

MAINTENANCE MANUAL
COMPACT PRINTER
AD-8116

A & D COMPANY, LTD.
A & D ENGINEERING, INC.

mano-8116-006a/b-v.1

(I) COMPLIANCE WITH FCC RULES

Please note that this equipment generates, uses and can radiate radio frequency energy. If this equipment is not installed and used in accordance with the instruction manual you are warned that it may cause interference to radio communications. This unit has been tested and has been found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules. These rules are designed to provide reasonable protection against interference when equipment is operated in a commercial environment. However if this unit is operated in a residential area it is likely to cause interference and under these circumstances the user will be required to take whatever measures are necessary to eliminate the interference, at his own expense.

(II) WARRANTY

A & D Engineering, Inc. (hereinafter called the "COMPANY") warrants that articles, materials and work furnished by them will conform to specifications, drawings and to other data cited, further stipulating that such material and workmanship shall be free from defect. The COMPANY will repair or replace at its discretion, free of charge, any equipment covered by this warranty which is returned within one year of initial delivery and which upon examination proves to be defective in nature or workmanship.

This warranty does not apply to any COMPANY product that has been: -

- a) Repaired or modified by anyone other than someone authorized by the COMPANY if in their judgment such repair or modification has detrimentally affected the performance or reliability of the product.
- b) Improperly installed or not adjusted in accordance with instructions provided by the COMPANY.
- c) Mishandled, abused or in the judgment of the COMPANY has been exposed to an environment for which the product was not designed.

All products returned for warranty claim should be sent freight prepaid to the San Jose facility with a brief description of the problem. The COMPANY will notify the customer about the results of the factory inspection. If warranty repair is confirmed the unit will be repaired or replaced (at the COMPANY's discretion) at no extra cost to the customer and it will then be returned to him freight prepaid.

***N. B. FCC RULES & WARRANTY ONLY APPLY TO THE U.S.A.
THIS PAGE SHOULD BE DISREGARDED IN ANY OTHER COUNTRY AND
PLEASE REFER TO LOCAL CONSUMER PROTECTION LEGISLATION
CONCERNING WARRANTY RIGHTS.***

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A. INTRODUCTION

AD-8116 COMPACT PRINTER is a technologically advanced product designed to be used with A & D electronic balances, counting balances and with AD-4316 & AD-4321 weighing indicators. This printer contains a central processing unit (CPU) with resident read-only memory (ROM). Although obviously degraded components on the printed circuit board (PCB) can be individually replaced, it is recommended that most repairs should be limited to replacing either the entire PCB or the printer unit. Mechanical damage to the case, key-switches etc. may require the reassembly of an old printer in a new case or the replacing of individual components; for mechanical repairs see the exploded view and parts list.

Please note that before this printer can be connected to A & D instruments, an RS-232C interface must be installed. The printer is supplied with an appropriate cable and connector for connection to A & D's RS-232C I/O port.

AD-8116 FEATURES

1. Portability, this printer is exceptionally compact and light.
2. Statistical calculations as well as normal weight or quantity data printing.
3. Compatible with RS-232C interfacing standards.
4. Alphanumerical print-out.
5. Switch selectable automatic and manual printing.

B. SPECIFICATIONS

PRINTER TYPE: Thermal dot-matrix

FONT: 5 x 7 dots

CHARACTERS: 2mm (H), 16 characters per line.

SPEED: Approx. 1 line per second.

PAPER TYPE & SIZE: Thermal roll paper; 38mm wide, 65µm thick, 10 metres long, max. roll diameter 2.8cm.

MACHINE HEAD LIFE: 500,000 lines.

OPERATING TEMPERATURE RANGE: 0→+40°C (32→104°F)

STORAGE TEMPERATURE RANGE: -10→+60°C (14→140°F)

DIMENSIONS: 94 (W) x 160 (D) x 34 (H) mm / 3.7" x 6.3" x 1.3"

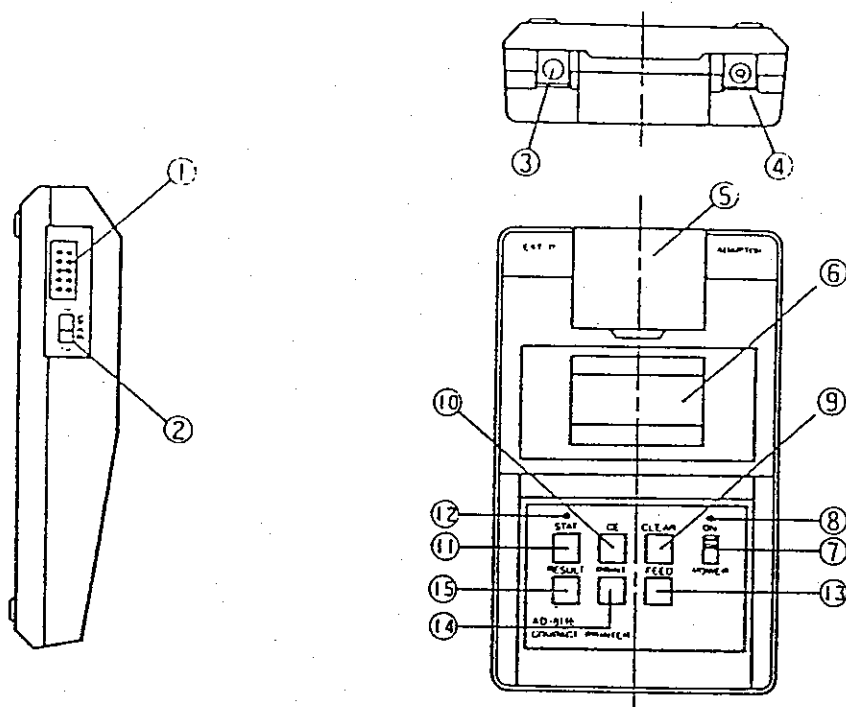
WEIGHT: 250g (8.8oz)

POWER REQUIREMENTS: 100/115/220/240V AC, 50/60Hz, converted to 9V DC @ 800mA.

INTERFACE MODE: RS-232C with A & D standards

STANDARD ACCESSORIES: AC to DC adaptor, printing paper (2 rolls), interface cable (KO:256) and instruction manual.

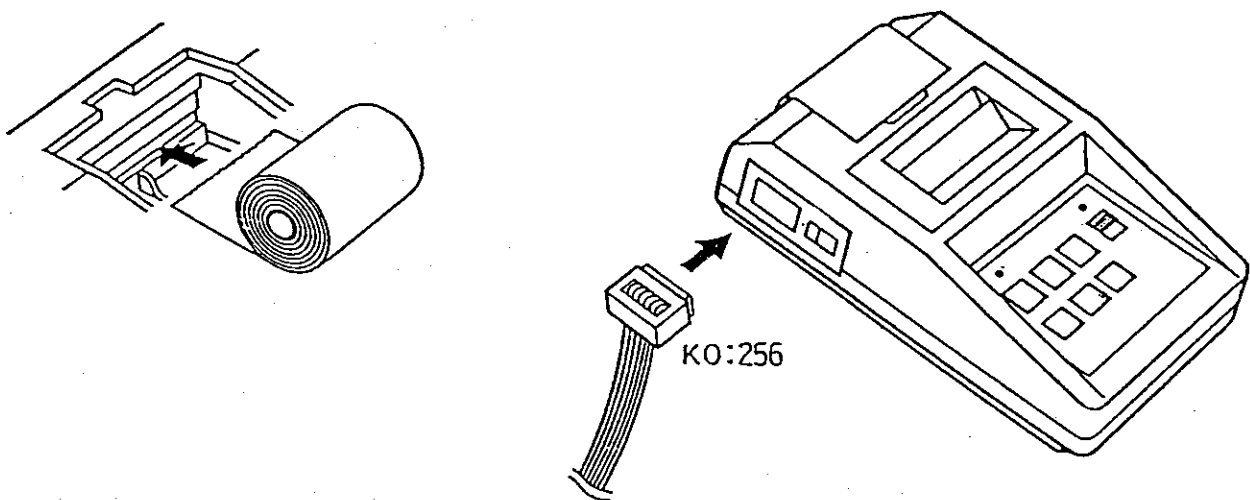
C. DESCRIPTION



- 1) DATA INPUT SOCKET (for KO:256)
- 2) MODE SWITCH
- 3) EXT. P. (remote control socket for external print commands)
- 4) ADAPTOR. (DC input socket)
- 5) PAPER HOLDER COVER
- 6) PAPER CUTTER
- 7) POWER SWITCH
- 8) POWER ON PILOT LAMP
- 9) CLEAR KEY (clear statistics from memory)
- 10) CE KEY (cancel last entry)
- 11) STAT KEY (statistics mode selection---weight or quantity)
- 12) STATISTICS PILOT LAMP (green=weight data and red=quantity data)
- 13) FEED KEY (paper feed)
- 14) PRINT KEY
- 15) RESULT KEY (for statistical calculations; press once for number & total and press twice for max. , min. , data average and standard deviation data).

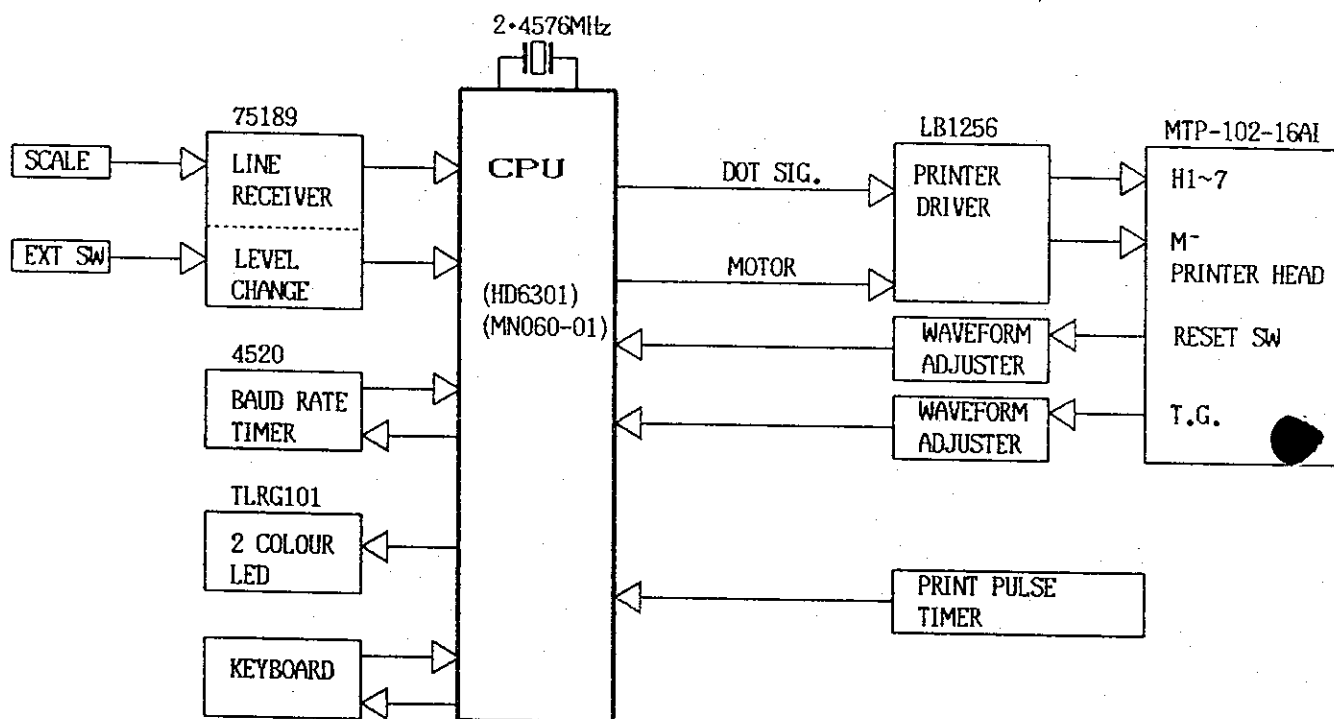
D. INSTALLATION

- 1) Plug in the AC to DC adaptor and plug the DC output into the printer socket.
- 2) Switch on and make sure that the red power lamp is on.
- 3) To load the printer with paper, first make sure that the end to be fed into the printer has a straight cut at right angles to the edge.
- 4) Gently insert the end of the roll of paper into the paper input slot while pressing the paper feed key.
- 5) After the printer has taken up the paper, place the roll in the paper holder and close the paper holder cover.
- 6) Switch off power.
- 7) Make sure that the RS-232C interface card is set to 2,400 baud and (depending upon which balance or indicator you are operating) stream mode or keyboard print control mode.
- 8) Connect the KO:256 cable between the RS-232C interface I/O port and printer.



- 9) Selection of Mode 1: Printer will print all data but if the weighing system is in motion it will only print "*".
STREAM/KEYBOARD PRINT MODE: EXY-N series, ET-300A, EY-300A/3000A
STREAM MODE: EX-A, EY-A, ER-A model ranges (in order to print final data rather than continuous data, the balance should be in auto-print mode).
- 10) Selection of Mode 2: Printer will print only when the AD-8116 print key is pressed but if the weighing system is in motion it will print "*".
STREAM MODE: EW-A, EV-A, EZ-A, EZ-N series, AD-4316, AD-4321.
STREAM MODE/BALANCE MODE SW. =NORMAL: EX-A, EY-A, ER-A series.

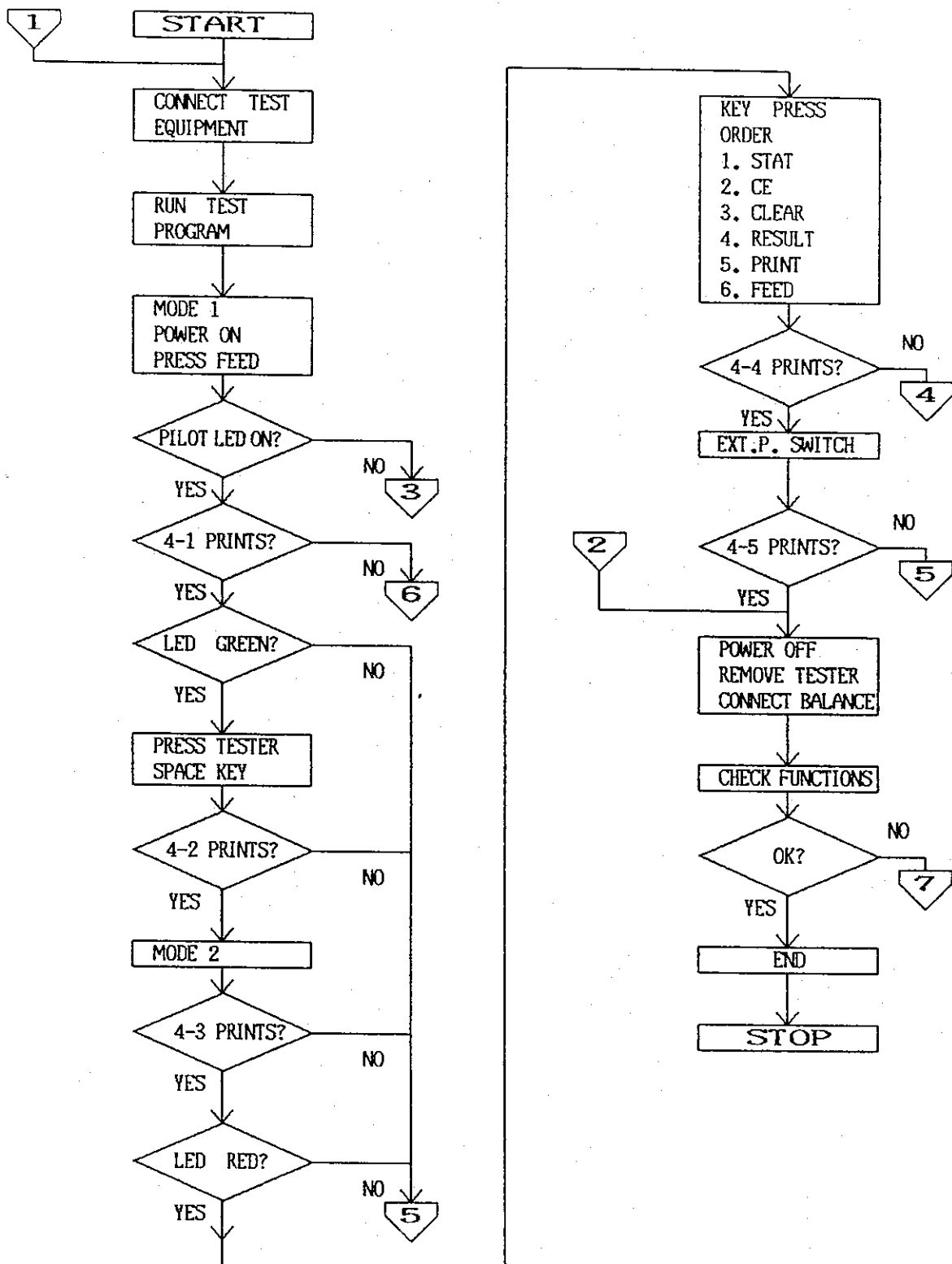
E. BLOCK DIAGRAM

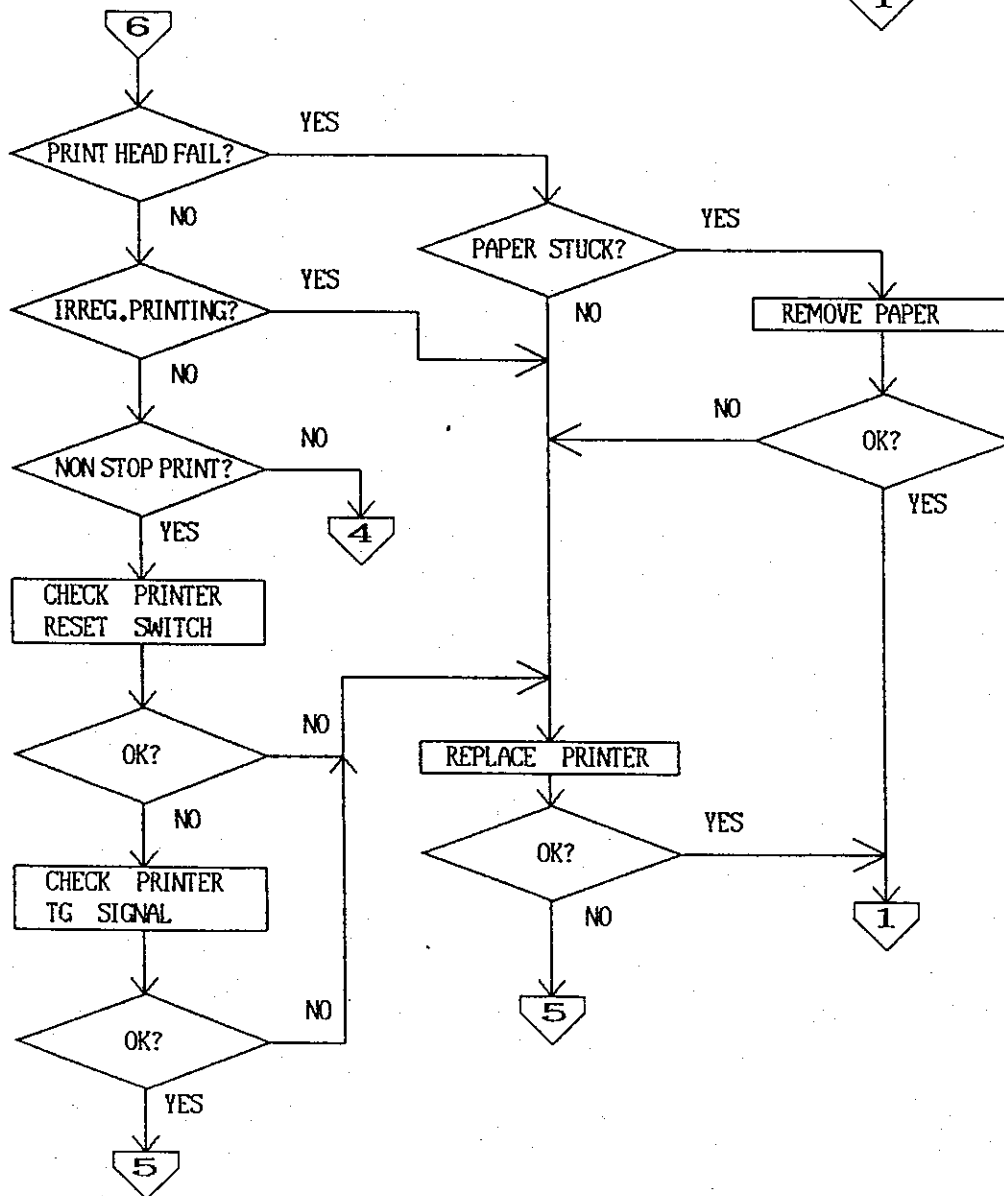
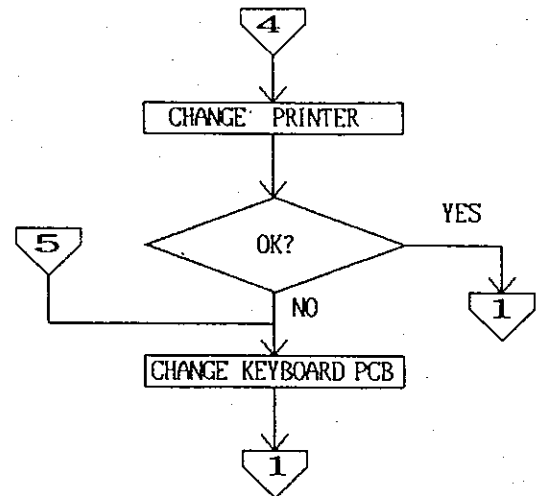
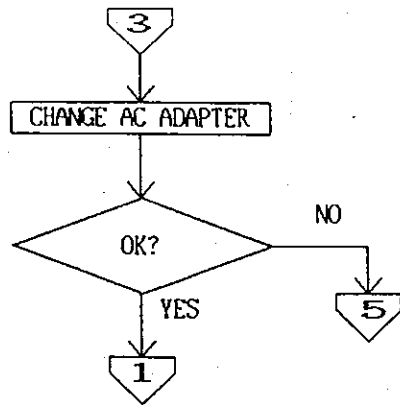


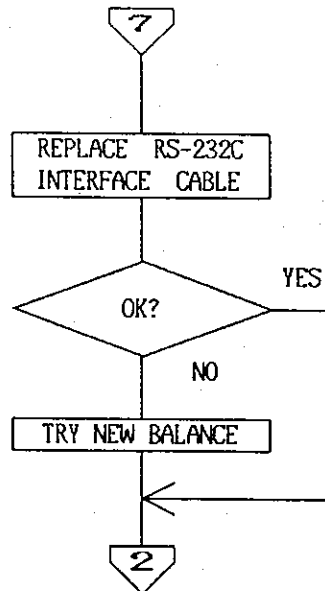
F. TROUBLE-SHOOTING

SYMPTOM	POSSIBLE CAUSES
NO POWER	CHECK AC ADAPTOR IS FUNCTIONING, FUSES ETC. ONLY USE THE ADAPTER SUPPLIED WITH THE PRINTER. CHECK AC INPUT/DC OUTPUT VOLTAGE IS CORRECT. CHECK AC & DC POWER CABLES AND PLUGS/SOCKETS.
NO PRINTING	CHECK RS-232C CABLE AND CONNECTORS. CHECK INTERFACE SET TO STREAM MODE AT 2400BAUD. CHECK BALANCE MODE SW/PRINTER MODE SW CORRECT.
RANDOM PRINTING	CHECK BAUD RATE & TRANSMISSION MODE.
*C ERROR PRINTED	PROBABLY INCORRECT BAUD RATE SETTING.

G. TESTING PCB AND PRINTER







PRINTER TEST PRINT-OUTS (SEE THE FLOW CHART ON PAGE 6)

4-1

```

**PRINTER TEST**
!*"#$%&'()*+,-./
0123456789:;<=>?
@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_
`abcdefghijklmno
pqrstuvwxyz{|}~

**COM.I/F TEST**
  
```

4-2

RS-232C - OK

4-3

SWITCH TEST

4-4

```

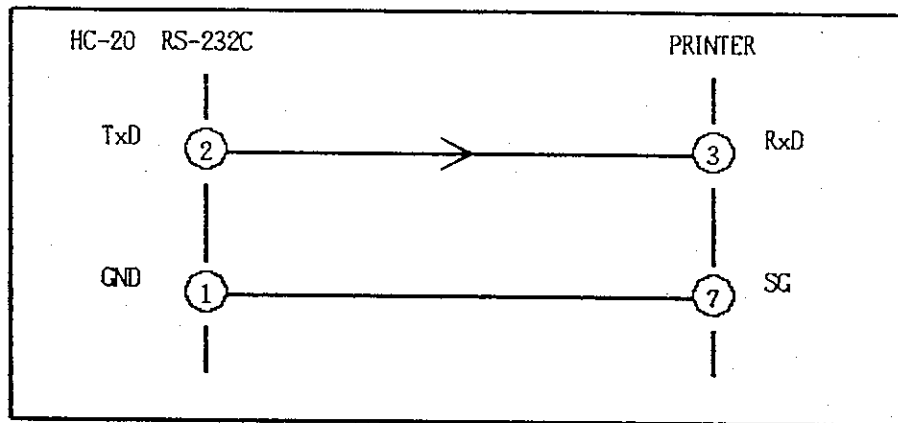
\STAT - OK
\CE - OK
\CL - OK
\RESULT - OK
\PRINT - OK
\FEED - OK
  
```

4-5

\EXT.P. - OK

CONNECTING THE TESTER

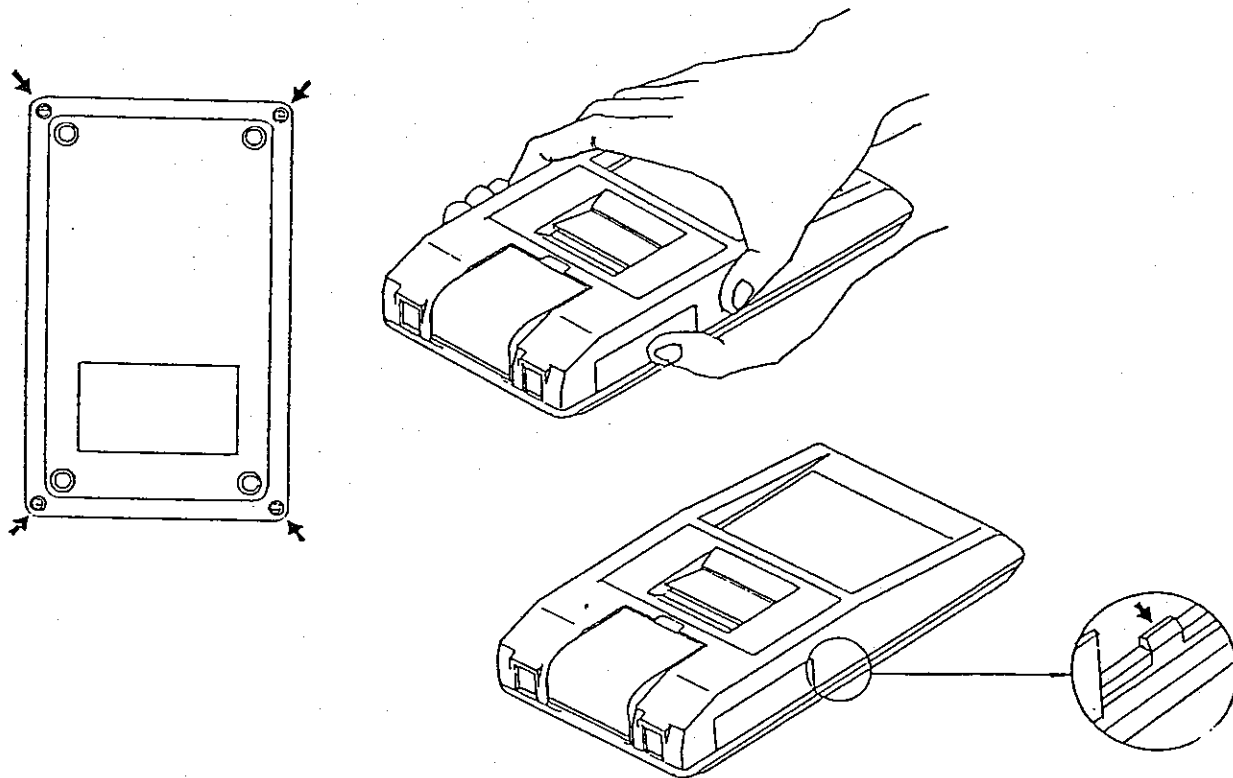
The tester can be a custom made unit or a computer such as the EPSON HC-20; in which case you should connect the computer TxD output line to the printer RxD input line. The compact printer connector should be a 3473-6500SC or equivalent. See below for connections and an HC-20 Microsoft BASIC program.




```
100 OPEN"O",#1,"COM0:(57E1F)"
110 FOR I=1 TO, 200:NEXT I
120 CLS
130 LOCATE 0,1
140 PRINT" START=SPACE KEY"
150 IF INKEY$<>" " THEN 150
160 PRINT#1," RS-232C-OK"
170 FOR I=1 TO 500:NEXT I
180 GOTO 150
190 END
```

OPENING THE CASE

Power off and remove the AC/DC adaptor plug. Turn the printer up-side-down and remove the four cross headed screws indicated in the diagram. Turn the printer the right way up and, while holding level, gently unclip first the left and then right hand side panel clips. Any screws which were previously "locked" with paint should be relocked during reassembly.



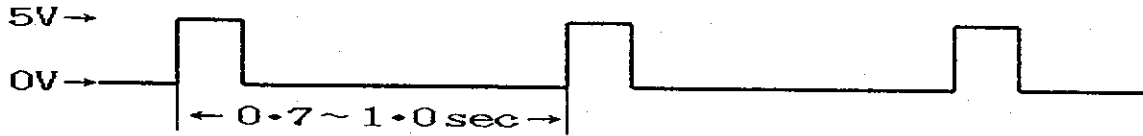
If the rubber keyboard mat stuck to the upper half of the case has perished, replace with a new mat after cleaning off any old rubber still adhering to it with alcohol. Small drops of fresh flexible rubber glue should be placed on the keyboard location pins. → 

Take care when you re-assemble the printer that nothing (like a component) is protruding into the space between the gold plated contacts and rubber keyboard mat. The gold plated contacts may be cleaned with alcohol or methylated spirits. If you wish to test the RESET SW and TG signals with an oscilloscope, place a rubber keyboard mat on the gold plated contacts, check that no liquid or metal object is likely to cause a short circuit now that the case is open and reconnect the power cable/switch on.

CHECKING THE RESET SW AND TG SIGNALS

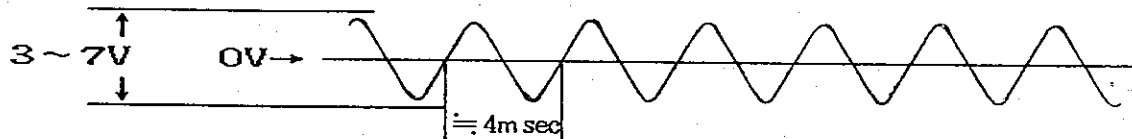
1. RESET SW SIGNAL

The signal waveform should be as below when the motor is running and the oscilloscope is connected to GND and point (A) on the diagram.

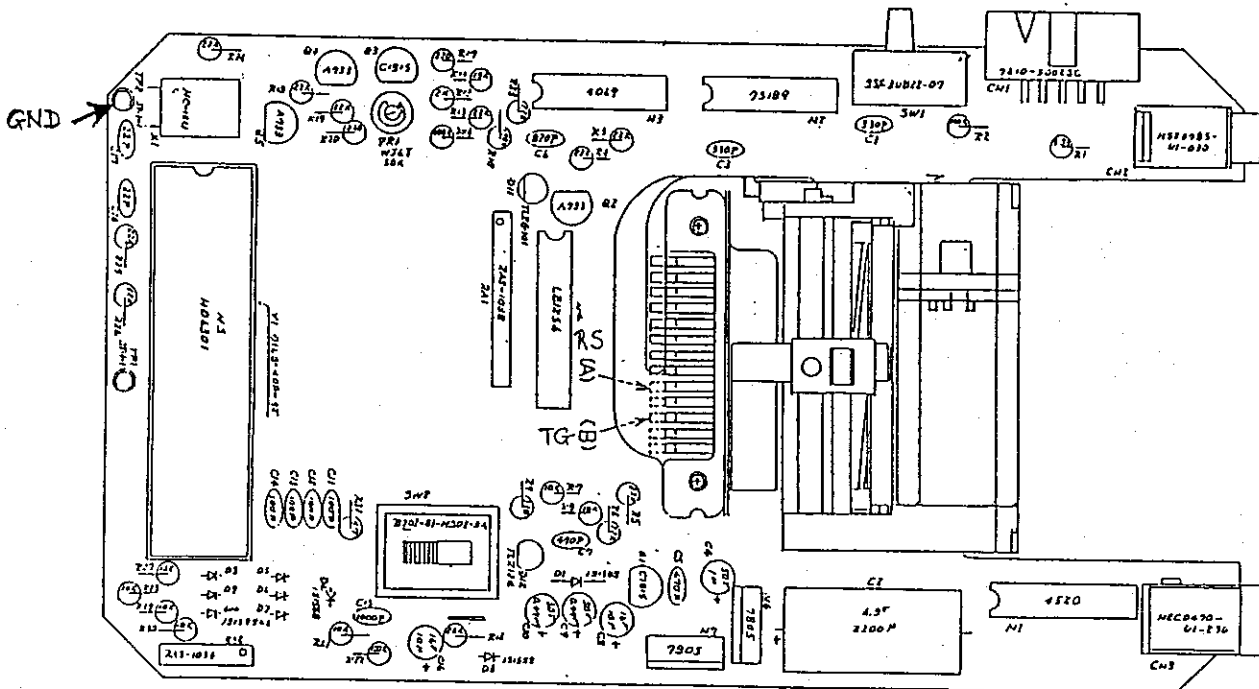


2. TG SIGNAL

The timing signal waveform from the motor should be as below when the motor is running and the oscilloscope is connected to GND and point (B).



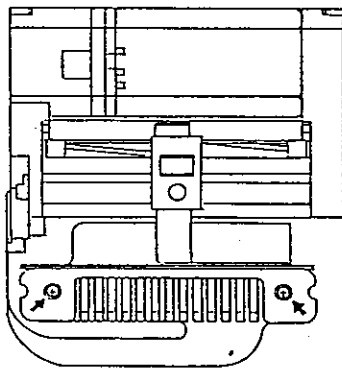
If the motor is running too fast the period will be less, too slow = longer.



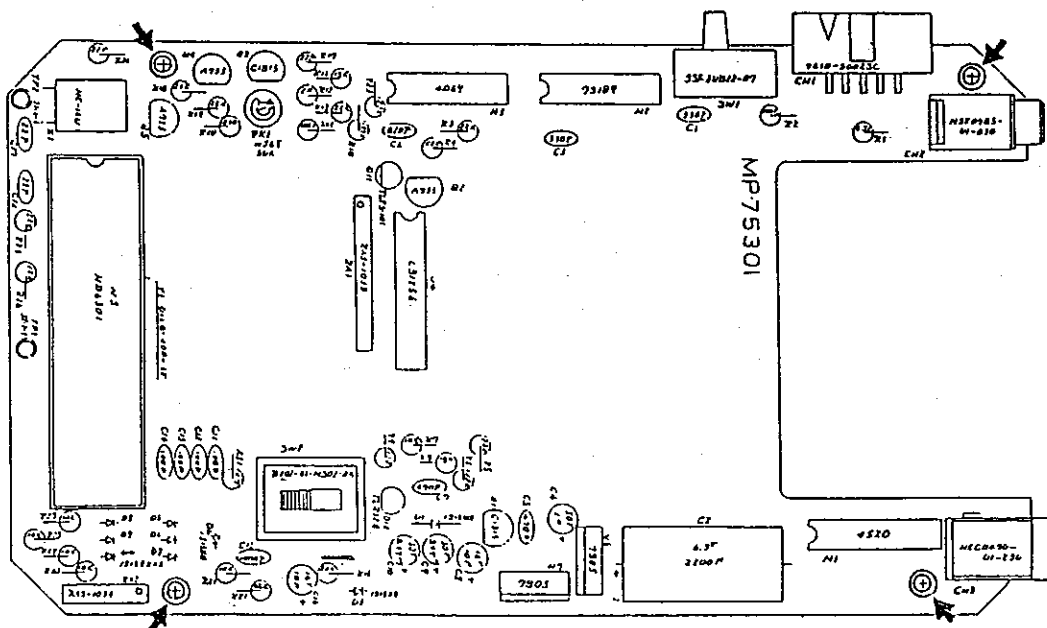
H. REPLACING PCB OR PRINTER

DISASSEMBLY (ASSEMBLE IN REVERSE ORDER)

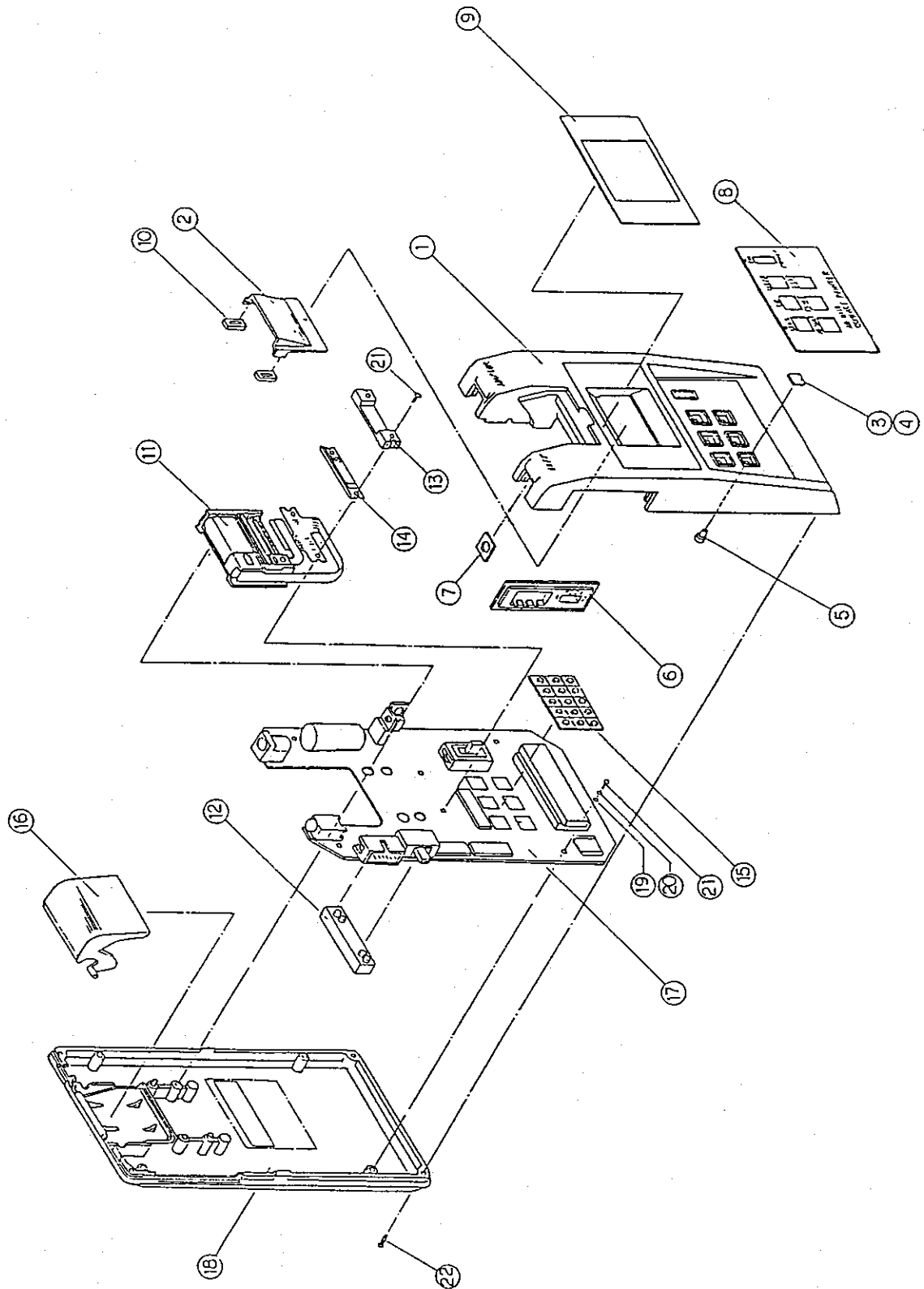
1. Switch the power off and remove the adaptor cable.
2. Open the case as previously described and prepare an anti-static mat for the printed circuit board to be placed upon.
3. Unscrew the two screws on either side of the flexible printed circuit (FPC) ribbon cable contact comb. Remove the comb and frame in order to release the FPC from the main board. Please be very careful about the way you handle the flexible printed circuit because it is not very strong and can be damaged easily.
4. Now that the printer is no longer attached to the PCB by its cable you may carefully remove the printer by easing it off its location pins. Replace the printer or, if the PCB needs to be replaced, proceed to step 5.



5. Remove the main printed circuit board by unscrewing the four screws indicated in the diagram.
6. Carefully remove the PCB and place it on the anti-static mat for repair or replace the entire board. After repair or replacing parts check/adjust the printing pulse standard clock adjustment (details later).



EXPLODED VIEW



PARTS LIST

FIG. N°	PART NAME	PART N°	Q ^{TY}	COST ¥
1	UPPER HALF OF CASE	ET:542542B	1	
2	PAPER CUTTER	ET:541457	1	
3	RED SWITCH CAP	ET:525210A	1	
4	BLUE SWITCH CAPS	ET:525210B	5	
5	SWITCH BUTTONS	ET:542554	6	
6	SPACER	ET:542555	1	
7	JACK FACIA	ET:542556	1	
8	KEYBOARD FACIA	ET:544446	1	
9	PRINTER FACIA	ET:544447	1	
10	CUTTER CLIPS	ET:541489	2	
11	PRINTER	ET:527792	1	
12	FPC FRAME (MALE)	ET:542019	1	
13	FPC FRAME (FEMALE)	ET:542020	1	
14	FPC SPRING COMB	ET:542021	1	
15	RUBBER KEYBOARD MAT	ET:527972	1	
16	PAPER COVER	ET:541458	1	
17	PRINTER KEYBOARD	ET:937383	1	
18	LOWER HALF OF CASE	ET:542541B	1	
19	WASHERS		4	
20	SPRING WASHERS		4	
21	M 2 X 6 SCREWS		6	
22	M 3 X 8 SCREWS		4	

*N. B. ANY COSTS QUOTED WILL BE "ONE-OFF" UNIT PRICES.
 ALL PRICES ARE IN JAPANESE YEN (¥).
 ALL PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.*

PRINTING PULSE STANDARD CLOCK ADJUSTMENT

1. Environmental Conditions.

Temperature: 20~30°C (68~86°F) but if outside this range use the following compensation formula where "Ta" = °C outside temperature range and "K" = Compensation for temperature in μ secs. viz. $T = -0.5 (Ta - 25) + K (\mu s)$.

Humidity: 40~80% relative humidity.

2. Equipment.

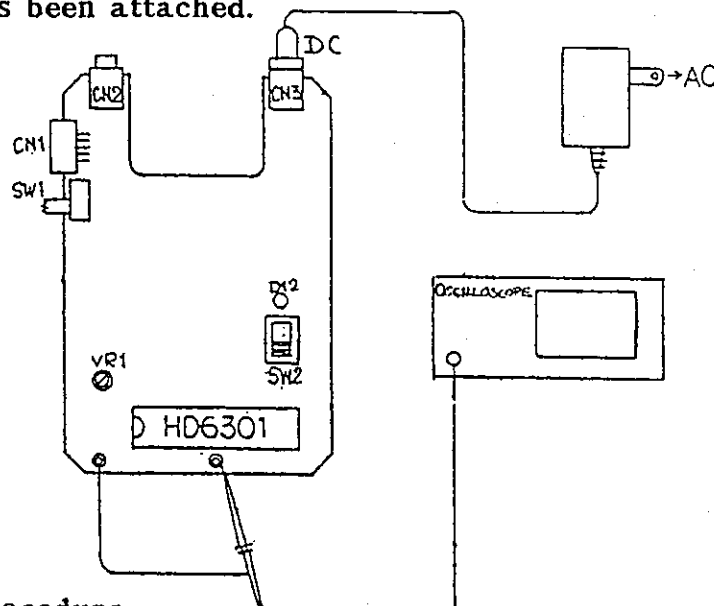
Printer and the correct 9V DC / 800mA adaptor.

20MHz Oscilloscope.

One insulated flat head trimming screwdriver.

3. Connection diagram.

The printer should not be connected to the PCB and the power switch SW2 should be OFF before you attach the oscilloscope. Switch ON power after the oscilloscope has been attached.



4. Adjustment Procedure

Printing pulse standard clock adjustment must be set to match the head rank of the printer. Adjustment is carried out via the VR1 trimmer which should be paint locked after adjustment has been completed.

HEAD RANK	ADJUSTMENT	TOLERANCE
A	64.0 μ s	$\pm 5\%$
B	58.5 μ s	$\pm 5\%$
C	53.0 μ s	$\pm 5\%$

