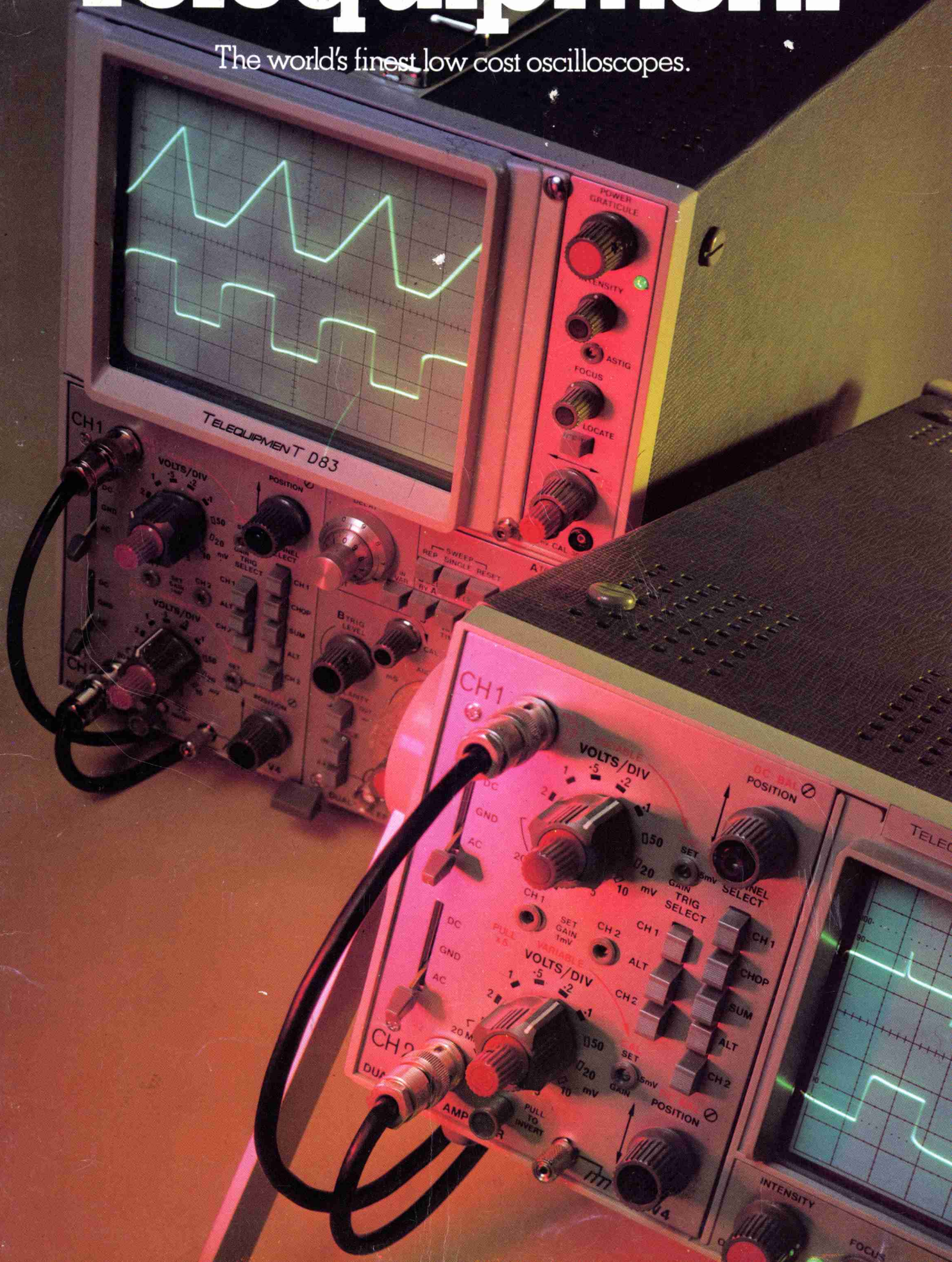


# Telequipment

The world's finest low cost oscilloscopes.





MAY 1977

Printed in England by Creaseys of Hertford Ltd.



# About the Company...

Telequipment was founded as a company in 1953 by a small group of dedicated engineers, determined to bring some original ideas to the development of the oscilloscope, then still in its infancy. During the ensuing years the Company concentrated its efforts on the low-cost area of the market, incorporating into its products many of the technical features previously found only in the most expensive laboratory instruments.

Telequipment rapidly established a unique reputation and by 1966 had become the largest U.K. oscilloscope manufacturer and the world leader in the low-cost oscilloscope field.

At this point in time Telequipment became part of the renowned Tektronix group. This unique combination of Telequipment/Tektronix engineering expertise and marketing experience now provides a product line of exceptional performance and versatility. Telequipment products incorporate most of the desirable technical features common to the more expensive instruments at prices which bring them well within reach of even the most modest budget.

There is a Telequipment product ideally suited to every type of application.

In the educational field the combination of a large screen and simple controls provides the student or lecturer with an easy-to-use instrument ideally suited to his needs. For the Service Engineer there are a number of portable, rugged oscilloscopes from a simple, single trace, battery operated instrument small enough to be carried in the brief case, to a sophisticated 50MHz dual-trace, dual sweep oscilloscope ideally suited to computer servicing. Between these extremes there is a range of general purpose instruments for research departments, production testing, mechanical engineering, etc. In every case Telequipment oscilloscopes can be relied upon to provide the high quality and value demanded by today's technology.

As part of Tektronix, Telequipment products benefit from a first-class, world-wide sales and service support. There are fully equipped service centres staffed with highly qualified engineers in more than 50 countries.

All Telequipment products have a warranty period for parts and workmanship of one year. This unique position has contributed to the Company's rapid growth rate. In all Telequipment has served world-wide about 75,000 customers and the number is continually growing.



# The choice is yours...

The Telequipment range extends from DC to 50MHz bandwidth in both monolithic and modular configurations. For easy cross reference, the basic characteristics are shown on this page in tabulated format but for the complete specifications of any instrument, please refer to the appropriate page. In the case of mainframe and plug-in combinations it should be noted that with certain plug-in units, the maximum bandwidth is governed by the characteristics of the mainframe.

Where rackmounted versions of some instruments are available, this is indicated in the table and on the relevant specification page by the model number with suffix R.

Accessories such as probes, protective covers, and viewing hoods are listed at the rear of this catalogue.

Oscilloscope	Special Features	Bandwidth	Vertical Sensitivity	No. of traces	Rise Time (approx.)	Sweep range and accuracy	Bandwidth X input	Viewing Area (approx.)	Accelerating potential	Page
S61		5 MHz	5 mV/div-20 V/div	1	70 ns	500 ms/div-1µs/div ±5%	1 MHz	8 x 10 div (1 div = 1 cm)	2 kV	10
S22	Battery/Mains portable	5 MHz 1 MHz	10 mV/div-5 V/div 1 mV/div-0.5 V/div	1	70 ns	300 ms/div-1µs/div ±5% (to 100ns/div at ±10%)	—	6 x 10 div (1 div = 0.6 cm)	1.25 kV	4
D32	Battery/Mains portable	10 MHz	10 mV/div-5 V/div	1 or 2	35 ns	0.5 s/div-500 ns/div ±5% (to 100ns/div at ±10%)	—	8 x 10 div (1 div = 0.7 cm)	3 kV	6
D61a		10 MHz	10 mV/div-5 V/div	1 or 2	35 ns	0.5 s/div-500 ns/div ±5% (to 100ns/div at ±10%)	2 Hz-1 MHz	8 x 10 div (1 div = 1 cm)	3.5 kV	12
D54/D54R		10 MHz	10 mV/div-50 V/div	1 or 2	35 ns	2 s/div-200 ns/div ±5% (plus × 5 variable expansion)	1 MHz	6 x 10 div (1 div = 1 cm)	4 kV	30
DM64	Dual trace storage oscilloscope	10 MHz 8 MHz	10 mV/div-50 V/div 1 mV/div-5 V/div	1 or 2	35 ns	2 s/div-100 ns/div ±5% (to 100ns/div at ±8%)	1 MHz	8 x 10 div (1 div = 1 cm)	3.5 kV	18
D34	Battery/Mains portable	15 MHz	2 mV/div-5 V/div	1 or 2	24 ns	0.2 s/div-500 ns/div ±5% (to 40ns/div at ±10%)	—	8 x 10 div (1 div = 0.65cm)	9.5 kV	8
D65		15 MHz 10 MHz	10 mV/div-50 V/div 1 mV/div-5 V/div	1 or 2	24 ns 35 ns	2 s/div-100 ns/div ±5% (to 40ns/div at ±8%)	1 MHz	8 x 10 div (1 div = 1 cm)	4 kV	30
D63/DM63	Dual beam, with plug-in amplifiers. Storage on DM63	15 MHz 12 MHz	5 mV/div-20 V/div 1 mV/div-4 V/div	1, 2 or 4	24 ns	1 s/div-200 ns/div ±3% (to 40ns/div at ±5%)	1 MHz	8 x 10 div (1 div = 0.9 cm)	8 kV	20
D66A		25 MHz 15 MHz	10 mV/div-50 V/div 1 mV/div-5 V/div	1 or 2	14 ns 24 ns	2 s/div-100 ns/div ±5% (to 20ns/div at ±7%)	1 MHz	8 x 10 div (1 div = 1 cm)	10 kV	14
D67A	Dual trace, dual time base	25 MHz	10 mV/div-50 V/div	1 or 2	14 ns	2 s/div-200 ns/div ±3% (to 40ns/div at ±5%)	1 MHz	8 x 10 div (1 div = 1 cm)	10 kV	16
D75	Dual trace, dual time base, portable	50 MHz 15 MHz	5 mV/div-20 V/div 1 mV/div-4 V/div	1 or 2	7 ns 24 ns	2s/div - 100ns/div ±3% (to 10ns/div at ±6%)	1 MHz	8 x 10 div (1 div = 1 cm)	15 kV	22
D83	Plug-in amplifiers and time bases	50 MHz 15 MHz	5 mV/div-20 V/div 1 mV/div-4 V/div	1 or 2	7 ns 24 ns	2s/div - 100ns/div ±3% (to 10ns/div at ±6%)	1 MHz	8 x 10 div (1 div = 1.22 cm)	15 kV	24
Plug-in Units for D63/DM63 and D83			Vertical amplifiers - V1, V3, V4, V5 Television amplifier - TV1 Timebases - S1, S2A (for D83 only)							26
CT71	Semiconductor curve tracer									28
Optional Accessories										31

The company reserves the right to depart from specifications in the light of continuing development.



# S22

## 5 MHz

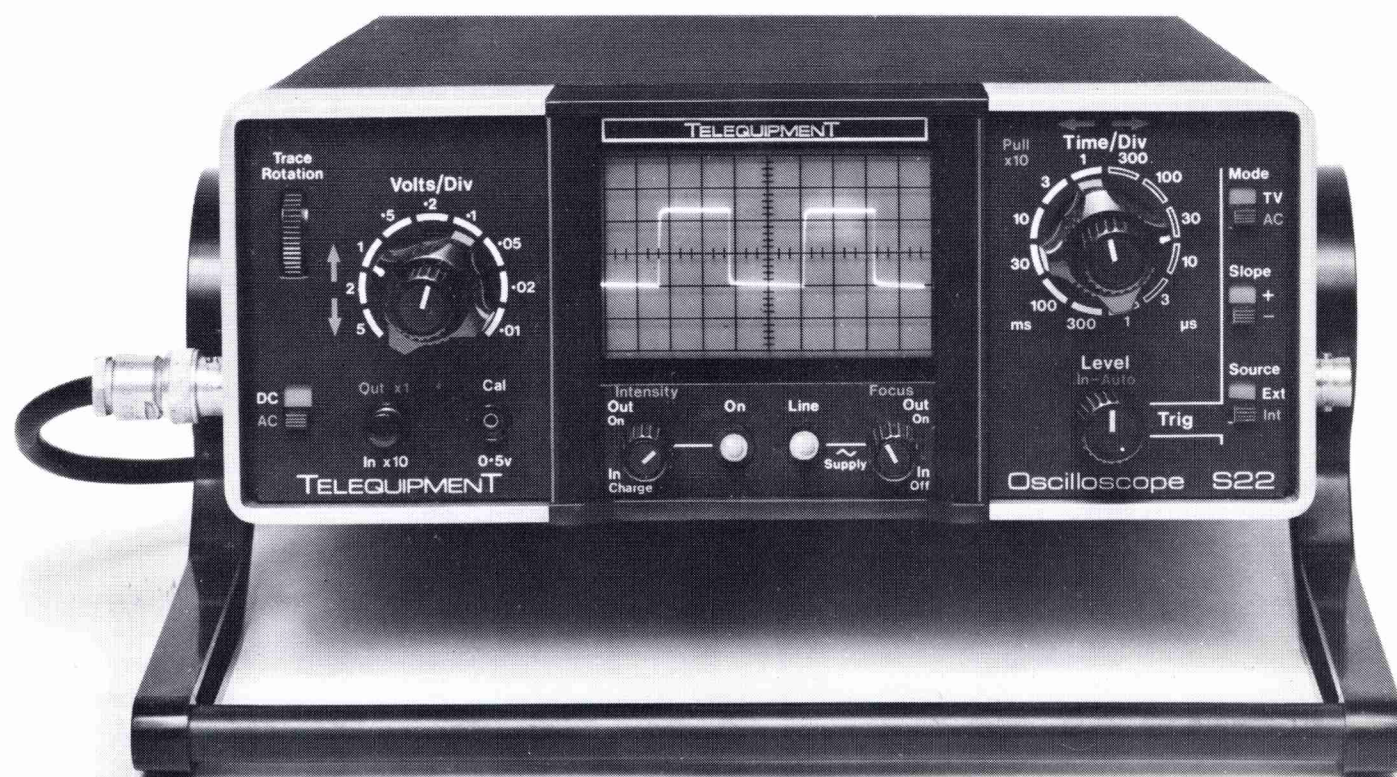
### Portable Oscilloscope

#### Battery/Mains operation

The smallest in Telequipment's range of solid-state instruments. The S22 is a single trace battery/mains portable oscilloscope with a bandwidth of 5MHz. Normal sensitivity of the vertical amplifier is 10mV per division but a X10 magnifier increases this to 1mV up to a bandwidth of 1MHz. The comprehensive triggering arrangements include special features to simplify the observation of television line and field waveforms.

The built-in batteries give up to four hours continuous use and can be recharged by plugging the instrument into a mains socket overnight.

Small size, low weight and sturdy dependability make the S22 particularly well suited to the executive engineer who needs a personal, high performance oscilloscope in his briefcase.



#### GENERAL DESCRIPTION

The S22 is a single channel 5MHz portable oscilloscope with a single time base, for use on internal rechargeable batteries or AC mains.

#### VERTICAL SYSTEM

**Bandwidth:** (approx.)

DC Coupled DC to 5MHz (-3dB)

AC Coupled 3Hz to 5MHz (-3dB)

**Rise Time:** 70ns

**Deflection Factors:**

10mV/div to 5V/div in 9 calibrated steps (1-2-5 sequence). A  $\times 10$  gain switch extends the amplifier

sensitivity to 1mV/div at a bandwidth of DC to 1MHz (-3dB) approx.

Voltage Measuring Accuracy:  $\pm 5\%$

**Input Impedance:**

1M $\Omega$   $\pm 45$ pF

**Input Conditions:**

Switched choice of a.c. or d.c.

coupling via standard BNC connector.

**Maximum Input Voltage:**

$\pm 250$ V peak.

#### HORIZONTAL SYSTEM

**Sweep Speeds:**

300ms/div to 1.0  $\mu$ s/div in 12 calibrated steps (1-3-10 sequence).

A  $\times 10$  magnifier operates over all time base ranges, increasing the fastest sweep speed to approx.

100ns/div.

**Time Measuring Accuracy:**

Normal  $\pm 5\%$

$\times 10 \pm 10\%$

#### TRIGGERING

Fully variable level control, operates over 6 vertical divisions on all waveforms. Selectable Auto mode. Bright line in the absence of a trigger signal in Auto.

Selectable AC or TV mode. On TV, will automatically lock on TV frame at sweep speeds up to 0.1ms/div, and on TV line at higher sweep speeds.

**Sources:**

Internal or external

**Sensitivity:**

Internal 0.3 div 40Hz-2MHz

1.0 div 2MHz-5MHz

External 500mV (approx.) 40Hz-5MHz

**Polarity:**

Positive or Negative

#### C.R.T.

**Display Area:**

6  $\times$  10 divisions, each division nominally 0.6cm.

**Phosphor:**

P31 supplied as standard

**Accelerating Potential:**

1.25kV

#### CALIBRATOR

**Output Voltage:** +500mV

**Output Impedance:**

1k $\Omega$  approx.

**Wave Shape:** Square, positive going vertical edge at approx. screen centre.

**Accuracy:**  $\pm 1\%$

#### POWER REQUIREMENTS

**Mains voltages:** 100V-112V,

112V-125V,

200V-224V,

225V-250V

**Frequency:** 50 to 400Hz

**Consumption:** 14VA (mains)

7VA (battery)

Internal rechargeable batteries: 6  $\times$  1.25 "D" cells

**Running time on fully charged batteries:** 4 hours

**Recharge time:** 14 hours

**Trickle Charger:** Operates when instrument used on AC mains.

#### External DC

Rear socket accepts input from external DC supply of 12 to 30V via DC to DC convertor (see Accessory page).

#### DIMENSIONS AND WEIGHT

Height	77mm	(3in)
Width	211mm	(8in)
Depth	263mm	(10in)
Weight	4.3kg	(10lb)



# D32

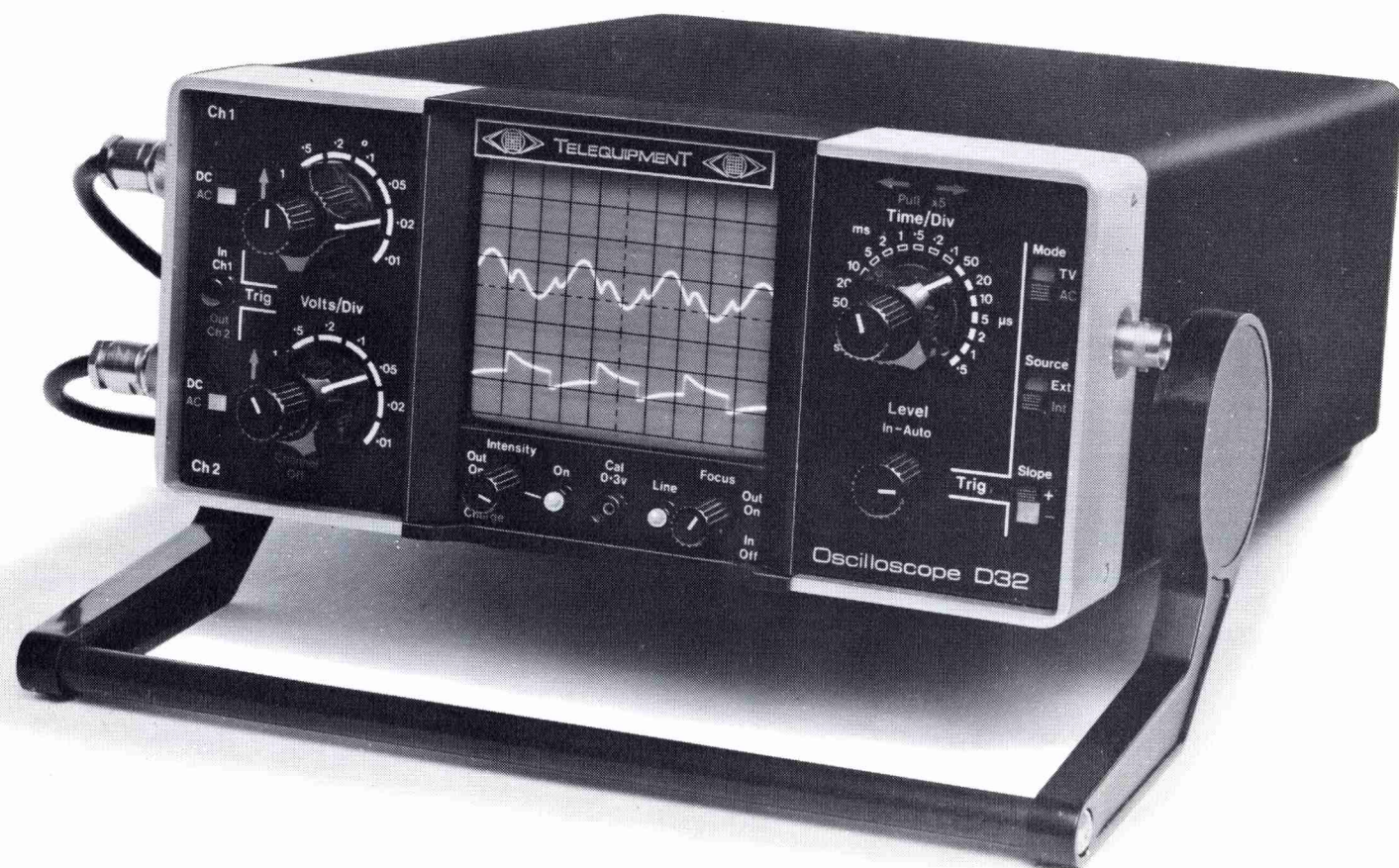
## 10 MHz

### Portable

# Oscilloscope

## Battery/Mains operation

A dual trace battery-mains portable oscilloscope with a performance far bigger than its diminutive outline and low cost suggests. In a case measuring only 4 x 9 x 11 inches, the D32 packs a full size specification – two identical 10MHz vertical amplifiers with sensitivities up to 10mV, a 19 range time base with x5 magnifier, variable, automatic and TV triggering, internal rechargeable batteries – all in a unit weighing no more than 10 lbs. With its emphasis on simplicity of controls, rugged construction and a relatively large screen, the D32 is equally at home at the top of a ladder, on a catwalk in a processing plant, in the cockpit of a light aircraft or in service at a remote outdoor location.



### GENERAL DESCRIPTION

The D32 is a dual channel 10MHz portable oscilloscope with a single time base, for use on internal rechargeable batteries or AC mains.

### VERTICAL SYSTEM

Two identical input channels

**Bandwidth:** (approx.)

DC Coupled DC to 10MHz (–3dB)

AC Coupled 3Hz to 10MHz (–3dB)

**Rise Time:** 35ns

**Deflection Factors:**

10mV/div to 5V/div in 9 calibrated

steps (1-2-5 sequence)

Voltage Measuring Accuracy:  $\pm 5\%$

**Input Impedance:**

1 M $\Omega$  + 32pF

**Input Conditions:**

Switched choice of a.c. or d.c.

coupling via standard BNC connector.

**Maximum Input Voltages:**

$\pm 250$ V peak

**Operating Modes:**

Channel 1 only

Channel 1 and 2 chopped or alternate sweep, automatically selected on time/div switch.

(Chopped 500ms/div to 2ms/div,

alternate 1ms/div to 500ns/div.)

Chop rate 100kHz approx.

### HORIZONTAL SYSTEM

**Sweep Speeds:**

500ms/div to 0.5 $\mu$ s/div in 19 calibrated steps (1-2-5 sequence).

x5 magnifier operates on all time base ranges, increasing fastest sweep speed to 100ns/div.

**Time Measuring Accuracy:**

Normal  $\pm 5\%$

x5 – 100ms/div to 200ns/div  $\pm 7\%$

x5 – 200ns/div to 100ns/div  $\pm 10\%$

### TRIGGERING

Fully variable level control, operates over 8 vertical divisions on all waveforms. Selectable Auto Mode. Bright line in the absence of a trigger signal in Auto.

Selectable AC or TV mode. On TV, will automatically lock on TV frame at sweep speeds up to 0.1ms/div, and on TV line at higher sweep speeds.

**Sources:**

Internal Channel 1 or Channel 2

External

**Sensitivity:**

Internal 0.3 div, 40Hz-2MHz

1.0 div, 2MHz-10MHz

External 500mV (approx.)

40Hz-5MHz

1V (approx.)

5MHz-10MHz

**Polarity:**

Positive or Negative

**C.R.T.**

**Display Area:**

8 x 10 div, each division nominally 0.7cm

**Phosphor:**

P31 supplied as standard

**Accelerating Potential:**

3kV

### CALIBRATOR

**Output Voltage:** + 300mV

Output Impedance: 600 $\Omega$

**Wave Shape:** Square, positive going vertical edge at approx. screen centre.

**Accuracy:**  $\pm 1\%$

### POWER REQUIREMENTS

**Mains voltages:** 100V-112V,  
112V-125V,  
200V-224V,  
225V-250V

**Frequency:** 50 to 400Hz

**Consumption:** 14VA (mains)  
7VA (battery)

Internal rechargeable batteries:  
6 x 1.25 "D" cells

**Running time on fully charged batteries:** 4 hours

**Recharge time:** 14 hours

**Trickle Charger:** Operates when instrument used on AC mains.

**External DC:**

Rear socket accepts input from external DC supply of 12 to 30V via DC to DC convertor (see Accessory page)

### DIMENSIONS AND WEIGHT

Height	105mm	(4in)
Width	230mm	(9in)
Depth	288mm	(11in)
Weight	4.5kg	(10lb)



# D34

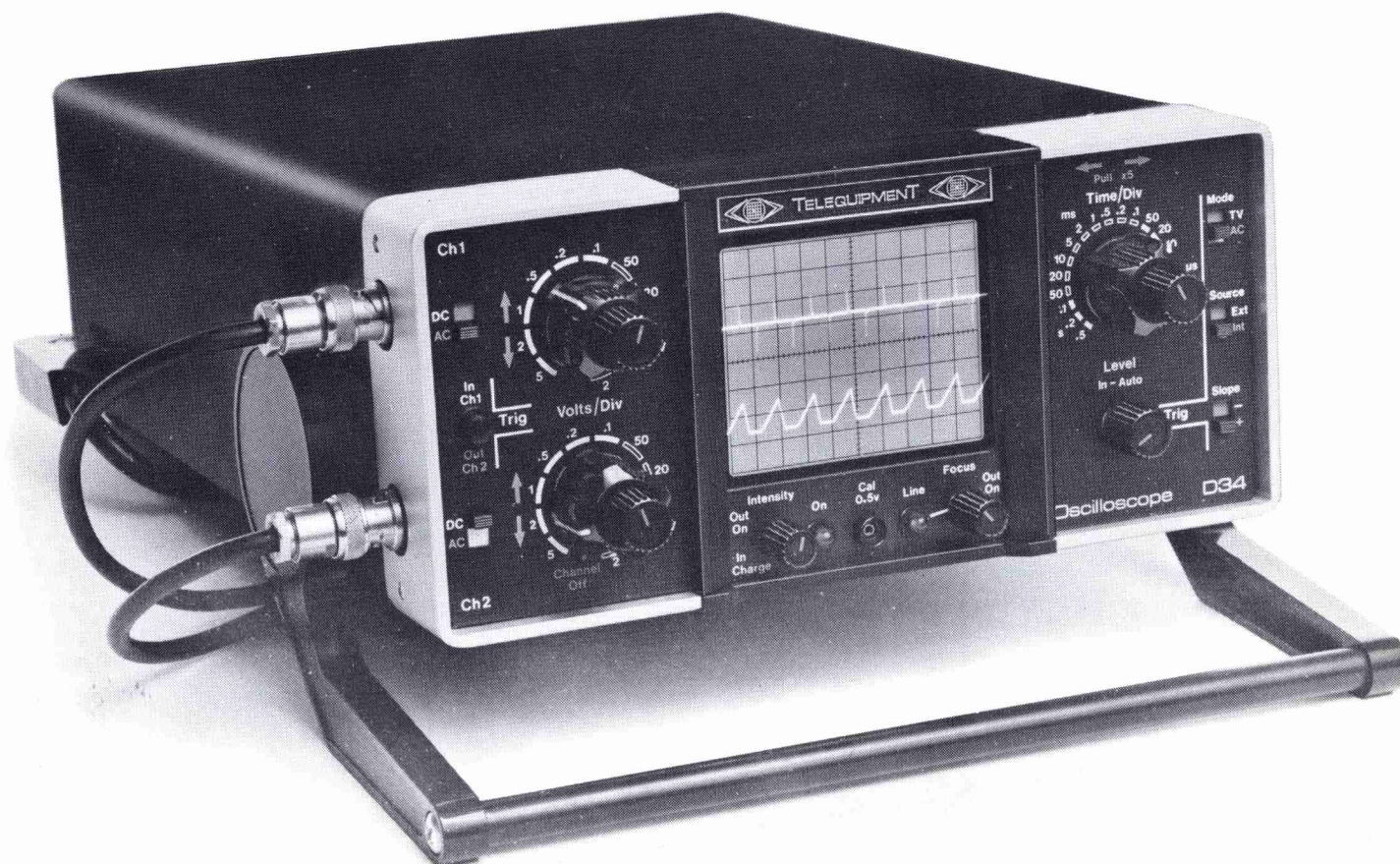
## 15 MHz

### Portable

# Oscilloscope

## Battery/Mains operation

A battery/mains dual trace portable oscilloscope with all the features of the D32 but with even greater bandwidth and higher sensitivity. Maximum deflection sensitivity is raised to 2mV per division right up to 15MHz. To match this increased performance, maximum sweep speed extends to 0.2 $\mu$ s per division. The observation of fast leading edges is facilitated by the inclusion of vertical signal delay.



#### GENERAL DESCRIPTION

The D34 is a dual channel 15MHz portable oscilloscope with a single time base, for use on internal rechargeable batteries or AC mains.

#### VERTICAL SYSTEM

Two identical input channels

**Bandwidth:** (approx.)

DC Coupled DC to 15MHz ( $-3$ dB)

AC Coupled 3Hz to 15MHz ( $-3$ dB)

**Signal Delay:**

Adequate to display leading edge of a signal

**Rise Time:** 24ns (approx.)

**Deflection Factors:**

2mV/div to 5V/div in 11 calibrated steps (1-2-5 sequence)

Voltage Measuring Accuracy:  $\pm 5\%$

**Input Impedance:**

1M $\Omega$  + 32pF

**Input Conditions:**

Switched choice of a.c. or d.c. coupling via standard BNC connector.

**Maximum Input Voltages:**

250V peak

**Operating Modes:**

Channel 1 only

Channel 1 and 2 chopped or alternate sweep, automatically selected on time/div switch.

(Chopped at sweep rates up to 2ms/div, Alternate from 1ms/div to 0.2 $\mu$ s/div.)

Chop rate: 100kHz

#### HORIZONTAL SYSTEM

**Sweep Speeds:**

500ms/div to 0.2 $\mu$ s/div in 20 calibrated steps (1-2-5 sequence).

$\times 5$  magnifier operates on all time base ranges, increasing fastest sweep speed to 40ns/div.

**Time Measuring Accuracy:**

Normal  $\pm 5\%$

$\times 5$  - 100ms/div to 200ns/div  $\pm 7\%$

$\times 5$  - 200ns/div to 40ns/div  $\pm 10\%$

#### TRIGGERING

Fully variable level control, operates over 8 vertical divisions on all waveforms. Auto trigger on symmetrical waveforms over 2 divisions amplitude with restricted level control. Bright line in the absence of a trigger signal in Auto. Selectable AC or TV mode. On TV, will automatically lock on TV frame at sweep speeds up to 0.1ms/div, and on TV line at higher sweep speeds. Trigger level control inoperative in TV mode.

**Sources:**

Internal Channel 1 or Channel 2, and External

**Sensitivity:**

Internal 0.3 div, 40Hz-2MHz

1.0 div, 2MHz-15MHz

External 100mV (approx.)

40Hz-5MHz

300mV (approx.)

5MHz-15MHz

**Polarity:**

Positive or Negative

**C.R.T.**

**Display Area:**

8  $\times$  10 div, each division nominally 0.65cm

**Phosphor:**

P31 supplied as standard

**Accelerating Potential:**

9.5kV

#### CALIBRATOR

**Output Voltage:** +500mV

Output Impedance: 600 $\Omega$

**Wave Shape:** Square, Positive going vertical edge at approx. screen centre.

**Accuracy:**  $\pm 1\%$

#### POWER REQUIREMENTS

**Mains voltages:** 100V-112V, 112V-125V, 200V-224V, 225V-250V

**Frequency:** 50 to 400Hz

**Consumption:** 17VA mains (approx.)  
8VA battery (approx.)

Internal rechargeable batteries: 6  $\times$  1.25V "D" cells

**Running time on fully charged batteries:**

4 hours (approx.)

**Recharge time:** 14 hours

**Trickle Charger:** Operates when instrument used on AC mains.

**External DC:**

Rear socket accepts input from external DC supply of 12 to 30V via DC to DC convertor (see Accessory page)

#### DIMENSIONS AND WEIGHT

Height	105mm	(4in)
Width	230mm	(9in)
Depth	335mm	(13 $\frac{1}{4}$ in)
Weight	5.5kg	(12lb)

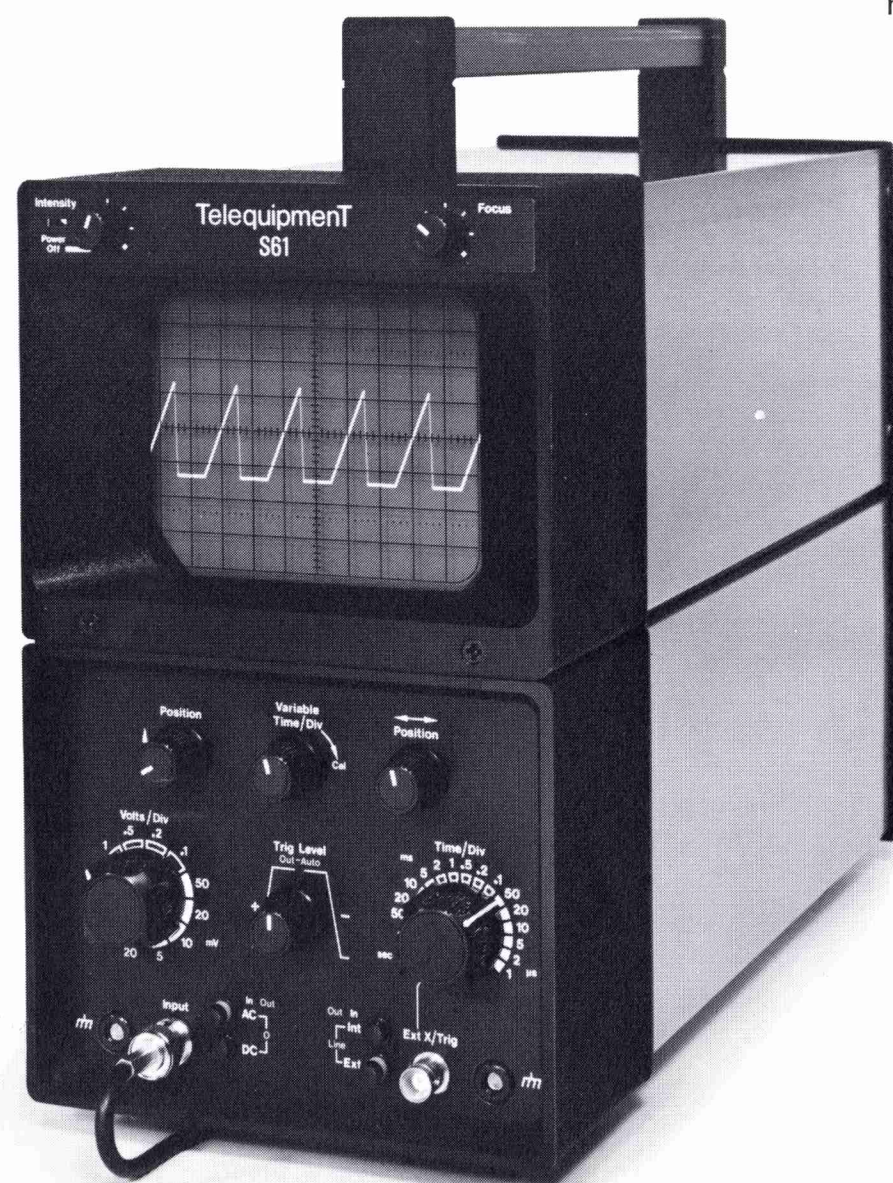


# S61

## 5 MHz

### Lightweight single-beam Oscilloscope

This single-beam 5MHz oscilloscope brings the larger screen into the low-cost instrument category. The CRT used in the S61 is a full 5 inch diameter and provides a graticuled screen measuring 8 x 10cm. The number of controls has been reduced to a practical minimum without the loss of flexibility of performance. The triggering facilities include variable level and polarity controls as well as an automatic mode. In the absence of an input signal the time base free-runs so that a trace can always be obtained on screen. The combination of easy operation, large screen size, efficient triggering and rugged construction makes the S61 very suitable for general industrial uses and for use by non-technical personnel.



#### GENERAL DESCRIPTION

The S61 is a mains operated single channel 5MHz oscilloscope with a single time base.

#### VERTICAL SYSTEM

**Bandwidth:** (approx.)

DC Coupled DC to 5MHz (-3dB)

AC Coupled 2Hz to 5MHz (-3dB)

**Rise Time:** 70ns (approx.)

**Maximum Amplitude:**

8 div at low frequency, decreasing to 5 div at 5MHz.

**Deflection Factors:**

5mV/div to 20V/div in 12 calibrated steps (1-2-5 sequence).

Voltage Measuring Accuracy:  $\pm 5\%$

**Input Impedance:**

1 M $\Omega$  + 35pF

**Input Conditions:**

Switched choice of a.c. or d.c. coupling via standard BNC connector.

**Maximum Input Voltage:**

400 volts peak

#### HORIZONTAL SYSTEM

**Sweep Speeds:**

500ms/div to 1 $\mu$ s/div in 18 calibrated steps (1-2-5 sequence). A variable control provides overlap between steps.

External X:

Bandwidth DC to 1MHz approx. (-3dB)

Sensitivity 750mV/div approx.

Input Impedance 100k $\Omega$  + 20pF

#### TRIGGERING

Variable control or Auto mode.

Bright line in the absence of a trigger signal in Auto.

**Source:**

Internal, External or Line

**Sensitivity:**

Internal, 0.5 div from 40Hz to 5MHz

External, 500mV from 40Hz to 5MHz

**Polarity:**

Positive or Negative

#### C.R.T.

**Display Area:**

8 x 10cm

**Phosphor:**

P31 supplied as standard P7 available as an option

**Accelerating Potential:**

2kV

**Z Modulation:**

Input for perceptible modulation - 10V approx.

#### POWER REQUIREMENTS

**Voltage:** 95 to 130 volts or 190 to 260 volts

**Frequency:** 48 to 440Hz

**Consumption:** 25VA

#### DIMENSIONS AND WEIGHT

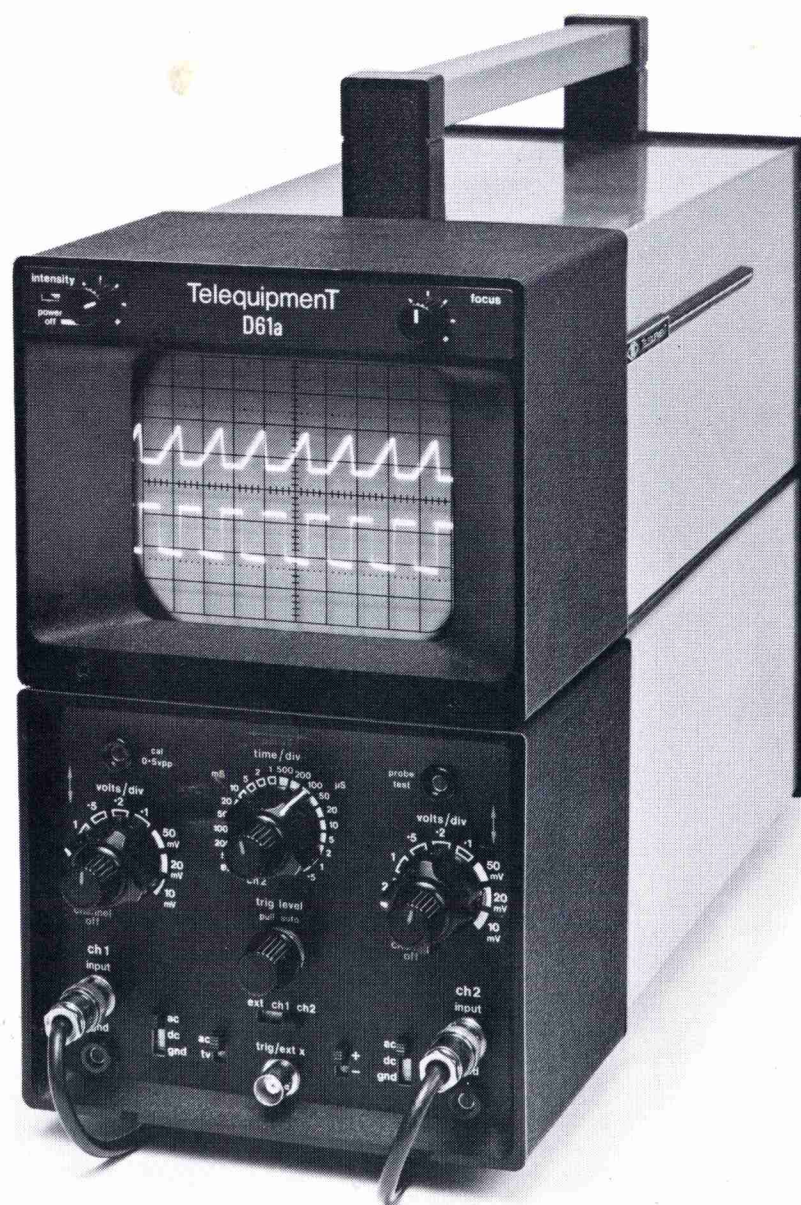
Height	280mm	(11in)
Width	160mm	(6 $\frac{1}{4}$ in)
Depth	370mm	(14 $\frac{3}{4}$ in)
Weight	6.5kg	(14.3lb)



# D61a

## 10 MHz

### Lightweight dual-trace Oscilloscope



A light-weight dual-trace 10MHz oscilloscope designed for general purpose duties in the laboratory, the classroom, and in the radio and TV service department.

Its tough, all solid state construction ensures convenient portability with outstanding performance for a very reasonable capital outlay.

Simplification of controls makes it easy to use, the triggering — especially on TV signals — is excellent. The vertical construction, as opposed to the more general horizontal style, was chosen for maximum operating and carrying convenience, advantages which become evident when using the instrument on a busy work-bench or in cramped or difficult locations. A built-in tilting front stand gives maximum visibility of the larger-than-average CRT screen.

#### GENERAL DESCRIPTION

The D61a is a mains operated dual-trace 10MHz oscilloscope with two vertical amplifiers and a single time base.

#### VERTICAL SYSTEM

Two identical input channels

**Bandwidth:** (approx.)

DC Coupled DC to 10MHz (-3dB)

AC Coupled 2Hz to 10MHz (-3dB)

**Rise Time:** 35ns (approx.)

**Maximum Amplitude:**

8cm (5cm at 10MHz)

**Deflection Factors:**

10mV/cm to 5V/cm in 9 calibrated steps (1-2-5 sequence)

Voltage Measuring Accuracy:  $\pm 5\%$

**Input Impedance:**

1M $\Omega$  + 35pF

**Input Conditions:**

Switched choice of d.c. or a.c.

coupling via standard BNC connector.

A third position grounds the input of the attenuator but not the input socket.

**Maximum Input Voltage:**

400V peak

**Operating Modes:**

Channel 1 only

Channel 2 only

Channels 1 and 2 chopped or alternate sweep, automatically selected on time/cm switch.

Chopped — 500ms/cm to 2ms/cm

Chop rate 100kHz approx.

Alternate — 1ms/cm to 0.5 $\mu$ s/cm.

**X-Y Facility:**

In the 'X-Y' mode (selected on 'time/div' switch) Channel 2 becomes the horizontal amplifier.

Bandwidth DC to 1MHz.

#### HORIZONTAL SYSTEM

**Sweep Speeds:**

500ms/cm to 0.5 $\mu$ s/cm in 19 calibrated steps (1-2-5 sequence).

X5 magnifier increases fastest sweep speed to 100ns/cm.

**Time Measuring Accuracy:**

Normal  $\pm 5\%$

With x5 magnifier  $\pm 7\% > 200$ ns/cm,  $\pm 10\%$  at 100ns/cm.

External x:

Bandwidth 2Hz to 1MHz

Sensitivity 240mV/cm approx.

Input Impedance 1M $\Omega$  + 10pF

#### TRIGGERING

Variable level control or auto. Bright line in the absence of a trigger signal in Auto.

AC/TV switch. In 'TV', at sweep speeds of 100 $\mu$ s/cm to slower, it will automatically lock on FRAME; at sweep speeds to 50 $\mu$ s/cm and faster it automatically locks on LINE.

**Source:**

Channel 1, Channel 2 or External

**Sensitivity:**

Internal 0.5cm 40Hz-1MHz falling to 1.0cm at 10MHz

External 100mV 40Hz-1MHz falling to 1.0cm at 10MHz

External 100mV 40Hz-1MHz

**Polarity:**

Positive or Negative

#### C.R.T.

**Display Area:**

8  $\times$  10 div (each division nominally 1cm)

**Phosphor:**

P31 supplied as standard, P7 available on request.

**Overall Accelerating Potential** 3.5kV

**Z Modulation:**

Input for perceptible modulation at average brightness 10V approx.

#### CALIBRATOR

**Output Voltage:**

+500mV

**Wave Shape:**

50-50 Square Wave

**Frequency:** As power line

**Accuracy:**  $\pm 2\%$

#### POWER REQUIREMENTS

**Voltage:** 100-120V a.c.

200-250V a.c. in 4 ranges

**Frequency:** 48-400Hz

**Consumption:** 25VA

#### DIMENSIONS AND WEIGHT

Height 280mm (11in)

Width 160mm (6 $\frac{1}{4}$ in)

Depth 435mm (17 $\frac{1}{8}$ in)

Weight 6.5kg (14.3lb)



# D66A

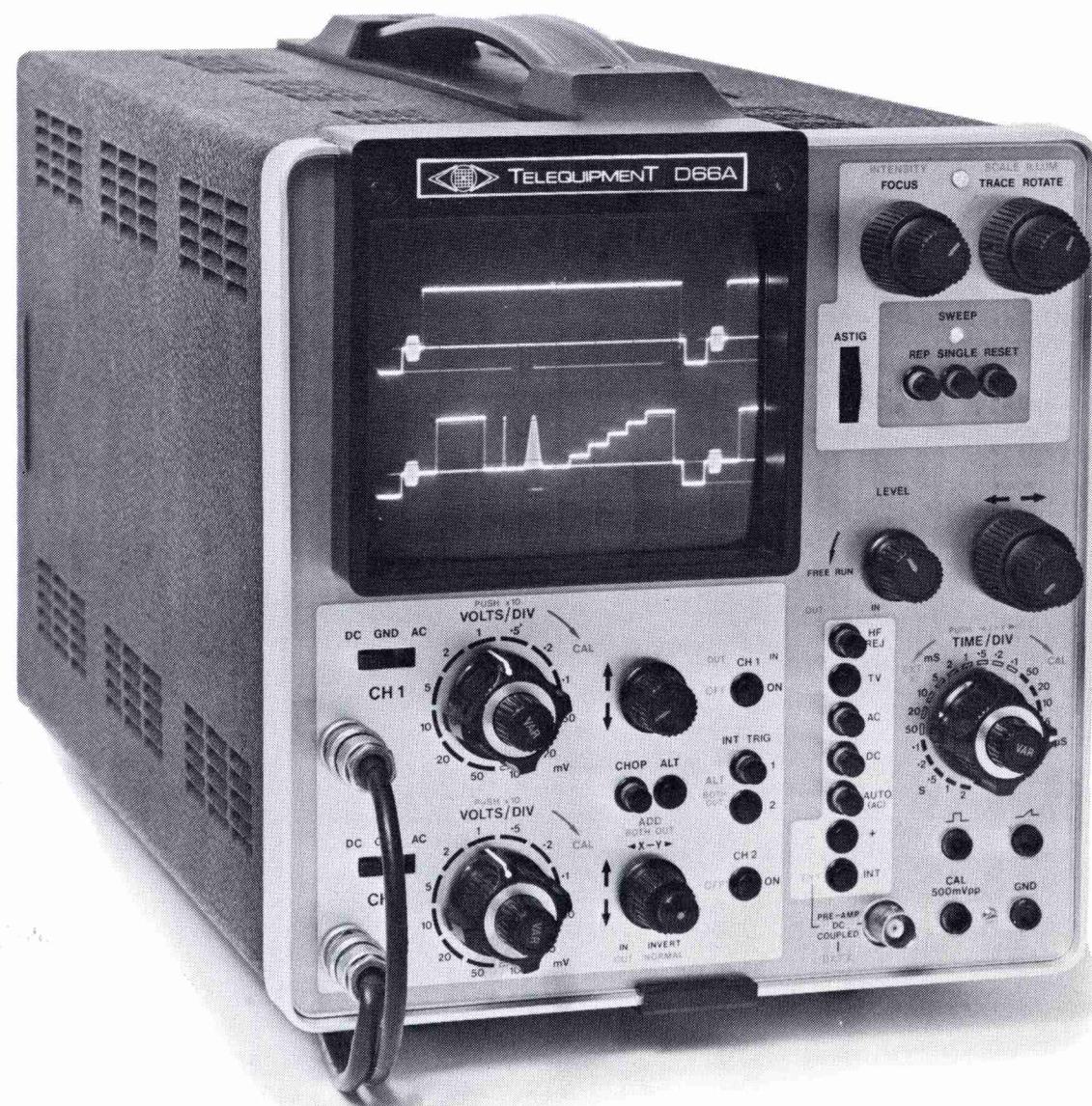
## 25 MHz

### Dual-trace

### general

### purpose

### Oscilloscope



The D66A is a general purpose dual trace oscilloscope, ideal for use in the laboratory, maintenance work and in television applications.

The dual vertical amplifiers cover a bandwidth of DC to 25MHz with a measurement accuracy of  $\pm 5\%$ , supported by a wide-range time base equipped with matching triggering facilities.

Sweep speeds range up to 100ns/div (20ns/div with the X5 magnifier). The inclusion of special features in the triggering circuit to reject HF interference results in improved display stability at low frequencies.

#### GENERAL DESCRIPTION

The D66A is a dual-trace mains operated oscilloscope equipped with two vertical amplifiers and a single wide-range time base.

#### VERTICAL SYSTEM

Two identical input channels.

##### Bandwidth:

DC Coupled DC to 25MHz ( $-3\text{dB}$  approx.).

AC Coupled 2Hz to 25MHz ( $-3\text{dB}$  approx.).

##### Rise Time:

14ns.

##### Signal Delay:

200ns.

##### Deflection Factors:

10mV/div to 50V/div in 12 calibrated steps (1-2-5 sequence). A  $\times 10$  gain switch extends the amplifier sensitivity to 1mV/div at a bandwidth of DC to 15MHz ( $-3\text{dB}$ ). A variable uncalibrated control provides continuous coverage between stepped ranges, extending the low sensitivity range to 125V/div.

##### Maximum Amplitude:

8 div (7 div at 25MHz).

##### Voltage Measuring Accuracy:

$\pm 5\%$ .

##### Input Impedance:

1M $\Omega$  + 47pF approx.

##### Input Conditions:

Switched choice of d.c. or a.c. coupling via standard BNC connectors. A third switch position grounds the input of the attenuator but not the input socket.

##### Maximum Input Voltage:

400V DC or AC peak.

##### Operating Modes:

Channel 1.

Channel 2.

Channels 1 and 2 Chopped or Alternate (chop rate 150kHz approx.).

Channels 1 and 2 added algebraically.

Channel 2 inverted.

X-Y. Via Channel 1 with Channel 2 input selected as horizontal amplifier on time base switch.

Bandwidth DC to 1MHz ( $-3\text{dB}$ ).

Phase error less than  $1^\circ$  at 25kHz.

#### HORIZONTAL SYSTEM

##### Sweep Speeds:

2s/div to 100ns/div in 23 calibrated steps (1-2-5 sequence). A  $\times 5$  magnifier provides maximum sweep speeds of 20ns/div. A variable uncalibrated control provides continuous coverage between stepped ranges, extending the slowest sweep speed to 5s/div.

##### Time Measuring Accuracy:

Normal  $\pm 5\%$ .

$\times 5$   $\pm 7\%$  approx.

#### TRIGGERING

AC Coupled - 10Hz to 25MHz.

DC Coupled - DC to 25MHz.

Auto (AC) - 40Hz to 25MHz.

HF Reject - Provides sync from 10Hz to 50kHz

TV - Triggers at field rate from 2s/div to 100  $\mu\text{s}$ /div, and at line rate from 50  $\mu\text{s}$ /div to 100ns/div.

##### Sources:

Internal, from either channel or alternate.

External.

##### Sensitivity:

Internal, 0.5 div to 15MHz (1.0 div in alternate).

1.0 div to 25MHz (1.0 div in alternate).

External, 250mV approx.

##### Polarity:

Positive or Negative.

##### Trigger Level:

Variable control selects virtually any point of leading edge of input signal slope, plus free-run facility.

##### Single Sweep:

Single shot facility with lockout is incorporated. A neon indicates when the time base is armed.

#### EXTERNAL X

**Bandwidth:** DC to 1MHz ( $-3\text{dB}$ ).

##### Sensitivity:

200mV/div or 1V/div.

##### Input Impedance:

100k $\Omega$  and 30pF (approx.) Input via front panel BNC connector.

#### OUTPUT SIGNALS

##### Gate Out:

500mV peak to peak, DC Coupled.

##### Sawtooth Out:

10 volt peak to peak, DC coupled.

##### C.R.T.

Single gun, with mesh P.D.A.

##### Display area:

8  $\times$  10 div, each div nominally 1cm.

##### Phosphor:

P31 supplied as standard.

##### Graticule:

External, with variable illumination control on front panel.

##### Accelerating Potential:

10kV.

##### Z Modulation:

AC coupled to C.R.T. grid. 15V for perceptible modulation, 50V maximum.

#### CALIBRATOR

##### Output Voltage:

500mV square wave at power line frequency.

##### Accuracy:

$\pm 2\%$ .

#### POWER REQUIREMENTS

##### Mains Voltages:

100 to 125V in

5 volt steps.

200 to 250V in

10 volt steps.

##### Frequency:

48 to 400Hz.

##### Consumption:

50VA approx.

#### DIMENSIONS AND WEIGHT

Height 240mm (9 $\frac{1}{2}$ in)

Width 210mm (8 $\frac{1}{4}$ in)

Depth 440mm (17 $\frac{3}{8}$ in)

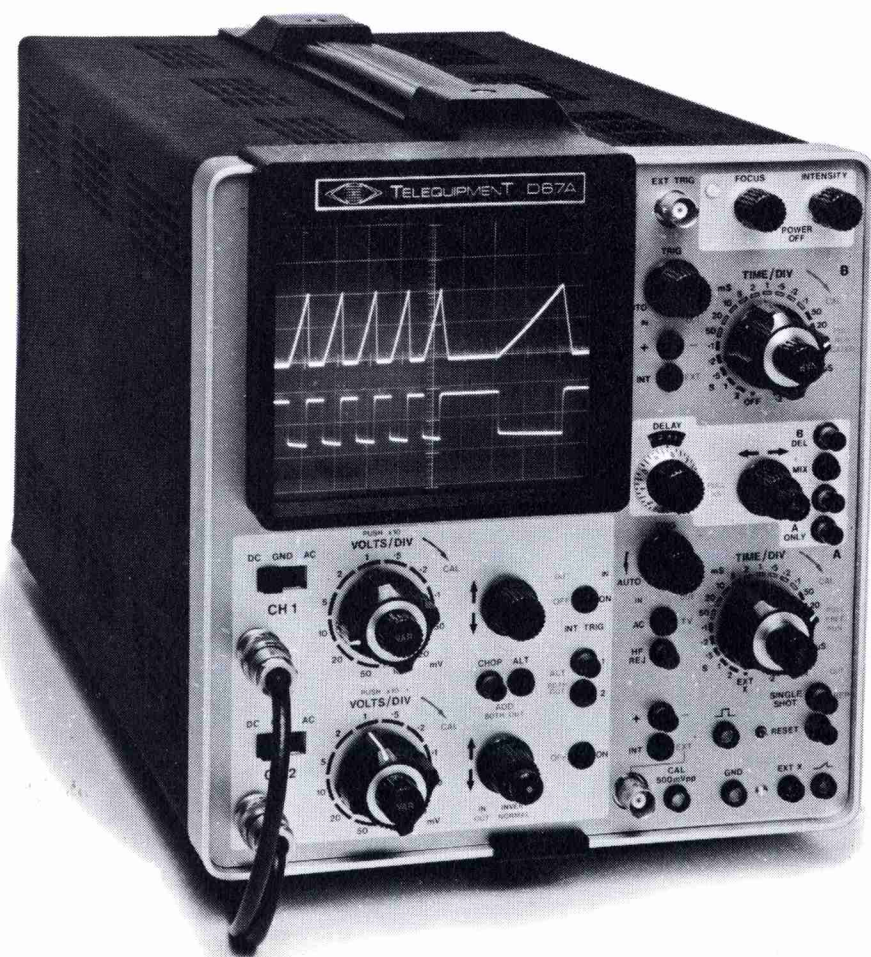
Weight 11.5kg (25 $\frac{1}{2}$ lb)



# D67A

## 25 MHz

### Versatile dual-trace Oscilloscope



The D67A is a highly versatile dual-trace 25MHz oscilloscope with an impressive specification in all performance areas.

The dual trace vertical system displays either channel separately, adds channels algebraically, alternates between channels or chops between channels. The use of F.E.T.'s in the input circuits ensures minimum initial drift and rapid stabilisation, allowing full exploitation of the normal 10mV per division sensitivity up to 25MHz and 1mV sensitivity to 15 MHz. Its two independent time bases can be used to provide delayed, intensified or mixed sweep operation, particularly useful for the detailed examination of complex waveforms and the accurate measurement of time jitter. Comprehensive trigger facilities are included and the observation of fast-rise pulses is aided by the use of signal delay in the vertical system. Regulated power supplies, all solid state construction techniques and advanced Telequipment design combine to give this oscilloscope a measurement accuracy of  $\pm 3\%$  in both axes.

#### GENERAL DESCRIPTION

The D67A is a dual channel 25MHz Oscilloscope with dual time bases, for use on AC mains.

#### VERTICAL SYSTEM

Two identical input channels.

**Bandwidth:** (approx.)

DC coupled DC to 25MHz ( $-3\text{dB}$ )

AC coupled 2Hz to 25 MHz ( $-3\text{dB}$ )

**Signal Delay:** 200ns

**Rise Time:** 14ns

**Deflection Factors:**

10mV/div to 50V/div in 12 calibrated steps (1-2-5 sequence). A

$\times 10$  gain switch on each vertical amplifier extends sensitivity to 1mV/div  $-5\text{V/div}$ , at a maximum bandwidth of 15MHz.

A variable uncalibrated control provides continuous coverage between stepped ranges, extending the low sensitivity range to 125V/div.

**Voltage Measuring Accuracy:**  $\pm 3\%$

**Input Impedance:**  $1\text{M}\Omega + 40\text{pF}$

**Input Conditions:**

Switched choice of ac or dc coupling.

A third switch position earths the input of the attenuator but not the input socket.

**Maximum Input Voltage:**

400V DC + peak AC

**Operating Modes:**

Channel 1

Channel 2

Channels 1 and 2 Alternate sweep

Channels 1 and 2 Chopped (at 150kHz approx.)

Channels 1 and 2 added

Channel 2 Inverted

#### HORIZONTAL SYSTEM

**Main Sweep "A"** (also used as delaying sweep)

**Sweep Speeds:**

2s/div to 200ns/div in 22 calibrated steps (1-2-5 sequence). A

variable uncalibrated control provides continuous coverage between stepped ranges, extending slowest sweep speed to approximately 5s/div. A  $\times 5$  horizontal magnifier, common to both time bases, increases the fastest sweep speed to 40ns/div.

**Time Measuring Accuracy:**

$\times 1 \pm 3\%$

$\times 5 \pm 5\%$

#### Triggering

Push-button selection of the following trigger modes:

Auto - 50Hz to 25MHz (Bright line in the absence of a trigger signal)

AC - 50Hz to 25MHz

HF reject - Limits trigger bandwidth to approximately 50kHz

**TV Triggering:**

Field or Line triggering automatically selected by the "A" sweep time/div switch. The change-over occurs at 0.1ms/div.

**Sources:**

Internal, from either channel or alternately Channel 1 and Channel 2. External, via front panel BNC socket.

**Sensitivity:**

Internal 0.2 div to 15 MHz, 1.0 div at 25MHz

External 250mV to 15V

**Polarity:**

Switched choice of + or -.

**Trigger Level:**

Variable level control on all input signals.

**Single Shot:**

A single shot facility with lock-out is provided. A neon indicates when the time base is armed.

**Delayed Sweep "B"**

**Sweep Speeds:**

2s/div to 200ns/div in 22 calibrated steps (1-2-5 sequence). A variable uncalibrated control provides continuous coverage between stepped ranges, extending slowest sweep speed to approximately 5s/div. A  $\times 5$  magnifier, common to both time bases, increases the fastest sweep speed to 40ns/div.

**Time Measuring Accuracy:**

$\times 1 \pm 3\%$

$\times 5 \pm 5\%$

**Triggering**

**Polarity:**

Push-button selection of + or -.

**Auto:**

50Hz to 25MHz (Bright line in the absence of a trigger signal)

**Trigger Level:**

Variable level control on all input signals.

**Sources:**

Internal, from either channel or alternately Channel 1 and Channel 2. External, via front panel BNC socket.

**Delayed triggering:**

B sweep triggered by delayed pick-off from A sweep, via a 10 turn helical delay control. "B" sweep can also be gated by this pick-off.

#### Sweep Modes

Push-button selection of the following sweep modes:

"A" only. "A" intensified by "B"

"B" delayed by "A"

"A" and "B" mixed

#### EXTERNAL X

**Bandwidth:**

DC - 1MHz ( $-3\text{dB}$  approx.)

**Input Impedance:**  $1\text{M}\Omega + 30\text{pF}$  (approx.)

**Sensitivity:**

3V/div (approx.) on  $\times 1$

600mV/div (approx.) on  $\times 5$

Input via front panel pin-connector socket.

#### OUTPUT SIGNALS

Pin connector sockets provide the following outputs from "A" sweep at sweep repetition rates:

**Gate Out:**

5V peak output, DC coupled. From A or B sweep.

**Sawtooth Out:**

36V amplitude (approx.), DC coupled. From A sweep.

#### C.R.T.

**Display Area:**

$8 \times 10$  div, each division nominally 1cm.

**Phosphor:**

P31 supplied as standard.

**Graticule:**

External, with variable illumination control on rear panel.

**Accelerating Potential:** 10kV

**Z Modulation:**

Max peak to peak input 25V

#### CALIBRATOR

**Output Voltage:**

500mV peak to peak

**Waveshape:** Square

**Frequency:** As power line

**Accuracy:**  $\pm 2\%$

#### POWER REQUIREMENTS

**Mains Voltages:**

100V-125V in 5V steps

200V-250V in 10V steps

**Frequency:** 48-400Hz

**Consumption:** 50VA (approx.)

#### DIMENSIONS AND WEIGHT

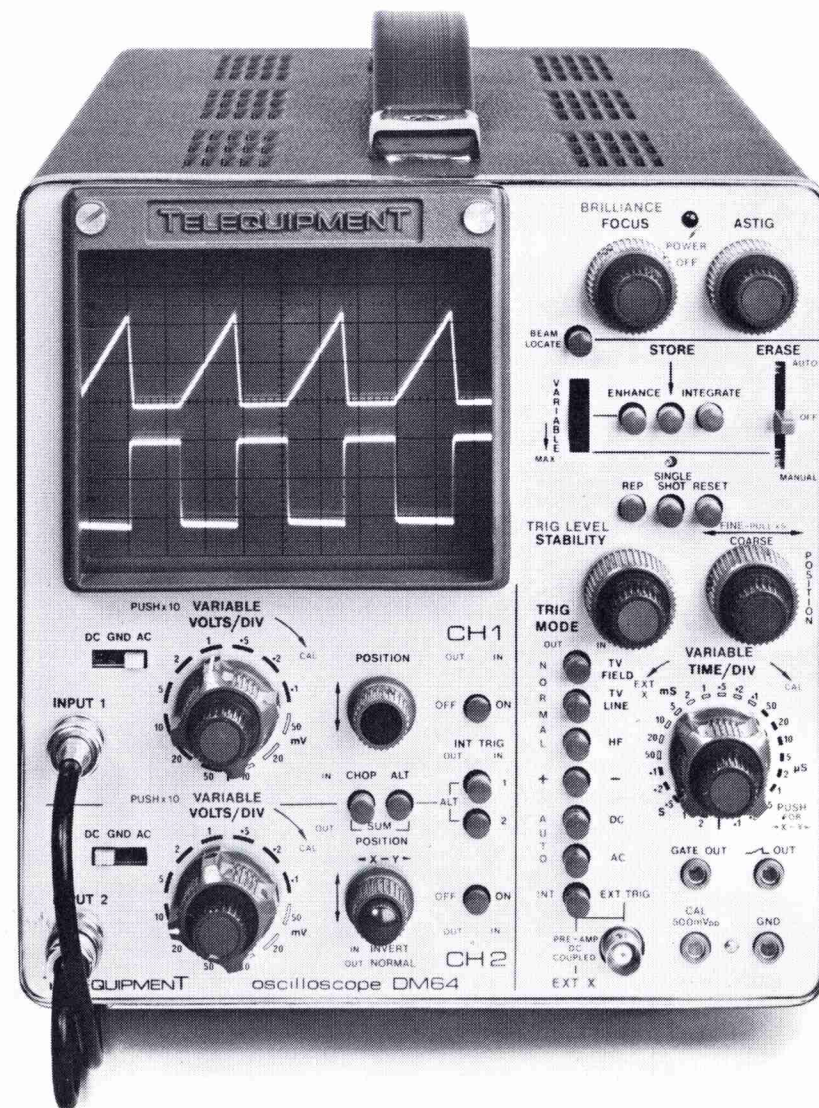
Height	240mm	(9in)
Width	210mm	(8 $\frac{1}{4}$ in)
Depth	440mm	(17 $\frac{1}{2}$ in)
Weight	11.5kg	(25lb)



# DM64

## 10 MHz

### Dual-trace storage oscilloscope



The DM64 is a 10MHz dual-trace oscilloscope with storage facilities. Incorporating the well proven bistable CRT pioneered and developed by Tektronix, the DM64 offers all the advantages of a storage oscilloscope plus the features of a conventional non-storage instrument.

The normal stored writing speed is at least 25cm/ms but this can be increased to at least 250cm/ms by using the Enhanced mode of operation. The viewing time of stored displays is up to one hour, but if required, the oscilloscope can be operated in an auto-erase mode, permitting automatic erasure of the stored trace at the end of each sweep. The contrast ratio and brightness of the stored displays are constant and independent of viewing time, writing and sweep rates or signal repetition rates. The DM64 is probably the least expensive bistable storage oscilloscope available anywhere and meets the demand for an instrument which considerably eases the problem of observing single events, low repetition rate signals and fast-rise waveforms for extended periods of time.

#### GENERAL DESCRIPTION

The DM64 is a dual trace 10MHz oscilloscope with storage facilities. It is equipped with two vertical amplifiers and a single wide range time base.

#### VERTICAL SYSTEM

Two identical input channels

##### Bandwidth:

DC Coupled DC to 10MHz (-3dB)

AC Coupled 2Hz to 10MHz (-3dB)

##### Rise Time: 35ns

##### Deflection Factors:

10mV/div to 50V/div in 12 calibrated steps (1-2-5 sequence). A x10 gain switch extends the amplifier

sensitivity to 1mV/div-5V/div at a bandwidth of DC to 8MHz.

A variable uncalibrated control provides continuous coverage between stepped ranges, extending the low sensitivity range to 125V/div

Voltage Measuring Accuracy:  $\pm 5\%$

##### Input Impedance:

1M $\Omega$  +47pF approx.

##### Input Conditions:

Switched choice of dc. or ac. coupling via standard BNC connectors. A third switch position grounds the input of the attenuator but not the input socket.

##### Maximum Input Voltage:

400V DC or AC peak

##### Operating Modes:

Channel 1

Channel 2

Channels 1 and 2 Chopped or alternate sweep (chop rate 150kHz approx.)

Channels 1 and 2 added algebraically

Channel 2 inverted

X-Y. Via Channel 1 with Channel 2 input selected as horizontal

amplifier on time base switch.

Bandwidth DC to 1 MHz. Phase error less than 1° at 10kHz.

#### HORIZONTAL SYSTEM

##### Sweep Speeds:

2s/div to 100ns/div in 23 calibrated steps (1-2-5 sequence). A x5 magnifier operates on sweep rates up to 0.5 $\mu$ s/div (i.e. a maximum magnified sweep of 100ns/div). A variable uncalibrated control provides continuous coverage between stepped ranges, extending slowest sweep speed to 5s/div approximately.

Time Measuring Accuracy:

Normal  $\pm 5\%$

x5  $\pm 8\%$

##### TRIGGERING

Push button selection of the following trigger modes:-

AC Coupled

DC Coupled

HF Sync - Provides sync from 1MHz to 10MHz

TV Line - Triggers at line rate

TV Field - Triggers at field rate

##### Source:

Internal, from either channel

External

##### Sensitivity:

Internal 0.25 div 40Hz to 1MHz

rising to 0.5 div at 5MHz

##### Polarity:

Positive or Negative

##### Trigger Level:

Variable control selects virtually any point of leading edge of input signal slope.

##### Single Sweep:

Single shot facility with lockout is incorporated.

A neon indicates when the time base is armed.

##### EXTERNAL X

Bandwidth: DC to 1MHz

##### Sensitivity:

200mV/div to 1V/div

##### Input Impedance:

100k $\Omega$  and 30pF approx.

##### OUTPUT SIGNALS

Gate Out: 500mV peak to peak amplitude, DC Coupled.

Sawtooth Out: 10V peak to peak amplitude, DC Coupled.

#### C.R.T.

##### Display Area:

8 x 10 division, each division nominally 1.0cm

##### Overall Accelerating Potential:

3.5kV

##### Z Modulation:

Input for perceptible modulation at average brightness, 20V approximately. AC Coupled.

##### C.R.T. Type

Flat-faced bistable storage with internal grid.

##### Storage Characteristics:

Viewing Time: Up to 1 hour

Erase Time: 0.25s approximately

##### Auto Erase:

At end of each sweep when required

Writing Rate: 25 div/ms

Enhanced Writing Rate: 250 div/ms

Variable Enhancement:

25 to 250 div/ms

Integrate Mode:

Increases effective writing speed on repetitive signals.

Non Store Characteristics:

Approximately equivalent to P31 phosphor

##### CALIBRATOR

Output Voltage: 500mV

Wave Shape: Square

Frequency: As power line

Accuracy:  $\pm 2\%$

##### POWER REQUIREMENTS

Mains voltages: 100 - 125V in

5 volt steps

200 - 250V in

10 volt steps

Frequency: 48 to 400Hz

Consumption: 100VA

approximately

##### DIMENSIONS AND WEIGHT

Height 240mm (9 $\frac{1}{2}$ in)

Width 210mm (8 $\frac{1}{4}$ in)

Depth 370mm (14 $\frac{5}{8}$ in)

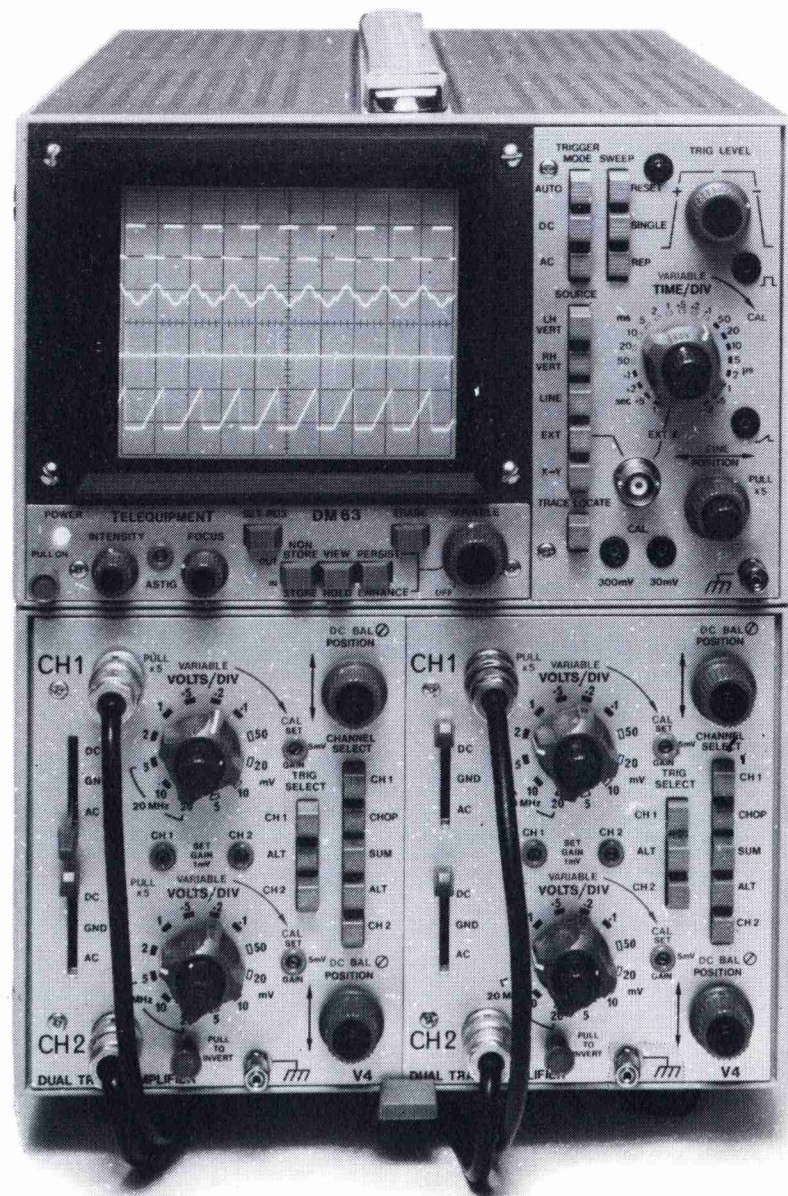
Weight 12.97kg (28 $\frac{3}{4}$ lb)



# D63/DM63

## 15 MHz

### Dual beam Oscilloscopes, with optional storage



Telequipment's 63 series of dual-beam oscilloscopes is a 15MHz system based on two mainframes with integral time bases and a number of alternative plug-in vertical amplifier units. One of the mainframes, the D63, is fitted with a conventional CRT. The other, the DM63, is equipped with a variable persistence storage CRT, providing up to 4 traces with full storage facilities.

The choice between two mainframes, together with the plug-in units available, enables the 63 series to cover a wide range of measurement needs. Full details of the plug-in units are shown on pages 26 and 27.

#### GENERAL DESCRIPTION

The D63 is a mainframe containing a dual beam conventional CRT, a wide-range time base, power pack, calibrator, and two receptacles for accommodating units from the range of plug-in units described on pages 26 and 27 of this brochure. The maximum bandwidth available is 15MHz. The DM63 has the same basic features as the D63 with the exception that it is fitted with a dual beam direct viewing storage CRT.

#### VERTICAL SYSTEM

(Abridged specification only – see under appropriate plug-in for full details).

**V1 – Single Trace 15MHz amplifier**  
**Deflection Factors:**

5mV/div at 15MHz  
1mV/div at 12MHz

**V3 – Single Trace, High Gain, Differential amplifier**  
**Bandwidth:**

150kHz at 50 $\mu$ V/div, rising to 2MHz from 2mV/div to 10V/div

**Deflection Factors:**

50 $\mu$ V/div to 10V/div

**V4 – Dual Trace 15MHz amplifier**  
(2 identical channels)

**Bandwidth:**

DC to 15MHz

DC to 12MHz with  $\times 5$  gain in use  
**V5 – Same as V1 but with 200ns delay line and deletion of  $\times 5$  gain control.**

**TV1 – Television Line Amplifier**  
for 625 line systems

**Bandwidth:**

DC to 5MHz  $\pm 0.25$ dB

DC to 10MHz  $\pm 0.5$ dB

Special line selector features.

#### HORIZONTAL SYSTEM

**Sweep Speeds:**

1s/div to 200ns/div in 21 calibrated steps (1-2-5 sequence). A  $\times 5$  magnifier increases fastest sweep speed to 40ns/div. A variable uncalibrated control provides continuous coverage between stepped ranges, reducing slowest sweep speed to 2.5s/div.

**Time Measuring Accuracy:**

Normal  $\pm 3\%$   
 $\times 5 \quad \pm 5\%$

#### TRIGGERING

Push-button selection of the following trigger modes:–

Auto 10Hz to 15MHz.

Bright line in the absence of a trigger signal.

DC Coupled DC to 15MHz

AC Coupled 10Hz to 15MHz

**Sources:**

Internal from either channel

External or AC power line

**Sensitivity:**

Internal 0.3 div up to 1 MHz,

falling to 1.0 div at 15MHz

External 100mV up to 1MHz,

falling to 200mV at 15MHz

**Trigger Level and Polarity:**

Single knob control determines level and polarity of trigger function.

**Sweep Modes:**

Repetitive or Single-shot. (A neon indicates when time based is armed in single-shot mode)

#### EXTERNAL X

**Bandwidth:** DC to 1MHz ( $-3$ dB)

**Sensitivity:** 1V/div (approx.) on  $\times 1$   
0.2V/div (approx.) on  $\times 5$

#### X-Y MODE

Via left and right hand plug-in units.

**Trace Locate:**

Push button to place trace on screen

#### C.R.T. – D63

**Display Area:**

8  $\times$  10 division, each division 1.0cm

**Phosphor:**

P31 supplied as standard

**Overall Accelerating Potential:**  
8kV

**Z Modulation:**

Bandwidth DC to 3MHz approx.

Input for full modulation at max.

intensity + 20V, DC coupled into 10k $\Omega$  and 20pF approx.

**Display Area:**

8  $\times$  10 division, each division 0.9cm

**Overall Accelerating Potential:**  
8kV

#### Operating Modes:

Non Storage, Variable Persistence, Storage.

**Z Modulation:** Same as D63 CRT

**Storage Characteristics:**

**Minimum Writing Speed:**

In stored condition: 0.05div/ $\mu$ s

In Max. Enhancement mode:  
1.0div/ $\mu$ s

**Storage Time:**

In stored condition: 4 min

In Variable persistence mode:

0.2s to 0.5min (average)

In Max. Enhancement mode:  
0.5 min

**Hold Time:**

In stored condition: 50 min

In Max. Enhancement mode: 5 min

#### CALIBRATOR

**Output Voltages:**

30mV and 300mV peak to peak

**Wave Shape:** Square

**Frequency:** 1kHz (approx.)

**Current:** 3mA between 30mV output and 300mV output

**Accuracy:**  $\pm 1\%$  voltage and current

#### POWER REQUIREMENTS

**Mains voltages:**

100 to 125 Volts in 5V steps

200 to 250 Volts in 10V steps

**Frequency:** 48 to 400Hz

**Consumption:** 85VA (depending on choice of plug-in units)

#### DIMENSIONS AND WEIGHT

Height	290mm	(11 $\frac{1}{2}$ in)
Width	215mm	(8 $\frac{1}{2}$ in)
Depth	520mm	(20 $\frac{1}{2}$ in)
Weight	9.5kg to 14kg depending on plug-in units.	

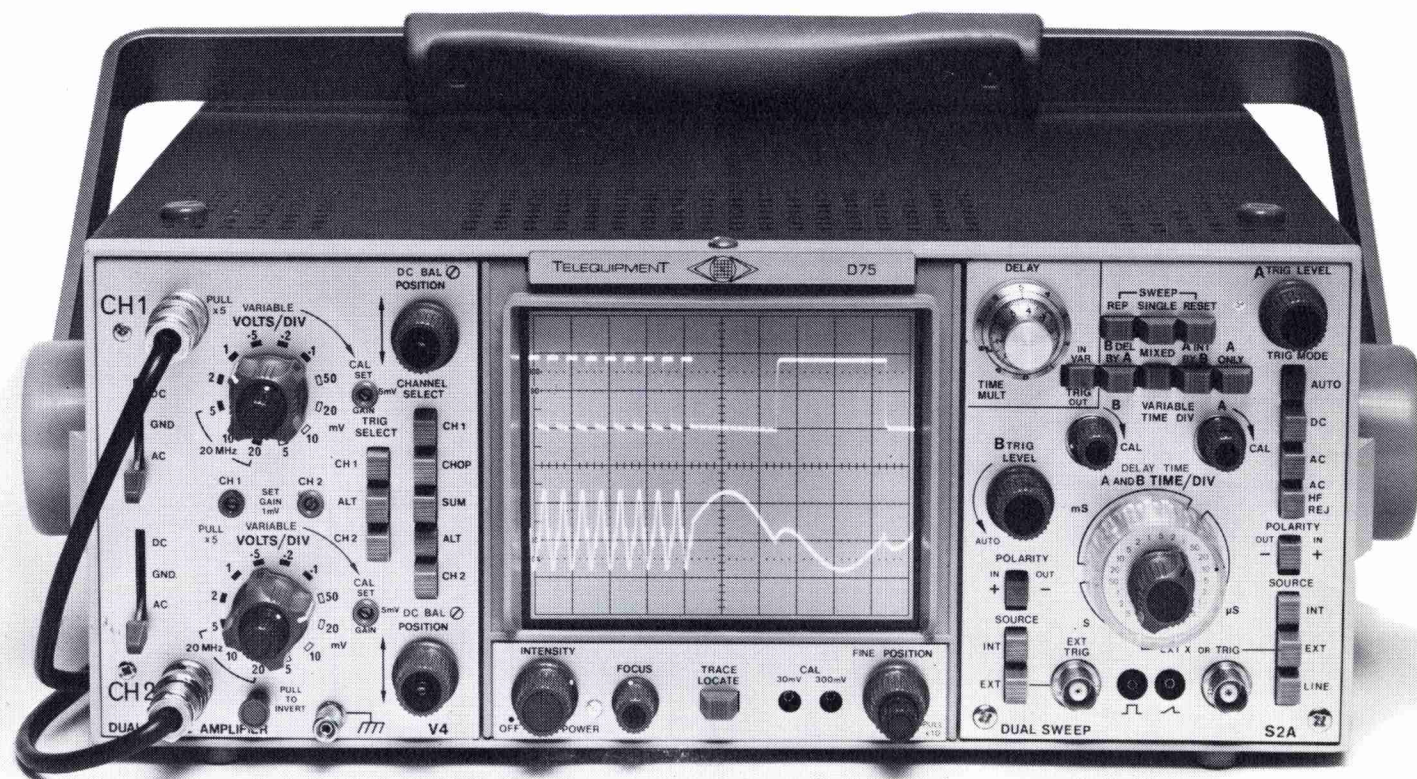


# D75 50 MHz Portable Oscilloscope

Light, compact and convenient to carry, this portable dual trace 50MHz oscilloscope carries laboratory standards of performance into the field with ruggedness and reliability.

Its 8 x 10cm CRT operates at 15kV, providing a bright, sharp display, and, with the S2A unit fitted, offers wide-range dual time bases incorporating mixed sweep, sweep intensifying and delayed modes of operation. Measuring accuracy is  $\pm 3\%$ .

The D75 is a portable version of the D83 oscilloscope using the V4 and S2A plug-in units in a monolithic form of construction. Alternative plug-ins for the D83 can be supplied as factory fitted options in the D75, details of these options are included in this section. The characteristics of the vertical amplifier and timebase units are given on pages 26 and 27.



## GENERAL DESCRIPTION

The D75 is a dual-trace 50MHz portable oscilloscope designed for operation on AC mains supplies. It has two identical vertical amplifiers and is equipped with a Main Time Base and a Delayed Time Base. The instrument is factory assembled from units of the 83 range of plug-ins but these units are not interchangeable in the field in the D75 mainframe. The specification of the standard D75 is given below. Other factory-assembled options are available, details are given at the end of this section. The characteristics of the vertical amplifier and timebase units are given on pages 26 and 27.

## VERTICAL SYSTEM

(Abridged specification only – see V4 plug-in for complete details)  
Two identical input channels

### Bandwidth:

DC Coupled DC to 50MHz ( $-3\text{dB}$ )  
AC Coupled 2Hz to 50MHz ( $-3\text{dB}$ )

### Deflection Factors:

5mV/div to 20V/div in 12 calibrated steps (1-2-5 sequence)

## HORIZONTAL SYSTEMS

(Abridged specification only – see S2A plug-in for complete details)

### Timebase A:

Sweep Speeds:  
2s/div to 100ns/div in 23 calibrated steps (1-2-5 sequence)

### Timebase B:

Sweep Speeds:  
1s/div to 100ns/div in 22 calibrated steps (1-2-5 sequence)

### Operating Modes – Timebases A and B

A only, A intensified by B, B delayed by A, A and B mixed, Delayed B variable or triggered. Repetitive or Single Shot.

## TRIGGERING

(Timebase A) Modes – Auto, DC, AC HF reject

## TRIGGERING

(Timebase B) Modes – Auto, AC

## C.R.T.

### Display Area:

8cm x 10cm on rectangular faced C.R.T.

## Phosphor:

P31 supplied as standard

## Accelerating Potential:

15kV

## Z Modulation:

Bandwidth DC – 5MHz, +20V for full modulation.

DC coupled into 10k $\Omega$  +15pF

## CALIBRATOR

### Output Voltage:

30mV and 300mV peak to peak

### Wave Shape:

Square

### Frequency:

1kHz approx.

### Output Current:

3mA between 30mV output and 300mV output

### Accuracy:

$\pm 1\%$ , voltage and current.

## POWER REQUIREMENTS

Mains voltages: 100V-125V in

5 volt steps

200V-250V in

10 volt steps

Frequency: 40 to 400Hz

Consumption: 105VA

## DIMENSIONS AND WEIGHT

Height 136mm (5 $\frac{3}{8}$ in)

Width 380mm (15in)

Depth 470mm (18 $\frac{3}{4}$ in)

Weight 11.4kg (25 $\frac{1}{2}$ lb)

## Optional versions of the D75 Oscilloscope

The D75 mainframe is not fitted with the means to facilitate the insertion and removal of alternative vertical and horizontal plug-ins. Factory assembled versions are available, however, based on the following combinations:–

### D751 Specifications

With 50MHz dual-channel vertical amplifiers, characteristics the same as V4 unit.

Single time base, characteristics the same as S1 unit.

### D752 Specifications

With single channel differential vertical amplifier, characteristics as V3 unit, and with main and delayed time bases as S2A unit.

### D753 Specifications

With single channel differential vertical amplifier, as V3 unit, and with single time base, as S1 unit.

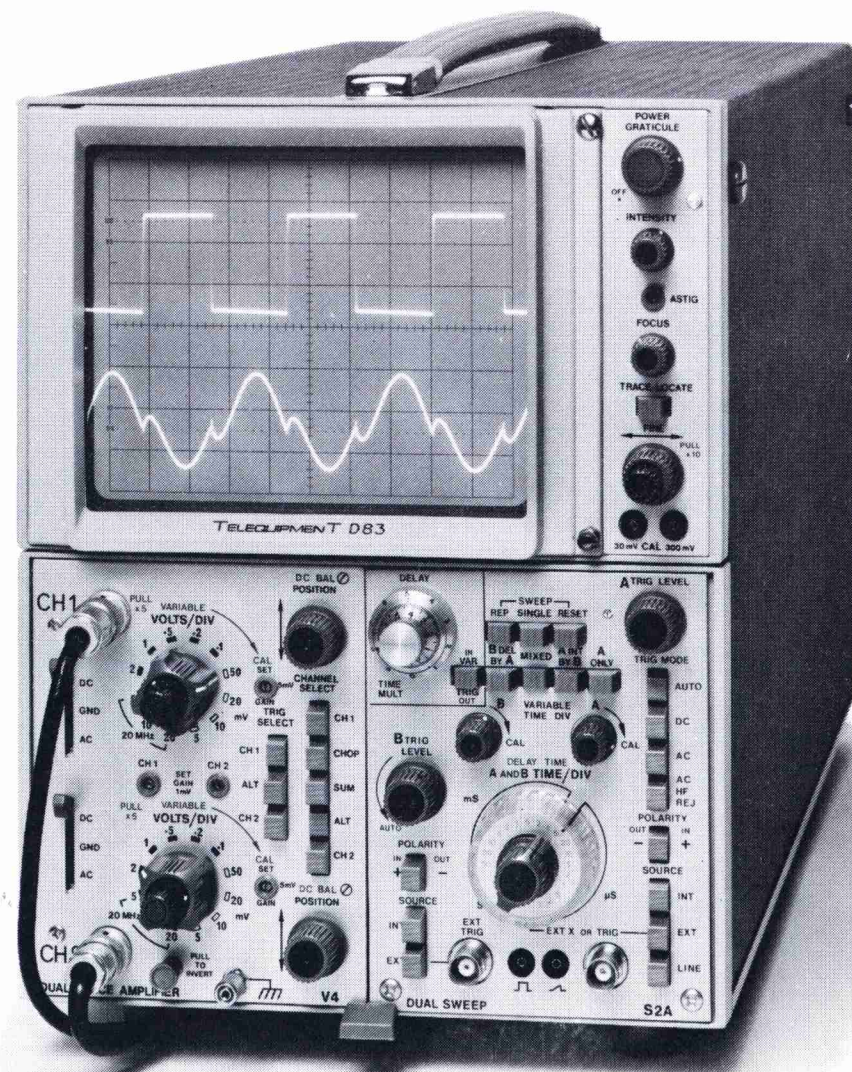


# D83

## 50 MHz High frequency plug-in Oscilloscope

The D83 is a dual-trace 50MHz oscilloscope which sets high standards of performance, versatility and value.

Designed around a large CRT, the mainframe accepts one vertical and one horizontal plug-in unit, offering a choice between 5mV sensitivity at maximum bandwidth and 50 $\mu$ V differential operation with a very high degree of common-mode signal rejection, whilst, for precision measurements on television signals, there is a special-purpose plug-in unit available. The wide-range dual time-base plug-in incorporates sweep intensifying, delaying and single shot facilities. A simpler, single time base plug-in is included in the range of units, offering the addition of X-Y capabilities. Full details of the plug-in units are shown on pages 26 and 27.



### GENERAL DESCRIPTION

The D83 is a mainframe containing a 6 $\frac{1}{2}$ in C.R.T., a power pack, and two receptacles for accommodating units from the range of plug-in vertical amplifiers and timebases described on pages 26 & 27 of this brochure. The vertical and horizontal channel characteristics will be determined by the plug-in used. The maximum bandwidth is 50MHz and the mainframe includes vertical signal delay line.

### VERTICAL SYSTEM

(Abridged specification only – see under appropriate plug-in for full details.)

#### V1 – Single Trace 35MHz amplifier

**Deflection Factors:** 5mV/div at 35MHz  
1mV/div at 15MHz

#### V3 – Single Trace, High Gain, Differential amplifier

**Bandwidth:** 150kHz at 50 $\mu$ V/div rising to 2MHz from 2mV/div to 10V/div

**Deflection Factors:** 50 $\mu$ V/div to 10V/div

#### V4 – Dual Trace 50MHz amplifier (2 identical channels)

**Bandwidth:** DC to 50MHz  
DC to 15MHz with  $\times 5$  gain in use

#### Deflection Factors:

5mV to 20V/div

#### TV1 – Television line amplifier for 625 line systems

**Bandwidth:** DC to 5MHz  $\pm 0.25$ dB  
DC to 10MHz  $\pm 0.5$ dB

Special line selector features.

**V5 – Same as V1** but with 200ns delay line and deletion of  $\times 5$  gain control

### HORIZONTAL SYSTEMS

#### S1 – Single Timebase:

Sweep Speeds:  
2s/div to 100ns/div

#### S2A – Dual Timebase:

Sweep Speeds:  
(Timebase A) – 2s/div to 100ns/div  
Sweep Speeds:  
(Timebase B) – 1s/div to 100ns/div

### C.R.T.

#### Display Area:

8  $\times$  10 div, each division 1.22cm

#### Phosphor:

P31 supplied as standard. Internal Graticule with variable illumination

#### Accelerating Potential:

15kV

#### Z Modulation:

**Bandwidth:** DC to 5MHz, +20V for full modulation. DC coupled into 100k $\Omega$  + 15pF

### CALIBRATOR

#### Output Voltage:

30mV and 300mV peak to peak

#### Wave Shape:

Square

#### Frequency:

1kHz approx.

**Current:** 3mA between 30mV output and 300mV output.

**Accuracy:**  $\pm 1\%$ , voltage and current

### POWER REQUIREMENTS

**Mains voltages:** 100V – 125V in 5V steps

200V to 250V in 10V steps

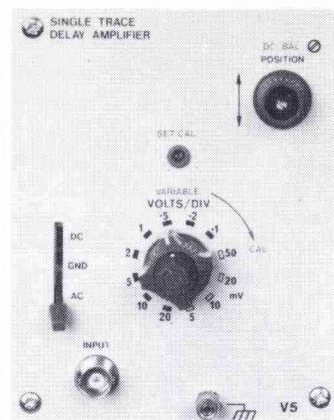
**Frequency:** 50 – 400Hz

**Consumption:** 80VA

### DIMENSIONS AND WEIGHT

Height	286mm	(11 $\frac{1}{4}$ in)
Width	216mm	(8 $\frac{5}{8}$ in)
Depth	514mm	(20 $\frac{1}{4}$ in)
Weight	14.25kg	(31 $\frac{1}{2}$ lb)





#### V5 GENERAL DESCRIPTION

The V5 is a 15MHz single channel amplifier for use in Telequipment oscilloscopes D83, D63 and DM63. Its specification is the same as the V1 plug-in unit, except that the V5 includes a 200ns signal delay line and does not include a  $\times 5$  gain facility.

#### V1 GENERAL DESCRIPTION

The V1 is a 15MHz single channel amplifier for use in Telequipment oscilloscopes D83, D63, and DM63

##### **BANDWIDTH (D63 AND DM63 ONLY):**

DC Coupled DC to 15MHz ( $-3\text{dB}$ )

AC Coupled 2Hz to 15MHz ( $-3\text{dB}$ )

Rise Time: 23ns

##### **BANDWIDTH (D83 ONLY):**

DC Coupled DC to 35MHz ( $-3\text{dB}$ )

AC Coupled 2Hz to 35MHz ( $-3\text{dB}$ )

Rise Time: 10ns

Max bandwidth 5V/div to 20V/div; 20MHz ( $-3\text{dB}$ )

##### **DEFLECTION FACTORS:**

5mV to 20V/div in 12 calibrated steps (1-2-5 sequence). A  $\times 5$  gain switch extends the sensitivity to 1mV/div with a maximum bandwidth, in the D83, of 15MHz and, in the D63 and DM63, of 12MHz. A variable uncalibrated control provides continuous coverage between stepped ranges, extending low sensitivity range to 50V/div.

##### **VOLTAGE MEASURING ACCURACY: $\pm 3\%$**

**INPUT IMPEDANCE:**  $1\text{M}\Omega + 29\text{pF}$  approx.

##### **INPUT CONDITIONS:**

Switched choice of DC or AC coupling via standard BNC connector. A third switch position earths the attenuator input but not the input socket.

##### **MAXIMUM INPUT VOLTAGE:**

400V DC + AC peak

400V DC + AC peak

400V DC + AC peak

400V DC + AC peak

400V DC + AC peak

400V DC + AC peak

400V DC + AC peak

400V DC + AC peak

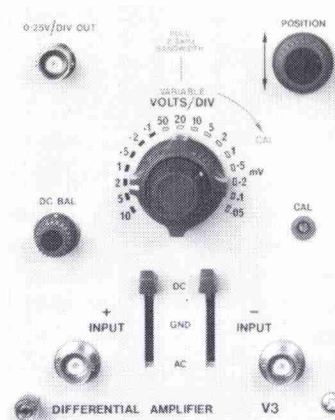
400V DC + AC peak

400V DC + AC peak

400V DC + AC peak

400V DC + AC peak

400V DC + AC peak



#### V3 GENERAL DESCRIPTION

The V3 is a single channel dual input differential amplifier with a maximum sensitivity of  $50\mu\text{V}/\text{div}$ . It is intended for use in Telequipment oscilloscopes D83, D63, DM63 and also in factory assembled versions of the D75.

##### **BANDWIDTH:**

150kHz at  $50\mu\text{V}/\text{div}$  rising to

2MHz from  $2\text{mV}/\text{div}$  to  $10\text{V}/\text{div}$ . Maximum bandwidth can be reduced to 2.5kHz by operating

push-pull switch mounted concentrically with Volts/div control.

##### **DEFLECTION FACTORS:**

$50\mu\text{V}/\text{div}$  to  $10\text{V}/\text{div}$  in 17 calibrated steps (1-2-5 sequence).

A variable uncalibrated control provides continuous coverage between stepped ranges, extending low sensitivity range to 25V/div.

##### **VOLTAGE MEASURING**

**ACCURACY:  $\pm 3\%$**

##### **INPUT IMPEDANCE:**

$1\text{M}\Omega + 35\text{pF}$  at each input socket. Common input resistance may be increased to  $100\text{M}\Omega$  at user's option.

##### **INPUT CONDITIONS:**

Switched choice of DC or AC coupling at each input socket via standard BNC connector. A third switch position earths the attenuator input but not the input socket.

##### **INPUT LIMITS:**

Differential (Common Mode)  $50\mu\text{V}/\text{div}$  to  $10\text{mV}/\text{div} - \pm 12\text{V}$

$20\text{mV}/\text{div}$  to  $0.1\text{V}/\text{div} - \pm 120\text{V}$

$0.2\text{V}/\text{div}$  to  $10\text{V}/\text{div} - \pm 400\text{V}$

Single ended, all ranges  $- \pm 400\text{V}$

Common Mode Rejection Ratio: 100,000:1 ( $0.05\text{mV}$  to  $0.5\text{mV}$  at DC to 5kHz)

Signal output (via front panel BNC connector):

$0.25\text{V}/\text{div}$  approx., direct coupled.

$0.25\text{V}/\text{div}$  approx., direct coupled.

$0.25\text{V}/\text{div}$  approx., direct coupled.

$0.25\text{V}/\text{div}$  approx., direct coupled.

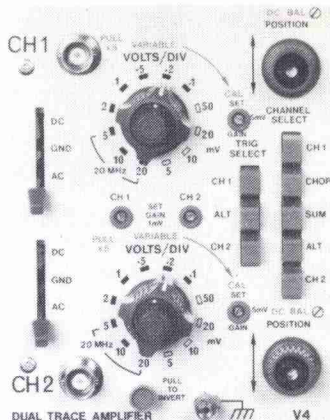
$0.25\text{V}/\text{div}$  approx., direct coupled.

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$0.25\text{V}/\text{div}$  approx., direct coupled.



#### V4 GENERAL DESCRIPTION

The V4 is a dual channel wide band amplifier designed to provide dual trace operation in Telequipment D83, D63, and DM63 oscilloscopes, and also in factory assembled versions of the D75. When used in the D83 and D75 the maximum bandwidth is 50MHz. In the D63 and DM63 the maximum band width available is 15MHz.

**BANDWIDTH (D83 and D75 only)**

DC Coupled DC to 50MHz ( $-3\text{dB}$ )

AC Coupled 2Hz to 50MHz ( $-3\text{dB}$ )

Rise Time: 7ns

**BANDWIDTH (D63 and DM63 only)**

DC Coupled DC to 15MHz ( $-3\text{dB}$ )

AC Coupled 2Hz to 15MHz ( $-3\text{dB}$ )

Rise Time: 23ns

##### **DEFLECTION FACTORS:**

$5\text{mV}$  to  $20\text{V}/\text{div}$  in 12 calibrated steps (1-2-5 sequence). A  $\times 5$  gain switch extends the sensitivity on both channels to  $1\text{mV}/\text{div}$ .

Maximum bandwidth in  $\times 5$  in D83 and D75 is 15MHz, and in D63 and DM63, 12MHz.

A variable uncalibrated control provides continuous coverage between stepped ranges, extending the low sensitivity range to  $50\text{V}/\text{div}$ .

##### **VOLTAGE MEASURING**

**ACCURACY:  $\pm 3\%$**

##### **INPUT IMPEDANCE:**

$1\text{M}\Omega + 33\text{pF}$

##### **INPUT CONDITIONS:**

Switched choice of DC or AC coupling via standard BNC connectors. A third switch position earths the input to the attenuator but not the input socket.

##### **MAXIMUM INPUT VOLTAGE:**

400V DC + AC peak

##### **OPERATING MODES:**

Channel 1 only; Channel 2 only; Channel 1/2 in Alternate or

Chopped sweep mode (chop rate 350kHz approx.); Channel 1 and 2 added; Channel 2 inverted.

##### **TRIGGER SOURCES:**

Channel 1 only; Channel 2 only; Alternate (from displayed signal).

Channel 1 only; Channel 2 only; Alternate (from displayed signal).

Channel 1 only; Channel 2 only; Alternate (from displayed signal).

Channel 1 only; Channel 2 only; Alternate (from displayed signal).

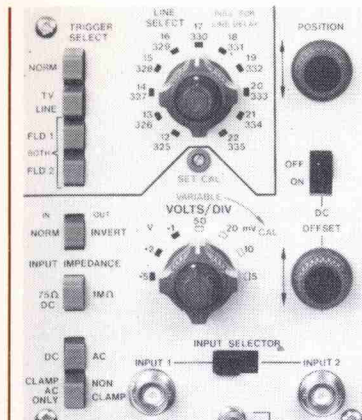
Channel 1 only; Channel 2 only; Alternate (from displayed signal).

Channel 1 only; Channel 2 only; Alternate (from displayed signal).

Channel 1 only; Channel 2 only; Alternate (from displayed signal).

Channel 1 only; Channel 2 only; Alternate (from displayed signal).

Channel 1 only; Channel 2 only; Alternate (from displayed signal).



#### TV1 GENERAL DESCRIPTION

The TV1 plug-in is designed for the display and measurement of 625 line television signals when used as the vertical amplifier in Telequipment D83, D63 and DM63 oscilloscopes. Its frequency response is virtually flat to 10MHz and the unit incorporates field and line selector facilities, black level clamping circuitry and DC offset capability.

##### **BANDWIDTH:**

Not Gaussian but maintained within the following limits:—

DC Coupled DC to 5MHz ( $\pm 0.25\text{dB}$ )

DC to 10MHz ( $\pm 0.5\text{dB}$ )

AC Coupled 10Hz to 5MHz ( $\pm 0.25\text{dB}$ )

8Hz to 10MHz ( $\pm 0.5\text{dB}$ )

8Hz to 10MHz ( $\pm 0.5\text{dB}$ )

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8Hz to 10MHz ( $\pm 0.5\text{dB}$ )

8Hz to 10MHz ( $\pm 0.5\text{dB}$ )

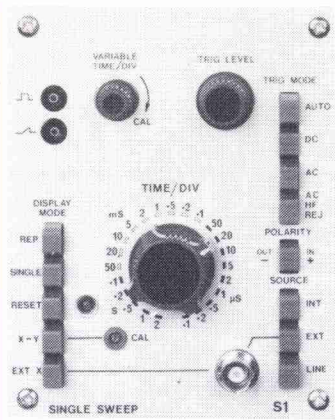
8Hz to 10MHz ( $\pm 0.5\text{dB}$ )

8Hz to 10MHz ( $\pm 0.5\text{dB}$ )

8Hz to 10MHz ( $\pm 0.5\text{dB}$ )

8Hz to 10MHz ( $\pm 0.5\text{dB}$ )

8Hz to 10MHz ( $\pm 0.5\text{dB}$ )



#### S1 GENERAL DESCRIPTION

The S1 is a plug-in single time base for use in Telequipment oscilloscope D83, and also in factory-assembled versions of the D75.

##### **SWEEP SPEEDS:**

2s/div to 100ns/div in 23 calibrated steps (1-2-5 sequence). A  $\times 10$  magnifier operates on all time base

ranges, increasing fastest sweep speed to 10ns/div. A variable uncalibrated control provides

continuous coverage between stepped ranges, reducing slowest sweep speed to 5s/div.

##### **TIME MEASURING**

**ACCURACY:**

Normal  $\pm 3\%$

$\times 10 \pm 6\%$

##### **TRIGGERING:**

Push-button selection of the following trigger modes:—

Auto: 40Hz to 50MHz. Sweep free-runs in the absence of an input signal.

DC Coupled: DC to 50MHz

AC Coupled: 10Hz to 50MHz

HF reject: 10Hz to 2MHz ( $-3\text{dB}$ )

Sources: Internal, External or AC power line.

Sources: Internal, External or AC power line.

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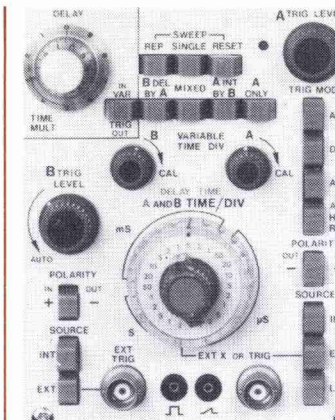
Sources: Internal, External or AC power line.

Sources: Internal, External or AC power line.

Sources: Internal, External or AC power line.

Sources: Internal, External or AC power line.

Sources: Internal, External or AC power line.



#### S2A GENERAL DESCRIPTION

The S2A is a plug-in dual time base for use in Telequipment oscilloscope D83 and in factory assembled versions of the D75.

##### **TIME BASE A (MAIN AND DELAYING SWEEP):**

**SWEEP SPEEDS:** 2s/div to 100ns/div in 23 calibrated steps (1-2-5 sequence). A  $\times 10$  magnifier operates on all time base

ranges, increasing fastest sweep speed to 10ns/div. A variable uncalibrated control provides

continuous coverage between stepped ranges, reducing slowest sweep speed to 2.5s/div.

##### **TIME MEASURING**

**ACCURACY:**

Normal  $\pm 3\%$

$\times 10 \pm 6\%$

##### **TRIGGERING:**

Push-button selection of the following trigger modes:—

Auto: 10Hz to 10MHz (Sweep free-runs in the absence of an input signal.)

AC: 10Hz to 10MHz

Sources: Internal or External

Sensitivity: Internal 0.4 div (min) falling to 1.0 div at 10MHz

External 500mV to 10MHz, falling to 1V at 50MHz

Polarity: Switched choice of + or -

Trigger level: Variable level control on all input signals.

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Trigger level: Variable level control on all input signals.

Trigger level: Variable level control on all input signals.

Auto: 40Hz to 50MHz. Sweep free-runs in the absence of an input signal.

DC Coupled: DC to 50MHz

AC Coupled: 10Hz to 50MHz

HF reject: 10kHz to 2MHz ( $-3\text{dB}$ )

Sources: Internal, External, or AC power line.

Sensitivity: Internal 0.4 div (min) to 10MHz, falling to 1.0 div at 50MHz

External 500mV to 10MHz, falling to 1V at 50MHz

Polarity: Switched choice of + or -

Trigger level: Variable level control on all input signals.

**TIME BASE B (DELAYED SWEEP):**

**SWEEP SPEEDS:** 1s/div to 100ns/div in 22 calibrated steps (1-2-5 sequence). A  $\times 10$  magnifier operates on all sweep ranges, increasing the fastest sweep speed to 10ns/div. A variable uncalibrated control provides continuous coverage between stepped ranges, reducing slowest sweep speed to 2.5s/div.

**TIME MEASURING ACCURACY:**

Normal  $\pm 3\%$

$\times 10 \pm 6\%$

**TRIGGERING:**

Push-button selection of the following trigger modes:—

Auto: 10Hz to 10MHz (Sweep free-runs in the absence of an input signal.)

AC: 10Hz to 10MHz

Sources: Internal or External

Sensitivity: Internal 0.4 div (min) falling to 1.0 div at 10MHz

External 500mV to 10MHz, falling to 1V at 50MHz

Polarity: Switched choice of + or -

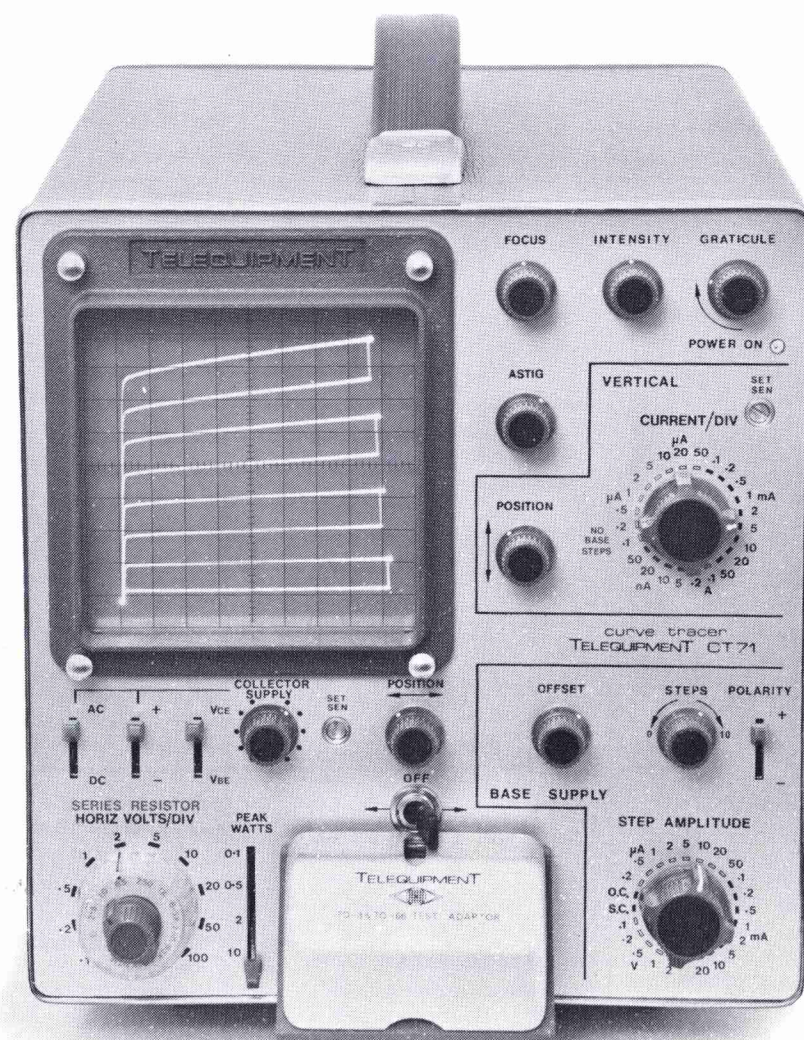
Trigger level: Variable level control on all input signals.

**DELAY TIME:**

Range, 10 $\mu\text{s}$  to 2



# CT71 Semi-conductor curve-tracer



The CT71 curve tracer is a dynamic semi-conductor tester for the display and measurement of the characteristics of transistors, F.E.T.'s and diodes. Two different transistor characteristics may be displayed, including the collector family in the common emitter configuration.

In addition to transistor curves, the CT71 can be used to show the dynamic characteristics of a wide range of semi-conductor devices, including those of diodes with forward currents up to 2 Amps, reverse currents down to 5nAmps, and reverse voltages up to 1kV.

The instrument is fitted with a front panel socket which accepts one of two available Test Fixtures, each containing pairs of sockets for all generally available transistor types. A manually operated switch is used to select the transistor to be tested, allowing rapid comparisons between transistors of the same type.

## GENERAL DESCRIPTION

The CT71 is a semiconductor curve tracer for the dynamic testing of transistors, FETs, diodes and similar solid-state devices. Input sockets for all commonly used semiconductors are arranged in pairs, a front panel switch selects the device to be tested and permits rapid comparison of characteristics.

## VERTICAL SYSTEM

The Vertical Amplifier displays collector currents only. Current ranges are 5nA/div to 200mA/div in 24 calibrated steps (1-2-5 sequence).

**Accuracy:**  $\pm 5\%$

## HORIZONTAL SYSTEM

The Horizontal Amplifier displays collector volts or base volts. Voltage ranges are 0.1V/div to 100V/div in 10 calibrated steps (1-2-5 sequence).

**Accuracy:**  $\pm 5\%$

## Collector Supply:

The Collector Supply provides sweep voltages that drive the collector of the transistor under test between zero and a peak value selected by the front panel controls. The peak value is either positive or negative depending on the setting of the polarity switch to allow the collector voltages to sweep between zero and positive values or zero and negative values. The repetition rate of the sweep is twice the line frequency; thus the collector voltage sweeps between zero and the peak value at least once for each step applied to the transistor base. The peak voltage is continuously adjustable from zero to 1,000V. Peak current available is 2A. Maximum power available 15W. The collector series resistances available are: 0, 2.5 $\Omega$ , 10 $\Omega$ , 65 $\Omega$ , 250 $\Omega$ , 1k $\Omega$ , 6.5k $\Omega$ , 25k $\Omega$ , 85k $\Omega$ , 500k $\Omega$  and 1.7M $\Omega$  all within 5%. The peak power settings are 0.1, 0.5, 2 and 10 watts.

## Base Step Generator:

The Step Generator develops current or voltage steps to drive the base of the transistor under test. The steps are adjustable from 1 to 10 and move in a positive or negative direction depending on the polarity switch setting. A continuously variable offset with a range of  $\pm 1$  step is provided. Steps and offset are only available on collector current ranges greater than 10 $\mu$ A/div. Each step has a rise that is selected as either a value of voltage or current. The value of each step rise in the voltage ranges is 0.1V to 2V per step and is selected from 5 values in a 1-2-5 sequence. The value of each step rise in the current ranges is 0.2 $\mu$ A to 20mA per step and is selected from 16 values in a 1-2-5 sequence.

**Accuracy:**  $\pm 5\%$

## Transistor Test Fixtures:

Two test fixtures are provided, which plug into the front of the CT71, providing a means of connecting the Collector Supply output, the Step Generator output and the display amplifiers to the device to be tested. One fixture has the following features: 1 pair of TO18 sockets in a source-drain-gate configuration, 1 pair of TO18 sockets in the emitter-base-collector configuration, 1 pair of TO5 sockets in the emitter-base-collector configuration, and 2 sets of 3 terminals in the emitter-base-collector configuration. The other comprises: 2 TO66 and 2 TO3 sockets.

## Safety Interlock:

The protective cover cannot be opened until the supplies to the test fixtures are disconnected.

## C.R.T.

### Display Area:

10  $\times$  10 div, each division nominally 1cm.

**Overall Accelerating Potential:** 2.5kV

### Phosphor:

P31 supplied as standard

### Graticule:

External, with variable illumination control on front panel.

## POWER REQUIREMENTS

**Main voltages:** 100V-125V in 5V steps  
200V-250V in 10V steps

**Frequency:** 48-63Hz

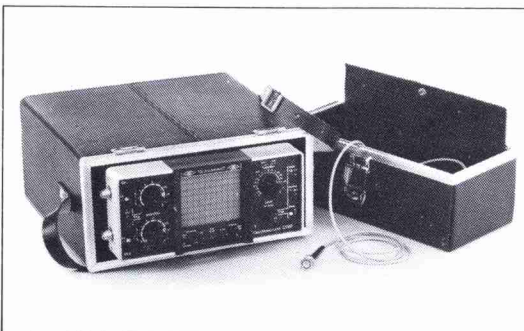
**Consumption:** 37.5VA (approx.)

## DIMENSIONS AND WEIGHT

Height	265mm	(10 $\frac{1}{2}$ in)
Width	240mm	(9in)
Depth	482mm	(19in)
Weight	12.9kg	(28 $\frac{1}{2}$ lb)

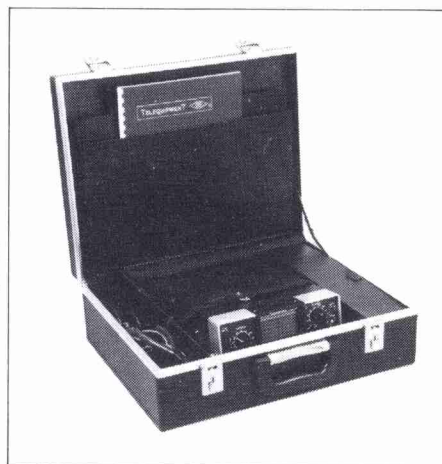


# Accessories



## Carrying Cases

(Executive-style brief cases)  
For S22 Part No. 016-0373-00  
For D32 Part No. 016-0374-00  
For D34 Part No. 016-0619-00



## Shoulder Carrying Cases

For S22 Part No. 016-0372-00  
For D32 Part No. 016-0601-00  
For D34 Part No. 016-0499-00

## Protective Covers

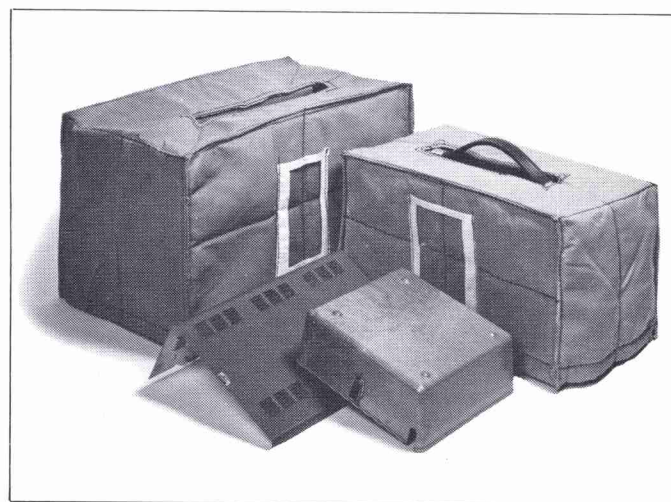
Front cover (fibreglass) for DM64, D65, D54  
(also fits rear of instrument) Part No. 016-0513-01  
Only fits instruments with two chrome bands.

**Note** - To use front cover, Part No. 016-0513-01, new side panels with clamp fasteners are required.

Side Panel, with clamp fasteners, for DM64, D65, D54  
(two panels required per instrument) Part No. 390-0207-03  
Front Cover for S22 Part No. 016-0360-00  
Front Cover for D75 Part No. 016-0564-01  
Front Cover for D61a Part No. 016-0617-00  
Front Cover for D66A/D67A Part No. 016-341-00

## Protective Covers

(Slip-over covers with access to instrument handle)  
For D75 series Part No. 016-0590-00  
For D54, DM64, D65, Part No. 016-0138-00

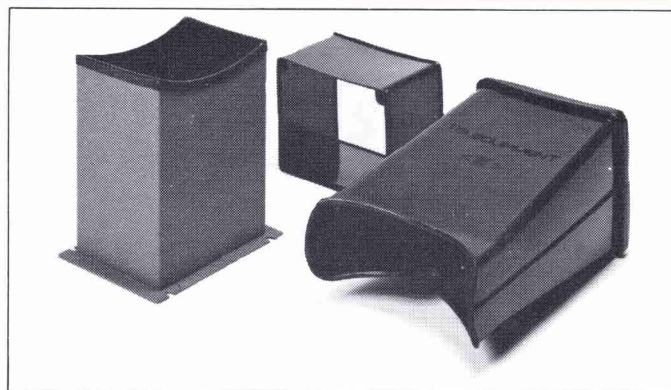


## Viewing Hoods

Rubber, 3 in depth, for D54 Part No. 016-0293-01  
Rubber, 3 in depth, for DM64, D65 Part No. 016-0294-01  
Plastic, 5½ in depth, folding, for D83 Part No. 016-0260-00  
Plastic, 10 in depth, for D83 Part No. 016-0154-00  
Viewing Hood for D32 Part No. 016-0383-00

## Viewing Hood Extension

Rubber, 7 in depth, extends hoods 016-0293-01 and 016-0294-01  
to approximately 10 in depth Part No. 016-0292-00



## Coaxial Adaptors

BNC female to double 4 mm plug Part No. 103-0128-00  
UHF female to double 4 mm plug Part No. 103-0129-00  
BNC female to UHF male 50 Ω Part No. 103-0015-00  
BNC female to UHF male 75 Ω Part No. 103-0145-00

## Transistor Test Adaptors

(For CT71), T03 and T066 Part No. 013-0119-00  
(For CT71), T05 and T018 Part No. 013-0120-00

## Power Cords

For DM64, D65, D67A Part No. 161-0084-00  
For D54, D54R Part No. 161-0051-00  
For D75 Part No. 161-0085-01  
For D63, DM63 and D83 Part No. 161-0084-00  
For S22, D32 and D34 Part No. 161-0113-01

## DC to DC converter

For operating oscilloscopes S22, D32 and D34 on external  
DC supplies of 12 to 30 V Part No. 119-0766-00

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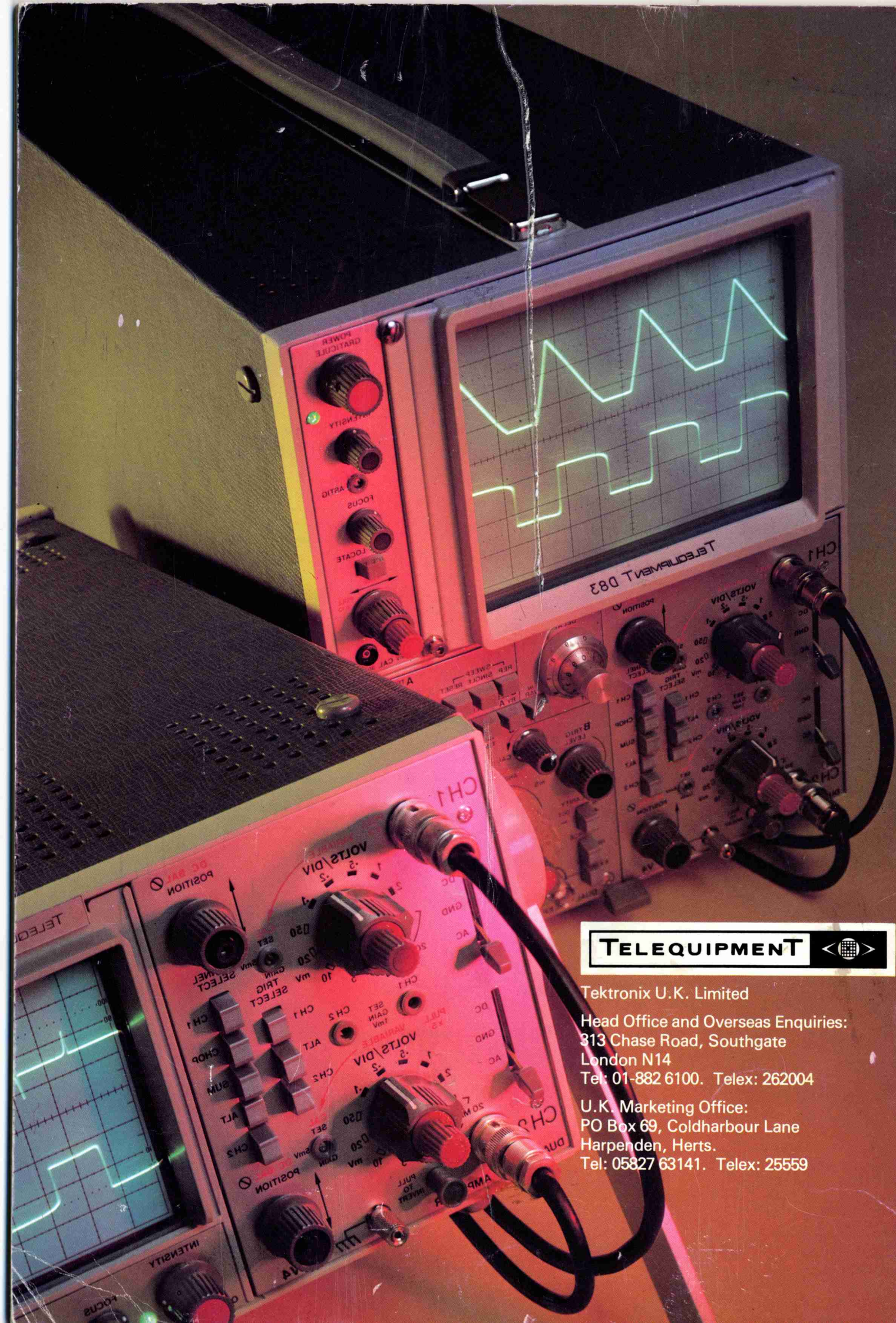
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Tel: 061 224 0446. Telex: 668409

Scottish Office:  
7 Shiel House, Craigshill,  
Livingston, West Lothian  
Tel: Livingston 32766





## TELEQUIPMENT



Tektronix U.K. Limited

Head Office and Overseas Enquiries:  
313 Chase Road, Southgate  
London N14  
Tel: 01-882 6100. Telex: 262004

U.K. Marketing Office:  
PO Box 69, Coldharbour Lane  
Harpenden, Herts.  
Tel: 05827 63141. Telex: 25559