

# USER MANUAL

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## MODEL 1194 Single Mode Fiber Modem With Four Fixed E1/T1 Interfaces



**PATTON**  
Electronics Co.



An ISO-9001  
Certified  
Company

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## 1.0 WARRANTY INFORMATION

**Patton Electronics** warrants all Model 1194 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 INDUSTRY CANADA NOTICE

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above condition may not prevent degradation of service in some situations. Repairs to some certified equipment should be made by an authorized maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the ground connections of the power utility, telephone lines

and internal metallic water pipe system, are connected together. This protection may be particularly important in rural areas.



Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

**Caution**

## **1.2 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



Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

**Caution**

## **1.3 DC POWER NOTICE**

Connect the equipment to a 36–60 volts direct-current (VDC), 340 mA source that is electrically isolated from the AC source. The 36–60 VDC source *must* be connected to a reliable earth ground.

An approved external SELV power supply that incorporates a disconnect device must be used and positioned within reach of the operator's position.

#### 1.4 PATTON CONTACT INFORMATION

If you have any trouble operating the Model 1194, please contact **Patton Electronics Technical Support** at **301-975-1000**. The telephone company may ask you to disconnect the equipment from the telephone network until the problem has been corrected or until you are certain that the Model 1194 is not malfunctioning. In accordance with FCC rules and regulation CFR 47 68.218(b)(6), you must notify the telephone company prior to disconnection.

The following information may be required when applying to your local telephone company for leased line facilities. The Universal Service Order Code (USOC) is RJ-48C. The Facility Interface Codes (FIC) are 04DU9-BN, 04DU9-DN, 04DU9-1KN, and 04DU9-1SN. The Service Order Code (SOC) is 6.0N.

Service	Facility Interface Code	Service Code	Network Connection
1.544 Mbps SF format without line power	04DU9-BN	6.0N	RJ48C
1.544 Mbps SF and B8ZS without line power	04DU9-DN	6.0N	RJ48C
1.544 Mbps ANSI ESF without line power	04DU9-1KN	6.0N	RJ48C
1.544 Mbps ANSI ESF and B8ZS without line power	04DU9-1SN	6.0N	RJ48C

#### 1.5 FCC PART 68 COMPLIANCE STATEMENT (1194/T1)

This equipment complies with Part 68 of FCC Rules. Please note the following:

1. You are required to request service from the telephone company before you connect the CSU to a network. When you request service, you must provide the telephone company with the following data. When you request T1 Service, you must provide the telephone company with the Facility Interface Code. Provide the telephone company with both of the following codes: 04DU9-B (1.544 MB D4 framing format) and 04DU9-C (1.544 MB ESF format). The telephone company will select the code it has available. The Service Order Code(s) (SOC): 6.0N. The required Universal Service Order Code (USOC) jack: RJ 48C. The make, model number, and FCC Registration number of the CSU.

2. Your telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. The telephone company will notify you in advance of such changes to give you and opportunity to maintain uninterrupted telephone service.
3. If your CSU causes harm to the telephone network, the telephone company may temporarily discontinue your service. If possible, they will notify you in advance, but if advance notice is not practical, you will be notified as soon as possible and will be informed of your right to file a complaint with the FCC.
4. If you experience trouble with the CSU, please contact Patton Electronics, Co. for service or repairs. Repairs should be performed only by Patton Electronics Co.
5. You are required to notify the telephone company when you disconnect the CSU from the network.

## **1.6 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 European Union (EU). A Certificate of Compliance is available by contacting Technical Support.

## **1.7 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 1194. 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

- Four ITU G.703 (E1) or T1 channels over single-mode fiber
- Full duplex operation over a single strand of fiber
- Single-mode fiber with max distance 15.5 miles (25.0 km)
- Two fiber connection options available: FC or SC
- Clocking options: Internal, Network, or Receive Recover (fiber link)
- Local/remote loops: V.52 compliant 511/511E test patterns on each port
- 120-Ohm RJ-48C E1 or 100-Ohm T1 terminations
- AMI, HDB3 (E1), or B8ZS (T1) line coding
- 19 front panel LED status indicators: Fiber line, E1/T1 lines, Test mode, Error, Loss, No Signal, and Power.

### 2.2 DESCRIPTION

The Model 1194 (see Figure 1) enables service providers to offer cost effective extension (see Figure 2 on page 9) and distribution of four T1/E1 network circuits from a Telco's Central Office to a point of presence (POP), or in back-haul type operation linking CSU/DSUs, PABXs, routers, or multiplexers located at remote sites.

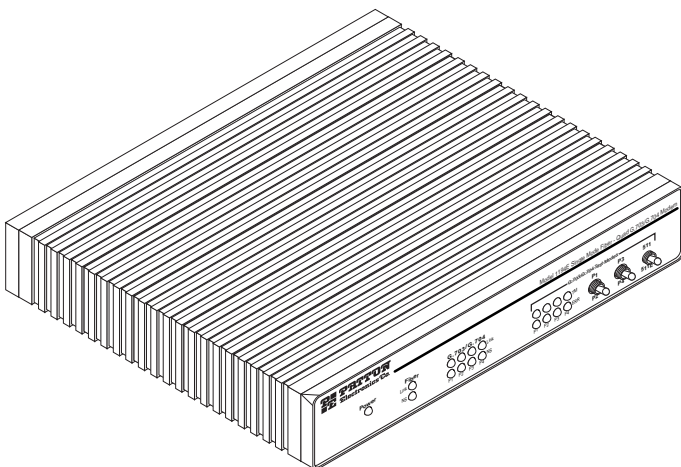
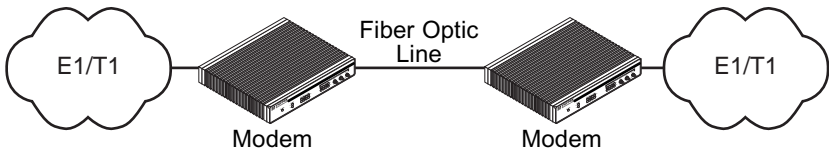


Figure 1. Model 1194





**Figure 2.** Network extension between remote locations

Using a laser transmitter (1300nm) and a single-mode fiber (9/125 micro meter), the Model 1194 offers a high speed, noise immune, full duplex fiber link over a single strand of fiber with a reach of up to 15.5 miles (25.0 km).

The Model 1194 is available in two versions: 1194/T1 and 1194/E1, for connection to T1 and E1 circuits respectively. Features include AMI, B8ZS/HDB3 line coding; internal, network, and receiver recovered clocks; all easily configured via DIP switches. Local/Remote loops and V.52 compliant 511 test patterns are accessible via front panel switches, allowing quick testing and troubleshooting of the Model 1194 transceivers, and fiber and network links.

The Model 1194 is equipped with 19 front panel LEDs that monitor power, fiber, network, and diagnostic features status.

The single-mode fiber interface uses either an SC or FC fiber connector, while the network interfaces are presented on RJ-48C connectors.

The Model 1194 offers options for universal input (100–240 VAC) and 48 VDC power supplies

### 3.0 CONFIGURATION

The Model 1194 has 16 DIP switches that enable configuration of the unit for a wide variety of applications. This section describes location of the switches and explains the different configurations.

#### 3.1 CONFIGURING THE HARDWARE DIP SWITCHES

Using a small flat-tip screwdriver, remove the protective cover located on the underside of the Model 1194 (see Figure 3).

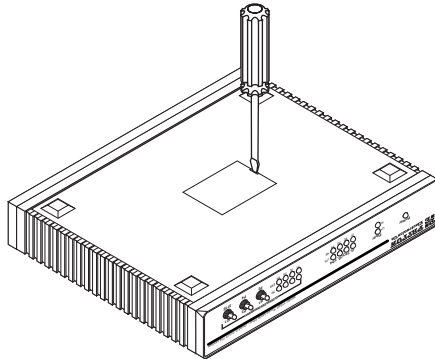


Figure 3. Removing the cover to access DIP switches S1 and S2

Figure 4 shows the orientation of the DIP switches in the “ON” and “OFF” positions.

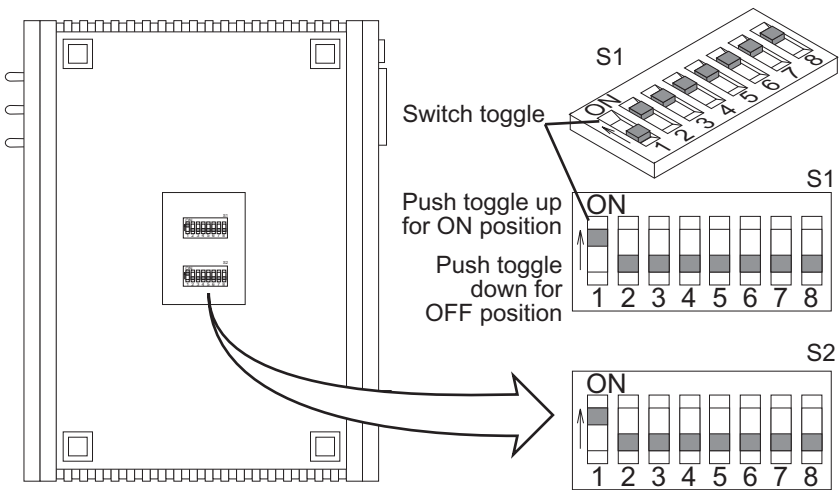


Figure 4. DIP switches S1 and S2

## Configuring DIP switch S1

Switches S1-1 through S1-8 are used to configure clocking modes and line coding. Default settings of the switches are shown in Table 1. Descriptions of the switch options follow the table.

**Table 1:** Switch S1 summary

Position	Function	Default Setting	Selected Option
S1-1	HDB3(E1)/B8ZS(T1) or AMI Line Coding	OFF	HDB3(E1)/B8ZS(T1)
S1-2	T1 Line Buildout	ON	0 dB
S1-3	T1 Line Buildout	ON	
S1-4	Reserved		
S1-5	Reserved		
S1-6	Clock Mode	OFF	Network
S1-7		ON	
S1-8	Reserved		

**Switch S1-1: Line Coding Options.** Use switches S1-1 to determine the line coding of the network interface ports. The setting should be *HDB3* if your unit is an 1194/E1, *B8ZS* if your unit is an 1194/T1, or *AMI* (common to both T1 and E1 technologies) The line coding must be the same line coding prescribed by the network access provider (NAP). Most applications will use HDB3.

S1-1	Setting
ON	AMI
OFF	HDB3 (E1)/B8ZS(T1)

- **Alternate Mark Inversion (AMI):** AMI 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 modem receiving the signal relies on the signal to recover the clock. If you must use AMI, ensure that the data terminal equipment connected to the unit provides a minimally acceptable pulse density. AMI coding does not inherently account for ones density. To meet this requirement, ensure that the data inherently meets pulse density.
- **High Density Bipolar 3 (HDB3):** In HDB3 coding, the transmitter deliberately inserts a bipolar violation when excessive zeros in the data stream are detected. The receiver recognizes these special viola-

tions and decodes them as zeros. This method enables the network to meet minimum pulse density requirements.

- **Bipolar 8 Zero Substitution (B8ZS):** This mode assures proper bit density in the data stream. In this mode any data pattern can be transmitted without causing ones density errors. This mode allows for 64 kbps clear channel timeslots.

**Switches S1-2 and S1-3: Line Build Out.** Line buildout (LBO) is a T1 equipment feature, it controls the transmitter signal strength and pulse shape sent over the T1 line. For most applications, the default settings (0 dB) will suffice. When connecting to a carrier's T1 circuit, the carrier will determine what LBO is necessary. 0 dB provides the highest signal strength, and therefore the longest distance, while -15.0 dB provides the lowest usable signal level. -22.5 dB is used to test the line and should not be used in normal applications.

Transmitted E1 signals are not specified in terms of LBO. Patton's Model 1194/E1 complies with ITU-T G.703 recommendation for signal pulse shape and amplitude, and has a reach of 1.6 km. No user configuration is required

S1-2	S1-3	Function
ON	ON	0dB
OFF	ON	-7.5dB
ON	OFF	-15.0dB
OFF	OFF	-22.5dB

**Switches S1-6 and S1-7: Clock Mode.** Use switches S1-6 and S1-7 to determine clock mode of the 1194.

S1-6	S1-7	Setting	Description
ON	ON	Internal	Transmit clock generated internally
ON	OFF	Receive Recover	Transmit clock derived from the fiber line link
OFF	ON	Network	Transmit clock derived from E1 or T1 equipment interface
OFF	OFF	Internal use only	

**Note** The Model 1194 units are intended to work in pairs. Set the clock modes for the Model 1194 units with one end of the link set for receive recover and the other end set for either internal or network.

## Configure DIP switch S2

Switches S2-1 through S2-8 are for configuring Local/Remote Loop, RDL response, and front panel switch operation (see Table 2). Descriptions of the switch options follow the table.

**Table 2:** Switch S2 summary

Position	Function	Default Setting	Selected Option
S2-1	Local/Remote Loop	OFF	Local Loop
S2-2	Reserved		
S2-3			
S2-4			
S2-5			
S2-6			
S2-7	Response to RDL	OFF	Enabled
S2-8	Front panel switches	OFF	Enabled

**Switch S2-1: Local/Remote Loop.** Switch S2-1 determines which Loop can be activated from the front panel loop switches (P1 to P4)

S2-1	Loop selected
OFF	Local Loop
ON	Remote Loop

**Switch S2-7: Response to RDL.** Switch S2-7 enables or disables the ability of the model 1194 to respond to RDL (Fiber Loop)

S2-7	RDL Response
ON	Disabled (no response)
OFF	Enabled

**Switch S2-8: Front Panel Switches.** Switch S2-8 enables or disables front panel switches, affecting the operation of P1 to P4 (loop switches) and test pattern switches. In the ON position, S2-8 disables the operation of front panel switches preventing the accidental activation of diagnostic loops and test patterns.

S2-8	Front panel Switches
ON	Disabled
OFF	Enabled

## 4.0 INSTALLATION

Once the Model 1194 is configured, it is ready to connect to the fiber interface, to the E1/T1 equipment, and to the power source. This section describes how to make these connections.

The power, network (E1/T1), and fiber line connections are located on the rear panel of the Model 1194. Figure 5 shows the location of each of these ports.

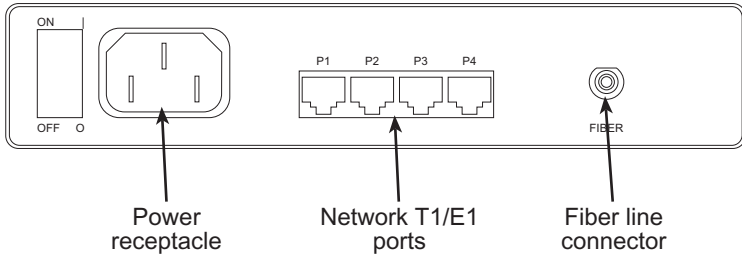


Figure 5. Network, fiber, and power connection ports

### 4.1 CONNECT THE G.703/G.704 OR T1 NETWORK

The Model 1194 is equipped with 4 RJ-48C jacks for connection to an E1 or T1 network. Figure 6 shows the pinout for each of the four network interface ports.

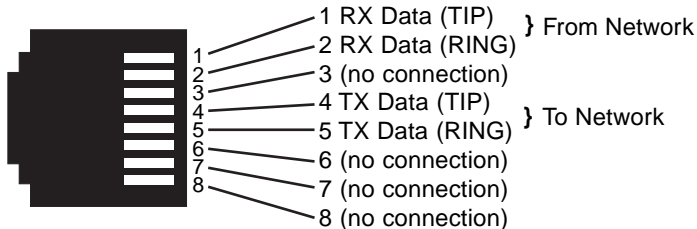


Figure 6. E1 or T1 network interface

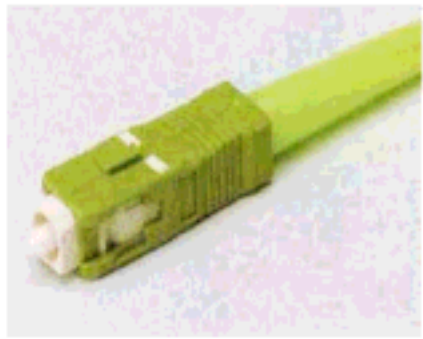
### 4.2 CONNECT THE FIBER INTERFACE

The Model 1194 is designed to be connected to another Model 1194. The Model 1194 supports communication between T1 or E1 equipment over single-mode fiber at distances up to 25 km (16 miles). One modem can connect to another on the end of a single strand of fiber optic cable.

To connect two Model 1194s, use one strand of 9/125 micron single-mode fiber. The fiber connects to each Model 1194 using either an FC or SC connector. Figure 7 shows a close-up of SC and FC connector types.



FC



SC

Figure 7. Single-mode fiber connectors (FC and SC)



Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

### Caution

## 4.3 POWER CONNECTION

The Model 1194 is available with two power supply options:

- **Universal Interface AC Power Supply option (Model 1194-UI)** operates in environments ranging from 100 to 240 VAC, with no re-configuration necessary (see **Appendix B** for available domestic and international power cords).
- **DC Power Supply option (Model 1194/48)** operates in 48 VDC (36–60 VDC) environments and is equipped with a 3-pin “terminal strip” style connector.

### Connecting to an AC Power Source

The Universal Interface AC Supply is equipped with a male IEC-320 power connection. A domestic (US) power supply cord is supplied with the unit at no extra charge. To connect the standard or universal power supply, follow these steps:

1. Attach the power cord (supplied) to the shrouded male IEC-320 connector on the rear of the Model 1194.
2. Plug the power cord into a nearby AC power outlet.

3. Set the ON/OFF power switch (see Figure 8) to ON.

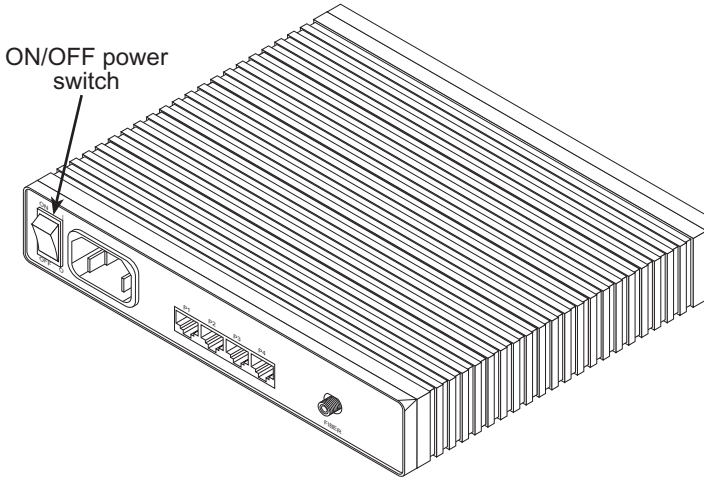


Figure 8. Power switch location

### Connecting to a DC Power Source

The 48 VDC power supply option uses a 3-pin terminal block with spring-type connectors. Please refer to the *Model 1090 Series Service Manual* for the power line voltage connections.



**There are no user-serviceable parts in the power supply section of the Model 1194. Fuse replacement should only be performed by qualified service personnel. Contact Patton Electronics Technical support at +1 (301) 975-1007, via our web site at [www.patton.com](http://www.patton.com), or by E-mail at [support@patton.com](mailto:support@patton.com), for more information.**

### WARNING

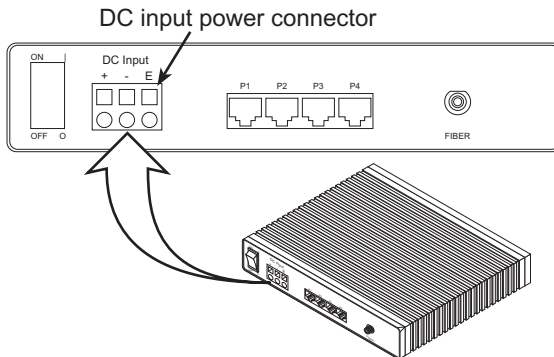


Figure 9. DC power connection



## 5.0 POWER-UP

To apply power to the Model 1194, first be sure that the unit is connected to the appropriate power source. Then do the following:

1. Set front panel switches to the center position
2. Plug the provided AC or DC power into the Model 1194.
3. Set the ON/OFF power switch (see Figure 8 on page 16) to ON.  
After the local and remote Model 1194s are powered up, a synchronization process will occur to establish a link. The synchronization process should take approximately 5 seconds. If one of the Model 1194s loses power (for example, during a lightning storm), the local and remote units will re-synchronize before they can resume data transmission.

## 6.0 LED STATUS MONITORS

The Model 1194 features front panel LEDs that monitor power, network, fiber, and diagnostic signals. Figure 10 shows the front panel location of each LED. Table 3 describes each LED's function.

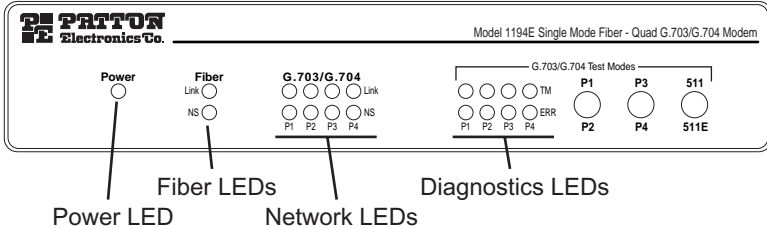


Figure 10. Front panel picture of 1194

Table 3: Front panel LED descriptions

LED	LED color	Description
POWER	Green	Indicates the presence of AC or DC power
FIBER LINK	Green	Indicates the unit fiber link is synchronized and operating correctly
FIBER NS	Red	Indicates the absence or synchronization or fiber connection
Network Link (4)	Green	Indicates synchronization of the corresponding E1 or T1 port (P1-P4)
Network Loss (4)	Red	Loss of synchronization or link of the corresponding E1 or T1 port (P1-P4)
Test Mode TM (4)	Yellow	Indicates the activation of Local, Remote, or 511/511 pattern for corresponding E1 or T1 port (P1-P4)
Error ERR (4)	Red	Indicates the presence of errors in test pattern data received

## 7.0 TEST MODES

The following section describes the test patterns and loopbacks used in the Model 1194. The Model 1194 offers local/remote loopback tests, plus a built-in V.52 BER test pattern generator to evaluate the condition of the modems and the network (T1/E1 lines) and fiber links. These tests can be activated physically from the front panel. Before initiating a loopback test, the user needs to select Local or Remote loops via DIP switch S2-1 located on the underside of the unit

S2-1	Loop Test Selected
OFF	Local
ON	Remote

### 7.1 LOCAL LOOPBACK TEST

This feature is used to test the T1 or E1 link on a per-port basis. Each of the four T1 or E1 ports can be tested to verify the proper operation of the line and the device at the remote end of the T1/E1 link. During local loopback the corresponding E1 or T1 port in the Model 1194 will transmit the data received back to the originating device.

Set S2-1 to the OFF position, this setting prepares the Model 1194 for local loop. The model 1194 has 3 front panel toggle switches, one of the switches initiates 511/511E test patterns, the other two switches will initiate loops for a network port, the switches have labels corresponding to network ports (P1 through P4). For example, to initiate a local loop on network port 1, move the first switch from the left UP towards label "P1". See Figure 11 loop diagram

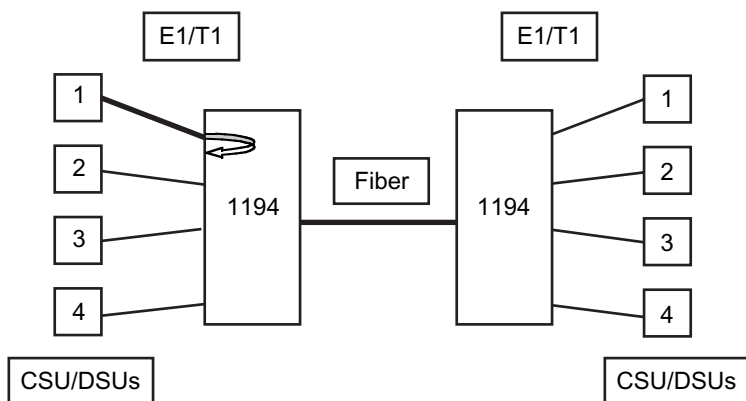


Figure 11. 1194 Local loop

To test the local connection, do the following:

1. Set S2-1 to the OFF position.
2. Locate the port label (P1-P4) above or below the front panel switches, Activate local loopback for a network port by moving the appropriate front panel toggle switch UP or DOWN. A yellow TM LED corresponding to the port under test will turn on.
3. A BER (Bit Error Rate) test can be performed using a BER tester at the far end of the T1/E1 link. If the BER test equipment indicates no faults but the data indicates a fault, follow the manufacturer's checkout procedures for the far end device. The BER test can also be performed using a built-in 511/511E pattern generator. (See the following section for more on how to use the built-in 511/511E pattern generator.)
4. Upon completion of the LAL test, return the front panel switch to center position. After approximately 30 seconds, the TM LED should turn off.

## 7.2 REMOTE LOOPBACK TEST

The Remote loopback feature tests the performance of the local and remote 1194 and the fiber optic link. During this test, data transmitted from a T1 or E1 port at a local 1194 and sent over the fiber link is returned by the remote 1194. For example, to initiate a remote loop test on network port 1, move the first switch from the left UP towards label "P1", data sent from port 1 will go through the 1194 and fiber link to the remote 1194 (see Figure 12). The remote 1194 will send port 1 data back to the originating device, as well as to the corresponding port on it's E1/T1 network side.

In order to prepare the Model 1194, make sure that fiber connection is in place. Verify that the "Fiber link" LED on the front panel of the 1194 is ON.

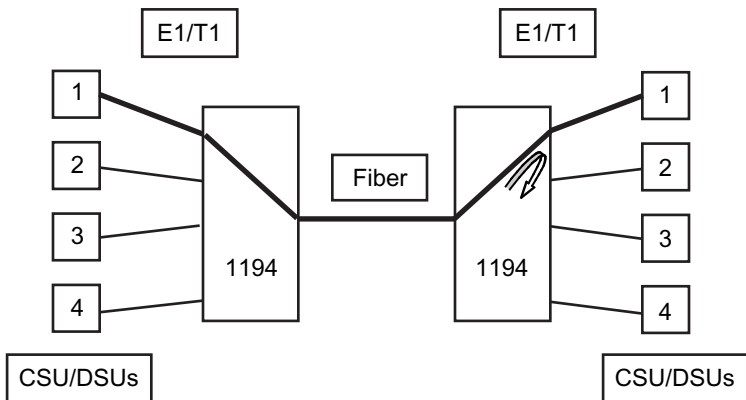


Figure 12. 1194 Remote Loop

To test the fiber connection, do the following:

1. Set S2-1 to the ON position.
2. Locate the port label (P1-P4) above or below the front panel switches, Activate Remote Loopback for a network port by moving the appropriate front panel toggle switch UP or DOWN. A green TM LED corresponding to the port under test will turn on. A BER test can now be initiated using a BER tester or the built-in 511/511E pattern generator.
3. Upon completion of the remote loop test, return the front panel switch to center position. After approximately 30 seconds, the TM LED should turn off.

### **7.3 THE V.52 TEST PATTERN GENERATOR**

To use the V.52 BER test in conjunction with the Local or Remote Loopbacks, follow these instructions:

1. Locate the “511/511E” toggle switch on the front panel of the Model 1194 and move it UP. This activates the V.52 BER test mode and transmits a “511” test pattern into the loop. If any errors are present, the red “ERR” LED corresponding to the port under test will blink intermittently.
2. If the above test indicates no errors, move the V.52 toggle switch down, activating the “511/E” test with errors present. If the test is working properly, the local 1194 red “ERR” LED will blink approximately once every 2 seconds. A successful “511/E” test will confirm that the link is in place, and that the Model 1194’s built-in “511” generator and detector are working properly.

**Note** Note: When the unit is set for Network Clock Mode, the unit will derive its timing from the Network (T1/E1)Interface. Failure to connect to the network may result in bit errors during the 511 or 511/E test.

## **APPENDIX A**

### **MODEL 1194 QUAD E1/T1 TO SINGLE MODE FIBER SPECIFICATIONS**

#### **A.1 CONFIGURATION**

Externally accessible dip switches

#### **A.2 CLOCKING MODES**

Network (E1/T1), Internal, Receive Recover (fiber Link)

#### **A.3 NETWORK PORTS SPECIFICATIONS**

##### **Network Line Rate**

2048 kbps (G.703), 1.544Mbps (T1)

##### **Transmit Line Buildout (T1)**

0 dB, -7.5 db, -15 db, and -22.5 dB

##### **Interface**

RJ-48C 120 ohm (E1), 100 ohm (T1)

##### **Line coding**

AMI or HDB3 (E1), B8ZS (T1)

##### **Isolation**

1500 Vrms

##### **Physical Connection**

- (RJ-48C)
- pin 1 Rx Data Tip
- pin 2 Rx Data Ring
- pin 4 Tx Data Tip
- pin 5 Tx Data Ring
- pins 3, 6, 7, 8 no connection

## **A.4 FIBER PORT SPECIFICATIONS**

### **Fiber Line Coding**

8B10B

### **Fiber Physical**

- **Connection:** One strand of 9/125 micron single-mode fiber with FC or SC connectors
- **Transmission Line:** Single fiber
- **Link Budget:** 13 dB

## **A.5 DIAGNOSTICS**

V.52 compliant (511/511E) pattern generator and detector with error injection mode. Remote Loopback (toward fiber line) and local loopback (toward T1/E1 Network) controlled by front panel switches

## **A.6 COMPLIANCE**

FCC Part 15, FCC Part 68, CE, CTR12.

UL1950, CAN/CSA C22.2 No. 950

## **A.7 LASER SAFETY**

Complies with 21CFR 1010 and 1040, Class 1 Lasers

## **A.8 NETWORK LINE INTERFACE**

Transformer coupled, 1500 VAC isolation

## **A.9 POWER**

- 100–240 VAC, 400 mA, 50–60 Hz (universal input);
- 48 VDC (option). (36–60) 340 mA input.

## **A.10 TEMPERATURE RANGE**

32–122°F (0–50°C)

## **A.11 ALTITUDE**

0–15,000 feet

**A.12 HUMIDITY**

5 to 95%, non-condensing

**A.13 DIMENSIONS**

7.3 W x 6.6 D x 1.62H in. (185 W x 168 D x 41 H mm)

**A.14 WEIGHT**

2.01 lbs. (1.0kg)

**A.15 MEAN TIME BETWEEN FAILURE (MTBF)**

113,258 hours, based on MIL-HDBK-217F, Notice 2.