



Now  
You Know



## Knowledge Is Power.

Your network is down. Try diagnosing it with some testers, and they'll show you that the service isn't working. Which you already know.

Rather than just testing the network service, the new 3M™ Dynatel™ Advanced Modular System 965AMS tests the integrity of the physical media layer. With this new family of Dynatel testers, you can determine what your line problem is, where it is and what's causing it.

### Modems come and go. It's the media that matters.

Unlike some testers, Dynatel tests the integrity of the physical media layer. With its full-featured DSL-specific wideband and POTS testing, one technician may quickly, easily and accurately pinpoint the location and extent of each problem. The line can then be repaired and re-qualified for future reference.

### Built for the real world. Because you work in the real world.

The new 3M™ Dynatel™ Advanced Modular System 965AMS meets or exceeds Broadband Forum and IEEE standards, can be fully immersed, survive a five-foot drop and still perform. This durable workhorse even works at 0 degrees Fahrenheit.

### 30 years of technology at your service.

With the 3M™ Dynatel™ Advanced Modular System 965AMS, a field technician gains the accumulated knowledge of over 30 years in advanced testing and technology from the leader in copper testing. Plus new capabilities.

For instance, its enhanced TDR capabilities allow you to trace and locate troublesome faults that are difficult, if not impossible, to do with other testers, which can help reduce repeat calls and save you money.

And with the advanced 3M™ Dynatel™ Fault Sense technology<sup>1</sup> in its Auto Test and Auto TDR functions, it not only tells you what the fault is, it actually makes decisions and recommendations for you on the next steps to fix the trouble.

### The future of testing.

Modems come and go. It's the media that matters, and 3M Dynatel products are known for media tests. It's been that way for 30 years, and we're making sure it stays that way for years to come with aggressive R&D and advanced copper test capabilities that not only measure, but analyze the network.

So now you know.

<sup>1</sup> Identifying and locating trouble cases may require 3M™ Far End Device. Refer to User's Guide for more information.



## The complete testing platform for outside plant telecommunications

This flexible test set provides full-featured testing for the triple play—voice, video and data circuits. Because it's a 3M™ Dynatel™ Advanced Modular System 965 series, the AMS model is easy to use, requiring minimal training for testing professionals. And because it emphasizes fault diagnosis and location, customer problems can be solved quickly.

The 965AMS family includes three product tiers. There is the value-priced tier, the 3M™ Dynatel™ 965AMS Lite series. This entry-level copper test platform includes POTS, VOM and RFL functions with optional TDR capability. The 965AMS Lite is fully upgradable to the 965AMS and 965AMS Pro Models. The 965AMS adds as standard features wideband loss/tone (up to 2MHz), voiceband spectrum analyzer, and Expert Pair Autotest. The 965AMSPro series is the most comprehensive product tier including Spectrum Analyzer, Enhanced Wideband Test Suite, and optional 30MHz test capability with the 3M™ Dynatel™ SA30 and 3M™ Dynatel™ Far End Device III.

### Autotest

The knowledge-based smart autotest function is the product of more than a hundred years of accumulated Dynatel team experience. It conducts an automatic test of active and inactive pairs with pass/fail limits. Autotest capabilities also include 3M™ Dynatel™ Fault Sense analysis of test results with advice on how to repair or locate faults. 3M™ Far End Device type and service based selections of tests are supported by the autotest feature of the 965AMS platform.

### External modules

The 3M™ Dynatel™ Advanced Modular System 965AMS modules are field swappable, providing the exact testing interface needed for each job. Modules support technicians who work on a variety of circuits during a typical day. Because the modules are field swappable, the technicians can share them. Because they are rugged, there is little worry about breaking them. Contact 3M for a list of available modules.

### Rugged, weather-resistant design

The handheld 965AMS product is housed in a lightweight, ergonomically designed case for portability and ease of handling. The unit is weather-resistant and weighs only 3.3 lbs (1.5 kg). It's at home on a desktop, on the ground, up in an aerial environment and in underground locations.

The Dynatel brand and the distinctive Dynatel yellow case are your indication of rugged dependability.

# 3M™ Dynatel™ Advanced Modular System 965AMS

## Features and Benefits

Features	Benefits
<b>Communications</b>	Capability to connect directly with a PC or notebook computer for software upload and data downloads
<b>Flexible architecture</b>	Industry standard Microsoft Windows CE operating system
<b>Graphical user interface</b>	User-friendly, icon-based display of test results
<b>Help function</b>	Internal help provides information as needed during operation
<b>Big, bright screen</b>	Highly visible even in bright sunlight with proprietary 3M™ Vikuiti™ Brightness Enhancement Technology; 80% larger than 965DSP
<b>Backlight</b>	For use in low light work areas
<b>Keypad</b>	Allows rapid access to 12 different “blue key” functions, reducing menu levels. Also has cursors and supports alpha-numeric entry
<b>LED indicators</b>	Signal battery state and communication status
<b>Modular design</b>	Simply replace modules to change test capability (no need to replace test set)
<b>3M™ Dynatel™ Fault Sense</b>	TDR and Autotest knowledge-based systems aid technicians with test interpretation
<b>Dynatel brand promise</b>	Rugged, dependable, accurate

Features	Benefits/Descriptions
<b>Interconnectivity</b>	
RS232	Requires serial adapter cable
USB Active Sync client 1.1	Requires USB adapter cable
Battery charger port	
Test lead connectors	
<b>Basic VOM</b>	
<b>Basic Line Tests</b>	
Voltage	Detects and measures the presence of central office (exchange) or foreign DC or AC voltages, including ringing voltages
Current	Measures DC loop current with a 430-ohm shunt resistance
Resistance	Measures conductor and insulation resistance up to 1 Giga Ohm
Soak test	High voltage extended period resistance measurement to expose corrosion-induced faults
Opens	Locates opens at distances up to 100,000 ft. (30 km)
Resistance fault location	Displays distance to fault
Special resistance	Measures the loop resistance and the resistance difference (resistive balance) between two conductors on a pair
Wet section test	Allows RFL measurement when both wires in a pair are faulted and there is no separate good pair available
Ringers	Measures and displays capacitance associated with one or more ringers and the equivalent count
Ground resistance	Measures the resistance of the ground path



# 3M™ Dynatel™ Advanced Modular System 965AMS

## Features and Benefits

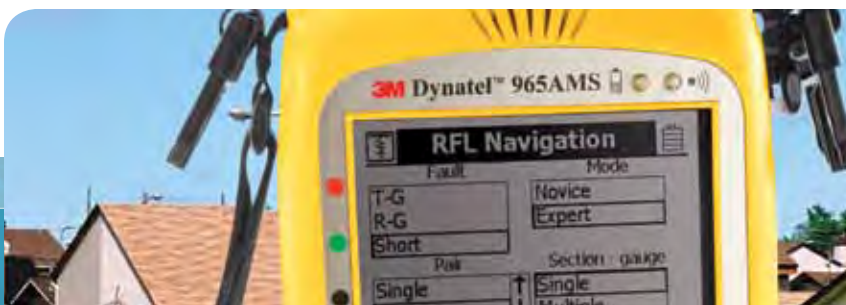
Features	Benefits/Descriptions
ID tone	High power interrupted signal for pair tracing and identification
Kick test	Rapid combination of resistance, voltage and opens for quickly evaluating cable pairs
<b>Voiceband tests</b>	<b>Noise, loss, tone, longitudinal balance, load coil counting and FED compatibility</b>
Load coil count	Indicates the presence of load coils in a loop circuit and distance to the first load coil
Loss	Measures voiceband loss
Noise	Measures noise metallic and noise to ground in dBmC or dBm0p
Longitudinal balance	Provides active measurement of line balance
Level trace	Measures and displays the impedance of the line as a function of frequency
Tone	Provides test tones for conductor identification and transmission testing. 10 default tones, user selectable. Voiceband to 20 kHz, ID tones to 1 kHz
Autotest	Supports 3M™ Far End Device (FED II and III)
Dialing	Offhook, dialing capability, monitoring capability
Microphone and speaker	Speaker has 1-watt power output for noisy environments
Caller ID functionality	Displays number, name, date, and time
Voiceband spectrum analyzer	Displays active noise and longitudinal signals from 1 Hz to 8,000 Hz using dBmC or flat filter
<b>Standard Wideband</b>	<b>This feature set is enabled in the Standard and Pro models</b>
Wideband loss	Measures wideband signals from 20 kHz to 2.2 MHz
Wideband tone	Provides test tones from 20 kHz to 2.2 MHz at 0dBm
<b>Optional Features</b>	<b>Benefits/Descriptions</b>
<b>TDR Modes</b>	<b>Full-featured TDR with user-selectable pulse widths, length, gain, zoom, filter and Vp The TDR feature is enabled in the TDR and Pro models</b>
Single trace	Provides graphical representation of events on a pair. Includes 3M™ Dynatel™ Fault Sense analysis of trace results
Dual trace	Allows active comparison of two traces
Differential	Displays difference between two traces
Crosstalk	Displays the crosstalk from one pair to another
Memory	Allows comparison of an active trace with a trace stored in memory
Memory differential	Displays difference between memory and live trace
Peak	Displays a history of maximum and minimum values with the live trace
Live differential	Locates light and intermittent faults with optional echo booster
<b>Wideband Expanded</b>	<b>Wideband noise and Spectrum Analyzer. This feature set is enabled in the Pro models and includes Standard Wideband</b>
Test impedances	100 and 135 Ω
Wideband noise	Provides metallic and longitudinal noise measurements through wideband standard noise filters
Spectrum analyzer	Graphical representation of the wideband frequencies present on the pair
Impulse noise	Counts transient noise events that surpass a settable threshold

# 3M™ Dynatel™ Advanced Modular System 965AMS

## Electrical Specifications

Functions	Range	Resolution	Accuracy
<b>Voltage (DC)</b>	0 to 99.9 V 100 to 300 V	0.1 V 1 V	1% ± 0.5 V 3%
<b>Voltage (AC)</b> Meter resistance - 100 kΩ or 1 MΩ	0 to 99.9 V 100 to 250 V	0.1 V 1 V	1% ± 0.5 V 3%
<b>Current</b>	0 to 59.9 mA 60 to 110 mA	0.1 mA 0.1 mA	1% ± 0.3 mA 2%
<b>Shunt resistance</b>	430 Ω		
<b>Resistance</b>	0 to 9,999 Ω	1 Ω	1% ± 5 Ω
<b>With CO voltage</b>	0 to 9,999 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 0.1 kΩ 1 kΩ 10 kΩ 0.1 MΩ 1 MΩ	1% ± 50 Ω 1% 3% 3% 5% 10%
<b>Opens (no noise)</b>	0 to 3,000 ft. (0 to 1,000 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%
<b>Resistance Fault Locator (RFL)</b> Fault range	0 to 20 MΩ	—	—
Resistance to fault (no noise)	0 to 99.99 Ω 100 to 999.9 Ω 1 k to 3 kΩ	RTS 0.01 Ω RTS 0.1 Ω RTS 1.0 Ω	0.1% of RTS ± 0.01 Ω <sup>1</sup> 0.2% of RTS ± 0.01 Ω <sup>1</sup> 1.0% of RTS ± 0.01 Ω <sup>1</sup>
<b>Loop resistance</b>	0 to 99.9 Ω 100 to 999.9 Ω 1,000 to 7,000 Ω	0.01 Ω 0.1 Ω 1 Ω	0.1% ± 0.01 Ω 0.2% ± 0.01 Ω 1.0% ± 0.01 Ω
<b>Resistance difference</b>	0 to 99.99 Ω	0.01 Ω	1% of loop resistance ± 0.01 Ω
<b>Tone output</b> ID tone	200 to 1,000 Hz, fixed level (approximately 8 volt peak to peak)	—	±1 Hz
Precision tone- 600 Ω Zout	200 to 9,999 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
<b>Ringers</b>	0.0 to 4.0 ringer 0 to 2,000 nF	0.1 ringer 10 nF	
<b>Load coil count</b>	0 to 5	1	±1 load coil
<b>Ground resistance</b>	5 to 500 Ω	1 Ω	1% ± 1 Ω
<b>Ohms/distance calculator</b>	0 to 9,999 Ω	0.01 Ω	—

<sup>1</sup> Note: All resistance to fault measurement accuracies have an added factor of  $[(2 \times 10^{-8}) \times R_f \text{ ohms}]$  ( $R_f$ =fault resistance in ohms)



# 3M™ Dynatel™ Advanced Modular System 965AMS

## Electrical Specifications

Functions	Range	Resolution	Accuracy
<b>Loss</b> (and frequency) With 600 Ω Zin	-40 to +10 dBm, 200 to 3,000 Hz -40 to +10 dBm, 3,000 to 9,995 Hz -40 to +10 dBm, 10 k to 19.9 kHz	0.1 dB, 1 Hz 0.1 dB, 10 Hz 1 dB, 10 Hz	±0.5 dB, 2 Hz ±0.5 dB, 10 Hz ±1 dB, 20 Hz
<b>Noise metallic</b> 600 Ω Zin C Message and Psophometric filters	0 to 50 dBmC (-90 to -40 dBm0p)	1 dB	±2 dB
<b>Noise to ground</b> 600 Ω Zin	40 to 100 dBmC (-50 to 10 dBm0p)	1 dB	±2 dB
<b>Longitudinal balance</b>	0 to 85 dB	1 dB	±2 dB
<b>Dial mode</b>	DTMF, pulse	—	—
<b>Caller ID</b> (U.S. and Canada only)	Date, time, number, name	—	—
Carrier level	-4 to -32 dBm	1 dBm	±2 dBm
<b>TDR</b>			
Length	100 ft, 200 ft, 500 ft, 1,000 ft, 2,000 ft, 5,000 ft, 10,000 ft, 20,000 ft, 30,000 ft (30 m, 60 m, 150 m, 300 m, 600 m, 1.5 km, 3km, 6 km, 10 km)	1 ft. (1 m)	0.3% range  Fixed values
Pulse width	5 nS, 34 nS, 235 nS, 1600 nS	—	—
Velocity input	0.50 to 0.99 (75 to 150 m/μs)	—	—
Modes	Single trace, dual trace, differential, memory, crosstalk, peak, memory differential, live differential (optional)	—	—
<b>Wideband specifications (without SA option)</b>			
Wideband loss - 100, 135 Ω Zin	-85 to +5 dBm, 20 kHz to 2.2 MHz	0.1 dB, 100 Hz	±1 dB, 1% Hz
Wideband tone output-100,135 Ω Zout	0 dBm, 20 kHz to 2.2 MHz	1 kHz	±1 dB
<b>SA wideband specifications (with SA option)</b>			
Wideband Loss 100, 135 Ω Zin	-85 to +5 dBm, 20 kHz to 2.2 MHz	0.1 dB, 100 Hz	±1 dB, 1% Hz
<b>Wideband noise metallic</b>			
100, 135 Ω Zin E, F, G & G2 filters	E filter 10-90 dBm F filter 20-90 dBm G-2, G filter 30-90 dBm	1 dB 1 dB 1 dB	±2 dBm ±2 dBm ±2 dBm
<b>Wideband spectral analysis</b>			
100, 135 Ω Zin dynamic range	10 kHz to 2.2 MHz -90 dBm to +10 dBm	1% of span	1%
<b>Wideband tone</b>			
Wideband tone output 100, 135 Ω Zout	0 dBm, 20 kHz to 2.2 MHz	1 dB, 1 kHz	+/-1 dB, ±0.1% Hz
<b>Impulse noise counting</b>			
E, F, G & G2 filters Counting interval threshold	1 to 60 minutes 0 to 90 dbm	1 minute 1 dB	±5% ±1 dB

# 3M™ Dynatel™ Advanced Modular System 965AMS

## General Specifications

Feature	Performance/Capability
Drop test	Survives 3 ft. (1 m) drop onto concrete (or 5 ft. drop onto concrete with soft case) using ASTM D4169 assurance level I method 5276
Vibration	Meets Mil-Std 810F method 514.5
Water, dust and chemical proof	Meets IP65 per IEC 529 (1989) for rain and dust Immersion test IP67 0.15 m deep
Emissions	Meets FCC part 15, class A: Digital Devices for the US, and EN55022 (radiated emissions) for Europe
Built to ISO9001/2000 certification for manufacturing facilities and TL 9000 compliant	
Built to ANSI/IPC A610-C manufacturing standards	
Languages supported	English, Spanish, French Canadian, German, Italian, Danish, Polish, Finnish, Russian, Turkish, Japanese, Taiwanese, Korean, and Chinese
Units	Feet or meters, Fahrenheit or Celsius, dBmC or dBm0p, m/uS or Vp
Battery	Rechargeable battery pack or alkaline cell holder 9 hours typical use (50% on/off measuring voltage)
Display	4.1" x 3.1" (104 x 79 mm), 320 x 240 pixel resolution, high visibility in bright sunlight due to 3M™ Vikuiti™ film technology

Note: Routine lab calibration is not recommended or required

## Environmental Specifications

	Specifications
Operating temperature	0° to 140°F (-18 to 60°C)
Storage temperature	-40° to 165°F (-40 to 75°C)
Moisture	Meets or exceeds IP64, IP67

## Physical Specifications

	Size (H X W X D) In. (Cm)	Weight (Including Batteries)
965AMS (includes ADSL2+ module)	11.5 x 5.75 x 3.25 (29.2 x 14.6 x 8.3)	3.5 lbs. (1.59 kg)
965AMS (includes All-in-one VDSL2 module)	11.5 x 5.75 x 3.625 (29.2 x 14.6 x 9.2)	3.8 lbs. (1.72 kg)





# 3M™ Dynatel™ Advanced Modular System 965AMS

## Available Accessories<sup>2</sup>

	Description
<b>Test leads</b>	Five 5-ft (1.5 m) test leads with 2 mm gold-plated banana plugs on one end and chrome-plated alligator clips on other end (black/red, blue/yellow, green) Lead styles include bed of nails, no nails, spike and Canadian test leads
<b>European test leads</b>	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)
<b>RFL strap</b>	1.5 ft. (0.5 m) with alligator clips on ends
<b>User's guide</b>	User's guide on CD & DVD
<b>Vehicle charger</b>	Power adapter for vehicle
<b>Soft case</b>	Full soft case available
<b>Alkaline battery holder</b>	Six AA alkalines can provide power
<b>Self-test board</b>	Verify system performance
<b>Communication cables</b>	USB, serial adapter cables
<b>AC charger</b>	100-250 VAC (50/60 Hz) input, 12 VDC (1 A) output power cord with IEC socket, US cord included

<sup>2</sup> Not all accessories included in all product configurations.

## Configuration<sup>3</sup>

Model Name	965AMS Lite	965AMS	965AMS w/TDR	965AMS w/TDR, ADSL2+	965AMS Pro (2 MHz)	965AMS Pro (2 MHz) w/ADSL2+	965AMS Pro (30 MHz) w/VDSL2
<b>Features:</b>							
VOM, RFL, POTS	•	•	•	•	•	•	•
TDR	Optional	Optional	•	•	•	•	•
Wideband loss/tone		•	•	•	•	•	•
Wideband test suite					•	•	•
Modem Module ADSL2+				•		•	
All-in-one Modem Module VDSL2							•

<sup>3</sup>Voiceband Spectrum Analyzer and Expert Pair Test not standard on 965AMS Lite

## Kit Components

Model	Description
965AMS Lite	965AMS base unit, bag, blue, yellow, green, red and black test leads, DVD user's guide, alkaline battery holder, NiMH battery pack, 110/220 VAC adapter, certificate of calibration, warranty card and USB cable
All other 965AMS Models	965AMS base unit, bag, blue, yellow, green, red and black test leads. Conductor strap, NiMH battery pack (packed in unit), alkaline battery holder, wire gauge, self test circuit board and chain bead, 110/220 V AC adapter, certificate of calibration, vehicle power adapter, CD/DVD user's guide, warranty card, quick reference card, USB cable, and Ethernet cable (with modem module)

## 3M™ Dynatel™ Advanced Modular System 965AMS

To order, call 800/426 8688 and specify the 3M™ Dynatel™ Advanced Modular System 965AMS.

You may order the modules and 3M™ Far End Device accessory for the 965AMS separately. For further information, please contact your local 3M representative or visit our website at [www.3M.com/dynatel](http://www.3M.com/dynatel) for more details.

### Ordering Information

Product Number	Product Description	3M Stock Number
965AMS-CE/LITE/BON	965AMS Lite	80-6113-3150-7
965AMS-CE/NOTDR/BON	965AMS	80-6113-2147-4
965AMS-CE/TDR/BON/AC/DC	965AMS with TDR	80-6113-2146-6
965AMS-CE/TDR/BON/ADSL2+/AC/DC	965AMS with TDR, ADSL2+	80-6113-2149-0
965AMS-CE/TDR/SA/1343/BON	965AMS Pro (2 MHZ) and FED II	80-6113-1500-5
965AMS-CE/TDR/SA/AC/DC/BON	965AMS Pro (2 MHZ)	80-6113-2145-8
965AMS-CE/TDR/SA/ADSL2+/AC/DC/BON	965AMS Pro (2 MHZ) with ADSL2+	80-6113-2148-2
965AMS-CE/TDR/SA/BON/ADSL2+/1343	965AMS Pro (2 MHZ) with ADSL2+ and FED II	80-6113-1611-0
965AMS-CE/TDR/SA/VDSL2/AC/DC/BON	965AMS Pro (2 MHZ) with VDSL2	80-6113-2506-1
965AMS-CE/TDR/SA30/AC/DC/BON	965AMS Pro (30 MHZ)	80-6113-3000-4
965AMS-CE/TDR/SA30/AC/DC/FEDIII/BON	965AMS Pro (30 MHZ) and FED III	80-6113-3011-1
965AMS-CE/TDR/SA30/VDSL2/AC/DC/BON	965AMS Pro (30 MHZ) with VDSL2	80-6113-2971-7
965AMS-CE/TDR/SA30/VDSL2/AC/DC/FEDIII/BON	965AMS Pro (30 MHZ) with VDSL2 and FED III	80-6113-3005-3
965AMS-ADSL2+/SIM/W/MODEM	965AMS ADSL2+ MODULE	80-6113-1661-5
965AMS-VDSL2/SIM/W/MODEM	965AMS VDSL2 MODULE	80-6113-2668-9

NOTES: All units come with Bed of Nails test leads. All 965AMS-CE models shipped with the 1197 Full Soft Case and new symbolic keypad.





The full-service 3M repair facility can help you with any spare part needs.  
Contact the 3M repair center at 800/426 8688, or online at [www.3MRepair.com](http://www.3MRepair.com).

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Note: Product specifications and descriptions in this document are subject to change.

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### **Warranty; Limited Remedy; Limited Liability.**

This product will be free from defects in material and manufacture for a period of 12 months from the time 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, indirect, special, incidental or consequential regardless of the legal theory asserted.**



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