

OPERATING, MAINTENANCE AND
PARTS MANUAL FOR
V-5/HP-105B
HYDRAULICALLY POWERED
VIBRATORY PILE DRIVER/EXTRACTOR
SYSTEM

"WARNING! DO NOT START OR OPERATE THE
V-5/HP-105B UNTIL HAVING THOROUGHLY
READ THIS MANUAL AND HAVING RECEIVED
INSTRUCTIONS FROM AN MKT FACTORY
AUTHORIZED SERVICE REPRESENTATIVE OR A
PROPERLY TRAINED, EXPERIENCED
V-5/HP-105B OPERATOR.



**GEOTECHNICAL
SYSTEMS**
BOX 793, DOVER, NJ 07801

MANUAL NO. 02814

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OCCUPATIONAL HEALTH WARNING!

Construction equipment frequently operates at sound levels almost as loud as an electronic rock music group. Such sound levels are harmful to the human hearing system. Sustained exposure to such high sound levels can permanently impair one's hearing.

HEARING PROTECTION SHOULD BE WORN BY ANYONE AND
EVERYONE WITHIN CLOSE PROXIMITY TO AN OPERATING PILE
INSTALLATION MACHINE!

WARRANTY

MKT CORPORATION STANDARD WARRANTY

WARRANTY — MKT Corporation warrants new Products sold by it to be free from defects in material or workmanship for a period of 90 days after date of delivery to the first user and subject to the following conditions:

MKT Corporation's obligation and liability under this Warranty is expressly limited to repairing or replacing at MKT Corporation's option, any parts which appear to MKT Corporation upon inspection to have been defective in material or workmanship. Such parts shall be provided at no cost to the user, at the business establishment of the authorized MKT Corporation distributor of the Product during regular working hours. This Warranty shall not apply to component parts or accessories of Products not manufactured by MKT Corporation and which carry the warranty of the manufacturer thereof, or to normal maintenance (such as oil filters). MKT CORPORATION MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND MAKES NO WARRANTY FOR MERCHANTABILITY OF FITNESS FOR ANY PARTICULAR PURPOSE.

MKT Corporation's obligation under this Warranty shall not include any transportation charges, costs of installation, duty, taxes or any other charges whatsoever, or any liability for direct, indirect, incidental, or consequential damage or delay. If requested by MKT Corporation, Products or parts for which a warranty claim is made are to be returned transportation prepaid to MKT Corporation, Dover, N.J. Any improper use, including operation after discovery of defective or worn parts, operation beyond rated capacity, substitution of parts not approved by MKT Corporation, or any alteration or repair by others in such manner as in MKT Corporation's judgment affects the Product materially and adversely, shall void this Warranty.

NO EMPLOYEE OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY UNLESS SUCH CHANGE IS MADE IN WRITING AND SIGNED BY AN OFFICER OF MKT CORPORATION AT DOVER, N.J.

CAUTION DO NOT WELD

ANY WELDING ON THE HAMMER MUST BE APPROVED BY THE FACTORY. NOTE WARNING PLATE ON HAMMERS. WELDING ON HAMMER MAY VOID WARRANTY. CONSULT FACTORY.

 **MKT[®] GEOTECHNICAL
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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.

Earth Boring Units - Located on the front of the roller base and the top of the motor housing.

WHEN ORDERING PARTS, MENTION THE MODEL AND SERIAL NUMBER OF YOUR HAMMER.

I. INTRODUCTION

The MKT V-5/HP-105B Hydraulic Vibratory Pile Driver/Extractor is a rotating eccentric weight mechanical sine-wave oscillator system for installing or removing piling, principally of steel, of various shapes and sizes. In granular non-clinging soils, the V-5 system should be economically effective in moving pile weights of up to approximately 4,000 pounds.

When operated within its load capabilities, the V-5 Vibrator is designed to deliver a driving force of 30 tons to a pile at a rate of 1,450 vibrations per minute. The HP-105B Hydraulic Prime Mover is correspondingly designed to maintain the necessary hydraulic flow to the V-5 Vibrator motors of 50 gpm at 2,700 psi.

II. V-5/HP-105B SYSTEM COMPONENTS

The essential components of a complete V-5/HP-105B Hydraulic Vibratory Pile Driver/Extractor System are:

- a. An HP-105B diesel engine driven hydraulic power pack;
- b. A connecting (normally 100 feet) hydraulic, five hose bundle;
- c. A V-5 Exciter fitted with a suspension assembly and a pair of clamp jaws hydraulically powered.

III. SPECIFICATIONS

1. HP-105B HYDRAULIC POWER PACK

Rated Flow @ Steady State Frequency	50 GPM
Rated Pressure @ Steady State Frequency	2,700 PSI
Engine Operating	2,000 RPM
Detroit Diesel Engine (2 Valve)	4-53
Diesel Starting System	12 VDC
Diesel Fuel Tank	40 GAL.
Hydraulic Oil Tank	100 GAL.
Hydraulic Fluid Filtration	10 MICRON
Net Weight	3,900 LBS.

2. HYDRAULIC HOSE BUNDLE

Motor Line Hose (2 req'd.)	2" O.D.
Motor Drain Line Hose	1 1/4" O.D.
Clamp Line Hose (2 req'd.)	1 1/4" O.D.

3. V-5 VIBRATOR

Driving Force @ Steady State Frequency	30 TONS
Hydraulic Motor Output @ Steady State Frequency	59 HP
Steady State Frequency @ Rated Flow & Pressure	1,450 CPM
Vibrating Weight	4,000 LBS.
Driving Amplitude, Free Hanging	0.5 IN.
Hydraulic Motor Efficiency	75%
Net Weight of Vibrator	6,800 LBS.
Pile Clamping Force @ 2,500 psi	62 TONS
Max. Line Pull in Extraction	20 TONS

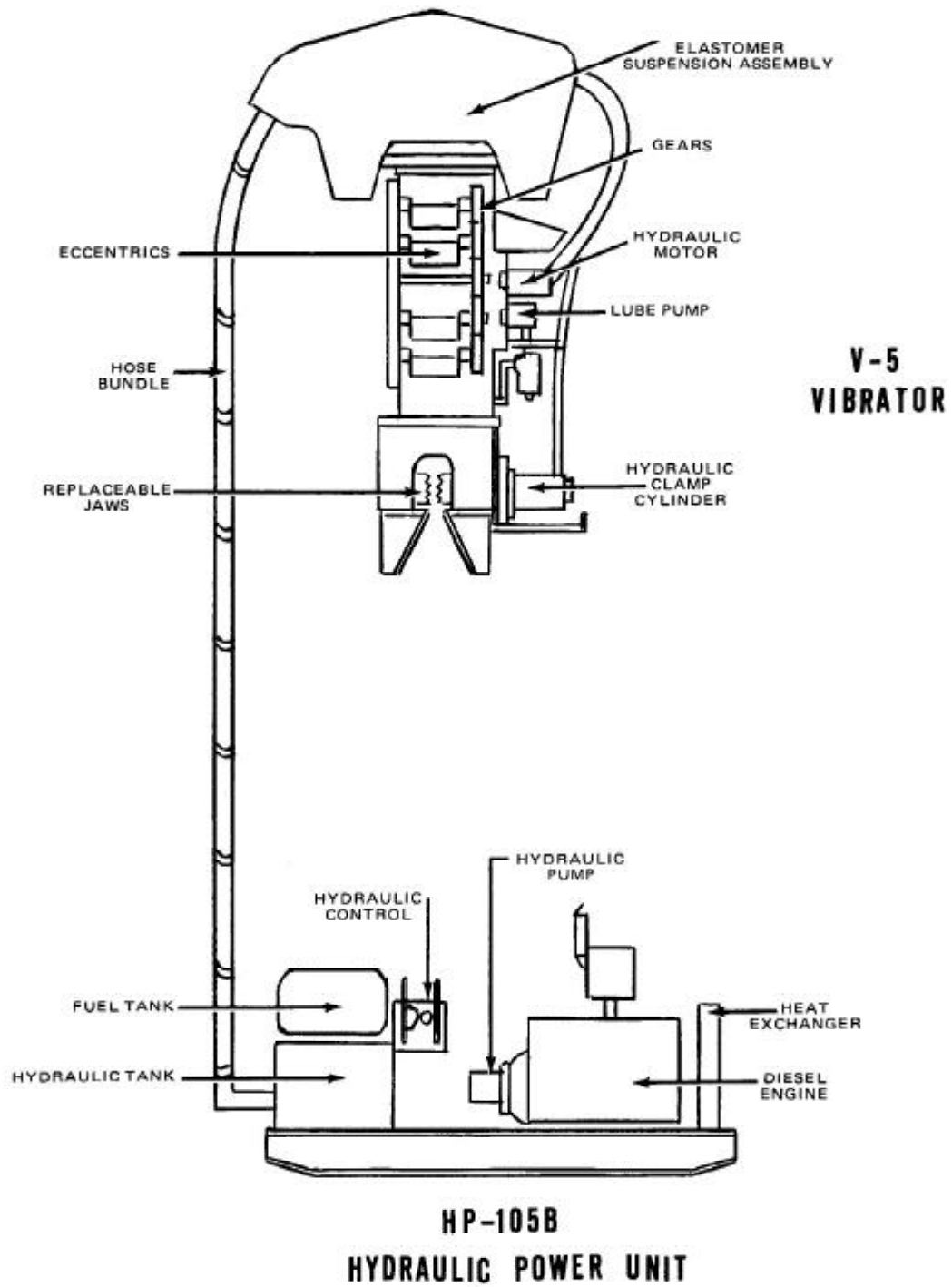


FIG. 1

IV. SETTING UP THE V-5/HP-105B SYSTEM

A. The HP-105B Hydraulic Power Pack is assembled on a tubular steel skid base carrying a steel tubing bail which is fitted with a lifting eye. The power pack is thus designed to be lifted by a crane, using an adequate chain, from location to location for safe, firm positioning with an unobstructed operator view in reasonable proximity to the intended operation of the V-5 Vibrator.

B. 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.

When the hoses are attached to the vibratory 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.

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.

"Damaged hose section of 50 ft. or the shorter length suspension hoses, clamp, drain and motor lines, must be replaced with hoses of the equivalent rating".

V. SETTING UP THE V-5/HP-105B SYSTEM

B. CONNECTION OF HOSES - Continued

BEFORE MAKING ANY HYDRAULIC HOSE CONNECTIONS, ASSURE THAT THE CONNECTIONS ARE WIPED CLEAN OF ANY DIRT OR CONTAMINATION TO PREVENT SUBSEQUENT CONTAMINATION OF AND DAMAGE TO THE COMPONENTS IN THE HYDRAULIC SYSTEM.

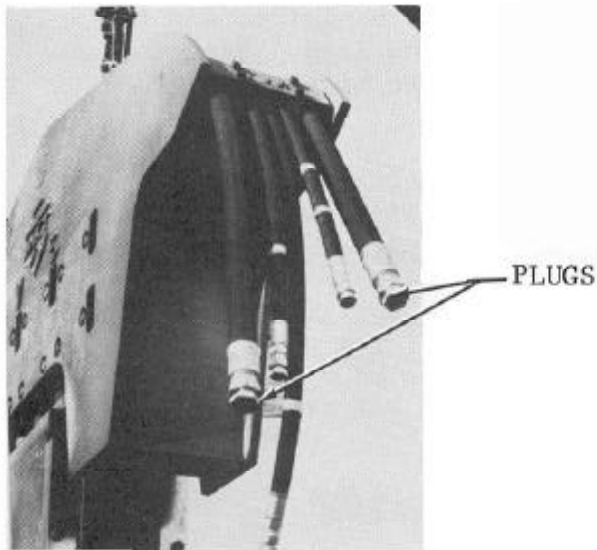


FIG. 2

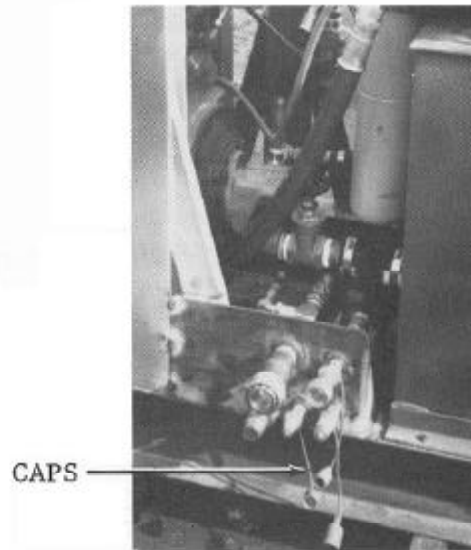


FIG. 3

DO NOT PERMIT MOBILE EQUIPMENT TO RUN OVER THE HYDRAULIC HOSE BUNDLE! The hydraulic hose in the bundle, even filled with hydraulic oil, is not able to withstand high external compression.

Make it a habit whenever hydraulic lines are subsequently disconnected, to immediately cap or plug them to avoid their becoming dirty and introducing contamination into and damage to the components of the hydraulic system. Assure that the caps and plugs are wiped clean of any dirt or contamination before using.

IV. SETTING UP THE V-5/HP-105B SYSTEM

- C. The V-5 Vibrator is factory fitted with its suspension assembly and is shipped flat on its side. It is designed to receive a three-part wire rope triple cable-clamped sling through the bail in the suspension assembly which, in turn, can be slipped over a lifting crane hook. The V-5 Vibrator can be lifted from the horizontal to the vertical without danger of excess stress upon its connecting parts or structure.

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.

Hanging in the air, the V-5 Vibrator should be hoisted, swung and rotated to again assure that the hose bundle hangs free of any loops or entanglements.

Manipulating the V-5 Vibrator in the air during the foregoing procedure, as well as later when setting the vibrator upon a pile, will be made possible by fastening a ground handling rope before hoisting the vibrator aloft.

V. MAKING THE V-5/HP-105B READY FOR OPERATION

- A. Make all lubrication, fuel, radiator and preventative maintenance checks recommended in the engine manufacturer's operating and maintenance manual before starting the diesel engine.
- B. Check the hydraulic oil tank level of the HP-105B Power Pack. DO NOT OPERATE THE HP-105B WITH THE HYDRAULIC OIL LEVEL BELOW THE GAUGE. If hydraulic fluid must be added to the system, DO NOT ALLOW FOREIGN MATTER TO ENTER THE HYDRAULIC SYSTEM, and use the proper hydraulic oil for the HP-105B system.
- C. Check the vibrator lube oil level. See Fig. 6, Page 15.

V. MAKING THE V-5/HP-105B READY FOR OPERATION

D. The hydraulic valves in the HP-105B Power Pack have already been set for proper pressures during the minimum four-hour factory break-in and operation of the V-5/HP-105B System. DO NOT MAKE ADJUSTMENTS TO THE VALVES WITHOUT THE ASSISTANCE OF A FACTORY TRAINED SERVICE REPRESENTATIVE.

E. CONTROL LEVERS

1. The first of two control levers, the one on the left, operates the clamp jaws. Moving the lever inward, or pushed, 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 the maximum pump flow. 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.

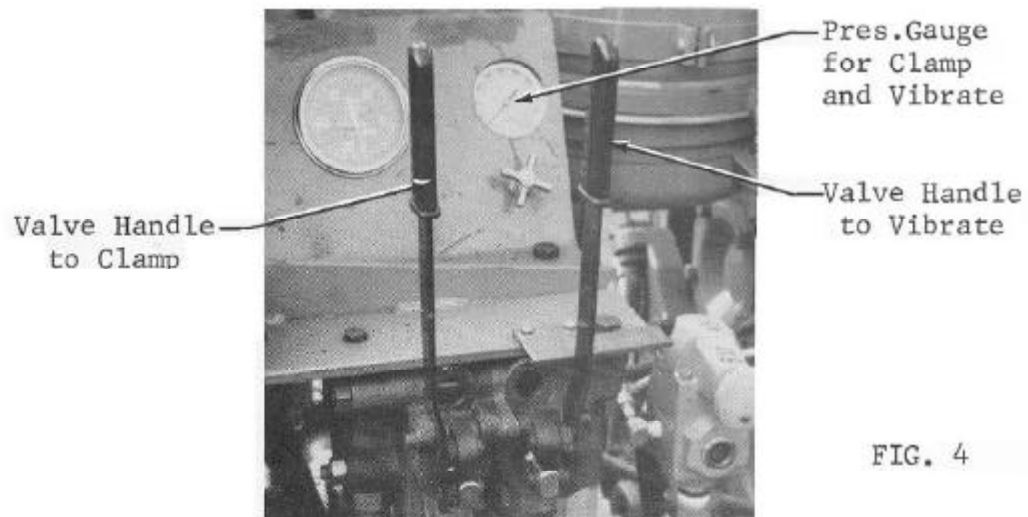


FIG. 4

2. The vibrate control lever, the one on the right, is not spring loaded and can be pulled to vibrate and remain in that position. Only one direction is required on the vibrate valve handle because the vibrator is to be run in one direction. The lube pump is powered by one of the eccentric shafts and is unidirectional pumping.

VI. STARTING THE V-5/HP-105B SYSTEM

A. START AND WARM-UP ENGINE

Follow the engine starting operating and maintenance procedures detailed in the engine manufacturer's manual: Start engine at idle speed, 800-1000 RPM; run engine at part throttle, 1000-1500 RPM, for a few minutes for warm-up. Bring up engine speed to 2000 RPM for V-5 operation. CAUTION: DO NOT PUSH THROTTLE HANDLE TOO HARD FOR MAXIMUM SPEED OR CONTROL BRACKET WILL BEND.

- B. Before positioning the vibrator onto a pile, put the V-5 into the vibrate mode, free hanging, for a few seconds. Have an associate check the flow of lube oil by removing the pipe plug in the outside lube piping. See Fig. 5.

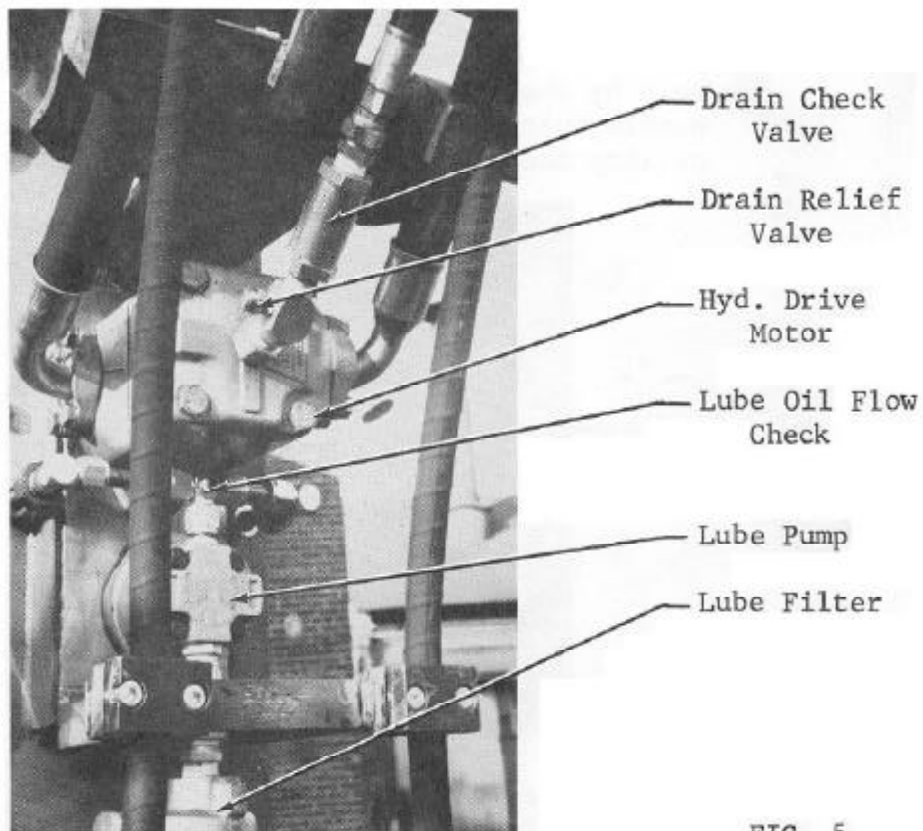


FIG. 5

VI. STARTING THE V-5/HP-105B SYSTEM

DO NOT OPERATE THE V-5 VIBRATOR UNLESS PROPER LUBRICATION IS OBSERVED.

NOTE: The hydraulic motor on the V-5 Exciter will operate in either direction. The lube pump on the V-5 Exciter, however, will pump oil only when it is run in the proper direction. Failure to see a flow of oil from the opened pipe plug hole may be the result of having inadvertently reversed the motor line hoses.

NORMAL GAUGE READINGS DURING FREE-HANGING OPERATION OF HP-105B POWER PACK

Engine Speed	2,000 RPM
Drive Pressure	1,200 PSI
Clamp Pressure	2,700 PSI
Hydraulic Oil Temperature	100 ^o -160 ^o F.
Vibrator Frequency	1,650 CPM

VII. OPERATING THE V-5/HP-105B SYSTEM

A. With a preset pile, the V-5 Vibrator, with clamp open, is hoisted above, centered over and lowered onto the pile head section which is to be gripped. CAUTION! BEFORE CLOSING THE JAWS, ASSURE THAT THE PILE HEAD IS ENTERED COMPLETELY INTO THE OPENING BETWEEN THE JAWS. GRIPPING THE PILE WITH MERELY THE LOWER END OF THE JAWS WILL PUT UNNATURAL STRESSES ON THE JAWS AND CLAMP SYSTEM, DAMAGING ONE OR MORE PARTS.

1. TO CLAMP ON THE PILE:

The clamp control lever need only be pushed or pulled and held for a second or more to open or close the jaws respectively. The clamp-close pressure will be locked in the cylinder by a built-in check valve in the clamp cylinder. As an additional clamp safety, drive pressure will boost the clamp cylinder pressure through a cross-over line with a check valve.

VII. OPERATING THE V-5/HP-105B SYSTEM

B. TO DRIVE THE PILE

1. The V-5 will vibrate with the jaws open or closed. If vibrated with jaws open, the high dynamic forces could add high stresses to the loosely connected movable jaws. The movement of the clamp and drive handles are in directions (pull to vibrate and pull to close jaws) to minimize the operator's accidentally opening the clamp jaws when the vibrator is in a vibrating mode.
2. A pile is driven with a V-5 Vibrator by completely relaxing the hoist line after clamping the V-5 Vibrator to a supported pile.
3. The V-5/HP-105B Hydraulic Driver/Extractor System cannot be harmed by an overload from the pile-soil system. When a pile will move no further, and the hydraulic fluid pressure is at maximum, excess hydraulic flow of the V-5/HP-105B System may automatically dump to tank and slow down the V-5 frequency. Maximum pressure will be 2700 psi on the gauge. The pressure gauge is used to view pressure on 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 clamp circuit.
4. The addition of Driving Weights to the suspension of the V-5 Vibrator will often aid in acquiring some additional pile penetration. When a pile slows to the point of little movement, however, the user will usually find it economically wise to discontinue trying to use the vibrator and to switch to some other driving system, such as a larger model MKT Vibrator or an MKT Diesel or Steam/Air Impact Hammer.
5. Occasionally the inability of the V-5 Vibrator to continue to move a pile will be the result of piles striking an impenetrable obstruction. The observable action of the V-5 Vibrator and clamped pile will be to "dance" in place, often causing erratic interaction of the V-5 Exciter and its suspension assembly. **WHENEVER THE V-5 VIBRATOR IS**

VII. OPERATING THE V-5/HP-105B SYSTEM

B. TO DRIVE THE PILE - Continued

OBSERVED "DANCING" AND "CHATTERING" IN PLACE, IT SHOULD BE HOISTED UNTIL THE ACTION STOPS. FAILURE AFTER SEVERAL ATTEMPTS, TO BE ABLE TO MOVE A PILE FURTHER WITHOUT "DANCING" OR "CHATTERING" OF THE V-5 VIBRATOR SHOULD BE CAUSE TO PROMPTLY ABANDON THE EFFORT BEFORE SERIOUS DAMAGE IS DONE TO THE VIBRATOR OR ITS SUSPENSION SYSTEM. To continue operations, the obstruction must be removed or penetrated by switching to an MKT Diesel or Steam/Air Impact Pile Hammer.

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

C. TO EXTRACT THE PILE

1. The suspension assembly effectively isolates vibrations from the crane boom through six rubber shear blocks. A maximum recommended stretch of 4 1/2" of the elastomer shear blocks is the rated lift of approximately 20 tons (See Par. C-4, Page 12).
2. Extraction of a pile is simply accomplished, even while driving, by tensioning the load line holding the vibrator.
3. For pile extraction operations, a V-5 Vibrator is frequently fitted with a shackle and a short line attached through the hole drilled in the pile clamp housing. The V-5 Vibrator is clamped to a steel sheet pile to be pulled, and the shackle is fastened into the lifting hole in the pile. The V-5 Vibrator is operated to extract the pile until the pile can be easily lifted out of place exclusively by the line pull of crane. The V-5 Vibrator is then stopped. The pile is pulled out of the ground and the vibrator and pile swung to where the pile will be stacked. The lower end of the pile is set on the ground. The V-5 Vibrator Jaws are opened, allowing the pile head to fall away from the jaws and hang by the line and shackle. The V-5 Vibrator and dangling pile are lowered to the ground where the shackle is disconnected from the pile.

VII. OPERATING THE V-5/HP-105B SYSTEM

C. TO EXTRACT THE PILE - Continued

4. Arrows welded and painted black on the exciter housing and suspension assembly are indicators of the load range driving extraction. As the arrows approach each other, maximum line pull is approaching. DO NOT PULL THE ARROWS PAST EACH OTHER OR THE VIBRATOR WILL BE OVERLOADED!

D. TO STOP THE VIBRATOR

1. Push the right, vibrate control lever to neutral.
2. The hydraulic drive circuit does not have braking valves which means that when the free hanging V-5 is vibrating and the drive lever returned to neutral, the deceleration will not be abrupt. When driving a pile, soil resistance will brake the vibrator.

E. TO UNCLAMP FROM THE PILE

1. Push the left, clamp control lever forward. The control lever is spring loaded. The clamp cylinder will operate very quickly, in about 1/2 second. As soon as the clamp opens, release the clamp control lever.
2. DO NOT UNCLAMP THE VIBRATOR FROM THE PILE WHILE THE VIBRATOR IS VIBRATING.

VIII. TO SHUT DOWN THE V-5/HP-105B SYSTEM

- A. Stop the vibrator and open jaws.
- B. Stop the diesel engine.

IX. MAINTENANCE OF THE V-5/HP-105B SYSTEM

A. GENERAL

1. The V-5 Vibrator and HP-105B 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.
2. The diesel-driven, HP-105B 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 following.
3. 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.
4. 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.

B. DIESEL ENGINE

1. 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.

IX. MAINTENANCE OF THE V-5/HP-105B SYSTEM

B. DIESEL ENGINE - Continued

1. LUBRICATION - Continued

RECOMMENDED OILS FOR CRANKCASE:

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

RECOMMENDED FUEL FOR DIESEL ENGINE:

No. 2 Diesel Fuel Oil

2. The diesel engine maximum governed speed should be set at 2000 RPM.
3. 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.
4. 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.

C. VIBRATOR

Vibrator lubrication is basically automatic and an occasional check of flow during operation by removing the pipe plug in the lube outside piping is all that should be required. See Fig. 5, Page 8. The gear-bearing-eccentric housing is sealed and the oil level should not change.

The lube oil supplied by the factory is Shell Tellus 33, SAE 20, an equivalent Texaco Oil is Rando HD-315, SAE-20. The basic requirement for this oil is good lubricating qualities, that is: a high viscosity index above (100) and a relatively low pour point.

IX. MAINTENANCE OF THE V-5/HP-105B SYSTEM

C. 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. 6.

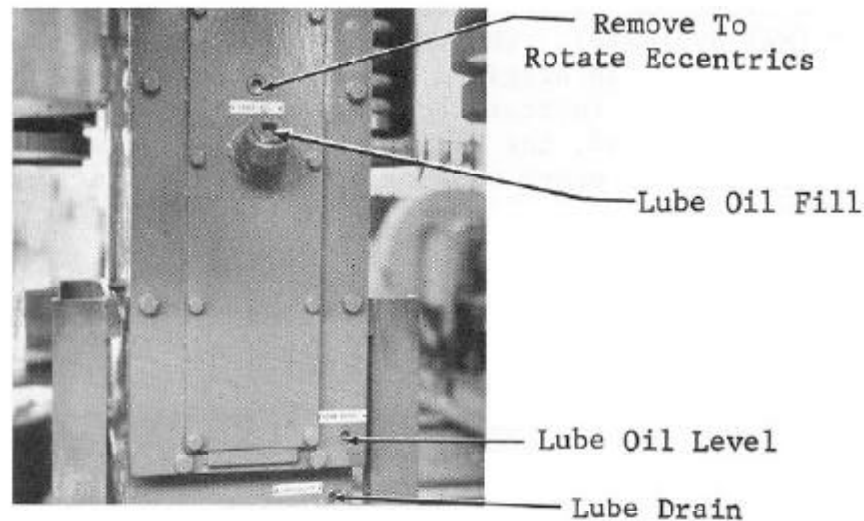


FIG. 6

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.

IX. MAINTENANCE OF THE V-5/HP-105B SYSTEM

C. VIBRATOR - Continued

The clamp 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, sand and grit.

The lube filter assembly is shown on Fig. 7 below. This is a suction, low pressure filter, a throw away paper 100 micron element. The filter element is Marvel No. 629206-5199 (MKT 09310410). There is also a cleanable filter sleeve for this filter assembly (MKT 09310268). The indicator ring at the bottom will return to 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.

A washer about 2 3/4 O.D. is added below the filter element to prevent vertical movement. This washer must be reinstalled whenever the filter element is changed!

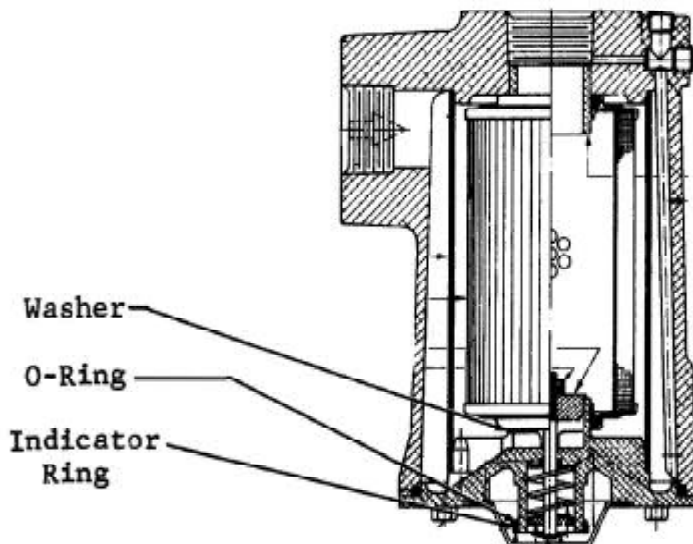


FIG. 7

IX. MAINTENANCE OF THE V-5/HP-105B SYSTEM

D. HYDRAULIC SYSTEM

1. The hydraulic system in the HP-105B 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:

Automatic Transmission Fluid Type F or
Texaco Rando HD-150 or equivalent.

Texaco Rando HD-150, an SAE-10 premium hydraulic oil, has oxidation, rust, and foam inhibitors with the following specs:

Gravity °API	Flash °F	Viscosity SUS 100°F	Viscosity SUS 210°F	Viscosity Index	Pour °F
31.6	410	146	43.2	105	-30

Fill the reservoir to "full" capacity on gauge and check level daily, not to operate below gauge tube. 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 100 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.

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

IX. MAINTENANCE OF THE V-5/HP-105B SYSTEM

D. HYDRAULIC SYSTEM - Continued

3. A recommended oil for very cold weather use, such as temperatures lower than 10° F., for hydraulic fluid and vibrator lube oil is

Shell Lo Hydraul 123	
Pour Point:	-54° F.
Viscosity Index:	180
SUS:	115-125 @ 110° F.

4. The hydraulic oil filter, a double 10 micron element, Ref. Fig. 8, 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 replacement of filter cartridges: original cartridge should be replaced after a maximum of 50 hours operation; after original,

Average atmosphere - after each 500 hours
Dirty atmosphere - - after each 250 hours

Replacement cartridge is Vickers No. 942407, a double filter element, MKT 09310404. (Supersedes a single cartridge on older models. Vickers 228468, MKT 09310367).



FIG. 8

Diesel Fuel
Filler Cap

Hyd. Oil Filter

Hyd. Oil
Filler Cap

Hyd. Oil
Level and
Temp. Gauge

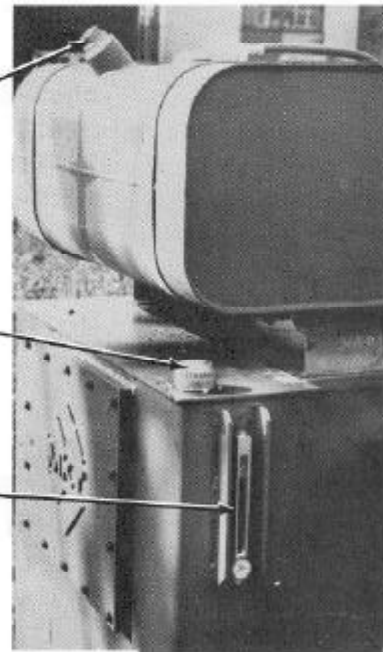


FIG. 9

IX. MAINTENANCE OF THE V-5/HP-105B SYSTEM

D. HYDRAULIC SYSTEM - Continued

5. The hydraulic oil, sucked up from the reservoir, passes through a 74 micron strainer in the tank. This strainer has a 3 psi by-pass.
6. The hydraulic motor on the vibrator requires a drain line to relieve case pressure inside the motor. The back-to-tank motor drain line has a safety relief valve and a low 3 psi cracking pressure check valve (free flow to tank) located close to the hydraulic motor on the Vibrator, Ref. Fig.11, Page 20. 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 this relief valve.
7. The hydraulic fluid pressure gauge is oil filled. The temperature/level gauge measures oil level and 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.
8. The V-5/HP-105B System is shipped from the factory with the hydraulic reservoir of the HP-105B, the hose bundle and the V-5 Vibrator lines and components filled with hydraulic fluid. Whenever the system has been completely or partially drained (as when a new hose section is replaced in the hose bundle), the hydraulic lines must be purged of air. To purge the motor lines, with hoses connected to the V-5 and HP-105B, run the engine at idle speed, 800-1000 RPM, and pull vibrator handle for vibrate mode. Hydraulic oil may have to be added to the hydraulic tank. To purge the clamp lines, bleed the hydraulic clamp cylinder at the high pressure side of the cylinder. It is necessary to run the engine at full speed when bleeding the clamp cylinder with clamp valve engaged because full flow will be over relief. Ref. Fig. 10, Page 20.

IX. MAINTENANCE OF THE V-5/HP-105B SYSTEM

D. HYDRAULIC SYSTEM - Continued

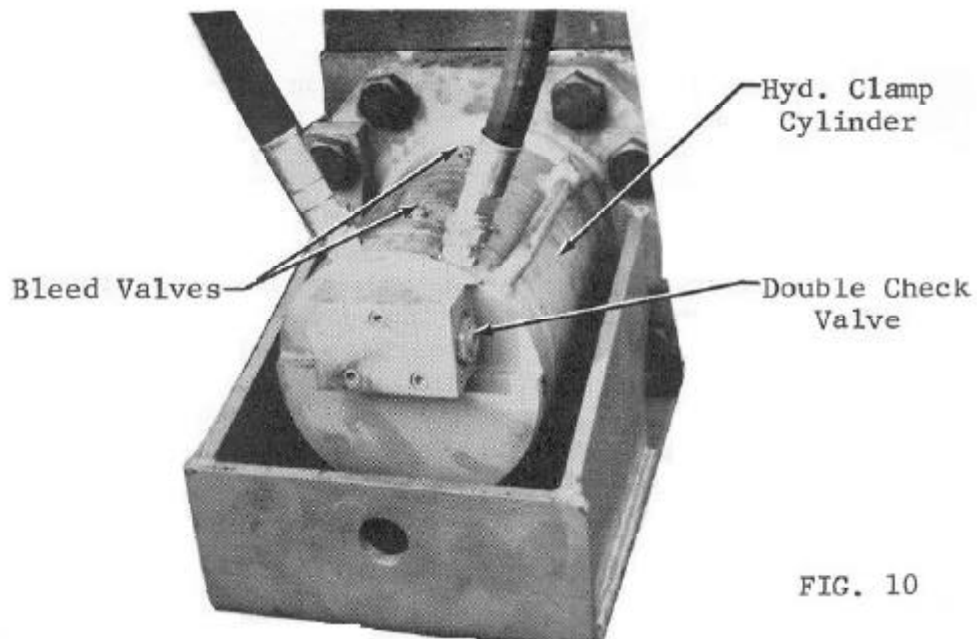


FIG. 10

9. All hoses used on the V-5/HP-105B are made with crimped fittings. A repair of a damaged hose cannot be made in the field. Replace damaged hose section with hose material of the equivalent rating. When hoses are attached to the vibratory 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.

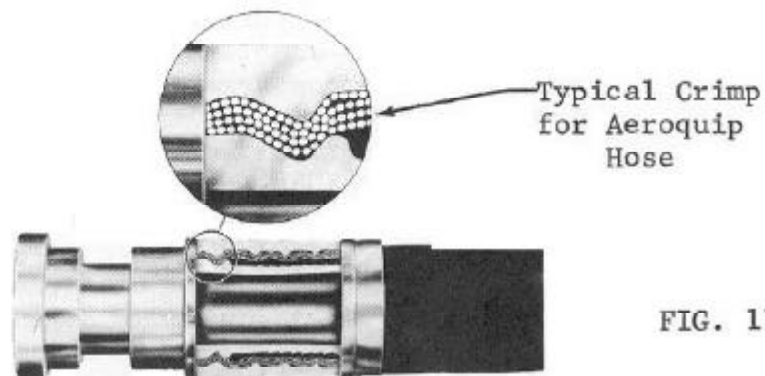


FIG. 11

X. DAILY CHECK LIST

CHECK THE ENTIRE V-5/HP-105B SYSTEM 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 the gauge.
 - c. With the exciter in the vertical position--check for the proper lube oil level by removing inspection plug.
 - d. 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.
 - e. Look for any damage to the unit in general that might cause it to fail when put into operation.
 - f. Check tightness of mounting screws on hydraulic motor, lube pump, etc. Look for cracks or stressed areas.
 - g. Check for tightness of jaw screws.
 - h. Check jaws for excessive wear of teeth and cracks.
 - i. Check spacing under suspension housing. Should be fairly equal distance. Unequal spacing could be a sign one of the rubber blocks has failed.
 - j. Be sure there is fuel in tank.
 - k. Be sure there is cooling fluid in radiator.

X. DAILY CHECK LIST

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. VI. B, Page 8.
 - g. Always maintain close check on the lifting cable to assure no fraying has occurred.
 - h. Check for overheated bearing housings.
 - i. Assure the drain relief doesn't spill.
 - j. Maximum engine speed is 2000 RPM.

XI. TROUBLE, CAUSES & POSSIBLE REMEDIES

<u>TROUBLE</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
1. V-5 not coming up to speed and/or pressure very low	a) Clogged relief valve in dir. valve or clogged adjustable relief valve.	"Consult Factory Authorized Distributor Service Representative".
	b) Worn out pump or motor - check for excessive drain.	"Consult Factory Authorized Distributor Service Representative".
2. V-5 slipping on pile	a) Air in clamp line.	Bleed the clamp lines at cyl. thoroughly.
	b) Clamp slide may be sticking.	Check slide for end 'mushrooming' effect on broken key. Replace or rework slide.
	c) Check valve on crossover from drive to clamp line hung-up.	"Consult Factory Authorized Distributor Service Representative".
	d) Jaw teeth worn.	Replace jaws or build up jaw teeth with weld.
3. V-5 frequency low but pressure high	a) Motor seal might have blown filling V-5 with hyd. oil.	"Consult Factory Authorized Distributor Service Representative".
	b) Bearing Failure.	"Consult Factory Authorized Distributor Service Representative".

XI. TROUBLE, CAUSES & POSSIBLE REMEDIES

<u>TROUBLE</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
4. Motor drain popping-off at relief valve	a) Line kinked or quick disconnect not engaged.	Check all drain lines and check quick disconnect-may have to be replaced.
	b) Excessive motor drain.	"Consult Factory Authorized Distributor Service Representative".
5. Drive pressure up but no vibrating	a) Quick disconnect not engaged.	If engaged, might require replacement.
6. Clamp won't work	a) Quick disconnect not engaged.	If engaged, might require replacement.
7. Suspension Elastomer failing	a) Excessive suspension housing movement-- might be result of restricting hose loops.	Try to relieve excessive hose loop forces. Add bias to increase isolation.
	b) Driven piling encountering obstructions such as timber, rock or boulders causing exciter suspension system to bounce.	Try extracting pile a few feet then redrive. If after successive efforts does not displace obstruction, discontinue operation. Try larger vibrator, excavate the obstructions or use impact hammer.

XII. ADJUSTING THE V-5/HP-105B SYSTEM

ADJUSTMENT OF THE FACTORY SET VALVES OF THE V-5/HP-105B SYSTEM SHOULD ONLY BE MADE BY A FACTORY AUTHORIZED DISTRIBUTOR SERVICE REPRESENTATIVE. CAUTION! ATTEMPTS TO RANDOMLY MAKE SUCH ADJUSTMENTS MAY SERIOUSLY MISADJUST THE ENTIRE SYSTEM AND THEREBY VOID THE EQUIPMENT WARRANTY!

REPLACEMENT PARTS IDENTIFICATION

This manual includes in the Parts Identification section the following parts information:

DWG. NO.	DESCRIPTION	PAGE
3405 0205	V-5 General Assembly	P1
6893 0247	V-5 Exciter Assembly	P2
5405 0275	V-5 20-Ton Elastomer Suspension Assembly .	P3
6405 0078	V-5 Hydraulic Clamp Assembly	P4
0170 0128	HP-105B Hydraulic Power Unit-Photos	P5
4170 0110	HP-105B Hydraulic Hose Assembly	P6
0170 0127	HP-105B Hydraulic Schematic	P7
0170 0129	HP-105B Hyd.Schematic-Components Located .	P8

This material is included for the user to have a point of reference while discussing trouble-shooting actions with his factory authorized distributor service department. CALL YOUR NEAREST MKT FACTORY AUTHORIZED DISTRIBUTOR SERVICE DEPARTMENT TO REMEDY ANY ABNORMAL OCCURRENCES IN THE OPERATION OF YOUR V-5/HP-105B SYSTEM.

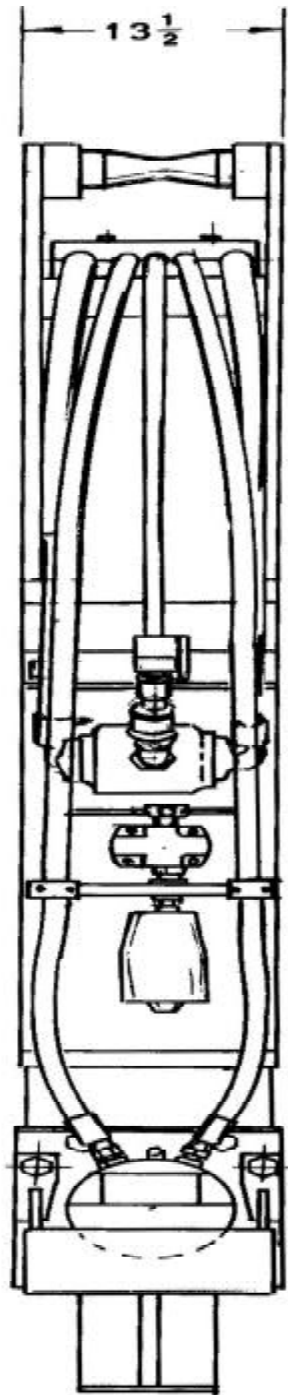
Successful internal repairs to and general overhaul of a V-5/HP-105B System must be handled as clean-shop procedures. MKT Factory Authorized Distributors are properly equipped and should be contacted to provide such service.

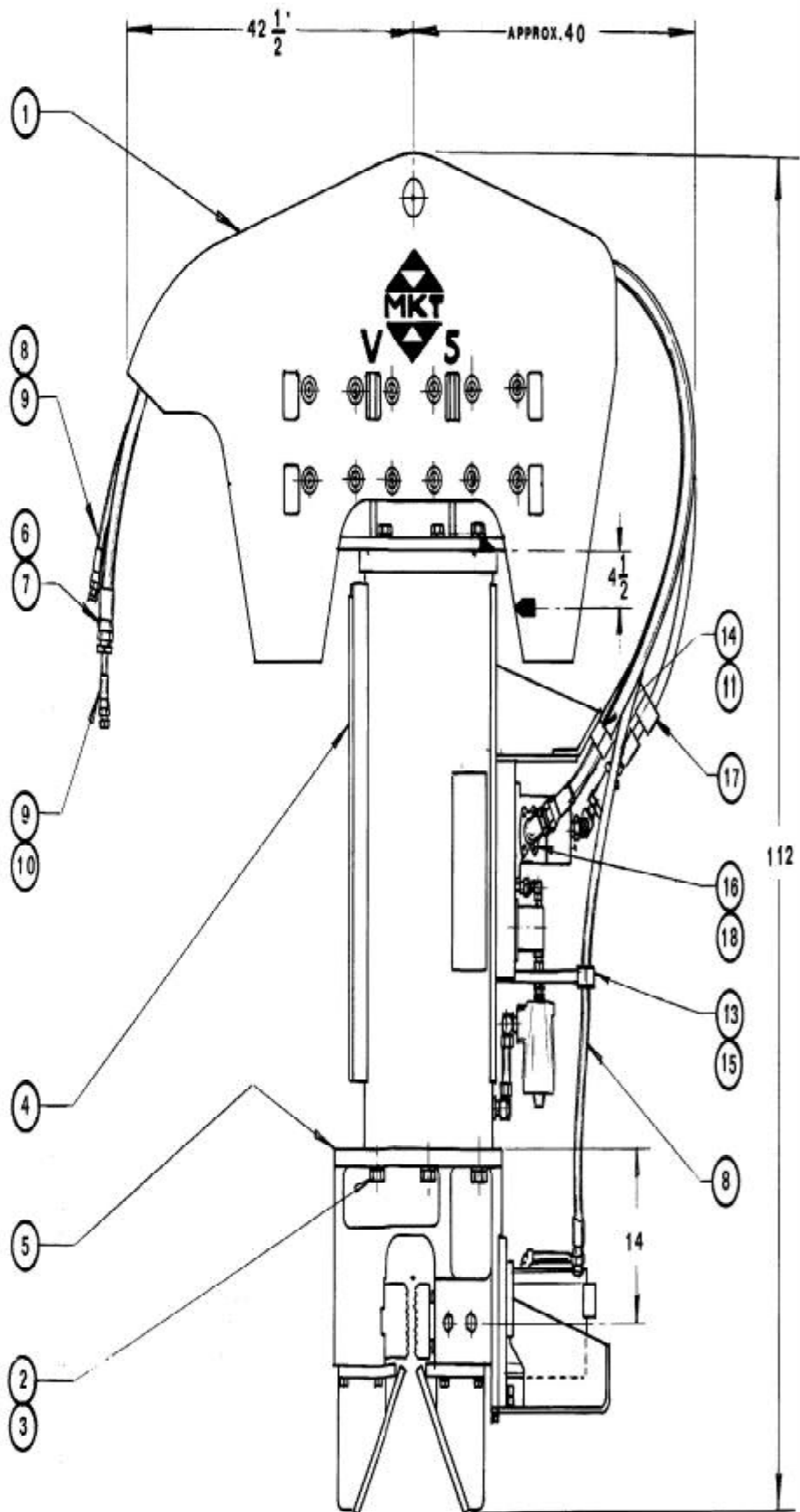
PARTS LISTS

PAGES P1 THROUGH P8

GENERAL ASSEMBLY
V-5 VIBRATORY HAMMER
(34050205)

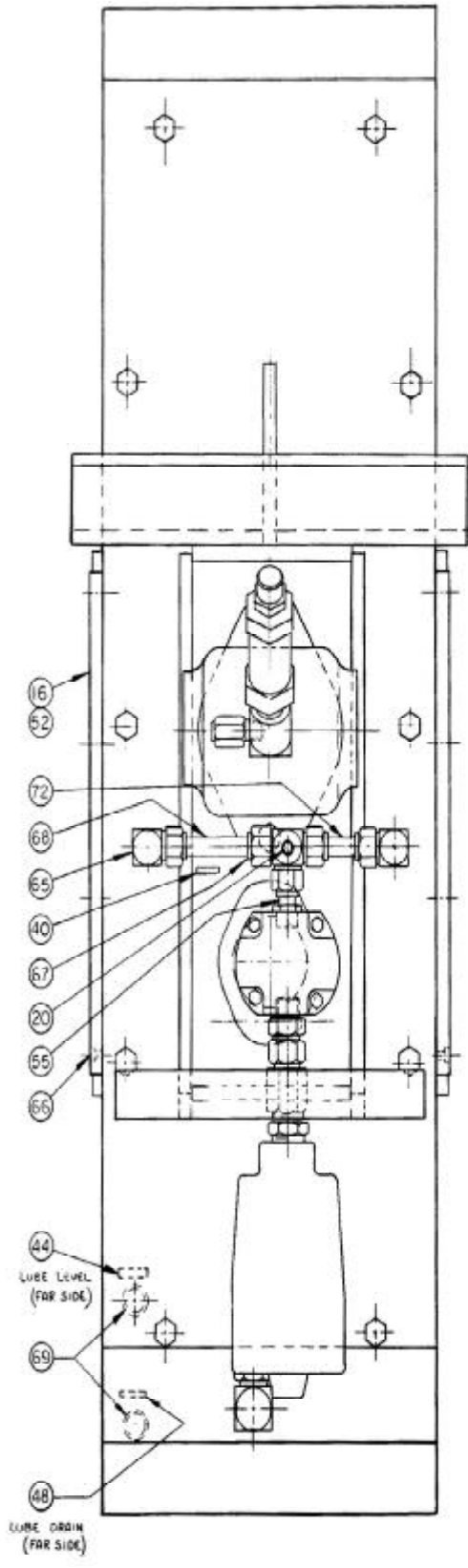
ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.
1	5 405 02 75	20 Ton Rubber Suspension Ass'y.	1
2	0 901 63 11	1 1/2-6 x 3 1/4 HHCS	6
3	0 903 01 29	1 1/2 Lockwasher	6
4	6 405 01 73	Exciter Assembly	1
5	6 405 00 78	Hydraulic Clamp Assembly	1
6	2 405 01 82	Motor Line Hose Ext.	2
7	0 923 04 13	Hyd. Fitting	2
8	2 405 01 67	Clamp Line Hose Ext.	2
9	0 923 00 10	Hyd. Fitting	3
10	2 410 04 38	Motor Drain Hose Extension	1
11	0 919 00 55	1/2-13 x 1 3/4 SHCS	4
13	0 919 00 43	1/2-13 x 1 1/4 SHCS	6
14	3 405 00 27	Motor Line Hose Block	2
15	2 405 00 32	Clamp Line Hose Block	3
16	0 923 06 50	Hyd. Fitting	2
17	2 405 02 71	Hose Clamp Bracket	1
18	0 911 00 98	Flange	2

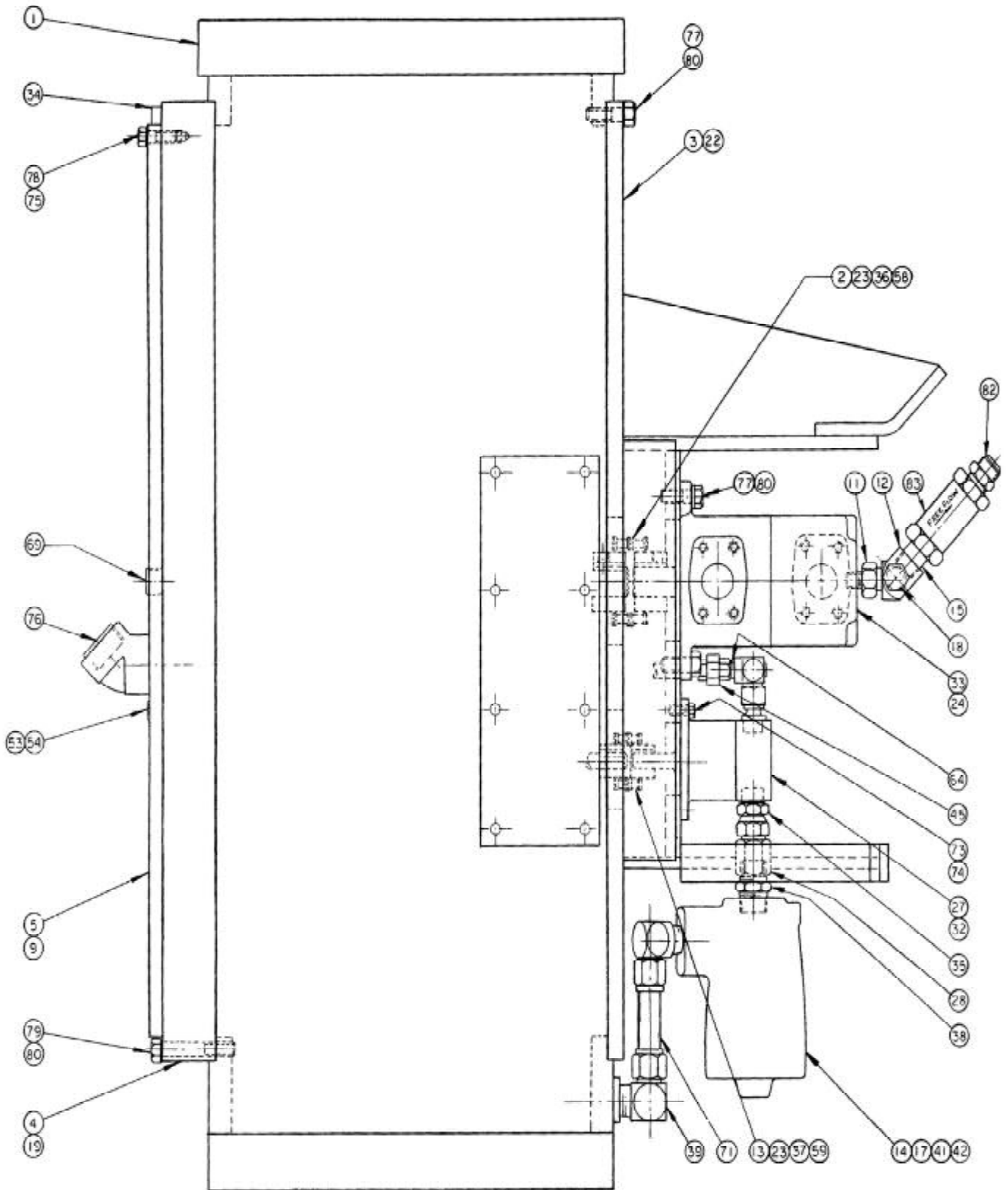




V-5 EXCITER ASSEMBLY
(68930247)

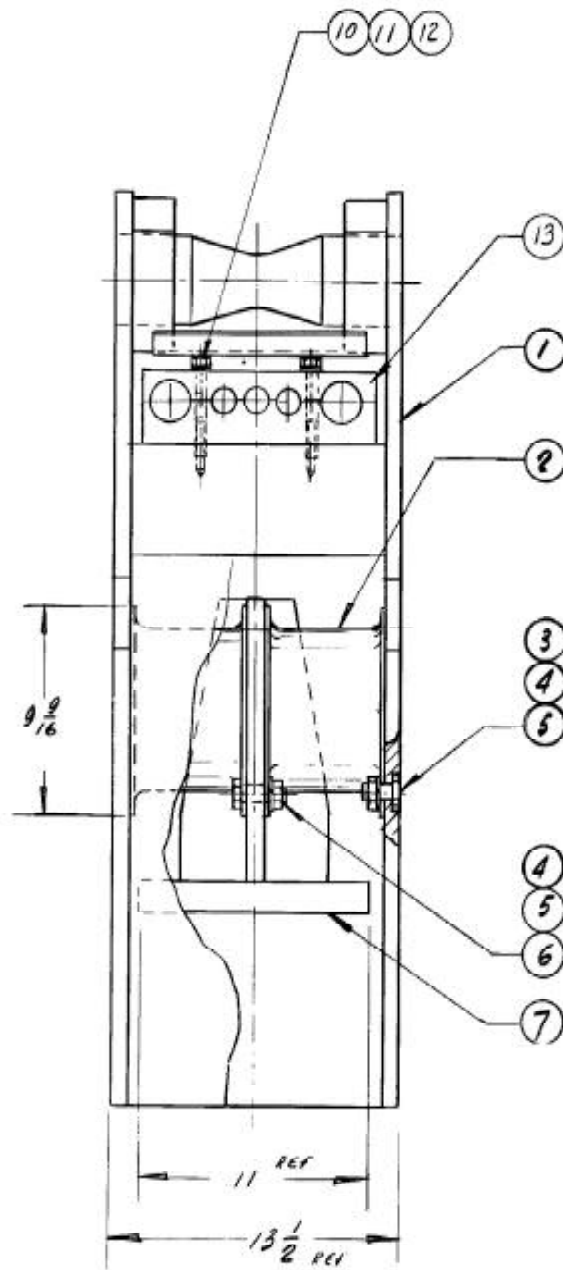
ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.
1	6 405 01 58	Exciter Housing	1
2	0 925 04 09	5/16-18 Soc.Set Scr. x 1/2 Cup Pt.	1
3	6 405 00 03	Exciter Motor Housing	1
4	4 405 00 04	Bearing Housing	1
5	3 405 00 93	Bearing Cover	1
9	3 405 00 94	Bearing Cover Gasket	1
11	0 923 02 80	Lenz #6-12 PRC	1
12	1 405 02 72	Modified Elbow (Aer. 2088-12-12S)	1
13	0 925 02 05	No. 10-24 Soc.Set Scr.x 1/4 Cup Pt.	1
14	0 902 00 08	1 1/8 Am. Std. Flat Washer	1
15	0 930 00 13	3/4 Short Nipple - Sch. 80	1
16	3 405 00 39	Exciter Side Cover	2
17	0 913 01 13	"O" Ring No. 2-120	1
18	0 931 04 07	RELIEF VALVE	1
19	3 405 00 40	Gasket - Bearing Housing	1
20	0 930 00 56	1/4 Pipe Plug - Steel - C'Sunk	1
22	3 405 00 41	Gasket - Motor Housing	2
23	0 924 00 32	Roll Pin	2
24	2 405 01 80	Gasket - Hyd. Motor	2
27	2 405 00 43	Gasket - Lube Pump	1
28	0 923 02 72*	Lenz #12-16 PRC	1
32	0 911 00 43	Pump	1
33	0 910 00 27	Hyd. Motor	1
34	1 405 00 84	Bearing Cover Shear Block	2
35	0 923 04 04	Aeroquip #2066-12-12S	1
36	1 405 01 16	Coupling	1
37	1 405 01 17	Coupling	1
38	0 923 03 80	Aeroquip No. 2083-16-16S	1
39	0 923 01 44	Lenz #400-16	2
40	2 405 00 99	Nameplate: "Lube Flow Check"	1
41	0 931 02 02	Filter	1
42	0 931 04 10	Filter Elem.	1
44	2 405 01 00	Nameplate: "Lube Level"	1
45	0 930 01 65	3/8-NPT Union - Steel	2
48	2 405 01 01	Nameplate: "Lube Drain"	1
52	2 405 00 46	Gasket - Side Cover	2
53	2 405 01 02	Nameplate: "Lube Fill"	1
54	2 405 01 06	Nameplate: "Lube Oil Desc."	1
55	0 923 04 16	Lenz #10 Tan	1
58	0 918 00 12	Key 5/16 x 5/16 x 1 1/2	2
59	0 918 00 13	Key 3/16 x 3/16 x 1 1/8	1
64	0 930 01 00	3/8 Close Nipple x 1" - Sch. 40	2
65	0 923 04 15	Lenz #450-10-6	2
66	0 919 00 63	5/16-18 Soc.Hd.Cap Scr. x 5/8	16
67	1 405 01 23	Tee 5/8 Tube (Mod.)	1
68	0 930 03 81	5/8 O.D. x .049 Wall x 4 1/2 Lg.	1
69	0 930 03 42	3/4 Pipe Plug - Steel, C'Sunk	4
71	0 930 03 68	1" O.D. x .095 Wall x 5 1/4	1
72	0 930 03 80	5/8 O.D. x .049 Wall x 3 1/4 Lg.	1
73	0 919 00 07	3/8-16 x 1 Hex Hd. Cap Scr.	2
74	0 903 01 11	3/8 Lockwasher - Med.	12
75	0 919 00 59	3/8-16 Soc.Hd. Cap Scr. x 7/8	4
76	0 930 00 61	1 1/2 Pipe Plug-Steel, C'Sunk	1
77	0 919 00 49	5/8-11 x 1 3/4 Hex Hd. Cap Scr.	12
78	0 919 00 47	1/2-13 x 1 1/2 Hex Hd. Cap Scr.	12
79	0 919 00 53	5/8-11 x 3 1/2 Hex Hd. Cap Scr.	10
80	0 903 01 15	5/8 Lockwasher - Med.	22
82	0 923 00 20	Aeroquip No. 2021-12-12S	1
83	0 931 04 05	Check Valve	1

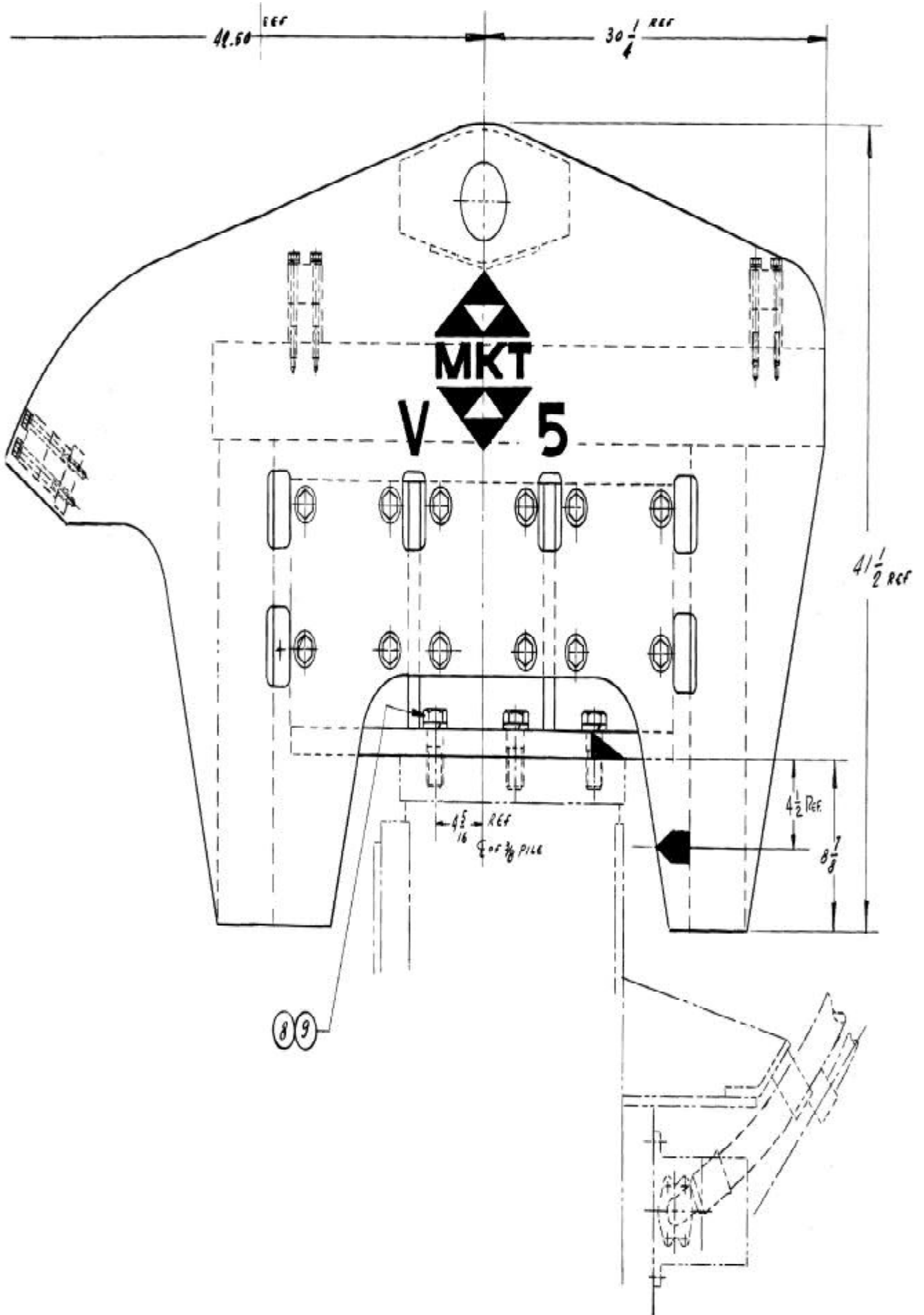




20 TON ELASTOMER SUSPENSION ASSEMBLY
w/CAST HOSE CLAMPS
V-5 VIBRATORY HAMMER
(54050275)

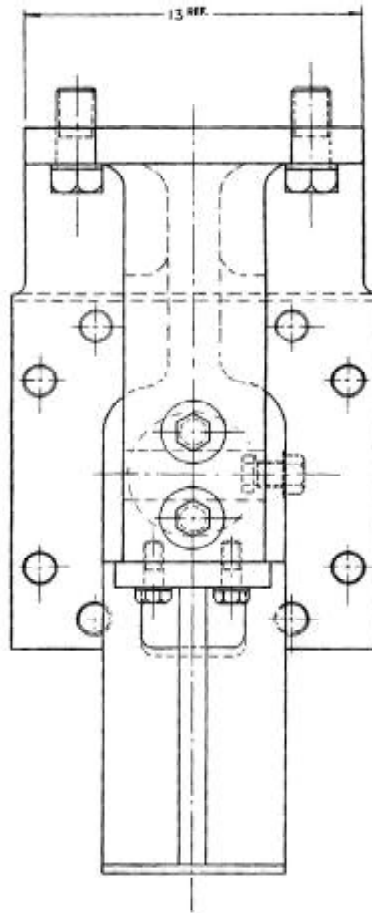
ITEM NO.	PART NO.		DESCRIPTION	QTY. REQ'D.
1	5	405 0274	Suspension Housing	1
2	0	941 0014	Elastomer Shear Block	6
3	0	901 5915	3/4-10 x 1 3/4 HHCS	24
4	0	903 0117	3/4 Med. Lockwasher	36
5	0	900 0019	3/4-10 Reg. Hex Nut	36
6	0	901 5921	3/4-10 x 2 1/2 HHCS	12
7	4	405 0217	Suspension Base	1
8	0	901 6311	1 1/2-6 x 3 1/4 HHCS	6
9	0	903 0129	1 1/2 Lockwasher	6
10	0	903 0113	1/2 Lockwasher	12
11	0	901 5735	1/2-13 x 5 HHCS	12
12	0	902 0003	1/2 Flat Washer	12
13	3	405 0273	Cast Hose Clamp Half	6





V-5
HYDRAULIC CLAMP ASSEMBLY
(64050078)

ITEM NO.	PART NO.		DESCRIPTION	QTY. REQ'D.
1	6	405 01 45	Clamp Housing	1
2	3	405 01 34	Jaw Shield	2
3	4	405 00 88	Clamp Slide	1
4	2	405 00 89	Slide Key	1
5	3	405 00 74	Screw Type Jaw - Fixed End	1
6	3	405 00 76	Screw Type Jaw - Movable End	1
7	2	405 00 91	Slide-Key Bolt	2
9	0	901 61 37	1"-8 x 7" HHCS - Gr. 8	2
10	0	903 01 21	1" Lockwasher	2
11	0	901 29 17	3/4-10 x 2 HHCS - Gr. 5	8
12	0	903 01 17	3/4 Lockwasher	12
13	0	901 62 18	1 1/4-12 x 3" HHCS - Gr. 8	6
15	0	922 00 18	Hyd. Cyl. 8" x 1 1/2 Stroke	1
16	0	923 00 20	Aeroquip 2021-12-12S	2
17	0	924 00 30	3/4 x 3 5/8" Lg. Roll Pin	1
19	0	901 62 24	1 1/4-12 x 4" HHCS	2
20	0	901 29 13	3/4-10 x 1 1/2 HHCS - Gr. 5	4
21	4	495 03 11	Clamp Cyl. Shield	1



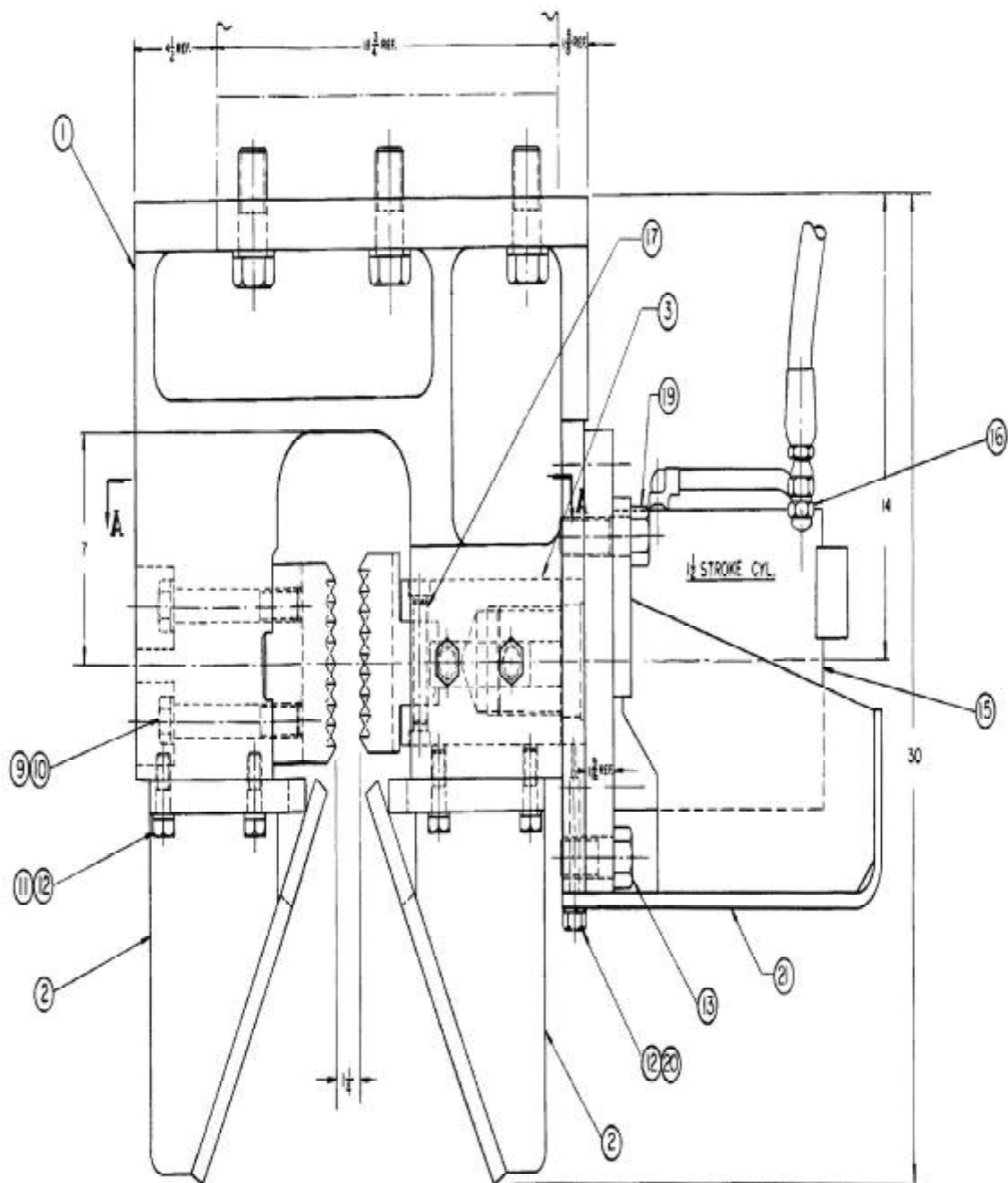
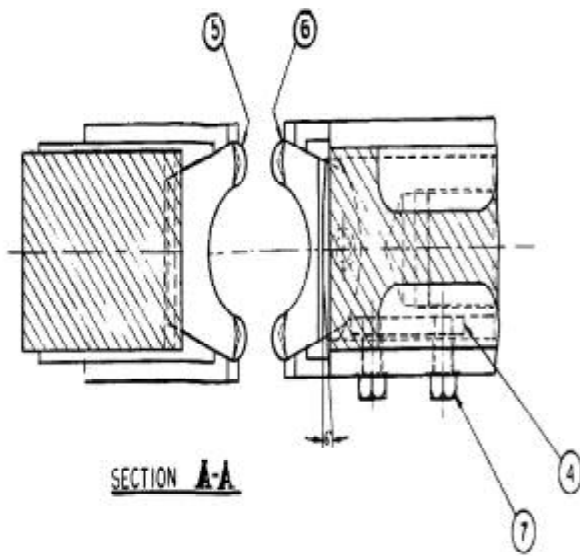
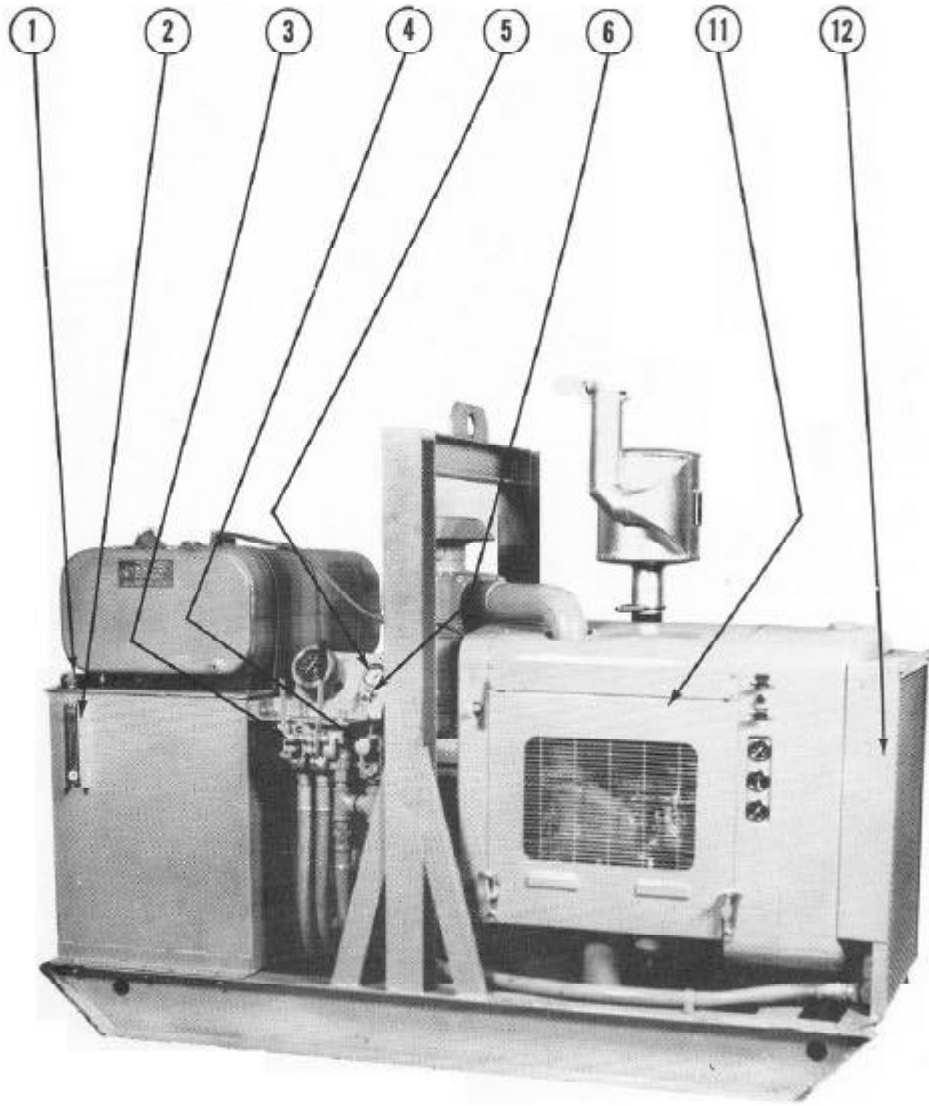
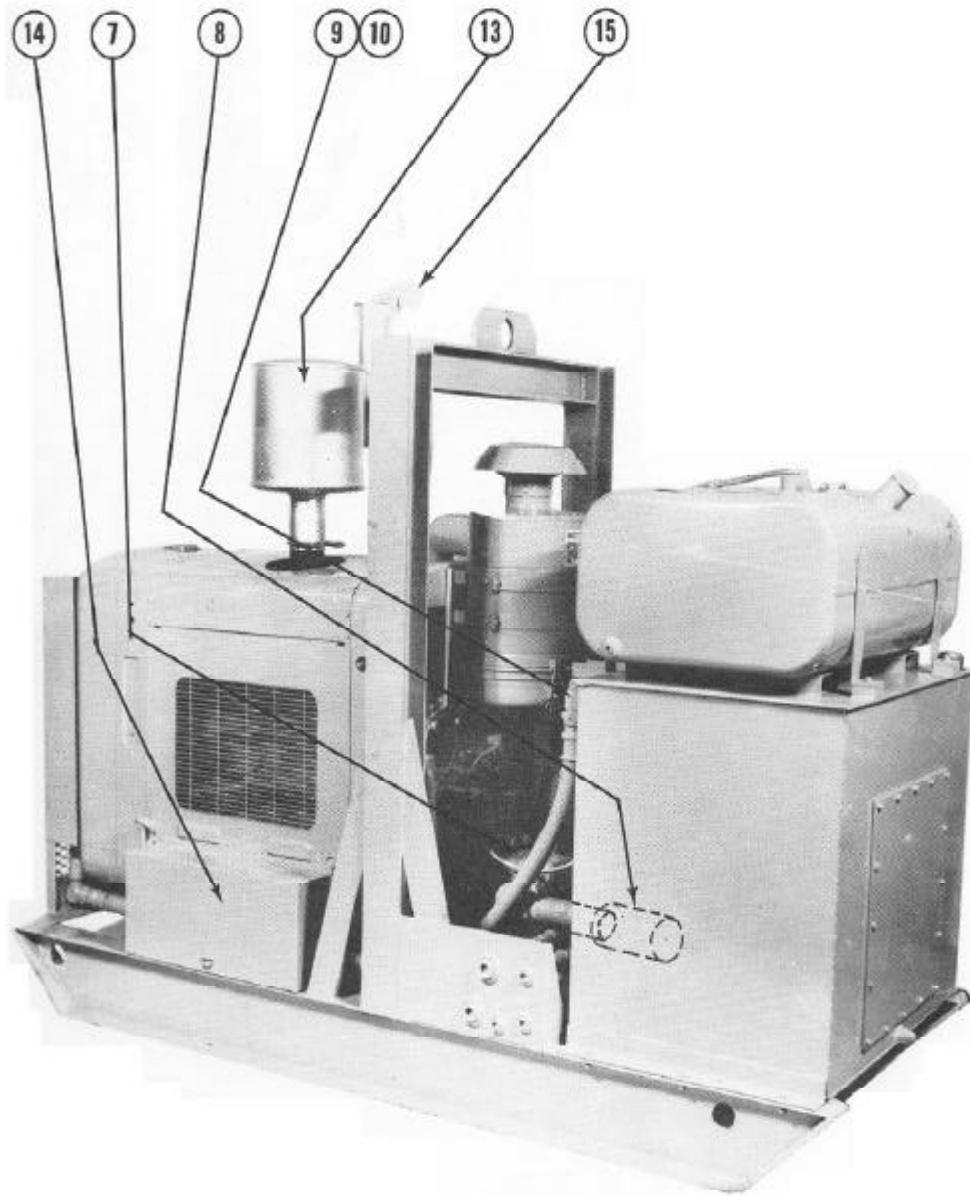


PHOTO IDENTIFICATION
OF
HP-105B HYDRAULIC POWER UNIT
(01700128)

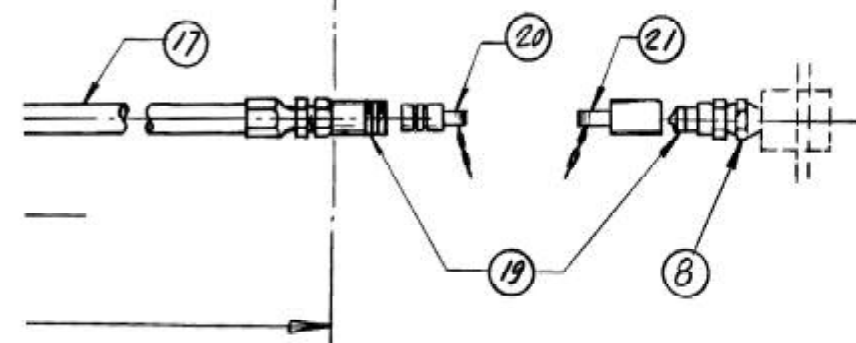
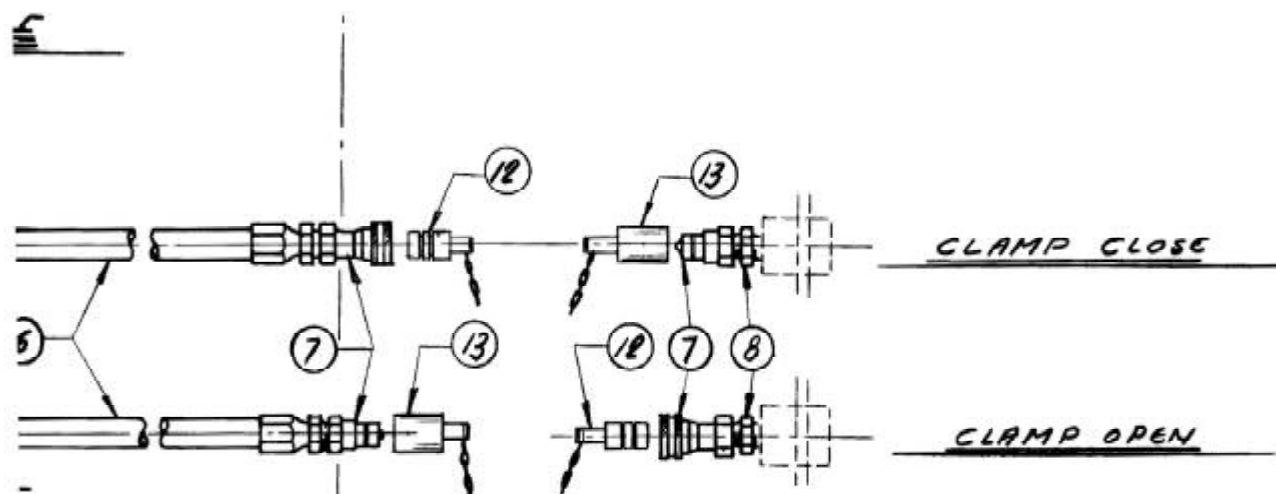
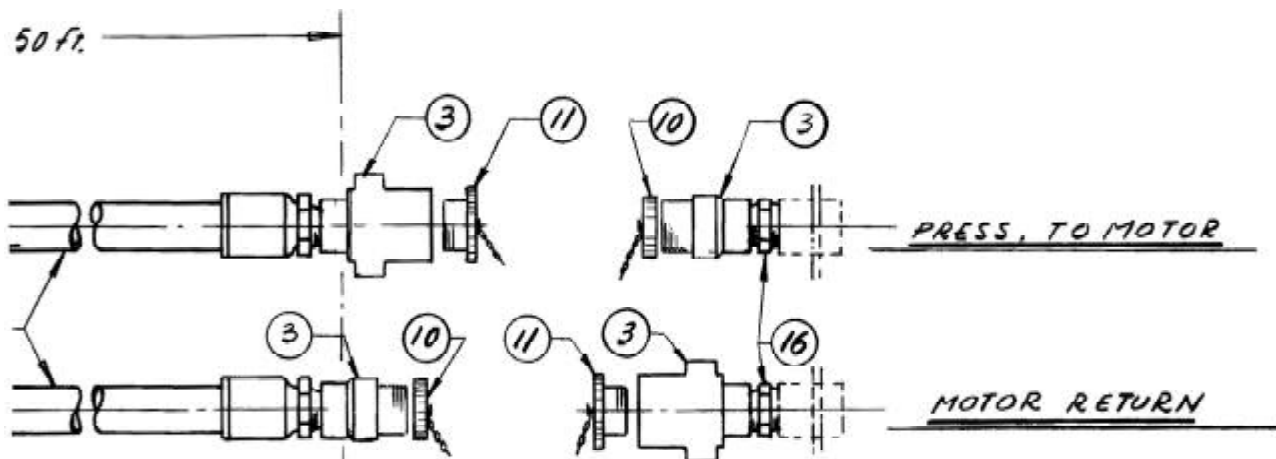
ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.
1	0 931 0079	Filler-Breather	1
2	0 931 0283	Level Gauge	1
3	0 931 0270	Directional Valve	1
4	0 931 0300	Relief Valve	1
5	0 931 0278	Pressure Gauge	1
6	0 931 0280	Shut-off Valve for Pres.Gauge	1
7	0 911 0084	Hydraulic Pump	1
8	0 931 0269	Suction Strainer	1
9	0 931 0403	Return Line Filter	1
10	0 931 0404	Filter Element	1
11	0 944 0023	Detroit Diesel No. 4-53	1
12	0 934 0007	Oil Cooler	1
13	0 944 0018	Spiral Silencer	1
14	0 933 0342	12 ^V Battery	1
15	0 944 0021	Rain Cap	1





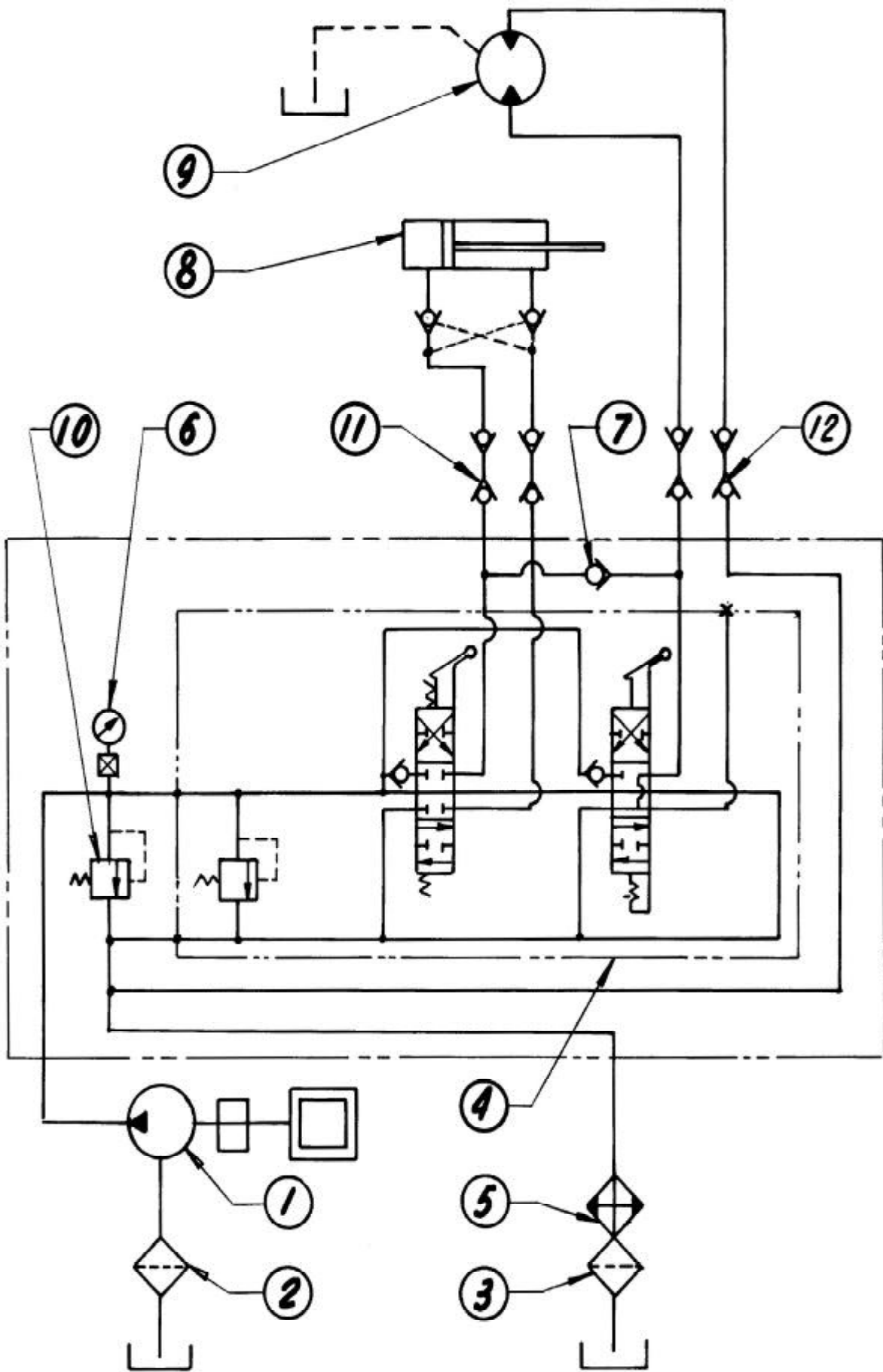
HP-105B HYDRAULIC HOSE ASSEMBLY
(41700110)

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.
1	0 923 0008	Aeroquip #2022-20-20S	2
2	2 410 0404	Motor Line Hose Assembly(50 Ft.)	4
3	0 927 0043	Drive Quick Disconnect	2
5	0 923 0007	Aeroquip #2022-12-12S	3
6	2 410 0415	Clamp Line Hose Assembly(50 Ft.)	4
7	0 927 0005	Aeroquip #5600-12-12S	2
8	0 923 0376	Aeroquip #2083-12-12S	3
10	0 927 0045	Drive Dust Cap	2
11	0 927 0044	Drive Dust Cap	2
12	0 923 0002	Clamp Dust Plug	2
13	0 923 0003	Clamp Dust Cap	2
14	0 923 0013	Drive Cap Nut	2
15	0 923 0012	Drain/Clamp Cap Nut	3
16	0 923 0377	Aeroquip #2083-20-20S	2
17	2 410 0426	50 Ft. Drain Hose	2
18	0 923 0389	Aeroquip No. 2027-12-12S	3
19	0 927 0010	Aeroquip No. 5600-12-10S	1
20	0 923 0062	Drain Dust Plug	1
21	0 923 0063	Drain Dust Cap	1
22	0 923 0014	Aeroquip No. 2027-20-20S	2



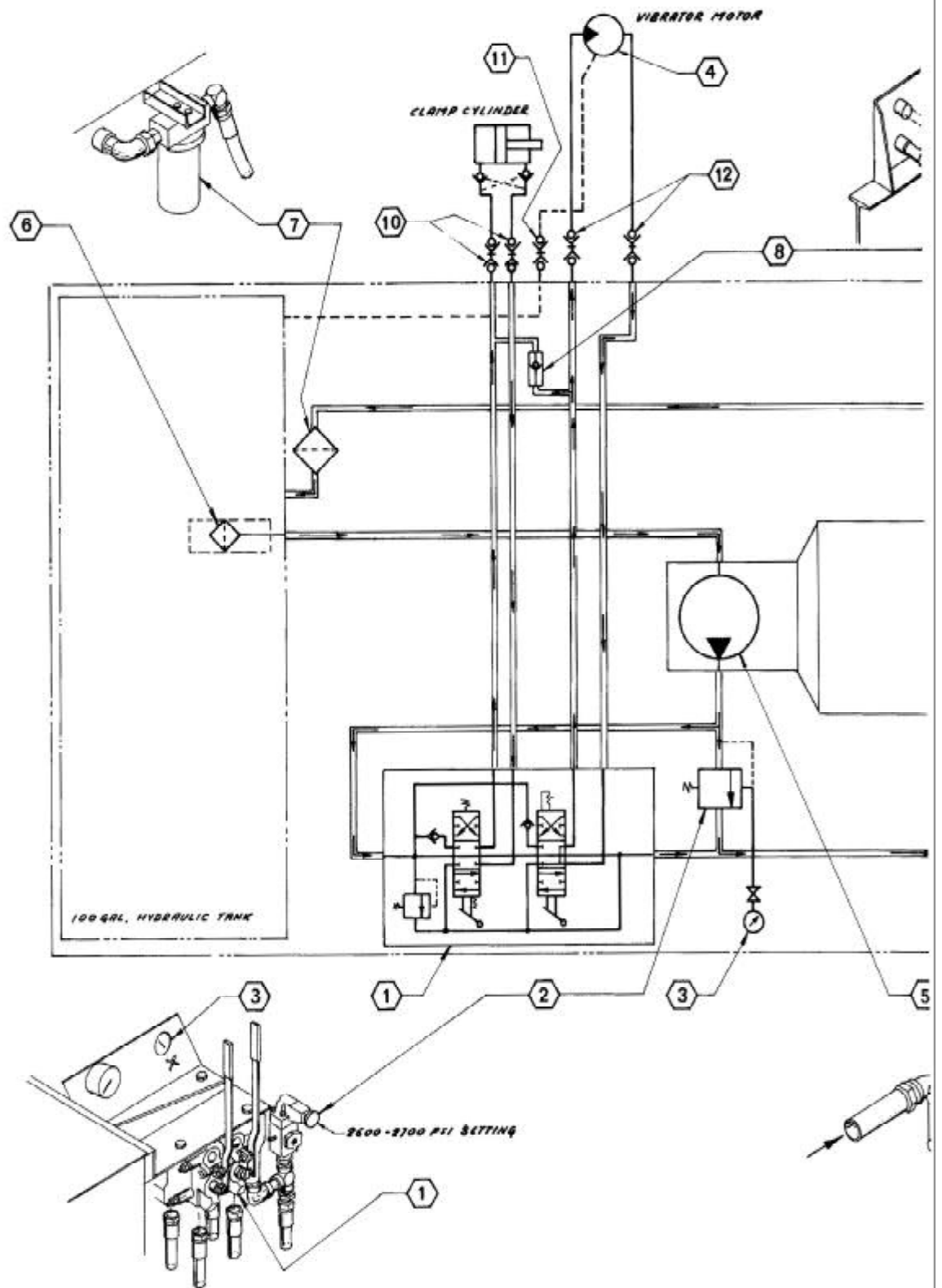
HP-105B HYDRAULIC SCHEMATIC
(01700127)

ITEM NO.	PART NO.		DESCRIPTION	QTY. REQ'D.
1	0	911 0084	Hyd. Pump	1
2	0	931 0269	Suction Strainer	1
3	0	931 0403	Return Line Filter	1
4	0	931 0270	Directional Valve	1
5	0	934 0007	Oil Cooler	1
6	0	931 0278	Pressure Gauge	1
7	0	931 0298	Check Valve	1
8	0	922 0018	Hydraulic Clamp Cylinder	1
9	0	910 0027	Hydraulic Motor	1
10	0	931 0300	Relief Valve	1
11	0	927 0005	Clamp Quick Disconnect	2
12	0	927 0043	Drive Quick Disconnect	2

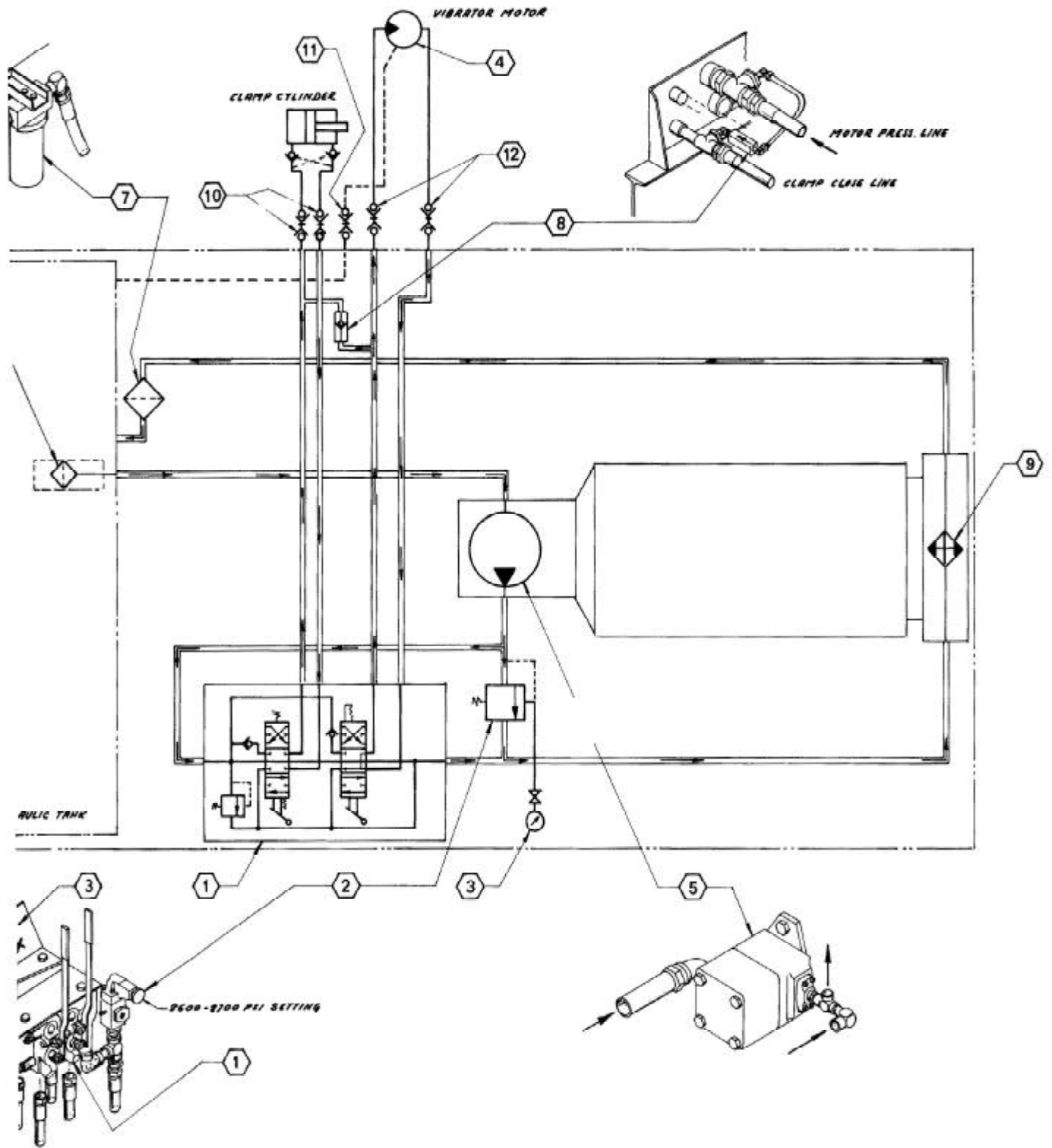


HP-105B HYDRAULIC SCHEMATIC
 COMPONENTS LOCATED
 (01700129)

ITEM NO.	PART NO.		DESCRIPTION
1	0	931 0270	Dir. Valve
2	0	931 0300	Relief Valve
3	0	931 0278	Pressure Gauge
4	0	910 0027	Hydraulic Motor
5	0	911 0084	Hydraulic Pump
6	0	931 0269	Suction Strainer
7	0	931 0403	Return Line Filter
8	0	931 0298	In-Line Check Valve
9	0	934 0007	Oil Cooler
10	0	927 0005	Clamp Quick Disconnect
11	0	927 0010	Drain Quick Disconnect
12	0	927 0043	Motor Quick Disconnect



Continued



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