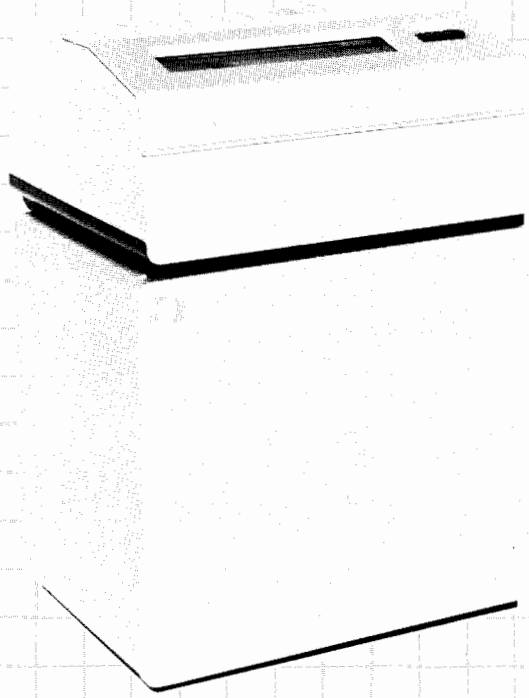
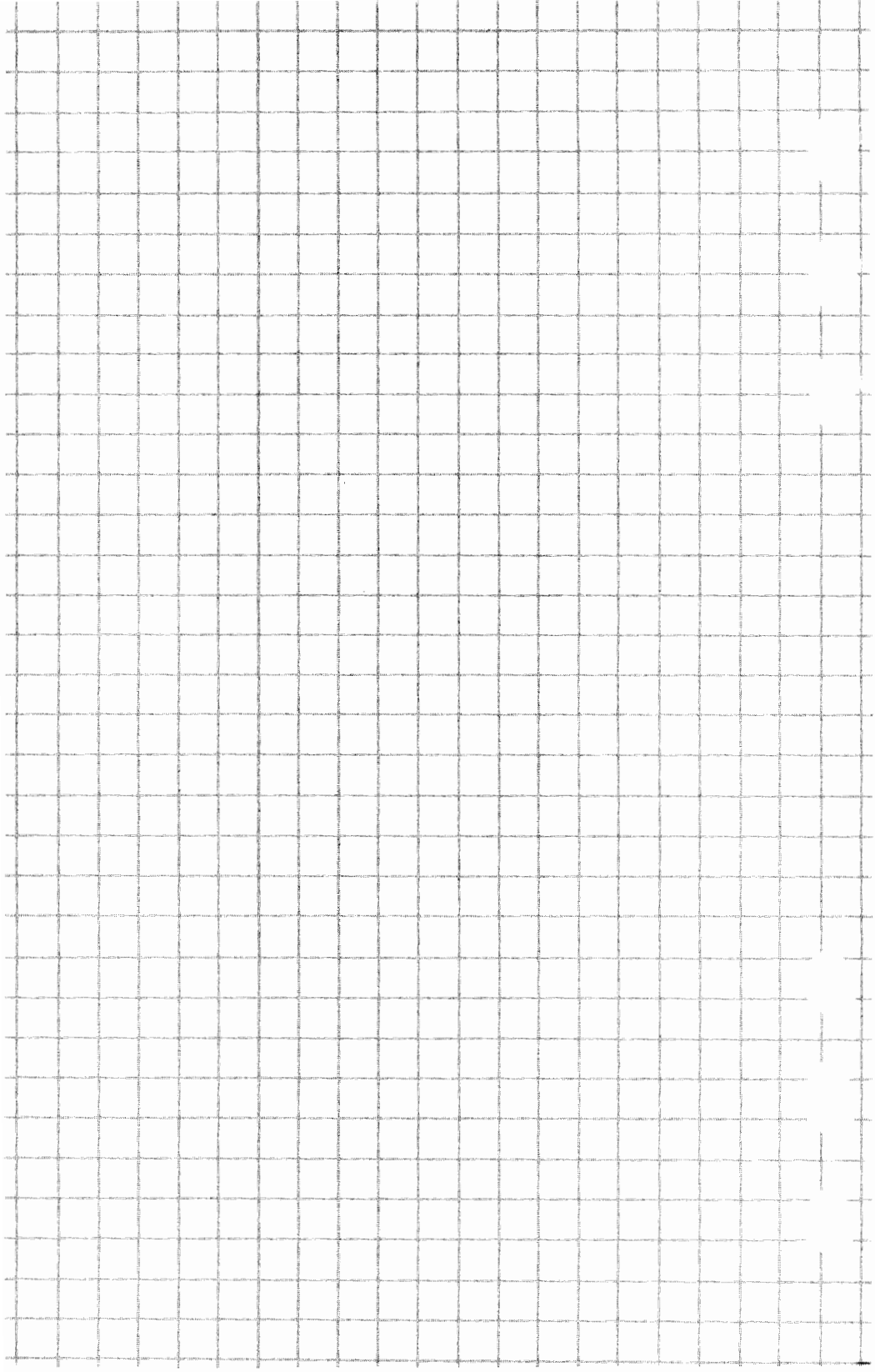
2608A



P/N 02608-90161



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Section I
Product Information

Table of Contents

New Tractor Available

New, thinner tractors are available for the 2608A (left tractor—HP P/N 1530-0360 and right tractor—HP P/N 1530-0361). Be aware that when facing the front of the machine, the right tractor has an "L" on it and the left tractor has an "R" on it. Be sure the tractors are correctly in place by turning and checking the square shaft.

First Line Compressed

If you are experiencing this problem, it is caused by paper guide holes being offset in the tractor when tearing off paper. To fix the problem, do a TOF before printing or hold the paper down when tearing. Also see Service Note 2608A-8 for a permanent fix.

If you have compression throughout the text, you may have a bind in the paper path, bad stepper motor, or bad drivers located on the motherboard.

2608A Line Printer ALL SERIAL NUMBERS

RECOMMENDED LOGIC CARD REPLACEMENT

In some backplane positions, the Motor Driver PCA is susceptible to electrical noise on the backplane MOVE signal. This noise will cause scattering of dots while printing.

With this in mind, it has become necessary for us to support ONLY the following card placement in the 2608A backplane assembly. This card placement does not exhibit the problem.

J3 - Servo PCA P/N 02608-60039, or 02608-60141
J4 - Motor Driver PCA P/N 02608-60017, or 02608-60140, or 02608-60181
J5 - Control PCA P/N 02608-60018, or 02608-60171
J6 - Differential I/O PCA P/N 02608-60019, or HP-IB PCA P/N 02608-60026

Jumper Settings on HP-IB PCA (02608-60026)

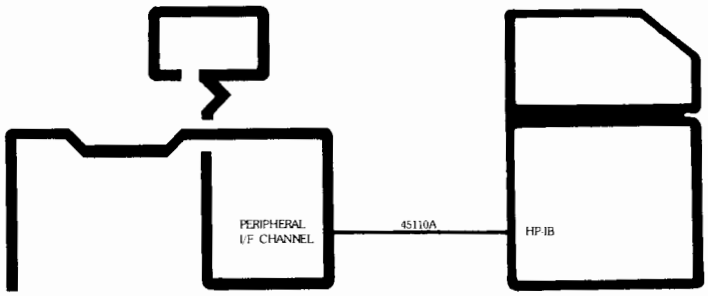
JUMPER LOCATION	DESCRIPTION OF FUNCTION	SYSTEM(S) INSTALLED ON
W1-W2	Ignore Command Parity Checking	HP 250 HP 9835A/45A/45B
W3-W4	CR, LF, FF Executed	HP 9835A/45A/45B
W5-W6	SRO Enable	Not Normally Installed

Section II
Environment/
Installation/PM

It is recommended the squirrel cage fan be checked and cleaned whenever any maintenance is performed on the printer. Printers in carpeted areas, or heavy traffic areas, or where paper dust and chad are extreme may require fan cleaning more often.

Section III
Configuration

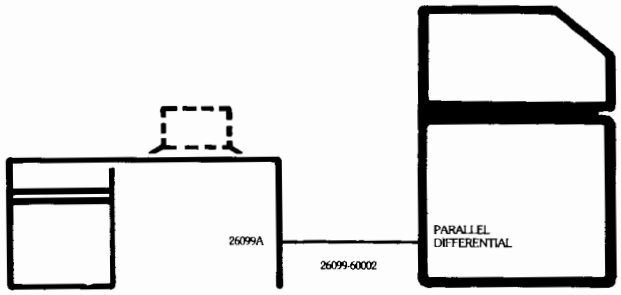
HP 250
DOT MATRIX SYSTEM PRINTER



250 2608

ORDER	RECEIVE
2608A	
#251	400 LPM Dot Matrix Printer HP-IB I/O for 2608A (HP-IB Cable, 45110A, from GSD) Installation
#106	Ribbon 6 pack
#110	Sound Cover

HP 1000
DOT MATRIX SYSTEM PRINTER

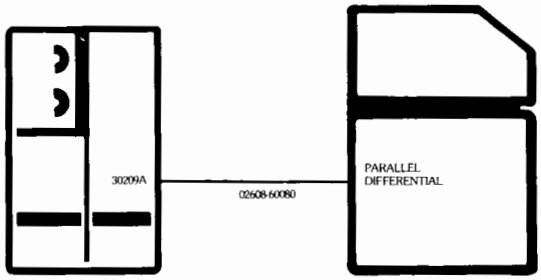


1000 **2608A**

DRIVER: DVB12

ORDER	RECEIVE
2608A	400 Lpm Dot Matrix Printer
#210	Parallel Differential Interface 25 ft. cable (26099-60002) 26099A Interface for HP 1000 Installation
#106	Ribbon 6 Pack
#110	Sound Cover

HP 3000/II, III
DOT MATRIX SYSTEM PRINTER

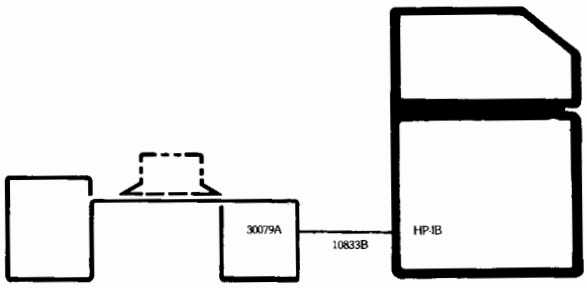


3000/II, III **2608A**

DRIVER: IOLPT0
Type: 32
Subtype: 4

ORDER	RECEIVE
2608A	400 Lpm Dot Matrix Printer
#300	Parallel Differential Interface 50 ft. cable (02608-60080) Installation
#106	Ribbon 6 Pack
#110	Sound Cover

HP 3000/30, 33
DOT MATRIX SYSTEM PRINTER



3000/33 **2608A**

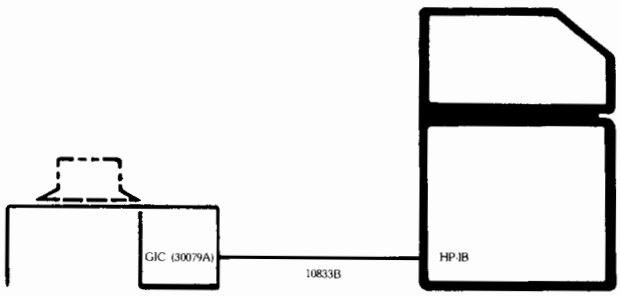
DRIVER: IOLPT0

Type: 32

Subtype: 4

ORDER	RECEIVE
2608A #333	400 Lpm Dot Matrix Printer HP-IB Interface 2 Meter cable (10833B) Installation
#106	Ribbon 6 Pack
#110	Sound Cover

3000 SERIES 40, 44, 64
DOT MATRIX SYSTEM PRINTER

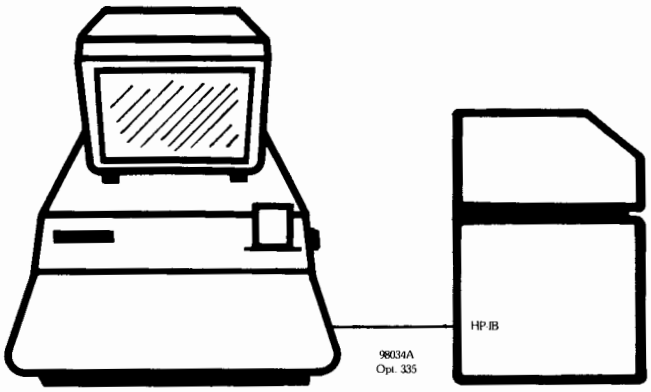


3000/40, 44, 64 **2608A**

DRIVER: IOLPT0
Type: 32
Subtype: 4

ORDER	RECEIVE
2608A	400 LPM Dot Matrix Printer
#340, 344, 364	HP-IB I O PCA 2 meter cable (10833B) Installation
#106	Ribbon 6 pack
#110	Sound Cover
#112	Replaces enclosed stand with open stand

HP 9835A
DOT MATRIX SYSTEM PRINTER



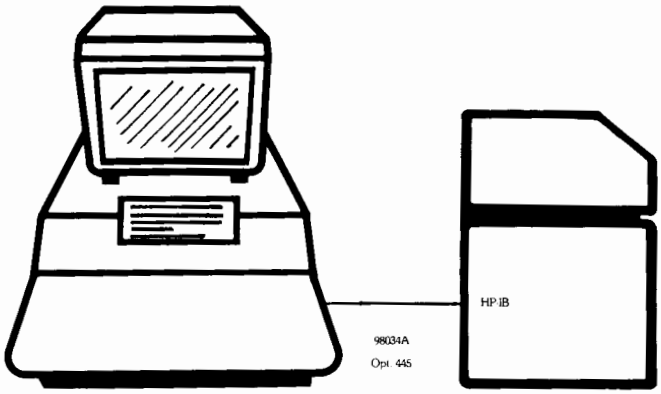
9835A **2608A**

ORDER	RECEIVE
2608A	400 Lpm Dot Matrix Line Printer
#835	HP-IB Interface

NOTES:

(i) 9835A plotter ROM (98337A) required for all graphics capabilities.
(ii) 9835A I/O ROM (98332A) required for graphics.
(iii) Graphics dump via Basic program in User's Library.

HP 9845A
DOT MATRIX SYSTEM PRINTER



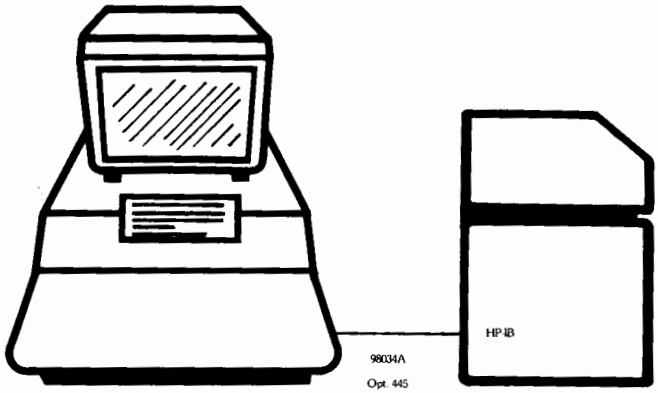
9845A **2608A**

ORDER	RECEIVE
2608A #845	400 Lpm Dot Matrix Line Printer HP-IB Interface

NOTES:

(i) 9845A graphics ROM (opt 700 or 98470A) required for all graphics capabilities.
(ii) 9845A mass storage ROM (opt 310 or 98431A) required for graphics.
(iii) 9845A I/O ROM (opt 320 or 98432A) required for advanced features on 2608A, i.e. double-size characters, graphics,
(iv) Graphics Dump via Basic program in User's Library.

HP 9845B
DOT MATRIX SYSTEM PRINTER



9845B **2608A**

ORDER	RECEIVE
2608A	400 Lpm Dot Matrix Line Printer
#845	HP-IB Interface

NOTES:

(i) 9845B graphics ROM (opt 311 & 700 or 98411A & 98470A) required for all graphics capabilities.
(ii) 9845B I/O ROM (opt 312 or 98412A) required for advanced features on 2608A, i.e. double-size characters, graphics, etc.
(iii) Graphics dump via a Basic program in User's Library.

Section IV
Troubleshooting

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Table 1. Fault Indications

Sub-Test No.	Sub-Test Name
001	Processor Direct Control and Interrupt
010	Input Bus
011	Output Bus
100	RAM
101	Character Generation
110	Servo Control Loop
111	(Reserved)
PRINTING TESTS	Character Sets
	Graphics Print
	Double Size Ripple Print
	Standard Ripple Print
	Exercise Remaining Logic (signals change states)

Table 2. Fault Indications and Solutions

FAULT INDICATION	PROBABLE SOLUTION
Print Mech indicator on	1. Remove print mechanism shipping lock, if in place
	2. Check the core bar for obstructions which may inhibit movement.
	3. Check and, if necessary, replace fuses on the motherboard PCA.
	4. Replace motor driver PCA.
	5. Replace servo PCA.
	6. Replace control PCA.
	7. If fuses open again, as in step 3, the linear actuator coil or motherboard PCA may need replacement.
PLATEN/RIBBON indicator on	1. Close the platen release lever.
	2. Load a ribbon cartridge in the unit. If a ribbon is already installed, ensure that it is properly seated.
	3. Ensure that the tab on the ribbon cartridge has not been broken.
	4. Disconnect the ribbon sensor (P30 on motherboard PCA); if indicator extinguishes, replace the ribbon/platen switch.

	PROBABLE SOLUTION (con't)
	5. If indicator remains on in step 4, replace the motor driver PCA.
	6. Disconnect the paper jam detector from the motor driver PCA (02608-60181). If the indicator extinguishes, perform the paper jam detector adjustment for the motor driver PCA (HP P/N 02608-60181).
PLATEN/RIBBON indicator off	1. If indicator is off when platen is open, check the switch on the platen.
	2. Replace the front control panel PCA.
PAPER OUT indicator on	1. Load more paper and place the printer on-line.
	2. Disconnect paper-out sensor (P31 on motherboard PCA) and press the RESET switch; if the indicator extinguishes, replace the paper-out switch and cable.
	3. If the indicator remains on in step 2, replace motor driver PCA.
POWER ON indicator off	1. Set the main power switch to ON.
	2. Check the power source outlet and circuit breaker.
	3. Check +5V, +12V and -12V test points on the mother-board PCA.
	4. Check the fuses on the motherboard PCA; replace them if they're bad.
	5. If step 4 does not return the printer to an operating condition, determine which PCA is over-loading the voltage supplies and replace it.
*SUB-TEST 001	1. Check the position transducer adjustment (see Servo PCA).
	2. Replace the control PCA.
	3. Replace the servo PCA.
*SUB-TEST 010	1. Replace all boards on the motherboard backplane one by one.
	2. Replace the front control panel PCA.
	3. Replace the motherboard PCA.
*SUB-TEST 100	1. Replace the control PCA.
*SUB-TEST 101	1. Replace the servo PCA.
*SUB-TEST 110	1. If no print mechanism motion exists, check the linear motor coil and its connector.
	2. Replace the servo PCA.
	3. Replace the motor driver PCA.
	4. Replace the motherboard PCA.

*This binary number can be observed when the TEST FAIL indicator is illuminated by pressing and holding the SELF TEST switch while watching the PRINT MECH, PAPER OUT, and PLATEN/RIBBON indicators.

Section V
Diagnotics

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Section VI
Adjustments

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2608A

NOTE

Check the part number of the boards to determine whether A or A Prime adjustments are applicable. See page 17 or 28 for details.

2608A Prime

NOTE

Check the part number of the boards to determine whether A or A Prime adjustments are applicable. See page 17 or 28 for details.

IMPORTANT

Adjustment procedures for the HP 2608A Line Printer are divided into two sections.

Adjustment Procedures 2608A contains adjustment procedures for printers configured with the following PCA's:

Multilayer Servo and Dot Generation PCA	02608-60039
Motor Driver PCA	02608-60017

Adjustment Procedures 2608A (Prime) contains adjustment procedures for printers configured with the following PCA's.

Multi-layer Servo and Dot Generation PCA	02608-60141
Motor Driver PCA	02608-60140 or 02608-60181
Motherboard PCA	02608-60007 Rev. C. Series 1932 02608-60007 Rev. E. Series 1932, 1934 02608-60144

Table 1 is provided as an aid in determining which adjustment procedures are to be used in a given configuration.

TABLE 1. 2608A ADJUSTMENT PROCEDURES MATRIX

PCA	APPLICABLE ADJUSTMENT SECTION
Multilayer Servo and Dot Generation PCA	
02608-60039	2608A adjustment section
02608-60141	2608A (Prime) adjustment section
Motor Driver PCA	
02608-60017	2608A adjustment section
02608-60140, 02608-60181	2608A (Prime) adjustment section
Hammer Driver PCA	No adjustments
02608-60016 02608-60142 02608-60103	
Motherboard PCA	
02608-60007 Rev. C. Series 1932	Use adjustment procedure contained in the Multilayer Servo and Dot Generation PCA adjustment section (see page 32)
02608-60007 Rev. E. Series 1932, 1934	Use adjustment procedure contained in the Multilayer Servo and Dot Generation PCA adjustment section (see page 32)
02608-60144	Use procedures in 2608A (Prime) adjustment section.
High Voltage PCA	No adjustments

Corebar

The only adjustment to the corebar is that it is properly seated into the flextures. The flextures have square alignment holes for the corebar round alignment pins to mate with. Figure 1 shows proper seating of the corebar into the flextures.

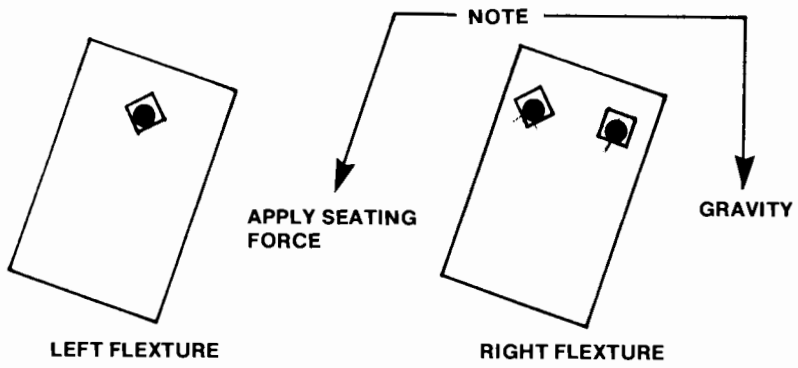

Figure 1. Flexture Seating

Linear Motor Coil

The coil assembly should be centered within the gap of the linear motor. Under NO condition should it rub or bind against the frame or the motor. Replacement and adjustment of the coil is described below.

CAUTION

When performing adjustments or repairs in the vicinity of the linear motor, remove your wrist watch. The magnetic field of the linear motor, even during power-off, may damage certain types of wrist watches.

To replace the linear motor coil, proceed as follows:

a. Remove the two print mechanism mounting nuts and washers which mount the casting to the base on the right hand side of the unit.

b. Completely loosen the four screws which secure the linear motor assembly to the base. Lift the right side of the print mechanism assembly until the linear motor can be pulled from the unit.

c. Remove the five screws located on the face (flat surface) of the linear motor coil adapter.

d. Remove the linear motor coil from the unit.

e. Install the new linear motor coil.

f. Position the nut plate so the holes are in line with the holes on the linear motor coil.

g. Insert, but do not tighten, the five screws and lock washers of the linear motor coil adapter.

h. Carefully slide the linear motor back into the unit so that the linear motor will not damage the coil.

i. Secure the linear motor to the base with the rear of the linear motor seated firmly on the base of the print mechanism.

NOTE

To seat the linear motor, insert it carefully and slide it toward the rear of the casting until it is firmly against the stops.

To adjust the linear motor coil, proceed as follows:

a. If the five screws on the face of the coil have not previously been loosened, loosen them just enough to allow the coil to be repositioned around the linear motor using moderate pressure.

b. Using a single thickness of .15 mm (.006 in.) punched card stock, or equivalent, slide the pieces of card stock around the gap between the outside of the coil and the inside of the linear motor frame. If there is binding around the perimeter of the coil, push the coil in a direction that will relieve the binding.

c. When the gap is equal around the coil, carefully tighten the five screws to avoid changing the gap. The screws should be tightened until the lock washers are flattened snugly against the coil face.

d. After tightening the screws, recheck the gap around the outside of the coil; then, using a single thickness of card stock, check the inside gap of the coil (between the coil and the linear motor magnet).

e. If the gap changed during tightening of the screws, repeat steps b. through d.

CAUTION

Following adjustment of the linear motor coil, the Position Transducer Adjustment, found on page 21 of this section, MUST BE performed

f. Reinstall the print mechanism mounting hardware and tighten in place.

Velocity Transducer

The magnetic core of the velocity transducer must not touch or rub on the velocity coil. Shine a light behind the coil and sight down the open end to see that the core is centered in the coil. Adjustment is made by putting in or taking out shims under the coil, (see figure 2).

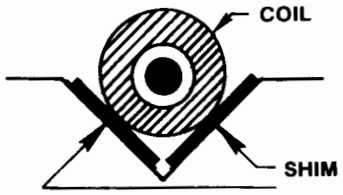

Figure 2. Velocity Transducer Adjustment

If you have to add shims and you don't have any brass shim stock, then use card stock. If you find a velocity transducer that has been rubbing excessively replace it. The velocity transducer part number is 02608-60030.

Hammer To Platen Adjustment

The correct distance from the hammer balls to the face of the platen is 0.013 inch, (see figure 3).

To adjust the platen:

a. Remove the paper and ribbon.

b. Set the platen knob to zero (0).

c. Remove the black plastic column indicator from the top of the core bar by prying up on the left edge with a screw driver.

Check the platen gap by inserting a 0.011 gauge between the hammer balls and the ribbon shield (0.011 gauge+0.002 ribbon shield equals 0.013 gap). If you go behind the ribbon shield you will be obstructed by the paper tension spring. The gap should be the same across the entire platen. If adjustment is required, loosen the platen hold screws (two at each end at the top of the platen). Turning the platen adjustment screws on the rear of the platen into the platen will increase the gap, turning the screws out of the platen will decrease the gap. Always recheck the gap after tightening the platen hold screws.

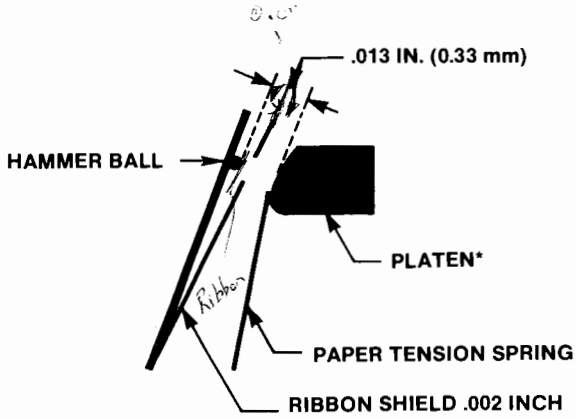

Figure 3. Hammer To Platen

Position Transducer Adjustment ("Home" Position)

NOTE

There are two procedures for the Position Transducer Adjustment depending on the series code on the backplane PCA. The following procedure is for printers with a backplane PCA 02608-60007 below series 1930.

a. With power off, disconnect linear actuator cable.

b. With power to the unit ON, attach an oscilloscope probe to test point 16 (labelled PXDCR) on the Servo PCA with the ground lead on test point 10 (labelled GND). Set the oscilloscope on autotrigger, 2 volts per division sensitivity, and 2.0 msec. per division sweep rate. Center the trace for 0 volts input, then dc couple the input.

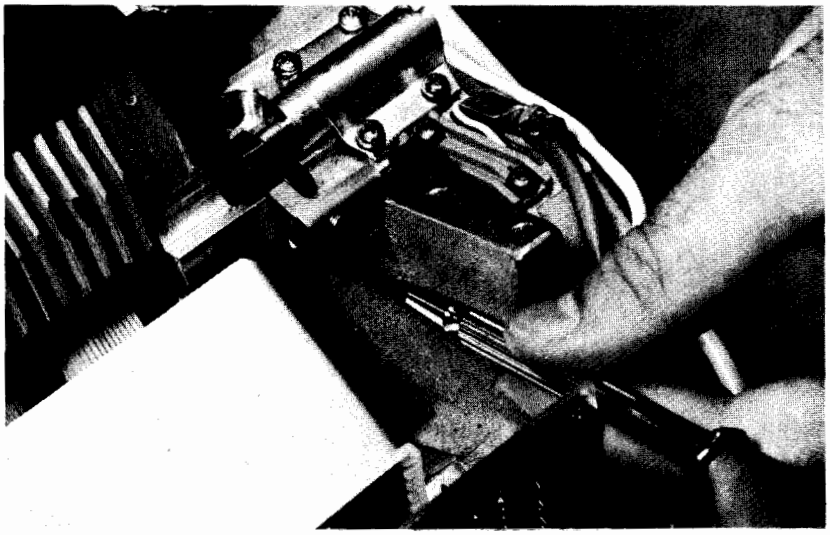

Figure 4. Position Transducer Adjustment
(Shown with Ribbon Motor Assembly removed)

c. Loosen, just slightly, the screw which attaches the position transducer vane to the core bar (see figure 4). Move the vane to approximately the center adjustment position and tighten the attaching screw.

d. Loosen the two screws which attach the position transducer to the print structure. Move the transducer left or right to vertically center the oscilloscope trace. Tighten the two attaching screws. The trace may move away from the vertical center as the screw is tightened; this is expected.

e. Again loosen the vane attaching screw. Using a flat blade screwdriver in the adjustment pivot slot (see figure 4), centered vertically. Tighten the attaching screw while maintaining the centered trace position. This adjustment causes the position control system rest position to coincide with the mechanical rest position.

f. After the position transducer has been tightened in place, manually push and release the core bar to the right, then the left, while observing the trace on the oscilloscope. The waveform should go away from the vertically centered position while the core bar is being pushed, but return to within 0.5 volts of center after release. If the waveform is not returning to zero after the core bar is released, there may be some binding occurring at the linear actuator on the core bar, or in the velocity transducer, (see figure 2). The binding must be relieved before operating the printer to avoid possible damage to the linear actuator coil.

g. Turn the main power OFF. Connect the linear actuator cable to its connector on the motherboard PCA.

NOTE

There are two procedures for the Position Transducer Adjustment depending on the series code on the backplane PCA. The following procedure is for printers with a backplane PCA 02608-60007 series 1932 or 1934.

a. Remove power.

b. Ensure the linear actuator motor is disconnected and the platen is open.

c. Loosen the position transducer assembly and slide it away from the core bar until the vane no longer transects the transducer.

d. SERIES 1932: Move the jumper on the top left corner of the backplane assembly from the W1-W2 position to the W3-W4 position.
SERIES 1934: Move the jumper on the lower left portion of the backplane assembly from the W1 to the W2 position.

e. Apply power.

f. Connect a voltmeter between ground and TP13 on the backplane assembly.

g. Adjust pot R32 for 0.5V, +/-0.01V at TP13.

h. Continue to monitor TP13 and slide the position transducer towards the corebar until the voltage at TP13 is 0.25V, +0.01V.

i. Tighten the position transducer assembly ensuring the voltage set in step 8 is maintained.

j. Remove power.

k. SERIES 1932: Remove jumper from W3-W4 and install in W1-W2 position.
SERIES 1934: Remove jumper from W2 and install in W1 position.

l. Apply power and monitor "PXDCR" TP on the Servo PCA. It should be between zero and +/-1.0V.

m. Remove the power and reconnect the linear actuator motor.

n. Continue with the remaining servo adjustment per the service manual.

e. Velocity Profile Generator

Control PCA

If, at any time, it becomes necessary to change the microprocessor chip on the control PCA, a simple adjustment procedure may be required for the new chip. It will be necessary to insert the control PCA in the left most slot of the backplane connector for this adjustment. Each microprocessor chip has its required backgate voltage (VBG) stamped on the ceramic package. Monitor test point 5 (TP5) and adjust R4 (see figure 5) until the required voltage is observed.

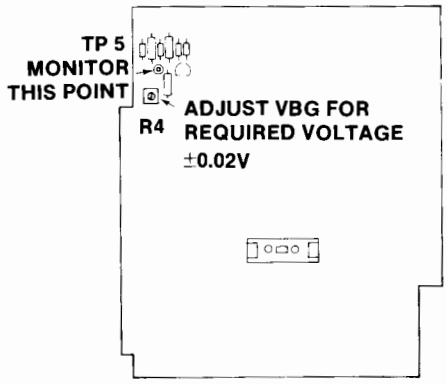

Figure 5. Control PCA Adjustment

Multilayer Servo and Dot Generation PCA Adjustments

Several adjustments must be performed on the servo PCA if, for any reason, the servo PCA is replaced, or the print mechanism or core bar are replaced. The purpose in many of these servo PCA adjustments is to ensure that the velocity profile waveform, which controls the frequency of hammer coil pulling pulses, is maintained at a precise interval to allow the hammer to be pulled at a time when it is oscillating toward the hammer coil. An oscilloscope and digital voltmeter are required for these adjustments. All adjustments MUST be performed sequentially as follows:

a. Bias Supply Voltage Checks

1. Set the main power to OFF and arrange the servo PCA in the left most slot of the backplane connector. Disconnect the linear actuator cable from the motherboard PCA.

2. Set the main power to ON and check the bias voltages as listed below. The values listed are for reference only, no adjustments are provided. Any deviation outside the given tolerances may indicate problems in the power supply or the regulator circuits.

BIAS VOLTAGE	TEST LOCATION	TOLERANCE
+12Vdc	TP6	+/-0.7V
-12Vdc	TP11	+/-0.7V
+5Vdc	TP4	+/-0.25V
+5Vdc	U46, pin 10	+/-0.25V
-5Vdc	U46, pin 8	+/-0.15V

NOTE

The Platen Release Lever should be placed in the OPEN position for the following adjustments. This will allow the core bar to mogate during the adjustment procedures but will prevent actual printing of the print hammer.

b. Loop Gain Adjustment

1. Turn the main power ON. Set all potentiometers on the servo PCA at the center point of their rotational adjustment. Press the SELF TEST switch. Mogation should now occur. If not, then it may be necessary to rotate R47 (labelled LOOP GAIN) clockwise one-fourth turn and/or to adjust R99 (labelled RESET ADJ) slightly clockwise or counterclockwise of center until mogation does occur when the SELF TEST switch is pressed.

2. With the corebar mogating, rotate R47 (LOOP GAIN) counterclockwise until audible ringing of the linear actuator just begins to occur. Then rotate R47 clockwise approximately one-eighth turn. The ringing should cease.

c. Velocity Integrator Reset Adjustment

1. Attach one oscilloscope probe to TP7 (labelled POS) on the servo PCA with the ground lead attached to TP10 (labelled GND). Vertical sensitivity should be 2.0 volts/cm. Attach another oscilloscope probe to TP18 (labelled AUTO RESET LEVEL). Set the vertical sensitivity for this probe to 1 volt/cm. Set the sweep rate at 2 msec./cm.

2. Connect a probe from TP9 (labelled L/R) to the external trigger input of the oscilloscope. Set the trigger controls to EXT. DC., negative going, and NORM.

3. Press the SELF TEST switch. While the corebar is mogating, adjust the oscilloscope TRIGGER LEVEL until a stable trace of the position signal at TP7 occurs. Adjust R99 (labelled RESET ADJ) until the position signal at TP7 appears as shown in figure 6 and the auto reset level at TP18 is near zero. The auto reset level will continuously move back and forth between the two closely spaced levels as auto adjust occurs. Proper adjustment of R99 will place these levels near zero. (If a waveform as shown in figure 6 appears, this indicates that the reset is occurring either too early or too late with malfunction of the auto reset circuit).

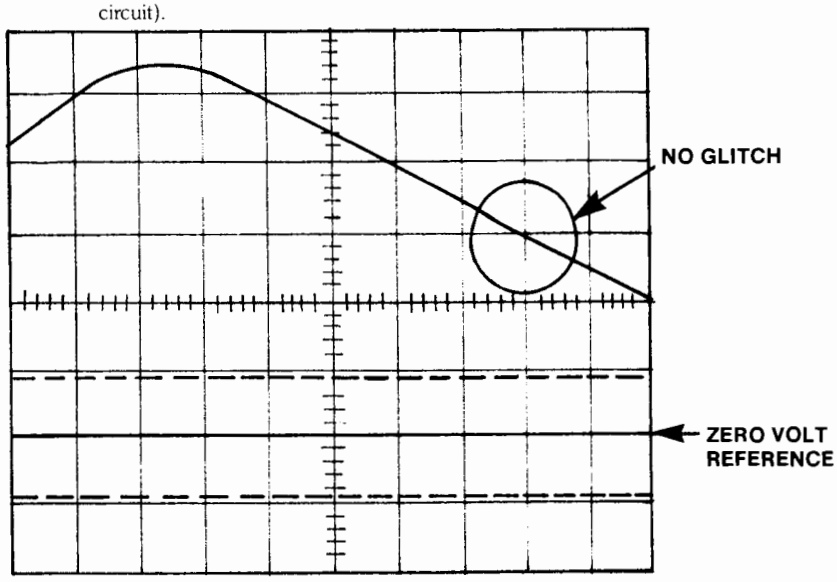

Figure 6. Position Signal Waveform

d. Reset Adjustment

Attach scope as follows:

Channel A = Servo PCA - TP 7 (POS)
0.2 volts/Div.

Channel B = Servo PCA - TP18 (Auto reset)
0.1 volts/Div.
2.0ms/Div. sweep rate

External Trigger = Servo PCA - TP9 (L/R)

Trigger Control = External, DC, negative, normal.

1. Hold self test down.
2. Adjust scope trigger for stable trace as shown.
3. On the servo PCA adjust R99 (reset adjust) until the channel B signal toggles above and below A zero volt reference. The channel A signal has no glitch in the indicated area.

e. Velocity Profile Generator
Offset Adjustment

1. Connect the oscilloscope probe to TP13 (labelled PF2) on the servo PCA. DC couple the probe with the vertical sensitivity set at 0.10 volts/cm. Set the sweep rate at 2.0 msec./cm with the trigger on AUTO.

2. Adjust R49 (VEL BAL) to zero the voltage at TP13. Some noise will be apparent on the output at this sensitivity setting.

f. Oscillator Timing Adjustment

An oscillator on the motor driver PCA works in conjunction with signals generated on the servo PCA to provide drive pulses for other electronic circuits in the printer. The operating frequency of the oscillator must be adjusted to coincide with the timing adjustment just completed. The following steps accomplish this.

1. With main power ON and the Platen Release Lever OPEN, connect the oscilloscope probe to TP13 on the motor driver PCA. This test point is accessible from the rear of the board so that the board does not have to be moved to the outside backplane slot to make the adjustment. Set the sweep rate at l0usec./cm and the vertical sensitivity at 2 volts/cm. Set the trigger controls to INT, DC, negative-going and NORM.

2. Press and hold the SELF TEST switch to cause mogation of the corebar. Adjust the TRIGGER LEVEL control to stablize a trace of the oscillator output on the scope. Approximately two cycles of the oscillator output will be displayed.

3. With mogation of the corebar taking place, adjust R48 (OSC FREQ) to set the oscillator period at 50 microseconds.

Velocity Amplitude Adjustment

1. With main power ON, connect the channel A oscilloscope probe to TP 8 (labelled P PULSE) on the servo PCA. DC couple the probe with the vertical sensitivity set at 2 volts/cm. Set the sweep rate at 0.5 msec/cm.

2. Connect the channel B oscilloscope probe to TP 18 (labelled SERVO ADJUST) on the motor driver PCA. DC couple the probe with the vertical sensitivity set at 5 volts/cm. Set the display control on CHOP.

3. Connect a probe from the external trigger input of the oscilloscope to TP3 (labelled RTA) on the servo PCA. Set the trigger controls on EXT, DC, positive-going, and NORM.

4. Press and hold the SELF TEST switch. While the corebar is mogating, adjust the oscilloscope TRIGGER LEVEL and the channel A and B POSN controls to obtain a trace of the pulse trains on both channels. Locate the pulse train for position pulses on channel A slightly above the pulse train of servo adjust pulses on channel B.

5. Adjust R55 (labelled VEL AMPL) to position the leading edge of the second position pulse coincident with the leading edge of the second of the group of servo adjust pulses as shown in figure 7.

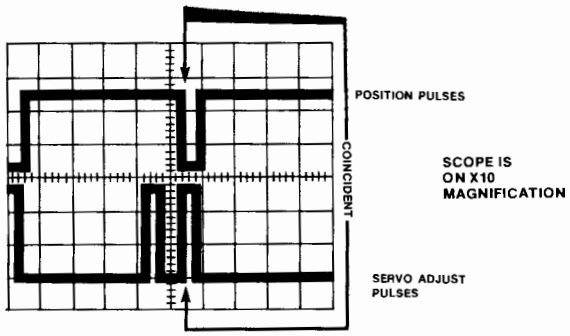

Figure 7. Velocity Amplitude Adjustments

h. Velocity Turn-Around Adjustment

1. With main power ON, connect the channel A oscilloscope probe to TP 8 (labelled P PULSE) on the servo PCA. DC couple the probe with the vertical sensitivity set at 2 volts/cm. Set the sweep rate at 1 msec./cm.

2. Connect the channel B oscilloscope probe to TP 18 (labelled SERVO ADJUST) on the motor driver PCA. DC couple the probe with the vertical sensitivity set at 5 volts/cm. Set the display control on CHOP.

3. Connect a probe from the external trigger input of the oscilloscope to TP9 (labelled L/R) on the servo PCA. Set the trigger controls on EXT, DC. positive-going and NORM.

4. Press and hold the SELF TEST switch. While the corebar is mogating, adjust the oscilloscope TRIGGER Level and the channel A and B POSN controls to obtain a trace of the pulse trains on both channels. Locate the pulse train for position pulses on channel A slightly above the pulse train of servo adjust pulses on channel B.

5. Adjust R48 (labelled TA) to position the leading edge of the second position pulse coincident with the leading edge of the second pulse in the third group of servo adjust pulses as shown in figure 8.

6. Change the external trigger slope control to negative going. With the corebar mogating, adjust R62 (RTA) to position the leading edge of the second position pulse coincident with the leading edge of the second pulse in the third group of servo adjust pulses as illustrated in figure 8

7. Close the platen.

i. Column Spacing Adjustment

1. Close the Platen Release Lever.

2. Press and release the SELF TEST switch to print an entire self-test pattern. Check for proper dot column spacing by observing the double size characters and the slanted lines. If the spacing is correct, the double size characters will appear uniform, and the slanted lines will be straight with no breaks. If any of these are not correct in appearance, then adjust R94 (DOT COL) on the servo PCA by one-eighth turns until appropriate dot placement occurs.

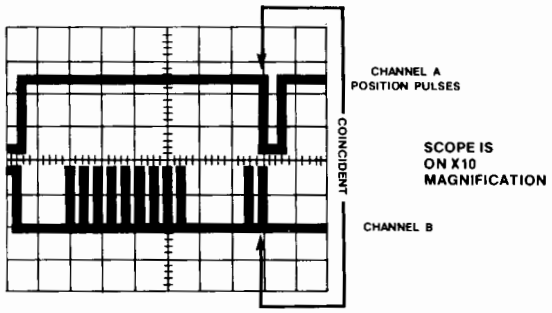

Figure 8. Velocity Turn-Around Adjustment

NOTE

R94 controls the voltage gain of the velocity transducer amplifier to control the spacing of the outside dot columns of adjacent character columns. If the gain is too low, these outside dot columns will tend to overlap. If the gain is too high, they will be separated by a gap which is larger than the gap between the dot columns within a character column. This behavior will be evident as the adjustment is being made.

j. Overstrike Minimization

1. With the machine printing in the self-test mode, adjust the velocity amplitude via R55 (VEL AMPL) until overstrike, if apparent, is minimized. Open the platen when the adjustment is completed.
2. Repeat the Velocity Amplitude Adjustment of this test procedure with one essential change. In step e, adjust R48 (OSC FREQ) on the motor driver PCA (rather than R55 on the servo PCA) to position the leading edges of the pulses so that they are coincident.
3. Repeat the Velocity Turn-Around Adjustment for this final velocity amplitude and turn-around setting.

Motor Driver PCA

a. If the motherboard PCA is series 1932 or 1934, place the jumper in the W2 position.

b. Ground TP3 on the motor driver PCA to disable the Home Servo.

c. Hold down RESET button. This disengages the linear motor amplifier. Measure and record the voltage at PXDCR test point TP15 on the servo PCA.

d. Without pressing RESET, measure the voltage at PXDCR and readjust R35 on the motor driver PCA for the same voltage as in step c.

e. Replace the jumper in the W1 position of the motherboard PCA.

IMPORTANT

Adjustment procedures for the HP 2608A Line Printer are divided into two sections.

Adjustment Procedures 2608A contains adjustment procedures for printers configured with the following PCA's:

Dot Generation PCA	02608-60039
Motor Driver PCA	02608-60017

Adjustment Procedures 2608A (PRIME) contains adjustment procedures for printers configured with the following PCA's.

Multi-layer Servo and Dot Generation PCA	02608-60141
Motor Driver PCA	02608-60140 and 02608-60181
Motherboard PCA	02608-60007, Rev. C, Series 1932 02608-60007, Rev. E, Series 1932, 1934 02608-60144

Table 1 is provided as an aid in determining which adjustment procedures are to be used in a given configuration.

TABLE 1. 2608A ADJUSTMENT PROCEDURES MATRIX

PCA	APPLICABLE ADJUSTMENT SECTION
Servo and Dot Generation PCA	
02608-60039	2608A adjustment section
02608-60141	2608A (Prime) adjustment section
Motor Driver PCA	
02608-60017	2608A adjustment section
02608-60140 02608-60181	2608A (Prime) adjustment section
Hammer Driver PCA 02608-60016 02608-60142 02608-60103	No adjustments
Motherboard PCA	
02608-60007 Rev. C, Series 1932	Use adjustment procedure contained in the Multilayer Servo and Dot Generation PCA adiustment section (see page 33).
02608-60007 Rev. E, Series 1932, 1934	Use adjustment procedure contained in the Multilayer Servo and Dot Generation PCA adjustment section (see page 33).
02608-60144	Use procedures in 2608A (Prime) adjustment section.
High Voltage PCA 02608-60022 02608-60149	No adjustments

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Linear Coil Adjustment

The coil assembly should be centered within the gap of the linear motor. Under NO condition should it rub or bind against the frame or the motor. Replacement and adjustment of the coil is described below:

CAUTION

When performing adjustments or repairs in the vicinity of the linear motor, remove your wrist watch. The magnetic field of the linear motor, even during power-off, may damage certain types of wrist watches.

To replace the linear actuator coil, proceed as follows:

a. Remove the two print mechanism mounting nuts and washers which mount the casting to the base on the right hand side of the unit.

b. Completely loosen the four screws which secure the linear motor assembly to the base. Lift the right side of the print mechanism assembly until the linear motor can be pulled from the unit.

c. Remove the five screws located on the face (flat surface) of the linear motor coil.

d. Remove the linear motor coil from the unit.

e. Install the new linear motor coil.

f. Position the nut plate so the holes are in line with the holes on the linear motor coil.

g. Insert, but do not tighten, the five screws and lock washers into the face of the coil.

h. Carefully slide the linear motor back into the unit so that the linear motor will not damage the coil.

i. Secure the linear motor to the base with the rear of the linear motor seated firmly on the base of the print mechanism.

NOTE

To seat the linear motor, insert it carefully and slide it toward the rear of the casting until it is firmly against the stops.

To adjust the linear actuator coil, proceed as follows:

a. If the five screws on the face of the coil have not previously been loosened, loosen them just enough to allow the coil to be repositioned around the linear motor using moderate pressure.

b. Using a single thickness of .15 mm (.006 in.) punched card stock or equivalent, slide the pieces of card stock around the gap between the outside of the coil and the inside of the linear motor frame. If there is binding around the perimeter of the coil, push the coil in a direction that will relieve the binding.

c. When the gap is equal around the coil, carefully tighten the five screws to avoid changing the gap. The screws should be tightened until the lock washers are flattened snugly against the coil face.

d. After tightening the screws, recheck the gap around the outside of the coil; then, using a single thickness of card stock, check the inside gap of the coil (between the coil and the linear motor magnet).

e. If the gap changed during tightening of the screws, repeat steps b through d.

CAUTION

Following adjustment of the linear motor coil, the Opto-Interrupter Position Transducer adjustment MUST BE performed to avoid overheating of the linear motor coil.

f. Reinstall the print mechanism mounting hardware and tighten in place.

Hammer To Platen Gap Adjustment

This adjustment can be performed with the print mechanism either in or out of the printer. The following steps describe the procedure with the print mechanism installed, but the only difference is that, with the print mechanism out of the unit, the platen need not be opened and the adjustment screws can be accessed through the openings in the print structure behind the platen. Do not remove the print mechanism solely for the purpose of adjusting the platen; however, if the print mechanism has already been removed for some other purpose, it will be easier to adjust the platen before replacing the print mechanism into the unit.

NOTE

Prior to performing this adjustment, ensure the platen is not locked in place (i.e., when platen release lever is released, platen should move freely).

a. Move the paper tractors to the center of the drive shafts.

b. Set the platen adjust knob to the zero (minimum open) position and remove the plastic corebar cap (column indicator).

c. Check, with a thickness gauge, the gap between the platen face and the hammer ball along the entire length of the corebar and platen. The gap should be as shown in figure 1. Small variations (+/-0.002 in.; +/-0.05 mm) will occur along the corebar, the gap measurement should be an average of these variations.

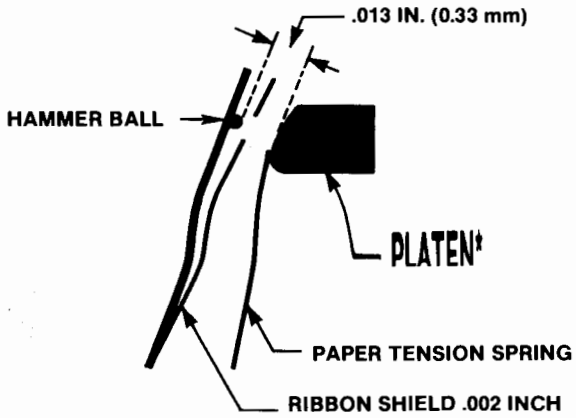


Figure 1. Hammer-to-Platen Gap Adjustment

d. If the gap as shown in figure 1 is not maintained across the entire platen, move the platen release lever to the open position. Using a hex driver, slightly loosen, but do not remove, the two pairs of socket head screws at each end on top of the platen.

NOTE

Newer printers have thumb screws in place of the socket head adjustment screws. These screws are adjusted by hand and do not require a hex driver.

e. Insert a 90 degree hex driver into the socket head adjustment screw located on the rear side of the platen for the side needing adjustment. Adjust the screw as needed then close the platen release lever and perform step c. again.

f. When the correct gap has been attained, close the platen release lever and tighten the two pairs of socket head screws on top of the platen. Recheck the gap as in step c. to ensure that the gap has not changed. Replace the corebar cap.

Multilayer Servo and Dot Generation PCA Adjustment

Several adjustments must be performed on the Servo and Dot Generation PCA if, for any reason, it is replaced or the print mechanism or corebar are replaced. These adjustments are performed to compensate for variations in electronic components on the Servo and Dot Generation PCA and for manufacturing variations in the corebar and supporting flexures. An oscilloscope and digital voltmeter are required for these adjustments. These adjustments MUST ALL be performed sequentially in the order specified.

a. Initial Set-Up Procedure

To perform the initial set-up procedure, proceed as follows:

1. Ensure Main Power is OFF.
2. Remove the top cover from the 2608A.
3. Arrange the printed circuit boards so that the Servo and Dot Generation PCA is located in the outside card slot (preferred position), with the component side of the board accessible to the Customer Engineer.
4. Examine the Backplane PCA and Motor Driver PCA to determine if they are compatible with the Servo and Dot Generation PCA (refer to table 2). If incompatible assemblies exist, replace with compatible PCAs.
5. If a ~~compatible~~ 02608-60007 Backplane PCA Revision C or E is present, perform the following adjustment.

   (a) Revision C, Series 1932 - Move the W1-W2 jumper on the Motherboard PCA to the W3-W4 position. Monitor the voltage at test point TP12 on the Motherboard PCA using the oscilloscope or multimeter. Adjust potentiometer R32 on the Motherboard PCA for 2.0 volts (+/-0.5 volts). Leave the jumper permanently placed between W3 and W4 and proceed with the Servo and Dot Generation PCA adjustment procedure.

   (b) Revision E, Series 1932, 1934 - Move the W1 jumper on the Motherboard PCA to the W2 position. Monitor the voltage at test point TP12 on the Motherboard PCA using the oscilloscope or multimeter. Adjust potentiometer R32 for 2.0 volts (+/- 0.5 volts). Leave the jumper permanently in W2 position and proceed with the Servo and Dot Generation PCA adjustment procedure.

b. Servo and Dot Generation PCA Initial Adjustment

This initial adjustment procedure applies to Servo and Dot Generation PCAs (02608-60141) which have not been previously adjusted and which are considered to be extremely misadjusted.

TABLE 2 - PCA COMPATIBILITY MATRIC RELIABILITY UPGRADED ASSEMBLIES

PRESENT ASSY / ORIGINAL ASSEMBLIES	HIGH VOLT - 02608-60150	HIGH VOLT. 60250	BACK-PLANE 60144	HAMM. DRIV. 60103	SERVO/ DOT 60141	MOTOR DRIV. 60140	MOTOR DRIV. 60181	CONTROL 60171
HIGH VOLTAGE 02608-60008	I	I	C	C	C	C	C	C
BACKPLANE 02608-60007	C	C	I	C	ALL EXCPT REV. C SERIES 1904, 1926, & 1930	C	C	C
HAMMER DRIV. 02608-60039	C	C	C	I	C	C	C	C
SERV/DOT GEN 02608-60039	C	C	C	C	SEE NOTE 1	NOT RECMD.	NOT RECMD.	C
MOTOR DRIVER 02608-60017	C	C	C	C	C	SEE NOTE 1	SEE NOTE 1	C
CONTROL PCA 02608-60018	C	C	C	C	C	C	C	I

I — interchangable C — compatible

Note 1:

The 60141 should be used to replace the -60039 Servo PCA; however, the -60039 Servo should not be used to replace the -60141 PCA. The -60039 Servo should not be used with the 60140 Motor Driver PCA and should only be used in printers which were originally shipped with the -60039 PCA.

NOTE

This initial adjustment is normally not required for field replacement PCA's.

To perform the initial adjustment on the Servo and Dot Generation PCA proceed as follows:

1. Set potentiometer R10 Velocity Amplitude (VEL) to the approximate midpoint.
2. Set potentiometer R3 Velocity Balance (V. BAL) to the approximate midpoint.
3. Set potentiometer R23 Turn Around (TA) to the fully clockwise position (maximum turn around time).
4. Set potentiometer R9 Loop Gain (LOOP GAIN) to the fully counterclockwise position (minimum loop gain).
5. Set potentiometer R80 Dot Column (DOT COL) to the fully counterclockwise position (minimum corebar displacement).
6. Set potentiometer R73 Integrator Zero (INT) to the approximate midpoint.

c. Power On Test and Adjustment

To perform the Power On test and adjustment proceed as follows:

1. Ensure the Servo and Dot Generation PCA is properly inserted in the preferred position card slot.
2. Turn the MAIN POWER ON/OFF switch on the back of the printer to ON.
3. Ensure that after a few seconds (no more than 10 seconds) the POWER ON indicator on the control panel illuminates.

CAUTION

If the POWER ON indicator fails to illuminate after 10 seconds, power the printer OFF immediately.

4. If the POWER ON indicator does not illuminate, remove the Servo and Dot Generation PCA.
5. Repeat the POWER ON test.

d. Power Distribution Voltage Check

With the power to the 2608A on, check the following voltages on the Servo and Dot Generation PCA. All voltages must fall within the tolereance specifications listed. To perform the voltage checks use a digital multimeter.

Voltage	Test Point	Tolerance Specification
+5 Logic	TP 1	+5V+/-0.025V
+12 Logic	TP 2	+12V+/-0.03V
+12 Analog	TP 3	+12V+/-1.0V
-12 Analog	TP 4	-12V+/-1.0V
-5 Logic	TP 5	-5V+/-0.5V
-5 Analog	TP 6	-5V+/-0.5V
+5 Analog	TP 8	+5V+/-0.5V

e. Opto-Interrupter Position Transducer Adjustment

The Opto-Interrupter Position Transducer adjustment is performed to ensure correct positioning of the Opto-Interrupter Position Transducer. This adjustment is temperature dependent and should be performed when the corebar and print mechanism casting are at the same temperature (when the printer has been idle for a minimum of one hour).

Although it is desirable to perform the Opto-Interrupter Transducer adjustment when the corebar and print mechanism casting are at the same temperature, it is not critical to the adjustment. If necessary, the adjustment can also be performed after heavy printing.

NOTE

Heavy printing is defined as high density graphics printing, or printing in 80 or more of the 132 columns for five minutes or more immediately prior to making the adjustment.

The Opto-Interrupter Position Transducer adjustment is performed with the ribbon removed and the platen lever open. The linear motor cable does not need to be removed if the Motor Driver PCA (02608-60140 or -60181) is used. If, however, the Motor Driver PCA (02608-60017) is used, the linear motor cable MUST be removed.

Two procedures are given for adjusting the Opto-Interrupter Position Transducer. Both procedures will result in correct positioning of the Opto-Interrupter Position Transducer when the casting and corebar are at the same temperature. Procedure (A) requires test equipment and is the procedure to be used if the adjustment is necessary after heavy printing or if the Motor Driver PCA has been replaced. Procedure (B) requires no test equipment and is the procedure to be used when the corebar and the print mechanism casting are at approximately the same temperature and the Motor Driver PCA has not been replaced.

1. Procedure (A)

   With power to the 2608A ON perform the following steps:

   (a) Monitor the voltage at test point TP25 HOME POSITION with a digital multimeter. (Use test point TP15 GND for the negative lead of the multimeter.)

   CAUTION

   Do not short the test point to the flame sprayed case.

   (b) Loosen the Opto-Interrupter screws and position the the transducer for a reading of +4.0V+/-0.5V. If the corebar is hot after heavy printing, position the transducer for a reading of +2.5V+/-0.5V.

   (c) Tighten the hold down screws.

   (d) If the reading does not remain in tolerance, it may be necessary to make a small adjustment in the position of the vane on the corebar as shown in figure 2.

2. Procedure (B)

   (a) Carefully connect a jumper cable to test point TP22 HOME A and test point TP16 HOME B. This disables the circuitry which compensates for the thermal expansion of the corebar.

   (b) Loosen the Opto-Interrupter hold down screws and slide the transducer away from the corebar enough to extinguish LED DS1 on the Servo and Dot Generation PCA.

   (c) Slowly slide the transducer toward the corebar until the LED illuminates.

   (d) Carefully tighten the hold down screws. Push the corebar very slightly to the right and verify the LED extinguishes.

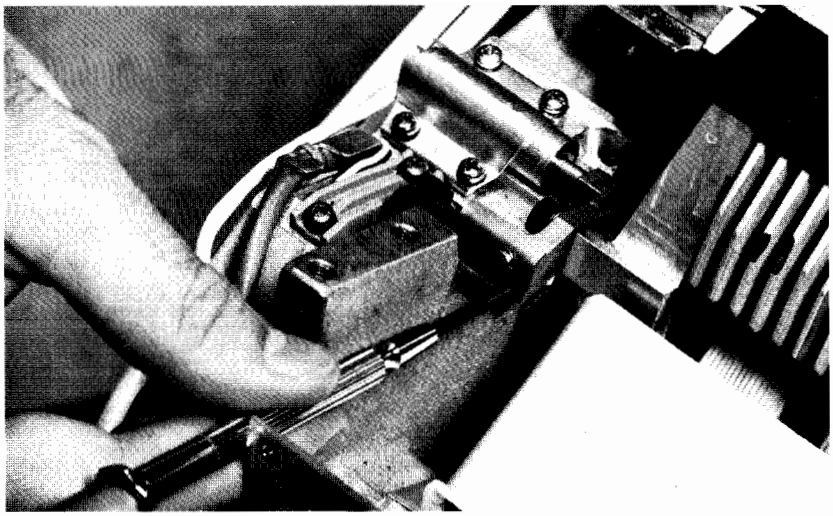


Figure 2. Position Transducer Adjustment
(Shown with Ribbon Motor Assembly removed)

(e) Remove the jumper wire between test points TP16 and TP22. The LED should extinguish.

f. Linear Motor Amplifier Zero Current Adjustment

The Linear Motor Amplifier Zero Current Adjustment is performed to ensure that the average direct current through the linear motor is zero whenever the Servo and Dot Generation PCA calls for zero current.

The procedures are provided for adjusting the linear motor for zero current. Procedure (A) requires the use of a digital multimeter and is the procedure to be used when a Motor Driver PCA is replaced, or when Procedure (B) of this section indicates the Motor Driver PCA requires adjustment. Procedure (B) requires no test equipment and is primarily intended for field service and production line use whenever the Servo and Dot Generation PCA is replaced without replacing the Motor Driver PCA.

NOTE

The platen lever must be open for this adjustment and the ribbon must be removed.

1. Procedure (A)

(a) Carefully connect a jumper wire between test points TP14 AMP ADJ and TP11 GND. This enables the linear motor amplifier on the Motor Driver PCA (02608-60140 or -60181). Connect a digital voltmeter to test point TP25 Home Position (use test point TP15 GND for the negative lead of the voltmeter).

(b) Depress and hold down the RESET switch on the operator control panel and note the voltage at test point TP25 Home Position on the SErvo PCA (02608-60141).

(c) Release the RESET switch and note whether the voltage at test point TP25 is the same as that observed in step (b) +/-0.10 volts.

(d) If the voltage at test point TP25 is not the same as that noted in step (b), adjust potentiometer R35 (AMP OFFSET) on the Motor Driver PCA to obtain a voltage within +/-0.10 volts of the voltage in step (b).

(e) Remove the multimeter test leads and jumper wire.

2. Procedure (B)

(a) Connect a jumper wire between test points TP14 AMP ADJ and TP11 GND.

(b) Press and release the RESET button on the operator control panel several times while carefully observing the corebar.

(c) If any motion of the corebar is detected in step (b), adjust the Motor Driver PCA per Procedure (A) above. If no motion of the corebar is detected, it is not necessary to adjust the Motor Driver PCA.

NOTE

It may be helpful to lightly touch the corebar while pressing the RESET button to determine if motion is present.

g. Velocity Integrator Zero Adjustment

The Velocity Integrator Zero Adjustment is performed to ensure that the velocity integrator is reset whenever the corebar passes through the mechanical center position (Home Position).

To perform the Velocity Integrator Zero Adjustment use a dual trace 100 mHz oscilloscope and proceed as follows:

NOTE

The platen lever must be open for this adjustment.

1. Connect the Channel A oscilloscope probe to test point TP23 (COMP D).
2. Set Channel A sensitivity to 2.0 volts/DIV.
3. Set the TRIGGER functions to: A. Norm. Neg. DC, and INT.
4. Set the TRIGGER level to slightly negative.
5. Set the TIME/DIV to 5.0 msec/DIV.
6. Connect the Channel B oscilloscope probe to test point TP18 (POS).
7. Set the Channel B sensitivity to 2.0 volts/DIV.
8. Set the DISPLAY to Channel B.
9. With Power to the 2608A on, press and hold down the SELF TEST switch on the operation control panel.
10. With the corebar mogating, adjust the oscilloscope trigger level until a stable trace of the POS signal appears at test point TP18.

NOTE

A small glitch may be visible on one or both sides of the waveform (see figure 3a).

11. Adjust potentiometer R73 (INT) so that the glitches on the waveform are minimized and are of equal sizes on both sides of the waveform (see figure 3b).

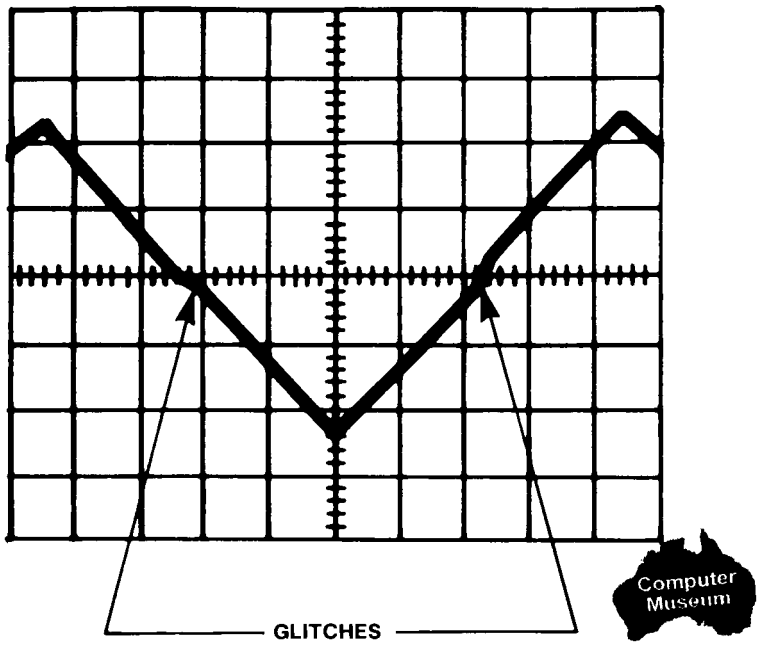
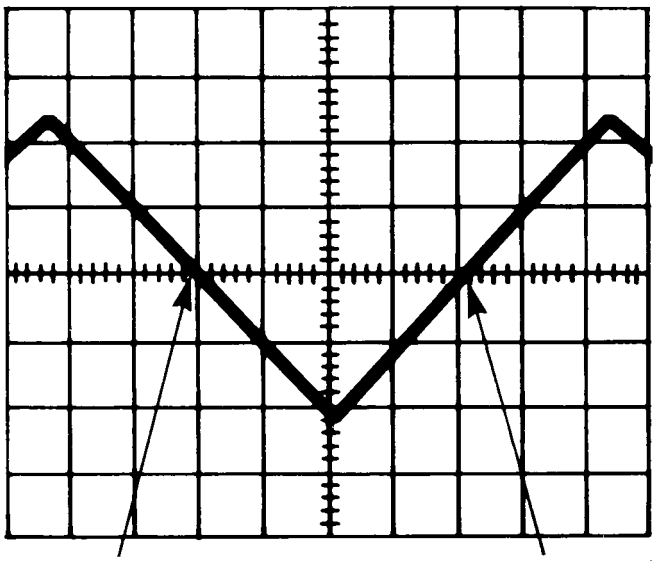


Figure 3A. Velocity Integrater Zero Adjust

NOTE: THE WAVEFORM SHOWN HERE MAY APPEAR INVERTED. IT MAY BE NECESSARY TO ADJUST THE TRIGGER HOLDOFF ON SOME OSCILLOSCOPES FOR A STABLE TRACE.



GLITCHES, IF PRESENT ARE SMALL AND EQUAL SIZED ON EACH SIDE OF THE WAVEFORM.

Figure 3B. Velocity Integrater Zero Adjust

h. Loop Gain Adjustment

The Loop Gain adjustment is performed to obtain the highest possible loop gain while still maintaining stability of the corebar velocity loop.

NOTE

The platen lever must be open for this adjustment.

To perform the Loop Gain adjustment use the oscilloscope set-up described in steps 1 thru 4 of the Velocity Integrator Zero Adjustment and proceed as follows:

1. With power to the 2608A on, press and hold down the SELF TEST switch on the operator control panel.
2. Connect the Channel B oscilloscope probe to test point TP17.
3. With the corebar mogating, adjust the oscilloscope TRIGGER level until a stable trace of VEL signal appears at test point TP17.
4. Rotate potentiometer R9 clockwise until audible squealing just begins to occur.

NOTE

The audible squealing can be observed on the oscilloscope as oscillations on the square wave signal.

5. Rotate potentiometer R9 counterclockwise until oscillations are completely removed from the waveform. Excessive counterclockwise rotation of potentiometer R9 will cause distortion on the top and bottom portions of the velocity waveform. This distortion indicates there is not enough gain in the loop circuitry. Figure 4b illustrates the desired waveform for this adjustment. Figure 4a illustrates the waveform with too little loop gain.

i. Velocity Balance Adjustment

The Velocity Balance adjustment is performed to ensure the corebar moves with the same velocity to the left as it moves to the right.

To perform this adjustment use the oscilloscope set-up specified in step 1 thru 4 of the Velocity Integrator Zero Adjustment and proceed as follows.

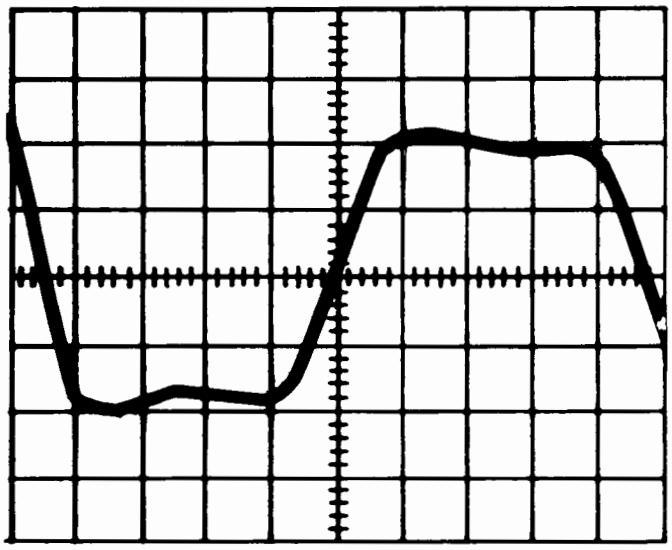
NOTE

The platen lever must be open for this adjustment.

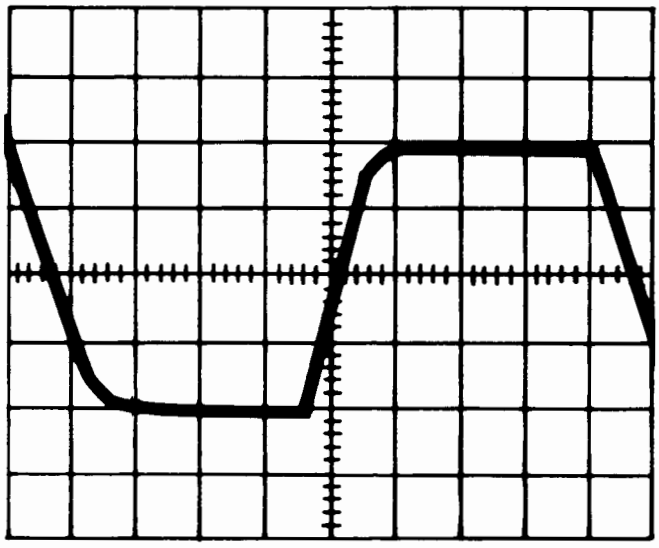
1. Select display Channel A.
2. Set TIME/DIV switch to 1 msec/DIV.
3. With power to the 2608A on, press and hold down the SELF TEST switch on the operator control panel.
4. With the corebar mogating, observe the square wave on the oscilloscope as illustrated in figure 5a.
5. Rotate potentiometer R3 Velocity Balance (V. BAL) until a single transition (with a minimum or no jitter at transition) appears on the oscilloscope as shown in figure 5b.

NOTE

An X10 or X5 magnification on the oscilloscope may provide better definition of the transition point.



A. LOOP GAIN TOO LOW



B. ACCEPTABLE LOOP GAIN

Figure 4. Loop Gain Adjustment

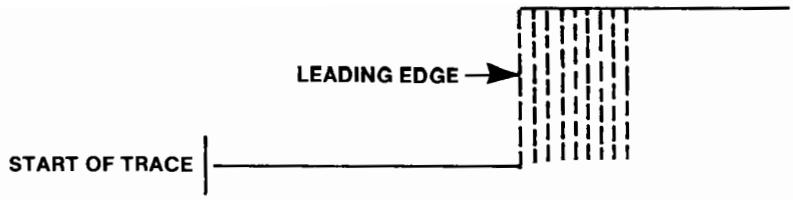


Figure 5A. Velocity Balance and Turn Around Time Adjustment

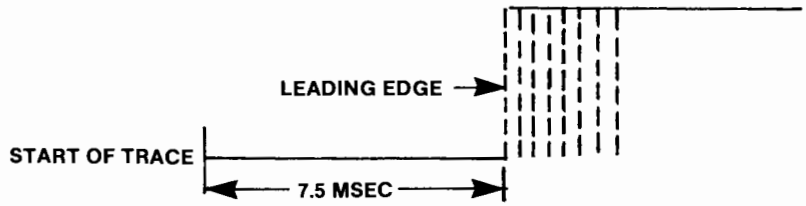


Figure 5B. Velocity Balance and Turn Around Time Adjustment

j. Turn Around Time Adjustment

The Turn Around Time adjustment is performed to ensure that the time required for the corebar to reverse its direction of motion is three times the dot-to-dot impact time (nominally 7.5 ms).

To perform the Turn Around Time adjustment use the oscilloscope set-up specified in steps l thru 4 of the Velocity Integrator Zero Adjustment and proceed as follows.

1. Ensure that the trace on the oscilloscope is positioned at the leftmost mark on the screen.
2. With power to the 2608A on, press and hold down the SELF TEST switch on the operator control panel.
3. With the corebar mogating, observe the square wave illustrated in figure 5b.
4. Adjust potentiometer R23 Turn Around (TA) for a turn around time of 7.5 ms +/-0.5 ms.

NOTE

It may be necessary to adjust R3 (V BAL) to obtain minimum jitter on the transition.

k. Velocity Amplitude Adjustment

The Velocity Amplitude adjustment is performed to control the speed of the corebar in order to establish the time interval between printed dots.

To perform this adjustment, use the oscilloscope set-up specified in steps 1 thru 4 of the Velocity Integrator Zero Adjustment and proceed as follows.

NOTE

The platen lever must be open for this adjustment.

1. Connect Channel B of the oscilloscope probe to test point TP20 (COMP C).
2. Set the TRIGGER functions to: A Norm, POS, DC, and INT.
3. Set the TRIGGER slope to POS.
4. Set the TRIGGER level to slightly positive.
5. Set the TIME/DIV to 0.5 msec.
6. Set the DISPLAY to Channel B.
7. With the corebar mogating, adjust the TRIGGER LEVEL on the oscilloscope for a stable trace as shown in figure 6.
8. With the corebar mogating, adjust potentiometer R10 Velocity (VEL) until a transition occurs at 2.5 msec+/-.05 msec.

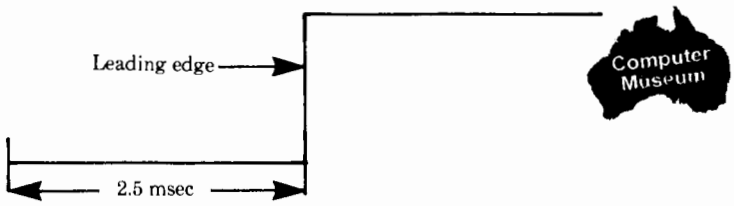


Figure 6. Velocity Amplitude Adjustment

I. Column Spacing Adjustment

The Column Spacing adjustment is performed to ensure proper dot column spacing.

To perform the Column Spacing adjustment proceed as follows:

NOTE

A ribbon must be installed and the platen lever must be CLOSED for this adjustment.

1. With power to the 2608A on, press and release the SELF TEST button on the operator control panel to print an entire self test pattern.
2. Check for proper dot column spacing by observing the double sized characters and the slanted lines. If the spacing is correct, the double sized characters will appear uniform without gaps running vertically down the center of each character and the slanted lines will be straight with no breaks.
3. If the dot column spacing needs to be adjusted, adjust potentiometer R80 (DOT COLUMN) to obtain proper dot placement.

NOTE

Potentiometer R80 controls the voltage gain of the velocity transducer amplifier which controls the spacing of the outside dot columns of adjacent characters. If the voltage gain is too low, these dot columns will tend to overlap. If the voltage gain is too high, the dot columns will be separated by a gap that is larger than the gap between dot columns within a character.

4. Loop Gain and Dot Column adjustment are interacting. It is, therefore, necessary after completing the Dot Column adjustment to repeat the Loop Gain adjustment.

NOTE

If print quality is still unacceptable after the previous adjustments have all been completed, check the mechanical adjustments of the print mechanism, especially the platen gap. The corebar should also be inspected for excessive ribbon ink and paper lint buildup around the balls on the print hammers.

m. Overstrike Minimization Adjustment

The Overstrike Minimization adjustment is performed to ensure minimum overstrike and best overall print quality.

NOTE

Excessive overstrike can be identified by printing a Self Test pattern and examining the print quality. A self test pattern with excessive overstrike appears dirty with extraneous dots occuring between letters. This situation is particularly evident on the "T", "I", and "Y" characters. A sample Self Test with excessive overstrike is provided in figure 7a. For comparison, a sample Self Test with good quality print is provided in figure 7b.

If the print quality is acceptable after performing the adjustments and any necessary mechanical adjustments, this adjustment is not required.

The adjustments contained in this section slightly alter the normal dot-to-dot impact time of 2.50 msec. The overstrike may be further minimized (beyond the minimization which occurs with a dot-to-dot impact time of 2.50 msec) and the print quality improved by small adjustments of the hammer fire timing. The dot-to-dot impact time can be varied by adjusting potentiometer R48 (OSC FREQ) on the Motor Driver PCA.

NOTE

Whenever potentiometer R48 (OSC FREQ) is adjusted, potentiometers R10 Velocity (VEL) and R23 Turn Around (TA) on the Servo and Dot Generation PCA should also be adjusted for optimum print quality.

To perform the Overstrike Minimization adjustment use a dual trace oscilloscope and proceed as follows:

NOTE

The platen lever must be open for this adjustment.

1. Initial Set-Up

   (a) Connect Channel B to test point TP13 (OSC 2) on the Motor Driver PCA.

   (b) Connect Channel A to test point TP23 (COMP D) on the Servo and Dot Generation PCA.

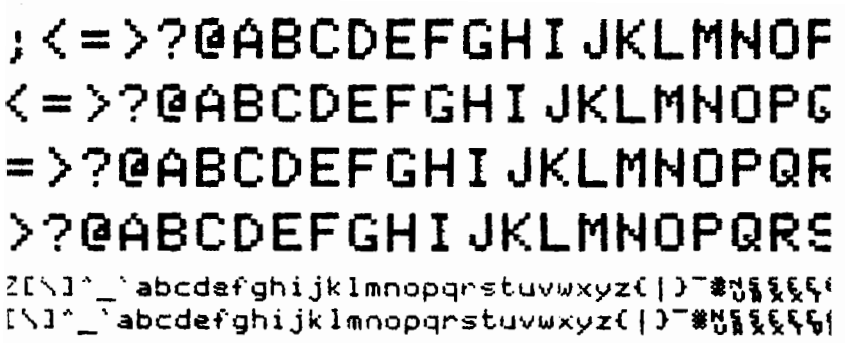


Figure 7A. Overstrike Print Sample

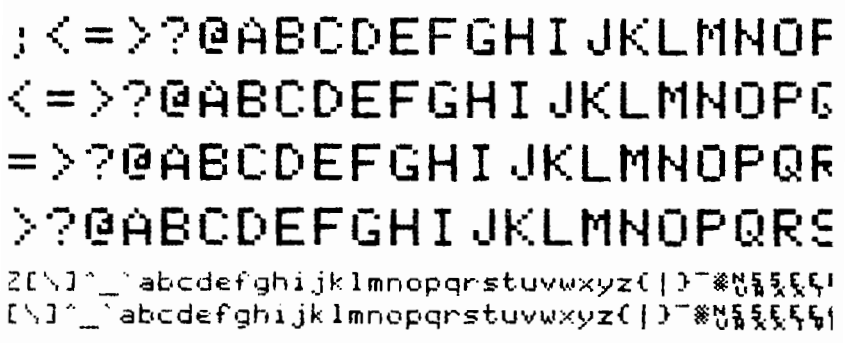


Figure 7B. Print Sample With Good Print Quality

(c) Set the TRIGGER functions to: B, Norm. Neg. DC and INT.

(d) Set the TRIGGER level to slightly negative.

(e) Set the TIME/DIV to 10 us/DIV.

(f) Set the DISPLAY to Channel B.

2. Oscillator Frequency Adjustment

(a) With power to the 2608A on, press and hold down the SELF TEST switch on the operator control panel.

(b) With the corebar mogating, adjust the TRIGGER level until a stable trace of oscillator frequency is displayed on the screen.

(c) Adjust potentiometer R48 (OSC FREQ) on the Motor Driver PCA until the oscillator frequency is 51.0 usec (+/–.1 usec).

(d) Set the DISPLAY to Channel A.

3. Turn Around Time Adjustment

(a) Set the TRIGGER functions to: A, Norm, Neg, DC and INT.

(b) Set the TIME/DIV to 1 msec/DIV.

NOTE

To obtain proper accuracy on the following measurement, ensure that the trace on the oscilloscope is positioned at the leftmost mark on the screen.

(c) Press and hold down the SELF TEST switch on the operator control panel.

(d) With the corebar mogating, adjust the TRIGGER level until a stable trace is obtained on the screen.

(e) Adjust potentiometer R23 Turn Around (TA) on the Servo and Dot Generation PCA for a reading of 7.65 msec +/-.02 msec).

(f) Set the DISPLAY to Channel B.

4. Velocity Adjustment

(a) Connect Channel B to test point TP20 (COMP C).

(b) Set the TIME/DIV to 0.5 msec/cm.

(c) Set the TRIGGER slope to POS.

(d) Set the TRIGGER level to slightly positive.

(e) With power to the 2608A on, press and hold down the SELF TEST switch on the operator control panel.

(f) With the corebar mogating, adjust the TRIGGER level until a stable trace is obtained on the screen.

(g) Adjust potentiometer R10 Velocity (VEL) on the Servo and Dot Generation PCA for a transition of 2.55 msec (+/-.02 msec).

(h) Close the platen lever.

(i) Press and release the SELF TEST switch on the operator control panel to print an entire self test pattern.

The Overstrike Minimization adjustment may have improved the print quality. If print quality has not been improved, it is necessary to repeat the Overstrike Minimization adjustment adjusting potentiometer R48 (OSC FREQ) in increments of 1 usec (51, 52 and 53 usec). If print quality is still unsatisfactory, adjust potentiometer R48 (OSC FREQ) in increments of one usec in the opposite direction (48, 47, 46 usec).

NOTE

When adjusting potentiometer R48 (OSC FREQ), adjust potentiometer R10 Velocity (VEL) for the desired dot-to-dot impact time. Refer to table 3 for corresponding times for adjusting potentiometer R23 Turn Around (TA).

TABLE 3. OVERSTRIKE MINIMIZATION TIMING SPECIFICATIONS

Adjust R18 Dot-to-Dot Impact Time	Adjust R45 (TA) on (OSC FREQ) on Motor Driver PCA to	Adjust R23 Turn around time Servo and Dot Generation PCA to
2.65 msec	53 μsec	7.95 msec
2.60 msec	52 μsec	7.80 msec
2.55 msec	51 μsec	7.65 msec
2.50 msec	50 μsec	7.50 msec
2.45 msec	49 μsec	7.35 msec
2.40 msec	48 μsec	7.20 msec
2.35 msec	47 μsec	7.05 msec
2.30 msec	46 μsec	6.90 msec

Motherboard PCA Adjustment Procedure

The only adjustment on the Motherboard PCA (02608-60144) is made to achieve the +5V power supply. To perform this adjustment proceed as follows:

a. Ensure that all PCA's are properly installed in the card cage area.

b. Connect a digital voltmeter to the +5V test point and to ground.

c. Turn the MAIN POWER ON/OFF switch on the back of the printer to the ON position.

d. Adjust potentiometer R17 for +5V +/-.025V.

Motor Driver PCA Adjustment (For 02608-60181 Only)

This adjustment would be performed if the motor driver PCA (P/N 02608-69181) is changed or if the paper jam retrofit kit (HP P/N 26003A-E03) is installed.

a. Adjustment Procedure

NOTE

In the following adjustment procedure a valid TTL logic high signal is defined as being between 2.8V to 5.25V. And a valid TTL logic low signal is defined as less than 0.6V.

1. Connect a DVM to test point TP20 (PAP).

2. With no paper installed in the tractors, verify that a valid TTL logic low level is present. If a valid TTL logic level is observed, proceed to step 4.

3. To reach a valid TTL logic low level, the brightness of the LED must be increased by increasing the current drive to the LED. The S1, switch on the motor driver card (P/N 02608-60181), should be changed as indicated in Table 4.

TABLE 4. TTL LOGIC LOW LEVEL ADJUSTMENT

Present Position	Next Position
Right	Left
Center	Right
Left	Change Paper Jam Assy (P/N 02608-60134)

After changing the position of S1, verify that a valid TTL logic low level is present at TP20. If not, repeat step 3 until a valid TTL logic low is present.

4. With paper installed between the LED and the phototransistor, verify that a valid TTL logic high level of 2.8V to 5.25V is present at TP20. If the TTL logic high level is within the acceptable range, this is the final step.

5. To adjust the TTL logic high level the intensity of the LED must be reduced because the LED is too bright and may be shining through the paper. To adjust the intensity of the LED, the switch, S1, on the motor driver PCA (0260860181) should be changed to the position indicated in Table 6 to reduce the LED current drive.

TABLE 6. TTL LOGIC HIGH LEVEL ADJUSTMENT

Present Position	Next Position
Right	Center
Center	Replace Paper Jam Assy (P/N 02608-60134)
Left	Right

After changing the position of S1, verify that a valid TTL logic high level is present at TP20. If not, repeat step e until a valid TTL logic high is present.

6. Repeat step 2 to verify that the TTL logic low signal is still within specifications.

Section VII
Part Numbers

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Section VIII: Diagrams

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Section IX: Service Notes

Seq. No.	Pub. Date	Title
1	12/78	All Serial Numbers Recommended Logic Card Placement
2	10/79	Serial Prefix Below 1926 New Tractors
3	10/79	Serial Prefix Below 1930 VDE RFI Specification
4	12/79	New Revision Backplane Assembly 02608-60007
5	3/80	Serial Prefix below 1952 Circuit Breaker Wiring
6	9/80	New Motor Driver PCA
7	8/80	Reliability Improved PCAs
8	3/81	New Control PCA - Firmware Update