



section IV maintenance

4-1. ROUTINE MAINTENANCE

IMPORTANT: Foreign matter in hydraulic oil is one of the greatest contributors to trouble in hydraulic systems. Impurities in the hydraulic oil can cause excessive friction at various points in the hydraulic system. It can also clog the strainer in the hydraulic power unit and severely reduce the amount of oil available to the pump. This condition can cause, in addition to slow operation of the tracer valve, a noisy pump, and in time permanent damage to the pump. **KEEP OIL CLEAN AT ALL TIMES.**

4-2. LUBRICATION. Lubricate the tracer slide assembly after every **4 HOURS** of operation using a grease gun. There is only one lubrication fitting. This fitting is located on the side of the top slide. (See figure 4-1.)

SLIDE LUBRICATION NOTICE

Use Vactra No. 2, Mobile Oil Co., for the slide assembly. This lubricant has been found to effectively reduce friction in the ways, and helps to attain a smooth, free-tracing operation with a minimum of power.

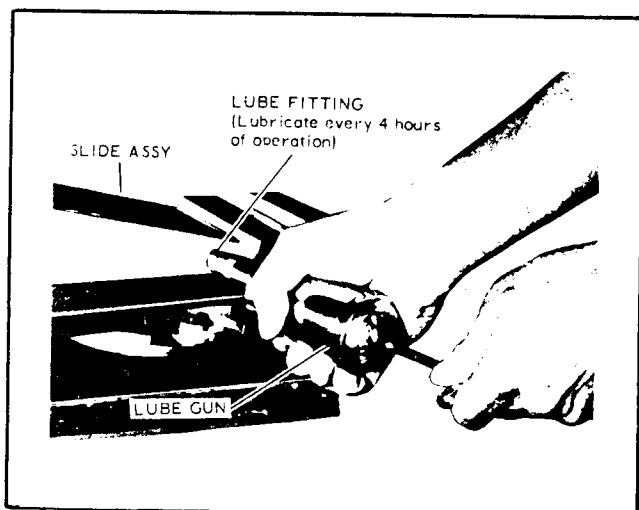


Figure 4-1. Lubricating Slide Assembly

4-3. CHANGING OIL IN HYDRAULIC POWER UNIT. Under most operating conditions, the oil need only be changed once a year. Under extreme operating conditions (dirty shop conditions or high temperature operation), change the oil every six months. Check the condition of the oil as follows:

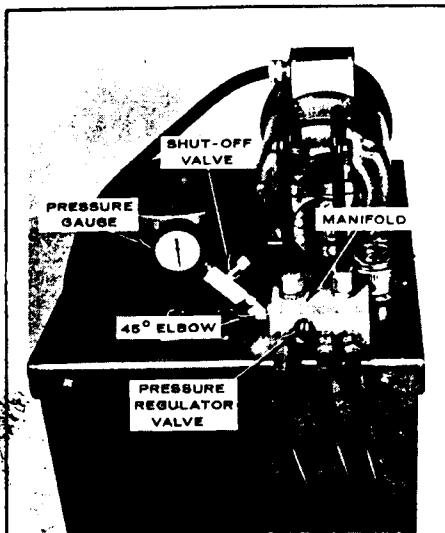
- a. Take a sampling of oil from the drain plug on the hydraulic reservoir. Use a glass test tube.
- b. Compare the sampling of oil with a test tube filled with new oil. Check for foreign matter and color. Before re-filling the hydraulic reservoir, clean the system as described in step c below.

- c. Make sure there is 15 gallons of hydraulic oil in the reservoir. Add three pints of Mobilol A, Mobil Oil Co., to the hydraulic oil. Operate the hydraulic power unit through complete cycles for 24 hours. The unit may be used for regular operation during the cleaning period. Do NOT leave the solution in the unit longer than the specified 24 hour period. This solution will damage hoses, seals, and piston cups if used longer than 24 hours. Do not use the solution stronger than specified (this is approximately 5% of volume of hydraulic oil). Drain the hydraulic reservoir at the end of the cleaning period. Remove the top assembly from the power unit and clean the inside of the reservoir thoroughly with solvent. Dry with compressed air. Wash the strainer in solvent and dry with compressed air.

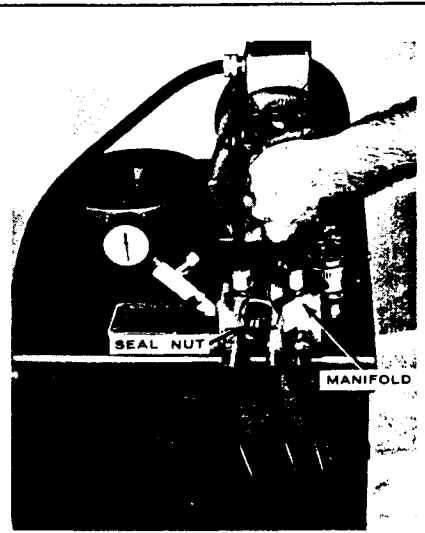
4-4. BREATHER CAP. Clean the breather cap element in solvent at least once every 6 months.

4-5. ROUTINE ADJUSTMENTS

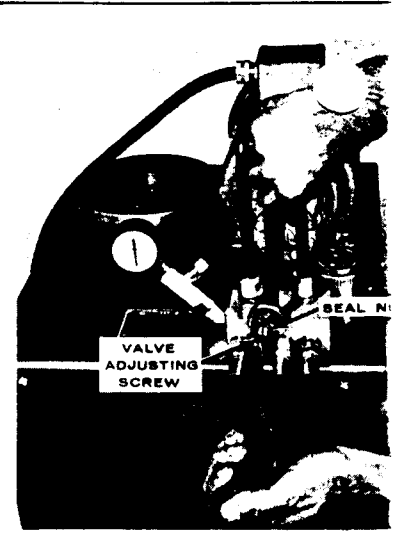
4-6. HYDRAULIC POWER UNIT. To adjust the hydraulic power unit, proceed as described in figure 4-2.



STEP 1 Remove the plug from the 45° elbow on the manifold. Install a 0 to 300 psi pressure gauge in the elbow. As protection for the gauge, it is recommended that a shut-off valve be installed between the manifold and the pressure gauge.



STEP 2 Leave the hydraulic hose assemblies connected to the tracer valve or cap the ends of the hoses. When the hose assemblies are connected to the tracer valve, the valve should be held at null (no pressure on the spindle).



STEP 3 Loosen the seal nut with a wrench and turn the valve adjusting screw until the pressure gauge indicates the correct operating pressure as specified in the chart. Turning the adjusting screw clockwise increases the pressure; counterclockwise decreases the pressure. Hold the adjusting screw firm and tighten the seal nut. It is necessary to remove the pressure gauge to operate the power unit.

Model Attachment	Mark "O"	Mark "O-A"	Mark IIA	Mark III	Mark IV	Mark V	Mark VI
Normal Operating Pressure	160 psi	160 psi	160 psi	200 psi	200 psi	200 psi	200 psi

Figure 4-2. Procedure for Adjusting Output Pressure of Hydraulic Power Unit

4-7. GIB ADJUSTMENTS. Refer to figures 5-1 through 5-7 and adjust the gibs as follows:

- a. Loosen the front and rear gib screws slightly.
- b. Tighten the front gib screw until a bind occurs; then back off slightly.

c. Tighten the rear gib screw until a bind occurs; then back off slightly.

d. Check that the gibs are snug but not bind.

CAUTION: If the gibs in the slide assembly too loose or too tight, accuracy of the machine part will be affected.

Table 4-1. Trouble-shooting Chart (Sheet 1 of 3)

Trouble	Probable Cause	Remedy
Chatter (hydraulic pulsation) or rough finish on work piece (Be sure to use good cutting practice.)	Improper gib adjustment (too tight or too loose)	Adjust gibs as described in paragraph 4-7.
	Loose linkage between tracer and cutting tool. Cutting tool holder loose. T-bolts on cross slide loose	Check linkage at each point between tracer valve and cutting tool. Tighten all loose bolts and nuts. Check for wear and other factors that could contribute to lost motion. ELIMINATE ALL LOST MOTION between tracer valve and cutting tool.
	Hydraulic pressure too high	Readjust hydraulic power unit if necessary as described in figure 4-2.
	Inadequate lubrication and maintenance	Refer to paragraph 4-2. Remember the slide assembly MUST be lubricated after every 4 hours of operation.
	Air in hydraulic system	Bleed the hydraulic system of all trapped air as described in paragraph 2-34 d. Make sure there is sufficient oil in the system.
	Loose stylus in spindle of tracer valve	Be sure the stem of the tracing stylus is seated firmly and tight inside the tracer valve spindle. Make sure the setscrews are tight.
Tracing too slowly	Tracer out of adjustment	Readjust the tracer valve as described in paragraph 3-31.
	Hydraulic power unit not adjusted properly	Readjust the hydraulic power unit as described in figure 4-2. Check for dirty strainer in hydraulic power unit.
	Air in hydraulic system	Bleed the hydraulic system of all trapped air as described in paragraph 2-34 d. Make sure there is sufficient oil in the system.
	Foreign matter in hydraulic system	Clean the system as described in paragraph 4-3. KEEP OIL CLEAN AT ALL TIMES.
	Pump in hydraulic power unit defective	Check the pump for evidence of binding, wear, or dirt clogging.
	Hydraulic oil too cold	Oil temperature should be between 90° and 120° F for optimum operation. Allow the hydraulic power unit to operate for approximately one hour prior to performing tracing operations.
	Inadequate lubrication and maintenance	Refer to paragraph 4-2. Remember the slide assembly MUST be lubricated after every 4 hours of operation.
	Improper hydraulic oil	Use Mobil Velocite "S" (Mobil Oil Co.) hydraulic oil in the hydraulic power unit.
	Gibs too tight	Adjust gibs as described in paragraph 4-7.

Table 4-1. Trouble-shooting Chart (Sheet 2 of 3)

Trouble	Probable Cause	Remedy
Variation between template and machined part	Improper radius of stylus	Refer to paragraph 3-4.
	Lathe carriage speed too fast	Refer to paragraph 3-32.
	Loose linkage between tracer and cutting tool	Refer to "loose linkage" on page 4-3.
	Template not held securely on template rail	Tighten the template clamps securely.
	Improper gib adjustment	Refer to paragraph 4-7.
	Inaccuracies in machine tool	Check the machine tool carefully. Precision duplicating can only be accomplished if your machine tool is accurate.
Excessive leakage of tracer valve or cylinder	Loose hose connections	Tighten all hose connections. Tighten all pipe plugs and fittings.
	Defective seal	Refer to the exploded views in Section V and replace any defective seals.
Tracer valve fails to trace	Clogged hydraulic line	Check that hydraulic oil is flowing through the system. Clean the system if necessary as described in paragraph 4-3c.
	Pressure and exhaust lines reversed	Make sure the hose assemblies between the tracer valve and hydraulic power unit are properly connected. Reversing the pressure and exhaust lines may cause hydraulic bind in the system.
	Improper gib adjustment	Refer to paragraph 4-7.
	Contaminated hydraulic oil	Filter or replace the hydraulic oil. Refer to paragraph 4-3c.
	Air in hydraulic circuit	Tighten all fittings and hose connections. Bleed the system using the two bleeders on the top of the cylinder.
	Metering valve in full closed position	Open the metering valve to its normal operating position.
Sluggish operation of tracer valve	Improper hydraulic oil	Use Mobil Velocite "S" (Mobile Oil Co.) oil in the hydraulic power unit.
	Hydraulic oil too cold	Oil temperature should be between 90° and 120° for optimum operation. Allow the hydraulic power unit to operate for approximately one hour prior to performing tracing operations.
	Contaminated hydraulic oil	Refer to paragraph 4-3c.

Table 4-1. Trouble-shooting Chart (Sheet 3 of 3)

Trouble	Probable Cause	Remedy
Excessive noise in hydraulic power unit	Foreign matter or impurities in hydraulic oil	Refer to paragraph 4-3.
	Cavitation - inadequate supply of oil in pump	Be sure there is the correct amount of hydraulic oil in reservoir. Be sure the strainer is clean.
	Worn, faulty or dirty relief valve	Be sure that the pressure relief valve is clean and functioning properly.
	Defective pump	Check the operation of the pump. Replace if defective.
	Loose pipe on intake side of pump	Tighten pipes on intake side of pump.
Electric pump motor stalls	Defective motor	Replace motor if defective.
	Hydraulic pressure settings too high	Refer to figure 4-2.
	Hydraulic pump frozen	Replace pump if necessary.
No oil pressure out of hydraulic power unit	Pressure hose assembly pinched or collapsed	Check the pressure hose assembly and repair if necessary.
	Worn, faulty or dirty relief valve	Be sure the pressure relief valve is clean and functioning properly.
	Defective pump	Check the pump and replace if necessary.