

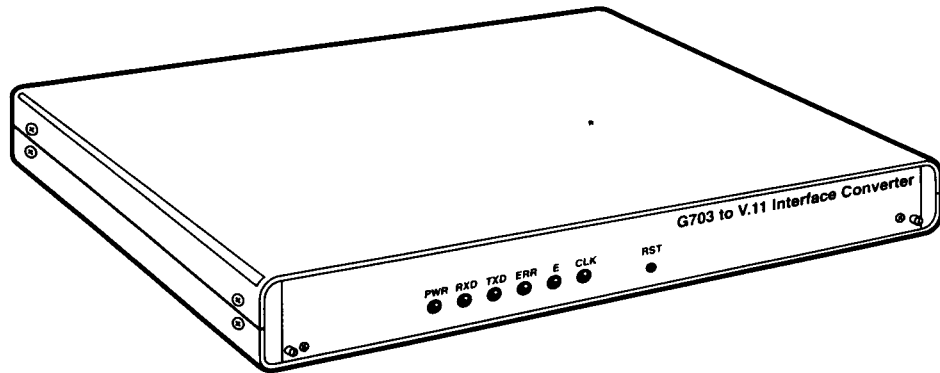


**Black Box Corporation**  
The Source for Connectivity®

11/3/97

JANUARY 1997  
IC930A  
IC931A

## G703 to V.11 Interface Converter



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**FEDERAL COMMUNICATIONS COMMISSION  
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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 J 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 the Canadian Department of Communications.*

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

## INSTRUCCIONES DE SEGURIDAD

### 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.

## INSTRUCCIONES DE SEGURIDAD

11. El aparato eléctrico deberá ser conectado 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 física 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 líneas de energía.
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 objetos líquidos 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: Objetos 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.

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**CONTENTS**

1. Specifications .....	8
2. Introduction .....	9
2.1 IC930A and IC930C .....	9
2.2 IC931A and IC931C .....	9
2.3 IC930C and IC931C .....	10
3. Installation .....	11
3.1 Co-directional unit (IC930A and IC930C) .....	11
3.2 Contra-directional unit (IC931A and IC931C) .....	12
3.3 Local Loopback .....	13
3.4 Slave (DTÉ) or Master (DCE) Selection .....	13
4. Operation .....	14
Appendix A: Connectors .....	15
Appendix B: Rackmount Card Version of the G703 to V.11 Interface Converter .....	17

## 1. Specifications

**Speed**—64 Kbps

**Indicators**—LEDs: PWR (Power), RXD (Receive Data from G703 port), TXD (Transmit data to G703 port), ERR (Elastic buffer reset), S (Co-directional use: On=Slave mode, OFF=master mode or in loopback; Contra-directional use: Receive clock from G703 port), CLK (Co-directional use: Network external Clock active; Contra-directional use: Clock provided by internal generator (loopback mode))

**Interface**—X.21 as V.11 electrical, i.e., RS-422; G703 as HDB3 encoding

**Connectors**—X.21 (V.11) port: DB15 female fitted with female screw-locking posts; G703 port: 2-part screw-terminal block

**Power**—Rackmount card: 9 to 14 VAC 50/60 Hz at 5 VA, or regulated +5 VDC at 150 ma for rackmount card; Standalone model: Input: 100-250 VAC, 0.4 A, 47-63 Hz, Output: 9 VDC, 1.5 Amps

**Size**—IC930C, IC931C: double Euro-card format 9.2"H x 6.3"D (23.4 x 16 cm); IC930A, IC931A: 1.6"H x 11"W x 8.7"D (4 x 28 x 22 cm)

**Weight**—Cards: 1.1 lb. (0.5 kg); Rack with power supply: 11 lb. (5 kg); Power supply: 4.4 lb. (2 kg); Box: 2.2 lb. (1 kg); Power supply: 1.1 lb. (0.5 kg)

## 2. Introduction

G703 CCITT is the general standard for interfacing to digital high-speed circuits. It is widely used as a termination standard for KiloStream and similar high-speed data circuits. V.11 is a CCITT interface recommendation that is electrically similar to RS-422. The G703 to V.11 Interface Converter lets you attach synchronous multiplexors and more common data terminals to your high-speed (64 Kbps) line.

### 2.1 IC930C and IC930A

The G703 to V.11 Interface Converter (IC930C or IC930A) is a co-directional unit. This means that it requires only two balanced pairs for the G703 interface. Each balanced pair has data and encoded clocks. Optionally, you may also have an external network clock.

The co-directional interface can derive the required system clocks from those embedded in the network-provided data stream (slave mode), or from a supplied external clock, or from an internal clock generator (master mode). G703 data is accepted from the network and a V.11 clock is derived from the appropriate source and supplied to the V.11 port. This clock is also used to clock data out of the V.11 port for transmission to the network.

### 2.2 IC931C and IC931A

The G703 to V.11 Interface Converter (IC931C or IC931A) adapts X.21 (V.11 electrical) interfaces to the G703 standard with full-duplex conversion. It lets you connect an X.21 DTE to a G703 DCE operating at 64 Kbps. The G703 interface is via four balanced transformer-coupled pairs for Rx and Tx data and clocks and presented on eight screw terminals. The X.21 interface is presented as a V.11 electrical on a standard 15-pin female D connector.

The contra-directional interface accepts clocks from the 64K network and converts received data and a clock to V.11 standards for transfer out of the V.11 port. Data received at the V.11 port is clocked out of the G703 output using a network-supplied clock. To alleviate problems caused by phase discontinuities, an elastic buffer is provided in the data path.

## G703 TO V.11 INTERFACE CONVERTER

Indicators are provided for send and receive data, data errors, power, and clocks, and a self-test loopback facility is fitted as standard. Both standalone and rackmount versions are available in double Euro-card format.

The V.11 circuit connects to the unit via a DB15 socket and the G703 circuit connects to the unit via screw terminals. Adapter cables are available to let you use this equipment in V.35 environments. Both units have a negligible effect on network error rates.

### 2.3 IC930C and IC931C

The cards are double Euro-card format, that is, to suit a 6U high rack. The actual card dimensions are 9.2”H x 6.3” D (23.4 x 16 cm). The card has a metal front panel that incorporates an upper and lower screw fixing to allow the card to be securely held in the rack. The width of the front panel and the positions of the card guides in the rack are such that 14 cards may be fixed side by side into one rack. LED indicators are mounted on the front panel, which has appropriate legends. The back edge of the card holds the V.11 interface connector, the G703 connector, and the power connector. The specifications and pin usages of these connectors are identical to the standalone version.

## G703 TO V.11 INTERFACE CONVERTER

### 3. Installation

The G703 to V.11 units come in both standalone and rackmount form. In either case, you may apply power by low-voltage AC or regulated +5 VDC. You need to set a link on the printed circuit board to the method that you are using.

#### 3.1 IC930A and IC930C (Co-directional unit)

For the co-directional unit, a single jumper is labeled “JP1 EXT 5V.” When the jumper is left open, the power is drawn from the AC power supply plugged into the 3-pin Molex® connector. When linked, power may be drawn from pin 15 of the V.11 connector (leave the AC supply disconnected if you use pin 15’s power).

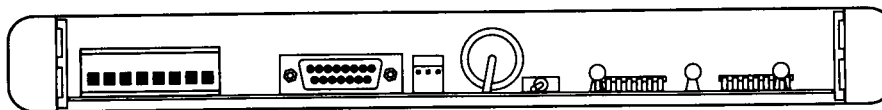


Figure 3-1. Rear panel of the IC930A.

### 3.2 IC931A and IC931C (Contra-directional unit)

For the Contra-directional unit, the 2-position link is labeled “int/psu/ext.” With the link set to “INT PSU,” power is provided by a low-voltage AC in-line power supply that plugs into the 3-pin Molex connector next to the V.11 connector. An AC voltage in the range 9 to 14 VAC is required at 200 mA max. With the link set to the “EXT PSU,” power is supplied by DC power on the V.11 interface via pin 15 of the V.11 connector. A regulated +5 VDC (150 ma max.) supply is required. The 0V return must be connected to pin 8.

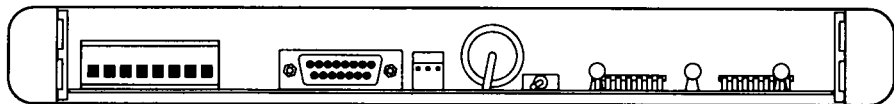


Figure 3-2. Rear panel of the IC931A.

### 3.3 Local Loopback

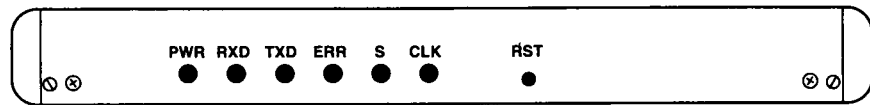
All the units allow local loopback. This loops the G703 output (just before the transformer output to line) back in again. You do not need a connection to the network, since an on-board clock generator is provided.

### 3.4 Slave (DTE) or Master (DCE) Selection

The co-directional converter (IC930A) may be set as either a Slave (DTE) (factory default) or Master (DCE) via Switch SW1 on the rear of the board (see **Figure 3-1** for the location of this switch). The Slave position is away from the power connector and the Master position is toward the power connector. In the Master mode, the clock is provided by the on-board generator. If a pair of units are communicating with each other, and no network clock is provided, you must set one for Master and the other for Slave.

## 4. Operation

Two LEDs indicate transmit (TX) and receive (RX) data activity. The PWR LED indicates adequate power. The ERR indicator is a latched indicator that shows that the elastic data buffer has been reset. It does not affect operation when lit and may be turned off by pressing the reset button. The Contra-directional unit (IC931A) has LEDs that show RX and TX clock activity. The Co-directional unit (IC930A) has an LED marked S that shows that the unit is set in slave mode, and an LED marked CLK that lights if the network provides an external clock. **Figure 4-1** shows the location of the LEDs on the front panel.



**Figure 4-1. Front panel of the IC930A and IC931A.**

### Testing

You can test the unit with a bit error rate test set (BERT test).

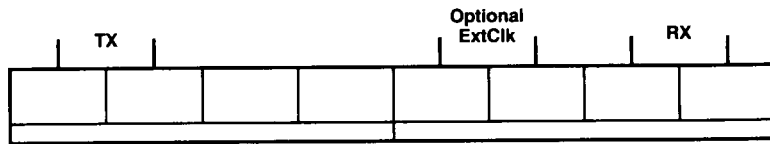
- Test 1: Test an individual unit from the V.11 interface by setting the unit into local loopback.
- Test 2: Connect the unit to the network and loop the TX data pair to the RX data pair on the remote unit's V.11 port.

## Appendix A: Connectors

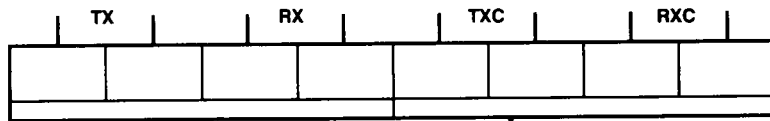
**Table A-1. Pin Assignment for DB15, X.21 (V.11) Interface.**

Pin	Signal	Direction DCE DTE	Function
1			N/C
2	TxA	<—	Transmitted Data A
3	CA	<—	Control A
4	RxA	—>	Received Data A
5	IA	—>	Indication A
6	Clk A	—>	Clock Out A
7			N/C
8	0V	<—	0 volts
9	TxB	<—	Transmitted Data B
10	CB	<—	Control B
11	RxB	—>	Received Data B
12	IB	—>	Indication B
13	Clk B	—>	Clock Out B
14			N/C
15	Ext	<—	Optional +5 VDC external power into unit.

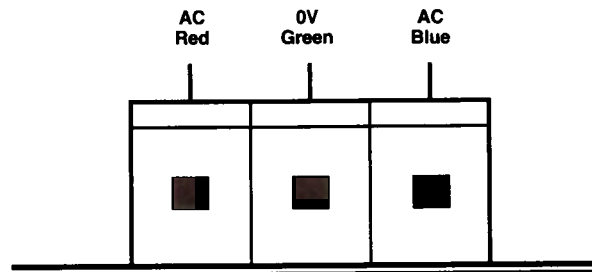




**Figure A-1. The G703 co-directional interface (IC930A, IC930C), screw terminal connection.**



**Figure A-2. The G703 contra-directional interface (IC931A, IC931C), screw terminal connection.**



**Figure A-3. The power connector.**

## Appendix B: Rackmount Card Version of the G703 to V.11 Interface Converter

Both versions of the Interface Converter are available in card form (part numbers IC930C and IC931C) to suit a 19" rack.

The cards are double Euro-card format, that is, to suit a 6U high rack. The actual card dimensions are 9.2 inches high by 6.3 inches deep (23.4 x 16 cm). The card has a metal front panel that incorporates an upper and lower screw fixing so the card can be securely held in the rack. You can fix up to 14 cards side-by-side in the rack. LED indicators are mounted on the front panel. The back edge of the card has the V.11 interface connector, the G703 connector, and the power connector. The specifications and pinings of these connectors are identical to the standalone version.

## G703 TO V.11 INTERFACE CONVERTER

The rack (RM9300A/E) is 6U high (1U=4.45 cm), 22 cm deep, and standard 19" cabinet width. It is fitted with a suitable mains transformer and a wire loom. The mains power is converted to the required low voltage AC power used by the cards, and looped to a 3-pin Molex connector next to the rear of each card position. A power connector is then plugged into each card fitted. The rack has a 3-pole mains power inlet terminal block to let you terminate mains power from within the cabinet. The mains LIVE is fused. The transformer is sized to power a full complement of 14 cards. You need reasonable ventilation around the rack, but no fan is required.

You terminate the V.11 and G703 connections individually, so you can unplug and remove a card without disturbing the other cards.

**Table B-1. Rack Specifications.**

Description	Part number	Power supply requirements
110 VAC rack	RM9300A	110 VAC @ 450 ma
240 VAC rack	RM9300AE	240 VAC @ 200 ma
Co-directional rack card	IC930C	9 VAC @ 230 ma
Contra-directional rack card	IC931C	9 VAC @ 230 ma

**Figure B-1. Rackmount Card and Rack.**

## G703 TO V.11 INTERFACE CONVERTER

