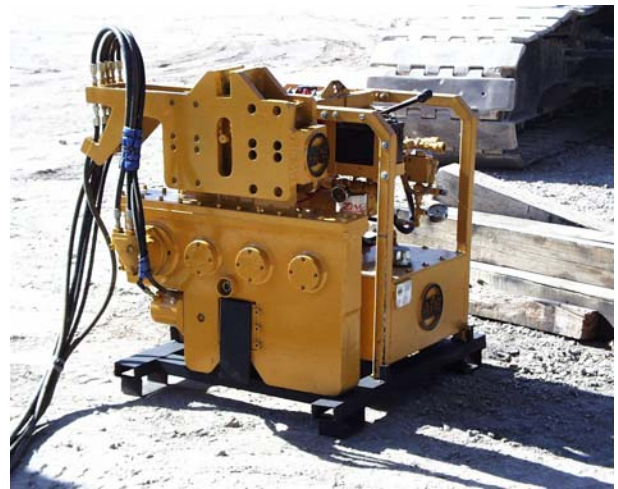
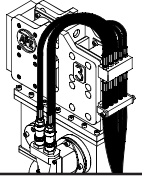




OPERATION AND MAINTENANCE MANUAL



**MODEL 3 and 6 VIBRATORY HAMMER
WITH MODEL 10 and 14 POWER UNIT**



Revision Record

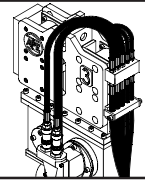
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OPERATION / MAINTENANCE MANUAL

MODEL 3 & 6 VIBRATORY HAMMER WITH MODEL 14 POWER UNIT

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Preface

General

This manual covers the **Model 3 Vibratory Hammer and the Model 14 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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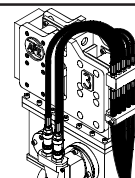


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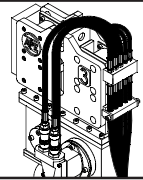
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Safety Precautions

(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. Remove all tools and electrical cords before starting the unit.
6. Keep oily rags away from the exhaust system.
7. Never store flammable liquids near the engine.
8. 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.
9. Always wear eye and ear protection.
10. Avoid standing downwind of vibrating piles. Dirt and other matter may become airborne and fall into the unprotected eye.
11. Always wear a hardhat, gloves, and safety shoes.
12. Always attach safety line to pile when extracting or hoisting into position.
13. (**WARNING**) Never clamp vibro to pile and disconnect from crane line. Lay vibro down on ground when not in use.



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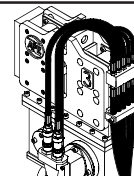


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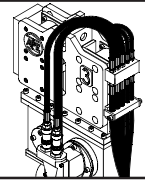
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Warranty

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:

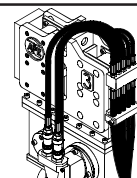
APE's obligation and liability under this WARRANTY is expressly limited to repairing or replacing at APE's option, any parts which appear to APE upon inspection to have been defective in material or workmanship. Such parts shall be provided at no cost to the user, at the business establishment of APE 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**



I. GENERAL INFORMATION

I-1. Machine Features. - Model 3 Vibratory Hammer

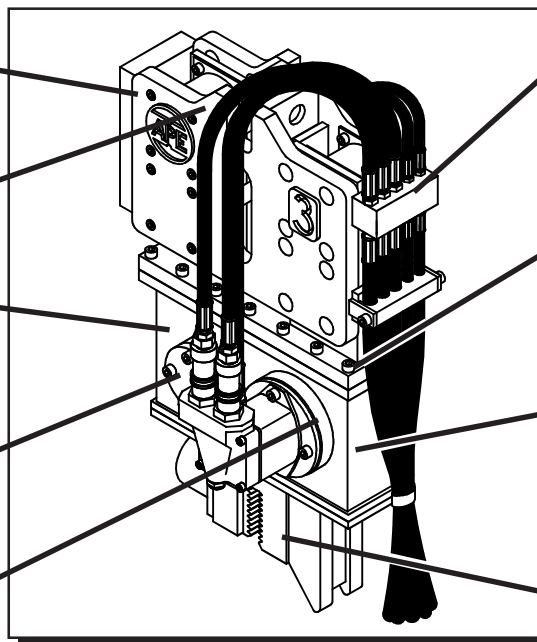
The APE Model 3 Vibro has a suspended weight of just 600 pounds.

The Model 3 is designed to operate off any backhoe.

Small enough to be transported in the back of a pick-up truck or the trunk of a car.

Two eccentric weights deliver 3 Tons of driving force.

One piece eccentric/gear design eliminates bolts, keyways, splines and pins.



Because of its 36 inch height, the Model 3 is perfect for usage in tight and covered areas.

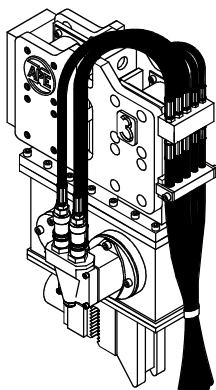
Removable top plate allows easy access to the bearings and gears for maintenance.

The Model 3 can be operated under water. (Consult factory for depth and submersion time limitations.)

High strength clamp ensures maximum grip without damaging plastic and light weight sheets and piles.

Figure 1-A. Machine Features

I-2. Machine Specifications



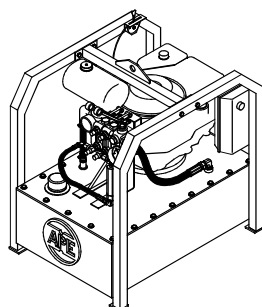
I-2A. Model 3 Vibro - Table 1-A.

Model 6

Eccentric Moment	34.63 kg-cm (30 in. lbs.)	70 kg-cm (60 in. lbs.)
Drive Force Max	26.68kN (3 US Tons)	68 kN (7.67 US Tons)
Frequency (cpm)	0 to 3000 vpm	0 to 3000 vpm
Amplitude	Consult Factory	Consult Factory
Pile Clamp Force	106 kN (12 US Tons)	214 kN (24 US Tons)
Line Pull for Extraction	44.48 kN (5 US Tons)	44.48 kN (5 US Tons)
Suspended Weight (without suppressor)	100 kg (220 lbs.)	100 kg (220 lbs.)
Suspended Weight (with suppressor)	272 kg (600 lbs.)	300 kg (660 lbs.)
Length	47 cm (18 1/2")	63 cm (25")
Width at Throat	15.2 cm (6")	15.2 cm (6")
Height with clamp attachment	91.4 cm (36")	91.4 cm (36")
Height without clamp attachment	70 cm (27.5")	70 cm (27.5")

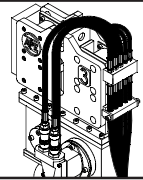
Note: Newer models do not have removeable clamp

I-2B. Model 14 Power Unit - Table 1-B.



Diesel Engines

Engine Type	Gas powered, 4-stroke, O.H. valve, single cylinder
Engine Oil Capacity	0.3 lit. (0.32 US qt.)
Lubrication	Full Pressure with Full Flow Filter
Horsepower	13 hp @ 3,600rpm
Length	78.7 cm (31")
Width	58.4 cm (23")
Height	76.2 cm (30")
Shipping Weight	223.1 kg (492 lbs.)



I. GENERAL INFORMATION (Continued...)

I-3. General Description of Model 3 Vibro

The **APE Model 3** is a variable frequency vibratory pile driver/extractor designed to drive and extract plastic and light sheet piles.

The Model 3 operates in a frequency range of 0 to 3000 cycles per minute depending on the generator setting. The Model 3 is especially suited for driving or extracting piles that are in tight or covered areas.

The two major parts to the Model 3 are as follows:

- A.) The Vibratory Gearbox.
- B.) The Clamping Attachment.

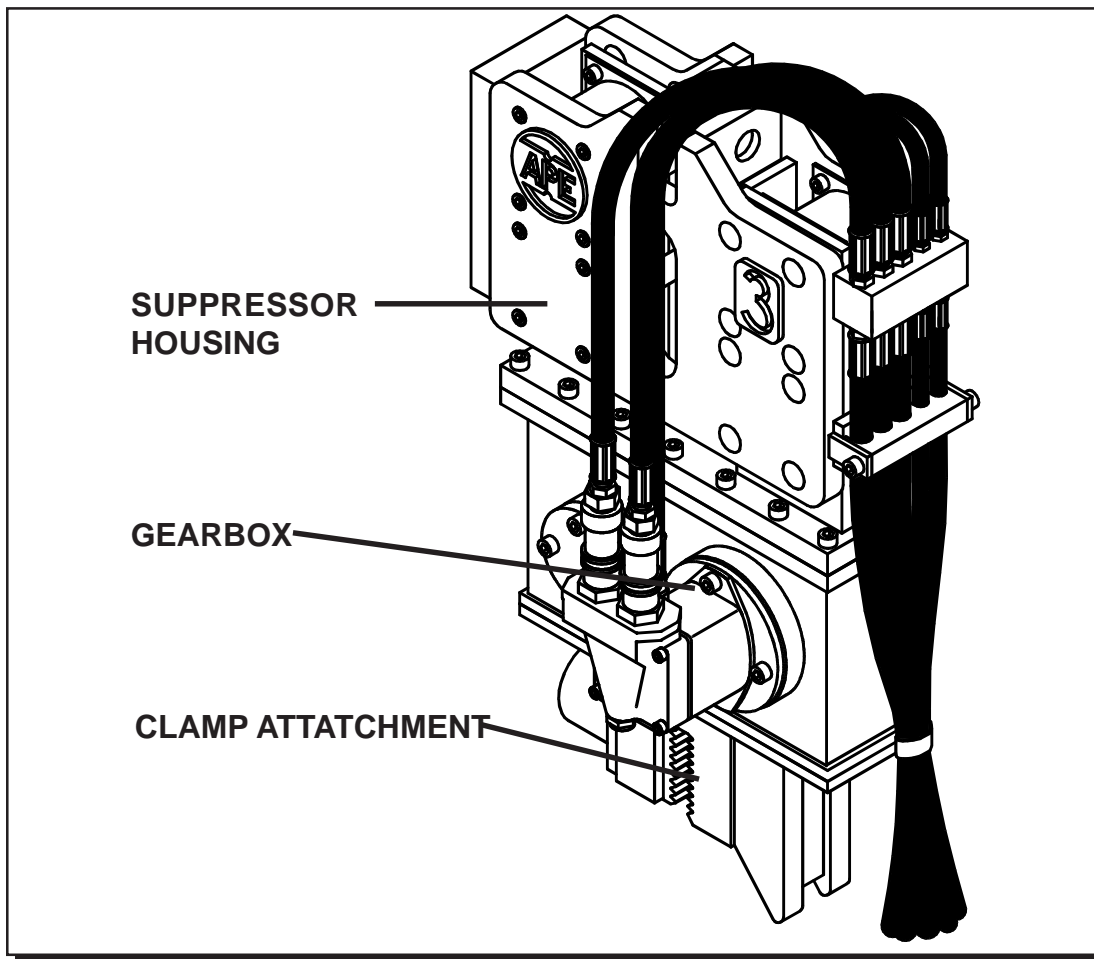
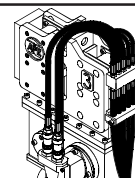


Figure 1-B. General Description of 3 Vibro.



I. GENERAL INFORMATION (Continued...)

I-3A. The Vibrator Gearbox

The vibrator gearbox contains two eccentric weights cast in one piece with the gear. 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 vibrator machines. Vibration is caused by the vertical movement created when the eccentrics are rotated. The eccentric and drive gears are all driven in line by one Volvo motor mounted on the outside face of the gearbox. The eccentrics rotate on two shafts housed by four 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. The Model 3 can be operated under water without modifications. (Consult factory for depth and time restrictions.)

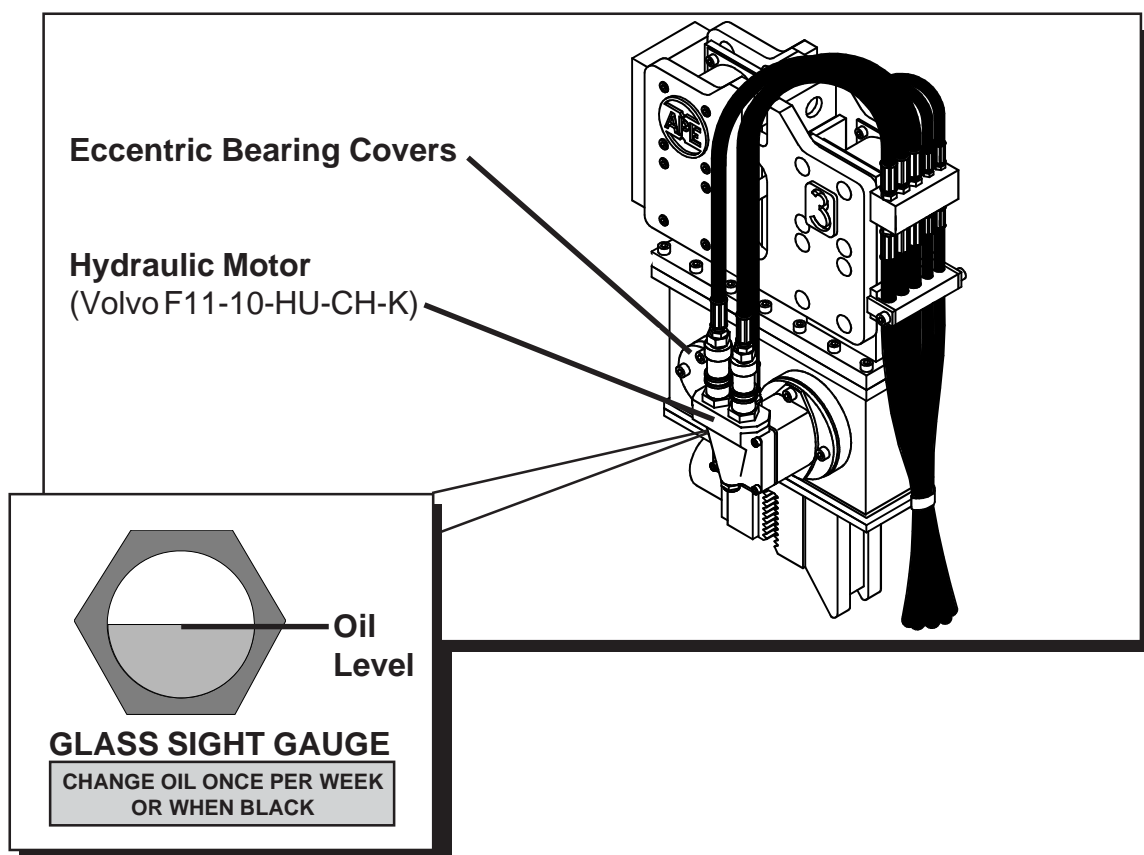


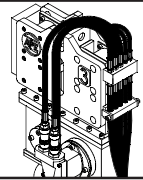
Figure 1-C. General Description of Vibrator Gearbox.



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I. GENERAL INFORMATION (Continued...)

I-3B. The Clamp Attachment

The APE 3 comes with a **standard sheet pile clamp attachment**. The clamp contains two gripping jaws. One is "fixed" and one is "movable". A hydraulic cylinder operates the moveable jaw with up to 3 tons of clamping force depending on the generator setting.

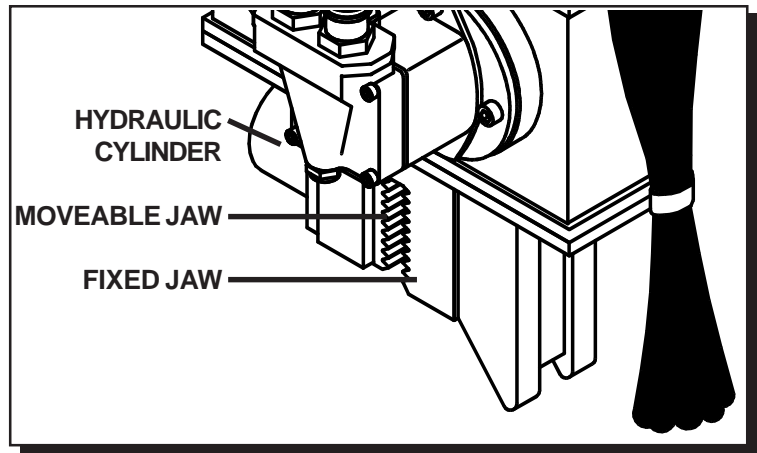


Figure 1-D. General Description of Clamp Attachment.

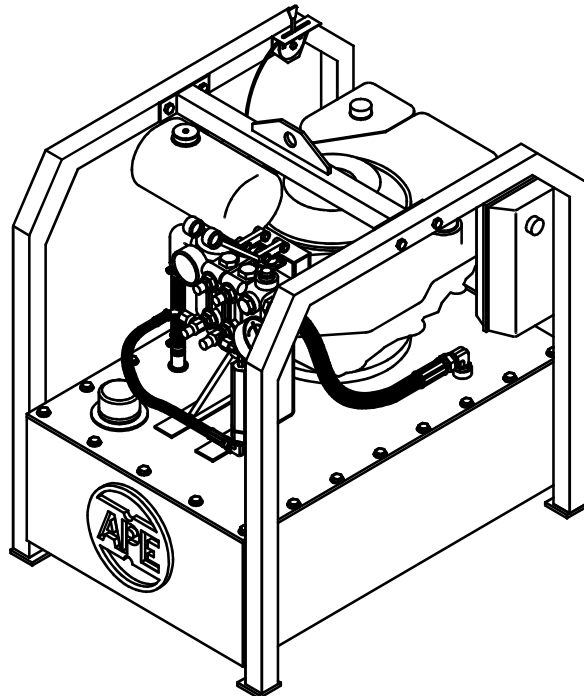
I-3C. Optional Attachments.

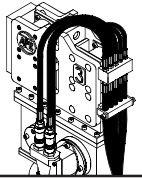
The APE Model 3 Hammer can also be equipped with attachments for the following:

T-Metal Fence Post	ShoreGuard Plastic Sheet	Pipe Clamp 1-2 Inches	C-LOK	Coregated Trapezoid 12" Flat	International Grating Flat Sheet	Manta-Ray Anchors
--------------------------	--------------------------------	-----------------------------	-------	------------------------------------	--	----------------------

I-4. General Description of Model 14 Power Unit.

The APE Model 3 & 6 Hammer runs off the APE Model 14 power unit. The APE 14 has a 13 horsepower HONDA horizontal shaft gasoline engine. APE also supplies a diesel engine with electric start. The engine is mounted to a steel tank base that also serves as a hydraulic fluid reservoir. Two hydraulic 4-way directional control valves are mounted on the unit to control the vibrator motor and the vibrator clamp jaw. The motor, fuel tank and all controls are enclosed within a protective steel frame. One pump feeds both the motor and the clamp attachment. The vibrator is connected to the power unit via 1/2" hydraulic hoses with JIC fittings on each end. A lifting eye is located at the top of the frame for movement.





II. MAJOR COMPONENT DEFINITION

II-1. Component Identification - Model 3 Vibratory Hammer-New Style.

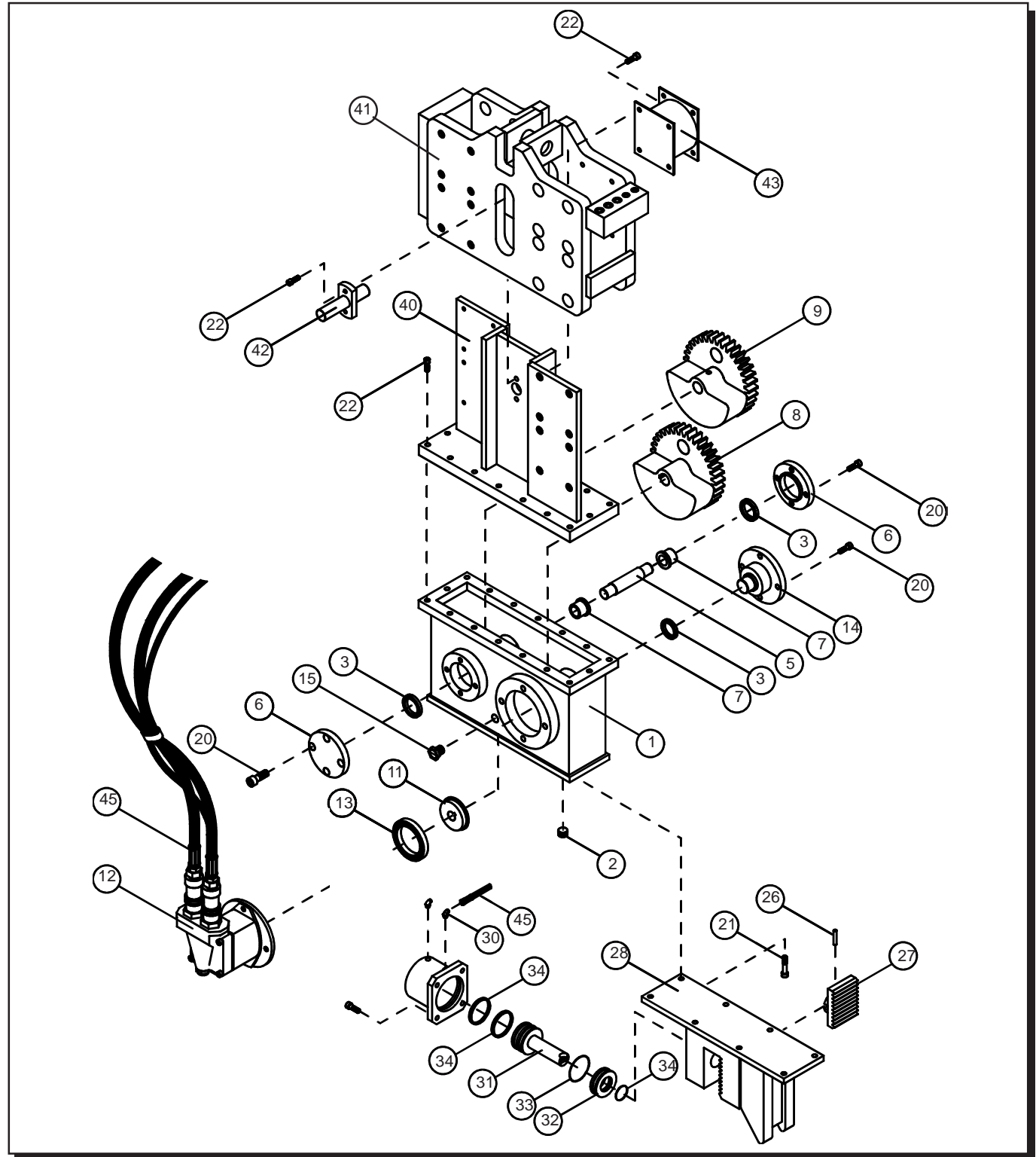


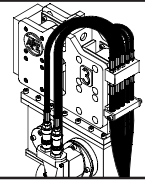
Figure 2-A Component Identification.



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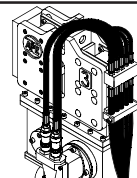
II. MAJOR COMPONENT DEFINITION (Continued...)

II-1. Component Identification

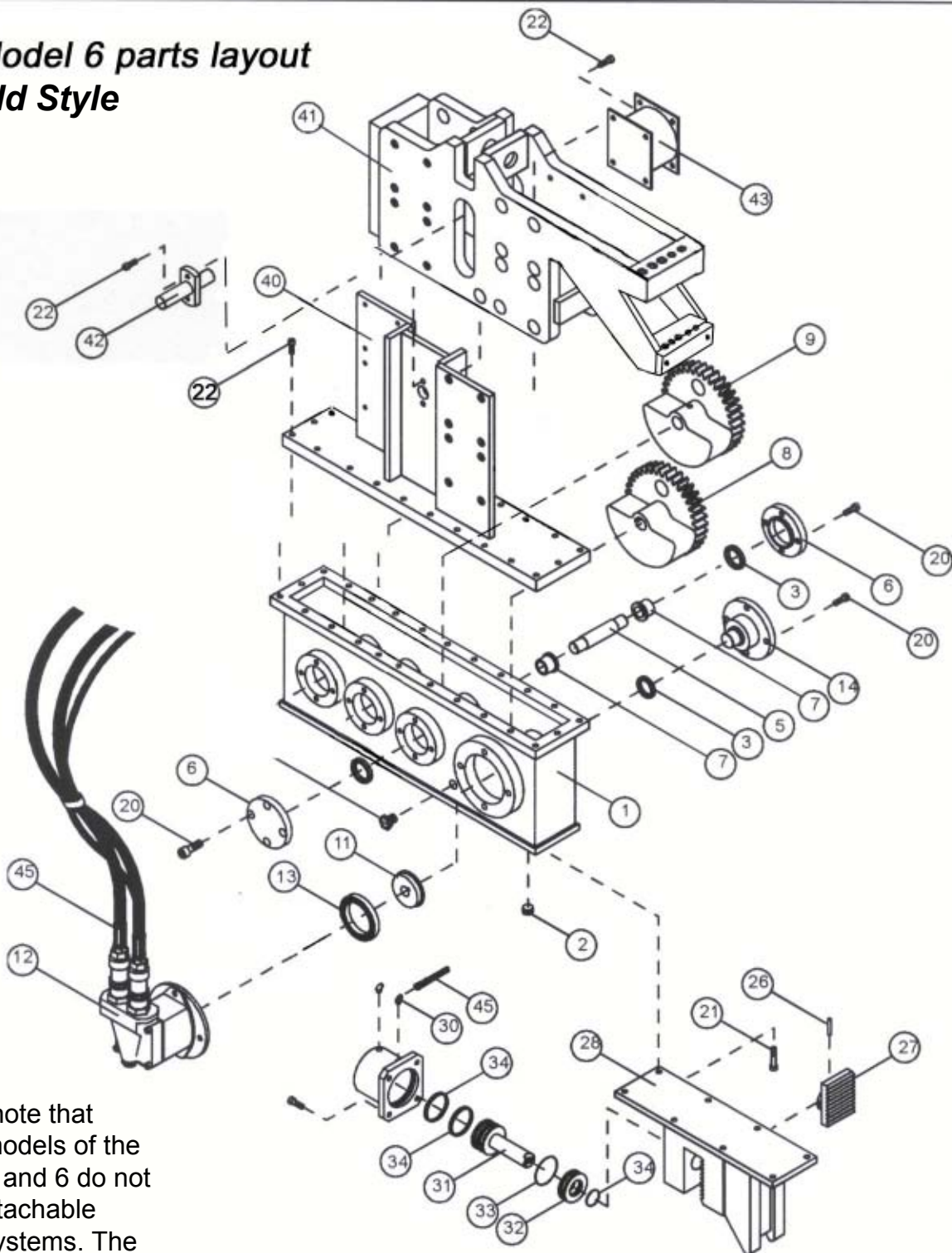
The following is a general listing of the APE 3 Major components and part numbers. (Please see Figure 2-A. for component location).

Table 2-A. Component Identification.

Item	Qty	Description	Part #
1	1	Vibratory Gearbox	#105001
2	1	Magnetic Drain Plug	#105004
3	3	Eccentric Bearing	#105101
4	2	Shaft Spacer	#105102
5	1	Eccentric Shaft	#105103
6	2	Eccentric Bearing Cover	#105104
7	2	Bearing Sleeve	#105105
8	1	Eccentric Weight - Driver	#105106
9	1	Eccentric Weight - Driven	#105107
10	1	Bearing Spacer	#105109
11	1	Motor Bearing Carrier	#105110
12	1	Motor - Volvo #F11-10-HU-CH-K	#105201
13	1	Motor - Bearing	#105202
14	1	Motor Bearing Cover	#105205
15	1	Sight Glass #LSP151-05 3/4"NPT	#105305
16	---	-----	-----
17	---	-----	-----
18	---	-----	-----
19	---	-----	-----
20	1	Model 3 Bolt Kit - Gearbox	#105410
21	1	Model 3 Bolt Kit - Clamp	#105420
22	1	Model 3 Bolt Kit - Suppressor	#105430
23	---	-----	-----
24	---	-----	-----
25	1	1/8" Grease Zert	#205101
26	1	Jaw Pin	#205102
27	1	Moveable Jaw	#205104
28	1	Model 3 Clamp Body	#205119
29	1	Clamp Cylinder	#205501
30	2	#6SAE/#6JIC 45 deg. Fitting	#205502
31	1	Plunger Shaft	#205503
32	1	Cylinder End Cap	#205504
33	1	Model 3 Clamp O-Ring Kit	#205509
34	1	Model 3 Clamp Seal Kit	#205510
35	---	-----	-----
36	---	-----	-----
37	---	-----	-----
38	---	-----	-----
39	---	-----	-----
40	1	Model 3 Inner Suppressor	#305011
41	1	Model 3 Outer Suppressor	#305012
42	1	Model 3 Suppressor Safety Pin	#305013
43	4	Model 3 Elastomers	#305104
44	---	-----	-----
45	1	Model 3 Hose Kit	#405100



Model 6 parts layout Old Style



Please note that newer models of the Model 3 and 6 do not have detachable clamp systems. The clamp is built into the gearbox as shown on the front cover.

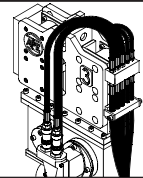
Figure 2-B Component Identification.



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II. MAJOR COMPONENT DEFINITION - Model 6

II-1a. Component Identification

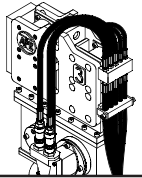
The following is a general listing of the APE 6 Major components and part numbers. (Please see Figure 2-B. for component location).

Table 2-B. Component Identification.

Item	Qty	Description	Part #
1	1	Vibratory Gearbox	#107001
2	1	Magnetic Drain Plug	#105004
3	7	Eccentric Bearing	#105101
4			
5	3	Eccentric Shaft	#105103
6	6	Eccentric Bearing Cover	#105104
7	6	Bearing Sleeve	#105105
8	1	Eccentric Weight - Driver	#105106
9	3	Eccentric Weight - Driven	#105107
10			
11	1	Motor Bearing Carrier	#105110
12	1	Motor - Volvo #F11-10-HU-CH-K	#105201
13	1	Motor - Bearing	#105202
14	1	Motor Bearing Cover	#105205
15	1	Sight Glass #LSP151-05 3/4"NPT	#105305
16	---	-----	-----
17	---	-----	-----
18	---	-----	-----
19	---	-----	-----
20	1	Model 3/6 Bolt Kit - Gearbox	#105410
21	1	Model 3/6 Bolt Kit - Clamp	#105420
22	1	Model 3/6 Bolt Kit - Suppressor	#105430
23	---	-----	-----
24	---	-----	-----
25	1	1/8" Grease Zert	#205101
26	1	Jaw Pin	#205102
27	1	Moveable Jaw	#205104
28	1	Model 3 Clamp Body	#205119
29	1	Clamp Cylinder	#205501
30	2	#6SAE/#6JIC 45 deg. Fitting	#205502
31	1	Plunger Shaft	#205503
32	1	Cylinder End Cap	#205504
33	1	Model 3/6 Clamp O-Ring Kit	#205509
34	1	Model 3/6 Clamp Seal Kit	#205510
35	---	-----	-----
36	---	-----	-----
37	---	-----	-----
38	---	-----	-----
39	---	-----	-----
40	1	Model 6 Inner Suppressor	#307103
41	1	Model 6 Outer Suppressor	#307102
42	1	Model 3/6 Suppressor Safety Pin	#305016
43	4	Model 3/6 Elastomers	#305104
44	---	-----	-----
45	1	Model 3/6 Hose Kit	#405100

2 left and 2 right gear cut

It is necessary to replace all eccentrics when rebuilding a Model 3 or 6 gearbox to insure gear cut alignment.



Model 6 parts layout New Style

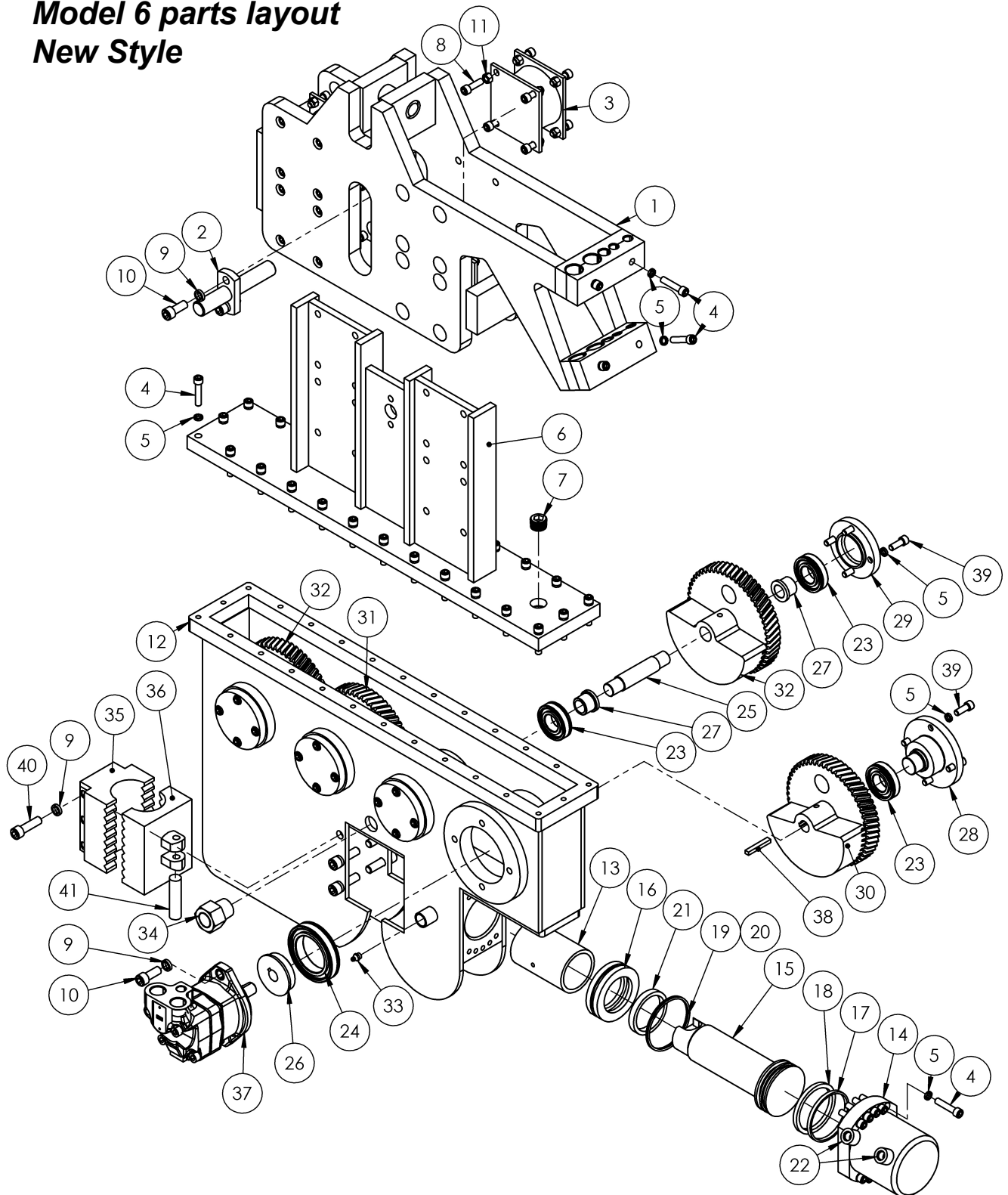


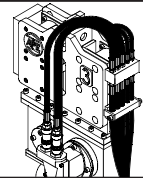
Figure 2-C Component Identification.



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II. MAJOR COMPONENT DEFINITION - Model 6

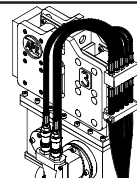
II-1b. Component Identification

The following is a general listing of the APE 6 Major components and part numbers. (Please see Figure 2-C. for component location).

Table 2-C. Component Identification.

Item	Qty	Description	Part #
1	1	Model 6 Outer Suppressor	#1006662
2	1	Model 3/6 Suppressor Safety Pin	#1006673
3	4	Model 3/6 Elastomers	#305104
4	40	SHCS 3/8-16x1.75	
5	68	HCLW 3/8	
6	1	Model 6 Inner Suppressor	#1006664
7	1	3/4 NPT Plug	
8	32	SHCS 3/8-16x1.25	#1002982
9	10	HCLW 1/2	
10	4	SHCS 1/2-13x1.25	
11	32	Stover Nut 3/8-16	
12	1	Vibratory Gearbox	#1006659
13	1	Cylinder Sleeve	#1001643
14	1	Clamp Cylinder Bucket	#1001644
15	1	Cylinder Rod	#1001642
16	1	Hydraulic Gland	#1001645
17	1	Wear Ring 612-350-025	
18	1	Piston Ring PS1850-56	
19	1	2-238 O-Ring 90 Duro	
20	1	8-238 Backup	
21	1	Seal 250-02.500-375B	
22	1	3/8 SAE Boss	
23	7	Eccentric Bearing	#105101
24	1	Motor - Bearing	#105202
25	3	Eccentric Shaft	#105103
26	1	Motor Bearing Carrier	#105110
27	6	Bearing Sleeve	#105105
28	1	Motor Bearing Cover	#105205
29	6	Eccentric Bearing Cover	#105104
30	1	Eccentric Weight R.H. - Driver	#105107
31	1	Eccentric Weight R.H. - Driven	#105111
32	2	Eccentric Weight L.H. - Driven	#105113
33	1	1/8" Grease Zert	#221001
34	1	Sight Glass #LSP151-05 3/4"NPT	#105305
35	1	Fixed Jaw	#205006
36	1	Moveable Jaw	#205005
37	1	Motor - Volvo #F11-10-HU-CH-K	#105201
38	1	Key for 1/4 x 1/8 K.W.	
39	28	SHCS 3/8-16x1.00	#1002981
40	6	SHCS 1/2-13x1.75	#130235
41	1	Roll Pin	

It is necessary to replace all eccentrics when rebuilding a Model 3 or 6 gearbox to insure gear cut alignment.



III. LOADING AND UNLOADING

III-1. Model 3 Vibratory Hammer.

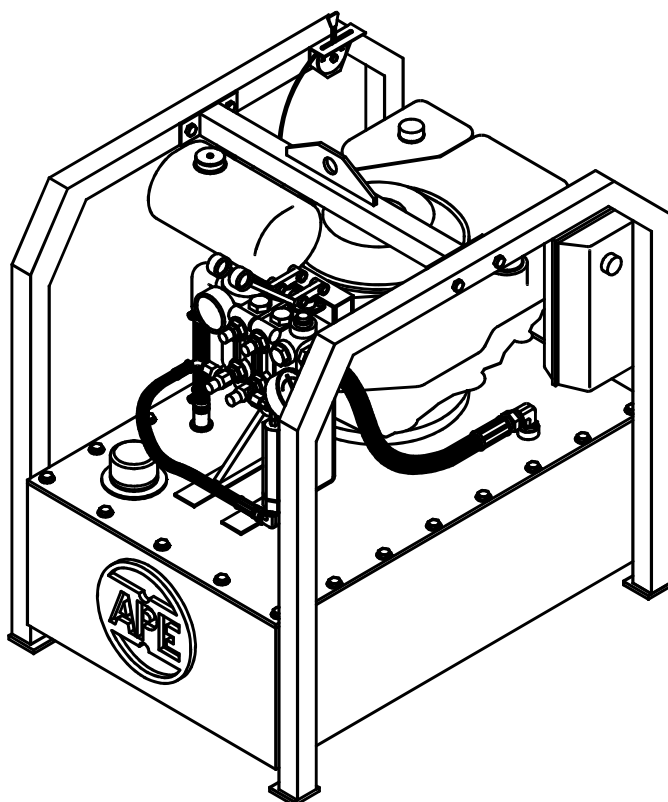
The APE 3 vibrator is normally shipped laying flat on the trailer deck with the hoses coiled next to it. Lift the vibrator by rigging one line to the lifting pin and one line around the clamp attachment. Vibro should be loaded with motor facing upward. Before the truck has left, carefully inspect the machine 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.

III-3. Model 14 Power Unit.

The APE Model 14 Power unit is a self contained unit with a single lifting eye located at the top of the frame for use with a shackle. The unit is designed to allow forklift transporting. The power unit should always be standing on its base frame with the lifting eye facing upward.

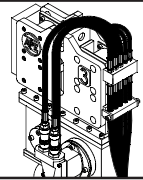




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IV. PREPARATION AND OPERATION

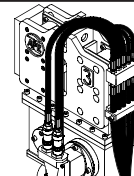
IV-1. Rigging of Vibratory Hammer

A steel wire rope sling must be connected to the lifting pin located on top of the vibro. The required strength of this sling depends on the capacity of the crane and the work to be carried out. A safety factor of six is recommended. When making a sling, avoid using cheap cable clamps. Check the cable clamps daily.

IV-2. 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 3 Vibratory Hammer.

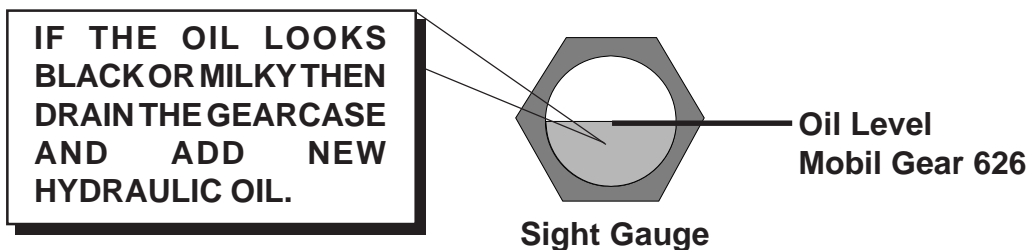
- 1.) Follow the Daily Maintenance Required Prior to Operation, [Section V-1.] [page 5-1].
- 2.) Read and follow the Safety Precautions, [page v].
- 3.) Start with piles in good condition.
- 4.) Put all teeth in pile.
- 5.) Drive in steps.
- 6.) Keep sheets plumb.
- 7.) Come up to speed before doing work.
- 8.) No dancing. Avoid de-intensification.
- 9.) Drive past obstacles and then go back.
- 10.) Backhoe on site to remove obstacles.
- 11.) Probe the pile if it appears stuck.
- 12.) Keep piles plumb or down the road you go.
- 13.) Never rush the sheet pile foreman.
- 14.) Slow and plumb and the job will get done.
- 15.) Never stand under pile hammers.
- 16.) Low clamp pressure means jaw failures.
- 17.) Wait for vibro to get to full speed then pull.
- 18.) Look at the jaws during driving.
- 19.) Beware of cracked or broken sheets.
- 20.) In sandy soils drive faster.
- 21.) In clay amplitude is everything.
- 22.) Low drive pressure means easy work.
- 23.) High pressure means friction on piles.
- 24.) No amplitude means get a bigger hammer.
- 25.) Check clamp bolts each morning.
- 26.) Read the manual - know your machine.
- 27.) Attach whip line to pile when pulling.
- 28.) Know your line pull.
- 29.) Extract straight - look at boom and cable.
- 30.) Give boom stops some room.



V. MAINTENANCE

V-1. Daily Maintenance Required Prior to Operation - Model 3 Vibro.

- 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 crane 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 black then change it. **Change the oil every 75 hours regardless.**
- 5.) Check wire rope sling and make sure it is in excellent condition.
- 6.) Check jaws for wear. Replace if necessary.
- 7.) Make sure the jaws close properly prior to clamping onto pile.

V-2. Daily Maintenance Required Prior to Operation - Model 14 Power Unit.

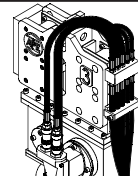
- 1.) Visually inspect the entire unit for loose nuts or bolts. Check for leaks and cracked or broken fuel line or hoses.
- 2.) Check the oil level in the engine and the reservoir.



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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 standard weight oil until half way up the sight gauge (Mobil Gear 626).

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

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

1.) Model 3 - The Eccentric Bearings should be checked and/or replaced after every 5000 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.

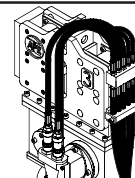
During stand-by or inactive periods, the servicing intervals may be reduced to one-half. The unit should be run every 30 days or less to keep internal parts lubricated.

V-6A. Lubrication - Vibratory Gearbox.

The Gearbox oil should be changed when black or milky. Mobil Gear 626 or equal is the preferred oil. Just ask your oil supplier for an equivalent type 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 regular basis.

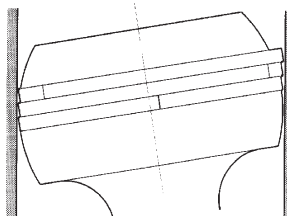


V. MAINTENANCE (Continued...)

V-7. Hydraulic Motor - Installation and Start-Up. - Figure 5A.

LAMINATED PISTON RING

The three-part laminated piston ring is hydrostatically balanced radially, which helps minimize the contact force between the piston ring and the cylinder wall. The piston itself has a relatively large clearance, and the risk of piston seizure due to sudden temperature changes is greatly reduced.

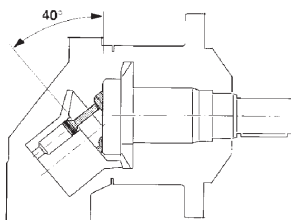


Low leakage
Minimal wear
Reduced heat generation
Little risk of oil film break-down
Low viscosity fluids can be utilized
Designed to help withstand thermal shocks

40° SWASH ANGLE

With the spherical piston concept, the pistons are allowed to operate at a wide 40° angle.

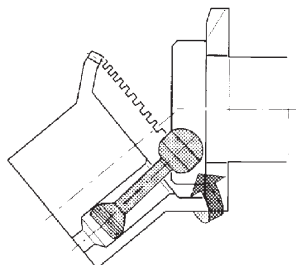
- Small cylinder barrel and pistons
- High torque efficiency
- Favorable bearing loading



POSITIVE SYNCHRONIZATION

The timing gear between the shaft and the cylinder barrel offers many advantages.

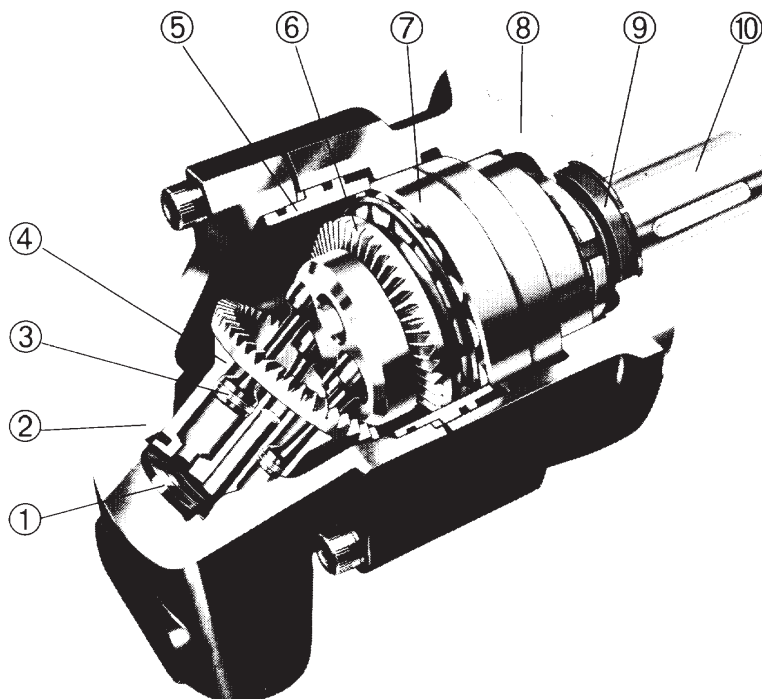
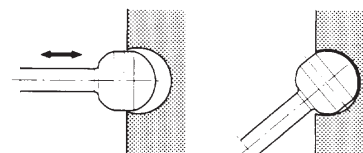
- Low side forces on the pistons
- More vibration tolerant operation
- Withstands high accelerations



POSITIVE PISTON LOCKING

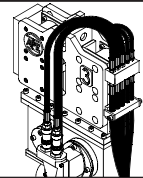
The piston is secured by the specially formed spherical ball end which fits in a socket in the drive shaft.

- Increased reliability
- Few moving parts
- Easy assembly and disassembly



LEGEND

1. Valve plate
2. Barrel housing
3. Spherical piston with laminated piston ring
4. Cylinder barrel
5. Guide spacer with O-rings
6. Timing gear
7. Roller bearing
8. Bearing housing
9. Shaft seal
10. Shaft



V. MAINTENANCE (Continued...)

V-7. Hydraulic Motor - Installation and Start-Up. - Figure 5A. (Continued...)

SPECIFICATIONS

Motor/pump designation	F11-5	F11-10	F11-19
Displacement [cu. in./ rev] (cm ³ /rev)	0.30 4.88	0.60 9.84	1.16 19.0
Peak operating pressure [psi] (bar)	6000 420	6000 420	6000 420
Max continuous pressure [psi] (bar)	5000 350	5000 350	5000 350
Operating speed [rpm] Max	12000	10000	7500
Max continuous	8500	6800	5400
Min continuous	200	200	150
Max output power [hp] (kW)	24 18	38 28	60 45
Continuous output power [hp] (kW)	17 13	27 20	43 32
Flow (theor.) at 1000 rpm [gpm] (liters/min)	1.29 4.88	2.60 9.84	5.02 19.0
Torque (theor.) at 1000 psi [lb. in.] at 100 bar (Nm)	48 7.8	96 15.7	184 30.2
Moment of inertia [ft. lbs. sec ²] (kgm ²)	1.32 x10 ⁻⁴	3.24 x10 ⁻⁴	8.83 x10 ⁻⁴
Pressurized oil volume [cu. in.] (one port) (cm ³)	0.6 10	1.2 20	1.7 28
Weight [lbs] (kg)	11 5.0	17 7.5	24 11.0

SELF-PRIMING SPEED

In pump applications, the F11 with function **L** (left hand rotation) or **R** (right hand rot.) is normally used. The **L** or **R** provides the highest self-priming speed (see table) as well as the lowest noise level. The **H** (motor) function can also be used as a pump, in either direction, but at a lower self-priming speed.

Max self-priming speed [rpm]

Pump designation	Function L or R	Function H
F11-5	4600	3200
F11-10	4200	2700
F11-19	3500	2100

Operating above the self-priming speed (refer to the F11-39 diagram below) requires increased inlet pressure. As an example, at least 10 psi (≈ 0.7 bar) is needed when driving the F11-39-H at 2500 rpm.

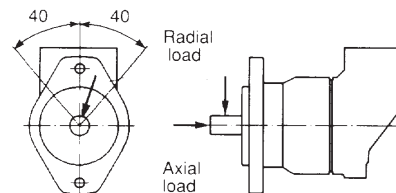
Insufficient inlet pressure can cause pump cavitation resulting in greatly increased pump noise and deteriorating performance.

Contact Volvo Hydraulics for further information on inlet pressure.

HIGH EXTERNAL SHAFT LOADS

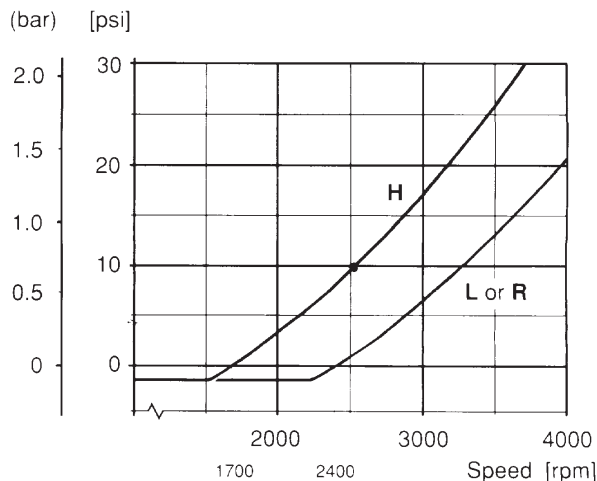
The heavy duty tapered roller bearings permit substantial external shaft loads. The table shows the highest recommended radial and axial loads (corresponding to 5000 psi /350 bar operating pressure). The radial load figures are valid irrespective of load direction.

Design.	Max radial load [lbs]	Max radial load (N)	Max axial load [lbs]	Max axial load (N)
F11-5	240	1090	785	3500
F11-10	430	1960	1260	5600
F11-19	725	3290	1970	8750



NOTE: Within 40 from the centerline (see above) a higher radial load can be accepted; contact Volvo Hydraulics for further information.

Min required inlet pressure (F11-39)

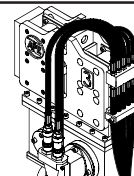




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VI. VIBRO TROUBLE-SHOOTING

The following table lists some possible problems, causes and solutions. If a serious problem should occur, contact the factory for additional service information.

Table 6-A. Vibro Trouble-Shooting Index

ITEM	PROBLEM	ITEM	PROBLEM
1.	Oil Blowing Out Between Gear box and Hydraulic Motor.	4.	Opening and Closing Clamp Jaws Seems Spongy or Slow.
2.	Vibro Gearbox is Too Hot.	5.	Vibrator Wont Start.
3.	Excess Oil in the Gearbox.		

Possible Cause

Remedy

1. Oil Blowing Out Between Gearbox and Hydraulic Motor.

The breather may be plugged or damaged.

Remove the breather and clean it. If the breather is damaged replace it.

Motor may not be sealing properly.

Clean the area between the motor and the gearbox. replace the motor and fully tighten the motor fasteners.

2. Vibro Gearbox is Too Hot.

Oil level may be too high.

Make sure the gearbox is level. Remove the oil over fill plug (located on the gearbox next to the sight gage). If oil flows out, the oil level is too high and must be lowered.

Oil may be too dirty.

Look at oil in the sight gage. If the oil is black or milky it must be replaced. If you are still not sure, remove the case drain plug and check the oil.

3. Excess Oil in the Gearbox.

The seal between the gearbox and the hydraulic motor may be bad and is allowing oil to flow directly into the gearbox.

Remove the motor from the face of the gearbox. Check and clean the seal area, replace and tighten the fasteners..

4. Opening and Closing Clamp Jaws Seems Spongy or Slow.

The plunger shaft may not be properly lubricated or may need cleaning.

Remove the movable jaw from the clamp. Inspect the plunger shaft and check for lubrication or debris build up. Clean the shaft if needed and then lubricate using the grease zerk on the clamp body.

There may not be enough pressure from the power unit

Check the power unit for improper settings or operation.

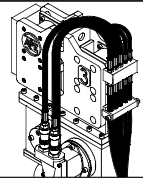
5. Vibrator Wont Start When Start Button is Engaged.

Hoses may be connected improperly.

Check hoses and make connection corrections if required.

Vibro gearbox may be frozen up..

If motors are working fine and the drive pressure appears normal, then the vibro gearbox may be frozen and in need of repair.



VII. MODEL 14 POWER UNIT

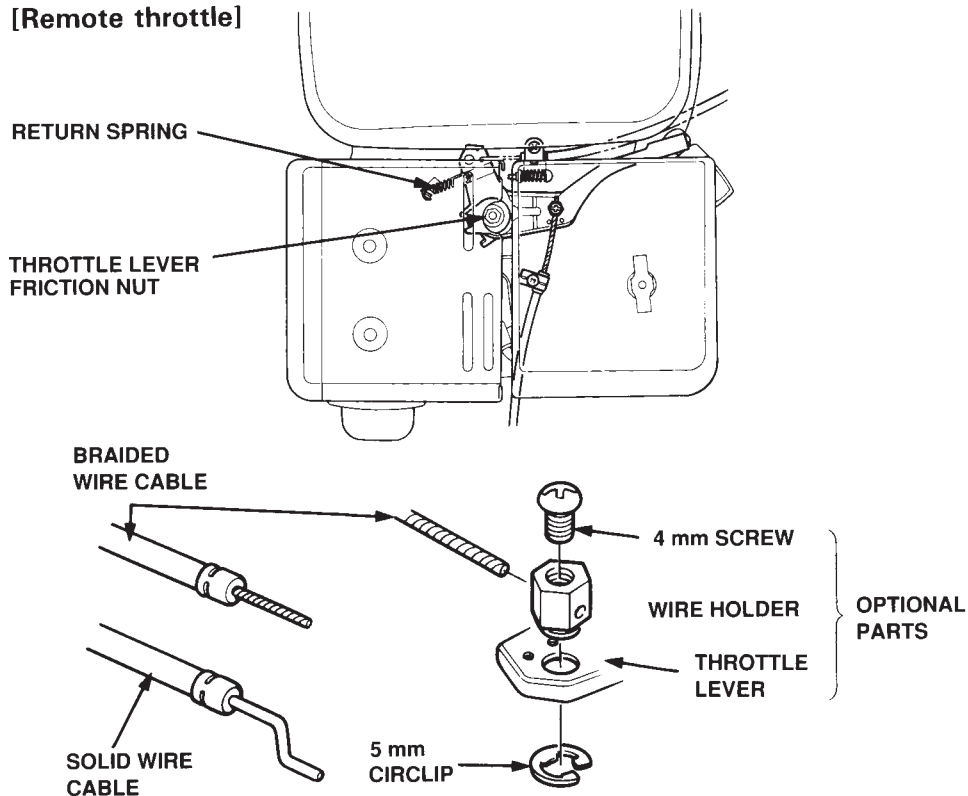
VII-1. HONDA #GX390 Engine.

VII-1A. Remote Control Linkage (for throttle and choke cables).

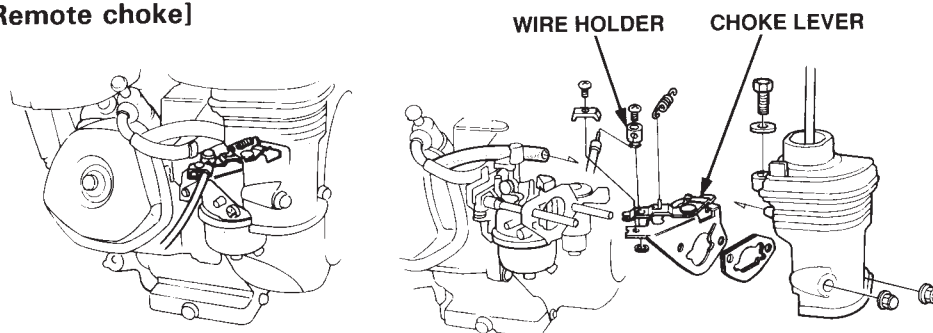
The throttle and choke control levers are provided with holes for optional cable attachment. The following illustrations show installation examples for a solid wire cable and for a braided wire cable. If using a braided wire cable, add a return spring as shown.

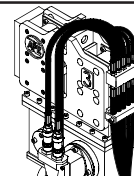
It is necessary to loosen the throttle lever friction nut when operating the throttle with a remote cable.

[Remote throttle]



[Remote choke]





VII. MODEL 14 POWER UNIT

VII-1. HONDA#GX390 Engine (Continued...)

VII-1B. Pre-Operation Check.

1. Engine oil

NOTICE

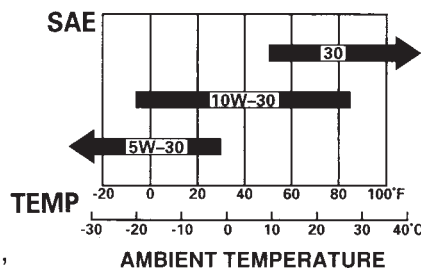
- **Engine oil is a major factor affecting engine performance and service life. Nondetergent oils and 2-stroke oils are not recommended because they have inadequate lubricating characteristics.**
- **Check the oil level with the engine on a level surface and the engine stopped.**

Use Honda 4-stroke oil, or an equivalent high detergent, premium quality motor oil certified to meet or exceed U.S. automobile manufacturer's requirements for Service Classification SG, SF.

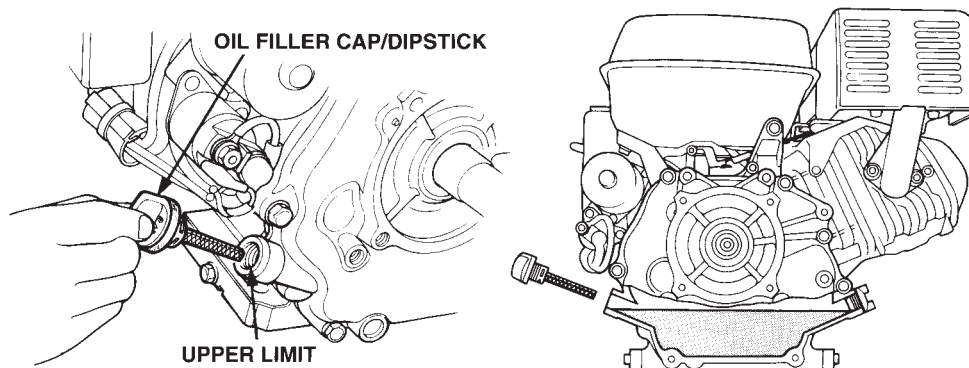
Motor oils classified SG, SF will show this designation on the container.

SAE 10W/30 is recommended for general, all-temperature use.

Other viscosities shown in the chart may be used when the average temperature in your area is within the indicated range.

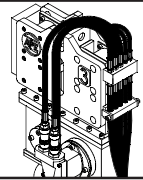


1. Be sure the engine is in a level position.
2. Remove the oil filler cap/dipstick and wipe it clean.
3. Insert the filler cap/dipstick into the oil filler neck, but do not screw it in.
4. If the level is low, fill to the top of the oil filler neck with the recommended oil.
5. Reinstall the oil filler cap/dipstick.



NOTICE

Running the engine with a low level can cause engine damage.

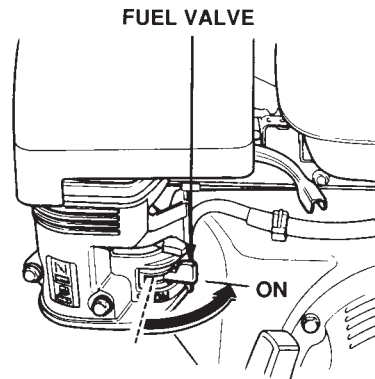


VII. MODEL 14 POWER UNIT

VII-1. HONDA #GX390 Engine (Continued...)

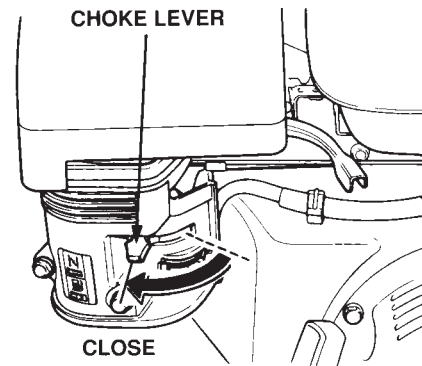
VII-1C. Starting the Engine.

1. Turn the fuel valve to the ON position.

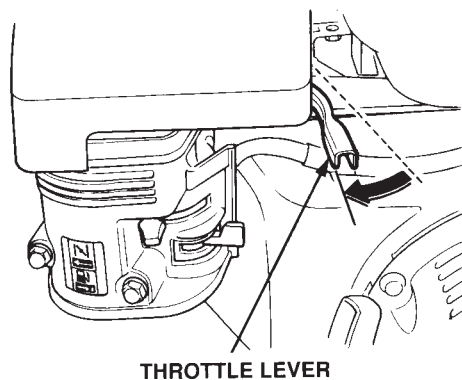


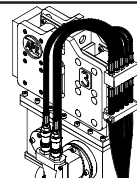
2. Move the choke lever to the CLOSE position.

NOTE: The choke may not be needed if the engine is warm or the air temperature is high.



3. Move the throttle lever slightly to the left.



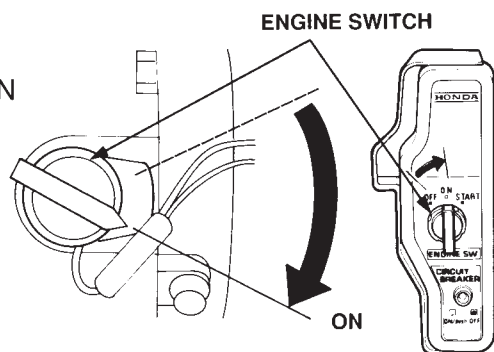


VII. MODEL 14 POWER UNIT

VII-1. HONDA #GX390 Engine (Continued...)

VII-1C. Starting the Engine (Continued).

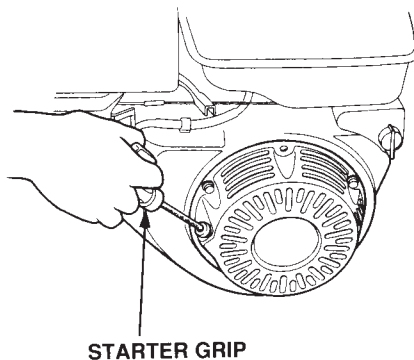
4. Start the engine.
 - With recoil starter:
Turn the engine switch to the ON position.



(QAE type)

Pull the starter grip lightly until resistance is felt, then pull briskly.

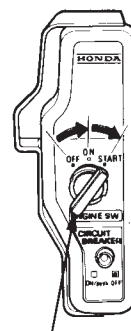
NOTICE Do not allow the starter grip to snap back against the engine. Return it gently to prevent damage to the starter.



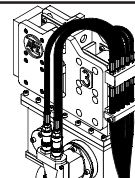
- With electric starter (QAE2 type):
Turn the engine switch to the START position and hold it there until the engine starts.

NOTICE Do not use the electric starter for more than 5 seconds or starter motor damage may occur. If the engine fails to start, release the switch and wait 10 seconds before operating the starter again.

When the engine starts, allow the engine switch to return to the ON position.



ENGINE SWITCH
(QAE type)

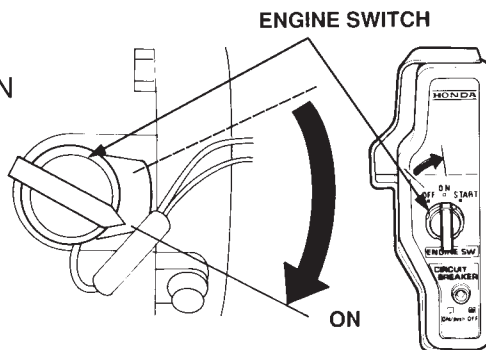


VII. MODEL 14 POWER UNIT

VII-1. HONDA #GX390 Engine (Continued...)

VII-1D. Engine Operation.

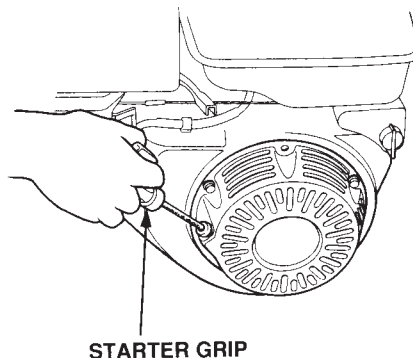
4. Start the engine.
 - With recoil starter:
 - Turn the engine switch to the ON position.



(QAE type)

Pull the starter grip lightly until resistance is felt, then pull briskly.

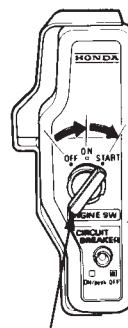
NOTICE Do not allow the starter grip to snap back against the engine. Return it gently to prevent damage to the starter.



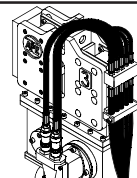
- With electric starter (QAE2 type):
 - Turn the engine switch to the START position and hold it there until the engine starts.

NOTICE Do not use the electric starter for more than 5 seconds or starter motor damage may occur. If the engine fails to start, release the switch and wait 10 seconds before operating the starter again.

When the engine starts, allow the engine switch to return to the ON position.



ENGINE SWITCH
(QAE type)

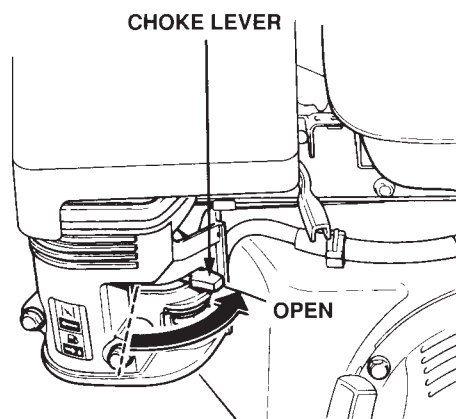


VII. MODEL 14 POWER UNIT

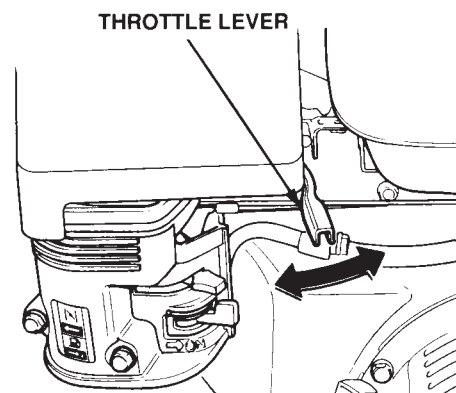
VII-1. HONDA #GX390 Engine (Continued...)

VII-1D. Engine Operation (Continued).

1. As the engine warms up, gradually move the choke lever to the OPEN position.



2. Position the throttle lever for the desired engine speed.



• High altitude operation

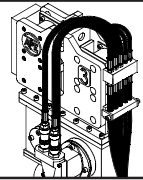
At high altitude, the standard carburetor air-fuel mixture will be too rich. Performance will decrease, and fuel consumption will increase. A very rich mixture will also foul the spark plug and cause hard starting.

High altitude performance can be improved by specific modifications to the carburetor. If you always operate your engine at altitudes above 1,800 meters (6,000 feet), have your dealer perform this carburetor modification.

In any case, engine horsepower will decrease about 3.5% for each 300 meter (1,000 foot) increase in altitude.

NOTICE

When the carburetor has been modified for high altitude operation, the air-fuel mixture will be too lean for low altitude use. Operation at altitudes below 1,800 meters (6,000 feet) with a modified carburetor may cause the engine to overheat and result in serious engine damage. For use at low altitudes, have your dealer return the carburetor to original factory specifications.



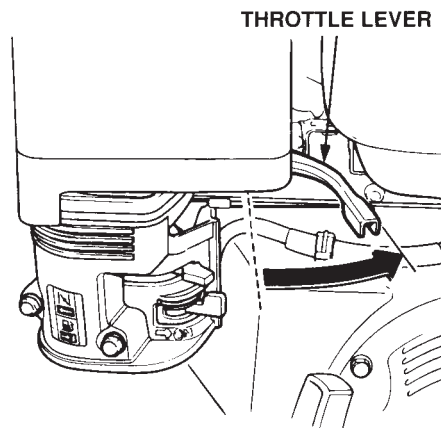
VII. MODEL 14 POWER UNIT

VII-1. HONDA #GX390 Engine (Continued...)

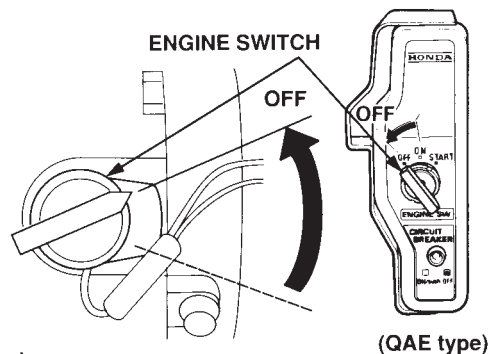
VII-1E. Stopping the Engine.

To stop the engine in an emergency, turn the engine switch to the OFF position. Under normal conditions, use the following procedure:

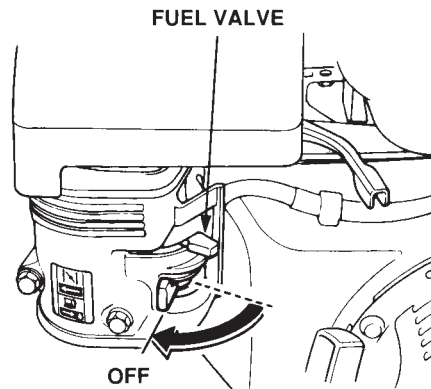
1. Move the throttle lever fully to the right.

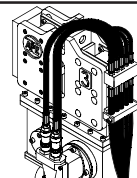


2. Turn the engine switch to the OFF position.



3. Turn the fuel valve to the OFF position.





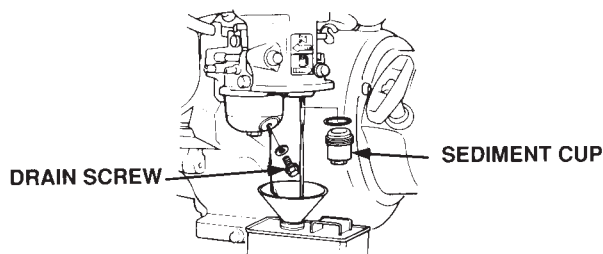
VII. MODEL 14 POWER UNIT

VII-1. HONDA #GX390 Engine (Continued...)

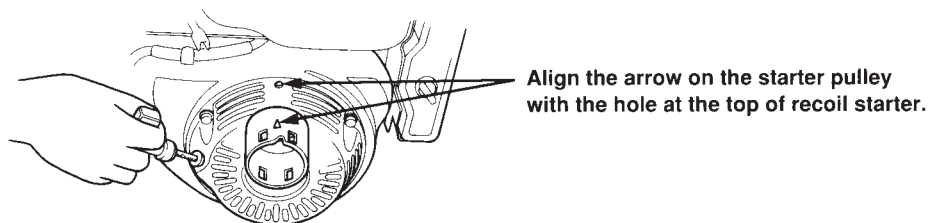
VII-1E. Stopping the Engine (Continued).

- a. With the fuel valve OFF, remove and empty the sediment cup.
Replace the sediment cup and tighten securely.
- b. Drain the carburetor by loosening the drain screw. Drain the gasoline into an approved gasoline container. Tighten the drain screw securely.

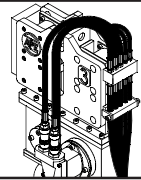
⚠ WARNING Gasoline is extremely flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in the area.



3. Change the engine oil.
4. Remove the spark plug and pour about a tablespoon of clean engine oil into the cylinder. Crank the engine several revolutions to distribute the oil, then reinstall the spark plug.
5. Pull the starter rope slowly until resistance is felt. Continue pulling until the notch on the starter pulley aligns with the hole on the recoil starter (see illustration below). At this point, the intake and exhaust valves are closed. This will help to protect the engine from internal corrosion.



6. QAE2 type: Remove the battery and store it in a cool, dry place. Recharge it once a month.
7. Cover the engine to keep out dust.



VII. MODEL 14 POWER UNIT

VII-1. HONDA #GX390 Engine (Continued...)

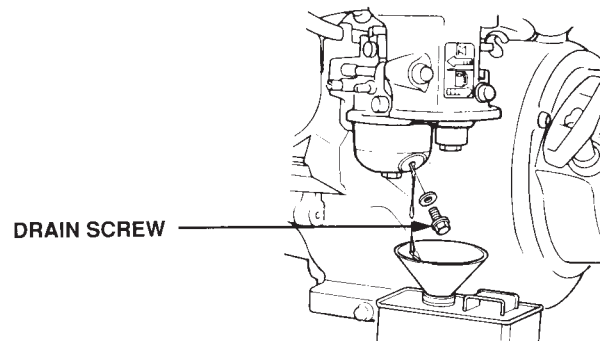
VII-1F. Engine Troubleshooting.

Engine will not start, using recoil starter:

1. Is the engine switch ON?
2. Is there enough oil in the engine?
3. Is the fuel valve ON?
4. Is there fuel in the fuel tank?
5. Is gasoline reaching the carburetor?
To check, loosen the drain screw with the fuel valve on.

⚠ WARNING

- **Never hold the spark plug lead with wet hands while performing this test.**
- **Make sure that no fuel has been spilled on the engine and the spark plug is not wet with fuel.**
- **To avoid fire hazards, do not allow sparks near the plug hole.**



6. Is there a spark at the spark plug?
 - a. Remove the spark plug cap. Clean any dirt from around the spark plug base, then remove the spark plug. (see pages 27 and 28).
 - b. Install the spark plug in the plug cap.
 - c. Turn the engine switch on.
 - d. Grounding the side electrode to any engine ground, and pull the recoil starter to see if sparks jump across the gap.
 - e. If there is no spark, replace the plug.
If OK, try to start the engine according to the instructions.
7. If the engine still does not start, take the engine to the dealer.

Engine will not start, using electric starter:

1. Are the battery cables securely connected and free of corrosion?
2. Is the battery fully charged?

NOTE: If the engine does not charge the battery, check the circuit breaker.

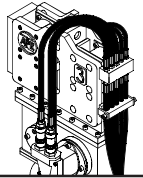
3. If the starter motor operates but the engine will not start, follow the troubleshooting procedures described under recoil starter operation.



OPERATION / MAINTENANCE MANUAL

MODEL 3 & 6 VIBRATORY HAMMER WITH MODEL 14 POWER UNIT

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



VII. MODEL 14 POWER UNIT

VII-1. HONDA #GX390 Engine (Continued...)

VII-1G. Engine Maintenance.

1. Changing oil.

Drain the oil while the engine is still warm to assure rapid and complete draining.

- A. Remove the oil filler cap and drain plug to drain the oil.
- B. Install the drain plug, and tighten it securely.
- C. Refill with the recommended oil and check the oil level.
- D. Install the oil filler cap.

Please dispose of used motor oil and the oil containers in a manner that is compatible with the environment. We suggest you take it in a sealed container to your local recycling center or service station for reclamation. Do not throw it in the trash or pour it on the ground.

2. Air cleaner service.

A dirty air cleaner will restrict air flow to the carburetor. To prevent carburetor malfunction, service the air cleaner regularly. Service more frequently when operating the engine in extremely dusty areas.

WARNING!! Never use gasoline or low flash point solvents for cleaning the air cleaner element. A fire or explosion could result.

NOTICE! Never run the engine without the air cleaner. Rapid engine wear will result from contaminants, such as dust and dirt, being drawn through the carburetor, into the engine.

3. Sediment cup cleaning.

Turn the fuel valve to OFF. Remove the sediment cup and O-ring, and wash them in nonflammable or high flash point solvent. Dry them thoroughly, and reinstall securely. Turn the fuel valve ON, and check for leaks.

WARNING!! After installing the sediment cup, check for leaks, and make sure the area is dry before starting the engine.

4. Spark plugs.

To ensure proper engine operation, the spark plugs must be properly gapped and free of deposits. (Recommended spark plug: BPR6ES (NGK) - W20EPR-U (NIPPONDENSO)).

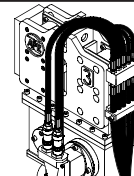
- A. Measure the plug gap with a feeler gauge.
The gap should be: 0.70-0.80 mm (0.028-0.031 in).



OPERATION / MAINTENANCE MANUAL

MODEL 3 & 6 VIBRATORY HAMMER WITH MODEL 14 POWER UNIT

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VII. MODEL 14 POWER UNIT

VII-2. Hydraulic Return Filter.

A hydraulic return filter is mounted within the power unit frame. This filter contains a gauge that monitors the hydraulic pressure inside the filter. When the filter has become too contaminated the gauge will read in the red area indicating that it is time to change the filter (Replace with "Zinger" model #AE-10 element or equal).

VII-3. Power Unit Component List.

Table 7-A. Hydraulic Component Identification.

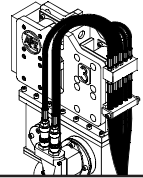
ITEM	QTY	DESCRIPTION	APE PART #
1.	1	Martin #ML-100 Jaw Coupling with Hytrel Spider (1" bore x 0.75" bore)	
2.	1	Key 0.25" Sq.	
3.	1	Key 0.1875" Sq.	
4.	1	McMillin #F1L-2A Pump Mount	
5.	1	Pump Grainger #4F665 (0.39 cu. in.)	
6.	1	Suction Strainer FLOW EZY #S10-100	
7.	1	Filter/Breather FLOW EZY #AB-1000-6	
8.	1	Magnetic Strap	
9.	1	Spin of Filter Head ZINGA #ZAF-07-25-1	
10.	1	Element ZINGA #AE-10	
11.	1	Gage ZINGA #C1-20	
12.	1	Check Valve #C250 S	
13.	1	Gauge #CF1P-350 A (0-5000psi)	
14.	1	Pump Mount (Optional) #6Z069	
15.	1	Mobile Valve Assembly GRESEN #V20-DF4-4-RP-VB	
16.	1	Adapter (Male St. Thd./Male O-Ring) WH #C3249x12x12	
17.	1	Connector (St. Thd. / O-Ring) WH #C5315x12x8	
18.	1	Hose WH #C30012-612-612-33"	
19.	1	Hose WH #C30012-612-612-13.5"	
20.	1	Hose WH #C10404-604-664-11"	
21.	1	Hose WH #H10112-6"	
22.	2	90 Deg. Male Elbow WH #C5405x12	
23.	1	90 Deg. Elbow (St. Thd. O-Ring) WH #C5515x12	
24.	1	Adapter (Male St. Thd./Male O-Ring) WH #3249x12x12	
25.	1	90 Deg. Street Elbow WH #C3409x12	
26.	4	Connector (St. Thd. O-Ring) WH #C5315x10	
27.	2	Tee (Swivel Nut Run) WH #C5706x10	
28.	2	Reducer WH #C5015x10x4	
29.	1	90 Deg. Elbow (Swivel Nut) WH #C5506x4	



OPERATION / MAINTENANCE MANUAL

MODEL 3 & 6 VIBRATORY HAMMER WITH MODEL 14 POWER UNIT

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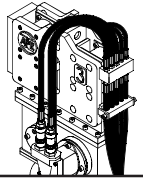


VII. MODEL 14 POWER UNIT

VII-3. Power Unit Component List (Continued).

Table 7-A. Hydraulic Component Identification (Continued).

ITEM	QTY	DESCRIPTION	APE PART #
30.	1	Adapter (Fem. 37 Deg. JIC Swivel/Male Pipe) WH #9100x4x4	
31.	1	90 Deg. Elbow (Male) WH #C5405x4x4	
32.	1	90 Deg. Street Elbow WH #C3409x4	
33.	1	Bushing WH #C3109x 4x2	
34.	2	Adapter (St. Thd. O-Ring/Fem. Pipe) WH #C3269x12x8	
35.	1	Connector (Male) WH #C5205x6x8	
36.	2	Hose Clamps #20012 H	
37.	2	Brass Hose Barbs NW Hydroline #1212	
38.	1	1/4" Fuel Line Hose x 18" lg.	
39.	1	Hose Clamp for 1/4" Hose.	
40.	1	Throttle Control #HR23 (Pt. #18237)	
41.	1	Engine HONDA #GX390	
42.	1	Gas Tank HONDA	
43.	2	Band HONDA	
44.	1	Pet Cock	
45.	1	Toggle Switch #SS206R-BG SPDT (ON-ON)	
46.	1	Toggle Switch Boot #SSAN-105	
47.	1	Name plate for Toggle Switch (ON-OFF)	
48.	4	Hex Bolt 3/8"-16 x 2 1/2" lg.	
49.	4	1/2" Hex Nylock Nut	
50.	33	Hex Bolt 3/8"-16 x 1 1/4" lg.	
51.	20	3/8" Heavy Hex Nuts	
52.	13	3/8" Lock Washer	
53.	24	3/8" Flat Washer	
54.	4	Hex Bolt M8-1.25 x 50mm lg.	
55.	4	8mm Lock Washer	
56.	2	Pan Head Screws #10-32 x 1/2" lg.	
57.	3	Hex Bolt 5/16"-18 x 2 1/2" lg.	
58.	3	5/16" Lock Washer.	
59.	3	Round Head Screws #10-32 x 1/2" lg.	



VII. MODEL 14 POWER UNIT

VII-4. Power Unit Hydraulic Schematic

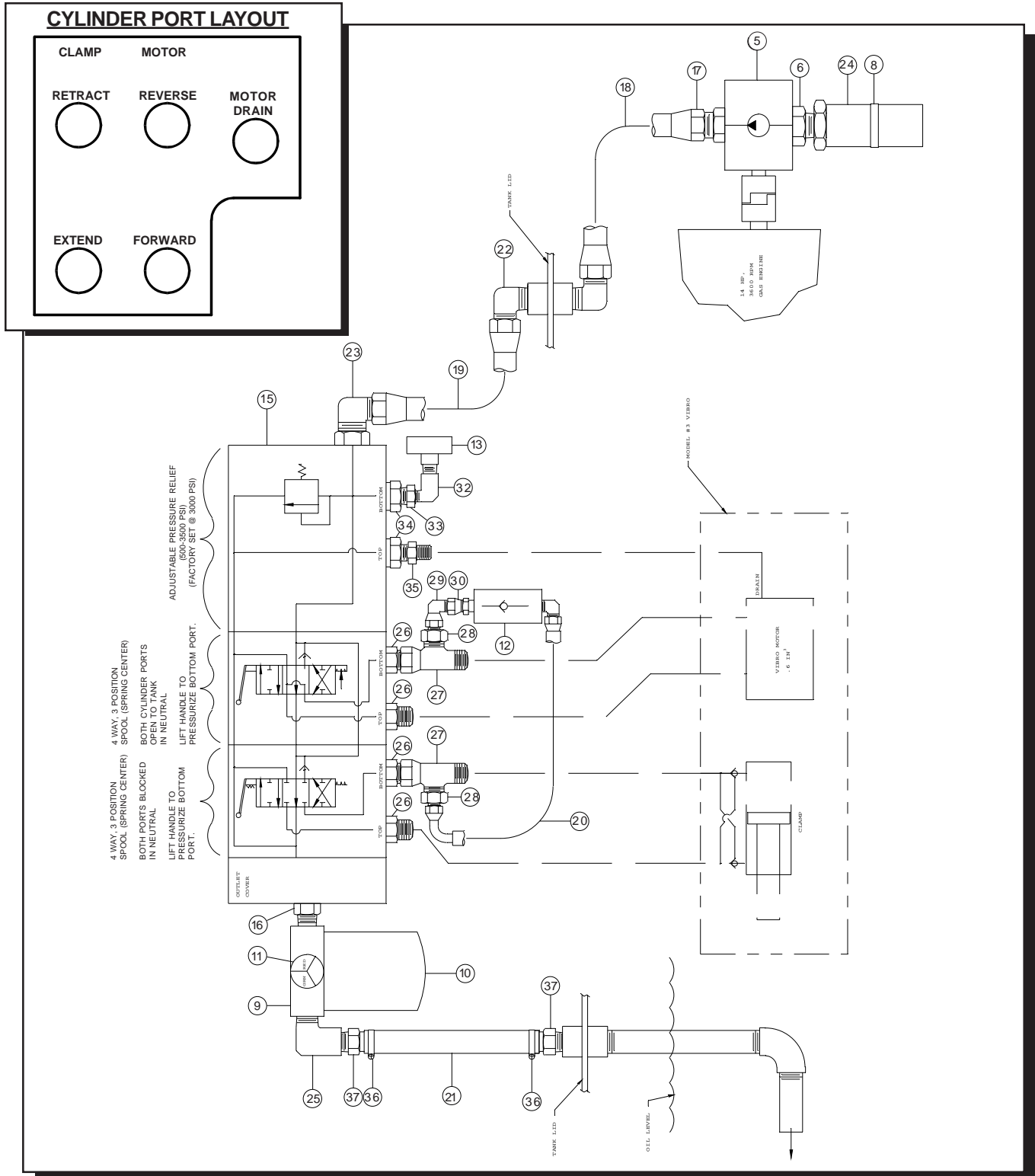
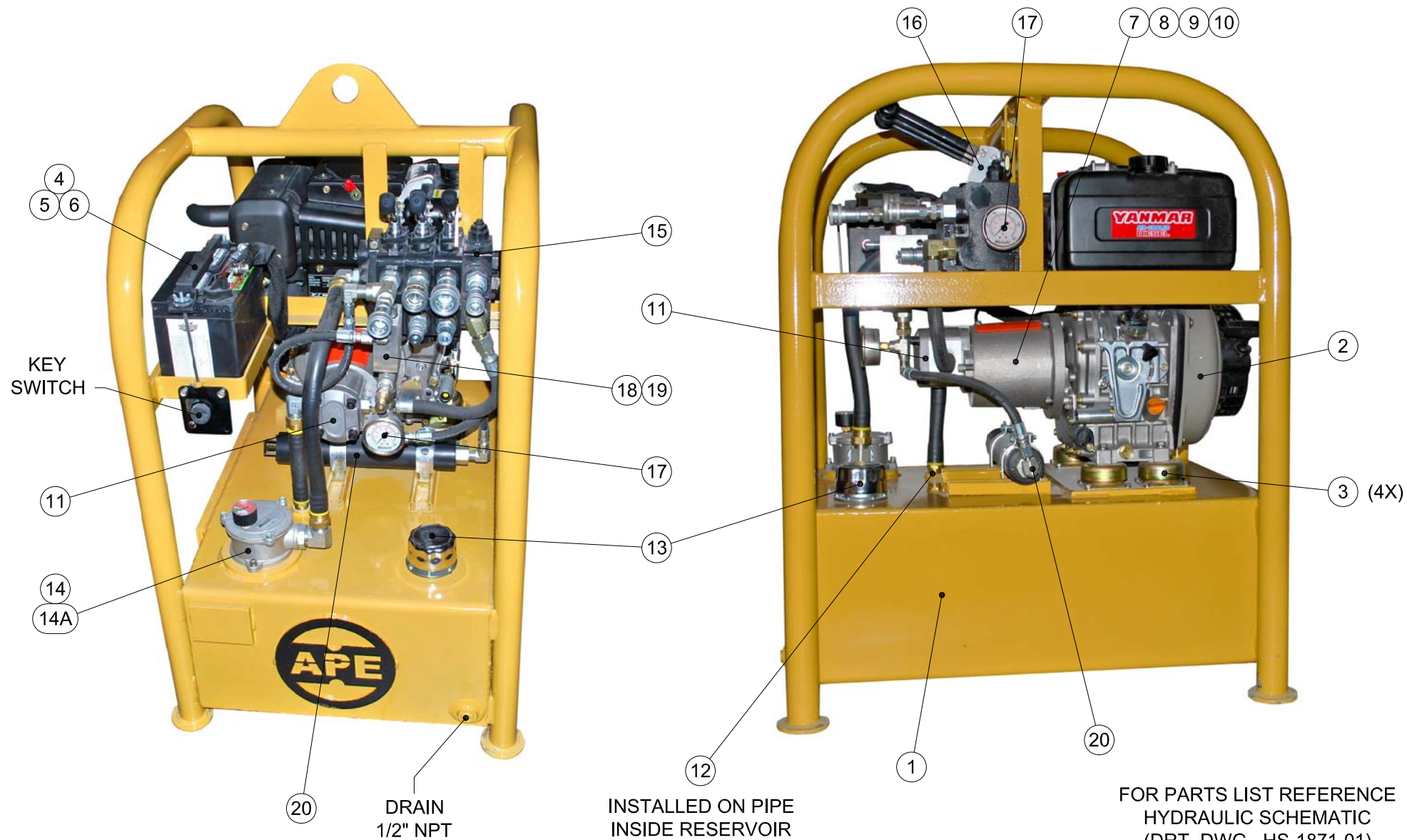
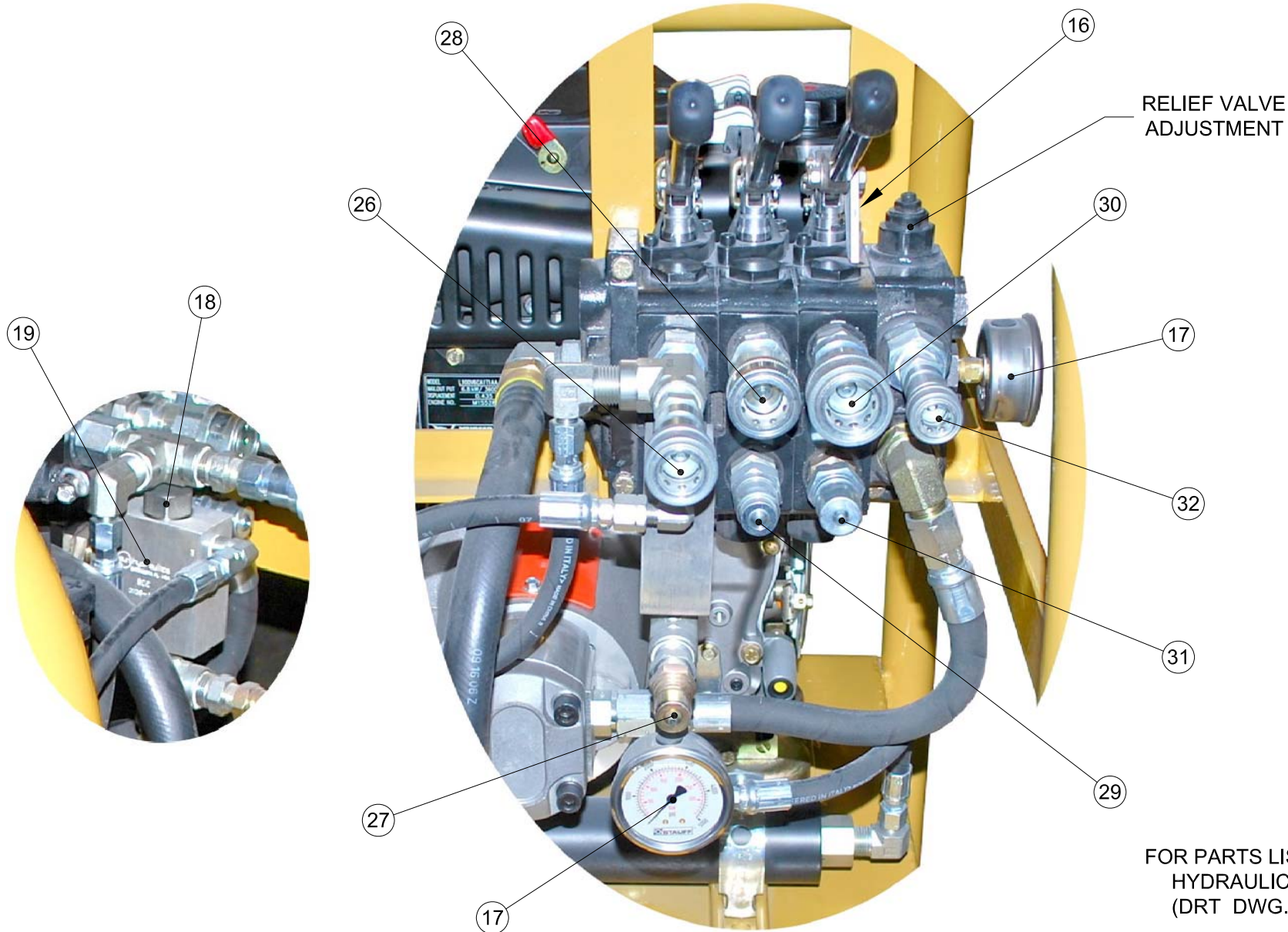


Figure 7-B. Model 14 Hydraulic Schematic.



<div><i>DRT Fluid Power, LLC</i></div> <div><i>4491 South 134th Place</i></div> <div><i>Phone: (206) 988-6775</i></div> <div><i>Fax: (206) 988-6773</i></div> <div><input checked="" type="checkbox"/> SEATTLE, WA. 98168</div> <div><input type="checkbox"/> SPOKANE, WA. 99201</div>	JOB / ASSY. MODEL 10 HPU	SCALE:	MATERIAL:		DATE	SUBTITLE: PARTS LOCATION DIAGRAM				
	CUSTOMER APE					DWG. TITLE:				
	LOCATION KENT, WA	TOLERANCES EXCEPT AS NOTED	DRAWN BY	R. WITRUK	12/03/09	APE MODEL 10 HYDRAULIC POWER UNIT				
	S.O. #	-	ENG. BY	-	-					
	PROD. #	.X = ± .030	CHECKED BY	-	-					
	P.O.#	-	.XX = ± .015	APPROVED BY	-	-	DWG. SIZE: A	DWG. NO: PLD-1900-01	REV: Ø	SHEET 1 OF 2
	PROJECT	-	.XXX = ± .005	-	-	-				
-	-	FRAC. = ± 1/32	-	-	-					
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FOR PARTS LIST REFERENCE
HYDRAULIC SCHEMATIC
(DRT DWG. HS-1871-01)

DRT Fluid Power, LLC

4491 South 134th Place

Phone: (206) 988-6775

Fax: (206) 988-6773

☒ SEATTLE, WA. 98168

☐ SPOKANE, WA. 99201

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JOB / ASSY.	MODEL 10 HPU
CUSTOMER	APE
LOCATION	KENT, WA
S.O. #	-
PROD. #	-
P.O.#	-
PROJECT	-
-	-
-	-

SCALE:

TOLERANCES
EXCEPT AS NOTED

.X = ± .030

.XX = ± .015

.XXX = ± .005

FRAC. = ± 1/32

ANGLES = ± 1°

MATERIAL:

DRAWN BY

R. WITRUK

ENG. BY

-

CHECKED BY

-

APPROVED BY

-

-

-

-

-

WEIGHT

-

DATE

12/03/09

SUBTITLE:

PARTS LOCATION DIAGRAM

DWG. TITLE:

APE MODEL 10
HYDRAULIC POWER UNIT

DWG. SIZE:

A

DWG. NO:

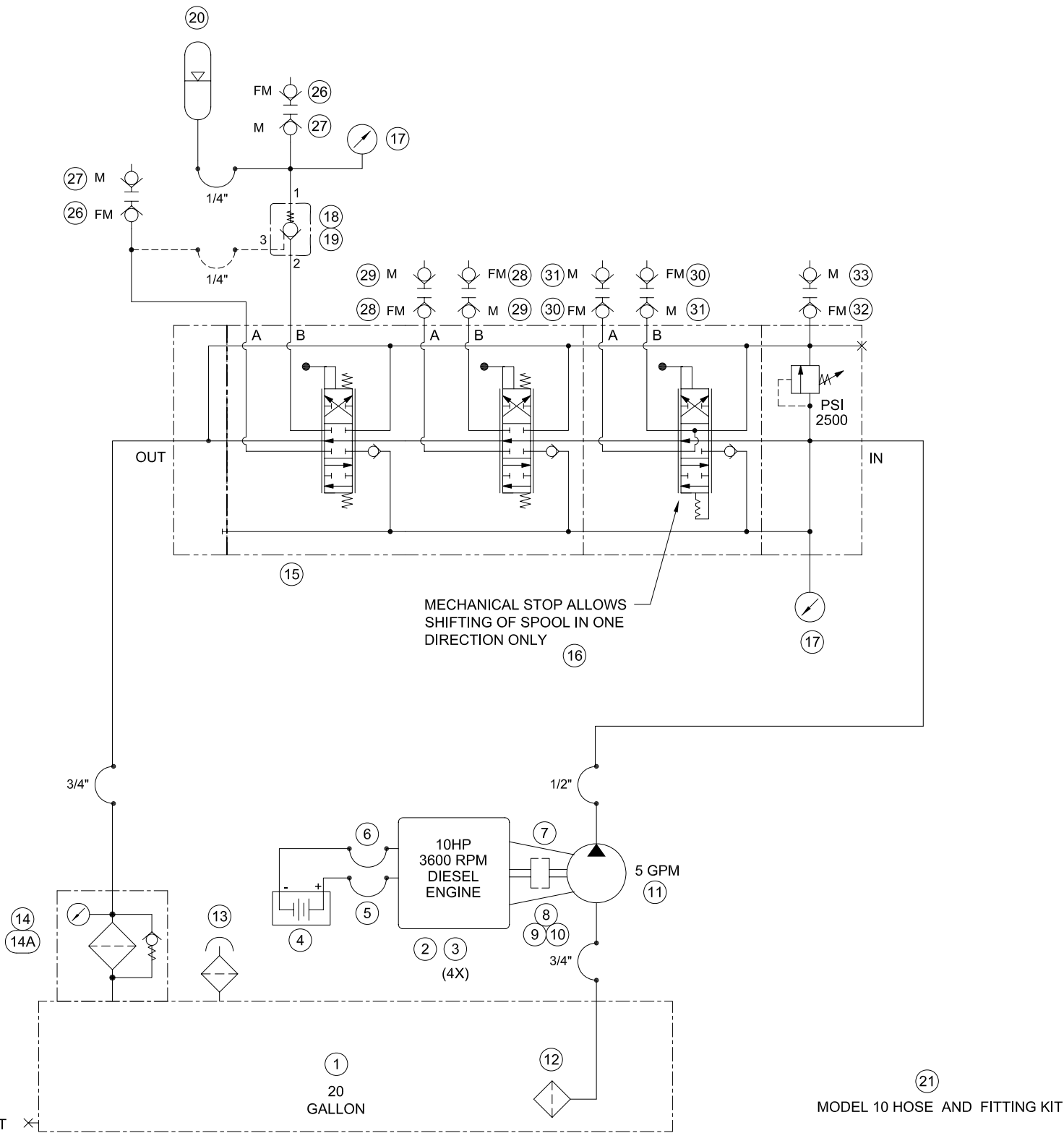
PLD-1900-01

REV:

Ø

SHEET

2 OF 2



QTY.	PART NUMBER	DESCRIPTION	MANUFACTURER	ITEM
1	WR-1293-01	HPU TANK / FRAME ASSEMBLY, MODEL 10	DRT	1
1	L100V6CA1T1AA	DIESEL ENGINE, 8.3HP @ 3600RPM	YANMAR	2
4	CM2-30-B-N-T	VIBRATION ISOLATOR	KORFUND DYNAMICS	3
1	SP-30HD	12 VOLT BATTERY	INTERSTATE	4
1	781146	RED BATTERY CABLE	NAPA	5
1	781116	BLACK BATTERY CABLE	NAPA	6
1	E575602A	PUMP / MOTOR ADAPTER	MAGNALOY	7
1	P09002406	COUPLING HALF, 3/4" x 3/16" (PUMP)	MAGNALOY	8
1	P09010008	COUPLING HALF, 1" x 1/4" (ENGINE)	MAGNALOY	9
1	P097N7	COUPLING INSERT, NITRILE	MAGNALOY	10
1	GP-F20-06-P1-C	GEAR PUMP, 0.36 cu"/Rev	DYNAMIC FLUID	11
1	TMF-10-0	1-1/4" x 3/4" SUCTION STRAINER	STAUFF	12
1	SMBB-80-S-0-10-05-B-S080-0	FILLER BREATHER	STAUFF	13
1	RTF25S-G10B/S2/V	RETURN FILTER	STAUFF	14
REF	RTE25G10B/S2 (1ea Req'd)	REPLACEMENT ELEMENT, RTF25	STAUFF	14A
1	V20-4830084	DIRECTION VALVE, 3-BANK (V20-RV-DF4-0)	PARKER / GRESEN	15
1	SM-1343-01	V20 DETENT BRACKET	DRT	16
2	SPG-063-05000-5-P-N04-0	PRESSURE GAUGE, 0-5000 PSI	STAUFF	17
1	CKEB-XCN	CHECK VALVE CARTRIDGE	SUN	18
1	BCC	VALVE BODY, INLINE	SUN	19
1	A2N0029D1K	PISTON ACCUMULATOR	PARKER	20
1	APE MODEL 10 HOSE KIT	MODEL 10 HOSE AND FITTING KIT	DRT	21
-	-	-	-	22
-	-	-	-	23
-	-	-	-	24
-	-	-	-	25
REF	B60-6-6 (H3-62)	QUICK DISCONNECT BODY, 3/8" FNPT	NW HYDRA-LINE (PARKER)	26
REF	P60-6-6 (H3-63)	QUICK DISCONNECT NIPPLE, 3/8" FNPT	NW HYDRA-LINE (PARKER)	27
REF	B66-8-8 (6601-8-10)	QUICK DISCONNECT BODY, 1/2" FNPT	NW HYDRA-LINE (PARKER)	28
REF	P66-8-8 (6602-8-10)	QUICK DISCONNECT NIPPLE 1/2" FNPT	NW HYDRA-LINE (PARKER)	29
REF	B60-8-8 (H4-62)	QUICK DISCONNECT BODY, 1/2" FNPT	NW HYDRA-LINE (PARKER)	30
REF	P60-8-8 (H4-63)	QUICK DISCONNECT NIPPLE 1/2" FNPT	NW HYDRA-LINE (PARKER)	31
REF	B60-4-4 (H2-62)	QUICK DISCONNECT BODY, 1/4" FNPT	NW HYDRA-LINE (PARKER)	32
REF	P60-4-4 (H2-63)	QUICK DISCONNECT BODY, 1/4" FNPT	NW HYDRA-LINE (PARKER)	33
-	-	-	-	-
-	-	-	-	-

NOTES:
1. INCLUDED IN HOSE AND FITTING KIT ITEM (21). SHOWN FOR REFERENCE ONLY.

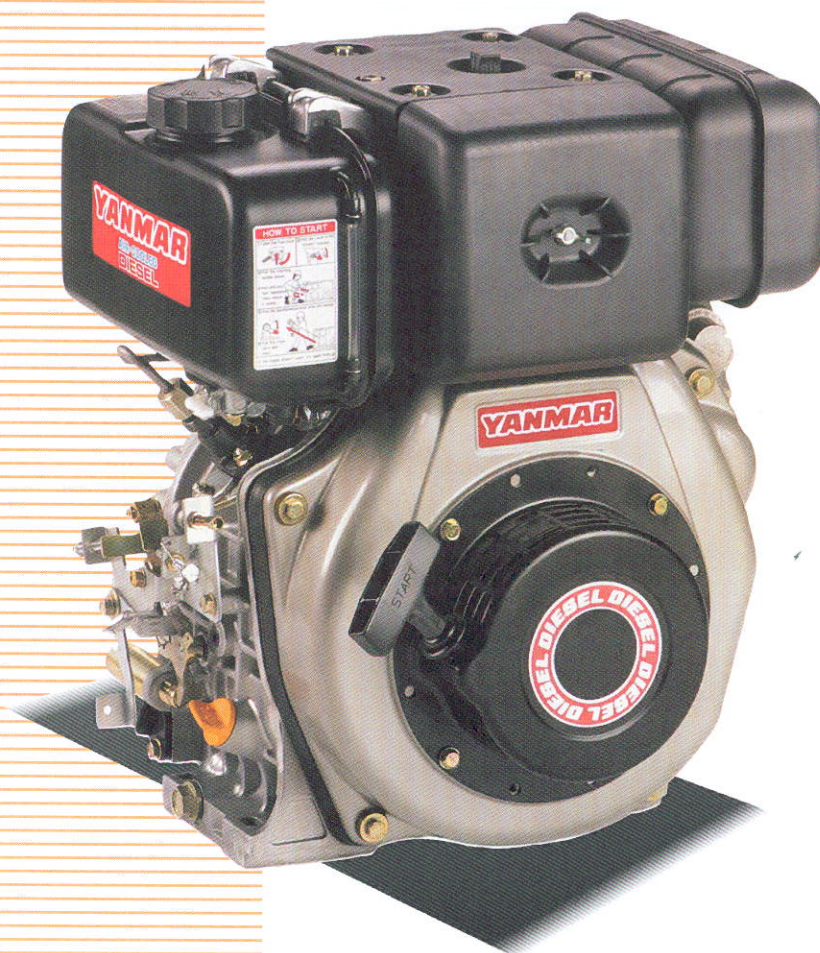
-	-	-	-	<div><div><div>DRT Fluid Power, LLC</div><div>4491 South 134th Place</div><div>Phone: (206) 988-6775 Fax: (206) 988-6773</div><div><input checked="" type="checkbox"/> SEATTLE, WA. 98168 <input type="checkbox"/> SPOKANE, WA. 99201</div></div><div>THIS DRAWING IS THE PROPERTY OF DRT FLUID POWER AND ALL RIGHTS TO THE DATA HEREIN DISCLOSED REST WITH DRT FLUID POWER. NO PART OF THIS DATA MAY BE REPRODUCED OR USED WITHOUT THE EXPRESS WRITTEN PERMISSION OF DRT FLUID POWER.</div></div>	JOB / ASSY. MODEL 10 HPU	SCALE:	MATERIAL:		DATE	SUBTITLE: HYDRAULIC SCHEMATIC			
-	-	-	-		CUSTOMER APE	TOLERANCES EXCEPT AS NOTED .X = ± .030 .XX = ± .015 .XXX = ± .005 FRAC. = ± 1/32 ANGLES = ± 1°	DRAWN BY	R. WITRUK	12/01/09	DWG. TITLE: APE MODEL 10 HYDRAULIC POWER UNIT			
-	-	-	-		LOCATION KENT, WA		ENG. BY	-	-				
-	-	-	-		S.O. #		CHECKED BY	-	-				
-	-	-	-		PROD. #		APPROVED BY	-	-				
-	-	-	-		P.O.#		-	-	-				
-	-	-	-		PROJECT		-	-	-				
-	-	-	-	-	-		-	-					
REV.	DATE	DESCRIPTION		BY	-	-	WEIGHT		-	DWG. SIZE: B	DWG. NO: HS-1871-01	REV: Ø	SHEET 1 OF 1

YANMAR®

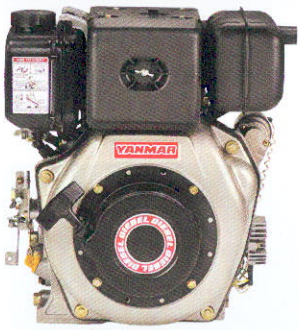
DIESEL ENGINES

LV series

**L48V
L70V
L100V**



Photograph may show optional equipment.



- EPA Tier II exhaust emission compliant
- Air-cooled, vertical single-cylinder, 4-stroke diesel power-pack.
- All models feature direct injection.
- All models are counter balanced for high speed operation.
- Recoil & electric start options.
- Multiple PTO shafts available.

Engine Specifications

Model		L48V	L70V	L100V
Engine Type		Air cooled, 4 cycle, Vertical Cylinder		
Fuel		Diesel		
Number of Cylinders		1		
Bore x Stroke, mm		70 X 57	78 X 67	86 X 75
Total Displacement (cc)		219	320	435
Combustion Type		Direct Injection		
Aspiration		Natural Aspiration		
Valves per Cylinder		2		
Rated Speed		3600 rpm		
Net Intermittent Hp	[kW] / rpm	4.7 [3.5] / 3600	6.4 [4.8] / 3600	9.1 [6.8] / 3600
Net Continuous Hp	[kW] / rpm	4.2 [3.1] / 3600	5.8 [4.3] / 3600	8.3 [6.2] / 3600
Direction of Rotation		Counter Clockwise, Viewed from PTO Side		
Crankshaft Type		Straight Keyed, Tapered or Threaded		
Starting System		Recoil or Recoil / 12 V Electric		
Decompression System		Manual Type with Auto-return Lever		
Charging System		12 Volt, 15 Amps (for Electric Start Models)		
Electric Stop Device		Optional, Fuel Stop Solenoid (for Electric Start Models)		
Cold Start Aid		Optional, Intake Air Heater (for Electric Start Models)		
Fuel Tank Capacity, Liters		2.4	2.9	4.7
Brake Specific Fuel Consumption at Rated Output, g / kW-hr		274	268	279
Lubrication System		Pressure Lubrication with Trochoid Pump		
Oil Capacity, Liters [Effective]		0.80 [0.25]	1.10 [0.40]	1.60 [0.60]
Exhaust System		Expansion Silencer with Cover		
Air Cleaner		Dry Type with Paper Element Filter		
Balancing System		Single, Counter-Rotating, Balancer Shaft		
Length, Inches [mm]		13.1 [332.5]	14.9 [378.2]	16.4 [417]
Width, Inches [mm]		15.1 [384.5]	16.6 [422]	18.5 [470.5]
Height, Inches [mm]		16.5 [417.8]	17.8 [453]	19.4 [493]
Dry Weight, lbs. (Recoil Start) [kg]		58.4 [26.5]	78.3 [35.5]	105.8 [48.0]
Dry Weight, lbs. (Electric Start) [kg]		70.6 [32.0]	88.2 [40.0]	120.2 [54.5]
Noise Output at Continuous Output Rating, Mean of Four Direction at 1 Meter		93.5 dB(A)	95.5 dB(A)	97.0 dB(A)

Note: All data subject to alteration without notice.