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PRINTER SERVICE GUIDE

The Printer Service Guide is an introduction to the component and operation of the 2022 and 2023 PRINTER.

The Service Guide has been divided into 3 categories, Theory of Operation, Troubleshooting Procedures, and Operating Failures and Corrections.

The Theory of Operation goes into detail on critical areas and allows the technician to better understand the internal workings of the controller board.

The Troubleshooting procedures will step a technician through a series of diagnostics and will allow them to reference a known good output for various tests.

An Operating Failure and Correction table for various problems have been inserted to assist in expedient repairs.

A reprint of the EPSON Service manual is enclosed with the Service Guide to enable you to completely disassemble and assemble the mechanism.

PRINTER THEORY OF OPERATION

I. GENERAL

Controller

The heart of the controller board is a 6504 microprocesser chip (location U12 [8B]). The microprocessor executes programs stored in 4K bytes of Read Only Memory (location U11 [8A]). There are also two 6532 memory and I/O chips (location U3 and U4 [5B and 7B]), each of which contain 128 bytes of RAM memory, 16 parallel I/O lines, and a programmable interval timer. Discreet circuitry, includes those transistors necessary to drive the various motors and solenoids in the printer mechanism.

Printer Mechanism

The printer uses an impact printing mechanism, printing characters and graphic symbols by appropriate application of seven vertical print needles.

II. CPU and ROM

Clock/Reset

The printer controller circuits are clocked at a 1.0 mhz rate. This clock originates at an oscillator circuit consisting of 7404 inverters (location U13 [4A]) arranged in a closed loop; along with either an 8.0 mhz or 16.0 mhz crystal. This oscillator frequency is then divided to yield the 1.0 mhz system clock. The division factor is jumper-selectable on the controller board. (Solder jumper #4 and #5).

When power is first applied to the board an LM555 timer (location U14), configured as a one-shot, will generate a pulse (approximately 100 milli-seconds long) which is used to reset the system logic to an initialized state (Epson version uses a NOR gate and RC network to generate the reset pulse). A reset pulse will also be generated if the timer in the 6532, (location U4 [7B]), is allowed to reach its terminal count, indicating the CPU has failed to respond in a programmed amount of time, also receipt of an IFC (Interface Clear) signal from the controlling computer via the IEEE 488 BUS will cause the system to trigger the reset pulse.

NOTE: Items within brackets pertain to the parts location of the EPSON printer version controller board.

CPU

The significant pins used by the 6504 CPU chip are:

Input Clock (OO)

This input is a 1.0 mhz square ware, derived from the oscillator divider (U5 [3C]).

Output Clock (02)

This clock is generated internally in the 6504, using the OO clock input. All system memory and I/O operations are keyed to this clock.

Address Buss (A0-A12)

These 13 output lines allow the 6504 to address 8k bytes of memory and/or I/O addresses.

Data Bus (D0-D7)

These bi-directional lines are used in transferring data between the CPU and memory or I/O devices.

Read/Write (R/W)

This output will go high during any CPU READ cycle, and will go low during any CPU write cycle. During a Read or Write (R/W) cycle, the state of R/W will be established within 300NS of the falling edge of 02 and will be valid for the remainder of the cycle. The address outputs will be valid within 300 NS of the falling edge of 02, and guaranteed to remain valid for at least 30NS after the next falling edge (end of the cycle).

During a READ cycle, the addressed memory or I/O device must establish valid data on the data bus at least 100 NS before the end of the cycle and maintain it for at least 10 NS afterwards.

During a WRITE cycle, the CPU will output valid data on the bus within 200 NS of the rising edge of 02 and will maintain it for at least 30 NS after the end of the cycle. The addressed memory or I/O device must take the data during this time.

ROM

The 6332 ROM (location U11 [8A]) used in the printer controller is a 24 pin chip containing 4096, 8 bit bytes of data. The ROM is selected whenever the most significant bit, A12, is high; address bits A0-A11 will then select one of the 4K addresses and, after the ROM access time is satisfied, the

selected data will be available on the D0-D7 data bus.

III. SYSTEM RAM

The printer controller contains 256 bytes of Read/Write memory (RAM), consisting of 128 bytes in each of the 6532 chips. The 6532 located at U3 [5B] contains the Queue and format memory. The Queue is 100 byte buffer and contains the current print line and the building of the next line to be printed. The first 28 bytes of format memory is contained in the 6532 located at U3 [5B] and the remainder 52 bytes are contained in the 6532 located at U4 [7B].

The format memory contains the secondary address information used to format the printing. The 6532 located at U4 [7B] contains 60 bytes of program work storage that is used internally in the system and the remaining 16 bytes of memory is used by the 6504 microprocessor for the stack pointer.

IV. IEEE-488 BUS

The printer controller uses the 6532s to control the transfer of commands and data from the controlling computer to the printer over the IEEE-488 bus. Signals on the IEEE bus are of three types:

a) Bidirectional data bus (8 bit parallel)

b) Handshaking Transfer Control (3 lines)

c) Management Signals (5 lines)

Devices connected to the IEEE bus may generally be of three types: Talker, Listener, and/or Controller; since the printer controller need only accept commands or data, it will always be configured as a listener.

Activity in the printer controller begins when the controlling computer sends the proper device number over the IEEE bus as a primary address. The device number to be compared is read by the CPU from the 6532 (U4 [7B]) I/O bits PA3-PA5, which may be jumpered as required on the controller board. The device number is preset to 4 at the factory but can be altered from device 4 to device 11 by changing jumpers 1, 2, &/or 3 on the controller board. The diagram below shows the different device numbers and the associated jumpers to be cut.

Jumper Device #	1	2	3
4			
5	X		
6		X	
7	X	X	
8			X
9	X		X
10		X	X
11	X	X	X

Transfer Sequence

The signals NRFD (Not Ready for DATA) and NDAC (Data Not Accepted) are driven by all listener devices on the bus with open-collector drivers; thus any listener is capable of holding these lines low. When all listeners on the bus are ready to accept data, they will allow NRFD to go high. The talker, when ready to transfer a byte, will sense NRFD high and place a data byte on the bus; after a suitable data settling time, the talker takes DAV (Data Available) low. All listeners sense DAV low, take NRFD low, and accept the data on the bus; as each listener has the data, it will allow NDAC to go high. When the slowest listener has accepted the data, the talker will sense NDAC high, will take DAV high, and the listeners respond by taking NDAC low.

V. PRINTER INTERFACE

Control Signals

The CPU will program the eight I/O bits (PB0-PB7) of the 6532 (U3 [5B]) and six I/O bits (PA1 thru RA5, and PA7) of the 6532 (U3 [5B]) to control the printer mechanism. The CPU will also program the 6532 (U3 [5B]) interval timer to determine the various time parameters required in controlling the printer mechanism; upon loading the timer with the appropriate count, the CPU will receive an interrupt request from 6532 (U3 [5B]) when the terminal count is reached.

Signals from the printer controller to the printer mechanism, and their source on 6532 (U3) are as follows:

Source	Signal	Remarks
PA1	MOTOR DRIVE	Controls the motor to allow the print head to sweep across the carriage
PA2 & PA3	TRACTOR MOTOR	Controls the amount of paper advancement of the tractor feed printer under control of secondary address 6

PA4		Controls the gating time of the 30+ volts to the printer needles
PA5	MOTOR SYNC	Gates the timing signal from the motor control circuit of the print mechanism.
PB7	FEED PAPER	Controls paper feed for friction type mechanism only
PB0-PB6	NDL1-NDL7	Control print needles
PA7	HOME AND TIMING	Senses photocell indicating the print head at the home and print position

Paper Feed

Paper feed is accomplished by applying a 25V+10% volt pulse to the paper feed solenoids. The solenoids are connected on one side to 25 volts DC; when bit PB7 is taken low, transistor Q8 [Q4,Q7] will turn on and apply a ground return to the solenoid, initiating the paper feed operation. The print needles on the print head are also solenoid controlled. With 21 to 29 VDC applied to one side of the solenoids, 6532 (U3 [5B]) bits PB0-PB6, being taken high, will allow the corresponding drive transistor Q1-Q7 [Q9-Q15] to turn on, when Q9 furnishes a ground return, pulsing the corresponding print needle. The 30 VDC to the print solenoids is controlled by PA4 of 6532 (U3) when PA4 is low, inverted output U2 is high, allowing transistor Q10, and consequently transistor Q9, to turn on. Thus the 36 VDC may be applied to the print solenoids only when required for printing. In the Epson version the needles are gated by NAND gates 3B and 4B.

R Detector

An LED is turned on in the printer mechanism by applying 5V to its anode, and grounding its cathode through resistor R1. A photo-sensitive transistor, with its collector to 5V, will be turned on when sensing the LED light; voltage comparator (located on the R Detector board) will sense the presence or absence of emiter voltage, allowing the PA7 bit to sense the home position of the print head.

Motor Control Board

The motor control board has two functions:

A. Provide power source to drive the mechanism. The drive motor is controlled by PA1 turning on Q2 with an active low, thus allowing the motor to draw current from the power transistor Q4.

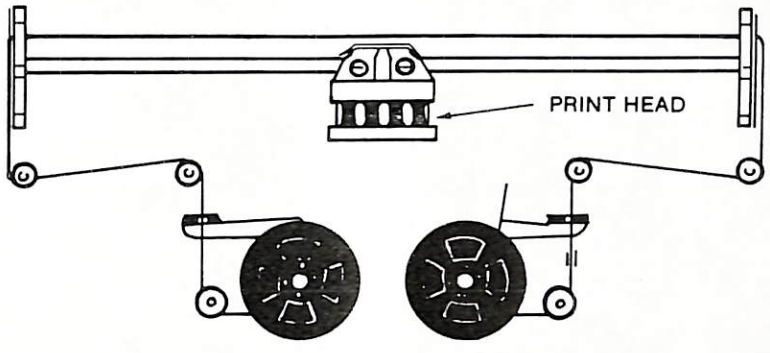
B. A generator, internal in the motor, provides motor speed control and timing signals. D4-D7 provide the signal output from the generator to the speed control circuit (Q2). Q7 and Q8 convert the timing signal to a logic level to be inputed to U1 [5A].

2022/2023 PRINTER TEST

The following is a list of equipment and tools necessary for test and repair of the 2022/2023 printers.

1. 2001 Series Computer
2. PET to IEEE cable
3. Printer Test Tape
4. Whetstone 100 x 9.5
5. Oil stone 100 x 9.5
6. Metric Feeler Gauge
7. Oil
8. Grease

I. Before applying power to the printer, visually inspect the mechanism for debris or foreign material. Check the ribbon track to insure ribbon is properly installed.



Do not connect the printer to the 2001 at this time.

Locate the power switch and place the rocker switch to the off position (the white dot on the switch not visible.)

II. Plug the A.C. power cord into a receptacle and switch the on/off switch to the on position. The head assembly should sweep across the carriage and return to the home position. No printing should occur during this action of the print head. If the head does not move across the carriage, check the following items:

Mechanical

A. Obstructions in carriage path
B. Inspect motor alignment and gear train for damage.

Electronic

A. Check main fuse at 1A
B. Check diodes CR-3, CR-4, CR-19, CR-20 [DB2]
C. Check output of 5v regulator at VR-1 [Q6]

D. Check input (30v) and output (25v) of Q-16 [Q8]
E. Replace U4 [7B] and U3 [5B]
F. Replace U11 (2332 [8A])
G. Replace U12 (6504 [8B])
H. Check U10 (7406) pin 8 and pin 9, if pins equal-replace U10 [6A])

III. Reference CBM printer User Manual (page 10) for installation of paper at this time.

IV. Internal Diagnostics

To enable the internal diagnostics you must depress the paper feed switch and while holding the switch in, turn on power to the printer. The print head will sweep across the paper once without printing and then start printing continuous lines of characters.

If any problems occur at this point refer to the Helpful Hints section.

To stop the internal diagnostic you must power the system off.

V. Printer Test Tape

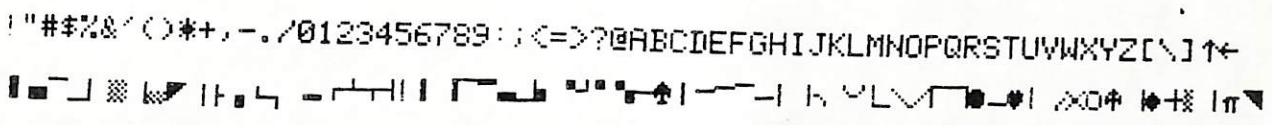
Insert the "Printer Test" program into a C2N or internal cassette. Rewind the tape and then depress the "shift" key and "run/stop" key simultaneously. The screen on the 2001 will display

```
PRESS PLAY ON TAPE #1
SEARCHING
FOUND PRINTER TEST
LOADING
```

Once the program has been loaded it will automatically execute. Above test(s) can also be stored on diskette.

Test #1 prints every character once:

GOOD

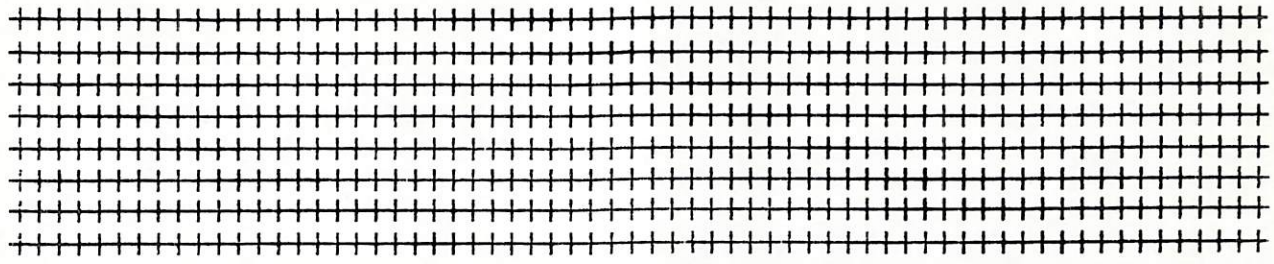


Possible Causes for Not Printing All the Characters:

A. Bad 6532 memory at U3 [5B]
B. Bad 6532 I/O lines at U4 [7B]

Test #2 will check for horizontal alignment. Make sure each line starts and stops at the same position.

GOOD



Possible causes:

A. Bad or weak motor
B. Bad motor control board

Test #3 checks for vertical alignment by overprinting a line 5 times.

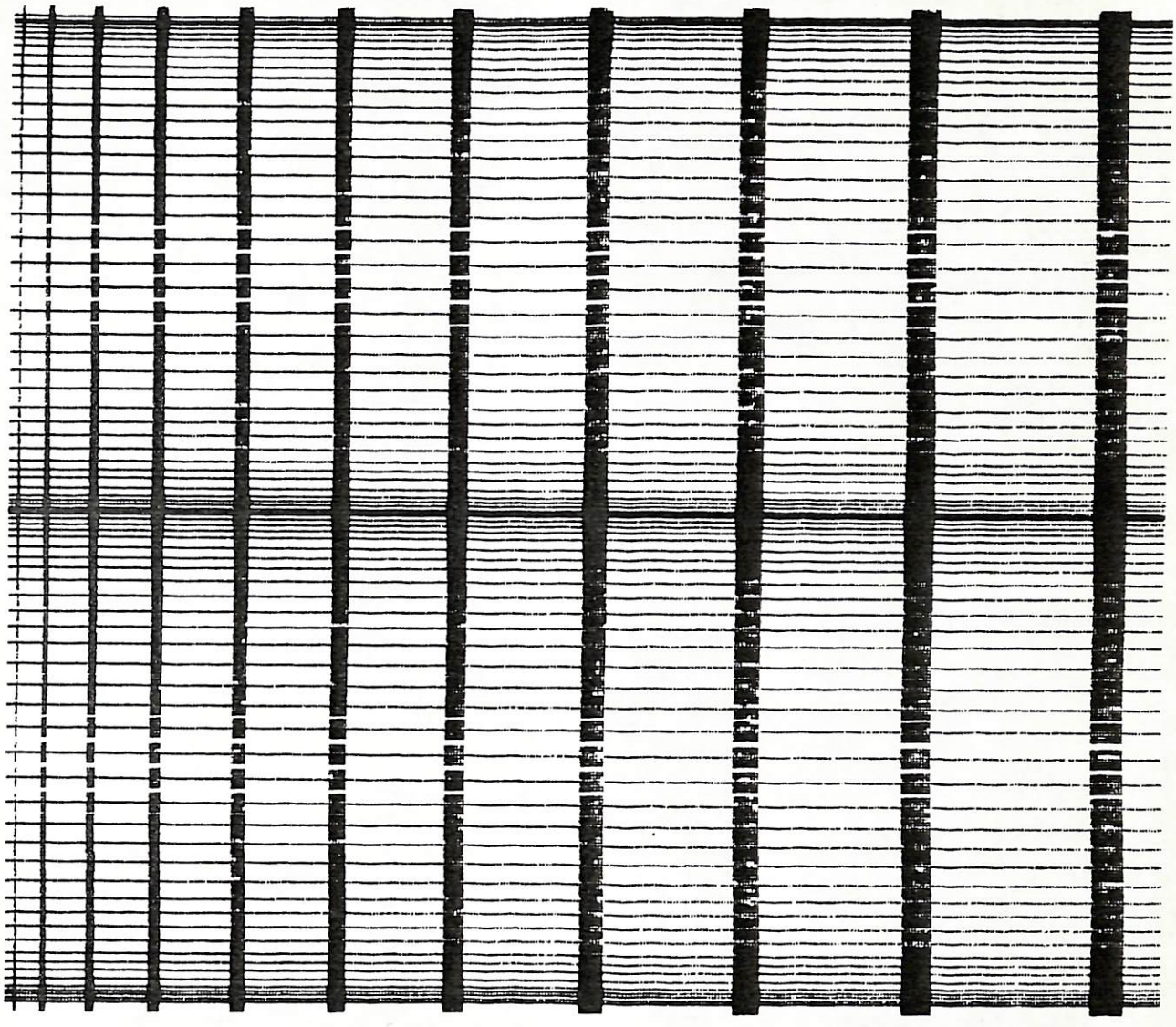
GOOD

Possible causes for not printing correctly:

A. Bad motor
B. Bad motor control
C. Bad U1 [5A]
D. Bad 6532 at U3 [5B]

Test #5 verifies the vertical spacing of lines (tractor feed only)

GOOD



Possible causes

A. Bad tractor drive transistors
B. Bad 6532 at U3 [5B]
C. Bad 6332 at U11 [8A]
D. Tractor assembly mechanically binding

VI. NEEDLE SOLENOID TIMING ADJUSTMENT

This adjustment is necessary when a mechanism, needle, or logic board has been replaced. Follow the procedure as outlined below to achieve the correct pulse width of the needle solenoid timing. It will be necessary to use a scope.

Remove printed ribbon cable from its socket on the motor control PCB.

1. Set scope adjustments for

Voltage	2V/Div
Sweep	50 ms/Div
Trigger	Internal

2. Connect scope probe to R26 [TPW] on the logic board.

3. Remove printer ribbon cable from its socket on the motor control board.

4. Turn the power switch on while pressing the paper feed button. This will allow the printer to run in diagnostic mode and print the ASCII character set over and over. With the printer ribbon cable removed, the needles will not fire but you will be able to see the timing pulse on the osc.

5. Adjust R27 until you achieve a 455+ I5ms pulse at R26.

FAILURE AND CORRECTION TABLE

Mechanical:

1. Printhead does not return to home position on power up.

   A. Check for obstructions in carrier path.
   B. Check motor alignment and gear train for damage.

2. Printer output too light

   A. Check clearance between print head and platen (.45 mm)
   B. Check ribbon for wear-replace
   C. Check platen for wear or damage. Rotate if necessary. Note: Platen alignment is critical.
   D. Needle solenoid timing not adjusted correctly.

3. Ribbon not feeding

   A. Check ribbon transmission lever for binding. (Reform as necessary)
   B. Check for excessive dirt or lubricant in ribbon drive mechanism. (Clean and relubricate)

4. Tractor feed is not feeding paper

   A. Check tractor motor harness for physical damage or loose connections
   B. Check reduction idler gear on tractor assembly for tooth damage
   C. Check tractor belts for damage

Electronic:

1. Print head does not return to home position on power up.
   A. Check main fuse at 1A.
   B. Check diodes CR-3, CR-4, CR-19, CR-20
   C. Check output of 5v regulator at VR-1 [Q6]
   D. Check input (30v) and output (25v) of Q-16 [Q8], must be + 0.5v
   E. Replace U4 [7B] and U3 [5B] (6532)
   F. Replace U11 [8A] (2332)
   G. Replace U12 [8B]
   H. Check U10 [6A] (7406) pin 8 and pin 9, if pins equal-replace U10 [6A]

2. Will not run internal diagnostic (Print test)
   A. Replace U3 [7B] and U4 [5B] (6532)
   B. Replace U11 [8A] (2332)

C. Replace U12 [8B] (6504)
D. Check pin 27 of U12 [8B] (6504) for 1MHZ clock

3. Will not accept data from CPU but will run internal diagnostic (Print Test)
   A. Check IEEE cable for shorts or opens
   B. Replace U3 [7B] and U4 [5B] (6532)
   C. Replace U11 [8A] (2332)
   D. Replace U12 [8B] (6504)
   E. Replace U6 [7A] (74LS27)
   F. Replace U10 [6A] (7406)

4. Print head cycles continuously without print.
   A. Check outputs from Epson P.C.B. mounted under printer frame.
   B. Replace U3 [7B] and U4 [5B] (6532)
   C. Replace U11 [8A] (2332)
   D. Replace U10 [6A] (7406)

5. No paper feed (Friction Printer)
   A. Check Q8 [Q4 or Q7] (RCAs-121)
   B. Check U13 [6A] (7404)
   C. Replace U3 [7B] and U4 [5B] (6532)

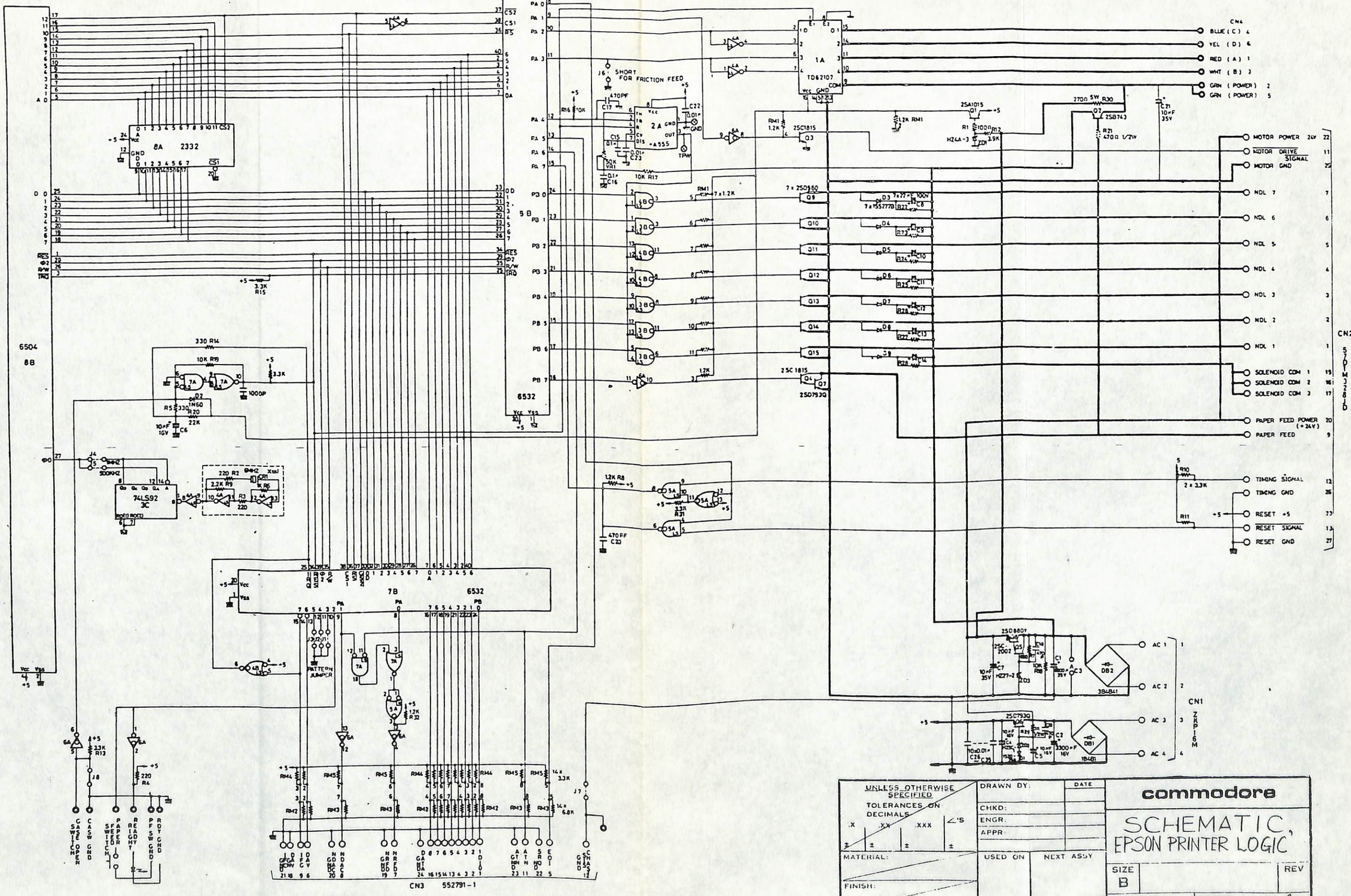
6. No paper feed (Tractor Feed)
   A. Check tractor motor harness
   B. Check Q12, Q13, Q14, Q15 [1A]
   C. Replace U9 [1A]

7. Print head needles breaking and damaging ribbons
   A. Check output of U2 pin 3 at T.P.
      1. Turn power off and connect oscilloscope to TP and logic ground
      2. Disconnect print head ribbon cable
      3. While holding down feed switch turn power on.
      4. Adjust R27 (50k pot) to achieve output pulse of 455 + 15 mSec.

COMMODORE PRINTER LOGIC COMPONENT CROSS REFERENCE

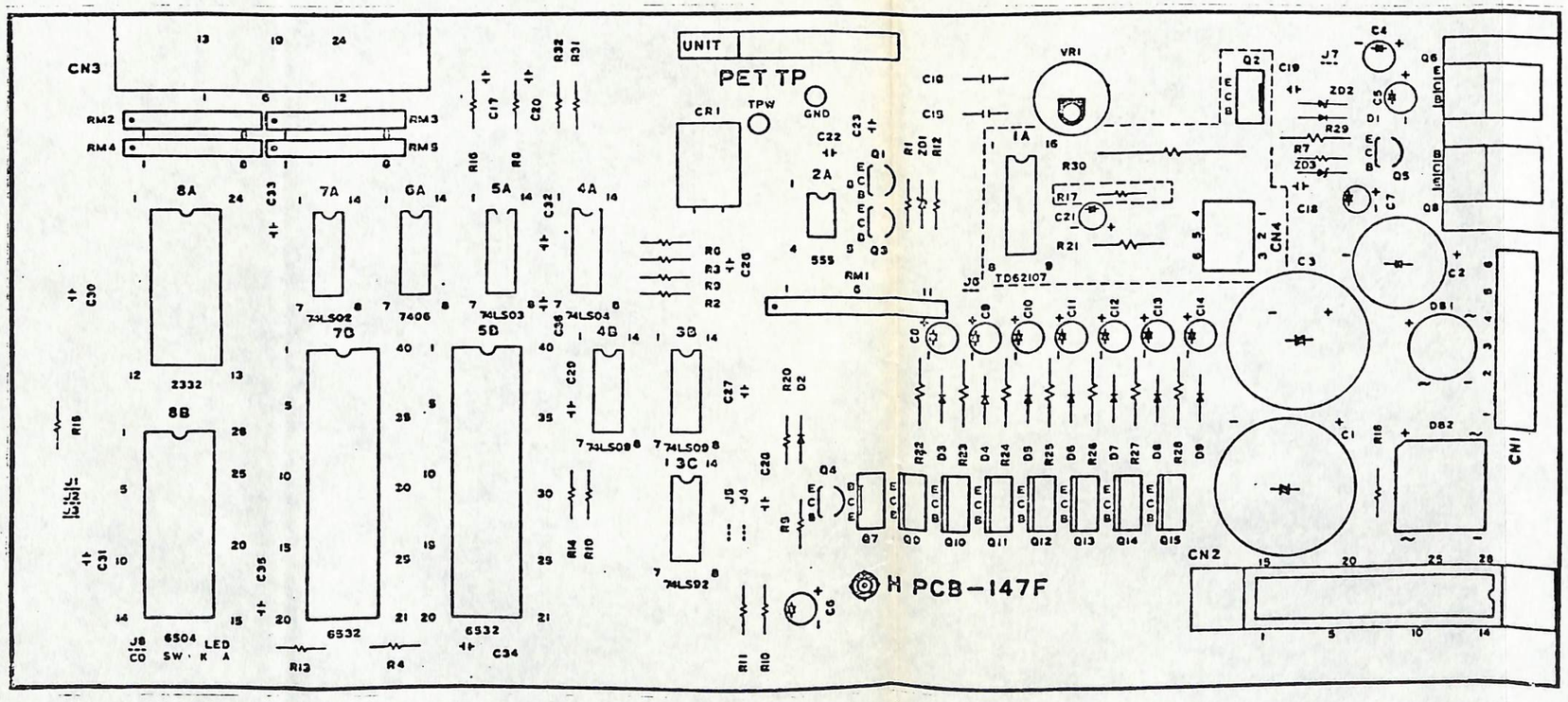
Location	Description	Part #
C1	4700 uf 16v elect	900101-32
C2, C6-C16	.1uF 50v mini	900020-01
C3	330 uF 16v elect	900101-03
C4, C5, C33	4700 uF 35v elect	900107-01
C17	22 PF 200v cer	900010-42
C18	10 PF 500v cer	900010-35
C19	470 PF 50v cer	900010-22
C20	1000 PF 50v cer	900010-25
C21, C23	.01 uF 50v cer	900010-38
C22	.1uF 100v film	900152-06
C24, C25	10uF 10v Tant	900402-01
C26, C32	2.2uF 100v Elect	900101-43
C34, C35	100 uF .35v Elect	900107-02
C36	.002uF 250v cer	900010-47
CR1-CR4, CR12, CR19, CR20	IN5402 Diode	900753-01
CR5-CR11, CR24-CR30	IN4004 or IN4005 Diode	900750-04
CR13, CR15-CR18	IN4002 Diode	900750-02
CR22	IN971B 27v Zener	900947-01
P1	28 pin connector	903207-01
P2	Polarized header	903331-04
P3	2 pin header	903316-02
P3	5 pin header	903316-05
P4	IEEE 488 connector	903206-01
Q1-Q8, Q16	RCA 121	902732-01
Q9, Q11	D45E3	902740-01
Q10, Q12-Q15	2N4401	902652-01
R1-R7, R9-R12, R26, R49	1k ohm 1/4w 5%	901550-01
R8, R51	2.2k ohm 1/4w 5%	901550-18
R13-R19	1k ohm 1/2w 5%	901600-35
R20, R50	330 ohm 1/4w 5%	901550-14
R21, R45	370 ohm 2w 5%	901700-12
R22, R35	10k ohm 1/4w 5%	901550-20
R23	4.7k ohm 1/2w 5%	901600-11
R24, R25, R36	4.7k ohm 1/4w 5%	901550-19
R27	50k ohm potentiometer	902260-03
R28	15k ohm 1/4w 5%	901550-26
R29	3k ohm 1/4w 5%	901550-33
R30	6.2k ohms 1/4w 5%	901550-47
R31	3.3k ohm 1/4w 5%	901550-02
R32	270 ohm 1/4w 5%	901550-76
R33, R34, R37-R40	150 ohm 1/4w 5%	901550-58
R41-R44	150 ohm 1/4w 5%	901550-89
R46	470 ohm 5w 5%	902250-03
R47	820 ohm 1/4w 5%	901550-67
RP1	3K ohm resistor pack	902419-52
RP2	6.2k ohm resistor pack	902419-61
SW1	Power switch	904503-01
SW2	Paper feed switch	320303-01

T1	Power transformer	320337-02
U1	7401	901522-25
U2, U14	LM555	901523-01
U3, 44	6532	901458-01
U5	74LS93	901521-07
U6	74LS27	901521-22
U9, U10	7406	901522-06
U11	6332	901472-04
U12	6504	901455-01
U13	7404	901511-05
VR1	7805 Reg +5v 1.0A	901517-02
Y1	8MHz crystal	900556-01



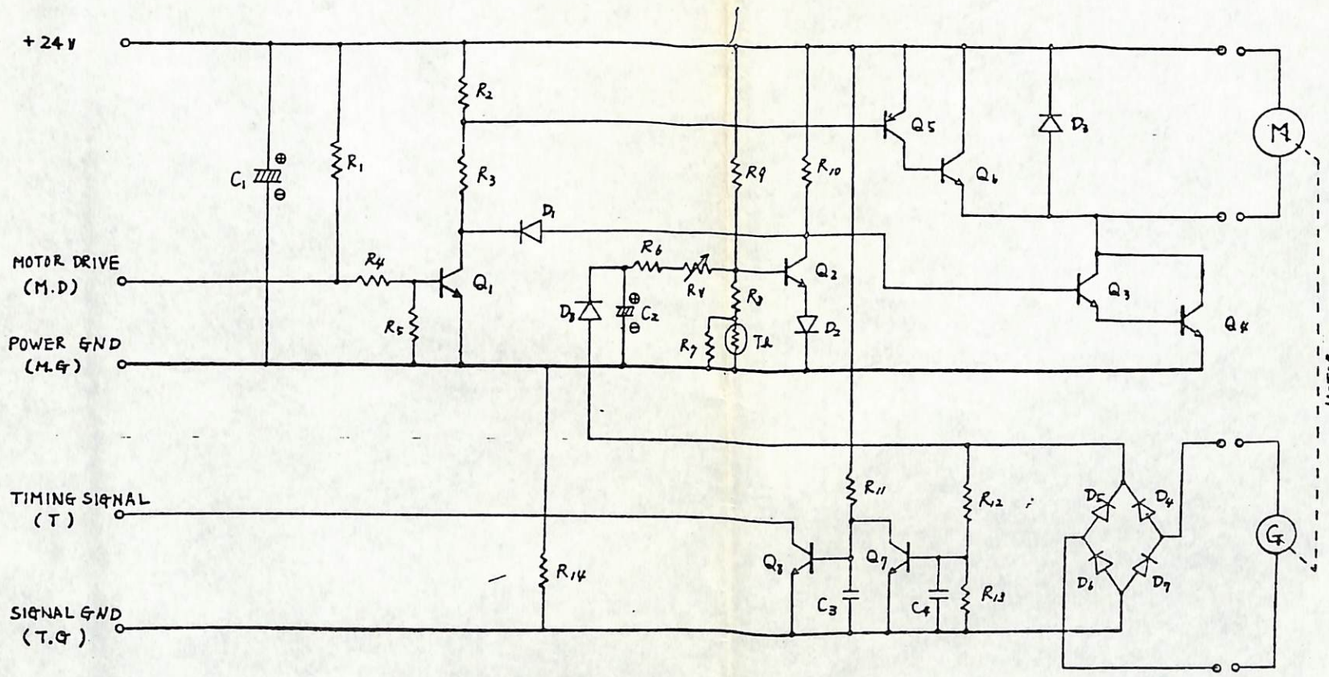
UNLESS OTHERWISE SPECIFIED TOLERANCES ON DECIMALS .X ± .XX ± .XXX ± ∠'S ±	DRAWN BY:	DATE	commodore
	CHKD:		SCHEMATIC, EPSON PRINTER LOGIC
	ENGR:		
	APPR:		
MATERIAL:	USED ON	NEXT ASSY	SIZE B — REV
FINISH:			SCALE — SHEET 1 OF 4

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED



UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X ± .XX ± .XXX ± ∠'S ±	DRAWN BY:	DATE	commodore
	CHKD:		PCB ASSY, EPSON LOGIC BOARD
	ENGR:		
	APPR:		
MATERIAL:	USED ON	NEXT ASSY	SIZE B — REV
FINISH:			SCALE — SHEET 2 OF 4

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED



Q_1, Q_3, Q_7, Q_8	2N4401 OR 2N3904	R_6	1.2KΩ 1/4W
Q_2	2N3904	R_9	470KΩ 1/4W
Q_4, Q_6	TIP31A (29)	R_{11}	22KΩ 1/4W
Q_5	2N3906 OR 2N4402	R_{14}	22Ω
D_1, D_2, D_4, D_5	WG713C	C_1	33μF 35V
D_6, D_7, D_8	1N4002	C_2	0.68μF 20V
D_3	W03A	C_3, C_4	0.01μF
R_1, R_5, R_{12}, R_{13}	3.3KΩ 1/4W	Th	1KΩ
R_2	1.5KΩ 1/2W	Rv	0Ω ~ 15KΩ
R_3, R_4, R_{10}	4.7KΩ 1/4W		
R_7	5.6KΩ 1/4W		
R_8	6.2KΩ 1/4W		

UNLESS OTHERWISE SPECIFIED
TOLERANCES ON:
DECIMALS
.X ± .XX ± XXX ± ∠'S ±

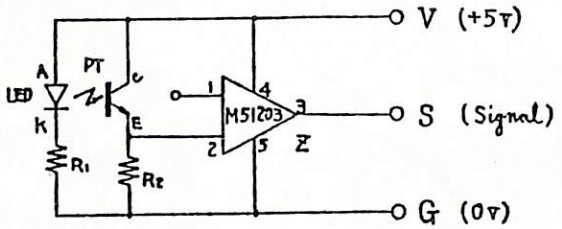
DRAWN BY: | DATE
CHKD:
ENGR:
APPR:
MATERIAL:
FINISH:
USED ON | NEXT ASSY

commodore

SCHEMATIC, EPSON MOTOR CONTROL

SIZE B | REV
SCALE | SHEET 3 OF 4

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED



Symbol	Parts Name	Standard	Notice
LED	LED	SE302A	
PT	Photo Transistor	PH101	h_{FE} (R)
Z	Voltage Comparator	M51202	
R1	Resistor	220Ω ¼W	±5%
R2	Resistor	220Ω ¼W	±10%

UNLESS OTHERWISE SPECIFIED
TOLERANCES ON DECIMALS
.X ± .XX ± .XXX ± ∠'S ±

DRAWN BY: | DATE
CHKD:
ENGR:
APPR:

MATERIAL:
FINISH:

USED ON | NEXT ASSY

commodore

SCHEMATIC,
R DETECTOR

SIZE B | REV

SCALE | SHEET 4 OF 4

REVISIONS			
LTR	ZONE	DESCRIPTION	DATE APPROVED
A		[illegible]	[illegible]
B		REVISED PER ECO 983	[illegible]
C		REVISED PER ECO 999	[illegible]
D		PER ECO 1101	[illegible]
E		PER ECO 1309	[illegible]

U12 6504 — U11 2332 — U4 6532 — U3 6532

U5 74LS93 — U13 7404 — U10 7406 — U6 74LS27 — U14 LM555

RP1 3.0K — RP2 6.2K — R29 3.0K — R30 6.2K — R31 3.3K — R32 270 — R33 470 — R34 470 — R35 10K — R36 4.7K

C17 22PF — C18 10PF 500V — Y1 8MHZ — C23 .01 — C24 10 10V TANT — C25 10 10V TANT

P4

SHORT JUMPER *5 FOR 8MHZ

PUSH BUTTON SWITCH — READY LIGHT RED — J2 P2 — KEY

FEED SWITCH

PATTERN JUMPER — SHORT ALL

NC — DIØ — DIØ1 — DIØ2 — DIØ3 — DIØ4 — DIØ5 — DIØ6 — DIØ7 — DIØ8 — NRFD — NDAC — DAV — IFC — DATA GND — NDAC GND — NRFD GND — DAV GND — IFC GND — SRQ GND — ATN GND — CHASSIS GND — IEEE-488

2. CAPACITANCE VALUES ARE IN MICROFARADS

1. RESISTANCE VALUES ARE IN OHMS, 1/4 WATT, ±5%

NOTES: UNLESS OTHERWISE SPECIFIED

commodore

SCHEMATIC - PET PRINTER EPSON 3110 VERSION

SIZE D | 320309 | REV E

SCALE NONE | SHEET OF 2

115993-2

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

PB0 PB1 PB2 PB3 PB4 PB5 PB6 PB7 FEEDPAPER

R1 R2 R3 R4 R5 R6 R7 R8 2.2K R9 1K

Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 RCA-121

CR24 CR25 CR26 CR27 CR28 CR29 CR30 IN4004

U13 12 13

CR5 CR6 CR7 CR8 CR9 CR10 CR11 IN4004

C26 C27 C28 C29 C30 C31 C32 2.2,100V

R13 R14 R15 R16 R17 R18 R19 1K,1/2W

NDL 7 NDL 6 NDL 5 NDL 4 NDL 3 NDL 2 NDL 1 SOLENOID COM

P1 J1

FOR BOTTOM NEEDLE

FOR TOP NEEDLE

FUSE 1A

POWER SWITCH

LIVE

AC LINE

NEUT

GROUND

CHASSIS GROUND

J3 P3

KEY

CR1 IN5402 CR2 IN5402

+10VDC

C1 4700 16V

C2 0.1 16V

ON HEAT SINK

VR1 7805

C3 330 16V

C6-8 0.1

C9 0.1 16V

C10-15 0.1

+5V

5V GND

+30V

+25V

25V GND

CR3 IN5402 CR4 IN5402 CR19 IN5402 CR20 IN5402

+30VDC

C4,5, C33 4700 35V

RCA121 ON HEAT SINK Q16

CR21 IN4148

R47 820

C34 100 35V

CR22 27V

C35 100 35V

CHASSIS GROUND

+30V +25V

R45 470 2W

R49 1K

Q11 D45E1

R46 470 5W

ON HEAT SINK D45E3 Q9

R50 330Ω 1/4W

CR12 IN5402

R23 4.7K 1/2W

R20

R21 470 2W 330

Q10 2N4401

R22 10K

CR13 IN4002

SOLDER JUMPER

R28 15K

PAPERFEED MAGNET (+)

PAPERFEED MAGNET (FRICTION TYPE) (MECH ONLY)

TIMING SIGNAL

TIMING SIGNAL CIRCUIT

+5V GND

RESET (HOME) SIGNAL

RESET (HOME) SIGNAL CIRCUIT

MOTOR (+)

MOTOR GND

MOTOR DRIVE SIGNAL

MOTOR DRIVE CIRCUIT

M

R24 4.7K

R25 4.7K

C19 470PF

C20 1000PF

R12 1K

R11 1K

R10 1K

U1 7401

PA7 OUT

IN (PA5)	OUT (PA7)
H	RESET
L	TIMING

PA1 PA3 PA2 PA4 PA5

U13 7404

U10 7406

U9

SHORT FOR FRICTION FEED

R37 470

R38 470

R39 470

R40 470

R41 150 R42 150 R43 150 R44 150

C16 0.1

CR15 CR16 CR'7 CR18 IN4002

Q12 Q13 Q14 Q15 2N4401

RED GRN WHT BLUE GRN YEL

PULSE MOTOR

PULSE MOTOR DRIVER FOR TRACTOR FEED

<2.4V 100US

C36 .002 50V

R51 2.2K

CR23 IN4148

C21 .01

U2 LM555

TH TR R CV DIS 0

515US AT 24V

TP

R26 1K

C22 0.1 FILM

R27 50K

CR14 IN4148

UNLESS OTHERWISE SPECIFIED TOLERANCES ON DECIMALS

DRAWN BY DATE CHKD ENGR APPR

MATERIAL FINISH

USED ON NEXT ASSY

commodore

SCHEMATIC – PET PRINTER EPSON 3110 VERSION

SIZE D 320309 REV E

SCALE NONE SHEET 2 OF 2