1500/1800/2000 Cruz Crane

Service Manual

S406169M3

CASE

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Look for this symbol which points out important safety precautions.
It means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

Never smoke while refuelling, servicing the fuel system, or working with batteries.

Always use a non-flammable solvent for cleaning component parts. Avoid gasoline or other flammable substances.

Storage batteries give off highly explosive hydrogen gas when being charged. Keep them away from sparks and open flames.

If battery electrolyte contacts skin or clothing, flush immediately and thoroughly with water.

Whenever servicing the machine, always tag mark the ignition switch to alert other operators and prevent accidental start-ups.

Keep hands, feet and loose clothing away from fan belts, fans, pulleys and drive shafts when engine is running.

Keep working area as clean as possible at all times. To prevent slips and falls, wipe up oil spills immediately.

When working on the hydraulic system or air system, be sure to relieve all pressure in the lines by working the controls back and forth several times before removing component.

Always deflate tires before removing them from the machine for servicing. Tires can come apart with an explosive force if not handled properly.

When servicing the cooling system, be sure to relieve pressure in the system by carefully turning the radiator cap to its first position before removing it completely.

When removing major components such as the boom or turntable, ensure that they are properly slung and adequately secured.

Never remove any part of the swing mechanism before adequately blocking the turntable to prevent it from swinging.

THINK SAFETY FIRST!

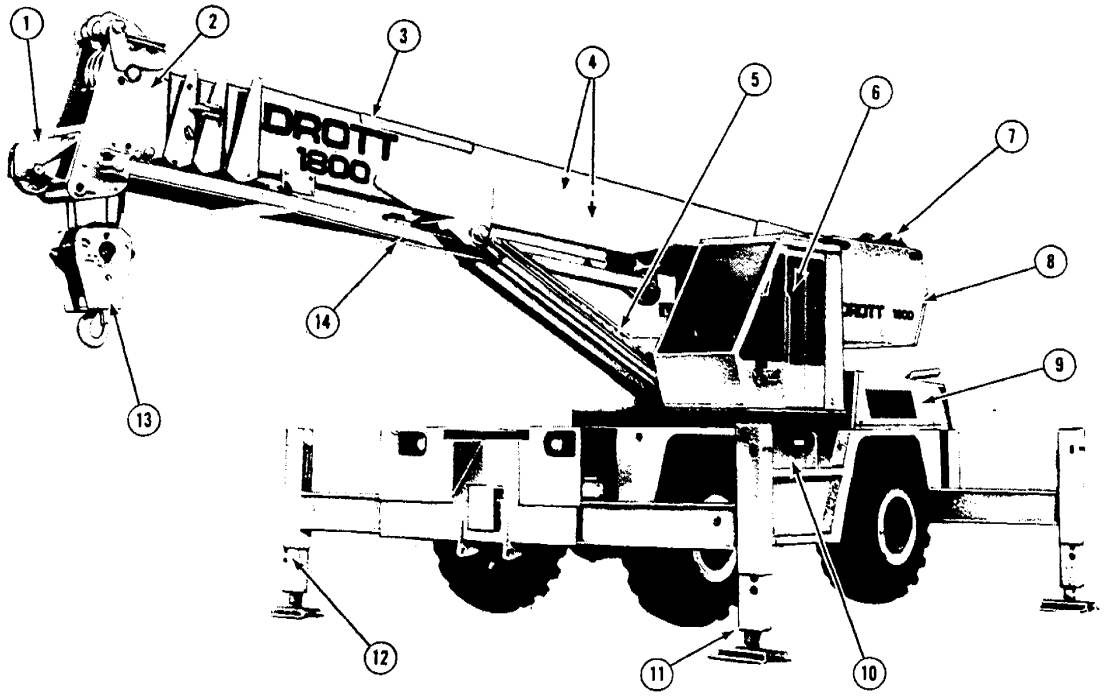


Figure 1. Nomenclature

NOMENCLATURE

1. AUXILIARY HEAD
2. BOOM HEAD
3. BOOM (Retracted)
4. CROWD CYLINDERS LOCATION
5. HOIST CYLINDERS
6. OPERATOR'S CAB
7. WINCH LOCATION
8. COUNTERWEIGHT LOCATION
9. ENGINE COMPARTMENT
10. HYDRAULIC RESERVOIR LOCATION (Fuel Tank on Opposite Side)
11. OUTRIGGER
12. OUTRIGGER PIN
13. HOOK BLOCK
14. A-FRAME JIB (Stowed Position)

INTRODUCTION

This manual is intended to serve as a guide in maintaining and servicing the DROTT 1500/1800 CRUZ-CRANE. All components, circuits and functions are thoroughly covered, with the exception of the engine and winches. In these cases, the reader is referred back to the Manufacturer's Manual included with each machine.

A separate section entitled "Scheduled Preventive Maintenance" is provided to cover all components which require periodic maintenance. Refer to this section whenever performing normal maintenance. It includes a Maintenance Schedule, Component Capacities and Lube Charts for easy reference. If more detailed information is desired, refer to the sections on Servicing the various systems.

For easier troubleshooting, the machine is divided into four general systems -- Mechanical, Air, Electrical and Hydraulic. Each system and each component is explained to provide the understanding necessary for good troubleshooting. Troubleshooting Charts are used extensively to provide the serviceman with a quick and easy reference.

Disassembly and Repair procedures for individual system components are found near the end of each section. Written instructions are supplemented with exploded view drawings, and with photographs and artwork wherever it is deemed essential in explaining critical steps.

Torque Charts and schematic drawings of the Air, Electrical and Hydraulic systems are located in the back of this manual for convenience while troubleshooting and servicing the unit.

DIRECTIONAL REFERENCE

The turntable on the CRUZ-CRANE will rotate through a complete 360 degrees. The normal driving and working position is with the Boom over the front of the chassis, as shown in Figure 2. In this position, directional callouts for both the Turntable and Chassis are the same. All references to Front, Rear, Right and Left will be made with respect to this position.

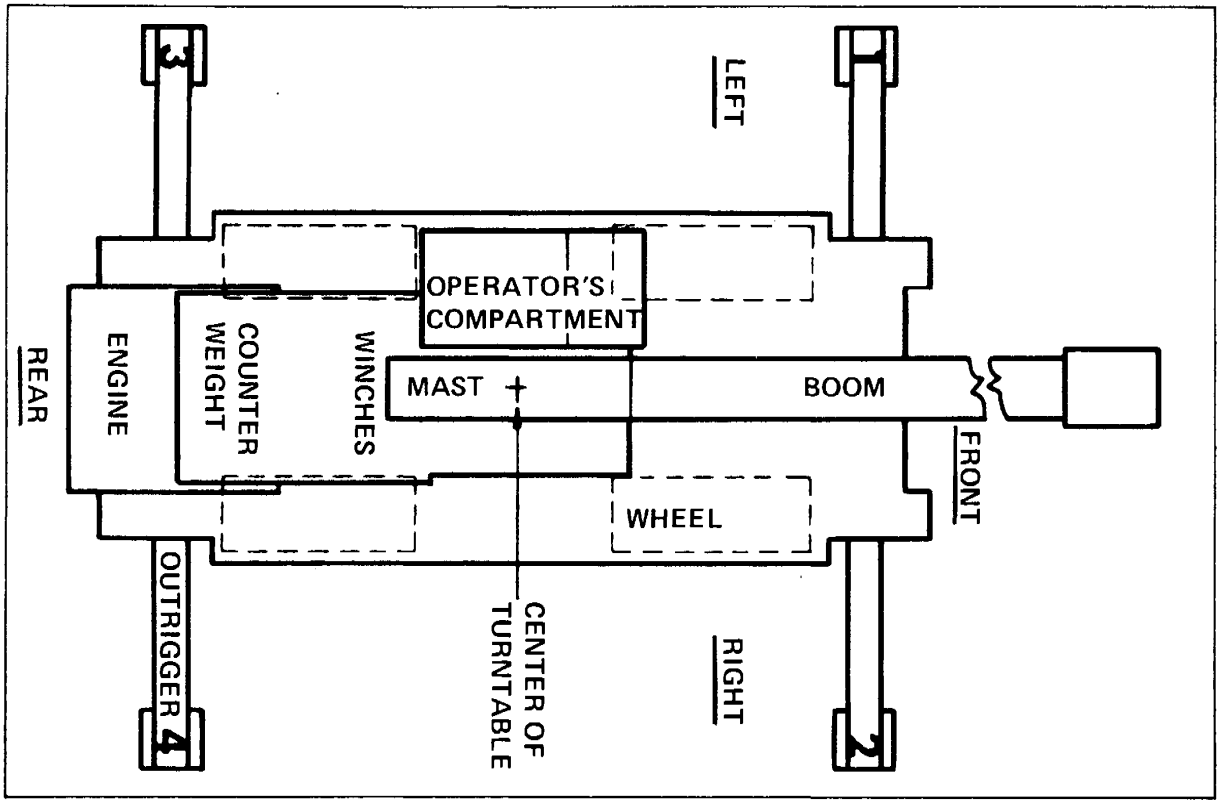


Figure 2. Directional Reference

PARTS AND SERVICE

When writing to the dealer or manufacturer about your DROTT machine, always refer to the model and P I N (Product Identification Number) as well as the part name and location. The P I N Plate is located on the lower left front side of the Operator's Cab.

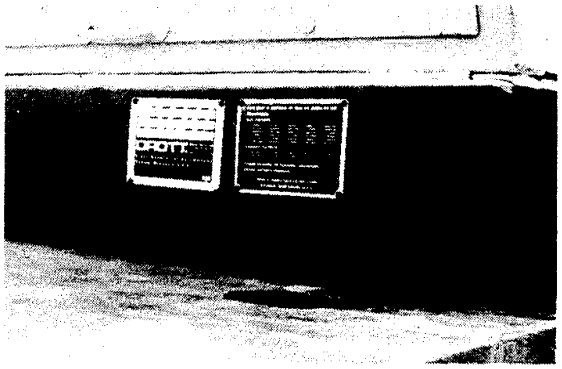


Figure 3. Identification Plate

SECTION 1

SCHEDULED PREVENTIVE MAINTENANCE

INTRODUCTION

Scheduled preventive maintenance is essential to keeping the CRUZ-CRANE in top operating condition. Decide from the start upon a maintenance schedule that will best suit your particular needs. The type of work being done, the size of loads, and ground and weather conditions should all be taken into consideration when establishing a schedule.

Use the engine hourmeter along with a calendar and checklist to ensure that all recommended maintenance is performed at the prescribed intervals.

Our recommendations are based upon average operating conditions, and should be considered as the MINIMUM maintenance requirements of the CRUZ-CRANE.

Depart from the recommended intervals only when conditions warrant shortening them, or when changes in ambient temperature require it. The recommended intervals should be shortened whenever the machine is operated under extreme conditions, such as on a dusty job site, in extreme heat or cold, under intermittent operation or extremely heavy loads.

LUBRICANT AND FLUID RECOMMENDATIONS

LUBRICANTS

It is not the policy of DROTT to publish lists of approved lubricants or to guarantee lubricant performance. The responsibility for the quality of any lubricant rests solely with the distributor or manufacturer of the lubricant.

In various paragraphs of this manual, you will find the statement "Use (lubricant brand name) or functional equivalent". This statement does not constitute an unconditional guarantee of the performance of the brand of oil mentioned; it is intended only as a guide as to the type of lubricant recommended for a given application.

HYDRAULIC OIL RECOMMENDATIONS

DROTT DHF Fluid is recommended for year-round use in the hydraulic system; or as an alternate, use SAE 10W (system temperatures 0^{o} to 180^{o} F. -18^{o} to 82^{o} C.), SAE 20-20W (system temperatures 50^{o} to 210^{o} F. or 10^{o} to 99^{o} C.), and SAE 5W or SAE 5W-20 (arctic conditions).

Viscosity: The viscosity of the oil at starting should not exceed 4000 SSU or drop below 60 SSU for sustained high temperature operation. The optimum operating conditions are between 80 SSU and 180 SSU. The viscosity index should not be less than 90 (for this service).

COMPONENT CAPACITIES

Item	Lubricants/Fluid	Capacity
Engine Crankcase	See Engine Manufacturer's Manual	
Engine Cooling System	½ ethylene glycol base anti-freeze, ½ water	8½ gallons - (32 litres)
Fuel Tank	Diesel Fuel	50 gallons - (189 litres)
Transmission Torque Converter	DROTT DHF or Type "A" Trans. Fluid	8½ gallons - (32 litres)
Differentials	EP 80-90 gearlube	4½ gallons - (17 litres)
Planetary Hub	EP 80-90 gearlube	1 gallon ea. - (3.8 litres)
Master Brake Cylinder	Type "A" Brake Fluid - must meet or exceed SAE spec J-1703E	Approx. 1 pint (.47 litres)
Accelerator Master Cylinder		
Swing Gearbox	SAE 30W oil	11 pints - (6.5 litres)
Turntable Open Gear	Spray-on open gear lubricant such as Mobiltac E, Texaco Crater Compound or functional equivalent	Apply liberal amount - Rotate turntable so pinion helps spread lube
Complete Hydraulic System	DROTT DHF Fluid or alternate (See page 7)	95 gallons - (360 litres)
Hydraulic Reservoir		70 gallons - (265 litres)
Boom Sections	STP or functional equivalent	
Gearmatic Model 23 Winch Final Drive Assembly	SAE 90 Gearlube	3½ pints - (1.7 litres)
Braden Model PD 10-75 Winch	SAE 90 Gearlube	5½ pints (2.5 litres)

TIRE PRESSURES

Tire Size	Roading the Crane	Driving Over Rough Terrain	Working on Rubber (Maximum Pressure)
16:00 x 24 16 ply	55 psi (380 kPa)	65 psi (450 kPa)	80 psi (550 kPa)
20.5 x 25 20 ply	55 psi (380 kPa)	65 psi (450 kPa)	80 psi (550 kPa)

NOTE: For overall use of the Crane, roading pressure is recommended. If pressures are increased for other working conditions, they must be reduced to roading pressure prior to roading the Crane.

HYDRAULIC SYSTEM OPERATING PRESSURES

VALVE/CIRCUIT	PRESSURE SETTING
Main Reliefs	2500 psi (17 200 kPa)
Steering System Relief	2000 psi (13 800 kPa)
Swing Port Reliefs	2050 psi (14 100 kPa)
Swing Cushion Relief	1900 psi (13 100 kPa)
Hoist (thru Main Relief)	2500 psi (17 200 kPa)
Winch (thru Main Relief)	2500 psi (17 200 kPa)

VALVE/CIRCUIT	PRESSURE SETTING
Outriggers (thru Main Relief)	2500 psi (17 200 kPa)
Crowd (thru Main Relief)	2500 psi (17 200 kPa)
Hoist Counterbalance	400 psi (2800 kPa)
Crowd Counterbalance	400 psi (2800 kPa)
Braden Winch Counterbalance	250 psi (1700 kPa)
Braden Winch Brake	180 psi (1200 kPa)

NOTE: Counterbalance Valve Settings (cracking pressures) are listed for reference purposes only. Do NOT adjust these valves. For adjustment procedures: Main Relief, see page 134; Port Reliefs, see page 148; Steering Relief, see page 142; Swing Cushion, see page 147.

ENGINE CONVERTER STALL CHART

Engine	Low Idle	High Idle	Governed RPM	Stall RPM
Case 504 BD	725-775	2330-2380	2200	2000
DD 4-71 'N'	600	2450-2475	2400	2000

PREVENTIVE MAINTENANCE SCHEDULE

DAILY OR EVERY 10 HOURS

Hydraulic Reservoir	Check fluid level and fill
Outriggers	Clean dirt from channels
Tires	Check for proper inflation and inflate
Fuel Tank	Fill at end of shift to prevent condensation
Engine	Check oil and coolant
Operator's Cab	Clean
Air Reservoir	Drain moisture and oil buildup
Turntable Open Gear	Lubricate with spray-on gear lube

WEEKLY OR EVERY 50 HOURS

Planetary Wheel Hubs	Check oil level and fill
Batteries	Check electrolyte level and fill
Differentials	Check oil level and fill
Fuel Tank	Clean breather
Transmission, Torque Converter	Check fluid level and fill
Engine Air Cleaner	Remove dust from collector
Radiator	Check radiator fins for obstructions, coolant specific gravity
Swing Gearbox	Check oil level and fill
Accelerator and Brake Master Cylinder	Check fluid level and fill
General Machine Lubrication	Use Lithium Base EP No. 2 Bearing grease or functional equivalent

EVERY 2 WEEKS OR EVERY 100 HOURS

Engine Air Cleaner	Remove and clean or replace
Air Compressor Strainer	Remove and clean or replace

MONTHLY OR EVERY 250 HOURS

Turntable Capscrews	Retorque
Transmission/Torque Converter	Replace Filter
Swing Brake	Adjust
Service Brake Control Valve	Lubricate lever roller and roller pin with light engine oil

EVERY 2 MONTHS or 500 HOURS

In-Line Hydraulic Filters	Replace paper elements, clean screen-type elements
Engine Air Cleaner	Replace element
Hydraulic Reservoir Breather	Replace element
Air Compressor Filter	Replace element
Transmission/Torque Converter	Drain and refill
BRADEN PD10-75 Winches	Drain, flush with kerosene, and refill after first 2 months. Drain and refill every 6 months thereafter.
Center Swivel Base	Lubricate

SEMIANNUALLY OR EVERY 1500 HOURS

Planetary Wheel Hubs	Drain and refill, clean breather
Battery	Clean connections
Hydraulic Reservoir	Drain and refill; clean breather
Hydraulic Reservoir Screen Filter	Clean
Differentials	Drain and refill, clean breathers
Steering Knuckles	Disassemble, clean and repack
Swing Gearbox	Drain and refill, clean breather

ANNUALLY

GEARMATIC Winch Final Drive Assembly	Drain, inspect and refill
Air Compressor	Disassemble, clean and inspect cylinder head and components

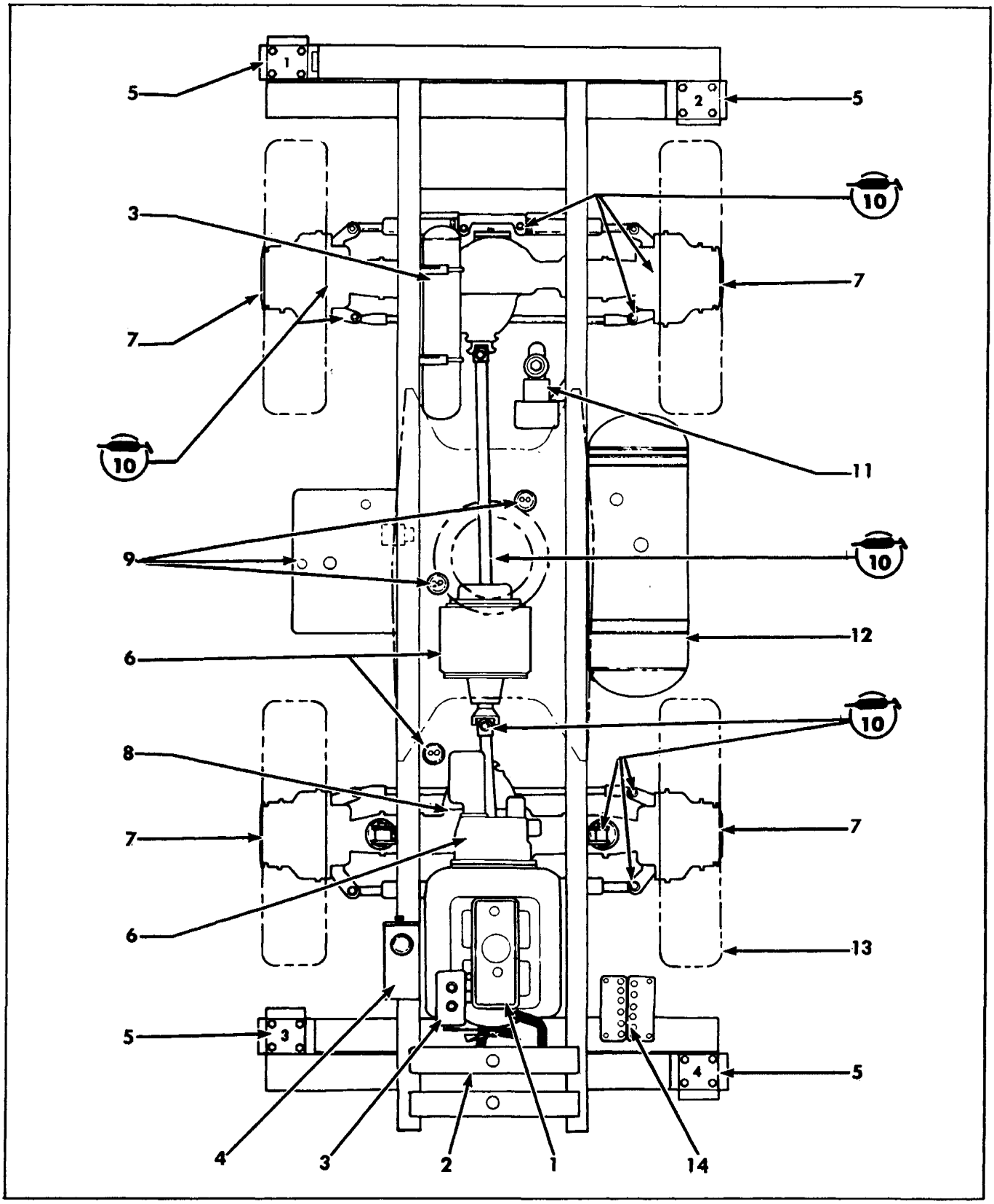


Figure 4. Service Points on Lower Structure

SERVICE CHART

1. ENGINE - See Engine Manual.

2. RADIATOR and COOLING SYSTEM - (daily or 10 hours) - Check coolant level and fill. Drain and flush system twice annually. (See page 14).

3. AIR COMPRESSOR and AIR TANK - (Daily or 10 hours) - Drain moisture and oil buildup. Clean or replace air compressor strainer every two weeks or 100 hours. (See page 94).

4. AIR CLEANER - (Weekly or 50 hours) - Remove dust from rubber dust collector tube. Remove and clean or replace element every two weeks or 100 hours. (See page 15).

5. OUTRIGGERS - (Daily) - Clean mud and dirt from channels.

6. TORQUE CONVERTER - TRANSMISSION - (Weekly or 50 hours) - Check fluid level and fill. Replace filter monthly or 250 hours. Drain and refill system every two months. (See page 22).

7. PLANETARY HUBS - (Weekly or 50 hours) - Check oil level and fill. Drain and refill semi-annually or 1500 hours. (See page 27).

8. DIFFERENTIALS - (Weekly or 50 Hours) - Check oil level and fill. Clean breather. Drain and refill unit semi-annually. (See page 27).

9. HYDRAULIC RESERVOIR and FILTERS - (Daily) - Check fluid level and fill. Clean breather and screen filters and replace paper filter every two months or 500 hours. Drain and refill system semi-annually. (See page 128).

10. PRESSURE GUN FITTINGS - (Weekly or 50 hours) - Use Lithium Base EP No. 2 bearing grease or functional equivalent. (See Pictorial Listing on page 12).

11. BRAKE MASTER CYLINDER - (Weekly or 50 hours) - Check fluid level and fill. (See page 96).

12. FUEL TANK - (Daily) - Fill at end of shift to prevent condensation. - (See Engine Manual).

13. TIRES - (Daily) - Check pressures. See page 8. For overall use, roading pressure is recommended.

14. BATTERIES - (Weekly or 50 hours) - Check electrolyte level and fill. Clean post periodically. (See page 114).

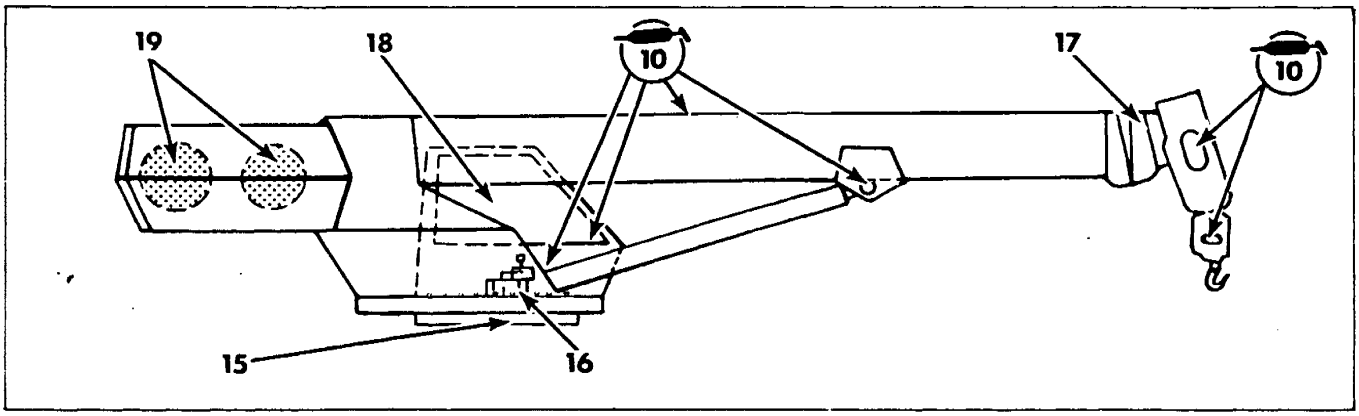


Figure 5. Service Points on Upper Structure

15. TURNTABLE BEARING - (Weekly or 50 hours) - Lube through central lube point in cab. (See page 12). Check torque on bearing capscrews once a month or 250 hours. (See page 32).

16. SWING GEARBOX and TURNTABLE OPEN GEAR - (Daily or 10 hours) - Lubricate Open Gear with spray-on lubricant. Check oil level in gearbox weekly; drain and refill semi-annually. (See page 32).

17. BOOM SLIDES - (Weekly or 50 hours) - Apply STP or functional equivalent. (See page 36).

18. ACCELERATOR MASTER CYLINDER (Weekly or 50 hours) - Check fluid level and fill (See page 17).

19. WINCHES - See page 37 and Winch Manufacturer's Manuals.

PICTORIAL LISTING OF LUBRICATION FITTINGS

Ref.	Location/Title	Quantity	Interval
A	Top of Main Boom	2	Weekly/50 hours
B	Boom Head Sheaves and Drop Block	6	Weekly/50 hours
C,D	Hoist Cylinders	2 per cyl.	Weekly/50 hours
E	Shifting Linkage above Center Swivel	2	Weekly/50 hours
F	Turntable Bearing Central Lube Point	1	Weekly/50 hours
G,H	Controls in Cab	12	Weekly/50 hours
I	Control Linkages under Cab	10	Weekly/50 hours
J	Oscillation Lockout Cylinders	2 per cyl.	Weekly/50 hours
K	Center of Rear Axle Pivot	2	Weekly/50 hours
L	Steering Cylinders	2 per cyl.	Weekly/50 hours
M	Steering Knuckles, Tie Rod Ends	6 per axle	Weekly/50 hours
N	Upper and Lower Drive Shafts	3 per shaft	Weekly/50 hours
O	Center Swivel base	2	Bi-monthly/500 hours

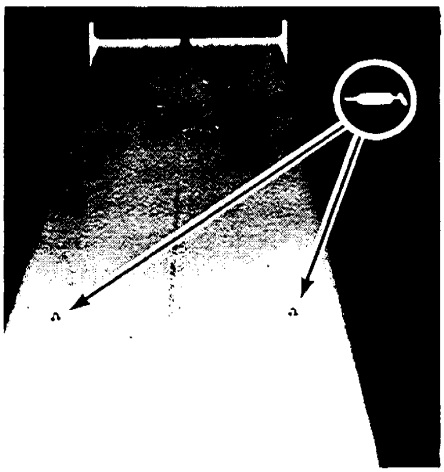
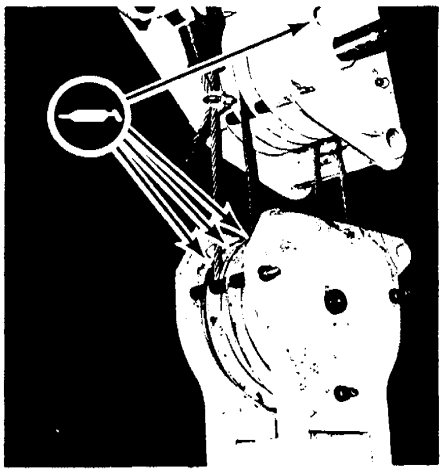


Figure A



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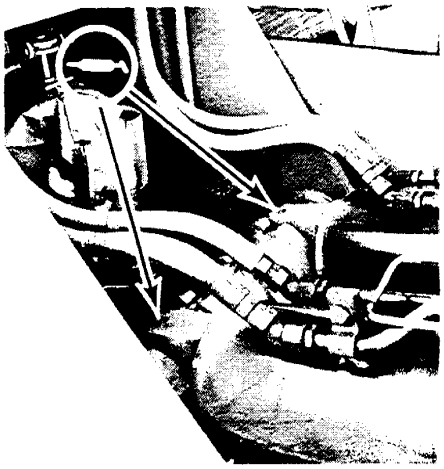

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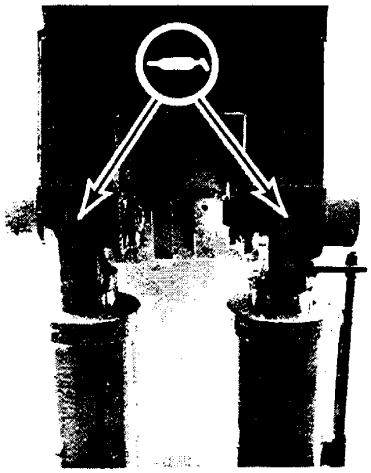

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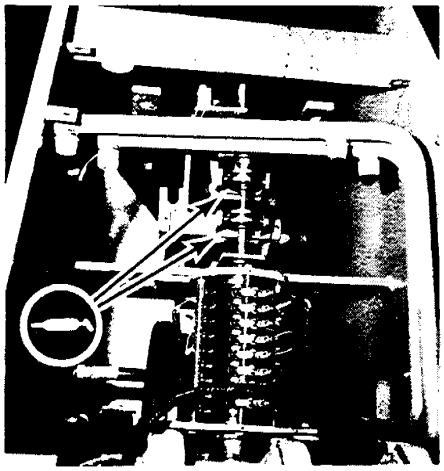

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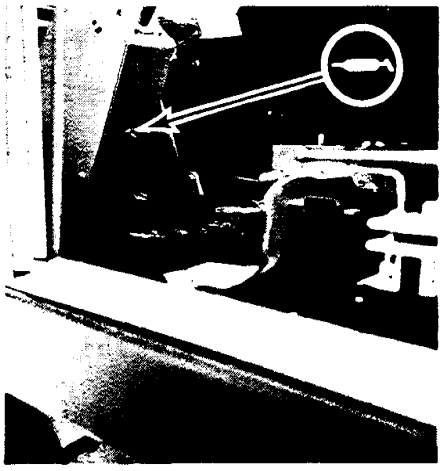


Figure F

PICTORIAL LISTING OF LUBRICATION FITTINGS

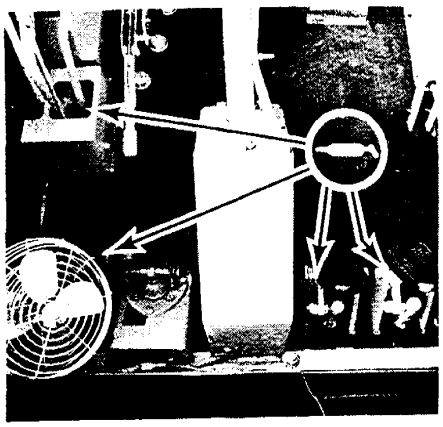
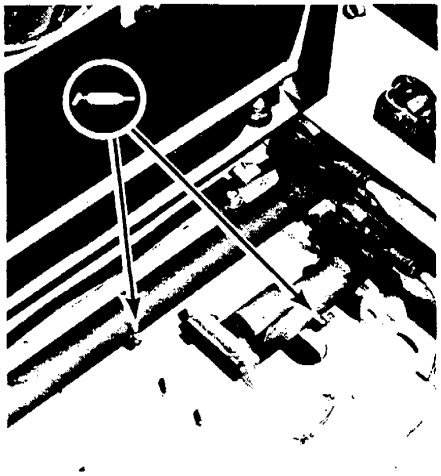


Figure G



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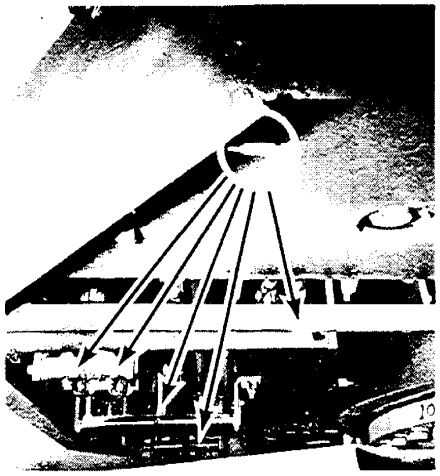
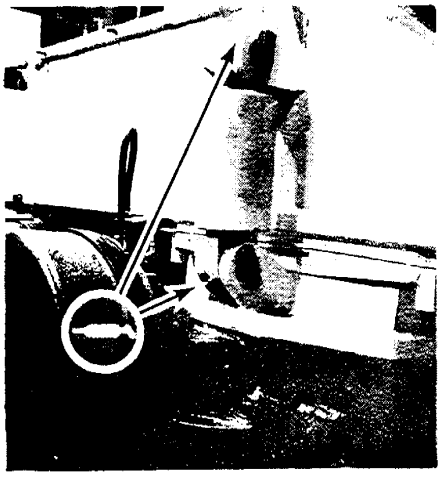


Figure I



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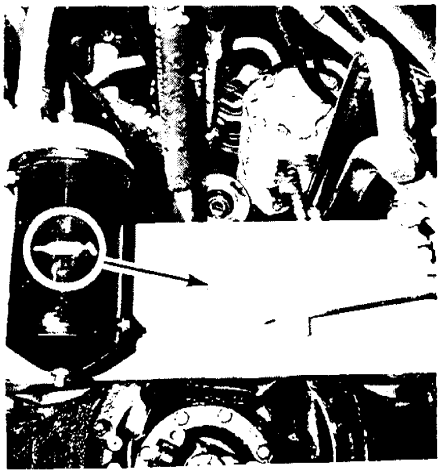
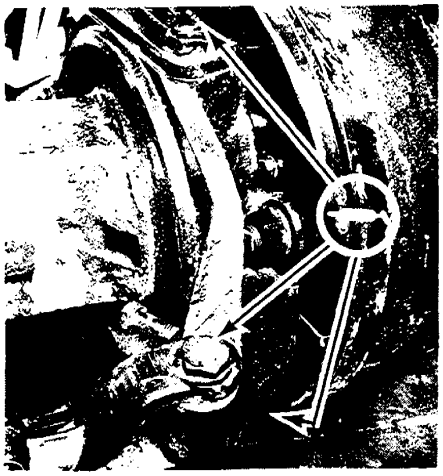


Figure K

Figure L



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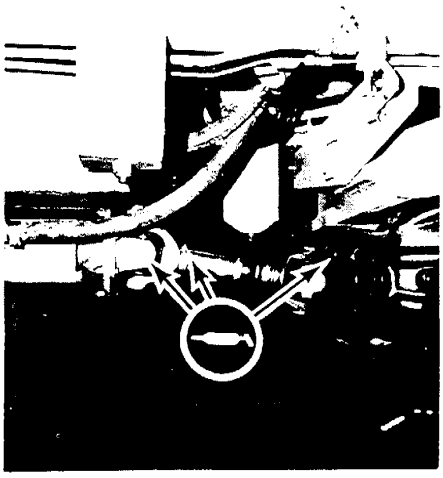

Figure N

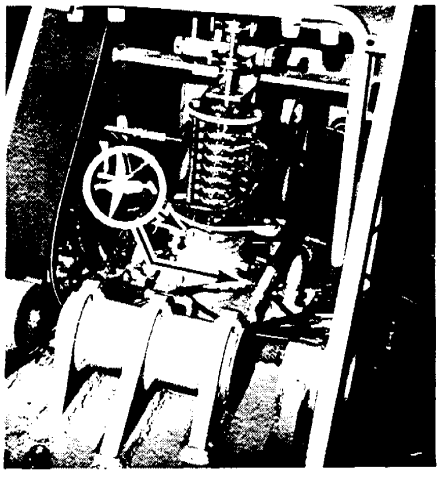

Figure O

SECTION 2
THE MECHANICAL SYSTEM

DESCRIPTION, MAINTENANCE AND TROUBLESHOOTING

INTRODUCTION

The Mechanical System includes the complete power train, the turntable bearing and swing mechanism, and those components of the lower and upper structures which are not integral parts of the air, electrical or hydraulic systems. Some of these components will be covered again in later sections, and will be only briefly discussed here.

Components Listing:

1. Engine and Related Items
2. Torque Converter, Transmission and Shifting Linkage
3. Axles and Oscillation Lockout
4. The Turntable Swing
5. Boom Group

1. Engine and Related Items

ENGINE MAINTENANCE AND SERVICE

Engine maintenance is covered in the separate engine manual which accompanies each machine. Refer to the engine manual for specifications, maintenance tune-ups and governor adjustments.

For major servicing and overhaul, contact your nearest engine distributor. The Case engine is serviced through DROTT Distributors. The GMC engine is serviced through Detroit Diesel Distributors.

ENGINE COOLING SYSTEM

To ensure correct engine operating temperatures, the entire cooling system should be inspected regularly and serviced at the prescribed intervals.

When shipped from the factory, the cooling system on the CRUZ-CRANE is filled with a permanent type antifreeze solution of 1/2 water and 1/2 ethylene glycol base. Any high boiling point type antifreeze marketed today will work equally well. However, sealant type antifreeze should be avoided.

NOTE

Antifreeze with sealer additives is not recommended for use with the Detriot Diesel engine, due to plugging problems which can develop throughout the cooling system.

Corrosion Inhibitors

A non-chromate type inhibitor is recommended for use with either water or the ethylene glycol base solution to retard rust and scale buildup within the cooling system. Borates, nitrates and nitrites are acceptable corrosion inhibitors. Do not use chromates or soluble oil as corrosion inhibitors.

All corrosion inhibitors, no matter what type being used, dissipate under normal operating conditions, and therefore should be replenished at approximately 500 hour intervals.

Scheduled Maintenance

Check coolant level in radiator daily. The coolant level should be within 2" of the top of the filler neck.

WARNING 

When checking coolant level, remove cap slowly to relieve pressure within the system.

If coolant level is consistently low, check for leaks in the radiator or connecting hoses. If no leaks are found, check for the presence of air in the system, possibly caused by a leaky head gasket.

Clean radiator fins at least once a week. Use compressed air to blow out dust accumulations and other obstacles. Check fan belts for frays and proper tension and alignment. Make sure that radiator cap and thermostats are functioning properly.

Drain and flush the cooling system twice a year, preferably Spring and Fall. Use the following procedure:

1. Open the petcock on the radiator or lower hose and allow the system to drain completely.

2. Close petcock and refill system with water.

CAUTION

If engine is still hot, refill slowly to prevent rapid cooling and distortion of engine castings.

3. Start engine and run it for approximately fifteen minutes to circulate the water throughout the system.

4. Again drain system completely.

5. Refill with recommended coolant, then run engine for several minutes to circulate the coolant. Recheck coolant level. Add if necessary.

For further information on thermostat replacement and cooling system maintenance, refer to the engine manual.

Engine Air Breather System

The air cleaner is designed to supply an adequate amount of clean air for engine operation. Loose connections, damaged hoses or a clogged filter element defeat the purpose of the air cleaner and can result in extensive wear on the engine.

Scheduled Maintenance

Remove element every two weeks or every 100 hours, and clean it as instructed below. Check dust accumulation in dust tube on air cleaner weekly or more often. Extremely dusty conditions call for shorter intervals between service. An over-abundance of dust in the collector tube indicates a need for additional service.

The air cleaner element should be replaced after five cleanings or every 500 hours, whichever occurs first. It is a good idea to keep a spare on hand to prevent the loss of time needed to clean the element.

CAUTION

The engine should never be run without an element in the air cleaner, or with the dust collector tube removed.

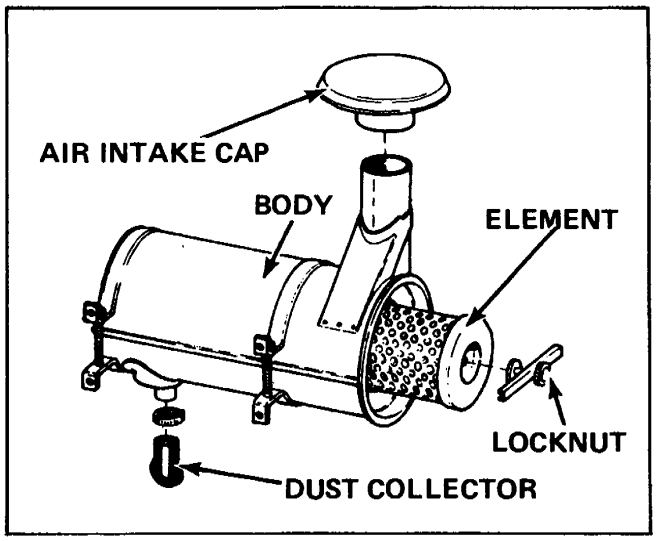

Figure 6. Engine Air Cleaner

To service the element or air cleaner:

1. Remove and wash intake umbrella, then dry with compressed air.

2. Unscrew element lock and remove filter element. Clean out inside of element housing with damp cloth.

3. Clean the element either by tapping it against the palm of your hand and blowing from inside out with compressed air, or by rinsing it in a solution of non-sudsing detergent (do not use hot water) and then shaking out excess solution and letting it dry.

NOTE

To speed drying process, it is possible to insert damp element into housing and run engine for about ten minutes (away from dust).

To test the element for weak spots, hold a lighted bulb in center of element and check for areas where light shows through with more intensity than rest of element. If spots are found in the element, replace it.

Engine Performance Check

Engine performance will affect the performance of the entire machine. Proper throttle linkage adjustment is essential to obtain the recommended range of engine rpm as shown on page 8.

Maximum governed rpm is determined by running engine at full throttle under minimum load conditions (all controls in neutral).

NOTE

The engine should be warmed to operating temperatures before any performance checks are made.

To check engine rpm, use a strob-tachometer aimed at a chalk mark on the engine crankshaft pulley. Make sure that the RED wire of the strob-tachometer is connected to the POSITIVE (+) or "hot" terminal from the battery, and the BLACK wire to the NEGATIVE (-) or "ground" terminal of the battery. Aim the timing light at chalk mark on engine crankshaft pulley, then adjust strob-tachometer until timing light "stops" chalk mark. Read tachometer.

NOTE

If throttle linkage is suspected of malfunctioning, disconnect it and work engine governor lever by hand. Check engine speeds obtained in this way against speeds obtained with throttle linkage connected.

Throttle Linkage

The throttle linkage consists basically of a master cylinder hydraulically linked to a slave cylinder. The accelerator master cylinder is located below the operators cab. A hydraulic line extends from the master cylinder down through the Center Swivel to a slave cylinder mounted on the engine. The slave cylinder in turn is connected to the governor lever which controls the engine speed.

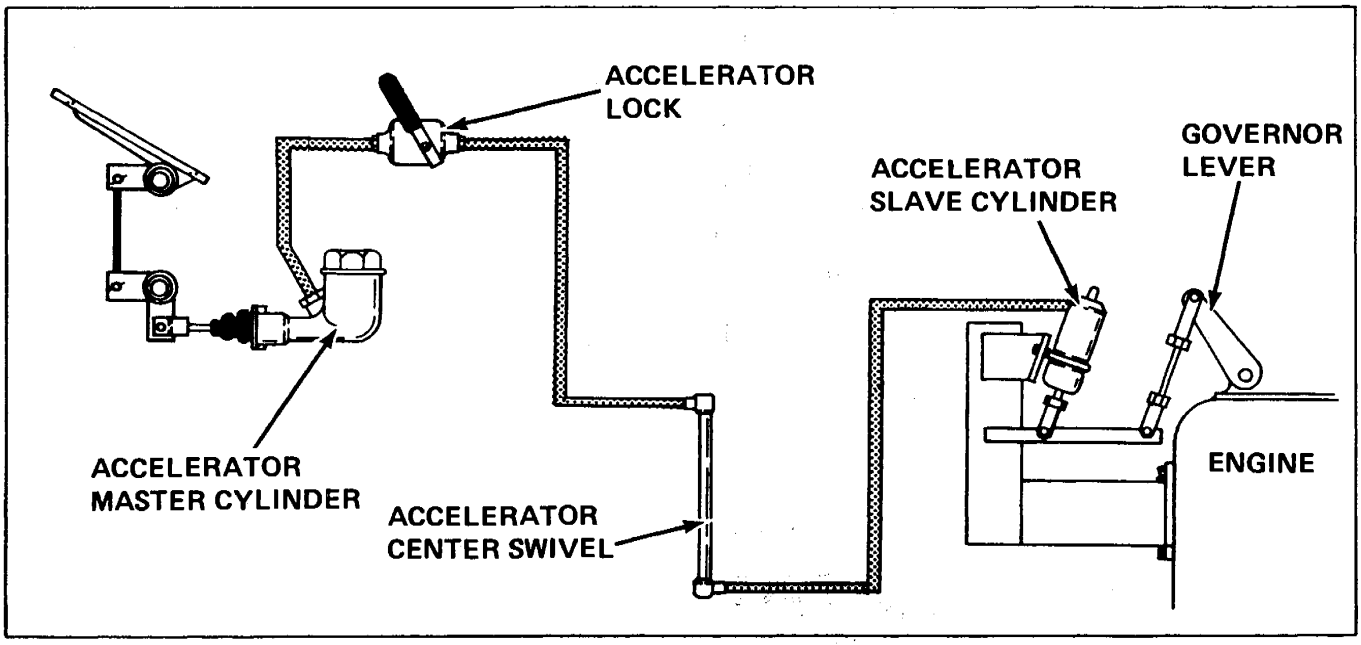

Figure 7. Accelerator Hydraulic Linkage

How the Linkage Works:

When the accelerator pedal is depressed, hydraulic brake fluid is forced from the master cylinder through the connecting line to the slave cylinder and causes the slave cylinder plunger to move outwards. When the pedal is released, spring force causes the slave cylinder plunger to return to its original position, forcing the hydraulic brake fluid back to the master cylinder.

An accelerator lock is located in the hydraulic line between the master cylinder and the Center Swivel. This is simply a manual ON/OFF type valve which blocks the free flow of fluid between the master cylinder and the slave cylinder. When the operator desires to set the engine speed, he depresses the accelerator pedal until the desired rpm is reached, then flips the valve to its "lock" position and releases the pedal. The accelerator lock "holds" the engine at the desired rpm by preventing the fluid originally forced into the slave cylinder from returning to the master cylinder.

Throttle Linkage Adjustment

Throttle adjustment is made at the slave cylinder end of the linkage. To adjust the linkage, loosen the jam nut on the slave cylinder push rod, disconnect the yoke from the governor lever, and move the yoke either in or out to obtain the desired increase or decrease in engine rpm. Re-tighten the jam nut after adjustment is made.

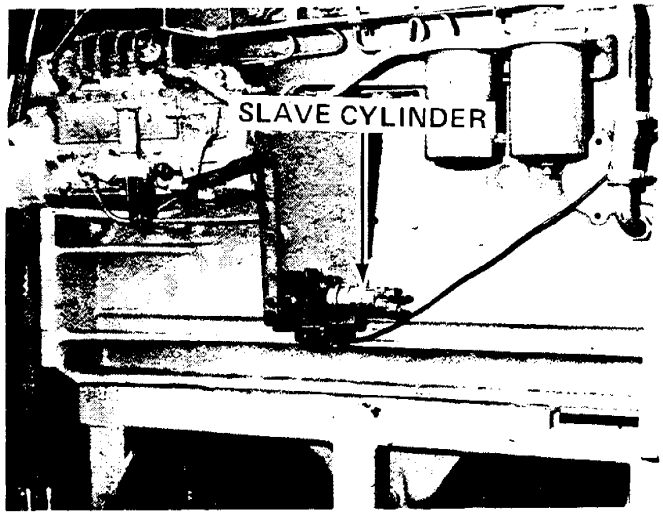

Figure 8. Slave Cylinder on Case Engine

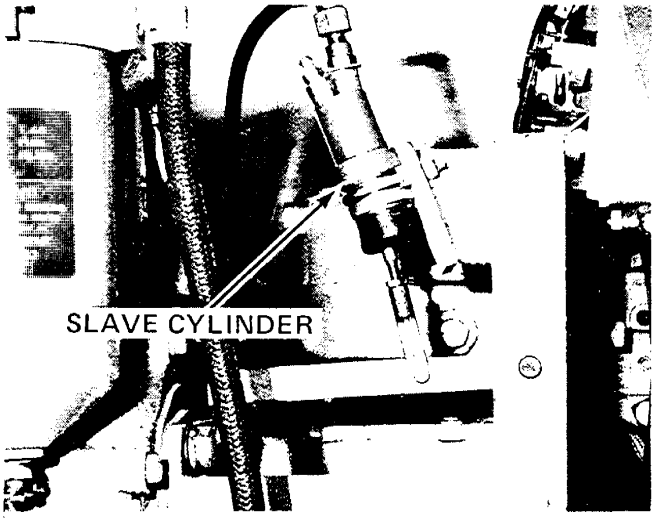

Figure 9. Slave Cylinder on GMC Engine

Bleeding Procedure for Accelerator Linkage

If accelerator feels spongy, and engine response seems sluggish, the hydraulic line may need bleeding. This can be done either with a pressure bleeder, or with the accelerator pedal. The Accelerator slave cylinder has a bleed fitting.

To bleed the accelerator system, use the following procedure:

1. Thoroughly clean around the bleed fitting in the slave cylinder. Clean dirt from around master cylinder filler cap.

2. Be sure master cylinder reservoir is full of Type "A" Brake Fluid that is free of air bubbles.

3. If a pressure bleeder is used, be sure it contains sufficient fluid. Insert the proper adapter on the master cylinder filler opening and connect the hydraulic hose from the pressure bleeder to the adapter. Charge the bleeder with air (20 psi or 140 kPa max.)

4. Slip a hose over the end of the bleed fitting on the slave cylinder. Submerge the other end in a glass jar partly filled with brake fluid, so that air bubbles escaping from hydraulic system can be seen.

5. Open bleed fitting on slave cylinder, then open pressure bleeder supply valve and permit fluid to flow from the accelerator system until bubbles are no longer visible in the glass jar.

6. Close the bleed fitting on the slave cylinder.

7. Close pressure-bleeder supply valve and remove hose and adapter from master cylinder fill port (if pressure bleeder was used). Fill master cylinder reservoir with clean fluid to within 1/4" (6.3 mm) of top. Replace cap.

NOTE

If frequent bleeding is required, check system for leaks, look for dark accumulations of dirt around line connections.

NOTE

If accelerator response is still sluggish, it is possible the line leading to the swivel may need bleeding. To bleed this line, use the procedure below.

1. Pump up pressure using accelerator pedal. Place a heavy weight on the pedal to keep the pressure in the line. Pumping the accelerator pedal should create enough pressure for proper bleeding.

2. Crack the accelerator hydraulic line at the top swivel fitting to bleed air out of the line. Close fitting and re-tighten. Remove weight from accelerator and test for proper response.

TROUBLESHOOTING GUIDE - ENGINE

PROBLEM	POSSIBLE CAUSE	REMEDY
A. Engine lacks power, stalls at idle speed	1. Clogged air cleaner 2. Engine needs tune-up	1. Remove and clean or replace element, check dust collector 2. See engine manual
B. Engine overheats	1. Insufficient coolant 2. Defective thermostat 3. Insufficient lubricating oil	1. Check coolant level and fan belts 2. Replace, see engine manual 3. Add oil, see engine manual
C. Engine does not develop full rpm	1. Low fluid in accelerator master cylinder 2. Accelerator linkage out of adjustment 3. Engine needs tune-up	1. Check, refill if necessary 2. Adjust linkage to governor 3. See engine manual
D. Engine responds sluggishly when accelerator pedal is depressed	1. Air in hydraulic linkage 2. Worn or defective master or slave cylinder 3. Defective fuel system	1. Bleed accelerator system 2. Disassemble and repair or replace item found defective 3. See engine manual
E. Engine won't start	1. Faulty cranking system 2. Faulty fuel system	1. See engine manual and Electrical System section of this manual 2. See engine manual

2. Torque Converter, Transmission and Shift Linkage

GENERAL DESCRIPTION

The transmission and torque converter function together and share a common hydraulic system. The torque converter is mounted on the rear of the engine. It serves as a pump drive for the main hydraulic pump and the power steering pump as well as the converter charging pump. The three pump drive gears are arranged in a semi-circle within the converter housing and are meshed with the Impeller Hub Gear, which rotates with the engine flywheel. (See figure 10). Driving torque is transmitted directly from the engine to the pump drives, with no power multiplication. The torque converter is linked to the input shaft of the remote mounted transmission by means of a drive shaft.

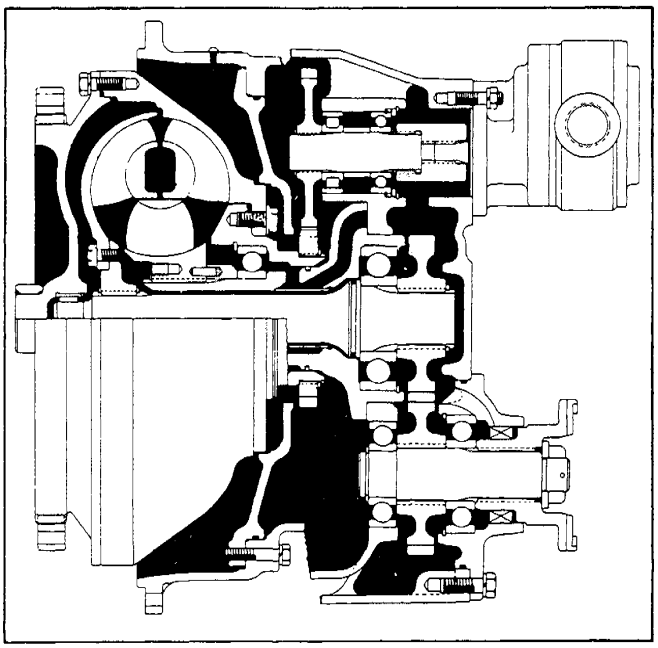

Figure 10. Cutaway View of Torque Converter

The six-speed transmission has three working and three travel ranges (determined by gear ratio). The working (low) range consists of 1st, 2nd and 4th gears; the travel (high) range includes 3rd, 5th and 6th gears. Range shift from high to low must be made with the machine stopped. Figure 11 shows the gear arrangement within the transmission.

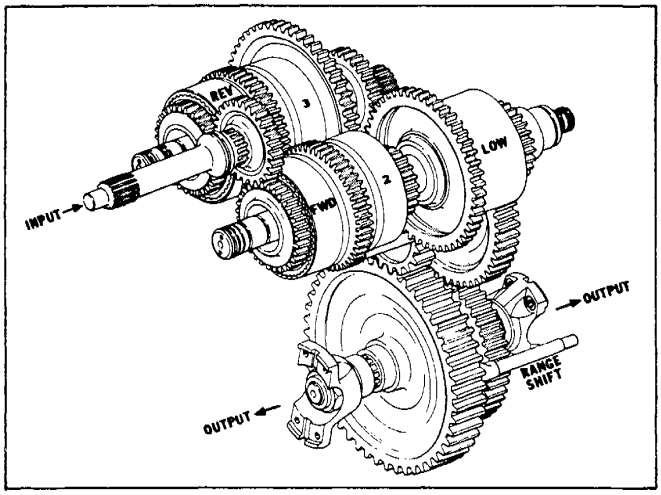

Figure 11. 6-Speed Gear Arrangement

The control valve for shifting the transmission is mounted directly below the Center Swivel. The valve is hydraulically linked to the transmission by means of hoses and tubing. The function of the control valve is to direct oil to the directional and speed clutches within the transmission. The directional and speed clutches, in turn, direct the power flow through the gear train to provide the desired speed range and direction.

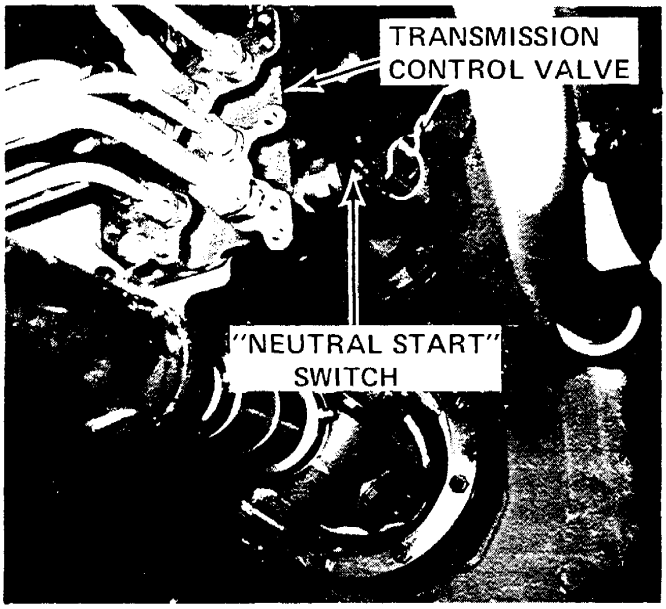

Figure 12. Transmission Control Valve