



**CDU 150 CT 531/3**

**OSCILLOSCOPE**

**6625-99-223-1190**

**HANDBOOK**

**ISSUE 2**

COSSOR ELECTRONICS LIMITED

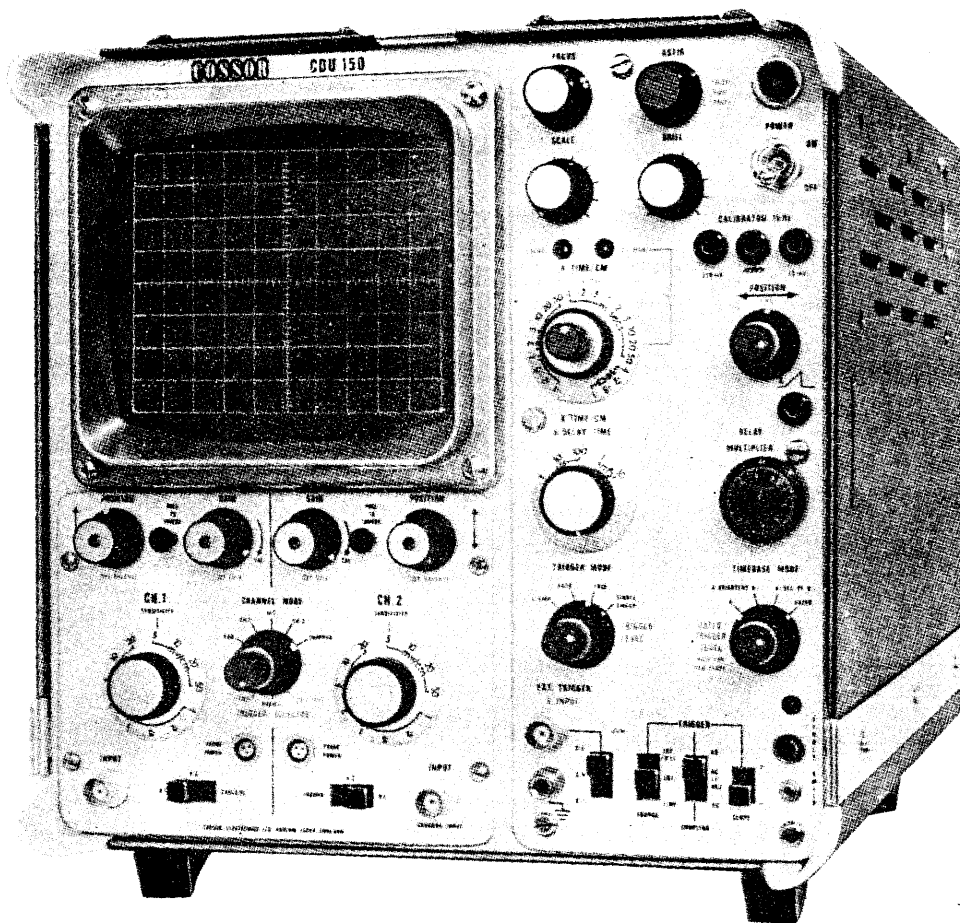
THE PINNACLES · ELIZABETH WAY · HARLOW · ESSEX · CM19 5BB · ENGLAND

Telephone: Harlow 26862 Telex: 81228

Cables: Cossor Harlow England

Printed in England

*A subsidiary of A.C. COSSOR LTD. and of RAYTHEON COMPANY U.S.A.*



COSSOR OSCILLOSCOPE  
CDU150 CT53/3



CDU150-CT531/3  
OSCILLOSCOPE

CDU150-CT531/3

OSCILLOSCOPE

LIST OF CONTENTS

INTRODUCTION

Oscilloscope, accessories and options

SECTION 1

Data Summary and Characteristics

SECTION 2

Description of Controls

SECTION 3

Operation

SECTION 4

Maintenance

SECTION 5

Layouts, Component Lists and Circuit Diagrams  
Guarantee of Instruments  
Spares and Service

LIST OF ILLUSTRATIONS

CDU150-CT531/3 Oscilloscope	Frontispiece
Controls on Front Panel	Fig.2.1
Block Diagrams, Deflection Modes	Fig.3.1
Block Diagrams, Timebase Modes	Fig.3.2
Calibration adjustments	Fig.4.1

	LAYOUT	CIRCUIT	CIRCUIT REF.
Main Frame Assembly	5.1	-	K
X Amplifier and Timebase Assy	5.2	-	K
Low Voltage Power Supplies	5.3	5.4	A
EHT and Blanking Circuits	5.5	5.6	B
Trigger Circuits	5.7	5.8	C
'B' Timebase Comparator and Auto	5.9	5.10	D
'A' Timebase and Single Shot	5.11	5.12	E
X-Amplifier and Calibrator	5.13	5.14	F
Y Output Amplifier	5.15	5.16	G
Y Preamplifier and Switching	5.17	5.18	H
Y Attenuators	5.19	5.20	J
Timebase Modes and Trigger Mode Switches	-	5.21	-
Power Supplies: Interconnections	-	5.22	-

## INTRODUCTION

THIS HANDBOOK describes an oscilloscope and accessories listed below:

OSCILLOSCOPE

CDU150-CT531/3 comprising:

1 Oscilloscope	D/GA80490	6625-99-223-1190
1 Mains Lead		
1 Plug (for single sweep)		
1 Handbook		

ACCESSORIES, not included with the above:

D/GA80491 Panel Protection Cover and Accessories,

including:	2 - Fuses 2A	A912423/17
	2 - Fuses 1A	KS92497/11
	3 - Fuses 500mA	KS92497/19
	1 - Fuse 250mA	KS92497/12
	1 - Viewing Hood	C73176
	1 - Polarized Viewer	C73127
	1 - Camera Adaptor Plate	C73100
	2 - 10:1 Probe Kits	C73166
	2 - 50 $\Omega$ Terminations	A73167

OPTIONS

The undermentioned options can be supplied if specified at the time of ordering.

OPT.01	'B' Timebase 2ms/cm instead of 1ms/cm.
OPT.02	CRT with P7 Phosphor (Part No.B913054) instead of P31.
OPT.03	A mains lead (Part No.B73333) with American flat-pin moulded rubber plug instead of the standard lead.

- OPT.04 'B' Timebase, 100ms/cm instead of 10ms/cm
  - OPT.05 'B' Timebase additional 20ms/cm and 50ms/cm ranges
  - OPT.06 Front panel GATE OUT instead of SWEEP OUT
  - OPT.07 'B' Timebase 100ms/cm instead of 1 $\mu$ s/cm
  - OPT.08 'B' Timebase 20ms/cm instead of 10ms/cm
  - OPT.09 Variable 'B' sweep
  - OPT.10 Ch.1 ground position instead of cascade
- N.B. Only one timebase option can be supplied, but this may be combined with any other option(s) if required.

CDU150 - CT531/3

OSCILLOSCOPE

SECTION 1

DATA SUMMARY AND CHARACTERISTICS

The CDU 150-CT531/3 is a solid-state general purpose oscilloscope featuring:

Bandwidth DC to 35MHz at 5mV/cm - dual channel

High brightness display (8 x 10cm)

Full delayed timebase with gated mode

Measuring accuracy,  $\pm 3\%$  'X' & 'Y' on all ranges.

VERTICAL DEFLECTION SYSTEM (two identical channels)

Sensitivity	5mV/cm to 20V/cm in 12 steps with 1-2-5 sequence. A variable gain control covers between steps and increases the range to 50V/cm
Bandwidth	D.C. to 35MHz (-3dB) A.C. 2Hz to 35MHz (-3dB) 0.2Hz to 35MHz (-3dB) with X10 probe.
Rise Time	10ns $\pm$ 2ns
Input impedance	1M $\Omega$ $\pm$ 10% shunted by 25pF $\pm$ 1pF.
Max. Input Voltage	$\pm$ 600V peak (combined D.C. & A.C.)
Measuring Accuracy	$\pm 3\%$
Display Modes	Channel 1 only Channel 2 only Channels 1 & 2 (alternate sweeps) Chopped (500KHz) nominal Channels 1 & 2 added algebraically (either channel may be inverted)



## DATA SUMMARY &amp; CHARACTERISTICS

Signal Delay Line	180ns nominal
Cascade	Channels 1 & 2 cascaded internally to give a sensitivity of 1mV/cm ( $\pm 3\%$ ). Bandwidth, 2.5Hz to 8MHz ( $-3\text{dB}$ )
X Y Mode	Channel 2 input and attenuator can be switched to provide calibrated 'X' amplifier sensitivities of 5mV/cm to 20V/cm, $\pm 3\%$ . Bandwidth D.C. to 3MHz ( $-3\text{dB}$ )
Internal Trigger	Normal, Channel 1 or channel 2
Invert Facility	Both channels

HORIZONTAL DEFLECTION SYSTEM

Timebase 'A' Sweep Range	0.1 $\mu\text{s/cm}$ to 1s/cm in 22 steps with 1-2-5 sequence. Accuracy $\pm 3\%$ . A variable control gives complete coverage and extends the range to 2.5s/cm. A front panel lamp indicates uncalibrated sweep rates.
Timebase 'B' Sweep Range	1.0 $\mu\text{s/cm}$ to 10ms/cm in decade steps. Accuracy $\pm 3\%$ . A ten-turn multiplier controls delay time to within $\pm 1\%$ of the selected range. Jitter better than 1 part in 20,000.
Timebase 'A' Sweep Modes	Auto, triggered or single shot (armed).
Timebase 'B' Sweep Modes	Triggered
X5 Magnifier	Increases all sweep speeds by a factor of 5; i.e. extends fastest sweep Timebase 'A' to 20ns/cm and Timebase 'B' to 0.2 $\mu\text{s/cm}$ . Overall timebase accuracy, with magnifier in use, $\pm 3\%$ . A front panel lamp indicates magnifier in operation.

DATA SUMMARY & CHARACTERISTICS

Timebase Modes	'A' 'A' brightens 'B' 'A' delayed by 'B' 'A' delayed by 'B' Gated. Separate slope switch and trigger level control incorporated.
Sweep Out	Timebase 'A' sawtooth, d.c. coupled; amplitude 10V minimum into 10K $\Omega$ .
Trigger Source	Internal, External or Line
Trigger Requirements	Internal: 2mm at D.C. rising to 1cm at 35MHz External: 200mV p-p at D.C. rising to 1V at 35MHz.
Trigger Level	Internal: positive or negative slope, variable over full 8cm C.R.T. display height. External: positive or negative slope, variable over +20V to -20V.
Trigger Coupling	A.C., A.C. with LF reject, or D.C.
Automatic Triggering	Timebase free runs to give bright display until a vertical signal of 1cm appears on C.R.T., timebase then triggers automatically.
X Amplifier	Sensitivities: 100mV/cm, 200mV/cm, 500mV/cm, 1V/cm and 5V/cm. Accuracy $\pm 3\%$ . Input impedance: 1M $\Omega \pm 1\%$ shunted by 25pF Bandwidth: D.C. to 3MHz, or A.C. 2Hz to 3MHz
Cathode Ray Tube	Display area 8cm X 10cm. Single gun P.D.A tube with 12kV overall accelerating potential. Direct access to C.R.T. plates.

## DATA SUMMARY &amp; CHARACTERISTICS

Brightness Modulation	A.C. coupled and requires 10V for visible modulation of the trace.
Graticule	Illuminated, and light filter provided.
Beam Finder	Overrides brilliance, vertical and horizontal shift control to bring bright trace onto C.R.T. face.
Calibrator	1KHz square wave; amplitude 25mV and 250mV p-p. Accuracy (frequency and amplitude) $\pm 1\%$
Power Requirements	100V-120V $\pm 6\%$ or 200V-250V $\pm 6\%$ , 45 to 440Hz, consumption 110VA.
Size	10in (26cm) wide, 10 in (26cm) high, and 16in (41cm) deep overall, including protection lugs.
Weight	27lb (12.5kg) approx.
Environmental	Designed to meet REMC/20/FR Cat.3 Issue 4 (General Requirements for Joint Service Electronic and Electrical Test Equipment), i.e. relevant clauses for Defence Spec. DEF133 Working Temperature Range: $-10^{\circ}\text{C}$ to $+55^{\circ}\text{C}$ Accuracy: $\pm 5\%$ at extremes of range, $\pm 3\%$ from $+10^{\circ}\text{C}$ to $+30^{\circ}\text{C}$ Storage Temperature Range: $-40^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ .

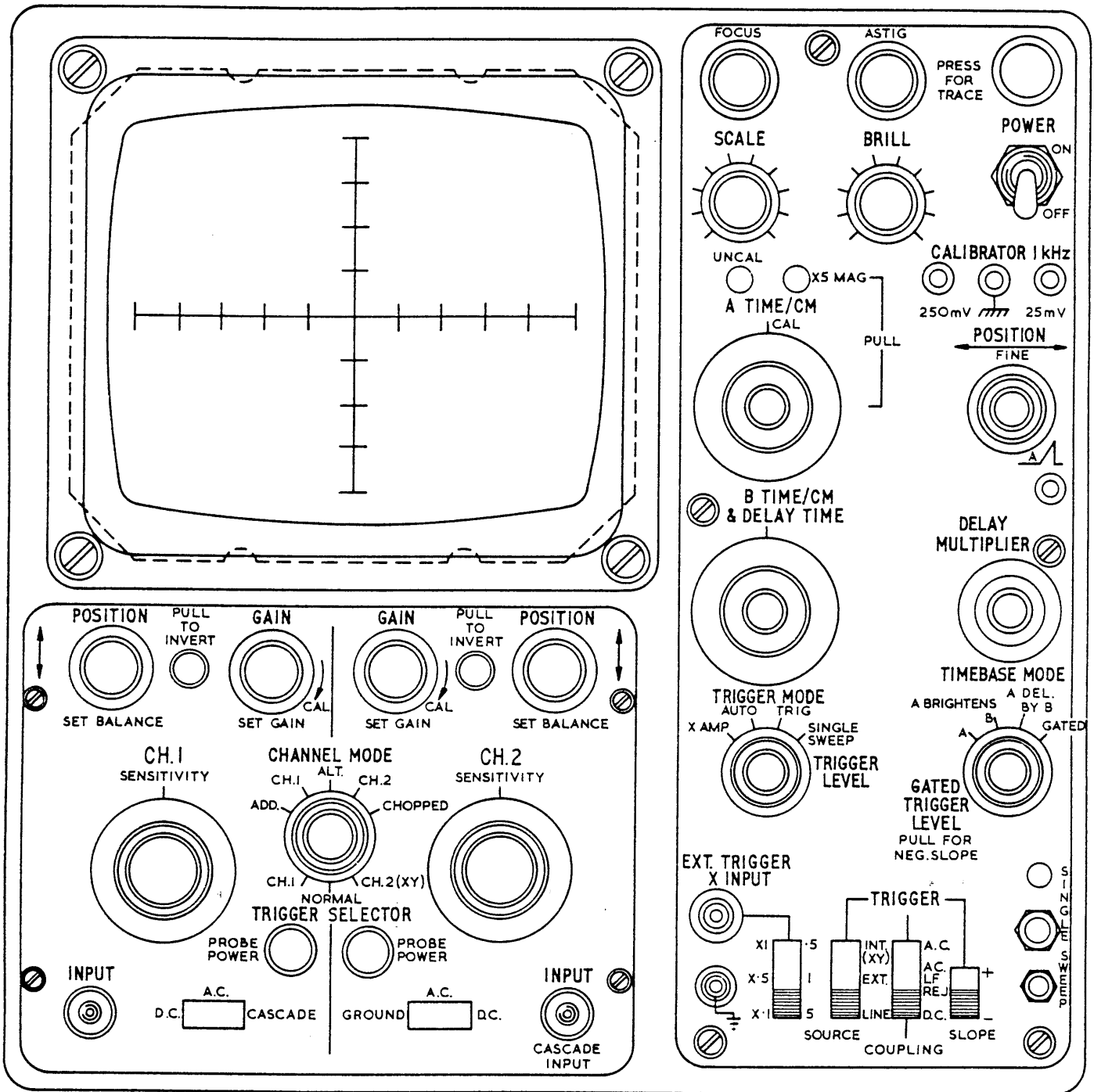


FIG. 2.1

CONTROLS ON FRONT PANEL

CDU150-CT531/3

OSCILLOSCOPE

CDU150-CT531/3

OSCILLOSCOPE

SECTION 2

DESCRIPTION OF CONTROLS

DUAL-CHANNEL VERTICAL DEFLECTION SYSTEM

The dual-channel vertical deflection system permits two waveforms of amplitude not greater than 600V to be displayed either singly or simultaneously. The input impedance is  $1M\Omega$  in parallel with 25pF.

INPUTS

CH1	BNC connector for Channel 1 deflection signals, or Y axis deflection signals using X-Y mode.
CH2 (CASCADE)	BNC connector for Channel 2 deflection signals, X axis deflection signals using X-Y mode or the input when using CASCADE.

CONTROLS

INPUT (Coupling)

AC	couples the input via a capacitor, blocking any d.c. component present in the input signal.
DC	couples all components of the input signal to the input amplifier.
GROUND	grounds the input of CH2 input amplifier and disconnects the input signal
CASCADE	couples the output of CH2 preamplifier to CH1 input.

SENSITIVITY

determines the input amplitude required to give 1cm vertical deflection providing the GAIN control is in the CAL position.

GAIN

Provides continuous adjustment of sensitivity between the calibrated positions of the SENSITIVITY switch.

## DESCRIPTION OF CONTROLS

<u>CAL</u>	Position of GAIN control which gives calibrated sensitivity.
<u>SET GAIN</u>	Screwdriver adjustment to align the amplifier gain with the SENSITIVITY setting.
<u>POSITION</u>	Controls the vertical position of the display
<u>SET BALANCE</u>	Screwdriver adjustment to minimize vertical shift of the display when the GAIN control is varied.
<u>PULL TO INVERT</u>	
In	positive input gives upward deflection
Out	positive input gives downward deflection
<u>CHANNEL MODE</u>	
CH1	Channel 1 input displayed
CH2	Channel 2 input displayed
ALT	Channel 1 and Channel 2 inputs displayed on alternate sweeps
CHOPPED	Channel 1 and Channel 2 inputs displayed on the same sweep by switching between channels at approximately 500 kHz
ADD	the algebraic sum of Channel 1 and Channel 2 inputs is displayed. The algebraic difference is obtained by inverting either channel (PULL TO INVERT)

TRIGGER SELECTOR

Selects the source of internal triggering; also selects the source of the X signal when using the X-Y mode.

## DESCRIPTION OF CONTROLS

CH1	horizontal sweep circuits triggered only from CH1
NORMAL	each sweep is triggered from the waveform it displays.
CH2 (XY)	horizontal sweep circuits triggered only from CH2 input signal. <u>NOTE:</u> When using the X-Y mode, CH2 input is connected to the horizontal deflection amplifier.
<u>PROBE POWER</u>	provides power supplies for an active probe.

HORIZONTAL DEFLECTION SYSTEM

The horizontal deflection system is capable of producing two linear timebases, A and B. The main timebase A, is used either in the single timebase mode, or delayed by means of the other timebase B. Control settings determine whether the A timebase triggers immediately after the delay period or is primed (GATED) to trigger from the next input signal after the delay period. The unit also provides for internal or external triggering of the timebases together with single sweep operation of the A timebase. The horizontal deflection amplifier may also be used as the X axis for X-Y operation.

CONTROLS

<u>FOCUS</u>	provides optimum display definition
<u>ASTIG/PRESS FOR TRACE</u>	provides optimum display definition when used in conjunction with the FOCUS control. PRESS FOR TRACE operates the beam finder switch and brings the display within the area of the graticule irrespective of the POSITION and BRILL controls and of the nature of the input signal.

## DESCRIPTION OF CONTROLS

<u>SCALE</u>	controls graticule illumination
<u>BRILL</u>	controls display brightness
<u>POWER ON/OFF</u>	switches power to the instrument (adjacent neon indicator).
<u>CALIBRATOR</u>	sockets provide 25mV and 250mV 1KHz square wave, accurate to $\pm 1\%$ amplitude and frequency for calibration purposes.
<u>POSITION</u>	concentric controls for coarse and fine adjustment of the horizontal position of the display
<u>A TIME/CM</u>	selects the sweep rate of the A timebase to give 1cm of horizontal deflection, providing that the concentric variable control is in the CAL position. The variable control provides continuous adjustment of the A timebase sweep rate between the calibrated positions of the A TIME/CM switch. Pulling out the variable control increases the gain of the horizontal deflection amplifier 5 times increasing the sweep rates of the A or B timebases accordingly, and producing a corresponding increase in X axis sensitivity when operated in the X-Y mode.
<u>UNCAL Neon</u>	indicates that the A variable control is not in the CAL position.
<u>X5 MAG neon</u>	indicates that the horizontal deflection is 5 times magnified.
<u>B TIME/CM &amp; DELAY TIME</u>	selects the sweep rate of the B timebase and in conjunction with the DELAY MULTIPLIER, the delay time.



DESCRIPTION OF CONTROLS

DELAY MULTIPLIER



provides variable sweep delay between 0.5 and 10.5 times the delay time indicated on the B TIME/CM & DELAY TIME switch.

socket provides the sawtooth waveform of the A timebase.

TRIGGER MODE

X AMP

routes the internal or external X input signals to the horizontal deflection amplifier.

AUTO

displays the A timebase as a free-running trace in the absence of a trigger signal. An internal trigger signal resulting from a vertical display of 1 cm or greater will trigger the A timebase at a preset level.

TRIG

routes the internal or external trigger signals to either the A or B timebase as determined by the TIMEBASE MODE switch

SINGLE SWEEP

permits a single sweep of the triggered A timebase. A further display cannot occur until the SINGLE SWEEP push button is operated, or a short-circuit applied remotely through the jack.

TRIGGER LEVEL

concentric with the TRIGGER MODE switch. A continuously variable control which determines the point on the trigger signal at which the A or B timebase is triggered.

TIMEBASE MODE

A

horizontal deflection provided by the A timebase.

## DESCRIPTION OF CONTROLS

## A BRIGHTENS B

horizontal deflection provided by the B timebase, but having an intensified region on the display showing the position and duration of the A timebase (delayed sweep) with respect the B timebase (delaying sweep), its position being determined by the DELAY MULTIPLIER, and duration by A TIME/CM.

## A DEL BY B

horizontal deflection provided by the A timebase (delayed sweep) represented by the intensified region of the previous setting.

## GATED

horizontal deflection provided by the A timebase (delayed sweep) as for A DEL BY B, with the exception that the A timebase is triggered from the input signal waveform following the completion of the delay time.

GATED TRIGGER LEVEL

a continuously variable control which determines the point on the A timebase (delayed sweep) at which the timebase is triggered. With the GATED TRIGGER LEVEL pushed IN the timebase is triggered from a positive-going transition on the waveform, and with the control pulled OUT the timebase is triggered from a negative-going transition on the waveform.

EXT TRIGGER/X INPUT

BNC connector for external trigger or X input. Adjacent 3-position slider switch provides calibrated attenuation of the EXT TRIGGER input, and calibrated sensitivities for the X INPUT when used in the X-Y mode.

DESCRIPTION OF CONTROLS

TRIGGER SOURCE

INT (XY)

selects the source of the trigger or X axis signal.

selects the internal trigger signal from the vertical display unit, or the CH2 output as the X axis when used in the X-Y mode (TRIGGER SELECTOR at CH2 - XY)

EXT

selects the external trigger signal or the X input from the EXT TRIGGER/X INPUT socket.

LINE

selects a trigger signal derived from the a.c. power supply to the instrument.

TRIGGER COUPLING

AC

selects the method of coupling the trigger or X signals.

input coupled via a capacitor, blocking any d.c. component present. A.C. response -3dB at 20Hz

AC LF REJ

input coupled via a capacitor, blocking any d.c. component present. A.C. response -3dB at 1.6kHz

DC

accepts all components of the input signal.

TRIGGER SLOPE

determines whether the timebase selected is triggered from a positive-going or negative-going transition of the trigger signal waveform.

SINGLE SWEEP

used when operating the A timebase in the Single Sweep mode.

Push Button

primes the A timebase to trigger from the next input signal.

Neon

indicates that the A timebase is primed.

Jack

for remote operation, simulating the push-button operation.

## DESCRIPTION OF CONTROLS

<u>TOP LEFT HAND REAR CONTROLS</u>	(release chrome screw & lift hinged flap)
<u>GEOMETRY</u>	continuously variable control for overall orthogonal setting of the display.
<u>TRACE TWIST</u>	continuously variable control for aligning the display with the horizontal graduation of the graticule
<u>Y-PLATES INPUT</u>	direct connection to the C.R.T. Y plates. The input is applied to the Y PLATES sockets and the two-position slider switch set to EXT. For normal use set slider switch to INT.
<u>X-PLATES INPUT</u>	direct connection to the C.R.T. X plates. The input is applied to the X PLATES sockets and the two-position slider switch set to EXT. For normal use set slider switch to INT.
<u>Z MOD</u>	for intensity modulation of the display. The input is applied to the Z MOD sockets and the two-position slider switch set to EXT. For normal use set the slider switch to INT.
<u>TOP RIGHT HAND REAR CONTROLS</u>	(release chrome screw & lift hinged flap)
<u>VOLTAGE SELECTOR PANEL</u>	selects the line voltage operating range of the instrument. Line fuse is adjacent.

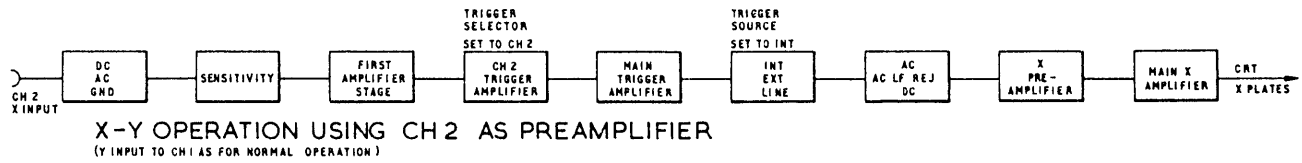
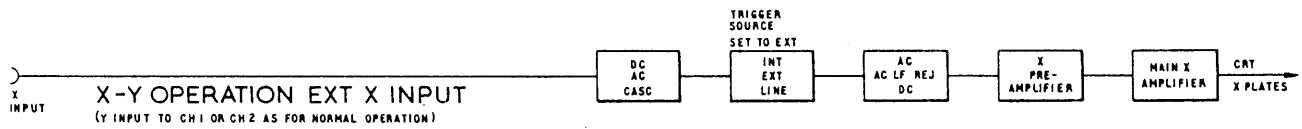
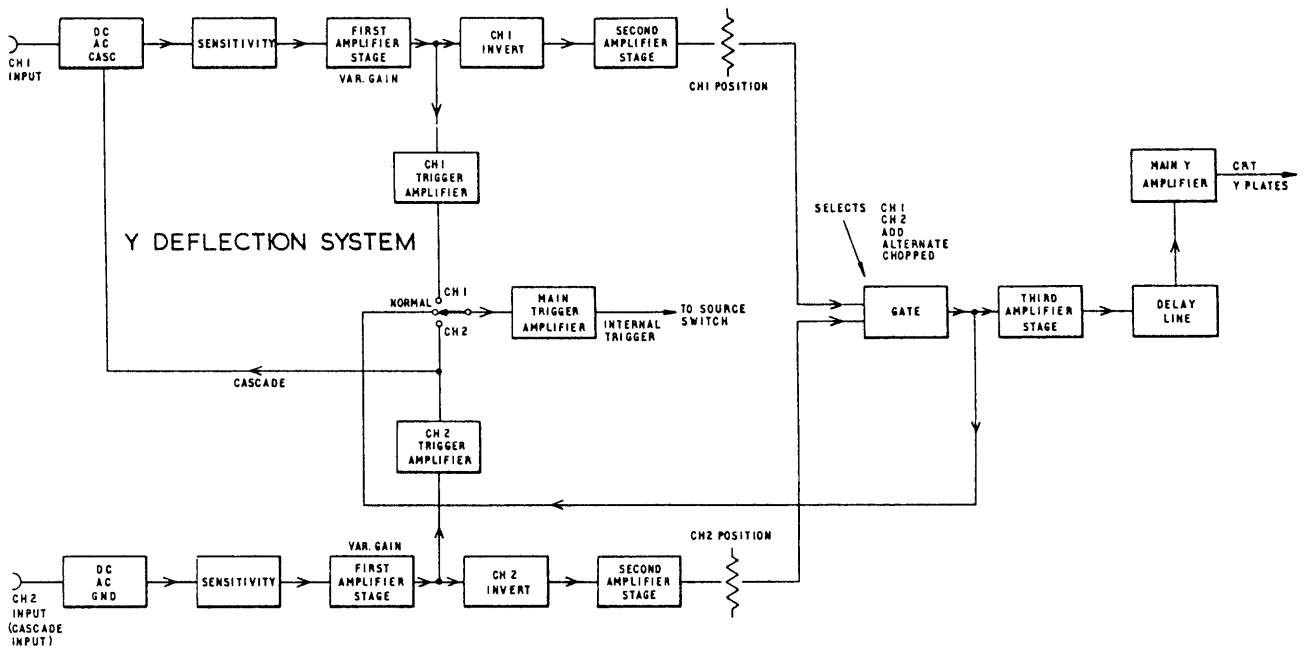


FIG. 3.1

DEFLECTION MODES

OSCILLOSCOPE  
SECTION 3  
OPERATION

CAUTION Before connecting the oscilloscope to the power supply check that the setting of the mains voltage selector (located at top right-hand rear) is correct for the available supply voltage.  
Do not operate the instrument with ventilation holes obstructed.  
A 30 minute warm-up period should be allowed before using the instrument to its full specification.

Obtaining a Display

1. (1) Set front panel controls as follows: (Fig. 2.1)

CHANNEL MODE	CH2
TRIGGER SELECTOR	NORMAL
CH2 input	GROUND
A TIME/CM	1ms
A VARIABLE	CAL.
X5 MAG	IN (X1)
TRIGGER MODE	AUTO
TIMEBASE MODE	A
TRIGGER SOURCE	INT

- (2) Switch ON and allow at least 30 seconds warm up.
- (3) Press ASTIG control (PRESS FOR TRACE) and centralize the trace on the CRT using the CH2 POSITION and horizontal POSITION controls.
- (4) Release PRESS FOR TRACE control and adjust BRILLIANCE, FOCUS and ASTIG to obtain a well defined trace.

Single Channel Operation

2. The input signal may be applied to either CH1 or CH2 input socket and the associated front panel controls used.

If CH1 is used switch CHANNEL MODE to CH1 and TRIGGER SELECTOR to CH1 or NORMAL.

## OPERATION

If CH2 is used switch CHANNEL MODE to CH2 and TRIGGER SELECTOR to CH2 or NORMAL.

Cascade Operation

3. Recommended only when sensitivities of 1mV/cm to 5mV/cm are required

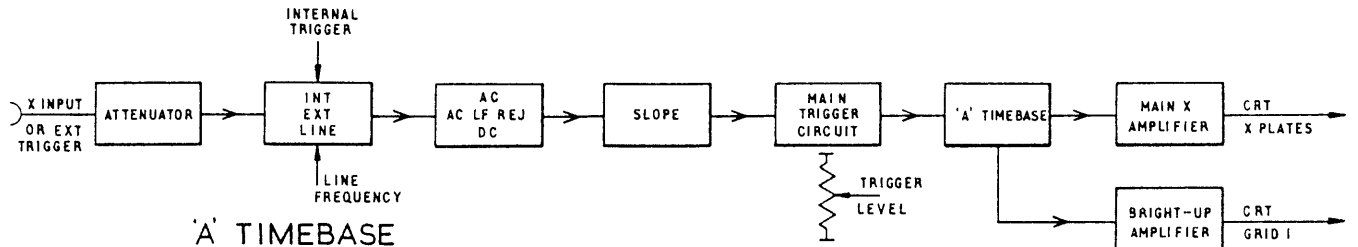
CH1 & CH2 SENSITIVITY	5mV/cm
CHANNEL MODE	CH1 (CH1 controls operative)
TRIGGER SELECTOR	CH1 or NORMAL
CH2 input coupling	AC or DC
CH1 input coupling	CASCADE

Apply the input signal to CH2 (CASCADE INPUT socket).

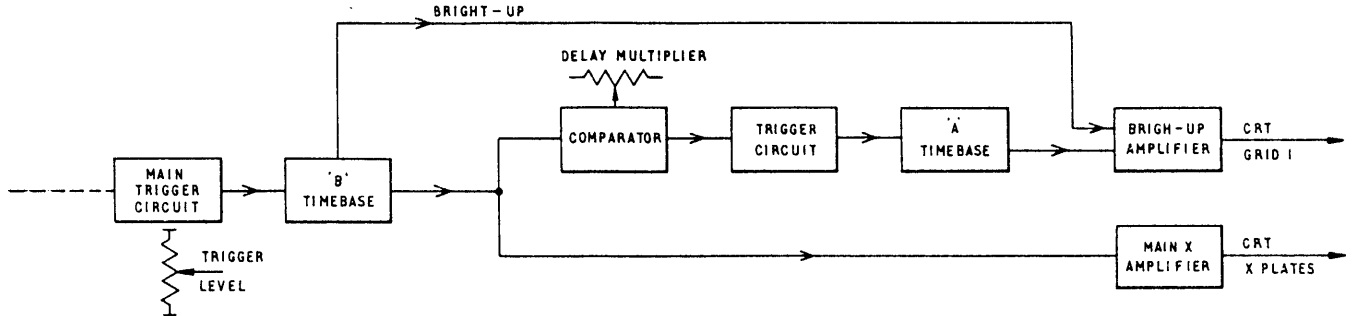
Dual Channel Operation

4. NOTE: The displays may be viewed separately as for single trace operation.

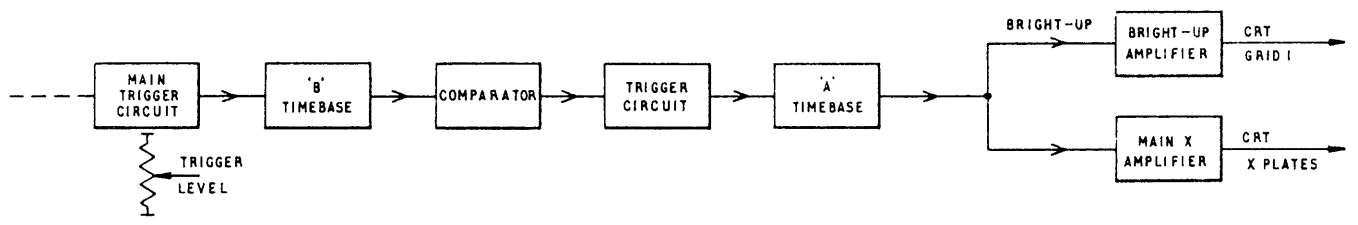
- (a) ALTERNATE: recommended for input frequencies above 10KHz.
- (1) Apply the two input signals to CH1 and CH2 INPUT sockets.
  - (2) Switch CHANNEL MODE to ALT
  - (3) If the two input signals are not synchronous switch TRIGGER SELECTOR to NORMAL.
  - (4) If the two input signals are synchronous, and it is desired to display them in their true time relationship switch TRIGGER selector to CH1 or CH2 as desired.
- (b) CHOPPED: recommended for input frequencies below 10KHz.
- (1) Apply the two input signals to CH1 and CH2 INPUT sockets.
  - (2) Switch CHANNEL MODE to CHOPPED



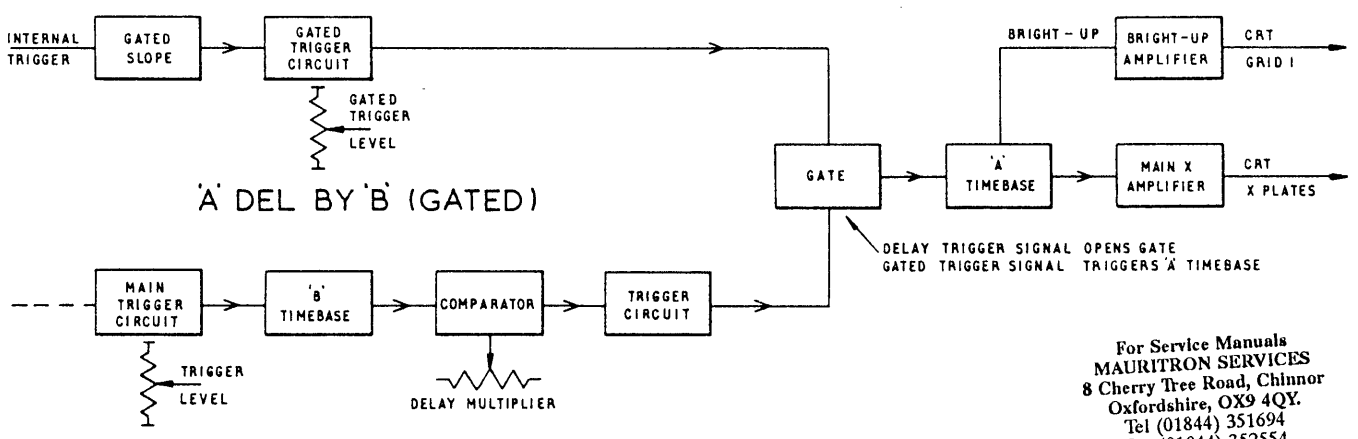
'A' TIMEBASE



'A' BRIGHTENS 'B'

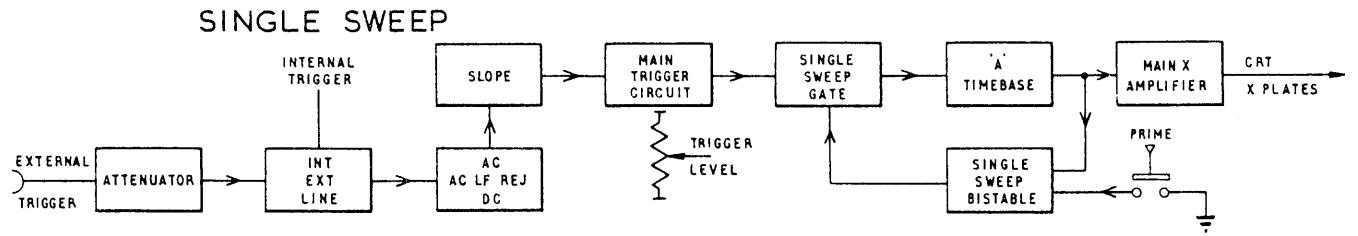


'A' DEL BY 'B'



'A' DEL BY 'B' (GATED)

For Service Manuals  
**MAURITRON SERVICES**  
 8 Cherry Tree Road, Chinnor  
 Oxfordshire, OX9 4QY.  
 Tel (01844) 351694  
 Fax (01844) 352554  
 email:- sales@mauritron.co.uk



SINGLE SWEEP



## OPERATION

- (3) Switch TRIGGER SELECTOR to CH1 or CH2
- (c) ADD: suitable for synchronous signal inputs only.
- (1) Apply the two input signals to CH1 and CH2 input sockets.
- (2) Switch CHANNEL MODE to ADD
- (3) Push in INVERT switches on both channels.
- (4) TRIGGER SELECTOR may be at CH1, NORMAL or CH2
- (5) The algebraic sum of the two input signals will be displayed. To obtain the algebraic difference invert one channel.

Single Timebase Operation

5. (1) Apply the input signal(s) to CH1 and/or CH2 INPUT socket(s), and set controls for the desired mode of operation.
- (2) Switch TIMEBASE MODE to A and select the desired sweep rate on the A TIME/CM control.
- (3) Select the desired TRIGGER SOURCE, COUPLING and SLOPE.
- (4) Switch TRIGGER MODE to AUTO or TRIG.

NOTE: The TRIGGER LEVEL control is operative only when TRIG is selected.

Single Sweep Operation

6. (1) Set TRIGGER MODE to SINGLE SWEEP and other controls as for single timebase operation.
- (2) Operation of the SINGLE SWEEP push button results in one scan of the timebase, providing the TRIGGER LEVEL control is set correctly. But, if the button is operated when there is no input signal the A timebase is primed and the neon lamp glows. One scan of the A timebase will now be produced when an input signal is applied, providing the TRIGGER LEVEL control is set correctly.

## OPERATION

Delayed Sweep Operation

7. (1) Apply input signal to CH1 and/or CH2 INPUT socket(s) and set controls as desired.
- (2) Switch TIMEBASE MODE to A BRIGHTENS B
- (3) Switch B TIME/CM and DELAY TIME to the required range, and set the DELAY MULTIPLIER to give the required delay time.
- (4) Select the TRIGGER SOURCE, COUPLING and SLOPE for the delaying sweep (B timebase).
- (5) Switch TRIGGER MODE to TRIG and adjust TRIGGER LEVEL to trigger the B timebase.
- (6) Select the appropriate A TIME/CM range to determine the duration of the delayed sweep (A timebase) indicated by the brightened-up region of the display.
- (7) Switch TIMEBASE MODE to A DEL BY B to display the delayed sweep.

NOTE: To eliminate any jitter, switch TIMEBASE MODE to GATED and use the GATED TRIGGER LEVEL control in conjunction with the GATED SLOPE switch to trigger the delayed sweep.

X-Y Operation (using X INPUT socket)

8. (1) Apply the Y axis input signal to CH1 or CH2 and set controls as required.
- (2) Apply the X axis input signal to the X INPUT socket and select the desired X sensitivity on the adjacent switch.
- (3) Switch TRIGGER SOURCE to EXT and select the desired TRIGGER COUPLING.
- (4) Switch TRIGGER MODE to X AMP.

X-Y Operation (using CH2 as a pre-amplifier)

9. (1) Apply the Y axis input to CH1 and set the controls for single-

OPERATION

channel operation, i.e. CHANNEL MODE to CH1.

- (2) Apply the X axis input to CH2 and switch TRIGGER SELECTOR to CH2 (XY).
- (3) Switch TRIGGER SOURCE to INT (XY) and select the desired TRIGGER COUPLING.
- (4) Switch TRIGGER MODE to X AMP.

Operation of Z Mod (Intensity Mod).

10. (1) Set controls for vertical and horizontal deflection as required.
- (2) Raise the top, left-hand rear access panel and apply the intensity modulation signal to the Z MOD input sockets.
- (3) Switch the two-position Z MOD slider switch to EXT.

Direct Connection to X & Y Plates

11. Raise the top, left-hand rear access panel and apply the input signal(s) to the X PLATES or Y PLATES as required, switch the appropriate two-position slider switch to EXT.

- NOTE:
- (1) X and Y POSITION controls remain operative
  - (2) Do NOT apply signals to CH1 or CH2 INPUT sockets whilst using direct access to X or Y plates.

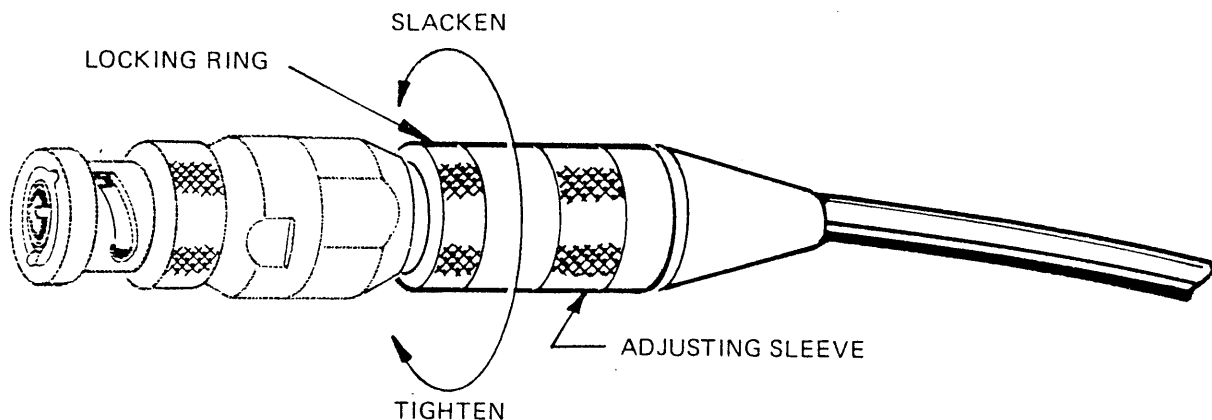
### PROBE COMPENSATION

Before using Passive Probe CPK 100 in the X10 condition, it is necessary to set up the compensation. This must be done every time the probe is transferred from one Oscilloscope to another.

Set the control as follows:

Y deflection	5mV/cm
Timebase	500 $\mu$ s/cm

Connect the probe tip to the 250mV output of the internal CALIBRATOR. Slacken the locking ring of the probe and turn the adjusting sleeve to obtain the best square-wave display without either overshoot or undershoot. Tighten the locking ring without moving the adjusting sleeve and recheck the waveform.



### PASSIVE PROBE CPK 100 SPECIFICATION

ATTENUATOR RATIOS	X1 and X10
INPUT RESISTANCE	1M $\Omega$ on X1, and 10 M on X10
INPUT CAPACITANCE	11pF (nominal) on X10
BANDWIDTH	D.C. to 50Mc/S min.
RISE TIME	7 $\mu$ s max.
OVERSHOOT	2% max.
MAX. INPUT VOLTAGE	600V peak (combined d.c. and a.c.)

CDU150-CT531/1

OSCILLOSCOPE

SECTION 4

MAINTENANCE

Calibration and Setting Up Procedure

This section assumes the oscilloscope to be in working order except for adjustments. Having worked through this section from page 4.2, providing each requirement of each instruction has been achieved, the oscilloscope will perform satisfactorily and meet its specification.

If any of these test requirements cannot be achieved, using the procedure given, this indicates that there is a circuit malfunction and further investigation is required.

Supplementary Checks

When used in conjunction with the above instructions, provide a means of checking that all circuits are functioning correctly, and that the equipment performs to its specification.

Waveforms

These are included to provide a ready means of verifying that all circuits are working correctly. It is essential that before observing waveforms that the calibration of the instrument is checked.

D.C. levels only are given for the vertical deflection system.

Dismantling

Advice on how to obtain access to P.C.Bs etc.

CALIBRATION AND SETTING-UP PROCEDUREGENERAL

The instructions below assume an oscilloscope which is in working order except for adjustments. It is important that the procedure be followed in the order given.

Unless indicated to the contrary all instructions refer to the CDU 150 oscilloscope under test. The word 'Oscilloscope', when used refers to the Oscilloscope in the list of TEST GEAR below. Where in any paragraph a particular control is not mentioned, its position is unchanged from that last mentioned. Instructions to connect a test instrument to a point on the CDU 150 imply that the earthing lead of the instrument is to be connected to chassis as close as possible to the live lead.

TEST GEAR

The following list of test gear quotes suitable instruments. Other types may be used providing that their performance is adequate. In case of difficulty advice should be sought from

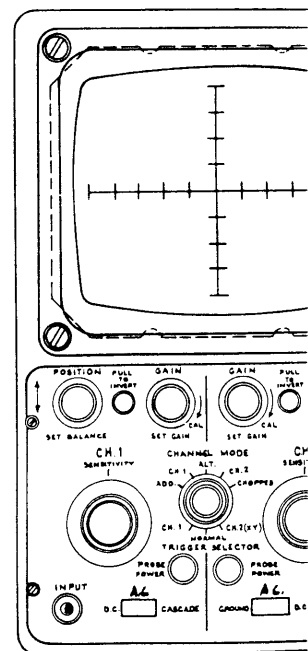
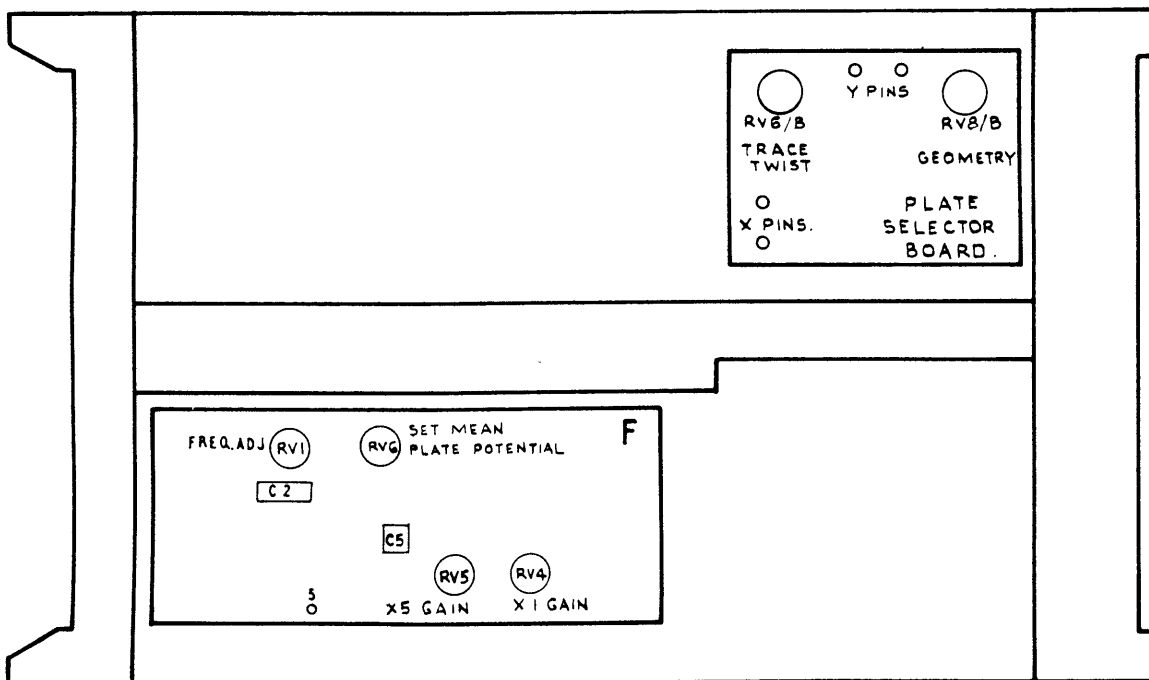
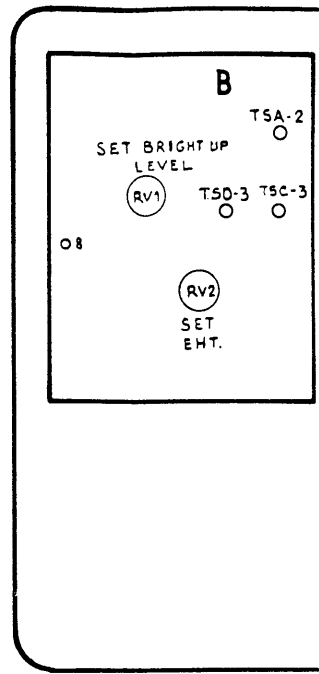
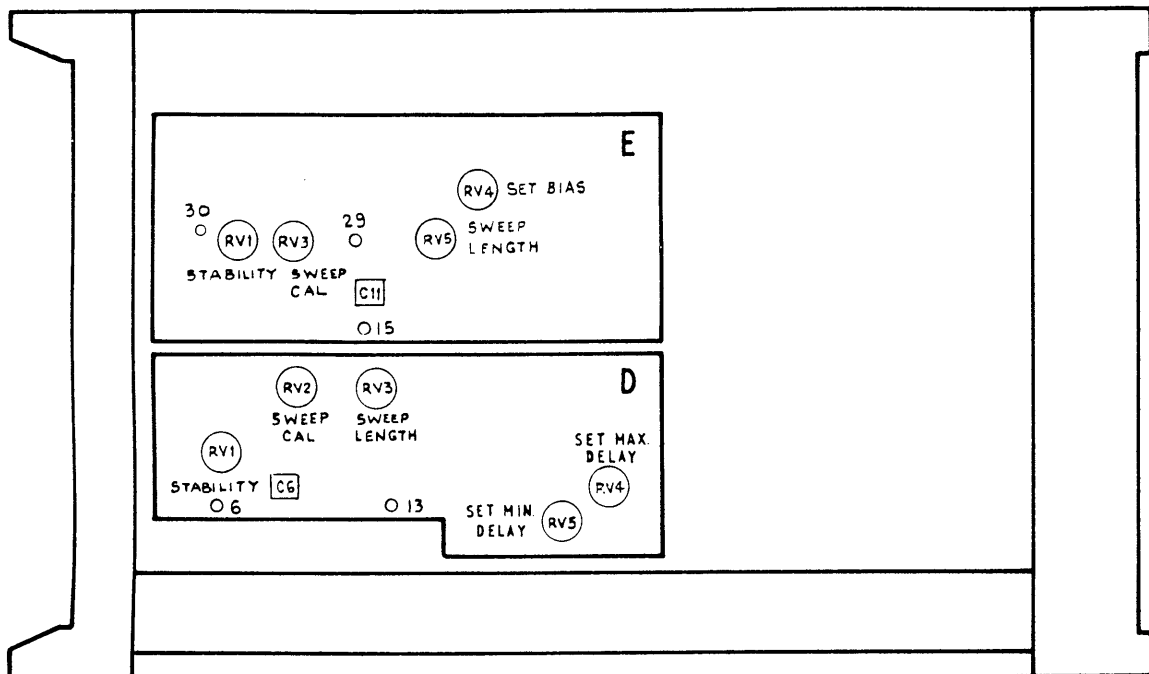
COSSOR ELECTRONICS LTD.,  
SERVICE DEPT.  
EDINBURGH PLACE  
HARLOW : ESSEX  
ENGLAND

Tel. Harlow 26624 Telex 81228

Multimeter	AVO Model 8
Oscilloscope	Cossor CDU 110 with CAM 111 Plug-in
Probe, 1:1	
Probe, 10:1 (2 off)	
Digital Voltmeter	Solartron LML450
Electrostatic Voltmeter, 18kV	Pye Scalamp
Oscilloscope Calibrator	Bradley type 156

RIGHT HAND SIDE VIEW.

RE



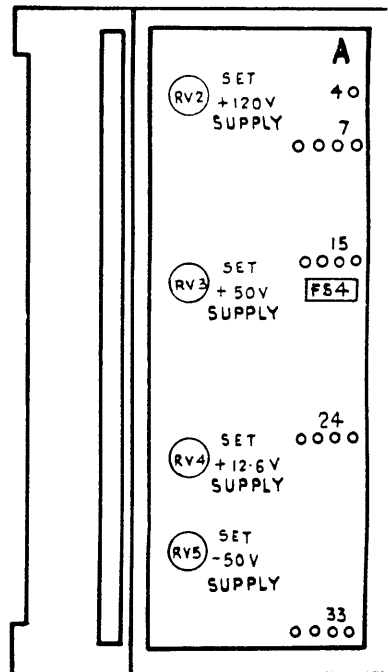
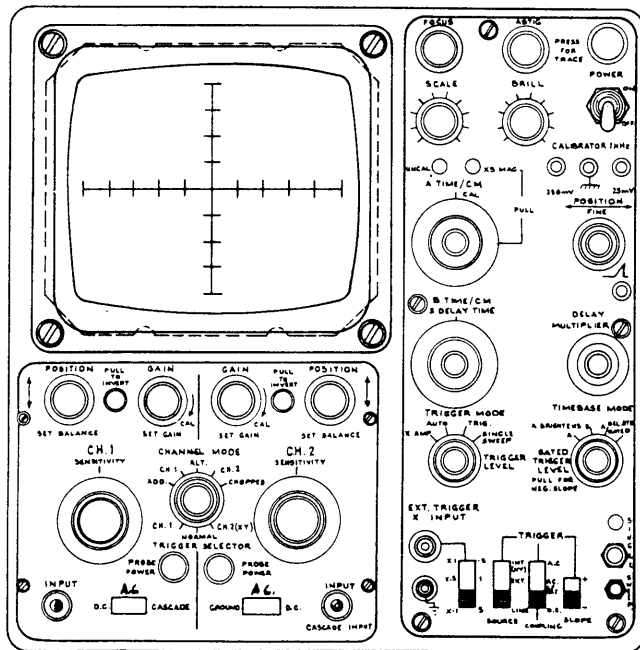
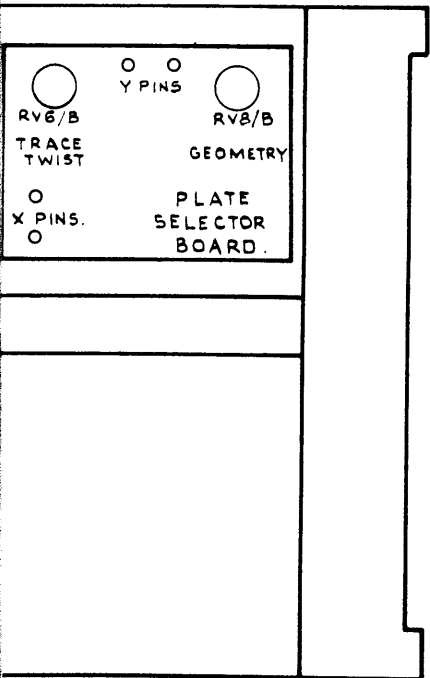
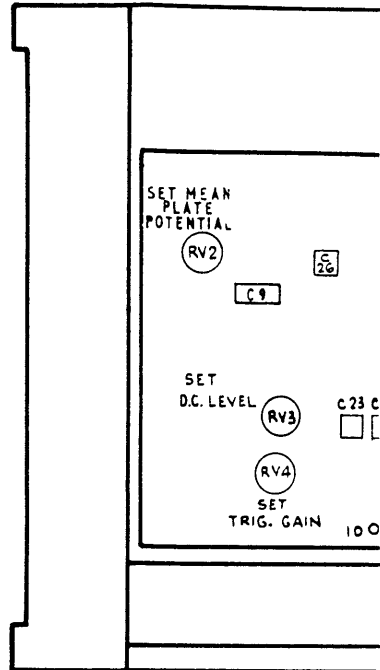
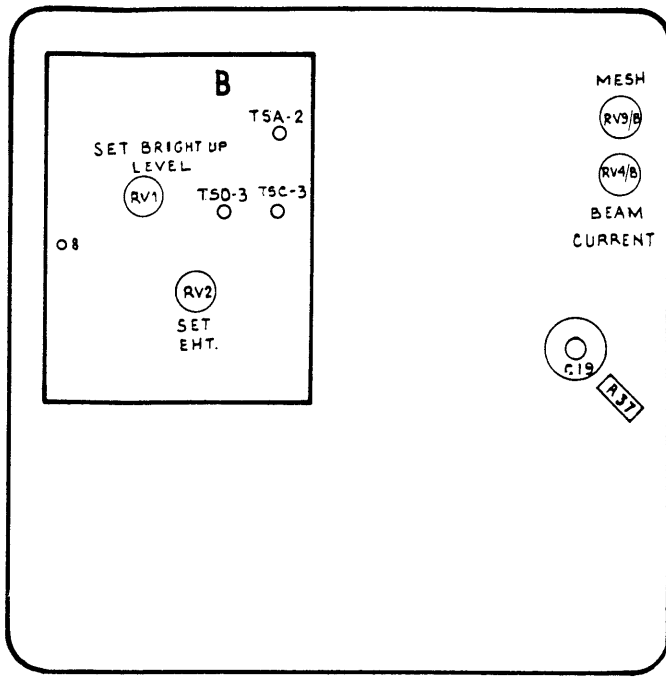
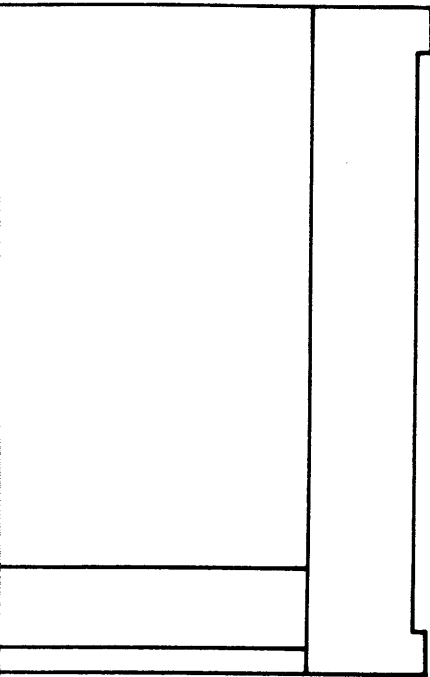
TOP VIEW

FRON

NOT TO SC

EW.

REAR VIEW



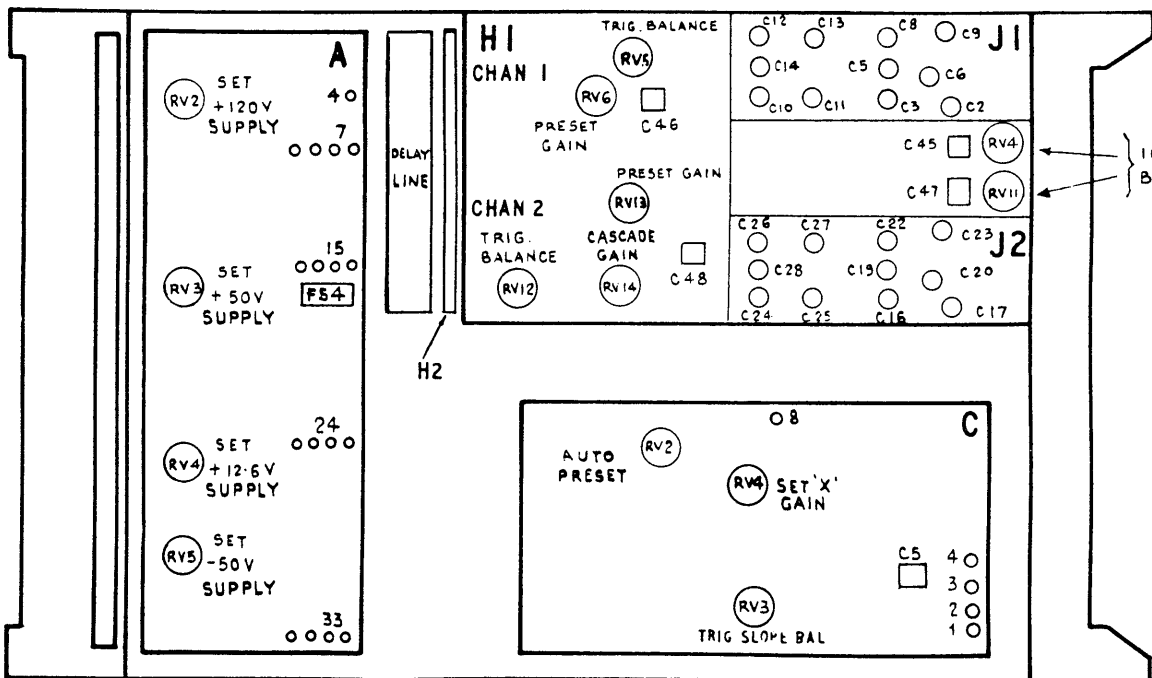
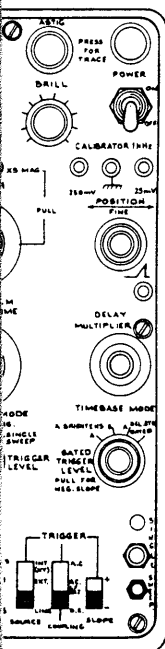
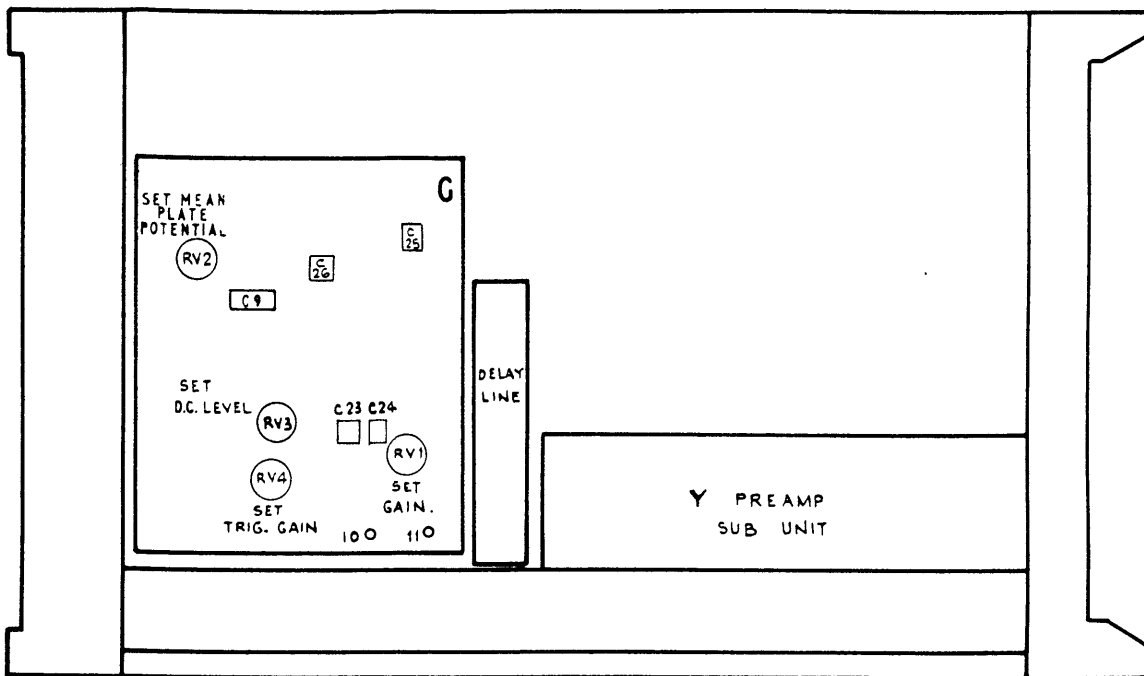
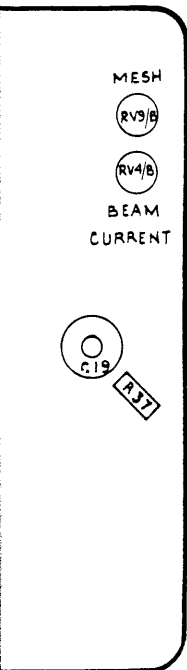
FRONT

NOT TO SCALE

LAYOUT SHOWING CALIBRATION ADJUSTMENTS



LEFT HAND SIDE VIEW.



FRONT

UNDERSIDE VIEW

ADJUSTMENTS

For Service Manuals  
MAURITRON SERVICES  
8 Cherry Tree Road, Chinnor  
Oxfordshire, OX9 4QY.  
Tel (01844) 351694  
Fax (01844) 352554  
email:- sales@mauritron.co.uk

FIG.4.1

## OSCILLOSCOPE

Fast rise-time Pulse Generator	Cossor 1090 with 14 dB 75 $\Omega$ attenuator and 75 $\Omega$ termination
Square-wave Generator	Tektronix 106
Constant Amplitude Signal Generator	Tektronix 191
Time Mark Generator	Tektronix 184
LC Meter	Tektronix 130
2 off BNC - BNC leads	50 $\Omega$
1 off BNC - Tee-piece	50 $\Omega$
Crocodile clip-leads	
1 off 0.1 $\mu$ F capacitor	2 kV d.c. working

PRELIMINARIES

Remove the covers as follows:- Remove four screws securing the back cover. Remove four screws securing the bottom cover. Slacken the screws securing the handle on top of the instrument and the screws securing the side trim. Ease out the two side covers.

Check that the mains voltage selector is adjusted to suit the available supply.

Connect mains lead switch POWER ON and allow a 15 minute warm-up period.

LV POWER SUPPLIES

Connect the Digital Voltmeter, negative to chassis and positive to PCM A as below. Adjust the controls to obtain the readings shown:

DVM Range	Connect to	Adjust Control	DVM Reading
200V	Pin 7	RV2	+120.0V
200V	Pin 15	RV3	+ 50.0V
20V	Pin 24	RV4	+ 12.6V
200V	Pin 33	RV5	- 50.0V

EHT SUPPLIES

WARNING: The oscilloscope under test MUST be switched off while the test gear is being connected and disconnected.

FOCUS	Fully counter-clockwise
BRILL	Fully clockwise
RV4 (SET BEAM CURRENT)	Fully counter-clockwise on rear upright of chassis

Connect AVO 8 set to 2500V d.c. range, neg. to TSD-3 on PCB B and pos. to chassis. Connect the electrostatic voltmeter between chassis and the junction of R37/B and C19/B on the rear panel of the instrument. Switch ON and adjust RV2 (SET EHT) on PCB B to obtain an indication of 1140V on the AVO. Check that the ESV reads between 8.8 and 11.2kV. Disconnect the AVO.

Connect the AVO, set to 2.5V d.c., neg. to TSD-3 and pos. to TSC-3 both on PCB B. WARNING: This AVO is 1.2kV from earth when connected. Adjust RV4/B (SET BEAM CURRENT) on left rear upright of chassis to obtain an indication of 0.4V on the AVO. Turn BRILL fully counter-clockwise and check that AVO reading falls to zero. Switch OFF and disconnect all testgear. Switch ON.

#### MEAN PLATE POTENTIALS

Set controls as follows:-

TRIG MODE	X AMP	X5MAG	IN (X1)
CHAN MODE	CH2	X,Y, and Z MOD INPUTS on	INT
CH2 INPUT	GROUND	PLATE SELECTOR board	

Connect an AVO set to 100V d.c. range, across the X pins on the Plate Selector Board (top of instrument, left rear) and adjust X POSITION to obtain 0V on the AVO. Disconnect negative lead of AVO and connect it to chassis. Adjust RV6 (SET MEAN PLATE POTENTIAL) on PCB F to obtain +60V on the AVO. Check that both X pins are between +59 and +61V. Disconnect the AVO.

Connect the AVO, set to 100V d.c. range, across the Y pins on the Plate Selector Board. Adjust CH2 POSITION control to obtain 0V on the AVO. Disconnect the negative lead of the AVO and connect it to chassis. Adjust RV2 (SET MEAN PLATE POTENTIAL) on PCB G to obtain +60V on the AVO. Check that both Y pins are between +59V and +61V. Disconnect the AVO. Adjust BRILL, FOCUS and ASTIG controls to obtain a sharply defined spot.

PRESETTING A AND B TIMEBASES

Set the controls as follows:-

TRIGGER MODE	TRIG
TIMEBASE MODE	A
TRIGGER LEVEL	Fully counter-clockwise
A TIME/CM	0.1 ms/cm
B TIME/CM	100 $\mu$ s/cm

Connect an AVO set to the 2.5V d.c. range, pos. to pin 29 on PCB E and neg. to chassis. Adjust RV4 (SET BIAS) on PCB E to obtain a reading of 1.1V. Disconnect the AVO.

Connect an AVO set to the 2.5V d.c. range, pos. to pin 30 on PCB E and neg. to chassis. Adjust RV1 (STABILITY) on PCB E to obtain a reading of 1.0V. Disconnect the AVO.

Set the AVO to the 2.5V d.c. range and connect it, pos. to pin 6 on PCB D and neg. to chassis. Adjust RV1 (STABILITY) on PCB D to obtain a reading of 1.0V. Disconnect the AVO.

X ATTENUATOR FREQUENCY COMPENSATION

Set the controls as follows:-

TRIGGER MODE	X AMP
TRIGGER SOURCE	EXT
X ATTENUATOR	1V/cm
TRIGGER COUPLING	DC

Connect the Oscilloscope, set to 50 mV/cm with a X10 probe (overall sensitivity 0.5V/cm) DC Coupled, to pin 3 on PCB C and chassis. Apply 2V p-p 1kHz square wave from the Bradley Calibrator to X INPUT and adjust C5 on PCB C to obtain optimum square wave response.

PRESETTING TRIGGER CIRCUIT

Set the controls as follows:-

X ATTENUATOR	0.5V/cm	A TIME/CM	0.1 ms
TRIGGER SOURCE	EXT	B TIME/CM	100 $\mu$ s
TRIGGER COUPLING	AC	TIMEBASE MODE	A
TRIGGER SLOPE	+VE	TRIGGER MODE	TRIG

Connect an AVO, set to the 2.5V d.c. range between pins 1 and 2 of PCB C. Adjust TRIGGER LEVEL to obtain a reading of 0V.

Connect the Bradley Calibrator to X INPUT and set it to give a 1kHz square wave of 100mV p-p. Adjust RV3 (TRIGGER SLOPE BAL) on PCB C to obtain a stable trace on the CRT. Note the position of RV3.

Set SLOPE to -ve and readjust RV3 to obtain a stable trace. Note new position of RV3.

Set RV3 to a position midway between the two positions noted above, so that a trace is obtained whether SLOPE is set to +ve or -ve, ensuring that the AVO indication is maintained at 0V. Disconnect the Calibrator and AVO.

#### TRACE TWIST

Set TRIGGER MODE to AUTO

Adjust RV6, TRACE TWIST on the Plate Selector Board to obtain a horizontal trace. If the range of adjustment is not enough, reverse the connections to RV6. See access instruction on page 4.33.

#### CH1 and CH2 INVERT BALANCE

Set the controls as follows:-

CHANNEL MODE	CH2	CH2 INVERT	IN
CH2 INPUT	GROUND	CH1 INPUT	DC
CH1 Var. GAIN	CAL	CH1 SENSITIVITY	5mV/cm
CH2 Var. GAIN	CAL	CH2 SENSITIVITY	5mV/cm
CH1 INVERT	IN	TRIGGER MODE	AUTO

Centre the trace on the CRT screen by means of CH2 POSITION control. Rotate CH2 variable GAIN control counter-clockwise and note any displacement of the trace. Adjust CH2 SET BALANCE so that the trace remains stationary during rotation of CH2 variable GAIN control.

NOTE: CH2 POSITION control may be used if necessary to keep the trace in the middle of the screen.

Pull out CH2 INVERT control and note any displacement of the trace. Adjust RV11 (INVERT BALANCE) on PCB H1 so that the trace remains in the same position whether the INVERT control is in or out.

Set CHANNEL MODE to CH1 and put a short-circuited BNC Plug in CH1 INPUT socket. Repeat the above procedure but using CH1 controls and RV4 (INVERT BALANCE) on PCB H1. Remove shorting plug and disconnect AVO.

MESH AND GEOMETRY

Set the controls as follows:-

CHANNEL MODE	CH2	TIMEBASE MODE	A
CH2 INPUT	GROUND	A TIME/CM	0.1 ms
CH2 SENSITIVITY	5mV/cm	X5 MAG	In (X1)
TRIGGER MODE	AUTO	MESH	Fully clockwise

Adjust BRILL for a reasonably bright trace. Adjust FOCUS and ASTIG controls to obtain a sharply defined trace.

Set CH2 INPUT to AC and connect the Constant Amplitude Signal Generator to CH2 INPUT with a 1 MHz (approx) signal of level enough to obtain a vertical deflection of 6 cm p-p. Adjust RV8/B (GEOMETRY) on Plate Selector Board located at left rear of top of the instrument to obtain the optimum rectangular raster within the limits of the graticule.

Set CH2 INPUT to GROUND. Connect an AVO, set to the 100V d.c. range, pos. to the wiper of RV8/B (GEOMETRY) on the Plate Selector Board and neg. to the wiper of RV9 (MESH) on the left rear upright of framework. Adjust RV9 (MESH) for suppression of the background flare and check that the AVO reading does not exceed 40V.

MAIN Y AMP GAIN

Set the controls as follows:-

TRIGGER MODE	AUTO
TRIGGER SELECTOR	NORMAL
TIMEBASE MODE	A
CHANNEL MODE	CH2
CH1 & CH2 SENSITIVITY	5mV/cm
CH1 & CH2 INPUT	AC
CH1 & CH2 Var. GAIN	CAL

Connect the Oscilloscope with 10:1 probe and 10mV/cm on each channel, arranged to display difference between channels, one probe to pin 10 and the other pin 11 on PCB G. Apply a 1 kHz square wave to CH2 INPUT of amplitude enough to obtain 500mV (5 cm) p-p display on the Oscilloscope. Adjust RV1 (SET GAIN) on PCB G to obtain 6 cm p-p deflection on the instrument under test. Disconnect the Oscilloscope.

CH1 and CH2 GAIN

Set both CH1 and CH2 SET GAIN controls to approximately  $60^\circ$  from the clockwise end of their travel. Apply an input of exactly 25 mV p-p 1 kHz square wave from the Bradley Calibrator to CH2 INPUT. Adjust RV13 on PCB H1, CH2 PRESET GAIN, to give exactly 5 cm vertical deflection.

Apply the same input to CH1 INPUT and switch CHANNEL MODE to CH1. Adjust RV6 on PCB H1 to give exactly 5 cm vertical deflection. Disconnect the Calibrator.

TRIGGER LEVELS

Set the controls as follows:-

CHANNEL MODE	CH2	TRIGGER SELECTOR	NORMAL
CH2 INPUT	GROUND	A TIME/CM	0.1 ms
TRIGGER MODE	AUTO	CH1 INPUT	DC
		(with s/c BNC plug in input socket)	
TIMEBASE MODE	A		

Set the Oscilloscope to 50mV/cm, DC coupled and free running timebase, d.c. zero set to middle of screen. Connect it with X10 probe to pin 4 of PCB C. Adjust CH2 position to bring the trace to middle of CRT of the instrument under test. Adjust RV3 on PCB G to bring the trace on the Oscilloscope to the middle of the screen, i.e. 0V input.

Repeat the foregoing paragraph with the TRIGGER SELECTOR set to CH1 using RV5 on PCB H1 and CH2 using RV12 on PCB H1. Check that the voltage at pin 4 of PCB C remains within  $\pm 2$  mm as seen on the Oscilloscope with the TRIGGER SELECTOR switched to CH2, NORMAL or to CH1. Disconnect the Oscilloscope.

AUTO TRIGGER LEVEL

Set the controls as follows:-

TRIGGER MODE	AUTO	CHANNEL MODE	CH2
TRIGGER SOURCE	INT	CH2 INPUT	DC
TRIGGER COUPLING	AC	CH2 SENSITIVITY	5mV/cm

## OSCILLOSCOPE

TRIGGER SLOPE	+VE	CH2 Variable Gain	CAL
TRIGGER SELECTOR	CH2	CH2 INVERT	In
TIMEBASE MODE	A	A TIME/CM	0.2ms

With 4mV p-p 1kHz square wave to CH2 INPUT and adjust RV2 (AUTO PRESET) on PCB C to trigger the timebase half-way up the positive-going edge.

X AMP AND TIMEBASES

Set the controls as follows:-

TRIGGER SOURCE	INT	TIMEBASE MODE	A
TRIGGER MODE	AUTO	A TIME/CM	0.1 ms
SLOPE	+VE	A TIME UNCAL	CAL
CHANNEL MODE	CH2	B TIME/CM	100 $\mu$ s
CH2 INPUT	DC	X5 MAG	In (X1)

Connect the Oscilloscope using a 10:1 probe and sensitivity 0.5V/cm d.c. coupled to pin 15 on PCB E. Adjust RV5 on PCB E to obtain 13V p-p ramp on the oscilloscope. Disconnect oscilloscope.

Apply 100 $\mu$ s/div. marker pulses from the Calibrator to CH2 INPUT, and set CH2 SENSITIVITY to obtain approx. 2 cm vertical deflection. Switch TRIGGER MODE to TRIG and adjust TRIGGER LEVEL to obtain a stable trace. Adjust RV4 (X1 GAIN) on PCB F to obtain approx 11 cm horizontal trace.

Adjust RV3 (SWEEP CAL) on PCB E in conjunction with the horizontal POSITION control to align the second and tenth pulses with the second and tenth divisions respectively on the graticule.

Set A TIME/CM to 1  $\mu$ s and the input to 1  $\mu$ s/div. Adjust C11 on PCB E for 1 pulse/cm (2nd to 10th divisions on the graticule).

Check all timebase ranges adjusting RV3 and C11 as above to spread any errors and check that in no case does the error exceed  $\pm 2$  mm in 10 cm.

NOTE: C11 on PCB E is effective only on the 0.1 $\mu$ s/cm to 5 $\mu$ s/cm ranges.

With A TIME/CM set to 100 $\mu$ s and the input to 20 $\mu$ s/div., pull out X5MAG and adjust RV5 (X5GAIN) on PCB F for 1 pulse/cm (2nd to 10th divisions on the graticule).



Set the A TIME/CM to  $0.1\mu\text{s}$  and the input to  $20\text{ns}/\text{div}$ . Rotate the X POSITION controls to observe the first ten pulses of the expanded trace. Ignore the first four pulses and adjust C5 on PCB F to obtain 1 pulse/cm from the fifth to the tenth divisions on the graticule. Push X5 MAG control in. Disconnect the Calibrator.

### B TIMEBASE

Set the controls as follows:-

TRIGGER MODE	TRIG
TIMEBASE MODE	A BRIGHTENS B
A TIME/CM	$0.1\text{ ms}$
B TIME/CM	$1\text{ms}$

Connect the Oscilloscope with 10:1 probe, sensitivity  $0.5\text{V}/\text{cm}$ , DC coupled, to pin 13 on PCB D. Apply an input of  $0.2\mu\text{s}/\text{div}$ . from the Calibrator to CH2 INPUT, and adjust RV3 (SWEEP LENGTH) on PCB D to obtain 13V p-p ramp on the Oscilloscope. Disconnect oscilloscope.

Set B TIME/CM to  $1\text{ ms}$  and the input to  $1\text{ms}/\text{div}$ . Adjust RV2 (SWEEP CAL) on PCB D to align the second and tenth marker pulses with the second and tenth divisions respectively of the graticule.

Set B TIME/CM to  $1\mu\text{s}$  and the input to  $1\mu\text{s}/\text{div}$ . Adjust C6 on PCB D for 1 pulse/cm. (Second to tenth divisions).

Check all B TIME/CM ranges adjusting RV2 and C6 as above to spread any errors and check that in no case does the error exceed  $\pm 2\text{mm}$  in  $10\text{cm}$ .

NOTE: C6 on PCB D is effective only on the  $1\mu\text{s}/\text{cm}$  range.

Set the DELAY MULTIPLIER to 5.0 on dial, B TIME/CM to  $100\mu\text{s}$  and A TIME/CM to  $10\mu\text{s}$  Set the input from the Calibrator to  $100\mu\text{s}$  period, trigger the timebase by means of the TRIGGER LEVEL control, and adjust BRILL to show a brightened region approximately half-way along the trace.

Connect the Oscilloscope via a  $0.1\mu\text{F}$   $2\text{kV}$  capacitor with a 10:1 probe,  $1\text{V}/\text{cm}$  sensitivity ( $10\text{V}/\text{cm}$  overall) AC coupled, timebase  $0.5\text{ms}/\text{cm}$ , to the junction of C2 and R9 at TSA2 on PCB B.

WARNING: TSA 2 is at  $-1290\text{V}$  with respect to earth.

Adjust RV1 on PCB B to obtain a flat top response of the step waveform displayed on the Oscilloscope within  $\pm 1$  mm. Disconnect the Oscilloscope.

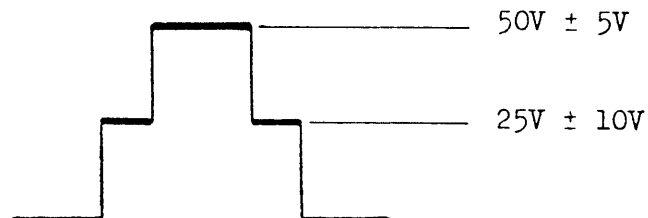


Fig.4.2 Waveform observed  
during adjustment of Timebase 'B'

#### DELAY CALIBRATION

Turn the DELAY MULTIPLIER control fully counter-clockwise. Check that dial reads 0.5. If not, loosen the knob and set it to 0.5. Set B TIME/CM to  $100\mu\text{s}$  and A TIME/CM to  $1\mu\text{s}$ . Set the Calibrator to give  $50\mu\text{s}/\text{div}$ . marker pulses and trigger the timebase by means of the TRIGGER LEVEL control.

Set the DELAY MULTIPLIER control to 10.5, adjust RV4 (SET MAX DELAY) on PCB D so that the brightened region just starts on the leading edge of the 22nd marker pulse. Turn DELAY MULTIPLIER to 0.5 and adjust RV5 (SET MIN DELAY) on PCB D so that the brightened region starts on the leading edge of the 2nd marker pulse.

Repeat the foregoing paragraph until both conditions are satisfied. Turn the DELAY MULTIPLIER so that the brightened region starts at the leading edge of the 11th pulse and check that the dial reads between 4.95 and 5.05.

CASCADE

CH 1 Var	CAL	TIMEBASE MODE	A
◀ CH 1 SENSITIVITY	5mV/cm	A TIME/CM	0.5 μs ▶
CH 1 INPUT	CASCADE	CHANNEL MODE	CH 1
CH 2 VAR	CAL	TRIGGER SELECTOR	NORMAL
CH 2 SENSITIVITY	5mV/cm	TRIGGER MODE	AUTO
CH 2 INPUT	AC	TRIGGER SOURCE	INT

Apply an input of 5mV p-p, 1kHz square wave from the Calibrator to CH 2 INPUT. Adjust RV14 on PCB H to obtain 5 cm p-p vertical deflection.

X - Y OPERATION

Set the controls as follows:-

◀ CHANNEL MODE	CH2	TRIGGER SELECTOR	CH2 (XY) ▶
CH 1 INPUT	AC	TRIGGER MODE	X AMP
CH 2 INPUT	DC	TRIGGER SOURCE	INT (XY)
CH 2 SENSITIVITY	5mV/cm	TRIGGER COUPLING	AC

Put the short-circuited BNC plug in CH 1 INPUT socket. Apply an input of 1 kHz square wave 20mV p-p to CH 2 INPUT from the Calibrator. Adjust RV4 (SET TRIG GAIN) on PCB G to obtain 4cm p-p horizontal deflection.

NOTE: Adjustment of RV4 results in a small d.c. shift at pin 4 of PCB C. Disconnect the calibrator, repeat the procedure described under the heading TRIGGER LEVELS on page 4.8.

Y AMPLIFIER, H.F. COMPENSATION

Set the controls as follows:-

CH1 INPUT	DC	CH2 INPUT	DC
CH1 SENSITIVITY	5mV/cm	CH2 SENSITIVITY	5mV/cm
CH1 Var. gain	CAL	CH2 Var. gain	CAL
CHANNEL MODE	CH 1	TIMEBASE MODE	A
◀ TRIGGER SELECTOR	NORMAL	A TIME/CM	0.5 μs ▶
TRIGGER SOURCE	INT	TRIGGER MODE	AUTO
TRIGGER COUPLING	AC	TRIGGER SLOPE	+ve
		X5 MAG	In (X1)

## OSCILLOSCOPE

Ensure that the instrument has been switched on for at least half an hour.

Connect the Cossor 1090 Fast rise-time pulse generator via the 14dB attenuator and the 75 ohm termination to CH 2 INPUT and adjust the input level to obtain 6cm p-p on the CRT at approximately 1 MHz.

Pull out the X5 MAG control and adjust X POSITION to observe the second pulse. Adjust C47 & C48 on PCB H1 and C24 on PCB G to minimum capacitance, i.e. maximum undershoot. Adjust C25 and C26 in turn bringing up the leading edge while maintaining a level pulse top. Adjust C24 and C23 in turn to bring up the leading edge still further.

Push in the X5 MAG control and adjust C25 to obtain a level pulse top. Pull out X5 MAG control.

Set CH2 variable GAIN fully counter-clockwise and adjust C48 on PCB H1 (rear trimmer) to obtain the fastest rise time with minimal pulse irregularities and overshoot. Restore CH2 variable GAIN control to CAL. Bring up the leading edge with C47 on PCB H (front trimmer) in conjunction with C23 on PCB G.

Insert the input from the generator to obtain 8cm p-p display. Set A TIME/CM to 0.1 $\mu$ s and measure the 10% to 90% rise time. Verify that the rise time is between 8ns and 12ns (i.e. 4-6mm horizontal).

Disconnect the Cossor 1090, termination and attenuator from CH2 and connect the Constant Amplitude Signal Generator, set to a frequency of 50kHz, to CH2 INPUT. Set A TIME/CM to 0.1ms X5 MAG. control pushed in and adjust the input level to obtain 8cm p-p display. Increase the frequency till the amplitude of the displayed waveform falls to 5.6 cm. Check that the frequency is not less than 35 MHz. Disconnect the Signal Generator.

Set CHANNEL MODE to CH1, A TIME/CM to 0.5 $\mu$ s, with X5 MAG control pulled out. Apply an input from the Cossor 1090 to obtain a 6cm p-p vertical display. Adjust the X POSITION controls to observe the second pulse. Set CH1 Variable GAIN fully counter-clockwise and adjust C46 (rear trimmer) on PCB H1 for optimum pulse shape. Restore CH1 variable GAIN to CAL and adjust C45 (front trimmer) on PCB H1 for optimum pulse shape.

Ascertain the rise time and upper 3dB point, as detailed for CH2. If less than 35MHz it will be necessary to repeat the procedure, setting CH1 followed by CH2.

## OSCILLOSCOPE

ATTENUATORS, H.F. RESPONSE

Set the controls as follows:

CH 1 INPUT	DC	CH2 INPUT	DC
CH 1 SENSITIVITY	5mV/cm	CH 2 SENSITIVITY	5mV/cm
CH 1 Var. gain	CAL	CH 1 Var. gain	CAL
TRIGGER SELECTOR	NORMAL	TIMEBASE MODE	A
TRIGGER SOURCE	INT	A TIME/CM	1ms
TRIGGER COUPLING	AC	X5 MAG	IN (X1)
		TRIGGER MODE	TRIG
		TRIGGER SLOPE	+ve

Connect in Square Wave Generator to CH1 INPUT with or without the Capacitance Standardizer as detailed below the corresponding trimmers for optimum square wave response. Repeat for CH2 with the appropriate trimmers.

SENSITIVITY	TRIMMER CAPACITOR		ACTION
	CH1 (PCB J1)	CH2 (PCB J2)	
5mV/cm	C14	C28	Connect the LC Meter on 30 pF FSD range across INPUT socket and adjust for 25pF
10mV/cm	C12	C26	) Apply 5kHz square wave input from TEK106, of such input as gives 5cm p-p (approx) deflection and adjust for optimum square wave
20mV/cm	C10	C24	
50mV/cm	C8	C22	
0.1V/cm	C13	C27	
0.2V/cm	C11	C25	
0.5V/cm	C5	C19	
5V/cm	C3	C16	)
5V/cm	C9	C17	) Disconnect input. Connect LC Meter across INPUT socket and adjust for 25pF
0.5V/cm	C6	C20	)
50mV/cm	C2	C23	)

CALIBRATOR

Set the controls as follows:

CH 1	AC	CH2 INPUT	AC
CH 1 SENSITIVITY	5mV/cm	CH2 SENSITIVITY	5mV/cm
CH 1 Var. gain	CAL	CH2 Var. gain	CAL
TRIGGER SELECTOR	CH2	CHANNEL MODE	CH1
TRIGGER SOURCE	INT	TRIGGER MODE	X AMP
TRIGGER COUPLING	AC		

Apply an input of 1kHz, 25mV p-p square wave from the Bradley Calibrator type 156 to CH2 input. Connect CH1 INPUT to the 25mV CALIBRATOR socket of the instrument under test. Check that the display is a 4 point Lissajou figure and adjust RV1 (FREQ.ADJ.) on PCB F to obtain a beat frequency of less than 1 Hz.

SUPPLEMENTARY CHECKSGENERAL

The checks described in subsequent paragraphs will, in conjunction with the Calibration procedure described in Part 1 of this Section, prove the correct functioning of all circuits. The checks should be carried out in the order given. Where in any paragraph a control is not mentioned, its position is unchanged from that last mentioned.

TESTGEAR

The testgear called for in this Part is to be selected from the list in Part 1, Calibration.

CHECKS:-JITTER

Set the controls as follows:-

CHANNEL MODE	CH.2	TRIGGER SOURCE	EXT
CH2 INPUT	AC	TRIGGER SELECTOR	NORMAL
CH2 SENSITIVITY	0.5V/cm	TRIGGER MODE	TRIG
TIMEBASE MODE	A	TRIGGER COUPLING	AC
A TIME/CM	2 $\mu$ s	SLOPE	+ve
B TIME/CM	1ms	X5 MAG	In (X1)
DELAY MULTIPLIER	Fully clock- wise	Variable sweep	CAL

Using the Time Mark Generator apply 1ms/div time markers to CH2 INPUT socket and 10ms/div time markers to EXT TRIG socket simultaneously. Adjust TRIGGER LEVEL control to trigger the timebase. Set TIMEBASE MODE to A DEL BY B and rotate DELAY MULTIPLIER slowly counterclockwise until the leading edge of the first marker pulse

## OSCILLOSCOPE

appears at the centre of the screen. Pull out the X5 MAG control and verify that the horizontal jitter is not greater than 1 cm. Any side-ways drift should be ignored.

CASCADE BANDWIDTH

Set the control as follows:

TIMEBASE MODES	A
CH1 & CH2 variable GAIN	CAL
CH1 & CH2 SENSITIVITY	5mV/cm
CH1 Input	CASCADE
CHANNEL MODE	CH1
TRIGGER MODE	AUTO
A TIME/CM	0.5ms
TRIGGER SOURCE	INT
X5 MAG	IN

Apply 5mV p-p 50 kHz sine wave from the Constant amplitude Signal Generator to CH2 INPUT and verify that the vertical deflection is 5cm. Increase the frequency and verify that the frequency at which the trace amplitude decreases to 3.5 cm (-3dB) is greater than 8MHz.

X AMPLIFIER BANDWIDTH

X ATTENUATOR	0.5V/cm	TRIGGER MODE	X AMP
CHANNEL MODE	CH2	TRIGGER SOURCE	EXT
CH2 INPUT	GROUND	TRIGGER COUPLING	AC

Apply 2.5V p-p 50 kHz sine wave from the Constant Amplitude Signal Generator to X INPUT and verify that the horizontal deflection is 5cm.

Increase the frequency and verify that frequency at which the horizontal deflection decreases to 3.5 cm is not less than 3MHz.

INTERNAL and GATED TRIGGER SENSITIVITY

TRIGGER MODE	AUTO	CHANNEL MODE	CH2
TRIGGER SOURCE	INT	CH2 INPUT	AC
TRIGGER COUPLING	AC	CH2 SENSITIVITY	5mV/cm
TRIGGER SLOPE	+ve	CH2 GAIN	CAL
TIMEBASE MODE	A	CH2 INVERT	In
A TIME/CM	10 $\mu$ s	TRIGGER SELECTOR	NORMAL
B TIME/CM	10 $\mu$ s	CH1 INPUT	AC



Apply an input of 40mV p-p 50kHz sine-wave from the Constant Amplitude Signal Generator to CH.2 INPUT socket. Switch TRIGGER MODE to TRIG, and by operation of the TRIGGER LEVEL control, verify that the timebase can be triggered by any part of the +ve-going slope of the displayed waveform. Set SLOPE to -ve and verify triggering from the -ve-going edge.

Set SLOPE to +ve and TIMEBASE MODE to A DEL BY B, and verify that rotation of the DELAY MULTIPLIER causes sideways movement of the displayed waveform. Switch TIMEBASE MODE to GATED, adjust GATED TRIGGER LEVEL control to verify that the timebase can be triggered from any part of the positive-going edge of the displayed waveform. Pull GATED TRIGGER LEVEL (NEG.SLOPE) and verify that the timebase can be triggered from any part of the negative-going edge of the displayed waveform. Rotate DELAY MULTIPLIER) and note that there is no sideways movement of the waveform.

Set the controls as follows:-

TIMEBASE MODE	A
CH2 SENSITIVITY	50mV/cm
A TIME/CM	20 $\mu$ s
Input	10mV p-p

Verify that the waveform can be triggered satisfactorily from all parts of the displayed waveform. Set A TIME/CM to 0.1 $\mu$ s and pull out X5 MAG. Increase the input to 50mV p.p. 35MHz to give 1 cm p-p deflection satisfactorily and verify that the timebase can be triggered. Disconnect the input.

#### EXTERNAL TRIGGER SENSITIVITY

Set the controls as follows:-

X ATTENUATOR	0.5V/cm	SLOPE	+ve
TRIGGER SOURCE	EXT	TIMEBASE MODE	A
TRIGGER MODE	TRIG	A TIME/CM	0.1ms
TRIGGER COUPLING	DC	X5 MAG	IN

Apply an input of 200mV p-p 50kHz sine wave from the Constant Amplitude Signal Generator to the EXT TRIGGER socket and verify

## OSCILLOSCOPE

that the timebase can be triggered on +ve and -ve slope. Increase the input to 1V p-p and frequency to 35MHz and repeat the test.

LINE TRIGGER

Set the controls as follows:-

A TIME/CM	5ms	TRIGGER SELECTOR	NORMAL
TRIGGER SOURCE	LINE	CH2 INPUT	AC
TRIGGER MODE	TRIG	CHANNEL MODE	CH2

Connect CH2 input to a suitable source to supply an input voltage at mains frequency. Set CH2 SENSITIVITY to obtain 2cm p-p deflection, and verify that the timebase can be triggered on +ve and -ve slope.

CHANNEL MODES, ADD

CH1 & CH2 INPUT	DC	TRIGGER SELECTOR	NORMAL
CH1 & CH2 SENSITIVITY	5mV/cm	TRIGGER MODE	TRIG
CH1 & CH2 variable GAIN	CAL	TRIGGER SOURCE	INT
CH1 & CH2 INVERT	In	TRIGGER COUPLING	AC
CHANNEL MODE	ALT	A TIME/CM	1ms

Apply an input of 15mV p-p 1kHz square wave from the Calibrator to both channels simultaneously and adjust TRIGGER LEVEL control to trigger the timebase. Using the respective POSITION controls, place the CH1 trace above and CH2 trace below the horizontal centre-line and ensure that the amplitude of each waveform is 3 cm p-p.

Set the controls as follows in sequence and verify the results stated:-

CHANNEL MODE	to ADD	Vertical deflection	6 cm p-p
CH1 INVERT	pulled	Vertical deflection	zero
CH2 INVERT	pulled	Vertical deflection	6 cm p-p
CH1 INVERT	restored	Vertical deflection	zero
CH2 INVERT	restored	Vertical deflection	6 cm p-p

CHANNEL MODE, ALTERNATE

CH1 INPUT	DC	A TIME/CM	0.5ms/cm
CH2 INPUT	GROUND	TRIGGER MODE	AUTO
TIMEBASE MODE	A	CHANNEL MODE	ALT

Put a short-circuited BNC plug into CH1 INPUT socket. Adjust CH1 and CH2 POSITION controls to separate the traces approximately 3cm. Set A TIME/CM to 20ms and verify that the traces appear alternately. Set A TIME/CM to 0.1ms and verify that 3cm vertical shift of CH1 (using CH1 POSITION control) produces not more than 1 mm of vertical shift of the CH2 trace, and vice versa.

CHANNEL MODE, CHOPPED

Set the controls as follows:-

CHANNEL MODE	CHOPPED
TRIGGER MODE	TRIG
A TIME/CM	1 $\mu$ s

Adjust TRIGGER LEVEL control to trigger the timebase.

Verify that the frequency of the displayed waveform is between 400kHz and 600kHz and that there is no visible vertical edge at maximum BRILL.

SINGLE SWEEP

Set the controls as follows:-

CHANNEL MODE	CH2	A TIME/CM	0.1sec
CH2 SENSITIVITY	5mV/cm	X5 MAG	In(X1)
CH2 INPUT	AC	TRIGGER MODE	TRIG
TRIGGER SELECTOR	NORMAL	TRIGGER SOURCE	INT
TIMEBASE MODE	A	TRIGGER COUPLING	AC

Apply an input of 10mV p-p 1kHz square wave from the Calibrator to CH2 INPUT, and adjust TRIGGER LEVEL to trigger the timebase. Switch TRIGGER MODE to SINGLE SWEEP. The trace should disappear. Press the SINGLE SWEEP pushbutton and check that a single sweep of the timebase appears. Using the plug supplied, check that a single sweep occurs when the SINGLE SWEEP jack is short-circuited.

Set CH2 INPUT to GROUND. Press the SINGLE SWEEP pushbutton and check that the SINGLE SWEEP indicator lamp glows. Switch CH2 INPUT

## OSCILLOSCOPE

to AC and check that a single sweep of the timebase occurs and that the SINGLE SWEEP lamp is extinguished. Disconnect the input from CH2.

Beamfinder PRESS FOR TRACE

Set the controls as follows:-

TRIGGER MODE    AUTO

Obtain a trace at the centre of the screen. Turn the BRILL control fully counter-clockwise, and operate the PRESS FOR TRACE button (concentric with ASTIG) and hold it in. Check that the trace re-appears at full brilliance. Release the button and adjust BRILL to normal level. Release PRESS FOR TRACE

Push PRESS FOR TRACE and hold in. Check that the trace cannot be moved off the graticule by operation of the CH2 and X position controls.

EXT X & Y INPUTS

Set the controls as follows:-

TRIGGER MODE	X AMP
CH2 INPUT	GROUND
X and Y plate* switches	EXT

\*Under hinged panel at rear top of the instrument.

By means of CH2 and X position controls bring the spot to the centre of the graticule. Apply an input of 30V p-p square wave between each Y plate socket and chassis in turn and check that the p-p vertical deflection is between 5 and 7 cm in each case.

Apply the same input to the X plate sockets in turn and check that the horizontal deflection is between 2.4 and 3.6 cm in each case. Restore the plate switches to INT.

Z MODULATION

Set the controls as follows:-

CH2 SENSITIVITY	5V/cm	A TIME/CM	2 $\mu$ s
CH2 INPUT	AC	TRIGGER MODE	TRIG

Using a tee-piece, apply an input of 100kHz square wave from the Square Wave Generator set to high output and terminated in 50  $\Omega$  to CH2 INPUT and Z1 simultaneously. Adjust TRIGGER LEVEL control to trigger the timebase, and adjust the input to give a vertical deflection of approximately 2 cm p-p. Set the Z-MOD switch to EXT and check that the horizontal parts of the displayed waveform are extinguished, adjusting the BRILL control as necessary. Disconnect both inputs and restore the Z-MOD switch to INT.

### SWEEP OUT

Set the controls as follows:-

TRIGGER MODE	AUTO
TIMEBASE MODE	A

Connect a 1k $\Omega$  5% resistor from the SWEEP OUT socket to chassis. Connect an oscilloscope with X10 probe, 0.5V/cm sensitivity, d.c. coupled, -ve slope across this resistor and check that on all A TIME/CM ranges of the CDU150-CT531/3 timebase, a ramp, of at least 10V (2cm) is displayed on the oscilloscope

WAVEFORMS

Conditions of Test

The tests described below will demonstrate the correct functioning of all parts of the circuit, but only if they are carried out in the order given, commencing on page 4.23 and working through the section to page 4.38.

All the oscillograms are taken from an oscilloscope used as test gear, not from the CDU150-CT531/3 under test; in every case d.c. zero is on the horizontal centre line of the oscillogram. Controls designated in CAPITALS are those of the CDU150-CT531/3 under test.

Control settings of both the CDU150-CT531/3 and the oscilloscope should remain unaltered between tests, unless explicit instructions are given to the contrary.

L.V. Power supply

(1) Ensure that the CDU150 is switched OFF. Connect it to a 50 Hz or 60 Hz supply variable between 210 and 250V. Set the Voltage Selector to 230V and adjust the supply to 230V. Remove FS4 on PCB A. Unsolder the two leads from pin 8 on PCB B, but leave them connected together and temporarily insulate the joint. Short-circuit C2 on PCB F. Switch ON.

(2) Using a digital voltmeter, check the supply voltages with respect to chassis as follows:-

PCB A, pin	Voltage
7	+120
15	+ 50
24	+ 12.6
33	- 50

(3) Using an oscilloscope with X1 probe, sensitivity 5mV/cm, a.c. coupled, timebase 10ms/cm, check 100 Hz ripple as follows:-

Test Point	Max. 100 Hz ripple
PBC A - 7	10 mV p-p
- 15	2 mV p-p
- 24	2 mV p-p
- 33	5 mV p-p

(4) Using the oscilloscope as in (3) above, and the DVM, vary the supply voltage over the range 214 - 246V and check the following:-

Test Points	DVM limits	Max. 100 Hz ripple
PCB A - 7	119.7 - 120.3	15 mV p-p
- 15	49.88- 50.12	3 mV p-p
- 24	12.57- 12.63	3 mV p-p
- 33	49.88- 50.12	7.5 mV p-p

(5) Switch power OFF, replace FS4 on PCB A, restore leads to pin 8 on PCB B and remove the shorting link from C2 on PCB F.

#### EHT Supply

Connect an AVO 8 set to the 2500V range, -ve to TSD/3 on PCB B, +ve to chassis. Connect an electrostatic voltmeter capable of indicating 15kV between the junction of R37 & C19 (circuit B) and chassis. Switch ON.

(1) Vary the BRILL control over its whole range and check that the AVO reading remains between 1140V and 1155V, and that of the ESV varies by not more than 10% of its reading at minimum brilliance. Restore the BRILL control to minimum brilliance immediately, switch off and disconnect both voltmeters.

(2) Connect an oscilloscope as follows and observe the oscillogram.

OSCILLOSCOPE

Oscilloscope  
connected to:-

T1 b (cct B)

Chassis

Oscilloscope  
set to:-

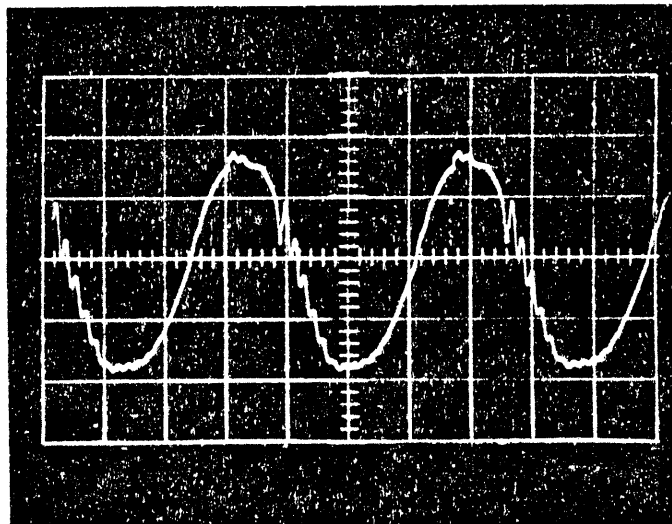
X10 probe

2V/cm

a.c. coupled

10 $\mu$ s/cm

-ve slope



1

Trigger Circuit

(1) Set the controls as follows:-

TRIGGER MODE XAMP

TRIGGER SOURCE EXT

X ATTENUATOR 0.5V/cm

Apply an input of 1V p-p, 1kHz squarewave to X INPUT.

Oscilloscope  
connected to:-

Pin 3 on PCB C

Oscilloscope  
set to:-

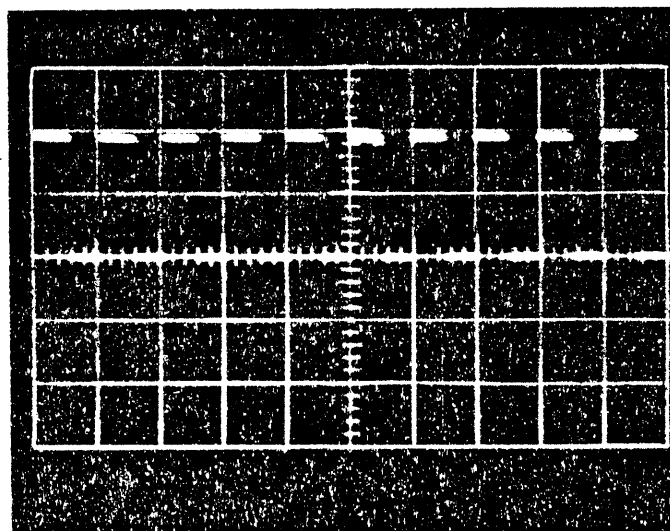
X10 probe

50mv/cm

d.c. coupled

1ms/cm

+ve slope



2

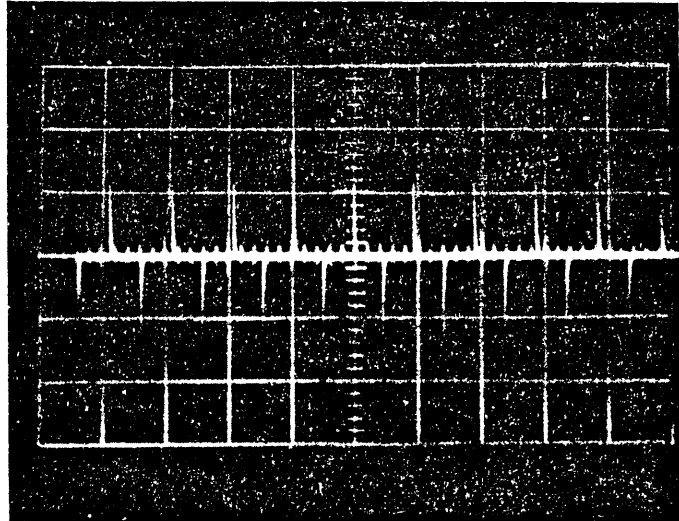
TRIGGER COUPLING - DC



Oscilloscope  
connected to:-  
Pin 3 on PCB C

Oscilloscope  
set to:-  
X10 probe  
50mv/cm  
d.c. coupled  
1ms/cm  
+ve slope

3

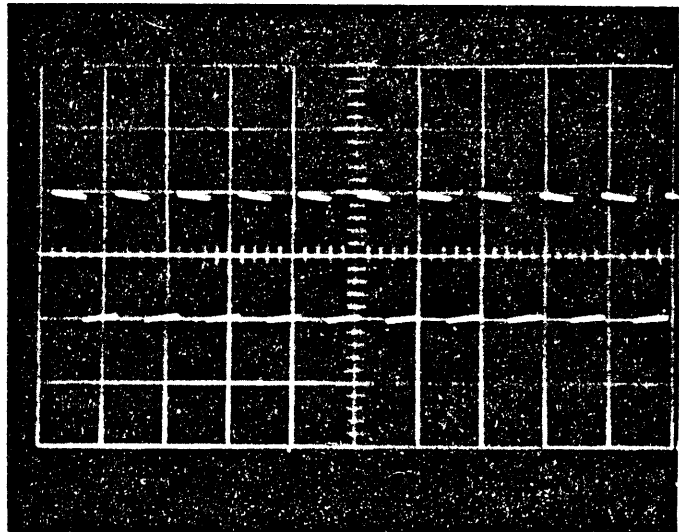


TRIGGER COUPLING - AC LF REJ

Oscilloscope  
connected to:-  
Pin 3 on PCB C

Oscilloscope  
set to:-  
X10 probe  
50mv/cm  
d.c. coupled  
1ms/cm  
+ve slope

4



TRIGGER COUPLING - AC

(2) Set the controls as follows:-

TRIGGER COUPLING	AC
X ATTENUATOR	1V/cm

Increase the input to 2V p-p and check that oscillogram No.4 is repeated. Set the X ATTENUATOR to 5V/cm and increase the input to 10V p-p. Check that oscillogram No.4 is repeated.

OSCILLOSCOPE

(3) Set the controls as follows:-

X ATTENUATOR	X1
TRIGGER MODE	AUTO
A TIME/cm	5 $\mu$ s

Adjust BRILL FOCUS and ASTIG for a sharply defined trace. Switch TRIGGER MODE to TRIG.

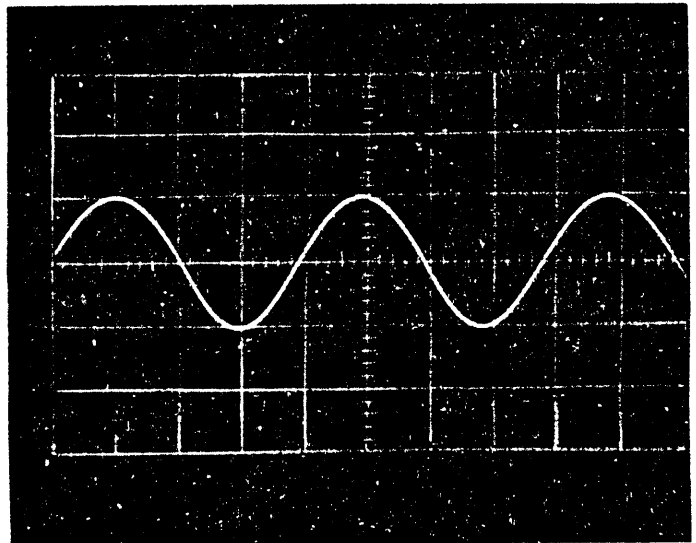
Apply an input of 1V p-p, 50kHz sine wave to X INPUT. Adjust TRIGGER LEVEL to trigger the timebase.

Oscilloscope  
connected to:-

Oscilloscope  
set to:-  
x 10 probe

5 $\mu$ s/cm

5



Oscilloscope  
connected to:-

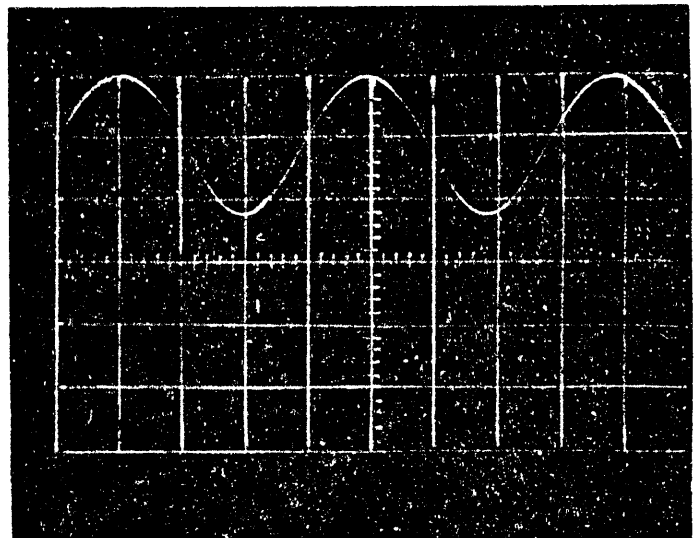
Pin 7 on PCB C

then

Pin 1 on PCB C

Oscilloscope  
set to:-  
x 10 probe

6

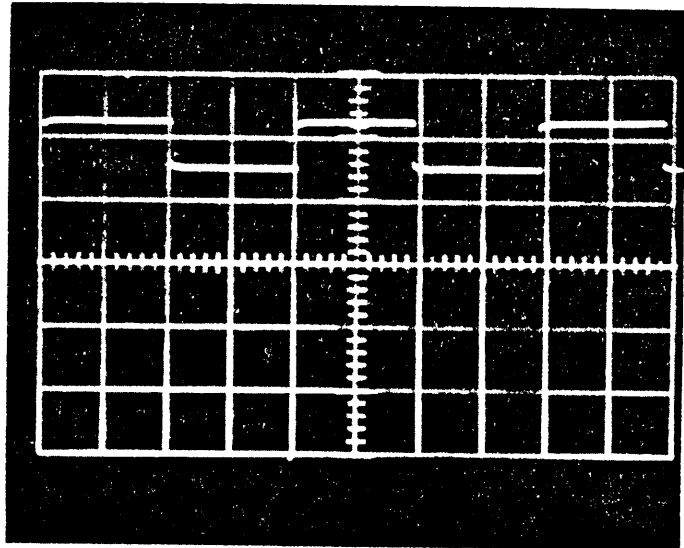


Transfer probe to Pin 2 on PCB C, set SLOPE to -ve and check that oscillogram No.6 is repeated.

Oscilloscope  
connected to:-  
TR10 collector  
on PCB C

Oscilloscope  
set to:-  
x 10 probe  
0.5V/cm

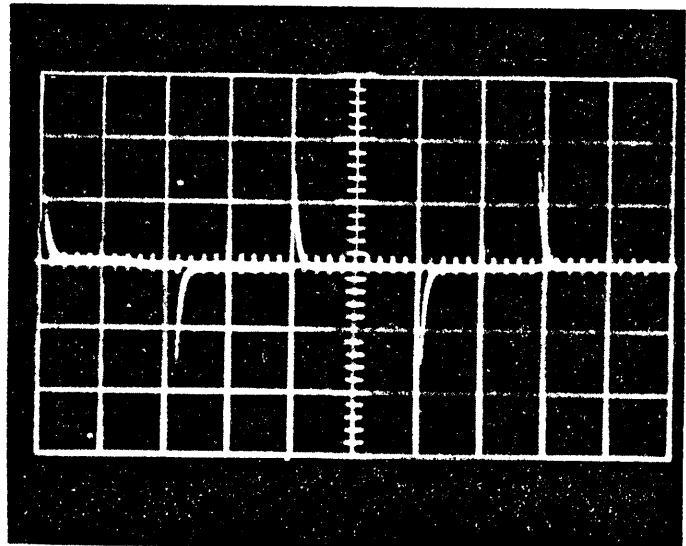
7



Oscilloscope  
connected to:-  
Pin 11 on PCB C

Oscilloscope  
set to:-  
x 10 probe  
0.2V/cm

8



NB Negative-going spikes move with TRIGGER LEVEL control.

OSCILLOSCOPE

A Timebase

Oscilloscope  
connected to:-

Pin 6 on PCB E

Oscilloscope  
connected to:-

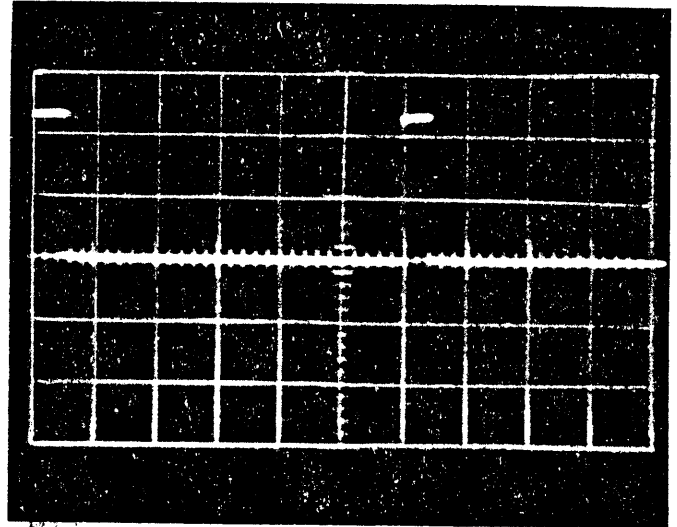
TR4 collector  
on PCB E

Oscilloscope  
set to:-

Oscilloscope  
set to:-  
x 10 probe  
0.5V/cm  
10µs/cm  
+ve slope

Check that oscillogram No.8 is  
repeated

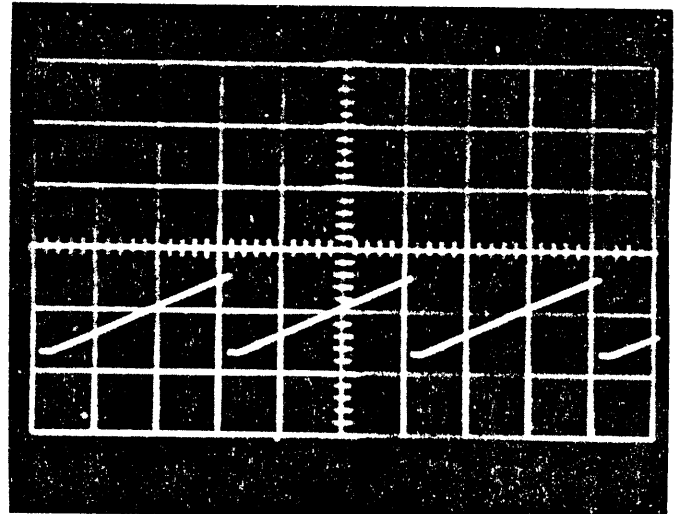
9



Oscilloscope  
connected to:-  
Pin 15 on PCB E

Oscilloscope  
set to:-  
x 10 probe  
1V/cm  
20µs/cm  
-ve slope

10



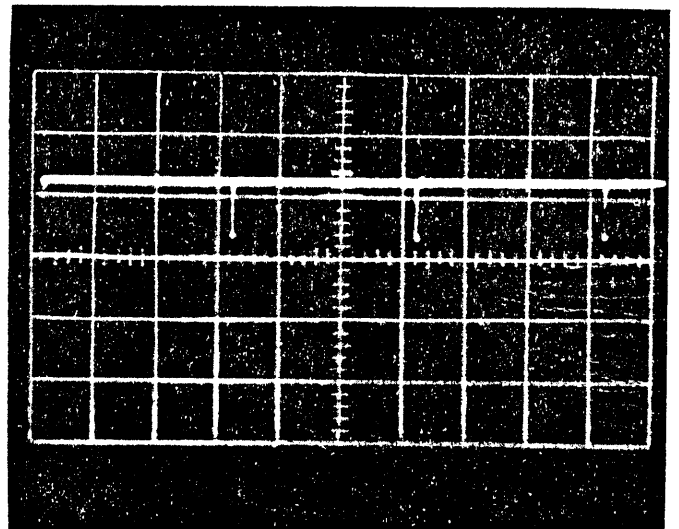
Set CHANNEL MODE to ALT

Oscilloscope  
connected to:-

Pin 14 on PCB E

Oscilloscope  
set to:-  
x 10 probe  
0.5V/cm  
+ve slope

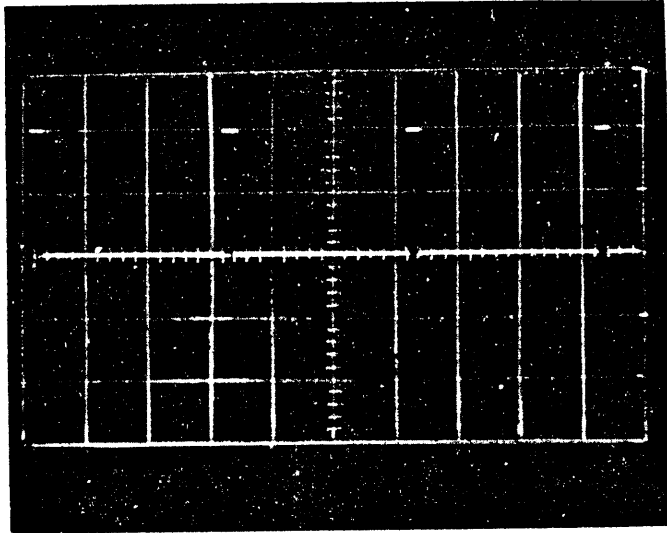
11



Oscilloscope  
connected to:-

TR1 collector  
on PCB E

Oscilloscope  
set to:-  
X10 probe  
0.2V/cm



12

Switch CHANNEL MODE to CH2

### X Amplifier

Adjust TRIGGER LEVEL to trigger the timebase

Oscilloscope  
connected to:-

Pin 7 on PCB F

Oscilloscope  
set to:- X10 probe

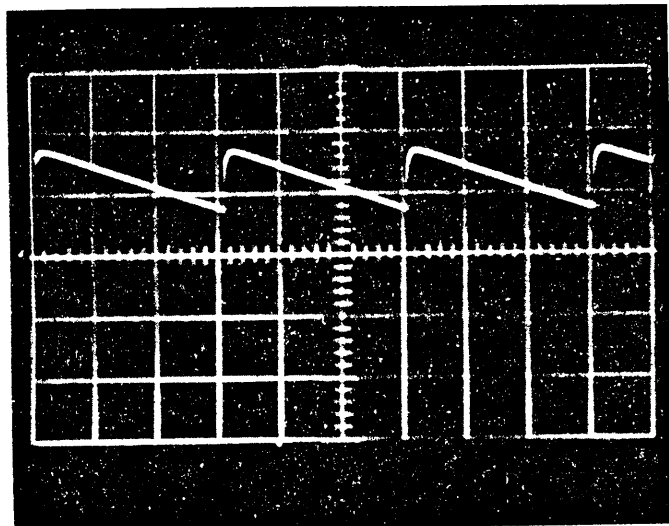
1V/cm  
-ve slope

Check that oscillogram No.10 is  
repeated

Connect an AVO on 100V d.c. range across pins 16 and 17 on PCB F  
and adjust Horizontal POSITION controls for 0V

Oscilloscope  
connected to:-  
Pin 16 on PCB F

Oscilloscope  
set to:-  
x 10 probe  
+ve slope  
5V/cm



13

CDU150-CT531/3

OSCILLOSCOPE

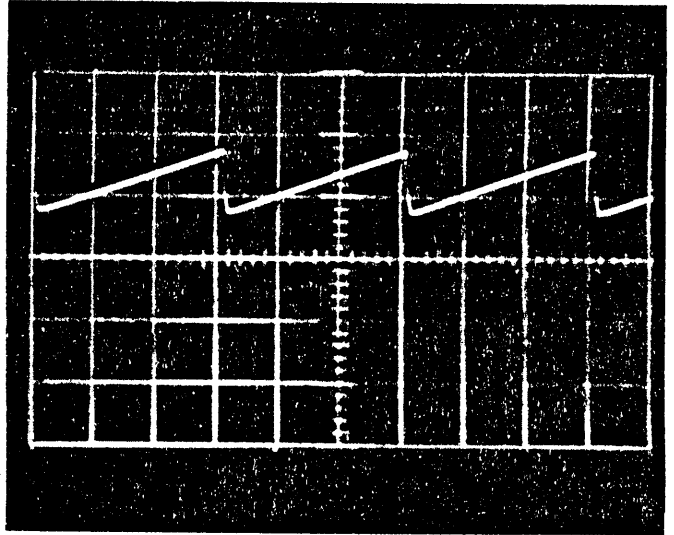
Oscilloscope  
connected to:-

Pin 17 on PCB F

Oscilloscope  
set to:-

-ve slope

14



Bright-up

Oscilloscope  
connected to:-

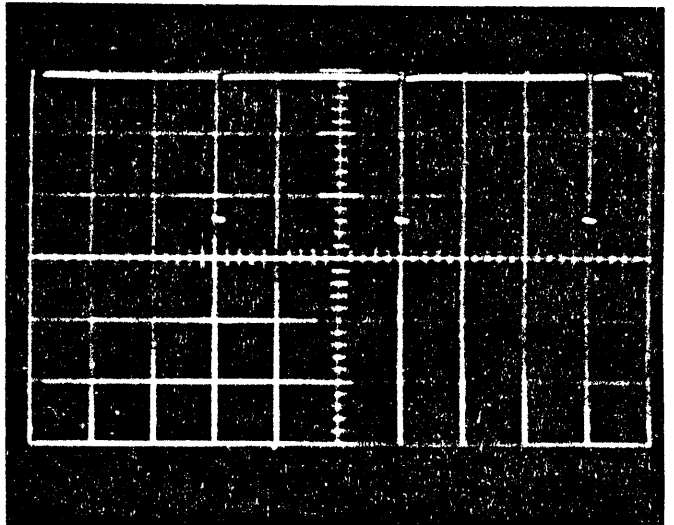
Pin 13 on PCB B

Oscilloscope  
set to:-

2V/cm

+ve slope

15



Set BRILL fully counterclockwise

Oscilloscope  
connected to:-

Pin 14 on PCB B

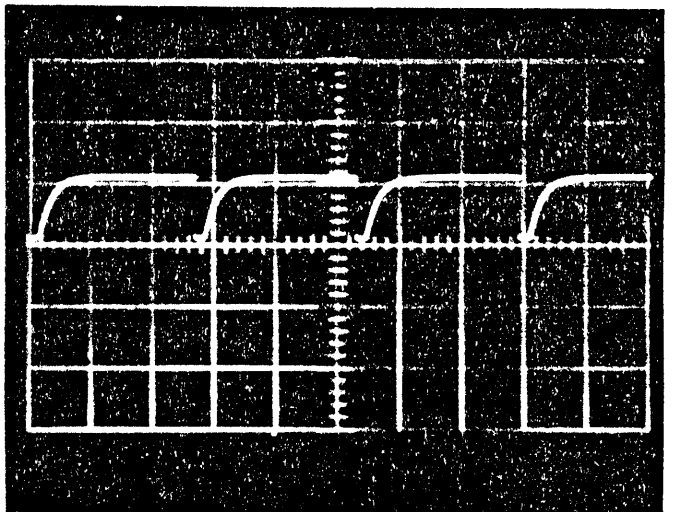
Oscilloscope  
set to:-

5V/cm

2 $\mu$ s/cm

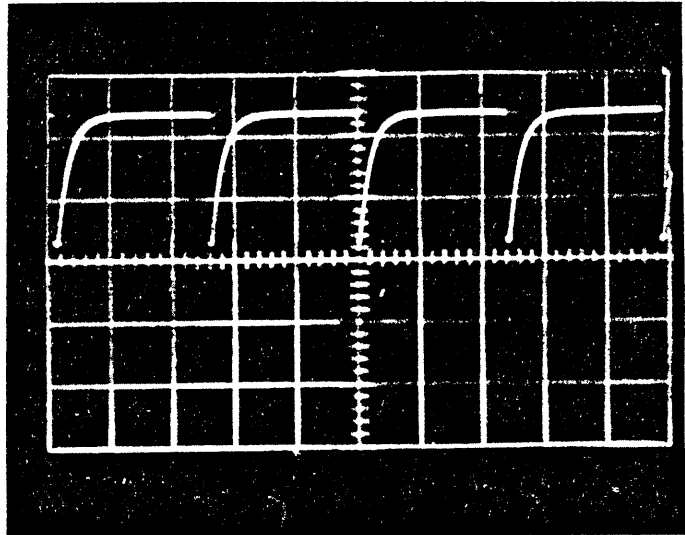
-ve slope

16



Set BRILL fully clockwise

Oscilloscope connected to:-	Oscilloscope set to:-
Pin 14 on PCB B	5V/cm
	2 $\mu$ s/cm
	-ve slope



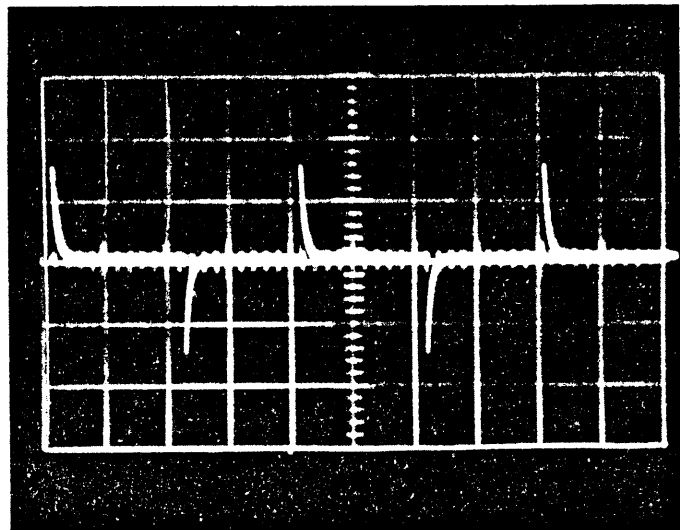
17

B Timebase

Set the controls as follows:-

TIMEBASE MODE	A BRIGHTENS B
A TIME/CM	1 $\mu$ s
B TIME/CM	10 $\mu$ s
DELAY MULTIPLIER	5.0

Oscilloscope connected to:-	Oscilloscope set to:-
Pin 5 on PCB D	0.2V/cm
	5 $\mu$ s/cm
	+ve slope



18

CDU150-CT531/3

OSCILLOSCOPE

Oscilloscope  
connected to:-

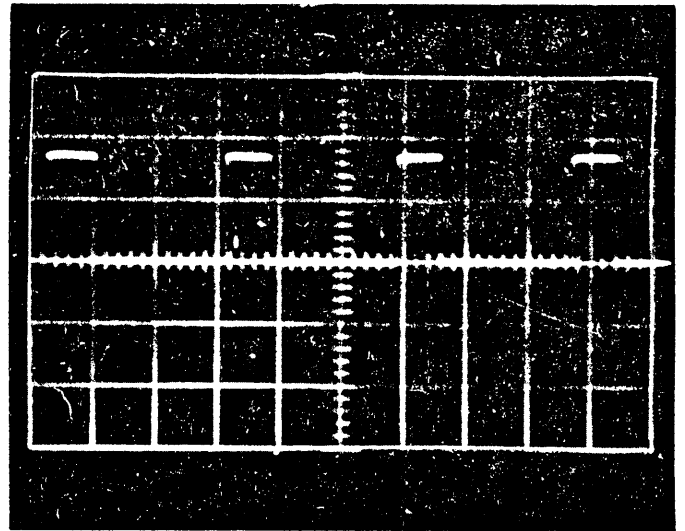
Pin 7 on PCB D

Oscilloscope  
set to:-

0.5V/cm

50 $\mu$ s/cm

19



Oscilloscope  
connected to:-

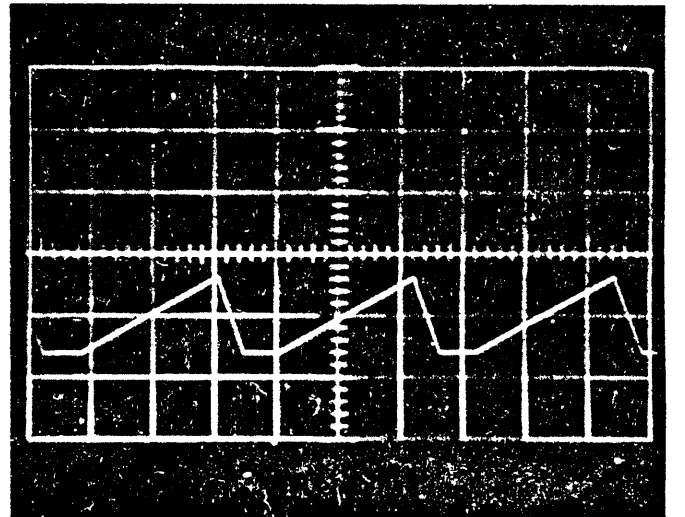
Pin 13 on PCB D

Oscilloscope  
set to:-

1.0V/cm

-ve slope

20



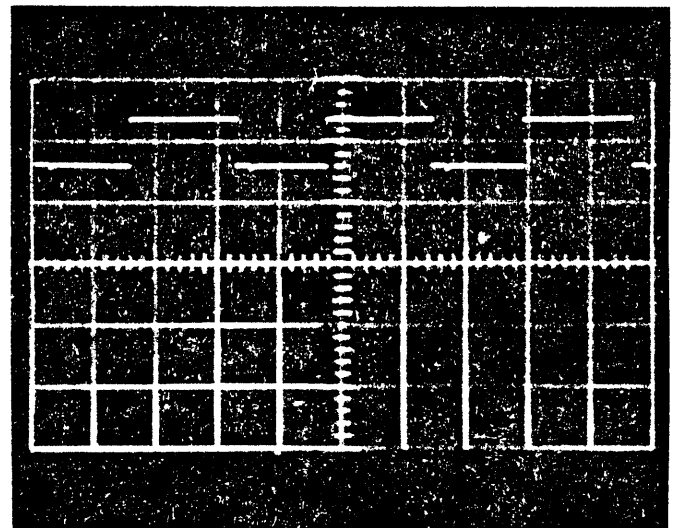
Oscilloscope  
connected to:-

Pin 14 on PCB D

Oscilloscope  
set to:-

0.5V/cm

21





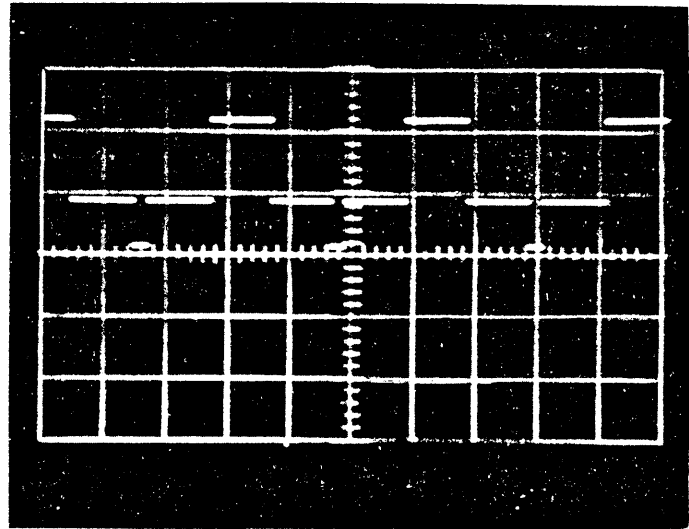
Oscilloscope  
connected to:-

Pin 1 on PCB D

Oscilloscope  
set to:-

0.2V/cm

+ve slope



22

### Auto Trigger

Set the controls as follows:-

TIMEBASE MODE A

TRIGGER MODE AUTO

Oscilloscope  
connected to:-

Pin 18 on PCB D

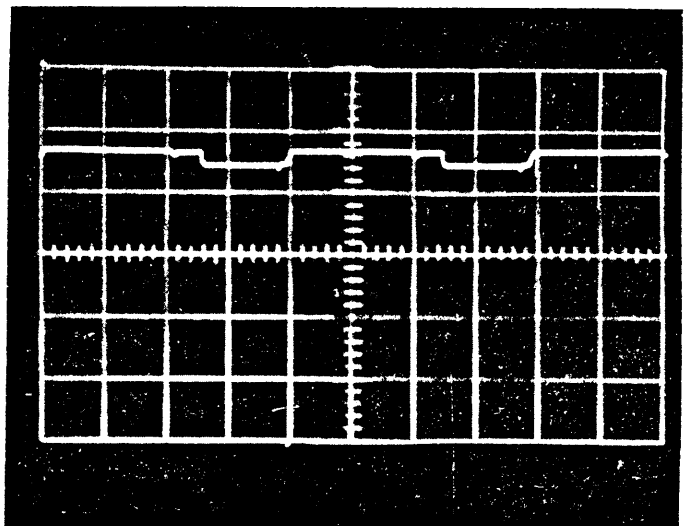
Oscilloscope  
set to:-

0.2V/cm

5 $\mu$ s/cm

+ve slope

Check that oscillogram No.8  
is repeated.



Pin 19 on PCB D

23

Remove input to CDU150-CT531/3 and check that a d.c. level of  
-1V is displayed on the oscilloscope.

## OSCILLOSCOPE

Gated

Set the controls as follows:-

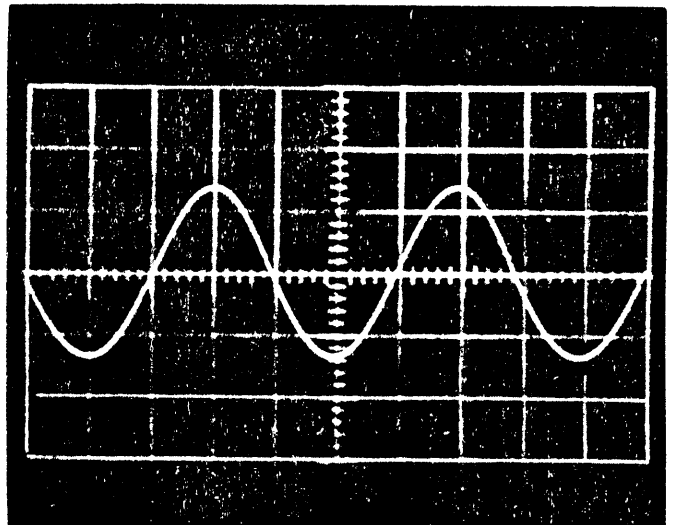
CH2 INPUT	AC	TRIGGER SOURCE	INT
CH2 SENSITIVITY	0.2V/cm	SLOPE	+VE
CHANNEL MODE	CH2	GATED SLOPE	+VE (In)
TRIGGER SELECTOR	NORMAL	TIMEBASE MODE	A
TRIGGER MODE	TRIG	A TIME/CM	5 $\mu$ s

Transfer the 1V p-p 50kHz input to CH2 INPUT. Adjust TRIGGER LEVEL to trigger the timebase. Set TIMEBASE MODE to GATED and rotate GATED TRIGGER LEVEL to trigger the timebase halfway up the +ve-going slope. Centre the trace using the CH2 POSITION control.

Oscilloscope  
connected to:-  
Pin 15 on PCB C

Oscilloscope  
set to:-  
(CH2)  
0.1V/cm

24

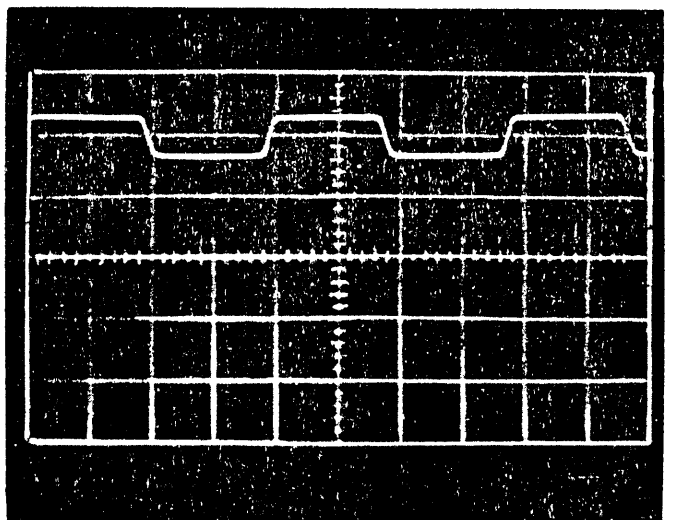


Switch TRIGGER SELECTOR to CH2. Oscilloscope display should remain stationary independent of CH2 POSITION control.

Oscilloscope  
connected to:-  
TR15 collector  
on PCB C

Oscilloscope  
set to:-  
0.5V/cm

25



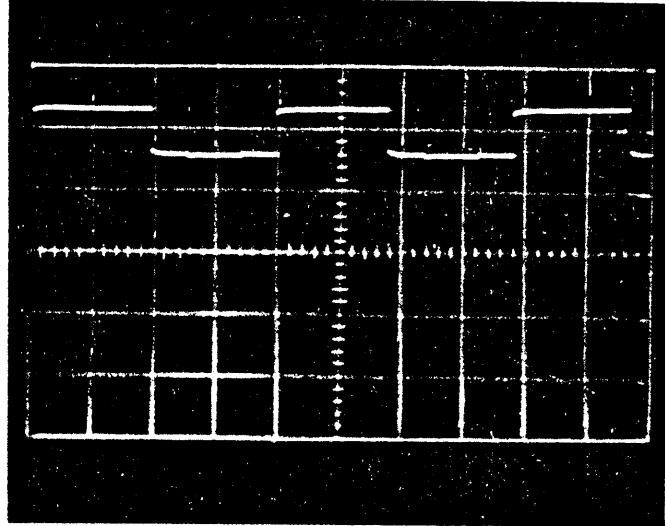
Oscilloscope  
connected to:-

TR21 collector  
on PCB C

Oscilloscope  
set to:-

0.5V/cm

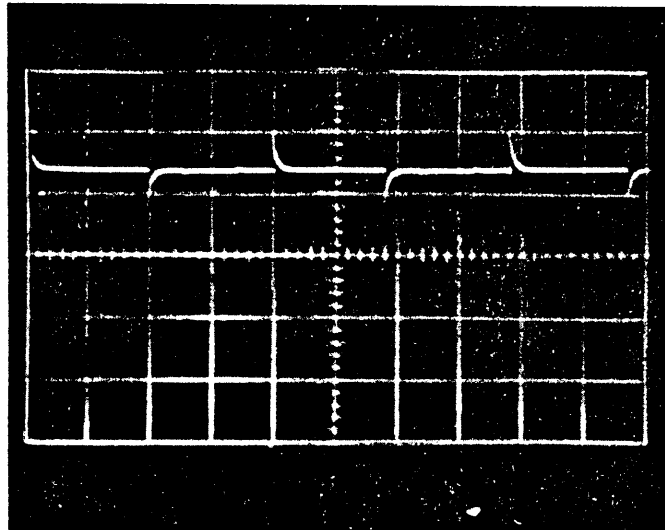
26



Oscilloscope  
connected to:-

Pin 20 on PCB C

27



Chopped

Set the controls as follows:-

TIMEBASE MODE     A  
CHANNEL MODE     CHOP

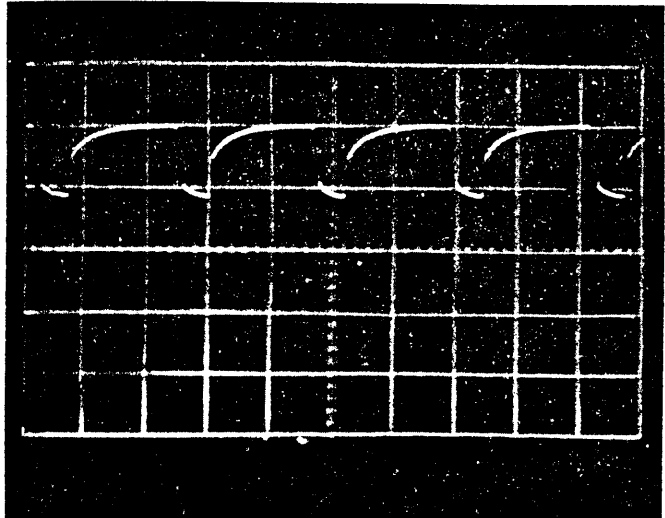
Oscilloscope  
connected to:-

PCB H2  
TR32 collector

Oscilloscope  
set to:-

0.5V/cm  
0.5 $\mu$ s/cm  
-ve slope

28



CDU150-CT531/3

OSCILLOSCOPE

Oscilloscope  
connected to:-

PCB H2

TR34 collector

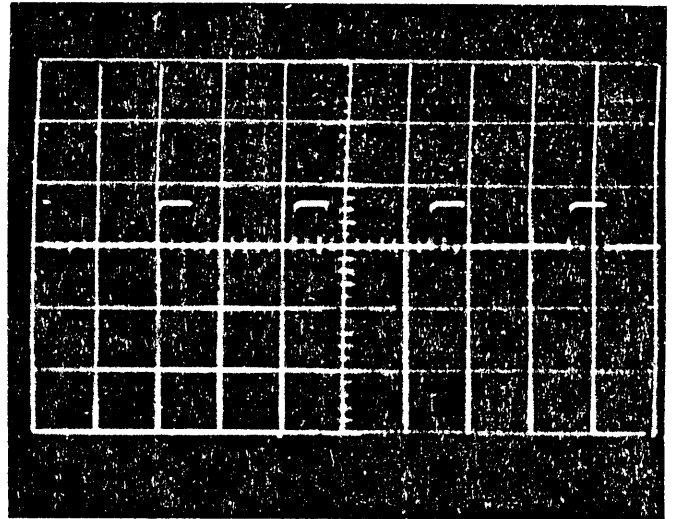
Oscilloscope  
set to:-

0.5V/cm

0.5 $\mu$ s/cm

-ve slope

29



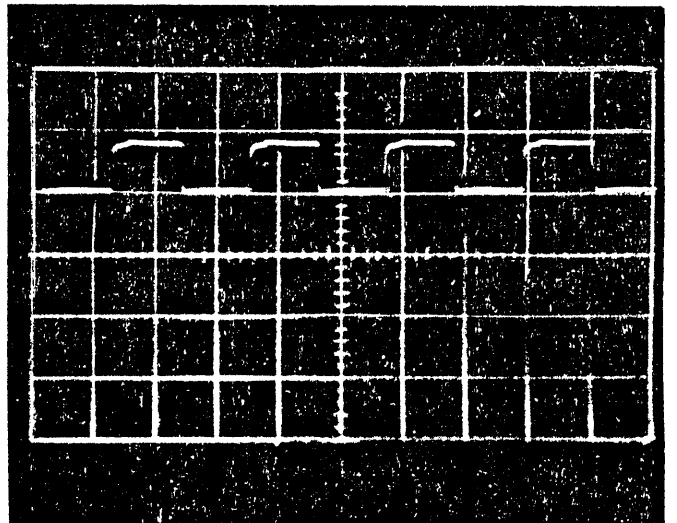
Oscilloscope  
connected to:-

PCB H2 Pin 1

Oscilloscope  
set to:-

1 $\mu$ s/cm

30



Y DEFLECTION SYSTEM

All measurements should be taken using an AVO. Model 8.

VOLTAGES ON PCB H1

TRANSISTOR			VOLTAGE	
			MIN	MAX
TR1	TR18	source	+ 0.1	+ 4.1
TR3	TR20	emitter	- 0.49	+ 3.49
TR7	TR24	base	+ 7.16	+ 8.44
TR7	TR24	collector	+ 6.46	+ 7.54
TR5	TR22	emitter	- 1.29	+ 2.97
TR10	TR27	collector	+ 0.6	+ 0.8
TR12	TR28	collector	+ 9.8	+10.2
TR12	TR88	emitter	+ 5.76	+ 6.94
TR14		base	+10.6	+10.9

VOLTAGES ON PCB H2

TR16		base	+14.5	+15.6
TR16		collector	+13.8	+14.9

VOLTAGES ON PCB G

TR1	TR2	base	+13.8	+14.9
TR1	TR2	collector	+11.4	+13.4
TR3	TR4	collector	+ 3.7	+ 5.3
TR9	TR10	collector	+ 9.6	+10.6
TR11	TR12	emitter	+11.6	+12.2
TR11	TR12	base	+12.3	+12.8
D3	D7	cathode	+60	+60*
TR14		base	+3.2	+5.4

\* This voltage is established by the Mean Plate Potential adjustment, see Section 4 Part 1, calibration. If it is in error, the calibration procedure should be carried out.

DISMANTLING

TO REMOVE COVERS:-

Remove four screws securing the rear cover. Remove four screws securing the bottom cover. Slacken the screws securing handle and side-trims and ease out both side covers.

PCB A:-

Release five captive screws securing the PCB and hinge forward about the cableform.

PCB B:-

Unsolder D15 from the terminal strip, R47 from pin 5, and the leads from pins 2 and 4. Release the five captive screws securing the PCB and hinge about the cableform.

PCB C:-

Unsolder the leads from pins 1, 2, 3 and 4 and from pins 21, 22 and 23. Unplug the green socket from the plug on the centre metalwork. Release the five captive screws and the PCB can be hinged towards the centre.

PCB D:-

Release the five captive screws securing the PCB which can then be pulled forward, easing it carefully past adjacent cableforms.

PCB E:-

Release the five captive screws securing the PCB and ease it carefully past adjacent cableforms. It will then hinge downwards.

PCB F:-

Unplug the five coloured sockets from the pins in the centre metalwork. Release the six captive screws securing the PCB and hinge it outwards.

PCB G:-

Unsolder the leads from pins 1 and 2. Release the two screws immediately above the PCB and also the screw at the rear left-hand corner of the Plate Selector Board. Hinge the board forward about the lower edge.

Plate Selector Board:-

First hinge forward PCB G as directed in the previous paragraph. Unplug the red and black sockets from the Y-plate pins of the CRT and hinge up the board part-way. Unplug the yellow and blue sockets from the X-plate pins of the CRT and hinge up the board to its full extent.

X Amp and Timebase Unit

Slacken the five front panel retaining screws.

Release the retaining clip and unplug the multiway connector (PL1/K) situated below the mains selector panel. Unplug the sockets (red, yellow, white, blue, black) on the top centre chassis member and the socket (green) on the bottom centre chassis member.

Release the two captive screws holding the rear of the unit to the centre chassis member, remove the five front panel securing screws. Carefully withdraw the unit.

Y Preamplifier Unit

From the bottom of the instrument, unsolder all leads from the edge of PCB H2 including the coaxial lead. Remove four screws, two from the bracket fixed to the centre partition and two from the side-member of the chassis, taking care not to drop the spacers into the instrument. Remove four screws from the corners of the front panel of the unit. Withdraw the unit.

PCB H1:-

Remove the Y preamplifier unit as above. Unsolder the two earth braids on the INVERT switch operating rods and remove the rods. Remove, without unwiring, RV7 and RV15 POSITION potentiometers and RV2 and RV9, GAIN potentiometers.

Unsolder R38 from the earth tag inside the unit and the leads from pins 18 and 19. Remove six screws securing the PCB which can then be lifted. Further leads may be unsoldered to attain the desired degree of freedom.

#### PCB H2:-

Remove the Y preamplifier unit as above. Remove the four corner securing screws and unsolder such leads as are necessary to achieve the desired degree of freedom.

#### PCB J1 & PCB J2:-

Removal of these boards entails complete dismantling of the preamplifier unit and should not be attempted.

#### Replacement of CRT:-

Hinge out PCB G and the Plate Selector Board (see above). Unplug the four deflector plate connectors and slacken the tube-neck clamp (if fitted) which appears through the tube screen adjacent to the Y-plate connectors. Remove the retaining stop (if fitted) from behind the tube base, and pull off the tube base taking care not to bend the tube pins. Remove the PDA connector (Red rubber) from the tube envelope just behind the front panel. Remove the bezel, graticule and filter by means of the four corner screws.

Push the tube forward from the rear and draw it out until the white twist-coil leads appear. Unsolder these and remove the tube.

Fit the new tube in the reverse order.

NOTE: The instrument will need recalibration if a new tube is fitted.  
See Section 4.



SECTION 5LAYOUTS, COMPONENT LISTS AND CIRCUIT DIAGRAMSINTRODUCTION

Circuit diagrams are drawn on a functional basis, each comprising a printed-circuit board and, in some cases, associated components mounted on one or more of the three main assemblies: Main Frame, X-amplifier and Timebase assembly, and Y-amplifier assembly. For example, the circuit diagram of the Low Voltage Power Supply Fig.5.4, consists of a printed-circuit board and a number of components on the Main Frame and on the X-amplifier and Timebase Assembly.

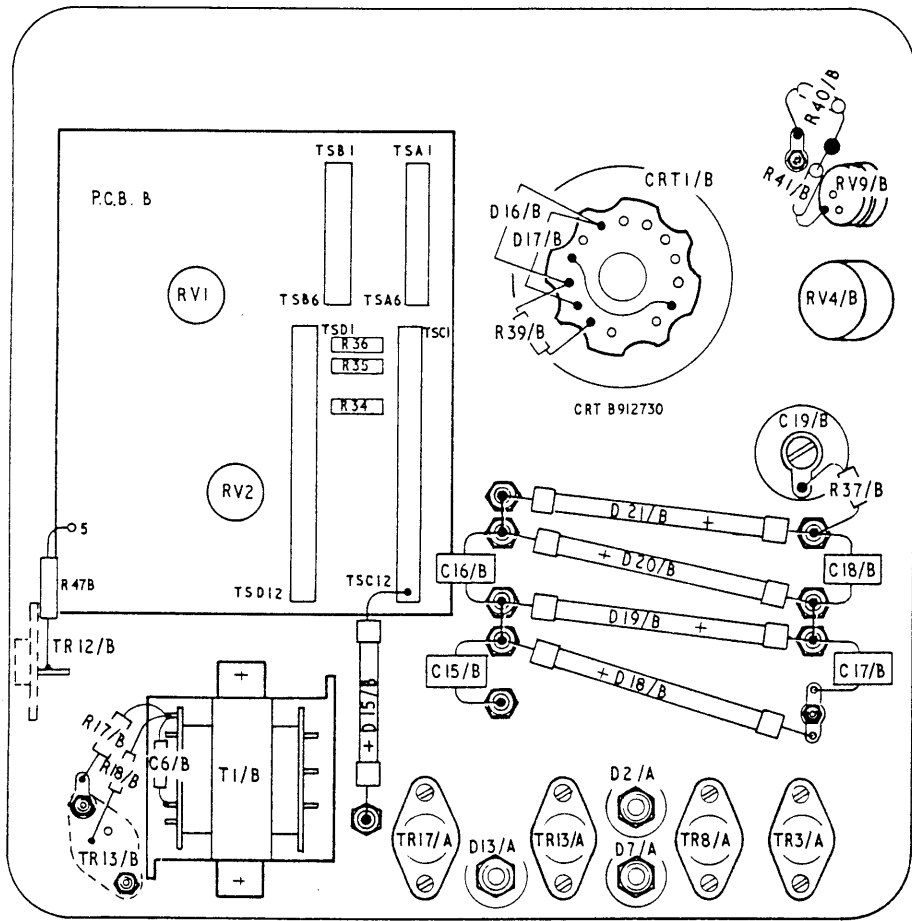
A component lists is provided for each functional circuit, given every component in the circuit diagram. A layout diagram facing the circuit diagram shows the location of components on the printed-circuit board; the location of other components is shown either on Fig.5.1 or 5.2. If the location of a component as shown on Fig.5.1 or Fig.5.2, this is indicated against the component in the component list, and the component detail is given in the component list adjacent to Fig.5.1 and Fig.5.2.

Each circuit has a reference letter, as listed on page (ii). These letters are used as a suffix to the circuit reference of those components not mounted on printed-circuit boards. The suffixes do not appear on the actual instrument.

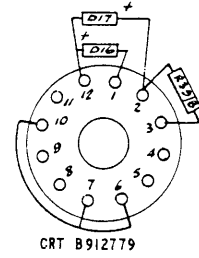
LIST OF SYMBOL USED

CC	Carbon Composition	HSP	Polystyrene
◀ HSC	Hi Stab Carbon	P	▶
O	Metal Oxide	PE	Polyester
F	Metal Film	PC	Polycarbonate
W	Wirewound	M	Mica
C	Ceramic	T	Tantalum
E	Electrolytic		

- NOTE: 1. Components lists show preferred Cossor Approved components, but other approved components may have been used during production.
2. ONLY approved switch lubricant is Electrolube 2 GA-X.



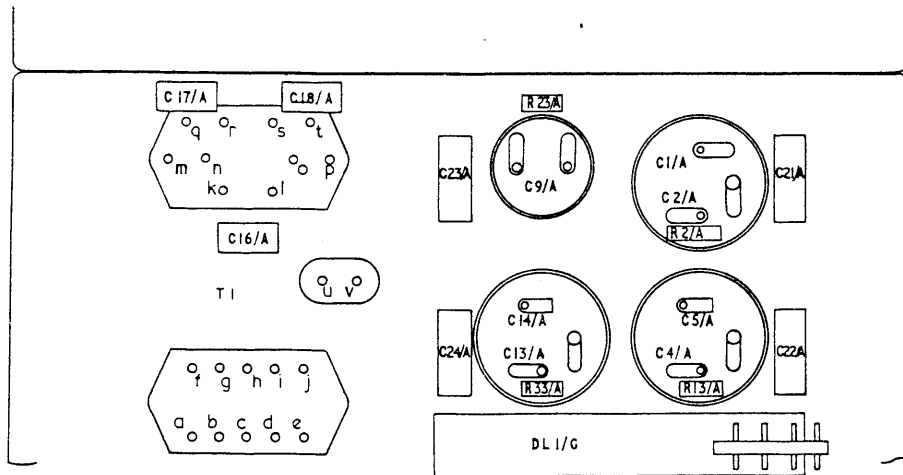
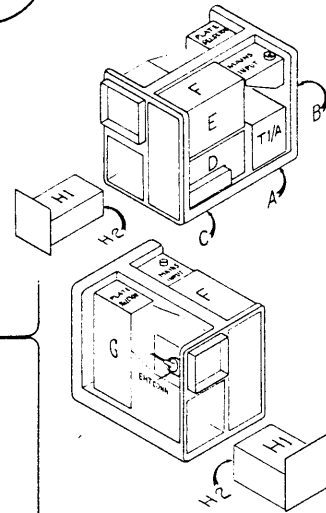
REAR VIEW WITH COVER REMOVED



CRT B912779

COMPONENTS NOT SHOWN

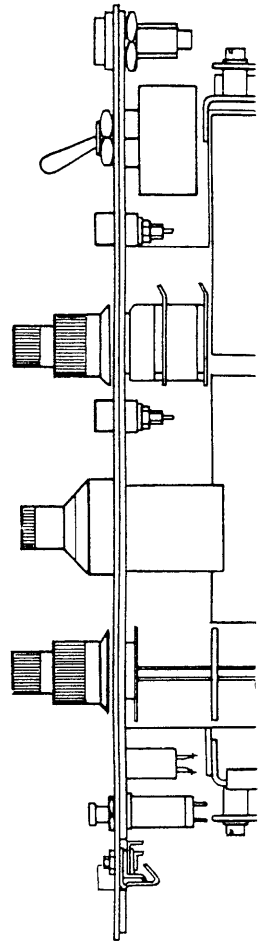
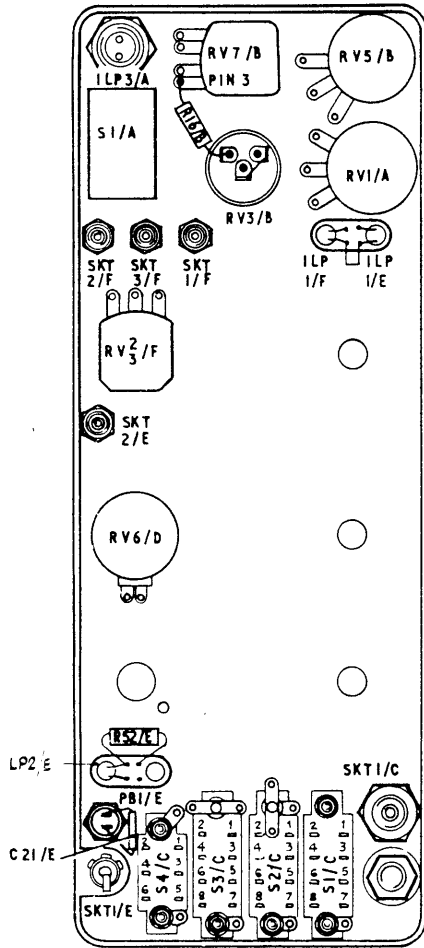
- T1/A AT RH SIDE OF CHASSIS
- FS1/A } AT TOP RIGHT REAR
- PL1/A } OF INSTRUMENT
- SKT1/A }
- VS1/A }
- ILP1/A } REAR OF FRONT PANEL
- ILP2/A }
- PL2 TO } CHASSIS TOP CENTRE
- PL6 } }
- PL7 CHASSIS BOTTOM CENTRE



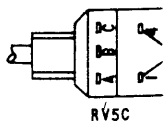
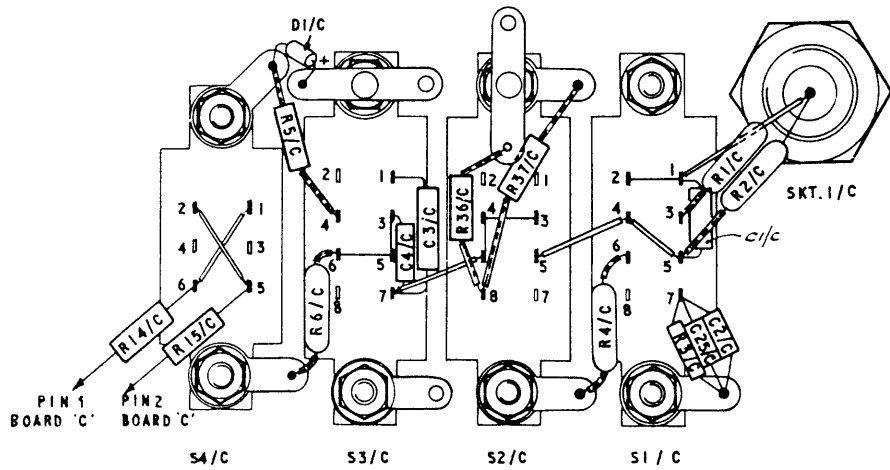
VIEW FROM BELOW , PCB 'A' REMOVED

FIG. 5.1.

MAIN FRAME ASSEMBLY

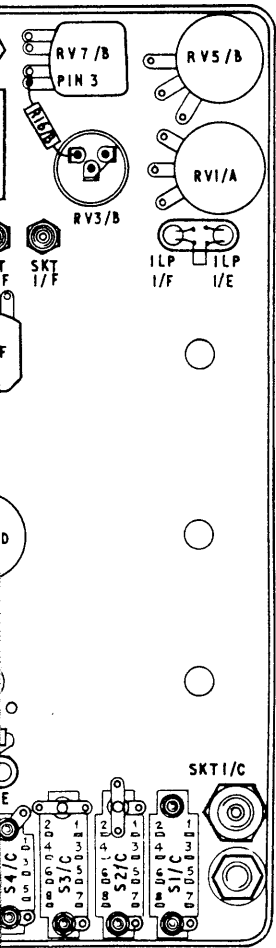


REAR VIEW OF FRONT PANEL

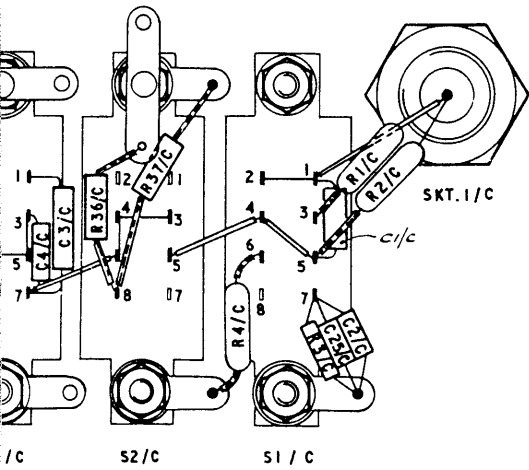


SCRAP VIEW SHOWING DETAILS OF WIRE LINKS & COMPONENTS FITTED TO SWITCHES.

SKT 1/ REAR VII

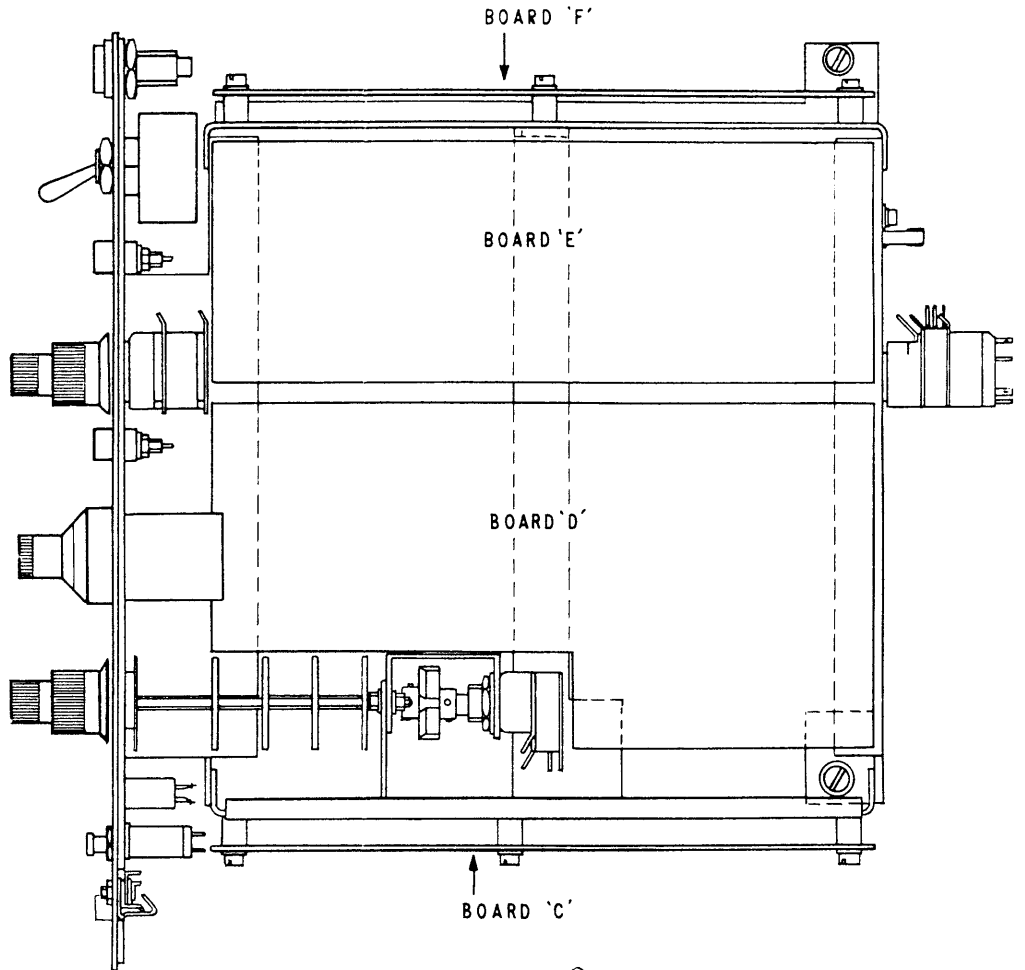


VIEW OF FRONT PANEL

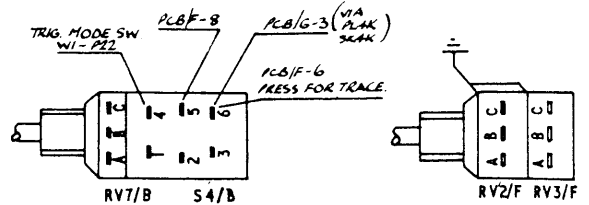
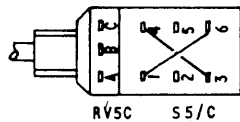
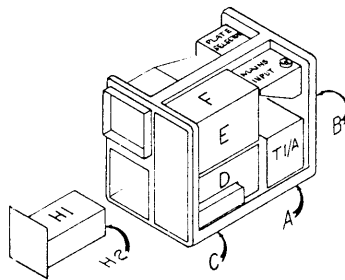


DETAILS OF WIRE LINKS  
CONNECTED TO SWITCHES.

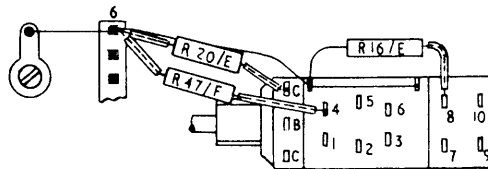
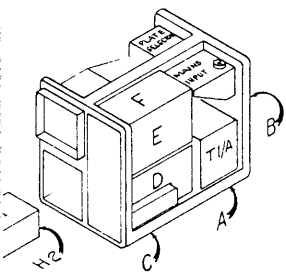
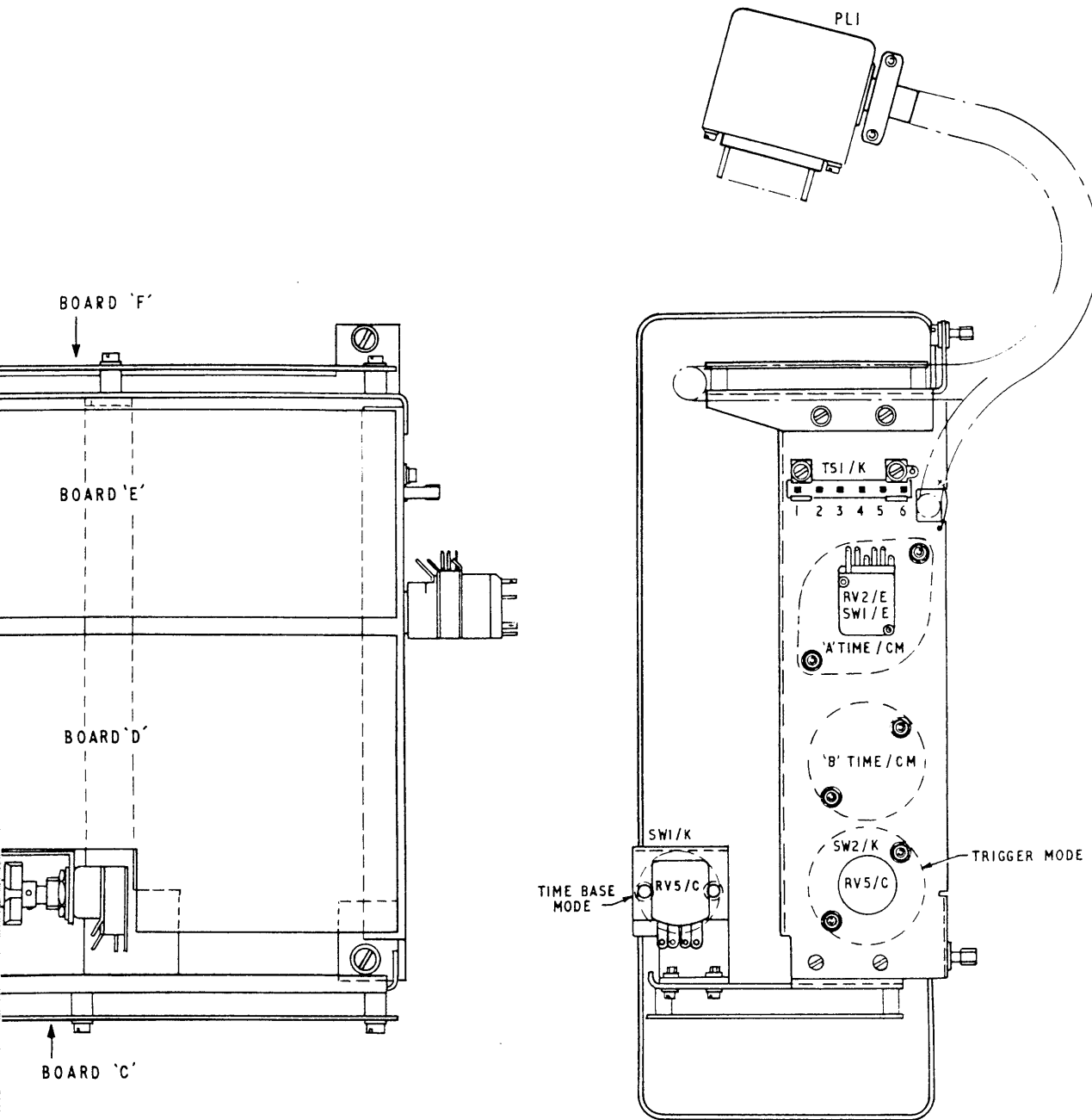
SKT 1/E  
REAR VIEW



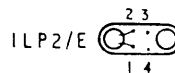
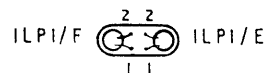
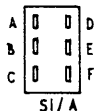
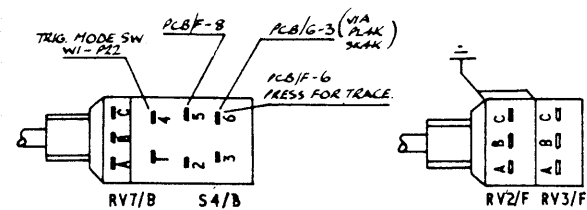
TIME 1  
MOD



'X' AMP & TIMEBASE

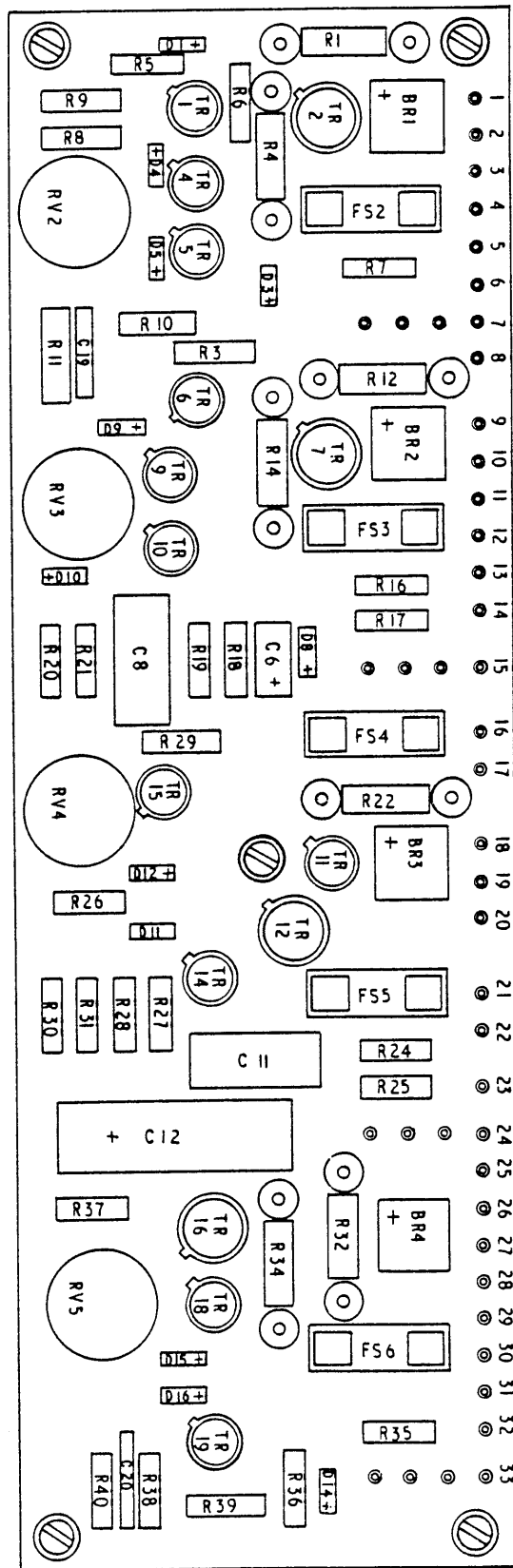


SKETCH SHOWING COMPONENTS CONNECTED TO RV2/E



'X' AMP & TIMEBASE

FIG. 5.2



C / SA80490 / 100

FIG. 5.3

PRINTED CIRCUIT BOARD 'A'

COMPONENT LISTSMAIN FRAME ASSY. D/SA 80490/120

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
		FIG. NO.			
	P.C.B. 'A' Assy.	5.3 & 5.4			C/SA 80490/100
	P.C.B. 'B' Assy.	5.5 & 5.6			C/SA 80490/83
	P.C.B. 'G' Assy.	5.15 & 5.16			C/SA 80490/104
	Plate Selector Bd.	5.5 & 5.6			C/SA 80490/110
<u>CATHODE RAY TUBES &amp; COMPONENTS</u>					
<u>EITHER</u>					
	C.R.T. Base				B912731
CRT1/B	Telefunken D14-131GH				B912730
L2/B	Twist Coil				B/GA 31988
R34/B	C	47K	5	1W	B912637/89
R35/B	C	680K	5	1W	B912748/5
R36/B	C	680K	5	1W	B912748/5
<u>OR</u>					
	C.R.T. Base				A912732
CRT1/B	MOV 1474B	(B913054 for OPT 02)			B912779
L2/B	Twist Coil				B832178
R34/B	CC	150K	5	1W	B912748/4
R35/B	CC	470K	5	1W	B912748/3
R36/B	CC	330K	5	1W	B912748/2
<u>CAPACITORS</u>					
C1/A ) C2/A )	E	( 500 ( 50	+50-20	200V	A912646
C4/A ) C5/A )	E	( 500 ( 50	+50-20	200V	A912646
C6/B C9/A	PE E	.047 2000	20 +50-20	250V 25V	B911476/7 A912647
C13/A ) C14/A )	E	( 500 ( 50	+50-20	200V	A912646
<u>See Note on page 5.1</u>					

COMPONENT LISTSMAIN FRAME ASSY. D/SA 80490/120

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>CAPACITORS (contd.)</u>					
C15/B	C	500p	+100-0	8kV	A912674
C16/A	PE	1	10	250V	B911477/8
C16/B	C	500p	+100-0	8kV	A912674
C17/A	PE	1	10	250V	B911477/8
C17/B	C	500p	+100-0	8kV	A912674
C18/A	PE	1	10	250V	B911477/8
C18/B	C	500p	+100-0	8kV	A912674
C19/B	C	500p	+50-20	20kV	A912651
C21/A	PE	1	10	250V	B911477/8
C22/A	PE	1	10	250V	B911477/8
C23/A	PE	1	10	250V	B911477/8
C24/A	PE	1	10	250V	B911477/8
<u>DIODES</u>					
D2/A	Zener Mullard BZY93C47	47V			B912407/34
D7/A	Zener Mullard BZY93C39	39V			B912407/32
D13/A	Zener Mullard BZY93C39	39V			B912407/32
D15/B	Selenium Rectifier STC K83/90D				C912679/2
D16/B	Silicon Fairchild IN916				B910086/2
D17/B	Silicon Fairchild IN916				B910086/2
D18/B	Selenium Rectifier STC K83/150/D				C912679/3
D19/B	Selenium Rectifier STC K83/150/D				C912679/3
D20/B	Selenium Rectifier STC K83/150/D				C912679/3
D21/B	Selenium Rectifier STC K83/150/D				C912679/3
<u>FUSES</u>					
FS1/A	Mains Input Slow-Blow	2A			A912423/17
- Size '00' Alert					
<u>LAMPS</u>					
IILP1/A	Bulb Lilliput Type 'A' )	Scale		6.3V	A912699/2
IILP2/A	Bulb Lilliput Type 'A' )			6.3V	A912699/2
<u>PLUGS</u>					
PL1/A	(S.B-104-74-AS-3PXSS) Smart & Brown				A912724/1
PL1/K	See page 5.9				
PL2K to )	6 off for flying leads				A912695/1
PL7K )	Oxley 50 FP 156				

See note on page 5.1

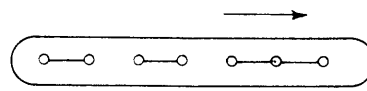


R				
C				
TR				
MISC.	VSI,	SI,	FSI,	PL1, SKT1, ILP1, ILP2, ILP3, RV

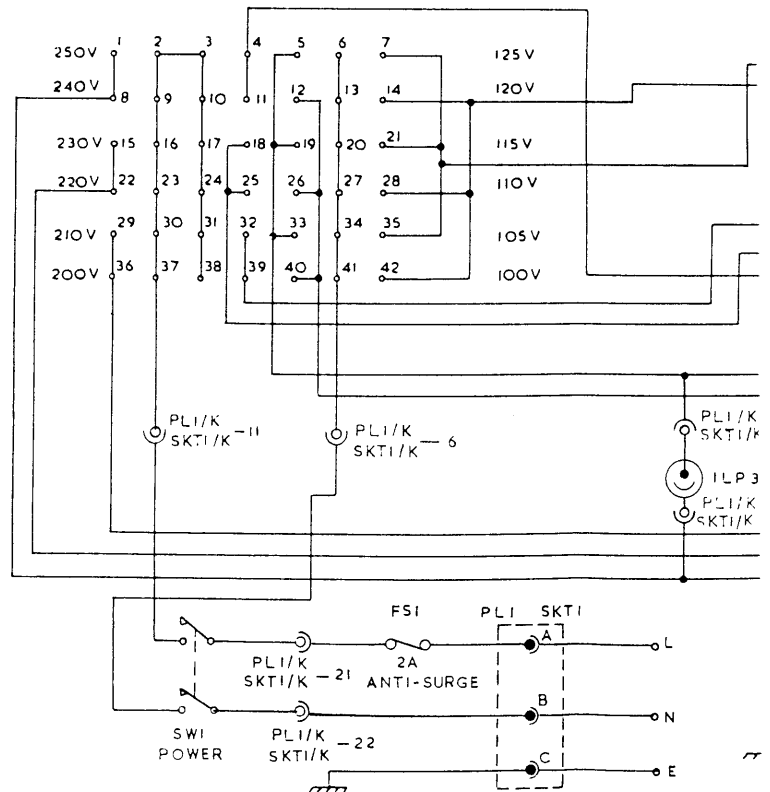
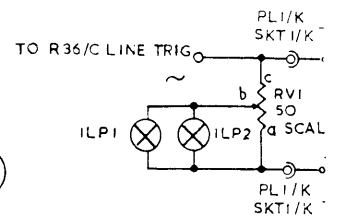
TO CRT1/B PIN1

6-3V

CRT. H  
TO CRT1/B PIN 2

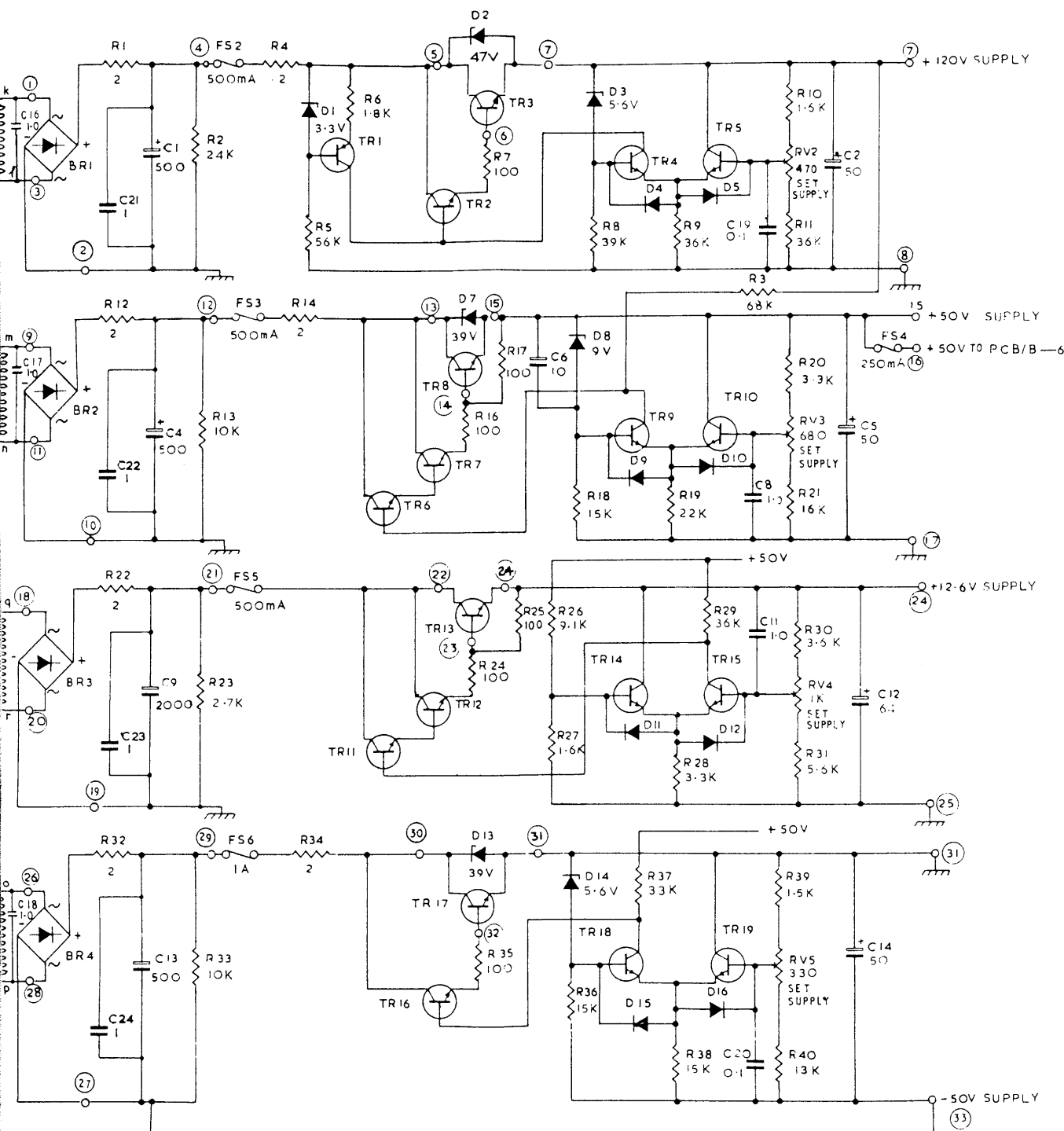


VOLTAGE SELECTOR  
VSI





32, 1, 12, 22, 2, 13, 4, 14, 34, 5, 6, 16, 24, 35, 7, 17, 25, 26, 27, 36, 18, 8, 28, 37, 9, 19, 38, 29, 3, 10, 11, 21, 31,	R
17, 18, 21, 22, 23, 24, 1, 4, 9, 13, 6, 19, 20, 8, 11, 2, 5, 12, 14,	C
2, 12, 8, 1, 11, 6, 16, 7, 13, 17, 3, 18, 11, 9, 4, 5, 10, 15, 19,	TR
BR1, BR2, BR3, BR4, FS2, FS3, FS5, FS6, DI, D7, D2, D13, D14, D8, D3, D9, D11, D15, D4, D5, D10, D12, D16, RV2, RV3, RV4, RV5, FS4,	MISC.



LOW VOLTAGE POWER SUPPLY  
CIRCUIT REFERENCE 'A'  
D/CD80490/5

FIG. 5.4

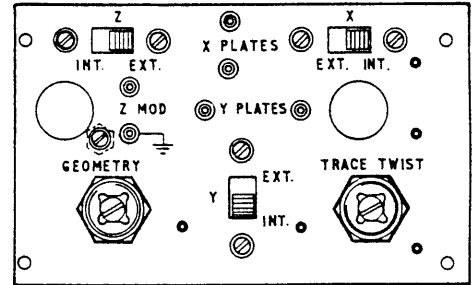
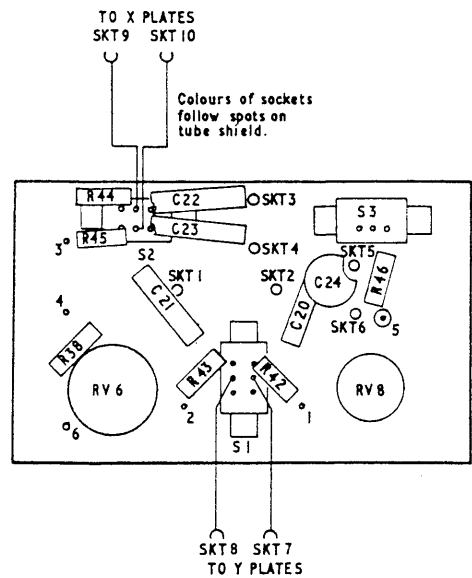
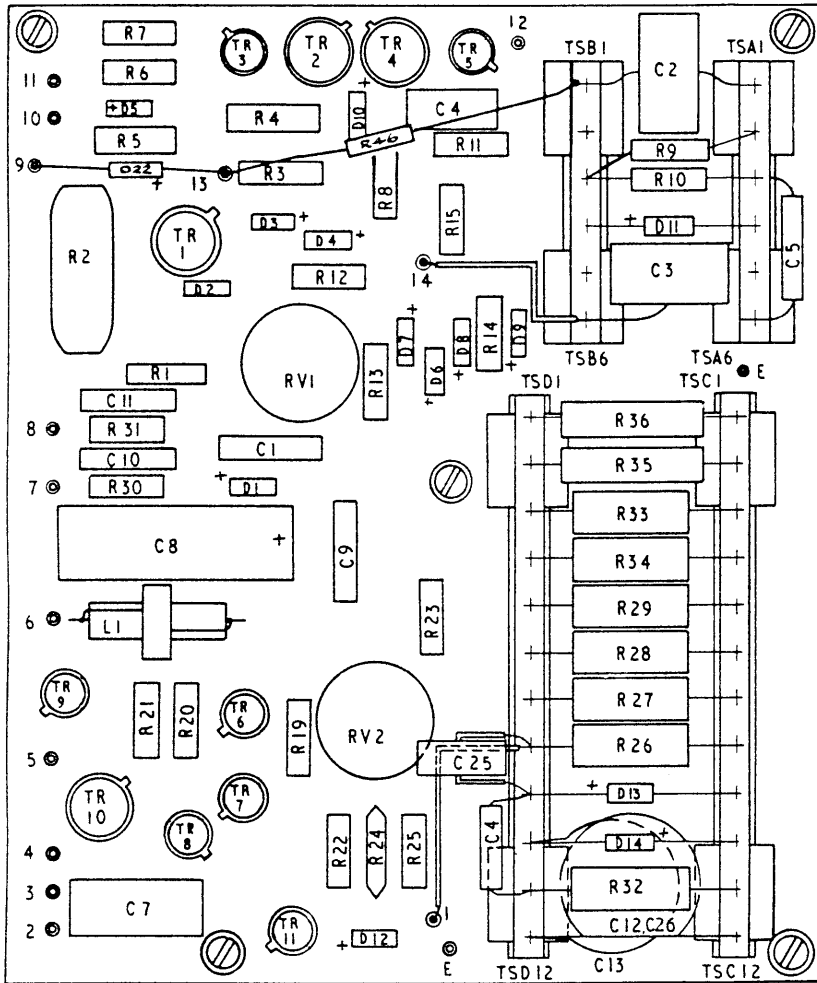
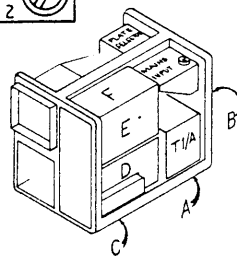


PLATE SELECTOR BOARD



C/SA 80490/83

FIG.5.5

PRINTED CIRCUIT BOARD 'B'

COMPONENT LISTSMAIN FRAME ASSY. D/SA 80490/120

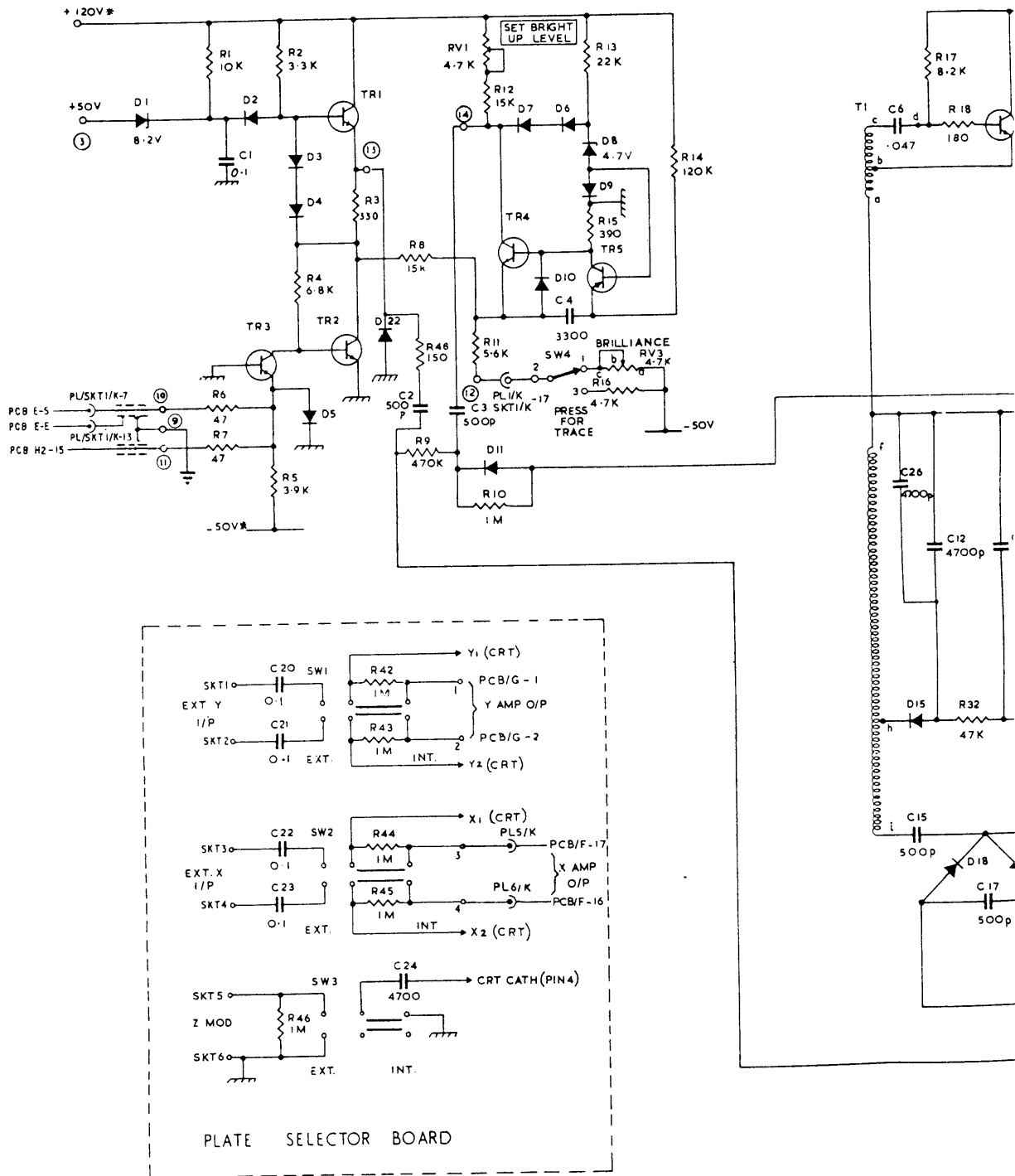
CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS</u>					
R2/A	0	24K	10	1W	5905-99-013-5779
R13/A	HSC	10K	5	$\frac{1}{2}$ W	B912636/73
R17/B	HSC	8.2K	5	1W	B912637/71
R18/B	HSC	180	5	$\frac{1}{2}$ W	B912636/31
R23/A	HSC	2.7K	5	$\frac{1}{2}$ W	B912636/59
R33/A	HSC	10K	5	$\frac{1}{2}$ W	B912636/73
R37/B	HSC	4.7M	10	$\frac{1}{2}$ W	B912748/1
R39/B	HSC	100K	5	$\frac{1}{2}$ W	B912636/97
R40/B	HSC	47K	5	$\frac{1}{2}$ W	B912636/89
R41/B	HSC	47K	5	$\frac{1}{2}$ W	B912636/89
R47/B	0	100	5	$\frac{1}{2}$ W	B912636/25
<u>RESISTORS, VARIABLE</u>					
RV4/B	Davall Type 60	100K	20		B912643/6
RV9/B	Morganite U	150K	20		B912749/2
<u>SOCKETS</u>					
SKT1/K	25 Way McMurdo X525 Latch (to secure plug)				B96164/4 A912720
<u>TRANSFORMERS</u>					
T1/A	Mains Transformer				KA31881/
T1/B	E.H.T. Transformer				KA31914/
<u>TRANSISTORS</u>					
TR3/A	2N3054				B99160/2
TR8/A	2N3054				B99160/2
TR12/B	2N3054				B99160/2
TR13/A	2N3054				B99160/2
TR13/B	2N3583				C912306/1
TR17/A	2N3054				B99160/2

See Note on page 5.1

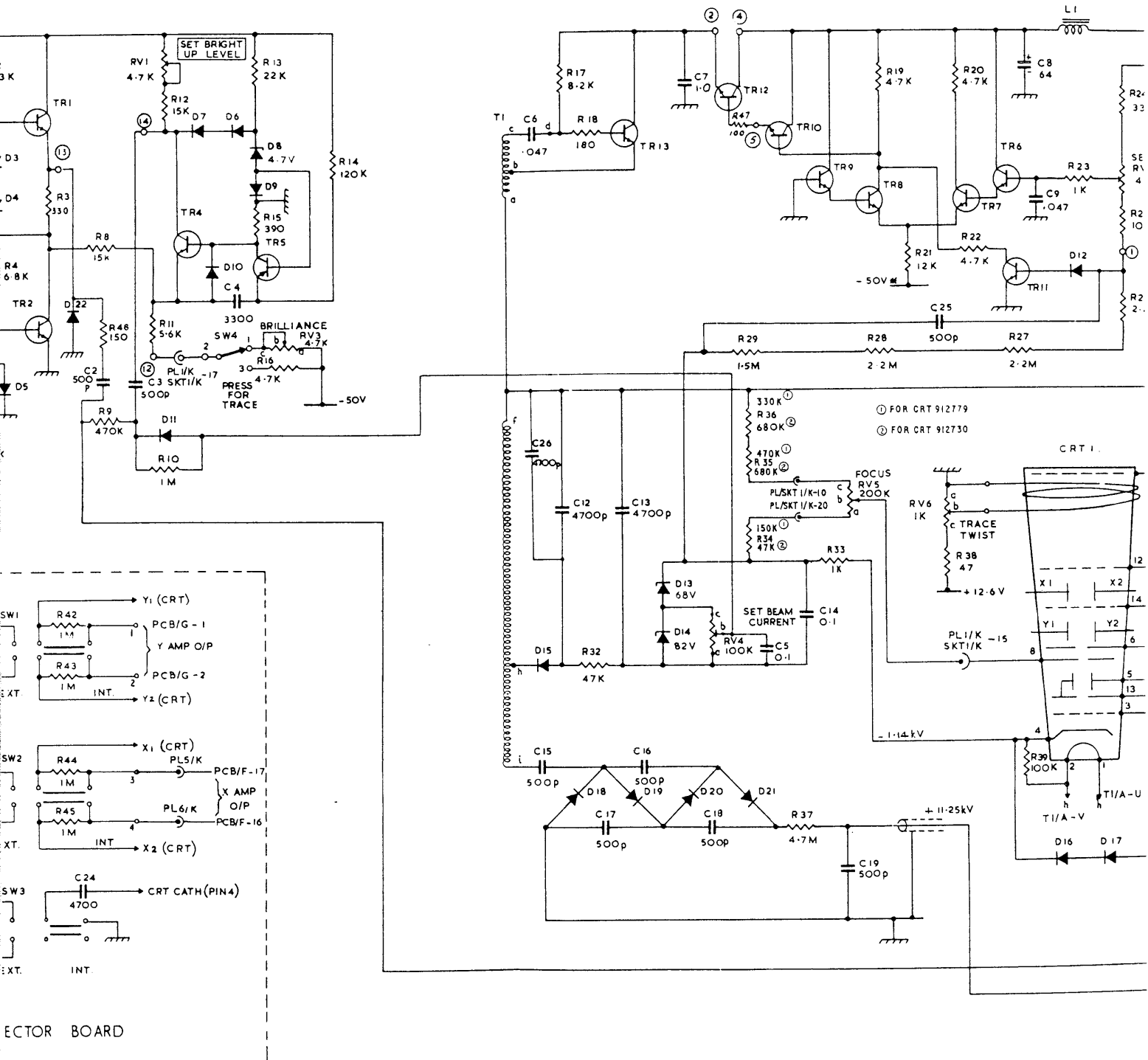
COMPONENT LISTSMAIN FRAME ASSY. D/SA 80490/120

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>MISCELLANEOUS</u>					
DL1/G	Delay Line Assy.				C/SA80490/140
VS1/A	Voltage Selector Assy. Containing McMurdo B279002/A				A/SA80490/138 P 912776
	Insulating Kit, Zener Diodes, (3 off)	Lucas 54006108			A912744
	Transistor Mounting Kit (TO-66) (6 off)				A912745
	Fuseholder (FS1/A) Size '00'	Belling & Lee L1596			A911939
	Lamp Holder (ILP1/A & ILP2/A)	Radiospares L.E.S.			A912759
	Capacitor Clamp (3 off)				A912722/2
	Capacitor Clamp (1 off)				A912722/1
	Potentiometer Lock	2 off			KS93660
	Tube Screen				D912774
	Anode Connector Assy. including Connector Cable UR 43 (2 ft.)				B/SA80490/139 A912738 1345-612-010
<u>See note on page 5.1</u>					

R	1, 6, 7, 5, 46, 2, 4, 43, 45, 9, 8,	42, 44, 3,	10, 11, 12,	13, 15, 16,	17, 18, 32,
C	1,	20, 22, 21, 23,	24, 2,	3,	4, 6, 15, 12, 17, 13, 1
D	1,	2, 3, 4, 5,	D22	11, 7, 10, 6, 8, 9,	26, 15, 18, 19,
MISC	TR3, SW1, SW2, TR2, TR1,	RV1, TR4,	TR5,	T1,	TR13,



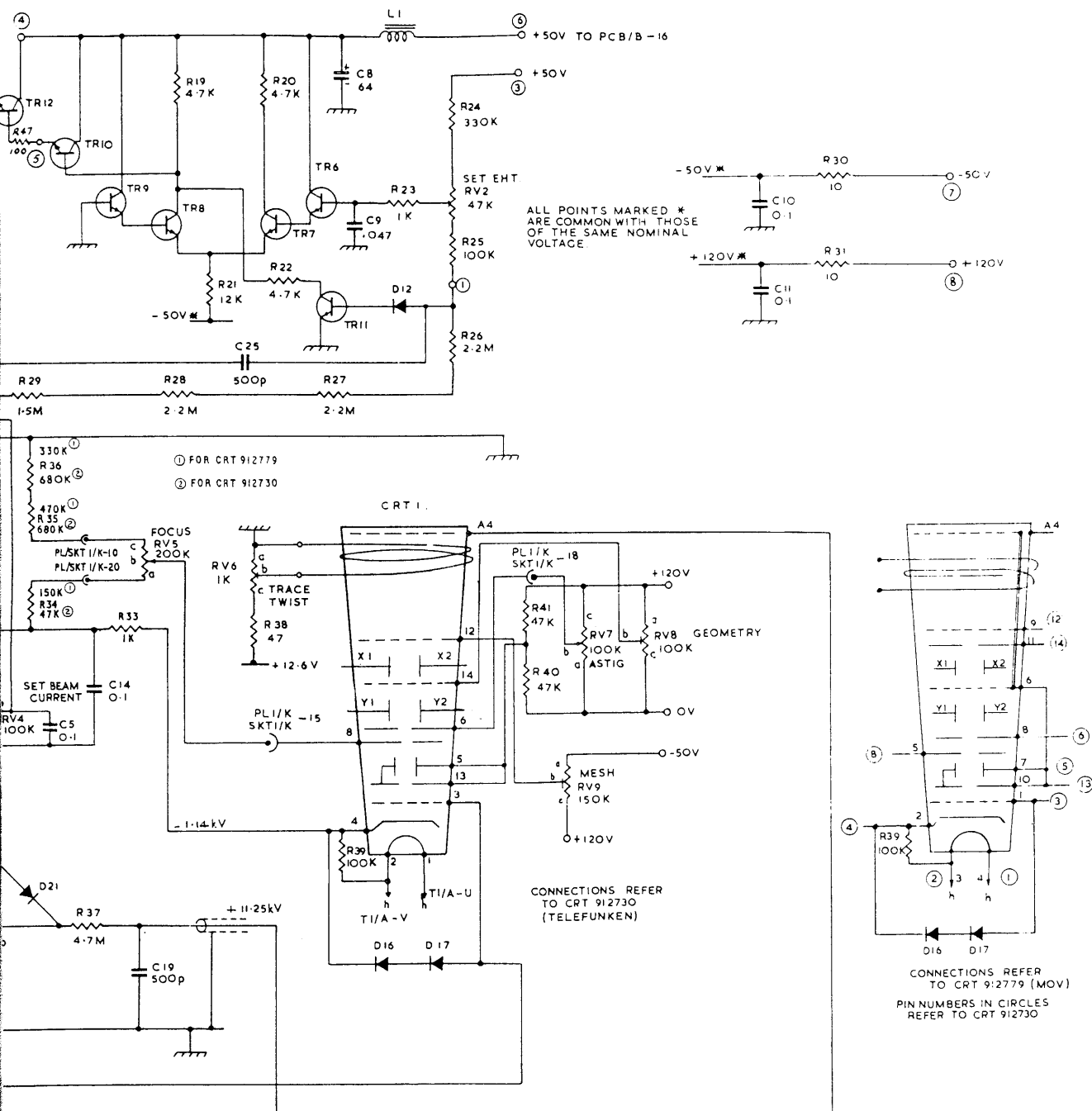
42, 44, 3,	13,	47, 36, 29,	28,	38,	21
43, 45, 9, 8,	10, 11, 12,	17, 18, 32,	35, 34,	19, 21,	20, 22, 27, 39,
24, 2,	3,	4,	6, 15, 12,	17, 13, 16,	7, 18,
5,	14,	19,	25,	8, 9,	
22,	11,	7, 10, 6,	8, 9,	26,	15,
18,	19, 13, 14, 20,	21,	16, 12, 17,		
2, TR2, TR1,	RV1, TR4,	TR5,	TI,	TR13,	RV4, TR12, RV5, TR10, TR9,
					TR8, RV6, TR7, TR6, TR11, LI,
					RV2



RECTOR BOARD



7, 36, 29,	28,	38,	25,	41,	
35, 34,	19, 21,	20, 22,	24, 26,	40,	30, 31,
5	14,	19,	25,	8, 9,	10, 11,
21,				16, 12, 17	
TR12, RV5, TR10, TR9,	TR8,	RV6, TR7, TR6, TR11,	L1,	RV2,	RV9, RV7, RV8,
					MISC



EHT & BLANKING  
CIRCUIT REFERENCE 'B'

FIG. 5.6

D/CD80490 SHT. 6

For Service Manuals  
MAURITRON SERVICES  
8 Cherry Tree Road, Chinnor  
Oxfordshire, OX9 4QY.  
Tel (01844) 351694  
Fax (01844) 352554  
email:- sales@mauritron.co.uk

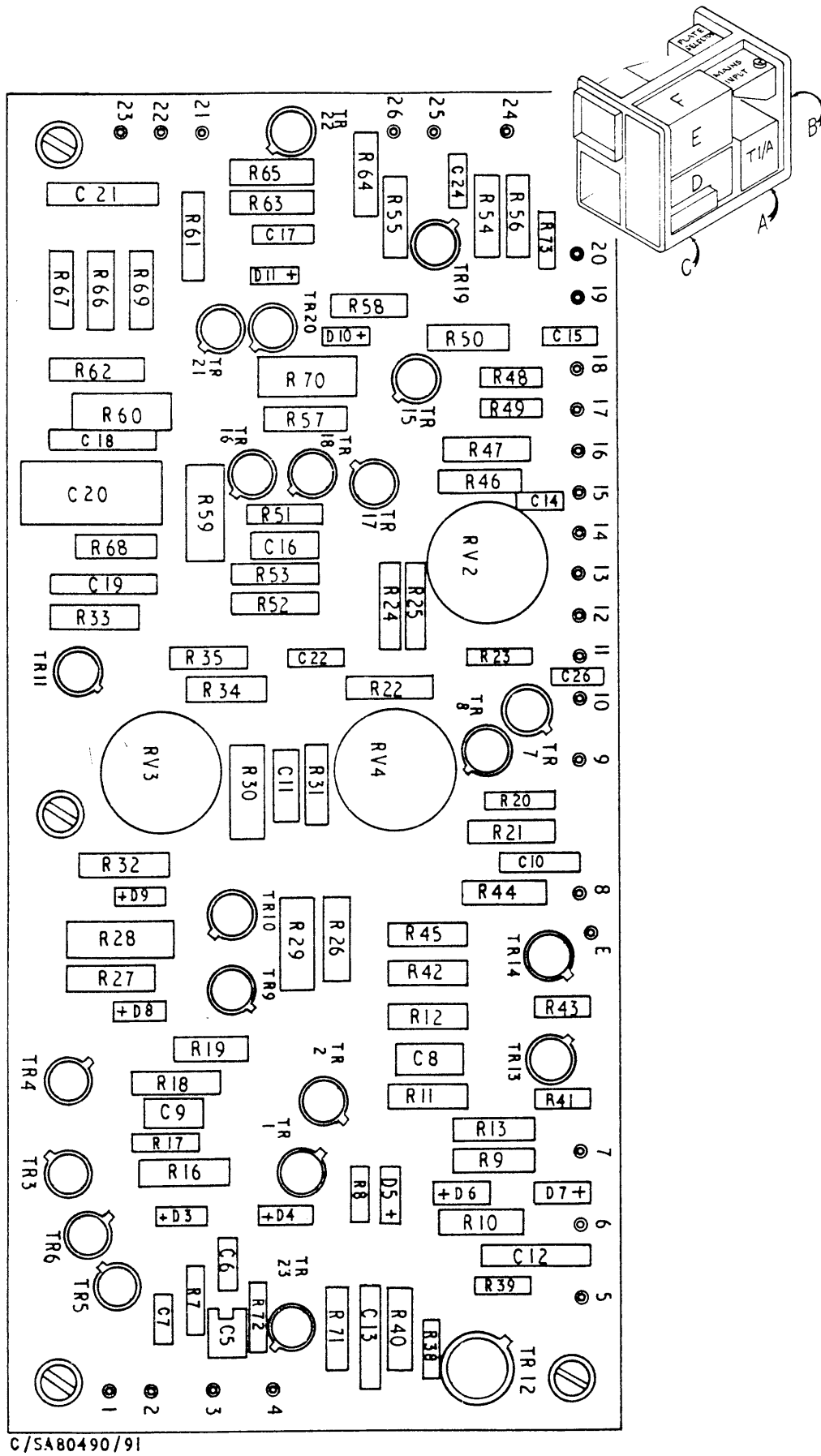


FIG. 5.7

PRINTED CIRCUIT BOARD 'C'

COMPONENT LISTSX AMP AND TIME BASE ASSY. D/SA 80490/96

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
		FIG. NO.			
	P.C.B. 'C' Assy	5.7 & 5.8			C/SA80490/91
	P.C.B. 'D' Assy	5.9 & 5.10			C/SA80490/85
	P.C.B. 'E' Assy	5.11 & 5.12			C/SA80490/87
	P.C.B. 'F' Assy	5.13 & 5.14			C/SA80490/102
	Switch Assy (B TIME/CM)	5.10			B/SA80490/127
	Switch Assy (A TIME/CM)	5.12			B/SA8049 /126
<u>CAPACITORS</u>					
C1/C	HSP	33p	5	630V	B912701/1
C2/C	HSP	180p	5	125V	B910931/107
C3/C	C	0.01	+80-20	750V	B910976/2
C4/C	C	100p	10	750V	C96964/85
C21/E	C	0.01	+80-20	100V	B911711/10
C25/C	HSP	100p	2.5	160V	B910931/18
<u>DIODES</u>					
D1/C	Silicon Fairchild	IN916			B910086/2
<u>LAMPS</u>					
ILP1/E	Neon Lire	NM2L-Uncal			A912698
ILP1/F	Neon Lire	NM2L-X5MAG			A912698
ILP2/E	Neon Lire	NM2L-Single Sweep			A912698
ILP3/A	Mains Neon	Guest LS1-B			A912700
<u>RESISTORS</u>					
R1/C	F	1.125M	1		B912160/93
R2/C	F	900K	1		B912160/91
R3/C	F	111K	1		B912160/81
R4/C	F	1M	1		B912160/88
R5/C	HSC	100K	5	$\frac{1}{2}$ W	B912636/97

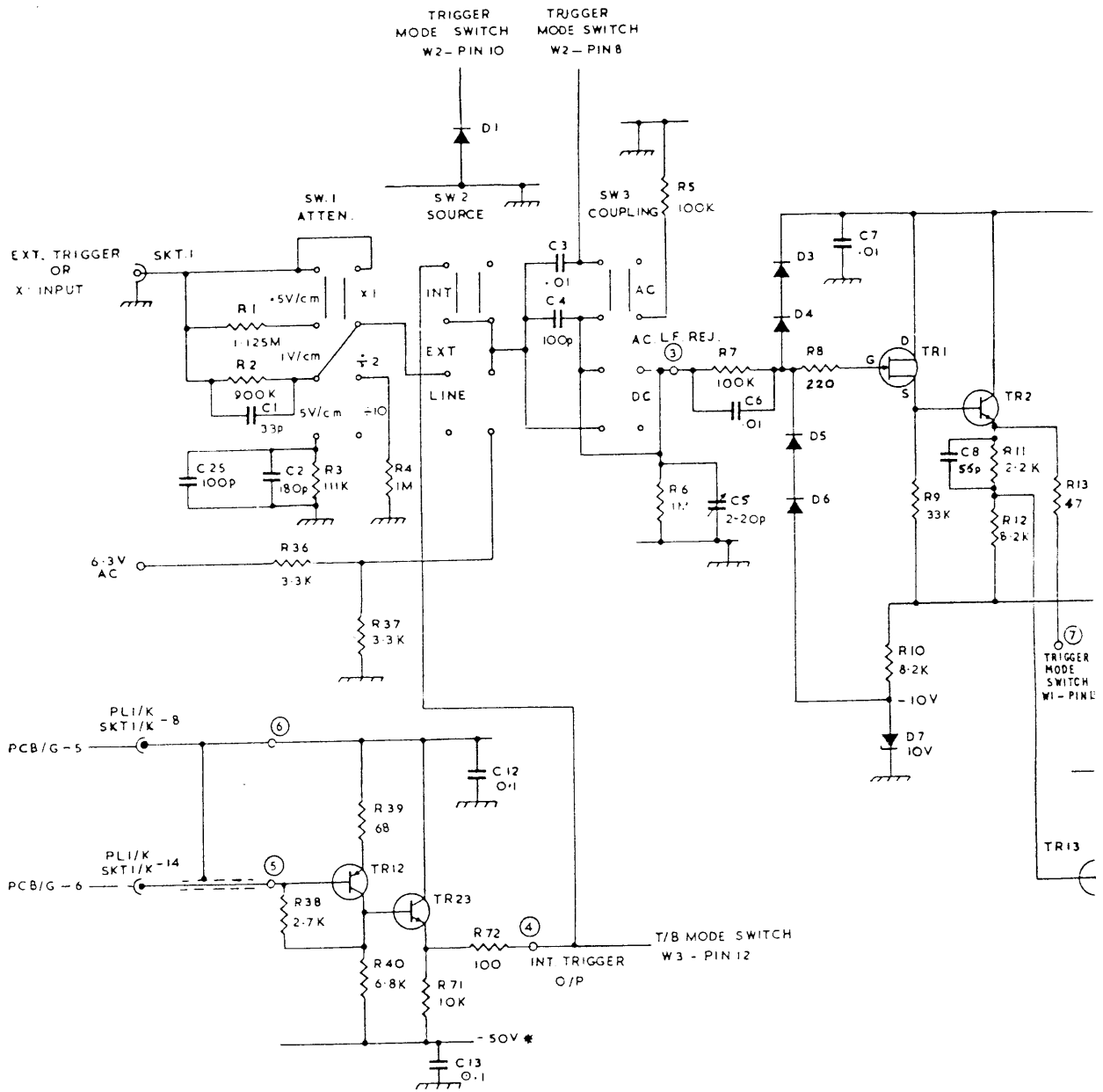
See note on page 5.1

For Service Manuals  
**MAURITRON SERVICES**  
 8 Cherry Tree Road, Chinnor  
 Oxfordshire, OX9 4QY.  
 Tel (01844) 351694  
 Fax (01844) 352554  
 email:- sales@mauritron.co.uk

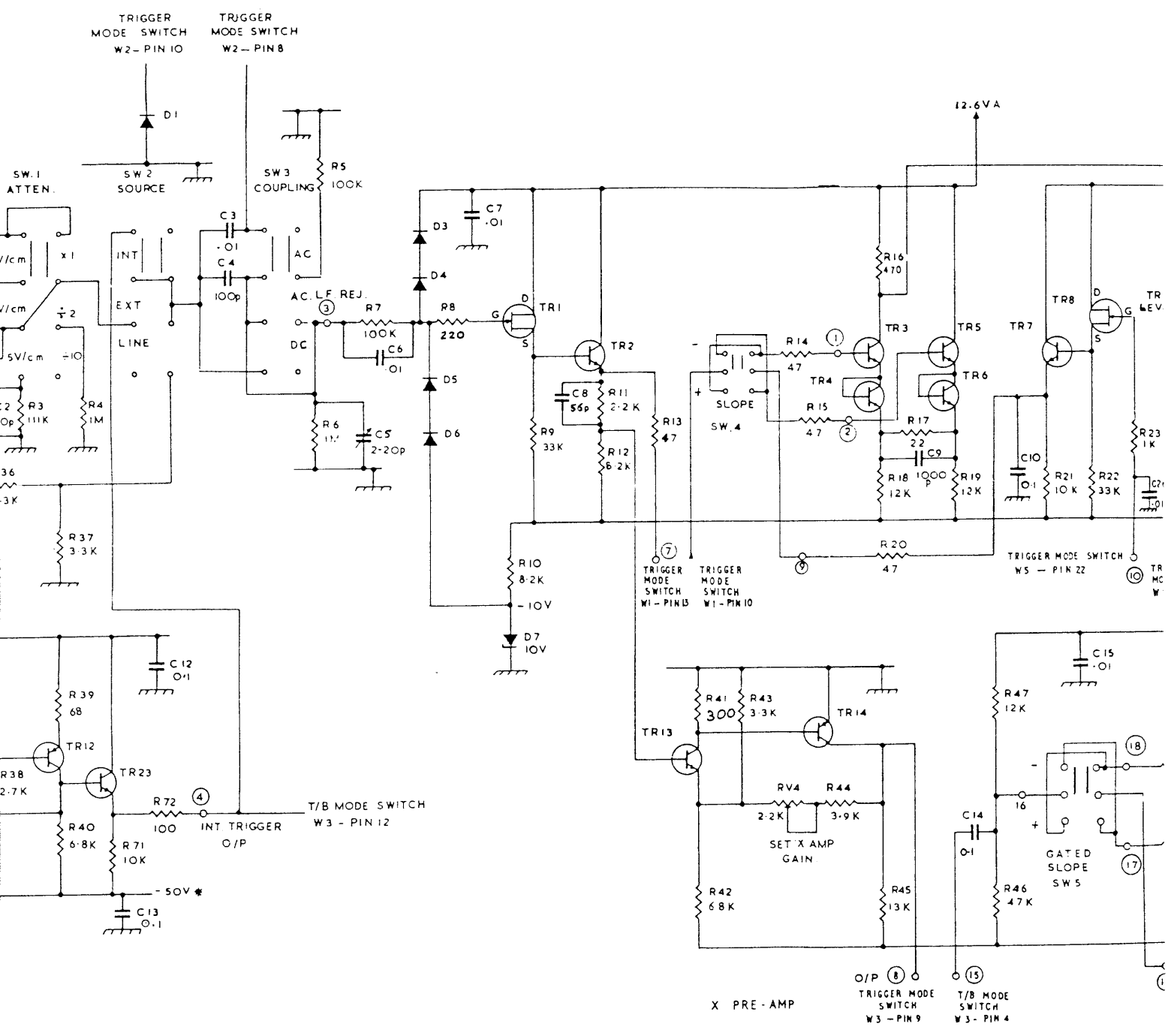
COMPONENT LISTSX AMP AND TIME BASE ASSY. D/SA 80490/96

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS</u> (contd.)					
R6/C	F	1M	1		B912160/88
R14/C	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R15/C	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R16/B	HSC	4.7K	5	$\frac{1}{2}$ W	B912636/65
R16/E	HSC	100K	5	$\frac{1}{2}$ W	B912636/97
R20/E	HSC	1.2K	5	$\frac{1}{2}$ W	B912636/51
R36/C	HSC	3.3K	5	$\frac{1}{2}$ W	B912636/61
R37/C	HSC	3.3K	5	$\frac{1}{2}$ W	B912636/61
R47/F	HSC	100K	5	$\frac{1}{2}$ W	B912636/97
R52/E	HSC	33K	5	$\frac{1}{2}$ W	B912636/85
<u>RESISTORS, VARIABLE</u>					
RV1/A	Wirewound Colvern CLR 12.111 LIN	50		2W	A910664/3
RV2/E	Preh Duplex 16 LIN	4.7K			A912689/1
RV2/F } RV3/F }	Dual Concentric Preh Duplo	20 LIN 22K+22K			A912631/1
RV3/B	Morganite U LIN	4.7K			B912749/3
RV5/B	Davall Type 60 LIN	200K			B912643/3
RV6/D	Bourn 3500-5-2-103 LIN	10K (10 turn)			A912633/8
RV7/B	Preh Deplex 20 LIN	100K			A912690/1
<u>SOCKETS</u>					
SKT1/C	BNC Greenpar GE35027				B912589
SKT1/E	Jack (2mm) Cinch 81-892				A912727
SKT1/F	4mm Hirschmann BIL-20 Black				B912761
SKT2/E	4mm Hirschmann BIL-20 Black				B912761
SKT2/F	4mm Hirschmann BIL-20 Black				B912761
SKT3/F	4mm Hirschmann BIL-20 Black				B912761
<u>See note on page 5.1</u>					

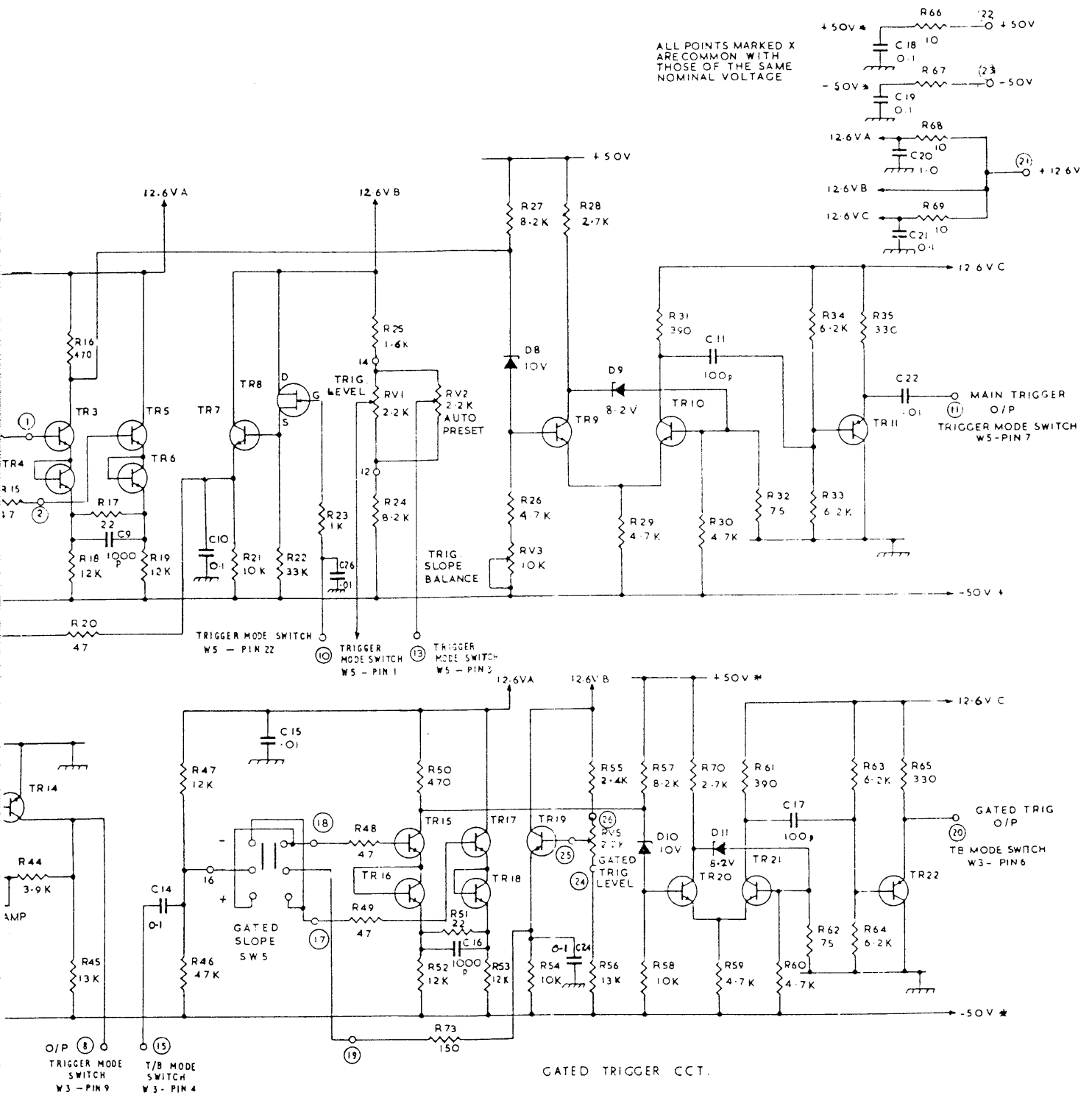
R	1, 2, 38, 36, 3, 37, 39, 40, 4,	5, 6,	7,	8,	10, 9,	11, 12,	41,
C	1, 2	13, 12,	3, 4,	5, 6,	7,	8,	
TR	12	23,			1,	2,	13,
MISC.	SW1	D1, SW2	SW3	D3, D4, D5, D6,	D7,		



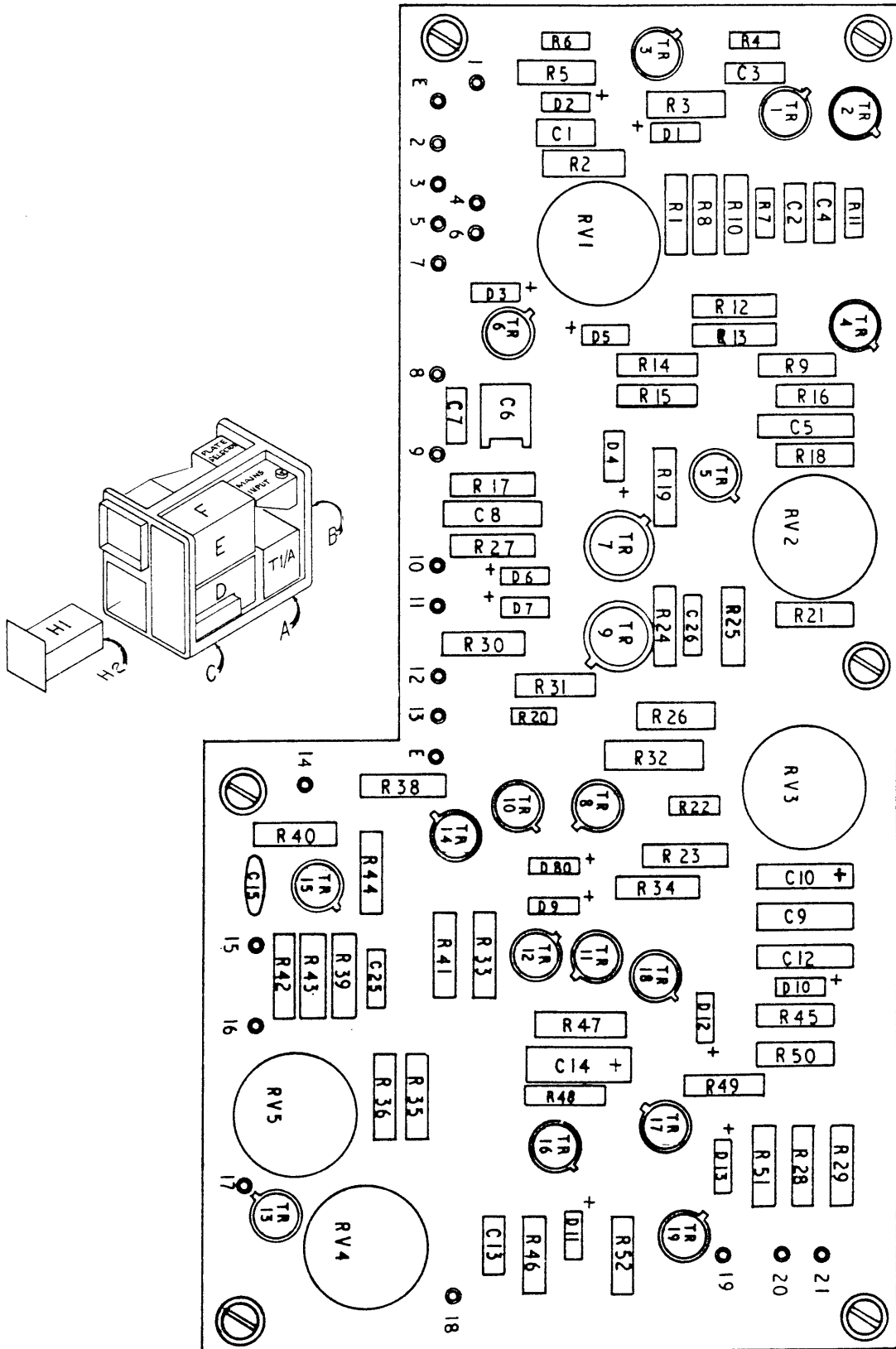
36, 3, 37, 39, 40, 4,	5, 6,	7,	8,	10, 9,	11, 12,	41, 42,	43, 14, 19, 44,	16, 18, 45, 17,	19, 46, 47, 21,	22,	23, 48
13, 12,	3, 4,	5, 6,	7,	8,				9, 14,	10,	15,	
12	23,			1,	2,	13,		14, 4, 3,	5, 6,	7, 8,	
SW1	DI,	SW2	SW3	D3, D4, D5, D6,	D7,	SW4	RV4,			D12, D13,	



44, 16, 18, 45, 17, 19, 46, 47, 21, 22, 23, 48, 49, 25, 24, 50, 52, 51, 53, 27, 26, 54, 28, 55, 56, 29, 57, 58, 31, 30, 70, 59, 61, 32, 60, 62, 34, 33, 63, 64, 35, 65, 66, 67, 68, 69	F
9, 14, 10, 15, 16, 11, 17, 18, 19, 20, 21, 22	C
4, 3, 5, 6, 7, 8, 15, 16, 17, 18, 19, 9, 20, 10, 21, 11, 22	TR
D12, D13, RV1, RV2, DB, RV3, RV5, D9, D10, D11	MISC



TRIGGER CIRCUITS  
 CIRCUIT REFERENCE 'C'  
 D/C080490/4



C/SA80490/85

FIG. 5.9

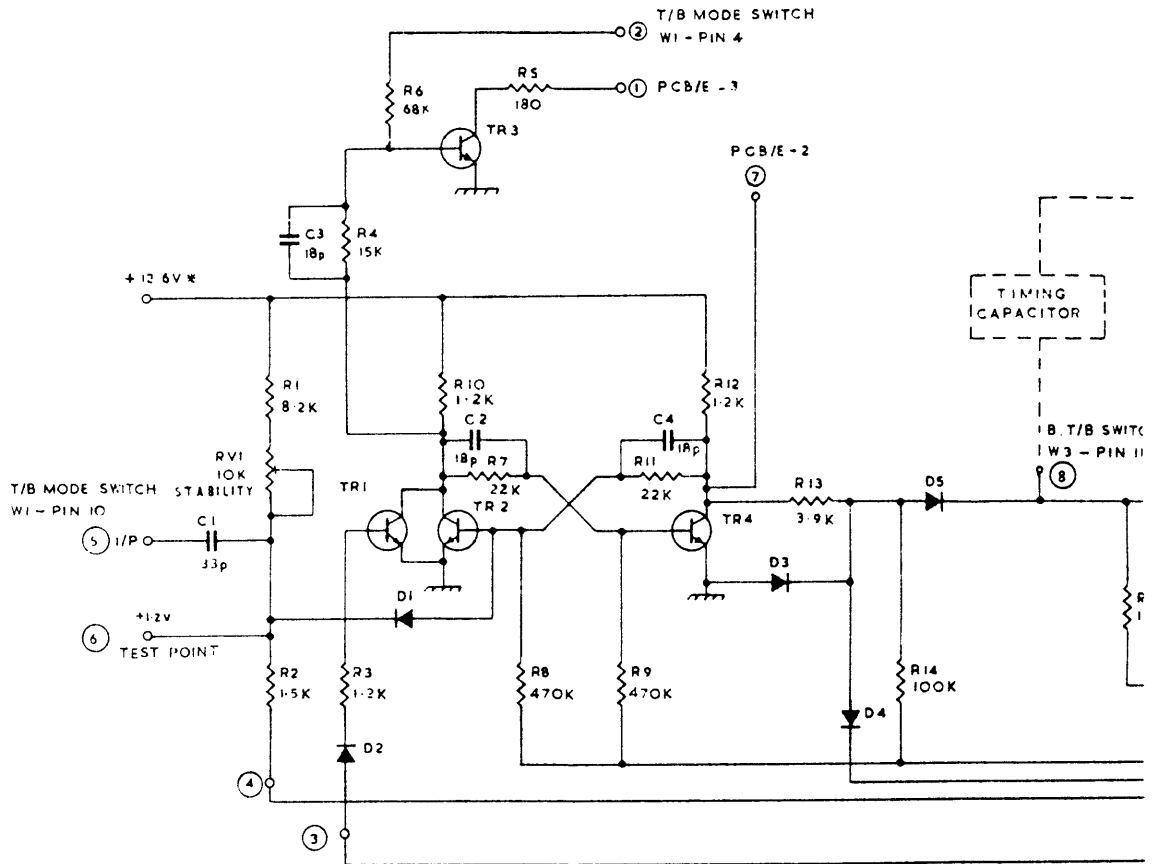
PRINTED CIRCUIT BOARD 'D'



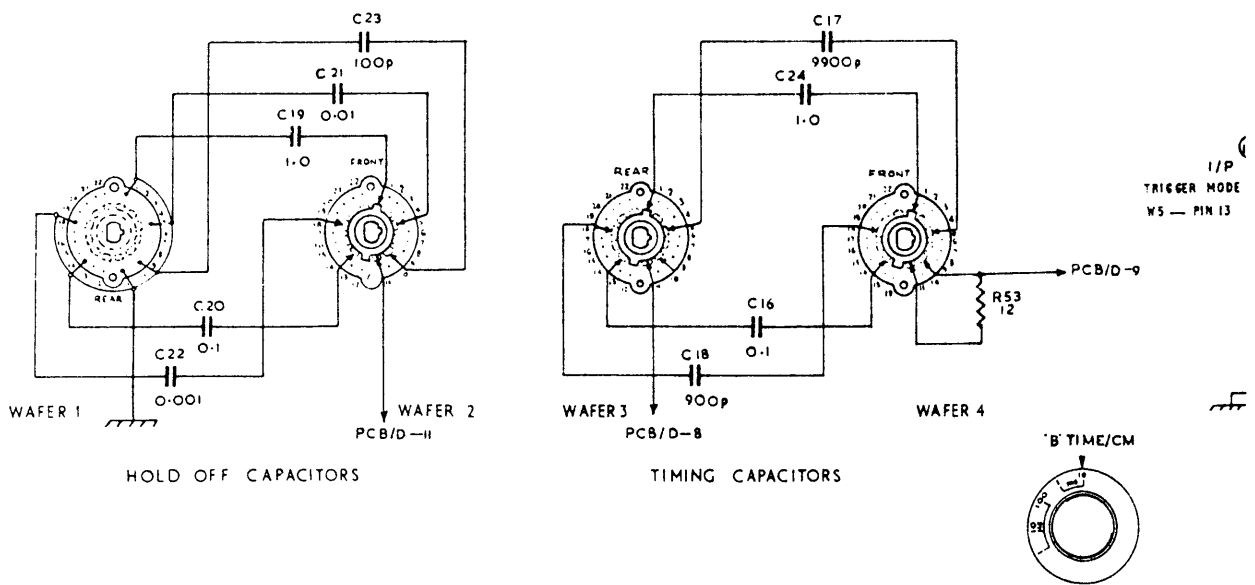
COMPONENT LISTSX AMP AND TIME BASE ASSY D/SA 80490/96

<u>CCT.</u> <u>REF.</u>	<u>DESCRIPTION</u>	<u>VALUE</u>	<u>TOL.</u> <u>%</u>	<u>TRG</u>	<u>COSSOR REF.</u>
<u>SWITCHES</u>					
SW1/A	Mains				A 912757
PB1/E	S/Sweep				A 912702/2
SW1/C	X Atten				B 912564
SW2/C	Source				B 912564
SW3/C	Coupling				B 912564
SW4/C	Slope				B 912703
SW1/E	A Time/cm	)			
SW1/D	B Time/cm	)			
SW1/K	Timebase Mode	)	See below		
SW1/K	Trigger Mode	)			
<u>MISCELLANEOUS</u>					
PL1/K	Plug (25 way McMurdo XP25)				B 96113/4
	Cover (Top entry) (McMurdo XC125A)				B 97121/4
	<u>Switch Assy</u>				
	<u>A Time/cm</u>				B/SA 80490/126
	containing:				
	Switch				A 50490/36
RV2/E	Potentiometer PREH Duplex 16 4.7K				A 912689/1
	Coupling				A 912336/5
	<u>B Time/cm</u>				B/SA 80490/127
	containing:				
	Switch				A 50490/37
	<u>Trigger Mode</u>				B/SA 80490/128
	containing:				
S2/K	Switch				A 50490/40
	Coupling				B 912336/5
RV1/C	Potentiometer Morganite U 2.2.K				B 912749/1
	<u>Timebase Mode</u>				B/SA 80490/129
	containing				
S1/K	Switch				A 50490/39
	Coupling				B 912336/5
RV5/C	Potentiometer Preh Duplex 16 2.2K				A 912632/1
<u>See Note on page 5.1</u>					

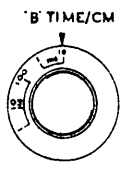
R	1, 2, 3, 4, 6, 10, 7, 5, 8, 9, 11, 12, 13, 53, 14, 15,
C	19-23, 1, 3, 2, 4, 18, 16, 24, 17,
D	2, 1, 3, 4, 5,
MISC	RV1, TR1, TR2, TR3, TR4,



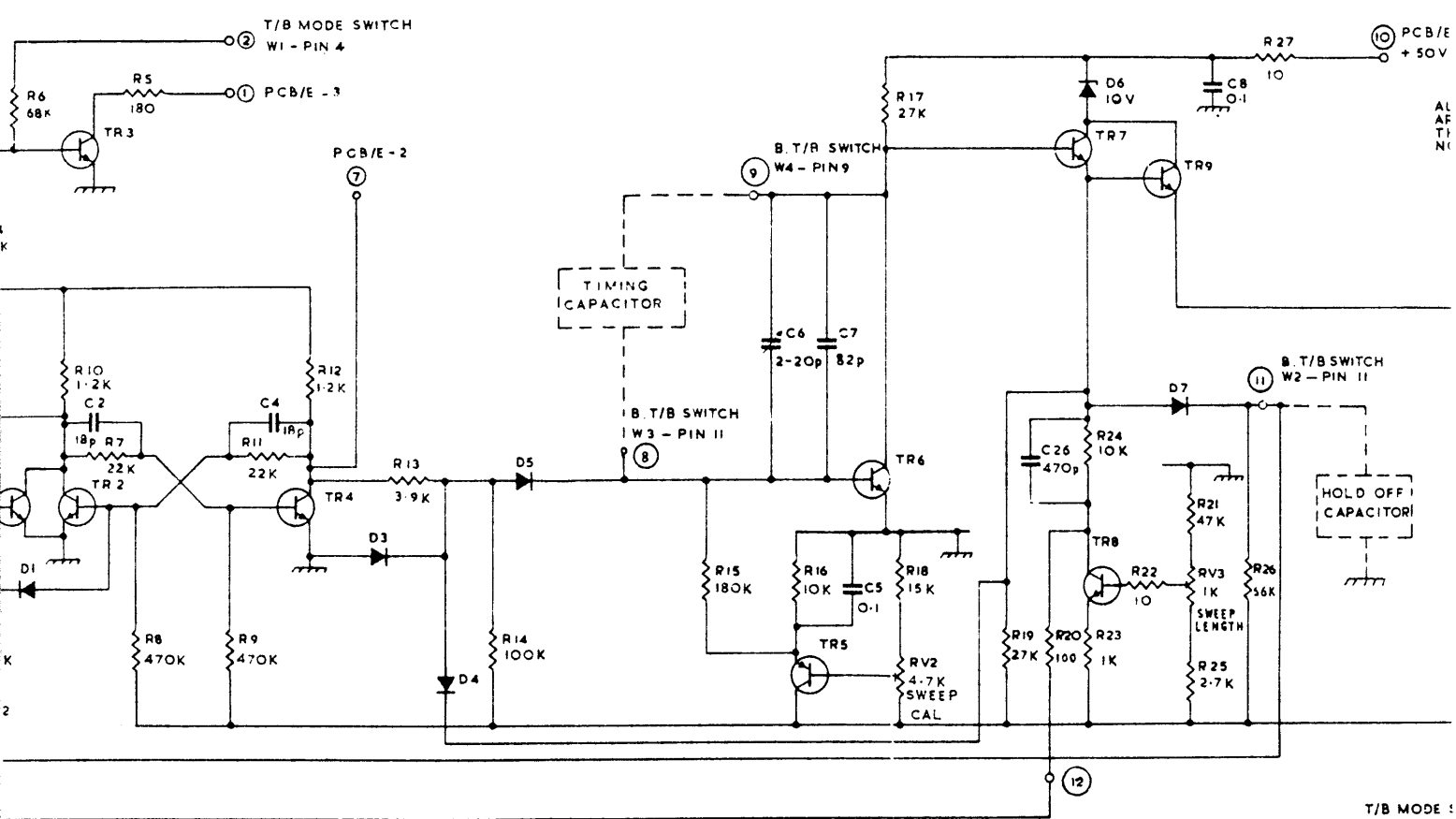
B



I/P  
TRIGGER MODE  
W5 - PIN 13

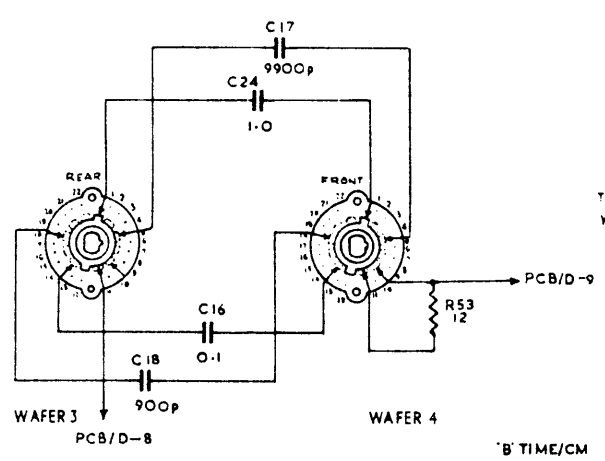


6.	10.	7.	5, 8.	9.	11.	12.	13.	53.	14.	15.	16.	46, 47.	17.	18.	45, 48.	19.	20.	49.	23.	24.	22, 21.	25.	26.	27.	50.	51.	52	
2.				4, 19	16.	24.	17.				6.	13.	12.	7.	5.	14.		26.						8				
1.				3.	4.	5.				10.													6.	11.	7.	12.	13.	
TR2, TR3				TR4,																			TR7	TR8, TR9.	RV3,	TR18,	TR19,	

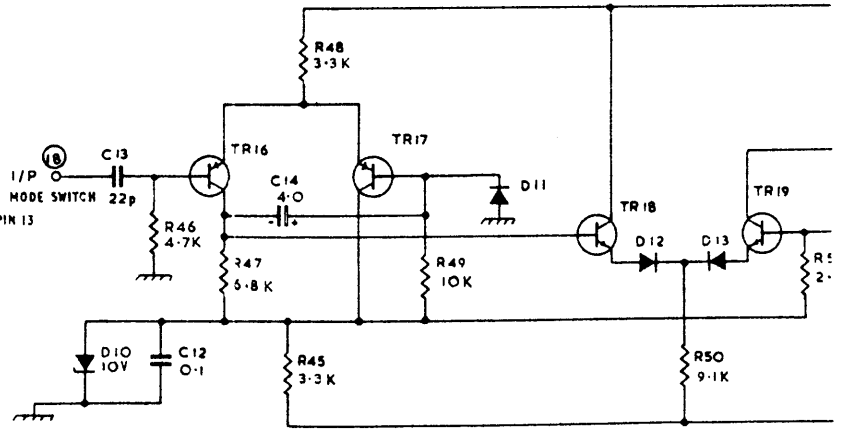
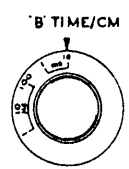


**B TIMEBASE**

T/B MODE :  
W4 — PIN



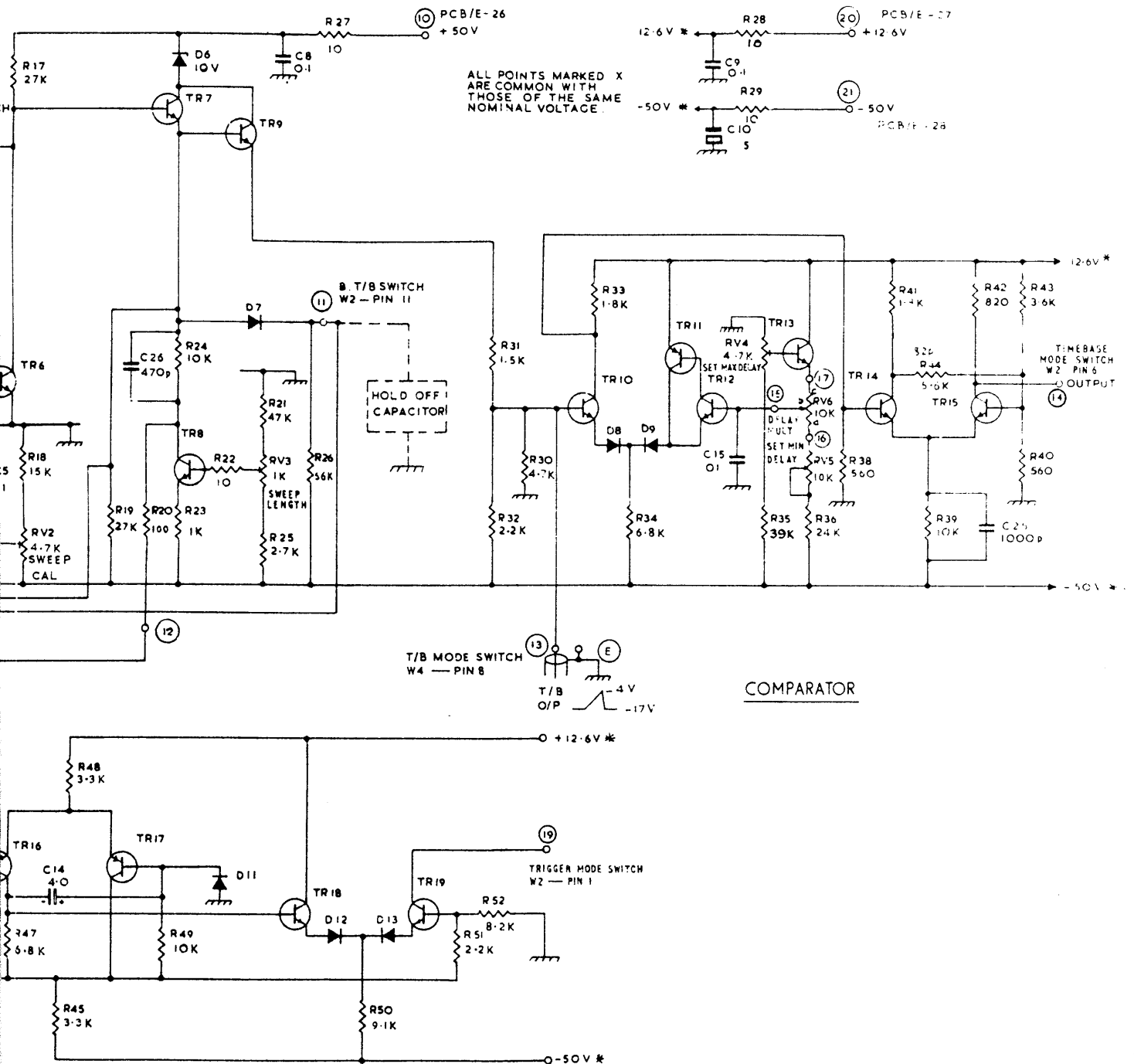
TIMING CAPACITORS



**AUTO**

**'B' TIMEBASE  
CIRCUIT**  
b/c

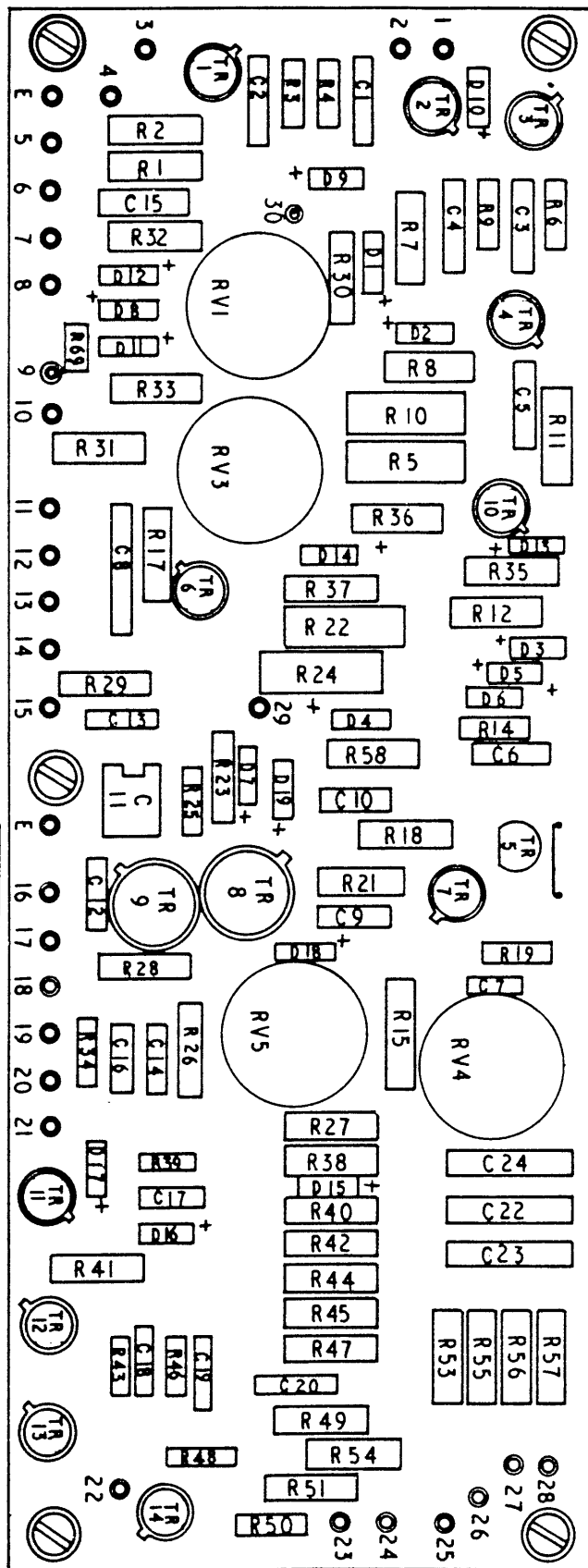
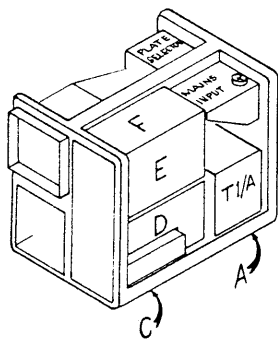
18, 45, 48, 19,	20, 49, 23, 24, 22, 21, 25,	26, 27, 50,	51, 52, 31, 32, 30,	33, 34,	28, 29, 37, 35,	36, 38,	41, 39,	42, 43, 40,	R		
5,	14,	26,	8		9, 10, 15,		11,	25	C		
	6,	11, 7,	12,	13,	8,	9,			D		
TR16,	TR17,	TR7,	TR8, TR9,	RV3,	TR18,	TR19,	TR10,	TR11, TR12,	RV4, TR13, RV6, RV5,	TR14, TR15	MISC



'B' TIMEBASE, COMPARATOR AND AUTO.  
CIRCUIT REFERENCE 'D'

D/CD80490 SHEET 3

FIG. 5.10



C/SA 80490/87

For Service Manuals  
 MAURITRON SERVICES  
 8 Cherry Tree Road, Chinnor  
 Oxfordshire, OX9 4QY.  
 Tel (01844) 351694  
 Fax (01844) 352554  
 email:- sales@mauritron.co.uk

FIG. 5.II

PRINTED CIRCUIT BOARD 'E'

CDU150-CT531/3

OSCILLOSCOPE

P.C.B. 'A' C/SA 80490/100CIRCUIT REFERENCE 'A'

<u>CCT.</u> <u>REF.</u>	<u>DESCRIPTION</u>	<u>VALUE</u>	<u>TOL.</u> %	<u>RTG.</u>	<u>COSSOR REF.</u>
<u>BRIDGE RECTIFIERS</u>					
BR1	Silec 110 B6				A912686
BR2	Silec 110 B6				A912686
BR3	Silec 110 B6				A912686
BR4	Silec 110 B6				A912686
<u>CAPACITORS</u>					
C1	} Fig 5.1				
C2					
C4	} Fig 5.1				
C5					
C6	E	10	+50-10	16V	B910700/26
C8	PC	100	20	100V	B911943/40
C9	Fig 5.1				
C11	PC	1.0	20	100V	B192282/11
C12	E	64	+50-10	64V	B910208/29
C13	} Fig 5.1				
C14					
C16	)				
C17	} Fig 5.1				
C18					
C19	PE	0.1	10	250V	B911477/2
C20	PE	0.1	10	250V	B911477/2
C21	} Fig 5.1				
C22					
C23					
C24					
<u>DIODES</u>					
Insulating Kit Zener Diodes Lucas 54006108				3 off	A912744
D1	Zener STC ZF3.3	3.3V	5	400mW	A910099/3
D2	Fig 5.1				

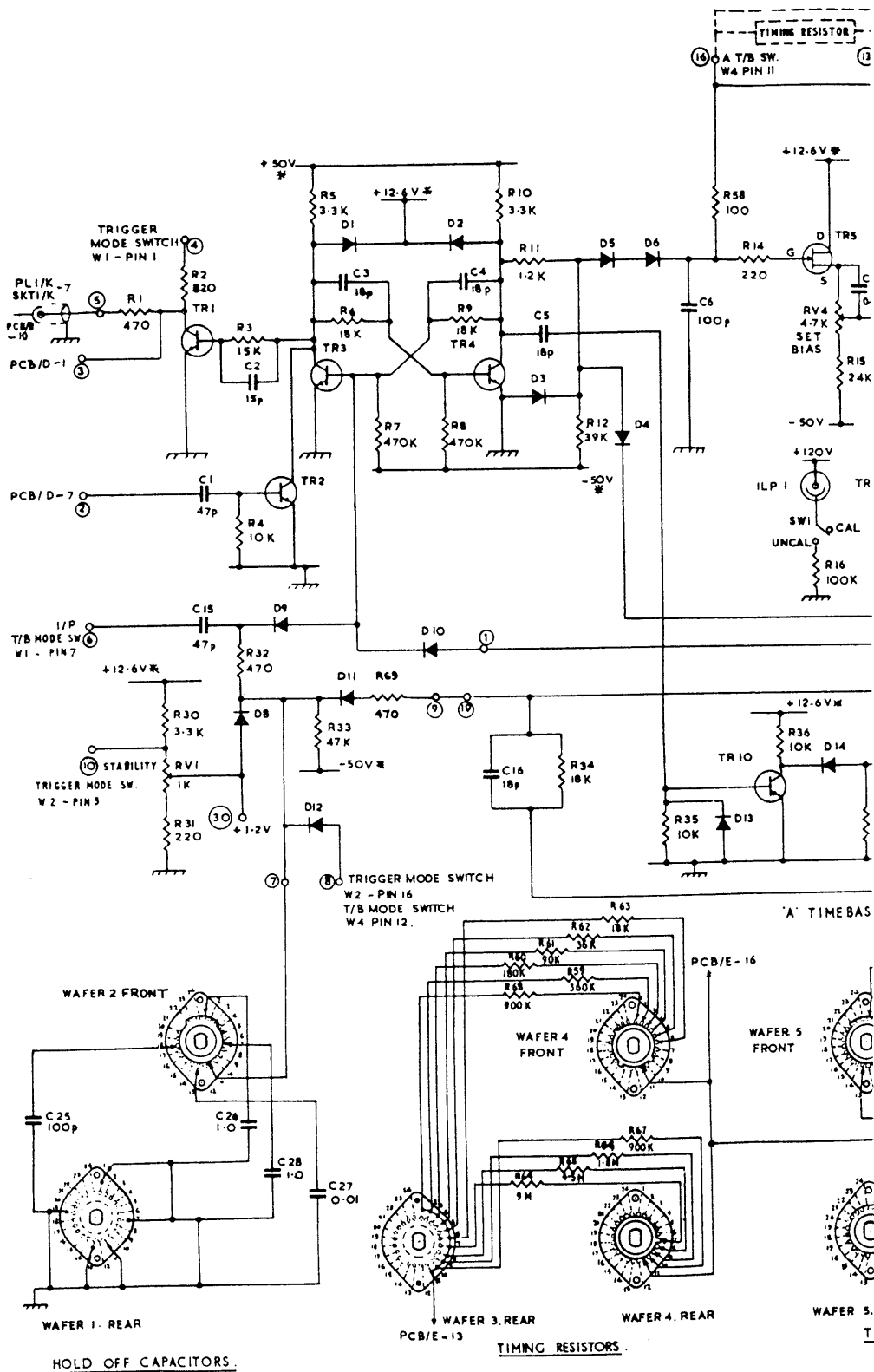
See note on page 5.1

P.C.B. 'A' C/SA 80490/100CIRCUIT REFERENCE 'A'

<u>CCT.</u> <u>REF.</u>	<u>DESCRIPTION</u>	<u>VALUE</u>	<u>TOL.</u>	<u>RTG.</u>	<u>COSSOR REF.</u>
<u>DIODES</u> (contd.)					
D3	Zener STC ZF5.6	5.6V	5	400mW	A910099/9
D4	Silicon Fairchild IN916				B910086/2
D5	Silicon Fairchild IN916				B910086/2
D6	Not used				
D7	Fig 5.1				
D8	Zener Reference Motorola IN935 9V		5	500mW	A912540/1
D9	Silicon Fairchild IN916				B910086/2
D10	Silicon Fairchild IN916				B910086/2
D11	Silicon Fairchild IN916				B910086/2
D12	Silicon Fairchild IN916				B910086/2
D13	Fig 5.1				
D14	Zener STC ZF5.6	5.6V	5	400mW	A910099/9
D15	Silicon Fairchild IN916				B910086/2
D16	Silicon Fairchild IN916				B910086/2
<u>FUSES</u>					
FS1	Fig 5.1				
FS2	Size '00' Belling-Lee L562 500mA				KS92497/19
FS3	Size '00' Belling-Lee L562 500mA				KS92497/19
FS4	Size '00' Belling-Lee L562 250mA				KS92497/12
FS5	Size '00' Belling-Lee L562 500mA				KS92497/19
FS6	Size '00' Belling-Lee L562 1A				KS92497/11
<u>LAMPS</u>					
ILP1	Fig 5.1				
ILP2	Fig 5.1				
<u>PLUGS</u>					
PL1	See Fig.5.1				
PL1/K	See Fig.5.1				
<u>RESISTORS</u>					
R1	W	2	10	5W	B910174/99
R2	Fig 5.1				

See note on page 5.1

R	1, 30, 31, 2,	3, 4, 32,	33, 5, 6,	7, 69, 8, 9,	10, 11,	34, 12,	35, 13, 50, 14, 36, 16, 15, 3'
C	1, 15,	2,	3,	4,	16, 5,	6,	7,
TR	1,	2, 3,		4,		10,	5,
MISC	RV1,	D8, D9,	D12, D1,	D10, D11, D2,	D3,	D5, D4, D6,	D13, D14, RV,

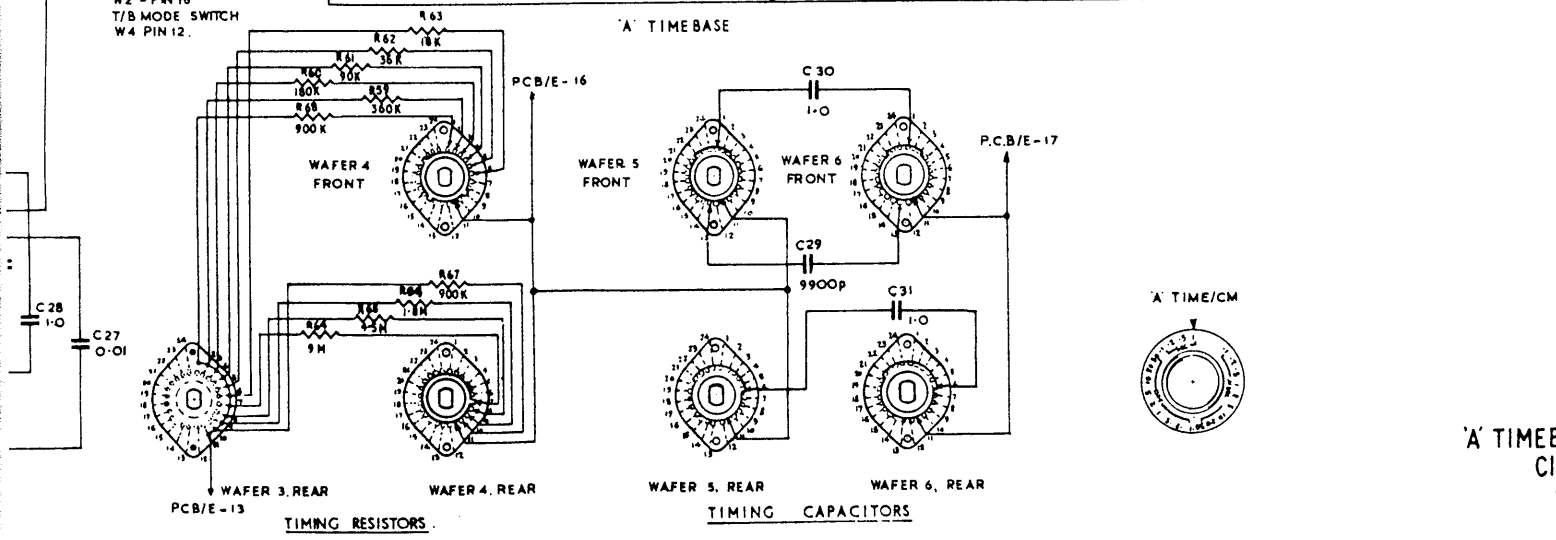
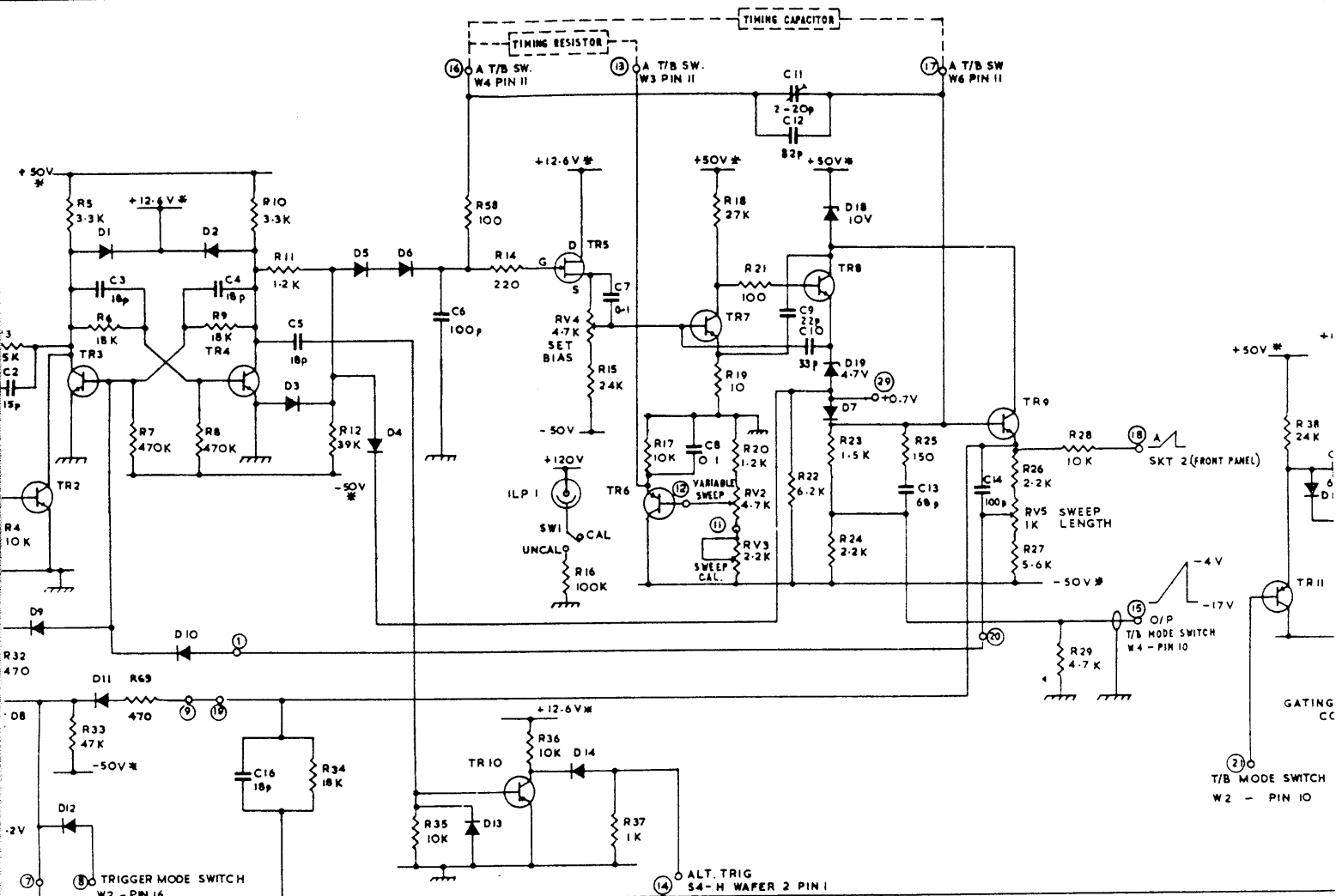


HOLD OFF CAPACITORS.

TIMING RESISTORS.

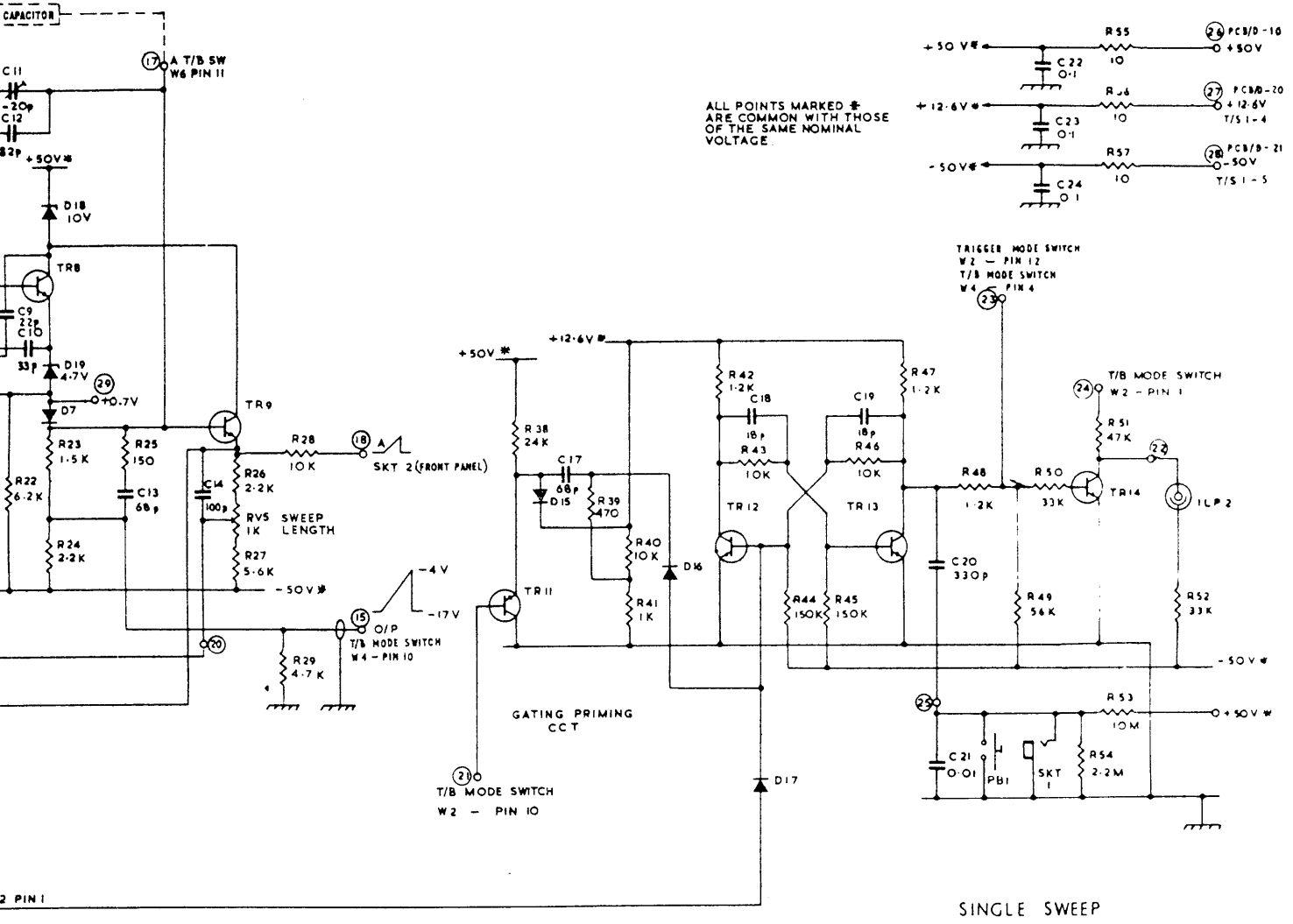


32,	33, 5, 6,	7, 8, 9,	10, 11,	14, 12,	35,	13,	14,	36,	16, 15,	37, 17,	18, 19,	20, 21,	22,	23, 24,	25,	26, 27, 29, 20,	30,	
2,	3,	4,	16,	5,	6,	7,	8,	9, 10, 11, 12,	13,	14,	9,	11,	11,	11,	11,	11,	11,	11,
2, 3,	4,	10,	5,	6,	7,	8,	9,	11,	11,	11,	11,	11,	11,	11,	11,	11,	11,	11,
9, D9,	D12, D1,	D10, D11, D2,	D3,	D5, D4, D6,	D13,	D14,	RV4, ILPI,	RV2, RV3,	D18, D19, D7,	RV5,	D1,	D1,	D1,	D1,	D1,	D1,	D1,	D1,

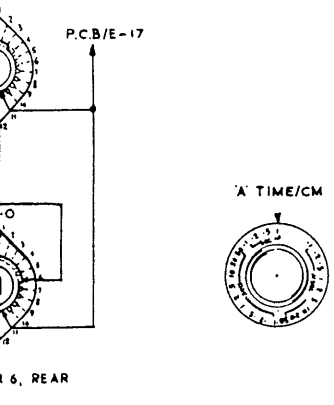


'A' TIME/CM  
C1

22, 23, 24,	25,	26, 27, 29, 20,	30,	39, 40, 41,	42, 43, 44,	45,	46,	47,	48,	49, 50,	54, 51, 53, 55, 56, 57, 52,	P
10, 11, 12,	13,	14,	17,	18,	19,	20, 21,						C
8,	9,	11,	12,	13,	14,							TR
D18, D19, D7,	RV5,	DIS,	D16,	D17,	PB1, SKT. 1,	ILP 2,	MISC.					

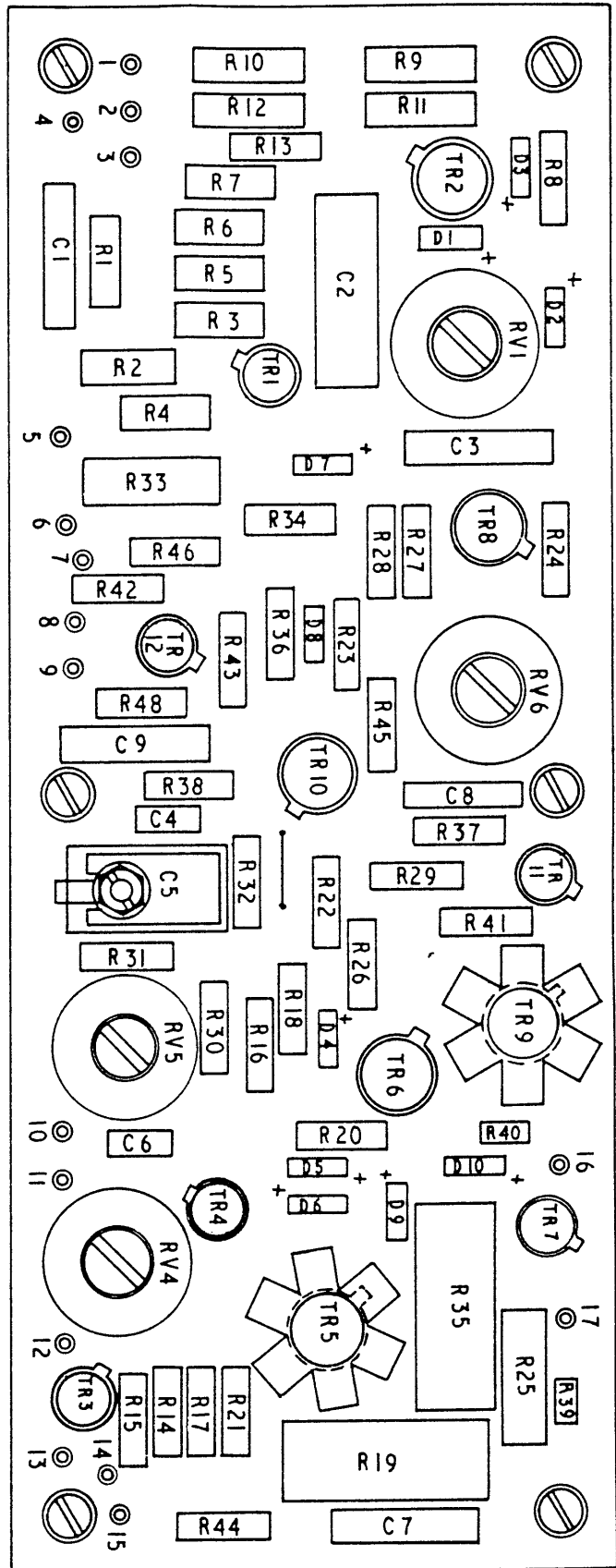
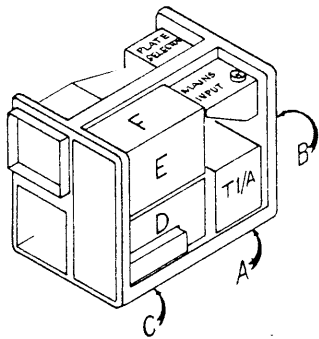


SINGLE SWEEP



'A' TIMEBASE & SINGLE SHOT  
CIRCUIT REF. 'E'  
D/CD 80490 SHT. 1

FIG. 5. 12



C/SA 80490/102

FIG. 5.13

PRINTED CIRCUIT BOARD 'F'

P.C.B. 'A' C/SA 80490/100CIRCUIT REFERENCE 'A'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
R3	HSC	68k	5	$\frac{1}{2}$ W	B912636/93
R4	W	2	10	5W	B910174/99
R5	HSC	56k	5	$\frac{1}{2}$ W	B912636/91
R6	HSC	1.8k	5	$\frac{1}{2}$ W	B912636/55
R7	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R8	HSC	39k	5	$\frac{1}{2}$ W	B912636/87
R9	0	36k	2		5905-99-013- 6032
R10	0	1.6k	2		5905-99-013- 6000
R11	0	36k	2		5905-99-013- 5655
R12	W	2	10	5W	B910174/99
R13	Fig 5.1				
R14	W	2	10	5W	B910174/99
R15	Not used				
R16	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R17	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R18	HSC	15k	5	$\frac{1}{2}$ W	B912636/77
R19	HSC	22k	5	$\frac{1}{2}$ W	B912636/81
R20	F	3.3k	1		B912160/75
R21	F	16k	1		B912160/77
R22	W	2	10	5W	B910174/99
R23	Fig 5.1				
R24	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R25	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R26	0	9.1k	2	$\frac{1}{2}$ W	5905-99-013- 6018
R27	0	1.6k	2	$\frac{1}{2}$ W	5905-99-013- 6000
R28	HSC	3.3k	5	$\frac{1}{2}$ W	B912636/61
R29	HSC	36k	5	$\frac{1}{2}$ W	B912636/86
R30	0	3.6k	2	$\frac{1}{2}$ W	5905-99-013- 6088
R31	0	5.6k	2	$\frac{1}{2}$ W	5905-99-013- 6013

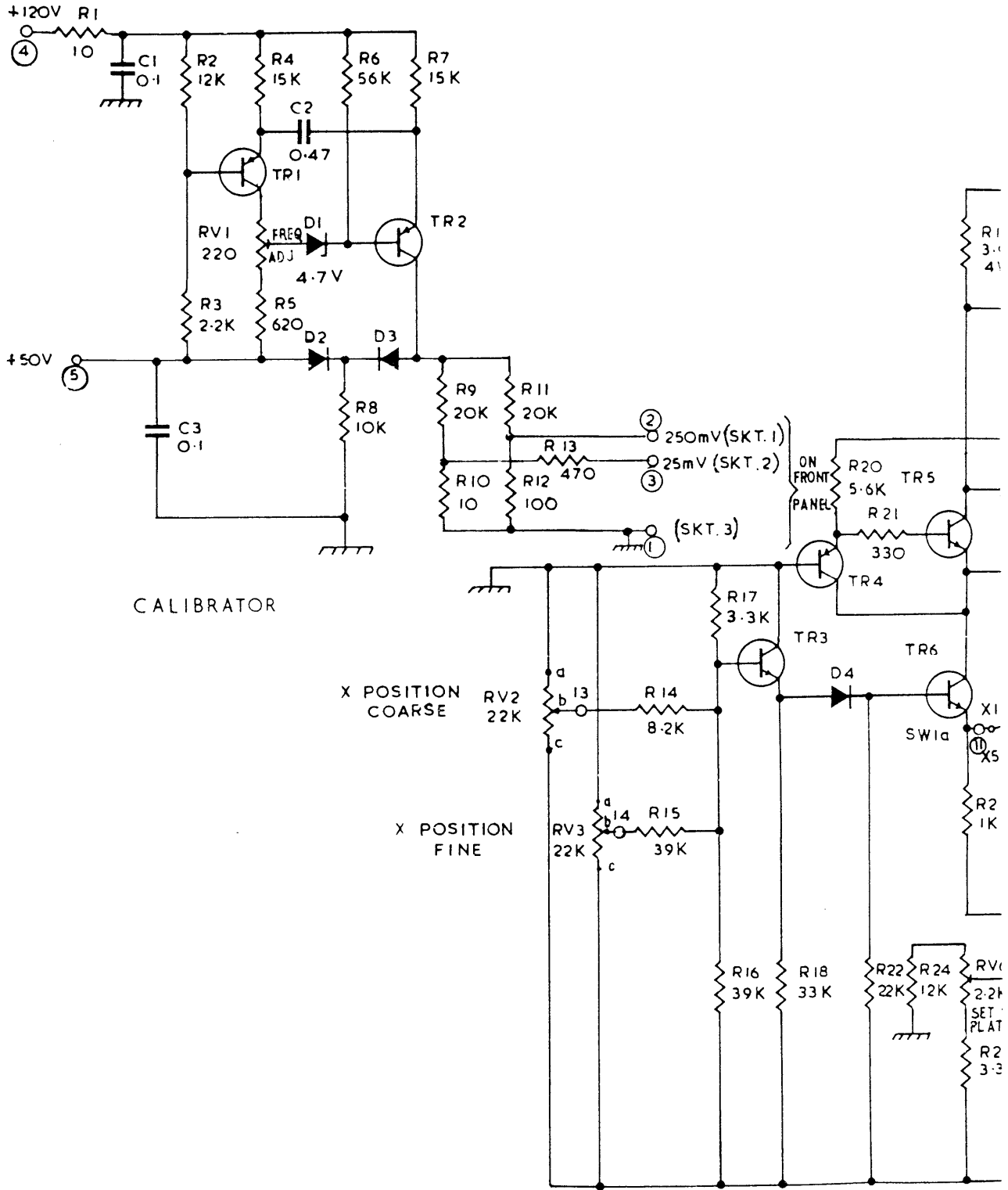
See note on page 5.1

P.C.B. 'A' C/SA 80490/100CIRCUIT REFERENCE 'A'

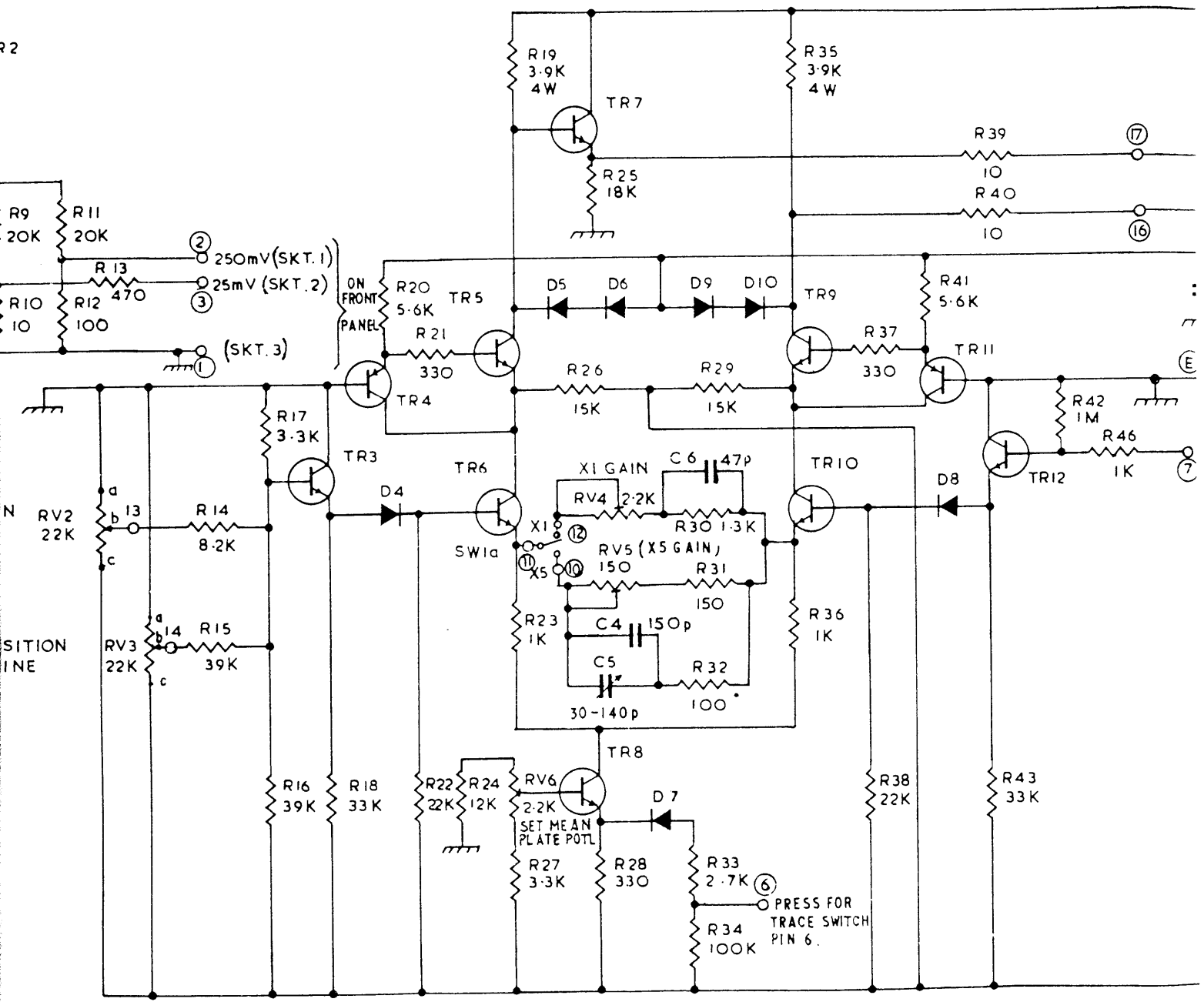
CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS (contd.)</u>					
R32	W	2	10	5W	B910174/99
R33	Fig 5.1				
R34	W	2	10	5W	B910174/99
R35	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R36	HSC	15k	5	$\frac{1}{2}$ W	B912636/77
R37	HSC	33k	5	$\frac{1}{2}$ W	B912636/85
R38	HSC	15k	5	$\frac{1}{2}$ W	B912636/77
R39	0	1.5k	2	$\frac{1}{2}$ W	5905-99-013- 5999
R40	0	13k	2	$\frac{1}{2}$ W	5905-99-013- 6022
<u>RESISTORS, VARIABLE</u>					
RV1	Fig 5.1				
RV2	Preset Davall 81P LIN	470	20		A912635/2
RV3	Preset Davall 81P LIN	680	20		A912635/15
RV4	Preset Davall 81P LIN	1k	20		A912635/9
RV5	Preset Davall 81P LIN	330	20		A912635/8
<u>SOCKETS</u>					
SKT 1/K	See Fig 5.1				
PL 1/K	25 way (Fig 5.1)				
<u>SWITCHES</u>					
SW1	Fig.5.1				
<u>TRANSFORMERS</u>					
T1	Fig.5.1				
<u>TRANSISTORS</u>					
TR1	2N3906				A910648
TR2	2N3053				B99160/1
TR3	Fig 5.1				B99160/2
TR4	BC107				B912676/1

See note on page 5.1

R	1,	2, 3,	4, 5,	6, 8,	7, 9, 10, 11, 12, 13,	14, 15,	17, 16, 18,	20, 21, 22, 24, 19, 2:		
C	1, 3,	2,								
TR	1,			2,		3,			4,	5, 6,
MISC	RV1, D1, D2,			D3,		RV2, RV3,		D4, SW1a, RV6, D5, F		



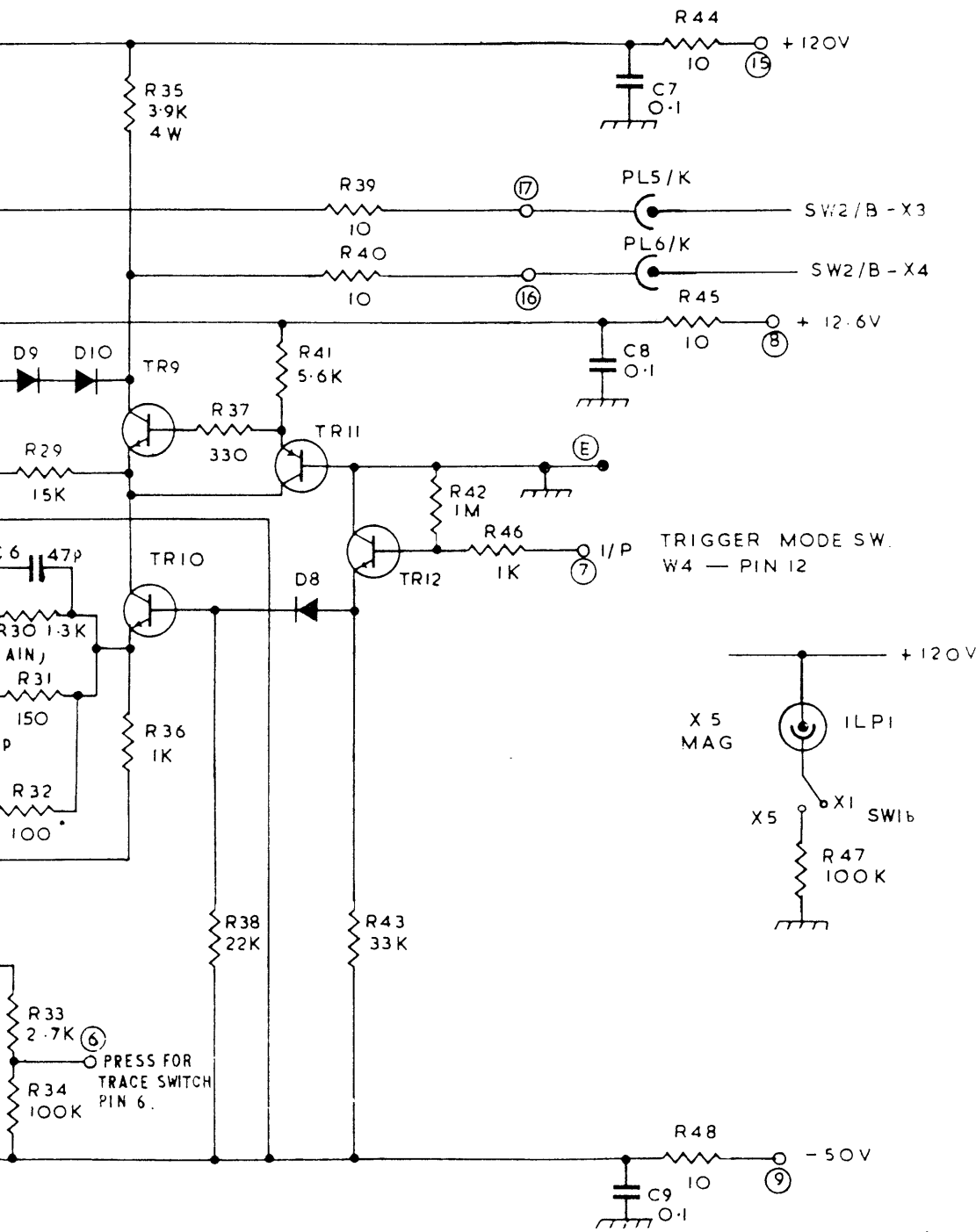
X AMP



X AMPLIFIER

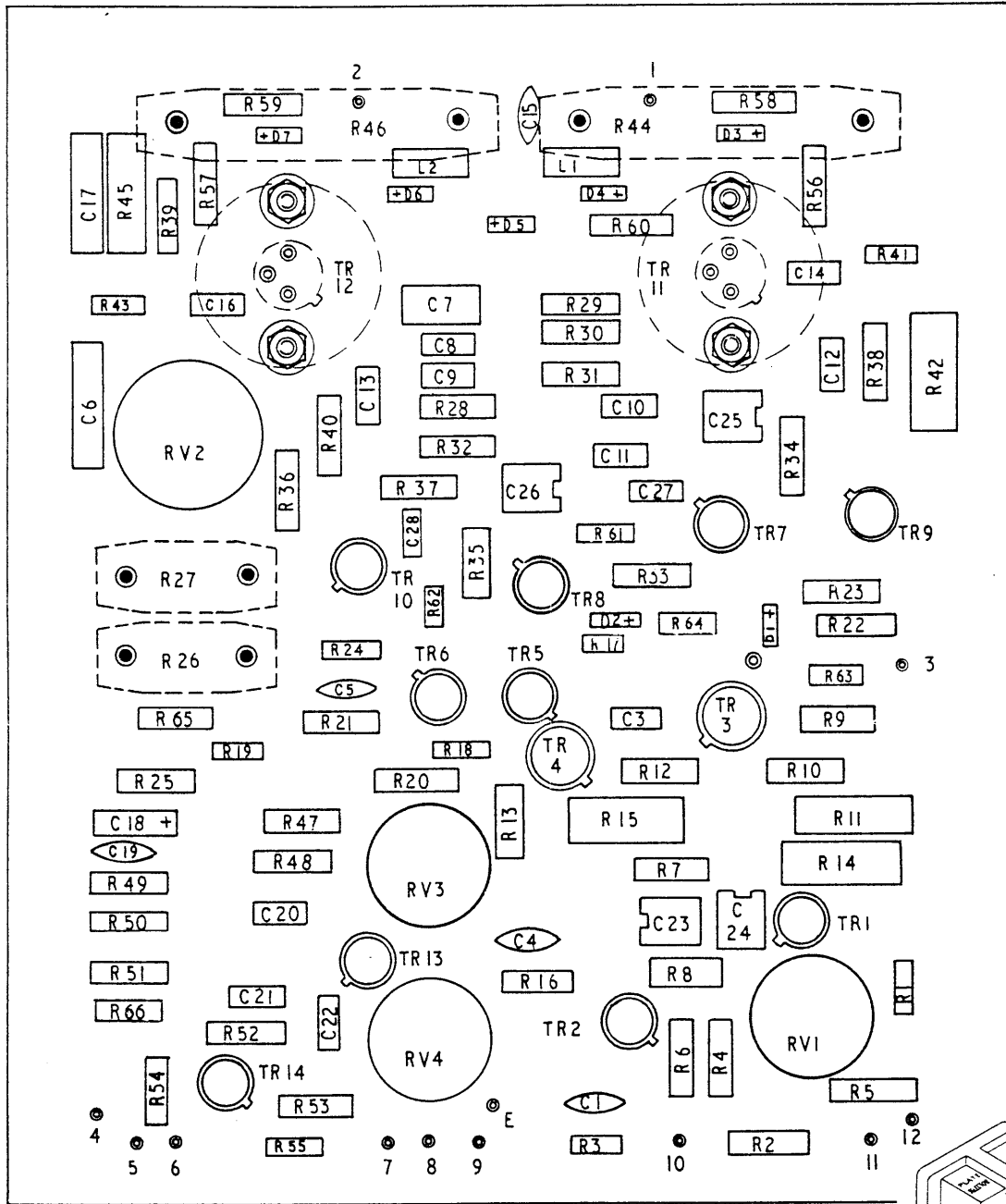
X AMPL  
CIRC

10, 31, 32, 33, 34, 35, 36, 37, 38, 41, 39, 40, 43, 42, 46,	45, 44, 48, 47	R
6,	7, 8, 9,	C
9, 10,	11, 12,	TR
7, D9, D10,	D8	SW1b
		MISC.



X AMPLIFIER & CALIBRATOR FIG.5.14  
 CIRCUIT REFERENCE 'F'  
 C/CD80490 SHEET 2





C/SA 80490/104

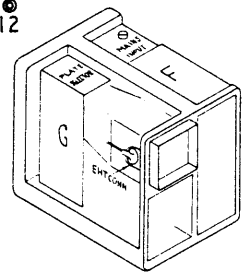


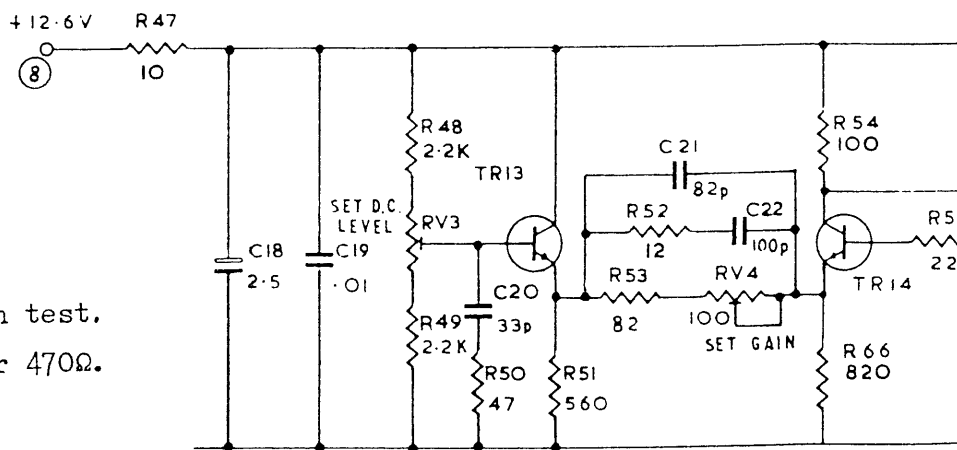
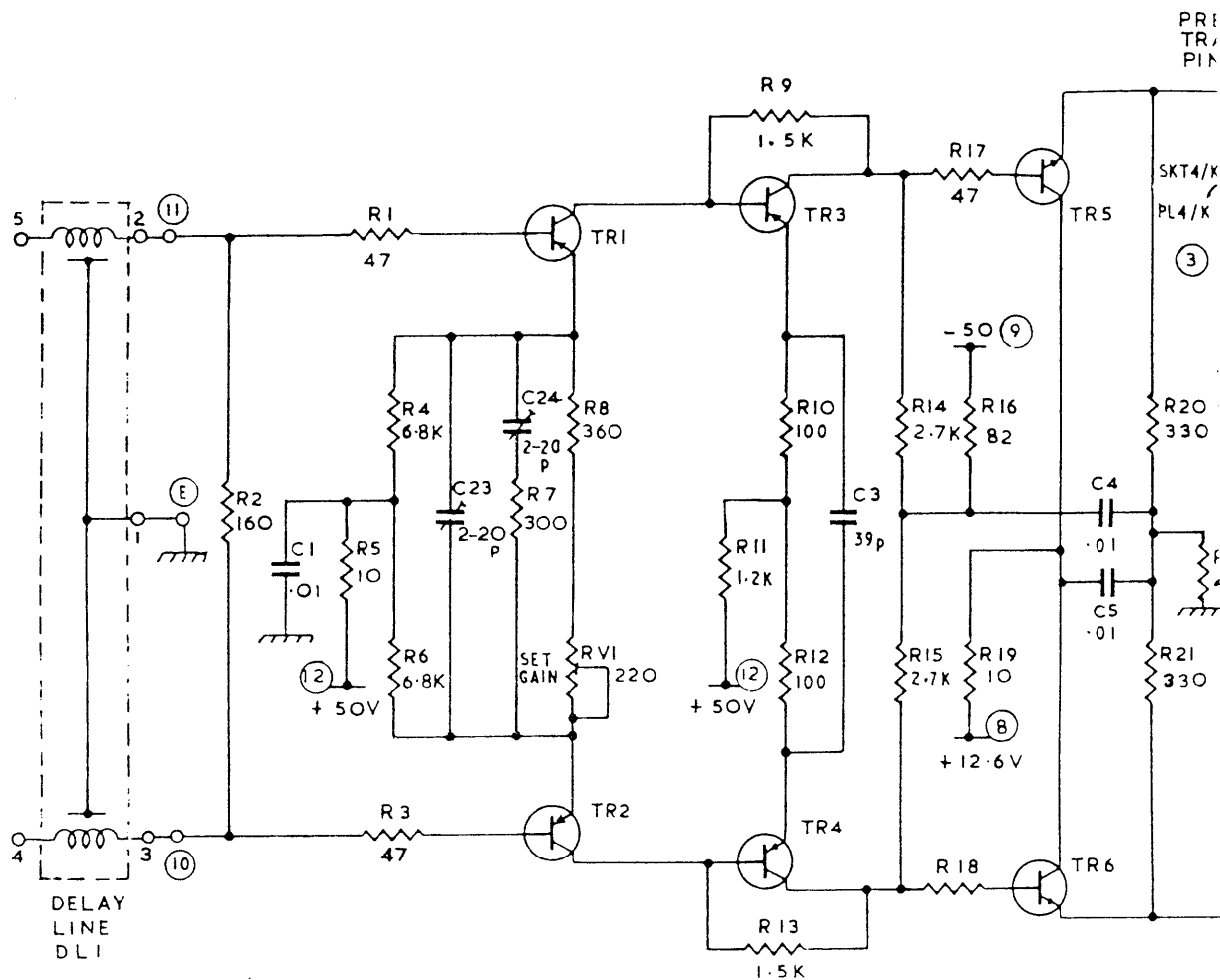
FIG. 5.15

PRINTED CIRCUIT BOARD 'G'

P.C.B. 'A' C/SA 80490/100CIRCUIT REFERENCE 'A'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>TRANSISTORS (contd.)</u>					
TR5	BC107				B912676/1
TR6	BC107				B912676/1
TR7	2N3053				B99160/1
TR8	Fig.5.1				
TR9	BC107				B912676/1
TR10	BC107				B912676/1
TR11	BC107				B912676/1
TR12	2N3053				B99160/1
TR13	Fig 5.1				
TR14	BC107				B912676/1
TR15	BC107				B912676/1
TR16	2N3053				B99160/1
TR17	Fig 5.1				
TR18	BC107				B912676/1
TR19	BC107				B912676/1
<u>MISCELLANEOUS</u>					
	Fuseholder Belling-Lee size '00'	L1383 (5 off)			A912697
	Transistor Mounting Pad T05	(4 off)			A99286
VS1	Voltage selector assembly	Fig.5.1			
<u>See note on page 5.1</u>					

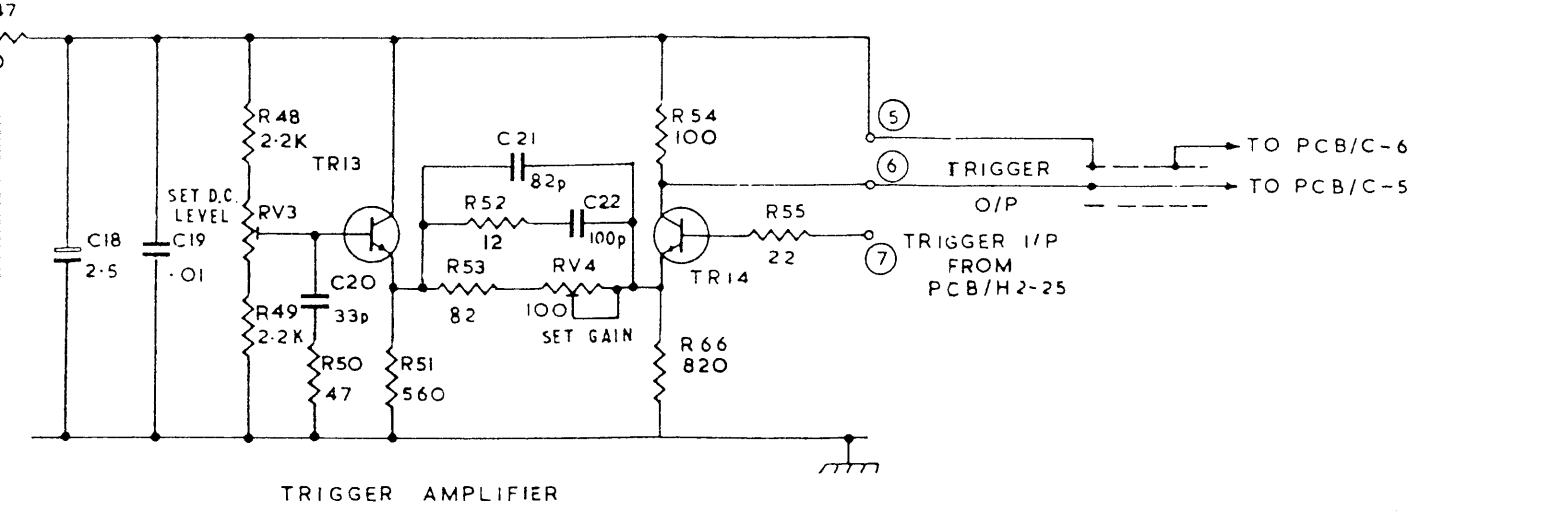
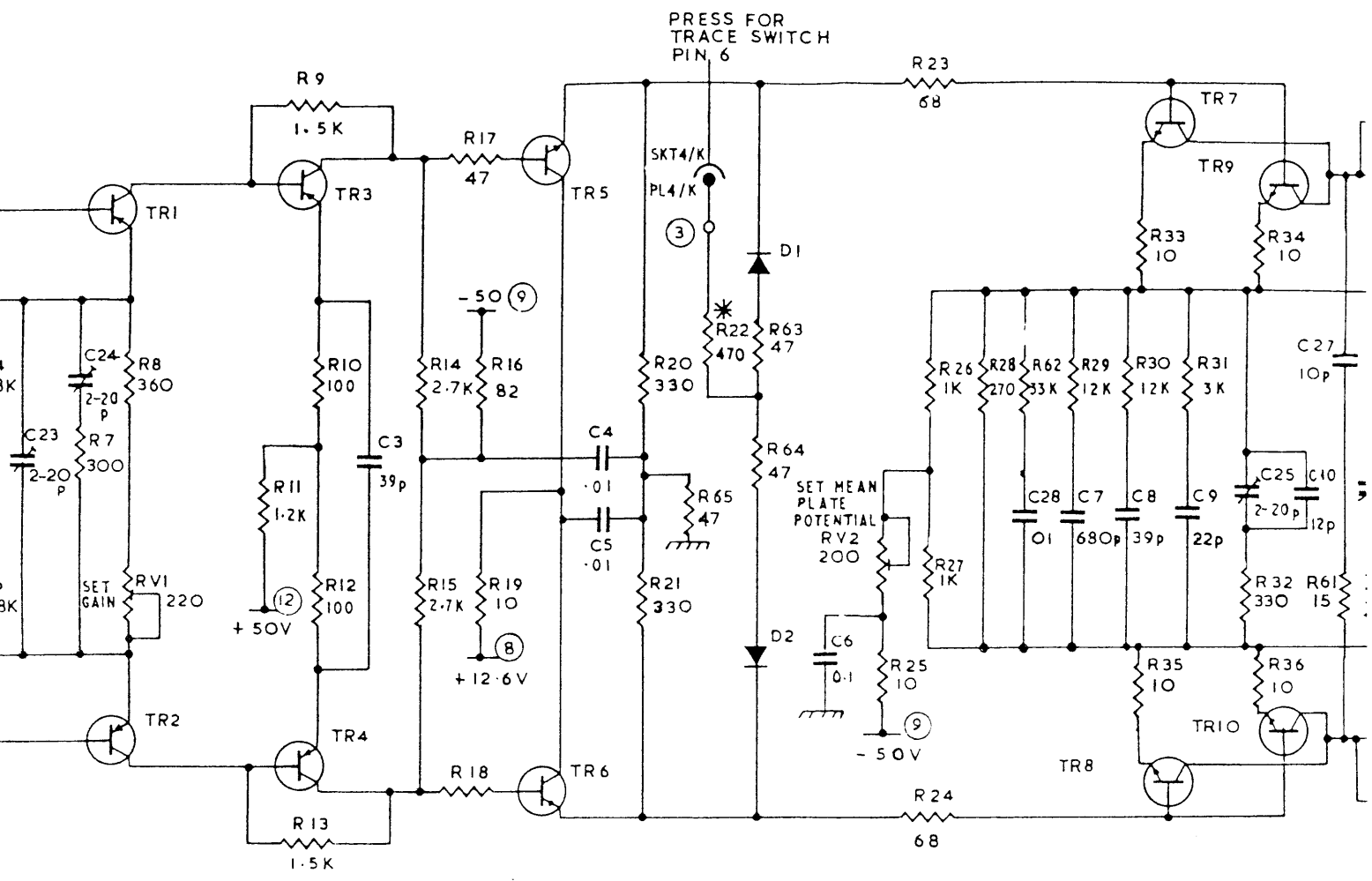
R	2, 5, 1, 3, 4, 6, 47, 7, 8, 48, 49, 11, 50, 51, 10, 12, 13, 52, 53, 14, 15, 16, 17, 19, 18, 54, 20, 21, 55,
C	1, 23, 18, 24, 19, 20, 3, 21, 22, 4, 5,
TR	1, 2, 3, 4, 13, 5, 6, 14,
MISC	RV1, RV3, RV4



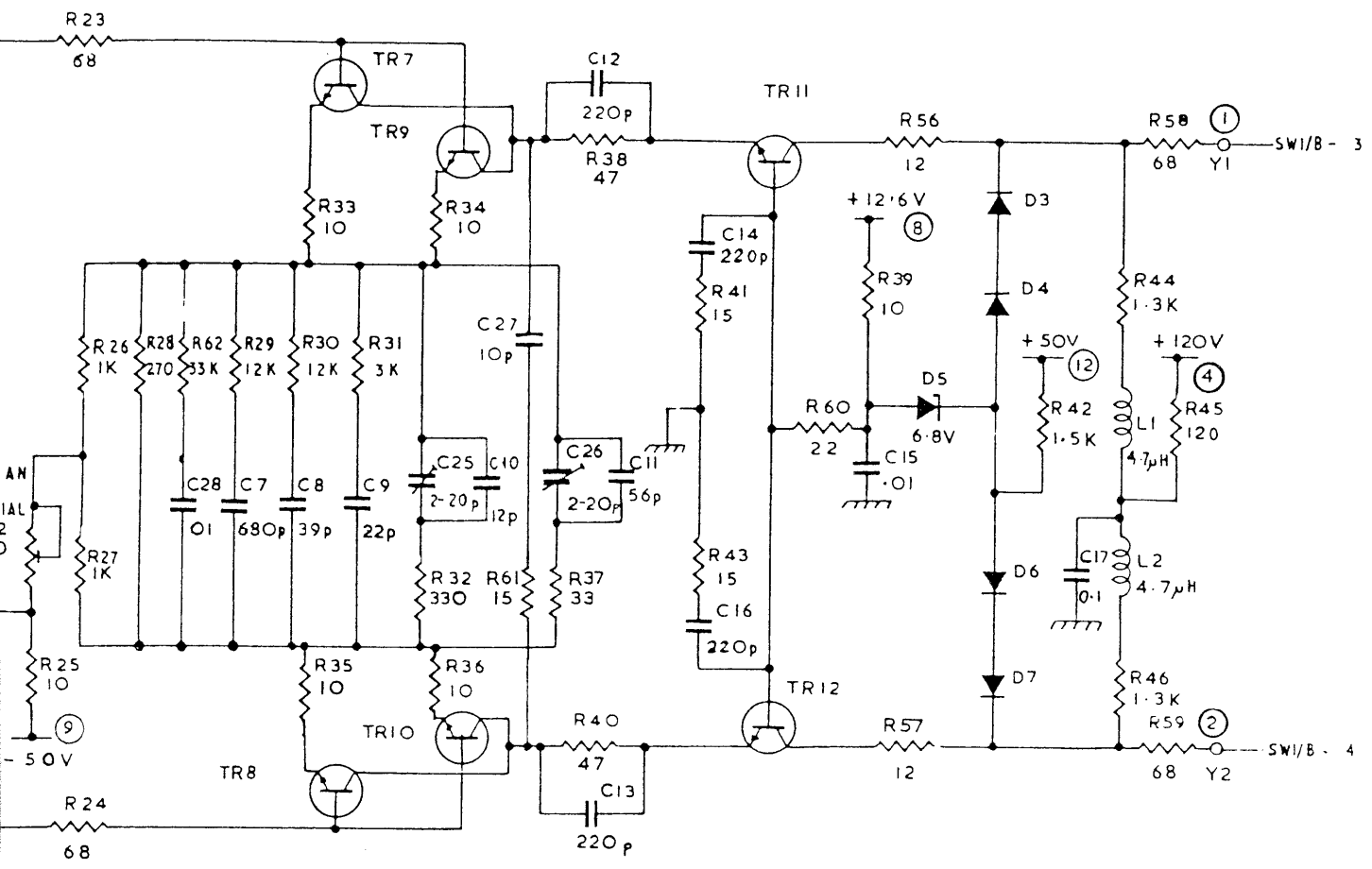
\* R22 Select on test.  
330Ω, 390Ω, or 470Ω.

TRIGGER AMPLIFIER

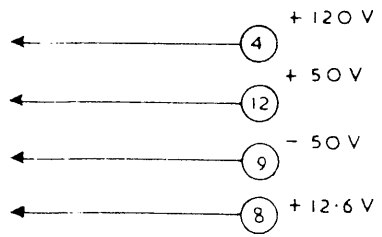
6, 47, 7, 8,	48, 49, 11, 50, 51, 10, 12, 13, 52, 53, 14, 15, 16, 17, 19, 18, 54,	20, 21, 55, 22, 65, 66, 63, 64,	25, 23, 24, 26, 27, 28, 62, 29, 30, 33, 35, 31, 32, 34, 36, 61,	31
23, 18, 24, 19,	20,	3, 21, 22,	4, 5,	6,
1, 2,	3, 4, 13,	5, 6, 14,	8, 7, 9, 10,	25, 27, 10, 2
RV1,	RV3,	RV4	DI, D2,	RV2,



25, 23, 24, 26, 27, 28, 62, 29, 30, 33, 35, 31, 32, 34, 36, 61,	37, 38, 40,	41, 43,	60, 39, 56, 57,	42, 44, 45, 46, 58, 59	R
28, 7,	8, 9,	25, 27, 10, 26, 12, 11, 13, 14, 16,	15,	17,	C
8, 7,	9, 10,	11, 12,			TR
2,			D3	D7, L1, L2	MISC

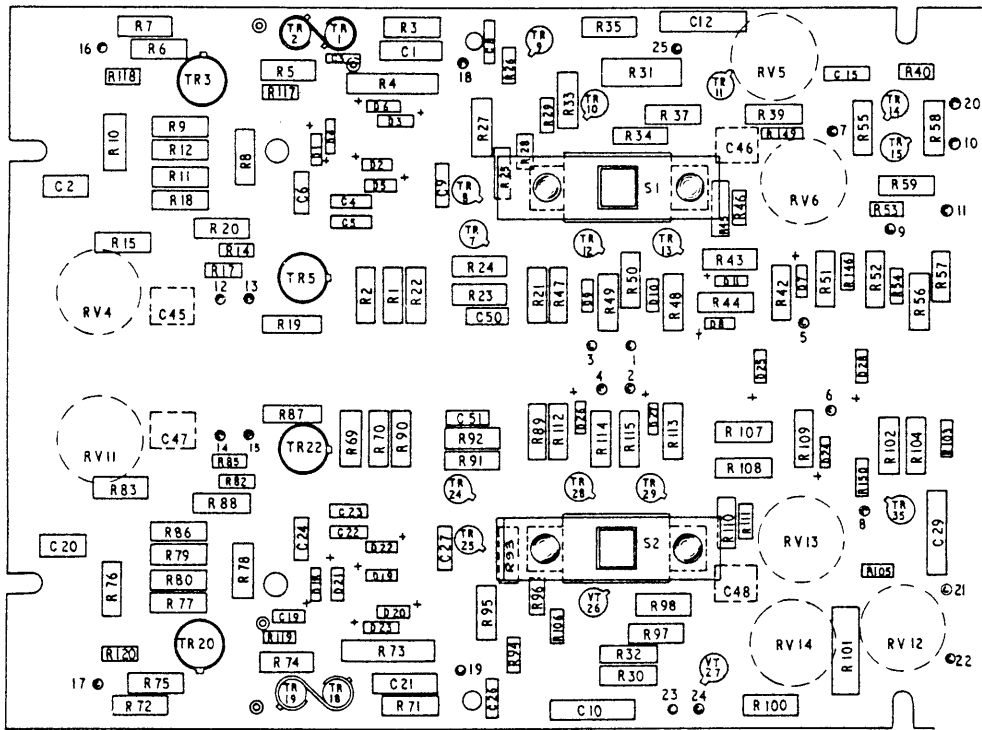


TRIGGER → TO PCB/C-6  
 O/P → TO PCB/C-5  
 ER I/P  
 OM  
 3/H2-25



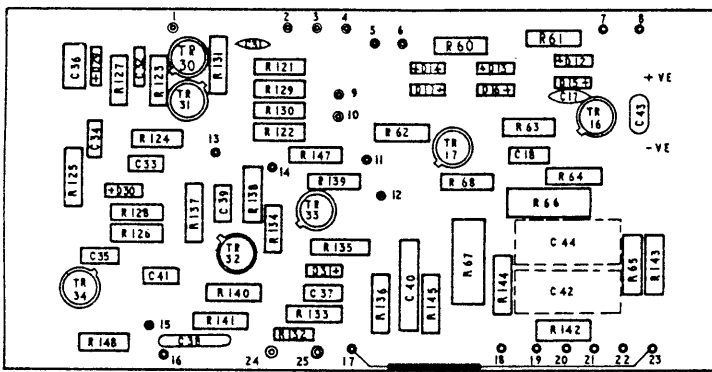
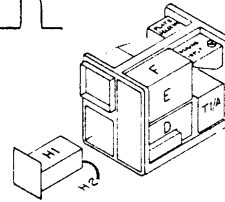
**Y OUTPUT AMPLIFIER**  
**CIRCUIT REFERENCE 'G'**  
 C/CD80490 SHT.7

FIG. 5.16



C/SA80490/106

PCB 'HI'



B/SA80490/108

PCB 'H2'

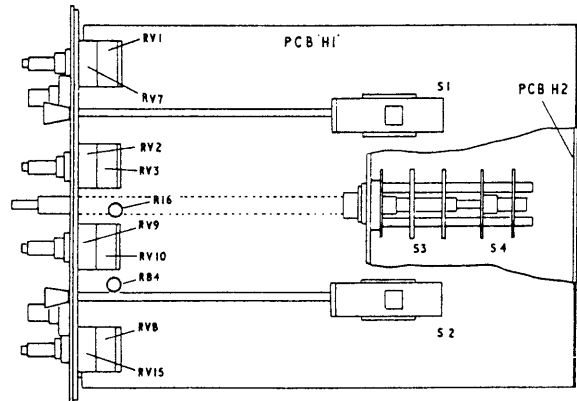


FIG. 5.17

PRINTED CIRCUIT BOARDS 'HI' & 'H2'

P.C.B. 'B' C/SA 80490/83CIRCUIT REFERENCE 'B'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>CAPACITORS</u>					
C1	PE	0.1	10	250V	B911477/2
C2	C	500p	-0+100	8kV	B912674
C3	C	500p	-0+100	8kV	B912674
C4	PE	3300p	20	500V	B911476/11
C5	PE	0.1	10	250V	B911477/2
C6	Fig.5.1				
C7	PC	1	20	100V	B911943/40
C8	E	64	-10+50	64V	B910208/29
C9	PE	.047	20	250V	B911476/7
C10	PE	0.1	10	250V	B911477/2
C11	PE	0.1	10	250V	B911477/2
C12	C	4700p	-20+50	3kV	B912650/55
C13	C	4700p	-20+50	3kV	B912650/55
C14	PE	0.1	10	250V	B911477/2
C15 )					
C16 )					
C17 )	Fig 5.1				
C18 )					
C19 )					
C20-24	See page 5.21				
C25	C	500p	-0+100	8kV	B912674
C26	C	4700p	-20+50	3kV	B912650/55
<u>COILS</u>					
L1	Inductor Cambion 2965-4	470μH			A911210/1
<u>DIODES</u>					
D1	Zener STC ZF8.2	8.2V	5	400mW	A910099/13
D2	Silicon Fairchild IN916				B910086/2
D3	Silicon Fairchild IN916				B910086/2
D4	Silicon Fairchild IN916				B910086/2
D5	Silicon Fairchild IN916				B910086/2
D6	Silicon Fairchild IN916				B910086/2
D7	Silicon Fairchild IN916				B910086/2
D8	Zener STC ZF4.7	4.7V	5	400mW	A910099/7

See note on page 5.1

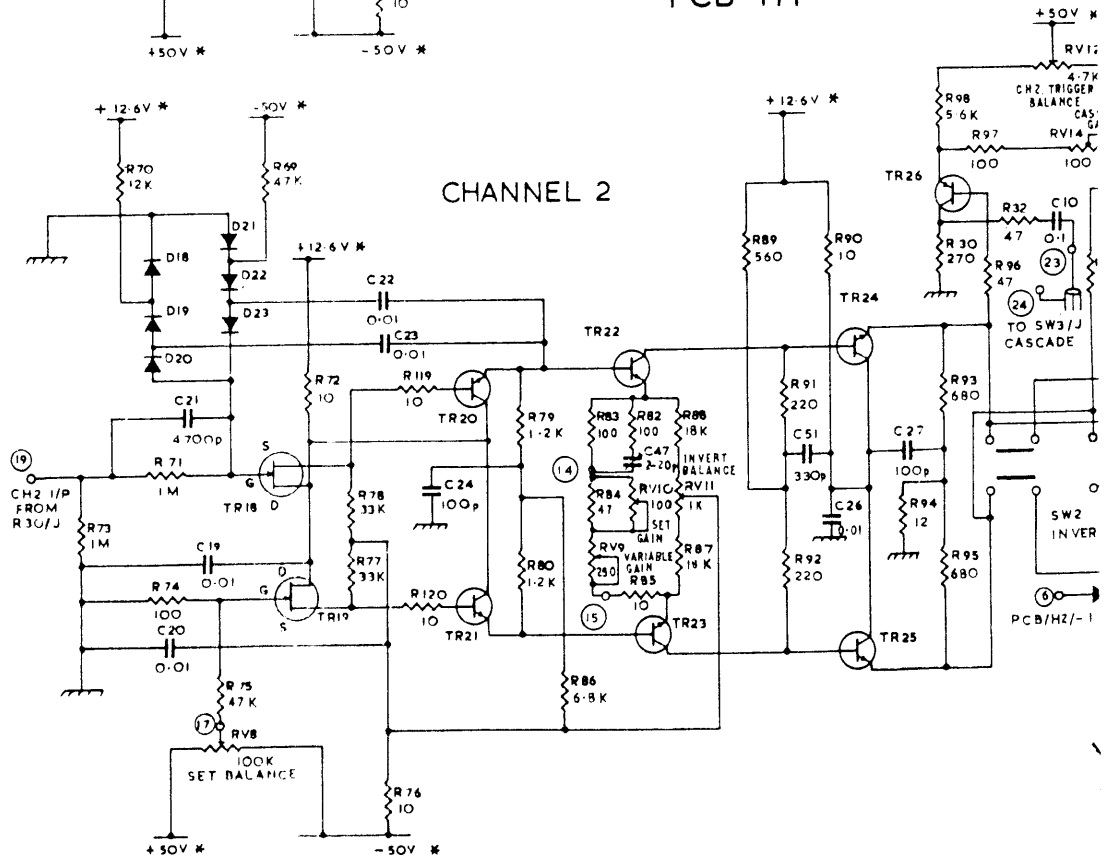
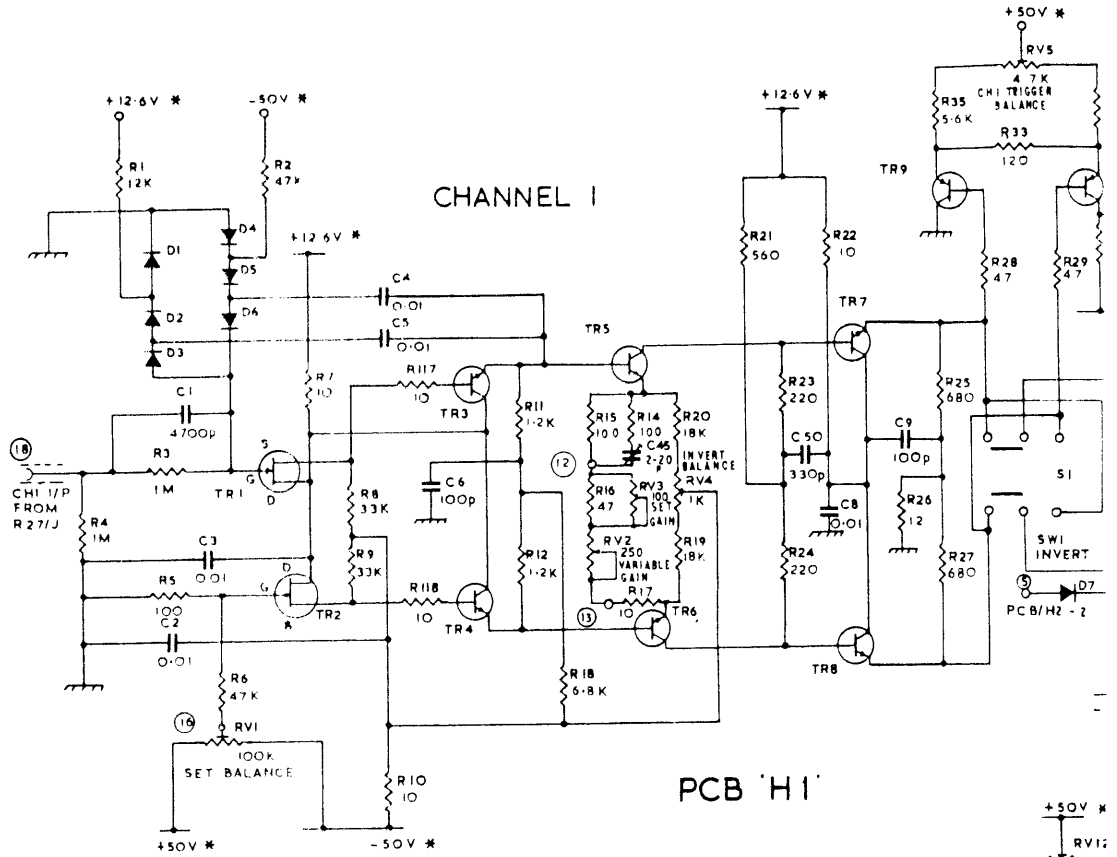
P.C.B. 'B' C/SA 80490/83CIRCUIT REFERENCE 'B'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>DIODES (contd.)</u>					
D9	Silicon Fairchild IN916				B910086/2
D10	Silicon Fairchild IN916				B910086/2
D11	Silicon diffused Mullard BAX16				B912688
D12	Silicon Fairchild IN916				B910086/2
D13	Zener Motorola IN5266	68V	5	500mW	A912687/14
D14	Zener Motorola IN5268	82V	5	500mW	A912687/15
D15 )	Fig 5.1				
D16 )					
D17 )					
D18 )					
D19 )					
D20 )					
D21 )					
D22	Silicon Fairchild IN916				
<u>PLUGS</u>					
Fixed, uncoded, 6 off white. see fig.5.1					A912695/1
<u>RESISTORS</u>					
R1	HSC	10k	5	$\frac{1}{2}$ W	B912636/73
R2	0	3.3k	5	4W	B912639/61
R3	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R4	0	6.8k	5	1W	5905-99-013- 5766
R5	0	3.9k	5	1W	5905-99-013- 5760
R6	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R7	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R8	HSC	15k	5	$\frac{1}{2}$ W	B912636/77
R9	HSC	470k	5	$\frac{1}{2}$ W	B912636/113
R10	HSC	1M	5	$\frac{1}{2}$ W	B912636/121
R11	HSC	5.6k	5	$\frac{1}{2}$ W	B912636/67
R12	0	15k	5	1W	5905-99-013- 5774
R13	0	22k	5	1W	5905-99-013- 5778
R14	HSC	120k	5	$\frac{1}{2}$ W	B912636/99
R15	HSC	390k	5	$\frac{1}{2}$ W	B912636/39

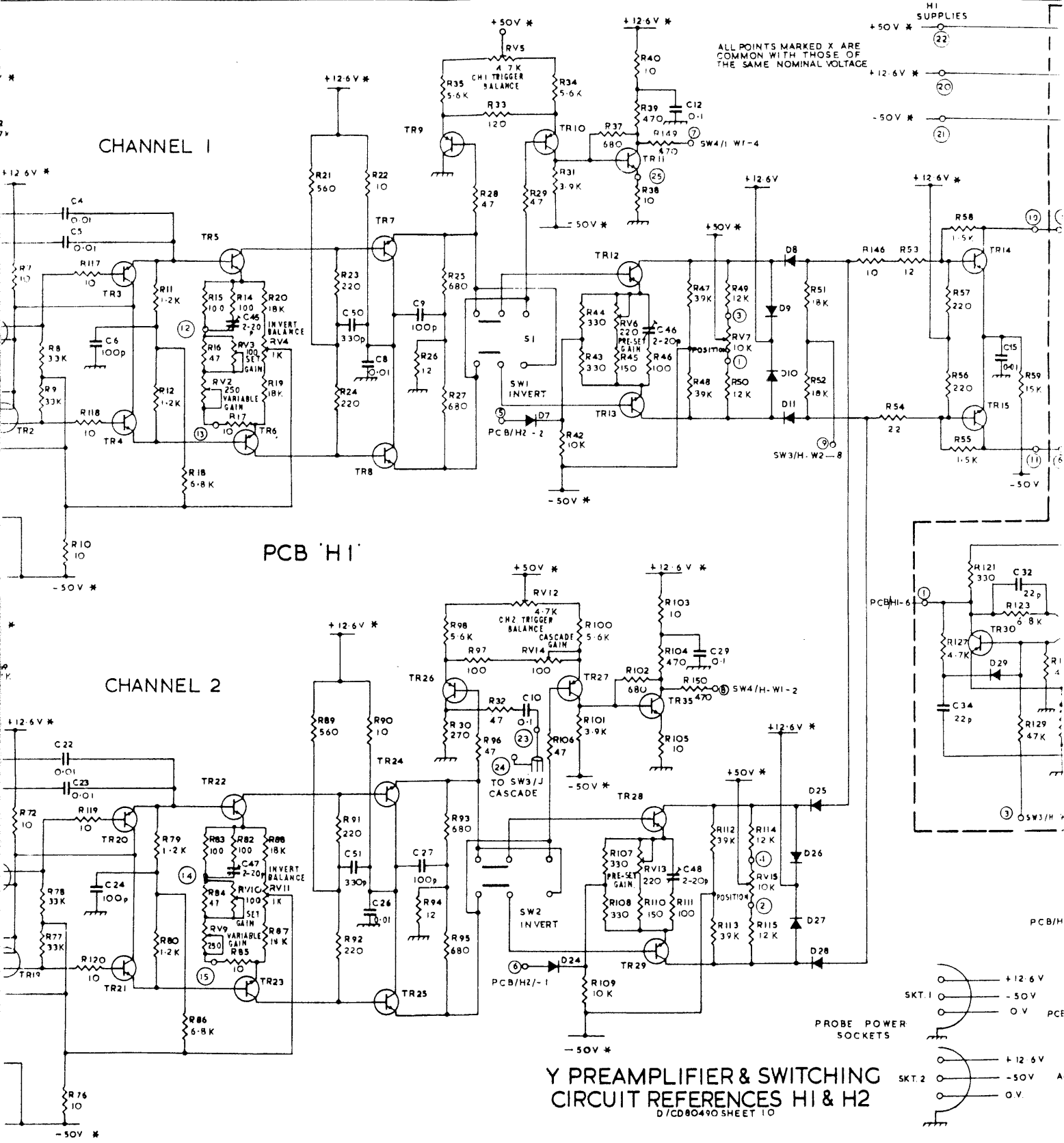
See note on page 5.1



R	4, 1, 3, 71, 73, 70, 5, 74, 75,	6, 72,	7, 72,	8, 78, 10, 117, 119, 120,	11, 79, 10, 15, 83, 14, 17, 20, 88, 12, 80, 84, 14, 84, 82, 85, 19, 87,	21, 23, 91, 22, 94, 35, 27, 30, 95, 97, 32, 29, 31, 104
C	2, 20, 1, 3, 21, 19,			4, 5, 22, 23, 6, 24,	45, 47,	7, 25, 50, 8, 24, 9, 10,
TR		1, 18, 19, 2,		3, 9, 20, 21,	5, 6, 22, 23,	7, 8, 24, 25, 9, 26, 10,
MISC	D1, D2, D3, D18, D19, D20, D4, D5, D4, D21, D22, D23, RV1, RV8,				RV2, RV3, RV4, RV9, RV10, RV11, S1, S2, RV5, RV12, D7, D24	



7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125
4, 5, 22, 23, 6, 24, 45, 47, 7, 25, 50, 8, 26, 9, 10, 46, 48, 12, 29, 34, 15, 32
0, 19, 2, 3, 4, 20, 21, 5, 6, 22, 23, 7, 8, 24, 25, 9, 26, 10, 27, 11, 12, 13, 35, 28, 29, 14, 15, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125
D21, D22, D23, RV1, RV8, RV2, RV3, RV4, RV9, RV10, RV11, S1, S2, RV5, RV12, D7, D24, RV14, RV6, RV13, RV7, RV15, D8, D11, D25, D28, D29



46, 103, 105, 47, 112, 49, 114, 51,	57, 55,	59,	61,	124,	62,	133,	66, 132, 136, 65, 134,	140, 142, 144, 141	R
104, 50, 117, 48, 113, 50, 115, 52,	144, 54, 53, 127, 58, 56, 121, 123, 129,	125, 131, 60, 128, 130,	122,	128,	137,	135, 63, 67, 139,	64, 68, 138,	147, 143, 145, 148	C
10, 12, 29,	34,	15, 32,	31, 36, 16, 33,	35, 17,	37, 39,	18, 38,	40, 41, 42, 43, 44,	49	TR
3, 28, 29,	14, 15, 30,			31,	16, 17, 32,		33,	4	MISC
RV7, RV15, DB	D11, D25, D28,	D29,	D30, D12	D17, D31					

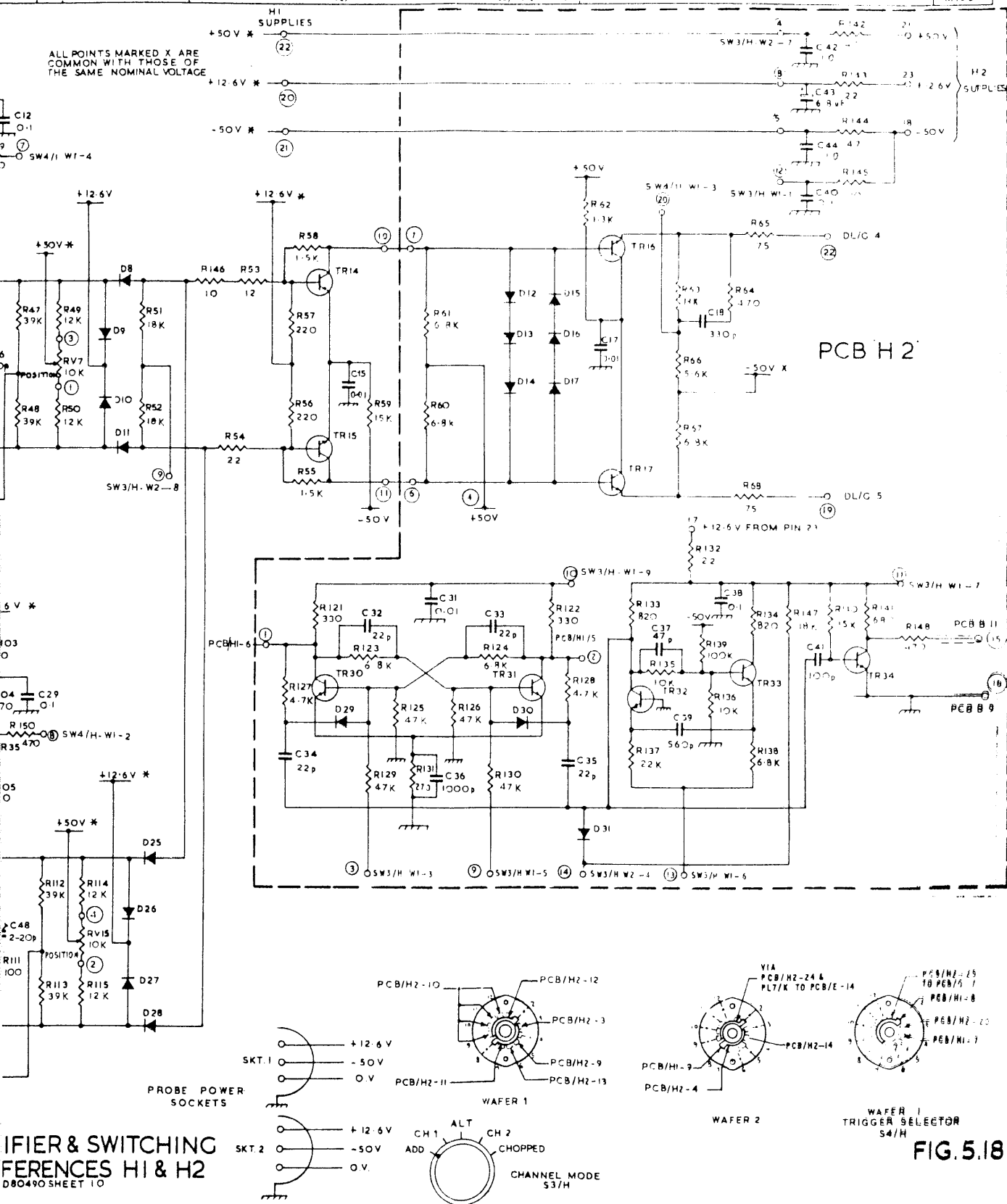
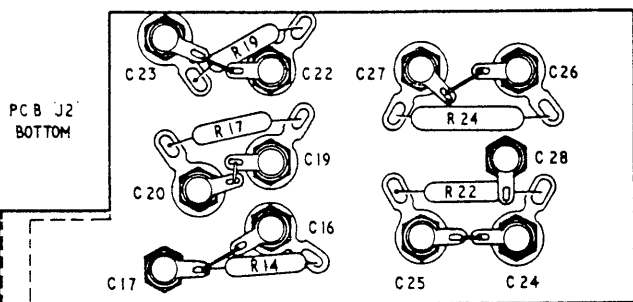
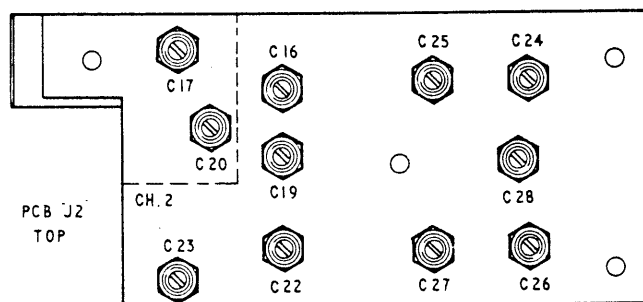
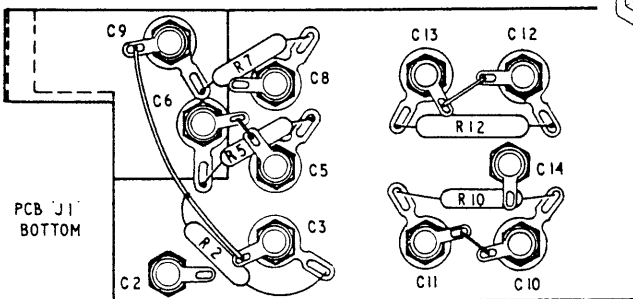
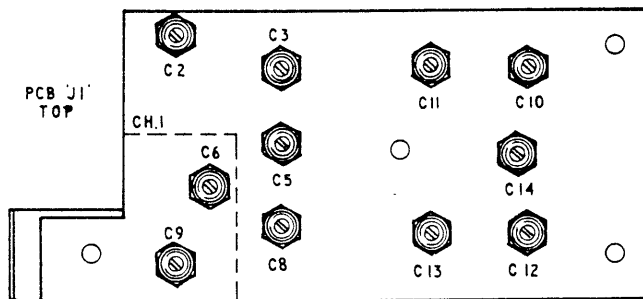


FIG. 5.18

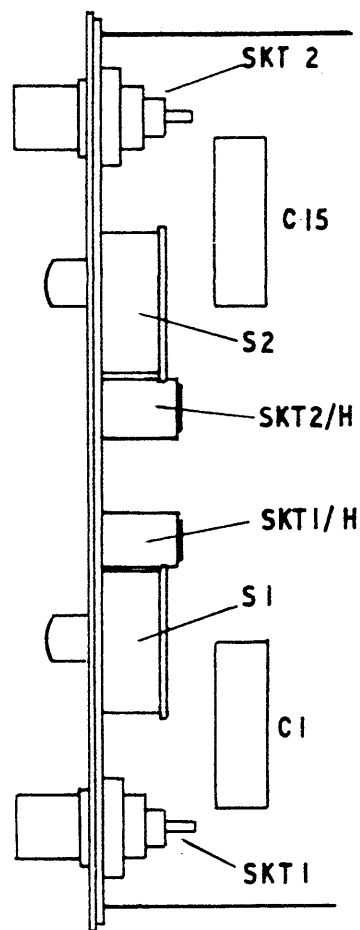
AMPLIFIER & SWITCHING  
REFERENCES H1 & H2  
D80490 SHEET 10



B/SA80490/90



B/SA80490/89



UNDERNEATH VIEW

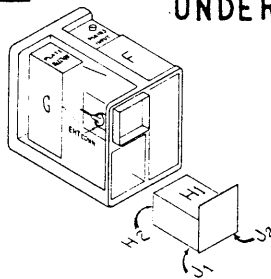


FIG. 5.19

PRINTED CIRCUIT BOARDS 'J1' & 'J2'

P.C.B. 'B' C/SA 80490/83CIRCUIT REFERENCE 'B'

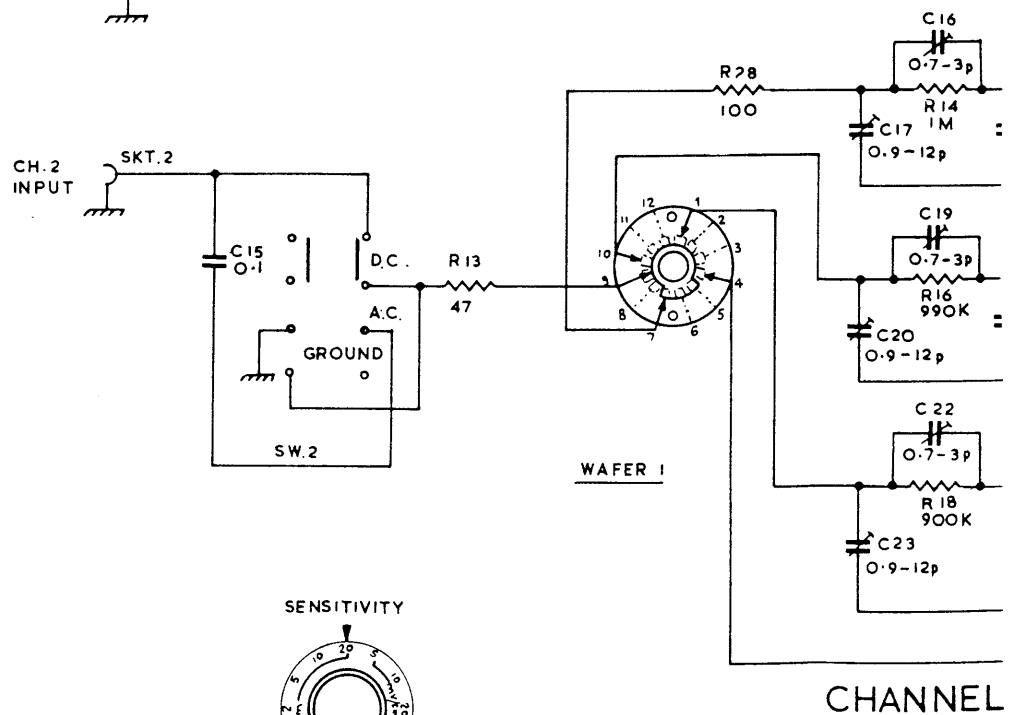
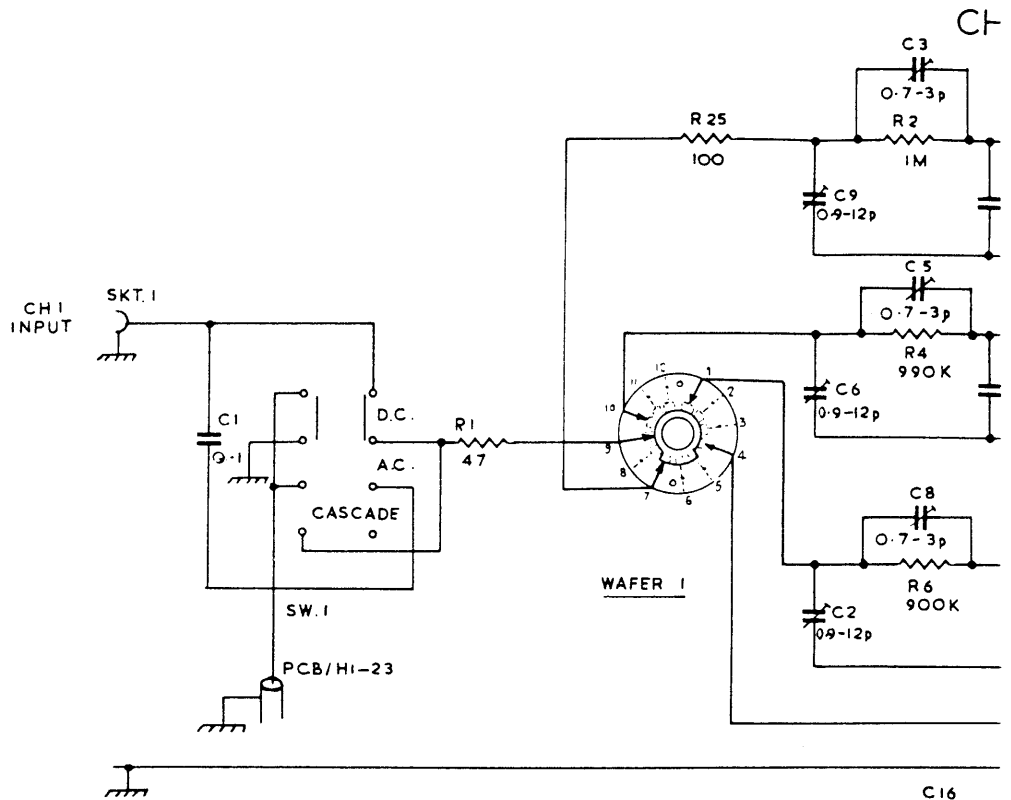
CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
R16 )	Fig 5.1				
R17 )					
R18 )					
R19	HSC	4.7k	5	$\frac{1}{2}$ W	B912636/65
R20	HSC	4.7k	5	$\frac{1}{2}$ W	B912636/65
R21	HSC	12k	5	$\frac{1}{2}$ W	B912636/75
R22	HSC	4.7k	5	$\frac{1}{2}$ W	B912636/65
R23	HSC	1k	5	$\frac{1}{2}$ W	B912636/49
R24	F	330k	1		B912160/85
R25	0	100k	5	$\frac{1}{2}$ W	5905-99-013- 6164
R26	F	2.2M	1		B912641/1
R27	F	2.2M	1		B912641/1
R28	F	2.2M	1		B912641/1
R29	F	1.5M	1		B912641/3
R30	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R31	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R32	HSC	47k	5	1W	B912637/89
R33	HSC	1k	5	1W	B912637/49
R34 )	See Fig 5.1				
R35 )					
R36 )					
R37 )		4.7M	10	$\frac{1}{2}$ W	B912748/1
R38	HSC	47	5	$\frac{1}{2}$ W	
R39 )	Fig 5.1				
R40 )	Fig 5.1				
R41 )					
R46	HSC	150	5	$\frac{1}{2}$ W	B912636/29
R47	Fig.5.1				
<u>RESISTORS, VARIABLE</u>					
RV1	Preset Davall 81P LIN	4.7k	20		A912635/10
RV2	Preset Davall 81P LIN	47k	20		A912635/14
RV3	(Fig 5.1)				

See note on page 5.1

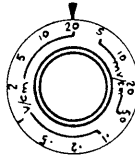
P.C.B. 'B' C/SA 80490/83CIRCUIT REFERENCE 'B'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
<u>RESISTORS, VARIABLE, (contd.)</u>					
RV4	Fig 5.1				
RV5	Fig 5.1				
RV6	Page 5.21	-	-		-
RV7	Fig 5.2	100k			
RV8	Page 5.21	-	-	-	-
RV9	Fig.5.1			-	
<u>TRANSISTORS</u>					
TR1	Motorola MM3001				A912680
TR2	Motorola MM3001				A912680
TR3	Motorola MPS2369				A912682
TR4	Motorola MM3001				A912680
TR5	Motorola MPS3640				B912545
TR6	2N4410				B912777/2
TR7	2N4410				B912777/2
TR8	2N4410				B912777/2
TR9	2N4410				B912777/2
TR10	2N3053				B99160/1
TR11	2N4410				B912777/2
<u>MISCELLANEOUS</u>					
	Mounting Pad T05				A99286 (4 off)
<u>See note on page 5.1</u>					

R	1, 13,	25, 28,	2, 4, 6, 14, 16,
C			23, 9, 6, 2, 3, 5, 8, 20, 16, 19,
MISC.	SKT 1, SKT 2.		

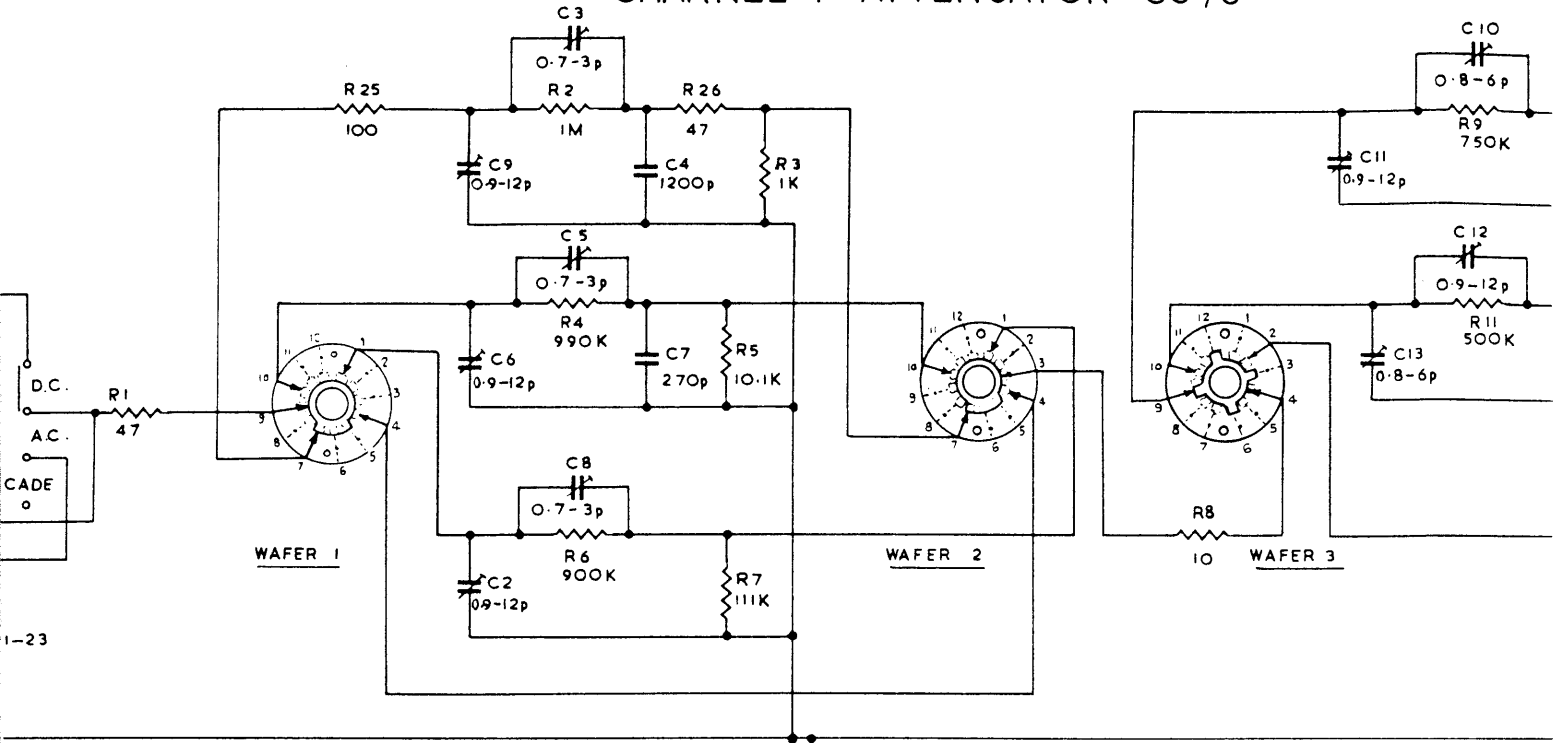


SENSITIVITY

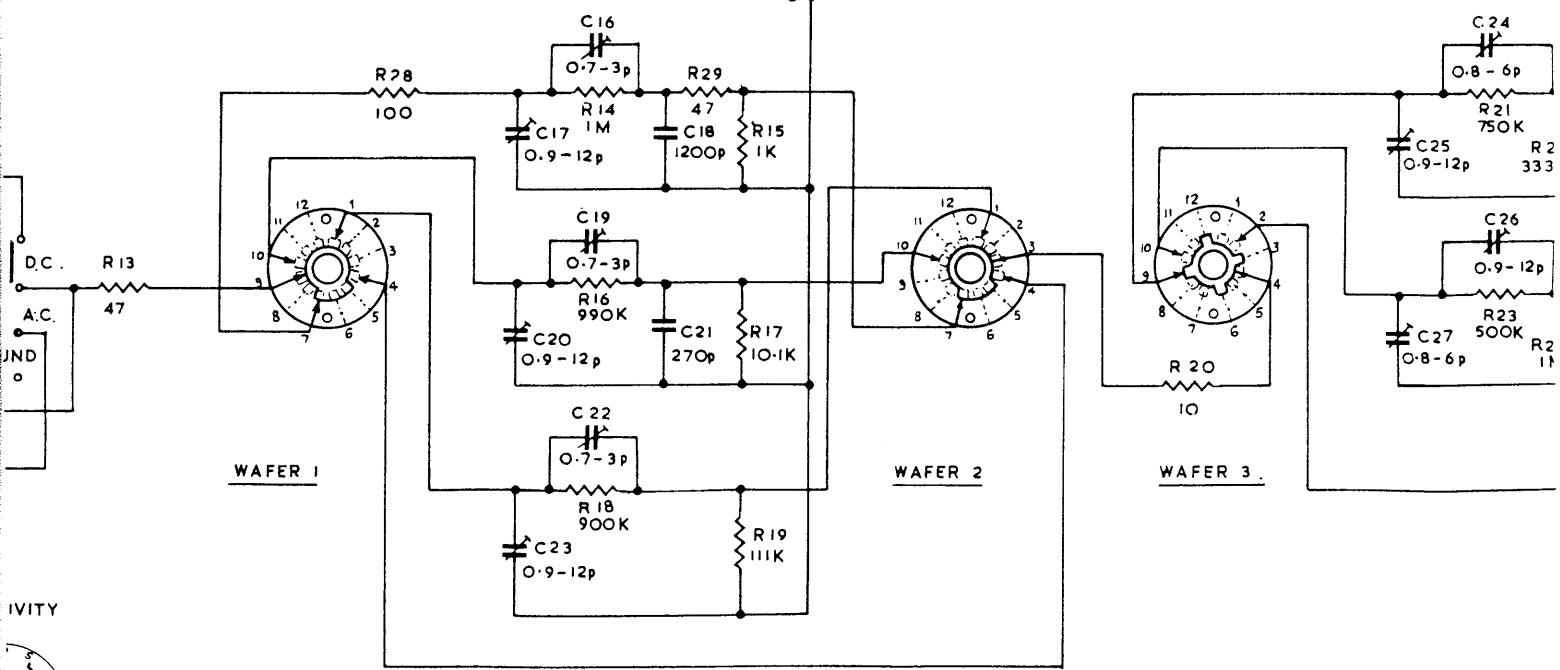


CHANNEL

### CHANNEL 1 ATTENUATOR S3/J



### CHANNEL 2 ATTENUATOR S4/J

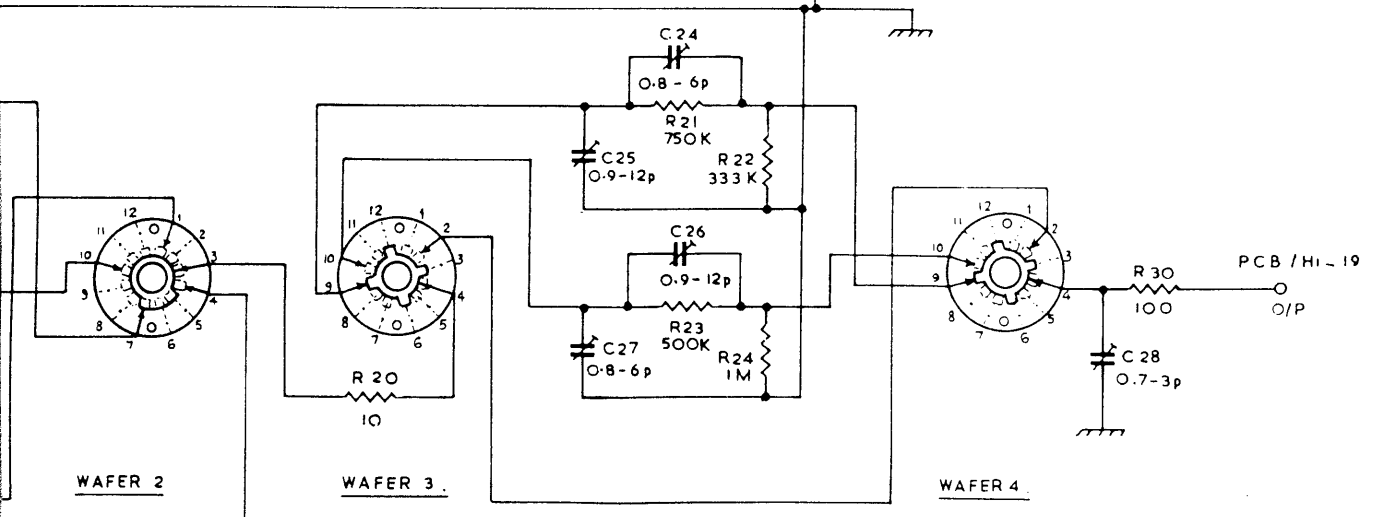
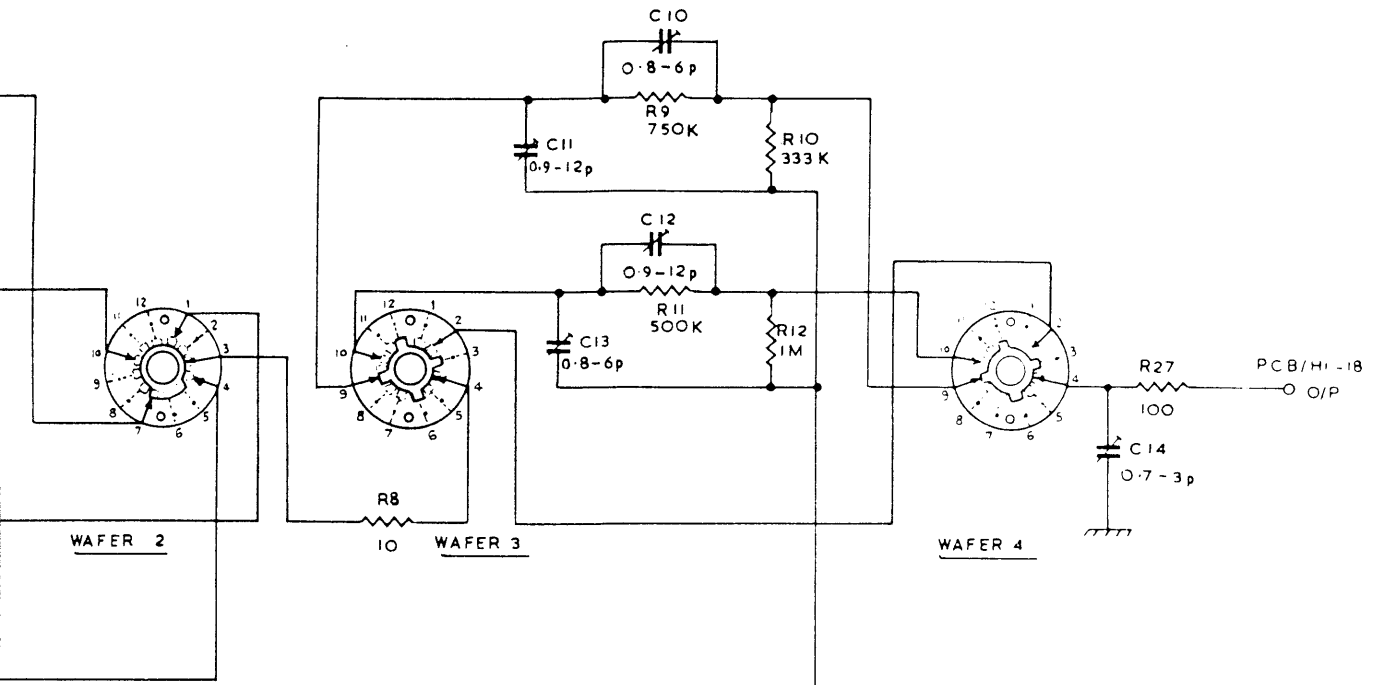


Y INF  
CIRCU



19, 3,	8, 20,	9, 11, 21, 23, 22, 24, 10, 12,	27, 30,	R
		25, 10, 24, 11, 13, 27, 12, 26,	14, 28,	C
				MISC

I ATTENUATOR S3/J

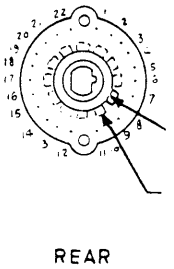
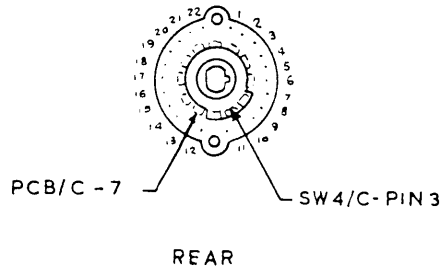
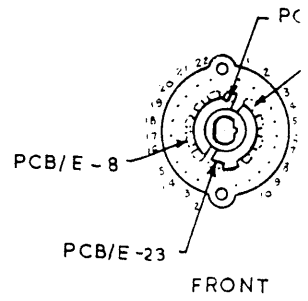
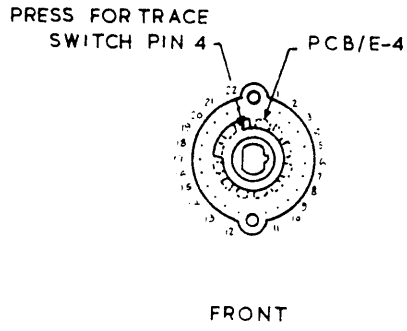
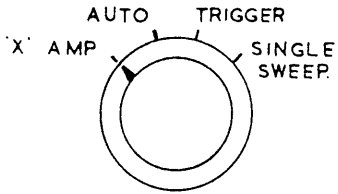


ENNUATOR S4/J

For Service Manuals  
**MAURITRON SERVICES**  
 8 Cherry Tree Road, Chinnor  
 Oxfordshire, OX9 4QY.  
 Tel (01844) 351694  
 Fax (01844) 352554  
 email:- sales@mauritron.co.uk

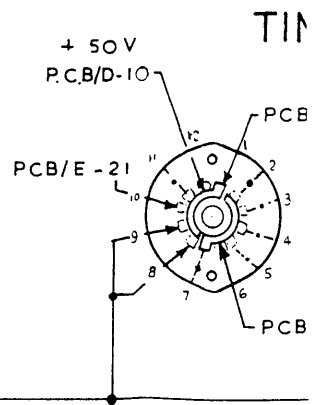
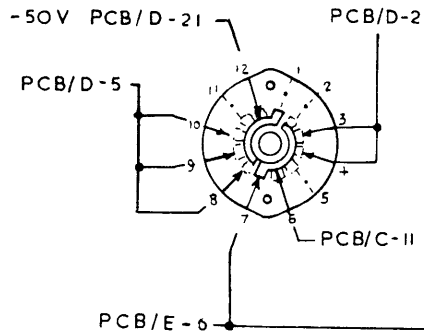
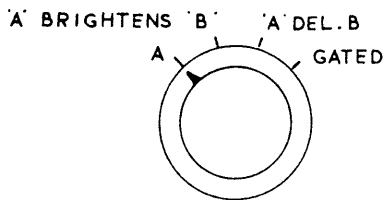
Y INPUT ATTENUATORS  
 CIRCUIT REFERENCE 'J'  
 D/CD80490/9

FIG. 5.20



WAFER 1

WAFER 2

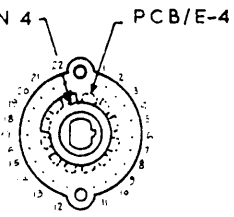


WAFER 1

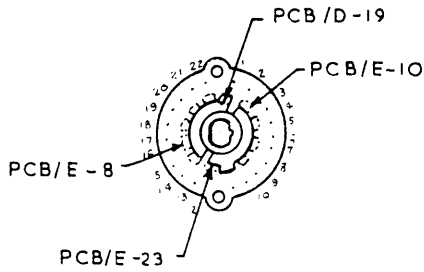
WAFER 2

TRIGGER MODE :

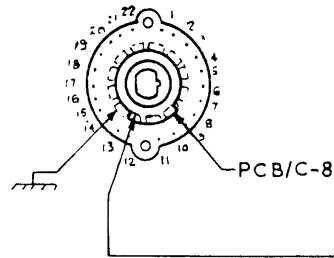
FOR TRACE  
SWITCH PIN 4



FRONT

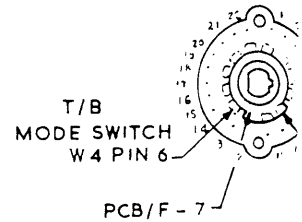


FRONT



FRONT

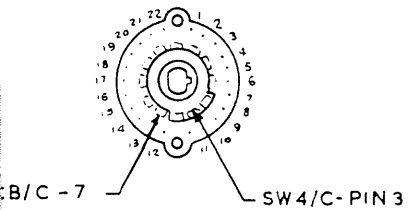
WA FER 3



FRONT

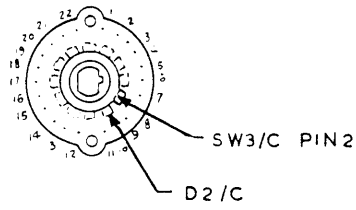
WA FER 4

## TRIGGER MODE SWITCH



REAR

WA FER 1

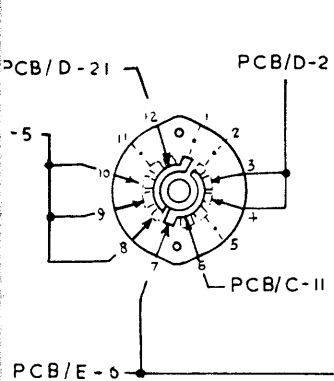


REAR

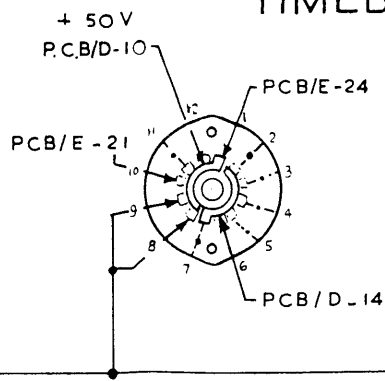
WA FER 2

## TRIGGER MODE SWITCH

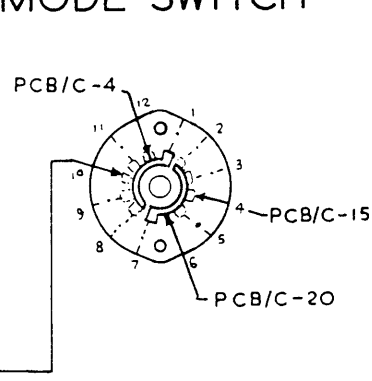
## TIMEBASE MODE SWITCH



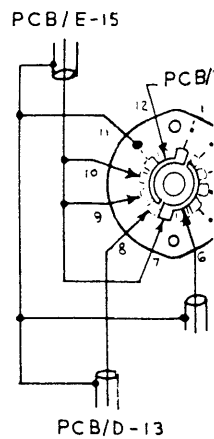
WA FER 1



WA FER 2



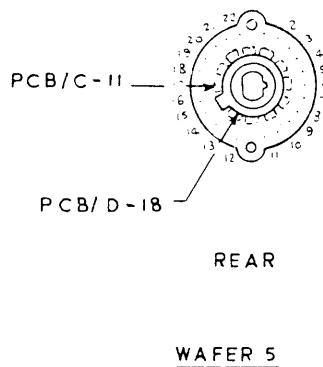
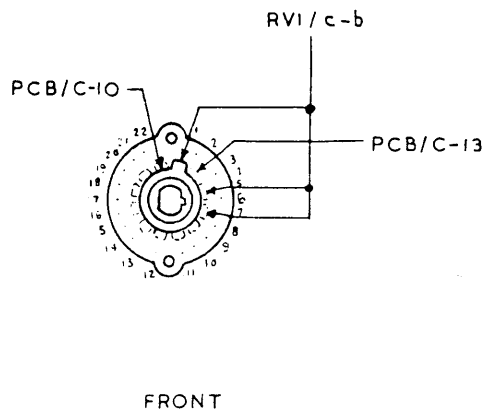
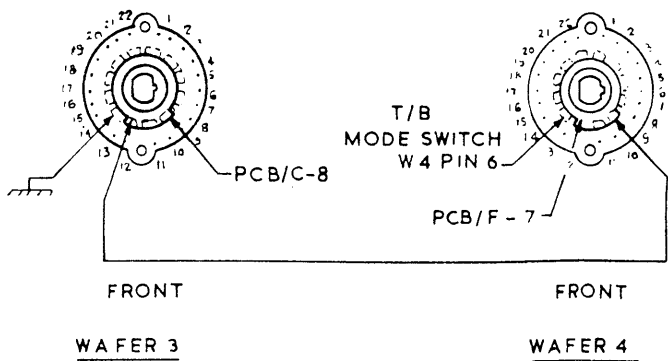
WA FER 3



WA FER 4

## TRIGGER MODE & TIMEBASE MODE SWITCHES

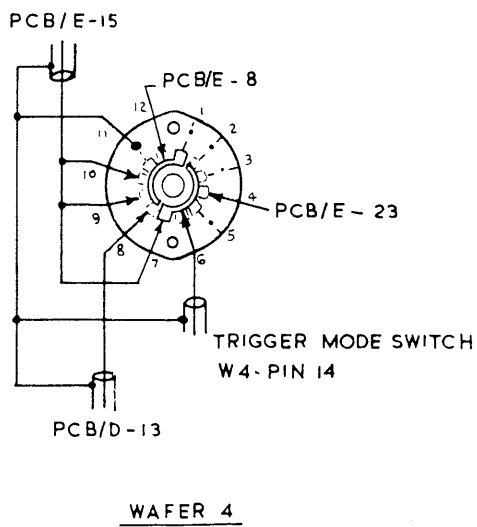
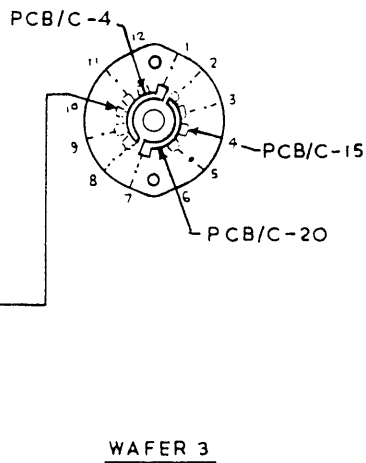
D/CD80490/8



TRIGGER MODE SWITCH

GER MODE SWITCH

E MODE SWITCH



BASE MODE SWITCHES

FIG. 5.21

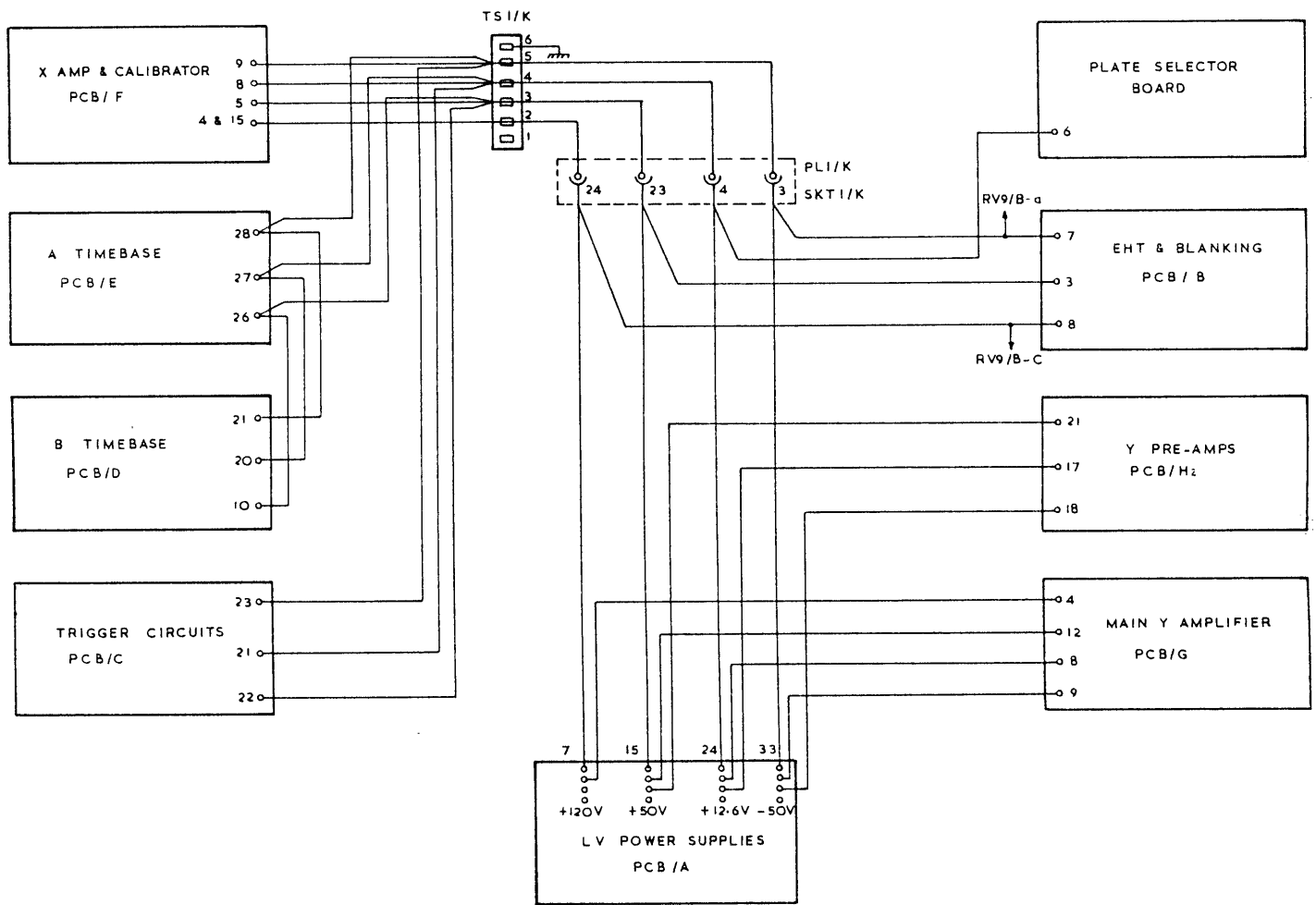
PLATE SELECTOR BOARD C/SA 80490/110CIRCUIT REFERENCE 'B'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>CAPACITORS</u>					
C20	PE	0.1	20	630V	B911625/31
C21	PE	0.1	20	630V	B911625/31
C22	PE	0.1	20	630V	B911625/31
C23	PE	0.1	20	630V	B911625/31
C24	C	4700p	-20+50	3KV	B912650/55
<u>RESISTORS</u>					
R38	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R42	HSC	1M	5	$\frac{1}{2}$ W	B912636/121
R43	HSC	1M	5	$\frac{1}{2}$ W	B912636/121
R44	HSC	1M	5	$\frac{1}{2}$ W	B912636/121
R45	HSC	1M	5	$\frac{1}{2}$ W	B912636/121
R46	HSC	1M	5	$\frac{1}{2}$ W	B912636/121
<u>RESISTORS, VARIABLE</u>					
RV6	Reliance MW LIN	1K		1W	B912643/2
RV8	Morganite U LIN	100K			B912749/4
<u>SWITCHES</u>					
SW1	EML S5				B912703
SW2	EML S5				B912703
SW3	EML S5				B912703
<u>ASSEMBLIES</u>					
SKT1-6	'X' and 'Y' Mod.Board containing:-				C/SA80490/111
	SKT1-6 Oxley 50S/156				A99280/10 6 off.
	C.R.T. Lead Assembly containing:				A/SA80490/121
	Socket (Yellow) Oxley 50LS/156				A912696/3
	C.R.T. Lead Assembly containing:				A/SA80490/122
	Socket (Blue) Oxley 50LS/156				A912696/4
<u>See note on page 5.1</u>					

PLATE SELECTOR BOARD C/SA 80490/110

CIRCUIT REFERENCE 'B'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>ASSEMBLIES</u> (contd.)					
	C.R.T. Lead Assembly containing: Socket (Red) Oxley 50LS/156				A/SA80490/123 A912696/1
	C.R.T. Lead Assembly containing: Socket (Black) Oxley 50LS/156				A/SA80490/124 A912696/2
<u>MISCELLANEOUS</u>					
	Pot Lock (2 off)				KT93660
<u>See note on page 5.1</u>					



POWER DISTRIBUTION  
C/CD80490 SHEET II

FIG. 5.22

P.C.B. 'C' C/SA 80490/91CIRCUIT REFERENCE 'C'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>CAPACITORS</u>					
C1 )	} Fig 5.1				
C2 )					
C3 )					
C4 )					
C5	Mullard 80905003	2-20p		50V	A912672/3
C6	C	.01	+80-20	100V	B911711/10
C7	C	.01	+80-20	100V	B911711/10
C8	P	56p	10	160V	B910931/11
C9	P	1000p	10	63V	B910222/9
C10	C	0.1	+50-20	18V	B912282/11
C11	P	100p	5	125V	B910031/104
C12	PE	0.1	10	250V	B911477/2
C13	PE	0.1	10	250V	B911477/2
C14	C	0.1	+50-20	18V	B912282/11
C15	C	.01	+80-20	100V	B911711/10
C16	P	1000p	10	63V	B912022/9
C17	P	100p	5	125V	B910931/104
C18	PE	0.1	10	250V	B911477/2
C19	PE	0.1	10	250V	B911477/2
C20	PC	1	20	100V	B911943/40
C21	PE	0.1	10	250V	B911477/2
C22	C	.01	+80-20	100V	B911711/10
C23	Not used				
C24	C	0.1	+50-25	18V	B912282/11
C25	Fig 5.1				
C26	C	.01	+80-20	100V	B911711/10
<u>DIODES</u>					
D1	Fig.5.1				
D2	Not used				
D3	Silicon Fairchild IN916				B910086/2
D4	Silicon Fairchild U17549/1				A912684
D5	Silicon Fairchild U17549/1				A912684
D6	Silicon Fairchild IN916				B910086/2

See note on fig.5.1.



P.C.B. 'C' C/SA 80490/91CIRCUIT REFERENCE 'C'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
<u>DIODES (contd.)</u>					
D7	Zener STC ZF10	10V	5	400MW	B910099/15
D8	Zener STC ZF10	10V	5	400MW	B910099/15
D9	Zener STC ZF8.2	8.2V	5	400MW	B910099/13
D10	Zener STC ZF10	10V	5	400MW	B910099/15
D11	Zener STC ZF8.2	8.2V	5	400MW	B910099/13
<u>RESISTORS</u>					
R1)	Fig 5.1				
R2)					
R3)					
R4)					
R5)					
R6)					
R7	HSC	100k	5	$\frac{1}{8}$ W	B912638/97
R8	HSC	220	5	$\frac{1}{8}$ W	B912638/33
R9	HSC	33k	5	$\frac{1}{2}$ W	B912636/85
R10	HSC	8.2k	5	$\frac{1}{2}$ W	B912636/71
R11	HSC	2.2k	5	$\frac{1}{2}$ W	B912636/57
R12	HSC	8.2k	5	$\frac{1}{2}$ W	B912636/71
R13	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R14)	Fig 5.1				
R15)					
R16	HSC	470	5	$\frac{1}{2}$ W	B912636/41
R17	HSC	22	5	$\frac{1}{8}$ W	B912638/9
R18	HSC	12k	5	$\frac{1}{2}$ W	B912636/75
R19	HSC	12k	5	$\frac{1}{2}$ W	B912636/75
R20	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R21	HSC	10k	5	$\frac{1}{2}$ W	B912636/73
R22	HSC	33k	5	$\frac{1}{2}$ W	B912636/85
R23	HSC	1k	5	$\frac{1}{8}$ W	B912638/49
R24	HSC	8.2k	5	$\frac{1}{2}$ W	B912636/71
R25	HSC	1.6k	5	$\frac{1}{2}$ W	B912636/54
R26	HSC	4.7k	5	$\frac{1}{2}$ W	B912636/65
R27	HSC	8.2k	5	$\frac{1}{2}$ W	B912636/71
R28	0	2.7k	5	$\frac{1}{2}$ W	5905-99-013-5756
R29	0	4.7k	5	1W	5905-99-013-5762

See note on page 5.1

P.C.B. 'C' C/SA 80490/91CIRCUIT REFERENCE 'C'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
<u>RESISTORS</u> (contd.)					
R30	0	4.7k	5	1W	5905-99-013-5762
R31	HSC	390	5	$\frac{1}{2}$ W	B912636/39
R32	HSC	75	5	$\frac{1}{2}$ W	B912636/22
R33	HSC	6.2k	5	$\frac{1}{2}$ W	B912636/68
R34	HSC	6.2k	5	$\frac{1}{2}$ W	B912636/68
R35	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R36) R37)	Fig 5.1				
R38	HSC	2.7k	5	$\frac{1}{8}$ W	B912638/59
R39	HSC	68	5	$\frac{1}{8}$ W	B912638/21
R40	HSC	6.8k	5	$\frac{1}{2}$ W	B912636/69
R41	0	300	5	$\frac{1}{2}$ W	5905-99-013-6103
R42	HSC	6.8k	5	$\frac{1}{2}$ W	B912636/69
R43	HSC	3.3k	5	$\frac{1}{8}$ W	B912638/61
R44	HSC	3.9k	5	$\frac{1}{2}$ W	B912636/63
R45	HSC	13k	5	$\frac{1}{2}$ W	B912636/76
R46	HSC	47k	5	$\frac{1}{2}$ W	B912636/89
R47	HSC	12k	5	$\frac{1}{2}$ W	B912636/75
R48	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R49	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R50	HSC	470	5	$\frac{1}{2}$ W	B912636/41
R51	HSC	22	5	$\frac{1}{8}$ W	B912638/9
R52	HSC	12k	5	$\frac{1}{2}$ W	B912636/75
R53	HSC	12k	5	$\frac{1}{2}$ W	B912636/75
R54	HSC	10k	5	$\frac{1}{2}$ W	B912636/73
R55	HSC	2.4k	5	$\frac{1}{2}$ W	B912636/58
R56	HSC	13k	5	$\frac{1}{2}$ W	B912636/76
R57	HSC	8.2k	5	$\frac{1}{2}$ W	B912636/71
R58	HSC	10k	5	$\frac{1}{2}$ W	B912636/73
R59	0	4.7k	5	1W	5905-99-013-5762
R60	0	4.7k	5	1W	5905-99-013-5762
R61	HSC	390	5	$\frac{1}{2}$ W	B912636/39
R62	HSC	75	5	$\frac{1}{2}$ W	B912636/22

See note on page 5.1

P.C.B. 'C' S/CA 80490/91CIRCUIT REFERENCE 'C'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
<u>RESISTORS (contd.)</u>					
R63	HSC	6.2k	5	$\frac{1}{2}$ W	B912636/68
R64	HSC	6.2k	5	$\frac{1}{2}$ W	B912636/68
R65	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R66	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R67	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R68	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R69	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R70	0	2.7k	5	1W	ITB 3533/27205
R71	HSC	10k	5	$\frac{1}{2}$ W	B913636/73
R72	HSC	100	5	$\frac{1}{8}$ W	B913638/25
R73	HSC	150	5	$\frac{1}{8}$ W	B913628/29
<u>RESISTORS, VARIABLE</u>					
RV1 (Fig 5.1 page 5.8)					
RV2	Davall 81P LIN	2.2k		20	A912635/1
RV3	Davall 81P LIN	10k		20	A912635/11
RV4	Davall 81P LIN	2.2k		20	A912635/1
RV5 (Fig 5.1)					
<u>SOCKETS</u>					
SKT1 (Fig 5.1)					
<u>SWITCHES</u>					
SW1)					
SW2) Fig 5.1					
SW3)					
SW4)					
<u>TRANSISTORS</u>					
TR1)	Union Carbide KEM101-UC734 (matched pair)				A912677
TR8)					
TR2	2N3904				A910649
TR3	2N3904				A910649
TR4	Motorola MPS 2369				A912682
TR5	2N3904				A910649
TR6	Motorola MPS 2369				A912682
TR7	2N3904				A910649
TR9	Motorola MPS 2369				A912682
TR10	Motorola MPS 2369				A912682

see note on page 5.1

CDU150-CT531/3

OSCILLOSCOPE

P.C.B. 'C' C/SA 80490/91

CIRCUIT REFERENCE 'C'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
TR11	Motorola MPS 3640				B912545
TR12	2N2904				B910008
TR13	2N3904				A910649
TR14	2N3906				A910648
TR15	2N3904				A910649
TR16	Motorola MPS 2369				A912682
TR17	2N3904				A910649
TR18	Motorola MPS 2369				A912682
TR19	2N3904				A910649
TR20	Motorola MPS 2369				A912682
TR21	Motorola MPS 2369				A912682
TR22	Motorola MPS 3640				B912545
TR23	2N3904				A910649
<u>MISCELLANEOUS</u>					
	Transistor Mtg. Pad. T05				A99286

For Service Manuals  
MAURITRON SERVICES  
8 Cherry Tree Road, Chinnor  
Oxfordshire, OX9 4QY.  
Tel (01844) 351694  
Fax (01844) 352554  
email:- sales@mauritron.co.uk

see note on page 5.1

BLANK PAGE.

CDU150-CT531/3

OSCILLOSCOPE

P.C.B. 'D' C/SA 80490/85

CIRCUIT REFERENCE 'D'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
<u>CAPACITORS</u>					
C1	P	33p	5	125V	B910931/99
C2	P	18p	5	125V	B910931/96
C3	P	18p	5	125V	B910931/96
C4	P	18p	5	125V	B910931/96
C5	PE	0.1	10	250V	B911477/2
C6	Mullard 80905003	2-20p		50V	B912672/3
C7	P	82p	5	125V	B910931/103
C8	PE	0.1	10	250V	B911477/2
C9	PE	0.1	10	250V	B911477/2
C10	PE	5		64V	B91070 <sup>0</sup> /45
C11	Not used				
C12	PE	0.1	10	250V	B911477/2
C13	P	22p	5	125V	B910931/97
C14	E	4	+100-0	10V	B910700/19
C15	C	0.01	+80-20	100V	B911711/10
C16	PC	0.1	1	160V	B912645/101
C17	PC	9900p	1	160V	B912645/114
C18	M	900p	1	350V	A912648
C19	PC	1	20	100V	B911943/40
C20	PC	0.1	20	100V	B911943/34
C21	PC	0.01	20	250V	B911943/1
C22	P	1000p	5	125V	B910931/115
C23	P	100p	5	125V	B910931/104
C24	PC	1	1	63V	B912644/3
C25	P	1000p	-20+40		B911711/9
C26	P	470p		160V	B910931/111
<u>DIODES</u>					
D1	Silicon Fairchild IN916				B910086/2
D2	Silicon Fairchild IN916				B910086/2
D3	Silicon Fairchild IN916				B910086/2
D4	Silicon Fairchild IN916				B910086/2
D5	Silicon Fairchild IN916				B910086/2
D6	Zener STC ZF10	10V	5	400mW	A910099/15

See note on page 5.1

P.C.B. 'D' C/SA 80490/85CIRCUIT REFERENCE 'D'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>DIODES (contd.)</u>					
D7	Silicon Fairchild IN916				B910086/2
D8	Silicon Fairchild IN916				B910086/2
D9	Silicon Fairchild In916				B910086/2
D10	Zener STC ZF10	10V	5	400mW	A910099/15
D11	Silicon Fairchild IN916				B910086/2
D12	Silicon Fairchild IN916				B910086/2
D13	Silicon Fairchild IN916				B910086/2
<u>RESISTORS</u>					
R1	HSC	8.2k	5	$\frac{1}{2}$ W	B912636/71
R2	HSC	1.5k	5	$\frac{1}{2}$ W	B912636/53
R3	HSC	1.2k	5	$\frac{1}{2}$ W	B912636/51
R4	HSC	15k	5	$\frac{1}{8}$ W	B912638/77
R5	HSC	180	5	$\frac{1}{2}$ W	B912636/31
R6	HSC	68k	5	$\frac{1}{8}$ W	B912638/93
R7	HSC	22k	5	$\frac{1}{8}$ W	B912638/81
R8	HSC	470k	5	$\frac{1}{2}$ W	B912636/113
R9	HSC	470k	5	$\frac{1}{2}$ W	B912636/113
R10	HSC	1.2k	5	$\frac{1}{2}$ W	B912636/51
R11	HSC	22k	5	$\frac{1}{8}$ W	B912638/81
R12	HSC	1.2k	5	$\frac{1}{2}$ W	B912636/51
R13	HSC	3.9k	5	$\frac{1}{2}$ W	B912636/63
R14	HSC	100k	5	$\frac{1}{2}$ W	B912636/97
R15	F	180k	1	$\frac{1}{2}$ W	B912981/13
R16	HSC	10k	5	$\frac{1}{2}$ W	B912636/73
R17	HSC	27k	5	$\frac{1}{2}$ W	B912636/83
R18	0	15k	5	$\frac{1}{2}$ W	5905-99-013-6144
R19	HSC	27k	5	$\frac{1}{2}$ W	B912636/83
R20	HSC	100	5	$\frac{1}{8}$ W	B912638/25
R21	HSC	47k	5	$\frac{1}{2}$ W	B912636/89
R22	HSC	10	5	$\frac{1}{8}$ W	B912638/1
R23	HSC	1k	5	$\frac{1}{2}$ W	B912636/49
R24	HSC	10k	5	$\frac{1}{2}$ W	B912636/13
R25	HSC	2.7k	5	$\frac{1}{2}$ W	B912636/59

see note on page 5.1

CIRCUIT REFERENCE 'D'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS</u> (contd.)					
R26	HSC	56K	5	$\frac{1}{2}$ W	B912636/91
R27	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R28	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R29	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R30	0	4.7K	5	$\frac{1}{2}$ W	5905/99/013- 6132
R31	0	1.5K	5	$\frac{1}{2}$ W	5905-99-013- 6132
R32	0	2.2K	5	1W	5905-99-013- 5754
R33	HSC	1.8K	5	$\frac{1}{2}$ W	B912636/55
R34	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R35	0	39K	5	$\frac{1}{2}$ W	5905-99-013- 6154
R36	0	24K	5	$\frac{1}{2}$ W	5905-99-013- 6149
R38	HSC	560	5	$\frac{1}{2}$ W	B912636/43
R39	HSC	10K	5	$\frac{1}{2}$ W	B912636/73
R40	HSC	560	5	$\frac{1}{2}$ W	B912636/43
R41	HSC	1.8K	5	$\frac{1}{2}$ W	B912636/55
R42	HSC	820	5	$\frac{1}{2}$ W	B912636/47
R43	HSC	3.6K	5	$\frac{1}{2}$ W	B912636/62
R44	HSC	5.6K	5	$\frac{1}{2}$ W	B912636/67
R45	HSC	3.3K	5	$\frac{1}{2}$ W	B912636/61
R46	HSC	4.7K	5	$\frac{1}{2}$ W	B912636/65
R47	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R48	HSC	3.3K	5	$\frac{1}{2}$ W	B912636/61
R49	HSC	10K	5	$\frac{1}{2}$ W	B912636/73
R50	HSC	9.1K	5	$\frac{1}{2}$ W	B912636/72
R51	HSC	2.2K	5	$\frac{1}{2}$ W	B912636/57
R52	HSC	8.2K	5	$\frac{1}{2}$ W	B912636/71
R53	HSC	12	5	$\frac{1}{8}$ W	B912683/3
	Part of B T/B Switch Assembly A/SA/80490/127				

see note on page 5.1



P.C.B. 'D' C/SA 80490/85CIRCUIT REFERENCE 'D'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS, VARIABLE</u>					
RV1	Davall 81P LIN	10k	20		A912635/11
RV2	Davall 81P LIN	4.7k	20		A912635/10
RV3	Davall 81P LIN	1k	20		A912635/9
RV4	Davall 81P LIN	4.7k	20		A912635/10
RV5	Davall 81P LIN	10k	20		A912635/11
RV6	(Fig 5.2)				
<u>SWITCHES</u>					
	Switch Assembly ('B' Timebase) Fig 5.2 includes S1				B/SA80490/127 A50490/37
<u>TRANSISTORS</u>					
TR1	Motorola MPS 2369				A912682
TR2	Motorola MPS 2369				A912682
TR3	Motorola MPS 2369				A912682
TR4	Motorola MPS 2369				A912682
TR5	2N3906				A910648
TR6	BC 107				A912676/1
TR7	2N3053				B99160/1
TR8	2N3904				A910649
TR9	2N3503				B99160/1
TR10	2N3904				A910649
TR11	2N3906				A910648
TR12	2N3904				A910649
TR13	2N3904				A910649
TR14	Motorola MPS 2369				A912682
TR15	Motorola MPS 2369				A912682
TR16	2N3906				A910648
TR17	2N3906				A910648
TR18	2N3904				A910649
TR19	2N3904				A910649
<u>MISCELLANEOUS</u>					
	Transistor Mounting Pad. T05				A99286 (2 off)
see note on page 5.1.					

P.C.B. 'E' C/SA 80490/87CIRCUIT REFERENCE 'E'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
<u>CAPACITORS</u>					
C1	P	47p	10	125V	B910931/101
C2	P	15p	1p	125V	B910931/95
C3	P	18p	1p	125V	B910931/96
C4	P	18p	1p	125V	B910931/96
C5	P	18p	1p	125V	B910931/96
C6	P	100p	10	125V	B910931/104
C7	C	0.1	+50-25	18V	B912282/11
C8	PE	0.1	10	250V	B911477/2
C9	C	22p	10		KT95964/8
C10	P	33p	1p	125V	B910931/99
C11	Mullard 80905003	2-20p		50V	A912672/3
C12	P	82p	2.5	125V	B910931/103
C13	P	68p	5	125V	B910931/102
C14	P	100p	10	125V	B910931/104
C15	P	47p	1p	125V	B910931/101
C16	P	18p	1p	125V	B910931/96
C17	P	33p	1p	125V	B910931/99
C18	P	18p	1p	125V	B910931/96
C19	P	18p	1p	125V	B910931/96
C20	P	330p	5	125V	B910931/110
C21	Fig.5.1				
C22	PE	0.1	10	250V	B911477/2
C23	PE	0.1	10	250V	B911477/2
C24	PE	0.1	10	250V	B911477/2
C25	P )	100p	10	125V	B910931/104
C26	PC )	1	20	100V	B911943/40
C27	PC )	0.01	20	250V	B911943/1
C28	PC )	1	20	100V	B911943/40
C29	PC )	9900p	1	160V	B912645/114
C30	PC )	1	1	63V	B912644/3
C31	PC )	1	1	63V	B912644/3
<u>DIODES</u>					
D1	Silicon Fairchild IN916				B910086/2

see note on page 5.1

P.C.B. 'E' C/SA 80490/87CIRCUIT REFERENCE 'E'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG%	COSSOR REF.
<u>DIODES (contd.)</u>					
D2	Silicon Fairchild IN916				B910086/2
D3	Silicon Fairchild IN916				B910086/2
D4	Silicon Fairchild IN916				B910086/2
D5	Silicon Fairchild U17549/1				B910086/2
D6	Silicon Fairchild IN916				A912684
D7	Silicon Fairchild IN916				B910086/2
D8	Silicon Fairchild IN916				B910086/2
D9	Silicon Fairchild IN916				B910086/2
D10	Silicon Fairchild IN916				B910086/2
D11	Silicon Fairchild IN916				B910086/2
D12	Silicon Fairchild IN916				B910086/2
D13	Silicon Fairchild IN916				B910086/2
D14	Silicon Fairchild IN916				B910086/2=
D15	Silicon Fairchild IN916				B910086/2
D16	Silicon Fairchild IN916				B910086/2
D17	Silicon Fairchild IN916				B910086/2
D18	Zener STC ZF10	10V	5	400mW	A910099/15
D19	Zener STC ZF4.7	4.7V	5	400mW	A910099/7
<u>INDICATOR LAMPS</u>					
ILP1	Fig.5.1				
ILP2	Fig.5.1				
<u>RESISTORS</u>					
R1	HSC	470	5	$\frac{1}{2}$ W	B912636/41
R2	HSC	820	5	$\frac{1}{2}$ W	B912636/47
R3	HSC	15k	5	$\frac{1}{8}$ W	B912638/77
R4	HSC	10k	5	$\frac{1}{8}$ W	B912638/73
R5	0	3.3k	5	1W	5905-99-013-5758
R6	HSC	18k	5	$\frac{1}{8}$ W	B912638/79
R7	HSC	470k	5	$\frac{1}{2}$ W	B912636/113
R8	HSC	470k	5	$\frac{1}{2}$ W	B912636/113
R9	HSC	18k	5	$\frac{1}{8}$ W	B912638/79

see note on page 5.1

P.C.B. 'E' C/SA 80490/87CIRCUIT REFERENCE 'E'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
<u>RESISTORS (contd.)</u>					
R10	0	3.3k	5	1W	5905-99-013-5758
R11	HSC	1.2k	5	$\frac{1}{2}$ W	B912636/51
R12	HSC	39k	5	$\frac{1}{2}$ W	B912636/87
R13	Not used				
R14	HSC	220	5	$\frac{1}{8}$ W	B912638/33
R15	HSC	24k	5	$\frac{1}{2}$ W	B912636/82
R16	HSC	100k	5	$\frac{1}{2}$ W	B912636/97
R17	HSC	10k	5	$\frac{1}{2}$ W	B912636/73
R18	HSC	27k	5	$\frac{1}{2}$ W	B912636/83
R19	HSC	10	5	$\frac{1}{8}$ W	B912638/1
R20	HSC	1.2k	5	$\frac{1}{2}$ W	B912636/51
R21	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R22	0	6.2k	5	1W	5905-99-013-5765
R23	0	1.5k	5	$\frac{1}{2}$ W	5905-99-013-6120
R24	0	2.2k	5	1W	5905-99-013-5754
R25	HSC	150	5	$\frac{1}{8}$ W	B912638/29
R26	0	2.2k	5	$\frac{1}{2}$ W	5905-99-013-6124
R27	0	5.6k	5	$\frac{1}{2}$ W	5905-99-013-6134
R28	HSC	10k	5	$\frac{1}{2}$ W	B912636/73
R29	0	4.7k	5	$\frac{1}{2}$ W	5905-99-013-6132
R30	HSC	3.3k	5	$\frac{1}{2}$ W	B912636/61
R31	HSC	220	5	$\frac{1}{2}$ W	B912636/33
R32	HSC	470	5	$\frac{1}{2}$ W	B912636/41
R33	HSC	47k	5	$\frac{1}{2}$ W	B912636/89
R34	HSC	18k	5	$\frac{1}{8}$ W	B912638/79
R35	HSC	10k	5	$\frac{1}{2}$ W	B912636/73
R36	HSC	10k	5	$\frac{1}{2}$ W	B912636/73
R37	HSC	1k	5	$\frac{1}{2}$ W	B912636/49
R38	HSC	24k	5	$\frac{1}{2}$ W	B912636/82
R39	HSC	470	5	$\frac{1}{8}$ W	B912638/41
R40	HSC	10k	5	$\frac{1}{2}$ W	B912636/73

See note on page 5.1

P.C.B. 'E' C/SA 80490/87CIRCUIT REFERENCE 'E'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS (contd.)</u>					
R41	HSC	1k	5	$\frac{1}{2}$ W	B912636/49
R42	HSC	1.2k	5	$\frac{1}{2}$ W	B912636/51
R43	HSC	10k	5	$\frac{1}{8}$ W	B912638/73
R44	HSC	150k	5	$\frac{1}{2}$ W	B912636/101
R45	HSC	150k	5	$\frac{1}{2}$ W	B912636/101
R46	HSC	10k	5	$\frac{1}{8}$ W	B912638/73
R47	HSC	1.2k	5	$\frac{1}{2}$ W	B912636/51
R48	HSC	1.2k	5	$\frac{1}{8}$ W	B912638/51
R49	HSC	56k	5	$\frac{1}{8}$ W	B912638/91
R50	HSC	33k	5	$\frac{1}{8}$ W	B912638/85
R51	HSC	47k	5	$\frac{1}{2}$ W	B912636/89
R52	HSC	33k	5	$\frac{1}{2}$ W	B912636/85
R53	HSC	10M	10	$\frac{1}{2}$ W	B912767/290
R54	HSC	2.2M	10	$\frac{1}{2}$ W	B912767/258
R55	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R56	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R57	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R58	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R59	F	} Part of A T/B Switch B/SA/80490/126	360k	1	B912160/87
R60	F		180k	1	B912160/80
R61	F		90k	1	B912160/79
R62	F		36k	1	B912160/82
R63	F		18k	1	B912160/78
R64	F		9M	1	B9121762/1
R65	F		4.5M	1	B912762/2
R66	F		1.8M	1	B912160/89
R67	F		900k	1	B912160/91
R68	F		900k	1	B912160/91
R69	HAC	470	5	$\frac{1}{8}$ W	B912638/41
<u>RESISTORS, VARIABLE</u>					
RV1	Davall 81P LIN	1k	20		A912635/9

See note on page 5.1

P.C.B. 'E' C/SA 80490/87  
CIRCUIT REFERENCE 'E'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
RV2	(Fig.5.2)				
RV3	Davall 81P LIN	2.2k	20		A912635/1
RV4	Davall 81P LIN	4.7k	20		A912635/10
RV5	Davall 81P LIN	1k	20		A912635/
<u>SOCKETS</u>					
	SKT 1 Fig.5.1				
	SKT 2 Fig.5.1				
<u>SWITCHES</u>					
	PB1 Fig.5.2				
	Switch Assembly ('A' Timebase) (Fig.5.1)				
<u>TRANSISTORS</u>					
TR1	Motorola MPS 2369				A912682
TR2	Motorola MPS 2369				A912682
TR3	Motorola MPS 2369				A912682
TR4	Motorola MPS 2369				A912682
TR5	FET Motorola MPF 102				A912681
TR6	2N3906				A910648
TR7	BC 107				B912676/1
TR8	2N3053				B99160/1
TR9	2N3053				B99160/1
TR10	Motorola MPS 2369				A912682
TR11	Motorola MPS 3640				B912545
TR12	Motorola MPS 2369				A912682
TR13	Motorola MPS 2369				A912682
TR14	2N3904				A910649
<u>MISCELLANEOUS</u>					
	Transistor Mtg. Pad. T05				A99286 (2 off)
	see note on page 5.1				

BLANK PAGE

CDU150-CT531/3

OSCILLOSCOPE

P.C.B. 'F' C/SA 80490/102

CIRCUIT REFERENCE 'F'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>CAPACITORS</u>					
C1	PE	0.1	10	250V	B911477/2
C2	PC	0.47	2	63V	B912644/5
C3	PE	0.1	10	250V	B911477/2
C4	P	120p	5	125V	B910931/105
C5	Ceramic Wingrove Rodgers S 1401	30-140p			B912673/4
C6	P	47p	5	125V	B910931/101
C7	PE	0.1	10	250V	B911477/2
C8	C	0.1	+50-20	18V	B912282/11
C9	PE	0.1	10	250V	B911477/2
<u>DIODES</u>					
D1	Zener STC ZF4.7	4.7V	5	400MW	A910099/7
D2	Silicon Fairchild IN916				B910086/2
D3	Silicon Fairchild IN916				B910086/2
D4	Silicon Fairchild IN916				B910086/2
D5	Silicon Fairchild IN916				B910086/2
D6	Silicon Fairchild IN916				B910086/2
D7	Silicon Fairchild IN916				B910086/2
D8	Silicon Fairchild IN916				B910086/2
D9	Silicon Fairchild IN916				B910086/2
D10	Silicon Fairchild IN916				B910086/2
<u>INDICATOR LAMPS</u>					
ILP 1 Fig.5.1					
<u>RESISTORS</u>					
R1	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R2	0	12k	5	$\frac{1}{2}$ W	5905-99-013-6142
R3	0	2.2k	5	$\frac{1}{2}$ W	5905-99-013-6124
R4	0	15k	5	$\frac{1}{2}$ W	5905-99-013-6144
R5	0	620	5	$\frac{1}{2}$ W	5905-99-013-6111
R6	0	56k	5	$\frac{1}{2}$ W	5905-99-013-6158
R7	0	15k	5	$\frac{1}{2}$ W	5905-99-013-6144

See note on page 5.1

For Service Manuals  
CUSTOMER SERVICES



P.C.B. 'F' C/SA 80490/102CIRCUIT REFERENCE 'F'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
R8	HSC	10k	5	$\frac{1}{2}$ W	B912639/73
R9	F	20k	.5	$\frac{1}{2}$ W	B912160/84
R10	F	10	.5	$\frac{1}{2}$ W	B912160/72
R11	F	20k	.5	$\frac{1}{2}$ W	B912160/84
R12	F	100	.5	$\frac{1}{2}$ W	B912160/73
R13	HSC	470	5	$\frac{1}{2}$ W	B912636/41
R14	HSC	8.2k	5	$\frac{1}{2}$ W	B912636/71
R15	HSC	39k	5	$\frac{1}{2}$ W	B912636/87
R16	HSC	39k	5	$\frac{1}{2}$ W	B912636/87
R17	HSC	3.3k	5	$\frac{1}{2}$ W	B912636/61
R18	HSC	33k	5	$\frac{1}{2}$ W	B912636/85
R19	O	3.9k	5	4W	B912639/63
R20	HSC	5.6k	5	$\frac{1}{2}$ W	B912636/67
R21	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R22	HSC	22k	5	$\frac{1}{2}$ W	B912636/81
R23	HSC	1k	5	$\frac{1}{2}$ W	B912636/49
R24	HSC	12k	5	$\frac{1}{2}$ W	B912636/75
R25	O	18k	5	1W	5905-99-013-5776
R26	HSC	15k	5	$\frac{1}{2}$ W	B912636/77
R27	HSC	3.3k	5	$\frac{1}{2}$ W	B912636/61
R28	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R29	HSC	15k	5	$\frac{1}{2}$ W	B912636/77
R30	HSC	1.3k	5	$\frac{1}{2}$ W	B912636/52
R31	HSC	150	5	$\frac{1}{2}$ W	B912636/29
R32	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R33	O	2.7k	5	1W	5905-99-013-5756
R34	HSC	100k	5	$\frac{1}{2}$ W	B912636/97
R35	O	3.9k	5	4W	B912636/63
R36	HSC	1k	5	$\frac{1}{2}$ W	B912636/49
R37	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R38	HSC	22k	5	$\frac{1}{2}$ W	B912636/81
R39	HSC	10	5	$\frac{1}{8}$ W	B912638/1
R40	HSC	10	5	$\frac{1}{8}$ W	B912638/1

See note on page 5.1

P.C.B. 'F' C/SA 80490/102CIRCUIT REFERENCE 'F'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
<u>RESISTORS (contd.)</u>					
R41	HSC	5.6k	5	$\frac{1}{2}$ W	B912636/67
R42	HSC	1M	5	$\frac{1}{2}$ W	B912636/121
R43	HSC	33k	5	$\frac{1}{2}$ W	B912636/85
R44	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R45	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R46	HSC	1k	5	$\frac{1}{2}$ W	B912636/49
R47	(Fig 5.2)				
R48	HSC	10	5	$\frac{1}{2}$ W	B912636/1
<u>RESISTORS, VARIABLE</u>					
RV1	Davall 81P LIN	220	20		A912635/12
RV2) RV3)	(Fig. 5.2)				
RV4	Davall 81P LIN	2.2k	20		A912635/1
RV5	Davall 81P LIN	150	20		B912635/16
RV6	Davall 81P LIN	2.2k	20		B912635/1
<u>SOCKETS</u>					
SKT 1)					
SKT 2)	Fig 5.1				
SKT 3)					
<u>SWITCHES</u>					
SW1	Part of RV2/E	Figs 5.2 and 5.14			
<u>TRANSISTORS</u>					
TR1	2N3906				A910648
TR2	Texas 2S301				B99161/1
TR3	2N3904				A910649
TR4	2N3906				A910648
TR5	Motorola MM3001				A912680
TR6	2N3053				B99160/1
TR7	Motorola MM3001				A912680
TR8	2N3053				B99160/1
TR9	Motorola MM3001				A912680

see note on page 5.1

P.C.B. 'F' C/SA 80490/102

CIRCUIT REFERENCE 'F'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>TRANSISTORS (contd.)</u>					
TR10	2N3053				B99160/1
TR11	2N3906				A910648
TR12	2N3904				A910649
<u>MISCELLANEOUS</u>					
	Transistor Mtg. Pad. T05 (7 off)				A99286
	Transistor Heat Sink T05 (2 off)				A99130

see note on page 5.1

CIRCUIT REFERENCE 'G'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>CAPACITORS</u>					
C1	C	0.01	-20+80	100V	B911711/10
C2	Not used				
C3	P	39p	5	125V	B910931/100
C4	C	0.01	-20+80	100V	B911711/10
C5	C	0.01	-20+80	100V	B911711/10
C6	PE	0.1	10	250V	B911477/2
C7	P	680p	2.5	160V	B910931/58
C8	P	39p	-20+80	125V	B910931/10
C9	P		1pF	160V	B910931/5
C10	P	12p	1pF	160V	B910931/2
C11	P	56p	2.5	160V	B910931/12
C12	C	220p	20	500V	B95964/7
C13	C	220p	20	500V	B95964/7
C14	P	220p	20	500V	B95964/7
C15	C	0.01	-20+80	100V	B911711/10
C16	P	220p	20	500V	B95964/7
C17	PE	0.1	10	250V	B911477/2
C18	E	2.5	-10+100	16V	B910700/25
C19	C	0.01	-20+80		B911711/10
C20	P	33p	5	125V	B910931/99
C21	P	82p	2.5	30V	B910930/8
C22	P	100p	2.5	30V	B910930/10
C23	Mullard 80905003	2-20p		50V	A912672/3
C24	Mullard 80905003	2-20p		50V	A912672/3
C25	Mullard 80905003	2-20p		50V	A912672/3
C26	Mullard 80905003	2-20p		50V	A912672/3
C27	P		10p	±1pF	125V B910931
C28	C		0.01	-20+80	B911711

see note on page 5.1

P.C.B. 'G' C/SA 80490/104

CIRCUIT REFERENCE 'G'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>COILS</u>					
L1	Choke Cambion 3640-37	4.7 $\mu$ H	5		B910147/29
L2	Choke Cambion 3640-37	4.7 $\mu$ H	5		B910147/29
<u>DIODES</u>					
D1	Silicon Fairchild IN916				B910086/2
D2	Silicon Fairchild IN916				B910086/2
D3	Silicon Fairchild IN916				B910086/2
D4	Silicon Fairchild IN916				B910086/2
D5	Zener STC ZF6.8	6.8V	5	400m	A910099/11
D6	Silicon Fairchild IN916				B910086/2
D7	Silicon Fairchild IN916				B910086/2
<u>RESISTORS</u>					
R1	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R2	HSC	160	5	$\frac{1}{2}$ W	B912636/30
R3	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R4	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R5	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R6	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R7	HSC	300	5	$\frac{1}{2}$ W	B912636/36
R8	0	360	5	$\frac{1}{2}$ W	5905-99-013 -6105
R9	0	1.5K	5	$\frac{1}{2}$ W	5905-99-013 -6120
R10	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R11	0	1.2K	5	1W	5905-99-013 -5748
R12	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R13	0	1.5K	5	$\frac{1}{2}$ W	5905-99-013 -6120
R14	HSC	2.7K	5	1W	5905-99-013 -5756
<u>see note on page 5.1</u>					

CIRCUIT REFERENCE 'G'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS</u> (contd.)					
R15	HSC	2.7K	5	1W	5905-99-013 -5756
R16	HSC	82	5	$\frac{1}{2}$ W	B912636/23
R17	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R18	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R19	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R20	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R21	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R22	0	*Select on test: 330, 390, 470	5	$\frac{1}{2}$ W	5905-99-013 -6108
R23	HSC	68	5	$\frac{1}{2}$ W	B912636/21
R24	HSC	68	5	$\frac{1}{2}$ W	B912636/21
R25	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R26	0	1K	5	4W	B912639/49
R27	0	1K	5	4W	B912639/49
R28	0	270	5	$\frac{1}{2}$ W	5905-99-013 -6102
R29	HSC	12K	5	$\frac{1}{2}$ W	B912636/75
R30	HSC	12K	5	$\frac{1}{2}$ W	B912636/75
R31	HSC	3K	5	$\frac{1}{2}$ W	B912636/60
R32	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R33	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R34	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R35	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R36	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R37	HSC	33	5	$\frac{1}{2}$ W	B912636/13
R38	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R39	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R40	HSC	47	5	$\frac{1}{2}$ W	B912636/17
<u>see note on page 5.1</u>					

P.C.B. 'G' C/SA 80490/104

CIRCUIT REFERENCE 'G'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
R41	HSC	15	5	$\frac{1}{8}$ W	B912638/5
R42	HSC	1.5K	5	1W	5905-99-013 -5750
R43	HSC	15	5	$\frac{1}{8}$ W	B912638/5
R44	0	1.3K		8W	B912640/38
R45	0	120	5	1W	5905-99-013 -5724
R46	0	1.3K		8W	B912640/38
R47	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R48	HSC	2.2K	5	$\frac{1}{2}$ W	B912636/57
R49	HSC	1K	5	$\frac{1}{2}$ W	B912636/49
R50	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R51	HSC	560	5	$\frac{1}{2}$ W	B912636/43
R52	HSC	12	5	$\frac{1}{2}$ W	B912636/3
R53	HSC	82	5	$\frac{1}{2}$ W	B912636/23
R54	HSC	100	5	$\frac{1}{2}$ W	B912636/25
R55	HSC	22	5	$\frac{1}{8}$ W	B912638/9
R56	HSC	12	5	$\frac{1}{2}$ W	B912636/3
R57	HSC	12	5	$\frac{1}{2}$ W	B912636/3
R58	HSC	68	5	$\frac{1}{2}$ W	B912636/21
R59	HSC	68	5	$\frac{1}{2}$ W	B912636/21
R60	HSC	68	5	$\frac{1}{2}$ W	B912636/21
R61	HSC	15	5	$\frac{1}{8}$ W	B912638/5
R62	HSC	33K	5	$\frac{1}{8}$ W	B912638/85
R63	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R64	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R65	HSC	47	10		
R66	HSC	820	5	$\frac{1}{8}$ W	B912638/47

see note on page 5.1

P.C.B. 'G' C/SA 80490/104CIRCUIT REFERENCE 'G'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS, VARIABLE</u>					
RV1	Davall 81P LIN	220	20		A912635/12
RV2	W. Type 115 LIN	220	20	3W	A912642
RV3	Davall 81P LIN	1k	2Q		A912635/9
RV4	Davall 81P LIN	100	20		A912635/7
<u>TRANSISTORS</u>					
TR1	Motorola MPS 3640				B912545
TR2	Motorola MPS 3640				B912545
TR3	2N2904				B910008
TR4	2N2904				B910008
TR5	BSX20				B912398/1
TR6	BSX20				B912398/1
TR7	BSX20				B912398/1
TR8	BSX20				B912398/1
TR9	BSX20				B912398/1
TR10	BSX20				B912398/1
TR11	Ferranti spec 106				A912685
TR12	Ferranti spec 106				A912685
TR13	BSX20				B912398/1
TR14	BSX20				B912398/1
<u>MISCELLANEOUS</u>					
	Transistor Mtg. Pad T05				A99286 (2 off)
	Heatsink T05				A912758 (2 off)
DL1	Delay Line (Fig 5.1)				C/SA80490/140
<u>see note on page 5.1</u>					



BLANK PAGE

## 'Y' AMP. ASSEMBLY C/SA 80490/81

CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
					<u>Drg. No.</u>
	P.C.B. 'H1' Assy.				C/SA 80490/106
	P.C.B. 'H2' Assy.				C/SA 80490/108
	Attenuator S/W Assy.	Fig. 10			C/SA 80490/79
<u>CAPACITORS</u>					
C1/J	PE	0.1	20	630V	B911625/31
C15/J	EE	0.1	20	630V	B911625/31
<u>RESISTORS</u>					
R16/H	Ø	47	5	½W	5905-99-013-6084
R38/H	HSC	10	5	½W	B912636/1
R84/H	0	47	5	½W	5905-99-013-6084
<u>RESISTORS, VARIABLE</u>					
RV1/H } RV7/H }	Dual concentric Preh Duplo 16-63332-000	100K+10K			A912629/1
RV2/H } RV3/H }	Dual Concentric Preh Duplo 16-63332-008	250+100			A912630/1
RV8/H } RV15/H }	Dual Concentric Preh Duplo 16-63332-000	100K+10K			A912629/1
RV9/H } RV10/H }	Dual Concentric Preh Duplo 16-63332-008	250+100			A912630/1
<u>SOCKETS</u>					
SKT 1/J	BNC Greenpar GE35027				A912589
SKT1/H	Selectro D102A-052				A912725
SKT2/J	BNC Greenpar GE35027				A912589
SKT2/H	Selectro D102A-052				A912725
<u>SWITCHES</u>					
S1/J	EML S5				B912564
S2/J	EML S5				B912564
<u>MISCELLANEOUS</u>					
	Cableform 'C'				B/SA 80490/132
	Cableform 'D'				B/SA 80490/133
	Cableform 'G'				B/SA 80490/144

See note on page 5 1

P.C.B. 'H1' ASSY. C/SA 80490/106

CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>CAPACITORS</u>					
C1	PE	4700p	20	500V	B911476/12
C2	PE	.01	20	250V	B911476/13
C3	C	0.01	+80-20	100V	B911711/10
C4	C	0.01	+80-20	100V	B911711/10
C5	C	0.01	+80-20	100V	B911711/10
C6	P	100p	2.5	100V	B910931/18
C7	Not used				
C8	C	0.01	+80-20	100V	B911711/10
C9	P	100p	2.5	160V	B910931/18
C10	PE	0.1	10	250V	B912771/2
C12	C	0.1		18V	B912282/11
C15	C	0.01	+80-20	100V	B911711/10
C19	C	0.01	+80-20	100V	B911711/10
C20	PE	0.01	20	250V	B911476/3
C21	PE	4700p	20	500V	B911476/12
C22	C	0.01	+80-20	100V	B911711/10
C23	C	0.01	+80-20	100V	B911711/10
C24	P	100p	2.5	160V	B910931/18
C26	C	0.01	+80-20	100V	B911711/10
C27	P	100p	2.5	160V	B910931/18
C29	C	0.1		18V	B912282/11
C45	Mullard 80905003	2-20p		50V	B912672/3
C46	Mullard 80905003	2-20p		50V	B912672/3
C47	Mullard 80905003	2-20p		50V	B912672/3
C48	Mullard 80905003	2-20p		50V	B912672/3
C50	P	330p	2.5	63V	B912022/7
C51	P	330p	2.5	63V	B912022/7
<u>DIODES</u>					
D1	Silicon Fairchild IN916				B910086/2
D2	Silicon Fairchild U17549/1				A912684
D3	Silicon Fairchild IN916				B910086/2
D4	Silicon Fairchild IN916				B910086/2
D5	Silicon Fairchild U17549/1				A912684

see note on page 5.1

## P.C.B. 'H1' ASSY. C/SA 80490/106

CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>DIODES</u> (Contd.)					
D6	Silicon Fairchild IN916				B910086/2
D7	Silicon Fairchild IN916				B910086/2
D8	Silicon Fairchild IN916				B910086/2
D9	Silicon Fairchild IN916				B910086/2
D10	Silicon Fairchild IN916				B910086/2
D11	Silicon Fairchild IN916				B910086/2
D18	Silicon Fairchild IN916				B910086/2
D19	Silicon Fairchild U17549/1				A912684
D20	Silicon Fairchild IN916				B910086/2
D21	Silicon Fairchild IN916				B910086/2
D22	Silicon Fairchild U17549/1				A912684
D23	Silicon Fairchild IN916				B910086/2
D24	Silicon Fairchild IN916				B910086/2
D25	Silicon Fairchild IN916				B910086/2
D26	Silicon Fairchild IN916				B910086/2
D27	Silicon Fairchild IN916				B910086/2
D28	Silicon Fairchild IN916				B910086/2
<u>RESISTORS</u>					
R1	HSC	12K	5	$\frac{1}{2}$ W	B912636/75
R2	HSC	47K	5	$\frac{1}{2}$ W	B912636/89
R3	HSC	1M	5	$\frac{1}{2}$ W	B912636/121
R4	F	1M	1	1W	B912981/21
R5	0	100	5	$\frac{1}{2}$ W	5905-99-013-6092
R6	0	47K	5	$\frac{1}{2}$ W	5905-99-013-6156
R7	0	10	5	$\frac{1}{2}$ W	5905-99-013-6068
R8	HSC	33K	5	$\frac{1}{2}$ W	912636/85
R9	HSC	33K	5	$\frac{1}{2}$ W	912636/85
R10	HSC	10	5	$\frac{1}{2}$ W	912636/1
<u>see note on page 5.1</u>					

P.C.B. 'H1' ASSY. C/SA 80490/106

CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS</u> (Contd.)					
R11	HSC	1.2K	5	$\frac{1}{2}$ W	912636/51
R12	HSC	1.2K	5	$\frac{1}{2}$ W	912636/51
R13	HSC				
R14	HSC	100	5	$\frac{1}{8}$ W	B91263 8/25
R15	0	100	5	$\frac{1}{2}$ W	5905-99-013-6092
R16	0				
R17	HSC	10	5	$\frac{1}{8}$ W	B912638/1
R18	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R19	HSC	18K	5	$\frac{1}{2}$ W	B912636/79
R20	HSC	18K	5	$\frac{1}{2}$ W	B912636/79
R21	HSC	560	5	$\frac{1}{2}$ W	B912636/43
R22	HSC	10	5	$\frac{1}{2}$ W	B912636/43
R23	0	220	5	$\frac{1}{2}$ W	5905-99-013-6100
R24	0	220	5	$\frac{1}{2}$ W	5905-99-013-6100
R25	HSC	680	5	$\frac{1}{2}$ W	B912636/45
R26	HSC	12	5	$\frac{1}{8}$ W	B912638/3
R27	HSC	680	5	$\frac{1}{2}$ W	B912636/45
R28	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R29	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R30	0	270	5	$\frac{1}{2}$ W	5905-99-013-6102
R31	0	3.9K	5	1W	5905-99-013-5760
R32	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R33	0	120	5	$\frac{1}{2}$ W	5905-99-013-6094
R34	HSC	5.6K	5	$\frac{1}{2}$ W	B912636/67
R35	HSC	5.6K	5	$\frac{1}{2}$ W	B912636/67
R36	Not used				
R37	0	680	5	$\frac{1}{2}$ W	5905-99-013-6112
R38	Not used				
R39	HSC	470	5	$\frac{1}{2}$ W	B912636/41
R40	HSC	10	5	$\frac{1}{8}$ W	B912638/1
<u>see note on page 5.1</u>					

P.C.B. 'H1' ASSY. C/SA 80490/106CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS (COntd.)</u>					
R41	Not used				
R42	0	10K	5	$\frac{1}{2}$ W	5905-99-013-6140
R43	0	330	5	$\frac{1}{2}$ W	5905-99-013-6104
R44	0	330	5	$\frac{1}{2}$ W	5905-99-013-6104
R45	0	150	5	$\frac{1}{2}$ W	5905-99-013-6096
R46	HSC	100	5	$\frac{1}{8}$ W	B912638/25
R47	0	39K	5	$\frac{1}{2}$ W	5905-99-013-6154
R48	0	39K	5	$\frac{1}{2}$ W	5905-99-013-6154
R49	0	12K	5	$\frac{1}{2}$ W	5905-99-013-6142
R50	0	12K	5	$\frac{1}{2}$ W	5905-99-013-6142
R51	HSC	18K	5	$\frac{1}{2}$ W	B912636/79
R52	HSC	18K	5	$\frac{1}{2}$ W	B912636/79
R53	HSC	12	5	$\frac{1}{8}$ W	B912638/3
R54	HSC	22	5	$\frac{1}{8}$ W	B912638/9
R55	0	1.5K	5	$\frac{1}{2}$ W	5905-99-013-6120
R56	HSC	220	5	$\frac{1}{2}$ W	B912636/33
R57	HSC	220	5	$\frac{1}{2}$ W	B912636/33
R58	0	1.5K	5	$\frac{1}{2}$ W	5905-99-013-6120
R59	HSC	15K	5	$\frac{1}{2}$ W	B912636/77
R69	HSC	47K	5	$\frac{1}{2}$ W	B912636/89
R70	HSC	12K	5	$\frac{1}{2}$ W	B912636/75
R71	HSC	1M	5	$\frac{1}{2}$ W	B912636/121
R72	0	10	5	$\frac{1}{2}$ W	5905-99-013-6068
R73	F	1M	1	1W	B912981/21
R74	0	100	5	$\frac{1}{2}$ W	5905-99-013-6092
R75	0	47K	5	$\frac{1}{2}$ W	5905-99-013-6156
R76	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R77	HSC	33K	5	$\frac{1}{2}$ W	B912636/85
<u>see note on page 5.1</u>					

P.C.B. 'H1' ASSY. C/SA 80490/106CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS (Contd.)</u>					
R78	HSC	33K	5	$\frac{1}{2}$ W	B912636/85
R79	HSC	1.2K	5	$\frac{1}{2}$ W	B912636/79
R80	HSC	1.2K	5	$\frac{1}{2}$ W	B912636/80
R81	Not used				
R82	HSC	100	5	$\frac{1}{2}$ W	B912638/25
R83	0	100	5	$\frac{1}{2}$ W	5905-99-013-6092
R84	0				
R85	HSC	10	5	$\frac{1}{8}$ W	B912638/1
R86	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R87	HSC	18K	5	$\frac{1}{2}$ W	B912636/79

9	R88	HSC		18K	5	$\frac{1}{2}$ W	B912636/7
3	R89	HSC		560	5	$\frac{1}{2}$ W	B912636/4
	R90	HSC		10	5	$\frac{1}{2}$ W	B912636/1
13-6100	R91	0		220	5	$\frac{1}{2}$ W	5905-99-0
13-6100	R92	0		220	5	$\frac{1}{2}$ W	5905-99-0
5	R93	HSC		680	5	$\frac{1}{2}$ W	B912636/4
	R94	HSC		12	5	$\frac{1}{8}$ W	B912638/3
5	R95	HSC		680	5	$\frac{1}{2}$ W	B912636/4
7	R96	HSC		47	5	$\frac{1}{8}$ W	B912638/1
13-6092	R97	0		100	5	$\frac{1}{2}$ W	5905-99-0
7	R98	HSC		5.6K	5	$\frac{1}{2}$ W	B912536/6
	R99	Not used					
7	R100	HSC		5.6K	5	$\frac{1}{2}$ W	B912536/6
13-5760	R101	0		3.9K	5	1W	5905-99-0
13-6112	R102	0		680	5	$\frac{1}{2}$ W	5905-99-0
	R103	HSC		10	5	$\frac{1}{8}$ W	B912638/1
1	R104	HSC		470	5	$\frac{1}{2}$ W	B912636/4
	R105	HSC		10	5	$\frac{1}{8}$ W	B912638/1
7	R106	HSC		47	5	$\frac{1}{8}$ W	B912638/1
13-6104	R107	0		330	5	$\frac{1}{2}$ W	5905-99-0

see note on page 5.1

P.C.B. 'H1' ASSY. C/SA 80490/106CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS (contd.)</u>					
R108	0	330	5	1/2W	5905-99-013-6104
R109	0	10k	5	1/2W	5905-99-013-6140
R110	0	150	5	1/2W	5905-99-013-6096
R111	HSC	100	5	1/8W	B912638/25
R112	HSC	39k	5	1/2W	5905-99-013-6154
R113	HSC	39k	5	1/2W	5905-99-013-6154
R114	HSC	12k	5	1/2W	5905-99-013-6142
R115	HSC	12k	5	1/2W	5905-99-013-6142
R116	Not used				
R117	HSC	10	5	1/8W	B912638/1
R118	HSC	10	5	1/8W	B912638/1
R119	HSC	10	5	1/8W	B912638/1
R120	HSC	10	5	1/8W	B912638/1
R146	HSC	10	5	1/8W	B912638/41
R149	HSC	470	5	1/8W	B912638/41
R150	HSC	470	5	1/8W	B912638/41
<u>RESISTORS, VARIABLE</u>					
RV4	Davall 81P LIN	4.7k	20		A912635/10
RV5	Davall 81P LIN	4.7k	20		A912635/10
RV6	Davall 81P LIN	220	20		A912635/12
RV11	Davall 81P LIN	4.7k	20		A912635/10
RV12	Davall 81P LIN	4.7k	20		A912635/10
RV13	Davall 81P LIN	220	20		A912635/12
RV14	Davall 81P LIN	100	20		A912635/7
RV1 )	) See				
RV7 )					
RV2 )	) Page				
RV3 )					
RV8 ))	) 5.49				
RV15 ))					
RV9 )	) )				
RV10 )					
<u>TRANSISTORS</u>					
TR1 )	) Union Carbide KEM101 UC734 Matched pair				A912677
TR2 )		see note on page 5.1			



P.C.B. 'H1' ASSY. C/SA 80490/106CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>TRANSISTORS (contd.)</u>					
TR3) TR4)	Fairchild U17718/1	Double transistor			A912683
TR5) TR6)	Fairchild U17718/1	Double transistor			A912683
TR7	Motorola MPS2369				A912682
TR8	Motorola MPS2369				A912682
TR9	Motorola MPS3640				A912545
TR10	Motorola MPS3640				A912545
TR11	Motorola MPS2369				A912682
TR12	Motorola MPS2369				A912682
TR13	Motorola MPS2369				A912682
TR14	Motorola MPS2369				A912682
TR15	Motorola MPS2369				A912682
TR18) TR19)	Union Carbide KEM101 UC734	Matched pair			A912677
TR20) TR21)	Fairchild U17718/1	Double transistor			A912683
TR22) TR23)	Fairchild U17718/1	Double transistor			A912683
TR24	Motorola MPS2369				A912682
TR25	Motorola MPS2369				A912682
TR26	Motorola MPS3640				A912545
TR27	Motorola MPS3640				A912545
TR28	Motorola MPS2369				A912682
TR29	Motorola MPS2369				A912682
TR35	Motorola MPS2369				A912682
<u>MISCELLANEOUS</u>					
	Invert Switch Assy.				A/SA 80490/119
	includes:				
	Slider Switch EM1.S5				
	2 pole, 2 posn.				B912703
Bead (8 off)	Mullard FX1115				B910279
	<u>see note on page 5.1</u>				

P.C.B. 'H2' ASSY. B/SA 80490/108CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>CAPACITORS</u>					
C17	C	0.01	-20+80	100V	B911711/10
C18	P	330pF	2.5	160V	B910931/42
C31	C	0.01	-20+80	100V	B911711/10
C32	P	22pF	1pF	63V	B912022/6
C33	P	22pF	1pF	63V	B912022/6
C34	P	22pF	1pF	63V	B912022/6
C35	P	22pF	1pF	63V	B912022/6
C36	P	1000pF	2.5	63V	B912022/8
C37	P	47pF	2.5	125V	B910931/10
C38	C	0.1	+50-25	18V	B912282/11
C39	P	560pF	2.5	160V	B910931/54
C40	PE	0.1	10	250V	B911477/2
C41	P	100pF	2.5	160V	B910931/18
C42	PC	1	20	100V	B911943/40
C43	T	6.8	20	25V	B910860/19
C44	PC	1	20	100V	B911943/40
<u>DIODES</u>					
D12	Silicon Fairchild IN916				B910086/2
D13	Silicon Fairchild IN916				B910086/2
D14	Silicon Fairchild IN916				B910086/2
D15	Silicon Fairchild IN916				B910086/2
D16	Silicon Fairchild IN916				B910086/2
D17	Silicon Fairchild IN916				B910086/2
D29	Silicon Fairchild IN916				B910086/2
D30	Silicon Fairchild IN916				B910086/2
D31	Silicon Fairchild IN916				B910086/2
<u>RESISTORS</u>					
R60	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R61	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R62	HSC	1.3K	5	$\frac{1}{2}$ W	B912636/52
R63	HSC	1.1K	5	$\frac{1}{2}$ W	B912636/50
R64	HSC	470	5	$\frac{1}{2}$ W	B912636/41

see note on page 5.1

P.C.B. 'H2' ASSY. B/SA 80490/108

CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS (Contd.)</u>					
R65	0	75	5	$\frac{1}{2}$ W	5905-99-013-6089
R66	HSC	5.6K	5	1W	B912637/67
R67	HSC	6.8K	5	1W	B912637/69
R68	0	75	5	$\frac{1}{2}$ W	5905-99-013-6089
R121	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R122	HSC	330	5	$\frac{1}{2}$ W	B912636/37
R123	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R124	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R125	HSC	47K	5	$\frac{1}{2}$ W	B912636/89
R126	HSC	47K	5	$\frac{1}{2}$ W	B912636/89
R127	HSC	4.7K	5	$\frac{1}{2}$ W	B912636/65
R128	HSC	4.7K	5	$\frac{1}{2}$ W	B912636/65
R129	HSC	47K	5	$\frac{1}{2}$ W	B912636/89
R130	HSC	47K	5	$\frac{1}{2}$ W	B912636/89
R131	HSC	270	5	$\frac{1}{2}$ W	B912636/35
R123	HSC	22	5	$\frac{1}{8}$ W	B91263/9
R133	HSC	820	5	$\frac{1}{2}$ W	B912636/47
R134	HSC	820	5	$\frac{1}{2}$ W	B912636/47
R135	HSC	10K	5	$\frac{1}{2}$ W	B912636/73
R136	HSC	10K	5	$\frac{1}{2}$ W	B912636/73
R137	HSC	22K	5	$\frac{1}{2}$ W	B912636/81
R138	HSC	6.8K	5	$\frac{1}{2}$ W	B912636/69
R139	HSC	100K	5	$\frac{1}{2}$ W	B912636/97
R140	HSC	15K	5	$\frac{1}{2}$ W	B912636/77
R141	HSC	820	5	$\frac{1}{2}$ W	B912636/47
R142	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R143	HSC	22	5	$\frac{1}{2}$ W	B912636/9
R144	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R145	HSC	10	5	$\frac{1}{2}$ W	B912636/1
<u>See note on page 5.1</u>					

P.C.B. 'H2' ASSY. B/SA 80490/108CIRCUIT REFERENCE 'H'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS</u> (Contd.)					
R147	HSC	18K	5	$\frac{1}{2}$ W	B912636/79
R148	HSC	470	5	$\frac{1}{2}$ W	B912636/41
<u>TRANSISTORS</u>					
TR16	BSX20				B912398/1
TR17	BSX20				B912398/1
TR30	BSY95A				A912678
TR31	BSY95A				A912678
TR32	Motorola MPS2369				A912682
TR33	Motorola MPS2369				A912682
TR34	Motorola MPS2369				A912682
<u>see note on page 5.1</u>					

BLANK PAGE

CDU150-CT531/3

OSCILLOSCOPE

ATTENUATOR Sw. ASSY. C/SA 80490/79

CIRCUIT REFERENCE 'J'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>ASSEMBLIES</u>					
	Atten. Sw. & P.C.B. Assy. (RH)				C/SA80490/141
	Atten. Sw. & P.C.B. Assy. (LH)				B/SA80490/142
<u>MISCELLANEOUS</u>					
	Switch-Channel Selector				A 50490/38
<u>see note on page 5.1</u>					

ATTENUATOR SWITCH ASSY. C/SA 80490/79

CIRCUIT REFERENCE 'J'

CCT. REF.	DESCRIPTION	VALUE	TOL.	RTG.	COSSOR REF.
<u>ATTENUATOR SW. AND P.C.B. ASSY. (RH)</u>					
<u>C/SA 80490/141</u>					
<u>ASSEMBLIES</u>					
	P.C.B. J2 Assy. (Ch.2)				B/SA80490/90
	Atten. Sw. and Comp. Assy. (Ch.2)				C/SA80490/77
<u>CAPACITORS</u>					
C18 M	Lemco MS119/1/RS/1200/PJ/350	1200pF	5	350V	B911480/27
<u>P.C.B. J2 ASSY. (RH. CH2) B/SA 80490/90</u>					
<u>TRIMMERS</u>					
C16	Trimmer tubular Mullard COO4EA/3E				A910601/1
<del>C17</del>	<del>Trimmer tubular Mullard COO4EA/12E</del>				<del>A910601/3</del>
C19	Trimmer tubular Mullard COO4EA/3E				A910601/1
C20	Trimmer tubular Mullard COO4EA/12E				A910601/3
C22	Trimmer tubular Mullard COO4EA/3E				A910601/1
C23	Trimmer tubular Mullard COO4EA/12E				A910601/3
C24	Trimmer tubular Mullard COO4EA/6E				A910601/2
C25	Trimmer tubular Mullard COO4EA/12E				A910601/3
C26	Trimmer tubular Mullard COO4EA/12E				A910601/3
C27	Trimmer tubular Mullard COO4EA/6E				A910601/2
C28	Trimmer tubular Mullard COO4EA/3E				A910601/1
<u>RESISTORS</u>					
R14	F	1M	1	1/2W	B912981/21
R17	F	10.1K	1	1/2W	B912981/5
C19	F	111K	1	1/2W	B912981/12
C22	F	333K	1	1/2W	B912981/15
C24	F	1M	1	1/2W	B912981/21
<u>ATTENUATOR SW. AND COMP. ASSY. (RH. CH2)</u>					
<u>B/SA 80490/77</u>					
<u>ASSEMBLY</u>					
	Atten. Switch (RH)				A/SA80490/113
<u>RESISTORS</u>					
R13	HSC	47	5	1/2W	B912636/17
R15	F	1K	1	1/2W	B912981/3
R16	F	990K	1	1/2W	B912981/20

see note on page 5.1

ATTENUATOR SWITCH ASSY. C/SA 80490/79CIRCUIT REFERENCE 'J'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>ATTENUATOR SW. AND P.C.B. ASSY. (LH)</u>					
<u>C/SA 80490/142</u>					
<u>ASSEMBLIES</u>					
	P.C.B. J1. Assy. (Ch.1)				B/SA80490/89
	Atten. Sw. and Comp. Assy. (Ch.1)				C/SA80490/78
<u>CAPACITORS</u>					
C4 M	Lemco MS119/1/RS/1200/PJ/350	1200pF	5	350V	B911480/27
<u>P.C.B. J1 Assy. (LH, CH1) B/SA 80490/89</u>					
<u>TRIMMERS</u>					
C2	Trimmer tubular Mullard COO4EA/3E				A910601/1
C3	Trimmer tubular Mullard COO4EA/12E				A910601/3
C5	Trimmer tubular Mullard COO4EA/3E				A910601/1
C6	Trimmer tubular Mullard COO4EA/12E				A910601/3
C8	Trimmer tubular Mullard COO4EA/3E				A910601/1
C9	Trimmer tubular Mullard COO4EA/12E				A910601/3
C10	Trimmer tubular Mullard COO4EA/6E				A910601/2
C11	Trimmer tubular Mullard COO4EA/12E				A910601/3
C12	Trimmer tubular Mullard COO4EA/12E				A910601/3
C13	Trimmer tubular Mullard COO4EA/6E				A910601/2
C14	Trimmer tubular Mullard COO4EA/3E				A910601/1
<u>RESISTORS</u>					
R2	F	1M	1	$\frac{1}{2}$ W	B912981/21
R5	F	10.1K	1	$\frac{1}{2}$ W	B912981/5
R7	F	111K	1	$\frac{1}{2}$ W	B912981/12
R10	F	333K	1	$\frac{1}{2}$ W	B912981/15
R12	F	1M	1	$\frac{1}{2}$ W	B912981/21
<u>ATTENUATOR SW. AND COMP. ASSY. (LH, CH1)</u>					
<u>B/SA 80490/78</u>					
<u>ASSEMBLY</u>					
	Atten. Switch (LH)				A/SA80490/113
<u>RESISTORS</u>					
R1	HSC	47	5	$\frac{1}{2}$ W	B912636/17
R3	F	1K	1	$\frac{1}{2}$ W	B912981/3
R4	F	990K	1	$\frac{1}{2}$ W	B912981/20
<u>see note on page 5.1</u>					



ATTENUATOR SWITCH ASSY. C/SA 80490/79

CIRCUIT REFERENCE 'J'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF
<u>RESISTORS</u> CONTD					
R18	F	900K	1	$\frac{1}{2}$ W	B912981/19
R20	HSC	10	5	$\frac{1}{2}$ W	B912636/1
R21	F	750K	1	$\frac{1}{2}$ W	B912981/18
R23	F	500K	1	$\frac{1}{2}$ W	B912981/17
R28	HSC	100	5	$\frac{1}{8}$ W	B912638/25
R29	HSC	47	5	$\frac{1}{8}$ W	B912638/17
R30	HSC	100	5	$\frac{1}{8}$ W	B912638/25
<u>CAPACITORS</u>					
C21	M	270pF	5	350V	A912649
<u>see note on page 5.1</u>					

ATTEN. Sw. & P.C.B. ASSY. (LH) B/SA 80490/142CIRCUIT REFERENCE 'J'

CCT. REF.	DESCRIPTION	VALUE	TOL. %	RTG.	COSSOR REF.
<u>RESISTORS</u> (Contd)					
R6 F		900K	1	$\frac{1}{2}$ W	B912981/19
R8 HSC		10	5	$\frac{1}{2}$ W	B912636/1
R9 F		750K	1	$\frac{1}{2}$ W	B912981/18
R11 F		500K	1	$\frac{1}{2}$ W	B912981/17
R25 HSC		100	5	$\frac{1}{8}$ W	B912638/25
R26 HSC		47	5	$\frac{1}{8}$ W	B912638/17
R27 HSC		100	5	$\frac{1}{8}$ W	B912638/25
<u>CAPACITORS</u>					
C7 M		270pF	5	350V	A912649
<u>MISCELLANEOUS</u>					
SW1	EMI 2 pole 3 pos S5				B912564
SKT1	BNC				A912589
C1 PE		0.1 $\mu$ F	20	630V	B911625/31
SW2	EMI 2 pol 3 pos S5				B912564
SKT.2	BNC				A912589
C15 PE		0.1 $\mu$ F	20	630V	B911625/31
<u>see note on page 5.1</u>					