

OPERATING/MAINTENANCE/PARTS MANUAL

McKIERNAN-TERRY MODEL V-5

VIBRATORY PILE DRIVER/EXTRACTOR

AND

HP-105 HYDRAULIC POWER PACK



Koehring
MKT Division
Dover, New Jersey 07801

November 1974



FIG. 1

WARRANTY

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Koehring

MKT Division

Dover, New Jersey 07801

This manual contains parts, descriptive maintenance, operational principles and trouble-shooting instructions for the McKiernan-Terry Model V-5 Vibratory Pile Driver/Extractor with Model HP-105 Hydraulic Power Pack.

Sufficient descriptive material, together with numerous photographs, schematics and line drawings are included to enable the operator to understand the basic construction of the vibrator and how the principles by which the hydraulic system functions.

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I. GENERAL DESCRIPTION

A. V-5 VIBRATOR

The V-5 Vibrator consists of four equal sized eccentrics powered by a single hydraulic gear motor. The hydraulic motor drives a jack shaft which in turn drives the four eccentrics through equal teeth gears. The vertical dynamic forces of the four eccentrics are additive causing a downward and upward movement. All horizontal dynamic forces are cancelled. These vibratory dynamic forces are transmitted to a pile section through clamping jaws that are hydraulically powered. The suspension assembly consists of springs that permit lifting or pile extracting.

The four eccentrics are stacked in a vertical column and mounted in heavy duty spherical roller bearings. One eccentric is directly coupled to a lubricating gear pump. The lube oil is forced to two upper discharge pipes that each guide oil into the upper two bearings and upper gear, splashing oil throughout the enclosure. The operating frequency of the V-5 is about 1350 cpm varying slightly lower by increasing load and slightly by engine speed droop. The amplitude depends on the total mass being vibrated and the resistance of the soil. The free hanging vibrator will have a total amplitude of 7/16-1/2 inches. The hydraulic clamp is actuated by an 8" hydraulic cylinder with a 1 1/2 inch maximum travel developing about 31 tons at 2500 psi. There are two jaws, one fixed, and one movable in a side rocking motion to compensate for minor deformations in pile sections. Clamping or unclamping is accomplished in a second or less.

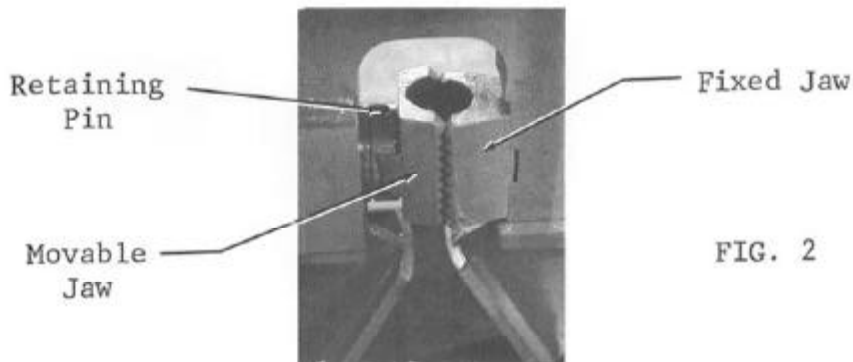


FIG. 2

I. GENERAL DESCRIPTION - Continued

A. V-5 VIBRATOR - Continued

A pre-loaded, spring suspension system effectively isolates vibrations from the crane boom while vibrating on a pile. Free hanging, there may be some vibration transmitted to the lifting head when starting and stopping. The suspension assembly is designed for a maximum of 15 ton line pull when extracting. The lifting head has been made massive for maximum driving weight. Additional weights are not recommended. The large spring enclosures are designed for personnel safety. Operation of the vibrator without the spring enclosures is not recommended.

The V-5 Vibrator can operate underwater. However, the factory should be consulted for preparations and expected problems of corrosion.

The outer race of the eccentric bearings is a tight fit in the housings and a slip fit on the eccentric shafts. The center drive shaft bearing is a slip fit in the housing and a tight fit on the drive shaft (sometimes referred to as the jack shaft).

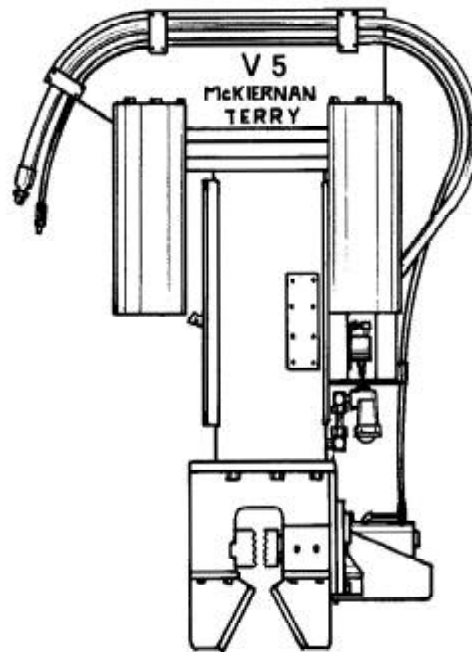


FIG. 3

I. GENERAL DESCRIPTION - Continued

B. HP-105 HYDRAULIC POWER PACK

A portable hydraulic power pack, designated HP-105, is used to develop the hydraulic energy to rotate the V-5 Vibrator eccentrics and open and close the clamp jaws. The skid mounted power package has reservoirs for hydraulic fluid and diesel fuel, is powered by a diesel engine and is complete with all necessary valving and gauges for the operation of the open loop drive and clamp circuits. The standard hydraulic power package is operated by manual valves located on top of the 80 Gal. reservoir. A single pump powers the vibrator clamp cylinder and the eccentric drive motor.

The two manual control valves are open center and not required to hold a load in neutral. One valve located on left will power the vibrator clamp cylinder. Clamp pressure will be maintained in the cylinder by a built-in check on the cylinder after the clamp valve is spring positioned to neutral. The other valve will direct flow from the pump to the vibrator eccentric motor requiring valve spool movement from detent positions.

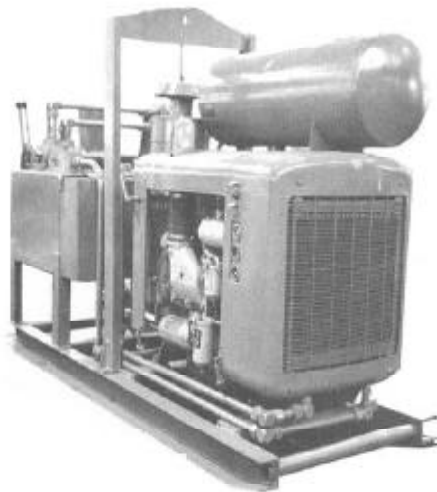


FIG. 4

I. GENERAL DESCRIPTION - Continued

B. HP-105 HYDRAULIC POWER PACK - Continued

There is a built-in relief valve located in the input valve end. This relief valve controls the maximum pressure of 2,500 psi for the clamp cylinder and for the eccentric motor, on the vibrator.

In the open loop circuit of the clamp cylinder and hydraulic motor, all return-to-tank oil is directed through the heat exchanger, located in front of the engine radiator and through a 25 micro-in-tank filter. The drive circuit powers the vibrator by supplying hydraulic oil under pressure through hoses which are connected to the power unit and to the hydraulic motor in the vibrator.

The hydraulic in-tank return line filter, located on top of the power pack has a full size by-pass valve that protects the filter element and system with a minimum of pressure loss. Ref. Fig. 6 below for cutaway of filter.

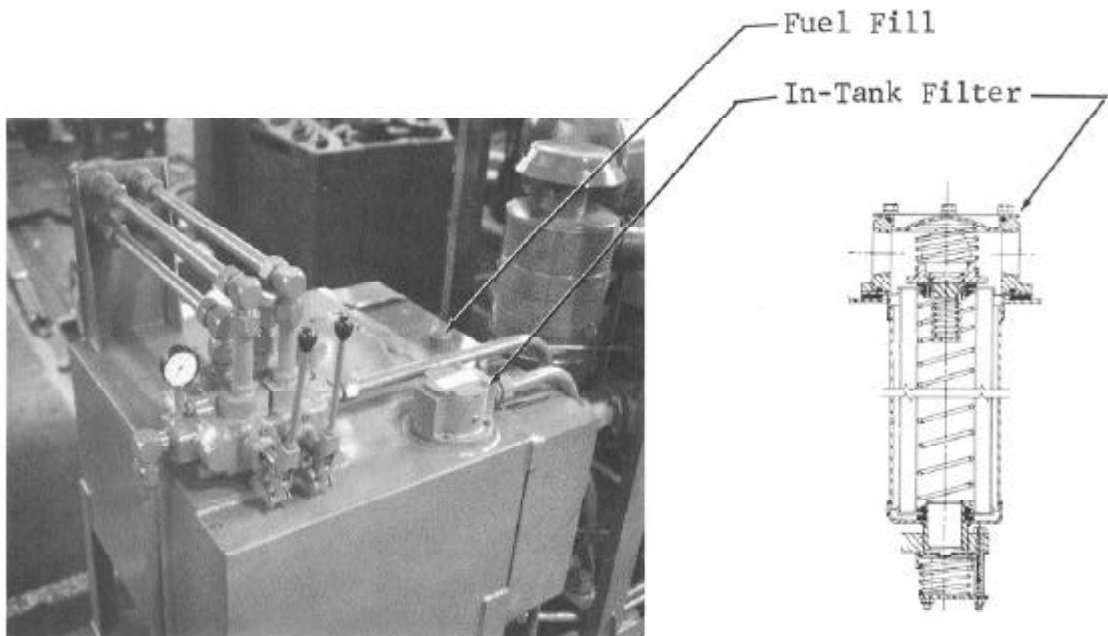


FIG. 5

FIG. 6

I. GENERAL DESCRIPTION

C. SPECIFICATIONS

1. V-5 VIBRATOR

Max. output HP of Hydraulic Motor @ 2500 psi and 1350 RPM - - - - -	55 HP
Frequency @ 1000-1200 psi - Free Hanging- Operating to 2500 psi - - - -	1600 cpm 1400-1000 cpm
Amplitude - - - - -	7/16"-1/2"
Dynamic Force @ 1350 CPM - - - - -	51,800 lbs.
Max. Operating Pressure - - - - -	2,500 psi
Pile Clamping Force @ 2500 psi - - - - -	31 ton
Max. line Pull, Extraction - - - - -	15 ton
Net Weight- - - - -	9,490 lbs.
Lube Pump Cap @ 1350 RPM - - - - -	9 GPM
Clamp Line Hyd. Hose (2 Reqd.) - - - - -	1 1/4" O.D.
Motor Line Hyd. Hose (2 Reqd.) - - - - -	2" O.D.
Motor Drain Line Hyd. Hose (1 Reqd.) - -	1 1/4" O.D.

2. HP-105 HYDRAULIC POWER PACK

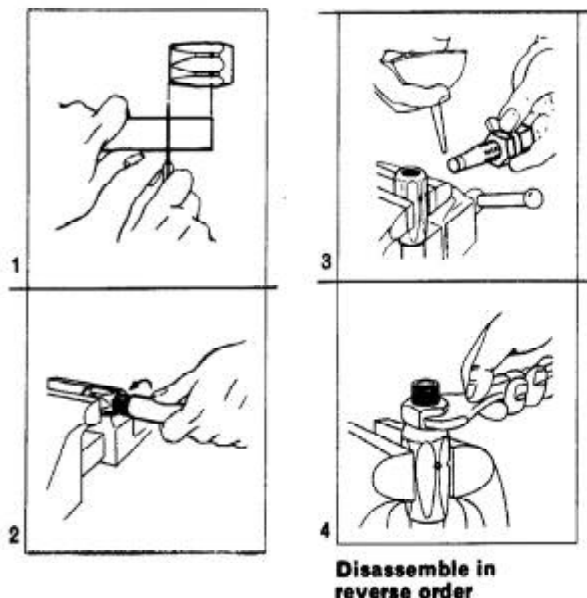
Detroit Diesel Engine (2 Valve) - - - - -	4-53
Diesel Starting - - - - -	12 VDC
Diesel Fuel Tank(25 Gal.Upper,35 Gal.Lower)	60 GAL.
Hyd. Oil Tank - - - - -	80 GAL.
Net Weight- - - - -	3600 LBS.
Max. Pump (Tyrone 20300) Flow	
@ 2200 RPM and 1000 psi - - -	56 GPM
@ 2100 RPM and 2500 psi - - -	45 GPM
Max. Engine Speed - - - - -	2200 RPM
Max. Energy Output Rated BHP @ 2200 RPM -	103 HP
Hyd. Fluid Filtration - - - - -	25 MICRON

II. OPERATING INSTRUCTIONS

A. CONNECTION OF HOSES

All V-5 Vibrators are thoroughly tested at the factory and consequently all hose lines will be filled with hydraulic fluid. Generally, the hose bundle assembly filled with oil, is disconnected from the hydraulic power pack and the vibrator for shipment. Therefore, it is necessary, when reconnecting, to make the correct hose connections to the vibrator and power pack. There are five hoses in the bundle, each 100 ft. long. Two 1 1/4 I.D. lines for the hydraulic motor, two 3/4 I.D. lines for the hydraulic clamp cylinder and one 3/4 I.D. line for the hydraulic motor case drain. Hose connections at the hydraulic power pack are made easily by quick disconnects with double checks. At the vibrator, it is important to connect the correct hoses which are originally color coded.

Refer to Fig. 7, for repair of hoses with re-usable fittings. When the hoses are attached to the boring unit, care should be made to have the bundle hang free. Extreme care should be made at all times not to kink any of the hoses.



To assemble

Step 1. Cut hose to length required. Hose must be stripped of its rubber cover before inserting in socket. Locate stripping point by putting hose end next to high pressure fitting as shown—from hose end of socket to notch on socket.

Step 1A. Strip hose. Cut rubber cover around down to wire reinforcement. Slit lengthwise. Raise flap and pull off with pliers. Clean excess rubber off wire reinforcement with wire brush or soft wire wheel. Do not fray or flare wire reinforcement when brushing.

Step 2. Put socket in vise and screw hose into socket counter-clockwise until it bottoms.

Step 3. Oil nipple threads and inside of hose liberally. No assembly mandrel is needed for double wire braid and spiral wrap hose. Use grease instead of oil for larger sizes.

Step 4. Screw nipple clockwise into socket and hose. Leave 1/8" to 1/16" clearance for takeup.

FIG. 7

II. OPERATING INSTRUCTIONS

A. CONNECTION OF HOSES - Continued

Care should be taken to have all connections free from contamination especially the high pressure hydraulic motor lines. All hydraulic line connectors and quick disconnects, when disconnected, should be capped or plugged immediately to assure against contamination.



FIG. 8

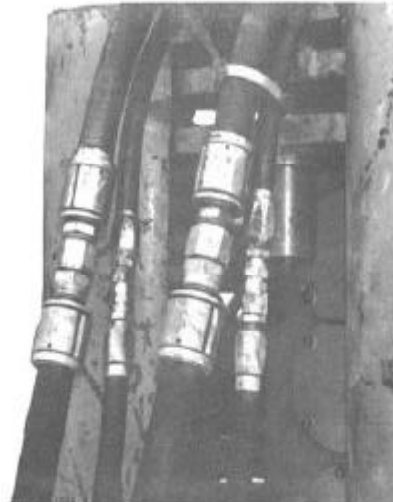


FIG. 9

When the hoses are attached to the Vibrator, care should be made to have the bundle hang free and the larger hoses evenly supporting the load. Extreme care should be made at all times not to kink any of the hoses. As an example, the 1 1/4" I.D., 2" O.D. hose has a minimum bending radius of 18 inches. Even though these hoses have a minimum bursting pressure of 12,000 psi, a kink will weaken the hose multiple spiral wire wrap reinforcement and rupture will result at high operating pressures.

The hose lines between the vibrator and the hydraulic power pack are 100 ft. long, made up of 50 ft. lengths. A damaged hose section of 50 ft. can be replaced or a repair connector inserted in the 3/4 I.D., 1 1/4 O.D. hydraulic clamp lines and drain line (Refer to Fig. 7, Page 11). The 1 1/4 I.D., 2 O.D. motor lines cannot be repaired in the field without special tooling.

II. OPERATING INSTRUCTIONS - Continued

B. START AND WARM-UP ENGINE

Before starting the engine, read the engine manufacturer's operating and maintenance instructions carefully. Follow the engine starting operating and maintenance procedures detailed in the manual. CAUTION: DO NOT PUSH THROTTLE HANDLE TOO HARD FOR MAXIMUM SPEED OR CONTROL BRACKET WILL BEND.

C. FILLING THE HYDRAULIC LINES

Initially, motor hose lines and clamp lines, should be connected to the power unit and the other ends connected together, not to the vibrator. Running the engine initially at low speed with vibrate valve engaged to fill the lines, then full speed to rush maximum oil flow through the lines. After the vibrator has been connected to the hose lines, it is recommended that the engine speed is set low (1000 RPM) with the vibrator valve engaged. With the clamp lines attached to the vibrator, it will be necessary to bleed the lines at the cylinder always at the high pressure side of the cylinder. It will be necessary to run the engine at full speed when bleeding the clamp cylinder with clamp valve engaged because full flow will be over relief.

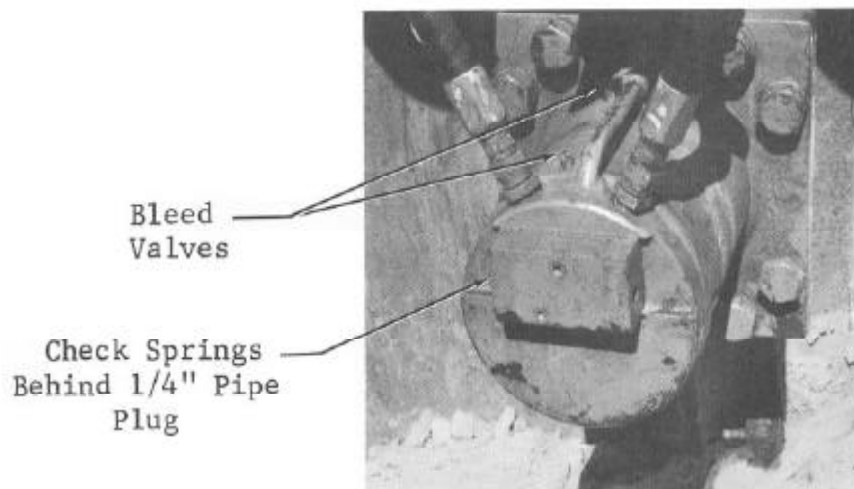


FIG. 10

II. OPERATING INSTRUCTIONS - Continued

D. OPERATING VALVES

Different valve assemblies are used on the HP-105 Power Packs. The first of two valve levers, one on the left, operates the clamp jaws. Moving the lever one direction inward or push opens the jaws and the other direction, pull, closes the jaws. The valve handle is spring loaded and must be held to operate or it will spring back to neutral position. The clamp cylinder will operate very quickly or equivalent to about 1/2 sec. at pump flows of about 50 GPM. Clamp pressure with jaws closed will be held by the check valve on the cylinder. The clamp handle must be in the neutral position before pulling the vibrate valve handle. The vibrate valve handle, one on the right is not spring loaded and can be pulled to vibrate and left in that position. Only one direction is required on the vibrate valve handle because the vibrator is to run in one direction as is the lube pump. The lube pump is powered by one of the eccentric shafts and is unidirectional pumping. The relief valve is located on the valve. The pressure gage on the manual valve is used to view pressure of both the clamp circuit and vibrate circuit. While the vibrate valve handle is pulled to power the vibrator, the clamp handle is not to be pulled or pushed or all oil will be directed from the vibrator to the clamp circuit. Ref. Hydraulic Schematic, Fig. 21, Page 31.

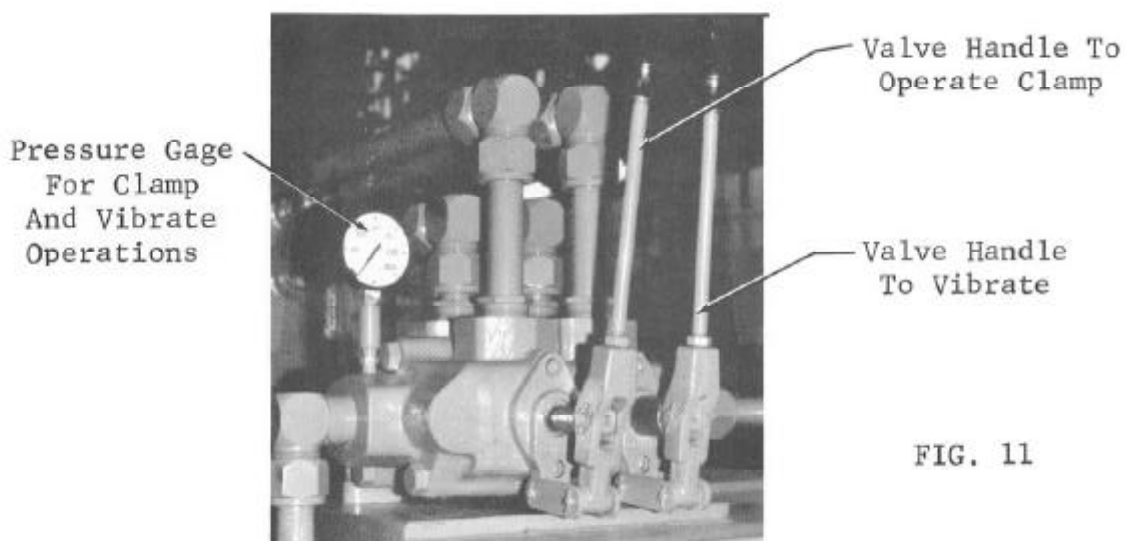


FIG. 11

II. OPERATING INSTRUCTIONS

E. CHARACTERISTICS

The varying characteristics of the V-5 Vibrator can be seen on the frequency vs. dynamic force graph, Fig. 15, Page 20. The four eccentrics in the vibrator are fixed in size and the resulting dynamic force of the vibrator is directly proportionate to the square of the angular frequency. As an example, at 1400 CPM vibrator frequency, the theoretical vertical dynamic force is about 55,000 lbs. The power of the vibrator is generally referred to the hydraulic motor output power and is dependent on hydraulic flow and pressure. Fig. 15 has the horsepower curves as a function of pressure and frequency or the hydraulic flow converted to hydraulic motor speed. For a given hydraulic motor speed, which is vibrator frequency since the motor is driving the eccentrics directly, as an example 1400 RPM, the motor output horsepower is about 44 at 2000 psi fluid pressure.

The clamp lever on the valve need only be pushed or pulled and held for a second or more to open or close the jaws respectively. As can be seen on the Hydraulic Schematic, Fig. 21, Page 30, there is equal oil pressure on both sides of the clamp cylinder when the clamp handle is in the neutral position. Oil pressure in the neutral position, with flow directly to tank, is a result of restrictions of maximum flow going through the oil cooler, the filter and long piping lines. This neutral position pressure is about 200-250 psi. Equal pressure on both sides of the cylinder piston could cause the piston to extend or cause the jaws to close when in the "open" position. However, a stiff spring on the free flow of the cylinder check, Fig. 10, Page 13 is adequate to restrict piston movement.

II. OPERATING INSTRUCTIONS

E. CHARACTERISTICS - Continued

The hydraulic gear pump used on the HP-105 Hydraulic Power unit and the hydraulic gear motor used on the V-5 Vibrator have varying output characteristics dependent on speed or flow and pressure. Reference the performance characteristics of the Tyrone Hydraulic Pump 20300, Fig. 13, Page 17, and the Tyrone Hydraulic Motor 20350, Fig. 14, Page 18. For reference to engine speed, refer to the engine tachometer as shown on Fig. 12 below.

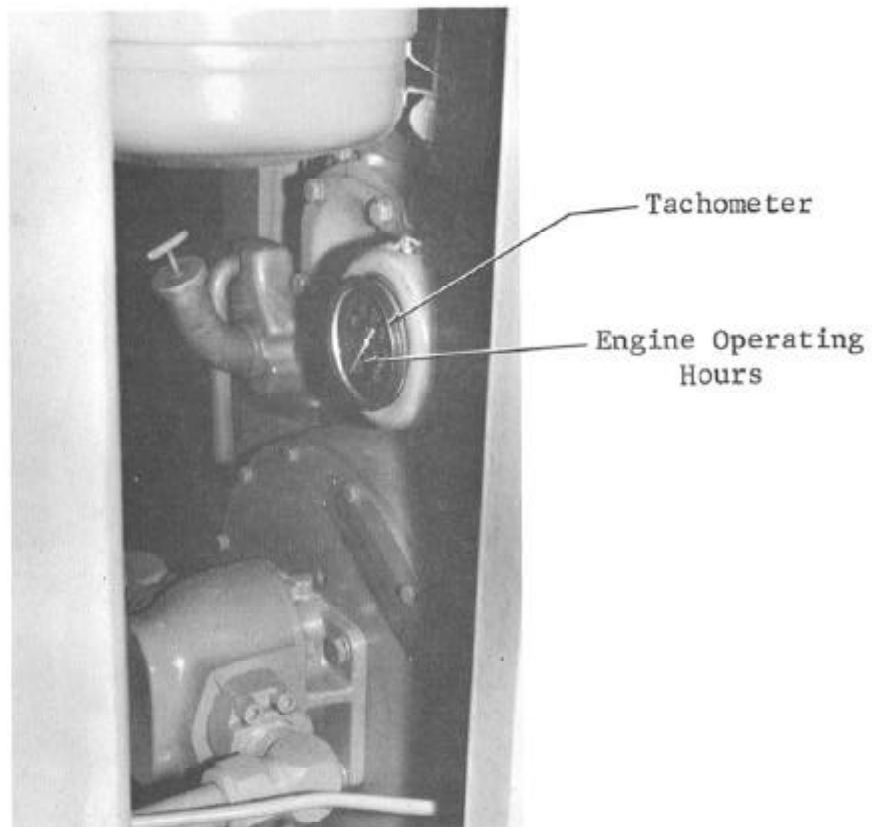


FIG. 12

**PERFORMANCE CURVES
TYRONE HYD. MOTOR M 20350**

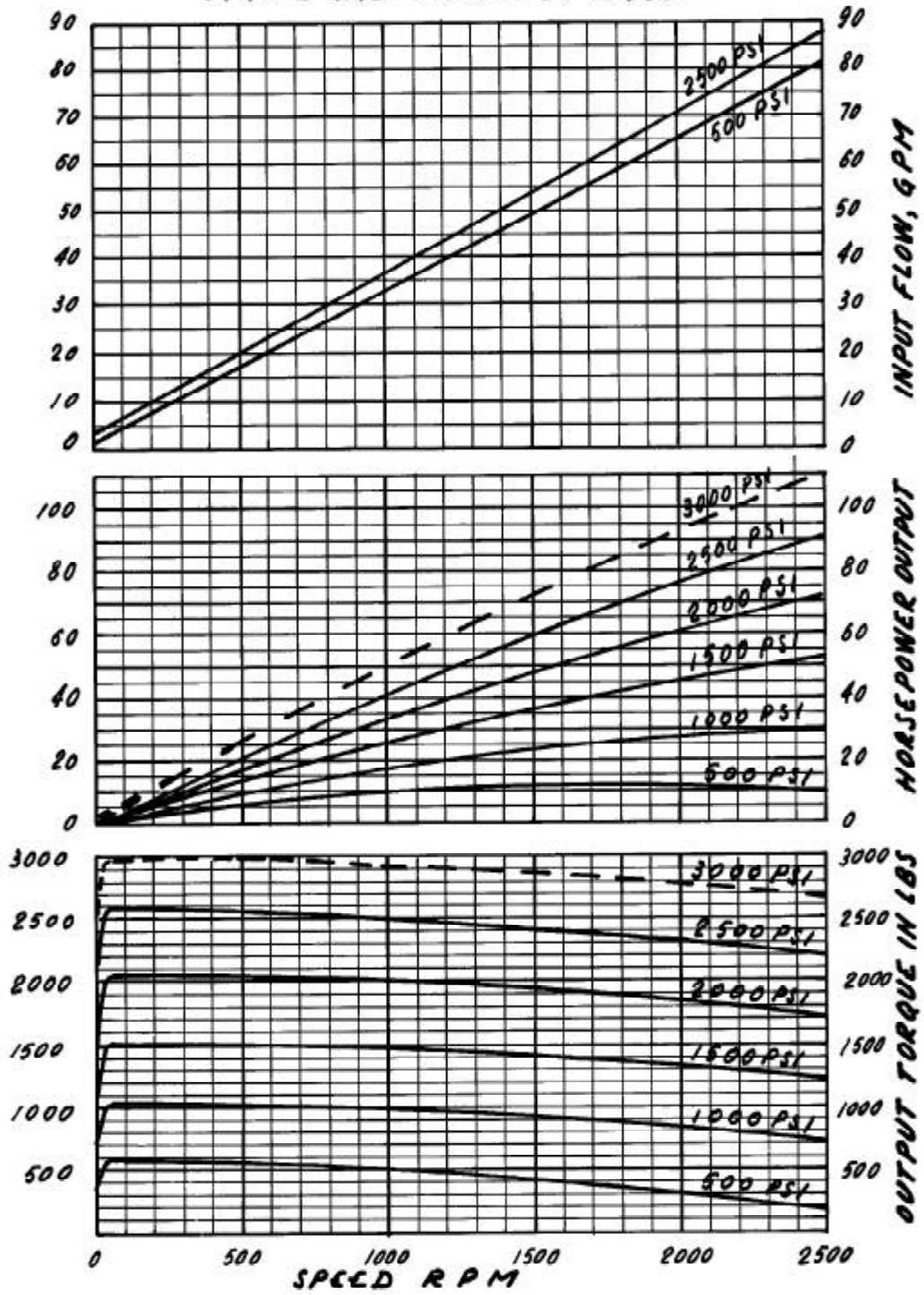


FIG. 13

PERFORMANCE CHARACTERISTICS

TYRONE HYD. PUMP NO. 20300

VISCOSITY 80 SSU

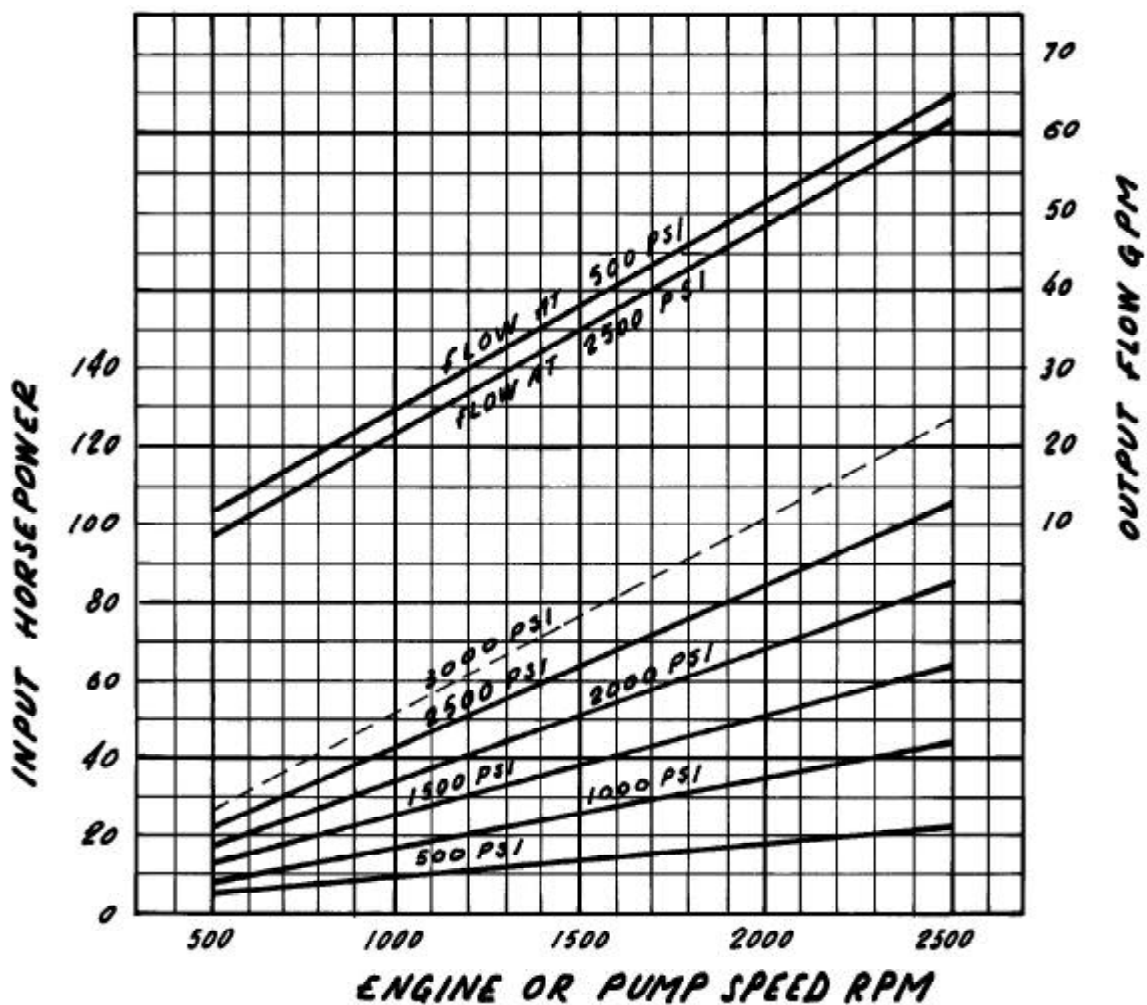


FIG. 14

II. OPERATING INSTRUCTIONS

E. CHARACTERISTICS - Continued

The varying vibrator frequency with changing loads is a characteristic of a hydraulic gear pump and hydraulic gear motor. The changing frequency of the vibrator will not be obvious unless a frequency meter check is made. A minimum frequency of about 1000 CPM is recommended under maximum load to assure that the suspension springs are not excited at or near their natural frequency. Below 1000 cpm, the lifting head may bounce or go through a larger amplitude than the excitation amplitude of the exciter assembly.

The hydraulic power pack engine speed determines pump flow. The maximum recommended engine speed set at the factory is 2200 RPM at no load. The maximum operating pressure recommended is 2500 psi, generally set with the vibrator operating on a pile at maximum load. The maximum engine droop should be from 2200 RPM to 2000. As the vibrator resistance is increased, calling for higher pressure, hydraulic oil will pass over relief causing the vibrator to slow down. If the frequency drops below 1000 CPM, the vibrator is over-loaded and its driving capabilities will greatly reduce. Reference the dynamic force of the vibrator at varying frequencies on Fig. 15, Page 20. A secondary characteristic of a very low operating frequency, say 600-900 CPM, will be audible noises from the suspension assembly, possibly springs banging against the housing. A very loud, unusual noise always indicates abnormal operation and damage could result.

The bearings on the V-5 Vibrator eccentrics are spherical rollers, their loading is radial and equal each to 1/8 of the dynamic force, created by the rotating eccentrics. The statistical life of these bearings is shown on Fig. 16, Page 20.

II. OPERATING INSTRUCTIONS

E. CHARACTERISTICS - Continued

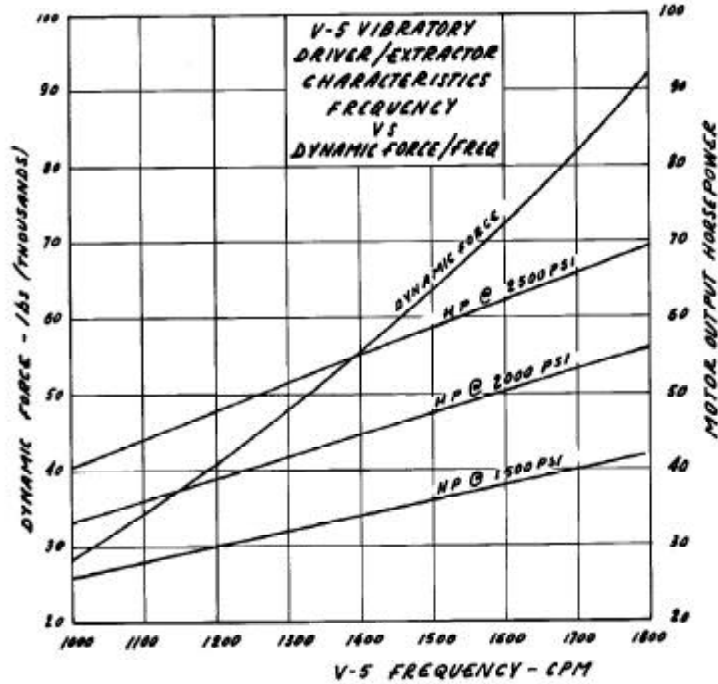


FIG. 15

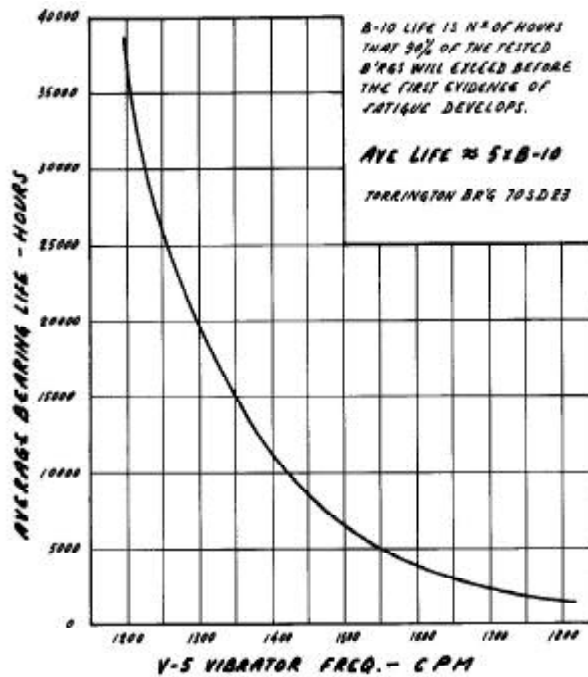


FIG. 16

III. MAINTENANCE AND ADJUSTMENTS

A. GENERAL

The V-5 Vibrator and HP-105 Hydraulic Power Pack should be inspected regularly to help keep it in good operating condition. The time interval between necessary adjustments and repairs depends primarily on how much and how hard the machine has been used. Repair or replace broken or damaged parts as soon as they are discovered. Periodic cleaning and repainting will help keep all parts in better working order and prolong the machine's life.

The diesel-driven, HP-105 hydraulic power pack has been designed to minimize field downtime by making most components replaceable as units. Field maintenance will generally be limited to the regular preventative maintenance procedures detailed below.

The vibrator is run-in and checked thoroughly at the factory for leaks and possible malfunctions. The vibrator bearing-gear enclosure is completely sealed with a closed, forced lubrication system requiring a minimum of checking.

The removal of the movable jaw is done by pushing out the 3/4" rollpin, either up or down. The single, vertical rollpin captivates the movable jaw. The fixed jaw is held tight against the housing with two 1" bolts. Operating the V-5 on piling without the jaw shields could result in jaw damage if the vibrator is dropped onto the pile.

Frequent inspection of the vibrator is encouraged. Removal of the side cover opens to view the motor and pump couplings, the lube piping, the end of the gears and an end view of the bearings. Always assure that the couplings are fixed securely and the gear lineup is correct. Removal of the cover plate on the heavy bearing cover will expose all bearings at that end. If it is suspected that the eccentrics are locked, remove the 1" socket head pipe plug above the fill spout on the bearing cover plate, insert the hex wrench into the socket head pipe plug in the end of the drive shaft and try to rotate by turning clockwise. Ref. Fig. 19.

The hydraulic motor on the vibrator will have a normal drain when operating at pressures 1000-2000 psi of 6-8 GPM. Motor repair may be required if drains exceed 8 GPM.

III. MAINTENANCE AND ADJUSTMENTS

B. DAILY CHECK LIST

CHECK THE ENTIRE UNIT PRIOR TO AND DURING START-UP AT EACH SHIFT.

1. Prior to starting the engine at each shift, check as follows:
 - a. Make all daily lubrication and preventative maintenance checks indicated in the engine manufacturer's operating and maintenance manuals.
 - b. Check the hydraulic oil level before starting the engine. Recheck this level after filling the lines to be sure it remains in the safe operating range. DO NOT operate the unit with the hydraulic oil level below 3/4.
 - c. Visually check all hoses for signs of damage or cuts that might cause hose failure during operation. Be sure all connections are tight, especially the quick disconnects.
 - d. Look for any damage to the unit in general that might cause it to fail when put into operation.
 - e. Check tightness of screws on hydraulic motor, lube pump, spring shields, etc. Look for cracks at stressed areas.
 - f. Check spacing under lifting head. Should be fairly equal distance. Unequal spacing could be a sign one of the springs or spring containers is broken.
 - g. Be sure there is fuel in tank.
 - h. Be sure there is cooling fluid in radiator.

III. MAINTENANCE AND ADJUSTMENT

B. DAILY CHECK LIST - Continued

2. After start-up and V-5 is vibrating, check as follows:
 - a. Inspect the hydraulic lines for leaks.
 - b. Inspect the oil seal areas in the pump drive and control valves for leaks.
 - c. Allow hydraulic oil temperature to come up slightly above the oil pour temperature preferably to 30° F. before starting vibrator.
 - d. Before attaching to pile, open and close clamp jaws to verify fast and positive action.
 - e. Be sure there are no kinks in the lines and that they hang uniformly.
 - f. Once the vibrator has been started, be sure lube oil is pumping. Ref. Section III. C.3.
 - g. Always maintain close check on the lifting cable to assure no fraying has occurred.
 - h. Oil the lifting shafts and grease the guide bushings generously. Check for overheated bearing housings.
 - i. Be sure clamp jaws open and close.
 - j. Maximum engine speed is 2200 RPM.

III. MAINTENANCE AND ADJUSTMENTS

C. LUBRICATION

1. Diesel Engine - should read:

An SAE-30 oil is recommended for year-round use. The use of lower viscosity oils or multigrade products will usually result in less than normal engine life. Recommended oils for crankcase:

Exxon	HDX Plus 30
Gulf	Gulflube XHD-30
Mobil	Delvac 1230
Shell	Rotella T-30
Texas	Ursa Extra Duty 30
Standard	Facto 30

RECOMMENDED FUEL FOR DIESEL ENGINE:

No. 2 Diesel Fuel Oil

The diesel engine maximum governed speed should be set at 2200 RPM.

The air cleaner must be serviced frequently depending on the dust conditions. Replace the oil in the air cleaner when it becomes dirty using the same kind of oil that is used in the crankcase. Consult the engine manufacturer's manual for complete information concerning the air cleaner.

The cooling system capacity for the 4-53 Diesel Engine is 25 quarts. In winter months, use about 40/60 solution of anti-freeze and water or about 10 quarts anti-freeze.

III. MAINTENANCE AND ADJUSTMENTS

C. LUBRICATION - Continued

2. Hydraulic System

The hydraulic system in the HP-105 power unit requires highly dependable fluids to provide maximum efficiency and continuity of operation. The fluid must operate over wide temperature ranges, keep the system free from rust, separate quickly from water encountered from either contamination or condensation, and protect all parts from wear over extended periods of service. The fluid must have extra anti-wear characteristics. The hydraulic fluid recommended is:

Texaco Rando HDA or equivalent.

This is a SAE-10 oil which meets all the requirements above. Fill the reservoir to "full" capacity and check level daily, not to operate below 3/4 capacity. Drain and flush the entire system at least once a year, depending on use of equipment. It may be necessary to change it more frequently depending on the operating conditions. The hydraulic tank capacity is 80 gallons.

WARNING: WHEN REPLACING OR ADDING OIL, BE EXTREMELY CAREFUL TO KEEP FOREIGN MATTER FROM ENTERING THE OIL AND THE SYSTEM. DIRT, DUST, ETC., WILL HARM OR INTERFERE WITH THE OPERATION OF THE PUMPS AND VALVES.

Mixing different manufacturers' hydraulic oils can be done if they are miscible, (same base and additives). Check with oil suppliers or factory.

III. MAINTENANCE AND ADJUSTMENTS

C. LUBRICATION - Continued

2. Hydraulic System - Continued

The hydraulic oil filter, Reference Fig. 5, and Fig. 6, Page 9, is to be inspected frequently, especially after additions of hydraulic fluid, change of hydraulic lines, disconnection of hoses or when operating conditions are dusty. Recommended frequency of filter change is every month of operation. The filter element is a throw away Schroeder K25 (25 Micron).

The hydraulic motor on the vibrator requires a drain line to relieve case pressure inside the motor. The motor drain line back-to-tank has a "blow off" safety valve located in the line on the vibrator, Ref. Fig. 17. The "blow off" relief valve setting recommended is 40-50 psi to protect the motor seals and interior components. If this pressure is surpassed by a kink in the line or incorrect connection at the power unit tank or any resistance of flow to tank oil will spill at the valve. The clamp cylinder has two hose lines leading from the cylinder to the power unit valve. The clamp cylinder is powered in both directions, operating the jaws to open and close.

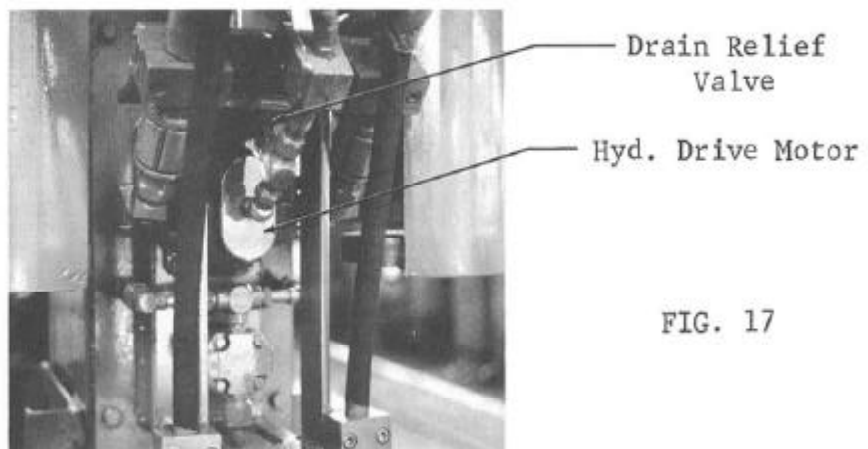


FIG. 17

III. MAINTENANCE AND ADJUSTMENTS

C. LUBRICATION - Continued

3. Vibrator

Vibrator lubrication is basically automatic and an occasional check of flow by removing one of the two top pipe plugs in the bearing cover is all that should be required. See Fig. 18. The gear-bearing-eccentric housing is sealed and the oil level should not change.

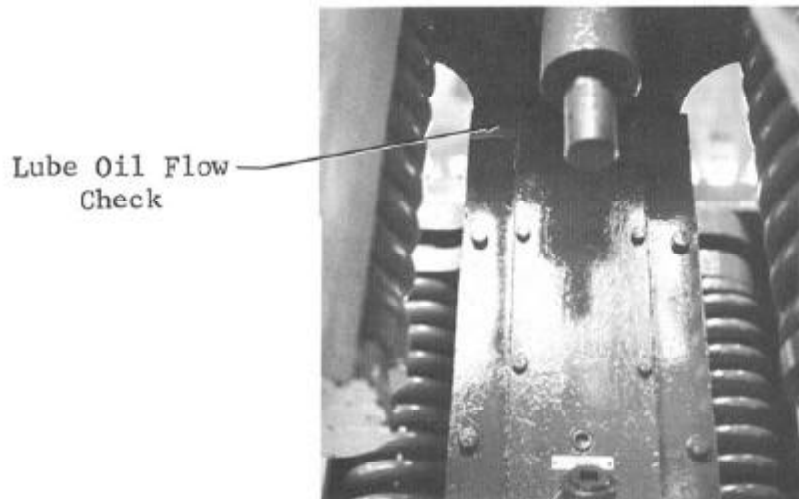


FIG. 18

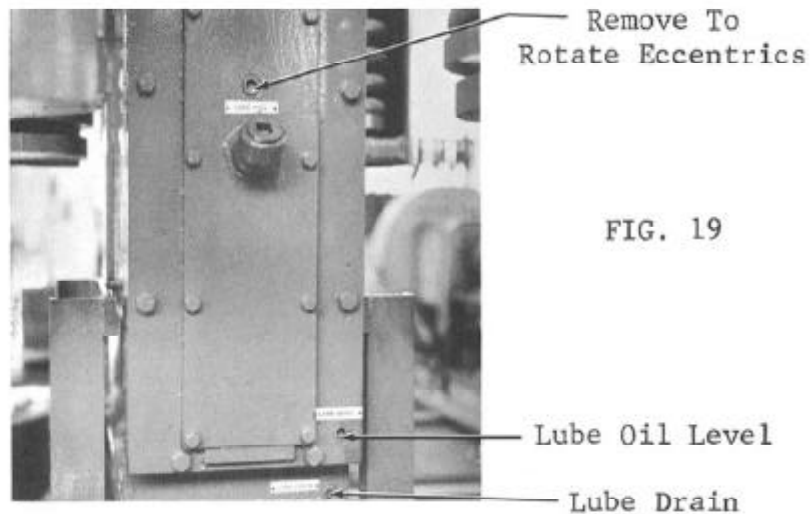
The lube oil supplied by the factory is Shell Tellus 933, SAE 30. The basic requirement for this oil is good lubricating qualities, that is: an EP (extreme pressure), a high viscosity index above (100) and a relatively low pour point.

III. MAINTENANCE AND ADJUSTMENTS

C. LUBRICATION - Continued

3. Vibrator - Continued

A check on the lube oil level is made by removing the lower pipe plug on the bearing end cover opposite motor housing. The oil level should be to the bottom of this pipe plug hole when the vibrator is level. Ref. Fig. 19.



If the level of oil is above this pipe plug opening or lube oil volume increasing, this will indicate that the hydraulic motor is leaking hydraulic fluid through the motor drive shaft seal. The seal leakage must be corrected immediately. The mixture of hydraulic oil and lube oil is not a lube problem but the increased level will add load to the rotating eccentrics and cause excessive foaming. The side cover, closest to the hydraulic motor housing, can be removed and an inspection of the oil and coupling connectors to the lube pump and eccentrics can be made.

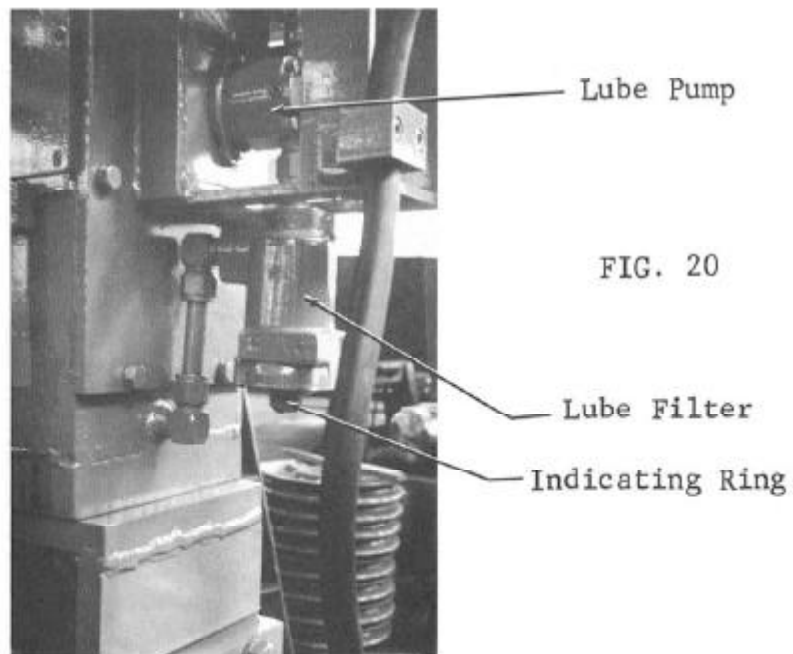
III. MAINTENANCE AND ADJUSTMENTS

C. LUBRICATION - Continued

3. Vibrator - Continued

The clamping assembly moving jaw slide is not lubricated. If desired, a coating of "Moly-Kote" could be applied, but do not use oils or grease since they will pick up dirt and grit. The suspension assembly has six grease fittings, one on each bushing. These bushings are to be greased regularly to minimize bushing wear.

The lube filter assembly is shown on Fig. 20 below. This is a suction, low pressure filter, a cleanable type, with a monel 74 micron element. The filter element is a Marvel No. 1120. The indicator ring at the bottom will return its original position when stopped but an O-ring will indicate the last position. If the O-ring is in the red, the filter must be cleaned. Recommended cleaning is every week of operation. After cleaning the filter element, be sure to return the O-ring back to the green area.



IV. HYDRAULIC SYSTEM

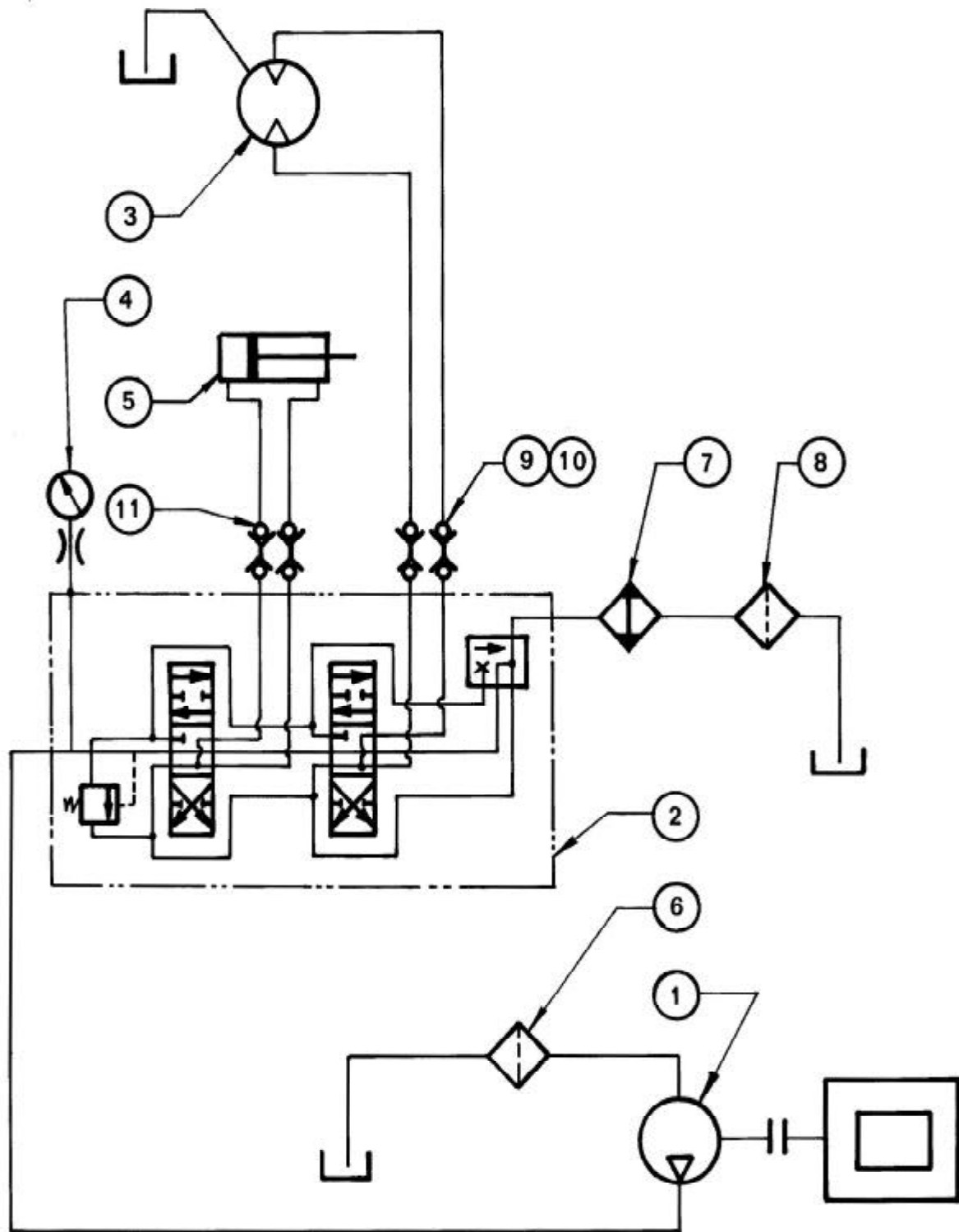
A. CIRCUITRY

The repetitive functions to be performed hydraulically, for the operation of the V-5 Vibrator is first to be able to clamp on to a pile, vibrate the pile, stop vibrating, and unclamp from the pile. One basic, open loop, hydraulic circuit has been used, with a single pump performing both clamping and vibrating operations. The principle of using one pump is dependent on a clamping hydraulic cylinder that has an integrated holding pressure check valve, meaning once the pressure has been applied and immediately removed, the pressure will be locked in the cylinder. The tandem circuit design valve, with two plungers, is of the open center type. This valve is not required to hold a load in neutral. The valve consists of an inlet section with an adjustable pressure relief, two working sections, the plunger nearest to the inlet takes priority over the oil supply, and an outlet section. The plunger nearest the inlet is the clamp valve and the other is the main drive or vibrate valve.

Following the hydraulic circuit, Fig. 21, Page 31, the oil from the pump goes directly to tank through each spool when each plunger is in the vertical position. The plunger nearest the inlet operates the clamp circuit. A quick and full plunger movement operates the clamp in a fraction of a second with a spring return neutral position. The second plunger operates the vibrate circuit and is two position only, forward and neutral. The single position is necessary to assure the vibrator motors rotate in one direction because the lube pump only pumps in one direction. It is necessary to move the plunger back to neutral position to stop since the plunger has detents held in all positions.

ITEM NO.		PART NO.	DESCRIPTION	QTY. REQ'D.
1	0	9110055	Tyrone Pump No. 20300C-3D-3	1
2	0	9310194	BE-GE Valve U20RE02E-03E-LF	1
3	0	9100020	Tyrone Motor No. M20350	1
4	0	9310076	Pressure Gage 0-3000 psi	1
5	0	9220018	Hydraulic Clamp Cylinder	1
6	0	9310181	Schroeder Filter SKB-2	1
7	0	9340004	Perfex VOC-50 Heat Exchanger	1
8	0	9310217	Schroeder RT-1K25	1
9	0	9270016	Snap-Tite 71C16-20F Coupling	2
10	0	9270017	Snap-Tite 71N16-20F Nipple	2
11	0	9270005	Aeroquip 5600-12-12S Q.D.	2

FIG. 21



IV. HYDRAULIC SYSTEM - Continued

A. CIRCUITRY - Continued

All oil passing through the valve back to tank from the cylinder or motor line in the vibrator is directed through an oil heat exchanger located in front of the water radiator. Before the oil enters the tank, it is filtered through a 10 micron reclaimable filter. The hydraulic oil sucked up from the reservoir must pass through a magnetic separator which separates magnetic particles as small as 1 micron in size from the fluid. Non-ferrous particles adhering to the magnetic particles through the viscous action of the fluid are also removed.

The pressure gage is protected by a snubber of flow control valve to protect the sensitive valve needle. The temperature gage measures reservoir hydraulic fluid temperature, which should not exceed 170° F. during operation. Hydraulic oil temperature rises may approach 170° F. when operating at maximum vibrator load. Running the hydraulic power unit without load will lower the temperature.

V. TABLE OF FIGURES

FIG. LOCATED ON PAGE		DESCRIPTION
1	2	Photo of V-5
2	6	Photo of Jaws
3	7	Line Drawing of V-5
4	8	Photo of Hydraulic Power Pack
5	9	Photo of Valves on Tank
6	9	Cross Section of Filter
7	11	Line Drawing of Hose Ass'y Procedure
8	12	Photo of Hoses Capped
9	12	Photo of Hoses Hanging
10	13	Photo of Clamp Cylinder
11	14	Photo of Valves on Reservoir
12	16	Photo of Engine Tachometer
13	17	Graph of Motor Performance Curves
14	18	Graph of Pump Characteristic Curves
15	20	Graph of Dynamic Force vs. RPM
16	20	Graph of Bearing Life vs. RPM
17	26	Photo of Motor-Blow Off Fuse
18	27	Photo of Bearing Cover Plate
19	28	Photo of V-5 Oil Fill and Level
20	29	Photo of V-5 Lube Filter
21	31	Hydraulic Schematic
22	34	Photo of V-5
23	35	Line Drawing Main Assembly
24	36	Line Drawing Exciter - Suspension Ass'y.
25	37	Line Drawing Exciter - Suspension Ass'y.
26	38	Line Drawing Hydraulic Clamp Assembly
27	39	Line Drawing BE-GE Hydraulic Power Pack
28	40	Line Drawing Standard Jaws
29	42	Cross Sections of BE-GE Directional Valve
30	43	Line Drawing of HPI Valve on Power Pack
31	44	Line Drawing of Warner-Motive Hyd.Power Pack

VI. PARTS IDENTIFICATION

The component parts of each assembly drawing are identified by a balloon with a number inserted called an item number. When ordering a component part, use only the seven digit number to the right of the vertical line through the part number block.

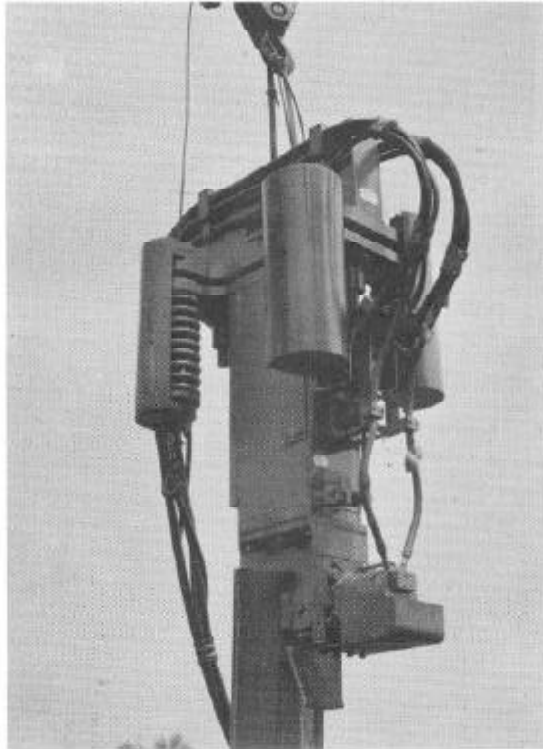


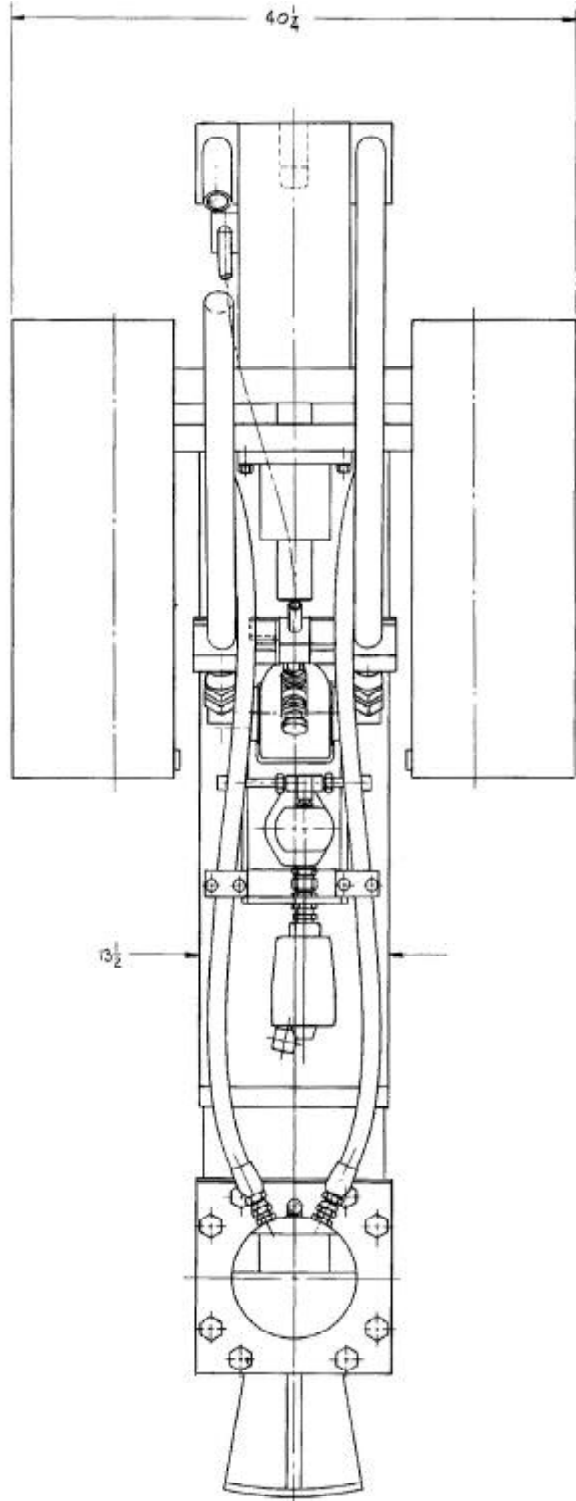
FIG. 22

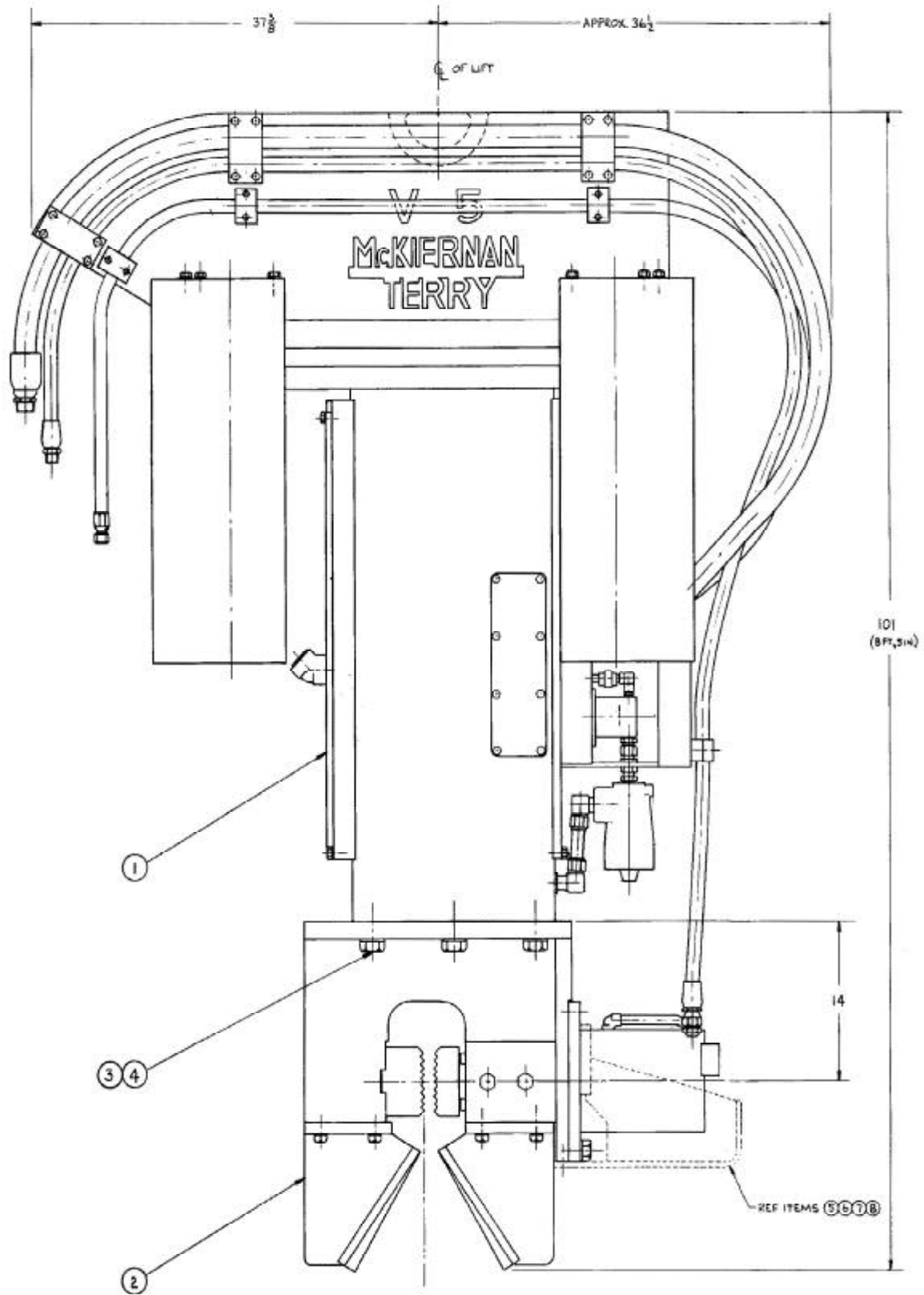
VI. A.

GENERAL ASSEMBLY

ITEM NO.	PART NO.		DESCRIPTION	QTY. REQ'D.
1	6	4050080	Exciter-Suspension Assembly	1
2	6	4050078	Hydraulic Clamp Assembly	1
3	0	9016311	1 1/2 x 3 1/4 Hex Hd. Cap Screw	6
4	0	9030129	1 1/2 Lockwasher	6
5	4	4950311	Clamp Cylinder Shield	1
6	0	9016224	1 1/4 x 4 Hex Hd. Cap Screw	2
7	0	9012913	3/4 x 1 1/2 Hex Hd. Cap Screw	4
8	0	9030117	3/4 Lockwasher	4

FIG. 23



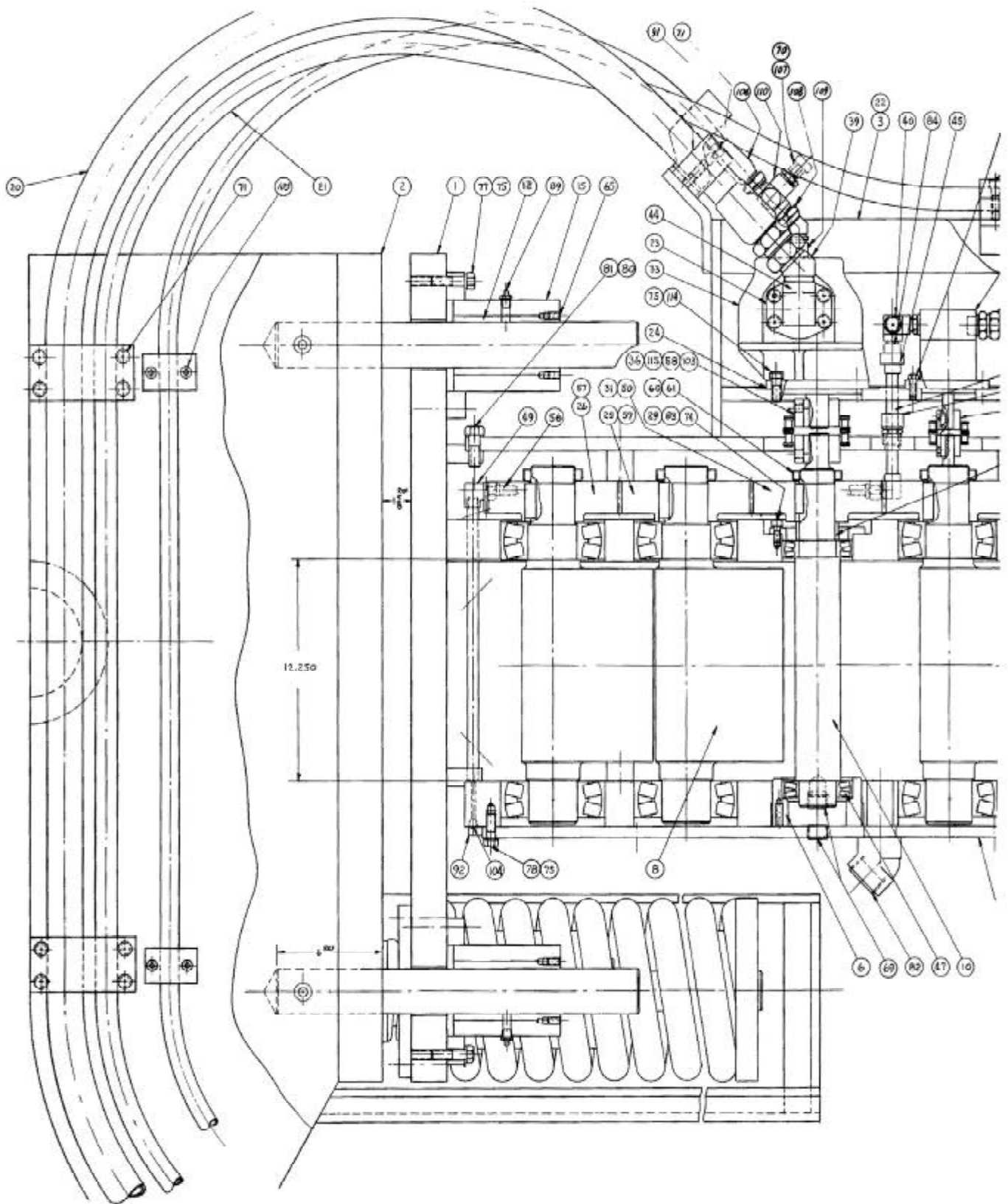


VI. B.

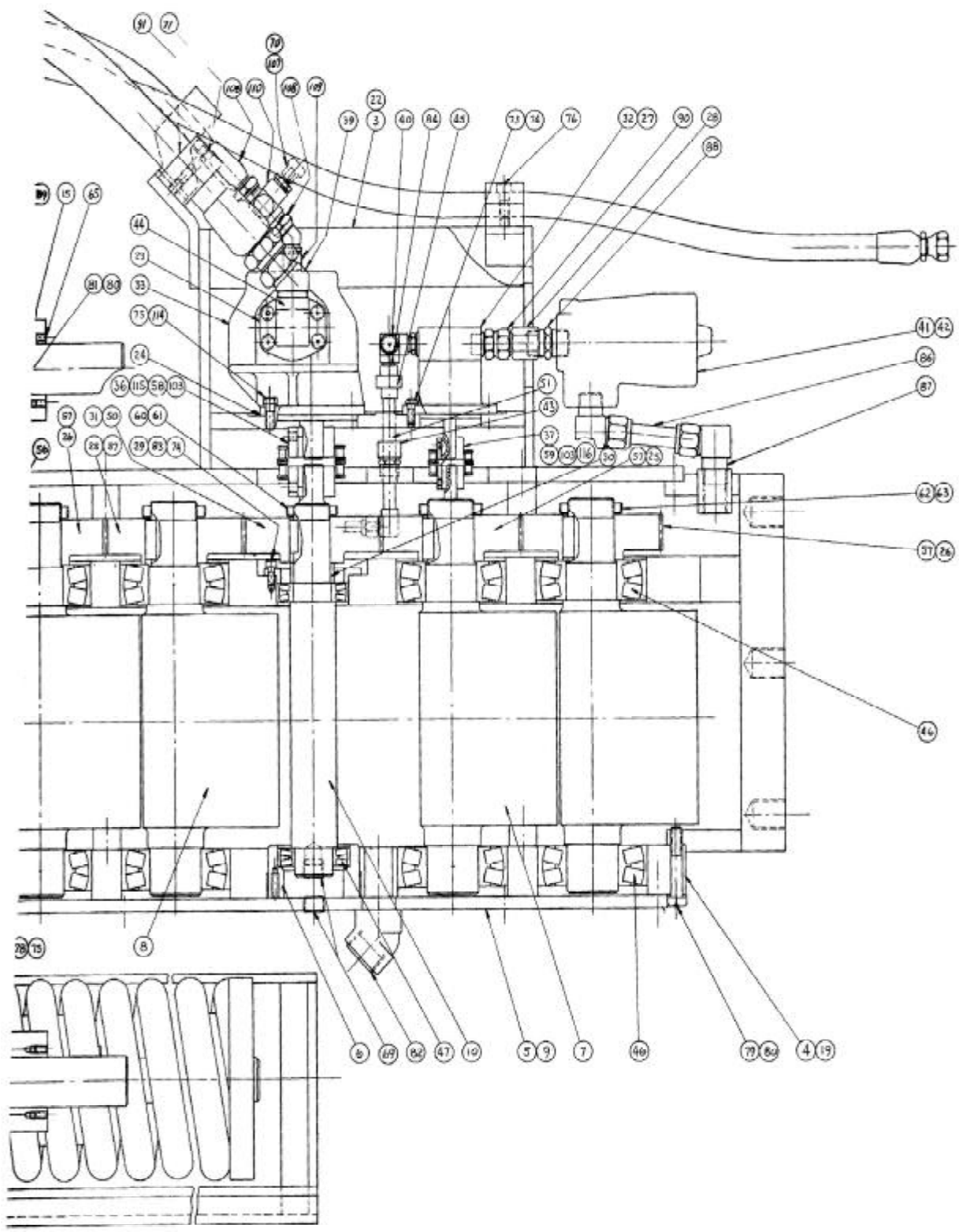
EXCITER-SUSPENSION ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.	
1	6	4050001	Exciter	1
2	4	4050112	Lifting Head	1
3	6	4050003	Exciter Motor Housing	1
4	4	4050004	Bearing Housing	1
5	3	4050093	Bearing Cover	1
6	3	4050092	Bearing Cartridge	1
7	4	4050096	Eccentric (Pump Drive)	1
8	4	4050097	Eccentric	3
9	3	4050094	Gasket	1
10	3	4050010	Jack Shaft	1
11	3	4050011	Bottom Nut	4
12	0	9140075	Bushing	2
13	0	9140076	Bushing	4
14	3	4050108	Lifting Shaft	4
15	3	4050095	Bushing Holder	2
16	3	4050039	Exciter Side Cover	2
17	4	4050082	Protector Spring Shield	2
18	4	4050083	Protector Spring Shield	2
19	3	4050040	Gasket	1
20	2	4050020	Motor Line Ext.	2
21	2	4050021	Clamp Line Ext.	2
22	3	4050041	Gasket	1
23	0	9110034	Valve Flange	2
24	2	4050042	Gasket	1
25	3	4050025	Driven Eccentric Pinion	2
26	3	4050026	Driven Eccentric Gear	2
27	2	4050043	Gasket	1
28	0	9230272	Lenz No. 12-16 PRC-3/4	1
29	3	4050029	Small Bearing Retainer	1
30	1	4050030	Spacer	1
31	3	4050031	Drive Pinion	1
32	0	9110043	Lube Pump	1
33	0	9100020	Hydraulic Motor	1
34	3	4100309	Spring - Outer	4
35	3	4050038	Spring - Support	4
36	1	4050116	Coupling	1
37	1	4050117	Coupling	1
38	2	4100320	Hex Slotted Nut - 2 1/4-4	4
39	0	9230328	Aeroquip #2023-20-20S	2
40	0	9230068	Aeroquip #2090-12-12S	1
41	0	9310202	Lube Filter Housing	1
42	0	9310203	Lube Filter	1
43	0	9330230	Pile National DB-111116	2
44	0	9230329	Aeroquip #2089-20-20S	2
45	0	9300165	3/8-NPT Union - Steel	2
46	0	9140001	Bearing	8
47	0	9140058	Bearing	2
49	0	9230381	Lenz #450-8	4
50	1	4050023	Key	1
51	0	9300324	3/8 Pipe Nipple x 6 1/2 Sch. 40	2
52	2	4050046	Gasket	2
53	0	9240024	Dowell Pin 1/2 x 6" Lg.	4
54	0	9040001	Cotter Pin 3/8 x 4" Lg.	4
55	0	9230341	Aeroquip #2000-12-10B	1

FIG. 24



Continued

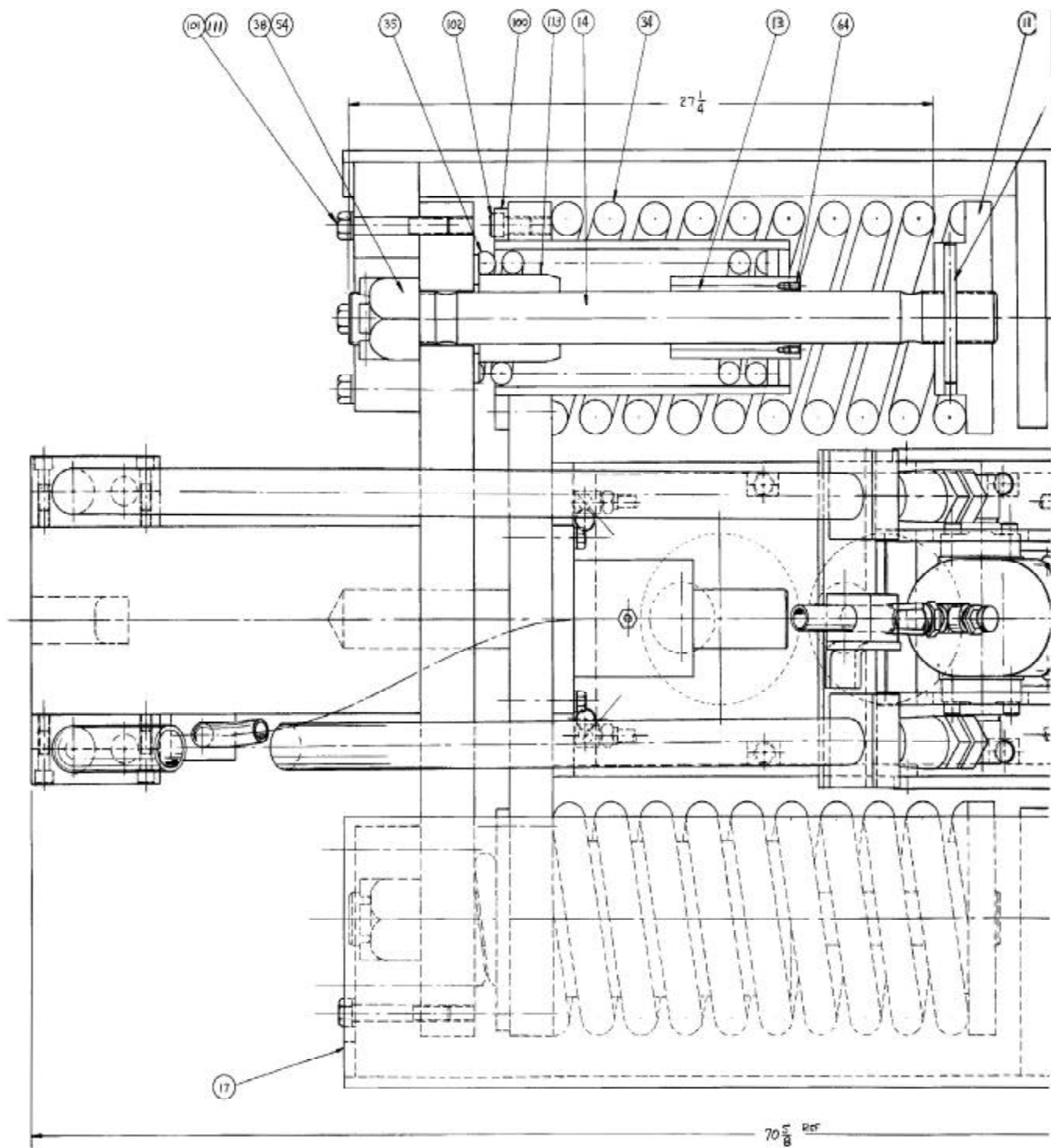


VI. C.

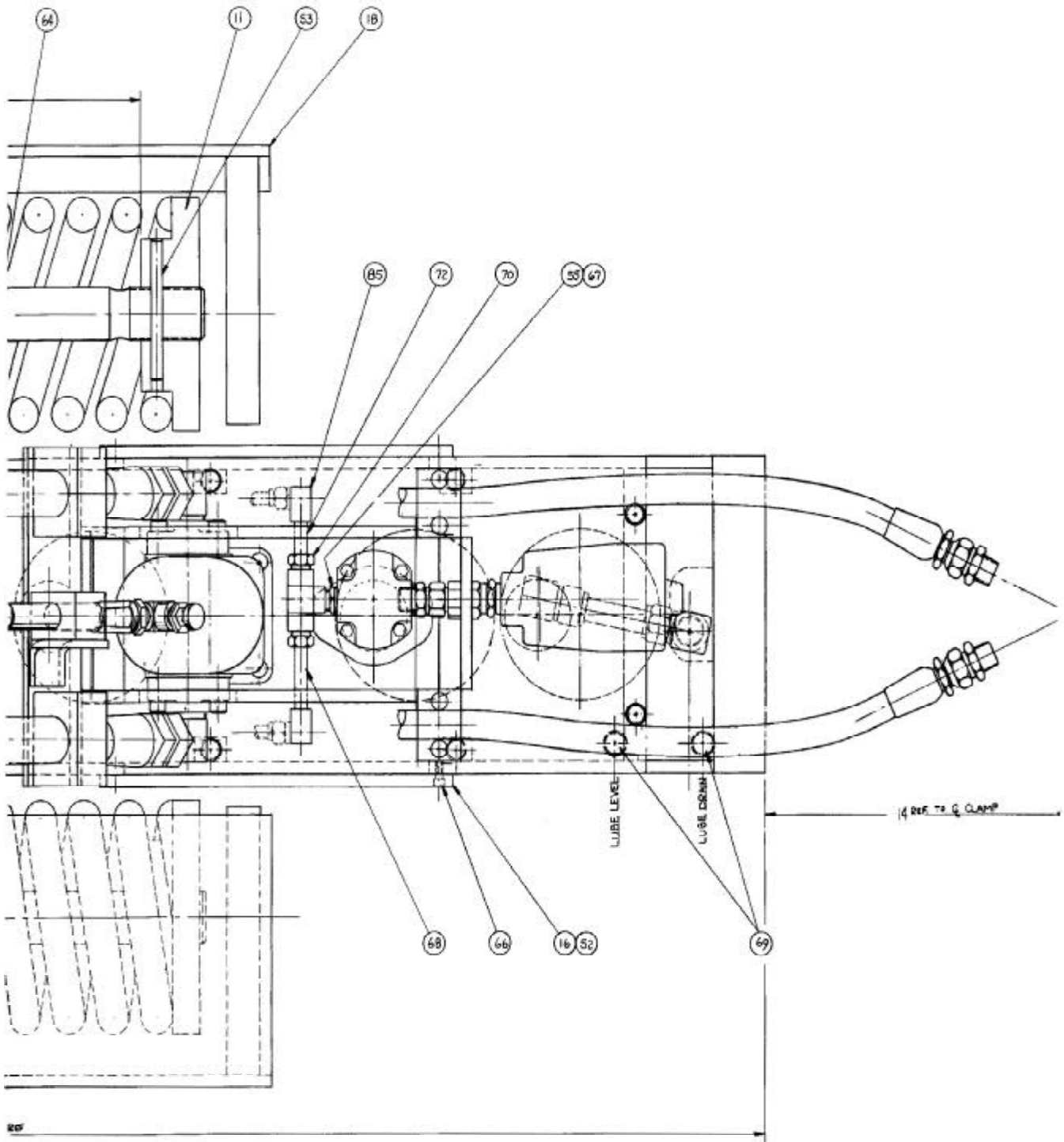
EXCITER-SUSPENSION ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.	
56	0	9230170	1/2 Tube x .018 Wall x 22" Lg.	2
57	1	4050049	Key	4
58	0	9180012	Key	2
59	0	9180013	Key	1
60	0	9210027	Bearing L.N. No. 10	1
61	0	9210028	Bearing L.W. No. 10	1
62	0	9210018	Bearing L.N. No. 12	4
63	0	9210019	Bearing L.W. No. 12	4
64	0	9430184	Set Screw, Brass 1/4-20 x 1/2	8
65	0	9430017	Set Screw, Brass 3/8-16 x 1/2	4
66	0	9190008	5/16 x 5/8 Soc. Hd. Cap Screw	16
67	0	9130112	Aeroquip #22617-10	1
68	0	9300315	3/8 Nipple x 3 1/2-Sch. 40	1
69	0	9300342	3/4 Pipe Plug - Steel, C'Sunk	4
70	0	9230060	Aeroquip #2081-12-6S	3
71	0	9190014	1/2 x 1 3/4 Soc. Hd. Cap Screw	28
72	0	9300314	3/8 Nipple x 2 1/4 - Sch. 40	1
73	0	9190007	3/8 x 1 Hex Hd. Cap Screw	2
74	0	9030111	3/8 L.W.	12
75	0	9030113	1/2 L.W.	24
76	0	9190043	1/2 x 1 1/4 Soc. Hd. Cap Screw	8
77	0	9190046	1/2 x 2 Hex Hd. Cap Screw	8
78	0	9190047	1/2 x 1 1/2 Hex Hd. Cap Screw	12
79	0	9190048	5/8 x 3 1/2 Hex Hd. Cap Screw	10
80	0	9030115	5/8 L.W.	48
81	0	9190049	5/8 x 1 3/4 Hex Hd. Cap Screw	10
82	0	9300061	1 1/2 Pipe Plug - Steel, C'Sunk	1
83	0	9190044	3/8 x 7/8 Soc. Hd. Cap Screw	4
84	0	9300100	3/8 Close Nipple x 1"	2
85	0	9230122	Aeroquip #2087-6-6S	2
86	0	9300368	Tube	1
87	0	9230144	Lenz No. 400-16	2
88	0	9230380	Aeroquip #2083-16-16S	1
89	0	9420009	Alemite Fitting #1627-A	4
90	0	9230404	Aeroquip 2066-12-12S	1
91	3	4050027	Motor Line Hose Block	2
92	1	4050084	Shear Block	2
99	0	9240005	Drive Pin #4 x 1/4	16
100	3	4050034	Support Spring Enclosure	4
101	0	9015933	3/4 x 4 1/2 Hex Hd. Cap Screw	28
102	0	9050811	5/8 x 1 1/4 Soc. Hd. Cap Screw	16
103	0	9240032	Esna Roll Pin #59-012-062-0500	2
104	0	9300056	1/4 Pipe Plug - Steel C'Sunk	2
105	0	9050515	3/8 x 1 1/2 Soc. Hd. Cap Screw	8
106	2	4100431	Motor Drain Hose Ext.	1
107	0	9310006	Circle Seal #D539-3M-40	1
108	0	9230394	Aeroquip #2067-12-8S	1
109	0	9230393	Parker Hannifin #6-8F50G5-S	1
110	0	9230396	Aeroquip #203103-12-12S	1
111	0	9030117	3/4 Lockwasher	28
112	0	9130113	O-Ring No. 2-120	1
113	2	4050115	Support Spring Guide	4
114	0	9190013	1/2 x 1 1/4 Hex Hd. Cap Screw	4
115	0	9250409	5/16 Set Screw x 1/2	1
116	0	9250205	10-24 Set Screw x 1/4	1

FIG. 25

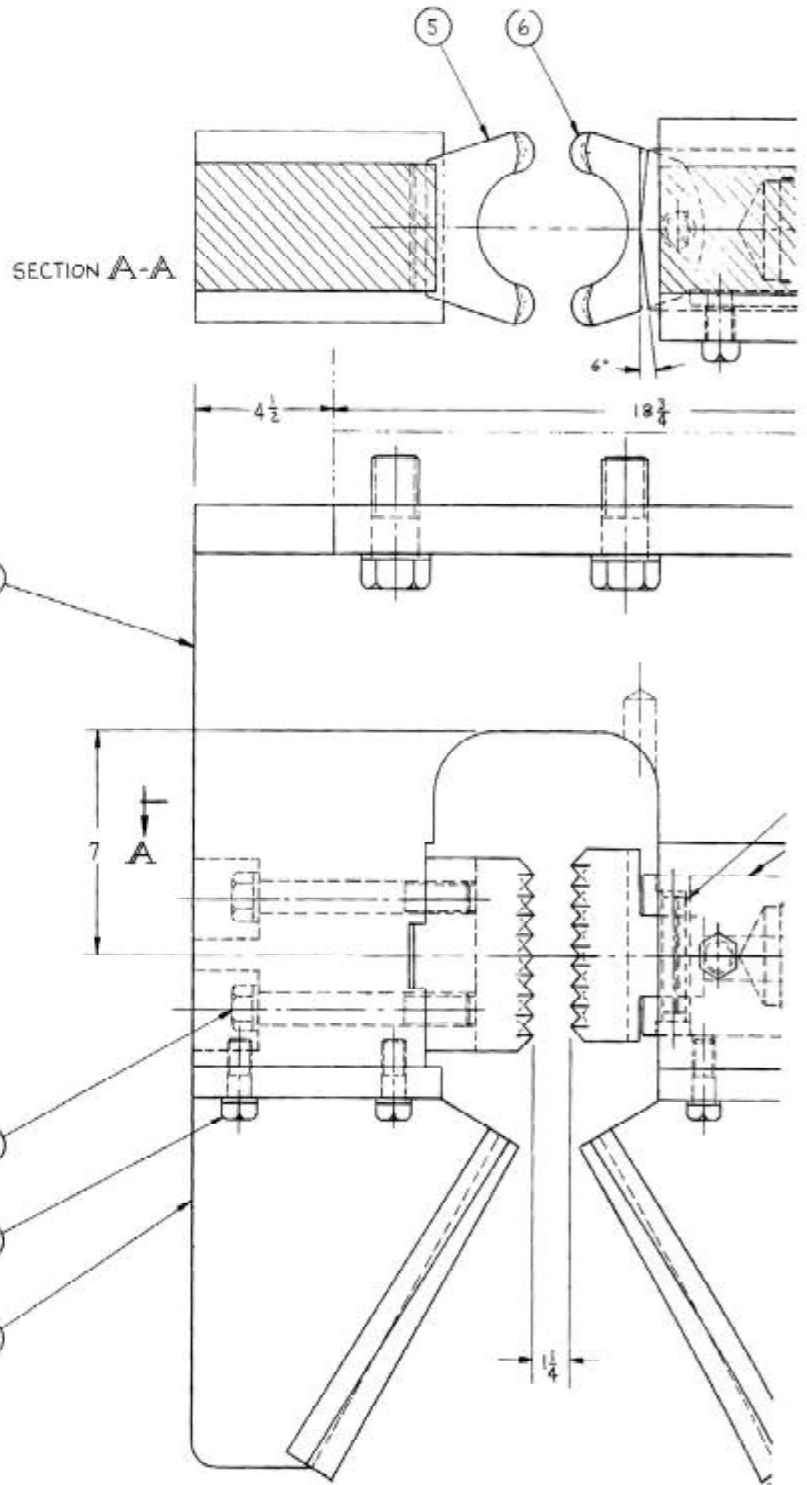
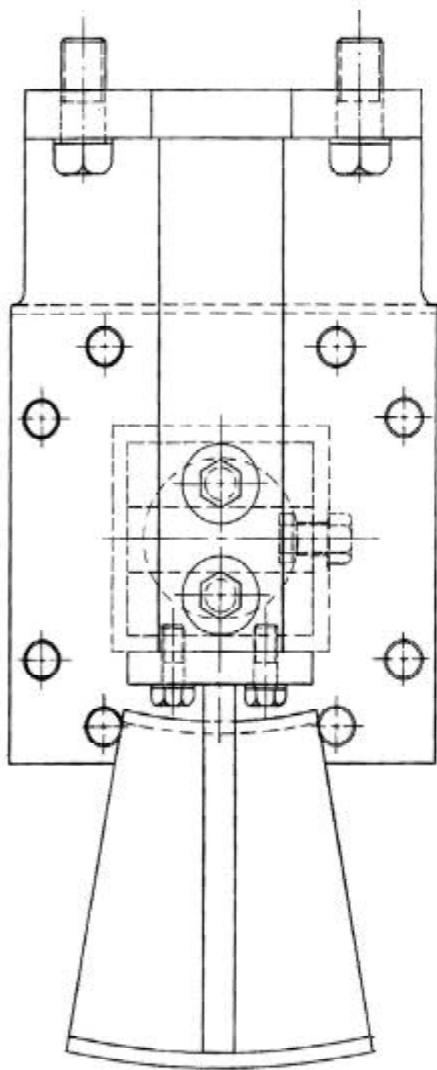


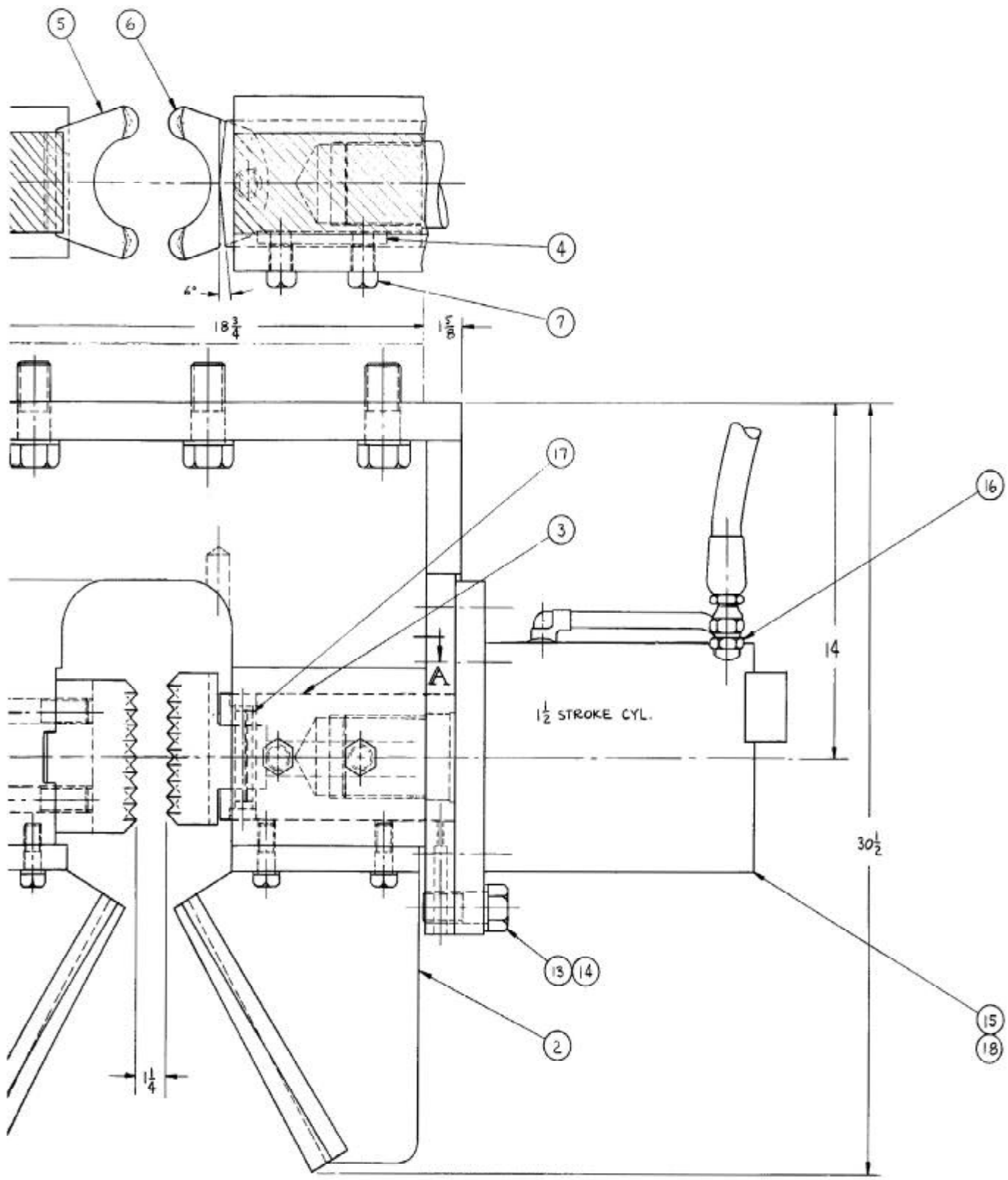
70⁵/₈ Ref



ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.	
1	6	4050087	Clamp Housing	1
2	3	4050090	Jaw Shield	2
3	4	4050088	Clamp Slide	1
4	2	4050089	Slide Key	1
5	3	4050074	Fixed Jaw	1
6	3	4050076	Movable Jaw	1
7	2	4050091	Slide-Key Bolt	2
9	0	9013137	1" x 7" Hex Hd. Cap Screw	2
10	0	9030121	1" Lockwasher	2
11	0	9012917	3/4 x 2" Hex Hd. Cap Screw	8
12	0	9030117	3/4 Lockwasher	8
13	0	9016218	1 1/4 x 3" Hex Hd. Cap Screw	8
14	0	9030125	1 1/4 Lockwasher	8
15	0	9220018	Hydraulic Cylinder	1
16	0	9230020	Aeroquip No. 2021-12-12S	2
17	0	9240030	3/4" x 3 5/8 Roll Pin	1
18	0	9400012	Spring	1

FIG. 26



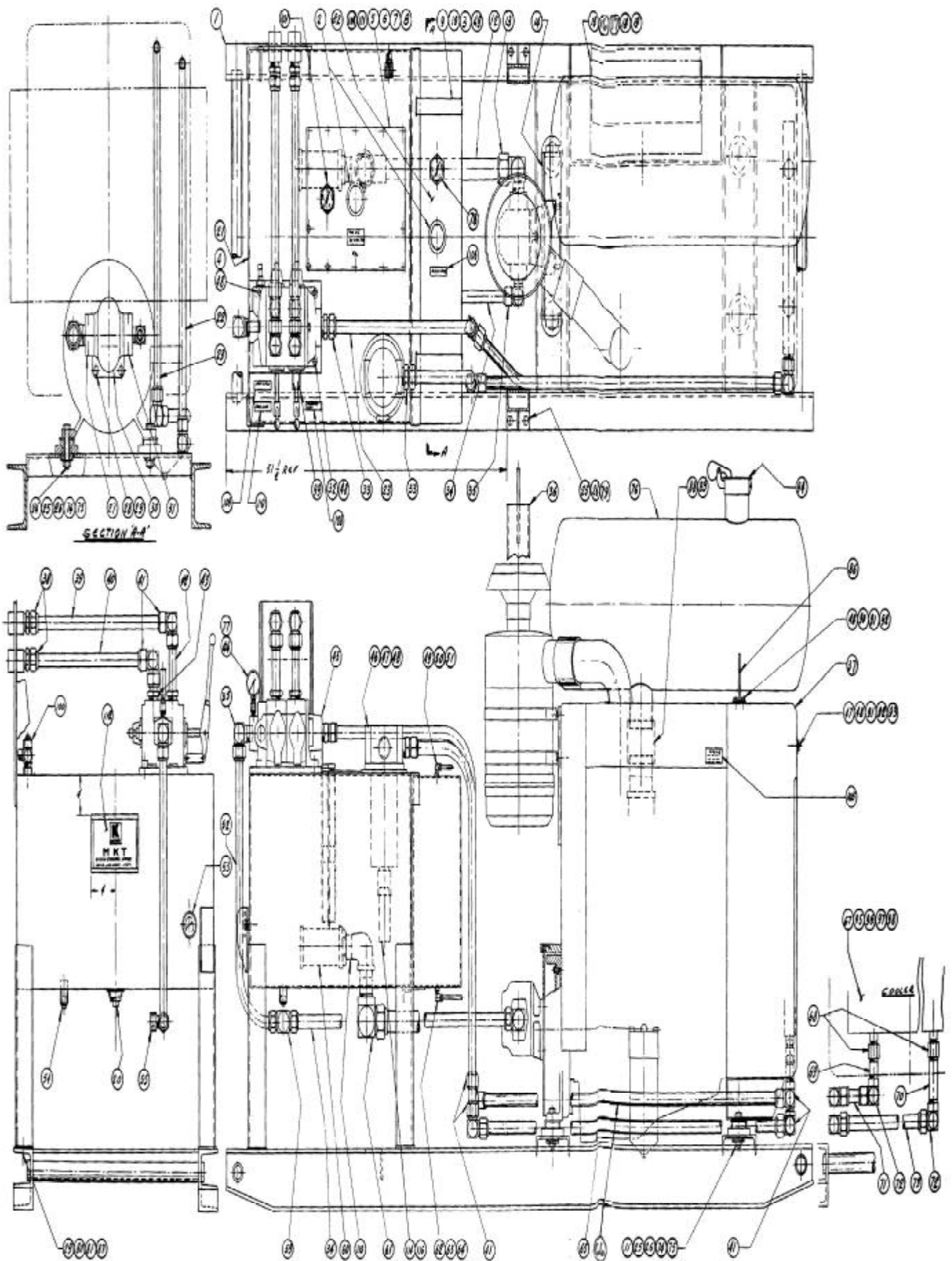


ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.	
1	4	1700001	Skid	1
2	0	9310079	Vickers #SP-113-B Filler Cap	2
3	0	9000012	3/8-24 Hex Nut	4
4	0	9012513	3/8 x 1 1/4 Hex Hd. Cap Screw	1
5	2	1251034	Gasket	1
6	2	1650006	Hand Hole Cover	1
7	0	9010305	1/4 x 1/2 Hex Hd. Cap Screw	14
8	0	9030109	1/4 Lockwasher	14
9	0	9430111	Cotton Belt	12
10	2	1251028	Fuel Tank Strap	2
11	0	9012827	5/8 x 3 1/4 Hex Hd. Cap Screw	2
12	0	9300343	Tube 2" O.D.	1
13	0	9230362	Lenz #400-32-24	1
14	0	9110058	Federal PTO Type 751D SAE #4	1
15	0	9330204	Apollo Battery - Titan 9164 D, 12V	1
16	0	9330221	Battery Cable Delco #1E-19	2
17	2	1251017	Battery Holder	2
18	0	9010413	5/16 x 1 1/4 Hex Hd. Cap Screw	2
19	0	9030110	5/16 Lockwasher	2
20	0	9300080	1 1/2 Sq. Hd. Pipe Plug	1
21	5	1700002	Hydraulic Reservoir	1
22	2	1700003	Tube 1 1/4 O.D.	1
23	2	1700004	Tube 1 1/4 O.D.	1
24	0	9012831	5/8 x 4" Hex Hd. Cap Screw	2
25	0	9000017	5/8 Hex Nut	12
26	0	9030115	5/8 Lockwasher	12
27	0	9110036	Anchor #W43-24-24 1 1/2 Flange	1
28	0	9012711	1/2 x 1 1/4 Hex Hd. Cap Screw	4
29	0	9030113	1/2 Lockwasher	10
30	0	9110055	Tyrone Pump 20300C-3D-3	1
31	0	9110035	Anchor #43-20-20 1 1/4 Flange	1
32	0	9012515	3/8 x 1 1/2 Hex Hd. Cap Screw	2
33	0	9230363	Lenz #100-20-24	2
34	2	1700005	Tube 1 1/4 O.D.	1
35	0	9230148	Lenz #400-20 Elbow	2
36	3	1700006	Lifting Rig	1
37	0	9440011	Detroit Diesel Engine 4-53	1
38	0	9230147	Lenz #100-20	4
39	0	9300344	Tube 1 1/4 O.D.	2
40	0	9300345	Tube 1 1/4 O.D.	2
41	0	9230351	Lenz #500-20	8
42	0	9230364	Lenz #20 TPN-LL	2
43	0	9230365	Lenz #20 TPN	2
44	0	9310076	Marshalltown-Beryllo Gage 0-3000 psi	1
45	0	9310194	BE-GE Valve No. U20RE02E-03E-LF	1
46	0	9310217	Schroeder, Model #RT-1K25 Filter	1
47	0	9010511	3/8 x 1" Hex Hd. Cap Screw	8
48	0	9030111	3/8 Lockwasher	17
49	0	9230091	Weatherhead #105 x 5 Tube Nut	2
50	0	9230358	Weatherhead #400 x 5 x 4 Male Elbow	1

VI. E. HP-105 HYDRAULIC POWER PACK (BE-GE VALVE)

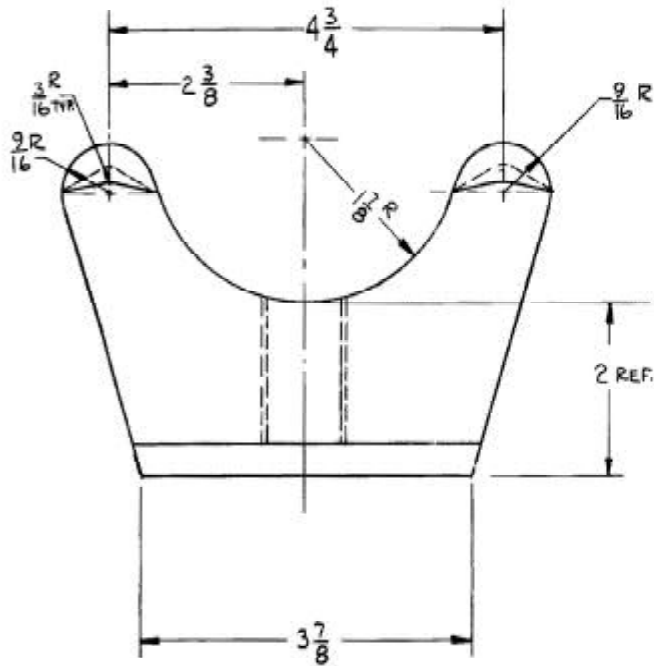
ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.
51	0 9300082	5/16 O.D. Tube	1
52	2 1700007	Tube 1 1/4 O.D.	1
53	0 9310147	Thermometer	1
54	0 9300017	3/4 Pipe Plug	1
55	0 9300058	1" NPT Pipe Cap	1
59	0 9230369	Lenz #600-20-20-16	1
60	0 9310181	Schroeder Mag. Filter #SKB-2	1
61	0 9230370	Lenz #450-32	1
62	0 9300081	3/8 O.D. Tube	1
63	0 9230089	Weatherhead #105 x 6 Tube Nut	2
64	0 9230090	Weatherhead #400 x 6 El.	2
65	0 9300349	Tube 1 1/4 O.D.	1
66	2 1700008	Tube 1 1/4 O.D.	1
67	0 9340004	Perfex No. VOC-50 Heat Exchanger	1
68	0 9230272	Lenz #12-16 PRC	2
69	0 9300350	1" Nipple 3" Lg.	1
70	0 9300351	1" Nipple 5 1/2 Lg.	1
71	0 9300347	Tube 1 1/4 O.D.	1
72	0 9230371	Lenz #450-20-16	2
73	0 9300348	Tube 1 1/4 O.D.	1
74	0 9410006	Lord #J-8006-1 Mounting	4
75	1 1700010	Snubbing Washer	8
76	1 1700009	Maxim Silencer #M51, 3 1/2"	1
77	0 9310210	Chemiquip Press. Snubber #25SE	1
78	2 1700023	Fuel Level Gage	1
79	0 9012815	5/8 x 1 3/4 Hex Hd. Cap Screw	8
80	0 9010713	1/2 x 1 1/2 Hex Hd. Cap Screw	6
81	0 9020003	1/2 Flat Washer	6
82	2 1251027	Fuel Tank (25 Gal.)	1
83	0 1700015	Hydraulic Hose Assembly	1
84	2 4110031	Nameplate	1
85	1 0990600	Ear Protection Decal	1
86	3 1700013	Muffler Support	1
87	0 9000015	1/2 Hex Nut	6
88	1 1700024	Muffler Adaptor	1
89	0 9300050	3" x 4 Pipe Nipple	1
90	0 9010507	3/8 x 3/4 Hex Head Cap Screw	4
91	0 9000011	3/8 Hex Nut	8
92	0 9020002	3/8 Flat Washer	8
93	1 1700012	Shim	2
94	0 9440013	Rain Cap	1
95	0 9300021	1/4 Allen Pipe Plug	2
96	0 9300352	1" Allen Pipe Plug	1
97	0 9010413	5/16 x 1 1/4 Hex Hd. Cap Screw	6
98	0 9010415	5/16 x 1 1/2 Hex Hd. Cap Screw	2
99	1 1700014	Spacer	1
100	0 9230395	Aeroquip #2093-12-12S	1
101	2 4110202	Level Gage	1
113	0 9300248	2" Street Elbow	1
114	0 9300364	1 1/2" Coupling	1
115	0 9300363	1 1/2" x 5" Lg. Nipple	1

FIG. 27

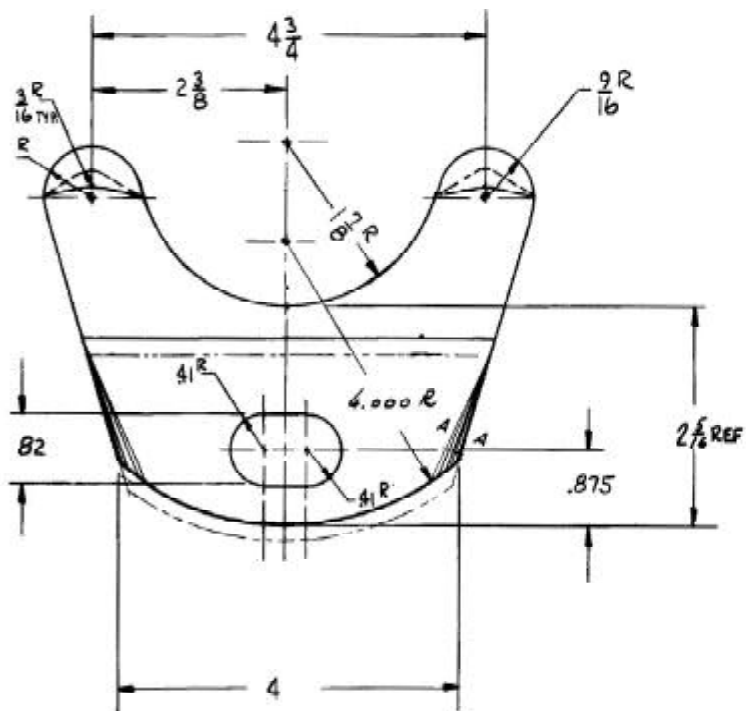


VI. F.

STANDARD JAWS

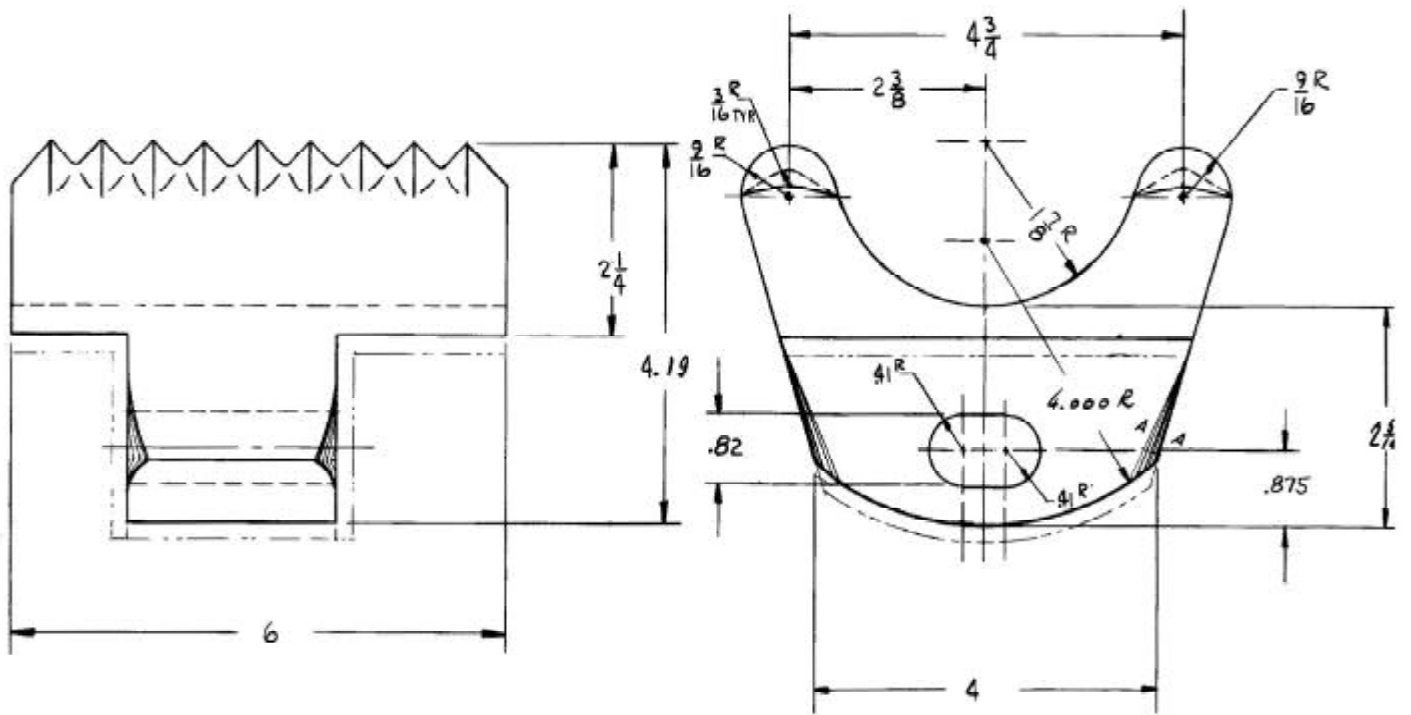
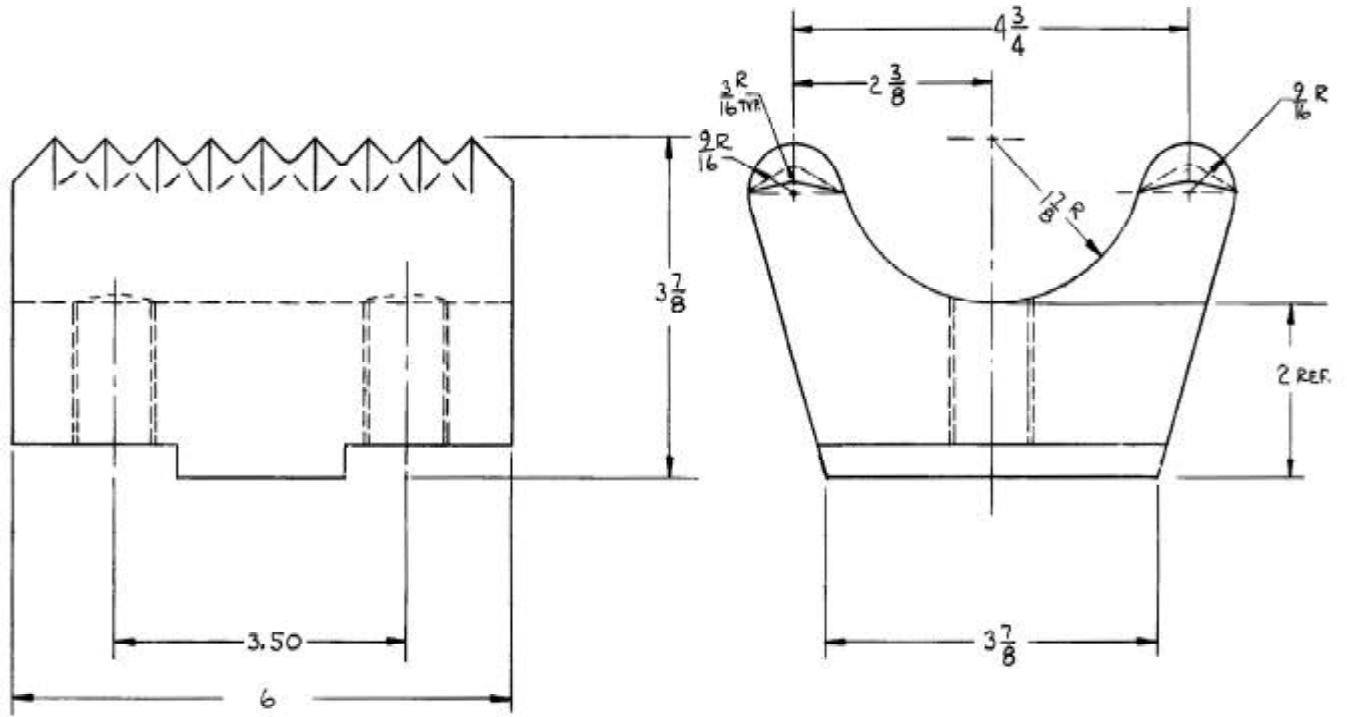


FIXED JAW



MOVABLE JAW

FIG. 28



VI. G.

STANDARD SPARE PARTS CHEST

ITEM NO.		PART NO.	DESCRIPTION	QTY. REQ'D.
1	0	9280001	Kennedy K-20 Tool Kit	1
2	0	9260001	Loctite - 50cc	1
3	2	4100404	50 Ft. Motor Hose	1
4	2	4100415	50 Ft. Clamp Hose	1
5	0	9270016	Coupling - Snap Tite	1
6	0	9270017	Nipple - Snap Tite	1
7	0	9270005	Aeroquip 5600-12-12S	1
8	0	9230227	0-3000 psi Gage	1
9	0	9310005	Schroeder Filter K-25	1
10	0	9140075	Bushing	4
11	0	9140076	Bushing	2
12	2	4050020	Motor Line Ext.	1
13	2	4050021	Clamp Line Ext.	1
14	0	9310203	Lube Filter	1
15	0	9040001	3/8 x 4" Cotter Pin	4
16	0	9430184	1/4 x 1/2" Brass Set Screw	8
17	0	9430017	3/8 x 1/2 Brass Set Screw	4
18	0	9190014	1/2 x 1 3/4 Soc. Hd. Cap Screw	12
19	0	9030117	3/4 Lockwasher	14
20	0	9015933	3/4 x 4 1/2 Hex Hd. Cap Screw	14
21	0	9016311	1 1/2 x 3 1/4 Hex Hd. Cap Screw	4
22	0	9030129	1 1/2 Lockwasher	4
23	0	9013137	1" x 7" Hex Hd. Cap Screw	2
24	0	9030121	1" Lockwasher	2
25	0	9016218	1 1/4 x 3" Hex Hd. Cap Screw	4
26	0	9240030	3/4 x 3 5/8 Roll Pin	2
27	0	9310147	Thermometer	1
	0	9310006	Circle Seal No. D539-300-40	1
	2	4100431	Drain Line Ext.	1

VI. H.

CROSS SECTION OF BE-GE DIR. VALVE

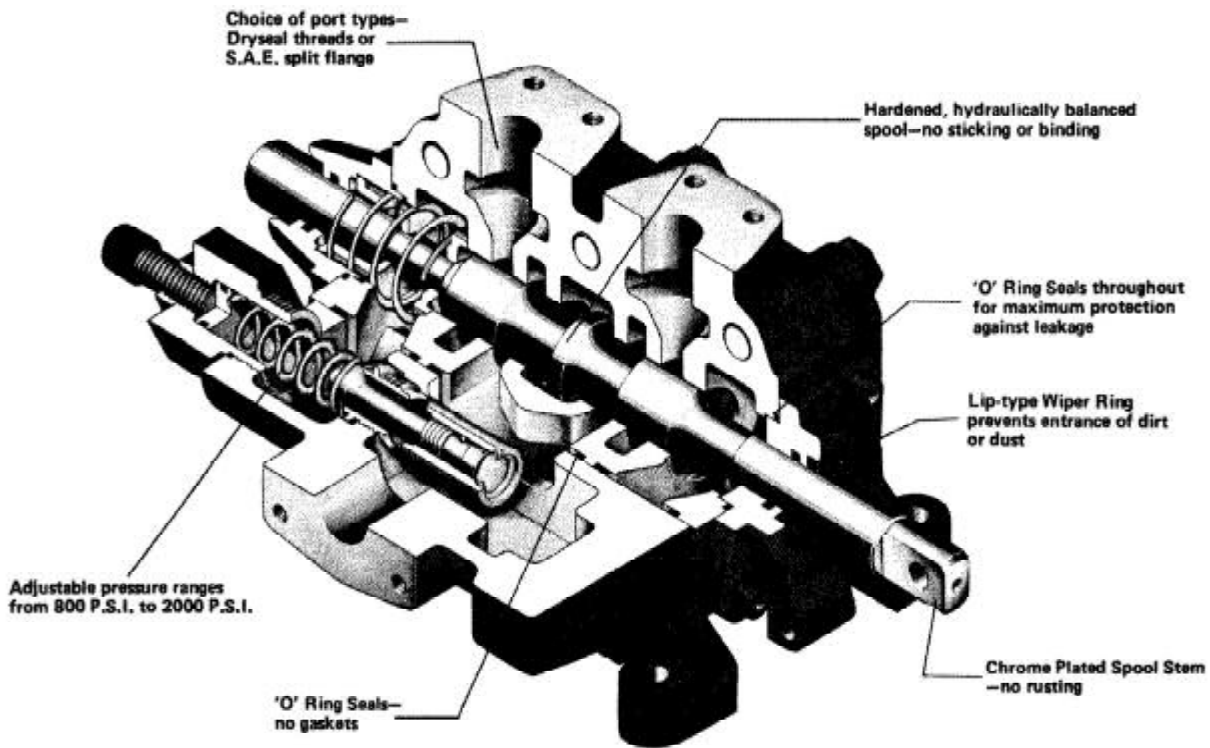
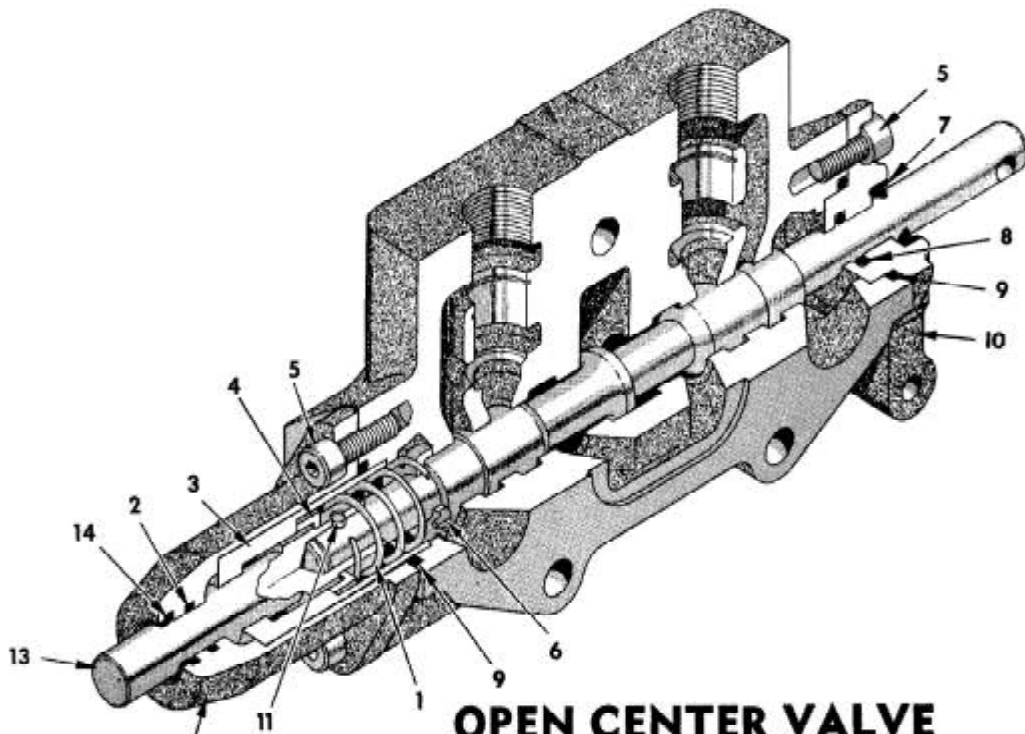
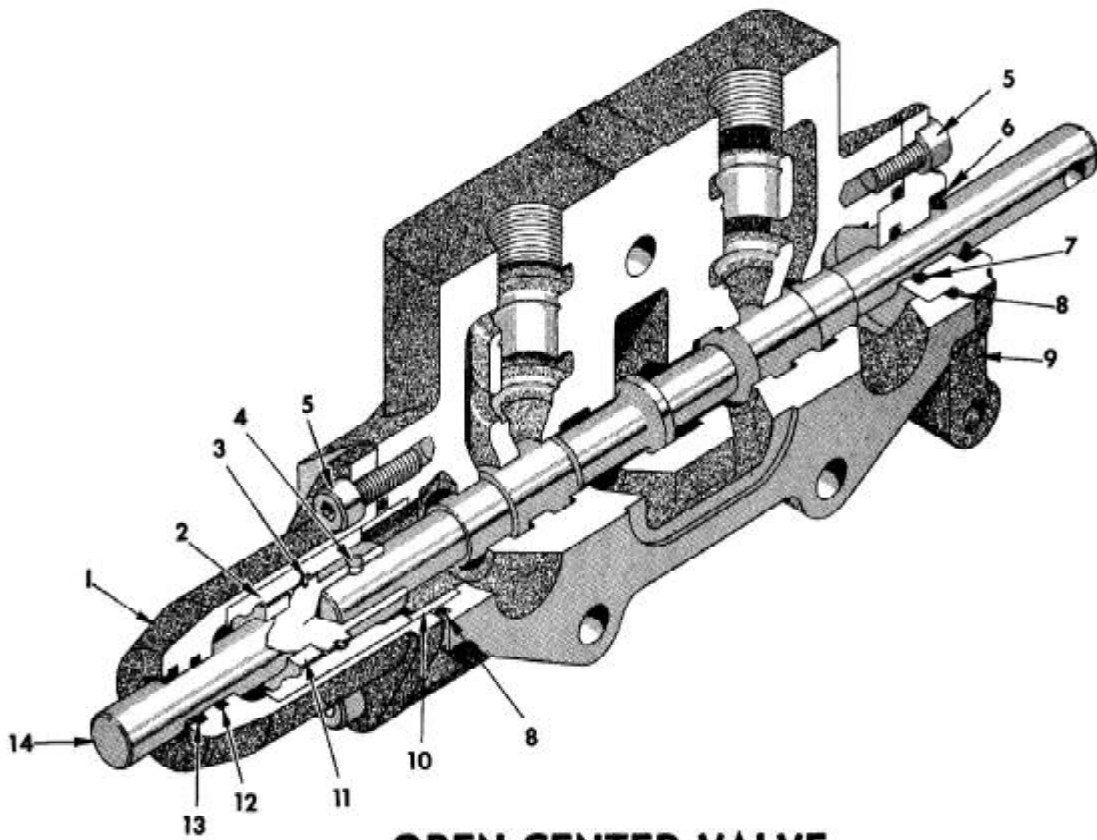


FIG. 29



OPEN CENTER VALVE

12 SPRING RETURN TO NEUTRAL (ALL PORTS OPEN IN NEUTRAL)



OPEN CENTER VALVE

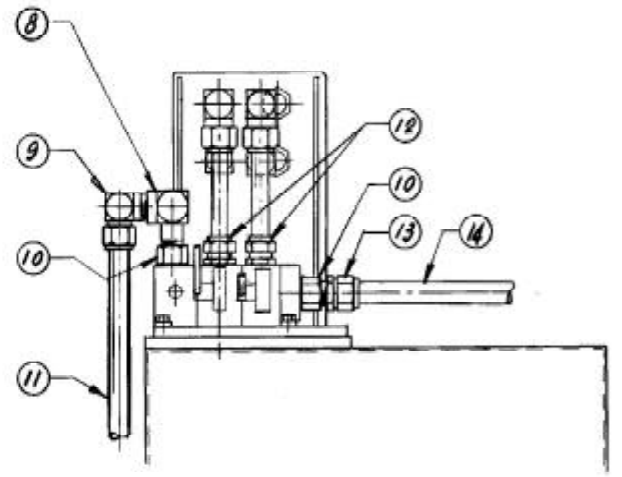
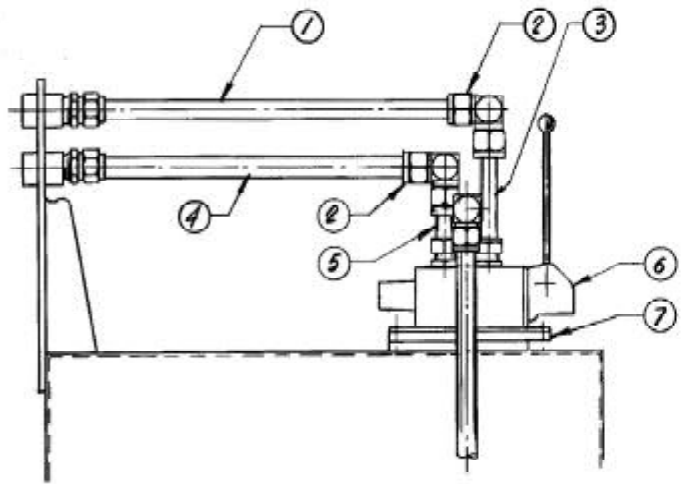
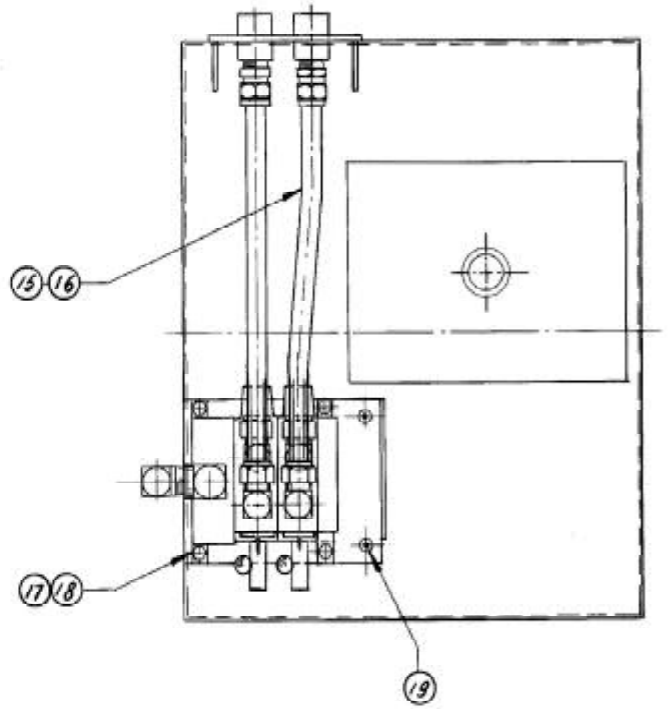
WITH 3 POSITION DETENT (ALL PORTS OPEN IN NEUTRAL)

VI. I.

HPI VALVE ON HYDRAULIC POWER PACK

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.
1	0 9300369	1 1/4 O.D. Tube x .120 Wall	1
2	0 9230403	Lenz 500-20-16	4
3	0 9300370	1" O.D. Tube x .109 Wall	2
4	0 9300371	1 1/4 O.D. Tube x .120 Wall	1
5	0 9300372	1" O.D. Tube x .109 Wall	2
6	0 9310219	HPI Directional Valve	1
7	1 1700026	Adapter Plate	1
8	0 9230401	Lenz 16-20SE	1
9	0 9230148	Lenz 400-20	1
10	0 9230402	Lenz 16 APC	2
11	2 1700027	1 1/4 O.D. Tube	1
12	0 9230140	Lenz A100-16	4
13	0 9230151	Lenz 100-20-16	1
14	2 1700028	1 1/4 O.D. Tube	1
15	2 1700029	1 1/4 O.D. Tube	1
16	2 1700030	1 1/4 O.D. Tube	1
17	0 9010709	1/2 x 1 Hex Hd. Cap Screw	4
18	0 9030113	1/2 Lockwasher	4
19	0 9050507	3/8 x 3/4 Soc. Hd. Cap Screw	3

FIG. 30

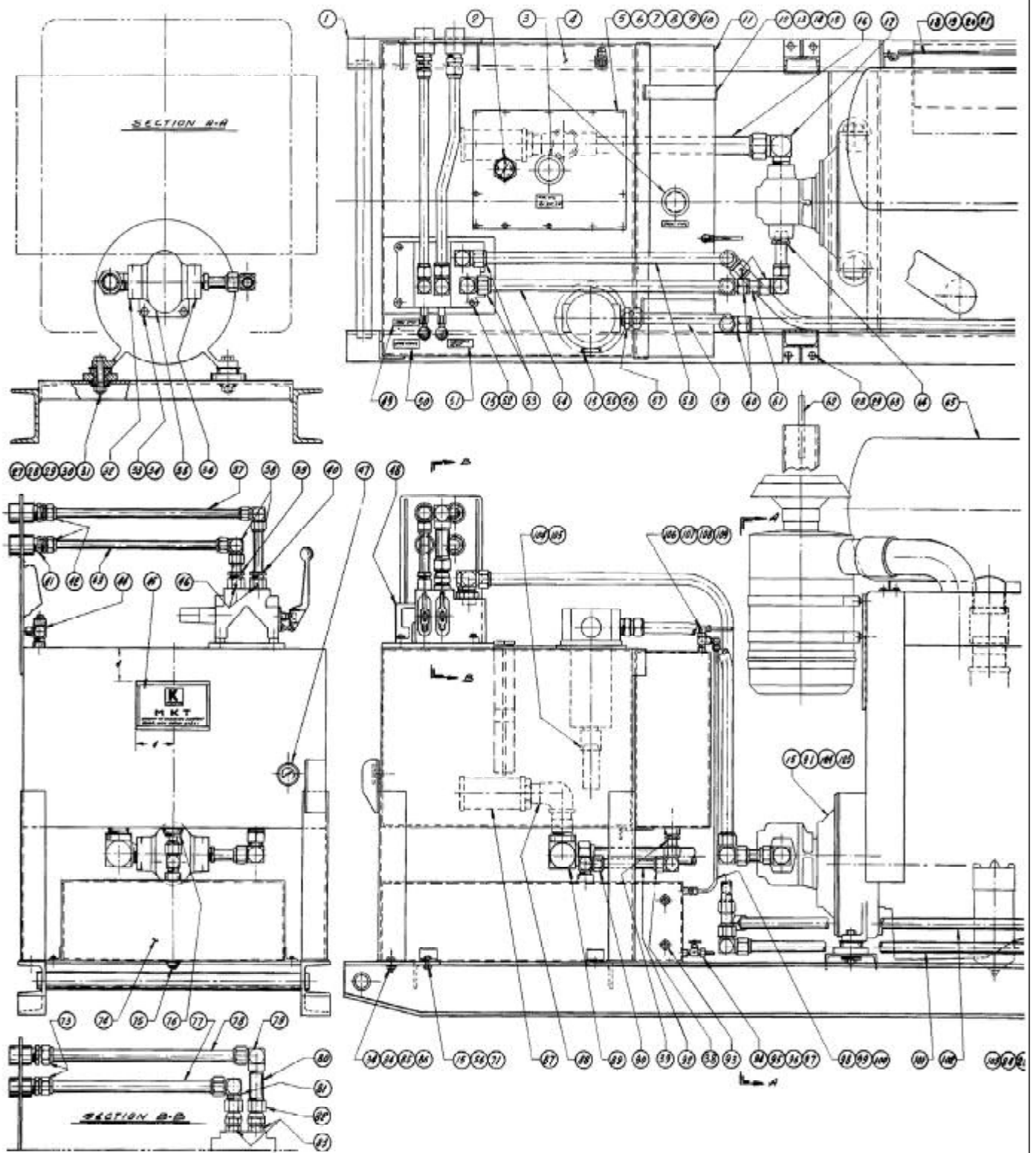


VI. J. HP-105 HYD. POWER PACK ASS'Y. (WARNER-MOTIVE VALVE)

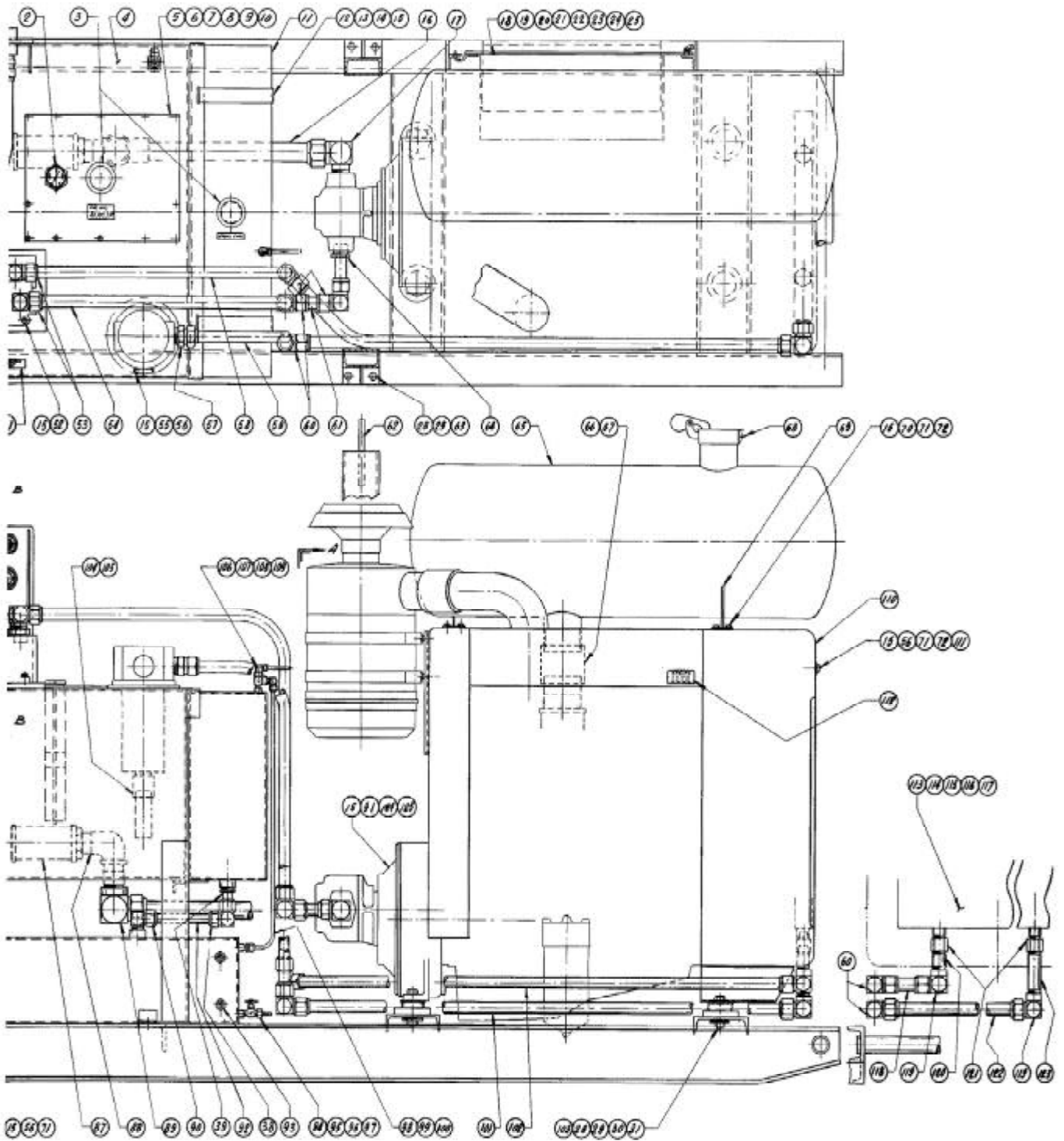
ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.	
64	0	9230390	Lenz #20TPN-L Nipple	1
65	1	1700009	Maxim Silencer #M51, 3 1/2"	1
66	1	1700024	Muffler Adaptor	1
67	0	9300050	3" x 4 Lg. Pipe Nipple	1
68	0	9440013	Rain Cap	1
69	3	1700013	Muffler Support	2
70	0	9010507	3/8-16 x 3/4 Hex Hd. Cap Scr.	8
71	0	9000011	3/8-16 Hex Nut	16
72	0	9020002	3/8 Flat Washer	12
73	0	9230147	Lenz #100-20	2
74	4	1700038	Fuel Tank 35 Gal.	1
75	0	9300017	3/4 Sq. Hd. Pipe Plug	1
76	0	9300080	1 1/2 Sq. Hd. Pipe Plug	1
77	2	1700039	Tube	1
78	2	1700040	Tube	1
79	0	9230375	Lenz #450-20 Elbow	1
80	0	9230408	Lenz #20 SPN x 5" Lg. Nipple	1
81	0	9230148	Lenz #400-20 Elbow	1
82	0	9230410	Aeroquip #2242-20-20S	2
83	0	9230411	Parker Hann. #0503-16-20	2
84	0	9010713	1/2-13 x 1 1/2 Hex Hd. Cap Scr.	6
85	0	9020003	1/2 Flat Washer	6
86	0	9000015	1/2 Hex Nut	6
87	0	9310181	Schroeder #SKB-2 Suction Filter	1
88	0	9300248	2" NPT Street Elbow	1
89	0	9230370	Lenz #450-32 Elbow	1
90	0	9230144	Lenz #400-16 Elbow	1
91	0	9050507	3/8-16 x 3/4 Soc. Hd. Cap Scr.	8
92	0	9300378	Tube 1" O.D. x .109 Wall x 8 1/2 Lg.	1
93	0	9310053	Oil-Rite #1264 Window Sight	2
94	0	9310224	Weatherhead #A6760 Shut-Off Valve	1
95	0	9300081	Copper Tube 3/8 O.D.x.032 Wall x 35"Lg.	1
96	0	9230089	Weatherhead #105 x 6 Nut	1
97	0	9230090	Weatherhead #400 x 6 El.	1
98	2	1700041	Tube	1
99	0	9230271	Lenz #100-6 Conn.	1
100	0	9230306	Lenz #400-6 Elbow	1
101	0	9300349	Tube 1 1/4 O.D. x .095 Wall x 56 Lg.	1
102	2	1700042	Tube	1
103	0	9012827	5/8-11 x 3 1/4 Lg. Hex Hd. Cap Scr.	2
104	0	9300364	1 1/2 NPT Coupling	1
105	0	9300363	1 1/2 NPT x 5" Lg. Nipple	1
106	0	9230409	Lenz #4 St. Street Tee	1
107	0	9230091	Weatherhead #105 x 5 Nut	2
108	0	9230358	Weatherhead #400 x 5 x 4 Elbow	1
109	0	9300082	Copper Tube 5/16 O.D.x.032 Wall x 30"Lg.	1
110	0	9440011	Detroit Diesel Engine 4-53	1
111	1	1700012	Shim	2
112	1	1251084	Nameplate (Lube)	1
113	0	9340004	Perfex #VOC-50 Heat Exchanger	1
114	0	9300021	1/4" Allen Pipe Plug	2
115	0	9300352	1" Allen Pipe Plug	1
116	0	9010413	5/16-18 x 1 1/4 Hex Hd. Cap Scr.	6
117	0	9010415	5/16-18 x 1 1/2 Hex Hd. Cap Scr.	2
118	0	9300347	Tube 1 1/4 O.D. x .095 Wall x 6" Lg.	1
119	0	9230371	Lenz #450-20-16 Elbow	2
120	0	9300350	1" Nipple 3" Lg.	1
121	0	9230272	Lenz #12-16 PRC	2
122	0	9300348	Tube 1 1/4 O.D.x.095 Wall x 18 1/2 Lg.	1
123	0	9300351	1" Nipple 5 1/2 Lg.	1
124	0	9110058	Engine Pump Drive	1
125	0	9012513	3/8-16 x 1 1/4 Hex Hd. Cap Scr. H.S.	12

FIG. 31

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.	
1	4	1700001	Skid	1
2	2	4110202	Level Gage	1
3	0	9310079	Vickers #SP-113-B Filler Cap	2
4	5	1700043	Hydraulic Reservoir	1
5	2	1251034	Gasket	1
6	2	1650006	Hand Hole Cover	1
7	0	9010305	1/4-20 x 1/2 Hex Hd. Cap Scr.	14
8	0	9030109	1/4 Lockwasher	14
9	1	1251032	Nameplate (Hyd. Fluid)	1
10	1	1700021	Nameplate (80 Gal. Cap.)	1
11	4	1700032	Fuel Tank (25 Gal. Cap.)	1
12	0	9430111	Cotton Belt 1/8 x 1 1/4 x 45	4
13	2	1251028	Fuel Tank Strap	2
14	0	9000012	3/8-24 Hex Nut	4
15	0	9030111	3/8 Lockwasher	25
16	0	9300343	Tube 2" O.D. x .134 Wall x 25 1/2 Lg.	1
17	0	9230362	Lenz #400-32-24 Elbow	1
18	0	9330204	Apollo Battery-Titan 9164D	1
19	0	9330221	Battery Cable Delco #1E-19	2
20	2	1251017	Battery Holder	2
21	0	9010413	5/16-18 x 1 1/4 Hex Hd. Cap Scr.	2
22	0	9030110	5/16 Lockwasher	2
23	1	1700033	Battery Bracket	1
24	1	1700034	Battery Bracket	1
25	1	1700035	Battery Retaining Bar	1
27	0	9012831	5/8-11 x 4" Lg. Hex Hd. Cap Scr.	2
28	0	9000017	5/8-11 Hex Nut	12
29	0	9030115	5/8 Locknut	12
30	0	9410006	Lord #J-8006-1 Engine Mount	4
31	1	1700010	Snubbing Washer	8
32	0	9110036	Anchor #W43-24-24 1 1/2 Flange	1
33	0	9012711	1/2-13 x 1 1/4 Hex Hd. Cap Scr.	4
34	0	9030113	1/2 Lockwasher	10
35	0	9110055	Tyrone Pump 20300C-3D-3	1
36	0	9110035	Anechor #W43-20-20 1 1/4 Flange	1
37	0	9300376	Tube 1" O.D. x .109 Wall x 25" Lg.	1
38	0	9230405	Lenz #500-16 Elbow	3
39	0	9230154	Lenz #16TPN Nipple	2
40	0	9230406	Lenz #16TPN-LL Nipple	1
41	0	9230407	Lenz #20-16 HB Bushing	2
42	0	9230152	Lenz #100-16 Conn.	2
43	0	9300377	Tube 1" O.D. x .109 Wall x 22 1/2 Lg.	1
44	0	9230395	Aeroquip #2093-12-12S Tee	1
45	3	4100002	Nameplate	1
46	0	9230402	Lenz #16 APC Conn.	1
47	0	9310147	Thermometer	1
48	0	9310221	Warner-Motive Valve, Model 305	1
49	1	1700019	Nameplate (Jaws Open)	1
50	1	1700020	Nameplate (Jaws Closed)	1
51	1	1700018	Nameplate (Vibrate & Stop)	1
52	0	9012513	3/8-16 x 1 1/4 Hex Hd. Cap Scr.	3
53	0	9230349	Lenz #A400-20 Elbow	2
54	2	1700036	Tube	1
55	0	9310217	Schroeder, Model #RT-1K25.P. Filter	1
56	0	9010511	3/8-16 x 1" Hex Hd. Cap Scr.	12
57	0	9230363	Lenz #100-20-24	1
58	2	1700037	Tube	1
59	2	1700003	Tube	1
60	0	9230351	Lenz #500-20 Elbow	6
61	0	9300379	Tube 1 1/4 O.D. x .120 Wall x 5 Lg.	1
62	3	1700006	Lifting Rig	1
63	0	9012815	5/8-11 x 1 3/4 Hex Hd. Cap Scr. H.S.	4



Continued



VI. K.

HYDRAULIC HOSE ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.
1	0	Aeroquip #2022-20-20S	2
2	3	Motor Line Hose Ass'y. (100 Ft.)	2
3	0	Snap-Tite #71C16-20F Coupling	2
4	0	Snap-Tite #71N16-20F Nipple	2
5	0	Aeroquip #2022-12-12S	2
6	3	Clamp Line Hose Ass'y. (100 Ft.)	2
7	0	Aeroquip #5600-12-12S Push-Pull Coup.	2
8	0	Aeroquip #2083-12-12S	2
9	0	Aeroquip #2081-20-12S	2
10	0	Snap-Tite Dust Plug 1 1/4	2
11	0	Snap-Tite Dust Cap 1 1/4	2
12	0	Aeroquip #5659-12 Dust Plug	2
13	0	Aeroquip #5657-12 Dust Cap	2
14	0	Aeroquip #210292-20S Cap Nut	2
15	0	Aeroquip #210292-12S Cap Nut	2
16	0	Aeroquip #2083-20-20S	2
17	2	50 Ft. Drain Hose	2
18	0	Aeroquip No. 2027-12-12S	1
19	0	Aeroquip #5600-12-10S	1



Koehring
MKT Division
Dover, New Jersey 07801

DATE: February 26, 1974

SALES & SERVICE BULLETIN ATTENTION: SALES - PARTS - SERVICE

LOCATION OF SERIAL NUMBERS

The location of the Serial Number on our equipment is as follows:

Steam/Air Pile Hammers - Located on the left front on each part (top head, cylinder, etc.).

Steam/Air Extractors - Located on the left side front and each sidestrap.

Diesel Pile Hammers - Located on the instruction plate above the travel plug on the front of the hammer.

Vibratory - Located on the center post of the control side of the power pack. Located on the left side or motor side of the exciter housing.

KA-MO Units - Located on the front of the roller base and the top of the motor housing.

DISTRIBUTION: ALL DISTRIBUTORS AND BRANCHES



Koehring
MKT Division
Dover, New Jersey 07801

DATE: November 12, 1974

NO. 1-893-001

SALES & SERVICE BULLETIN ATTENTION: SALES - PARTS - SERVICE

SYSTEM SERIAL NUMBERS

Up until the present, MKT has been selling vibratory and earth boring systems. As such, when the sale was effected, both the power packs and the exciter or boring unit had been assigned the same serial number.

Now it has become obvious that these systems will, on occasion, be sold as separate items. Hence:

- (A) Major system items supplied separate from a matched system will be assigned a sequential serial number.
- (B) Major system items supplied in a matched system will have a suffix on the serial number identifying the component.
 - 1. Power Packs, Suffix P.
 - 2. Vibratory Exciters, Suffix E.
 - 3. Earth Augers, Suffix A.

EXAMPLE:

A V-14 Vibratory System will have a Serial Number on the Power Pack marked 741101P and the Exciter will be marked 741101E.



Koehring
MKT Division
Dover, New Jersey 07801

DATE: December 26, 1974
NO. 1-405-002

SALES & SERVICE BULLETIN ATTENTION: SALES - PARTS - SERVICE

V-5 VIBRATORY HAMMER POWERED BY THE HP-210 (V-14 P/P)

The V-14 Power Pack can be used to power the V-5 Vibratory Hammer. The clamp circuit and drain line can be connected directly between the power pack and the vibrator. The motor line flow and pressure must each be lowered to safely operate the V-5 Vibrator. The maximum pressure over relief for the motor line must be set at 2500 psi. The maximum flow must be set at about 54 gpm for a free hanging frequency of 1450-1500 cpm. The actual flow to the vibrator motor is not easily measured but by the manipulation of the fast and slow button on the control pendent, the measured frequency of 1450-1500 cpm can be set.

When setting the motor drive pressure to a maximum of 2500 psi, over relief, check the actuator rotation when depressing the slow button. The actuator will stop when one of the switch rollers dips off the cam high path. Carefully hold out this roller to permit the acuator to continue rotating the cam a little further with the slow button depressed (Note, the vertical rod on the pump will rise). Connect the vibrator to the motor lines of the power pack and check the vibrator frequency while free hanging.



Koehring
MKT Division
Dover, New Jersey 07801

DATE: January 3, 1975

NO. 1-405-003

SALES & SERVICE BULLETIN ATTENTION: SALES - PARTS - SERVICE

REPLACING THE GASKET BETWEEN THE V-5 BEARING HOUSING AND EXCITER HOUSING

Four eccentric supported bearings are tightly fitted into the V-5 Bearing Housing and one jack shaft bearing cartridge is slip fitted into this same bearing housing. A gasketed plate covers the eccentric bearings and retains the jack shaft bearing cartridge. Reference the V-5 Manual, Fig. 24, Page 36. The eccentric bearings are a slip fit on the eccentrics and the jack shaft bearings are tightly fitted onto the jack shaft. A .030 Gasket, 34050040, is affixed to the Bearing Housing, 44050004 with Permatex.

To remove the large Bearing Housing, 44050004, first remove the Bearing Cover, 34050093, and try sliding out the Jack Shaft Bearing Cartridge, 34050092. If the cartridge will not pull out, remove the entire bearing housing and the cartridge may come with it. In doing so, the Jack Shaft, 34050010, Bearing, 09140001, may come apart by the separating force between the outer and inner race. This will not damage the bearing and it can be reassembled.

Replace the Bearing Housing Gasket, 34050040, and assemble by applying Permatex to the Bearing Housing, 44050004. Assemble the bearing housing by lowering and carefully fitting the bearing inner races on the eccentric shafts. Light tapping of the inner race may be necessary to help guide the bearings. Do not assemble the Jack Shaft Bearing Cartridge, 34050092, at this time. After the bearing housing is fully seated and bolted, guide in the bearing cartridge which will slip fit into the housing and over the bearing outer race. Reassemble the Bearing Cover, 34050093, replacing its Gasket, 34050095, only if damaged. The Bearing Cover Gasket, 34050095, is affixed to the bearing cover with Permatex.

If a jack shaft bearing has to be replaced, its removal from the jack shaft will be difficult because of an interference fit of .001 to .002. Application of heat and a puller may be used. Replacement and assembly of a Jack Shaft Bearing, 09140058, to the jack shaft is done by heating the bearing in oil at a temperature of about 250° F., and positioning the bearing tight against the jack shaft shoulder.



Koehring
MKT Division
Dover, New Jersey 07801

DATE: February 20, 1975

NO. 1-405-004

SALES & SERVICE BULLETIN

ATTENTION: SALES - PARTS - SERVICE

The Standard Spare Parts Chest for the V-5 Vibratory Hammer and HP-105 Hydraulic Power Pack is as follows:

ITEM NO.	PART NO.	DESCRIPTION	QUAN.
1	928 00 01	KENNEDY TOOL KIT, NO. K-20	1
2	926 00 01	LOCTITE - 50CC	1
3	927 00 16	SNAP-TITE NO. 71C16-20F (COUPLING)	1
4	927 00 17	SNAP-TITE NO. 71N16-20F (NIPPLE)	1
5	927 00 05	AEROQUIP NO. 5600-12-12S Q.D.	1
6	931 02 27	PRES. GAGE 0-5000 PSI	1
7	931 00 05	SCHROEDER K-25 FILTER	1
8	914 00 75	FEDERAL BRONZE NO. FB4052-48 BUSHING	4
9	914 00 76	FEDERAL BRONZE NO. FB3644-48 BUSHING	2
10	405 00 20	MOTOR LINE EXT.	1
11	405 00 21	CLAMP LINE EXT.	1
12	410 04 31	DRAIN LINE EXT.	1
13	931 02 03	MARVELBO-S FILTER NO. 629206-1120	1
14	931 00 06	CIRCLE SEAL NO. D539-3M-40	1
15	904 00 01	COTTER PIN 3/8" x 4" LG.	4
16	943 01 84	BRASS SET SCREW, 1/4-20 x 1/2	8
17	943 00 17	BRASS SET SCREW, 3/8-16 x 1/2	4
18	919 00 14	1/2-13 x 1 3/4 SOC.HD.CAP SCR.	12
19	903 01 17	3/4 LOCKWASHER	14
20	901 59 33	3/4-10 x 4 1/2 HEX HD. CAP SCR.-GR.8	14
21	901 63 11	1 1/2-6 x 3 1/4 HEX HD. CAP SCR.GR.8	4
22	903 01 29	1 1/2 LOCKWASHER	4
23	901 31 37	1-8 HEX HD. CAP SCR. x 7" GR. 5	2
24	903 01 21	1" LOCKWASHER	2
25	901 62 18	1 1/4-12 UNF HEX HD.CAP SCR.x3 (GR.8)	4
26	924 00 30	3/4 D. x 3 5/8" LG. ROLL PIN	2
27	931 01 47	MARSHALLTOWN THERMOMETER, FIG. 99	1



Koehring
MKT Division
Dover, New Jersey 07801

DATE: FEBRUARY 20, 1975

NO. 1-405-005

SALES & SERVICE BULLETIN

ATTENTION: SALES - PARTS - SERVICE

The Standard Spare Parts Chest for the V-5 Vibratory Hammer is as follows:

ITEM NO.	PART NO.	DESCRIPTION	QUAN.
1	928 00 01	KENNEDY TOOL KIT, NO. K-20	1
2	926 00 01	LOCTITE - 50CC	1
3	914 00 75	FEDERAL BRONZE NO. FB4052-48 BUSHING	4
4	914 00 76	FEDERAL BRONZE NO. FB3644-48 BUSHING	2
5	405 00 20	MOTOR LINE EXT.	1
6	405 00 21	CLAMP LINE EXT.	1
7	410 04 31	DRAIN LINE EXT.	1
8	931 02 03	MARVELBO-S FILTER NO. 629206-1120	1
9	931 00 06	CIRCLE SEAL NO. D539-3M-40	1
10	904 00 01	COTTER PIN 3/8" x 4" LG.	4
11	943 01 84	BRASS SET SCREW, 1/4-20 x 1/2	8
12	943 00 17	BRASS SET SCREW, 3/8-16 x 1/2	4
13	919 00 14	1/2-13 x 1 3/4 SOC.HD.CAP SCR.	12
14	903 01 17	3/4 LOCKWASHER	14
15	901 59 33	3/4-10 x 4 1/2 HEX HD.CAP SCR.-GR.8	14
16	901 63 11	1 1/2-6 x 3 1/4 HEX HD.CAP SCR.GR.8	4
17	903 01 29	1 1/2 LOCKWASHER	4
18	901 31 37	1-8 HEX HD. CAP SCR. x 7" GR. 5	2
19	903 01 21	1" LOCKWASHER	2
20	901 62 18	1 1/4-12 UNF HEX HD.CAP SCR.x3(GR.8)	4
21	924 00 30	3/4 D. x 3 5/8" LG. ROLL PIN	2



Koehring
MKT Division
Dover, New Jersey 07801

DATE: February 26, 1975

NC. 1-405-006

SALES & SERVICE BULLETIN ATTENTION: SALES - PARTS - SERVICE

V-5 LUBE FILTER ELEMENT MOVEMENT

The vertically mounted filter assembly has a cleanable type monel element that fits into the cast housing with a small amount of end play. The high G loading caused by the vibrator could cause the filter, thrust vertically, to crush itself. We have added a washer-spacer that prevents the element from moving. Some earlier V-5 units may not have had this spacer added. The spacer is a 1 1/8" flat washer with 1 1/4" I.D., 2 3/4" O.D. and .19"-.22" thickness.

