Dynatel™ Advanced Modular System 965AMS
30-Megahertz Spectrum Analyzer
DSL User’s Guide
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**DSL (Digital Subscriber Line)**

The DSL functions include: DSL Loss, DSL Noise, DSL Spectrum Analyzer, Resistive Balance, and DSL Impulse Noise.

**DSL > DSL Loss**

Use **DSL Loss** function to measure the amount of loss in a circuit at a specific frequency. This is typically accomplished by sending tone with another 965AMS, a 3M™ Dynatel™ Far End Device (FED), or test equipment that is capable of sending wideband tone from 20 kHz to 30 MHz.

**DSL > DSL Loss > Hook-Up**

![Diagram showing hook-up for DSL Loss measurement](image-url)
**DSL>DSL Loss>Operation**

1. Press the blue DSL key to enter the DSL function.

   Use the up and down arrow keys to select DSL Loss.

   Use a tone source at the far end that is capable of sending a known output level such as a 965AMS. Use 0dBm as the output level or follow your method of test.

2. Press **DSL Setup** to select the type of service.

3. Use the up and down arrow keys to select the type of service that you are measuring.

4. Press **OK** when finished.
5. Press **OK** to make the measurement.

6. The results of the measurement will be displayed as a –dBm level at a specific frequency.

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**Application Notes**

DSL Loss measures the signal lost from a tone transmitter (965AMS, 3M™ Dynatel™ Far End Device (FED) or other capable device) to the measuring 965AMS.

High loss is an indication of:

1. A loop that is too long for the potential service.
2. Bridge tap.

To get a complete picture of loss, it is recommended that you use a FED that will generate a sweep of frequency for the service type. The sweep will indicate either a good circuit, high loss or dips in the reading can be an indication of bridge tap. The image
below is a sweep that was performed with a 965AMS, a 3M™ Dynatel™ Far End Device FED II and the selected service was ADSL2.

Look at the before and after for these two readings. When the bridge tap is removed then the slope no longer displays frequency dips.
**DSL>** **DSL Noise**

Use **DSL Noise** function to measure the Longitudinal or Metallic Noise on a DSL line.

**DSL>** **DSL Noise>** **Hook-Up**

![Hook-Up Diagram]

**DSL>** **DSL Noise>** **Operation**

1. Press the blue DSL key to enter the DSL function. Use the up and down arrow keys to select DSL Noise.

2. Press **DSL Setup** to select the type of service.
3. Use the up and down arrow keys to select the type of service that you are measuring.

4. Press **OK** when finished.

5. Press **OK** to start the measurement for DSL noise.

6. Press **Select Longitudinal** to measure longitudinal noise.
7. Press **Select Metallic** to measure metallic noise.

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**DSL>DSL Noise>Application Notes**

Noise can affect wideband services by taking up valuable bandwidth and reducing speed. Symptoms of high noise can be data errors and loss of connection. The 965AMS measures longitudinal as well as metallic noise. Having high noise in either of these tests will prompt you to look at the circuit with a Spectrum Analyzer to identify the source.

Longitudinal Noise is a measured between Tip [A] and Ring [B] (shorted internally) and the shield/ground.

Longitudinal Noise measures influences from outside the cable (power induction, AM radio or other outside frequencies).
Metallic Noise is a measured between Tip [A] and Ring [B]. Metallic Noise measures the active noise on a pair.

Both tests are performed through filters based on the service that is selected in Setup.
Use DSL Spectrum Analyzer (SA) to display a graph of useful signals and interference/noise at specific frequencies up to 30 MHz.

**Hook-Up**

1. Press the blue DSL key to enter the DSL function.

Use the up and down arrow keys to select DSL Spec. Analyzer.

2. Press OK.
3. Press **Span** to change the frequency range.

4. Use the left and right arrow keys to move the cursor. The cursor position will display the frequency and the signal level.

5. Once you have selected a span of 1M or 2M you may add a noise mask.

   The mask is initially set to “none.” Pressing F2 or F3, the screen will show the following masks:

   ADSL Downstream
3M™ Dynatel™ Advanced Modular System 965AMS 30-MHz Spectrum Analyzer

**DSL>DSL Spectrum Analyzer>Operation**

**ADSL Upstream**

**T1**

**HDSL**

**ISDN**
Spectrum analysis allows you to visually see a disturbing signal’s shape by reading and displaying the level of noise in a frequency range.

The shape can be caused by ADSL, ISDN, HDSL, T1 or VDSL.

This chart shows the ADSL2+ spectrum with common disturbers and chart 2 shows the VDSL spectrum with potential disturbers.

### Center Frequencies

- **ADSL**
  - Upstream: 28 kHz
  - Downstream: 40 kHz
  - Nyquist Frequency: 138 kHz
  - 140 kHz

- **ADSL2**
  - Upstream: 28 kHz
  - Downstream: 196 kHz
  - Nyquist Frequency: 772 kHz
  - 780 kHz

- **HDSL**
  - Nyquist Frequency: 2200 kHz

- **T1**
  - Nyquist Frequency: 30 MHz

- **AM Radio 680 kHz+**

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### VDSL Spectrum

- **US 0**
  - 1.1 MHz

- **US 1**
  - 3.75 MHz

- **US 2**
  - 8.5 MHz

- **DS 1**
  - 3.75 MHz

- **DS 2**
  - 5.2 MHz

- **US 2**
  - 12 MHz

- **US 2**
  - 30 MHz
Use **Resistance Balance** to measure the:

- Loop resistance between the Red and Green test leads.
- Resistance of each conductor connected to the Red and Green test leads.
- Resistance difference between the two conductors.

### DSL>Resistance Balance>Hook-Up

![Diagram of Resistance Balance]

### DSL>Resistance Balance>Operation

1. Press the blue DSL key to enter the DSL function.

   Use the up and down arrow keys to select Resistance Balance.

   Press **OK**.

2. Connect the strap at a ‘far-end’ access point. The strap should be connected to all three of the conductors at the far end.
DSL>Resistance Balance>**Operation**

3. Press **Test** to start the test.

**DSL>Resistance Balance>Normal Values**

<table>
<thead>
<tr>
<th>Service</th>
<th>% Ohms Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>POTS</td>
<td>3%</td>
</tr>
<tr>
<td>Wideband</td>
<td>1%</td>
</tr>
</tbody>
</table>

**DSL>Resistance Balance>Application Notes**

The resistance balance test is used to identify a high resistance open or a bad splice.

The test will also identify a loop that is resistively too long for the selected autotest.
**DSL>DSL Impulse Noise**

Use Impulse Noise to measure short spikes of random amplitude and random frequency. These short bursts can damage data transmission if the amplitude and frequency are spiking into used transmission paths. The 965AMS measures spikes eight times per second.

**DSL>DSL Impulse Noise>Hook-Up**

![Diagram of hook-up with labels: RED - Ring 1, GRN - Ground, BLK - Tip 1.]

**DSL>DSL Impulse Noise>Operation**

1. Press the blue DSL key to enter the DSL function.
   Use the up and down arrow keys to select Impulse Noise.

2. Press **DSL Setup** to select the type of service.
3. Use the up and down arrow keys to select the type of service that you are measuring.

4. Press **OK** when finished.

5. Press **OK** to start the Impulse Noise test.

6. Press **Setup** to select:
   - Count Threshold
   - Time
   - Spread
   - Metallic or Longitudinal

7. Press **OK** when finished.
8. Press **Restart** to begin a new test.

9. Press **Setup** to return to the setup screen.
Since impulse hits, noise and other power related interference can fluctuate during the day you have the option of measuring three different levels. If you traditionally measure Impulse hits at a threshold of 40 dBm, then select a count threshold of 32 and a spread of 2 dB, then you will be able to see any hits that exceed 32, 36 or 40. Although this circuit will pass at 40, you will be able to see if there is noise just under the threshold that can appear later with a change in power usage or plant conditions.

Selected a spread of 4 dB and a threshold of 32 would allow you to count hits that exceed 32, 36 and 40.

Check with your DSLAM vendor regarding excessive hits for a circuit. Different DLSAM vendors have settings to make use of buffers (dynamic memory) to compensate for errors that can be caused by impulse noise.
This is the EU symbol for equipment that is covered under the Waste from Electrical and Electronic Equipment (WEEE) directive per CENELEC Specification 5041. It indicates that certain products should not be discarded in the trash, but rather should be recycled. This applies to all electronic pluggable and battery powered products.

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