

## **APPENDIX B SUBSCRIBER STATION WEB PAGE**

This section provides instructions for setting up and using the Subscriber Station (client) Web Page using a Web browser.

### **B.1 SETTING UP THE BROWSER**

When accessing the Web page we recommend using Mozilla Firefox 2.0 (or higher) or Microsoft Internet Explorer 6.0 (or higher). In addition, before you can access the SS Web Page, you need to ensure that your Web browser's settings will enable access to the tool. The following procedure describes how to configure Microsoft Internet Explorer for this purpose.

#### **To Configure Microsoft Internet Explorer for Web Management:**

1. Start Internet Explorer.
2. From the **IE** menu, select **Tools → Internet Options**.
3. In the Internet Options window, click the **General** tab, and then in the "Temporary Internet Files" group, click the **Settings** button. The Settings window opens.
4. In response to "Check for newer versions of stored pages", select the "Every visit to the page" option, and then click **OK**. This ensures you will always view current information.
5. Click the **Security** tab, and then configure the following security settings:
  - a. Select the **Trusted Sites** zone.
  - b. Click the **Sites** button.
  - c. In the **Add this Web site to the Zone** field, enter the client's IP address, for example:  
http://10.0.0.1
  - d. Click **Add**, and then click **OK**.
6. In the Internet Options window, click the **Apply** button, and then click **OK**.

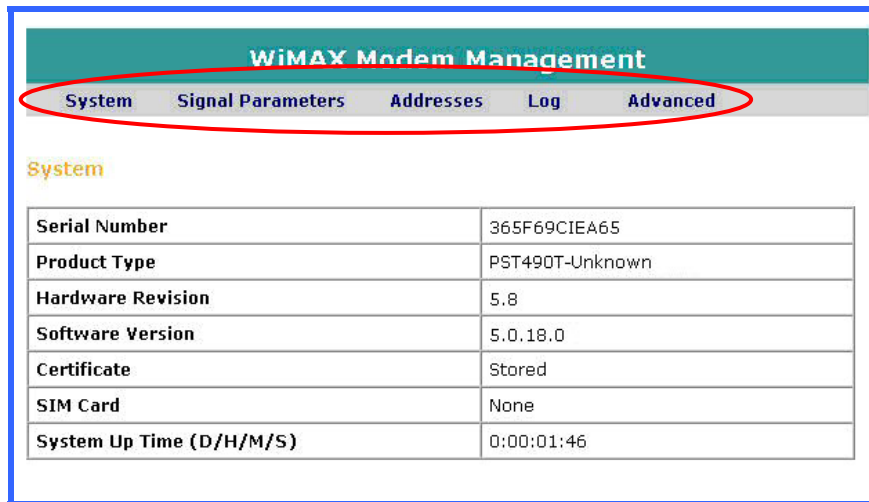
### **B.2 ACCESSING THE SS WEB PAGE**

Each client has a pre-configured IP address that is used to access the SS Web Page. This Web Page communicates with the Web server software embedded in the client.

#### **To access the SS Web Page:**

1. Open a Web browser session.
2. Enter the client's IP address in the URL Address field.
3. Press the **<Enter>** key or click the **Go** button.

The SS Web Page will display the WiMAX Modem Management tool home page, as displayed below:



**Figure B-1: SS Web Page - Menu Bar**

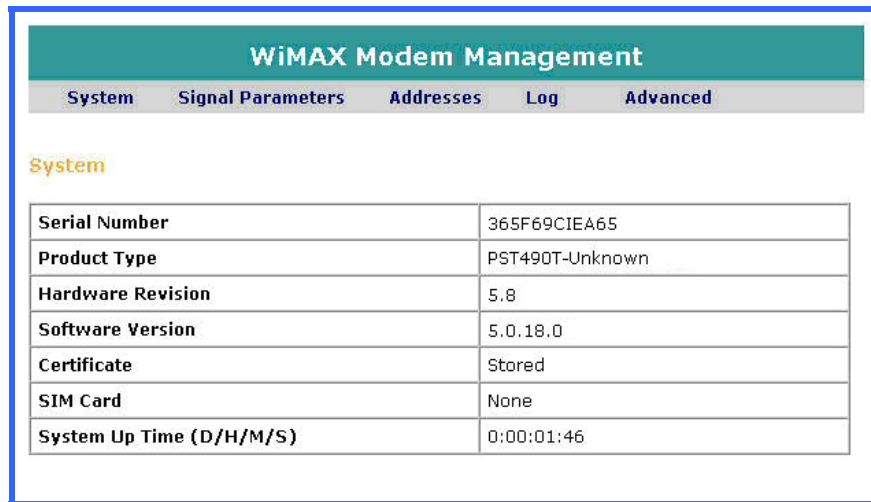
The menu bar, located at the top of the page, provides links (menus) to various configuration categories. This menu bar is displayed throughout the Web pages to allow easy navigation between categories.

**Table B-1: SS Web Page Menu Bar Description**

Menu Item	Description
<b>System</b>	The System page (described in Section B.3.) displays client identification parameters such as serial number, hardware version, software version, etc.
<b>Signal Parameters</b>	The Signal Parameters page (described in Section B.4.) displays signaling parameters such as frequency and RSSI.
<b>Addresses</b>	The Addresses page (described in Section B.5) displays addresses such as the client's Ethernet MAC and IP address.
<b>Log</b>	The Log page (described in Section B.6) displays logged traps and their severity levels.
<b>Advanced</b>	The Advanced page (described in Section B.7) provides access to advanced features that are for use by authorized personnel only.

## B.3 SYSTEM PAGE

The client's system information is displayed in the System page. This page is accessed from the System menu. The System page displays a table containing read-only system information, as displayed below.



The screenshot shows a web interface titled "WiMAX Modem Management". It has a navigation menu with tabs for "System", "Signal Parameters", "Addresses", "Log", and "Advanced". The "System" tab is selected. Below the menu, there is a section titled "System" containing a table with the following data:

Parameter	Value
Serial Number	365F69CIEA65
Product Type	PST490T-Unknown
Hardware Revision	5.8
Software Version	5.0.18.0
Certificate	Stored
SIM Card	None
System Up Time (D/H/M/S)	0:00:01:46

**Figure B-2: SS Web Page – System Page**

The parameters of the System page are described in the Table B-2.

**Table B-2: System Page Parameters**

Parameter	Description
<b>Serial Number</b>	Client's serial number.
<b>Product Type</b>	Product type.
<b>Hardware Revision</b>	Hardware revision.
<b>Software Version</b>	Active software version.
<b>Certificate</b>	Digital certificate (x.509) indication, either stored or not.  Note: Only client's with stored certificate will work in Authentication and Encryption modes.
<b>SIM Card</b>	Indicates if SIM card is installed.
<b>System Up Time (D/H/M/S)</b>	How long the system is running since the last reset in Days, Hours, Minutes and Seconds.

## B.4 SIGNAL PARAMETERS PAGE

The **Signal Parameters** menu opens the Signal Parameters page (see Figure B-3). This page displays various signaling parameters. This page displays: the Link Status (Table B-3), BS to client Downlink Parameters (Table B-4), and client to BS Uplink Parameters (Table B-5).

WiMAX Modem Management				
System	Signal Parameters	Addresses	Log	Advanced
<b>Signal Parameters</b>				
<b>Link Status</b>				
NETWORK ENTRY: SCANNING				
Downlink Parameter		Value		
BS Identifier	N/A			
Downlink Frequency	4902.500 MHz			
Downlink Channel Bandwidth	N/A			
SNR	0.0 dB			
Received Signal Strength	-84.0 dBm			
Modulation	64QAM 3/4			
Uplink Parameter		Value		
Uplink Frequency	4902.500 MHz			
Uplink Channel Bandwidth	N/A			
Tx Power	0.0 dBm			
Modulation	BPSK 1/2			

**Figure B-3: Signal Parameters Page**

**Table B-3: Link Status Parameters**

Network Entry State	Description
<b>IDLE</b>	No link established.
<b>SCANNING</b>	The client is scanning through a preconfigured list of frequencies and bandwidths in search of a base station (BS) transmission. Once a BS is detected the channel is scored according to the signal strength. The best channel is then used for the network entry process.
<b>DL_SYNC</b>	The client is synchronizing to the downlink (DL) channel. During this phase the client identifies the correct cyclic prefix. DL synchronization is obtained in case the client periodically receives the DL broadcast messages (DL MAP and DCD) transmitted by the BS.

Continued...

<b>Network Entry State</b>	<b>Description</b>
<b>UL_SYNC</b>	The client tries to obtain uplink messages required to access the air interface. UL synchronization is obtained in case the client periodically receives UL broadcast messages (UL MAP and UCD) transmitted by the BS.
<b>RANGING</b>	The client performs ranging with the preferred BS in order to adjust its transmission parameters, including Tx power, timing, and frequency offset.
<b>BASIC CAPABILITY</b>	The client negotiates with the BS regarding the basic capabilities that will be used on the link between them, such as supported modulations and coding schemes.
<b>AUTHORIZATION</b>	The client and BS perform authentication and authorization using X.509 digital certificate transferred to the BS by the client.
<b>REGISTRATION</b>	The client and BS negotiate capabilities concerning (mainly) management options for the client.
<b>IP CONNECTIVITY</b>	The client obtains IP address through DHCP.
<b>OPERATIONAL</b>	The client has completed network entry and is capable of transferring data.

Table B-4: Downlink Parameters

<b>Parameter</b>	<b>Description</b>
<b>BS Identifier</b>	BS ID number that the client is presently connected to.
<b>Downlink Frequency</b>	Frequency used for downlink transmission (in MHz).
<b>Downlink Channel Bandwidth</b>	Downlink frequency bandwidth (in MHz).
<b>SNR</b>	Signal-to-noise ratio (in dB).
<b>Received Signal Strength</b>	Received signal strength at client (in dBm).
<b>Modulation</b>	Modulation scheme available to the client (e.g. 16 QAM 1/2).

Table B-5: Uplink Parameters

Parameter	Description
<b>Uplink Frequency</b>	Frequency used for uplink transmission (in MHz).
<b>Uplink Channel Bandwidth</b>	Uplink frequency bandwidth (in MHz).
<b>Tx Power</b>	Transmit power of client (in dBm).
<b>Modulation</b>	Modulation scheme of the last uplink data stream.

## B.5 ADDRESSES PAGE

The **Addresses** menu opens the Addresses page (see Figure B-4), displaying various IP addresses as well as MAC addresses “learned” (listed in the MAC Table) from bridging.

WiMAX Modem Management				
System	Signal Parameters	Addresses	Log	Advanced
<b>Addresses</b>				
MAC Address #1	00:A0:0A:C0:88:5a			
MAC Address #2	00:A0:0A:C0:88:5b			
LAN Port Default IP Address	10.0.0.1			
Default Subnet Mask	255.0.0.0			
IP Address (via DHCP)	Unmanaged			
IP Mask (via DHCP)	N/A			
Default GW (via DHCP)	N/A			
DHCP Server IP Address	N/A			
<b>MAC Table</b>				
Index	MAC Address	Status		
001	00:02:B3:17:27:F7	Learned		

Figure B-4: Address Parameters Page

**B.5.1 Address Parameters****Table B-6: Address Parameters**

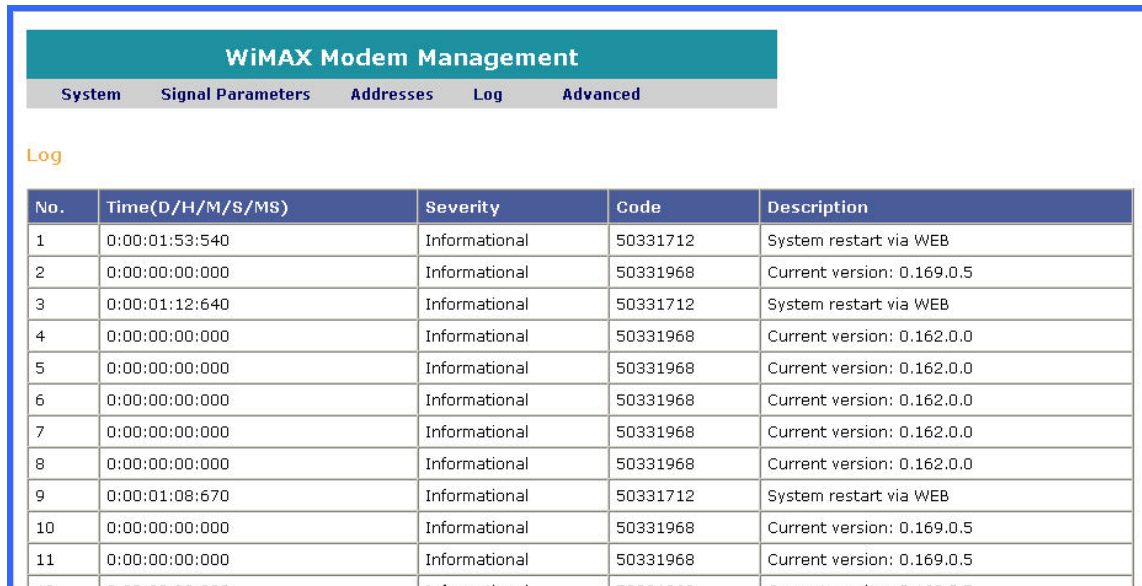
<b>Parameter</b>	<b>Description</b>
<b>MAC Address #1</b>	Ethernet media access control (MAC) address of the device (i.e., client)
<b>MAC Address #2</b>	Ethernet media access control (MAC) address of the 2nd device (for future release)
<b>LAN Port Default IP Address</b>	IP address of client's LAN port (default value is 10.0.0.1).
<b>Default Subnet Mask</b>	Default subnet mask address.
<b>IP Address (via DHCP)</b>	Client's IP address assigned by Dynamic Host Configuration Protocol (DHCP). When set to DHCP, see IP Mode Settings.
<b>IP Mask (via DHCP)</b>	Subnet mask address assigned by DHCP. When set to DHCP, see IP Mode Settings.
<b>Default GW (via DHCP)</b>	Default gateway address assigned by DHCP. When set to DHCP, see IP Mode Settings.
<b>DHCP Server IP Address</b>	IP address of DHCP server. When set to DHCP, see IP Mode Settings
<b>IP Address (static)</b>	Client's IP address set manually, see IP Mode Settings.
<b>IP Mask (static)</b>	Subnet mask address, see IP Mode Settings.
<b>Default GW (static)</b>	Default gateway address, see IP Mode Settings.
<b>DHCP Server IP Address</b>	N/A in Static mode.

**B.5.2 MAC Table Parameters****Table B-7: MAC Table Parameters**

<b>Parameter</b>	<b>Description</b>
<b>Index</b>	Place identifier.
<b>MAC Address</b>	Ethernet media access control (MAC) address of the devices connected to the client via a LAN.
<b>Status</b>	Current status.

## B.6 LOG PAGE

The Web-based management tool logs traps and events generated by and received from the client. The information logged parameters are displayed in the Log page.



WiMAX Modem Management				
System	Signal Parameters	Addresses	Log	Advanced
<b>Log</b>				
No.	Time(D/H/M/S/MS)	Severity	Code	Description
1	0:00:01:53:540	Informational	50331712	System restart via WEB
2	0:00:00:00:000	Informational	50331968	Current version: 0.169.0.5
3	0:00:01:12:640	Informational	50331712	System restart via WEB
4	0:00:00:00:000	Informational	50331968	Current version: 0.162.0.0
5	0:00:00:00:000	Informational	50331968	Current version: 0.162.0.0
6	0:00:00:00:000	Informational	50331968	Current version: 0.162.0.0
7	0:00:00:00:000	Informational	50331968	Current version: 0.162.0.0
8	0:00:00:00:000	Informational	50331968	Current version: 0.162.0.0
9	0:00:01:08:670	Informational	50331712	System restart via WEB
10	0:00:00:00:000	Informational	50331968	Current version: 0.169.0.5
11	0:00:00:00:000	Informational	50331968	Current version: 0.169.0.5

**Figure B-5: Log Page**

**Table B-8: Log Page Parameters**

Parameter	Description
<b>No.</b>	Trap identification number.
<b>Time</b>	Time (in Days, Hours, Minutes, Seconds, and Milliseconds) since power up, when the particular event was generated.
<b>Severity</b>	Severity level of trap: <ul style="list-style-type: none"> <li>• Debug (Level 3)</li> <li>• Debug (Level 2)</li> <li>• Debug (Level 1)</li> <li>• Informational</li> <li>• Warning</li> <li>• Fatal.</li> </ul>
<b>Code</b>	Unique event code.
<b>Description</b>	Brief description of trap or event.



## B.7 ADVANCED PAGE

The Advanced page, accessed from the Advanced menu, is used for advanced configuration procedures. These advanced features include the following:

**Table B-9: Advanced Page Menu**

Feature	Description
<b>Software Download</b>	To download software to the client.
<b>Channel Table Settings</b>	Defines frequency channels client will scan.
<b>Base Station ID Settings</b>	Defines the base station the client is connecting to.
<b>System Info Settings</b>	To view and define general System information such as: name, location, and contact information.
<b>Code Banks List</b>	To view the software code versions resident in the flash banks list.
<b>Detailed Log</b>	To view detailed logs.
<b>Connections List</b>	To display information on current connections.
<b>Change User Name</b>	To change the User Name.
<b>Change Password</b>	To change the Password.
<b>Maximum TX Power Setting</b>	To set the maximum TX power.
<b>IP mode Settings</b>	To define IP mode settings.
<b>Reset 2 Default</b>	To reset the client to the factory default settings.
<b>Clear Log</b>	To clear all Log entries.
<b>External Unit Settings</b>	To set calibration values for the transceiver. Do not change.
<b>Restart</b>	To restart the client.

### B.7.1 Accessing the Advanced Page

The Advanced Page is secured by login user name and password, and therefore, can only be accessed by authorized technicians.



NOTE

Login parameters are case sensitive.

The default Advanced page login parameters are as follows:

- User Name: **Admin**
- Password: **VIDA802.16**

#### To access the Advanced Page:

1. On the menu bar, click the **Advanced** option to open the Login page.

The screenshot shows a web interface for 'WIMAX Modem Management'. At the top, there is a teal header with the title. Below it is a grey navigation bar with five tabs: 'System', 'Signal Parameters', 'Addresses', 'Log', and 'Advanced'. The 'Advanced' tab is highlighted. Underneath, the word 'Login' is written in orange. A blue-bordered box contains the login form, which has a 'User Name:' label and a text input field containing 'Admin'. Below that is a 'Password:' label and a password input field filled with dots. At the bottom of the form is a blue 'Enter' button.

Figure B-6: Advance Page Login

2. In the **User Name** field, enter the User Name.
3. In the **Password** field, enter the Password.
4. Click **Enter** to open the Advanced page.



NOTE

To improve security, we recommend changing the default user name and password after installing a client. For more information on changing the user name and password, refer to Sections B.13 and B.14.



**Figure B-7: Advanced Page – Main Menu**

- To access an advanced feature, select the desired feature and click the Select button.



NOTE

While viewing an Advanced feature, you can return to the Advanced Page by clicking on the **Back** button. However, any pending changes not submitted will be lost.

## **B.7.2 Upgrading Subscriber Station Software**

The Software Download feature allows you to upgrade the subscriber station software. This should only be performed by an authorized Tyco Electronics technician. The process is performed by downloading a software version file to the client using File Transfer Protocol (FTP). The downloaded file is initially stored to the client's standby software bank, which is inactive. To activate the downloaded file, the file must be transferred (swapped) with the client's active software bank, and then the client must be restarted.



NOTE

To upgrade the device, you need to define the FTP parameters and the name of the software version file that you want downloaded.

The client upgrade should only be performed by authorized Tyco Electronics technicians.

### To Download a Software File:

1. Ensure that you have an FTP server program up and running on the host and configured with a user “1” with password “1” and the software file is stored in the default path for that user.
2. Open a web-browser on the host with a target address of “**http://10.0.0.1**”.
3. If you need access to the Advanced page, click the **Advanced** option from the menu bar and login as required.
4. On the Advanced page, select **Software Download** and click the **Select** button to open the Software Download window.
5. Verify the following FTP login entries, as shown in Figure B-8:
  - FTP Server IP Address field: 10.0.0.10
  - FTP User Name field: 1
  - FTP Password field: 1
  - File Name field: software version file name
6. Click the **Load** button. The Confirmation message box appears, requesting that you confirm software version file download.



NOTE

Click the **Back** button to return to the Advanced Page without performing the software download.

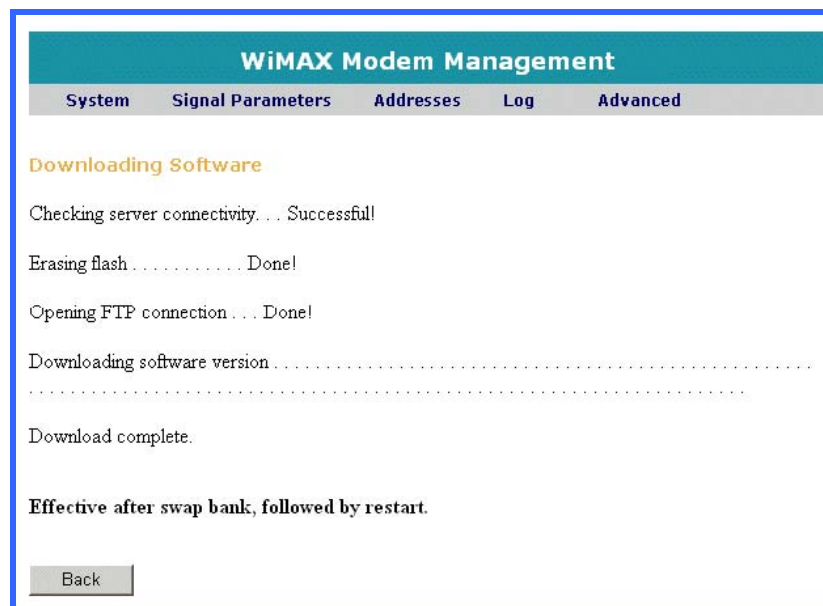
A screenshot of a web application interface titled "WiMAX Modem Management". At the top, there is a teal header bar with the title. Below it is a navigation menu with tabs for "System", "Signal Parameters", "Addresses", "Log", and "Advanced". The "Advanced" tab is selected. The main content area is titled "Software Download" in orange text. It contains a form with the following fields: "FTP Server IP Address:" with the value "10.0.0.10", "FTP User Name:" with the value "1", "FTP Password:" with the value "1", and "File Name:" with the value "ss.z". Below the form are three buttons: "Load", "Swap Bank", and "Back".

Figure B-8: Advanced Page - Software Download Window

7. Click **OK** to confirm and start the process. The Web server performs the following:
  - a. Checks the connection with the Web embedded server.
  - b. Erases the software version stored in the standby software bank on the flash memory.
  - c. Begins communicating with the FTP server.
  - d. Starts downloading the software file, via the FTP server, to the client's standby software bank. The download processing is indicated on the Downloading Software update window.



8. When the software file download completes, the “**Download complete**” message is displayed



9. After the download is complete, click the **Back** button on the “Downloading Software” window and return to the “Software Download” window.



NOTE

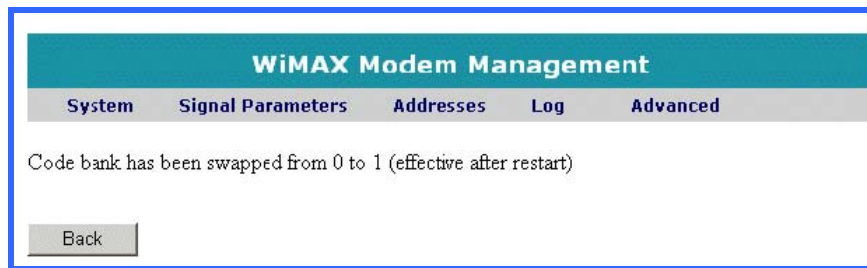
Before the software can be activated it must be transferred into the client's “active software bank” and the client must be restarted.

10. Click the **Swap Bank** button.
11. When the Confirmation message box appears, click the **OK** button to confirm software transfer between standby and active banks.



Failure to confirm (by clicking **OK**) will result in not swapping the files and the client. When it is restarted, it will continue to use the previous software version stored in the active bank.

12. The downloaded software file is transferred to the client's active bank and the previously active software file is transferred from the active bank to the standby bank as indicated by the swap screen.



13. To activate the downloaded file, you must restart the client.
  - a. Click the **Back** button to return to the Software Download window.
  - b. Click the **Back** button to return to the Advanced page, and then follow the restart instructions in Restarting the Unit or cycle the client's power.

When the restart process is complete, the downloaded file becomes the active software running on the client. Verify that the downloaded software version is active by opening the System page (see Viewing Configuration Parameters).



The old software has been transferred to the standby bank. If for some reason the old software needs to be reactivated, return to the "Software Download" window and repeat Steps 10 through 13.

## B.8 DEFINING FREQUENCY CHANNELS

The client configuration tool allows you to define frequency channels for uplink and downlink channels. The client scans these defined channels to seek viable frequency channels (one for uplink and one for downlink) to communicate with the VIDA Broadband Base Station.



NOTE

Click the **Back** button to return to the previous window.

### To define Uplink and Downlink Frequency Channels:

1. Access the Advanced page (see B.7.1, Accessing the Advanced Page).
2. In the Advanced page, select **Channel Table Settings** and click the **Select** button. The “Channel Table Settings” window appears.

**Figure B-9: Advanced Page – Channel Table Settings**

3. Select one of the following:
  - Scan All Channel Bandwidth Tables – to scan both high and low channel bandwidth tables.
  - Scan 10 MHz Channel Bandwidth Table – to scan only the high channel bandwidth table.
  - Scan 5 MHz Channel Bandwidth Table – to scan only the low channel bandwidth table.



NOTE

High and Low refer to a single channel spacing in each band. High refers to the 10 MHz channel spacing and low refers to the 5 MHz channel spacing.

- Click the **Select** button to display the selected “Channel Table Settings” window.

**Figure B-10: Advanced Page – 5 MHz Channel Table Settings**



Select **Reset to Default** to reset the client to the factory Channel settings and replace the user-defined settings.

The frequencies shown are for illustration purposes only; the frequency range of the specific client will be displayed.

- In the selected “Channel Table Settings” window, enter the frequencies for the Uplink (UL) channel frequencies.
  - In the First UL Channel Frequency field, enter the first frequency (in kilohertz) of the Frequency Channel table for the uplink communication. (For example: 4.9425 GHz is 4942500 kHz.)
  - In the Last UL Channel Frequency field, enter the last frequency (in kilohertz) of the Frequency Channel table for the uplink communication.
- Click the **Submit** button to display the selected “Channel Table,” indicating the frequencies used for the uplink and downlink channels in the selected Bandwidth.
- Place a check mark for the specific frequencies to be scanned.



The client is factory configured to scan the complete channel list referenced in Table 5-1.

Check boxes with a check mark indicate that the corresponding channel will be scanned for viable communication with the VIDA Broadband Base Station.

- Clear (un-check) the Channel IDs not to be scanned.



**WiMAX Modem Management**

System
Signal Parameters
Addresses
Log
Advanced

New parameters have been stored (effective after restart)

**5 MHz Channel Table**

Status	Channel	Uplink Frequency (MHz)	Downlink Frequency (MHz)
<input checked="" type="checkbox"/>	0	4942.500	4942.500
<input type="checkbox"/>	1	4945.000	4945.000
<input checked="" type="checkbox"/>	2	4947.500	4947.500
<input type="checkbox"/>	3	4950.000	4950.000
<input checked="" type="checkbox"/>	4	4952.500	4952.500
<input type="checkbox"/>	5	4955.000	4955.000
<input checked="" type="checkbox"/>	6	4957.500	4957.500
<input type="checkbox"/>	7	4960.000	4960.000
<input checked="" type="checkbox"/>	8	4962.500	4962.500
<input type="checkbox"/>	9	4965.000	4965.000
<input checked="" type="checkbox"/>	10	4967.500	4967.500
<input type="checkbox"/>	11	4970.000	4970.000
<input checked="" type="checkbox"/>	12	4972.500	4972.500
<input type="checkbox"/>	13	4975.000	4975.000
<input checked="" type="checkbox"/>	14	4977.500	4977.500
<input type="checkbox"/>	15	4980.000	4980.000
<input checked="" type="checkbox"/>	16	4982.500	4982.500
<input type="checkbox"/>	17	4985.000	4985.000
<input checked="" type="checkbox"/>	18	4987.500	4987.500

**Figure B-11: Advanced Page – 5 MHz Channel Table Shown**



The channel numbers defined in this table and the channel numbers defined in the BS configuration script do not necessarily link to the same frequency. When choosing channels for BS – SS communication, use the frequency to choose channels not the channel number.

9. Click **Submit**. A confirmation message appears, confirming that the new parameters have been stored.

**WiMAX Modem Management**

System
Signal Parameters
Addresses
Log
Advanced

New parameters have been stored (effective after restart)

10. To apply the new frequency channel settings to the unit, you need to restart the unit. Click **Back** to return to the Advanced page, and then follow the restart instructions in B.20, Restarting the Unit.

## **B.9 DEFINING ASSOCIATED BASE STATIONS**

For the client to communicate with a base station, the specific base station can be defined at the client. The base station is defined by a Base Station ID (BSID) value and a Base Station Mask value. The Base Station ID value is the ID of the base station to which the client is registered (authorized to communicate with). Multiple base stations can be defined for communication with the unit. This is typically relevant in roaming scenarios.

This functionality ensures that the client establishes a communication link with authorized VIDA Broadband Base Station(s).

The Base Station ID is a 48-bit long programmable (user-defined) field identifying the BS. The most significant 24 bits are used as the operator ID (configurable). This is a network management hook that can be used to restrict the client from performing network entry with a predefined base station or a group of base stations.

The Base Station Mask is a 48-bit programmable (user-defined) field that identifies which bits of the Base Station ID require a match to enable the client to associate with the BS.

### **Example for defining a single base station with which the unit can communicate:**

Assume that the administrator wants to limit the network entry of a client to a specific BS with ID =0xAB5050123456. To enable this, the following configuration must be performed:

- Base Station ID: **AB 50 50 12 34 56**
- Base Station Mask: **FF FF FF FF FF FF** (This is limited to one (1) specific BS.)

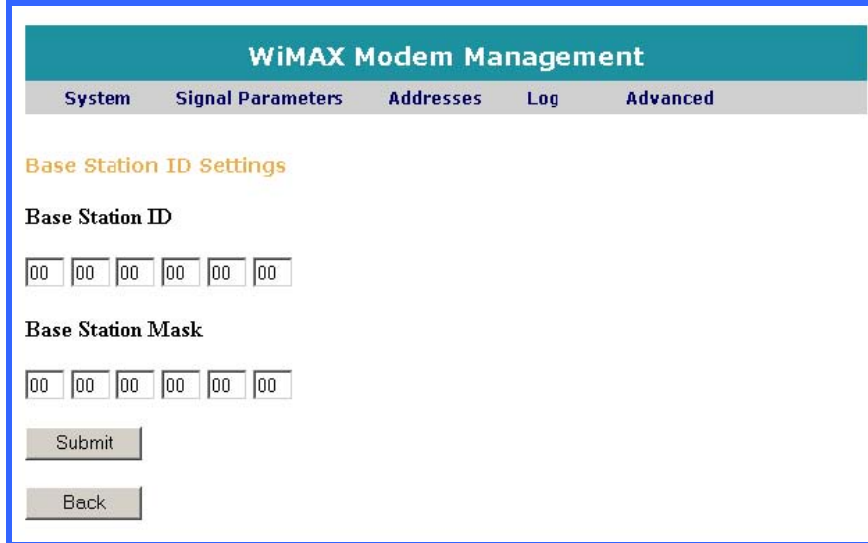
### **Example for defining multiple base stations with which the unit can communicate:**

The administrator needs to set up a BSID plan in which it can identify, for example, three base stations together. For example, it can divide the coverage area into zones of four BS. The zone number shall be 22 bits and the BS index within the zone shall be 2 bits. If the administrator wishes to limit the unit access to zone #30, then the configured parameters must be:

- Base Station ID: **AB 50 50 00 00 78**
- Base Station Mask: **FF FF FF FF FF FC**

### **To define the base station:**

1. Access the Advanced page (see B.7.1, Accessing the Advanced Page).
2. In the Advanced page, select **Base Station ID Settings** and click the **Select** button. The Base Station ID Settings page appears.



The screenshot shows the 'WiMAX Modem Management' interface. At the top, there is a teal header with the title 'WiMAX Modem Management'. Below the header is a navigation bar with five tabs: 'System', 'Signal Parameters', 'Addresses', 'Log', and 'Advanced'. The 'Advanced' tab is currently selected. The main content area is titled 'Base Station ID Settings' in orange text. Under this title, there are two sections: 'Base Station ID' and 'Base Station Mask'. Each section contains a row of six input boxes, each containing the number '00'. Below these sections are two buttons: 'Submit' and 'Back'.

**Figure B-12: Advanced Page – Base Station ID Settings**

3. In the Base Station ID field, enter the identification number of the base station to which the unit must communicate.
4. In the Base Station Mask field, enter the mask to identify which bits of the Base Station ID require a match to enable the client to associate with the BS.
5. Click the **Submit** button. A confirmation message is displayed informing you that the new values have been saved.



The screenshot shows the 'WiMAX Modem Management' interface. At the top, there is a teal header with the title 'WiMAX Modem Management'. Below the header is a navigation bar with five tabs: 'System', 'Signal Parameters', 'Addresses', 'Log', and 'Advanced'. The 'Advanced' tab is currently selected. The main content area displays a confirmation message: 'New parameters have been stored (effective after restart)'. Below the message is a single button labeled 'Back'.

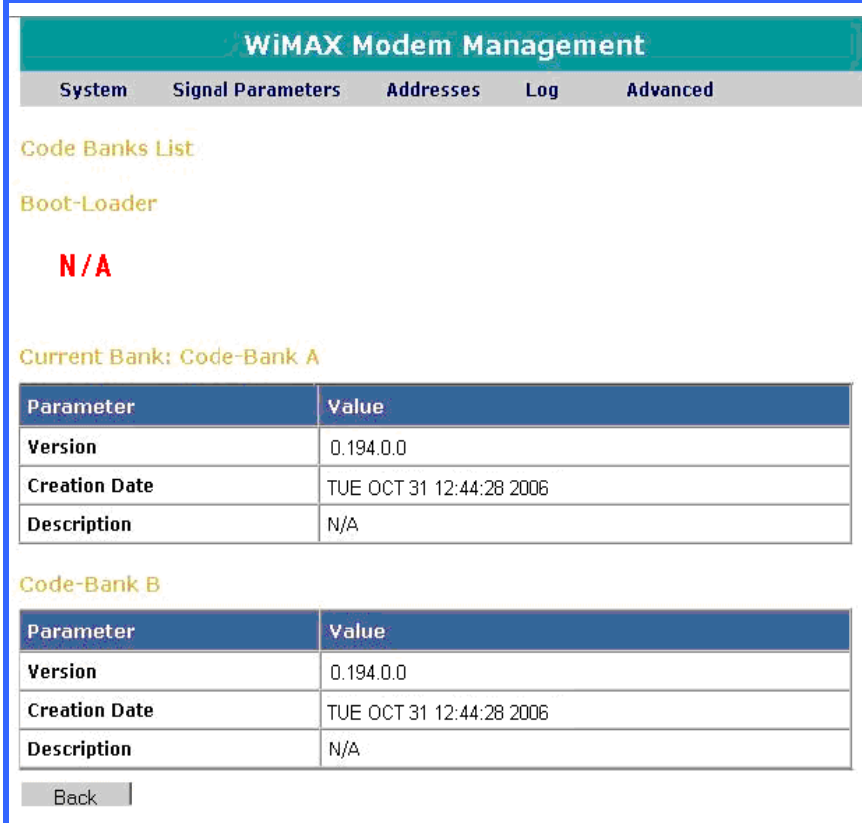
6. To apply the settings, you need to restart the unit. Perform the following:
  - a. Click the **Back** button to return to the Base Station ID Settings page.
  - b. Click the **Back** button to return to the Advanced page, and then follow the restart instructions in Restarting the Unit.

## B.10 VIEWING CODE BANKS

The client management tool allows viewing the Code Banks and the Boot Loader version. Both the Current Bank (B) and Bank (A) are displayed.

### To access the Code Bank List:

1. Access the Advanced page, as described in B.7.1, Accessing the Advanced Page.
2. In the Advanced page, select **Code Banks List** and click the **Select** button. The Code Banks List page opens.



The screenshot shows the 'WIMAX Modem Management' interface. At the top, there is a navigation bar with tabs for 'System', 'Signal Parameters', 'Addresses', 'Log', and 'Advanced'. Below the navigation bar, the 'Code Banks List' section is visible. Underneath, there is a 'Boot-Loader' section with 'N/A' displayed. The 'Current Bank: Code-Bank A' section contains a table with the following data:

Parameter	Value
Version	0.194.0.0
Creation Date	TUE OCT 31 12:44:28 2006
Description	N/A

Below this, the 'Code-Bank B' section contains an identical table:

Parameter	Value
Version	0.194.0.0
Creation Date	TUE OCT 31 12:44:28 2006
Description	N/A

At the bottom of the page, there is a 'Back' button.

Figure B-13: Advanced Page – Code Banks List

3. Click the **Back** button to return to the Advanced page.

## B.11 VIEWING DETAILED LOGS

The client management tool has detailed log traps and events that are generated by and received from the client and are displayed in this Detailed Log in greater detail. The logged parameters are displayed in the Detailed Logs page.

### To access the Detailed Log:

1. Access the Advanced page (see B.7.1, Accessing the Advanced Page).
2. In the Advanced page, select **Detailed Log** and click the **Select** button. The Detailed log page appears.



WiMAX Modem Management				
System	Signal Parameters	Addresses	Log	Advanced
<b>Detailed Log</b>				
No.	Time(D/H/M/S/MS)	Severity	Code	Description
1	0:00:01:53:540	Informational	50331712	System restart via WEB
2	0:00:00:00:000	Informational	50331968	Current version: 0.169.0.5
3	0:00:01:12:640	Informational	50331712	System restart via WEB
4	0:00:00:00:000	Informational	50331968	Current version: 0.162.0.0
5	0:00:00:00:000	Informational	50331968	Current version: 0.162.0.0

Figure B-14: Advanced Page – Detailed Log

Table B-10: Detail Log Parameters

Parameter	Description
<b>No.</b>	Trap identification number.
<b>Time</b>	Time (in Days, Hours, Minutes, Seconds, and Milliseconds) since power up, when the particular event was generated.
<b>Severity</b>	Severity level of trap: <ul style="list-style-type: none"> <li>• Debug (Level 3)</li> <li>• Debug (Level 2)</li> <li>• Debug (Level 1)</li> <li>• Informational</li> <li>• Warning</li> <li>• Fatal</li> </ul>
<b>Code</b>	Unique event code.
<b>Description</b>	Brief description of trap or event.

3. Click the **Back** button to return to the Advanced page.

## B.12 DISPLAY CONNECTIONS LIST

The Connection List page allows you to display information about your current connections.

### To access the Connections List:

1. Access the Advanced page (see B.7.1, Accessing the Advanced Page).
2. In the Advanced page, select **Connections List** and click the **Select** button. The Connections List page appears.

Wimax Modem Management				
System	Signal Parameters	Addresses	Log	Advanced
<b>Connections List</b>				
Direction	CID	SFID	Type	State
Bidirectional	00000000	00000000	Initial Ranging	Active
DL	0000FFFF	00000000	Broadcast	Active
DL	0000FFFD	00000000	Fragmentable Broadcast	Active
UL	0000FFFE	00000000	Padding	Active
Bidirectional	0000FEFF	00000000	AAS	Active

Back

**Figure B-15: Advanced Page – Connections List**

**Table B-11: Connections List Parameters**

Parameter	Description
<b>Direction</b>	Displays the transmission direction, either: <ul style="list-style-type: none"> <li>• UL – uplink</li> <li>• DL – downlink</li> <li>• Bidirectional - both uplink and downlink</li> </ul>
<b>CID</b>	Displays the connection identifier (ID).
<b>SFID</b>	Displays the Service Flow identifier (ID).
<b>Type</b>	Displays the connection type.
<b>State</b>	Displays the current connection status.

3. Click the **Back** button to return to the Advanced page.

## B.13 CHANGING ADVANCED PAGE USER NAME

Using the Web-based management tool, you can change your User Name as necessary. To change your User Name enter your Password, **old** User Name, and **new** User Name. Then confirm the **new** User Name.

### To change your User Name:

1. Access the Advanced page (see B.7.1, Accessing the Advanced Page).
2. In the Advanced page, select **Change User Name** and click the **Select** button. The Change User Name page opens.



The screenshot shows the 'WiMAX Modem Management' interface. At the top, there is a teal header with the title 'WiMAX Modem Management'. Below the header is a navigation bar with tabs for 'System', 'Signal Parameters', 'Addresses', 'Log', and 'Advanced'. The 'Advanced' tab is selected. The main content area is titled 'Change User Name' in orange text. Below this title is a blue-bordered form with the following fields and buttons:

- Label: Password: [Text Input Field]
- Label: Old User Name: [Text Input Field]
- Label: New User Name: [Text Input Field]
- Label: Confirm New User Name: [Text Input Field]
- Buttons: Submit, Back

**Figure B-16: Advanced Page – Change User Name**

3. Enter your Password.
4. Enter your old User Name.
5. Enter your new User Name.
6. Re-enter your new User Name to Confirm.
7. Click **Submit**. A confirmation message is displayed to confirm the requested change.



- Click **OK** to accept the change, resetting the unit is not required.
- Click the **Back** button to return to the Advanced page.



The new User Name will be required for subsequent access to the Advanced page.

## B.14 CHANGING ADVANCED PAGE PASSWORD

Using the Web-based management tool you can change your Password as necessary. For security reasons, it is advisable to change your password periodically. To change your Password enter your User Name, **old** Password, **new** Password and then confirm the **new** Password.

### To change your Password:

- Access the Advanced page (see B.7.1, Accessing the Advanced Page).
- In the Advanced page, select **Change Password** and click the **Select** button. The Change Password page opens.

The screenshot shows the 'Change Password' page within the 'WiMAX Modem Management' interface. The page features a teal header with the title 'WiMAX Modem Management' and a navigation bar with tabs for 'System', 'Signal Parameters', 'Addresses', 'Log', and 'Advanced'. The 'Advanced' tab is selected. Below the navigation bar, the page title 'Change Password' is displayed in orange. The form contains four input fields: 'User Name:', 'Old Password:', 'New Password:', and 'Confirm New Password:'. At the bottom of the form are two buttons: 'Submit' and 'Back'.

**Figure B-17: Advanced Page – Change Password**

- Enter your User Name.
- Enter your old Password.
- Enter your new Password.
- Re-enter your new Password to Confirm.



- Click the **Submit** button. A confirmation message is displayed to confirm the requested change.



- Click the **OK** button to accept the change, resetting the unit is not required.
- Click the **Back** button to return to the Advanced page



The new Password will be required for subsequent access to the Advanced page.

## B.15 SETTING THE MAXIMUM TX POWER

The Web-based WiMAX interface configuration tool allows you to set maximum TX power. You can define the maximum TX power transmission required.

Different territories have various regulation definitions for the maximum TX power transmission permitted by an RF product. Maximum TX Power Setting enables configuration flexibility for any of the regulation domains.

### To set Maximum TX Power:

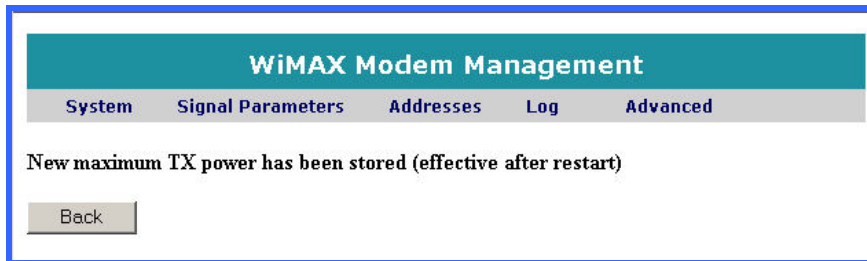
- Access the Advanced page (see B.7.1, Accessing the Advanced Page).
- In the Advanced page, select **Maximum TX Power Setting** and click the **Select** button. The Maximum TX Power page opens.

 A screenshot of the "WiMAX Modem Management" web interface. The page has a teal header with the title "WiMAX Modem Management". Below the header is a navigation menu with tabs: "System", "Signal Parameters", "Addresses", "Log", and "Advanced". The "Advanced" tab is selected. The main content area is titled "Maximum TX power Setting" in orange text. Below this title is a form with a label "Maximum TX Power:" and a text input field containing the number "27". To the right of the input field is the unit "dBm". Below the input field are two buttons: "Submit" and "Back".

**Figure B-18: Advanced Page – Maximum TX Power Setting**

- Define the maximum TX power setting.

4. Click the **Submit** button. A confirmation window appears, confirming that the new parameters have been stored.



5. To apply the settings to the unit, you need to restart the unit. Click the **Back** button to return to the Advanced page, and then follow the restart instructions in Restarting the Unit.

## B.16 IP MODE SETTINGS

The Web-based WiMAX interface configuration tool allows you to define IP mode settings. The IP address can be assigned dynamically via the DHCP server or you can assign a static IP address.

### To access IP Mode Settings:

1. Access the Advanced page, as described in B.7.1, Accessing the Advanced Page.
2. In the Advanced page, select **IP Mode Settings** and click the Select button to open the “IP Mode Settings” page.

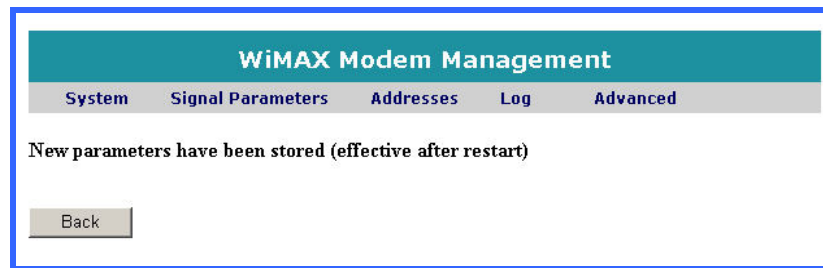


Figure B-19: Advanced Page – IP Mode Settings

3. Select the **Dynamic** setting to provide unit’s IP address via the DHCP server, this is the **default** value.

If assigning the IP address manually, select the **Static** setting and enter the appropriate values.

- Click the **Submit** button. A confirmation window appears, confirming that the new parameters have been stored.



- To apply the settings to the unit, you need to restart the unit. Click the **Back** button to return to the Advanced page, and then follow the restart instructions in Restarting the Unit.



NOTE

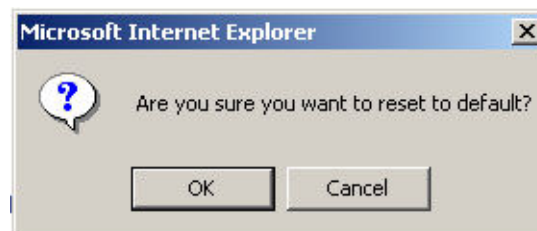
After changing the IP mode to dynamic or static, the unit will still be accessible using the IP address 10.0.0.1.

## B.17 RESET TO DEFAULT

In the event you want to reset the device the Web-based management tool allows you to reset the device to the factory default settings and replace the user-defined settings.

### To Reset to Default:

- Access the Advanced page (see B.7.1, Accessing the Advanced Page).
- In the Advanced page, select **Reset2Default** and click the **Select** button. The Reset to Default confirmation message appears.



- Click **OK** to reset the client's settings to the factory default settings. A message page is displayed when the reset is finished.





Reset to Default – Will overwrite defaults to the NVRAM. Defaults are of the current software in use.

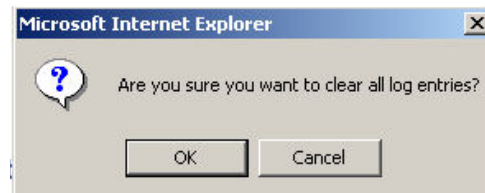
4. Click the **Back** button to return to the Advanced page.

## B.18 CLEAR LOG

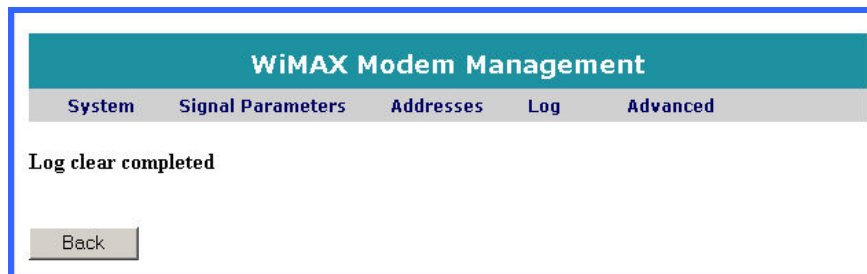
In the event you want to clear all the device's event logs to have a clean log state, the Web-based management tool allows you to clear all log entries.

### To Clear the Logs:

1. Access the Advanced page (see B.7.1, Accessing the Advanced Page).
2. In the Advanced page, select **Clear Log** and click the **Select** button. The Clear Log confirmation message is displayed.



3. Click **OK** to clear the log. A message page indicating that all Log entries have been cleared is displayed.



4. Click the **Back** button to return to the Advanced page.

## B.19 EXTERNAL UNIT SETTINGS

The RF offsets of the final cascade stage in the 4.9 GHz transceiver is set in the external unit settings entries. The external unit settings are factory calibrated and should not be changed.



Changes to the calibrated values in the External Unit Settings can degrade the equipment performance. Please contact Technical Assistance to obtain the calibrated values.

### To View the External Unit Settings:

1. Access the Advanced page (see B.7.1, Accessing the Advanced Page).
2. In the Advanced page, select **External Unit Settings** and click the **Select** button. The External Unit Settings page is displayed.

The screenshot shows the 'WiMAX Modem Management' interface. At the top, there is a teal header with the title 'WiMAX Modem Management'. Below the header is a navigation bar with tabs: 'System', 'Signal Parameters', 'Addresses', 'Log', and 'Advanced'. The 'Advanced' tab is selected. The main content area is titled 'External Unit Settings' in orange. Underneath, there is a section 'External Unit In Use' with two radio buttons: 'Enable' (selected) and 'Disable'. Below this, there are two input fields: 'TX Shift' with the value '9' and 'RX Shift' with the value '5'. At the bottom of the form, there are two buttons: 'Submit' and 'Back'.

Figure B-20: Advanced Page – External Unit Settings

3. Click the **Back** button to return to the Advanced page

## B.20 RESTARTING THE UNIT

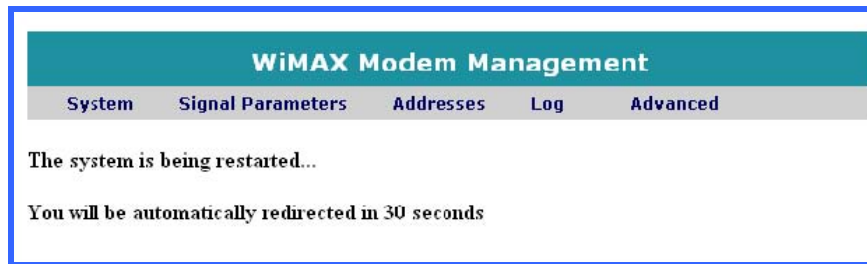
Resetting the client is required to activate certain configuration changes. These configuration settings include upgrading the unit's software, defining frequency channels, and defining a base station.

### To Restart the Unit:

1. Access the Advanced page (see B.7.1, Accessing the Advanced Page).
2. Select **Restart**. The reset confirmation message is displayed.



3. Click the **OK** button to confirm that you want to restart the unit. A restart message is displayed informing you that the unit is being restarted.



After a few seconds, the system restart is completed successfully.



NOTE

A cold restart can also be initiated by cycling power to the client.


## APPENDIX C INSTALLATION OPTIONS AND ACCESSORIES

This section provides details for the installation options and accessories that are available through Tyco Electronics.

### C.1 SURGE PROTECTION OPTIONS


#### C.1.1 RF Port Surge Protector, PT-016508-001

The RF port should be protected in all installation configurations. The recommended surge protector is the PolyPhaser AL-LSXL-ME, DC blocking lightning arrester. This device should be connected directly to a station's RF Port.

Surge:	18kA IEC 1000-4-5 8/20 $\mu$ s	
Impedance:	50 $\Omega$	
Frequency Range:	1.8 to 3.8, 4.2 to 6.0 GHz	
VSWR:	$\leq$ 1.2:1 Typical; $\leq$ 1.3:1 Max	
Return Loss:	$>$ 20 dB	
Insertion Loss:	0.1 dB	
RF Power:	10 W continuous	
Operational Temperature Range:	-40 $^{\circ}$ C to +85 $^{\circ}$ C	
Throughput Energy:	$\leq$ 0.5 $\mu$ J for 3 kA @8/20 $\mu$ s	
Peak Let-Through Voltage:	$\leq$ $\pm$ 3 volts for 3kA @8/20 $\mu$ s	
Vibration:	1 G @ 5 Hz to 100 Hz	
Conn. Equip. (protected) Side:	N (male)	
Conn. Ant. (surge) Side:	N (female)	


#### C.1.2 CAT5E, RJ-45, Data Port Surge Protector, PT-016508-003

The data lines using Cat5e Ethernet cables should be protected prior to connecting to the Ethernet Switch. This protection can be best provided by installing a (Transtector TSJ 10/100BT) surge protector. The TSJ 10/100BT is designed for STP (Shielded Twisted Pair) applications. Each of the eight lines is protected with a three stage suppression circuit. This device should be connected between the client or base station Cat5e Ethernet cable and the Ethernet Switch as close to the switch as practical.

Nominal Service Voltage:	12V	
Voltage Clamp Levels:	15V	
Connector:	RJ-45 – all 8 lines protected	
Surge Ratings:	10/1000 $\mu$ s, up to 200A	
Operating Temperature:	-30 $^{\circ}$ C to +65 $^{\circ}$ C	
Dimensions:	2.1”H x 2.1”W x .875”D 5.4 cm x 5.4 cm x 2.22 cm	
Response Time (Max.)	5 Nanoseconds	

### C.1.3 GPS Port Surge Protector, PT-016508-002

Generally the GPS antenna is mounted directly to the base station chassis where the bonded chassis provides proximity protection. If the antenna is mounted elsewhere, surge protection should be installed between the GPS antenna port and the antenna. The GPS port supplies a DC voltage for an active antenna and so the protector must be able to pass DC. The recommended surge protector is the PolyPhaser DGXZ+15TFTF-A.


Freq. Range:	800-2500 MHz	
Maximum Power (Watts):	50 Watt	
Throughput Energy:	175µJ	
Conn. Equip. Side:	TNC Female	
Conn. Ant. Side:	TNC Female	
Inject, Pick, or Both:	DC Pass	
Maximum DC:	6 Vdc	



To connect the surge protector between the base station and the GPS antenna cable, you will need BA579 SMAM-TNCM and BA589 SMAF-TNCM L-Com Adaptors.

### C.1.4 DC Surge Protector, PT-016508-004, 005


The power source surge protection should be installed on all 24 or 48 Volt power sources to protect the equipment from lightning and stray transients. The protection device should be installed between the power supply and the powered devices (client, base station, etc.). The recommended device is the Transtector FSP 4002 MC (24 Vdc) or FSP 4003 MC (48 Vdc).

	FSP 4002 MC	FSP 4003 MC	
Nominal Service Voltage:	27 Vdc	54 Vdc	
Voltage Protection Level	33 Vdc	67V	
Surge Current Rating:	181A	90A	
Dimensions:	2.125”H X 2.125”W X .875”D 5.4 cm X 5.4 cm X 2.2 cm		
Response Time (Max.)	<5 Nanoseconds		




**C.1.5 AC/DC Surge Protector, PT-016508-006**

When using 24-30 Vac to power Subscriber Stations, power source surge protection should be installed to protect the equipment from lightning and stray transients. The recommended protection device is the Polyphaser IS-PSP-24. This is a hardwire power supply shunt protector with high speed MOV and high current gas tube combination.

Operating Voltage:	24 Vac/ 30 Vdc	
Max Surge Current:	35kA	
Operating Temperature:	-40°C to +85°C	
Turn On Voltage:	39 L-L, 90 L-G V	


**C.1.6 Camera Data Port Surge Protector, PT-016508-007**

Installers should also consider installing surge protection for the closed circuit television cameras. The surge protector is designed to protect one coax video signal and either 24 Vdc and two-wire data (CCTV-PTZ), or four-wire data (CCTV-PTZ-4). The device should be installed as close to the protected equipment as possible.

CCTV Model	CCTV PTZ-4	CCTV PTZ	Both Models	
Nominal Service Voltages	24 Vac/Vdc RS232	RS232/422/485	Coax Protection	
Surge Current Ratings 10/1000 ms	150A	190A	140A	
Maximum Voltage	28 Vac 40 Vdc	24 Vdc	12 Vdc	
Operating Temperature	-40° C to +65° C			
Dimensions:	3.25"H x 3.17"W x 1.3"D 8.26 cm x 8.05 cm x 3.3 cm			
Response Time (Max.)	<5 Nanoseconds			

### C.1.7 CCTV Surge Protector, PT-016508-008

To protect CCTV coaxial lines we recommended installing a Transtector TCP CMS silicon based surge protection device.

Nominal Service Voltages	90V	
Surge Current Ratings*	20kA	
Connector Type:	BNC type Male/Female	
Max. Shunt Capacitance:	<30 pF	
Series Resistance	None	
Response Time (Max.)	<5 Nanoseconds	
Insertion Loss @ 40MHz	-0.5 dB	

### C.1.8 120 VAC Surge Protector, PT-016508-009

When using 120 Vac to power an AC base Station, power source surge protection should be installed to protect the equipment from lightning and stray transients. The recommended protection device is the Transtector ACP100MN. This is a Wire-in Silicon Surge Protectors for 120 Vac Single Phase applications.

Nominal Service Voltages	120 V	
Surge Current Ratings*	15 A	
Protection Level:	to 330 V	

## C.2 ANTENNA OPTIONS

Table C-1 is a list of approved antennas and their specifications. These antennas are available from Tyco Electronics or their respective manufacturers or distributors.



NOTE

The Transmitter Output Power must be reduced if the Effective Maximum Antenna Gain is greater than 26 dBi.

Table C-1: Recommended Fixed Antennas

Part Number	Description			Manufacturer (Mfg Part Number)		Image	
	Polarization	Gain (dBi)	Beamwidth (-3 dB)		Size		Weight
			Az°	EL°			
<b>AN-013386-008</b>	<b>Subscriber Panel Antenna</b>			Mars Antenna and RF Systems (MA-WA49-1X)			
Linear, Vertical or Horizontal	21.0	10.5	10.5	12 x 12 x 0.6" (30.5 x 30.5 x 1.5 cm)	5.0 lbs (2.3 kg)		
<b>AN-013386-013</b>	<b>Subscriber Panel Antenna</b>			PCTEL, Inc. MAXRAD (MP24581820PT)			
Linear, Vertical or Horizontal	20.0	9	9	15.1 x 13.9 x 1.9" (38.4 x 35.3 x 4.8 cm)	3.9 lbs (1.8 kg)		
<b>AN-013386-002</b>	<b>90° Sector Antenna</b>			Radio Waves, Inc. (SEC-47V-90-16)			
Vertical	16.0	90	8	25.5 x 8.5 x 4.0" (65 x 21.6 x 10 cm)	5.0 lbs (2.3 kg)		
<b>AN-013386-003</b>	<b>90° Sector Antenna</b>			Radio Waves, Inc.(SEC-47H-90-16)			
Horizontal	16.0	90	8	25.5 x 8.5 x 4.0" (65 x 21.6 x 10 cm)	5.0 lbs (2.3 kg)		
<b>AN-013386-004</b>	<b>60° Sector Antenna</b>			Radio Waves, Inc. (SEC-47V-60-17)			
Vertical	17.0	60	8	25.5 x 8.5 x 4.0" (65 x 21.6 x 10 cm)	5.0 lbs (2.3 kg)		
<b>AN-013386-005</b>	<b>60° Sector Antenna</b>			Radio Waves, Inc. (SEC-47H-60-17)			
Horizontal	17.0	60	8	25.5 x 8.5 x 4.0" (65 x 21.6 x 10 cm)	5.0 lbs (2.3 kg)		
<b>AN-013386-015</b>	<b>120° Sector Antenna</b>			Mars Antenna and RF Systems (MA-WA49-7X)			
Vertical	15.0	120	6	28 x 7 x 2.4" (71 x 17.8 x 6.1 cm)	6.6 lbs (3.0 kg)		

Table C-1: Recommended Fixed Antennas









Part Number	Description			Manufacturer (Mfg Part Number)		Image	
	Polarization	Gain (dBi)	Beamwidth (-3 dB)		Size		Weight
			Az°	EL°			
<b>AN-013386-014</b>	<b>180° Sector Antenna</b>			TerraWave Solutions (M5120120P10006)			
Vertical	12.0	180	7	28 x 7 x 2.4" (71 x 17.8 x 6.1 cm)	6.6 lbs (3.0 kg)		
<b>AN-013386-006</b>	<b>Grid Parabolic Antenna</b>			Radio Waves, Inc. (G2-4.7NF)			
Plane	26.4	7.1		24 in. diameter (61 cm)	22.0 lbs (9.9 kg)		
<b>AN-013386-007</b>	<b>Std Parabolic Antenna</b>			Radio Waves, Inc. (SP1-4.7)			
Plane	21.2	13.1		12 in. diameter (30 cm)	15.0 lbs (6.8 kg)		
<b>AN-013386-001</b>	<b>Std Parabolic Antenna</b>			Radio Waves, Inc. (SP2-4.7NS)			
Plane	26.6	7.1		24 in. diameter (61 cm)	22.0 lbs (9.9 kg)		
<b>AN-013386-009</b>	<b>Omnidirectional Antenna</b>			TerraWave Solutions (T490800100006)			
Vertical	8	360		13.4 in. high (34.1 cm)	0.5 lbs (0.23 kg)		
<b>AN-013386-012</b>	<b>Omnidirectional Antenna</b>			PCTEL, Inc. MAXRAD (MFB49009)			
Vertical	9	360 H/8 V		20.2 in. high (51.3 cm)	0.5 lbs (0.23 kg)		
<b>AN-013386-010</b>	<b>Wideband Parabolic Reflector Antenna</b>			PCTEL, Inc. MAXRAD (MPRC2449)			
Linear	26.4	6		26 in. dia. (66 cm)	24.0 lbs (10.9 kg)		

Table C-1: Recommended Fixed Antennas

Part Number	Description			Manufacturer (Mfg Part Number)			
	Polarization	Gain (dBi)	Beamwidth (-3 dB)		Size		Weight
			Az°	EL°			
<b>AN-013386-011</b>	<b>Nomadic Antenna</b>			PCTEL, Inc. MAXRAD (MEFC49005HF)			
Vertical	5	360		12 in. high (30.4 cm)	0.5 lbs (0.23 kg)		

### C.3 MISCELLANEOUS EQUIPMENT OPTIONS

#### C.3.1 Standard Grounding Kits - 3/8" Cable

The grounding kit diverts transient currents from lightning off the shielded transmission, communication, or power lines to an earth grounding system to prevent damage to cable and broadband equipment. Each broadband cable installation normally uses at least three grounding kits: one within six (6) inches of the VIDA Broadband unit, one at the bottom of the cable prior to the horizontal run, and one just prior to the cable entering the building or shelter.



Figure C-1: Grounding Kit

The recommended grounding kit, Andrew # 223158-2 (Tessco #493736), is designed for use with 1/4" to 3/8" cables. It has a 24" ground wire with a solid copper strap and a factory attached two-hole lug. The kit complies with MIL-STD-188-124A and has been verified by independent labs to protect coax from

lightning strikes in excess of 200 kA. The kit also includes materials necessary for attachment to the buss bar, including mastic and electrical tape for weatherproofing.

**Installing Grounding Kit on Power Cable:**

When installing the grounding kit on the power cable, it is important to ensure the copper ground wire makes contact with the grounding strap as shown in Figure C-2.

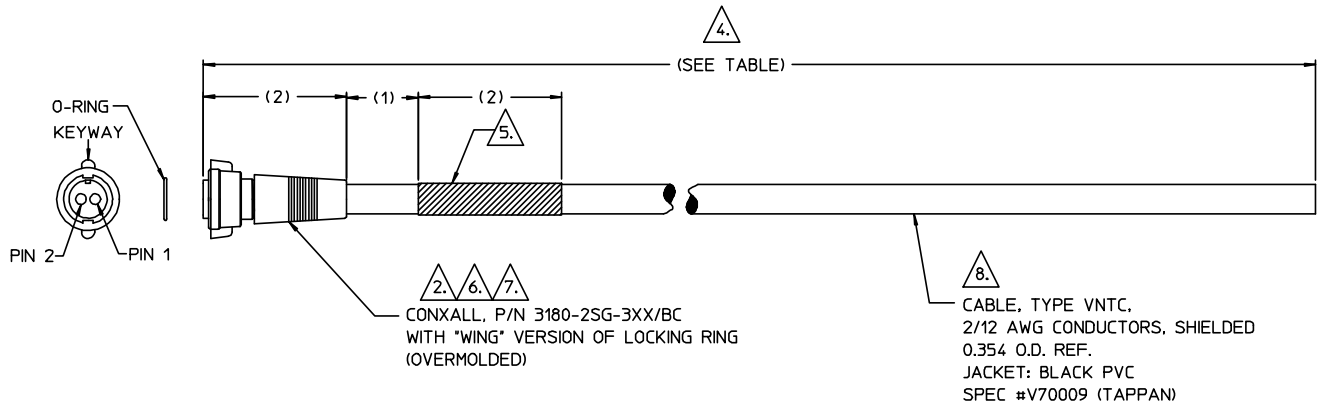


**Figure C-2: Grounding Kit Installation**

# APPENDIX D INSTALLATION CABLE ASSEMBLIES

## D.1 POWER CABLES

### D.1.1 2-Pin Power Cable, CA-014984-XXXXXX



NOTES:

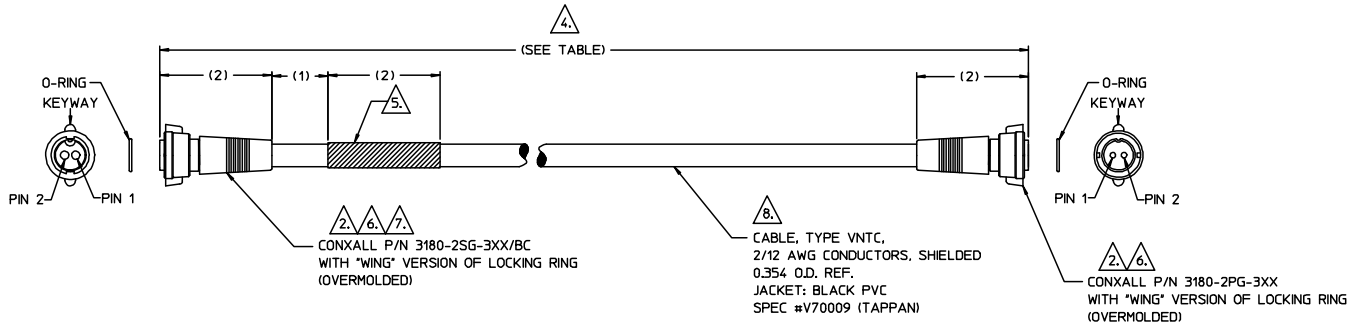
- 1. MATERIAL: OVERMOLD BOOT MATERIAL:  
POLYURETHANE, NATURAL BLACK WITH U.V. INHIBITORS, RATED TO +85°C MINIMUM.
- 2. THERE MUST BE A BOND BETWEEN THE CABLE JACKET AND OVERMOLD.
- 3. ASSEMBLE CABLE IN ACCORDANCE WITH PER IPC/WHMA-A-620, LATEST REVISION.
- 4. TOLERANCE FOR TOTAL CABLE LENGTH SHALL BE ±2% FOR CABLE LENGTHS 50 FT OR LESS. A TOLERANCE OF ±5 % IS ACCEPTABLE.
- 5. THE PART NUMBER (CA-014984-XXXXXX) SHALL BE WRITTEN ON A LABEL AND LOCATED AS SHOWN. -XXXXXX INDICATES THE LENGTH OF THE CABLE BEING MADE, PER TABLE "A".
- 6. WIRING OF CONNECTOR: PIN 1=WHITE, PIN 2=BLACK.
- 7. CONNECTOR PART NUMBER REPRESENTS STANDARD MULTI-CONX WITH BERYLLIUM COPPER CONTACTS AND WINGED COUPLING RING.
- 8. FOIL AND DRAIN WIRE OF SHIELD SHALL BE ELECTRICALLY ISOLATED FROM THE TWO CIRCUIT POSITIONS. THE FOIL AND DRAIN WIRE MAY EXTEND INTO THE OVERMOLD, AS LONG AS ISOLATION IS MAINTAINED.

TABLE "A"

REVISION	DASH NO.	LENGTH
-	-000005	5 FT
-	-000015	15 FT
-	-000025	25 FT
-	-000050	50 FT
-	-000100	100 FT
-	-000150	150 FT
-	-000200	200 FT
-	-000250	250 FT
-	-000300	300 FT

(Made from AD-CA-014984-XXXXXX Rev. A)

**D.1.2 2-Pin Power Patch Cable, CA-014988-XXXXXX**



NOTES:

1. MATERIAL: OVERMOLD BOOT MATERIAL: POLYURETHANE, NATURAL BLACK WITH U.V. INHIBITORS, RATED TO +85°C MINIMUM.

2. THERE MUST BE A BOND BETWEEN THE CABLE JACKET AND OVERMOLD.

3. ASSEMBLE CABLE IN ACCORDANCE WITH PER IPC/WHMA-A-620, LATEST REVISION.

4. TOLERANCE FOR TOTAL CABLE LENGTH SHALL BE ±2% FOR CABLE LENGTHS 50 FT OR LESS, A TOLERANCE OF ±5 % IS ACCEPTABLE.

5. THE PART NUMBER (CA-014984-XXXXXX) SHALL BE WRITTEN ON A LABEL AND LOCATED AS SHOWN. -XXXXXX INDICATES THE LENGTH OF THE CABLE BEING MADE, PER TABLE 'A'.

6. WIRING OF CONNECTOR: PIN 1=WHITE, PIN 2=BLACK.

7. CONNECTOR PART NUMBER REPRESENTS STANDARD MULTI-CONX WITH BERYLLIUM COPPER CONTACTS.

8. FOIL AND DRAIN WIRE OF SHIELD SHALL BE ELECTRICALLY ISOLATED FROM THE TWO CIRCUIT POSITIONS. THE FOIL AND DRAIN WIRE MAY EXTEND INTO THE OVERMOLD, AS LONG AS ISOLATION IS MAINTAINED.

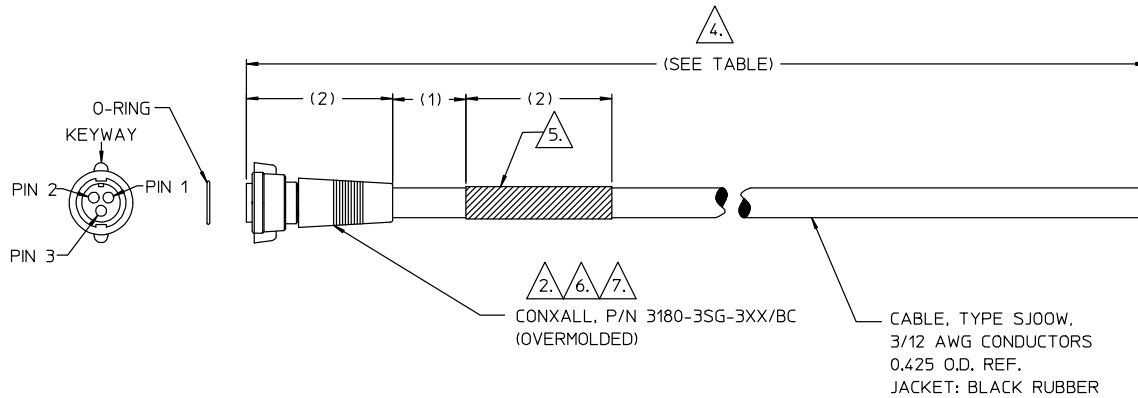
TABLE "A"

REVISION	DASH NO.	LENGTH
A	-000005	5 FT
A	-000015	15 FT
A	-000025	25 FT
A	-000050	50 FT
A	-000100	100 FT
-	-000150	150 FT
-	-000200	200 FT
-	-000250	250 FT
-	-000300	300 FT

(Made from AD-CA-014988-XXXXX, Rev. B)



**D.1.3 3-Pin Power Cable, CA-014985-XXXXXX**



NOTES:

1. MATERIAL: OVERMOLD BOOT MATERIAL:  
POLYURETHANE, BLACK WITH U.V. INHIBITORS, RATED TO +85°C MINIMUM.
2. THERE MUST BE A BOND BETWEEN THE CABLE JACKET AND OVERMOLD.
3. ASSEMBLE CABLE IN ACCORDANCE WITH PER IPC/WHMA-A-620, LATEST REVISION.
4. TOLERANCE FOR TOTAL CABLE LENGTH SHALL BE ±2% FOR CABLE LENGTHS 50 FT OR LESS. A TOLERANCE OF ±5 % IS ACCEPTABLE.
5. THE PART NUMBER (CA-014985-XXXXXX) SHALL BE WRITTEN ON A LABEL AND LOCATED AS SHOWN. -XXXXXX INDICATES THE LENGTH OF THE CABLE BEING MADE, PER TABLE "A".
6. WIRING OF CONNECTOR: PIN 1=BLACK, PIN 2=WHITE, PIN 3=GREEN.
7. CONNECTOR PART NUMBER REPRESENTS STANDARD MULTI-CONX WITH BERYLLIUM COPPER CONTACTS AND WINGED COUPLING RING.

TABLE "A"

REVISION	DASH NO.	LENGTH
-	-000005	5 FT
-	-000015	15 FT
-	-000025	25 FT
-	-000050	50 FT
-	-000100	100 FT

(Made from AD-CA-014985-XXXXX, Rev-)

## D.2 COPPER ETHERNET CABLE

The Cat5e Ethernet cable consists of four (4) twisted-pair solid copper 24 gauge wires. The twisted pairs are contained with an inner jacket then shielded by foil with a drain wire all encased in a waterproof UV resistance outer Jacket designed for outdoor use. The cable meets or exceed EIA/TIA 568 B.2-1 and ISO/IEC 11801 Standards for 350 MHz high-speed data applications, and 10/100/1000 Mbps high-performance data communications.

Table D-1 lists part numbers for bulk lengths of the CA-015223-XXX family of Ethernet cables available through Tyco Electronics. The “-XXX” dash variant describes the length to which the bulk cable is cut, measured in feet. For example, CA-015223-015 is 15 feet of cable cut from the box. A special case would be CA-015223-000 representing the entire 1000 foot box.

### D.2.1 Cable Selection

- Cable type: 8-conductor
- Conductor size: 24 AWG
- Conductor type: copper
- Belden, Inc. Part Number 7929A or 7919A
- Shielding: Foil

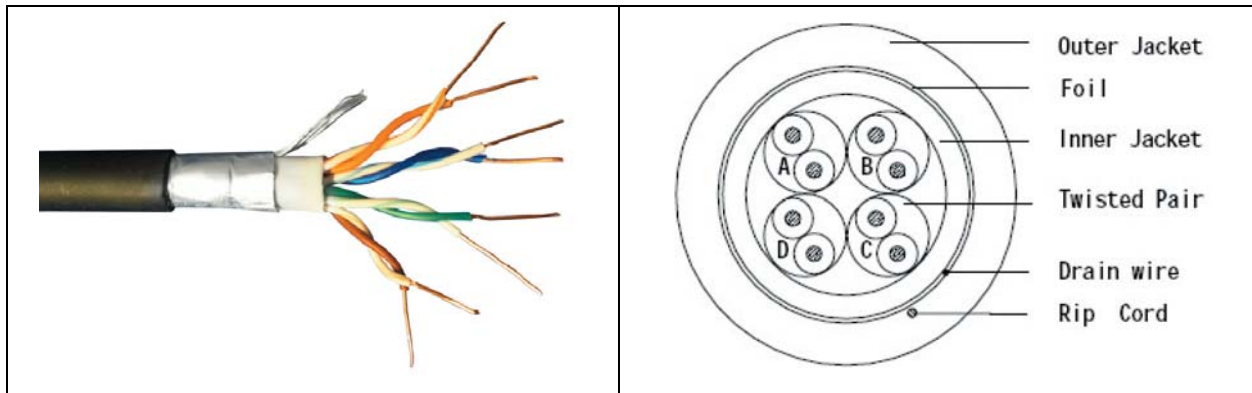


Figure D-1: Ethernet Cable Construction

The twisted pairs shall be color coded as follows:

- Pair 1 - Blue, White/Blue
- Pair 2 – Orange, White/Orange
- Pair 3 – Green, White/Green
- Pair 4 – Brown, White/Brown

### D.2.2 Tools Required

- Tyco Electronics-AMP Modular Plug Hand Assembly 790163-7 and Die Set 790163-8 (or equivalent).
- Cable tester, Ideal VDV MultiMedia Cable Tester #33-856, or equivalent.

**Table D-1: Copper Indoor/Outdoor Cat5e Shielded Cable (Bulk)**

Part Number	Description
CA-015223-000	Cable, Cat5e, Outdoor, Shielded, w/Drain, 1,000 feet long
CA-015223-005	Cable, Cat5e, Outdoor, Shielded w/Drain, 5 feet long
CA-015223-015	Cable, Cat5e, Outdoor, Shielded w/Drain, 15 feet long
CA-015223-025	Cable, Cat5e, Outdoor, Shielded w/Drain, 25 feet long
CA-015223-050	Cable, Cat5e, Outdoor, Shielded w/Drain , 50 feet long
CA-015223-100	Cable, Cat5e, Outdoor, Shielded w/Drain, 100 feet long
CA-015223-150	Cable, Cat5e, Outdoor, Shielded w/Drain, 150 feet long
CA-015223-200	Cable, Cat5e, Outdoor, Shielded w/Drain, 200 feet long
CA-015223-250	Cable, Cat5e, Outdoor, Shielded w/Drain , 250 feet long
CA-015223-300	Cable, Cat5e, Outdoor, Shielded w/Drain, 300 feet long
CA-015223-350	Cable, Cat5e, Outdoor, Shielded w/Drain, 350 feet long
CA-015223-400	Cable, Cat5e, Outdoor, Shielded w/Drain, 400 feet long
CA-015223-450	Cable, Cat5e, Outdoor, Shielded w/Drain, 450 feet long
CA-015223-500	Cable, Cat5e, Outdoor, Shielded w/Drain, 500 feet long

### D.2.3 Ethernet Cat5e Equipment Plug Kit 1738607-1 Assembly

The following sections provide instructions for fabricating the Ethernet cable equipment end connection. The assembly procedures are provided for reference and are superseded by any instructions provided with the connector. Always read and follow any instructions provided by the connector manufacturer.

The solid wire Plug Kit (Tyco Electronics # 1738607-1), shown in Figure D-2, consists of an 8-position Category 5e RJ-45 plug, load bar, and plug assembly. The load bar is used to hold the cable wires for insertion into the RJ-45 plug. The RJ-45 plug must be terminated and then installed into the plug assembly. The RJ-45 plug is held in the plug assembly by the locking tab. The cable fitting holds the RJ-45 plug in the plug assembly and seals the plug at the cable end. When engaged, the connector is held together by a locking mechanism (coupling ring and bayonet lock), which prevents accidental disconnection. The engaged connector is sealed by the interfacial seal.

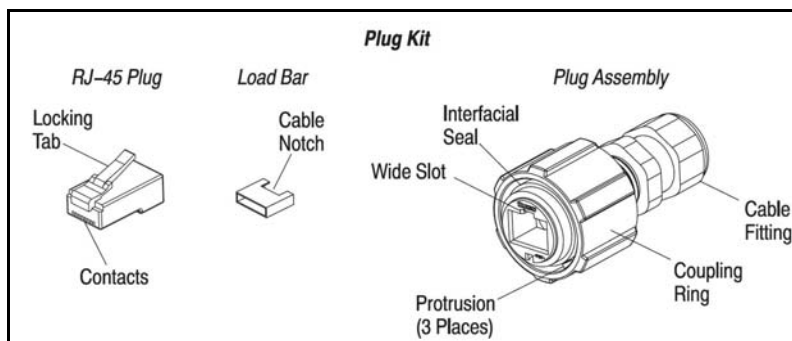


Figure D-2: Tyco/Industrial Ethernet Connector Plug Kit (1738607-1)

### D.2.4 Ethernet Cable - Equipment End Connector

#### Preparation Procedure:

Prepare the cable using the following procedure:



Reasonable care must be taken not to scrape or nick any part of the cable during the stripping operation.

1. Slide the plug assembly (cable fitting end first) onto the cable. See Figure D-3, Detail A.

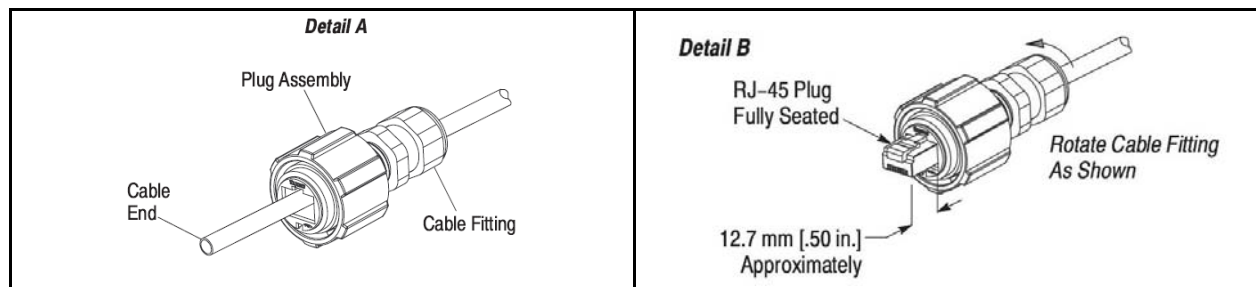


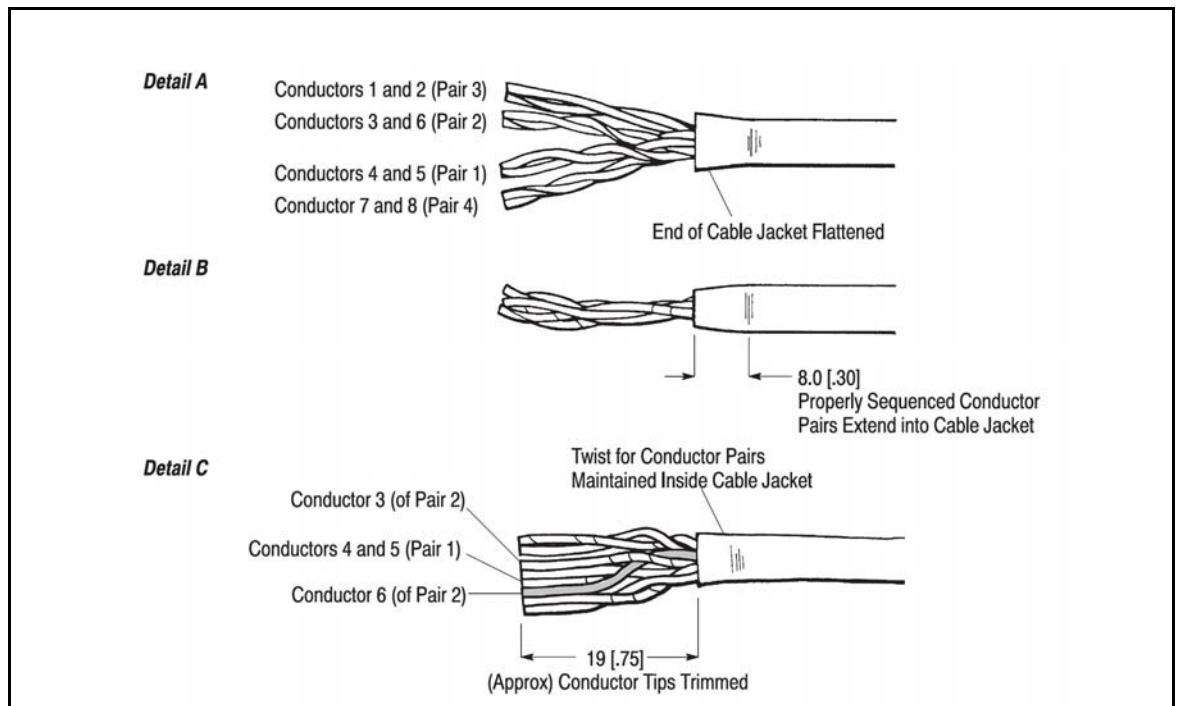
Figure D-3: Cable Preparation

- Strip back the cable insulation and shielding approximately one inch exposing the twisted pairs . Proper strip length is necessary to insert the conductors into the contact slots.



Insulation of individual conductors **must not** be cut or removed. This could result in shorted or open connections.

- Conductor pairs must be oriented side-by-side in the order shown in Figure D-4, Detail A. The end of the cable jacket must be flattened so that the conductor pairs lay side-by-side.
- Properly sequenced conductor pairs should extend into the cable jacket to the dimension given in Figure D-4, Detail B, creating an oblong shape.
- The conductor tips must be trimmed evenly to the dimension shown in Figure D-4, Detail C. Proper orientation of conductors must be maintained.



**Figure D-4: Cable Preparation Continued**

- The conductor pairs must be untwisted and arranged according to EIA/TIA T568B (defined in Figure D-5). IT IS CRITICAL that the pairs are NOT untwisted inside the cable jacket.

When arranging conductor pairs, IT IS IMPORTANT that Conductor 6 is crossed over Conductors 4 and 5 as shown in Figure D-4, Detail C.

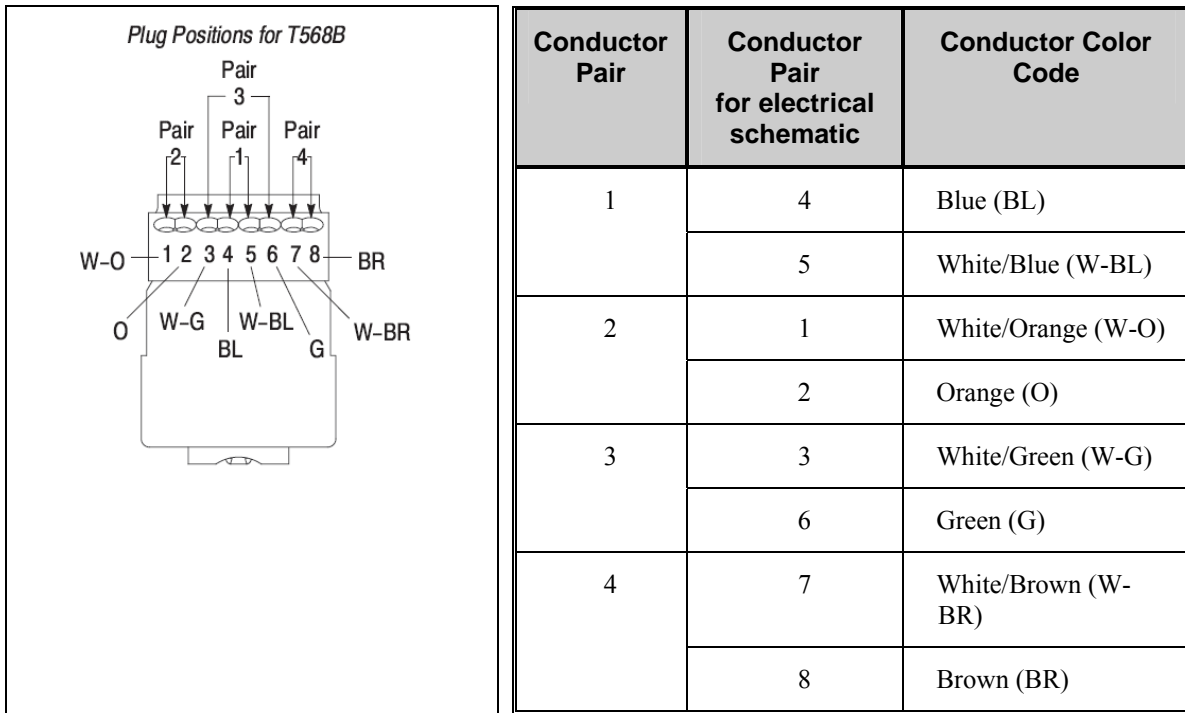


Figure D-5: Cable Preparation Continued

D.2.4.1 Termination

Terminate the RJ-45 plug to the cable end using the following procedure:

1. The conductors (maintaining arrangement) must be inserted into the load bar (oriented so that the cable notch will align with the contacts) until the cable jacket rests against the cable notch. The conductor twist must not enter the front of the load bar. The conductors must be trimmed evenly and square with the front edge of the load bar to the dimension given in Figure D-6, Detail A.
2. The conductors must be retracted from the load bar so that the conductors protrude from the end of the load bar to the dimension given in Figure D-6, Detail B. The top of the load bar must not be deformed.

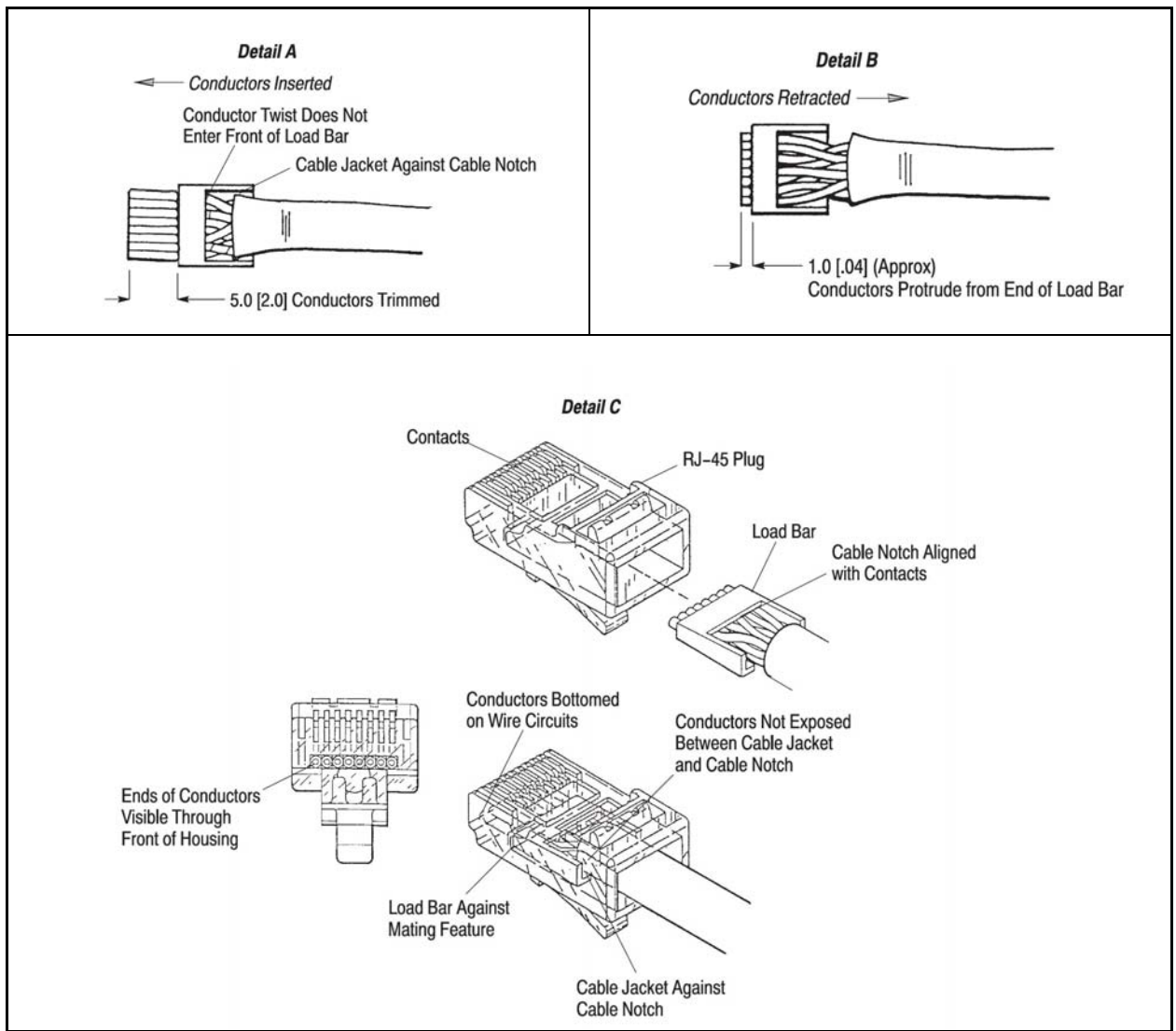


If the load bar is deformed, the conductor twist entered the front of the load bar.

3. The load bar (oriented so that the cable notch is aligned with the contacts) must be inserted into the RJ-45 plug until it butts against the mating feature of the RJ-45 plug, and the conductors are bottomed on the wire circuits. The cable jacket must be against the cable notch after the load bar is fully seated. The conductors must not be exposed between the cable jacket and cable notch. The ends of the conductors must be clearly visible through the front of the RJ-45 plug. See Figure D-6, Detail C.



If the conductors do not bottom on the wire circuits, they must be re-trimmed (after removing the load bar/cable assembly from the RJ-45 plug), and re-inserted into the RJ-45 plug. If the conductors are too short, the cable must be re-stripped.



**Figure D-6: Termination Requirements**

4. The RJ-45 plug must be terminated to the cable according to the instructions included with the tooling.

#### **D.2.4.2 Assembly**

Assemble the RJ-45 connector into the plug assembly using the following procedures:

1. Align the locking tab of the RJ-45 plug with the wide slot at the front (end opposite the cable fitting) of the plug assembly. See Figure D-7, Detail A.
2. Depress the locking tab, and insert the RJ-45 plug into the plug assembly. Gently pull the cable until the RJ-45 plug is fully seated. There should be approximately 12.7 mm [.50 in.] of the RJ-45 plug protruding from the front of the plug assembly. See Figure D-7, Detail B.



CAUTION

To avoid damage to the connection, the cable must be pulled GENTLY when seating the RJ-45 plug.

3. While holding the RJ-45 plug in position, rotate the cable fitting as shown in Figure D-7, Detail B until tightened to a torque of 1.7-2.8 N-m [15-25 lb-in.].



NOTE

The given torque must be met in order for the cable fitting to seal the plug at the cable end.

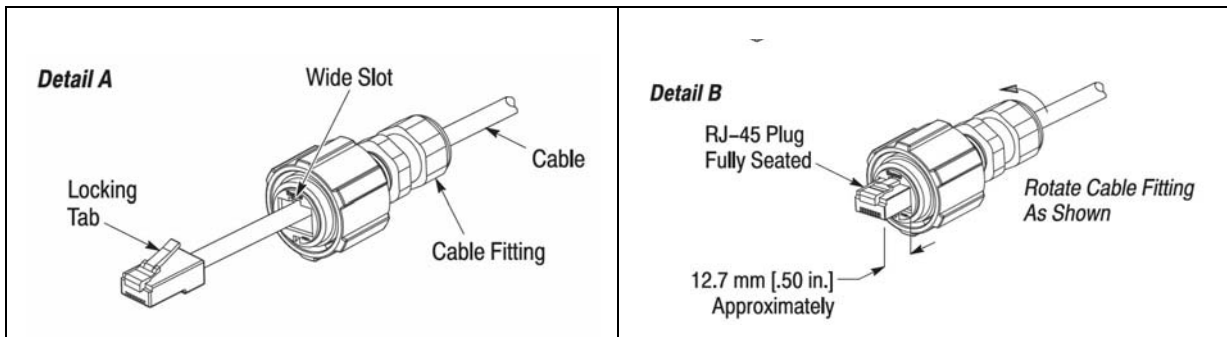


Figure D-7: Assembly Detail



## D.2.5 Ethernet Cable - Shelter End Connector

The following sections provide instructions for fabricating the Ethernet cable shelter end connector, Tyco Electronics part number 336462-1 (or equivalent). The assembly procedures are provided for reference and are superseded by any instructions provided with the connector. Always read and follow any instructions provided by the connector manufacturer.

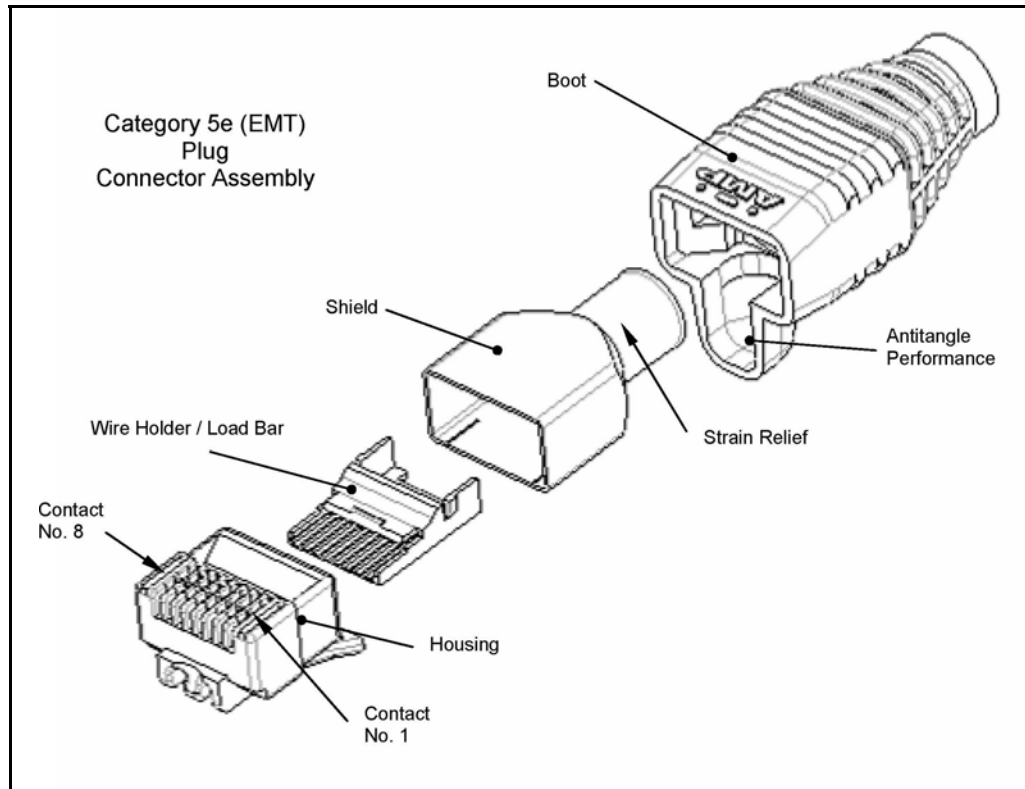


Figure D-8: Tyco Electronics 336462-1 Cat 5e (EMT) Plug Connector Assembly

### D.2.5.1 Cable Preparation

Prepare the cable using the following procedure (refer to Figure D-9):



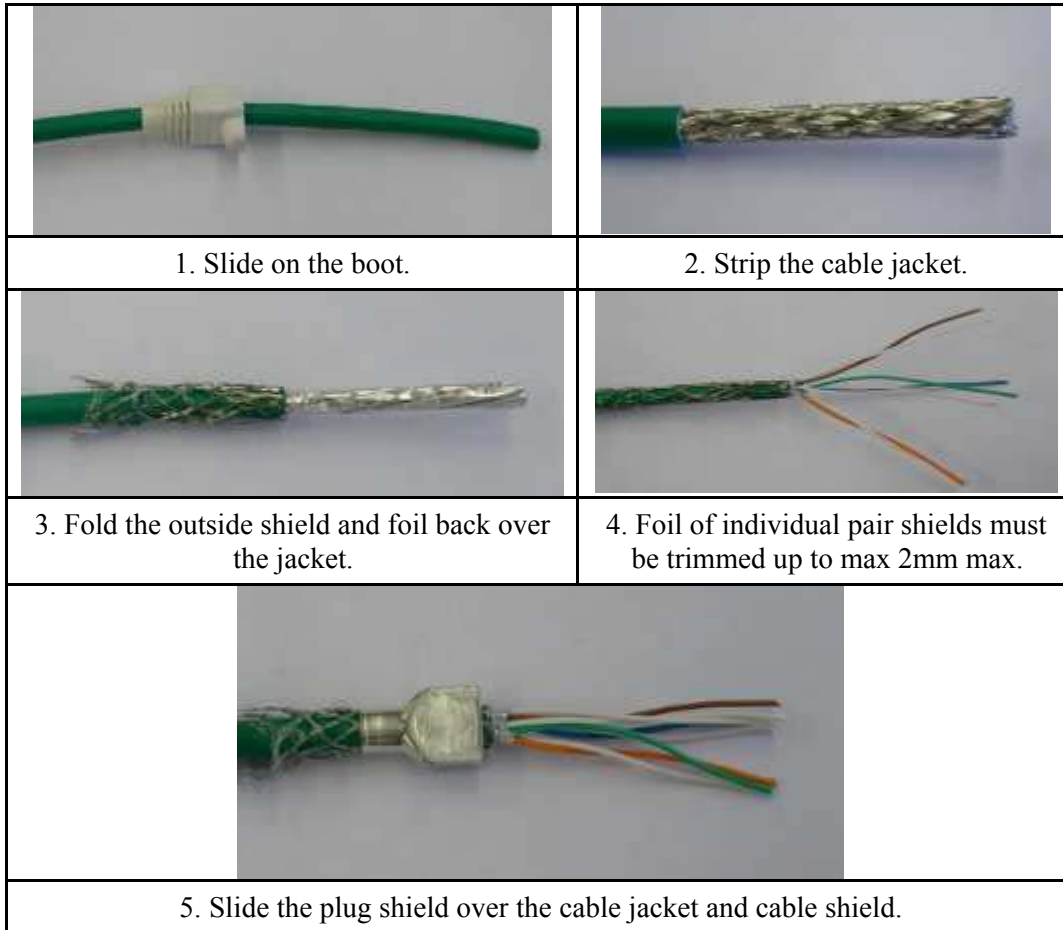
Reasonable care must be taken not to scrape or nick any part of the cable during the stripping operation.

1. Slide each boot over the relevant end of the cable before the cable stripping operation.
2. Strip the cable jacket 30 – 40mm [1.18 – 1.58 in.] as shown.
3. Fold the outside shield foil back over the jacket.
4. Foil must be trimmed up to 2.0mm [0.079 in.] max from the jacket end. Individual pair shields must be trimmed up to 2.0 [.079] max from the jacket end.



Cut and remove any cable filler, ripcord, or plastic wrap, if present.

- Slide the plug shield over the cable jacket and cable shield.



**Figure D-9: Cable Preparation – Strip and Fold Shield**

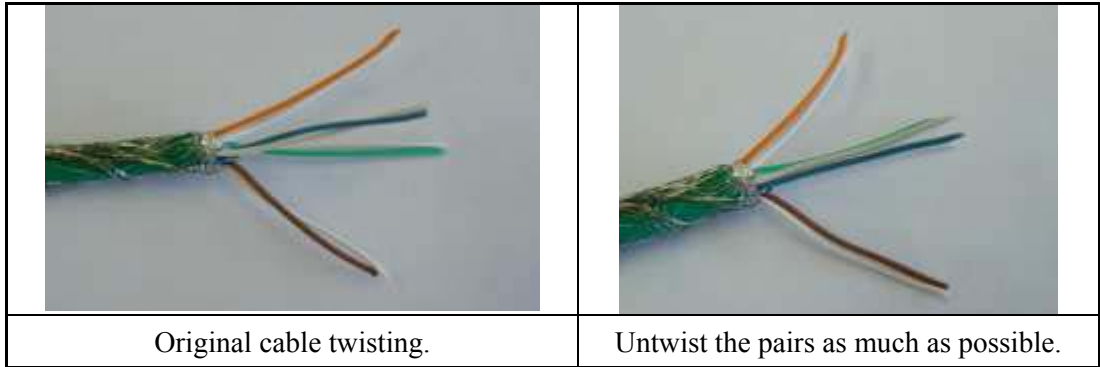


Reasonable care must be taken not to scrape or nick any part of the cable during the stripping operation.

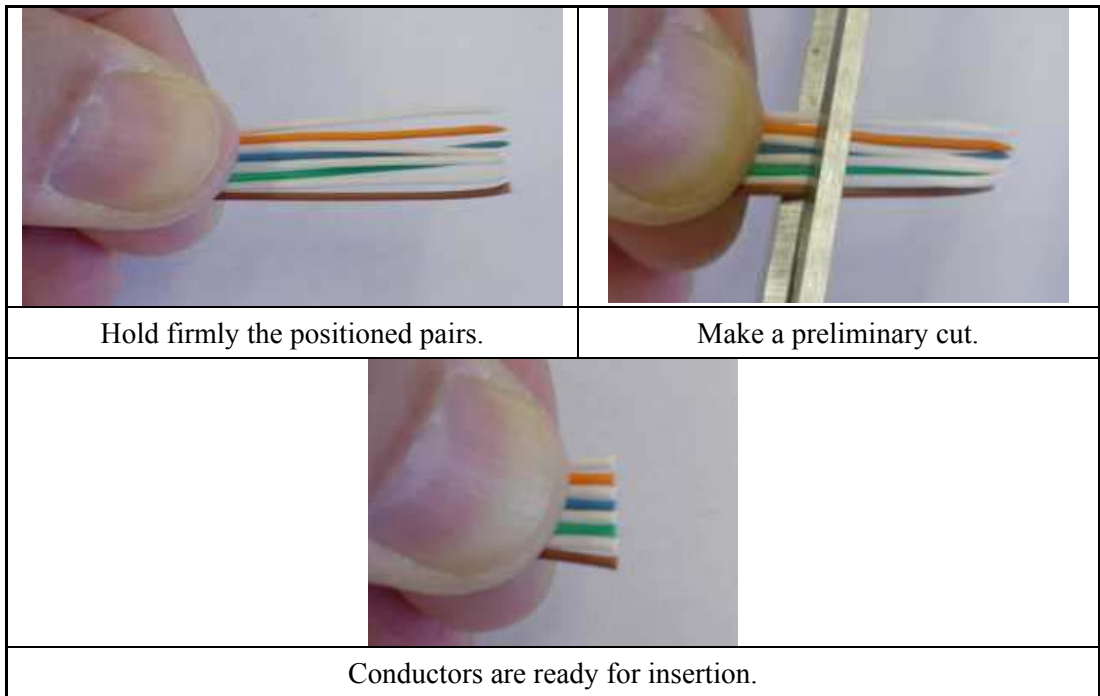
### D.2.5.2 Cable Positioning

- While firmly holding the cable jacket next to the stripped end, untwist the pairs as much as possible as shown in Figure D-10.
- Position the pairs according to the Wiring Diagram shown in Figure D-5. Try to avoid twisting between pairs as much as possible, see Figure D-4.

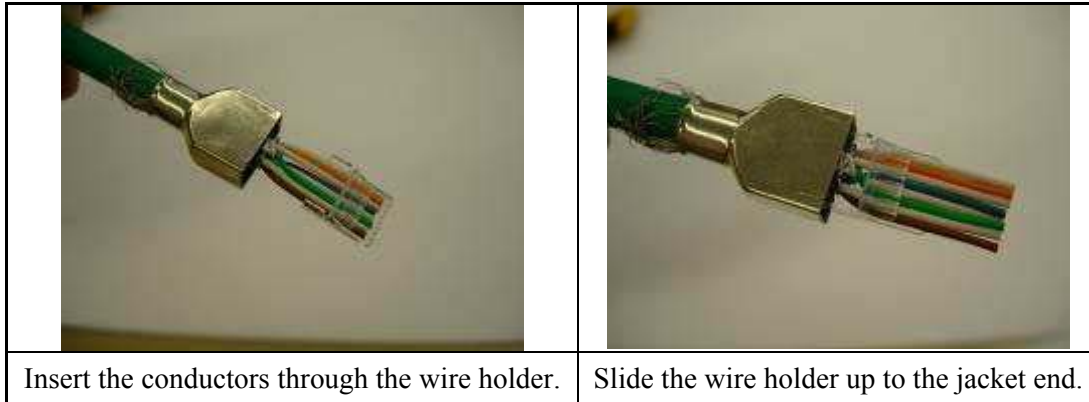
3. While firmly holding the positioned pairs, make a preliminary cut to the pairs to help the insertion of the conductors into the wire holder, as shown in Figure D-11.
4. Insert the conductors through the wire holder and slide it up to the end, as shown in Figure D-12.



**Figure D-10: Cable Positioning - Untwist Pairs**

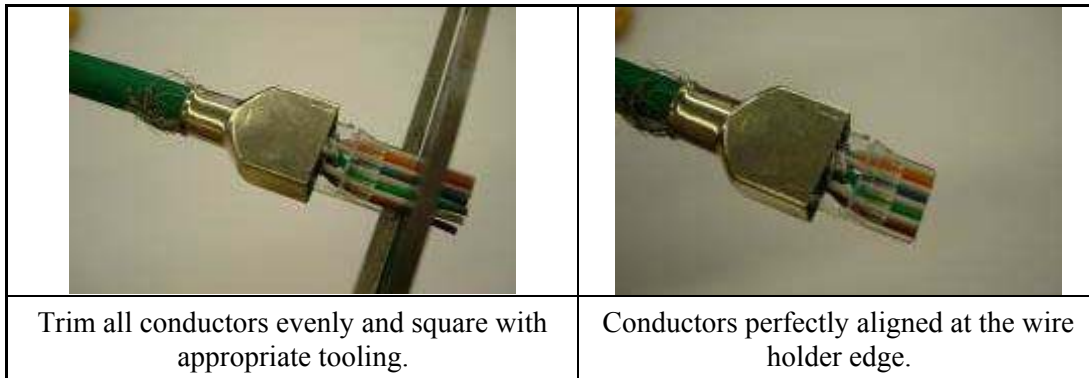


**Figure D-11: Cable Positioning, Trim Wires**



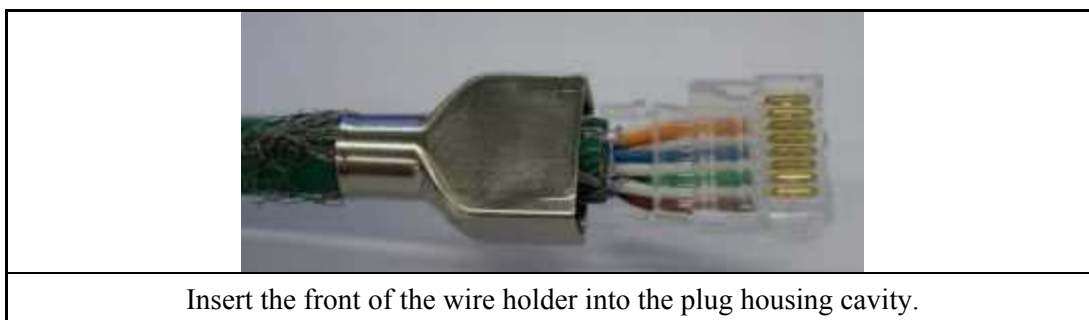
**Figure D-12: Cable Positioning, Insert Wire Holder**

5. While holding all conductors down against the wire holder in a flat layer, trim all conductors evenly and square with appropriate tooling, just beyond the front edge of the wire holder, as shown in Figure D-13.



**Figure D-13: Cable Positioning, Finish Trim**

6. Insert the front of the wire holder and the ends of the conductors into the cavity of the plug housing, as shown in Figure D-14.



**Figure D-14: Cable Positioning, Insert Wire Holder**

7. Push the wire holder into the housing, making sure it arrives up to the end, as shown in Figure D-15.

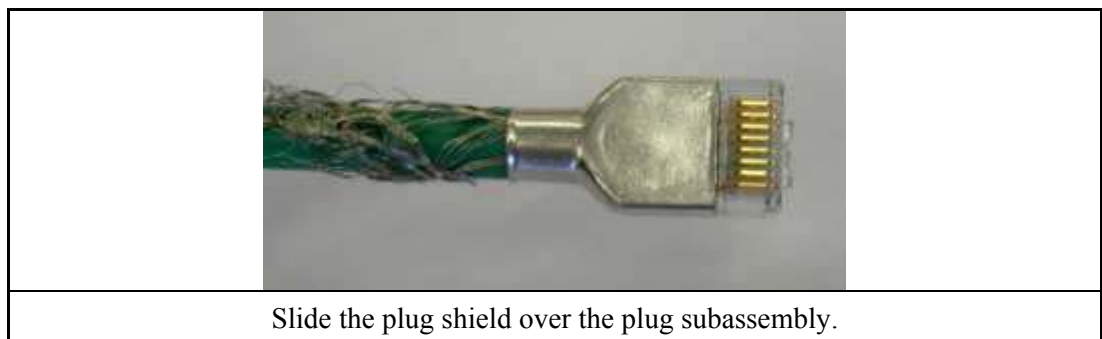


**Figure D-15: Cable Positioning, Latch Wire Holder in Housing**

8. Visually verify that all conductors are fully inserted into the housing with the ends of the conductors seated against the end of the housing cavity. If not, push the cable into the wire holder and check if the wire holder has latched into both sides of the plug housing.

### D.2.5.3 Connector Termination

1. Slide the plug shield over the plug subassembly until it seats against the front edge of recessed area around the outside of the plug housing, as shown in Figure D-16.



**Figure D-16: Connector Termination, Position Plug Shield**

2. Insert the plug and shield assembly into the appropriate crimping tool and crimp the connector according to the instruction sheet packaged with the tool. The shield must be free of bulges, tears and must be uniform after the crimping operation.
3. Trim away any braid/foil left extending beyond the end of the plug shield, as shown in Figure D-17.



**Figure D-17: Connector Termination, Trim Excess Foil**

4. Slide the boot over the crimped plug and shield, as shown in Figure D-18.



**Figure D-18: Connector Termination, Slide on Boot Cover**

5. After fabricating the connectors on both ends of the cable, test the cable for continuity and verify there are no shorts or opens.

## D.3 FIBER OPTIC CABLE

### D.3.1 Fiber Optic Cable Specifications

#### Electrical

• Fiber Type	100Base-FX Multimode	
• Core Diameter	62.5 um	
• Cladding Diameter	125 um	
• Wavelength	<u>850 nm</u>	<u>1300 nm</u>
• Attenuation (Maximum)	3.4 dB/km	1.5 dB/km
• Bandwidth (Maximum)	200 MHz-km	500 MHz-km

### D.3.2 Outdoor Fiber Optic Cable

The fiber optic cable available from Tyco Electronics is intended for outdoor applications supporting networking, data transfer, and phone lines. It includes a UV protected outer jacket, incasing two 62.5/125 um fiber multimode members. It is suitable for high-speed data applications, and supports 100Base-FX high-performance data communications.

The cables consist of two multimode 62.5 um 100Base-FX fiber optic members with supporting structure(s) to make the cable suitable for “supported” aerial and/or direct burial indoor/outdoor conditions. The cables are terminated on both ends using IP67 industrialized LC connectors. These connectors also include the protective mating caps for protection during cable installation and delivery. Cables of 150 feet or longer shall be equipped with a pulling eye on one end for use during installation. The connector-cable interfaces have a pull-strength in excess of 45 lbs.

Table D-2 is a list of factory made fiber optic cables, with LC connectors, available from Tyco Electronics. We do not recommend mating LC connectors to cables in the field, however, if this becomes necessary, fabricate the LC plug termination according to the manufacturer’s instructions.

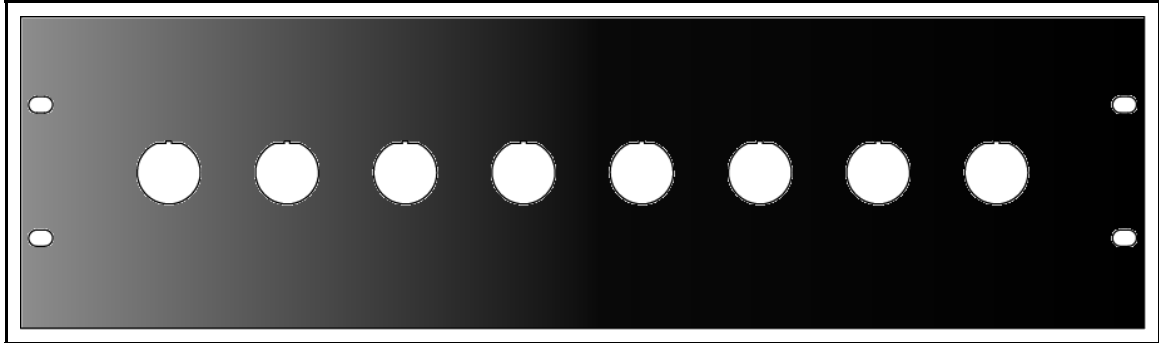
**Table D-2: Outdoor Fiber Optic Cable Assemblies**

<b>Part Number</b>	<b>Description</b>
CA-015488-000003	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 3 feet long.
CA-015488-000005	Cable, Fiber Optic, IP67, LC-LC Duplex, 5 feet long.
CA-015488-000010	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 10 feet long.
CA-015488-000016	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 16 feet long.
CA-015488-000033	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 33 feet long.
CA-015488-000050	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 50 feet long.
CA-015488-000075	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 75 feet long.
CA-015488-000100	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 100 feet long.
CA-015488-000125	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 125 feet long.
CA-015488-000150	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 150 feet long.
CA-015488-000175	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 175 feet long.
CA-015488-000200	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 200 feet long.
CA-015488-000225	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 225 feet long.
CA-015488-000250	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 250 feet long.
CA-015488-000275	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 275 feet long.
CA-015488-000300	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 300 feet long.
CA-015488-000325	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 325 feet long.
CA-015488-000350	Cable, Fiber Optic, Outdoor, IP67, LC-LC Duplex, 350 feet long.



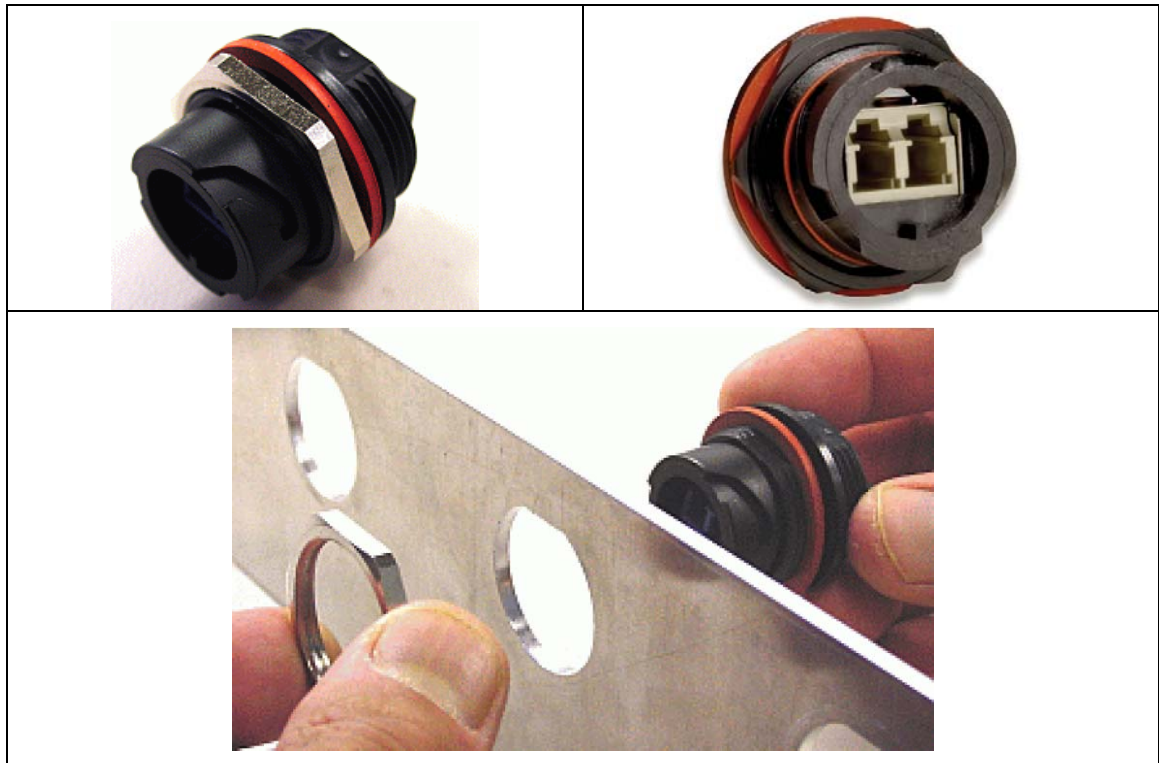
### D.3.3 Fiber Optic Cable Demarcation

Once the outdoor fiber cable enters a protected area, a shelter or other indoor space, we recommend creating a demarcation point to transition from outdoor fiber cabling to indoor fiber cabling. Tyco Electronics provides one option for this task with the use of a rack mount panel and industrialized fiber receptacles. The FM-016476 is a panel designed to mount into a standard 19-inch equipment rack and has eight (8) available locations for holding the receptacles. The receptacles should be installed on the panel such that the outdoor cable connects to the protected reverse-side of the panel. Indoor fiber cables then connect from the front of the panel to the appropriate network device.



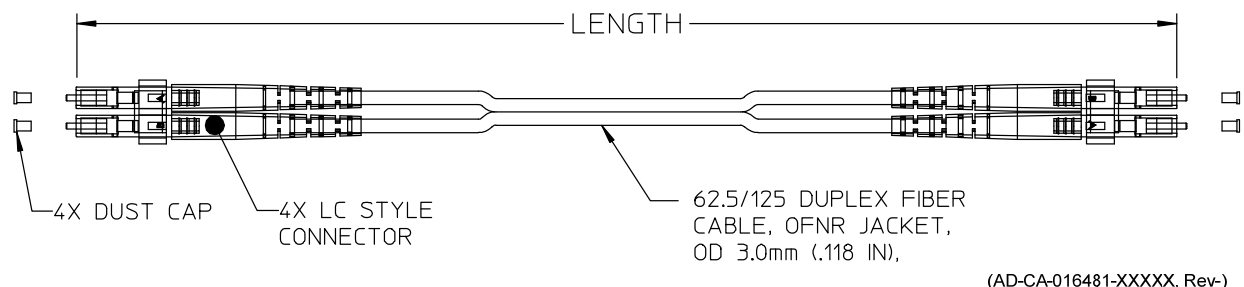
**Figure D-19: XLC-MM 19" Rack Mount Panel, Part Number FM-016476**

The receptacle assembly consists of the receptacle, a seal (panel gasket), and a panel nut, as shown in Figure D-20.



**Figure D-20: Industrialized Fiber Receptacle, Part Number 1828619-1**

### D.3.4 Indoor Fiber Optic Cable



**Table D-3: Indoor Fiber Optic Cable Assemblies**

Part Number	Description
CA-016481-001GRA	Cable, Fiber, LC Duplex, 1m, Gray
CA-016481-002GRA	Cable, Fiber, LC Duplex, 2m, Gray
CA-016481-003GRA	Cable, Fiber, LC Duplex, 3m, Gray
CA-016481-004GRA	Cable, Fiber, LC Duplex, 4m, Gray
CA-016481-005GRA	Cable, Fiber, LC Duplex, 5m, Gray
CA-016481-010GRA	Cable, Fiber, LC Duplex, 10m, Gray
CA-016481-001BLU	Cable, Fiber, LC Duplex, 1m, Blue
CA-016481-002BLU	Cable, Fiber, LC Duplex, 2m, Blue
CA-016481-003BLU	Cable, Fiber, LC Duplex, 3m, Blue
CA-016481-004BLU	Cable, Fiber, LC Duplex, 4m, Blue
CA-016481-005BLU	Cable, Fiber, LC Duplex, 5m, Blue
CA-016481-010BLU	Cable, Fiber, LC Duplex, 10m, Blue
CA-016481-001YEL	Cable, Fiber, LC Duplex, 1m, Yellow
CA-016481-002YEL	Cable, Fiber, LC Duplex, 2m, Yellow
CA-016481-003YEL	Cable, Fiber, LC Duplex, 3m, Yellow
CA-016481-004YEL	Cable, Fiber, LC Duplex, 4m, Yellow
CA-016481-005YEL	Cable, Fiber, LC Duplex, 5m, Yellow
CA-016481-010YEL	Cable, Fiber, LC Duplex, 10m, Yellow
CA-016481-001GRN	Cable, Fiber, LC Duplex, 1m, Green
CA-016481-002GRN	Cable, Fiber, LC Duplex, 2m, Green
CA-016481-003GRN	Cable, Fiber, LC Duplex, 3m, Green
CA-016481-004GRN	Cable, Fiber, LC Duplex, 4m, Green
CA-016481-005GRN	Cable, Fiber, LC Duplex, 5m, Green
CA-016481-010GRN	Cable, Fiber, LC Duplex, 10m, Green
CA-016481-001RED	Cable, Fiber, LC Duplex, 1m, Red
CA-016481-002RED	Cable, Fiber, LC Duplex, 2m, Red
CA-016481-003RED	Cable, Fiber, LC Duplex, 3m, Red
CA-016481-004RED	Cable, Fiber, LC Duplex, 4m, Red
CA-016481-005RED	Cable, Fiber, LC Duplex, 5m, Red
CA-016481-010RED	Cable, Fiber, LC Duplex, 10m, Red
CA-016481-001ORN	Cable, Fiber, LC Duplex, 1m, Orange
CA-016481-002ORN	Cable, Fiber, LC Duplex, 2m, Orange
CA-016481-003ORN	Cable, Fiber, LC Duplex, 3m, Orange
CA-016481-004ORN	Cable, Fiber, LC Duplex, 4m, Orange
CA-016481-005ORN	Cable, Fiber, LC Duplex, 5m, Orange
CA-016481-010ORN	Cable, Fiber, LC Duplex, 10m, Orange

## APPENDIX E SPECIFICATIONS

### E.1 SUBSCRIBER STATION

#### E.1.1 Hardware Specifications

##### Model Numbers:

Low Power Copper Client:	MAVM-VMCLL (BS-010700-001)
High Power Copper Client:	MAVM-VMXCH (BS-010700-002)
High Power Nomadic Copper Client:	MAVM-VMCHN (BS-010700-002) <sup>2</sup>
High Power Fiber Client:	MAVM-VMCHH (BS-010700-003)
Low Power Fiber Client:	MAVM-VMCLH (BS-010700-004)

##### Physical Characteristics:

Electrical Power:	
Standard Models:	11 to 30 Vdc (neg. gnd.) or 16 to 26 Vac
Fiber Models:	11 to 30 Vdc(neg. gnd.)
Power Consumption:	16 Watts maximum (8 Watts - Low Power Clients)
Size (H x W x D):	9.9 in. x 7.9 in. x 2.9 in. (25.1 cm x 20.1 cm x 7.3 cm)
Weight:	6 lbs (2.7 kg) (less mounting hardware)

##### Environmental Specifications:

Operating Temperature:	-22°F to +140°F (-30°C to +60°C)
Storage Temperature:	-40°F to +185°F (-40°C to +85°C)
Environmental (Enclosure):	NEMA4
Altitude:	15,000 ft. (operational)

##### System Interfaces:

Data Plane:	
Standard Client:	100Base-TX (copper - RJ-45 connector), Weatherproof
Fiber Client:	100Base-FX (LC Fiber Optic Connector), Weatherproof
Management:	100Base-TX, 100Base-FX, or over the air
4.9 GHz RF:	Type-N (F) connector, 50 ohms

<sup>2</sup> High Power Copper Client supplied with nomadic installation kit.

### **E.1.2 Data Specifications**

#### **Security Features:**

Authentication:	X.509 Digital Certificate
Authorization:	RSA Public Key Encryption
Encryption:	AES 128 bit

#### **Network Features:**

Management:	SNMP
Convergence:	IPv4 over IEEE 802.3/Ethernet IEEE 802.3/Ethernet
Configuration:	UAS, BAS, or embedded Web page

#### **PHY Characteristics:**

PHY:	OFDM 256 FFT
Channel Bandwidth:	5 or 10 MHz
Modulation Rates:	BPSK, QPSK (1/2, 3/4), 16QAM (1/2, 3/4), 64QAM (1/2, 3/4)
Duplexing:	Time Division Duplexing (TDD)
Frame Durations:	5 msec, 10 msec
CP:	1/32, 1/16, 1/8, 1/4
Throughput:	1 to 19 Mbps for 5 MHz channel 3 to 38 Mbps for 10 MHz channel

#### **MAC Characteristics:**

Duplexing:	Time Division Duplexing (TDD)
Service Classes Supported:	Real-Time Polling Service (rtPS) Non-Real-Time Polling Service (nrtPS) Unsolicited Grant Service (UGS) Best Efforts (BE)
Payload Header Suppression:	Supported
Automatic Repeat Request (ARQ):	Supported

**E.1.3 Transmitter**

Frequency:	4897.5 + 5*n (n=1,2,...18) MHz, or 4895.0 + 10*n (n=1,2,...9) MHz
Channel Bandwidth:	5 or 10 MHz
Output Power into a 50 $\Omega$ Load:	
Low Power Model:	0.1 Watts (+20 dBm QPSK/16QAM)
High Power Model:	0.5 Watts (+27 dBm QPSK/16QAM)
Output Power Control:	
Low Power Model:	+20 to -30 dBm (50 dB range) adjustable, 1 dB steps
High Power Model:	+27 to -23 dBm (50 dB range) adjustable, 1 dB steps
FCC ID:	
High Power Model:	BV8VIDA-BBCL
Industry Canada:	
High Power Model:	3607A-VIDABBCL
Spectrum Mask:	FCC Mask M (90.210)

**E.1.4 Receiver**

Frequency Band:	4897.5 + 5*n (n=1,2,...18) MHz, or 4895.0 + 10*n (n=1,2,...9) MHz
Channel Bandwidth:	5 or 10 MHz
Frequency Stability:	20 PPM
Sensitivity at BER 10 <sup>E-6</sup> :	
BPSK -1/2:	-96 dBm
QPSK -3/4:	-91 dBm
16-QAM – 3/4:	-85 dBm
Max RX Input Power:	-30 dBm
Max/RX Input Power (no damage):	0 dBm

## **E.2 BASE STATION**

### **E.2.1 Hardware Specifications**

#### **Model Numbers:**

Base Station, AC with Copper Ethernet:	MAVM-VMXBA (BS-009214-001)
Base Station, DC with Fiber:	MAVM-VMXBD (BS-009214-002)
Base Station, DC with Copper Ethernet:	MAVM-VMXBD (BS-009214-003)

#### **Physical Characteristics:**

Electrical Power:	
AC Model:	120 Vac $\pm$ 15%, 50-60 Hz
DC Model:	+24 $\pm$ 3 Vdc (neg. gnd.)
Power Consumption:	60 Watts maximum
Size (H x W x D):	14.5 in. x 8.0 in. x 4.25 in. (36.9 cm x 20.3 cm x 10.8 cm)
Weight:	13.5 lbs (6.17 kg)

#### **Environmental Specifications:**

Operating Temperature:	-22°F to +140°F (-30°C to +60°C)
Storage Temperature:	-40°F to +185°F (-40°C to +85°C)
Environmental:	NEMA4
Altitude:	15000 ft

#### **System Interfaces:**

Data Plane:	
Copper:	100Base-TX (copper - RJ-45 connector), Weatherproof
Fiber:	100Base-FX (LC Fiber Optic Connector), Weatherproof
Management:	100Base-TX or 100Base-FX
4.9 GHz RF:	Type-N (F) connector, 50 ohms
GPS RF:	SMA (F) connector, 50 ohms

**Security Features:**

Authentication:	X.509 Digital Certificate
Authorization:	RSA Public Key Encryption
Encryption:	AES 128 bit

**Network Features:**

Management:	SNMP
Convergence:	IPv4 over IEEE 802.3/Ethernet IEEE 802.3/Ethernet
Configuration:	UAS, BAS, or embedded Web page

**PHY Characteristics:**

PHY:	OFDM 256 FFT
Channel Bandwidth:	5 MHz
Modulation Rates:	BPSK, QPSK (1/2, 3/4), 16QAM (1/2, 3/4), 64QAM (1/2, 3/4)
Duplexing:	Time Division Duplexing (TDD)
Frame Durations:	5 msec, 10 msec
CP:	1/32, 1/16, 1/8, 1/4
Throughput:	1 to 19 Mbps for 5 MHz channel

**MAC Characteristics:**

Duplexing:	Time Division Duplexing (TDD)
Service Classes Supported:	Real-Time Polling Service (rtPS) Non-Real-Time Polling Service (nrtPS) Unsolicited Grant Service (UGS) Best Effort (BE)
Payload Header Suppression:	Supported
Automatic Repeat Request (ARQ):	Supported

**E.2.2 Transmitter**

Frequency Band:	4937.5 + 5*n (n=1,2,...10) MHz
Channel Bandwidth:	5 MHz
RF Power Output:	0.5 Watts (27 dBm ) Maximum
Output Power Control:	30 dB
FCC ID:	BV8VIDA-BB
Industry Canada:	3670A-VIDABB
Spectrum Mask:	FCC Mask M (90.210)

**E.2.3 Receiver**

Frequency Band:	4937.5 + 5*n (n=1,2,...10) MHz
Channel Bandwidth:	5 MHz
1 <sup>st</sup> Adjacent channel rejection at BER = 1e-6 for 3 dB degradation C/I (16QAM-3/4):	>20 dB
2 <sup>nd</sup> Adjacent channel rejection at BER = 1e-6 for 3 dB degradation C/I (16QAM-3/4):	>50 dBc
Sensitivity at BER 10 <sup>E-6</sup> :	
BPSK -1/2:	-96 dBm
QPSK -3/4:	-91 dBm
16-QAM – 3/4:	-85 dBm
Max RX Input Power:	-30 dBm
Max/RX Input Power (no damage):	0 dBm



## E.3 MULTILINK STATION AND B510 BASE STATION

### E.3.1 Hardware Specifications

#### Model Numbers:

MultiLink Station <sup>3</sup> :	MAVM-MLINK (BS-014648-003)
B510 Base Station :	MAVM-MBASE (BS-014648-004)

#### Regulatory:

Wireless Protocol:	IEEE 802.16 2004
FCC ID:	
MultiLink Station:	BV8MLINK
Base Station	BV8MBASE
Industry Canada:	
MultiLink Station:	3670A-MLINK
B510 Base Station	3670A-MBASE
Spectrum Mask:	FCC Mask 90.210(m)

#### Physical Characteristics:

Electrical Power:	+24 ±3 Vdc (neg. gnd.)
Power Consumption:	
MultiLink Station:	76 Watts (max)
B510 Base Station	60 Watts (max)
Size (H x W x D):	14.5 in. x 8.0 in. x 4.25 in. (36.9 cm x 20.3 cm x 10.8 cm)
Weight:	
MultiLink Station:	11.4 lbs (5.18 kg)
B510 Base Station	10.8 lbs (4.91 kg)

#### Environmental Specifications:

Operating Temperature:	-22°F to +140°F (-30°C to +60°C)
Storage Temperature:	-40°F to +185°F (-40°C to +85°C)
Environmental:	NEMA4
Altitude	
Low Pressure Operating Range:	15000 ft.
Low Pressure Storage Range:	30000 ft.

<sup>3</sup> The MultiLink Station contains the functionality of both a base station and subscriber station.

**System Interfaces:**

Data Plane:	
Copper:	100Base-TX (copper - RJ-45 connector), Weatherproof
Fiber:	100Base-FX (LC Fiber Optic Connector), Weatherproof
4.9 GHz RF:	Two-Type-N (F) connectors, 50 ohms (base station/client)
GPS RF:	TNC (F) connector, 50 ohms

**Security Features:**

Authentication:	X.509 Digital Certificate
Authorization:	RSA Public Key Encryption
Encryption:	AES 128 bit

**Network Features:**

Management:	SNMP
Convergence:	IPv4 over IEEE 802.3/Ethernet IEEE 802.3/Ethernet
Configuration:	UAS, BAS, or embedded Web page

**PHY Characteristics:**

PHY:	OFDM 256 FFT
Channel Bandwidth:	5 or 10 MHz
Modulation Rates:	BPSK, QPSK (1/2, 3/4), 16QAM (1/2, 3/4), 64QAM (1/2, 3/4)
Duplexing:	Time Division Duplexing (TDD)
Frame Durations:	5 msec, 10 msec
CP:	1/32, 1/16, 1/8, 1/4
Throughput:	1 to 19 Mbps for 5 MHz channel 3 to 38 Mbps for 10 MHz channel

**MAC Characteristics:**

Duplexing:	Time Division Duplexing (TDD)
Service Classes Supported:	Real-Time Polling Service (rtPS) Non-Real-Time Polling Service (nrtPS) Unsolicited Grant Service (UGS) Best Efforts (BE)
Payload Header Suppression:	Supported
Automatic Repeat Request (ARQ):	Supported

### **E.3.2 Base Station Section Specifications**

#### **E.3.3 Transmitter**

Frequency Band:	4897.5 + 5*n (n=1,2,...18) MHz, or 4895.0 + 10*n (n=1,2,...9) MHz
Channel Bandwidth:	5 or 10 MHz
RF Power Output:	0.5 Watts (27 dBm ) Maximum
Output Power Control:	30 dB
FCC ID:	
MultiLink Station:	BV8MLINK
Base Station	BV8MBASE
Industry Canada:	
MultiLink Station:	3670A-MLINK
Base Station	3670A-MBASE
Spectrum Mask:	FCC Mask M (90.210)

#### **E.3.4 Receiver**

Frequency Band:	4897.5 + 5*n (n=1,2,...18) MHz, or 4895.0 + 10*n (n=1,2,...9) MHz
Channel Bandwidth:	5 or 10 MHz
1 <sup>st</sup> Adjacent channel rejection at BER = 1e-6 for 3 dB degradation C/I (16QAM-3/4):	>20 dB
2 <sup>nd</sup> Adjacent channel rejection at BER = 1e- 6 for 3 dB degradation C/I (16QAM-3/4):	>50 dBc
Sensitivity at BER 10 <sup>E-6</sup> :	
BPSK -1/2:	-96 dBm
QPSK -3/4:	-91 dBm
16-QAM – 3/4:	-85 dBm
Max RX Input Power:	-30 dBm
Max/RX Input Power (no damage):	0 dBm

### E.3.5 Subscriber Station Section Specifications (MultiLink Only)

#### E.3.6 Transmitter

Frequency:	4897.5 + 5*n (n=1,2,...18) MHz, or 4895.0 + 10*n (n=1,2,...9) MHz
Channel Bandwidth:	5 or 10 MHz
Output Power into a 50 $\Omega$ Load:	0.5 Watts (+27 dBm QPSK/16QAM)
Output Power Control:	+27 to -23 dBm (50 dB range) adjustable, 1 dB steps
FCC ID:	BV8MLINK
Industry Canada:	3670A-MLINK
Spectrum Mask:	FCC Mask M (90.210)

#### E.3.7 Receiver

Frequency Band:	4897.5 + 5*n (n=1,2,...18) MHz, or 4895.0 + 10*n (n=1,2,...9) MHz
Channel Bandwidth:	5 or 10 MHz
Frequency Stability:	20 PPM
Sensitivity at BER 10 <sup>E-6</sup> :	
BPSK -1/2:	-96 dBm
QPSK -3/4:	-91 dBm
16-QAM – 3/4:	-85 dBm
Max RX Input Power:	-30 dBm
Max/RX Input Power (no damage):	0 dBm



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