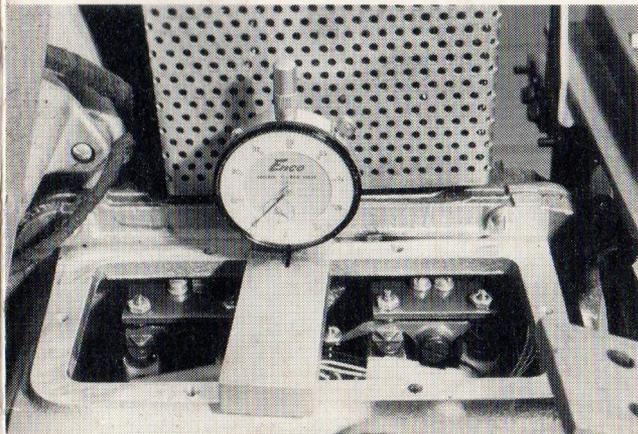


# 1403 Hydraulic Unit

## Adjusting Tool Instructions



This method of adjusting the hydraulic unit eliminates the use of feeler gauges and allows the two spool valves to be adjusted without removing the valve block assembly.

### CAUTION –

When making adjustments to the spool valves with the T handle, DO NOT loosen locknuts. Also be sure that the brass lock under each locknut is folded against the flat on the locknut. This ensures the locknuts do not work loose while adjusting the position of the spool stem. If a nut should work loose while making this adjustment, an offset 3/16" open end wrench is provided in the kit to retighten the nut. After retightening, fold brass lock back over flat on nut.

Energize the magnets electrically, never by hand. All adjustments are made with:

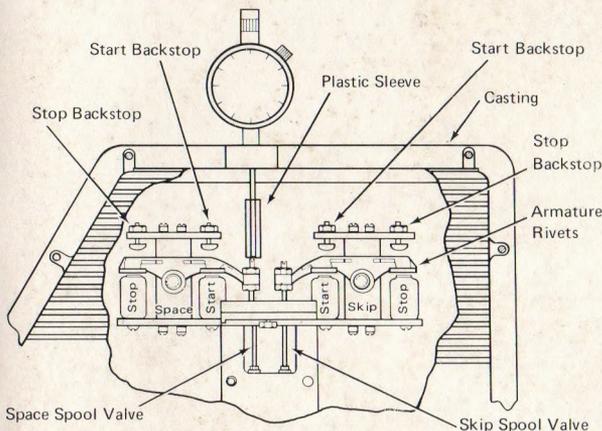
- Power On
- Hydraulic drive motor turning.
- Hydraulic unit at normal operating temperature

*Before attempting to make adjustments, a visual inspection of spool valve assembly should be made. Check for excessive rust around armatures. This could indicate sealing which will be corrected; however, if rust is evident, carefully inspect armatures for loose rivets.*

*Pay particular attention to readings obtained in Step 1.5 (.040" to .052"). A reading of less than .040" could indicate worn pivot or incorrectly assembled unit. Higher than .052" could indicate too many shims under pivot block.*

*Bear in mind that worn/loose or incorrectly assembled parts cannot be compensated for by these adjustments. To adjust a worn polyurethane backstop is a quick but not a permanent fix. Replacing the backstops is the only correct method. A supply of backstops is in the adjusting kit. Replacement of these backstops on the skip side is not usually necessary.*

On page 4 of these instructions is a method to replace these backstops through the inspection hole.



## ADJUSTMENT PROCEDURE FOR SPACE SPOOL VALVE: LOW SPEED

- 1.1 Rotate (counterclockwise) the two backstops on the space magnet assembly to their limit.
- 1.2 Set dial gauge on top of unit with gauge tip resting on the space spool valve stem.
- 1.3 Calibrate gauge to zero. Rotate outer housing of gauge to accomplish this.
- 1.4 Get the unit in a low-speed continuous operation.
- 1.5 Read the dial gauge (small numerals on gauge) and *record* the reading (it will be from .040" to .052"). The optimum you want in the end is .024" so the excess will be removed with the next adjustments of the backstops.
- 1.6 Take the recorded reading you obtained in the above step and subtract .024" from it. Take the resultant and divide by 2. This figure will be about .010" to .015". Each space backstop will be adjusted by this amount. Refer to this amount as "X."
- 1.7 With the unit stopped and the dial gauge resting on the space spool valve, calibrate the gauge to zero.
- 1.8 Turn the start backstop clockwise until the space spool valve has moved "X" amount plus .001". Tighten locknut.
- 1.9 Move the unit in low speed, calibrate gauge to zero.
- 1.10 Turn the space stop backstop clockwise until the gauge reads "X" plus .001" (large numerals on gauge). Tighten the locknut. There should now be .024" "travel" of the space spool valve.
- 1.11 Stop the unit. Use the special "T" wrench to turn the space spool valve stem clockwise until the unit starts to creep. Set the dial gauge on the spool stem and calibrate gauge to zero. Be sure to take several readings here and pay particular attention to placing the dial gauge square with unit here and in Step 1.12.
- 1.12 Remove gauge and rotate space spool stem counterclockwise 1/3 of a turn. You should have moved the stem .009". Check this amount with the gauge and tweak in either direction until this is reached. You are now through with the space magnet and spool valve adjustments.
- 1.13 Go to skip valve adjustment (Section 2.1) only if necessary, then return here.

Since you have changed the mechanical adjustments of the hydraulic unit, the space, skip and bypass valve must be adjusted as well as space single shots and E1 emitter timing. (Always check carriage brush timings after change of E1.)

## SPACE, SKIP, AND BYPASS NEEDLE VALVE ADJUSTMENT

1. Screw bypass valve all the way down and then back off 1/3 turn (coarse adjustment).
2. Space valve - carriage in neutral, low speed continuous and turn space valve clockwise until seated then back off until detent nips, now clockwise until nip is gone. (Pushing upward on detent with firm finger tip pressure you should feel nipping.) This assures detent is against backstop.
3. Skip valve - carriage in neutral, *high speed* continuous. Adjust skip valve using same procedure as space valve above. (If nipping cannot be achieved it may be because bypass valve is too tight. If this occurs back skip valve off 4 turns and go to bypass valve adjustment.)
4. Bypass valve should now be adjusted to provide proper braking effect. Since bypass valve must be adjusted with detent *disengaged* you need either a helper, or a block to wedge against the detent. Use either pencil trace or tach generator. Screw down on bypass valve until you see what appears to be overshoot; this indicates too much brake. Now back off on bypass valve until overshoot just disappears.
5. Set space single shots, carriage settling single shot, E1 emitter, and carriage brushes.

The hydraulic unit is now completely in adjustment. Should you still have problems, check speed and response time according to maintenance manual. If these are within specs, your problem is *almost* certain to be external to hydraulic unit.

## ADJUST PROCEDURE FOR HIGH SPEED (SKIP SPOOL VALVE) Usually Not Required

- 2.1 Rotate (counterclockwise) the two backstops on the skip magnet assembly to their limit.
- 2.2 Set dial gauge on top of unit with gauge tip resting on skip spool valve stem.
- 2.3 Calibrate the gauge to zero.
- 2.4 Get the unit in a high speed continuous operation.
- 2.5 Read the dial gauge (small numerals on gauge) and *record* the reading (it will be from .040" to .052").
- 2.6 Take the recorded reading you obtained in the above step and subtract .024" from it. Take the resultant and divide by 2. This figure will be about .010" to 0.15". Each skip backstop will be adjusted by this amount. Refer to this amount as "Y".
- 2.7 With the unit stopped and the dial gauge resting on the skip spool valve, calibrate the gauge to zero.
- 2.8 Turn the start backstop clockwise until the skip spool valve has moved "Y" amount plus .001" (read small numerals on gauge). Tighten locknut.
- 2.9 Get the unit in high speed, calibrate gauge to zero.
- 2.10 Turn the skip stop backstop clockwise until the gauge reads "Y" plus .001. Tighten the locknut. There should now be .024" "travel" of the skip spool valve.
- 2.11 Get the unit in low speed. Use the special "T" wrench to turn the skip spool valve stem clockwise until the unit begins to speed up. Set the dial gauge on the spool stem and calibrate gauge to zero.

2.12 Remove gauge and rotate skip spool stem counter-clockwise  $1/3$  of a turn. You should have moved the stem .009". Check this amount with the gauge (read large numerals on gauge) and tweak in either direction until this is reached. You are now through with the skip magnet and valve adjustments.

Return to section on needle valve adjustments after step 1.13.

The above procedure will correct the majority of problems associated with hydraulic units and wavy printing. Other items not mentioned in this procedure that could cause wavy printing, skipping, and spacing failures are listed below:

1. Dirty oil filter causes slow speed.
2. Out of round E1 shaft.
3. Wrong type oil in unit.
4. Open magnet coils.
5. Binding oil retainers around pump and motor shafts.
6. Binding tractors on the carriage.
7. Worn bearings on hydraulic pump and motor shafts.
8. A leaking lower check valve causes reduced space speed. A leaking upper check valve usually causes no carriage malfunction other than to cause the detent spring to break prematurely (the check valves are interchangeable).

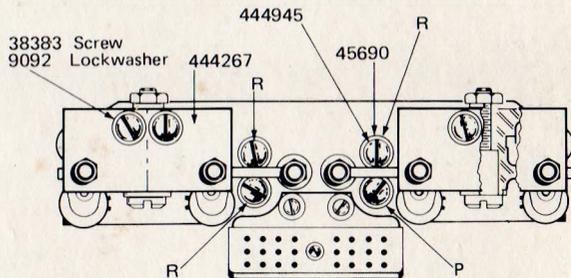
## SPACE BACKSTOP REPLACEMENT (Alternate Method)

Space backstops may be replaced without removing the control block assembly or the reservoir. The two screws (P/N 38383) are hidden by the reservoir. We will move them to a position where they can be removed through the inspection hole in the reservoir. This will allow removal of the backstop plate (P/N 444267) and change the backstops (P/N 836892) on the bench.

### CAUTION –

1. A dropped screw or washer here falls in the reservoir base.
2. The space spool valve stem will be flexed. Do not over flex it.
3. After the backstops are changed, proceed to adjust the control block assembly using the alternate method (dial gauge).

First, remove the three screws and lockwashers labeled R on the reference drawing. Loosen the screw labeled P slightly. Screw P will be our pivot screw. Pivot the left side of the magnet assembly toward you slightly until the 2 screws (P/N 38383) are completely visible. Now lock pivot screw P. You may now remove the two screws (P/N 38383) and washers being careful and holding backstop plate (P/N 444267). After the second screw is removed, the backstop plate may be removed. Replace backstops on plate and install plate in reverse order of removal. Now proceed with the dial gauge and adjust your hydraulic unit per instructions with the gauge.



Space Backstop Replacement (Alternate Method)