



# Dynatel™ 965DSP

## Subscriber Loop Analyzer



## Complete testing of POTS and ISDN subscriber loops

The 3M™ Dynatel™ 965DSP Subscriber Loop Analyzer is a microprocessor-controlled integrated test set that provides full-featured POTS and wideband testing. The functions include fault location and repair verification on twisted-pair, quad and coaxial cable (utilizing capacitance bridge, resistance bridge and Time Domain Reflectometer (TDR) functions).

The Dynatel 965DSP subscriber loop analyzer executes a wide range of individual tests, or performs automatic test routines to categorize and sectionalize problems. Specific tests and measurements performed by the unit include:

- Voltage – detects and measures the presence of central office (exchange) or foreign DC or AC voltages.
- Tone – provides test tones for conductor identification and transmission testing. 10 default tones, user selectable as ID tone, voiceband, or wideband. Wideband goes up to 1.2 MHz, voiceband to 20 kHz, ID tone to 1000 Hz.
- Current – measures DC loop current.
- Resistance – measures conductor and insulation resistance up to 1000 megohms.
- TDR – full-featured TDR with user-selectable pulse widths, length, gain zoom, filter and Vp. Five modes of operation:

**Single trace** – provides graphical representation of events on a pair.

**Dual trace** – allows active comparison of two traces.

**Differential** – displays difference between two circuits.

**Crosstalk** – displays the crosstalk from one pair to another.

**Memory** – allows comparison of an active trace with a trace stored in memory.

**Peak** – displays a history of maximum and minimum values with the live trace.

- Resistive fault location – displays distance to fault.
- Opens – locates opens at distances up to 100,000 ft. (30 km).
- Load coil count – indicates the presence of load coils in a loop circuit and distance to the first load coil.
- Wideband loss – loss measurements to 1200 kHz for pre-qualifying ISDN, HDSL and ADSL.
- Loss – measures voiceband loss.
- Noise – measures noise metallic and noise to ground in dBm or dBm0p.
- Longitudinal balance – provides active measurement of line balance.
- Autotest – allows an automatic test of active, inactive and wideband (56K/64K DDS, ISDN, HDSL, T1, E1 and ADSL) lines with pass/fail limits.
- Ground resistance – allows the 965DSP to measure the resistance of the ground path.
- Special resistance – allows the 965DSP to measure the loop resistance and the resistance difference between two conductors on a pair.
- K-Test – allows RFL measurement when both wires in a pair are faulted and there is no separate good pair available.



3M Dynatel 965DSP with 3M Far End Device

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- Ringers – measures and displays capacitance associated with one or more ringers and the equivalent count.
- Level Trace – measures and displays the AC impedance of the unterminated line as a function of frequency.
- 3M's FED and CTCs Smartstrap™ support for wideband auto test.

### Flexible, practical features

The 965DSP subscriber loop analyzer is designed for functionality and ease of use. Features of the unit include:

- IR port – infrared port for downloading future software programs and uploading test results to a PC or printer.
- Self-calibration – internal instrument calibration and set-up procedures.
- Graphical user interface – user-friendly, icon-based display of test results.
- Replaceable test leads.
- HELP function – an internal help menu provides information as needed during operation.
- Telephone – internal telephone or “talk set.”
- Rechargeable nickel metal hydride batteries – with battery charger and alkaline battery holder.
- Object oriented software design – for easy upgrades, investment protection.
- Backlit high resolution/high contrast LCD display.

### Rugged, weather resistant design

The hand-held 965DSP test set is housed in a lightweight, ergonomically designed case for portability and ease of handling. The unit is weather-resistant and weighs only 3.3 pounds (1.5 kg).

The Dynatel brand and its distinctive Dynatel yellow cases are your assurance of rugged dependability.



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RFL Strap



6 AD/DC Adapter Cable

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## 3M™ Dynatel™ 965DSP Subscriber Loop Analyzer

### Electrical Specifications

Main Functions	Range	Resolution	Accuracy
Voltage (DC)	0 to 99.9 V 100 to 300 V	0.1 V 1 V	1% ± 0.5 V 3%
Voltage (AC)	0 to 99.9 V 100 to 250 V	0.1 V 1 V	1% ± 0.5 V 3%
Current	0 to 59.9 mA 60 to 110 mA	0.1 mA 0.1 mA	1% ± 0.3 mA 2%
Resistance (DC) with CO voltage	0 to 9999 Ω 0 to 9999 Ω 10 k to 99.9 kΩ 100 k to 999 kΩ 1 M to 9.9 MΩ 10 M to 99 MΩ 100 M to 990 MΩ	1 Ω 1 Ω 0.1 kΩ 1 kΩ 0.1 MΩ 1 MΩ 10 MΩ	1% ± 5 Ω 1% ± 50 Ω 1% 3% 3% 5% 10%
Opens (no noise)	0 to 3,000 ft (0 to 1000 m) 3,000 to 10,000 ft (1 km to 3 km) 10,000 to 50,000 ft (3 km to 15 km) 50,000 to 100,000 ft (15 km to 30 km)	1 ft (1 m) 1 ft (1 m) 10 ft (10 m) 100 ft (100 m)	1% ± 3 ft (1 m) 3% 5% 10%
RFL			
Fault range	0 to 20 MΩ	—	—
Resistance to fault (no noise)	0 to 99.99 Ω RTS 100 to 999.9 Ω RTS 1 kΩ to 7 kΩ RTS	0.01 Ω 0.1 Ω 1.0 Ω	0.1% of RTS ± 0.01 Ω 0.2% of RTS ± 0.01 Ω 1.0% of RTS ± 0.01 Ω
Loss (& frequency) with 600 Ω Zin	-40 to +10 dBm, 200 to 3000 Hz -40 to +10 dBm, 3000 to 9995 Hz -40 to +10 dBm, 10 k to 19.9 kHz	0.1 dB, 1 Hz 0.1 dB, 5 Hz 1 dB, 10 Hz	0.5 dB, 2 Hz 0.5 dB, 10 Hz 1 dB, 20 Hz
Wideband loss 135 Ω Zin	-50 to +2 dBm, 20 k to 1200 kHz	.1 dB, 100 Hz	2 dB, 1%
Noise metallic 600 Ω Zin	0 to 50 dBmrc (-90 to -40 dBm0p)	1 dB	2 dB
Noise to ground 600 Ω Zin	40 to 100 dBmrc (-50 to 10 dBm0p)	1 dB	2 dB
Longitudinal balance	0 to 85 dB	1 dB	2 dB
Tone output			
ID	200 to 1000 Hz, fixed level	1 Hz	1%
Precision - 600 Ω Zout	200 to 9999 Hz, -20 to +1 dBm 10 k to 19.99 kHz, -20 to +1 dBm	1 Hz, 0.1 dB 1 Hz, 0.1 dB	1% Hz, 0.2 dB 2% Hz, 1 dB
Wideband - 135 Ω Zout	0 dBm, 20 k to 1200 kHz	1 kHz	1 dB
Dial mode	DTMF, Pulse	Standard	Standard
TDR*			
Ranges	3 ft–300 ft, 20 ft–1,000 ft, 50 ft–3,000 ft, 150 ft–10,000 ft, 450 ft–30,000 ft (1–100 m, 5–300 m, 15–1,000 m, 45–3,000 m, 140–10,000 m)	1 ft (1 m)	0.6% range
Pulse width	5 nS, 34 nS, 235 nS, 1600 nS	Fixed values	—
Velocity input	0.50 to 0.99 (150 to 299 m/μs)	0.01 (1 m/μs)	—
Modes	Single trace, dual trace, differential, memory, crosstalk	—	—
ISDN			
Link test	Active/inactive	—	—
Error test (U.S. & Canada only)	Near-end & far-end block errors	1 error	1 error
Auto	Same specifications as full tests	See above	See above

\*Not included in 965DSP-B version; available as optional factory upgrade.

### Physical Specifications

Size	10.0"H x 4.0"W x 2.5"D	(25 cm x 10 cm x 6 cm)
Net weight	3.3 lb. with battery and soft case	(1.5 kg)
Shipping weight	7 lb.	(3.17 kg)
Material	High-impact grade ABS	



AC/DC Adapter

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Battery Holder

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Battery Pack

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Far End Device

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## 3M™ Dynatel™ 965DSP Subscriber Loop Analyzer

### Environmental Specifications

Operating temperature	0° to 140°F	(-18 to 60°C)
Storage temperature	-40° to 165°F	(-40 to 75°C)
Humidity	0-95%, non-condensing	

### Accessories

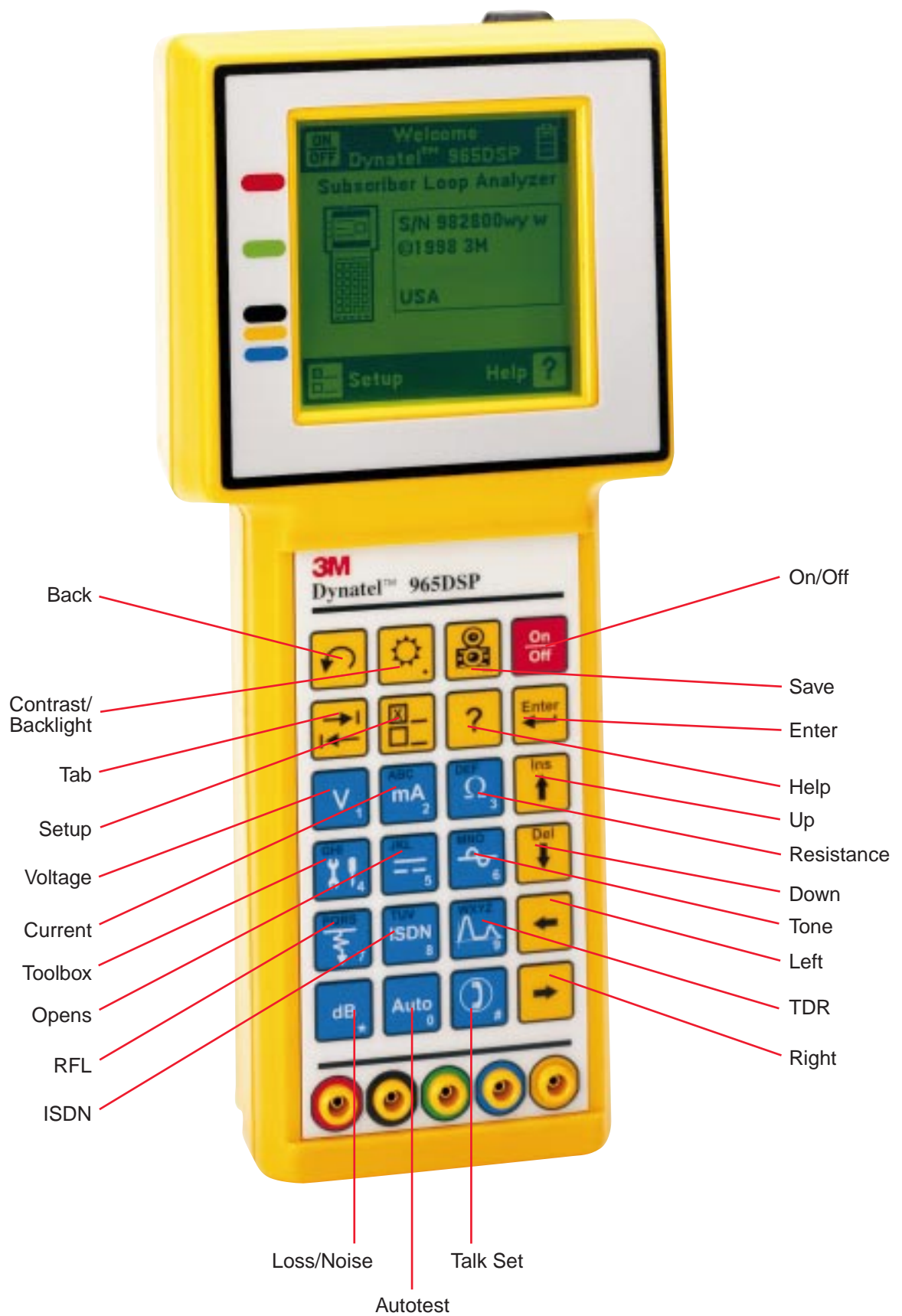
Test leads	U.S. – Five 5 ft (1.5 m) test leads with 2 mm gold-plated banana plugs one end and chrome-plated alligator clips on other end (black/red, blue/yellow, green) European – Five 5 ft (1.5 m) test leads with 2 mm gold-plated banana plugs one end and 4 mm gold-plated banana plugs on other end (black/red, blue/yellow, green)
RFL strap	U.S. – 1.5 ft (0.5 m) with alligator clips on ends European – 1.5 ft (0.5 m) with banana plugs on ends
AC/DC adaptor	100-250 Vac (50/60 Hz) input; 12 Vdc (1 A) output. For charging only. Do not operate when using adapter.
Soft case	Heavy-duty fabric case for unit and test leads
Battery holder	Plastic holder for 6 AA (LR6) batteries
Battery pack	Custom 1.2 amp-hour Nickel metal hydride

Toolbox Functions	Range	Resolution	Accuracy
Load coil count	0 to 5	1	±1
Ohms/distance calculator	0-9999 ohms 0-99999 ft (0-30 km)	0.01Ω 1 ft (0.1 m)	— —
Caller ID (U.S. & Canada only) Carrier level	Date, time, number, name -4 to -32 dBm	— 1 dBm	— 2 dBm
Self-calibrate	Pass/Fail		
Loop resistance	0 to 99.9 Ω 100 to 999.9 Ω 1000 to 7000 Ω	0.01 Ω 0.1 Ω 1 Ω	0.1% ± 0.01 Ω 0.2% ± 0.01 Ω 1.0% ± 0.01 Ω
Resistance difference	0 to 99.99 Ω	0.01 Ω	1% of loop resistance ± 0.01 Ω
Ground resistance	5 to 500 Ω	1 Ω	1% ± 1 Ω
K-Test			
Loop resistance	0 to 7K Ω	—	—
Fault ratio	(Fault Res <sub>1</sub> ) > twice (Fault Res <sub>2</sub> )	—	—
Resistance to fault (no noise)	0 to 99 Ω 100 to 999 Ω 1K Ω to 3.5K Ω	0.01 Ω 0.1 Ω 1 Ω	5% 5% 5%
Stored results (Auto Test and TDR)	100 results of each, minimum		
Ringers	0.0 to 4.0 0 to 2000 nF	0.1 Ω 10 nF	

### General Specifications

Ruggedness	Survives 5 ft (1.5 m) drop in soft case
Water-resistance	Splash-proof; may be used in light to moderate rain
Standards	Meets FCC part 15, class A: Digital Devices for the US, and EN55022 (radiated emissions), EN55024-2 (electrostatic discharge), EN55024-3 (radiated immunity) EN55024-4 (transient immunity) and IEC1010 (product safety) for Europe. Built to ISO9001 certification for manufacturing facilities. Built to Bellcore (Telcordia Technologies) TSY000078 manufacturing methods. Meets UL50 Rain Test.
Language	English, Spanish, French, German, Danish, Italian, Canadian French
Units	Feet or meters, Fahrenheit or Celsius, dBmC or dBm0p, m/uS or Vf
Battery life	Rechargeable battery pack, 12 hours typical usage (no backlight), 4 hours typical (with backlight); typical usage defined as 30 minutes on, 30 minutes off
Charging time	2 hours from low to full, typical
Keypad	24-key membrane keypad with tactile feedback
Display	2.5" x 2.5" (74 x 74 cm), 192 by 192 pixel resolution, backlight

Note: Routine calibration is not recommended or required.



## 3M™ Dynatel™ 965DSP Subscriber Loop Analyzer

Test	Inactive Pair w/o FED Basic Full		Inactive Pair w/FED Basic	Inactive Pair w/FED Full	Active Pair w/o FED	Wideband w/FED Basic	Wideband w/FED Full
Volts	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ohms	Yes	Yes	Yes	Yes	No	Yes	Yes
Opens	Yes	Yes	Yes	Yes	No	Yes	Yes
Longitudinal balance	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sweep loss	No	No	No	Yes	No	No	Yes
Single tone loss	No	No	Yes	Yes	Yes	Yes	Yes
Loop resistance	No	No	No	Yes	No	Yes	Yes
Resistance balance	No	No	No	No	No	No	Yes
Load coils	No	Yes	No	Yes	No	Yes	Yes
Loop current	No	No	No	No	Yes	No	No
Noise	No	No	No	No	Yes	No	No
Power influence	No	No	No	No	Yes	No	No
Capacitive balance	No	No	No	No	No	Yes	Yes
Slope	No	No	No	Yes	No	No	No

### Ordering Information

To order, specify the appropriate 965DSP Subscriber Loop Analyzer which includes: analyzer, AC adaptor, AC power cord, test leads, alkaline battery holder,

conductor strap and operating manual. For further information, please contact your local 3M sales representative.

Stock Number	Product Description	UPC
80-6108-6390-6	965DSP-Subscriber Loop Analyzer	051138-57603
80-6109-9074-1	965DSP-B Subscriber Loop Analyzer	051138-58643
80-6109-9319-0	965DSP-European Model	051138-70088
80-6109-9203-6	965DSP-B TDR Upgrade Kit	051138-58770

### Optional accessories

80-6108-6435-9	Black/red test lead, alligator, bed of nails	051138-57648
80-6108-6395-5	Black/red test lead, 4 mm banana, 1.5 m	051138-57608
80-6108-6436-7	Blue/yellow test lead, alligator, bed of nails	051138-57649
80-6108-6397-1	Blue/yellow test lead, 4 mm banana, 1.5 m	051138-57610
80-6108-6437-5	Green test lead, alligator, bed of nails	051138-57650
80-6108-6399-7	Green test lead, 4 mm banana, 1.5 m	051138-57612
80-6108-6472-2	Alkaline battery holder	051138-57685
80-6109-9059-2	110/220 Vac adaptor	051138-57606
80-6108-6392-2	Soft case	051138-57605
80-6108-6473-0	Nickel metal hydride, battery pack	051138-57686
80-6109-3281-8	Cigarette lighter adaptor	051138-57744
80-6109-3830-2	Ground strap, alligator	051138-58529
80-6109-3833-6	Ground strap, 4 mm banana	051138-58532
80-6109-9197-0	IR Adapter Cable	051138-58764
80-6109-9320-8	1162 KM Box (K-test Adaptor)	051138-70089
80-6110-2035-7	Far end device	051138-89322
80-6110-2044-9	Printer IR Adapter	051138-89331
80-6110-2045-6	Seiko DPU-414 Printer Kit	051138-89332

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