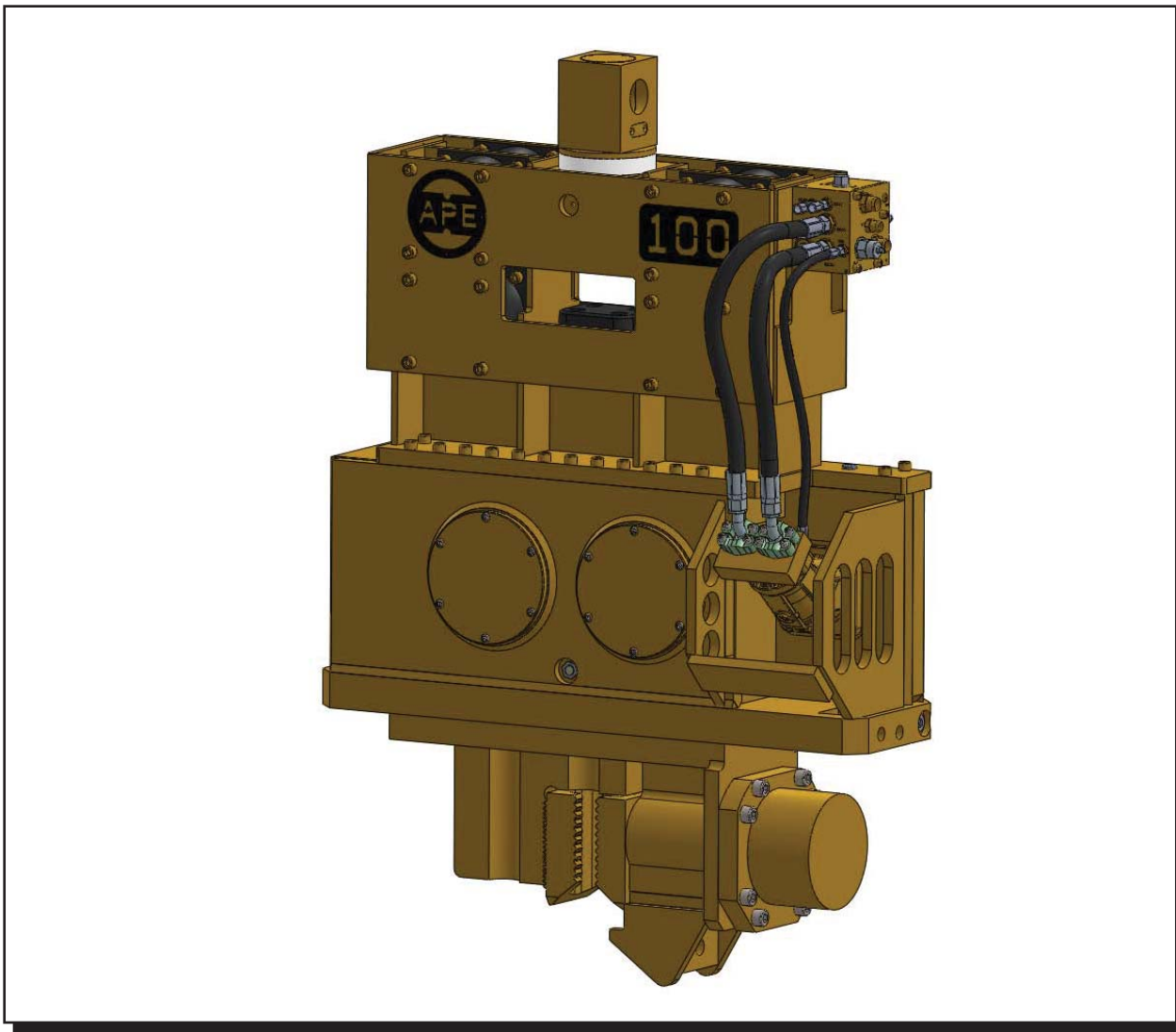




# OPERATION / MAINTENANCE MANUAL

MODEL 100E VIBRATORY DRIVER

7032 SOUTH 196th - KENT, WA. 98032 - (253) 872-0141 / FAX (253) 872-8710



SERIAL NUMBER:

**MODEL 100E VIBRO**



# OPERATION / MAINTENANCE MANUAL

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# **OPERATION / MAINTENANCE MANUAL**

MODEL 100E VIBRATORY DRIVER

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## **Preface**

### **General**

This manual covers the **Model 100E Vibratory Driver/Extractor**. Most information contained in this manual is identical for all the models covered. The data provided in this manual gives the necessary information to operate and maintain APE equipment. The listed procedures are to be performed by qualified personnel who have an understanding of the equipment and who follow all safety precautions.

### **Guide to Using the Manual**

1. Refer to the Table of Contents for the page location of applicable sections.
2. All weights and measurements in this manual are in both English and Metric units.
3. The manual will be revised as necessary to reflect current information.

### **Abbreviations**

The following are abbreviations used within this manual.

|             |                          |             |                           |
|-------------|--------------------------|-------------|---------------------------|
| <b>lbs.</b> | = Pounds                 | <b>HCLW</b> | = High Collar Lock Washer |
| <b>psi.</b> | = Pounds per Square Inch | <b>P/N</b>  | = Part Number             |
| <b>hp.</b>  | = Horse Power            | <b>SHCS</b> | = Socket Head Cap Screw   |
| <b>gpm.</b> | = Gallons Per Minute     |             |                           |
| <b>rpm.</b> | = Revolutions Per Minute |             |                           |
| <b>eng.</b> | = Engine                 |             |                           |
| <b>cyl.</b> | = Cylinder               |             |                           |
| <b>mm.</b>  | = Millimeter             |             |                           |
| <b>mtg.</b> | = Mounting               |             |                           |
| <b>S/N</b>  | = Serial Number          |             |                           |
| <b>sol.</b> | = Solenoid               |             |                           |

### **Serial Number Locations**

1. **VIBRATOR:** Above and in between the eccentric covers on both sides of the machine.



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MODEL 100E VIBRATORY DRIVER

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## APE Vibratory Hammer Checklist Prior to Shipment

Date: \_\_\_\_\_ Sales Order Number: \_\_\_\_\_ Vibro S/N: \_\_\_\_\_

Customer: \_\_\_\_\_ Clamp S/N: \_\_\_\_\_

Engine serial number: \_\_\_\_\_ Ship Date: \_\_\_\_\_

*\* Items checked with an asterisk should be checked regularly, but not every time the unit is serviced*

### Checking the suppressor

- Removed all wire rope for insurance reasons
- Checked Shackle pin cotter key and nut
- Checked large elastomers for signs of cracks
- Checked small elastomers for signs of cracks
- Checked all bolts on elastomers
- Removed and checked anti-cavitation valve\*
- Inspected pop off safety check valve
- Checked line pull pin and multi-stage pin
- Inspected all suppressor mounting bolts
- Inspected entire suppressor for weld cracks
- Installed safety line pull sticker
- Inspected all hoses and fittings on suppressor
- Inspected all fittings on rifle board top plate
- Checked suppressor loop hoses for wear

### Vibro gearbox

- Checked gearbox oil level
- Flushed gearbox with flushing system
- Changed gearbox oil
- Removed and cleaned gearbox oil site gage
- Removed and cleaned magnetic drain plug
- Checked/replaced damaged bearing cover bolts
- Removed, cleaned, and replaced breather valve
- Checked motor bearing cover bolts
- Checked bottom of gearbox- all mounting holes
- Checked entire bottom clamp mounting surface
- Checked hydraulic motor mounting bolts
- Checked motor couplers for leaks
- Checked motor coupler bolts
- Inspected entire gearbox for signs of cracks
- Removed any welding attached by pile crew
- Inspected main bearings visually for wear\*
- Inspected motor bearings visually for wear\*

### Clamp attachment: sheet wood caisson other

- Measured jaw opening width for pile
- Checked with contractor to confirm pile thickness
- I am sure the jaws will open wide enough
- Checked to see if mounting bolts were tight
- Replaced worn jaws, inspected teeth and bolts
- Checked fixed jaw bolts
- Checked vertical jaw pin and put spare in box
- Checked 90 degree hyd fittings on clamps
- Inspected clamp casting for cracks
- Serial number stamped and welded with SS rod
- Greased slide
- Inspected clamp hoses, replace if necessary
- Removed air from lines of clamp cylinder
- Stroked cylinder back and forth for visual check
- Put spare back up jaws in power unit tool box
- Put extra clamp bolts in tool box

### Vibro test

- Checked and cleaned quick disconnects
- Checked to make sure caps and plugs are there
- Checked all o-rings on QD's
- Put spare o-ring kit in tool box of power unit
- Closed jaws and checked hoses for leaks
- Checked clamp pressure with hoses attached
- Checked pendant light to make sure it works

### Test Data:

- Free hanging drive pressure: \_\_\_\_\_
- Cycles per minute: \_\_\_\_\_
- Temperature of hydraulic oil at time of test: \_\_\_\_\_

### Tips for the APE service technicians and pile crew:

Do not free hang test the vibro with the jaws open because the moveable jaw could break from vibration. Close the jaws!.

Before removing clamp quick disconnects, please open the jaws. This will take the hydraulic pressure off the fittings so that you can remove them by hand.

Remove the vibro sight glass and clean it so you can read the level while standing ten feet away from the hammer. If you have to get your nose up to the vibro to read the sight glass then it needs to be cleaned. Remember, the oil level should be in the middle of the glass.

Please clean the control panel and spray some armor all on it.

Prior to the vibro going out on rent it must look like new condition. If the paint appears bad then paint it. If the paint surface is bad then have it sand blasted. Do not allow the hammer to go out looking bad. Any bad hoses should be replaced. The most important thing is the condition of the jaws and the hoses. Both should be new or in new condition.

If this unit is going to operate in cold weather then please make sure the proper oils have been used. In cold weather operations we must use a softer o-ring to handle the colder temperatures.

### Part parts that should be with the vibro power unit:

- Two spare 90 degree fittings for the clamp cylinder
- One sight glass with teflon tape already installed and boxed
- One socket wrench for removing and replacing sight glass
- One manual with copy of this check out sheet
- Two extra clamp lines with plugs on both ends
- Two extra caps and two extra plugs for the clamp cylinder
- One spare set of jaws and two jaw pins and fixed jaw bolts
- Two extra clamp mounting bolts
- APE hard hat stickers for pile crew
- APE literature on this unit plus any new information for the pile bucks to read.
- The tool kit for the power unit should be listed on the "Check list for power unit" and therefore is not included with this form.

### Comments:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- Inspected by: \_\_\_\_\_
- Approved by: \_\_\_\_\_
- This unit owned by: \_\_\_\_\_
- Final inspection completion date: \_\_\_\_\_
- Branch manager final approval: \_\_\_\_\_



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## **Safety Precautions**

(This list of precautions must be followed at all times to ensure personal & equipment safety.)

1. Read this manual from beginning to end before operating or working on this machine.
2. When operating in a closed area, pipe exhaust fumes outside. (**WARNING:** Breathing exhaust fumes can cause serious injury and even death.)
3. When servicing batteries, avoid any type of spark or open flame. Batteries generate explosive gases during charging. There must be proper ventilation when charging batteries.
4. Never Adjust or repair the unit while it is in operation.
5. Make sure the Control Pendant is in the "OFF" position before starting the unit.
6. Remove all tools and electrical cords before starting the unit.
7. Keep oily rags away from the exhaust system.
8. Never store flammable liquids near the engine.
9. Never stand under vibro at any time and keep your eyes on the vibro when it is in operation. Keep a look out for loose bolts or leaking hydraulic lines.
10. Avoid pulling on hose quick dis-connect fittings. Move power unit closer to work if hoses cannot reach. Do not use hoses as a tow line to tug the power unit! If a hose fails at the hydraulic couplers then it is a result of "hose tugging by the pile crew".
11. Avoid kinks in the hoses. Kinks will cut the hose safety factor by 50 percent.
12. Always wear eye and ear protection.
13. Avoid standing downwind of vibrating piles. Dirt and other matter may become airborne and fall into the unprotected eye.
14. Always wear a hardhat, gloves, and safety shoes.
15. When moving, driving or extracting pile, always attach safetyline between pile and crane hook.
16. (**WARNING**) Never clamp vibro to pile and dis-connect from crane line. Lay vibro down on ground when not in use.
17. Do not truck power unit with quick disconnect caps and plugs screwed on to fittings unless the caps and plugs have wire rope safety lines attached. Store in storage box under control panel.



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The use of the Ape Sequence Valve with any Ape vibro, regardless of model or size, whether attached to an excavator or run from an Ape power unit, must have in place safety chains and/or safety cables attached to any pile regardless of pile type. This is a mandatory safety device required to prevent injury and/or damage by possible failure of clamp close hydraulic pressure for any reason. Loss or reduction of hydraulic clamp pressure may result in dropping a pile unexpectedly.

Picking up piles of any type and moving them from location to location without this safety device is absolutely forbidden. Anytime an Ape vibro is attached to a pile of any type, regardless of intended use of the vibro shall always have this safety device attached, no exceptions allowed.

Violation of this basic and standard safety procedure is the sole responsibility of the user and American Piledriving Equipment, Inc shall not be held liable, directly or indirectly for possible results that may occur due to the intentional or unintentional use of our product without this safety device installed.





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## Warranty

American Piledriving Equipment, Inc.

### STANDARD WARRANTY

American Piledriving Equipment, Inc. (APE/J&M) warrants new products sold by it to be free from defects in material or workmanship for a period of one year after the date of delivery to the first user and subject to the following conditions:

APE/J&M's obligation and liability under this WARRANTY is expressly limited to repairing or replacing at APE/J&M's option, any parts which appear to APE/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 APE/J&M or the authorized APE/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 APE/J&M and which carry the warranty of the manufacturer thereof, or to normal maintenance (scraped and skived lube and fuel lines, worn cushion material in the drive base) or normal maintenance parts (such as fouled injectors, weakened check valve springs, damaged grease fittings caused by use over time).

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. APE/J&M makes no other warranty, expressed or implied and makes no warranty of merchantability of fitness for any particular purpose.

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

**ANY TYPE OF WELDING ON EQUIPMENT  
WILL VOID THE WARRANTY**

Refusal: Vibros: If the pile does not move one foot in 30 seconds of vibro operation at full speed. Resort to a larger vibro. APE/J&M equipment may exceed the refusal driving criteria for short periods of time as may be needed to penetrate hard soil layers or obstacles. In such cases, a heat gun is used to monitor the temperature of the bearings and related components to prevent use of the machine beyond 210 degrees F. Contact APE/J&M or your local

APE/J&M distributor for special instructions when faced with refusal conditions.

Refusal: Diesels: Do not exceed 10 blows per inch or 120 blows per foot. In cases of setting of the pile it is permitted to increase the blow count to 250 blows per foot, but only for one foot of driving penetration. Pile inspectors should consult the APE factory for permission to exceed these limits. Failure to do so will void the warranty. This standard specification is accepted by the DFI (Deep Foundations Institute) and the PDCA (Pile Driving Contractors Association) and by all manufacturers of pile driving equipment.



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MODEL 100E VIBRATORY DRIVER

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## II. MAJOR COMPONENT DEFINITION

### II-1. Model 100E Final Assembly Identification

1000751

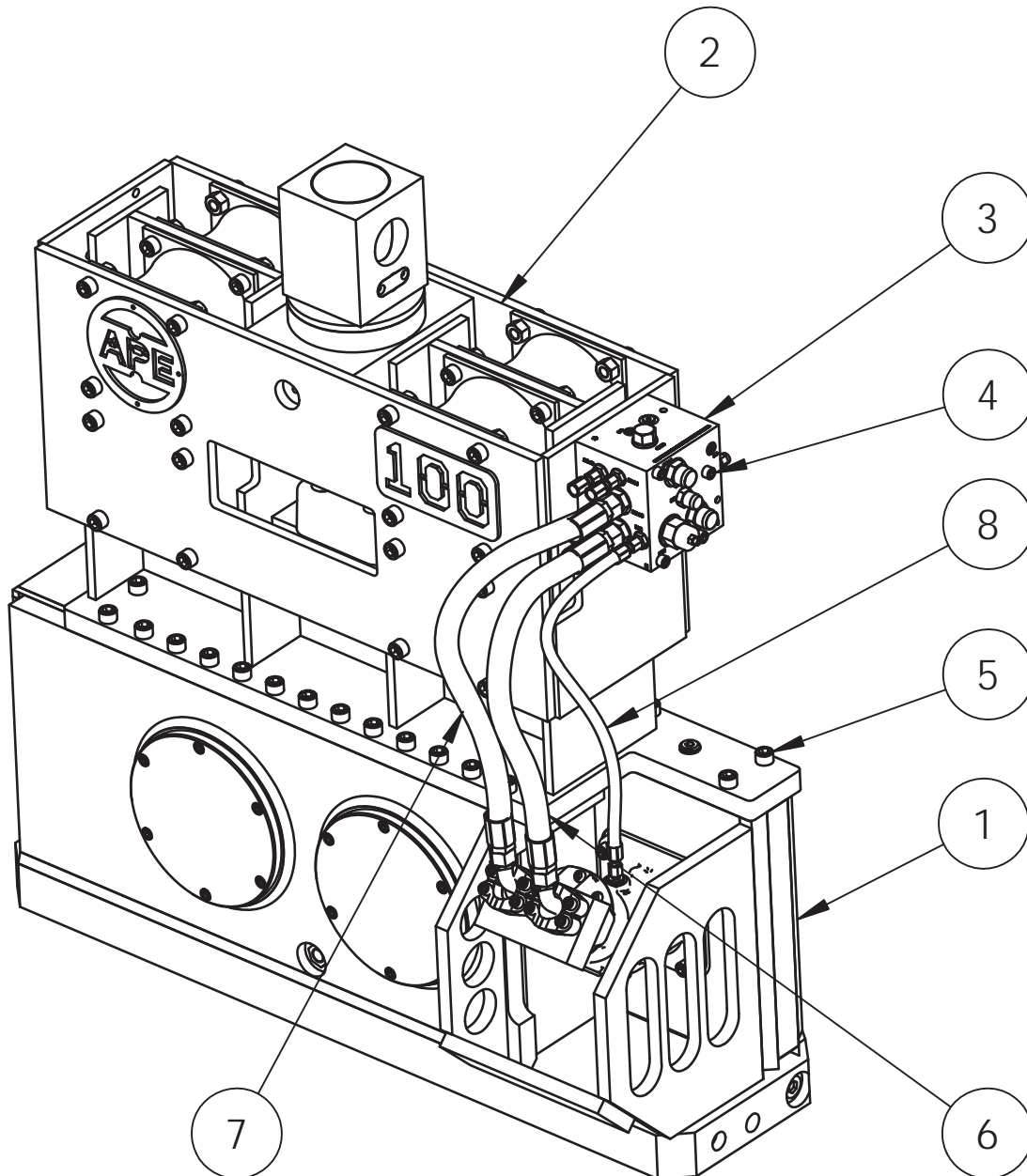


Figure 2-A. Model 100E Final Assembly



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## II. MAJOR COMPONENT DEFINITION (Continued...)

### II-1. Model 100E Final Assembly Identification 1000513

| <u>Item</u> | <u>Part Number</u> | <u>Qty.</u> | <u>Description</u>         |
|-------------|--------------------|-------------|----------------------------|
| 1           | 1000752            | 1           | GEAR BOX ASSEMBLY          |
| 2           | 350101             | 1           | SUPPRESSOR ASSEMBLY        |
| 3           | 1000753            | 1           | SEQUENCE MANIFOLD ASSEMBLY |
| 4           |                    | 4           | 0.50-13UNC X 7.00 LG SHCS  |
| 5           |                    | 31          | 0.75-10UNC X 3.00 LG SHCS  |
| 6           |                    | 1           | HOSE125C13H420H020L0780    |
| 7           |                    | 1           | HOSE125C13H420H020L0780    |
| 8           |                    | 1           | HOSE075R09J012J012L0780    |

Table 2-A. Model 100E Final Assembly

### II. MAJOR COMPONENT DEFINITION (Continued...)

#### II-2. Suppressor Identification

350101

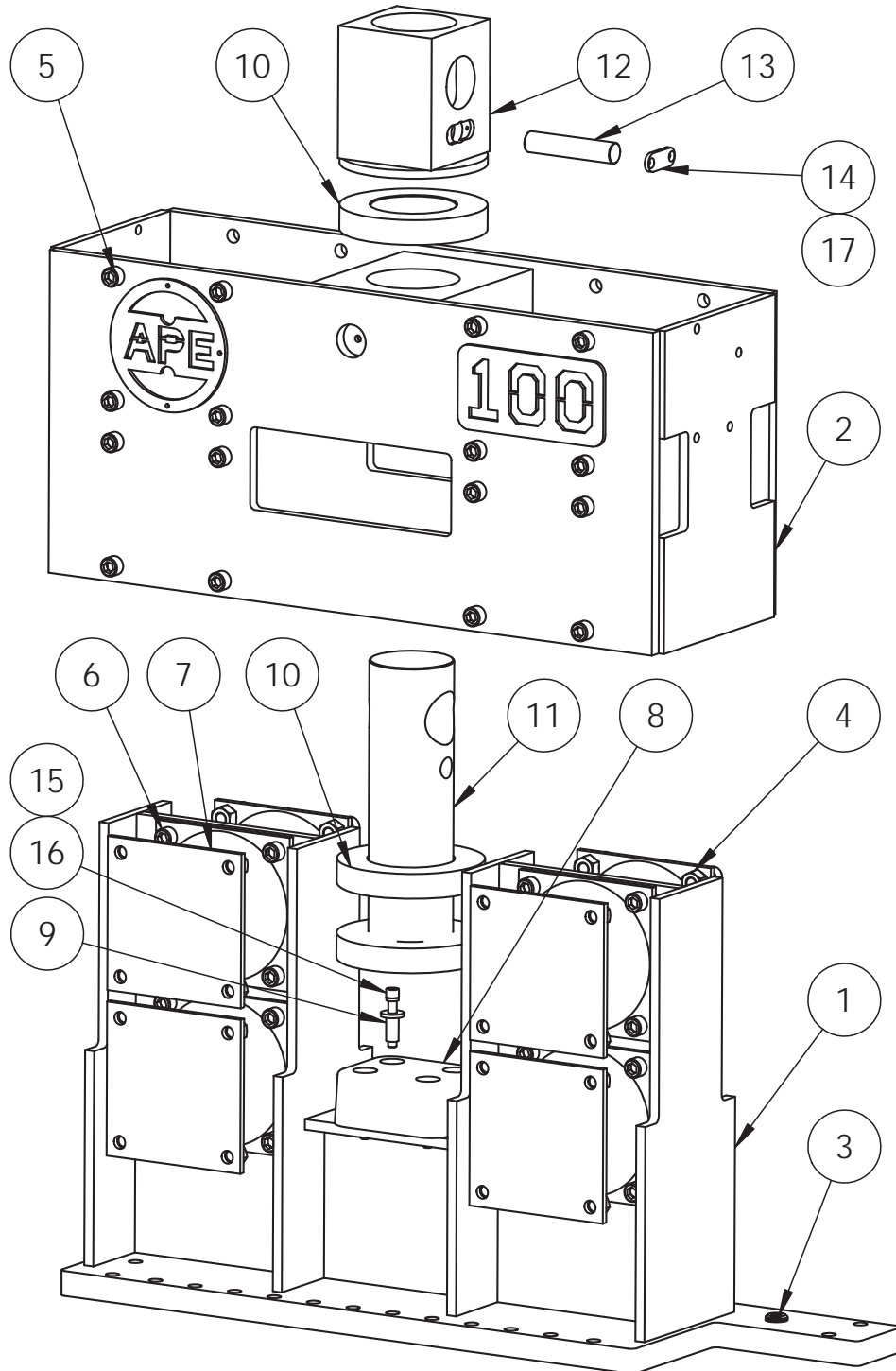


Figure 2-B. Suppressor Assembly



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## II. MAJOR COMPONENT DEFINITION (Continued...)

### II-2. Suppressor Identification 350101

| <u>Item</u> | <u>Part Number</u> | <u>Qty.</u> | <u>Description</u>         |
|-------------|--------------------|-------------|----------------------------|
| 1           | 350103             | 1           | INNER SUPPRESSOR ASM       |
| 2           | 350102             | 1           | OUTER SUPPRESSOR ASM       |
| 3           | 100063             | 1           | FITT2P-16P PLUG            |
| 4           | 1170816            | 48          | 0.75-10UNC STOVER NUT      |
| 5           | 400069             | 32          | 0.75-10UNC X 2.00 LG SHCS  |
| 6           | 170812             | 16          | 0.75-10UNC X 2.25 LG SHCS  |
| 7           | 321004             | 8           | ELASTOMER                  |
| 8           | 312109             | 1           | DOCK BUMPER                |
| 9           | 312111             | 4           | DOCK BUMPER INSERT         |
| 10          | 1000754            | 2           | OUTER SUPPRESSOR SPACER    |
| 11          | 1000755            | 1           | SWIVEL PIN                 |
| 12          | 1000756            | 1           | SHACKLE MOUNT              |
| 13          | 1000757            | 1           | CONNECTING PIN             |
| 14          | 1000758            | 2           | KEEPER PLATE               |
| 15          | 100027             | 4           | 0.50 HI-COLLAR LOCK WASHER |
| 16          | 130235             | 4           | 0.50-13 UNC X 3.00 LG SHCS |
| 17          |                    | 4           | FLAT HEAD CAP SCREW        |

**Table 2-B. Suppressor Assembly**

### II. MAJOR COMPONENT DEFINITION (Continued...)

#### II-3. Gearbox Identification

1000752

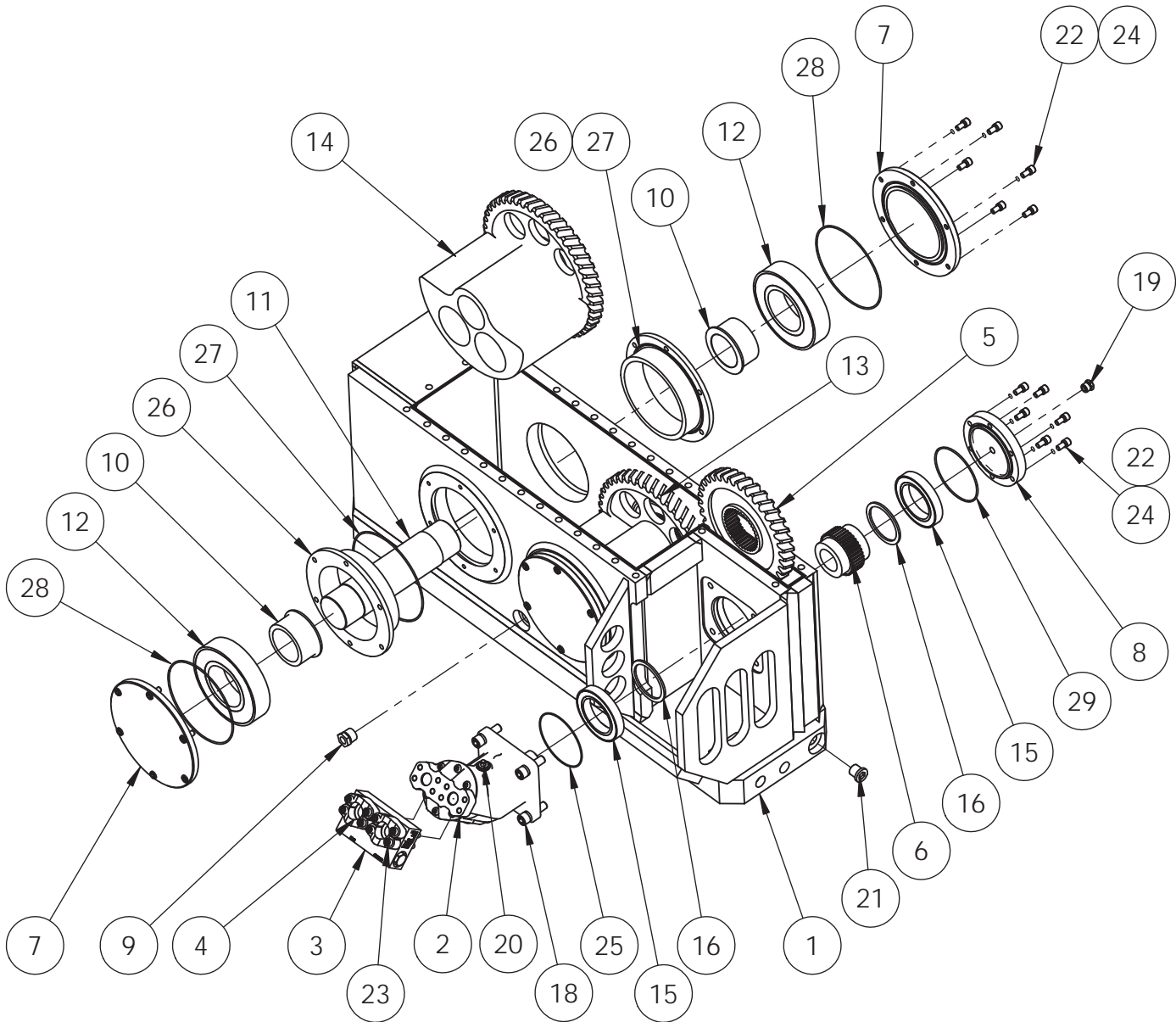


Figure 2-C. Gearbox Assembly



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## II. MAJOR COMPONENT DEFINITION (Continued...)

### II-3. Gearbox Identification

1000752

| <u>Item</u> | <u>Part Number</u> | <u>Qty.</u> | <u>Description</u>         |
|-------------|--------------------|-------------|----------------------------|
| 1           | 183001             | 1           | GEAR BOX                   |
| 2           | 122001             | 1           | VIBRO MOTOR FM125          |
| 3           | 112003E            | 1           | CV MANIFOLD ASSEMBLY       |
| 4           |                    | 2           | #20 SPLIT FLANGE CODE 62   |
| 5           | 122007             | 1           | DRIVE GEAR RIGHT           |
| 6           | 122010             | 1           | GEAR CARRIER               |
| 7           | 122004             | 4           | ECCENTRIC BEARING COVER    |
| 8           | 122005             | 1           | MOTOR BEAR COVER           |
| 9           | 120005             | 1           | SIGHT GLASS                |
| 10          | 181005             | 4           | BEARING SLEEVE             |
| 11          | 181003             | 2           | ECCENTRIC SHAFT            |
| 12          | 121001             | 4           | ECCENTRIC BEARING          |
| 13          | 131007F LEAD       | 1           | LH ECCENTRIC               |
| 14          | 131007F LEAD       | 1           | RH ECCENTRIC               |
| 15          | 122002             | 2           | MOTOR BEARING              |
| 16          | 122009             | 2           | GEAR SPACER                |
| 17          | 400727             | 4           | 0.75 HI COLLAR LOCK WASHER |
| 18          | 100067             | 4           | 0.75-10UNC X 2.50 LG SHCS  |
| 19          | 122015             | 1           | GEAR BOX BREATHER          |
| 20          | 300099             | 1           | FITT2S-08M10R              |
| 21          | 123004             | 1           | 1" NPT MAG PLUG            |
| 22          | 100445             | 30          | 0.50-13UNC X 1.00 LG SHCS  |
| 23          | 100079             | 8           | 0.50-13UNC X 4.00 LG SHCS  |
| 24          | 100027             | 30          | 0.50 HI COLLAR LOCK WASHER |
| 25          | 352113             | 1           | 2-163 O-RING               |
| 26          | 181002             | 4           | BEARING CARRIER            |
| 27          | 352067             | 4           | 2-274 O-RING               |
| 28          |                    | 4           | 2-271 O-RING               |
| 29          | 100680             | 1           | 2-258 O-RING               |

**Table 2-C. Gearbox Assembly**

### II. MAJOR COMPONENT DEFINITION (Continued...)

#### II-4. Sequence Manifold Identification

1000753

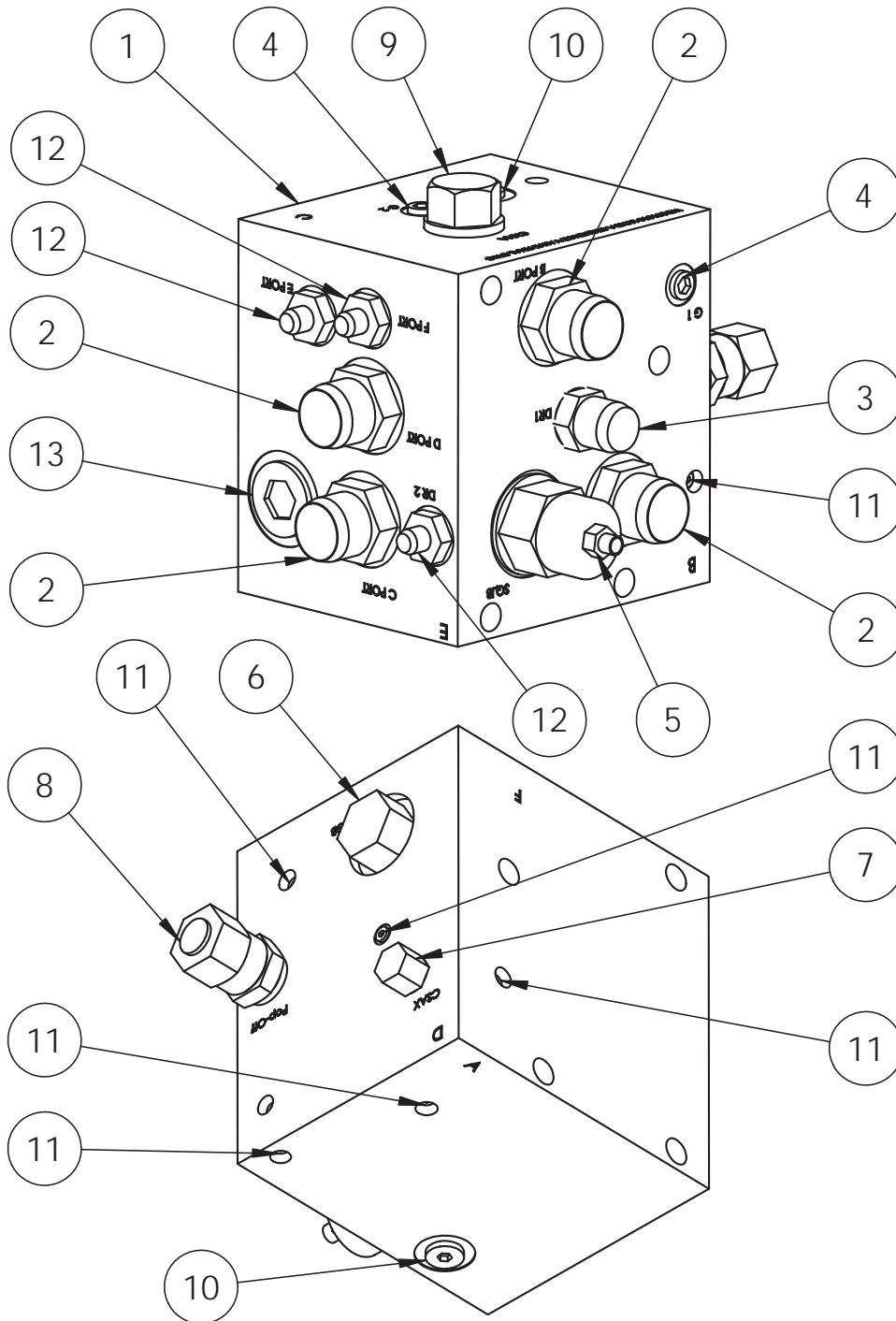


Figure 2-D. Sequence Manifold Assembly





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## II. MAJOR COMPONENT DEFINITION (Continued...)

### II-4. Sequence Manifold Identification

**1000753**

| <u>Item</u> | <u>Part Number</u> | <u>Qty.</u> | <u>Description</u> |
|-------------|--------------------|-------------|--------------------|
| 1           |                    | 1           | MANIFOLD BLOCK     |
| 2           | 300676             | 4           | FITT2S-16M16R      |
| 3           | 100139             | 1           | FITT2S-08M08R      |
| 4           | 110935             | 2           | FITT2P-04R PLUG    |
| 5           | 111011             | 1           | SEQUENCE VALVE     |
| 6           | 150695             | 1           | P O CHECK VALVE    |
| 7           |                    | 1           | SHUTTLE VALVE      |
| 8           | 321009             | 1           | POP OFF RELIEF     |
| 9           | 1351901            | 1           | CHECK VALVE        |
| 10          | 100903             | 2           | FITT2P-08R PLUG    |
| 11          |                    | 8           | FITT2P-03R PLUG    |
| 12          | 300099             | 3           | FITT2S-08M10R      |
| 13          | 130829             | 1           | FITT2P-16R PLUG    |

**Table 2-D. Sequence Manifold Assembly**



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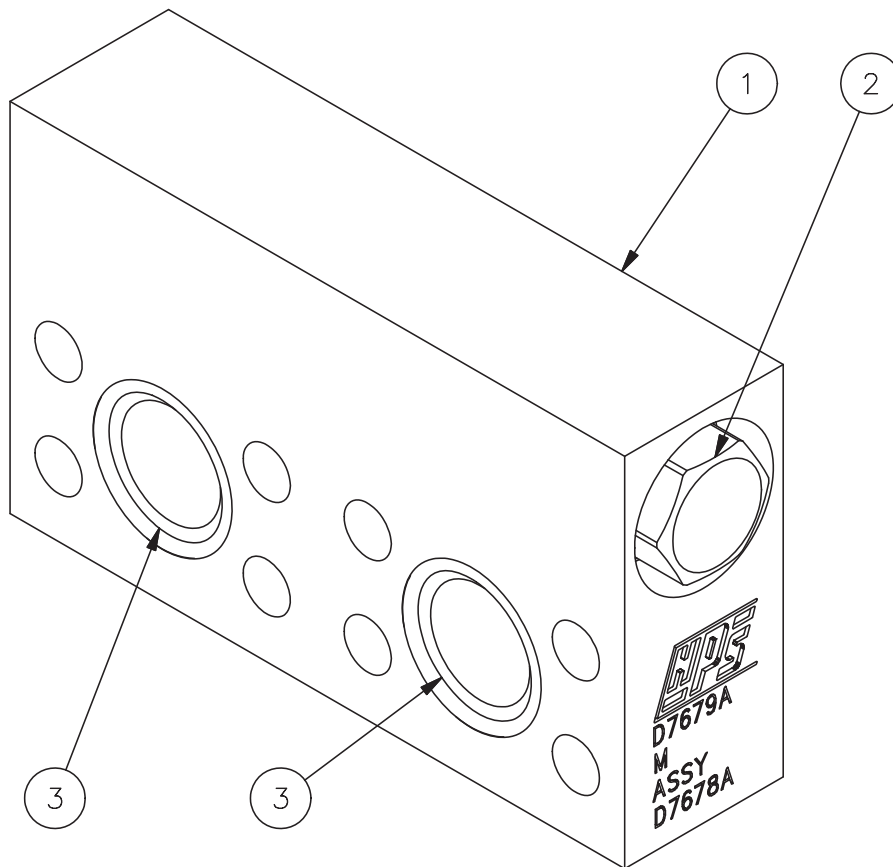
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## II. MAJOR COMPONENT DEFINITION (Continued...)

### II-5. Check Valve Identification

**112003E**



**Figure 2-E. Check Valve Assembly**

### II-5. Check Valve Identification

**112003E**

| <u>Item</u> | <u>Part Number</u> | <u>Qty.</u> | <u>Description</u> |
|-------------|--------------------|-------------|--------------------|
| 1           | 352105             | 1           | CHECK VALVE BODY   |
| 2           | 352107             | 1           | CHECK VALVE        |
| 3           | 100037             | 2           | 2-222 O-RING       |

**Table 2-E. Check Valve Assembly**

### II. MAJOR COMPONENT DEFINITION (Continued...)

#### II-6. 50 Sheet Clamp Identification

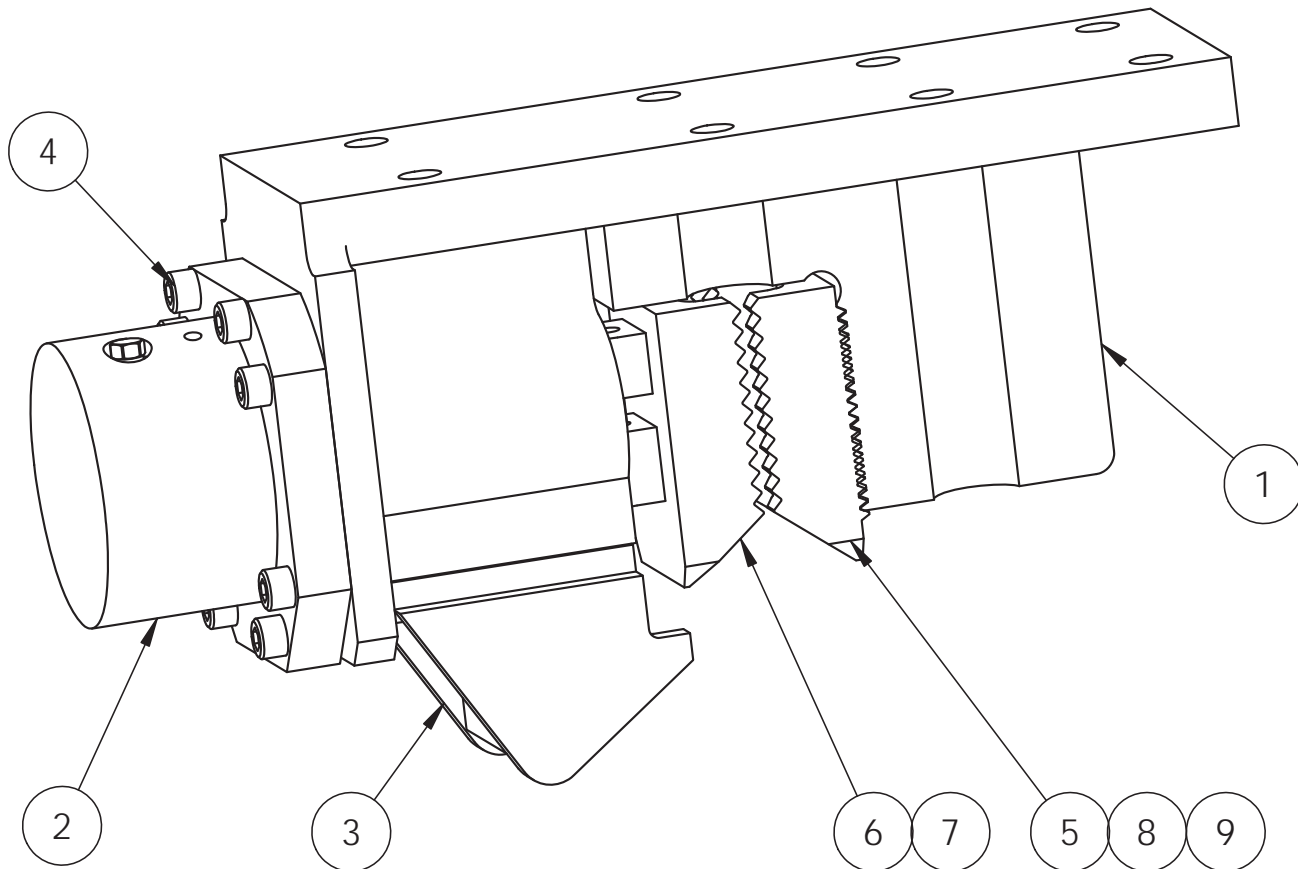


Figure 2-F. Model 50 Sheet Clamp Assembly



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## II. MAJOR COMPONENT DEFINITION (Continued...)

### II-6. Clamp Identification

| <u>Item</u> | <u>Part Number</u> | <u>Qty.</u> | <u>Description</u>        |
|-------------|--------------------|-------------|---------------------------|
| 1           | 210101F            | 1           | 50 CLAMP BODY             |
| 2           | 222001             | 1           | APE CYLINDER ASM          |
| 3           | 221017             | 1           | SHHET PILE GUIDE          |
| 4           |                    | 8           | 1.25-12UNF X 4.00 LG SHCS |
| 5a          | 7.50 WIDE          | 1           | FIXED JAW                 |
| 5b          | WIDE               | 1           | DOUBLE SHEET FIXED JAW    |
| 6a          | 7.50 WIDE          | 1           | MOVEABLE JAW              |
| 6b          | WIDE               | 1           | DOUBLE SHEET MOVEABLE JAW |
| 7           | 221005             | 1           | JAW PIN                   |
| 8           |                    | 2           | 1.00 HI COLLAR L/W        |
| 9           |                    | 2           | 1.00-8UNC X 9.00 LG SHCS  |

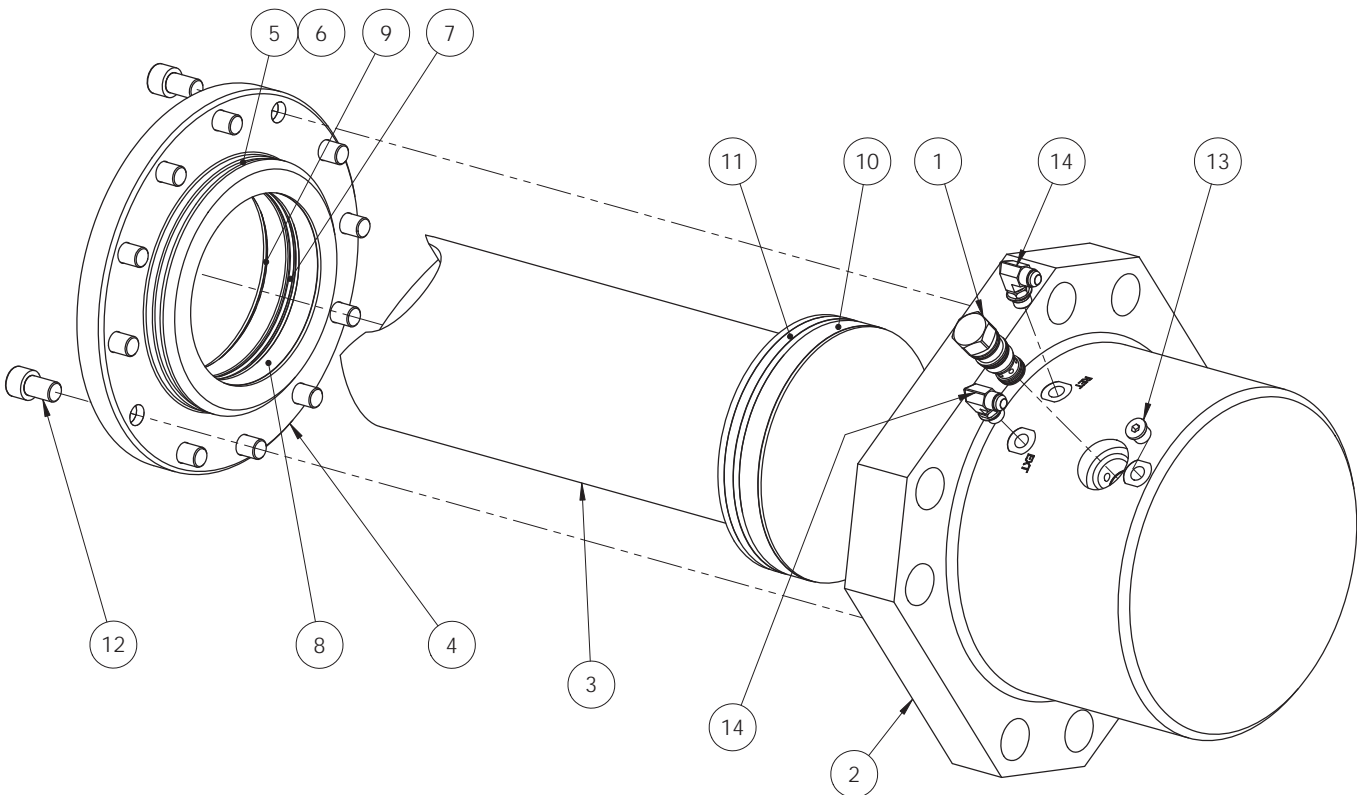
ALL SEALS ARE INCLUDED IN SEAL KIT 222010

**Table 2-F. Model 50 Sheet Clamp Assembly**

### II. MAJOR COMPONENT DEFINITION (Continued...)

#### II-7. Sheet Clamp Cylinder Identification

**222001**



**Figure 2-G. Sheet Clamp Cylinder Assembly**



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## II. MAJOR COMPONENT DEFINITION (Continued...)

### II-7. Sheet Clamp Cylinder Identification

**222001**

| <u>Item</u> | <u>Part Number</u> | <u>Qty.</u> | <u>Description</u>        |
|-------------|--------------------|-------------|---------------------------|
| 1           | 222016             | 1           | PO CHECK VALVE            |
| 2           |                    | 1           | CLAMP CYLINDER BUCKET     |
| 3           |                    | 1           | SHEET CLAMP PISTON-ROD    |
| 4           |                    | 1           | FRONT SEAL PLATE          |
| 5           |                    | 1           | 2-367 O-RING              |
| 6           |                    | 1           | 8-367 PAR BACK            |
| 7           |                    | 1           | ROD SEAL                  |
| 8           |                    | 1           | ROD BEARING               |
| 9           |                    | 1           | ROD WIPER                 |
| 10          |                    | 1           | PISTON BEARING            |
| 11          |                    | 1           | PISTON SEAL               |
| 12          |                    | 12          | 0.63-18UNF X 1.00 LG SHCS |
| 13          | 400992             | 1           | FITT2P-06R                |
| 14          | 130057             | 2           | FITT2L-06M06R             |

ALL SEALS ARE INCLUDED IN SEAL KIT 222010

**Table 2-G. Sheet Clamp Cylinder Assembly**



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## **III. LOADING AND UNLOADING**

### **III-1. Model 100E Vibratory Driver.**

The APE 100E vibrator is normally shipped ready to be connected to an excavator laid flat on the trailer deck. Lift the vibrator by rigging one line to the lifting shackle and one line around the clamp attachment. Avoid smashing hydraulic lines. Vibro should be loaded with hydraulic motor down facing the deck and breather valve facing the sky. Before the truck has left, carefully inspect the machine and hoses for any missing equipment or sign of damage that may have occurred during shipment or unloading.

### **III-2. What to do if damaged during shipment.**

In the event of damage, notify the trucking agent at once. Note all damage on the bill of lading. Fax the information as soon as possible, any delay may make it impossible to find the responsible party.



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## IV. PREPARATION AND OPERATION

### IV-1. Rigging of Vibratory Driver

A yoke designed to fit the stick of an excavator in place of the bucket. Check the clamps daily.

The Vibro is fitted with a standard sheet clamp at the factory. However, several types of clamps are used on APE vibros to fit many different types of piles. A step by step procedure is provided as follows:

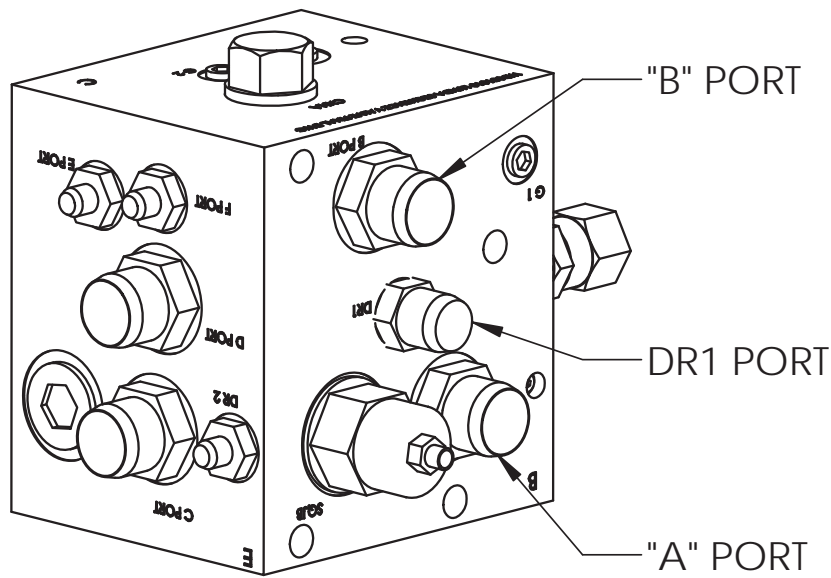
- 1.) Clean all drilled and tapped threads on the bottom surface of the gearbox. Always wearing eye protection. Use a 1-1/2"UNC tap to clean any rusted threads and blow out any remaining fragments with compressed air. If there is a cutting torch on the jobsite then use the oxygen setting to blast the threads clean. Hold a rag over the tapped hole to minimize flying debris.
- 2.) Clean the machined bottom surface of the gearbox and prepare to mount the clamp. If the clamp bolts should ever break, check the machined surface with a straight edge to make sure it is true and flat.
- 3.) Clean the machined surface of clamp. Eye-ball the entire surface for damage. Make sure the surface is flat and void of all dirt.
- 4.) Start by getting the center bolt in first and work outwards. Do not tighten bolts until you have all of the bolts started.
- 5.) Tighten bolts using a torque wrench to 2,800 ft-lbs.
- 6.) Go around all bolts at least three times making sure they are tight.
- 7.) After vibrating the first pile, check the bolts again.
- 8.) If one bolt breaks, replace them all since they may be weak or cracked.
- 9.) Never operate the vibro with missing clamp bolts.

**WARNING:** Do not use grade five bolts. All bolts should be allen head cap screw bolts. If one bolt breaks then the others are damaged and must be replaced. Never drive piles if one bolt is broken. Bolts break only because they were not tight and the crew neglected to check them. A good operator insists that every bolt is checked twice daily.

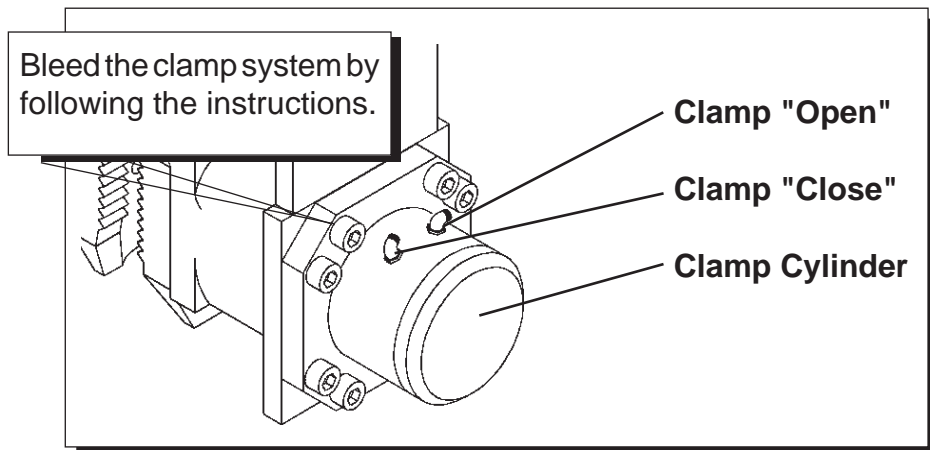
### IV. PREPARATION AND OPERATION (Continued...)

#### IV-2. Plumbing the Vibro Hoses to the Excavator.

There are three hoses leading from the vibro that must be connected to the excavator to begin operation (Please see Figure 4-A below.) Two of the hoses attach to the excavator where the bucket hoses terminate. The hose that extends the bucket cylinder (close bucket) will connect to the "A PORT" on the sequence manifold. The hose that retracts the bucket cylinder (open bucket) will connect to the "B PORT" on the sequence manifold. A hose 0.75 ID will need to be run from the return filter in the hydraulic tank of the excavator to the "DR1 PORT" on the sequence manifold.



**Figure 4-A. Excavator Hose Positions at Sequence Manifold**



**Figure 4-B. Bleeding Clamp Attachment**



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## **IV. PREPARATION AND OPERATION (Continued...)**

### **IV-3. Bleeding the Clamp Attachment Hydraulic Hoses.**

If the opening and closing of the jaws seems spongy or slow, it may be a result of air in the clamp hoses. Normally there is no need to worry about bleeding the clamp hoses because the unit is shipped fully tested. However, should the vibro sit for a long period of time, if a new attachment is being installed or if a damaged clamp hose has been replaced, the system may require bleeding to remove air in the system.

- 1.) Turn the Excavator engine OFF.
- 2.) Make sure the clamp hoses are connected to the sequence manifold and clamp.
- 3.) Start the excavator engine and run at 1300 rpm. Give the engine time to warm up.
- 4.) Remove the clamp hoses at the hydraulic cylinder fittings and place ends into a bucket.
- 5.) Pull the right hand joy stick slowly on the excavator to close clamp (close bucket) "CLOSE" and wait for oil to flow from the hose. **WATCH FOR AIR BUBBLES.** When air bubbles have stopped allow oil to run for a few seconds more. Return joy stick to center (NEUTRAL) and replace hose to the cylinder fitting.
- 6.) Repeat the same procedure for "OPEN" side. Push the right hand joy stick slowly on the excavator to open clamp (open bucket) "OPEN" and wait for oil to flow from the hose. **WATCH FOR AIR BUBBLES.** When air bubbles have stopped allow oil to run for a few seconds more. Return joy stick to center (NEUTRAL) and replace hose to the cylinder fitting.
- 7.) Operate the jaws. If they are still a bit spongy then repeat bleeding steps once more.

**WARNING: DO NOT BLEED SYSTEM AT FULL ENGINE THROTTLE BECAUSE TOO MUCH OIL WILL FLOW FROM THE HOSES AND COULD CAUSE INJURY.**

### **IV-4. Filling Vibrator Pressure Hoses.**

The vibrator is shipped with the hoses filled with oil. However for the initial connection to the excavator the hose will not be full of oil. Hook up the three hoses to the excavator as explained (see Section IV-2 on [page 4-2] and Figure 4-A.).

- 1.) With the excavator engine warm and running at 1300 rpm.
- 2.) Loosen the hose that is connected to the "C" port at the hydraulic motor fitting.
- 3.) Loosen the hose that is connected to the "D" port at the "D" port fitting.
- 4.) Loosen jam nut on Sequence valve and turn the adjustment screw all the way out. (counter clockwise)
- 5.) Pull the right hand joy stick slowly on the excavator to close clamp (close bucket) "CLOSE" and wait for oil to flow from the hoses. **WATCH FOR AIR BUBBLES.** When air bubbles have stopped allow oil to run for a few seconds more. Return joy stick to center (NEUTRAL) and tighten hose fittings.
- 6.) Adjust Sequence valve as described in VI-7 on [page 4-5]



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## **IV. PREPARATION AND OPERATION (Continued...)**

### **IV-5. Precautions and Rules for Operation.**

The following is a list of precautions, suggestions and rules that are intended to help promote the safe and productive use of the APE Model 200-6 Vibratory Driver.

- 1.) Follow the Daily Maintenance Required Prior to Operation, [Section V-1].
- 2.) Read and follow the Safety Precautions, [page v].
- 3.) Follow the start-up procedures listed in the manual for the power unit being used.
- 4.) Start with piles in good condition.
- 5.) Put all teeth in pile.
- 6.) Drive in steps eight feet (2.5M) or less.
- 7.) Keep sheets plumb.
- 8.) Come up to speed before doing work.
- 9.) No dancing. Avoid densifying the soil.
- 10.) Drive past obstacles and then go back.
- 11.) Backhoe on site to remove obstacles.
- 12.) Lead with the ball.
- 13.) Probe the pile if it appears stuck.
- 14.) Keep piles plumb or down the road you go.
- 15.) Never rush the sheet pile foreman.
- 16.) Slow and plumb and the job will get done.
- 17.) Melted inner locks - piles out of plumb.
- 18.) Never stand under pile drivers.
- 19.) Low clamp pressure means jaw failures.
- 20.) Wait for vibro to get to full speed then pull.
- 21.) Don't over excavate - lower the ring.
- 22.) Look at the jaws during driving.
- 23.) Beware of cracked or broken sheets.
- 24.) In sandy soils drive faster. Vibration can cause settlement in loose, granular soils.
- 25.) In clay amplitude is everything.
- 26.) Low drive pressure means easy work.
- 27.) High pressure means friction on piles.
- 28.) Over 4800 psi means get a bigger vibro.
- 29.) No amplitude means get a bigger vibro.
- 30.) Caissons need heavy wall to avoid flex.
- 31.) Check clamp bolts each morning.
- 32.) Read the manual - know your machine.
- 33.) Attach whip line to pile when pulling.
- 34.) Know your line pull.
- 35.) Extract straight - look at boom and cable.
- 36.) Give boom stops some room.
- 37.) Stalled engine means dirty fuel filters.

### IV. PREPARATION AND OPERATION (Continued...)

#### IV-6. Convention of Valves

- 1.) PO CHECK valve is used to hold clamp pressure in the clamp cylinder.
- 2.) ANTI REVERSE check valve is used to allow flow to go to the "OPEN" clamp circuit and keep the vibro from running.
- 3.) SEQUENCE valve is used to allow hydraulic oil to flow to the vibrator motor after sufficient clamping pressure has been achieved. During driving and extracting this valve allows clamp pressure to be maintained.
- 4.) SHUTTLE Valve is in place to allow pilot signal to drain off when not being used.
- 5.) POP-OFF relief valve is used to limit case drain pressure to 50 psi.

#### IV-7. Setting of Sequence Valve

- 1.) Remove plug from the G1 port and install the needed fittings, hose and a 6,000 psi gage.
- 2.) With hoses connected from the C port and the D port to the motor.
- 3.) Loosen jam nut on Sequence valve and turn the adjustment screw all the way out. (counter clockwise)
- 4.) Set the excavator throttle at maximum RPM.
- 5.) Pull the right hand joy stick on the excavator to close clamp (close bucket).
- 6.) The clamp will close and the vibro will begin to run.
- 7.) The pressure will stabilize between 1,000 and 1,400 psi. on the G1 gage.
- 8.) Turn the Sequence valve adjustment screw in (clockwise) until G1 port gage pressure reaches 1800 psi.
- 9.) Tighten jam nut.
- 10.) Push the right hand joy stick to the right the vibro will stop and the clamp will open.
- 11.) Replace plug in the G1 port.

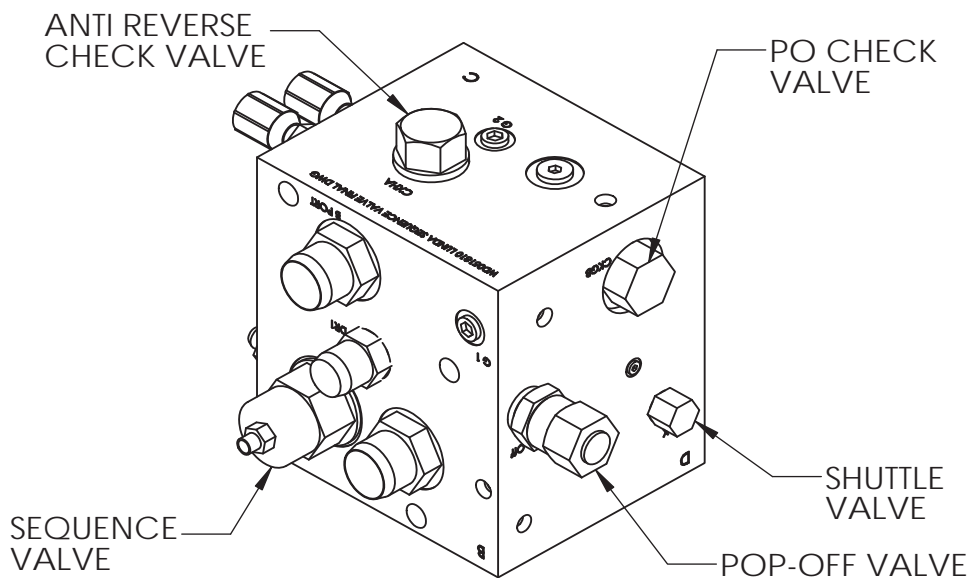


Figure 4-C. Valve Identification



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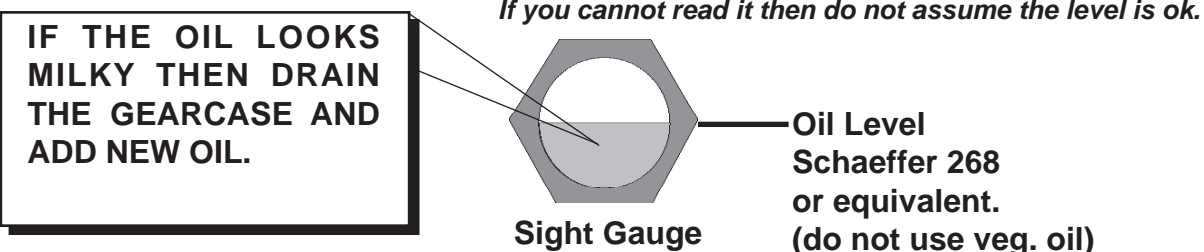


## V. MAINTENANCE

### V-1. Daily Maintenance Required Prior to Operation.

- 1.) Visually inspect the entire vibro for loose nuts or bolts. Put a wrench on the clamp bolts and check them for tightness.
- 2.) Grease the Jaw Plunger on the clamp housing.
- 3.) Check the oil level in the vibrator. Hang vibro from the vibro and look at sight gauge. Make sure the oil is half way up gauge. If you cannot read it then you can't run the vibro. Remove the gauge and clean it by spraying a shot of starting fluid at it.

#### YOU MUST KNOW THE LEVEL!



- 4.) If the oil is milky or contaminated then change it.
- 5.) Check the fluid level in the power unit hydraulic tank.
- 6.) Look at all the hoses. Check for cuts or other damage that might cause an oil leak.
- 7.) Check the Elastomers (rubbers) in the suppressor housing. Look for cracks.
- 8) Check the following:
 

|  |  |
|--|--|
| <ul style="list-style-type: none"> <li>Check coolant level in radiator</li> <li>Check battery water level</li> <li>Check fuel level</li> <li>Check oil level in pump drive</li> <li>Check hydraulic oil level</li> <li>Check engine oil</li> </ul> | <ul style="list-style-type: none"> <li>Check hydraulic return filter indicator</li> <li>Check fan belts on engine</li> <li>Check entire unit for hydraulic leaks</li> <li>Check condition of jaws before operating</li> <li>Check ball valves supplying oil to pumps are open</li> </ul> |
|--|--|

### V-2. Checklist After Excavator Engine Has Started

- 1.) Check all hydraulic hoses for leaks. Make sure they hang free with no kinks.
- 2.) Check all items according to the excavators operator manual states.
- 3.) Check jaws for wear. Replace if necessary.



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## **V. MAINTENANCE (Continued...)**

### **V-3. Maintenance and Adjustments. (75 Hours)**

Change the oil in vibrator gearbox. Remove the drain plug from bottom of gearbox and drain the oil into a bucket. Check oil for any metal shavings. Replace oil in gearbox by adding 3.5 gallons of Schaeffer 268.

Clean the gearbox breathers each time the oil is changed. Replace the breathers if necessary.

### **V-4. Maintenance and Adjustments. (Eccentric Bearings)**

- 1.) Model 100E** - The Eccentric Bearings should be checked and/or replaced after every 2500 hours of operation.

### **V-5. Maintenance and Adjustments in Severe Conditions.**

When average temperature is above (80 deg. F) or below (-1 deg. F) reduce servicing intervals to one half of those specified above.

When operating in the presence of dust or sand, reduce servicing intervals to one-third of those specified.

During stand-by or inactive periods, the servicing intervals may be reduced to one-half. The unit should be run every 30 days or less to keep internal parts lubricated.

### **V-6A. Lubrication - Vibratory Gearbox.**

The Gearbox oil should be changed when contaminated or milky. Schaeffer 268 or equal is the preferred oil. The gearbox requires 3.5 gallons of oil.

### **V-6B. Lubrication - Clamp Attachment.**

The Clamp Attachment hydraulic oil must be checked and changed on a regular basis. The Clamp Cylinder Plunger should be checked for rust and debris. Lubricate the plunger on a daily basis using the grease fitting on the side of the clamp housing.



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## **VI. MODEL 100E VIBRO**

### **VI-1. Hydraulic Circuitry.**

#### **VII-1. Hydraulic Circuitry.**

Oil is provided to the close clamp (E port) when the right hand joy stick is pulled (close bucket) completely to the left. Oil flows through the PO Check valves to the clamp cylinder and the jaw closes. When the Sequence valve reaches the set pressure it opens and full flow of oil is sent to the vibro motor (C port), the vibro starts and will run as long as the joy stick is held. Return oil (D port) through the Anti reverse valve is returned to the excavator from the (B port). The PO Check valve holds the oil pressure in the clamp cylinder. Return joy stick to the center position and oil flow is stopped and the vibro will stop. As the eccentrics slow down the oil is allowed to circulate through the motor and anti cavitation valve. After the vibro is stopped pushing the joy stick (bucket open) to the right sends oil to the PO Check valves and the open side of the clamp cylinder and opens the clamp from the pile. Excessive case drain pressure is limited by the POP-OFF valve.

### VI-2. Hydraulic Schematic.

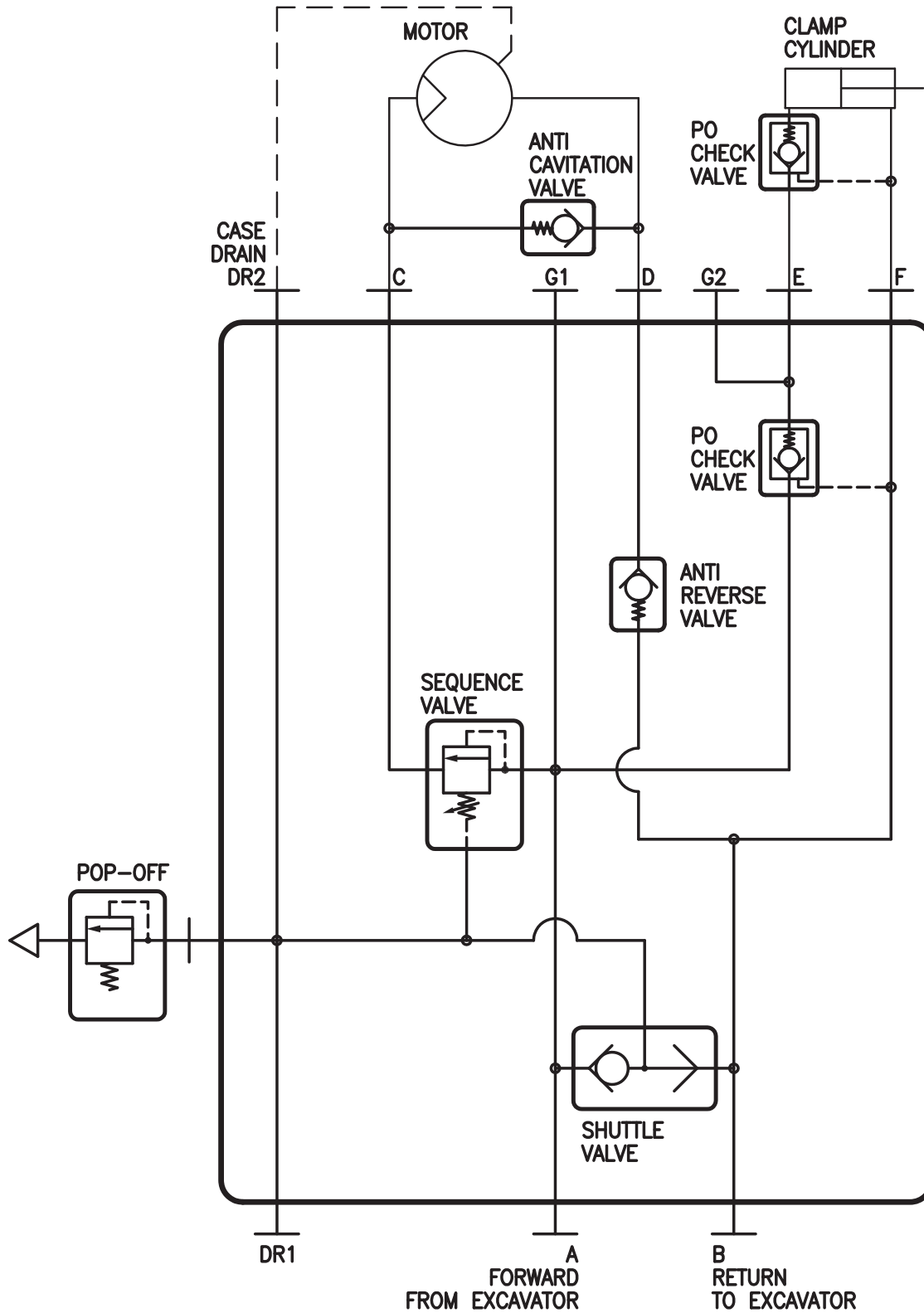


Figure 7-A. Hydraulic System Schematic



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## VI-3. Recommended Bolt Tightening Torque

| Nominal Screw Size | Nominal Socket Size | Tightening Torque Ft-Lbs. (Kg-M) | Nominal Screw Size | Nominal Socket Size | Tightening Torque Ft-Lbs. (Kg-M) |
|--------------------|---------------------|----------------------------------|--------------------|---------------------|----------------------------------|
| #10-24             | 5/32                | 6 Ft-Lbs. (.83 Kg-M)             | #10-32             | 5/32                | 6 Ft-Lbs. (.83 Kg-M)             |
| .25-20             | 3/16                | 13 Ft-Lbs. (1.8 Kg-M)            | .25-28             | 3/16                | 15 Ft-Lbs. (2.1 Kg-M)            |
| .31-18             | 1/4                 | 27 Ft-Lbs. (3.7 Kg-M)            | .31-24             | 1/4                 | 30 Ft-Lbs. (4.2 Kg-M)            |
| .38-16             | 5/16                | 48 Ft-Lbs. (6.6 Kg-M)            | .38-24             | 5/16                | 55 Ft-Lbs. (7.6 Kg-M)            |
| .44-14             | 3/8                 | 77 Ft-Lbs. (10.6 Kg-M)           | .44-20             | 3/8                 | 86 Ft-Lbs. (11.9 Kg-M)           |
| .50-13             | 3/8                 | 119 Ft-Lbs. (16.4 Kg-M)          | .50-20             | 3/8                 | 133 Ft-Lbs. (18.4 Kg-M)          |
| .63-11             | 1/2                 | 234 Ft-Lbs. (32.3 Kg-M)          | .63-18             | 1/2                 | 267 Ft-Lbs. (36.9 Kg-M)          |
| .75-10             | 5/8                 | 417 Ft-Lbs. (57.6 Kg-M)          | .75-16             | 5/8                 | 467 Ft-Lbs. (64.5 Kg-M)          |
| .88-9              | 3/4                 | 676 Ft-Lbs. (93.4 Kg-M)          | .88-14             | 3/4                 | 742 Ft-Lbs. (102.5 Kg-M)         |
| 1.00-8             | 3/4                 | 1,009 Ft-Lbs. (139.4 Kg-M)       | 1.00-12            | 3/4                 | 1,126 Ft-Lbs. (155.6 Kg-M)       |
| 1.25-7             | 7/8                 | 1,600 Ft-Lbs. (221.1 Kg-M)       | 1.25-12            | 7/8                 | 1,800 Ft-Lbs. (248.8 Kg-M)       |
| 1.50-6             | 1                   | 2,800 Ft-Lbs. (387 Kg-M)         | 1.50-12            | 1                   | 3,000 Ft-Lbs. (414.6 Kg-M)       |

**Table 6-A. Recommended Bolt Tightening Torque**

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.