

SERVICE MANUAL
1526 • MPS 802 • 4023
PRINTERS
APRIL 1985 PN-314003-03

 **commodore**
COMPUTERS

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1526 • MPS 802 • 4023
PRINTERS
APRIL 1985 PN-314003-03

Commodore Business Machines, Inc.

1200 Wilson Drive, West Chester, Pennsylvania 19380 U.S.A.

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SPECIFICATIONS

• 1526 • MPS 802 • 4023 •

PRINT METHOD	• Bi-directional impact dot matrix
CHARACTER MATRIX	• 8 X 8 Dot Matrix
CHARACTERS	• Upper & lower case letters with true descenders. Numerals & symbols. All PET graphic characters
GRAPHICS	• 8 Vertical dots — maximum 640 columns
CHARACTER CODES	• CBM ASCII code
PRINT SPEED	• 60 CPS
MAXIMUM COLUMNS	• 80 Columns
LINE FEED SPACING	• 6 Lines/inch in character mode • 9 Lines/inch in graphics mode
LINE FEED SPEED	• 5 Lines/sec in character mode • 7.5 Lines/sec in graphics mode
PAPER FEED	• Pin feed
PAPER WIDTH	• 4.5 to 10'' Width (including tractor feed holes) • 8.5'' Width (after tractor holes)
MULTIPLE COPIES	• Original plus maximum of 3 copies
POWER REQUIREMENTS	• 120 Volts AC, 60 Hz, 1.5 Amp

• 1526/MPS 802 •

INTERFACE COMPUTERS

- SERIAL
- VIC20, C64,
SX64, C16,
PLUS 4

• 4023 •

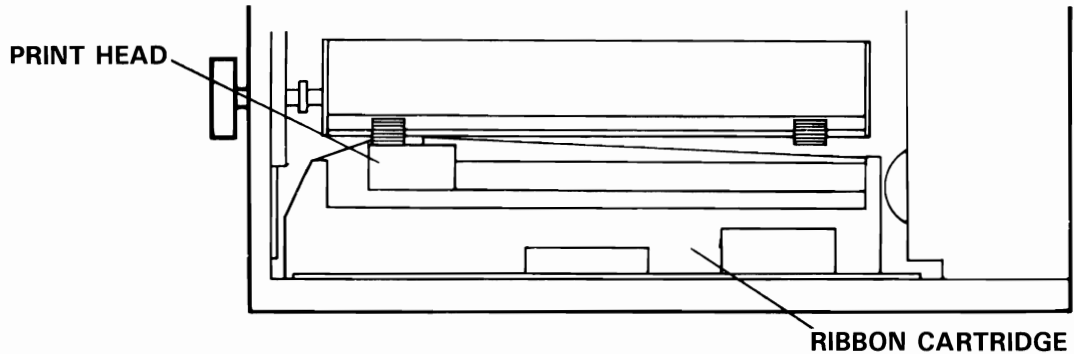
INTERFACE COMPUTERS

- IEEE Protocol
- 4032, 8032,
8096, SP9000,
B-MODEL

SET UP AND TESTING

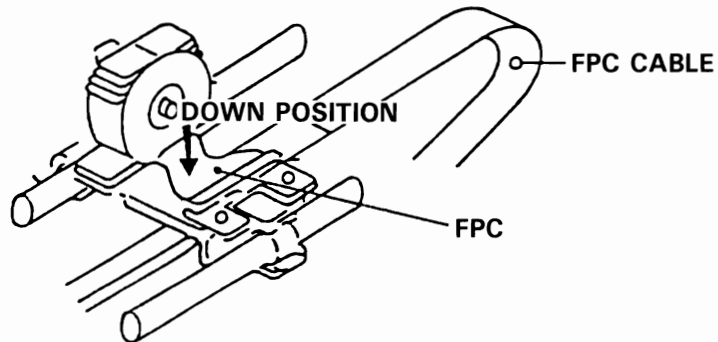
VISUAL OBSERVATION is particularly important before attempting to repair a printer. Always check for physical damage to the mechanism. Remove any loose debris that may have accumulated inside the unit.

Ribbon Cartridge



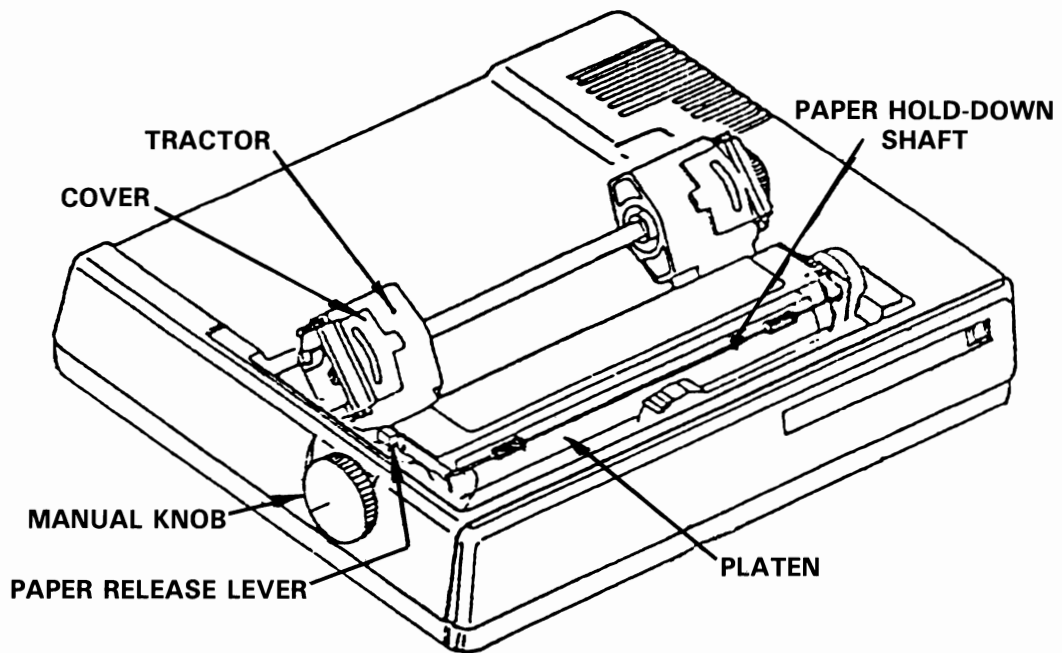
Before installing the ribbon cartridge, turn the printer off. By carefully pushing the carriage, position the print head in the center of the unit. Turn the dial knob on the cartridge in the direction of the arrow until the ribbon is taut. Insert the cartridge in the hooks provided and push down. The ribbon must be positioned between the print head and the ribbon guide.

CAUTION! When installing or removing the ribbon cartridge, do not touch the FPC cable. Check that the FPC cable remains in the down position as shown.



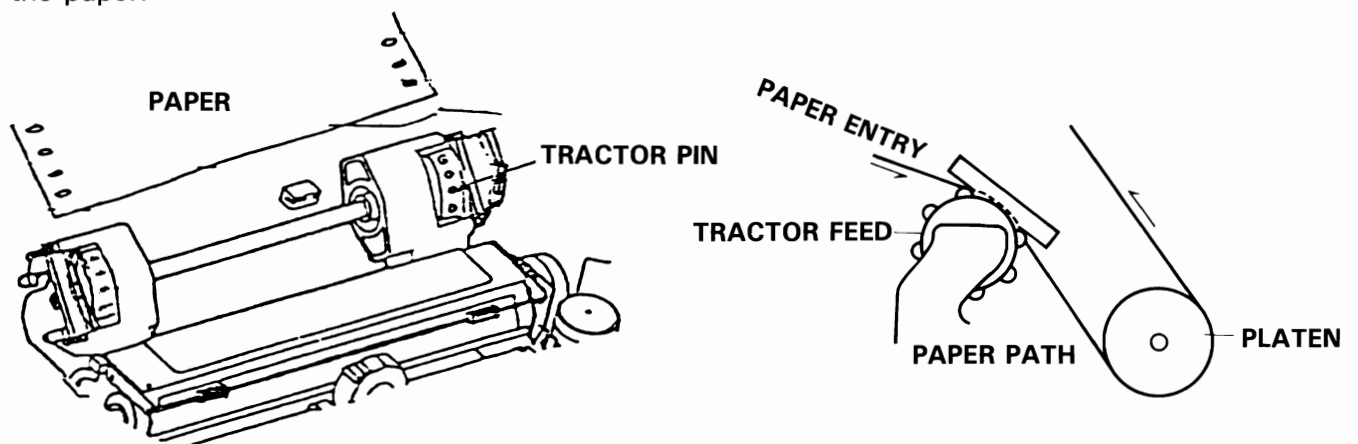
SET UP AND TESTING (Continued)

Paper Installation



To install paper, turn the printer off, remove the paper rack and lift the soundproof cover. Lift the paper hold down shaft and raise the covers of the left and right tractors to allow access to the tractor pins. Align the paper perforations with the tractor pins and close the covers. The left tractor assembly must be firmly pressed against the left stopper. The right tractor assembly slides to allow adjustment for paper width.

Once the paper is aligned in the tractor, turn the manual feed knob while guiding the paper to its position behind the platen (See the paper path figure below). Standard paper may be used by simply installing it in front of the tractor and behind the platen, using the manual feed knob to friction feed the paper.



ACCESSORIES PARTS LIST

C 314597-01	1526/802/4023	PAPER RACK
C 314598-01	1526	USER'S MANUAL
C 314598-02	MPS802	USER'S MANUAL
C 314598-03	4023	USER'S MANUAL
C 314599-01	1526/802/4023	RIBBON
C 1515001-01	1526/MPS802	6PIN DIN CABLE
C 903508-04	1526/802/4023	POWER CORD

MAINTENANCE

Cleaning

CAUTION

Do not use chemicals to clean any of the printer parts.

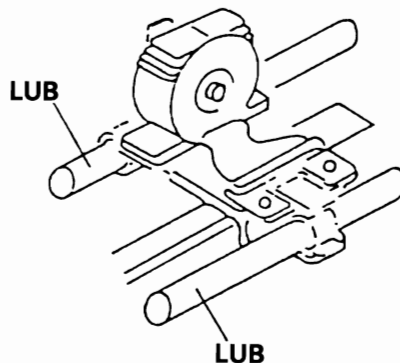
Using a clean, dry brush, remove dust and debris from the ribbon guide, print head, platen area and tractors often. Periodically remove the top case and brush any accumulated dust or particles from the unit.

Lubrication

CAUTION

Do not allow oil or grease to contact the motors, sensors, tractors, platen, ribbon or print head.

Oil the carriage pillars, as indicated, every 500,000 lines or once a year. Use dry guaze to clean the pillars before oiling. Oil sparingly and remove any excess. Use a light oil that will not attract and hold dust and dirt.



A clean, light grease is used to protect the meshing parts of the plastic gears. Also, the 4 springs on the unit may require lubrication. They can be found behind the paper guide, on the roller unit (2), and on the paper holder (2). See disassembly numbers 12, 14 and 17 for identification. Be sure to use lubricants sparingly.

FUNCTIONAL BLOCK DIAGRAM

Functional Block Diagram Data Flow Theory

The 1526, MPS 802 and 4023 printers are functionally the same, with the exception of the interface circuits. The 1526 and MPS 802 printers have a serial interface, and the 4023 printer has an IEEE interface. The data flow is the same for all of the printers.

The Interface

The 1526 and MPS 802 Serial Interface

Serial data is received at a rate determined by the clock input. The serial data signal is inverted, then input to the IC U4D. IC U4D converts serial data to parallel data.

The 4023 IEEE Interface

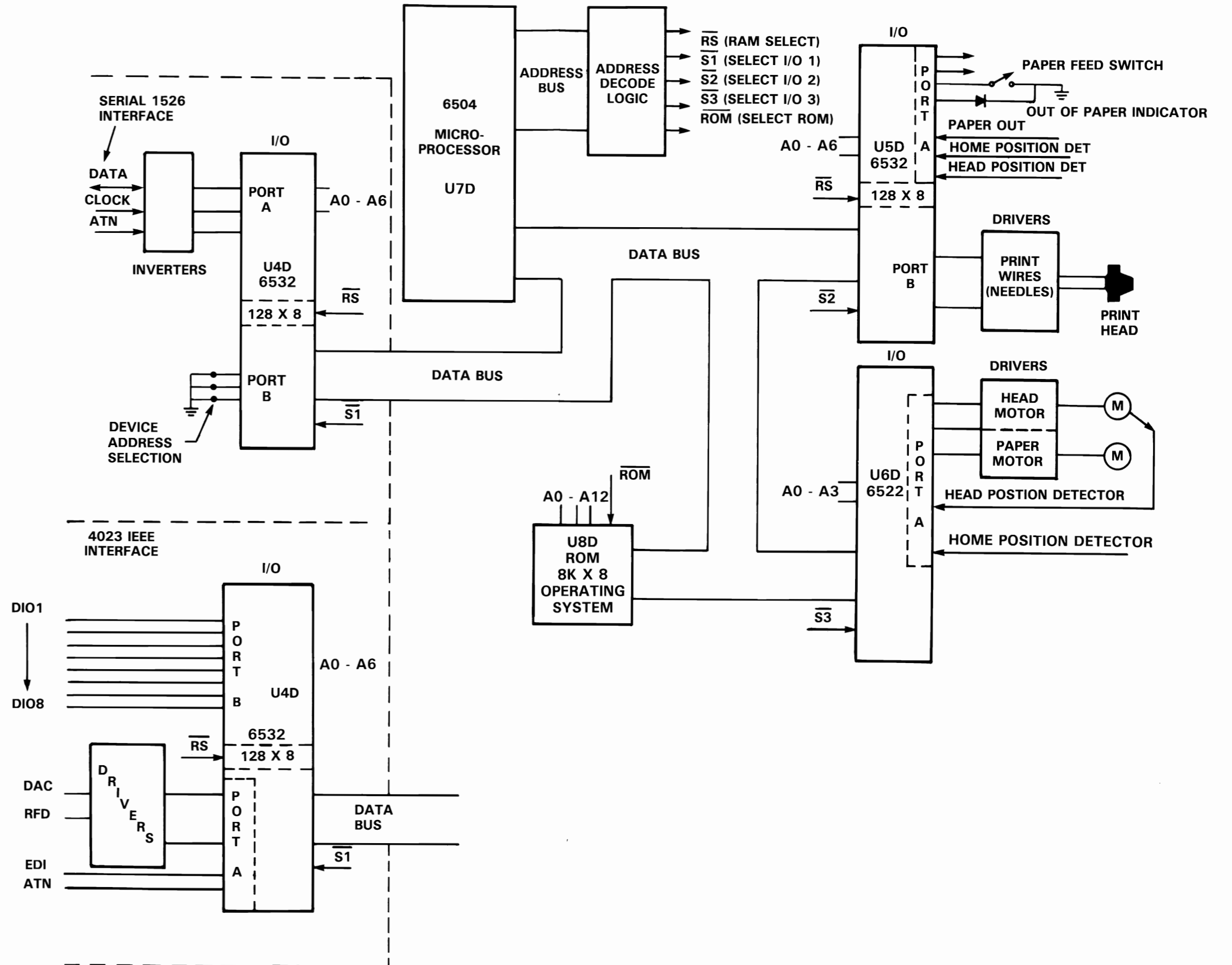
Parallel data (DIO1-DIO8) is received on the Port B inputs of U4D (PB0-PB7). U4D acts as a buffer, allowing synchronization between the processor read operation and the receive data rate. Handshake signals ATN (Attention), RFD (Ready for Data), and DAC (Data Accepted) provide synchronization between the transmitting device and the printer.

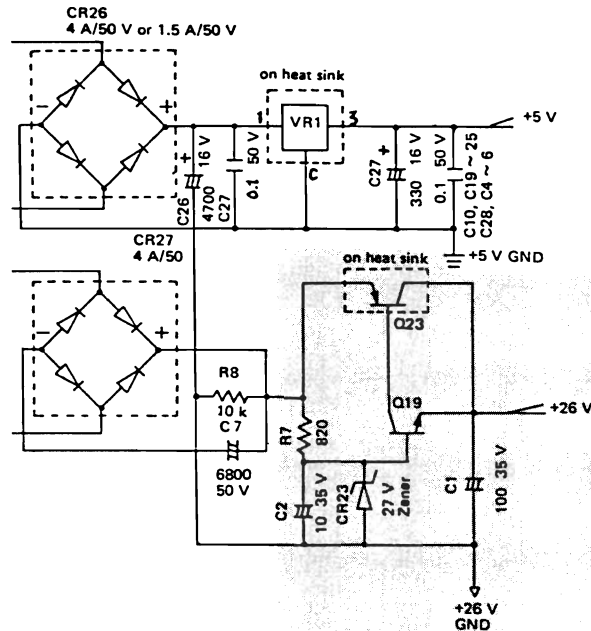
Processor Logic

Printer Data Flow

Parallel data from the interface is present on the data bus at times selected by the operating system program. The operating system (program in ROM) monitors the data being received from the interface. Receive data can be printable characters or control codes. Printable characters are stored in RAM. 256 bytes of RAM are available for character storage. 128 bytes of RAM are in U4D, and 128 bytes in U5D. This RAM is called the TEMPORARY LINE BUFFER. Control codes are interpreted as special function commands and are executed at the time they are received. The number of lines per inch and the characters per inch are examples of special function commands.

Printable characters are stored in the LINE BUFFER. When the carriage return character is received, all the characters stored in the LINE BUFFER are converted to DOT MATRIX codes by the operating system. The DOT MATRIX codes are stored in ROM with the operating system. The DOT MATRIX data is written into port B of U5D. The driver circuits activate the proper print wires to form the characters, one column at a time. As a character is being printed, the head (carriage) stepper motor moves one dot column position at a time. A position sensor outputs pulses that are used to indicate head position any time it is not home (far left). The paper stepper motor moves paper up one line at a time when a carriage return is sensed. The operating system program monitors the position sensor output, and generates the signals that are passed to IC U6D port A controlling the motors.





The Power Supply

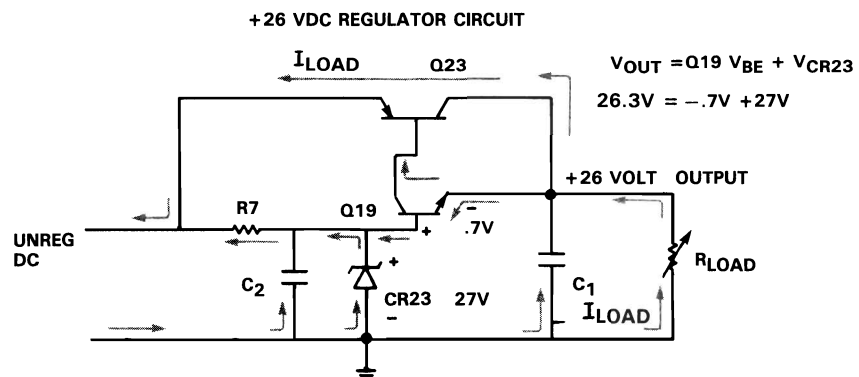
The Power Supply generates two outputs, +5VDC and +26VDC. Both outputs are regulated. The 5VDC output supplies the microprocessor and TTL circuits. The +26VDC output supplies the print wire coils and the paper feed and carriage motor drive circuits.

+5VDC Supply

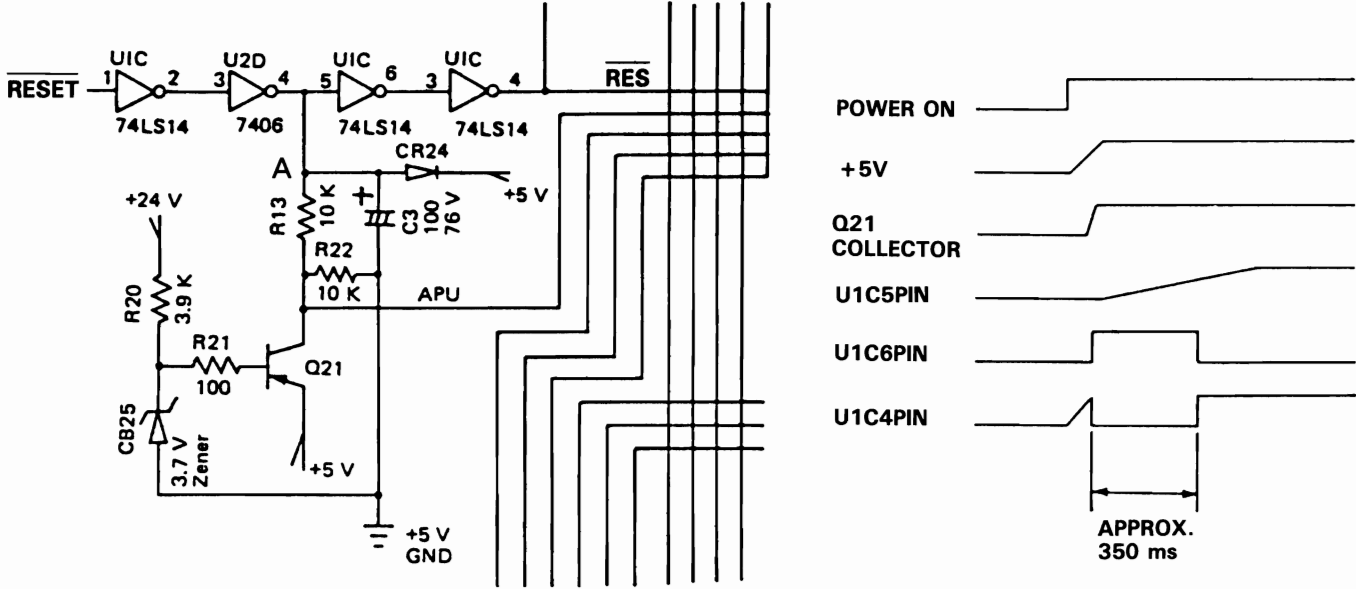
VR1 is a series regulator. The series regulator keeps the output voltage constant when the load varies. Capacitive filtering eliminates most of the ripple voltage on the output. CR26 is a full wave bridge rectifier which converts the AC voltage generated from the top secondary winding of the power transformer to DC voltage.

+26VDC Supply

A shunt type regulator circuit generates the constant 26 VDC output.



The output voltage is regulated at 26.3VDC because the base to emitter voltage of Q19 opposes the voltage developed across CR23. Most of the load current passes through the power transistor Q23. CR27 is a full wave bridge rectifier which converts the AC voltage output from the bottom secondary winding of the power transformer to DC voltage. C7 filters the rectified DC output voltage.

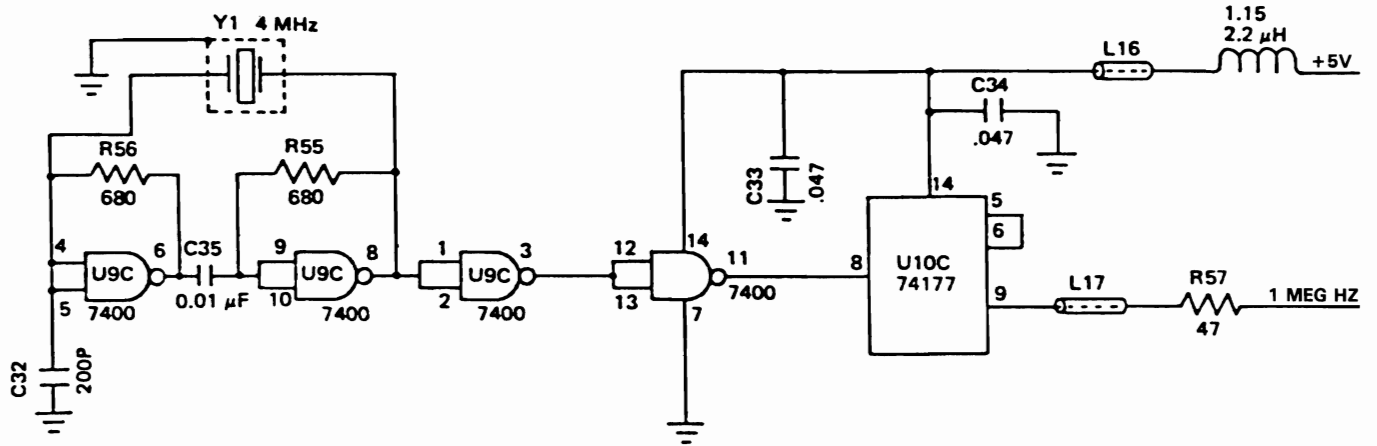


Reset Logic Circuit Theory

A "low" pulse applied to the reset interrupt input, pin 1 of the microprocessor U7D, causes the processor to restart execution of the printer operating system program stored in the ROM U8D. A reset pulse occurs when the power is turned on. An external device connected to the serial bus can also generate a reset, initializing all devices connected on the bus at the same time.

A short time after the power is turned on, the 5VDC supply rises to its normal operating level. This forward biases Q21, allowing C3 to charge. When the voltage across C3 reaches 2 volts, the output of the inverter U1C pin 6 goes "low", causing the output of the inverter U1C pin 4 to go "high". This "low" pulse occurs when the unit is switched on. The reset input - \overline{RES} - on the serial bus (interface clear signal - \overline{IFC} - on the 4023 IEEE interface) forces the reset pulse by applying a "low" to the input of the inverter U1C pin 1.

1526 AND 4023 CIRCUIT THEORY



Clock Circuit

Crystal Y1 generates the fundamental 4 MHz clock. The circuit illustrated below the crystal stabilizes and squares the signal. U10C divides the input frequency by 4. A 1 MHz clock is output on pin 9 of U10C. This is the processor system clock.

Microprocessor Logic

Main control of all printer operations is overseen by the 6504 microprocessor (U7D). The 6504 microprocessor can address 8196 locations allocated to RAM, ROM, or I/O. The processor communicates with two 6532 I/O devices (U4D and U5D), a 6522 VERSATILE INTERFACE ADAPTER (U6D), and an 8K byte ROM (U8D).

U4D is a 6532 I/O device. The printer interface and address selection are controlled by U4D.

U5D is also a 6532 I/O device. Port B outputs the signals that control activation of the print wire solenoids.

Port A signals control the following functions:

1. Paper feed motor position hold.
2. Carriage return motor position hold.
3. Paper out sense.
4. Monitors carriage position by counting timing pulses.
5. Monitors carriage home position.
6. Outputs error LED signal.
7. Monitors paper advance switch.

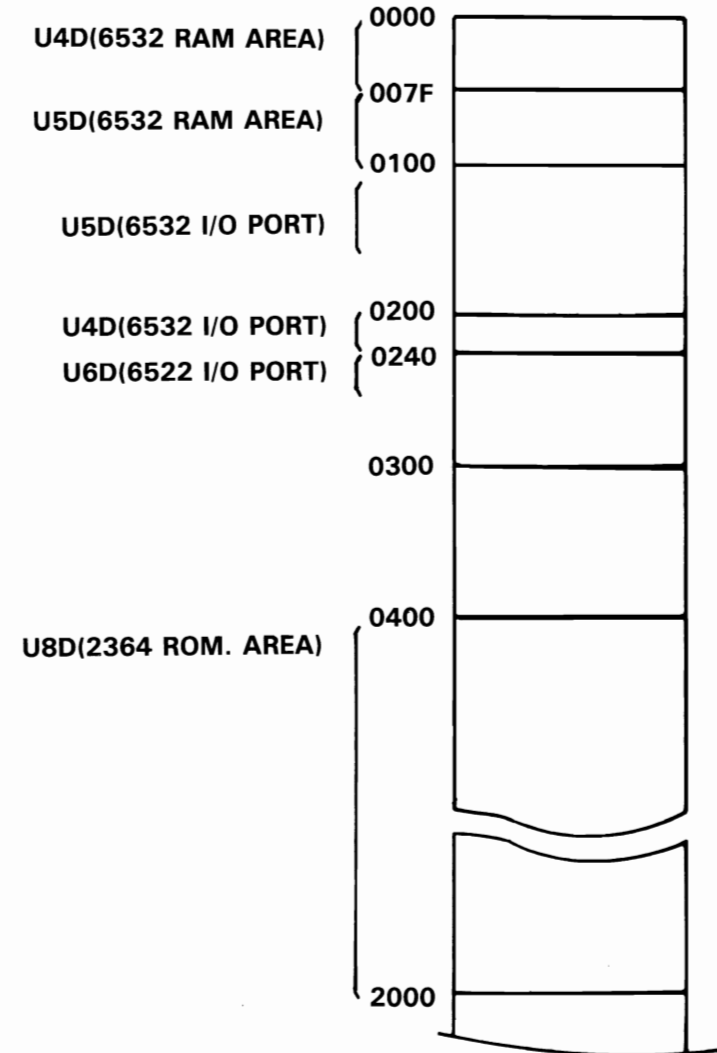
Both 6532 I/O devices contain 128 bytes of RAM. 256 bytes of storage is used as a line buffer, and for processor scratch pad and stack operations.

U6D is a 6522 VIA. This device controls the motors. Port A signals PA0-PA3 control the head motor transistor drivers. Port A signals PA4-PA7 control the paper motor transistor drivers.

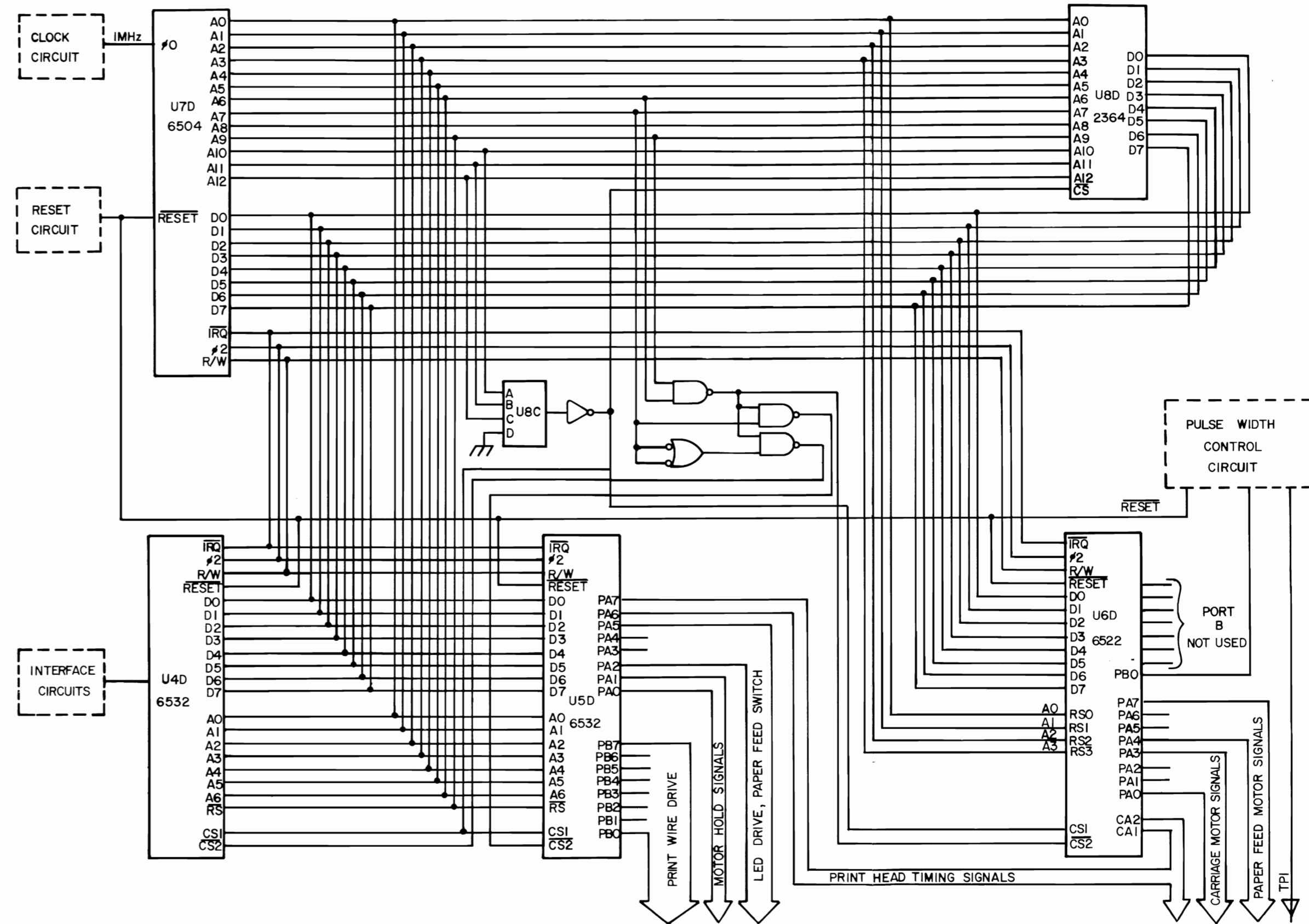
The pulse width control circuits protect the print head by controlling the length of time current passes through the print wire coils. A 555 timer limits this time to 500 microseconds.

Microprocessor Address Decoding Logic

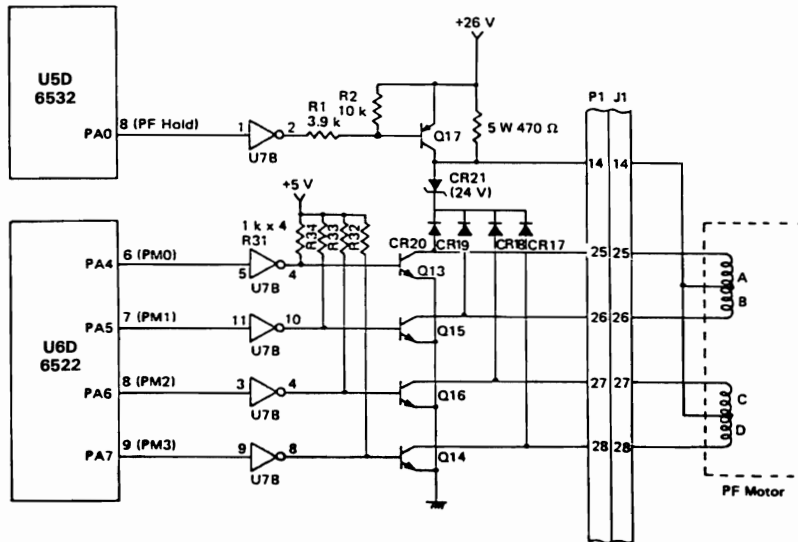
U1D pin 11 goes "low" and U2C pin 12 goes "high" when U4D is selected by the processor. U1D pin 6 goes "low" and U2C pin 12 goes "high" when U5D is selected by the processor. When the processor communicates with the 256 bytes of RAM internal to the 6532 I/O devices, the RS input on the selected 6532 goes "low" because the processor address output A9 is "low". U1D pin 3 goes "low" and U2C pin 12 goes "high" when the processor selects U6D. U2C pin 12 goes "low" when the processor selects U8D.



MEMORY MAP



1526 AND 4023 CIRCUIT THEORY



STEPPING ORDER	COIL			
	M0	M1	M2	M3
0	ON	ON	OFF	OFF
1	OFF	ON	ON	OFF
2	OFF	OFF	ON	ON
3	ON	OFF	OFF	ON
4	ON	ON	OFF	OFF

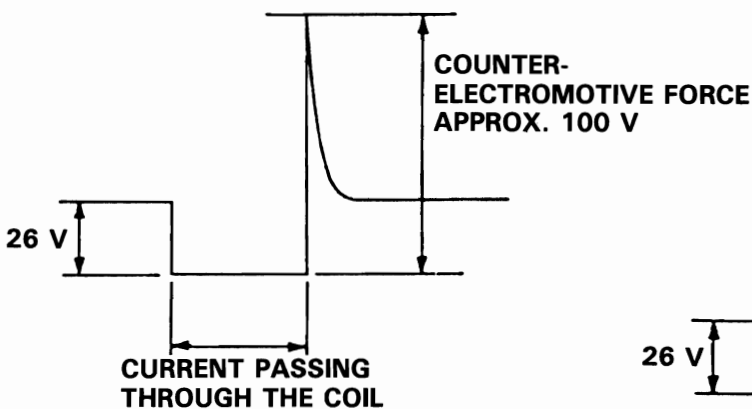
FORWARD MOTION

NOTE: DURING REVERSE TRANSMISSION, THE CURRENT FLOW IS STEPPED IN REVERSE ORDER - 4, 3, 2, 1, 0.

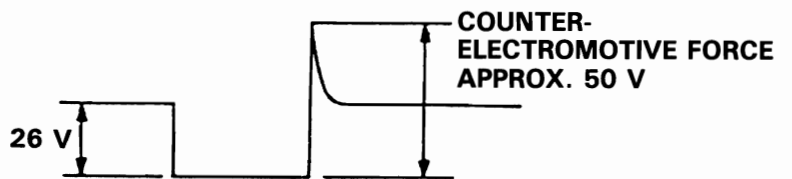
Paper Feed Motor Circuit

The paper feed motor is a four phase stepper motor. Sequentially exciting two phases at a time causes the motor to turn in step clockwise or counter clockwise. See timing chart above. Four outputs from U6D, PA4-PA7, activate the current amplifier transistors Q13-Q16. Current flow through the emitter collector junction of Q13, through phase A coil, through the emitter collector junction of Q17 via the center tap motor coil excites phase A of the stepper motor. This occurs when the PA4 output of U6D goes "low", U7B pin 4 goes "high", turning on Q13. The PA0 output of U5D must also be "high", then U7B pin 2 is "low", and Q17 is turned on. CR17 - CR21 suppress CEMF developed by the stepper motor coils. This protects the current amps Q13-Q16.

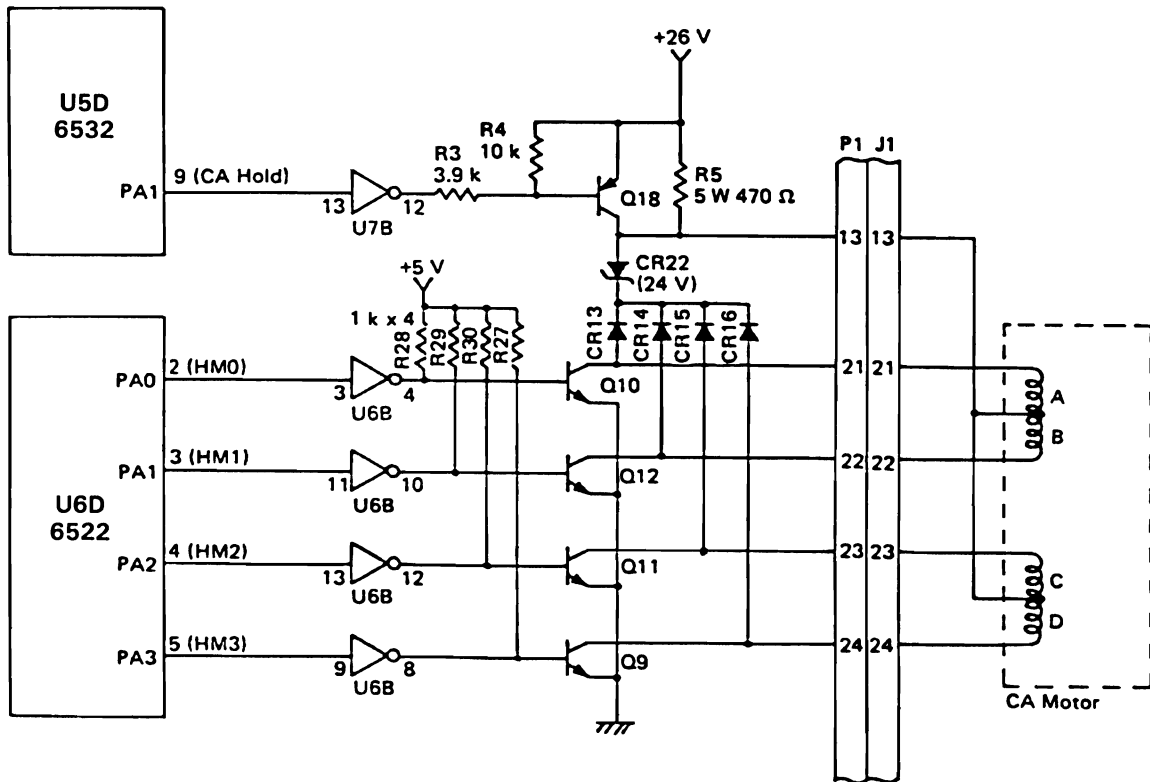
*WITH NO CR 17 - 21



*WITH CR 17 - 21

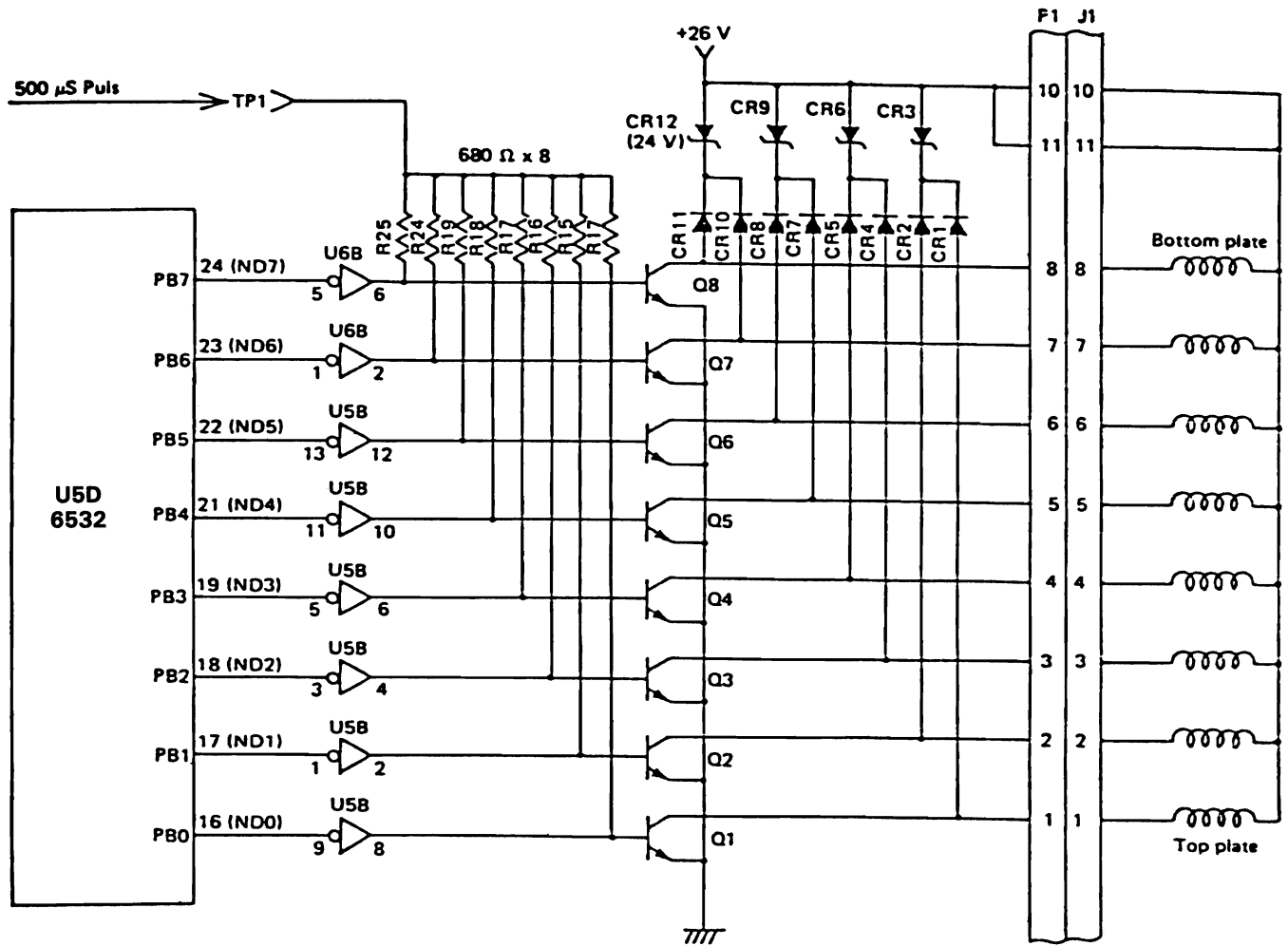


The stepper motor holds in position when the paper is not advancing. This occurs when a low value current passes through 2 phases, producing opposing torques holding the motor in position. Phase A and phase D are turned on, and Q17 is switched off. Current flow is limited by the 470 ohm 5 watt resistor that is in parallel with Q17.



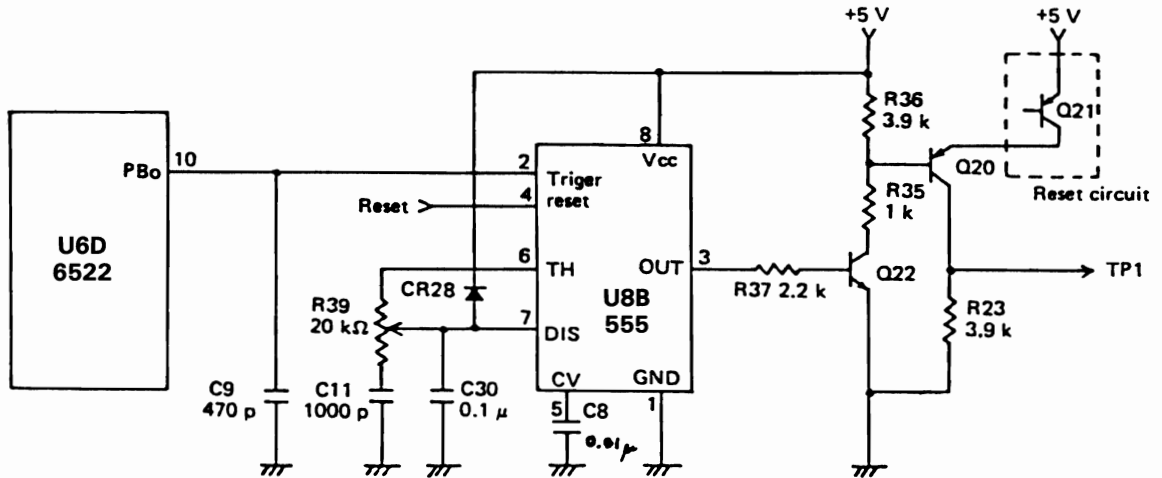
Carriage Motor Drive Circuits

U6D outputs signals HM0-HM3 (HM stands for head motor). Four outputs drive the four phases of the stepper motor. This circuitry is similar to the paper drive motor circuits. Q9-Q12 are current amplifiers. The phase A coil is energized when Q10 is turned on. Current is passed through the center tap of the motor coil, through Q18 to the 26VDC supply. The other three phases are controlled the same way. The output PA1 (CA Hold) goes "low", and Q18 turns off when holding current is needed to hold the paper in position. Two opposing phases are energized creating opposing torques holding the motor in position. The holding currents from the motor coils return through R5 to the 26VDC supply. R5 limits the current flow through the coils. CR13 through CR16 suppress the CEMF developed by the coils in the motor protecting the output transistors Q9-Q12.

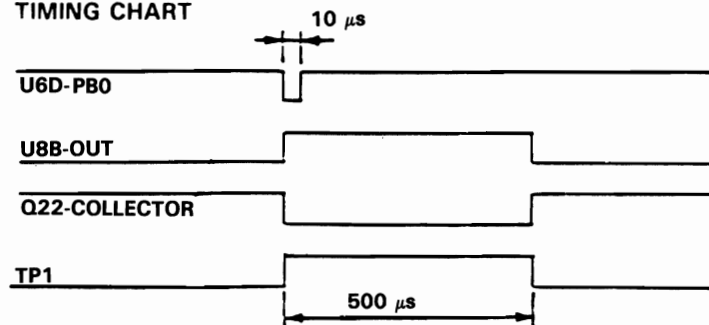


Print Wire Drive Circuits

U5D outputs eight signals ND0 – ND7 (ND = Needle Drive) from parallel port B (PBO – PB7). These signals are inverted by U5B and U6B. The output of the inverters control current amplifier transistors Q1 – Q8. A print wire (needle) is fired when an output transistor is forward biased, allowing current to flow through the coil from the 26VDC supply. CR1 – CR12 suppress CEMF developed by the coils. The inverters U5B and U6B are 7406 open collector Hex/Inverters. A one shot circuit generates +VCC for U6B and U5B for 500 microseconds when a print wire is fired. This protects the print wire coils by limiting the current through the coils. See Coil Protection Circuit and Timing on page 14.

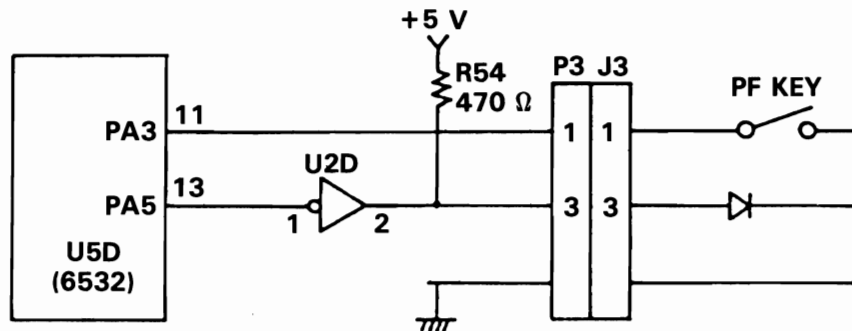
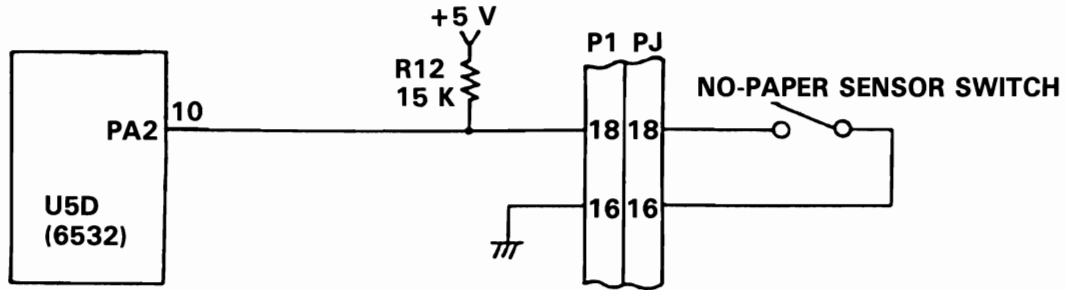


TIMING CHART



Print Wire Coil Protection Circuits

When a print wire is fired, the output PBo on U6D goes "low". This triggers the 555 U8B. The output pin 3 goes "high" for 500 microseconds. This turns on Q20, Q21, and Q22. The potential developed at the collector of Q20 is used as +VCC for the open collector Hex/Inverters U5B and U6B. R39 should be adjusted to obtain the 500 microsecond pulse.

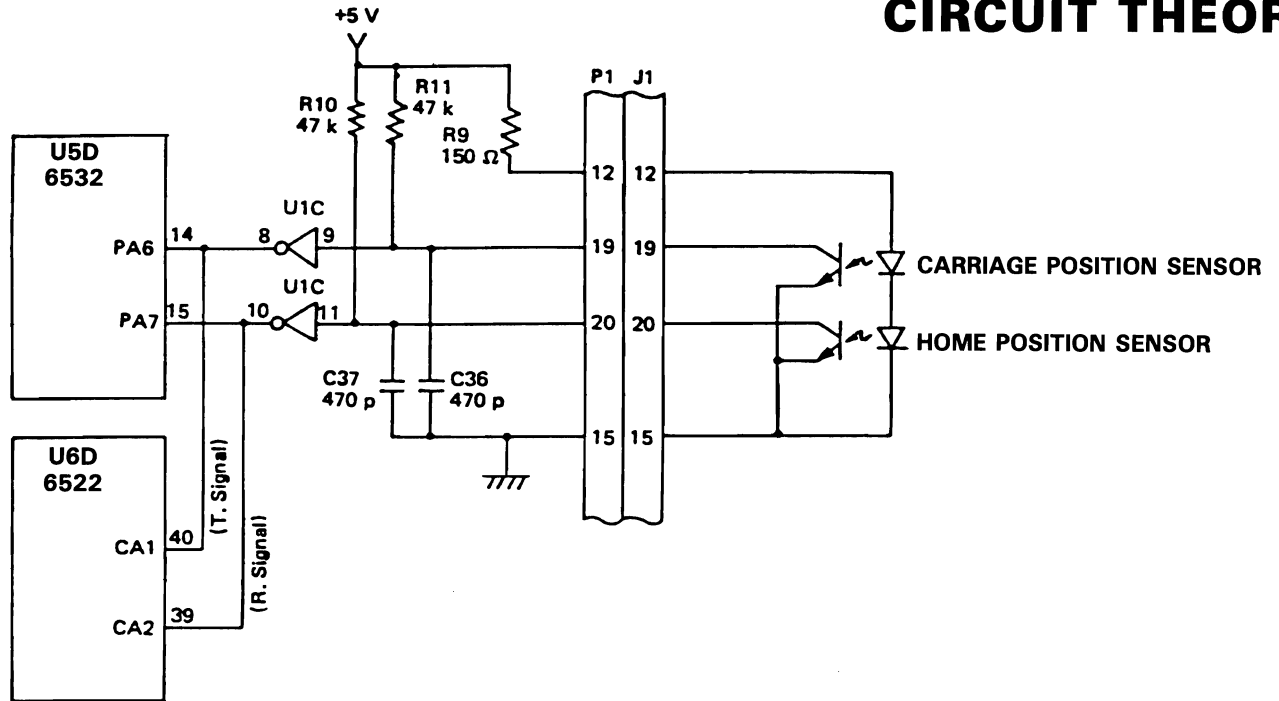


PAPER ADVANCE SWITCH AND INDICATOR CIRCUIT

Paper Control Logic

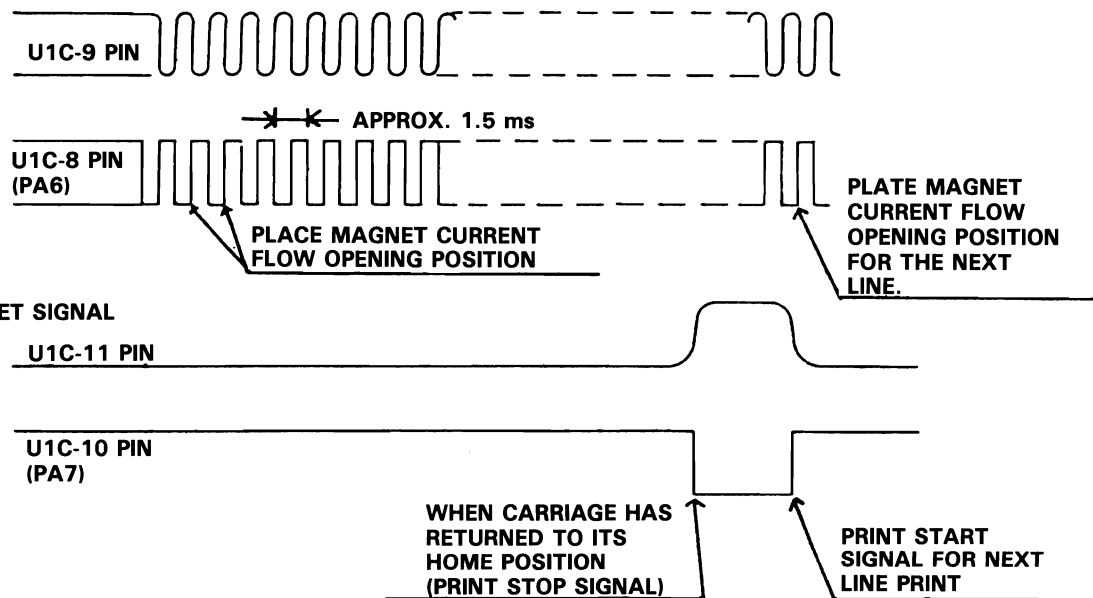
A normally closed micro switch located behind the platen opens when paper is loaded in the printer. When no paper is in the printer, the switch is closed causing a "low" potential to be input at U5D pin 10 (PA2).

Depressing the push button on the front of the printer causes a form feed to occur. Form feed length is software controlled. A "low" potential is applied to U5D pin 11 (PA3) when the push button is depressed. An LED inside the push button case indicates the printer is powered on. A flashing LED indicates paper out. The output U5D pin 13 goes "low", U2D pin 2 goes "high", and the LED turns on.



TIMING CHART

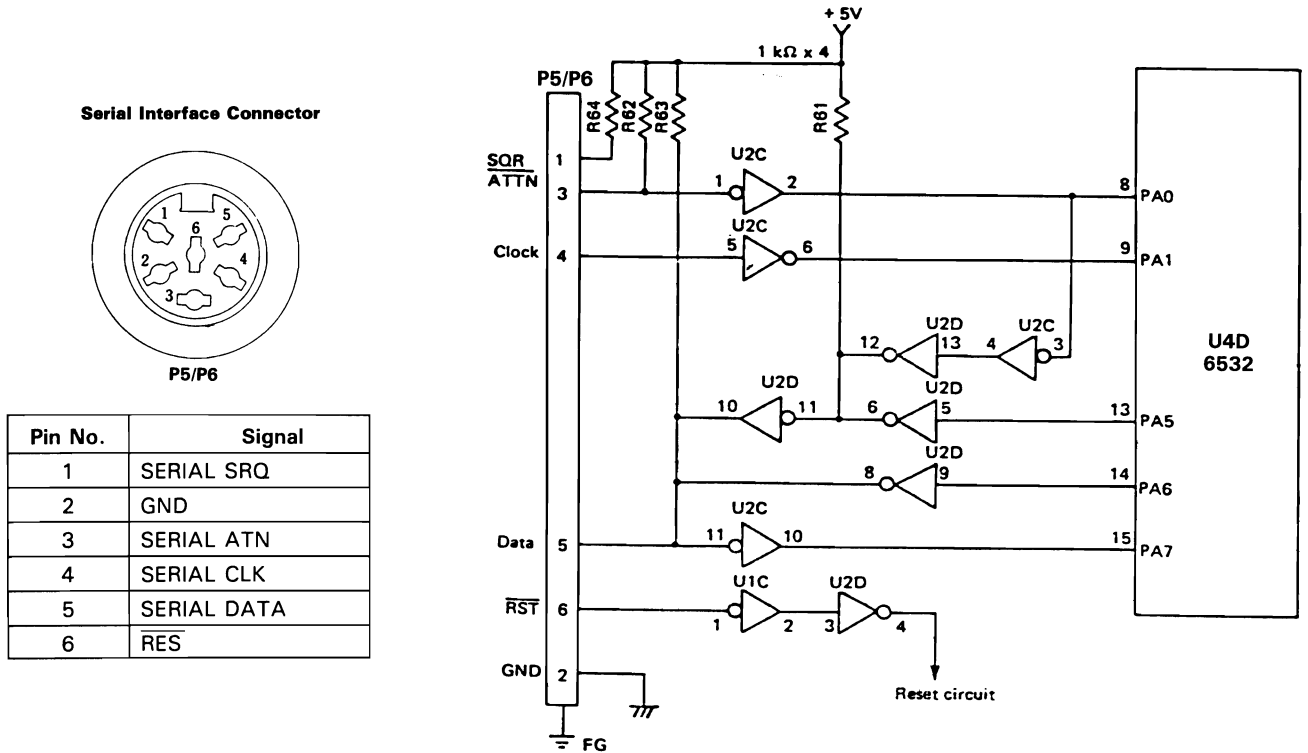
*TIMING SIGNAL



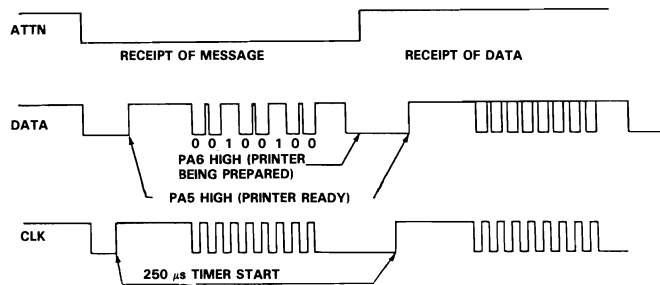
Position Sensor and Home Sensor Circuit Theory

When printing, the print head moves across the paper on the carriage assembly. The carriage assembly is driven by a carriage stepper motor. As the stepper motor turns, a photo-coupler device generates "low" pulses which are input to U1C pin 9. U1C is an inverter. U1C generates "high" active pulses which are input at U5D pin 14 (PA6), and U6D pin 40 (CA1). A subroutine in the operating system monitors the pulses generated by the photo-coupler, providing processor controlled print head positioning. A second photo-coupler device provides a synchronizing pulse or a start pulse when the print head is at the far left (Home) position. The output of the photo-coupler is input to U1C pin 11. The output on pin 10 is input at U5D pin 15 (PA5) and U6D pin 39 (CA2).

1526 AND MPS 802 CIRCUIT THEORY



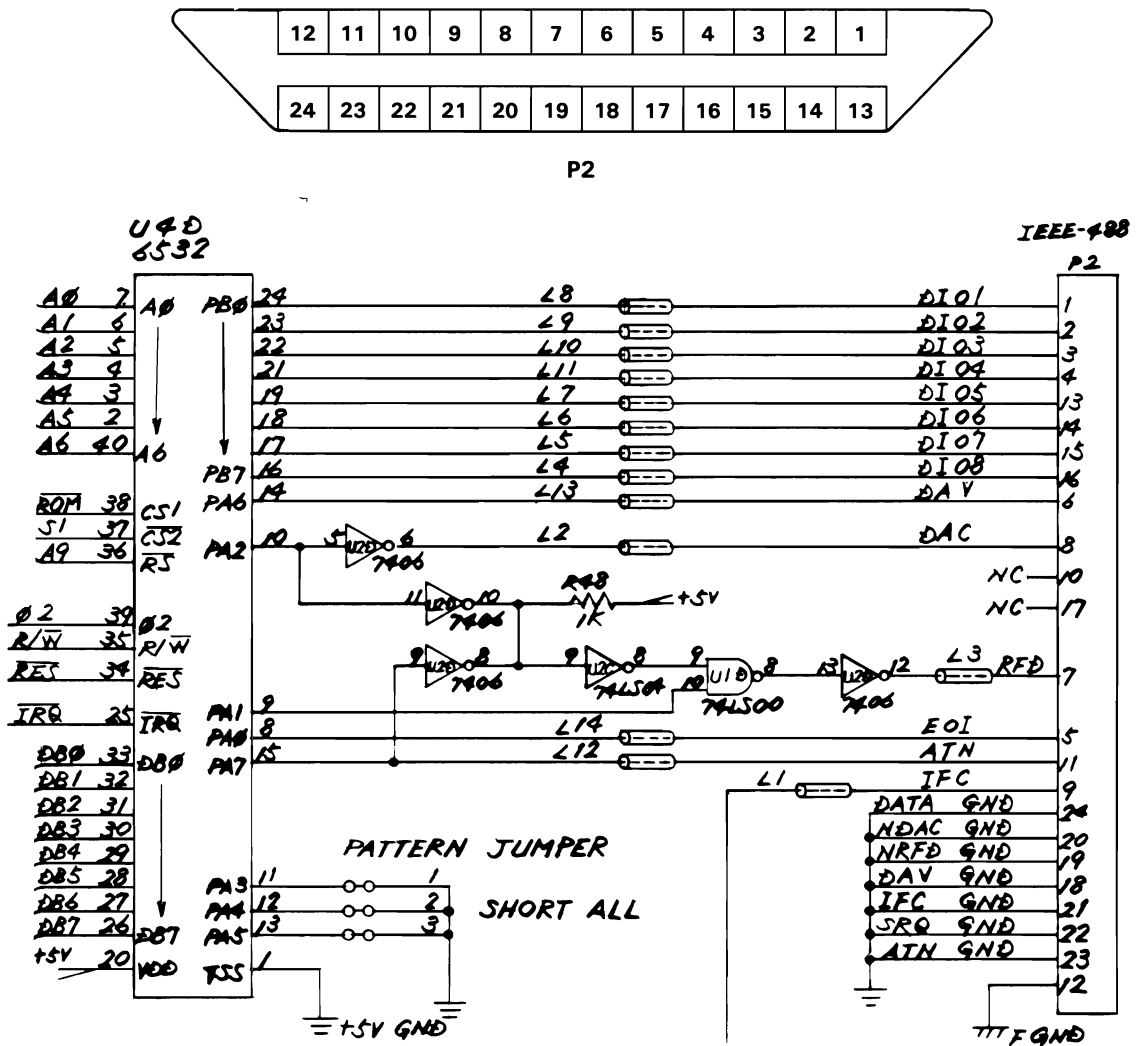
TIMING CHART



The 1526 and MPS 802 Serial Interface Circuit Theory

The serial interface has bi-directional DATA and CLOCK signals. SQR (Service Request) is a handshake input that is not used. ATTN (Attention) is a "low" active handshake signal. The printer accepts data on the DATA input (pin 5 of P5 and P6) after the ATTN input (pin 3 of P5 and P6) goes "low". U2C pins 2 and 3 go "high", U2C pin 4 goes "low", U2D pin 12 goes "high", and U2D pin 10 goes "low". This is the DATA output which acts as an acknowledgment to the ATTN input. When the printer becomes ready to accept data, U4D pin 13 (PA5) goes "high", U2D pin 6 goes "low", U2D pin 10 goes "high". ATTN kept "low" by the transmitting device indicates commands are being transmitted on the DATA line. When ATTN is "high", data is being transmitted on the DATA line. Data is input on U2C pin 11. The output of the inverter U2C pin 10 is input at U4D pin 15 (PA7). Data is clocked into the printer at the rate specified by the signal on the CLOCK input (pin 4 of P5 and P6). The Clock signal is inverted by U2C, then input at U4D pin 9 (PA1). An external reset will reset the processor logic inside the printer. RESET is on pin 6 of P5 and P6.

4023 CIRCUIT THEORY



The 4023 IEEE Interface Circuit Theory

All the signals on the interface are controlled by the I/O device U4D. Eight parallel bi-directional data lines (PB0-PB7) are used as the parallel data bus for the interface. DAV (Data Valid) pin 6 of P2 is a "high" active output from the transmitting device. Valid 8 bit codes are transmitted to the receiving device when DAV is "high". DAC (Data Accepted) pin 8 of P2 is an output that is "low" when data is being accepted because U4D pin 10 (PA2) is "high". RFD (Ready for Data) pin 7 of P2 goes "low", indicating the printer is ready to receive data when data is not being accepted (DAC is "high"), and U4D pin 7 (PA1) is "low". ATN pin 11 of P2 is an input. The transmitting device brings this line "low" before the data is transmitted. EOI (End or Identify) pin 5 of P2 is an input. The transmitting device brings this line "low" when the last byte of a message is being transmitted. IFC (Interface Clear) pin 9 of P2 is an input. An external reset signal applied to the IFC initializes all the printer processor logic.

TROUBLESHOOTING GUIDE

SYMPTOM 1: Printer does not initialize when powered up.

	POSSIBLE CAUSE	SOLUTIONS									
1.	Power cord is damaged.	Check that the power cord is connected properly and is in good condition.									
2.	Power switch is broken.	Check and replace it if necessary.									
3.	Fuse is blown.	Replace it. If it blows again, check the power supply unit and PCB.									
4.	Power supply is defective.	Check for proper voltages at the P/S connector J4. <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">AC Volts</td> <td style="padding: 5px;">Across Pins</td> <td style="padding: 5px;">Cable Color</td> </tr> <tr> <td style="padding: 5px; text-align: center;">26</td> <td style="padding: 5px; text-align: center;">1 and 4</td> <td style="padding: 5px; text-align: center;">Orange</td> </tr> <tr> <td style="padding: 5px; text-align: center;">9</td> <td style="padding: 5px; text-align: center;">2 and 3</td> <td style="padding: 5px; text-align: center;">Red</td> </tr> </table>	AC Volts	Across Pins	Cable Color	26	1 and 4	Orange	9	2 and 3	Red
AC Volts	Across Pins	Cable Color									
26	1 and 4	Orange									
9	2 and 3	Red									
5.	Defective logic board.	Check for shorts on PCB. See circuit theory on page 7 for proper operation of power supply circuit.									

SYMPTOM 2: Printer initializes but will not print.

	POSSIBLE CAUSE	SOLUTIONS
1.	Ribbon cartridge is missing or empty.	Replace ribbon.
2.	Paper out condition is present.	Check that paper is properly inserted. Check paper out switch and replace if necessary.
3.	Bad connection between PCB and Mechanical assembly.	Check mechanical connection at P1 on PCB.
4.	Data transmission is not complete.	Check serial or IEEE cable for proper connection. Check for proper data transmission from computer. Check interface circuits on PCB. See circuit theory on pages 18 and 19.

TROUBLESHOOTING GUIDE (Continued)

SYMPTOM 3: Part of a printed character is missing.

	POSSIBLE CAUSE	SOLUTIONS
1.	Ribbon is worn out.	Replace the ribbon cartridge.
2.	Head shift lever is out of position.	Re-set the shift lever.
3.	Print head on flexible cable is defective.	<p>Check flexible cables and wiring harness for continuity.</p> <p>Check the print head by disconnecting the wire harness connector J1 from P1. With an ohmmeter set on the 200 ohm range, place one of the leads on pin 10 of J1 and the other lead on pins 1 through 8 of J1. A resistance of 10 to 14 ohms at each pin indicates a good print head. Replace if necessary.</p>
4.	Interference (NOISE) in the proximity of the printer.	Place printer in area void of external interference (i.e., motors, machinery).

SYMPTOM 4: Paper does not feed correctly.

	POSSIBLE CAUSE	SOLUTIONS
1.	Physical interference with proper paper feed.	<p>Check for obstruction of the paper feed path — paper guide, platen, tractors.</p> <p>Check that the left tractor is positioned to the extreme left and the right tractor is adjusted to the correct paper width.</p> <p>Check that the paper holes align with the tractor pins correctly.</p> <p>Check that the paper release lever is in the correct position — in the direction of the arrow for tractor feed or opposite the arrow for friction feed.</p> <p>Check that no more than the maximum allowable sheets of paper are being used.</p>
2.	Paper feed motor defective.	<p>With power off, check motor with an ohmmeter. Set on the 200 ohm range. A good paper feed motor should need around 50 ohms between pin 14 of J1 and pins 25, 26, 27, and 28 of J1.</p> <p>Check for good mechanical and electrical connections to the motor and its wiring — see wiring diagram on page 28.</p> <p>Check for +26 VDC supply to the motor.</p>
3.	Circuit failure on PCB.	Check motor circuitry on PCB. See circuit theory on page 12 for proper circuit operation.

TROUBLESHOOTING GUIDE (Continued)

SYMPTOM 5: Improper Ribbon Feed

	POSSIBLE CAUSE	SOLUTIONS
1.	Obstruction of ribbon path.	Check FPC cables for proper location. Check ribbon guide for foreign matter.
2.	Defective ribbon cartridge.	Check for proper ribbon insertion. Check the rotation of the cartridge by manually rotating the ribbon in the direction of the arrow.
3.	Defective mechanics.	Check the ribbon drive gears for proper lubrication (see page 5) and smooth operation.

SYMPTOM 6: Carriage does not move correctly.

	POSSIBLE CAUSE	SOLUTIONS
1.	Physical obstruction in the path of the head carriage.	Check that dirt or foreign objects have not accumulated within the mechanism.
2.	Carriage motor is defective.	With power off, check the motor with an ohmmeter. Place one of the leads on pin 13 of J1 and read the resistance to pins 21, 22, 23 and 24 of J1. A good carriage motor will read about 50 ohms. Check for good mechanical and electrical connections to the motor and its wiring — see wiring diagram on page 28. Check for +26 VDC supply to the motor.
3.	Circuit failure on PCB.	Check motor circuitry on PCB. See circuit theory on page 12 for proper circuit operation.

PCB PARTS LIST
• 1526 • MPS 802 • 4023 •

C — Indicates Commodore Stocked Part Numbers

Differences noted in PARENTHESIS!

PCB Assy 1526	C 314584-01
PCB Assy MPS 802	C 314584-02
PCB Assy 4023	C 314585-01

INTEGRATED CIRCUITS			DIODES (Continued)			
U1C	74LS14	901521-30	CR21,22	Zener RD24F, 24V, 1W, 10%		
U1D	74LS00	901521-01	CR23	Zener HZ27-2 .5W		
U2C	74LS14 (1526, MPS 802)	901521-30	CR24	Switching 1S2076		
	74LS04 (4023)	901521-02	CR25	Zener HZ4B-2 .5W		
U2D	7406	901522-06	CR26	Stack KBP02 Sub: S2VB 1.5A		
U4D	6532	C 901458-01	CR27	Stack KBL02 Sub: S4VB 4A		
U5B	7406	901522-06	CR28	Switching 1S2076		
U5D	6532	C 901458-01	RESISTORS — All values are in ohms- 1/4 W 5% unless noted otherwise.			
U6B	7406	901522-06				
U6D	6522 VIA	C 901437-01	R1	3.9K	R26	2K
U7B	7406	901522-06	R2	10K	R27-35	1K
U7D	6504 CPU	C 901455-01	R3	3.9K	R36	3.9K
U8B	555	901523-01	R4	10K	R37	2.2K
U8C	74LS42	901521-17	R5,6	470, 5W 10%	R38	22K
U8D →	2364		R7	820	R39	Variable
	ROM (1526/MPS 802)	C 325341-08	R8	10K		20K,
	ROM (4023)	C 325360-03	R9	150		EMV-K4G
U9C	7400	901522-04	R10,11	47K	R48	1K (4023 only)
U10C	74177	901522-03	R12	15K	R54	470
TRANSISTORS			R13	10K	R55,56	680
Q1-Q8	2SD837		R14-19	680	R57	47
Q9-Q16	2SD946B	sub:	R20	3.9K	R61-64	1K (1526, MPS802 only)
	2SD985	SK 9370 71.35	R21	100		
Q17,Q18	2SB794		R22	10K		
Q19	2SD946B	sub:	R23	3.9K		
	2SD985		R24,25	680		
Q20,21	2SA733	sub:	CAPACITORS			
	2SA844		C1	Electrolytic	100μF,	35V
Q22	2SC2308C		C2	Electrolytic	10μF,	35V
Q23	2SB705	sub:	C3	Electrolytic	100μF,	16V
	2SA1075		C4-6	Ceramic	.1μF,	12V
DIODES			C7	Electrolytic	6800μF,	50V
CR1,2	Power IN4002		C8	Ceramic	.01μF,	50V
CR3	Zener RD24F, 24V, 1W, 10%		C9	Ceramic	470pF,	50V
CR4,5	Power IN4002		C10	Ceramic	.1μF,	12V
CR6	Zener RD24F, 24V, 1W, 10%		C11	Ceramic	1000pF,	50V
CR7,8	Power IN4002		C19-25	Ceramic	.1μF,	12V
CR9	Zener RD24F, 24V, 1W, 10%		C26	Electrolytic	4700μF,	16V
CR10,11	Power IN4002		C27	Ceramic	.1μF,	50V
CR12	Zener RD24F, 24V, 1W, 10%		C28	Ceramic	.1μF,	12V
CR13-20	Power IN400		C29	Electrolytic	330μF,	16V
			C30	Film	.1μF,	100V

PCB PARTS LIST
• 1526 • MPS 802 • 4023 • (Continued)

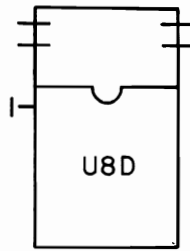
C — Indicates Commodore Stocked Part Numbers

CAPACITORS (Continued)		MISCELLANEOUS (Continued)	
C32	Ceramic	200pF,	50V
C33-34	Ceramic	.047 μ F,	50V
C35	Ceramic	.01 μ F,	50V
C36-37	Ceramic	470pF,	50V
MISCELLANEOUS			
	Ferrite Beads		
	1526/MPS802	4023	
	L1	L1, 2	
	L3-6	L4-14	
	L15-17	L15-17	
Y1	Crystal 4 MHz, HC18V		
P1	28 Pin Connector		
P2	IEEE-48 Rt. Angle Connector		
			C 903206-01 (4023)
P3	3 Pin Keyed Header		
P4	4 Pin Connector		
P6,P7	6 Pin DIN Connector		
			C 903361-01 (1526/MPS802)
VR1	Regulator 7805		
	Shield Box		C 4022048-01
	Shield Cap		C 4022047-01

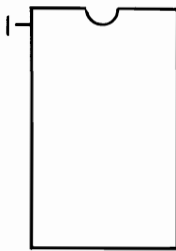
1526 • MPS 802 ROM UPGRADES

The PCB for these printers was designed to accommodate a 24 pin ROM or 28 pin EPROM at location U8D. A jumper change at J1-J4 will configure the board for either I.C. When changing chips at this location, match the jumpers to the type of I.C.

CLOSED J1 → → J2 CLOSED
OPEN J3 → → J4 OPEN

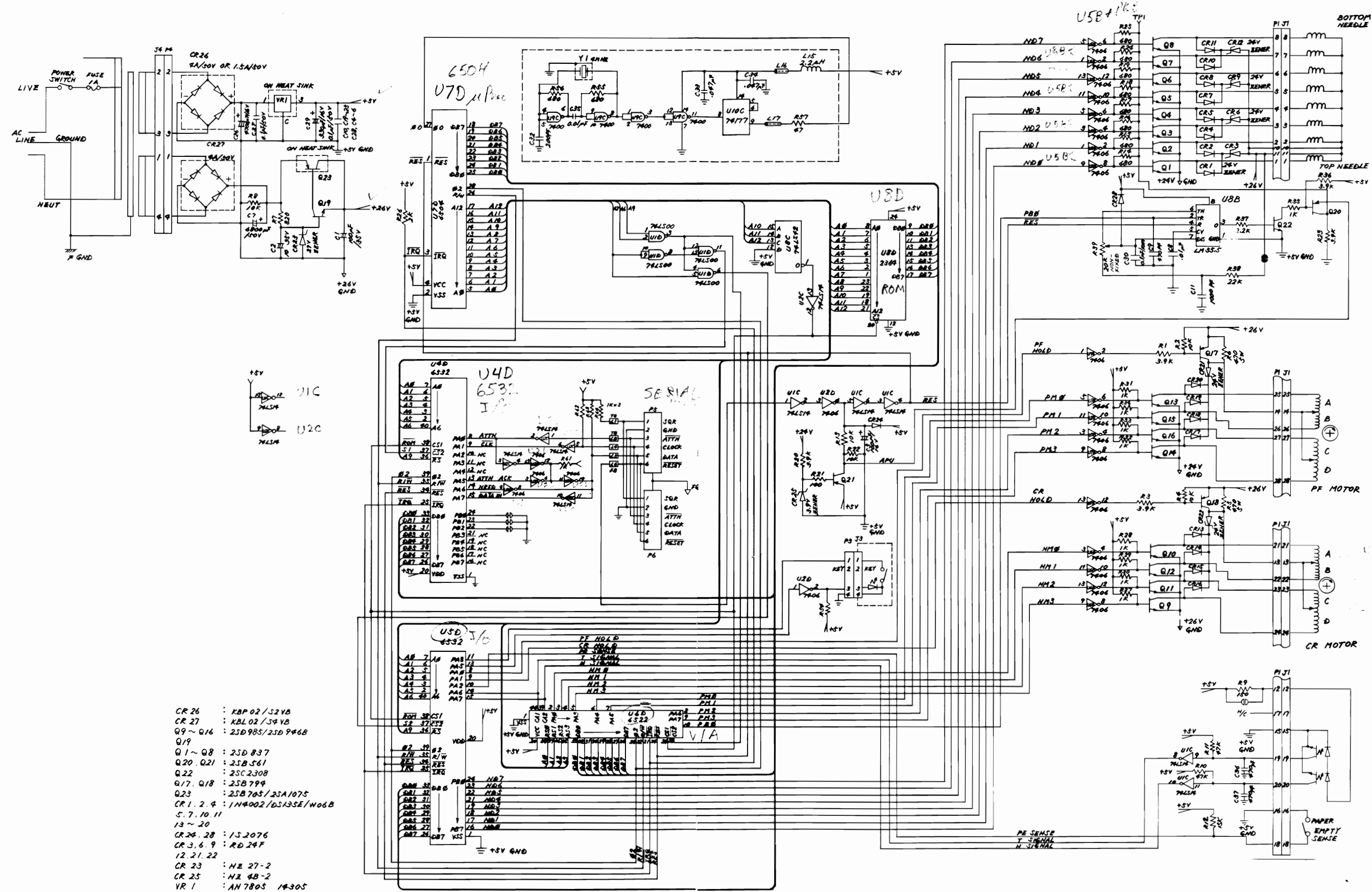


24 PIN ROM



28 PIN EPROM

- CR 26 : KBP 02 / 52 VB
- CR 27 : KBL 02 / 54 VB
- Q9 ~ Q16 : 2SD 985 / 2SD 946 B
- Q19 : 2SD 837
- Q20, Q21 : 2SB 361
- Q22 : 2SC 2308
- Q17, Q18 : 2SB 799
- Q23 : 2SB 705 / 2SA 1075
- CR 1, 2, 4 : 1N4002 / D1335E / W06 B
- 5, 7, 10, 11
- 13 ~ 20
- CR 24, 28 : 1S 2076
- CR 3, 6, 9 : RD 24 F
- 12, 21, 22
- CR 23 : NE 27-2
- CR 25 : NE 4B-2
- VR 1 : AN 7805 1A305

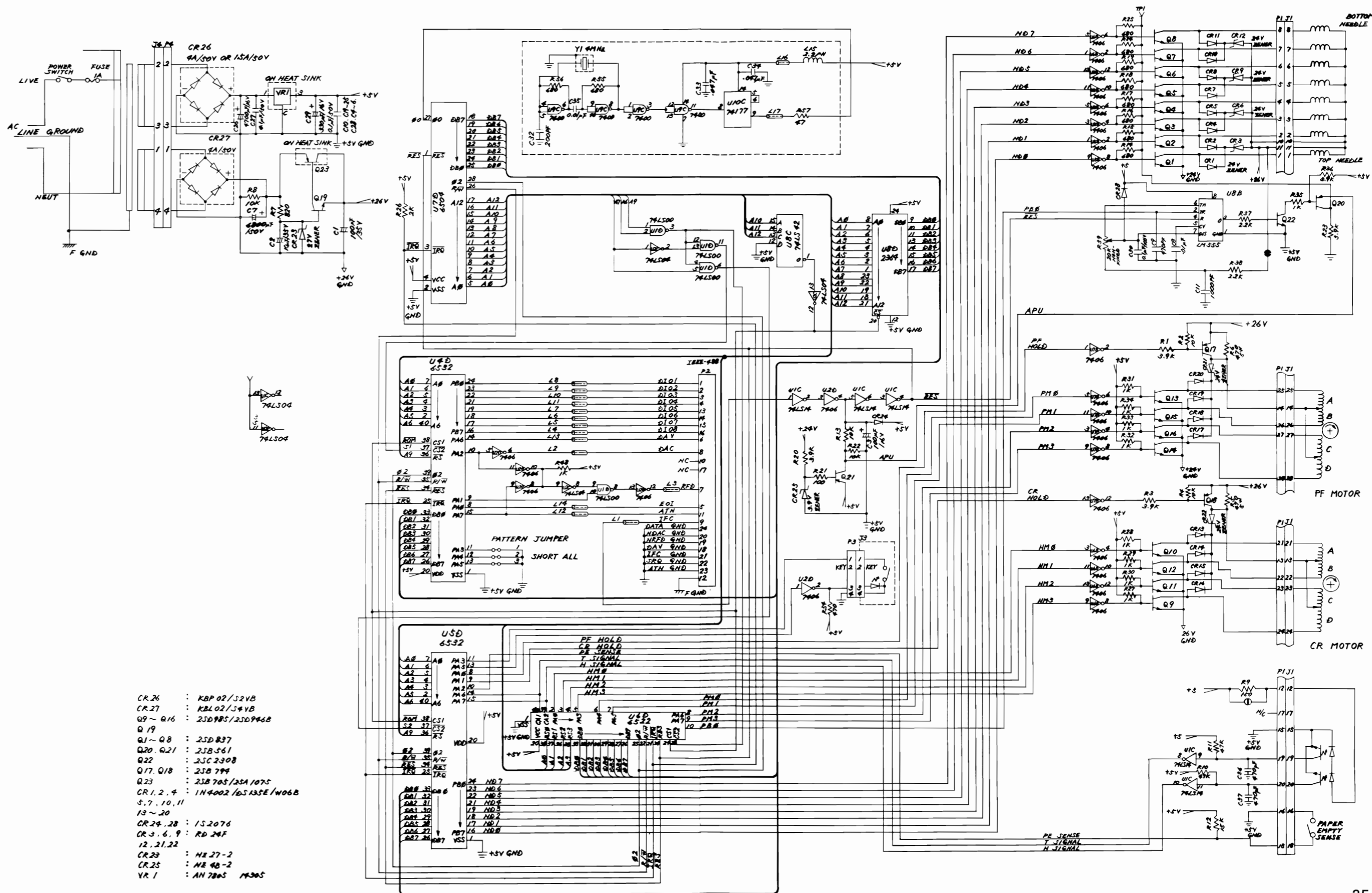


DEVICE NUMBER CHANGE

The 1526, MPS 802, and 4023 are shipped from the factory set for device #4. The channel can be hardware altered to #5, 6, 7, 8, 9, 10 or 11 by lifting the indicated pin or pins of the 6532 at location U4D.

DEVICE #	1526 • MPS 802	4023
5	24	11
6	23	12
7	23 and 24	11 and 12
8	22	13
9	22 and 24	11 and 13
10	22 and 23	12 and 13
11	22, 23 and 24	11, 12 and 13

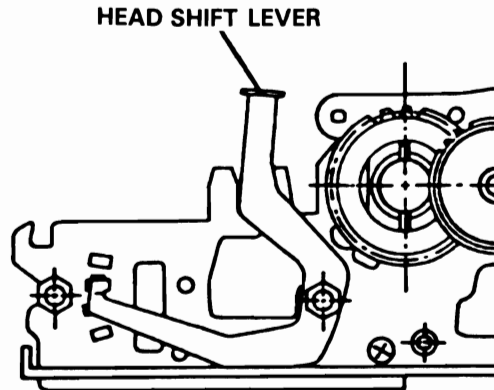
- CR 26 : KBP 02/52VB
- CR 27 : KBL 02/54VB
- Q9 ~ Q16 : 2SD985/2SD996B
- Q 19 : 2SD837
- Q20, Q21 : 2JB561
- Q22 : 2JC2308
- Q17, Q18 : 2JB799
- Q23 : 2JB705/2SA1075
- CR 1, 2, 4 : 1N4002/6S18SE/W06B
- 5, 7, 10, 11 : 13 ~ 20
- CR 24, 28 : 1S2076
- CR 3, 6, 9 : RD 24F
- 12, 21, 22 : CR 23 : HE 27-2
- CR 25 : HE 48-2
- YR 1 : AN 7805 78305



ADJUSTMENTS

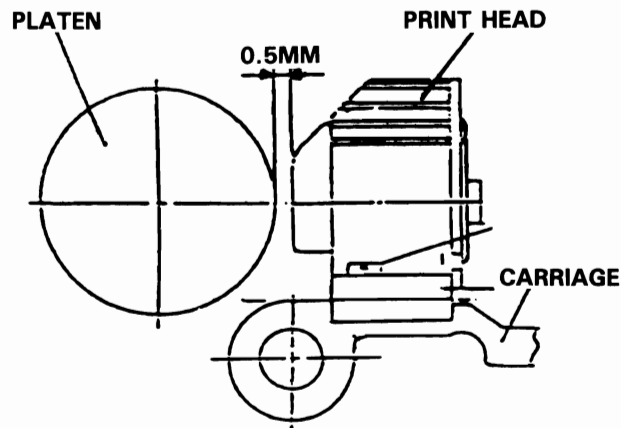
Head Shift Lever

The head shift lever controls the position of the print head in relation to the platen. With the lever in its lowest position, towards the front of the printer, the print head is positioned as far as possible from the platen. With the lever in its highest position, towards the back of the printer, the print head is positioned as close as possible to the platen.



Print Head

Set the head shift lever in its lowest position on the right side frame. Position the print head so that the clearance between it and the platen is $0.5 \text{ mm} \pm 0.05 \text{ mm}$. Tighten all screws and nuts and recheck the distance between the print head and platen. Re-adjust if necessary.

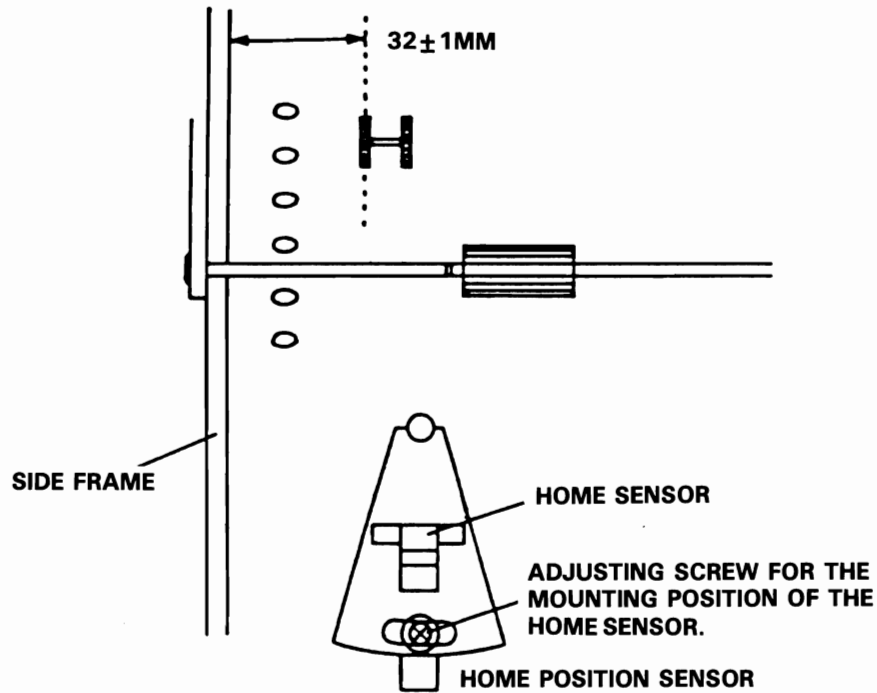


With the head shift lever in its highest position the gap should be reduced to about 0.4 mm.

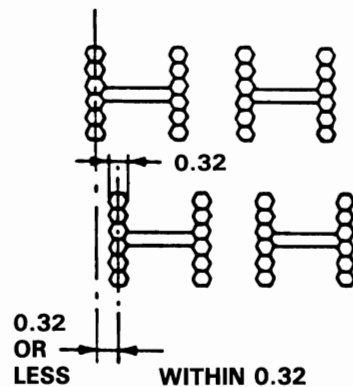
ADJUSTMENTS (Continued)

Home Sensor

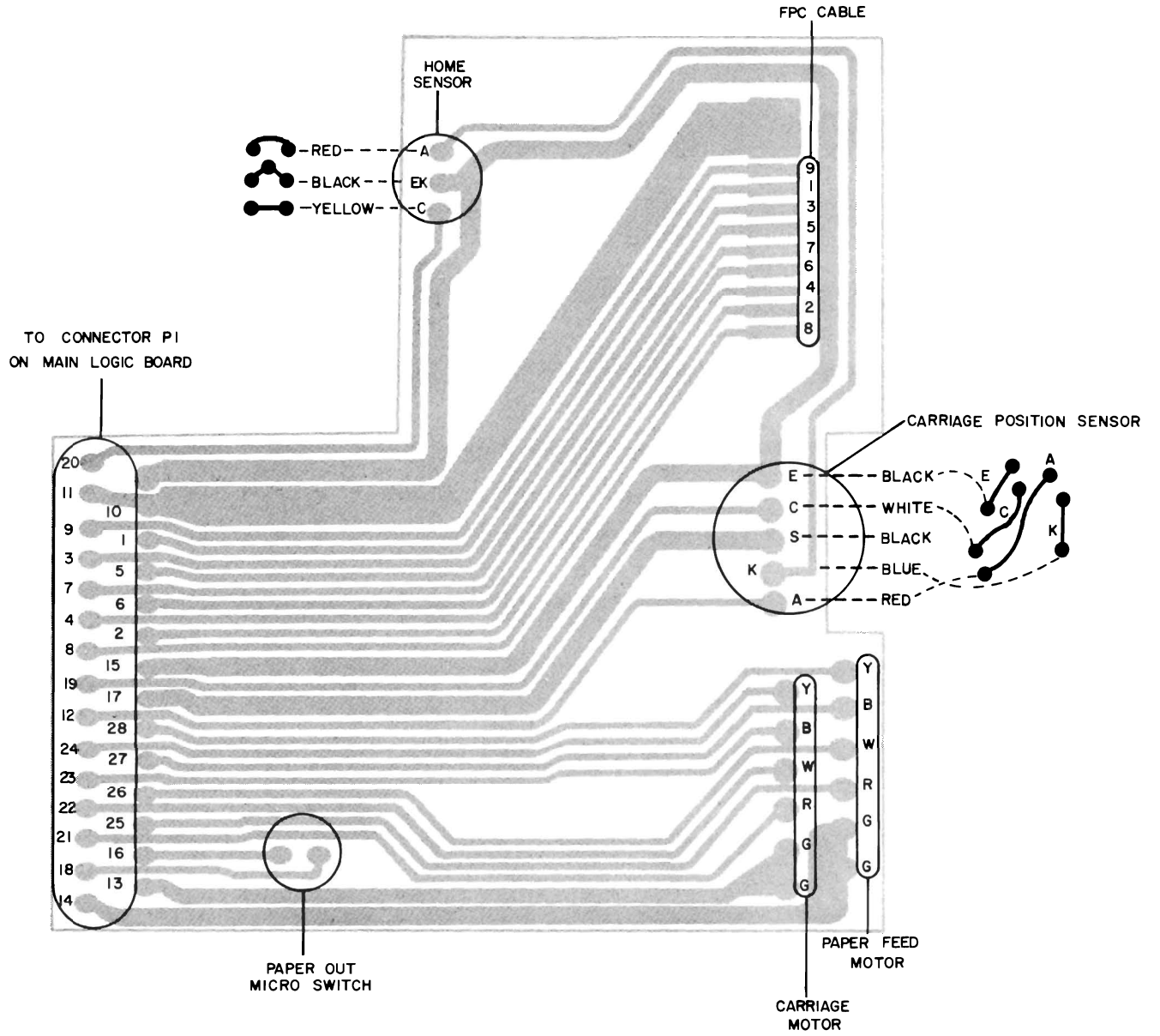
To adjust the print start position, loosen the mounting screw for the home sensor. Slide it to the left or right, so that the center of the dot farthest to the left is 32 ± 1 mm away from the inside left frame when printing standard characters. Tighten mounting screw.



Using the self-test, check for the position of the leftmost dot. If alternating lines are not within 0.32 mm of each other, re-adjust the home sensor.



WIRING DIAGRAM

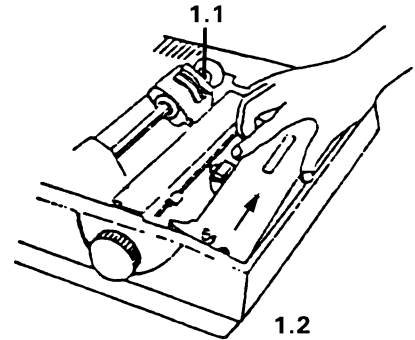


MECHANICAL DISASSEMBLY

The phillips head screws used in the printer mechanism are metric size. Use caution when selecting the proper size screwdriver.

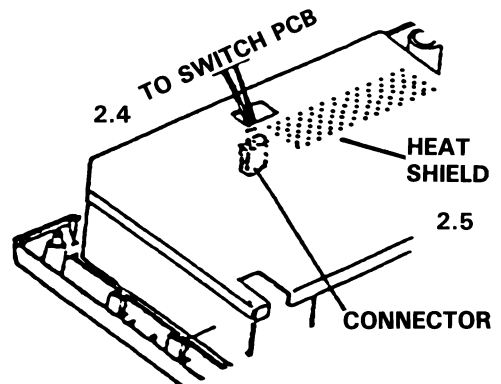
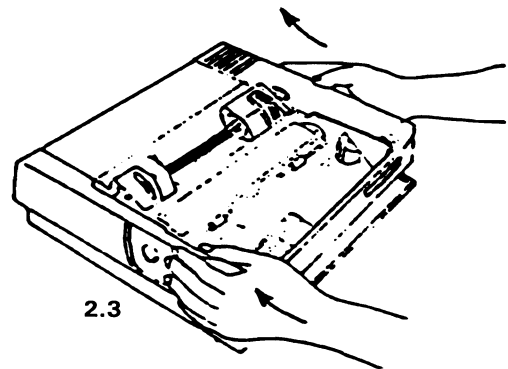
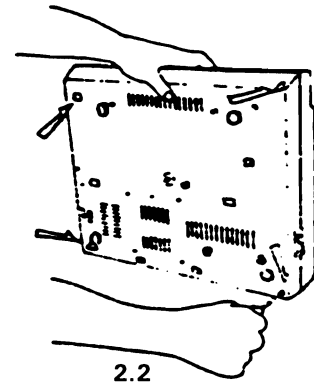
1. To remove the ribbon cartridge:

- 1.1 Position the right side tractor assembly to the far right.
- 1.2 Lift the ribbon cartridge from the printer.



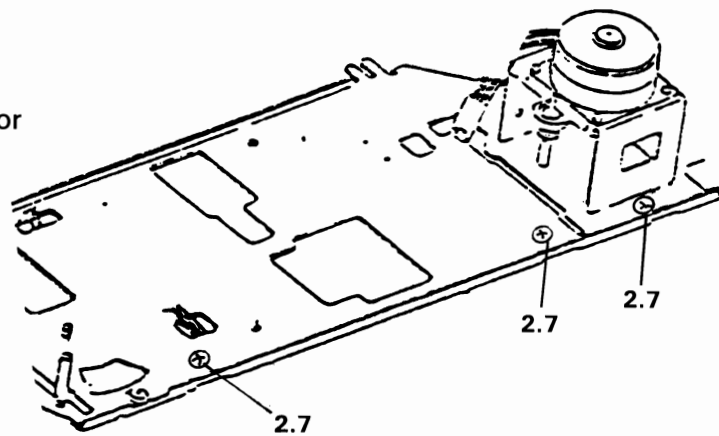
2. To remove the top case and printer mechanism:

- 2.1 Remove the manual paper feed knob by firmly pulling it from the shaft.
- 2.2 Stand the unit up, as shown, and remove the 4 case screws at the corners. If the 2 center shipping bolts are still in place, remove them.
- 2.3 Using both hands, support the top case while lifting it up and towards the back of the unit.
- 2.4 With the top case tilted toward the back, lift the switch connector from the PCB.
- 2.5 Remove the heat shield to expose the PCB.



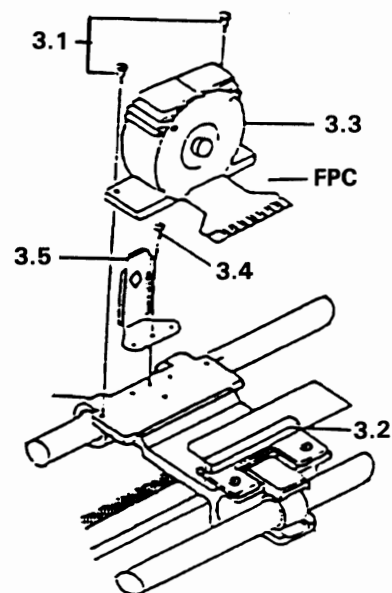
MECHANICAL DISASSEMBLY (Continued)

- 2.6 Detach the wiring harness connector from P1 on the PCB.
- 2.7 Loosen the 3 large phillips head screws at the front of the mechanism. Sliding the mechanism towards the front, lift it from the bottom case.



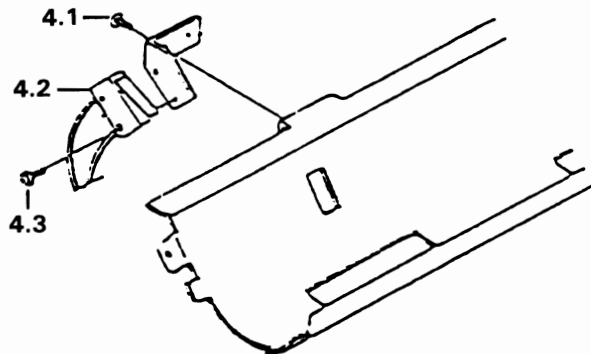
3. To remove the print head and ribbon guide:

- ~~3.0~~ 3.1 Set the head release lever to its lowest position on the side frame.
- ~~3.1~~ 3.2 Remove the 2 head screws.
- ~~3.2~~ 3.3 By gently pulling, detach the FPC cable from its connector.
- ~~3.3~~ 3.4 Lift the print head from the carriage.
- ~~3.4~~ 3.5 Remove the ribbon guide screw.
- ~~3.5~~ 3.6 Lift the ribbon guide and head insulation sheet from the carriage.



4. To remove the paper detection switch:

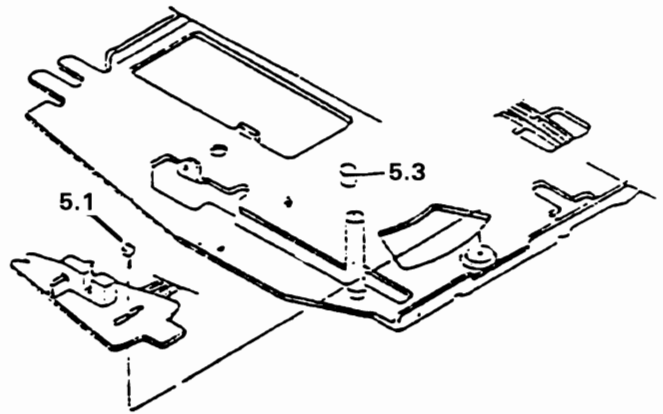
- 4.1 Remove the switch bracket screw.
- 4.2 De-solder the micro switch wires from the wiring harness PCB. (See wiring diagram on page 28).
- 4.3 To detach the switch bracket, remove the screw from the micro switch.



MECHANICAL DISASSEMBLY (Continued)

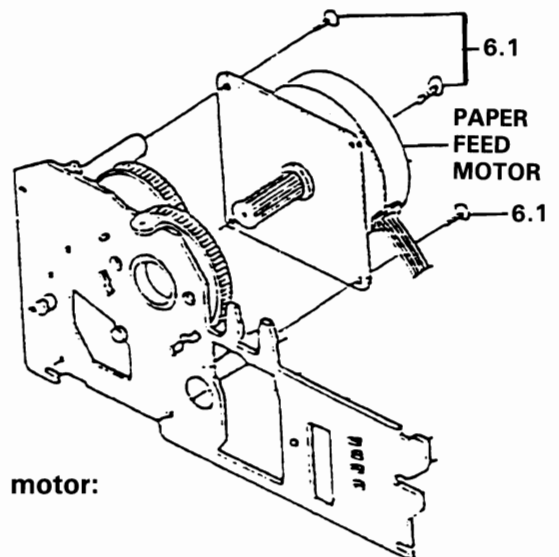
5. To remove the home position sensor:

- 5.1 Remove the sensor PCB screw.
- 5.2 De-solder the wire connections from the wiring harness PCB. (See wiring diagram on page 28).
- 5.3 Slide the sensor PCB toward the front of the mechanism, pulling it from its bracket. Turn it sideways to fit between the carriage pillars.



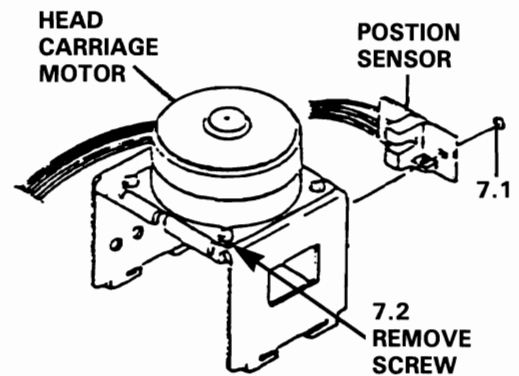
6. To remove the paper feed motor assembly:

- 6.1 Remove the 3 motor bracket screws from the right side frame assembly.
- 6.2 De-solder the wire connections from the wiring harness PCB. (See wiring diagram on page 28).



7. To remove the carriage position sensor and carriage motor:

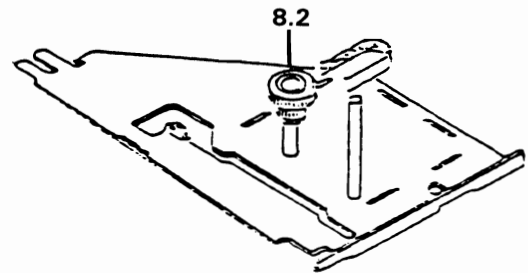
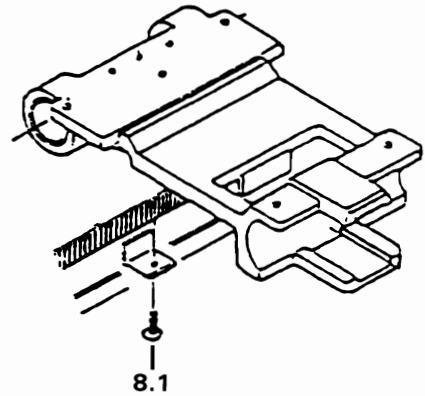
- 7.1 Remove the sensor PCB screw and de-solder the wire connections from the wiring harness PCB. (See wiring diagram on page 28).
- 7.2 Remove the carriage motor screw as indicated. Detach the carriage motor and its holder by carefully bending the bracket legs to release them from the base.
- 7.3 De-solder the motor wires from the wiring harness PCB. (See wiring harness on page 28).



MECHANICAL DISASSEMBLY (Continued)

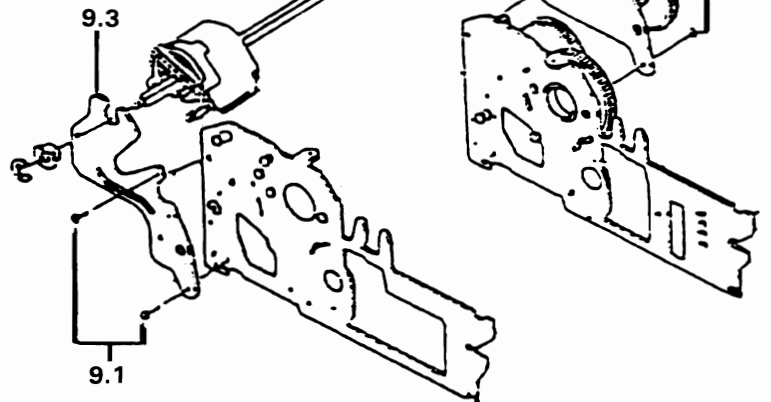
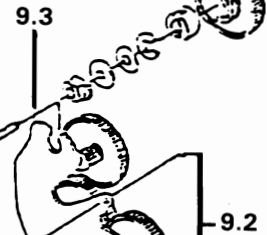
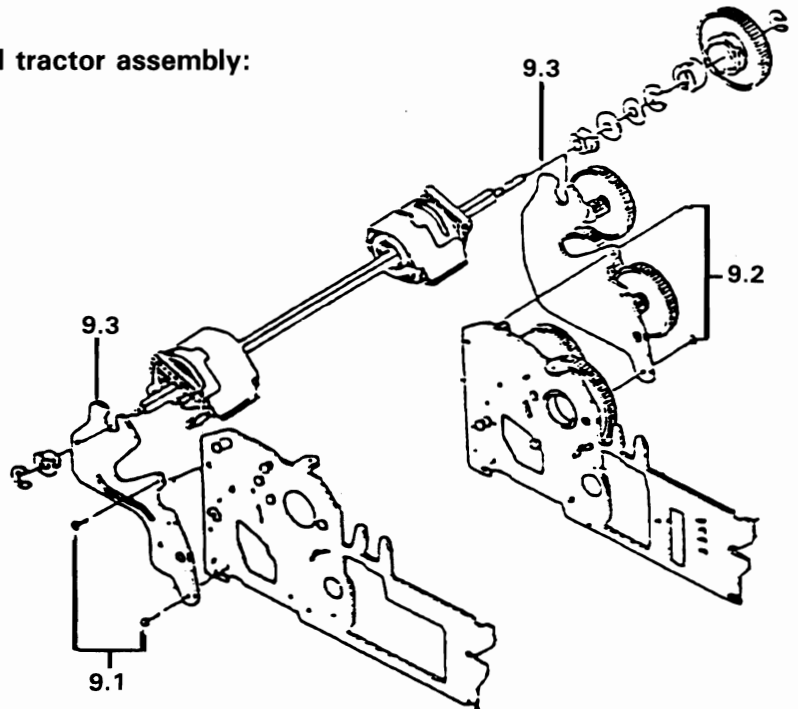
8. To remove printer drive belt:

- 8.1 Position the carriage at the center of the unit to allow access through the base to the belt holder screw. Remove the screw and bracket.
- 8.2 Remove the "E" clip to release the belt gear assembly on the right.
- 8.3 The drive belt will be released from the gear assembly on the left and can be removed.



9. To remove the sprocket frames and tractor assembly:

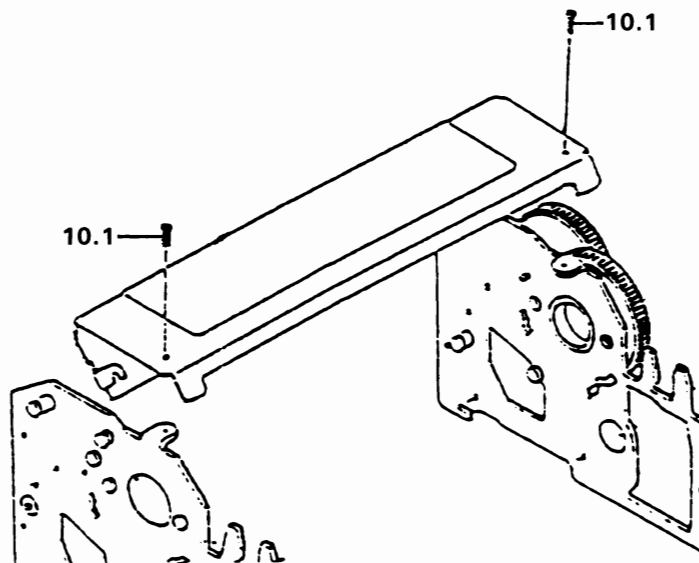
- 9.1 The left sprocket frame is detached by removing the 2 frame screws.
- 9.2 To remove the right sprocket frame assembly, remove the 2 frame screws.
- 9.3 Remove the "E" clips to release the tractor assembly from the sprocket frames.



MECHANICAL DISASSEMBLY (Continued)

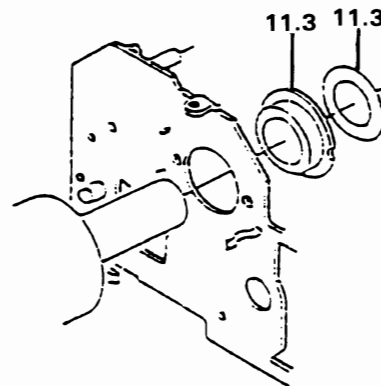
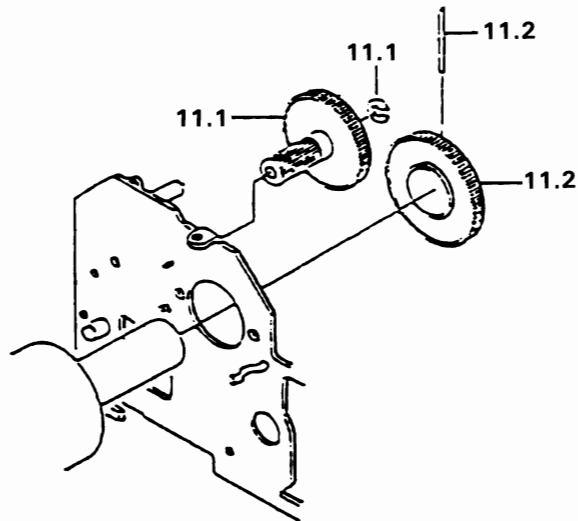
10. To remove the platen cover:

- 10.1 Remove the 2 cover screws, as indicated. Lift the cover off of the platen.



11. To remove the platen and reduction gears:

- 11.1 Remove the "E" clip and pull the reduction gear off of the frame.
- 11.2 Remove the spring pin from the platen gear by tapping it with a punch. Withdraw the gear from the platen shaft.
- 11.3 Remove the platen washer and shaft supporter that are now exposed.

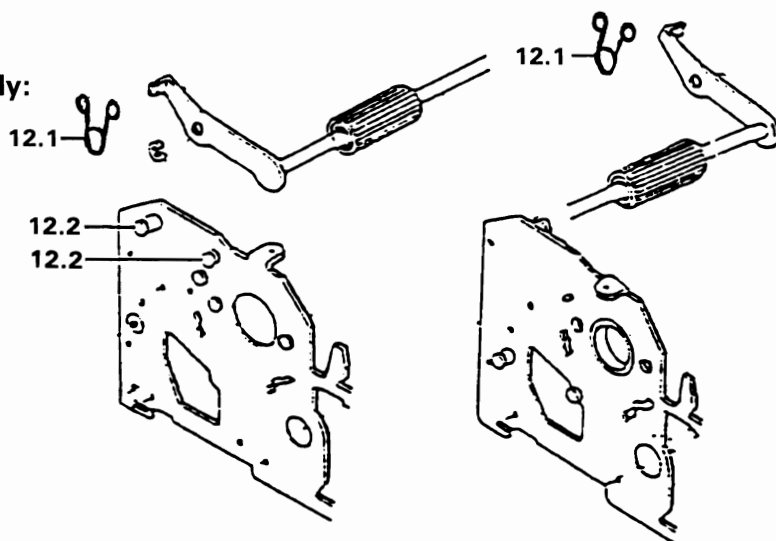


MECHANICAL DISASSEMBLY (Continued)

12. To remove the paper roller assembly:

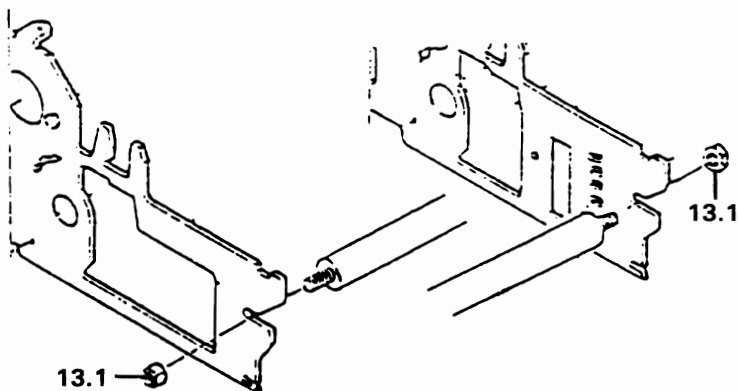
12.1 Remove the 2 paper holding springs from the right and left frames.

12.2 Remove the left "E" clip and pull the paper roller axle to enable it to slide over the frame pins.



13. To remove the front carriage guide:

13.1 The front guide pillar is removed by loosening the hex nuts at each end. Next, slide the pillar from its slots in the right and left frame plates.

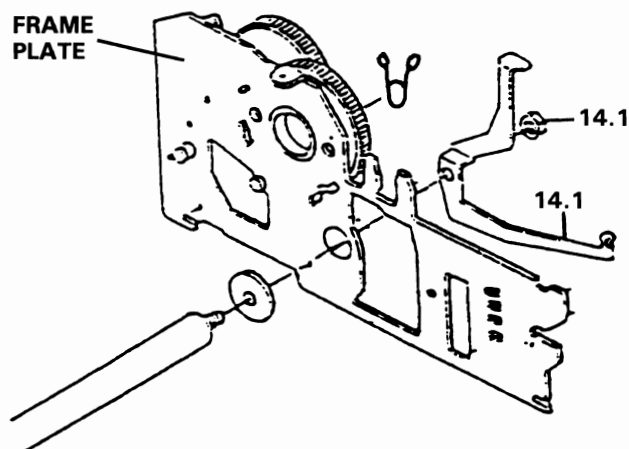


14. To remove the head shaft lever and right side frame plate:

14.1 Remove the hex nut at the right end of the carriage pillar. Pull the lever from the shaft.

14.2 Remove the right side roller plate spring from behind the paper guide.

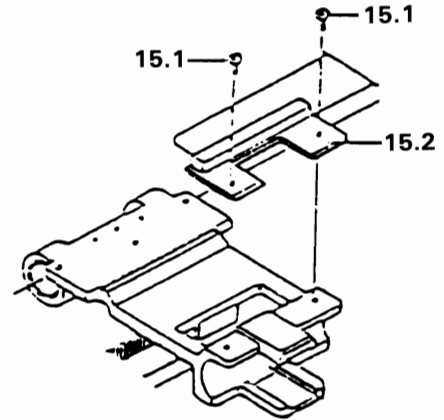
14.3 Remove the remaining screws in the frame plate. The frame must slide back, out of the base, to be removed.



MECHANICAL DISASSEMBLY (Continued)

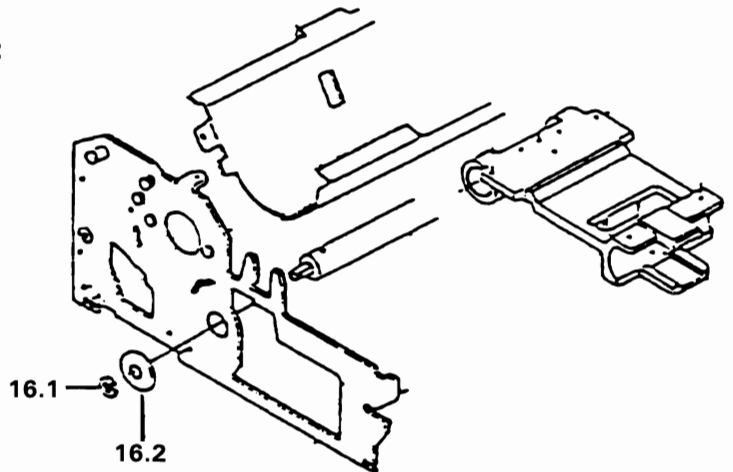
15. To remove the FPC cable assembly:

- 15.1 Remove the cable assembly screws.
- 15.2 Lift the FPC cable bracket from the carriage.



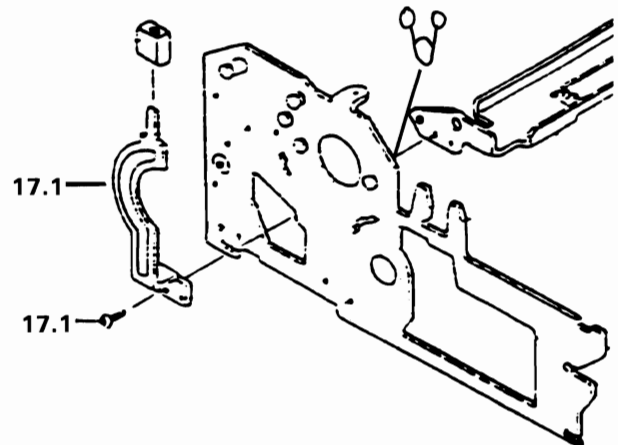
16. To remove the carriage and guide pillar:

- 16.1 Remove the "E" clip from the pillar.
- 16.2 Gently pry the plastic supporter from the shaft.
- 16.3 Slide the pillar to the right to release it from the frame.



17. To remove the paper roller assembly:

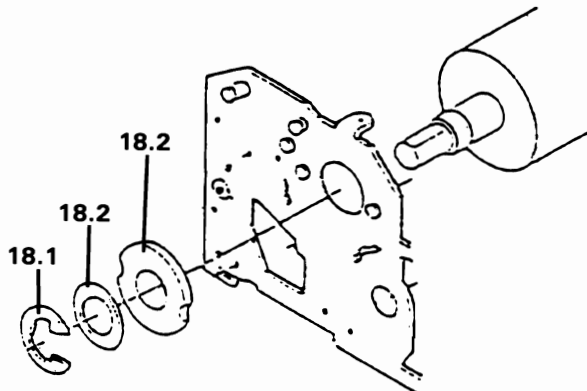
- 17.1 Remove the release lever screw and the lever assembly.
- 17.2 Release the left side roller plate spring from the frame plate.
- 17.3 Slide the roller plate to the right to release it from the frame for removal.



MECHANICAL DISASSEMBLY (Continued)

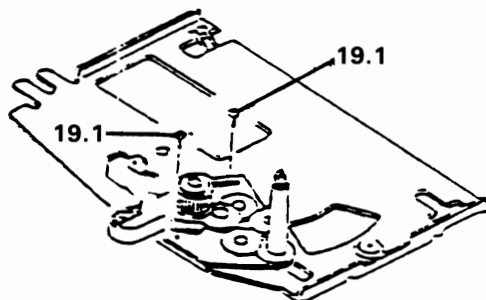
18. To remove the platen and paper guide:

- 18.1 Remove the "E" clip from the platen shaft.
- 18.2 Pull the platen washer and shaft supporter from the platen shaft.
- 18.3 Slide the platen to the right to clear the side frame.
- 18.4 Remove the paper guide screw from the side frame. Slide the paper guide to the right to clear the frame.



19. To remove the gear plate assembly and left side frame:

- 19.1 Remove the 2 plate screws from the assembly.
- 19.2 Remove the "E" chip from each gear and lift the assembly from the frame.
- 19.3 Remove the remaining left frame screw and slide the frame to release it from the base.



ASSEMBLY NOTES

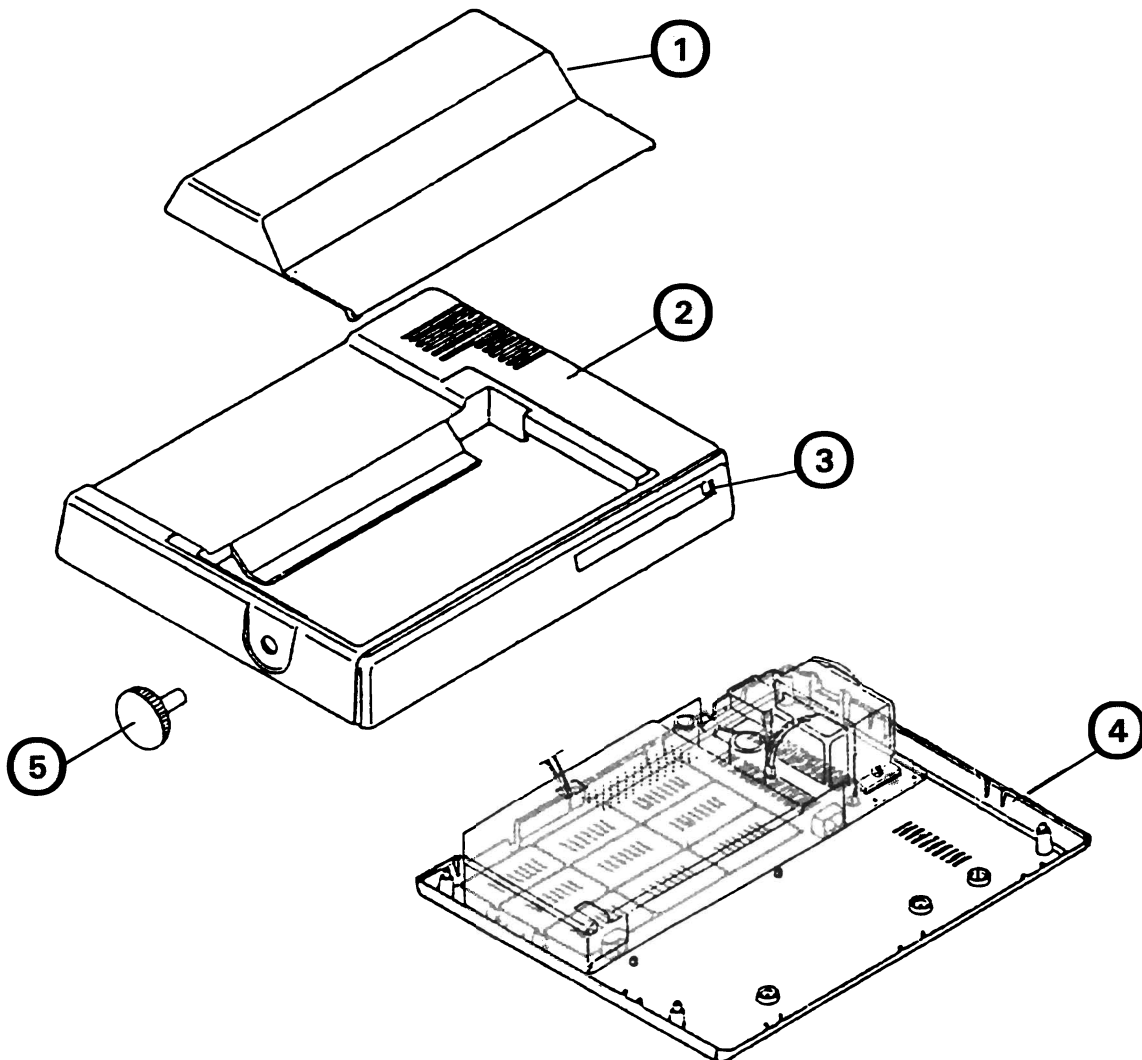
To reassemble the printer mechanism, reverse the order of disassembly and follow these precautions:

- The print head must be insulated from the carriage assembly. Check it with an ohmmeter.
- Lubricate all gears and springs as instructed on page 5.
- Secure all screws with a self-locking liquid.
- Make adjustments, as required, per the procedure on pages 26 and 27.

CASEWORK – MECHANICAL ASSEMBLIES

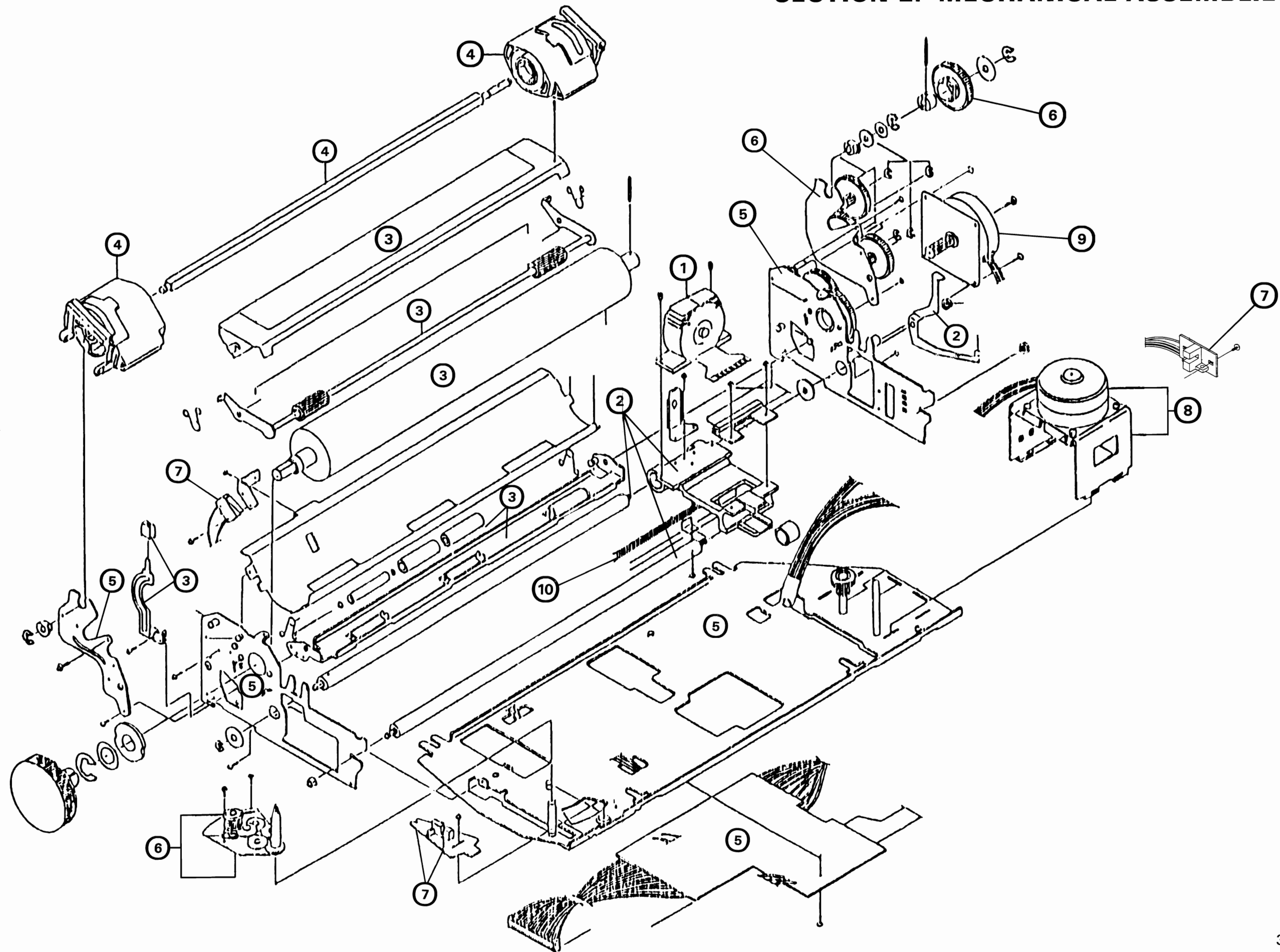
Section 1. Casework/Power Supply

REF. NO.	
1-1	C 31458001 1526/802/4023 SOUNDPROOF COVER
	C 31458101 1526 TOP CASE
1-2	C 31458102 MPS 802 TOP CASE
	C 31458103 4023 TOP CASE
1-3	C 31458201 1526/802/4023 PLATE ASSY 1-Plate w/Paper Advance Switch 2-Lamp, PCB and Harness
	C 31458301 1526 BOTTOM CASE W/PWR/SUP ASSY 1-Plastic Case, Ground Plate and Cover 2-Power Supply Assy
1-4	C 31458302 MPS 802 BOTTOM CASE W/PWR/SUP ASSY 1-Plastic Case, Ground Plate and Cover 2-Power Supply Assy
	C 31458303 4023 BOTTOM CASE W/PWR/SUP ASSY 1-Plastic Case, Ground Plate and Cover 2-Power Supply Assy
1-5	C 314600-01 1526/802/4023 PAPER FEED KNOB



SECTION 2. Mechanical Assemblies

REF. NO.		
2-1	C 31458601	1526/802/4023 PRINT HEAD ASSY 1-Print Head 2-Flexible Cable
2-2	C 31458701	1526/802/4023 CARRIAGE ASSY 1-Carriage w/Guide 2-Carrier Guide Pillar 3-Head Adjust Lever
2-3	C 31458801	1526/802/4023 PLATEN ASSEMBLY 1-Platen w/Upper Cover 2-Paper Guide 3-Roller Plate w/Release Arm and Button 4-Pressure Roller Unit
2-4	C 31458901	1526/802/4023 TRACTOR ASSEMBLY 1-Paper Holders L&Rt 2-Pin Feed Rollers (2) 3-Tractor Shaft
2-5	C 31459001	1526/802/4023 GROUND PLATE ASSEMBLY 1-Bottom Ground Plate 2-Side Ground Plates (2) 3-Sprocket Frame Left 4-PCB w/Harness and Flexible Cable
2-6	C 31459101	1526/802/4023 GEAR REPLACEMENT KIT 1-All Plastic Gear Parts
2-7	C 31459201	1526/802/4023 SENSOR ASSEMBLY 1-Home Position Sensor w/PCB 2-Carriage Position Sensor w/PCB 3-Paper-Out Microswitch
2-8	C 31459301	1526/802/4023 HEAD MOTOR ASSEMBLY 1-Motor w/Holder 2-Rotation Detector
2-9	C 31459401	1526/802/4023 LINEFEED MOTOR
2-10	C 31459501	1526/802/4023 CARRIAGE DRIVE BELT
	C 31459601	1526/802/4023 HARDWARE KIT 1-Miscellaneous Screws, Washers and Nuts 2-Miscellaneous Springs and "E" Clips 3-Miscellaneous Plastic and Rubber Pieces





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