

OPERATING, MAINTENANCE AND
PARTS MANUAL FOR
V-20 / HP-350
HYDRAULICALLY POWERED
VIBRATORY PILE DRIVER/EXTRACTOR
SYSTEM

"WARNING! DO NOT START OR OPERATE THE V-20/HP-350 UNTIL HAVING THOROUGHLY READ THIS MANUAL AND HAVING RECEIVED INSTRUCTIONS FROM AN MKT FACTORY AUTHORIZED SERVICE REPRESENTATIVE OR A PROPERLY TRAINED, EXPERIENCED V-20/HP-350 OPERATOR".



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

MANUAL NO. 07817

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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.



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.)

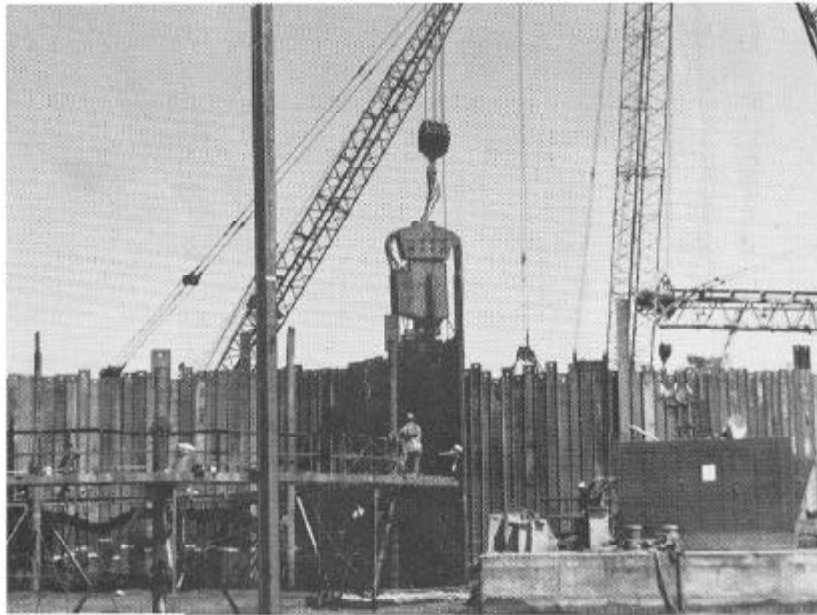
Steam/Air Extractors - Located on the left side front and each sidestrap.

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

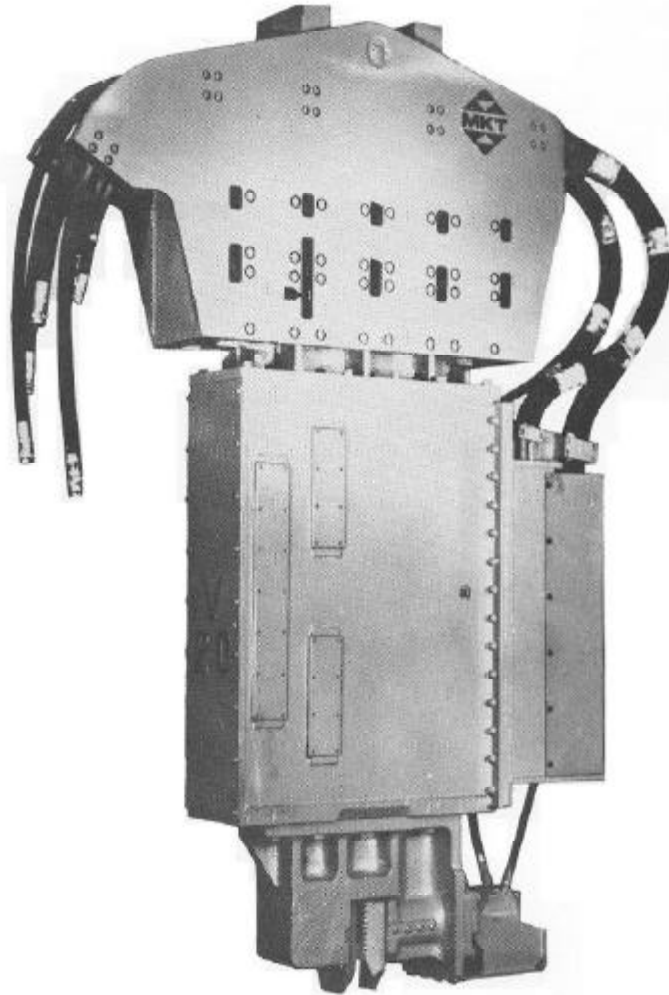
Vibratory - Located on the center post of the control side of the power pack. Located on the left side or motor side of the exciter housing.

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.



V-20/HP-350 VIBRATOR
DRIVER-EXTRACTOR SYSTEM



V-20

VIBRATORY HAMMER

iiii

I. INTRODUCTION

The MKT V-20/HP-350 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-20 system should be economically effective in moving pile weights of up to approximately 12,000 pounds.

The four major components of the MKT vibratory driver/extractors include: rotating eccentrics to generate the vibratory forces to drive or extract piles, a power package to develop the hydraulic energy needed to rotate the eccentrics at steady state frequency, a clamp housing to transmit vibratory forces to the pile section and an elastomer suspension system to isolate the vibratory forces from the holding device.

The eccentrics of the MKT driver/extractors are driven by hydraulic motors. There are four rotating eccentrics stacked in a vertical plane and mounted in special heavy-duty spherical roller bearings. The eccentrics are directly connected by chain couplings to the fixed displacement, piston type hydraulic motors. To maintain proper relationship, the eccentrics are gear-connected. Flood lubrication is furnished to the eccentric bearings by a pump (rated at 10 gpm) driven off the lower eccentric.

When operated within its load capabilities, the V-20 Vibrator is designed to deliver a driving force of 100 tons to a pile at the rate of 1,650 vibrations per minute. The HP-350 hydraulic prime mover is correspondingly designed to maintain the necessary hydraulic flow and pressure to the V-20 vibrator motors of 106 gpm at 5,000 psi.

II. SPECIFICATIONS FOR V-20/HP-350 VIBRATORY PILE DRIVER/
EXTRACTOR SYSTEM

A. OPERATING DATA - V-20 DRIVER/EXTRACTOR

Driving Force @ SSF	100 tons
Hyd. Motor Output HP @ SSF	295 hp
SSF @ Rated Pressure and Flow	1,650 cpm
Driving Amplitude58 in.
Rated Flow @ SSF	106 gpm
Rated Pressure @ SSF	5000 psi
Engine Operating rpm	2000 rpm
Net Weight Exciter	12,500 lbs.
Pile Clamping Force	70 tons
Maximum Line Pull	50 tons
Length	146 in.
Width at Throat	14 in.

Note: SSF = Steady State Frequency @ Rated Pressure

B. OPERATING DATA - HP-350 HYD. POWER PACK

Diesel Engine	DD-8V-92
Diesel Engine rpm for Rated Flow	2000 rpm
Diesel Starting	24V DC
Diesel Fuel Tank Capacity	100 gal.
Hydraulic Oil Tank Capacity	200 gal.
Clamp line and drain line Hyd. Hoses	3/4" ID
Motor Line Hydraulic Hoses	1 1/4" ID
Length - Over-all	142 in.
Width - Over-all	60 in.
Height - Over-all	80 in.
Net Weight	15,000 lbs.

C. HOSE BUNDLE

- 6 pcs. - 50-ft. 1 1/4" ID Motor Inlet Line (24180075)
- 6 pcs. - 50-ft. 1 1/4" ID Motor Return Line (24100446)
- 9 pcs. - 50-ft. 3/4" ID Clamp and Drain Lines (24200072)

D. SUSPENSION ASSEMBLY HOSES

- 2 pcs. - 16 1/4-ft. 1 1/4" ID Motor Inlet Ext. (24180073)
- 2 pcs. - 16 1/2-ft. 1 1/4" ID Motor Return Ext. (24100443)
- 2 pcs. - 19-ft. 3/4" ID Clamp Ext. (24100437)
- 1 pc. - 14-ft. ID Drain Ext. (24100438)

II. SPECIFICATIONS FOR V-20/HP-350 VIBRATORY PILE DRIVER/
EXTRACTOR SYSTEM

E. DRIVING FORCE CHARACTERISTICS

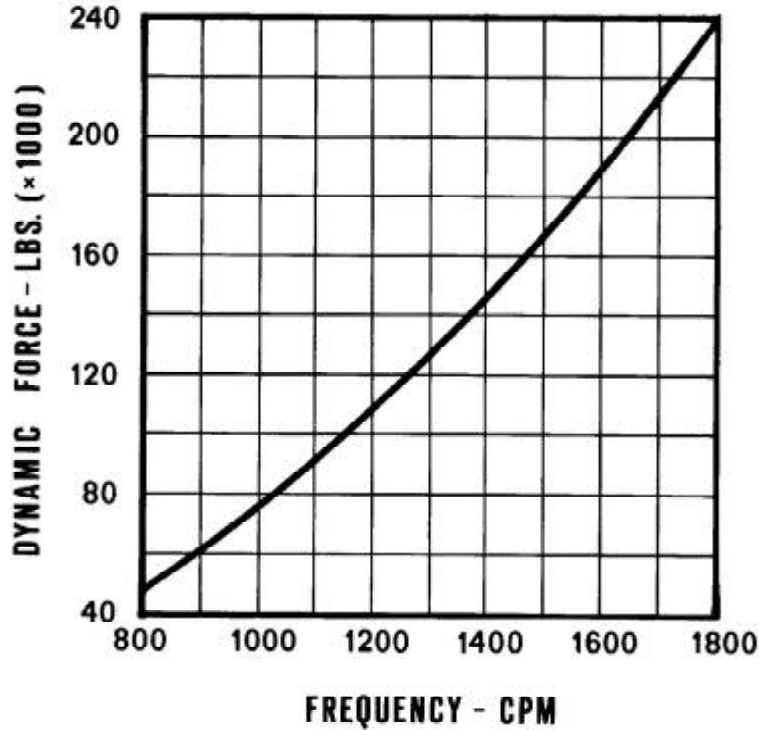


FIG. 1

F. OUTPUT MOTOR HORSEPOWER

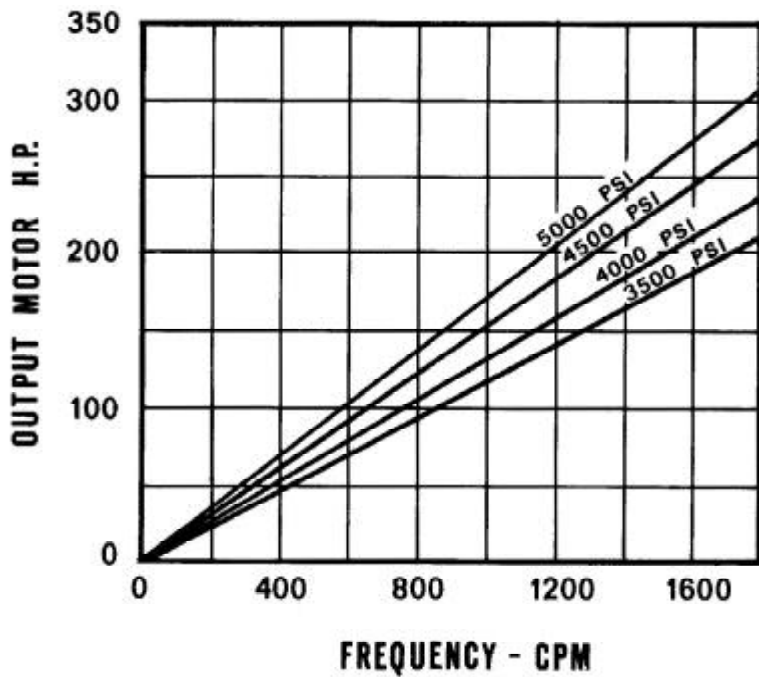


FIG. 2

III. V-20/HP-350 SYSTEM COMPONENTS

The essential components of a complete V-20/HP-350 Hydraulic Vibratory Pile Driver/Extractor system are:

- A. An HP-350 diesel engine driven hydraulic power pack;*
- B. A connecting (normally 150 feet) hydraulic, seven-hose bundle;
- C. A V-20 exciter fitted with a suspension assembly and a pair of clamp jaws to form the complete V-20 Vibrator;
- D. A 50 foot electrical remote control pendant-cable assembly.

***NOTE:** The power pack reservoir is factory filled with a hydraulic oil meeting precise specifications for viscosity, viscosity index, pour point and inhibitors. The oil used, or its equivalent, is readily available for most major oil companies.

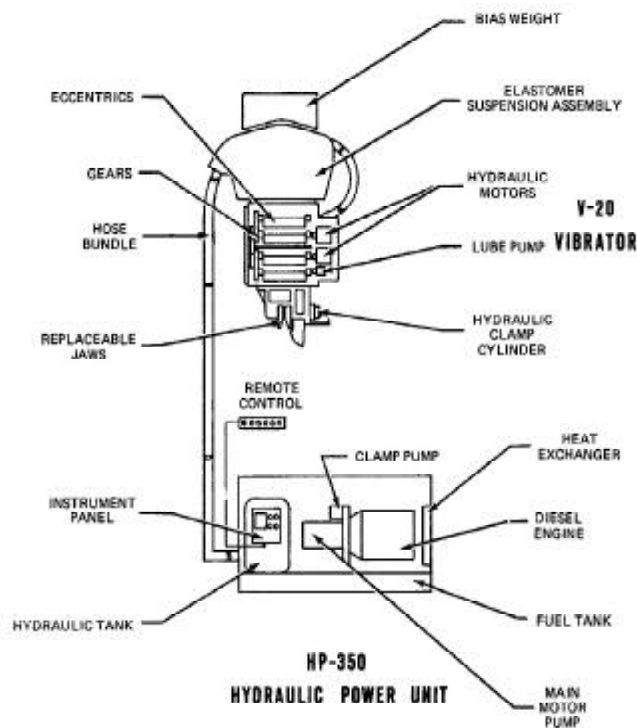


FIG. 3

IV. SETTING UP THE V-20/HP-350 SYSTEM

- A. The HP-350 Hydraulic Power Pack is assembled on a tubular steel skid base, framed with steel tubing, covered with a vandal-protection enclosure, and is fitted with two lifting eyes. The power pack, weighing approximately 15,000 lbs., is thus designed to be lifted by a crane, using an adequate chain, from location to location for safe, firm positioning. The power pack can be positioned with an unobstructed operator view in reasonable proximity to the intended operation of the V-20 Vibrator.

- B. The Connecting Seven-Hose Bundle is shipped from the factory filled with the proper hydraulic fluid, strapped every four feet, and coiled on a wooden pallet. Before making any hose connections, straighten out the bundle by lifting it up with the crane to straighten out the lines without a kink. Position the quick disconnect ends of the hose bundle next to the power pack connections and the swivel connections near the vibrator. The hose bundle is composed of four 1 1/4" I.D. motor line hoses, two 3/4" I.D. clamp cylinder hoses and one 3/4" I.D. drain line. All hose lines are connected at the HP-350 power unit through quick disconnects. The clamp and drain lines are push-pull type and the motor lines are the screw-on type. The quick disconnects have their plug to couplers alternately matched to prevent incorrect hose connections. Motor line hoses have pressure hose lines a brown color where the return hose lines are black. Hose connections at the V-20 Vibrator are swivel screw type and are color coded. Never connect a drain line hose to a clamp line hose.
 1. TAKE CARE NOT TO KINK OR OVERBEND ANY HOSE IN THE BUNDLE. The high pressure motor line hoses have a minimum bursting pressure of 20,000 psi, but a kink will weaken the spiral wire hose wrap and reduce its bursting pressure rating. These high pressure motor line hoses have a minimum bending radius of 16 1/2 inches. Hence, when handling the hose (particularly with a crane) care must be taken to prevent a shorter bending radius, for instance, as might occur over a bare hook.

IV. SETTING UP THE V-20/HP-350 SYSTEM

B. The Connecting Seven-Hose Bundle - Continued

2. BEFORE MAKING ANY HYDRAULIC HOSE CONNECTIONS, ASSURE THAT THE CONNECTORS ARE WIPED CLEAN OF ANY DIRT OR CONTAMINATION TO PREVENT SUBSEQUENT CONTAMINATION OF AND DAMAGE TO THE COMPONENTS IN THE HYDRAULIC SYSTEM.
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 external compression.
4. The ends of the hoses in the straightened hose bundle should be carefully wiped clean and connected, according to size and color code, to the short hose lengths straddling the V-20 suspension.
5. 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.

C. The V-20 Vibrator is factory fitted with its suspension assembly and is shipped flat on its side. It is designed to receive a 7/8" three-part wire rope triple cable-clamped sling through the bale in the suspension assembly which in turn can be slipped over a lifting crane hook. The V-20 Vibrator, weighing approximately 12,500 lbs. can be lifted from the horizontal to the vertical without danger of excess stress upon its connecting parts or structure.

1. Hanging in the air, the V-20 Vibrator should be hoisted, swung, and rotated to assure that the hose bundle hangs free of any loops or entanglements.

IV. SETTING UP THE V-20/HP-350 SYSTEM

C. The V-20 Vibrator - Continued

2. Manipulating the V-20 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 through the hole drilled in the V-20 clamp housing before hoisting the vibrator aloft.

D. The Jaw Shield is generally shipped disconnected from the V-20 Vibrator Jaw Housing. Before using the V-20 Vibrator, assure that the jaw shield is tightly connected (with four hex head cap screws and lock-washers) to the V-20 Vibrator. The jaw shield not only acts as a guide tongue to position the V-20 Vibrator on a standing pile but also is necessary to protect the jaws and the pile clamp system from unnatural impact shock and resulting damage.

E. The Remote Operator's Pendent Control has 50 ft. of electrical cable that connects to the hydraulic power pack. There is a connector at each end of the electrical cable to connect the pendent and the electrical control panel of the power unit.

The pendent has four (4) push buttons and one (1) green indicator light. The jaw clamping or unclamping is designated as "Close" or "Open". The vibrate-start or stop is designated "START" or "STOP". The green light will go on only when the jaws are fully clamped.

F. The Pipe Clamp Accessory for the V-20 Vibratory Driver/ Extruder is adjustable for a range of pipe piles, 10" to 36" outside diameter. The two clamp-jaw assemblies, one fixed, and one hydraulically actuated, and a mandrel support block, are made to slide along the clamping angle bars securing them on each side. A special length of tie rod and a special mandrel is required for each specific pipe size.

When the fixed clamp, the I.D. mandrel pinned to the mandrel support block, the tie rod and the hydraulically

IV. SETTING UP THE V-20/HP-350 SYSTEM

F. The Pipe Clamp Accessory - Continued

actuated clamp are correctly positioned for the size of pipe piling being used, proper tightening of the bolts and pre-load tightening of the tie rod is necessary to secure these assemblies. Each clamp end assembly is supported by 3 to 4 bolts on each side depending on its location along the clamping angle bars.

FIRST, TIGHTEN THE BOLTS (SHOWN SHADED BELOW) REQUIRED TO SECURE THE (2) ADJUSTABLE CLAMP ASSEMBLIES AND THE TIE ROD to 950 ft. lbs. torque each. Then, randomly tighten the rest of the bolts to 350 ft. lbs. torque each. **IMPORTANT! DO NOT TIGHTEN THE BOLTS BETWEEN THE CLAMP ASSEMBLIES UNTIL THE BOLTS OVER EACH ASSEMBLY ARE SECURE, OR IT WILL BE IMPOSSIBLE TO PROPERLY SECURE THE CLAMP ASSEMBLIES.**

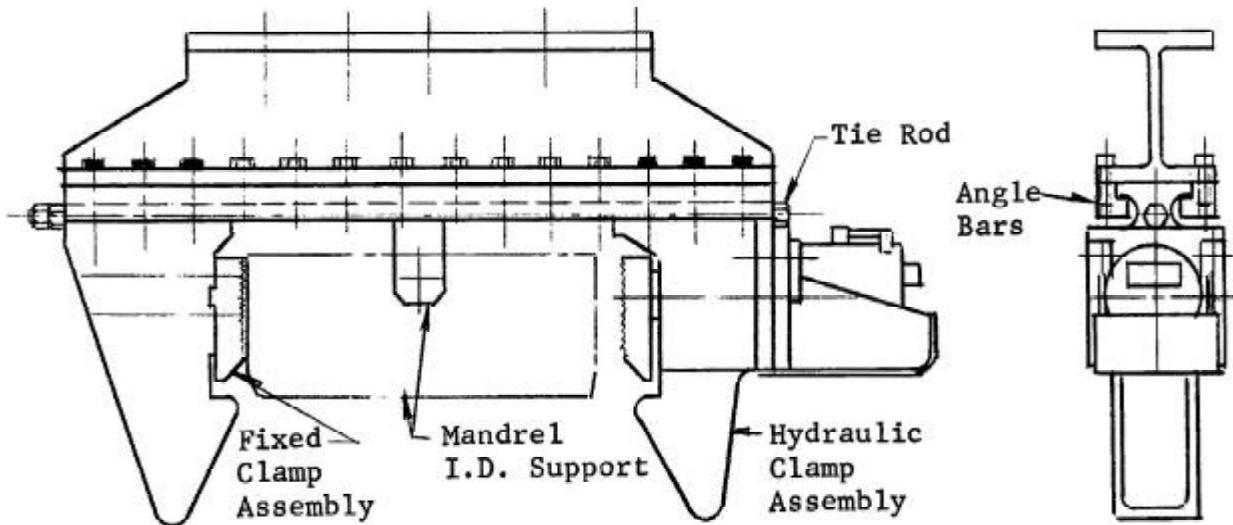


FIG. 4

V. MAKING READY THE V-20/HP-350 SYSTEM 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-350 power pack. DO NOT OPERATE THE HP-350 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-350 system. See the lubricant and hydraulic fluid requirements for the V-20/HP-350 System, Page 11.
- C. The HP-350 Power Pack has separate pumps for the hydraulic motor and clamp circuits. The main motor drive pump is connected at the rear bottom of the engine. The clamp pump is on the rear upper left side of the engine. The main motor drive pump should maintain its prime from factory tests.
1. The hydraulic valves in the HP-350 power pack have already been set for proper pressures during the minimum four-hour factory break-in and operation of the V-20/HP-350 System. DO NOT MAKE ADJUSTMENTS TO THE VALVES WITHOUT THE ASSISTANCE OF A FACTORY TRAINED SERVICE REPRESENTATIVE.
 2. The clamp pump should maintain its prime from factory tests. When starting the engine, clamp "close" position should immediately register 2,600 - 2,800 psi. If not, check trouble shooting Section XI, A-5.

V. MAKING READY THE V-20/HP-350 SYSTEM FOR OPERATION

- D. The lubricating oil level in the V-20 Vibrator must be maintained at all times for proper lubrication of the gear train and eccentric bearings. Check the lube oil level by holding the exciter in a vertical position and removing the lube oil level plug. If the oil is below the level plug hole, add oil. Should the level be too high, allow oil to drain to level of hole. Too much oil on initial check may indicate leakage of hydraulic oil into the exciter housing through the hydraulic motor seals.

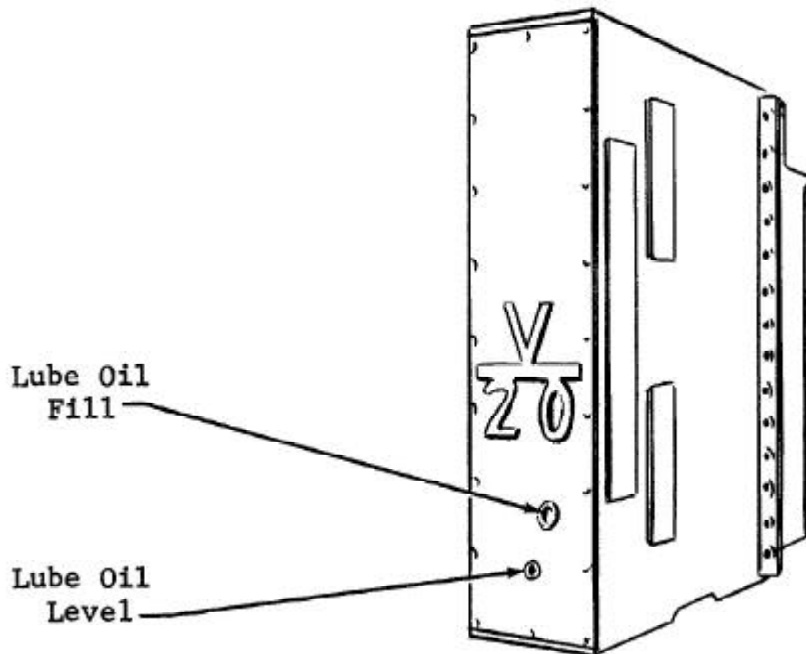


FIG. 5

V. MAKING READY THE V-20/HP-350 SYSTEM FOR OPERATION

E. LUBRICANTS, COOLING AND HYDRAULIC FLUID

V-20 LUBE OIL GALS.

Texaco Meropa 220	Amb.	{	32° F.		9
Mobil DTE-26	Amb.	}	32° F.		

HP-350 HYDRAULIC OILS GALS.

Auto Transmission Fluid, Type F _____ 200

HP-350 COOLING SYSTEM

	<u>Antifreeze</u>		
	<u>Capacity-Qts.</u>	<u>Min.Qts.</u>	<u>Max.Qts.</u>
D. D. 8V-92 Engine	82	33	41

CRANKCASE OIL - 8V-92

Mobil Delvac 1230 SAE 40
 or Shell Rotella T-30 SAE 40
 or Texaco Ursa Extra Duty SAC 40

VI. STARTING THE V-20/HP-350 SYSTEM

WARNING! SUSTAINED EXPOSURE TO HIGH SOUND LEVELS CAN PERMANENTLY IMPAIR ONE'S HEARING! HEARING PROTECTION SHOULD BE WORN BY ANYONE AND EVERYONE WORKING WITHIN CLOSE PROXIMITY TO THE HP-350 POWER PACK.

A. START-UP PROCEDURE:

1. Open radiator door.
 2. Connect the electrical remote control pendent after the hydraulic hoses are connected per Section IV, Par. B, Page 5.
 3. The engine controls will be found mounted on the HP-350 operator's panel, consisting of a throttle and start-run-stop switch.
 4. Start engine at idle speed of 800-1000 RPM. Allow to idle until charge pressure registers. Roof door will open automatically.
 5. Run engine at part throttle (1000-2000 RPM) for warm-up. If ambient temperatures are 30^o F. or below, the engine must be run for at least 30 minutes to assure proper warm-up of the hydraulic oil in the system. It is recommended heaters be installed in the hydraulic tank if the V-20 is subjected to prolonged use in sub-freezing temperatures.
 6. Turn on 24^V power at electrical control panel.
 7. Bring up engine speed to 2,000 RPM.
 8. Assure clamp pressure register on "clamp close".
- B. Whenever the hydraulic lines of the V-20/HP-350 System have been newly reconnected, THE CLAMP CYLINDER CIRCUIT MUST BE BLED OF ENTRAINED AIR. Lift the V-20 Vibrator vertically off the ground. Depress the "clamp close" push button to close the jaws. Using a 1/8" Allen Wrench, loosen the locknut and unscrew the vent valve set screw on the top and outboard end of the clamp cylinder.

VI. STARTING THE V-20/HP-350 SYSTEM

B. Continued

CAUTION! A STREAM OF FROTHING HYDRAULIC FLUID WILL SHOOT FROM THE RELIEVED SET SCREW! After thirty seconds or so, close the set screw. Depress the "clamp open" push button to open the jaws and repeat the process at the inboard vent valve. Repeat the procedure until an air-free stream of oil comes from each relieved set screw. FAILURE TO COMPLETELY BLEED THE CLAMP CIRCUIT OF AIR MAY IMPAIR CLAMPING FORCE.

- C. Before positioning the vibrator onto a pile, put the V-20 into the vibrate mode, free hanging, for a few seconds. Have an associate observe the oil sight gauge at the motor end mid-point of one side of the V-20 Vibrator. Proper lubrication of the V-20 Vibrator will be indicated by oil flowing down over the sight gauge immediately when vibrating stops.*

DO NOT OPERATE THE V-20 VIBRATOR UNLESS PROPER LUBRICATION IS OBSERVED. The V-20/HP-350 System is now ready to drive or extract pile.

*NOTE: The hydraulic motors on the V-20 Exciter will operate in either direction. The lube pump on the V-20 exciter, however, will pump oil only when it is run in the proper direction. Failure to see a flow of oil over the sight gauge may be the result of having inadvertently reversed one or the other connection of the motor line hoses.

NORMAL GAUGE READINGS DURING OPERATION OF THE HP-350 POWER PACK

ENGINE SPEED _____	2000 RPM
DRIVE PRESSURE _____	1200 to 5000 PSI
CLAMP PRESSURE _____	2700 to 2800 PSI
CHARGE PRESSURE _____	200 to 400 PSI
HYDRAULIC OIL TEMPERATURE _____	115° F. to 165° F.
VIBRATOR FREE HANGING FREQUENCY _____	1700 CPM

VII. OPERATING THE V-20/HP-350 SYSTEM

A. OPERATING THE V-20/HP-350 SYSTEM - DRIVING MODE

1. With a preset pile, the V-20 Vibrator with clamp jaws open, is hoisted above, entered 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, RESULTING IN POTENTIAL FAILURE OF THE JAWS, THE CLAMP SLIDE AND/OR OTHER CLAMP ASSEMBLY COMPONENTS.
2. The clamp jaws will close upon the pile with an approximate 70-ton force by depressing the "clamp close" push button. A built-in check valve system in the clamp cylinder assures the clamp jaws remain locked closed or opened until powered in the opposite direction.
3. A pile is driven with a V-20 Vibrator by completely relaxing the hoist line after clamping the V-20 Vibrator to a supported pile.
4. The V-20/HP-350 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-20/HP-350 System may automatically dump over relief valve and slow down the V-20 frequency.
5. The addition of driving weights to the suspension of the V-20 Vibrator will often aid to acquire 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 an MKT Diesel or Steam/Air Impact Pile Hammer.

VII. OPERATING THE V-20/HP-350 SYSTEM

A. OPERATING THE V-20/HP-350 SYSTEM-DRIVING MODE - Cont.

6. Occasionally the inability of the V-20 Vibrator to continue to move a pile will be the result of pile's striking an impenetrable soils material or an obstruction. The observable action of the V-20 Vibrator and clamped pile will be to note a considerable fall-off of drive pressure and the exciter will "dance" in place, often causing erratic interaction of the V-20 Exciter and its suspension assembly. WHENEVER THE V-20 VIBRATOR IS OBSERVED "DANCING" AND "CHATTERING" IN PLACE, IT SHOULD BE HOISTED UNTIL THE ACTION STOPS. FAILURE TO MOVE A PILE FURTHER WITHOUT "DANCING" OR "CHATTERING" OF THE V-20 VIBRATOR SHOULD BE CAUSE TO PROMPTLY ABANDON THE EFFORT BEFORE SERIOUS DAMAGE IS DONE TO THE VIBRATOR. To continue operations, the obstruction must be removed or penetrated by switching to another driving system such as an MKT Diesel or Steam/Air Impact Pile Hammer.

B. OPERATING THE V-20/HP-350 SYSTEM - EXTRACTING MODE

1. A pile is extracted by merely tensioning the V-20 Vibrator hoisting line. The amount of pull which can be exerted on the V-20 Vibrator in extraction is limited by the rating of the suspension assembly and the tensional strength of the pile. DO NOT PULL IN EXCESS OF THE RATING OF THE V-20 VIBRATOR'S SUSPENSION ASSEMBLY OR EXCESS STRESSES WILL BE PUT ON THE SUSPENSION ASSEMBLY DAMAGING ONE OR MORE PARTS. A maximum recommended stretch of 4 1/2 inches is the rated lift of approximately 50 ton.
2. The ability of the V-20 Vibrator to switch instantly from driving to extracting mode by merely pulling on its hoist line has evolved a pile driving procedure exclusive to vibratory usage. A vibrator, hanging on a #1 crane line, is swung into the air. A sheet pile, for example, is lifted from the ground on the #2 line. The #2 line pulls the head of the pile between the clamp jaws of the vibrator. The jaws are closed, the #2 line slacked; and both vibrator and pile are then held by the #1 line.

VII. OPERATING THE V-20/HP-350 SYSTEM

B. OPERATING THE V-20/HP-350 SYSTEM-EXTRACTING MODE - Cont.

2. Continued

The pile is stabbed in its location with the vibrator; the vibrator is turned on and the pile worked into the ground. Usually out of plumb at the outset, the pile is alternately driven and extracted until it penetrates the soil sufficiently to be self-supporting. It is then pulled far enough to be straightened, plumb and quickly driven. (Sheet piles usually are driven only a few feet, then adjacent pile set).

3. For pile extraction operations, a V-20 Vibrator is frequently fitted with a shackle and short line attached through the hole drilled in the pile clamp housing. The V-20 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-20 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-20 Vibrator is then stopped by depressing the stop push button on the operator's pendant. 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-20 Vibrator Jaws are opened, allowing the pile head to fall away from the jaws and hang by the line and shackle. The V-20 Vibrator and dangling pile are lowered to the ground where the shackle is disconnected from the pile.

VIII. TO SHUT DOWN THE V-20/HP-350 SYSTEM

1. Stop vibrator and open jaws.
2. Reduce engine speed to idle (800-1000 RPM) and allow to idle for a few minutes.
3. To stop engine, turn engine start switch to off and hold for a couple of seconds.
4. Turn main power selector switch to "power off"; green light on panel will go off.
5. Close radiator door. Roof door will close slowly by gravity.

IX. MAINTAINING THE V-20/HP-350 SYSTEM

- A. Maintenance procedures for the diesel engine in the HP-350 are described in the engine manufacturer's manual.
- B. Properly maintaining the total V-20/HP-350 System begins with cleanliness - assuring that no dirt or foreign material enters the hydraulic fluid circuit. Contamination of the components of the hydraulic system: pumps, motors, valves, etc., will result in erratic operation, downtime for correction, shortened equipment life, damaged parts and expensive repair and replacement part costs.
 1. To trap foreign material which inadvertently enters the hydraulic circuit, the V-20/HP-350 System contains several filters. There are 2 suction filters, 1 in-line filter and a strainer on the HP-350 Power Pack (Reference HP-350 Hydraulic Circuit, P5) and a lube pressure filter on the V-20 Vibrator. Filter elements should be changed when the indicator on the in-line filter housing indicates a need for change or the vacuum gauge on the main pump suction filters show above ten inches of mercury.

IX. MAINTAINING THE V-20/HP-350 SYSTEM

B. Continued

2. After experience with operating the V-20/HP-350 System, a regular interval for change of filter elements can usually be established.

C. The hydraulic oil level in the system should be maintained at all times. Leaks in the hydraulic system, particularly noticeable after transport and re-set-up of the system should be eliminated by checking and tightening the leaking parts. Hose connections may leak as a result of manipulating and straightening lines, and should be promptly tightened. The CAUSE OF HYDRAULIC LEAKS WHICH CANNOT BE CORRECTED SHOULD BE ELIMINATED BY CALLING FOR FACTORY AUTHORIZED DISTRIBUTOR SERVICE ASSISTANCE.

1. Check the hydraulic oil level at the HP-350 tank gauge before and during operation of the V-20/HP-350 System. DO NOT OPERATE THE V-20/HP-350 IF THE HYDRAULIC FLUID REGISTERS AT THE BOTTOM OF THE TANK FLUID GAUGE.

2. In normal, safe operation of the V-20/HP-350 System, the hydraulic oil temperature should remain in its normal range: from 115° to 165° F. read on the thermometer (on the panel). IF HYDRAULIC OIL TEMPERATURE BECOMES EXCESSIVE (ABOVE 180°), STOP OPERATIONS AND CONSULT WITH THE NEAREST FACTORY AUTHORIZED SERVICING DISTRIBUTOR. A temperature switch will automatically turn on a red light on the panel if temperature reaches 190°-195° F.

D. Daily check all hoses in the hydraulic line hose bundle for cuts or other damage. Hoses are sometimes cut or bruised by dragging them across pile heads while setting the V-20 Vibrator. Stop V-20 Vibrator operations that may damage hoses, and redirect the hose bundle to avoid dragging and damage. Damaged hose sections must be replaced to eliminate failure and downtime during operations.

IX. MAINTAINING THE V-20/HP-350 SYSTEM

- E. Inspect the V-20 Vibrator for normal hanging posture and tightened nuts - particularly on the suspension and clamp housing assemblies before and during operation. SAFETY WARNING! STAND AWAY FROM THE PILE AND FROM BELOW THE V-20 VIBRATOR DURING VIBRATING OPERATIONS. Any unobserved, uncorrected loose nut or other fastener always falls - DOWNWARD!
- F. Assure that the proper lube oil level is maintained in the V-20 Vibrator. See Page 10.
- G. Assure that lubricating oil is flowing in the V-20 Vibrator. See Page 10.

X. DAILY MAINTENANCE CHECK LIST - V-20/HP-350 SYSTEM

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 the gauge.
 - 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.

X. DAILY MAINTENANCE CHECK LIST - V-20/HP-350 VIBRATOR

1. Continued

- e. Check tightness of screws on the hydraulic motors, lube pump, etc. Look for cracks at highly stressed areas.
- f. Check spacing under lifting housing which should be fairly equal distance. Unequal spacing could be a sign that one or more of the elastomers is damaged.
- g. Be sure there is fuel in tank.
- h. Be sure there is cooling fluid in radiator. Recommended antifreeze is 33 to 41 quarts. Cooling system capacity is 82 quarts. (Ref. Page 11).
- i. WARNING: DO NOT start the clamp pump after it has been inoperative for a long time without first checking to be sure the pump is primed, i.e., the pump case full of oil; this will prevent starting the pump without lubrication which can cause pump damage. To check the clamp pump, remove the drain hose and visually determine if the case is full of oil.
- j. If oil has to be added to the pump for priming, extreme care must be taken with cleanliness of the pouring container, funnel, hose adapters, or with the disconnecting of hoses and plugs. The oil being introduced to the system by priming should pass through a 10 micron filter.
- k. Check the V-20 Vibrator lube oil level.
- l. Open radiator door.
- m. Connect electrical pendent and hydraulic hoses.
- n. Check tightness of jaw screws used on earlier models and check for damage to jaws.

X. DAILY MAINTENANCE CHECK LIST - V-20/HP-350 VIBRATOR

2. After starting engine, check as follows:
 - a. If ambient temperatures are 30^o F. or below, the engine must be run for at least 30 minutes to assure proper warm-up of the hydraulic oil in the system. It is recommended heaters be installed in the hydraulic tank if the V-20 is subjected to prolonged use in sub-freezing temperatures.
 - b. Turn on power at electrical panel; green light should go on.
 - c. Assure clamp pressure registers on "clamp close" and pendent green light goes on.
 - d. Assure charge pressure registers and roof door automatically opens.
3. After start-up and V-20 is vibrating, check as follows:
 - a. Inspect the hydraulic lines for leaks.
 - b. Allow hydraulic oil temperature to come up slightly above the oil pour temperature, preferably above 30^o F. before starting vibrator.
 - c. Before attaching to pile, open and close clamp jaws to verify fast and positive action.
 - d. Be sure there are no kinks in the lines and that they hang uniformly.
 - e. Once the vibrator has been started, be sure lube oil is pumping.
 - f. Always maintain close check on the lifting cable to assure no fraying has occurred.
 - g. Assure the drain relief doesn't spill.

X. DAILY MAINTENANCE CHECK LIST - V-20/HP-350 VIBRATOR

4. Periodic Owners Check

- a. It is recommended the owner purchase a photo tachometer or strobe for occasionally checking vibration rate. This will insure optimum efficiency of the V-20 Vibrator.
- b. A hydraulic oil sample should be taken for Lab analysis to verify no breakdown has occurred.

XI. TROUBLES, POSSIBLE CAUSES & REMEDIES

A. HYDRAULIC DRIVE CIRCUIT

<u>TROUBLE</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
A-1 Charge pressure doesn't register.	a) Suction filter clogged.	Check vacuum and change if necessary.
	b) Oil temperature very cold and viscous fluid restricted.	Allow to run at idle until charge pressure registers.
	c) Broken pressure gauge.	Replace pressure gauge or add extra gauge at pump.
	d) Charge pump drive key or shaft broken.	Consult Factory Authorized Distributor.
A-2 Vibrator frequency and drive pressure fluctuating.	a) Charge pump suction filters clogged.	Check hydraulic tank level gauge - might see air bubbles indicating turbulence. Change charge pump suction filter/s.
	b) Air in the lines.	Will work out of circuit.
A-3 Vibrator frequency seems to have changed.	a) Servo amplifier control adjusting screw might have turned due to vibration.	Consult factory authorized distributor.
	b) Drive or brake relief valve.	Consult factory authorized distributor.

XI. TROUBLES, POSSIBLE CAUSES & REMEDIES

A. HYDRAULIC DRIVE CIRCUIT - Continued

<u>TROUBLE</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
A-4 Vibrator won't operate when put in vibrate mode.	a) Charge pressure may be too low with charge pressure switch open.	Check charge pump suction filters and/or tightness of suction fittings.
	b) Charge pump may be damaged.	Consult factory authorized distributor.
	c) Main Drive Pump may be damaged.	Consult factory authorized distributor.
	d) Clamp closed pressure switch may be stuck open.	Consult factory authorized distributor.
	e) Broken line in pendent or cable.	a) Check for wire continuity and repair if possible. Use spare wire if necessary.
		b) Use test pendent to determine if problem is in pendent or cable.
		c) Wire may be disconnected in control box.
	f) Drive and/or brake relief valve or pilot may be stuck open.	Consult factory authorized distributor.
	g) Relay No. CR-3 may be inoperative.	Consult factory authorized distributor.

XI. TROUBLES, POSSIBLE CAUSES & REMEDIES

A. HYDRAULIC DRIVE CIRCUIT - Continued

<u>TROUBLE</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
A-4 Continued Vibrator won't operate when put in vibrate mode.	h) Loss of signal from Servo Amplifier. (Speed control adjust- ment screw fully clockwise).	Consult factory authorized dis- tributor.
	i) Electrical controller quick disconnect.	Consult factory authorized dis- tributor.
	j) Charge pressure switch may be stuck open.	Consult factory authorized dis- tributor.
A-5 Clamp close pressure not registering.	a) Faulty clamp pump.	Consult factory authorized dis- tributor.
	b) Pump front seal blew.	Consult factory authorized dis- tributor.
	c) Loss of prime.	Reprime the pump housing.
	d) Broken pressure gauge.	Replace pressure gauge.
	e) Broken clamp cylinder.	Check and replace clamp cylinder if necessary.
	f) Clamp directional valve stuck.	Consult factory authorized dis- tributor.
	g) Relay either CR-1 or CR-2 may be inoperative.	Consult factory authorized dis- tributor.

XI. TROUBLES, POSSIBLE CAUSES & REMEDIES

A. HYDRAULIC DRIVE CIRCUIT - Continued

<u>TROUBLE</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
A-6 Top exhaust door doesn't open, or if open, doesn't retract.	a) Door cylinder is binding from misalignment. b) Lack of charge gauge port pressure.	Try to improve alignment. Check lines from charge pump gauge port.
A-7 Hydraulic fluid overheating.	V-20 overloaded in too high ambient.	Relieve pile slightly from overloaded condition for temperature to drop.
A-8 Jaws won't open.	Duplex pressure switches on the drive manifold may be stuck open.	Consult factory authorized distributor.

B. VIBRATOR ASSEMBLY

B-1 Loss of vibrator lube oil.	Leakages.	Check for leakage and replace gaskets or tighten pipe fittings.
B-2 Increase of vibrator lube oil level.	a) If submerged under water, taking in water. b) Hydraulic motor blew a seal.	Check all covers for tightness of seal. Consult factory authorized distributor.
B-3 No vibration but drive pressure up when put into vibrate mode.	Locked eccentrics or eccentric bearings.	Consult factory authorized distributor.

XI. TROUBLES, POSSIBLE CAUSES & REMEDIES

B. VIBRATOR ASSEMBLY - Continued

<u>TROUBLE</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
B-4 No vibration and very low drive pressure when put into vibrate mode.	a) Damaged main drive pump.	Consult factory authorized distributor.
	b) Faulty drive or brake relief valve and/or pilot section.	Consult factory authorized distributor.
	c) Motor drive coupling(s) or key broken.	Consult factory authorized distributor.
B-5 No lube oil pumping to bearings (not visible at sight glass).	a) Broken or damaged lube pump drive coupling.	Consult factory authorized distributor.
	b) No lube oil.	Check oil level in vibrator.
	c) Obstruction in small orifice leading to sight glass.	Remove sight glass and clear opening.
	d) Obstruction in suction strainer before lube filter.	Consult factory authorized distributor.
	e) Lube filter clogged.	Replace filter element.
	f) Vibrator eccentrics rotating in wrong direction.	Check motor lines and correct connection.
	g) Lube pump faulty.	Consult factory authorized distributor.

XI. TROUBLES, POSSIBLE CAUSES & REMEDIES

B. VIBRATOR ASSEMBLY - Continued

<u>TROUBLE</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
B-6 Vibrator overheating.	a) No lube to bearings.	Check lube pump, filters, and lube oil level.
	b) Bearing damage.	Consult factory authorized dis- tributor.
	c) Inadequate thermal expansion allowance.	Consult factory authorized dis- tributor.
B-7 Internal noise in vibrator.	a) Loose motor or lube pump mounting.	Tighten all loose screws.
	b) Broken or damaged lube pump.	Consult factory authorized dis- tributor.
	c) Broken or damaged bearing.	Consult factory authorized dis- tributor.
	d) Broken eccentric drive coupling.	Consult factory authorized dis- tributor.
	e) Loose or damaged gear(s).	Consult factory authorized dis- tributor.
	f) Loose bearing retainers.	Consult factory authorized dis- tributor.
B-8 Drain "blow- off" relief valve open- ing.	a) During driving, could be damaged relief valve.	Inspect and replace if necessary.

XI. TROUBLES, POSSIBLE CAUSES & REMEDIES

B. VIBRATOR ASSEMBLY - Continued

<u>TROUBLE</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
B-8 Continued Drain "blow-off" relief valve opening.	b) Blockage in drain return to tank line.	Check for drain line blockage. Might have oil too viscous in return line because of low temperature. Drain line flow might be too high because of warm motor.
B-9 50 Ton Sus- pension bounce when vibrat- ing.	a) Frequency of vibrator too low.	Check frequency of vibrator. Should be 1,700 cpm free hang- ing.
	b) Soil condition.	May be soil causing unusual rebound-addition of bias weights will help.
	c) Vibrator accelerat- ing to frequency too slowly.	Consult factory authorized dis- tributor.
B-10 50 Ton Sus- pension, excessive noise.	Broken or damaged elastomer blocks.	Consult factory authorized dis- tributor.
B-11 Clamp pres- sure but no clamp move- ment.	a) Quick disconnects not connected.	Make connection.
	b) Broken clamp cylinder.	Consult factory authorized dis- tributor.
	c) Malfunctioning directional valve.	Consult factory authorized dis- tributor.

XI. TROUBLES, POSSIBLE CAUSES & REMEDIES

B. VIBRATOR ASSEMBLY - Continued

<u>TROUBLE</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
B-11 Continued Clamp pressure but no clamp movement.	d) Damaged slide.	Consult factory authorized distributor.
B-12 Jaws slipping on pile.	a) Lack of clamping overtravel.	Check for full 1 1/2" clamp cylinder travel and jaw spacing. Jaw may be worn too far.
	b) Inadequate clamp pressure.	Consult factory authorized distributor.
	c) Faulty clamp pump.	Consult factory authorized distributor.
B-13 Excessive looseness of movable jaw.	a) Captivating shoulder jaw screws loose or broken.	Replace with new jaw screw.
	b) Damaged slide jaw keyway or damaged jaw key.	Consult factory authorized distributor.

XII. ADJUSTING THE V-20/HP-350 SYSTEM

ADJUSTMENT OF THE FACTORY SET VALVES OF THE V-20/HP-350 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 OF V-20/HP-350

Included in the Replacement Parts Identification section of this manual, with identification of the principle parts, are drawings of:

DWG. NO.	DESCRIPTION	PAGE NO.
5420 0045	V-20 General Assembly	P1
6893 0239	V-20 Motor Housing Assembly	P2
5420 0116	V-20 50-Ton Elastomer Suspension	P3
6420 0109	Hydraulic Clamp Ass'y.	P4
5425 0011	HP-350 Hyd. Schematic	P5
6425 0151	HP-350 Hyd. Schem.-Components Located ..	P6
4425 0012	HP-350 Electrical Schematic	P7
3420 0063	V-20 Hydraulic Hose Assembly	P8
4425 0066	Pendent Assembly	P9

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 MKT V-20/HP-350 SYSTEM.

Successful internal repairs to and general overhaul of a V-20/HP-350 Hydraulic Vibratory Pile Driver/Extractor System must be handled as clean-shop procedures. MKT Factory Authorized Distributors are properly equipped and should be contacted to provide such service.

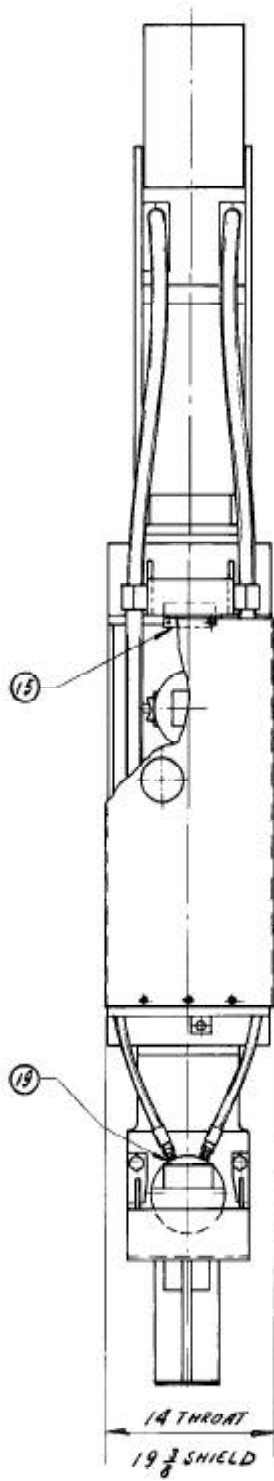
FOR THE NAME AND ADDRESS OF THE NEAREST MKT FACTORY AUTHORIZED V-20/HP-350 DISTRIBUTOR, CALL MKT, DOVER, NEW JERSEY, AND ASK FOR THE SALES AND SERVICE DEPARTMENT. (201) 361-2800, TELEX: 13-6403.

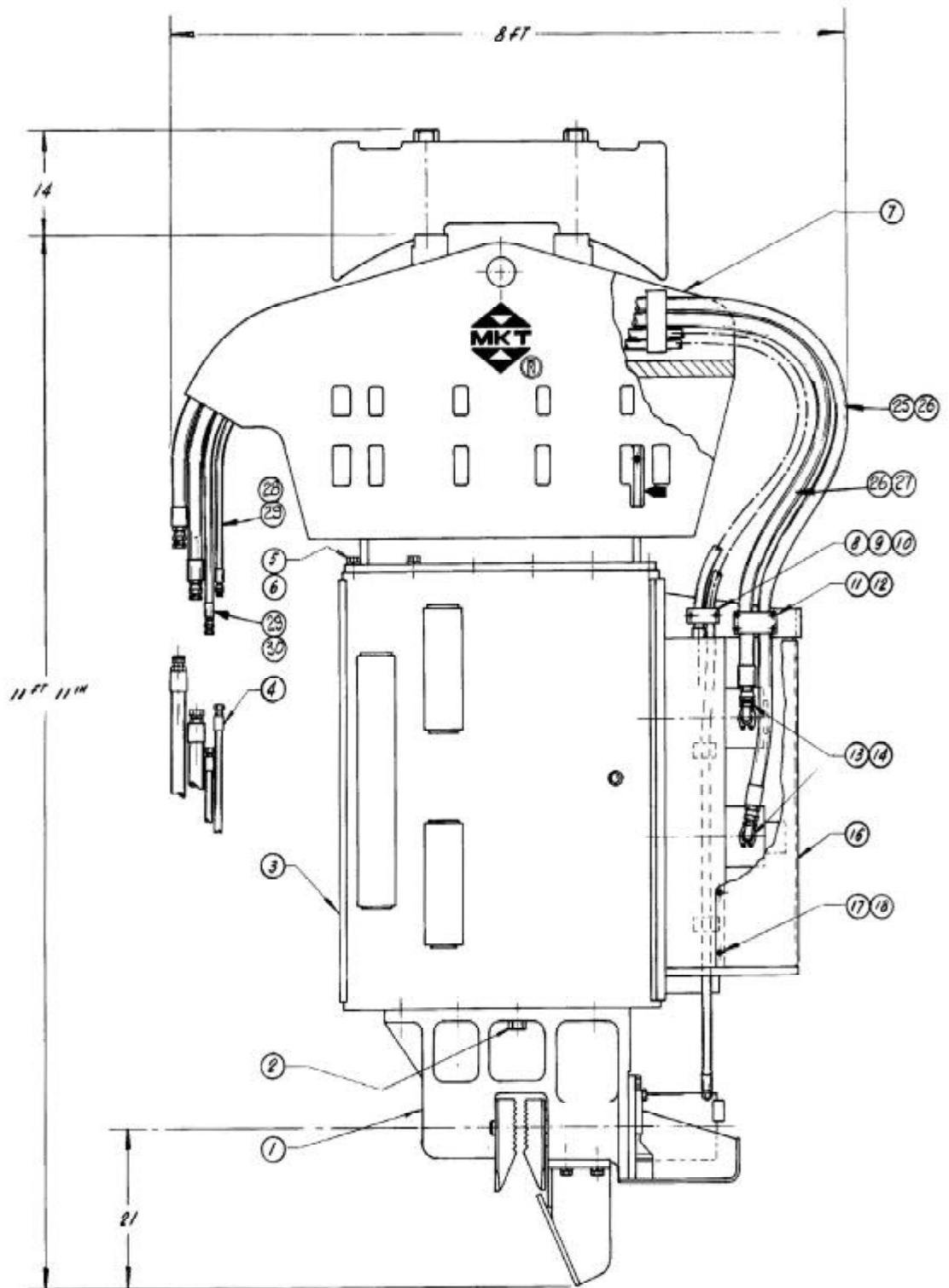
REPLACEMENT PARTS IDENTIFICATION

PAGES P1 THROUGH P9

V-20 GENERAL ASSEMBLY
(54200045)

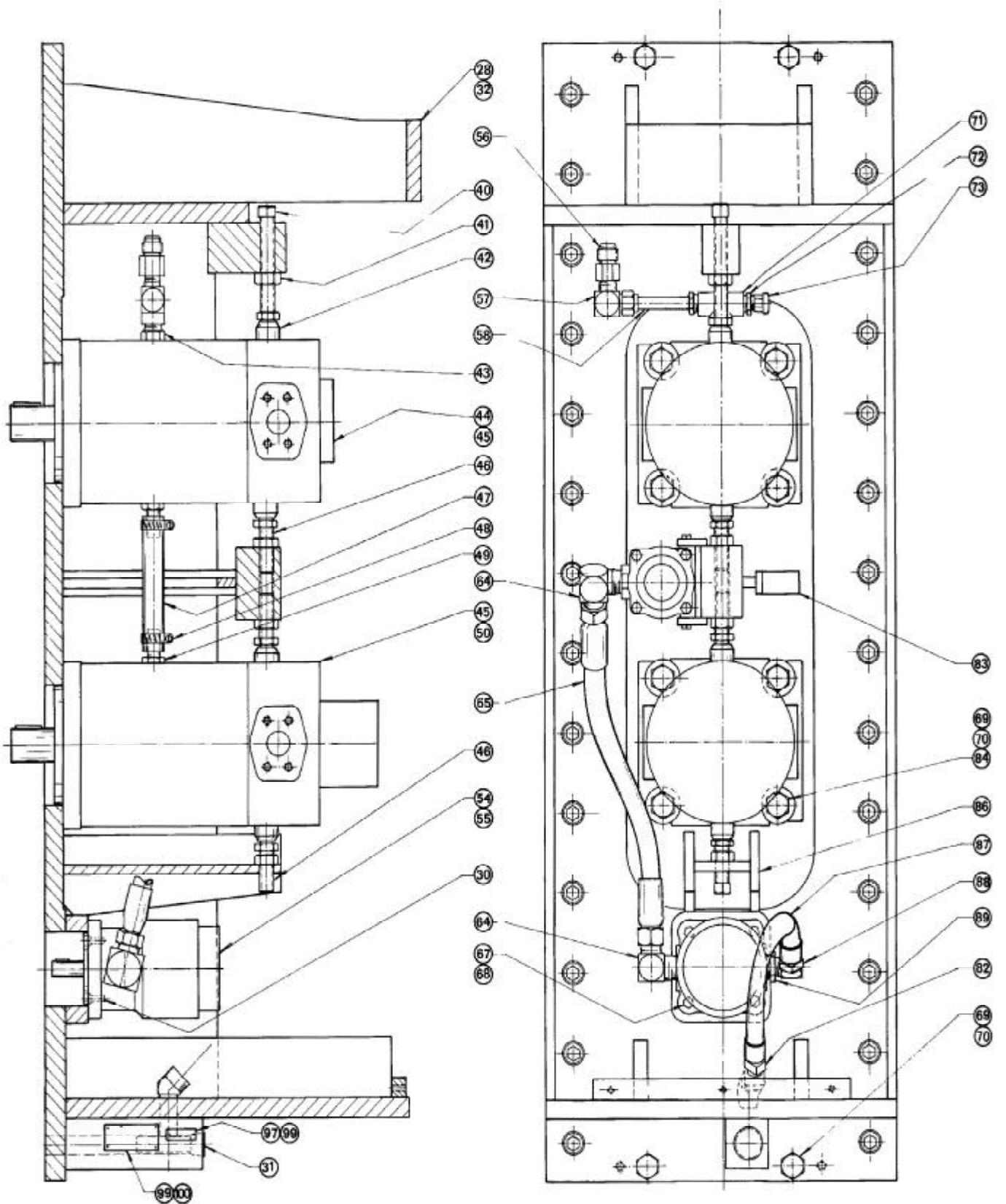
ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.
1	6 420 0115	Hyd. Clamp Assembly	1
2	0 901 6311	1 1/2-6 x 3 1/4 HHCS	8
3	6 420 0046	Exciter Assembly	1
4	3 420 0063	150 Ft. Hose Assembly	1
5	0 919 0065	1-8 x 3 HHCS	12
6	0 903 0121	1" Lockwasher	12
7	5 420 0116	50 Ton Suspension Assembly	1
8	2 420 0071	Hose Clamp	1
9	2 405 0032	Hose Clamp	5
10	0 919 0043	1/2-13 x 1 1/4 SHCS	12
11	3 420 0036	Hose Clamp	2
12	0 919 0055	1/2-13 x 1 3/4 SHCS	8
13	0 923 0523	Aeroquip No. FF5162-1620S	4
14	0 923 0524	Aeroquip No. FF595-16	4
15	2 420 0068	Motor Shield Mount Plate	1
16	4 420 0067	Motor Shield	1
17	0 919 0077	1/2-13 x 3/4 HHCS	17
18	0 903 0113	1/2 Lockwasher	17
19	0 923 0020	Aeroquip #2021-12-12S	2
25	2 410 0443	Motor Return Line	2
26	0 923 0413	Aeroquip #900599-20 (Plug)	4
27	2 418 0073	Motor Inlet Line	2
28	2 410 0438	Drain Line	1
29	0 923 0010	Aeroquip #900599-12 (Plug)	3
30	2 410 0437	Clamp Line	2



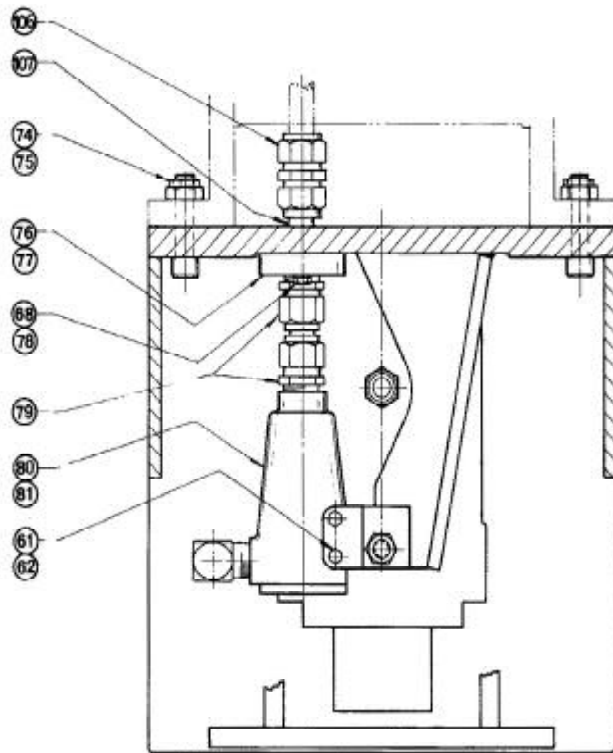


V-20 MOTOR HOUSING ASSEMBLY
(68930239)

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.
28	3 4200064	MOTOR HOUSING GASKET	1
30	0 9190059	3/8-16 x 7/8 Lg.-Soc.Hd. (Gr. 8)	6
31	1 4100148	Lube Suction Filter	1
32	6 4200050	Motor Housing	1
40	0 9430287	Sq.Hd. Set Scr. 3/4-10 x 6" Lg.	1
41	0 9001019	3/4-10 Hex Jam Nut	4
42	0 9430277	Swivel Pad	4
43	0 9230545	Lenz #10APN	1
44	0 9100033	Hydraulic Motor w/o Manifold	1
45	2 4200016	Gasket Hyd. Motor	2
46	0 9430278	3/4-10 Socket Set Scr. x 3" Lg.	3
47	0 9290074	Aeroquip #FC194-10 (7" Lg.)	1
48	0 9310368	Hose Clamp	2
49	0 9230416	Lenz #10 Tan (Tube Nipple)	2
50	2 4200075	Hydraulic Motor w/Manifold	1
54	0 9110001	Lube Pump	1
55	2 4100138	Gasket, Lube Pump	1
56	0 9230547	Aeroquip #2022-8-12S	1
57	0 9230427	Lenz #400-10	1
58	0 9230387	Lenz #10TPN-L	1
61	0 9190073	5/16-18 x 3/4 HHCS	4
62	0 9030110	5/16 Lockwasher	4
64	0 9230550	Aeroquip #2024-16-12S	2
65	2 4200056	Hose Assembly	1
67	0 9190057	3/8-16 Hex Hd. Cap Scr. x 1 1/4	4
68	0 9030111	3/8 Lockwasher	4
69	0 9190074	3/4-10 x 2 1/2 Hex Hd.	12
70	0 9030117	3/4 Lockwasher	12
71	0 9230018	Aeroquip #2090-8-8S	1
72	0 9230036	Aeroquip #2081-8-6S	1
73	0 9310399	Seal - Drain Relief Valve	1
74	0 9190075	3/4-10 x 3" Lg. Soc. Hd. Cap Scr.	28
75	0 9200035	Lock Nut	28
76	2 4200062	Filter Mount	1
77	2 4100133	Gasket	1
78	0 9190076	3/8-16 x 1 3/8 Hex Hd.	2
79	0 9230152	Lenz #100-16	2
80	0 9310198	Lube Filter	1
81	0 9310199	Lube Filter Element	1
82	0 9230019	Aeroquip No. 2088-12-12S	1
83	3 4200051	Motor & Filter Support Bracket	1
84	0 9020515	3/4 Flat Washer	8
86	3 4200052	Motor Support Bracket	1
87	2 4180015	Lube Pump Hose Assembly	1
88	0 9230077	Aeroquip #2024-12-12S	1
89	0 9230016	Aeroquip #2081-16-12S	1
97	2 4050101	Nameplate - Lube Drain	1
99	0 9240005	Drive Pin No. 4 x 1/4	12
100	2 4200081	Nameplate-Clean Screen Strainer	1

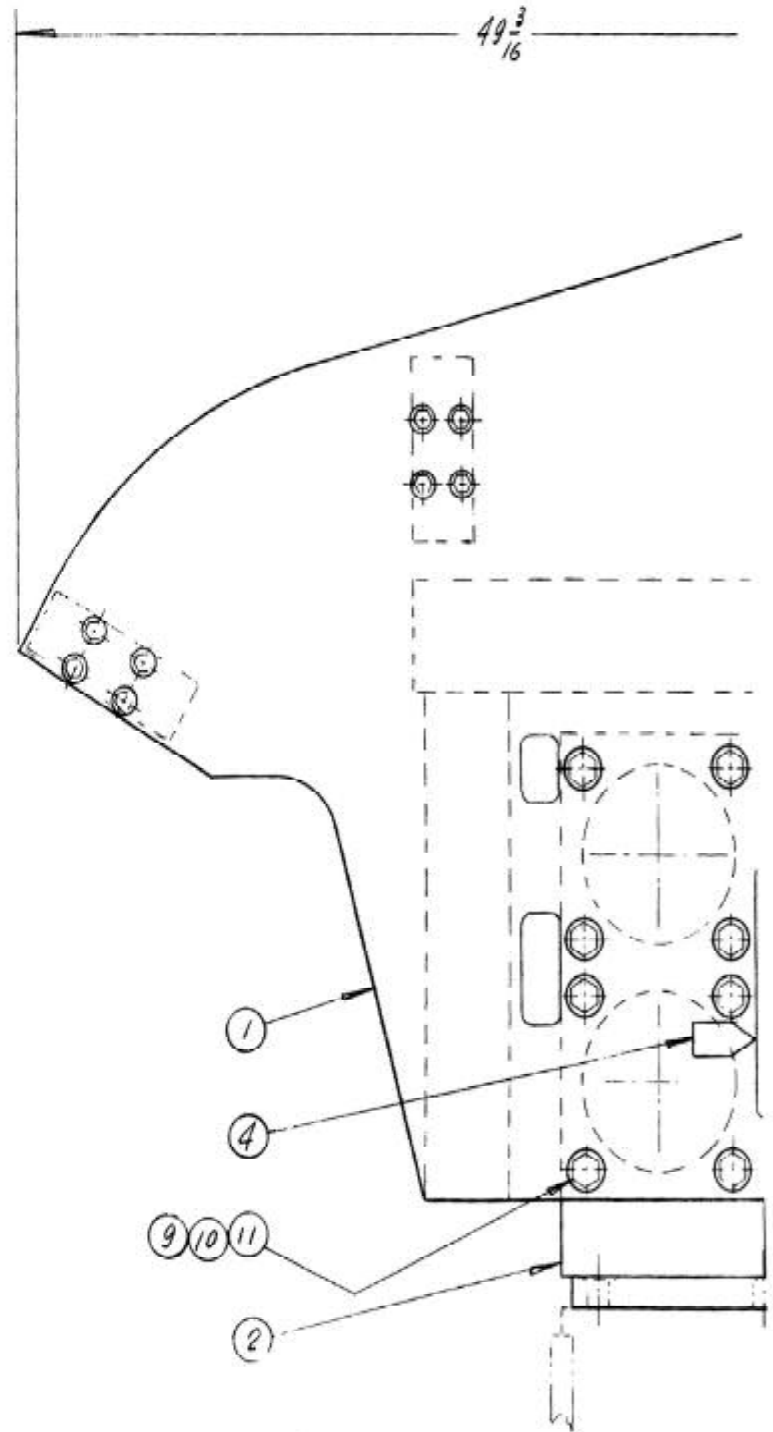
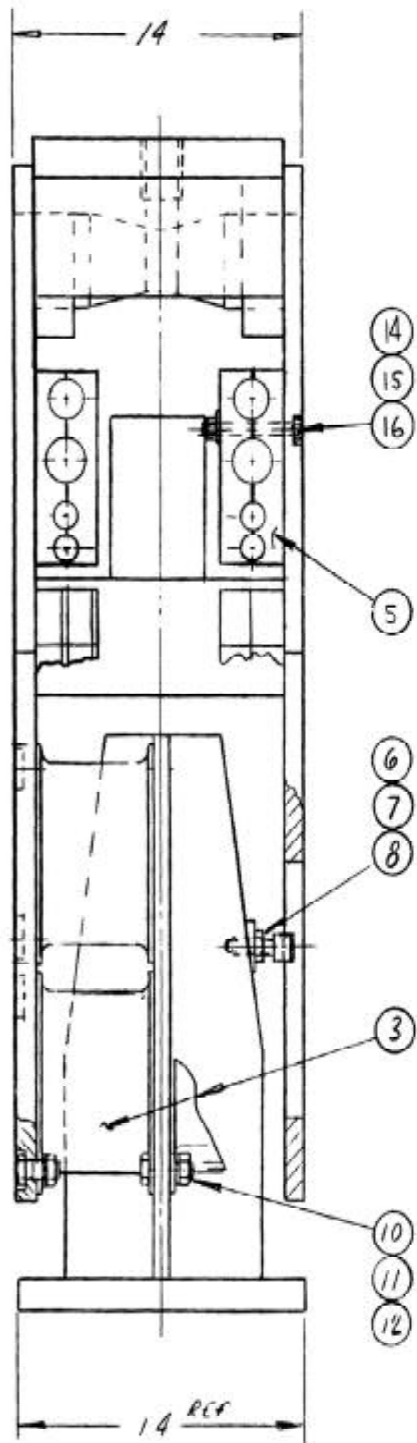


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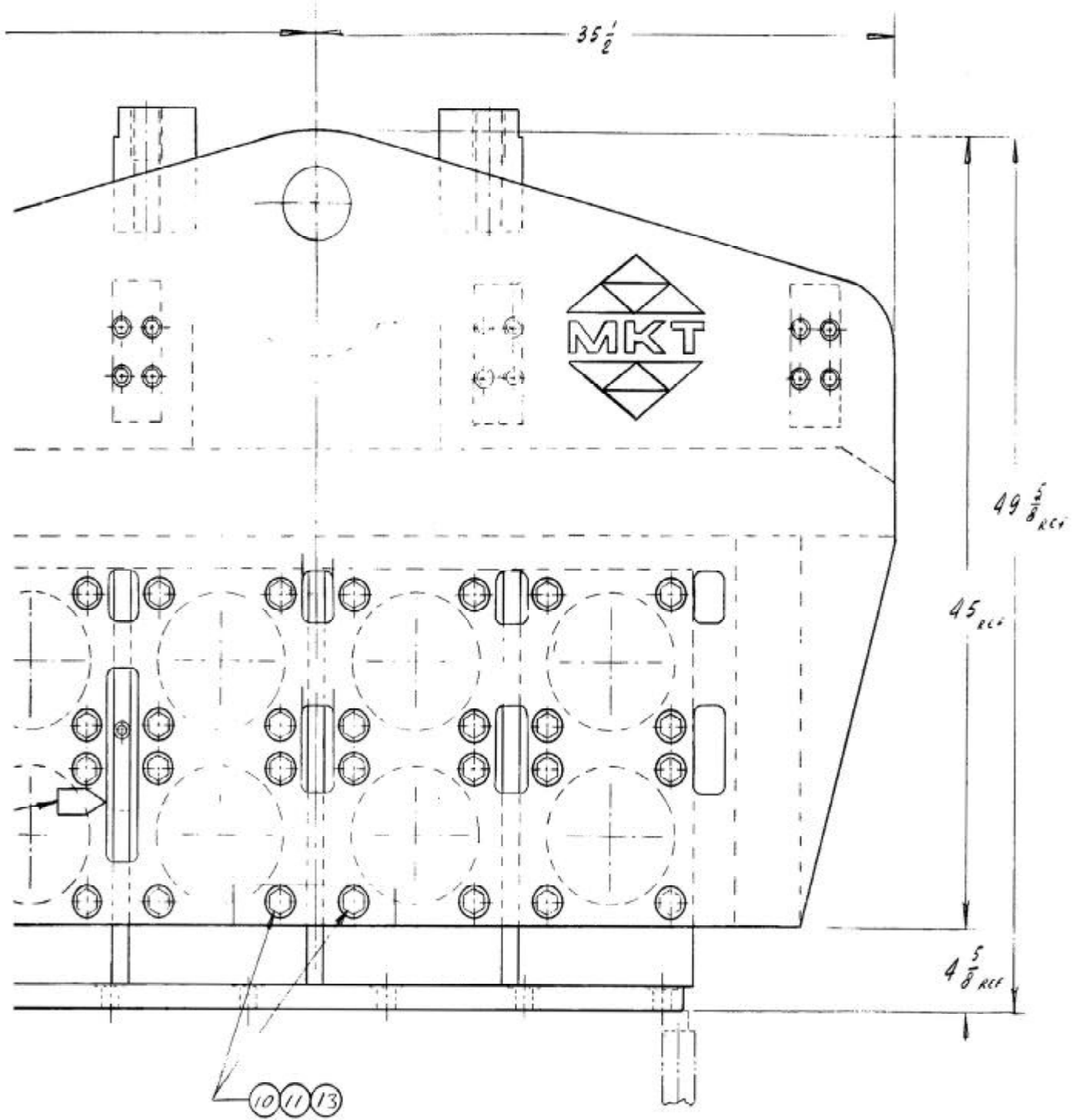


50 TON SUSPENSION ASSEMBLY FOR V-20
(54200116)

ITEM NO.	PART NO.		DESCRIPTION	NO. REQ'D.
1	5	420 01 17	Suspension Housing	1
2	4	420 00 96	Suspension Base	1
3	0	941 00 14	Elastomer Shear Block	16
4	1	420 00 38	Arrow Indicator	2
5	3	420 01 04	Cast Hose Clamp-Half Section	20
6	0	905 09 23	3/4-10 x 2 3/4 Lg. Soc.Hd.Cap Scr.	2
7	0	900 10 19	3/4-10 Hex Jam Nut	2
8	0	943 03 08	3/4 Beveled Washer	2
9	0	901 59 17	3/4-10 x 2 HHCS - GR. 8	60
10	0	900 00 19	3/4-10 Hex Nut	96
11	0	903 01 17	3/4 Lockwasher	96
12	0	901 59 19	3/4-10 x 2 1/4 HHCS - GR. 8	32
13	0	901 59 15	3/4-10 - 1 3/4 HHCS GR. 8	4
14	0	920 00 40	SPS Nut	40
15	0	901 57 33	1/2-13 x 4 1/2 HHCS	40
16	0	902 00 03	1/2 FLAT WASHER	40

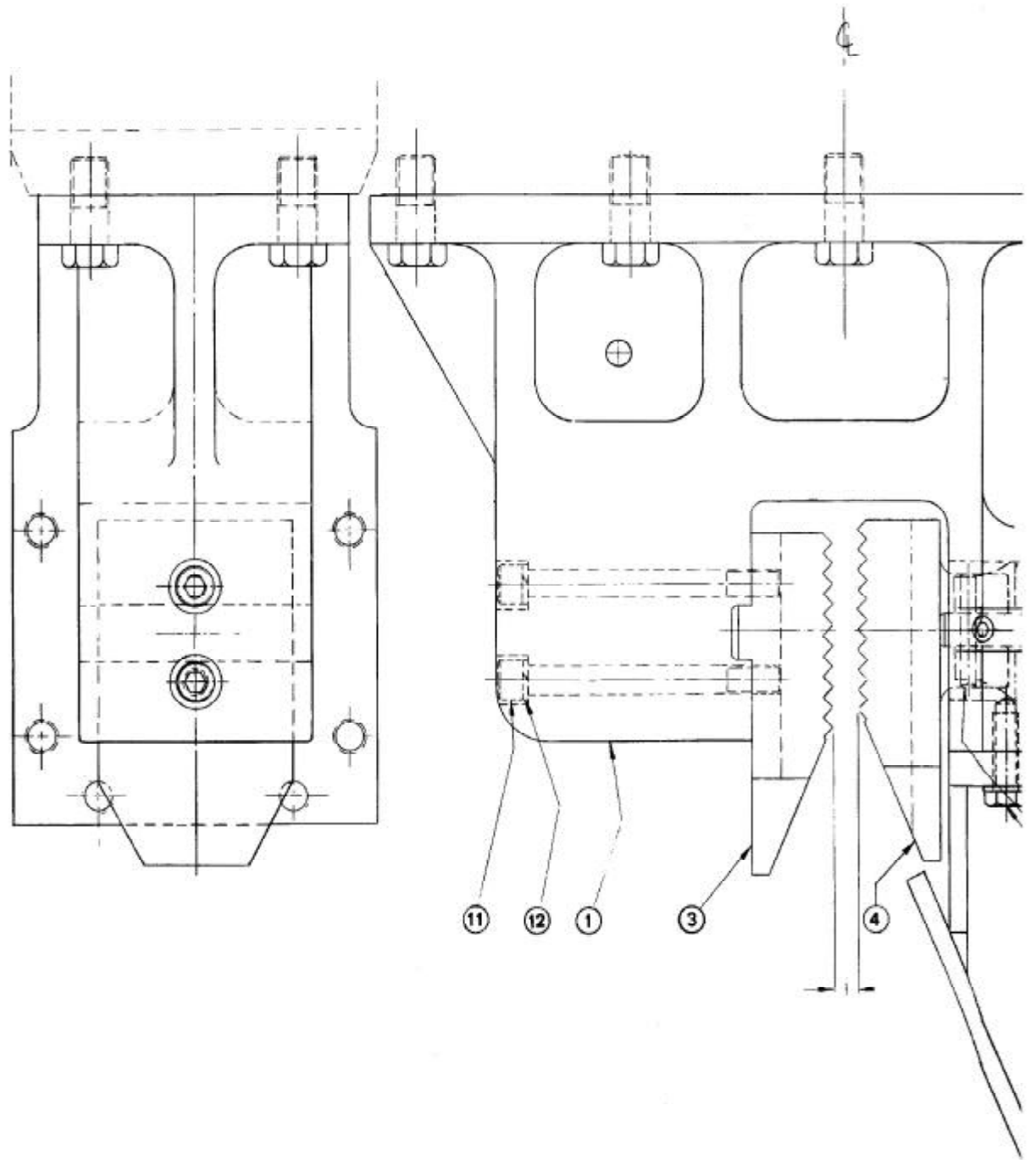


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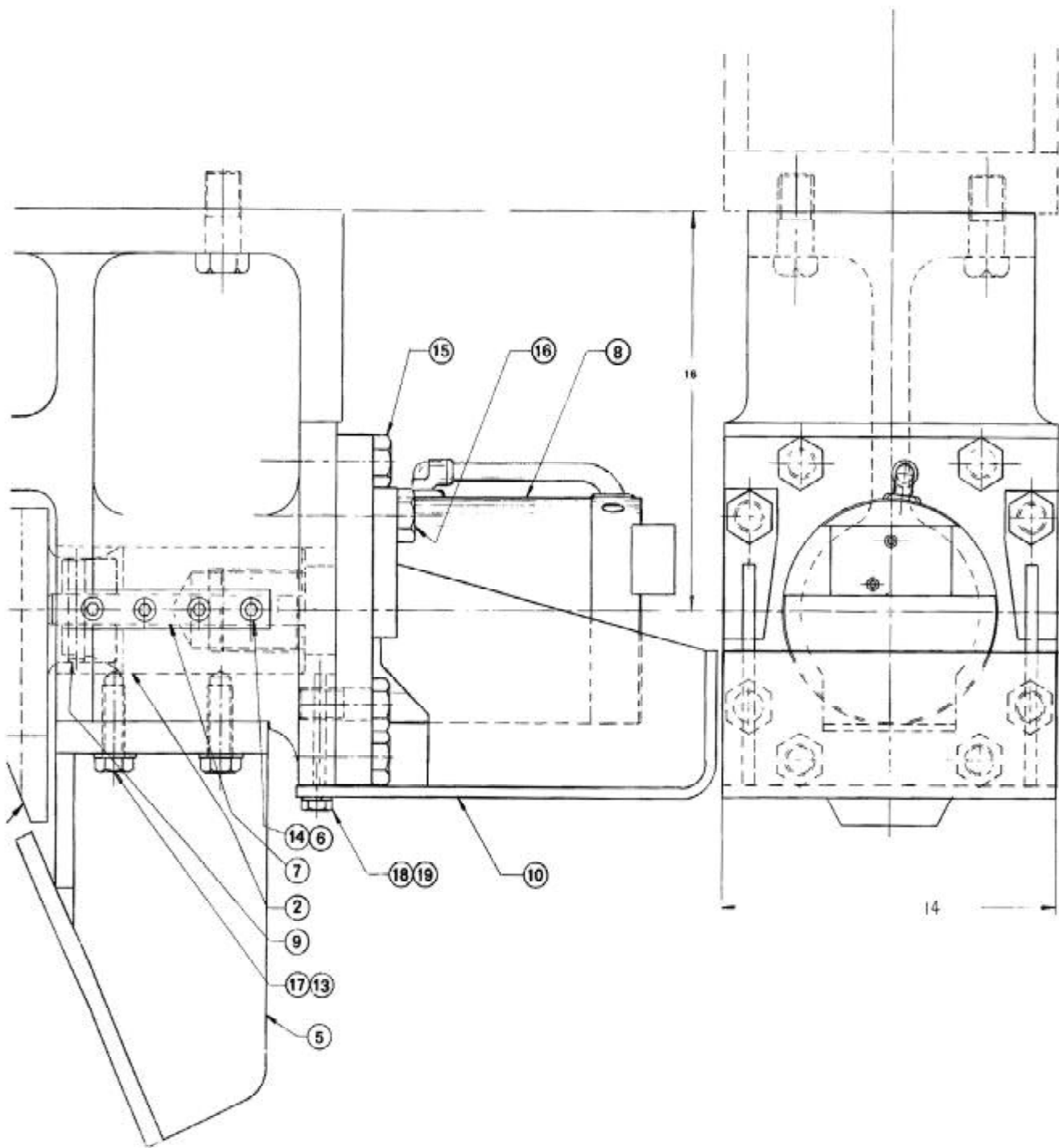


HYDRAULIC CLAMP ASSEMBLY
(64200115)

ITEM NO.	PART NO.		DESCRIPTION	QTY. REQ'D.
1	6	420 0128	Clamp Housing	1
2	3	420 0114	Clamp Slide	1
3	3	436 0141	Fixed Jaw - Wide Teeth	1
	3	420 0133	Alt. Fixed Jaw - Universal	As Req'd.
4	3	420 0126	Movable Jaw - Wide Teeth	1
	3	420 0111	Alt.Movable Jaw - Universal	As Req'd.
5	4	499 0161	Jaw Shield	1
6	0	903 0115	5/8 Lockwasher	4
7	2	420 0043	Slide Key	1
8	0	922 0068	Hyd. Cyl., 8" x 2" Stroke	1
9	0	924 0053	3/4 x 4 Dowel Pin	1
10	4	495 0311	Cylinder Shield	1
11	0	905 1141	1"-8 x 10 SHCS	2
12	0	903 0421	1" Lockwasher for SHCS	2
13	0	903 0121	1" Lockwasher	4
14	0	943 0269	5/8-11 x 1 1/4 But.Hd.Cap Scr.	4
15	0	901 6218	1 1/4-12 x 3 HHCS	6
16	0	901 6224	1 1/4-12 x 4 HHCS	2
17	0	901 6113	1"-8 x 2 1/2 HHCS	4
18	0	903 0117	3/4 Lockwasher	4
19	0	901 5913	3/4-10 x 1 HHCS	4

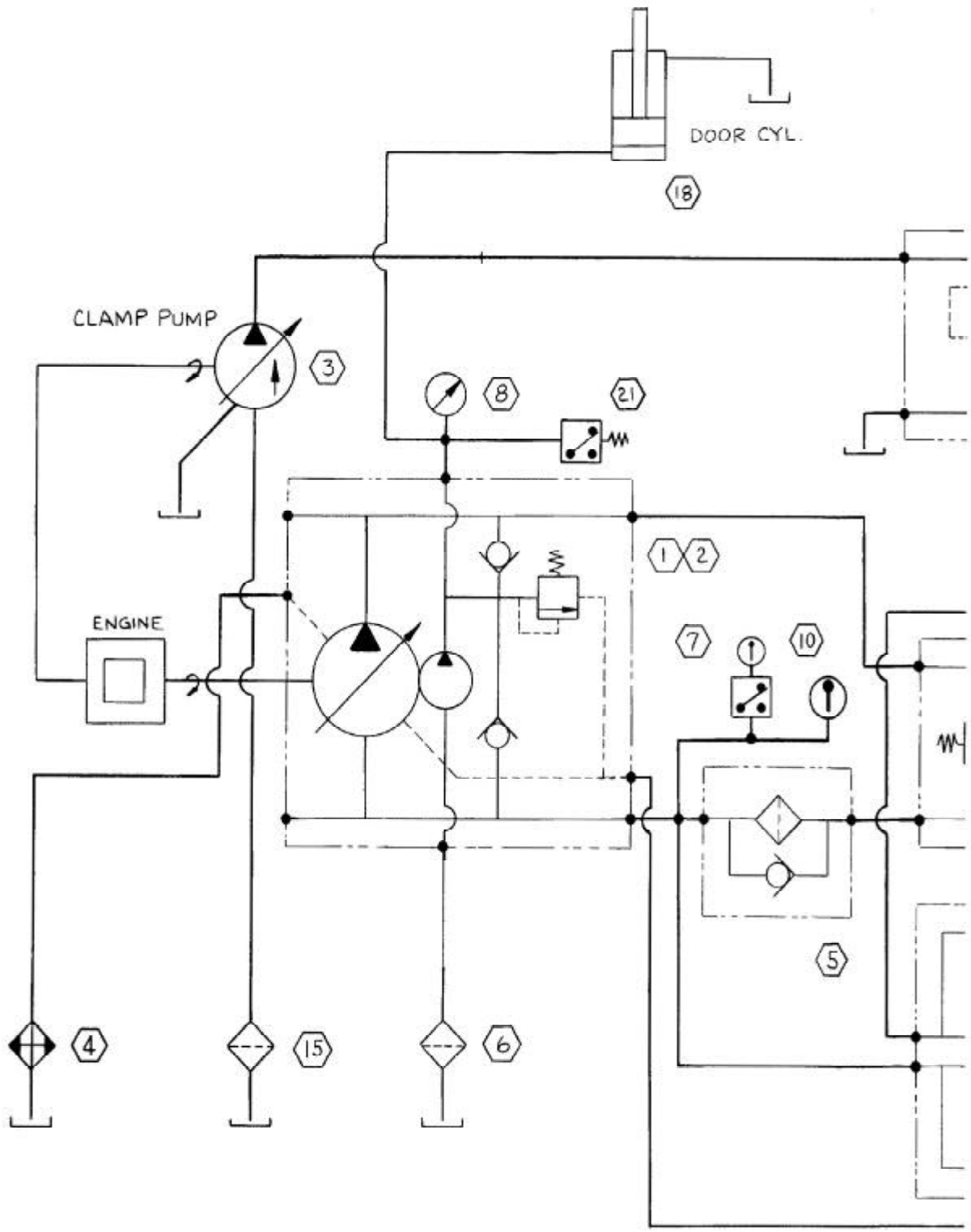


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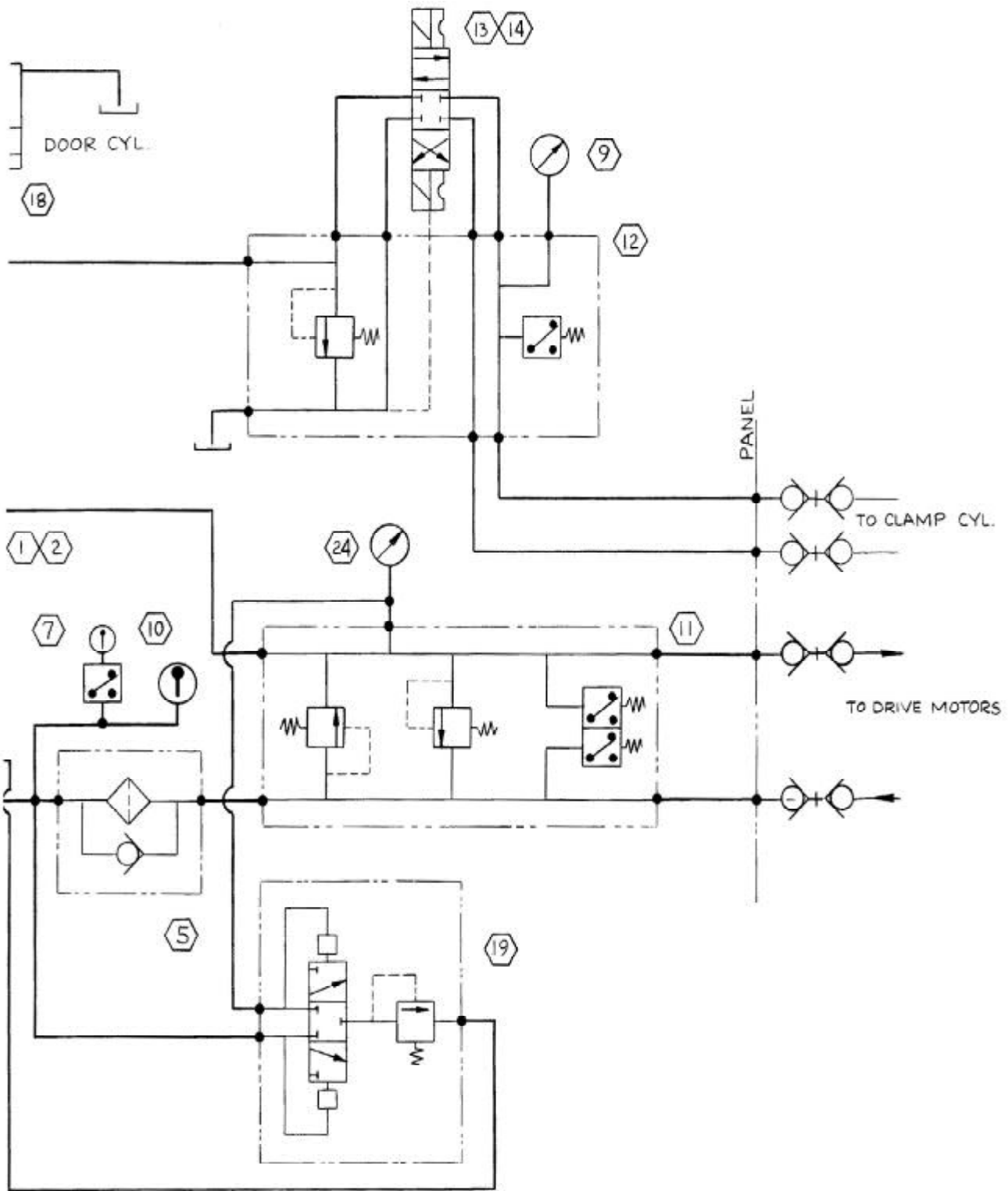


HP-350 HYDRAULIC SCHEMATIC
(54250011)

ITEM NO.	PART NO.	DESCRIPTION
1	0 911 0071	Piston Pump
2	0 911 0155	Pump Actuator
3	0 911 0085	Piston Pump
4	2 425 0064	Oil Cooler
5	0 931 0375	Filter
6	0 931 0442	Filter
7	0 933 0331	Temperature Switch
8	0 931 0365	Pres. Gauge 0-600
9	0 931 0363	Pres. Gauge 0-5000
10	0 931 0262	Temp. Gauge 30 ^o -240 ^o F.
11	3 425 0121	Drive Control
12	2 425 0015	Clamp Control
13	0 931 0255	Dir. Valve
14	0 931 0256	Valve Bolt Kit
15	0 931 0258	Tank Strainer
18	0 922 0026	Hyd. Cyl.
19	0 910 0034	Manifold Valve
21	0 931 0308	Pres. Switch
24	0 931 0341	Pres. Gauge 0-10,000 PSI

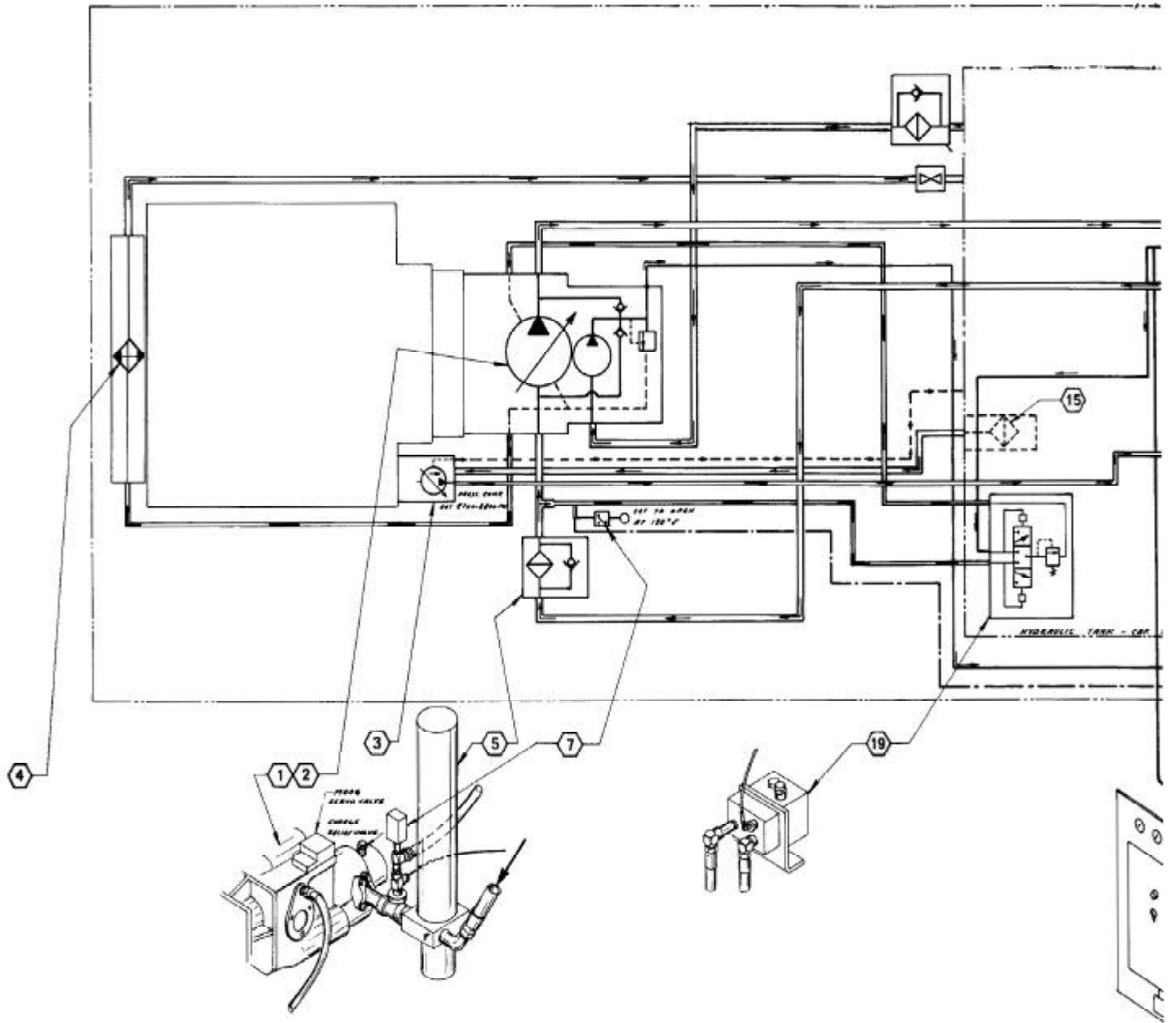


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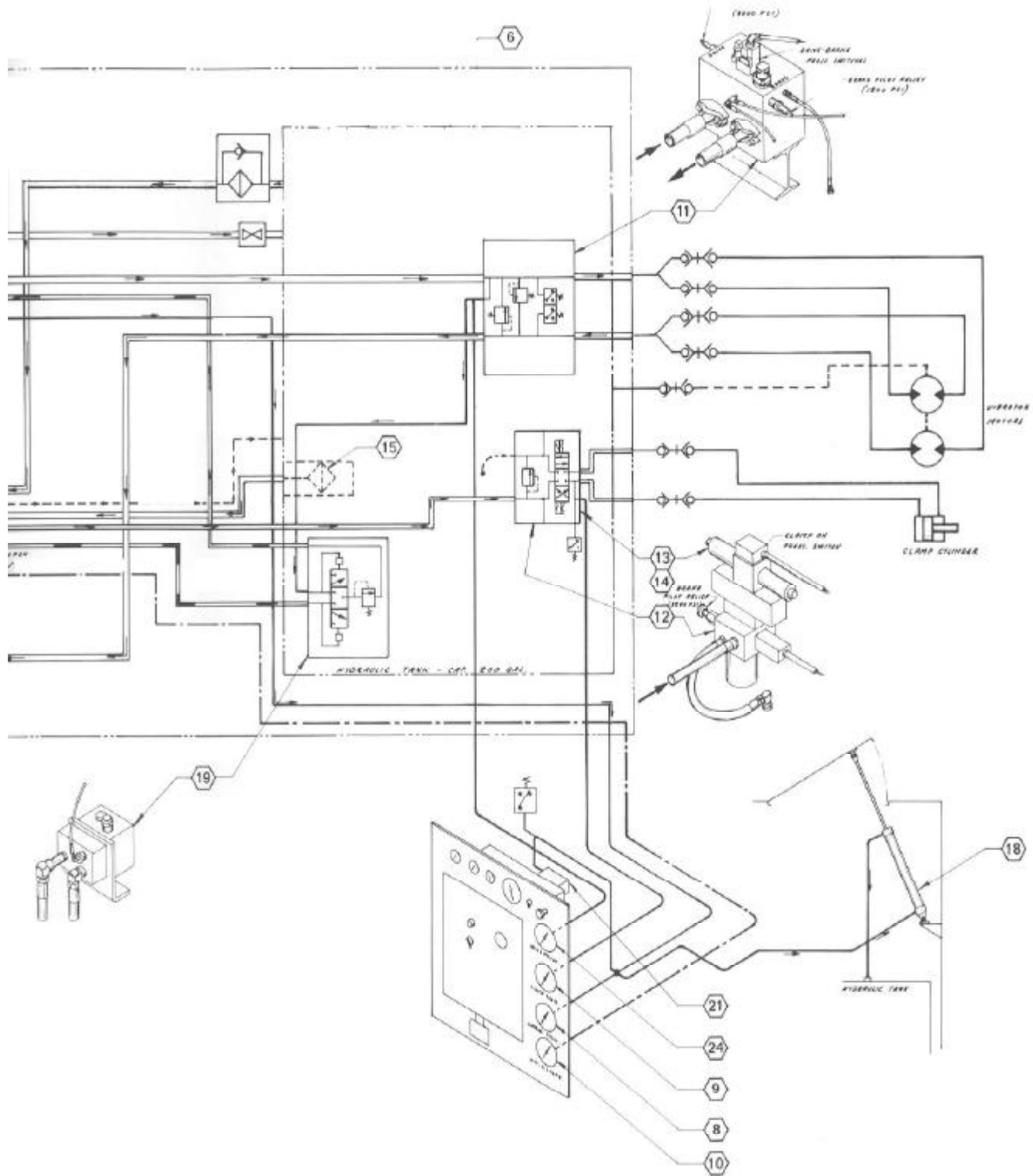


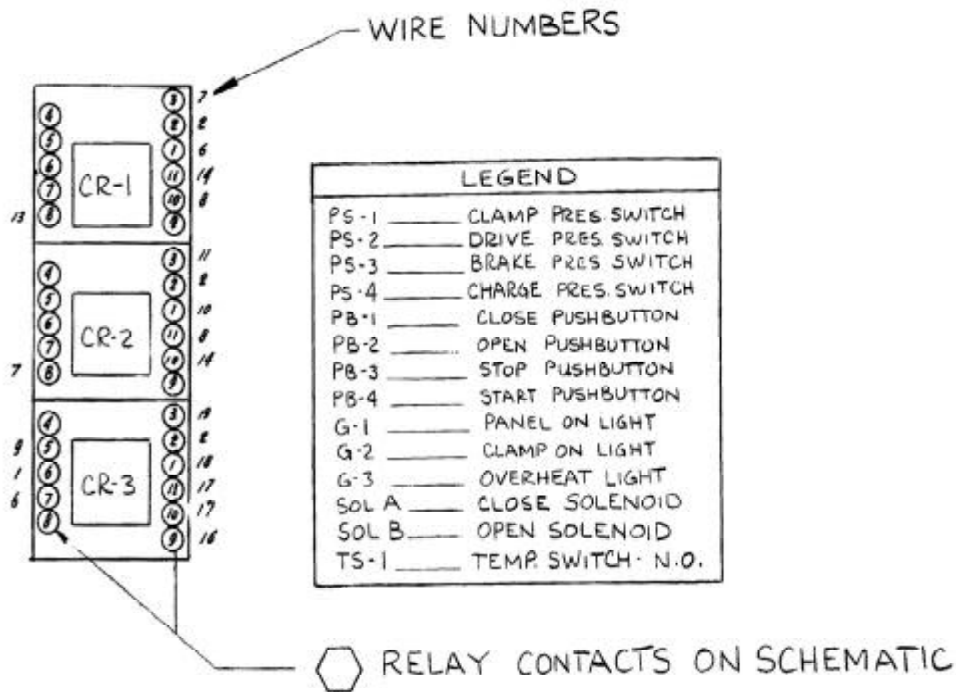
HP-350 HYDRAULIC SCHEMATIC
 - PICTORIAL COMPONENTS LOCATED -
 (64250151)

ITEM NO.	PART NO.	DESCRIPTION
1	0 911 0071	Piston Pump
2	0 911 0155	Pump Actuator
3	0 911 0085	Piston Pump
4	2 425 0064	Oil Cooler
5	0 931 0375	Filter
6	0 931 0442	Filter
7	0 933 0331	Temp. Switch
8	0 931 0365	Pres. Gauge 0-600
9	0 931 0363	Pres. Gauge 0-5000
10	0 931 0262	Temp. Gauge 30 ^o -240 ^o F.
11	3 425 0121	Drive Control
12	2 425 0015	Clamp Control
13	0 931 0255	Dir. Valve
14	0 931 0256	Valve Bolt Kit
15	0 931 0258	Tank Strainer
18	0 922 0026	Hyd. Cyl.
19	0 910 0034	Manifold Valve
21	0 931 0308	Pres. Switch
24	0 931 0341	Pres. Gauge 0-10,000 PSI



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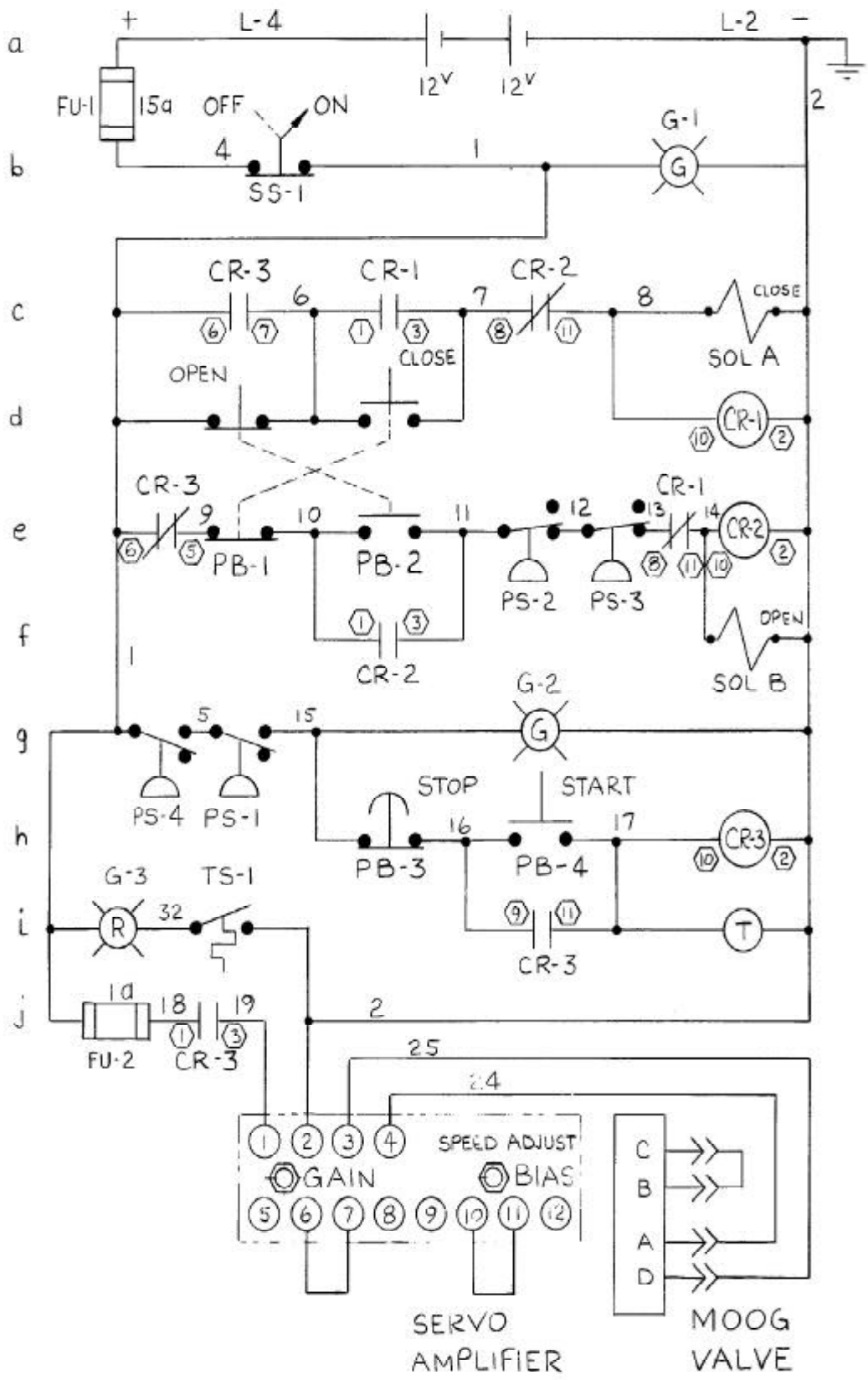
V-20 FREQUENCY SETTING

1. SET BIAS (SPEED CONTROL) FULLY COUNTER CLOCKWISE
2. SET GAIN FULLY COUNTER CLOCKWISE AND ADJUST CLOCKWISE FOR VIBRATOR FREQ. (APPROX. 1700 CPM). LOCK.
3. SPECIAL LOWERING OF FREQ. CAN BE MADE BY TURNING BIAS ORIGINAL MAX. SETTING BY RETURNING BIAS FULLY COUNTER CLOCKWISE.

SERVO AMPLIFIER

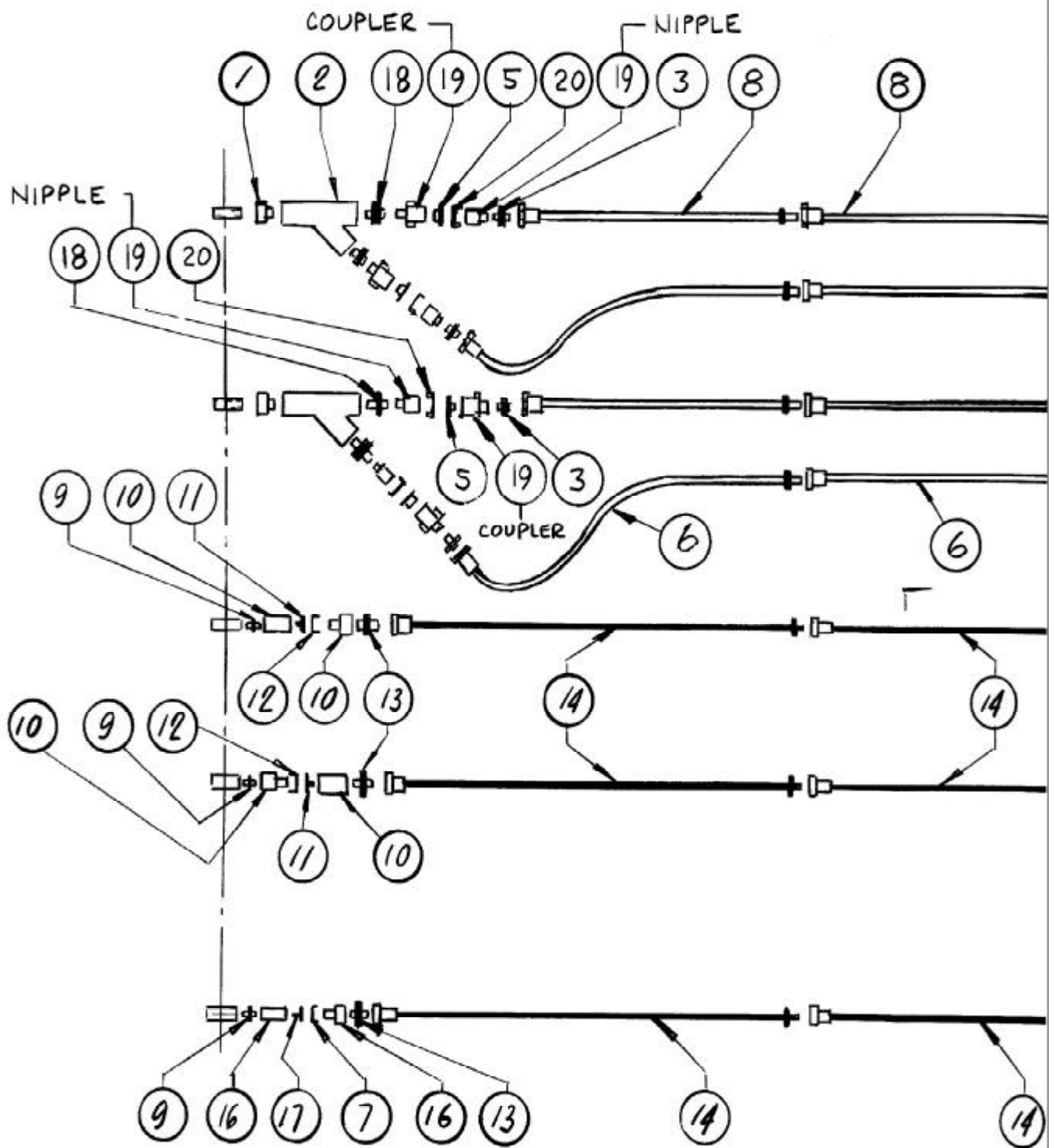
VOLTAGE	BETWEEN PINS
24 VOLTS	① AND ②
20-24 VOLTS	③ AND ④ AMPHENOL DISCONNECTED
0-2½ VOLTS	③ AND ④ AMPHENOL CONNECTED

PINS ② ⑦ AND ⑩ ARE COMMON

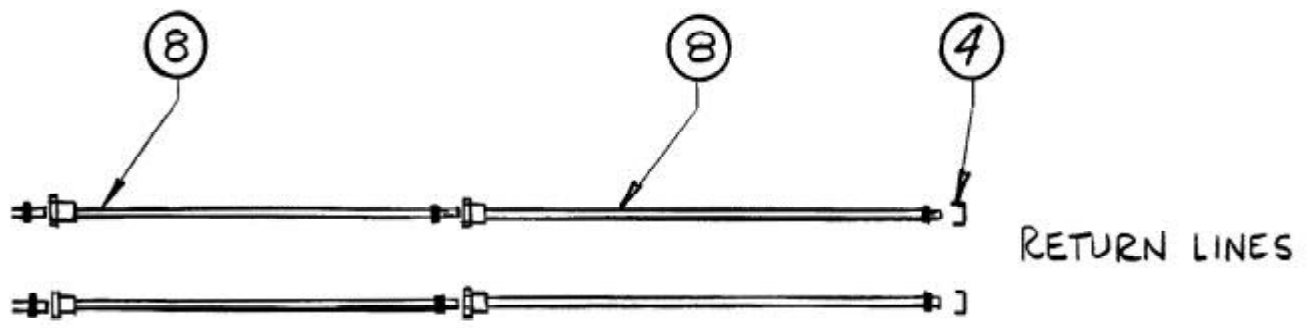


V-20 HYDRAULIC HOSE ASSEMBLY
(34200063)

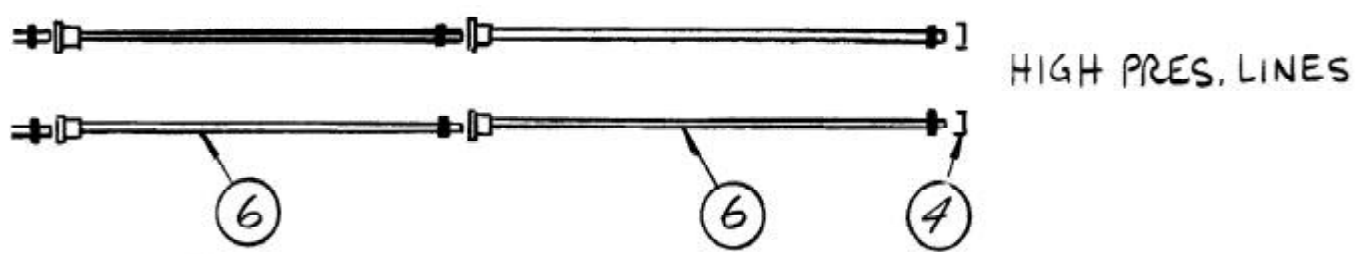
ITEM NO.	PART NO.		DESCRIPTION	QTY. REQ'D.
1	0	923 0492	Aeroquip #2040-20-24S	2
2	2	425 0140	1 1/4 Steel Lateral	2
3	0	923 0161	Aeroquip #2021-20-20S	4
4	0	923 0013	Aeroquip #210292-20S - (Cap Nut)	4
5	0	927 0044	Aeroquip #900599-20 (Plug)	4
6	2	418 0075	50 Ft. Motor Inlet Line	6
7	0	923 0063	Aeroquip #5657-10 (Dust Cap)	1
8	2	410 0446	50 Ft. Motor Return Line	6
9	0	930 0013	3/4 Nipple	3
10	0	927 0005	Aeroquip #5600-12-12S(Q.D.Clamp)	2
11	0	923 0002	Aeroquip #5659-12 (Dust Plug)	2
12	0	923 0003	Aeroquip #5657-12 (Dust Cap)	2
13	0	923 0020	Aeroquip #2021-12-12S	3
14	2	420 0072	50 Ft. Clamp & Drain Hose Assy.	9
15	0	923 0012	Aeroquip #210292-12S Cap Nut	3
16	0	927 0010	Aeroquip #5600-12-10S (Q.D.Drain)	1
17	0	923 0062	Aeroquip #5659-10 Dust Plug	1
18	0	923 0377	Aeroquip 2083-20-20S	4
19	0	927 0043	Q.D. - Motor Line	4
20	0	927 0045	Dust Cap - Motor Line	4



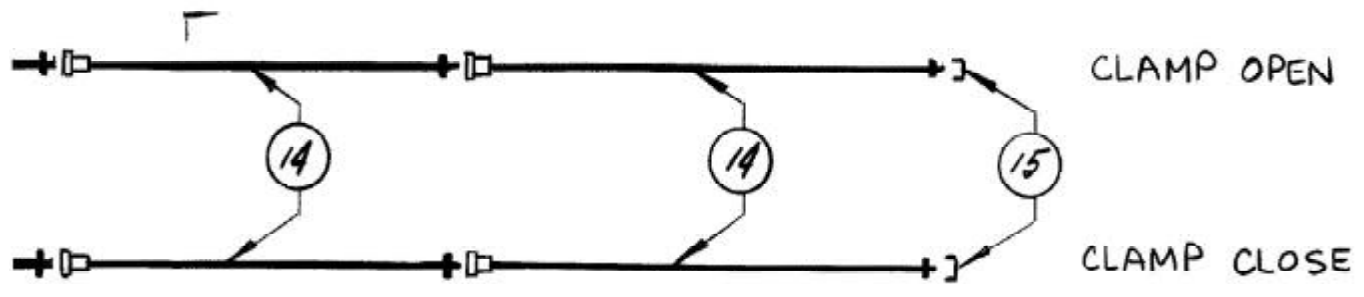
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RETURN LINES

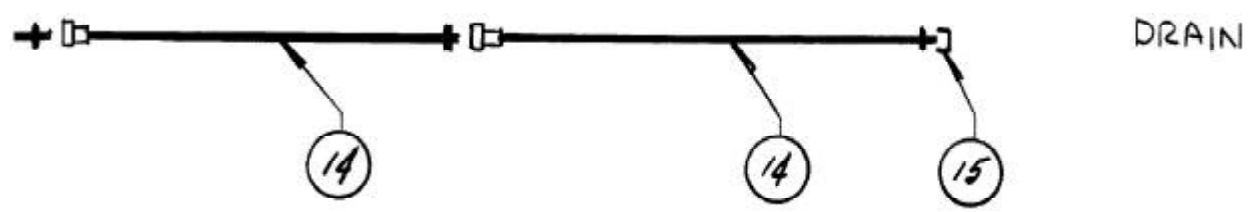


HIGH PRES. LINES



CLAMP OPEN

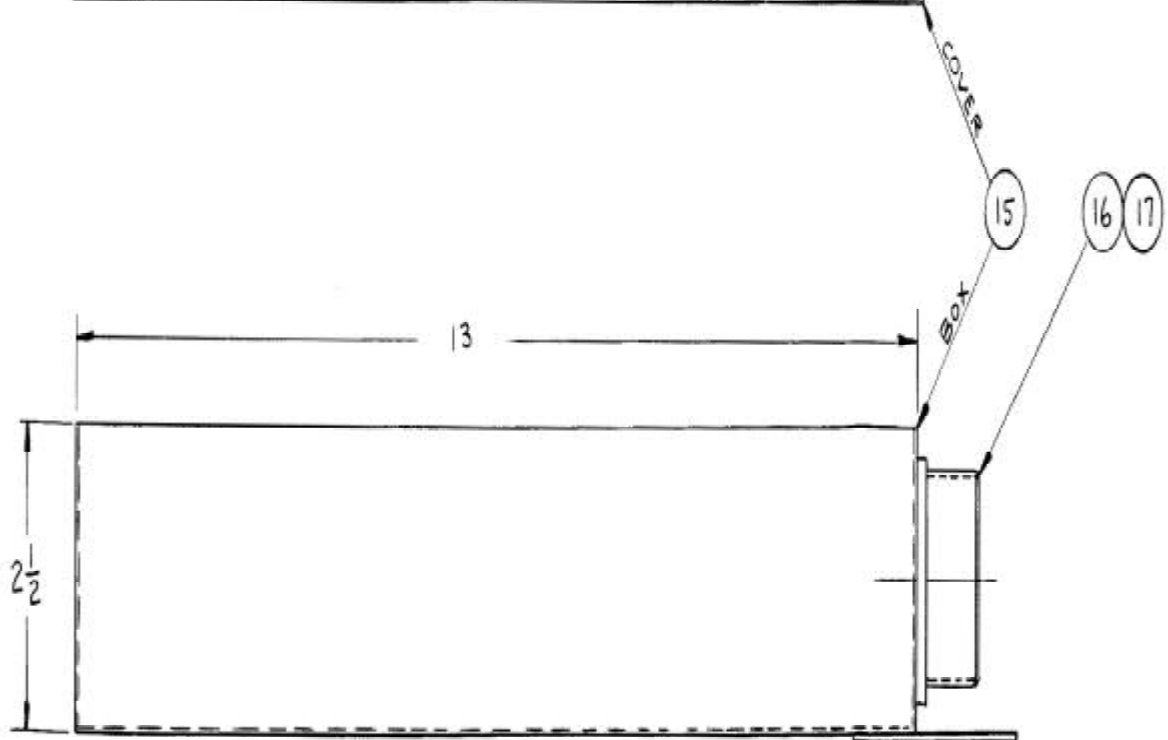
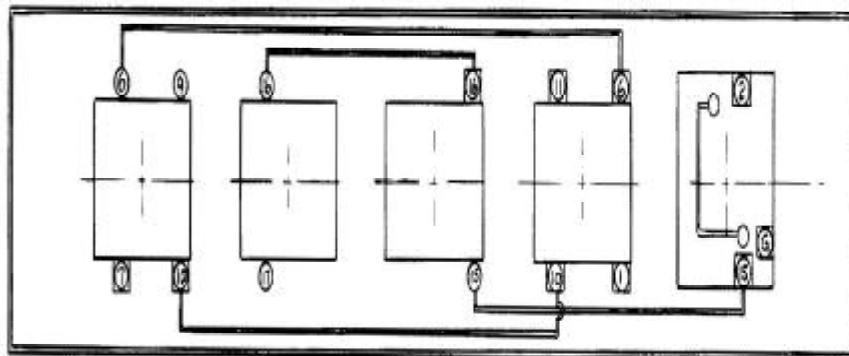
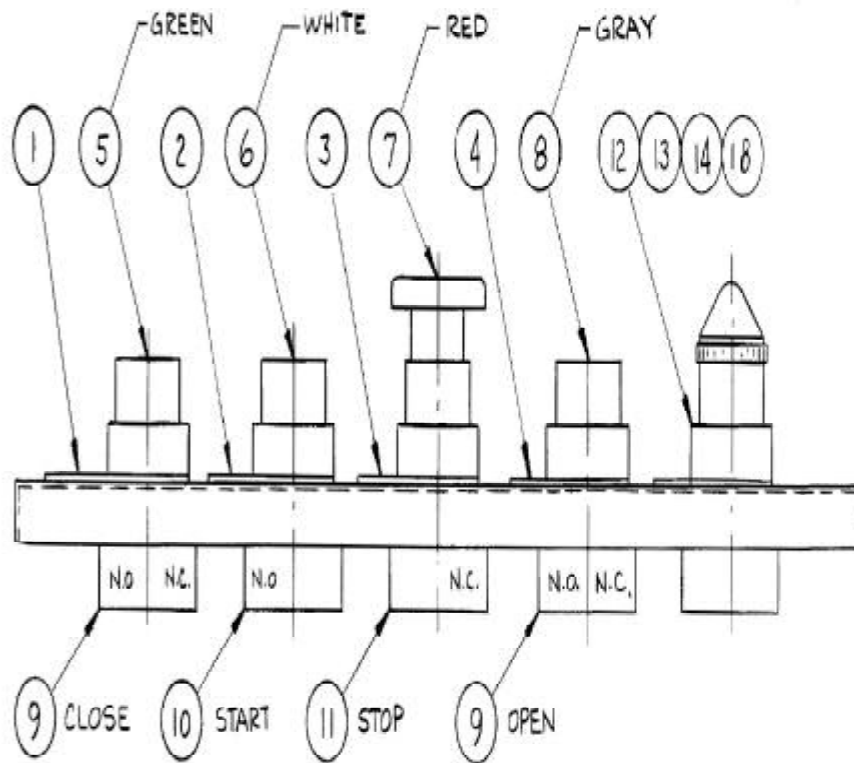
CLAMP CLOSE



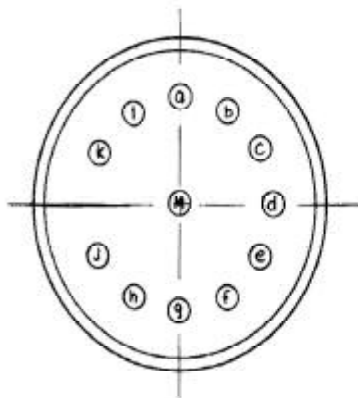
DRAIN

HP-210B/HP-350/HP-650
PENDENT ASSEMBLY
(44250066)

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ'D.
1	0 933 0259	Nameplate - "Close"	1
2	0 933 0260	Nameplate - "Start"	1
3	0 933 0261	Nameplate - "Stop"	1
4	0 933 0262	Nameplate - "Open"	1
5	0 933 0143	Push Button	1
6	0 933 0144	Push Button	1
7	0 933 0145	Push Button	1
8	0 933 0146	Push Button	1
9	0 933 0006	Contact Block	2
10	0 933 0150	Contact Block	1
11	0 933 0151	Contact Block	1
12	0 933 0148	Light	1
13	0 933 0149	Green Lens	1
14	0 933 0007	24 ^v Bulb-Screw Type	1
14	0 933 0364	12 ^v Bulb-Screw Type (HP-210B)	1
15	0 933 0263	Enclosure	1
16	0 933 0237	Electrical Connector	1
17	0 933 0243	Electrical Connector Cover	1
18	1 425 0120	Nameplate - "Clamp"	1



PIN LETTER	TERMINAL N°	COLOR WIRE
A	①	GREEN/BLACK
B	②	RED/BLACK
C	⑥	WHITE
E	⑦	BLUE
F	⑨	ORANGE
H	⑩	BLACK/WHITE
J	⑪	RED
K	⑬	BLUE/BLACK
L	⑬	ORANGE/BLACK
M	⑰	BLACK
G	④	GREEN
D	SPARE	WHITE/BLACK



AMPHENOL N° MS3102A-28-185
BOX RECEPTACLE

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DATE: August 17, 1983

NO. 944-83-02

TECHNICAL BULLETIN

ATTENTION: SALES-PARTS-SERVICE

DETROIT DIESEL ENGINE

LUBE SPEC.

In the past Detroit Diesel specified SAE 30 Service C. D. oils to be used in their engines.

All our manuals read as such. Detroit Diesel has now changed these specs to SAE 40 Service C. D. to be used in all their engines.

MKT recommends all manuals referencing Detroit Diesel engines to be changed to read SAE 40 Service C. D. for crankcase oils.

Date: August 10, 1982

416-82-01

SERVICE BULLETIN

ATTENTION: SALES-PARTS-SERVICE

V-16/V-20 CLAMP ASSEMBLIES

MKT has made several changes and additions to V-16 and V-20 (also V-14 and V-18) clamp assemblies and jaw designs to improve those hammers' abilities to clamp on and to drive/extract the myriad of piling sections currently available; and to improve both the reliability and serviceability of our clamping devices.

First, all new equipment leaving the factory will be assembled using clamp slide, Part No. 420 0114. This uses a vertical pin connection for the movable jaw to the slide, allowing better articulation of the jaw.

Second, we have available new wide tooth jaws, fixed (Part No. 436 0141) and movable (Part No. 420 0126). These jaws should hold much better on piles being extracted and should be ordered as standard in place of the universal screw jaws when used with slide 420 0114.

Third, to allow for equivalent open jaw spacing in this design, the area in the clamp housing where the jaws are located has been enlarged from 7-3/8" to 7-5/8". To allow for interchangeability between this modified style housing and old style jaws still in use, all clamp cylinders shipped for spare parts after February 1, 1982 shall have 2" stroke in lieu of 1-1/2" stroke. If the new style clamp slide (420 0114) and wide teeth jaws (436 0141 and 420 0126) are used in an old housing, the open distance between the teeth will only be .75 inch.* The housing opening may have to be opened to easily clamp on some pile sections. There is a sketch enclosed depicting this machining process.

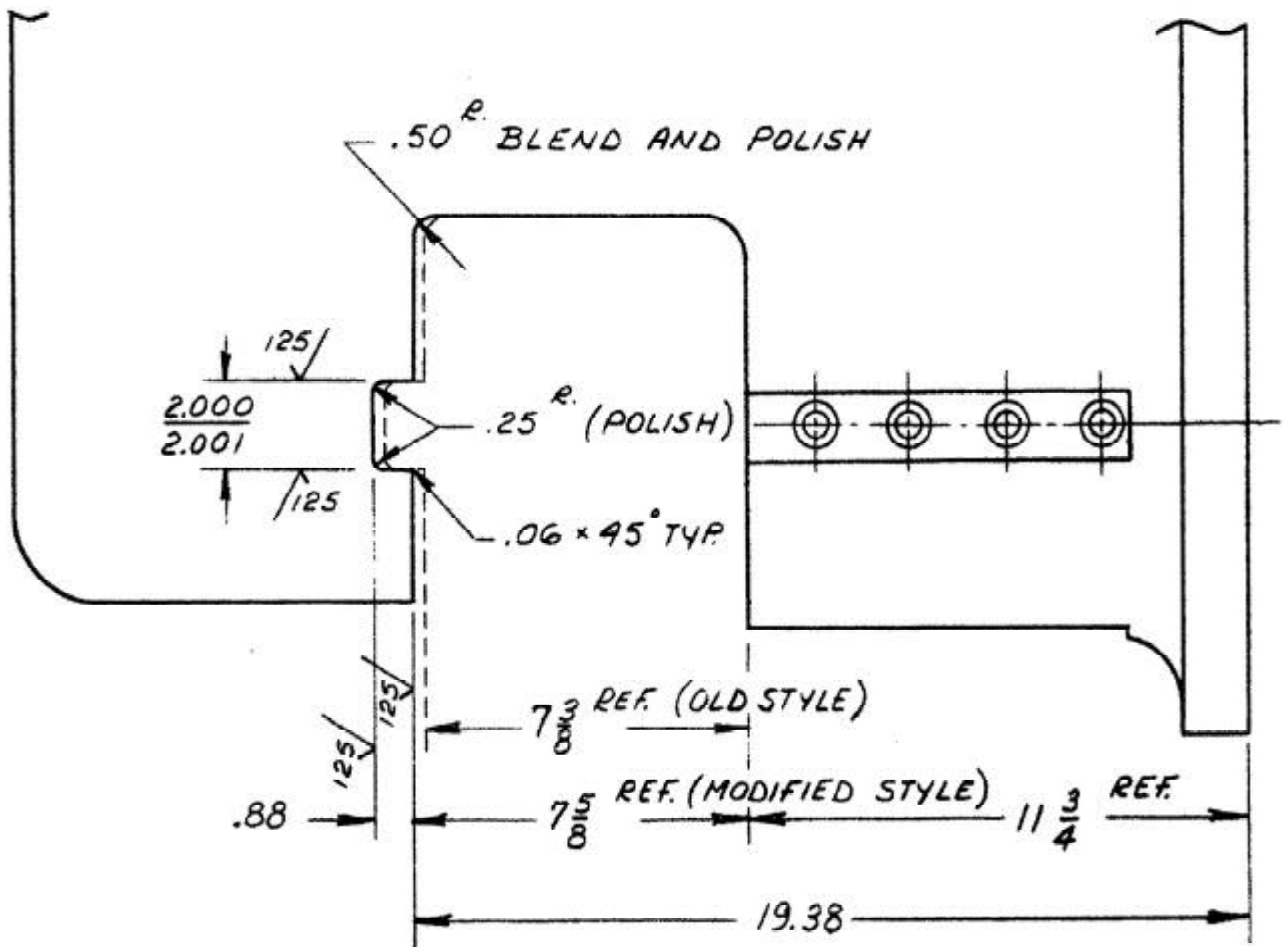
The available jaw combinations are depicted on the attached sheet.

* and the housing keyway depth of 5/8" may be too shallow to accommodate the fixed jaw (436 0141) key thickness of 5/8".

SERVICE BULLETIN

ATTENTION: SALES-PARTS-SERVICE

V-16/V-20 CLAMP ASSEMBLIES



*REWORK REQUIREMENT FOR
 V-16B/V-20 CLAMP HOUSING*