

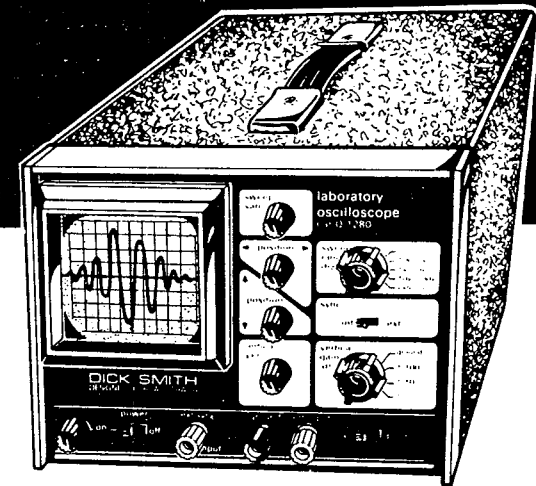
User's manual

for the

Dick Smith

75mm Oscilloscope

Cat Q-1280



DICK SMITH ELECTRONICS

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EXCEPT WHERE NOTED, ALL ITEMS SHOWN IN STOCK AT PRICES GIVEN AT TIME OF GOING TO PRESS
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● This unit is wired for operation on 240V AC 50/60Hz supply

● Note that there may be differences between the unit itself and the contents of this manual.

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1. GENERAL INFORMATION

The Dick Smith Q-1280 Oscilloscope is a compact, reliable, general purpose instrument employing a 75mm round CRT and solid state circuitry. It is housed in a lightweight alloy housing.

The vertical system has a sensitivity of 10mV per division or greater, and a usable signal bandwidth of DC - 5MHz.

The timebase circuitry provides sweep frequencies from 10Hz to 100kHz and both internal and external negative slope synchronization. The external sync signal input is via a front panel terminal. In the external sweep mode, the deflection sensitivity is 500mV per division or greater, and bandwidth is DC - 500kHz. This mode allows X-Y operation of the oscilloscope, providing high operational flexibility.

Since solid state circuitry is employed throughout, the oscilloscope is ready for use less than 20 seconds after switch-on. The lack of heat generating components and the low wattage of the instrument minimises drift and provides high reliability.

Waveforms are easily observed, as this oscilloscope employs a sweep retrace blanking circuit.

2. SPECIFICATIONS

VERTICAL DEFLECTION SYSTEM

Characteristic	Specification	Remarks
Sensitivity	10 mV/DIV or over	1kHz, 1DIV = 6mm
Frequency bandwidth	AC : 2 Hz ~ 5 MHz DC : DC ~ 5 MHz	within - 3 dB
Attenuator	1/1, 1/10, 1/100 and GND	
Attenuator accuracy	within ± 3 %	
Input Impedance	1 MΩ ± 5% within 35 pF	
Input terminal	3/4" Binding-post	
Maximum allowable input voltage	600 V _{p-p} Less than 1 min.	DC + AC _{p-p} AC: Less than 1kHz

EXTERNAL HORIZONTAL AMPLIFIER

Characteristic	Specification	Remarks
Sensitivity	500 mV/DIV or over	1kHz, 1DIV = 6mm
Frequency bandwidth	DC ~ 500 kHz	within - 3 dB
Input impedance	1 MΩ ± 10% within 35 pF	
Input terminal	Binding-post	
Variable range	1-1/10 or more	
Maximum allowable input voltage	100 V _{p-p} Less than 1 min.	DC + AC _{p-p} AC: Less than 1kHz

TIME BASE

Characteristics	Specification	Remarks
Sweep frequency	10 Hz - 100 kHz	
Synchronizing	Internal and external	

3. EXPLANATION OF PANEL CONTROLS

CRT

Characteristics	Specification	Remarks
Type	75 mm round screen CRT	
Blanking	At GI	

POWER REQUIREMENTS

Characteristics	Specification	Remarks
Voltage	240V AC	Selected by change of internal connection
Frequency	50 - 60 Hz	
Wattage	Approx. 10 VA	

DIMENSIONS AND WEIGHT

Characteristics	Specification	Remarks
Dimensions	202mm W x 160mm H x 305mm D	Overall
Weight	Approx. 3.8kg	

ACCESSORIES

Operation Manual 1

Front Panel

1	POWER ON OFF	Power on and off switch.
2	←→ POSITION	Horizontal positioning of the spot (or trace) on the CRT screen.
3	↑↓ POSITION	Vertical positioning of the spot (or trace) on the CRT screen.
4	VERT GAIN	Continuously-variable control of vertical deflection sensitivity.
5	V. GAIN ATT.	Vertical deflection sensitivity in 3 steps. The sensitivity is maximum (unity) when 1/1 range. It is reduced by a factor of 1/10 or 1/100 range respectively. GND: Input signal is removed and the input circuit is grounded. Does not ground the input signal.
6	AC DC	This selects the method of coupling signal to the input of the vertical amplifier. AC: Signal is capacitively coupled to the vertical amplifier. DC component of signal is blocked. DC: All components of the input signal are passed to the vertical amplifier.
7	VERT INPUT	Input terminal for vertical deflection of trace.
8	GND	Ground terminal.
9	EXT SYNC/ HORIZ INPUT	External signal input terminal for horizontal deflection and external synchronizing.
10	SWEEP RANGE	This selects sweep frequency in 4 steps. When this knob is turned to the extremely clockwise position (EXT position), the input signal for horizontal amplifier is connected to the EXT SYNC HORIZ INPUT terminal to operate in the external sweep mode.

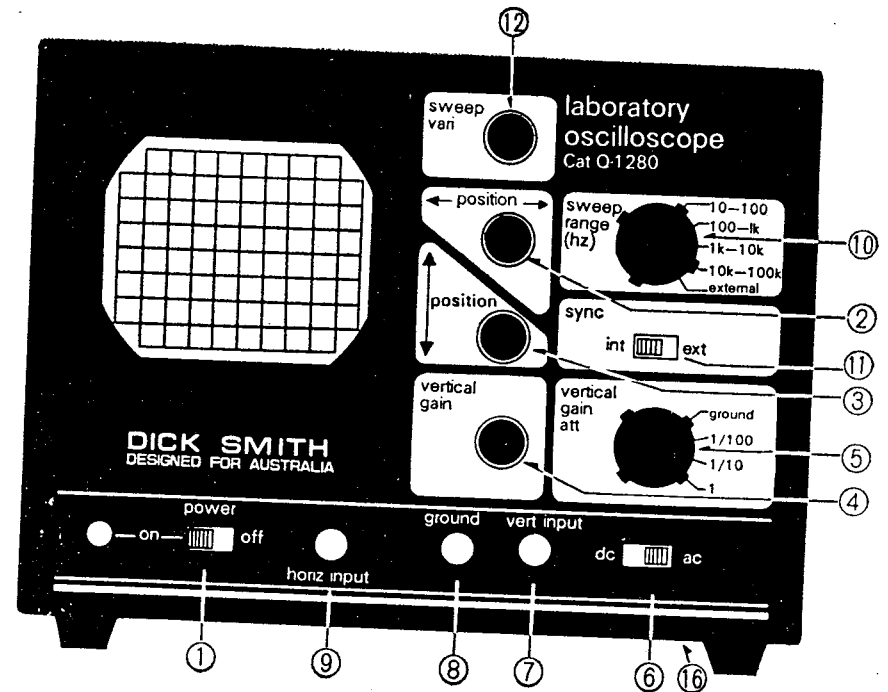
11	SYNC INT-EXT.	At the INT position, synchronization is effected by INPUT voltage and, at the EXT position, the signal voltage applied to the "9" terminal is synchronized.
12	SWEEP VARI.	<p>Sweep frequency fine adjustment and external signal gain control. When the SWEEP RANGE selector switch "10" is in the internal frequency range (10-100K), this control acts as the fine adjustment of sweep frequency to the number of the cycles in the signal waveform on the cathode ray tube screen.</p> <p>When the SWEEP RANGE selector switch "10" is in the EXT position, this control provides facilities to adjust the Gain of the signal connected to the HOR EXT. INPUT terminal "9" to Change the amplitude of the horizontal signal on the cathode ray tubes screen.</p> <p>Note that the horizontal frequency response varies with the position of this control. (Refer to specifications)</p>

Rear Panel

13	INTENSITY	CRT intensity (brightness) control. The spot (trace) becomes brighter as the knob is turned clockwise.
14	FOCUS	For CRT spot (trace) focussing.
15	Cord	Power supply cord.

Bottom

16	DC-BAL	This control should be so adjusted (with a screwdriver) that the baseline of trace is not vertically shifted when the VERT GAIN VARI. knob is turned.
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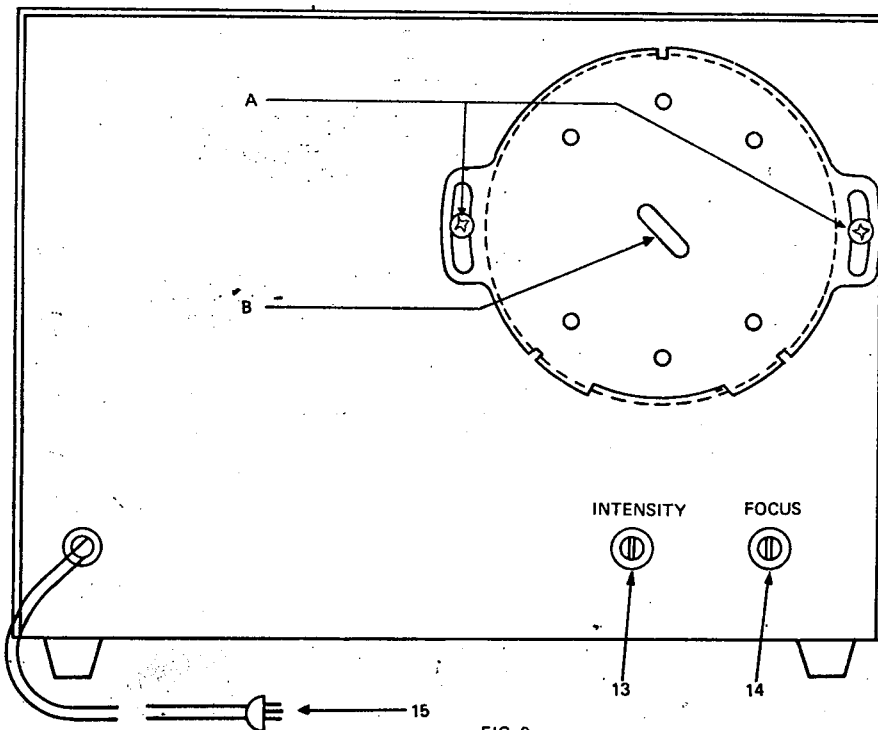


FIG. 2

4. OPERATING PROCEDURE

To display waveforms on the CRT screen, follow the following procedure until you become familiar with the use of the unit's controls.

1. To begin, set the controls as follows:

POWER	OFF
V GAIN ATT	GND
VERT GAIN	fully clockwise
VERT POSITION	About centre
SWEEP RANGE	10-100
SWEEP VARI	About centre
HOR POSITION	About centre

2. Next connect the unit to a power outlet and switch on the power.

3. A trace should appear on the screen after about 10 seconds.

4. Adjust the VERT POSITION and HOR POSITION controls until the trace is at the centre of the CRT screen.

The unit is now ready to display a waveform.

Feed the signal to be displayed to the vertical input and adjust the SWEEP RANGE and VERT GAIN controls until the waveform is easily observable.

DISPLAYING THE OUTPUT WAVEFORM OF AN OSCILLATOR

Feed the oscillator's output to the vertical input as shown in Fig. 1 or 3. Set the SWEEP RANGE switch to suit the frequency being displayed i.e. for frequencies between 10 and 100Hz, set the SWEEP RANGE to '10-100'; for frequencies between 100 and 1000 Hz set it to '100-1k' etc. Now turn the SWEEP VARI control until the sweep frequency is synchronised with the input frequency and the display stops moving.

As the oscillator output is increased the display will increase in height, until eventually it will spread off the CRT screen. Adjust the height to suit the level using the V. GAIN ATT. switch and the VERT GAIN knob. Note: the VERT GAIN knob adjusts sensitivity continuously from about 10% to maximum.

SAMPLE APPLICATIONS

Measuring the frequency response of an amplifier

The simplest way to check the overall frequency response of an amplifier is to feed the output of a signal generator into the AUX input of the amplifier and connect the vertical input of the oscilloscope to the speaker output (see Fig. 4). Keeping the level of the generator's output constant, sweep the frequency through its range. Any frequency response variations will cause the amplitude (height) of the display to change.

Note: measuring the speaker output is quite accurate, as the low impedance of the speaker terminals minimises signal attenuation caused by the oscilloscope's input cable capacitance. Measurements of frequency response at points within the circuitry of an amplifier may need to be adjusted to allow for effects caused by input cable capacitance.

Monitoring the output signal of a stereo amplifier (see Fig. 5)

1. Set the SWEEP RANGE switch of the oscilloscope to the EXT sweep variable terminal.
2. Set the SWEEP VARI. control to about centre.
3. Set the SYNC switch to EXT.
4. Set the V GAIN ATT switch to 1/100
5. Set the VERT_GAIN control fully clockwise
6. Connect the LEFT + speaker terminal of the amplifier to the VERT INPUT terminal of the oscilloscope and the LEFT - speaker terminal to the GND terminal with shielded cable
7. Connect the right + speaker terminal to the EXT SYNC HORIZ INPUT terminal with shielded cable.
8. Operate the amplifier. A Lissajous pattern of the left and right signals of the amplifier is displayed on the CRT screen.
9. Adjust the amplitude with the VERT GAIN and SWEEP RANGE switch; and set the position of the figure on the screen with the vertical and horizontal position controls.

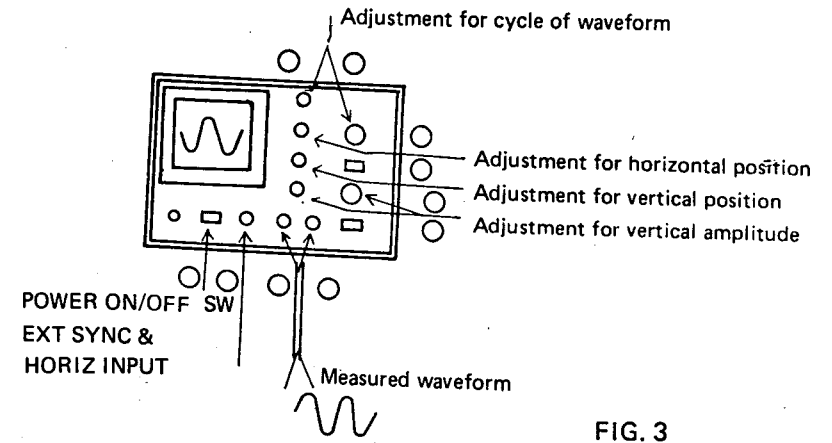


FIG. 3

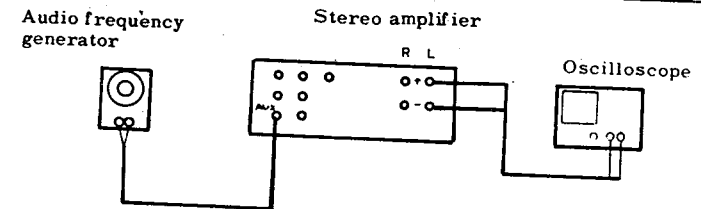


Fig. 4

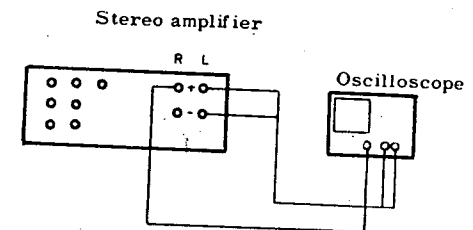


Fig. 5
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OPERATING NOTES AND LIMITATIONS

Supply line voltage

The instrument can be operated safely on voltage variations of up to 10% from the specified voltage of 240V.

Fuse

A fuse of 0.2A rating is incorporated for protection of the circuitry. Do not use any other value of fuse in the unit.

Ambient temperature

Do not expose the unit to direct sunlight for any prolonged period or place on or near any equipment which generates heat. The unit can be operated safely in ambient temperatures of from 5°C to 35°C. Operating the unit in temperatures outside this range may alter the specifications and shorten the life of the oscilloscope.

Maximum input voltage

Maximum input voltage is specified to prevent any parts working outside their specified voltage range. Application of voltages greater than those specified will damage the circuitry and invalidate the guarantee.

VERT INPUT terminal maximum *600V p-p

EXTERNAL SYNC/HORIZ INPUT terminal maximum *100V p-p

*AC: less than 1kHz; less than 1 minute

Life of the CRT

The life of the CRT will be shortened if the trace brightness is run at a high level; if the trace is displayed as a spot, or if the supply line voltage is higher than normal for long periods.

Maximum input voltage to EXT SYNC HORIZ INPUT terminal without distortion of waveform.

The horizontal axis of the the instrument is designed for observation of phase. For this purpose, a source follower is used as an impedance convertor between the SWEEP VARI control and EXT SYNC HORIZ INPUT terminal. Consequently the dynamic range of the horizontal amplifier is rather narrow. The input is saturated, and the waveform distorted if the input is greater than about 8V p-p.

6 MAINTENANCE AND CALIBRATION

1 Case removal

Remove the six screws on the side of the case and the two screws on the top of the case (see Fig. 7).

Slide the case about 2cm to the rear and remove from the chassis. The panel allowing access to the bottom is fixed by three screws.

2 Change of supply line voltage

Disconnect the instrument from the power supply when changing the supply line voltage.

Change the wiring of the power transformer to match the power source. Carefully note the relationship between the colour of the wire and the supply voltage.

3 Replacing the fuse

The fuse is located on the printed circuit board. The fuse has a value of 0.2A on 240V supply. Disconnect the instrument from the power source before attempting to replace the fuse.

Before replacing the fuse, correct the fault causing it to blow.

4 Adjustment of DC balance (see Fig. 9)

The horizontal trace may shift when rotating the VERT GAIN control. Adjust the DC BAL control (16) as shown on page 19 for no baseline shift of the CRT display.

Set the V GAIN ATT switch to GND.

Position the trace on the centre horizontal graticule line with the VERT POSITION control.

Rotate the VERT GAIN control through its range.

Adjust the DC BAL control for no trace shift on the CRT screen as the VERT GAIN is varied.

5 Frequency compensation for V GAIN ATT switch (see Fig. 9)

A 1kHz square wave with a rise time of 0.1 μ s or less and without overshoot is required for this adjustment.

Set the V GAIN ATT switch to 1/10 and adjust the square wave amplitude for a four division display.

Adjust the trimmer capacitor (17 in Fig 9) to give the correct display as shown in Fig. 6.

Set the V GAIN ATT switch to 1/100 and adjust the square wave amplitude for a four division display.

Repeat the adjustment of (17) on this setting.

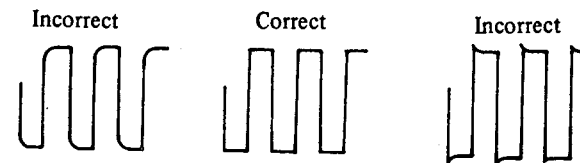


FIG. 6

6 Adjustment of high frequency response compensation of the Vertical Amplifier (see Fig. 9)

This adjustment is the phase compensation of the vertical amplifier at high frequency. It is necessary to use a 100kHz square wave with a risetime of 1ns or less for this adjustment. Such a square wave generator is a special instrument. This procedure is the only method of adjustment for the high frequency response compensation. Do not adjust the compensator without a suitable square wave generator.

Set the V GAIN ATT switch to 1/1

Connect the 100kHz (see above) to the VERT INPUT terminal.

Adjust the SWEEP RANGE switch and the SWEEP VARI control for 2 or 3 cycles on the screen.

Turn the VERT GAIN control fully clockwise, as this has an effect on the rising part of the waveform.

Adjust the control (19) (see Fig. 6) to minimise the overshoot and undershoot.

7 Adjustment of Horizontal DC balance (see Fig. 9)

This is the adjustment of the DC balance of the horizontal amplifier

Set the SWEEP RANGE switch to EXT

Adjust the control (20) (see Fig. 9) so that the spot on the CRT screen does not move when rotating the SWEEP VARI. control through its range.

8 Adjustment of trace alignment (see Fig. 2)

Loosen the screw (A) holding the CRT mounting plate at the rear

Place the oscilloscope in the normal operating position

Put the blade of a screwdriver in the slit (B) to turn the CRT mounting plate to set the bright line correctly against the scale graduation.

Carefully tighten the screw (A) ensuring that the horizontal line does not move.

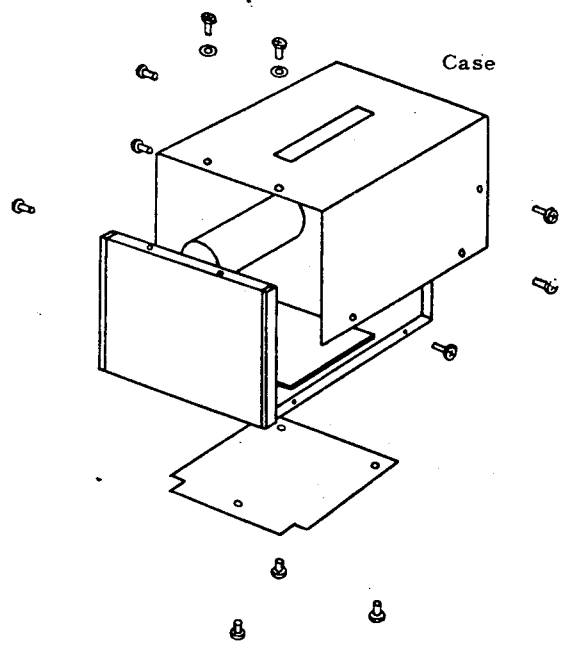


Fig. 7

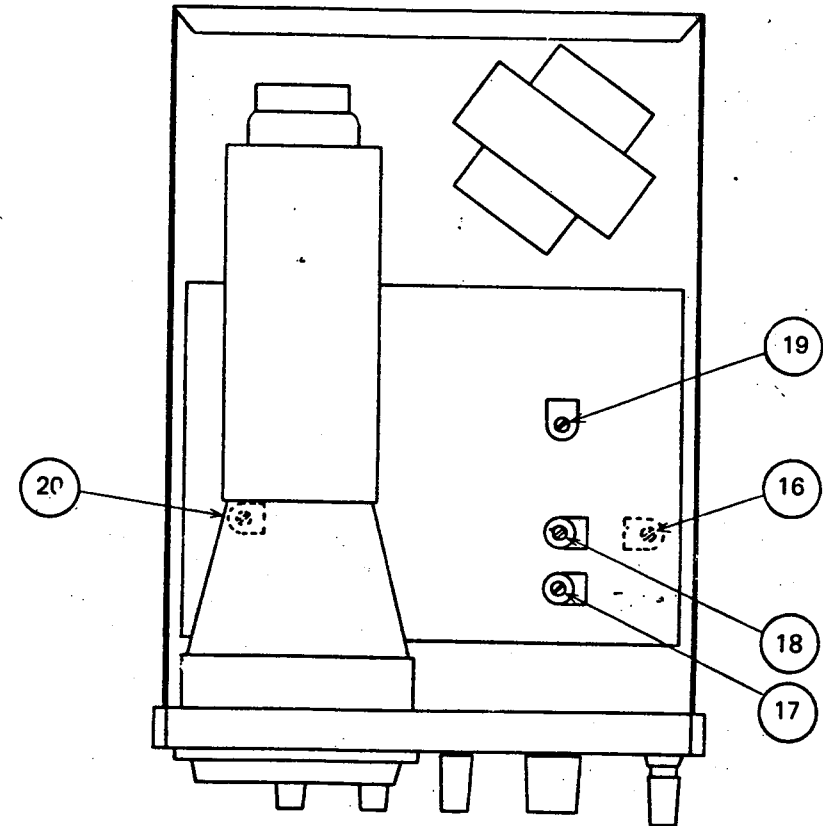


Fig. 9

