USER MANUAL

MODEL 1094A
NetLink™ HDSL
Multi-Rate
Symmetric DSL Modem

PATTON Electronics Co.

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ISO 9001

An ISO-9001 Certified Company

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1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model 1094A 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 RADIO AND TV INTERFERENCE

The Model 1094A generates and uses radio frequency energy, and if not installed and used properly—that is, in strict accordance with the manufacturer's instructions—may cause interference to radio and television reception. The Model 1094A has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the Model 1094A does cause interference to radio or television reception, which can be determined by disconnecting the unit, the user is encouraged to try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

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 European Union (EU). A Certificate of Compliance is available by contacting 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**
Email: **support@patton.com**
www: **http://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 1094A. Technical Service hours: **8AM to 5PM EST, Monday through Friday.**

> **IMPORTANT:** **The Model 1094A is equipped with flash upgrade. Please refer to Patton website, http://www.patton.com or contact Technical Support for the latest version of the software.**

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

- DSL Distances on just two wires using HDSL technology
- DTE Speeds n x 64 to 1.152 Mbps
- 2-wire Operation
- Standalone (QuikConnect™) and Rackmount Versions Available
- SNMP Network Management with In-Band Management of Remote Units plus Advanced Diagnostics & Statistics using Patton Model 1000MC
- Internal, external or receive recovered clocking options
- LED indicators for TD, RD, CTS, CD, DTR, TM, ER and NS

2.2 DESCRIPTION

The Patton Electronics *NetLink™ HDSL* Multi-Rate DSL Modem provides high speed 2-wire connectivity to ISPs, PTTs, and corporations using HDSL (Multi-rate Digital Subscriber Line) technology. Multi-rate DSL offers the ability to deliver the maximum bit rate that a twisted pair line can accommodate. Supporting multiple line rates from 144kbps to1.168 Mbps, the NetLink provides "megabyte" speeds to leased line, LAN to LAN interconnection, and WAN access networks over 2.9 miles/4.7km (1.152Mbps on 24AWG/.5mm wire).

The *NetLink™ HDSL* standalone allows DTE speeds from 64kbps to 1.152Mbps in increments of 64kbps. Features include loop-back diagnostics, inband SNMP/HTTP remote management capabilities and externally accessible configuration switches. A high density 2U-high rack card version of the *NetLink™ HDSL* is also available.

As a symmetric DSL NTU, *NetLink™ HDSL* offers the same data rates in both directions over a single pair of regular telephone lines using 2B1Q modulation. Featuring replaceable DCE-DTE interface modules, the NetLink HDSL can be configured for a huge range of V.24/RS-232, V.35, RS-422/530, G.703 and X.21 applications. Line connection is made by an RJ-45 jack. The standard Model 1094A is powered by a 100/230VAC(Universal) supply. The DC power supply option supports any DC input between 40-60VDC.

3.0 CONFIGURATION

The Model 1094A is equipped with three sets of eight DIP switches, which allow configuration of the unit for a wide variety of applications. This section describes switch locations and explains all possible configurations.

3.1 CONFIGURING THE HARDWARE DIP SWITCHES

The 24 external switches are grouped into three eight-switch sets, and are externally accessible from the underside of the Model 1094A (See Figure 1).
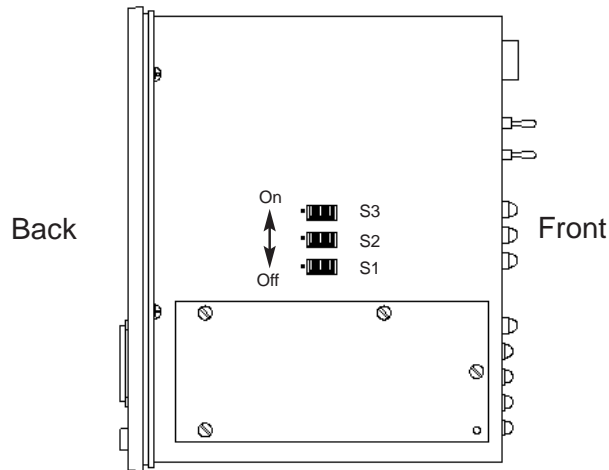

Figure 1. Underside of Model 1094A, Showing Location of DIP Switches

The three sets of DIP switches on the underside of the Model 1094A will be referred to as S1, S2, and S3. As Figure 2 shows, the orientation of all DIP switches is the same with respect to "ON" and "OFF" positions.
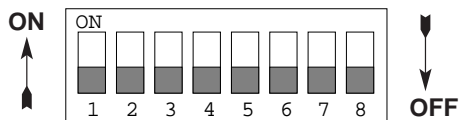
Figure 2. Close Up of Configuration Switches (all sets are identical in appearance)

3.1.1 Configuration DIP Switch Set "S1" - Reserved Switches

All Switches in Switch S1 are reserved for future use. These switches should remain in the On position.

3.1.2 Configuration DIP Switch Set "S2"

The configuration switches on S2 allow you to specify the Clocking Mode and response to DTE Loop Enable. Default settings of S2 are shown in the table below.

S2 SUMMARY TABLE		
Position	Function	Factory Default
S2-1	Reserved	Off
S2-2	Reserved	Off
S2-3	Reserved	Off
S2-4	Reserved	Off
S2-5	Reserved	Off
S2-6	Clock Mode	On ⎱ Receive
S2-7	Clock Mode	Off ⎰ Recovered Clock
S2-8	Enable Loop from DTE	Off Disable

Switch S2-1, S2-2, S2-3, S2-4, and S-5: Reserved for Future Use and Should Remain in the Off Position.

Switches S2-6 and S2-7: Clock Mode

Use Switches S2-6 and S2-7 to configure the 1094A for internal, external, or receive recover clock mode.

CO/CP Unit	S2-6	S2-7	Clock Mode	Description
CO	On	On	Internal	Transmit clock generated internally
CO	Off	On	External (DTE)	Transmit clock derived from terminal interface
CP	On	Off	Receive Recover	Transmit clock derived from the received line
	Off	Off		*Reserved*

Switch S2-8: Enable/Disable Loop Tests from DTE

Use Switch S2-8 to allow Model 1094A to enter loopback tests when the DTE raises the appropriate loop request pin.

S2-8	Setting
On	Response to DTE Loopback Request Enabled
Off	Response to DTE Loopback Request Disabled

3.1.3   Configuration Switch Set "S3"

Use the eight DIP Switches in Switch S3 to enable the DTE connection rate.   The following table summarizes default positions of DIP Switch S3. Detailed descriptions of each switch follow the table.

S3 SUMMARY TABLE		
Position	**Function**	**Factory Default**
S3-1	DTE Rate	Off
S3-2	DTE Rate	Off
S3-3	DTE Rate	On
S3-4	DTE Rate	On
S3-5	DTE Rate	On
S3-6	DTE Rate	On
S3-7	Reset Software Defaults	On Normal Operation
S3-8	Transmit Data Sample Point	On Normal Operation

(S3-1 through S3-6 bracketed as 64Kbps)

Switch S3-1: DTE Rate

Use Switch S3-1 through S3-6 to set the DTE bit rate.

S3-1	S3-2	S3-3	S3-4	S3-5	S3-6	DTE Rate (kbps)
Off	Off	On	On	On	On	64
On	On	Off	On	On	On	128
Off	On	Off	On	On	On	192
On	Off	Off	On	On	On	256
Off	Off	Off	On	On	On	320
On	On	On	Off	On	On	384
Off	On	On	Off	On	On	448
On	Off	On	Off	On	On	512
Off	Off	On	Off	On	On	576
On	On	Off	Off	On	On	640
Off	On	Off	Off	On	On	704
On	Off	Off	Off	On	On	768
Off	Off	Off	Off	On	On	832
On	On	On	On	Off	On	896
Off	On	On	On	Off	On	960
On	Off	On	On	Off	On	1024
Off	Off	On	On	Off	On	1088
On	On	Off	On	Off	On	1152

NOTE: **Based upon the chosen DTE rate, the Model 1094A will automatically select the optimum line rate for distance. This selection is based on the lowest line rate that will support the DTE rate.**

Switch S3-7: Reset Software Defaults

Switch S3-7 allows the user to reset the software configured factory defaults.

S3-7	Factory Test
On	Normal Operation
Off	Reset

Switch S3-8: Transmit Data (TD) Sampling Point

Switch 3-8 controls the Transmit Data (TD) sampling point.

S3-8	Setting	Description
On	Normal	TD sampled on the falling edge of the 1094A Transmit Clock (TC)
Off	Invert	TD sampled on the rising edge of the 1094A Transmit Clock.

4.0 INSTALLATION

Once the Model 1094A is properly configured, it is ready to connect to the twisted pair interface, to the serial port, and to the power source. This section tells you how to make these connections.

4.1 CONNECTING THE TWISTED PAIR INTERFACE

The Model 1094A supports communication between two DTE devices at distances to 4 miles (8 km) over 24 AWG (.5mm) twisted pair wire. There are two essential requirements for installing the Model 1094A:

1. These units work in **pairs**. Both units at the end of the twisted pair must have the same 2-Wire connection and DTE rate.

2. To function properly, the Model 1094A needs one **twisted** pair of metallic wire. This twisted pair must be **unconditioned**, dry, metallic wire, between 19 (.9mm) and 26 AWG (.4mm) (the higher number gauges will limit distance). Standard dial-up telephone circuits, or leased circuits that run through signal equalization equipment, or standard, flat modular telephone type cable, are *not acceptable*.

The RJ-45 connector on the Model 1094A's twisted pair interface is polarity insensitive and is wired for a two-wire interface. The signal/pin relationships are shown in Figure 3 below.
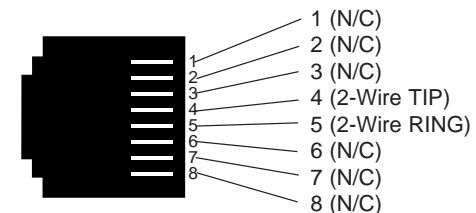

1 (N/C)
2 (N/C)
3 (N/C)
4 (2-Wire TIP)
5 (2-Wire RING)
6 (N/C)
7 (N/C)
8 (N/C)

Figure 3. Model 1094A twisted pair line interface.

IMPORTANT!: **The Model 1094A has been optimized for performance at high bitrates (DTE rates greater than 512 kbps). To ensure accurate performance at these bit rates, please use twisted pair line interface cable that is at least 330ft (100m) in length.**

4.2 CONNECTING THE SERIAL PORT

The serial port interface on the Model 1094A uses interchange-able *QuikConnect™* Modules.   Each *QuikConnect™* Module has a 50-pin card edge connector on one side and a serial port interface on the other. Figure 4 below shows how a *QuikConnect™* Module plugs into the back of the Model 1094A.
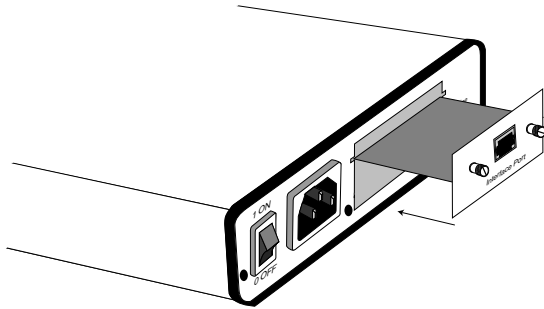

Figure 4. Installation of Model 1094A Plug-in Serial Interface Module

4.2.1 Changing *QuikConnect™* Modules

When you purchase a particular version of the Model 1094A, it should be shipped to you with the appropriate *QuikConnect™* Module already installed. If you need to install a different *QuikConnect™* Module, follow these steps:

Removing the Existing *QuikConnect™* Module

1) Turn the power switch off. Leave the power cord plugged into a grounded outlet to keep the unit grounded.

2) Loosen the two thumbscrews on the module by turning them counterclockwise.

3) Grasp the two thumbscrews and gently pull the module from the unit. Apply equal force to the thumbscrews to keep the module straight during the removal process

Installing the New *QuikConnect™* Module

1) Make sure the power switch is off. Leave the power cord plugged into a grounded outlet to keep the unit grounded.

2) Hold the module with the faceplate toward you and align the module with the guide slots in the rear panel of the Model 1094A.

3) While keeping the module's faceplate parallel with the Model 1094A rear panel, slide the module straight in – so that the card edge contacts line up with the socket inside the chassis.

> **NOTE: The card edge connector should meet the socket when it is almost all the way into the chassis. If you encounter a lot of resistance, remove the module and repeat steps 2 & 3.**

4) With the card edge contacts aligned with the socket, firmly seat the module by using your thumbs to apply pressure directly to the right and left edges of the module faceplate. Applying moderate and *even* pressure should be sufficient to seat the module. You should hear it "click" into place.

5) To secure the module in place, push the thumbscrews into the chassis and turn the screws clockwise to tighten.

4.2.2 Connecting to a "DTE" Device

The serial port on most *QuikConnect™* interface modules (all except the X.21 module) 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.

4.2.3 Connecting to a "DCE" Device

If the Model 1094A's QuikConnect™ interface module is hard-wired as a DCE (all except the X.21 module), 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 rec-ommend 6 feet or less. When purchasing or constructing a null modem interface cable, use the pin diagrams in **Appendix C** as a guide.

> **NOTE: Pin-out requirements for null modem applications vary widely between manufacturers. If you have any questions about a specific application, contact Patton Electronics Technical Support.**

4.2.4 Configuring the X.21 *QuikConnect™* Module

The serial port on the X.21 *QuikConnect™* Module 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 module according to the instructions in **Section 4.2.1**. The DCE/DTE strap is located on the bottom side of the module's PC 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 180º, 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. Reinstall the module according to the instructions in **Section 4.2.1**.

4.3 CONNECTING POWER

The Model 1094A is available with two power supply options:

Universal Interface AC Power Supply option (**Model 1094A-UI**) operates in environments ranging from 100 to 253 VAC, with no re-configuration necessary (see **Appendix B** for available domestic and international power cords).

DC Power Supply option (**Model 1094A-DC**) operates in 48 VDC environments and is equipped with a 3-pin "terminal strip" style connector.

4.3.1 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 1094A.

2) Plug the power cord into a nearby AC power outlet.

3) Turn the rear power switch ON.

4.3.2 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.

WARNING! **There are no user-serviceable parts in the power supply section of the Model 1094A. Fuse replacement should only be performed   by qualified service personnel. Contact Patton Electronics Technical support at (301) 975-1007, via our web site at http://www.patton.com, or by e-mail at support@patton.com, for more information.**

5.0 OPERATION

Once the Model 1094A is properly configured and installed, it should operate transparently. This sections describes power-up, reading the LED status monitors, and using the built-in loopback test modes.

5.1 POWER-UP

To apply power to the Model 1094A, first be sure that you have read **Section 4.3**, and that the unit is connected to the appropriate power source. Then power-up the unit using the rear power switch.

5.2 LED STATUS MONITORS

The Model 1094A features eight front panel LEDs that monitor power, the DTE signals, network connection and test modes. Figure 5 (below) shows the front panel location of each LED. Following Figure 5 is a description of each LEDs function.
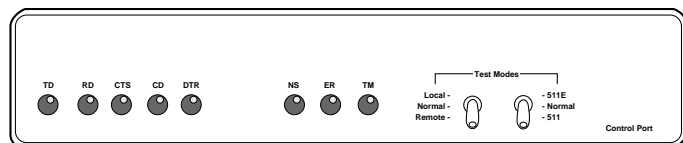

Figure 5. Model 1094A Front Panel

TD & RD   Glows yellow to indicate an idle condition of Binary "1" data on the respective terminal interface signals. Green indicates Binary "0" data

CTS   Glows green to indicate that the Clear to Send signal from the modem is active.

CD   Glows yellow if no carrier signal is being received from the remote modem. Green indicates that the remote modem's carrier is being received.

DTR   Glows green to indicate that the Data Terminal Ready signal from the terminal is active.

ER   - blinks ON/OFF after a 511/511E test has timed out. See Section 5.3.3 (Test Pattern Generator) for more information.

- flashes once to indicate that a CRC error has occurred (during normal operation) or bit errors have occurred (during 511/511E tests).

- Only at power up, blinks once every 200 ms if the DTE Rate is set to an unsupported settings

TM   glows yellow to indicate that the Model 1094A has been placed in Test Mode. The unit can be placed in test mode by the local user or by the remote user.

NS   (No Signal) glows red to indicate that the local Model 1094A is not connected with the remote Model 1094A.

5.3 TEST MODES

The Model 1094A offers two proprietary loopback test modes, plus a built-in V.52 BER test pattern generator to evaluate the condition of the modems and the communication link. These tests can be activated physically from the front panel or via the DTE interface.

5.3.1 Overview

Figure 6 below shows the major elements used in the loop-back and pattern tests available in the Model 1094A. Each block has several functions. Following Figure 6 are descriptions that show how the elements are used during Test Modes.
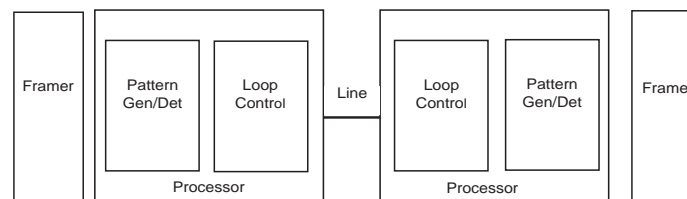

Figure 6: Block Diagram Model 1094A

Framer   The framer is used to determine the status of the line. In normal operation the framer transmits and expects to receive framed packets from the far end. If the framer receives framed packets from the far end, CTS and CD will be active. If framed packets are not received, CTS and CD will be inactive. The restart procedure uses this information to determine if a valid connection is made (cable disconnect, poor cable quality, etc). In normal Data Mode, if the box receives 4 seconds of unframed packets it will restart the box and begin trying to re-establish a connection with the far end. The distinction between framed packets and unframed packets becomes important when we discuss the Pattern Generator.

Pattern Gen/Det   This part of the Processor generates and detects the 511/511E patterns. When transmitting 511 patterns, the information is unframed (because it originates after the framer) and is intended to be evaluated only by another Processor. If the units are in Data Mode and the pattern generator is enabled on one end of the link, the far end will begin receiving unframed packets and assume that the line has gone down. During test modes, we force the pattern generator to time out before it can cause the link to be killed.

Loop Control   This part of the Processor is used to control loop-backs. In a Local Loop, the data is looped back towards the local DTE. In a Remote Loop, the data is looped back to the line, but it is also allowed to pass through to the framer and to the remote DTE.

Restart Procedure and Time Outs   The restart procedure is in place to allow the units to re-establish a connection after the framer begins seeing unframed packets. The Test Model Timing Chart below shows the amount of time the framer must see consecutive unframed packets before the unit will restart and try to establish a new line connection. The reason that there are different Restart Times will become apparent after reading the rest of the document. The 511/511E Time Out shown refers to the amount of time the 511/511E pattern will be valid. At the end of this time the pattern will automatically turn itself off and the normal data path will be re-established. The ER led will flash indicating to the user that the test has timed out. The ER led will stop flashing once the 511/511E switch is placed into the normal position.

Test Mode Timing	
Item	**Elapsed Time (seconds)**
Start Up	50
Data Mode	4
511/511E Generator Enabled	60 (The generator will stop after 45 seconds.)
Remote End of an RDL	60
511/511E Time Out	45 (The pattern generator will automatically turn off after 45 seconds. The ER LED will flash until the user turns off the 511/511E switch.)

Symbol Indicators

☐   This symbol designates the origination or the termination of a data path. The direction of the arrow connected distinguish the two data paths.

▨   This symbol designates an invalid data path. If there is data present it should be ignored.

5.3.2 Loops and Patterns

The following section describes the Test Modes used in the Model 1094A. At the bottom of each Test Mode, a figure is included to show the data path.

Local Loop

There are two different modes of operation for a Local Loop depending on the status of the units at the time that the Local Loop is initiated. If the units are not in linked (NS LED on) and the Local Loop is initiated, either by the front panel switch or the DTE interface, the unit will enter mode 1. If the units are linked, NS LED off, then the unit will enter a mode 2 Local Loop.

A Mode 1 Local Loop is shown in Figure 7. When the Local Loop is initiated, either by the front panel switch or the DTE interface, the loop will be activated within the local Processor. The data present at the local DTE interface will be looped back to the local DTE by the Loop Control block within the Processor. Any data present on the line or at the far end DTE interface is invalid. The remote unit will remain in the StartUP mode, NS LED on, CTS LED yellow, and CD LED yellow, until the local unit is taken out of the Local Loop mode. After the Local Loop is deselected, the units will both be in StartUP mode and the link will be established.

A mode 2 Local Loop is shown in Figure 8. When the Local Loop is initiated, either by the front panel switch or the DTE interface, two separate loop paths will be started. In the first path, data presented to the local DTE interface will be looped back to the local DTE within the framer. In the second path, data presented at the far end DTE will be transmitted to the local DTE and then looped back within the local DTE Loop Control block with the Processor. After the Local Loop is deselected, the units will be placed back into DataMode and the normal data paths will be re-established.
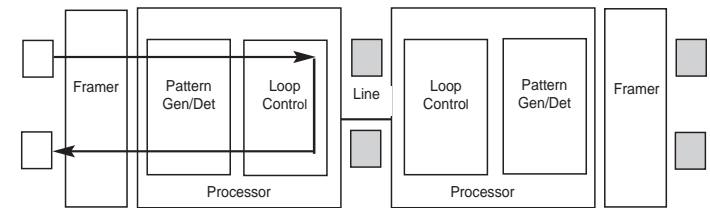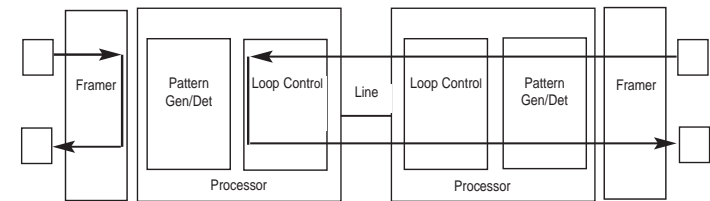

Figure 7. Block Diagram Local Loop Mode 1

Figure 8. Block Diagram Local Loop Mode 2

Local Loop with 511/511E

When the unit is placed into a Mode 1. Local Loop and the 511/511E pattern generator is activated, the local pattern generator begins sending out a 511/511E pattern to the Loop Control block. The Loop Control block will loop this data back to the 511/511E pattern detector block, which will evaluate the data for errors. Because the 511/511E pattern generator is contained within the Processor the data is unframed so the framer will begin seeing unframed packets. The framer receives this unframed data and can not distinguish this information from a line disconnection (this would cause the units' Restart procedure to start). What we have done to allow this mode to work is to add time outs for the pattern generators. When the 511/511E is initiated, the line restart procedure is changed to one minute. The 511/511E pattern will timeout after 45 seconds. So if the 511/511E is turned on during a local loop, the restart procedure is set to one minute, but the 511/511E pattern will time out after 45 seconds, allowing the framer to begin seeing framed packets (and not restart the box).

Local Loop with 511/511E (continued)

After the 511/511E pattern times out, the ER led will begin flashing. It will remain this way until the pattern generator switch is turned off. Note that the data at the local DTE and the remote DTE are not valid. Because the data is unframed there is no way for the framer to send this data out to the DTE. This is an important distinction because other Patton units will send out the 511 pattern.

When the unit is placed into a Mode 2 Local Loop, the 511/511E pattern generator on the local unit is unavailable for transmission. As can be seen from Figure 10, the 511/511E pattern generator has no data path connections available. The 511/511E pattern generator is still available on the remote unit. For more information on the proper operation of this pattern generator please refer to the "Remote Digital Loop with 511/511E" section.
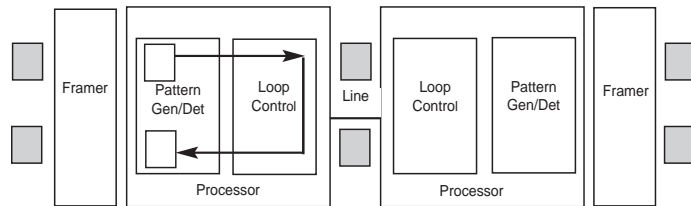

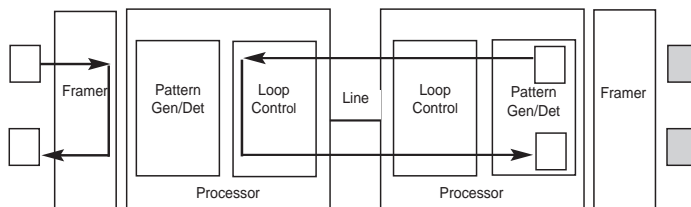**Figure 9.** Block Diagram Local Loop Mode 1 with 511/511E

Figure 10. Block Diagram Local Loop Mode 2 with 511/511E

Remote Digital Loop

The Remote Loop uses the EOC channel (an out-of-band signaling channel) to establish the remote link. Upon the RDL switch being thrown or DTE initiation, a RDL_ON Request signal is sent to the remote unit. The Remote unit then responds with an RDL Acknowledge command and the link is established. Data originates at the local DTE and is looped at the Remote PROCESSOR back to the Local DTE. Note that the data is also passed through to the Remote DTE and is not squelched. When a Remote unit enters RDL, it changes its' Restart timeout to one minute (the reason will be explain in the RDL with 511/511E section). If the line is disconnected, the local unit will Restart (NS led activated) after 4 - 6 seconds, but the Remote unit will wait for one minute before it Restarts. Note that the transmit data at the Remote DTE is ignored. When the switch is thrown or the DTE removes the RDL request, the local unit will transmit an RDL_OFF Request to the Remote unit. The local unit will keep its' TM led active until this request has been completely sent out. If the switch is thrown again before the completion of the termination phase the switch will be ignored until it is placed back into the normal position.
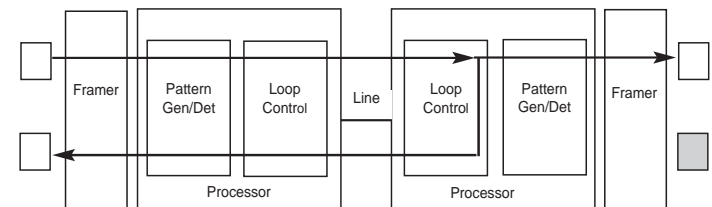

Figure 11. Block Diagram Remote Loop

Remote Digital Loop with 511/511E

The Remote Digital Loop with 511/511E is shown above. After RDL is established the Remote units' Restart Timer is set to one minute. This has been done because when the 511/511E generator is started on the local unit, the Remote framer begins seeing unframed packets. The Remote unit can not distinguish the 511/511E pattern from the line being disconnected so the Restart Timer has been lengthened to allow the pattern generator to function. Once the 511/511E test is started, the Local unit changes its' Restart Timer to one minute. The pattern originates within the Processor and is sent to the Remote unit. It is then looped back to the Local unit where it is evaluated for errors. After 45 seconds, the Pattern Generator will timeout and stops sending the pattern. The ER led will begin blinking until the user turns off the 511/511E switch.
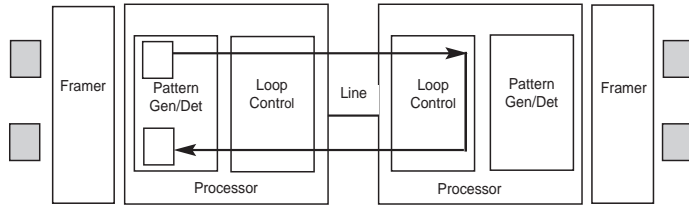

Figure 12. Block Remote Loop with 511/511E

Data Mode with 511/511E Pattern Generators

When the units enter DataMode it is possible to turn on the 511/511E pattern generators on both ends of the link. Once a 511/511E pattern is selected on one end of the link, the pattern generator will begin transmitting unframed 511/511E through the line to the Remote end. A possible problem with this test can occur due to the Restart procedure. Once the Local 511/511E is turned on, the Remote unit begins receiving an unframed 511 pattern. If the Remote unit does not turn on the 511/511E-pattern generator within 4 seconds, the Remote unit will Restart and enter the StartUp mode. Note that once the 511/511E-pattern generator is started the Restart timer is changed to one minute (only on the unit which has the pattern enabled). If both units enable the 511/511E pattern within 4 seconds of each other, both units will be transmitting and receiving the 511/511E pattern. Both framers are now receiving unframed data and will restart after one minute. The 511/511E pattern generators will TimeOut after 45 seconds re-enabling the normal data path. The ER led will begin flashing until the user terminates the test.
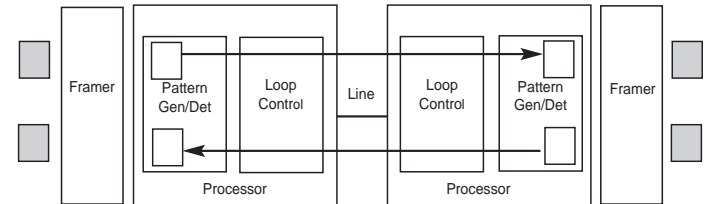

Figure 13. Block Diagram DataMode with 511/511E

5.3.3 Using the V.52 (BER) Test Pattern Generator

To use the V.52 BER tests in conjunction with the Remote Digital Loopback tests (or with Local Line Loopback tests), follow these instructions:

1. Locate the "511/511E" toggle switch on the front panel of the 1094A 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 local modem's red "ER" LED will blink sporadically.

2. If the above test indicates no errors are present, move the V.52 toggle switch DOWN, activating the "511/E" test with errors present. If the test is working properly, the local modem's red "ER" LED will glow. A successful "511/E" test will confirm that the link is in place, and that the Model 1094A's built-in "511" generator and detector are working properly.

NOTE: **The above V.52 BER tests can be used independently of the Remote Digital Loopback tests. This requires two operators: one to initiate and monitor the tests at the local Model 1094A, and one to do the same at the remote Model 1094A. In this case, the test pattern sent by each Model 1094A will not be looped back, but will be transmitted down the line to the other Model 1094A. While one operator initiates test, the other monitors for errors.**

APPENDIX A

PATTON ELECTRONICS MODEL 1094A
SPECIFICATIONS

Transmission Format:	Synchronous
Transmission Line:	Two-Wire unconditioned twisted pair
Clocking:	Internal, external or receive recovered clock
Interface Modules:	EIA RS-232/ITU/T V.24, RS-232/530, ITU/T V.35 and ITU/T X.21
Line Rates:	144, 272, 400, 528, 784, 1040, and 1168 kbps
DTE Rates:	64, 128, 192, 256, 320, 384,448, 512, 576, 640, 704, 768, 832, 896, 960, 1024, 1088, and 1152 kbps
Diagnostics:	V.52 compliant bit error rate pattern (511/511E pattern) generator and detector with error injection mode; Local Line Loopback and Remote Digital Loopback, activated by front panel switch or via serial interface
LED Status Indicators:	TD, RD, CTS, CD, DTR, NS(no signal), ER (error) and TM (test mode)
Connectors:	RJ-45 on line side; DB-25 female, M/34 female or DB-15 female on serial interface side, depending upon which interface module is installed.
Power:	100-253 VAC, 50-60 Hz (universal input); 48 VDC (option). 10 watts.
Temperature Range:	32-122°F (0° -50°C)
Altitude:	0-15,000 feet
Humidity:	5 to 95% non-condensing
Dimensions:	7.3" x 6.6" x 1.62" (185mm x 168mm x 41mm)
Weight:	2.01 lbs. (1.0kg)

APPENDIX B

PATTON ELECTRONICS MODEL 1094A
FACTORY REPLACEMENT PARTS AND ACCESSORIES

Patton Electronics Model #	Description
IM1/A	V.24 with DB25F
IM1/B	RS422/RS530 with DB25F
IM1/C	V.35 with M34F
IM1/D	X.21 with DB15F
IM1/E	V.35 with DB25F
IM1/F	G.703 with RJ45
IM1/I	Ethernet Bridge Module
IM1/J	Voice/Data Module
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
07M1090SVC	1090 Series Service Manual

APPENDIX C

PATTON ELECTRONICS MODEL 1094A
INTERFACE PIN ASSIGNMENTS

RS-232, RS-530 Interface Pin Description
(DB-25 Female Connector)
(DCE Configuration)

Pin #	Signal
1	FG (Frame Ground)
2	TD (Transmit Data)
3	RD (Receive Data)
4	RTS (Request to Send)
5	CTS (Clear to Send)
6	DSR (Data Set Ready)
7	SGND (Signal Ground)
8	CD (Carrier Detect)
9	RC/ (Receive Timing-B)
10	CD/ (Carrier Detect-B)
11	XTC/ (External Transmit Clock)
12	TC/ (Transmit Clock-B)
13	CTS/ (Clear to Send)
14	TD/ (Transmit Data-B)
15	TC (Transmit Clock-A)
16	RD (Receive Data)
17	RC (Receive Timing)
18	LLB (Local Line Loop)
19	RTS/ (Request to Send)
20	DTR (Data Terminal Ready)
21	DL (Remote Digital Loop)
22	DSR/ (Data Set Ready)
23	DTR/ (Data Terminal Ready)
24	XTC (External Transmit Clock)
25	TM (Test Mode)

PATTON ELECTRONICS MODEL 1094A
INTERFACE PIN ASSIGNMENTS
(Continued)

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)

PATTON ELECTRONICS MODEL 1094A
INTERFACE PIN ASSIGNMENTS
(Continued)

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

PATTON ELECTRONICS MODEL 1094A
TRANSMISSION DISTANCES

Transmission Distance - Patton NetLink HDSL Model 1094A							
		No Cross Talk					
Line Rate	DTE Rates	26 AWG (0.4mm)			24 AWG (0.5mm)		
kbps		feet	miles	km	feet	miles	km
144	64, 128	20700	3.9	6.2	24500	4.6	7.3
272	192, 256	17400	3.3	5.2	24200	4.5	7.2
400	320, 384	15100	2.9	4.6	22600	4.2	6.7
528	448, 512	14900	2.8	4.4	21000	3.9	6.2
784	576, 640, 704, 768	13500	2.6	4.2	18000	3.4	5.4
1040	832, 896, 960, 1024	11900	2.3	3.6	15500	2.9	4.6
1168	1088 - 1152	11000	2.1	3.3	15200	2.8	4.4
		Cross Talk (49 adjacent CAP pairs)					
Line Rate	DTE Rates	26 AWG (0.4mm)			24 AWG (0.5mm)		
kbps		feet	miles	km	feet	miles	km
144	64, 128	18600	3.5	5.6	22100	4.2	6.7
272	192, 256	15700	2.9	4.6	21800	4.1	6.5
400	320, 384	12800	2.4	3.8	19200	3.6	5.7
528	448, 512	13000	2.5	4	18300	3.4	5.4
784	576, 640, 704, 768	12200	2.3	3.6	16200	3.1	4.9
1040	832, 896, 960, 1024	10500	1.9	3	13600	2.5	4
1168	1088 - 1152	94000	1.7	2.7	12900	2.4	3.8