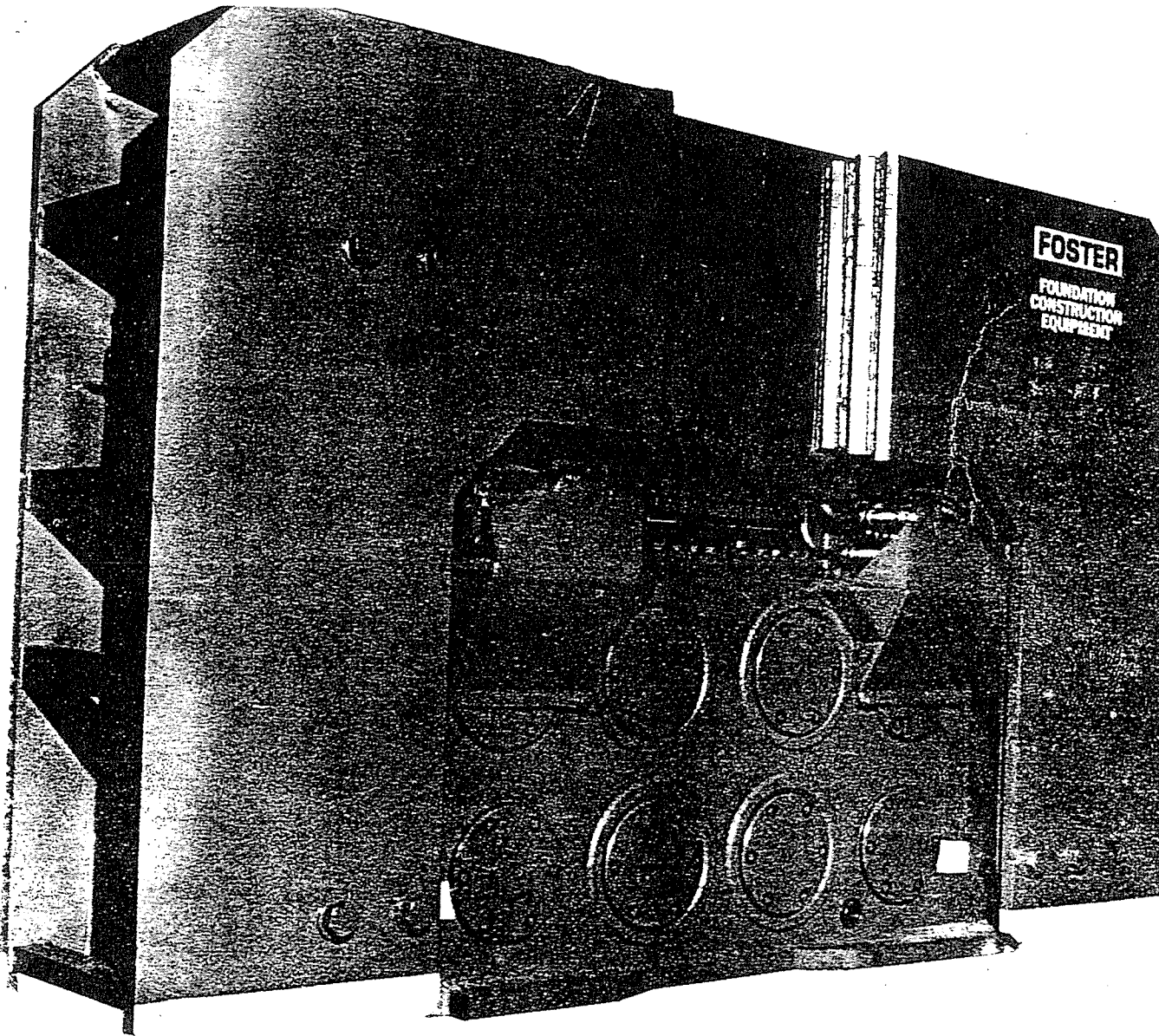


FOSTER

L.B.FOSTER COMPANY

4000
VIBRO DRIVER[®]/EXTRACTOR



OPERATION/MAINTENANCE
MANUAL

L. B. FOSTER
4000
VIBRO DRIVER/EXTRACTOR
OPERATION AND MAINTENANCE MANUAL

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I). GENERAL DESCRIPTION

A). Vibro Driver/Extractor

The Foster 4000 is a low frequency vibrator pile driver designed to drive and extract sheet piling, pipe, timber, and concrete pile, caisson pile, and H, I, and wide flange beams.

The model 4000 operates in a frequency range of 0 to 1400 vibrations per minute to provide maximum pile penetration and extraction rates in a wide variety of soils. Amplitude, the major determinate of pile penetration rate, is governed by the design of the unit and by pile weight and type of soil. Amplitude for the 4000 usually ranges between 5/16 and 1-1/4 inch.

The Vibro/Driver Extractor System consists of two major components - the Drive Extractor itself, with attached driving/extracting head, and the hydraulic power pack with remote control pendant.

The Driver/Extractor consists of two major components - a vibro case, and a suspension case containing a vibration suspension system.

The Vibro case contains eight eccentric weights which rotate in a vertical plane to create vibration. The two hydraulic motors are gear coupled to the eccentrics. The eccentrics and drive shafts are mounted in heavy-duty cylindrical roller bearings. Lubrication is provided by a splash system actuated by the rotating eccentrics and gears.

A unique elastomeric suspension system isolates the suspension case from the vibro case and therefore the crane boom from most vibration.

B). Hydraulic Power Pack

The Hydraulic Power Pack is driven by an Allis Chalmers 25000 Engine. The engine rating is 445 H.P. at 2000 RPM.

The totally enclosed power pack is mounted on a skid type fuel tank sub-base. Located at the rear of the unit is a control panel which houses all operating controls.

and pressure gauges. All 5 hydraulic hoses connect into the power pack below the control panel. The unit utilizes a closed loop hydraulic circuit with rapid response pressure compensation to limit maximum pressure output. A common tank supplies oil for both the hydraulic pumps; one for the clamp in the driving/extracting head and one pump for the vibrator motors. Hydraulic oil temperature is maintained by an oil cooler. The hydraulic system is continually cleaned by 10 micron and 3 micron full flow oil filters.

Control of the output flow is maintained by a hand-held remote control pendant.

C). Driving/Extracting Heads

Various types of driving/extracting heads are available for the 4000 to handle everything from steel sheet piling to the largest caisson pipe. The head bolts to the bottom of the vibrating case and contains one or more hydraulic cylinders to provide up to 200 tons of clamping force. Clamping or unclamping occurs in 5 to 7 seconds.

D). Remote Control Pendant

The Vibro Driver/Extractor is controlled from a hand-held pendant. Switches control clamp and unclamp of the driving/extracting head. A potentiometer controls vibrating speed, and a pressure light indicates that the clamp is closed and vibration can be started.

E). SpecificationsDriver/Extractor

Eccentric Moment	4000 in.-lbs.
Frequency	0 - 1400 VPM
Amplitude	5/16" - 1-1/4"
Pile Clamping Force	100 - 200 tons
Pile Clamping Time	5 - 7 seconds
Working Line Pull for Extraction	45 tons
Oil Capacity - Vibrating Case	5 gals.
Weight with Cable and Hoses	18,800 lbs.
Length	118"
Width	22"
Height	76-1/2"
Throat Width	12"
Maximum Operating Pressure	5000 psi
Maximum Flow	120 gpm
Maximum Output Hydraulic Motors	299 hp

Power Pack

Maximum Pump Pressure	5000 psi
Maximum Flow	120 gpm
Diesel Engine	Allis Chalmers 25000
Engine Power	445 hp at 2000 rpm
Fuel Tank Capacity	125 gal.
Oil Capacity - Hydraulic System	146 gal.
Weight with Fuel	11,160 lbs.
Clamp Pump Pressure	4500 psi
Length	10'8"
Width	3'10"
Height	6'7"

II. PREPARATION FOR OPERATION

A. General

When unloading the Vibro Driver, use extreme care. For your protection, make a thorough inspection of the unit immediately on 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.

B. Safety Precautions

Safety is a requirement that must be first in the minds of all people who have occasion to operate equipment. Each job or situation has its own problems which cannot be covered by rules. The following is a general guide to safe operation but your knowledge of standard safety precautions will be your best guide to safety.

1. Never adjust or repair the unit while it is in operation.
2. Never operate the hydraulic power pack when it is not connected to the vibrator.
3. Do not smoke or use open flame in the area of the power pack while refueling.
4. Never store flammable liquids near the engine.
5. When charging or servicing the lead acid batteries, have adequate ventilation and do not smoke or use an open flame in the area, because batteries generate explosive gas during charging.
6. Never operate the diesel engine with the governor linkage disconnected. Hydraulic reactions are not fast enough to control the fuel rack.
7. When operating the power pack in an enclosed area, pipe exhaust fumes out or use an approved method of exhaust condensation in water. Continued breathing of exhaust fumes can be fatal.
8. Remove all tools and rags before restarting after adjustments or repairs.
9. Store oily rags in containers.

REMEMBER ---- SAFETY IS EVERYONE'S BUSINESS

C). Rigging of Vibro Driver/Extractor

A steel wire rope sling must be connected to the support pin 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 or cable capacity of five times the weight to be lifted is recommended.

Attach a safety cable from the crane hook to the Driver/Extractor to hold the unit in case the main sling falls.

D). Connection of Driving Extracting Head

When the Vibro Driver is connected to the crane line, lift the Vibro Driver so that the driving/extracting head can be bolted to the bottom of the vibrating case. All bolts must be in place.

E). Connection of Hydraulic Hoses

1). The vibrator and driving/extracting head are connected to the power pack by five hydraulic hoses.

2). It is important to clean all hose connections with a clean cloth before making connections. All hydraulic lines should be capped immediately after disconnection.

3). Connection of the hoses at the Vibro are color coded. Two 1-1/2" hoses; 1 red, 1 blue, and 1 3/4" yellow hose, and two 3/8" hoses; 1 red and 1 blue. Connections at the Vibro are the high pressure flare type and connections at the power pack are of the quick disconnect type.

4). Color coding for the vibro is as follows:

1 red 1-1/2" - high pressure motor hose

1 blue 1-1/2" - return motor hose

1 yellow 3/4" - drain hose

1 red 3/8" - clamp cylinder hose

1 blue 3/8" - unclamp cylinder hose

5). Make sure that all hose connections are tight.

F). Final Check

1). Check the fluid in the hydraulic reservoir.

2). Check oil level in vibrating case, should be 1/2 level of sight glass.

III). OPERATING INSTRUCTIONS

A). Completion of Set-Up

1). Complete set up as described in Section II.

2). Perform any required maintenance as described in Section IV.

B). Start and Warm-up Engine

1). Before starting the engine, read the engine manufacturer's operating and maintenance instructions carefully. Follow the engine starting, operating and maintenance procedures detailed in the manual.

2). Open all enclosure doors and be sure all pre-start checks have been performed.

3). Turn the main power switch on the control panel to the "on" position, and the "off-on-start" switch to "on".

4). Set the engine speed control (throttle) for idle.

5). Set control pendant potentiometer fully counter-clockwise.

6). Ready light on control panel will indicate when potentiometer is fully counter-clockwise.

7). Press the Murphy switch reset and hold in while simultaneously turning the "off-on-start" switch to start. It will be necessary to hold the reset button in until the engine oil pressure exceeds 30 psi. Release the start switch as soon as the diesel starts.

8). As soon as the engine attains normal operating temperature, adjust the speed control for 2000 RPM.

C. Warming the Hydraulic Fluid

1. The Vibro should not be operated at full speed unless the oil temperature is above 60°F. Check the oil temperature on the thermometer in the oil tank.
2. If temperature is below 60°F. set diesel speed at 1200 RPM and rotate the speed potentiometer to No. 3 on the control pendant to start the vibrator. Operate the vibrator until the oil temperature exceeds 60°F. then full speed operation can be performed.

D. Operation of the Remote Control Pendant

1. The operation of the vibratory driver/extractor is controlled by the remote control pendant. The pendant is connected to the power pack by a flexible electrical cable, which allows operation from any convenient location near the vibrator.
2. The pendant has one switch, one light, and one speed potentiometer.
 - a. To clamp to the pile, place the clamping head over the pile and turn the clamp switch to close position and the clamp light will light when adequate pressure has been obtained to permit vibration to begin.
 - b. To start vibration rotate the speed potentiometer clockwise and adjust vibrating speed to match soil conditions for driving or extracting.

CAUTION: DO NOT START VIBRATING UNTIL THE CLAMP LIGHT IN THE PENDANT COMES ON.

3. To stop vibration rotate the speed potentiometer counter clock wise to its full extreme. The vibration will stop in a few seconds. If counter clock wise rotation of the speed potentiometer does not stop the Vibro Driver/Extractor, pull the engine stop knob and move the control off/on switch located on the control panel of the power pack to off, and refer to the trouble shooting section, Chapter

4. To Unclamp the Pile

WARNING: THE OPERATOR MUST WAIT UNTIL A VISUAL CHECK HAS PROVED THAT ALL VIBRATIONS HAS STOPPED.

Turn the clamp/unclamp switch to the unclamp position and the jaws of the clamp will open so the vibrator can be removed from the pile. The clamp light on the pendant will go out, indicating that the pressure in the line to the clamp cylinder has been released.

E. Shut Down

1. Stop the vibrator and open jaws.
2. Reduce diesel engine speed to 1500 RPM and allow engine to run for 5 additional minutes, then slowly reduce speed to idle.
3. Pull out the engine stop knob.
4. Turn the main power switch to off, and the 12 volt switch to off.
5. If the diesel engine is shutdown while the vibrator is clamped to the pile, the clamp check valves will keep the vibrator clamped to the pile. (WARNING IT IS NOT RECOMMENDED TO LEAVE THE VIBRATOR CLAMPED TO A PILE WHEN THE DIESEL ENGINE IS NOT RUNNING, BECAUSE SYSTEM LEAKAGE COULD CAUSE A LOSS IN CLAMP PRESSURE).

IV. MAINTENANCE *FOR ALL L.B. FOSTER VIBRO-DRIVER EXTRA*

✓ A. GENERAL

Preventive maintenance includes normal servicing that will keep the engine, vibro driver/extractor and power pack in the peak operating condition and prevent unnecessary trouble from developing. This servicing is periodic lubrication and inspection of the moving parts and accessories of the unit.

Lubrication is an essential part of protective 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. Therefore it is important that the instructions regarding types of lubricants and frequency of their application be closely followed.

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

Thoroughly clean all lubrication fittings, caps, filter and level plugs and their surrounding surfaces before servicing. Prevent dirt from entering with lubricants and coolants. The intervals given in the schedule are based on normal operation; perform these services, inspections, etc., more often (as needed) for operation under abnormal or severe conditions.

✓ B. DAILY

1. Check the entire Vibro Driver System prior to and during start-up each day or at the beginning of each shift. Prior to starting the diesel engine at each shift check the following items.

2. Driver/Extractor

a. Visibly inspect all bolts, nuts and screws, including the bolts fastening the driving heads to the Vibro case to insure they are tight.

b. Check the oil level in the vibro case. The oil level should be in the center of the sight glass. Change oil if milky or black.

✓ 2. Driver/Extractor - Cont'd..

- c. Check the fluid level in the hydraulic reservoir and refill if necessary.
CAUTION: It is absolutely necessary that no dirt or other impurities be permitted to enter the hydraulic system. Any contamination will drastically reduce the life of the high pressure hydraulic system.
- d. Visually check all hose and hose connections for cuts that could cause hose failure during operation. Check all hose connections for tightness.
- e. Perform all daily maintenance checks and lubrication recommended in the Allis Chalmers operating and maintenance manual.

✓ 3. After start up check the following:

- a. Check all hydraulic lines and fittings for leaks.
- b. Check both pumps and manifolds for leaks.
- c. Inspect the indicators for the filters with the oil at operating temperature to be sure the elements do not need changing.
- d. Before operating attach the vibro to the pile, open and close the clamp jaws to ensure proper operation.
- e. Be sure there are no kinks in the hydraulic lines and that they are hanging freely.
- f. Check the lifting cable for fraying.
- g. Inspect the serrations of the gripping surfaces of the hydraulic clamp.
Replace them if worn.

C. 100 Hours

- 1. Drain and refill the vibrating case. Use Exxon (Imperial to Canada) Terresso or equivalent.
- 2. Remove the 10 bearing covers and check the condition of the bearings.
- 3. Perform all maintenance checks and lubrication indicated in the Allis-Chalmers operating and maintenance manual.