

USER MANUAL

MODEL 2707C, D
**G.703 NTU with
V.35, X.21
Interfaces**



PATTON
Electronics Co.



**An ISO-9001
Certified Company**

Part# 07M2707-A
Doc# 086191UA
Revised 7/17/01

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1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model 2707 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 FCC INFORMATION

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

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 Services at:

Tel: **(301) 975-1007**

E-mail: **support@patton.com**

URL: **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 Model 2707. Technical Service 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 or problems arise during installation or use of this product, please do not hesitate to contact **Patton Electronics Technical Support** at **(301) 975-1007**.

2.1 FEATURES

- Terminates G.703 E1 service (2.048 Mbps)
- Available in low-cost standalone or rack-mountable versions
- X.21 and V.35
- Switch-selectable AMI or HDB3 line encoding options
- Switch-selectable DTE/DCE modes for X.21 version
- 75 Ohm dual coax and 120 Ohm twisted-pair G.703 connections
- Local loopback diagnostics
- Internal, External, and G.703 network timing
- CE approval
- 100-240VAC & 48VDC power options
- Conforms to ONP requirements CTR 12 for connection to international Telecom networks

2.2 DESCRIPTION

The Model 2707 receives clear channel E1/G.703 (2.048 Mbps) data from the telco's digital data network. The Model 2707 terminates the G.703 telco interface and converts the data for transmission to a user-oriented serial (X.21 and V.35). The 2707 can connect to a Router, FRAD, PABX or Multiplexer over its serial interface at 2.048 Mbps.

3.0 CONFIGURATION

The Model 2707 features configuration capability via hardware DIP switches. This section describes all possible DIP switch configurations of the Model 2707.

3.1 DIP SWITCH CONFIGURATION

The Model 2707 has one internal DIP switch that allow configuration for a wide range of applications. The switch is accessed from the underside of the 2707. Figure 1 shows the location of the DIP switch on the bottom of the printed circuit board.

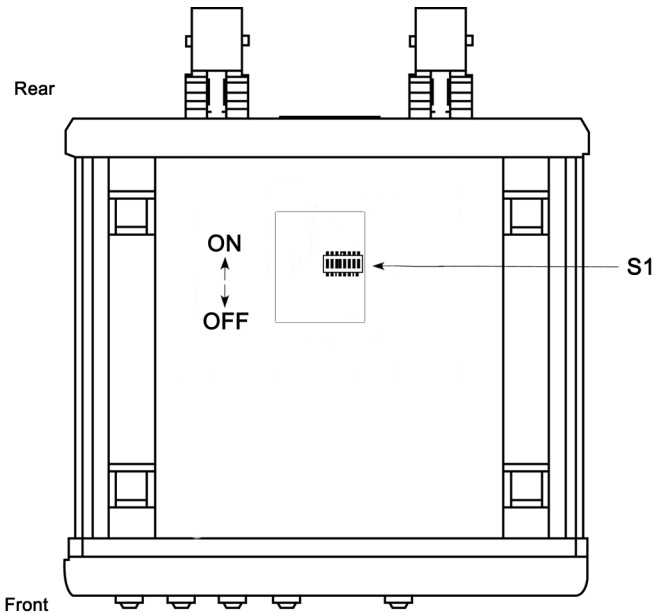


Figure 1. Underside of Model 2707, Showing Location of DIP Switches

The Model 2707 DIP switch can be configured as either “ON” or “OFF”. Figure 2 shows the orientation of the DIP switch with respect to ON/OFF positions.

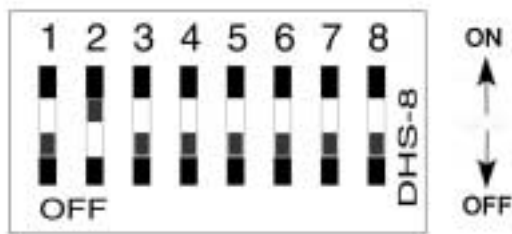


Figure 2. Close up of configuration switches

Switch SW1-1 through SW1-8

Table 1: Switch Set 1 Summary

| Position | Function | Factory Default | Selected Option |
|----------|-------------|-----------------|-----------------------|
| SW1-1 | Line Code | OFF | HDB3 |
| SW1-2 | LLB | OFF | OFF |
| SW1-3 | | Reserved | |
| SW1-4 | | Reserved | |
| SW1-5 | | Reserved | |
| SW1-6 | Clock Mode | OFF | Received Recovered |
| SW1-7 | Clock Mode | OFF | Received Recovered |
| SW1-8 | TM from DTE | OFF | Enabled |

Switch SW1-1 Line Coding: HDB3 (default)

Use Switch SW1-1 to control the Network Line Coding options. Set these options to be the same as the Line Coding given to you by your Service Provider. If you are using two Model 2707s together as short range modems, set both units to HDB3.

| SW1-1 | Line Encoding |
|-------|---------------|
| Off | HDB3 |
| On | AMI |

Options: **HDB3, AMI**

HDB3: In this line coding, the transmitter substitutes a deliberate 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. Unless AMI is required in your application, HDB3 should be used whenever possible.

AMI: Alternate Mark Inversion defines a pulse as a “mark,” a binary one, as opposed to a zero. In an E1 network connection, signals are transmitted as a sequence of ones and zeros. Ones are sent as pulses, and zeros are sent as spaces, i.e., no pulse. Every other pulse is inverted from the previous pulse in polarity, so that the signal can be effectively transmitted. This means, however, that a long sequence of zeros in the data stream will cause problems, since the NTU receiving the signal relies on the signal to recover the 2.048 Mbps clock.

If you must use AMI, you should ensure that the data terminal equipment connected to the unit provides a minimally acceptable pulse density. For this reason, there are advantages to using HDB3 instead. AMI coding does not inherently account for ones density. To meet this requirement, the user should ensure that the data inherently meets pulse density requirements.

SW1-2 Local Loop: Inactive (default)

Use SW1-2 to activate/deactivate local loopback test.

Table 2: SW1-2 Local Loop Setting

| SW1-2 | Setting |
|--------------|-------------------------|
| Off | Local Loopback Inactive |
| On | Local Loopback Active |

SW1-6 and SW1-7 Clock Modes

Use Switches SW1-6 and SW1-7 to configure the 2707 for internal, external, or receive recover clock mode.

Table 3: SW1-6 and SW1-7 Clock Modes

| SW1-6 | SW1-7 | Clock Mode |
|-------|-------|------------------------------|
| ON | ON | Network (Received Recovered) |
| ON | OFF | Internal |
| OFF | ON | External |
| OFF | OFF | Network (Received Recovered) |

| | |
|----------------|---|
| Network Clock | Transmitter timing is derived using the received line signal (received recovered) from the network. |
| Internal Clock | Transmitter timing is derived from an internal clock source. |
| External Clock | Transmitter timing is derived from DTE terminal timing. |

SW1-8: Enable/Disable Loop Tests from DTE

Use Switch SW1-8 to allow Model 2707 to enter loopback tests when the DTE raises the appropriate loop request pin.

| SW1-8 | Setting |
|-------|---|
| Off | Response to DTE Loopback Request Enabled |
| On | Response to DTE Loopback Request Disabled |

4.0 INSTALLATION

Once the Model 2707 is properly configured, it is ready to connect to the G.703 interface, to the serial port, and to the power source. This section describes how to make these connections.

4.1 CONNECTING TO THE G.703 NETWORK

The Power, G.703 and serial Line connections are located on the rear panel of the Model 2707. The following sections describe operation of these connections.

Connecting the 2707/D (X.21 version) Dual Coaxial Cable (75 Ohm) to the G.703 Network

The Model 2707/D (X.21 version) is equipped with dual female BNCs (TX and RX) for connection to a 75 Ohm dual coax G.703 network interface. If your G.703 network terminates via dual coaxial cable, use the diagram below to make the proper connections. (See Figure 3).

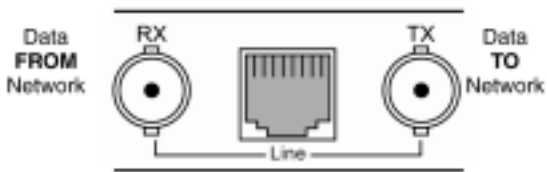


Figure 3. Rear Panel, Showing Location of Connectors

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

When using the 75 Ohm interface, jumper straps JP2, JP6, JP7, and JP5 must be installed over the jumpers. The jumpers are located next to the BNC connectors. Refer to the following section to open the case. Open the case and install jumper straps for JP2, JP6, JP7, and JP5.

Opening the Case

Open the case by inserting a screwdriver into the slots and twist the screwdriver head slightly. The top half of the case will separate from the lower half of the case. Take caution not to damage any of the PC board mounted components.

Connecting the Twisted Pair (120 Ohm) to the G.703 Network

The Model 2707 is equipped with a single RJ-48C jack for connections to a 120 Ohm twisted pair G.703 network interface. If your G.703 network terminates via RJ-48C, use Figure 4 below to connect the 120 Ohm G.703 network channel.

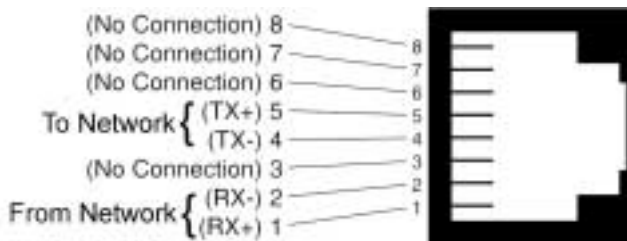


Figure 4. G.703 120 Ohm Connection

4.2 CONNECTING THE SERIAL PORT

The Model 2707/C and D supports V.35, X.21 serial port connections. This section describes how to connect the serial ports to your terminal equipment.

Connecting to a “DTE” Device

The serial port on the 2707/C (V.35 version) is hard-wired as a DCE. Therefore these modules “want” to plug into a DTE such as a terminal, PC or host. When making the connection to your DTE device, use a **straight through** cable of the shortest possible length—we recommend 6 feet or less. When purchasing or constructing an interface cable, please refer to the pin diagrams in Appendix C as a guide.

Connecting to a “DCE” Device

If the Model 2707 serial interface is hard-wired as a DCE (all except the X.21 version), you must use a null modem cable when connecting to a modem, multiplexer or other DCE device. This cable should be of the shortest possible length—we recommend 6 feet or less.

Configuring the X.21 Interface (2707/D)

The serial port on the X.21 interface is default wired as a DCE, but may be switched to a DTE. This is done by reversing the orientation of the DCE/DTE strap, as described below:

To reverse DCE/DTE orientation, remove the top case. Refer to “Opening the Case” on page 9.

The DCE/DTE strap is located near the DB15 connector on the top side of the board. The arrows on the top of the strap indicate the configuration of the X.21 port (for example, if the DCE arrows are pointing toward the DB-15 connector, the X.21 port is wired as a DCE). Reverse the DCE/DTE orientation by pulling the strap out of its socket, rotating it 180°, then plugging the strap back into the socket. You will see that the DCE/DTE arrows now point in the opposite directions, showing the new configuration of the X.21 port.

Note If the 2707/D is configured as a DTE, the clocking mode must be set for external clock.

4.3 POWER CONNECTION

Universal AC Power (100-240VAC)

The Model 2707 uses a 5VDC, 2A universal input 100-240VAC, power supply (center pin is +5V). The universal input power supply has a male IEC-320 power entry connector. This power supply connects to the Model 2707 by means of a barrel jack on the rear panel. Many international power cords are available for the universal power supply.

The Model 2707 powers up as soon as it is plugged into an AC outlet--there is no power switch.

DC Power

The 36-60 VDC DC to DC adapter supplied with the DC version of the Model 2707 plugs in a DC source (nominal 48VDC) and plugs into the barrel power supply jack on the rear of the 2707. Please refer to Figure 5 to make the proper connection.

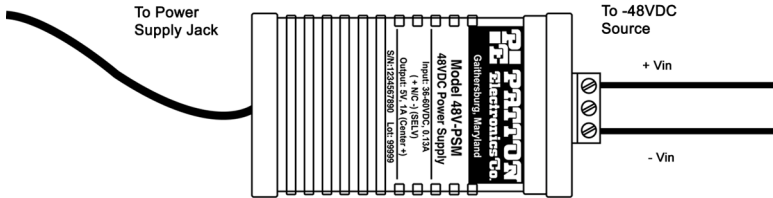


Figure 5. Connecting DC Power to the 2707 DC Power Supply



There are no user-serviceable parts in the power supply section of the Model 2707. Contact Patton Electronics Technical support at +1 (301) 975-1007, via our web site at www.patton.com, or by E-mail at support@patton.com, for more information.

5.0 OPERATION

When the Model 2707 has been properly configured and installed, it should operate transparently. This sections describes power-up, LED status monitors, and the built-in loopback test modes.

5.1 POWER-UP

Before applying power to the Model 2707, please read **section 4.3, “Power Connection” on page 11 and ensure** that the unit is properly connected to the appropriate power source.

5.2 LED STATUS MONITORS

The Model 2707 features six front panel LEDs that monitor connections on the G.703 and signaling, error and test modes. Figure 6 shows the front panel location of each LED. Descriptions of each LED follow Figure 6.

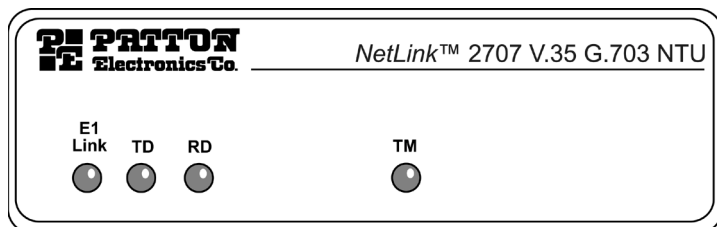


Figure 6. 2707 Front Panel

| | |
|---------|--|
| E1 Link | (Active Green) Solid green (On) indicates that the end to end E1 Link is up, signifying that the link is active. The E1 Link LED is Off when the link is down. |
| TD & RD | Glows yellow to indicate an idle condition of Binary “1” data on the respective terminal interface signals. Green indicates Binary “0” data. |
| TM | (Active Yellow) Solid Yellow indicates an Active Test Mode. The unit may be placed in test mode by the local user. |

5.3 LOCAL LOOP DIAGNOSTICS

The Model 2707 offers V.54 loop diagnostics. Use these diagnostics to test the NTU and any communication links. This test can be activated via DIP switches or via signals on the Model 2707 serial port interface.

Operating Local Loopback (LL)

The Local Loopback (LL) test checks the operation of the local Model 2707, and is performed separately on each unit. Any data sent to the local Model 2707 in this test mode will be echoed (returned) to the user device (i.e., characters typed on the keyboard of a terminal will appear on the terminal screen)

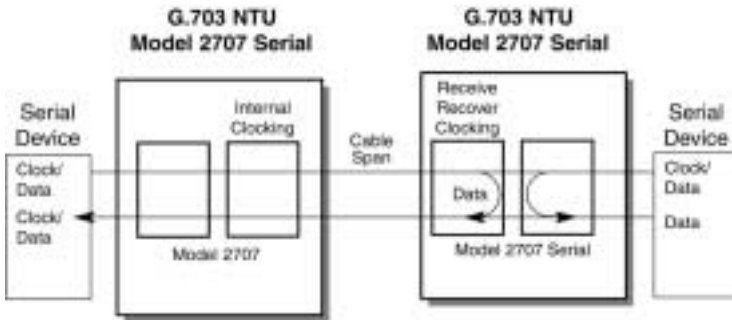


Figure 7. Local Loopback for a Network Termination Application

To perform a LL test, follow these steps:

1. Activate LL. This may be done in one of two ways:
 - Place the DIP switch SW1-2 to the “ON” position.
 - Activate the “LL” signal on the DTE (2707/C only). If you are not sure which lead is the “LL” signal, please refer to Appendix C.
2. Verify that the data terminal equipment is operating properly and can be used for a test.

APPENDIX A
MODEL 2707, G.703 SPECIFICATIONS

| | |
|--------------------|--|
| Network Data Rate: | 2.048 Mbps |
| Network Connector: | RJ-48C/Dual Coax BNC (2707/D) |
| Nominal Impedance: | 75/120 Ohm |
| Line Coding: | Selectable AMI or HDB3 |
| Line Framing: | G.703 (Unframed) |
| Clocking: | Internal or Network (Receive Recover) |
| Distance: | Maximum 1.8 km (6,000 ft.) on 24 AWG Cable |
| Configuration: | One 8-Position DIP Switches |
| Power Supply: | +5VDC External power supply/100-240VAC, 50-60Hz, 0.4A; or 48VDC Power Supply |
| Humidity: | Up to 90% non-condensing |
| Temperature: | 0 to 50° C |
| Dimensions: | 9.0 x 5.3 x 2.0 cm (3.5"L x 2.1"W x 0.78"H) |

APPENDIX B
MODEL 2707, INTERFACE PIN ASSIGNMENT

V.35 Interface
(M/34F Female Connector)
(DCE Configuration)

| Pin # | Signal |
|--------------|--------------------------------|
| B | SGND (Signal Ground) |
| C | RTS (Request to Send) |
| D | CTS (Clear to Send) |
| E | DSR (Data Set Ready) |
| F | CD (Carrier Detect) |
| H | DTR (Data Terminal Ready) |
| L | LLB (Local Line Loop) |
| M | TM (Test Mode) |
| N | RDL (Remote Digital Loop) |
| P | TD (Transmit Data) |
| R | RD (Receive Data) |
| S | TD/ (Transmit Data-B) |
| T | RD/ (Receive Data-B) |
| U | XTC (External Transmit Clock) |
| V | RC (Receive Timing) |
| W | XTC/ (External Transmit Clock) |
| X | RC/ (Receive Timing) |
| Y | TC (Transmit Clock-A) |
| AA | TC/ (Transmit Clock-B) |

APPENDIX B - Continued

| V.35 TO V.35 (STRAIGHT-THROUGH CABLE) PIN OUT | |
|--|-----------------|
| PIN | Function |
| A | Frame Ground |
| B | Signal Ground |
| C | RTS |
| D | NC |
| E | DSR |
| F | DCD |
| H | DTR |
| K | NC |
| L | NC |
| P | TD (A) |
| R | RD (A) |
| S | TD (B) |
| T | RD (B) |
| U | SCTE (A) |
| V | RT (A) |
| W | SCTE (B) |
| X | RT (B) |
| Y | NC |
| AA | NC |

| V.35 TO V.35 (CROSS OVER CABLE) PIN OUT | | |
|--|-----------------|------------|
| PIN | Function | PIN |
| A | Frame Ground | A |
| B | Signal Ground | B |
| C | DCD | F |
| D | NC | D |
| E | DTR | H |
| F | RTS | C |
| H | DSR | E |
| K | NC | K |
| L | NC | L |
| P | RD (A) | R |
| R | TD (A) | P |
| S | RD (B) | T |
| T | TD (B) | S |
| U | RT (A) | V |
| V | SCTE (A) | U |
| W | RT (B) | X |
| X | SCTE (B) | W |
| Y | NC | Y |
| AA | NC | AA |

APPENDIX C
MODEL 2707, INTERFACE PIN ASSIGNMENT

X.21 Interface
(DB-15 Female Connector)
(DTE/DCE Configuration)

| Pin # | Signal |
|--------------|------------------------------|
| 1 | Frame Ground |
| 2 | T (Transmit Data-A) |
| 3 | C (Control-A) |
| 4 | R (Receive Data-A) |
| 5 | I (Indication-A) |
| 6 | S (Signal Element Timing-A) |
| 7 | BT (Byte Timing-A) |
| 8 | SGND (Signal Ground) |
| 9 | T/ (Transmit Data-B) |
| 10 | C/ (Control-B) |
| 11 | R/ (Receive Data-B) |
| 12 | I/ (Indication-B) |
| 13 | S/ (Signal Element Timing-B) |
| 14 | BT/ (Byte Timing-B) |

APPENDIX D
 MODEL 2707, FACTORY REPLACEMENT PARTS
 AND ACCESSORIES

| Model # | Description |
|----------------|------------------------------------|
| 2707/C | G.703 NTU with a V.35 interface |
| 2707/D | G.703 NTU with an X.21 interface |
| 2707/I | G.703 NTU w/ 10Base-T EN interface |
| 0805US | American Power Cord |
| 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 |
| 08055DCUI | Universal Input Power Supply |
| 07M2707 | User Manual |

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