

AccessionIndex: TCD-SCSS-V.20141212.002

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Object name: Roband RO50A Oscilloscope Instruction Manuals

Vintage: c.1964

Synopsis: Roband RO50A and Roband Plug-in Unit 5C operating and service manuals, including circuit diagrams, Roband, Horley, Surrey, UK, Nov-1964.

Description:

The Roband company was set up in the late 1950s to manufacture high-quality electronic instruments. The Roband Oscilloscope Type RO50A was a high-quality cathode-ray (CRT) oscilloscope, using mixed valve (vacuum-tube) and transistor technology. The Plug-in Unit 5C was a dual trace module for this oscilloscope.

Valve technology was the universal basis for electronic systems from the 1910s through to the 1950s when transistors were gradually introduced after their invention in 1948. The first electronic computers were all valve-based, and continued to be until the late-1950s. This oscilloscope is typical of those used for debugging problems with the valve and transistor generation of digital computers in the period 1950-1970. Valves have since been superseded by transistorised technology, principally within integrated circuits, for all but a few exotic applications. Hence these manuals, which include the full circuit diagrams, give a window on what is now an almost forgotten yet fascinating form of electronics.

The instruction manuals for this oscilloscope and its dual trace module are bound together. For more details, see the Hardware category of this catalog.

The homepage for this catalog is at: <https://www.scss.tcd.ie/SCSSTreasuresCatalog/>
Click '*Accession Index*' (1st column listed) for related folder, or '*About*' for further guidance. Some of the items below may be more properly part of other categories of this catalog, but are listed here for convenience.

Accession Index	Object with Identification
TCD-SCSS-V.20141212.002	Roband RO50A Oscilloscope Instruction Manuals, Roband RO50A and Roband Plug-in Unit 5C operating and service manuals, including circuit diagrams, Roband, Horley, Surrey, UK, Nov-1964. c.1964.
TCD-SCSS-V.20141212.002.01	Roband RO50A Oscilloscope Instruction Manual. Roband Electronics, Nov-1964.
TCD-SCSS-V.20141212.002.02	Roband Plug-in Unit 5C Instruction Manual. Roband Electronics, Jul-1965.

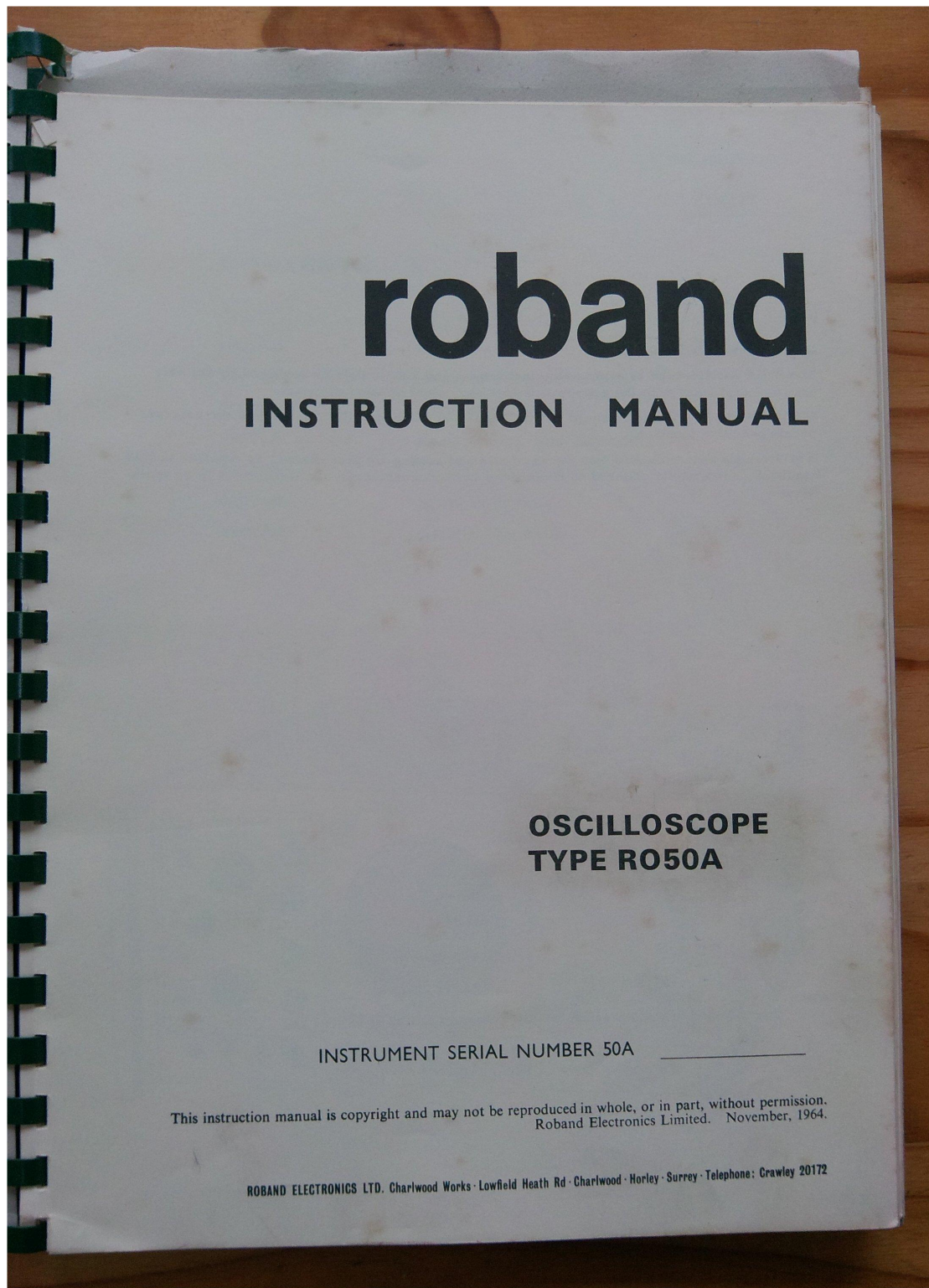


Figure 1: Roband RO50A Oscilloscope Instruction Manual, front cover

CONTENTS

SECTION	1	SPECIFICATION
SECTION	2	OPERATING INSTRUCTIONS
SECTION	3	CIRCUIT DESCRIPTION
SECTION	4	MAINTENANCE AND SERVICE
SECTION	5	CALIBRATION PROCEDURE
SECTION	6	PARTS SCHEDULE
SECTION	7	CIRCUIT DIAGRAMS

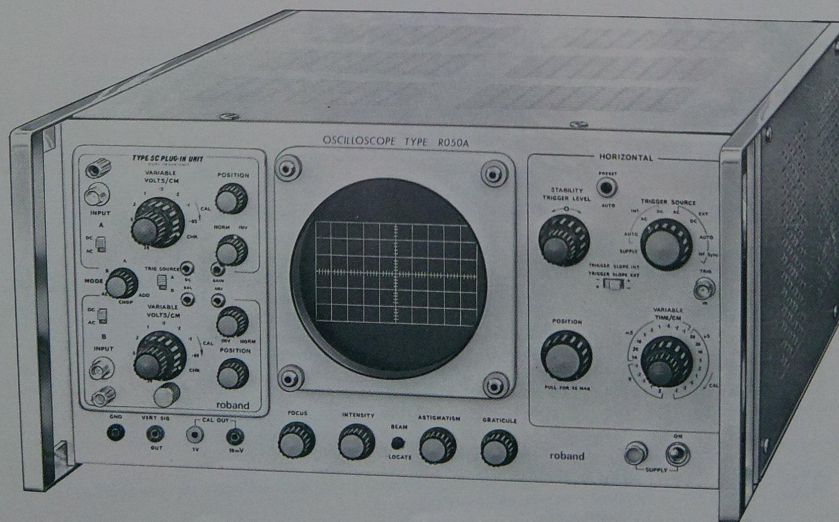


Figure 2: Roband RO50A Oscilloscope Instruction Manual, table of contents

SECTION 1 SPECIFICATION

GENERAL

The ROBAND RO50 is a precision oscilloscope having exceptional versatility through the use of the ROBAND 5 series plug-in units. All DC rails, including a special DC rail for amplifier valve heaters, are stabilised. High brightness displays at any sweep speeds are ensured with a 13kv stabilised E.H.T. and can be easily observed even in high ambient lighting conditions. The use of signal delay enables the leading edge of fast-rise pulses to be readily viewed.

VERTICAL DEFLECTION SYSTEM

With factory special Plug-in Units, internal output amplifier, factory-adjusted to the following values -

Bandwidth	: DC to 32Mc/s (frequency response down 3dB $\pm \frac{1}{2}$ dB at 32Mc/s)
Rise time	: 10 n secs (10% to 90%)

WITH 5K PLUG-IN UNIT

Bandwidth	: DC to 25Mc/s (frequency response down 3dB $\pm \frac{1}{2}$ dB at 25Mc/s)
Rise time	: 13 n secs (10% to 90%)
Calibrated Sensitivity	: 50mV/cm - 20V/cm
Input Impedance	: 1M $\Omega \pm 2\%$ shunted by 35pf approx.
Input Volts	: 400v (DC + AC) peak.
Position Range	: 3 screen diameters minimum
Measurement Accuracy	: $\pm 3\%$ relative to max. gain

BALANCED SIGNAL DELAY	: 160 nano secs. permitting observation of leading edge of waveform triggering the sweep
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HORIZONTAL DEFLECTION SYSTEM

Sweep Generator	: A feedback controlled constant current charging circuit having an excellent starting time and a clean run-down sweep
Sweep Range	: 0.02 μ s/cm to 6 sec/cm
Calibrated Sweep Rates	: 23 positions are provided:- 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50 μ s/cm 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50 ms/cm 0.1, 0.2, 0.5, 1, 2 sec/cm Also a variable, uncalibrated control gives continuous adjustment from 0.1 μ s/cm to 6 sec/cm approx.
Calibrated Sweep Accuracy : (applies to centre 8cms)	: All unexpanded sweeps, typically $\pm 3\%$ and never greater than $\pm 4\%$ except .1, .2 μ s/cm and .5, 1 and 2 sec/cm which are typically $\pm 4\%$ and never greater than $\pm 6\%$
Sweep Magnifier	: X5 magnifier increases amplifier gain to give a fastest sweep of 0.02 μ s/cm. All expanded sweeps (except .02, .04 and .1 μ s/cm) deteriorate typically by 1% from unexpanded and by no more than 2%
Expanded Linearity	: 1% typically after first 4 cm
Position Range	: Horizontal control enables any part of an expanded or unexpanded sweep to be brought on to the screen.

TRIGGERING

System	: Tunnel diode trigger circuit giving control over level and amplitude of trigger point.
Modes:	: Internal - Supply, Auto, A.C., D.C., External - Auto, D.C., A.C.
Level Selection	: Internal Range - at least full screen in calibrated position of volts/cm control with all 5 series plug-in units. External Range - ± 7.5 volts.

Figure 3: Roband RO50A Oscilloscope Instruction Manual, specification page 1

Automatic Trigger : This position provides a mean level trigger point for most trigger waveforms from 20c/s to 2 c/s. The present stability control is adjustable from the front panel. For this mode the STABILITY and TRIGGER LEVEL are disconnected.

Trigger Requirements : With 5K Plug-in.

FREQUENCY	INTERNAL DEFLECTION	EXTERNAL	INTERNAL AUTO	EXTERNAL AUTO
DC - 2c/s	2 cm	400mV	-	-
2c/s - 20c/s	1 cm	400mV	-	-
20c/s - 10Mc/s	3 mm	400mV	1 cm	1V
10Mc/s - 20Mc/s	1 cm	400mV	2 cm	1V
20Mc/s - 30Mc/s	2 cm	600mV	-	-

UNBLANKING

: D. C. coupled to C. R. T. grid to ensure uniform brightness at all sweep speeds. Multiple unblanking is provided from the plug-in unit.

GENERAL

Cathode Ray Tube : 5" flat-faced single gun precision CRT operating at 13kV stabilised to give ultra-bright 6 x 10 cm displays. P31 phosphor is normally supplied; other phosphors to special order

Calibrator : 1V and 10mV rectangular wave (2kc/s approx.) with amplitude accuracy $\pm 2\%$ max. (typically $\pm 1\%$)

External Brightness (Z) : Accessible at rear of instrument on 4mm sockets

Modulation

Graticule : Edge-lit two colour variable intensity, engraved in centimetre squares and two millimetre centre line divisions. Illumination is controlled by a front panel knob

Camera Attachment : Accepts all standard cameras on 5" centres

Beam Locate : Operation of the beam locate button limits the swing of the vertical amplifier to a maximum of ± 3 cm, ensuring that the beam is always on the screen. The stability is over-riden, giving a free running sweep.

Output Waveform : A vertical signal is available at a socket on the front panel, the amplitude of which is approx. 0.2v/cm of screen signal up to 2Mc/s approx.

Mechanical Construction : The instrument is housed in a 17" low line case with sides, top and bottom (of plastic covered aluminium), easily removable. The case is readily converted to rack mounting by means of brackets (which are provided) which bolt to its sides. A tilt stand is provided to lift front to a convenient viewing angle.

Cooling : Effective convection cooling under all normal working conditions

Supply Input : 100-125v/200 -250v 45/500 c/s

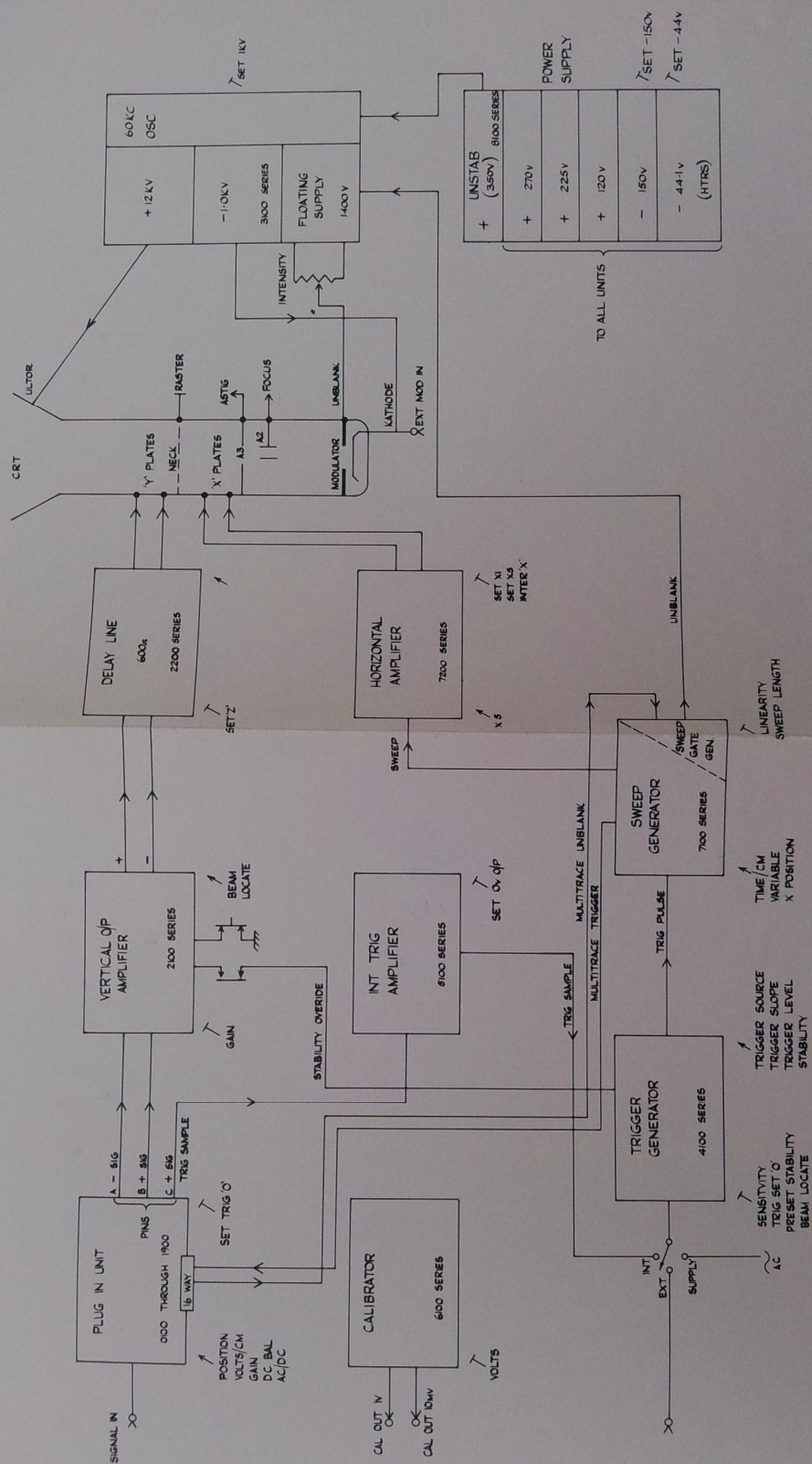
Power Consumption : 240vA approx. with max. dissipation 5 series plug-in unit.

Dimensions and Weight : Height - $8\frac{3}{4}$ " (22cm) Weight - 31 lb (14kg)
Width - 17" (43cm)
- 19" with brackets (48cm)
Depth (excluding handles) - 21" (53.5cm)
Depth (including handles) - 23" (58.5cm)

ACCESSORIES SUPPLIED

- 1 Mains connector
- 1 4 mm plug lead
- 1 Instruction Manual
- 1 Allan key
- 1 Spare fuse

Figure 4: Roband RO50A Oscilloscope Instruction Manual, specification page 2



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BLOCK DIAGRAM

roband

Figure 5: Roband RO50A Oscilloscope Instruction Manual, block diagram

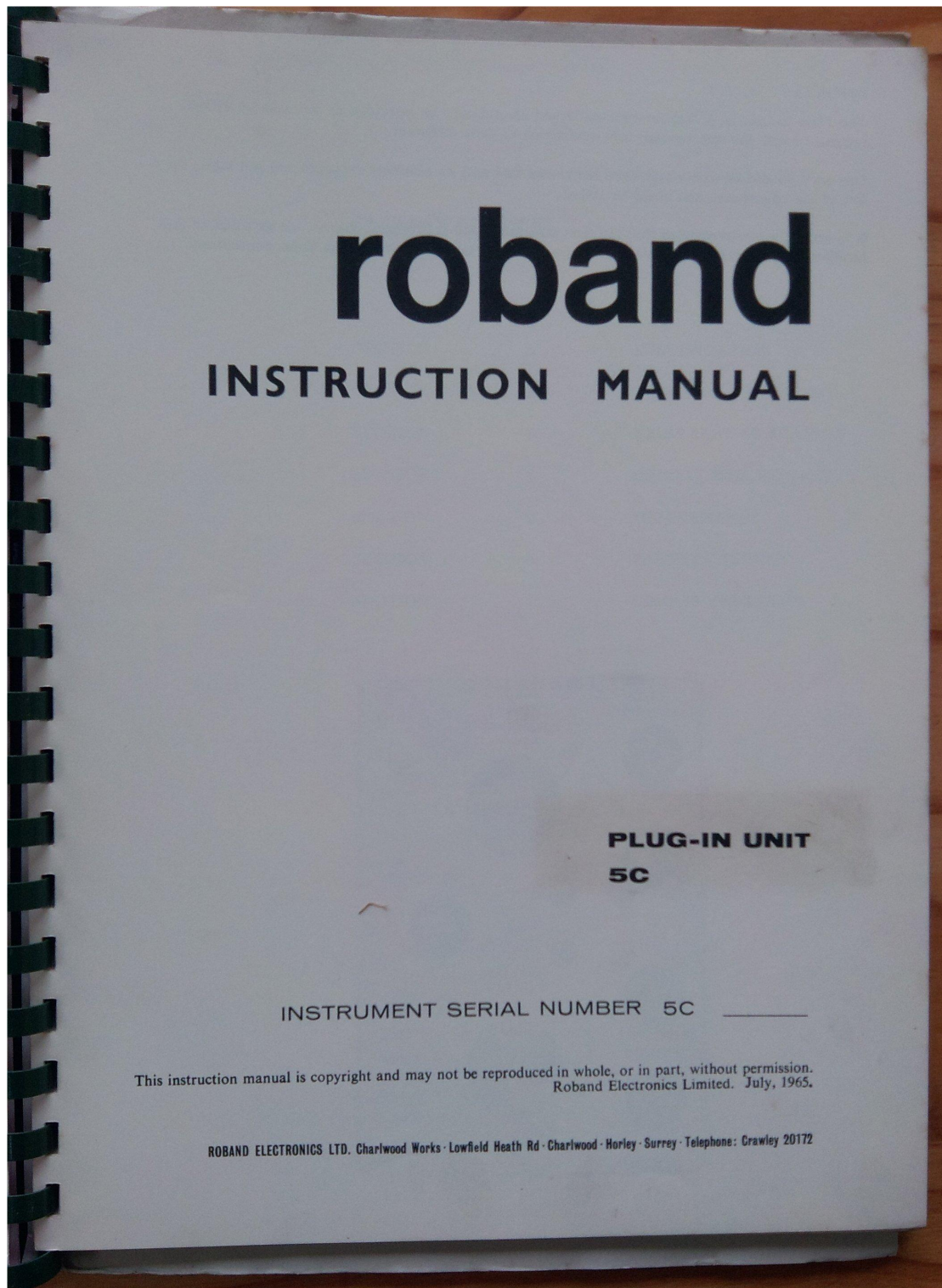


Figure 6: Roband Plug-in Unit 5C Instruction Manual, front cover

CONTENTS

SECTION	1	SPECIFICATION
SECTION	2	FUNCTION OF CONTROLS
SECTION	3	FIRST TIME OPERATION
SECTION	4	CIRCUIT DESCRIPTION
SECTION	5	MAINTENANCE
SECTION	6	PARTS SCHEDULE
SECTION	7	CIRCUIT DIAGRAMS

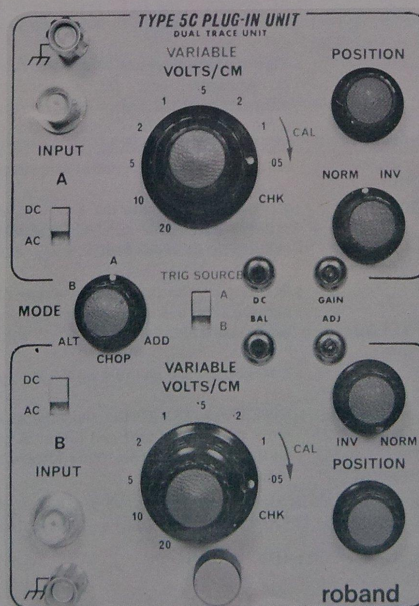


Figure 7: Roband Plug-in Unit 5C Instruction Manual, table of contents

SECTION 1 SPECIFICATION

CHARACTERISTICS (Applies to each channel)

RISE TIME AND BANDWIDTH

	'A', 'B', 'ALTERNATE', 'CHOP'		ADD	
Oscilloscope	Bandwidth 3 dB down	Rise time	Bandwidth	Rise time
RO50	DC-25Mc/s	13n. secs	DC-15Mc/s	24n. secs
RO51	DC-25Mc/s	13n. secs	DC-15Mc/s	24n. secs
RO55	DC-15Mc/s	24n. secs	DC-11Mc/s	29n. secs
RO56	DC-15Mc/s	24n. secs	DC-11Mc/s	29n. secs

CALIBRATED SENSITIVITY

: 50mV/cm - 20V/cm

CALIBRATED POSITIONS

: 9 positions are provided plus a CHECK position:-
0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20V/cm. Also a variable,
uncalibrated control gives continuous adjustment from 0.05 to
50V/cm.

CALIBRATED ACCURACY

: $\pm 3\%$. A SET GAIN is provided which when accurately adjusted
with the volts/cm switch in the 0.05V/cm position ensures that
any other calibrated position is accurate to within $\pm 3\%$.

CHECK POSITIONS

: Permits setting of dc levels without disconnecting the input
signals.

AC/DC SWITCH

: AC coupled - the L.F. response is 20 cps on normal input.
- the L.F. response is 2 cps on any $\times 10$ probe.

OPERATING MODES

: Five modes of operation are provided,
(1) 'A' channel only, (2) 'B' channel only, (3) channels switched
alternately at the end of each sweep, (4) channels switched at
a free running rate of approx. 100kc/s. (5) both channels added
algebraically. Switching one of the channels to INVERTED the
unit becomes a differential amplifier.

COMMON MODE REJECTION

: Better than 20:1 with the 1 volt signal from the oscilloscope
internal calibrator and both channels at the calibrated
sensitivity of 0.05V/cm.

POLARITY INVERSION

: Polarity can be inverted on either channel for comparison of
signals 180° out of phase and the bandwidth will change by no
more than 1Mc/s.

INPUT IMPEDANCE

: 1 Megohm $\pm 2\%$ shunted by 35pF approx.

TRIGGER SOURCE

: INTERNAL TRIGGER - the trigger is supplied DC connected
from the plug-in unit and either A or B channel can be selected
as the trigger source. This allows true time comparison
between traces.

CHANNEL TIME ERROR

: 4 n. secs. max.

WEIGHT

: $4\frac{1}{2}$ lb. (2.1kg)

Figure 8: Roband Plug-in Unit 5C Instruction Manual, specification

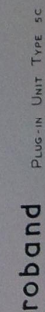


Figure 9: Roband Plug-in Unit 5C Instruction Manual, dual-trace amplifier circuit diagram

