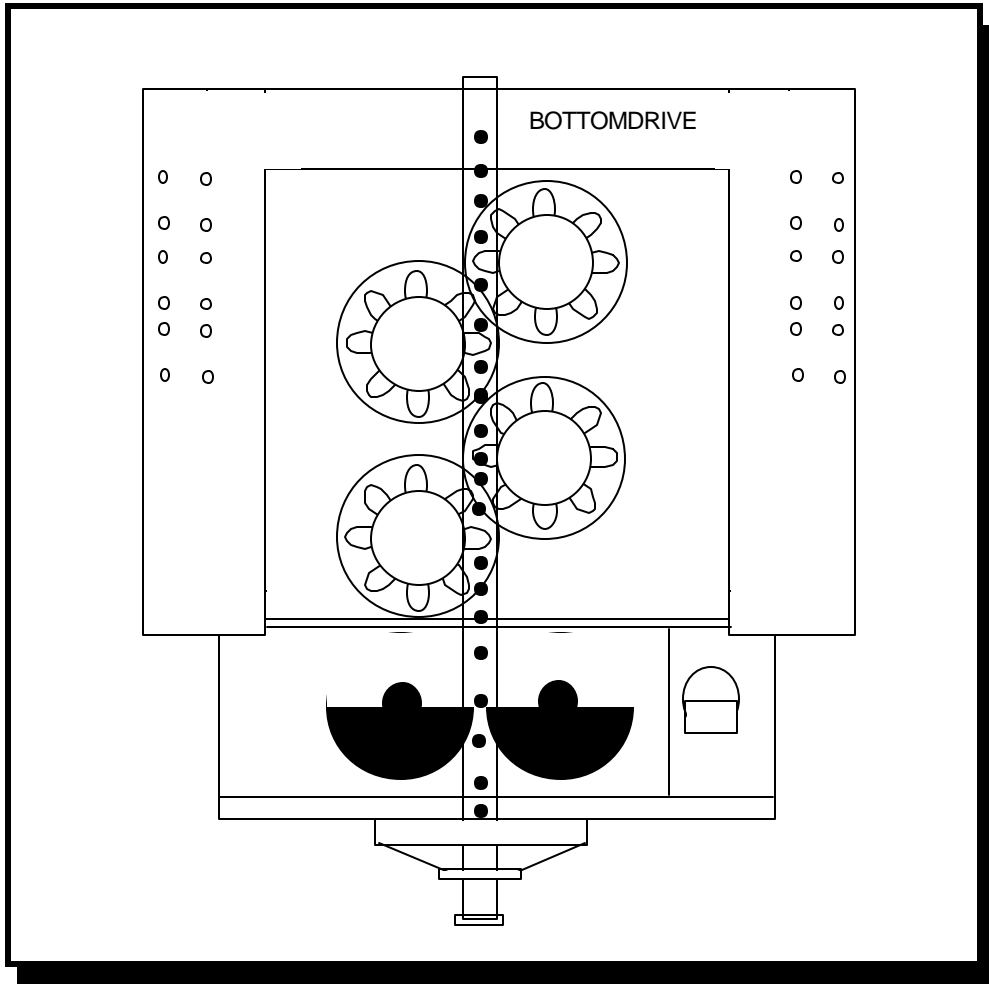




OPERATION AND MAINTENANCE MANUAL

(condensed version)



SERIALNUMBER:

**MODEL 100 WICK DRAIN VIBRO WITH
BOTTOM SPROCKET DRIVE AND
350 POWER UNIT with Cummins M11**



OPERATION / MAINTENANCE MANUAL

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

Preface

General

This manual covers the **Model 100 Vibro with center hole complete with sprocket drive and the Model 350 Power Unit**. 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.

- lbs.** = Pounds
- psi.** = Pounds per Square Inch
- hp.** = Horse Power
- gpm.** = Gallons Per Minute
- rpm.** = Revolutions Per Minute
- hyd.** = Hydraulic
- NPT.** = National Pipe Thread



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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. Always attach safety line to pile when extracting or hoisting into position.
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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Warranty

American Piledriving Equipment, Inc. STANDARD WARRANTY

American Piledriving Equipment, Inc. (APE) 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's obligation and liability under this WARRANTY is expressly limited to repairing or replacing at APE's option, any parts which appear to APE 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 or the authorized APE distributor of the product during regular working hours. **This WARRANTY, shall not apply to component parts or accessories of products not manufactured by APE** and which carry the warranty of the manufacturer thereof, or to normal maintenance (such as engine tune-up) or normal maintenance parts (such as 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. AMERICAN PILEDIVING EQUIPMENT, INC. 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, products or parts for which a warranty claim is made are to be returned transportation prepaid to APE. 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 or any alteration or repair by others in such manner as in APE's judgment affects the product materially and adversely, shall void this warranty.

NO EMPLOYEE OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY UNLESS SUCH CHANGE IS MADE IN WRITING AND SIGNED BY AN OFFICER OF APE, INC.

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



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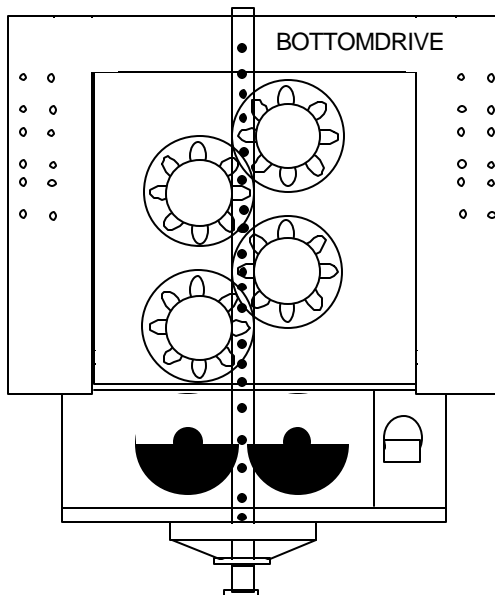
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I. GENERAL INFORMATION

I-1. Machine Features

APE MODEL 100 VIBRO/SPROCKET DRIVE

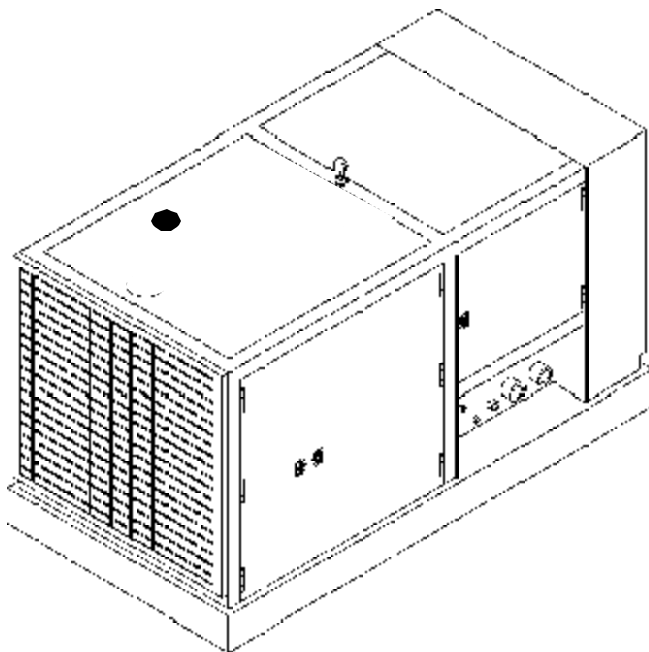
FOR INSTALLING WICK DRAINS. VIBRO CAN BE USED FOR DRIVING OR EXTRACTING ALL TYPES OF PILES



- Wick mandrel passes through center of vibro
- One piece gear/eccentric design
- No pins, splines or keyways on eccentrics or gears
- 1,000 inch pounds - very powerful
- Can mount and operate off backhoe
- Can be used under water
- Clamp fits H-beams & plates
- Attachments for wood & pipe piles
- Sprockets transfer torque to both sides of mandrel
- No side loads on mandrel
- Speeds up to 330 feet per minute
- Static load or dynamic load or both at same time

APE MODEL 350 POWER UNIT

HYD POWER SOURCE FOR VIBROS, AUGERS, DECK WINCHES, HYD. IMPACT HAMMERS, ETC.



- Cummins engine M11
- 350 HP
- Lockable sheet metal enclosure
- 5000 (345bar) psi system
- Complete tool box provided
- Bi-directional flow
- 50 foot (15m) electric pendant
- Backup controls mounted on panel
- Engine safety shutdowns built in
- Sound reduction by design
- Easy to change hydraulic filters
- One loop hydraulic system
- Large cooler keeps oil temp down
- Radio control available



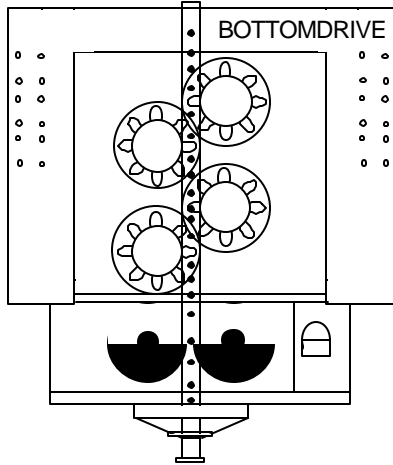
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I. GENERAL INFORMATION (Continued...)

I-2. Machine Specifications

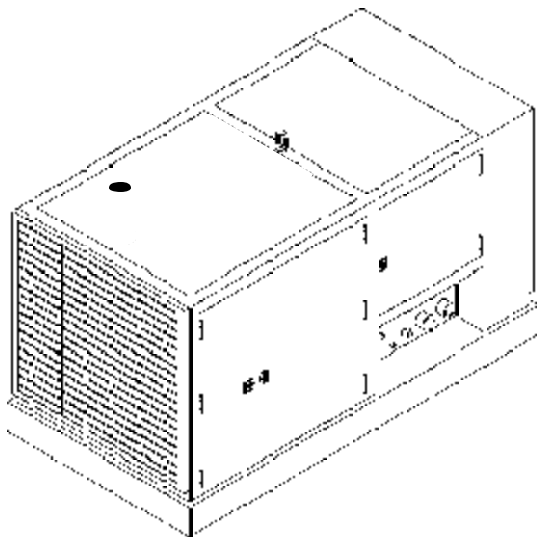
I-2A. Model 100 Vibro - (Table 1-A.)



Vibro dynamic force:	25 tons
Eccentric moment:	1000 in-lbs
Frequency:	0 to 1600 cpm
Suspended weight:	9,500 lbs
Length:	6 feet
Width:	30 inches
Height:	13 feet
Static force:	25 tons
Tons per square foot:	500

Dynamic force of 25 tons is calculated at 1350 cycles per minute. The vibro can operate safely up to 1600 cycles per minute with standard splash oil system. With optional forced lubrication the unit can vibro up to 2300 cycles per minute.

I-2B. Model 350 Power Unit - (Table 1-B.)



Engine	Cummins M11
Maximum Power	350
Operating Speed in rpm	1800
Maximum Drive Pressure	5000 psi (345 bar)
Max.Hyd.Flow-Forward	230 gpm
Max.Hyd.Flow-Reverse	230 gpm
Operating Pressure	2700 psi
Weight	10,000 lbs.
Length	122 inches
Width	66 inches
Height	70 inches

Note: This power unit is equipped with the necessary pumps to operate the sprocket drive and the spotter functions. Vibro runs off the crane.

**Dimensions may vary depending on the year and model.
Consult the factory for certifications on unit being used.**



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I. GENERAL INFORMATION (Continued...)

I-3. General Description of Model 100 Vibro wick drain machine

The **APE Model 100 Wick drain vibro with sprocket drive** is a variable frequency vibratory wick mandrel driver/extractor designed to drive and extract wick drains using vibratory forces and static forces. When the sprocket drive is used, the mandrel sees only static forces. The vibro is activated when dynamic force is needed to punch through difficult soil or when seating the anchor plate.

The Model 100 operates in a frequency range of 400 to 1,670 cycles per minute depending on the hydraulic flow and on the hydraulic motors fitted to the gear train. The Model 100 is especially suited for driving or extracting wick drain mandrels.

The three major parts to the Model 100 are as follows:

- A.) The Suppressor housing.
- B.) The sprocket drives
- C.) The vibro gearbox with eccentrics

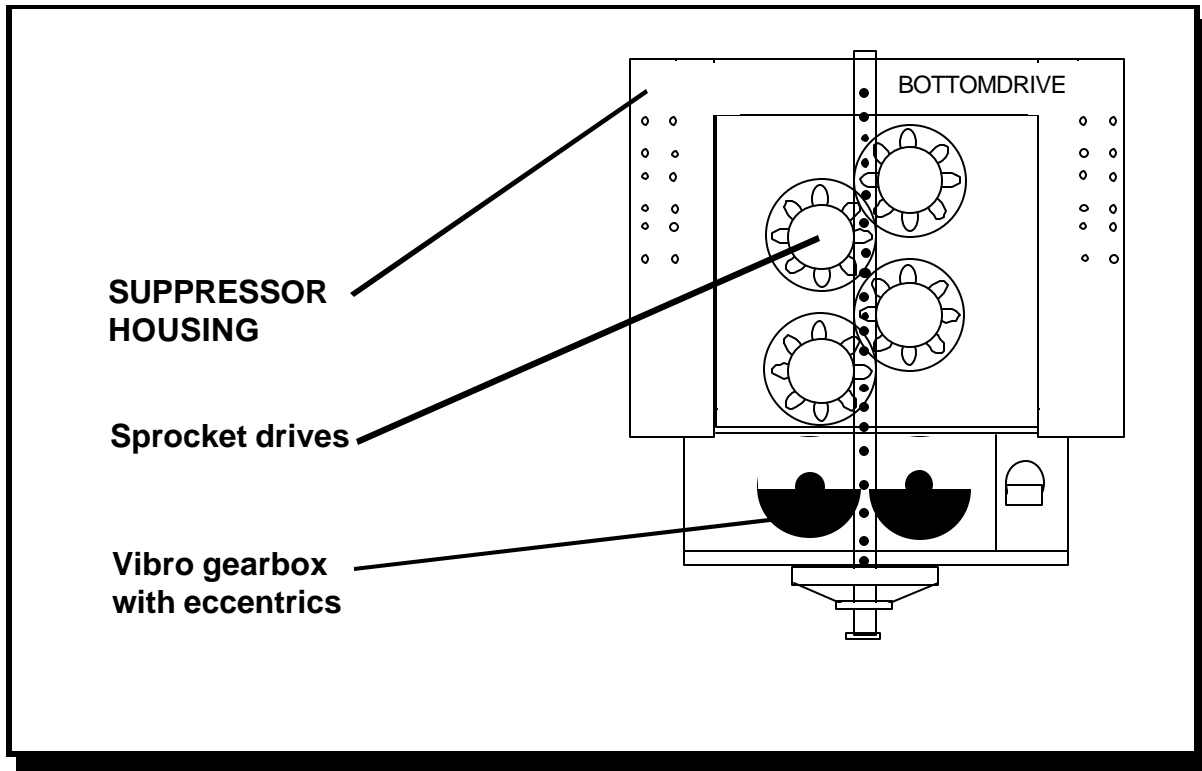
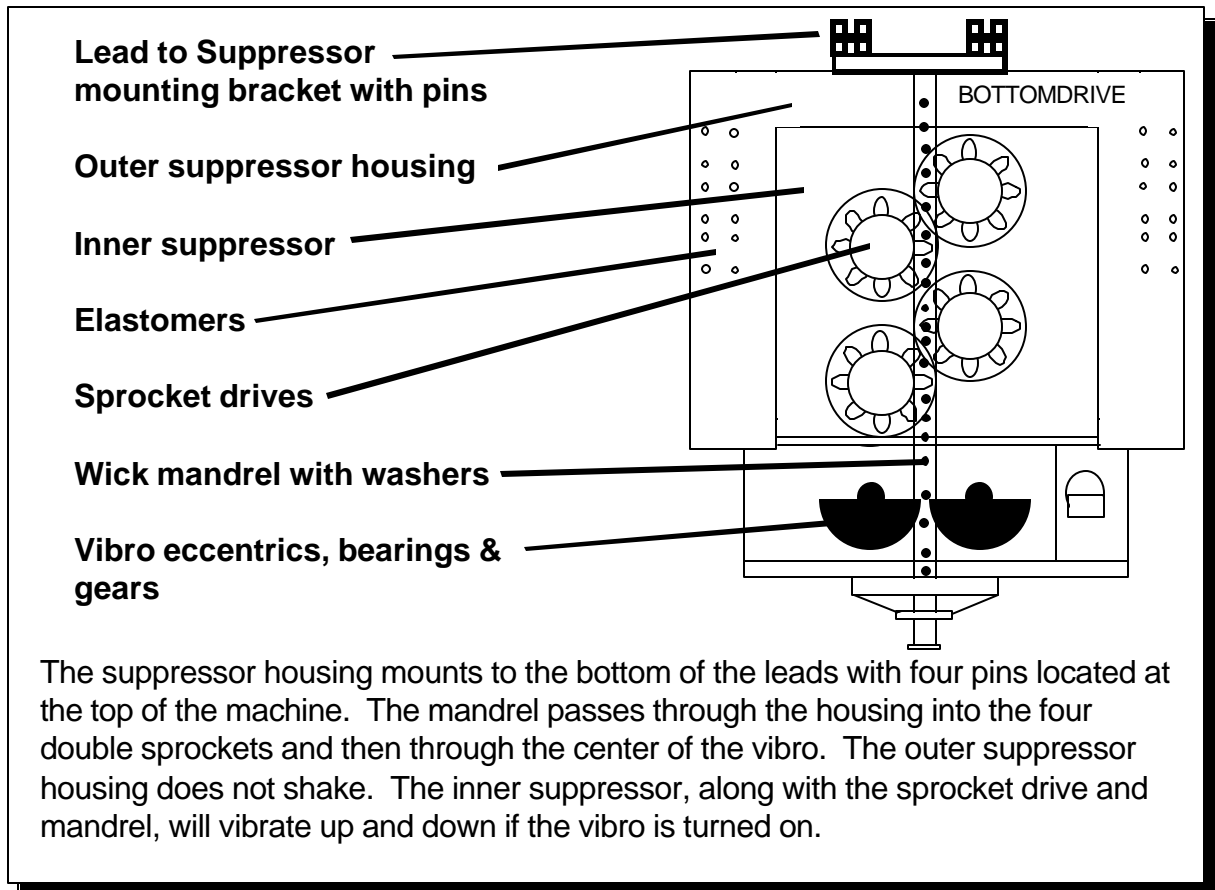


Figure 1-B. General Description of 100 Vibro/Sprocket drive system

I. GENERAL INFORMATION (Continued...)

I-3A. The Suppressor Housing

The suppressor housing is located at the top of the machine. It is designed to absorb the vibration generated from the vibrator gearbox. The suppressor housing consists of up to 12 rubber elastomers. It is not required to operate with all 12 elastomers. The wick drain crew may remove pairs of elastomers from both sides. Operating with a reduced amount of paired elastomers will allow the machine to run smoother. Each elastomer delivers one ton of line pull for each inch of travel. (**WARNING! Hard pulling for long periods of time will heat and damage the elastomers. The heat generated from constant heavy line pull will destroy the chemical bond between the rubber and mounting plate which will cause the elastomer to fail.**) When engaged in hard extracting, break every 15 minutes to allow elastomers to cool. Do not operate if



The suppressor housing mounts to the bottom of the leads with four pins located at the top of the machine. The mandrel passes through the housing into the four double sprockets and then through the center of the vibro. The outer suppressor housing does not shake. The inner suppressor, along with the sprocket drive and mandrel, will vibrate up and down if the vibro is turned on.

Figure 1-C. General Description of Suppressor Housing & related components



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I. GENERAL INFORMATION (Continued...)

I-3B. The Vibrator Gearbox

The vibrator gearbox contains two high amplitude eccentric weights cast in one piece with the gear. The center has a hollow tube. This design is unique to the industry and was developed by the engineers of APE to solve a number of problems associated with other types of wick drain machines. Both the eccentric and the drive gear have been helically cut to provide high speed operation with reduced noise and wear. Vibration is caused by the vertical movement created when the eccentrics are rotated. The eccentric and drive gear are driven in line by one hydraulic motor mounted on the outside face of the gearbox. The eccentrics rotate on two shafts housed by four giant spherical bearings. The gears and bearings receive lubrication as a result of the fluid splashing inside the gearbox when the gears are rotated. The oil level is quickly determined by looking at the site gauge.

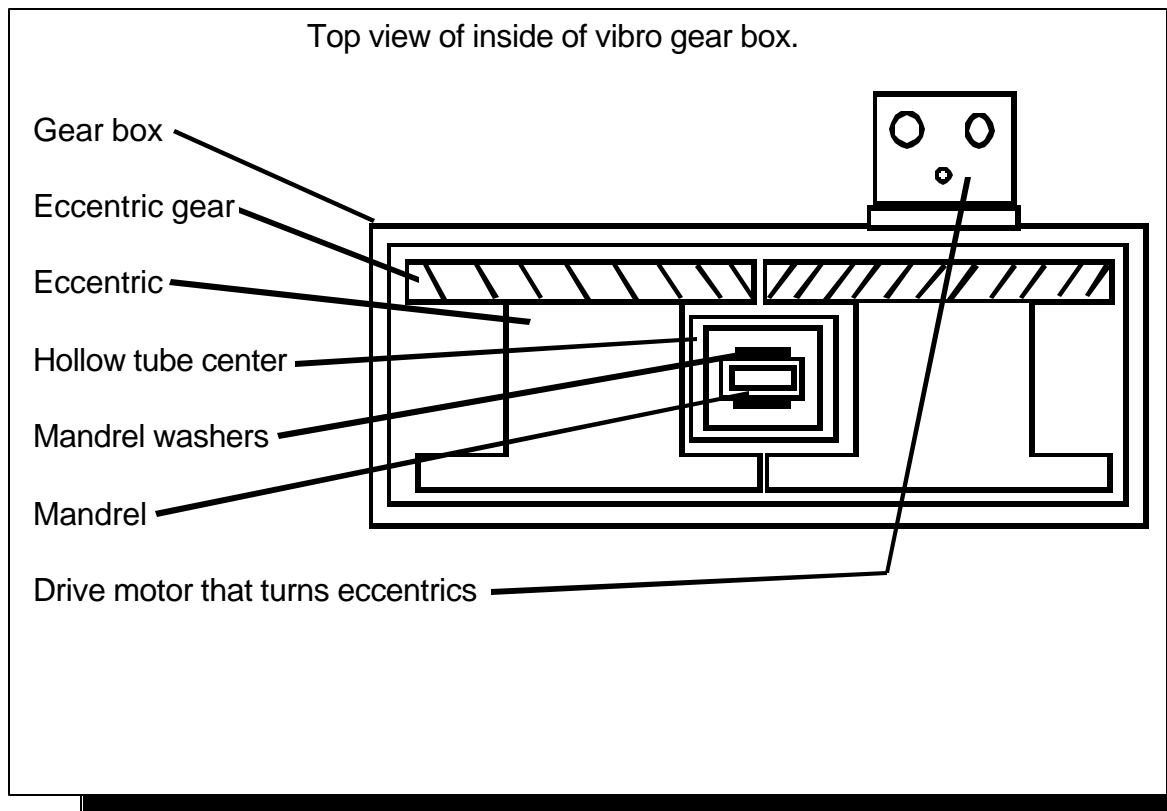


Figure 1-D. General Description of Vibrator Gearbox.



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I. GENERAL INFORMATION (Continued...)

I-3C. The sprocket drive

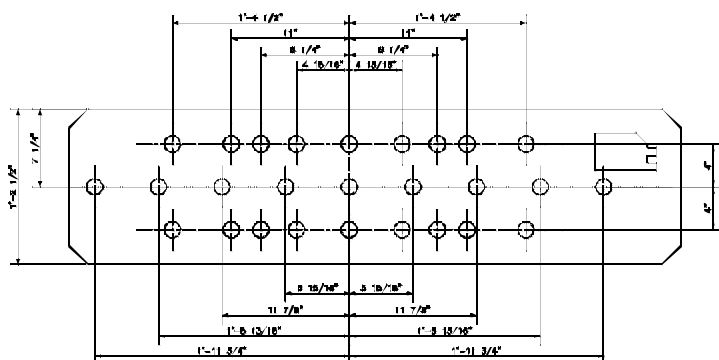
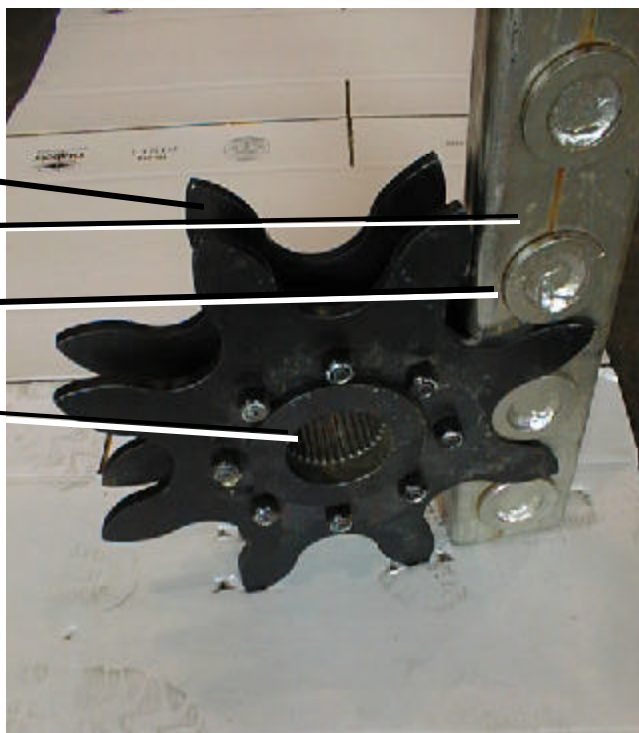
The sprocket drive transfers torque to the mandrel. Each sprocket is double sided and has a hub in the center. The sprocket has an internal female spline that matches the output shaft of the poclair hydraulic motor. The sprocket slides onto the shaft and is secured by a holding plate. The holding plate is held into position by two bolts that screw into the motor shaft. The mandrel has male sprocket pins (called washers) welded on both sides.

Double sided drive sprocket

Wick drain mandrel

sprocket washers

Internal splines



1 1/2-6 UNC
x 2" DEEP.
(27 PLCS.)

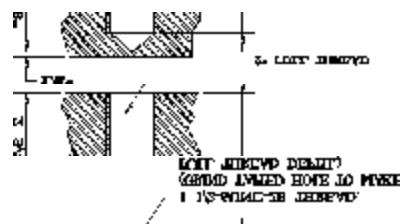


Figure 1-F. Clamp Attachment Hole Configuration.



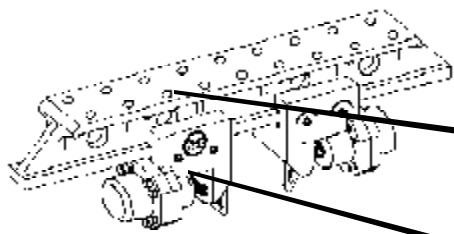
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I. GENERAL INFORMATION (Continued...)

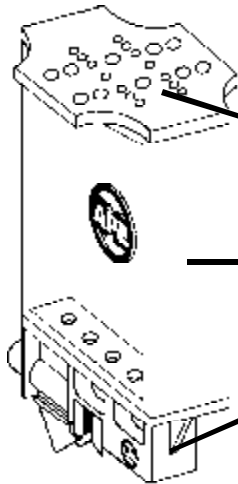
I-3D. Optional Attachments

The following are some of the optional attachments for the APE Vibratory Hammers. (Contact APE or your local APE distributor for more information about these and other available equipment.)

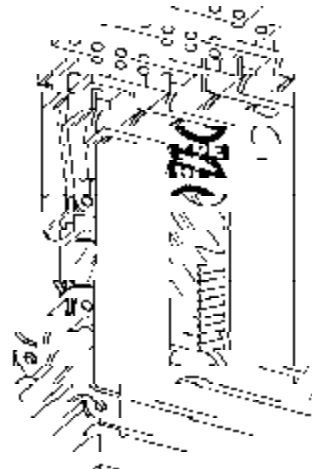


- 7 ft. Caisson Beam (#901000)
- 8 ft. Caisson Beam (#902000)
- 11ft. Caisson Beam (#903000)
- Caisson Clamp (#250000)

APE CAISSON CLAMP



- 90 Degree Adapter Plate (#905000)
 - 4 ft. Extension Adapter (#906000)
 - Clamp Attachment
- APE 90 DEGREE ADAPTER WITH EXTENSION**



- APE DELUXE CONCRETE / WOOD CLAMP (#907000)**

Figure 1-G. Optional Attachments



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I. GENERAL INFORMATION (Continued...)

I-4. General Description of Model 350 Power Unit

The Model 100 Wick drain machine sprocket drives run off the APE Model 350 power unit. The engine is mounted to a tubular frame that also serves as a diesel fuel tank. A sheet metal and tube frame covers the engine and is equipped with locking doors for protection from the environment. Equipment attached to the Power Unit can be controlled from the Main Control Panel (located behind one of the doors), the 50 foot Pendant switch, or the Radio Control (400 ft. radius).

WARNING: Clean with ether or a clean rag before installing quick disconnects. Make sure you seat the quick disconnect fittings all the way tight. Failure to tighten the quick disconnects will stop the flow of oil and will prevent the vibro from operating. Failure to tighten the clamp fittings completely tight will cause the jaws to either not open or not close. If this happens you may have to crack the fitting and bleed off the pressure to release the quick dis-connects.

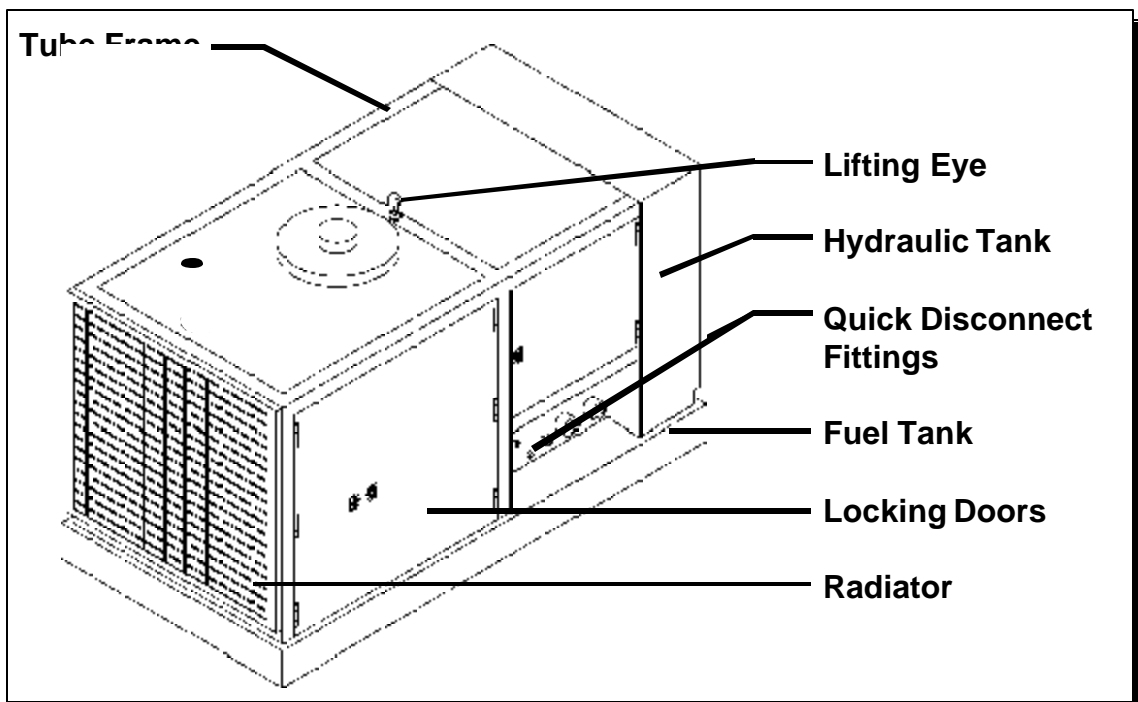
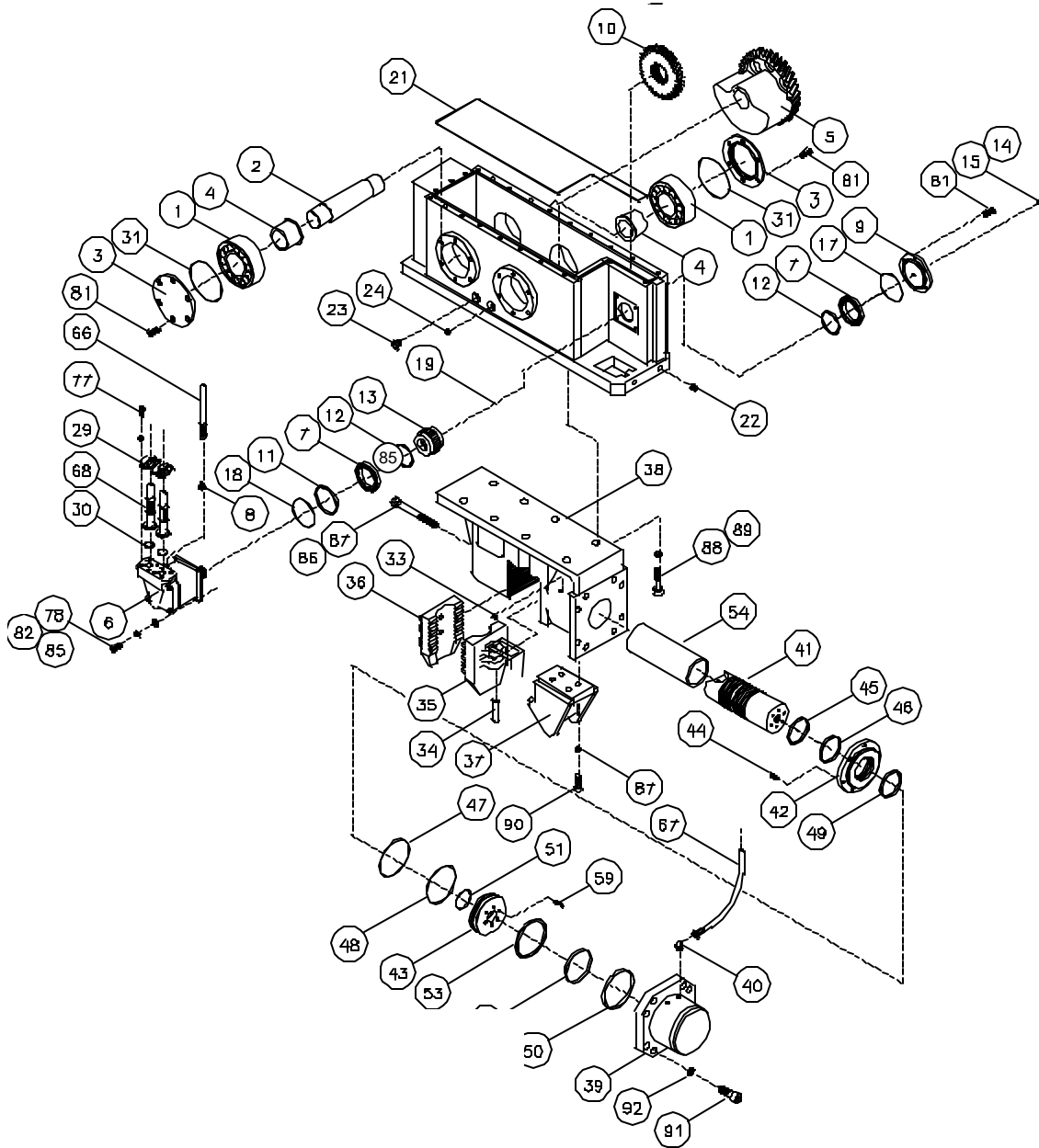


Figure 1-H. General Description of Model 350 Power Unit

II. COMPONENT DEFINITION

II-1. Component Identification - Model 100 Vibratory gearbox



Note: The components above are for the standard Model 100 vibro. The wick drain vibro has a tube in the center. The eccentrics on the wick machine are cut away in the center to allow the tube to pass through it. The only difference between the standard Model 100 vibro and the wick vibro is the center tube and the cut away eccentrics. Consult the factory for more details on this unit. This unit contains tungsten inserts in the counterweights.



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II. COMPONENT DEFINITION (Continued...)

II-3. Model 350 Power Unit Skid Identification

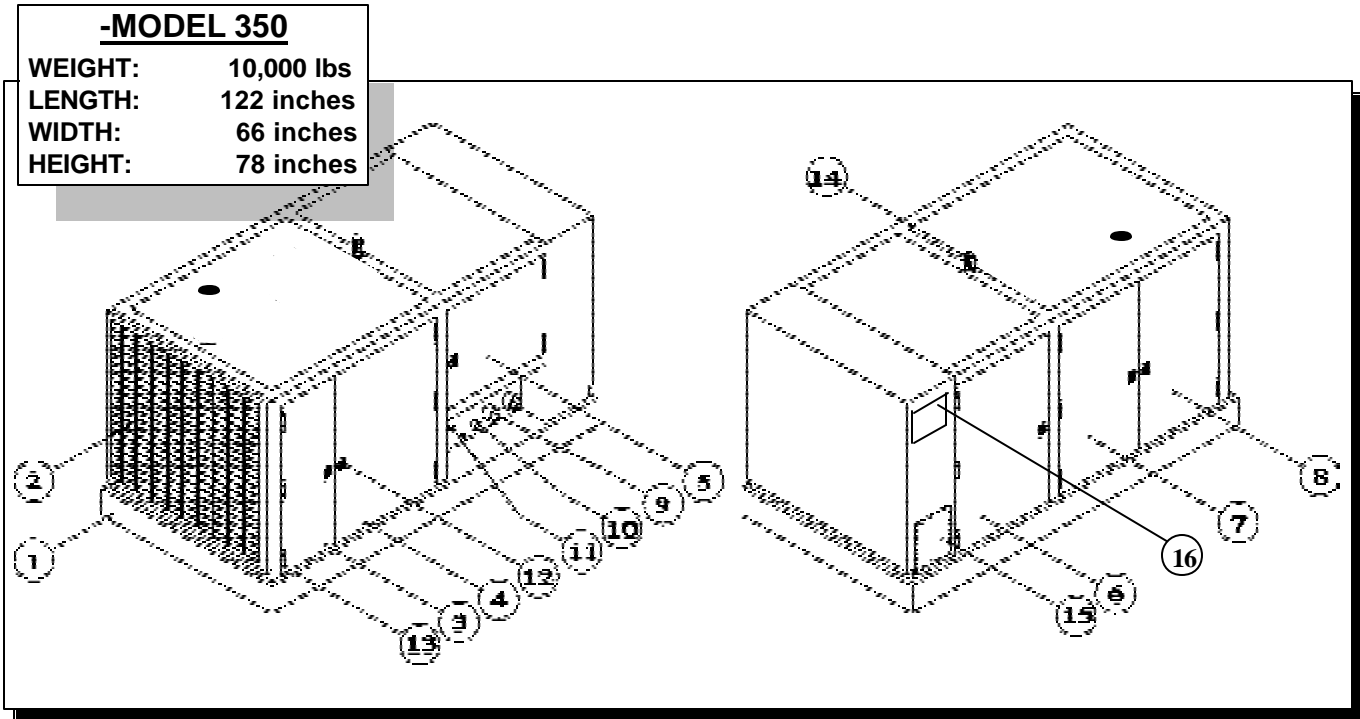


Figure 2-C. Model 350 Power Unit Skid Identification

- 1) Skid with fuel tank sub base and hydraulic tanks, lower and spare upper
- 2) Heat exchanger and engine radiator
- 3) Control panel door
- 4) Service door
- 5) Service door and access to hydraulic valves
- 6) Service door and access to engine
- 7) Service door
- 8) Service door
- 9) Hydraulic quick disconnects
- 10) Case drain line
- 11) Spotter quick disconnects
- 12) Door latch
- 13) Door hinge- lift up to remove door. Grease to assist using built in grease zert.



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II. MAJOR COMPONENT DEFINITION (Continued...)

II-4. Quick Disconnect Couplings

The APE Quick Disconnect Couplings are high pressure hydraulic couplings designed for rugged applications. Service in many such applications has proven the design compatible to extreme pressures, structural and system induced shock loads. The construction of the coupling assembly promotes ease of use and maintenance.

Design Features:

- Excellent flow characteristics for continuous duty applications.
- High strength design endures high surge and shock conditions.
- Flat crested stub-ACME threads and all steel construction withstand storage and rig-up damage.
- Structurally compatible with weight of 5,000 P.S.I. flex-hose and system induced shock loads.

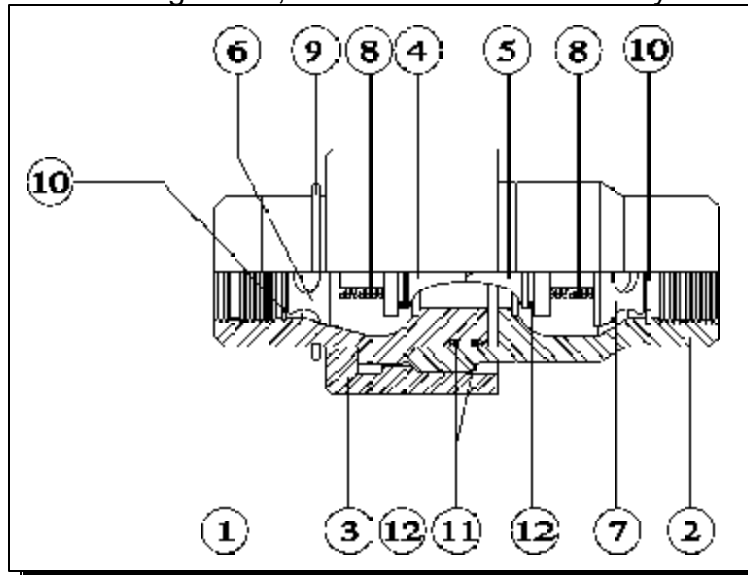


Figure 2-D. Quick Disconnect Coupling Identification

Table 2-D. Quick Disconnect Coupling Identification

Item	Qty	Description
1	1	Q.D. Hydraulic Female Coupling #400301
2	1	Q.D. Hydraulic Male Coupling #400303
3	1	Q.D. Hydraulic Coupling Sleeve #400302
4	1	Q.D. O-Ring Carrier "A" #400202
5	1	Q.D. O-Ring Carrier "B" #400201
6	1	Q.D. Plunger #400101
7	1	Q.D. Plunger #400101
8	1	Q.D. Plunger Spring #400701
9	1	Retaining Ring - "Inverted External" #I-275
10	2	Retaining Ring - "Truarc Internal" #N5000-168
11	2	Parker O-Ring #2-230 & One Parback
12	2	Parker O-Ring #2-216



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II. MAJOR COMPONENT DEFINITION (Continued...)

II-5. Tool Set Identification

Mounted inside the **Model 350 Power Unit** is a set of tools frequently used for the maintenance of the **APE Model 100 Vibro**. The following figure and table shows the location and the use for each tool.

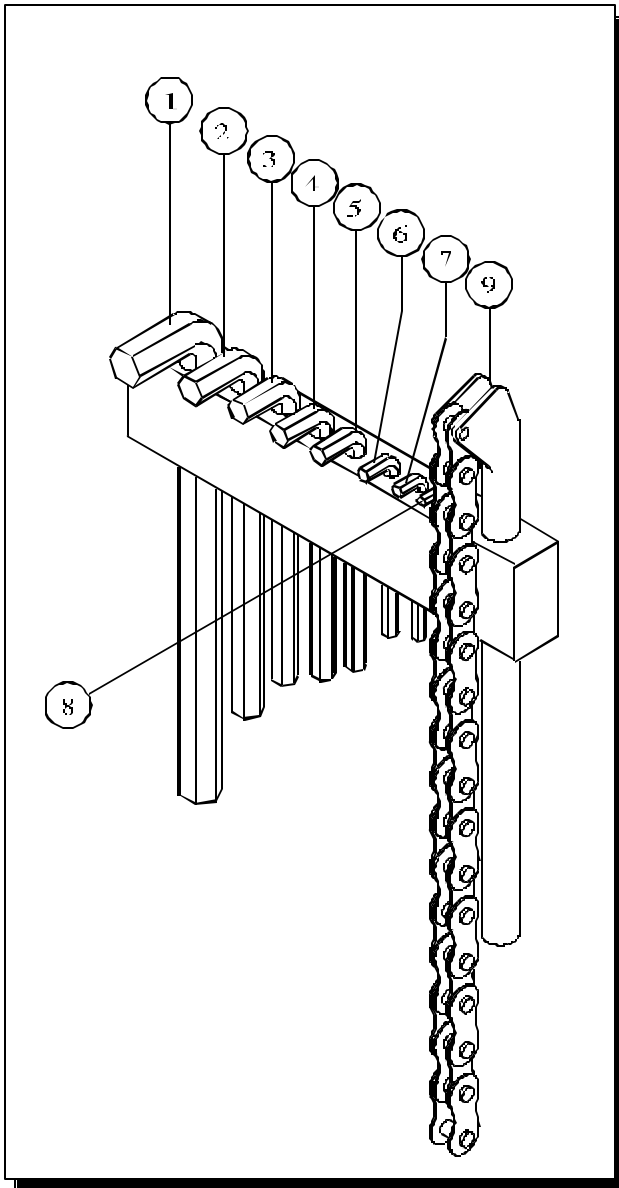


Figure 2-E. Tool Set Identification

Table 2-E. Tool Set Identification

ITEM	QTY	DESCRIPTION	PART#
1	1	1" Allen Wrench	#50004
For use with the clamp attachment bolts			
2	1	3/4" Allen Wrench	#50006
For use with clamp fixed jaw, sheet guide			
3	1	5/8" Allen Wrench	#95007
For hydraulic motor, drain plug, top plate			
4	1	9/16" Allen Wrench	#50013
For use with the hose bracket bolts			
5	1	1/2" Allen Wrench	#50008
6	1	3/8" Allen Wrench	#50009
For use with bearing cover bolts			
7	1	5/16" Allen Wrench	#50014
For use with the hose bracket bolts			
8	1	1/4" Allen Wrench	#50015
For use with the vibro oil level check			
9	1	Chain Wrench	#50011
Used to tighten the quick disconnects			