ZEUS 600
MANUAL

SERIAL NUMBERS

HAMMER:

POWER UNIT:
P12011

2021

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ZEUS 600 WITH 1200E POWER UNIT

2021

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SAFTEY 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.

WARRANTY

STANDARD WARRANTY

Antaeus 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: This WARRANTY is expressly limited to repairing or replacing parts in following situation: Any parts which appear to have been defective in material or workmanship. Such parts shall be provided at no cost to the user, at the business establishment of Antaeus or the authorized Antaeus distributor of the product during regular working hours. This WARRANTY, shall not apply to component parts or accessories of products not manufactured by Antaeus and which carry the warranty of the manufacturer thereof, or to normal maintenance such as scraped and skived lube hoses, weakened check valve springs, damaged grease zirts, other maintenance items. 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. Antaeus makes no other warranty, expressed or implied and makes no warranty of merchantability of fitness for any particular purpose. Antaeus'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 Antaeus, products or parts for which a warranty claim is made are to be returned transportation prepaid to Antaeus. 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 Antaeus or any alteration or repair by others in such manner as in Anbtaeus's judgment affects the product materially and adversely, shall void this warranty.

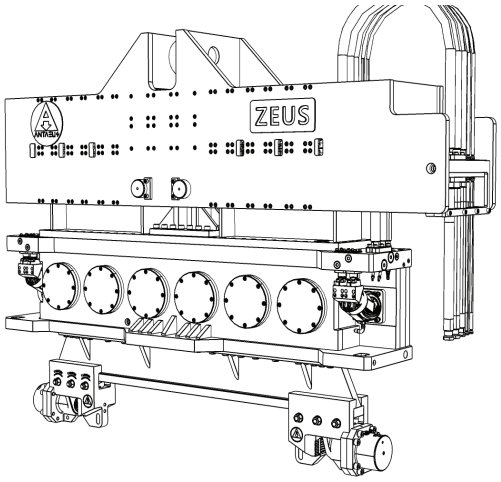
ANY TYPE OF WELDING ON EQUIPMENT
WILL VOID THE WARRANTY

Refusal: Vibros: If the pile does not move one foot in 30 seconds of vibro operation at full speed then resort to a larger vibro. Antaeus 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 Antaeus or your local Antaeus distributor for special instructions when faced with refusal conditions.

SPECIFICATIONS

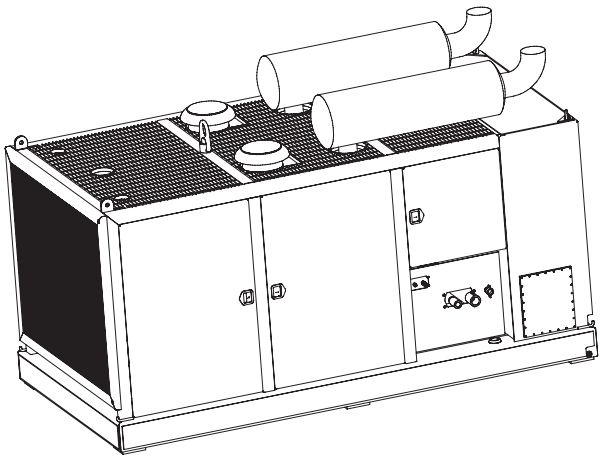
I-2. Machine Specifications

I-2A. Model 600 Vibro



Eccentric Moment Drive	17,000 in-lbs (196 kg-m)
Force	543 Tons (4,830 kN)
Frequency (vpm)	400 to 1,400
Amplitude w/dual clamps	1.66" (42 mm)
Pile Clamp Force Line	120 Tons (1,176 kN)
Pull for Extraction*	352 Tons (3,131 kN)
Hydraulic Hose Length	150' (45 m)
Suspended Weight**	48,000 lbs. (21,772 kg)
Length	183" (4648 mm)
Width at Throat	37" (940 mm)
Height***	110" (2438 mm)

I-2B. Model 1200E ICE Power Unit



Engine	Twin Caterpillar C15
Maximum Power	1190 hp (895 kW)
Operating Speed	1800 rpm
Maximum Drive Pressure	4,800 psi (331 bar)
Hyd. Flow-FWD/REV	250 gpm (946 lpm)
Clamp Pressure	4,800 psi (331 bar)
Clamp Pump Flow	3.3 gpm (12 lpm)
Weight	32,000 lbs (10,206 kg)
Length	224" (5690 mm)
Width	84" (2134 mm)
Height	114" (2896 mm)
Resevoir size	550 gal (2082 liters)
Fuel Capacity	430 gal (1627 liters)

GENERAL INFORMATION

I-3. General Description of Model 600 Vibro

The Antaeus is a variable frequency vibratory pile driver/extractor designed to drive and extract all types of piles including sheet, pipe, timber, concrete, H-beam, I-beam and steel plates. In addition, the vibrator can be used for soil compaction, installing well casings, and installation of tie-backs and wick drains.

The Zeus 600 operates in a frequency range of 400 to 1,400 cycles per minute depending on the hydraulic flowandonthehydraulicmotors fittedtothegeartrain.

The three major parts to the Model 600 are as follows:

A.) The Suppressor housing.
B.) The Gearbox.
C.) The Clamp Attachment.

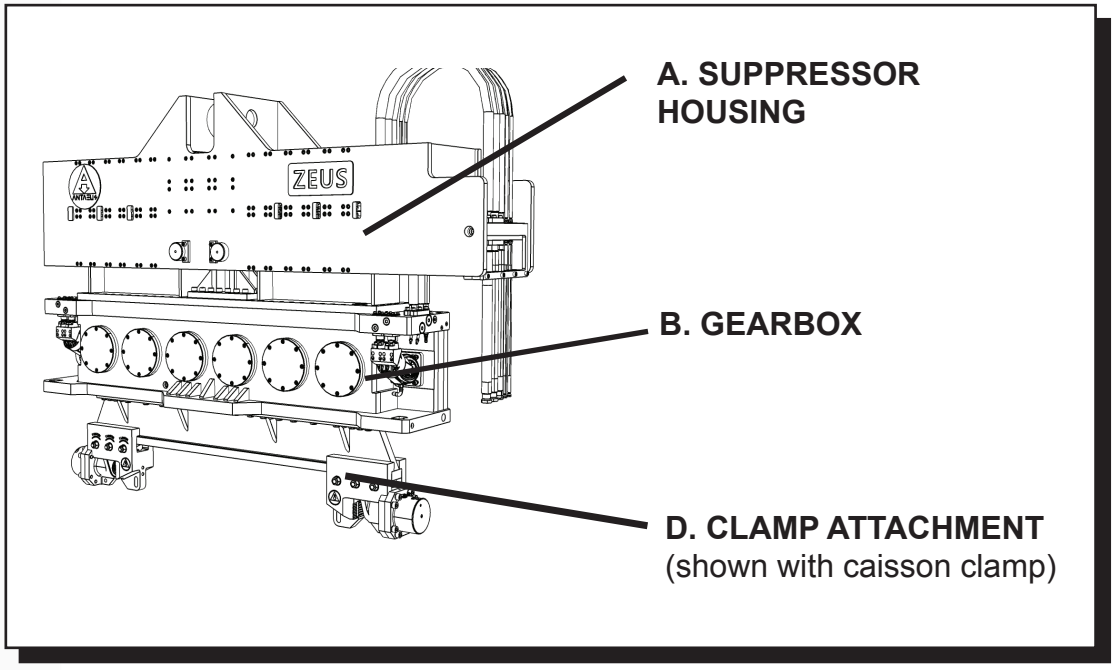
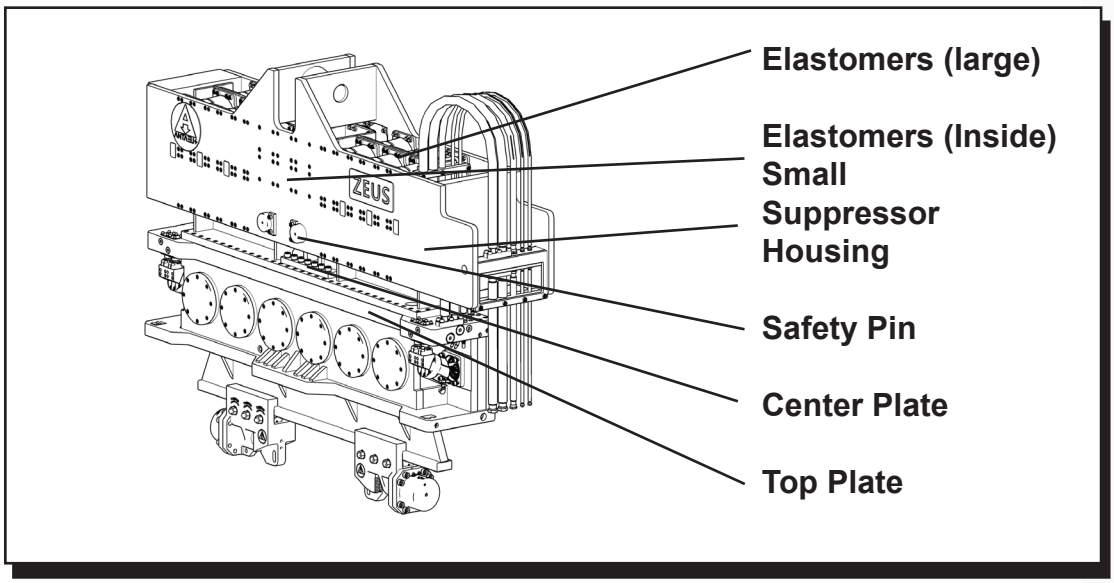


Figure 1-B. General Description of 600 Vibro.

GENERAL INFORMATION

I-3A. The Suppressor Housing

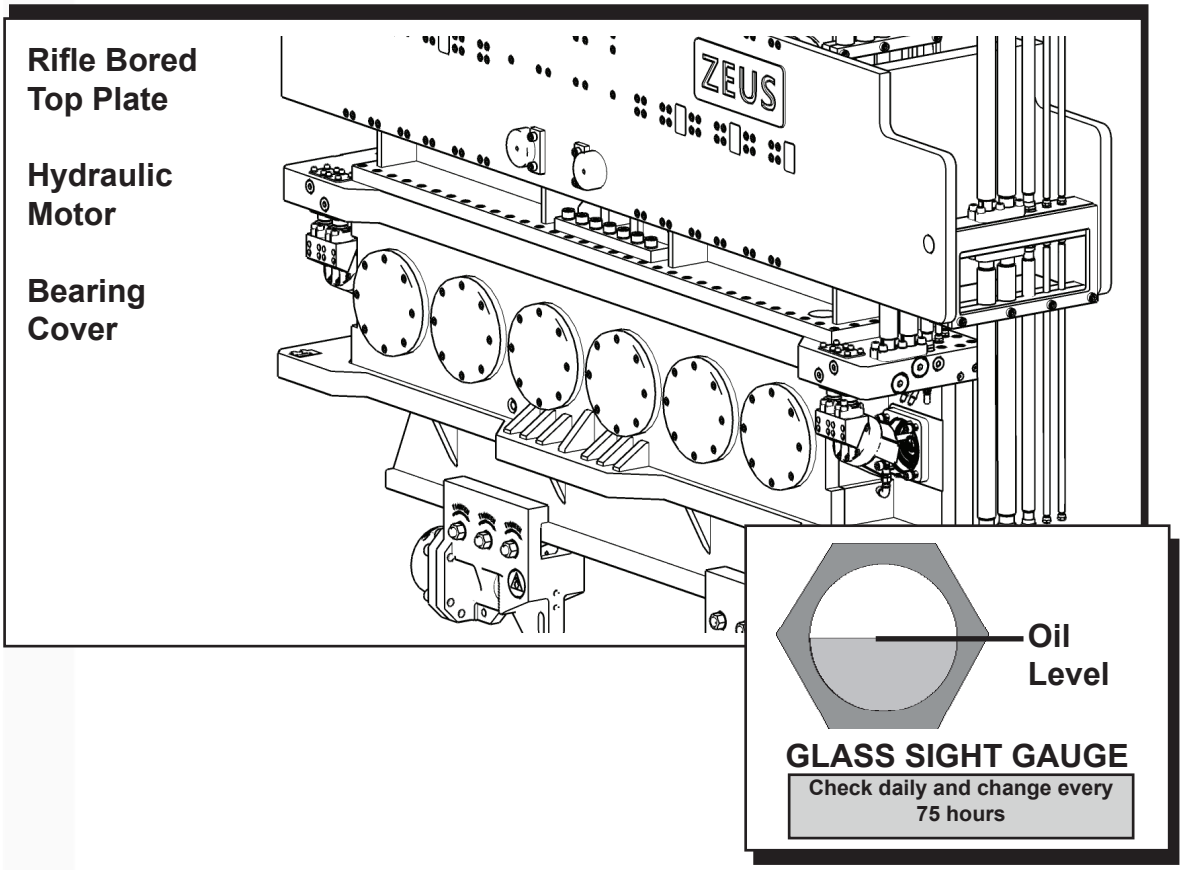
The suppressor housing utilizes a total of twenty-four, fist stage large elastomers and eight small, second, stage small elastomers. During extraction, the first stage displaces approximately 10 inches and then engages the inner second stage and engagement pin plate. The engagement pin will then come into motion and provide an additional 6 inches until the safety pin bottoms out in the visual slot registering the total line pull with a total maximum line pull of 250 tons to 500 tons depending upon the stiffness of the elastomers installed. When the second stage is engaged you must be fully engaged in the second stage. Bouncing on the safety pin between stages is damaging. **(WARNING! Hard pulling for long periods of time will heat and damage the large elastomers. The heat generated from constant heavy line pull will destroy the chemical bond between the rubber and mounting plate which will cause elastomer failure.)** When engaged in hard extracting, break every 15 minutes to allow elastomers to cool.



GENERAL INFORMATION

I-3B. The Vibrator Gearbox

The vibrator gearbox contains six high amplitude eccentric weights cast in one piece with the gear. This design is unique to the industry and was developed by the engineers of Antaeus to solve a number of problems associated with other types of vibrator machines. The eccentric and the drive gears 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 eccentrics and drive gears are all driven in line by hydraulic motors tucked in on the outboard side of the gearbox. The motors are recessed for maximum protection. The eccentrics rotate on six shafts housed by twelve 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. The Model 600 can be operated under water to a depth of 30 feet without modi fi cations. (Consult factory for depths below 30 feet.)



GENERAL INFORMATION

I-3C. The Clamp Attachment

The Zeus 600 comes with a **Caisson Beam and Caisson Clamps** or a **Sheet Clamp**. Each of the clamps contain two gripping jaws. One is "fixed" and one is "moveable". A large hydraulic cylinder operates the moveable jaw with up to 120 tons of clamping force depending on clamp pump relief pressure. The jaws open and close by turning a switch on the remote control pendant or may be operated by turning the switch at the main control panel mounted on the power unit. **The Antaeus Caisson Clamp** can be used for driving and extracting caissons from 16 inches to 9.5 feet. (for larger diameters contact Antaeus) The clamps are held in place with a simple wedge-lock design. Clamps can be fi tted with hydraulically activated wedges for faster adjustments when driving more than one size caisson. (Contact Antaeus or your local Antaeus distributor for more information on clamp attachments for special pile types.)

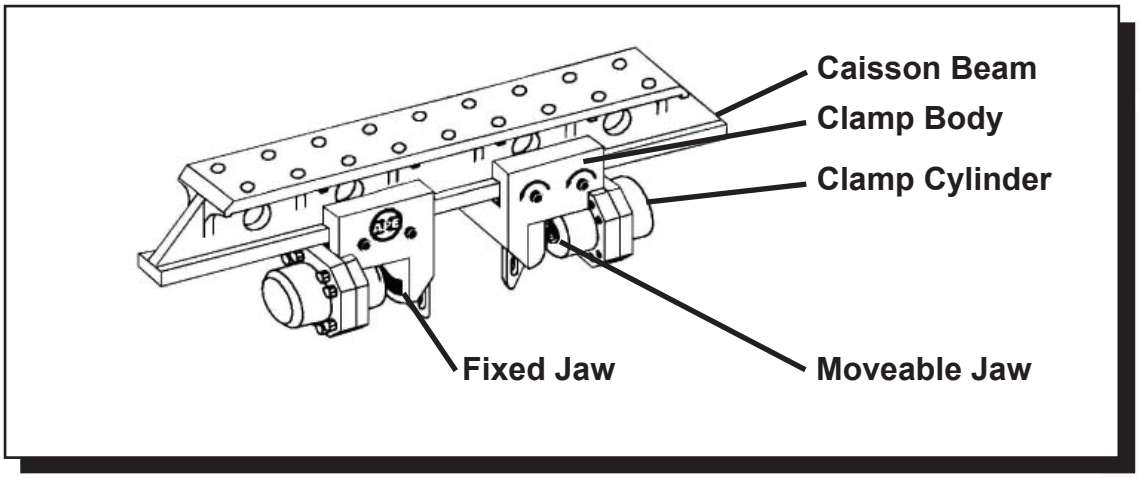
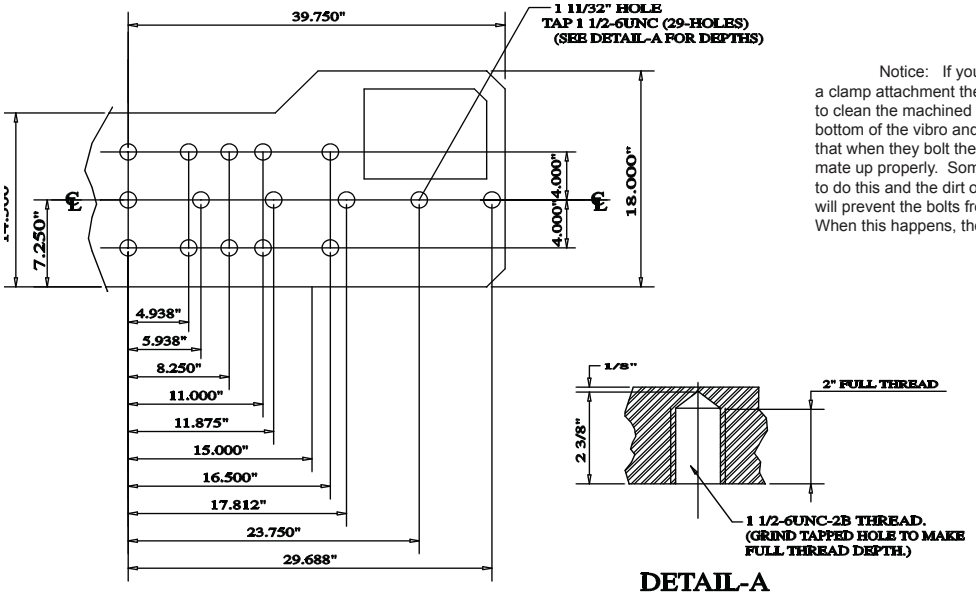


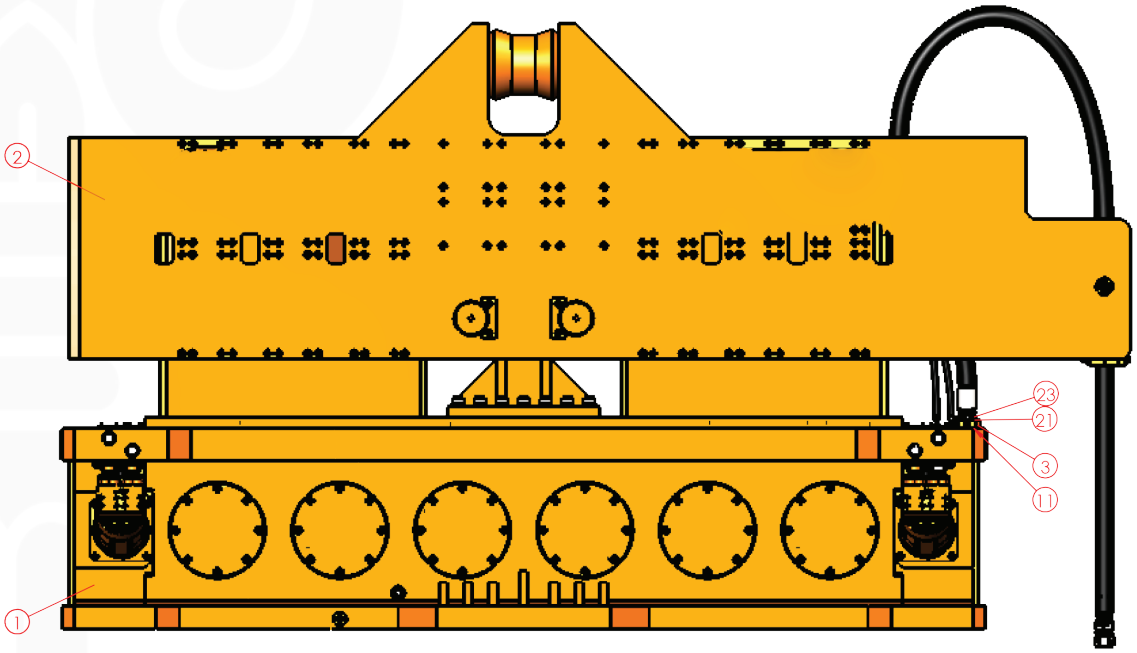
Figure 1-E. General Description of Clamp Attachment.

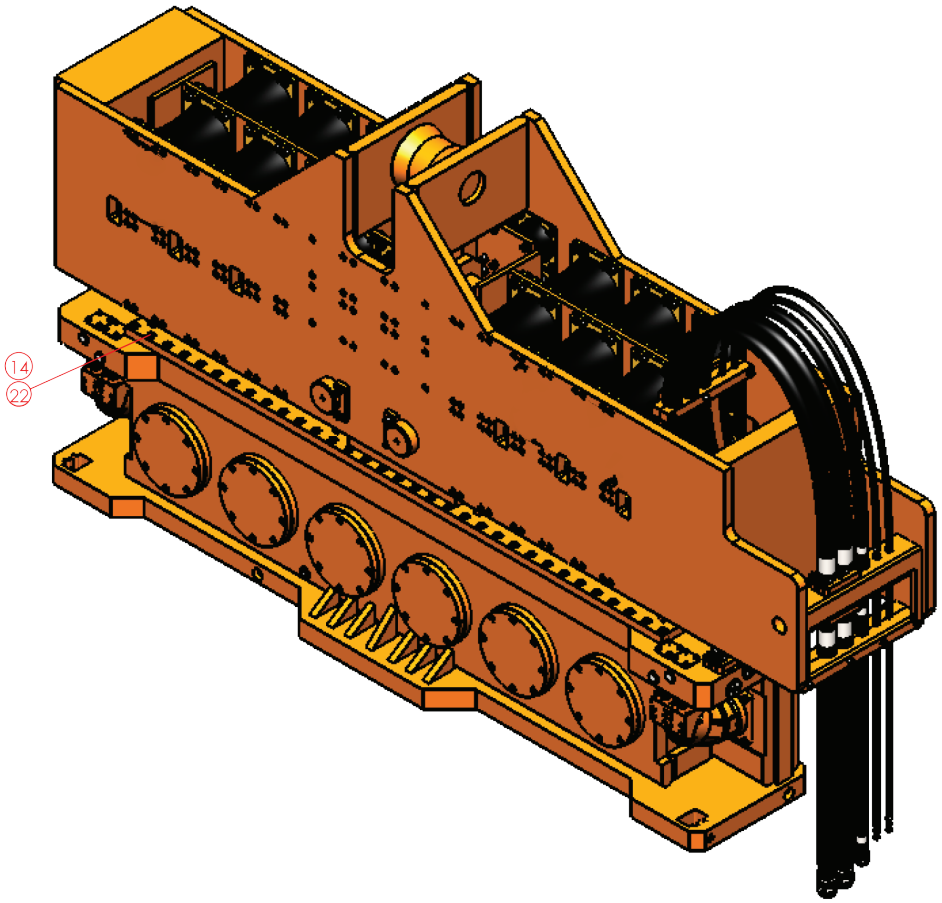


Notice: If you are involved in changing a clamp attachment then please train your crew to clean the machined surfaces of both the bottom of the vibro and the top of the clamp so that when they bolt the two together they will mate up properly. Sometimes a crew will forget to do this and the dirt or dent in the metal plates will prevent the bolts from becoming fully tight. When this happens, the clamp bolts break.

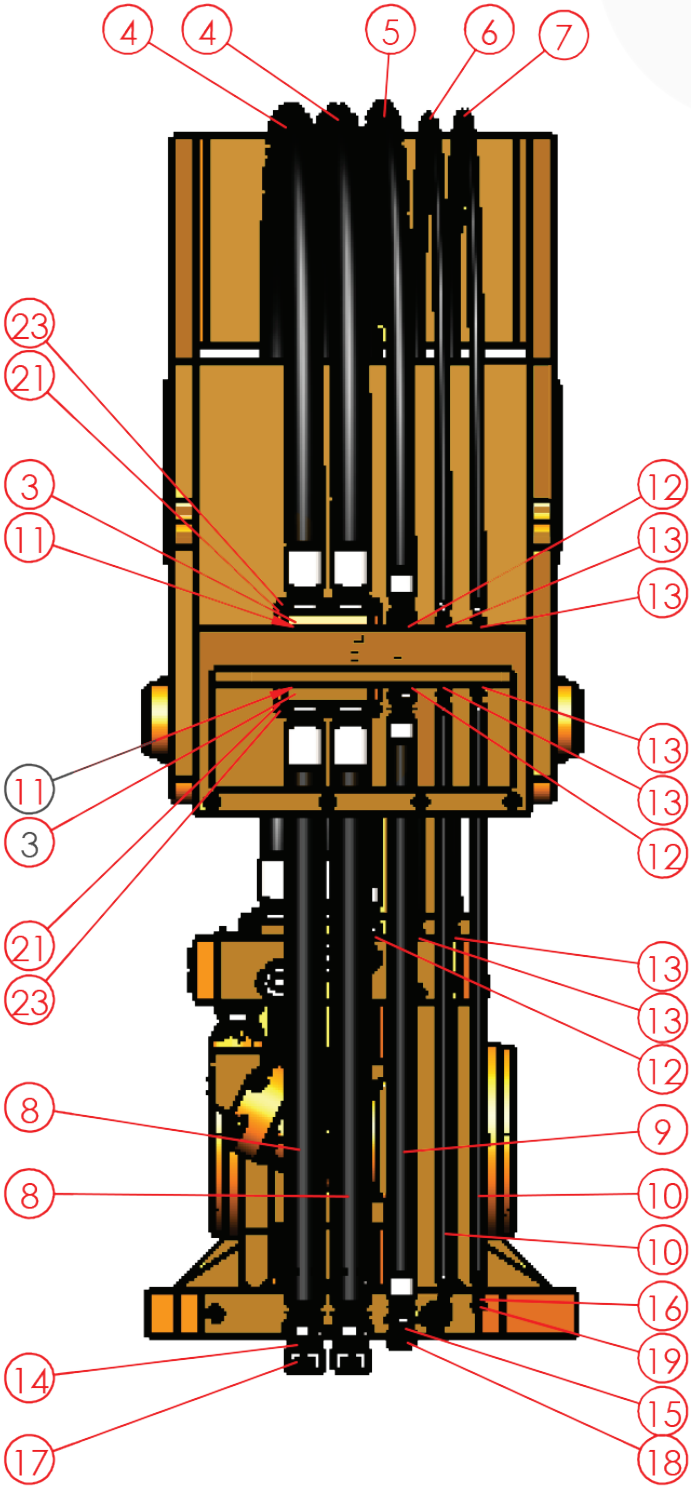
Figure 1-F. Clamp Attachment Hole Configuration.

HAMMER PARTS IDENTIFICATION
MAIN COMPONENTS (1 OF 5)

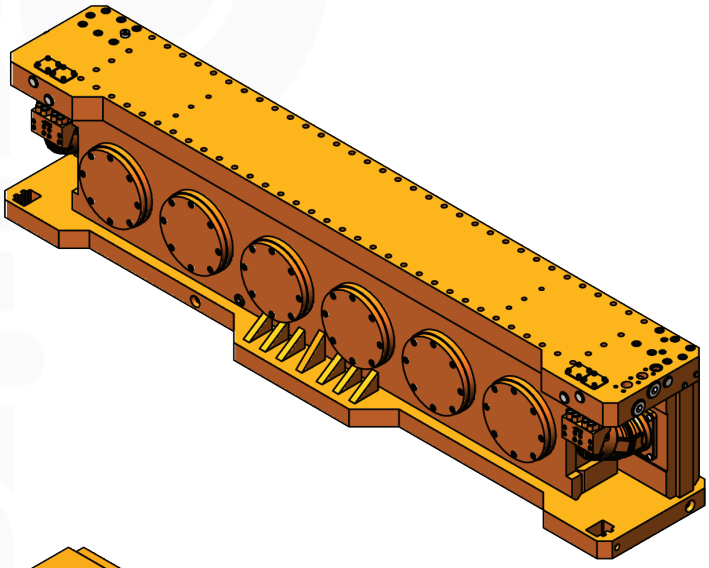




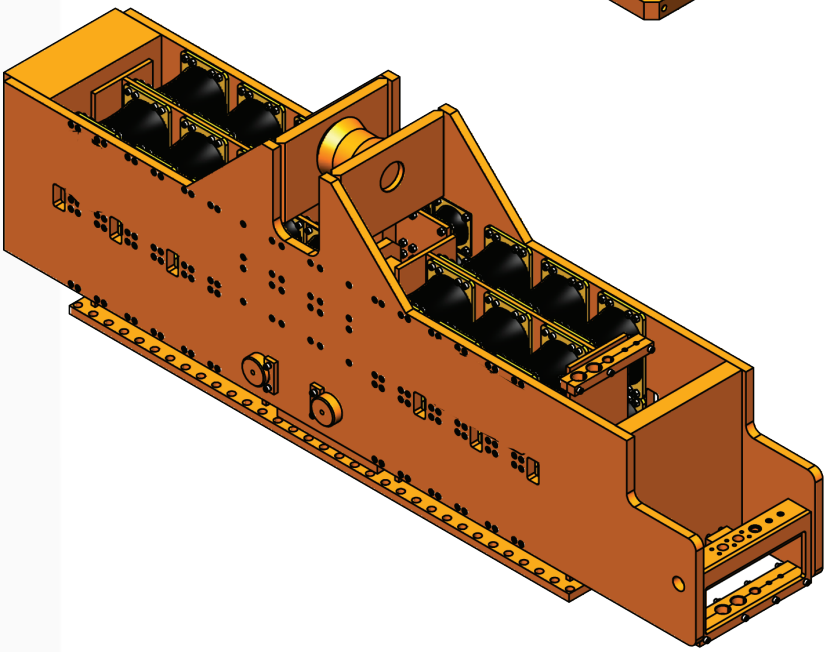
HAMMER PARTS IDENTIFICATION
MAIN COMPONENTS (2 OF 5)



HAMMER PARTS IDENTIFICATION
MAIN COMPONENTS (3 OF 5)



ITEM 1
600 GEAR BOX ASSEMBLY
#



ITEM 2
600 SUPPRESSOR ASM
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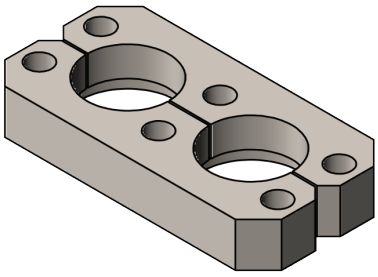


ITEM 3
GEAR BOX TOP PLATE SPLIT FLANGE
#

HAMMER PARTS IDENTIFICATION
MAIN COMPONENTS (4 OF 5)

ITEM 4
HOSE200R13H032H032L14400
#

ITEM 5
HOSE125R09J020J020L14400
#

ITEM 6
HOSE038R09J006J006L14400
#

ITEM 7
HOSE038R09J006J006L14400
#

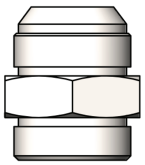
ITEM 8
HOSE200R13H032J032L09800
#

ITEM 9
HOSE125R09J020J020L09800
#

ITEM 10
HOSE038R09J006J006L09800
#

NOTE: ITEM 6 IS THE SAME WITH ITEM 7

ITEM 11
2-228 O-RING
#



ITEM 12
FITT2S-20M20R
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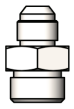

ITEM 13
FITT2S-06M08R
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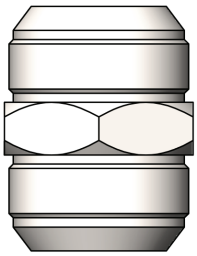

ITEM 14
FITT2S-32M32M
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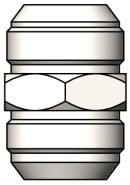
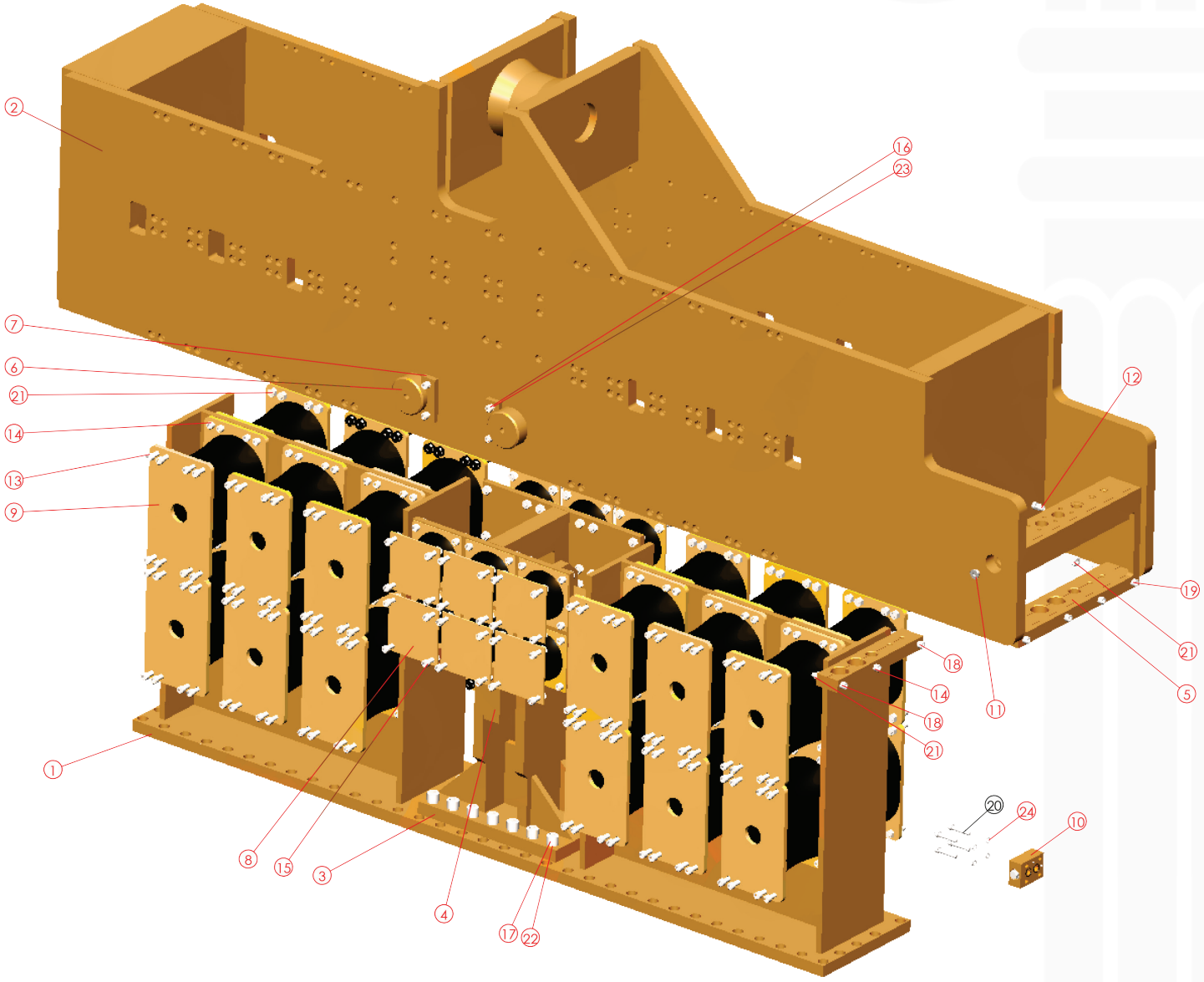


ITEM 15
FITT2S-20M20M
#

HAMMER PARTS IDENTIFICATION
MAIN COMPONENTS (5 OF 5)

ITEM NO.	PartNo	DESCRIPTION	QTY.
1		600 GEAR BOX ASSEMBLY	1
2		600 SUPPRESSOR ASSEMBLY	1
3		GEAR BOX TOP PLATE SPLIT FLANGE	3
4		HOSE200R13H032H032L14400	2
5		HOSE125R09J020J020L14400	1
6		HOSE038R09J006J006L14400	1
7		HOSE038R09J006J006L14400	1
8		HOSE200R13H032J032L09800	2
9		HOSE125R09J020J020L09800	1
10		HOSE038R09J006J006L09800	2
11		2-228 O-RING	6
12		FITT2S-20M20R	3
13		FITT2S-06M08R000-000H001	6
14		FITT2S-32M32M	2
15		FITT2S-20M20M	1
16		FITT2S-06M06M	2
17		FITT2C-32M	2
18		FITT2C-20M	1
19		FITT2C-06M	2
20		Hi Collar LW 1	72
21		Hi Collar LW 0.75	18
22		HX-SHCS 1-9x9x3-N	72
23		HX-SHCS 0.75-10x2.5x2.5-N	18

HAMMER PARTS IDENTIFICATION SUPPRESSOR (1 OF 4)



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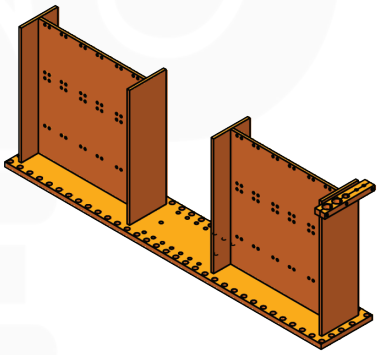

Item 1
600 SUPPRESSOR SUB MACHIND
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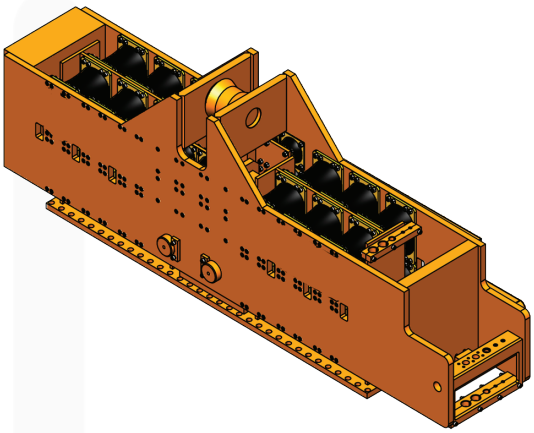

Item 2
600 UPPER SUPPRESSOR FRAME MACHINED
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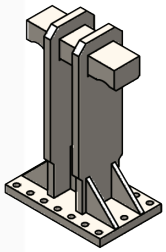

Item 3
600 LIFTING BRACKET MACHINE
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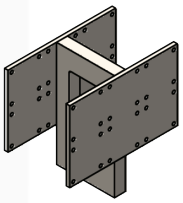

Item 4
600 CENTER PLATE MACHINE
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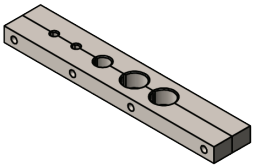

Item 5
HOSE CLAMP
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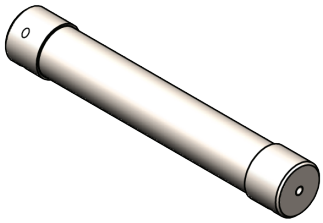

Item 6
SAFTY PIN
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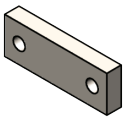
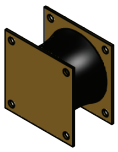


Item 7
SAFTY PIN RETAINER PLATE
#



Item 8
ELASTOMER-321-004
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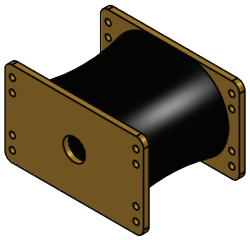

Item 9
ELASTOMER-321-003
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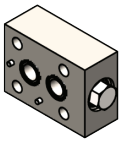

Item 10
Check Valve Assembly
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HAMMER PARTS IDENTIFICATION SUPPRESSOR (3 OF 4)

Item 11
FITT2P-12R
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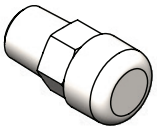

Item 12
POP OFF RELIEF
#

Item 13
HX-SHCS 0.75-10x3x2
#

Item 14
HX-SHCS 0.75-10x3.5x2.5
#

Item 15
HX-SHCS 0.75-10x2.5x2.5
#

Item 16
HX-SHCS 0.75-10x2.25x2.25
#

Item 17
HX-SHCS 1-8x4x3
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Item 18
HX-SHCS 0.75-10x5.5x2.5
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Item 19
HX-SHCS 0.75-10x7.5x2.5
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HX-SHCS 0.625-11x3.25x1.75
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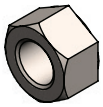


Item 21
STOVER NUT 0.75-10
#

Item 22
Hi Collar LW 1.25
#

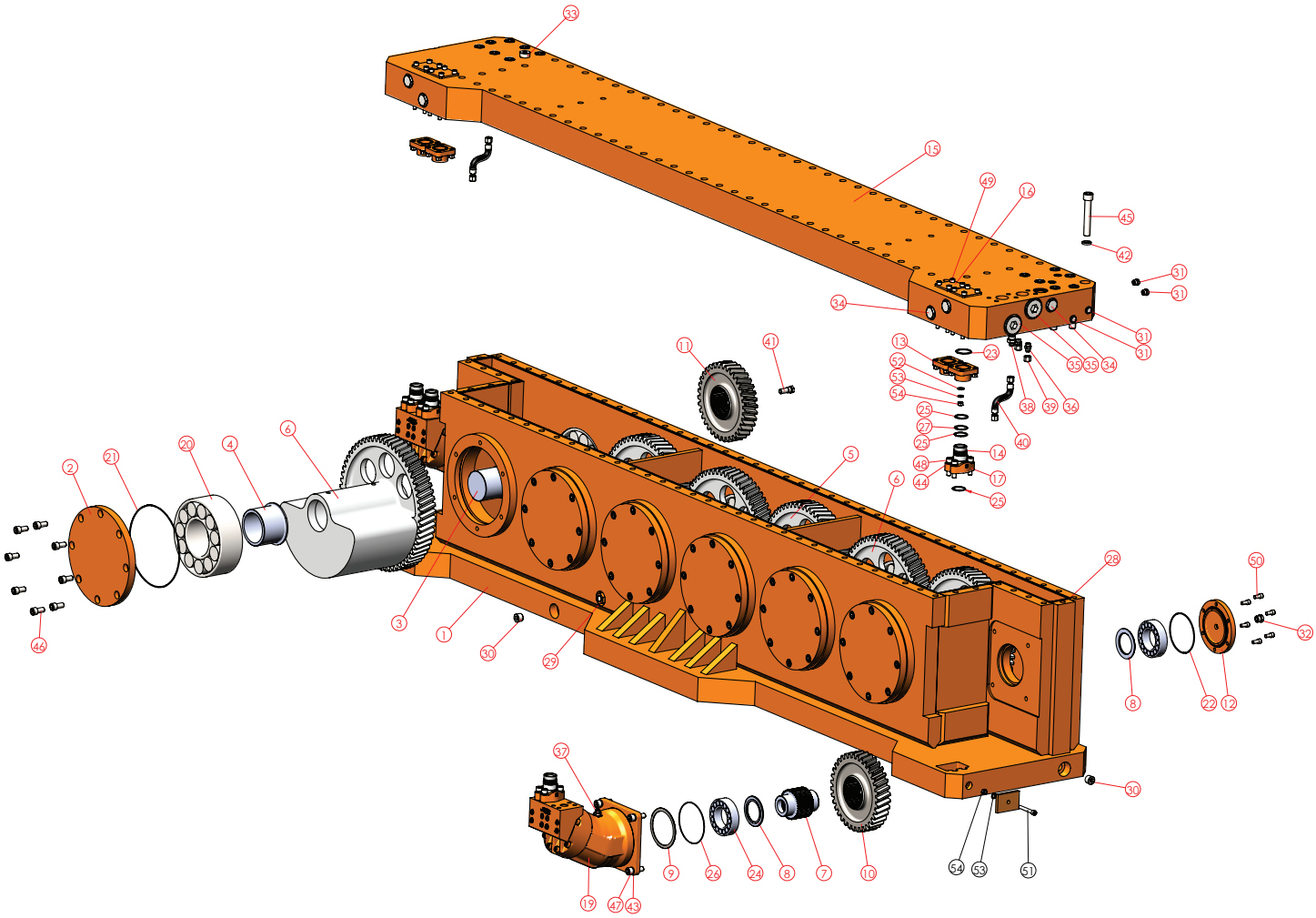
Item 23
Hi Collar LW 0.75
#

Item 24
Hi Collar LW 0.625
#

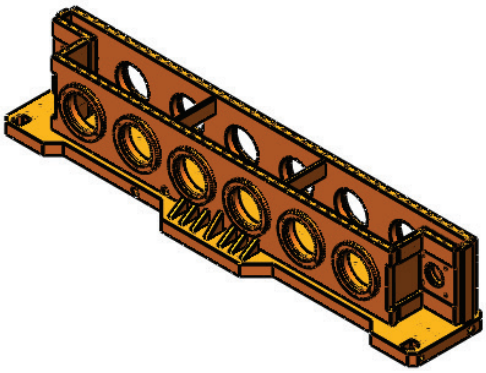
HAMMER PARTS IDENTIFICATION SUPPRESSOR (4 OF 4)

ITEM NO.	PartNo	DESCRIPTION	QTY
1		600 SUPPRESSOR SUB MACHINED	1
2		600 UPPER SUPPRESSOR FRAME MACHINED	1
3		600 LIFTING BRACKET	1
4		600 CENTER PLATE MACHINED	1
5		HOSE CLAMP	1
6		600 SAFTY PIN	2
7		SAFTY PIN RETAINER PLATE	4
8		ELASTOMER-321-004	12
9		ELASTOMER-321-003	24
10		Check Valve Assembly	1
11		FITT2P-12R	1
12		POP OFF RELIEF	1
13		HX-SHCS 0.75-10x3x2-N	192
14		HX-SHCS 0.75-10x3.5x2.5-N	97
15		HX-SHCS 0.75-10x2.5x2.5-N	48
16		HX-SHCS 0.75-10x2.25x2.25-N	56
17		HX-SHCS 1.25-7x4x3.25-N	16
18		HX-SHCS 0.75-10x5.5x2.5-N	2
19		HX-SHCS 0.75-10x7.5x2.5-N	4
20		HX-SHCS 0.625-11x3.25x1.75-N	4
21		STOVER NUT 0.75-10	390
22		Hi Collar LW 1.25	16
23		Hi Collar LW 0.75	8
24		Hi Collar LW 0.625	4

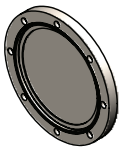
HAMMER PARTS IDENTIFICATION GEARBOX (1 OF 6)



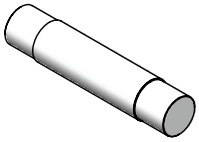
HAMMER PARTS IDENTIFICATION
GEARBOX (2 OF 6)



Item 1
600 GEAR BOX MACHINED
#

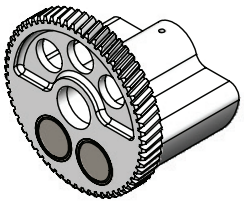


Item 2
ECCENTRIC BEARING COVER
#

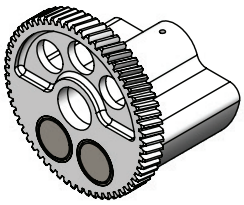


Item 3
ECCENTRIC SHAFT
#

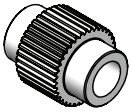
Item 4
BEARING SLEEVE
#



Item 5
ECCENTRIC WEIGHT LEFT
#



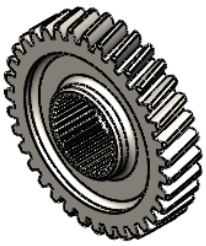
Item 6
ECCENTRIC WEIGHT RIGHT
#



Item 7
GEAR CARRIER
#

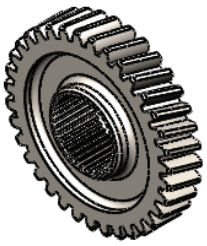
Item 8
GEAR SPACER
#

Item 9
GEAR SPACER
#

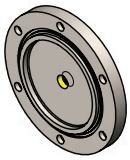


Item 10
DRIVE GEAR RIGHT HAND
#

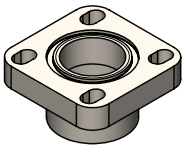
HAMMER PARTS IDENTIFICATION GEARBOX (3 OF 6)



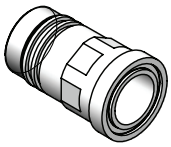
Item 11
DRIVE GEAR LEFT HAND
#



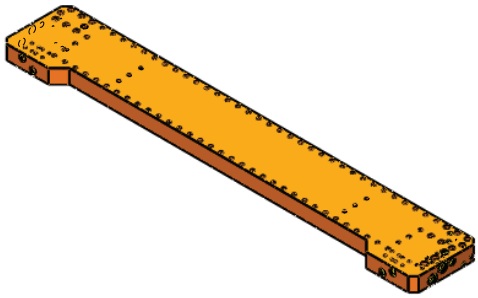
Item 12
BEARING COVER
#



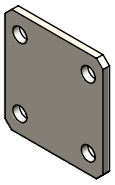
Item 13
HYDRAULIC FLANGE ADAPTER
#



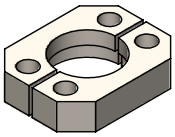
Item 14
HYDRAULIC MOTOR ADAPTER
#



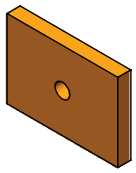
Item 15
600 GEAR BOX COVER PLATE
#



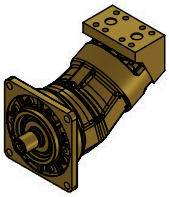
Item 16
PLATE WASHER
#



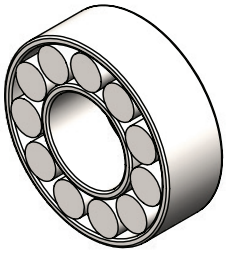
Item 17
MOTOR SPLIT FLANGE
#



Item 18
HOSE CLAMP PLATE
#

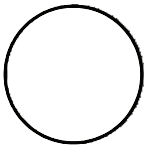


Item 19
MOTOR FM250
#

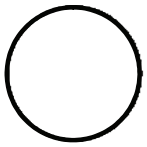


Item 20
ECCENTRIC BEARING
#

HAMMER PARTS IDENTIFICATION GEARBOX (4 OF 6)



Item 21
2-279 O-RING
#

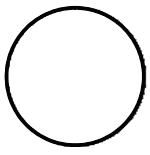


Item 22
2-259 O-RING
#

Item 23
2-228 O-RING
#

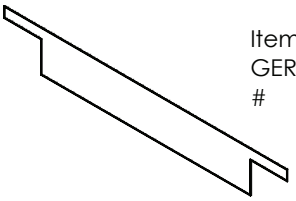
Item 24
MOTOR BEARING
#

Item 25
2-225 O-RING
#

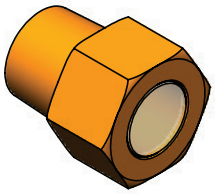


Item 26
2-165 O-RING
#

Item 27
PARKER PARBACK
8-225 O-RING
#

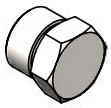


Item 28
GERA BOX SEAL
#

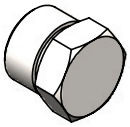


Item 29
SIGHT GLASS
#

Item 30
1 IN MAG PIPE PLUG
#

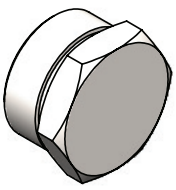


Item 31
FITT2P-08R
#

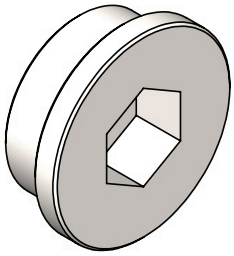


Item 32
FITT2P-10R
#

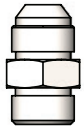
Item 33
FITT2P-16P
#



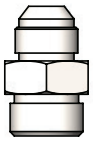
Item 34
FITT2P-20R
#



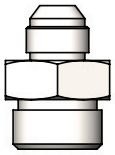
Item 35
FITT2P-32R
#



Item 36
FITT2S-08R08M
#



Item 37
FITT2S-10R08M
#

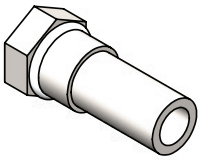


Item 38
FITT2S-12R08M
#

Item 39
FITT2C-08M
#

Item 40
HOSE050R02J008J008L01750
#

HAMMER PARTS IDENTIFICATION GEARBOX (5 OF 6)



Item 41
GEAR BOX BREATHER
#

Item 42
Hi Collar LW 1
#

Item 43
Hi Collar LW 0.75
#

Item 44
Hi Collar LW 0.625
#

Item 45
HX-SHCS 1-8x6x3
#

Item 46
HX-SHCS 0.75-10x1.5x1.5
#

Item 47
HX-SHCS 0.75-10x2.25x2.25
#

Item 48
HX-SHCS 0.625-11x2.25x2.25
#

Item 49
HX-SHCS 0.5-13x7.25x2
#

Item 50
HX-SHCS 0.5-13x1x1
#

Item 51
HX-SHCS 0.5-13x3.5x2
#

Item 52
Preferred Narrow FW 0.5
#

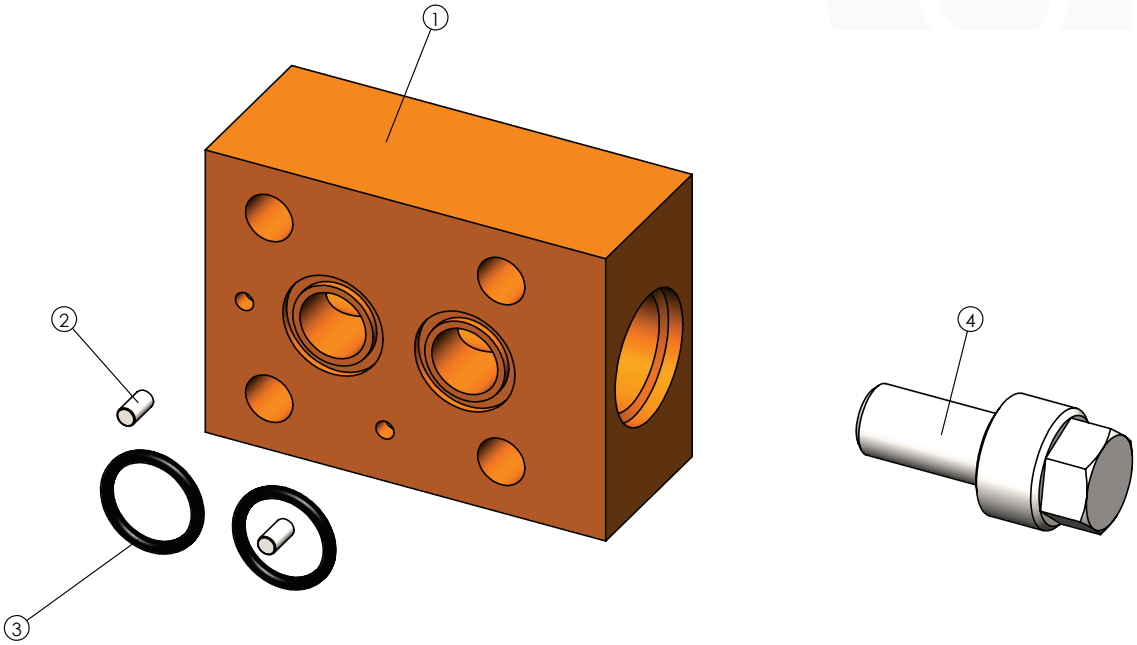
Item 53
Regular LW 0.5
#

Item 54
HEX NUT 0.5-13
#

HAMMER PARTS IDENTIFICATION
GEARBOX (6 OF 6)

ITEM NO.	PartNo	DESCRIPTION	QTY
1		600 GEARBOX MACHINED	1
2		ECCENTRIC BEARING COVER	12
3		ECCENTRIC SHAFT	6
4		BEARING SLEEVE	12
5		ECCENTRIC WEIGHT LEFT	3
6		ECCENTRIC WEIGHT RIGHT	3
7		GEAR CARRIER	2
8		GEAR SPACER	4
9		SPACER	2
10		DRIVE GEAR RIGHT HAND	1
11		DRIVE GEAR LEFT HAND	1
12		BEARING COVER	2
13		HYDRAULIC FLANGE ADAPTER	4
14		HYDRAULIC MOTOR ADAPTER	4
15		600 GEAR BOX COVER PLATE	1
16		PLATE WASHER	4
17		MOTOR SPLIT FLANGE	4
18		HOSE CLAMP PLATE	2
19		MOTOR FM250	2
20		ECCENTRIC BEARING	12
21		2-279 O-RING	12
22		2-259 O-RING	2
23		2-228 O-RING	4
24		MOTOR BEARING	4
25		2-225 O-RING	12
26		2-165 O-RING	2
27		PARKER PARBACK 8-225 O-RING	4
28		600 GERA BOX SEAL	1
29		SIGHT GLASS	1
30		1 IN MAG PIPE PLUG	3
31		FITT2P-08R	8
32		FITT2P-10R	1
33		FITT2P-20P	1
34		FITT2P-20R	6
35		FITT2P-32R	4
36		FITT2S-08R08M	4
37		FITT2S-10R08M	2
38		FITT2S-12R08M	2
39		FITT2C-08M	4
40		HOSE050R02J008J008L01750	2
41		GEAR BOX BREATHER	1
42		Hi Collar LW 1	14
43		Hi Collar LW 0.75	8
44		Hi Collar LW 0.625	16
45		HX-SHCS 1-8x6x3-N	14
46		HX-SHCS 0.75-10x1.5x1.5-N	96
47		HX-SHCS 0.75-10x2.25x2.25-N	8
48		HX-SHCS 0.625-11x2.25x2.25-N	16
49		HX-SHCS 0.5-13x7.25x2-N	16
50		HX-SHCS 0.5-13x1x1-N	12
51		HX-SHCS 0.5-13x3.5x2-N	2
52		Preferred Narrow FW 0.5	16
53		Regular LW 0.5	18
54		hex nut 0.5-13	18

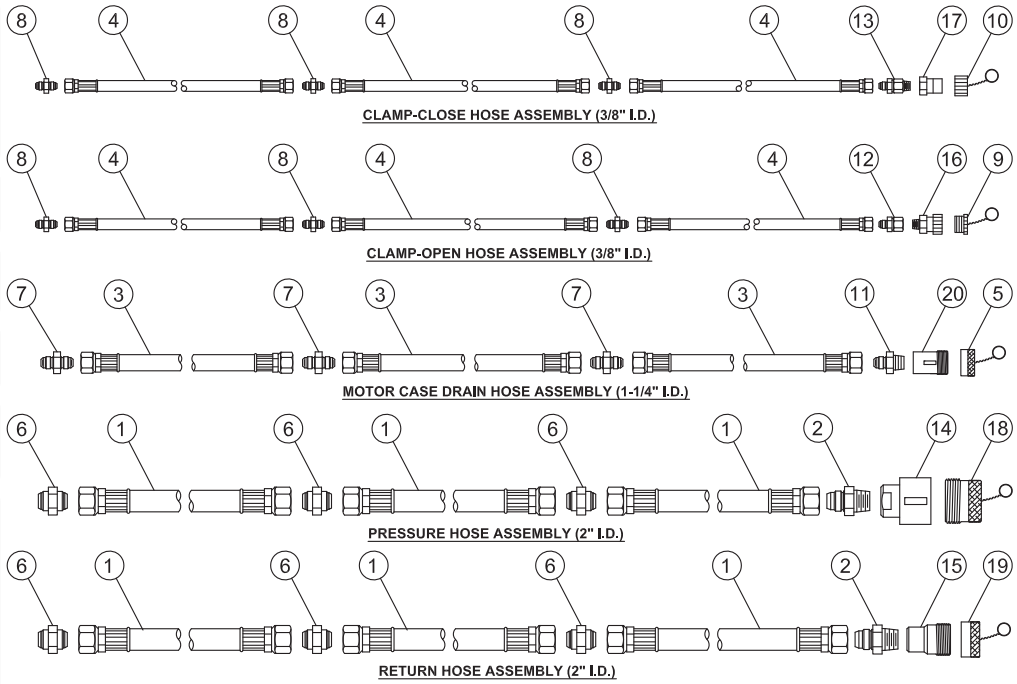
HAMMER PARTS IDENTIFICATION
CHECK VALVE ASSEMBLY (1 OF 1)



Check Valve Assembly
#

Item No.	PartNo	Description	Qty.
1		CHECK VALVE BODY	1
2		0.25 x 0.5LONG ROLL	2
3		2-216 O-RING	2
4		Check Valve	1

HAMMER PARTS IDENTIFICATION
HOSE AND HOSE FITTINGS (1 OF 1)



Item	Qty	Description	Part No.
1	6	2" x 50' c/w 2" FJIC e/e Hose (5000 psi rated)	421008_A
2	2	Fitting #32 MJIC/ #32 M.Pipe	421051_A
3	3	1-1/4" x 50' c/w #20 FJIC e/e Hose (2000 psi rated)	421009_A
4	6	3/8" x 50' c/w 3/8" FJIC e/e Hose (CPB 5500 psi)	421010_A
5	1	1-1/4" Dust Cap	421021_A
6	6	Fitting #32 Male JIC Union	421048_A
7	3	Fitting #20 Male JIC Union	440013_A
8	6	Fitting #6 Male JIC Union	421014_A
9	1	3/8" Safeway Plug #S34-3	421027_A
10	1	3/8" Safeway Cap #S39-3	421026_A
11	1	Fitting #12 MJIC/ #16 M. Pipe	555175_A
12	1	Fitting #6 MJIC/ #6 F. Pipe	421011_A
13	1	Fitting #6 MJIC/ #6 M. Pipe	421017_A
14	1	2" QD Female Coupling	441301_A
15	1	2" QD. Male Coupling	441302_A
16	1	3/8" Safeway Female QD #S35-3	421024_A
17	1	3/8" Safeway Male QD #S31-3	421025_A
18	1	Antaeus 2" Dust Plug	441103_A
19	1	Antaeus 2" Dust Cap	441104_A
20	1	1-1/4" QD Male Coupling	

CLAMP PARTS IDENTIFICATION (1 OF 2)

II-8. Caisson Clamp Identification

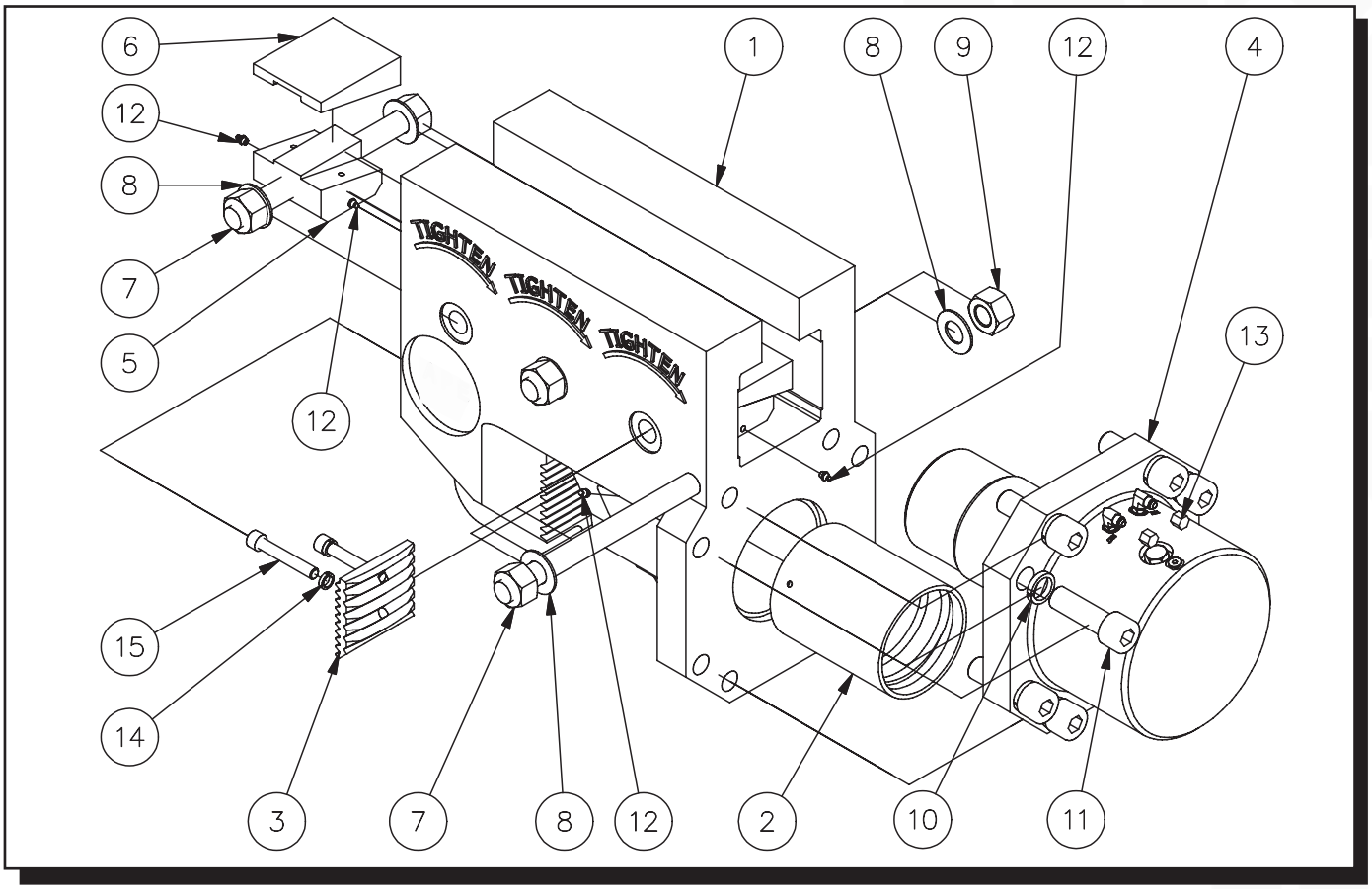


Figure 2-I. 200 Caisson Clamp Assembly

Item	Qty	Description	Part #
1	1	Caisson Clamp Body	#250101_A
2	1	Plastic Sleeve	#250224_A
3	1	Fixed Jaw	#250202H_A
4	1	Clamp Cylinder Asm	#251001_A
5	3	Male Wedge Half (Bronze)	#243102_A
6	3	Female Wedge Half (Steel)	#243105_A
7	3	ACME Wedge Bolt	#124211A_A
8	6	Wedge Washer	#124219_A
9	3	ACME Wedge Nut	#124122_A
10	8	1-1/4" High Collar Lock Washer	#124205_A
11	8	Bolt - SHCS 1-1/4" NF x 4.00	#124204_A
12	7	Grease Zerk	#221001_A
13	2	#6 JIC Cap BRE304C6	#100057_A
14	2	Lock Washer 5/8" High Collar	#124115_A
15	2	Bolt - SHCS 5/8" x 4"	#124214_A

Table 2-I. 200 Caisson Clamp Assembly

CLAMP PARTS IDENTIFICATION (2 OF 2)

II. MAJOR COMPONENT DEFINITION (Continued...)

II-9. Caisson Clamp Cylinder Identification

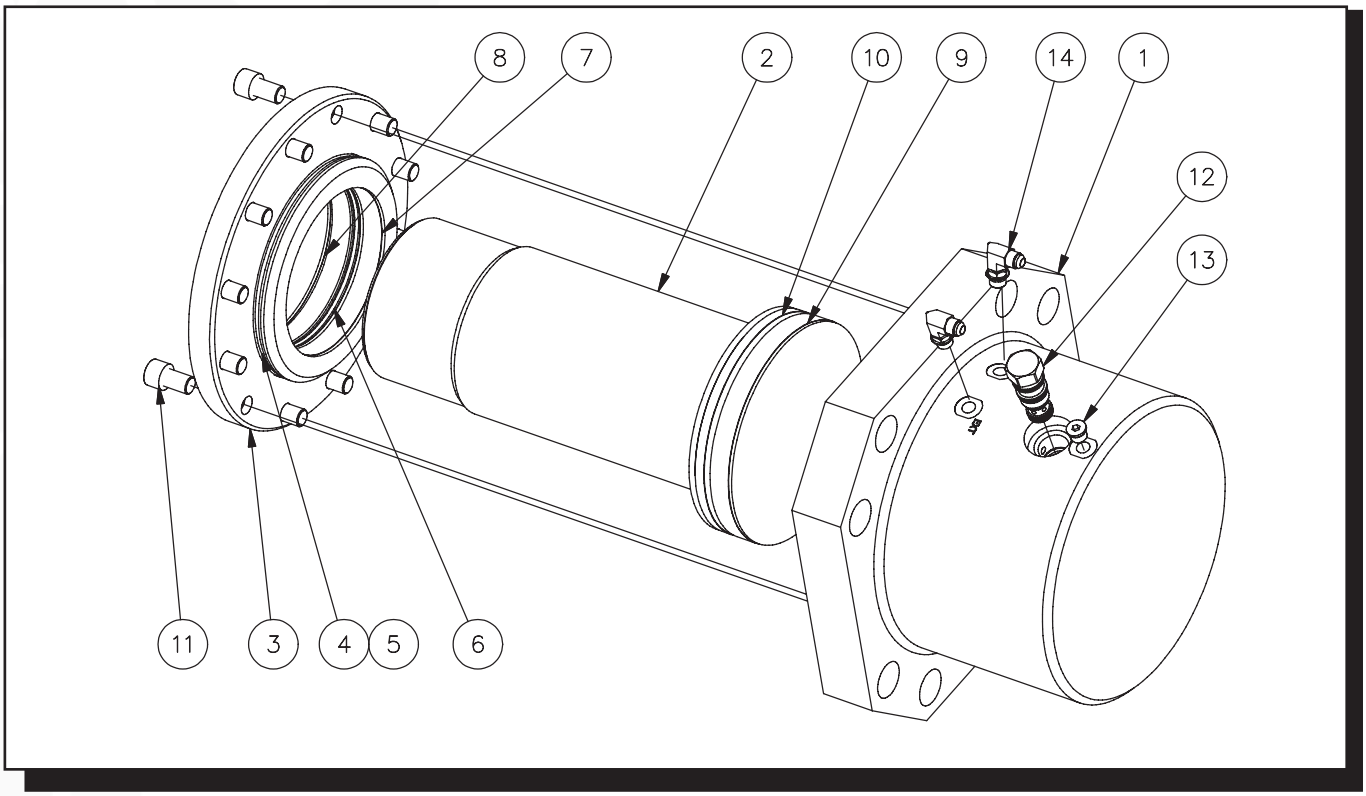


Figure 2-J. 200 Caisson Clamp Cylinder Assembly #250001

Item	Qty	Description	Part #
1	1	Clamp Cylinder Bucket	#1001409_A
2	1	Piston Rod	#250003_A
3	1	Cylinder Gland	#222004_A
4	1	*O-Ring 2-367	
5	1	*8-367 Par Bak	
6	1	*Rod Seal	
7	1	*Rod Wear Band	
8	1	*Rod Wiper	
9	1	*Piston Wear Band	
10	1	*Piston Ring and Expander	
11	12	Bolt SHCS 0.625-18UNF X 1.00	#1003804_A
12	1	P O Check Valve CKEB-XCN	#222016_A
13	1	#6 SAE Allen Plug	#1003959_A
14	2	#6 M O-Ring - #6 M JIC 90 deg Fitting	#130057_A
		*Included in Seal Kit-8" Clamp Cylinder	#1003614

Table 2-J. 200 Caisson Clamp Cylinder Assembly

SHIPPING AND TRANSPORT

III-1. Model ZEUS 600 Vibratory Driver.

The ZEUS 600 vibrator is normally shipped in a travel stand. Two sliding pins release the vibrator from the stand. To re-install, set vibro in stand and slide pins inward and rotate. Hoist vibro and stand by rigging to the vibro lifting shackle. Vibrator shipped without stands is usually laid flat on the trailer deck and the hose bundle is coiled on top. Lift the vibrator by rigging one line to the lifting shackle and one line around the clamp attachment lifting the vibro and hose bundle as one load. Avoid smashing hydraulic lines. Vibro should be loaded with hydraulic motors down facing the deck and breather valves 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. Model ICE 1200E Power Unit.

The Power Unit is always loaded with the oil cooler / radiator facing to the rear of the truck to prevent damage to the cooler and the radiator from flying objects. The Power Unit is usually held to the truck by wrapping a chain around both ends of the fuel tank base and the truck bed. After loading the Power Unit, tape the exhaust rain cap shut to prevent rain water from getting inside. If quick disconnects do not have safety cables then store them under the panel in the storage box rather than risk the possibility of the caps and plugs coming loose and falling off into trafi c. Make sure all doors are fully closed. Tighten fuel vent on the fuel cap to prevent diesel fuel from washing out the fi ll spout.

III-3. 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 laiding. Fax the information as soon as possible, any delay may make it impossible to fi nd the responsible party.

SHIPPING AND TRANSPORT

IV-1. Rigging of Vibratory Driver

A steel wire rope sling must be connected to the lifting bail 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. Several turns of a smaller diameter cable will result in a longer lasting sling than one larger diameter cable. When making a sling, avoid using cheap cable clamps. Check the clamps daily.

IV-2. Installing the Clamp Attachment

The Vibro is fitted with a standard sheet clamp at the factory. However, several types of clamps are used on Antaeus 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. 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 prevent flying dirt from blasting into your eyes.
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 six-foot cheater pipe. If you do not have a cheater pipe then use a sledge hammer.
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.

PREPARATION AND OPERATION

IV-3. Plumbing the Vibro Hoses to the Power Unit

There are five hoses leading from the vibro that must be connected to the power unit to begin operation (Please see section II-5, "Hose Identification, page 2-5.) The hoses attach to the power unit by screwing the quick dis-connect couplers onto the proper couplers of the power unit. The couplers on the power unit are mated with the couplers on the vibro so there is no chance of putting them on backwards. Please take the following steps when installing the couplers:

WARNING: TURN THE POWER UNIT OFF BEFORE INSTALLING COUPLERS

1.) Turn the power unit OFF.
2.) Clean all couplers with a can of ether if available. A clean dry cloth will also work but will require extreme care. Fittings must be spotless clean.
3.) Install couplers by screwing them onto their respective counterparts. Try to avoid cross-threading and maintain a straight line. Jerk the hose back and forth while turning coupler to aid installation effort. Push hard to get the big coupler threads started.
4.) Make sure fittings are tight. If they are properly cleaned they should run up tight with just a firm hand grip. However, they should be double checked with a chain wrench.
5.) Avoid over-tightening.
6.) If near salt water, spray with a light oil to prevent oxidation.
7.) Position the Power Unit so that vibrator has enough hose to reach the work. Avoid pulling too hard on hoses. Most hose failures are caused by pulling hoses off couplers.

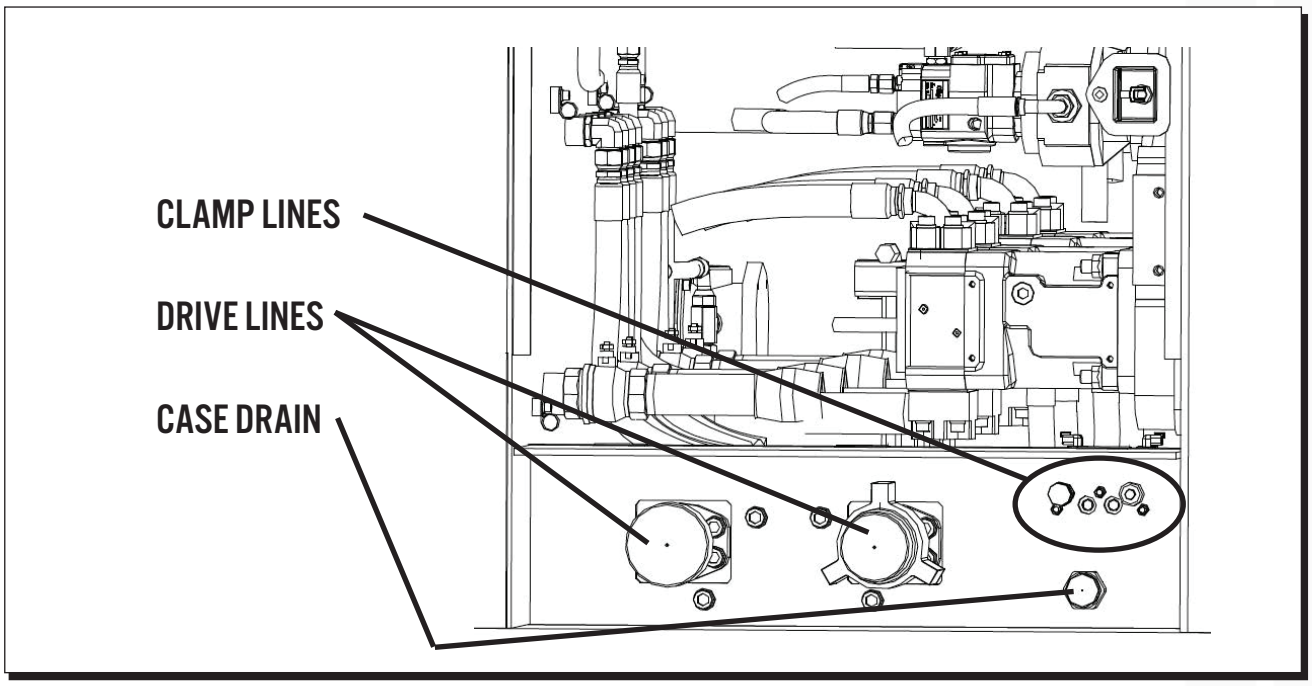


Figure 4-A. Power Unit Hose Plumbing

PREPARATION AND OPERATION

IV-4. Filling Vibrator Pressure Hoses

The vibrator is shipped with the hoses filled with oil. However, if the unit has been sitting for a long period of time or if a damaged hose has been replaced with a new one, then the hoses must be filled. Hook up all the hoses to the power unit . Start the power unit and let it run for ten minutes before running the vibro. The hoses will fill up by themselves in ten minutes even if the vibro is not in the vibrate mode.

IV-5. 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 lines 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, then the system may require bleeding to remove unwanted air in the system. To bleed the clamp system, follow the following steps:

1.) Shut Power Unit OFF.
2.) Make sure the clamp line quick dis-connects are coupled to the power unit.
3.) Start the power unit engine and run at 1000 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.) Turn the clamp switch on the power unit control pendant to "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. Turn clamp switch to off and replace hose to the cylinder fitting.
6.) Repeat the same procedure for "OPEN" side.
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.

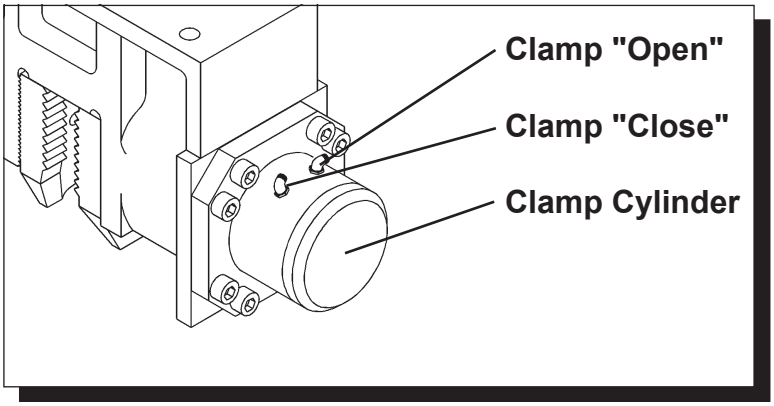


Figure 4-B. Bleeding Clamp Attachment

PREPARATION AND OPERATION

IV-6. 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 Antaeus Model 600 Vibratory Driver.

1.) Follow the Daily Maintenance Required Prior to Operation, [Section V-1].
2.) Read and follow the Safety Precautions, [page iii].
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 5000 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.

PREPARATION AND OPERATION

IV-8. Shut-down Procedures

The following procedures explain what to do with the power unit to correctly shut down the Antaeus Model 600 Vibratory Driver.

1.) Stop the vibrator. (Refer to the power unit operating manual .)
2.) Allow the diesel engine to run for five minutes at 1000 engine rpm.
3.) Reduce engine speed to low idle for about 60 seconds.
4.) Shut engine off by turning off the main power switch.

WARNING: Do not shut the power unit engine down while the vibrator is clamped onto a pile. The clamp check valve will slowly bleed off if there is any leakage in the hose lines or worn clamp seals in the cylinder that moves the jaw open or closed.

IV-9. Suppressor Housing - Gearbox Mating.

If the Suppressor Housing and Gearbox must be shipped separately, the following will assist in re-assembling these components. Normally, the Gearbox assembly is shipped with the Top Plate attached by several bolts at either end.

Place gearbox on flat, sturdy, surface.

Clean the upper surface of the Top Plate, and the bottom surface of the Inner Suppressor. These surfaces must be clean of all dirt, rust, paint or protective coverings.

Place Suppressor Housing on top of the Gearbox assembly (with Top Plate).

Lubricate and insert the 1.0-8UNC X 9.00 Lg. socket head bolts with Hi Collar Lock Washers to get the two large assemblies aligned. Start threading bolts by hand to ensure thread engagement. When all bolts are started, proceed with preliminary tightening (approx. 50 Ft-lbs [6.9 Kg-M]). Continue tightening, with a torque wrench, in stages, with a “center out” sequence, applying about 100-200 Ft-Lbs (13.8-27.6 Kg-M) per stage. The final pass at full torque should be 1010 Ft-Lbs (139.4 Kg-M).

The drive, case drain, and clamp hoses need to be connected to the Top Plate. These hoses are to be aligned on the Top Plate as they come from the manifold and hose clamp. (See assembly drawing on page 2-2).

The drive and return hoses are to be connected using the double split flange. Make sure there is an o-ring in the end of the hose, and all area surfaces are clean. Some o-ring lube should be used. The 0.75-10UNC X 2.50Lg socket head bolts with Hi Collar Lock Washers for the double split flange are to be lubricated, inserted and tightened evenly until the torque of 240 Ft-lbs (33.2 Kg-M).

The case drain and clamp lines are connected to JIC type fittings. Make sure the tapered connecting surfaces are clean to ensure a good, steel to steel, seal. Tighten these fittings so that they do not leak or vibrate loose.

MAINTENANCE

V-1. Daily Maintenance Required Prior to Operation

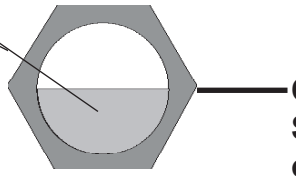
1.) Visually inspect the entire vibro for loose nuts or bolts. Put a wrench on the clamp bolts and check them for tightness.

2.) Grease the Jaw Plunger on the clamp housing.

3.) Check the oil level in the vibrator. Hang vibro from 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!**

IF THE OIL LOOKS MILKY OR CONTAMINATED THEN DRAIN THE GEARCASE AND ADD NEW OIL.

If you cannot read it then do not assume the level is ok.



Sight Gauge

Oil Level
Schaeffer 268
or equivalent.
(do not use veg. oil)

4.) If the oil is milky or contaminated then change it. **Change the oil every 75 hours.**

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 items:

Check water level in radiator	**Check engine oil**
Check battery level	**Check hydraulic return filter indicator**
Check fuel level	**Check fan belts on engine**
Check oil level in pump drive	**Check entire unit for hydraulic leaks**
Check hydraulic oil level	**Check condition of jaws before operating**

V-2. Checklist After Power Unit Engine Has Started

1.) Check all hydraulic hoses for leaks. Make sure they hang free with no kinks.

2.) Check inside the Power Unit. Look at all hoses and valves, check for leaks.

3.) Check return filter gage at control panel with engine running at full rpm and hydraulic oil temperature above 80 degrees F. Replace filter when pressure is above 50 psi.

4.) Check wire rope sling and make sure it is in excellent condition.

5.) Check jaws for wear. Replace if necessary.

6.) Close jaws, make sure clamp light comes on.

MAINTENANCE

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 20.6 gallons of standard weight oil. 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 600 -** 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 black or milky. Schaeffer 268 or equal is the preferred oil. The gearbox requires 20.6 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 regular basis using the grease zert on the side of the clamp housing.

BOLT TORQUE INFORMATION

V-8. Bolt Torque Information

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

The only way to actually tighten high strength bolts is with proper lubrication and a torque wrench. Proper use of the torque wrench is important. To obtain the listed torques, a steady pull should be exerted to the handle until the desired torque is reached.

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

Final Assembly Identification		Page 2-2 & 2-3
Item 33	1/2”-13	119 Ft-Lbs (16.4 Kg-M)
Item 30	5/8”-11	233 Ft-Lbs (32.3 Kg-M)
Item 10	3/4”-10	233 Ft-Lbs (32.3 Kg-M)
Item 28	3/4”-10	417 Ft-Lbs (57.6 Kg-M)
Item 7, 8	1"-8	1,009 Ft-Lbs (139.4 Kg-M)
Suppressor Identification		Page 2-6
Item 24	5/8”-11	233 Ft-Lbs (32.3 Kg-M)
Item 13,15,16, 17, 19, 21	3/4”-10	417 Ft-Lbs (57.6 Kg-M)
Item 12	1-1/4”-7	1,600 Ft-Lbs (221.1 Kg-M)
Gearbox Identification		Page 2-8
Item 22	1/2”-13	119 Ft-Lbs (16.4 Kg-M)
Item 21	3/4”-10	417 Ft-Lbs (57.6 Kg-M)
CLAMP BODY		Page VIII-36
Item 4	5/8”-11	233 Ft-Lbs (32.3 Kg-M)
Item 15, 19, 29	1”-8	1009 Ft-Lbs (139.4 Kg-M)
Item 26	1 -1/2”-6	2800 Ft-Lbs (387 Kg-M)

BOLT TORQUE CHART

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)
1/4-20	3/16	13 Ft-Lbs. (1.8 Kg-M)	1/4-28	3/16	15 Ft-Lbs. (2.1 Kg-M)
5/16-18	1/4	27 Ft-Lbs. (3.7 Kg-M)	5/16-24	1/4	30 Ft-Lbs. (4.2 Kg-M)
3/8-16	5/16	48 Ft-Lbs. (6.6 Kg-M)	3/8-24	5/16	55 Ft-Lbs. (7.6 Kg-M)
7/16-14	3/8	77 Ft-Lbs. (10.6 Kg-M)	7/16-20	3/8	86 Ft-Lbs. (11.9 Kg-M)
1/2-13	3/8	119 Ft-Lbs. (16.4 Kg-M)	1/2-20	3/8	133 Ft-Lbs. (18.4 Kg-M)
5/8-11	1/2	234 Ft-Lbs. (32.3 Kg-M)	5/8-18	1/2	267 Ft-Lbs. (36.9 Kg-M)
3/4-10	5/8	417 Ft-Lbs. (57.6 Kg-M)	3/4-16	5/8	467 Ft-Lbs. (64.5 Kg-M)
7/8-9	3/4	676 Ft-Lbs. (93.4 Kg-M)	7/8-14	3/4	742 Ft-Lbs. (102.5 Kg-M)
1-8	3/4	1,009 Ft-Lbs. (139.4 Kg-M)	1-12	3/4	1,126 Ft-Lbs. (155.6 Kg-M)
1-1/4-7	7/8	1,600 Ft-Lbs. (221.1 Kg-M)	1-1/4-12	7/8	1,800 Ft-Lbs. (248.8 Kg-M)
1-1/2-6	1	2,800 Ft-Lbs. (387 Kg-M)	1-1/2-12	1	3,000 Ft-Lbs. (414.6 Kg-M)

Table 7-F. 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.

HAMMER 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.

ITEM	PROBLEM
1.	Oil Blowing Out Between Gear box and Hydraulic Motor.
2.	Vibro Gearbox is Too Hot.
3.	Excess Oil in the Gearbox.
4.	Oil Blowing Out From Pop-Off Valve.
5.	Opening and Closing Clamp Jaws Seems Spongy or Slow.
6.	Vibrator Won't Start When Forward Switch is Engaged.
7.	Clamp Won't Open When Clamp Open Switch is Engaged.
8.	Vibro Won't Come Up to Normal Operating Speed.
9.	Vibro Won't Stop When Stop Button is Engaged.

Table 6-A. Vibro Trouble-Shooting Index

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.
O-rings may not be sealing properly	Check the o-rings between the gearbox top plate and the motor. Clean the seal areas and replace the o-rings if needed.
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 milky or contaminated it must be replaced. If you are still not sure, remove the gear box 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 hydraulic oil to flow directly into the gearbox.	Remove the motor from the face of the gearbox. Check and clean the seal area, replace the seal if it looks bad.
4. Oil Blowing out Pop-Off Valve.	
Blocked flow in case drain line.	Check case drain line to see if it is pinched.
Valve may be bad.	Check case drain line for proper connection tightness.
One or both motors bay be damaged.	Remove and check the valve. Replace the valve if needed.
	Remove the motors and have them checked for damage. Replace if needed.

HAMMER TROUBLE SHOOTING

Possible Cause	Remedy
5. 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 zert on the clamp body.
The clamp hoses may have air in them and may need bleeding.	Follow the procedures listed in this manual (page 4-3) for bleeding the clamp attachment hydraulic hoses.
6. Vibrator Won't Start When Start Switch is Engaged.	
Hoses may be connected improperly.	Check hoses and make connection corrections if required.
One or both hydraulic motors may not be operating properly.	Remove the case drain hose from a motor and plug the port connecting it to the other motor. Hold the case drain hose so that the oil will flow into a bucket. Run the Vibrator, if a large amount of oil flows from the case drain hose the motor needs to be replaced or rebuilt. Do the same proceedure to the other motor.
Vibrator 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.
Drive pressure is too low.	Manually close start valve at the drive manifold. If vibro will not start, replace the start valve. If vibro will not start, replace the drive pump.
7. Clamp Won't Open When Clamp Open Switch is Engaged.	
Vibrator is running.	The clamp won't open while the vibro is in operation. To open the clamp, stop the vibro.
There may be an electrical failure.	Check for the following: - Defective CLAMP switch in pendant, flip "LOCAL / PENDANT" switch to "LOCAL" and use CLAMP switch on main panel. - Broken or loose wire in the pendant or pendant cable. - Defective OPEN solenoid. - Broken or loose wire between main power switch and START relay. - Defective or sticking clamp timing delay relay. - Broken or loose wire between main power switch and amphenol connector.
The clamp pump may be defective.	Replace clamp check valves. If clamp still wont open, replace the clamp pump.

HAMMER TROUBLE SHOOTING

Possible Cause	Remedy
8. Vibro Won't Come Up to Normal Operating Speed.	
Defective hydraulic motor or drive pump.	If vibration frequency has been verified lower than normal, Replace the hydraulic motors one at a time to see if performance improves. If vibro still operates below normal speed, replace drive pump.
9. Vibro Won't Stop When Stop Switch is Engaged.	
There may be an electrical failure.	Check for the following: - Defective REVERSE / OFF / FORWARD switch in pendant, flip "LOCAL / PENDANT" switch to "LOCAL" and use REVERSE / OFF / FORWARD switch on main panel. - Broken or loose wire in the pendant or pendant cable. - Defective START valve.

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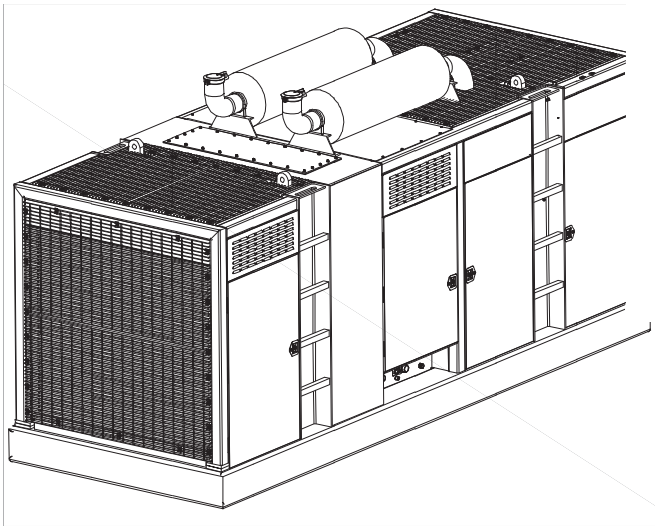
OPERATION & MAINTENANCE MANUAL



Model 1200E Power Unit Model

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Fax: 757 432-1302

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Fax: 863-680-1540

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Fax 832-201-0413

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Fax: 504 910-6407

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ICE 1200E ORIGINAL MANUAL (PAGE 3)

International Construction Equipment, Inc. Standard Warranty

International Construction Equipment, Inc., hereafter referred to as ICE, warrants new products sold by it to be free from defects in material and workmanship for a period of one year after date of delivery to the first user and subject to the following conditions:

ICE's obligation and liability under this warranty is expressly limited to replacing, at ICE's option, any parts that appear to ICE 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 ICE or at the ICE distributor of the product during regular working hours.

This warranty shall not apply to component parts or accessories not manufactured by ICE and which carry the warranty of the manufacturer thereof or to normal maintenance parts (such as filters).

Replacements 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.

ICE'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 ICE, products or parts for which a warranty claim is made are to be returned, transportation paid, to ICE.

Any improper use, including operation after discovery of defective or worn parts, operation beyond rated

capacity, substitution of parts not approved by ICE or any alteration or repair by others in such manner as in ICE's judgment affects the product materially and adversely shall void the warranty.

For impact pile hammers, driving in excess of 10 blows per inch (25mm) [set of 0.1 (2.5mm) per blow] is considered practical refusal. Driving in excess of 10 blows per inch (25mm) for more than 6 inches (150mm) or driving in excess of 20 blows per inch (25mm) at all is considered improper use and will void the hammer warranty.

For vibratory drivers, driving/extracting when the movement is less than 1" (25mm) per minute is considered practical refusal. Driving/extracting when movement is less than 1" (25mm) per minute for more than 5 minutes of driving/extracting or driving at all when penetration is less than 1" (25mm) per minute and amplitude is greater than 1" (25mm) [vibrator and pile are bouncing] is considered improper use and will void the vibrator warranty. Driving/extracting when bearing covers (paint removed) are above 210°F (100°C) is considered improper use and will void the vibrator warranty. Use of a vibrator on a batter without discussing the operation with ICE and getting prior written approval is considered improper use and will void the vibrator warranty.

For limited-access drills and top-drive rotary heads, the use of a down-the-hole hammer without discussing the operation with ICE and getting prior written approval is considered improper use and will void the drill warranty.

For leads, use in lengths or at batters exceeding the initial set-up without ICE evaluating the new set-up and providing prior written approval is considered improper use and will void the leads warranty.

For power units, welding on power units or other equipment with electrical or electronic controls must be done with the battery leads disconnected. Welding with battery leads connected will void the warranty.

ICE MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AND MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

No employee or representative is authorized to change this warranty unless such change is made in writing and signed by an officer of ICE.

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INTRODUCTION

Literature

This manual contains parts information for your ICE equipment. This manual should be stored in or near the power unit in a literature holder or literature storage area. Read, study and keep it with the equipment literature, ICE Parts Manuals, and CAT engine information. English is the primary language for the ICE publications. The English used facilities translation and consistency in electronic media deliver. Some photographs or illustrations in this manual show details or attachments that may be different from your equipment. Guards and covers may have been removed for illustrative purposes. Continuing improvement and advancement of product design may have caused changes to your equipment which are not included in this manual. Whenever a question arises regarding your equipment or this manual, please consult ICE or your ICE distributor for the latest available information**.**

Equipment Manual Set

The manuals for your ICE equipment consists of four manuals – 1) an Operation and Maintenance Manual for your power unit and vibrator 2) a Parts Manual for your power unit, 3) a Parts Manual for your vibrator and 4) a Vibrator Clamp and Accessories Parts Manual for your vibrator.

Section 1 - General Information

This section provides a description of the equipment and specifications.

Section 2 - Safety

The safety section lists the basic precautions and identifies hazardous and potentially dangerous situations. It is imperative that all operators and support staff read and understand the precautions listed before beginning operation, repair, or maintenance on the equipment.

Section 3 - Loading, Unloading and Shipping

This section provides information for loading, unloading and shipping the equipment.

Section 4 & 5 - Preparation for Operation and Operating Instructions

These sections are a reference for proper operation. Illustrations and proper procedures give guidance for operational preparation, handling, engine starting and equipment warm-up, operation, and stopping the equipment. Controls and gauges are explained. The operational description is basic. Operators gain knowledge and develop skills and techniques that enhance efficiency and economical production through experience and time dedicated to understanding equipment application and operation.

Sections 6 & 7 - Maintenance and Torque Charts

These sections serves as a guide for equipment care. Service intervals, required lubrication, adjustments, and torque specifications for fasteners are listed. Major repairs are not detailed here or in the troubleshooting section. Major repairs should be entrusted only to experienced personnel.

Section 8, 9 & 10 - Troubleshooting, Electrical and Hydraulic Information

These sections aid in resolving difficulties with the equipment. The information provided gives indications of possible causes for difficulties and the repairs required to correct malfunctions. Please contact International Construction Equipment, Inc. for assistance in diagnosing unresolved issues and corresponding repairs.

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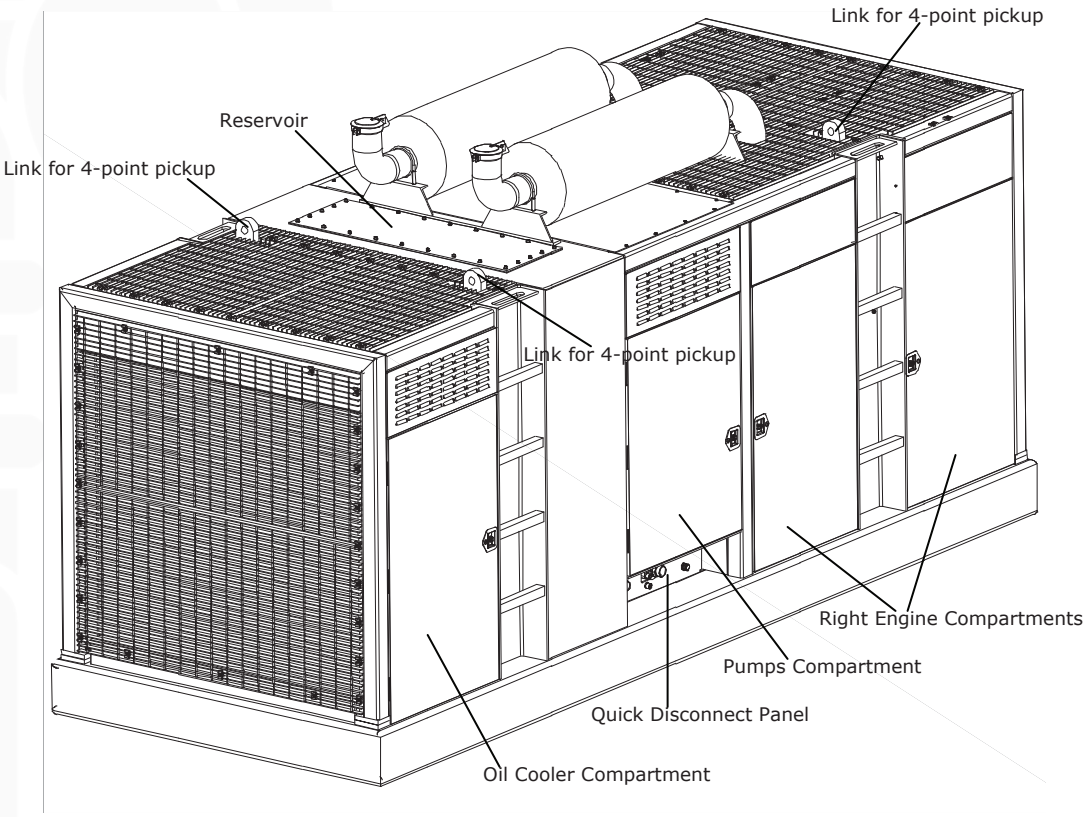
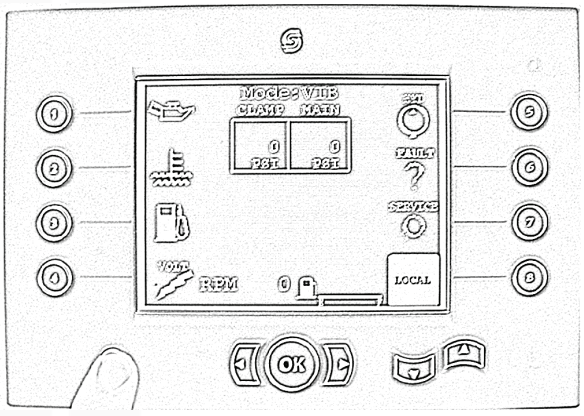
Power Unit Layout

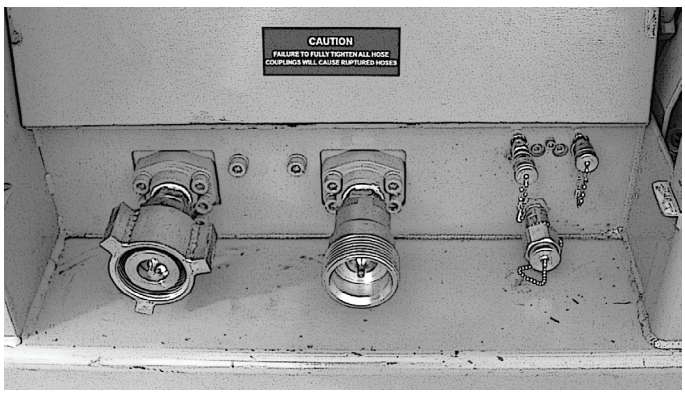


The ICE model 1200E is a twin diesel engine hydraulic power unit. All components are mounted on a tubular sub base that also serves the fuel tank for the unit. Hydraulic oil is supplied from the reservoir. The hydraulic oil temperature, as well as the engine coolant temperature, is cooled by a hydraulically driven fan that draws air through a heat exchanger at each end of the unit. Four lifting eyes are located on each corner of the roof to lift the unit level and securely. All components are enclosed in a sheet metal cabinet with locking doors. The power unit is controlled by a remote control pendant; with backup local controls at the panel. An electronic control panel display provides the control and status of the engines and hydraulic systems. Self sealing quick disconnect couplers provide connection for the 110C, 125C, or V360 vibratory driver-extractor.

A tandem kit can be used to provide dual unit operation.



Electronic Display at Control Panel



Quick Disconnect Panel

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Power Unit Specifications

Model 1200E				
Engine	Twin Caterpillar		C15	
Power	1190	HP	887	kW
Operating Speed	1975	rpm	1975	rpm
Max Drive Pressure	6000	psi	414	bar
Drive Flow	250	gpm	946	lpm
Clamp Pressure	5500	psi	379	bar
Clamp Flow	3.3	gpm	12	lpm
Weight (w/ full fluid & fuel)	32000	lbs	14515	kg
Length	224	in	5690	mm
Width	84	in	2134	mm
Height	114	in	2896	mm
Hydraulic Reservoir	550	gal	2082	liters
Fuel Capacity	430	gal	1627	liters

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SAFETY

Important Safety Information

Most accidents involving product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this equipment can be dangerous and could result in serious injury or death to you or other persons.

Do not operate or perform any lubrication, maintenance or repair on this equipment, until you have read and understood the operation, lubrication, and maintenance and repair information in both the International Construction Equipment, Inc. and Caterpillar Operation & Maintenance Manuals.

Safety precautions and warnings are provided in the manuals. If these hazard warnings are not heeded, serious bodily injury or death could occur to you or other persons.

IMPORTANT SAFETY INSTRUCTIONS ARE MARKED AS SHOWN BELOW:

!WARNING – Safety!

The meaning of this safety warning is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning, explaining the hazard, can be either written or pictorially presented.

!WARNING – Equipment!

The meaning of this safety warning is as follows:

Attention! Become Alert! Equipment could be damaged.

The message that appears under the warning, explaining the hazard, can be either written or pictorially presented.

International Construction Equipment, Inc. and Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in the manuals and on the equipment are therefore not all inclusive. If a tool, procedure, work method or operating technique not specifically recommended in writing by authorized personnel from International Construction Equipment, Inc. or Caterpillar is used, you must satisfy yourself that it is safe for you and others. You should also ensure that the equipment would not be damaged or made unsafe by the operation, lubrication, maintenance and/or repair procedures you choose.

The information, specifications, and illustrations in the manuals are on the basis of information available at the time it was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service given to the product. Obtain the complete and most current information before starting any job. International Construction Equipment, Inc. and Caterpillar dealers have the most current information available.

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Hazard Information

Use caution when removing filler caps, grease fittings, pressure taps, breathers or drain plugs. Hold a rag over the cap or plug to help prevent being sprayed or splashed by liquids under pressure.

Wear a hard hat, protective glasses, hearing protection and other protective equipment as required by job conditions and project regulations.

Do not wear loose clothing or jewelry that can catch on controls or other parts of the equipment.

Make certain all-protective guards and covers are secured in place.

Use all cleaning solutions with care.

Never put maintenance fluids into glass containers since glass containers can break.

Report all needed repairs.

Maintenance Procedures

Stop the equipment. Stop the engine.

Ensure the protective locks or controls are in the applied position.

Disconnect the batteries whenever performing any maintenance or before servicing the electrical system. If the engine has electric starters, disconnect and tape the battery ground leads to prevent accidental starting.

Disconnect the batteries before performing any welding. Failure to do so will cause serious damage to the power unit's operating system.

Do not attempt any repairs or adjustments to the engine or equipment while it is running.

Do not attempt any repairs that you do not understand or for which you are not qualified. Use proper tools; replace or repair broken or damaged equipment.

Block or restrain the equipment, if applicable before operating or performing maintenance.

Do not adjust, or set, hydraulic pressures higher or lower than those specified in the parts manual.

Pressurized Air and Water Hazards

Pressurized air can cause personal injury. When using pressurized air for cleaning, wear a protective face shield, protective clothing and protective shoes.

The maximum air pressure must be below 30 psi (205 kPa) and maximum water pressure must be below 40 psi (275 kPa) for cleaning purposes.

Wear eye protection at all times when cleaning the cooling system. Pressurized water could cause debris and/or hot water to be blown and result in serious personal injury.

Do not spray pressurized water at the control box. Pressurized water could result in damage to the electronics, which could cause the operating system to malfunction.

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Fluid Penetration Risk

Always use a board or cardboard when checking for a leak. Escaping fluid under pressure, even a pinhole size leak, can penetrate body tissue, causing serious injury or possible death.

If fluid is injected into your skin, a doctor familiar with this type of injury must treat it immediately.

Hoses, Lines and Tubes Handling Procedures

Do not pull on, or attempt to move equipment, by force or pressure to the hydraulic hoses. The power unit will need to be moved closer to the work if hoses do not reach.

Do not operate this equipment with hydraulic hoses that are damaged or kinked. Replace damaged hoses immediately.

Do not lift or support hydraulic hoses with wire rope slings.

Do not pull kinks in the hoses. Kinks will reduce the hose safety factor by 50 percent.

Do not bend or strike high-pressure lines. Do not install bent or damaged lines, tubes or hoses.

Leaks can cause fires. Repair any loose or damaged fuel and oil lines, tubes and hoses.

Inspect all lines, tubes and hoses carefully. Do not use your bare hands to check for leaks. Tighten all connections to the recommended torque.

Make sure that all clamps, guards and heat shields are installed correctly to prevent rubbing against other parts and excessive heat during operation.

Hoses, Lines, and Tubes Check List

End fittings damaged, leaking or displaced. Replace hose and related fittings.

Outer covering chafed or cut and wire reinforcing exposed. Replace hose.

Outer covering ballooning locally. Replace hose.

Evidence of kinking or crushing of the flexible part of the hose. Replace hose.

Abrasion guard missing or torn. Replace cover.

Precautions for Oils

Hot oil and components can cause serious personal injury. Do not allow hot oil or components to contact the skin.

Keep all exhaust manifold and turbocharger shields in place to protect hot exhaust from oil spray in the event of a hose, tube or seal failure.

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Fire or Explosion Prevention

All fuels, most lubricants, hydraulic oil, and some coolant mixtures are flammable.

Diesel fuel is flammable. Gasoline is flammable. The mixture of diesel and gasoline fumes is extremely explosive.

Do not weld or flame cut on pipes or tubes that contain flammable fluid(s). Clean them thoroughly with non-flammable solvent before welding or flame cutting on them.

Power Unit fire shields must be installed correctly. These shields are for the purposes of isolating exhaust components from oil or fuel and can assist in lessening the range of a spray in the event of a line, hose, and tube or seal failure.

Clean and tighten all electrical connections. Check regularly for loose or frayed electrical wires. Refer to maintenance schedules for inspection interval. Have all loose or frayed electrical wires tightened, repaired or replaced before operating the equipment.

Wiring must be kept in good condition, properly routed and firmly attached. Routinely inspect wiring for wear or deterioration. Loose, unattached, or unnecessary wiring must be eliminated. All wires and cables must be of the recommended gauge and properly fused.

Never bypass fuses. Maintaining tight connections, and replacing worn, frayed or damaged wire and cable will prevent arcing that could cause a fire.

Fire Extinguisher Requirements

Have a fire extinguisher of the appropriate type and size available and know how to use it. Inspect and have it serviced as recommended on its instruction plate.

Injury Prevention

Support equipment and attachments properly at all times and especially when working beneath them.

Never attempt adjustments while the engine is running unless otherwise specified in this manual.

Stay clear of all rotating and moving parts. Guards should be in place whenever maintenance is not being performed.

Keep objects away from moving fan blades. They will throw or cut any object or tool that falls into their path.

Wear protective glasses when striking objects to avoid injury to your eyes.

Make sure no one can be injured by flying debris before striking any object. Chips or other debris can fly off objects when struck.

Mounting and Dismounting

Do not climb on, or jump off the equipment or stand on components that cannot support your weight. Use an adequate ladder.

Always use steps and handholds when mounting and dismounting. Clean steps, handholds and areas of the equipment you will be working on or around.

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Before Starting the Engines

Read "Before Starting the Engine" in the Caterpillar Operation & Maintenance Manual.

- ⇒ Make sure the control pendant (or radio control) is in a safe place. Do not leave the control pendant (or radio control) unattended.
- ⇒ On the Control Panel: Make sure the main circuit REVOFF-FOR and auxiliary circuit REV-OFF-FOR switches are set to OFF
- ⇒ On the Remote-Control Pendant: Make sure the main circuit REVOFF-FOR and auxiliary circuit REV-OFF-FOR switches are set to OFF
- ⇒ Make sure the clamp OPEN-CLOSE switch is in the center (neutral) position.
- ⇒ Make sure power unit is on level, stable ground.
- ⇒ Do not smoke or use open flame in the vicinity when filling fuel tanks or when flammable vapors are present.
- ⇒ Make sure that all lifting equipment, including cranes, wire rope, slings, hooks, shackles, etc., are properly sized for the worst case loads anticipated during operations. Check wire rope clips for tightness, and check wire ropes for wear or damage daily.
- ⇒ Make sure equipment areas are clear for operation.
- ⇒ If there are any questions about the weights, specifications, or performance of the equipment, contact International Construction Equipment, Inc. before handling or operating the equipment.
- ⇒ Do not attempt to connect the quick-disconnect couplers when the power unit is running.
- ⇒ If the equipment is to be used for anything other than specified use, contact International Construction Equipment, Inc. before using the unit.
- ⇒ Make sure that operations will not damage adjacent structures or excavations

During Engine Starting

Read "Engine Starting" in the Caterpillar Operation & Maintenance Manual.

Before Starting Equipment

- ⇒ Equipment area should be clear before starting operation.
- ⇒ Make sure no one is working on or close to equipment before starting.
- ⇒ Always make an inspection of the equipment before and after starting at the beginning of operations.
- ⇒ Read and become familiar with the electronic display and starting instructions.
- ⇒ Engines are started one at a time.
- ⇒ Both engines must be running to operate the equipment.

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LOADING, UNLOADING, AND SHIPPING

Power Unit

The power unit should be loaded with the heat exchangers facing to the rear of the truck to prevent damage to the heat exchangers from flying objects. The power unit is usually held to the truck by wrapping a chain around both ends of the fuel tank sub-base. Before shipping the power unit, tape the exhaust rain cap shut to prevent rainwater from entering. If quick-couplers do not have safety cables for the caps and plugs, store caps and plugs under the panel in the storage box rather than risk the possibility of them coming loose and falling off into traffic. Make sure all doors are fully closed and latched. Tighten fuel cap and close fuel petcock to prevent loss of diesel fuel.

Vibrator

The equipment should be shipped laying flat on the trailer deck. Lift the equipment by rigging one line to the lifting pin and one line to the hose bundle as one load. Avoid crushing hydraulic lines.

Damage During Shipment

Before the truck leaves, carefully inspect the machine and hoses for any missing equipment or sign of damage that may have occurred during shipment or unloading. In the event of damage during shipment, notify the trucking agent at once. Note all damage on the bill of lading. Send via email or fax the information to International Construction Equipment, Inc. as soon as possible; photos are often the best evidential method of explaining a claim. Any delay may make it difficult to identify the responsible party.

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Preparation for Operation

General

When unloading and unpacking the power unit and equipment, use extreme care.

For your protection, make a thorough inspection of the unit immediately upon delivery. In case of any damage or shortage, notify the transit agent at once and have the delivering carrier make a notation on the freight bill.

Rigging of Vibrator

A steel wire rope sling must be connected to the lifting pin (s) of the vibration suppressor. The required strength of this sling depends on the capacity of the crane and the work to be carried out. A safety factor of five is recommended. Several turns of a smaller diameter cable will usually last longer than one turn of a larger diameter cable. Synthetic web slings should be selected with attention to job environment– presence of caustic chemicals, welding and cutting, abrasive or sharp edged adjacent structures or piles, as well as strength rating and profile.

!WARNING – Safety!

Wire rope failure or cable clamp slippage may result in injury or death.

Connection Of Hydraulic Hoses

!WARNING – Safety!

Disconnecting hoses under pressure can result in serious bodily injury or death.

!WARNING – Safety!

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

!WARNING – Equipment! **!WARNING – Safety!**

Starting the equipment with the hoses reversed could result in reversed operation from labels on the control and pendant or in rare cases blown hoses on the vibrator.

Connection of Hoses at Power Unit for Vibrator

The vibrator and hydraulic clamp are connected to the power unit by five hydraulic hoses.

The hoses connect to the power unit with quick-disconnect couplers. Hose couplers are arranged to ensure correct connections at the power unit.

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

Make sure that the couplers are fully run up and hand tightened prior to using an appropriate chain type wrench.

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Equipment Operation

Only well-trained and experienced personnel should attempt to operate or maintain this equipment.

Do not leave the equipment control pendant (radio control) unattended.

Do not stand any closer to equipment than necessary when in operation. Parts may loosen and fall.

Do not operate this equipment with hydraulic hoses that are damaged or kinked. Replace damaged hoses immediately.

Do not lift, or support, hydraulic hoses with wire rope slings.

Do not pull on, or attempt to move equipment, with hydraulic hoses.

Do not operate the equipment within 15'(5m) of electrical power lines, transformers, and other electrical equipment, or within such distance as required by applicable safety codes.

Do not side-load crane boom. Dangerous crane boom damage may result. Always be sure that the crane line is aligned with the centerline of the equipment used.

Stopping Equipment

Make sure vibrator, rotary head, and power unit have completely stopped and engine is off before relocating equipment. Normal stop of equipment is accomplished by moving FORWARD-OFF-REVERSE switch to OFF

Stopping Engines

Read "Engine Stopping" in the Caterpillar Operation & Maintenance Manual.

A cool down period is required

Engines Emergency Stop

The engine emergency stop should be used only to prevent injury to personnel or damage to the equipment such as in the case of a ruptured hydraulic line. Often hazards can be avoided by simply stopping the vibration of the unit by switching the FORWARD-OFF-REVERSE switch to OFF. Emergency stop buttons are located on the control panel and the remote pendant control and are red in color.

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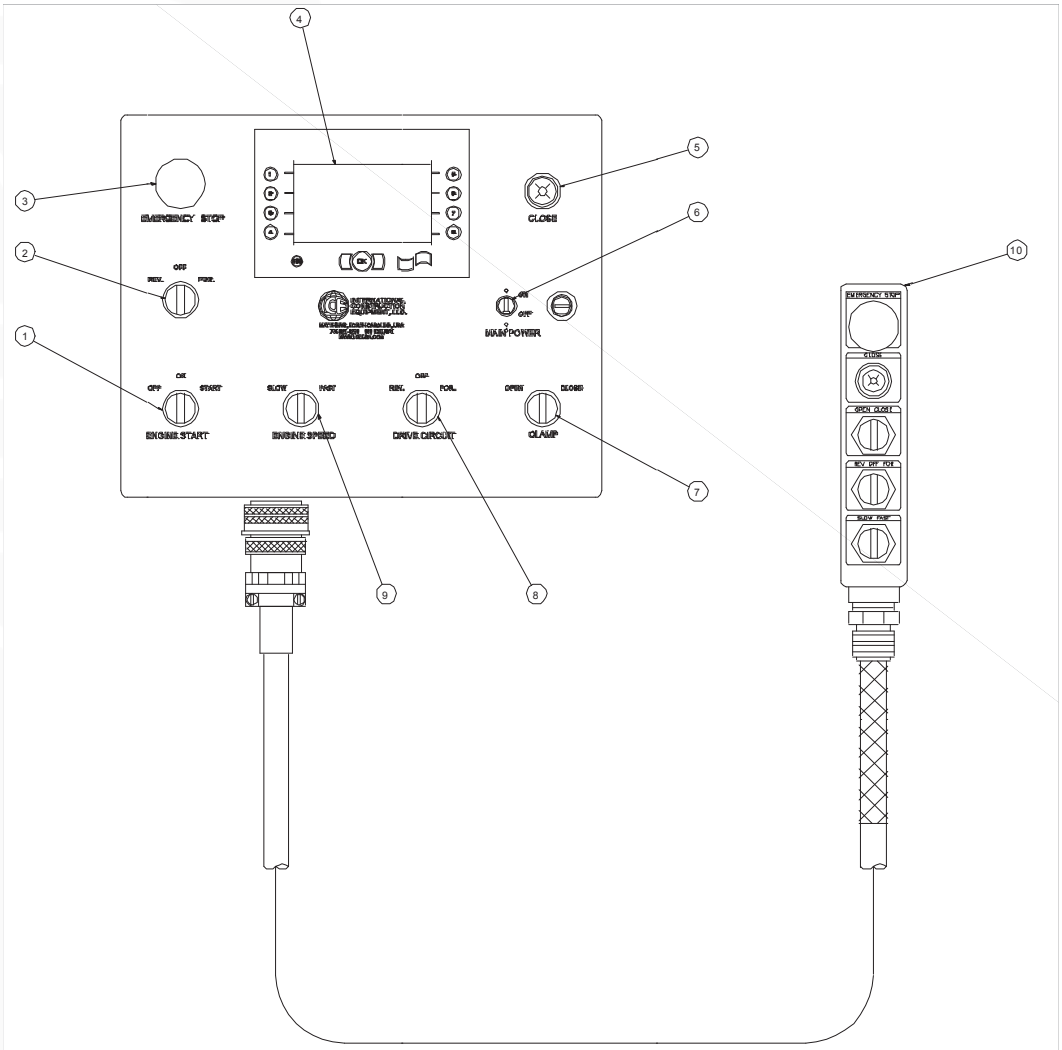
Control Panel and Remote Pendant



Number	Description
1	Engine OFF-ON-START Switch
2	Auxiliary REV-OFF-FOR Switch
3	Engine EMERGENCY STOP Button
4	Control Panel Display for Onboard Computer Modules (OCM)
5	Light (CLAMP CLOSED)
6	Main Power Switch
7	Clamp OPEN-CLOSE Switch
8	Main Circuit REV-OFF-FOR Switch
9	Engine Speed SLOW-FAST witch
10	Pendant Engine EMERGENCY STOP Button
11	Pendant (CLAMP CLOSED) Light
12	Pendant Auxiliary DEC-OFF-INC Switch (Optional)
13	Pendant Clamp OPEN-CLOSE Switch
14	Pendant Main Circuit REV-OFF-FOR Switch
15	Pendant Engine Speed SLOW-FAST Switch

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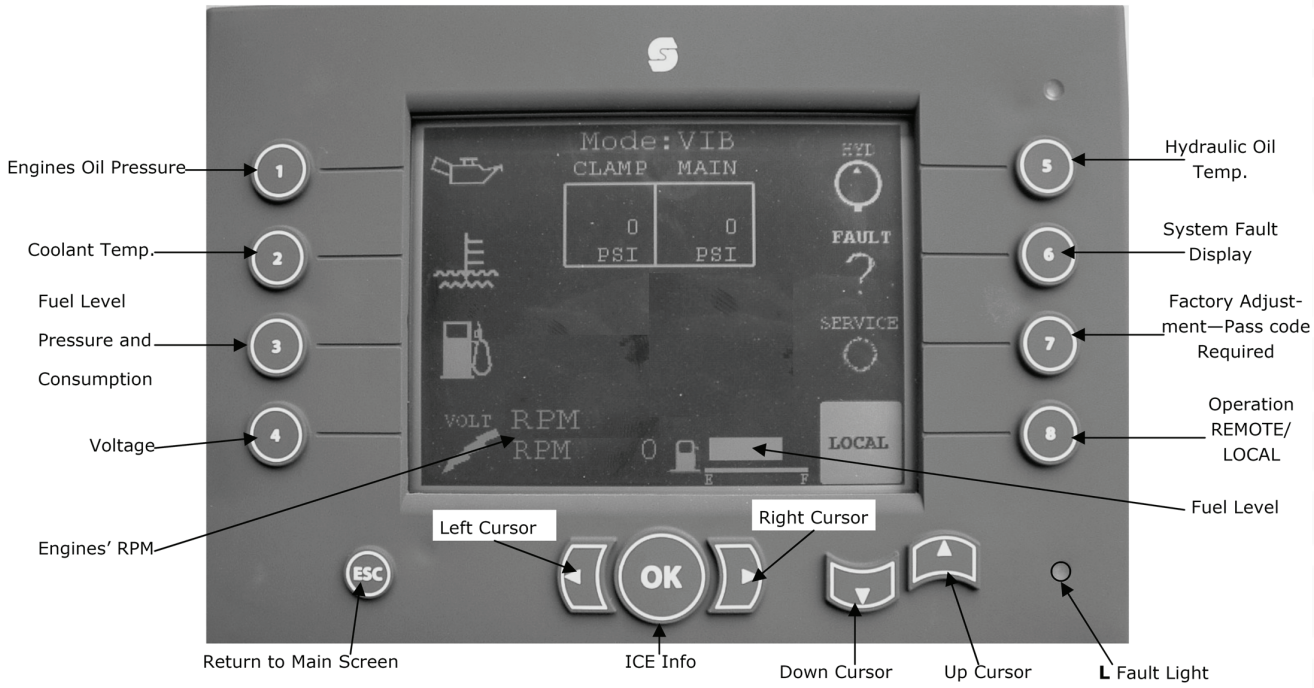
Onboard Computer Module Display Screen



Button/Display	Function
1	Displays Engines Oil Pressure
2	Displays Engines Coolant Temperature
3	Displays Engines' fuel pressure, level, consumption.
4	Displays Engines Voltage
5	Displays Hydraulic Oil Temperature and Main Return Filter Pressure
6	Displays Fault Codes
7	Provides Access to Service Menu
8	Toggles Between REMOTE/LOCAL Control
ΛV	Scrolls Up / Down
< >	Scrolls Left / Right
ESC	Returns To Main Menu
L	Fault Indicator
Clamp	Displays Clamp Pressure
Main	Displays Main (Drive) Pressure
Mode	Displays Vibrator or Rotary Head Mode
Engine Rpm	Displays Engines Rpm
Fuel Level	Displays Fuel Level

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Power Unit Controls

The control panel contains an electronic display screen and local controls for the engine speed and vibratory functions. The operating parameters (engine speed, temperature, oil pressure, hydraulic system functions, and fault alarms can be viewed from the display. The three operational modes are Vibro, Auger1, and Auger2. The ICE 110C vibrator can only be operated in the Vibro mode. To protect the equipment to be operated, the mode of operation is password protected.

Local or Remote Control

The power unit control functions may be operated either from the control panel (Local) or from the remote control pendant (Remote). Additionally an operational radio control may be provided for remote operation. Remote/ Local operation is selected on the display screen by pressing button #8. Press #7 for the for service screen, then press and hold #1 until default screen is displayed.

Remote Control

The remote-control pendant can control the operation of the vibratory driver/extractor. The pendant is connected to the control cabinet with 50 feet (15 meters) of electrical cable to permit operation from advantageous positions to view the operation of the equipment. Pendant extensions and options are available upon request.

The electronic display control must be in the remote mode to operate the vibrator using the remote conrol pendant. Button #8 displays controls remote/local operation. If the display reads LOCAL, then pressing button #8 once will switch the control to REMOTE. Pushing the button again will return to LOCAL.

Should the remote control become damaged, select LOCAL and operate from control cabinet. The Safety Shutdown Override will have to be activated by pressing button #7 (service screen appears) and hold #1 until the default or home screen returns.

Starting and Warming Engines

The display at the control panel will require the operator to start one engine at a time. Both engines must be running to operate the vibrator. The electronic screen will display ENGINE 1 flashing; this is the first engine to start. After engine one has started, press the right arrow; ENGINE 2 will now flash (as ENGINE 1 did previously). After ENGINE 2 starts the display returns to the main screen.

It is possible to bypass and start either engine individually for service or trouble shooting, but both engines must be running to operate the vibrator. The left and right arrow buttons select ENGINE 1 or ENGINE 2. The up and down arrows select BYPASS or ENGINE START.

There is a one second delay before the engine will crank when turning START switch. If the engine fails to start after 30 seconds of cranking, allow the starter to cool for two minutes before reattempting engine start. After the engine starts, there is a two second delay before the control system will allow the engine throttle to increase or decrease.

After these two seconds have elapsed, adjust the throttle using the engines' speed switch until the engines register 1200 RPM and allow it to warm up for five minutes.

The equipment cannot be operated when the hydraulic oil is at or below 40°F (4°). The oil may be circulated in the REV position by holding the MAIN CIRCUIT REV-OFF-FOR switch in the REV position.

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Starting and Warming Engines (Continued)

Before starting the engines, read the Caterpillar Operation & Maintenance Manual carefully. Follow the engine starting, operating, and maintenance procedures in the Caterpillar Manual.

If the temperature of the hydraulic oil is at or below 0°F (-18°), the diesel engine will not start.

The engines' temperature may be read on the display screen by pressing #5. If a temperature below 0°F (-18°) is anticipated, the application of external and immersion heaters

and/ or an insulated shelter will be required. The engine will not start when the hydraulic oil is at or below 0°F (18°C)

The temperature may be read on the display by pressing #5 on the display screen.

!WARNING – Equipment!

Operation with hydraulic oil temperature below 0°F (18°C) may result in damage to hydraulic components.

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

Turn the ENGINE START OFF-ON-START switch to ON.

Turn the MAIN CIRCUIT (REV-OFF-FOR) and the AUXILIARY CIRCUIT (REV-OFF-FOR) on the control panel and pendant to the OFF position.

Turn the CLAMP OPEN –CLOSE switch on the control panel and pendant and pendant to the center (neutral) position. A red light on the lower right corner of the display will flash if any of these switches are not in the correct position, and the engine will not start. A text message will appear on the display once starting of the engines is attempted.

!WARNING – Safety!

Equipment could start due to component malfunction. Keep clear.

Turn the ENGINE START switch to START.

There is one second delay before the engine will crank. If engine fails to start after thirty seconds of cranking, allow starter to cool for two minutes before attempting to start again.

As the engine starts, there is a two second delay before the control system will allow the throttle to increase or decrease.

After these two seconds have elapsed, adjust the throttle using the engines' speed switch until the speed is at 1200 RPM and allow warm up for five minutes.

!WARNING – Equipment!

The vibrator cannot be operated when the oil temperature is below 40° (4°C). The power unit should be only operated to warm oil.

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Warming Hydraulic Oil

The equipment should not be operated at full speed if the hydraulic temperature is below 60°F (16°C).

After initial warm up, the engines should be throttled up to 1500 RPM. Operation of the equipment can begin at this speed. After the temperature exceeds 60°F (16°C), full speed (2050 RPM) operation can begin.

!WARNING – Equipment!

The equipment cannot be operated at full speed when the oil temperature is below 60° (16°C). Damage to components could result.

The hydraulic oil temperature is monitored by the temperature transducer located in the return filter housing. The oil temperature should never exceed 160°F (71°C). If oil exceeds this temperature, the engine will automatically shut down.

!WARNING – Equipment!

Operation of the equipment when hydraulic oil temperature exceeds 160°F (16°C) could damage hydraulic components, as well as thermally stressing the hydraulic oil.

Engine Shutdown

Stop the vibratory driver/ extractor by placing the MAIN CICUIT REV-OFF-FOR switch in the OFF position.

Decrease engines' speed to 1500 RPM with the ENGINE SPEED SLOW-FAST switch and allow the Diesel Engine to run for five minutes.

Reduce the engine speed to low idle for thirty seconds.

Stop the engine by turning the ENGINE START switch to OFF.

In an emergency , the engines may be stopped by pushing the EMERGENCY STOP button on either the control pendant or the control panel.

!WARNING – Equipment!

Use the emergency stop button only in actual emergencies, as the required cool down period is eliminated.

Pushing the EMERGENCY STOP BUTTON will cause all operating functions to stop.

Diesel Engine and Vibrator will stop immediately.

To restart the power unit the MAIN POWER switch must be turned to the OFF position, wait five seconds; then returned to the ON position to reset the system.

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Power Unit Operation with Vibratory Driver/ Extractor

!WARNING – Equipment!

The Display must be in the VIBRO mode prior to use with the vibratory Driver/ Extractor

Clamp to Pile

Position vibrator to pile. Turn the CLAMP OPEN-CLOSE switch on the pendant to CLOSE. The CLAMP light on the pendant and control panel will illuminate when the clamp has achieved adequate pressure to permit vibration to begin. The light should normally come on in a few seconds.

Start Vibration

Turn the MAIN CIRCUIT REV-OFF-FOR switch to FOR position. Make sure the engines are at adequate speed to maintain the vibrator's load.

Stop Vibration

Turn the MAIN CIRCUIT REV-OFF-FOR switch to OFF position. Hold the CLAMP switch to the REV position has no effect in this VIBRO mode and will not have adverse results (holding the switch in REV can aid in warming the oil prior to operation).

Unclamp to Pile

Make sure the MAIN CIRCUIT REV-OFF-FOR switch is in the OFF position. Allow all vibration to cease before opening the clamp. Hold the CLAMP switch in the OPEN position to open the hydraulic clamp so the vibrator can be moved from the pile. Complete opening requires about ten seconds. To prevent damage to the clamp, make sure the clamp is completely open before stabbing unto next piling.

Change Engine Speed

Turn the ENGINE SPEED switch to SLOW and the engines will decrease RPMs. Turn the switch to FAST and the engines will increase RPMs . The switch must be held in desired direction for approximately two seconds before the system will change speed.

Change Engine Speed

In order to provide maximum flexibility in achieving optimum pile penetration and extraction rates, the frequency of the vibrator must be adjusted. The frequency is varied by changing the engine speed. Generally the gradual increase of vibration frequency provides stability in the installation of piling. Decrease frequency if a hard ground creates rebound through the pile.

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Maintenance

Preventative maintenance includes normal servicing that will keep the power unit and the vibratory driver/ extractor in peak operating condition and prevent unnecessary trouble from developing. Service consists of periodic lubrication and inspection of the moving parts and accessories of the unit.

Proper lubrication is an essential part of preventative maintenance, controlling to a great extent the useful life of the unit. Different lubricants are needed and some components in the unit require more frequent lubrication than others. It is important that the instructions regarding types of lubricants and frequency of their applications be closely followed.

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

Before servicing, be sure to clean all lubrication fittings, caps, filler, and level plugs and surrounding surfaces to prevent dirt from entering with lubricants and coolants.

The intervals given in the schedule are based on normal operating conditions. For operation under abnormal or severe conditions, such as heavy dust, severe temperature, duty cycle, etcetera, perform these services, lubrication replacements, and inspections more often.

Engine Maintenance

As indicated in the Caterpillar operation and Maintenance Manual, perform all maintenance and lubrication checks . Please refer to their manual for additional daily and time-based maintenance requirements.

Daily Maintenance

!WARNING – Equipment!

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

Before Start-Up Checklist

- Check the entire set-up prior to starting the power unit.
- Check the oil level in the hydraulic reservoir and refill if necessary.
- Check oil level, with dipstick, in the pump drive. Replace oil if any water is present.
- Check all hoses for signs of damage or cuts that might cause hose failure during operation.
- Check all hose connections are tight, especially the quick-disconnect couplers.
- Inspect all connections to the equipment.
- As indicated in the Caterpillar Operation & Maintenance Manual, perform all daily maintenance checks and lubrications

After Start-Up Checklist

- Check all hydraulic hoses for leaks.
- Check all hydraulic hoses are hung freely with zero kinks.
- Check all pumps and hydraulic manifolds for leaks.
- With the diesel engine running at full speed, check the RETURN FILTER on the power pack by pressing Button 5.

  Low Scale=Filter Clean (0-17 psi); Mid Scale=Change Filter (18-23 psi); High Scale=Filter Clogged (24+psi)

ICE 1200E ORIGINAL MANUAL (PAGE 23)

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ICE 1200E ORIGINAL MANUAL (PAGE 24)

Service Intervals

100 Hour Maintenance

Vibratory / Driver Extractor– Drain and add new lubrication to vibrator's transmission case. Inspect used oil for contamination, debris, or metal particles. An oil testing program is an asset in setting maintenance cycle and products.

500 Hour Maintenance

After the first 500 hours, drain and replace lubricant in the power unit multi-pump drive housing. Thereafter, change every six months. Inspect used oil for wear particles.

Annual Maintenance

Hydraulic Oil: At least yearly, have the hydraulic oil tested by a lab equipped to do so. Replace if required. Again, an oil testing program for all components is an asset to the maintenance program. Testing of the hydraulic oil is essential to prevent costly repairs. Never allow the unit to be operated with the hydraulic oil temperature above 160°F (71°C), be observant with the color of the oil or presence of water.

Severe Conditions

The service intervals and daily maintenance specified prior to this are based on normal operating conditions. Operation under severe or unusual conditions will require some adjustments in service intervals.

Example: 100 hours changes to 50 hours; 500 hours change to 250 hours, annual changes to 6-months.

Average Temperature: Above 80°F (27°C) or below –10°F(-23°C) reduce service intervals by one half of those specified.

Air Condition: Operating in dust or sand, reduce service time by one half of those specified. Operating in salt or high moisture have hydraulic oil tested quarterly and use normal service intervals.

Extended Work Hours: Operating in excess of twelve hours per day, reduce service time intervals by one half of those specified.

Extended Inactive Periods: Not operational for five days, engines should be started once every three days and run until operating temperature is reached. During lengthy storage periods, daily maintenance intervals can be extended appropriately. Refer to Caterpillar for advice on lengthy storage periods.

ICE 1200E ORIGINAL MANUAL (PAGE 24)

Service Intervals

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ICE 1200E ORIGINAL MANUAL (PAGE 25)

Lubrication

Engine

Follow the Caterpillar maintenance schedule and oil specifications as printed in the Caterpillar Operation manual. Comparable brand engine oils:

AMOCO	15W-40 300
ARCO	15W-40 Fleet S3 Plus
ASHLAND	15W-40 400M
BORON (BP)	15W-40 Vanellus C Extra
CATERPILLAR	10W-30 CH-4
CHEVRON	15W-40 Delo 400
CITGO	15W-40 C500 Plus
CONOCO	15W-40 Fleet Supreme
EXXON	15W-40 XD3
GULF	15W-40 Super Duty Plus
MOBIL	15W-40 Delvac Super
PHILLIPS	15W-40 Super HD II
SHELL	15W-40 Rotella T
SUN	15W-40 Sunfleet Super C
TEXACO	15W-40 Ursa Super Plus
UNION	15W-40 Guardol
VALVOLINE	15W-40 All Fleet

Vibrator Gear Case

Checking Lubricating Oil Level: Read oil level using sight glass located on the motors' side, lower center of the gear case. Fluid level should be in the middle of the sight glass.

Adding Lubricating Oil: On the vibrator gear case top plate, remove the 1" pipe plugs. When necessary, lubricating oil may be added through these holes.

Draining the vibrator gear case: Remove one 3/4" pipe plug at either end of the base plate; tilt the case for complete drainage

Multi-Pump Drive Adapter Housings

Checking Oil Level: The oil level is easily checked using the dipstick on the side of each housing.

Adding Oil: Lubricating oil may be added by removing the filler breather plug from the fitting located on the top center of each multi pump drive adapter housing.

Draining the Oil: Draining the lubricant may be done by removing the magnetic drain plug on the bottom of the multi-pump drive housing.

ICE 1200E ORIGINAL MANUAL (PAGE 25)

Lubrication

Engine

Follow the Caterpillar maintenance schedule and oil specifications as printed in the Caterpillar Operation manual. Comparable brand engine oils:

AMOCO	15W-40 300
ARCO	15W-40 Fleet S3 Plus
ASHLAND	15W-40 400M
BORON (BP)	15W-40 Vanellus C Extra
CATERPILLAR	10W-30 CH-4
CHEVRON	15W-40 Delo 400
CITGO	15W-40 C500 Plus
CONOCO	15W-40 Fleet Supreme
EXXON	15W-40 XD3
GULF	15W-40 Super Duty Plus
MOBIL	15W-40 Delvac Super
PHILLIPS	15W-40 Super HD II
SHELL	15W-40 Rotella T
SUN	15W-40 Sunfleet Super C
TEXACO	15W-40 Ursa Super Plus
UNION	15W-40 Guardol
VALVOLINE	15W-40 All Fleet

Vibrator Gear Case

Checking Lubricating Oil Level: Read oil level using sight glass located on the motors' side, lower center of the gear case. Fluid level should be in the middle of the sight glass.

Adding Lubricating Oil: On the vibrator gear case top plate, remove the 1" pipe plugs. When necessary, lubricating oil may be added through these holes.

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Recommendation per Lubricating Oil Vibrator Gear Case/ Multi Pump Adapter

All ICE gear drives come with Schaeffer 268. This product has been proven to have an excellent service life under intense duty cycles.

Lubricating Oil in order of Preference:

Schaeffer	268
Exxon Mobil	SHC-634
Chevron	Gear Compound 460
Citgo	Premium MP 85W-140
Gulf	MP GL5 SAE 85W-140
Phillips	SMP 85W-140
Shell	Omala S2G

If Shaeffer 268 is not available, service intervals should be decrease. An oil testing program would be an asset in setting a proper maintenance program.

Hydraulic System

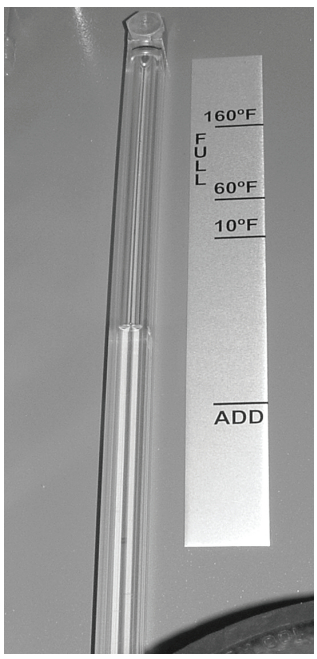
To maintain the maximum operating efficiency in the precision parts of the hydraulic system, it is extremely important to eliminate factors that can cause breakdowns or unsatisfactory performance in the system. Among the most common of these factors are rust, corrosion, contamination, and products of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

Checking Oil Level

The hydraulic oil sight gauge is located on the reservoir and is accessible through the door above the hose quick disconnect couplers.

Make certain hydraulic oil is visible at the ambient or above temperature.

The oil level does climb as the oil warms.



!WARNING – Equipment!

The power unit should not be operated if hydraulic oil is not visible in sight glass, above the ADD line.

Oil is added by the manual pump mounted on the reservoir to the right and below the sight gauge. Oil is pumped through a return filter to guarantee cleanliness of the oil.

The oil is drained through a plug on the bottom of the reservoir.

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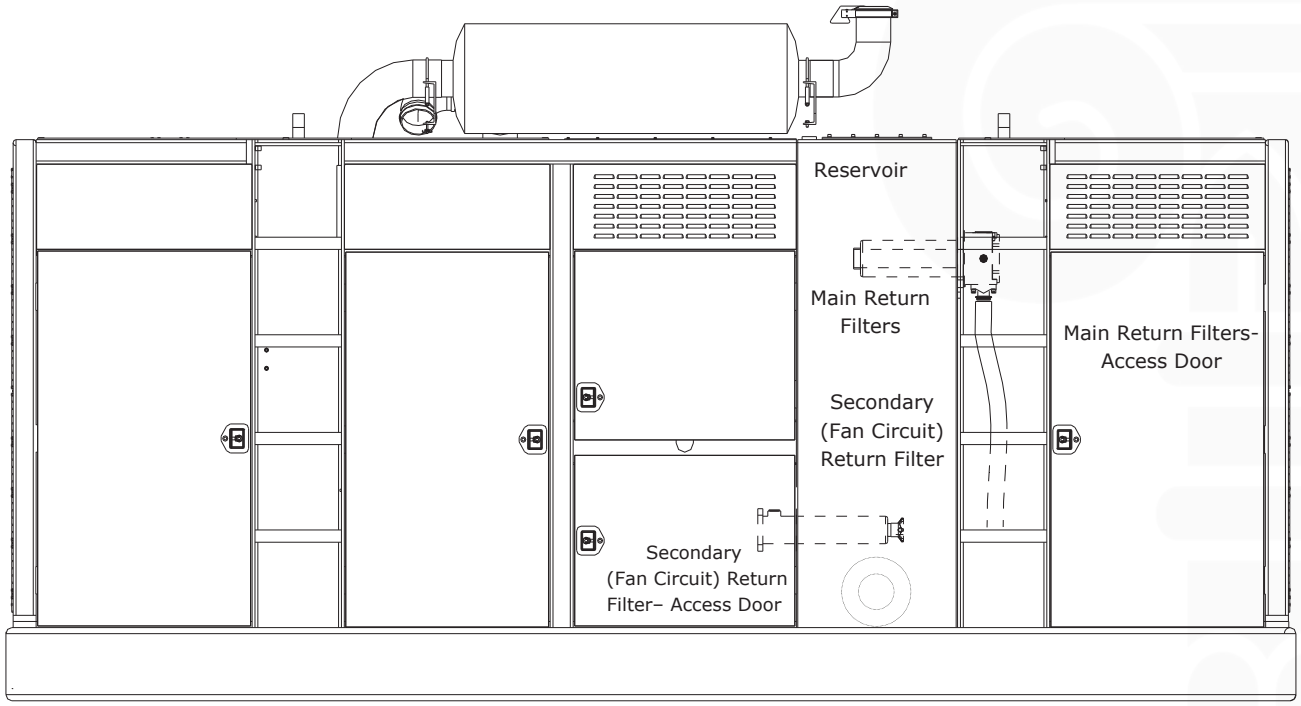
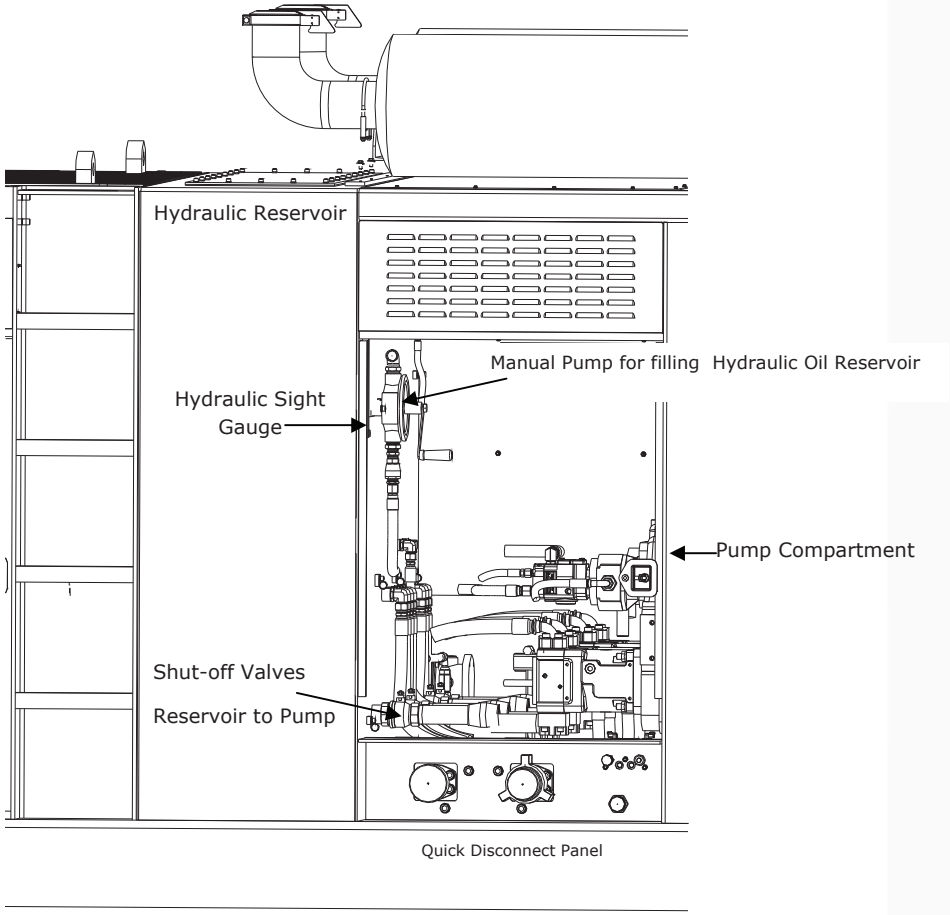
Hydraulic Return Filters and Manual Pump for Filling Reservoir





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Changing Hydraulic Return Filters

Remove Hydraulic Return Filters:

- Loosen and remove four bolts from each cover, gently tap and evenly pry off cover, remove old filter elements.
- Inspect and remove bypass valves and make sure the valves open by hand.
- Insert bypass valves into new filter elements.
- Install new elements.
- Inspect covers and sealing o-rings– replace if nicked or compressed.
- Install covers and tighten evenly
- Start engine and check for leaks

!WARNING – Equipment!

Guarantee, if installing elements other than those obtained through ICE, that the elements are a matched replacement.

Cautionary Practices for Hydraulic Oil and Return Filters

- Keep stored oil dry and clean at all times and always store in clean sealed containers.
- Keep tools, spouts, lids, funnels, etc when used in conjunction with the transfer of oil.
- Do not return contaminated oil after component failure to reservoir.
- Do not use dirty, water contaminated, or discolored oil in system without filtering and testing.
- Replace filters at first indication that they are becoming clogged.
- Mixing of different manufacturer's oil is not recommended; store replacement oil to prevent this issue.

!WARNING – Equipment!

Foreign material in the hydraulic system can drastically affect the life and operation of hydraulic components.

Recommendations on Hydraulic Oil

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

Power units are shipped with Chevron Clarity® AW46 hydraulic oil. Chevron Clarity exceeds the requirements of both the E.P.A. and the U.S. Fish and Wildlife Service for non-toxicity and is inherently biodegradable. Adding other oil will contaminate the Chevron Clarity AW46 and render it no longer environmentally friendly.

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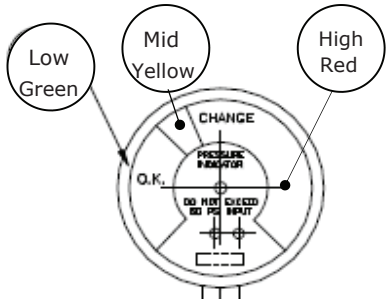
Secondary Hydraulic Return Filter Indicator Gauge

The secondary return filter is not linked to the onboard computer display. A pressure gauge mounted on the side of the filter's canister displays condition of filter elements and should be read with the hydraulic oil at operating temperature. If in the red, elements must be changed.



Secondary Return Filter Gauge

Low Scale=Filter Clean (0-17 psi); Mid Scale=Change Filter (18-23 psi); High Scale=Filter Clogged (24+psi)

Recommended Hydraulic Oils

Oil is listed in order of preference. When not using the first two selections, the hydraulic oil should be tested more frequently.

Chevron	Clarity AW46
Exxon Mobile	DTE15M
Lyondell (Citgo)	Duro AW 32
Chevron	Hydraulic Oil AW ISO 32
Phillips	Magnus A ISO VG32
Shell	Tellus Plus 32

The hydraulic oils selected were chosen based on the hydraulic system being 5°F (–15°C), which is the cold ambient start-up to 160°F (71°C), the maximum operating.

Operating in Sub– Freezing or Extreme Heat Conditions: It may become necessary to change the viscosity of the hydraulic oil due to extremes of ambient temperature. Further steps such as additional oil cooling or oil heaters may be required. Contact ICE for specific concerns.

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Setting Clamp Relief Valve

The Clamp Relief Valve limits clamp pressure to 4800 psi (330 bar).

- The Clamp Relief Valve is located on the power unit clamp manifold, which is located on the left behind the panel above the quick-disconnect couplers at the power unit.
- Check the clamp hoses are connected properly in order to receive an accurate pressure leading.
- Start and warm up the diesel engine.
- With the engine warmed up, increase engine speed to 1950 rpm.
- While observing the display screen, turn the clamp (OPEN-CLOSE) switch to OPEN.
- The pressure should read 4800 psi (330 bar).

!WARNING – Equipment!

The clamp must be connected to the power unit to properly adjust valves.

!WARNING – Equipment!

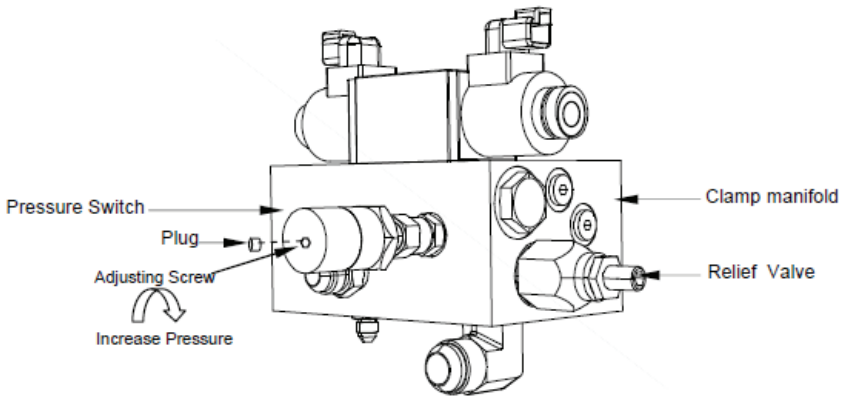
Be cautious to keep hands away from jaws when opening and closing clamp.

Checking the Clamp Pressure

- If the pressure is not at least 4500 psi, Release the (OPEN-CLOSE) switch.
- While holding the Clamp Relief Valve adjusting screw with a hex key, loosen the adjusting screw jam nut with an open-end wrench.
- Adjust the Clamp Relief Valve by turning the adjusting screw approximately 1/8th turn in the desired direction.
- Turning the screw clockwise will increase the pressure setting.
- Turning counter-clockwise will decrease pressure
- While observing the OPEN pressure gage, turn the clamp (OPEN-CLOSE) switch to OPEN, the pressure should read 4800 psi (330 bar)

The Clamp Pressure Switch sets clamp pressure to 4500 psi (310 bar):

- The Clamp Relief Valve must be set to 4800 psi (330 bar) prior to setting the Clamp Pressure Switch.
- The Clamp Pressure Switch is located on the power unit clamp manifold, which is located on the left behind the panel above the quick-disconnect couplers at the power unit.
- Turn MAIN POWER switch ON.
- On the Control Panel Display Screen, push Button 7 and then Button 6.
- Enter Password. Password can be obtained from your ICE service department.
- Use left arrow to scroll to clamp pressure display.
- Use up and down arrows to scroll to 4500 psi (310 bar).
- Press ESC Button to return to main screen.



ICE 1200E ORIGINAL MANUAL (PAGE 31)

Section 7: TORQUE SPECIFICATIONS

!WARNING – Equipment!	!WARNING – Safety!
Vibration from operation of equipment loosens bolts, nuts, and screws. Loose or broken fasteners may cause components to break away and fall resulting in injury, equipment damage or both. Check all fasteners daily.	

!WARNING – Equipment!	!WARNING – Safety!
Mismatched, dirty, damaged, or incorrect fasteners can result in damage, malfunction, or injury. Make sure fasteners are correct, clean, and undamaged. Check fasteners daily.	

!WARNING – Equipment!	!WARNING – Safety!
A torque wrench is strongly recommended for assembly and maintenance of ICE equipment.	

Torque is measured in terms of force and distance. Force is the amount of pushing or pulling applied at the end of the lever. Distance is the length of the lever that is being used. Torque values are given in the following units: NEWTON meters (N-m), inch pounds (in-lb) and foot-pounds (ft-lb).

Be sure to use a torque wrench that has the proper range. Torque wrenches must be used properly in order to ensure that the correct torque is applied. Always use a smooth pull for torque wrenches. Do not jerk a torque wrench. Do not use adapters that change the length of the torque wrench. For the correct use of the torque wrench, refer to the instructions that were packaged with the torque wrench.

Prior to installation of any hardware, ensure that components are in near new condition. Bolts and threads must not be worn or damaged. Threads must not have burrs or nicks. Hardware must be free of rust and corrosion. Clean reused fasteners with a noncorrosive cleaner. Lightly lubricate the threads of reused fasteners. Lightly lubricate the mating surface of the head of reused fasteners.

Note: Too much tension on the bolt will cause the bolt to be stretched beyond the point of yield. The bolt will be permanently stretched. The bolt will loosen the grip on the parts that are being fastened. If the bolt is tightened again, the bolt will break. Do not reuse bolts that have been permanently stretched.

Torque Sequence

1. Hand tighten all fasteners. Larger connections may require the use of a small hand wrench.
2. Torque all fasteners to 40% of full torque.
3. Torque all fasteners to 70% of full torque
4. Torque all fasteners to full torque by using a cross pattern. Large flanges may require additional passes.
5. Apply at least one final full torque to all fasteners in a clockwise direction until all torque is uniform. Large connections may require additional passes.

ICE 1200E ORIGINAL MANUAL (PAGE 32)

Torque Specifications

!WARNING – Equipment! | **!WARNING – Safety**

Mismatched or incorrect fasteners can result in damage, malfunction, or possible injury.

Screw Size	Allen Wrench Size	Standard Torque		Screw Size	Allen Wrench Size	Standard Torque	
10-24	5/32	6	0.83	10-32	5/32	6	0.83
1/4-20	3/16	13	1.8	1/4-28	3/16	15	2.1
5/16-18	1/4	27	3.7	5/16-24	1/4	30	4.2
3/8-16	5/16	48	6.6	3/8-24	5/16	55	7.6
7/16-14	3/8	77	10.6	7/16-20	3/8	86	11.9
1/2-13	3/8	119	16.4	1/2-20	3/8	133	18.4
5/8-11	1/2	234	32.3	5/8-18	1/2	267	36.9
3/4-10	5/8	417	57.6	3/4-16	5/8	467	64.5
7/8-9	3/4	676	93.4	7/8-14	3/4	742	102.5
1-8	3/4	1009	139.4	1-12	3/4	1126	155.6
1-1/4-7	7/8	1600	221.1	1-1/4-12	7/8	1800	248.8
1-1/2-6	1	2800	387	1-1/2-12	1	3000	414.6

Torque Table for Allen Head Bolts

Thread Size	Standard Torque N-m	Standard Torque ft-lb
1/4	12 ± 3	9 ± 2
5/16	25 ± 6	18 ± 4
3/8	47 ± 9	35 ± 7
7/16	70 ± 15	50 ± 11
1/2	105 ± 20	75 ± 15
9/16	160 ± 30	120 ± 22
5/8	215 ± 40	160 ± 30
3/4	370 ± 50	275 ± 37
7/8	620 ± 80	460 ± 60
1	900 ± 100	660 ± 75
1 1/8	1300 ± 150	960 ± 110
1 1/4	1800 ± 200	1320 ± 150
1 3/8	2400 ± 300	1780 ± 220
1 1/2	3100 ± 350	2280 ± 260

Torque Table for UNC Bolts and Nuts

Metric ISO Thread Size	Standard Torque	
M6	12 ± 3	9±2
M8	28 ± 7	21 ± 5
M10	55 ± 10	41 ± 7
M12	100 ± 20	75 ± 15
M14	160 ± 30	120 ± 22
M16	240 ± 40	1 75 ± 30
M20	460 ± 60	340 ± 44
M24	800 ± 100	590 ± 75
M30	1600 ± 200	1180 ± 150
M36	2700 ± 300	2000 ± 220

Torque Table for Metric Bolts and Nuts

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Trouble Shooting

It cannot be emphasized enough that over 90% of difficulties can be prevented by good periodic inspection, lubrication, and maintenance. The time and energy consumed in proper care is only a fraction of that incurred when trouble stops operation.

When difficulties arise, please first use this general troubleshooting guide and the Caterpillar Operation and Maintenance Manual. If the difficulty cannot be corrected, contact your Caterpillar dealer for engine problems, the local ICE dealership, or ICE Corporate at 888-ICE-USA1 or 704-821-8200.

Components in CAPITAL LETTERS are shown on the Electrical and Hydraulic Schematics in the Power Unit Parts Manual.

Power Unit Monitoring and Protection

The power unit utilizes an Onboard Computer Module (OCM). The Display Screen monitors OCM critical hydraulic and engine parameters for conditions that can damage the unit.

The following hydraulic system parameters are monitored for conditions that can damage the hydraulic components:

- Hydraulic oil level
- Hydraulic oil temperature
- Return filter pressure

The following engine parameters are monitored for conditions that can damage the engines:

- Oil pressure
- Fuel pressure
- Fuel temperature
- Fuel level
- Coolant temperature
- Intake air temperature
- Engine over speed

If any of these conditions deviate from the programmed parameters, the OCM will shut down or derate the engine.

After the problem is corrected, the OCM may be reset at the Display Screen by turning the MAIN POWER switch to OFF for at least five seconds.

Electrical Control Problems

In the case of control malfunctions, try resetting circuit breakers. Check all plugs, connectors, terminals for good and complete connectivity.

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Safety Shutdown Overrides

If the Onboard Computer shuts down the power unit for any non-catastrophic fault, the operator can override shutdown faults until the power unit is either turned off or ten hour have elapsed. The following shutdowns are considered non catastrophic:

- Low Hydraulic Level (but visible in the sight gauge and above add level)
- High Return Filter Pressure (confirm that the mechanical pressure gauge is reading in the safe range)
- Faulty Hydraulic Oil Temperature Reading
- Faulty Fuel Level Reading

The following steps are required to override the fault codes:

1. Momentary push the Emergency Stop Button on the Control Panel
2. Push and release Button # 6 on the Display Screen
3. Push and release button #7 on the Display Screen
4. Press and hold Button #1 on the Display Screen until the fault is overridden.

!WARNING – Equipment!

Continued operation of the equipment while overriding fault codes could result in catastrophic damage. OCM problems must be corrected to prevent voiding the warranty.

Check System Faults

How to check for OCM system faults using the Display Screen:

1. Press #6 button on Display Module and try to start engines
2. Observe any fault code that appears.
3. Refer to fault code table for explanation and Reset if possible.

Resetting Fault Codes

Correct the condition that caused the fault according to the table and clear the fault code from the computer:

1. Correct the condition that caused the fault according to the table.
2. Push Emergency Stop Button
3. Turn Main Power Switch to OFF and wait at least 5 seconds.
4. Turn Main Power Switch to ON

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Power Unit

Diesel Engine Does Not Start

- Check Main Power Switch on the control panel is ON; wait 15 seconds for the Onboard Computer Module (OCM) to initialize.
- Check all switches in the Off or neutral position on both pendant and local control panel.
- Turn ENGINE START switch to ON
- If Fault light on the Display Module is blinking, press Button 6 and read the Fault Codes.
- Check engine coolant temperature; if over 220°F(105°C) allow the engine to cool before attempting operation of vibrator.
- Check engine oil level
- Check batteries' condition and connections, electrical components and connections, including the starter relay
- Check fuel supply and fuel filter; verify that fuel is uncontaminated
- Consult the Caterpillar Operation and Maintenance Manual

Diesel Engine Does Not Stop

- Call local Caterpillar dealer and service center.
- Push Emergency Stop Button on remote control pendant or control panel.
- Check all electrical connections
- Consult Caterpillar Operation and Maintenance Manual
- Call local Caterpillar engine dealership and service center

Diesel Engine Speed Control Switch Not Functioning

- Switch between Local or Remote mode to check for damaged pendant
- Check fault codes.

Diesel Engine Does Not Run at Full Speed

The Power Unit's OCM reduces engine speed or derates if conditions exist that could damage engine.

- If the engine should slow down, stop vibrator's operation
- Shut down engine.
- Check oil level and pressure.
- Turn Engine Start switch to Start and push Button 3 to check fuel pressure. If below 15 PSI (1 BAR), check fuel filter. Use primer pump to purge air from system.
- Check engine coolant temperature.

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Vibratory Driver/ Extractor

Vibrator Does Not Start or Does not Come Up to Speed

- Both Diesel Engines must be running with the Display module in VIB mode at 2050 RPM.
- Clamp must be closed with pressure above 4500 PSI (310 BAR)
- With the Display Module in Remote Mode, turn the main circuit (REV-OFF-FOR) switch on remote control pendant to FOR.
- With the Display in the LOCAL mode, turn the main circuit on the control panel to the FOR position
- Check that the pressure and return hydraulic hoses from the power unit to the vibrator are routed properly
- If main drive pressure is at 4500-5500 psi (310-380 BAR) Check that the quick disconnect couplers are clean, straight, threaded completely and tightened fully- Do not remove or attach quick disconnect couplers with the engine running.
- Make certain that the vibrator's momentum has not been negated by pile weight or soil composition. Vibratory Driver / Extractor should vibrate at 1550 cycles per minute (speed can be tested with a photo tachometer) free hanging without pile. USE EXTREME CAUTION WHEN TESTING TO AVOID INJURY TO PERSONNEL, DAMAGE TO CRANE, SURROUNDING STRUCTURES, AND VIBRATOR.
- If the pressure reads 500-800 PSI (55 BAR) and the vibrator does not start, inspect the check valve (CV6) at the vibrator to make sure it is not stuck open.
- If FOR does not appear above pressure reading check for loose wires or bad switch in control pendant box or at control panel.
- If FOR appears above pressure reading, manually shift forward reverse control valve. If vibrator starts, check electric signal to solenoid and wire connections. Replace valve or solenoid if signal is present and electrical connections are good.
- Shut off engine, disconnect the drive and return quick disconnect couplers and check system pressure. Running against the quick disconnect check valves, the main relief pressure should be between 4500-5500 PSI (310-380 BAR). If significantly less: Check relief valve setting, check control manifold, proportional relief and cartridges-make sure movement is not inhibited by debris or trash– clean and reassemble.
- If pressure at power unit is adequate; reconnect hoses at the quick disconnect couplers. Remove both motors from the vibrator's transmission case. Remove drain hoses with power unit running full speed and main circuit switch in FOR position. Monitor motor shaft speed (use photo tachometer) and check drain flows. After comparing the two, replace motor if drain flow is significant, or if one shaft speed significantly slower. Consult with ICE for detail specifications if needed.
- Test Pump flow from at each Drive pump outlet. Check condition and output speed of multi pump drive transmission. Remove Power Unit Drive pumps if flow is low and have inspected by an authorized hydraulic shop.
- Check that vibrator's transmission is not overfilled with gear oil, filled with hydraulic oil from failed motor shaft seals.
- Inspect Vibrator transmission for mechanical failure– metal particles in gear oil– exterior paint burnt

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Vibratory Driver/ Extractor Case Drain Relief (RV2) Expels Oil

- Make sure that 1" Drain hose in bundle quick disconnect (QD5) is made up straight and completely
- Make certain that 1" drain line is not kinked or smashed
- Test Motors' drain flow; repair or replace as needed.

Clamp Does not Close or Open

- Make sure that quick disconnect couplers are made up properly.
- Make sure hoses are routed properly.
- Check OPEN control pressure.
- Swap from Remote to Local operation mode and attempt to close; pendant may be damaged.
- Operate control valve manually. If successful, check for electrical connections or malfunctioning solenoid.
- Check all clamps for internal (piston seal leaks). Often a malfunctioning clamp bypasses oil to the rod end of a sound tandem clamp or (or one or more in quad clamp configuration) rendering it unmoving. Remove the open side clamp hose place clamp switch in CLOSE position; check hose and port for bypass oil after piston has closed.
- Check clamp pump output.
- Make sure clamp rod is not seized in clamp body.

Clamp Light Does Not Illuminate

If Clamp closed pressure is reaching 4500 PSI: Check light bulb, socket, electrical connection, broken wires.

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Fault Codes

SW= Service Warning ES=Engine Shutdown W=Warning HCS =Hydraulic Circuit Shutdown

Fault Message	Description	Corrective Action	Fault Level
Aux Trans	Auxiliary press. transducer malfunction	Inspect/Replace Part 770181	SW
C1P33 Start	Short/open circuit to engine start circuit	Inspect/repair wiring engine start circuit	SW
C1P34 Clamp Open	Clamp open solenoid malfunction	Inspect/replace Part 750360	SW
C1P35 Clamp Close	Clamp close solenoid malfunction	Inspect/replace Part 750360	SW
C1P36 Drive For	Forward drive solenoid malfunction	Inspect/replace Part 750026	SW
C1P37 Drive Rev	Reverse drive solenoid malfunction	Inspect/replace 750026	SW
C1P39 Hydraforce Valve	Hydraforce valve malfunction	Inspect/replace 730807	SW
C1P40 Aux Fwd	Forward drive solenoid malfunction	Inspect/replace Part 750026	SW
C1P41 Aux Rev	Reverse drive solenoid malfunction	Inspect/replace Part 750026	SW
C1P42 Fast	Short/open circuit engine fast circuit	Inspect/repair wiring eng. fast circuit	SW
C1P43 Slow	Short/open circuit engine slow circuit	Inspect/wiring to engine slow circuit	SW
C1P45 Prop Relief	Drive pressure relief valve malfunction	Inspect/replace drive pressure relief valve	SW
C1P46 Mnt Reset	CAT engine maintenance needed	Consult CAT Operation Maintenance Manual	SW
Case 1-6 Trans	Reserved	Not Used	NA
Clamp Trans	Clamp Pressure transducer malfunction	Inspect/replace 770181	SW
Change Filter	Return Filter Clogged	Replace return filter cartridge	ES
Drive Transducer	Drive pressure transducer malfunction	Inspect/replace Part 770181	SW
ES Shutdown	Emergency Stop Pressed	Reset System	ES
Filter Trans	Filter pressure transducer Malfunction	Inspect/replace 770182	SW
Fuel Low	Fuel Level is low	Add Fuel	W
Fuel Trans	Fuel level transducer malfunction	Inspect/replace 770182	SW
Fuel Out	Fuel tank is empty	Refill Tank	ES
Hyd . Oil Level	Hydraulic fluid level low	Refill Hydraulic Tank	ES
Oil temp 32°F	Hydraulic oil temp<32°F	Preheat Oil w/ optional heater	ES
Oil temp 45°F	Hydraulic oil temp <45°F	Heat oil by circulation	HCS
Oil Temp 145°F	Hydraulic oil temp>145°F	Cease vibration circulate oil to cool	W
Oil Temp 180°F	Hydraulic oil temp>180°F	Check oil cooler and oil level	ES
Oil Temp Trans	Oil temp. transducer malfunction	Inspect/replace Part 770179	SW

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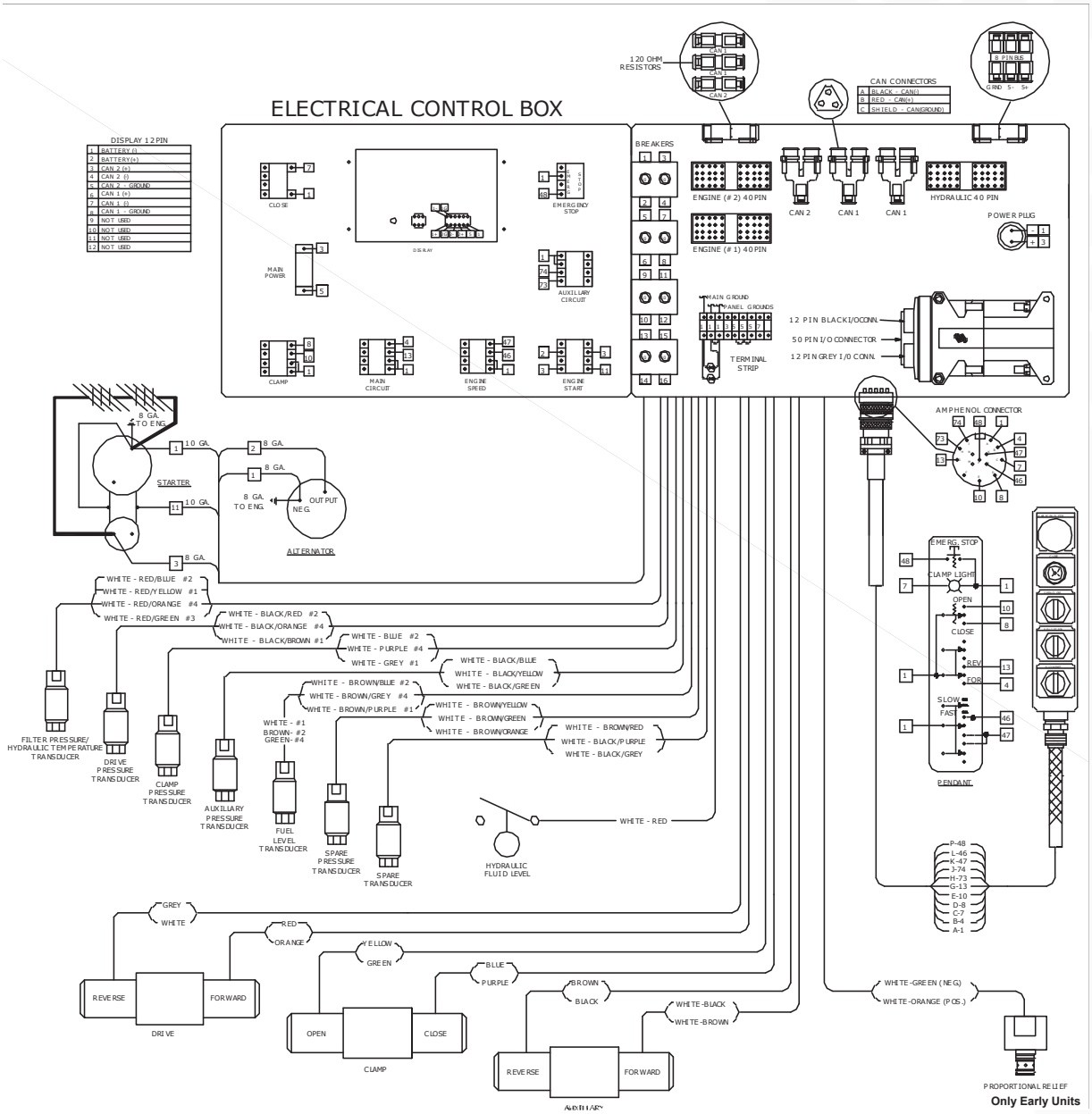
Electrical Component Diagram



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Electrical Component Legend

ENGINE (#2) 40 PIN - RIGHT

1	BATTERY (+)	UN-SWITCHED POS.
2	BATTERY (-)	NEGATIVE
3	NOT USED	NA
4	NOT USED	NA
5	NOT USED	NA
6	NOT USED	NA
7	NOT USED	NA
8	NOT USED	NA
9	NOT USED	NA
10	NOT USED	NA
11	NOT USED	NA
12	PIN 46 ON 50 PIN I/O	MAINTENANCE RESET
13	PIN 12 ON 12 PIN GREY I/O	MAINTENANCE DUE
14	NOT USED	NA
15	NOT USED	NA
16	PIN 5 ON 12 PIN FOR DISPLAY	CAN 3 (GND) J1939
17	PIN 3 ON 12 PIN FOR DISPLAY	CAN 3 (+) J1939
18	PIN 4 ON 12 PIN FOR DISPLAY	CAN 3 (-) J1939
19	NOT USED	NA
20	NOT USED	NA
21	NOT USED	NA
22	NOT USED	NA
23	NOT USED	NA
24	NOT USED	NA
25	NOT USED	NA
26	BATTERY (+)	SWITCHED POSITIVE
27	PIN 44 ON 50 PIN I/O	ENGINE ON
28	NOT USED	NA
29	BATTERY (-)	NEGATIVE
30	PIN 42 ON 50 PIN I/O	ENGINE FAST
31	BATTERY (+)	UN-SWITCHED POS.
32	BATTERY (+)	UN-SWITCHED POS.
33	NOT USED	NA
34	NOT USED	NA
35	NOT USED	NA
36	39 ON 50 PIN I/O	START OUTPUT
37	NOT USED	UN-SWITCHED POS.
38	NOT USED	NA
39	PIN 43 ON 50 PIN I/O	ENGINE SLOW
40	PIN 30 ON 50 PIN I/O	GLOW PLUG

ENGINE (#1) 40 PIN - LEFT

1	BATTERY (+)	UN-SWITCHED POS.
2	BATTERY (-)	NEGATIVE
3	NOT USED	NA
4	NOT USED	NA
5	NOT USED	NA
6	NOT USED	NA
7	NOT USED	NA
8	NOT USED	NA
9	NOT USED	NA
10	NOT USED	NA
11	NOT USED	NA
12	PIN 46 ON 50 PIN I/O	MAINTENANCE RESET
13	PIN 12 ON 12 PIN GREY I/O	MAINTENANCE DUE
14	NOT USED	NA
15	NOT USED	NA
16	PIN 5 ON 12 PIN FOR DISPLAY	CAN 2 (GND) J1939
17	PIN 3 ON 12 PIN FOR DISPLAY	CAN 2 (+) J1939
18	PIN 4 ON 12 PIN FOR DISPLAY	CAN 2 (-) J1939
19	NOT USED	NA
20	NOT USED	NA
21	NOT USED	NA
22	NOT USED	NA
23	NOT USED	NA
24	NOT USED	NA
25	PIN 10 ON 12 PIN GREY I/O	C4-C6 PTO ENABLE
26	BATTERY (+)	SWITCHED POSITIVE
27	PIN 44 ON 50 PIN I/O	ENGINE ON
28	NOT USED	NA
29	BATTERY (-)	NEGATIVE
30	PIN 42 ON 50 PIN I/O	ENGINE FAST
31	BATTERY (+)	UN-SWITCHED POS.
32	BATTERY (+)	UN-SWITCHED POS.
33	NOT USED	NA
34	NOT USED	NA
35	NOT USED	NA
36	33 ON 50 PIN I/O	START OUTPUT
37	BATTERY (+)	UN-SWITCHED POS.
38	NOT USED	NA
39	PIN 43 ON 50 PIN I/O	ENGINE SLOW
40	PIN 30 ON 50 PIN I/O	GLOW PLUG

HYDRAULIC 40 PIN

1	8 PIN BUS (+5V)	NA
2	NOT USED	NA
3	8 PIN BUS (-5V)	NA
4	PIN 37 ON 50 PIN I/O	DRIVE REVERSE
5	GROUND	NA
6	8 PIN BUS (+5V)	NA
7	PIN 6 ON 12 PIN BLACK	DRIVE PRESSURE
8	8 PIN BUS (-5V)	NA
9	PIN 36 ON 50 PIN I/O	DRIVE FORWARD
10	GROUND	NA
11	NOT USED	NA
12	NOT USED	NA
13	NOT USED	NA
14	PIN 34 ON 50 PIN I/O	CLAMP OPEN
15	GROUND	NA
16	8 PIN BUS (+5V)	NA
17	PIN 5 ON 12 PIN BLACK I/O	CLAMP PRESSURE
18	8 PIN BUS (-5V)	NA
19	PIN 35 ON 50 PIN I/O	CLAMP CLOSED
20	GROUND	NA
21	8 PIN BUS (+5V)	NA
22	PIN 4 ON 12 PIN BLACK I/O	PRESSURE - FILTER
23	PIN 3 ON 12 PIN BLACK I/O	TEMPERATURE - FILTER
24	8 PIN BUS (-5V)	NA
25	P41 ON 50 PIN I/O	AUXILIARY REVERSE
26	GROUND	NA
27	8 PIN BUS (+5V)	NA
28	PIN 31 ON 50 PIN I/O	AUXILLARY PRESSURE
29	8 PIN BUS (-5V)	NA
30	PIN 40 ON 50 PIN I/O	AUXILIARY FORWARD
31	GROUND	NA
32	8 PIN BUS (+5V)	NA
33	PIN 2 ON 12 PIN BLACK I/O	FUEL LEVEL
34	8 PIN BUS (-5V)	NA
35	NOT USED	NA
36	GROUND	NA
37	PIN 10 ON 50 PIN I/O	HYD. FLUID LEVEL
38	NOT USED	NA
39	GROUND	NA
40	PIN 45 ON 50 PIN I/O	FORWARD RAMP

BREAKERS

1	PIN 1 ON ENG #1 40 PIN	NA
2	TERM 5 ON TERM STRIP	NA
3	PIN 31 ON ENG #1 40 PIN	NA
4	TERM 5 ON TERM STRIP	NA
5	PIN 32 ON ENG #1 40 PIN	NA
6	TERM 5 ON TERM STRIP	NA
7	PIN 37 ON ENG #1 40 PIN	NA
8	TERM 5 ON TERM STRIP	NA
9	PIN 1 ON ENG #2 40 PIN	NA
10	TERM 5 ON TERM STRIP	NA
11	TERM 31 ON ENG #2 40 PIN	NA
12	TERM 5 ON TERM STRIP	NA
13	PIN 32 ON ENG #2 40 PIN	NA
14	TERM 5 ON TERM STRIP	NA
15	PIN 37 ON ENG #2 40 PIN	NA
16	TERM 5 ON TERM STRIP	NA

50 PIN I/O CONNECTOR

1	BATTERY (-)	NA
2	BATTERY (+)	NA
3	CAN 1 (+)	PLUS 1 NETWORK
4	CAN 1 (-)	PLUS 1 NETWORK
5	CAN 1 - GROUND	PLUS 1 NETWORK
6	WIRE 48 TO E-STOP	EMERGENCY STOP
7	PIN P ON AMPHENOL CONN.	CLAMP LIGHT
8	5VDC SENSOR PANEL	NA
9	SENSOR GROUND	NA
10	PIN 37 ON 40 PIN HYD. CONN.	HYDRAULIC FLUID LEVEL
11	WIRE 10 TO OPEN ON PANEL	OPEN SWITCH PANEL
12	PIN E ON AMPHENOL CONN.	OPEN SWITCH PENDANT
13	WIRE 8 TO CLOSE ON PANEL	CLOSE SWITCH PANEL
14	PIN D ON AMPHENOL CONN.	CLOSE SWITCH PENDANT
15	WIRE 4 TO FORWARD PANEL	FORWARD SWITCH PANEL
16	PIN B ON AMPHENOL CONN.	FORWARD SWITCH PENDANT
17	WIRE 13 TO REVERSE PANEL	REVERSE SWITCH PANEL
18	PIN G ON AMPHENOL CONN.	REVERSE SWITCH PENDANT
19	WIRE 46 TO SLOW ON PANEL	SLOW SWITCH PANEL
20	CAN 2 (+)	J 1939 NETWORK
21	CAN 2 (-)	J 1939 NETWORK
22	CAN 2 - GROUND	J 1939 NETWORK
23	PIN L ON AMPHENOL CONN.	SLOW SWITCH PENDANT
24	WIRE 47 TO FAST ON PANEL	FAST SWITCH PANEL
25	PIN K ON AMPHENOL CONN.	FAST SWITCH PENDANT
26	WIRE 5 TO ENGINE ON	ENGINE ON
27	WIRE 11 TO ENGINE START	ENGINE START
28	WIRE 74 TO AUX. FOR. PANEL	AUXILIARY FORWARD PANEL
29	PIN J ON AMPHENOL CONN.	AUXILIARY FORWARD PENDANT
30	PIN 40 ON 40 PIN ENG. CONN.	GLOW PLUG
31	PIN 28 ON 40 PIN HYD. CONN.	AUXILIARY PRESSURE
32	NOT USED	NA
33	PIN 36 ON 40 PIN ENG. #1	START OUTPUT (ENGINE #1)
34	PIN 14 ON 40 PIN HYD. CONN.	CLAMP OPEN SOLENOID
35	PIN 15 ON 40 PIN HYD. CONN.	CLAMP CLOSE SOLENOID
36	PIN 9 ON 40 PIN HYD. CONN.	DRIVE FORWARD SOLENOID
37	PIN 4 ON 40 PIN HYD. CONN.	DRIVE REVERSE SOLENOID
38	PIN C ON AMPHENOL CONN.	CLAMP LIGHT
39	PIN 36 ON 40 PIN ENG. #2	START OUTPUT (ENGINE #2)
40	PIN 30 ON 40 PIN HYD. CONN.	AUXILLARY FORWARD SOLENOID
41	PIN 25 ON 40 PIN HYD. CONN.	AUXILLARY REVERSE SOLENOID
42	PIN 30 ON 40 PIN ENG. CONN.	RAMP UP - IDLE (ENG. 1 & 2)
43	PIN 39 ON 40 PIN ENG. CONN.	RAMP DOWN - IDLE (ENG. 1 & 2)
44	PIN 27 ON 40 PIN ENG. CONN.	ENGINE ON (ENG. 1 & 2)
45	PIN 40 ON 40 PIN HYD. CONN.	FORWARD RAMP
46	PIN 12 ON 40 PIN ENG. CONN.	MANITENANCE RESET (ENG 1 & 2)
47	BATTERY (+)	NA
48	BATTERY (+)	NA
49	BATTERY (+)	NA
50	BATTERY (+)	NA

12 PIN BLACK I/O CONN.

1	PIN 13 ON 40 PIN ENG. #2	MAINTENANCE DUE ENGINE #2
2	PIN 33 ON 40 PIN HYD. CONN.	FUEL LEVEL TRANSDUCER
3	PIN 23 ON 40 PIN HYD. CONN.	TEMPERATURE TRANSDUCER
4	PIN 22 ON 40 PIN HYD. CONN.	FILTER PRESSURE TRANSDUCER
5	PIN 17 ON 40 PIN HYD. CONN.	CLAMP PRESSURE TRANDUCER
6	PIN 6 ON 40 PIN HYD. CONN.	DRIVE PRESSURE TRANSDUCER
7	NOT USED	NA
8	NOT USED	NA
9	NOT USED	NA
10	NOT USED	NA
11	NOT USED	NA
12	NOT USED	NA

12 PIN GREY I/0 CONN.

1	BATTERY (-)	NA
2	BATTERY (+)	NA
3	CAN 1 (+)	PLUS 1 NETWORK
4	CAN 1 (-)	PLUS 1 NETWORK
5	NOT USED	NA
6	8 PIN BUS (+5V)	NA
7	8 PIN BUS (-5V)	NA
8	WIRE 73 TO REVERSE PANEL	REVERSE SWITCH PANEL
9	PIN H ON AMPHENOL CONN.	REVERSE SWITCH PENDANT
10	NOT USED	NA
11	NOT USED	NA
12	PIN 13 ON 40 PIN ENG. #1	MAINTENANCE DUE ENGINE #2

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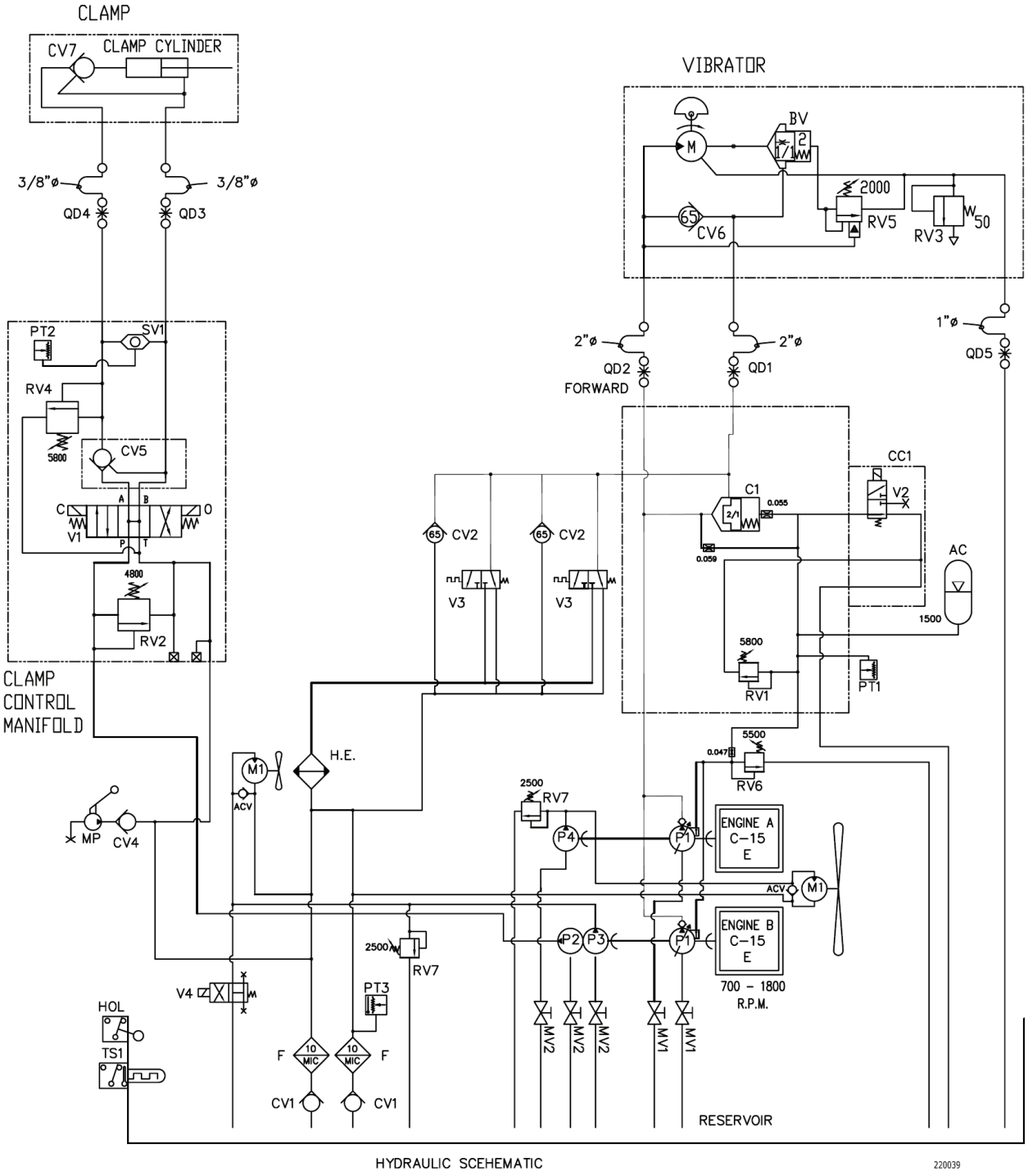
Hydraulic Schematic



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Hydraulic Schematic

ITEM	QTY.	PART NO.	DESCRIPTION
AC	1	750064	ACCUMULATOR
ACV	2	750288	ANTI-CAVITATION VALVE
BV	1	110622	BREAK VALVE
C1	1	750283	CARTRIDGE VALVE
CC1	1	750421	CARTRIDGE COVER
CV1	4	760050	CHECK VALVE
CV2	2	130339	CHECK VALVE
CV3	1	NA	CHECK VALVE
CV4	1	100451	CHECK VALVE
CV5	1	760036	CHECK VALVE
CV6	1	110296	CHECK VALVE
CV7	1	120629	CHECK VALVE
CV8	1	500131	CHECK VALVE
E	2	730816	DIESEL ENGINE
F	8	100584	RETURN FILTER
HOL	1	100314	FLOAT SWITCH
TS1	1	750002	TEMPERATURE SWITCH
M	2	750409	DRIVE MOTOR
MP	1	100447	MANUAL PUMP
P1	2	750651	DRIVE PUMP
P2	1	170393	CLAMP PUMP
P3	1	750688	FAN PUMP
P4	1	750689	FAN PUMP
PT1	1	770181	PRESS TRANS 0-7500
PT2	1	770181	PRESS TRANS 0-7500
PT3	1	750365	PRESS TRANS 0-100
QD1	1	110690	REVERSE DISCONNECT
QD2	1	110692	FORWARD DISSCONECT
QD3	1	100777	OPEN DISCONNECT
QD4	1	100245	CLOSE DICONNECT
QD5	1	400095	CASE DISCCONNECT
RV1	1	750408	RELIEF VALVE
RV2	1	750408	RELIEF VALVE
RV3	1	100032	RELIEF VALVE
RV4	1	731071	THERMAL RELIEF VALVE
RV5	1	731161	RELIEF VALVE
RV6	1	750408	RELIEF VALVE
RV7	2	770293	RELIEF VALVE
SV1	1	750024	SHUTTLE VALVE
V1	1	750334	DIRECTIONAL VALVE
V2	1	750513	DIRECTIONAL VALVE
V3	2	110628	COOLER VALVE
V4	1	140665	HYDRAULIC FAN VALVE
M1	2	110628	FAN MOTOR
MV1	2	510095	MANUAL VALVE
MV2	3	400117	MANUAL VALVE