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## 1. MAINTENANCE SCHEDULE

	Daily Before Starting	Every 25 hrs.	Every 100 hrs.	Every 300 hrs.
Check engine oil level.	•			
Visually inspect exciter base for leaks	•			
Inspect/clean air filter. Re-oil foam element; replace as required.	•			
Check/tighten external hardware.		•		
Change engine oil.		•		
Inspect/adjust V-belt.		•		
Check/regap spark plug. Replace when necessary.			•	
Clean engine cylinder cooling fins.			•	
Inspect shock absorber. Replace if cracked or split.			•	
Change exciter oil.				•
Change hydraulic oil in handle.				•
Change fuel filter or strainer.				•
Clean combustion chamber.				•
Check/adjust breaker point ignitions.				•
Clean/rinse fuel tank.				•
Clean rewind starter				•

For new or reconditioned engines:

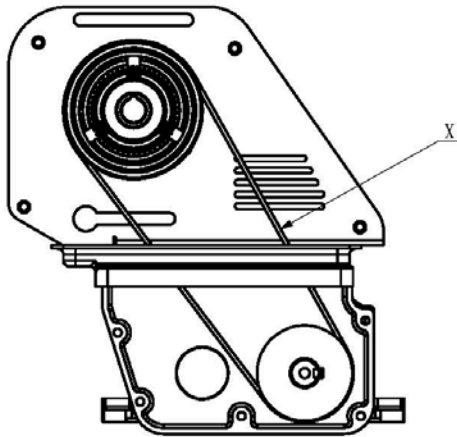
Check/adjust belt tension.	After first 5 hours of operation.
Change engine oil.	After first 10 hours of operation.

## 2. MAINTAINANCE

### 2.1 Drive Belt

See Maintenance Schedule for service intervals. On new machines or after installing a new belt, check the belt tension after the first 5 hours of operation.

Adjust belt for 5-10mm deflection when pressed midway between the belt pulleys (x).



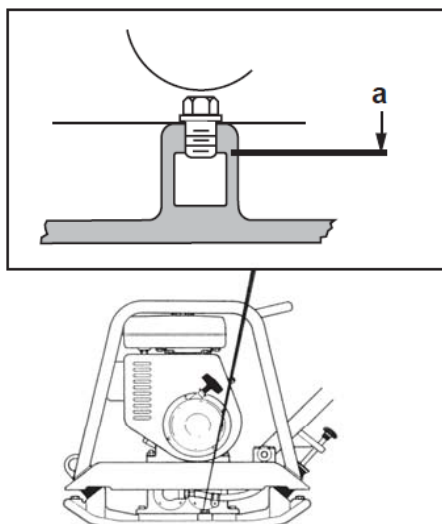
### 2.2 Exciter Oil

The bearings in the exciter assembly are splash lubricated and rotate at a very high speed (up to 5400rpm). It is important to maintain the exciter oil at the proper level and change it regularly to ensure maximum protection.

To drain oil, remove drain plug and tip machine toward drain hole. Use a suction gun to draw oil out of the exciter case.

When filling, position plate on a level surface and add oil through drain plug hole until oil is even with bottom edge of threads (a).

**Caution:** DO NOT overfill exciter case. Excessive wear on engine and exciter bearings will result.



## 2.3 Control Circuit Oil

Check oil level in control handle once a week or every 25 hours.

Remove plug from top of the control handle. Add oil as required to maintain proper oil level. Oil level should be at "OIL LEVEL" mark on outside of housing. If oil needs replenishing on a regular basis, it may be leaking past the seals on the pistons.

Service the seals on the pistons.

A low oil may allow air to enter the control circuit. This condition is normally characterized by the plate's inability to travel in the forward direction. Should this occur, bleed the system.

## 2.4 Bleeding the Control Circuit

Bleed control circuit whenever handle or exciter have been opened for service.

2.4.1 Turn off engine before servicing.

2.4.2 Lock handle in its vertical upright position.

2.4.3 Remove belt cover to expose exciter pulley **(a)**.

2.4.4 Secure the control lever in the reverse position using a C-clamp to prevent the spring and piston inside from popping out when control assembly is removed.

Remove control assembly from handle tube.

2.4.5 Fill handle tube with oil.

2.4.6 Remove bleeder screw **(c)** from cover flange on exciter.

2.4.7 Slowly rotate exciter pulley counterclockwise (same direction as normal operation) two full turns. Oil will flow out of bleeder hole during this procedure as the piston in the exciter extends and retracts inside flange cover.

2.4.8 Rotate exciter pulley to a position where oil is observed flowing from the hole and insert the bleed crew while holding the pulley in this position. This prevents air from being drawn back into the flange cover. Tighten the bleeder screw.

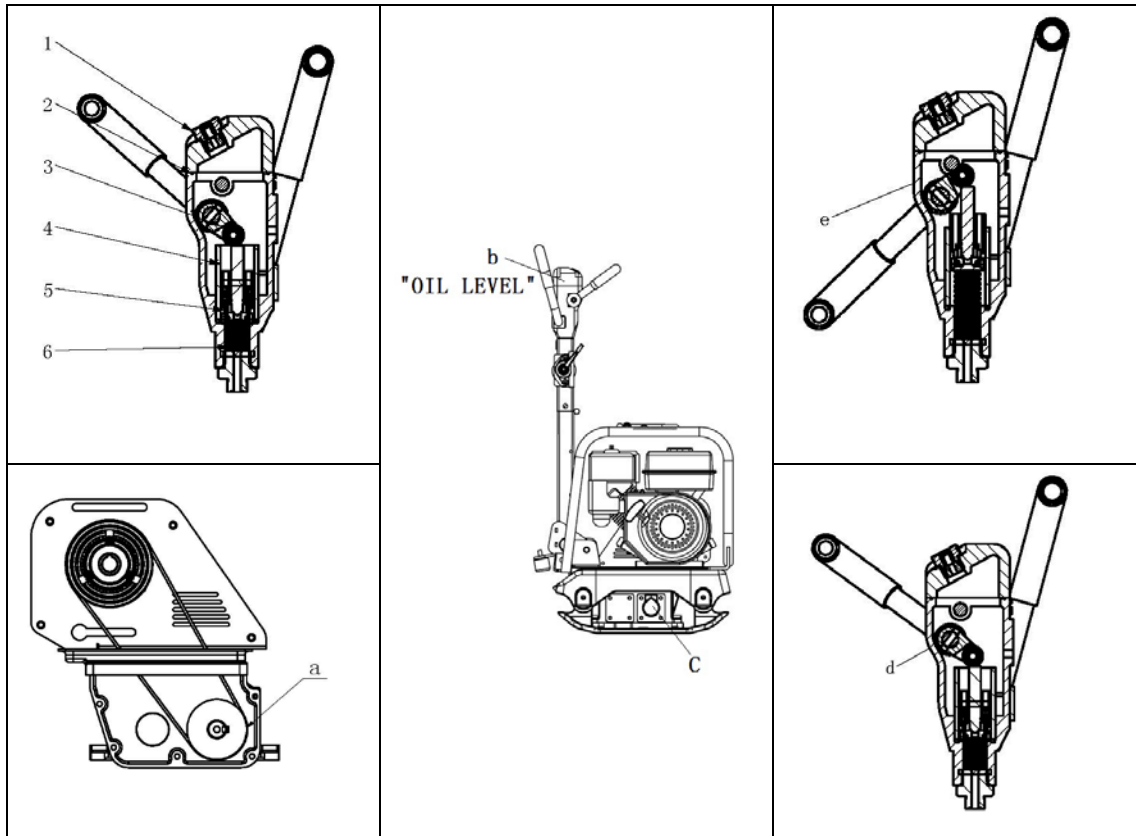
2.4.9 Top off oil handle tube.

2.4.10 Make sure O-ring is in place between control assembly and tube flange and re-install control lever assembly.

2.4.11 Remove fill plug from control lever assembly and fill with oil to "OIL LEVEL" mark **(b)**. **Do not** overfill.

2.4.12 Wait 30 seconds for oil to fill area under piston, then remove C-clamp and re-install fill plug.

2.4.13 Start plate and check direction control.



Ref.	Description	Ref.	Description
1.	FILL PLUG	4	PISTON
2	O-RING	5	OIL SEAL
3	CAN	6	SPRING

## **3. REPAIR**

### **3.1 General Repair**

The repair procedures specify using sealants and screw and nut adhesives to seal metal surfaces and secure fasteners in place. These products must be used where indicated.

Most thread locking sealants break down at temperatures above 177°C. If a bolt or nut resists separation, apply heat to it using a small propane torch. When doing so, check to make sure no other portion of the unit will be damaged from the use of the torch.

Correct torque values are listed whenever possible. Follow these specifications when replacing or tightening screws and nuts. This is especially important at sealed surfaces where screws must be tightened evenly to ensure airtight seals thus preventing leaks.

The step-by-step procedures listed here provide complete descriptions for the removal and replacement of all serviceable parts. However, items such as bearings and shafts, assembled with press fits, should be inspected for wear and damage while still in place. Removing or installing such items often requires tools or presses to do the test properly.

When installing bearing into housing, apply pressure only to the outer race of the bearing. If pressing a bearing onto a shaft, pressure should be applied only to the inner race. Apply pressure evenly around the bearing. Avoid using a hammer to pound bearing in place.

If using heat to fit a bearing onto a race, use a hot plate or hot oil bath where the temperature can be controlled. Never heat a bearing using a propane torch.

Excessive heat, over 150°C, can affect the hardness characteristics and tolerance values of the bearing.

### **3.2 Checking Exciter Operation**

Before servicing the exciter, check for other possible problems that could affect machine operation, such as: engine speed, control circuit operation, drive belt tightness, and clutch performance.

If the engine is running under speed, the exciter VPM will be reduced, the plate will handle sluggishly and perform poorly, and travel speeds will be greatly reduced. Check engine speed with a tachometer.

If engine cannot be brought up to speed, either the engine is at fault or exciter bearings are binding. Check general condition of engine, engine compression, and no-load operation speed.

3.2.1 To check bearings, run the machine with clutch engaged for several minutes to warm exciter. Bearings may appear to turn freely when cold but start to bind as they heat up. Stop engine and rotate the exciter by hand.

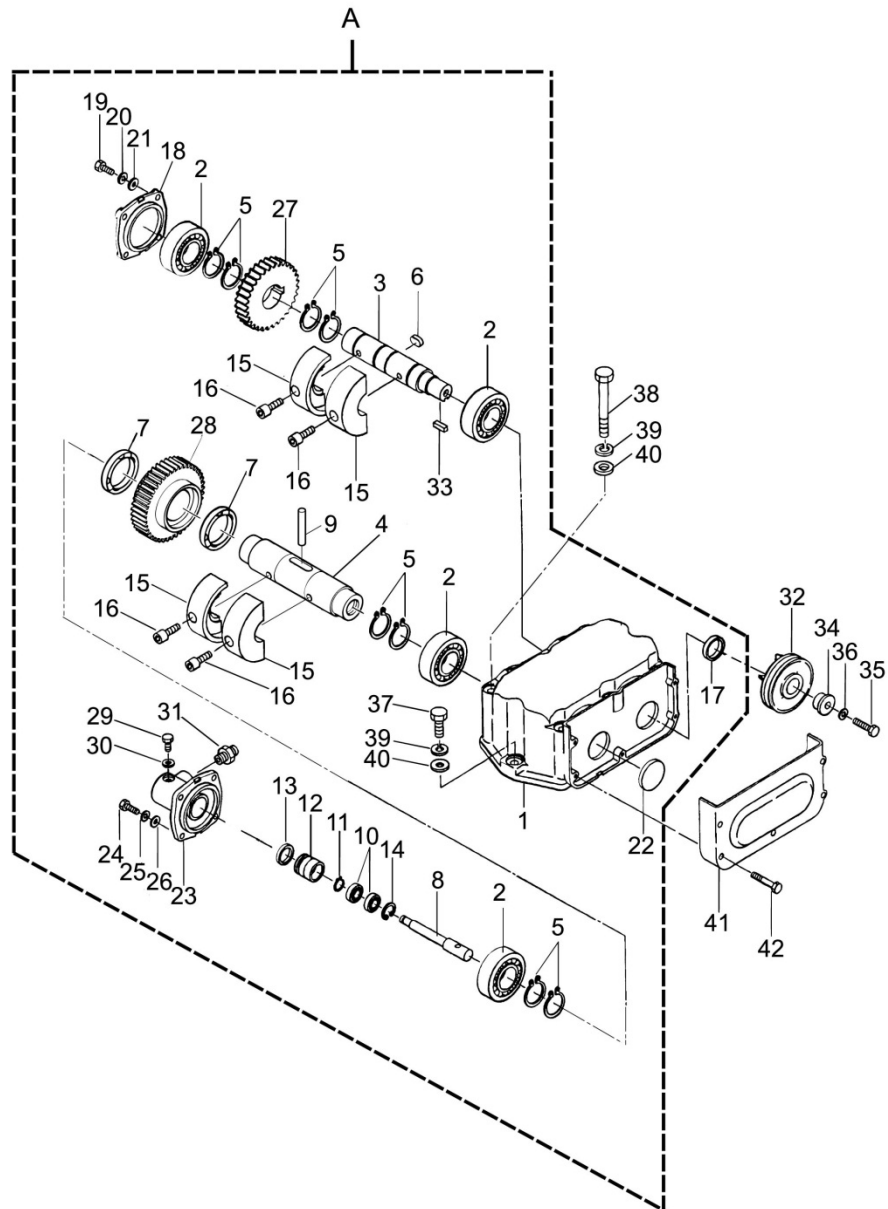
3.2.2 Remove belt cover and check operation of drive belt, clutch, and exciter pulley. Use a vibration tachometer and check exciter VPM with engine running at full throttle (3500-3600rpm)

3.2.3 Air trapped in the control circuit will affect the plate's ability to maintain

natural position, or shift into forward. Make sure the system has been properly bled, seals in handle are in good condition, and oil is at correct level. See *Bleeding the Control Circuit*.

3.2.4 If control system checks out but machine's directional control still does not operate correctly, the exciter's actuating assembly is faulty or the exciter timing is set incorrectly.

### 3.3 Exciter Exploded View



Ref.	Description	Ref.	Description
1.	VIBRATING CASE	22	SEAL CAP
2	ROLLER BEARING	23	CYLINDER
3	ROTARY SHAFT, DRIVE	24	BOLT
4	ROTARY SHAFT, DRIVEN	25	SW
5	STOP RING	26	PW
6	KEY	27	GEAR (DRIVE)
7	BEARING	28	GEAR (DRIVEN)
8	PISTON ROD	29	BOLT
9	PIN	30	COPPER PACKING
10	BEARING	31	CONNECTOR
11	STOP RING	32	PULLEY
12	PISTON	33	KEY
13	PACKING	34	WASHER
14	STOP RING	35	BOLT
15	ECCENTRIC ROTATOR	36	SW
16	SOCKET HEAD BOLT	37	BOLT
17	OIL SEAL	38	BOLT
18	BEARING COVER	39	SW
19	BOLT	40	PW
20	SW	41	BELT COVER (LOWER)
21	PW	42	SOCKET HEAD BOLT

### 3.4 Removing Exciter

- 3.4.1 Turn machine's engine off.
- 3.4.2 Remove belt cover and remove drive belt.
- 3.4.3 Using a 3-jaw puller, remove pulley from exciter drive shaft.
- 3.4.4 Clamp the control line hose with locking pliers or C-clamp to prevent leaking. Then, disconnect the line from the front exciter flange cover.
- 3.4.5 Remove the four hex nuts that secure the tubular frame to the plate. Remove the frame from the plate.
- 3.4.6 Using an appropriate lift or crane, lift the complete upper mass from the baseplate to expose the exciter assembly.
- 3.4.7 Mark the exciter housing referencing the right hand from side.
- 3.4.8 Remove the eight socket head screw securing exciter and lift the exciter from the plate.

### 3.5 Installing Exciter

- 3.5.1 Scrape off old gasket material and thoroughly clean mounting surfaces on exciter and baseplate.
- 3.5.2 Once thoroughly clean and completely dry, coat mounting baseplate.
- 3.5.3 Position exciter assembly so that exciter drive pulley faces back left (CPC-60, CPC-160 and CPC-240)/back right (CPC-350 and CPC-405) corner of plate.
- 3.5.4 Coat threads of mounting bolts, insert them and torque to 49Nm.



- 3.5.5 Inspect shock absorber. Replace any that appear worn or damaged. Coat threads of shock absorber, insert and torque to 86Nm.
- 3.5.6 Position upper mass onto lower mass and secure with nuts. Torque nuts to 86Nm.
- 3.5.7 Install exciter drive pulley until it is flush against shaft shoulder.
- 3.5.8 Connect control hose and bleed the system.
- 3.6.9 Install drive belt. Adjust belt tension and check alignment of pulleys replace belt cover.
- 3.6.10 Fill exciter with oil.

### **3.6 Disassembling the Exciter**

- 3.6.1 Mark from corner of housing on side that exciter pulley attaches to.
- 3.6.2 Jam the gears to prevent them from turning and remove all ECCENTRIC ROTATOR (15).
- 3.6.3 Remove STOP RING (5).
- 3.6.4 Mark location of all BEARING COVER (18), SEAL CAP (22), CYLINDER (23) and PULLEY (32).
- 3.6.5 Remove driven shaft (4).
- 3.6.6 Use arbor press or 2-jaw puller to remove bearing.
- 3.6.7 Remove piston assembly from driven shaft by placing on a wooden V-block. The block should have a hole drilled in it for a pin (9). Press pin (**DO NOT HAMMER**) through shaft until piston can be removed.
- 3.6.8 Press drive shaft from exciter.
- 3.6.9 Use an arbor press or puller to remove bearing race and drive gear.

### **3.7 Re-assembling the Exciter**

#### **Installing drive shaft**

- 3.7.1 Assemble stop ring (5), key (6), drive gear (27), and bearing races onto shaft.
- 3.7.2 Press roller bearing into on side of exciter housing. Use bearing cover as a guide in positioning the bearing the correct distance into the housing.
- 3.7.3 Install the drive shaft. Complete the installation by pressing the remaining bearing into the opposite side of housing. Position the bearing into the housing using the cover.

#### **Installing driven shaft**

- 3.7.4 Using the wooden V-block to secure shaft, position the piston assembly in driven shaft and press pin (9) through.

**Caution:** Do not hammer on the pin. Hammering may mushroom top of pin and cause it to bind in the sleeve gear.

**Note:** *When installing pin, make sure it extends an equal distance on each side of shaft so it will slide freely once sleeve gear is installed.*

- 3.7.5 Press sleeve gear bearing on shaft and secure in place with stop ring.
- 3.7.6 Press bearing race on pulley side of shaft. Do not install bearing race on opposite side of shaft until shaft and driven gear are in place.
- 3.7.7 Insert driven shaft assembly through housing and slide driven gear on shaft and over driven gear.

**Note:** Driven gear must be installed so that when the piston assembly is pulled **out**.

3.7.8 Press bearing into pulley side of exciter housing. Position it in the housing using a bearing cover.

**Timing ECCENTRIC ROTATOR**

3.7.9 Align timing marks on gears with piston extended.

3.7.10 Install stop ring.

3.7.11 After installation is complete, operate piston by hand and make sure both driven gear and piston slide freely.

3.7.12 Assemble cylinder to housing. Torque screw to 10Nm.

3.7.13 Install stop ring on end of driven shaft.

*3.7.14 Once assembled, eccentric rotator can cause exciter shaft to turn unexpectedly and with considerable force. Keep fingers and hands away from gears and eccentric rotator when handling exciter assembly to prevent being pinched.*

Install eccentric rotator. Torque screws to 50Nm.

3.7.15 Re-install the exciter assembly to plate.

## 4. TROUBLESHOOTING

Problem	Cause	Remedy
Engine runs, but no vibration	Belt broken or loose. Clutch not engaging.	Replace belt or adjust tension. Inspect clutch for damage and repair
Engine runs, but plate does not develop full speed	Engine RPM set too low.  Throttle control not adjusted correctly. Soil conditions too wet, plate bogging down. Drive belt or clutch worn and slipping. Exciter pulley slipping. Exciter gears not timed correctly. Exciter bearing binding.	Adjust engine speed per manufacturer's recommendations. Inspect throttle control and adjust rpm to 3600 at full throttle. Review application.  Replace belt or clutch shoes.  Replace tolerance ring. Remove exciter and adjust timing.  Check oil level in exciter and inspect exciter bearings. Replace bearings if necessary.
Plate pulls to on side	Shock absorber damaged.	Inspect and replace.
Plate travels in reverse only	Air in control circuit. Oil level low in handle. Seals in handle leaking. Seal on exciter piston leaking.	Bleed air from system. Fill oil to level mark. Replace seals. Replace seal.
Forward and Reverse switched	Exciter gears not timed correctly. Sleeve gear installed incorrectly on drive shaft.	Remove exciter and adjust gear timing.  Remove exciter and check position of sleeve gear on drive shaft.
Directional control inoperative	Piston binding in flange.  Sleeve gear biding on drive shaft	Inspect piston assembly for damage. Repair or replace. Remove flange cover and operate piston by hand to check operation of sleeve gear. Check sleeve gear and guide pin.

## 5 OIL/FUEL CONSUMPTION

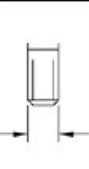
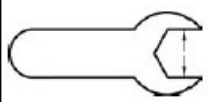

Honda GX160 – 1.4L/h – 3600RPM

Exciter oil – 15W40 150ml

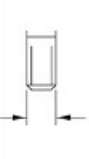

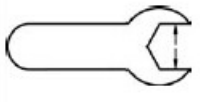

Model	Fuel Consumption	Exciter oil	Hydraulic Oil
CPC-60	1.4L/h – 3600RPM	10W30	Shell Tellus S32
CPC-160	1.7L/h – 3600RPM		
CPC-240	2.4L/h – 3600RPM		
CPC-350	3.5L/h – 3600RPM		
CPC-405	3.5L/h – 3600RPM		

## 6 TORQUE

### Metric Fasteners (DIN)

	TORQUE VALUES (Based on Bolt Size and Hardness)						WRENCH SIZE			
	8.8		10.9		12.9					
Size	Nm	ft.lb.	Nm	ft.lb.	Nm	ft.lb.	Metric	Inch	Metric	Inch
M3	1.2	*11	1.6	*14	2.1	*19	5.5	7/32	2.5	–
M4	2.9	*26	4.1	*36	4.9	*43	7	9/32	3	–
M5	6.0	*53	8.5	6	10	7	8	5/16	4	–
M6	10	7	14	10	17	13	10	–	5	–
M8	25	18	35	26	41	30	13	1/2	6	–
M10	49	36	69	51	83	61	17	11/16	8	–
M12	86	63	120	88	145	107	19	3/4	10	–
M14	135	99	190	140	230	169	22	7/8	12	–
M16	210	155	295	217	355	262	24	15/16	14	–
M18	290	214	405	298	485	357	27	1-1/16	14	–
M20	410	302	580	427	690	508	30	1-1/4	17	–

### Inch Fasteners (DIN)

	SAE 5		SAE 8							
	Size	Nm	ft.lb.	Nm	ft.lb.	Nm	ft.lb.	Metric	Inch	Metric
No.4	0.7	*6	1.0	*14	1.4	*12	5.5	1/4	–	3/32
No.6	1.4	*12	1.9	*17	2.4	*21	8	5/16	–	7/64
No.8	2.5	*22	3.5	*31	4.7	*42	9	11/32	–	9/64
No.10	3.6	*32	5.1	*45	6.8	*60	–	3/8	–	5/32
1/4	8.1	6	12	9	16	12	–	7/16	–	3/32
5/16	18	13	26	19	33	24	13	1/2	–	1/4
3/8	31	23	45	33	58	43	–	9/16	–	5/16
7/16	50	37	71	52	94	69	16	5/8	–	3/8
1/2	77	57	109	80	142	105	19	3/4	–	3/8
9/16	111	82	156	115	214	158	–	13/16	–	–
5/8	152	112	216	159	265	195	24	15/16	–	1/2
3/4	271	200	383	282	479	353	–	1-1/8	–	5/8