



iMcV-T1/E1/J1

Operation Manual



FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B computing device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

The use of non-shielded I/O cables may not guarantee compliance with FCC RFI limits. This digital apparatus does not exceed the Class B limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.

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About the iMcV-T1/E1/J1

The iMcV-T1/E1/J1™ chassis mounted media conversion module allows you to extend the distances between T1, J1, and E1 copper telephony systems by adding a fiber segment. The distances you can add range from 2km to 100km depending on the module used and the fiber type available.

Contents

This box contains the following items:

- 1 - iMcV-T1/E1/J1 Module
- 1 - Operation Manual

Prerequisites

Before you install the iMcV-T1/E1/J1 modules, perform the following:

- Make sure you have the correct modules for your fiber type and your distance requirements.
- Make sure that T1 UTP lines **DO NOT** use simplex power (no wet lines).
- Before you install the iMcV-T1/E1/J1 modules you must verify the DIP switches are configured for the feature wanted.
- Make sure you deploy the iMcV-T1/E1/J1 modules in pairs.
- Make sure the Remote Chassis is not managed.

NOTE
<i>The iMcV-T1/E1/J1 modules are delivered pre-configured for standard T1 operation in Passive mode. To enable remote management you must move DIP switch S2-2 to the "ON" position on the Remote module (refer to the DIP switch diagram and table).</i>

Configuration

The iMcV-T1/E1/J1 module is factory-configured to use the following default features:

- **T1/E1 Mode**..... T1
- **Receive Equalizer Gain Limit (EGL)**:-30 dB (Limited Long Haul)
- **Line Encoding**: AMI (Passive Mode)
- **Transmit LIU Waveshape (Build-out)**: DSX-1 (0 to 133 ft) 0 dB CSU
- **Receive LIU Termination**:..... Receive Side 100 ohms Enabled
- **Transmit Data Source**: Standard Data
- **Jitter Attenuator Select**: Place Jitter Attenuator on TX Side
- **Remote Management**:Remote Management Disabled
- **Loopback Selection**: No Loopback
- **Monitor/Boost Mode**: No Boost
- **NRZ Selection**: Disable NRZ (Passive Mode)

You can use the iView² management software to change some of the iMcV-T1/E1/J1 features after installing the modules in the chassis. Refer to the iView² online help for more information.

Passive Mode

It is recommended that you use the default Passive mode configuration for most typical applications. Passive mode allows the fiber segment to pass data unchanged between the T1/E1 segments independent of the actual line coding (AMI, B8ZS, or HDB3). All errors and fault conditions from one T1/E1 end will pass through the fiber to the other end as if there were one long T1/E1 connection.

Available configurations enabled by DIP switches (and iView²):

T1 Mode Configurations (default)

- Receive Equalizer Gain Limit (EGL) **iView²**
 - -36 dB (Long Haul)
 - -30 dB (Limited Long Haul) (default)
- Line Encoding **iView²**
 - B8ZS
 - AMI (default)
- Transmit LIU Waveshape (Build-out)
 - DSX-1 (0 to 133 ft) 0 dB CSU (default)
 - DSX-1 (133 to 266 ft)
 - DSX-1 (266 to 399 ft)
 - DSX-1 (399 to 533 ft)
 - DSX-1 (533 to 655 ft)
 - -7.5 dB CSU
 - -15 dB CSU
 - -22.5 dB CSU
- Receive LIU Termination
 - Receive Side Termination Disabled
 - Receive Side 120 ohms Enabled
 - Receive Side 100 ohms Enabled (default)
 - Receive Side 75 ohms Enabled
- Transmit Data Source **iView²**
 - Standard Data (default)
 - Transmit Pseudorandom Bit Sequence
 - Transmit Alternating Ones and Zeros
 - Transmit Unframed All Ones
- Jitter Attenuator Select
 - Place Jitter Attenuator on RCV Side
 - Place Jitter Attenuator on XMT Side (default)
- Remote Management
 - Remote Management Enabled
 - Remote Management Disabled (default)
- Loopback Selection **iView²**
 - No Loopback (default)
 - Fiber Analog Loopback
 - Fiber Digital Loopback
 - Twisted Pair Digital Loopback
- Monitor/Boost Mode
 - No Boost (default)
 - 20 dB
 - 26 dB
 - 32 dB
- NRZ Selection **iView²**
 - Disable NRZ (default)
 - Enable NRZ

E1 Mode Configurations

- Receive Equalizer Gain Limit (EGL) **iView²**
 - -12 dB (Short Haul)
 - -43 dB (Long Haul)
- Line Encoding **iView²**
 - HDB3
 - AMI
- Transmit LIU Waveshape (Build-out)
 - 75 ohms
 - 125 ohms
 - 75 S ohms w/ High Return Loss
 - 125 S ohms w/ High Return Loss
- Receive LIU Termination
 - Receive Side Termination Disabled
 - Receive Side 120 ohms Enabled
 - Receive Side 100 ohms Enabled
 - Receive Side 75 ohms Enabled
- Transmit Data Source **iView²**
 - Standard Data
 - Transmit Pseudorandom Bit Sequence
 - Transmit Alternating Ones and Zeros
 - Transmit Unframed All Ones
- Jitter Attenuator Select
 - Place Jitter Attenuator on RCV Side
 - Place Jitter Attenuator on XMT Side
- Remote Management
 - Remote Management Enabled
 - Remote Management Disabled
- Loopback Selection **iView²**
 - No Loopback
 - Fiber Analog Loopback
 - Fiber Digital Loopback
 - Twisted Pair Digital Loopback
- Monitor/Boost Mode
 - No Boost
 - 20 dB
 - 26 dB
 - 32 dB
- NRZ Selection **iView²**
 - Disable NRZ
 - Enable NRZ

Installation

At the central location the iMcV-T1/E1/J1 unit is typically installed in a managed chassis such as the **iMediaChassis** or the **iMediaCenter**.

iMediaChassis



iMediaCenter



MediaChassis

The MediaChassis provides a typical unmanaged chassis suitable for all remote installation locations.



NOTE

<i>Chassis may also be available in Industrial Ethernet (IE) configurations.</i>
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Each module requires one slot in the chassis. To install a module, remove the blank brackets covering the slots where the module is to be installed (if present) by removing the screws on the outside edges of the bracket. Slide the module into the chassis, via the card guides, until the module is seated securely in the connector. Secure the module to the chassis by tightening the captive screw. Save any “blanks” removed during installation for future use should your configuration requirements change.

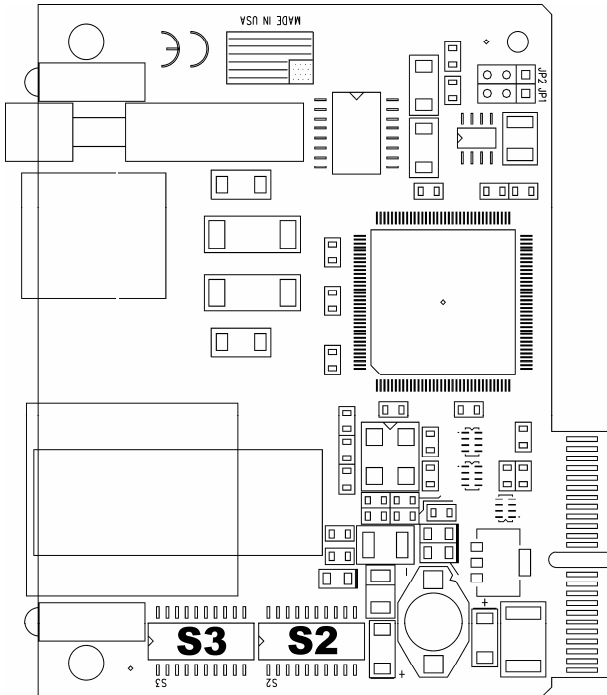
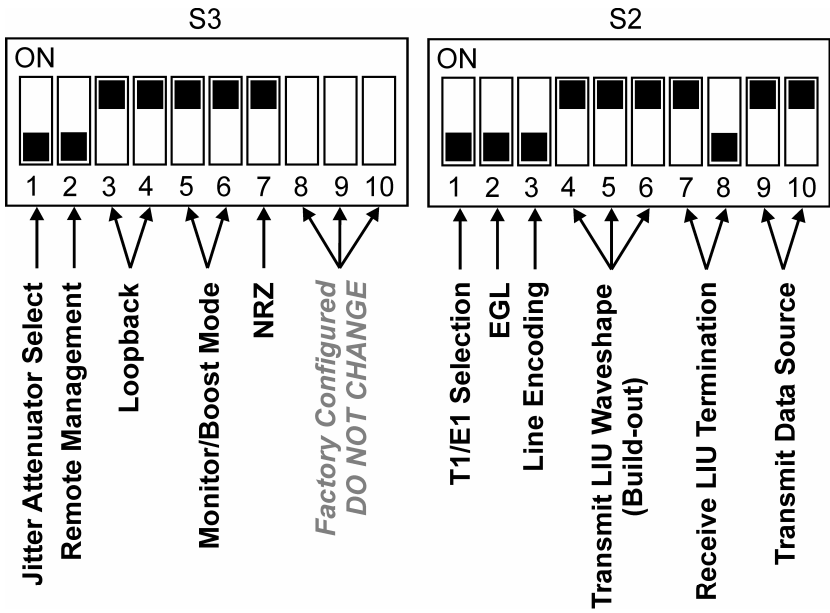
Crossover/Straight-Through Connection

iMcV-T1/E1/J1 comes with an RJ48 UTP connector that features a push-button switch, located next to the port, for selecting a crossover workstation or straight-through connection. To select a cross-over connection, press the push-button IN. A straight-through connection is selected when the push-button is OUT. When unsure what type of connection you need, set the push button to the position that turns the NO LNK LED off.

DIP Switch Table

T1/E1 Selection					
S2-1: OFF	T1 Mode Selected				default
S2-1: ON	E1 Mode Selected				
Receive Equalizer Gain Limit (EGL)					
E1				<i>iVIEW²</i>	
S2-2: ON	-12 dB (Short Haul)			<i>iVIEW²</i>	
S2-2: OFF	-43 dB (Long Haul)			<i>iVIEW²</i>	
T1				<i>iVIEW²</i>	
S2-2: ON	-36 dB (Long Haul)			<i>iVIEW²</i>	
S2-2: OFF	-30 dB (Limited Long Haul)			<i>iVIEW²</i>	default
Line Encoding <i>iVIEW²</i>				<i>iVIEW²</i>	
S2-3: ON	HDB3 (E1) / B8ZS (T1)			<i>iVIEW²</i>	
S2-3: OFF	AMI (Required for Passive Mode)			<i>iVIEW²</i>	default
Transmit LIU Waveshape (Build-out)					
E1					
S2-4: ON	S2-5: ON	S2-6: ON	75 ohms		
S2-4: OFF	S2-5: ON	S2-6: ON	125 ohms		
S2-4: ON	S2-5: ON	S2-6: OFF	75 S ohms w/ High Return Loss		
S2-4: OFF	S2-5: ON	S2-6: OFF	125 S ohms w/ High Return Loss		
T1					
S2-4: ON	S2-5: ON	S2-6: ON	DSX-1 (0 to 133 ft) 0 dB CSU		default
S2-4: OFF	S2-5: ON	S2-6: ON	DSX-1 (133 to 266 ft)		
S2-4: ON	S2-5: OFF	S2-6: ON	DSX-1 (266 to 399 ft)		
S2-4: OFF	S2-5: OFF	S2-6: ON	DSX-1 (399 to 533 ft)		
S2-4: ON	S2-5: ON	S2-6: OFF	DSX-1 (533 to 655 ft)		
S2-4: OFF	S2-5: ON	S2-6: OFF	-7.5 dB CSU		
S2-4: ON	S2-5: OFF	S2-6: OFF	-15 dB CSU		
S2-4: OFF	S2-5: OFF	S2-6: OFF	-22.5 dB CSU		
Receive LIU Termination					
S2-7: ON	S2-8: ON	Receive Side Termination Disabled			
S2-7: OFF	S2-8: ON	Receive Side 120 ohms Enabled			
S2-7: ON	S2-8: OFF	Receive Side 100 ohms Enabled			default
S2-7: OFF	S2-8: OFF	Receive Side 75 ohms Enabled			
Transmit Data Source <i>iVIEW²</i>					
S2-9: ON	S2-10: ON	Standard Data		<i>iVIEW²</i>	default
S2-9: OFF	S2-10: ON	Transmit Pseudorandom Bit Sequence		<i>iVIEW²</i>	
S2-9: ON	S2-10: OFF	Transmit Alternating Ones and Zeros		<i>iVIEW²</i>	
S2-9: OFF	S2-10: OFF	Transmit Unframed All Ones		<i>iVIEW²</i>	
Jitter Attenuator Select					
S3-1: ON	Place Jitter Attenuator on RCV Side				
S3-1: OFF	Place Jitter Attenuator on XMT Side				default
Remote Management					
S3-2: ON	Remote Management Enabled (only at the REMOTE end)				
S3-2: OFF	Remote Management Disabled (only at the LOCAL end)				default
Loopback Selection <i>iVIEW²</i>					
S3-3: ON	S3-4: ON	None		<i>iVIEW²</i>	default
S3-3: OFF	S3-4: ON	Local Loopback		<i>iVIEW²</i>	
S3-3: ON	S3-4: OFF	Analog Loopback		<i>iVIEW²</i>	
S3-3: OFF	S3-4: OFF	Remote Loopback		<i>iVIEW²</i>	
Monitor/Boost Mode					
S3-5: ON	S3-6: ON	Normal Operation (No Boost)			default
S3-5: OFF	S3-6: ON	20 dB			
S3-5: ON	S3-6: OFF	26 dB			
S3-5: OFF	S3-6: OFF	32 dB			
NRZ Selection <i>iVIEW²</i>					
S3-7: ON	Disable NRZ (Required for Passive Mode)			<i>iVIEW²</i>	default
S3-7: OFF	Enable NRZ (Line Terminating Mode)			<i>iVIEW²</i>	
Fiber Type					
S3-8: Factory Configured		DO NOT CHANGE			
S3-9: Factory Configured		DO NOT CHANGE			
S3-10: Factory Configured		DO NOT CHANGE			

All *iVIEW²* enabled switches are overridden by management software.



Unmanaged Modules

Before installing the iMcV-T1/E1/J1 module into an unmanaged chassis, configure the module hardware-selectable features via DIP switches located at position S3 and S2 on the PCB (refer to the *DIP Switch Table* section for more information). The jumpers located at positions JP1 and JP2 are factory configured— DO NOT CHANGE.

Description of DIP Switch-Selectable Options

The iMcV-T1/E1/J1 module includes movable DIP switches for hard switching the optional features. Some of these switch options are overridden by the management setting of a managed chassis (refer to the *DIP Switch Table* section for a list of the iView² managed switches).

This module is shipped in the standard T1 option configuration. The following section contains a brief description of the available options.

T1/E1/J1 Mode

This option allows you to select the data rate standard that the module will use when converting: T1/J1 (default) or E1. The default is OFF, T1/J1 mode selected.

Receive Equalizer Gain Limit (EGL)

This option allows you to compensate for diminishing signal intensity over the data line by adjusting the sensitivity of the UTP receiver. By setting the Receive Equalizer Gain Limit, very long copper lines can be utilized.

Line Encoding

This option allows you to set the transmit/receive encoding for HDB3, B8ZS or AMI (default).

NOTE
<i>There are currently no applications that use any other settings than AMI encoding and NRZ disabled (Passive mode). Changing the encoding setting to anything other than AMI can result in data corruption.</i>

Transmit LIU Waveshape (Line Build-out)

This option allows you to control the waveshape being output by the transmitter. This helps to correct problems related to long cables. Improperly setting this switch will cause signal degradation.

Receive LIU Termination (Line Termination)

This option allows you to set the receive termination. This is used to properly terminate cables in order to prevent signal reflections which can cause signal degradation.

Transmit Data Source

This option allows you to set the module to send normal data (default) or to send specific test-patterns of data to determine problems along the cable as a diagnostic tool. The user can set the module to send a pseudorandom bit sequence (PRBS) ($2^{15}-1$ for E1 and $2^{20}-1$ for T1), an alternating ones and zeros, or an unframed all ones code, depending on the diagnostic requirements.

Jitter Attenuator Select

This option allows you to select Jitter Attenuation on the UTP transmit or receive side. This decreases jitter in the data stream which increases data reliability.

NOTE
<i>The jitter attenuator must always be enabled on the transmit side of the copper line.</i>

Loopback Selection

This option allows you to set the Loopback location on the module. Loopback is a diagnostic tool that enables the user to test the integrity of the line by allowing the data to be looped back. The following independent loopback locations are included on the module:

- Analog Loopback - Set this switch on the Remote module to loop the data back from the remote copper port (refer to the *Remote Copper Loopback Mode* section for more information).
- Local Loopback – Set this switch on the Remote module to loop the data back from the remote fiber port (refer to the *Remote Fiber Loopback Mode* section for more information).
- Remote Loopback - Set this switch on the local module to loop the data back from the local fiber port (refer to the *Local Fiber Loopback Mode* section for more information).

Refer to the *Loopback Testing* section for application examples of the loopback testing modes.

Remote Management

This option allows you to enable Remote management on the module. **The remote management feature is designed to work only on the remote module of the Local/Remote pair.** With Remote management enabled, you can easily perform the following:

- Test the line integrity of the remote copper port.
- Use the Local unit to configure all SNMP-configurable features for both units.
- Use the Local unit to download firmware for both units.

Refer to the *Module LED Functions* section for more information.

NOTE
<i>When you enable the Remote management feature on the remote module, you must disable SNMP-management on the chassis in which the remote unit is installed (i.e. turn the iMediaCenter chassis SNMP switch off, or do not install an SNMP Management module in either an iMediaChassis or iMcV series chassis.</i>

Monitor/Boost Mode

This option allows you to boost the UTP receive signal (i.e internal linear gain boost). This helps the UTP receiver to compensate for line loss.

NRZ (Non-Return-to-Zero)

This option allows you to enable or disable the NRZ mode.

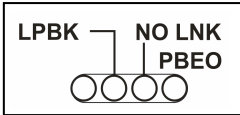
NOTE
<i>There are currently no applications that use any other settings than AMI encoding and NRZ disabled (Passive mode). Enabling NRZ can result in data corruption.</i>

Enabling NRZ terminates the line coding on the copper line. This forces the module to send raw data to the fiber line without line code information.

Module LED Functions

This section describes the LEDs and their functions. The Fiber port LED RM is the only LED that should be lit on the modules under normal operating conditions.

Copper Port LEDs



LPBK

Glow green when the module is set to one of the Loopback modes.

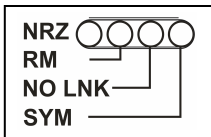
NO LNK

Glow green when a UTP link is **NOT** established.

PBE0

Only used when the **Transmit Data Source** option is set to **Pseudo-random Bit Sequence**. This LED will glow amber when the iMcV-T1/E1/J1 module receives errors and will stay dark when the converter receives a Pseudorandom Bit Sequence without errors.

Fiber Port LEDs



NRZ

Glow green when the NRZ mode is enabled.

RM

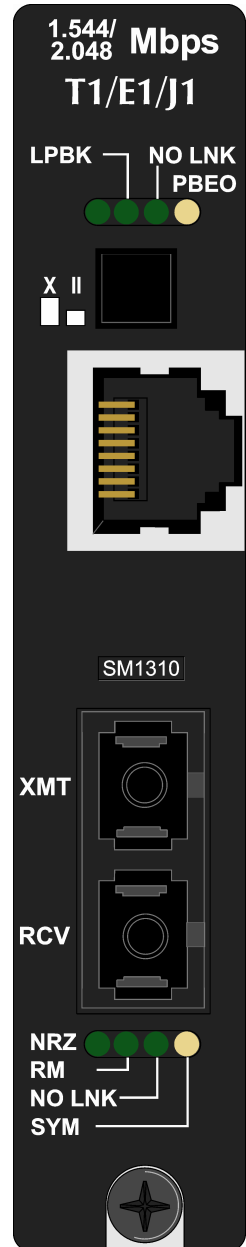
Glow green on the Remote unit when Remote management is enabled. Glow green on the Local unit when it has discovered a Remote unit with Remote management enabled.

NO LNK

Glow green when a fiber link has **NOT** been established.

SYM

Glow amber when a 4-bit to 5-bit (4b/5b) symbol encoding error in the fiber line is detected.



Testing

To test a media converter by itself, first make sure you have an appropriate fiber patch cable, then perform the following steps:

1. Connect the media converter to the T1/E1 device with a standard UTP cable. If the **NO LNK** LED for the copper port remains on, you are not receiving a valid signal. Push the crossover push button on the front of the unit. Verify that the **NO LNK** LED for the copper port is off.
2. Loop a single strand of fiber from the transmit port to the receive port of the media converter. Verify that the **NO LNK** LED for the fiber port is off.

Or

For single-strand fiber products, connect a single fiber cable from the Local iMcV-T1/E1/J1 to the remote iMcV-T1/E1/J1. Verify that the **NO LNK** LED for the fiber port is off.

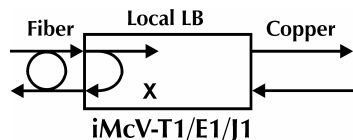
Loopback Testing

The iMcV-T1/E1/J1 includes the following loopback locations:

- Local
- Remote
- Analog.

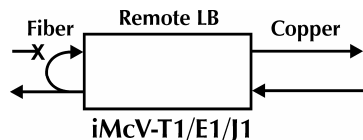
Local Loopback

The Local loopback location on the module loops the fiber-receive port to the fiber-transmit port.



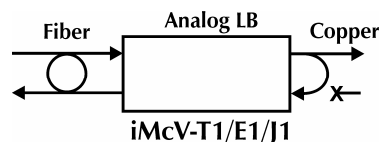
Remote Loopback

The Remote loopback location on the module loops the fiber-transmit port to the fiber-receive port.



Analog Loopback

The Analog loopback location on the module loops the copper-transmit port to the copper-receive port.



The iMcV-T1/E1/J1 can be configured to use the following loopback test modes:

- **Local Fiber Loopback Mode**

This setting tests the path from the CO copper port to the Local iMcV-T1/E1/J1 module fiber port and back.

- **Remote Fiber Loopback Mode**

This setting tests the path from the CO copper port to the Remote iMcV-T1/E1/J1 module fiber port and loops it back.

- **Remote Copper Loopback Mode**

This setting tests the path from the CO copper port to the Remote iMcV-T1/E1/J1 module copper port and loops it back.

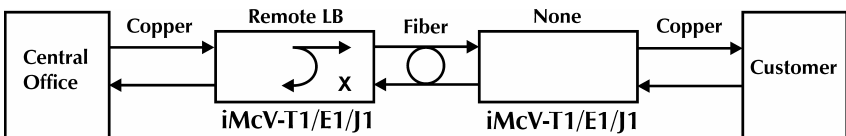
The following illustrations show a typical progression of digital loopback tests; this series allows you to individually test each segment of the conversion. To test the copper segment at the remote location requires the PRBS test described in the next section.

Local Fiber Loopback Mode

To set the loopback testing mode to Local Fiber Loopback Mode, perform the following:

1. Set the Local iMcV-T1/E1/J1 module to **Remote** Loopback (DIP switch S3-3=Off and S3-4=Off)
2. Set the Remote iMcV-T1/E1/J1 module Loopback to **None** (DIP switch S3-3=On and S3-4=On).

This configuration allows you to test the path from the CO copper port to the Local iMcV-T1/E1/J1 module fiber port and loop it back. The transmitted data is sent unhindered and the received data is ignored.

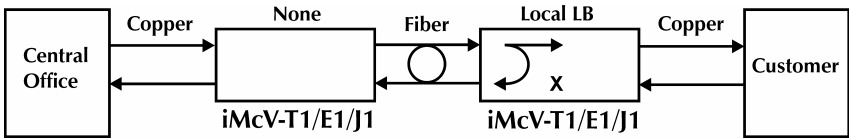


Remote Fiber Loopback Mode

To set the loopback testing mode to Remote Fiber Loopback Mode, perform the following:

1. Set the Local iMcV-T1/E1/J1 module Loopback to **None**
(DIP switch S3-3=On and S3-4=On)
2. Set the Remote iMcV-T1/E1/J1 module to **Local** Loopback
(DIP switch S3-3=Off and S3-4=On).

This configuration allows you to test the path from the CO copper port to the Remote iMcV-T1/E1/J1 module fiber port and loop it back. The transmitted data is sent unhindered and the received data is ignored.

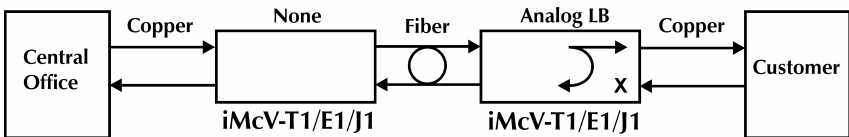


Remote Copper Loopback Mode

To set the loopback testing mode to Remote Copper Loopback Mode, perform the following:

1. Set the Local iMcV-T1/E1/J1 module Loopback to **None**
(DIP switch S3-3=On and S3-4=On)
2. Set the Remote iMcV-T1/E1/J1 module to **Analog** Loopback
(DIP switch S3-3=On and S3-4=Off).

This configuration allows you to test the path from the CO copper port to the Remote iMcV-T1/E1/J1 module copper port and loop it back. The transmitted data is sent unhindered and the received data is ignored.

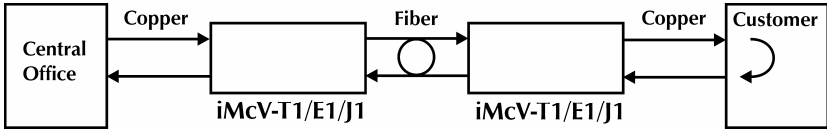


After you have confirmed the integrity of these data paths, you can activate the PRBS data generator on the Remote module and place a loopback on the customer premise equipment to test the final copper segment (refer to the *Testing with Pseudorandom Bit Sequence (PRBS)* section for more information).

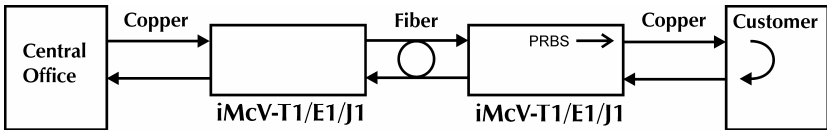
Testing with Pseudorandom Bit Sequence (PRBS)

To test the copper segment from the Remote module to the Customer Premises Equipment (CPE) by using PRBS, perform the following:

1. Set the CPE to loopback the signal.



2. Set the Remote module to generate PRBSs (DIP switch S2-9=On and S2-10=Off).



Check the LEDs to verify errors are not received (refer to the Module LED Functions section for more information).

Specifications

Power Consumption (Typical):

0.550 Amp

Operating Temperature:

32° to 122° F (0° to 50° C)

Storage Temperature:

0° to 160°F (-20° to 70° C)

Humidity:

5 to 95% (non-condensing); 0 to 10,000 ft. altitude

Dimensions:

Single Slot iMcV module

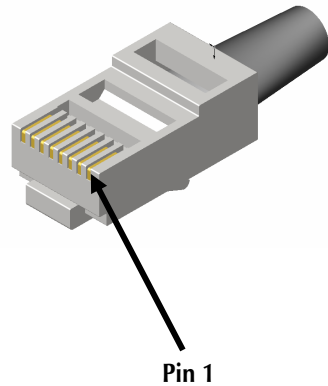
Fiber Optic Specifications

For fiber optic specifications, visit our Web site at www.imcnetworks.com.

RJ48 Pinout

The following table lists the pin configuration for the RJ48 connector.

Pin	Signal
1	Receive Ring
2	Receive Tip
3	No Connection
4	Transmit Ring
5	Transmit Tip
6	No Connection
7	No Connection
8	No Connection



Safety Certifications

UL/CUL: Listed to Safety of Information Technology Equipment, including Electrical Business Equipment.

CE: The products described herein comply with the Council Directive on Electromagnetic Compatibility (89/336/EEC) and the Council Directive on Electrical Equipment Designed for use within Certain Voltage Limits (73/23/EEC). Certified to Safety of Information Technology Equipment, Including Electrical Business Equipment. For further details, contact IMC Networks.



**Class 1 Laser product, Luokan 1 Laserlaite,
Laser Klasse 1, Appareil A' Laser de Classe 1**

European Directive 2002/96/EC (WEEE) requires that any equipment that bears this symbol on product or packaging must not be disposed of with unsorted municipal waste. This symbol indicates that the equipment should be disposed of separately from regular household waste. It is the consumer's responsibility to dispose of this and all equipment so marked through designated collection facilities appointed by government or local authorities. Following these steps through proper disposal and recycling will help prevent potential negative consequences to the environment and human health. For more detailed information about proper disposal, please contact local authorities, waste disposal services, or the point of purchase for this equipment.





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January 2007

If the product's part number begins with an "8", it is compliant with the Restriction of Hazardous Substances (RoHS) directive.

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