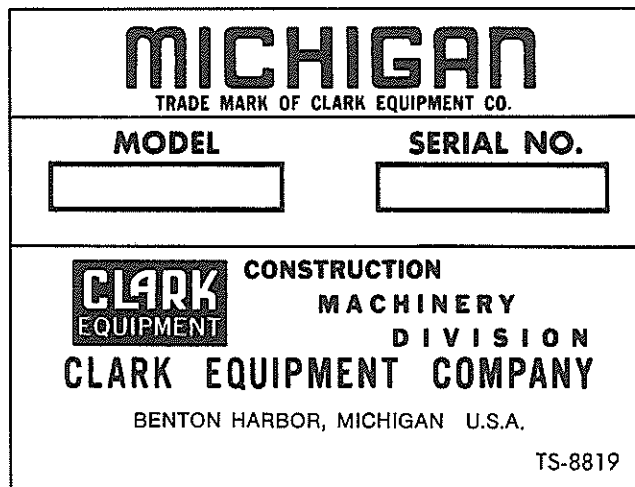


Fig. 2. Machine Serial Number Plate

LUBRICATION INSTRUCTIONS						
ITEM	SHOVEL	DOZER	SCRAPER	CHECK	LUBRICATION OR CHANGE PERIOD	LUBRICANT KEY
AIR CLEANER(S)	X	X	X	SEE OPERATORS MANUAL FOR DETAILED INSTRUCTIONS.		
HYDRAULIC RESERVOIR	X	X	X	8 HRS.	1000 HRS.	HF
TORQUE CONVERTER & TRANSMISSION	X	X	X	8 HRS.	500 HRS.	HF
ALL GREASE FITTINGS EXCEPT:	X	X	X	—	8 HRS.	LBG-1
AUTOMATIC LUBE SYSTEM RESERVOIR**	X	X	X	—	8 HRS.	LBG-2
BOOM & BUCKET SEALED LINKAGE PINS**	X	—	—	—	*100 HRS.	LBG-1
BRAKE CAMSHAFT FITTINGS	X	X	X	—	50 HRS.	LBG-1
PROPELLER SHAFT FITTINGS	X	X	X	—	*100 HRS.	LBG-1
ELEVATOR MOTOR CIRCUIT SWIVEL JOINTS	—	—	X	—	250 HRS.	LBG-1
FRONT AXLE DIFFERENTIAL	X	X	X	50 HRS.	1000 HRS. - 6 MO.	SAE 90 EPGL-1
REAR AXLE DIFFERENTIAL	X	X	—	50 HRS.	1000 HRS. - 6 MO.	SAE 90 EPGL-1
FRONT AXLE PLANETARY HUBS	X	X	X	50 HRS.	1000 HRS. - 6 MO.	SAE 90 EPGL-1
REAR AXLE PLANETARY HUBS	X	X	—	50 HRS.	1000 HRS. - 6 MO.	SAE 90 EPGL-1
REAR AXLE WHEEL BEARINGS	—	—	X	—	1000 HRS. - 6 MO.	WB
REAR AXLE WHEEL BEARINGS & CENTER STEER ARM BEARINGS (Non-Driving Axles)	X	—	—	—	1000 HRS. - 6 MO.	WB
STEERING GEAR**	X	X	X	50 HRS.	—	LBG-1
FAN DRIVE GEAR BOX**	—	X	—	50 HRS.	1000 HRS. - 6 MO.	SAE 90 GL
ELEVATOR GEARBOX	—	—	X	50 HRS.	1000 HRS. - 6 MO.	SAE 90 EPGL-2
MIDMOUNT BEARING ASSEMBLY: A — Equipped with level & drain plug B — Equipped with grease fittings (2)	X X	X X	— —	50 HRS. —	1000 HRS. - 6 MO. 100 HRS.	HF LBG-1
BRAKE MASTER CYLINDER (Hydraulic & Air Over Hydraulic Brakes)	X	—	X	50 HRS.	—	BF
BRAKE POWER CLUSTER AIR CHAMBER (Air Over Hydraulic Brakes)	X	—	X	—	1000 HRS.	HF
CAB PRESSURIZER FILTER**	X	X	X	REMOVE, CLEAN & REPLACE EVERY 8 HRS. OR OFTENER AS REQUIRED		
HYDRAULIC SYSTEM BREATHER	X	X	X	REMOVE, CLEAN & REPLACE EVERY 50 HRS.		
CONVERTER BREATHER	X	X	X	REMOVE, CLEAN & REPLACE EVERY 50 HRS.		
TRANSMISSION BREATHER	X	X	X	REMOVE, CLEAN & REPLACE EVERY 50 HRS.		
CONVERTER & TRANSMISSION OIL FILTERS	X	X	X	—	250 HRS.	—
STEERING SYSTEM OIL FILTERS	X	X	X	—	250 HRS.	—
BRAKE SYSTEM AIR DRYER CARTRIDGE**	X	X	X	*CHANGE CARTRIDGE EVERY 500 HRS.		
HYDRAULIC RESERVOIR SUCTION & RETURN FILTERS	X	X	X	CLEAN OR REPLACE EVERY 250 HRS.		
AXLE BREATHERS	X	X	X	REMOVE, CLEAN & REPLACE EVERY 500 HRS.		
ENGINE, FUEL & OIL FILTERS & ACCESSORIES				SEE ENGINE OPERATORS MANUAL FOR INSTRUCTIONS.		
*LUBRICATION OR CHANGE PERIOD IS AS INDICATED, EXCEPT WHEN DIFFERENT ON DECAL BELOW. **WHERE APPLICABLE.						
LUBRICANT KEY						
LBG-1	LITHIUM BASE MULTI-PURPOSE GREASE 0°F & ABOVE — GRADE 2 BELOW 0°F — GRADE 0	GL	STRAIGHT MINERAL OIL GEAR LUBE — API CLASS GL1			
		BF	SAE J1703 (70R-3) BRAKE FLUID			
LBG-2	LITHIUM BASE MULTI-PURPOSE GREASE 30°F (−1°C) & ABOVE — GRADE 0 −30°F (−34°C) TO 30°F (−1°C) — GRADE 00	WB	WHEEL BEARING GREASE — EP GRADE 1 (Lithium Soap or Lithium Lead Type — 40 lbs. Min. Lever Load, Timken Test)			
EPGL-1	EXTREME PRESSURE GEAR LUBE — SCL TYPE	HF	AMBIENT TEMP. RANGE	LUBRICANT TO BE USED		
EPGL-2	EXTREME PRESSURE GEAR LUBE — API CLASS GL4 (Military Spec. MIL-L-2105B)		ABOVE 0°F (−18°C)	SAE 10W Engine Oil, API Class SD or SE MIL-L-2104B or MIL-L-2104C. (For Optional Lubricants See Operators Manual).		
			0°F (−18°C) & BELOW	See Operators Manual		
SEE APPLICABLE OPERATORS MANUAL FOR DETAILED INSTRUCTIONS.						
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**Fig. 3. Lubrication Instruction Decal**

### LUBRICATION INSTRUCTION PLATE

The lubrication instruction plate as shown in Figure 3 provides a list of items to be lubricated on specific models, intervals of lubrication, and types of lubricant to be used. However, in addition to the lubrication instruction plate, it will be necessary to refer to the Lubrication Section in applicable Operator's Manual for location of lubricating points and detailed instructions pertaining to lubrication.

### SAFETY WIRING DECAL

The safety wiring decal as shown in Figure 4 indicates that the machine is equipped with an alternator having a negative grounded electrical system.

The alternator is a continuous output diode rectified alternating current (a.c.) generator that develops a continuous output of electrical energy at all engine operating speeds (high, low and idle). The output of the alternator is controlled by a transistorized voltage regulator.

*Note: To prevent serious injury to personnel or extreme damage to electrical system components, it should be noted that information contained in this manual pertaining to electrical system components will emphasize certain precautions that must be followed when servicing the charging system.*

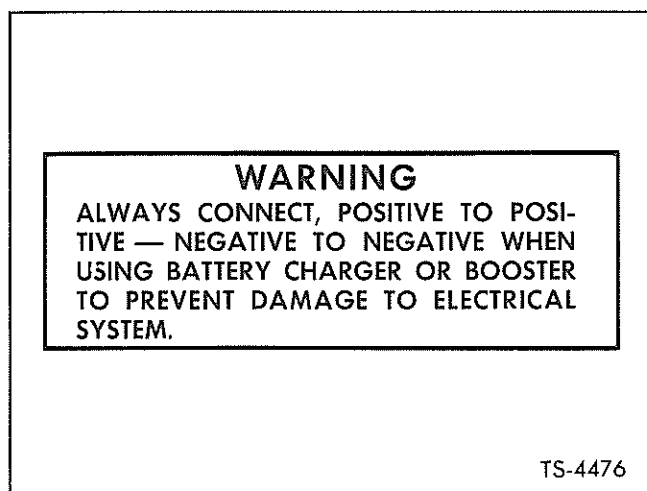


Fig. 4. Safety Wiring Decal

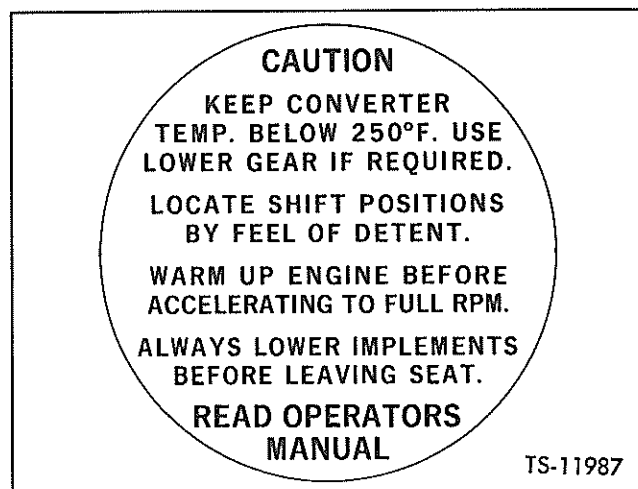


Fig. 5. Operating Precaution Plate

### OPERATING PRECAUTION PLATE

The operating precaution plate as shown in Figure 5 is located in the center of the steering wheel. This plate provides a few precautions to follow during machine operation, and also reminds the operator to refer to the Operator's Manual for additional information that is necessary for proper operation of the machine.

### TRANSMISSION OR TORQUE CONVERTER SERIAL NUMBER PLATE

The transmission serial number plate is located on the transmission. The torque converter serial number plate is located on the torque converter. Both plates are identical except for model number and serial number stamped on each plate to properly identify the units. Plate is shown in Figure 6.

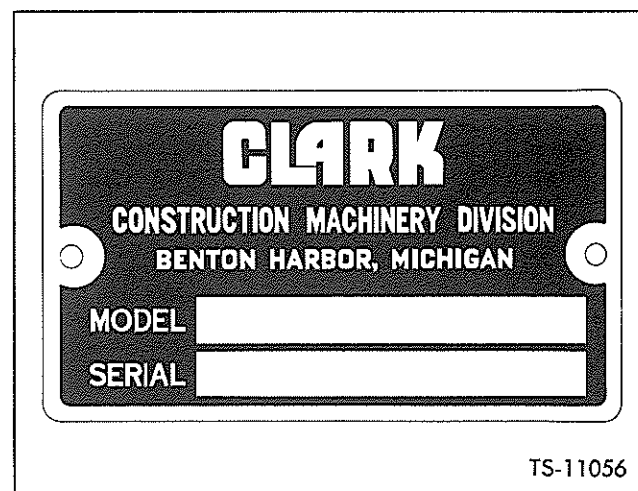


Fig. 6. Torque Converter or Transmission Serial Number Plate

## NOTICE

**SUBJECT: Spark Arresters  
All Models**

Many states and other governmental entities have adopted laws and regulations which require Spark Arresters on machines operating on or near forest, brush or grass-covered lands within their jurisdiction. The Federal government also has regulations (Forest Services) which require Spark Arresters on machines operating on National lands.

Use of machines without Spark Arresters in areas where such use is prohibited by law or regulation can subject the owner or operator of the machine to penal fines or civil damages, including the costs of fire suppression.

Spark arresting equipment complying with the applicable laws and regulations must be installed on any machines which are likely to be operated in such areas. All machines which are converted for Woodland use (loggers, harvesters, etc.) should be installed with approved Spark Arresting Equipment.

Machines with turbo charged engines do not require additional Spark Arresting Equipment to comply with currently known laws and regulations.



## PREPARATION FOR OPERATION

It is essential that the following points be checked with machine in a level position before operating this MICHIGAN Tractor Shovel.

Refer to the Lubrication Charts to locate items listed below.

1. Check entire machine for damage in transit or storage.
2. Check oil level in the following to specifications outlined in Lubrication Section.
  - a. Engine crankcase
  - b. Transmission case (with engine idling)
  - c. Front drive axle differential
  - d. Front drive axle planetary hubs
  - e. Rear drive axle differential
  - f. Rear drive axle planetary hubs
  - g. Hydraulic system reservoir
  - h. Brake master cylinders
  - i. Midmount bearing
3. Check cooling system to make sure radiator is filled and that radiator drain cock and engine block drain cock are closed. When there is danger of water freezing in the cooling system, use a reliable brand of permanent type anti-freeze according to manufacturer's instructions. For further information, please refer to Operation and Maintenance Manual of engine manufacturer.
4. Check batteries that plates are covered with water. Add only clean distilled water. Do not overfill.
5. Check fuel level in tank. Handle fuel in clean containers. Use No. 2 Diesel fuel oil, Cetane 40 minimum.
6. Check that all drain plugs, drain cocks, filler openings, fuel lines, oil lines, hydraulic lines, cooling system and air cleaner connections are tight and do not leak.
7. Check tire pressures and hydroinflation. See Specifications and Service Data for air pressure and hydroinflation data. Be sure valve caps are in place to prevent dirt, moisture and foreign material from damaging valve core.
8. Grease all lubrication points of the entire unit. Refer to Lubrication Section as a guide for location and type of lubricant.



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## INSTRUMENTS AND OPERATING CONTROLS

Before operating a machine of this type it is essential that the operator become thoroughly familiar with the location and function of the various controls and instruments. Reference to, and study of the illustrations of the operator's compartment, controls, and instruments, together with the following paragraphs will aid in acquiring this information.

The operator should work slowly and carefully until he has become thoroughly accustomed to the machine. Speed and skill will be attained much easier if the necessary time is spent to acquire complete familiarity with the machine and its operation.

### INSTRUMENTS AND SWITCHES

All instruments and switches with the exception of the hourmeter and foot operated horn switch are conveniently located on instrument panels at left and right front sides of operator's compartment. The hourmeter is mounted at the rear of the operator's compartment. The foot operated horn switch is located at left side of front floorboard.

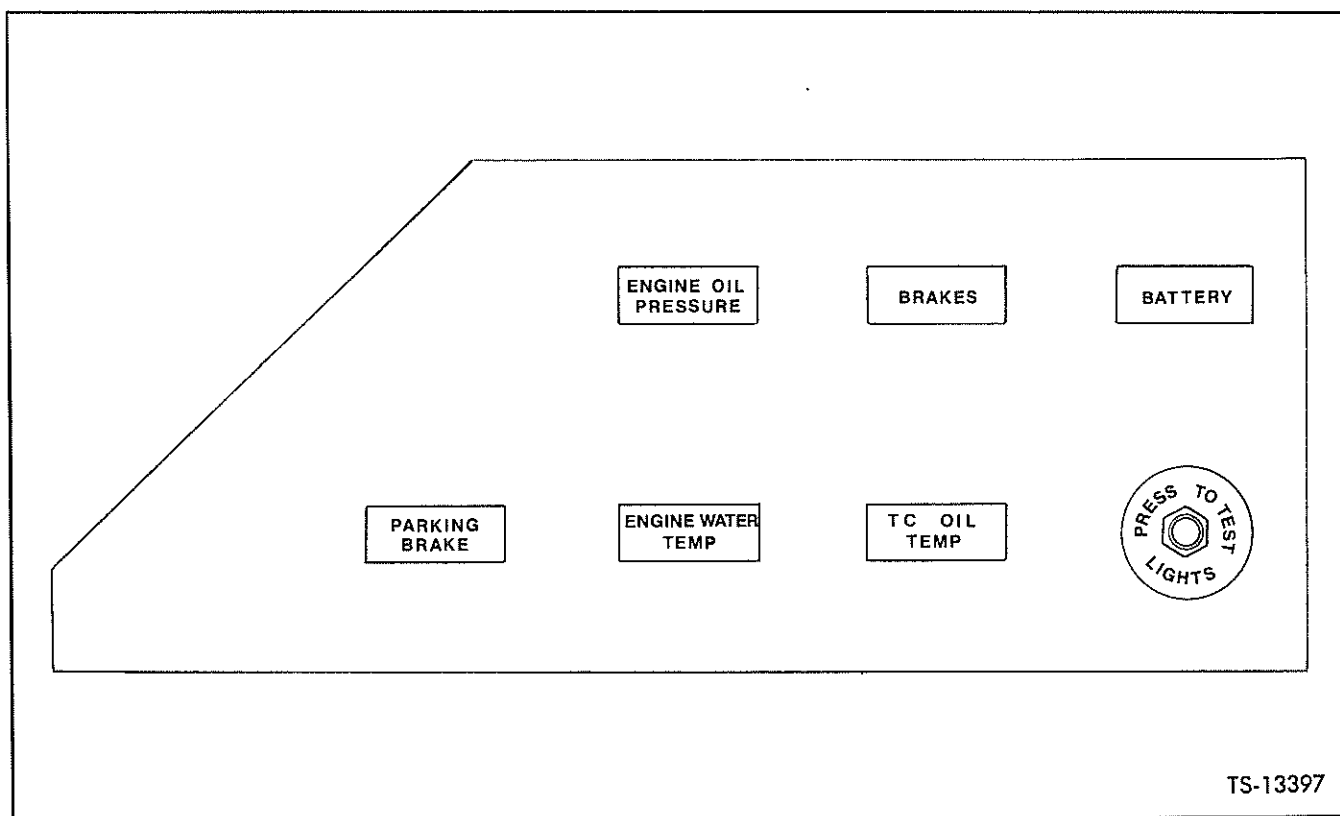
It is good practice to observe warning lights frequently while working the machine. Each warning light serves as an important check point for operating conditions of torque converter and transmission, and of the engine and accessories. Do not operate machine if warning lights are not functioning properly.

Figures 7, 8 and 9 give identification of instruments and switches.

### INSTRUMENT PANELS

**Engine Temperature Warning Light** warns operator of excessively high temperature of engine coolant. Under normal operating conditions light will remain off. If warning light comes on idle engine, and add water to the system. When temperature lowers, shut down engine and troubleshoot cooling system for cause of overheating.

**Engine Oil Pressure Warning Light** warns operator of low oil pressure in engine lubricating system. If warning light remains on for over 10 to 15 seconds, stop engine immediately and determine cause.



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Fig. 7. Left Hand Instrument Panel

**Brake Warning Light** warns operator of low pressure in air reservoir for operating brakes. Never operate machine if warning light is on. Refer to Specifications and Service Data for air pressure specifications.

**Torque Converter Temperature Warning Light** indicates when the temperature of fluid in torque converter and transmission lubricating system has reached 250° F. (121° C.). When warning light comes on shift to a lower operating speed range.

**Battery Warning Light** indicates batteries are discharging when light is on with engine operating. When this condition exists, engine should be shut down and trouble shooting of the electrical system should be undertaken immediately.

**Light Switch** operates headlights, and tail lights in first position, with the addition of back-up lights in second position. Pull switch to operate.

**Ignition Switch** energizes all warning lights and switches on instrument panel, and starting motor circuit. Turn switch to right for ON position. To start engine, turn key to extreme right and hold to turn cranking motor; release when engine starts. Do not crank engine continuously for more than 30 seconds to avoid damage to cranking motor. Pause a few minutes between cranking cycles, if difficulty

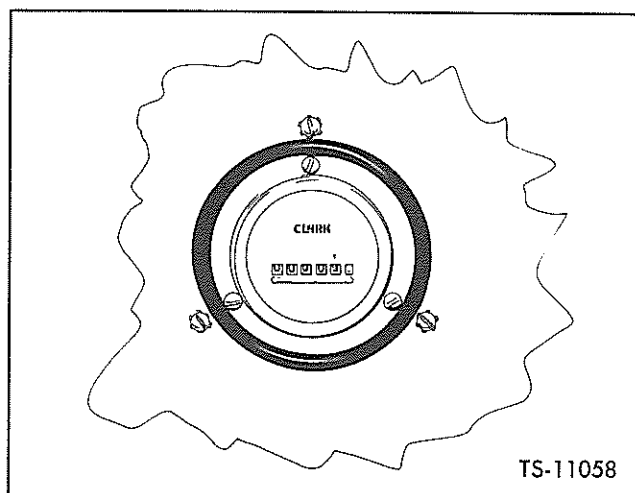
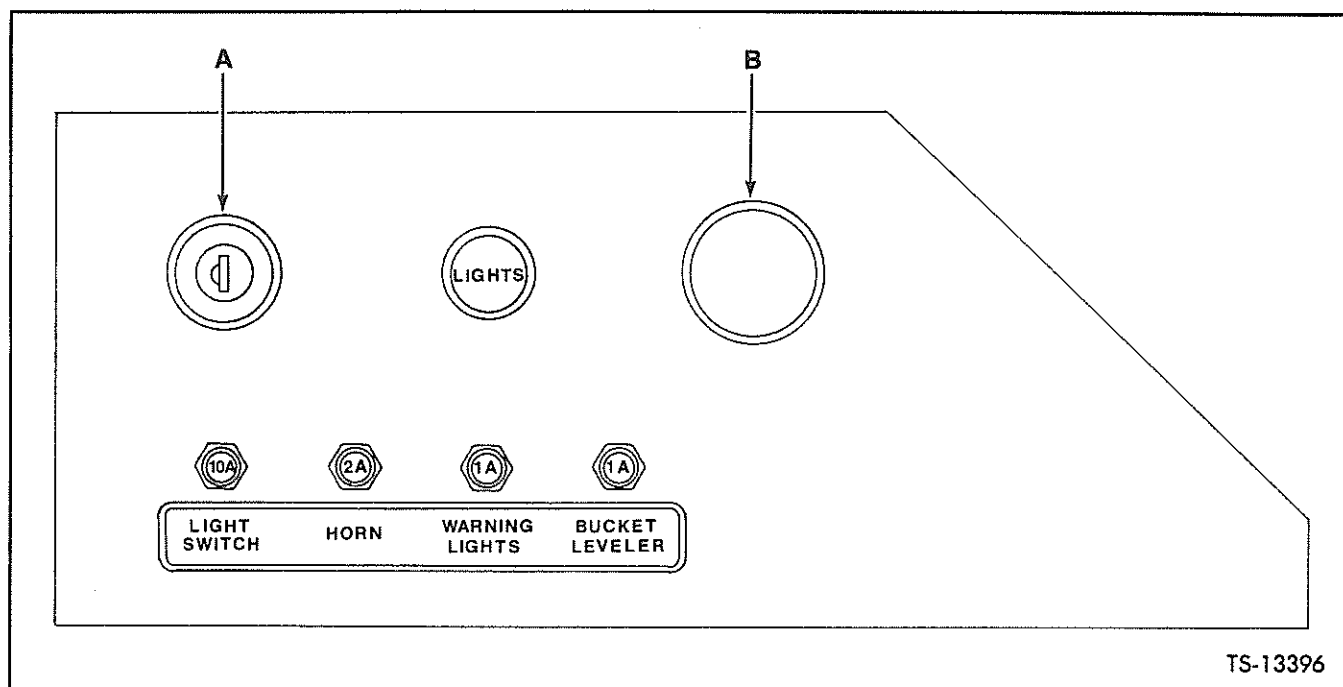


Fig 8. Hourmeter

is encountered to let windings cool. See Starting Procedure.

**Parking Brake Warning Light** indicates that the parking brake is applied when ignition switch is ON. Release parking brake before attempting to move the machine.

**Press To Test Button** activates all instrument panel warning lights and warning buzzer. At the beginning of each work shift, turn ignition key to the ON position and press button to check proper function of warning lights and buzzer.



A. Ignition Switch

B. Emergency Brake Hand Valve

Fig. 9. Right Hand Instrument Panel



## CONSTRUCTION MACHINERY DIVISION



Buzzer is activated simultaneously with warning lights. Whenever one of the warning lights comes on, the buzzer also comes on providing an audible warning as well as visual.

**Emergency Brake Hand Valve** is located on right hand instrument panel. It is a push pull type control used to actuate the manually controlled emergency brake system. Pull button out to apply brakes, push in to release brakes.

**WARNING:** *The emergency brake is not to be used as a parking brake since air pressure in the*

*emergency system bleeds down shortly after engine has been shut down.*

**Circuit Breakers:** The lights, horn, warning lights and bucket leveler are protected by individual circuit breakers, each with its own reset button. Press button and hold momentarily to re-set circuit breaker.

If circuit breaker is repeatedly activated, check corresponding electrical system for short-circuits without delay.

## OPERATING CONTROLS

All controls are conveniently located to provide maximum ease of operation of the machine.

The operator's seat can be shifted forward or rearward to suit the individual by moving the lever on left side of seat forward and shifting the seat to desired position. The height and angle of the seat can also be adjusted by repositioning the seat in the adjusting holes in seat mounting brackets.

If enclosed parking is not available when shutting down machine at end of shift, spread tarpaulin over operator's compartment to give protection from inclement weather. A cab enclosure kit is available as optional accessory equipment.

Refer to Figure 10 for location and identification of operating controls.

**Directional Shift Lever** is the top lever on steering column. This lever provides three positions, FORWARD, NEUTRAL and REVERSE to control direction of machine travel. Pushing lever into forward position engages FORWARD travel. Pulling lever into rear position engages REVERSE travel. Lever is in NEUTRAL when in its central position.

When shifting from FORWARD into REVERSE or vice versa, always decrease engine rpm and stop machine momentarily while making the shift.

**Speed Range Lever** is the bottom lever on steering column. This lever controls the travel speed of the machine. Pushing the lever forward engages LO (First) speed range. Pulling the lever to the rear engages progressively higher speed ranges in consecutive order.

Observe torque converter temperature warning light when working machine. If light comes on, shift to a lower operating speed range.

Shifting from one speed range to another can be made at any time during the working cycle. Momentarily let up on accelerator pedal when shifting to a higher speed range, and accelerate slightly when shifting to a lower speed range.

It is not good driver practice to skip speed ranges when shifting, if machine is in motion. It is better to make progressive shifts engaging each speed range before proceeding to the next.

**Boom Control Lever** is the outer lever on right hand side of operator. This lever has four positions: RAISE, HOLD, DOWN PRESSURE and FLOAT to control boom operation. Of the four positions, RAISE, HOLD and FLOAT are detent located and can be distinctly felt by the operator. The DOWN PRESSURE position is not detent located and must be located by "feathering" the lever between the HOLD and FLOAT positions.

To raise boom and bucket, pull boom lever backward to the last detent position. Boom and bucket will raise in proportion to engine speed.

Push lever forward, one notch ahead of RAISE position to reach the HOLD (neutral) position. Placing boom control lever in this position will stop and hold boom and bucket at any height desired.

Push lever all the way forward to reach the FLOAT position. In this detent position, hydraulic oil will pass from the base end of the boom cylinders through the control valve and into the rod end of the cylinders, keeping them free of air. FLOAT position may be used for lowering the bucket or back dragging.

The DOWN PRESSURE position is found between the HOLD and FLOAT positions by "feathering" the lever. This position may be used for lowering the boom and bucket or to provide penetration to dig below grade level.

Always place boom control lever in HOLD (neutral) position before starting or shutting down engine. This lever will lower boom and bucket even though engine has been shut down.

**Bucket Control Lever** is the inner lever on right hand side of operator. This lever has three positions: CLOSE, HOLD and DUMP to control bucket operation. Since lever is connected to a spring loaded plunger in the control valve, it returns to the HOLD position automatically when released.

To DUMP bucket, push lever forward. Release the lever and it will return to the HOLD (neutral) position, allowing the bucket to remain in the DUMP position.

To CLOSE bucket, pull lever backward. Release the lever and it will return to the HOLD (neutral) position when the bucket reaches a level attitude

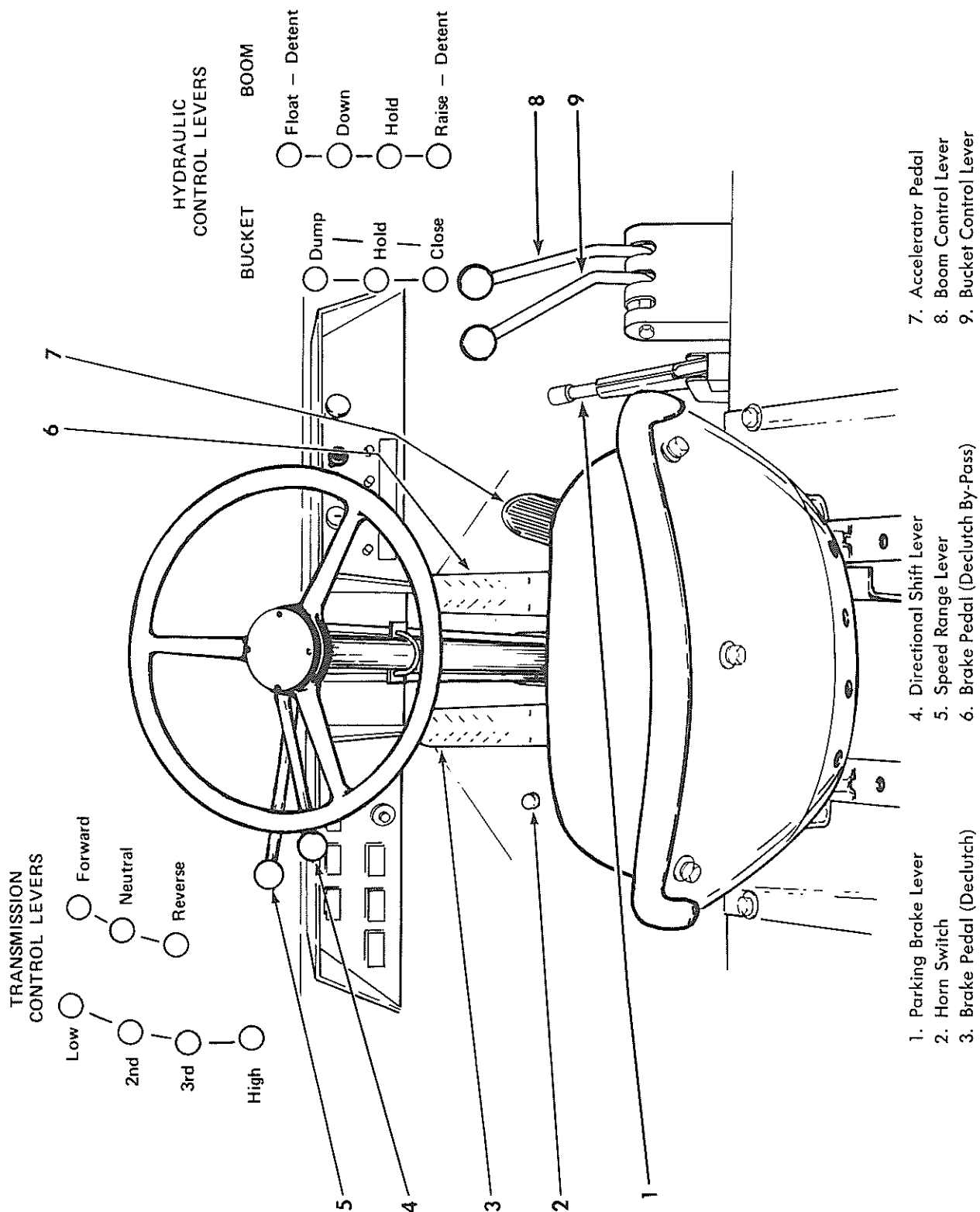


Fig. 10. Operating Controls

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## CONSTRUCTION MACHINERY DIVISION



as it is being rotated back from the DUMP position.

The bucket may be stopped and held at any position of its dumping arc by placing lever in the HOLD (neutral) position.

**Parking Brake Lever** applies mechanical brake on drive line. To set brake, pull up and back on lever. To release brake push lever forward and down.

**Accelerator Pedal** increases fuel supply to engine thus increasing its rpm.

**Brake Pedal** design permits brake application with either left or right foot of operator. Pedal actuates an air valve for applying brakes at all wheels. As pedal pressure increases, air valve opens wider, and brake application becomes more severe.

The left hand brake pedal also operates a de-clutch or shut-off valve in the transmission control cover which blocks off hydraulic pressure to the forward clutch in all speed ranges, thus disengaging the forward clutch and establishing a transmission neutral when the left hand brake pedal is applied. The reverse clutch is not affected.

The right hand brake pedal by-passes the de-clutch valve, making it possible to apply the service brakes without de-clutching if so desired. This permits inching the machine forward using service brakes and throttle.

The purpose of the de-clutching feature is to prevent the machine from creeping forward when loading or dumping the bucket, yet permits backing away if operating on a sloping grade. It also increases boom and bucket hydraulic system working power by blocking the power transmitted to the wheels.



## OPERATING INSTRUCTIONS

After the machine has been properly checked and the operator has familiarized himself with location and function of the various controls, the machine should be operated according to instructions in the following paragraphs.

## SAFETY PRECAUTIONS

A careful and efficient operator of heavy equipment must be guided by simple and fundamental rules of safety. He must take the necessary precautions to insure the safety of others as well as himself, and must avoid careless operating habits which cause damaging accidents to machinery and equipment.

The use of this machine is subject to certain hazards that cannot be met by mechanical means, but only by the exercise of intelligence, care and common sense.

**Warning:** *Use safety links when servicing machine. Do not stand or work in hinge area(s) when machine is running. There is no room in this area for a man when machine is turned.*

The following are a few of the primary sources of injury to workmen.

1. Repairing and servicing equipment in dangerous positions.
2. Striking other persons or vehicles with the machine.
3. Unexpected violent tipping of the equipment.
4. Unexpected violent shocks or jars to the machine.
5. Uncontrolled traffic involving other vehicles.
6. Hazards from limbs of trees or overhead obstructions.
7. Leaving earth-moving or other equipment in dangerous positions unattended.

In order to help prevent accidents the following safety rules should be observed at all times.

**Do Not Leave Machine Unattended:** Do not leave machine unattended with engine running. Always place directional shift lever in neutral,

lower bucket, set parking brake, and shut down engine before leaving operator's seat.

**Never Leave Machine with Bucket in Air:** Never leave machine without first lowering bucket so that it rests on the ground. Make sure all control levers are in neutral position and engine shut down.

**Watch Bucket and Direction at All Times:** Keep your eye on the load and always face or look in the direction machine is traveling.

**Avoid Greasy Hands and Floors:** Keep hands, floors and controls free from water, grease and mud to insure non-slip control.

**Never Get On or Off a Machine in Motion:** Never get on or off a machine that is in motion. Positively in no case should anyone ride in the bucket, or on the outside of the machine.

**Stop Machine to Lubricate or Adjust:** Stop all operation and shut down engine when cleaning, adjusting, or lubricating the machine. Tie red WARNING tag on steering wheel, turn off ignition switch and remove key.

**Never Lift Bucket Over Ground Crew:** Watch for ground crew and other workers on foot while machine is in motion. Never swing bucket over a truck cab. Sound horn as a warning when approaching ground crew, and before setting machine in motion.

**Keep Brakes in Proper Working Order:** At the first signs of brake slippage, stop machine, inspect and repair brakes promptly.

**Never Transport Load With Bucket Fully Raised:** The nearer the ground that the bucket is held, the better the stability, especially on slopes or when turning machine. Approximately 15 inches from the ground is best.

**Bucket Position for Travel:** Raise bucket approximately 15 inches off the ground and tip back to afford maximum visibility.

**Always Set Brake to Hold Machine When Parked:** Set parking brake lever when parking machine. If on a grade, block wheels.



## CONSTRUCTION MACHINERY DIVISION



**Maintain Proper Tire Inflation:** Check tire inflation pressure daily to provide best operation and longest tire life. Particular attention must be emphasized when checking hydro-inflated tires as there is less volume of air to provide cushioning.

**Select Proper Speed Range:** Operate machine at speeds consistent with conditions on the particular job. Extra caution should be used if wet or icy conditions exist.

**Maintain Shovel Balance:** Keep bucket close to the ground for balance when tractor shovel is traveling up a steep grade.

**Do Not Use Bucket as a Brake:** When going down a steep slope do not use bucket as a brake.

**Check Before Moving Shovel:** Walk around machine to make certain that no one is in "danger area" before entering operator's compartment. Sound horn before moving machine.

**Do Not Operate Machine Without Instruments:** Each warning device on the instrument panel serves as an important check point for operating conditions of the machine. Do not operate machine if warning devices are not functioning properly.

**Be Courteous:** Always give loaded equipment the right of way.

Portions of above safety precautions taken from Data Sheet D-256 by permission of National Safety Council.

## STARTING PROCEDURES

Refer to starting instructions for make of engine involved located at rear of this section.

### PRE-STARTING CHECKS

Before starting engine at beginning of work shift, or at any time machine has been shut down for adjustment or time-off period, perform the following checks.

1. Engine oil level.
2. Engine air cleaner.
3. Hydraulic system oil level.
4. Cooling system.
5. Fuel supply.
6. Transmission fluid.
7. Tire pressures.

Service units at this time if inspection indicates the necessity.

**Caution:** *Disconnect safety links before moving machine.*

### COLD WEATHER STARTING

MICHIGAN machines do not require extensive preparation for cold weather operation beyond addition of a permanent type anti-freeze to the cooling system, and a change of engine oil to a viscosity suitable for anticipated temperatures in which the machine is to operate. At temperatures below 0°F. a change of oil in the main hydraulic system to lubricant recommended on Lubrication Charts will aid starting by reduction of resistance in the main pump. Probably the most important item to insure prompt starting is proper maintenance of the electrical system, especially the batteries.

Batteries must be kept fully charged at all times, since in cold weather the capacity to deliver full power is greatly reduced. A full charged battery at 15° F. (-9,3° C.) is capable of delivering only 70% of its rated amperage, and at lower temperatures becomes even less efficient. Service batteries weekly as follows:

1. Add distilled water to cover plates and separators but do not overfill. Overfilling causes dilu-

tion of the electrolyte, and sputtering during the charging cycle. This may result in battery freezing and corroded terminals.

2. Keep terminals clean and tight. Dirty or loose connections offer high resistance.
3. Keep vent plugs in place, and tight to prevent entrance of foreign materials into cells.
4. Check specific gravity regularly with a hydrometer, and recharge or replace batteries that continually show a low reading.

Service other electrical components as follows:

1. Visually check all wiring for worn or cracked insulation and loose terminal connections.
2. Clean and tighten loose connections on cranking motor, alternator, voltage regulator, solenoid switch, relays and sender units.
3. Clean and tighten external ground straps, and replace if badly frayed or corroded.

To avoid unnecessary cranking because of air locks in cold fuel oil, change fuel oil only when engine is hot; then start and run engine after filter change, and check that there is no fuel restriction or leakage.

When not in use, machine should be parked or stored in a closed garage or building during cold weather to reduce cranking effort when starting a cold engine. It is particularly important in starting the engine that it is not accelerated to governed speed or a load applied until the oil has become warm enough to circulate to all bearing surfaces.

### WARM-UP CHECKS

Hold engine at idle speed for approximately two minutes after starting; then while engine continues to warm up for the next few minutes perform the following checks.

1. Engine oil pressure warning light.
2. Battery.
3. Air pressure warning light.



4. Engine temperature warning light.
5. Torque converter temperature warning light.
6. Horn.
7. Lights.
8. Hydraulic system — boom and bucket control levers.

Visually check for leaks at drain and fill plugs in axle assemblies, torque converter and transmission, and at hose couplings and fittings in hydraulic, fuel, air intake, brake and cooling systems. Correct all leaking conditions, and repair or replace warning devices that are not functioning before continuing operation of the machine.

#### PARKING AREA CHECKS

As a final check before leaving the parking area, set machine into motion and test the following:

1. Steering gear.
2. Service brakes.
3. Parking brake.

Remember, the safety of the operator and other workmen, and the efficient operation of the machine depend upon the performance of all items in the check list above. Service units at this time if inspection indicates the necessity.

## G.M. DIESEL

### STARTING INSTRUCTIONS

#### NORMAL STARTING

*Caution: Walk around machine. Make certain that no one is in "danger area" before entering the operator's compartment.*

1. Set directional shift lever in NEUTRAL.
2. Depress and release accelerator to reset governor throttle control lever in IDLE position.
3. Turn ignition switch ON; rotate key to start position, and very lightly depress accelerator to feed additional fuel. Operate cranking motor no more than 30 seconds at a time to avoid overheating motor.

*Caution: If engine fails to start, wait until cranking motor stops rotating before repressing starter switch. Serious damage to the cranking motor may result if this precaution is not complied with.*

If engine fails to start after four periods of cranking, refer to Operation and Maintenance Manual of engine manufacturer.

4. After engine starts, check oil pressure gauge. If no pressure is indicated within 15 seconds, shut down engine immediately and determine cause.
5. Allow engine to reach operating temperature before driving or operating machine.

#### COLD WEATHER STARTING

##### When Colder Than 40° F. (4.5° C.)

G.M. Diesels are not equipped with cold weather starting aids. However, starting fluid (pressurized can type) sprayed into air cleaner intake is recommended as engine is being started.

Ether starting fluid is available in 16 oz. (253,6 gram) pressurized cans from your authorized MICHIGAN Distributor under part number 945152.

A fluid starting aid (capsule form) can be installed by any authorized G.M. Diesel Distributor.

1. Set all control levers in NEUTRAL position and turn ignition switch ON.
2. Depress accelerator to full throttle position.

3. Rotate key to start position and simultaneously use starting fluid directed into air cleaner intake.

Do not operate cranking motor for more than 30 seconds at a time to avoid overheating motor.

*Caution: If engine fails to start, do not repress starter until cranking motor has stopped rotating. Serious damage to cranking motor may result if above procedure is not complied with.*

4. After engine starts, check oil pressure gauge.

If no pressure is indicated within 15 seconds shut off engine and determine cause.

5. Allow engine to warm up for a few minutes before driving or operating machine.

#### SHUTTING DOWN ENGINE

It is important to idle an engine 3 to 5 minutes before shutting it down. This will allow lubricating oil and water to carry heat away from combustion chambers, cylinder head, bearings and shafts.

Residual heat can damage many parts ranging from valves to fuel pumps. The latter suffer from gums and deposits remaining after residual evaporation. In addition, the physical stresses from expansion and contraction can cause distortion, permanent warping and gasket failures. In some cases, oil seals and cylinder sleeve seals suffer badly, although the results may not appear until much later.

To shut down a G.M. Diesel, turn ignition switch OFF; then pull engine fuel shut-off control (forward T-handle) up and hold until engine stops rotating. After engine stops running, replace T-handle in its original position.

If after pulling fuel shut-off control, engine continues to operate, the engine emergency air shut-off control (rear T-handle) must be pulled to the up position. This T-handle will trip the latch assembly securing air shut-off valve inside air intake housing, thus starving the engine of air and preventing further combustion of fuel. Replace control T-handle in its original position and manually reset latch assembly at air intake housing before restarting engine.



1

2



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## CUMMINS DIESEL

### STARTING INSTRUCTIONS

#### NORMAL STARTING

**Caution:** Walk around machine. Make certain that no one is in "danger area" before entering operator's compartment.

1. Set directional shift lever in NEUTRAL.
2. Turn ignition switch ON; and rotate key to start position. Very lightly depress accelerator to feed additional fuel. Operate cranking motor no more than 30 seconds at a time to avoid overheating motor.

**Caution:** If engine fails to start within the first 30 seconds, wait two to five minutes before re-cranking.

If engine fails to start after four periods of cranking, refer to Operation and Maintenance Manual of engine manufacturer.

3. After engine starts, check oil pressure gauge. If no pressure is indicated within 15 seconds, shut off engine and determine cause.
4. Allow engine to reach operating temperature before driving machine.

#### COLD WEATHER STARTING When Colder Than 50°F. (10°C.)

##### (a) Use of Ether without Metering Equipment

Cummins Diesels are not equipped with cold weather starting aids. However, two men can use the following procedure as a cold weather starting aid.

**Caution:** Ether is highly flammable. Do not use with preheater or near open flame. Do not breathe ether fumes.

1. Pour three tablespoonfuls of ether on a cloth; hold cloth close to air cleaner intake while second man cranks the engine.
2. As an alternate method, spray ether into air cleaner intake while second man cranks the engine.
3. Ether fumes will be drawn into the air intake manifold and the cold engine should start without difficulty.

**Caution:** Do not use excessive amounts of ether. Excessive amounts of ether will cause unusually high pressures and detonation.

##### (b) Use of Preheater Arrangement (Optional Equipment)

An intake air preheater arrangement can be obtained as optional equipment to aid in cold weather starting. This equipment consists of a single glow plug mounted in the intake manifold, and a hand priming pump to force atomized fuel into the manifold. Depressing glow plug switch heats glow plug, igniting the fuel in the manifold and heating the intake air entering the combustion chamber.

Since primary ignition takes place within the manifold, serious damage may result if starting fluid (pressurized can type) is used with glow plug hot. Do not use starting fluid in any form.

1. Set throttle in IDLE position. Do not accelerate during the starting procedure.
2. Turn ignition switch ON, and press glow plug switch. When indicator light has been on 20 seconds, rotate key to start position.
3. As engine rotates, operate preheater priming pump to maintain 80 to 100 psi fuel pressure. Use of primer before 20 second interval will wet glow plug and prevent heating.
4. If engine does not start within 30 seconds, stop cranking and repeat steps 2 and 3. This will aid in battery conservation, and provide maximum cranking time. If no start is obtained after two trials, check intake manifold for heat.
5. After engine starts, release starter switch, but hold glow plug switch. Pump primer slowly to keep engine idling smoothly. In cold weather this may require 4 to 5 minutes or longer. Do not accelerate engine.
6. When engine does not falter between strokes, stop pumping, close primer and lock; then release glow plug switch.
7. Allow engine to reach operating temperature before driving machine.



### SHUTTING DOWN ENGINE

It is important to idle an engine 3 to 5 minutes before shutting it down. This will allow lubricating oil and water to carry heat away from combustion chambers, cylinder head, bearings, and shafts.

Residual heat can damage many parts, ranging from valves to fuel pumps. The latter suffer from gums and deposits remaining after residual evaporation. In addition, the physical stresses from expansion and contraction can cause distortion,

permanent warping, and gasket failures. In some cases, oil seals and cylinder sleeve seals suffer badly, although the results may not appear until much later.

IT IS GOOD PRACTICE TO IDLE ANY ENGINE LONG ENOUGH TO REDUCE EXTREME TEMPERATURES.

To shut down a Cummins Diesel, turn ignition switch off.



## OPERATING TRACTOR SHOVEL

### SETTING MACHINE IN MOTION

The following steps give proper procedure for setting the machine in motion. Refer to Operating Controls Diagram, Figure 10.

1. Raise boom and bucket approximately 15 inches above the ground by pulling backward on boom control lever. Then roll bucket back to afford maximum visibility.
2. Place directional shift lever in position for direction of travel desired. When shifting from forward into reverse, or vice versa, always decrease engine rpm and stop machine momentarily while making shift.
3. Select applicable speed range for operating machine. Speed range and directional shift levers are so positioned that it is convenient to load in low range forward, and back away from pile in high range reverse by gripping both levers at the same time.

High range should be used when traveling machine for comparatively long distances without a load.

A shift from a low speed range to a higher speed range can be made when machine is in motion, by momentarily letting up on accelerator, making the shift, and again depressing accelerator.

When making a down shift, accelerate engine to synchronize engine and drive shaft speeds when transmission clutch re-engages.

4. Release parking brake.
5. Gradually apply pressure on accelerator pedal until desired travel speed is reached.

### LOADING THE BUCKET

Place speed range lever in low, and directional lever in forward. With bucket control lever, adjust bucket to the level position.

When loading from a stockpile, drive into pile with cutting edge parallel to the ground, and push cutting edge into pile until bucket is nearly full. Then pull boom control lever back to raise bucket. As bucket raises, pull bucket lever back to tip bucket back against stops. Continue to raise bucket with boom lever until it breaks out of pile. Back

out of pile keeping load low, and deliver load to desired dumping position.

When grading or excavating, bucket should be in the level position. Feather boom control lever to the DOWN PRESSURE position to face bucket cutting edge against the ground as machine moves forward.

If cutting edge does not penetrate the ground immediately, use bucket control lever to incline the angle of the cutting edge slightly to give better penetration. When cutting edge penetrates, use bucket control lever to adjust bucket to level position to avoid excessive penetration. The operator may manipulate boom and bucket control levers slightly to maintain a good grade as machine moves forward.

When maintaining a grade, machine should be driven in low speed range at sufficient throttle to make an accurate cut. When the end of the cut is reached, pull backward on bucket control lever to tip bucket back against the stops, then raise boom so that bucket is approximately 15 in (381 mm) off the ground for carrying to dumping position.

### TRANSPORTING THE LOAD

When transporting the load, travel speed of machine will depend upon the length of haul, and kind of surface over which the machine must pass. Rough terrain calls for a fairly slow speed. When the bucket is full, it should be carried approximately 15 in. (381 mm) off the ground. Never transport load with bucket fully raised. The nearer the ground the bucket is held, the better the stability, especially on slopes or when turning machine.

### DUMPING THE BUCKET

Approach truck, railroad car or hopper raising the boom until bucket safely clears top edge of unit. At proper clearance height, place boom control lever in HOLD (neutral) position. Move machine up to place bucket inside the dumping area, positioning Tractor Shovel perpendicular to side of unit to avoid spillage, and to distribute material evenly. Apply service brakes, which will automatically disengage transmission FORWARD clutch. This not only prevents machine from creeping forward when engine is accelerated, but also provides maximum hydraulic working power for bucket cylinders.

Push bucket control lever forward slowly to dump bucket. Control rate of material discharge with accelerator, and by manipulating control lever between DUMP and HOLD positions. Bucket can be maintained in full dump or partial dump position by returning control lever to HOLD position. Dumping load slowly will minimize shock loading of a truck body or other transporting vehicle.

When bucket is empty, pull backward on bucket control lever into detent located CLOSE position, and back away from loaded unit. Place boom control lever in DOWN PRESSURE or FLOAT position while returning for another load. Bucket will stop in a level position automatically. The bucket control lever automatically returns to the HOLD (neutral) position.

#### BACKFILLING AND SPREADING

The bucket is used for backfilling and spreading operations. Lower the bucket in an attitude parallel to the surface of the ground and proceed forward in one of the lower speed ranges allowing the bucket to fill. The material will form its own dozer blade. Best results are obtained when a shallow bite is used. Caution must be used in controlling the depth of the bite as too deep a bite will cause wheel spin and an uneven working surface.

#### TRAVELING WITHOUT A LOAD IN BUCKET

When driving machine from job to job, shift into high speed range. The bucket should be raised approximately 15 in. (381 mm) off the ground and tipped back to afford maximum visibility.

#### TOWING THE MACHINE

If at anytime it is necessary to tow the machine any appreciable distance, observe the following precautions:

1. Set all control levers in NEUTRAL.
2. Remove the propeller shaft from the transmission to the rear axle assembly, and one of the propeller shafts from between the transmission and the front axle assembly.
3. Attach safety links.

**Important:** *Note correct assembly of propeller shafts before removing them. Reassemble them in the same position. The tubular end is always the driving end. Do not separate the two ends of the assembly due to wear pattern and balancing characteristics. Wire the spider and bearing assemblies to the prop shaft flanges and wrap the assemblies in lint free cloths.*

When the machine is being towed, the converter charging pump is not operating. There is danger of bearing or gear damage in the torque converter and transmission if propeller shafts are not removed.

When reinstalling propshaft assemblies use only the special heat treated nuts and bolts provided. Tighten attaching bolts to the torque specified on Bolt Torque Chart.

4. When towing an articulated machine it may be best to raise one end of machine with safety links attached since machine cannot be steered without engine operating.

## LUBRICATION

This section of the manual is divided into two major categories — LUBRICATION and MAINTENANCE. The LUBRICATION portion is to be used in conjunction with Chassis and Drive Line Lube Charts found in the rear of this section. This section contains the recommended intervals at which the machine should be serviced such as Daily or Shift, Weekly or 50 Operating Hours, up through a 1000 Operating Hour schedule.

Lubrication is maintenance, but the items described in the Lubrication portion are only those that pertain to the actual greasing or oiling of the machine, including the level checks and the drain and refill procedures.

The MAINTENANCE portion contains recommended checks and adjustments over and above those found in the LUBRICATION portion.

The maintenance schedule is based on hours of normal operation recorded on the hourmeter. A more practical schedule should be developed for each job application. Make changes in the basic schedule as required based on the type of work machine is doing, the rate at which it is worked, and how it is being worked.

### LUBRICATION

The importance of proper lubrication cannot be overemphasized. It is the most essential single factor in a well planned preventive maintenance program. Refer to lubrication charts to locate the various points to be serviced.

Before servicing machine always wipe dirt and foreign material from grease fittings, clips, plugs or covers to prevent dirt, grit or foreign material from entering into mechanisms. When checking various lubricant levels, machine must be level and areas around all fill and level plug openings cleaned. Systems requiring draining at specific intervals

should always be drained after working machine when fluid is at operating temperature. Hot oil flows more freely and carries more foreign material with it.

Cleanliness of the oil used and of the system cannot be overemphasized. Oil added to the reservoir should be poured through a 100 mesh screen. Filters and breathers should be serviced regularly.

Additions required to maintain fluid level in the system should be made with the same fluid as is in the system, however, on occasions may be made with another approved lubricant for a given temperature range. Preferably the lubricants being mixed should be from the same manufacturer. The original fluid should not be diluted more than 50% by adding another fluid. When these conditions cannot be met, the system should be completely drained and refilled.

Lubricant changes for the different prevailing ambient temperature ranges specified should be made by complete drainage and refill. Occasional startups in temperatures above or below the prevailing ambient temperature ranges specified, for a given lubricant, will not require a complete change of lubricant. When the temperature, however, at startup is consistently above or below the range specified for the lubricant in the system, a complete change of lubricant is required, using the lubricant specified for the prevailing temperature range.

The lubrication charts herein specify the recommended lubricants for the various points to be serviced. NOTE: Lubricant specified on lube charts for use in the Transmission/Converter and Main/Steering Hydraulic Systems are for use in prevailing ambient temperature ranges above 0°F. (−18°C.). For additional approved lubricants for use in various ambient temperature ranges refer to charts below.

#### A — TRANSMISSION & CONVERTER HYDRAULIC SYSTEM:

##### PREVAILING AMBIENT TEMPERATURE

30°F. (−1°C.) & Above

−10°F. (−23°C.) & Above

##### LUBRICANT TO BE USED

SAE 30 Engine Oil, API Class SD or SE, MIL-L-2104B or MIL-L-2104C.

1 SAE 10W Engine Oil, API Class SD or SE, MIL-L-2104B or MIL-L-2104C.

2. Type C-2 Hydraulic Transmission Fluid.



## CONSTRUCTION MACHINERY DIVISION



−30°F. (−34°C.) & Above

DEXRON\* Automatic Transmission Fluid —  
(This does not include fluids referred to as Dexron II).

\* \* \* \*

0°F. (−18°C.) & Below

See Section titled Optional Lubricants.

### B — MAIN/STEERING HYDRAULIC SYSTEM:

#### PREVAILING AMBIENT TEMPERATURE

Above 0°F. (−18°C.)

#### LUBRICANT TO BE USED

1. SAE 10W Engine Oil, API Class SD or SE, MIL-L-2104B or MIL-L-2104C.
2. See Section titled Optional Lubricants.

DEXRON\* Automatic Transmission Fluid —  
(This does not include fluids referred to as Dexron II) — See Sub-Note I.

−30°F. (−34°C.) & Above

\* \* \* \*

0°F. (−18°C.) & Below

See Section titled Optional Lubricants

**NOTE 1:** DEXRON\* Fluid is suitable for use only if it meets the following specifications:

- A) Contain the type and content of anti-wear compounding found in API Class SD or SE engine oils, or have passed pump tests similar to those used in developing anti-wear type hydraulic oils.
- B) Have sufficient chemical stability for mobile hydraulic system service.
- C) Meet the viscosity requirements of API Class SD or SE engine oils — Grade SAE 10W.

\*DEXRON is a registered trademark of General Motors Corporation.

### OPTIONAL LUBRICANTS:

The following optional lubricants, in addition to the standard recommendations given above, are approved for use in the Transmission/Converter Hydraulic System and/or Main/Steering Hydraulic System.

#### PREVAILING AMBIENT TEMPERATURE

0°F. (−18°C.) & Below

#### LUBRICANT TO BE USED

The following should be used as a guide in consultation with a reputable oil supplier. *Any lubricant may be used which meets the following requirements:*

1. Oil to be used must contain anti-wear properties and rust and oxidation inhibitors plus anti-foam agents equivalent to that found in API Class SD or SE engine oils or have passed pump tests similar to those used in developing anti-wear type hydraulic oils.
2. Oil must have a Saybolt Universal Viscosity of 145 to 225 seconds at 100°F. (38°C.), and a viscosity of not less than 42 seconds at operating temperature. The oil selected should have a high shear

stability to insure that the viscosity remains within recommended limits. Viscosity Index should not be less than 90.

3. Have a pour point of 20°F. (11°C.) below start-up temperature.
4. Diesel fuel, kerosene, transformer oil, etc., *must not be used* to dilute normal fluids.

**NOTE:** Lubricants to the above specification may be used in prevailing ambient temperature range of Above 0°F. (-18°C.) in the Main/Steering Hydraulic System ONLY.

\* \* \* \*

There are literally hundreds of commercial brands of oil marketed today. Obviously, it is not physically possible or practical to test and evaluate each one of these brands of oil. Satisfactory OIL QUALITY is the responsibility of the oil supplier, therefore, the selection of a suitable lubricant should be made in consultation with a reputable oil supplier. Strict observance of oil change recommendations and proper filter maintenance will provide the best assurance of satisfactory performance.

### SERVICE DAILY (Every 8 Operating Hours)

**Grease Fittings:** Lubricate all points indicated on Chassis Lubrication Chart for 8 hour intervals. Use grade of lubricant specified on lubrication charts according to ambient temperature.

**Engine and Accessories:** Refer to Operation and Maintenance Manual of engine manufacturer for lubrication instructions of engine and accessories.

**Fuel Tank:** Fill fuel tank with clean fuel handled in clean containers. Use a good brand of fuel procured from a reliable company.

**Diesel Engine:** For most operating conditions, a No. 2 Diesel Fuel Oil Cetane 40 minimum is recommended. For unusual operating conditions with regard to load, speed, idling time, or ambient air temperature, refer to fuel oil specifications recommended by engine manufacturer.

**Radiator:** Check daily and refill as required with clean, soft water. See "Every 1000 Operating Hours" for Drain and Refill.

**Torque Converter and Transmission:** Check fluid level daily observing the following conditions.

1. Machine must be LEVEL.
2. Fluid must be HOT (operating temperature of 180°F. to 200°F.) (82°C. to 94°C.).
3. Engine must be IDLING.
4. Area around transmission dipstick opening

must be CLEAN.

5. Maintain fluid level to indicated FULL mark on dipstick.

Refill as necessary adding fluid through the transmission fill plug.

See "Every 250 Operating Hours" for Filter Change, and "Every 500 Operating Hours" for Drain and Refill.

**Hydraulic Reservoir:** Check oil level daily observing the following conditions:

1. Machine must be LEVEL.
2. Bucket must be on GROUND.
3. Engine must be SHUT DOWN.
4. Area around reservoir cap must be CLEAN.

Loosen reservoir cap at right side of machine SLOWLY to relieve pressure in reservoir tank; then remove cap. Remove reservoir dipstick located inside reservoir and wipe clean with lint-free cloth. Reinsert and remove to check oil level. Maintain oil level to FULL mark on dipstick.

Refill as necessary using only premium quality fluid. Refer to Chassis Lubrication Chart for recommended hydraulic fluid.

See "500 Hour Maintenance Operations" for Filter Change and "Every 1000 Operating Hours" for Drain and Refill.



### PRESSURIZER FILTER ELEMENT

The operator's cab comes equipped with a removeable and reuseable dry-type pleated filter element. Service the filter every 8 hours or whenever air flow is noticeably reduced. To gain access to the filter, turn the two eccentric bolts at the outside of the access panel, located inside of cab at the rear. Remove the access panel and turn the two locking rods clockwise and remove the filter.

Clean the filter by gently tapping the filter on a flat surface the dirty side down. Do not tap in a manner that may dent or rupture the filter. If desired, clean the filter with compressed air under 100 psi. With a reasonable distance between the air nozzle and filter, direct the air up and down the pleats blowing in the direction opposite to the arrows. Blow air against the clean side of the filter

being careful not to rupture the element with the air jet.

When the above methods do not clean the filter satisfactorily, it will be necessary to wash the filter. Soak the filter for 15 minutes in a solution of warm water, no hotter than your hand can stand, and a non-sudsing detergent. Gently agitate filter to flush out dirt. Rinse filter thoroughly with clean water running freely from a hose, without a nozzle, in a direction opposite to the arrows. Allow filter to dry. This usually requires 24 to 72 hours. Before using in a dusty atmosphere, the filter must be completely dry. Do not use drying agents or dry the filter at temperatures above 180°F (82°C). Protect a wet filter from freezing. Using compressed air may rupture a wet filter. It would be good practice to have a second filter to use while the recently washed filter is drying.



## SERVICE WEEKLY (Every 50 Operating Hours)

**Grease Fittings:** Lubricate all points indicated on Chassis Lubrication Chart for 50 hour intervals. Use grade of lubricant specified on lubrication charts according to ambient temperature.

**Engine and Accessories:** Refer to Operation and Maintenance Manual of engine manufacturer for lubrication instructions of engine and accessories.

**Brake Master Cylinders:** Check and maintain fluid level to within .25 in. (6,4 mm) from top of master cylinder reservoir. See Specifications and Service Data for recommended brake fluid.

**Initial Filter Change:** Remove and replace all replaceable filter elements in the converter/transmission, main and steering hydraulic systems after the first 50 operating hours. Subsequent filter changes may then be made at regular prescribed intervals.

**Batteries:** Keep terminals clean and tight, and be sure that distilled water is added to cover plates and separators in each cell. Do not overfill.

**Front Axle Differential:** Check lubricant level each 50 operating hours at the differential level plug. Add lubricant until level with plug opening. See "Every 1000 Operating Hours" for Drain and Refill.

**Front Axle Planetary Hubs:** Check lubricant level each 50 operating hours. Rotate wheel until arrow on sun gear thrust cap points downward. This will position plug slightly below centerline of hub. Remove plug and check level.

Add lubricant until level with plug opening. See "Every 1000 Operating Hours" for Drain and Refill.

**Rear Axle Differential:** Check lubricant level each 50 operating hours at the differential level plug. Add lubricant until level with plug opening. See "Every 1000 Operating Hours" for Drain and Refill.

**Rear Axle Planetary Hubs:** Check lubricant level each 50 operating hours. Rotate wheel until arrow on sun gear thrust cap points downward. This will position plug slightly below centerline of hub. Remove plug and check level.

Add lubricant until level with plug opening. See "Every 1000 Operating Hours" for Drain and Refill.

**Midmount Bearing:** Check oil level of mid-mount bearing assembly connecting prop shafts between the transmission and front axle every 50 operating hours. Keep reservoir full to level plug opening on front face of reservoir. Add lubricant as required through combination breather and filler plug opening located on top of mid-mount reservoir. See "Every 100 Operating Hours" for Drain and Refill.



### SERVICE PERIODICALLY

Check and service the following items at intervals as specified.

#### (Every 100 Operating Hours)

**Propeller Shafts:** There are four propeller shafts — one from torque converter to transmission, one from transmission to midmount bearing,

one from midmount bearing to front drive axle, and one from transmission to rear drive axle. Each shaft has 3 points of lubrication — one on each spider assembly, and one on each slip yoke assembly. Total 12 points. Use a hand gun and apply grease until it is visible at all four bearing caps on each spider and bearing assembly. The grade of lubricant specified is on Drive Line Lubrication Chart according to ambient temperature.



**(Every 250 Operating Hours)**

**Engine and Accessories:** Refer to Operation and Maintenance Manual of engine manufacturer for lubrication instructions of engine and accessories.

**Torque Converter and Transmission Filter:** The torque converter and transmission hydraulic system is protected by full flow replaceable element type filter assemblies.

All fluid leaving the converter pump first passes through the filters providing clean fluid to the torque converter and transmission.

Replace filter elements every 250 operating hours and whenever converter pump, transmission or torque converter is repaired or overhauled for any reason. Thoroughly clean filter cases and base

castings before inserting new elements. Using new gasket in base castings, tighten center bolts to specified torque. See Bolt Torque Chart in rear of manual.

Run engine 5 minutes at approximately 1500 rpm checking filter assemblies, hoses and connections for leaks. Recheck transmission fluid level when it is at operating temperature as described under "Service Daily".

*Note: Filter elements are especially designed to withstand pressure and flow rate requirements. Use only replacement filter elements called for in applicable parts manual. Use of "will-fit" or substitute elements will endanger proper operation of torque converter and transmission and could cause costly repairs and down time.*

**(Every 500 Operating Hours)**

**Grease Fittings:** Lubricate all points indicated on Chassis and Drive Line Lubrication Charts for 500 hour intervals. Use grade of lubricant specified on lubrication charts according to ambient temperature.

**Engine and Accessories:** Refer to Operation and Maintenance Manual of engine manufacturer for lubrication instructions of engine and accessories.

**Torque Converter and Transmission:** Drain and refill torque converter and transmission every 500 operating hours and whenever converter pump, transmission or torque converter is repaired or overhauled for any reason.

1. Always drain system while fluid is at operating temperature. Hot oil flows more freely and carries more foreign material with it.
2. Remove drain plug from transmission housing and drain thoroughly.
3. Clean magnetic drain plugs and reinstall.
4. Replace elements in transmission and torque filter cases and base castings before inserting new elements. Using new gaskets in base castings, tighten center bolts to specified torque. See Bolt Torque Chart in rear of manual.
5. Remove breather cap from top of torque converter housing. Clean parts in solvent, blow

dry with compressed air and reassemble.

6. Refill torque converter and transmission with fluid through transmission filler extension. Refer to Drive Line Lubrication Chart for recommended fluid. Refer to Specifications and Service Data for capacity.
7. Disconnect return oil cooler hose from cooler line and direct open end into waste drum or on ground. Securely block wheels of machine and apply parking brake.
8. Start engine, shift speed range selector lever in HI speed range and directional shift lever in FORWARD and maintain idle speed to force trapped oil in torque converter and oil cooler out through open end of return oil cooler hose. Drain sufficient fluid to insure clean fluid flow; then shut down engine and reconnect return oil cooler hose.
9. Restart and run engine for 5 minutes at approximately 1500 rpm checking filters, drain plugs, hoses and connections for leaks.
10. Recheck transmission fluid level when it is at operating temperature (180° F. to 200° F.) (82° C. to 94° C.). Add transmission fluid as necessary to maintain FULL mark on dipstick. (This check is to be performed with engine idling).

NEVER UNDER ANY CIRCUMSTANCES USE ANY FLUSHING OIL OR COMPOUNDS FOR CLEANING SYSTEM.

### (Every 1000 Operating Hours)

**Radiator:** Twice a year, drain flush and refill cooling system. Add permanent anti-freeze according to manufacturer's instructions when air temperature is 32° F. (0° C.) or lower, or when there is danger of water freezing in the system. Always use a hydrometer to check freezing point of solution when it is at operating temperature.

Check for evidence of foreign material blocking radiator core and blow out with compressed air.

Refer to Specifications and Service Data for capacity.

**Hydraulic Reservoir:** Drain, clean and refill hydraulic oil system every 1000 hours of operation or oftener if required. When operating under severe dusty and dirty conditions, clean the system more often to prevent excessive wear or premature failure of valve, pump, or cylinder parts.

1. Always drain system after working machine, and while oil is at operating temperature. Hot oil flows more freely and carries more foreign material with it.
2. To thoroughly drain cylinders and hoses, raise boom and bucket to full height and extend bucket cylinders. *Securely block or chain boom and bucket in raised position.* Then shut down engine.
3. Loosen reservoir cap *slowly* to relieve pressure in hydraulic reservoir.
4. Remove drain plug in hand hole cover in bottom of reservoir and drain reservoir.
5. Disconnect boom and bucket cylinder hoses at lowest points to drain cylinders.
6. Replace reservoir return filter assemblies as specified under "500 Maintenance Operations".
7. Remove hand hole cover from bottom of reservoir and clean all foreign material from bottom of tank. Remove magnet and clean thoroughly. Reinstall magnet; then reinstall hand hole cover and drain plug securely.

8. Reconnect all hoses and unions.

9. Refill reservoir to indicated FULL mark on dipstick. Reinsert dipstick and secure reservoir cap. Refer to Chassis Lubrication Chart for recommended fluids.

Refer to Specifications and Service Data for capacity.

10. Be sure all control levers are in NEUTRAL position. Start engine and run it at idle speed for a few minutes.
11. Place boom lever in RAISE position to pump oil into boom cylinders. Then remove blocks or chains securing boom and bucket. *Do not stand or work under boom and bucket after removing blocks or chains.*
12. Operate unit by raising, lowering, dumping, and closing bucket until oil ceases to foam. This will "bleed" the system, forcing trapped air to escape through reservoir drain hose.
13. After oil has ceased to aerate, add oil to reservoir to bring level to indicated FULL mark on dipstick. This will replace oil drawn into cylinders and hoses.
14. Check all connections for leaks and make certain reservoir cap is properly secured.

NEVER UNDER ANY CIRCUMSTANCES USE ANY FLUSHING OIL OR COMPOUNDS FOR CLEANING THE SYSTEM.

**Transmission Sump and Screen:** When servicing transmission at every 1000 operating hours remove transmission sump and screen. Wash in solvent, dry and reinstall using new gaskets.

**Front Axle Differential:** Drain differential every 1000 operating hours. Refill with lubricant recommended on Drive Line Lubrication Chart until level with plug opening at center of axle assembly.

Refer to Specifications and Service Data for capacity.

**Front Axle Planetary Hubs:** Drain planetary hubs every 1000 operating hours; then rotate wheel until arrow on sun gear thrust cap points downward.



## CONSTRUCTION MACHINERY DIVISION



Add lubricant recommended on Drive Line Lubrication Chart until level with plug opening slightly below centerline of hub.

Refer to Specifications and Service Data for capacity.

**Rear Axle Differential:** Drain differential every 1000 operating hours. Refill with lubricant recommended on lubrication chart until level with plug opening at center of axle assembly.

Refer to Specifications and Service Data for capacity.

**Rear Axle Planetary Hubs:** Drain planetary hubs every 1000 operating hours; then rotate wheel until arrow on sun gear thrust cap points downward.

Add lubricant recommended on Drive Line Lubrication Chart until level with plug opening slightly below centerline of hub.

Refer to Specifications and Service Data for capacity.

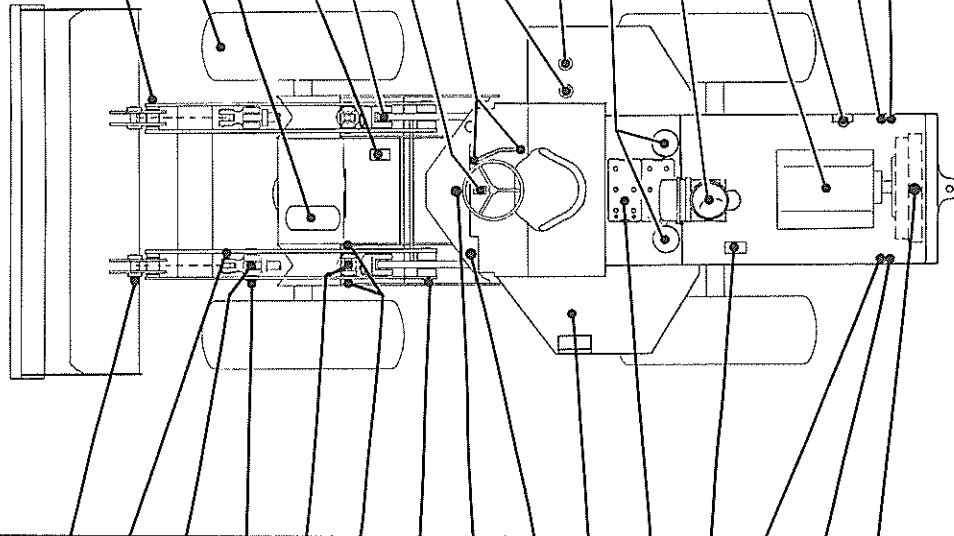
**Midmount Bearing:** Drain and refill every 1000 operating hours. Remove drain plug located in bottom of midmount bearing and allow all fluid to drain out. Reinstall drain plug. Remove check plug from side and breather fill cap from top of midmount bearing. Add fluid through breather-fill cap hole until level reaches check plug hole. Reinstall check plug. Wash breather-fill cap in solvent, dry and reinstall. See Drive Line Lubrication Chart for recommended fluid.

Refer to Specifications and Service Data for capacity.

# MICHIGAN

## CHASSIS LUBRICATION

KEY	HOURS					DESCRIPTION
	1000	500	250	50	∞	
LBG	X					BOOM TO BUCKET 1 Fitting Each Side
	X					TIRES — FRONT & REAR. (See Text)
				X		AIR RESERVOIR (See Text)
BF				X		FRONT BRAKE FLUID RESERVOIR (See Text)
LBG	X					BUCKET CYLINDER TO FRAME 1 Fitting Each Side
LBG				X		STEERING GEAR (See Text)
LBG	X					STEERING DRAG LINK 2 Fittings
HF	X					HYDRAULIC SYSTEM OIL RESERVOIR (See Text)
			X			HYDRAULIC SYSTEM RETURN FILTER (See Text)
				X		AIR RESERVOIRS (See Text)
	X					AIR CLEANER (See Text)
	X					ENGINE & ACCESSORIES (See Text)
			X			TRANSMISSION & CONVERTER OIL FILTER FILTER (See Text)
LBG	X					STEERING CYLINDER REAR BUSHING 1 Fitting
LBG	X					AXLE CRADLE BUSHING 1 Fitting



DESCRIPTION	HOURS					KEY
	1000	500	250	50	∞	
1 Fitting Each Side PUSH ROD TO BUCKET				X		LBG
1 Fitting Each Side BELL CRANK				X		LBG
1 Fitting Each Side BUCKET CYLINDER TO BELL CRANK				X		LBG
1 Fitting Each Side BELL CRANK TO BELL CRANK PIVOT				X		LBG
1 Fitting Each Side BOOM CYLINDER TO BOOM				X		LBG
2 Fittings Each Side BOOM CYLINDER TO TRUNNION				X		LBG
1 Fitting Each Side BOOM TO UPPER PIVOT PINS				X		LBG
1 Fitting Each Pin UPPER & LOWER TRACTOR PIVOT PINS				X		LBG
1 Fitting Each Side FRONT STEERING CYLINDER BUSHINGS				X		LBG
(See Text) FUEL TANK				X		
(See Text) BATTERIES				X		
(See Text) REAR BRAKE FLUID RESERVOIR				X		BF
1 Fitting REAR STEERING CYLINDER BUSHING				X		LBG
1 Fitting AXLE CRADLE BUSHING				X		LBG
(See Text) RADIATOR	X					

KEY		
LBG	LITHIUM BASE MULTI-PURPOSE GREASE	
	ABOVE 0°F	SAE 10W Engine Oil, API Class SD or SE MIL-L-2104B or MIL-L-2104C (For Optional Lubricants See Operators Manual Text)
HF	0°F & ABOVE	See Operators Manual Text
BF	0°F & BELOW	SAE J1703 (70R-3) BRAKE FLUID

## MODEL 75B ARTICULATED TRACTOR SHOVEL

TS-13575

Chassis Lubrication Chart

# MICHIGAN

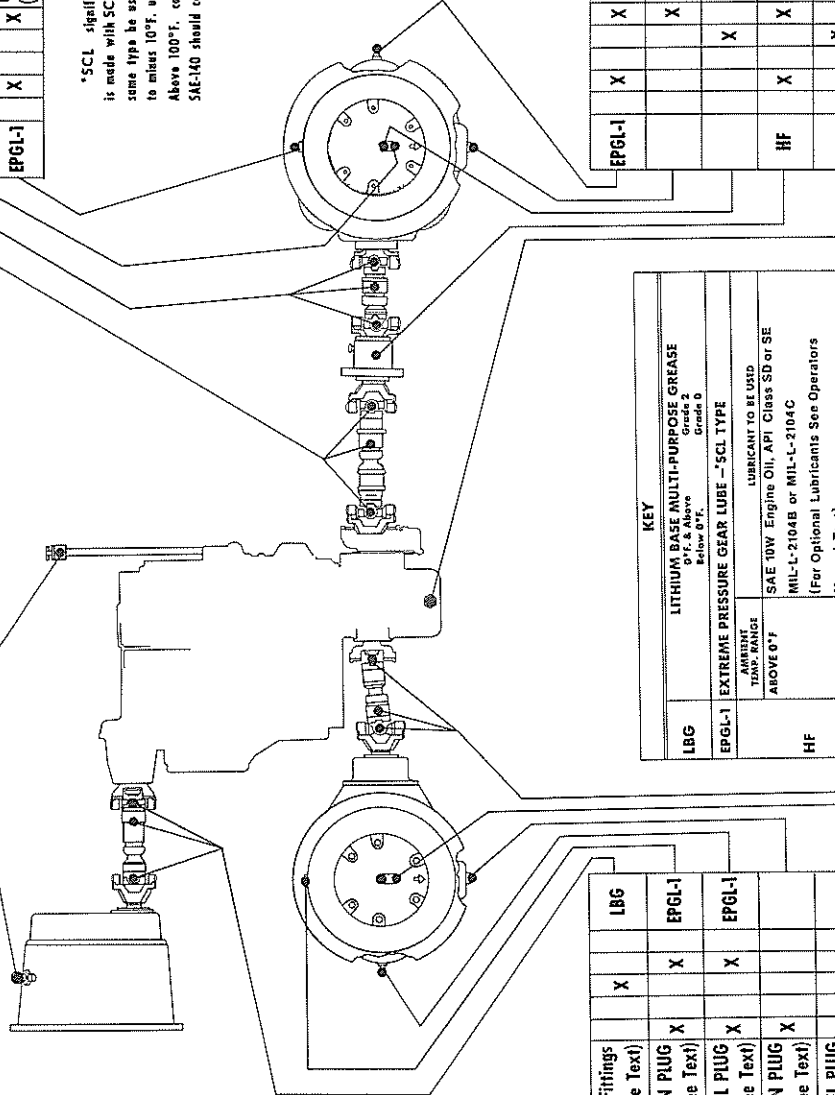
## DRIVE LINE LUBRICATION

### MODEL 75B ARTICULATED TRACTOR SHOVEL

DESCRIPTION	HOURS					KEY
	1000	500	100	50	8	
TRANSMISSION & TORQUE CONVERTER FILL PLUG & DIP STICK (See Text)	X				X	HF
TORQUE CONVERTER BREATHER (See Text)		X				

KEY	HOURS					DESCRIPTION
	1000	500	100	50	8	
LBG		X				PROP SHAFT 3 Fittings (See Text)
LBG		X				PROP SHAFT 3 Fittings (See Text)
		X				PLANETARY LEVEL PLUG (See Text)
EPGL-1	X					PLANETARY FILL & DRAIN PLUG (See Text)

\*SCL signifies self-chlor-lead type. Factory fill is made with SCL type lube and it is recommended that same type be used when adding or refilling. Below 0°F. to minus 10°F. use SAE-80. Up to 100°F. use SAE-90. Above 100°F. consistently, use SAE-140. SAE-80 and SAE-140 should contain additives similar to SAE-90.



TS-13551

KEY	HOURS					DESCRIPTION
	1000	500	100	50	8	
EPGL-1	X					DIFFERENTIAL FILL & LEVEL PLUG (See Text)
		X				DIFFERENTIAL DRAIN PLUG (See Text)
		X				AXLE BREATHERS (See Text)
HF	X					MID MOUNT BEARING (See Text)
		X				TRANSMISSION & TORQUE CONVERTER DRAIN PLUG (See Text)

KEY		LUBRICANT TO BE USED	
LBG	LITHIUM BASE MULTI-PURPOSE GREASE Grade 2 Below 0°F.	SAE 10W Engine Oil, API Class SD or SE	
EPGL-1	EXTREME PRESSURE GEAR LUBE - SCL TYPE	MIL-L-2104B or MIL-L-2104C	
HF	AXLE TEMP. RANGE ABOVE 0°F.	(For Optional Lubricants See Operators Manual Text)	
	0°F & BELOW	See Operators Manual Text	

DESCRIPTION	HOURS					KEY
	1000	500	100	50	8	
PROP SHAFT 3 Fittings (See Text)		X				LBG
PLANETARY FILL & DRAIN PLUG (See Text)	X					EPGL-1
DIFFERENTIAL FILL & LEVEL PLUG (See Text)	X					EPGL-1
DIFFERENTIAL DRAIN PLUG (See Text)	X					
PLANETARY LEVEL PLUG (See Text)	X					
PROP SHAFT 3 Fittings (See Text)		X				LBG

**MAINTENANCE SCHEDULE**

SYSTEM	OPERATION	DAILY or SHIFT	TIME INTERVAL (HOURS)				
			50	100	250	500	1000
<b>Engine, Controls, Cooling System and Accessories</b>	Engine Maintenance		See Engine Manufacturer's Manual				
	Check Air Cleaner Service Indicator	●	●	●	●	●	●
	Check Cooling System for Leaks		●	●	●	●	●
	Drain Fuel Tank Sediment		●	●	●	●	●
	Check Anti-Freeze Protection		●	●	●	●	●
	Tighten Air Cleaner Connections		●	●	●	●	●
	Check and Adjust Belt Tension		●	●	●	●	●
	Check Engine RPM				●	●	●
	Clean Radiator Core					●	●
	Service Air Cleaner Element and Body					●	●
<b>Torque Converter and Transmission System</b>	Check Hydraulic System for Leaks		●	●	●	●	●
	Clean Torque Converter and Transmission Breather			●	●	●	●
	Check and Adjust Transmission Shift Lever Linkage					●	●
	Check Transmission De-Clutch Valve					●	●
	Check Converter Internal Pressure					●	●
	Check Transmission Clutch, Lubricating and Oil Cooler Pressures					●	●
<b>Boom and Bucket System</b>	Check Hydraulic System for Leaks		●	●	●	●	●
	Clean Cylinder Rods		●	●	●	●	●
	Adjust Bucket Leveler				●	●	●
	Check Boom and Bucket Pressure					●	●
	Adjust Boom and Bucket Control Levers					●	●
	Service Reservoir Return Filter Assembly				●	●	●
	Check and Repair Bucket Cutting Edge						●
	Check Boom to Bucket Linkage						●
<b>Electrical System</b>	Check Lights and Circuit Breakers		●	●	●	●	●
	Service Batteries		●	●	●	●	●
	Clean and Tighten Electrical Connections					●	●
	Inspect, Test and Lubricate Electrical Units						●
<b>Axles, Prop Shafts, Wheels and Tires</b>	Check Tire Pressure and Casings	●	●	●	●	●	●
	Tighten Wheel Nuts and Inspect Rims		●	●	●	●	●
	Clean Axle Breathers					●	●
<b>Steering System</b>	Check Hydraulic System for Leaks		●	●	●	●	●
	Clean Cylinder Rods		●	●	●	●	●
	Check Steering Pressure					●	●
	Check and Adjust Steering Pump					●	●
	Adjust Drag Link Ball Joints					●	●
	Adjust Steering Gear						●
<b>Brake System</b>	Inspect Brakes	●	●	●	●	●	●
	Check Air Chamber and Lines for Leaks		●	●	●	●	●
	Tighten Brake Disc Mounting Bolts				●	●	●
	Bleed Brake System				●	●	●
	Adjust Parking Brake				●	●	●
<b>General Maintenance</b>	Visually Inspect Machine	●	●	●	●	●	●
	Adjust and Lubricate Operator's Seat				●	●	●
	Check and Adjust Lower Hinge Pin Bushing				●	●	●
	Tighten Mounting Bolts					●	●
	Steam Clean Machine					●	●
	Inspect Frame						●

## MAINTENANCE

The Maintenance Schedule lists checks or adjustments within machine systems or related components.

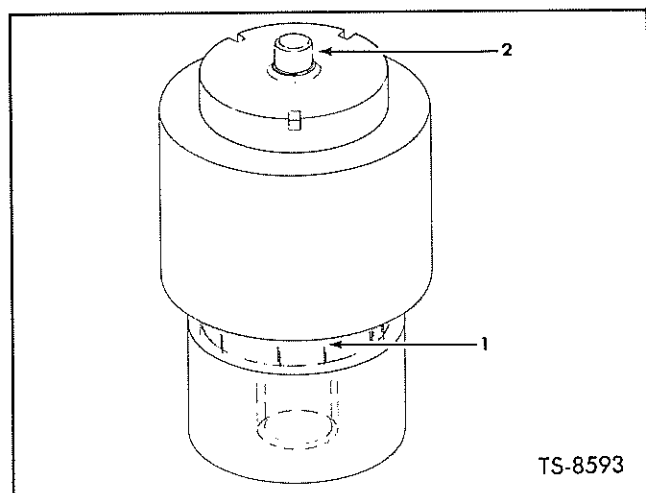
Procedure from each system listed at a specified interval are described in sequence. They should be performed at the same time as the lubrication intervals.

### DAILY OR SHIFT MAINTENANCE OPERATIONS

- ENGINE MAINTENANCE
- CHECK AIR CLEANER SERVICE INDICATOR
- CHECK TIRE PRESSURE AND CASINGS
- INSPECT BRAKES
- VISUALLY INSPECT MACHINE

**Engine Maintenance:** Refer to Operation and Maintenance Manual of engine manufacturer for maintenance instructions of engine and accessories.

**Check Air Cleaner Service Indicator:** Mounted on the air cleaner outlet to the engine, the service indicator is factory set to signal when servicing of the filter element is required. Refer to Figure 11.



1. Red Flag

2. Reset Button

**Fig. 11. Air Cleaner Service Indicator**

Dirt trapped by the filter element gradually increases the pressure drop across the cleaner. As the resistance increases, the Red Flag of the indicator gradually rises in the window. When the flag reaches the top position it will lock in place regardless of whether or not the engine is running. Service filter element at this time. To reset service indicator, press reset button.

**Check Tire Pressure and Casings:** Check air pressure in all tires. See Specifications and Service Data for recommended air pressure. Particular attention must be emphasized when checking hydro-inflated tires as there is less volume of air to provide cushioning. Be sure valve caps are in place to prevent dirt, moisture, and foreign material from damaging valve core.

**Inspect Brakes:** On machines equipped with disc brakes, visually inspect to insure that all bolts are tight and that boot deterioration or excessive lining wear has not occurred. Linings worn to .125 in. (3,2 mm) thickness should be replaced. Discs worn to less than .450 in. (11,4 mm) should be replaced. Inspect brake hydraulic system to be certain that no leakage is evident.

**Visually Inspect Machine:** Visually inspect general condition of the machine, operating controls, instruments and switches, control rods, cable controls and linkage, fuel pump, filters and the radiator for any noticeable damage.

Special attention must be emphasized when inspecting components of the oil system, fuel system, and cooling system. If unusual, or unexplained traces of oil, fuel, or water are found on or below components of the respective systems locate and correct such leaks immediately.

Unexplained oil streaks on or below the engine, transmission, torque converter, or axle assemblies must be carefully investigated. Such indications may be evidence of cracks, loose mounting bolts, damaged seals or gaskets, which (if neglected) may result in complete failure and major damage to the engine and drive line.



## 50 HOUR MAINTENANCE OPERATIONS

- ENGINE MAINTENANCE
- CHECK COOLING SYSTEM FOR LEAKS
- DRAIN FUEL TANK SEDIMENT
- CHECK ANTI-FREEZE PROTECTION
- TIGHTEN AIR CLEANER CONNECTIONS
- CHECK AND ADJUST BELT TENSION
- CHECK HYDRAULIC SYSTEMS FOR LEAKS
- CLEAN TORQUE CONVERTER AND TRANSMISSION BREATHER
- CHECK LIGHTS AND CIRCUIT BREAKERS
- SERVICE BATTERIES
- TIGHTEN WHEEL NUTS AND INSPECT RIMS
- CHECK AIR CHAMBERS AND LINES FOR LEAKS
- CLEAN CYLINDER RODS

**Engine Maintenance:** Refer to Operation and Maintenance Manual of engine manufacturer for maintenance instructions of engine and accessories.

**Check Cooling System for Leaks:** Check radiator, hoses, oil cooler, water pump and drain cocks for leaks and correct where necessary. Loss of coolant due to ruptured hoses, loose clamps, leaking pump or drain cocks can and will result in expensive repairs or replacement of engine components.

**Drain Fuel Tank Sediment:** Every 50 operating hours loosen drain plug in hand hole cover on bottom of fuel tank and drain off any accumulated water.

Check all fuel lines, fuel pump, filters, and shut-off cocks for leaks and correct where necessary. Open drain cock at bottom of filters, when provided, and drain off accumulated water and sediment.

**Check Anti-Freeze Protection:** At specified intervals, or whenever anticipating extremely cold weather, use a hydrometer to check freezing point of solution (permanent type anti-freeze) when it is at operating temperature. If necessary add additional anti-freeze according to manufacturer's

instructions to maintain a safe level beyond the freezing point.

**Tighten Air Cleaner Connections:** Tighten all hose clamps and air cleaner mounting bracket bolts. Check all hoses and pipes between air cleaner and engine for cracks or leaks, which will permit dust laden air to by-pass air cleaner entering directly into engine. Serious and costly damage to the engine will result. See "500 Hour Maintenance Operations" for servicing air cleaner filter element.

**Check and Adjust Belt Tension:** Each 50 operating hours inspect all drive belts for serviceable condition and proper tension. Neglect and improper tension often leads to inadequate cooling, bearing failure of the driven part and short belt life. Belts should be just tight enough to drive the moving parts without slipping.

*Note: Due to older belts having been stretched, through use, beyond their original length and preventing newer belts from carrying most of the load, it will be necessary to replace all belts as a matched set when one or two belts in the set are worn or damaged beyond serviceable condition.*

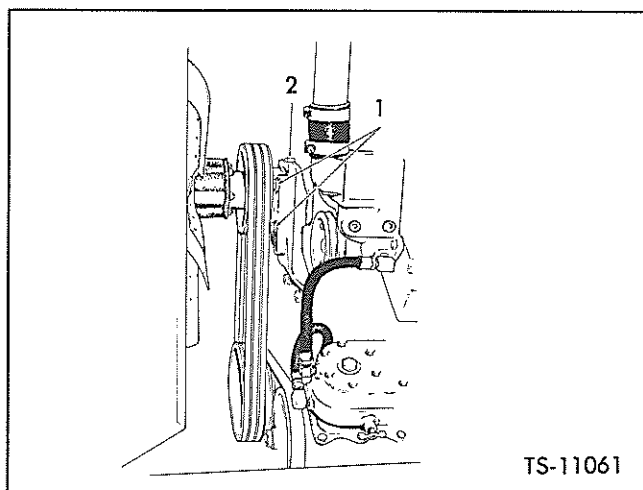
All new belts will loosen after operating for a day or two and must be rechecked and retensioned if necessary. At specified intervals check and retension fan belts as follows:

### G.M. ADJUSTMENT

1. Loosen the four mounting bolts securing the fan drive pulley bracket as shown in Figure 11.
2. Turn fan bracket adjusting bolt clockwise to raise fan drive pulley (increasing belt tension) or counterclockwise to lower fan drive pulley (decreasing belt tension) depending on the existing condition.
3. Turn the adjusting bolt so that .75 in. (19,1 mm) maximum deflection is obtained on the belts midway between the pulleys as shown in Figure 12.
4. When belts are properly adjusted, retighten the four mounting bolts securing the fan drive pulley.

### CUMMINS ADJUSTMENT

1. Loosen capscrews securing fan drive pulley to



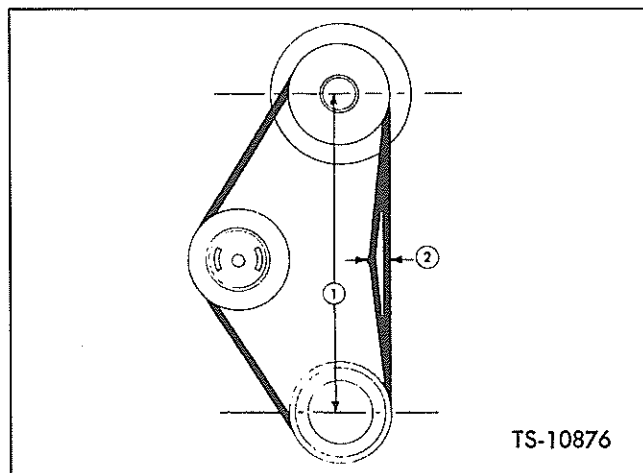
1. Mounting Bolts 2. Adjusting Bolt

**Fig. 12. Check Fan Belt Tension — G.M.**

bracket.

2. Turn fan drive pulley adjusting bolt clockwise to raise fan drive pulley (increasing belt tension) or counterclockwise to lower fan drive pulley (decreasing belt tension) depending on the existing condition.
3. Turn the adjusting bolt so that .625 in. (15,9 mm) maximum deflection is obtained on the belts midway between the pulleys, as shown in Figure 13.
4. When belts are properly adjusted, retighten cap screws to 78-85 ft.-lbs. (10,8-11,8 kg.-m) torque. Rotate torque one more hex.
5. Back-off adjusting screw one-half turn.

Periodically belts should be cleaned to remove



**Fig. 13. Check Fan Belt Tension — Cummins**

grease and glaze by wiping with a cloth saturated with brake fluid. This in most instances will eliminate squeak and extend the service life of the belts.

**Check Hydraulic System for Leaks:** Check oil reservoirs, valve, pumps, cylinders, all hydraulic hose lines and connections for leaks, correcting where necessary. Particular attention should be paid to hoses on the intake or suction side of the pumps. Hose clamps and connections employed must be securely tightened to prevent entrance of foreign material or air into the system. Air drawn into the system at this point will cause cavitation of the pump with resultant malfunctioning and early failure. All hoses should be checked for abrasions which could result in ruptures of same. Replace hoses found in this condition.

**Clean Torque Converter and Transmission Breather:** The torque converter and transmission system is equipped with a breather located on top of torque converter.

Each 50 operating hours unscrew breather, wash in solvent, blow dry with compressed air and reinstall.

**Check Lights and Circuit Breakers:** Circuit breakers provide protection for the electrical system. All circuit breakers are located on the instrument panel as shown on the Wiring Diagram.

Circuit breakers are easily reset. Press the reset button and hold momentarily.

Circuit breaker protection for the various circuits is as follows:

Main .....	70 amp.
Light Circuit .....	10 amp.
Horn .....	2 amp.
Warning Lights .....	1 amp.
Bucket Leveler .....	1 amp.

(a) **Headlamps and Back-Up Lamps:** The machine is equipped with headlamps and back-up lamps mounted in shock resistant rubber retainers. The headlamps and back-up lamps are floodlamps that disperse light in a horizontal pattern.

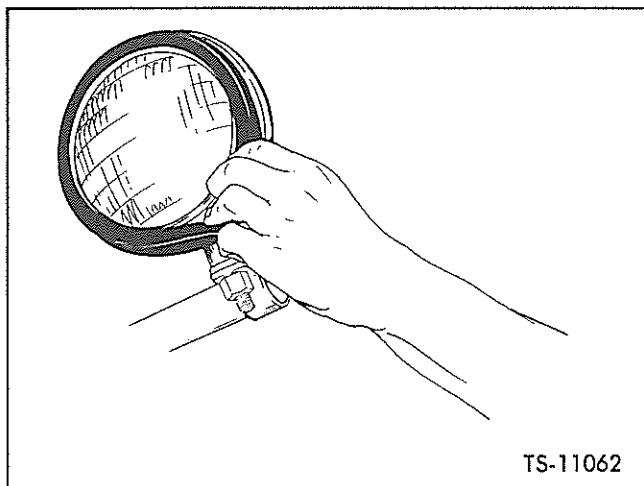


Fig. 14. Replace Headlamps or Back-Up Lamps

Headlamps are factory adjusted, but may be re-adjusted at the headlamp mounting bolts or nuts to obtain a desired light pattern.

If necessary to replace floodlamps, depress lamp and spread lip of rubber retainer outward forcing lamp out as shown in Figure 14, and disconnect terminals. Reconnect terminals on new lamp and reinstall in retainer.

(b) **Dash, Tail and Stop Lamps:** These lights are easily replaced by a push and a twist. To remove dash lamp reflector from dash lamp assembly pull out to remove and push on to retain. Reflectors for the tail and stop lights must be removed by removing three screws shown in Figure 15 and carefully forcing reflectors out. To reinstall reflectors carefully depress reflectors and fasten in place with retaining screws.

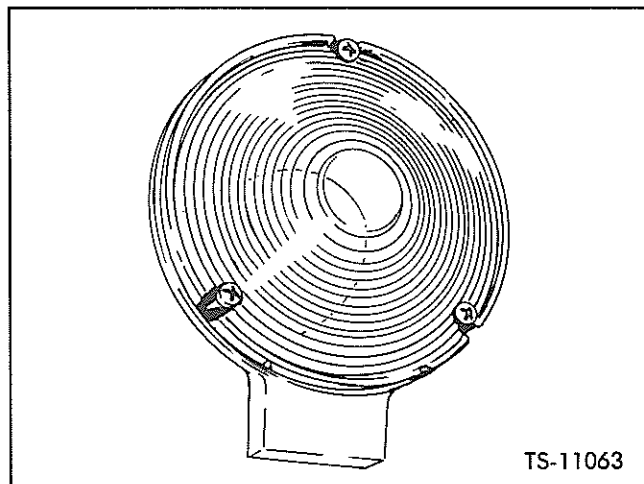


Fig. 15. Remove Reflectors and Replace Tail or Stop Lamps

**Service Batteries:** Keep terminals clean and tight, and be sure distilled water is added to cover plates and separators in each cell. Do not overfill.

To prevent serious damage to electrical system components when recharging or replacing batteries in the charging system.

**... REMEMBER ...**

1. When installing batteries, *make sure* batteries and alternator polarities are the same.
2. Booster batteries *must be* parallel.
3. Battery-charger and battery polarities *must agree*.
4. Before doing any welding, *disconnect ground cable from batteries and electrical lead from battery terminal on alternator*.

**Tighten Wheel Nuts and Inspect Rims:** Wheel nuts should be checked regularly and kept tight. Loose wheel nuts will cause undue tire wear, strain axle assemblies and affect steering and load distribution. Apply lubricant on threads of wheel studs only and tighten wheel nuts to torque specified on Bolt Torque Chart.

Check rims for bent or damaged flanges and repair or replace as needed.

**Check Air Chambers and Lines for Leaks:** Periodically check connecting lines and fittings to be sure they are air tight. Air chambers occasionally should be painted with soap solution to detect leakage. Tighten clamping ring bolts uniformly until leakage is eliminated, as no leakage is permissible.

Check and securely tighten air chamber to mounting bracket bolts and mounting bracket to axle bolts.

**Clean Cylinder Rods:** Wipe boom, bucket, and steering cylinder rods with clean cloth saturated in hydraulic oil. Check rods for nicks or burrs which would damage packings or seals. Remove such nicks or burrs with a fine grained hand stone or crocus cloth.



## 100 HOUR MAINTENANCE OPERATIONS

- **ENGINE MAINTENANCE**

Engine Maintenance: Refer to Operation and Maintenance Manual of engine manufacturer for maintenance instructions of engine and accessories.

## 250 HOUR MAINTENANCE OPERATIONS

- ENGINE MAINTENANCE
- CHECK ENGINE RPM
- ADJUST BUCKET LEVELER
- BLEED BRAKE SYSTEM
- ADJUST PARKING BRAKE
- ADJUST AND LUBRICATE OPERATOR'S SEAT
- CHECK BRAKE DISC MOUNTING BOLTS
- SERVICE RESERVOIR RETURN FILTER ASSEMBLY

**Engine Maintenance:** Refer to Operation and Maintenance Manual of engine manufacturer for maintenance instructions of engine and accessories.

**Check Engine RPM:** Engine speeds should be checked regularly against specifications to determine engine efficiency and machine performance. Proper speeds insure safe operating limits for the engine and maintain correct operating speeds for torque converter and transmission.

(a) **Low Idle and High Idle RPM:** These speeds are the free operating limits of the engine under no load conditions. They are determined by the amount of fuel delivered to the engine. See Specifications and Service Data.

**Caution:** Do not accelerate to maximum rpm until engine is at operating temperature.

Check throttle linkage to insure wide open throttle when accelerator is fully depressed, also closed throttle when accelerator is fully released. Accelerator and linkage should operate freely in all positions.

Occasionally control rods, control levers or bell cranks loosen or become damaged, impairing the operating efficiency of the engine. Insufficient power is frequently caused by throttle linkage being out of adjustment. Adjust linkage if necessary.

Fuel controls are accurately calibrated at the factory to insure correct idle and high idle speeds.

**Adjust Throttle Linkage:** If throttle linkage requires adjustment, proceed as follows:

1. Unhook spring and disconnect ball joint assembly from throttle control lever.
2. Depress accelerator until it contacts stop on floorboard.
3. Rotate throttle control lever to the extreme full throttle position and adjust ball joint to obtain a slip fit on throttle control lever just before accelerator pedal bottoms.
4. Reinstall ball joint assembly and reconnect spring.
5. Depress and release accelerator, and check that accelerator control rods will properly rotate throttle control lever from idle to full throttle position without interference.
6. Additional adjustments may be made at the other ball joint or at accelerator pedal.

Pressure required to depress accelerator is controlled by the spring on the throttle control lever. This spring also insures that the engine will return to idle speed when accelerator pedal is released.

(b) **Stall RPM:** The engine and torque converter act as a unit to deliver power to the transmission. A stall check should be performed to insure that the engine is developing rated power and that the torque converter is operating efficiently.

**Caution:** Check stall rpm only when torque converter fluid is hot (180° F. to 200° F.), (82° C. to 94° C.), engine is at operating temperature, and boom and bucket relief valve setting is at proper specification.

1. Install tachometer on engine.
2. Apply parking brake, block wheels, attach safety links, and place directional lever in NEUTRAL.
3. Start engine and raise bucket a few inches above the ground.
4. Shift levers into FORWARD, HI speed range, and accelerate engine. When engine reaches maximum rpm, pull back on bucket control lever to rotate bucket to full close position. When engine rpm drops off to lowest point read tachometer.

DO NOT STALL CONVERTER MORE THAN 30 SECONDS AT ANY ONE TIME.

If stall rpm is not within specifications, trouble shooting of engine or torque converter by a qualified mechanic is required. See Specifications and Service Data.

**Note:** Stall rpm specified in Specifications and Service Data at rear of this manual is applicable to altitude of 500 ft. and ambient temperature of 85° F. Due to many combinations of altitude and temperature possible in the field, space does not permit publishing here all the corrections necessary to the stall rpm indicated to accommodate such variations. It is suggested the engine manufacturer's distributor be contacted to determine the correction necessary for altitude and temperature in your application.

**Adjust Bucket Leveler:** Servicing and adjustment procedures are as follows, see Figure 16; Leveler cam must be parallel to cylinder rod.

The bucket leveler mechanism consists of a leveler cam and an electric switch mounted on the right hand bucket cylinder, and a solenoid operated air valve. The electric switch is wired to the solenoid operated air valve, which in turn is connected to the air tank and main hydraulic valve by piping.

The roller arm on the electric switch rolls off the leveler cam as the bucket is rotated back from the DUMP position. This action closes the electric switch and completes the circuit, sending a flow of electricity to the solenoid operated air valve. This releases a flow of air from the tank to the main control valve causing the bucket lever to move from the detent located CLOSE position to the HOLD (neutral) position. The bucket will then stop in a level position.

Servicing and adjustment procedures are as follows: Refer to Figure 16 for correct position of leveler cam in relation to roller on electric switch when bucket is in a level position.

**Caution:** Leveler cam must be parallel to bucket cylinder rod at all times.

1. Start engine, position bucket level on ground, shut down engine and pull bucket lever into detent located CLOSE position.
2. Adjustment is provided at the leveler cam bracket. Elongated holes in the leveler cam

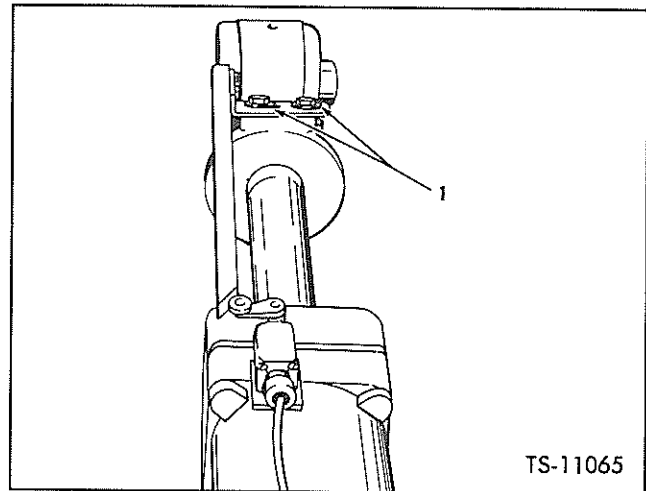


Fig. 16. Adjust Bucket Leveler

bracket allow adjustment either in or out to maintain proper roller arm stroke, .125 in. (3,2 mm) to actuate. (Figure 16 Item 1).

3. The roller on the electric switch should be just off, but nearly touching the leveler cam when bucket is in a level position.
4. Additional adjustment is provided at the roller arm on the electric switch. Maximum stroke of roller arm is .563 in. (14,3 mm).
5. Start engine. Raise bucket to a number of different heights and cycle bucket slowly at each of these various heights to check proper operation. Each time bucket is rotated back from the DUMP position, the bucket lever should return automatically to the HOLD (neutral) position.

**Bleed Brake System:** Occasionally it may be necessary to bleed brake system to remove air trapped in the system due to a leak in the line or the installation of new parts in the system. Air trapped in the system will be indicated by a soft spongy brake pedal.

**Note:** It is recommended to use a bleeder hose on bleeder valves when ever possible to keep fluid away from linings. Keep master cylinder(s) filled during bleeding process.

1. Open bleeder valve, (See Item 1 Figure 17), and actuate brakes several times until fluid coming from bleeder valve is free of bubbles. Depress brake pedal and close bleeder valve, then release brake pedal.

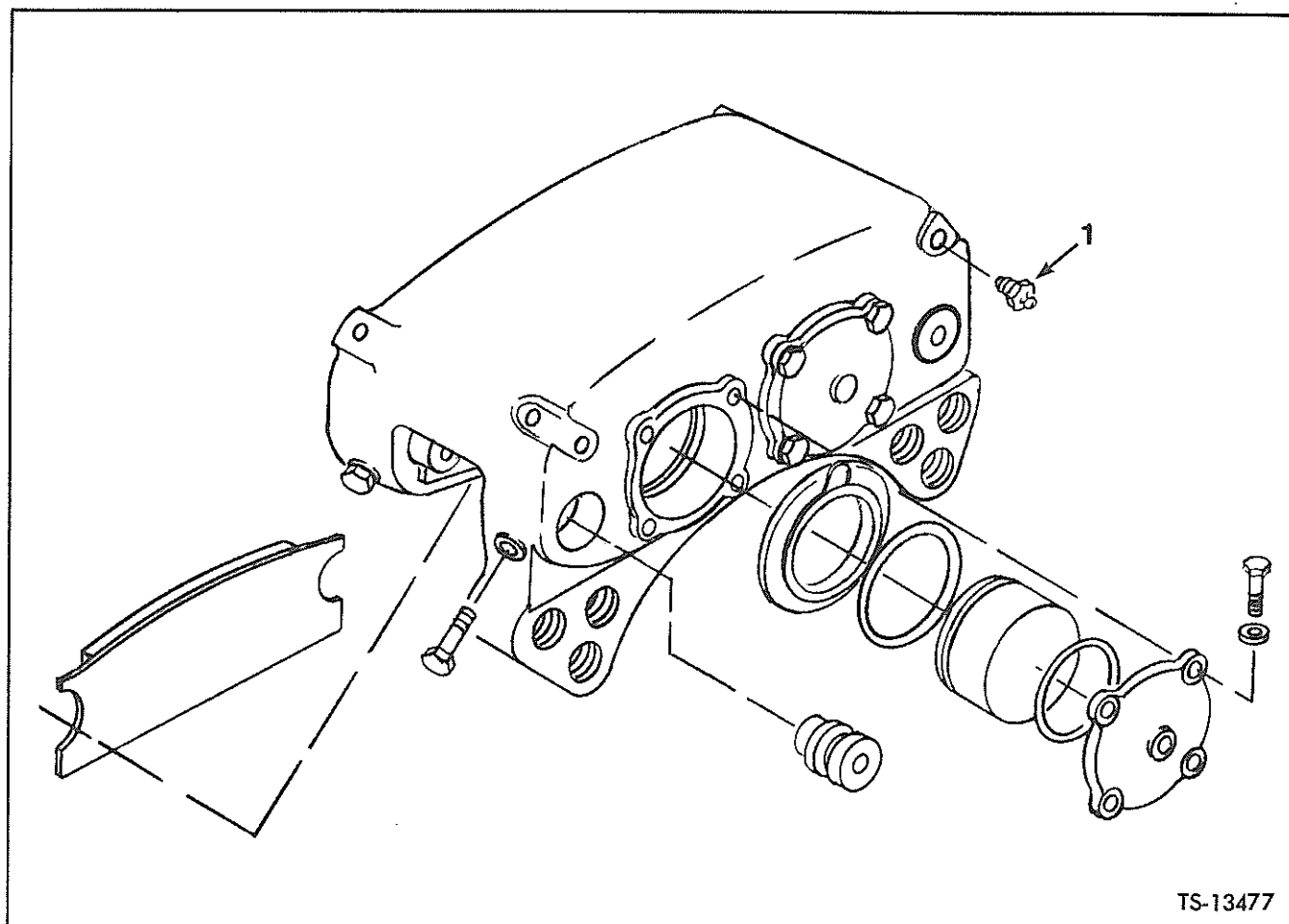


Fig. 17. Disc Brake Head (Exploded View)

2. Actuate brakes several times.
3. Repeat step 1, until no bubbles are observed in fluid from bleeder valves.
4. Repeat entire process at each brake head to finish bleeding system.

**Note:** Master cylinder(s) must be kept full at all times.

See Specifications and Service Data section in rear of this manual for recommended brake fluid.

**Adjust Parking Brake:** When slack develops in parking brake cable, perform the following adjustments.

1. With lever in released position, turn acorn on

end of handle clockwise as shown in Figure 18.

2. Test for good resistance over center as handle is pulled up to applied position.

Further adjustment is provided by a clevis at the brake arm. See Figure 19. First be sure that

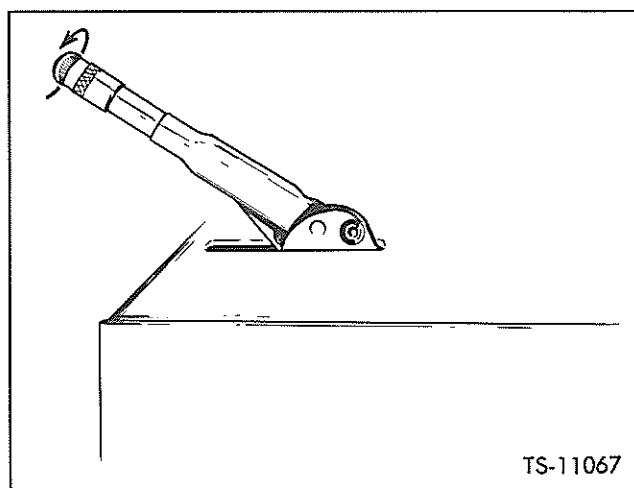
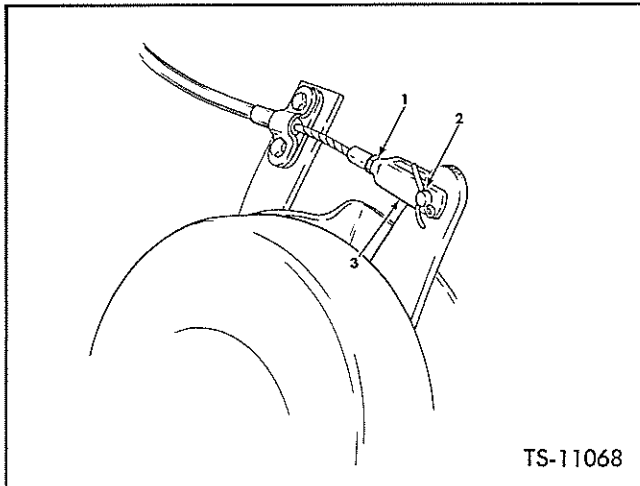


Fig. 18. Adjust Parking Brake at Handle



**Fig. 19. Adjust Parking Brake at Brake Arm**

acorn on lever is backed off, so that all slack can be taken up at the clevis. Brake lever should be in released position.

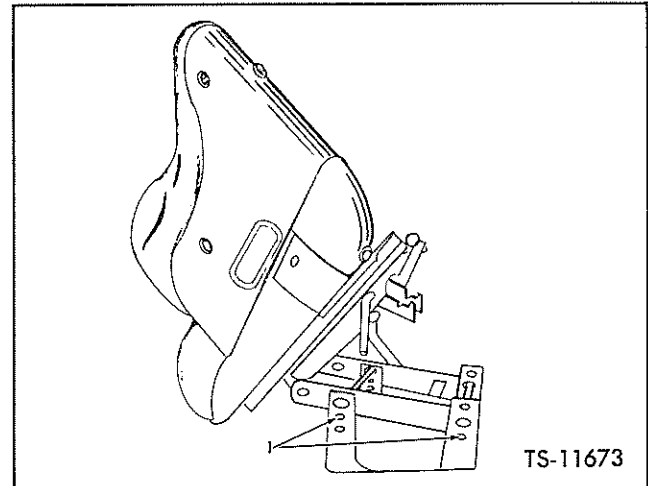
1. Loosen locknut (Item 1 Figure 19), on brake cable.
2. Remove cotter and clevis pin (Item 2 Figure 19).
3. Turn clevis (Item 3 Figure 19) clockwise to tighten brake.
4. Reassemble and tighten locknut.
5. Test brake for proper application and release.

**Adjust and Lubricate Operator's Seat:** The operator's seat can be shifted forward or rearward to suit the individual by moving the lever on side of operator's seat and shifting seat to the desired position.

The seat can also be adjusted up and down by relocating the seat assembly in the adjusting holes, (Item 1 Figure 20), in the seat mounting brackets.

Oiling of release mechanism, track assemblies and pivot points will keep them operating freely.

Tilt seat over steering wheel when shutting



**Fig. 20. Adjust Operator's Seat**

down machine at end of work shift.

**Brake Disc Mounting Bolts:** Check brake disc mounting bolts after first 250 operating hours. If any bolts show evidence of loosening, all brake disc mounting bolts should be re-tightened as follows:

1. Tighten all brake disc mounting bolts to specified torque. See Bolt Torque Chart in rear of manual.
2. Repeat entire procedure so that each individual bolt is checked twice. Subsequent checking should not be necessary until brake disc is replaced.

**Replacement of Brake Disc:** If at any time it is necessary to replace the brake disc, all mounting bolts should be tightened in the following manner:

1. Tighten all brake disc mounting bolts to specified torque. See Bolt Torque Chart in rear of manual.
2. Repeat entire procedure so that each individual bolt is checked twice.
3. After first 250 operating hours on new disc, check brake disc mounting bolts. If any bolts show evidence of loosening, all brake disc mounting bolts should be retightened as described in Steps 1 and 2 above.



## 500 HOUR MAINTENANCE OPERATIONS

- ENGINE MAINTENANCE
- CLEAN RADIATOR CORE
- CHECK AND ADJUST TRANSMISSION SHIFT LEVER LINKAGE
- CHECK TRANSMISSION DE-CLUTCH VALVE
- CHECK CONVERTER INTERNAL PRESSURE
- CHECK TRANSMISSION CLUTCH AND OIL COOLER PRESSURES
- CHECK AND ADJUST BOOM AND BUCKET PRESSURES
- ADJUST BOOM AND BUCKET CONTROL LEVERS
- CLEAN AND TIGHTEN ELECTRICAL CONNECTIONS
- CLEAN AXLE BREATHERS
- CHECK STEERING PRESSURE
- CHECK AND ADJUST STEERING PUMP
- ADJUST DRAGLINK BALL JOINTS
- TIGHTEN MOUNTING BOLTS
- STEAM CLEAN MACHINE
- SERVICE AIR CLEANER ELEMENT AND BODY

**Engine Maintenance:** Refer to Operation and Maintenance Manual of engine manufacturer for maintenance instructions of engine and accessories.

**Clean Radiator Core:** External surfaces of radiator core must be kept clean, straight, and unobstructed to prevent blocking the air flow and causing overheating.

Flying objects such as sand, dust, leaves, twigs, bugs or other debris that plug the core or adhere to water or oil streaks impair the cooling efficiency.

Use compressed air, steam, or a high pressure water stream and remove such objects opposite the air flow through the core assembly. Oil streaks

should be removed using a solvent non-harmful to hoses and wiring insulation. Straighten bent fins being careful not to puncture or enlarge the openings.

**Check and Adjust Transmission Shift Lever Linkage:** Inspect all mechanical control linkage to make sure all shift rods, bell cranks, ball joint assemblies and shift levers are in good serviceable condition and properly adjusted. Correct any questionable condition such as loose or bent linkage, worn pins or evidence of binding or rubbing of any of the shifting components.

The directional and speed range shift levers must be properly adjusted to insure full engagement into all detent positions without interference.

1. Check and tighten bolts securing the shift levers, shift quadrant, and steering column so that bolts are snug.
2. Place speed range lever in LO (first) and directional lever in NEUTRAL.
3. Loosen jam nut, (Item 1 Figure 22), on shift rod, (Item 2 Figure 22), and remove locknut, (Item 3 Figure 22) securing ball joint assembly (Item 4 Figure 22), to shift lever arm, (Item 5 Figure 22).
4. Adjust ball joint assembly as necessary to correct existing condition, then check lever alignment on shift quadrant in operator's compartment. If sufficient adjustment is not available, adjust ball joint assembly at opposite end of shift rod (bell crank end).
5. Reinstall ball joint assembly in lever arm and

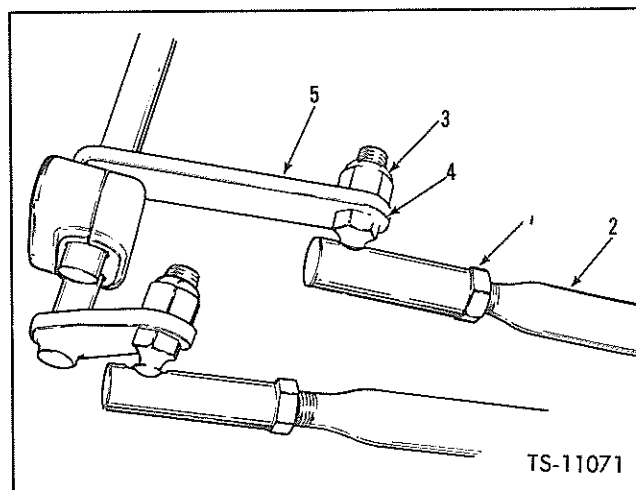


Fig. 22. Adjust Directional and Speed Range Levers

secure with locknut, then tighten jam nut on shift rod.

6. Check that levers will shift into all detent positions without interference from the steering column, bell cranks, bell crank mounting support or transmission control cover and valve housing.

**Check Transmission De-Clutch Valve:** The transmission de-clutch valve is an air operated valve consisting of a piston, piston stop plug, and the necessary o-rings to provide an air tight body. This valve is installed in a housing bore containing a shut-off valve spool located in the transmission control cover and connected to the brake valve by a hose line.

The function of the de-clutch valve is to automatically establish a transmission neutral using air pressure from the brake system when the left brake pedal is applied.

When the left brake pedal is applied, the brake valve releases air pressure from the brake system into the de-clutch valve forcing the de-clutch valve piston to contact the shut-off valve spool inside the transmission control cover. This forces the shut-off valve spool to shift into a position that prevents oil flow to the forward clutch, disengaging the clutch and establishing a transmission neutral. *The reverse clutch is not affected.*

This arrangement prevents the machine from creeping forward when loading or dumping the bucket; yet permits backing away if operating on a sloping grade. It also increases the boom and bucket hydraulic system working power by utilizing the power contained at the transmission, which is normally used for engaging the forward clutch to drive the wheels.

Maintenance consists of periodically checking the de-clutch valve or proper operation as described below:

1. Place directional shift lever in NEUTRAL position and start engine.
2. Accelerate engine to approximately half throttle, lightly apply left brake pedal and shift directional shift lever to FORWARD position. There should be no clutch engagement (causing the machine to move forward) or drop in engine rpm as would be noticed when shifting lever into

REVERSE position. A steady rpm will give a more pronounced indication. However, if forward movement of the machine does occur, this is an indication that the de-clutch valve is not functioning properly and must be replaced.

3. Shut down engine and remove and replace de-clutch valve.
4. Recheck valve operation as described in Steps 1 and 2.

**Check Transmission Clutch, and Oil Cooler Pressures:** Check transmission clutch, and oil cooler pressures at specified intervals, or whenever machine evidences overheating or no power in any speed range in forward or reverse direction.

Pressure checks must be taken with fluid hot (180° F. to 200° F.), (82° C. to 94° C.).

(a) **Transmission Clutch Pressure:** Pressure check should be made in all speed ranges in both forward and reverse directions. Wheels of machine should be securely blocked and parking brake applied.

1. Remove cap on quick disconnect fitting.
2. Install an accurate gauge, 0 to 400 psi (0 to 28 kg/cm<sup>2</sup>) capacity in the quick disconnect fitting in rear of cockpit as shown in Figure 23 Item A.
3. Check pressure with engine at IDLE.
4. Read gauge in NEUTRAL; then engage clutches one at a time. Minimum pressure reading should be as specified in Specifications and Service

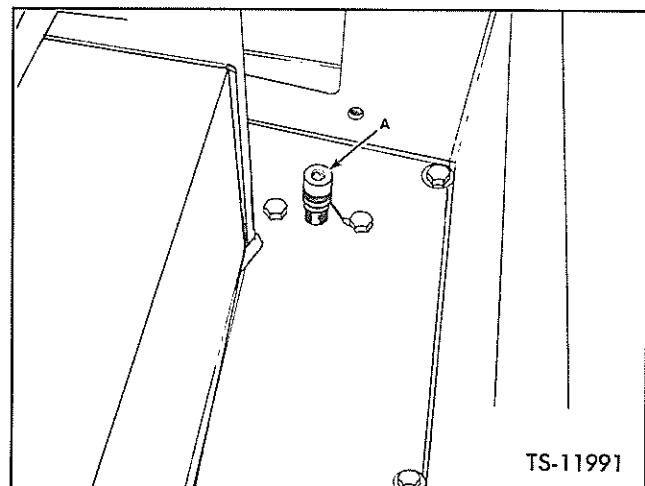


Fig. 23. Transmission Clutch Pressure

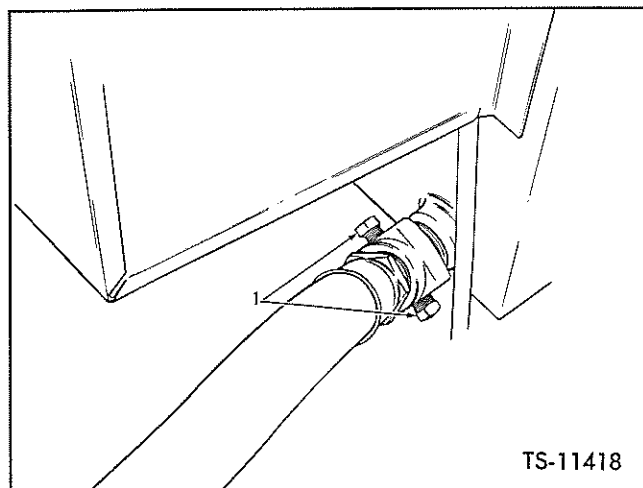


Fig. 24. Check Pressure — Oil Cooler IN

Data Section at rear of manual.

If pressure is not as specified, further trouble shooting of the transmission, torque converter and allied hydraulic system by a qualified mechanic is required.

(b) **Oil Cooler Pressure:** The drop in pressure across the oil cooler at bottom of radiator will indicate whether oil cooler has or is becoming plugged with foreign material causing overheating.

Pressure check must be made with fluid hot using accurate gauges 0 to 100 psi (7 kg/cm<sup>2</sup>) capacity at 2000 rpm.

1. Install tachometer on engine. Install gauges at cooler IN and cooler OUT pressure ports shown as Item 1 in Figures 24 and 25.
2. Attach safety links, apply parking brake and shift directional lever into NEUTRAL position.
3. With the aid of a helper, read gauges at steady 2000 rpm, and subtract oil cooler OUT pressure from oil cooler IN pressure to get pressure drop. Pressure drop should be within specifications given in Specifications and Service Data Section.

If pressure difference is not within specifications it will be necessary to thoroughly clean or replace the oil cooler and/or the radiator assembly. If below minimum specifications check pump.

**Check Boom and Bucket Pressure:** The boom and bucket hydraulic pump is coupled to the drive

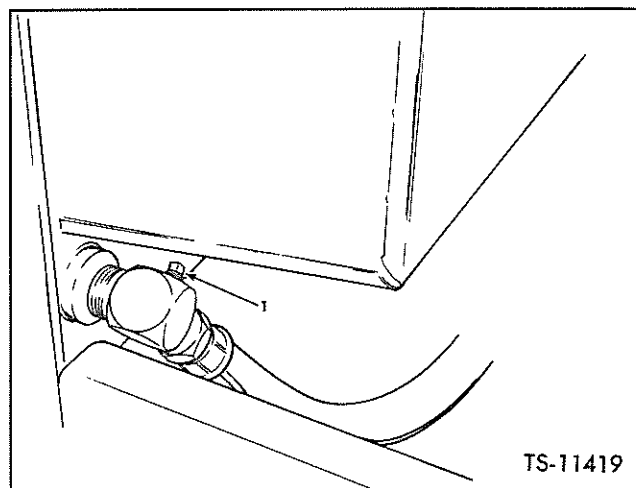


Fig. 25. Check Pressure — Oil Cooler OUT

line and operates as soon as the engine is started. The pump draws fluid from the reservoir and forces it under pressure into the boom and bucket control valve.

Maintenance consists of periodically checking the pressure in the system.

1. Remove access plate, apply parking brake, block wheels and attach safety links.
2. Use a hydraulic pressure gauge of at least 3000 psi capacity. With engine shut down, move boom control lever from RAISE to FLOAT to HOLD position to prevent loss of hydraulic oil while attaching gauge, then place lever in NEUTRAL position.
3. Remove pipe plug (Item 1 Figure 26) and attach gauge.

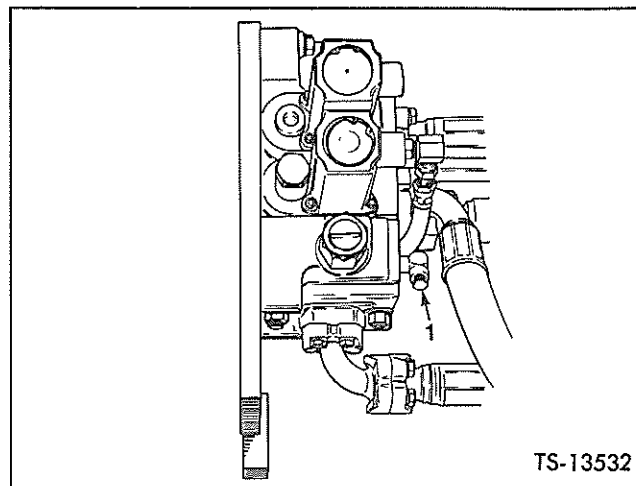


Fig. 26. Main Hydraulic Pressure — Gauge Port

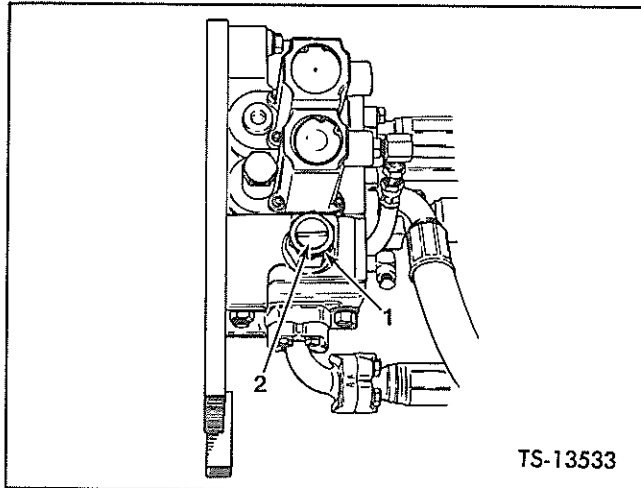


Fig. 27. Adjust Main Hydraulic Pressure

4. Start engine, place directional lever in NEUTRAL and accelerate to maximum rpm. Rotate bucket into full CLOSE position. When engine rpm drops to its lowest point, observe gauge reading. If gauge reading is not as specified in Specifications and Service Data section at rear of manual, shut down engine and adjust valve.
5. Loosen locknut, Item 1 then turn adjusting screw, Item 2, Figure 27, in increments of one half revolution or less, clockwise to increase pressure or counter-clockwise to decrease pressure, tighten locknut and retake reading. Repeat this procedure until gauge reads as specified in Specifications and Service Data section at rear of manual.
6. With engine shut down, move boom control lever from RAISE to FLOAT to HOLD position to prevent hydraulic oil loss while removing gauge. Remove gauge and reinstall pipe plug.

**Adjust Boom and Bucket Control Levers:** The control levers are properly set at the factory. An adjustment is provided by clevises connected directly to the levers to permit changing angle of levers if desired and to insure that spools shift into all positions.

With engine shut down, and bucket on the ground, place levers in HOLD (neutral) position. The adjustment can be made as follows: See Figure 28.

1. Loosen locknut (Item 1 Figure 28) on control rod.

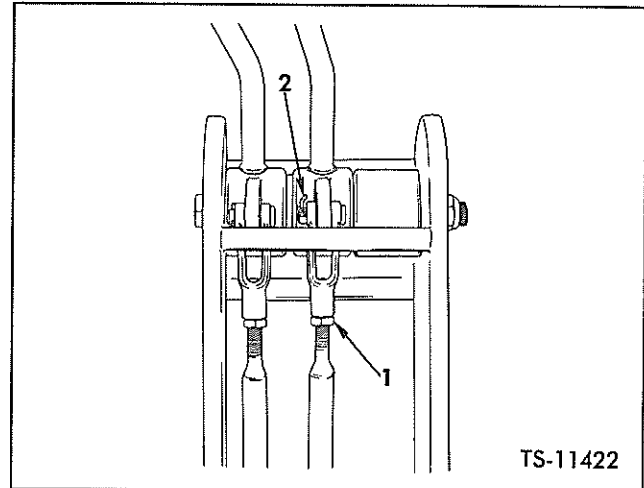


Fig. 28. Adjust Boom and Bucket Control Levers

2. Remove cotter and clevis pin (Item 2 Figure 28).
3. Turn clevis clockwise to move lever toward the rear; counter-clockwise to move lever forward.
4. When lever is set where desired, attach clevis with pin and cotter and tighten locknut securely.
5. Check that levers shift into all positions without interference. Additional adjustment may be made at control valve.

**Clean and Tighten Electrical Connections:** Periodically inspect and check all wiring and connections on electrical components such as the batteries, cranking motor, voltage regulator, alternator, solenoid switch, relays, instruments and switches for worn, cracked, broken or frayed insulation and loose terminal connections. Check for frayed or corroded external ground straps and corrosion on battery terminal ports.

Where inspection reveals dirt, looseness or damage; clean, tighten and adjust or replace as necessary depending on existing conditions.

**Note:** Maintenance personnel must observe the following precautions to prevent the possibility of serious injury or excessive damage to electrical system components when servicing the charging system.

1. WHEN INSTALLING BATTERIES, MAKE SURE BATTERIES AND ALTERNATOR POLARITIES ARE THE SAME—

When installing a battery, always make absolutely sure the ground polarity of the battery and the ground polarity of the alternator are the

same. If a battery of the wrong polarity is connected into the charging system or if a battery is reversed when installing it, the battery is directly shorted through the diodes. Consequently the diodes and machine wiring are endangered by high current flow. Burned wiring harness and burned "open" diodes probably will result.

## 2. BOOSTER BATTERIES MUST BE PARALLELED—

When connecting a booster or "slave" battery, make certain to connect the negative terminals together and the positive terminals together. Failure to observe this precaution will result in the same damage as described above.

## 3. BATTERY CHARGER AND BATTERY POLARITIES MUST AGREE—

When connecting a charger to the battery, connect the charger positive lead to the battery positive terminal and the charger negative lead to the battery negative terminal. Failure to follow this procedure will result in the same damage as described in the first caution.

## 4. NEVER OPERATE ALTERNATOR ON OPEN CIRCUIT—

Never operate the alternator on open circuit. With no battery or electric load in the circuit (open circuit), the alternator can build up high voltages which could be extremely dangerous to anyone who might accidentally touch the alternator battery terminal. Before making tests or "on the machine" checks, it is prudent to make sure all connections in the circuit are tight and secure.

## 5. DO NOT SHORT ACROSS OR GROUND ANY TERMINALS OF THE ALTERNATOR OR REGULATOR—

Do not short across or ground any of the terminals on the alternator or regulator. Any artificial circuit set up by purposely grounding or shorting any of the alternator or regulator terminals can cause serious electrical malfunctions that might endanger components of the electrical system.

## 6. DO NOT POLARIZE THE ALTERNATOR—

Do not attempt to polarize the alternator. Polarizing the d.c. type of generator is necessary to insure that generator and battery polarity are the same. Alternator polarizing however is not necessary since the voltage developed within the alternator is of both polarities and the diode rectifier automatically controls the direction of current flow. It is of vital importance as discussed

in the first precaution that the battery ground and the alternator ground be of the same polarity for diode protection.

## 7. BEFORE DOING ANY WELDING, DISCONNECT GROUND CABLE FROM BATTERY AND ELECTRICAL LEAD FROM BATTERY TERMINAL ON ALTERNATOR—

Before doing any welding on machines equipped with an alternator, disconnect the ground cable from the battery and the electrical lead from the battery terminal on the alternator.

**Clean Axle Breathers:** Each 500 operating hours inspect breathers on front and rear axle housings. Housing breathers have a loose fitting cap that should be rotated.

Oil leakage past breathers, thrust caps, carrier housing or pinion cap seals indicates that breathers may be clogged. Unscrew breathers, wash in solvent, dry and reinstall.

**Check Steering Pressure:** The steering hydraulic pump is coupled to the drive line and operates as soon as the engine is started. The pump draws fluid from the reservoir and forces it under pressure into the control valve mounted at the base of the steering gear.

Maintenance consists of periodically checking the pressure in the system.

**Note:** Remove safety links, if attached between front and rear frames.

**Warning:** Do not stand or work in hinge area(s) when machine is running — No room for a man in this area when machine is turned.

1. Use hydraulic pressure gauge of at least 3000 psi capacity. With engine shut down, remove pipe plug in steering relief valve, and install gauge as shown in Figure 29, Item 1.
2. Start engine and accelerate to maximum rpm; then turn tractor to the right and hold against stops.
3. With the aid of a helper read gauge. Pressure reading should be as specified in Specifications and Service Data section at rear of this manual.

If pressure reading is not as specified, shut down engine, and inspect and check for collapsed

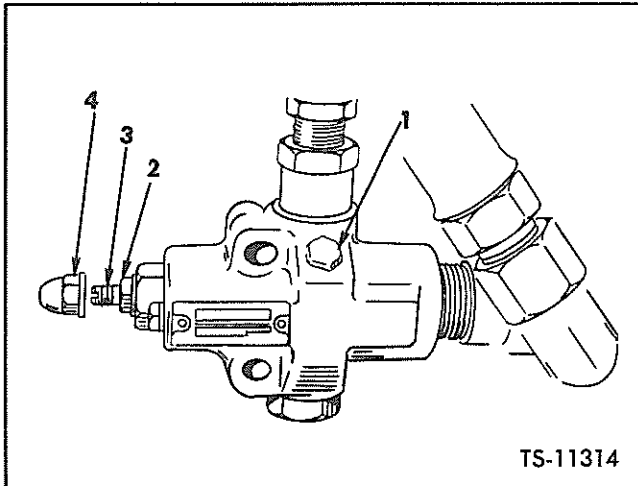


Fig. 29. Steering Pressure Relief Valve

or ruptured hoses, proper function of steering cylinder packing glands, defective steering pump or steering control valve.

If the above items are in satisfactory operating condition it will be necessary to adjust the steering pressure at the steering control valve. See Figure 29.

1. Remove acorn nut (Item 4) and loosen locknut (Item 2) on steering relief valve adjusting screw (Item 3).
2. Turn tractor to extreme right or left and hold against stops.
3. With transmission in neutral, accelerate to maximum rpm.
4. Turn adjusting screw in increments of  $\frac{1}{4}$  revolution or less, clockwise to increase pressure or counter-clockwise to decrease pressure.
5. When pressure reading on gauge reaches that specified in Specifications and Service Data section at rear of this manual, tighten locknut, release throttle and steering wheel, shut down engine, remove gauge and reinstall pipe plug.

**Check and Adjust Steering Pump:** The steering pump is a double pump consisting of a primary section and a secondary section. From low idle to by-pass rpm, both primary and secondary sections are supplying the steering system. From by-pass rpm to maximum rpm, the primary section continues to supply the steering system, but the secondary section by-passes.

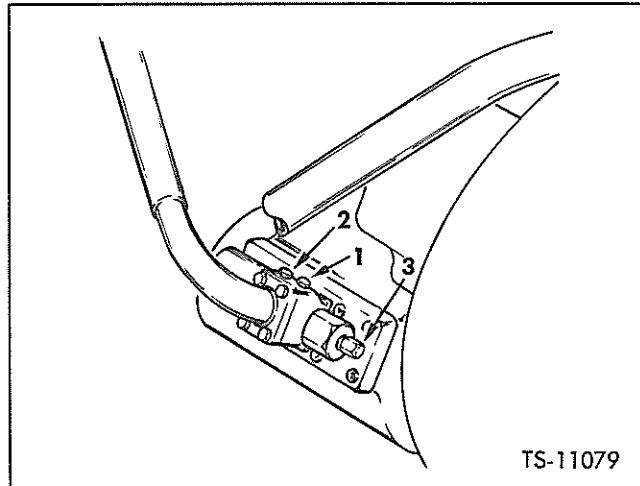


Fig. 30. Steering Pump Pressure Port and Adjustment

Maintenance consists of periodically checking, and adjusting if necessary, the rpm at which the secondary steering pump section by-passes.

1. Install tachometer on engine.
2. Install two 3000 psi capacity gauges, one at the steering pump primary section port, Item 1 and one at the secondary section port, Item 2. See Figure 30.
3. Remove safety links if attached between frames.

**WARNING:** Do not stand or work in hinge area(s) when engine is running. No room for a man in this area when machine is turned.

4. Start engine and maintain low idle rpm, turn steering against stops and hold. At this point, both gauges should read steering relief pressure or slightly below.
5. Accelerate engine rpm observing gauges and tachometer. Note the rpm at which the gauge attached to the secondary port indicates a large pressure drop off. At this point, tachometer should read as specified in Specifications and Service Data Section.
6. Accelerate to maximum rpm with steering held against stops. The gauge attached to the primary port should read system relief pressure while the gauge attached to the secondary port indicates very little pressure.

If secondary pump section does not show a pressure drop-off at specified rpm, it will be necessary to adjust the valve on the steering pump.

Proceed with valve adjustment as follows.

1. Turn steering to extreme right or left and hold against stops. Accelerate to maximum rpm. The gauge attached to the primary section pressure port should read system relief pressure.
2. If gauge reading is not as specified, adjust steering relief valve as described under 500 HOUR MAINTENANCE OPERATIONS.
3. With steering against stops, increase engine rpm slowly starting at low idle.
4. Carefully watching tachometer and pressure gauge attached to steer pump secondary pressure port, note the rpm at which pressure drop-off occurs.
5. Remove acorn nut, Item 3 and o-ring on steer pump valve. See Figure 30.
6. Turn adjusting screw clockwise to increase or counter-clockwise to decrease pressure drop-off rpm.
7. After correct setting has been obtained, reinstall acorn nut and o-ring. Recheck pressure drop-off rpm to be certain adjustment was not disturbed while installing acorn nut and o-ring.
8. Shut down engine, remove gauges and tachometer and reinstall pipe plugs.

**Adjust Draglink Ball Joints:** Adjust front and rear ball joints on drag link whenever excessive play develops. This condition will be indicated by an increase of free play at the steering wheel before tractor responds to turning action.

Remove cotter (Item 1) and turn slotted adjusting plug (Item 2) to remove all slack in ball joints at each end of drag link as shown in Figure 31.

**Tighten Mounting Bolts:** Mounting bolts on such components as engine, torque converter, transmission, steering gear, and prop shafts will occasionally work loose and cause supports and brackets to wear rapidly. Alignment difficulty may also develop.

Inspect all mounting bolts for evidence of looseness, stripped threads, cracked or broken heads or any other signs of damage.

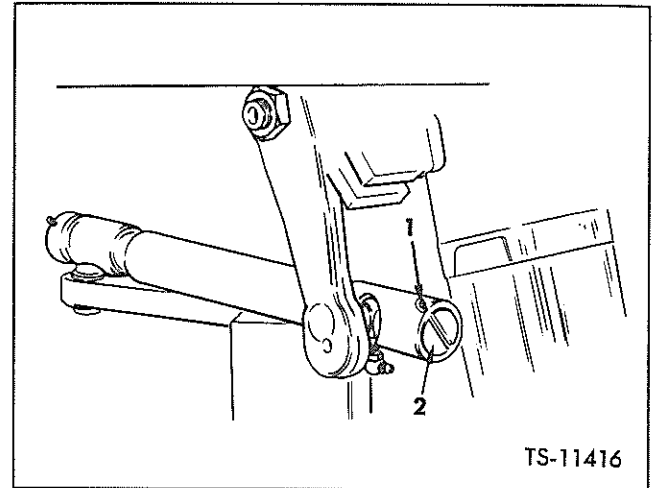


Fig. 31. Adjust Draglink Ball Joints

Remove and replace damaged or missing mounting bolts and tighten all loose mounting bolts as necessary. Refer to Bolt Torque Chart.

**Steam Clean Machine:** Periodically or whenever working machine in muddy or swampy areas or when machine begins to cake up with excessive dirt, the entire machine should be steam cleaned. If allowed to accumulate, dirt will find its way into the various systems when plugs, covers or caps are removed or during unit replacement eventually cause serious damage and down time.

Dirt packed on or around the axle, transmission, torque converter and engine breathers will cause oil losses.

Steam is the most effective and recommended method of cleaning a dirty machine. If unavailable use a spray of mineral spirits or a similar solvent non-harmful to exposed hoses, lines and electrical wiring.

**Note:** Prior to steam cleaning, cover all battery, alternator and cranking motor openings to protect them from the force of the steam jet.

**Service Air Cleaner Element:** Recommended servicing procedures and intervals for replacing the air cleaner filter elements are described below, but it should be understood that no set rule can be established for replacing the filter elements because the replacement interval is automatically established by a service indicator installed on the air cleaner outlet to the engine. The service indicator

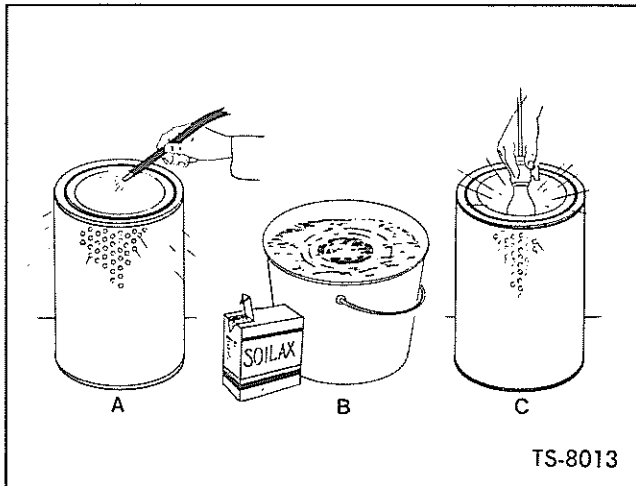


Fig. 32. Clean and Inspect Filter Element

insures maximum engine efficiency by providing the operator with a fast, safe and efficient method of determining when the filter element should be replaced. This is accomplished by a WARNING SIGNAL (red band) which is actuated by the pressure drop across the air cleaner.

Dirt trapped by the main filter element gradually increases the pressure drop across the air cleaner. As the resistance increases, a WARNING SIGNAL (red band) inside the indicator will become visible in the indicator window. This indicates the life reserve of the filter element. When restriction of the air flow through the filter reaches the upper limit for efficient filter element performance, the WARNING SIGNAL (red band) will lock and remain in a position visible to the operator regardless of whether or not the engine is running. This is an indication that the filter must be serviced.

**Note:** *Extended operation of machine without replacing filter element when indicated by the service indicator will create excessive restriction resulting in high fuel consumption, excessive smoke, lower horsepower and poor acceleration.*

Figures 32 thru 34 illustrate the removal and cleaning procedure of the air cleaner main element.

Loosen clamp assembly, (Item 2, Figure 33) and remove dust cup, (Item 1 Figure 33). Unscrew

the wing nut, (Item 3 Figure 33), and remove element, (Item 4 Figure 33). Pat sides of element with palm of hand to remove dust trapped in the pleats. Tapping element against hard surface or with hard objects may dent or break the element end cap seals (Figure 34 Item 1). This would affect improper sealing when the element is reassembled and result in rapid engine wear. Using low pressure air (see Figure 32 Item A), not over 100 psi, blow out remaining dust from inside out, opposite normal air flow through the element.

**Caution:** *Be careful not to rupture filter element. Maintain a reasonable distance between air nozzle and filter element when directing air up and down the clean air side of the element pleats.*

Extremely dirty main element can be cleaned in warm water, 120°F. to 140°F. (49°C. to 60°C.) using a nonsudsing detergent such as SOILAX. Soak element until dirt particles are loosened (approximately 15 minutes); then brush lightly with a non-metallic brush or agitate element in cleaning solution to remove dirt particles, (see Figure 32 Item B). Flush with clean water from a hose. Air dry element completely before using.

After element has been dried, check top sealing gasket for looseness or damage. A loose gasket may be recemented. Inspect the element for damage by placing a bright light inside element, (see Figure 32 Item C). Thin spots, pin holes, or the slightest rupture will render the element unfit for use. DISCARD ANY DAMAGED ELEMENT.

Clean the fins and inside of air cleaner body with a dry lint-free cloth and reassemble air cleaner. The wing nut retaining the element must always have the gasket washer around its shank.

**Caution:** *Do not use oil in dust cup.*

Inspect safety element (Item 5 Figure 33). If safety element becomes plugged with foreign material, discard and install new element. Do not attempt to clean and re-use plugged safety element.



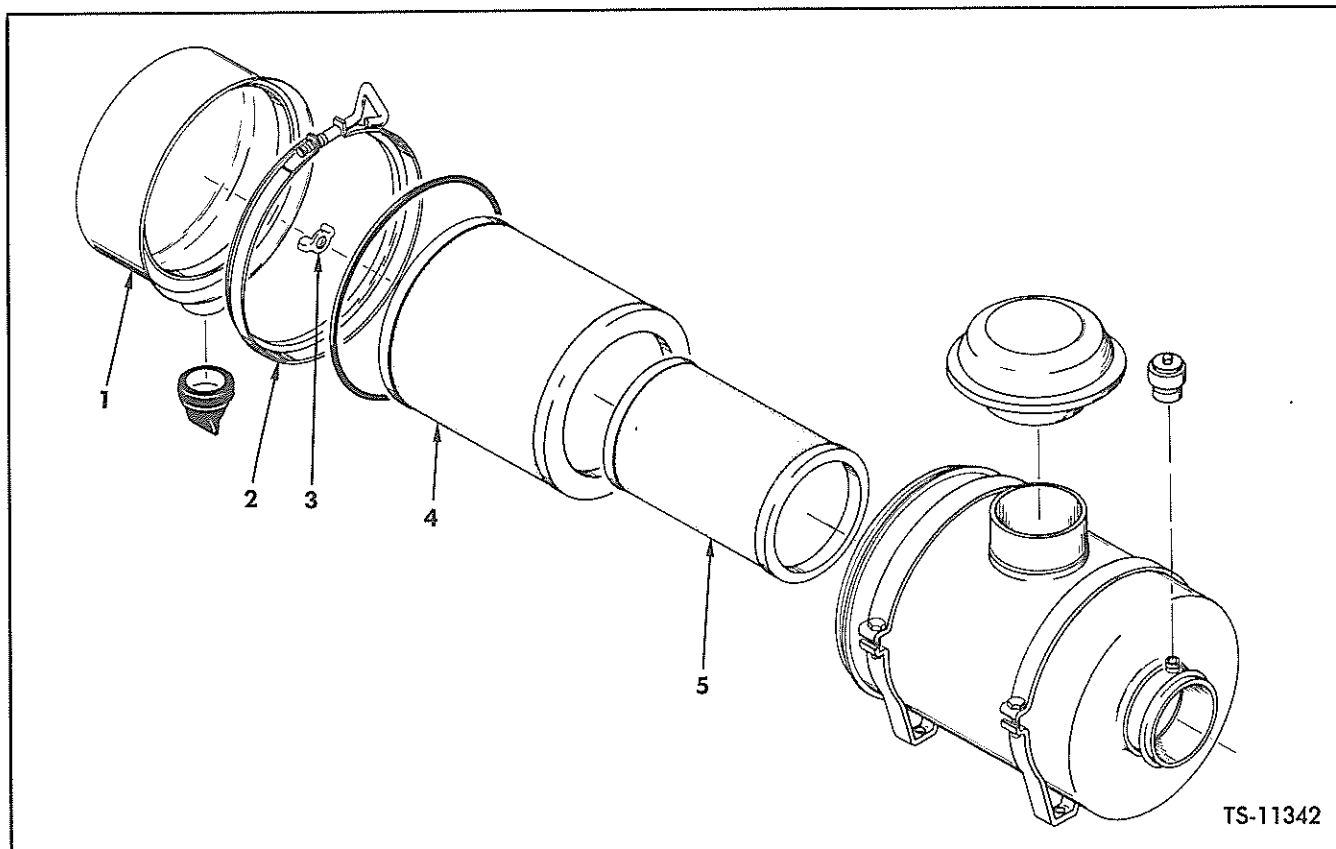


Fig. 33. Air Cleaner Assembly

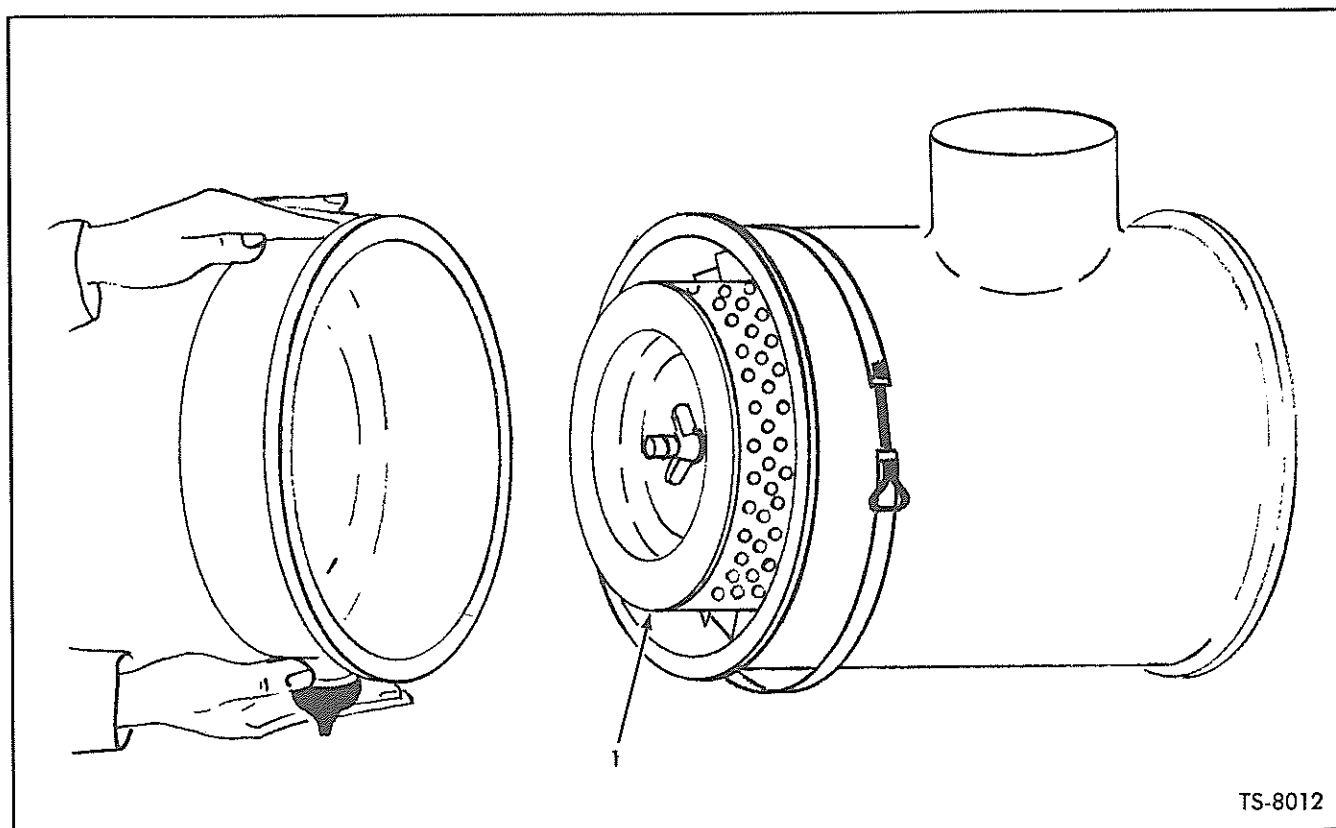


Fig. 34. Remove Dust Cup and Element



1

2



3

4

5

6



## 1000 HOUR MAINTENANCE OPERATIONS

- ENGINE MAINTENANCE
- CHECK AND REPAIR BUCKET CUTTING EDGE
- CHECK BOOM TO BUCKET LINKAGE
- INSPECT, TEST AND LUBRICATE ELECTRICAL UNITS
- ADJUST STEERING GEAR
- INSPECT FRAME

**Engine Maintenance:** Refer to Operation and Maintenance Manual of engine manufacturer for maintenance instructions of engine and accessories.

Always use a hydrometer to check freezing point of coolant with engine at operating temperature.

**Check and Repair Bucket Cutting Edge:** The bucket should be periodically inspected for badly ripped, cracked, chipped or worn-out cutting edges (bottom and sides).

If at any time it becomes necessary to replace the bucket cutting edge (bottom and/or sides), replacement parts can be ordered separately. Refer to Parts Manual for applicable part numbers.

To replace bucket cutting edges, follow the procedure outlined below and as shown in Figure 35.

1. Align and clamp straight edge (Item 5) so that back edge will line up with front edge of bucket sheet (Item 3) as shown in View B.
2. Measure segment length dimension (Item 2) up on each side cutting edge from bottom cutting edge and scribe lines (Item 1) as shown in View A.
3. Guide cutting torch through scribe lines (Item 1) and down rear edge of side cutting edges to bottom cutting edge as shown in View A; then continue cutting along back edge of straight edge (Item 5) as shown in View B. Remove and discard cut-out section from bucket. Grind all rough edges on bucket smooth.
4. Equally space three flat plates on bucket sheet and tack weld in three places as shown in View C.
5. Position and align new cutting edge flush against bucket sheet and flat plates and secure in place with clamps as shown in View C.
6. Alternately tack weld cutting edge to bucket sheet on top and bottom.
7. Remove flat plates and continuously weld cutting edge to bucket sheet on both top and bottom sides as shown in Views C and D.
8. Clamp side cutting edge flush against bucket sheet and bottom cutting edge and weld securely.
9. Grind all welds inside bucket to present a smooth surface for entry of material; grind the residue of the tack welds from bucket sheet.

**Note:** Use a  $\frac{3}{16}$  inch diameter low hydrogen electrode equivalent to AWS-E-7018.

**Check Boom to Bucket Linkage:** Boom to bucket linkage should be checked periodically and adjusted whenever inspection indicates or whenever new boom to bucket linkage parts are installed.

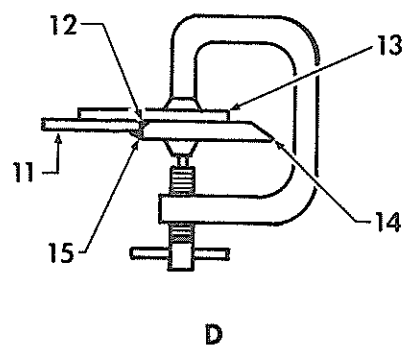
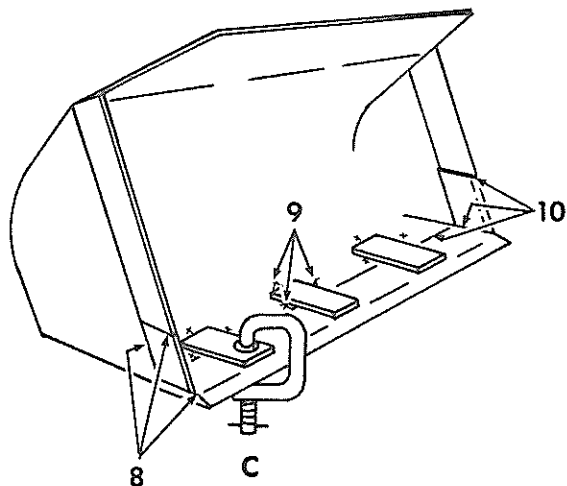
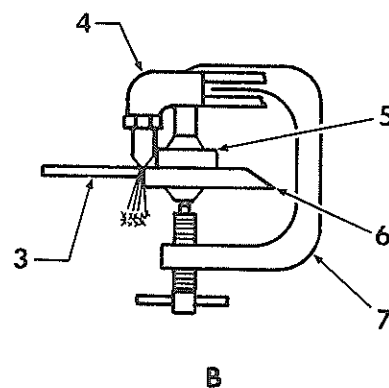
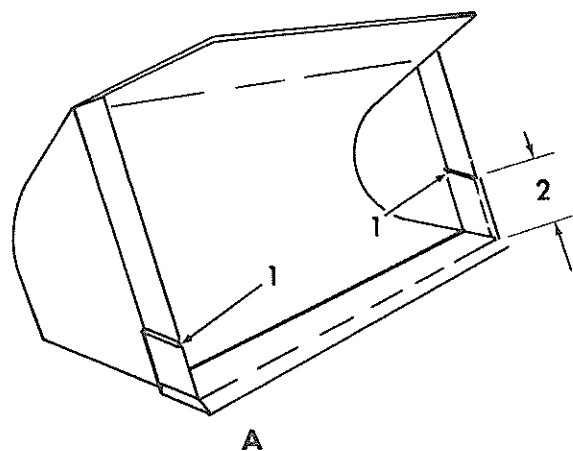
Refer to Figure 36, position "A" and raise boom to full up position, shut off engine and free fall bucket until bucket stop or stops contact boom. Adjust bucket stops to no more than .125 inch, 3,2 mm, space, one stop to the other by grinding or welding on bucket stops.

With boom in full up position, and bucket fully dumped, refer to Figure 36 position "B". In this position, bellcrank stops should not contact boom and must not have more than .25 in. (6,4 mm) clearance. Locate stops and weld accordingly with .50 in. (12,7 mm) weld all around.

**Inspect, Test and Lubricate Electrical Units:** Maintenance performed on the various electrical components usually consists of cleaning, lubricating, minor testing and adjusting, and replacing defective or worn out parts.

At specified intervals lubricate alternator and cranking motor sparingly. Excessive lubrication can result in premature failure.

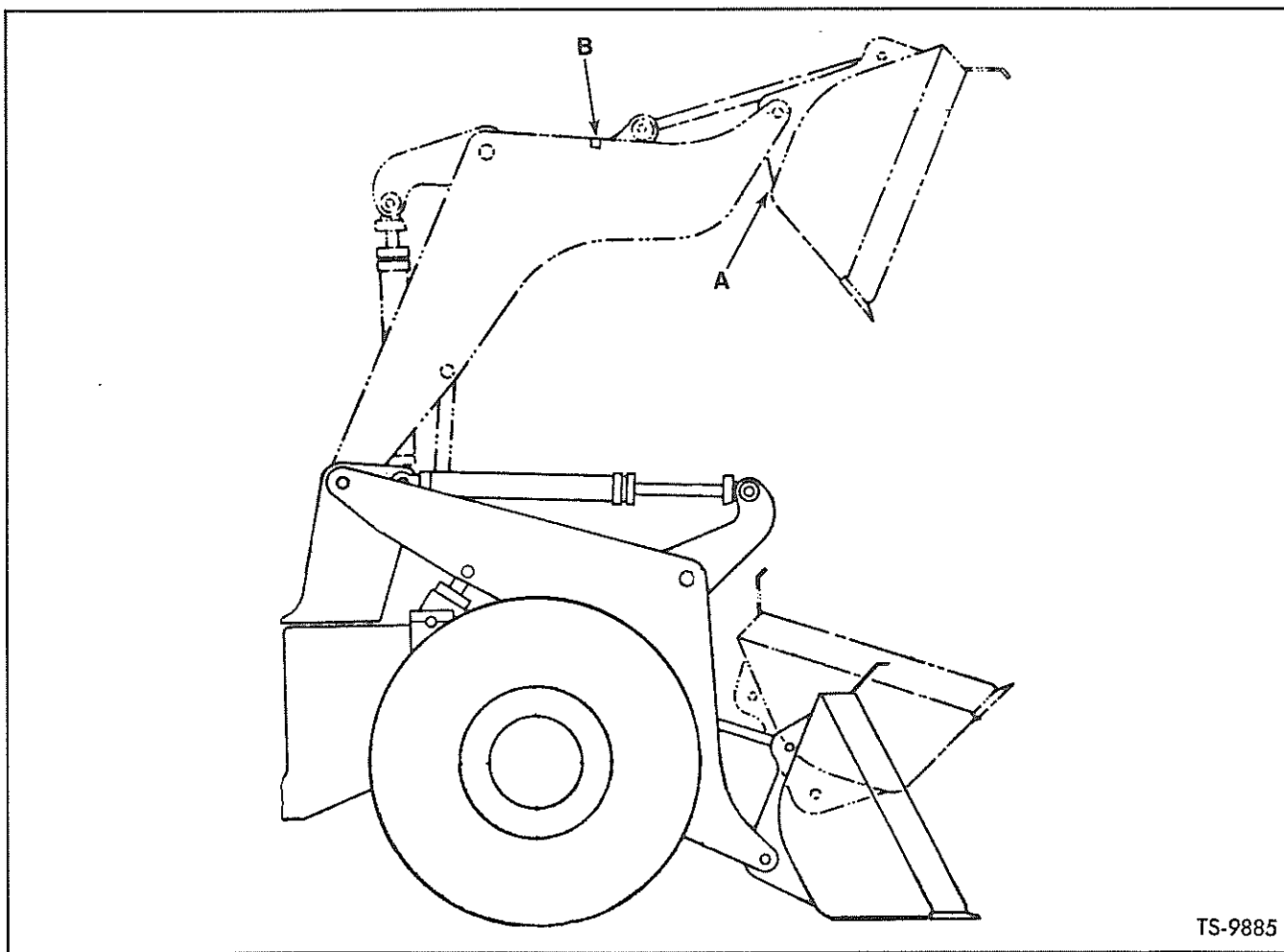
Check cranking motor operation with a substitute battery source known to be fully charged and



TS-11398

- |                      |                  |                              |                  |                  |
|----------------------|------------------|------------------------------|------------------|------------------|
| 1. Scribe Lines      | 4. Cutting Torch | 7. Clamp                     | 10. Weld         | 13. Flat Plate   |
| 2. Length of Segment | 5. Straight Edge | 8. Weld                      | 11. Bucket Sheet | 14. Cutting Edge |
| 3. Bucket Sheet      | 6. Cutting Edge  | 9. Tack Weld to Bucket Sheet | 12. Top Weld     | 15. Bottom Weld  |

Fig. 35. Repair Bucket Cutting Edge



TS-9885

Fig. 36. Check and Adjust Boom to Bucket Linkage

in good condition.

In general, proper function of the alternator and voltage regulator can usually be determined by the following conditions: (1) if batteries are kept fully charged, except when under unusually severe loads, and (2) if not more than the usual amount of water is required to keep them filled.

When testing alternator for charging rate use accurate test meters.

Inspect wires, cables and terminals for tight connections, cleanliness and evidence of deterioration or corrosion.

Blow out accumulated dust and dirt, and clean exterior surfaces of all electrical units.

**Adjust Steering Gear:** The steering gear assembly consists of a manual gear of the recirculating ball type with a hydraulic control valve mounted at the base.

The manual gear requires two adjustments to maintain proper operation: (1) worn bearing adjustment, (2) overcenter or pitman shaft adjustment. The worn bearing adjustment is performed only at the time the control valve is assembled to the gear. The adjusting nut is securely staked in place and does not require further attention.

The overcenter or pitman shaft adjustment, however, should be periodically checked and adjusted to remove lash between pitman shaft gear and the worn gear ball nut. Adjustment is indicated by too much free play at steering wheel before wheels respond to turning action. Adjustment is as follows with the engine shut off.

1. Disconnect steering drag link from pitman arm.
2. Turn steering wheel gently from one stop all the way to the other stop, carefully counting the total number of turns. Then turn wheel back exactly half way to the center position. Mark

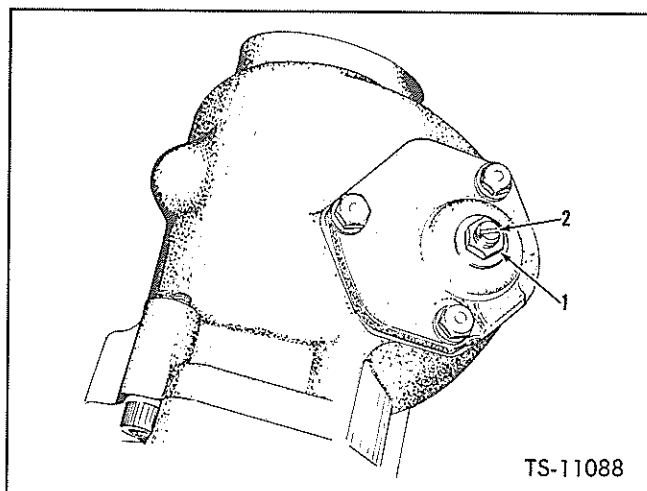


Fig. 37. Adjust Steering Gear

wheel at top or bottom center with piece of tape.

3. Measure the pull at the rim of the steering wheel required to keep the wheel in motion. Take the highest reading of the spring scale as the wheel is pulled through the center position. This pull can be measured by attaching a spring scale to the rim of the wheel with a piece of cord, then pulling on the spring scale to turn the wheel. The line of the scale should be kept tangent to the rim of the wheel. The proper pull at the wheel rim under these conditions should be  $1\frac{1}{8}$  to 2 lbs, (0,5 to 0,9 kg.).
4. Loosen locknut Item 1, and turn adjusting screw Item 2, clockwise to increase pull at the wheel and counter clockwise to decrease the pull. See Figure 37. Reset locknut and recheck pull as it must be within the specified limits after the locknut is tightened.
5. Reassemble drag link to pitman arm and adjust

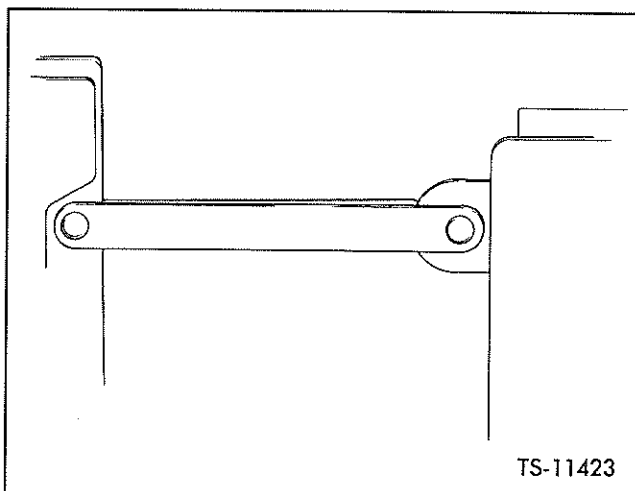


Fig. 38. Check Safety Links

drag link ball joints.

**Inspect Frame:** The frame is the basic backbone of the entire machine that provides structural support directly or indirectly for completely mounting all assemblies, sub-assemblies and individual components necessary for machine construction and operation. The frame structure and all supporting assemblies such as cradle, boom and bucket, bellcranks, pushrods, upper and lower pivots, cross members, reinforcing gussets, brackets and welds should be inspected for warping or any other signs of damage that would endanger proper operation.

Frame damage should be immediately repaired or corrected as necessary to maintain the frame assembly in good serviceable condition.

**Note:** Repair or replace safety links that do not connect properly or have been damaged. See Figure 38.



## BOLT TORQUE CHART

Location	Thread	Torque	
		Ft. Lbs.	Kg. M.
Brake Disc Mounting Bolts	—	167±8	23,1±1
Bucket Cylinder Cap	5/8-18	210	29,0
Converter Drive Gear Mounting	3/8-16	30	4,1
Converter Filter Center Bolt — A.C. Units		50±5	6,9±7
— Fleetguard Units		30±5	4,1±7
Converter Housing Mounting	3/8-16	45	6,2
Engine Support to Flywheel Housing	1/2-13	95	13,1
Engine Support to Frame	1/2-20	90	12,4
Propshaft 6C	3/8-24	50	6,9
Propshaft 7C	7/16-20	75	10,4
Tractor Pivot	1 1/8-12	1100	152,1
Transmission Bracket to Frame	3/4-16	320	44,2
Transmission to Bracket	3/4-10	123	16,9
Wheel Nuts	3/4-16	475	65,7

Bolts not listed are to be drawn up tight in a manner consistent with good workmanship.



## CONSTRUCTION MACHINERY DIVISION



## MODEL

## CAPACITIES (Approximate)

## 75B

## G.M.

## 75B

## Cummins

## U.S. MEASURE

Engine Crankcase and System .....	5 gal.	7 gal.
Cooling System .....	12 gal.	13 gal.
Front Drive Axle Differential .....	3 gal.	3 gal.
Front Drive Axle Planetary Hubs (Ea.) .....	5 qts.	5 qts.
Fuel Tank .....	70 gal.	70 gal.
Hydraulic System .....	60 gal.	60 gal.
Rear Drive Axle Differential .....	3 gal.	3 gal.
Rear Drive Axle Planetary Hubs (Ea.) .....	5 qts.	5 qts.
Torque Converter and Transmission .....	8 gal.	8 gal.
Midmount Bearing .....	2 qts.	2 qts.

## METRIC MEASURE (Liters)

Engine Crankcase and System .....	19,3	26,5
Cooling System .....	45,4	49,2
Front Drive Axle Differential .....	11,4	11,4
Front Drive Axle Planetary Hubs (Ea.) .....	4,7	4,7
Fuel Tank .....	264,9	264,9
Hydraulic System .....	227,2	227,2
Rear Drive Axle Differential .....	11,4	11,4
Rear Drive Axle Planetary Hubs (Ea.) .....	4,7	4,7
Torque Converter and Transmission .....	30,3	30,3
Midmount Bearing .....	1,9	1,9

## IMPERIAL MEASURE

Engine Crankcase and System .....	4.2 gal.	5.8 gal.
Cooling System .....	10.0 gal.	10.8 gal.
Front Drive Axle Differential .....	2.5 gal.	2.5 gal.
Front Drive Axle Planetary Hubs (Ea.) .....	4.2 qts.	4.2 qts.
Fuel Tank .....	58.3 gal.	58.3 gal.
Hydraulic System .....	50.0 gal.	50.0 gal.
Rear Drive Axle Differential .....	2.5 gal.	2.5 gal.
Rear Drive Axle Planetary Hubs (Ea.) .....	4.2 qts.	4.2 qts.
Torque Converter and Transmission .....	6.5 gal.	6.5 gal.
Midmount Bearing .....	1.7 qts.	1.7 qts.





## ENGINE SPECIFICATIONS AND SERVICE DATA

## ENGINE

	75B	75B
Make .....	G.M.	Cummins
Model .....	4-71N	V-504
No. of Cyls. ....	4	8
Bore in. (mm) .....	4.25 (107,9)	4.62 (117,5)
Stroke in. (mm) .....	5.00 (127)	3.75 (95,3)
Displacement cu. in. (liters) .....	284 (4,7)	504 (8,3)
Max. Torque ft. lbs. (kg. m.) .....	400 (55,3)	340 (46,9)
@ RPM .....	1600	1800
Flywheel Horsepower .....	142	154
Governor RPM .....	2300	3000
Low Idle RPM .....	700-750	700-750
High Idle RPM .....	2500	3300
*Stall RPM .....	1770-1870	2400-2600

\*NOTE: Stall rpm is the maximum obtainable rpm with converter oil at operating temperature 180°F. to 200°F. (82°C. to 94°C.) parking brake applied, wheels blocked, directional and speed range levers in FORWARD — HI, and bucket held in full close position. Stall rpm is applicable to altitude of 500 ft. (152 m) and ambient temperature of 85°F. (29.5°C.). Due to the many combinations of altitude and temperature possible in the field space does not permit publishing here all the corrections necessary to the stall rpm indicated to accommodate such variations. It is suggested the engine manufacturer's distributor be contacted to determine the correction necessary for altitude and temperature in your application.

## MODEL

## ELECTRICAL SYSTEM

	75B	75B
	G.M.	Cummins
Circuit Breakers:		
Main .....	70 Amp.	70 Amp.
Light Circuit .....	10 Amp.	10 Amp.
Horn Circuit .....	2 Amp.	2 Amp.
Warning Light Circuit .....	1 Amp.	1 Amp.
Bucket Leveler Circuit .....	1 Amp.	1 Amp.
Sender Units .....	24 Volt	24 Volt
Lamps:		
Back-Up .....	24 Volt, 60 Watt	24 Volt, 60 Watt
Tail & Stop .....	24 Volt, 32/6 C.P.	24 Volt, 32/6 C.P.
Head .....	24 Volt, 60 Watt	24 Volt, 60 Watt
Alternator .....	24 Volt, 70 Amp.	24 Volt, 65 Amp.
Voltage Regulator .....	24 Volt	24 Volt
Starting Motor .....	24 Volt	24 Volt
Batteries:		
Clark Part No. ....	1310121	1310121
No. & Voltage .....	2 — 12V	2 — 12V
System .....	24 Volt	24 Volt
Ground .....	Negative	Negative
Specific Gravity .....	1.230-1.260	1.230-1.260



# CONSTRUCTION MACHINERY DIVISION



## MODEL

75B  
G.M.

75B  
Cummins

### \*PRESSURES —

Engine Oil:		
Low Idle (minimum) .....	11 psi	11 psi
Gov. RPM (approximate) .....	30 psi	30 psi
Air Compressor .....	95-110 psi	95-110 psi
Main Hydraulic System — (At maximum rpm with one set of cylinders against stops) .....	2500 psi	2500 psi
Steering Hydraulic System — (At maximum rpm with tractor halves against stops) .....	1600 psi	1600 psi
Steering Hydraulic Pump — (Secondary section by- pass rpm) .....	1300-1450 rpm	1575-1725 rpm
Transmission Clutches — (At idle rpm in all speed ranges both forward and reverse) .....	240 min./ 270 max. psi	240 min./ 270 max. psi
Cooler pressure drop .....	16-30 psi	5-17 psi

### MISC. SPECS.

Fuel Oil ..... No. 2 Diesel, Cetane 40 minimum

Brake Fluid ..... SAE J-1703 (70 R3), Clark 850487

\*Note: All hydraulic pressure checks should be made with converter oil at operating temperature, approximately 180°F. to 200°F. (82°C. to 94°C.) and hydraulic system oil at least 150°F. (65°C.).



## TIRE DATA AND HYDROINFLATION

## TIRE DATA

MODEL	SIZE	PLY RATING	INFLATION PSI (kg/cm <sup>2</sup> )		TYPE
			FRONT	REAR	
75B	20.5-25	12	40 (2,1)	40 (2,1)	Traction or Rock
	20.5-25	16	40 (2,1)	40 (2,1)	Traction or Rock

Note: Other tire options available.

## HYDROINFLATION DATA

The following table indicates the amount of calcium chloride and water which may be added to rear tires where increased weight and tractive ability are desired.

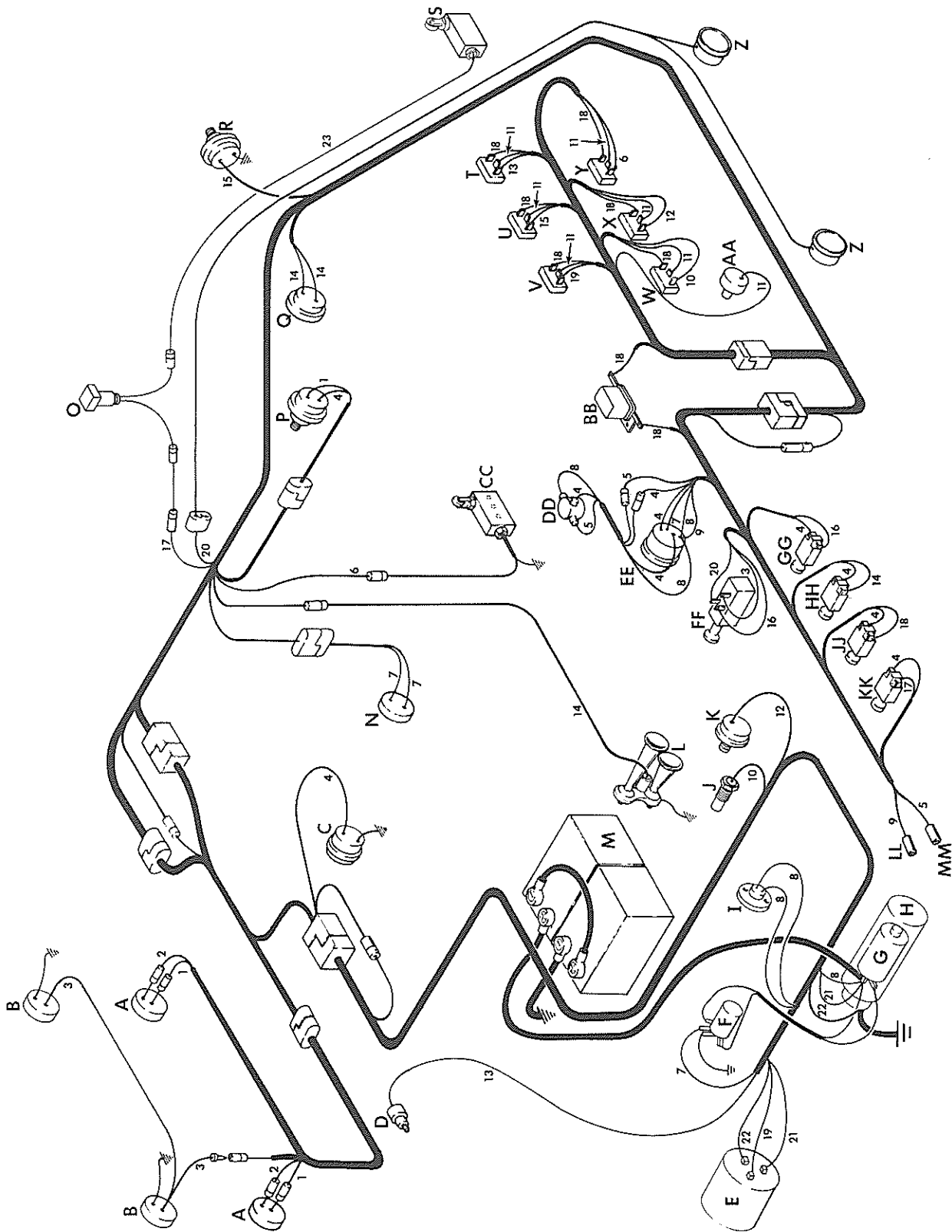
TIRE SIZE	USE $\text{CaCl}_2$ Lbs. (Kg.)	DISSOLVE IN WATER Gal. (Liters)	TOTAL SOLUTION Gal. (Liters)	WEIGHT INCREASE EACH TIRE Lbs. (Kg.)
20.5-25	278 (126)	80 (303)	93 (352)	944 (428)

The solution indicated above, when using a commercial calcium chloride flake of 77-80 %, should protect the tire against freezing down to  $-30^\circ\text{F}$ . ( $-35^\circ\text{C}$ .). Solution strength can be tested with a battery hydrometer. Reading at  $60^\circ\text{F}$ . ( $15,5^\circ\text{C}$ .) should be 1218.

It is recommended that the rear tires be hydro-inflated to the above table if optional counterweight is not used. It is not permissible to use both hydroinflation and optional counterweight. Do not hydroinflate front tires.

TS-13478

WIRING DIAGRAM — G.M.



**COLOR CODE REFERENCE CHART FOR USE WITH TS-13478**

Ref. No.	Color	Color Code
1.	Tan	Stoplights to Brake Light Switch
2.	Yellow	Tail Lights to Instrument Panel Plug (Joins Pink)
3.	Dark Blue	Rear Flood Lamps to Light Switch
4.	Red & White	Ignition Switch to Ignition Solenoid, Circuit Breakers, Hourmeter & Brake Light Switch
5.	Red & White #10	Ignition Switch to Ignition Solenoid to Cab Feed Connector
6.	Black & White	Parking Brake Switch to Parking Brake Warning Light
7.	White	Ignition Switch to Neutral Start Switch to Solenoid
8.	Red #10	Ignition Switch to Ignition Solenoid & Main Circuit Breaker to Starter Solenoid
9.	Red	Ignition Switch to Cab Dome Light Connector
10.	Grey	Converter Temp. Sender to Converter Temp. Warning Light
11.	Orange & Black	Test Switch to Center Terminal All Warning Lights
12.	Brown	Engine Temp. Sender to Engine Temp. Warning Light
13.	Dark Green	Engine Oil Press. Sender to Engine Oil Press. Warning Light
14.	Light Blue	2 Amp. Circuit Breaker to Horn Switch to Horn
15.	Light Green	Low Air Press. Sender to Brake Air Press. Warning Light
16.	Violet	10 Amp. Circuit Breaker to Light Switch
17.	Pink & Black	1 Amp. Circuit Breaker to Bucket Leveler Solenoid
18.	Purple	1 Amp. Circuit Breaker to Buzzer to Warning Lights
19.	Purple & White	Alternator Regulator Terminal to Battery Warning Light
20.	Pink	Light Switch to Head Lamps
21.	Red #8	Alternator Positive Terminal to Starter Solenoid
22.	Black	Alternator Negative Terminal to Starter Ground
23.	Optional	Bucket Leveler Solenoid to Bucket Leveler Limit Switch

**75 B G.M.**

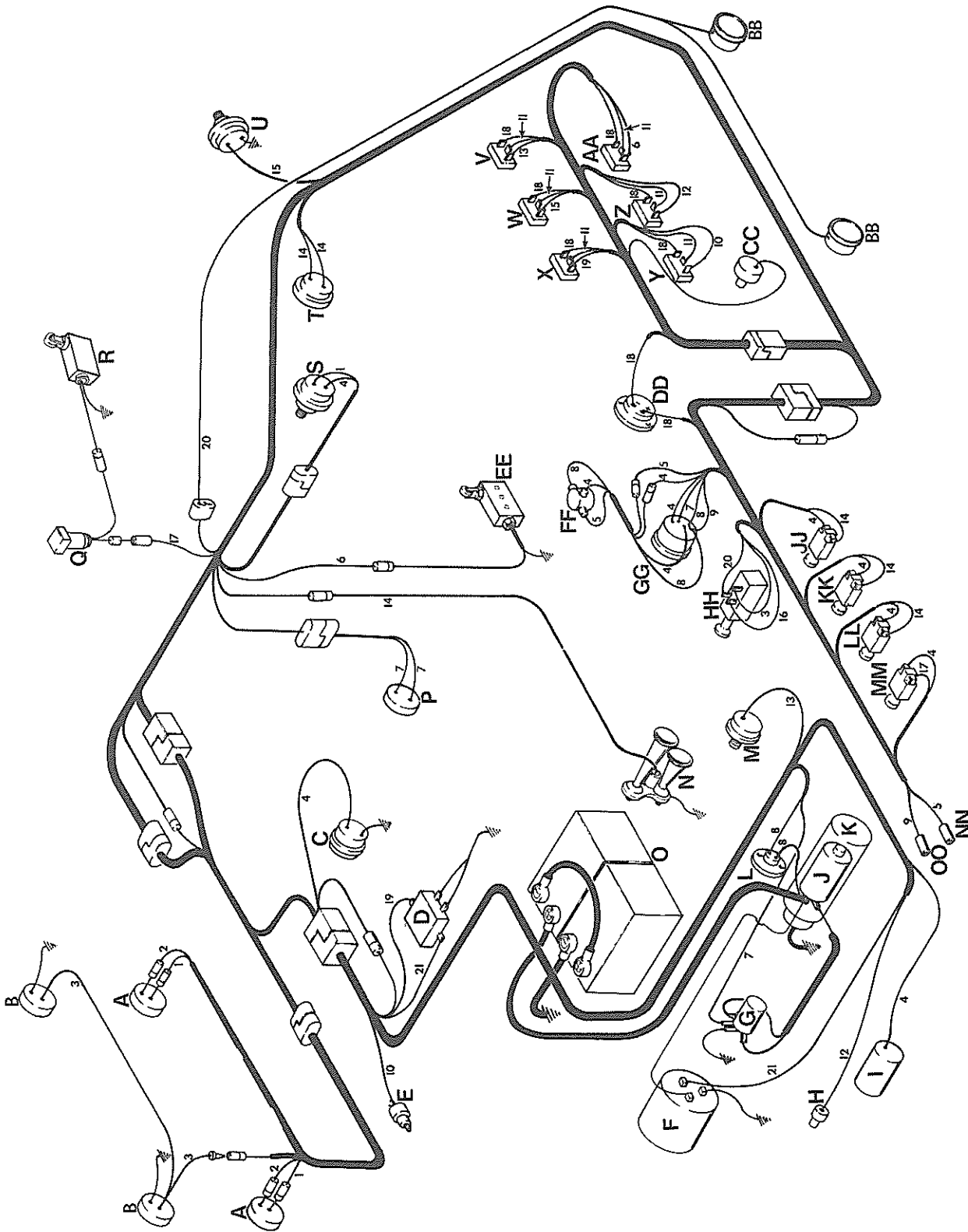
A — Tail & Stoplights  
 B — Rear Flood Lamps  
 C — Hourmeter  
 D — Converter Temp. Sender  
 E — Alternator  
 F — Solenoid  
 G — Starter Solenoid  
 H — Starter  
 I — 70 Amp. Main Circuit Breaker  
 J — Engine Oil Press. Sender  
 K — Engine Temp. Sender  
 L — Horn  
 M — Batteries

N — Neutral Start Switch  
 O — Bucket Leveler Solenoid  
 P — Brake Light Switch  
 Q — Horn Switch  
 R — Low Air Press. Sender  
 S — Bucket Leveler Limit Switch  
 T — Engine Oil Press. Warning Light  
 U — Brake Air Press. Warning Light  
 V — Battery Warning Light  
 W — Converter Temp. Warning Light  
 X — Engine Temp. Warning Light  
 Y — Parking Brake Warning Light  
 Z — Head Lamps

AA — Test Switch  
 BB — Buzzer  
 CC — Parking Brake Switch  
 DD — Ignition Solenoid  
 EE — Ignition Switch  
 FF — Light Switch  
 GG — 10 Amp. Circuit Breaker  
 HH — 2 Amp. Circuit Breaker  
 JJ — 1 Amp. Circuit Breaker  
 KK — 1 Amp. Circuit Breaker  
 LL — Dome Light Connector  
 MM — Cab Feed Connector

TS-13480

WIRING DIAGRAM — CUMMINS



**COLOR CODE REFERENCE CHART FOR USE WITH TS-13480**

Ref. No.	Color	Color Code
1.	Tan	Stoplights to Brake Light Switch
2.	Yellow	Tail Lights to Instrument Panel Plug (Joins Pink)
3.	Dark Blue	Rear Flood Lamps to Light Switch
4.	Red & White	Ignition Switch to Ignition Solenoid, Circuit Breakers, Hourmeter & Fuel Solenoid
5.	Red & White #10	Ignition Switch to Cab Feed Connector
6.	Black & White	Parking Brake Switch to Parking Brake Warning Light
7.	White	Ignition Switch to Neutral Start Switch to Solenoid
8.	Red #10	Ignition Switch to Ignition Solenoid & Main Circuit Breaker to Starter Solenoid
9.	Red	Ignition Switch to Dome Light Connector
10.	Grey	Converter Temp. Sender to Converter Temp. Warning Light
11.	Orange & Black	Test Switch to Center Terminal All Warning Lights
12.	Brown	Engine Temp. Sender to Engine Temp. Warning Light
13.	Dark Green	Engine Oil Press. Sender to Engine Oil Press. Warning Light
14.	Light Blue	2 Amp. Circuit Breaker to Horn Switch to Horn
15.	Light Green	Low Air Press. Sender to Brake Air Press. Warning Light
16.	Violet	10 Amp. Circuit Breaker to Light Switch
17.	Pink & Black	1 Amp. Circuit Breaker to Bucket Leveler Solenoid
18.	Purple	1 Amp. Circuit Breaker to Buzzer to Warning Lights
19.	Purple & White	Relay to Battery Warning Light
20.	Pink	Light Switch to Front Flood Lamps
21.	Purple & Black	Alternator to Relay
22.	Optional	Bucket Leveler Limit Switch to Bucket Leveler Solenoid

**75 B Cummins**

A — Tail & Stoplights	N — Horn	AA — Parking Brake Warning Light
B — Rear Flood Lamps	O — Batteries	BB — Front Flood Lamps
C — Hourmeter	P — Neutral Start Switch	CC — Test Switch
D — Relay	Q — Bucket Leveler Solenoid	DD — Buzzer
E — Converter Temp. Sender	R — Bucket Leveler Limit Switch	EE — Parking Brake Switch
F — Alternator	S — Brake Light Switch	FF — Ignition Solenoid
G — Solenoid	T — Horn Switch	GG — Ignition Switch
H — Engine Temp. Sender	U — Low Air Press. Sender	HH — Light Switch
I — Fuel Solenoid	V — Engine Oil Press. Warning Light	JJ — 10 Amp. Circuit Breaker
J — Starter Solenoid	W — Brake Air Press. Warning Light	KK — 2 Amp. Circuit Breaker
K — Starter	X — Battery Warning Light	LL — 1 Amp. Circuit Breaker
L — 70 Amp. Main Circuit Breaker	Y — Converter Temp. Warning Light	MM — 1 Amp. Circuit Breaker
M — Engine Oil Press. Sender	Z — Engine Temp. Warning Light	NN — Cab Feed Connector
		OO — Cab Dome Light Connector



**SUBJECT: Revised Stall Speed Specifications**

Stall speed specifications have been revised for Model 75B G.M.  
Tractor Shovels, effective on machines shipped from the factory with  
serial numbers:

**447A101 and After**



**\*Old Stall Speed Specification: 1770-1870 RPM with transmission in  
FORWARD—4th (HI) and bucket in full CLOSE position.**

**\*New Stall Speed Specification: 1650-1780 RPM with transmission in  
FORWARD—4th (HI) and bucket in full CLOSE position.**

**\*NOTE: All stall speed checks should be made with converter oil at  
operating temperature, approximately 180°F. to 200°F. (82°C. to 94°C.)  
and hydraulic system oil 150°F. (65°C.) minimum. Stall RPM is appli-  
cable to altitude of 500 ft. (152 m.) and ambient temperature of 85°F.  
(29.5°C.). Contact engine manufacturer's distributor to determine the  
correction necessary for altitude and temperature in your application.**





**CLARK**

**OPERATORS MANUAL SUPPLEMENT**

**No. 3173**

**MODEL 75B  
TRACTOR SHOVEL**

**SERIAL NUMBER RANGES**

**Cummins — 443C**

**G.M. — 447C**

**Use this Supplement with Operators Manual No. 2944-R1  
and existing supplements**

## INSTRUMENTS AND SWITCHES

Instruments and switches are located on the left hand and right hand instrument panels except the foot operated horn switch. The horn switch is located on the left side of the front floorboard.

Watch the gauges and warning lights while working the machine. Do not operate the machine when gauge and warning lights are not working properly.

### LEFT HAND INSTRUMENT PANEL

**Air Pressure Gauge:** Indicates pressure in air reservoir for operating brakes. The gauge should indicate in the green area when the machine is in operation. This would mean that 95 to 115 psi is available for brake operation.

**Water Temperature Gauge:** Indicates temperature of engine coolant. Under normal operating conditions, gauge will indicate in the green area. An indication in the red area is a warning that the coolant is near boiling point. When this happens, idle the engine and add water to the cooling system. As the temperature lowers, shut down the engine and find the cause of the overheating.

**Voltmeter:** Indicates the condition of the batteries. When the ignition switch is turned on, the voltmeter will indicate the voltage available from the batteries. A reading in the black and white range would indicate low batteries. A reading in the green area indicates that the batteries are fully charged. When the engine is running, a reading in the red area indicates overcharging and that trouble shooting the voltage regulator is required.

**Hourmeter:** Indicates total hours of engine operation. The hourmeter provides a record of operating hours for preventive maintenance scheduling.

**Engine Oil Pressure Gauge:** Indicates oil pressure in the engine lubricating system. A reading in the green indicates normal oil pressure. A reading in the red area indicates low oil pressure and is a warning to trouble shoot immediately. If the gauge does not register within 10 to 15 seconds after engine is started, shut down engine immediately and determine cause.

**Converter Oil Temperature Gauge:** Indicates temperature of the fluid in the converter and transmission. When the needle reaches the red portion of the gauge, shift to a lower speed range. Under normal operation the gauge will register in the green area.

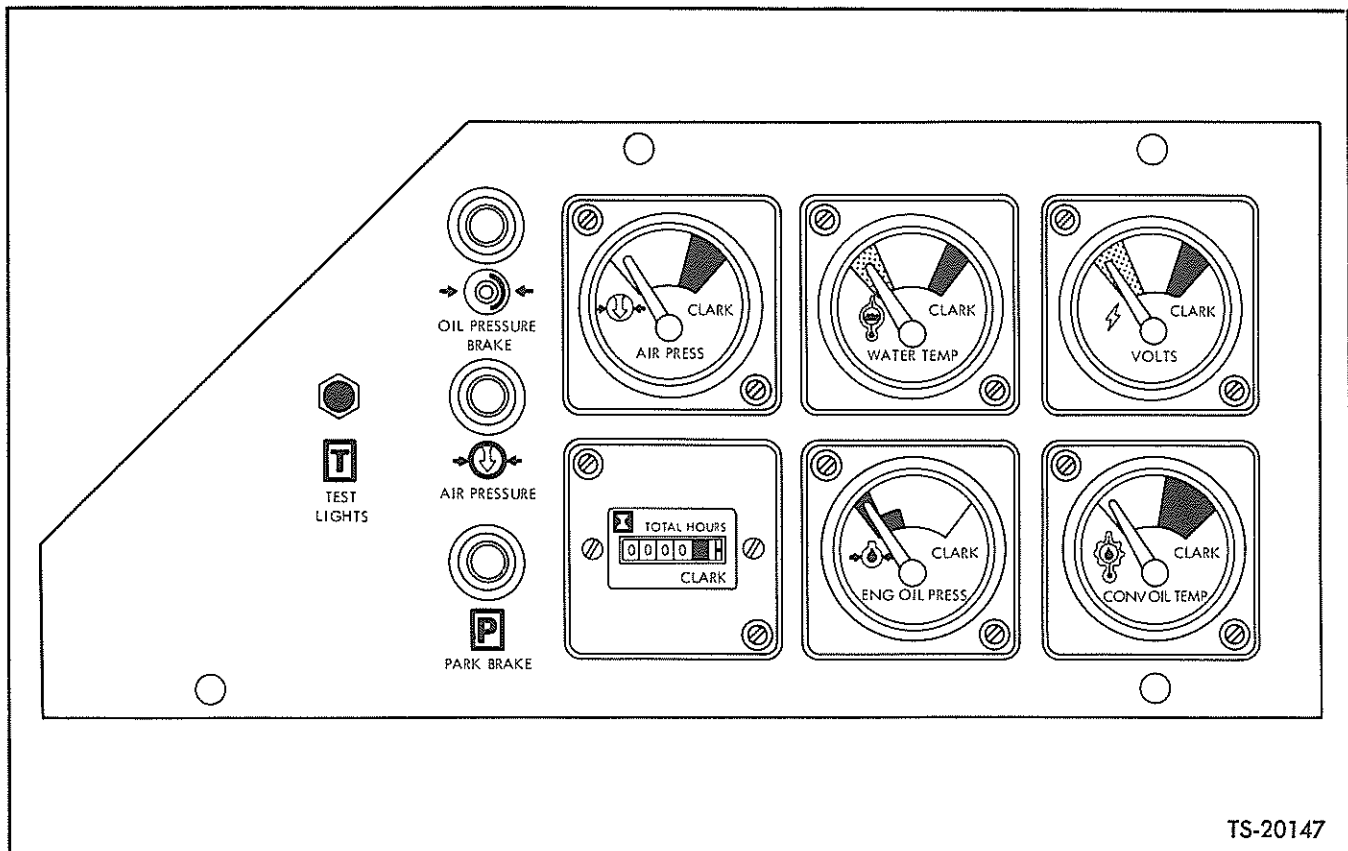


Fig. 1. Left Hand Instrument Panel

**Brake Oil Pressure Warning Light:** Becomes illuminated when brake fluid pressure is low. If warning light is illuminated, troubleshoot immediately.

**Air Pressure Warning Light:** Becomes illuminated when air pressure is low. Troubleshoot air system immediately.

**Parking Brake Warning Light:** Becomes illuminated when parking brake is applied and the ignition switch is in the on position. Release parking brake before moving machine.

**Test Switch:** Tests function of warning lights. Actuate switch with ignition switch in the on position to test warning lights.

### RIGHT HAND INSTRUMENT PANEL

**Ignition Switch:** Energizes all gauges, switches and starting motor. Actuates starting motor when turned all the way to the right.

**Light Switch:** Operates headlamps and tail lights when pulled out to the first position. Operates back-up lights when pulled out to the second position. Push all the way in to turn lights off.

**Emergency Brake Control:** This is a push-pull type of control used to actuate the manually controlled emergency brake system. Pull knob out to apply emergency brake, push in to release.



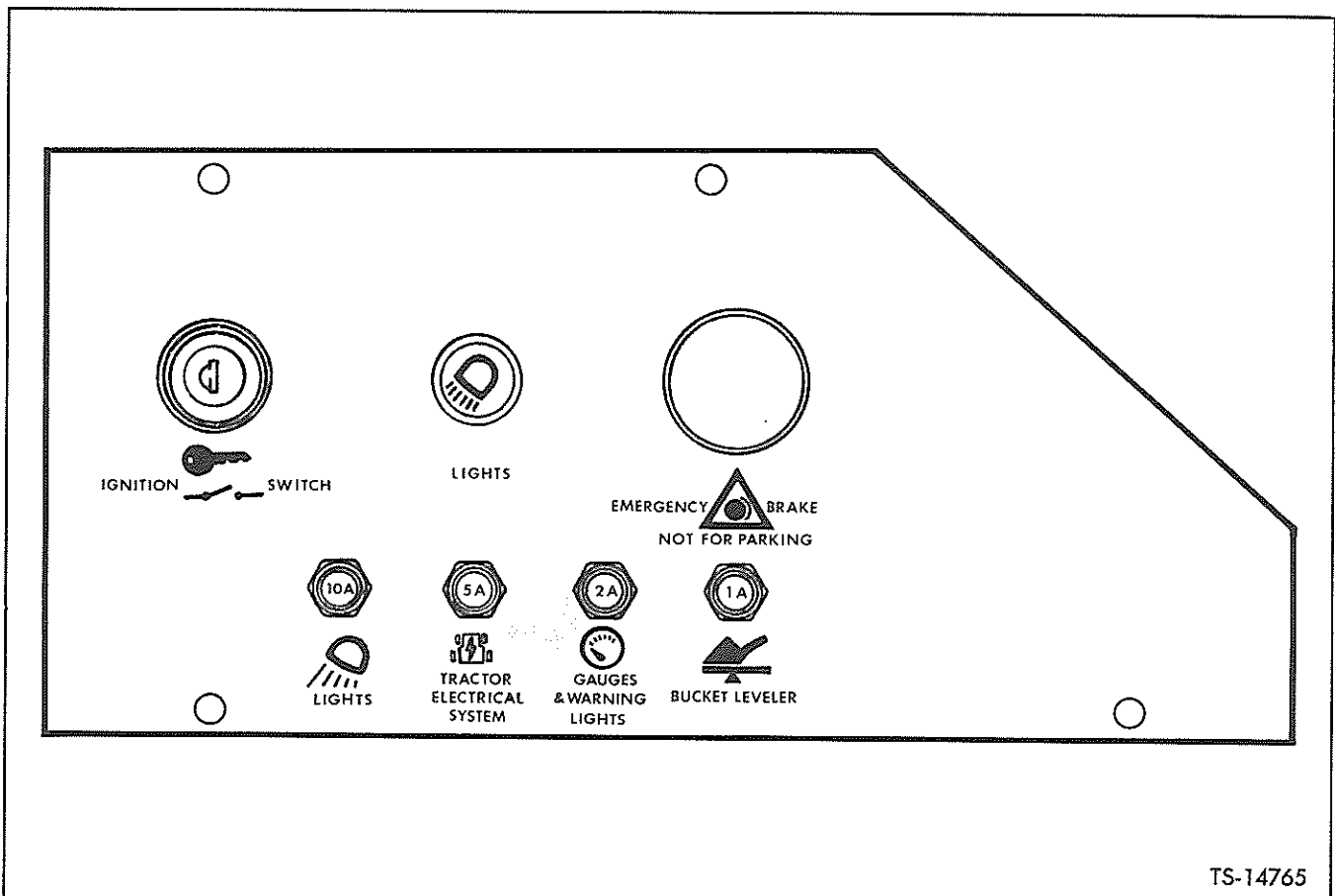
**DO NOT USE EMERGENCY BRAKE AS A PARKING BRAKE. AIR PRESSURE WILL BLEED DOWN ALLOWING THE MACHINE TO ROLL.**

**Circuit Breakers:** Provide protection for the various electrical circuits. To reset circuit breakers, push in and hold momentarily. Circuit breaker protection is provided as follows.

Lights .....	10 Amp.
Tractor Electrical System .....	5 Amp.
Gauges and Warning Lights .....	2 Amp.
Bucket Leveler .....	1 Amp.
Main .....	60 Amp.

If any circuit breaker is repeatedly activated, troubleshoot the portion of the electrical system protected by that circuit breaker without delay.

Refer to the wiring diagram in the rear of this supplement for the location of the various circuits and for color code information.



TS-14765

Fig. 2. Right Hand Instrument Panel

## SERVICE DAILY (Every 8 Operating Hours)

**Torque Converter and Transmission:** Check the fluid level daily. Observe the following conditions:

1. Machine must be **LEVEL**.
2. Fluid must be **HOT** (operating temperature of 180°F. to 200°F.) (82°C. to 94°C.).
3. Engine must be **IDLING**.
4. Area around transmission dipstick must be **CLEAN**.
5. Maintain fluid level to indicated **FULL** mark on dipstick. See Fig. 3.

Refill as necessary through dipstick, filler plug opening.

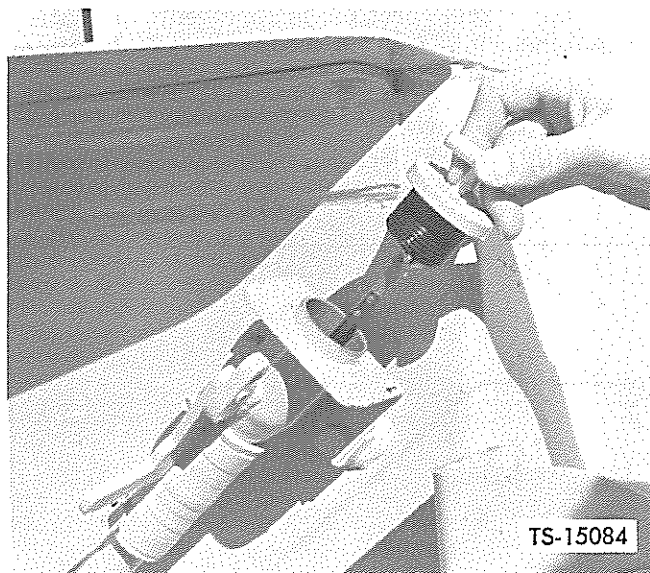


Fig. 3. Transmission Dipstick and Filler Plug

**Hydraulic Reservoir:** Check oil level daily. Observe the following conditions:

1. Machine must be **LEVEL**.
2. Bucket must be on **GROUND**.
3. Engine must be **SHUT DOWN**.
4. Check oil level at **SIGHT GLASS**. Maintain oil level as indicated on sight glass.

Refill as required. Use only premium quality fluid. See lubrication section of Operators Manual for fluid recommendations. Make sure that the area around the reservoir filler cap is clean before adding fluid.

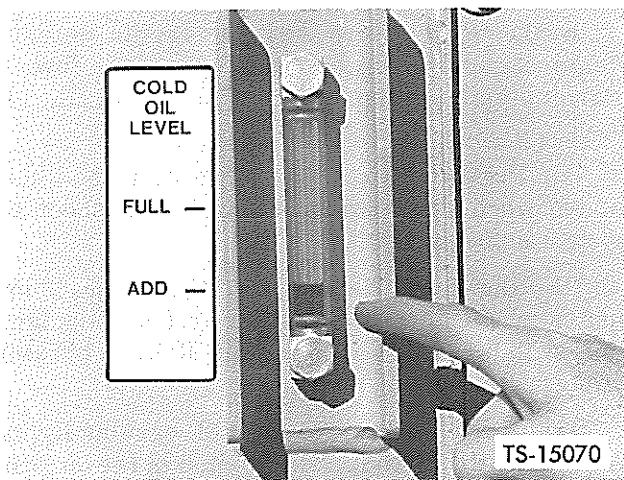


Fig. 4. Hydraulic Reservoir Sight Glass

## EVERY 500 OPERATING HOURS

**Check Oil Cooler Pressure Drop:** The drop in pressure across the oil cooler at the bottom of the radiator will indicate whether the oil cooler has or is becoming plugged with foreign material causing overheating.

The pressure check must be made with fluid hot using accurate gauges of 0 to 100 psi (7 kg/cm<sup>2</sup>) capacity at 2000 rpm.

1. Install tachometer on engine. Install gauges at cooler IN and cooler OUT pressure ports shown in Figure 5.
2. Attach safety links, apply parking brake and shift directional lever into **NEUTRAL** position.
3. With the aid of a helper, read gauges at a steady 2000 rpm. Subtract oil cooler OUT pressure from oil cooler IN pressure to get pressure drop. Maximum oil cooler pressure drop is 35 psi (2,5 kg/cm<sup>2</sup>).

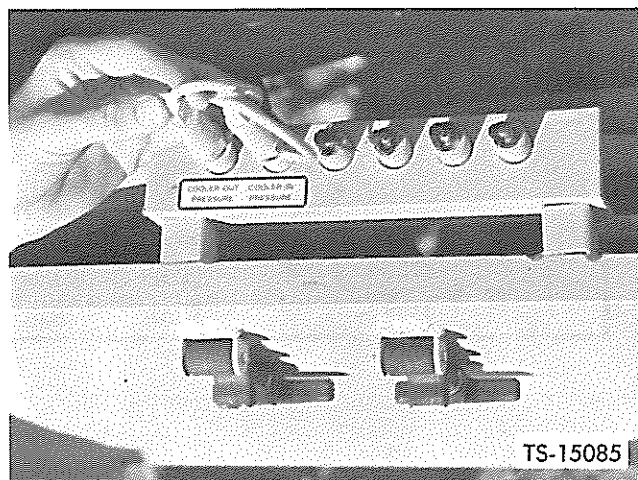


Fig. 5. Cooler IN and Cooler OUT Ports

**CHECK TRANSMISSION CLUTCH PRESSURE:** Check transmission clutch pressure every 500 operating hours or whenever the system evidences overheating or no power in any speed range in forward or reverse direction.

Fluid must be hot 180°F. to 200°F., (82°C. to 94°C.).

Check the clutch pressure in all speed ranges in both forward and reverse directions. Block wheels and apply parking brake.

1. Remove cap on quick disconnect fitting shown in Figure 6.
2. Install an accurate gauge, 0 to 400 psi (0 to 28 kg/cm<sup>2</sup>) on quick disconnect fitting.
3. Check pressure with engine at low idle.
4. Read gauge in NEUTRAL; then engage clutches one at a time.
5. Clutch pressure should be 240 to 270 psi. (16,8 to 18,9 kg/cm<sup>2</sup>).

There should be no more than 5 psi (0,4) difference between pressures recorded for each clutch engagement.

If clutch pressure is not as specified, further troubleshooting of the system by a qualified mechanic is required.

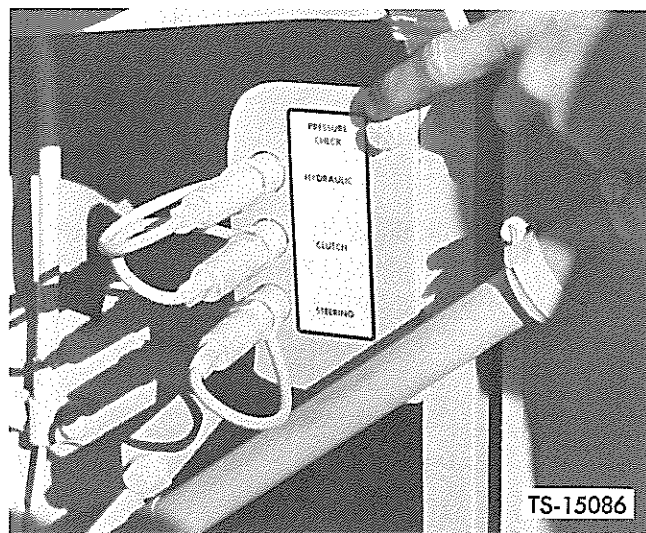


Fig. 6. Clutch, Main Hydraulic and Steering Pressure Ports

**CHECK MAIN HYDRAULIC PRESSURE:** Check the main hydraulic pressure every 500 operating hours or whenever boom and bucket performance is poor.

1. Remove cap on quick disconnect fitting shown in Figure 6.
2. Install an accurate gauge, 3000 psi (210 kg/cm<sup>2</sup>) capacity on quick disconnect fitting.
3. Place directional shift lever in neutral, start engine and accelerate to maximum rpm. Rotate bucket to full close position.
4. When engine drops to its lowest point, read gauge. Pressure should be 2500 psi (175 kg/cm<sup>2</sup>). If the pressure is not as specified, it will be necessary to adjust the main relief.

**CHECK STEERING HYDRAULIC PRESSURE:** Check the steering hydraulic pressure every 500 operating hours or whenever steering performance is poor.

1. Remove cap on quick disconnect fitting shown in Figure 6.
2. Install an accurate gauge, 3000 psi (210 kg/cm<sup>2</sup>) capacity on quick disconnect fitting.
3. Remove safety links, if attached between front and rear frames.
4. Place directional shift lever in neutral, start engine and maintain low idle rpm.
5. Turn tractor to right or left and hold against stops.
6. With the aid of a helper read gauge. Steering hydraulic pressure should be 1600 psi (112 kg/cm<sup>2</sup>). If the pressure is not as specified, it will be necessary to adjust the steering relief valve.

## ENGINE SPECIFICATIONS AND SERVICE DATA

ENGINE	75B	75B
Make .....	G.M.	Cummins
Model .....	4-71N	V-504
No. of Cyls. ....	4	8
Bore in. (mm) .....	4.25 (107,9)	4.63 (117,5)
Stroke in. (mm) .....	5.00 (127,0)	3.75 (95,3)
Displacement cu. in. (liters) .....	284 (4,7)	504 (8,3)
Max. Torque ft. lbs. (kg.m.) .....	400 (55,3)	340 (46,9)
@ RPM .....	1600	1800
Flywheel Horsepower .....	142	154
Governed RPM .....	2300	3000
Low Idle RPM .....	700-750	700-750
High Idle RPM .....	2500	3300
*Stall RPM .....	1650-1780	2400-2600

\*NOTE: Stall rpm is the maximum obtainable rpm with converter oil at operating temperature 180°F. to 200°F. (82°C. to 94°C.), parking brake applied, wheels blocked, directional and speed range levers in FORWARD — HI, and bucket held in full close position. Stall rpm is applicable to altitude of 500 ft. (152 m) and ambient temperature of 85°F. (29.5°C.). Due to the many combinations of altitude and temperature possible in the field, space does not permit publishing here all the corrections necessary to the stall rpm indicated to accommodate such variations. It is suggested the engine manufacturer's distributor be contacted to determine the correction necessary for altitude and temperature in your application.

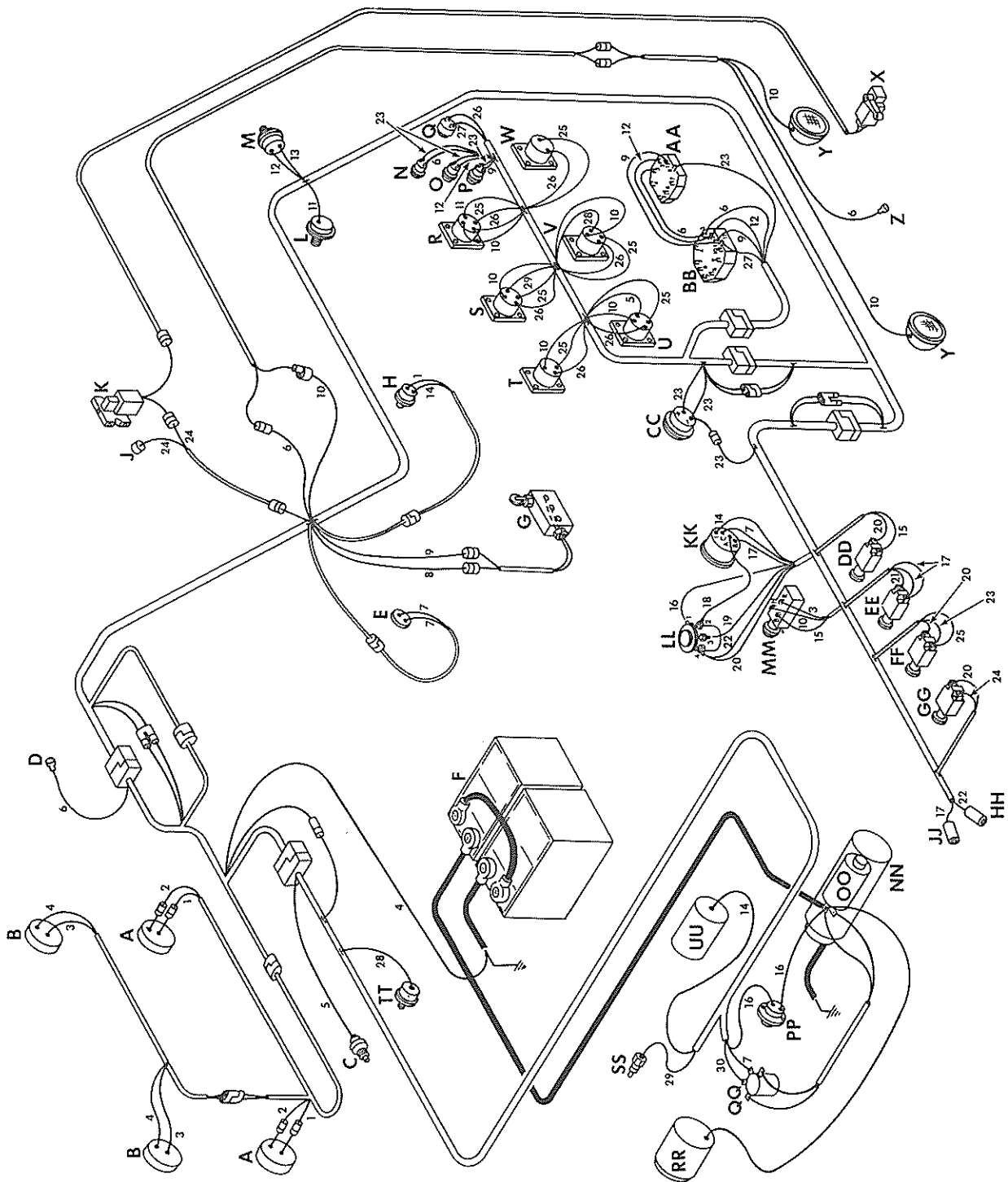
### MODEL

ELECTRICAL SYSTEM	75B G.M.	75B Cummins
Circuit Breakers:		
Main .....	60 Amp.	60 Amp.
Light Circuit .....	10 Amp.	10 Amp.
Tractor Electrical System .....	5 Amp.	5 Amp.
Gauges and Warning Lights .....	2 Amp.	2 Amp.
Bucket Leveler .....	1 Amp.	1 Amp.
Sender Units .....	24 Volt	24 Volt
Lamps:		
Back-Up .....	24 Volt, 60 Watt	24 Volt, 60 Watt
Tail & Stop .....	24 Volt, 32/6 C.P.	24 Volt, 32/6 C.P.
Head .....	24 Volt, 60 Watt	24 Volt, 60 Watt
Alternator .....	24 Volt, 70 Amp.	24 Volt, 65 Amp.
Voltage Regulator .....	24 Volt	24 Volt
Starting Motor .....	24 Volt	24 Volt
Batteries:		
Clark Part No. ....	1310121	1310121
Number & Voltage .....	2-12V	2-12V
System .....	24 Volt	24 Volt
Ground .....	Negative	Negative
Specific Gravity .....	1.230-1.260	1.230-1.260
Radiator Cap Pressure .....	7 Psi.	7 Psi.

## BOLT TORQUE CHART

Location	Thread	Torque	
		Ft. Lbs.	Kg. M.
Brake Disc Mounting Bolts	---	167±8	23,1±1
Bucket Cylinder Cap	5/8-18	210	29,0
Converter Drive Gear Mounting	3/8-16	30	4,1
Converter Filter Center Bolt — A.C. Units		50±5	6,9±7
— Fleetguard Units		30±5	4,1±7
Converter Housing Mounting	3/8-16	45	6,2
Engine Support to Flywheel Housing	1/2-13	95	13,1
Engine Support to Frame	1/2-20	90	12,4
Propshaft 6C	3/8-24	50	6,9
Propshaft 7C	3/16-20	75	10,4
Tractor Pivot	1 1/8-12	1100	152,1
Transmission Bracket to Frame	3/4-16	320	44,2
Transmission to Bracket	3/4-10	123	16,9
Wheel Nuts	3/4-16	475	65,7

Bolts not listed are to be drawn up tight in a manner consistent with good workmanship.



WIRING DIAGRAM — CUMMINS



**COLOR CODE REFERENCE CHART FOR USE WITH TS-20156**

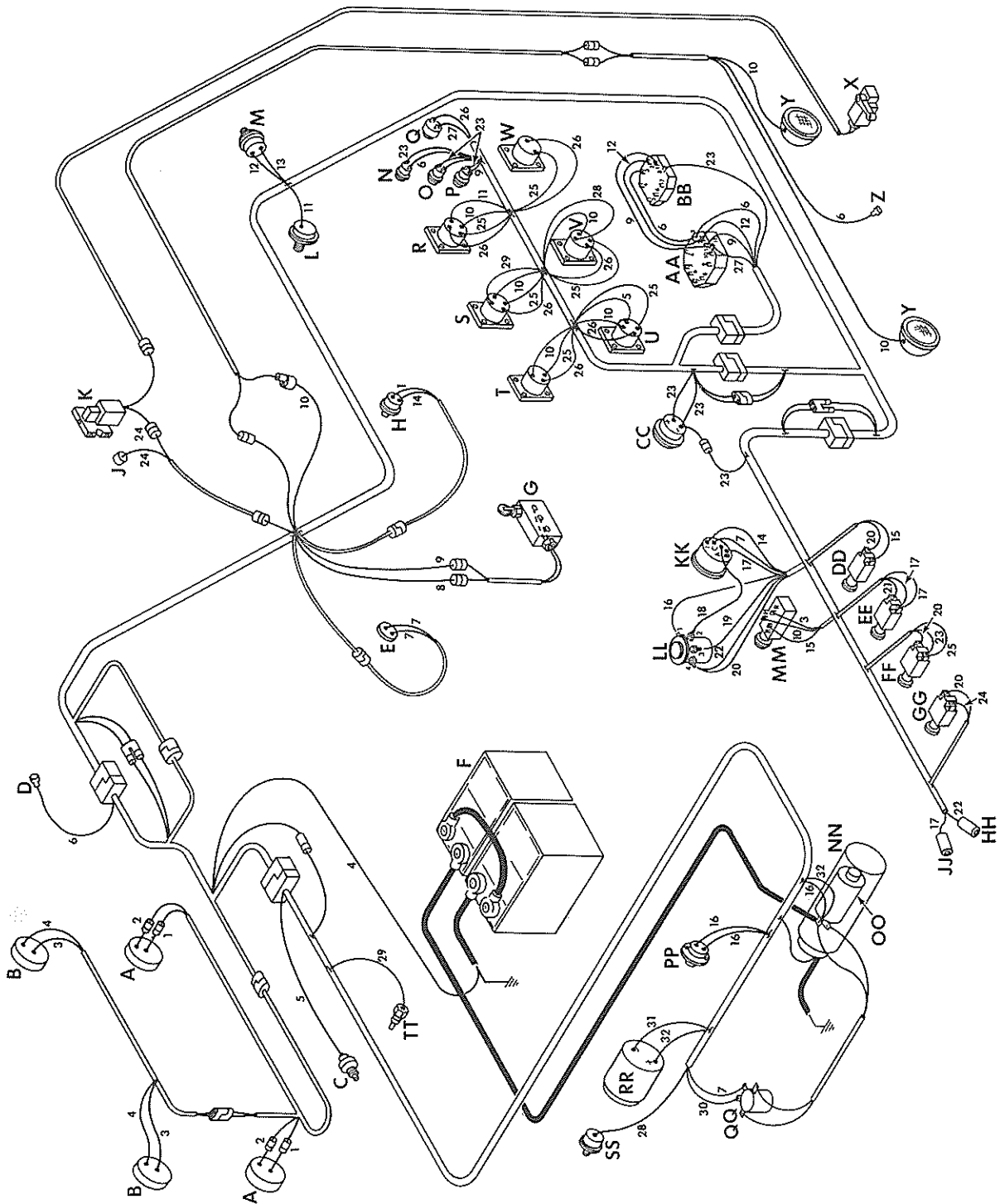
Ref. No.	Color	Color Code
1.	Tan	Stop Lights to Brake Light Switch
2.	Yellow	Tail Lights to Instrument Panel Plug (Joins Pink)
3.	Dark Blue	Rear Flood Lamps to Light Switch
4.	Black	Rear Flood Lamps to Ground
5.	Grey	Converter Temp. Sender to Converter Temp. Gauge
6.	White, Green & Brown	Front & Rear Power Clusters to Diode Blocks to Brake Oil Press. Warning Light
7.	White	Ignition Switch to Neutral Start Switch to Solenoid
8.	Black	Parking Brake Switch to Ground
9.	Black & White	Parking Brake Switch to Diode Blocks to Parking Brake Warning Light
10.	Pink	Light Switch to Front Flood Lamps and Gauges
11.	White, Green & Yellow	Air Press. Sender to Air Press. Gauge
12.	Light Green	Low Air Press. Sender to Diode Blocks to Low Air Press. Warning Light
13.	Black	Low Air Press. Sender to Ground
14.	Red & White	Ignition Switch to Brake Light Switch & Fuel Solenoid
15.	Violet	10 Amp. Circuit Breaker to Light Switch
16.	Red #6	Starter Bat. Terminal to 60 Amp. Circuit Breaker to Ignition Solenoid
17.	Red	5 Amp. Circuit Breaker to Ignition Switch & Dome Light
18.	Red & White #14	Ignition Solenoid to Ignition Switch
19.	Black #6	Ignition Solenoid to Ground
20.	Red & White #14	Ignition Solenoid to 10 Amp. Circuit Breaker, to 2 Amp. Circuit Breaker to 1 Amp. Circuit Breaker
21.	Red & White	5 Amp. Circuit Breaker from Red #6 (Joins at Instrument Panel Plug)
22.	Red & White #10	Ignition Solenoid to Cab Feed Connector
23.	Purple	2 Amp. Circuit Breaker to Diode Block, Buzzer & Warning Lights
24.	Pink & Black	1 Amp. Circuit Breaker to Boom Kickout & Bucket Leveler Solenoids
25.	Orange & Green	2 Amp. Circuit Breaker to Gauges & Hourmeter
26.	Black	Gauges, Hourmeter & Test Switch to Ground
27.	Orange & Black	Test Switch to Diode Blocks
28.	Dark Green	Engine Oil Press. Sender to Engine Oil Press. Gauge
29.	Brown	Engine Temp. Sender to Engine Temp. Gauge
30.	Black	Solenoid to Ground

**75B Cummins**

A — Tail & Stop Lights  
 B — Rear Flood Lamps  
 C — Converter Temp. Sender  
 D — Rear Brake Power Cluster Plug  
 E — Neutral Start Switch  
 F — Batteries  
 G — Parking Brake Switch  
 H — Brake Light Switch  
 J — Boom Kickout Solenoid Plug  
 K — Bucket Leveler Solenoid  
 L — Air Press. Sender  
 M — Low Air Press. Switch  
 N — Brake Oil Press. Warning Light  
 O — Low Air Press. Warning Light  
 P — Parking Brake Warning Light

Q — Test Switch  
 R — Air Press. Gauge  
 S — Engine Temp. Gauge  
 T — Voltmeter  
 U — Converter Temp. Gauge  
 V — Engine Oil Press. Gauge  
 W — Hourmeter  
 X — Bucket Leveler Limit Switch  
 Y — Front Flood Lamps  
 Z — Front Brake Power Cluster Plug  
 AA — Diode Block  
 BB — Diode Block  
 CC — Buzzer  
 DD — 10 Amp. Circuit Breaker  
 EE — 5 Amp. Circuit Breaker

FF — 2 Amp. Circuit Breaker  
 GG — 1 Amp. Circuit Breaker  
 HH — Cab Feed Connector  
 JJ — Dome Light Connector  
 KK — Ignition Switch  
 LL — Ignition Solenoid  
 MM — Light Switch  
 NN — Starter  
 OO — Starter Solenoid  
 PP — 60 Amp. Circuit Breaker  
 QQ — Solenoid  
 RR — Alternator  
 SS — Engine Temp. Sender  
 TT — Engine Oil Press. Sender  
 UU — Fuel Solenoid



WIRING DIAGRAM — G.M.

## COLOR CODE REFERENCE CHART FOR USE WITH TS-20155

Ref. No.	Color	Color Code
1.	Tan	Stop Lights to Brake Light Switch
2.	Yellow	Tail Lights to Instrument Panel Plug (Joins Pink)
3.	Dark Blue	Rear Flood Lamps to Light Switch
4.	Black	Rear Flood Lamps to Ground
5.	Gray	Converter Temp. Sender to Converter Temp. Gauge
6.	White, Green & Brown	Front & Rear Power Clusters to Diode Blocks to Brake Oil Press. Warning Light
7.	White	Ignition Switch to Neutral Start Switch to Solenoid
8.	Black	Parking Brake Switch to Ground
9.	Black & White	Parking Brake Switch to Diode Blocks to Parking Brake Warning Light
10.	Pink	Light Switch to Front Flood Lamps and Gauges
11.	White, Green & Yellow	Air Press. Sender to Air Press. Gauge
12.	Light Green	Low Air Press. Sender to Diode Blocks to Low Air Press. Warning Light
13.	Black	Low Air Press. Sender to Ground
14.	Red & White	Ignition Switch to Brake Light Switch
15.	Violet	10 Amp. Circuit Breaker to Light Switch
16.	Red #6	Starter Bat. Terminal to 60 Amp. Circuit Breaker to Ignition Solenoid
17.	Red	5 Amp. Circuit Breaker to Ignition Switch & Dome Light
18.	Red & White #14	Ignition Solenoid to Ignition Switch
19.	Black #6	Ignition Solenoid to Ground
20.	Red & White #14	Ignition Solenoid to 10 Amp. Circuit Breaker, to 2 Amp. Circuit Breaker to 1 Amp. Circuit Breaker
21.	Red & White	5 Amp. Circuit Breaker from Red #6 (Joins at Instrument Panel Plug)
22.	Red & White #10	Ignition Solenoid to Cab Feed Connector
23.	Purple	2 Amp. Circuit Breaker to Diode Block, Buzzer & Warning Lights
24.	Pink & Black	1 Amp. Circuit Breaker to Boom Kickout & Bucket Leveler Solenoids
25.	Orange & Green	2 Amp. Circuit Breaker to Gauges & Hourmeter
26.	Black	Gauges, Hourmeter & Test Switch to Ground
27.	Orange & Black	Test Switch to Diode Blocks
28.	Dark Green	Engine Oil Press. Sender to Engine Oil Press. Gauge
29.	Brown	Engine Temp. Sender to Engine Temp. Gauge
30.	Black	Solenoid to Ground
31.	Black	Alternator to Ground
32.	Red #6	Alternator to Starter Battery Terminal

## 75B G.M.

A — Tail & Stop Lights  
 B — Rear Flood Lamps  
 C — Converter Temp. Sender  
 D — Rear Brake Power Cluster Plug  
 E — Neutral Start Switch  
 F — Batteries  
 G — Parking Brake Switch  
 H — Brake Light Switch  
 J — Boom Kickout Solenoid Plug  
 K — Bucket Leveler Solenoid  
 L — Air Press. Sender  
 M — Low Air Press. Switch  
 N — Brake Oil Press. Warning Light  
 O — Low Air Press. Warning Light  
 P — Parking Brake Warning Light

Q — Test Switch  
 R — Air Press. Gauge  
 S — Engine Temp. Gauge  
 T — Voltmeter  
 U — Converter Temp. Gauge  
 V — Engine Oil Press. Gauge  
 W — Hourmeter  
 X — Bucket Leveler Limit Switch  
 Y — Front Flood Lamps  
 Z — Front Brake Power Cluster Plug  
 AA — Diode Block  
 BB — Diode Block  
 CC — Buzzer  
 DD — 10 Amp. Circuit Breaker  
 EE — 5 Amp. Circuit Breaker

FF — 2 Amp. Circuit Breaker  
 GG — 1 Amp. Circuit Breaker  
 HH — Cab Feed Connector  
 JJ — Dome Light Connector  
 KK — Ignition Switch  
 LL — Ignition Solenoid  
 MM — Light Switch  
 NN — Starter  
 OO — Starter Solenoid  
 PP — 60 Amp. Circuit Breaker  
 QQ — Solenoid  
 RR — Alternator  
 SS — Engine Temp. Sender  
 TT — Engine Oil Press. Sender



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**CLARK**

**≡≡≡ OPERATORS MANUAL SUPPLEMENT ≡≡≡**

**No. 3216**

**MODEL 75B  
TRACTOR SHOVEL**

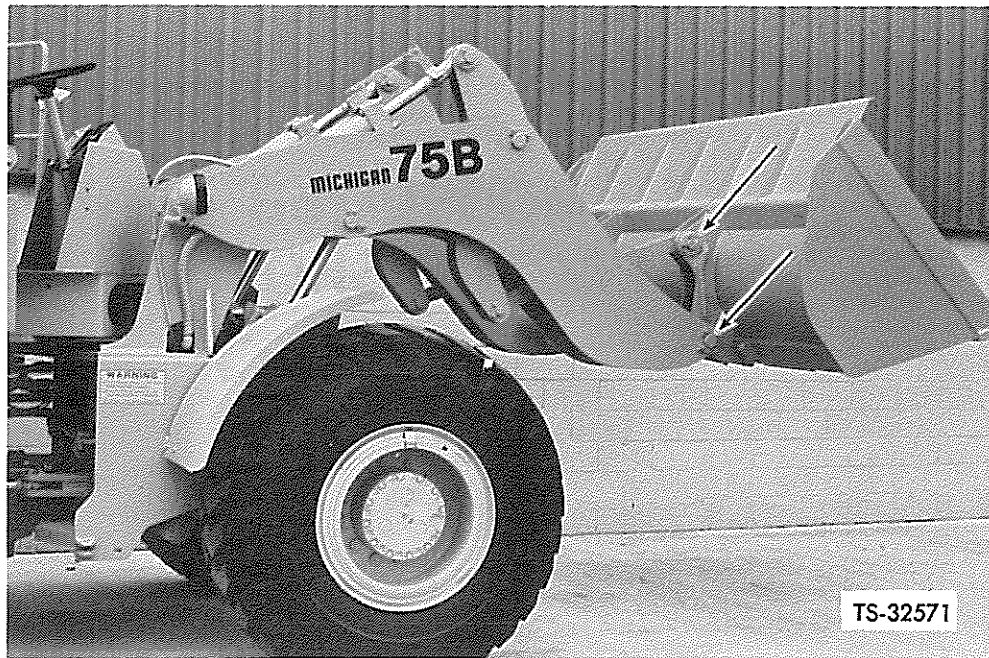
**SERIAL NUMBER**

**Cummins — 443D**

**G.M. — 447D**

**Use this Supplement with Operators Manual No. 2944-RI  
and existing supplements**

**EVERY 100 OPERATING HOURS  
ADD LUBRICANT TO BUCKET PINS AND BUSHINGS  
TWO FITTINGS EACH SIDE**



# CLARK

## OPERATORS MANUAL SUPPLEMENT

No. 3219

This Supplement Voids OMS 2991 and OMS 3205.

SUBJECT: Service Interval for Main Hydraulic System.

Applicable to: All models of tractor shovels and dozers.

**First filter change for all new machines: Replace the filter assembly after the first 50 Hours of operation.**

Service Interval for Machines with 15 Micron Filter Assemblies:  
Replace filter assembly every 250 hours. Drain, clean and refill the main hydraulic system every 1000 operating hours.

**Service Interval for Machines with 10 Micron filter Assemblies:**  
**Replace filter assembly every 500 hours. Drain, clean and refill the main hydraulic system every 2000 operating hours.\***

\*NOTE: The oil change interval may be more than 2000 operating hours if indicated by analysis of a regular oil sampling program conducted by a reputable oil company or an independent laboratory.

The 10 micron return filter assemblies were installed on machines shipped from the factory with the following serial numbers:

55B — 433B585FSC & after, 433B801CAC & after, 416C245FSC & after, and 416C1086CAC & after.

75B — 447C115CB & after, 447C112FSC & after, 447C277CAC & after, 443C113CB & after, 443C160FSC & after, and 443C166CAC & after.

125B — 441B335CB & after, 441B101FSC & after, 441266CAC & after, 439B322CB & after, 439B171FSC & after, and 439B195CAC & after.

175B — 438C316C & after, 438C156FSC & after, 438C256CAC & after, 427C308C & after, 427C115FSC & after, and 427C236CAC & after.

275B — 425C514C & after, 425C223FSC & after, and 425C521CAC & after.

475B — 421H224C & after, and 421J128CAC & after.

675B — All.

280-III A — 460C143C & after, 460B117FSC & after, and 546B174C & after.

380-III A — 434B112K & after, and 418E128K & after.

## IDENTIFICATION OF FILTER ASSEMBLIES:

You can identify a 10 micron filter assembly (Part Number 2515079) from a 15 micron filter assembly (Part Number 1530600). See Figure 1 for identification.

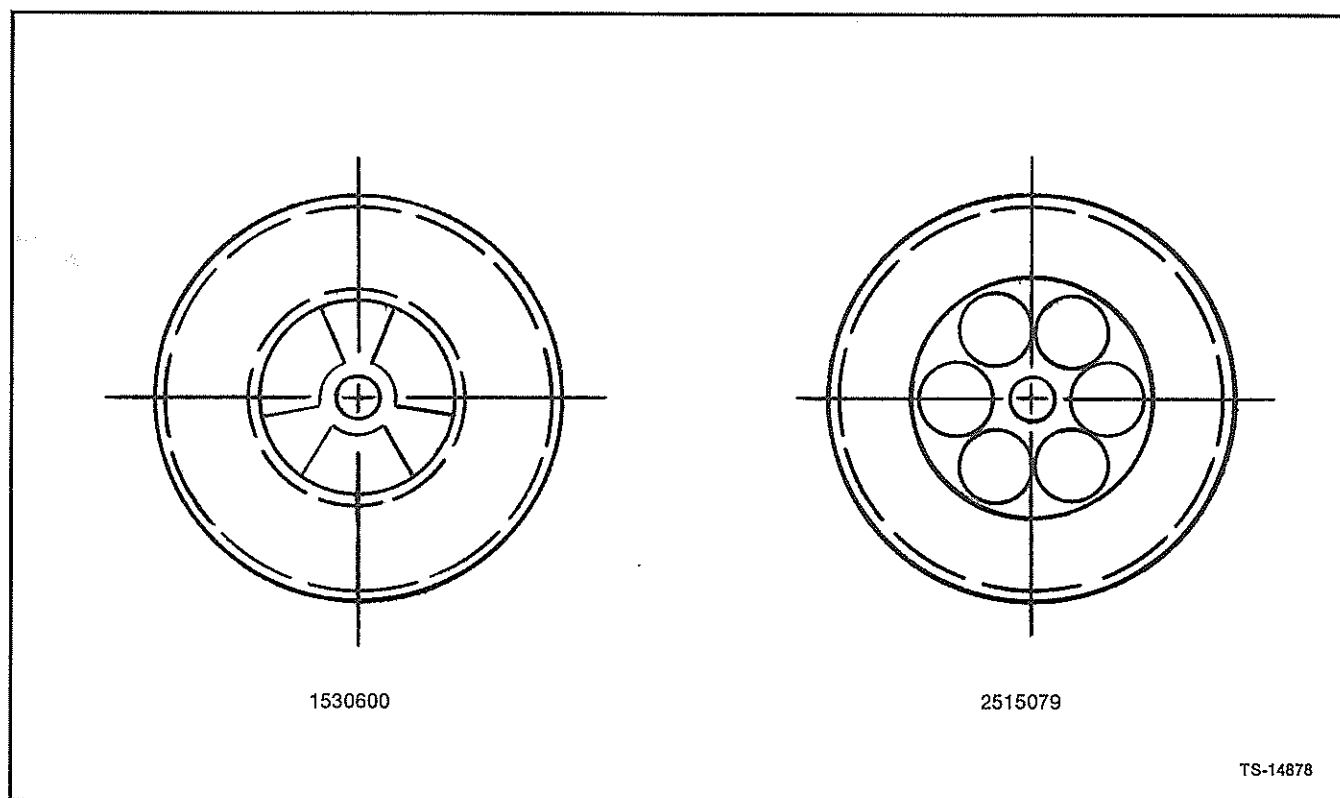


Figure 1. End View of Filter Assembly

Refer to CLARK MICHIGAN Service Gram SG-750 for information on installing the 10 micron filter on machines prior to the above serial numbers.