CED-47

SERVICE and PARTS MANUAL

for

SERIES 10, 10HD AND 12HD

HYDRAULIC BACKHOES

9308129

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SECTION I
BACKHOE DESCRIPTION

HYDRAULIC CIRCUITS AND CONTROLS

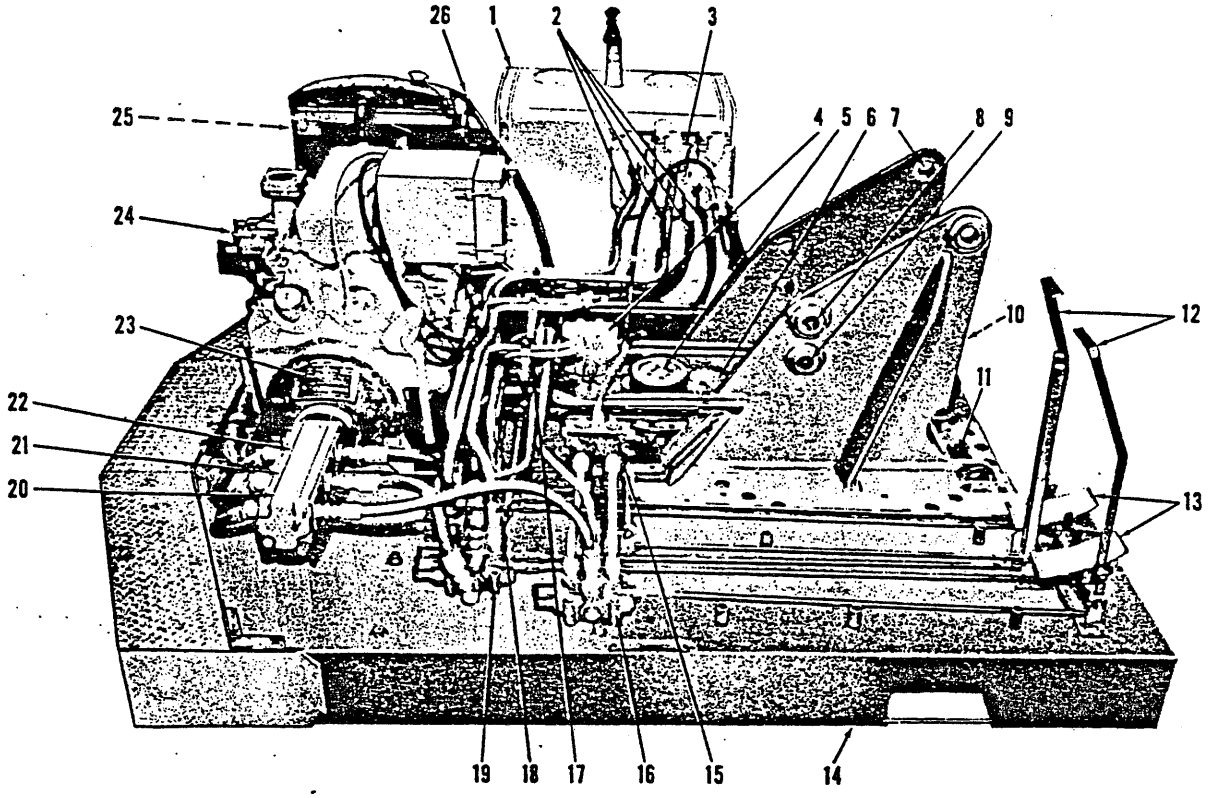
The information in this section is designed to furnish the owner and operator of Hein-Werner backhoes with the basic information needed to understand the operation of the machine. An understanding of the various systems is essential to proper operation and service, and we suggest this description be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



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

Figure 1. Machinery Platform

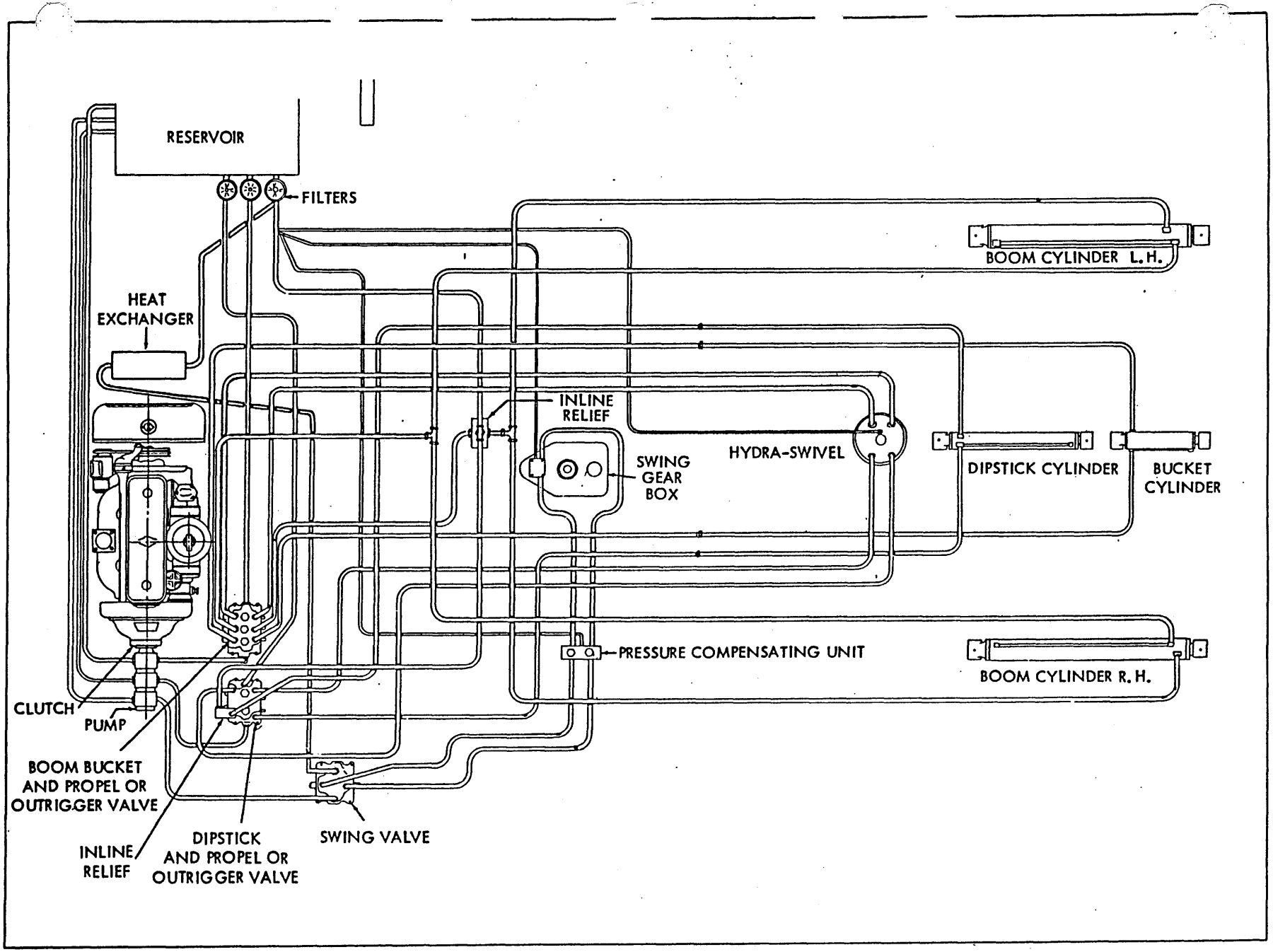


Figure 2. Hydraulic Schematic Diagram

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).

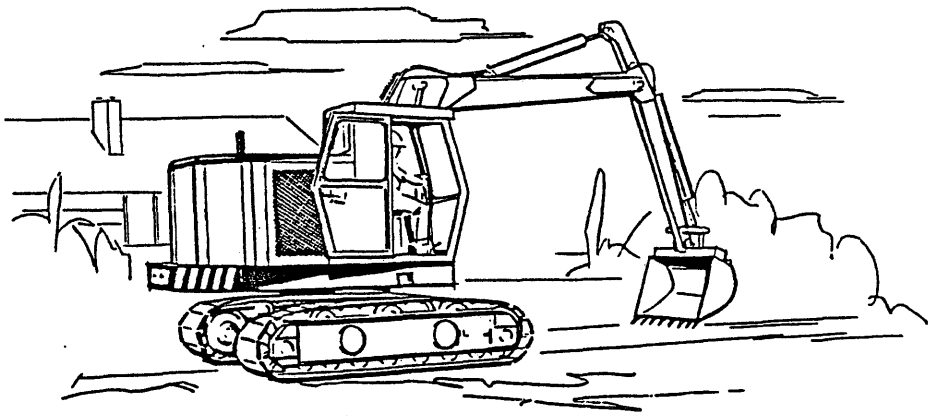
DIGGING MEMBERS

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 provid by the hydraulic system oil. The cylinder and roo bushings are centrifugally cast of aluminum bronze alloy.

A complete set of attachments can be used on all backhoes. These attachments are actuated throug 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 heck 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.

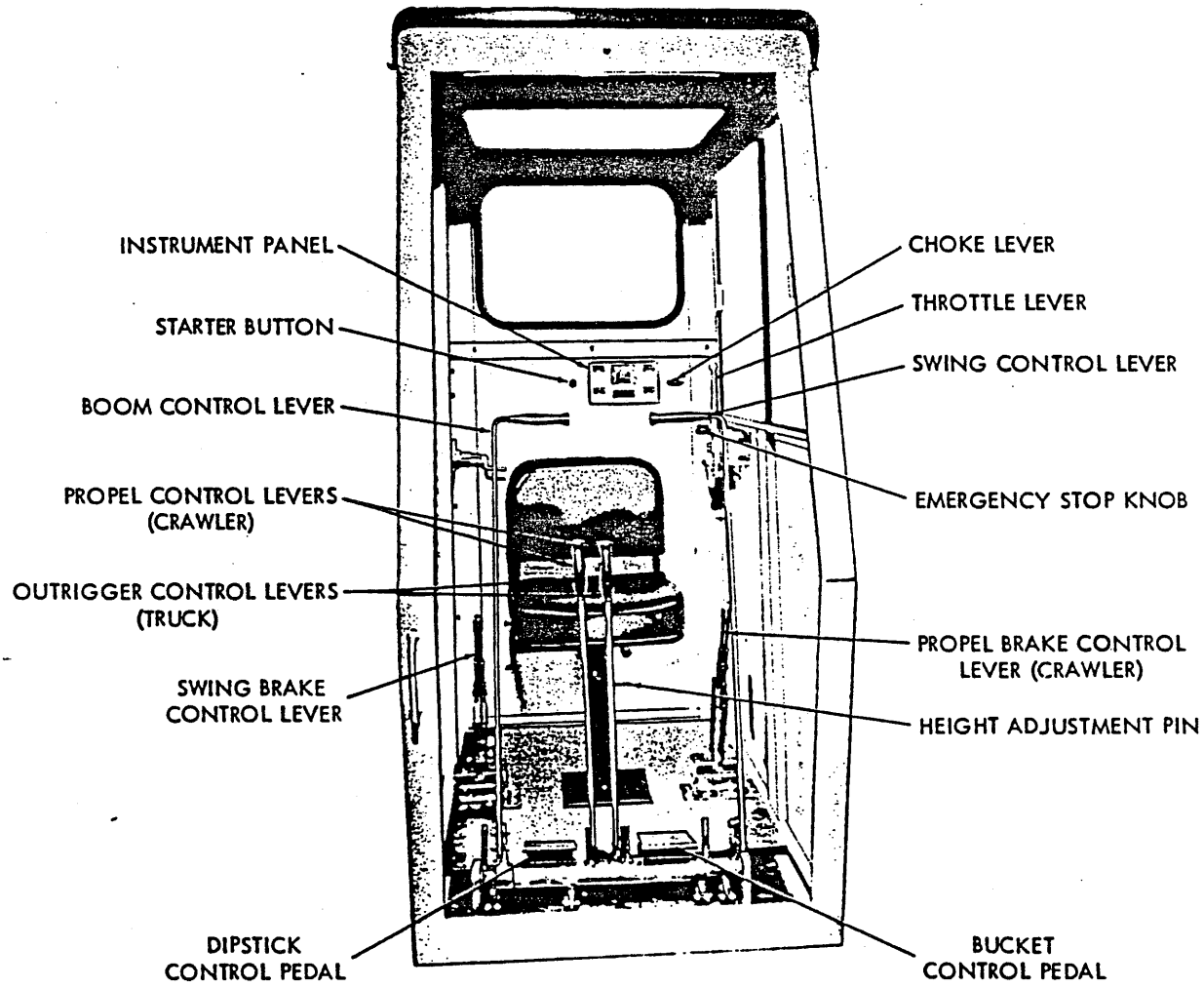


Figure 3. Operating Controls