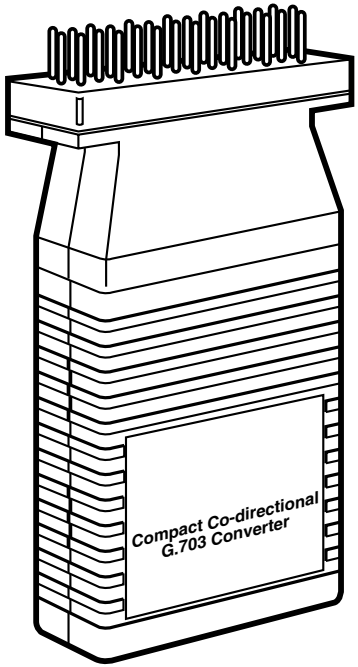
BLACK BOX®
NETWORK SERVICES

MAY 1998
IC700A
IC701A
IC702A

Compact Codirectional G.703 Converters



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FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate 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 communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

CE Notice

The CE symbol on your Compact Codirectional G.703 Converter indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the Union European (EU).

TRADEMARKS USED IN THIS MANUAL

Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

Contents

1. Specifications

Compliance—	CE approval; FCC Class A, EN 55022 (EMC Emissions); EN 50082-1, (EMC Susceptibility); EN 60950, (LVD Safety); CTR 14, (Type Approval)—The "CE 168X" symbol indicates that the G.703 Converter is in compliance with the applicable Telecom Directive of the EU. If your G.703 Converter is marked with this symbol, it is EU Telecom Type Approved and may be connected to the public network.
Applications—	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
Operating Speed—	Co-directional timing, Rx recovered: 64 kbps ± 500 ppm
G.703 Interface—	Symmetrically balanced pairs, 4-wire, 120-ohm terminated to female RJ-45
Terminal Interface—	IC700A: CCITT/ITU V.24 Sync, DCE; IC701A: CCITT/ITU V.35 Sync, DCE; IC702A: CCITT/ITU X.21 Sync, DCE
Indicators—	LEDs monitor TM and SYNC
Clocking—	Internal, External, or Network Timing (External Timing on IC700A and IC701A only)
Maximum Cable Loss—	0 to -10 dB
Line Encoding—	AMI
Jitter Performance—	CTR 14, G.823

Surge Protection—	Complies with IEC 801-5 Level 1, 500V
Isolation—	1500 VRMS isolation, transformer coupled
G.703 Input Signal Level—	2.0V differential, into 100 ohms, nominal
Power Supply Options—	External wallmount transformer: 100–240 VAC Input to +5 VDC/2A output; 100–132 VAC input to +5 VDC/300 mA output; Pin 9 on V.24 interface; Pin KK on V.35 interface; Pin 15 on X.21 interface: +5 VDC (±5%), 300 mA (min.)
Temperature Range—	32 to 140°F (0 to 60°C)
Maximum Altitude—	Up to 15,000 feet (4572 m)
Humidity Tolerance—	5 to 95%, noncondensing
Size—	IC700A: 2.9"H x 1.4"W x 0.7"D (7.4 x 3.6 x 1.8 cm); IC701A: 3.9"H x 1.4"W x 0.7"D (10 x 3.6 x 1.8 cm); IC702A: 2.6"H x 1.4"W x 0.7"D (6.6 x 3.6 x 1.8 cm)

2. Introduction

2.1 Description

The Compact Codirectional G.703 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 or external DTE timing, or G.703 network-generated timing, the G.703 Converter is perfect for networking applications that require a single 64-kbps data channel.

The G.703 Converter connects directly to the synchronous DTE using a DB25 connector (IC700A), an M/34 connector (IC701A) or a DB15 connector (IC702A). A 120-ohm twisted-pair telephone port provides the interface for the G.703 network. Additionally, 75-ohm terminations can be made using the G.703 75–120 Adapter (MT242A-M or MT242A-F).

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

2.2 Features

- Bi-directionally converts V.24, X.21, or V.35 to co-directional G.703.
- Operates at 64-kbps synchronous data rate.
- 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. (1600 m) on 24 AWG twisted pair.
- 120-ohm (twisted-pair) network termination.

3. Configuration

The G.703 Converter is easy to install and is designed for excellent reliability. The instructions in this chapter will help you set up and install the Converter properly.

3.1. Opening the Case

Before using the G.703 Converter, you must configure it for your application. To do so, you'll need to open the case. Insert a flat-head screwdriver into the open slot on either side of the case. (See Figure 3-1 to see how to open the IC700A and IC702A. See Figure 3-2 for an illustration of opening the IC701A's case.)

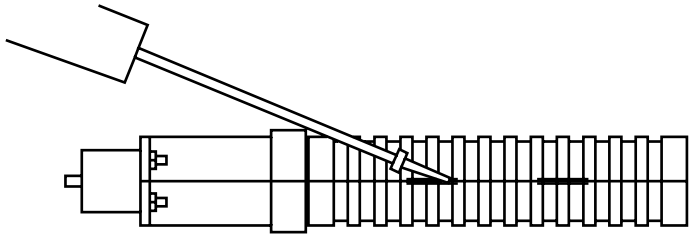


Figure 3-1. Using the screwdriver to pry open the IC700A or IC702A's case.

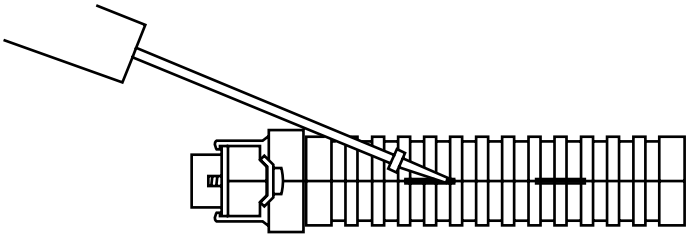


Figure 3-2. Using the screwdriver to pry open the IC701A's case.

Twist the screwdriver head slightly and the top half of the case will separate from the lower half. You now have access to the internal switches used to configure the unit. Figure 3-3 shows how the IC700A or IC702A's case separates, while Figure 3-4 shows how the IC701A's case separates.

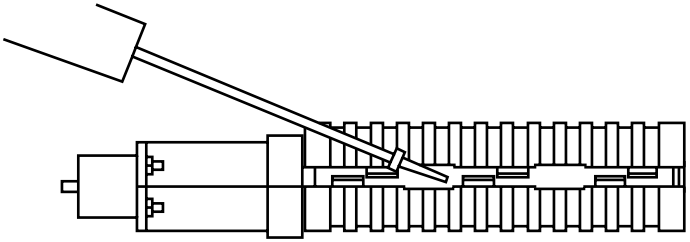


Figure 3-3. Using the screwdriver to completely open the IC700A or IC702A's case.

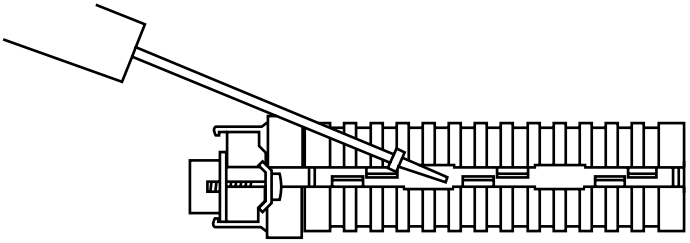


Figure 3-4. Using the screwdriver to open the main part of the IC701A's case.

After opening the case, refer to the section in this chapter that pertains to your unit for configuration details (**Section 3.2** for IC700A, **Section 3.3** for IC701A, and **Section 3.4** for IC702A).

NOTE

The RJ-45 G.703 port of the G.703 Converter is for connecting 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 Configuring the IC700A (V.24)

The IC700A 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 of the PC board. Follow the instructions in this section to configure the IC700A. See **Section 3.3** to configure the IC701A (V.35 version) or **Section 3.4** to configure the IC702A (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. Figure 3-5 shows the position of Switch S1 on the bottom of the IC700A PC board.

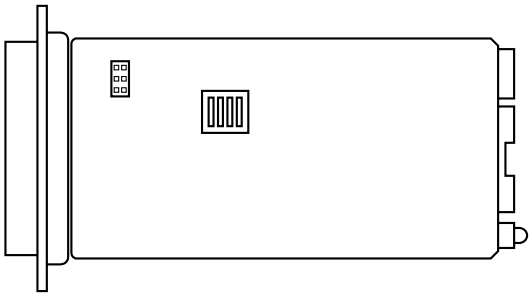


Figure 3-5. Switch S1 (located on the bottom of the IC700A's PC board).

Figure 3-6 shows the switch settings on DIP-Switch S1 with respect to ON/OFF positions. The default settings for DIP-Switch S1 are shown in Table 3-1. Detailed descriptions of each switch follow the table.

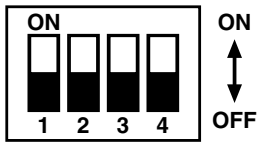


Figure 3-6. Closeup of the DIP switches.

Table 3-1. IC700A Switch S1

Position	Function	Factory Default	
S1-1	Test Mode	Off	Disabled
S1-2	Clock Mode	On	Network
S1-3	Clock Mode	On	Clock
S1-4	Respond to LL Request	On	Disabled

Switches S1-1: Test-Mode Activation

Use Switch S1-1 to enable or disable the IC700A's Test Mode. When Test Mode is enabled, the Local Line and G.703 loopback tests activate simultaneously. When Test Mode is disabled, the IC700A 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 IC700A's system clock. When using two G.703 Converters 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 IC700A provides an internally generated system clock.

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

Use Switch S1-4 to enable the IC700A 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	The IC700A ignores DTE requests to enter Local Loopback.
Off	Enabled	The IC700A enters Local Loopback Mode when pin 18 is raised.

3.2.2 Jumper Straps "JP1" and "JP2"

The IC700A uses two jumper straps to select the power-source option and to connect the unit's signal ground to frame ground. Figure 3-7 shows the position of Jumper Straps JP1 and JP2 on the bottom of the IC700A's PC board.

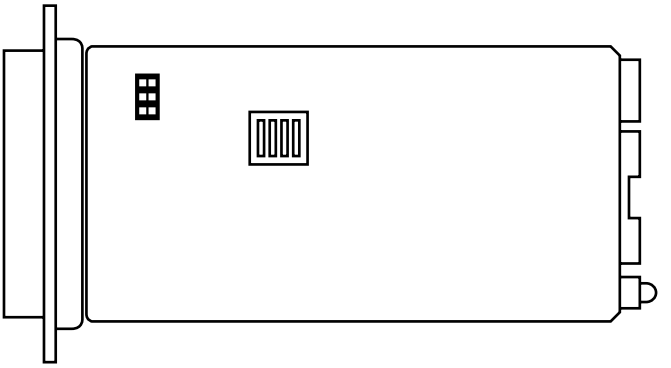


Figure 3-7. Straps JP1 and JP2 (on the bottom of the IC700A's PC board).

Figure 3-8 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.

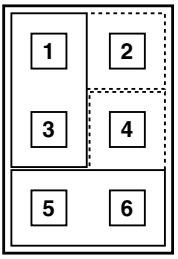


Figure 3-8. Possible settings for JP1 and JP2.

Table 3-2. IC700A's JP1 and JP2

Position	Function	Factory Default	
JP1	Power Source	1&3	AC Powered
JP2	SGND to FGND	5&6	Connected

Jumper JP1: Power Source

The IC700A may be powered by the RS-232 interface or by the supplied AC wall-mount transformer. The setting for JP1 determines how the IC700A receives its operating power.

Position 1&2 — Interface Power Option. In this setting the IC700A is powered from the DTE interface. Power should be applied to DB25 pin 9 at +5 VDC (±5%), 300 mA (min.). *The AC wall-mount transformer must not be connected in this setting.*

Position 1&3 — AC Power Option. In this setting, the IC700A 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).

3.3 Configuring the IC701A (V.35)

The IC701A 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 of the PC board, and the jumper strap is located on the top of the PC board. Follow the instructions in this section to configure the IC701A (V.35 version). See **Section 3.2** to configure the IC700A (V.24 version) or **Section 3.4** to configure the IC702A (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. Figure 3-9 shows the position of Switch S1 on the bottom of the IC701A's PC board.

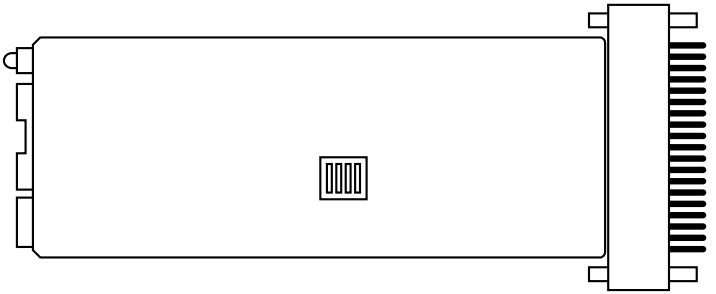


Figure 3-9. Switch S1 (located on the bottom of the IC701A's PC board).

Figure 3-10 shows the switch settings on DIP-Switch S1 with respect to ON/OFF positions. The default settings for DIP-Switch S1 are shown in Table 3-3. Detailed descriptions of each switch follow the table.

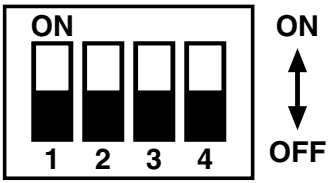


Figure 3-10. Closeup of the DIP switches.

Table 3-3. IC701A Switch S1

Position	Function	Factory Default	
S1-1	Test Mode	Off	Disabled
S1-2	Clock Mode	On	Network
S1-3	Clock Mode	On	Clock
S1-4	Response to LL Request	On	Disabled

Switches S1-1: Test-Mode Activation

Use Switch S1-1 to enable or disable the IC701A's Test Mode. When enabled, the Local Line and G.703 loopback tests activate simultaneously. When disabled, the IC701A 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 IC701A's system clock. When using two G.703 Converters 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 IC701A provides an internally generated system clock.

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

Use Switch S1-4 to enable the IC701A 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	The IC701A ignores requests to enter Local Loopback.
Off	Enabled	The IC701A enters Local Loopback Mode when pin 18 is raised.

3.3.2 Jumper Straps "JP1" and "JP2"

The IC701A uses two jumper straps (JP1 and JP2, see Figure 3-12) to select the power source option and to connect the unit's signal ground to frame ground. In order to get to the jumper straps, you'll need to remove the V.35 connector's shroud (see Figure 3-11). The shroud can be removed by unscrewing the small bolts on the sides of the connector.

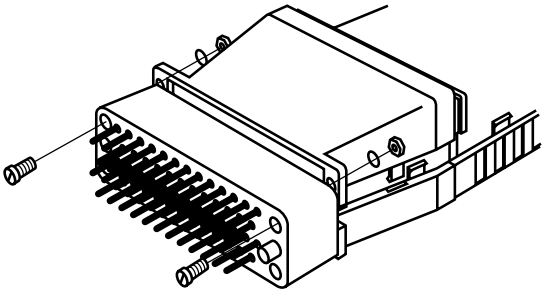


Figure 3-11. Removing the bolts.

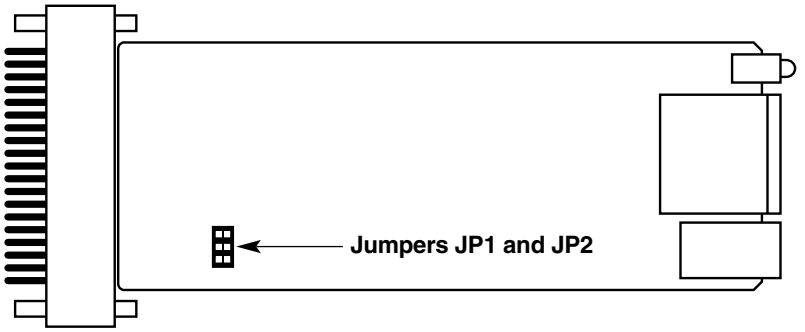


Figure 3-12. JP1 and JP2 (on the top of the IC701A's PC board), as seen when the V.35 connector shroud is removed.

Figure 3-13 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.

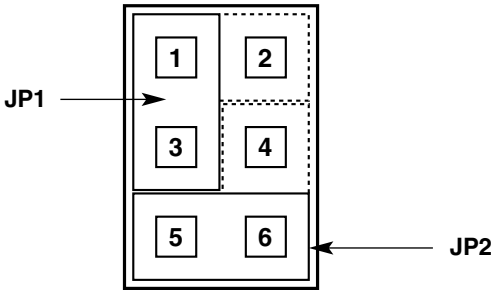


Figure 3-13. Possible settings for JP1 and JP2.

Table 3-4. IC701A's JP1 and JP2

Position	Function	Factory Default	
JP1	Power Source	1&3	AC Powered
JP2	SGND to FGND	5&6	Connected

Jumper JP1: Power Source

The IC701A may be powered by the V.35 interface or by the supplied AC wall-mount transformer. The setting for JP1 determines how the IC701A receives its operating power.

Position 1&2 Interface Power Option. In this setting the IC701A is powered from the DTE interface. Power should be applied to M/34 pin KK at +5 VDC (±5%), 300 mA (min.). *The AC wall-mount transformer must not be connected in this setting.*

Position 1&3 AC Power Option. In this setting, the IC701A 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 Configuring the IC702A (X.21)

The IC702A 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 and the jumper strap is located on the top of the PC board. Follow the instructions in this section to configure the IC702A (X.21 version). See **Section 3.2** to configure the IC700A (V.24 version) or **Section 3.3** to configure the IC701A (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. Figure 3-14 shows the position of Switch S1 on the bottom of the IC702A.

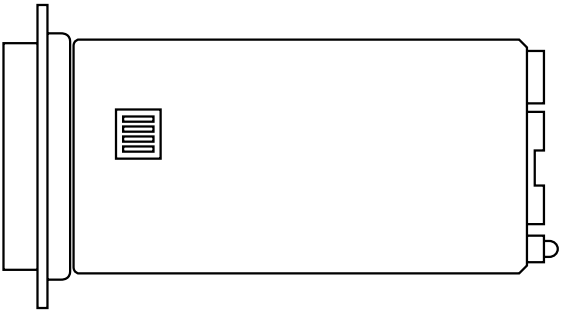


Figure 3-14. Switch S1 (located on the bottom of the IC702A's PC board).

Figure 3-15 shows the switch settings on DIP-Switch S1 with respect to ON/OFF positions. The default settings for DIP-Switch S1 are shown in Table 3-5. Detailed descriptions of each switch follow the table.

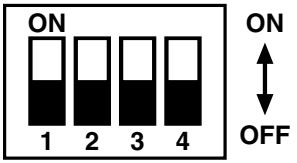


Figure 3-15. Closeup of the DIP switches.

Table 3-5. IC702A's Switch S1

Position	Function	Factory Default	
S1-1	Test Mode	Off	Disabled
S1-2	Clock Mode	On	Network
S1-3	Byte Timing	On	Enabled
S1-4	Reserved	Off	

Switches S1-1: Test-Mode Activation

Use Switch S1-1 to enable or disable the IC702A Test Mode. When enabled, the Local Line and G.703 loopback tests activate simultaneously. When disabled, the IC702A 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.

Switch S1-2: Clocking Mode

Use Switch S1-2 to set the IC702A's system clock. When using two IC702As 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.

S1-2	Clocking	Description
On	Network	The G.703 network provides the system clock (default).
Off	Internal	The IC702A provides an internally generated system clock.

Switch S1-3: Byte Timing

Use Switch S1-3 to enable the IC702A's byte timing. The byte-timing clock is an 8-KHz (1 byte/sync. pulse) framing clock synchronized to the G.703 Data.

S1-3	Activation	Description
On	Enabled	IC702A 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.

S1-4	Activation
On	Not a valid setting.
Off	Normal operation.

3.4.2 Jumper Strap "JP1" and "JP2"

The IC702A uses two jumper straps (JP1 and JP2, see Figure 3-16) to select the power-source option and to connect the unit's signal ground to frame ground.

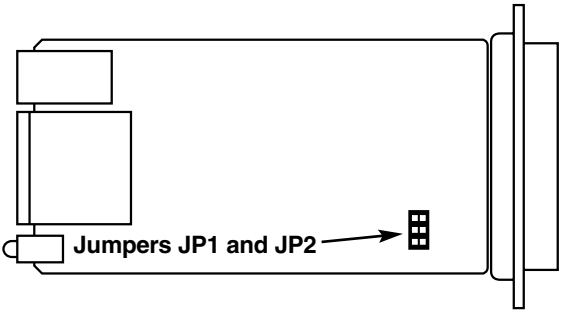


Figure 3-16. (JP1 and JP2 on the top of the IC702A's PC board).

Figure 3-17 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 3-17.

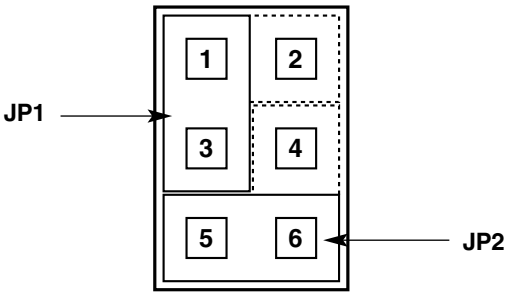


Figure 3-17. Possible settings for JP1 and JP2.

Table 3-6. IC702A's JP1 and JP2

Position	Function	Factory Default	
JP1	Power Source	1&3	AC Powered
JP2	SGND to FGND	5&6	Connected

Jumper JP1: Power Source

The IC702A may be powered by the X.21 interface or by the supplied AC wall-mount transformer. The setting for JP1 determines how the IC702A receives its operating power.

Position 1&2 Interface Power Option. In this setting the IC702A is powered from the DTE interface. Power should be applied to DB15 pin 15 at +5 VDC (±5%), 300 mA (min.) *The AC wall-mount transformer must not be connected in this setting.*

Position 1&3 AC Power Option. In this setting, the IC702A 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. Installation

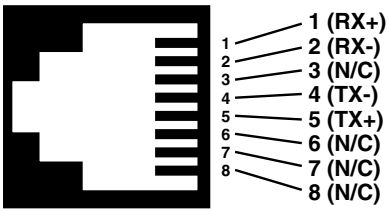
The G.703 Converter is designed for 4-wire, full-duplex communication over a co-directional 64-kbps G.703 clear-channel network or dedicated twisted pair. This chapter describes the proper connection of the line interface, the DTE (terminal) interface, and AC/DC power.

NOTE

The G.703 line surge protection on this product 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 G.703 Converter is pre-wired for direct connection to the G.703 PCM network. Connect the G.703 Converter's RJ-45 port 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 want to connect the G.703 Converter to another G.703 Converter (or compatible G.703 device) over private twisted pair, make the connection between the two devices using a crossover cable pinned according to the pinout 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 G.703 Converters are wired as a DCE and support a wide range of applications. You may purchase adapter cables separately; call Technical Support. If you would like to construct your own interface cable, refer to the pinout diagrams in **Appendix B**.

NOTE

Any line or terminal cable connected to the G.703 Converter must be shielded cable, and the outer shield must be 360° bonded—at both ends—to a metal or metalized backshell.

4.4 Power Connection

The 120-VAC wall transformer supplies +5V regulated DC up to 300 mA. The variable 110/230-VAC "international" version supplies +5V regulated DC up to 2A. Either of these transformers connect to the G.703 Converter by means of a cannon jack on the rear panel. The G.703 Converter is powered up as soon as it is plugged into an AC outlet; there is no power switch.

4.4.1 120-VAC Power

A wallmount 100–132 VAC adapter is supplied with the U.S. version of the G.703 Converter and may be plugged into any approved 120-VAC wall plug.

4.4.2 230-VAC Power

The variable 100–240 VAC adapter supplied with the "international" version of the G.703 Converter is equipped with an IEC-320 shrouded male connector. This connects with one of several country-specific power cords.

4.4.3 Interface Power Option

The G.703 Converter can also be powered by the appropriate V.24, V.35, or X.21 interface pin (see **Appendix B**). Voltage supplied should be +5V (±5%) regulated DC, 300 mA minimum. When powered by the interface, the power transformer must not be connected.

5. Operation

Once you have configured the G.703 Converter properly (**Chapter 3**) and made line, DTE, and power connections correctly (**Chapter 4**), you are ready to operate the Converter. There is no power switch: The Converter is on as soon as you plug it in. This chapter describes the LEDs and the loopback test mode.

5.1 Back-Panel LEDs

The G.703 Converter has two LEDs on the back panel (see Figure 5-1). Following Figure 5-1 is a description of each LED.

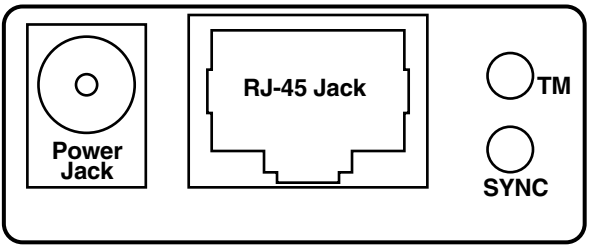


Figure 5-1. Back-panel LEDs.

TM When Test Mode (Local Loop/G.703 Loop) is initiated manually or by the DTE (see **Chapter 3**), this LED is lit red.

SYNC Lit 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 Test Mode is used to evaluate the condition of the modems and the communication link. It's 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 G.703 Converter on the terminal device side by echoing any data sent to the G.703 Converter back to the user device. For example, characters typed on the keyboard on the terminal will appear on the terminal screen (see Figure 5-2).

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 G.703 Converter. Using this test, the service provider sends BER (Bit Error Rate) signals to the G.703 Converter over the twisted-pair wire. The G.703 Converter senses these signals and loops the digital data back to the central office (Figure 5-2).

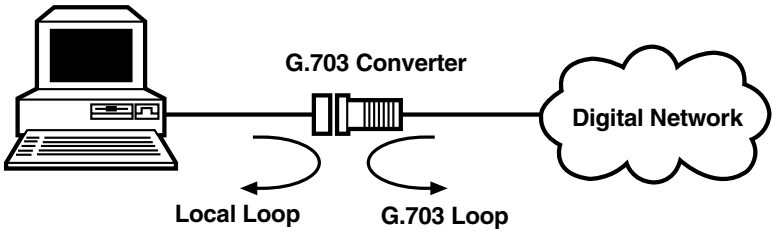


Figure 5-2. Test mode operation: Local loop/G.703 loop.

TEST-MODE ACTIVATION

1. Notify your G.703 service provider that you want to perform a G.703 Loop test.

2. To activate the G.703 Converter Test Mode:

   a. Move Switch S1-1 to the On position (you must use this method for the IC702A) 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 B**).

   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 LED will be lit 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. Cable Recommendations

The following statements apply when you use the G.703 Converter as a short-range modem over private twisted pair.

These Converters are tested to the distances stated in this manual (**Chapter 1**, Specifications) on twisted-pair cable with these characteristics:

Wire Gauge	Capacitance	Resistance
19 AWG	83 nF/mi or 15.72 pF/ft.	0.0163 Ω/ft.
22 AWG	83 nF/mi or 15.72 pF/ft.	0.0326 Ω/ft.
24 AWG	83 nF/mi or 15.72 pF/ft.	0.05165 Ω/ft.
26 AWG	83 nF/mi or 15.72 pF/ft.	0.08235 Ω/ft.

We fully expect that these Converters will operate on lines with specifications different from those tested. As a precaution, though, make sure that the cable being used has similar or better characteristics (lower capacitance or lower resistance).

Wire with capacitance of 20 pF/ft. or less is suitable for our Converters; however, distances may vary from those stated in this manual. Resistance will also affect distance but not functionality. Wire should be 26 AWG or larger (the smaller the number, the larger the gauge size).

These products are designed to withstand normal environmental noise and conditions; however, other environmental factors too numerous to list may affect the product's proper operation.

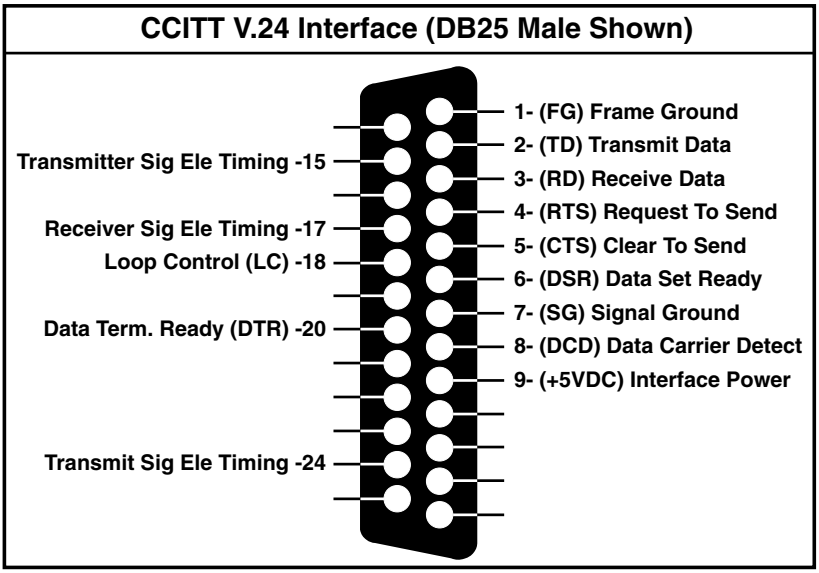
Appendix B. Interface Pin Assignments

G.703 Interface

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

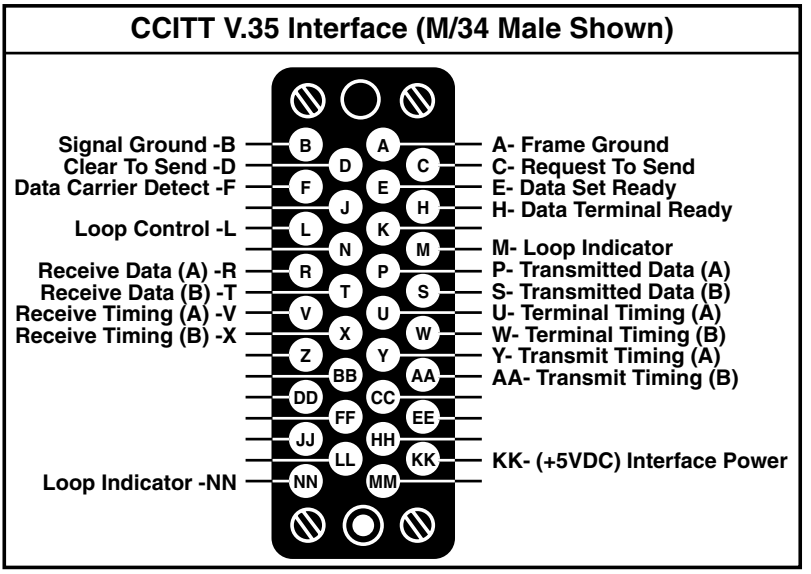
Pin #	Signal
1	RX+ (Line Receive Positive)
2	RX- (Line Receive Negative)
3	N/C (No Connection)
4	TX- (Line Transmit Negative)
5	TX+ (Line Transmit Positive)
6	N/C
7	N/C
8	N/C

IC700A: DB25 Connector (V.24) Terminal Interface, DCE Orientation

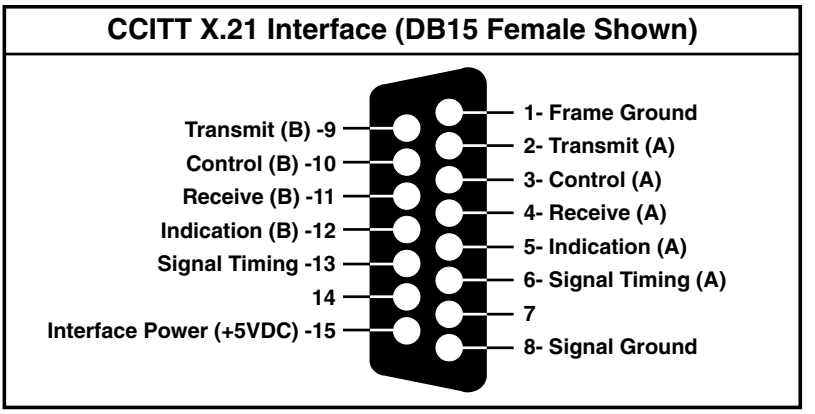


IC701A: M/34 Connector (V.35) Terminal Interface, DCE Orientation

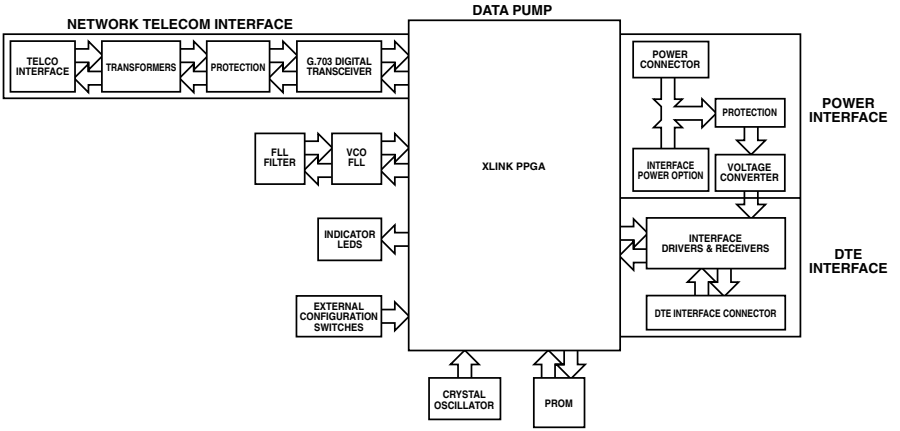
CCITT V.35 Interface (M/34 Male Shown)



IC702A: DB15 Connector (X.21) Terminal Interface, DCE Orientation



Appendix C. Block Diagram



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