OPERATING AND MAINTENANCE MANUAL

J&M MODEL 116

VIBRATORY PILE DRIVER/EXTRACTOR

WITH MODEL 110 POWER UNIT

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PREFACE

This manual was prepared to acquaint the owner, operator and serviceman with the operation and maintenance of the vibratory driver/extractor. We suggest that this manual be carefully studied before operating or undertaking any maintenance work on the unit.

This manual is organized into two major categories.

The first category is for routine OPERATING INSTRUCTIONS of the unit and includes a GENERAL DESCRIPTION section which presents a basic explanation of the driver/extractor and some of its specifications. The MAINTENANCE AND ADJUSTMENT section should be referred to periodically for normal servicing of equipment. All machines and equipment require systematic, periodic inspection and maintenance if they are to perform satisfactorily over a long period of time. The driver/extractor is primarily a vibrating machine and if not given the best of care, or if improperly used and maintained, it is self destructive. Therefore, the unit should receive at least the same care and maintenance as other high quality construction equipment.

The second category is for parts reordering and it includes both a PARTS LIST and a pictorial drawing of the assembly for easier determination of the required part. Refer to the ORDERING PARTS section of the PARTS LIST for more specific procedures regarding parts ordering. Adherence of the listed procedures will insure receipt of the required part (s) with the minimal amount of delay or error.

WARRANTY

J&M FOUNDATION EQUIPMENT STANDARD WARRANTY

J&M Foundation Equipment (J&M) 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:

J&M's obligation and liability under this WARRANTY is expressly limited to repairing or replacing at J&M's option, any parts which appear to J&M 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 J&M or the authorized J&M distributor of the product during regular working hours. This WARRANTY shall not apply to component parts or accessories of products not manufactured by J&M and which carry the warranty of the manufacturer thereof, or to normal maintenance (such as engine tune-up) or to normal maintenance parts (such as oil filters). Replacement or repair parts installed in the product covered by this WARRANTY are warranted only for the remainder of the warranty as if such parts were original components of said product. J&M *COMPANY MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND* MAKES NO WARRANTY OF MERCHANTABILITY OF FITNESS FOR ANY PARTICULAR PURPOSE.

J&M'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 J&M, products or parts for which a warranty claim is made are to be returned transportation prepaid to J&M. Any improper use, including operation after discovery of defective or worn parts, operation beyond rated capacity, substitution of parts not approved by J&M or any alteration or repair by others in such manner as in J&M's judgement 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 J&M.

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PARTS LIST

OPERATING INSTRUCTIONS

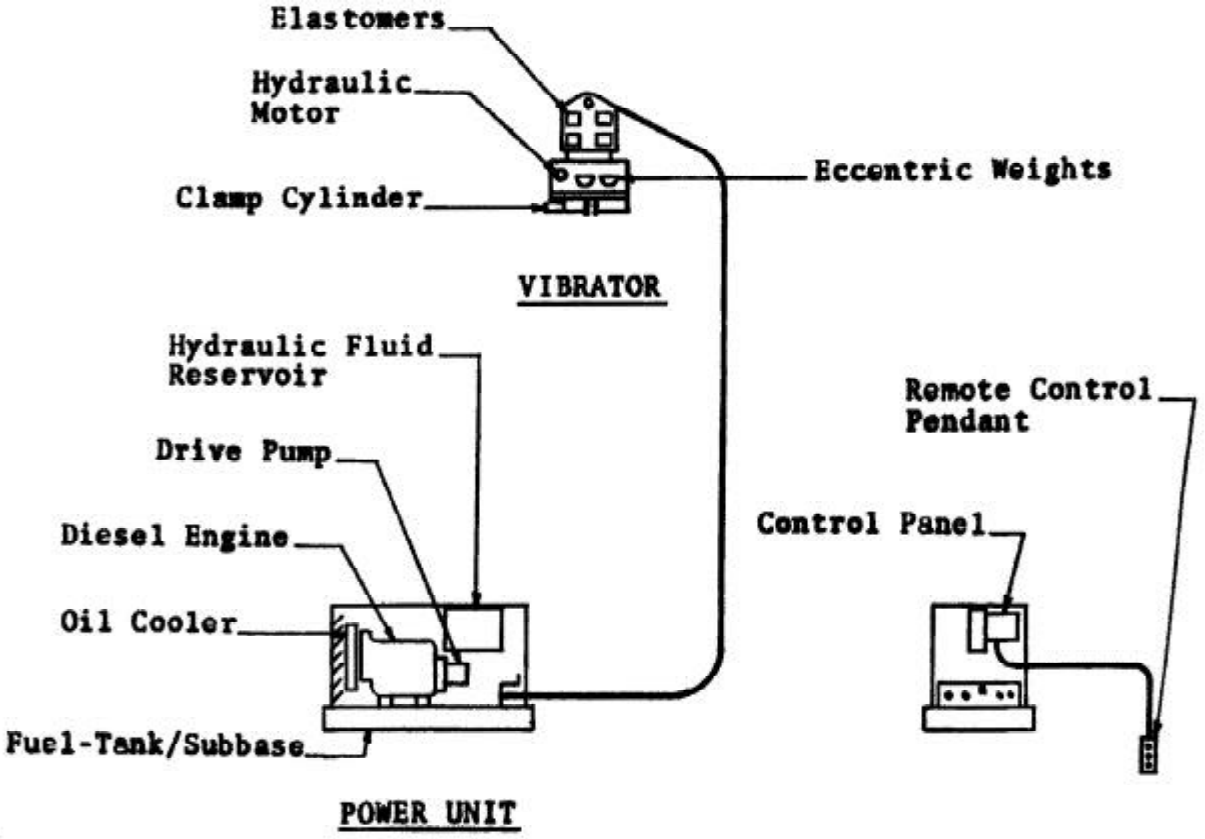
I. GENERAL DESCRIPTION

A. GENERAL

The J&M Model 116 is a low-frequency vibratory pile driver/extractor designed to drive and extract sheet piling, pipe, timber, caisson pipe, and H, I, and wide-flange beams.

The Model 116 operates in a frequency range of 400 to 1600 vibrations per minute to provide maximum pile penetration rates in a wide variety of soils. The unit has an eccentric moment of 600 inch-pounds and operates with an amplitude of 1/4 to 5/8 inch.

The vibratory driver unit consists of two major components; (1) the vibrator with attached clamp and (2) the power unit with remote-control pendant.



I. GENERAL DESCRIPTION

B. VIBRATOR

The vibrator consists of two major components; (1) the vibration case and (2) the vibration suppressor.

The vibration case contains two eccentric weights which rotate in a vertical plane to create vibration. The eccentric weights are driven by a hydraulic motor mounted on the vibration case. The motor and two eccentrics are all gear connected to maintain proper synchronization. The eccentrics and motor shaft are mounted in heavy-duty cylindrical roller bearings. Lubrication is provided by a splash system activated by the rotating eccentrics and gears.

The vibration suppressor contains four rubber elastomers to isolate the vibration case from the crane line which provides a maximum line pull of 10 tons during extraction or it is offered, as an option, with eight elastomers which provides the unit with a maximum line pull of 20 tons.

C. HYDRAULIC CLAMP

The hydraulic clamp contains two gripping jaws, one fixed and one moveable. A large hydraulic cylinder operates the moveable jaw with 50 tons of force to grip the pile. Clamping and unclamping occurs in a few seconds.

D. POWER UNIT

The Model 110 power unit for the 116 vibrator is powered by a Detroit Diesel 3-71 engine. The engine develops 113 HP at 2100 RPM.

The totally enclosed power unit is mounted on a skid type fuel tank sub-base. Control panels at the rear of the unit contain all operating gages and controls. A common reservoir supplies hydraulic fluid to two separate hydraulic pumps, one for the vibrator motor and one for the hydraulic clamps.

Three hydraulic lines, 65 feet in length, connect the power pack to the hydraulic motor in the vibrator. Two other hydraulic hoses run from the power unit to the hydraulic clamp.

I. GENERAL DESCRIPTION

E. REMOTE-CONTROL PENDANT

The vibrator is operated by a hand-held, remote-control pendant. The pendant has two, two-way switches and an indicator light. One switch, the vibrator switch (FORWARD/REVERSE), starts and stops vibration. The other switch, the clamp switch (OPEN/CLOSE), opens and closes the hydraulic clamp. The light indicates that adequate clamping pressure exists for vibration to begin.

F. SPECIFICATIONS

1. Constant improvement and engineering progress make it necessary that we reserve the right to make specification changes without notice.

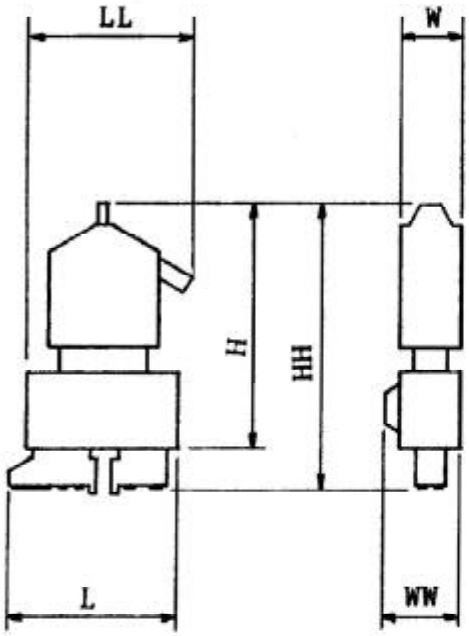


Fig. 1

2. MODEL 116 VIBRATOR

Type	Hydraulic
Eccentric Moment	600 in/lbs
Frequency	460-1600 VPM
Amplitude	1/4" to 5/8"
Horsepower (2100 RPM)	113
Pile Clamping Force	50 Tons
Max. Line Pull for Extraction	10 Tons
(Optional)	20 Tons
*Suspended Weight	4250 Lbs.
Length (L) Lower	50 Inches
(LL) Upper	56 Inches
Width (W)	12 Inches
(WW)	16 Inches
Height (H)	58 Inches
(HH)	69 Inches

3. MODEL 110 POWER UNIT

Type	Hydraulic
Engine	Detroit Diesel 3-71
Weight of Power Unit (with oil-no fuel)	5700 Lbs.
Length	96 Inches
Width	50 Inches
Height	66 Inches

*Suspended weight includes the vibrator with a 20 ton max. extraction set-up, clamp assembly and 1/2 the weight of the interconnecting hoses.

For specifications regarding liquid capacities, see SECTION IV - MAINTENANCE AND ADJUSTMENTS, page IV-8.

II. PREPARATION FOR OPERATION

A. GENERAL

When unloading and unpacking the vibratory driver, use extreme care. For your protection, make a thorough inspection of the unit immediately on delivery. In case of any damage or shortage, notify the transit agent at once and have the delivering carrier make a notation on the freight bill.

B. SAFETY PRECAUTIONS

Safety is basically common sense. There are standard safety rules, but each situation has its own peculiarities which can not always be covered by rules. Therefore, your experience and common sense will be your best guide to safety. Be ever watchful for safety hazards and correct deficiencies promptly.

Use the following safety precautions as a general guide to safe operations:

1. When operating in a closed area, pipe exhaust fumes outside. Continued breathing of exhaust fumes may be fatal.

2. When servicing batteries, do not smoke or use an open flame in the vicinity. Batteries generate explosive gas during charging. There must be proper ventilation when charging batteries.

3. When filling fuel tank, do not smoke or use open flame in the vicinity.

4. Be extremely careful when using a carbon tetrachloride fire extinguisher in a closed area as it produces toxic vapor. Provide adequate ventilation before entering a closed area where carbon tetrachloride has been used.

5. Never adjust or repair the unit while it is in operation.

6. Never operate the diesel engine with the governor linkage disconnected. Human reactions are not fast enough to control the fuel rack.

II. PREPARATION FOR OPERATION

B. SAFETY PRECAUTIONS (CONTINUED)

7. Remove all tools and electrical cords before starting or operating unit.

8. Store oily rags in metal containers.

9. Never store flammable liquids near the engine.

REMEMBER, SAFETY IS EVERYONE'S BUSINESS.

C. RIGGING OF VIBRATOR

A steel wire rope sling must be connected to the lifting pin of the vibration suppressor. The required strength of this sling depends on the capacity of the crane and the work to be carried out. A safety factor of five is recommended. Several turns of a smaller diameter cable will usually last longer than one turn of a larger diameter cable.

D. CONNECTION OF HYDRAULIC CLAMP

The vibrator is usually shipped with the hydraulic clamp already attached.

If the clamp is not attached, it will be necessary to attach it to the bottom of the vibrator, After the vibrator is connected to the crane line, lift the vibrator so that the hydraulic clamp can be bolted in place to the bottom of the vibration case. All twelve bolts must be in place. Place a length of pipe over the end of the Allen wrench to provide a six foot lever arm. Have two men tighten each bolt. These bolts, along with the jaw bolts, must be checked periodically and kept tight.

II. PREPARATION FOR OPERATION

E. CONNECTION OF HYDRAULIC HOSES

1. Connection of hoses at power unit.

   a. The vibrator and hydraulic clamp are connected to the power unit by five hydraulic lines (Fig. 2).

      CAUTION: The power unit must be shut down during connection of the hydraulic hoses.

   b. The hoses connect to the power unit with quick-disconnect couplers. The hose couplers are arranged to insure correct connection at the power unit.

   c. Always clean couplers with a lint-free cloth before making connections.

   d. Make sure that the couplers are fully run up "hand-tight". If wrenches are used, do not overtighten.

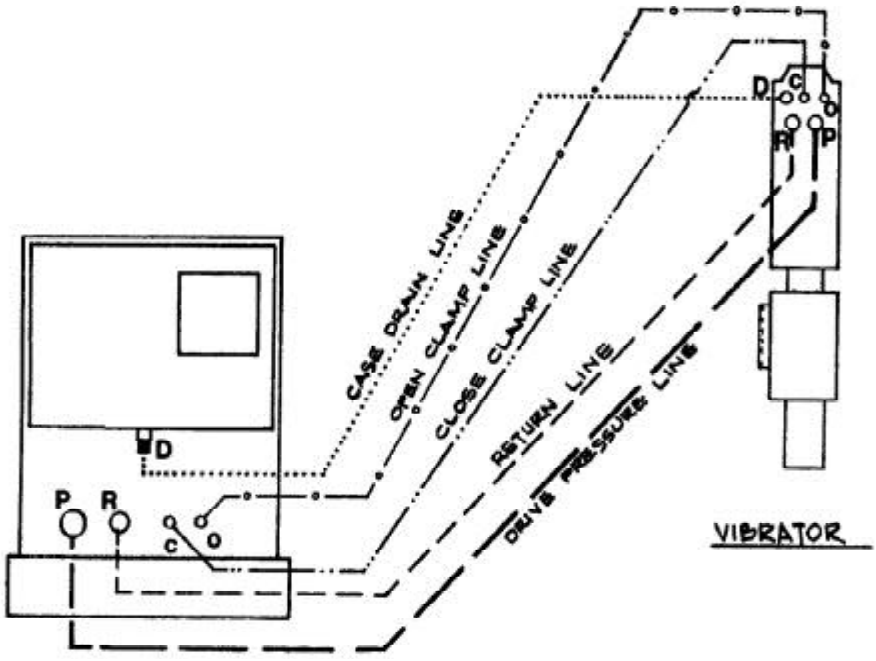


Fig. 2

II. PREPARATION FOR OPERATION

E. CONNECTION OF HYDRAULIC HOSES (CONTINUED)

2. Connection of hoses at vibrator.

a. The vibrator is usually shipped with the hoses attached to the vibrator. If the hoses have been shipped separately, they must be connected. The diagram on page II-3, (Fig. 2), shows the correct arrangement of the five hose lines connecting the power unit to the vibrator.

CAUTION: Starting the vibrator with the hoses reversed will most likely result in ruptured hoses.

b. The vibrator is usually shipped with the hydraulic clamp and hoses in place. If the clamp has been shipped separately, the two hoses connecting the clamp to the vibrator must be connected. The diagram below, (Fig. 3), shows the correct arrangment of the clamp line hoses.

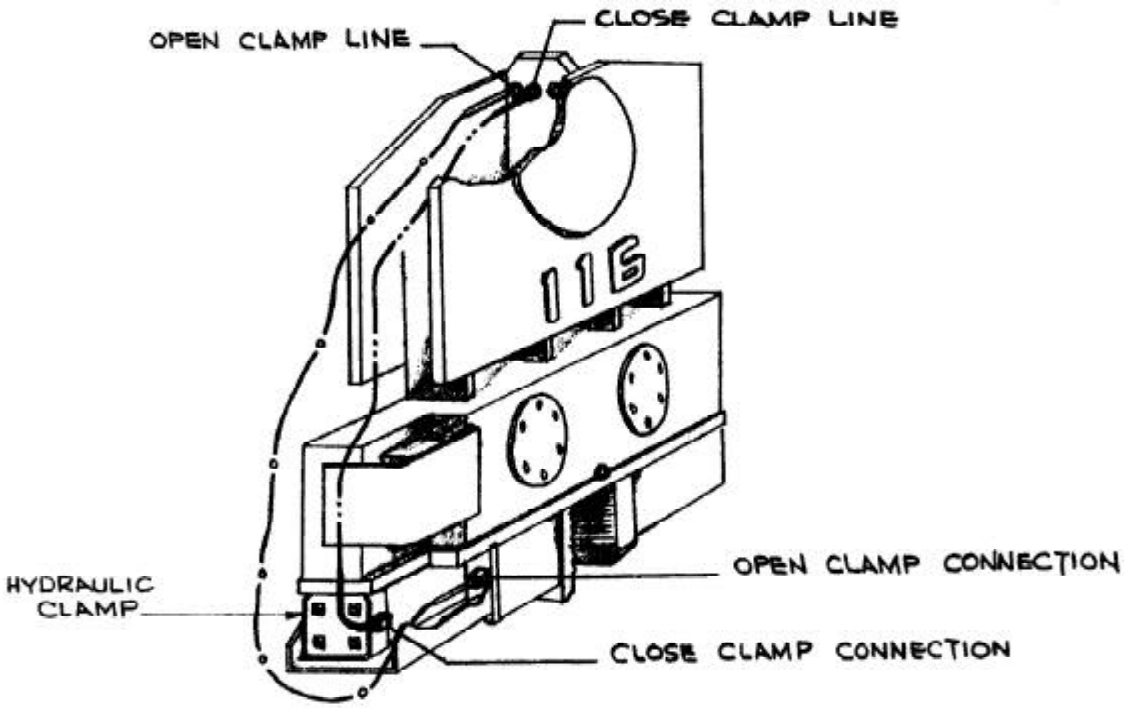


Fig. 3

II. PREPARATION FOR OPERATION

F. BLEEDING HYDRAULIC CLAMP HOSE LINES

1. Normally, the vibrator and hydraulic clamp are shipped as a unit with all hoses attached (vibrator to clamp and the 5 main lines connected to the vibrator). The hoses are usually full of fluid and may be used immediately. However, if due to any reason the clamp line hoses are ever disconnected, or if air is present in the lines, they must be bled prior to resuming operation.

2. Read SECTION III - OPERATING INSTRUCTIONS.

3. Start and warm up the diesel engine in accordance with SECTION III-C (STARTING AND WARMING UP ENGINE).

4. With the engine warmed-up and running at 1500 RPM, loosen the close-clamp line at the hydraulic clamp (Fig 3). Turn the clamp switch (OPEN/CLOSE) on the remote control pendant to CLOSE. Wait until fluid flows from the connection at the hydraulic clamp. When fluid flows without any traces of air, tighten the connection.

5. After the close-clamp line has been bled, alternately turn the clamp switch to CLOSE and to OPEN several times to insure that the clamp cylinder is working properly. It may be necessary to bleed the hose more than once. The open-clamp line may also require bleeding by using the very same procedure, except loosen the open-clamp line and turn the clamp switch to OPEN.

G. FILLING VIBRATOR PRESSURE HOSE

1. The vibrator is usually shipped with the vibrator hydraulic hoses full of fluid so that the unit may be used immediately. However, if the pressure hose has been removed from the vibrator, the hose should be allowed to fill with hydraulic fluid prior to full speed operation. It is not necessary to have the return hose filled with fluid.

2. Read SECTION III - OPERATING INSTRUCTIONS.

3. Start and warm up the diesel engine in accordance with SECTION III-C (STARTING AND WARMING UP ENGINE).

4. With the engine warmed up and running at 1800 RPM, the main lines will full with hydraulic fluid in about 10 minutes. Wait 10 minutes for this to occur. Do not operate any switches on the control pendant.

OPERATING INSTRUCTIONS

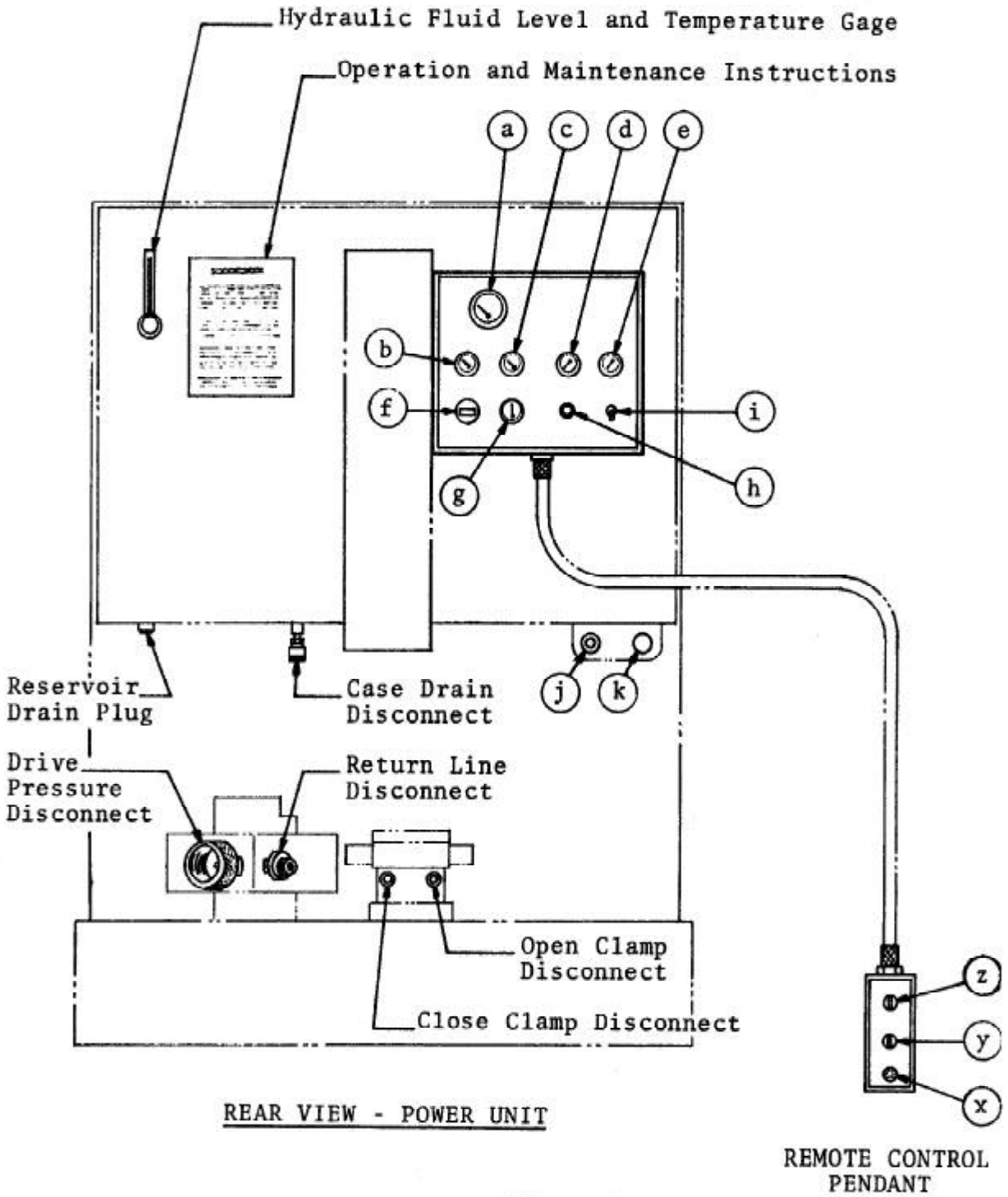


Fig. 4

III. OPERATING INSTRUCTIONS

A. COMPLETION OF SET-UP AND MAINTENANCE

1. Complete all preparations as described in Section II.

2. Read Section IV - MAINTENANCE AND ADJUSTMENTS and perform any required maintenance.

B. CONTROL PANEL (Fig. 4)

1. The control panel area at the rear of the power unit contains the Operating Panel with controls and gages for the diesel engine and the OPERATION AND MAINTENANCE INSTRUCTIONS.

2. The control panel contains the following controls and gages:

   a. Engine Tachometer
   b. Engine Oil Pressure Gage
   c. Engine Water Temperature Gage
   d. Clamp Pressure Gage
   e. Drive Pressure Gage
   f. Engine Hourmeter
   g. Engine Ammeter
   h. Engine Start Switch - for diesel engine
   i. Circuit Breaker - On/off switch for 12 volt electrical power. Must be on for vibrator to run.
   j. Engine Throttle
   k. Emergency Stop Knob

3. Connected to the control panel is the remote control pendant which contains the following controls or indicators:

   x. Clamp Light
   y. Clamp Switch - OPEN/CLOSE
   z. Vibrator Switch - FOR/OFF/REV

4. The OPERATION AND MAINTENANCE INSTRUCTIONS on the control operating area are there as reminders only. They are not complete and therefore not intended to substitute for a thorough understanding of this Operating Manual.

III. OPERATING INSTRUCTIONS

C. STARTING AND WARMING UP ENGINE

1. Before starting the engine, read the DETROIT DIESEL OPERATOR'S MANUAL carefully. Follow the engine starting, operating and maintenance procedures outlined in that manual.

   If the engine is being started for the first time, perform the operations listed in the Detroit Diesel Operator's Manual under PREPARATION FOR STARTING ENGINE FIRST TIME.

2. The diesel engine should not be started if the temperature of the hydraulic fluid is below 0°(F). The fluid temperature may be read on the gage mounted on the hydraulic reservoir. If ambient temperatures below 0°(F) are anticipated, an immersion heater for heating the hydraulic fluid is available. Consult ICE for details.

3. The CIRCUIT BREAKER on the control panel should be in the ON position. Check that the vibrator switch on the remote control pendant is in the OFF position and that the Emergency Stop Knob is pushed in fully.

4. Pull out the Engine Throttle Knob about half way. Press the button on the end of the throttle knob for fine adjustment.

5. Turn the Engine Start Switch to the START position. Start the engine using starting aids as necessary. If the engine fails to start after 30 seconds of cranking, allow the starter to cool for several minutes before repeating the starting procedure.

6. As the engine starts, release the Engine Start Switch. It will return to the RUN position. Never turn the start switch to the START position while the starting meter is running.

7. Adjust the throttle until the engine is running at partial throttle (1500 RPM), and no-load allowing it to warm-up for five minutes.

   Observe the oil pressure gage immediately after starting the engine. If no pressure is indicated within 10 to 15 seconds, stop the engine and check the lubricating system. Refer to the Detroit Diesel Operator's Manual.

III. OPERATING INSTRUCTIONS

C. STARTING AND WARMING UP ENGINE (CONTINUED)

8. Allow the temperature of the hydraulic fluid to come up to at least 30°(F) before starting the vibrator.

D. WARMING HYDRAULIC FLUID

1. The vibrator should not be operated at "full speed" if the temperature of the hydraulic fluid is below 60°(F). Read the temperature shown on the gage mounted on the hydraulic reservoir.

2. If temperature of the hydraulic fluid is below 60°(F), set the diesel engine at 1500 RPM and run the vibrator until the temperature of the hydraulic fluid exceeds 60°(F).

3. With the engine warmed up and hydraulic fluid temperature at least 60°(F), full speed operation may begin. Adjust the throttle so the engine is running at 2300 RPM. The engine should maintain about 2100 RPM under load.

CAUTION: Do not operate the vibrator if hydraulic fluid temperature exceeds 160°(F) as this may damage hydraulic components.

E. OPERATION OF REMOTE CONTROL PENDANT

1. The operation of the vibratory driver is controlled by the remote control pendant. The pendant is connected to the control cabinet with 50 feet (or optional 100 feet) of electrical cable to permit operation from any advantageous position near the vibrator.

2. The pendant has two, two-way switches and an indicator light.

a. To clamp to pile.

Position vibratory driver on pile. Turn the clamp switch on the pendant to CLOSE. The CLAMP light on the pendant will come on when the hydraulic clamp has achieved adequate pressure to permit vibration to begin. The light should normally come on in a few seconds.

III. OPERATING INSTRUCTIONS

E. OPERATION OF REMOTE CONTROL PENDANT (CONTINUED)

b. To start vibration.

Turn the vibrator switch to FORWARD.

NOTE: The vibrator switch reads FORWARD and REVERSE instead of START and STOP because the same Model 110 power unit is used to operate the J&M Model 1250 auger.

CAUTION: Do not turn the vibrator switch to FORWARD until the CLAMP light in the pendant comes ON indicating adequate clamping pressure.

c. To stop vibration

Turn the vibrator switch to REVERSE. When the vibration stops, turn the switch to OFF.

d. To unclamp from pile.

Turn the CLAMP switch to OPEN to release the hydraulic clamp so that the vibrator can be removed from the pile.

CAUTION: Do not turn the switch to OPEN until a visual check indicates that vibration has stopped.

F. CHANGING FREQUENCY

1. In order to provide maximum flexibility in achieving optimum pile penetration and extraction rates, the frequency of the vibratory driver is adjustable.

2. The frequency can be varied from 460 to 1600 vibrations per minute by changing engine speed. Engine speed is changed with the ENGINE THROTTLE (Fig. 4) at the control panel. Vibrator frequency corresponds to engine speed according to the table shown below:

ENGINE RPM	VIBRATOR VPM
2100	1600
2000	1520
1600	1216
1200	912
800	608
600	460

III. OPERATING INSTRUCTIONS

G. SHUTDOWN

1. Stop the vibrator.

2. Allow the diesel engine to run for five minutes at 1500 RPM.

3. Reduce speed to low idle for about thirty seconds.

4. Stop the engine by turning the ENGINE START SWITCH to OFF.

CAUTION: If the diesel engine is shut down while the vibrator is clamped to a pile, the clamp check valve will keep the vibrator clamped to the pile. However, system leakage could result in a loss of clamp pressure. Therefore, it is not recommended to leave the vibrator clamped to a pile when the diesel engine is not running.

IV. MAINTENANCE AND ADJUSTMENTS

A. GENERAL

Preventive maintenance includes normal servicing that will keep the engine, vibratory driver and power unit in peak operating condition and prevent unnecessary trouble from developing. This servicing consists of periodic lubrication and inspection of the moving parts and accessories of the unit.

Lubrication is an essential part of protective maintenance, controlling, to a great extent, the useful life of the unit. Some components in the unit require more frequent lubrication than others and some require different types of lubricants. Therefore, it is important that the instructions regarding types of lubricants and frequency of their applications be closely adhered to.

To prevent minor irregularities from developing into serious conditions that might involve shut-down and major repair, several other services or inspections are recommended for the same intervals as the periodic lubrications. The purpose of these services or inspections is to assure the uninterrupted operation of the unit.

Thoroughly clean all lubrication fittings, caps, filler and level plugs and their surrounding surfaces before servicing. Prevent dirt from entering with lubricants and coolants. The intervals given in the schedule are based on normal operation. Perform these services, inspections, etc., more often as needed for operation under abnormal or severe conditions.

B. DAILY

The daily instructions pertain to routine or daily starting of an engine and not to a new engine or one that has not been operated for a considerable period of time. For new or stored engines, refer to the Detroit Diesel Operators Manual under Preparation for Starting Engine, First Time (Section 4).

1. Check the entire unit prior to and during start-up each day or at the beginning of each shift.

IV. MAINTENANCE AND ADJUSTMENTS

B. DAILY (CONTINUED)

2. Prior to starting the diesel engine at each shift, check the following items:

a. Visibly inspect all bolts, nuts and screws, including the bolts fastening the hydraulic clamp to the vibration case to insure they are tight.
b. Tighten bolts holding gripping jaws in hydraulic clamp.
c. Grease plunger in hydraulic clamp with any good multi-purpose grease.
d. Check the oil level in the vibration case and fill to proper level if required. The oil level should be in the middle of the sight gage. Change oil if milky or black.
e. Check the fluid level in the hydraulic fluid reservoir and refill if necessary.

CAUTION: It is absolutely imperative that no dirt or other impurities be permitted to contaminate the hydraulic fluid. Any contamination will drastically shorten the life of the high-pressure hydraulic system.

f. 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-disconnect couplers.
g. Visually inspect all suppressor elastomers.
h. Electrical components need no maintenance except periodic wiping with a clean, dry, lint-free cloth to remove dust.
i. Perform all daily maintenance checks and operations indicated in the DETROIT DIESEL OPERATING INSTRUCTIONS - Preventive Maintenance Chart - Section 5.

3. After start-up, check the following:

a. Check all hydraulic hoses for leaks. Make sure they hang freely with no kinks.
b. Check pump and all hydraulic manifolds and fittings for leaks.
c. Check the filter indicator. The return filter on the power unit must be checked with the diesel engine running.

IV. MAINTENANCE AND ADJUSTMENTS

C. 8 HOURS, 50 HOURS, 100 HOURS AND OTHER

1. After eight hours of operation, service the air cleaner, drive belts, power take-off and reduction gear as per the preventive maintenance chart shown in section 5 of the Detroit Diesel Operators Manual.

2. After 50 hours, perform the services as noted on the time interval preventive maintenance chart in the Detroit Diesel Operators Manual.

3. At 100 hours, drain and refill the vibration case. See LUBRICATION (Vibration Case).

4. Follow the recommended maintenance procedures indicated for the various time intervals in the maintenance chart in the Detroit Diesel Operators Manual.

D. ANNUALLY

Have the hydraulic fluid analyzed by a local hydraulic service center. Replace fluid if required. See LUBRICATION (Hydraulic System) for fluid replacement data.

E. SEVERE CONDITIONS

1. The servicing intervals specified are based on normal operating conditions. Operation under unusual conditions require some adjustments in servicing intervals.

2. When the average temperature is above 80°(F) or below minus 10°(F), reduce service time intervals by one-half from those specified.

3. When operating in the presence of dust or sand, reduce service time intervals by one-half from those specified.

4. When operating in excess of twelve hours per day, reduce service time intervals by one-half from those specified.

5. When operating in air with high salt or moisture content, the service time intervals need not normally be changed. However, the unit should be thoroughly inspected weekly to determine what, if any, additional servicing might be required.

6. During stand-by or inactive periods, the service time intervals may be extended twice from those specified. The unit should be exercised every thirty days or less, depending upon conditions.

IV. MAINTENANCE AND ADJUSTMENTS

F. LUBRICATION

1. Crankcase (Diesel Engine)

a. Follow the engine manufacturer's maintenance schedule and the lubricating oil specifications outlined in the Detroit Diesel Operators Manual (Lubrication and Preventive Maintenance Schedule).
b. The lubricant shall meet the performance requirements of API Service Classifications CD or MIL-L-2104C.
c. New engines are shipped with MOBIL DELVAC 1240 (40W) but the following single grade crankcase oils are recommended for use or replacement in normal operation (10°F to 90°F) (-12°C to 32°C).

AMOCO	- 40W	300
ARCO	- 40W	Fleet S3 Plus
BORON (BP)	- 40W	Vanellus MCS-3
CHEVRON	- 40W	Delo 400
CITGO	- 40W	C500 Plus
CONOCO	- 40W	Fleet Supreme
EXXON	- 40W	XD3
GULF	- 40W	Super Duty
MOBIL	- 40W	Delvac 1240
PHILLIPS	- 40W	Super HD II
SHELL	- 40W	Rotella T
SUN	- 40W	Sunfleet Super C
TEXACO	- 40W	Ursa Super Plus
UNION	- 40W	Guardol
VALVOLINE	- 40W	All Fleet

d. Viscosity grade 30W may be used as a secondary choice in place of the 40W primary recommendation.

NOTE: The use of a multi-grade oil (15W-40 ONLY) may be selected ONLY when ambient temperatures are at, or less than, freezing (32°F - 0°C). Consult your Detroit Diesel representative when using oils other than the recommended single-grade SAE 40W or 30W grades. Any oils used in the crankcase must meet the sulfated ash limit and zinc content requirements specified in the Detroit Diesel lubrication specifications. Any multi-grade oil, other than 15W-40 (API class CD/SE) is NOT RECOMMENDED for use at any time in the Detroit Diesel engine.

IV. MAINTENANCE AND ADJUSTMENTS

F. LUBRICATION (CONTINUED)

2. Hydraulic System

To maintain the maximum operating efficiency in the precision parts of the hydraulic system, it is extremely important to eliminate factors which can cause breakdowns or unsatisfactory performance in the system. Among the most common of these factors are rust, corrosion, contamination and products of oil deterioration. Most problems can be minimized or avoided simply by maintaining a disciplined preventive maintenance program.

Some simple steps to follow as part of that program are:

a. Keep stored oil dry and clean at all times and always store in clean containers.

b. Always clean tools, spouts, lids, funnels, etc. when used in conjunction with the transfer of oil.

c. Never put dirty oil into the hydraulic system. Use only clean, uncontaminated oil of the types recommended. Never return to the system any fluid which has leaked out.

NOTE: Foreign material in the hydraulic system can drastically effect the life and operation of many hydraulic component parts.

d. Clean or replace filter elements at the first indication that they are dirty or ineffective.

Mixing of different manufacturers' hydraulic fluid is not recommended. However, it can be done if the fluids are miscible (contain the same base and additive). It may be necessary to contact an oil supplier to determine this.

IV. MAINTENANCE AND ADJUSTMENTS

F. LUBRICATION (CONTINUED)

New power units are shipped with MOBIL DTE-15 hydraulic oil. The following recommended fluids may be used when replacing fluid in the hydraulic system.

FIRST Preference Group:

MOBIL	DTE-15
SUN	2105

SECOND Preference Group:

AMOCO	Rykon MV
ARCO	Duro AW32
CHEVRON	Hydraulic AW32
PHILLIPS	Magnus A32
SHELL	Tellus 32

THIRD Preference Group:

BORON	Energol HLP32
CITGO	All-Temp HD
CONOCO	Super 32
EXXON	Nuto H32
GULF	Harmony 32AW
SUN	Sunvis 805 MG
TEXACO	Rando HD AZ32
UNION	Unax AW32

Whenever fluids from the second preference group are used, it is necessary to test the oil more often to insure that viscosity remains within recommended limits while in service. Using fluids from the third preference group requires even a more discerning inspection than use of fluids from the second group.

The recommended fluids were chosen based on the hydraulic system operating temperature range being 5°F (-15°C) (cold [ambient] start-up) to 160°F (71°C) (maximum operating).

When operating in artic conditions, it is recommended to use an immersion heater to pre-heat the oil prior to starting. It may also be necessary in extremely cold or hot climates to use a different viscosity oil which is better adapted to adverse conditions. Contact the nearest oil supply representative for suggested procedures.

MOBIL DTE-15 hydraulic fluid is available from ICE in five gallon cans. See SECTION VIII - ORDERING PARTS, page VIII-28.

IV. MAINTENANCE AND ADJUSTMENTS

F. LUBRICATION (CONTINUED)

3. Vibration Case

The fluid level is easily read through the sight glass located at the lower center of the side wall case on the motor side. Lubricating gear oil may be added when necessary, through the vibration case top plate, above the motor recess and the oil may be drained by removing the plug at the motor end of the base plate.

The most preferred lubricating oil is a synthetic lubricant, since synthetics were designed for applications where service conditions are more severe due to high operating temperatures and they have good oxidation stability. Synthetics also provide much longer service life than natural petroleum based lubricants consequently resulting in fewer maintenance hours spent on the mechanical service of the unit. Therefore, whenever the first preferred oil is not available, or desired, and the choice is to change to an oil from the second or third preferred group (natural petroleum base) the need to test the oil oftener becomes more essential.

a. The vibration case lubricant installed at the factory is MOBIL SHC-634 (a synthetic) but any of the following recommended gear lubes may be used when changing lubricants:

FIRST Preference Group (Synthetic):

MOBIL	SHC-634

SECOND Preference Group (Natural Petroleum Base):

BORON	Gearep 140
CHEVRON	Gear Compound NL 460
CITGO	Premium MP 85W-140
CITGO	Standard MP 85W-140
GULF	Lub 85W-140
PHILLIPS	SMP 85W-140
SHELL	Omala 460
SUN	Sunep 1110

IV. MAINTENANCE AND ADJUSTMENTS

F. LUBRICATION (CONTINUED)

3. Vibration Case

THIRD Preference Group (Natural Petroleum Base):

AMOCO	Perma Gear EP140
ARCO	Pennant NL 460
CONOCO	EP 460
EXXON	Spartan EP 460
PHILLIPS	AP 140
TEXACO	Meropa 460
UNION	MP 85W-140
VALVOLINE	Gear Lub 85W-140

MOBIL SHC-634 lubricant is available from in 5 gal. cans. See SECTION VIII - ORDERING PARTS, pg. VIII-28.

G. CAPACITIES

1.	Diesel Engine (Crankcase)	13 Quarts
2.	Hydraulic System (Reservoir)	165 Gallons
3.	Vibration Case	1.5 Gallons
4.	Diesel Engine Fuel	98 Gallons
5.	Engine Cooling Capacity	5.4 Gallons

H. DRAINING AND FILLING HYDRAULIC FLUID RESERVOIR

1. The hydraulic reservoir is drained by removing a plug on the bottom of the reservoir.
2. The hydraulic reservoir is filled through the filler pipe mounted on the engine side of the reservoir.

CAUTION: Only clean, filtered hydraulic fluid should be pumped into the reservoir. Any contamination carried into the system by the fluid will drastically shorten the life of the high pressure hydraulic system. See HYDRAULIC FLUID Section.

I. CLEANING HYDRAULIC PICK-UP FILTER

1. Drain hydraulic reservoir (See Section H).

2. Remove the top cover of the reservoir.

CAUTION: It is absolutely imperative that no dirt or other impurities be permitted to contaminate the hydraulic fluid. Any contamination will drastically shorten the life of the high pressure system. See HYDRAULIC FLUID Section.

IV. MAINTENANCE AND ADJUSTMENTS

I. CLEANING HYDRAULIC PICK-UP FILTER (CONTINUED)

3. The pick-up filter is connected to the input pipe for the hydraulic drive pump. Remove the entire filter assembly by unscrewing it from the bottom plate of the reservoir.

4. Disassemble and clean the entire filter in clean solvent or diesel fuel.

5. Replace filter. Carefully replace top cover of reservoir after cleaning so that no dirt is allowed to fall into the reservoir opening. Refill reservoir with recommended hydraulic fluid.

J. CHANGING HYDRAULIC RETURN FILTER ELEMENT

1. The return filter is located on the hydraulic reservoir wall on the engine side.

2. To remove elements, remove the four hex-head screws and remove the cover assembly. Screw driver slots are provided at the bottom to aid in removing the filter cover.

3. Remove the bypass valve and spring assembly from filter housing. Remove the two filter elements.

4. Clean filter housing interior and all component parts with a lint-free rag.

5. Check O-Ring for damage. Lubricate with multi-purpose grease.

6. Install two new elements.

7. Replace bypass valve and spring assembly into housing.

8. Replace filter cover and tighten four hex screws.

IV. MAINTENANCE AND ADJUSTMENTS

K. BOLT TORQUE INFORMATION

Torque, in foot-pounds, is determined by the length of the wrench handle (in feet) multiplied by the weight (or force in pounds) applied at the end of the handle. For example, if the wrench is one foot long and five pounds of force is applied at the end of the handle, the total torque applied would be five foot pounds. A six inch wrench would require ten pounds of force to obtain five foot pounds of torque.

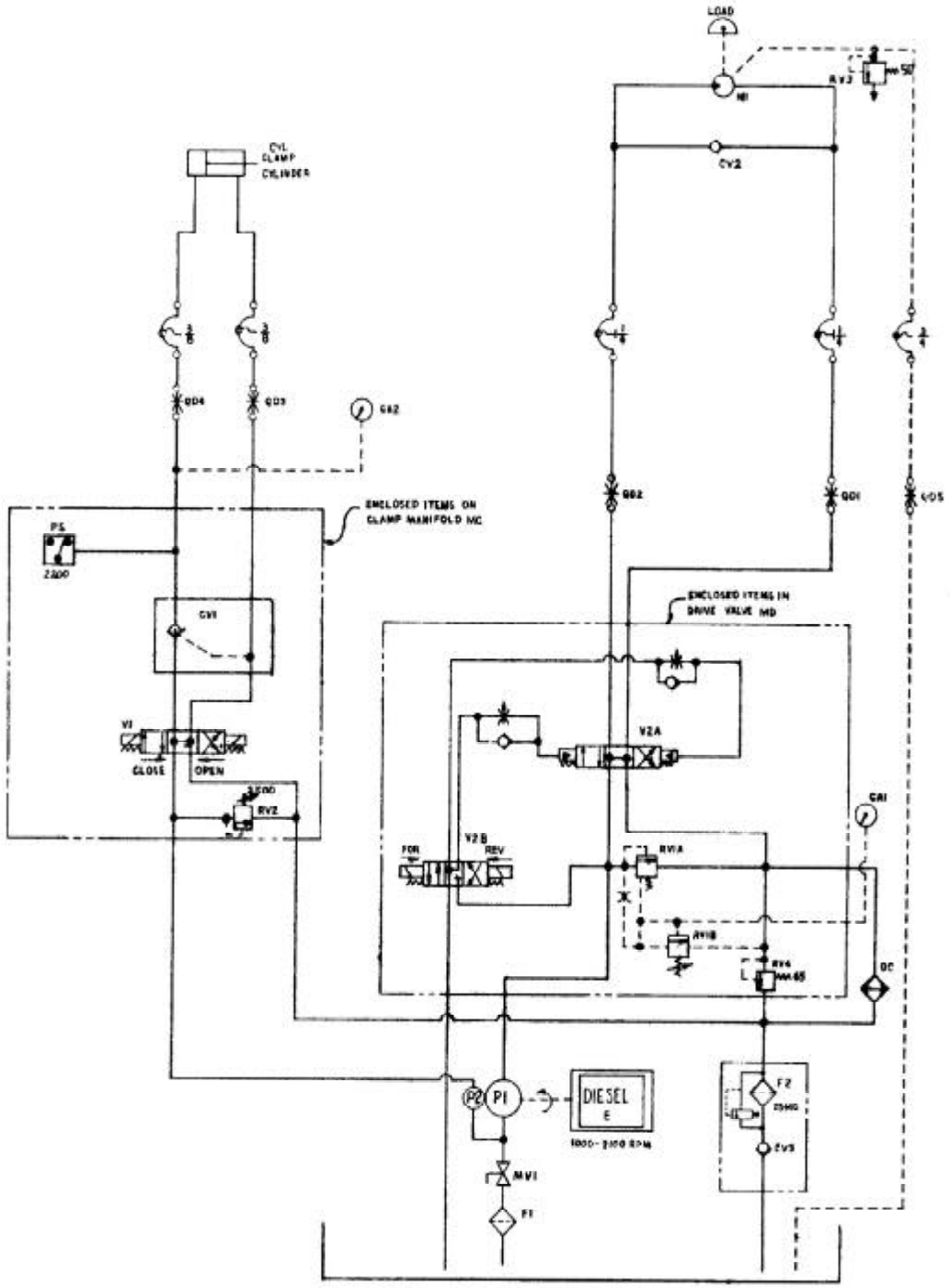
Proper use of the torque wrench is important. To obtain the listed torques, a steady pull should be exerted to the handle until the desired torque is reached.

The following torque specifications apply to the bolts from the component assemblies listed. Whenever any of these bolts are replaced, the given torque specifications should be adhered to.

VIBRATION SUPPRESSOR	Refer to page VIII- 6	
Item 33	5/16"-18	27 Ft/Lbs
Item 5	1/2"-13	119 Ft/Lbs
Item 10, 28, 40	5/8"-11	234 Ft/Lbs
Item 8, 18	3/4"-10	417 Ft/Lbs
Item 19, 45	1"- 8	1009 Ft/Lbs
Item 23	1-1/4"- 7	1600 Ft/Lbs
Item 20	1-1/2"- 6	2800 Ft/Lbs

VIBRATION CASE	Refer to page VIII-10	
Item 3, 11, 27	1/2"-13	119 Ft/Lbs
Item 17	5/8"-11	234 Ft/Lbs

V. HYDRAULIC CIRCUITRY
HYDRAULIC SCHEMATIC



V. HYDRAULIC CIRCUITRY

A. CLAMP

With the DIESEL ENGINE (E) running, hydraulic fluid is taken from the reservoir by the CLAMP PUMP (P2). Prior to entering the CLAMP PUMP (P2), the fluid is filtered by the PICK-UP FILTER (F1). If the CLAMP SWITCH, in the remote control pendant, has not been moved off of the neutral position, the clamp pump flow returns to the reservoir. Returning fluid passes through the RETURN FILTER (F2) prior to entering the reservoir.

Turning the CLAMP SWITCH, on the remote control pendant, to the CLOSE position activates the CLAMP CONTROL VALVE (V1). Hydraulic fluid is directed to the clamp side of the CYLINDER (CYL) in the hydraulic clamp. The clamp closes. Clamping pressure is indicated by the clamp PRESSURE GAGE (GA2). When clamping pressure reaches approximately 2200 PSI, the clamp PRESSURE SWITCH (PS) deactivates the clamp CONTROL VALVE (V1) which directs the flow from the clamp pump back to the reservoir. Pressure at the clamp is maintained by the clamp CHECK VALVE (CV1). If clamping pressure falls below 2000 PSI, the clamp PRESSURE SWITCH activates the clamp valve to restore pressure.

Turning the CLAMP SWITCH, on the remote control pendant, to the OPEN position activates the CLAMP CONTROL VALVE (V1). Hydraulic fluid is directed to the open (unclamp) side of the CYLINDER (CYL) in the hydraulic clamp. The clamp opens. Pressure in the clamping circuit is limited to 2500 PSI by the clamp RELIEF VALVE (RV2).

The QUICK DISCONNECT COUPLERS (QD3 and QD4) permit decoupling of the clamp hoses at the power unit.

B. MOTORS

With the DIESEL ENGINE (E) running, hydraulic fluid is taken from the reservoir by the DRIVE PUMP (P1). Prior to entering the drive pump, the fluid is filtered by the PICK-UP FILTER (F1). If the VIBRATOR SWITCH in the remote control pendant has not been moved from the OFF position, the drive pump flow returns to the reservoir. Returning fluid passes through the RETURN FILTER (F2) prior to entering the reservoir.

V. HYDRAULIC CIRCUITRY

B. MOTORS (CONTINUED)

Moving the VIBRATOR SWITCH, on the remote control pendant, to the FORWARD position operates the secondary MOTOR VALVE (V2B) which in turn activates the primary MOTOR VALVE (V2A), directing flow to the vibrator drive MOTOR (M1). The motor starts.

Motor drive pressure is indicated by the drive PRESSURE GAGE (GA1). Maximum drive pressure is limited to approximately 2400 PSI by the drive pressure RELIEF VALVES (RV1A/RV1B). Case drain fluid from the motors returns to the reservoir and the drain pressure is limited to 50 PSI by the case drain RELIEF VALVE (RV3).

Moving the VIBRATOR SWITCH, on the remote control pendant, to the REVERSE position operates the secondary MOTOR VALVE (V2B) which in turn activates the primary MOTOR VALVE (V2A) directing the drive flow to the reverse side of the motor. The flow slows and stops the motor. Excess flow returns to the reservoir thru the vibrator CHECK VALVE (CV2). RELIEF VALVE (RV4) protects the oil cooler from overpressurization by diverting fluid directly to the reservoir via the filter. After the motor stops, moving the vibrator switch to the OFF position directs the drive flow back to the reservoir.

The QUICK DISCONNECT COUPLERS (QD1, QD2 and QD5) permit decoupling of the drive, return and case drain lines at the power unit.

C. OTHER

Returning fluid is filtered by the RETURN FILTER (F2). The return filter CHECK VALVE (CV3) prevents fluid loss from the reservoir when the filter elements are removed.

The AIR COOLER (OC) cools the hydraulic fluid returning from the vibrator.

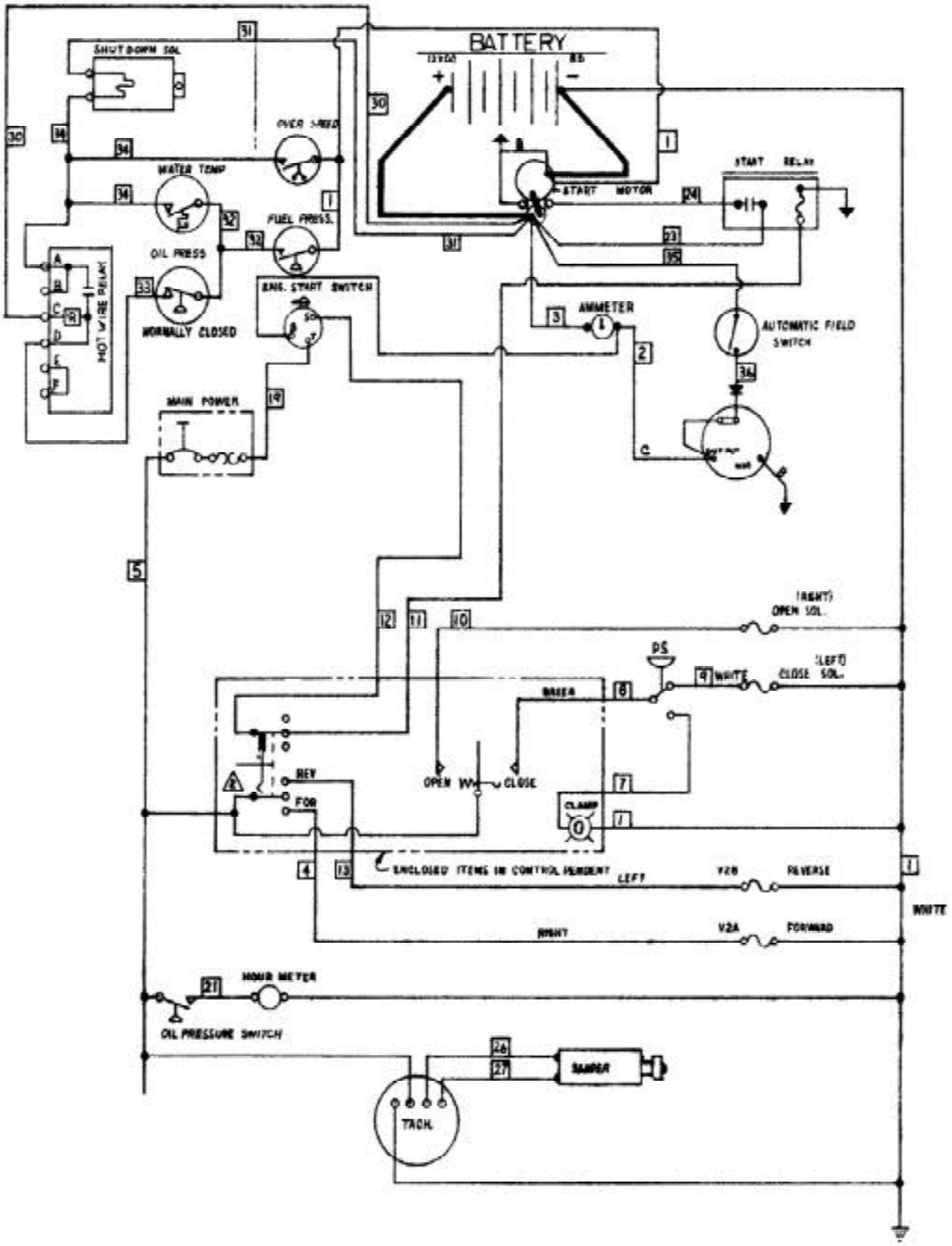
A manual SHUT-OFF VALVE (MV1) prevents fluid loss through the pick-up filter (F1) whenever the drive pump line is disconnected.

V. HYDRAULIC CIRCUITRY

D. HYDRAULIC COMPONENTS LIST SCHEMATIC ON PAGE V-1

Notation	Description	P/N	Pg. Ref.
CV2	Vibrator Check Valve	110731	VIII- 7
CYL	Hydraulic Clamp Cylinder	810217	VIII- 9
E	Diesel Engine	150099	VIII-17
F1	Pick-Up Filter	400087	VIII-17
F2	Return Filter	400085	VIII-17
	CV3 - Filter Check Valve		
GA1	Gage - Drive Pressure	150079	VIII-23
GA2	Gage - Clamp Pressure	150079	VIII-23
M1	Drive Motor	150023	VIII-11
MV1	Manual Valve	400117	VIII-19
OC	Oil Cooler	150061	VIII-17
P1	Drive Pump	150021	VIII-17
	P2 - Clamp Pump		
QD1	Return Disconnect	400093	VIII-19
QD2	Pressure Disconnect	400111	VIII-19
QD3	Clamp Open Disconnect	100777	VIII-21
QD4	Clamp Close Disconnect	100245	VIII-21
QD5	Case Drain Disconnect	400095	VIII-17
RV3	Case Drain Relief Valve	100032	VIII- 7
MC	Clamp Manifold	810025	VIII-27
	V1 - Control Valve	130033	
	CV1 - Check Valve	110149	
	RV2 - Relief Valve	110145	
	PS - Pressure Switch	810033	
MD	Drive Manifold Assembly	810265	VIII-25
	RV1A/RV1B - Relief Valves	150165	
	RV4 - Relief Valve	150165	
	V2A/V2B - Motor Valves	150165	

VI. ELECTRICAL CIRCUITRY
ELECTRICAL SCHEMATIC



VI. ELECTRICAL CIRCUITRY

A. DIESEL ENGINE

The BATTERY provides 12 volt current to start the diesel engine. With the vibrator switch on the remote control pendant in the OFF position, turning the ENGINE START SWITCH on the control panel, to START energizes the START RELAY which in turn energizes the START MOTOR and turns over the diesel engine. If fuel is available, the diesel engine will start.

With the diesel engine running, the AMMETER indicates current flow to and from the battery. The HOURMETER indicates the amount of engine operating hours.

A system of safety controls shuts off the fuel supply thereby stopping the diesel engine in the event that engine water temperature is too high or engine oil pressure is too low. The engine is also equipped with an OVERSPEED SHUTDOWN SWITCH which shuts down the engine due to excessive RPM's.

If the coil in the SHUTDOWN SOLENOID is energized, the FUEL PRESSURE SWITCH will open shutting off the fuel to the diesel engine. The engine will stop. The coil may be energized by either of the following devices:

1. Engine OIL PRESSURE SWITCH - normally a closed type switch connected through a HOT WIRE RELAY in the electrical circuit to the shutdown solenoid. When the oil pressure falls below 20 PSI, the switch closes and current flows to the HOT WIRE RELAY energizing the shutdown solenoid causing the diesel engine to shut down.

2. Engine WATER TEMPERATURE SWITCH - normally an open type switch connected in the electrical circuit to the shutdown solenoid. When the engine coolant temperature exceeds 210°F (99°C), the switch closes and the current energizes the shutdown solenoid causing the diesel engine to shut down.

VI. ELECTRICAL CIRCUITRY

A. DIESEL ENGINE (CONTINUED)

3. Engine OVERSPEED SWITCH - normally an open type switch which is activated by the overspeed governor whenever engine speed exceeds 2450 RPM. The overspeed switch allows current to flow to the shutdown solenoid causing the engine to shutdown.

NOTE: If the engine has been stopped by an automatic device, the air shut-off valve must be reset in the open position before the engine can be started. See DETROIT DIESEL OPERATORS MANUAL, Section 3, for location of air shut-off valve. The diesel engine can also be stopped manually by pulling the EMERGENCY STOP KNOB (Fig. 4) fully out. The stop knob, when pulled, shuts off the air supply to the engine which prevents further combustion of fuel and stops the engine.

Once the engine has been stopped by pulling the stop knob, the knob must be pushed back fully before restarting the engine again.

B. HYDRAULIC CLAMP - CLOSE

With the diesel engine running and the CIRCUIT BREAKER (MAIN POWER) switch ON, turning the clamp switch (OPEN/CLOSE) on the remote control pendant to CLOSE energizes the close-clamp solenoid (CLOSE SOL.). This operates the clamp hydraulic valve and closes the clamp.

When the pressure in the close-clamp circuit reaches 2000 PSI. the PRESSURE SWITCH (PS) opens and de-energizes the close-clamp solenoid which lights the CLAMP light on the control pendant. If the close-clamp pressure falls below 2000 PSI, the pressure switch closes and re-energizes the close-clamp solenoid to rebuild pressure. The clamp light on the pendant goes out. When pressure returns to 2000 PSI, the pressure switch opens de-energizing the close-clamp solenoid and turns on the clamp light again.

VI. ELECTRICAL CIRCUITRY

C. HYDRAULIC CLAMP - OPEN

With the diesel engine running and the CIRCUIT BREAKER (MAIN POWER) switch ON, turning the clamp switch (OPEN/CLOSE) to OPEN energizes the open clamp solenoid (OPEN SOL.). The clamp opens.

D. VIBRATOR - START

With the diesel engine running, and the CIRCUIT BREAKER (MAIN POWER) switch ON, turning the vibrator switch (FOR/OFF/REV) on the pendant to FORWARD energizes the MOTOR VALVE (V2A/V2B) solenoid on the drive valve. The drive valve sends hydraulic fluid to the drive side of the motor and the motor starts.

E. VIBRATOR - STOP

With the diesel engine running and the CIRCUIT BREAKER (MAIN POWER) switch ON, turning the vibrator switch (FOR/OFF/REV) on the pendant to REVERSE energizes the MOTOR VALVE (V2A/V2B) solenoid. Fluid is sent to the brake side of the motor and the flow slows and stops the motor.

VI. ELECTRICAL CIRCUITRY

F. ELECTRICAL COMPONENTS LIST

NOTATION	REFERENCE	PART NUMBER	PAGE REFERENCE
AMMETER	Ammeter	100371	VIII-23
BATTERY	12-Volt Battery	150081	VIII-17
CLAMP	Clamp Light	130085	VIII-23
CLOSE SOL.	Close-Clamp Solenoid	130033	VIII-27
ENG. START SWITCH	Engine Start Switch	130259	VIII-23
FORWARD	Vibrator Start Solenoid	150165	VIII-25
FOR-REV	Vibrator Switch	130155	VIII-23
FUEL PRESS.	Fuel Pressure Switch	See Detroit Diesel Parts Book	
HOUR METER	Hour Meter	100343	VIII-23
MAIN POWER	Main Power Circuit Breaker	400141	VIII-23
OIL PRESS.	Oil Pressure Gage/Switch	100329	VIII-23
OPEN/CLOSE	Clamp Switch	130155	VIII-23
OPEN SOL.	Open-Clamp Solenoid	130033	VIII-27
PS	Pressure Switch	810033	VIII-27
REVERSE	Vibrator Stop Solenoid	150165	VIII-25
START MOTOR	Engine Starter	See Detroit Diesel Parts Book	
START RELAY	Engine Start Relay	See Detroit Diesel Parts Book	
WATER TEMP.	Water Temperature Gage/Switch	100339	VIII-23
OVERSPEED	Overspeed Switch	110585	VIII-21
HOT WIRE RELAY	Hot Wire Relay	See Detroit Diesel Parts Book	
SHUTDOWN SOL.	Shutdown Solenoid	See Detroit Diesel Parts Book	
TACH	Tachometer	110974	VIII-23

NOTE: Refer to Detroit Diesel Operators Manual, Section 8, for Detroit Diesel parts ordering information whenever ordering engine related parts.

VII. GENERAL DATA

A. ABBREVIATIONS

The abbreviations shown below are used throughout the parts lists and various other parts of the manual.

Assy.	Assembly
BHCS	Button Head Cap Screw
Cyl.	Cylinder
DC	Direct Current
FHCS	Flat Head Cap Screw
FLCS	Flanged Head Cap Screw
HC	High Collar
HHCS	Hex Head Cap Screw
HHPP	Hex Head Pipe Plug
HSSS	Hex Socket Set Screw
Hyd.	Hydraulic
Lg.	Long
mm	Millimeter
Mtg.	Mounting
NPT	National Pipe Thread
PHMS	Phillips Head Machine Screw
P/N	Part Number
Qty.	Quantity
RHMS	Round Head Machine Screw
Sch.	Schedule
SHCS	Socket Head Cap Screw
SHPP	Socket Head Pipe Plug
SHSS	Socket Head Shoulder Screw
S/N	Serial Number
Sol.	Solenoid

B. SCREWS AND BOLTS

1. Practically all connections on the unit are made with socket head (Allen) cap screws. These high-strength screws are available at most industrial supply houses.

2. Screws and bolts are designated in the PARTS LIST in abbreviated form. (Refer to sub-section A, above for specific abbreviations). The information, in parenthesis, immediately following the bolt or screw designation shows the size as follows:

(1/2 - 13 x 1-1/2)	1/2" Diameter 13 Threads Per Inch 1-1/2" Length

VII. GENERAL DATA

B. SCREWS AND BOLTS (CONTINUED)

3. Some screws or bolts require a specific torque when replacing. For identification of these bolts and a more thorough understanding of torque, refer to SECTION IV - BOLT TORQUE INFORMATION.

C. SERIAL NUMBER LOCATIONS

1. The following J&M vibratory units are serial numbered separately:

   a. vibrator
   b. power unit

2. In addition to the serial number plate itself (on vibrators and power units), the serial number is stamped into each unit in one or more places as follows:

   a. Vibrator stamped twice - once on top right side of suppressor housing (motor side of vibrator). Once on vibration case near the sight level gage.

   b. Power unit stamped twice - once at control panel end (rear), inside coupler compartment at lower right corner, once on subbase at control panel end (rear), along fuel filler side of unit.

VIII. ORDERING PARTS

A. PROCEDURE

1. When ordering parts, be sure to include the model and serial number of the unit or component. The serial number may be located by referring to SECTION VII, SERIAL NUMBER LOCATIONS. Confirm all telephone orders immediately to avoid duplicating shipment.

2. ORIGINAL EQUIPMENT; Where serial numbers are given, these apply only to equipment and components originally furnished with the unit. Where equipment has been changed or added to, these numbers may not necessarily apply.

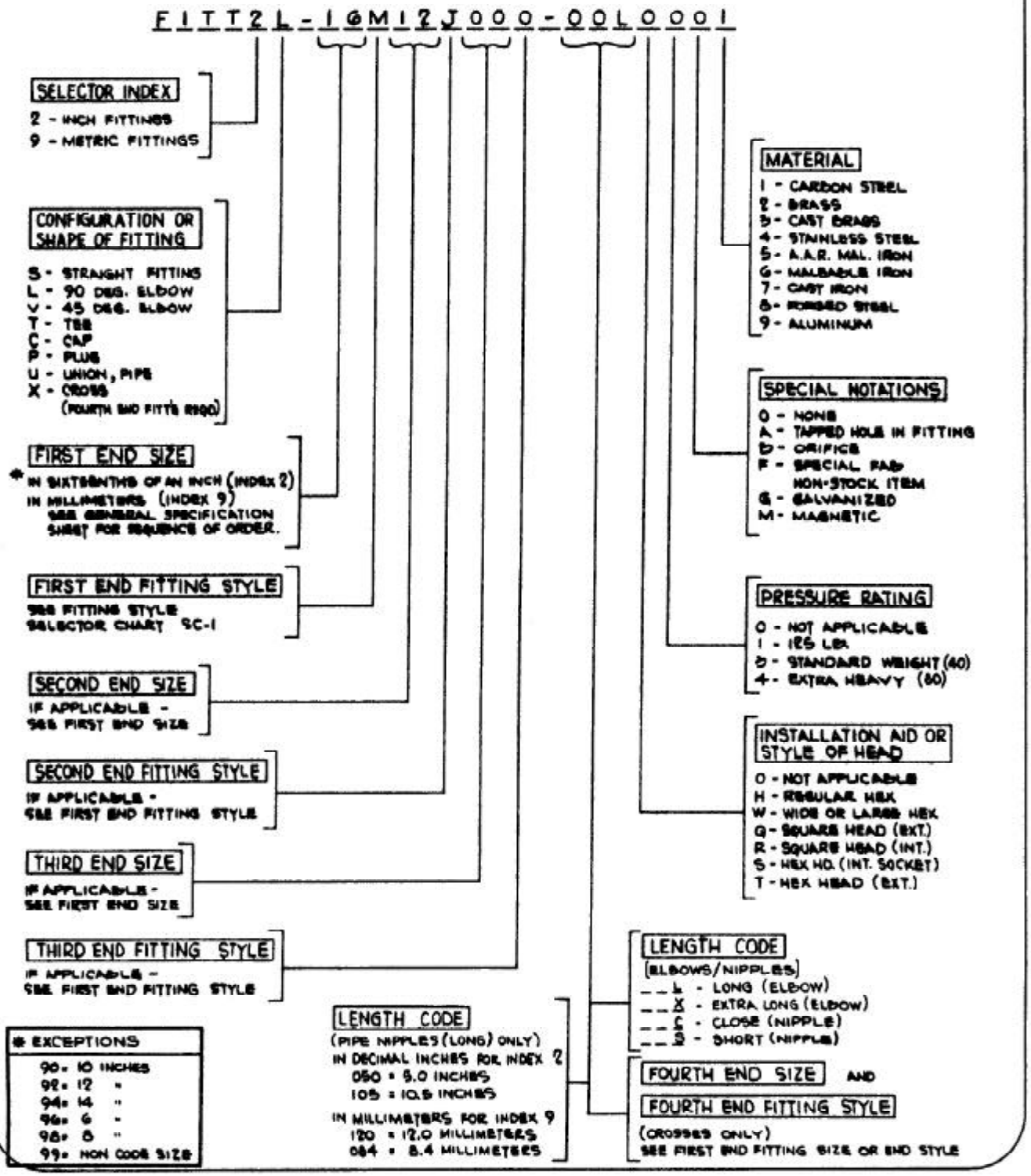
3. SHIPMENT; State to whom shipment is to be made and method of shipment desired, otherwise our own judgement will be used.

4. SHORTAGES; Claims for shortages or errors should be made immediately upon receipt of parts. No responsibility will be assumed for delay, damage or loss of material while in transit. Broken, damaged or lost material should be refused or a full description made of damage or loss to the carrier agent on the freight or express bill.

5. RETURN OF PARTS; If for any reason you desire to return parts to the factory or to any distributor from whom these parts were obtained, you must first secure permission to return the parts. Shipping instructions will be given along with this permission. A ten percent handling charge must be assessed against the returned shipment unless an error is made by the factory or by the distributor when filling your order.

VIII. ORDERING PARTS

B. FITTING DESCRIPTION KEY



VIII. ORDERING PARTS

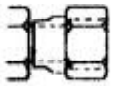
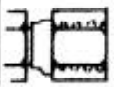
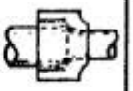
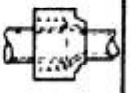
B. FITTING DESCRIPTION KEY (CONTINUED)

FITTING STYLE SELECTOR CHART

SC-1

FOR END FITTING STYLE SELECTION

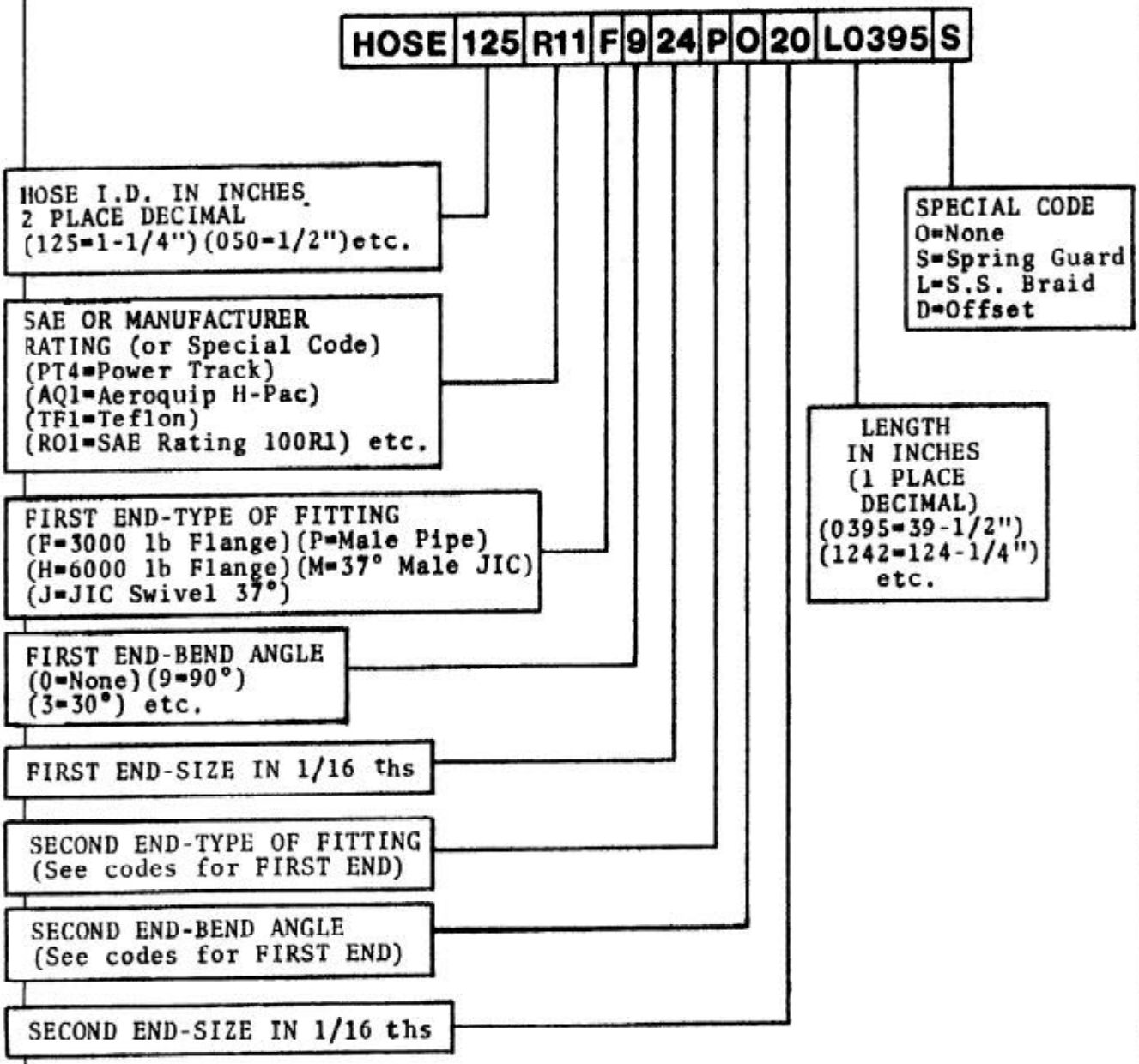
M		JIC MALE 37° FLARE
P		MALE PIPE NPTF
R		S.A.E. MALE O-RING (& ADJUSTABLE)
B		JIC MALE 37° FLARE BULKHEAD
D		MALE PIPE NPTF - SWIVEL
S		B.S.P. MALE PIPE
F		SPLIT FLANGE STANDARD PRESSURE CODE 61
H		SPLIT FLANGE HI PRESSURE CODE 62

J		JIC FEMALE 37° FLARE (& SWIVEL)
Q		FEMALE PIPE NPTF
K		S.A.E. FEMALE O-RING
N		FEMALE PIPE NPSM - SWIVEL
E		COMPRESSION FITTING FLARELESS (WEATHERHEAD)
I		COMPRESSION FITTING FLARELESS (IMPERIAL EASTMAN)

VIII. ORDERING PARTS

C. HOSE DESCRIPTION CODE

The HOSE DESCRIPTION CODE is a 24 digit number enabling easier and quicker identification whenever a hose replacement is desired. The key below explains the structure of the coded number in detail.



VIII. ORDERING PARTS

D. PARTS IDENTIFICATION

1. Parts lists and drawings are included on the following pages for the equipment components shown below:

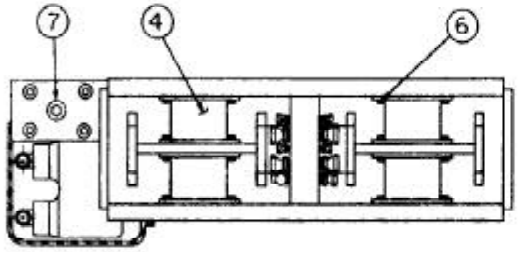
a.	VIBRATION SUPPRESSOR	800175
b.	VIBRATION CASE	810279
c.	HOSE ASSEMBLIES - INTERCONNECTING	800179
d.	POWER UNIT - ENCLOSURE	800181
	POWER UNIT WITH SILENCER GROUP	800183
e.	POWER UNIT - INTERNAL	800177
f.	CONTROL BOX	810249
	REMOTE CONTROL PENDANT	800023
g.	DRIVE CONTROL MANIFOLD	810265
h.	CLAMP MANIFOLD	810025

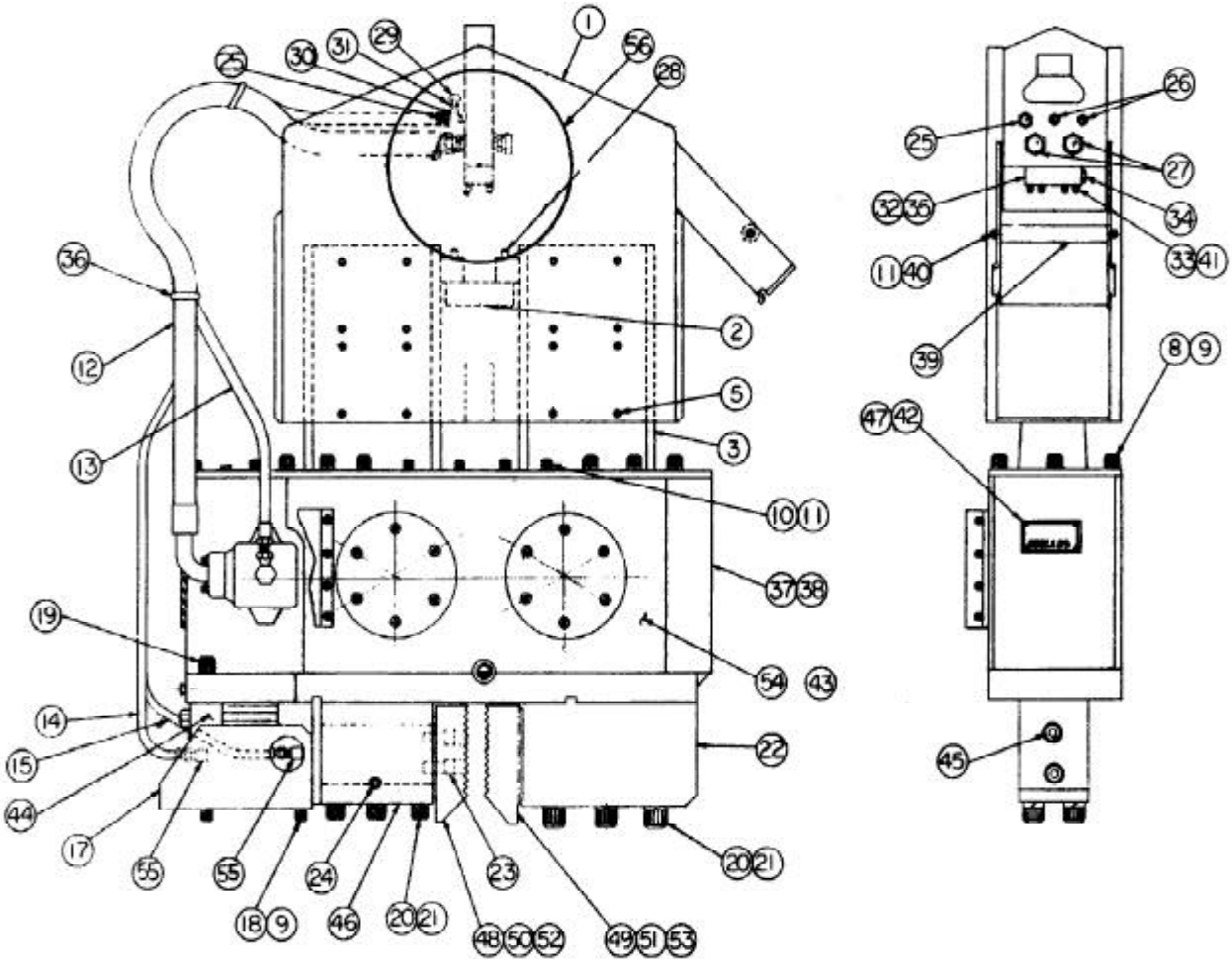
2. The spare parts list SECTION VIII - RECOMMENDED SPARE PARTS contains spare parts which may be very useful in keeping down-time to a minimum, especially in remote or secluded jobsites where unforeseen communication problems could cause delay of the delivery of an awaited part.

   These RECOMMENDED SPARE PARTS may be ordered beforehand, individually or as a package group as shown in the PARTS LIST.

PARTS LIST

VIBRATION SUPPRESSOR 800175





PARTS LIST

VIBRATION SUPPRESSOR 800175

Item	P/N	Qty.	Description
1	150011	1	Suppressor Housing
2	150013	1	Stop Plate
3	150009	1	Vibration Case Adapter
4	130023	4	Elastomer
5	100011	72	SHCS 1/2 - 13 x 2
6	130049	72	Nut 1/2 - 13 (ESNA)
7	100063	1	FITT2P-16P000000-000S007
8	100067	15	SHCS 3/4 - 10 x 2-1/2
9	100069	19	Lockwasher (3/4)
10	100071	10	SHCS 5/8 - 11 x 2-1/2
11	100007	12	Lockwasher (5/8)
12	150025	2	HOSE125R02P020F924L0580S
13	150027	1	HOSE075R01P012P008L0580S
14	150029	1	HOSE038R02P006J006L0820S
15	150031	1	HOSE038R02P006J006L0870S
17	130009	1	Cylinder Guard
18	400275	4	SHCS 3/4 - 10 x 1-1/2
19	100212	1	SHCS 1 - 8 x 4
20	130077	12	SHCS 1-1/2 - 6 x 11
21	100195	12	Lockwasher (1-1/2)
22	130285	1	Fixed Jaw Bracket
23	100214	2	SHSS 1-1/4 x 11/16
24	100229	1	Grease Fitting
25	100043	2	FITT2S-12P12N000-000H001
26	100041	4	FITT2S-06P06N000-000H001
27	100039	4	FITT2S-20P20N000-000H001
28	130135	4	SHCS 5/8 - 11 x 3-1/2
29	100032	1	Relief Valve (RV3)
30	130097	1	FITT2T-12Q12P12Q-0000001
31	400409	1	FITT2S-12P08Q000-000H001
32	100097	2	O-Ring (#214)
33	110177	4	SHCS 5/16 - 18 x 2-1/2
34	110731	1	Check Valve (CV2)
35	150015	1	Check Body
36	130243	5	Rubber Tie Down
39	130299	1	Hose Guide Rod

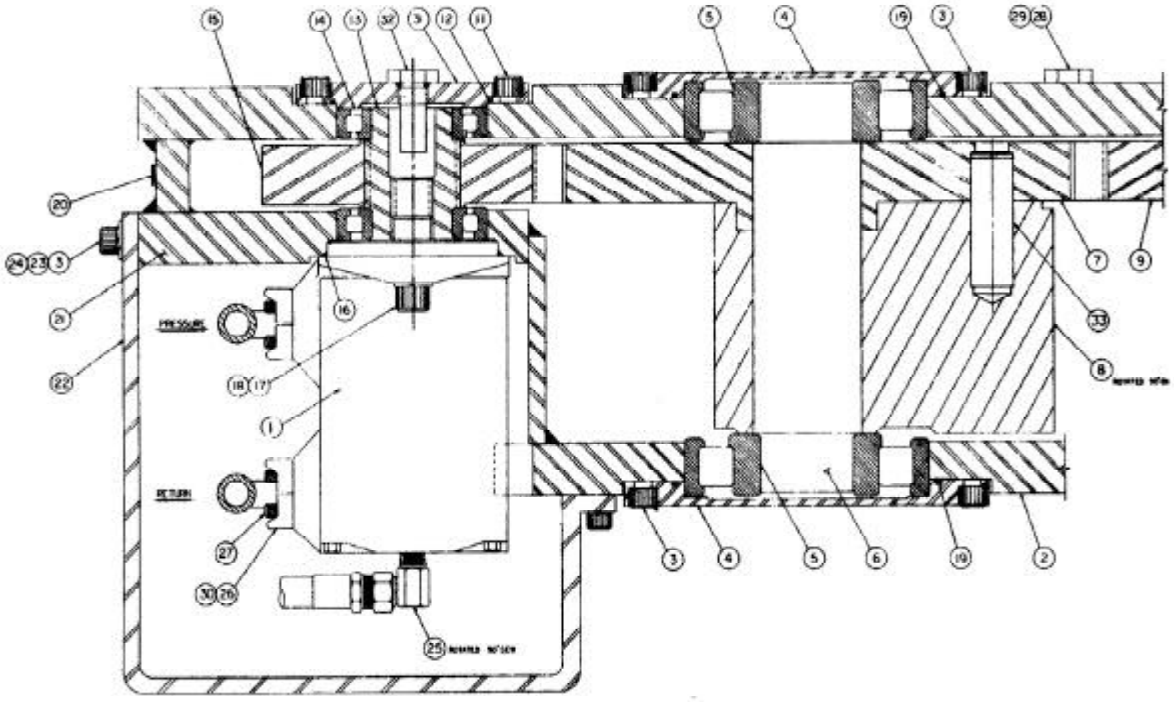
PARTS LIST

VIBRATION SUPPRESSOR 800175

Item	P/N	Qty.	Description
40	100575	2	SHCS 5/8 - 11 x 1-1/4
41	100287	4	Lockwasher (5/16)
42	130381	4	Rivet
44	810217	1	Clamp Cylinder Assembly (CYL)
45	300043	2	SHCS 1 - 8 x 8
46	130001	1	Guide Block
47	150043	1	Serial Number Plate
48	100217	1	Universal Jaw - Moveable
49	110515	1	Universal Jaw - Fixed
50	100221	1	Double Sheet Jaw - Moveable
51	110419	1	Double Sheet Jaw - Fixed
52	100225	1	H-Beam Jaw - Moveable
53	110541	1	H-Beam Jaw - Fixed
54	810279	1	Vibration Case
55	130057	2	FITT2L-06M06R000-000H001
56	400277	1	J&M Logo Plate

PARTS LIST

VIBRATION CASE 810279

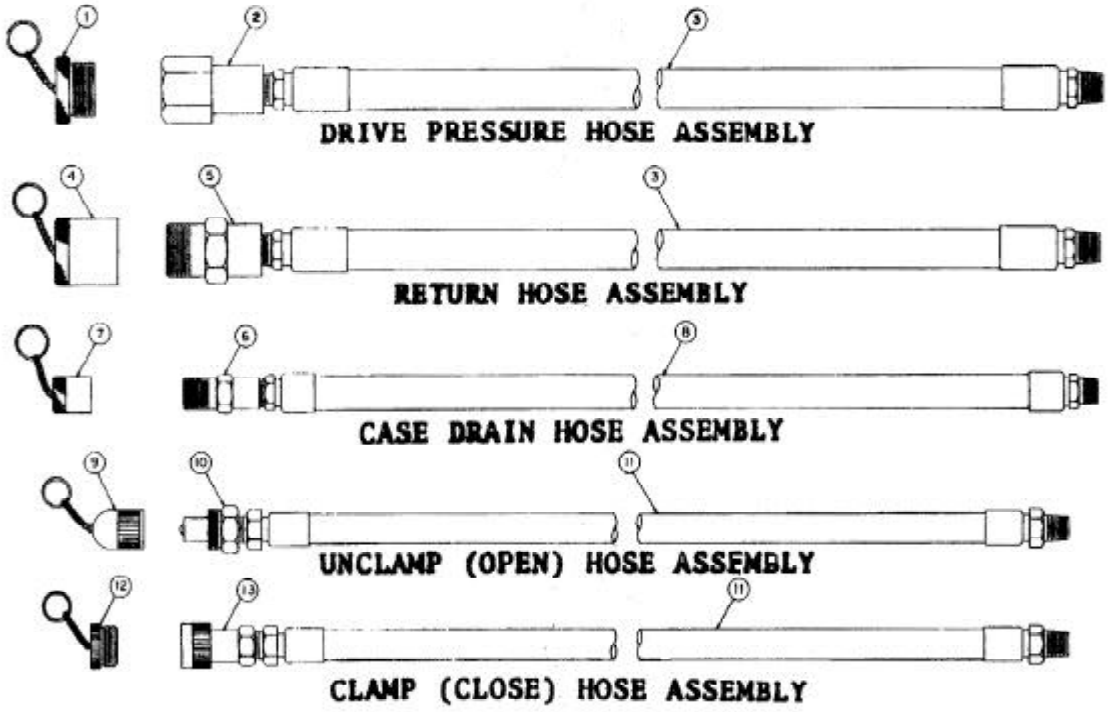


PARTS LIST

VIBRATION CASE 810279

Item	P/N	Qty.	Description
1	150023	1	Drive Motor (M1)
2	810043	1	Vibration Case Frame
3	100119	33	SHCS 1/2 - 13 x 1-1/4
4	100165	4	Bearing Cover
5	150017	4	Roller Bearing
6	150003	2	Eccentric Shaft
7	150005	1	Eccentric Gear
8	150001	2	Eccentric
9	150007	1	Eccentric Gear
11	100445	4	SHCS 1/2 - 13 x 1
12	100781	1	O-Ring (#156)
13	100755	1	Motor Gear Shaft
14	100161	2	Roller Bearing
15	100739	1	Motor Gear
16	110197	1	O-Ring (#159)
17	100005	2	SHCS 5/8 - 11 x 1-3/4
18	100007	2	Lockwasher (5/8)
19	100167	4	O-Ring (#266)
20	100187	1	FITT2P-12P000000-000S0M7
21	130289	1	Vibration Case Gasket
22	130287	1	Motor Guard
23	100121	9	Lockwasher (1/2)
24	100483	6	Flatwasher (1/2)
25	130167	1	FITT2L-08N06P000-000H001
26	100596	4	Split Flange Half (#24)
27	100163	8	SHCS 1/2 - 13 x 1-3/4
28	100185	1	Sight Gage
30	110119	2	O-Ring (#225)
31	100985	1	Bearing Housing
32	810229	1	Centrifugal Breather
33	150173	2	Drive Pin

HOSE ASSEMBLIES - INTERCONNECTING 800179



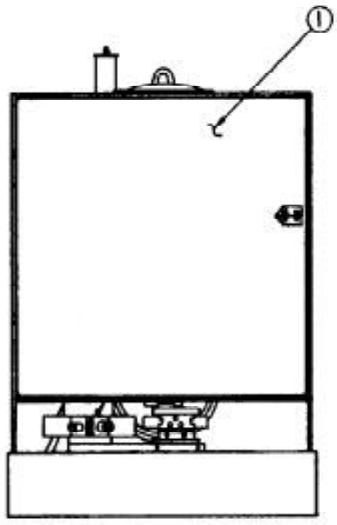
PARTS LIST

HOSE ASSEMBLIES - INTERCONNECTING 800179

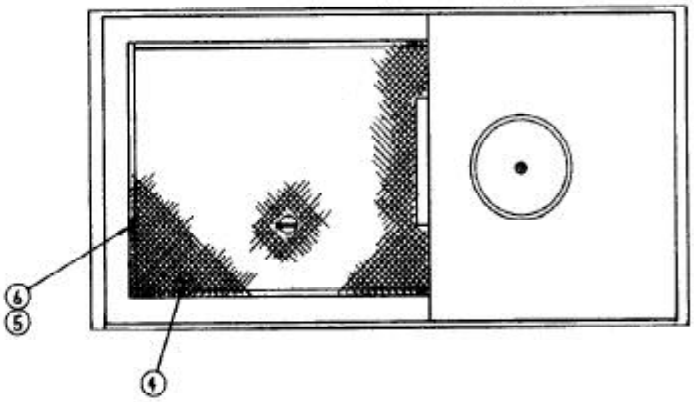
Item	P/N	Qty.	Description
1	400077	1	Dust Plug - 1-1/4
2	400111	1	Female Disconnect - 1-1/4
3	150157	2	HOSE125R02P020P020L78000
4	400079	1	Dust Cap - 1-1/4
5	400093	1	Male Disconnect - 1-1/4
6	400251	1	Male Disconnect - 3/4
7	400253	1	Dust Cap - 3/4
8	150159	1	HOSE075R02P012P012L79200
9	100257	1	Dust Cap - 3/8
10	100245	1	Male Disconnect - 3/8
11	150161	2	HOSE038R02P006P006L79200
12	100737	1	Dust Plug - 3/8
13	100777	1	Female Disconnect - 3/8
14	130243	5	Rubber Tie Down

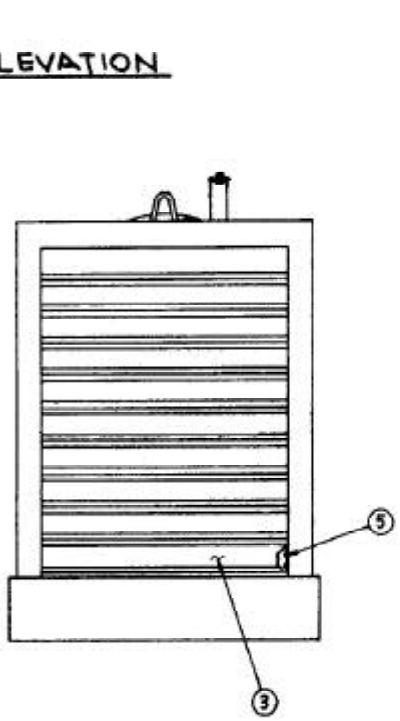
PARTS LIST

POWER UNIT - ENCLOSURE 800181

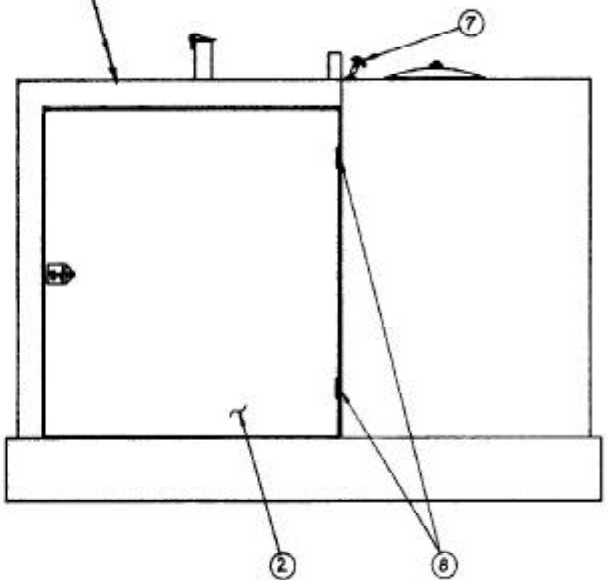


REAR ELEVATION





9 OPTIONAL with
10 Silencer Group



PARTS LIST

POWER UNIT - ENCLOSURE 800181

Item	P/N	Qty.	Description
1	150057	1	Control Door
2	150055	2	Side Door
3	150053	10	Louver
4	810329	1	Exhaust Grill
5	130209	48	Hex Tek 1/4 - 14 x 5/8
6	130227	8	Fender Washer (1/4)
7	110221	1	Door Catch
8	150169	6	Hinge (5")

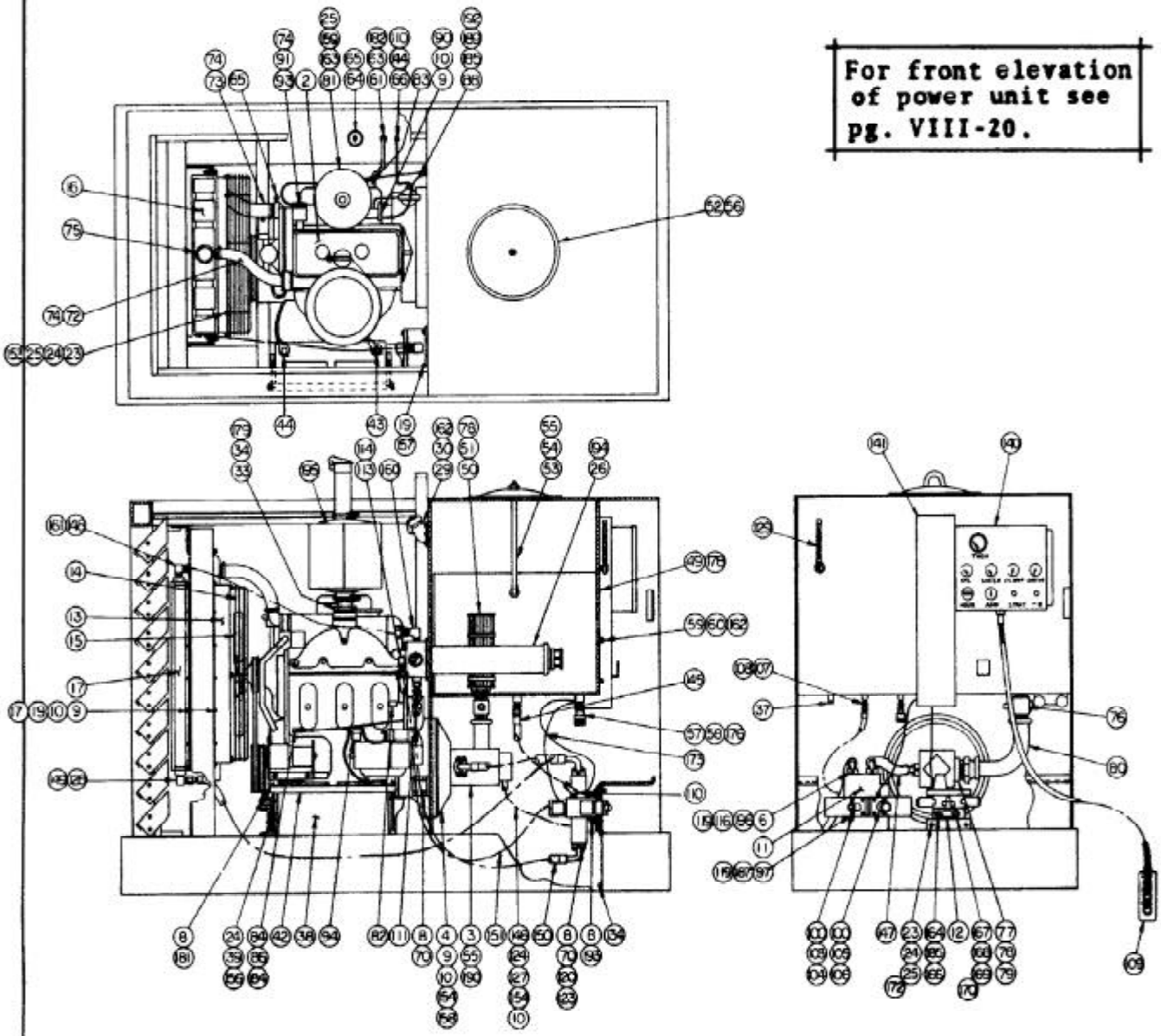
POWER UNIT - ENCLOSURE WITH SILENCER GROUP 800183

Item	P/N	Qty.	Description
All items listed above and including:			
9	150163	1	Acoustical Padding Group
10	130217	1	Glue (Gallon)

NOTE: Quiet-package for power unit is offered as an option.

PARTS LIST

POWER UNIT - INTERNAL 800177



For front elevation of power unit see pg. VIII-20.

PARTS LIST

POWER UNIT - INTERNAL 800177

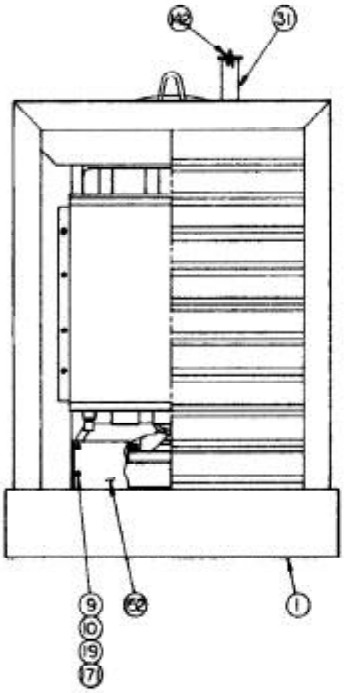
Item	P/N	Qty.	Description
1	810263	1	Fuel Tank Subbase
2	150099	1	Engine (E)
3	150021	1	Drive Pump (P1)
4	400259	1	Pump Adapter
6	100443	12	Lockwasher (7/16)
8	100121	20	Lockwasher (1/2)
9	100051	20	SHCS 3/8 - 16 x 1
10	400149	27	Lockwasher (3/8)
11	810265	1	Drive Valve Assembly
12	810025	1	Clamp Manifold
13	150091	1	Fan Shroud
14	150093	1	Fan Shield
15	150095	1	Fan
16	150097	1	Radiator
17	150061	1	Oil Cooler (OC)
19	100535	26	Hex Nut (3/8)
23	100289	10	Hex Nut (5/16)
24	100293	16	Flatwasher (5/16)
25	100287	16	Lockwasher (5/16)
26	400085	1	Return Filter (F2)
29	150077	1	Breather (Filler)
30	100576	7	SHCS 1/4 - 20 x 5/8
31	400263	1	Exhaust Extension
33	400267	2	Exhaust Clamp
34	150121	1	Muffler Flange
37	100183	4	FITT2P-12P000000-000S007
38	150081	1	Battery - 12V
39	400231	2	Hold Down Stud (5/16 x 8-1/2) S.S.
42	150111	1	Battery Hold Down
43	110755	1	Battery Cable (+)
44	100537	1	Battery Cable (-)
49	150033	1	Reservoir
50	400087	1	Pick-Up Filter (F1)
51	400445	2	Flex-Wrap Magnet
52	150067	1	Reservoir Access Cover
53	150113	1	L-Rod (5/8 - 11)
54	100273	1	Hex Nut (5/8 - 11)
55	100007	3	Lockwasher (5/8)
56	100086	1	Nut 5/8 - 11 (ESNA)
57	120049	1	FITT2S-12P12P000-000H001
58	400095	1	Female Disconnect (3/4) (QD5)
59	100557	4	SHCS 1/4 - 20 x 3/4

POWER UNIT - INTERNAL (CONTINUED) 800177

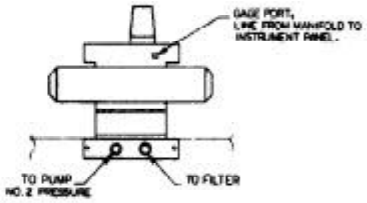
Item	P/N	Qty.	Description
60	100559	4	Lockwasher (1/4)
61	150137	1	HOSE038TFIJ006P004L0310L
63	110821	1	Fuel Filter Element
64	100417	1	FITT2C-48Q000000-0000306
65	100419	2	Fuel Cap Vent
66	150135	1	HOSE038TFIJ006P004L0190L
70	100119	12	SHCS 1/2 - 13 x 1-1/4
72	150117	1	Upper Radiator Hose
73	150119	1	Lower Radiator Hose
74	100963	6	Radiator Hose Clamp
75	150115	1	Radiator Cap
76	400117	1	Stop Cock (2-1/2 NPT)(MV-1)
77	150101	1	Solid Flange (3")
78	400173	2	FITT2S-48P40Q000-000H306
79	130119	2	FITT2S-40P000000-0450301
80	400195	1	Hose Coupler
81	150151	1	Air Filter
82	150129	1	Pressure Switch
83	150131	1	Check Valve
84	100333	1	FITT2L-04E02Q000-000H002
86	110415	9	Oil Pressure Hose
88	100429	1	Throttle Cable Seal
90	150107	1	Throttle Mounting Bracket
91	100577	1	Throttle Stop Cable Clamp
93	150109	1	Stop Cable Bracket
94	130095	1	Start Relay
97	150059	2	Flange Blocks
100	100441	2	FITT2S-20P20P000-000H001
103	400111	1	Female Disconnect (1-1/4)(QD2)
104	400077	1	Dust Plug (1-1/4)
105	400093	1	Male Disconnect (1-1/4) (QD1)
106	400079	1	Dust Cap (1-1/4)
107	400409	1	FITT2S-12P08Q000-000H001
108	110173	1	FITT2S-08M08P000-000H001
109	800023	1	Control Pendant Assembly
110	130399	2	FITT2S-06M04P000-000H001
111	100565	1	FITT2S-24M24P000-000H001
113	110713	1	FITT2S-12Q000000-0000308
114	100489	1	FITT2L-12M12P000-0000001
116	130177	6	Split Flange Half (#20)
119	100037	5	O-Ring (#222)
120	100596	2	Split Flange Half (#24)
123	110119	1	O-Ring (#225)
124	100049	2	Split Flange Half (#12)

PARTS LIST

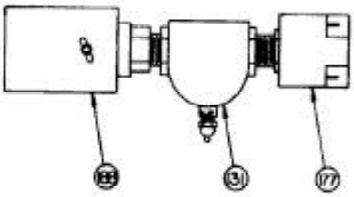
POWER UNIT - INTERNAL (CONTINUED) 800177



POWER UNIT
FRONT ELEVATION



CLAMP MANIFOLD



TACHOMETER T-DRIVE

For side elevation & top & rear view of power unit see pg. VIII-16

Item	P/N	Qty.	Description
127	100097	1	O-Ring (#214)
128	400221	1	FITT2L-20M20P000-0000001
129	130179	1	Sight Gage/Thermometer
131	150127	1	Tachometer Tee Drive
134	100423	2	FITT2P-08P000000-000S007
140	810249	1	Control Box Cover
141	150063	1	Wire Guard Shield
142	400265	1	Exhaust Rain Cap
144	400199	1	FITT2S-04Q04Q000-000H001
145	150149	1	HOSE038R02J006J006L03000
146	130051	1	HOSE050R09J008F012L02400
147	150139	1	HOSE125R10J024F920L0225D
148	150141	1	HOSE150R01J020J024L04250
149	150143	1	HOSE125R01J020F920L09300
150	150145	1	HOSE150R01J024F924L05600

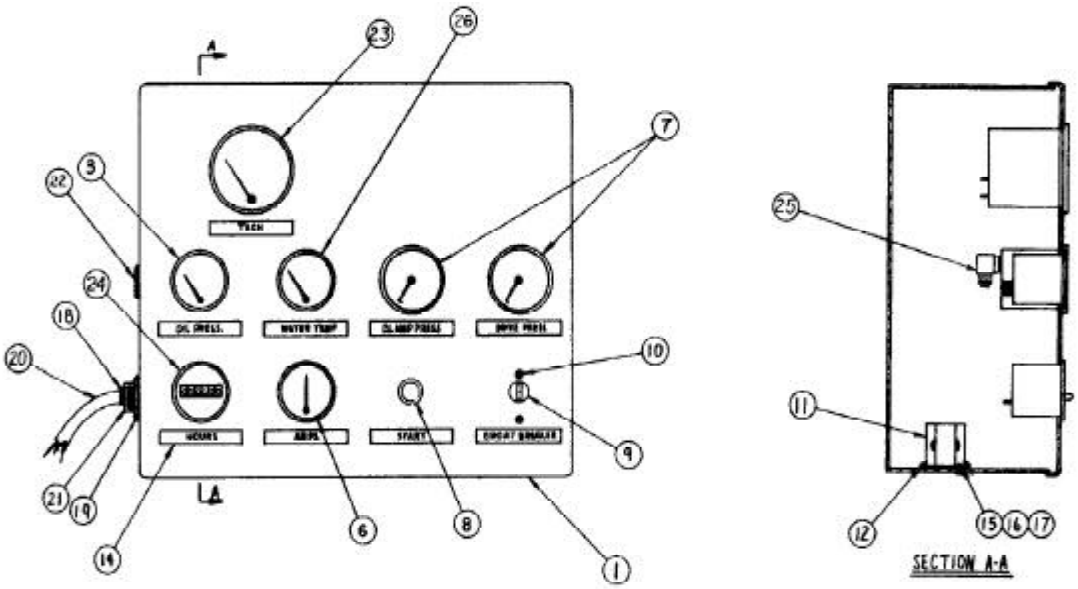
PARTS LIST

POWER UNIT - INTERNAL (CONTINUED) 800177

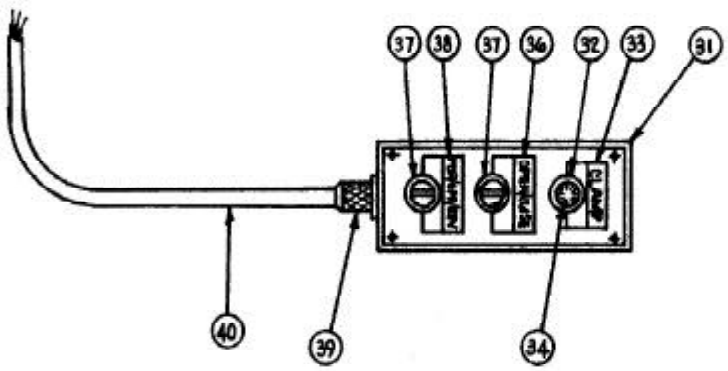
Item	P/N	Qty.	Description
151	150147	1	HOSE075R01J012J012L06300
152	150075	1	Baffle
153	100309	8	BHCS 5/16 - 18 x 1
154	100143	16	SHCS 3/8 - 16 x 1-1/4
156	100831	2	Wing Nut (5/16)
157	110511	4	Seal Washer (3/8)
158	100648	8	SHCS 3/8 - 16 x 7/8
159	150179	6	HHCS 5/16 - 18 x 3/4
160	100588	1	FITT2L024M24P000-0000001
161	150133	1	FITT2L-24M20P000-0000001
162	100597	11	Flatwasher (1/4)
163	810291	1	Air Filter Adapter
164	100245	1	Male Disconnect (3/8) (QD4)
165	100257	1	Dust Cap (3/8)
166	130221	1	FITT2S-08P06P000-000H001
167	100777	1	Female Disconnect (3/8) (QD3)
168	100737	1	Dust Plug (3/8)
169	400357	1	FITT2S-08P06Q000-000H001
170	130203	1	FITT2S-06P06P000-0300401
171	400151	28	Flatwasher (3/8)
172	110177	2	SHCS 5/16 - 18 x 2-1/2
173	110413	2	HOSE019R01J004J004L06000
174	100345	1	Stop Cable
176	400121	1	Dust Plug (3/4)
177	810301	1	Tachometer Transmitter Assembly
179	150199	1	Exhaust Adapter
180	400245	3	Wire Bundle Bracket
181	100163	2	SHCS 1/2 - 13 x 1-3/4
182	110171	1	FITT2S-08P06M000-000H001
184	100338	1	Hose Fitting (1/4)
185	150183	1	Throttle Cable
187	150083	8	SHCS 7/16 - 14 x 2-1/2
188	110585	1	Over Speed Switch
189	150185	1	Throttle Cable Clevis
190	100005	2	SHCS 5/8 - 11 x 1-3/4
192	150201	1	Stop Cable Pivot
193	100021	2	SHCS 1/2 - 13 x 1-1/2
194	810119	2	Filter Element
195	130267	1	Spiral Silencer
196	100439	12	SHCS 7/16 - 14 x 1-3/4

PARTS LIST

CONTROL BOX 810249



REMOTE CONTROL PENDANT ASSEMBLY 800023



PARTS LIST

CONTROL BOX 810249

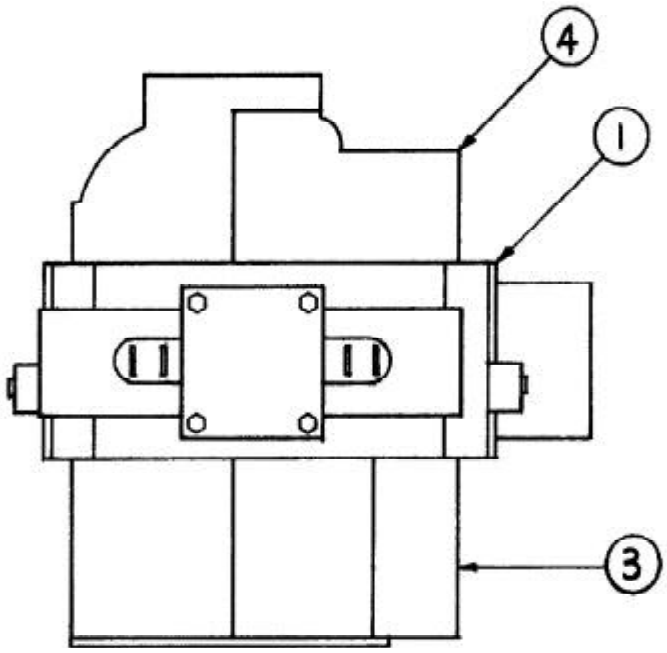
Item	P/N	Qty.	Description
1	810247	1	Box Assembly
3	100329	1	Oil Pressure Gage
6	110371	1	Ammeter
7	150079	2	Pressure Gage (GA1) (GA2)
8	130259	1	Start Switch
9	400141	1	Circuit Breaker - 10A
10	100331	2	BHCS #6 - 32 x 1/4
11	110567	7	Terminal Blocks
12	110569	1	Terminal Mounting Track
14	150103	1	Label Group
15	110649	2	PHMS #10 - 32 x 3/8
16	400161	2	Lockwasher (#10)
17	400163	2	Hex Nut (10 - 32)
18	110841	3	Plastic Bushing (1/2)
19	110843	3	Locknut (1/2)
20	110229	2	S/O Cord - 6'
21	100855	3	Straight S/O Connection
22	110701	4	Grommet (3/4)
23	110974	1	Tachometer
24	100343	1	Hourmeter
25	100321	2	FITT2L-04M04Q000-0000001
26	100339	1	Water Temperature Gauge

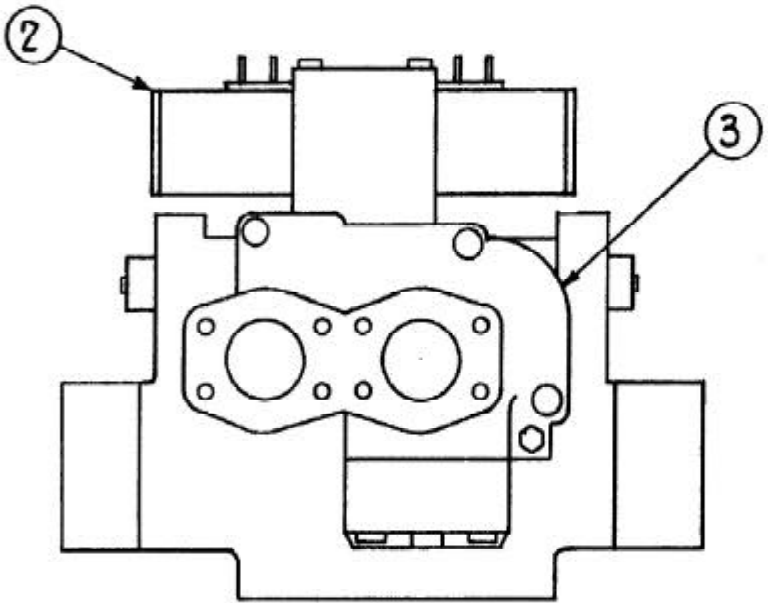
REMOTE CONTROL PENDANT ASSEMBLY 800023

Item	P/N	Qty.	Description
31	130153	1	Pendant Enclosure
32	130085	1	Clamp Light
33	100403	1	CLAMP Nameplate
34	100361	1	Lens, Clear
36	100401	1	OPEN-CLOSE Nameplate
37	130155	2	Switch
38	130157	1	FOR-OFF-REV Nameplate
39	100371	1	Strain Relief
40	130365	1	Pendant Cable (50')

PARTS LIST

DRIVE CONTROL MANIFOLD 810265





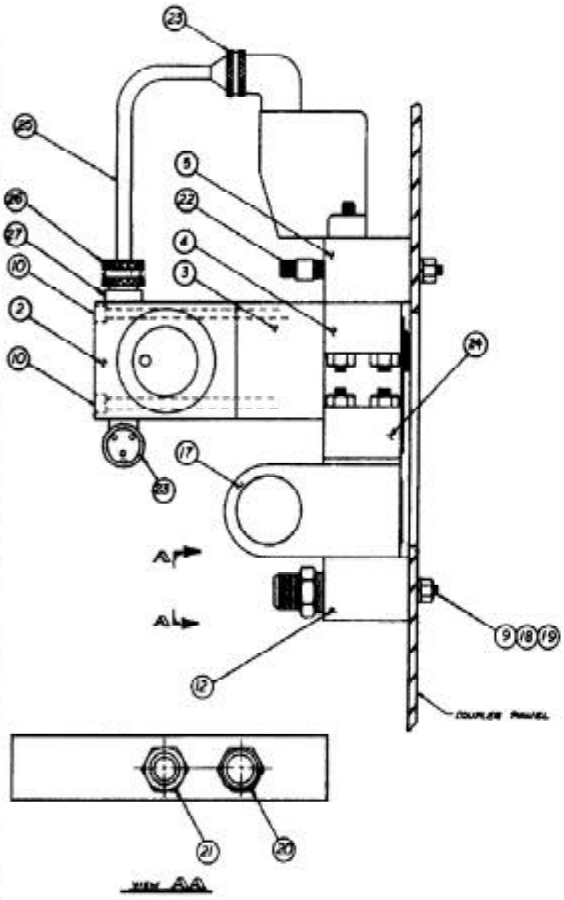
PARTS LIST

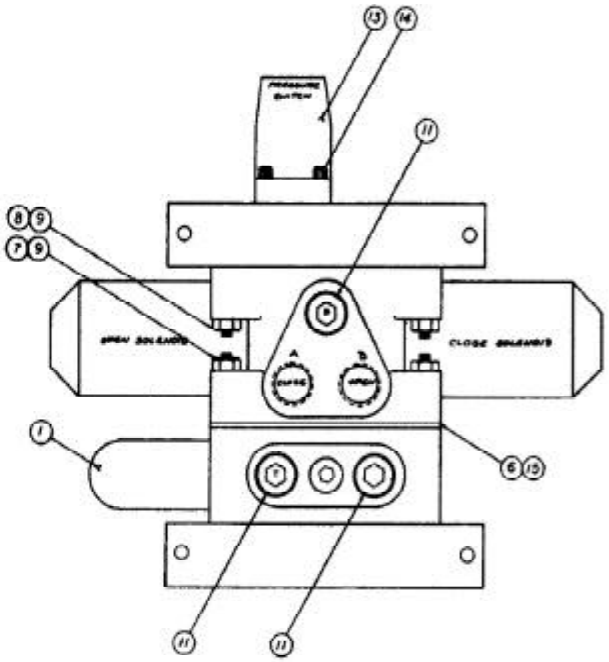
DRIVE CONTROL MANIFOLD 810265

Item	P/N	Qty.	Description
	150165	1	Manifold Stack Includes Items Below:
1			(1) Four-Way Valve
2			12VDC Solenoid
3			(1) Relief Valve (Inlet)
4			(1) Pressure Valve (Outlet)

PARTS LIST

CLAMP MANIFOLD 810025





PARTS LIST

CLAMP MANIFOLD 810025

Item	P/N	Qty.	Description
24	810137	1	Clamp Manifold Assembly
			Includes Items Below:
1	110145		(1) Relief Valve (RV2)
2	130033		(1) Control Valve (V1)
3	110149		(1) Check Valve (CV1)
4	110151		(1) Subplate
5	130187		(1) End Plate
6	110157		(1) Dividing Plate
7	110159		(4) SHCS 5/16-18 x 4-3/4
8	110161		(4) SHCS 5/16-18 x 2-3/4
10	130241		(4) SHCS 1/4 - 20 x 4
11	100423		(3) FITT2P-08P000000-000S007
12	130189		(1) End Plate
15	110179		(20) O-Ring (24mm)
17	110153		(1) Subplate
23	110235		(2) S/O Cord Adapter
27	110885		(2) Conduit Adapter
9	100289	4	Hex Nut 5/16 - 18
13	810033	1	Pressure Switch (PS)
14	110167	2	SHCS #10 - 32 x 1
18	110177	4	SHCS 5/16 - 18 x 2-1/2
19	100287	4	Lockwasher 5/16
20	110175	1	FITT2S-12M08P000-000H001
21	110173	1	FITT2S-08M08P000-000H001
22	110203	2	FITT2S-04M04P000-000H001
23	110235	1	S/O Cord Adapter
25	110227	1	Cord S/O
26	100855	1	S/O Compression Fitting
27	110885	1	Conduit Adapter

VIII. ORDERING PARTS

E. MISCELLANEOUS ACCESSORIES

1. TOOLS

Part Number	Qty.	Description
100651	1	24-Volt Test Light
100653	1	Set of Allen Wrenches - Includes All Wrenches Shown Below:
100655		(1) 1/16" Allen Wrench - Long Arm
100691		(1) 5/64" Allen Wrench - Long Arm
100569		(1) 3/32" Allen Wrench - Long Arm
100661		(1) 7/64" Allen Wrench - Long Arm
100663		(1) 1/ 8" Allen Wrench - Long Arm
100665		(1) 9/64" Allen Wrench - Long Arm
100667		(1) 5/32" Allen Wrench - Long Arm
100669		(1) 3/16" Allen Wrench - Long Arm
100671		(1) 7/32" Allen Wrench - Long Arm
100673		(1) 1/ 4" Allen Wrench - Long Arm
100657		(1) 5/16" Allen Wrench - Long Arm
100675		(1) 3/ 8" Allen Wrench - Long Arm
100677		(1) 7/16" Allen Wrench - Long Arm
100679		(1) 1/ 2" Allen Wrench - Long Arm
100681		(1) 9/16" Allen Wrench - Long Arm
100683		(1) 5/ 8" Allen Wrench - Long Arm
100685		(1) 3/ 4" Allen Wrench - Long Arm
100687		(1) 7/ 8" Allen Wrench - Short Arm
100689		(1) 1" Allen Wrench - Short Arm

2. BULK

Part Number	Qty.	Description
810013	5 GAL	Hydraulic Fluid
810011	5 GAL	Vibration Case Lubricant
100726	1 GAL	Coolant/Anti-Freeze
100298	1 GAL	J&M Green Paint
100299	1 GAL	Primer

VIII. ORDERING PARTS

E. MISCELLANEOUS ACCESSORIES (CONTINUED)

3. 116 DRIVER/EXTRACTOR HOSE GROUP KIT 850069

Item	P/N	Qty.	Description	Page Ref.
12	150025	2	HOSE125R02P020F924L0580S	VIII- 6
13	150027	1	HOSE075R01P012P008L0580S	VIII- 6
14	150029	1	HOSE038R02P006J006L0820S	VIII- 6
15	150031	1	HOSE038R02P006J006L0870S	VIII- 6

4. 110 POWER UNIT HOSE GROUP KIT 850071

Item	P/N	Qty.	Description	Page Ref.
61	150137	1	HOSE038TF1J006P004L0310L	VIII-16
66	150135	1	HOSE038TF1J006P004L0190L	VIII-16
145	150149	1	HOSE038R02J006J006L03000	VIII-16
146	130051	1	HOSE050R09J008F012L02400	VIII-16
147	150139	1	HOSE125R10J024F920L0225D	VIII-20
148	150141	1	HOSE150R01J020J024L04250	VIII-16
149	150143	1	HOSE125R01J020F920L09300	VIII-16
150	150145	1	HOSE150R01J024F924L05600	VIII-16
151	150147	1	HOSE075R01J012J012L06300	VIII-16
173	110413	2	HOSE019R01J004J004L06000	VIII-16

5. 116/110 O-RING KIT 850073

P/N	Qty.	Description
100037	14	O-Ring (#222)
110119	6	O-Ring (#225)
100097	6	O-Ring (#214)
100781	2	O-Ring (#156)
110197	2	O-Ring (#159)
100167	8	O-Ring (#266)

NOTE: O-Rings for Drive Control Manifold - 810265 are not included in this kit. They must be ordered separately and as a complete package.

Order: O-RING KIT - 110 DRIVE CONTROL MANIFOLD.

VIII. ORDERING PARTS

E. MISCELLANEOUS ACCESSORIES (CONTINUED)

6. CYLINDER SEAL KIT

P/N	Qty.	Description
810225	1	Clamp Cylinder Seal Kit

F. RECOMMENDED SPARE PARTS

VIBRATION SUPPRESSOR 800175 Refer to page VIII-6

Item	P/N	Qty.	Description
4	130023	1	Elastomer
14	150029	1	HOSE038R02P006J006L0820S
15	150031	1	HOSE038R02P006J006L0870S
20	130077	2	SHCS 1-1/2 - 6 x 11
23	100214	2	SHSS 1-1/4 x 11/16
32	100097	2	O-Ring (#214)
45	300043	2	SHCS 1 - 8 x 8
55	130057	2	FITT2L-06M06R000-000H001
--	810225	1	Cylinder Seal Kit
--	--	1 Set*	Clamp Jaws (Universal)
48	100217		(1) Moveable
49	110515		(1) Fixed
--	--	1 Set*	Clamp Jaws (Double Sheet)
50	100221		(1) Moveable
51	110419		(1) Fixed
--	--	1 Set*	Clamp Jaws (H-Beam)
52	100225		(1) Moveable
53	110541		(1) Fixed

*Determine type of jaws required and order either the Universal Set, the Double Sheet Set or the H-Beam Set.

VIII. ORDERING PARTS

F. RECOMMENDED SPARE PARTS (CONTINUED)

VIBRATION CASE 810279 Refer to page VIII-10

Item	P/N	Qty.	Description
12	100781	1	Bearing O-Ring (#156)
16	110197	1	Motor O-Ring (#159)
19	100167	4	O-Ring (#266)
28	100185	1	Sight Gage
30	110119	2	O-Ring (#225)

HOSE ASSEMBLIES-INTERCONNECTING 800179 Refer to page VIII-12

Item	P/N	Qty.	Description
3	150157	1	HOSE125R02P020P020L78000
8	150159	1	HOSE075R02P012P012L79200
11	150161	1	HOSE038R02P006P006L79200

POWER UNIT - INTERNAL 800177 Refer to page VIII-16 or VIII-20

Item	P/N	Qty.	Description
63	110821	1	Fuel Filter Element
119	100037	3	O-Ring (#222)
123	110119	1	O-Ring (#225)
127	100097	1	O-Ring (#214)
146	130051	1	HOSE050R09J008F012L02400
150	150145	1	HOSE150R01J024F924L05600
194	810119	2	Filter Element

DRIVE CONTROL MANIFOLD 810265 Refer to page VIII-24

Qty.	Description
1	O-Ring Kit - Drive Control Manifold 110 Power Unit