USER MANUAL

MODEL 1080ARC

Universal Synchronous & Asynchronous Short Range Modem Rack Mount Card

PATTON Electronics Co.

ISO 9001 CERTIFIED

An ISO-9001 Certified Company

Part# 07M1080ARC-D
Doc# 072051UD
Revised 7/12/01

SALES OFFICE
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1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model 1080ARC 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 Patton Technical Support.

1.3 SERVICE

All warranty and non-warranty repairs must be returned freight prepaid and insured to Patton Electronics. All returns must have a Return Materials Authorization number on the outside of the shipping container. This number may be obtained from Patton Electronics Technical Service 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 Model 1080ARC. Technical Service hours: **8AM** to **5PM EST**, **Monday** through **Friday**.

2.0 GENERAL INFORMATION

Thank you for purchasing this Patton Electronics product. This product has been thoroughly inspected by Patton's qualified technicians. 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

- Synchronous or asynchronous operation
- 2-wire half-duplex or 4-wire full- or half-duplex
- V.52 & V.54 test modes
- Automatic equalization & gain control
- Anti-streaming timer
- Data rates to 57.6 kbps
- Distances up to 20 miles (32 km)
- Point-to-point or multipoint
- Internal, external, or received loopback clocking
- Hardware and software flow control support
- Built-in transformer isolation & high speed surge protection
- Bi-color LED indicators
- Switchable 120V or 240V power supply
- Mounts in Patton's 16-card rack chassis
- Detects broken or inferior cable by lighting error LED

2.2 DESCRIPTION

The Model 1080ARC Series Universal Short Range Modem operates 2-wire (half duplex) or 4-wire (full or half duplex), in synchronous or asynchronous modes at an extended range of 20 miles. It operates at 12 switch-selectable data rates to 57.6 kbps. The Model 1080ARC always operates in sync. mode between the local and remote modems; when connected to an async. RS-232 device, the Model 1080ARC converts the async. data to sync. data.

The Model 1080ARC has several features to enhance overall performance: automatic equalization, automatic gain control, antistreaming timer, transformer isolation and Silicon Avalanche Diode surge protection. The Model 1080ARC features V.52 compliant bit error rate pattern tests and two V.54 test modes.

The Model 1080ARC is designed to mount in Patton's 2U high 19" rack chassis. This 16-card chassis has a switchable 120/240 volt power supply and mounts cards in a mid-plane architecture: The front card can be plugged into different rear cards. This means that the Model 1080ARC card can have several interface options and can be switched with other Patton short haul cards.

3.0 CONFIGURATION

This section describes the location and orientation of the Model 1080ARC's configuration switches and provides detailed instructions on setting each of the switches.

The Model 1080ARC uses a unique package of 24 DIP switches that allow configuration to an extremely wide range of applications. These 24 DIP switches are accessible when the card is slid out of the rack chassis. Once configured, the Model 1080ARC is designed to operate transparently, without need for frequent re-configuration.

3.1 SWITCH LOCATIONS AND ORIENTATION

The Model 1080ARC has three sets of eight switches—S1, S2, and S3—which are mounted on the PC board (Figure 1). These configuration switches allow you to select data rates, clocking methods, V.52 & V.54 tests, word lengths, extended signaling rates, async. or sync. mode, 2- or 4-wire operation, antistream control and input impedance. As Figure 2 shows, the orientation of all DIP switches is the same with respect to "ON" and "OFF" positions.

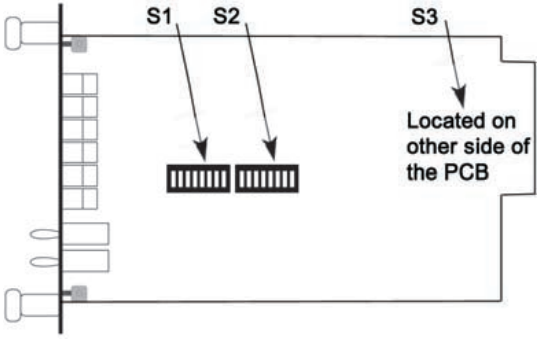


Figure 1. Model 1080ARC board, showing location of DIP switches

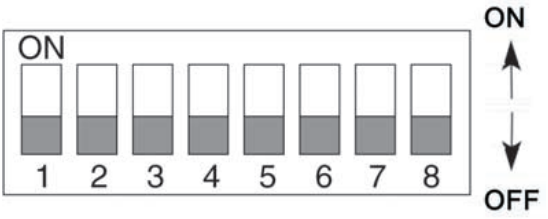


Figure 2. Close-up of DIP switches showing "ON" and "OFF" positions

3.2 CONFIGURATION SWITCH SET "S1"

The DIP switches on S1 set data rate, clock source, async./sync. mode and carrier control method. The default settings are summarized in Table 1.

Table 1: Summary of DIP switch default settings for set S1

Position	Function	Factory Default	
S1-1	Data Rate	On	9,600 bps
S1-2	Data Rate	Off	9,600 bps
S1-3	Data Rate	Off	9,600 bps
S1-4	Data Rate	On	9,600 bps
S1-5	Clock Source	On	Internal
S1-6	Clock Source	On	Internal
S1-7	Async./Sync.	On	Async.
S1-8	Carrier Control	Off	Constantly On

S1-1 through S1-4: Data Rate Setting

Switches S1-1 through S1-4 are set in combination to determine the asynchronous and synchronous data rate for the Model 1080ARC (see Table 2).

Table 2: S1-1 through S1-4: Data Rate Settings

S1-1	S1-2	S1-3	S1-4	Setting
On	On	On	On	1.2 kbps
Off	On	On	On	1.8 kbps
On	Off	On	On	2.4 kbps
Off	Off	On	On	3.6 kbps
On	On	Off	On	4.8 kbps
Off	On	Off	On	7.2 kbps
On	Off	Off	On	9.6 kbps
Off	Off	Off	On	14.4 kbps
On	On	On	Off	19.2 kbps
Off	On	On	Off	28.8 kbps
On	On	Off	Off	38.4 kbps
Off	On	Off	Off	57.6 kbps

S1-5 and S1-6: Clock Source

Switches S1-5 and S1-6 are set in combination to determine the transmit clock source for the Model 1080ARC (see Table 3).

Table 3: S1-5 and S1-6: Clock Source Settings

S1-5	S1-6	Setting
On	On	Internal transmit clock
Off	On	Receive recover clock
On	Off	External transmit clock

S1-7: Asynchronous/Synchronous Mode

The setting for switch S1-7 determines whether the Model 1080ARC is in asynchronous or synchronous operating mode (see Table 4).

Table 4: Asynchronous/Synchronous Mode Settings

S1-7	Setting
On	Asynchronous
Off	Synchronous

S1-8: Carrier Control Method

The setting for switch S1-8 determines whether the carrier is “constantly on” or “controlled by RTS”. This setting allows for operation in switched carrier, multipoint and/or hardware handshaking applications (see Table 5).

Table 5: Carrier Control Method Settings

S1-8	Setting
Off	Constantly on
On	Controlled by RTS

3.3 CONFIGURATION SWITCH SET S2

The DIP switches on S2 set word length, extended signaling rate, RTS/CTS delay, V.52 & V.54 diagnostic tests and 2- and 4-wire operation. The default settings are summarized in Table 6.

Table 6: Summary of DIP switch default settings for S2

Position	Function	Factory Default
S2-1	Not Used	N/A
S2-2	2-Wire/4-Wire	Off (4-Wire)
S2-3	V.52/V.54 Tests	Off (Normal Operation)
S2-4	RTS/CTS Delay	On (7 ms)
S2-5	RTS/CTS Delay	On (7 ms)
S2-6	Extended Signaling Rate	Off (-2.5% to 1%)
S2-7	Word Length	Off (10 bits)
S2-8	Word Length	Off (10 bits)

S2-2: 2-Wire/4-Wire Mode Selection

The setting for switch S2-2 determines whether the Model 1080ARC is operating in 2-wire or 4-wire mode (see Table 7).

Table 7: 2-Wire/4-Wire Mode Selection Settings

S2-2	Setting
Off	4-wire (full or half duplex)
On	2-wire (half duplex only)

S2-3: V.52 and V.54 Diagnostic Test

To reset the V.54 circuit, set switch S2-3 to the “ON” position, then back to the “OFF” position (see Table 8).

Table 8: V.52 and V.54 Diagnostic Test Settings

S2-3	Setting
Off	Normal Operation
On	Test Disabled

S2-4 and S2-5: RTS/CTS Delay

The combined settings for switches S2-4 and S2-5 determine the amount of delay between the time the Model 1080ARC “sees” RTS and when it sends CTS. Options are no delay, 7 ms and 53 ms (see Table 9).

Table 9: RTS/CTS Delay Settings

S2-4	S2-5	Setting
On	On	7 ms
On	Off	53 ms
Off	On	No delay
Off	Off	No delay

S2-6: Extended Signaling Rate

The setting for switch S2-6 determines the range of variability the Model 1080ARC “looks for” in asynchronous data rates (i.e., the actual variance from a given frequency level the Model 1080ARC will tolerate (see Table 10).

Table 10: Extended Signaling Rate Settings

S2-6	Setting
Off	-2.5% to +1%
On	-2.5% to +2.3%

S2-7 and S2-8: Word Length

Switches S2-7 and S2-8 are set in combination to determine the word length for asynchronous/synchronous data (see Table 11).

Table 11: Word Length Settings

S2-7	S2-8	Setting
On	Off	8 bits
On	On	9 bits
Off	Off	10 bits
Off	On	11 bits

3.4 CONFIGURATION SWITCH SET S3

The DIP switches on S3 set the antistream control, local loopback enable, remote loopback enable and receive (input) impedance levels for the Model 1080ARC. The default settings are summarized in Table 12 and Table 13.

Table 12: Summary of DIP switch default settings for S3

Position	Function	Factory Default	
S3-1	Input Impedance	On	200 Ohms
S3-2	Input Impedance	Off	200 Ohms
S3-3	Not yet assigned	n/a	
S3-4	Mode Selection	On	Point to Point
S3-5	Local Loopback	Off	Disabled
S3-6	Remote Loopback	Off	Disabled
S3-7	Antistream Control	Off	Disabled
S3-8	Antistream Control	Off	Disabled

Table 13: Selection Table for S3-1, S3-2

	Data Rates (kbps)											
Cable gauge	**1.2**	**1.8**	**2.4**	**3.6**	**4.8**	**7.2**	**9.6**	**14.4**	**19.2**	**28.8**	**38.4**	**57.6**
19	320	320	200	200	200	200	200	130	130	130	130	130
22	320	320	320	200	200	200	200	200	130	130	130	130
24	320	320	320	320	200	200	200	200	200	130	130	130
26	320	320	320	320	320	200	200	200	200	200	130	130

S3-1: Input Impedance

The setting for switch S3-1, S3-2 determines the 1080ARC's input impedance. This allows you to choose the optimum impedance setting for your application. In long distance applications the impedance of the cable must match the impedance of the load (or resistor) of the Model 1080ARC. Thicker gauge cables requires a lower ohm setting, while a thinner gauge cable should receive a higher ohm setting. If you are using higher speeds you will need a lower ohm setting, and a higher ohm setting for the slower speeds. See Table 13 for more details on selecting a setting.

Table 14: Input Impedance Settings

S3-1	S3-2	Setting
On	On	130 ohms
On	Off	200 ohms
Off	On	320 ohms
Off	Off	High impedance (minimum 2k-ohms)

S3-4: Mode Selection

The setting for switch S3-4 allows the user to choose the appropriate setting for point-to-point or multipoint applications (see Table 15).

Table 15: Mode Selection Settings

S3-4	Setting
On	Point-to-point
On	Multipoint application as "Master"
Off	Multipoint application as "Slave"

S3-5: RS-232 Initiation of Local Loopback Test

The setting for switch S3-5 determines whether or not the Model 1080ARC's local analog loopback test can be initiated by raising pin 18 on the RS-232 interface (see Table 16).

Table 16: RS-232 Local Loopback Settings

S3-5	Setting
On	RS-232 initiation enabled
Off	RS-232 initiation disabled

S3-6: RS-232 Initiation of Remote Loopback Test

The setting for switch S3-6 determines whether or not the Model 1080ARC's remote digital loopback test can be initiated by raising pin 21 on the RS-232 interface (see Table 17).

Table 17: RS-232 Remote Loopback Settings

S3-6	Setting
On	RS-232 initiation enabled
Off	RS-232 initiation disabled

S3-7 and S3-8: Antistream Control

Switches S3-7 and S3-8 are set in combination to determine the timeout period for the Model 1080ARC's antistream control timer (see Table 18).

Table 18: Antistream Control Settings

S3-7	S3-8	Setting
Off	Off	Disabled
Off	On	12.5 seconds
On	Off	50 seconds
On	On	12.5 seconds

3.5 REAR CARD CONFIGURATION

The Model 1080ARC has four interface card options: DB-25/RJ-11, Dual RJ-45, RJ-45/RJ-11 and DB-25/RJ-45. Each of these options supports one RS-232 connection and one 4-wire connection (the RS-232 port is always the lower port on the interface card). Figure 3 illustrates the four different interface options for the Model 1080ARC:

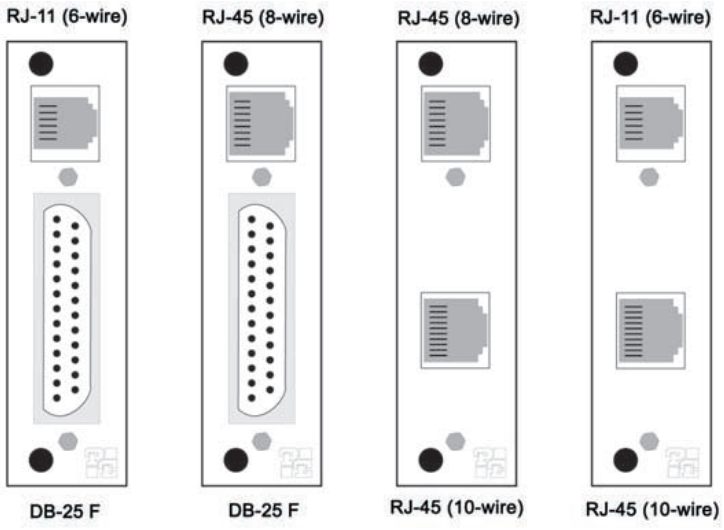


Figure 3. Model 1080ARC interface card options

Prior to installation, you will need to examine the rear card that you have selected and ensure that it is configured properly for your application. Each rear card is configured by setting straps located on the PC board. Sections “DB-25/RJ-11 & DB-25/RJ-45 Strap Settings” on page 17 and “RJ-45/RJ-11 & RJ-45/RJ-45 Strap Settings” on page 19 describe the strap locations and possible settings for each rear card.

DB-25/RJ-11 & DB-25/RJ-45 Strap Settings

Figure 4 shows strap locations for the Model 1000RCM12511 (DB-25/ RJ-11) and the Model 1000RCM12545 (DB-25/ RJ-45) rear cards. These straps determine various grounding characteristics for the RS-232 and twisted pair lines.

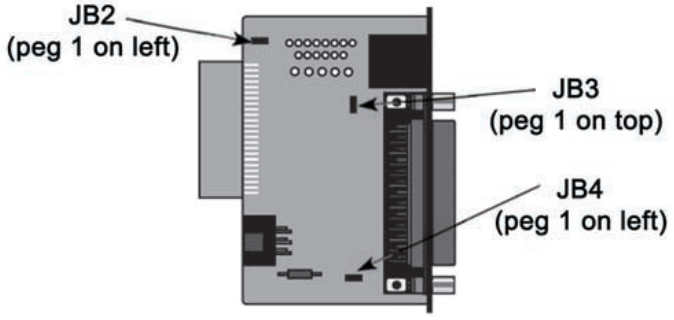


Figure 4. DB-25/RJ-11 & DB-25/RJ-45 strap locations

Figure 5 shows the orientation of the rear interface card straps. Observe that the strap can either be on pegs 1 and 2, or on pegs 2 and 3.

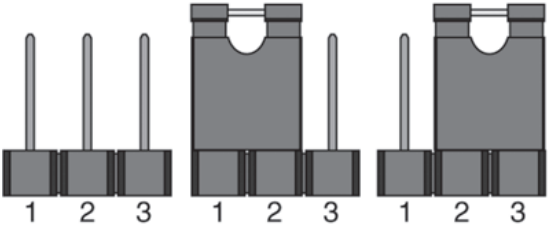


Figure 5. Orientation of interface card straps

Table 19 provides an overview of strap functions for the DB-25/modular cards. Following this overview is a detailed description of each strap's function.

Table 19: DB-25/RJ-11 & DB-25/RJ-45 Interface Card Strap Summary

Strap	Function	Position 1&2	Position 2&3
JB2	Line Shield & FRGND	Connected	Open*
JB3	DTE Shield (Pin1) & FRGND	Connected	Open*
JB4	FRGND & SGND	Connected	Open*

* indicates factory default

Line Shield & FRGND (JB2)

This strap pertains to the line interface. In the connected (closed) position, this strap links RJ-11 pins 1 and 6, or RJ-45 pins 2 and 7 to frame ground. These pins can be used as connections for the twisted pair cable shield. In the open (disconnected) position, pins 1 and 6 (or 2 and 7) remain connected to each other, but are “lifted” from the frame ground (see Table 20).

Table 20: Line Shield & FRGND (JB2) Settings

JB2	
Position 1&2 =	Line Shield and FRGND Connected
Position 2&3 =	Line Shield and FRGND Not Connected

DTE Shield (Pin 1) & FRGND (JB3)

In the connected (closed) position, this strap links DB-25 pin 1 and frame ground. In the open (disconnected) position, pin 1 is “lifted” from frame ground (see Table 21).

Table 21: DTE Shield (Pin 1) & FRGND (JB3) Settings

JB3	
Position 1&2 =	DTE Shield (Pin 1) and FRGND Connected
Position 2&3 =	DTE Shield (Pin 1) and FRGND Not Connected

SGND & FRGND (JB4)

In the connected (closed) position, this strap links DB-25 pin 7 (Signal Ground) and frame ground. In the open (disconnected) position, pin 1 is “lifted” from frame ground (see Table 22).

Table 22: SGND & FRGND (JB4) Settings

JB4	
Position 1&2 =	SGND (pin 7) and FRGND Connected
Position 2&3 =	SGND (Pin 7) and FRGND Not Connected

RJ-45/RJ-11 & RJ-45/RJ-45 Strap Settings

Figure 6 shows strap locations for the Model 1000RCM1D11 (RJ-45/RJ-11) and the Model 1000RCM1D45 (RJ-45/ RJ-45) rear cards. These straps determine various grounding characteristics for the RS-232 and twisted pair lines.

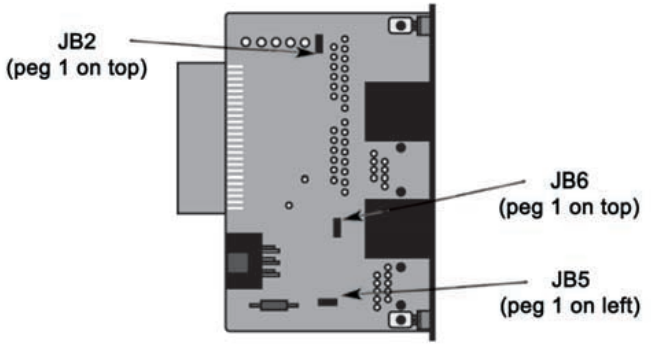


Figure 6. RJ-45/RJ-11 & RJ-45/RJ-45 strap locations

Table 23 provides an overview of strap functions for the modular/modular cards. Following the table is a detailed description of each strap's function.

Table 23: RJ-45/RJ-11 & RJ-45/RJ-45 Interface Card Strap Summary

Strap	Function	Position 1&2	Position 2&3
JB2	Line Shield & FRGND	Connected	Open*
JB5	SGND & FRGND	Connected	Open*
JB6	DTE Pin 2	DSR*	RI

Line Shield & FRGND (JB2)

This strap pertains to the line interface. In the connected (closed) position, this strap links RJ-11 pins 1 and 6, or RJ-45 pins 2 and 7 to frame ground. These pins can be used as connections for the twisted pair cable shield. In the open (disconnected) position, pins 1 and 6 (or 2 and 7) remain connected to each other, but are “lifted” from frame ground (see Table 24).

Table 24: Line Shield & FRGND (JB2) Settings

JB2	
Position 1&2 =	Line Shield and FRGND Connected
Position 2&3 =	Line Shield and FRGND Not Connected

SGND & FRGND (JB5)

This strap pertains to the DTE interface, which is a 10-position modular RJ-45 jack. In the connected (closed) position, this strap links modular pin 5 (Signal Ground) and frame ground. In the open (disconnected) position, pin 5 is “lifted” from frame ground (see Table 25).

Table 25: SGND & FRGND (JB5) Settings

JB5	
Position 1&2 =	SGND (pin 5) and FRGND Connected
Position 2&3 =	SGND (pin 5) and FRGND Not Connected

DTE Interface Pin 2 (JB6)

This strap configures DTE interface pin 2 for Ready Start (DSR) operation when placed on pegs 1 & 2. Placing the strap on pegs 2 & 3 is not a valid option when using this rear interface card in conjunction with the Model 1080ARC (see Table 26)

Table 26: DTE Interface Pin 2 (JB6) Settings

JB6	
Position 1&2 =	Ready Start (DSR) Operation
Position 2&3 =	Not a valid option

4.0 INSTALLATION

This section describes the functions of the Model 1000R16P rack chassis, tells how to install front and rear Model 1080ARC cards into the chassis, and provides diagrams for wiring the interface connections correctly.

4.1 THE MODEL 1000R16P RACK CHASSIS

The Model 1000R16P Rack Chassis (Figure 7) has sixteen short range modem card slots, plus its own power supply. Measuring only 3.5" high, the Model 1000R16P is designed to occupy only 2U in a 19" rack. Sturdy front handles allow the Model 1000R16P to be extracted and transported conveniently.

The Rack Power Supply

The power supply included in the Model 1000R16P rack uses the same mid-plane architecture as the modem cards. The front card of the power supply slides in from the front, and the rear card slides in from the rear. They plug into one another in the middle of the rack. The front card is then secured by thumb screws and the rear card by conventional metal screws.

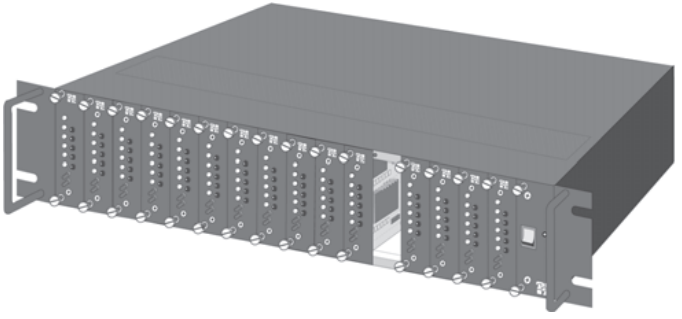


Figure 7. Model 1000R16P Rack Chassis with power supply

Switching the Power Supply On and Off

The power supply on/off switch is located on the front panel. When plugged in and switched on, a red front panel LED will glow. Since the Model 1000R16P is a "hot swappable" rack, it is not necessary for any cards to be installed before switching on the power supply. The power supply may be switched off at any time without harming the installed cards. Be sure power is off before power module card is removed.

4.2 INSTALLING THE MODEL 1080ARC INTO THE CHASSIS

The Model 1080ARC is comprised of a front card and a rear card. The two cards meet inside the rack chassis and plug into each other by way of mating 50 pin card edge connectors. Use the following steps as a guideline for installing each Model 1080ARC into the rack chassis:

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

Note Since the Model 1000R16P chassis allows "hot swapping" of cards, it is not necessary to power down the rack when you install or remove a Model 1080ARC.

4.3 WIRING THE MODEL 1080ARC

Each of the rear interface cards compatible with the Model 1080ARC has one RS-232 port and one 4-wire (twisted pair) port. These cards provide a female DB-25 for RS-232 connection.

RS-232 Connection

The Model 1080ARC uses a DB-25 female to connect the RS-232 interface to your computing hardware. It is pinned according to the RS-232C/V.24 interface standard. For specific interface pin-outs, please refer to the diagrams in Appendix D on page 37 of this manual.

The Model 1080ARC is wired to connect to a DTE. If your RS-232 output device is a DTE, use a straight though cable to connect to the Model 1080ARC. If your RS-232 output device is DCE, call Technical Support at (301) 975-1007 for specific installation instructions.

Twisted Pair Connection

The Model 1080ARC operates over one or two twisted pair. In all applications, the twisted pair wire must be 26 AWG or thicker, unconditioned, dry, metallic wire. Both shielded and unshielded wire yield favorable results.

Note The Model 1080ARC communicates in a closed data circuit with another Model 1080ARC or other compatible modem. Dial-up analog circuits, such as those used with a standard Hayes-type modem, are *not acceptable*. For further information about acceptable wire grades, please refer to the diagrams in Appendix B on page 34.

Point-to-Point Twisted Pair Connection

The 6-position RJ-11 and 8-position RJ-45 jack options for the Model 1080ARC are prewired for a standard TELCO wiring environment. Connection of a 2-wire or 4-wire twisted pair circuit between two or more Model 1080ARCs requires a crossover cable as shown in Table 27, Table 28, Table 29, Table 30 and Figure 8.

Table 27: RJ-11/4-Wire

SIGNAL	PIN#	COLOR	COLOR	PIN#	SIGNAL
GND†	1	Blue‡	White	6	GND
RCV-◊	2	Yellow	Red	4	XMT-
XMT+	3	Green	Black	5	RCV+
XMT-	4	Red	Yellow	2	RCV-
RCV+	5	Black	Green	3	XMT+
GND	6	White	Blue	1	GND

Table 28: RJ-45/4-Wire

SIGNAL	PIN#	COLOR	COLOR	PIN#	SIGNAL
GND†	2	Orange‡	Brown	7	GND
RCV-◊	3	Black	Green	5	XMT-
XMT+	4	Red	Yellow	6	RCV+
XMT-	5	Green	Black	3	RCV-
RCV+	6	Yellow	Red	4	XMT+
GND	7	Brown	Orange	2	GND

Connection to ground is optional
Standard color codes yours may be different
◊The Model 1080ARC is not sensitive to polarity

Table 29: RJ-11/2-Wire

SIGNAL	PIN#	COLOR	COLOR	PIN#	SIGNAL
XMT+◊	3	Green‡	Green	3	XMT+
XMT-	4	Red	Red	4	XMT-

Table 30: RJ-45/2-Wire

SIGNAL	PIN#	COLOR	COLOR	PIN#	SIGNAL
XMT+◊	4	Red‡	Red	4	XMT+
XMT-	5	Green	Green	5	XMT-

Standard color codes yours may be different
◊The Model 1080ARC is not sensitive to polarity

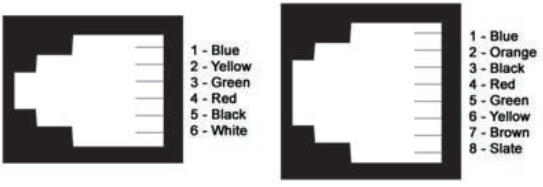


Figure 8. AT&T standard modular color codes

Multipoint Twisted Pair Connection

The Model 1080ARC supports multipoint applications using a star topology. Maximum distance between the units will vary based upon the number of drops, data rate, wire gauge, etc. Call Patton Technical Support for specific distance estimates. Figure 9 and Figure 10 show how to wire the one-pair and two-pair cables properly for a Model 1080ARC star topology. Note that the ground connection is not needed.

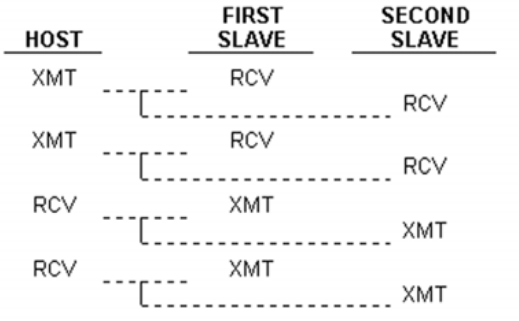


Figure 9. Two-pair star wiring for Model 1080ARC host and slaves

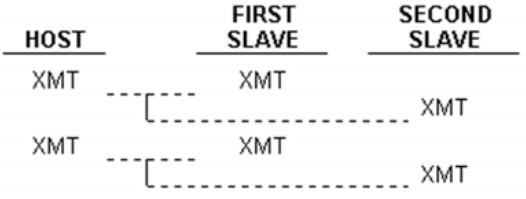


Figure 10. Single-pair star wiring for Model 1080ARC host and slaves

5.0 OPERATION

Once you have configured each Model 1080A properly and connected the twisted pair and RS-232 cables (see section 4.0, “Installation” on page 22), you are ready to operate the units. This section describes reading the LED status monitors, powering-up and using the built-in V.52 and V.54 test modes.

5.1 LED STATUS MONITORS

The Model 1080A features six front panel status LEDs that indicate the condition of the modem and communication link. Figure 11 shows the front panel location of each LED. Following Figure 11 is a description of each LED's function.

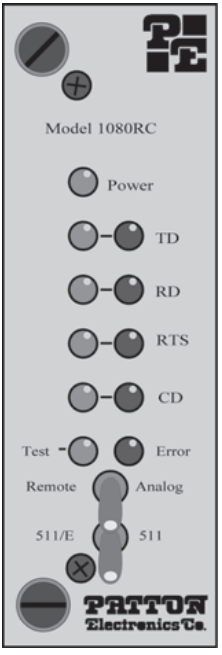


Figure 11. The Model 1080ARC front panel, showing LEDs and switches

The “TD” and “RD” Indicators

The “TD” and “RD” indicators blink red and green with data activity. Red indicates a low RS-232 logic level, green indicates a high RS-232 logic level.

Note RS-232 devices idle in a low state, so the LED will glow red if the connections are correct and the RS-232 device is in an idle state.

The "RTS" and "CD" Indicators

The "RTS" and "CD" indicators are bi-color and will glow red for a "low" signal or green for a "high" signal. RTS lights for an incoming signal on RS-232 pin 4. CD lights for an incoming signal on the line side, and the resulting output signal on RS-232 pin 8.

The "Test" Indicator

The green "Test" LED indicates that V.52 or V.54 tests are running.

The "Error" Indicators

The "Error" indicator LED has three functions:

A. When the 1080A is in test mode (green "Test" LED is lit), the error LED glows red when bit errors occur.

B. When not in test mode (green "Test" LED is off), the error LED is used to indicate an RTS streaming condition. See section 5.2, "Antistreaming Error Indicator" on page 29 for information on the antistreaming circuitry.

C. The "Error" LED is also used to detect line quality, such:

1. The improper use of flat (non-twisted pair) cable to connect the modems.
2. One or more broken wire in the 4 wire twisted pair cable.
3. The use of low quality twisted pair cable to connect the modems.
4. Broken or corroded connector.

Note In detecting line quality the "Error" LED indicator is designed for 4 wire twisted pair cable only, and may not function properly with two wire cable.

Setting Up The "Error" LED To Test Cable Quality

If there is any question as to the quality of your line we recommend the following test:

1. Disconnect both local and remote modems from their RS-232 interface. Make sure "TD", "RD" and "RTS" LEDs are lit red.

2. Set input impedance of both modems to 200. (S3-1 “On”, S3-2 “Off”)

3. Set data rate on both modems 9.6kbps. (S1-1 “On”, S1-2 “Off”, S1-3 “Off”, S1-4 “On”)

4. On local modem set “Carrier Constantly On”. (S1-8 “Off”)

5. Set remote modem to RTS control (S1-8, “On”).

6. Place both front panel toggle switches to neutral position. (Test Led will not light)

7. Connect both modems to the 4 wire twisted pair cable to be tested. (see “Twisted Pair Connection” on page 23)

Reading The Test

A. If line quality is good, “Error” LED on local modem will not light and “CD” LED will be red. On remote modem “Error” LED will not light and “CD” LED will light green.

B. If flat cable is used or parts of the line are flat cable, “Error” LED on local modem will light red and “CD” LED will light green. On remote modem “Error” LED will not light and “CD” LED will light green.

C. If one wire from the 4 wire twisted pair is broken “Error” LED will light red and “CD” LED will light green on at least one modem.

Note We cannot guarantee accurate detection if small pieces of flat cable are present in the line beyond 1500ft of the local modem.

5.2 ANTISTREAMING ERROR INDICATOR

When not in test mode (green “Test” LED is off), the front panel “Error” LED is used to indicate a streaming error. When the Model 1080A’s antistreaming circuitry is enabled, the RTS signal from the DTE is timer controlled. The timer begins to count when the DTE raises RTS. If the time period that RTS remains high exceeds the preset timeout period, the antistream circuit will force RTS low. The “Error” LED will light red, indicating a streaming condition (RTS continually on). This feature prevents a malfunctioning terminal from tying-up a computer port in a multidrop or polling environment. When the DTE drops RTS, the antistreaming timer is automatically reset and the front panel “Error” LED turns off. The timeout period is DIP switch selectable for 12.5 or 50 seconds.

5.3 POWER-UP

There is no power switch on the Model 1080ARC. Power is automatically applied to the Model 1080ARC when its card-edge connector makes contact with the chassis' mid-plane socket, or when the chassis' power supply is turned on.

> **Note** The Model 1080ARC is a "hot swappable" card—it will not be damaged by plugging it in or removing it while the rack is powered up.

When the local and remote Model 1080ARCs are both powered up and are passing data normally, the following LED conditions will exist:

- PWR = green
- TD & RD = flashing red and green
- RTS & CD = green
- TEST = off

5.4 TEST MODES

The Model 1080ARC offers two V.54 test modes and two V.52 test modes to evaluate the condition of the modems and the communication link. Both sets of tests can be activated physically from the front panel. The V.54 test can also be activated from the RS-232 interface.

> **Note** V.54 and V.52 test modes on the Model 1080ARC are available for point-to-point applications only.

Local Analog Loopback (LAL)

The Local Analog Loopback (LAL) test checks the operation of the local Model 1080ARC, and is performed separately on each unit. Any data sent to the local Model 1080ARC in this test mode will be echoed (returned) back to the user device. For example, characters typed on the keyboard of a terminal will appear on the terminal screen. To perform a LAL test, follow these steps:

1. Activate LAL. This may be done in one of two ways: First, by moving the upper front panel toggle switch RIGHT to "Analog". Second, by raising pin 18 on the RS-232 interface (note: be sure DIP switch S1-6 is enabled). Once LAL is activated, the Model 1080ARC transmit output is connected to its own receiver. The "Test" LED should be lit.

2. Verify that the data terminal equipment is operating properly and can be used for a test.

3. Locate the lower of the two toggle switches on the front panel of the Model 1080ARC and move it to the right. This will activate the V.52 BER test mode and inject a “511” test pattern into the local loop. If any errors are present in the loop, the red “Error” LED will blink sporadically.

4. If the BER test indicates no errors are present, move the V.52 toggle switch to the left, thus activating the “511/E” test with periodic errors. If the test is working properly, the red “Error” LED will blink regularly. A successful “511/E” test will confirm that the loop is in place, and that the Model 1080ARC’s built-in “511” generator and detector are working properly.

5. If the BER test indicates that errors are present, check to see that the RS-232 cable connecting the DTE to the Model 1080ARC is wired straight through, and is plugged in properly. Also, ensure that the Model 1080ARC is configured properly. Then re-check your DTE equipment. If you still have errors, call **Technical Support** at **(301) 975-1007**.

Remote Digital Loopback (RDL)

The Remote Digital Loopback (RDL) test checks the performance of both the local and remote Model 1080ARCs, and the communication link between them. Any characters sent to the remote 1080ARC in this test mode will be returned back to the originating device. For example, characters typed on the keyboard of the local terminal will appear on the local terminal screen after having been passed to the remote Model 1080ARC and looped back. To perform an RDL test, follow these steps:

1. Activate RDL. This may be done in two ways: First, by moving the upper front panel toggle switch LEFT to “Remote”. Second, by raising pin 21 on the RS-232 interface.

2. Verify that the DTE equipment on the local end is operating properly and can be used for a test.

3. Locate the lower of the two toggle switches on the front panel of the 1080ARC and move it to the right. This will activate the V.52 BER test mode and inject a “511” test pattern into the remote loop. If any errors are present in the loop, the red “Error” LED will blink sporadically.

4. If the BER test indicates no errors are present, move the V.52 toggle switch to the left, thus activating the “511/E” test with periodic errors. If the test is working properly, the red “Error” LED will blink regularly. A successful “511/E” test will confirm that the loop is in place, and that the Model 1080ARC’s built-in “511” generator and detector are working properly.

5. If the remote BER test indicates that errors are present, and the local analog loopback/BER tests showed that both Model 1080ARCs were functioning properly, this suggests a problem with the twisted pair communication line connecting the two modems. A common problem is improper crossing of the pairs. Also, verify that the modular connections are pinned properly, and the twisted pair line has continuity. If you still have errors, call **Technical Support** at **(301) 975-1007**.

Using The V.52 BER Test Independently

The Model 1080ARC's V.52 BER test can be used independent of the V.54 loopback tests. This requires two operators: one to initiate and monitor the test at both the local and the remote Model 1080ARC. To use the V.52 BER test by itself, both operators should simultaneously follow these steps:

1. Locate the lower of the two toggle switches on the front panel of the Model 1080ARC and move it to the right. This will activate the V.52 BER test mode and transmit a “511” test pattern to the other unit. If any errors are present, the receiving modem’s red “Error” LED will blink sporadically.

   Note For this independent test to function, the “511” switch on both Model 1080ARCs must be turned on.

2. If the test indicates no errors are present, move the V.52 toggle switch to the left, thus activating the “511/E” test with periodic errors present. If the test is working properly, the receiving modem’s red “Error” LED will blink regularly. A successful “511/E” test will confirm that the link is in place, and that the Model 1080ARC’s built-in “511” generator and detector are working properly.

APPENDIX A
SPECIFICATIONS

Transmission Format:	Synchronous or asynchronous, 2-wire/half duplex, or 4-wire/full or half duplex
Internal Interface:	Connection to Model 1000R16P rack chassis via 50 pin male card edge
External Interface:	DB-25 female; RJ-11 or RJ-45
Transmission Line:	2 or 4-wire UTP, 19 - 26 AWG
Data Rates:	Synchronous or asynchronous at 1.2, 1.8, 2.4, 3.6, 4.8, 7.2, 9.6, 14.4, 19.2, 28.8, 38.4, and 57.6 kbps—switch selected
Clocking:	Internal, external or receive recover
Controls:	Carrier constantly “ON” or “controlled by RTS”; RTS/CTS delay set to no delay, 7 or 53 ms
Applications:	Point-to-point or multi-point
Indicators:	Bi-color LED indicators for TD, RD, RTS & CD; single LED indicators for Test and Error
Diagnostics:	V.52 compliant bit error rate pattern; V.54 compliant—Local Analog Loop-back and Remote Digital Loopback, activated by front panel switch or via RS-232 interface
Transformer Isolation:	1500 V RMS
Surge Protection:	Silicon Avalanche Diodes
Temperature:	0-50°C / 32-122°F
Humidity:	0-95%, non-condensing
Dimensions:	0.95”w x 3.1”h x 5.4”l

APPENDIX B
CABLE RECOMMENDATIONS

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

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

Model 1080A Distance Table (miles)				
	Wire Gauge			
Data Rate	19	22	24	26
57,600	12	7.0	5.3	4.0
38,400	13	7.5	6.2	4.2
28,800	14	8.0	6.6	4.6
19,200	16	8.5	7.0	5.1
14,400	17	11.0	9.2	6.5
9,600	18.5	13.0	10.4	7.5
7,200	19.0	13.5	10.9	8.0
4,800	19.5	14.0	11.3	8.8
3,600	20	14.5	11.5	8.8
2,400	20.5	15.0	11.6	9.0
1,800	20.5	15.0	11.5	8.9
1,200	20	15.0	11.4	8.9

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 should be taken seriously. Certain models are better suited for particular applications and environments than others.

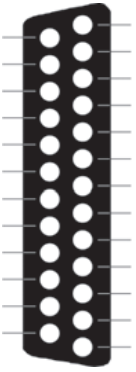
APPENDIX C
1080ARC FACTORY REPLACEMENT PARTS

The Patton Model 1080ARC rack system features interchangeable rear cards, power cords/fuses for international various operating environments and other user-replaceable parts. Model numbers, descriptions and prices for these parts are listed below.

Patton Model #	Description
1000RPEM	120/240V Rear Power Entry Module
1000RPSM-1	120/240V Front Power Supply Module
1000RPEM-DC	DC Rear Power Entry Module
1000RPSM-48A	48V Front Power Supply Module
0805US	American Power Cord
0805EUR	European Power Cord CEE 7
0805EURP	Europlug Power Cord CEE 7/16
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
0516FPB1	Single Width Blank Front Panel
0516FPB4	4-Wide Blank Front Panel
0516RPB1	Single Width Blank Rear Panel
0516RPB4	4-Wide Blank Rear Panel
056S1	Set of 16 #4 pan head screws/washers

APPENDIX D
1080ARC INTERFACE STANDARDS

DIRECTION	STANDARD RS-232C/V.24 DCE SETTING		DIRECTION
		1 - (FG) Frame Ground	
From 1080ARC	Transmit Clock - 15	2 - (TD) Transmit Data	To 1080ARC
		3 - (RD) Receive Data	From 1080ARC
From 1080ARC	Receive Clock - 17	4 - (RTS) Request to Send	To 1080ARC
To 1080ARC	Analog Loop - 18	5 - (CTS) Clear to Send	From 1080ARC
		6 - (DSR) Data Set Ready	From 1080ARC
		7 - (SG) Signal Ground	
To 1080ARC	Data Term. Ready (DTR) - 20	8 - (DCD) Data Carrier Detect	From 1080ARC
To 1080ARC	Digital Loop - 21		
To 1080ARC	External Clock - 24		
From 1080ARC	Test Mode - 25		



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