NCI Technologies

NCI – 465 WMU HANDHELD

USER MANUAL

NCI Technologies

Firmware Version 5.2.9.8

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NCI Technologies

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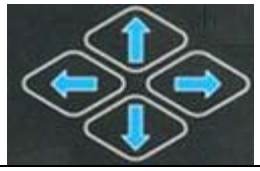
1. Product Introduction

The NCI-465 is a portable handheld unit designed specifically to meet and exceed customer expectations for fast turn-up and fault diagnostics of POTS, DSL, VoIP and IPTV services with minimal training for the field technician.

1.1 Layout – Front View

The Following views depict a front view layout of the NCI 465 display and keypad.

Keypad Definitions

KEY	FUNCTION/MEANING	DESCRIPTION
	On / Off	Push on – Push and Hold to Turn off
	Display Cursor Movement	Move up/down or Left/right to move cursor in Display Area for additional information
	Displays Pass Fail or Marginal line condition BLINKING indicates TEST IN PROCESS	GREEN – Indicates Test OK relative to the KEY and internal thresholds associated to the KEY. RED – Indicates Failed relative to the KEY and internal thresholds associated to the KEY. YELLOW – Indicates Marginal relative to the KEY and internal thresholds associated to the KEY.

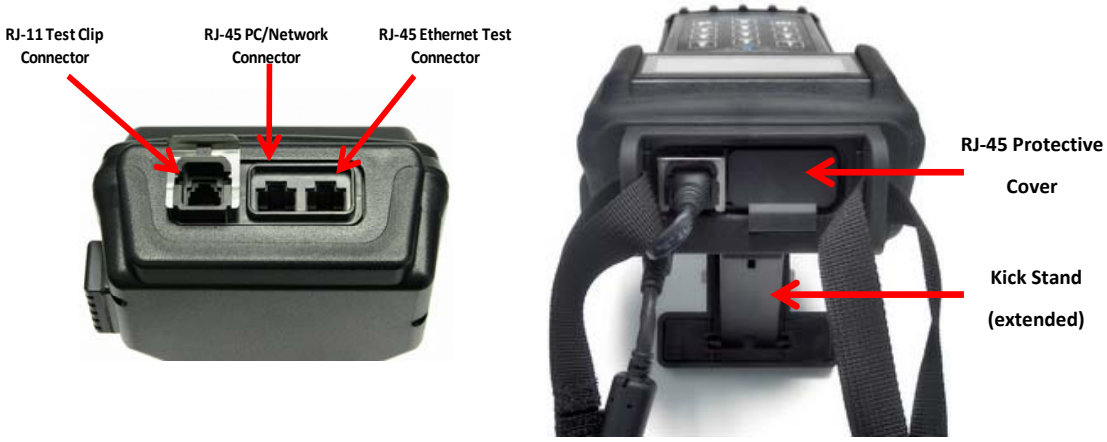
Keypad Definitions

KEY	FUNCTION/MEANING	DESCRIPTION
	**TEST OK - TOK**	Depress this key **after** the test is complete to view the results of the **PASS**, **FAIL** or **MARGINAL** LED indication.
	**DIGITAL MULTIMETER - DMM**	Depress this key to perform a complete POTS DMM test. **SEE** SECTION 5.1 for information on a complete POTS test
	**SINGLE ENDED LINE TEST – SELT**	Depress this key to perform a SELT test. **SEE** SECTION 5.2 for information on tests performed for a SELT test
	**DIGITAL SUBSCRIBER LINE TEST - DSL**	Depress this key to perform a DSL test. **NOTE:** This test is performed automatically on power up
	**ERRORS - ERR**	Depress this key to display more details on Threshold Errors from the line test.
	**DOUBLE ENDED LINE TEST - DELT**	Depress this key to perform a DELT test. **SEE** SECTION 5.3 for information on tests performed for a DELT test
	**INTERNET PROTOCAL TEST - IP**	Depress this key to perform an IP test. **NOTE:** This test is performed automatically on power up when successful DSL sync is achieved
	**ETHERNET TEST – ETH**	Depress this key to perform an ETH test. **SEE** SECTION 5.5 for information on tests performed for a ETH test or SECTION 4.6 for ETH Cable tests
	**VOIP / IPTV TEST**	Depress this key to perform HPNA/Coax/VoIP/IPTV tests **SEE** SECTION 5.7 for information on performing HPNA/Coax/VoIP/IPTV tests
	**ESC**	Depress this Key to Cancel a test or process

	**SETUP**	Depress this key to setup up configuration information for the unit.
	**CARRIAGE RETURN - ENTER**	Depress this key to execute the retest functionality or save data.

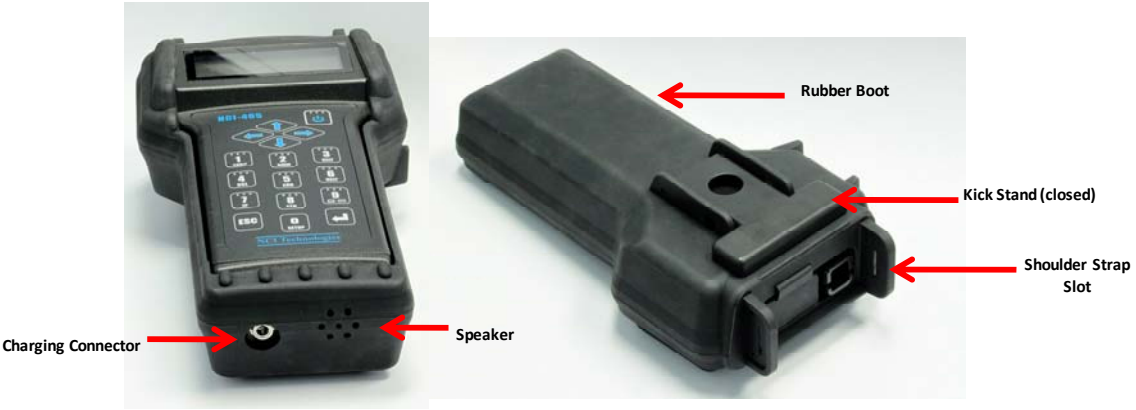
1.2 Layout – Top View

The Following views depict a top view layout of the connectors on the NCI 465.



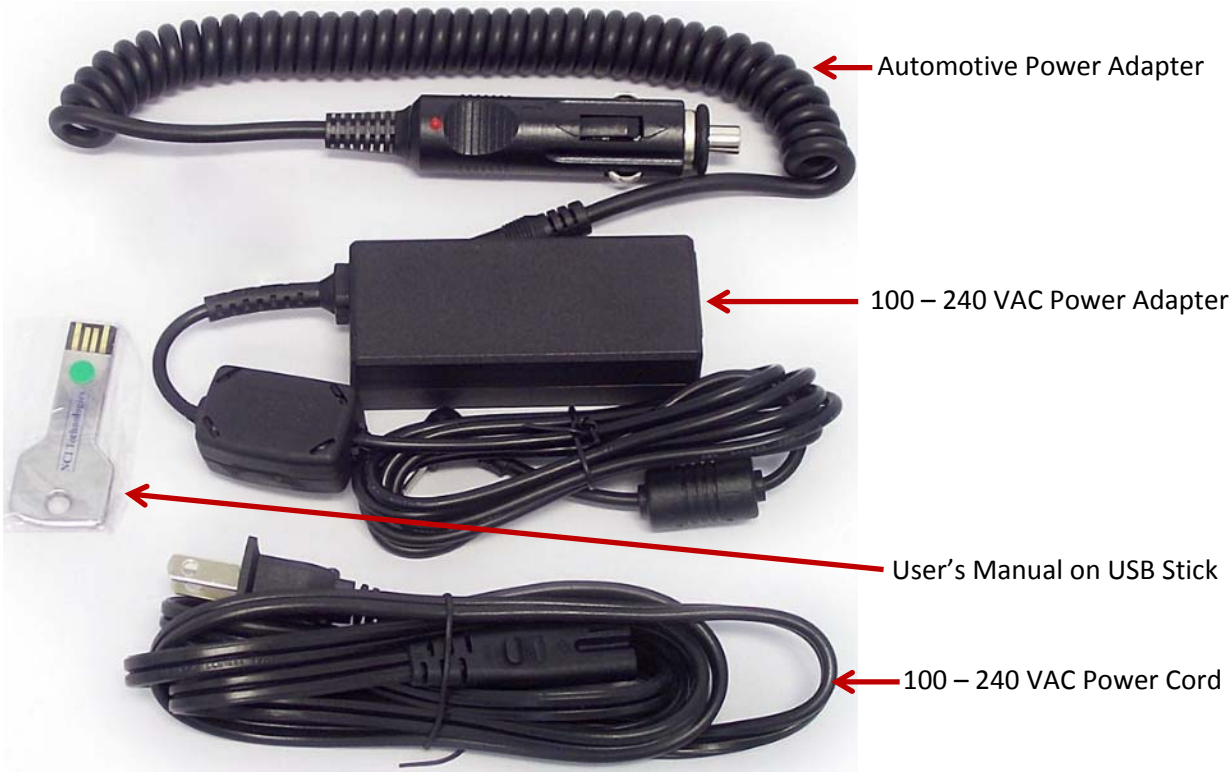
1.3 Layout – Bottom and Rear View

The Following views depict a bottom and rear view layout of the NCI 465.



1.4 Accessories

The Following views depict the accessories for the NCI 465.



Protective carrying pouch

2. Turning the Unit On and Off

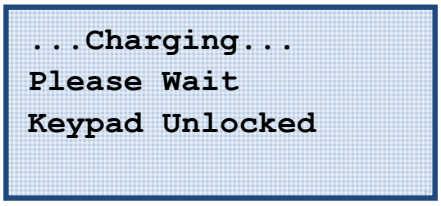
2.1 Notes on Batteries and Charging

The NCI-465 uses new technology Lithium Ion batteries. A power control module ensures that the batteries cannot be overcharged or over depleted. A discharge and charge test function is included to ensure the unit is performing up to standard throughout its lifetime. See 6.8 Testing the Battery and Charging System for details on performing these test functions on the unit.

If the unit is fully discharged and you attempt to turn the unit on, there may be some unexpected responses, from flashing LED's to nothing appearing to happen. Simply plug the unit into the charger, and power on. As with any modern electronic device running high technology battery systems, there will be a period of time when the unit will not respond, until a minimum charge is put into the batteries. With the NCI-465 you will see the following message indicating this is happening. The Yellow power LED will blink.

```
...Charging...
Please Wait
Keypad Locked
[▓▓...]
```

There will be 5 dots at the bottom of the screen, as the charge is being put into the batteries, the dots will be replaced with blocks. A period of 5 minutes is required to get a minimum charge in the batteries to enable the system to run. The Yellow power LED will be on solid at this point. Once this time period has elapsed, you will see the following screen.



At this point you may power the unit on and it will proceed to boot up.

2.2 Turning the unit on

To turn the unit on, press and hold the power key for 2 seconds. You should see the following screen in a second or so.

```
NCI Technologies
NCI-465
Booting…
```

2.2.1 CID, ORDER# and TECHID fields

The boot sequence will take about 35 seconds during which time you will hear some relays clicking as the unit nears the finish of the sequence. The next screen you will see is the Circuit ID screen

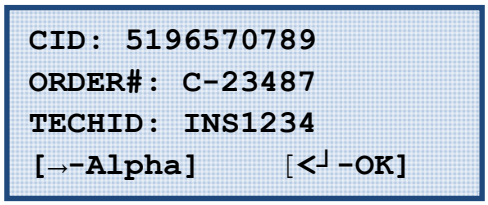
```
CID:
ORDER#:
TECHID:
[→-Alpha]      [<┘-OK]
```

Circuit ID is mandatory, however you may enter any number and press OK to continue testing. Alphanumeric characters are supported, press the right arrow key to enter Alphanumeric input mode. Press the down and up arrow to move between CID, ORDER# and TECHID fields. Press Alpha to start Alphanumeric input.

```
ORDER#: C-0231
ABCDEFGHIJKLMNOPQRST
UVWXYZ0123456789$@#-
[ESC]     [<┘-Select]
```

Press the arrow keys to move to the character you wish to select, press the Select key to place character into the field. Move the cursor to the top line in order to change from input mode to save mode or simply press the ESC key to save your edits.

```
ORDER#: C-0231
ABCDEFGHIJKLMNOPQRST
UVWXYZ0123456789$@#-
[ESC]       [<┘-Save]
```



Once you have input your required data, press the OK key, you are now able to perform any test you wish at this point. TECHID is saved by unit until it is overwritten or blanked out.

You will notice the DSL (4) key flashing a green LED. The unit is automatically trying to sync to a DSL circuit. If the circuit ID you entered is satisfactory, you may press the DSL (4) key to check the progress of the test. You may press any other key to perform other tests if you wish. See Section 3 Performing an Automatic Test on the Subscriber Line for information on the DSL tests being performed.

2.3 Turning the unit off

To turn the unit off, press and hold the power key, you will see a message Powering Down in 3,2,1 seconds, at which point the unit will write any transient data to memory and power itself off.

3. Performing an Automatic Test on the Subscriber Line - CPE EMULATION

An automatic test on the subscriber's line is performed upon connecting the RJ11 test clips to the subscriber's line and powering up the unit. The tests performed as part of this automatic process is as follows:

1. DSL Test (4 Key)
2. IP Test (7 Key)
3. DELT Test (6 Key)

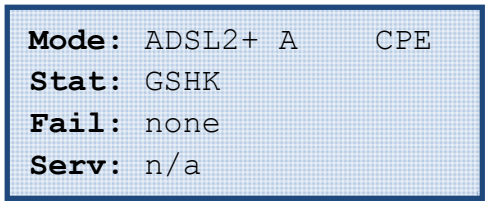
3.1 Automatic Test Process Flow

To perform an Automatic Test on a subscribers line perform the following steps

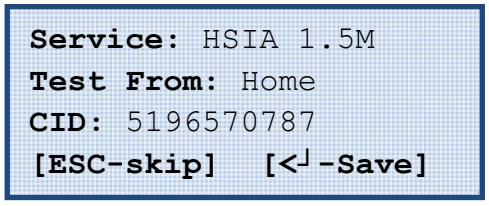
Using the RJ11 connector, or the Ring, Tip and Ground leads connect to the DSL circuit looking toward the DSLAM.

If the unit has not been powered on, do so now, press and hold power key until unit starts to boot. Follow steps in **Section 2 - Turning the Unit On and Off, enter Circuit ID, ORDER# and TECHID fields**

Once you have entered a Circuit ID, you may press the OK key and then the DSL (4) key. You will then be presented with the following screen.



Once training is successful the **DSL (4)** key will be solid **GREEN** and following screen will be displayed to the user



Using the Right Arrow Keys, select the type of service profile being tested. In the example above HSIA 1.5M service is selected.

NOTE: SELECTING THE SERVICE TYPE WILL SELECT A SPECIFIC SET OF THRESHOLD SETTINGS IN ORDER TO PROVIDE A PASS FAIL INDICATION FOR THE TYPE OF SERVICE BEING PROVIDED.

Using the Arrow Keys, select the location the current test is being performed. In the example the test is being performed at the Home.

NOTE: SELECTING THE LOCATION WHERE THE TEST IS BEING PERFORMED WILL SELECT A SPECIFIC SET OF THRESHOLD SETTINGS IN ORDER TO PROVIDE A PASS FAIL INDICATION FOR THE LOCATION.

Depress the Enter Key on the NCI 465 to save the information and associated test results.

Once the Enter Key is depressed the user will be presented with the following statistical information regarding the actual upstream/downstream data rates and margin.

A2+ A	US	DS
Rate:	806	21024
Max:	1087	27365
Margin:	6.5	7.1↓

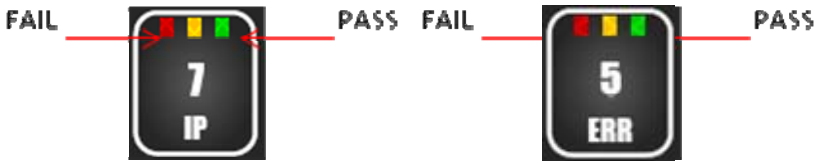
NOTE: The MAX indicates the Maximum data rate the loop will support.

Depress the Down Arrow key to display additional statistical information related to Impulse noise protection, Loop attenuation and loop length as shown below.

A2+ A	US	DS
INP:	1.0	1.5
LATN:	1.1	0.0
EWL:	4000ft	26AWG↑

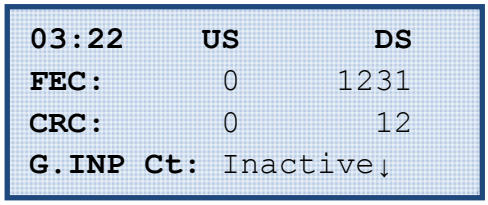
Depress the Up Arrow key to display the previous page.

In addition to the above test results, the unit will automatically authenticate into the BRAS and PING a pre-programmed site. The results of this process will provide a PASS FAIL indication on the 7 KEY and 5 KEY as shown below.



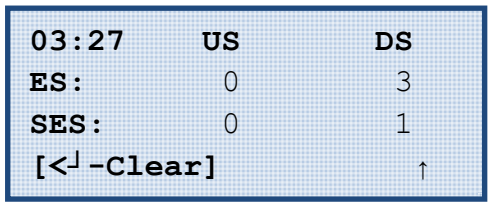
Should the 5 Key indicate a **FAILURE**, depress the 5 Key to view the reason for the **FAILURE** in order to take corrective action.

NOTE: a Failure will be denoted with an * to indicate which parameter was not within specifications.

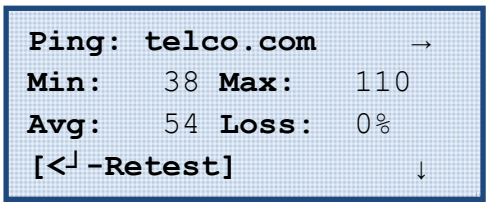


FEC (correct errors) and CRC (uncorrected physical layer errors) are shown. If the far-end supports G.INP physical layer retransmission, a count of the retransmitted frames will be displayed.

Depress the Down Arrow to display a count of the Errored Seconds and Severely Errored Seconds.

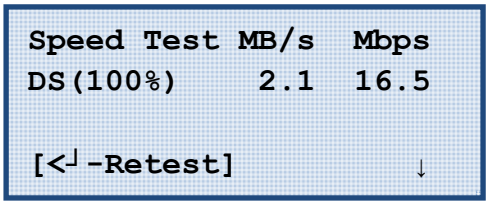


Should the 7 Key indicate a **FAILURE**, depress the 7 Key to view the reason for the **FAILURE** in order to take corrective action. **NOTE: a Failure will be denoted with an * to indicate which parameter was not within specifications.** The following screen shows a good test and the additional information provided when the 7 Key is depressed.



From this screen the user can depress the Right Arrow Key to select a different site to PING as shown below. To PING the GOOGLE.COM site the user simply depresses the Enter Key.

The user can also from this screen run a speed test to GOOGLE.COM by depressing the Down Arrow Key. Once performed, the following screen will be displayed. Depress the Enter Key to perform the Speed Test.

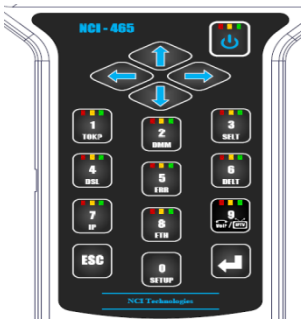


Depress the Down Arrow to display the IP address given to the unit from the DHCP server. An example response is shown below.

To release the IP back to the DHCP server, depress the Enter Key on the unit.

3.1.1 Additional Test Result Information

To obtain additional test result information regarding the test process performed in Section 2.1, view the keypad for any FAILED indicators. If any indicators are **RED**, Depress the associated KEY to review the FAILURE in order to take corrective action. **NOTE: a Failure will be denoted with an * to indicate which parameter was not within specifications.**



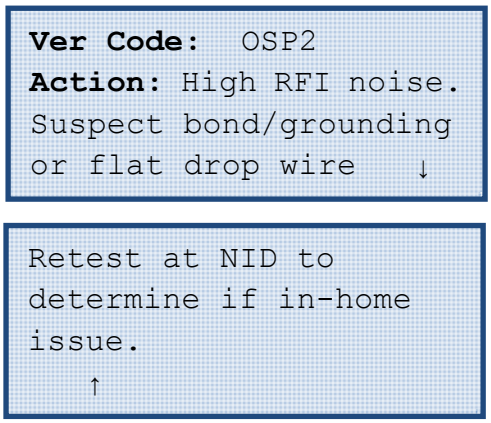
By depressing the 1 Key after the automatic test is complete as shown below, will give the user an indication of the overall line status compared to the thresholds and recommendations on corrective action should there be a FAILURE indication.

In the example shown below the line status was **Test OK.**

```
Ver Code:  TOK
All thresholds pass.
```

NOTE: Ver Code analysis is done on automated DSL testing only.

In the example shown below the line status was an **OSP2 VER CODE** and by depressing the Down Arrow Key additional information is provided for corrective action.



NOTE: The creation of the VER CODE shown above is accomplished by analyzing the test results against a set of user defined thresholds stored in the unit. The results of this analysis process generates the appropriate VER CODE depending on whether the results are within the defined thresholds (Test OK) or outside the thresholds (Bad Line)

4. Performing an Automatic Test on the Subscriber Line – DSLAM EMULATION

An automatic test on the subscriber's line is performed upon connecting the RJ11 test clips to the subscriber's line and powering up the unit. The tests performed as part of this automatic process is as follows:

1. DSL Test (4 Key)
2. DELT Test (6 Key)

4.1 Automatic Test Process Flow

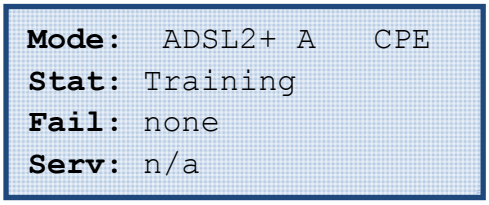
To perform an Automatic Test on a subscribers line perform the following Steps.
Connect the test clips to the subscriber's line to be tested.

NOTE: For this test process, connect the test clips looking towards the Customer.

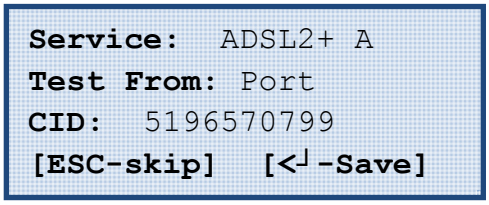
Power up the NCI 465 unit

NOTE: the unit will first go through a boot process prior to executing the test process. Once the Boot process is completed the number 4 key on the unit (DSL Key) will begin to **BLINK** indicating the test process has begun.

In addition the following screen will be displayed indicating the unit is training to the modem in the DSLAM



Once training is successful the **4 Key** will be solid **GREEN** and the following screen will be displayed to the user



Using the Right Arrow Keys, select the type of service profile being tested. In the example above ADSL2+ A is selected.

NOTE: SELECTING THE SERVICE TYPE WILL SELECT A SPECIFIC SET OF THRESHOLD SETTINGS IN ORDER TO PROVIDE A PASS FAIL INDICATION FOR THE TYPE OF SERVICE BEING PROVIDED.

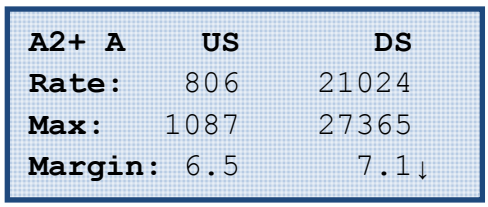
Using the Arrow Keys, select the location the current test is being performed. In the example the test is being performed at the Central Office frame.

NOTE: SELECTING THE LOCATION WHERE THE TEST IS BEING PERFORMED WILL SELECT A SPECIFIC SET OF THRESHOLD SETTINGS IN ORDER TO PROVIDE A PASS FAIL INDICATION FOR THE LOCATION.

Using the Arrow Keys, move the cursor to the CID: field and enter in the Circuit ID. (This is typically the Telephone number of the subscriber)

Depress the Enter Key on the NCI 465 to save the information and associated test results.

Once the Enter Key is depressed the user will be presented with the following statistical information regarding the actual upstream/downstream data rates and margin.



NOTE: The MAX indicates the Maximum data rate the loop will support.

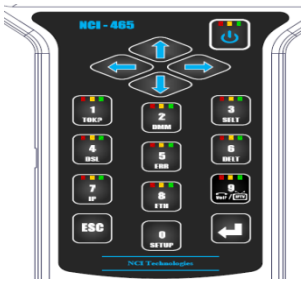
Depress the Down Arrow key to display additional statistical information related to Impulse noise protection, Loop attenuation and loop length as shown below.

A2+ A	US	DS
INP:	1.0	1.5
LATN:	1.1	0.0
EWL:	4000ft	26AWG↑

Depress the Up Arrow key to display the previous page.

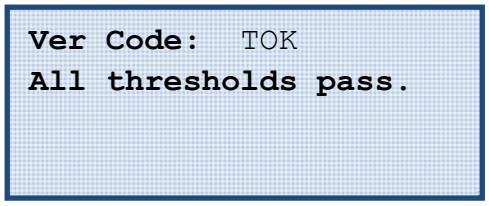
4.1.1 Additional Test Result Information

To obtain additional test result information regarding the test process performed in Section 3.1, view the keypad for any FAILED indicators. If any indicators are **RED**, Depress the associated KEY to review the FAILURE in order to take corrective action. **NOTE: a Failure will be denoted with an * to indicate which parameter was not within specifications.**

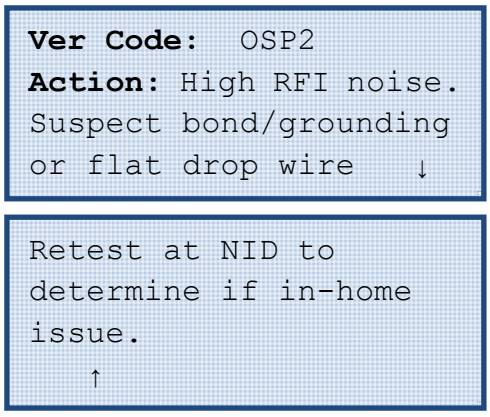


By depressing the 1 Key after the automatic test is complete as shown below, will give the user an indication of the overall line status compared to the thresholds and recommendations on corrective action should there be a FAILURE indication.

In the example shown below the line status was **Test OK.**



In the example shown below the line status was an **OSP2 VER CODE** and by depressing the Down Arrow Key additional information is provided for corrective action.



5. Performing Additional Manual Testing Functions

At any time during or after the automatic testing process a user can perform additional manual tests by either pressing the key associated with the manual test the user wishes to perform. Pressing the DMM button during automated DSL testing will interrupt the DSL test in progress.

Note: VER code analysis is not performed on DMM test results at this point in time; it is being developed for a future release, targeted for QIV/2011.

The following sections outline the manual testing functions provide with the unit.

5.1. Manual Test – DMM

The DMM Key when depressed performs many function other than the basic DMM measurement testing. These functions include the following:

1. **DMM Tests – Non-Working Pair**
2. **Quietline Test**
3. **DMM Test – ANI**

The following sections outline the procedure to execute the above listed test functions.

NOTE: as part of the DMM testing function a test for Hazardous Voltage and Current is automatically performed with the following screens being displayed to the user should a hazard be present

```
DMM: *** CAUTION ***
Hazardous AC voltage
>50Vac RMS detected.
[<┘-Retest]
```

```
DMM: *** CAUTION ***
Hazardous DC voltage
>130Vdc detected.
[<┘-Retest]
```

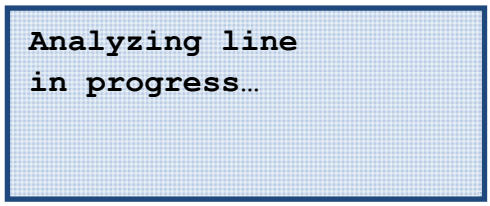
```
DMM: *** CAUTION ***
Hazardous current
>110mA detected.
[<┘-Retest]
```

5.1.1. DMM Testing – Non-Working Pair Test

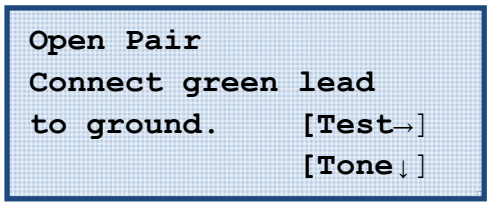
Perform the following steps to initiate a Metallic test on a Non-Working Pair

Connect the test clips to the non-working pair to be tested ensure green lead is connected to a ground

Power up the unit and depress the DMM Key. The following screen will be displayed.

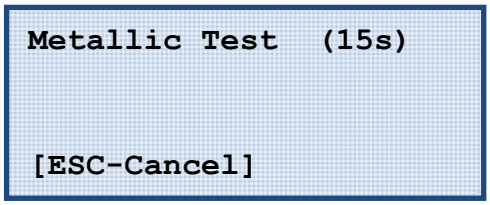


If the pair is a non-working pair, the following screen will be displayed.



Depress the Right Arrow Key to Enter the Metallic test function. The following status screen will be displayed.

PROGRESS STATUS MESSAGES



Once testing is completed you will see the following screen

```
Cap Length: 948ft
Cap Balance: 100%
Lng Balance: >75dB
Load Coil: 0        →
```

This screen displays the capacitive loop length, the capacitive balance of the line as well as the longitudinal balance of the line. If any load coils are detected a count will be provided.

Press the right arrow key to see the next set of results

```
     T-R  T-G  R-G
Res: >10M >10M >10M
Vdc:  0    0    0
Vac:  0    0    0   →
```

The second results screen shows Resistance across the three terminal pairs. Resistance is displayed in Kilohms, so .002 is 2 ohms, .873 is 873 ohms, 1.21 is 1210 ohms, 14.1 is 14100 ohms. If resistance is in Megohms then an M will follow the reading. >10M is greater than 10 Megohms.

Press the right arrow key to see the next set of results

```
     T-R  T-G  R-G
Cap: .010 .017 .017
RNG: NO
ROH: NO            →
```

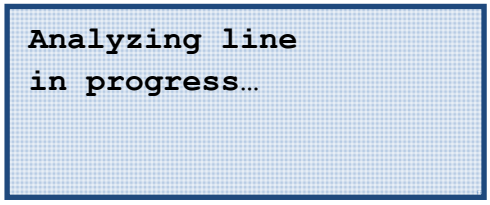
Capacitance in micro-farads is displayed across the three terminal pairs.
If a termination is detected on the line (ringer, modem etc.); YES will appear, otherwise NO will appear.
If a receiver off hook is detected ROH: will display YES, otherwise NO.

```
Cap Length: 949ft
Length T-R: 692ft
Length T-G: 864ft
Length T-R: 862ft   ←
```

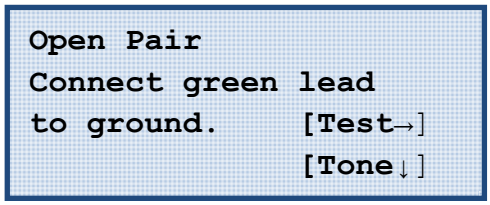
5.1.1.1 DMM Testing – Tones

Perform the following steps to place Tones on a Non-Working Pair

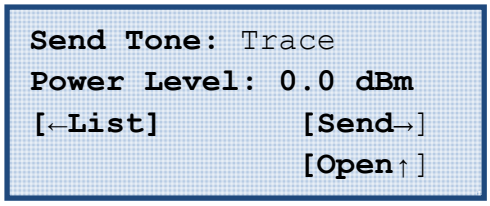
Connect the RJ11 test clips to the unit as shown on page 3.
Connect the test clips to the non-working pair to be tested.
Power up the unit and depress the DMM Key. The following screen will be displayed.



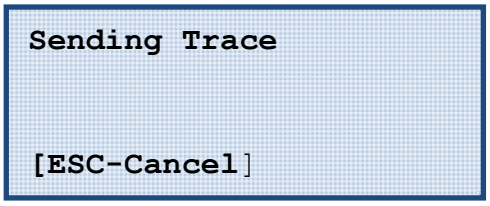
If the pair is a non-working pair, the following screen will be displayed.



Press the down arrow key to enter the Tone functions of the meter



You may send Trace tone or 1004 Hz tone at 0.0 dBm
Press the left arrow button to cycle between the two tones
Press the right arrow button to send the selected tone
Press the up arrow button to return to the previous screen
When you send tone, there will be a confirmation screen similar to this, press ESC to cancel sending the tone. You must cancel the tone before you may select another test.

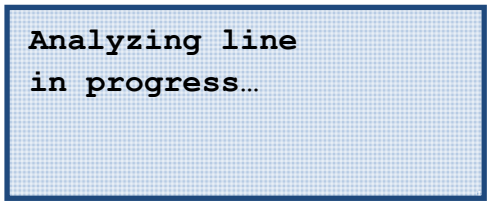


5.1.2. DMM Testing – In Service Pair

Perform the following steps to initiate testing a working subscriber line.

Connect the test clips to the subscriber's line to be tested.
NOTE: For this test process, connect the test clips looking towards the Central Office.

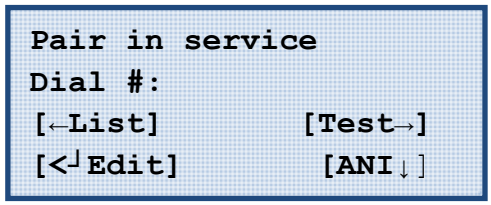
Power up the unit and depress the DMM Key. The following screen will be displayed.



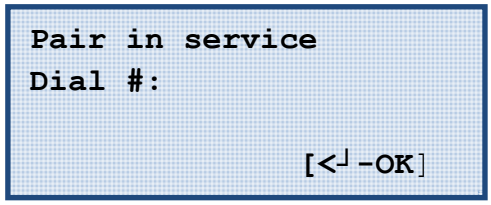
NOTE: In order to program in Quietline and ANI numbers the unit must be connected to a working telephone line.

5.1.2.1 Programming Quiet line Test Numbers

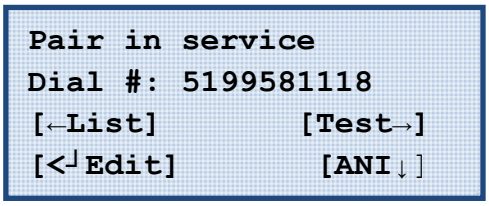
If the pair is working, you will see the following screen. This screen is where you access your Quiet line test numbers.



The **Dial #**: allows listing 3 pre-programmed numbers for dialing test lines in the Central Office. To program in a number press the return key (Edit).



Key in the first test number – 5199581118 and press the enter key to save the number

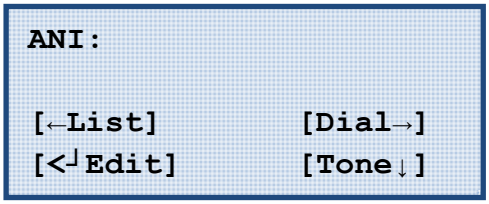


To enter additional numbers you must press the left arrow key (List) to get to a blank entry, then press the return (Edit) key to add another number. You may enter up to three test numbers into the unit. If you have three numbers programmed and you need to use a different number you must overwrite one of the numbers you have.

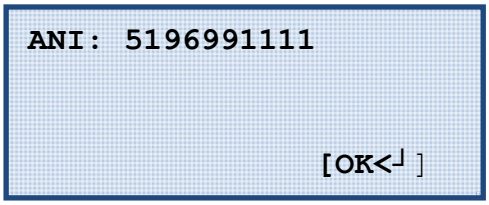
Press the down arrow key to program in ANI test numbers

5.1.2.2 Programming ANI Test Numbers

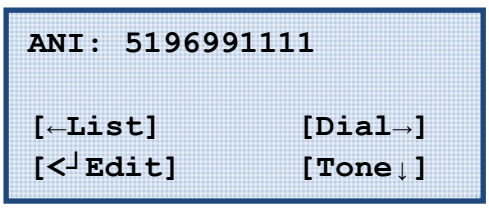
This screen is where you access your ANI test numbers, three numbers may be stored.



Pressing the return (Edit) key will allow you to program in a number, once you have keyed in the number press the return (OK) key.



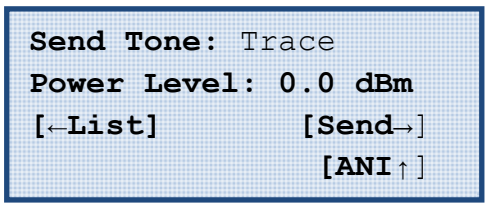
Once you have a valid ANI number programmed into the unit, press the right arrow key (Dial) to start the test. The progress of the call and ANI number will be heard through the units' speaker.



To enter additional numbers you must press the left arrow key (List) to get to a blank entry, then press the return (Edit) key to add another number. You may enter up to three test numbers into the unit. If you have three numbers programmed and you need to use a different number you must overwrite one of the numbers you have.

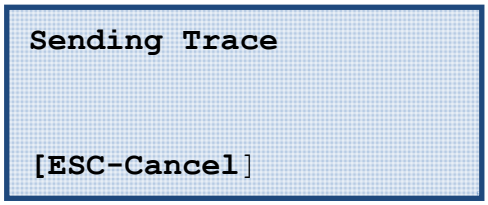
5.1.2.3 Sending Tones on an Active Line

Press the down arrow key access the Tone sending functions.



The left arrow key (List) allows you to select Trace or 1004 Hz tone. The up arrow key (ANI) returns you to the ANI screen.

Pressing the right arrow key (Send) will start sending the requested tone, you will see a status message. Press the ESC key to return to the Send Tone screen.



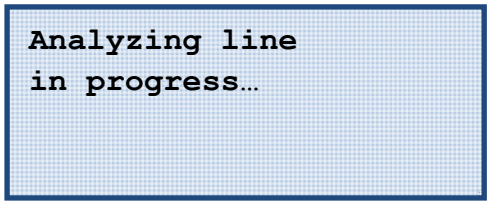
5.1.3. Quiet line Test

Perform the following steps to initiate a Quietline test on a subscriber line.

Connect the test clips to the subscriber's line to be tested.

NOTE: For this test process, connect the test clips looking towards the Central Office. Ensure ground lead is connected to ground for ground resistance testing.

Power up the unit and depress the DMM Key. The following screen will be displayed.



If the pair is a working pair, the following screen will be displayed.

```
Pair in service
Dial #: 5199581118
[←List]        [Test→]
[<┘Edit]        [ANI↓]
```

NOTE: If the working pair does not have dial tone the following screen will be displayed to allow you to manual perform a DMM test to aid in troubleshooting the problem. Depress the Right Arrow to initiate the DMM test.

```
No Dial Tone Pair


                [Test→]
```

If the screen displays **"Pair in service"**

```
Pair in service
Dial #: 5199581118
[←List]        [Test→]
[<┘Edit]        [ANI↓]
```

Press the right arrow key (Test) to initiate the test to the number displayed. You may press the left arrow key (List) to display other pre-programmed test numbers.

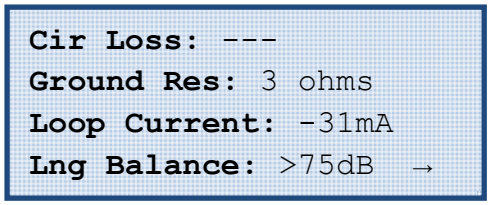
See Section **Programming Quiet line Test Numbers** for information on programming or changing test numbers.

PROGRESS STATUS MESSAGES

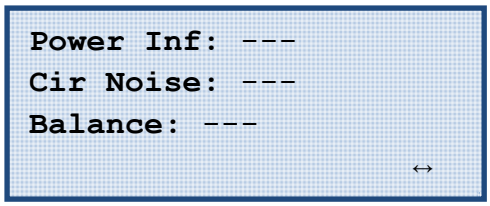
```
Dial 5199581118   ./
Quietline         ./
Metallic       (10s)
[ESC- Cancel]
```

The progress message will display until the Quiet line test is completed.

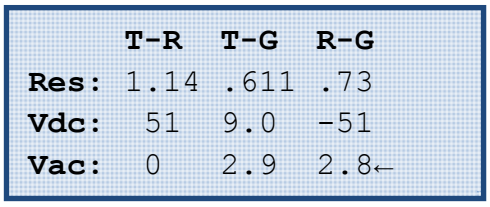
Once completed the following test results will be available



Ground Resistance is 3 ohms; ensure ground lead is connected to get this measurement
Loop current is -31 mA (positive current flow indicates Tip Ring reversal of test leads)
Longitudinal Balance is >75dB
Press the right arrow key to proceed to the next set of results



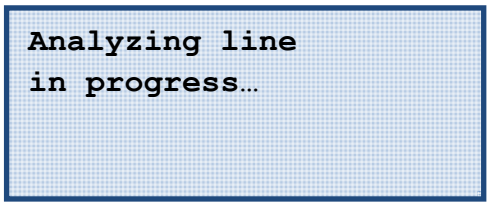
Power Influence
Circuit Noise
Balance
Press the right arrow key to proceed to the next set of results



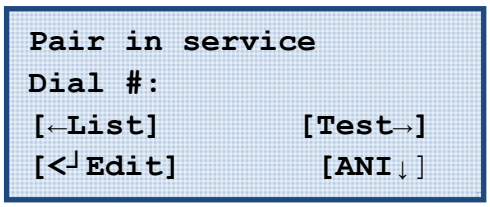
5.1.4. ANI Test (Automatic Number Identification)

Perform the following steps to initiate a test towards the Central Office.

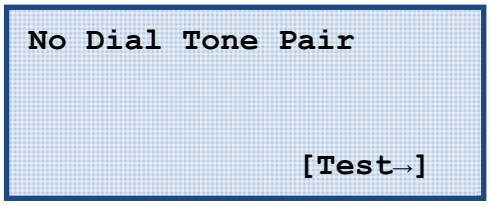
Connect the test clips to the pair to be tested.
Power up the unit and depress the DMM Key. The following screen will be displayed.



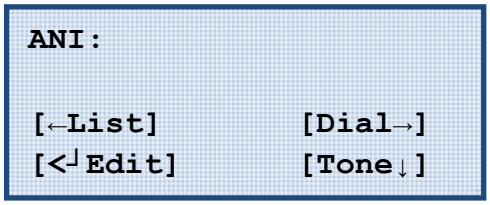
If the pair is a working pair, the following screen will be displayed.



NOTE: If the working pair does not have dial tone the following screen will be displayed to allow you to manual perform a DMM test to aid in troubleshooting the problem. Depress the Right Arrow to initiate the DMM test.



If the display is **"Pair in service"** Depress the Down Arrow Key for the ANI menu. The following screen will be displayed.

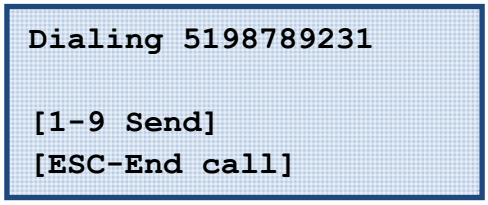


Press the left arrow key (List) to see a list of pre-programmed ANI numbers. Press the right arrow key to dial the displayed ANI number and perform the test.

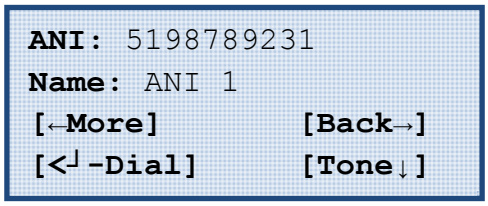
NOTE: The Left Arrow and the Enter Key shown above allow the user to enter ANI numbers and save them in a list for future use. See **Section Programming ANI Test Numbers** for instructions on programming up to three ANI numbers.

Once executed the following status screens will be displayed indicating the status during the testing process.

PROGRESS STATUS MESSAGES



NOTE: If dialing the ANI number from a List as explained in Step 6. Then the following screen will be displayed. Depress the Enter key to execute dialing.



Once dialing is complete the number will be spoken through the speaker on the NCI 465 unit.

Depress the ESC Key to end the call.

5.2 SELT – Single Ended Line Test

Purpose of Test:

A SELT test is performed on a vacant (non-working), and open pair to allow qualification of the pair for xDSL service. You may perform a SELT test from a cross connect point or frame toward the customer to determine if a spare pair will support the xDSL service you wish to provide. Customer equipment may be on loop, however DSL equipment should be removed. DSL equipment will absorb any test signals and you will get random results. You may also perform a SELT test from the customer NID on the spare pair to from the NID back toward the cross connect point.

Perform the following steps to initiate a SELT test on a line under test.

Connect the test leads to the pair under test and the ground lead to a good ground. Press the SELT key.

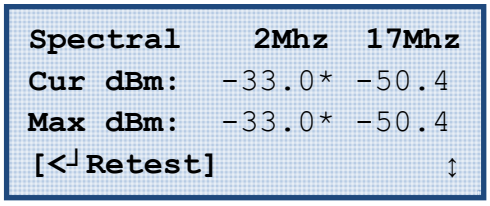
```
SELT Test
Disconnect DSL equip
on line.
[Test→]
```

You now select the location you are testing from, options are Home (customers premise), OSP (outside plant cross connect point) or Port, which is the DSLAM location. Use the right arrow key to cycle through the options; press OK when you have selected the correct location for the test. It is important to select the correct location; different parameters may be used in different locations to indicate pass or fail of the test

```
Microfilter: Pass
SELT Len: 751ft
SELT Fault: none
[<┘Retest]↓
```

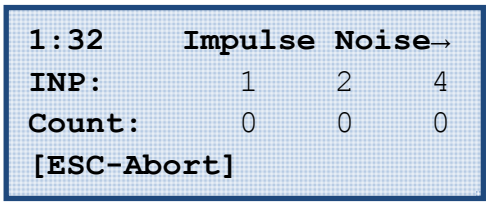
The above screen shows the presence or absence of the micro-filter, the loop length and whether or not a fault was detected on the line.

Depress the Down Arrow Key to display additional information as shown below.



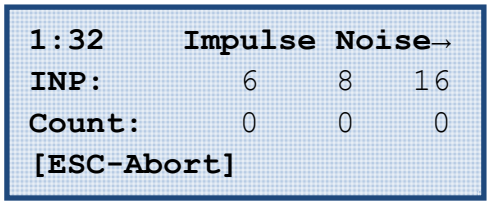
The above screen shows the results from the Spectral Analysis test. The asterisks shown denote a threshold was exceeded in the 2 MHz band. The RED LED on the SELT Key will be illuminated.

Depress the Down Arrow Key to display additional information as shown **below.**



The above screen shows the results from the Impulse Noise test. NOTE: This test is real time and will update the display until canceled. The timer in the upper left corner shows the updates to the screen refreshing approximately every 5 seconds

Pressing the right arrow key will display the following screen. Pressing the right arrow key will cause these two screens to alternate.



Pressing the ESC key will abort the continuous Impulse Noise test, you may now press the Retest button on the SELT LEN, Spectral Noise or Impulse Noise to test only those functions.

5.3 DELT – Double Ended Line Test

Purpose of Test:

The DELT test is used to check a service when the pair is working. You may perform a DELT test from the customer end of a service to the port of the DSLAM. You may also perform a DELT test toward the customer premises. When performing the DELT test to the DSLAM the NCI-465 is configured as a CPE device. When performing the DELT test to the customer premises the NCI-465 is configured as a DSLAM.

Perform the following steps to initiate a DELT test on a line under test.

Connect the test clips to the pair to be tested.
Power up the unit and depress the DELT Key. The following screen will be displayed once the tests are complete.

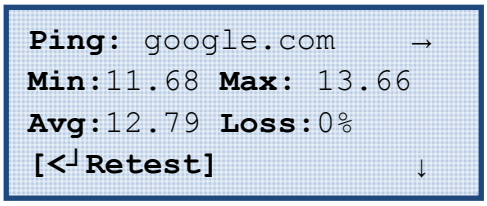
```
Faults: none
Taps RRE: 1044Kbps
Noise RRE: 4450Kbps
[ESC-Abort]
```

The above screen shows the results from the DELT test. There were no faults detected and the (RRE) Rate Reduction Estimates are shown for both the presence of a Tap and or the influence from the presence of Noise.

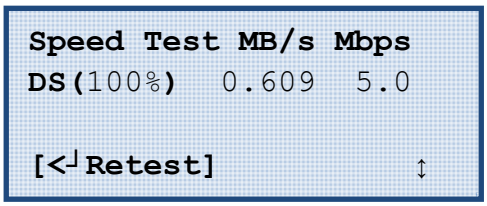
5.4 Ping Test and File Download Test

Ping tests are performed automatically as part of the DSL test sequence. The tests may be performed manually. Connect an Ethernet cable to the outer port of the NCI-465. Press the Ethernet key (8), and wait obtain a valid IP address with access to the Internet. If and Internet address is not obtainable, a ping test will be performed to any local router that provides an IP address. The ping tests to the Internet servers (Google, yahoo, your company) may be unsuccessful.

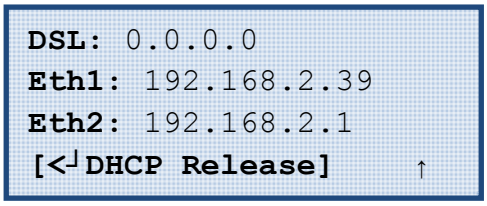
Once an IP address has been obtained, press the IP key (7) and press the enter key to start the test or retest the ping tests. The ping test will take a bit of time, depending on if the ping sites are available. Once complete you will have results similar to these.



Pressing the down arrow key will present you with the Speed Test screen; press enter to perform a manual speed test. The speed test downloads a file from the Internet or your company test server



Pressing the down arrow key will give you the IP addresses that were assigned, if a DSL connection is established, you will see a DSL IP, otherwise you will see an Ethernet IP plus the gateway IP. Press the return key to release the DHCP address assigned



5.5 Ethernet Testing – ETH

Perform the following steps to initiate a Ethernet test on a network.

Connect an Ethernet cable to the outside RJ45 connector on the unit. See **Section 1.2 - Layout - Top View** for location.
Connect the other end of the cable into the network.
Power up the unit and depress the ETH Key.

```
Starting…
Connect Ethernet
cable to outer port.
```

The following screen will be displayed once the tests are complete.

```
IP: 192.168.2.39
Rate-Dplx:  100M-Full

[<┘-DHCP Release]  ↓
```

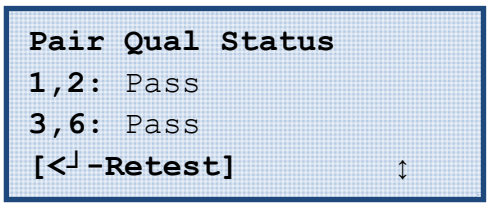
The above screen shows the IP address assigned to the NCI 465 by the DHCP server and that the Ethernet cable connected to the NCI 465 is a straight through cable.

Depress the Down Arrow Key for additional information as shown below.

```
Traffic     Tx      Rx
KBytes:  99930  999930
Errors:      0       0
[<┘-DHCP Release]  ↕
```

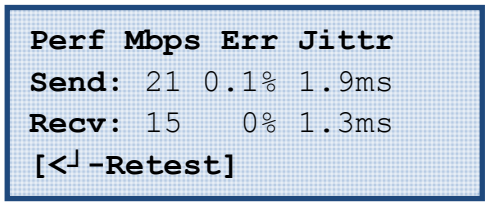
The above screen shows the data transfer rates and the number of Errors encountered.

Depress the Down Arrow Key for additional information as shown below.



The above screen shows the integrity of the Ethernet cable connected to the NCI 465. Status message could be xxf Short or xxf Cross or Snr Low or xxf Open. Short indicates a short between the 1,2 conductor or 3,6 conductor. Cross indicates a short between one of the conductors 1,2 with one of the conductors 3,6. In future a message to indicate this is a cross-over cable will be implemented.

Depress the Down Arrow Key for additional information as shown below.



The above screen shows the performance of the Speed test with any Errors and or Jitter.

5.6 Ethernet Testing – Cable Test

There are 3 different scenarios for testing Ethernet cables. The first is with the cable connected to the outer Ethernet port of the test set and the other end of the Ethernet cable left open. This method is known as OPEN test. The second is with the cable connected to the outer port and the other end connected to a device such as a switch, router or modem, but not another NCI-465. This method is known as LINKED. The third is with the cable connected to the outer port, and the other end connected to the middle port of the NCI-465. This method is known as LOOPED.

5.6.1 Open Cable Test

Connect the cable you wish to test to the outer port of the NCI-465

Press the ETH (8) key to start the testing, you will see the following screens

```
Starting…
Connect Ethernet
cable to outer port.
```

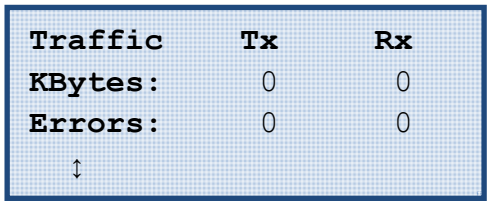
The following screen will be displayed once the tests are complete.

```
Eth: 0.0.0.0
Rate-Dplx:  n/a
Linked: No
[<┘-DHCP Release]  ↓
```

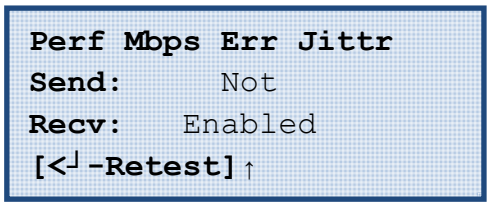
No IP address is assigned and data rate and duplex are unknown (cable is open). Press the down arrow key to see test results

```
Pair Qual Status
1,2: n/a  9ft Open
3,6: n/a  9ft Open
[<┘-Retest]       ↕
```

Pressing the down arrow key will provide traffic statistics (should be zero since cable is open)



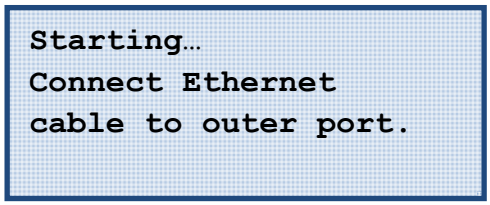
Pressing the down arrow key will provide Performance Statistics.



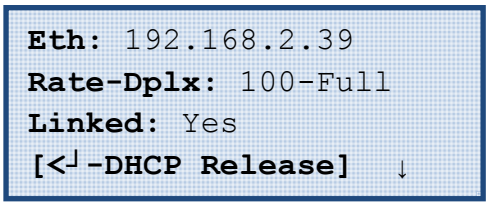
5.6.2 Linked Cable Test

Linked cable test is when one end of the Ethernet cable is connected to another device, such as a router, switch or HPNA device, but not another NCI-465.

Connect the end you wish to test from to the outer port of the NCI-465. Press the ETH (8) key to start the test.

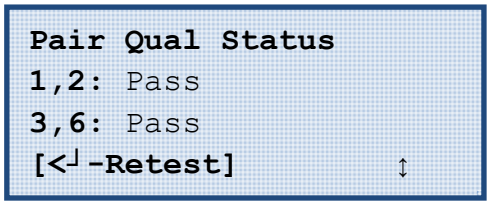


The following screen will be displayed once the tests are complete.



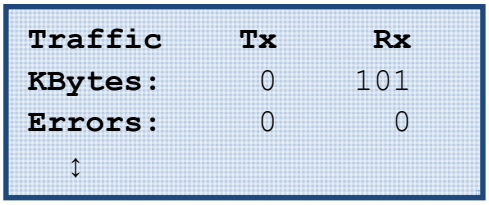
Here we see the assigned IP address from the network (if available) plus the data rate and duplex of the link. The Linked message simply tells us that the other end of the cable is connected to a device

Press the down arrow key to see results of the testing

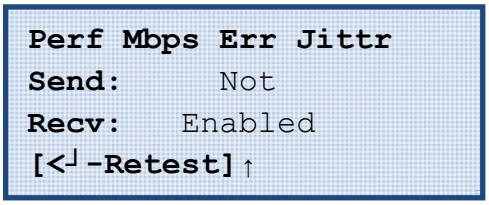


Expected test results are Pass, you may see Fail SNR Low indicating a failed SNR test.

Press the down arrow key to see traffic results



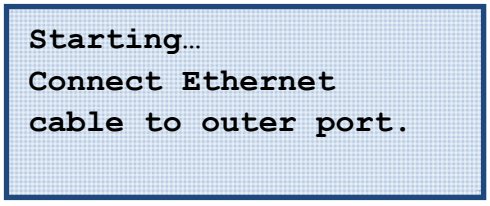
Pressing the down arrow key will provide Performance Statistics.



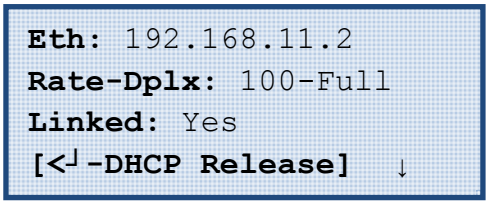
5.6.3 Looped Cable Test

Looped cable test is when both ends of the cable are connected to the NCI-465 test set. Use both Ethernet ports of the test set for this test.

Press the ETH (8) key to start the test.

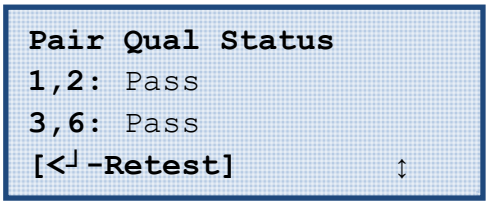


The following screen is displayed when test is completed.



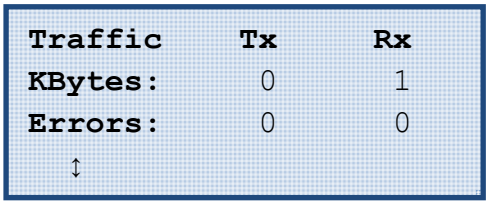
Notice the IP address is 192.168.11.2; this indicates that you have connected to the NCI-465. The middle port of the NCI-465 has an IP address of 192.168.11.1 and is a DHCP server.

Press the down arrow key to see the results of the testing

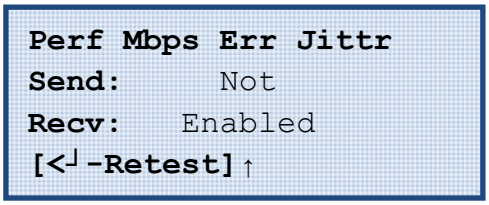


Expected test results are Pass, you may see Fail SNR Low indicating a failed SNR test.

Press the down arrow key to see traffic results



Pressing the down arrow key will provide Performance Statistics.



5.7 HPNA Tests

Perform the following steps to initiate the HPNA tests.

HPNA Test:

Connect an Ethernet cable to the outside RJ45 connector on the unit. See **Section 1.2 - Layout - Top View** for location.

Connect the other end of the cable to the customer's gateway, HPNA device or any other Ethernet jack that is on the same network as the HPNA devices.

Depress the 9 key.

If HPNA devices are detected, the following screen will be displayed.

```
HPNA:  Detected 3
devices.  Press → for 1K
test; ← for 100K.
[<┘-Rescan]      Coax↓
```

Depress the Right or Left Arrow Key to start the HPNA test. Depending upon the number of packets you use to test and the number of nodes, the test may take 1 to 2 minutes to 20 minutes. It is suggested to start with 1K packets for trouble shooting and 100K packets for network validation

```
Running CERT test
1,000 packets will take
< 2 min.
[ESC-Abort]
```

Results below are shown. Press the Right Arrow Key to display additional devices. The last screen will show the last four characters of the MAC address, the HPNA chipset model and firmware version.

```
HPNA Mbps   Err SNR→
1->2  144     0% 43
1->3   14   0.3% 27*
2->1  128     0% 43↓
```

```
Dev Mac Model Ver ←
1: 62e6 3210H 1.9.2
2: 1dc4 3210G 1.9.2
3: 1e9c 3210G 1.8.7↓
```

```
HPNA Mbps   Err SNR→
2->3   96     0% 43
3->18  0.2% 26*
3->2  128     0% 42↓
```

5.8 Testing Coax Cable

Perform the following steps to initiate the Coax tests.

Coax Test:

Connect the DSL-to-Coax adapter to the outside RJ11 connector. See **Section 1.2 - Layout Top View** for location.
Connect the other end of the cable to the customer's coax network on the input side of a splitter.
Depress the 9 key. Press the Down Arrow Key to display the Coax start screen.

```
Coax: Connect test cable
to coax adapter and
press → to test coax
wiring.          ↓
```

Depress the Right Arrow Key to start the coax test.

```
Coax: In progress...


[<┘-Retest]
```

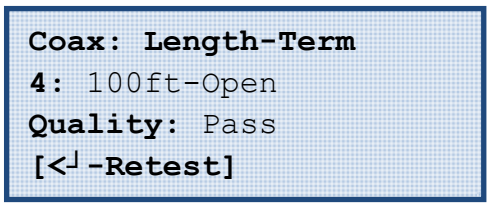
Results – The below results are displayed. The distance to each splitter or cable end (open) is displayed. The overall cable quality, based on noise ingress and cable integrity is shown as pass/fail.

```
Coax: Length-Term
1: 10ft-Splitter
2: 40ft-Open
3: 65ft-Open      ↓
```

```
Coax: Length-Term
4: 100ft-Open
Quality: Pass
[<┘-Retest]
```

5.9 Retest Function

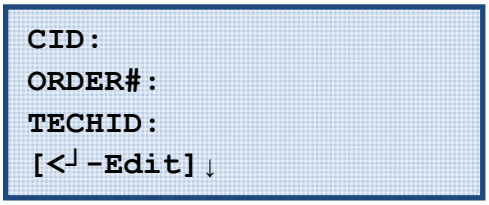
The user can perform a RETEST function from sub-menus within a primary test key.



6. NCI 465 Setup Menu

6.1 Initial Setup Screen

Press the SETUP button to get to the Initial Setup Screen shown here.



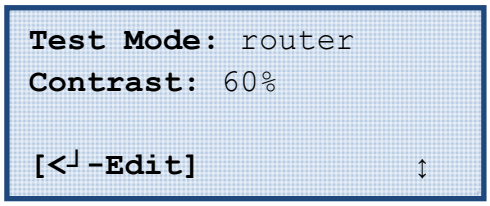
See **Section 2 - Turning the Unit On and Off, enter Circuit ID, ORDER# and TECHID** for details on the Initial Setup Screen

A fully charged unit will have the Yellow light on the power button extinguished, when plugged into a power source.

To determine if your power source if functioning and you suspect the unit is fully charged, simply remove the power source from the NCI-465, wait a few seconds and plug it back into the NCI-465. In a few seconds you should see the Yellow light activate on the Power key then go out if the power source is active and the unit is fully charged.

6.2 Test Mode and Contrast Setup

From the **Initial Setup Screen**, press the down arrow key to start setting up the test mode and screen contrast level.

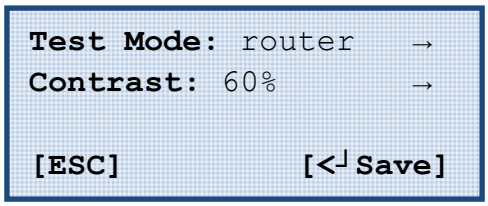


Press the down arrow key, the cursor will flash on the arrow next to the Test Mode line, press the right or left arrow to change between Bridge and Router. (Not implemented yet)

Press the down arrow key to adjust the Contrast level. The cursor will flash on the arrow in the Contrast line. Press the right arrow to increase contrast, left arrow to decrease contrast.

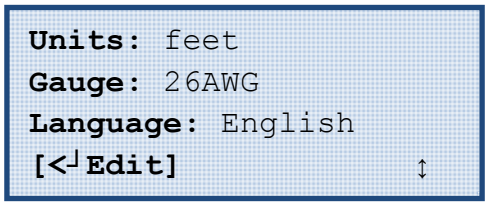
When completed, press the Enter Key to save the changes.

The ESC key will take you back to the test mode screen without saving changes.

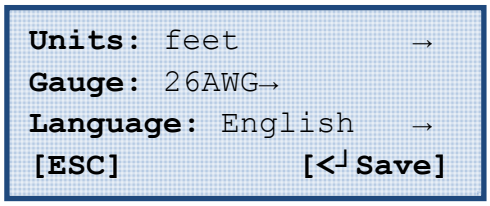


6.3 Units, Gauge and Language Setup

From the **Initial Setup Screen** press the down arrow key twice. The units, gauge and language screen will appear.



Pressing the enter key will allow you to edit the units, gauge and language settings.



With the cursor flashing on the right arrow key of the Units line, you may select between feet and meters.

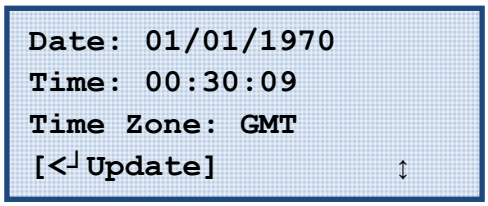
Gauge is set to 26AWG, it is not selectable at this time

Language may be changed between English and Francais (French)

Press the enter key to save your changes, the ESC key to abort changes.

6.4 Reviewing Date and Time

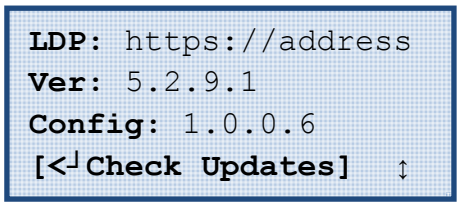
From the **Initial Setup Screen** press the down arrow key three times, you may review the current date and time values along with the time zone setting for the unit. Pressing the Update key will cause unit to attempt to update the time via the Internet. For this to succeed you must have Internet connectivity already established.



Press the up or down arrow key to move between the previous and next setup screen.

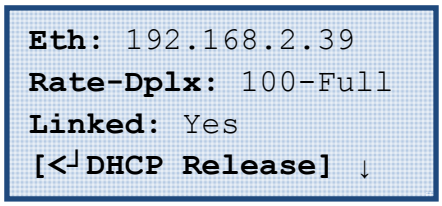
6.5 Checking and Updating Firmware Release

From the **Initial Setup Screen**, press the down arrow four times. You will see the current LDP server address, the firmware Version of the unit and the Configuration version of the unit.



Pressing the enter key will cause the unit to check for updates. There are a couple of conditions that must be met in order to successfully update the unit. The unit must have a valid IP address assigned to it. The IP address must have access to your LDP server. The unit must be plugged into a power source. Although the firmware update process is very robust, if the unit ran out of battery power at a critical point in the update process the unit could be rendered unusable, requiring return to factory for repair.

To obtain an IP address, plug an Ethernet cable into the outer port of the NCI-465, then press the ETH key. You should see a screen similar to this one.

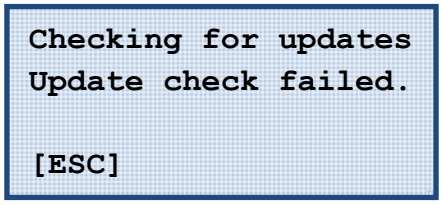


Enter the setup menu by pressing the Setup key and the down arrow key four times.

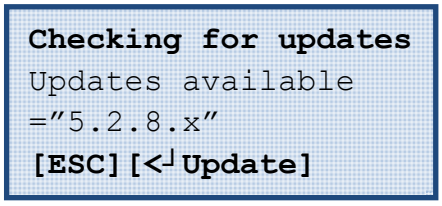
Press the enter key to Check Updates

Unit will respond with Checking for Updates, if none are available you will see

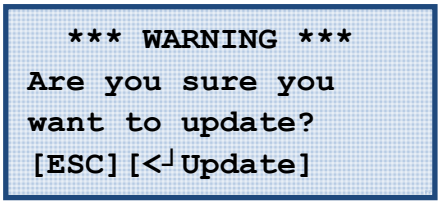
Press the ESC key to return to the firmware release display screen.
If you see the following message, check that you are connected to the Internet on the outer Ethernet port of the NCI-465. If you are connected, verify that you have a valid IP address, press the 8 key. You may also load firmware if the unit is in sync with a DSLAM using the test cable and the DSL circuit has access to the Internet.
If your company has an LDP server on a corporate Intranet, then when you request firmware updates you must ensure that the unit has access to the corporate Intranet, not the Internet. Update check failed indicates that you cannot reach the LDP server.



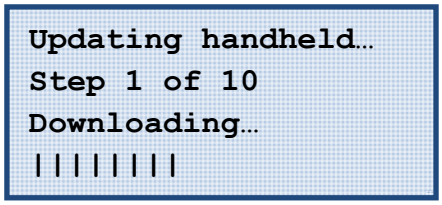
If an update is available you will see the following

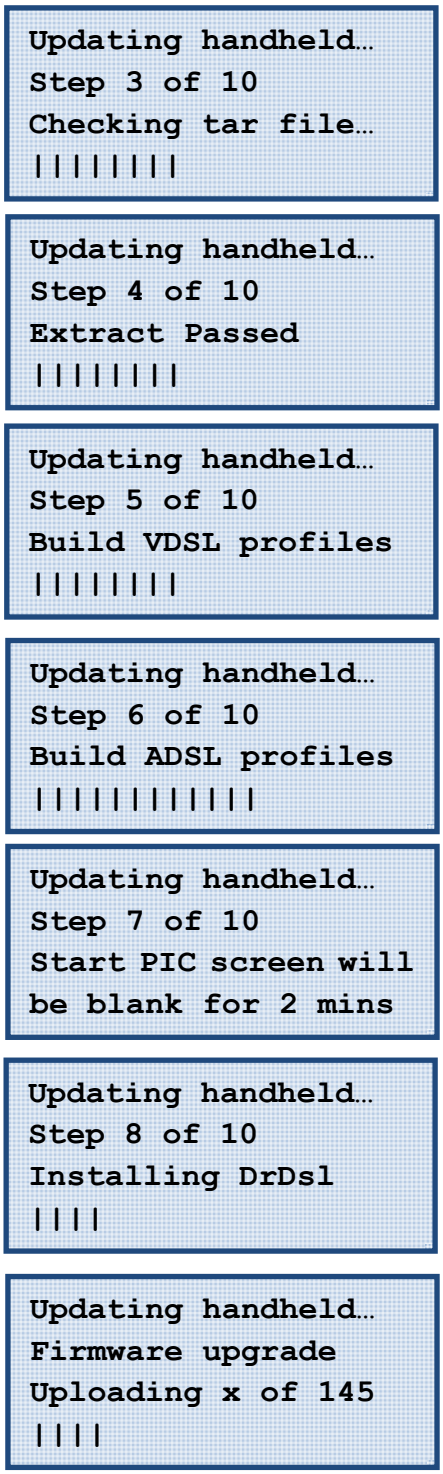


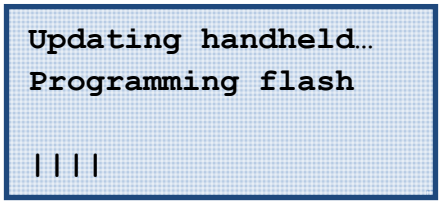
If the available update matches what your company has advised you it should be press the enter key to start the update process



Press enter to start the update process




Updating handheld…
Step 3 of 10
Checking tar file…
||||||||
Updating handheld…
Step 4 of 10
Extract Passed
||||||||
Updating handheld…
Step 5 of 10
Build VDSL profiles
||||||||
Updating handheld…
Step 6 of 10
Build ADSL profiles
||||||||||||
Updating handheld…
Step 7 of 10
Start PIC screen will
be blank for 2 mins
Updating handheld…
Step 8 of 10
Installing DrDsl
||||
Updating handheld…
Firmware upgrade
Uploading x of 145
||||



At this point the unit will power itself off. Other messages may appear, but these are the main steps in the update process. Press the Power key to power the unit back on and a message Update Complete will appear and unit will continue booting up.

6.6 Uploading Saved Test Results

From the **Initial Setup Screen**, press the down arrow key five times to upload test results.

Test results that have been saved in the NCI-465 are uploaded to the LDP server then deleted from the unit. The number of tests a unit can save depends upon the type of tests performed. A simple DMM test uses much less memory then full xDSL tests with spectral analysis. The unit has capacity for several hundred xDSL tests.

As with checking for firmware updates, you must have a valid IP address which can reach the LDP server before an upload can be successful.

Progress of the upload is indicated by the number of the pending upload counter decreasing. Last, is the last date an upload, or partial upload was successful

When completed you will see

Notes:

If there are a large number of tests to upload, and you disconnect from the process, the remaining tests are stored on the NCI-465 until the next upload attempt. You will not lose any test results.

6.7 Customer Number, Serial Number and MAC address

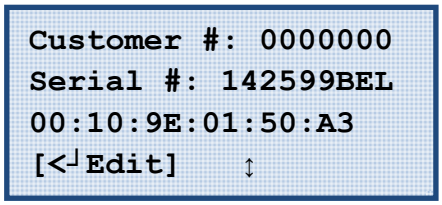
From the **Initial Setup Screen**, press the down arrow key six times to set customer number or check board serial number and MAC address.

The customer number determines what parameter files are used with your unit. The customer number comes pre-assigned for your company.

MAC address is displayed as 6 pairs of hexadecimal numbers

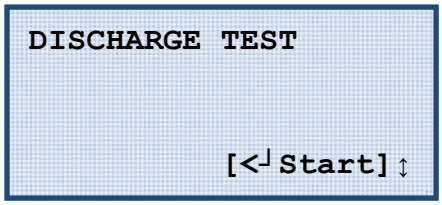
The serial number is the serial number of the DSL board inside the unit.

The customer number may be changed, however doing so will possibly render the automated test analysis to be incorrect or fail. If you lose your customer number see your manager or check a co-workers unit for the correct number.



6.8 Testing the Battery and Charging System

From the **Initial Setup Screen**, press the down arrow key seven times to start the Battery and Charging System tests.



The purpose of the discharge and charge testing functions is to allow the user to determine if a battery replacement is required. Battery life can be very subjective. This test sequence gives the end user the tool to determine correct function of both the charging system and the battery.

Requirements for testing…

1. Unit under test should be a room temperature
2. Unit must be fully charged before starting the test sequence
3. Discharge test must be run with charger unplugged
4. Full test cycle will take approximately six hours to complete

Steps to perform testing the charging system and battery pack

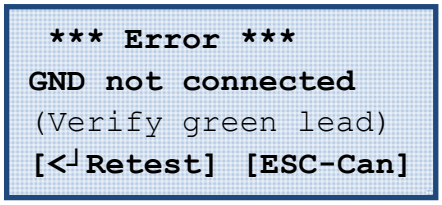
1. Fully charge battery, plug in unit, and wait until Yellow charge light goes out
2. Remove unit from charger
3. Power unit on, enter a CID and press down arrow key seven times to reach discharge test
4. Press the Start button
5. You will see a Running please wait message
6. Discharge test will take between 2.25 hours and 3.0 hours to complete
7. Unit will be powered off when test is completed (battery fully discharged)
8. Plug charger into the unit and power unit on
9. Unit will indicate that keypad is locked while initial charge is put into battery – 5 minutes. Scrollbar will indicate progress of the initial charge.
10. Once keypad is unlocked press Power button to boot unit up.
11. Enter a CID and press down arrow key seven times, to Discharge test screen, note the Pass or Fail message

12. If Pass is seen, press down arrow key once more
13. This will bring you to the charge test screen
14. Press the Start button
15. You will see a Running please wait message
16. Charge test will take 3.5 hours to complete
17. Once completed a Pass or Fail message will appear on the screen

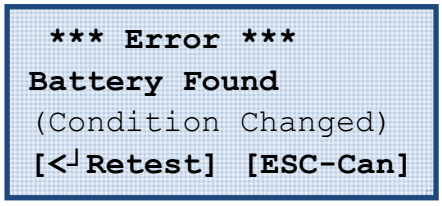
7 NCI 465 Error Messages

During the testing process various Error Messages may be displayed indicating a change in the loop that is currently under test. The following screens and explanations are provided when these message screens will occur.

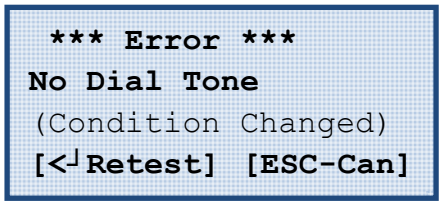
A. If the Ground Lead is not connected when required the following Error will occur.



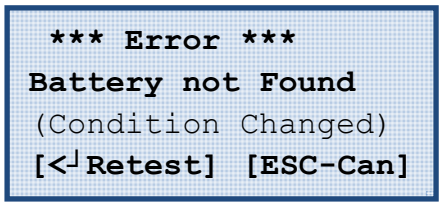
B. If when testing an open line and during the subsequent testing process battery is found then the line condition has changed and not open.



C. If when testing an active line that had dial tone and subsequent testing detects a loss of Dial tone the following message is displayed.



D. If when testing an active line and subsequent testing detects a loss of Battery the following message is displayed.



8 Troubleshooting Table

The following table will provide some troubleshooting steps you may use before calling for support.

Symptom	Troubleshooting Steps
Unit will not turn on	1) Press and hold power key for two seconds 2) Plug unit into a power source 3) If Yellow power LEDflashes, wait 5 minutes then power up 4) If no power LED light up, try a different power source (borrow a different AC charger) 5) If no power LED light up, arrange to return unit for repair
Unit will not sync to any service	1) Ensure the test cord is inserted correctly into the unit, slide the metal retaining clip up, push the test cord into the NCI-465, and slide the metal retaining clip down, retest. 2) Try a different test cord from a co-worker 3) Arrange to return unit for repair
Automotive charger does not work, but AC adapter does work.	1) Plug automotive charger into a 12 volt outlet and check for a red light on charger. If not lit, replace fuse in automotive charger with a new 6 amp fuse. 2) If red light still is not on, check the 12 volt outlet you are using for power 3) If red light is on, ensure the small plug is fully inserted into the NCI-465 meter 4) If yellow power light on meter is still not on (and you know that the battery is not

	fully charged), try a different automotive adapter
DMM module returns a constant and incorrect reading, such as ground, short or open	1) Ensure the test cord is inserted correctly into the unit, slide the metal retaining clip up, push the test cord into the NCI-465, and slide the metal retaining clip down, retest. 2) Try a different test cord from a co-worker 3) Arrange to return unit for repair
Unit fails Discharge Test	1) Replace battery 2) Repeat testing
Unit fails Charge Test	1) Follow your company procedures for replacing the unit