

SERVICE and PARTS MANUAL

for

SERIES 14

HYDRAULIC BACKHOES

Hein-Werner

CONSTRUCTION EQUIPMENT DIVISION
WAUKESHA, WISCONSIN 53186

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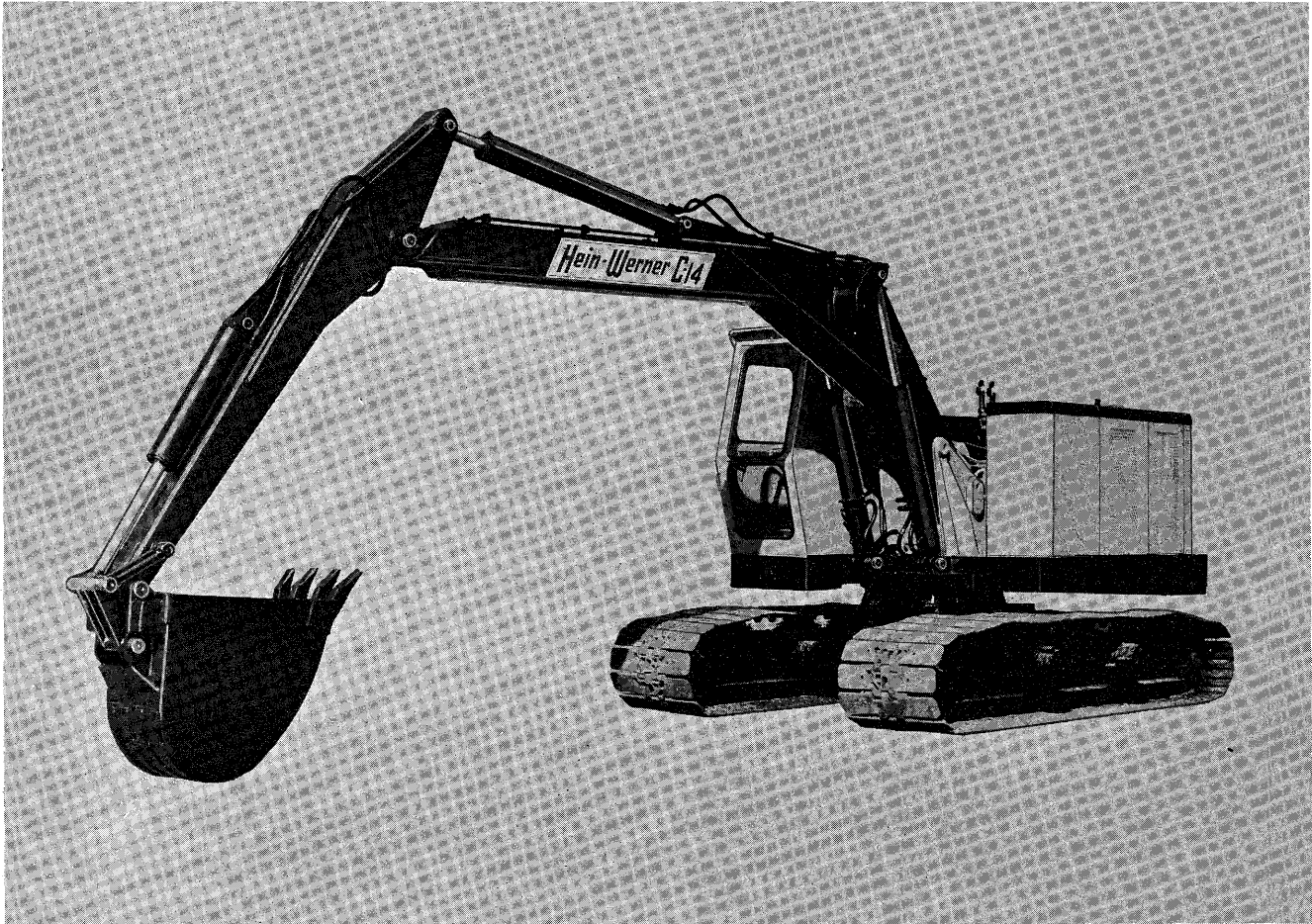


Figure 1. Hein-Werner C-14 Crawler-Mounted Hydraulic Backhoe

SECTION I BACKHOE DESCRIPTION

HYDRAULIC CIRCUITS AND CONTROLS

The information in this section is designed to furnish the owner and operator of the Hein-Werner C-14 Backhoe 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.

Power is supplied by a diesel engine, the make of which is optional. (For parts and service information, refer to the engine manual furnished with your machine.) The engine output shaft is coupled to a clutch and gear box which drives three separate gear type pumps.

The lower right pump (looking at the pump side of the gear case) delivers high pressure oil to the three-spool control valve for the boom and bucket cylinders and one propel motor on crawler mounted machines and to the boom and bucket cylinders and one outrigger cylinder on carrier mounted machines. The lower left pump delivers high pressure oil to the two-spool control valve for the dipstick cylinder and the other propel motor on crawler mounted machines and to the dipstick cylinder and the other outrigger cylinder on carrier mounted machines. The upper pump delivers high pressure oil to the single spool control valve and, if the machine is equipped with a power-speed boost circuit, to a solenoid control valve. The solenoid valve connects the output of the swing pump into the boom and dipstick circuits to provide higher speeds for lifting the boom and higher speeds and greater power for tucking the dipstick.

When the swing and dipstick control valves are in neutral position, oil flows through the valve and return lines to filters on the hydraulic reservoir. Return oil from the swing motor, the propel motor (or outrigger cylinder) and dipstick cylinder also passes through the valves and return lines. When the boom and bucket control valve is in neutral, the oil flows through the valve, return line, heat exchanger, and then through a filter to the reservoir. Return oil from the boom and bucket cylinders and the propel motor or outrigger cylinder also passes through the valve and heat exchanger.

The heat exchanger uses air drawn through the radiator by the engine to cool the oil. The filter in each hydraulic circuit contains a removable element that can be cleaned or replaced. 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 three control valves are operated by levers and pedals in the operator's cab (Figure 2). The solenoid valve is operated by buttons on the levers. 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 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 swing control valve is identical in design to the other two control valves except that it is an "open center" type valve. This design allows the machine to "coast" when the valve is in neutral and reduces shock loads on the swing system components caused by jarring stops.

Three in-line relief valves protect the boom, dipstick and swing circuits from excessive pressures caused by external forces.

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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-open 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 2)

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 2. 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. If the positioning of the two levers are changed and the machine is equipped with a power-speed boost circuit, the wires to the solenoid control valve should be interchanged. This will keep the button for increasing boom speed on the swing lever and button for increasing dipstick speed and force on the boom lever.

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.
4. For higher boom lift speeds, push the boom boost control button (left hand lever) while pulling boom control lever back.

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, 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.
4. For higher dipstick tuck speeds, push the dipstick boost control button (right hand lever) while pushing down with heel on the dipstick control pedal.
5. For higher dipstick tuck forces, push the dipstick boost control button with the dipstick pedal in neutral.

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.

BOOM POSITION ADJUSTMENT

The digging depth and dumping height of the boom can be varied by changing the position of the lift pin at the rod end of the boom lift cylinders. To get the maximum digging depth of 23'11" (dumping height 11'9"), install the pin in the upper two holes in the boom. To get the maximum dumping height of 15'6" (digging depth 22'0"), install the pin in the lower of the two holes.

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 manholes, 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 bucket in a flat position and shave or peel the soil by moving 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 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, 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.

A one year supply of "Preventive Maintenance Record" forms is included at the end of this manual. A sample copy, with several typical entries made, has also been included to show how these records may be maintained. These records, when kept complete and up-to-date, will benefit both the owner and the operator.

LUBRICANTS

To insure maximum efficiency and long life, use the lubricants or equivalent, recommended in Table 1.

MAINTENANCE SCHEDULES

Follow the periodic maintenance schedules and procedures as outlined in Table 2.

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 indicated in Figure 3 and at points indicated immediately below. See Table 1 for lubricants. Always remove excess grease after lubrication to prevent the accumulation of dust and dirt which would enter bearings and bushings. <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;"><u>Lubrication Point</u></th> <th style="text-align: center;"><u>No. of Fittings</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Cross shaft on propel</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">control rod linkage</td> <td></td> </tr> <tr> <td style="text-align: center;">Control levers.</td> <td style="text-align: center;">6</td> </tr> </tbody> </table>	<u>Lubrication Point</u>	<u>No. of Fittings</u>	Cross shaft on propel	2	control rod linkage		Control levers.	6
<u>Lubrication Point</u>	<u>No. of Fittings</u>								
Cross shaft on propel	2								
control rod linkage									
Control levers.	6								
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.)								