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FREECALL 1800 680 680



DLA-9D Data Line Analyzer

Features:

- Comprehensive parametric testing in the frequency range 20 Hz to 300 kHz
- Circuit testing in accordance with ITU-T M.1020, M.1025, M.1030, M.1040, M.1050 & M.1060
- Graphical Display of swept measurement results
- Phase, gain, and impulse noise events measurements with histogram display of results.
- Loopholding and dialling (Pulse and DTMF) for PSTN circuit testing
- Integral loudspeaker and microphone for line monitoring and end-to-end speech.
- Storage and downloading of instruments setups
- Storage and recall of test results.
- V.24 port for modem or printer connection.
- A range of accessories for signal balance, return loss and other measurements.
- Menus selectable in English, French, German, Italian or Spanish
- Ergonomically designed with adjustable stand for optimum operator convenience

The DLA-9D is a flexible and highly functional instrument for analogue testing up to 300 kHz. DSP (digital signal processing) technology delivers fast accurate results in a compact battery/mains powered instrument.

The feature set of the instrument is determined by software options. These can be selected to give the user a tailor-made solution for particular needs.

The large backlit graphical display with menu driven operation makes the DLA-9D very easy to use. It is suitable for commissioning, troubleshooting and maintenance on both 2-wire and 4-wire circuits. Wideband capability also makes the DLA-9D ideal for selecting suitable cable pairs for the ISDN Basic Rate "U" interface.

Measurements possible using the basic DLA-9D:

- Level/Attenuation
- Frequency
- Crosstalk (2 kHz)
- Selective level (2 kHz)
- Attenuation distortion (unmodulated)
- Noise with and without tone (820/1020 Hz)
- Psophometric Noise (O.41)
- Quantisation Distortion
- Signal to Noise Ratio
- Impedance (1 kHz)
- Return Loss (1 kHz)
- DC Voltage

Software Options

The following software options can be supplied already installed or as an upgrade option down loadable from a PC.

Level vs.Signal to Noise Option

Permits the measurement of Signal to Noise ratio.

- Level vs. Signal to noise ratio in accordance with (G.712)

Group Delay Measurement Option

Permits the measurement of Group Delay.

- Group Delay Distortion (O.81)
- Attenuation Distortion (O.81)

Events Measurement Option

Provides a comprehensive events testing package.Histogram analysis of all transient events enables problems to be identified to a one minute resolution.Fu rther analysis allows transients to be identified to a one second resolution.Measurements possible are:

- Impulsive noise (O.71)
- Impulsive noise (Wideband)
- Interruptions (O.61 and O.62 wideband)
- Phase Hits (O.95)
- Gain Hits (O.95)
- Phase Jitter (O.91)

End to End Control (ETEC) Option

The ETEC option enables automated testing between two instru m e n t s. The 'Master' instrument remotely controls a 'Slave' instrument over the circuit under test.Both instruments must be equipped with the ETEC option and either instrument can be configured to act as Master.

ETEC can be used over 2-wire and 4-wire circuits, and, with pre-defined measurement sequences and test limits, provides simpler faster testing.

Test Sequences

With the ETEC option, measurement sequences can be defined by the user to be run automatically.Sequence definitions can be copied b e t w e e n instruments allowing standard procedures to be fo l l o w e d .

Pass/Fail indication

Each measurement in a test sequence can have test limits applied.This allows a simple Pass/Fail indication against each result as the sequence is run.The Pass/Fail indications are stored and printed with the results.

Presentation of Results

Test results are clearly displayed on the high resolution LCD display in graphical and/or tabular form as described below:

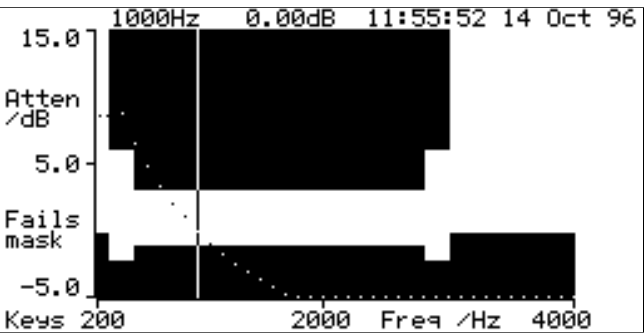
Graph Results

Result curves for frequency response, attenuation distortion and group delay distortion are displayed graphically.If the Level vs. SNR option is fitted, signal to noise ratio can be displayed as a graph against level.

Tolerance Masks

ITU-T or user programmed tolerance masks can be superimposed on result curves allowing an instantaneous assessment of the circuit quality.A cursor on the graph indicates the measured value at any point on the result curve.

Results Table



Shows all the measured values from a result curve in tabular form.Values which have failed a tolerance mask are highlighted by an asterisk.

Single Digit Results

Displayed in large bold easy to read digits. A simultaneously displayed quasi-analogue bar graph indicates the trend of measurements.

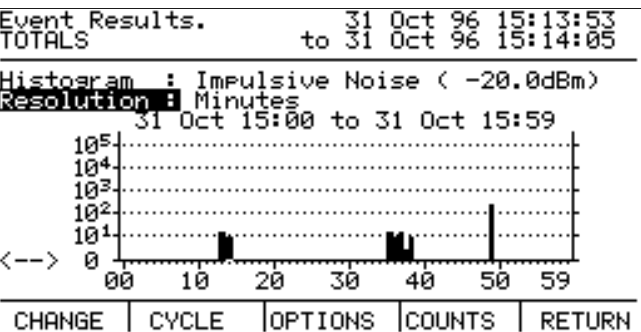
Histogram Results

All event measurements (e.g.impulsive noise, interruptions) can be displayed as histograms.Events measured can be displayed against time for the complete duration of the test. Up to 60 days of histogram results can be recorded.The last 60 hours (split between all event results) can be recorded with a resolution of 1 minute.

The following histogram types can be displayed:

- 60 days of results with a resolution of 1 day expendable to 1 hour
- 60 hours of results with a resolution of 1 hour expendable to 1 minute

Event Table



When the Events Option is fitted, all events can be displayed in tabular form showing total count for the duration of the test. A "one second" facility can be applied to the last set of results. This displays the total number of events counted during any one second interval.Up to 1,000 "one second" tables can be displayed. A search facility provides easy access to individual "one second" pages.

Storage and Printing of Results

Test results (date and time stamped) may be stored in the instrument for recall at a later time.Alternatively, for hard copy, the results can be printed locally via the instrument's V.24 port.

Transfer of results to PC

The WG Print Capture (WGPC) software supplied with the DLA-9D will run on a PC under Windows 3.1, 95 or NT and allows results to be transferred to the computer for long term storage, import into reports, or printing to any Windows printer. Results tables are saved as text files, and graphs are available as bitmap files.

Measurement Accessories

Accessories available to extend the measurement capabilities of the DLA-9D include:-

- VRL-6 Return Loss Bridge - allows swept return loss measurement on 2-wire circuits.
- VSM-6 Signal Balance Ratio Bridge - allows measurement of longitudinal conversion loss (LCL) and output signal balance (OSB) in accordance with ITU-T O.9.
- The VLB-6 Loopholding and Changeover Box allows loopholding to be switched in and out independently on two separate 2-wire circuits, and each circuit to be switched between generator and receiver.

Counters3 x 99999
Dead time.3 ms ± 1 ms and 125 ms ± 25 ms
Guard interval.35 us ± 15 us
Test duration.1 min.to 60 days
Test tone frequency (selectable) 820 Hz and 1020 Hz
Filters (ITU-T O.71).Flat (275 Hz to 3250 Hz)
.....Additional (750 Hz to 2300 Hz)
.....820 Hz, 1020 Hz notch

Interruptions Measurement (ITU-T O.61 and O.62)**

Threshold range.3 to 20 dB
Threshold resolution1 dB
Threshold accuracy 3 to 10 dB.±1 dB
11 to 20 dB.±2 dB
Counters ITU-T O.61.1 x 99999
ITU-T O.62.5 x 99999
user programmed.up to 10 x 99999
Dead time.3 ms ± 1 ms and 125 ms ± 25 ms
Test duration.1 min.to 60 days
Test tone frequency.1020 Hz
Test tone level range (600 Ω).-40 to + 5 dBm
Interruptions categories
ITU-T O.61>3.5 ms
ITU-T O.620.6-3 ms, 3-30 ms,30-300 ms
.....300 ms - 1 min., > 1 min.
User-programmed (10 categories)0.6 ms-> 1min.

Gain Hits Measurement (ITU-T O.95)**

Threshold range.± 2 to ± 9 dB
Threshold accuracy.±0.5 dB
Threshold resolution1 dB
Counters1 x 99999
Dead time.125 ms ± 25 ms
Guard interval.4 ms ±10%
Test duration.1 min.to 60 days
Test tone frequency.1020 Hz
Test tone level range (600 Ω).-50 to +5 dBm

Phase Hits Measurement (ITU-T O.95)

Threshold range.5 to 45°
Threshold accuracy.±0.3° ± 5 %
Threshold resolution1°
Counters1 x 99999
Dead time.125 ms + 25 ms
Guard interval.4 ms ±10%
Test duration.1 min.to 60 days
Test tone frequency.1020 Hz
Test tone level range (600 Ω).-50 to +5 dBm

Phase Jitter Measurement (ITU-T O.91)

Range0.2 to 40°
Accuracy
(level > -30 dBm, 600 Ω or jitter >3).±0.2° ±2.5%
Resolution0.1°
Filters (ITU-T O.91).4 Hz to 300 Hz
.....20 Hz to 300 Hz
Test tone frequency.1020 Hz
Test tone level range (600 Ω).-40 to +10 dBm
Receiver test tone hold level.-40 to +10 dBm

Impulsive Noise Measurement (Wideband)

Nominal threshold level range (150 Ω).+ 10 to -40 dBm
Additional thresholds relative to nomin.+3, -3 dB
Threshold accuracy
(> -30dBm, 150 Ω, generator muted).0, - 1 dB

Counters.3 x 99999
Dead time.3 ms ± 1 ms and 125 ms ± 25 ms
Guard interval.11 us ± 4 us
Test duration1 min, to 60 days

Interruptions Measurements (Wideband)

Threshold range3 to 20 dB

Threshold accuracy (150 Ω, generator muted)		
	3 to 10 dB	11 to 20 dB
+10 dBm to -20 dBm	±1 dB	±2 dB
-21 dBm to -25 dBm	±1 dB	±3 dB
-26 dBm to -30 dBm	±1.5 dB	—

Resolution1 dB
Counters (user-programmed categories) up to 10 x 99999
Dead time.3 ms ± 1 ms and 125 ms + 25 ms
Test duration1 min.to 60 days
Test tone frequency80 kHz
Test tone level range (150 Ω).-30 to +10 dBm
Interruption categories
User-programmed (10 categories).32 us to >1 min.

* With a resolution of 0.1 dB, an additional measurement uncertainty of up to 0.05 dB may be introduced.

** Impulsive noise, interruptions, phase hits and gain hits are all measured simultaneously using a 1020 Hz test tone.

~~Note: Specification applies to 4-wire operation (2-wire operation over the range 200 Hz to 4 kHz).~~

Swept Signal-to-Noise Ratio (SNR) vs Level Measurement (G.712)

SNR display range0 to 40 dB
Input level display range Absolute-50 to 10 dBm
.....Relative -50 to +10 dB
SNR accuracy, Psophometric filter
(noise level (≥ -85 dBm, 600 Ω)± 1 dB ± 1%

N.B. ITU-T has now replaced CCITT.

Generator

Connector. balanced, floating, 3-pin CF connector
 Output impedance (switchable). . . . low ($<12\Omega$), 600 Ω , 150 Ω
 and complex ($220\Omega + 115\text{ nF} // 820\Omega$)

20 kHz Range (Audioband)

Frequency range. 20 Hz to 20 kHz
 Frequency accuracy. $\pm 0.01\%$
 Frequency display resolution. 1 Hz
 Frequency sweeping: Step size. 1 to 2000 Hz
 Sweep rate. 1 to 8 steps/s
 Level range. -60 to +10 dBm
 Level accuracy (600 Ω)

	200 Hz to 20 kHz
+10 dBm to -40 dBm	$\pm 0.3\text{ dB}$
-41 dBm to -60 dBm	$\pm 0.5\text{ dB}$

Level resolution. 0.1 dB
 Level Sweeping (option BN 4518/00.06):
 Step size. 1, 2, 5 dB
 Sweep range. -50 to +10 dBm
 ITU-T O.81 signal frequency range. 200 Hz to 4 kHz
 ITU-T O.81 sweeping: Step size. 10 to 200 Hz
 Sweep rate. 1 or 4 steps/s
 ITU-T O.81 signal level range. -40 to +10 dBm
 Individual harmonic and spurious outputs
 (600 Ω balanced load)
 -40 to +10 dBm. -50 dBc
 -60 to -40 dBm. -30 dBc
 except, for signal levels $\leq -25\text{ dBm}$, spurious signals
 at frequencies greater than 30 kHz. $< -60\text{ dBm}$

Output signal balance (ITU-T O.9)

600 Ω output, 20 Hz to 20 kHz. $>50\text{ dBm}$

Output return loss

600 Ω output, 20 Hz to 20 kHz. $>35\text{ dB}$

Tone blanking. 10 user-programmed frequencies with
 a common user-defined blanking bandwidth

Spot frequencies. 10 sets of 30 user-programmed
 frequencies

300 kHz Range (Wideband)

Frequency range. 200 Hz to 300 kHz
 Frequency accuracy. $\pm 0.01\% \pm 1\text{ Hz}$
 Frequency display resolution. 10 Hz
 Level range. -40 to +8 dBm
 Level accuracy (600 Ω)

	200 Hz to 200 kHz	200 kHz to 300 kHz
+8 dBm to -40 dBm	$\pm 0.6\text{ dB}$	$\pm 1\text{ dB}$

Level resolution. 0.1 dB
 Individual harmonic and spurious outputs
 (600 Ω balanced load)
 -30 to +8 dBm. $< -35\text{ dBc}$
 -40 to -30 dBm. $< -25\text{ dBc}$
 Output signal balance
 150 Ω output, 200 Hz to 20 kHz. $>50\text{ dB}$
 20 kHz to 200 kHz. $>30\text{ dB}$
 Output return loss
 150 Ω output, 200 Hz to 20 kHz. $>40\text{ dB}$
 20 kHz to 200 kHz. $>30\text{ dB}$
 200 kHz to 300 kHz. $>20\text{ dB}$

Receiver

Connector. balanced, floating, 3-pin CF connector
 Input impedance (switchable) high ($>30\text{ k}\Omega$), 600 Ω , 150 Ω
 and complex ($220\Omega + 115\text{ nF} // 820\Omega$)

20 kHz Range (Audioband)

Receiver noise floor (generator muted)
 600 Ω term. wideband weighting. $< -88\text{ dBm}$
 600 Ω term. psophometric weighting. $< -98\text{ dBm}$
 Internal noise floor
 for signal levels $> -40\text{ dBm}$ at least 50 dB
 below the input signal
 Attenuation of out-of-band signals $>50\text{ kHz}$ $>45\text{ dB}$
 Input longitudinal interference loss (ITU-T O.9)
 600 Ω input, 20 Hz to 20 kHz. $>60\text{ dB}$
 Input return loss
 600 Ω input, 20 Hz to 20 kHz. $>40\text{ dB}$
 Display up-date rate. 4 per second

300 kHz Range (Wideband)

Receiver noise floor
 (600 Ω term., generator muted). $< -70\text{ dBm}$
 Input longitudinal conversion loss
 150 Ω input, 200 Hz to 20 kHz. $>60\text{ dB}$
 20 kHz to 200 kHz. $>30\text{ dB}$
 200 kHz to 300 kHz. $>20\text{ dB}$

Input return loss

150 Ω input, 200 Hz to 20 kHz. $>40\text{ dB}$

20 kHz to 200 kHz. $>30\text{ dB}$

200 kHz to 300 kHz. $>20\text{ dB}$

Audioband Measurement modes**Frequency Measurement**

Frequency range. 20 Hz to 20 kHz
 Frequency counter accuracy. $\pm 0.01\% \pm 1\text{ Hz}$
 Minimum signal level (600 Ω). $\sim -70\text{ dBm}$
 Frequency counter resolution. 1 Hz

Level Measurement

Detector type. True rms

Level range (crest factor <1.5)

600 Ω -80 to +10 dBm

150 Ω -74 to +16 dBm

Level accuracy (600 Ω wideband, generator muted)

	200 Hz to 10 kHz	10 kHz to 20 kHz
+10 dBm to -60 dBm	± 0.3 dB	± 0.6 dB
to -70 dBm	± 0.5 dB	± 0.6 dB
to -80 dBm	+0.9 dB -0.5 dB	± 0.6 dB

Level resolution* 0.1 or 0.01dB
Filters. Wideband, Channel, 2 kHz bandpass

Crosstalk Measurement (2 kHz)

Selective Level Measurement (2 kHz)

Measurement frequency. 2000 Hz
Level range -80 to +10 dBm
Crosstalk Attenuation measuring range. 0 to 100 dB
Accuracy. ± 1 dB
Resolution 0.1 dB
Measured using the 2 kHz bandpass filter
see Level Measurement for details

Noise Measurement

Psophometric Noise Measurement (ITU-T O.41)

Detector type. True rms
Noise level range (600 Ω , crest factor<3). -80 to +10 dBm
Accuracy. as level
Noise level resolution*. 0.1 or 0.01 dB
Filters. Wideband, Channel, Psophometric

Noise With-Tone Measurement

Noise level range (600 Ω). -80 to + 10 dBm
Tone level range. -60 to + 10 dBm
Test tone frequency. selectable
Filters. Wideband, Channel, Psophometric,
820 Hz notch, 1020 Hz notch

Quantising Noise Measurement (ITU-T O.132)

Signal-to-Noise Ratio Measurement

Range of signal to noise measurement. 10 to 50 dB
Accuracy (noise level ≤ -80 dBm, 600 Ω)
10 to 40 dB. ± 1 dB
40 to 50 dB. ± 3 dB
Resolution* 0.1 or 0.01 dB
Test tone frequency (selectable). 820 Hz and 1020 Hz
Filters. Wideband, Channel, Psophometric,
820 Hz notch, 1020 Hz notch

Frequency Response Measurement (unmodulated)

Attenuation Distortion Measurement (unmodulated)

Frequency range. 20 Hz to 20 kHz
Graphical display range. 20 Hz to 20 kHz
..... and 200 Hz to 4 kHz
Rx Level range (600 Ω). -80 to + 10 dBm
Tx Level range (600 Ω). -60 to + 10 dBm
Resolution* 0.1 or 0.01dB
Filters. Wideband, Channel

Return Loss Measurement (1 kHz)

(measurement made against internal system impedances)

Range. 0 to 40 dB
Accuracy. ± 1 dB ± 5 % of reading

Resolution* 0.1 or 0.01 dB
Drive signal 2V rms (emf)

Impedance Measurement (1 kHz)

Range. 6 Ω to 6 k Ω
Accuracy
6 Ω to 1300 Ω ± 2 %
1300 Ω to 3500 Ω ± 5 %
3500 Ω to 6000 Ω ± 8 %
Resolution < 100 Ω 0.1 Ω
> 100 Ω 1 Ω
Drive signal. 2 V rms (emf)

DC Volts Measurement

Range 120 V of either polarity
Accuracy. $\pm 1\%$ ± 1 V
Resolution. 0.1 V

Wideband Measurement modes

Frequency Measurement (Wideband)

Frequency range. 200 Hz to 300 kHz
Frequency counter accuracy. ± 0.01 % ± 2 Hz
Minimum signal level (600 Ω). -40 dBm
Frequency counter resolution <20 kHz. 1 Hz
..... ≥ 20 kHz. 10 Hz

Wideband Level and Noise Measurement

Wideband Attenuation and Crosstalk Measurement

Level range (crest factor<1.5) 600 Ω -60 to +10 dBm
150 Ω -54 to +16 dBm
Noise range (crest factor<3) 600 Ω -60 to +5 dBm
150 Ω -54 to +11 dBm

Level accuracy (600 Ω , generator muted)

	200 Hz to 200 kHz	200 kHz to 300 kHz
+10 dBm to -60 dBm	± 0.6 dB	± 1 dB

Level resolution** 0.1 or 0.01 dB

Group Delay Software Option

Group Delay Distortion Measurement (ITU-T O.81)

Attenuation Distortion Measurement (ITU-T O.81)

Frequency range. 200 Hz to 4 kHz
Graphical display range. 200 Hz to 4 kHz
Level range (600 Ω). -40 to + 10 dBm
Group delay range. ± 10 ms
Group delay accuracy as per ITU-T O.81
Group delay resolution 10 μ s or 1 μ s
Attenuation range. ± 20 dB
Attenuation accuracy. ± 1 dB
Attenuation resolution. 0.1 or 0.01dB
Initial max.attenuation distortion for sync. <15 dB

Events Software Option

Impulsive Noise Measurement (ITU-T O.71) **

Nominal threshold level range (600 Ω)-50 to 0 dBm
Additional thresholds relative to nominal. +3, -3 dB
Nominal threshold accuracy as ITU-T O.71
Threshold resolution. 0.1 dB

General features

Tolerance masks

Available for the group delay and attenuation distortion option when fitted.

Dialling and loopholding

Measurements can be made over a public switched telephone network by using the integral dialling and loopholding features of the DLA-9D. Dialling is done from the numeric keypad and loopholding is indicated on the screen.

Types of dialling. DTMF, Pulse (loop disconnect)
Loopholding current. 80 mA maximum

Storage of results and setups

Results will remain stored in memory as long as there is power left in the batteries. When power down is due to low battery supply, stored results are retained as power down takes place before the batteries are totally discharged. An internal capacitor retains the contents of the memory for at least 10 minutes (typically 12 hours) whilst batteries are being changed.

Feature	Storage
Histogram results	10 sets of 60 days
Instrument setups	10 complete sets
Group delay/ Attenuation results (when fitted)	10 pairs of curves
Swept signal to ratio (when fitted)	10 sets of 60 days

Calibration

Built-in self-calibration takes place automatically once a day and

after a change in temperature of approx.5°C. This feature can be disabled by the operator.

Languages

Menus and printouts are available in English, French, German, Italian and Spanish. Languages are user selected from within the instrument menu structure.

Display

Type. Liquid Crystal Display (LCD)
including user-controlled backlight
Size. 120 x 60 mm (256 X 128 pixels)

Printing

Printing of graphs, tables, histograms and setups with the time and date to an external printer.

Interface Serial V.24/RS232
Physical. 25-way male D-type, DTE
Electrical according to ITU-T V.28
Circuits. according to ITU-T V.24
RD,TD,RTS,CTS,DTR

Printer types. Epson FX&MX graphics/
HP Thinkjet/standard ASCII

Baud rates. 300,600,1200, 2400,4800,9600
Parity. odd, even, mark, space, none
Bits/character. 7, 8
Stop bits. 1, 2
Flow control. CTS, XON/XOFF, slow, none

Printer autoconfigure mode helps determine the unknown configuration of a printer.

General specifications

Power supply

DLA-9D can be powered from either rechargeable batteries or AC.mains via an adaptor. When connected to AC.mains, rechargeable batteries are automatically charged.

Battery operation:

Type. 6 internal NiCd cells
Size KR 27/50, "C", "Baby"

AC mains operation. Using external LNT-6

Operating conditions

Temperature range:

Operation. 5°C to 45°C
Storage -20°C to +60°C

Physical

Dimensions (D x W x H). 232 x 210 x 115 mm
Weight (with batteries) 2.8 kg
Stand. Built-in

Ordering Information

DLA-9D Data Line Analyzer 4547/10

complete with six 'C' size Ni-Cd cells, LNT-6 AC Adaptor/Charger and shoulder strap

Please specify the required mains plug type when ordering:

European type power plug BN 4529/00.01
UK type power plug BN 4529/00.02
US type power plug BN 4528/00.01
Australian type power plug BN 4529/00.04

Options (available at extra cost):

Swept Signal-to-Noise Ratio vs Level (G.712) BN 4547/00.01
End-to-end Control Option BN 4547/00.02
Group Delay Option BN 4547/00.03
Events Option BN 4547/00.04

Standard optional impedance sets

(replacing the standard 600 Ω, 150 Ω, 220 Ω + 820 Ω//115nF):
600 Ω 135 Ω 220 Ω + 820 Ω//115 nF BN 4514/00.20

600 Ω 950 Ω 220 Ω + 820 Ω//115 nF BN 4514/00.21
600 Ω, 900 Ω, 900 Ω //60 nF BN 4514/00.22
600 Ω, 900 Ω, 220 Ω + 820 Ω//115 nF BN 4514/00.23
600 Ω, 140 Ω, 370 Ω + 620 Ω//310 nF BN 4514/00.24
600 Ω, 1600 Ω, 900 Ω//60 nF BN 4514/00.25
600 Ω, 1200 Ω, 220 Ω + 820 Ω//120 nF BN 4514/00.26
600 Ω, 135 Ω, 800 Ω BN 4514/00.27

Accessories (available at extra cost):

VSM-6 VF Signal Balance Ratio Bridge BN 4514/00.04
VLB-6 VF Loopholding/Changeover Box BN 4514/00.05
VRL-6 VF Return Loss Bridge BN 4514/00.11

Equipment cases:

With cutouts for DLA-9D, LNT-6,
printer and a.c.mains charger BN 4527/00.01
With cutouts for DLA-9D and LNT-6 only BN 4527/00.02
Soft carrying case BN 4527/00.08
Printer cable K 1500

Subject to change without notice - E/1197/D4/846/5.0 GNV.709 - Printed in England