



# Complete testing of POTS and ISDN subscriber loops

The 3M<sup>™</sup> Dynatel<sup>™</sup> 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 dBrnc 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

• Ringers – measures and displays capacitance associated with one or more ringers and the equivalent count.

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- Level Trace measures and displays the AC impedance of the unterminated line as a function of frequency.
- 3M's FED and CTCs Smartstrap<sup>™</sup> support for wideband auto test.

## Flexible, practical features

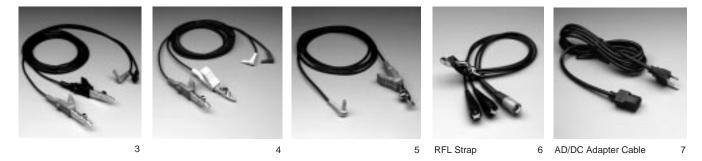
The 965DSP subscriber loop analyzer is designed for functionality and ease of use. Features of the unit include:

- 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.



# $\mathbf{3M}^{\scriptscriptstyle{\mathrm{TM}}} \; \mathbf{Dynatel}^{\scriptscriptstyle{\mathrm{TM}}} \; \mathbf{965DSP} \; \mathbf{Subscriber} \; \mathbf{Loop} \; \mathbf{Analyzer}$

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\% \pm 5 \Omega \\     1\% \pm 50 \Omega \\     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 Resistance to fault (no noise)	0 to 20 MΩ 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 $\Omega$ Zin	-50 to +2 dBm, 20 k to 1200 kHz	.1 dB, 100 Hz	2 dB, 1%	
Noise metallic 600 $\Omega$ Zin	0 to 50 dBrnc (-90 to -40 dBm0p)	1 dB	2 dB	
Noise to ground 600 $\Omega$ Zin	40 to 100 dBrnc (-50 to 10 dBm0p)	1 dB	2 dB	
ongitudinal balance	0 to 85 dB	1 dB	2 dB	
$ \begin{array}{ll} \hline \end{tabular} \begin{tabular}{lllllllllllllllllllllllllllllllllll$		1 Hz 1 Hz, 0.1 dB 1 Hz, 0.1 dB 1 kHz	1% 1% Hz, 0.2 dB 2% Hz, 1 dB 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 Velocity input Modes	5 nS, 34 nS, 235 nS, 1600 nS 0.50 to 0.99 (150 to 299 m/µs) Single trace, dual trace, differential, memory, crosstalk	Fixed values 0.01 (1 m/µs) —		
ISDN Link test Error test (U.S. & Canada only)	Active/inactive 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			



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### **Environmental Specifications**

Environmental Specific	cations					
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 a	ind test leads				
Battery holder	Plastic holder for 6 AA (LR6) bat	tteries				
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	$\begin{array}{c} 0.1\% \pm 0.01 \ \Omega \\ 0.2\% \pm 0.01 \ \Omega \\ 1.0\% \pm 0.01 \ \Omega \end{array}$			
Resistance difference	0 to 99.99 Ω	0.01 Ω	1% of loop resistance $\pm$ 0.01 $\Omega$			
Ground resistance	5 to 500 Ω	1 Ω	1% ± 1 Ω			
K-Test Loop resistance Fault ratio Resistance to fault (no noise)	0 to 7K Ω (Fault Res,) > twice (Fault Res₂) 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, dBrnC 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

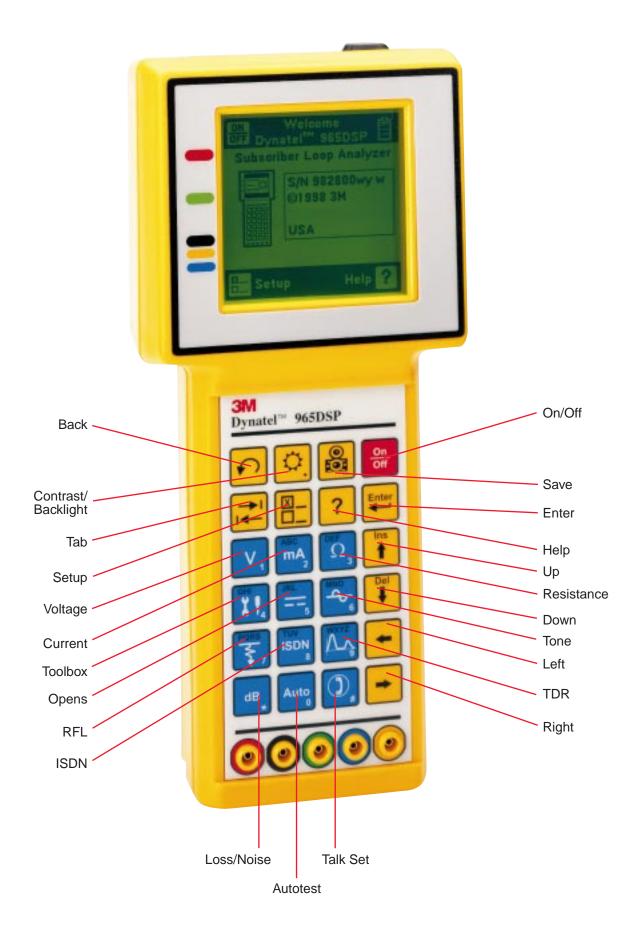
 Charging time
 2 hours from low to full, typical

 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: Deutine celibration is not recommended or required

Note: Routine calibration is not recommended or required.



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Test	Inac Pa w/o Basic	ir	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.

This product will be free from defects in material and manufacture

for a period of 12 months from the date of purchase. 3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. If this product is defective within the

warranty period stated above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the 3M product. Except where prohibited by law,

3M will not be liable for any loss or damage arising from this 3M product, whether direct, indirect, special, incidental or

consequential regardless of the legal theory asserted.

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	
<b>Optional accessories</b>			

#### 80-6108-6435-9 051138-57648 Black/red test lead, alligator, bed of nails 80-6108-6395-5 Black/red test lead, 4 mm banana, 1.5 m 051138-57608 80-6108-6436-7 051138-57649 Blue/yellow test lead, alligator, bed of nails 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 051138-57606 80-6109-9059-2 110/220 Vac adapter 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 051138-58529 80-6109-3830-2 Ground strap, alligator 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 051138-89331 80-6110-2044-9 Printer IR Adapter 80-6110-2045-6 Seiko DPU-414 Printer Kit 051138-89332 Warranty; Limited Remedy; Limited Liability.

### **Important Notice**

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**Telecom Systems Division** 

6801 River Place Blvd. Austin, TX 78726-9000 800/426 8688 FAX 800/626 0329 http://www.3M.com/telecom

 $\mathbf{G}$ Litho in USA 40% Pre-consumer waste paper 10% Post-consumer waste paper