

AALogic D-105

USER MANUAL VERSION 1.0.3



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1 INTRODUCTION

The AALogic D-105 digital test set offers features for Cable Transfers, Restoration, Troubleshooting and a variety of tests to help qualify pairs for DSL provisioning.

The D-105 main features include:

- ◆ **TDR, Step or Pulse**
- ◆ **“Z Stress” DSL Balance**
- ◆ **Leakage Tests**
- ◆ **Automatic Digital Metering**
- ◆ **Automated Fault Testing**
- ◆ **Tone Generator**
- ◆ **Special Circuit ID**
- ◆ **Frequency Scanning**
- ◆ **Load Coil Detection**
- ◆ **Expanded Talk Battery Support**

2 D-105 POWER

The D-105 uses an internal, rechargeable lithium ion battery. This eliminates the need to replace batteries. The D-105 can be operated indefinitely if connected to an AC power source using the included power supply.

NOTE: The D-105 should not be used for leakage or noise measurements while the power supply is connected.

The D-105 should be charged at least three hours prior to use on battery power for maximum operating time.

A battery charge indicator is displayed at the top left of all displays. The D-105 should be charged soon when only one segment is displayed.

A green light is visible at the TALK connector on the bottom panel when the power supply is connected to the D-105 and a suitable AC power source. A red light is visible while the D-105 is charging. The red light will turn off when charging is complete.

3 FRONT COVER

The front cover of the D-105 can be removed for convenience.

- Retract the two spring-loaded pins holding the lid to the case and remove the lid.

4 CAUTIONS

4.1 GROUND CONNECTION

For all tests and measurements, a good cable ground is required. The D-105 has a ground cable permanently attached. The clip is a battery style clip with a green boot. Position the D-105 in a location that allows the clip to attach firmly to the cable or frame ground as appropriate.

The ground can be extended by using several cable pairs tied to a good ground. This should be considered only if the D-105 cannot be connected directly to the ground.

A GROUND STRAP, CABLE SHEATH, OR GROUND BAR MAY NOT BE PROPERLY CONNECTED TO GROUND

THE FIRST TROUBLE SHOOTING STEP SHOULD ALWAYS BE CONFIRMING THAT THE TEST SET HAS A GOOD GROUND CONNECTION.

4.2 WATER DAMAGE

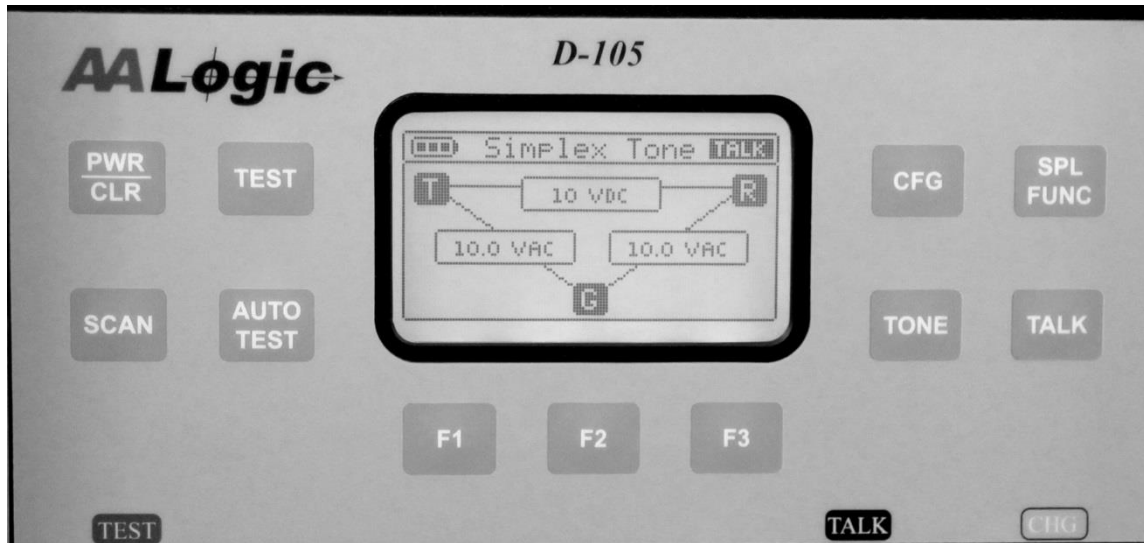
The D-105 case is not water proof and may be damaged if left in the rain or submerged in water.

4.3 NOISE AND LEAKAGE MEASUREMENTS

The D-105 should not be connected to the AC charger when Noise or Leakage measurements are being made. The AC power noise can introduce errors into these measurements.

THE NOISE AND LEAKAGE TEST OPTIONS WILL BE HIDDEN WHEN THE TEST KEY IS PRESSED AND THE POWER SUPPLY IS CONNECTED.

5 FRONT PANEL

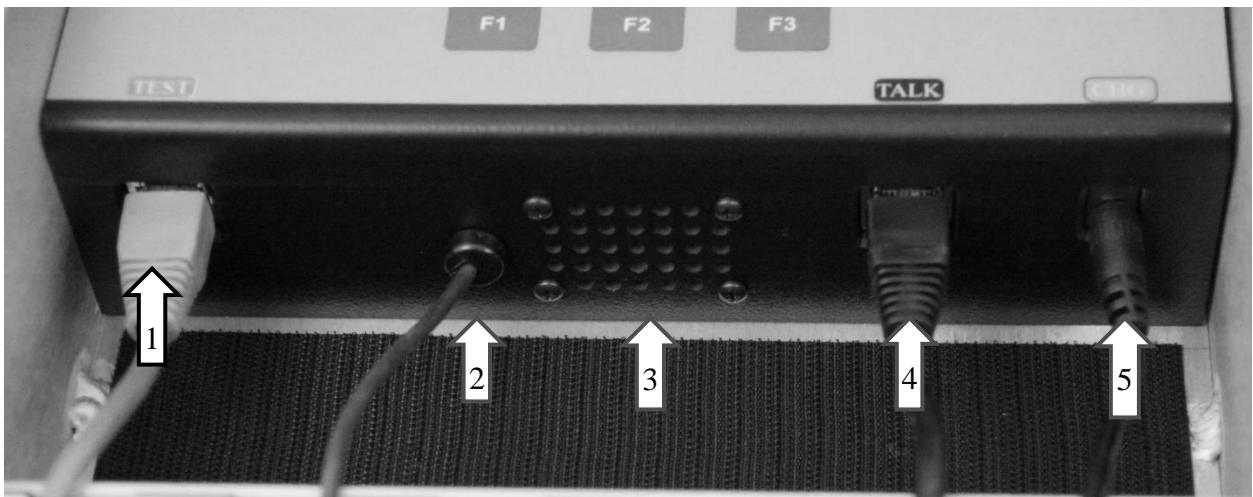


The front panel of the D-105 provides easy access to the test and measurement features. The digital display provides prompts and measurement data. The display is backlight and contrast adjustable to make it easy to read in a variety of lighting conditions.

Key	Function
PWR/CLR	Turns the power on and off and exiting menus and tests.
TEST	Selects the open meter, noise, or leakage tests.

Key	Function
SCAN	Selects the loads, balance, or frequency scans.
AUTO TEST	Selects the automatic test
CFG	Allows setting the VOP (TDR), change the timeout (TM OUT), adjust the display and volume (SYS).
SPL FUNC	Selects the TDR, Circuit ID, or Monitor
TONE	Selects on of the tone modes: SIMPLEX, TRIPLEX, or Tip/Ring/Metallic.
TALK	Turns the talk battery feature ON and OFF (requires the talk cord).
F1,F2,F3	Function keys change. The function is shown on the display above the keys.

6 CORD CONNECTIONS



The bottom panel of the D-105 has the connections for the cords and the speaker output grid. The cords are connected according to the labels on the front panel. The cords are identified in the following table.

Item Number	Function
1	Pair Test cord - Used for all test connections to cable pairs.
2	Ground cord - Connected to cable ground for all tests and measurements.
3	Speaker Outlet - Keep this area clear for the best volume.
4	Talk Cord - Only required when using the internal talk battery feature.
5	Power supply - Used to charge the internal battery and operate the unit for long periods.

7 CONFIGURATION – CFG

Some configuration options are available on the D -105. These options either adjust measurements or operating features of the D -105. To access the configurable options, press the CFG key from any screen. The configurable options are described below.

Configuration settings are stored in the D-105 memory and it is not necessary to reset them each time the D-105 is turned on.

7.1 VOP – CFG-F1

The VOP configuration option allows the user to set the velocity of propagation (VOP) for the time domain reflectometer (TDR). This is necessary to allow the TDR to determine the distance to the fault.

- From any screen, press CFG key – F1 VOP.
- Use the F1 and F3 keys to highlight the cable type and gauge.
- Press F2 to SET the value.
- If a different VOP value is needed, select the CUSTOM option.
 - Highlight CUSTOM.
 - Press F2 SET.
 - Use the F1 and F3 keys to change the VOP value.
 - Press F2 - SET
- The D-105 returns to the main screen.

Note: For convenience, the VOP configuration can be accessed by pressing the CFG key while using the TDR function. Make any changes and press the F2 – SET to return to the TDR.

7.2 TM OUT – F2

The D-105 has a power off timeout option. This time out conserves battery power if the user does not press a key within the timeout period. The timeout can be adjusted or turned off completely. The default timeout is 30 minutes.

- From any screen, press CFG key – F2 TM OUT.
- Use the F1 and F3 keys to select 15, 30, 45, or OFF. Values are in minutes.
- Press F2 to SET the value.
- The D-105 returns to the main screen.

7.3 SYS – F3 – DISPLAY AND VOLUME

The display backlight and contrast can be adjusted for the best visibility in all lighting and temperature conditions.

The speaker volume can also be adjusted for noisy areas or when the sound would be undesirable.

- From any screen, press CFG key – F3 SYS. Press the keys and follow the steps below.

7.3.1 BCKLTE – BACKLIGHT

- Press F1 – BCKLTE
- Use the F1 and F3 keys to adjust the backlight level. The screen will adjust to the selected value. Adjust the backlight for the best view.
- Press F2 to SET the value.
- The D-105 returns to the main screen.

7.3.2 CONTRST – CONTRAST

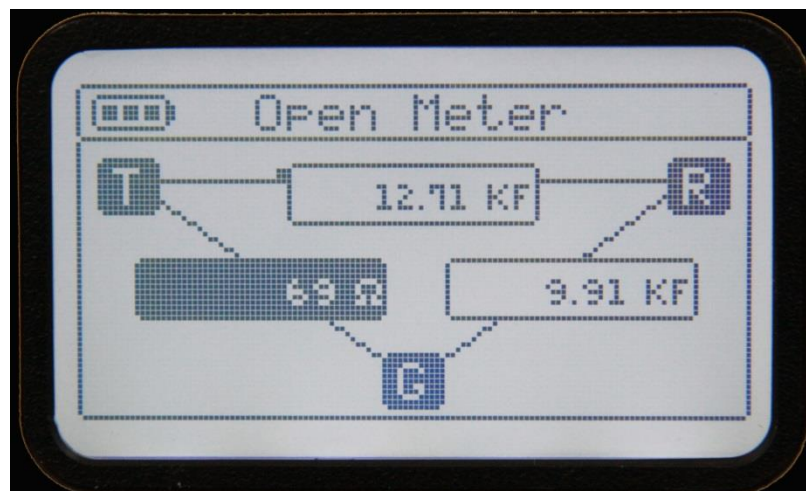
- Press F2 – CONTRST
- Use the F1 and F3 keys to adjust the screen contrast. The screen will adjust to the selected value. Adjust the contrast for the best view.
- Press F2 to SET the value.
- The D-105 returns to the main screen.

7.3.3 VOLUME

- Press F3 – VOLUME
- Use the F1 and F3 keys to adjust the volume. A key beep indicates the current volume level. Adjust the setting for the desired volume.
- Press F2 to SET the value.
- The D-105 returns to the main screen.

8 READING METER MEASUREMENTS

The meter display is designed to show three measurements at the same time, TR, TG, and RG. Depending on the test or measurement mode selected, each reading may be voltage, resistance, or capacitive length. The picture below illustrates a typical meter display.



In the image above, the Open Meter is displayed.

- The TR measurement is 12.71KF. This reading indicates the length of the pair. There is a problem on the pair so the TR length may be incorrect.
- The TG measurement is 69Ω. The measurement is shown on a black background to indicate a problem. This is a resistance reading indicating a GROUND on the tip side of the pair.
- The RG reading is 9.91KF. This is length reading. This reading may also be affected by the ground fault on the TG.
- A small square is displayed at the upper left corner of the measurement window each time a measurement is updated (see the TR window in the image). Wait until this square is displayed for a window before taking a reading any time the cable clips are moved or a change in the pair is made. It may take up to 6 seconds for all the measurements to be updated depending on the condition of the pair.

9 DC VOLTAGE MEASUREMENT – WORKING PAIRS OR FOREIGN BATTERY

The D-105 measures DC voltage Tip to Ring, Ring to Ground, and Tip to Ground and displays the results on one screen. The measurements are continuous allowing observation of changes in the pair voltage over time.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From the main screen, press F1 key – VOLTS. (Press CLR key, if necessary, to return to the main screen.)
- Read the TR, TG and RG measurements in VOLTS.
- Press CLR or other function button to exit the VOLTS function.

10 OHMS MEASUREMENT – GROUNDS AND SHORTS

The D-105 measures OHMS resistance Tip to Ring, Ring to Ground, and Tip to Ground and displays the results on one screen. The measurements are continuous allowing observation of changes in the pair resistance over time. This also allows the user to see when a ground or short is cleared.

The OHMS function reads grounds and shorts up to 1 MΩ. For resistances greater than 1MΩ use the leakage TEST.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.

- From the main screen, press F2 key – OHMS. (Press CLR key, if necessary, to return to the main screen.)
- Read the TR, TG and RG measurements in OHMS.
This function will also show voltage TR/TG/RG, if ± 2.5 VDC or more is present on the pair, with a black background. It is not necessary to use the VOLTS feature before using the OHMS feature.

TR measurements indicate a SHORT. TG or RG measurements indicate a GROUND.

- 100Ω = 100 OHMS
- $1.00 \text{ K}\Omega$ = 1,000 OHMS
- $> 1 \text{ M}\Omega$ = greater than 1,000,000 OHMS
- Press CLR or other function button to exit the OHMS function.

11 CAPACITANCE MEASUREMENTS – PAIR LENGTH, BALANCE, AND FAULTS

The D-105 measures capacitance Tip to Ring, Ring to Ground, and Tip to Ground and displays the results on one screen. The measurements are continuous allowing observation of changes in the pair capacitance over time.

The CAPMTR shows capacitive pair length in KF, 1000's of feet. The pair length is indicated Tip to Ring. The Ring to Ground and Tip to Ground measurements are used to indicate an unbalanced pair. This may be due to an open splice or bridge tap on one side of the pair.

The CAPMTR function reads distance up to 100KF.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From the main screen, press F3 key – CAPMTR. (Press CLR key, if necessary, to return to the main screen.)
- Read the TR, TG and RG measurements in DISTANCE - KF.
This function will also show voltage or resistance TR, TG and RG if present on the pair, with a black background. The voltage is displayed if it is greater than ± 2.5 VDC. Resistance is displayed if it is less than $100\text{K}\Omega$. It is not necessary to use the VOLTS or OHMS features before using the CAPMTR feature.

TR measurements indicate the distance of the pair, including bridge tap if present. TG or RG measurements should be close to each other if the pair is balanced. Large differences between the TG and RG indicate an unbalanced condition.

- Press CLR or other function button to exit the CAPMTR function.

12 TEST

The TEST functions allow the user to look at typical DC faults on a pair, measure metallic and power influence noise, and check for leakage. These diagnostic tests rapidly identify a majority of the typical pair faults.

From any screen, press the TEST key

12.1 OPN MTR – PAIR FAULT DETECTION

The OPN MTR test function examines the pair for DC voltage, resistance faults, and capacitive condition of the pair on a single, continuously updated screen. The test automatically checks for voltage then resistance and finally capacitance between the TR, TG, and RG. The following conditions may be detected:

- Working Battery On Pairs
 - Special Circuits (applied voltage)
 - Shorts
 - Grounds
 - Vacant Pair Length
 - Capacitive Balance (TG is longer or shorter than RG)
 - Poor Grounding (TG and RG capacitance varies from the TR capacitance)
 - Bridge Tap or Drop Wires (pair is longer than expected)
 - Splits (TR capacitance is shorter than TG and TG)
- Connect the green ground clip to the best ground available.
 - Connect the red pair test cord to the D -105.
 - Connect the test clips to the pair to be tested.
 - From any screen, press TEST key – F1 OPN MTR.
 - Allow the screen to update the TR, TG, and RG readings.
 - Read the displayed conditions.
 - The meter continues to update the readings. Any changes in the pair will be displayed the next time the reading is updated. All readings are updated each 5 seconds or less.

12.2 NOISE

Noise measurements are made TR and TR to ground (GND). The TR, or metallic, noise is an indication of imbalances in the pair. The noise to GND is a result of poor cable grounding or bonding. The meter measures to -70 dbm. Local practices should be consulted to determine acceptable noise levels.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From any screen, press TEST key – F2 NOISE.

- Allow the screen to update the readings.
- Read the displayed conditions for TR (metallic) and GND.
- The meter continues to update the readings. Any changes in the pair will be displayed the next time the reading is updated.

12.3 LEAKAGE

The leakage test reveals problems in pair insulation also known as high-resistive faults. These faults can also result problems such as noisy pairs, crosstalk, low data rates, foreign battery. The meter can read a maximum of 100MΩ. Local practices should be consulted to determine acceptable leakage levels.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From any screen, press TEST key – F3 LEAKAGE.
- Allow the screen to update. The initial measurement will be TR.
- Read the displayed conditions for TR (metallic) and GND. Leakage TG can be selected by pressing F2 and RG measurement by pressing F3.
- The meter continues to update the reading. Any changes in the pair will be displayed the next time the reading is updated.

13 SCAN

Scan features test the pair for AC parameters including LOAD coils, DSL Freq BALANCE, and frequency signals for ADSL, ADSL2, and XDSL. These tests should be completed after testing to ensure there are no DC faults on the pair.

13.1 LOADS

The LOADS function sweeps the pair with an AC signal and determines if load coils are present on the pair. The display shows the frequency response on the pair and displays the number of load coils detected at the end of the test.

The LOADS test makes a single pass and displays the results. If the D-105 detects DC faults on the pair, the test will be stopped and an error message is displayed. Additional tests can be made by pressing the RETEST key.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From any screen, press SCAN key – F1 LOADS.

- Allow the screen to update.
- Read the number of loads detected at the top of the screen. The D-105 can detect up to five loads ± 1 load.
- To test another pair, move the clips to the next pair and press F3 – RETEST.
- Press any other key to leave the LOAD screen.

13.2 BALANCE

The BALANCE function sweeps the pair with an AC signal and measures the impedance TG and RG. The signal should be the same if the pair is balanced. The display shows the impedance measurement difference and indicates which side, TG or RG, has the higher impedance. Local practices should be consulted to determine acceptable levels.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From any screen, press SCAN key – F2 BALANCE.
- Allow the screen to update. The test will check to ensure a pair is connected and it does not have DC faults and then complete the scan.
- Analyze the displayed graph. Ideally, the graph will be a straight line at 0 Ω .
- To test another pair, move the clips to the next pair and press F3 – RETEST.
- Press any other key to leave the BALANCE screen.

13.3 FREQ – FREQUENCY DETECTION

The FREQ function sweeps the pair and measures the AC signals within the selected frequency range. This is used to observe the presence and possible impairment of signals on working data pairs.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From any screen, press SCAN key – F3 FREQ.
- Select one of the test modes: F1 ADSL, F2 DSL2, OR F3 XDSL.
- Allow the screen to update.
- Analyze the displayed graph. The line shows the signal level at the frequencies scanned. Low signals and drop outs should be investigated further.
- Use the F2 CURSOR to read the frequency at any point on the line. The F1 and F3 keys can then be used to move left or right. Press F2 again to leave the CURSOR mode.
- To test another pair, move the clips to the next pair and press F3 – RETEST.

- To test another mode on the same pair, press F1 to toggle ADSL → ADSL2 → XDSL. The new test will start automatically.
- Press any other key to leave the BALANCE screen.

14 AUTO TEST

Auto Test incorporates several tests into a single step. The test stops on the first condition that prevents following tests to be completed properly as follows.

Measurement	Fail Criteria
• DCV TR, TG, or RG	Any battery > ± 2.5VDC
• OHMS	Any short or ground less than 100KΩ
• CAPACITANCE	Unbalanced or less than 60 feet long.
• LOADS	> 0 LOADS
• AUTO TR BALANCE	Pair Unbalanced
• Auto Noise	Metallic > -60dbm Power Influence > -10dbm
• Auto TDR	Z FAULT (Impedance fault detected)
• Auto Leakage	Leakage < 10MΩ

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From any screen, press AUTO TEST key. The screen will update as it progresses through the sequence of tests. The test will stop if any of the above conditions are found and an error message is displayed in the bottom left corner of the screen.
- To test another pair, move the clips to the next pair and press F3 – RETEST.
- Press any other key to leave the AUTO TEST screen.

15 SPL FUNC – SPECIAL FUNCTIONS

The special functions (SPL FUNC) include the TDR, CKT ID, and MONITOR functions. To access SPL FUNC, press the SPL FUNC key from any screen other than a TDR screen.

15.1 TDR – TIME DOMAIN REFLECTOMETER

The TDR is used to locate cable faults by analysis of the impedance of the line. The D-105 uses a STEP method for the 0 to 1KF range and a PULSE method for all other ranges. The STEP method provides better resolution for near faults.

This function requires the user to enter the velocity of propagation (VOP). The distance indication will be in error if this value is incorrect. The VOP can be set using the CFG key, refer to 7.1 above, or by pressing the CFG key from the TDR screen.

The measurements are continuous allowing observation of changes in the pair over time.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From the SPL FUNC screen, press F1 – TDR key.
- The TDR screen displays and prompts for a distance range. Select the shortest range that includes the fault for the best resolution. If the distance is unknown, select the largest range, F3. The D-105 automatically selects the mode.
- The result screen is a graph of the TDR response.
 - The AMP (amplitude) can be adjusted to help identify cable faults by using the F1 – ▼ AMP or F3 – ▲ AMP keys.
 - The distance can be read more accurately by pressing the F2 – CURSOR key and then using F1 - < and F3 - > keys to position the cursor at the cable fault. Press the F2 key again to exit the CURSOR mode.
 - Changing Range
 - The range can be changed by pressing the SPL FUNC key from any TDR screen. The range will cycle for each press of the key. The mode will also change to STEP for the shortest range and PULSE for other ranges.
 - Changing the VOP
 - Press the CFG key from the TDR display to change the VOP.
 - Press the F2 – SET key after changing the VOP to return to the TDR.
- To test another pair, move the clips to the next pair. It is not necessary to press a key.
- Press any key other than CFG or SPL FUNC to leave the TDR function.

15.2 CKT ID – CIRCUIT ID

The CKT ID function identifies the presence of a working special circuit on the pair. The test can identify HDSL, T1, and XDSL circuits on the pair.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From the SPL FUNC screen, press F2 – CKT ID key.
- The test runs and displays one of the identifiable circuits or displays VACANT indicating it did not find a HDSL, T1, and XDSL circuit on the pair.
- Press the F3 – RETEST key retest the same pair or move the clips to another pair and press F3.
- Press any key to exit the CKT ID function.

15.3 MONITOR

The MONITOR Function allows the signals on the line to be heard through the speaker. The modes include AUDIO and three special options for HDSL, T1, and ADSL.

- Connect the green ground clip to the best ground available.
- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From the SPL FUNC screen, press F3 - MONITOR key.
- The audio from the pair, if any, is sent to the speaker. The default mode is AUDIO. The F1- ▼ and F3 - ▲ keys are used to decrease or increase the volume.
- Press the F2 key to change the mode. The function cycles through the options from AUDIO → HDSL → T1 →ADSL.
- Press any key to exit the CKT ID function.

16 TONE

The tone modes are used to identify pairs by the application of a 577 HZ to the pair. The D-105 incorporates short detection to aid the users in verifying that the pair identified is the correct pair. This capability speeds up the process of pair identification for both section and half-tapped transfers.

The D-105 provides SIMPLEX, TRIPLEX, TG, RG, and TR (METALLIC) tone options.

16.1 F1 – SPLX

Simplex mode is also called “quiet” tone. Tone is applied to the pair on the TG and RG. This tone is applied in a way that a user will not hear the tone if the pair does not have impairments.

16.2 F2 – TRIPLEX

Triplex tone is useful when the cable has a lot of bleed over between pairs. The tone is applied TG, RG, and TR using a technique that significantly reduces signals on adjacent pairs.

16.3 T/R/MET – TG, RG, AND TR (METALLIC)

This mode allows tone to be sent TG or RG or TR. This may be necessary to identify pairs with impairments that prevent the effective use of other modes. The F1 key is used to change the applied tone in this mode.

16.4 USING TONE

- Connect the green ground clip to the best ground available.

- Connect the red pair test cord to the D -105.
- Connect the test clips to the pair to be tested.
- From any screen, press TONE key.
- Select the tone mode.
 - F1 – SPLX
Simplex mode is also called “quiet” tone. Tone is applied to the pair on the TG and RG. This tone is applied in a way that a user will not hear the tone if the pair does not have impairments.
 - F2 – TRIPLEX
Triplex tone is useful when the cable has a lot of bleed over between pairs. The tone is applied TG, RG, and TR using a technique that significantly reduces signals on adjacent pairs.
 - T/R/MET
This mode allows tone to be sent TG or RG or TR. This may be necessary to identify pairs with impairments that prevent the effective use of other modes. The F1 key is used to change the applied tone in this mode.
- The TONE mode operates continuously. Just move the clips to the next pair as needed.
- Press any key to exit the TONE function.

16.5 CONFIRMING PAIR IDENTIFICATION

The D-105 has a visual and audible indication when a short is placed on a pair. The D-105 beeps when a short is detected on the pair. The TR display briefly shows the word BUZZ, and The TR display box has a black background. This notification alerts the user that the pair has been identified. In addition to the alerts provided at the D-105, the tone pattern is also changed to a double-beep on the pair to alert the far end technician that the pair has been confirmed by the D-105.

16.6 CONFIRMING PAIRS WITH IMPAIRMENTS

Impairments on the pair may make confirming the pair identification difficult. The D-105 monitors the TR in an attempt to see a short on the pair. It also monitors the TG and RG for grounds. This is useful when the pair has one side open or the pair is split. Grounding one or both sides of the pair can also allow the D-105 to confirm the identification.

The D-105 may not be able to confirm the pair in all cases. The display shows the DC voltage TR and the AC voltage TG and RG. The user can use these readings to look for changes when the pair is shorted and/or grounded in the same way analog meters have been used in the past.

NOTE: Only ground can be used to confirm the identification when using TG or RG tone modes.

17 TALK BATTERY

The D-105 includes an internal, constant current talk battery source. This talk battery is compatible with digital butt sets and adjusts the applied voltage to maintain a constant 10 mA current on the talk pair for long and short loops.

- Connect the black talk cord to the D-105.
- From any screen, press the TALK key. The **TALK** indicator appears in the upper right corner of the display. The talk battery remains on until the D-105 is turned off.
- Use TONE if needed to identify the talk pair between the two work locations.
- Connect the talk pair clips to the pair.
- At the D-105 end, connect a headset or butt set the two clips on the talk cord near the D-105. These are located on the cord and are not the clips attached to the talk pair.
- At the far-end, connect a headset or butt set to the talk pair.
- The D-105 signals with three short beeps when the far-end connects or disconnects on the pair.
- Turn the talk battery off by pressing the TALK key **when** the talk battery is not in use to conserve battery power. The talk battery is automatically turned off when the D-105 is turned off.

18 WARRANTY

The D-105 is warranted against defects in materials and workmanship for a period of one year from the date of purchase. Contact your local sales representative or the manufacturer for a Return Authorization (RA) number and instructions on returning the product for service. Products cannot be processed unless accompanied by an RA number.

The user is responsible for determining the applicability of the product for any application. The manufacturer is not responsible for any damages, direct or consequential, resulting from the use of its products. Users are required to follow all work safety procedures when using this product.

Damages due to impact, battery failure, flooding, or normal wear are excluded.

The manufacturer will determine, exclusively at its own discretion, where repairs or replacement of the product is required for any warranty claim. In no case will the liability of the manufacturer exceed the original purchase price of the product.

19 SPECIFICATIONS

The following specifications are subject to change without notice.

Dimensions	8" x 4.75" x 5.25"		
Weight	4.5 pounds including cords		
Power	Single Li-ion 3200mAh	10-15 Hour operation time 2-3 Hour	
Operating Temperature	-20° to 50° C	non-condensing	
Tone	Frequency:	577Hz	
	Simplex Output:	10-12Vpp	
	TriPlex Output:	20-24Vpp	
Talk Battery Power	10-35VDC	10mA current isolated Battery	
SCAN Functions	Load(s):	300Hz → 7.5KHz	
	Balance:	10KHz → 120KHz	
	Frequency:		
	ADSL :	30KHz → 1.1MHz	
	ADSL2:	1MHz → 2.2MHz	
	VDSL :	2MHz → 3.1MHz	
TEST Functions			
V/Ω/C	VOLTS	0 → 250VDC	2%
	OHMS	1 → 5K ohms	2%
		5K → 100K ohms	5%
		100K → 1M ohm	10%
	CAPACITANCE	0 → 60 Feet	Reads OPEN
		60 FT → 25Kft	6% (± 20FT)
NOISE	Metallic	-70dbm → 0dbm	± 2db
	Ground (Power Influence)	-70dbm → 10dbm	± 4db
LEAKAGE		0 ohms → 20K	±10%
		20K → 1Meg Ohm	± 0.005 Meg
		1Meg → 100Meg Ohm	±10%
AUTO TEST	Battery Detection	> ± 2.1Vdc	
	Short Detection	< 1 Meg Ohm	
	Length Error, TR <> TG/RG	> ± 5% Differential	
	GND Error	Open TG or RG	
	Unbalance TG to RG	> 5%	
	Load Detection	> 0, count for up to 5 loads ± 1	
	Impedance (Z) Stress	> 3% Unbalanced	
	Noise TR (Metallic)	> -60dbm	
	Noise PI (Ground)	> -10dbm	
	TDR	Z FAULT (Impedance Error)	
	Leakage	< 100 Meg Ohms	
SPL FUNC			
TDR	Step	50 FT → 1.1 KFT	2%, ± 10 FT
	Pulse	250 FT → 4.3KFT	2%, ± 40 FT
		250 FT → 8.6KFT	2%, ± 100 FT

CKT ID	<ul style="list-style-type: none"> • HDSL • T1 • XDSL 	
MONITOR	<ul style="list-style-type: none"> • AUDIO • HDSL • T1 • ADSL 	
CFG	VoP Settings	<ul style="list-style-type: none"> • Gauge Table for GEL/PULP/PIC; 22, 24, 26 • Custom VoP value

