MODEL T-14 BULLDOZER-SHOVEL

EAST PLORIA, TUINOIS SPRINGFIELD

130-122 W. WASHI

PHONE 4.9

and a

719 C. MEEFEI

OPERATING MANUAL

AND

PARTS LIST

FOR

INTERNATIONAL HARVESTER TD-14 CRAWLER TRACTORS

MANUFACTURED BY

THE FRANK G. HOUGH CO.

LIBERTYVII.LE, ILLINOIS

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TO THE OWNER

It has been our aim to build the most reliable and serviceable shovel on the market.

Hough Shovels have, since 1920, built a reputation for dependable and economical service in the material handling field. This Shovel includes all these features which have made pos-sible long, dependable service, together with the latest engineering knowledge and design.

The purpose of this manual is to explain maintenance requirements and routine adjustments which are necessary for the most efficient operation of your Shovel. Also included in this manual is a parts catalog for your ready reference in repair parts orders. To protect your Shovel investment, study this manual before starting or operating your Shovel.

If you should need information not given in this manual, or require the services of a trained mechanic, we urge you to use the extensive facilities offered by The Frank G. Hough Co. Payloader dealers. Dealers are kept informed on the best methods of servicing and are equipped to provide prompt, high class service on the field or in an up-to-date service shop.

Dealers carry ample stocks of The Frank G. Hough Co. essential Payloader parts.

Listed below you will find the name of The Frank G. Hough Co. dealer with whom your parts orders should be placed and who should be called upon for any required information concerning proper operating and maintenance procedure.

OUR TRACTOR SHOVEL DEALER IS:

When ordering parts, always give The Frank G. Hough Co. Payloader dealer both the name and part number of the part required, and also the SERIAL NUMBER OF THE PAYLOADER.

SO THAT YOU MAY HAVE IT BEFORE YOU, WRITE THE TRACTOR SHOVEL, HYDRAULIC PUMP AND HYDRAULIC VALVE SERIAL NUMBERS HERE:

HYDRAULIC PUMP SERIAL NO: ________(Stamped on pump body)

HYDRAULIC VALVE SERIAL NO:_____

(Stamped on valve body)

A. E. HUDSON COMPANY

120-122 W. WASHINGTON ST. EAST PEORIA, ILLINOIS PHONE 4-9142 719 E. JEFFERSON STREET SPRINGFIELD, ILLINOIS PHONE 5600

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FOREWORD

The main factor in the performance of any machine of this type lies with the operator.

Skill in the use of the Shovel is acquired by practice, and by intelligent observation of the operation of the machine. For instance, correct Loading of the bucket can be judged by the feel of the operating lever, the sound of the engine, and the speed of the tractor.

SAFETY RULES

- 1. Never transport loads with the bucket raised to its full height.
- 2. Exercise caution when traveling on hillsides or rough ground.
- 3. Never stand or work under a raised bucket unless it is blocked.
- 4. Never attempt to clean, oil or adjust a machine while it is in motion.

IT IS THE POLICY OF THE FRANK G. HOUGH CO. TO IMPROVE ITS PRODUCTS WHENEVER POSSIBLE AND PRACTICAL TO DO SO. WE RESERVE THE RIGHT TO MAKE CHANGES OR ADD IMPROVEMENTS AT ANYTIME WITHOUT INCURRING ANY OBLIGATION TO MAKE SUCH CHANGES ON MODELS PREVIOUSLY SOLD.

WARRANTY

This Model T14 Shovel is waranted free from defects of material or workmanship for a period of six months from date of sale; it is further warranted to be mechanically practical for the purposes advertised by THE FRANK G. HOUGH CO.

Parts claimed to be defective are to be reported to us promptly and returned to us with transportation charges prepaid. If we find the parts defective upon our examination, credit will be issued or the parts replaced.

This warranty will not apply to machines that have been misused, loaded beyond factory rated capacity, neglected, or damaged through accident.

Any expense incurred without authorized consent for repairs or replacements will not be allowed. The use of any but THE FRANK G. HOUGH CO. parts nullifies this warranty.



Fig. 1 SEAT FRAME



Fig. 2 PUMP MOUNTING TO RADIATOR FRAME



MOUNTING INSTRUCTIONS

To install THE FRANK G. HOUGH CO. Model 14 BULLDOZER SHOVEL on an International TD14 Tractor follow the procedure outlined below in the order given. No special tools are required except a one (1) ton crane or hoist capable of reaching over the Tractor, to facilitate handling various sub-assemblies of the Shovel as shipped. No drilling or welding will be necessary.

The Tractor must be an International TD14 per Hough Modification #32.

The "right side or left side" of the Tractor are determined by sitting in the operator's seat and looking toward the Radiator.

Throughout the entire assembly be sure to use lockwashers on all bolts unless otherwise specified. Be sure to make all Hydraulic Connections oil tight and leakproof to keep air and water from being sucked into the system or oil from leaking out. Air sucked into the system will cause a noisy pump and interfere with the smooth action of the boom and bucket, and the oil will foam and overflow.

A. PREPARATION OF THE TRACTOR FOR SHOVEL ASSEMBLY - Figs. 1, 5

- 1. Place the Tractor under the crane or hoist. Shut off and disconnect the Fuel Lines at the Fuel Tank and remove the entire Seat Frame and Fuel Tank Assembly with the Fender Sheets, from the Tractor.
- 2. Disconnect and remove the Batteries. Bend the battery hold-down straps inward to about 45°.
- 3. Remove the UPPER, REAR bolt from the Rear End of the Main Frame Side Channels one on each side of the Tractor.

Remove the two (2) REAR bolts from the Front End of the Main Frame Side Channels two on each side of the Tractor. Save the bolts. They are removed to provide clearance when mounting the Shovel Main Frame.

- 4. Remove the corks from the upper four holes in the rear of Transmission Housing. Two (2) on each side of the Rear Power Take Off Cover. Two (2) from 7/8" tapped holes and two (2) from 1-1/8" bolt holes.
- 5. Remove the Rear Power Take Off Cover being careful to save the gaskets.
- 6. Using 1/2" std. Flat washers, with the Lockwashers, replace the eight bolts which held the Seat Frame Assembly to the top of the Transmission Housing. Make tight. This will prevent dirt falling into the Transmission.
- 7. Rework the seat Fender Side Sheets both sides by shortening as shown in Fig. #1.

B. MOUNTING THE SHOVEL FRAME - Figs. 3, 4, 5

- 8. Attach the Rear Tank Support (Fig. #7 Item #11) to the Rear Transmission Housing over the Power Take Off opening. The gasket must be in place. Use two (2) 7/8" NC x 2-1/4" lg. capscrews; six (6) 3/4" NC x 2" lg. capscrews in the Cover holes and two (2) 1-1/8" Dia. Special bolts with Nuts (Fig. #7 Item #15) thru the Transmission Housing. Be sure to use lockwashers under the nuts of all bolts, and under the heads of all capscrews used in a tapped hole.
- Remove the Bracket Caps (Fig. #7 Item #2) from the rear end of the Shovel Frame if they are bolted in place when received. (Fig. #7.Item #1)

Place a jack between the Shovel Main Frame pivot uprights, about central, to spread the Frame about 2 or 3 inches. Hook the crane to the center cross member and hoist the Frame over and onto the Tractor so the central, horizontal bolting pads rest on the Tractor cradle horizontal pads and so the rear Bearing Brackets butt around the Cross Bar of the Tank Support. The crane and sling must be capable of lifting 1500 lbs. safely to hoist the frame in place. Remove the jack and place a long clamp across the rear end of the Shovel Frame to draw it in so the rear Bearing Brackets fit in the grooves of the Tank Support Cross Bar.



Fig. 4 FOR MOUNTING INSTRUCTION L.H. OF TRACTOR

B. MOUNTING THE SHOVEL FRAME - (Cont.)

9. (Cont.)

Bolt the Bracket Caps onto the Frame Brackets and tighten securely so the Frame is anchored to the Tank Support. Then bolt the Frame to the Tractor Cradle at the center horizontal bolting pads. Use twelve (12) 3/4" NF x 2-1/2" lg. heat treated bolts with lockwashers under the nuts - six (6) on each side of the Tractor. Then bolt the front end of the Tractor Floorboard to the Shovel Frame using four (4) 1/2" NF x 1-3/4" lg. bolts thru the counterbored holes in the Frame uprights.

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Replace the bolts removed from the Front end of the Tractor Side Channels in Paragraph 3.

C. MOUNTING THE SEAT ASSEMBLY - Figs. 1, 3

- 10. After cutting the Seat Fenders as called for in Paragraph 7, attach to the seat, the rear Light Bracket (Fig. #7 Item #9) in the rear upper vertical holes on the Left Hand side of the Fuel Tank. Attach the Grab Iron Handles (Fig. #7 Item #8) to the upper rear holes, horizontally, on the Fuel Tank. Note the Left side Handle overlaps the upper hole of the Light Bracket. Use two (2) 3/8" NC x 1-1/2" and two (2) 3/8" NF x 7/8" bolts to attach the Handles. Use a 3/8" capscrew furnished with Tractor on the light Bracket.
- 11. The Pipe Supports (Fig. #10 Item #38) are attached to the Seat Frame Side Sheets and Fender, vertically, with the tapped hole downward. One Support on each side of the Seat Sides. The upper end is attached to the middle hole of the Seat Side and the Lower end in the corresponding hole in the Fender Sheet. Use four (4) 3/8" NF x 1-3/4" lg. bolts. The rear Light Cable Clip bolts under the upper end of the Left Pipe Support. This Clip is furnished with the Tractor.
- 12. Pass the crane sling thru the Grab Iron Handles and hoist the Seat Assembly back onto the Tractor. It now mounts directly onto two Seat Support Angles (Fig. #7 Item #13) which are bolted onto the rear end of the Shovel Frame by ten (10) 1/2" NF bolts x 2" lg. (On early models these angles were welded to the Frame). Use eight (8) 1/2" NC x 1-1/4" lg. bolts to attach the Seat to the Frame Angles at the rear and two (2) 1/2" NC x 1/2" lg. and two (2) 3/8" NC x 1/2" lg. capscrews at the front end to hold the Seat Fenders to the Frame. The Front capscrews must be inserted from the inside of the operator's seat. Do not omit these front bolts.

The Fuel Lines should now be re-connected to the Fuel Tank and the Fuel line Cocks opened. Replace the batteries. Attach and connect the Rear Light. Use two (2) 1/2" NF x l" lg. to attach the light to the Bracket.

D. MOUNTING THE HYDRAULIC RESERVOIR - Figs. 3, 4, 5

13. The valve (Fig. #15) has been factory assembled to the Reservoir (Fig. #8) using four (4) "0" ring oil seals between the Valve and Reservoir to prevent leakage. If the Valve is removed, be sure to protect all the openings against dirt.

To mount the Reservoir, place it upright, pass a sling around over the top and thru the legs to hoist it onto the Rear Tank Support. The Valve side faces forward. Bolt to the Frame using six (6) 1/2" NF x 1-1/2" lg. bolts with lockwashers.

E. ATTACHING WELDED PIPE MANIFOLDS - Figs. 3, 4, 5

14. Remove the plugs protecting the Valve ports, on each side, and clean the surfaces of the Valve to bolt the Manifolds in place. Remove any paint or burrs to insure a good fit. Place "O" ring oil seals in the grooves provided and bolt the manifolds in place. The R.H. Manifold (Fig. #10 Item #23) is different from the L.H. Manifold (Fig. #10 Item #24) by having a Bracket welded vertically to the pipes. This Bracket is where the Control Bell Cranks will be mounted. Use twelve (12) 1/2-13 NC Thd.



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E. ATTACHING WELDED PIPE MANIFOLDS - (Cont.)

14. (Cont.)

Capscrews x 1-1/2" lg. - six (6) in each manifold - with lockwashers. DO NOT USE PERMATEX OR OTHER SEALER between the valve and tank or between the Valve and the Manifolds. A sealer at these points may get in the Valve itself and will gum up the "O" rings.

Clamp the two long upper pipes of each manifold to the Pipe Supports bolted to the Seat Frame. Use Pipe Clamp (Fig. #10 Item #37) with a 3/8-16 NC Thd. Capscrew x 2-1/4" lg., one on each side.

- F. MOUNTING THE HYDRAULIC PUMP AND PUMP LINES Figs. 2, 3, 4, 5, 6
 - 15. To mount the Hydraulic Pump to the Radiator Frame first remove the pin in the front end of the engine crankshaft, then attach the Power Take Off Shaft (Fig. #9 Item #1) to the fan pulley by means of the International Coupling, Shaft Retainer, Felt Washer and Retainer, and Stud Nut Lock.

FILL THE COUPLING WITH A GOOD GRADE OF FIBRE GREASE BEFORE ATTACHING THE POWER TAKE OFF SHAFT.

The Pump Gear (Fig. #9 Item #5) is held to the Pump Shaft by a #21 Woodruff Key and a Gear Retainer (Fig. #9 Item #4) bolted to the Pump Shaft by a 3/8" NF x 1" lg. Capscrew with lockwasher. DO NOT DRIVE THE GEAR ONTO THE PUMP SHAFT OR THE PUMP WILL BE DAMAGED. IT MUST BE A SMOOTH FIT.

Fill the splined pump gear with a good grade of fibre grease before mounting the pump and aline the pump on the P.T.O. Shaft gently. The large 2" pipe port of the pump faces the left side of the Tractor. Bolt the pump flange to the Tractor Radiator Frame being careful not to bind the P.T.O. Shaft. Use four (4) 3/4"-10 NC Thd. Capscrews x 1-3/4" lg. with lockwashers.

16. Make the pump hydraulic connections to the Reservoir and Valve at this time. The larger welded 2" Suction Pipe (Fig. #10 Item #4) passes under the left side of the Tractor. The flanged end passes under, just inside the Shovel Frame, above the Cradle. The short end rests on the horizontal support welded to the Frame near the rear end of the Seat. Connect the pipe to the Reservoir with the short 2" Suction Hose (Fig. #10 Item #2): A nipple and 2" elbow screw into the Pump and are connected to the pipe by the longer 2" Hose. These Suction Hoses have Gaskets which must be placed inside their couplings. One Gasket to each Suction Hose. Be sure to have a Gasket between the Pipe Flanges also before bolting the pipes together. Use four (4) 5/8" NC x 3-1/4" lg. bolts in the Suction Line Flanges. Apply Plastic Lead Seal sealer on all male pipe threads only, except those on the Suction Hoses.

After all connections are leakproof tight, clamp the pipe by a "U" bolt to the horizontal support at the Reservoir end.

17. The 1-1/4" welded High Pressure pipe (Fig. #10 Item #20) passes under and just inside the Right side of the Shovel Frame with its flanged end forward, similar to the Suction Line Pipe. It, too, rests on a horizontal support near the Reservoir. Screw a 1-1/2" to 1-1/4" reducer, 1-1/4" nipple, elbow, and 1-1/4" straight Adapter Union on to the Pump, then connect to the pipe with the longer 1-1/4" High Pressure Hose (Fig. #10 Item #15). Apply Plastic Lead Seal on all male pipe thread only. These flanges use two (2) 5/8" x 3-1/4" bolts. Don't forget the Gasket in the Flanges. Connect pipe to R.H. manifold using the short 1-1/4" Hose (Fig. #10 Item #22) with an Adapter Union.

After all connections are leakproof tight, clamp the pipe by a "U" bolt to the rear horizontal support.

G. MOUNTING PIPE CLAMPS & HOSE GUARD - Figs. 2, 3, 4

- 18. After the pump lines have been clamped at the rear, attach the Front Suction Line Bracket (Fig. #10 Item #30) and the Front High Pressure Line Bracket (Fig. #10 Item #32) by removing the two middle bolts on each side of the Crankcase Guard. Use two (2) 3/4" NF x 2" lg. bolts to hold each Bracket to the Crankcase Guard and Tractor Side Channels. Note the hole spacing, in the Brackets, for the "U" bolt clamps so that the wider "U" bolts are used on the suction lines. Clamp both lines to the Brackets using the proper "U" bolt.
- 19. The Hose Guard (Fig. #7 Item #7) passes under the front radiator frame and above the Shovel Frame Crossmember. The bottom plate of this Guard is recessed to fit around the Crankcase Guard and is in the rear side of the Guard. Bolt the Guard to the underside of the Tractor Side Channels, first three holes on each side. Use six (6) 3/4" NF x 1-3/4" lg. bolts with lockwashers. NOTE: Do not attach the Hose Guard until the hoses have been connected tightly and the pipes clamped with "U" bolts at each end.

H. RADIATOR GUARD MOUNTING - Figs. 3, 4

- 20. The Radiator Guard (Fig. #7 Item #10) may be mounted anytime prior to mounting the Boom. Bolt it to the upper sets of holes in the front end Channel Crossmember support of the Shovel Frame. NOTE: The Radiator Guard must be attached before the boom, as it has two (2) large side holes so a long steel bar can be inserted to support the front end of the Boom or Bucket Control Rods when they are assembled to the Frame. Use six (6) 1/2" NF x 1-1/2" bolts to attach the Guard on Early Models. Later Models use 5/8" Dia.
- 1. MOUNTING THE CONTROL LEVERS AND RODS Figs. 3, 5
 - 21. Bolt the Bearing Block (Fig. #11 Item #4) to the right outside of the Shovel Frame, with its boss inward, just above the elongated hole in the Frame. Use four (4) 1/2" NF x 1-3/4" lg. bolts.
 - 22. Pass the Boom Lever Hub (Fig. #11 Item #3) on the inside boss of the Bearing Block and insert the shaft of Bucket Lever (Fig. #11 Item #2) thru the Bearing Block from the inside. Slip the cast Lever Arm (Fig. #11 Item #5) on the outside end of the Bucket Lever shaft. Key it on with a #18 Woodruff Key and lock it with a 3/8" NF x 2" lg. bolt.
 - 23. Next mount the Bell Cranks to the bracket on the R.H. pipe manifold.

NOTE: Be sure to mount Bell Crank #104888 (Fig. #11 Item #14) over Bell Crank #105075 (Fig. #11 Item #16). These part numbers are on the Bell Crank Castings. Be sure to place Bell Crank #105075 so its number is downward and place Bell Crank #104888 so its number is upward. Put the brass Spacer Washer (Fig. #11 Item #15) between the Bell Crank hubs. Pass the Pivot Pin (Fig. #11 Item #12) thru the bracket, Bell Cranks and Spacer Washer and lock underneath with a cotter pin.

24. The top spool of the Valve is spring loaded so it is automatically in neutral. This is the Bucket Control and will be the starting point to assemble the control rods. Assemble the 1/2" Dia. x 6" lg. threaded rod, with a straight clevis (Fig. #ll Item #17) on each end, to the upper valve spool and the upper arm on the Top Bell Crank. It will not be necessary to force the clevises on the arms if the Bell Cranks were assembled properly.

NOTE: Lock Nuts must be back of all clevises and all clevises are fastened to the levers by means of a pin and cotter. All clevis pins must be about parallel to each other so they will not bind. Do not use the cotter pins until the linkage assembly is complete.

Adjust the clevises on the rod until the numbered arm of the Bell Crank is approximately at right angles to the side of the Frame.

Next assemble the 1/2" Dia. x 43-3/8" lg. Rod (Fig. #11 Item #8) from the Upper Bell Crank's numbered arm to the Arm keyed on the Bucket Lever.

I. MOUNTING THE CONTROL LEVERS AND RODS - (Cont.)

24. (Cont.)

Use an offset clevis on the Bell Crank end. The tapped hub of the offset clevis is downward as shown in the exploded part list picture (Fig. #11 Item #11). A straight clevis and lock nut screw on the lever end. Adjust the clevises so the Bucket Lever will be vertical.

25. Next connect the lower Valve Spool to the lower Bell Crank using the shortest 1/2" Dia. threaded Rod (Fig. #11 Item #18) with straight clevises (Fig. #11 Item #6) on each end. Then connect the other (numbered) Arm of the lower Bell Crank to the Boom Control lever. Use the longest 1/2" Dia. threaded Rod (Fig. #11 Item #9) with offset clevises. The clevis on the Bell Crank end of the rod must have its shank upward. Now move the Boom Lever until the lower Valve Spool is in the neutral or Hold position. With both Valve Spools in neutral, adjust the clevises on the rods so both Hand Levers are vertical and the Bell Crank arms are parallel and in line, one above the other; the numbered arms of the Bell Cranks should be close to right angles to the side of the Shovel Frame. Try the Hand Levers to see that they operate freely and open and close the Valve Spool fully. If not, adjust clevises. There are no critical adjustments to maintain on this control linkage other than to prevent the clevises rubbing or binding and the spools must open and close fully. When these conditions are met, insert a cotter pin in each clevis pin and lock. Always insert clevis pins from the top of the clevis wherever the pins are vertical.

J. MOUNTING THE BOOM - Figs. 3, 4

26. The forked end of the Boom (Fig. #12 Item #2) pivots at the upper front holes of the Frame Uprights. Screw boiler clamps or heavy service "C" clamps, capable of holding 1500 lbs., to the upper edge of the boom about 57" from the front end, one on each side. Hook the crane, by a chain sling, to the clamps and hoist the boom in place. Be sure the crane, sling and clamps are capable of lifting the boom safely and not let go. Line up the Boom and the Frame pivot holes, inspecting each side to see that they have a good fit, then drive in the Boom Pivot Pins (Fig. #12 Item #1) from the outside. Line up the locking bolt holes and lock in place with a heat treated bolt - 3/8" NC x 4" lg.

Push a long steel bar, about 1-1/2" Dia. about 5 ft. long, thru the side holes in the Radiator Guard. Lower the front end of the Boom to rest on this bar. The ends of the bar should protrude sufficiently so each side of the Boom rests on it.

K. MOUNTING THE BOOM HOIST CYLINDER - Figs. 3, 4, 5

27. Slip a Pry Bar thru the cleats of one of the Upper Track Treads so one end rests in one of the bolt head clearance holes in the Shovel Frame, just above the cradle bolting pad.

Hook the crane, by a clamp, to the Poppet Valve Boss on the rear end of the Boom Hoist Cylinder (Fig. #13) so the pipe ports will be upward and toward the rear. Hoist the cylinder in place and allowing the front end to rest on the bar, line up the rear pivot with the Frame Pivot. The Frame Pivot is just back of the cradle pad on the outside of the Frame. Insert the eared Pivot Pin (Fig. #7 Item #3) and bolt in place. Use a 1/2" NC x 1" lg. capscrew with lockwasher.

Repeat above to mount cylinder on opposite side.

28. Before attaching the Boom Hoist to the Boom, connect the Cylinders to the Pipe Manifolds. First see that 1" straight Female Adapter Unions (Fig. #10 Item #25) are screwed tightly on the 1" pipes of the manifolds - the two lower pipes on each side of the Valve. Then screw the two (2) 1" x 42" lg. High Pressure Hoses (Fig. #10 Item #26) into the pipe ports (using a sealer) of the cylinder; the thread protectors must be removed first. Now connect the hose from the upper, forward, cylinder port to the Adapter Union on the lower inner manifold pipe. Then connect the rear cylinder port to the upper outer 1" pipe of the manifold. Be sure to use insoluble plastic lead seal or equal on all male pipe threads. Repeat on cylinder on opposite side.



1. M. S.

K. MOUNTING THE BOOM HOIST CYLINDER - (Cont.)

29. Now the Boom Hoist Cylinders may be attached to the Boom. Hook a chain fall around the cylinder piston rod end, being careful not to damage the bushing or the Rod, and pull the piston rod out about 14" or 18". Do the same on both cylinders. Then hook the crane on the front crossmember of the Boom and raise it slightly to remove the bar in the Radiator Guard. Then lower the front end of the Boom so the Cylinder Piston Rod End will line up with the Boom Hoist Pivot near the central part of the Boom. It may be necessary to use a pry bar to turn the Piston Rod slightly and to raise the end of the cylinder slightly to complete the alignment. Do not damage the bushing in the Rod End. Attach the Piston Rod to the Boom with a 2" Dia. x 6-1/2" lg. Pivot Pin (Fig. #12 Item #4). Bolt the pin to lock with heat treated bolt 3/8" NF x 3-1/2" lg. on the boom pivot. Note the grease hole of the pin faces inward. Repeat above on opposite cylinder. Then let the Boom down and unhook the crane.

L. MOUNTING THE BUCKET CONTROL CYLINDERS - Figs. 3, 4, 5, 14

30. Replace the steel bar thru the side holes in the Radiator Guard. Hook the crane onto the Bucket Control Cylinders so it will swing in place with the pipe ports downward and to the rear. Line up the Cylinder Pivot hole on the upper rear Frame pivot hole. Let the piston rod rest on the Steel bar in the Radiator Guard. Place the Sleeve (Fig. #7 Item #5) on the Bucket Cylinder Pin (Fig. #7 Item #4) up to the head of the pin, and drive it thru the holes from the outside. Lock in place by using 1-1/2"-12 Thd. slotted nut with 5/16" x 2-1/2" cotter pin.

Repeat above to mount the opposite cylinder.

31. See that 3/4" x 45° Adapter Unions are screwed into the pipe ports of both Cylinders. Use sealer on male threads. Be sure thread protector plugs are removed. Screw the 3/4" x 39-1/4" lg. High Pressure Hoses (Fig. #10 Item #28) into each 3/4" elbow of both pipe manifolds and then connect the hoses to the Adapter Unions in the Bucket Cylinders. Make all connections tight.

M. ATTACHING THE BUCKET - Figs. 3, 4

32. Place the Bucket (Fig. #12 Item #3) on the floor in front of the Tractor in its natural position with the cutting edge forward. Hook the crane on the Boom and raise it up enough to line up the front pivot holes with the Bucket pivots. It may be necessary to wedge up the back of the Bucket for perfect alignment. Attach the Boom to the Bucket with the Boom Hinge Pins (Fig. #12 Item #6) 2-1/2" Dia. x 5-1/2" lg. Drive in from the outside and bolt in place with heat treated bolt 3/8" NF x 4" lg.

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33. Lower one Bucket Control Rod at a time and connect it to the Bucket using Bucket Control Hinge Pin (Fig. #14 Item #16) 1-3/4" Dia. x 4-3/8" lg. Drive in from the outside after the Rod End and Bucket Pivots are lined up. Bolt pins in place with a heat treated bolt 3/8" NF x 3" lg. Remove the steel bar thru the Radiator Guard side holes.

N. TEST HYDRAULIC SYSTEM

- 34. Fill the Reservoir to the top (25 Gals. approx.) with a good grade of SAE 10 Motor Oil or equal. Start the Tractor engine, being sure the levers are in neutral. Pull back on the Boom Control Handle to raise the Bucket off the ground. This is the long outside lever. Raise the Boom to full height and lower several times. With the Boom Lever returned to neutral or Hold position while the Bucket is well off the ground, push the Bucket Lever forward to dump the bucket. This is the shorter inner lever. Dump and retract the bucket several times. Repeat raising, lowering, dumping and retracting the bucket at full open throttle several minutes. Then re-insert the long steel bar thru the Radiator Guard, lower the Boom gently to rest on the bar again and shut off the engine.
- 35. Inspect the entire Hydraulic System connections for leaks. All connection points must be tight and leakproof to prevent air or water from being sucked into the system and to prevent oil from leaking out.

N. TEST HYDRAULIC SYSTEM - (Cont.)

35. (Cont.)

Excessive air sucked into the system will cause the oil to foam and overflow and cause the Shovel to operate in a slow jerky manner.

Low oil level in the Reservoir or a dirty Reservoir Screen will cause cavitation and the pump will howl, interfering with the smooth action of the Bucket.

Water in the system may cause corrosion in the pump and cylinders at high velocities.

For persistent leaks, clean the joint and apply aviation Permatex or use a litharge and glycerin mixture on the threads.

36. When all hydraulic connections are tight refill the Reservoir to the correct level marked on the Bayonet Gage. The Gage is attached to a pipe plug screwed into the top of the Reservoir.

Always refill the reservoir with hydraulic oil after testing the Hydraulic System when work has been done on it because oil will have been drawn into the pipes, hoses and cylinders, thereby reducing the level in the tank.

IMPORTANT. When checking the hydraulic oil level in the Reservoir always have the Bucket retracted and resting on the ground.

0. MOUNTING THE PUMP GUARD - Figs. 3, 4

37. The Pump Guard is attached last, after the hydraulic system has been checked, so the pump connections could be observed for leaks.

Fasten the Pump Guard (Fig. #7 Item #6) to the Front of the Frame just under the Radiator Guard. Use four (4) 5/8" NF x 1-1/2" bolts with lockwashers.

P. PREPARING THE SHOVEL FOR OPERATION

38. Inspect the entire unit to be sure all nuts are tight with lockwashers.

Be sure all clevis pins have cotter keys and the levers operate freely.

Check the oil level in the Reservoir and be sure all connections are leakproof.

Grease the entire unit using the GREASE CHART Fig. #16 as a guide; grease every eight (8) hours thereafter with a good grade chassis lubricant.

Check the Tractor water and oil levels. Check batteries and wiring.

When the Tractor & Shovel have been checked and all work completed, the unit may be put to work.

OPERATING THE SHOVEL

When first using a machine of this type, the operator should take his time, work carefully at slow speed, and gradually become accustomed to the machine. Operating speed and skill will be attained easier by starting slowly. The time required to learn the "feel" of a machine is well spent in preventing possible accidents to the shovel as well as to the operator and other personnel.

A CAREFUL OPERATOR IS THE BEST INSURANCE AGAINST AN ACCIDENT

The Shovel operates on oil pressure; oil is drawn from the reservoir thru the suction line by the pump, and forced thru the high pressure lines into the valve which directs the flow into the cylinders. The oil circulates as soon as the engine is started.

The Valve is controlled by the operator with the two levers located at his Right Hand near the seat.

The longer, outer, Boom Control Lever controls the flow of oil to the Boom Hoist Cylinders which raise, hold, lower or float the bucket.

The shorter, inner, Bucket Control Lever controls the flow of oil to the Bucket Control Cylinders which dump or retract the Bucket.

BOOM CONTROL LEVER:

The Boom Lever has four positions which can be felt, distinctly, by the Operator as the lever is moved.

Pull the Boom Lever back, toward the Operator, to the last poppet to RAISE the Boom and Bucket.

Push the lever forward, one notch ahead of raise position, to the HOLD or NEUTRAL position. Placing the Boom Lever in HOLD position will stop and hold the Bucket at any height of its travel.

The LOWER position is the next poppet felt ahead of the hold notch and is used to exert down pressure on the Bucket or Backfiller Blade cutting edges.

The extreme forward poppet is the FLOAT position and is commonly used to lower the Bucket. It allows the Bucket or Backfiller Blade to move up and down freely and follow variations in grade lever.

Always return the Boom Lever to the NEUTRAL or HOLD position before shutting off or starting the TRACTOR ENGINE.

BUCKET CONTROL LEVER:

Push the Bucket Lever forward, away from the operator to dump or OPEN the Bucket. Release the Lever and it will automatically return to neutral allowing the Bucket to remain dumped.

Pull the Bucket Lever back, toward the operator, to retract or CLOSE the Bucket. Just release the Lever and it will return to Neutral holding the Bucket retracted or CLOSED.

The Bucket may be stopped and held in any position of its dumping arc by returning the Bucket Lever to its neutral position.

LOADING THE BUCKET:

When loading the Bucket, the normal action is to drive the Tractor forward, with the Bucket fully CLOSED or retracted and the cutting edge at digging level. The operator may manipulate the Boom lever slightly, raising or lowering the Bucket, to hold a good grade. Whether stripping or digging a pit or excavating for a foundation, it is better to take a shallow cut and let the forward movement of the Tractor fill the Bucket. This helps to maintain grade level over a longer area. If the surface is hard and the Bucket has difficulty entering, move the Boom Lever into LOWER position thus exerting down pressure on the cutting edge as the Tractor moves slowly forward. LOADING THE BUCKET - (Cont.)

As the Bucket fills, pull back on the Boom Lever and the cutting edge-will crowd forward, into the face of the cut, exclusive of the forward travel of the Tractor. This is especially noticeable when cutting a bank or hill.

When digging into a stock pile or other loose material, the forward movement of the Tractor and the "Tip-back" feature will give an action similar to a dipper stick shovel and as the Bucket raises out of the cut, it will automatically tip back to maintain a full load with minimum spillage.

TRANSPORTING LOADS:

When the Bucket is full, turn or back the Tractor away from the working area and transport the load with the Bucket held about four feet (4') off the ground. Never transport loads with the Bucket fully raised. The nearer the ground the bucket is held the better the stability, especially on side slopes and hills. The traveling speed will depend on the length of haul and the kind of surface over which the Tractor must travel. Rough terrain calls for slow speed.

DUMPING THE LOAD:

When dumping into a truck or bin, raise the bucket so it clears the top edge by about three feet (3'). Move the Tractor up so the Bucket is inside the dumping area. With the Boom Lever in the HOLD or NEUTRAL position, push forward on the Bucket Lever, thus emptying the load. The load may be dumped entirely or part at a time by manipulating the Bucket Lever. Dumping the load slowly will ease the shock of suddenly added weight to the Truck body. The Bucket may be partially opened and closed quickly several times to clear sticky material from the Bucket.

BACKFILLING AND BULLDOZING:

The Bucket can be removed and replaced with a Backfiller Blade for bulldozing operations. The Backfiller Blade pivots at the same points as on the Bucket. Use the Backfiller Blade to spread material, strip, level, and to backfill ditches and foundations. Usually, when bulldozing the FLOAT position is best, especially when dragging to spread material evenly. Down pressure can be exerted on the Blade for easier penetration in hard soil.

The Backfiller Blade may be dumped and retracted similar to the Bucket. This feature will be helpful when working wet clay or other sticky material.

MAINTENANCE SECTION

Regardless of the care used in the design and construction of any type of equipment, there are many conditions that cannot be completely safeguarded against without interfering with reasonable accessibility and efficient operation. The complete observance of one simple rule would prevent many serious injuries each year. That rule is--

> "NEVER ATTEMPT TO CLEAN, OIL OR ADJUST A MACHINE WHILE IT IS IN MOTION."

> > --National Safety Council--

NEVER WORK UNDER THE BOOMS OR BUCKET UNLESS THEY ARE BLOCKED AND THE ENGINE IS SHUT OFF.

The operating life of the Shovel may be considerably extended and fewer shutdowns will be experienced if the unit is properly serviced at regular intervals. Often major repairs or shutdowns can be avoided by regular inspections and trouble corrected while it is of a minor nature. Study the Parts List Drawings to become acquainted with the working parts and their relation to each other.

HYDRAULIC SYSTEM:

Never attempt to start the engine without oil in the Hydraulic System.

The hydraulic system consists of an Oil Reservoir, a Gear-type Pump, a Control Valve, two (2) Boom Hoist Cylinders, two (2) Bucket Control Cylinders and Connecting Hoses and Fittings.

- 1. Check all hose and fitting connections for leaks every eight (8) hours of operation.
- 2. Check the reservoir oil level every eight (8) hours of operation. It should be up to the FULL mark on the bayonet gage.
- 3. Change the hydraulic oil every two hundred (200) hours of operation.
- 4. Clean and flush the hydraulic system every four hundred (400) hours of operation.

DRAINING AND CLEANING THE HYDRAULIC SYSTEM:

- 1. Always drain and clean the hydraulic system after work has been done with the Shovel and while the oil is still warm. Warm oil will flow easier carrying more dirt and sludge with it.
- 2. Raise the Boom to full height with the Bucket dumped and block or chain it in this position.
- 3. Remove the clean-out cover and breather from the top of the reservoir. Clean the breather to permit passage of air.
- 4. Place a 25-gallon container under the reservoir drain plug and drain the reservoir.
- 5. Disconnect the cylinder hoses at the adapter unions and drain the cylinders and hoses.
- 6. Break the suction line and pressure lines at the adapter unions on each size of the pump and operate the control levers to drain the valve thru the pressure line.
- 7. Flush out and clean the bottom of the reservoir being careful not to force dirt into the suction line or the valve.

DRAINING AND CLEANING THE HYDRAULIC SYSTEM - (Cont.)

- 8. After flushing the reservoir reach inside and remove the suction line strainer. Wash the strainer in clean gasoline. A dirty strainer will cause cavitation and prevent the shovel from operating smoothly.
- 9. Reconnect all hoses and flanges. Be sure the flange gaskets are in place. Replace the drain plug in the reservoir. Refill the reservoir to the top with SAE #10 Motor Oil.
- 10. Start the engine and run at idle speed for a few minutes. Then retract and dump the bucket several times to pump oil in the Bucket Control Cylinders.
- 11. Place the Boom Lever in "raise" position to pump oil in the boom cylinders. Then remove the blocks or chains holding the Boom at full height. Do not work or stand under the Boom or Bucket when the blocks or chains are removed.
- 12. Operate the shovel by raising, lowering, dumping and closing the bucket five or six times to remove air trapped in the line.
- 13. Add oil in the reservoir to be sure it is up to the FULL mark on the bayonet gage. This is necessary to replace oil drawn into the cylinder and hoses.
- 14. Check all connections for leaks and make tight. Replace the clean-out cover and breather cap.

CARE OF THE HYDRAULIC SYSTEM:

NOTE: Excessive air being sucked into the system thru a faulty connection or hose will cause the oil to foam, retard oil circulation, and the shovel will operate in a slow, jerky manner. The pump will be noisy and howl. A faulty connection may allow air to be sucked into the system although oil may not leak out.

A dirty strainer will retard the flow of oil causing cavitation and the shovel will operate with slow, jerky movements and the pump will be noisy.

To "Purge" or "Bleed" the system of air, operate the boom and bucket slowly until the oil ceases to foam. The excess air will pass out thru the breather automatically. This applies only if all connections are tight and do not suck air into the system.

Small amounts of water will evaporate when the oil is warm, if the clean-out cover is left off and rain falls in the reservoir for a length of time, drain the reservoir. Water will cause damage to the pump and cylinder if not removed.

CARE OF THE PUMP:

No adjustments on the pump are necessary. Contact The Frank G. Hough Co. Dealer for details on the repair or replacement of the Hydraulic Pump.

CARE OF THE VALVE:

Refer to the Parts List Drawing to become acquainted with the design and working parts of the valve. The plungers are honed into the housing and the manufacturer does not recommend field replacement of the plungers. However, springs, gaskets, etc. may be replaced.

No adjustments on the valves are necessary unless the valve has been disassembled for repair to the relief valve.

To safeguard the pump, the valve pressure relief must be set at no more than 1000 lbs. oil pressure when the valve is reassembled.

CARE OF THE VALVE - (Cont.)

To adjust the pressure relief, insert a gauge of at least 2500 lbs. capacity into the small pipe port in the left hand pipe manifold casting. This casting is bolted to the left side of the valve. Start the engine, keeping it at idle throttle and raise the boom high enough to clear the ground when operating the bucket thru its dumping cycles. Remove the acorn nut from the right side of the valve. Operate the bucket by alternately dumping and retracting the bucket while opening the engine throttle gradually. Note the oil pressure indicated and do not allow it to exceed 1000 lbs. Adjust the screw found under the acorn nut, turning it counter-clockwise to reduce the pressure. Turning it clockwise increases the pressure.

When the screw is set at 1000 lbs. pressure relief, at full open throttle with the bucket being operated in its dumping cycle, the screw may be locked with the jam nut and the acorn nut replaced.

NOTE: WHEN CHECKING THE VALVE PRESSURE RELIEF, THE CYLINDER PISTONS MUST NOT BE PERMITTED TO REACH EITHER EXTREME END OF THEIR STROKE AS IN EITHER OF THESE TWO POSITIONS, OIL IS BY-PASSED TO RELIEVE THE PUMP AND THE CORRECT READINGS CANNOT BE OBTAINED.

CARE OF THE CYLINDERS:

These hydraulic cylinders are so constructed that the packing is self-sealing and does not require adjusting.

If oil escapes past the packing and wiper seals, the packing must be replaced. A light film of oil should adhere to the piston at all times.

To replace the packing, proceed as follows:

1. Disconnect the hoses and drain the cylinder. Remove the cylinder from the shovel.

- 2. Place the cylinder upright and remove the capscrews from the packing gland.
- 3. Remove the bolts holding the stuffing box to the cylinder tube.
- 4. Withdraw the entire piston rod assembly from the tube and detach the piston by removing the nut holding the head to the rod.
- 5. Slide the stuffing box, and then the packing ring and packing, down over the threaded end of the piston rod to remove. Note the "0" ring oil seal between the stuffing box and the tube.
- 6. If the packing gland dirt seal needs replacing, slip it down over the rod also.
- 7. To replace packing, assemble in reverse order of above. When tightening the stuffing box, be sure the "O" ring is in place and in good condition. The nuts holding the stuffing box to the cylinder tube must be drawn up evenly and tight to insure a metal-to-metal fit at all points.
- 8. Tighten the capscrews in the packing gland securely. A light film of oil should adhere to the piston rod as it emerges from the cylinder.



MAIN FRAME GROUP

ITEM	PART	PART PART NAME	QTY.	lst Used on Shovels of Serial Numbers		
NO.	NO.			FROM	THRU	
1	104765	Main Frame	1			
$\overline{2}$	105286	Bearing Bracket Cap	2			
3	104778	Pin - Hoist Cylinder to Frame	2			
4	104901	Pin - Bucket Cylinder to Frame	2			
-5	104903	Sleeve - Bucket Cylinder Pin	2			
6	104836	Bumper - Pump Guard	1			
7	104965	Hose Guard	1			
8	105 3 12	Grab Iron Handle	2			
9	106225	Bracket - Rear Light Mounting	Ţ			
10	104315	Radiator Guard	1 1			
11	104478	Tank Support				
12	104777	Bushing - Boom Pivot	2			
13	106731	Seat Support Angles.	2			
14	105944	Bolt - Bearing Bracket Caps.	4			
15	104910	Special Bolt - Tank Support to Tractor -	9			
	104005	1-1/8-12 That	r G			
	104907	Capscrew - Heat Treated - Tank Support	0			
	104909	Gargerew - Heat Treated - Tank Support	19			
	104127	Concorrent Heat Treated - Frame to Cratte.	A A			
	104128	Vapscrew - neat freated - beat to frame	ľ			

Be sure to give the Shovel Serial Number with the Part Number and name of items needed when ordering repair parts.



Fig. 8 RESERVOIR GROUP

RESERVOIR GROUP

ITEM	PART	PART QTY	PART QTY. PART NAME		lst Used on Shovels of Serial Numbers	
		_		FROM	THRU	
1 2 3	104475 104480 102510 102527	1 1 1 4	Oil Tank Complete. Oil Tank . Gasket . Adapter Cover . Bolt - Cover - 1/2-20 NF x 5/8 Lg. with			
- 4 5 6 7	1029 49 104939 102561	1 1 1	Filler Cap			

Be sure to give the Shovel Serial Number with the Part Number and name of items needed when ordering repair parts.

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Fig. 9 POWER TAKE OFF GROUP

POWER TAKE-OFF GROUP

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ITEM NO.	PART NO.	DART NAME	ΩТУ.	lst Used on Shovels of Serial Numbers	
		FAIL NAME	422.	FROM	THRU
1/2	104045	P.T.O. Drive Shaft	1 1 1		
3)4)5/id/7	102928 104283 104044*	Washer - 5/8 Stu	1 1 1		
. <u> </u>	<u> </u>	* NOTE: See THE FRANK G. HOUGH CO. DEALER	for det	ails on	

repairs and replacement of this pump.

Be sure to give the Shovel Serial Number with the Part Number and name of items needed when ordering repair parts.



Fig. 10 HYDRAULIC GROUP

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HYDRAULIC GROUP

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ITEM	PART	PART NAME	QTY.	lst Used on Shovels of Serial Numbers					
NO.	NO.		•	FROM THRU					
	SUCTION LINE - RESERVOIR TO PUMP								
1 2 3 4 5 6 7 8 9 10	$104475 \\ 106255 \\ 106796 \\ 104990 \\ 106258 \\ 106250 \\ 106259 \\ 106259 \\ 103407 \\ 104044$	Reservoir - (See Page 22). Hose - 2" Suction. Gasket - Suction Hose Coupling Welded Pipe Ass'y - 2" Gasket - Pipe Flange Pipe . Hose - 2" Suction. Elbow - 2" x 90° Nipple - 2" Ex. Heavy Short. Pump (See Note on Page 24).	1 2 1 1 1 1 1						
		HIGH PRESSURE LINE - PUMP TO VALVE	PIPES						
11 12 13 14 15 16 17 18 19 20 21 22	103405 GH-584 103372 105012 105002 104998 106644 105003 GH-584 106227	Reducer Bushing - 1/1/2 to 1-1/4							
		LINES - VALVE TO BOOM HOIST CYLI	NDERS						
23 24 25 26 27	106252 106251 106493 103 376	Pipe Manifold R.H. Side Bolted to Valve Pipe Manifold L.H. Side Bolted to Valve Adapter Union - 1" Straight Female Hose - 1" Hi Press. x 42" Lg Reducer Bushing - 1-1/4 To 1 (Cylinder)	1 1 4 4 2	-					
	· · · · · · · · · · · · · · · · · · ·	LINES - VALVE TO BUCKET CONTROL CY	LINDER	5					
23 24 28 29	106252 106251 103383 103380	Pipe Manifold - R.H. Side Pipe Manifold - L.H. Side Hose - 3/4 Hi Press. x 39-1/4 Lg Adapter Union - 3/4 x 45°	1 1 4 4 4						
		AUXILIARY PARTS							
30 31 32 33 34 35 36 37 38 39	$\begin{array}{c} 106144\\ 104931\\ 106147\\ 104930\\ 106201\\ 106407\\ 106408\\ 106215\\ 106214\\ 105086\\ \end{array}$	Bracket - Front Suction Pipe Support "U" Bolt - Suction Pipe Clamp Bracket - Front Pressure Pipe Support "U" Bolt - Pressure Pipe Clamp Valve Mtg. Studs "O" Ring Gasket - 1/8 x 1-5/16 I.D. x 1-9/16 O.D Manifold "O" Ring Gasket - 1/8 x 1-5/8 I.D. x 1-7/8 O.D Manifold Pipe Clamp - Manifold Pipes to Spacer	1 2 4 8 2 2 2 2 12	s.					

Be sure to give the Shovel Serial Number with the Part Number and name of items needed when ordering repair parts.



Fig. 11 CONTROL LEVER GROUP

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CONTROL LEVER GROUP

ITEM NO.	PART	PART NAME	PART PART NAME QTY	QTY.	lst Used of Seria	on Shovels al Numbers
	NO.			FROM	THRU	
1 2 2 3 4 4 7 8 9 4 1 2 4 5 4 7 8 9	$\begin{array}{c} 103634\\ 104884\\ 106666\\ 106665\\ 104887\\ 104890\\ GH-211\\ 104877\\ 104879\\ GH-212\\ 104879\\ GH-212\\ 104891\\ 104882\\ 104882\\ 104888\\ 104880\\ 105075\\ 105308\\ 102681\\ \end{array}$	Handle - Control Levers	2 1 1 5 8 1 1 8 3 1 1 1 1 1 1 3	70001	70026	

Be sure to give the Shovel Serial Number with the Part Number and name of items needed when ordering repair parts.

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Fig. 12 BOOM & BUCKET GROUP

BOOM & BUCKET GROUP

ITEM	PART	PART NAME		lst Used on Shovels of Serial Numbers	
NO.	NO.		U =	ፑR OM	THRU
1 2 3 4 5 6 7 8 9	104430 104416 104016 104429 <u>104419</u> <u>104027</u> / 104028 104028 104028 104038 104039 104513 106576 104049	Pivot Pin - Boom to Frame Boom Complete	ช า า ช ช ช า า า ช ช ช		

Be sure to give the Shovel Serial Number with the Part Number and name of items needed when ordering repair parts.

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BOOM HOIST GROUP

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ITEM	PART	ይልጽጥ እልΜ Έ	OTY.	lst Used on Shovels of Serial Numbers	
NO.	NO •		U	FROM	THRU
1 2 3 4 5 6 7 8 9 9 9 9	104249 105573 102493 $GH-9011A1$ 103083 103080 106402 104267 104259 105570 104260 105565 103355 103355	Boom Hoist Complete (obsolete - order 105573) Boom Hoist Complete (Uses Packing with Five "V" rings) Poppet Valve Spring - Poppet Valve "O" Ring - Poppet Gasket Plug - Poppet Valve Nut - Piston Piston Rings Piston Assembly Cylinder Cap (For Packing with Three "V" rings used in 104249 Hoist) Cylinder Cap (For Packing with Five "V" rings used in 105573 Hoist) Spacer Potenting Set (When used for 104249 Hoist	જ જજજજજજ નુજજ જ જજ	70001 70051 70001 70051	70050 up 70050 up
11 12 13 14 15 (~~)16 16 17 18 19 20 21 22	105562 102491 104256 104255 102513 104265 105580 105589 104255 106232 106229	<pre>Packing Set (When used for 104445 holts: discard one Leather & one rubber "V" ring) Packing Gland</pre>	પ્રિય્ય ય પ્રય મ્ ઝઝઝ્ઝ્ઝ	70001 70051	70050 up

Be sure to give the Shovel Serial Number with the Part Number and name of items needed when ordering repair parts.

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BUCKET CONTROL CYLINDER GROUP

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a.

ITEM	PART	PART	PART NAME	DART NAME		QTY.	lst Used of Serial	on Shovels Numbers
NO.	NO.			FROM	THRU			
$ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 6 \\ 7 \\ 6 \\ 7 \\ 10 \\ 11 \\ 12 \\ 13 \\ 8 \\ -14 \\ 16 \\ 17 \\ 17 \\ 17 \\ 17 \\ 17 \\ 17 \\ 17 \\ 17$	$\begin{array}{c} 105622\\ 104239\\ 104236\\ 102969\\ 107064\\ 104240\\ 105623\\ 103355\\ 105562\\ 103351\\ 102513\\ 102513\\ 104242\\ 104239\\ 104239\\ 10423\\ 106228\\ 104026\\ 106231\\ 104048\\ \end{array}$	Bucket Control Cylinder Complete	୪୪୮୫୫୪୪୪୪୪୪୪୪୪୪୪୫	70001 70051	7005 0 up			

N.

Be sure to give the Shovel Serial Number with the Part Number and name of items needed when ordering repair parts.

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ITEM NO.	PART NO.	PART NAME	QTY.	DESCRIPTION
	106492	Valve Complete	1	MU 1
1	106801	Spring	1	4501 v 183
2	106802		1	514x217
3	106803	Gasket	ī	A401x46
4	106804	Spring Guide	1	416x26
5	106716	Jam Nut	1	A249x3
6	106806	Acorn Nut	1	A427x6
7	106630	Adjusting Screw	1	A232x13
8	104321	Cap	1	514x187
9	106809		1	A401x65
10	106810	Machine Screw.	0 1	A122X4
10	106812	Ponnot Can Agely	1	ADYDXDD 757K7
13	106813	Snring	ì	4501x174
14	106814	Detent Poppet.	2	747x8
15	104358	Snap Ring.	$\tilde{2}$	812x64
16	106816	Washer	ĩ	A506x4
17	106817	Poppet Housing Flange	1	M3x52
18	106818	Snap Ring	1	812x82
19	106819	Pipe Plug	1	A299x4
20	106820	Plunger Piston	1	751x13
21	106821	Plunger Seat	1 7	414X33
22	106822	Pipe Piug.	0 1	ADUUX4 745K9
20	106823	Flow Control Ass'y	1 1	812x64
05	104000		1	A407x4
- 26	106826	Dash not Plunger	ī	754x5
27	106827	Spring	ī	A501x164
28	106828	"O" Ring Gasket.	1	A395x27
29	106829	Spring	1	A501x146
30	106830	Cap	1	514x212
31	106831	Plunger Ass'y	1 L	512x116K2
32	106691		κ 1	AODXX41
33	106833	Plunger Ass'y.	1	B525x191
04 35	106835	Relief Valve Plunger	ī	415x46
36	106836	Set Screw	2	A181x3
37	106837	Gasket	1	A401x4
38	106838	Machine Screw	2	A152x1
39	106839	Relief Valve Seat	1	414x35
40	106840	Machine Screw	8	A151x3
41	106841	Seal Retainer	2	521X12
42	106842	Plunger Eye - Boom Valve Plunger	1	A466x10
43	106843	Seal Ring - Boom Valve Plunger	1	512x116
44	106845	Spring Guide - Boom Valve Plunger.	ī	416x39
46	106846	Spring - Boom Valve Plunger.	ī	A501x82
47	104327	Check Plunger - Boom Valve Plunger	1	513x17
48	104322	Cap - Bucket Valve Plunger	1	514x186
49	106849	Washer - Bucket Valve Plunger	2	A408x51
50	106722	Seal Ring - Bucket Valve Plunger	ະ ເ	ASYSX17
51	106850	Spring - Bucket Valve Plunger	1	ADUCAD7
52	106846	Spring - Bucket Valve Flunger	ん 9	513x17
53	104327	Onersting Dlunger - Bucket Valve Flunger	r 1	512x102
04 55	106949	Plunger Eve - Bucket Valve Plunger	ī	516x49
56	106797	Manifold	1	M15x16
57	106798	"O" Ring	4	A395x31
58	106828	"O" Ring	4	A395x27
59	106799	"O" Ring	1	A395x11
60		Capscrew	5	OTXCOTH
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SPECIAL EQUIPMENT

PART		OWN	lst Used on Shovels		
NO.	FANI NAME	ATT •	FROM	THRU	
104974 105040 105077 GH-5831A1 104826 104825	Bulldozer Blade Complete	1 2 28 28 1 12 13			
105093	Bucket Tooth (11 req'd for 96" bucket)				



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Fig. 16 GREASE CHART

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NUMERICAL INDEX

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Don't No	Pago	Part No	Page	Part No.	Page	Part No.	Page
• GH-211 GH-212 GH-584 GH-5830A1 GH-9011A1	28 28 28 26 37 32	104242 104249 104255 104256 104259 104260 104260 104265	34 32 32 32 32 32 32 32 32 32 32	105075 105077 105093 105086 105286 105308	28 37 37 26 20 28	106731 106796 106797 106798 106799 106800 106801 106802	20 26 36 36 36 36 36 36 36 36
102491 102493 102510 102513 102527 102561 102681	32 32 22 32 - 34 22 22 28 28	104287 104283 104315 104321 104322	22 24 20 36 36	105312 105562 105565 105570 105573 105580	20 32 - 34 32 32 32 32 32 32	106803 106804 106806 106807 106809	36 36 36 36 36 36
102928 102949 102969 102977 102979	24 22 34 34 34 34	104327 104328 104358 104416 104419 104429 104429	36 36 30 30 30 30 30 30	105589 105622 105623 105944	32 34 34 20	106810 106811 106812 106813	36 36 36 36
103080 103083 103351 103355	32 32 34 32 - 34	104475 104478 104480 104513 104765 104777 104778	22 - 26 20 22 30 20 20 20 37	$106144 \\ 106147 \\ 106201 \\ 106214 \\ 106215 \\ 106225 \\ 106227 \\ 106228 \\ 10628 \\ 106$	26 26 26 26 26 20 20 26 34	106814 106816 106817 106818 106819	36 36 36 36 36 36
103372 103376 103380 103383 103405 103407 103634	26 26 26 26 26 26 28 28	$\begin{array}{c} 104826 \\ 104826 \\ 104836 \\ 104877 \\ 104879 \\ 104880 \\ 104882 \\ 104884 \\ 104887 \\ 104888 \end{array}$	37 20 28 28 28 28 28 28 28 28 28 28 28 28	106229 106230 106231 106232 106251 106252 106255 106258 106259	32 26 34 32 26 26 26 26 26 26	106820 106821 106822 106823 106825 106826 106826 106827	36 36 36 36 36 36 436 36
104016 104026 104027 10 4 028	30 34 30 30	104890 - 104891	28 28 28	106409	20	106828 106829	36 36
$ 104038 \\ 104039 \\ 104044 \\ 104045 \\ 104048 \\ 104049 $	30 30 22 - 26 24 34 30	$104901 \\ 104903 \\ 104907 \\ 104909 \\ 104910 \\ 104930 \\ 104931$	20 20 20 20 20 20 20 26 26	106402 106407 106408 106492 106493	22 26 26 36 26 26	106830 106831 106833 106834 106835 106835	36 3 ● 36 36 36 36 36
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