MODEL
VIBRATORY
DRIVER/EXTRACTOR

OPERATING AND MAINTENANCE MANUAL

J&M MODEL 1412

VIBRATORY PILE DRIVER/EXTRACTOR

WITH MODEL 950 POWER PACK

Serial Numbers: 185013 & Above

OM-1412/950-0594

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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, the service life will be Drastically Reduced. 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.

MODEL
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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 may 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 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, cost of installation, duty, taxes or any other charges whatsoever, or any liability for direct, indirect, incidental, or consequential damage of 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 of 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 OF J&M 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.

MODEL
VIBRATORY
DRIVER/EXTRACTOR

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OPERATING INSTRUCTIONS

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OPERATING INSTRUCTIONS (CONTINUED)

PARTS LIST

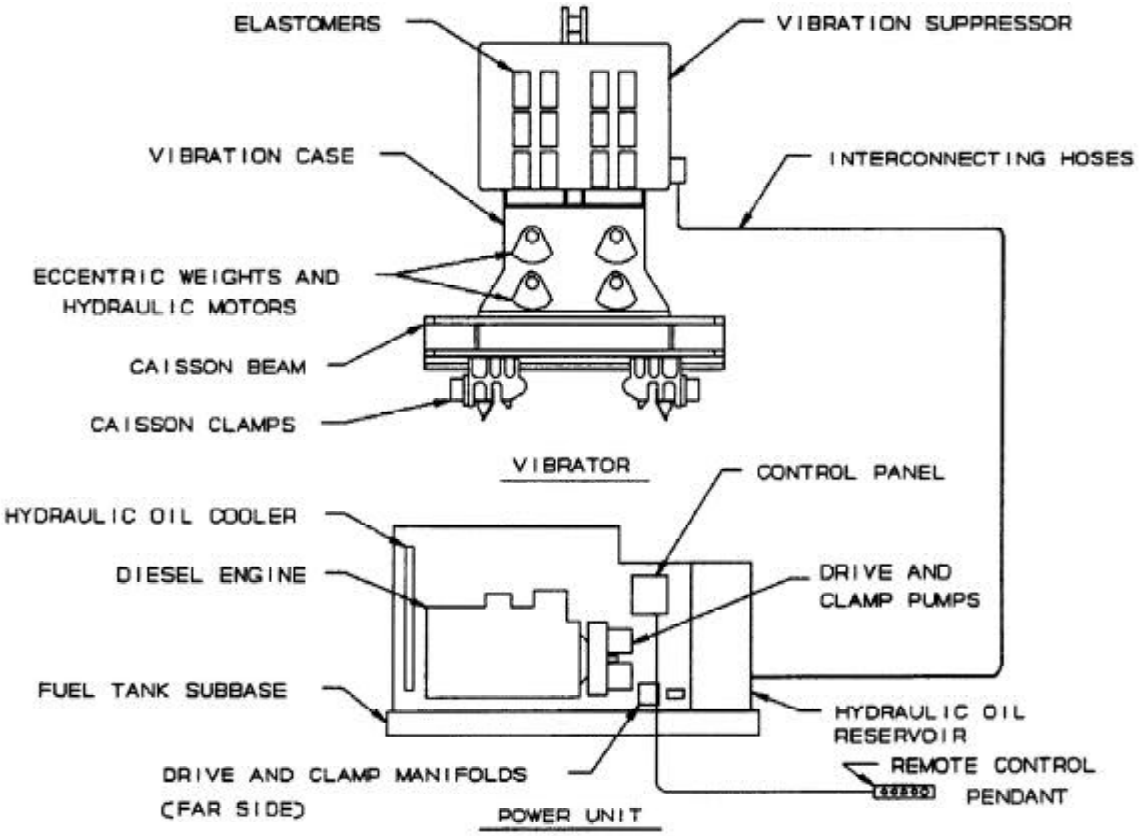
I. GENERAL DESCRIPTION

A. GENERAL

The J&M Model 1412B is a variable-frequency vibratory pile driver/extractor designed to drive and extract large caisson pipes up to 10 feet in diameter. With the use of other special hydraulic clamps, it may also be used to drive or extract other heavy sections, including sheet piling and wide flange beams.

The Model 1412B operates in a frequency range of 500 to 1250 vibrations per minute to provide maximum pile penetration rates in a wide variety of soils. The unit has an eccentric moment of 10,000 inch-pounds and operates with an amplitude of 1 to 1-1/2 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 four eccentric weights which rotate in a vertical plane to create vibration. The eccentric weights are driven by four hydraulic motors mounted on the vibration case. The four motors and four eccentrics are all gear connected to maintain proper synchronization. The eccentric and motor shafts are mounted in heavy-duty roller bearings. Lubrication is provided by a splash system activated by the rotating eccentrics and gears.

The vibration suppressor contains twenty-four rubber elastomers to isolate the vibration case from the crane . The suppressor is designed for a maximum line pull of 150 tons during extraction.

C. HYDRAULIC CLAMP

The Model 122 Caisson Clamps available for use with the 1412B Vibratory Driver/Extractor are used in pairs with either a 11' Caisson Beam to drive and extract pipe ranging from 22-1/4" min. I.D. to 129-1/4" max. O.D., or with a 4' Caisson Beam which has a range of 22 1/4" min. I.D. to 54 1/2" max. O.D.

Although primarily intended to drive and extract large diameter caisson pipes, the 1412B Vibrator may also drive and extract a variety of other heavy piling sections, by using the Model 196 Clamp Assembly.

D. POWER UNIT

The Model 1412B Vibrator is power by the J&M Model 950 power pack. The 950 power pack is powered by a Caterpillar 3412TA diesel engine. The engine develops 800 HP at 1900 RPM.

The totally enclosed power unit is mounted on a skid-type fuel tank sub-base. A Control panel at the side of the unit contain all operating gages and controls. A common reservoir supplies hydraulic fluid to five separate hydraulic pumps - four for the vibrator motors and one for the hydraulic clamp.

Three hydraulic hoses, 150 feet in length, connect the power unit to the hydraulic motors on the vibrator. Two other hydraulic hoses run from the power unit to the hydraulic clamp(s).

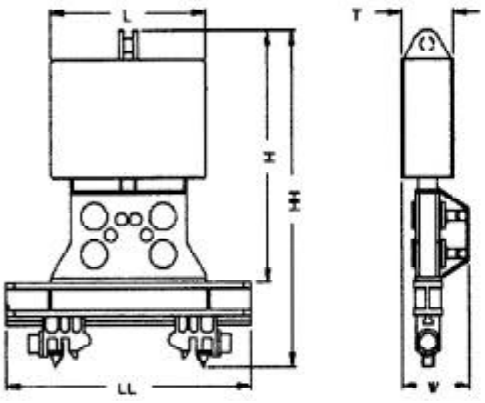
I. GENERAL DESCRIPTION

E. REMOTE-CONTROL PENDANT

The vibrator is operated by a hand-held remote control pendant. The pendant has two, two-way switches, and three push buttons, (one with a light). One switch (SLOW-FAST) raises and lowers the diesel engine speed. The other switch (OPEN-CLOSE) operates the hydraulic clamp. The (STOP) push button (red),stops the vibrator. The clear push button (START), starts the vibrator. The indicator light in the (START) button, when lite , shows it is safe to start vibration. The (red mushroom) push button (EMERGENCY STOP) shuts down the diesel engine instanly,in the event of an emergency. Note: All of the controls are duplicated on the control panel, except the EMERGENCY STOP and the SLOW-FAST buttons, in case the pendant is damaged. (See pg.III-6, Section E-e).

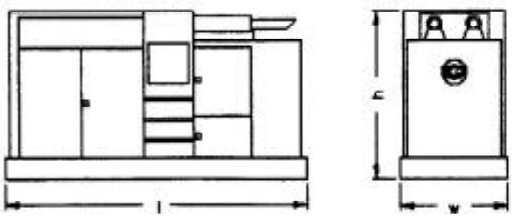
F. SPECIFICATIONS

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



2. MODEL 1412B VIBRATOR (with hydraulic clamp)

Type.....Hydraulic
Eccentric Moment..10,000 In-lbs.
Frequency.....500-1250 VPM
Amplitude.....1"-1-1/2"
Pile Clamping Force.....250 Tons
Max. Line Pull for Extraction.....150 Tons
Suspended Weight with 196 Clamp.....30,800 lbs.
Length [L].....96 in.
Width [W].....41 in.
Throat Width [T].....32 in.
Height with Clamp [HH]...192 in.
Height without clamp [H].148 in.



3. MODEL 950 POWER UNIT

Type.....Diesel
Engine.....CAT 3412TA
Horsepower (1900 RPM).....800
Weight.....24000 lbs.
Length [l].....186in.
Width [w].....66 in.
Height [h].....100 in.

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 to control the fuel rack.

7. Remove all tools and electrical cords before starting.

8. Store oily rags in containers.

II. PREPARATION FOR OPERATION

B. SAFETY PRECAUTIONS (CONTINUED)

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

Ordinarily the 1412B is used with the caisson clamps, which are mounted in pairs. The clamps, when used in conjunction with the 11 foot beam , must be installed after the caisson beam is connected to the bottom of the vibrator. The caisson beam should be bolted to underside of the vibrator using (26) 1-1/2-6UNC x 5" Lg. socket head cap screws and lockwashers. If the tee bar is not mounted, it must be mounted to the caisson beam using (37) 1-1/2-6UNC x 5" Lg. socket head cap screws and lockwashers. After all bolts are in place , torque to 2800 Ft/lbs.If a torque wrench is not available , place a six foot long pipe over the end of the Allen wrench and have two men tighten each bolt.

The 122 caisson clamps may then be mounted by sliding them onto the caisson beam and positioning them equal distance from the centerline of the vibrator,to suit the caisson pipe on which they will be clamped.

When using the 4 foot caisson beam, it can be mounted directly to the bottom of the vibrator,using (12) 1-1/2-6UNC x 8" Lg. socket head cap screws and lockwashers. (Torqued to 2800 Ft/lbs.)

Orient a 196 clamp to the vibrator with the clamp cylinder end (movable jaw) at the same end of the vibrator as the hose guard is mounted. All (11) 1-1/2-6UNC x 5"Lg.socket head cap screws and lockwashers must be in place and torqued to 2800 Ft.lbs.

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 hoses (Fig. 1).

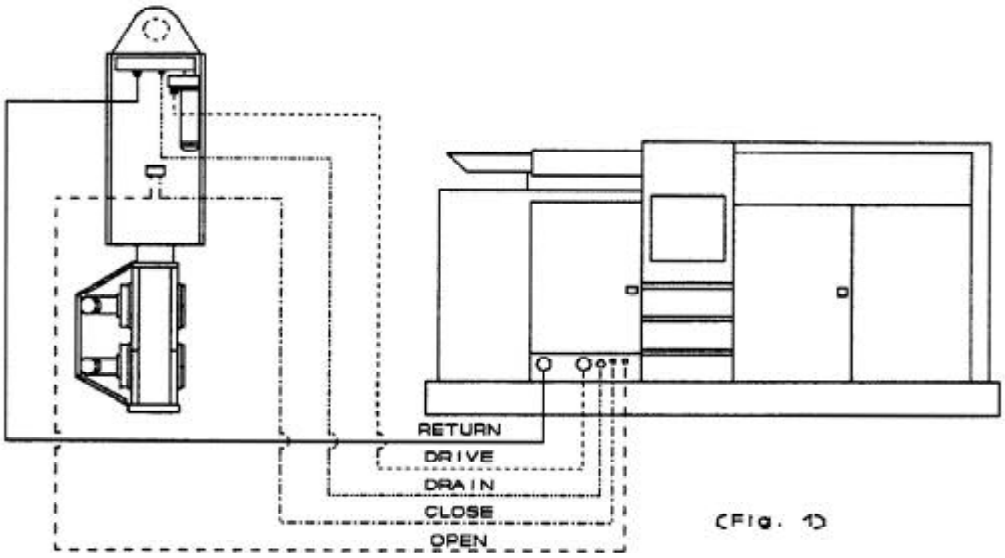
      CAUTION: The power unit must be shut down during connection of the hydraulic hoses.

   b. The hoses connect to the power unit with quick-disconnect couplers. The hose couplers are arranged to insure correct connections at the power unit. See the diagram (Fig. 1) below for correct hose connection.

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

   d. Make sure that the couplers are fully run up. They should be fully hand tight. Do not use wrenches to tighten.

   e. Tighten the set screws on the two large couplers to prevent loosening.



(Fig. 1)

II. PREPARATION FOR OPERATION

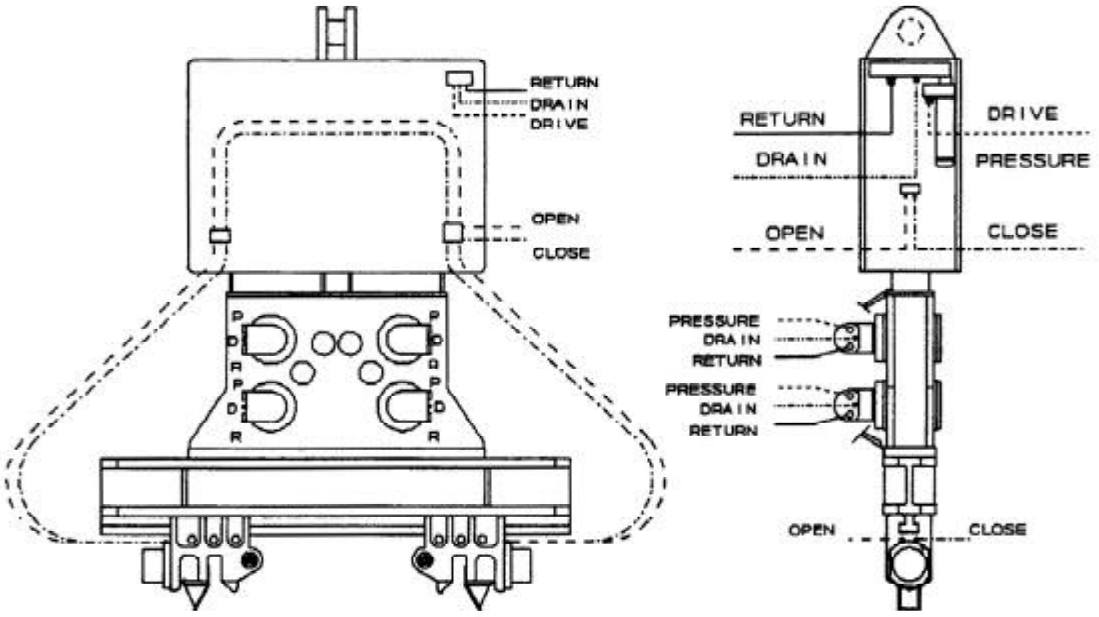
E. CONNECTION OF HYDRAULIC HOSES (CONTINUED)

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 in the field. Fig. 1 on the previous page shows the correct arrangement of the five hoses connecting the power unit to the vibrator.

CAUTION: Starting the vibrator with the hoses reversed will result in low power or possible ruptured hoses.

b. For clamp hose connections, refer to Fig.2, on this page ,as well as Fig.1 on page II-3 for the correct arrangement. The caisson clamp which are most commonly used with the 1412B, should be connected using these illustrations as a guide. Hose clamp blocks are normally stamped "O" for Open and "C" for Close so that lines may be routed to the correct fittings.

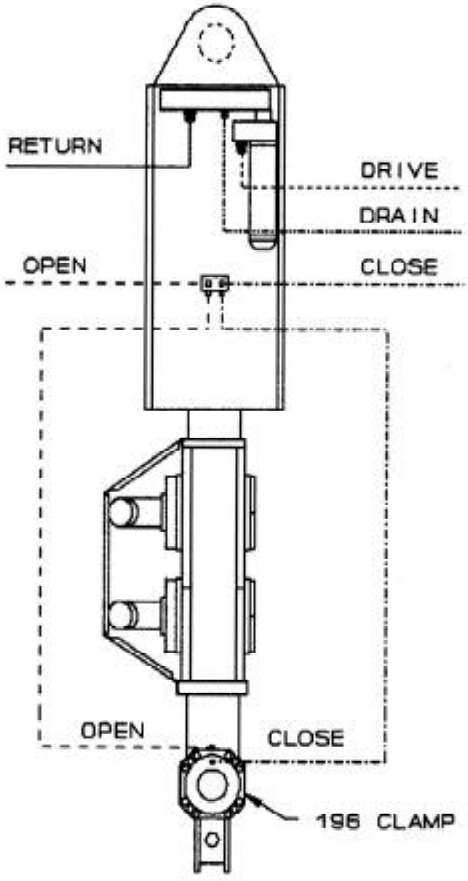


(Fig. 2)

II. PREPARATION FOR OPERATION

B. CONNECTION OF HYDRAULIC HOSES (CONTINUED)

c. For the 196 clamp hose connections, refer to Fig.3 on this page , as well as Fig.2 on page II-4. Cap the two #6 JIC ports on the clamp hose manifold block on the opposite end of the vibration suppressor. Attach the two 3/8 hoses to clamp hose manifold block on the main hose side of the vibration suppressor. Attach the other end of these hoses to the correct ports on the 196 clamp cylinder.



II. PREPARATION FOR OPERATION

F. BLEEDING HYDRAULIC CLAMP HOSES

1. When the vibrator and hydraulic clamp are shipped with all hoses attached (between vibrator, clamp and Power Unit, the hoses are usually full of fluid and may be used immediately. However, if any of the clamp hoses are connected at the jobsite or if air is present in hoses, they must be bled prior to 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 1200 RPM, loosen the close-clamp line at the hydraulic clamp. Turn the clamp switch on the remote-control pendant to CLOSE. Wait until fluid flows from the connection at the hydraulic clamp. When fluid flows without air, tighten the connection.

5. After the line has been bled, alternately turn the clamp switch to CLOSE and OPEN to insure that the clamp is working properly. It may be necessary to bleed the line more than once. The open-clamp line may also require bleeding.

G. FILLING VIBRATOR PRESSURE HOSE

1. The vibrator is usually shipped with the vibrator hydraulic hoses full of fluid and 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.

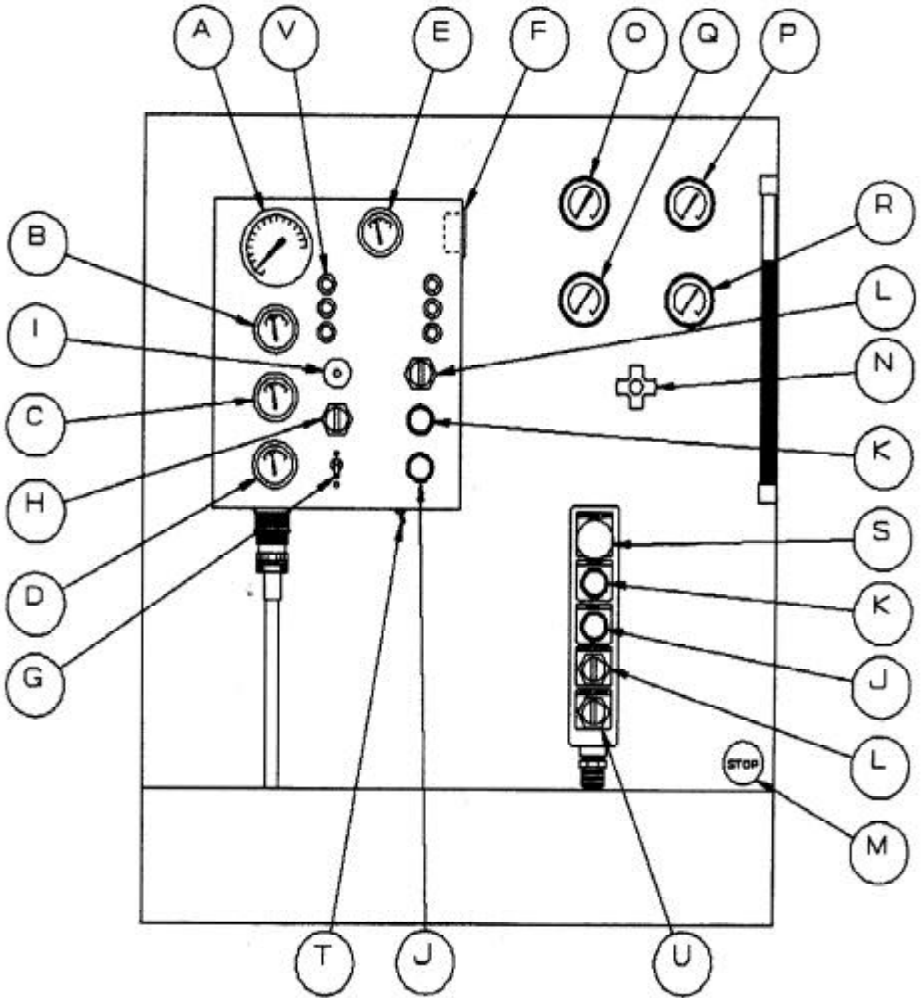
2. Read SECTION III - OPERATING INSTRUCTIONS.

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 pressure hose will fill with hydraulic fluid in about ten minutes. Do not press the START button on the control pendant.

III. OPERATING INSTRUCTIONS

CONTROL PANEL WITH REMOTE CONTROL-PENDANT



(Fig. 1)

III. OPERATING INSTRUCTIONS

A. COMPLETION OF SET-UP AND MAINTENANCE

1. Complete all preparation as described in Section II.

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

B. CONTROL PANEL

1. The control box (Fig. 1, page III-1) at the side of the power pack contains the controls and gages for the diesel engine,vibrator,and the OPERATION AND MAINTENANCE INSTRUCTIONS.

2. Control panel contains the following controls, gages and shutdown indicators.

   a. Engine Tachometer
   b. Engine oil Pressure Switch Gage
   c. Engine Water Switch Gage
   d. Engine Ammeter
   e. Hydraulic Fluid Temperature Switch Gage
   f. Engine Hour Meter
   g. Main Power Switch - ON-OFF Switch & Cir. Breaker
   h. Engine - ON-OFF-START - Switch for Diesel Engine
   i. Engine Shutdown Reset Button - over ride button for engine shutdown switch. Must be held in until oil pressure exceeds 30 PSI.
   j. Vibrator Stop Button
   k. Vibrator Start Button - with clamp light.
   l. Clamp Switch - open - close.
   m. Emergency Stop - pull out to stop engine.
   n. Engine Throttle
   o. Pressure Gage - Forward
   p. Pressure Gage - Brake
   q. Pressure Gage - Close Clamp
   r. Pressure Gage - Open Clamp
   s. Vibrator Switch
   t. Remote - Local Switch
   u. Shutdown indicator lights (6)
      1. Engine Oil Pressure shutdown indicator - comes on if engine has been shut down automatically due to engine oil pressure being low.
      2. Engine Water Temperature shutdown - comes on if engine has been shutdown automatically due to engine water overheating.
      3. Engine Overspeed shutdown indicator - comes on if engine has been shut down automatically due to the engine being run at excessively high RPM'S.

III. OPERATING INSTRUCTIONS

B. CONTROL PANEL (CONTINUED)

4. Filter Clogged shutdown indicator - comes on if engine has been shut down automatically due to the hydraulic fluid return filter being clogged.
5. Hydraulic Fluid Level Low shutdown indicator comes on if engine has been shut down automatically due to low hydraulic fluid level in the reservoir.
6. Hydraulic Fluid Temperature High shutdown indicator - comes on if engine has been shut down automatically due to high hydraulic fluid temperature.

3. The Operating & Maintenance Instructions on the control box door are there as reminders only. They are not complete and not intended to substitute for a through understanding of the Operators Manual.

III. OPERATING INSTRUCTIONS

C. STARTING AND WARMING UP ENGINE

1. Before starting the engine, read the CATERPILLAR OPERATION GUIDE carefully. Follow the engine starting, operating and maintenance procedures in that manual.

2. The diesel engine should not be started if the temperature of the hydraulic fluid is below 0 deg F. If ambient temperatures below 0 deg. F are anticipated, an immersion heater for the hydraulic fluid is available. Consult J&M for details.

3. Turn the MAIN POWER switch on the control panel to "ON".

4. Pull out the ENGINE THROTTLE about half way. Pressing the button on the end of the throttle allows rapid throttle adjustment. Turning the throttle allows fine adjustment. Be sure the EMERGENCY STOP knob is fully pushed in.

5. Turn the ENGINE START switch to START. Press and hold the SHUTDOWN RESET in until engine oil pressure exceeds 30 PSI. The engine should start.

6. Adjust the throttle until the engine is running at 1500 RPM and allow to warm up five minutes. After the engine is warmed up, adjust throttle so engine runs at 2100 RPM's under no load. The engine should hold 1900 RPM's under load.

7. Allow the temperature of the hydraulic fluid to come up to at least 30 deg. 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 deg. F. The HYDRAULIC FLUID COLD light on the control panel will be on if fluid temperature is below 60 deg. F.

2. If temperature is below 60 deg. F, set the engine at 1500 RPM and press the START button on the control pendant to start the vibrator. Allow the vibrator to run until the temperature of the hydraulic fluid exceeds 60 deg. F.

III. OPERATING INSTRUCTIONS

D. WARMING HYDRAULIC FLUID (CONTINUED)

3. When the engine is warmed up and hydraulic fluid temperature is at least 60 deg. F, full speed operation may begin.

4. The hydraulic fluid temperature is automatically maintained within acceptable limits by the Cooler Valves. Fluid temperature should never exceed 170 deg.F. The engine will be automatically shut down by the Hydraulic Fluid Temperature Switch Gage,if fluid temperature exceeds 170 deg. F.

CAUTION: Do not operate the vibrator if hydraulic fluid temperature exceeds 170 deg. 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 of electrical cable to permit operation from any advantageous position near the vibrator.

2. The pendant has three control buttons, two two-way switchs, 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 (Start Button) 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.

b. To Start Vibration:

Press the START button (lighted).

CAUTION: Do not press the START button until the CLAMP light comes on , indicating adequate clamping pressure.

III. OPERATING INSTRUCTIONS

E. OPERATION OF REMOTE-CONTROL PENDANT (CONTINUED)

c. To Stop Vibration:

Press the STOP button.
The vibrator will stop vibration in a few seconds. If the STOP button does not stop the vibrator, push the EMERGENCY STOP button.

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. Hold the CLAMP switch in the OPEN position for approximately 10 seconds or until a visual check shows the jaws to be fully open.

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

e. To change engine speed:

Turn the Throttle switch (SLOW-FAST) to SLOW and the engine speed will decrease. Turn the switch to FAST and the engine speed will increase.

f. Emergency stop button:

Push the EMERGENCY STOP button in and all operating functions will cease to operate. Diesel engine and vibrator will stop immediatlly.

g. If the remote control pendant is damaged or the pendant line is cut, you may still operate the vibrator by using the control switches on the control panel. (See Fig. 1 on page III-1 items J, K, L). To activate these switches, find the toggle switch on the bottom of the control panel, labeled "REMOTE-LOCAL". Turn the switch to LOCAL. The switches on the control panel will be functional and the remote control pendant will be disabled. The throttle arm attached to the end of the manual throttle cable will have to be attached to the governor shaft. The electric throttle actuator must then be disconnected from the throttle arm. Now engine speed may be varied manually.

III. OPERATING INSTRUCTIONS

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 500 to 1250 vibrations per minute by changing engine speed. Engine speed is changed with the ENGINE THROTTLE on the control panel,or the throttle switch SLOW-FAST on the Control Pendant. Vibration frequency corresponds to engine speed according to the table shown below.

ENGINE RPM	VIBRATOR VPM
1900	1250
1520	1000
1220	800
910	600
760	500

G. SHUT DOWN

1. Stop the vibrator.

2. Allow the diesel engine to run for five minutes at 1100 RPM.

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

4. Stop the engine by turning the ENGINE START switch to OFF. (Engine may also be stopped by pulling the EMERGENCY STOP KNOB on the control panel out,or pushing in the EMERGENCY STOP button on the Remote Control Pendant.)

5. Turn MAIN POWER switch to OFF.

6. 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 vibratory driver, clamp, 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. Different lubricants are needed and some components in the unit require more frequent lubrication than others. Therefore, it is important that the instructions regarding types of lubricants and frequency of their applications be closely followed.

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

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

2. Prior to starting the power unit or at the beginning of each shift, check the following items:

   a. Visibly inspect all bolts, nuts and screws including the bolts fastening the hydraulic clamp (caisson beam) to the vibration case to insure they are tight. IMPORTANT: Vibration loosens bolts check carefully.

   b. Tighten bolts holding gripping jaws in hydraulic clamp.

IV. MAINTENANCE AND ADJUSTMENTS

B. DAILY (CONTINUED)

c. Grease plunger in hydraulic clamps with any good multi-purpose grease.

d. Check the oil level in the vibration case and add oil if required. The oil level should be in the middle of the sight glass. Change oil if milky or black.

e. Check the fluid level in the hydraulic 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 (10 Service Meter Units) maintenance checks and lubrication in the CATERPILLAR OPERATION GUIDE. For the J&M Model 950 power unit, the HOUR METER on the control panel may be considered to read Caterpillar's "Service Meter Units".

3. After engine start-up, check the following:

a. Check all hydraulic hoses for leaks. Make sure they hang freely with no kinks.

b. Check both pumps and all hydraulic manifolds for leaks.

c. Check the filter indicators. The filter on the vibrator may be checked at any time. The return filters on the power unit must be checked with the diesel engine running at full speed.

IV. MAINTENANCE AND ADJUSTMENTS

C. 125 HOURS (125 Service Meter Units)

1. Drain and refill the vibration case.

2. Perform all maintenance checks and lubrication indicated in the Caterpillar OPERATION GUIDE.

D. 250, 500 HOURS and other

1. See Caterpillar OPERATION GUIDE.

2. After the first 500 hours, drain and replace the lubricant in the multi-pump drive, there after change every six months.

E. ANNUALLY

1. Have the hydraulic fluid tested by a local hydraulic service center. Replace if required.

2. See Caterpillar OPERATION GUIDE.

F. SEVERE CONDITIONS

1. The service 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 deg. F or below -10 deg. F, reduce service intervals to one-half of those specified in Sections C through E.
3. When operating in the presence of dust or sand, reduce service time intervals by one-half of those specified.
4. When operating in excess of twelve hours per day, reduce service time intervals by one-half of those specified.
5. When operating in air with high salt or moisture, the servicing intervals need not usually be changed. However, the unit should be inspected weekly to determine if additional servicing be required. Also, have hydraulic fluid tested quarterly.

6. During stand-by or inactive period, the servicing intervals may be twice those specified above. The unit should be "exercised" every week, also, refer to the Caterpillar OPERATION GUIDE.

IV. MAINTENANCE AND ADJUSTMENTS

G. LUBRICATION

1. Crankcase (Diesel Engine)

   a. Follow the engine manufacturer's maintenance schedule and the lubricating oil specifications outlined in the CATERPILLAR OPERATION GUIDE.
   b. The lubricant shall meet the performance requirements of API Service Classifications CD or MIL-L-2104C.
   c. New engines are shipped with ASHLAND 400M+HDT-15W-40 but the following multi-grade crankcase oils are recommended for use or replacement in normal operation (10 deg. F to 90 deg. F) (-12 deg. C to 32 deg. C).

AMOCO	- 15W-40	300
ARCO	- 15W-40	Fleet S3 Plus
BORON (BP)	- 15W-40	Vanellus C Extra
CHEVRON	- 15W-40	Delo 400
CITGO	- 15W-40	C500 Plus
CONOCO	- 15W-40	Fleet Supreme
EXXON	- 15W-40	XD3
GULF	- 15W-40	Super Duty Plus
MOBIL	- 15W-40	Delvac Super
PHILLIPS	- 15W-40	Super HD II
SHELL	- 15W-40	Rotella T
SUN	- 15W-40	Sunfleet Super C
TEXACO	- 15W-40	Ursa Super Plus
UNION	- 15W-40	Guardol
VALVOLINE	- 15W-40	All Fleet

   d. For operation in extreme sub-zero climate, refer to the CATERPILLAR OPERATION GUIDE Crankcase Lubricating Oils or contact the nearest Caterpillar representative.

IV. MAINTENANCE AND ADJUSTMENTS

G. LUBRICATION (CONTINUED)

2. Vibration Case

The fluid level is easily read through the sight glass located at the lower center of the vibration case, on the motor side. Lubricating oil may be added when necessary, through the hole in the vibration case top plate after removing the 1" pipe plug. To drain the case, remove a 3/4" pipe plug at either end of the base plate. (Motor side only) Tilt the case for complete drainage.

3. Multi-Pump Drive Adapter

The fluid level is easily read through the sight glass located between the two bottom pumps. Lubricating oil should be to this level. If low, lubricating oil may be added by removing the breather located on right side of the Multi-pump Drive Adapter. Draining the lubricating oil may be done by removing the 3/4 socket head pipe plug on the bottom of the Multi-pump Drive Adapter.

4. The preferred lubricating oil for J&M vibration cases and multi-pump drive adapters is a synthetic oil (Mobil SHC 634). Due to their purity, synthetics can provide longer service life in heavily loaded, severe conditions. They also provide good oxidation stability in high operating temperatures. Longer intervals between fluid changes and fewer maintenance hours spent on mechanical service can generally be realized with synthetics.

Therefore, whenever the "first preferred" oil is not available or desired and an alternate (natural petroleum base) fluid is selected, it will be necessary to test and/or change the oil at shorter intervals.

a. The vibration case and multi-pump drive adapter lubricant installed at the factory is MOBIL SHC-634 (a synthetic), any of the following gear lubes may be used when changing lubricants:

IV. MAINTENANCE AND ADJUSTMENTS

G. LUBRICATION (CONTINUED)

FIRST Preference Group (Synthetic):

MOBIL	SHC-634

SECOND Preference Group(Natural Petroleum Base):

BORON	Gearep 140
CHEVRON	Gear Comp. NL460
CITGO	Premium MP 85W-140
CITGO	Standard MP 85W-140
GULF	Lub 85W-140 Lub 85W-140
PHILLIPS	SMP 85W-140
SHELL	Omala 460 Omala 460
SUN	Sunep 1110

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 J&M in five gallon cans. See SECTION VIII - ORDERING PARTS, page VIII-52

5. 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.

IV. MAINTENANCE AND ADJUSTMENTS

G. LUBRICATION (CONTINUED)

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 below. 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.

New power units are shipped with SUN 2105 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

IV. MAINTENANCE AND ADJUSTMENTS

G. LUBRICATION (CONTINUED)

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. Third Group oils may be used when temperature variations are less than those listed below.

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

When operating in arctic conditions, it is recommended to use an immersion heater to pre-heat the oil prior to starting . Contact J&M for other arctic operating procedures. 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.

SUN-2105 hydraulic fluid is available from J&M in five gallon cans. See SECTION VIII - ORDERING PARTS, page VIII-45.

IV. MAINTENANCE AND ADJUSTMENTS

H. DRAINING AND FILLING HYDRAULIC FLUID RESERVOIR

1. The Hydraulic reservoir is draining by removing a plug on the bottom of the reservoir.

2. The hydraulic reservoir is filled by the manual hand pump (MP) mounted on the back (engine side) of the reservoir. All fluid is pumped to the reservoir through the returned filter (F2) to insure no dirt enters the hydraulic system.

CHANGING HYDRAULIC RETURN FILTER ELEMENT

1. The return filters are located in the hydraulic reservoir above the manual hand pump.

2. To remove filter elements, remove four hex head screws and remove the cover assembly. Screw driver slots are provided at the bottom to aid in removing the cover. (Note: Approximately one gallon of hydraulic fluid will be lost per filter.)

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

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 the new filter element (P/N 140403).

7. Replaced bypass valve and spring assembly.

8. Replace cover and tighten four hex screws.

9. Repeat for second filter.

10. Start power unit and run for approximately five minutes. Stop power unit and check for leaks.

IV. MAINTENANCE AND ADJUSTMENTS

J. CHANGING VIBRATOR HYDRAULIC FILTER ELEMENT

1. The vibrator filter is located on the terminal manifold block at the end of the vibration suppressor.
2. Remove the filter can clamp.
3. Unscrew the filter can. It should be firmly hand tight.
4. Remove the old filter element and O-ring.
5. Clean filter housing interior and O-ring with a lint-free rag.
6. Check O-ring for cuts and nicks. Replace if damaged. Lubricate with multi-purpose grease.
7. Insert new filter element and O-ring.
8. Screw in the filter can with the new element until it is firmly hand tight.
9. Replace the filter can clamp.
10. Start vibrator and run for approximately five minutes. Stop vibrator and check for Leaks.

IV. MAINTENANCE AND ADJUSTMENTS

K. BOLT TORQUE INFORMATION

Satisfactory Performance of bolted connections can best be achieved if these fasteners are maintained at the correct tightness (torque).

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 removed or replaced, the given torque specifications should be adhered to.

VIBRATION SUPPRESSOR		Page VIII-7 & 9
Item 14, 45	1/2"-13	119 Ft/Lbs
Item 16, 21	5/8"-11	233 Ft/Lbs
Item 6, 17, 20	3/4"-10	417 Ft/Lbs

VIBRATION CASE		Page VIII-11
Item 24	7/16"-14	85 Ft/Lbs
Item 4, 12	1/2"-13	119 Ft/Lbs
Item 16	5/8"-11	233 Ft/Lbs

CAISSON BEAM		Page VIII-41
Item 5, 34	1-1/2"-6	2800 Ft/Lbs

CLAMP BODY		Page VIII-43
Item 18	1-1/2"-6	2800 Ft/Lbs

V. HYDRAULIC CIRCUITRY (REFERENCE:HYDRAULIC SCHEMATIC PG V-4)

A. HYDRAULIC CLAMP

With the diesel engine running, hydraulic fluid is taken from the reservoir by the clamp pump (P2). The clamp pump flow returns to the reservoir if the clamp switch on the pendant has not been moved.

Turning the clamp switch on the control pendant to CLOSE activates the CLAMP CONTROL VALVE (V1). Hydraulic fluid is directed to the CLOSE CLAMP side of the hydraulic CYLINDER (CYL) in the hydraulic clamp. The clamp closes. Clamping pressure is indicated by the Clamp Pressure Gage (GA-3). When clamping pressure reaches approximately 4500 PSI, the CLAMP PRESSURE SWITCH (PS-1) 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 (CV-5). If clamping pressure falls below 4200 PSI, the CLAMP PRESSURE SWITCH reactivates the CLAMP CONTROL VALVE to restore pressure.

Turning the clamp switch on the control pendant to OPEN activates the CLAMP CONTROL VALVE (V1). Hydraulic fluid is directed to the OPEN CLAMP side of the hydraulic cylinder. The pressure in the OPEN CLAMP line opens the CLAMP CHECK VALVE (CV-5). The clamp opens. Pressure in the OPEN CLAMP line is indicated by the clamp pressure OPEN gage (GA-4).

Pressure in the clamping circuit is limited to 4800 PSI by the CLAMP RELIEF VALVE (RV2). The quick-disconnect couplers (QD3 & QD4) permit de-coupling of the clamp hoses at the power unit.

B. VIBRATOR DRIVE

With the diesel engine running, hydraulic fluid is taken from the reservoir by the four DRIVE PUMPS (P1).Fluid pressure opens the cartridge C2 and vents the hydraulic fluid back to the reservoir,through the RETURN FILTER (F2), if the vibrator button has not been pushed.

Pushing the START button, on the control pendant, activates the FORWARD SOLENOID on the CONTROL VALVE (V2). By blocking the pilot flow from cartridge C2, the CONTROL VALVE (V2) causes this cartridge to close, thus directing pump flow to the VIBRATOR MOTORS (M).

V. HYDRAULIC CIRCUITRY

B. VIBRATOR DRIVE (CONTINUED)

Full motor speed is reached within a few seconds and the motor drive pressure is indicated by GAGE (GA - 1). Maximum drive pressure is limited to approximately 5300 PSI by the FORWARD RELIEF VALVE (RV1). The FORWARD RELIEF VALVE (RV1), if opened by over pressure, permits a small pilot flow from cartridge (C2). This pilot flow causes cartridge (C2) to partially open and allows some or all of the pump flow to return to the reservoir. Flow to the motors is filtered by VIBRATOR FILTER (F3).Fluid returning from VIBRATOR MOTORS (M) opens cartridge C1 and returns to the reservoir through COOLER VALVES (V3-1&2) and RETURN FILTERS (F2). Cartridge C1 opens easily because its pilot flow is "vented" by CONTROL VALVE (V-2). Case drain fluid from the motors returns to the reservoir. Case drain pressure is limited to 50 PSI by the CASE DRAIN RELIEF VALVE (RV3).

Pushing the STOP button on the control pendant, de-energizes the CONTROL VALVE (V2) and "vents" (opens) cartridge C2. Oil returning from the motors,goes through cartridge C1. In the de-energized position, the CONTROL VAVLE (V2) blocks the pilot flow from Cartridge (C1), causing this cartridge to close. The back pressure (Brake Pressure) caused by cartridge (C1) is limited to 1000 Psi. by relief valve (RV4). BRAKE VALVE (RV4), if opened by over pressure (1000 psi.), permits a small pilot flow from Cartridge (C1) and allows Cartridge (C1) to partially open to maintain Brake Pressure. The Brake pressure can be monitored on PRESSURE GAGE A-2.

Hydraulic fluid temperature is regulated by the COOLER VALVES (V3-1&2). When fluid temperature is below 100 deg. F, COOLER VALVES V3-1&2 directs the flow directly to the reservoir through FILTERS (F2). When fluid temperature exceeds 100 deg. F, COOLER VALVES (V3-1&2) directs flow through the HEAT EXCHANGER (HE) before it enters the reservoir, through FILTERS (F2). Excessive pressure in the HEAT EXCHANGER (HE) is prevented by CHECK VALVES (CV-3&4), which bypassed excess flow and limits pressure to 65 PSI.

The quick-disconnect couplers (QD1, QD2, and QD5) permit de-coupling of the drive and case drain hoses at the power unit.

V. HYDRAULIC CIRCUITRY

C. OTHER

Returning fluid is filtered by the RETURN FILTERS (F2). The return FILTER CHECK VALVE (CV-1 and CV-2) prevents fluid loss from the reservoir when the filter elements are removed.

A manual PUMP (MP) is provided to fill the hydraulic reservoir. A CHECK VALVE (CV-8) prevents loss of fluid from the reservoir back through this pump.

Temperature of the fluid in the reservoir is continually sampled by the hydraulic fluid Temperature Switch Gage (TS-2), which shuts down the diesel engine if the fluid temperature exceeds 170 deg. F.

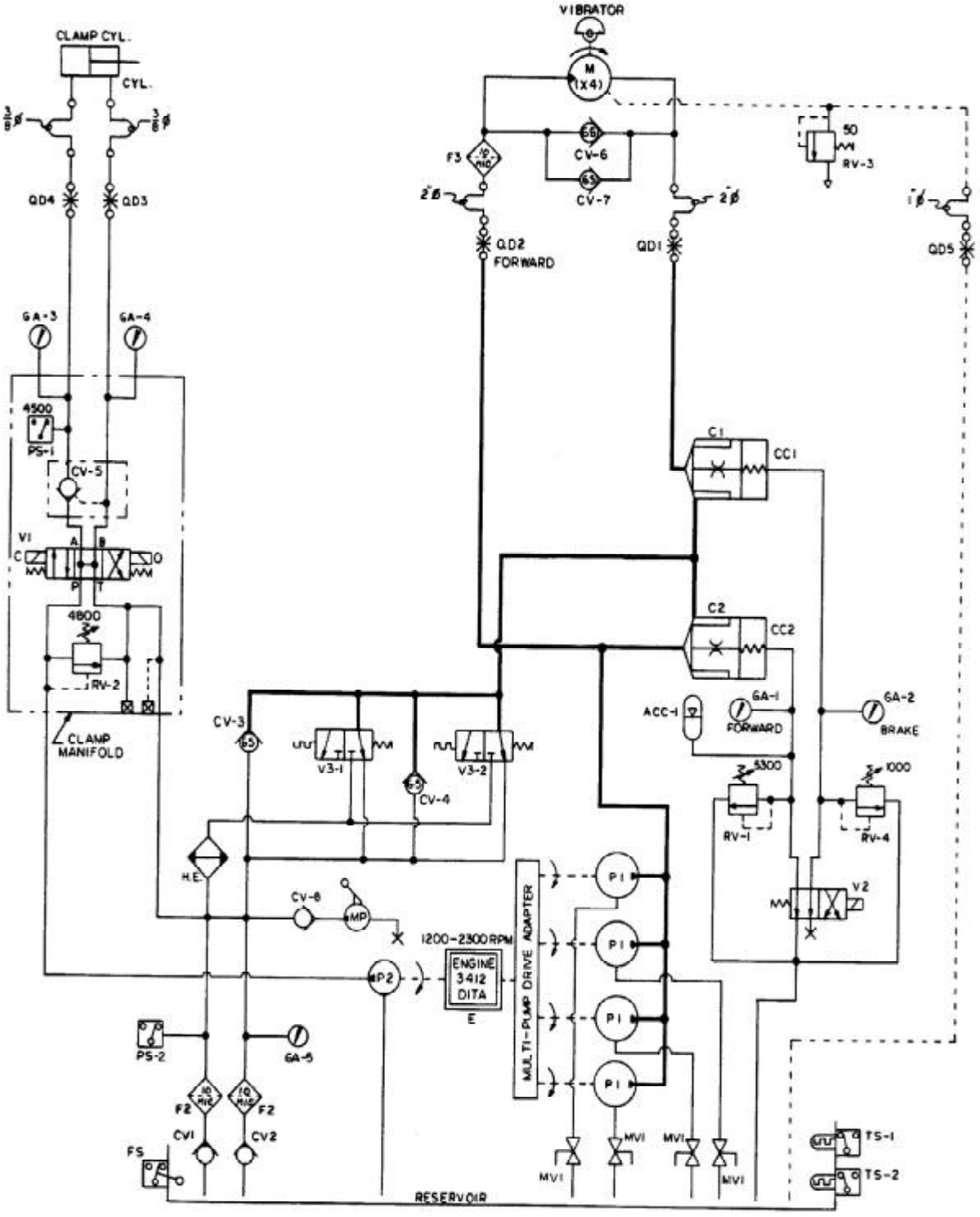
If the temperature of the hydraulic fluid is above 100 deg. F, the fluid returning from the motors is directed to the heat exchanger (HE) by the cooler valves (V3-1&2) The heat exchanger check valves (CV-3&4) insures flow through the heat exchanger and provides relief if the exchanger would become clogged. If fluid temperature is below 100 deg. F,fluid is directed to by-pass the heat exchanger by the cooler valves.

Motor cavitation is prevented during braking operations, by the CHECK VALVE (CV-6&7).

The ACCUMULATOR (ACC-1) in pilot system expands as the pressure increases. The additional pilot flow causes (C2) to produce a smooth acceleration of VIBRATOR MOTORS (M).

V. HYDRAULIC CIRCUITRY

D. HYDRAULIC SCHEMATIC



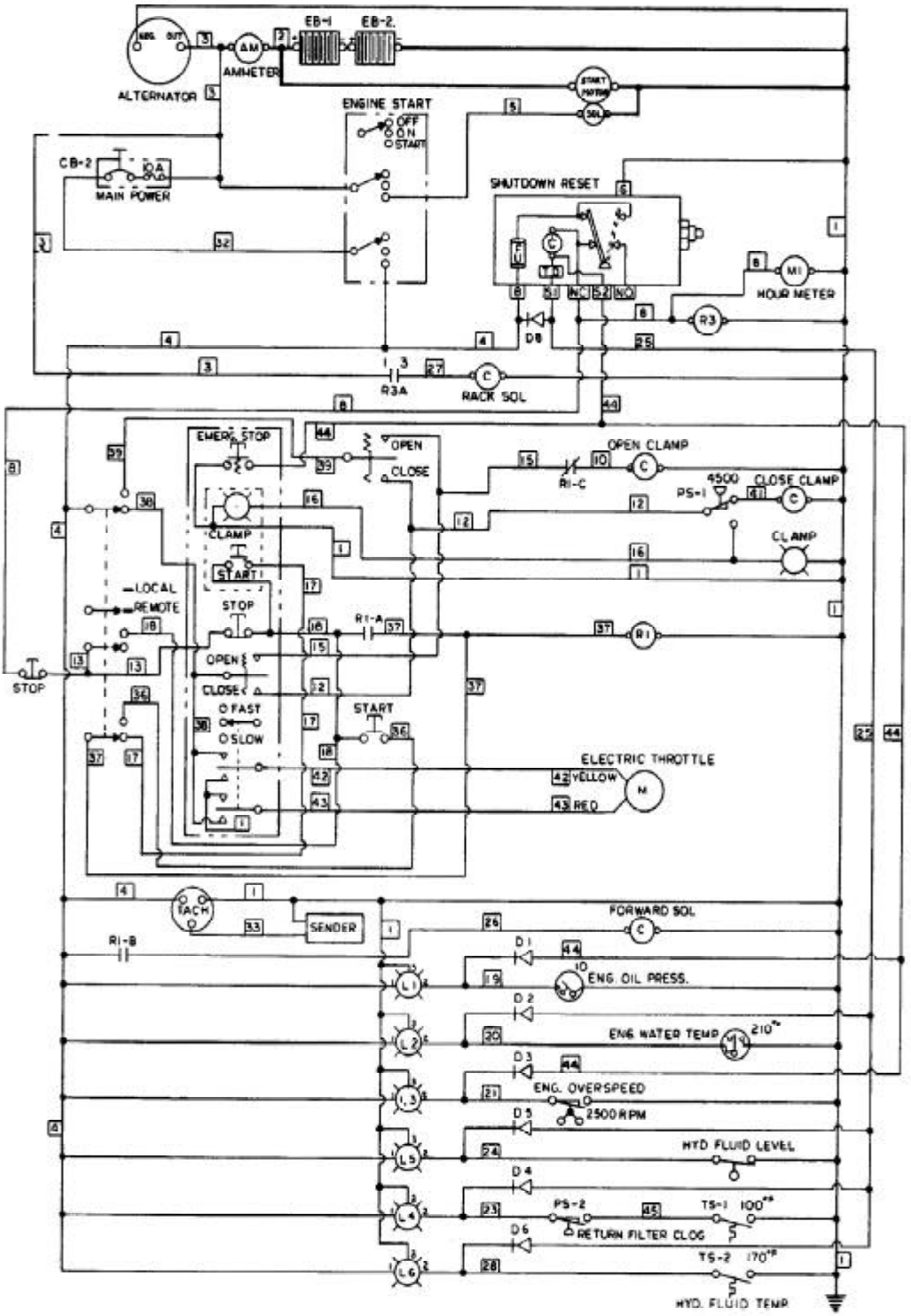
V. HYDRAULIC CIRCUITRY

E. HYDRAULIC COMPONENTS LIST

Notation	Description	Part Number	Page Ref.
ACC-1	Accumulator	810295	VIII-26
C1	Cartridge 1	140669	VIII-33
C2	Cartridge 2	140669	VIII-33
CC1	Cartridge Cover	140671	VIII-33
CC2	Cartridge Cover	140671	VIII-33
CV3&4	Check Valve	130339	VIII-33
CV5	Clamp Check Valve	110149	VIII-35
CV6&7	Check Valve - Vibrator	110731	VIII-7
CV8	Manual Pump Check Valve	100451	VIII-23
CYL	Hydraulic Clamp Cylinder		
E	Diesel Engine	140687	VIII-22
F2	Return Filter (2) CV1&2 Return Filter Check Valve	140403	VIII-23
F3	Vibrator Filter	140109	VIII-7
FS	Float Switch	100314	VIII-23
GA-1-4	Pressure Gage	110600	VIII-24
GA-5	Filter Indicator Gage	100775	VIII-22
HE	Heat Exchange	140763	VIII-27
M	Motor (4)	140679	VIII-11
MP	Manual Pump	100447	VIII-22
MV1	Manual Valve (4)	400117	VIII-23
P1	Drive Pump (4)	140829	VIII-22
P2	Clamp Pump	110401	VIII-25
PS-1	Clamp Pressure Switch	100627	VIII-35
PS-2	Pressure Switch	140413	VIII-23
QD1	Vibrator Reverse Disconnect	140037	VIII-24
QD2	Vibrator Forward Disconnect	140035	VIII-24
QD3	Clamp Open Disconnect	100245	VIII-24
QD4	Clamp Close Disconnect	100777	VIII-24
QD5	Case Drain Disconnect	120025	VIII-24
RV1	Forward Relief Valve	140677	VIII-25
RV2	Clamp Relief Valve	100898	VIII-35
RV3	Case Drain Relief Valve	100032	VIII-7
RV4	Brake Relief Valve	140677	VIII-21
TS-1	Temperature Switch	110590	VIII-24
TS-2	Temperature Switch	110640	VIII-17
VI	Clamp Control Valve	110147	VIII-35
V2	Control Valve	140665	VIII-21
V3-1&2	Cooler Valve	110628	VIII-33

VI. ELECTRICAL CIRCUITRY

ELECTRICAL SCHEMATIC



VI. ELECTRIC CIRCUITRY (REFERENCE:ELECTRICAL SCHEMATIC PG VI-1)

A. STARTING DIESEL ENGINE

The engine batteries (EB1, EB2) provide 24-volt current to start the diesel engine. With the MAIN POWER (CB-2) switch on, turning the ENGINE START switch to START energizes the start motor solenoid (SOL) and turns over the diesel engine. IF fuel is available, the diesel engine will start.

B. STOPPING DIESEL ENGINE

Turning the ENGINE START switch to OFF de-energizes the fuel pump RACK SOLENOID which shuts off the fuel supply to the diesel engine. The engine stops.

C. SAFETY CONTROL SYSTEM

A system of safety controls shut off the fuel supply, thereby stopping the diesel engine,in the event that any one of six malfunctions occur. The heart of this safety system is the SHUTDOWN RESET which is closed during normal operations (button in), thereby providing current to the fuel relay (R3). With the fuel relay energized, a set of contacts (R3A) close, energizing the RACK SOLENOID and turning on the fuel supply. With the SHUTDOWN RESET closed (button in) power is provided to the vibrator start circuitry.

As mentioned above, the SHUTDOWN RESET is closed during normal operation. If the SHUTDOWN RESET is opened, the fuel relay (R3)is de-energized. Contacts RA3 will open, resulting in the RACK SOLENOID being de-energized thereby shutting off the fuel supply and stopping the diesel engine. The SHUTDOWN RESET opens when its timing delay coil (TD) is energized. The timing delay coil may be energized by any of the following devices.

1. Engine Oil Pressure Gage - if pressure is below 10 PSI, the contacts of the gage will be closed providing current to energize the timing delay coil (TD) and to turn on the indicator light (L1). On start-up, the button on the SHUTDOWN RESET (on the control panel) must be held in until the oil pressure exceeds 30 PSI.
2. ENGINE WATER TEMPERATURE GAGE - If water temperature exceeds 210 deg. F, the contacts of the gage will close energizing the timing delay coil (TD) and turning on the indicator light (L2).
3. Engine Overspeed Switch - if the engine overspeeds, the overspeed switch will close , energizing the timing relay coil (TD) and turning on indicator light (L3).

VI. ELECTRICAL CIRCUITRY

C. SAFETY CONTROL SYSTEM (CONTINUED)

4. Return Filter Switch - if the hydraulic return filter is clogged, the return filter switch (PS-3) will close energizing the timing delay coil (TD) and turning on the indicator light(L4).

5. Hydraulic Fluid Level Switch - if the hydraulic fluid level is low, the hydraulic fluid switch will close energizing the timing delay coil (TD) and turning on indicator light (L5).

6. Hydraulic Fluid Temperature Gage - if the temperature of the hydraulic fluid exceeds 170 deg. F, the hydraulic fluid temperature gage switch will close, energizing the timing delay coil (TD) and turning on indicator (L6).

A diode (D1-D6) on each malfunction switch limits the flow of direct current to prevent multiple lights coming on. Another diode (D8) prevents arcing in the malfunction switches.

D. CLOSING HYDRAULIC CLAMP

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

When the pressure in the close-clamp hydraulic circuit reaches 4500 PSI, the pressure switch (PS-1) opens and de-energizes the close-clamp solenoid and turns on the CLAMP LIGHTS on the control pendant and control panel. If close-clamp pressure falls below 4200 PSI, the pressure switch closes and re-energizes the close-clamp solenoid to rebuild pressure. The CLAMP LIGHTS go out. When pressure returns to 4500 PSI, The pressure switch again opens,de-nergizing the lose-clamp solenoid and turns on the CLAMP LIGHTS.

E. OPENING HYDRAULIC CLAMP

With the diesel engine running, turning the clamp switch (OPEN-CLOSE) to OPEN energizes the open-clamp solenoid (OPEN SOL.) .The clamp opens.

VI. ELECTRICAL CIRCUITRY

F. STARTING THE VIBRATOR

With the diesel engine running, pressing the START button on the control pendant energizes the start relay coil (R1). Start relay contacts (R1-A) close and keep the relay coil energized until the STOP button is de- pressed. A second set of start relay contacts (R1-B) close and energizes the FORWARD SOLENOID on the Control Valve. The Control Valve sends hydraulic fluid to the vibrator motors. The motors start. A third set of contacts (R1-C) opens to prevent the OPEN SOLENOID from
being energized and opening the hydraulic clamp while the vibrator is running.

G. STOPPING THE VIBRATOR

With the diesel engine running, pressing the STOP button on the control pendant de-energizes the start relay coil (R1). The start relay contacts (R1-B) open and de-energize the FORWARD SOLENOID. The Control Valve stops the flow of hydraulic fluid to the vibrator motors. The motors stop. The start relay contacts (R1-C) close to allow the OPEN SOLENOID to be energized when the OPEN clamp button is pressed.

H. OTHER

The ammeter (AM) indicates battery charging amperes. The tachometer generator (TACH GEN) powers the tachometer (TACH) to indicate engine speed. The Hour meter(M1) indicates the engine operating hours.

Duplicate vibrator and clamp switches are located on the control pendant and on the control panel. Turning the LOCAL-REMOTE switch to LOCAL activates only the clamp and vibrator switches located on the control panel. Turning the LOCAL-REMOTE switch to REMOTE only permits operation of the clamp and vibrator from the control pendant.

Stopping the vibrator may be done by pressing either of the STOP buttons on the Control Panel or the Control Pendant at any time, no matter which position the LOCAL-REMOTE switch is in.

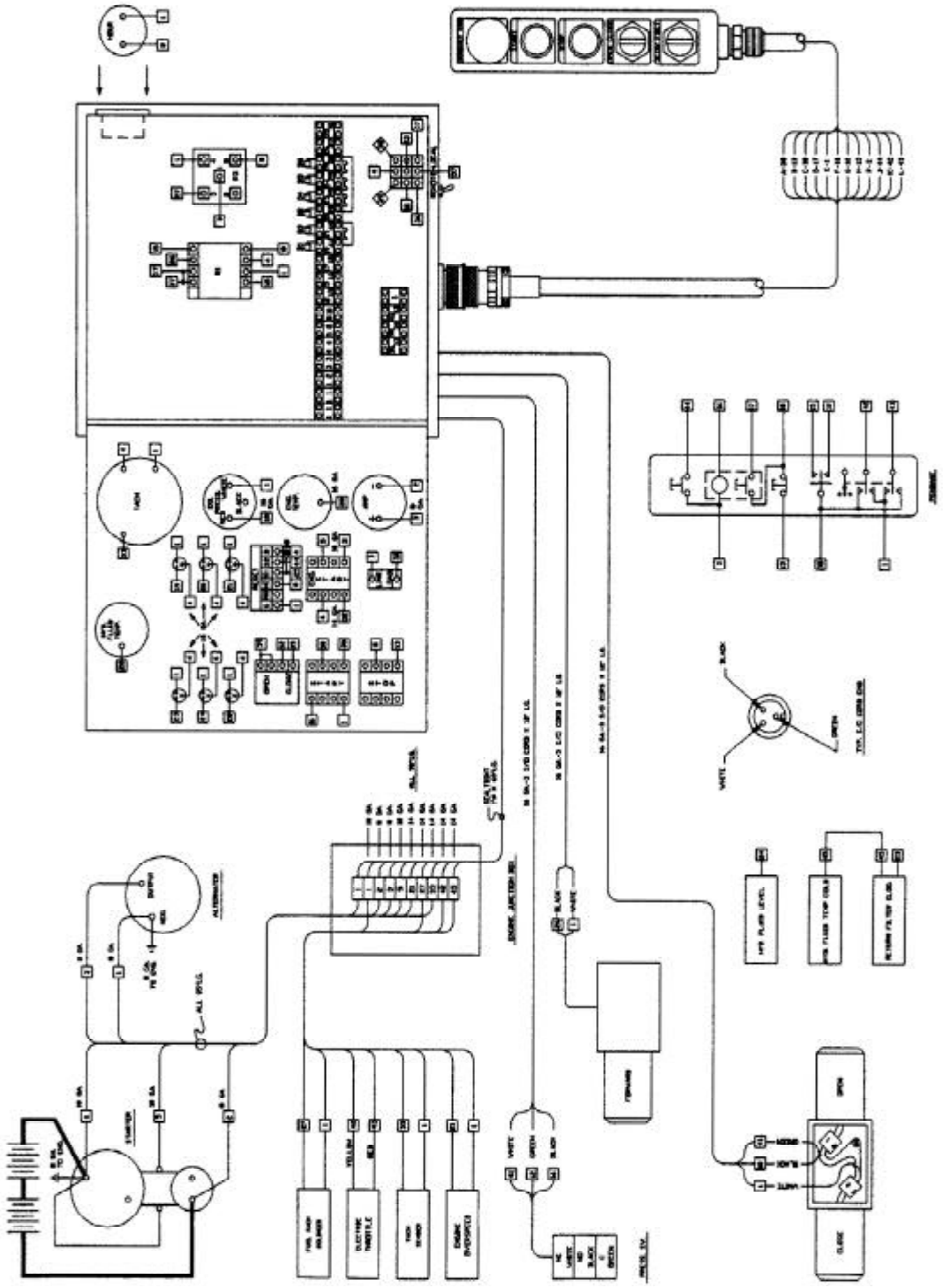
VI. ELECTRICAL CIRCUITRY

E. ELECTRICAL COMPONENTS LIST

Notation	Reference	Part Number	Page Ref.
ALTERNATOR	ALTERNATOR	See Cat. Parts Book	
AMMETER	AMMETER	110371	VIII-17
CB-2	MAIN POWER SWITCH	400141	VIII-17
CLAMP LIGHT (2)	CLAMP LIGHT	110598	VIII-17
CLOSE SOL	CLOSE-CLAMP SOLENOID	110147	VIII-35
D1-D7	DIODE	100413	VIII-17
EB-1 , EB-2	ENGINE BATTERY	100529	VIII-25
EMERG. STOP	EMERGENCY STOP BUTTON	130507	VIII-19
ENG. OIL PRESS.	ENGINE OIL PRESSURE GAGE AND SWITCH	100329	VIII-17
ENG. START	ENGINE START SWITCH	110615	VIII-17
ENG. WATER TEMP.	ENGINE WATER TEMPERATURE GAGE AND SWITCH	110697	VIII-17
ENG. OVERSPEED	ENGINE OVERSPEED SHUT-DOWN SWITCH	110972	VIII-26
FLUID LEVEL(FS)	HYD FLUID LEVEL SWITCH	100314	VIII-23
FOR.SOLENOID	FORWARD SOLENOID	140665	VIII-25
HOURMETER (M1)	HOUR METER	100343	VIII-17
HYD.FLUID TEMP	HYD FLUID TEMPERATURE SWITCH GAGE	110640	VIII-17
L-1 , L-6	SHUTDOWN INDICATOR LIGHT	100355	VIII-17
OPEN/CLOSE (2)	CLAMP SWITCH (OPEN/CLOSE)	130155	VIII-17
OPEN SOL	OPEN-CLOSE SOLENOID	110147	VIII-35
PS-1	CLAMP PRESSURE SWITCH	100627	VIII-35
R1	MOTOR START RELAY	110584	VIII-17
R1-A,B,C	START RELAY CONTACTS	110584	VIII-17
R3	RELAY	110604	VIII-17
R3A	RACK SOL. RELAY CONTACTS	110604	VIII-17
REMOTE-LOCAL	REMOTE-LOCAL SWITCH	140361	VIII-17
RET FIL CLOG	RETURN FILTER CLOGGED SWITCH	140413	VIII-23
SHUTDOWN RESET	ENGINE SAFETY SHUTDOWN	110387	VIII-17
SLOW-FAST	ENGINE THROTTLE SWITCH	100566	VIII-19
START	VIBRATOR START BUTTON	110589	VIII-17
STOP	VIBRATOR STOP BUTTON	100363	VIII-17
TACH	TACHOMETER	110650	VIII-17
SENDER	ENGINE TACH GENERATOR	See Cat. Parts Book	

VI. ELECTRICAL CIRCUITRY

J. ELECTRICAL LAYOUT



VII. GENERAL DATA

A. ABBREVIATIONS

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

ASM.	Assembly
BHCS	Button Head Cap Screw
Cyl.	Cylinder
DC	Direct Current
FHCS	Flat 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.) Listed below is a typical screw description:

   .5-13UNC x 1.50 LG SHCS .5 = Diameter
   13UNC = Threads Per Inch
   1.50 LG = Length
   SHCS = Screw Type Abbr.

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 - K-BOLT TORQUE INFORMATION.

VII. GENERAL DATA

C. SERIAL NUMBER LOCATIONS

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

    a. Vibrator
    b. Power unit
    c. Piling clamps
    d. Caisson beams

2. In addition to the serial number plate itself (on vibrators, power units and clamps), 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, once on bottom lip of vibration case on right side of motors' side.

    b. Power unit stamped twice - once on control panel side of unit at right corner of reservoir, once on sub-base inside door below hex-key rack.

    c. Model 196 clamp is stamped three times - once between the cylinder and pile guide, once above the grease fitting, and once on the flange of the cylinder housing.

    d. Model 122 caisson clamp stamped twice- once on side of the body at the jaw opening nearest the fixed jaw side, and once on the underside of the body under the pile guide on the cylinder side.

    e. Caisson beams are stamped three times - once on top center, once in center of both sides of flange.

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 LOCATION. Confirm all telephone orders immediately to avoid duplicating shipment.

2. ORIGINAL EQUIPMENT; Where component serial numbers are given, these apply only to equipment and components originally furnished with the unit. Where equipment has been changed or upgraded these numbers may not be an adequate description.

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 a Return Goods Authroization Number. 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

FITTING DESCRIPTION KEY

FITT 2 L - 16 M 12 J 00 0 - 00L 0 0 0 1

SELECTOR INDEX
2 - INCH FITTING
9 - METRIC FITTING

CONFIGURATION OR SHAPE OF FITTING
S - STRAIGHT FITTING
L - 90 Deg. ELBOW
V - 45 Deg. ELBOW
T - TEE
C - CAP
P - PLUG
U - UNION
X - CROSS
(FOURTH END FITT G REQ'D.)

FIRST END SIZE
* IN 1/16THS OF AN INCH (INDEX 2)
IN MILLIMETERS (INDEX 9)
SEE GENERAL SPECIFICATION SHEET FOR SEQUENCE OF ORDER

FIRST END FITTING STYLE
SEE FITTING STYLE SELECTOR CHART SC-1

SECOND END SIZE
IF APPLICIABLE - SEE FIRST END SIZE

SECOND END FITTING STYLE
IF APPLICABLE - SEE FIRST END FITTING STYLE

THIRD END SIZE
IF APPLICABLE - SEE FIRST END SIZE

THIRD END FITTING STYLE
IF APPLICABLE - SEE FIRST END SIZE

* EXCEPTIONS
90 = 10" 96 = 6"
92 = 12" 98 = 8"
94 = 14" 99 = NON CODE SIZE

MATERIAL
1 - CARBON STEEL
2 - BRASS
4 - STAINLESS STL
5 - AAR MAL IRON
6 - MALEABLE IRON
8 - FORGED STEEL

SPECIAL NOTATIONS

PRESSURE RATING
0 - NONE
1 - 125 LB
3 - SCH 40
4 - SCH 80

INSTALLATION AID OR STYLE OF HEAD
0 - NOT APPLICABLE
H - REGULAR HEX
Q - SQUARE HEAD (EXT.)
R - SQUARE HEAD (INT.)
S - HEX HEAD (INT SOCKET)
T - HEX HEAD (EXT.)

LENGTH CODE
(ELBOWS & NIPPLES)
__L - LONG (ELBOW)
__X - EXTRA LONG (ELBOW)
__C - CLOSE (NIPPLE)

PIPE NIPPLES (LONG) ONLY
IN DEC. INCHES FOR INDEX 2
050 = 5.0 INCHES
105 = 10.5 INCHES

IN MILLIMETERS FOR INDEX 9
120 = 12.0 MILLIMETERS
084 = 8.4 MILLIMETERS

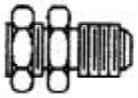
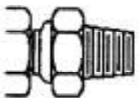
FOURTH END SIZE & FITTING STYLE
(CROSSES ONLY)
SEE FIRST END FITTING SIZE OR END STYLE

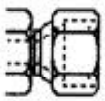
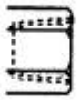
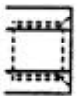
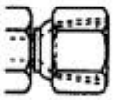
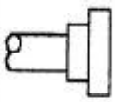
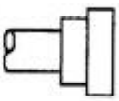
VIII. ORDERING PARTS

B. FITTING DESCRIPTION KEY (CONTINUED)

FITTING STYLE SELECTOR CHART

FOR END FITTING STYLE SELECTION

M		JIC MALE 37 Deg. FLARE
P		MALE PIPE NPT
R		S.A.E. MALE O-RING (& ADJUSTABLE)
B		JIC MALE 37 Deg. FLARE BULKHEAD
D		MALE PIPE NPT SWIVEL
S		B.S.P. MALE PIPE

J		JIC FEMALE 37 Deg. FLARE (& SWIVEL)
Q		FEMALE PIPE NPTF
K		S.A.E. FEMALE O-RING
N		FEMALE PIPE NPSM-SWIVEL
F		SPLIT FLANGE 3000 PSI CODE 61
H		SPLIT FLANGE 6000 PSI. CODE 62

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.

HOSE 125 R01 F 9 24 P 0 20 L0395 S

Hose I.D.
In Inches : 2 place decimal
(125 = 1-1/4") (050 = 1/2") etc.

SAE or Manufacture Rating
(PT4 = Powertrack)
(AQ1 = Aeroquip H-Pac)
(TF1 = Teflon)
(R01 = SAE Rating 100R1) etc.

First End - Type of Fitting
(F = 3000 lb Flange) (P = Male Pipe)
(H = 6000 lb Flange) (M = 37 deg. Male JIC)
(J = 37 deg Female Swivel)

First End Bend - Bend Angle
(0 = None) (9 = 90 deg)
(3 = 30 deg) etc.

First End - Size in 1/16 ths

Second End - Type of Fitting
(See code for First End)

Second End - Bend Angle
(See code for First End Bend)

Second End - Size in 1/16 ths

Length in Inches
1 Place Decimal
(0395 = 39-1/2") (1242 = 124-1/4") etc.

Special Code
(0 = None)
(S = Spring Guard)
(L = S.S.Braid)
(D = Offset)

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	800129
b.	VIBRATION CASE	810203
c.	HOSE ASSEMBLIES -INTERCONNECTING	800405
d.	POWER UNIT - ENCLOSURE	810589
e.	CONTROL BOX	810593
f.	POWER UNIT - INTERNAL	800385
g.	JUNCTION BOX	810145
h.	CONTROL MANIFOLD	810591
i.	CLAMP MANIFOLD	810449
j.	MODEL 122 CAISSON CLAMP	800153
k.	MODEL 122 CAISSON CYLINDER	810187
l.	PIGTAIL KIT	850119
m.	CAISSON BEAM-11 FT.	800411
n.	CAISSON BEAM-4FT.	800135
o.	MODEL 196 CLAMP	800315
p.	PENDANT EXTENSION CABLE	800059

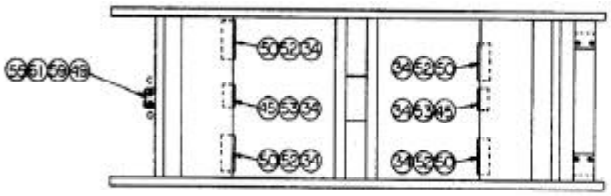
2. The spare parts list SECTION VIII - RECOMMENDED SPARE PARTS contains spare parts which may be very useful in keeping down-time to a minimum, especially in remote or secluded job sites where unforeseen communication problems could cause delay of the delivery of an awaited part.

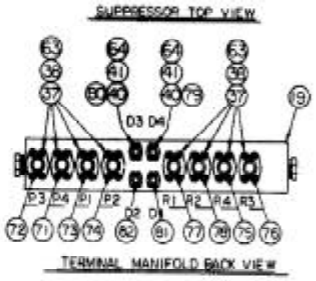
These RECOMMENDED SPARE PARTS may be ordered beforehand, individually or as a package group as shown in the PARTS LIST.

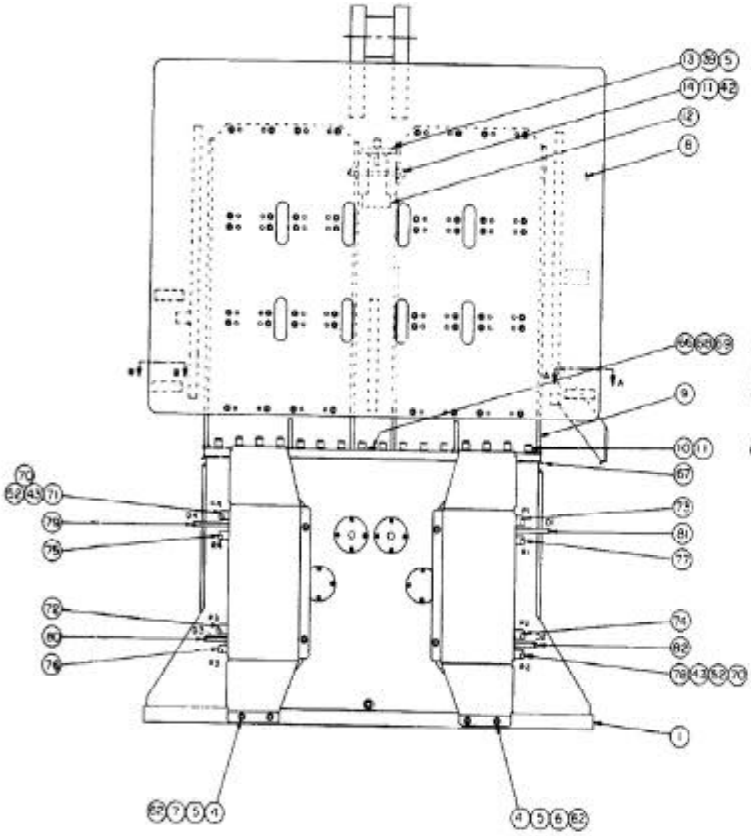
PARTS LIST

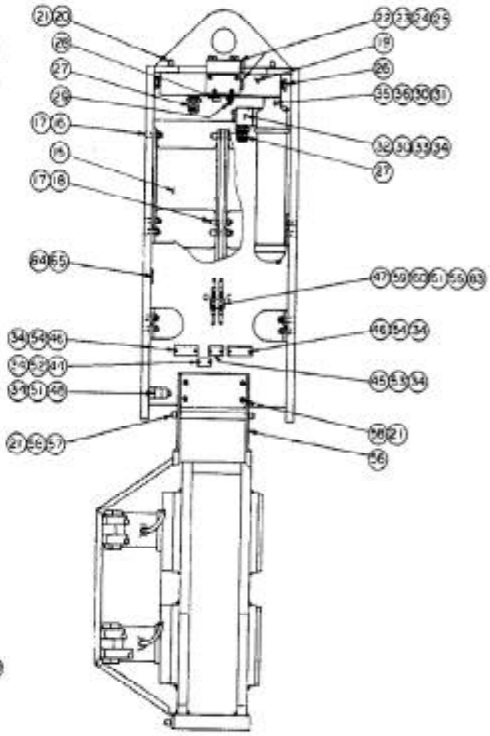
VIBRATION SUPPRESSOR

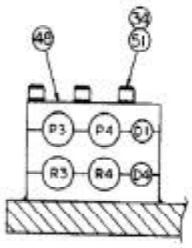
800129



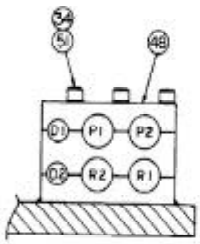








SECTION-BB



SECTION A-A

PARTS LIST

VIBRATION SUPPRESSOR 800129

Item	Part Number	Qty.	Description
1	810203	1	Transmission Case Asm.
4	400275	4	.75-10UNC x 1.50 Lg. SHCS
5	100069	10	.75 Lockwasher
6	~~140089~~ 140659	1	Right Motor Guard
7	~~140087~~ 140657	1	Left Motor Guard
8	140605	1	Suppressor Housing
9	140051	1	Transmission Adapter
10	140145	36	1.0-8UNC x 3.50 Lg. SHCS
11	100209	38	1.0 Lockwasher
12	140607	1	Stop Block
13	140609	1	Retainer Plate
14	140731	2	1.0-8UNC x 9.50 Lg. SHCS
15	100003	24	Elastomer
16	100085	96	.625-11UNC x 2.25 Lg. SHCS
17	100086	144	.625-11UNC Esna Nut
18	130135	48	.625-11UNC x 3.50 Lg. SHCS
19	140053	1	Terminal Manifold
20	140227	4	.625-11UNC x 2.0 Lg. SHCS
21	100007	10	.625 Lockwasher
22	110723	2	Check Body
23	110731	2	Check Valve (CV-6&7)
24	110735	8	.50-13UNC x 2.50 Lg. SHCS
25	100097	4	#214-O-Ring
26	140149	2	FITT2P-24P000000-000T007
27	140523	2	FITT2S-32M32P000-000H001
28	100032	1	Relief Valve (RV3)
29	110823	1	FITT2S-16M16P000-000H001
30	140233	2	#228-O-Ring
31	140235	4	.50-13UNC x 4.75 Lg. SHCS
32	140085	1	Filter Adapter Block
33	100025	4	.50-13UNC x 4.50 Lg. SHCS
34	100121	37	.50 Lockwasher
35	140107	1	Pressure Filter
36	140109	1	Filter Element (F3)
37	100089	16	#16 Split Flange Half
38	100091	8	#219-O-Ring
39	400045	3	.75-10UNC x 3.50 Lg. SHCS
40	100103	8	#8 Split Flange Half
41	100107	4	#210-O-Ring
42	400983	2	1.0-8UNC Esna Nut

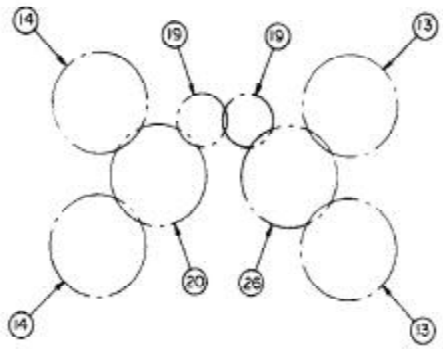
VIBRATION SUPPRESSOR (Continued) 800129

Item	Part Number	Qty.	Description
43	110986	16	#20 Split Flange Half
44	140083	1	Hose Clamp
45	140095	3	Hose Clamp
46	140079	2	Hose Clamp
47	140091	1	Right Terminal Block
48	140075	3	Gang Hose Clamp
49	140093	1	Left Terminal Block
50	140077	4	Gang Hose Clamp
51	100079	9	.5-13UNC x 4.00 Lg. SHCS
52	100011	48	.50_13UNC x 2.00 Lg. SHCS
53	100513	6	.50-13UNC x 1.50 Lg. SHCS
54	100829	4	.50-13UNC x 3.50 Lg. SHCS
55	140713	2	HOSE038R02J006J006L1660C
56	140449	1	Hose Guide
57	140451	1	Hose Guide Rod
58	100575	6	.625-11UNC x 1.25 Lg.SHCS
59	100053	6	FITT2S-06M06R000-000H001
60	130057	2	FITT2L-06M06R000-000H001
61	140287	4	FITT2P-06R000000-000T001
62	100589	4	.75 Flatwasher
63	140453	32	.375-16UNC x 1.00 Lg. HHCS
64	140455	16	.312-18UNC x 1.00 Lg. HHCS
65	140207	1	1412 S/N. Plate
66	100063	1	FITT2P-160000000-000S007
67	140063	1	Transmission Gasket
68	100735	4	Transmission Oil / Gal.
70	100037	8	#222-O-Ring
71	140689	1	HOSE100PT4F016H920L2270C
72	140691	1	HOSE100PT4F016H420L2460C
73	140693	1	HOSE100PT4F916H920L1340C
74	140695	1	HOSE100PT4F916H420L1400C
75	140697	1	HOSE100R02F016H920L2190C
76	140699	1	HOSE100R02F016H420L2250C
77	140701	1	HOSE100R02F016H920L1320C
78	140703	1	HOSE100R02F916H420L1380C
79	140705	1	HOSE050R02F008J008L2330C
80	140707	1	HOSE050R02F008J008L2430C
81	140709	1	HOSE050R02F908J008L1390C
82	140711	1	HOSE050R02F908J008L1450C
83	140563	2	FITT2S-06R06N000-000H001
84	130381	4	Rivet

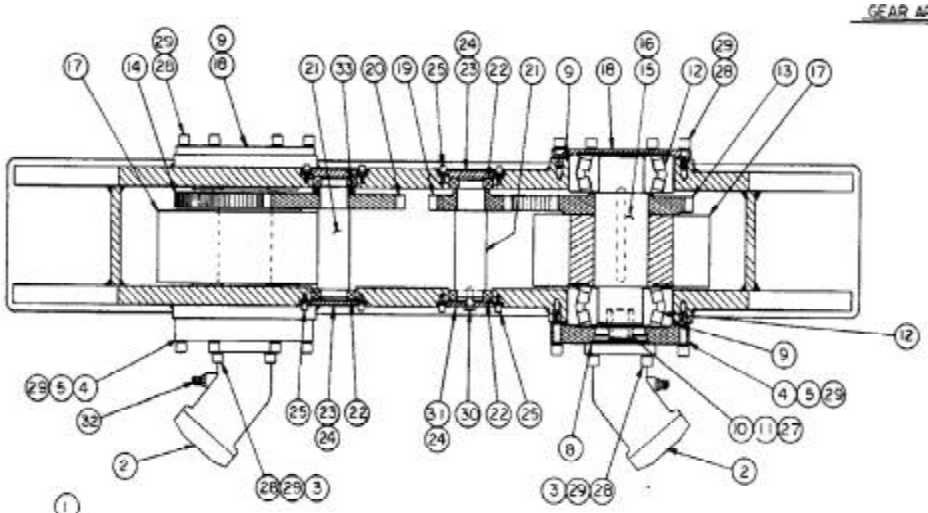
PARTS LIST

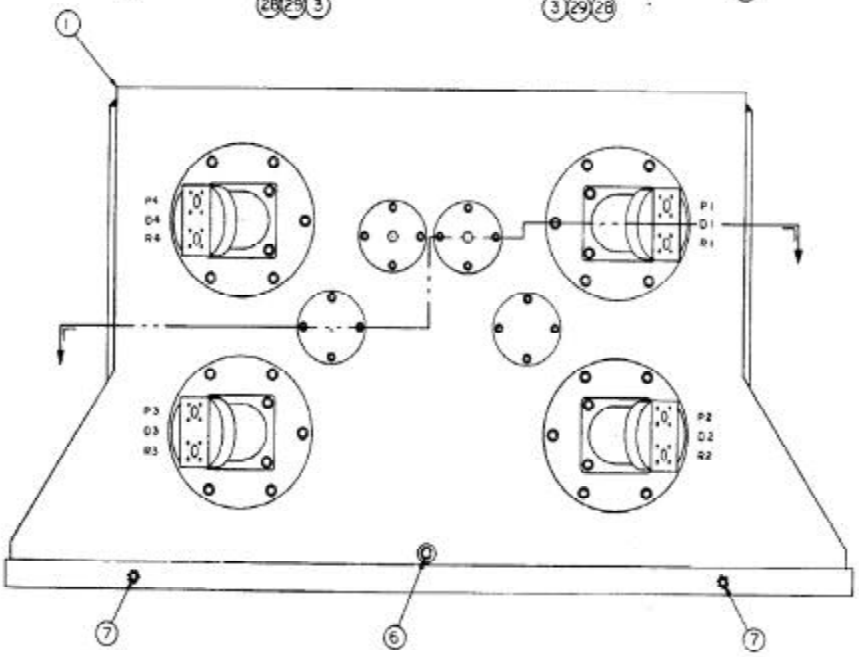
VIBRATION CASE

810203



GEAR ARRANGEMENT





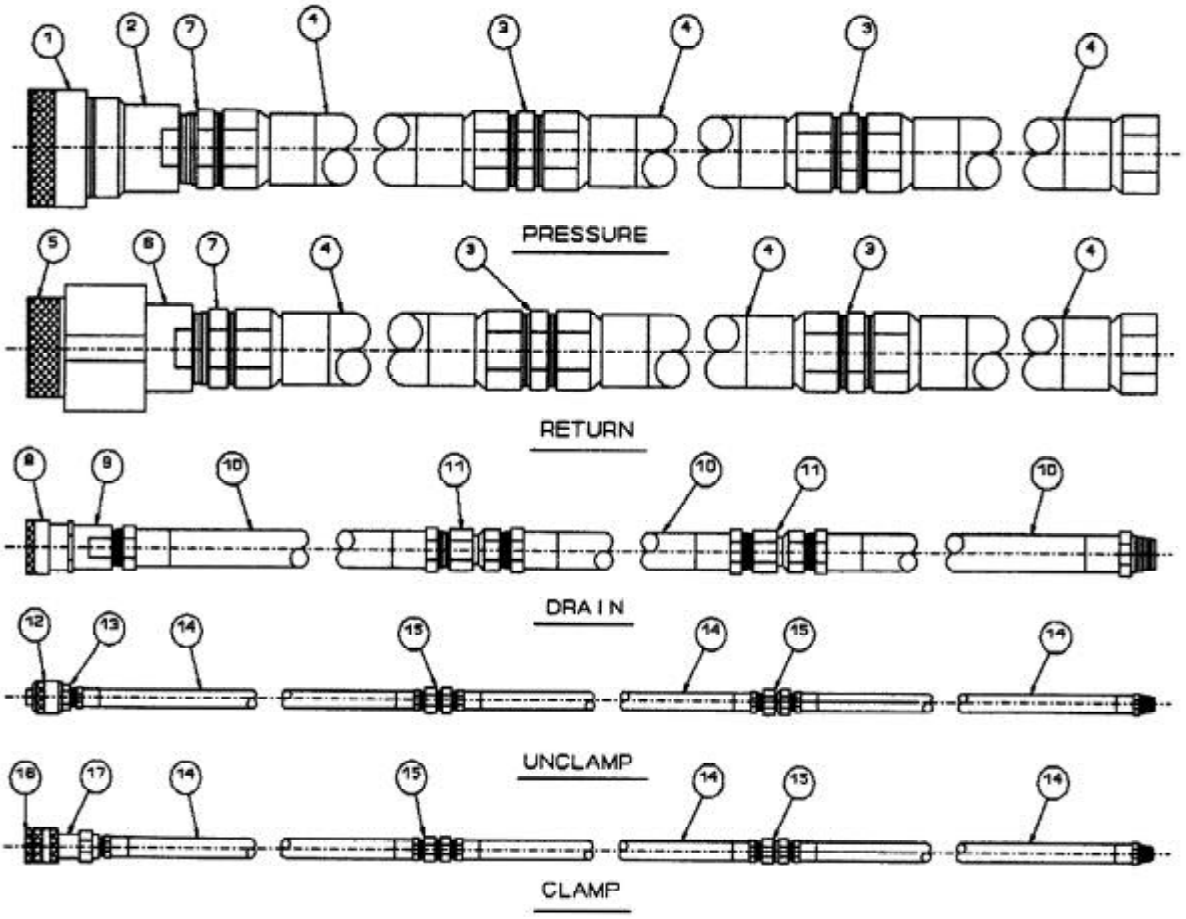
PARTS LIST

VIBRATION CASE 810203

Item	Part Number	Qty.	Description
1	810201	1	Vibration Case Frame
2	140679	4	Hydraulic Motor (M1-4)
3	100589	16	.75 Lockwasher
4	140029	4	Motor Mounting Plate
5	140111	24	.75-10UNC x 4.00 Lg. SHCS
6	100185	1	Sight Gauge
7	100187	2	FITT2P-12P000000-000S007
8	140031	4	#170-O-Ring
9	140033	8	#454-O-Ring
10	140003	4	Drive Hub
11	140005	24	Drive Pad
12	140007	8	Roller Bearing
13	140015	2	Eccentric Gear
14	140017	2	Eccentric Gear
15	140001	4	Shaft
16	140021	4	Key
17	140009	4	Eccentric
18	140027	4	Bearing Cover
19	140019	2	Idler Gear
20	100741	1	Eccentric Gear
21	140025	4	Idler Shaft
22	110191	8	Motor Bearing
23	110189	6	Bearing Housing
24	110197	8	#159-O-Ring
25	100119	32	.50-13UNC x 1.25 Lg. SHCS
26	100759	1	Eccentric Gear
27	120191	4	Retaining Ring
28	100067	40	.75-10UNC x 2.50 Lg, SHCS
29	100069	64	.75 Lockwasher
30	810229	2	Centrifugal Breather
31	110855	2	Bearing Housing Cap
32	300099	4	FITT2S-10R08M000-000H001
33	100171	2	Spacer

PARTS LIST

HOSE ASSEMBLIES - INTERCONNECTING 800405

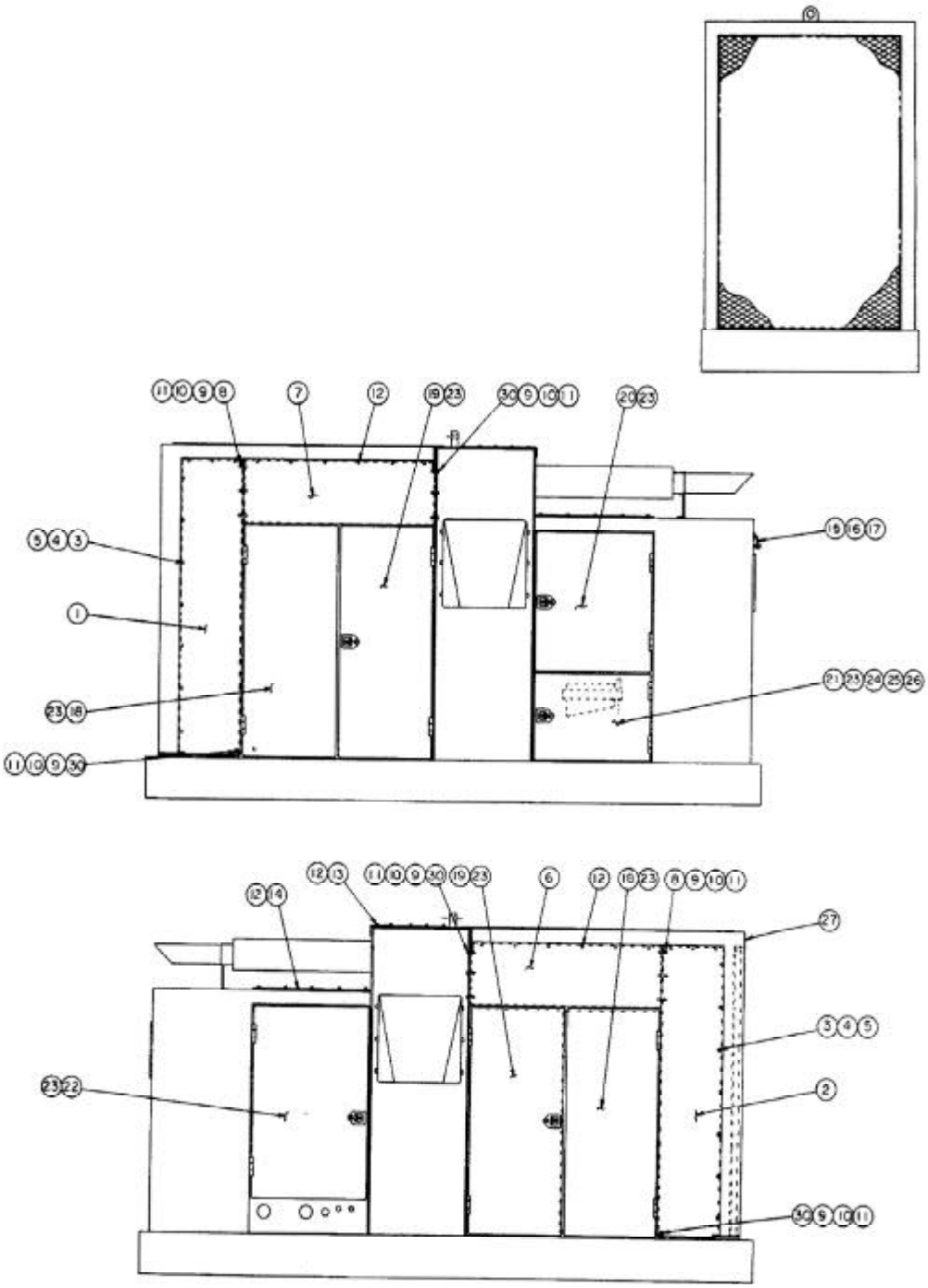


HOSE ASSEMBLIES - INTERCONNECTING 800405

Item	Part Number	Qty.	Description
1	140041	1	Dust Cap (2")
2	140037	1	Male Disconnect (2")
3	110271	4	FITT2S-32M32M000-000H001
4	140683	6	HOSE200PT6J032J032L60000
5	140039	1	Dust Plug (2")
6	140035	1	Female Disconnect (2")
7	140523	2	FITT2S-32M32P000-000H001
8	120029	1	Dust Cap (1")
9	120023	1	Male Disconnect (1")
10	140685	3	HOSE100PT4P016P016L6200
11	140357	2	FITT2S-16Q16N000-000H001
12	100257	1	Dust Cap (3/8")
13	100245	1	Male Disconnect (3/8")
14	100247	6	HOSE038R02P006P006L6200
15	100249	4	FITT2S-06Q06N000-000H001
16	100737	1	Dust Plug (3/8")
17	100777	1	Female Disconnect (3/8")
--	130243	20	Rubber Tie Down

PARTS LIST

POWER UNIT ENCLOSURE 810589



PARTS LIST

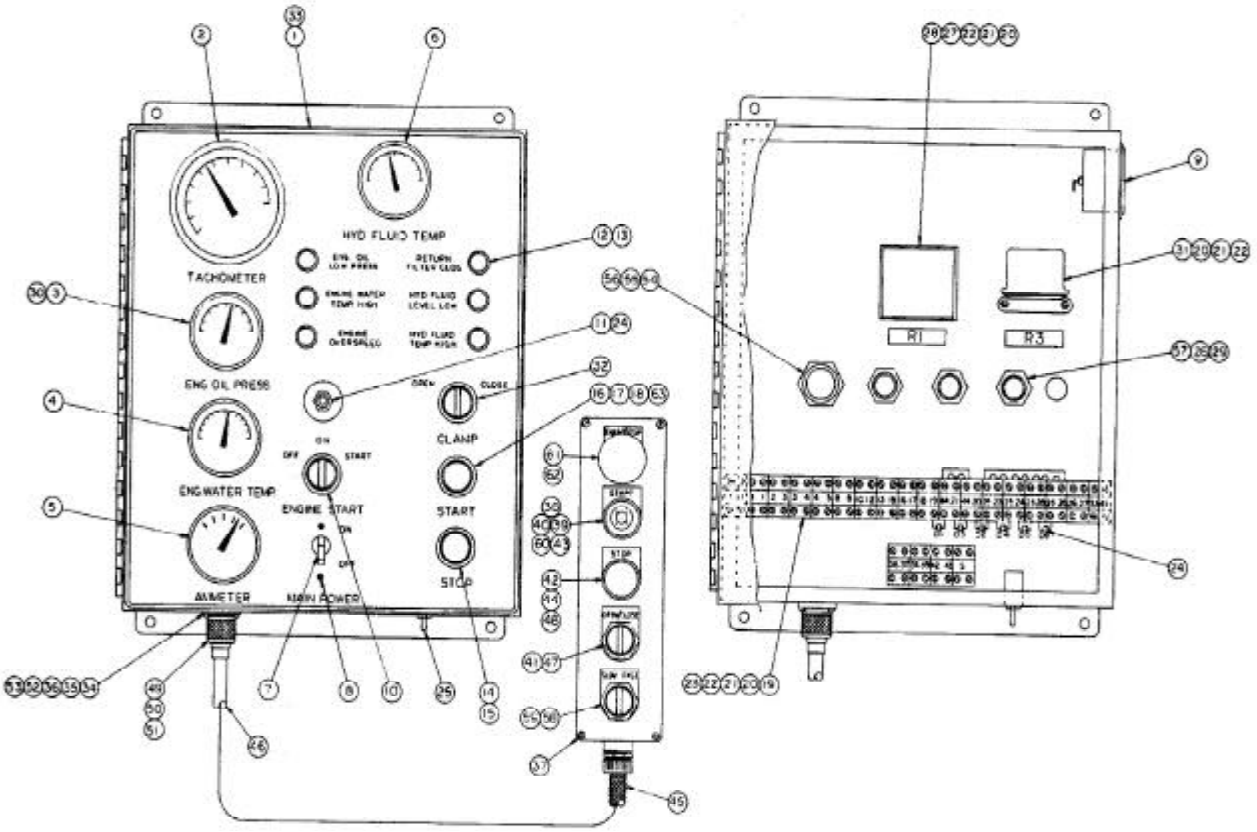
POWER UNIT ENCLOSURE 810589

Item	Part Number	Qty.	Description
1	140621	1	Cover
2	140623	1	Cover
3	100557	20	.25-20UNC x .75 Lg. SHCS
4	100559	20	.25 Lockwasher
5	100597	32	.25 Flatwasher
6	140613	1	Cover Panel
7	140661	1	Left Cover Panel
8	150179	6	.312-18UNC x .75 Lg. HHCS
9	100287	14	.312 Lockwasher
10	100293	20	.312 Flatwasher
11	100289	14	.312-18UNC Hex Nut
12	130209	32	.25-14 x 1.0 Lg Hex Tek Screws
13	140653	1	Bale Cover
14	140651	1	Unit Cover
15	110221	1	Door Hold Down
16	110861	2	10-32UNF x .5 Lg. PHMS
17	400161	2	#10 Lockwasher
18	140619	2	Cover Door
19	140617	2	Cover Door
20	140189	1	Cover Door
21	140187	1	Cover Door
22	140185	1	Cover Door
23	100834	14	5" Door Hinge
24	100600	1	Hex key Rack
25	810045	1	Hex Key Group
26	100651	1	Test Light
27	100290	2	J&M Decal
30	100309	8	.312-18UNC x 1.0 Lg. BHCS

PARTS LIST

CONTROL BOX ASSEMBLY

810593



PARTS LIST

CONTROL BOX ASSEMBLY 810593

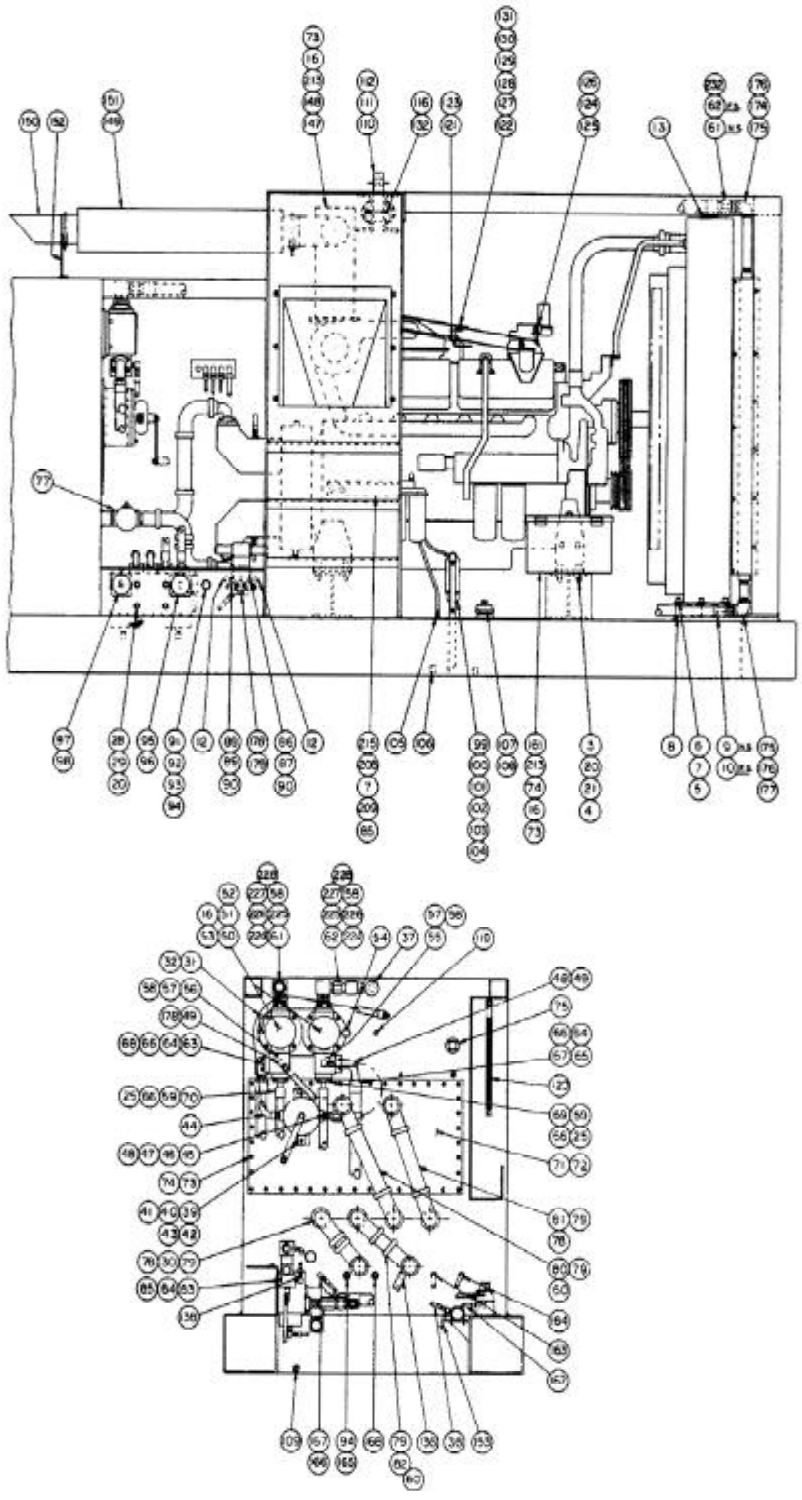
Item	Part Number	Qty.	Description
1	110652	1	Control Box Enclosure
2	110650	1	Tachometer
3	100329	1	Oil Press. Gauge
4	110697	1	Water Temperature Gage
5	110371	1	Ammeter
6	110640	1	Hyd. Fluid Temp. Gage (TS-2)
7	400141	1	Circuit Breaker (CB-2)
8	100331	2	#6-32 x .25 LG BHCS
9	100343	1	Hour Meter (M1)
10	110615	1	Start Switch
11	110456	1	Reset Button
12	100355	6	Warning Light (L1-L6)
13	130305	6	757 Light Bulb
14	100363	1	Stop Button
15	100365	1	Stop Dust Cover
16	110598	1	Start Button (w/ Clamp Light)
17	110594	1	Guard
18	110596	1	Lens
19	110569	15	Terminal Strip (inches)
20	110861	8	#10-32 x .5 LG PHMS
21	400163	8	#10-32 Hex Nut
22	400161	8	#10 Lock Washer
23	110567	22	Terminal Block
24	100413	7	Diode (D1-D8)
25	140361	2	Toggle Switch
26	110841	3	.5 Plastic Bushing
27	140281	4	Relay Mounting Track
28	110584	1	Relay (R1)
29	110843	3	.5 Locknut
30	100333	1	FITT2L-04E01Q000-000H002
31	110604	1	Relay (R3)
32	130155	1	Clamp Switch
33	140733	1	950 Label Group
34	110763	1	Female Amphenol Insert
35	100397	1	Female Amphenol Plug
36	110754	4	#6-32 x .375 LG RHMS
37	130505	1	Pendant Box Enclosure
38	110598	1	Start Button (w/ Clamp Light)
39	110596	1	Lens
40	110594	1	Guard

PARTS LIST

CONTROL BOX ASSEMBLY 810593

Item	Part Number	Qty.	Description
41	100401	1	Open/Close Name Plate
42	100363	1	Stop Button
43	100407	1	Start Name Plate
44	100405	1	Stop Name Plate
45	110603	1	Strain Relief
46	100560	50	Pendant Cable (feet)
47	130155	1	Switch
48	100365	1	Stop Dust Cap
49	110761	1	Male Amphenol Insert
50	100395	1	Male amphenol Plug
51	100375	1	Strain Relief
52	110696	4	#6 Lock Washer
53	110694	4	#6-32 Hex Nut
54	110693	1	1"-90 Deg. Compress. Fitting
55	110839	1	1" Plastic Nut
56	110845	1	1" Locknut
57	100853	3	90 Deg. S/O Compress Fitting
58	100566	1	Switch
59	100562	1	Slow-Fast Name Plate
60	130305	1	Light Bulb
61	130507	1	Emergency Stop Button
62	130509	1	Emergency Stop Name Plate
63	130305	1	Light Bulb

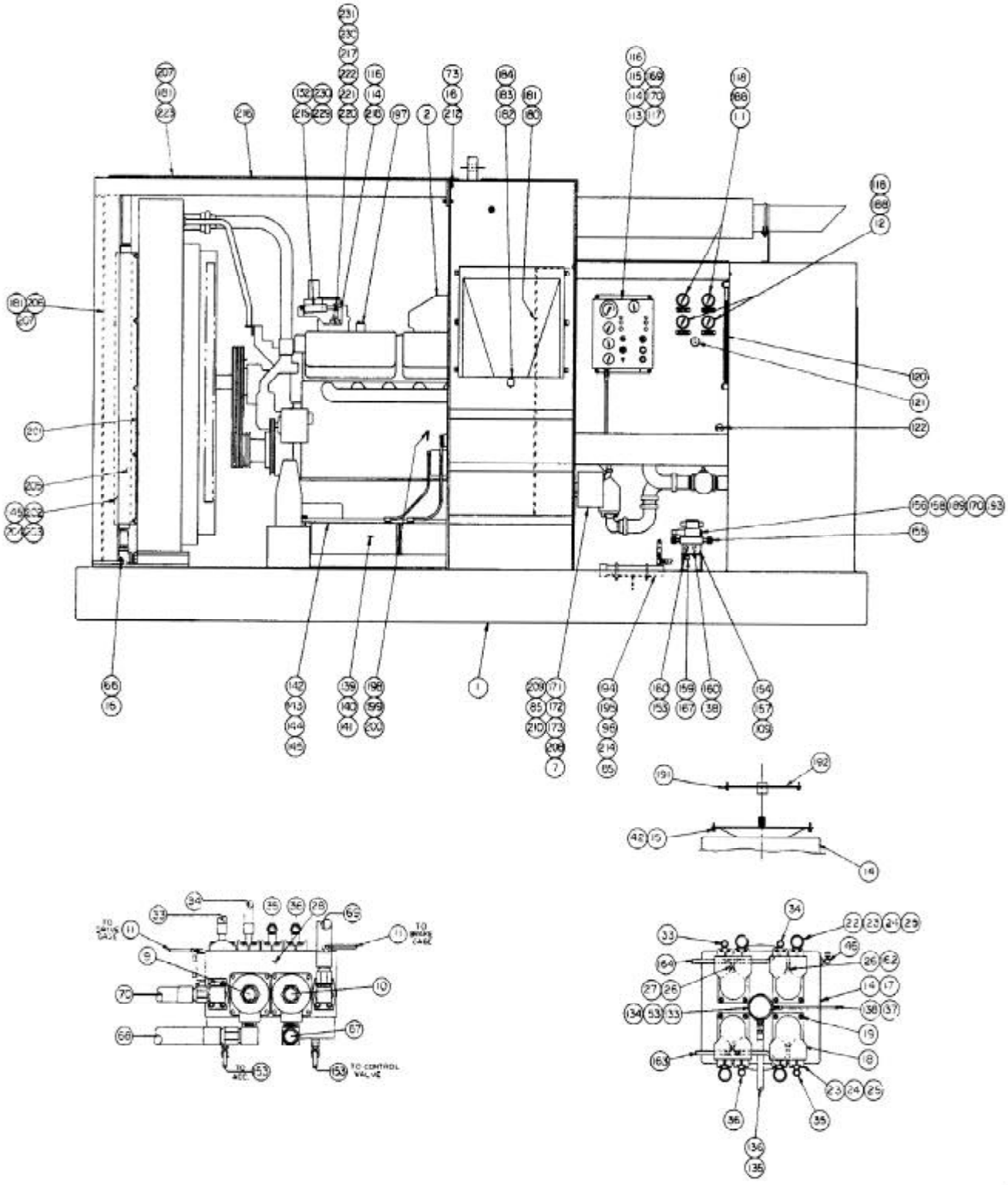
POWER UNIT-INTERNAL 800385



PARTS LIST

POWER UNIT-INTERNAL

800385



PARTS LIST

POWER UNIT-INTERNAL 800385

Item	Part Number	Qty.	Description
1	810587	1	Subbase Asm.
2	140687	1	3412 Diesel Engine (E)
3	100067	12	.75-10UNC x 2.50 Lg. SHCS
4	100587	12	.75-10UNC Hex Nut
5	130141	12	.625 Flatwasher
6	130135	6	.625-11UNC x 3.50 Lg. SHCS
7	100007	10	.625 Lockwasher
8	140765	2	Spacer
9	140753	1	HOSE200R01J032J032L17200
10	140755	1	HOSE200R01J032J032L18300
11	130393	2	HOSE019R01J004J004L11000
12	140735	2	HOSE025R01J004J004L11700
14	140767	1	Multi-Pump Adapter
15	100462	12	.437-14UNC x 1.25 Lg. SHCS
16	100121	30	.50 Lockwasher
17	100735	1	Transmission Oil / Gal.
18	140829	4	Drive Pump (P1)
19	100782	16	.75-10UNC Flange Nut
20	100069	16	.75 Lockwasher
21	100589	12	.75 Flatwasher
22	140769	4	Bent Stem Adapter
23	110103	32	16MM x 40MM Lg. SHCS
24	110243	16	#24 Split Flange Half
25	110119	10	#225-O-Ring
26	110984	4	FITT2S-12S08M000-000H0F1
27	140757	2	FITT2T-08M-8M08J-000H001
28	810591	1	Control Manifold Asm.
29	400275	4	.75-10UNC x 1.50 Lg. SHCS
30	140771	1	Pipe-2.5 SCH40 x 4.00"Lg.
31	100775	1	Visual Indicator (GA-5)
32	100838	1	FITT2L-02P04Q000-00L0001
33	140715	1	HOSE125PT4H020H924L05600
34	140717	1	HOSE125PT4H020H924L06400
35	140719	1	HOSE125PT4J020H924L02200
36	140721	1	HOSE125PT4J020H924L03200
37	100455	1	Breather
38	100108	1	HOSE038R02J006J006L02000
39	100447	1	Hand Pump (MP)
40	130091	1	Pump Mounting Bracket
41	100439	2	.437-14UNC x 1.75 Lg. SHCS

PARTS LIST

POWER UNIT-INTERNAL 800385

Item	Part Number	Qty.	Description
42	100443	14	.437 Lockwasher
43	400153	2	.437 Flatwasher
44	400215	1	HOSE100R01P016P016L08400
45	100449	1	FITT2S-16P16P000-000H001
46	100451	1	Check Valve (CV-8)
47	300119	1	FITT2S-16P12M000-000H001
48	300115	1	HOSE075R01J012J012L02600
49	100489	2	FITT2L-12M12P000-0000001
50	140179	2	Return Filter (F2)
51	140403	2	Filter Element
52	140543	2	Return Filter Gasket
53	100513	10	.5-13UNC x 1.50 Lg. SHCS
54	140413	1	Return Filter Press. Switch
55	140649	1	Filter Adapter
56	140663	1	Filter Adapter
57	100025	8	.5-13UNC x4.50 Lg. SHCS
58	400379	4	#232-O-Ring
59	100596	4	#24 Split Flange Half
60	130119	2	FITT2S-40P000000-0450301
61	140845	1	HOSE200R01J032J032L13900
62	140849	1	HOSE200R01J032J032L15000
63	140775	1	90 Deg. Flange Adapter
64	140233	2	#228-O-Ring
65	140261	2	#32 Split Flange Half
66	100119	22	.5-13UNC x 1.25 Lg. SHCS
67	140729	1	HOSE200R01J032F932L09000
68	140727	1	HOSE200R01J032F932L09900
69	140723	1	HOSE150R01J024F024L04800
70	140725	1	HOSE150R01J024F024L08700
71	140115	1	Cover PLate
72	140219	1	Cover Plate Gasket
73	100485	58	.5-13UNC Hex Nut
74	100483	44	.5 Flatwasher
75	100314	1	Float Switch
77	400117	4	Stop Cock (MV1)
78	140779	2	FITT2S-40P000000-0600301
79	400195	8	90 Deg. Flexible Coupling
80	140781	1	Pipe-2.5 SCH 40 x17"Lg.

PARTS LIST

POWER UNIT-INTERNAL 800385

Item	Part Number	Qty.	Description
81	140783	1	Pipe-2.5 SHC 40 x 16"Lg.
82	140785	1	Pipe-2.5 SCH 40 x 7"Lg.
83	810449	1	Clamp Manifold Asm.
84	100648	3	.375-16UNC x .375 Lg. SHCS
85	400149	15	.375 Lockwasher
86	100245	1	.375 Male Disconnect (QD3)
87	100257	1	.375 Dust Cap
88	100777	1	.375 Female Disconnect (QD4)
89	100737	1	.375 Dust Plug
90	130203	2	FITT2S-06P06P000-0300401
91	120095	1	FITT2S-16P16B000-000H001
92	120025	1	1" Female Disconnect (QD5)
93	120027	1	1" Dust Plug
94	100862	1	HSOE100J016J016L03300
95	140035	1	2" Female Disconnect (QD2)
96	140039	1	2" Dust Plug
97	140037	1	2" Male Disconnect (QD1)
98	140041	1	2" Dust Cap
99	120611	1	Water Separator Asm.
100	120613	1	Water Separator Element
101	110377	1	FITT2L-16P16Q000-0000306
102	120425	1	FITT2S-16P16P000-1000301
103	100715	1	FITT2S-16P06Q000-000H001
104	400227	1	FITT2L-06M06P000-0000001
105	400203	1	FITT2S-06M06P000-000H001
106	120523	2	Fuel Base Magnet
107	100417	1	Fuel Cap
108	100419	1	Petcock
109	100423	3	FITT2P-08P000000-000S007
110	140157	1	Link
111	140291	1	Pin
112	100722	2	Roll Pin
113	810593	1	Control Box Asm.
114	100557	6	.25-20UNC x .75 Lg. SHCS
115	100598	6	.25-20UNC Hex Nut
116	100597	16	.25 Flatwasher
117	100559	6	.25 Lockwasher
118	110600	4	Gage (GA-1-4)
119	110590	1	Hyd. Temp. Switch
120	110355	1	Hyd. Fluid Level Gage

PARTS LIST

POWER UNIT - INTERNAL 800385

Item	Part Number	Qty.	Description
121	110417	1	Engine Throttle
122	100345	1	Engine Stop Cable
123	110647	1	Throttle Bracket
124	110968	1	Key
125	110966	1	Shut-Off Arm
126	110964	1	Pivot
127	110962	1	Clamp
128	110960	1	Shim
129	100429	1	Throttle Cable Seal
130	400161	2	#10 Lockwasher
131	110861	3	#10-32UNF x .50 Lg. PHMS
132	110163	3	.25-20UNC x 3.50 Lg. SHCS
133	140839	1	Clamp Pump (P2)
134	100027	2	.5 Hi-Collar Lockwasher
135	120045	1	FITT2L-16M16R000-000H001
136	110831	1	HOSE100R01P016J016L07000
137	100139	1	FITT2S-08M08R000-000H001
138	~~140745~~ 110470	1	HOSE050PT4J008J008L04900
139	100529	2	Battery (EB-1 & 2)
140	140359	1	Battery Cable
141	110755	2	Battery Cable
142	810169	1	Battery Hold Down
143	400231	3	Hold Down Stud
144	100831	3	.312-18UNC Wing Nut
145	100293	27	.312 Flatwasher
146	300067	1	FITT2L-08P08Q000-0000001
147	140629	1	Exhaust Adapter
148	140787	1	Exhaust Adapter Gasket
149	110504	2	Muffler
150	140789	2	Exhaust Outlet
151	100297	4	Exhaust Clamp
152	110512	2	Muffler Support
153	140737	2	HOSE038PT4J006J006L04200
154	140675	1	Subplate
155	140677	1	Sandwich Relief Valve (RV1&4)
156	140665	1	Solenoid Valve
157	100017	4	.375-16UNC x 2.00 Lg. SHCS
158	140773	4	.25-20UNC x 2.38 Lg. SHCS
159	110704	1	FITT2L-08P06M000-0000001
160	110171	2	FITT2S-08P06M000-000H001

POWER UNIT - INTERNAL 800385

Item	Part Number	Qty.	Description
161	100558	1	Tool Box
162	100486	1	HOSE050R01J008J008L01450
163	140741	1	HOSE050R01J008J008L03800
164	140743	1	HOSE050R01J008J008L07000
165	140759	1	FITT2S-12P16M000-000H001
166	110704	1	FITT2L-08P06M000-0000001
167	110633	1	HOSE038R02J006J006L0370S
168	100183	1	FITT2P-12P000000-000S007
169	110231	2	S/O Cord (12')
170	110229	1	S/O Cord (6')
171	810145	1	Engine Junction Box
172	110785	1	1" Sealtight (30")
173	140791	1	Junction Box Bracket
174	140793	2	FITT2S_32P32P000-1400301
175	140795	4	FITT2L-32Q32Q000-0000001
176	140523	4	FITT2S-32M32P000-000H001
177	140797	2	FITT2S-32P32P000-0550301
178	140747	1	HOSE075R01J012J012L08800
179	300231	1	FITT2V-12M12J000-000H001
180	140799	1	Hose Shield
181	130209	47	.25 Hex Tek
182	130317	2	FITT2S-08Q000000-0000308
183	140507	2	FITT2S-02Q000000-0000306
184	140801	2	FITT2S-02P02P000-000H001
188	100321	4	FITT2L-04M04Q000-0000001
189	100853	1	90 Deg. Comp. Fitting
191	140803	8	.5-13UNC x 1.00 Lg. HHCS
192	140805	1	Flex Plate
193	140387	1	Orifice
194	810295	1	#10 Accumulator (ACC-1)
195	400413	1	FITT2T-06M06P06M-0000001
196	100461	2	U-Bolt
197	110972	1	Over-Speed Switch
198	110369	1	FITT2S-06P04Q000-000H001
199	110871	1	FITT2V-04P04E000-000H002
200	110415	1	Oil Pressure Line (10')
201	140615	2	Cooler Bracket
202	100105	12	.312-18UNC x 1.00 Lg. SHCS
203	100289	12	.312-18UNC Hex Nut

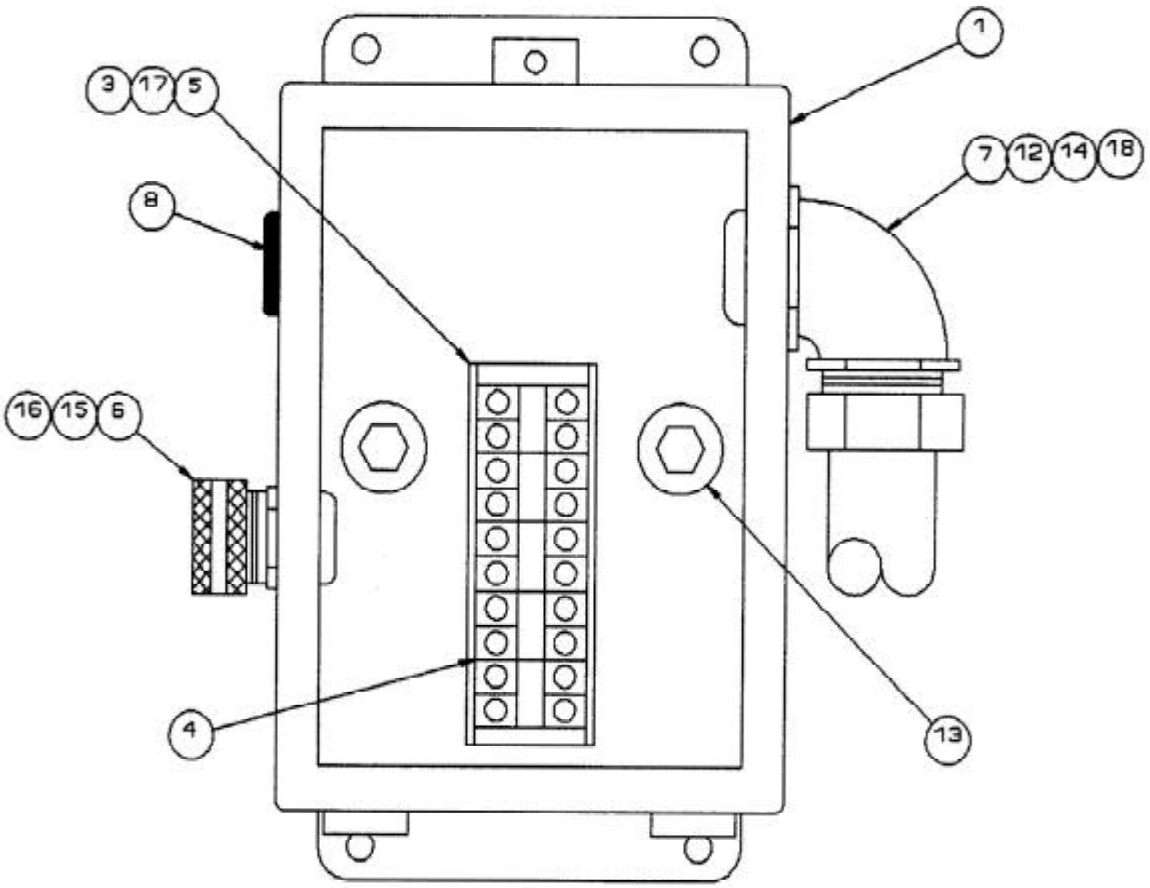
PARTS LIST

POWER UNIT - INTERNAL 800385

Item	Part Number	Qty	Description
204	100287	12	.312 Lockwasher
205	140763	1	Heat Exchanger (HE)
206	140625	1	Intake Grill
207	130227	37	.25 Fender Washer
208	100575	4	.625-11UNC x 1.25 Lg. SHCS
209	140453	4	.375-16UNC x 1.0 Lg. HHCS
210	400151	2	.375 Flatwasher
212	100163	6	.5-13UNC x 1.75 Lg. SHCS
213	400979	10	.5-13UNC x 1.50 Lg. HHCS
214	100535	4	.375-16UNC Hex Nut
215	140807	1	Fuel Filter Housing Bracket
216	810589	1	Cover Group Asm.
217	100595	1	.25-20UNC x 1.25 Lg. SHCS
218	110454	1	Electric Throttle Bracket
219	110460	1	Electric Actuator
220	110448	1	Adjustable Link
221	110827	1	#10-32UNF x .75 LG. BHCS
222	400163	1	#10-32UNF Hex Nut
223	140627	1	Top Grill
224	810009	2	FITT2S-32M32P000-0000001
225	400233	2	FITT2S-40P32Q000-000H001
226	100946	2	2.5 Solid Flange
227	110735	8	.5-13UNC x 2.50 Lg. SHCS
228	100027	8	.5 Hi-Collar Lockwasher
229	100631	1	.25-20UNC x 2.00 LG. SHCS
230	100422	3	.25-20UNC Esna Nut
231	810617	1	Modified Throttle Arm
232	140847	20	Fire Sleeve / Ft.

PARTS LIST

JUNCTION BOX 810145

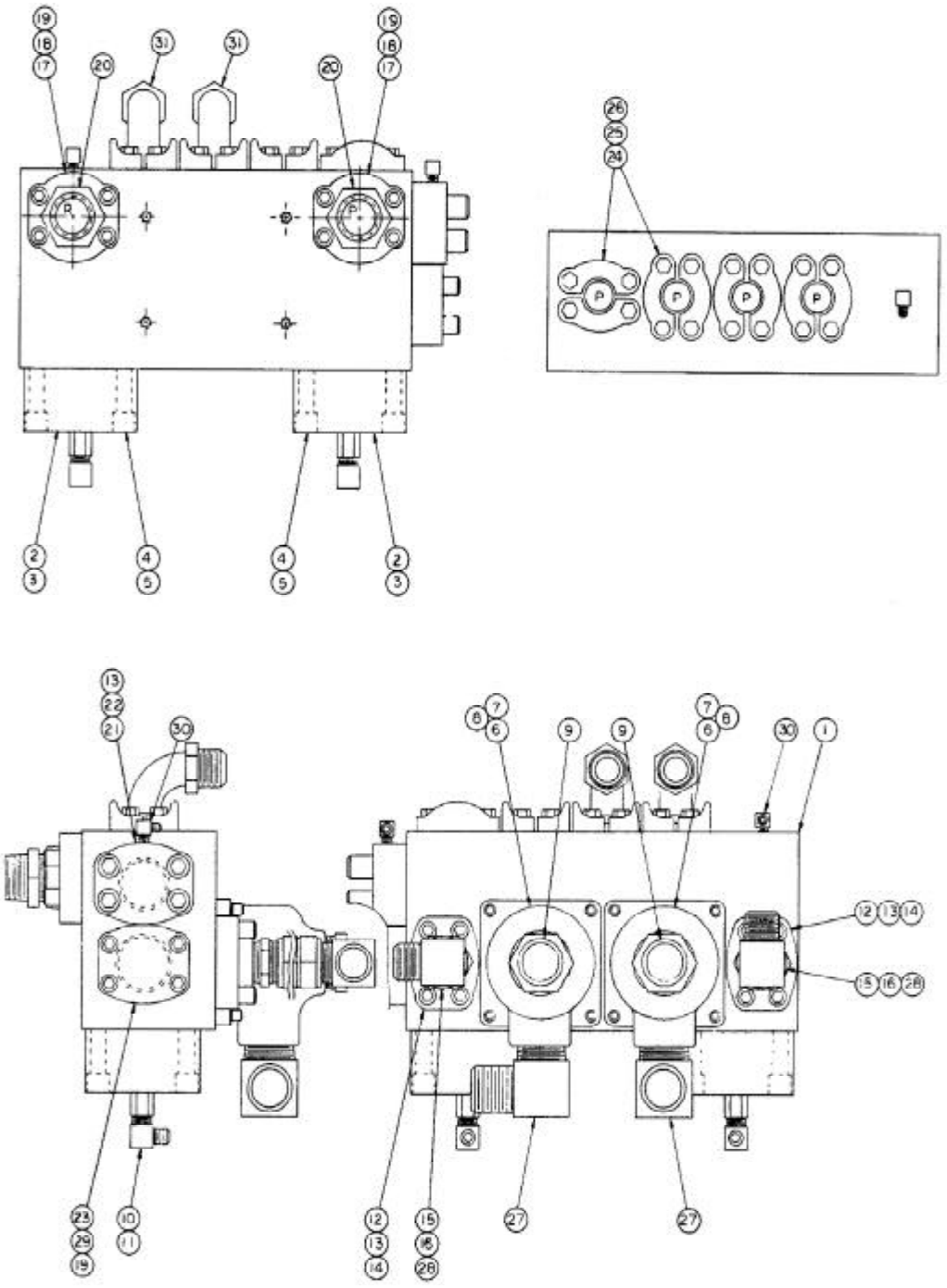


PARTS LIST

JUNCTION BOX 810145

Item	Part Number	Qty.	Description
1	110699	1	Junction Box
3	400163	2	10-32 Hex Nut
4	110567	5	Terminal Block
5	110569	1	Terminal Mounting Channel
6	100855	1	Straight Wire Connector
7	110693	1	90 Deg. Connector
8	110701	1	Grommet
12	110785	6	Seal Tight
13	110225	2	.625-10UNC x 1.50 Lg SHCS
14	110839	1	Plastic Bushing (1.0)
15	110843	1	Lock Nut (.5)
16	110841	1	Plastic Bushing (.5)
17	110649	2	10-32 x .375 Lg PHMS
18	110845	1	Lock Nut (1.0)

CONTROL MANIFOLD ASSEMBLY 810591



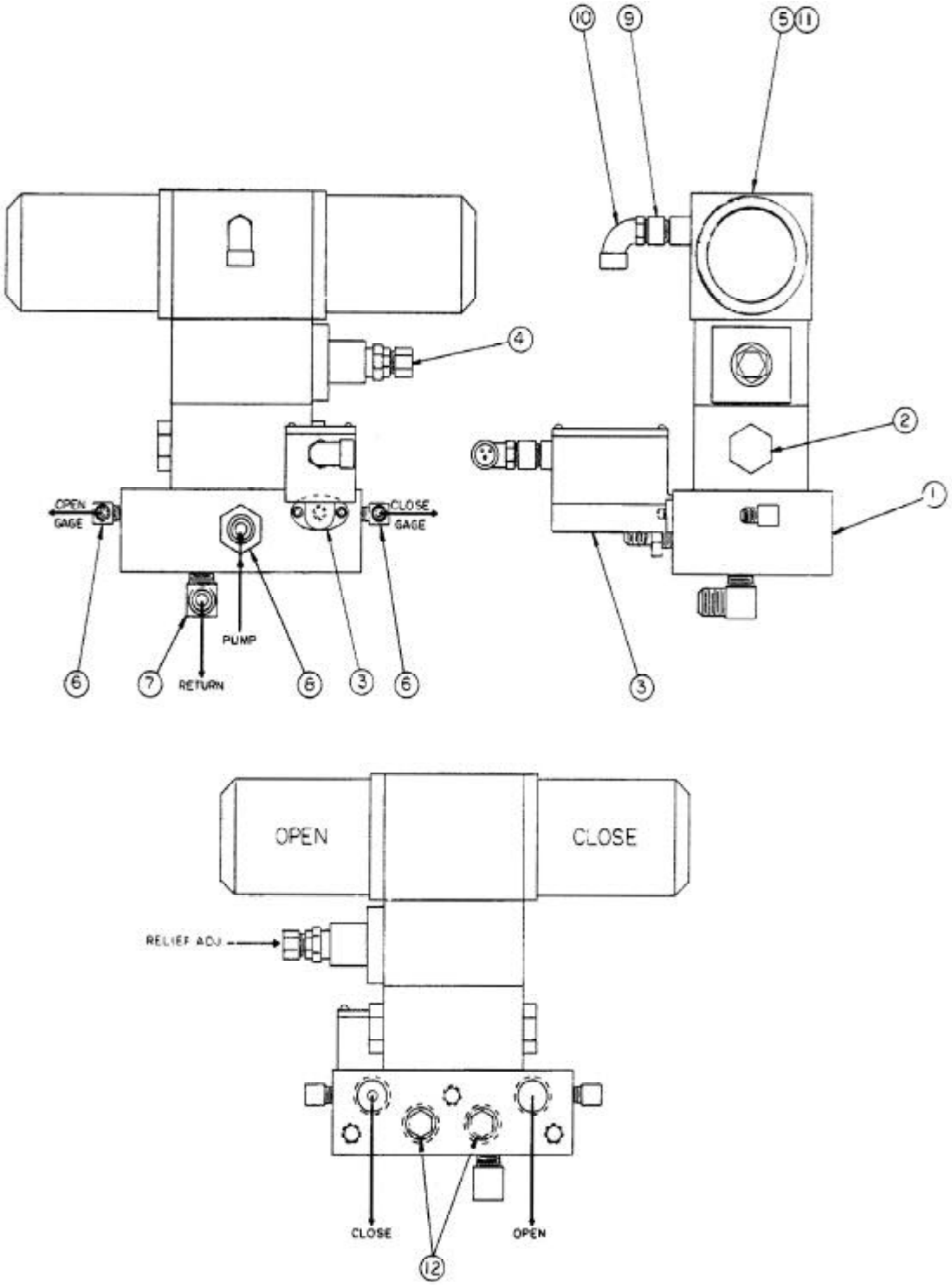
PARTS LIST

CONTROL MANIFOLD ASSEMBLY 810591

Item	Part Number	Qty.	Description
1	140611	1	Manifold Block
2	140669	2	Cartridge Valve (C1&2)
3	140671	2	Cartridge Cover (CC1&2)
4	400545	8	.75-10UNC x 3.00 Lg. SHCS
5	400727	8	.75 Hi-Collar Lockwasher
6	110628	2	Cooler Valve (V3-1&2)
7	110143	8	.375-16UNC x 1.25 Lg. SHCS
8	400149	8	.375 Lockwasher
9	140523	2	FITT2S-32M32P000-000H001
10	140681	2	FITT2S-08S08Q000-000H001
11	110704	2	FITT2L-08P06M000-0000001
12	110057	2	#24 Solid Flange
13	110119	3	#225-O-Ring
14	400043	8	.5-13UNC x2.50 Lg. SHCS
15	100037	2	FITT2S-24P24P000-000H001
16	130339	2	1.5 Check Valve (CV-3&4)
17	400109	2	#32 Solid Flange
18	110735	8	.5-13UNC x 2.50 Lg. SHCS
19	140233	3	#228-O-Ring
20	400235	2	FITT2S-32P32P000-000H001
21	140673	1	#24 Blank Flange
22	140227	4	.625-11UNC x2.00 Lg. SHCS
23	400937	1	#32 Blank Flange
24	110986	8	#20 Split Flange Half
25	100037	4	#222-O-Ring
26	400739	16	.5-13UNC x2.00 Lg. HHCS
27	810009	2	FITT2L-32M32P000-00000F1
28	100588	2	FITT2L-24M24P000-0000001
29	110513	4	.5-13UNC x 1.50 Lg. SHCS
30	140539	2	FITT2L-04M02P000-0000001
31	140853	2	FITT2L-20F20M000-0000001

PARTS LIST

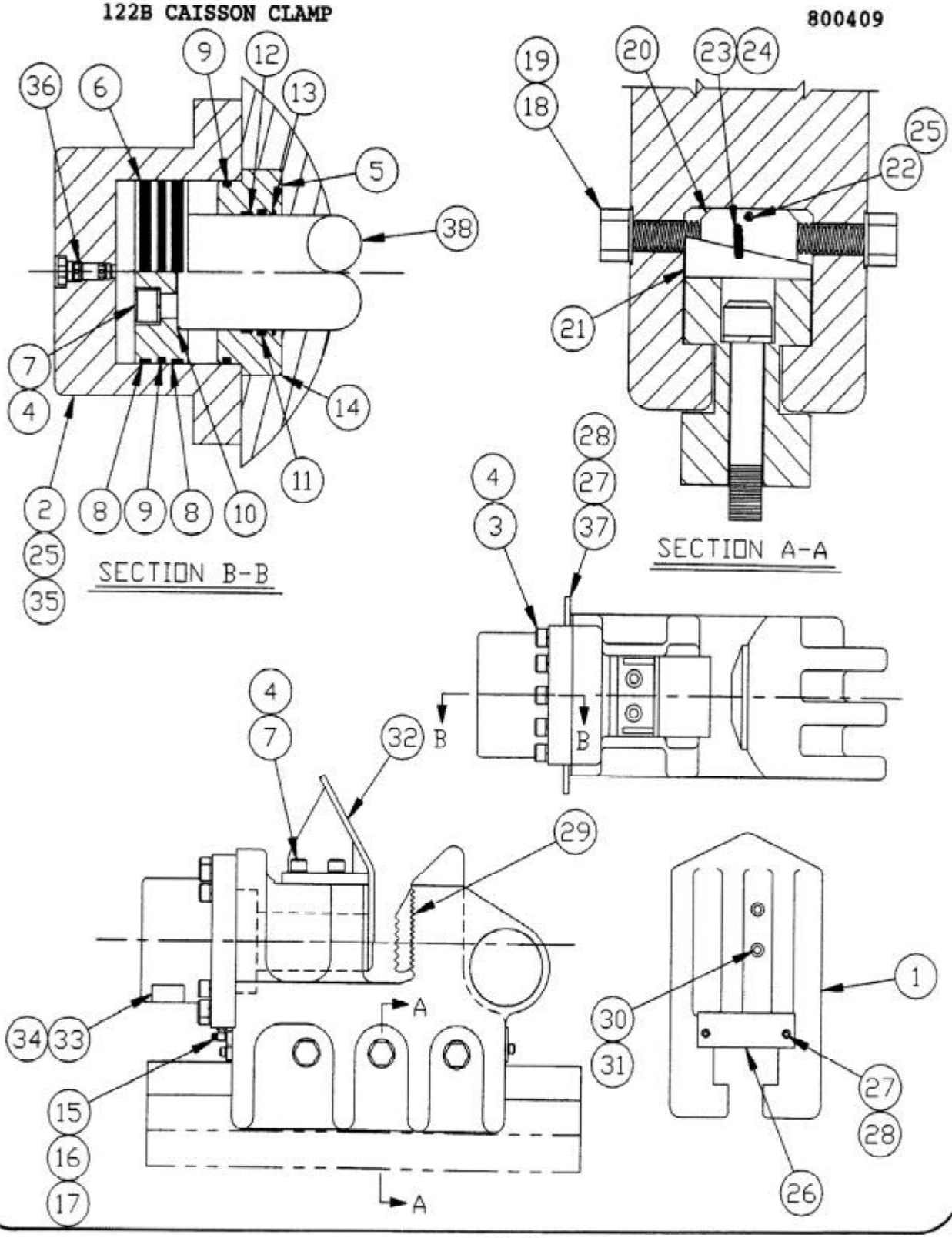
CLAMP MANIFOLD ASSEMBLY 810449



CLAMP MANIFOLD ASSEMBLY 810449

Item	Part Number	Qty.	Description
1	110642	1	Manifold Block
2	110149	1	Check Valve (CV-5)
3	810033	1	Pressure Switch (PS1)
4	100898	1	Relief Valve (RV2)
5	110147	1	4-Way Solenoid Valve (V1)
6	140539	2	FITT2L-04M02P000-0000001
7	110632	1	FITT2L-12M06P000-000H001
8	110630	1	FITT2S-08M06P000-000H001
9	110885	2	Conduit Adapter
10	110235	2	90 Deg. S/O Cord Adapter
11	100900	4	.25-20UNC x 6.0 Lg SHCS
12	400213	2	FITT2P-06P000000-000S007

PARTS LIST



PARTS LIST

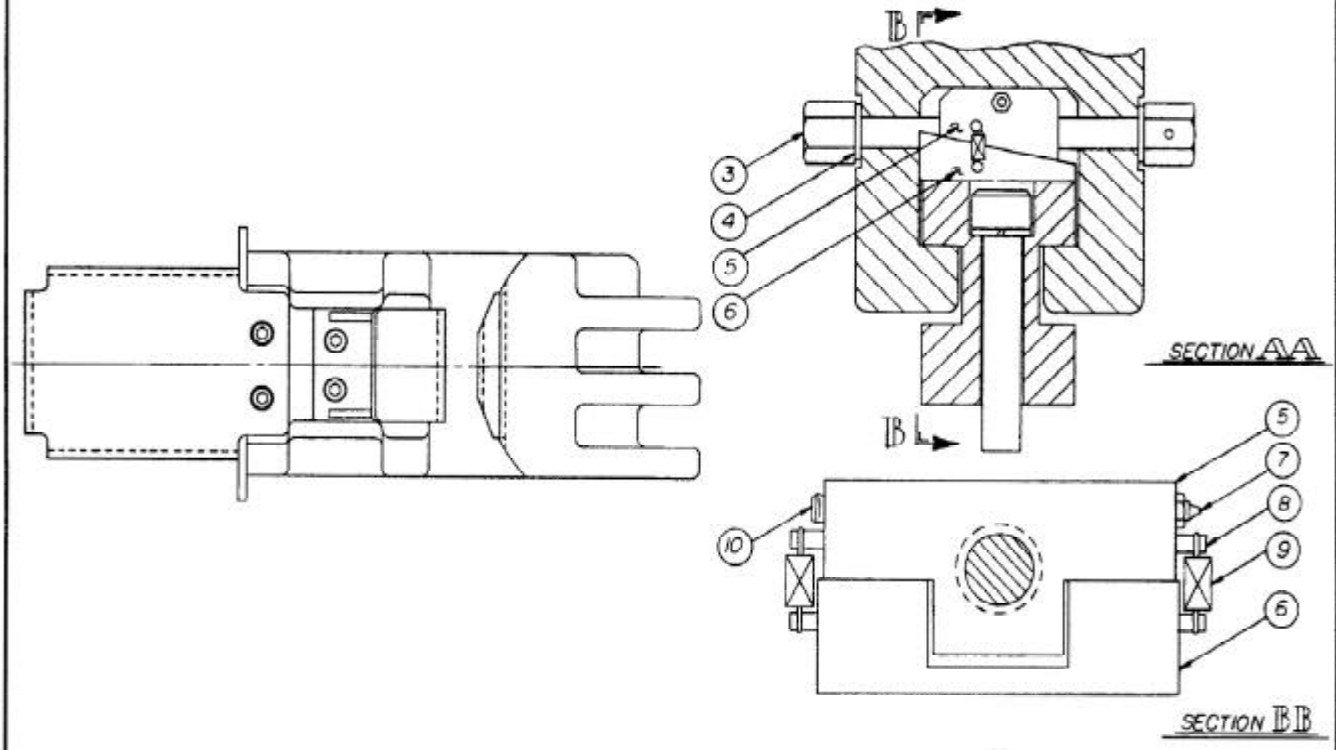
122B CAISSON CLAMP 800409

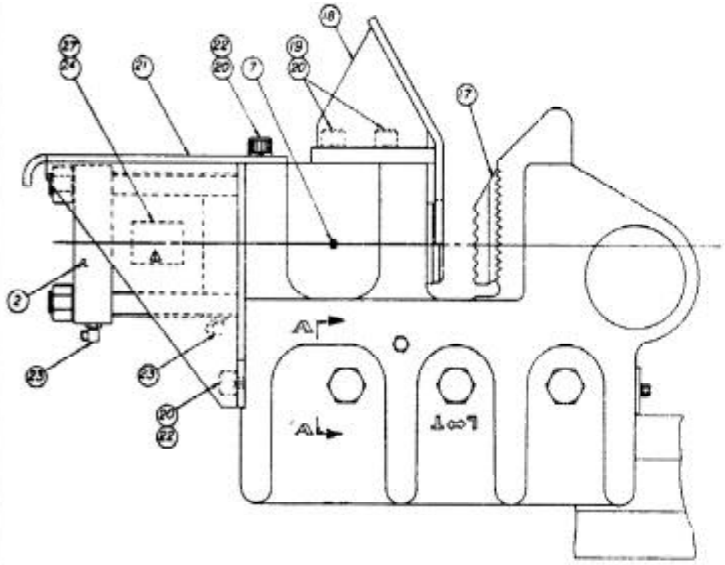
Item	Part Number	Qty	Description
1	810183	1	122B Caisson Clamp Body
2	810491	1	Cylinder
3	100212	10	1.0-8UNC x 4.00 Lg. SHCS
4	100209	17	1.0 Lockwasher
5	120633	1	Rod End Cap
6	120635	1	Piston
7	100213	7	1.0-8UNC x 2.5 Lg. SHCS
8	120285	2	Piston Bearing (Note)
9	120283	2	Piston Seal (Note)
10	120683	1	#248 O-Ring (Note)
11	120685	1	Rod Seal (Note)
12	120687	1	Rod Bearing (Note)
13	120289	1	Rod Wiper (Note)
14	120401	1	#269-O-Ring (Note)
15	130057	2	FITT2L-06M06R000-000H001
16	120009	2	HOSE038R02J006J006L0960S
17	100230	2	FITT2P-06M000000-000T001
18	810109	3	Caisson Screw Asm.
19	120111	6	Thrust Washer
20	120101	3	Wedge
21	120103	3	Lock
22	100229	4	Grease Fitting
23	120113	12	Drive Pin
24	120115	6	Spring
25	100646	7	FITT2P-02P000000-000S007
26	120119	1	Wedge Guard
27	100119	4	.5-13UNC x 1.25 Lg. SHCS
28	100121	4	.5 Lockwasher
29	120261	1	Fixed Jaw
30	100773	2	.625-11UNC x 4.50 Lg. SHCS
31	100007	2	.625 Lockwasher
32	120259	1	Caisson Head Guide
33	120335	1	Serial Number Plate
34	130381	4	Rivet
35	810633	1	122B Seal Kit
36	120629	1	Holding Valve Cartridge
37	120689	1	Chain Anchor
38	120637	1	Cylinder Rod

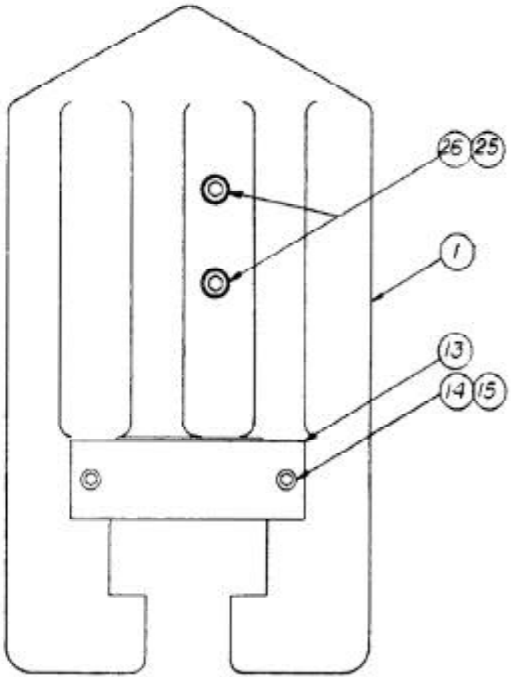
NOTE: Included in (810633) 122B Seal Kit.

PARTS LIST

122 CAISSON CLAMP 800153





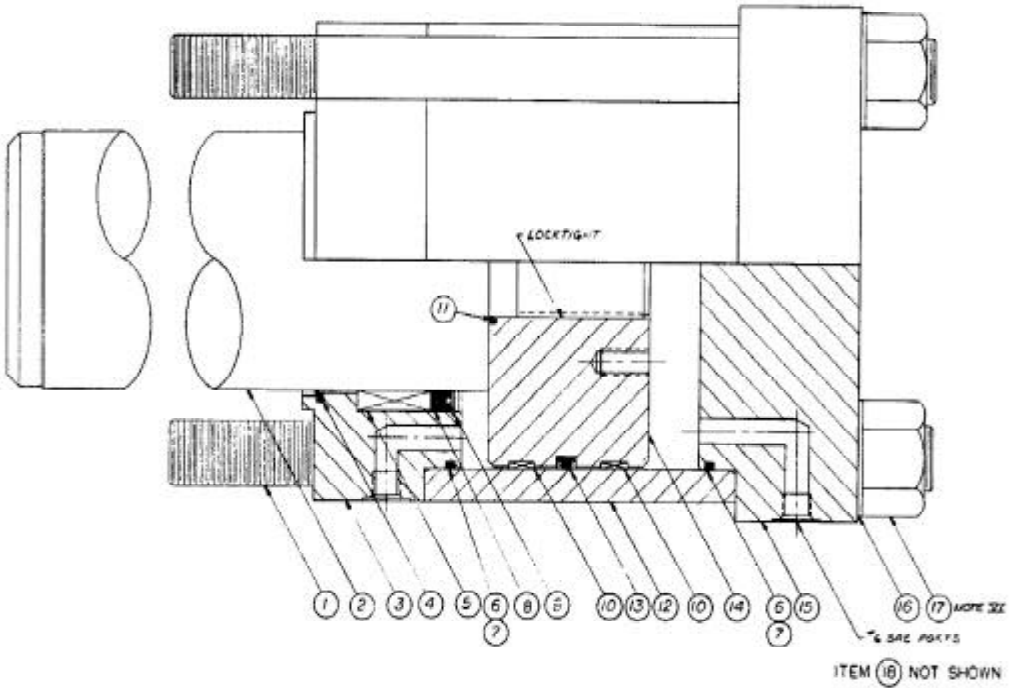


122 CAISSON CLAMP 800153

Item	Part Number	Qty.	Description
1	810183	1	122 Caisson Clamp Body
2	810187	1	122 Caisson Clamp Cylinder
3	810109	3	Caisson Clamp Screw Asm.
4	120111	6	Thrust Washer
5	120101	3	Wedge
6	120103	3	Lock
7	100229	4	Grease Fitting
8	120113	12	Drive Pin
9	120115	6	Spring
10	100646	3	FITT2P-02P000000-000S007
13	120119	1	Wedge Guard
14	100119	2	.5-13UNC x 1.50 Lg. SHCS
15	100121	2	.5 Lockwasher
17	120261	1	Fixed Jaw
18	120259	1	Caisson Head Guide
19	100213	4	1.0-8UNC x2.50 Lg. SHCS
20	100209	8	1.0 Lockwasher
21	120293	1	Cylinder Guard
22	400401	4	1.0-8UNC x 2.00 Lg. SHCS
23	130057	2	FITT2L-06M06R000-000H001
24	120335	1	Serial Number Plate
25	100007	2	.625 Lockwasher
26	100773	2	.625-11UNC 4.50 Lg.SHCS
27	130381	4	Rivet

PARTS LIST

122 CAISSON CYLINDER ASSEMBLY 810187

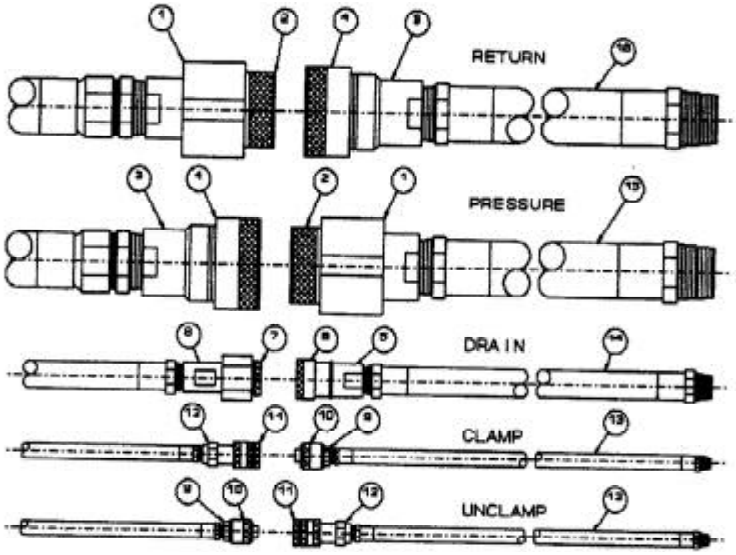


Item	Part Number	Qty	Description
1	120269	4	Tie Rod
2	120273	1	Cylinder Rod
3	120265	1	Rod End Cap
4	120289	1	Rod Wiper (Note)
5	120267	1	Rod Bushing
6	120277	2	#265-O-Ring (Note)
7	120279	2	#265 Back-up Washer (Note)
8	120287	1	Rod Seal (Note)
9	120291	1	Retaining Ring
10	120285	2	Piston Bearing (Note)
11	120281	1	#140-O-Ring (Note)
12	120275	1	Cylinder Tube
13	120283	1	Piston Seal (Note)
14	120271	1	Piston
15	120263	1	Piston End Cap
16	120111	4	1.25 Flatwasher
17	120301	4	1.25-12UNF Hex Nut
18	810213	1	122 Seal Kit

Note: Included in 122 Seal Kit.

PARTS LIST

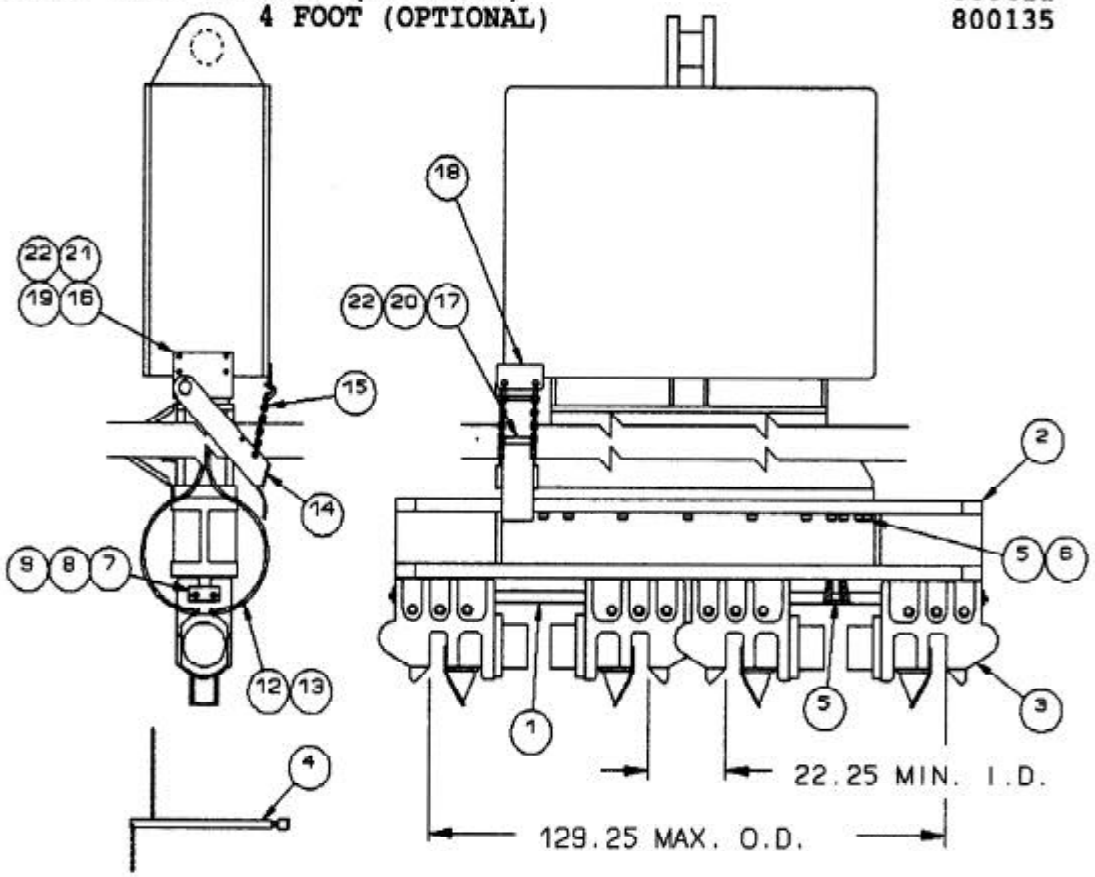
PIGTAIL KIT - 1412 (OPTIONAL) 850119

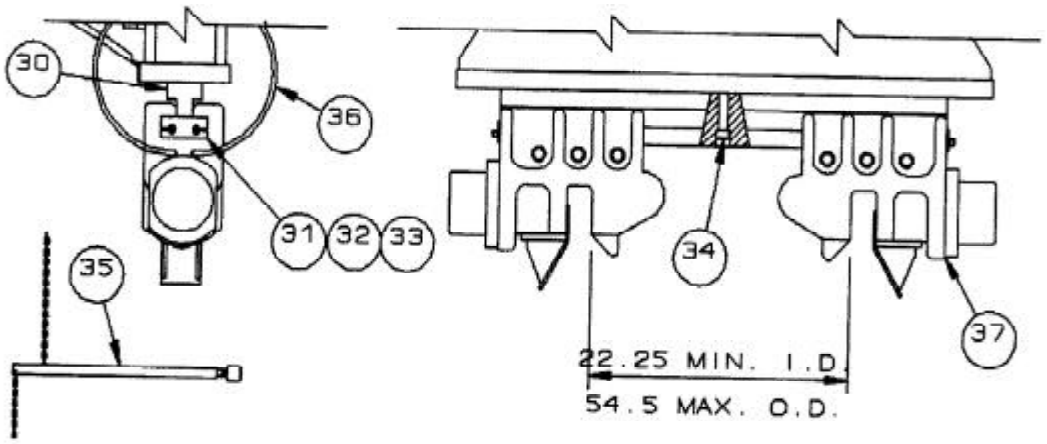


Item	Part Number	Qty	Description
1	140035	2	Female Disconnect (2")
2	140039	2	Dust Plug (2")
3	140037	2	Male Disconnect (2")
4	140041	2	Dust Cap (2")
5	120023	1	Male Disconnect (1")
6	120025	1	Female Disconnect (1")
7	120027	1	Dust Plug (1")
8	120029	1	Dust Cap (1")
9	100245	2	Male Disconnect (3/8")
10	100257	2	Dust Cap (3/8")
11	100737	2	Dust Plug (3/8")
12	100777	2	Female Disconnect (3/8")
13	140515	2	HOSE038R02P006P006L12000
14	140517	1	HOSE100R02P016P016L12000
15	140739	1	HOSE200PT6P032P032L10800
16	140761	1	HOSE200PT6P032P032L12000

PARTS LIST

CAISSON BEAM -11 FOOT (OPTIONAL) 800411
4 FOOT (OPTIONAL) 800135





PARTS LIST

CAISSON BEAM - 11 FOOT (OPTIONAL) 800411

Item	Part Number	Qty.	Description
1	140647	1	11′ Caisson Beam
2	800403	1	Beam Adapter
3	800153	2	122 Caisson Clamp Asm. (Note)
4	810173	1	Caisson Adjustment Tool
5	100193	63	1.50-6UNC x 5.00 Lg. SHCS
6	100195	22	1.50 Lockwasher
7	120011	2	Clamp Stop
8	400069	4	.75-10UNC x2.00 Lg. SHCS
9	100069	4	.75 Lockwasher
12	120411	4	HOSE038R02J006J006L1440S
13	100230	4	FITT2P-06J000000-000H001
14	140561	1	Hose Chute
15	810287	2	Chain Asm.
16	140555	1	Chute Bracket
17	140557	1	Guide Rod
18	140559	1	Chain Anchor
19	300375	1	.312 Cotter Key
20	100575	2	.625-11UNC x 1.25 Lg. SHCS
21	100005	4	.625-11UNC x 1.75 Lg. SHCS
22	100007	6	.625 Lockwasher

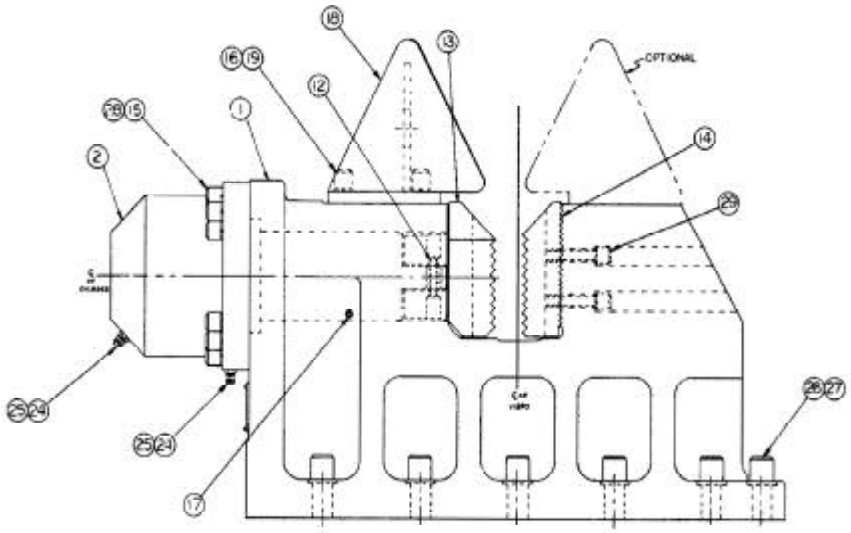
CAISSON BEAM - 4 FOOT (OPTIONAL) 800135

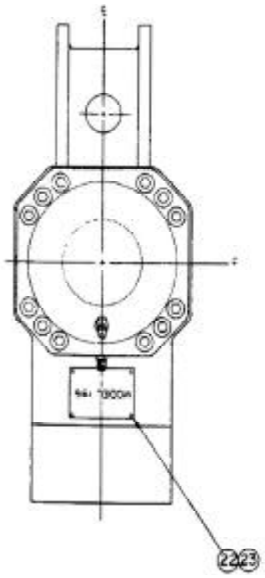
Item	Part Number	Qty	Description
30	120327	1	4′ Caisson Beam
31	120011	2	Clamp Stop
32	400069	4	.75-10UNC 2.0 Lg. SHCS
33	100069	4	.75 Lockwasher
34	120007	12	1.50-6UNC xx8.00 Lg. SHCS
35	810173	1	Caisson Adjustment Tool
36	120193	4	HOSE038R02J006J006L1320S
37	800153	2	122 Caisson Clamp Asm. (Note)

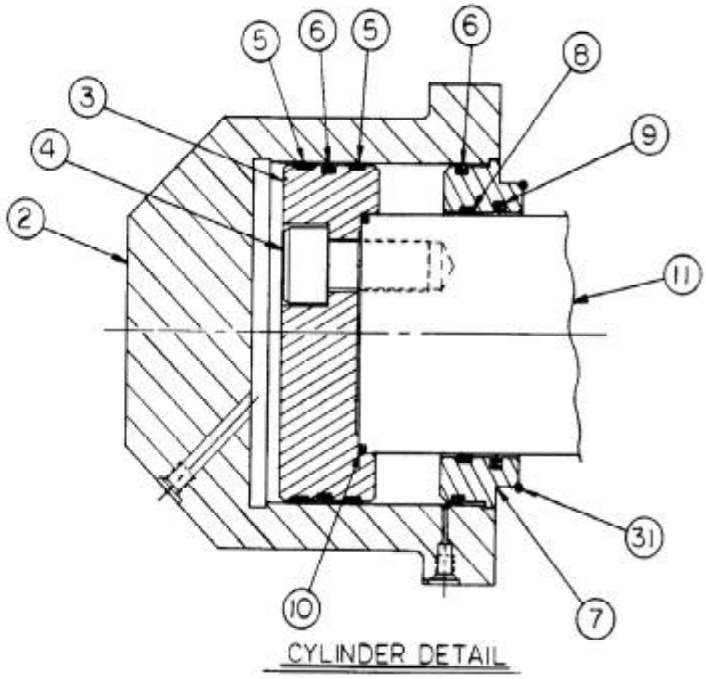
Note : Not part of final Assembly.

PARTS LIST

196 CLAMP ASSEMBLY 800315







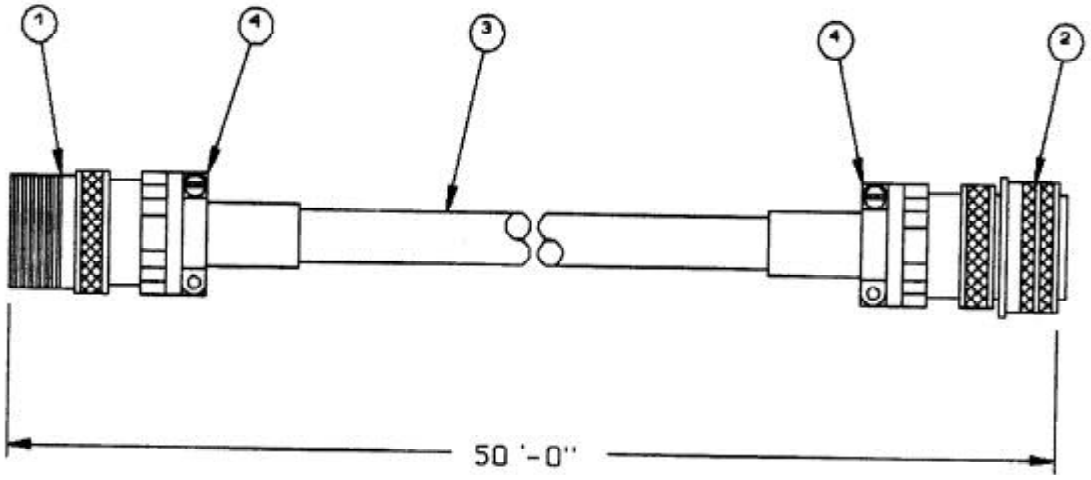
196 CLAMP ASSEMBLY 800315

Item	Part Number	Qty	Description
1	810457	1	196 Clamp Body
2	810459	1	Clamp Cylinder
3	120537	1	Piston
4	120157	3	1.50-6UNC x 3.00 Lg. SHCS
5	120551	2	Piston Bearing (Note)
6	120549	2	Piston Seal (Note)
7	120539	1	Rod End Cap
8	120555	1	Rod Bearing (Note)
9	120553	1	Rod Seal (Note)
10	120347	1	#261-O-Ring (Note)
11	120535	1	Cylinder Rod
12	130449	1	Roll Pin
13	810461	1	Movable Jaw (Note)
14	810463	1	Fixed Jaw (Note)
15	140145	12	1.0-8UNC x 3.50 Lg. SHCS
16	100209	4	1.0 Lockwasher
17	100229	1	Grease Fitting
18	100983	1	Pile Feed Guide
19	100213	4	1.0-8UNC x 2.50 Lg. SHCS
22	120561	1	Serial Number Plate
23	130381	4	Rivet
24	120193	2	HOSE038R02J006J006L1320S
25	100053	2	FITT2S-06M06P000-000H001
26	100193	11	1.50-6UNC x 5.00 LG. SHCS
27	100195	11	1.50 Lockwasher
28	400787	12	1.0 Hi-Collar Lockwasher
29	100212	2	1.0-8UNC x4.0 Lg. SHCS
30	810473	1	196 Clamp Seal Kit
31	120401	1	#269-O-Ring (Note)

Note : Not part of Final Assembly.

PARTS LIST

PENDANT EXTENSION CABLE - 50' (OPTIONAL) 800059



PENDANT EXTENSION CABLE - 50' (OPTIONAL)

Item	Part Number	Qty.	Description
1	100395	1	Amphenol Housing
	100763	1	Amphenol Insert
2	120169	1	Amphenol Housing
	100761	1	Amphenol Insert
3	100560	50'	Extension Cable
4	100375	2	Strain Relief

VIII. ORDERING PARTS

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
100659		(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 (SUN 2105)
810011	5 GAL	Vibration Case Lubricant (SHC634)
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. 1412 HOSE GROUP KIT-INTERNAL 850043

Item	P/N	Qty.	Description	Page Ref.
55	140713	2	HOSE038R02J006J006L1660C	VIII-9
71	140689	1	HOSE100PT4F016H920L2270C	VIII-9
72	140691	1	HOSE100PT4F016H920L2460C	VIII-9
73	140693	1	HOSE100PT4F916H920L1340C	VIII-9
74	140695	1	HOSE100PT4F916H420L1400C	VIII-9
75	140697	1	HOSE100R02F016H920L2190C	VIII-9
76	140699	1	HOSE100R02F016H420L2250C	VIII-9
77	140701	1	HOSE100R02F016H920L1320C	VIII-9
78	140703	1	HOSE100R02F916H429L1380C	VIII-9
79	140705	1	HOSE050R02F008J008L2330C	VIII-9
80	140707	1	HOSE050R02F008J008L2430C	VIII-9
81	140709	1	HOSE050R02F908J008L1390C	VIII-9
82	140711	1	HOSE050R02F908J008L1450C	VIII-9

4. 950 HOSE GROUP KIT-INTERNAL 850113

Item	P/N	Qty.	Description	Page Ref.
9	140753	1	HOSE200R01J032J032L17200	VIII-22
10	140755	1	HOSE200R01J032J032L18300	VIII-22
11	130393	2	HOSE019R01J004J004L11000	VIII-22
12	140735	2	HOSE025R02J004J004L11700	VIII-22
33	140715	1	HOSE125PT4H020H924L05600	VIII-22
34	140717	1	HOSE125PT4H020H924L06400	VIII-22
35	140719	1	HOSE125PT4J020H924L02200	VIII-22
36	140721	1	HOSE125PT4J020H924L03200	VIII-22
38	100108	1	HOSE038R02J006J006L0200S	VIII-22
44	400215	1	HOSE100R01P016P016L08400	VIII-23
48	300115	1	HOSE075R01J012J012L02600	VIII-23
61	140845	1	HOSE200R01J032J032L13900	VIII-23
62	140849	1	HOSE200R01J032JO32L15000	VIII-23
67	140729	1	HOSE200R01J032F932L09000	VIII-23
68	140727	1	HOSE200R01J032F932L09900	VIII-23
69	140723	1	HOSE150R01J024F024L04800	VIII-23
70	140725	1	HOSE150R01J024F024L08700	VIII-23
94	100862	1	HOSE100R01J016J016L03300	VIII-24
136	110831	1	HOSE100R01P016J016L07000	VIII-25
138	140745	1	HOSE050PT4J008J008L04900	VIII-25
153	140737	2	HOSE038PT4J006J006L04200	VIII-25
162	100486	1	HOSE050R01J008J008L01450	VIII-26
163	140741	1	HOSE050R01J008J008L03800	VIII-26
164	140743	1	HOSE050R01J008J008L07000	VIII-26
167	110633	1	HOSE038R02J006J006L0370S	VIII-26
178	140747	1	HOSE075R01J012J012L08800	VIII-26

VIII. ORDERING PARTS

E. MISCELLANEOUS ACCESSORIES (CONTINUED)

5. 1412/950 O-RING KIT 850115

P/N	Qty.	Description
110197	8	#159-O-Ring
140031	4	#170-O-Ring
100107	4	#210-O-Ring
100097	4	#214-O-Ring
100091	8	#219-O-Ring
100037	12	#222-O-Ring
110119	12	#225-O-Ring
140233	7	#228-O-Ring
400379	4	#232-O-Ring
140033	8	#454-O-Ring

6. CYLINDER SEAL KITS

MODEL 122B CAISSON CYLINDER 810633 Refer to page VIII-34

Item	P/N	Qty	Description
8	120285	2	Piston Bearing
9	120283	2	Piston Seal
10	120683	1	#248-O-Ring
11	120685	1	Rod Seal
12	120687	1	Rod Bearing
13	120289	1	Rod Wiper
14	120401	1	#269-O-Ring

MODEL 122 CAISSON CYLINDER 810213 Refer to page VIII-38

Item	P/N	Qty.	Description
4	120289	1	Rod Wiper
6	120277	2	#265-O-Ring
7	120279	2	#265 Back-Up Washer
8	120287	1	Rod Seal
10	120285	2	Piston Bearing
11	120281	1	#140-O-Ring
13	120283	1	Piston Seal

VIII. ORDERING PARTS

E. MISCELLANEOUS ACCESSORIES (CONTINUED)

6. CYLINDER SEAL KITS (CONTINUED

MODEL 196 CLAMP CYLINDER 810473 Refer to page VIII-42

Item	P\N	Qty	Description
5	120551	2	Piston Bearing
6	120549	2	Piston Seal
8	120555	1	Rod Bearing
9	120553	1	Rod Seal
10	120347	1	#261-O-Ring
31	120401	1	#269-O-Ring

F. RECOMMENDED SPARE PARTS

VIBRATION SUPPRESSOR 800129 Refer to page VIII-6

Item	P/N	Qty.	Description
15	100003	2	Elastomer
25	100097	2	#214-O-Ring
30	140233	2	#228-O-Ring
36	140109	1	Filter Element
38	100091	8	#219-O-Ring
41	100107	4	#210-O-Ring
55	140713	1	HOSE038R02J006J006L1660C

VIBRATION CASE 810203 Refer to page VIII-10

Item	P/N	Qty.	Description
--	140205	4	Motor Shaft Seal
6	100185	1	Sight Gage
8	140031	4	#170-O-Ring
9	140033	8	#454-O-Ring
24	110197	8	#159-O-Ring
30	810229	2	Centrifugal Breather

HOSE ASSEMBLIES-INTERCONNECTING 800053 Refer to page VIII-12

Item	P/N	Qty.	Description
4	140683	2	HOSE200PT6J032J032L60000
10	140685	1	HOSE100PT4P016P016L62000
14	100247	2	HOSE038RO2P006P006L62000

VIII. ORDERING PARTS

F. RECOMMENDED SPARE PARTS (CONTINUED)

POWER UNIT - INTERNAL	800385	Refer to page VIII-20	
Item	P/N	Qty	Description
33	140715	1	HOSE125PT4H020H924L05600
34	140717	1	HOSE125PT4H020H924L06400
35	140719	1	HOSE125PT4H020H924L02200
36	140721	1	HOSE125PT4J020H924L03200
51	140403	2	Filter Element

MODEL 122B CAISSON CLAMP	800409	Refer to page VIII-34	
Item	P/N	Qty.	Description
17	120261	1	Fixed Jaw
23	130057	2	.625-11UNC x 4.50 Lg.SHCS (Jaw Bolts)
35	810633	1	122B Seal Kit
36	120629	1	Holding Valve

MODEL 122 CAISSON CLAMP	800153	Refer to page VIII-36	
Item	P/N	Qty.	Description
--	810213	1	122 Seal Kit
17	120261	1	Fixed Jaw
23	130057	2	.625-11UNC x 4.50 Lg.SHCS (Jaw Bolts)

MODEL 196 CLAMP	800315	Refer to page VIII-42	
Item	P/N	Qty	Description
12	130449	1	Roll Pin
13	810461	1	Movable Jaw
14	810463	1	Fixed Jaw
24	120193	2	HOSE038R02J006J006L1320S
25	100053	2	FITT2S-06M06R000-000H001
26	100193	11	1.50-6UNC x 5.00 Lg SHCS (Head Bolts)
27	100195	11	1.50 Lockwasher
28	400787	2	1.0 Hi-Collar Lockwasher
29	100212	2	1.0-8UNC x 4.0 Lg. SHCS
30	810473	1	196 Seal Kit

G. CYLINDER INSTALLATION INSTRUCTIONS AND ASSEMBLY PROCEDURES
(TIE ROD TYPE CYLINDERS)

1. Assemble cylinder to clamp using grease and extreme care to prevent damage to O-rings.
2. Lubricate the tie rod threads with "NEVER SEIZE" and install hardened washers.
3. Install tie rod nuts "finger tight" against the cylinder head.
4. Torque the rod nuts in the sequence shown in Fig.1 per each of the four steps shown in the table. (Ft/Lbs.)
5. Scribe a line on a convenient point of the nut and cylinder head as shown in Fig. 2.
6. Turn the nuts an additional number of 1/12th turns as shown in the last column of the table.
7. Tighten the tie rod nuts in the sequence shown in Fig.1 with a 2/12ths maximum turn per each sequence.

CLAMP MODEL	BORE	TORQUE PER FIG.1 SEQUENCE FT/LBS.				TURNS IN 12ths
		STEP 1	STEP 2	STEP 3	STEP 4	
125/126	8"	30	60	125	250	5
216	7"	25	50	100	200	5
127	6"	20	80	250	480	0
80	7"	25	50	100	200	5
122	8"	30	50	100	200	5
254	12"	30	60	125	250	7

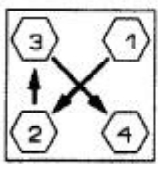


FIG. 1

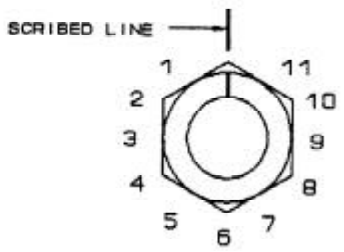


FIG. 2

G. CYLINDER INSTALLATION INSTRUCTIONS AND ASSEMBLY PROCEDURES (CONTINUED)

(ONE PIECE TYPE CYLINDERS)

CLAMP	BORE	MOUNTING BOLTS	TORQUE/FT./LBS.
196	10"	10	1,0009Ft/lbs
126B	8"	10	1,009 Ft/lbs.
127B	6"	6	1,009 Ft/lbs.
122B	8"	10	1,009 Ft/lbs.
80B	7"	8	1,009 Ft/lbs.

ASSEMBLY PROCEDURE

1. Lubricate Piston Seals and Rod Seal Housing O-Ring with generous amounts of grease.
2. Carefully slide the Cylinder body over the Piston and Rod Seal Housing, until it contacts the Clamp Body.
3. Insert Socket Head Cap Screws with Lockwashers, and tighten finger tight.
4. Torque all SHCS to specified Torque in steps and in a crossing pattern.

H. RECOMMENDED TIGHTENING TORQUE

Nominal Screw Size	Nominal Socket Size	Tightening Torque Ft/lbs.	Nominal Screw Size	Nominal Socket Size	Tightening Torque Ft/lbs.
#10-24	5/32	6 Ft/lbs.	#10-32	5/32	6 Ft/lbs.
1/4-20	3/16	13 Ft/lbs.	1/4-28	3/16	15 Ft/lbs.
5/16-18	1/4	27 Ft/lbs.	5/16-24	1/4	30 Ft/lbs.
3/8-16	5/16	48 Ft/lbs.	3/8-24	5/16	55 Ft/lbs.
7/16-14	3/8	77 Ft/lbs.	7/16-20	3/8	86 Ft/lbs.
1/2-13	3/8	119 Ft/lbs.	1/2-20	3/8	133 Ft/lbs.
5/8-11	1/2	234 Ft/lbs.	5/8-18	1/2	267 Ft/lbs.
3/4-10	5/8	417 Ft/lbs.	3/4-16	5/8	467 Ft/lbs.
7/8-9	3/4	676 Ft/lbs.	7/8-14	3/4	742 Ft/lbs.
1-8	3/4	1,009 Ft/lbs.	1-12	3/4	1,126 Ft/lbs.
1-1/4-7	7/8	1,600 Ft/lbs.	1-1/4-12	7/8	1,800 Ft/lbs.
1-1/2-6	1	2,800 Ft/lbs.	1-1/2-12	1	3,000 Ft/lbs.

NOTE: These values are for Socket head cap screws only. Button heads, Flat heads and Set screws have different values. Check the Allen Hand Book for correct torque specifications.