

# USER MANUAL

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## MODELS IM1/K and IM2RC/K G.703/G.704 QuikConnect™ and Rear Card Modules



**PE PATTON**  
**Electronics Co.**



An ISO-9001  
Certified  
Company

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Thank you for your purchase of this Patton Electronics product. This product has been thoroughly inspected and tested and is warranted for One Year parts and labor. If any questions or problems arise during installation or use of this product, please do not hesitate to contact Patton Electronics Technical Support at (301) 975-1007.

### 1.1 WARRANTY STATEMENT

**Patton Electronics** warrants all K Module components to be free from defects, and will—at our option—repair or replace the product should it fail within one year from the first date of shipment. This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse, or unauthorized modification. This product contains no serviceable parts; therefore the user shall not attempt to modify the unit in any way. If this product fails or does not perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall **Patton Electronics** be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. **Patton Electronics** specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user. In the event the user detects intermittent or continuous product malfunction due to nearby high power transmitting radio frequency equipment, the user is strongly advised to use only data cables with an external outer shield bonded to a metal or metalized connector.

## 1.2 RADIO AND TV INTERFERENCE

The Models IM1/K and IM2RC/K (K Module) generate and use radio frequency energy, and if not installed and used properly—that is, in strict accordance with the manufacturer's instructions—may cause interference to radio and television reception. If the K Module does cause interference to radio or television reception, which can be determined by disconnecting the cables, the user is encouraged to try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna, and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

## 1.3 CE AND TELECOMMUNICATION APPROVALS

The CE symbol on your Patton Electronics equipment indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

The K Module is in compliance with the Telecommunication technical requirements CTR-12; 2.048 Mbps digital unstructured leased line (D2048U) attachment requirements for terminal equipment interface.

The K Module also meets the Telecommunication technical requirements CTR-13; 2.048 Mbps digital structured leased lines (D2048S) attachment requirements for terminal equipment interface.

## 1.4 SERVICE INFORMATION

All warranty and non-warranty repairs must be returned freight prepaid and insured to Patton Electronics. All returns must have a Return Materials Authorization number on the outside of the shipping container. This number may be obtained from Patton Electronics Technical Support at:

tel: **(301) 975-1007**  
email: **support@patton.com**  
www: **http://www.patton.com**

**NOTE: Packages received without an RMA number will not be accepted.**

Patton Electronics' technical staff is also available to answer any questions that might arise concerning the installation or use of your Patton K Module. Technical Support hours: **8AM to 5PM EST, Monday through Friday.**

## 2.0 GENERAL INFORMATION

Thank you for your purchase of this Patton Electronics product. This product has been thoroughly inspected and tested and is warranted for One Year parts and labor. If any questions arise during installation or use of the unit, contact Patton Electronics Technical Support at (301) 975-1007.

### 2.1 FEATURES

- Quick Connect and Rear Card Modules for use with Patton mDSL modems
- nx64 G.703/G.704 Network Termination or Network Extension Applications
- Supports rates up to 2.048 (E1) Mbps
- 2.048Mbps G.703 Clear Channel (Unframed) or nx64 G.704 (Framed) Operation
- Selectable AMI or HDB3 Line Coding
- Configuration via DIP Switches and Jumpers
- Coax (BNC) connection for 75 ohm
- RJ-48C connection via twisted pair for 120 ohm
- Made in USA

### 2.2 GENERAL PRODUCT DESCRIPTION

The Patton Model IM1/K G.703/G.704 QuickConnect Module and IM2RC/K Rear Card Module provide E1/Fractional E1 termination and extension capabilities to the Patton NetLink mDSL modems (1095/1095RC). When used with a Patton mDSL modem, a G.703/G.704 line can be terminated or extended to a remote site up to 10km away.

There are two separate applications that can be employed when using the K Modules; Network Termination or Network Extension. In a Network Termination application, the G.703/G.704 line is terminated at the K Module and the clock and data is sent to the far end of the link. At the remote site, a Patton mDSL modem with a serial/Ethernet interface will be running the nx64 DTE rate. This application allows the remote user without a G.703/G.704 interface to extend the serial interface that is available to the G.703/G.704 access point without the need for a separate G.703/G.704 to serial converter. In the G.703/G.704 Network Extension application, two K Modules are employed, one at each end of the link. This application allows the user to extend the G.703/G.704 network over 10km away.

The **K Module** supports switch selectable AMI or HDB3 encoding, all nx64 kbps bit rates and *both* dual coaxial (75 ohm) and RJ-48C (120 ohm) G.703/G.704 terminations. The K Module is made in the USA. The K Module is CE marked and complies to applicable CTR standards.

## 3.0 TYPICAL APPLICATION

The K Module can be deployed in one of two applications: G.703/G.704 Network Termination (nx64kbps to 2.048Mbps), and G.703/G.704 Network Extension (nx64 kbps to 2.048Mbps). Both applications are discussed below.

### 3.1 NETWORK TERMINATION APPLICATION

**Network Termination** mode is used to connect a local site modem employing a K Module to a remote site modem employing a V.35, X.21, RS-530 Ethernet *QuikConnect* Module (refer to Figure 1, below). Transmitter clocking is derived from the G.703/G.704 network and carried through the system to all system devices.

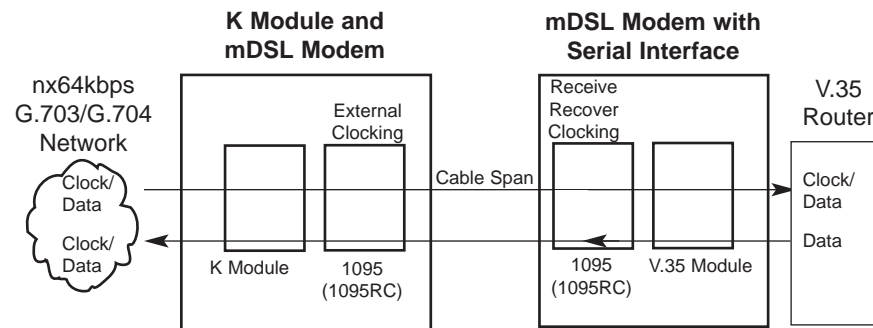


Figure 1. Clocking Settings in a Network Termination Application

## 3.2 NETWORK EXTENSION APPLICATION

**Network Extension** mode is used to extend nx64 -2.048Mbps G.703/G.704 service across a DSL link, providing an nx64 G.703/G.704 link at the remote site. Transmitter clocking is derived from the G.703/G.704 network, and transmitted over the baseband modem link (refer to Figure 2, below).

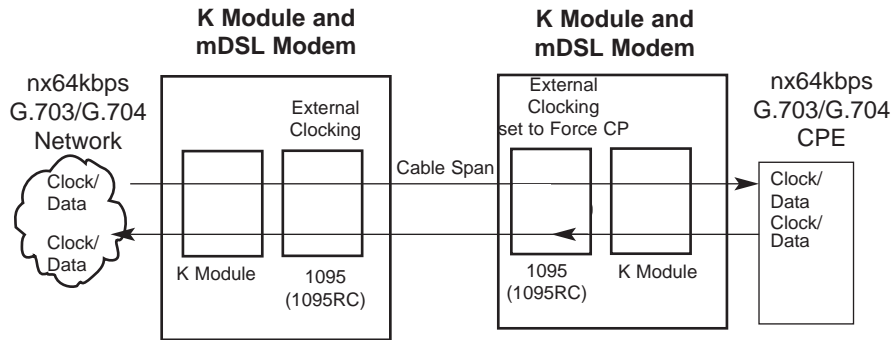


Figure 2. Clock Settings in a Network Extension Application

## 4.0 CONFIGURATION

The K Module features configuration capability via hardware switches and jumpers. Sections 4.1 and 4.2 describe all switch and jumper configurations for the Patton K Module. Section 4.3 describes the configuration required for your mDSL modem.

### 4.1 DIP Switch Configuration

The K Module has eight internal DIP switches (S1-1 through S1-8). The DIP switches can be configured as either "On" or "Off." See Appendix D for location and orientation of the DIP switches.

#### Switch S1-1: Line Coding

Use Switch S1-1 to control the Network Line Coding options. Set these options to be the same as the Line Coding that has been provided by your Service Provider.

S1-1	Line Framing & Coding
Off	HDB3
On	AMI

#### Line Coding Options:

**High Density Bipolar 3 (HDB3):** In HDB3 coding, the transmitter deliberately inserts a bipolar violation when excessive zeros in the data stream are detected. The receiver recognizes these special violations and decodes them as zeros. This method enables the network to meet minimum pulse density requirements. Use HDB3 unless AMI is required in your application .

**Alternate Mark Inversion (AMI):** AMI coding does not inherently account for ones density. To meet this requirement, you should ensure that the data inherently meets pulse density requirements.

#### Switch S1-2 : CRC-4 Multiframe

CRC-4 Multiframe uses Time Slot zero to carry CRC-4 information. When CRC-4 is enabled (ON), the unit synchronizes to the CRC-4 multi-frame protocol.

S1-2	Option
Off	Disabled
On	Enabled

NOTE: When the data rate is set to 2048 Kbps, K Module transmits user data on all 32 timeslots, ignoring framing information. In this case, Switch S1-2 will be ignored.

## Switch S1-3 : Clear Channel Mode

When S1-3 is at Off position, the K Module is running in G.703 clear channel mode. When S1-3 is at On position, the K Module is running in G.704 framed mode. When the K Module is set to framed mode, channel 0 will be used to pass G.704 framing information which results in a maximum bandwidth of 1984kbps for user data.

<u>S1-3</u>	<u>Option</u>
Off	Clear Channel Mode (G.703)
On	Framed Mode (G.704)

## Switch S1-4 Through S1-8 : Reserved

Reserved for future use and should be set to OFF.

## 4.2 Jumper Configuration

The Patton K Module has four jumpers (two position headers): JP4, JP5, JP6, and JP7. These jumpers are used to select input and output impedance matching between the module and external line. See Appendix E for jumper locations.

The following is a description of the jumper settings with respect to the front panel connectors.

1. For a 75 ohm connection (coax) install JP4 - JP7 (*default*).
2. For a 120 ohm connection (RJ-48C) remove JP4 - JP7.

## 4.3 Configuring Your Model 1095 mDSL Modem

This section describes how to configure your mDSL modem for use with an IM1/K (Model 1095) or an IM2RC/K (Model 1095RC).

**The K Module requires the 1095/1095RC to have software version 2.3.2 or later, which began shipping on 04/01/00.**

If you are unsure of the software revision of your unit, please contact Patton Electronics Technical Support.

## Clock Mode

The mDSL modem must be set for the External Clock mode when a K Module is installed. The modem will always receive the clocking from the K Module. If you are configuring a Network Extension application, set both modems for External Clock mode. If you are configuring a Network Termination application, please set the modem with the K Module for External Clock and the unit with the serial/Ethernet interface for Receive Recovered clock mode. In order to determine the switch settings specific to your unit, refer to the mDSL manual that was shipped with your unit.

## CO-CP

The CO/CP selection tells the units which modem will begin the handshaking for the link. In all applications one unit must be set for CO and one unit must be set for CP, they work in pairs. A mDSL modem set for either Internal or External clock mode will automatically default to the CO mode. A mDSL modem set for Receive Recovered clock mode will automatically default to the CP mode. If you are configuring a Network Extension application, you must force one of the units to CP mode by setting S2-1 on the mDSL modem to the ON position. Note that the mDSL manual refers to this switch as "Reserved". If you are running in the Network Termination mode, no extra configuration is required.

## Interface Type

The mDSL modem requires that the interface type is specified. Any unit that has a K Module installed must be set to G.703/G.704 Interface. This is done by setting S2-5 on the mDSL modem to ON. Note that the mDSL manual refers to this switch as "Reserved".

## DTE Rate for the mDSL Modems

To select the number of G.703/G.704 channels to be carried across the link, multiply the number of required channels by 64Kbps and then set the DTE rate of the mDSL modem to that number. The mDSL modem will then carry that number of channels from the G.703/G.704 line, starting with channel 1 (Note channel 0 is used for G.704 framing information) across the DSL link. For example, if you want to carry 4 channels across the DSL link, set the mDSL DTE Rate to 256Kbps (4 x 64Kbps = 256Kbps). The mDSL modem and the K Module will then carry channels 1 - 4 across the DSL link.

If you are running in clear channel mode, set switch S1-3 on the K Module to "clear channel" and set the DTE Rate of your mDSL modem to 2048Kbps.

## 5.0 INSTALLATION

This section describes how to install the IM1/K and IM2RC/K modules into your mDSL modems. Please refer to the section in this manual that describes your unit.

### 5.1 Installing the IM1/K

The *QuickConnect™* interface on the NetLink Modems are interchangeable Modules. Each *QuickConnect™* Module has a 50-pin card edge connector on one side and a Network interface on the other. Figure 3 below shows how a *QuickConnect™* Module plugs into the back of the Model 1095.

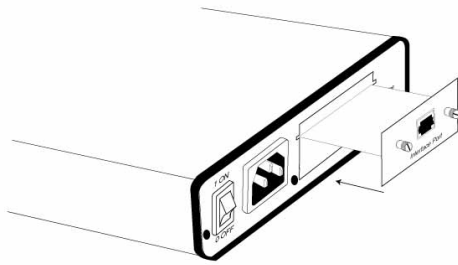


Figure 3. Installation of Model 1095 Plug-in K Module

#### 5.1.1 Changing *QuickConnect™* Modules

When you purchase a NetLink™ mDSL modem, it should be shipped to you with the appropriate *QuickConnect™* Module already installed. If you need to install a different *QuickConnect™* Module, follow these steps:

#### Removing the Existing *QuickConnect™* Module

- 1) Turn the power switch off. Leave the power cord plugged into a grounded outlet to keep the unit grounded.
- 2) Loosen the two thumbscrews on the module by turning them counterclockwise.
- 3) Grasp the two thumbscrews and gently pull the module from the unit. Apply equal force to the thumbscrews to keep the module straight during the removal process

### Installing the New *QuickConnect™* Module

- 1) Make sure the power switch is off. Leave the power cord plugged into a grounded outlet to keep the unit grounded.
- 2) Hold the module with the faceplate toward you and align the module with the guide slots in the rear panel of the NetLink Chassis.
- 3) While keeping the module's faceplate parallel with the NetLink chassis rear panel, slide the module straight in – so that the card edge contacts line up with the socket inside the chassis.
- 4) With the card edge contacts aligned with the socket, firmly seat the module by using your thumbs to apply pressure directly to the right and left edges of the module faceplate. Applying moderate and *even* pressure should be sufficient to seat the module. You should hear it “click” into place.
- 5) To secure the module in place, push the thumbscrews into the chassis and turn the screws clockwise to tighten.

### 5.2 Installing the IM2RC/K and Front Function Card

The Model IM2RC/K is a rear-mountable G.703/G.704 interface card that works with the Patton Model 1095RC function card. The two cards meet inside the rack chassis and plug into each other by way of mating 50 pin card edge connectors. Use the following steps as a guideline for installing each Model IM2RC/K and its function card mate into the rack chassis:

1. Slide the rear card into the back of the chassis along the metal rails provided.
2. Secure the rear card using the metal screws provided.
3. Slide the front card into the front of the chassis. It should meet the rear card when it's almost all the way into the chassis.
4. Push the front card *gently* into the card-edge receptacle of the rear card. It should “click” into place.
5. Secure the front card using the thumb screws.

The IM2RC/K is shipped with an IM1RC/K flip card. Ensure that the flip card is secured in the flip card socket on the 1095RC with the arrow (←) pointing toward the front panel. Please see the Model 1095RC User Manual (section **3.0 Configuration**), for more information on installing the flip card.

### 5.3 MAKING INTERFACE CONNECTIONS

The Patton K Module may be connected to G.703/G.704 ports using a single 120 ohm RJ-48C or a dual 75 ohm coax (BNC). The Patton K Module rear panels and the location of these connectors are show below in Figure 4.

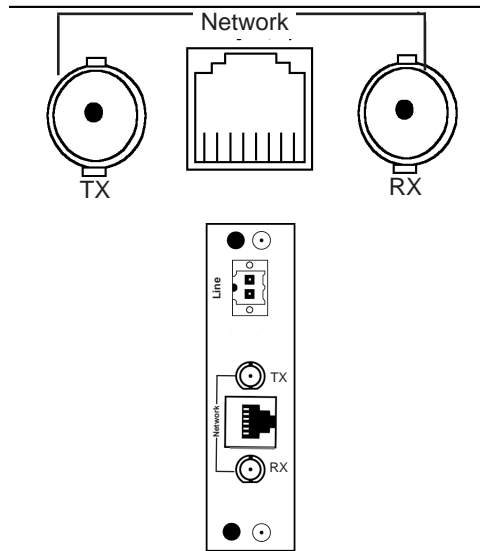


Figure 4: K Module Rear Panels, Showing Location of Connectors

#### 5.3.1 Connect Twisted Pair (120 ohm) to G.703/G.704 Network

The Patton K Module is equipped with a single RJ-48C jack for connections to a 120 ohm twisted pair G.703/G.704 network interface. If your G.703/G.704 network terminates via RJ-48C, use the diagram below and the table on the following page to make the proper connections. The connector pinout and signals are shown in Figure 5, below. Use the following connection diagram to connect the 120 ohm G.703/G.704 network channel.

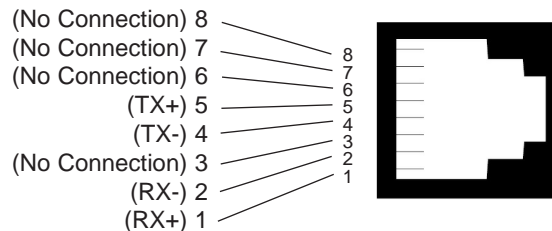


Figure 5: 120 ohm RJ-48C G.703/G.704 Interface

#### RJ-48C Cable (8-Wire)

K Module SIGNAL	PIN#	G.703/G.704 NETWORK SIGNAL
RX+	1	TX+
RX-	2	TX-
TX+	5	RX+
TX-	4	RX-
Shield	3	Shield
Shield	6	Shield

#### 5.3.2 Connect Dual Coaxial Cable (75 ohm) to G.703/G.704 Network

The Patton K Module is also equipped with dual female BNCs (TX and RX) for connection to a 75 ohm dual coax G.703/G.704 network interface. If your G.703/G.704 network terminates via dual coaxial cable, use the diagram below to make the proper connections. The connector pinout and signals are shown in Figure 6, below.

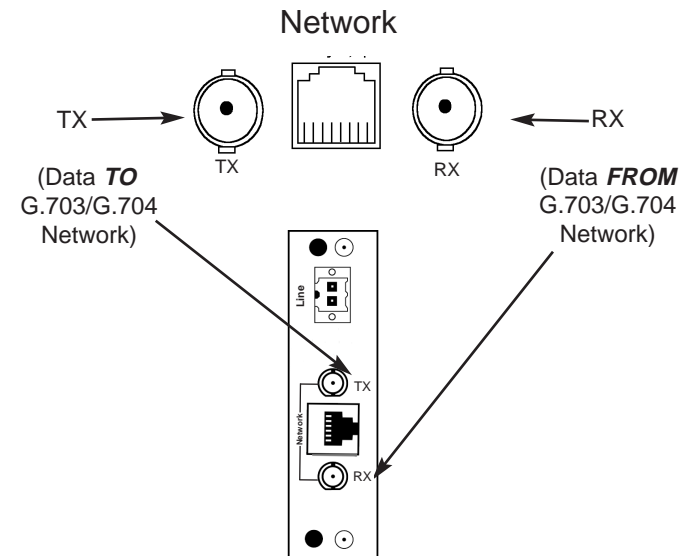


Figure 6: 75 ohm Dual Coaxial G.703 Interface

NOTE: The outer conductor of the coax cables are isolated from system earth ground.



## 6.0 OPERATION

Once the Patton K Module is installed and configured, it should operate transparently. Please refer to the base unit (i.e. Model 1095) user manual for instructions on how to read the front panel LEDs, perform diagnostics, monitor system status, and connect to the DSL line port.

## APPENDIX A

### PATTON ELECTRONICS MODEL K MODULE SPECIFICATIONS

<b>G.703/G.704 Interfaces:</b>	Female Dual Coaxial 75 ohm Female RJ-48C 120 ohm
<b>Line Framing:</b>	G.703 (unframed) or G.704 (framed)
<b>Line Coding:</b>	Switch Selectable AMI or HDB3
<b>Clock Options:</b>	Network Termination and Network Extension
<b>DTE Rates:</b>	<i>(selected on the base unit)</i> Nx64 rates (kbps): 64, 128, 192, 256, 320, 384, 448, 512, 576, 640, 704, 768, 832, 896, 960, 1024, 1088, 1216, 1280, 1344, 1408, 1472, 1536, 1600, 1664, 1728, 1792, 1856, 1920, 1984, 2048
<b>Distance:</b>	Maximum 1.6 km on 24 AWG Cable
<b>Isolation:</b>	1500 Vrms
<b>Power Supply:</b>	Power Supplied via NetLink Standalone Unit or NetLink front card
<b>Compliance:</b>	CE Mark per EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC, RTTE 99/5/EC Directive
<b>Dimensions:</b>	6.17 x 1.42 x 7.42 cm (2.43 x .56 x 2.92 inches)
<b>Humidity:</b>	Up to 95% non-condensing
<b>Temperature:</b>	32 to 140° F (0 to 60° C)

## APPENDIX B

### PATTON K MODULE CABLE RECOMMENDATIONS

All Patton Electronics Company Baseband Modems, CSU/DSUs and Short Range Modem are tested to the distances published in our Catalogs and Specification Sheets on twisted-pair cable with the following characteristics:

<u>Wire Gauge</u>	<u>Capacitance</u>	<u>Resistance</u>
19 AWG	83nF/mi or 15.72 pF/ft.	.0163 ohms/ft.
22 AWG	83nF/mi or 15.72 pF/ft.	.0326 ohms/ft.
24 AWG	83nF/mi or 15.72 pF/ft.	.05165 ohms/ft.
26 AWG	83nF/mi or 15.72 pF/ft.	.08235 ohms/ft.

We fully expect that the Baseband Modems, CSU/DSUs and Short Range Modems will operate on lines with specifications different from those tested, but to reduce the potential difficulties in the field, one should ensure that the cable being used has similar or better characteristics (lower capacitance or lower resistance).

Wire with capacitance of 20pF/ft. or less is suitable for all Baseband Modems, CSU/DSUs and Short Range Modems. However, distances may vary from those published in our catalog. Resistance will also affect distance but not functionality. Wire should be 26 AWG or larger (smaller AWG#).

Patton products are designed to withstand normal environmental noise and conditions; however, other environmental factors too numerous to discuss in this format may affect proper operation.

Selection of the proper Baseband Modem, CSU/DSU or SRM for an application is critical to maintaining Customer Satisfaction and must be taken seriously. Certain models are better suited for particular applications and environments than others.

## APPENDIX C

### K MODULE FACTORY REPLACEMENT PARTS AND ACCESSORIES

<u>Patton Electronics Model #</u>	<u>Description</u>
07MIM1/K Module.....	K Module User Manual
IM1/K Module.....	K Module for use with Model 1095
IM2RC/K Module.....	K Module for use with Model 1095RC
IM1RC/K Module.....	K Module flip card

**APPENDIX D  
PATTON K MODULE  
DIP SWITCHES**

Figure A (below) shows the location of the DIP switches on top of the printed circuit board. Following Figure A, Figure B shows the orientation of the DIP switches on the printed circuit board.

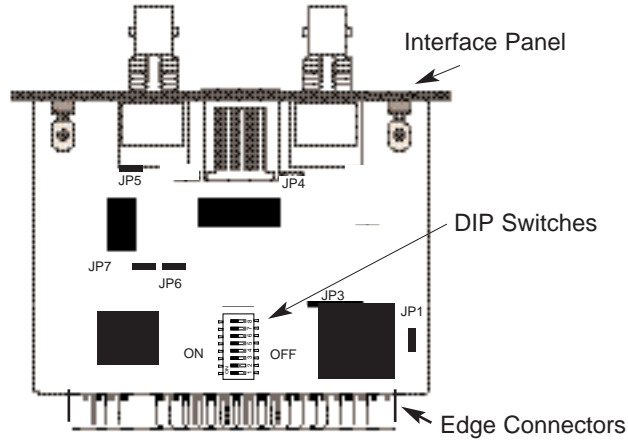


Figure A. IM1/K top view, showing location of DIP switches

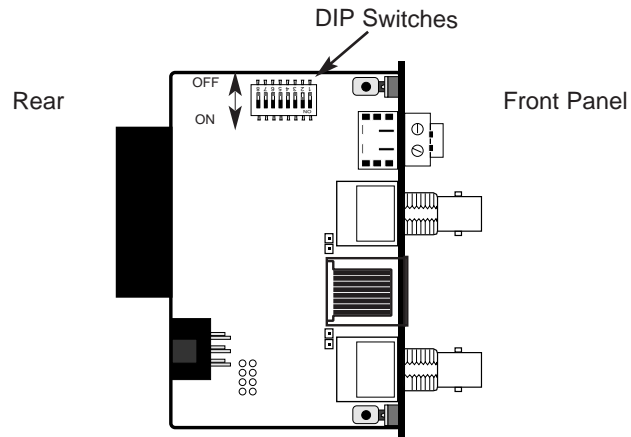


Figure B. IM2RC/K, top view, showing location of DIP switches

**APPENDIX E  
PATTON K MODULE JUMPER SETTINGS**

Figure C (below) shows the top view of the IM1/K printed circuit board (PCB) and the location of the jumpers.

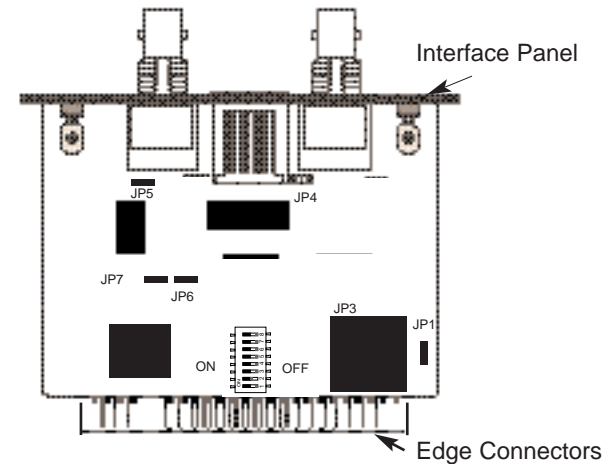


Figure C. K Module, top view, showing location of jumpers

Figure D (below) shows the top view of the IM2RC/K printed circuit board (PCB) and the location of the jumpers.

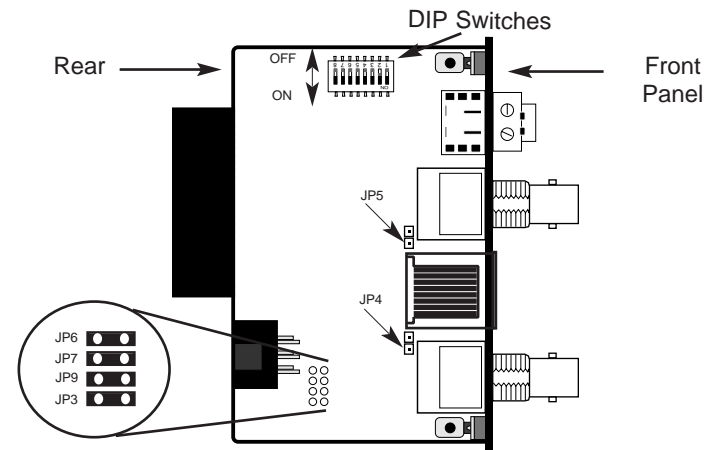


Figure D. IM2RC/K, top view, showing location of jumpers

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