

# USER MANUAL

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## Model 2070 Series V.24/X.21/V.35 to G.703 Interface Converter



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



An ISO-9001  
Certified Company

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## 1.0 WARRANTY INFORMATION

**Patton Electronics** warrants all Model 2070 Series 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. 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.

### 1.1 RADIO AND TV INTERFERENCE

The Model 2070 generates and uses 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. The Model 2070 has been tested and complies with the limits for a Class A computing device in accordance with the specification in Subpart J of Part 15 of FCC rules, that are designed to provide reasonable protection from such interference in a commercial installation. However, this is no guarantee that interference will not occur in a particular installation. If the Model 2070 does cause interference to radio or television reception, which can be determined by disconnecting the unit, 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, reorienting 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).

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 a shielded twisted pair data cable that is bonded to metalized external outer shield plugs at both ends. The use of a shielded cable satisfies compliance with the Electromagnetic Compatibility (EMC) directive by allowing proper shielding of the network connection.

## 2.0 GENERAL INFORMATION

### 1.2 CE NOTICE

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.

### 1.3 SERVICE

All warranty and nonwarranty 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 Service: **(301) 975-1007**, <http://www.patton.com>; [support@patton.com](mailto:support@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 Model 2070. Technical Service hours: **8AM to 5PM EST, Monday through Friday.**

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 Customer Service at (301) 975-1007.

### 2.1 FEATURES

- Bi-directionally converts V.24, X.21 or V.35 to co-directional G.703
- Operates at 64 kbps synchronous data rate
- LED indicators monitor Test Mode and Synchronization
- Internal, external or network clocking options (External clocking on V.24 and V.35 versions only)
- Test Mode controlled by switch or by local DTE (V.24 and V.35 Versions Only)
- Complies with CCITT/ITU G.823 Jitter Control Specifications
- Built-in surge protection and transformer isolation
- Point-to-Point distance up to 5250 ft (1600m) on 24 AWG twisted pair
- 120 ohm (twisted pair) network termination

### 2.2 DESCRIPTION

**The Patton Model 2070 Miniature Interface Converters** allow a synchronous V.24, V.35, or X.21 device to communicate bi-directionally over the G.703 co-directional PCM network. Supporting internal, external DTE timing or G.703 network generated timing, the Model 2070 is perfect for networking applications that require a single 64 kbps data channel.

The Model 2070 connects directly to the synchronous DTE using a DB-25 connector (Model 2070/Ax), an M/34 connector (Model 2070/Cx) or a DB-15 connector (2070/Dx). A 120 ohm twisted pair telephone port provides the interface for the G.703 network. Additionally, 75 ohm terminations can be made using the Patton Model 460 (G.703 balun).

Diagnostics include Local Loopback and G.703 Loopback testing. Synchronous clock jitter is attenuated in accordance with the G.823 specification.

### 3.0 CONFIGURATION

The Model 2070 is easy to install and is ruggedly designed for excellent reliability. The following instructions will help you set up and install the Model 2070 properly.

#### 3.1. OPENING THE CASE

To use the Patton Model 2070, you must first configure the unit for your application. To do so, first open the case by inserting a flat head screw driver into an open slot on either side of the case, as in Figure 1.

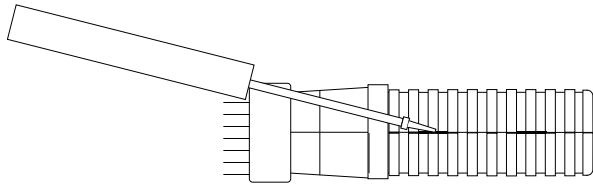


Figure 1. How to Use a Small Flathead Screwdriver to Begin to Open the Model 2070 Case

Twist the screw driver head slightly and the top half of the case will separate from the lower half, as in Figure 2. You now have access to the internal switches used to configure the unit.

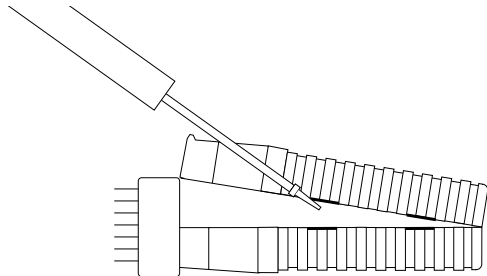


Figure 2: How to Use a Small Flathead Screwdriver to Finish Opening the Model 2070 Case

After opening the case, please refer to the section that pertains to your unit for configuration details.

**Notice!** The RJ-45 G.703 port of the Model 2070 is intended to connect to telecommunication network voltage (TNV) circuits which may carry dangerous voltages. Therefore the power and network cables must be disconnected prior to switch and jumper configuration.

### 3.2 CONFIGURATION (MODEL 2070/Ax – V.24 VERSION)

The Model 2070/Ax uses a mini DIP switch package and jumper strap that allow configuration to a wide range of applications. The switch and the jumper are located on the bottom side of the PC Board. Follow the instructions below to configure the 2070/Ax (V.24 Version). **See Section 3.3 to configure the Model 2070/Cx (V.35 Version) or Section 3.4 to configure the Model 2070/Dx (X.21 Version)**

#### 3.2.1 Configuration Switch Set “S1”

The four switches on DIP Switch S1 are used to select the test mode and clock mode functions. Figure 3 shows the position of Switch S1 on the bottom side of the Model 2070/Ax PC board.

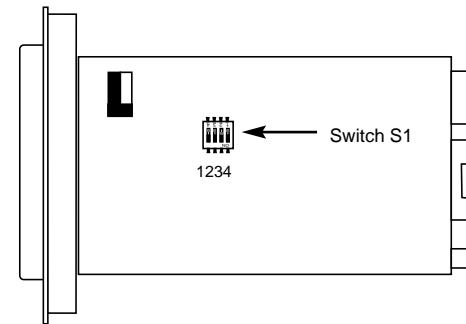


Figure 3. Location of Switch S1 on the bottom of the Model 2070/Ax PC board

Figure 4 shows the orientation of the Switches on DIP Switch S1 with respect to ON/OFF positions. The default settings for DIP switch S1 are shown in the table on page 7. Detailed descriptions of each switch follow the table.

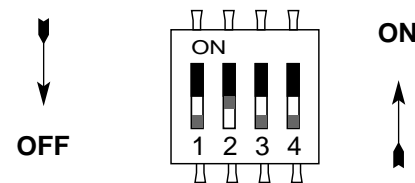


Figure 4. Close-up of DIP Switches Showing “ON” and “OFF” Positions

2070/Ax SWITCH S1 SUMMARY TABLE			
Position	Function	Factory Default	
S1-1	Test Mode	Off	Disabled
S1-2	Clock Mode	On	} Network Clock
S1-3	Clock Mode	On	
S1-4	Respond to LL Request	On	Disabled

### Switches S1-1: Test Mode Activation

Use Switch S1-1 to enable or disable the Model 2070/Ax Test Mode. When enabled, the Local Line and G.703 loopback tests activate simultaneously. When disabled, the Model 2070/Ax functions normally.

S1-1	Activation	Description
On	Enabled	Local Loop and G.703 Loop diagnostics enabled
Off	Disabled	Local Loop and G.703 Loop diagnostics disabled

### Switches S1-2 and S1-3: Clocking Mode

Use Switches S1-2 and S1-3 together to set the system clock for the Model 2070/Ax. When using two Model 2070s together in a point-to-point application as short range modems, set one unit for either Internal or External transmit clock and the other unit to Network clock. When connecting directly to the G.703 network, set the unit to Network clock.

S1-2	S1-3	Clocking	Description
On	On	Network	The G.703 network provides the system clock
On	Off	External	The DTE provides the system clock
Off	On	Internal	The Model 2070/Ax provides an internally generated system clock

### Switch S1-4: Response to DTE Request for Local Loopback

Use Switch S1-4 to enable the Model 2070/Ax to enter Local Loopback mode when pin 18 from the V.24 interface is raised. In the On position, the Local Loopback may only be enabled manually by Switch S1-1.

S1-4	Activation	Description
On	Disabled	Model 2070/Ax ignores DTE requests to enter Local Loopback
Off	Enabled	Model 2070/Ax enters Local Loopback Mode when pin 18 is raised

### 3.2.2 Jumper Straps "JP1" and "JP2"

The Model 2070/Ax uses two jumper straps to select the power source option and to connect the unit signal ground to frame ground. Figure 5 (below) shows the position of Jumper Straps JP1 and JP2 on the bottom side of the Model 2070/Ax PC board.

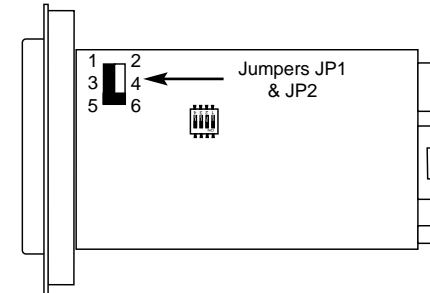


Figure 5. Location of Strap JP1 and JP2 on the bottom of the Model 2070/Ax PC board

Figure 6 shows possible settings of jumper straps JP1 and JP2. JP1 may be positioned on pegs 1 and 2 or on pegs 1 and 3; JP2 may be positioned on pegs 4 and 6 or on pegs 5 and 6.

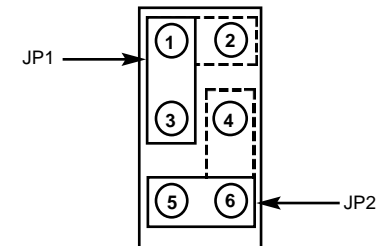


Figure 6. Possible Settings of Jumper Straps JP1 and JP2

2070/Ax JP1 AND JP2 SUMMARY TABLE		
Position	Function	Factory Default
JP1	Power Source	1&3 AC Powered
JP2	SGND to FGND	5&6 Connected

### Jumper JP1: Power Source

The Model 2070/Ax may be powered by the RS-232 interface or by the supplied AC wall-mount transformer. The setting for JP1 determines how the Model 2070/Ax receives its operating power.

JP1	
Position 1&2	Interface Power Option. In this setting the 2070/Ax is powered from the DTE interface. Power should be applied to DB-25 pin 9 at +5VDC ( $\pm 5\%$ ), 300mA (min). <b>The AC wall-mount transformer must not be connected in this setting.</b>
Position 1&3	AC Power Option. In this setting, the 2070/Ax is powered by the AC wall mount transformer

### Jumper JP2: SGND & FRGND

In the default position, Signal Ground is connected to Frame Ground. In the disconnected position, this strap disconnects Signal Ground and Frame Ground.

Position 4&6	G.703 FRGND connected to DTE FRGND. Both are disconnected from SGND.
Position 5&6	G.703 FRGND connected to DTE FRGND. Both are connected to SGND ( <i>default</i> ).

## 3.3 CONFIGURATION (MODEL 2070/Cx -- V.35 VERSION)

The Model 2070/Cx uses a mini DIP switch package and a jumper strap that allow configuration to a wide range of applications. The switch is located on the bottom side and the jumper strap is located on the top side of the PC board. Follow the instructions below to configure the 2070/Cx (V35 Version). **See Section 3.2 to configure the Model 2070/Ax (V.24 Version) or Section 3.4 to configure the Model 2070/Dx (X.21 Version).**

### 3.3.1 Configuration Switch Set "S1"

The four switches on DIP Switch S1 are used to select the test mode and clock mode functions. Figure 7 shows the position of Switch S1 on the bottom side of the Model 2070/Cx.

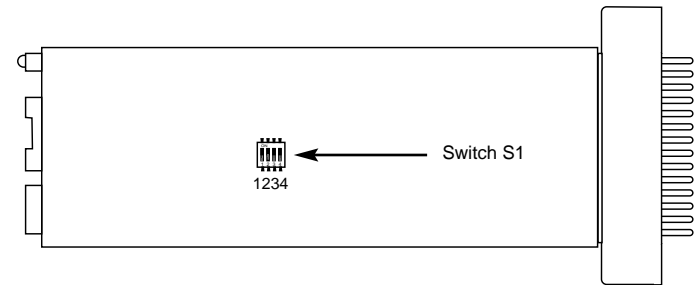


Figure 7. Location of Switch S1 on the bottom of the 2070/Cx PC board

Figure 8 shows the orientation of the Switches on DIP Switch S1 with respect to ON/OFF positions. The default settings for DIP switch S1 are shown in the table on the following page. Detailed descriptions of each switch follow the table.

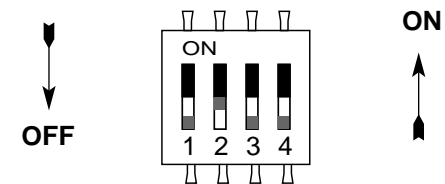


Figure 8. Close-up of DIP Switches Showing "ON" and "OFF" Positions

MODEL 2070/Cx SWITCH S1 SUMMARY TABLE			
Position	Function	Factory Default	
S1-1	Test Mode	Off	Disabled
S1-2	Clock Mode	On	} Network Clock
S1-3	Clock Mode	On	
S1-4	Response to LL Request	On	Disabled

### Switches S1-1: Test Mode Activation

Use Switch S1-1 to enable or disable the Model 2070/Cx Test Mode. When enabled, the Local Line and G.703 loopback tests are activated simultaneously. When disabled, the Model 2070/Cx functions normally.

S1-1	Activation	Description
On	Enabled	Local Loop and G.703 Loop diagnostics enabled
Off	Disabled	Local Loop and G.703 Loop diagnostics disabled

### Switches S1-2 and S1-3: Clocking Mode

Use Switches S1-2 and S1-3 together to set the system clock for the Model 2070/Cx. When using two Model 2070s together in a point-to-point application as short range modems, set one unit for either Internal or External transmit clock and the other unit to Network clock. When connecting directly to the G.703 network, set the unit to Network clock.

S1-2	S1-3	Clocking	Description
On	On	Network	The G.703 network provides the system clock
On	Off	External	The DTE provides the system clock
Off	On	Internal	The Model 2070/Cx provides an internally generated system clock

### Switch S1-4: Response to DTE Request for Local Loopback

Use Switch S1-4 to enable the Model 2070/Cx to enter Local Loopback mode when pin L from the V.35 interface is raised. In the On position, the Local Loopback may only be enabled manually by Switch S1-1.

S1-4	Activation	Description
On	Disabled	Model 2070/Cx ignores requests to enter Local Loopback
Off	Enabled	Model 2070/Cx enters Local Loopback Mode when pin 18 is raised

### 3.3.2 Jumper Straps "JP1" and "JP2"

The Model 2070/Cx uses two jumper straps (JP1 and JP2, see Figure 9 below) to select the power source option and to connect the unit signal ground to frame ground.

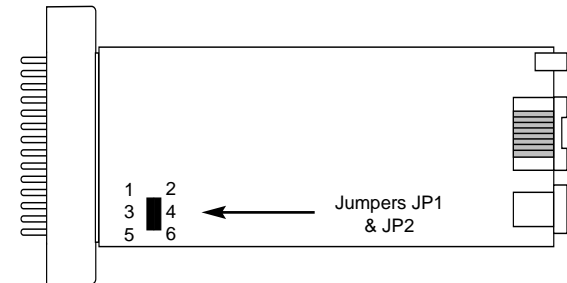


Figure 9. Location of Jumpers JP1 and JP2 on the top of the Model 2070/Cx PC board

Figure 10 shows possible settings of jumper straps JP1 and JP2. JP1 may be positioned on pags 1 and 2 or on pags 1 and 3. JP2 may be positioned on pags 4 and 6 or on pags 5 and 6.

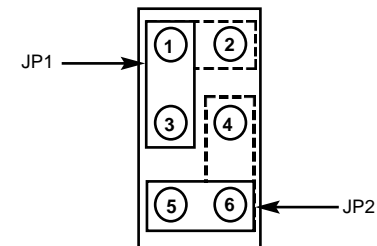


Figure 10. Possible Settings of Jumper Straps JP1 and JP2

2070/Cx JP1 AND JP2 SUMMARY TABLE		
Position	Function	Factory Default
JP1	Power Source	1&3 AC Powered
JP2	SGND to FGND	5&6 Connected

### Jumper JP1: Power Source

The Model 2070/Cx may be powered by the V.35 interface or by the supplied AC wall-mount transformer. The setting for JP1 determines how the Model 2070/Cx receives its operating power.

- JP1
- Position 1&2 Interface Power Option. In this setting the 2070/Cx Series unit is powered from the DTE interface. Powered should be applied to M/34 pin KK at +5VDC ( $\pm 5\%$ ), 300mA (min) **The AC wall-mount transformer must not be connected in this setting.**
- Position 1&3 AC Power Option. In this setting, the 2070/Cx is powered by the AC wall mount transformer (*default*).

### Jumper JP2: SGND & FRGND

In the default position, Signal Ground is connected to Frame Ground. In the disconnected position, this strap disconnects Signal Ground and Frame Ground.

- Position 4&6 G.703 FRGND connected to DTE FRGND. Both are disconnected from SGND.
- Position 5&6 G.703 FRGND connected to DTE FRGND Both are connected to SGND (*default*).

## 3.4 CONFIGURATION (MODEL 2070/Dx -- X.21 VERSION)

The Model 2070/Dx uses a mini DIP switch package and a jumper strap that allow configuration to a wide range of applications. The switch is located on the bottom side and the jumper strap is located on the top side of the PC board. Follow the instructions below to configure the 2070/Dx (X.21 Version). **See Section 3.2 to configure the Model 2070/Ax (V.24 Version) or Section 3.3 to configure the Model 2070/Cx (V.35 Version).**

### 3.4.1 Configuration Switch Set "S1"

The four switches on DIP Switch S1 are used to select the test mode and clock mode functions. Figure 11 shows the position of Switch S1 on the bottom side of the Model 2070/Dx.

Figure 12 shows the orientation of the Switches on DIP Switch S1 with respect to ON/OFF positions. The default settings for DIP switch S1 are shown in the table on the following page. Detailed descriptions of each switch follow the table.

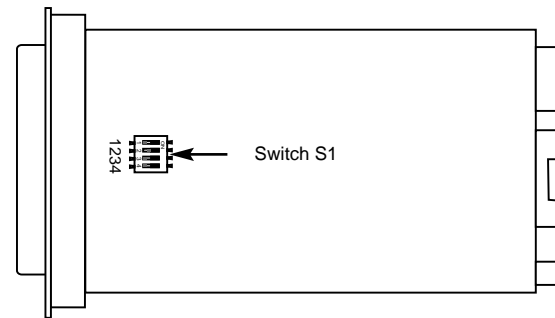


Figure 11. Location of Switch S1 on the bottom of the 2070/Dx PC board

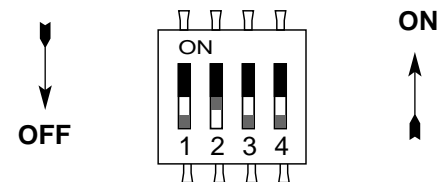


Figure 12. Close-up of DIP Switches Showing "ON" and "OFF" Positions



MODEL 2070/Dx SWITCH S1 SUMMARY TABLE		
Position	Function	Factory Default
S1-1	Test Mode	Off Disabled
S1-2	Clock Mode	On Network
S1-3	Byte Timing	On Enabled
S1-4	<i>Reserved</i>	Off

### Switches S1-1: Test Mode Activation

Use Switch S1-1 to enable or disable the Model 2070/Dx Test Mode. When enabled, the Local Line and G.703 loopback tests are activated simultaneously. When disabled, the Model 2070/Dx functions normally.

<u>S1-1</u>	<u>Activation</u>	<u>Description</u>
On	Enabled	Local Loop and G.703 Loop diagnostics enabled
Off	Disabled	Local Loop and G.703 Loop diagnostics disabled

### Switch S1-2 : Clocking Mode

Use Switch S1-2 to set the system clock for the Model 2070/Dx. When using two Model 2070s together in a point-to-point application as short range modems, set one unit for Internal clock and the other unit to Network clock. When connecting directly to the G.703 network, set the unit to Network clock.

<u>S1-2</u>	<u>Clocking</u>	<u>Description</u>
On	Network	The G.703 network provides the system clock
Off	Internal	The Model 2070/Dx provides an internally generated system clock

### Switch S1-3: Byte Timing

Use Switch S1-3 to enable byte timing on the Model 2040/Dx. The Byte timing clock is an 8 KHz (1 byte/sync. pulse) framing clock synchronized to the G.703 Data.

<u>S1-3</u>	<u>Activation</u>	<u>Description</u>
On	Enabled	Model 2070/Dx outputs Byte Timing
Off	Disabled	Byte timing is disabled

### Switch S1-4: Reserved for Factory Use

Switch S1-4 is reserved for factory use and **must remain in the Off position.**

<u>S1-4</u>	<u>Activation</u>
On	Not a Valid Setting
Off	Normal Operation

### 3.4.2 Jumper Strap “JP1” and “JP2”

The Model 2070/Dx uses two jumper straps (JP1 and JP2, see Figure 13 below) to select the power source option and to connect the unit signal ground to frame ground.

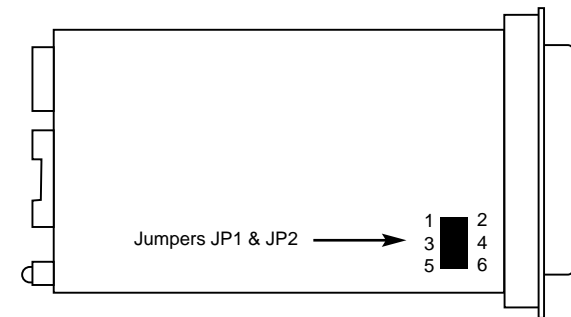


Figure 13. Location of Strap JP1 and JP2 on the top of the Model 2070/Dx PC board

Figure 14 (following page) shows possible settings of jumper straps JP1 and JP2. JP1 may be positioned on pegs 1 and 2 or on pegs 1 and 3; JP2 may be positioned on pegs 4 and 6 or on pegs 5 and 6. A detailed description of each jumper strap follows Figure 14.

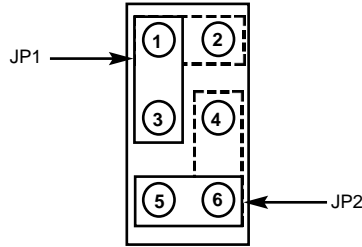


Figure 14. Possible Settings of Jumper Straps JP1 and JP2

2070/Dx JP1 AND JP2 SUMMARY TABLE		
Position	Function	Factory Default
JP1	Power Source	1&3 AC Powered
JP2	SGND to FGND	5&6 Connected

#### Jumper JP1: Power Source

The Model 2070/Dx may be powered by the X.21 interface or by the supplied AC wall-mount transformer. The setting for JP1 determines how the Model 2070/Dx receives its operating power.

**JP1**  
Position 1&2 Interface Power Option. In this setting the 2070/Dx is powered from the DTE interface. Power should be applied to DB-15 pin 15 at +5VDC ( $\pm 5\%$ ), 300mA (min) **The AC wall-mount transformer must not be connected in this setting.**

Position 1&3 AC Power Option. In this setting, the 2070/Dx is powered by the AC wall mount transformer

#### Jumper JP2: SGND & FRGND

In the default position, Signal Ground is connected to Frame Ground. In the disconnected position, this strap disconnects Signal Ground and Frame Ground.

Position 4&6 G.703 FRGND connected to DTE FRGND. Both are disconnected from SGND.

Position 5&6 G.703 FRGND connected to DTE FRGND Both are connected to SGND

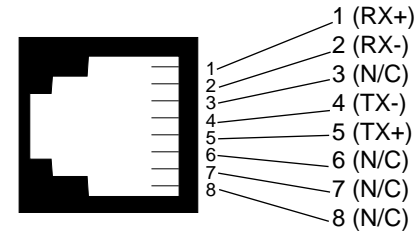
## 4.0 INSTALLATION

The Model 2070 is designed for 4-wire, full duplex communication over a co-directional 64 kbps G.703 clear channel network or dedicated twisted pair. This section describes the proper connection of the line interface, the DTE (terminal) interface, and AC/DC power.

**Notice!** The G.703 line surge protection on this unit was installed for circuit protection only. By no means does this include the preservation of signal quality during a large surge.

### 4.1 CONNECTING TO A PCM NETWORK CHANNEL

The RJ-45 port on a Model 2070 is pre-wired for direct connection to the G.703 PCM network. Connect the RJ-45 port of the Model 2070 to the RJ-45 jack provided by your digital service carrier using a **straight through** twisted pair cable between 19 and 26 AWG. To be sure you have the right wiring, use the diagram below as a guide.



### 4.2 CONNECTING OVER PRIVATE TWISTED PAIR

If you wish to connect the Model 2070 to another Model 2070 (or compatible G.703 device) over private twisted pair, make the connection between the two devices using a **crossover cable** pinned according to the diagram below.

#### RJ-45 Cable (8-Wire)

SIGNAL	PIN#	PIN#	SIGNAL
RX+	1-----	5	TX+
RX-	2-----	4	TX-
TX+	5-----	1	RX+
TX-	4-----	2	RX-
Shield	3-----	3	Shield
Shield	6-----	6	Shield

### 4.3 DTE (TERMINAL) CONNECTION

The V.24, V.35 or X.21 side of the Model 2070 Series units are wired as a DCE and support a wide range of applications. You may purchase adapter cables from Patton Electronics. If you would like to construct your own interface cable, refer to the pinout diagrams in **Appendix D** or contact Patton Electronics Technical Support: (301) 975-1007; support@patton.com; or http://www.patton.com for specific interface pin assignments.

**Notice!** Any line or terminal cable connected to the Model 2070 Series must be shielded cable, and the outer shield must be 360 degree bonded—at both ends—to a metal or metalized backshell.

### 4.4 POWER CONNECTION

The 120VAC U.S. wall transformer version supplies +5V regulated DC up to 300mA. The variable 110/230VAC “international” version supplies +5V regulated DC up to 2A. Either of these transformers connect to the Model 2070 by means of a cannon jack on the rear panel. The Model 2070 is powered-up as soon as it is plugged into an AC outlet—there is no power switch.

#### 4.4.1 120 VAC Power (US)

The 100-132 VAC adapter supplied with the U.S. version of the Model 2070 is a wall mount type and may be plugged into any approved 120 VAC wall plug.

#### 4.4.2 230 VAC Power (IEC)

The variable 100-240 VAC adapter supplied with the “international” version of the Model 2070 is equipped with an IEC-320 shrouded male connector. This connects with one of several available country-specific power cords (see the ordering information in **Appendix C**). You may purchase these power cords from Patton Electronics, or from a vendor of your choice.

(continued)

### 4.4.3 Interface Power Option

The Model 2070 can also be powered by the appropriate V.24, V.35 or X.21 interface pin (**See Appendix D**). Voltage supplied should be +5V ( $\pm 5\%$ ) regulated DC, 300mA min. **When powered by the interface, the power transformer must not be connected.**

**Notice!** If any version of the Model 2070 is to be powered by the host interface, please refer to the host’s installation manual and ensure that the combined power required by the host, and the total of all the additional peripherals, installed both externally and internally, does not exceed the power specifications of the host apparatus

### 4.4.4 DC Power Supply

The 36-60 VDC DC to DC adapter is supplied with the DC version of the Model 2070. The black and red leads plug into a DC source (nominal 48VDC) and the barrel power connector plugs into the barrel power supply jack on the 2070.



## 5.0 OPERATION

Once you have configured the Model 2070 properly (see Section 3.0) and made line, DTE and power connections correctly (see Section 4.0), you are ready to operate the unit(s). This section describes the LED status monitors, and the loopback test mode.

### 5.1 BACK PANEL LED STATUS MONITORS

The Model 2070 features two LEDs that are located on the back panel. Figure 11 below shows the positions of the LEDs. Following Figure 15 is a description of each LED.

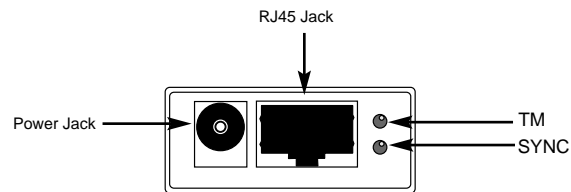


Figure 15. Model 2070 back panel LED indicators

**TM** glows RED when Test Mode (Local Loop/G.703 Loop) is initiated manually or by the DTE (See Section 3.0).

**SYNC** glows GREEN to indicate a valid G.703 synchronization to the terminal device. No signal indicates no data, no connection or synchronous clock slippage on either the G.703 side or the terminal device side.

### 5.2 TEST MODE

The Model 2070 offers a Test Mode that may be used to evaluate the condition of the modems and the communication link. Test Mode is composed of two diagnostics that are activated simultaneously either by DIP Switch S1-1 or by a signal on the terminal interface. This section describes the two Test Mode diagnostics: Local Loop and G.703 Loop.

#### Local Loop

The Local Loop test checks the operation of the local 2070 on the terminal device side by echoing any data sent to the Model 2070 back to the user device. For example, characters typed on the keyboard on the terminal will appear on the terminal screen (See Figure 16, following page)

#### G.703 Loop

The G.703 Loop test allows the G.703 service provider to test the condition of the twisted pair communication link between itself and the Model 2070. Using this test, the service provider sends BER (Bit Error Rate) signals to the Model 2070 over the twisted pair wire. The Model 2070 senses these signals and loops the digital data back to the central office (Figure 16, below).

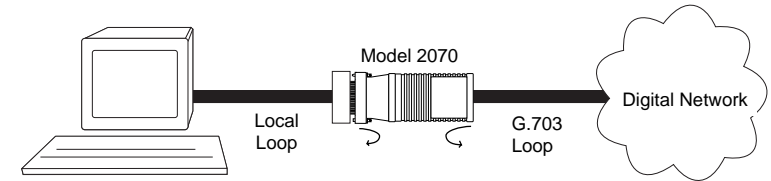


Figure 16 Test Mode Operation: Local Loop/G.703 Loop

### 5.2.1 Test Mode Activation

1. Notify the G.703 Service provider that you wish to perform a G.703 Loop test.
2. To Activate the Model 2070 Test Mode:
  - a. Move Switch S1-1 to the " On " position; **OR**,
  - b. Set Switch S1-4 to the Off (Enabled) position. Then raise the appropriate "Loop Control" (LC) pin on the terminal interface (**see Appendix D**).

When Test Mode is activated, both the Local Loop and G.703 Loop diagnostics are active: The terminal device's transmitter will be "looped" to its own receiver. Similarly, the G.703 transmitter output is connected to its own receiver input.

3. Perform a BER (bit error rate) test from the terminal interface. If the BER test equipment indicates no faults, but the data terminal indicates a fault, follow the manufacturer's checkout procedures for the data terminal. While the Test Mode is activated, the TM light will illuminate Red.
4. The service provider may also perform a loop or BER test on the G.703 communication link. If the loop or BER test indicates a fault, the twisted pair connection may be faulty.

## APPENDIX A

### PATTON MODEL 2070 SPECIFICATIONS

<b>Approvals:</b>	CE Mark
<b>Compliance:</b>	FCC Class A, EN 55022, (EMC Emissions) EN 50082-1, (EMC Susceptibility) EN 60950, (LVD Safety) CTR 14, (Type Approval) - The <del>CE</del> <b>168X</b> symbol indicates that the Model 2070 is in compliance with the applicable Telecom Directive of the EU. If your 2070 is marked with this symbol, it is EU Telecom Type Approved and may be connected to the public network.
<b>Applications:</b>	64K G.703 co-directional PCM network or CSU/DTE conversion to CCITT/ITU V.24, CCITT/ITU V.35, or CCITT/ITU X.21
<b>G.703 Interface:</b>	Symmetrically balanced pairs, 4 wire, 120 Ohm terminated to female RJ-45
<b>Terminal Interface:</b>	<b>Model 2070/Ax</b> CCITT/ITU V.24 Sync., DCE <b>Model 2070/Cx</b> CCITT/ITU V.35 Sync., DCE <b>Model 2070/Dx</b> CCITT/ITU X.21 Sync., DCE
<b>Operating Speed:</b>	Co-directional timing, Rx recovered: 64Kbits ± 500ppm
<b>Clocking:</b>	Internal, External or Network Timing (External Timing on 2070/Ax and 2070/Cx Only)
<b>G.703 Input Sig. Level:</b>	2.0V differential, into 100 Ohms, nominal
<b>Max. Cable Loss:</b>	0 to -10dB
<b>Line Encoding:</b>	AMI
<b>Jitter Performance:</b>	CTR 14, G.823
<b>Surge Protection:</b>	Complies with IEC 801-5 Level 1, 500V
<b>Isolation:</b>	1500 VRMS isolation, transformer coupled
<b>Indicators:</b>	LED's monitor TM and SYNC
<b>Power Supply Options:</b>	External wall-mount transformer: 100-240 VAC Input to +5VDC/2A output; 100-132 VAC input to +5VDC/300mA output; Pin 9 on V.24 interface; Pin KK on V.35 interface; Pin 15 on X.21 interface: +5VDC (±5%), 300mA (min).
<b>Temperature Range:</b>	0-60°C (32-140°F)
<b>Altitude:</b>	0-15,000 feet (0-4572m)
<b>Humidity:</b>	5 to 95% noncondensing
<b>Dimensions:</b>	<b>Model 2070/Ax:</b> 2.9" x 1.4" x 0.7". (7.4 x 3.6 x 1.8 cm) <b>Model 2070/Cx:</b> 3.9" x 1.4" x .7" (10.0 x 3.6 x 1.8 cm) <b>Model 2070/Dx:</b> 2.6" x 1.4" x 0.7" (6.7 x 3.6 x 1.8 cm)

## APPENDIX B

### PATTON MODEL 2070 CABLE RECOMMENDATIONS

The following statements apply when using the Model 2070s as a short range modems over private twisted pair:

All Patton Electronics Company Short Range Modems (SRMs) 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.	.0163Ω/ft.
22 AWG	83nF/mi or 15.72 pF/ft.	.0326Ω/ft.
24 AWG	83nF/mi or 15.72 pF/ft.	.05165Ω/ft.
26 AWG	83nF/mi or 15.72 pF/ft.	.08235Ω/ft.

We fully expect that the 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 our 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 of the SRM's.

Selection of the proper 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**

**PATTON MODEL 2070  
FACTORY REPLACEMENT PARTS AND ACCESSORIES**

<u>Patton Model #</u>	<u>Description</u>
08055DCUI.....	100-240VAC (+5V ±5% reg. DC/2A) International Adapter
08055VDC.....	110VAC (+5V ±5% reg. DC/300mA) American Adapter
0805EUR.....	European Power Cord CEE 7
0805UK.....	United Kingdom Power Cord
0805AUS.....	Australia/New Zealand Power Cord
0805DEN.....	Denmark Power Cord
0805FR.....	France/Belgium Power Cord
0805IN.....	India Power Cord
0805IS.....	Israel Power Cord
0805JAP.....	Japan Power Cord
0805SW.....	Switzerland Power Cord
07M2070.....	User Manual

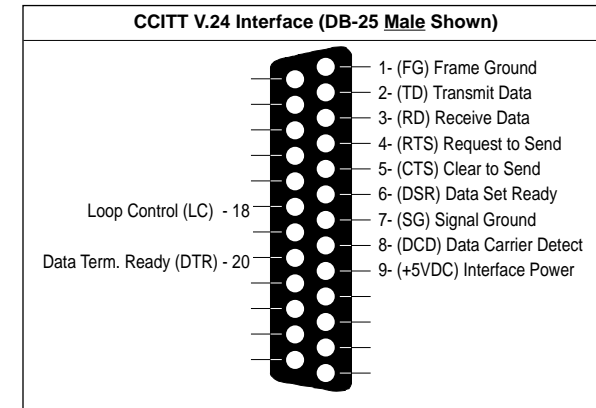
**APPENDIX D**

**PATTON MODEL 2070 INTERFACE PIN ASSIGNMENTS  
G.703 INTERFACE**

The G.703 Interface is an RJ-45 modular jack.

<u>Pin #</u>	<u>Signal</u>
1	RX+ (Line Receive Positive)
2	RX- (Line Transmit Negative)
3	NC( No Connection)
4	TX- (Line Transmit Negative)
5	TX+ (Line Transmit Positive)
6	N/C
7	N/C
8	N/C

**MODEL 2070/Ax  
DB-25 CONNECTOR (V.24) TERMINAL INTERFACE  
(DCE ORIENTATION)**

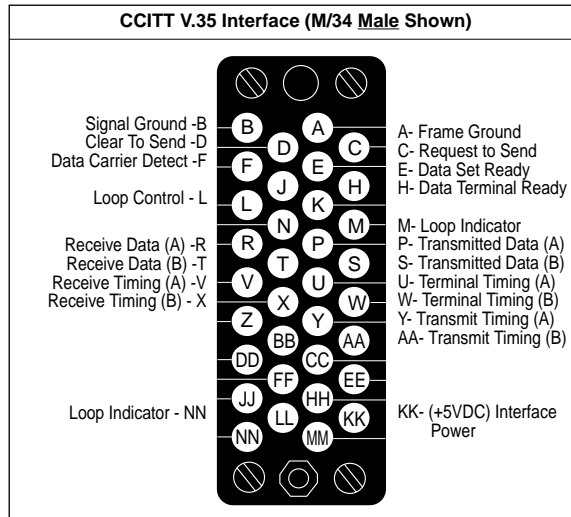


## APPENDIX D

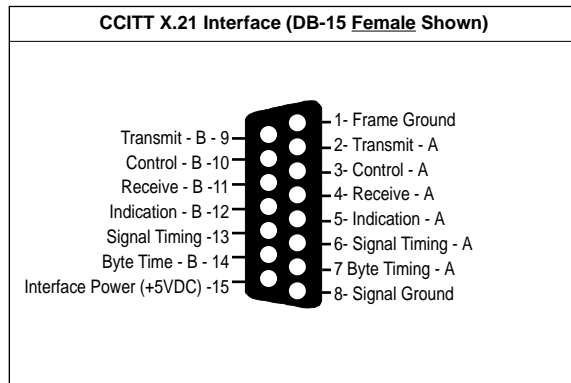
### PATTON MODEL 2070 INTERFACE PIN ASSIGNMENTS

(Continued)

#### MODEL 2070/Cx M/34 CONNECTOR (V.35) TERMINAL INTERFACE (DCE ORIENTATION)

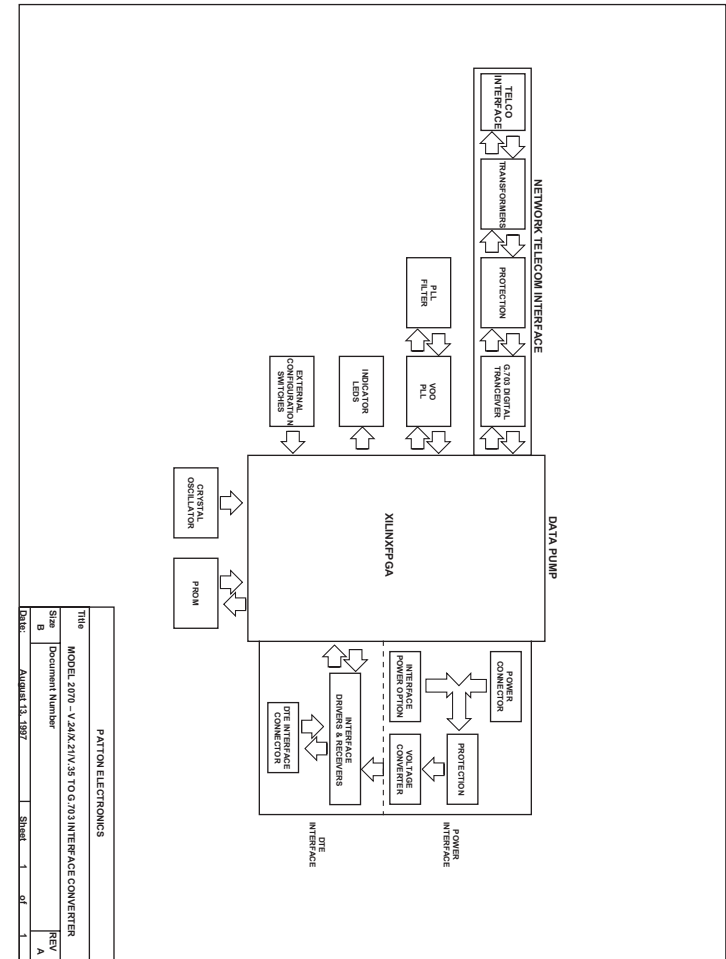


#### MODEL 2070/Dx DB-15 CONNECTOR (X.21) TERMINAL INTERFACE (DCE ORIENTATION)



## APPENDIX E

### PATTON MODEL 2070 BLOCK DIAGRAM



All Model 2070 Series Hardware and Firmware Versions  
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