



Hein-Werner
Service Manual
C10, C10HD & C12
Hydraulic Excavator

Service Manual

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HW-S-C10+

Dealer:

Attn:

Date:

OPTIONS AND MODIFICATIONS

Parts additions and deletions due to options and modifications listed below will be found on reference sheet applicable to change.

SERIAL

MODEL

ENGINE

TRACKS

Reference

ATTACHMENTS

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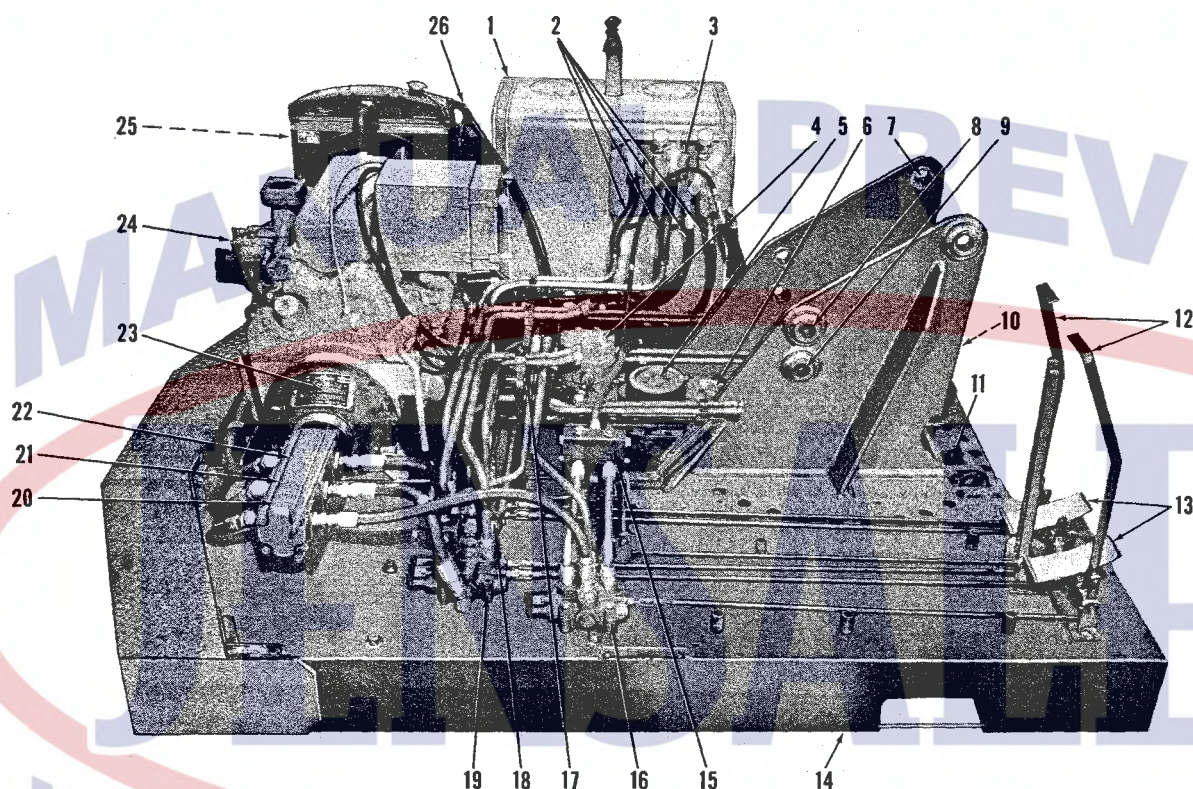
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- | | | |
|-----------------------------------|---------------------------------------|---------------------------------|
| 1. Hydraulic Reservoir | 11. Ball Bearing Ring Gear | 19. Dipstick and Propel or Out- |
| 2. Return Lines | 12. Levers | trigger Control Valve |
| 3. Filters | 13. Foot Pedals | 20. Swing System, Pump Section |
| 4. Hydraulic Swing Motor | 14. Machinery Platform | 21. Dipstick and Propel or Out- |
| 5. House Brake Drum | 15. Pressure Compensating Unit | trigger Pump Section |
| 6. Swing Gear Box | 16. Swing System Control Valve | 22. Boom, Bucket, and Propel |
| 7. Rotograder Boom Mounting Holes | 17. Inline Pressure Compensating Unit | or Outtrigger Pump Section |
| 8. Crane Boom Mounting Holes | 18. Boom, Bucket, and Propel or | 23. Clutch |
| 9. Backhoe Boom Mounting Holes | Outtrigger Control Valve | 24. Engine |
| 10. Hydra-Swivel (Between Boom | | 25. Heat Exchanger |
| Mounting Brackets | | 26. Swing System Return Line |

Figure 1. Machinery Platform

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SECTION I BACKHOE DESCRIPTION

HYDRAULIC CIRCUITS AND CONTROLS

The information in this section is designed to furnish the owner and operator of Hein-Werner backhoes with the basic information needed to understand the operation of the machine. An understanding of the various systems is essential to proper operation and service, and we suggest this description be read thoroughly.

All models of the backhoe, though they vary in size to provide different digging depths and reaches, operate in the same manner. Power is supplied by either a gasoline or diesel engine (24, Figure 1) the make of which is optional. (For service parts and information, refer to the engine manual supplied with your machine.) The engine is coupled to the hydraulic pump by either a direct drive shaft or a clutch (23). The clutch is extremely useful as a starting aid in cold weather. (If your machine is equipped with a clutch, refer to the separate section included with this manual.)

Figure 2 illustrates the hydraulic circuits schematically. Refer to it while reading the following description. The pump is a gear type, with three sections in tandem, mounted directly to the engine clutch housing. Each pump section is fitted with a separate supply line from the reservoir to assure proper oil flow. The pump section (22, Figure 1) closest to the engine delivers high pressure oil to the boom, bucket, and propel control valve (18) on the crawler mounted machine, and to the boom, bucket, and outrigger system on the carrier mounted machine. The center pump section (21) supplies high pressure oil to the dipstick and propel circuit valve (19) on the crawler mounted machine and to the dipstick and outrigger system on the carrier mounted machine. The pump section (20) furthest from the engine delivers high pressure oil to the swing control valve (16) on all models. The three pump sections are completely independent of each other enabling simultaneous use of all three circuits.

When the two control valves (18 and 19) are in neutral position, the oil flows through the valve and return lines (2) to the filters (3) mounted on the hydraulic reservoir (1). When the swing control valve (16) is in neutral position, the oil flows through the valve, return line (26), heat exchanger (25) and then through a filter. The heat exchanger uses air drawn through the radiator by the engine to cool the oil. Each hydraulic circuit includes a filter which contains a removable filtering element that can be recleaned or replaced. After being filtered, the oil flows directly into the reservoir. The filters include a pressure gage which is visible from the cab and indicates the condition of the filter element. When the gage pointer is in the red zone, the element must be cleaned or replaced.

The control valves are operated by levers (12) and foot pedals (13) in the operator's cab. The cab is also equipped with a complete set of engine gages and controls. The engine gage set consists of an ammeter, individual gages for fuel level, oil pressure and water temperature, and a combination tachometer and engine revolution hour meter. When a typical cylinder circuit is put into operation by moving the control lever or foot pedal in either direction from the neutral position, the valve spool moves within the control valve. This spool reroutes the oil flow from the return line port to the port which supplies oil to the cylinder being used. This spool is spring-loaded to return to neutral position when the control lever or pedal is released. The control valves have excellent "feathering" characteristics to assure smooth and precise operation of all components. The control valves contain a relief valve which is adjusted at the factory to a specified limit. If the pressure demanded by the circuit being used exceeds this pre-set limit, the relief valve will bypass the oil to the reservoir until the pressure demanded by the circuit drops to the specified pressure setting. The digging members are also protected from overload by an inline pressure compensating unit (17). This unit relieves the pressure in the boom and dipstick circuits when external forces cause the pressure to exceed the maximum allowable. The swing circuit is controlled by the single

spool control valve (16). This valve and its built-in relief valve are identical in design and purpose to the typical cylinder control valve already described, except that it is an "open center" type valve. This design allows the machine to "coast" in the neutral position which greatly reduces shock loads on the swing system caused by jarring stops. The swing circuit is also further protected by a pressure compensating unit (15) which minimizes shock loads.

SWING SYSTEM

The double rotation, positive displacement hydraulic motor (4) provides for unlimited swing in either direction. The motor is mounted on the swing gear box (6) with the splined output shaft meshed with the input pinion of the gear box. The gear box is secured to the machinery platform with specially ground alloy steel studs. The machinery platform is mounted on the outer race of a double row ball bearing turntable and attached with 32 capscrews. The inner race of the bearing is secured to the turntable adapter which is mounted on the crawler, truck or Roadster. The inner race includes a ring gear (11) which is always in perfect mesh with the output pinion of the swing gear box. All gears and shafts in the swing system are precision machined and hardened for maximum life. The shafts are carried by tapered roller bearings. The gear case and cover are precision bored and milled to assure precise gear mesh.

The swing brake is used to prevent rotation of the platform and keep it stationary. The brake is

mounted on the intermediate shaft of the gear box. It is cable-operated and controlled by a lever in the cab (see Figure 3).

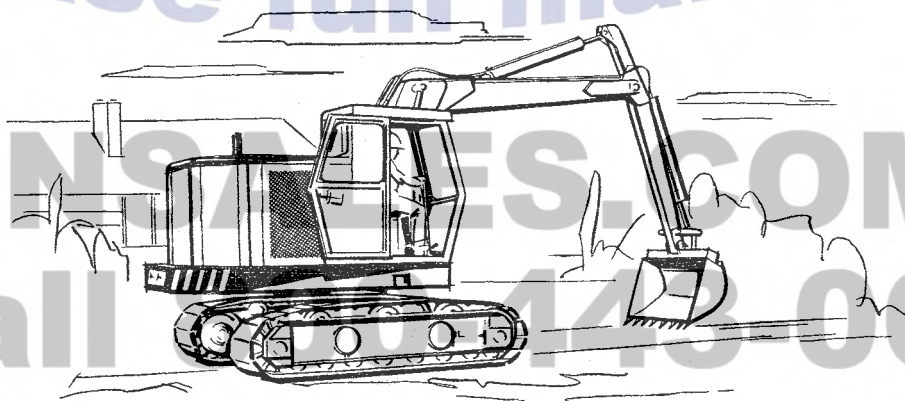
DIGGING MEMBERS

The two boom mounts on the platform are designed for installing all backhoe booms and the Rotograder-Crane boom. The holes (7, 8 and 9) for mounting each are identified in Figure 1. The booms and dipstick are reinforced box-section structures fabricated of alloy steel.

The double-acting cylinders which actuate the boom, dipstick and attachments are equipped with cast iron piston rings and self-adjusting packings. Lubrication of the cylinders is automatically provided by the hydraulic system oil. The cylinder and rod bushings are centrifugally cast of aluminum bronze alloy.

A complete set of attachments can be used on all backhoes. These attachments are actuated through a bellcrank linkage and are easily interchanged by removing two pins. These attachments include the following:

- 24-inch to 60-inch standard buckets
- 16-inch to 48-inch heavy duty rock buckets
- Standard and heavy duty 60-inch ditch cleaning buckets
- Replaceable side cutters for buckets
- Frost point



SECTION II BACKHOE OPERATION

PREPARATION FOR USE

When the machine is received, make a complete check for damage which may have occurred in shipment. Make the following checks and adjustments each day before operating the machine:

1. Engine checks (see engine manual for detailed instructions).

- ✓ Crankcase oil level.
- ✓ Fan belt tension.
- ✓ Coolant level.
- ✓ Air cleaner.
- ✓ Level of electrolyte in battery.
- ✓ Battery and terminals for corrosion.
- ✓ Tightness of all mounting bolts.
- ✓ Fuel level.

2. Upperstructure checks.

- ✓ Security of fuel, hydraulic, and electrical connections.
- ✓ Freedom of operation of all controls.
- ✓ Oil level in hydraulic reservoir. Remove the high level plug and check that the oil level is between the high level plug and the low level plug. If necessary, add premium grade SAE 20 oil.
- ✓ Level of lubricant in swing gear box. If necessary, add EP 80-90 oil.
- ✓ Lubricate entire machine as required; see Table 1 and Figures 4 and 5.
- ✓ After six to eight hours of running time, check the turn table mounting bolts in both the inner and outer bearing race for tightness. Torque the bolts to 200 foot pounds.

STARTING THE ENGINE

Leave all control levers in neutral. Place throttle in approximately half-fuel position. Place ON-OFF switch in ON position or place fuel shut-off lever in RUN position. Depress starter button to crank engine. If engine fails to start after two or three attempts, refer to engine manual for cause of trouble and instructions to correct it.

OPERATING CONTROLS (See Figure 3)

Operators not familiar with hydraulic machines may tend to over-control and thereby cause rough operation of the machine. It is recommended that the machine be operated at half throttle or less until the operator gets the "feel" of the controls. The throttle setting may then be gradually increased to fully governed speed.

When shipped, the boom and swing control levers are installed as shown in Figure 3. If desirable, both can be removed and installed to the right (as viewed from the operator's position) of the positions illustrated. In these new positions, the boom lever would control the swing system and the swing lever would control the boom.

BOOM CONTROL LEVER

1. To raise boom, pull boom control lever back.
2. To hold boom in position, move control lever to center position (neutral).
3. To lower boom, push boom control lever forward.

BUCKET CONTROL PEDAL

1. To place bucket in closed position, push down with heel of left foot on the pedal.
2. To hold bucket in position, move the pedal to center position (neutral).
3. To place bucket in open position, push down with toe of left foot on the pedal.

DIPSTICK PEDAL

1. To tuck dipstick in, push down with heel of right foot on the pedal.
2. To hold dipstick in place, move the pedal to center position (neutral).
3. To extend dipstick, push down with toe of the right foot on the pedal.

SWING CONTROL LEVER

1. To swing platform in a clockwise direction, push lever forward.
2. To swing platform counterclockwise, pull lever back.

The swing of the platform is controlled by reversing the control lever. Slight overcontrol allows the machine to be operated with a high degree of smoothness with no abrupt or dead stops. For example, if

the machine is rotating clockwise (lever pushed forward), feather the lever back toward the operator until the rotation stops. If one particular position is desired, lock the platform in place with the swing brake control lever.

SWING BRAKE LEVER

1. To engage brake, pull up on the lever. The lever will snap into an overcenter lock position.
2. To release brake, push the lever down.

SEAT ADJUSTMENT CONTROLS

The seat height can be adjusted by pulling out the height adjustment pin, setting the seat to the desired height and then reinserting the pin.

The seat can be moved forward and backward by pulling out the pin under the seat, sliding the seat cushion to the desired position and then reinserting the pin.

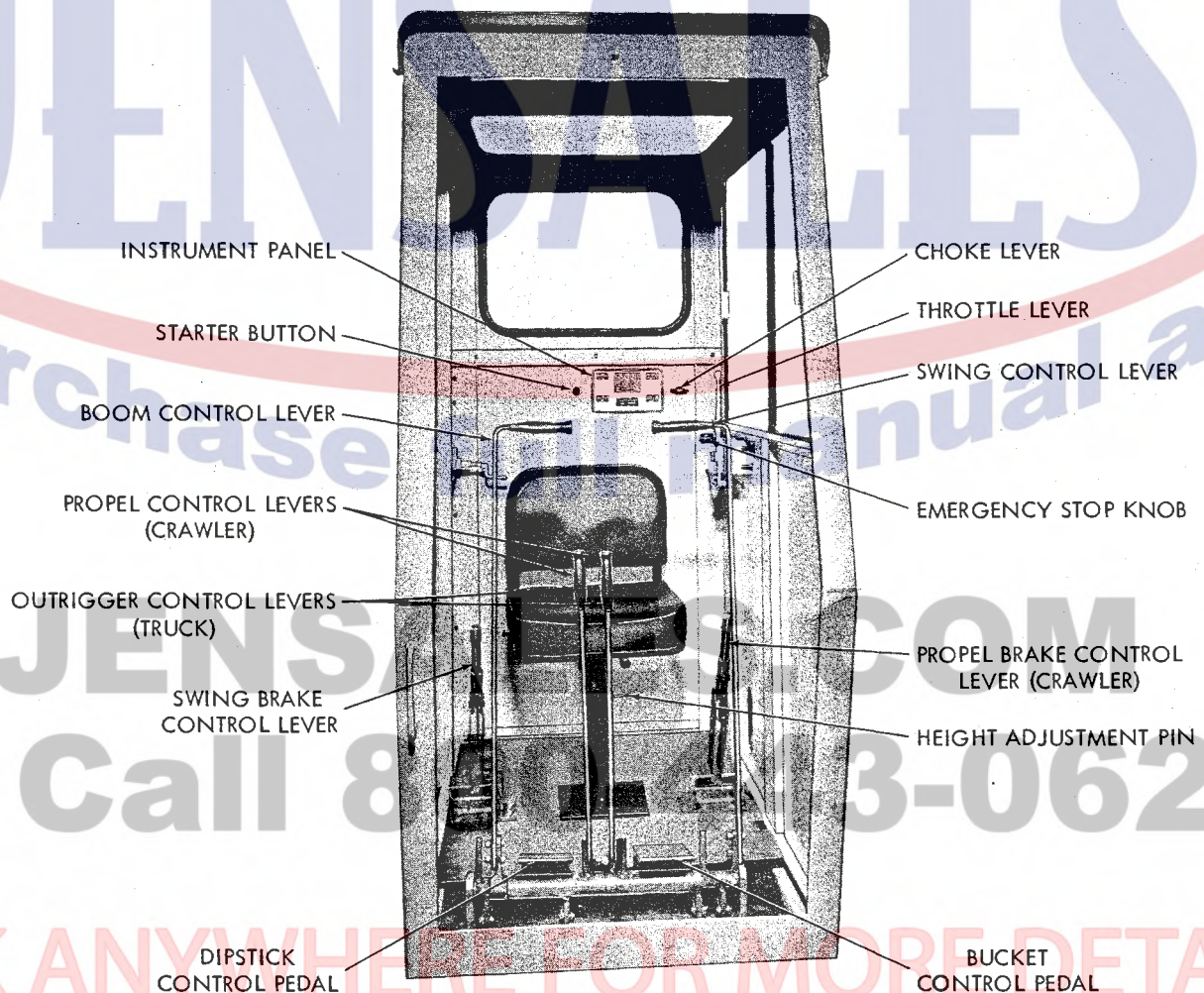


Figure 3. Operating Controls

DIGGING HINTS

Keep the machine as close to the work as possible. This results in a greater mechanical advantage and also cuts down the cycle time. Start a cut with the dipstick at right angles to the boom point; this will decrease cycle time because the boom does not have to be repositioned as often.

Tuck in the dipstick as the boom is raised out of a cut; this will permit clearing the top of the cut sooner and reduce the cycle time. Square cuts for man-holes, etc., can be made easier by moving the machine in line with each bank, rather than using the swing to get from bank to bank.

Make straight down end cuts by extending the dipstick and bucket and moving the machine forward or back to reach the bottom of the cut. To decrease cycle time, especially in a deep cut, shave off a layer at a time, rather than going to the bottom of the cut on every cycle. Rocks and stumps can be uncovered, undermined, and pried out using the bucket.

For faster dumping, open both the bucket and the dipstick. When digging in gravel, stones, or shale, use the bucket teeth to loosen the material so that the bucket can be filled on the next cycle. When digging in clay or hard soil, use the bucket in a flat position and shave or peel the soil by moving the boom and dipstick. The bucket can be removed and reattached in an inverted position to use the machine for shovel operation.

STOPPING THE ENGINE

Reduce engine speed to idle. Allow engine to operate at idle speed for approximately five minutes to normalize engine temperature, then place the ON-OFF switch or fuel shut off lever in OFF position. Do not stop the engine suddenly unless it is absolutely necessary.

If the engine continues to run after the fuel shut-off lever is placed in OFF position, pull emergency stop knob located on back wall of cab. This will shut off the air supply to the engine by tripping the air shut-off valve. If air shut-off valve has been tripped, it must be reset before the engine will operate. To reset the air shut-off valve, first push the emergency stop

knob all the way in, and then manually reset the air shut-off valve latch. Refer to the engine manual for detailed instructions.

PREPARATION FOR STORAGE

If the machine is to be stored for an indefinite length of time, perform the following procedures, subject to the length of the anticipated storage period:

1. Drain fuel system and refill with Valvoline Oil Company "Tectyl 503-C" rust preventative compound or its equivalent.
2. Drain engine lubricant and refill with engine preservative oil.
3. Drain engine cooling system and refill with corrosion inhibitor.
4. Crank engine to circulate preservative oils through fuel and lubricating systems.
5. Drain lubricant from swing and propel gear boxes and refill with preservative oil.

CAUTION

Wherever fluid systems have been drained, attach a waterproof tag to the tank or engine, to warn the operator not to operate the machine until the system(s) have been drained and refilled with correct fluid.

6. Remove battery.
7. Relieve engine belt tension. Tag the belts to indicate that belt tension must be adjusted before starting engine.
8. Wipe machine to remove all film and dirt. Apply preservative to any exposed metal surfaces subject to corrosion through prolonged non-usage, such as valve spools, cylinder rods, etc.
9. Close and secure all doors. Seal all openings with waterproof paper.
10. Fill hydraulic system completely with hydraulic oil.

SECTION III BACKHOE MAINTENANCE AND REPAIR

MAINTENANCE

It is impossible to overstress the importance of preventive maintenance. A well organized, day-to-day preventive maintenance schedule will save you expensive "downtime" and costly repairs. In addition it will help to insure proper operation and extended life of the machine.

This section outlines suggested maintenance schedules, lubrication guides, and minor adjustments which should be made to maintain optimum performance from your machine. These schedules, and the preventive maintenance record sheets included with this manual, will help you organize a good system of daily care which best suits your particular operation.

The maintenance requirements listed are for average working conditions. If your machine is subject to adverse conditions, such as extreme dust,

moisture, etc., the frequency and extent of the maintenance procedures should be increased accordingly.

Table 1. Recommended Lubricants

Part	Lubricant
Swing gear box	EP 80-90 oil
Swing gear	Crater compound
All grease fittings	Moly type grease, such as Mobiloil Special, or equivalent.
Hydraulic reservoir	Premium grade SAE 20 oil.

Table 2. Preventive Maintenance and Inspection Schedule

Frequency	Service or Inspection to be Performed
Daily	Lubricate backhoe at points shown in Figures 4 and 5. Always remove excess grease after lubrication to prevent the accumulation of dust and dirt which would enter bearings and bushings.
Daily	Inspect for and correct any fuel, oil, coolant, or hydraulic system leaks.
Daily	Check oil level in swing gear box. If necessary, add EP 80-90 oil.
Daily	Check oil in hydraulic reservoir. If necessary, add premium grade SAE 20 oil.
Daily	Check gages on hydraulic filters. If gage registers in "red zone," clean or replace filter element.
Daily	Check engine crankcase oil level, coolant level, belt tension, and level of electrolyte in battery(s). (See engine manual for complete specifications.)
Weekly	Lubricate upper unit at points shown in Figure 5.
Weekly	Check the torque on both the upper and lower bolts on the turntable; tighten to 200 foot pounds if necessary.

Table 2. Preventive Maintenance and Inspection Schedule (Continued)

Frequency	Service or Inspection to be Performed
Monthly	Check hydraulic system pressures as outlined under HYDRAULIC CIRCUIT PRESSURE CHECKS, page 9.
Monthly	Check swing brake adjustment. See SWING BRAKE ADJUSTMENT, page 10.
Monthly	Check all mechanical linkage connections.
Monthly	Check all mounting and assembly bolts. Tighten if necessary. Refer to Table 3.
Monthly	Check all hydraulic system hoses, lines, and fittings for signs of wear or damage.
As required	Inspect bucket teeth and replace as necessary. Do not use shanks without teeth for digging.
As required	Remove filter screen from hydraulic reservoir. Clean screen thoroughly with cleaning solvent. Be sure filter screen is in place when adding oil.

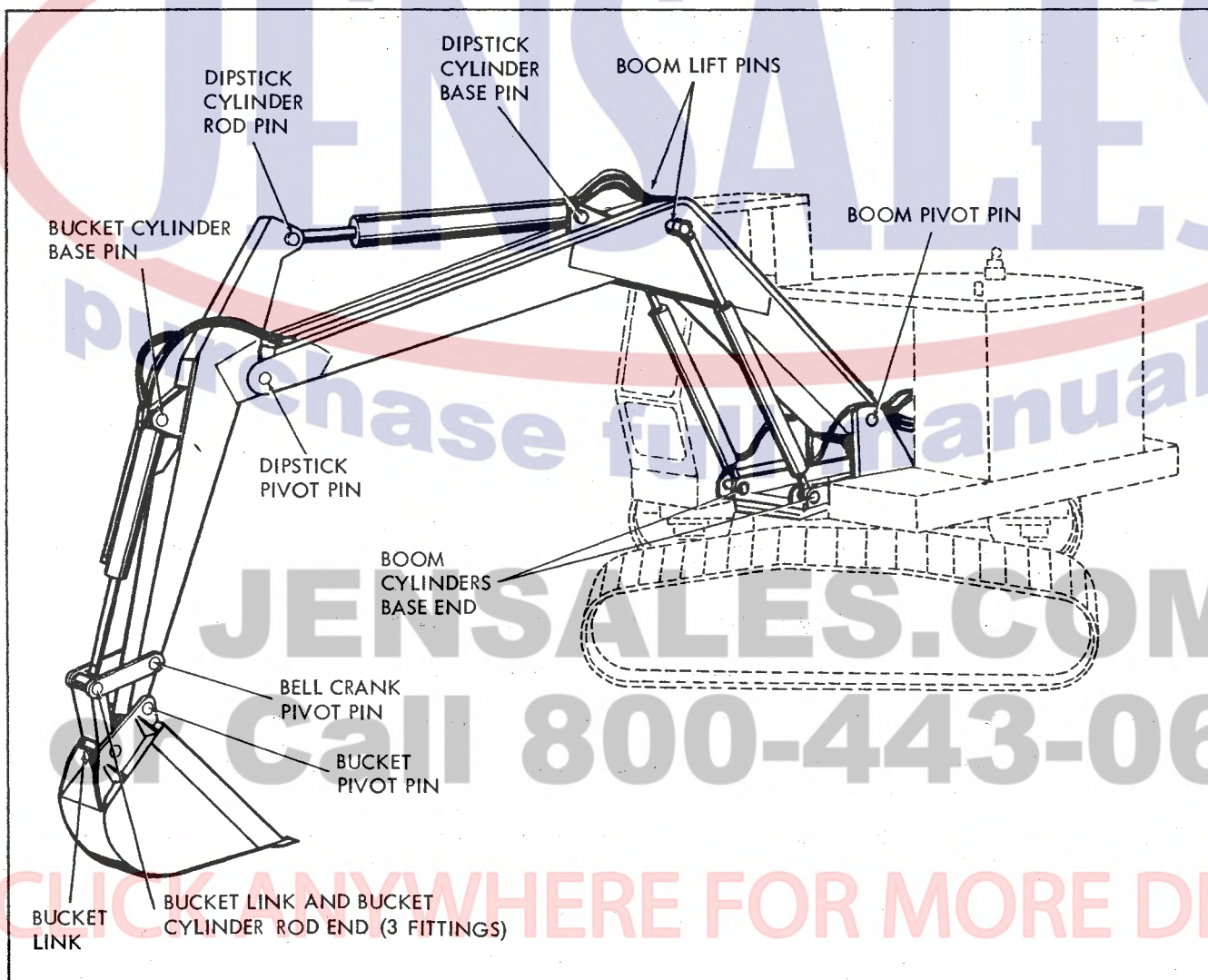


Figure 4. Lubrication Chart — Digging Members