

3M Dynatel™ Far-End Device (FED II) Applications

Testing with the 965DSP and Far-End-Device (FED II)

The FED II is like having a helper at the far end of the pair while you are performing AUTO tests with the 965DSP. It can qualify new lines or identify service problems on working lines.

The FED II sends pair identification tone and the appropriate transmission tones for the type of service being qualified and provides the proper terminations for noise and longitudinal balance testing. The FED does not interfere with open-ended tests, such as open length measurements.

The FED II allows two pair testing (pair 1, or primary pair, and pair 2, or secondary pair). It may be connected to a working pair at the central office distribution frame, cross-connect box or subscriber in line with the working pair. When the FED is dormant, it is in the pass-through mode and does not interfere with either POTS or wideband service.

When the FED II is activated by the 965DSP AUTO test, it automatically disconnects the CO or subscriber side of the circuit, making the pair vacant or inactive for further testing. After testing as an inactive pair, the 965DSP automatically turns OFF the FED and puts the pair back into service.

FED II Applications

To use the full capability of the FED II, the 965DSP must have software version 6.00.5 or later. The FED II can be used with earlier versions but only for single-pair testing.

The FED II supports the following functions:

- Loop resistance (T-R short)
- Resistance balance (T-G/R-G short)
- Single tone and sweep tone loss at both VF and wideband frequencies
- Longitudinal balance with IEEE termination
- Optional second pair connection
- Isolate central office for Active pair tests

Getting Started

Gather as much information about the cable and pairs as possible (cable and pair numbers, gauge, general layout of the cable routes, approximate length of the pair, cross-connect and working terminal locations, bridged taps, and type of service to be tested).

It always is a good idea to pretest the pairs with the 965DSP setup for Full Inactive POTS before hooking up the FED II at the far end. All FED commands are sent on the pair under test. If the pair is open or severely shorted, the FED cannot hear the commands and will not work.

FED II Powerup

The FED II can be turned on manually by the user or remotely by the 965DSP. Pressing the ON/OFF button once turns on the FED and places it in an idle state. Rapidly pressing the ON/OFF button twice turns on the FED and causes it to send pair identification ID tone (577 Hz) on the Blue-banded test leads. Pressing the ON/OFF button once more turns the FED off.

The FED II is automatically turned on remotely by the 965DSP at the beginning of the AUTO test sequence. Alternately, the FED can be turned on remotely by sending specific command tones from the 965DSP.

When the FED II is powered up, the LED flashes about four times per second. If the battery is weak, the LED will flash about once per second.

The FED should be turned off to conserve the battery when you are finished testing.

Installation in the Central Office

The FED may be used in the outside plant or installed on the distribution frame in the central office and connected to a protector adapter such as the Westek "Tel-Line Tester" (www.westkelectronics.com).

3M Dynatel™ Far-End Device (FED II) Applications

FED II Test Lead Hookups

The FED II has four color-coded sets of test leads:

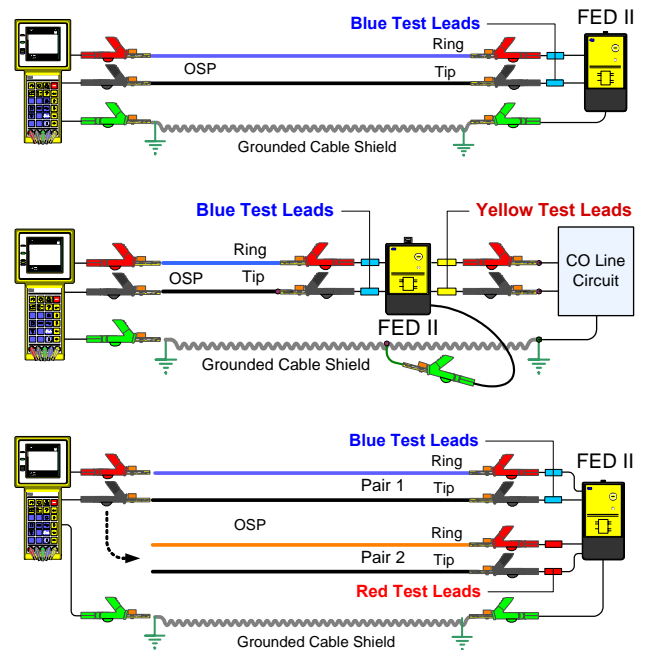
- Green Connects to ground
- Blue-Banded Connects to pair 1 (primary pair)
- Red-Banded Connects to pair 2 (secondary pair)
- Yellow-Banded Connects to the CO line circuit or subscriber side of the working service

The Blue-Banded test leads are used for single pair tests, and the Blue-Banded and Red-Banded test leads are used for two pair tests. The Yellow-Banded test leads normally are used to pass-through or isolate a working pair connected to the Blue-Banded leads. See table below.

FED II Hookups

Application	Green Ground	Blue-Banded Pair 1	Red-Banded Pair 2	Yellow-Banded
Single vacant pair on POTS or WB	√	√		
Single working pair on POTS or WB	√	√		√
2 vacant pairs on POTS or WB	√	√	√	
2 pair with pair 1 on working POTS or WB	√	√	√	√

The illustrations below show the most common hookups. The Blue-Banded leads are used in all applications, such as simple single pair tests (upper drawing). The Yellow-Banded leads are used for connection to a CO line circuit (middle drawing) and the Blue-Banded and Red-Banded leads are used for 4-wire (2 pair) testing (lower drawing).



Each pair of test leads has a Black and Red clip. For most applications, the Black connects to the Tip conductor and Red connects to the Ring conductor. Resistance Fault Locating (RFL) requires a slightly different hookup.

To communicate with the 965DSP, the FED Green lead must be connected to ground or at least have continuity to the 965DSP Green lead. If the cable shield is not continuous, a spare pair in the cable may be used to connect the FED Green lead to the 965DSP Green lead.

AUTO Tests

After the FED has been connected at one end of the pair and the 965DSP connected at the other end, the 965DSP AUTO test will automatically send the required commands to wake it up and program it for the appropriate Active, Inactive or Wideband test routines. When the tests are finished, and the 965DSP has been backed out of the AUTO test, the 965DSP will automatically send commands to reset and turn off the FED.

3M Dynatel™ Far-End Device (FED II) Applications

Manual FED Commands

The FED can be remotely controlled by DTMF tones from the 965DSP dial pad. When the FED is turned on remotely, a security password must be sent before the DTMF application commands.

The most frequently used DTMF command strings may be stored and recalled using the 965DSP dial test set function. After the FED is turned on and the DTMF commands sent for your application, back out of the dialing function and use the appropriate 965DSP test function to measure.



The FED sends Pair ID Tone if has been manually turned on by double-press. Turn off the ID tone by holding down any DTMF key on the 965DSP for more than 5 seconds.

There can be no more than a 1 second pause between key presses when using the 965DSP keypad to send DTMF commands.

Basic FED Commands

Application	Command String
Turn ON the FED	Send 577 Hz ID Tone for > 5 seconds
Security Password	123456 – a hiccup will be heard on the 965DSP speaker confirming acceptance of the password
Turn OFF the FED	9#
Set temporary extended timeout to N seconds	7N# , where N = 0 to 9999 seconds. Without the temporary extended timeout, the default timeout for all applications is 10 seconds. Enter the time extension followed by the function command.

Quiet Termination (600 ohm Termination for POTS Noise Measuring)

Application and Time	Command String
Quiet for 60 seconds	760#6#
Quiet for 5 minutes	7300#6#
Quiet for 15 minutes	7900#6#

IEEE Termination for Wideband Longitudinal Balance Measuring

Application and Time	Command String
Terminate for 30 seconds	730#47#
Terminate for 60 seconds	760#47#
Terminate for 5 minutes	7300#47#

TDR End of Pair Identification

Application and Time	Command String
Open and short pair every 0.5 seconds (winking)	
Wink for 10 seconds	007# or 710#007#
Wink for 30 seconds	730#007#
Wink for 60 seconds	760#007#

Send Sweep Tones for Measuring POTS or Wideband Slope

Application	Command String	Frequencies
POTS	00052#	404, 804, 1004, 1204, 1404, 1604, 1804, 2004, 2804, 3004 Hz
56 kb/s DDS	00053#	20, 28, 32, 40, 48, 82 kHz
64 kb/s DDS	00054#	20, 28, 32, 40, 48, 82 kHz
ISDN BRI	00055#	20, 28, 32, 40, 48, 60, 70, 82 kHz
HDSL	00056#	20, 30, 50, 70, 90, 110, 130, 196, 400 kHz
T1	00057#	200, 400, 500, 700, 772, 1024 kHz
ADSL	00058#	20, 30, 40, 50, 69, 90, 110, 138, 276, 400 kHz
E1	00059#	200, 400, 500, 700, 772, 1024 kHz

Send Single Tone for POTS Loss Measuring

Application and Time	Command String
Send single POTS frequency from 200 Hz to 9999 Hz	
404 Hz for 10 seconds	001404#
1004 Hz for 30 seconds	730#0011004#
2804 Hz for 60 seconds	760#0012804#

3M Dynatel™ Far-End Device (FED II) Applications

Send Single Tone for Wideband Loss Measuring

Application and Time	Command String
Send single Wideband frequency from 20 kHz to 1124 kHz	
40 kHz for 15 seconds	715#00240#
80 kHz for 30 seconds	730#00280#
196 kHz for 45 seconds	745#002196#
1100 kHz for 60 seconds	760#0021100#

Special Resistance and Resistance Fault Locate Applications

The FED may be used to short and ground the pair for Special Resistance (resistance balance testing) and as a strap for Resistance Fault Locating. This process is a little more difficult because the 965DSP hookup must be changed after commanding the FED to the measuring functions.

Using the FED to Strap the Pair for Special Resistance Measuring

FED hookup: Black to Tip, Red to Ring and Green to Ground.
965DSP hookup: Black to Tip, Red to Ring and Green to Ground.

After the commands have been sent, change the 965DSP hookup for Special Resistance Measuring.

Application and Time	Command String
Short and Ground the Pair	
Short/Ground for 60 seconds	760#5#
Short/Ground for 5 minutes	7300#5#
Short/Ground for 15 minutes	7900#5#
Short/Ground for 30 minutes	71800#5#

Single Pair Strap for Resistance Fault Locate

FED hookup: Black to Tip, Red to Ring and Green to Ground.
965DSP hookup: Black to Tip, Red to Ring and Green to Ground.

After the commands have been sent, change the 965DSP hookup for standard Single-Pair RFL.

Application and Time	Command String
Short (loop) the Pair	
Short for 60 seconds	760#1#
Short for 5 minutes	7300#1#
Short for 15 minutes	7900#1#
Short for 30 minutes	71800#1#

Separate Good Pair for Resistance Fault Locate (RFL)

FED hookup: Black and Red to Good Pair and Green to Faulted Wire.
965DSP hookup: Black and Red to Good Pair and Green to Faulted Wire.

After the commands have been sent, change the 965DSP hookup for Separate Good Pair RFL.

Application and Time	Command String
Short and Ground the Pair	
Short/Ground for 60 seconds	760#5#
Short/Ground for 5 minutes	7300#5#
Short/Ground for 15 minutes	7900#5#
Short/Ground for 30 minutes	71800#5#

Isolate Using the Yellow Banded Leads

Application and Time	Command String
Isolate and De-Isolate	
Isolate	21#
De-Isolate	20#

3M Dynatel™ Far-End Device (FED II) Applications

FED Quick Reference

Application	Command String
Turn ON FED	5 seconds 577 Hz ID Tone
Turn OFF FED	9#
Security Password	123456
Set Temporary Time	7N# , where N = seconds
Short the Pair	1#
Short and Ground the Pair	5#
600 Ohm Termination	6#
Wideband Balance Termination	47#
Single Tone POTS	001N# , where N = Frequency in Hz
Single Tone Wideband	002N# , where N = Frequency in kHz
TDR End of Pair ID	007#

Document Information:

Adapted from “3M Field Note 33”

Revision: 0.0 (original, 12/12/04)
0.1 (edited, 1/05/05)



Sound Advice In Telecommunications

Anchorage, AK USA
www.reeve.com