



# 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 dBrc 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



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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<br>100 to 300 V                                                                                                                           | 0.1 V<br>1 V                                               | 1% ± 0.5 V<br>3%                                                     |
| Voltage (AC)                         | 0 to 99.9 V<br>100 to 250 V                                                                                                                           | 0.1 V<br>1 V                                               | 1% ± 0.5 V<br>3%                                                     |
| Current                              | 0 to 59.9 mA<br>60 to 110 mA                                                                                                                          | 0.1 mA<br>0.1 mA                                           | 1% ± 0.3 mA<br>2%                                                    |
| Resistance (DC)<br>with CO voltage   | 0 to 9999 Ω<br>0 to 9999 Ω<br>10 k to 99.9 kΩ<br>100 k to 999 kΩ<br>1 M to 9.9 MΩ<br>10 M to 99 MΩ<br>100 M to 990 MΩ                                 | 1 Ω<br>1 Ω<br>0.1 kΩ<br>1 kΩ<br>0.1 MΩ<br>1 MΩ<br>10 MΩ    | 1% ± 5 Ω<br>1% ± 50 Ω<br>1%<br>3%<br>3%<br>5%<br>10%                 |
| Opens (no noise)                     | 0 to 3,000 ft (0 to 1000 m)<br>3,000 to 10,000 ft (1 km to 3 km)<br>10,000 to 50,000 ft (3 km to 15 km)<br>50,000 to 100,000 ft (15 km to 30 km)      | 1 ft (1 m)<br>1 ft (1 m)<br>10 ft (10 m)<br>100 ft (100 m) | 1% ± 3 ft (1 m)<br>3%<br>5%<br>10%                                   |
| RFL                                  |                                                                                                                                                       |                                                            |                                                                      |
| Fault range                          | 0 to 20 MΩ                                                                                                                                            | —                                                          | —                                                                    |
| Resistance to<br>fault (no noise)    | 0 to 99.99 Ω RTS<br>100 to 999.9 Ω RTS<br>1 kΩ to 7 kΩ RTS                                                                                            | 0.01 Ω<br>0.1 Ω<br>1.0 Ω                                   | 0.1% of RTS ± 0.01 Ω<br>0.2% of RTS ± 0.01 Ω<br>1.0% of RTS ± 0.01 Ω |
| Loss (& frequency)<br>with 600 Ω Zin | -40 to +10 dBm, 200 to 3000 Hz<br>-40 to +10 dBm, 3000 to 9995 Hz<br>-40 to +10 dBm, 10 k to 19.9 kHz                                                 | 0.1 dB, 1 Hz<br>0.1 dB, 5 Hz<br>1 dB, 10 Hz                | 0.5 dB, 2 Hz<br>0.5 dB, 10 Hz<br>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<br>10 k to 19.99 kHz, -20 to +1 dBm                                                                                     | 1 Hz, 0.1 dB<br>1 Hz, 0.1 dB                               | 1% Hz, 0.2 dB<br>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,<br>50 ft–3,000 ft, 150 ft.–10,000 ft,<br>450 ft–30,000 ft<br>(1–100 m, 5–300 m, 15–1,000 m,<br>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,<br>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

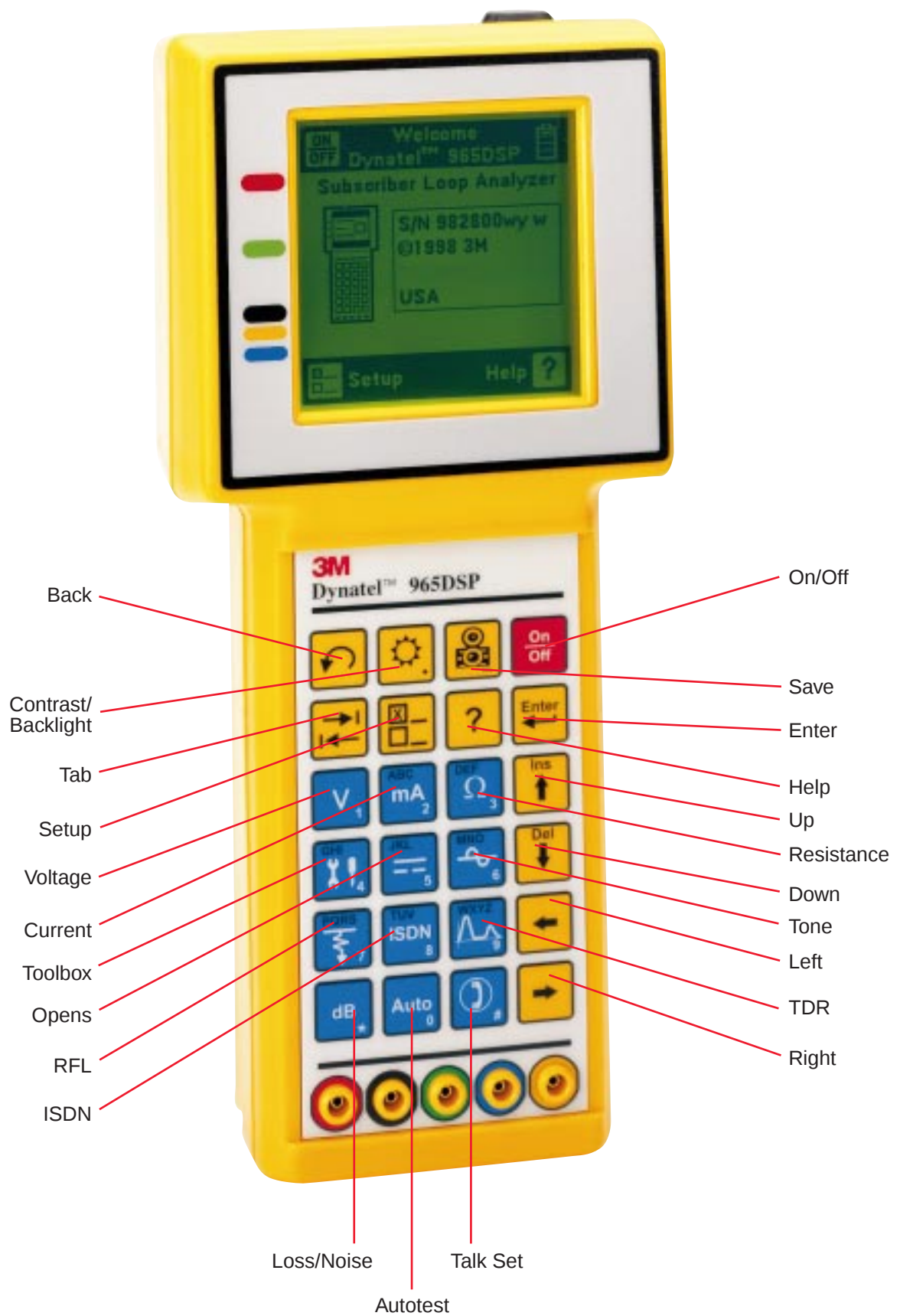
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|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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)<br>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<br>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<br>0-99999 ft (0-30 km)                         | 0.01Ω<br>1 ft (0.1 m)  | —<br>—                                          |
| Caller ID (U.S. & Canada only)<br>Carrier level | Date, time, number, name<br>-4 to -32 dBm                   | —<br>1 dBm             | —<br>2 dBm                                      |
| Self-calibrate                                  | Pass/Fail                                                   |                        |                                                 |
| Loop resistance                                 | 0 to 99.9 Ω<br>100 to 999.9 Ω<br>1000 to 7000 Ω             | 0.01 Ω<br>0.1 Ω<br>1 Ω | 0.1% ± 0.01 Ω<br>0.2% ± 0.01 Ω<br>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<br>100 to 999 Ω<br>1K Ω to 3.5K Ω                 | 0.01 Ω<br>0.1 Ω<br>1 Ω | 5%<br>5%<br>5%                                  |
| Stored results (Auto Test and TDR)              | 100 results of each, minimum                                |                        |                                                 |
| Ringers                                         | 0.0 to 4.0<br>0 to 2000 nF                                  | 0.1 Ω<br>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.<br>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<br>w/o FED<br>Basic Full |     | Inactive Pair<br>w/FED Basic | Inactive Pair<br>w/FED Full | Active Pair<br>w/o FED | Wideband<br>w/FED Basic | Wideband<br>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 |

### Important Notice

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