HANDBOOK FOR PORTABLE DOUBLE BEAM OSCILLOSCOPE TYPE CD 1400 (MAIN FRAME)

SECTION 1

INTRODUCTION

1. This unit is the main frame assembly for the CD 1400 double-beam oscilloscope system. The 5-inch diameter double-gun, cathode-ray tube and its associated controls are mounted in the central section of the frame, whilst the left- and right-hand sections respectively provide plug-in accommodation for two Y amplifier units and one time-base/X amplifier unit. The main frame unit contains the power supply system for the cathode-ray tube and for the three plug-in sub-units, and also the circuitry deriving the calibration voltage. The CD 1400 frame assembly can be supplied fitted in a bench or 19-inch rack-mounting case. Both types of cases are separately available and are directly interchangeable on the frame assembly. Blank plug-in chassis are available to customers wishing to construct special purpose units to their own requirements for application's not covered by standard range units.

SECTION 2

SPECIFICATION

2. **NOTE:** The CD 1400 main frame unit contains the cathode-ray tube and its associated controls, together with the power supply systems for both c.r.t. and plug-in sub-units. The frame also incorporates the calibration voltage circuitry.

INTERNAL CALIBRATOR

Frequency. Mains/line frequency. Square-wave.

Amplitude. 5mV, 500mV.

Amplitude Accuracy. ±2%.

GENERAL FEATURES

Cathode-Ray Tube. 5-inch double-gun, helical p.d.a. tube with 5×10cm display per beam, 4 cm overlap. Phosphors available P7, P31. Also P2 and P11 to special order.

E.H.T. 4kV.

External Brightness (Z) Modulation. 5V peak-to-peak (a.c. coupled) fully modulates the trace at average brilliance level. Impedance, 1MΩ through ·03μF.

Graticule. Edge-lit, variable intensity, with red or white illumination of grid markings. Engraved 1cm divisions.

Camera Attachment. Suitable for Shackman Cameras.

Escutcheon. Accommodates standard viewing hood.

Sockets. 83UHF co-axial and 4mm Belling Lee.

Power Requirements. 100—125V/200—250V, 45-66c/s.

Power Consumption. 150—200VA approximately, when driving full complement (3) of plug-in sub-units.

Overall Dimensions and Weight

Bench Mounting Version		
Height	7 in.	(17·8cm)
Width	12¾ in.	(32·4cm)
Depth	16½ in.	(41·9cm)
Weight	27 lb	(12·2kg)
Rack-Mounting Version		
Height	7 in.	(17·8cm)
Case Width	17 in.	(43cm)
Panel Width	19 in.	(48cm)
Depth	16½ in.	(41·9cm)
Weight	24¾ lb	(11·2kg)

SECTION 3

INSTALLATION AND OPERATING INSTRUCTIONS

INSTALLATION

GENERAL

3. The main frame unit is delivered as a fully assembled and electrically set-up unit ready for immediate operation, after the insertion of suitable X and Y sub-units in the right- and left-hand compartments respectively.

CAUTIONS

4. (1) Do not operate the instrument when it is standing on its back or on either side. However, short-term operation in these positions is permissible for servicing purposes.
   (2) Always switch-off the instrument before removing any plug-in unit.
   (3) Do not operate the instrument for long periods of time with any plug-in unit removed.
   (4) Do not restrict the ventilation by placing other equipment or articles on top of the oscilloscope.

INSTALLATION

WARNING

Disconnect instrument from mains supply before removing or inserting fuse and fuse-carrier.

5. (1) Set mains voltage selector panel in accordance with the average voltage of the a.c. mains supply.

   NOTE. The mains transformer primary is tapped to accept a.c. mains inputs of 100, 105, 110, 115, 120, and 125 volts, or 200, 210, 220, 230, 240, and 250 volts.

   (2) Check presence, continuity and rating (3 amperes) of mains fuse carried in holder on back-plate of instrument.
   (3) Connect mains plug to mains lead, red to line (L), black to neutral (N), and green to earth (E).

OPERATING INSTRUCTIONS

PANEL CONTROLS

6. **BRILLiance Controls (RV303, RV308)**
   Potentiometers varying the trace brightness, RV303 on Y upper and RV308 on Y lower. The mid-travel position of

these potentiometers is obtained when the dot engraved on the control knob is at the "12 o'clock" position.

ASTIGmatism Controls (RV306, RV309)
Pre-set potentiometers providing adjustment of the spot shape, RV306 on Y upper and RV309 on Y lower.

FOCUS Controls (RV302, RV307)
Potentiometers controlling spot focus, RV302 on Y upper and RV307 on Y lower. The mid-travel position of these potentiometers is obtained when the dot engraved on the control knob is at the "12 o'clock" position.

GRATicule Illumination Control (RV1)
A variable resistor controlling graticule illumination intensity. It is ganged with the mains on/off switch so that maximum light is obtained when the control is just moved off the fully counter-clockwise position to operate the switch. Continued rotation in a clockwise direction will progressively reduce the light intensity. The method of graticule edge-lighting provides choice of white or red illumination of grid markings. The change from white to red, or *vice versa*, is made by removing the graticule and turning it through 180°, so that the edge which originally was at the top finally lies at the bottom. Optimum grid illumination is obtained when the engraved side of the graticule faces the cathode-ray tube. White grid illumination is normally preferable for photographic applications.

Calibration Voltages (SKTF & SKTG)
Two 4mm banana-plug sockets carrying square-wave voltages of 500mV peak-to-peak and 5mV peak-to-peak for the calibration of the Y axis and time-base.

Z MOD Connectors (SKTD & SKTE)
Two 4mm banana-plug sockets, mounted on the back plate of the oscilloscope, to enable external brightness (Z) modulation to be applied to the Y upper trace. When Z modulation is not required these sockets are linked.

OPERATION

NOTE

7. The directions here given relate solely to the main frame unit Type CD 1400. Detailed operating instructions for the Y and X system sub-units are given in the individual manuals supplied with these items.

Preparatory

8. Before applying power to the main frame unit, insert the Y amplifier sub-units in the left-hand positions of the main frame, and the time-base/X amplifier sub-unit in the right-hand position.

(1) Set the listed controls in accordance with the directions given. The settings of controls not mentioned are immaterial for the present purpose of adjusting the trace focus, brilliance and position.

Y Sub-Units
Y SHIFT controls to mid-travel.
XI/XIO gain selectors to XI.

X Sub-Unit
STABILITY control fully clockwise.
X SHIFT control to mid-travel.

Main Frame Unit (CD 1400)
BRILL controls fully clockwise.
FOCUS controls to mid-traverse.

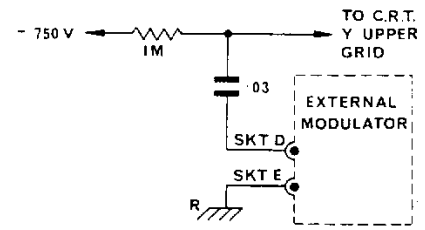
(2) Connect oscilloscope to mains supply, turn GRAT. control clockwise to switch on, and allow a one-minute warm-up period.
(3) Check that two traces appear on the cathode-ray tube, and adjust both sets of BRILL and FOCUS controls to obtain the best possible trace definitions.
(4) If one or other of the traces does not appear, check settings of Y SHIFT, X SHIFT, STABILITY, and BRILL controls.
(5) Adjust X and Y SHIFT controls to position traces.
(6) Connect 500mV calibrating signal to Y upper INPUT socket via a short lead. Set time-base and Y amplifier controls to obtain a steady trace, and finally adjust appropriate ASTIG control for optimum trace definition.
(7) Repeat procedure described in sub-paragraph (6) for Y lower channel.
(8) The oscilloscope is now ready for use.

External Brightness Modulation

9. The external drive signal must have an amplitude of at least 5 volts peak-to-peak to fully modulate the trace at average brilliance. The signal is applied between the Z MOD sockets carried on the main frame back-plate, SKTD being "signal high", and SKTE "signal low" (common rail). When the Z MOD facility is not required, sockets SKTD and SKTE must be connected by the shorting link.

CAUTION
The "signal high" socket SKTD is capacitively coupled to the Y upper c.r.t. control grid which is operated at a d.c. potential of the order of −750 volts. When the oscilloscope is switched on with the Z MOD sockets (SKTD, SKTE) connected by the link, the coupling capacitor will charge-up to this potential via the one megohm resistor. If the oscilloscope had been switched-on with the external modulating device connected at the Z MOD sockets, the voltage developed by the charging current across any resistance present in the external device may be sufficient to cause damage to the modulator. It is therefore important that the following procedure be adopted when connecting external circuitry to the Z MOD sockets.

(1) Check that the shorting link is inserted between the Z MOD sockets SKTD and SKTE.
(2) Switch-on the oscilloscope.
(3) Remove shorting-link from Z MOD sockets and connect external modulating device.



HANDBOOK FOR WIDE-BAND Y AMPLIFIER SUB-UNIT TYPE CX 1441 (CD 1400 SERIES)

SECTION 1

INTRODUCTION

1. The CX 1441 is a wide-band Y amplifier plug-in sub-unit for use with the CD 1400 oscilloscope main frame unit. It consists of an input attenuator and a four-stage push-pull amplifier, the last stage of which is a power amplifier driving the c.r.t. Y plates direct. The sensitivity range of 100mV/cm to 50V/cm is covered by 9 calibrated ranges over a bandwidth of d.c. to 15Mc/s.

SECTION 2

SPECIFICATION

2. **Bandwidth.** DC—15Mc/s (−3dB approximately) on all calibrated ranges.

Rise Time. 24 nsec approximately.

Sensitivity. 100mV/cm—50V/cm covered by 9 calibrated ranges in 1, 2, 5 steps. Fine gain control provides continuous variation between steps, and gives uncalibrated coverage up to 125V/cm. Switched X10 gain available on all ranges, giving a maximum sensitivity of 10mV/cm over the approximate bandwidth d.c.—750kc/s.

Input

Impedance. 1MΩ/35 pF.

Condition. Switched choice of d.c. or a.c. (via 0·1μF) coupling.

Maximum Voltage. 500V peak.

Measuring Accuracy. ±5%.

Shift. Approximately 2 screen diameters on all ranges, plus additional pre-set balance of 10 screen diameters.

Overall Dimensions and Weight

Height	3¼ in.	(8·2 cm)
Width	3¼ in.	(8.2 cm)
Depth	11⅛ in.	(28·3 cm)
Weight	2 lb	(0·9 kg)

SECTION 3

INSTALLATION AND OPERATING INSTRUCTIONS

INSTALLATION

INSERTION IN MAIN FRAME

3. Insert the CX 1441 sub-units into either of the left-hand positions of the CD 1400 main frame unit. Engage thread of captive securing screw, and drive sub-unit fully home by turning screw in a clockwise direction.

CAUTIONS

(1) Do not operate the instrument when it is standing on its back or on either side. However, short-term operation in these positions is permissible for servicing purposes.
(2) Always switch-off the instrument before removing any plug-in unit.
(3) Do not operate the instrument for long periods of time with any plug-in unit removed.

OPERATING INSTRUCTIONS

PANEL CONTROLS

4. **INPUT (SKTA)**
An 83UHF co-axial socket for signal input.

Cin ADJ (C21)
A variable capacitor enabling the distributed capacitance of a probe to be neutralised to provide compensated frequency transmission.

Input Condition Selector AC/DC (SB)
A 2-position switch selecting A.C. or D.C. signal coupling.

VOLTS/CM (SA)
A nine-position switch giving coarse calibrated control of the Y amplifier sensitivity between 0.1V/cm and 50V/cm in 1, 2, 5 sequence.

FINE GAIN (RV1)
A variable resistor effecting fine gain variation to provide continuous coverage between the ranges selected by the VOLTS/CM control.

Note: The designated sensitivity on any position of the VOLTS/CM selector is only attained when the FINE GAIN control is in the calibrated position (fully clockwise).

SET GAIN (RV2)
Pre-set, screwdriver adjusted, variable resistor providing control of amplifier gain for calibration purposes.

Gain Selector X1/X10 (SC)
A two-position selector switching the anode load of the input stage to give choice of X1 or X10 amplifier gain, thereby extending the sensitivity of the Y amplifier to .01V/cm.

Y SHIFT (RV3)
A potentiometer controlling the trace position on the vertical axis.

BALance Control (RV4)
Pre-set, screwdriver adjusted, potentiometer which enables the d.c. levels of the grids of the input stage to be set for minimum trace shift as the FINE GAIN control RV1 is operated.

OPERATION

General

5. The directions given in paragraphs 6 to 9 following assume that the CD 1400 main frame unit is fitted with a suitable X sub-unit, and that the CD 1400 controls have been adjusted to provide two satisfactory traces.

Probe Adjustment

6. (1) Connect probe lead to the INPUT socket on the appropriate Y amplifier.

(2) On the X sub-unit set the TIME/CM control to "500μsec", and the VOLTS/CM control on the related CX 1441 unit to "2".
(3) Insert probe tip into PROBE TEST socket, mounted in lower left-hand corner of the X sub-unit (CX 1443) front panel.
(4) Using a screwdriver, adjust pre-set variable capacitor C21 (Cin ADJ) for optimum squarewave response of the trace displayed.

Connection of Input Signal Lead

7. The input signals are applied to the INPUT co-axial socket, the lead braiding or screen being used for the earth return.

Setting of BALance Control

8. (1) Remove any signal that may be applied to the Y amplifier, and set the X1/X10 gain selector to X1.
(2) Swing the FINE GAIN control RV1 through full travel in both directions, at the same time adjusting the BAL. control to that point where no vertical trace shift occurs as RV1 is rotated.

Calibration of Y Amplifier

9. (1) Set appropriate VOLTS/CM control to the 0·1 position, FINE GAIN control RV1 fully clockwise to the CAL. position, and the X1/X10 selector to X1.
(2) Connect 500mV calibrating voltage from SKTF to the appropriate Y INPUT socket, using a very short or screened lead.
(3) Using a screwdriver, adjust the SET GAIN control for an exact peak-to-peak trace height of 5cm.
(4) The Y amplifier is now calibrated on all nine ranges for X1 and X10 gain operation.

CAUTION

The calibration of any CX 1441 sub-unit is valid only so long as the module is operated in the same position in the identical CD 1400 main frame unit in which the calibration was performed. If the CX 1441 sub-unit is transferred to another CD 1400 frame unit, or interchanged between the upper and lower positions in the original CD 1400 frame unit, the sub-unit must be re-calibrated following the directions given in sub-paragraphs (1) to (4) preceding.

HANDBOOK FOR TIME-BASE/X AMPLIFIER SUB-UNIT TYPE CX 1443 (CD 1400 SERIES)

SECTION 1 INTRODUCTION

1. The CX 1443 is a general-purpose time-base/X amplifier sub-unit for use in the CD 1400 oscilloscope main frame unit. It contains the trigger, time-base gating, and sweep voltage generating circuits, together with the push-pull power output amplifier driving the X plates. The time-base covers the velocity range 0·5 µsec/cm to 200msec/cm in 18 calibrated ranges with a measuring accuracy of ±5% on all but the three slowest ranges.

SECTION 2 SPECIFICATION

Time Base

2. **Range.** 0·5µsec/cm—200msec/cm covered in 18 calibrated ranges in 1, 2, 5, steps. Fine velocity control gives continuous uncalibrated coverage from 0·5µsec/cm—500msec/cm.
Measuring Accuracy. ±5%.
±20% at 200, 100, and 50msec/cm.
NOTE
Improved (5%) accuracy on the three slowest ranges can be obtained by calibration against an external standard.
Output. 20V peak-to-peak (from +5V to +25V approximately) available at panel socket.

Horizontal (X) Amplifier

Sensitivity. 0·5V/cm—2V/cm, continuously variable.
Expansion. X1—X5 approximately, continuously variable.

Shift. Either end of a 10cm trace can be centred at all settings of X gain control.
External Access. At panel socket.

Trigger

Source. Internal. Y UPPER/Y LOWER, +ve/−ve.
External. +ve/−ve.
Modes. NORMAL. Trigger level adjustable to any point on triggering waveform.
Level Range. Internal. ±2cm approximately about signal mean level.
External. ±3V approximately about signal mean level.
AUTO. Time-base triggered from signal of any frequency up to 1 Mc/s without adjustment of level control.
H.F. SYNC. Time-base synchronised to recurrent horizontal sweeps for signals of any frequency between approximately 1 Mc/s and 15 Mc/s.
Sensitivity. Internal. 5mm approximately.
External. 1·0V peak-to-peak approximately.
External Access. At panel socket, input impedance 1 MΩ.

Overall Dimensions and Weight

Height	6¾ in. (17·1cm)
Width	3¼ in. (8·2cm)
Depth	11¼ in. (28·5cm)
Weight	3 lb (1·4 kg)

SECTION 3 INSTALLATION AND OPERATING INSTRUCTIONS INSTALLATION

INSERTION IN MAIN FRAME

3. Insert CX 1443 sub-unit in right-hand position of the CD 1400 main frame unit. Engage thread of captive securing screw, and drive sub-unit fully home by turning screw in a clockwise direction.
CAUTIONS
(1) Do not operate the CD 1400 oscilloscope when it is standing on its back or on either side. However, short-term operation in these positions is permissible for servicing purposes.
(2) Always switch off the oscilloscope before removing any plug-in sub-unit.
(3) Do not operate the oscilloscope for prolonged periods of time with any plug-in sub-unit removed.
(4) Do not restrict the ventilation by placing other equipment or articles on top of the oscilloscope.

OPERATING INSTRUCTIONS

CX 1443 Panel Controls

4. **TIME/CM (SG)**
An eighteen position switch giving coarse control of time-base velocity from 0·5µsec/cm to 200msec/cm in 1, 2, 5, steps. The calibrated sweep rates are obtained only when the VELocity control RV5 is turned fully clockwise to the CAL. position.
VELocity (RV5)
A potentiometer giving uncalibrated time-base velocities intermediate to the 1, 2, 5, calibrated steps provided by the TIME/CM control SG.
SET VELocity (RV10)
A pre-set control for calibrating the sweep period against a known frequency signal.
X GAIN (RV8)
A variable resistor adjusting the cathode-coupling between the two valve-sections forming the output differential amplifier to provide 5 : 1 gain variation.
X SHIFT (RV7)
A potentiometer controlling the trace positions on the horizontal axis.
LEVEL Control (RV1)
A potentiometer determining the point on the triggering signal at which the sweep will commence.

STABILITY Control (RV3, ganged with SFa and SFb)
A potentiometer controlling the trigger sensitivity. When turned fully clockwise it provides a free-running time-base. If turned fully counter-clockwise the time-base is switched off, and switch SFa is opened to clamp the anode modulator potential at such a value as to hold the beams in their operational positions. The oscilloscope can now be driven by an externally-derived horizontal deflection signal applied at the EXT. X socket (SKTD), and routed to the input of the X output amplifier via switch-bank SFb.

AUTO Switch (SE)
This switch, which is ganged with the LEVEL control RV1, is operated when RV1 is turned fully counter-clockwise. When used in this condition the oscilloscope will display a trace with or without a triggering signal, provided that the STABILITY control is correctly set. The LEVEL control RV1 is naturally inoperative when the instrument is used in this mode.

+/− Trigger Slope Selector (SC)
A two-position switch giving choice of positive or negative-slope triggering.

UPPER/LOWER Trigger Source Selector (SA)
A two-position switch enabling the trigger signal to be taken from the UPPER (Y1) or LOWER (Y2) amplifier when SB is set to INTernal.

INT./EXT. Selector (SB)
A two-position switch selecting internal (UPPER/LOWER) or external trigger signal source.

TRIGGER/H.F. SYNC. Selector (SD)
A two-position switch giving choice of triggered or h.f. synchronised working. When operating in the latter mode, a recurrent horizontal sweep is obtained, which can be synchronised with the input signal by adjustment of the LEVEL and STABILITY controls.

External Trigger Connector (SKTA)
A 4mm banana-plug socket into which external trigger signals (minimum amplitude 1·0 volt peak-to-peak) can be fed.

T.B. OUT Connector (SKTC)
A 4mm banana-plug socket at which the time-base sawtooth waveform at 20 volts peak-to-peak is available for monitoring or driving external equipment.

EXT. X Connector (SKTD)
A 4mm banana-plug socket at which external horizontal deflection signals can be applied when the time-base is switched off by the STABILITY control.

PROBE-TEST Connector (SKTB)
A 4mm banana-plug socket at which a true square-wave signal (time-base gating waveform) is available for probe adjustment.

NOTE
Method of probe adjustment is described in the handbooks covering the Y amplifiers.

Earth Return Connectors
The captive screws securing the X and Y sub-units in the CD 1400 main frame unit are drilled to accept a 4mm banana-plug for the purpose of making the earth return to the T.B. OUT, EXT.X, and external trigger sockets.

OPERATION

Note

5. The following directions are given on the assumption that the CD 1400 main frame unit is fitted with two Y sub-units in the left-hand positions, and the CX 1443 sub-unit in the right-hand position. It is further assumed that power is applied to the frame unit, and that the BRILLiance and FOCUS controls have been adjusted to provide satisfactory traces.

Calibration of Sweep Period

6. (1) Connect the INPUT socket of one Y sub-unit to the "500mV" mains frequency, calibrating voltage source (SKTF) on the CD 1400 main frame unit.
   (2) On the selected Y sub-unit, set the A.C./D.C. selector to A.C., and the gain control to give a convenient trace height.
   (3) On the CX 1443 sub-unit, set the X GAIN and VEL. controls to the CAL. positions (fully counter-clockwise and clockwise respectively), and the TIME/CM selector to the "10ms" position.
   (4) With a screwdriver, adjust the SET VEL. control so that one cycle of the square-wave trace measures precisely 2cm (2 graticule divisions).

NOTE 1
The preceding instructions assume that the oscilloscope is powered from a 50c/s mains supply. When operating on 60c/s mains, the TIME/CM control must be set to the "20ms" position, and the SET VEL. control adjusted so that 6 complete cycles of the square-wave trace measure precisely 5cm (5 graticule divisions).

NOTE 2
The X-axis calibration of any given CX 1443 sub-unit is valid only so long as the unit is operated with the CD 1400 frame unit in which it was calibrated. Should the CX 1443 sub-unit be transferred to and used with another frame unit, re-calibration must be performed following the directions given in sub-paras. (1) to (4) preceding.

TRIGGER Operation

7. In addition to the normal trigger mode, which permits triggering at any selected point on the signal waveform, an AUTO trigger mode is also available. When operating in this AUTO mode, the trigger generator free-runs at a frequency of the order of 40 c/s, and will synchronise with any input signal of up to 1Mc/s in frequency to trigger the time-base without need for manual adjustment of the LEVEL control.

Trigger Source Selection

8. The trigger signal can be derived from the Y UPPER or Y LOWER channel by setting the INT./EXT. source selector to INT., and the UPPER/LOWER selector as required. The time-base can also be triggered by an external signal of minimum amplitude 1·0 volt peak-to-peak applied at the external trigger socket (SKTA), with the INT./EXT. selector set at EXT. Choice of positive or negative slope triggering on both internal and external operation is given by the +/− selector.

Normal Trigger Working

9. (1) Set TRIGGER/H.F. SYNC. selector to TRIGGER.

(2) Advance the STABILITY control from the fully counter-clockwise position until the time-base free-runs as evidenced by the appearance of a trace.
(3) Back-off the STABILITY control until the time-base ceases to free-run.
(4) Apply trigger signal and set trigger point by adjustment of the LEVEL control.

Note. The right and left-hand rotations with respect to the centre-point of the LEVEL control respectively permit triggering on the positive and negative portions of the trigger waveform.

AUTO-Trigger Working

10. (1) Set TRIGGER/H.F. SYNC. selector to TRIGGER.
(2) Turn LEVEL control fully counter-clockwise until switch is heard to operate.
(3) Advance the STABILITY control from the fully counter-clockwise position until a stable trace is obtained.

H.F. SYNC. Operation

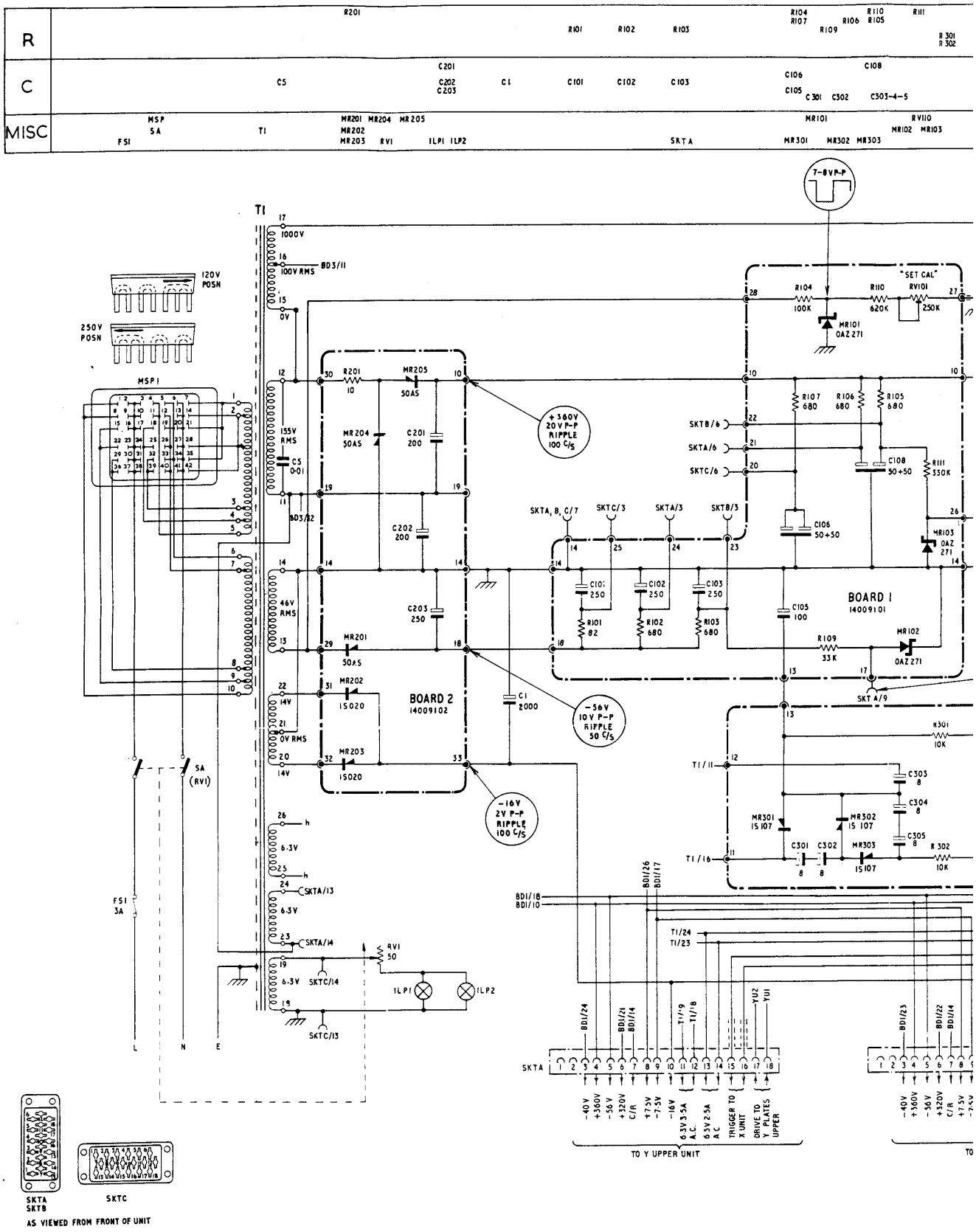
11. This mode of operation is intended for use with signals having a frequency between 1Mc/s and 15Mc/s. With the STABILITY control set to give a free-running sweep, the time-base can be synchronised with the signal by adjustment of the LEVEL and STABILITY controls.
(1) Set TRIGGER/H.F. SYNC. selector to H.F. SYNC.
(2) Starting with the STABILITY control fully counter-clockwise, advance this control in a clockwise direction until a sweep is obtained.
(3) Simultaneously adjust the LEVEL and STABILITY controls to stabilise the trace.

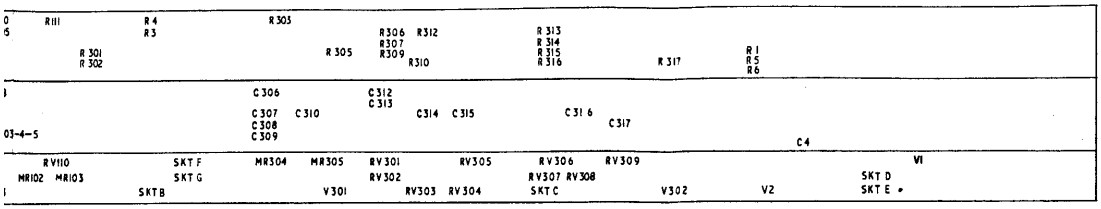
Time-Base Velocity Setting

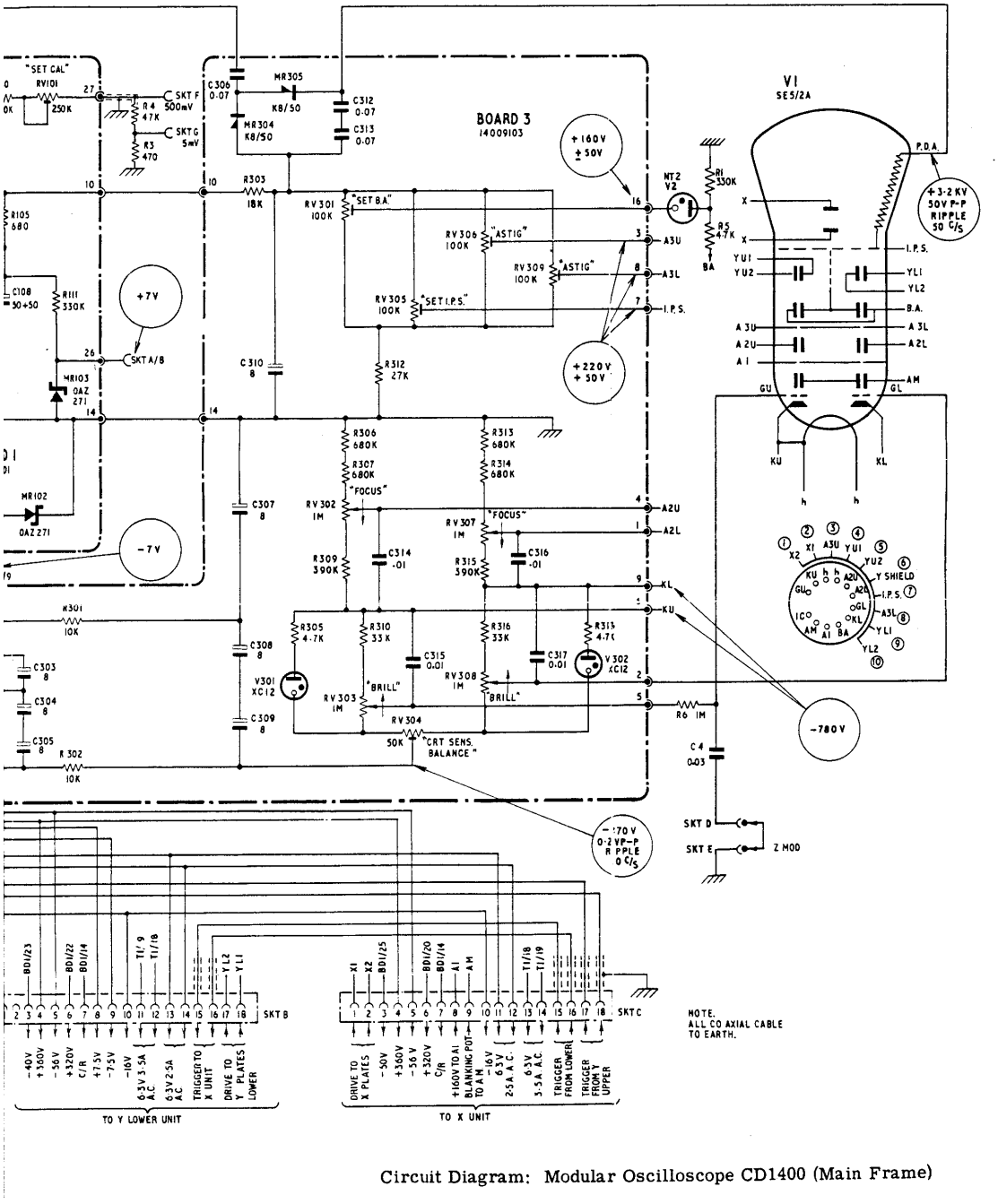
12. Three controls are provided for time-base velocity adjustment. The TIME/CM selector varies the velocity in 1, 2, 5 steps between 0·5μsec/cm. and 200msec/cm. The fine VELocity control gives uncalibrated continuous coverage between the steps selected by the TIME/CM selector. The X GAIN control provides continuously variable time-base expansion up to a maximum of X5. The calibrated sweep speeds defined by the TIME/CM selector will only be obtained when the VEL. control is turned fully clockwise and the X GAIN control is turned fully counter-clockwise, both to the CAL. positions. Pre-set variable resistor RV10 (SET VEL) effects fine velocity control to permit the sweep period to be calibrated against a signal of known frequency. RV10, a screwdriver adjusted control, is carried on the CX 1443 front panel just left of the X GAIN control. The drive voltage delivered by the X output amplifier is sufficient to provide a sweep length in excess of 10 cm over the production spread exhibited by the cathode-ray tube X-plate sensitivity characteristic.

External Sweep Operation

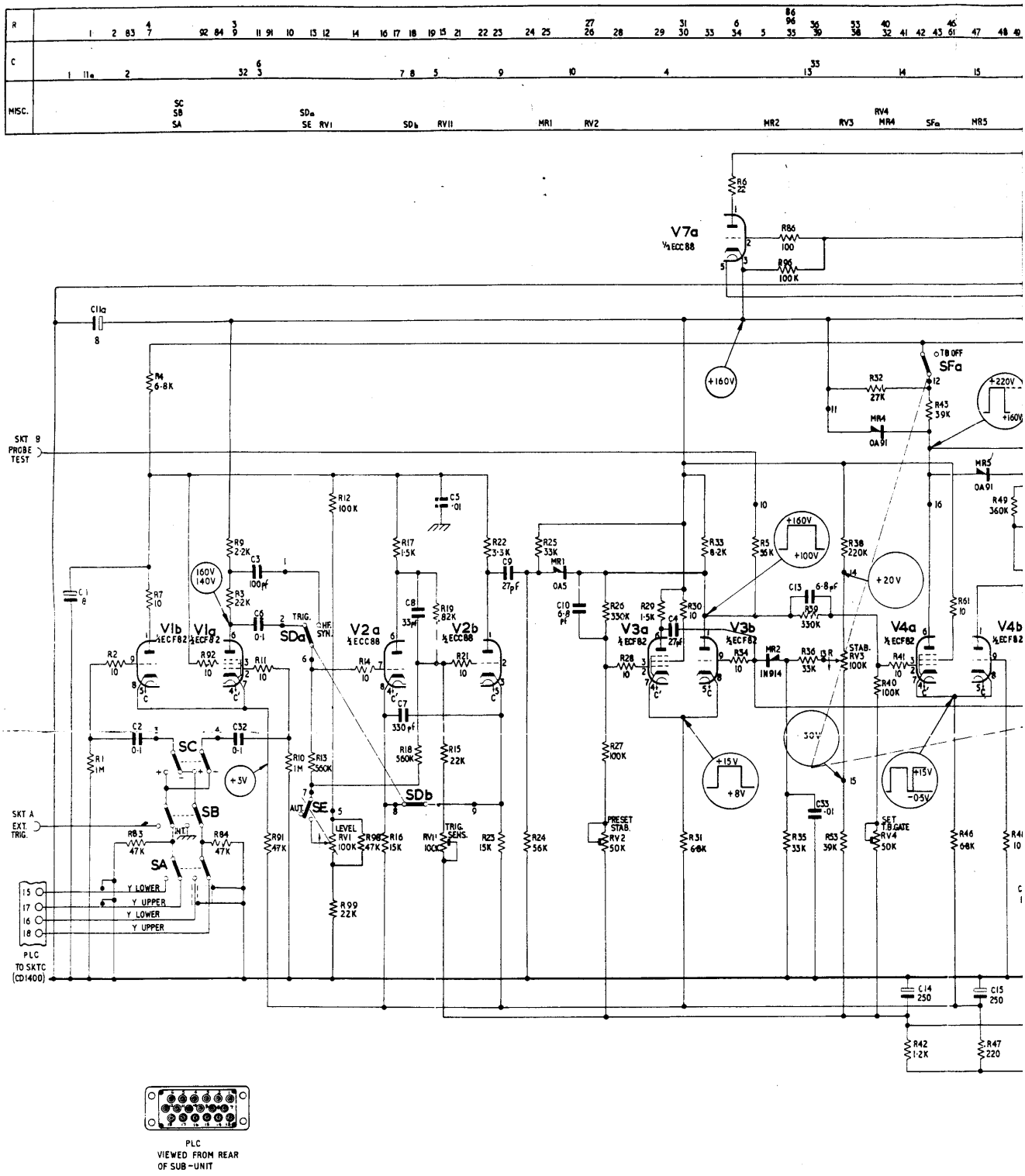
13. The X amplifier can be driven from an external signal of 0·5 volt minimum amplitude applied at the EXT X socket SKTD. When operating in this condition, the internal time-base must be stopped by turning the STABILITY control fully counter-clockwise until the T.B. OFF switch SF is heard to operate.

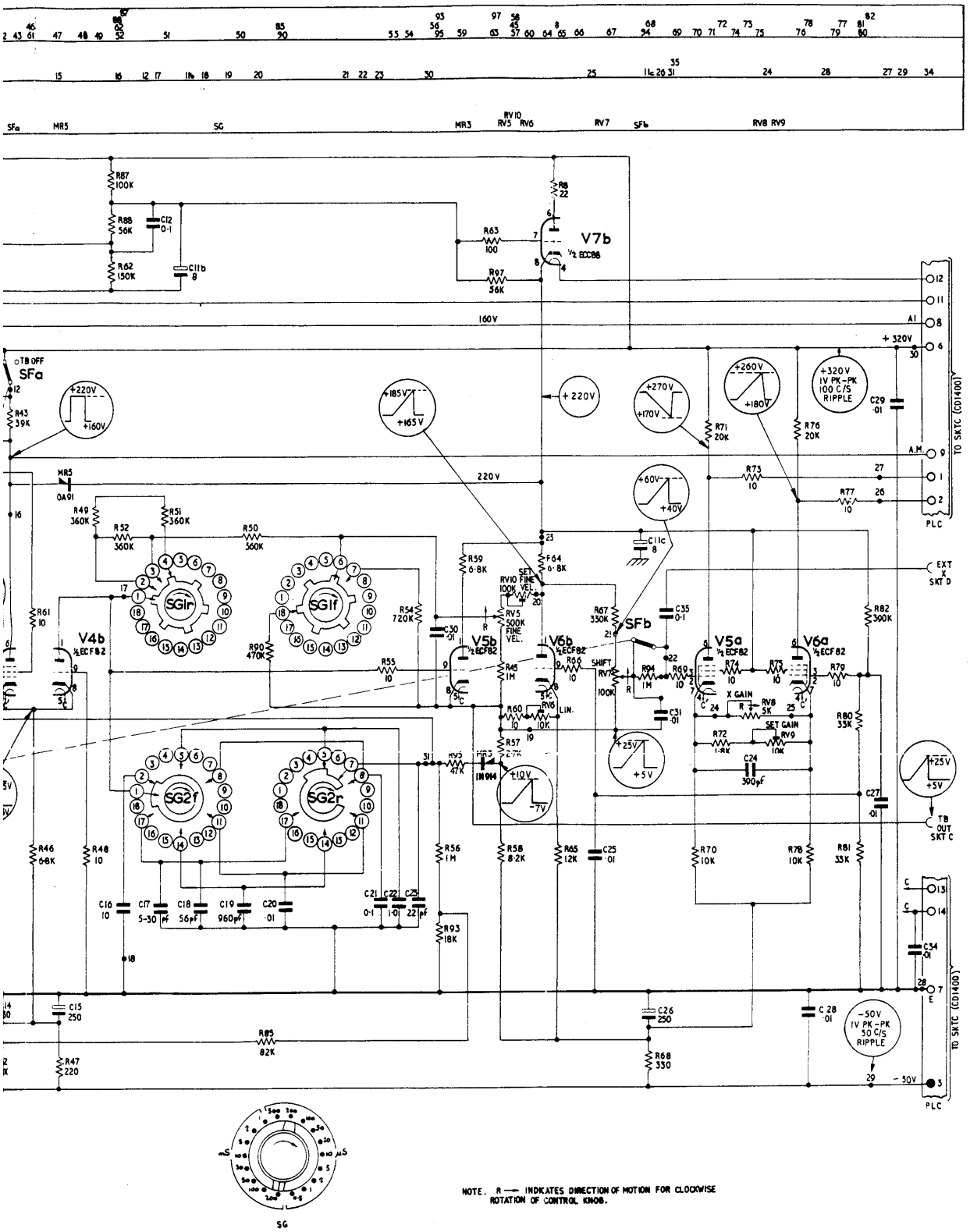






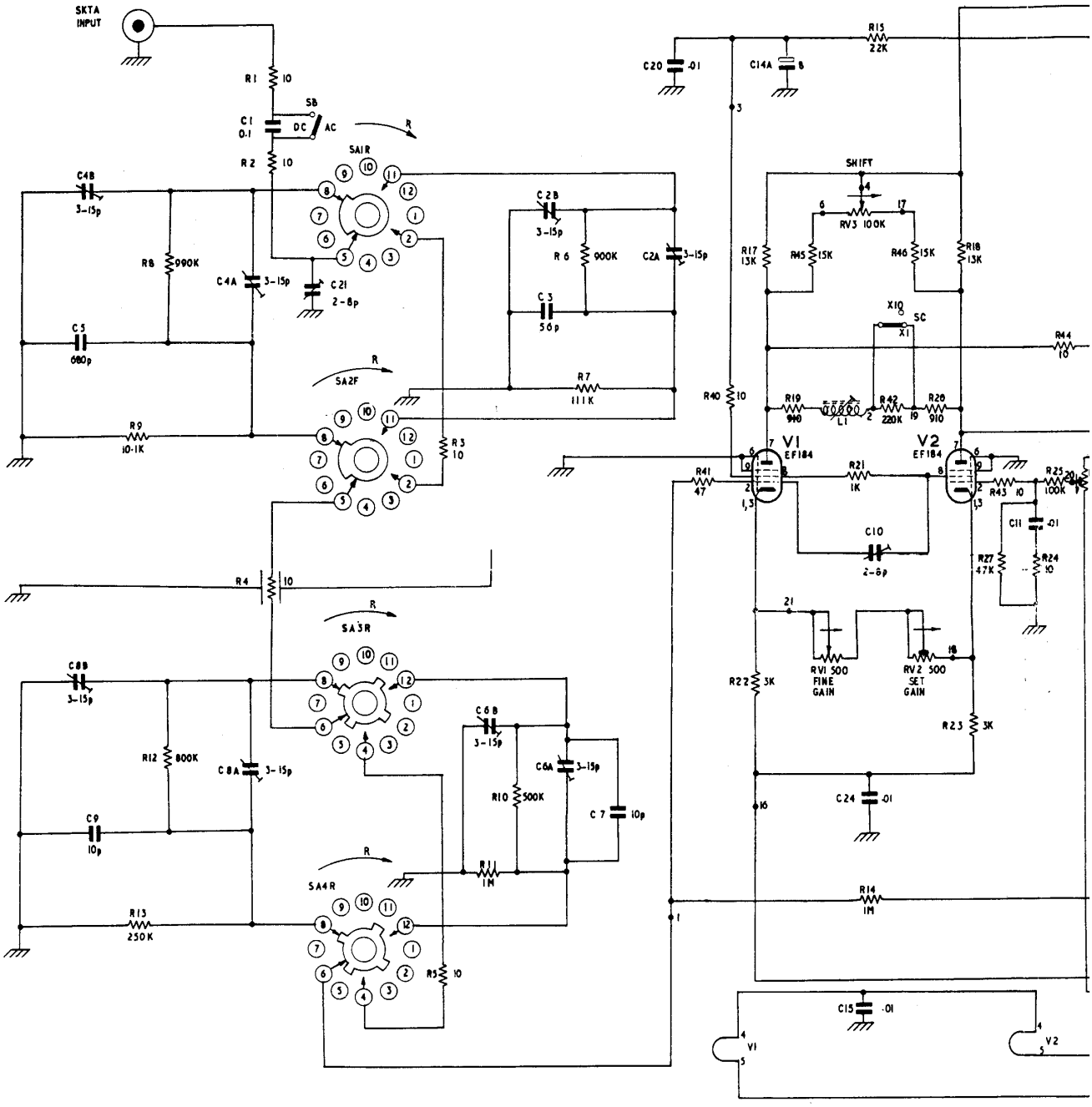
Circuit Diagram: Modular Oscilloscope CD1400 (Main Frame)

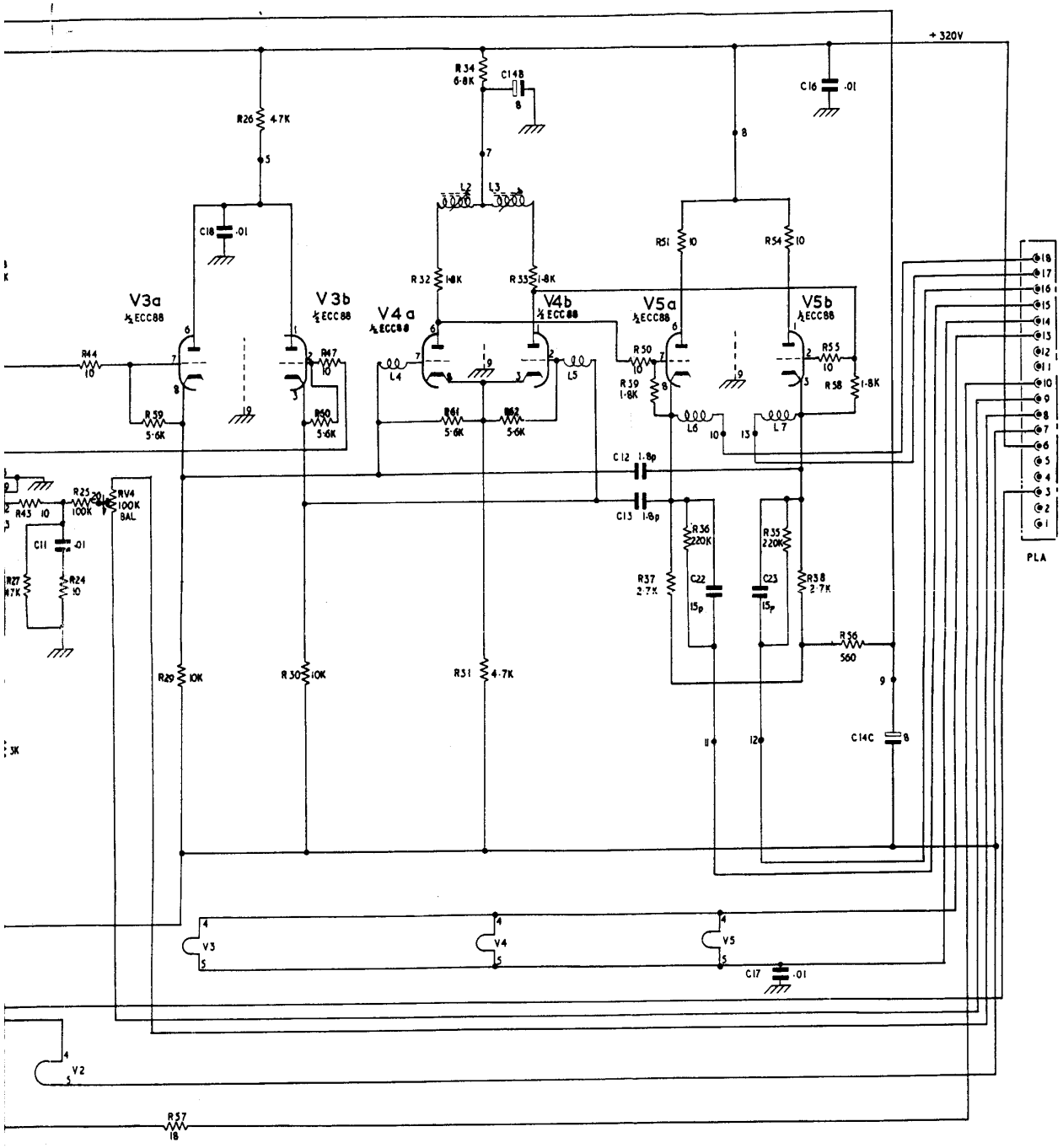




NOTE. R — INDICATES DIRECTION OF MOTION FOR CLOCKWISE ROTATION OF CONTROL KNOB.

Circuit Diagram: Time Base/X Amplifier Plug-in Unit CX1443





Circuit Diagram: Wide-Band Plug-in Y Amplifier Unit CX1441