

RocketLink-G Model 3088 Series **G.SHDSL NTU with fixed serial interface**

User Manual



Important

This is a Class A device and is not intended nor approved for use in a residential environment.

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Part Number: **07M3088-GSG, Rev. J**

Revised: **February 15, 2012**

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About this guide

This guide describes installing and operating the Patton Electronics Model 3088 G.SHDSL RocketLink-G™ NTU.

Audience

This guide is intended for the following users:

- Operators
- Installers
- Maintenance technicians

Structure

This guide contains the following chapters and appendices:

- [Chapter 1](#) on page 14 provides information about NTU features and capabilities
- [Chapter 2](#) on page 18 contains an overview describing NTU operation and applications
- [Chapter 3](#) on page 41 provides hardware installation procedures
- [Chapter 4](#) on page 51 provides quick-start procedures for configuring the RocketLink-G NTU
- [Chapter 5](#) on page 55 describes how to install and operate the RocketLink-G NTU
- [Chapter 6](#) on page 60 describes how to configure the RocketLink-G NTU, save the configuration, reset the NTU to the factory default condition, and upgrade the system software
- [Chapter 7](#) on page 62 describes the system tools that can be used to diagnose problems with the NTU
- [Chapter 8](#) on page 64 contains information on contacting Patton technical support for assistance
- [Appendix A](#) on page 67 contains compliance information for the RocketLink-G NTU
- [Appendix B](#) on page 71 contains specifications for the NTU
- [Appendix D](#) on page 78 provides cable recommendations
- [Appendix E](#) on page 80 describes the NTU's ports and pin-outs

For best results, read the contents of this guide *before* you install the NTU.

Precautions

Notes, cautions, and warnings, which have the following meanings, are used throughout this guide to help you become aware of potential problems. **Warnings** are intended to prevent safety hazards that could result in personal injury. **Cautions** are intended to prevent situations that could result in property damage or impaired functioning.

Note A note presents additional information or interesting sidelights.



The shock hazard symbol and **WARNING** heading indicate a potential electric shock hazard. Strictly follow the warning instructions to avoid injury caused by electric shock.



The alert symbol and **WARNING** heading indicate a potential safety hazard. Strictly follow the warning instructions to avoid personal injury.



The shock hazard symbol and **CAUTION** heading indicate a potential electric shock hazard. Strictly follow the instructions to avoid property damage caused by electric shock.



The alert symbol and **CAUTION** heading indicate a potential hazard. Strictly follow the instructions to avoid property damage.

Safety when working with electricity



- Do not open the device when the power cord is connected. For systems without a power switch and without an external power adapter, line voltages are present within the device when the power cord is connected.
- For devices with an external power adapter, the power adapter shall be a listed *limited Power Source*. The mains outlet that is utilized to power the device shall be within 10 feet (3 meters) of the device, shall be easily accessible, and protected by a circuit breaker in compliance with local regulatory requirements.
- For AC powered devices, ensure that the power cable used meets all applicable standards for the country in which it is to be installed.
- For AC powered devices which have 3 conductor power plugs (L1, L2 & GND or Hot, Neutral & Safety/Protective Ground), the wall outlet (or socket) must have an earth ground.
- For DC powered devices, ensure that the interconnecting cables are rated for proper voltage, current, anticipated temperature, flammability, and mechanical serviceability.
- WAN, LAN & PSTN ports (connections) may have hazardous voltages present regardless of whether the device is powered ON or OFF. PSTN relates to interfaces such as telephone lines, FXS, FXO, DSL, xDSL, T1, E1, ISDN, Voice, etc. These are known as “hazardous network voltages” and to avoid electric shock use caution when working near these ports. When disconnecting cables for these ports, detach the far end connection first.
- Do not work on the device or connect or disconnect cables during periods of lightning activity.



This device contains no user serviceable parts. This device can only be repaired by qualified service personnel.



This device is NOT intended nor approved for connection to the PSTN. It is intended only for connection to customer premise equipment.



In accordance with the requirements of council directive 2002/96/EC on Waste of Electrical and Electronic Equipment (WEEE), ensure that at end-of-life you separate this product from other waste and scrap and deliver to the WEEE collection system in your country for recycling.



Electrostatic Discharge (ESD) can damage equipment and impair electrical circuitry. It occurs when electronic printed circuit cards are improperly handled and can result in complete or intermittent failures. Do the following to prevent ESD:

- Always follow ESD prevention procedures when removing and replacing cards.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to safely channel unwanted ESD voltages to ground.
- To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

General observations

- Clean the case with a soft slightly moist anti-static cloth
- Place the unit on a flat surface and ensure free air circulation
- Avoid exposing the unit to direct sunlight and other heat sources
- Protect the unit from moisture, vapors, and corrosive liquids

Typographical conventions used in this document

This section describes the typographical conventions and terms used in this guide.

General conventions

The procedures described in this manual use the following text conventions:

Table 1. General conventions

Convention	Meaning
Garamond blue type	Indicates a cross-reference hyperlink that points to a figure, graphic, table, or section heading. Clicking on the hyperlink jumps you to the reference. When you have finished reviewing the reference, click on the Go to Previous View button  in the Adobe® Acrobat® Reader toolbar to return to your starting point.
Futura bold type	Commands and keywords are in boldface font.
<i>Futura bold-italic type</i>	Parts of commands, which are related to elements already named by the user, are in boldface italic font.
<i>Italicized Futura type</i>	Variables for which you supply values are in <i>italic</i> font
Futura type	Indicates the names of fields or windows.
Garamond bold type	Indicates the names of command buttons that execute an action.

Chapter 1 **General information**

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RocketLink-G 3088 overview

The Patton Electronics Model 3088 G.SHDSL RocketLink provides high speed 2-wire connectivity to ISPs, PTTs, and enterprise environments using Symmetrical High-data-rate Digital Subscriber Line (G.SHDSL) technology.

As a symmetric DSL NTU, RocketLink DSL offers the same data rates in both directions over a single pair of regular twisted pair lines using TC-PAM modulation. Line connection is made with an RJ-45 jack. Standard versions of Model 3088 are powered by an 100/230 VAC (Universal) supply. The NTU features externally-accessible DIP switches, loopback diagnostics, SNMP/HTTP remote-management capabilities using RocketLink Plug 'n' Play, as well as in-band management.



Figure 1. RocketLink-G 3088

Serial interface types

The Model 3088 versions listed below provide the following types of built-in serial interfaces:

- Model 3088/**CA** provides a **V.35** interface on a DB-25 female connector.
- Model 3088/**D** provides an **X.21** interface on a DB-15 female connector.
- Model 3088/**T** provides a **T1/E1** interface on an RJ-48C receptacle.
- Model 3088/**K** provides a **T1/E1** (G.703/G.704) interface on dual BNC connectors and an RJ-48C receptacle.

Features

- Symmetrical high data-rate DSL (G.SHDSL)
- Data rates up to 4.6 Mbps in 64-kbps intervals for X.21 and V.35 models
- Data rates up to 2.048 Mbps in 64-kbps intervals for T1 and E1 models
- One of the following built-in serial interfaces:
 - Serial V.35 (DCE only) — Model 3088/CA
 - X.21 (selectable DCE or DTE) — Model 3088/D
 - T1/E1 — Model 3088/K
 - T1/E1 — Model 3088/T
- RS-232 console port for management and configuration

- Built-in testing and diagnostics
- RocketLink Plug 'n' Play for easy installations
- Interoperable with other Patton G.SHDSL modems
- Configurable as remote (CP) units
- Configurable as central (CO) units to operate back-to-back
- Front-panel status indicators
- CE marked

Power input connector

The RocketLink-G comes with an AC or DC power supply. (See section “Power and power supply specifications” on page 73.)

- The power connection to the NTU is a 2.5 mm barrel receptacle with the center conductor positive (see figure 2).
- Rated voltage: 5 VDC
Rated current: 1 A

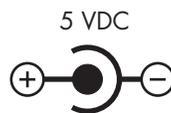


Figure 2. Power connection barrel receptacle 5 VDC diagram

External AC universal power supply

For additional specifications, see section “Power and power supply specifications” on page 73.

- Output from power supply: 5 VDC, 2 A
- Input to power supply: universal input 100–240 VAC 50/60 Hz 0.3A



The external AC adaptor shall be a listed limited power source that incorporates a disconnect device and shall be positioned within easy reach of the operator. Ensure that the AC power cable meets all applicable standards for the country in which it is to be installed, and that it is connected to a wall outlet which has earth ground.

External 48 VDC power supply



The external DC adaptor shall be a listed limited power source that incorporates a disconnect device and shall be positioned within easy reach of the operator. The interconnecting cables shall be rated for the proper voltage, current, anticipated temperature, flammability, and mechanical serviceability

Refer to section “Power and power supply specifications” on page 73 for additional specifications.

- Input
 - Rated voltage: 36–60 VDC
 - Rated current: 0.25 A DC
 - 3-pin locking connector, 3.5 mm pitch
 - Transient over-voltage protection, 100VDC at 2 ms
- Output
 - Rated voltage: 5 VDC \pm 5%, 5W
 - Rated current; 1 A DC
 - 6-inch cable terminated with 2.5 mm barrel plug, center positive

Chapter 2 Configuration

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Introduction

You can configure the RocketLink-G (see [figure 3](#)) in one of two ways:

- Software configuration using command line interface (CLI) via the console port
- Hardware configuration via DIP switches



Figure 3. RocketLink-G (Model 3088/D shown)

Software (CLI) configuration

To use software configuration you must set all the DIP switches to the *ON* position *before* powering-up the RocketLink-G. When all the DIP switches are set to *ON* the RocketLink-G will operate in software-configuration mode. When set for software-configuration mode the RocketLink-G will read any configuration data previously saved to FLASH memory during system power-up. If no configuration data was previously saved to FLASH, then the RocketLink-G will load the factory-default configuration from FLASH memory. After power-up, you may use console commands or the Embedded Operations Channel (EOC) to modify the configuration parameters.

Hardware (DIP-switch) configuration

To use DIP-switch configuration you must first set the DIP switches to a position other than all *OFF* or all *ON* *before* powering-up the RocketLink-G. When all the DIP switches are set to any position other than all *OFF* or all *ON* the RocketLink-G will operate in hardware (DIP-switch)-configuration mode. In DIP-switch-configuration mode the RocketLink-G will read the DIP-switch settings during system startup and configure itself according to the switch settings.

Once you power-up the RocketLink-G in DIP-switch mode it will operate in DIP-switch mode until powered-down. When operating in DIP-switch mode you cannot change any configuration settings:

- Changing the DIP switch settings while the device is running will not modify the operating configuration because the RocketLink-G only reads the DIP switches during system startup.
- If you attempt to modify the configuration by issuing console commands, the device will not execute your commands. Instead, the RocketLink-G will respond with a message indicating the device is operating in DIP-switch-configuration mode.

- If you attempt to modify any configuration parameters via the EOC (by changing (EOC variables), the RocketLink-G will not execute your changes.

Table 2 lists the Model 3088's configurable parameters.

Table 2. RocketLink-G configurable parameters

Parameter	Description	Possible Values
Password	The password used to login to the console.	Character strings 1–9 characters long.
Circuit ID	The circuit ID used to identify the unit.	Character string 1–64 characters long.
Front Panel Switches	If the device is populated with front panel switches, they can be used to start and stop test modes. If they are disabled, however, the front panel switch settings will be ignored.	Enabled or Disabled
DTE Loops (model C)	The V.35 interface can request LALs and RDLs using its RRDL and RLAL pins. If DTE loops are disabled, requests for loopbacks on these pins will be ignored.	Enabled or Disabled
TX Clock (models C, A & D)	Defines where (V.35 or X.21) serial transmit data is sampled in relation to the TX clock: on the falling edge (normal) or the rising edge (inverted) of the TX clock.	Normal or Inverted
DSL Data Rate/ Timeslots	Defines the number of DSL timeslots. The DSL data rate is calculated by the equation: data rate = DSL timeslots x 64k. This value also defines the maximum serial/T1/E1 data rate.	1–72
Serial/T1/E1 Timeslots	Defines the total number of serial/T1/E1 timeslots utilized. This value must be less than or equal to DSL timeslots.	1–72 (V.35) 1–72 (X.21) 1–24 (T1) 1–32 (E1)
Timeslot Mapping (models K & T)	Defines T1/E1-to-DSL timeslot mapping. By default defined/utilized DSL timeslots are mapped to the first n data-bearing timeslots on the T1/E1 line. Line type determines which timeslots are data-bearing: T1-Unframed: 1–24 ^a T1-SF: 1–24 ^a T1-ESF: 1–24 ^a E1-Unframed: 0–31 E1-Fractional: 1–31 E1-CRC: 1–31 E1-MF: 1–15,17–31 E1-CRCMF: 1–15,17–31	
Line Type (models K & T)	Defines the framing format of the T1 or E1 line.	T1-Unframed ^a T1-SF (D4) ^a T1-ESF ^a E1-Unframed (Clear Channel G.703) E1-Fractional E1-CRC E1-Multiframe E1-CRC & Multiframe

Table 2. RocketLink-G configurable parameters (Continued)

Parameter	Description	Possible Values
Line Code (models K & T)	Selects line coding for the T1 or E1 line.	AMI HDB3 (E1 only) B8ZS (T1 only)
Line Build Out (models K & T)	Selects wave form used on the T1 or E1 line.	Pulse-75 Ohm(E1) Pulse-120 Ohm (E1) 0.0 dB (T1) -7.5 dB (T1) -15.0 dB (T1) -22.5 dB (T1)
RX Equalizer (models K & T)	When enabled, this feature removes signal distortion introduced on the T1 or E1 cable.	Enabled (select for long-haul link). Disabled (select for short-haul link). Long haul LBO (line build-out) is defined by ANSI T1.403).
Pass Framing (models K & T)	When enabled, the RocketLink-G transparently passes framing information (T1 F-bit or E1 TSO) over the DSL link to the remote T1/E1 network.	Enabled or Disabled. Must always be enabled for T1.
Pass Alarms (models K & T)	When enabled, the RocketLink-G passes alarms detected on one T1/E1 network over the DSL link to the remote T1/E1 network.	Enabled or Disabled
Clock Mode	Defines the clock source operation for both DSL and serial/T1/E1 ports as follows. Internal: the on-board oscillator in the 3088 provides clock for both serial/T1/E1 and DSL lines. External: the serial/T1/E1 interface provides clock for the DSL line. Receive Recover: the DSL interface provides clock for the serial/T1/E1 line.	Internal External Receive Recover
Annex	The G.991.2 Annex.	A or B
Line Probe	When this special Patton feature is enabled, the 3088 will set the DSL data rate to the best rate in the 3-36 timeslot range that both NTUs can support. Enable for rate adaptive applications.	Enabled or Disabled
Loopback	The 3088 provides both a local loopback (LAL) and a remote loopback (RDL). This can be used to troubleshoot problems.	OFF, LAL, or RDL
Pattern	The 3088 provides an internal PRBS pattern generator and detector that can be used to run BER tests without external equipment. The patterns offered are 511 and 511 with errors.	OFF, 511, or 511E
DSL Error Monitor Maximum Intervals	The number of errors allowed in an interval before considering the interval errored. A value of 0 disables the error monitor.	0-255

Table 2. RocketLink-G configurable parameters (Continued)

Parameter	Description	Possible Values
DSL Error Monitor Interval Time	The length, in seconds, of an interval.	1–255
DSL Error Monitor Interval Count	The number of errored intervals allowed before restarting the DSL link.	1–255
DSL Error Monitor Total Intervals	The number of intervals to inspect before disabling the error monitor.	0–255
DSL Error Monitor Startup Delay	The length, in seconds, to wait after DSL link comes up before enabling the error monitor.	0–255

a. For T1 operation, pass framing must be enabled (see *Pass Framing* parameter for details).

Configuring the DIP switches

The Model 3088 is equipped with two sets of DIP switches, which you can use to configure the RocketLink-G for a broad range of applications. This section describes switch locations and discusses the configuration options available.

Note By default, the RocketLink-G’s DIP switches are all set to “ON” so the NTU can be configured via RocketLink Plug ‘n’ Play from a 3096RC. If that is how you will be configuring the NTU, skip ahead to section “Console” on page 32. Otherwise, read the following sections to manually configure the DIP switch settings.

The two sets of DIP switches are externally accessible from the underside of the Model 3088 (see figure 4).

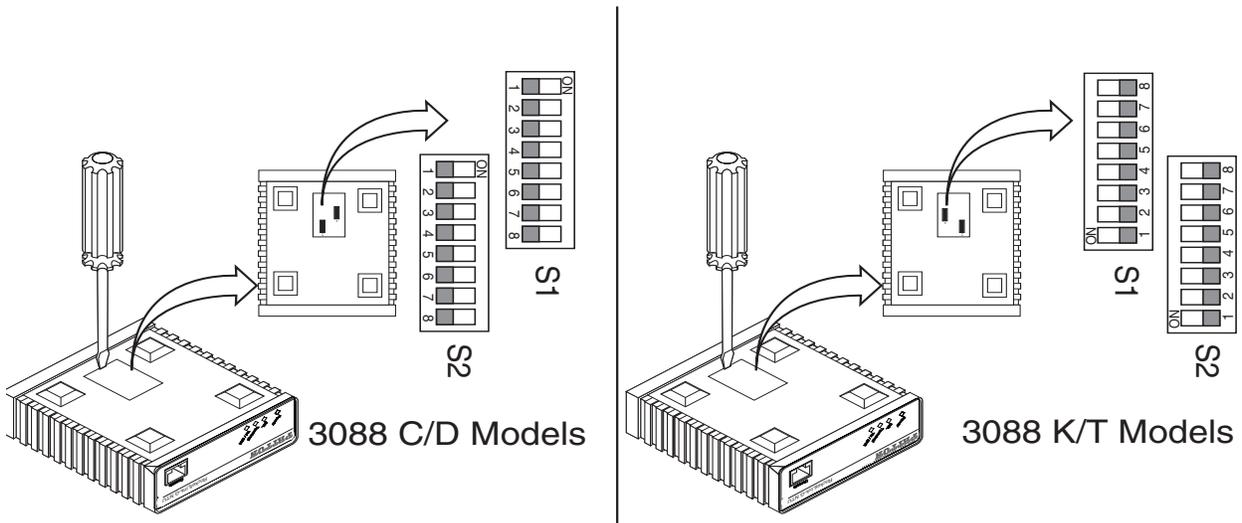


Figure 4. Underside of Model 3088 showing location of DIP switches

The two sets of DIP switches on the underside of the Model 3088 are referred to as *S1* and *S2*. As shown in figure 5, DIP switch orientation with respect to *ON* and *OFF* positions is consistent for all switches.

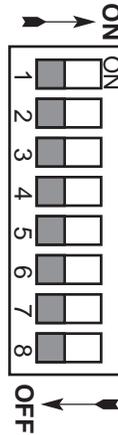


Figure 5. Close-up of configuration switches (all sets are identical appearance)

System reset mode

To enter system reset mode, switch all DIP switches to the *OFF* position and power cycle the unit. You can use a VT100 emulator configured for 19,200 kbps/1 stop bit/ no parity/ XON-XOFF flow control to access the console. Upon restart, you will see the message “Reset Mode”.

System reset mode provides two functions:

- Software upgrades
- Configuration reset to factory defaults

Software upgrades

The software is upgraded by waiting for the *Reset Mode* message. Then, the user can send an Intel HEX file supplied by Patton. After the VT100 emulator has finished sending this file, the 3088 will respond with a message stating how many errors were detected. The user may then set the DIP switches to the desired configuration and power cycle the unit to run the upgraded software.

Configuration reset to factory defaults

To recover from a forgotten password, the user may reset the unit to its factory configuration. After seeing the *Reset Mode* message, the user should type the ‘*’ key. This will result in a ‘:’ prompt. At the prompt, the user should enter the command `reset`. This will restore the unit to the factory configuration. The unit can then be restarted with the settings in place.

DIP switch settings

You can configure the 3088 by setting the DIP switches to the desired positions *before* you power up the RocketLink-G. If the DIP switches are set to anything other than all *OFF* or all *ON*, the RocketLink-G will operate in DIP switch configuration mode. Once the device is powered up and operating in DIP switch configuration mode, you cannot change configuration by any method until you power it down again.

DIP switch settings for RocketLink-G models 3088/CA and 3088/D

An overview of the RocketLink-G DIP switch functions for Models 3088/CA and 3088/D is provided in [table 3](#) and [table 4](#). The detailed switch settings are shown in following tables.

Table 3. Model 3088/CA and 3088/D - S1 DIP-Switch Functions

Position	Function
S1-1	Data Rate
S1-2	
S1-3	
S1-4	
S1-5	
S1-6	
S1-7	
S1-8	TX Clock

Table 4. Model 3088/CA and 3088/D - S2 DIP-Switch Functions

Position	Function
S2-1	Reserved
S2-2	Line Probe
S2-3	Annex
S2-4	Clock Mode
S2-5	
S2-6	DTE Loops
S2-7	Reserved
S2-8	

S1-1 through S1-7: Data Rate (RocketLink-G models 3088/CA and 3088/D)

Switches S1-1 through S1-7 define both the DSL data rate and the serial data rate.

Table 5. S1-1 through S1-7 Data Rate DIP switch settings

S1-1	S1-2	S1-3	S1-4	S1-5	S1-6	S1-7	Data Rate (kbps)
OFF	ON	ON	ON	ON	ON	ON	64
ON	OFF	ON	ON	ON	ON	ON	128
OFF	OFF	ON	ON	ON	ON	ON	192
ON	ON	OFF	ON	ON	ON	ON	256
OFF	ON	OFF	ON	ON	ON	ON	320
ON	OFF	OFF	ON	ON	ON	ON	384
OFF	OFF	OFF	ON	ON	ON	ON	448
ON	ON	ON	OFF	ON	ON	ON	512
OFF	ON	ON	OFF	ON	ON	ON	576
ON	OFF	ON	OFF	ON	ON	ON	640
OFF	OFF	ON	OFF	ON	ON	ON	704
ON	ON	OFF	OFF	ON	ON	ON	768
OFF	ON	OFF	OFF	ON	ON	ON	832
ON	OFF	OFF	OFF	ON	ON	ON	896
OFF	OFF	OFF	OFF	ON	ON	ON	960
ON	ON	ON	ON	OFF	ON	ON	1024
OFF	ON	ON	ON	OFF	ON	ON	1088
ON	OFF	ON	ON	OFF	ON	ON	1152
OFF	OFF	ON	ON	OFF	ON	ON	1216
ON	ON	OFF	ON	OFF	ON	ON	1280
OFF	ON	OFF	ON	OFF	ON	ON	1344
ON	OFF	OFF	ON	OFF	ON	ON	1408
OFF	OFF	OFF	ON	OFF	ON	ON	1472
ON	ON	ON	OFF	OFF	ON	ON	1536
OFF	ON	ON	OFF	OFF	ON	ON	1600
ON	OFF	ON	OFF	OFF	ON	ON	1664
OFF	OFF	ON	OFF	OFF	ON	ON	1728
ON	ON	OFF	OFF	OFF	ON	ON	1792
OFF	ON	OFF	OFF	OFF	ON	ON	1856
ON	OFF	OFF	OFF	OFF	ON	ON	1920
OFF	OFF	OFF	OFF	OFF	ON	ON	1984
ON	ON	ON	ON	ON	OFF	ON	2048
OFF	ON	ON	ON	ON	OFF	ON	2112
ON	OFF	ON	ON	ON	OFF	ON	2176
OFF	OFF	ON	ON	ON	OFF	ON	2240
ON	ON	OFF	ON	ON	OFF	ON	2304

Table 5. S1-1 through S1-7 Data Rate DIP switch settings (Continued)

S1-1	S1-2	S1-3	S1-4	S1-5	S1-6	S1-7	Data Rate (kbps)
OFF	ON	OFF	ON	ON	OFF	ON	2368
ON	OFF	OFF	ON	ON	OFF	ON	2432
OFF	OFF	OFF	ON	ON	OFF	ON	2496
ON	ON	ON	OFF	ON	OFF	ON	2560
OFF	ON	ON	OFF	ON	OFF	ON	2624
ON	OFF	ON	OFF	ON	OFF	ON	2688
OFF	OFF	ON	OFF	ON	OFF	ON	2752
ON	ON	OFF	OFF	ON	OFF	ON	2816
OFF	ON	OFF	OFF	ON	OFF	ON	2880
ON	OFF	OFF	OFF	ON	OFF	ON	2944
OFF	OFF	OFF	OFF	ON	OFF	ON	3008
ON	ON	ON	ON	OFF	OFF	ON	3072
OFF	ON	ON	ON	OFF	OFF	ON	3136
ON	OFF	ON	ON	OFF	OFF	ON	3200
OFF	OFF	ON	ON	OFF	OFF	ON	3264
ON	ON	OFF	ON	OFF	OFF	ON	3328
OFF	ON	OFF	ON	OFF	OFF	ON	3392
ON	OFF	OFF	ON	OFF	OFF	ON	3456
OFF	OFF	OFF	ON	OFF	OFF	ON	3520
ON	ON	ON	OFF	OFF	OFF	ON	3584
OFF	ON	ON	OFF	OFF	OFF	ON	3648
ON	OFF	ON	OFF	OFF	OFF	ON	3712
OFF	OFF	ON	OFF	OFF	OFF	ON	3776
ON	ON	OFF	OFF	OFF	OFF	ON	3840
OFF	ON	OFF	OFF	OFF	OFF	ON	3904
ON	OFF	OFF	OFF	OFF	OFF	ON	3968
OFF	OFF	OFF	OFF	OFF	OFF	ON	4032
ON	ON	ON	ON	ON	ON	OFF	4096
OFF	ON	ON	ON	ON	ON	OFF	4160
ON	OFF	ON	ON	ON	ON	OFF	4224
OFF	OFF	ON	ON	ON	ON	OFF	4288
ON	ON	OFF	ON	ON	ON	OFF	4352
OFF	ON	OFF	ON	ON	ON	OFF	4416
ON	OFF	OFF	ON	ON	ON	OFF	4480
OFF	OFF	OFF	ON	ON	ON	OFF	4544
ON	ON	ON	OFF	ON	ON	OFF	4608

S1-8: TX Clock (RocketLink-G models 3088/CA and 3088/D)

Table 6. S1-8 TX Clock DIP switch settings

S1-8	Setting	Description
ON	Normal	TD sampled on falling edge of TX clock.
OFF	Inverted	TD sampled on rising edge of TX clock.

S2-2: Line Probe (Models 3088/CA and D)

Line probe is a mechanism that determines the highest rate (192K to 2304K) that the DSL link can reliably support. This takes place during training. The DSL rate will be set to the rate that line probe determines. Note that both the CO and CPE unit must have line probe enabled for it to take effect.

Line probe could be used to determine the best rate the line will support, and then the user could set the units for that rate and disable line probe so that the rate won't change without the user's knowledge.

Table 7. S2-2 Line Probe Switch Settings

S2-2	Line Probe
ON	Disabled
OFF	Enabled

S2-3: Annex A/B (Models 3088/CA and D)

Annex A is typically used in North American-like networks, whereas Annex B is typically used in European-like networks. The different annexes specify different PSD (power spectral density) masks because of the difference in T1 and E1 PSDs.

Table 8. S2-3 Annex Type settings

S2-3	Annex
ON	A
OFF	B

S2-4 through S2-5: Clock Mode (Models 3088/CA and D)

The RocketLink-G can operate in one of three clock modes: *internal*, *network*, or *receive-recover*.

Table 9. S2-4 and S2-5 Clock Mode Settings

S2-4	S2-5	Clock Mode	Description
ON	ON	Internal	The on-board oscillator in the 3088 provides clock for both serial and DSL lines.
OFF	ON	Network	3088 uses the RX clock from the serial interface as the clock for the DSL link.
ON	OFF	Receive-Recover	3088 uses the RX clock from the DSL line as the clock for the serial interface.
OFF	OFF		Reserved

X.21 operation. There are a few things to note about clock modes and X.21 operation.

- One X.21 modem must be set to *Receive-Recover*. The other X.21 modem must be set to either *Internal* or *External/Network* clock mode.
- The X.21 modem that is configured as *Receive-Recover* must be DCE.
- The X.21 modem that is configured as *Internal* must also be DCE, but if it is an *External/Network* clock, then the modem must be configured as DTE.

Table 10. X.21 Clocking

Modem's X.21 Orientation	CPE-Side Modem	CO-Side Modem	
	Receive-Recover	Internal	External/Network
	DCE	DCE	x
	DCE	x	DTE

S2-6: DTE Loops (RocketLink-G models 3088/CA only)

The V.35 interface provides two pins, one to request an LAL and the other to request an RDL. If DTE loops are enabled, the 3088/CA will start a local loopback or a remote loopback when these pins are asserted. If DTE loops are disabled, these requests will be ignored.

Table 11. S2-6 V.35 Loopback settings

S2-6	Setting
ON	Enabled
OFF	Disabled

DIP switch settings for RocketLink-G models 3088/K and 3088/T

An overview of the RocketLink-G DIP switch functions for Models 3088/K (E1) and 3088/T (T1) is provided in [table 12](#) and [table 13](#).

Table 12. Model 3088/K and 3088/T S1 DIP-Switch Functions

Position	Function
S1-1	Timeslots
S1-2	
S1-3	
S1-4	
S1-5	
S1-6	
S1-7	Line Build Out
S1-8	

Table 13. Model 3088/K and 3088/T S2 DIP-Switch Functions

Position	Function
S2-1	Reserved
S2-2	Line Code
S2-3	Annex
S2-4	Clock Mode
S2-5	
S2-6	Line Type
S2-7	
S2-8	

S1-1 through S1-6: TimeSlots & Data Rate (RocketLink-G Models 3088/K and 3088/T)

Switches S1-1 through S1-6 define the number of timeslots utilized, and thus the data rate, on both the T1/E1 line and the DSL line. G.991.2 specifies G.SHDSL data rates beginning at 192 kbps. In compliance with the G.991.2 specification, the RocketLink-G will only set the number of DSL timeslots at a value greater than or equal to 3, regardless of the setting for T1/E1 timeslots

Table 14. S1-1 through S1-6 Timeslots & DSL Data Rate DIP switch settings

S1-1	S1-2	S1-3	S1-4	S1-5	S1-6	Number of Timeslots	Data Rate (kbps)
OFF	ON	ON	ON	ON	ON	1	64
ON	OFF	ON	ON	ON	ON	2	128
OFF	OFF	ON	ON	ON	ON	3	192
ON	ON	OFF	ON	ON	ON	4	256
OFF	ON	OFF	ON	ON	ON	5	320
ON	OFF	OFF	ON	ON	ON	6	384
OFF	OFF	OFF	ON	ON	ON	7	448
ON	ON	ON	OFF	ON	ON	8	512
OFF	ON	ON	OFF	ON	ON	9	576
ON	OFF	ON	OFF	ON	ON	10	640
OFF	OFF	ON	OFF	ON	ON	11	704
ON	ON	OFF	OFF	ON	ON	12	768
OFF	ON	OFF	OFF	ON	ON	13	832
ON	OFF	OFF	OFF	ON	ON	14	896
OFF	OFF	OFF	OFF	ON	ON	15	960
ON	ON	ON	ON	OFF	ON	16	1024
OFF	ON	ON	ON	OFF	ON	17	1088
ON	OFF	ON	ON	OFF	ON	18	1152
OFF	OFF	ON	ON	OFF	ON	19	1216
ON	ON	OFF	ON	OFF	ON	20	1280
OFF	ON	OFF	ON	OFF	ON	21	1344
ON	OFF	OFF	ON	OFF	ON	22	1408
OFF	OFF	OFF	ON	OFF	ON	23	1472
ON	ON	ON	OFF	OFF	ON	24	1536
OFF	ON	ON	OFF	OFF	ON	25	1600
ON	OFF	ON	OFF	OFF	ON	26	1664
OFF	OFF	ON	OFF	OFF	ON	27	1728
ON	ON	OFF	OFF	OFF	ON	28	1792
OFF	ON	OFF	OFF	OFF	ON	29	1856
ON	OFF	OFF	OFF	OFF	ON	30	1920
OFF	OFF	OFF	OFF	OFF	ON	31	1984
ON	ON	ON	ON	ON	OFF	32	2048

S1-7 and S1-8: Line Build Out (Models 3088/K and 3088/T)

Switches S1-7 and S1-8 define the shape of the waveform on the T1 or E1 line, as shown in [table 15](#).

Table 15. S1-7 – S1-8: Line Build Out Settings

S1-7	S1-8	Line Build Out (E1)	Line Build Out (T1)
ON	ON	Pulse-75 Ohm	0.0dB
OFF	ON	Pulse-120 Ohm	-7.5 dB
ON	OFF	Not Applicable	-15.0dB
OFF	OFF	Not Applicable	-22.5dB

Note 75 Ohms corresponds to the BNC connectors on Model 3088/K.
120 Ohms corresponds to the T1/E1 (RJ-45) interface on Models 3088/K and 3088/T.

S2-2 Line Code (Models 3088/K and 3088/T)

Switch S2-2 defines the T1 or E1 network line coding.

Table 16. S2-2 Line Code Switch Settings

S2-2	T1 Line Code	E1 Line Code
ON	AMI	AMI
OFF	B8ZS	HDB3

S2-3: Annex A/B (Models 3088/K and 3088/T)

Annex A is typically used in North American-like networks, whereas Annex B is typically used in European-like networks. The different annexes specify different PSD (power spectral density) masks because of the difference in T1 and E1 PSDs.

Table 17. S2-3 Annex Type settings

S2-3	Annex
ON	A
OFF	B

S2-4 through S2-5: Clock Mode (Models 3088/K and 3088/T)

The RocketLink-G can operate in one of three clock modes: *internal*, *network*, or *receive-recover*.

Table 18. S2-4 and S2-5 Clock Mode Settings

S2-4	S2-5	Clock Mode	Description
ON	ON	Internal	The on-board oscillator in the 3088 provides clock for both T1/E1 and DSL lines.
OFF	ON	Network	3088 uses the RX clock from the T1/E1 interface as the clock for the DSL link.
ON	OFF	Receive-Recover	3088 uses the RX clock from the DSL interface as the clock for the T1/E1 line.

Table 18. S2-4 and S2-5 Clock Mode Settings

S2-4	S2-5	Clock Mode	Description
OFF	OFF		Reserved

S2-6 through S2-8: Line Type (Models 3088/K and 3088/T)

The RocketLink-G has two different line types, T1 and E1. T1 has three different settings, and E1 has five different settings.

Table 19. S2-6 through S2-8 Line Type Settings

S2-6	S2-7	S2-8	Line Type
ON	ON	ON	T1-Unframed ^a
OFF	ON	ON	T1-SuperFrame ^a
ON	OFF	ON	T1-ExtendedSuperFrame ^a
OFF	OFF	ON	E1-Unframed (G.703 Clear Channel)
ON	ON	OFF	E1-Structured (G.704)
OFF	ON	OFF	E1-CRC
ON	OFF	OFF	E1-Multiframe
OFF	OFF	OFF	E1-CRC Multiframe

a. For T1 operation, pass framing must be enabled (see *Pass Framing* parameter in [table 2](#) on page 20 for details).

Console

The 3088 offers a console command line interface. To access the console, use a VT100 emulator configured to 19,200 kbps, 1 stop bit, no parity, and XON-XOFF flow control. Log into the unit using the default password. No username will be needed.

Note For software release 2.1.2, log in with the default password *patton*.
For software release 2.1.3, log in with the default password *superuser*.

Through the console, the following variables can be configured:

- **Password:** The password used to login to the console.
- **Circuit ID:** The circuit ID communicated to other units via EOC. EOC (Embedded Operations Channel) is an out-of-band channel specified in the G.991.2 standard for SHDSL. We use standard EOC messages for our remote loopback. The 3088 also supports proprietary EOC messages that allow a 3096RC to configure it.
- **Clock Mode:** The following options are available:
 - Internal: The internal oscillator in the 3088 provides the clock to both the serial/T1/E1 and DSL interfaces.
 - Network: The T1/E1 interface provides the clock for the DSL interface (T1/E1 only).

- External: The serial interface provides the clock for the DSL interface (V.35, X.21). It must be set to *DTE* for the X.21 interface.
- Receive Recover: The 3088 recovers the clock from the DSL interface and provides it to the serial/T1/E1 interface.
- **Data Rate:** Both the serial/T1/E1 and DSL data rates are set by specifying the number of 64k timeslots.
- **Pass Framing:** Must be *enabled* for T1. For E1, the entire TS0 time slot is passed. When E1 is configured for CAS (Multiframe), the entire TS0 time slot and all of TS16 are both passed.
- **Pass Alarms:** When Passed Framing is enabled, the alarms are always passed, even if Pass Alarms is disabled. When Passed Framing is disabled, you can pass alarms by enabling *Pass Alarms*.
- **Rx Equalizer:** This can be enabled to remove distortion introduced in the T1/E1 cable.
- **Line Type:** The following framing formats are available:
 - T1-Unframed: Pass Framing must be enabled.
 - T1-SF: Superframe (D4) framing.
 - T1-ESF: Extended superframe.
 - E1-Unframed: G.703 Clear Channel
 - E1-Fractional: G.703/G.704 fractional.
 - E1-CRC: Includes CRC multiframe.
 - E1-Multiframe: Includes channel associated signalling (CAS).
 - E1-CRC & Multiframe: Includes CRC and CAS multiframe.
- **Line Code:** The following line codes are available:
 - AMI: Alternate Mark Inversion.
 - HDB3: High Density Bipolar 3 (E1 only).
 - B8ZS: Bit 8 Zero Substitution (T1 only).
- **Line Build Out:** The following line build outs are available:
 - Pulse-75 (E1 only)
 - Pulse-120 (E1 only)
 - 0.0 dB (T1 only)
 - -7.5 dB (T1 only)
 - -15.0 dB (T1 only)
 - -22.5 dB (T1 only)
- **Annex:** Either G.991.2 Annex A or Annex B.
- **DSL Error Monitor Max Interval Errors:** The number of errors allowed in an interval before considering the interval errored. A value of '0' disables the DSL error monitor.
- **DSL Error Monitor Interval Time:** The length in seconds of an interval.

- **DSL Error Monitor Interval Count:** The number of errored intervals allowed before restarting the DSL link.
- **DSL Error Monitor Total Intervals:** The number of intervals to inspect before disabling the error monitor.
- **DSL Error Monitor Startup Delay:** The length in seconds to wait after the DSL link is established before starting the error monitor.
- **Test Modes:** Loopbacks (LAL or RDL) and PRBS (pseudo-random binary sequence) BER tests (511 or 511 with errors)
- **Line Probe:** Enable or disable Line Probe for rate adaptive applications.

The following status information is available through the command line interface:

- **LEDs:** Which software controlled LEDs are currently on.
- **FPSW Settings:** What the front panel switches are set to (if the unit is populated with them).
- **Configuration Mode:** Whether the 3088 is configured by DIP switches or software.
- **DSL Link State:** *In Progress, Success, Deactivated, or Idle.*
- **DSL Sync State:** *Out of Sync, Acquiring Sync, In Sync, or Losing Sync.*

Note DSL Link State vs. DSL Sync State—The DSL link state describes whether the DSL is training (in progress), linked (success), deactivated (we don't have an option to deactivate the modem, so the user should not see this), or idle.

The DSL sync state describes whether no sync words have been found (out of sync), there are no sync word errors (in sync), or whether we are transitioning from out of sync to in sync (acquiring sync) or vice versa (losing sync). Typically, when the link is training, the sync state goes from out of sync to acquiring sync to in sync.

- **DSL Actual Rate:** The actual rate at which the DSL link is running (minus DSL overhead).
- **DSL Line Condition:** *Good or Poor.*
- **Noise Margin Ratio:** the maximum tolerable increase in external noise power that still allows for BER of less than 1×10^{-7} .
- **DSL Error Counters:** The following error counters are available:
 - CRC
 - LOSW (Loss of Sync Word)
 - TX FIFO Full
 - TX FIFO Empty
 - TX FIFO Slip
 - TX Stuff
 - RX FIFO Full

- RX FIFO Empty
- RX FIFO Slip
- **T1/E1 Loss of Signal:** Active or Inactive.
- **T1/E1 Frame Sync:** Searching or Found.
- **T1/E1 Frame Errors:** Yes or No.
- **T1/E1 Buffer Slips:** Yes or No.
- **Alarms: RED, YELLOW, BLUE.** Active or Inactive.
- **T1/E1 Error Counters:** The following error counters are available:
 - Line Code Violations
 - Path Code Violations
 - Errored Seconds
 - Severely Errored Seconds
 - Severely Errored Frame Seconds
 - Unavailable Seconds
 - Controlled Slip Seconds
 - Line Errored Seconds
 - Bursty Errored Seconds
 - Degraded Minutes

Help Commands

The following commands are provided to help the user find the correct command:

- **help:** Lists all the commands that the console recognizes.
- **system help:** Lists all the commands that start with **system** that the console recognizes.
- **system set help:** Lists all the commands that start with **system set** that the console recognizes.
- **system show help:** Lists all the commands that start with **system show** that the console recognizes.
- **dsl help:** Lists all the commands that start with **dsl** that the console recognizes.
- **dsl set help:** Lists all the commands that start with **dsl set** that the console recognizes.
- **dsl show help:** Lists all the commands that start with **dsl show** that the console recognizes.
- **dsl show errcnt help:** Lists all the commands that start with **dsl show errcnt** that the console recognizes.
- **t1e1 help:** Lists all the commands that start with **t1e1** that the console recognizes.
- **t1e1 set help:** Lists all the commands that start with **t1e1 set** that the console recognizes.
- **t1e1 show help:** Lists all the commands that start with **t1e1 show** that the console recognizes.

System Configuration Commands

The following commands allow the user to configure the system:

- **system set password <password>**: Sets the system password.
- **system set circuitid <circuitid>**: Sets the circuit ID.
- **system set clockmode <internal|external|network|receiverrecover>**: Sets the clock mode. Internal clock mode means the 3088 provides the clock to both the DSL and the serial/T1/E1 interface. External clock mode means the 3088 uses the serial/T1/E1 transmit clock as its DSL transmit clock (V.35 only). Receive recover clock mode means that the 3088 uses the DSL receive clock as its DSL transmit clock and as the serial/T1/E1 receive clock.

Note X.21 External Clock Mode—The X.21 interface expects the DCE to provide the clock used for both transmitting data and for sampling receive data. When the 3088/D is set as a DCE, it may be used in internal or receive recover clock modes. The DSL generates a clock that is provided to the X.21 interface.

When the 3088/D is a DTE, it may be used in external clock mode. The X.21 interface needs to provide the clock. This clock is used by the DSL to sample the serial data and also to update the receive data.

The 3088 is set for either DCE or DTE by flipping the daughter-card. The 3088 is a DCE if DCE points away from the serial interface toward the front of the 3088. Note that this is different than the 3086/D.

The following commands allow the user to view the current system configuration:

- **system show config**: Shows the configuration of the entire system, including DSL and serial/T1/E1 lines.

Any changes to the system configuration or the DSL configuration will be lost on the next power cycle unless the changes are saved. The command **system save config** is used to save the changes.

System Status Commands

The following commands show system status:

- **system show status**: Shows the following system status information: LEDs, DSL test mode, front panel switch settings, DSL link state, and configuration mode.

DSL Configuration Commands

The following commands are used to configure the DSL:

- **dsl set timeslots <1–24 (t1) | 32 (e1) | 72 (v.35, x.21)>**: Sets the number of timeslots. For T1/E1 NTU's, the number of T1/E1 timeslots is set simultaneously. The T1/E1 timeslot mapping will be set to the default. The data rate is calculated by the equation: $data-rate = \#timeslots \times 64k$.
- **dsl set annex <a|b>**: Set the annex.
- **dsl set lineprobe <enabled|disabled>**: Enable or disable line probe.
- **dsl set loopback <off|lal|rdl>**: Start or stop loopbacks.
- **dsl set pattern <off|511|511e>**: Start or stop PRBS generator and BER meter.

- **DSL Error Monitor**

Startup Delay	Interval 1	Interval 2	...	Interval totint
<code>?startdelay⇒</code>	<code>?inttime⇒</code>	<code>?inttime⇒</code>	<code>?inttime⇒</code>	<code>?inttime⇒</code>

The DSL error monitor inspects intervals to see if they have met the error threshold (*maxint*). If the error monitor finds a certain number (*intcnt*) of intervals that meet or exceed the error threshold, it will restart the DSL link. The error monitor will wait (*startdelay*) seconds after the DSL link comes up before it begins monitoring errors. After the startup delay, it will check the number of errors that have occurred during each (*inttime*) seconds to see if they meet the error threshold. The error monitor inspects (*totint*) intervals before it stops.

Note Setting **maxint** to 0 disables the error monitor and setting **totint** to 0 causes the error monitor to run continuously.

The following commands configure the error monitor:

- **dsl set errmon maxint <maxint>**: Sets the number of errors allowed in an interval causes it to be considered an errored interval. If this is set to '0', then the error monitor is disabled.
- **dsl set errmon inttime <inttime>**: Sets the length of each interval.
- **dsl set errmon intcnt <intcnt>**: Sets the number of errored intervals that causes the DSL link to restart.
- **dsl set errmon totint <totint>**: Sets the number of intervals to inspect for errors before disabling the error monitor. If this is set to '0', then the error monitor will run continuously.
- **dsl set errmon startdelay <startdelay>**: Sets the number of seconds to wait after the DSL link comes up before the error monitor starts inspecting intervals.

Changing the data rate (**dsl set timeslots**), the clock mode (**system set clockmode**), the Annex (**dsl set annex**), or Line Probe (**dsl set lineprobe**), or the DSL error monitor settings will not take effect on the DSL link until the link restarts. The **dsl start** command restarts the DSL link.

DSL Status Command

The **dsl show status** command shows the following DSL status information: link state, sync state, link speed, error counters, line condition, noise margin, and test mode status.

DSL Clear Errcntrs Command

The **dsl clear errcntrs** command clears the error counters.

T1/E1 Configuration Commands

t1e1 set linetype <t1-unframed|t1-sf|t1-esf|e1-unframed|e1-fractional|e1-crc|e1-mf|e1-crcmf>

Select the T1 or E1 framing format to use.

t1e1 set linecode <ami|hdb3|b8zs>

Select the line code to use. HDB3 can only be used for E1 line types, and B8ZS can only be used for T1 line types.

t1e1 set lbo <75ohm|120ohm|0.0|7.5|15.0|22.5>

Select the line build out. 75? and 120? can only be use for E1 line types. The others can only be used for T1 line types.

t1e1 set timeslots <1-32>

Specify the number of T1/E1 timeslots to map to DSL timeslots. E1 has a maximum of 32 timeslots and T1 has a maximum of 24 timeslots.

t1e1 set tsmap <tsmap>

Specify the T1/E1 timeslots to map to DSL timeslots. This is a string that can contain ranges (-) and groups (.). For example, the string 2-4,8-9 will select timeslots 2, 3, 4, 8, and 9.

t1e1 set rxeq <enabled|disabled>

Enable or disable the Rx equalizer. This is usually only enabled for long haul applications.

t1e1 set passframing <enabled|disabled>

Specify whether or not to pass the f-bit transparently in T1 modes. This must be enabled for T1-Unframed mode.

t1e1 set passalarms <enabled|disabled>

Specify whether to generate alarms on the remote unit when detected on the local unit.

T1/E1 Status Commands

t1e1 show status: Shows the active T1/E1 configuration, loss-of-signal and framing errors, alarms, and performance statistics.

Remote Console

Provided that there is a DSL link to a second 3088, a user may login to the first 3088's console and enter the remote console command to access the second 3088's console. Using this remote console feature, the user can configure and query the status of the second 3088 from a remote location. When the user is finished with the remote console, the logout command can be used to return to the local console.

Example Command Line Interface Session

```
password: *****
> system set circuitid "3088 Circuit ID"
> system set timeslots 3
> system set clockmode internal
> dsl set annex b
> dsl set lineprobe disabled
> system save config
> dsl start
> system show status
leds: power: on dsl: on tm/er: off
dsl test mode:
  ber status: idle
  errors:    0
  time:     0
front panel switches: sw1: normal sw2: normal
dsl link state: success
configuration mode: software
> dsl show status
link state: success
sync state: in sync
link speed: 192k
error counters:
  crc:    0
  losw:   0
```

```

tx fifo full: 0
tx fifo empty: 0
tx fifo slip: 0
tx stuff: 0
rx fifo full: 0
rx fifo empty: 0
rx fifo slip: 0
line condition: good
noise margin: 3.5
> remote console

password: *****
> dsl clear errcntrs
> dsl show errcntrs
crc:          0
losw:         0
tx fifo full: 0
tx fifo empty: 0
tx fifo slip: 0
tx stuff:     0
rx fifo full: 0
rx fifo empty: 0
rx fifo slip: 0
> logout
exiting remote console

> dsl set loopback rdl
> dsl set pattern 511e
> dsl show testmode
ber status: in progress
errors:     42
time:       12
> dsl set pattern off
> dsl set loopback off
> logout
password:

```

RocketLink Plug 'n' Play

The RocketLink Plug 'n' Play feature allows ISPs, carriers and PTTs to quickly upgrade the link speed for a customer without requiring a visit to re-configure the Customer Premise (CP) Model 3088. This feature also allows service providers to set up all of the configurations at the Central Office (via the ForeFront AIS system) before installing the stand alone units, saving time spent configuring or re-configuring DIP switches.

Note RocketLink Plug 'n' Play is only available when using a ForeFront Model 3096RC running software release 1.5.7 or later. Since the 3096RC is CO, the RocketLink must be CP, which is the default.

The RocketLink Plug 'n' Play feature allows the user to configure the CP unit via the ForeFront Model 3096RC at the Central Office (CO). The stand alone unit at the Customer Premise (CP) site will automatically configure itself to the DTE rate (Bandwidth Allocation) defined at the Model 3096RC. Other configuration parameters may likewise be modified from their default setting.

Follow the instructions below to activate RocketLink Plug 'n' Play between CO (Model 3096RC and CP (Model 3088) units:

- Set the Model 3096RC (CO) to either Internal or External clocking mode as defined by the application.

- Set the Model 3088 (CP) to “RocketLink Plug-and-Play CP” by setting S1 and S2 DIP switches in the *ON* position as described in [figure 6](#).

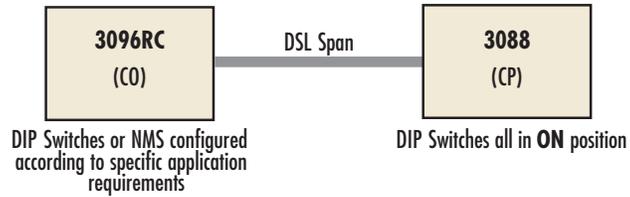


Figure 6. Typical RocketLink Plug 'n' Play Application

When the CO and CP units connect over DSL, the CP will enter a predefined default configuration (Receive Recovered Clocking). During the negotiation process, the CO unit will configure the DTE rate/line rate on the CP unit as defined by the settings of the CO unit.

Chapter 3 **RocketLink-G installation**

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Installation

Once the Model 3088 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.

Connecting the twisted pair interface

The Model 3088 supports communication between two DTE devices as follows:



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

Using 24 AWG (0.5 mm) wire up to:

- 32,000 feet (9.7 km) at 192 kbps
- 18,500 feet (5.6 km) at 2.312 Mbps

Using 26 AWG (0.4 mm) wire up to:

- 23,000 feet (7 km) at 192 kbps
- 13,200 feet (4 km) at 2.312 Mbps

Two things are essential:

1. These units work in pairs. Both units at the end of the twisted pair DSL span must be set for the same DTE rate—one unit set as CO, the other as CP.
2. To function properly, the Model 3088 needs one twisted pair of metallic wire. This twisted pair must be unconditioned, dry, metallic wire, between 19 (0.9mm) and 26 AWG (0.4mm) (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 3088's twisted pair interface is polarity insensitive and is wired for a two-wire interface. The signal/pin relationships are shown in [figure 7](#).

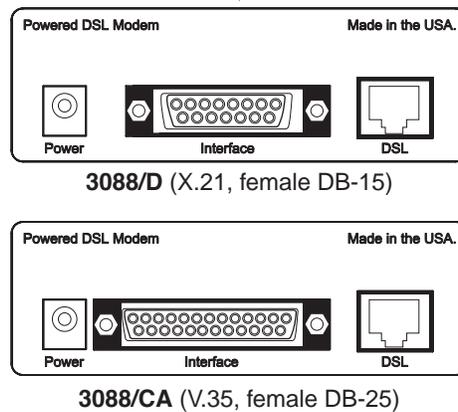


Figure 7. Model 3088 V.35/X.21 interfaces

Connecting the Model 3088/CA (V.35) serial interface

Model 3088/CA supports V.35 serial port connections. This section describes how to connect the serial ports to your V.35 equipment.



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

Connecting the Model 3088/CA (V.35) to a "DTE" device

The Model 3088/CA provides a V.35 DCE (data circuit terminating equipment) interface on an DB-25 female connector. As a DCE, this interface is designed to connect to DTE equipment, such as a router. When connecting the V.35 interface of the Model 3088/CA to your DTE device, use a V.35 straight-through cable (see [figure 8](#)). [Appendix D](#) on page 78 describes pin assignments and signal sources for the Model 3088/CA V.35 interface. When purchasing or constructing an interface cable, refer to the pin diagrams in [Appendix E](#) on page 80 as a guide.

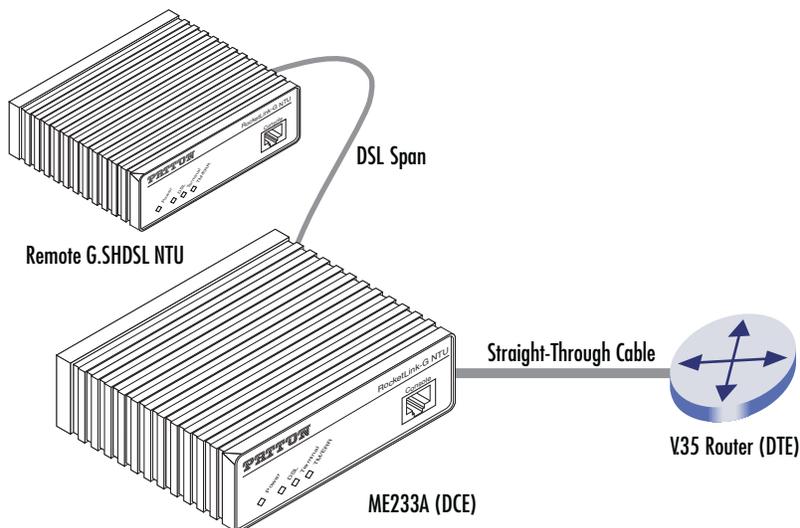


Figure 8. Connecting the Model 3088/CA to V.35 Serial DTE

Connecting the Model 3088/CA (V.35) to a "DCE" device

The Model 3088/CA provides a V.35 DCE (data circuit terminating equipment) interface on an DB-25 female connector. As a DCE, this interface is designed to connect to DTE equipment, such as a router. However, connecting the 3088/CA to another DCE device, such as a multiplexer or G.703 E1 NTU, requires a tail-

circuit cable. When connecting the V.35 interface of the Model 3088/CA to your DCE device (see figure 9), use a V.35 tail circuit cable. Some applications may also require the installation of a tail-circuit buffer to account for small differences in clock frequency between the 3088/CA and the V.35 DCE (multiplexer).

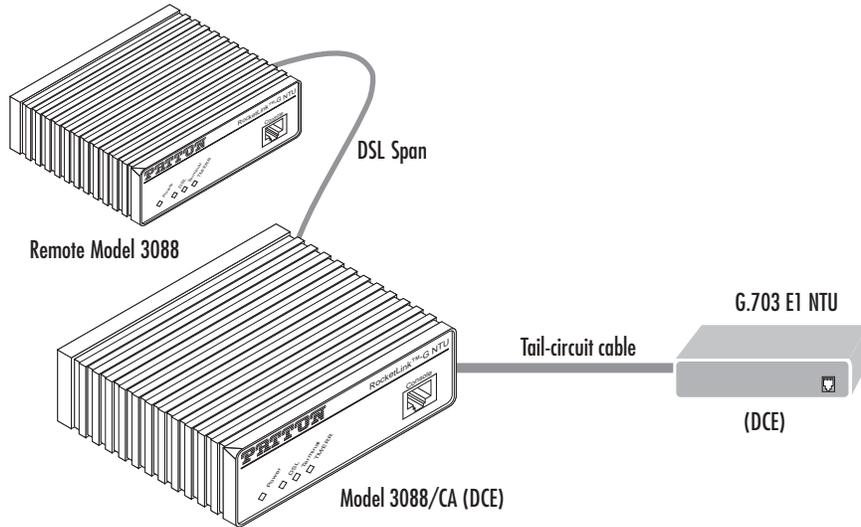


Figure 9. Connecting the Model 3088/CA to V.35 Serial DCE

Connecting the Model 3088/D (X.21) serial interface

Model 3088/D supports X.21 serial port connections. This section describes how to connect the serial ports to your X.21 equipment.



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

Connecting the Model 3088/D (X.21) to a "DCE" or "DTE" device

The Model 3088/D provides an X.21 interface on a DB-15 female connector. The X.21 interface default configuration is DCE for connection to DTE (data terminal equipment) such as a router. However, the X.21 interface on the Model 3088/D may be configured as DTE (data terminal equipment) for connection to DCE

such as a modem or multiplexer. When connecting the X.21 interface of the Model 3088/D to your DTE or DCE device, use an X.21 straight-through cable (See figure 10).

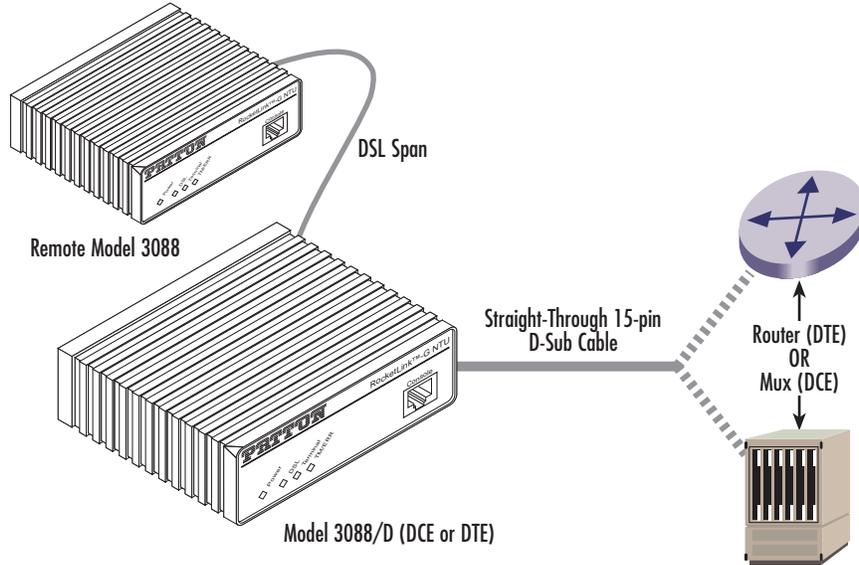


Figure 10. Connecting the Model 3088/D to X.21 DTE or DCE

To change the DCE/DTE orientation from the default position (DCE), you must open the case Model 3088/D case.

Opening the Case

To open the Model 3088/D case, insert a flat head screw driver into an open slot on both sides of the case, as in figure 11. Twist the screw driver head slightly and the top half of the case will separate from the lower half, as in figure 11. Be careful not to damage the PC-board mounted components.

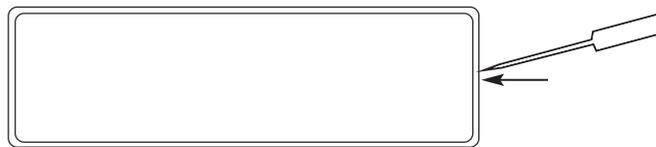


Figure 11. Opening the 3088 case with a small screwdriver

The DCE/DTE strap is located on the top side of the 3088/D pc board (See figure 12). 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). Change the DCE/DTE orientation by pulling the strap out of its socket, rotating it 180°, then plugging the strap back into the socket. You will see that the DCE/DTE arrows now point in the opposite directions, showing the new configuration of the X.21 port. To close the case, fit the two halves together snugly and snap them back in place.

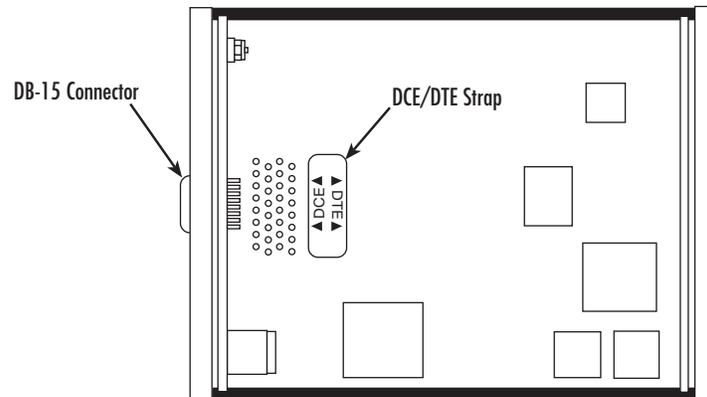


Figure 12. Setting the DCE/DTE Strap (X.21 only)

Connecting the Model 3088/K serial interface



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

Connecting the Model 3088/K to an E1 Network

The Model 3088/K supports E1 network connections. This section describes how to connect the network to your Model 3088/K.

Connect twisted pair (120 ohm) to E1 network

The Model 3088/K is equipped with a single RJ-48C jack for connections to a 120 ohm twisted pair E1 network interface. If your E1 network terminates via RJ-48C, use the diagram below and the table following it to make the proper connections. The connector pinout and signals are shown in [figure 13](#).

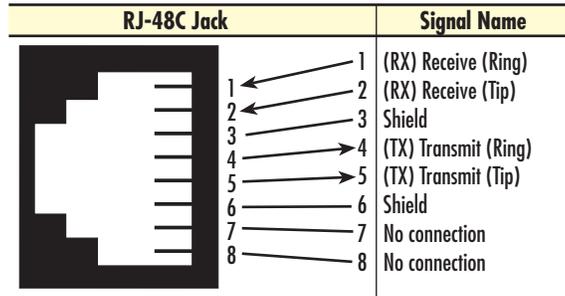


Figure 13. 120 Ohm RJ-48C E1 interface

Use the following connection diagram to connect the 120-ohm E1 network channel.

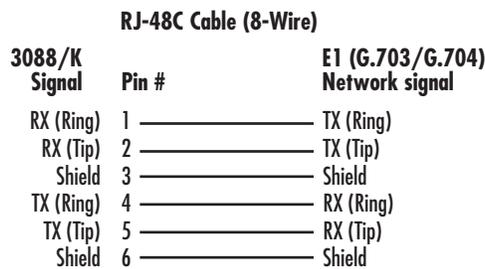


Figure 14. RJ-45 cable diagram for E1 connection

Connecting dual coaxial cable (75 ohm) to E1 network

The Model 3088/K is also equipped with dual female BNCs (TX and RX) for connection to a 75 ohm dual coax E1 network interface. If your E1 network terminates via dual coaxial cable, use [figure 15](#) to make the proper connections.



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

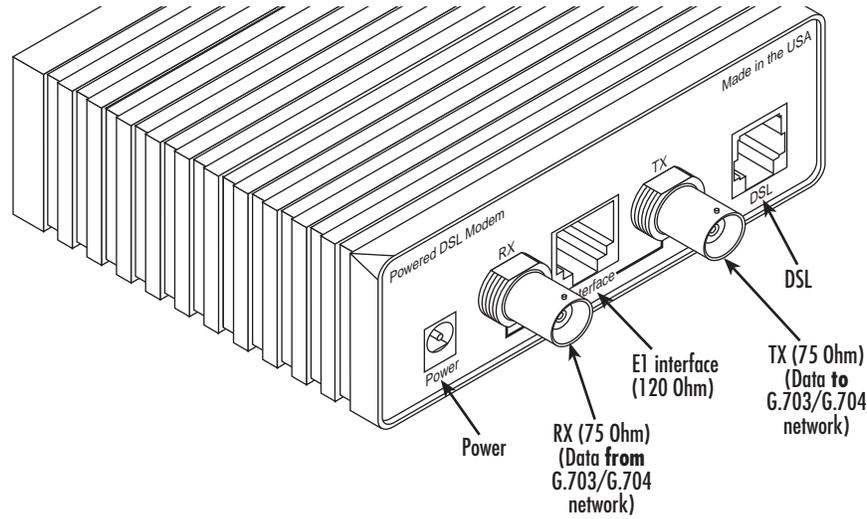


Figure 15. Model 3088/K rear panel

Connecting the Model 3088/T (T1) serial interface

The Model 3088/T supports T1 network connections. This section describes how to connect the network to your Model 3088/T.



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

Connect Twisted Pair (100 ohm) to T1 Network

The Model 3088/T is equipped with a single RJ-48C jack for connection to a 100 ohm twisted-pair T1 network interface. Use the diagram below and the table following it to make the proper connections. The connector pinout and signals are shown in figure 16.

RJ-48C Jack	Signal Name
1	(RX) Receive (Ring)
2	(RX) Receive (Tip)
3	Shield
4	(TX) Transmit (Ring)
5	(TX) Transmit (Tip)
6	Shield
7	No connection
8	No connection

Figure 16. 120 Ohm RJ-48C T1 interface

Use the following connection diagram to connect the 120 ohm E1 network channel.

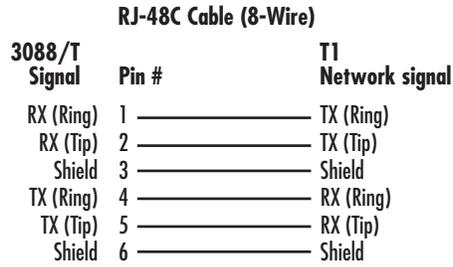


Figure 17. RJ-45 cable diagram for T1 connection

Connecting power

External AC universal power supply

1. Connect the power cord from the AC socket to the IEC-320 power entry connector on the universal input power supply.



CAUTION

The external AC adaptor shall be a listed limited power source that incorporates a disconnect device and shall be positioned within easy reach of the operator. Ensure that the AC power cable meets all applicable standards for the country in which it is to be installed, and that it is connected to a wall outlet which has earth ground.

2. Connect the barrel plug to the *Power* connector on the Model 3088.

Note The Model 3088 powers up as soon as it is plugged into an AC outlet—there is no power switch.

DC Power

The 36-60 VDC DC to DC adapter is supplied with the DC version of the Model 3088. The black and red leads plug into a DC source (nominal 48VDC) and the barrel power connector plugs into the barrel power supply jack on the 3088. (See Figure 18).



Figure 18. DC Power Supply



There are no user-servicable parts in the power supply section of the Model 3088/C/D/K/T. Fuse replacement should only be performed by qualified service personnel. See Chapter 8, “[Contacting Patton for assistance](#)” on page 64.

Chapter 4 **Operation**

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Introduction

Once the Model 3088 is properly configured and installed, it should operate transparently. The following sections describe power-up, reading the LED status monitors, and using the built-in loopback test modes.

Power-up

To apply power to the Model 3088, first be sure that you have read section “Power input connector” on page 16, and that the unit is connected to the appropriate power source. Power up the unit.

LED status monitors

There are four LEDs that provide feedback on the state of the unit. Figure 19 shows the location of the front panel LEDs. Following figure 19 is a description of each LED’s function.

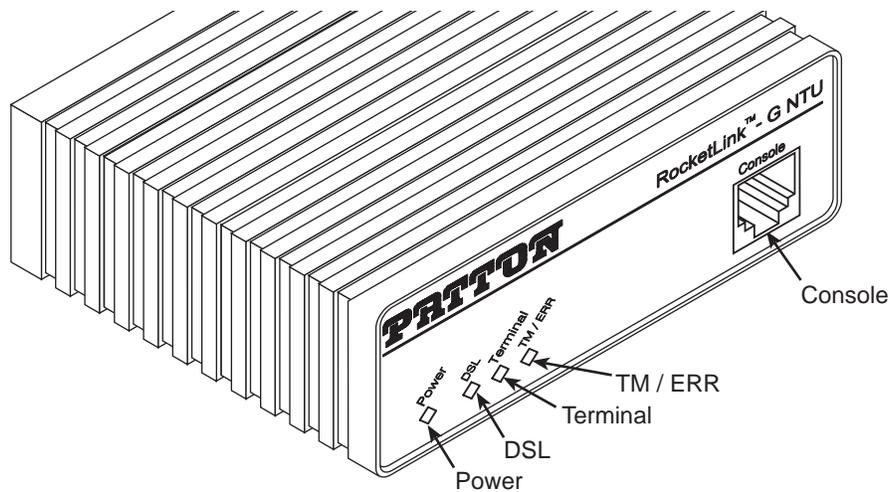


Figure 19. Model 3088/CA front panel

Power (Green)

The Power LED glows solid during normal operation. At startup, during the POST, the LED blinks once every second. If the POST fails, the unit does not enter normal operation, and the LED blinks once every 0.4 seconds.

DSL (Green)

The DSL LED glows solid while a DSL link is established. While the DSL link is training it blinks once every second.

Link (Green) (Models K and T only)

The Link LED indicates the status of the T1/E1 link. It is dark when it detects no signal. It blinks once per second when it detects signal, but not valid framing. It glows solid when it detects valid framing.

Term (Green) [Models C and D]

The Term LED glows solid under the following circumstances:

- **3088/CA with V.35 interface:** If the serial interface has asserted DTR
- **3088/D with the X.21 interface:**
 - **Configured as DCE:** Indicates that the “Control” signals have been asserted.
 - **Configured as DTE:** Indicates that the “Indication” signals have been asserted

TM/ER (Red)

The TM/ER LED is used to indicate that a test mode is in progress or an error has been detected. It blinks once every second while a test mode is starting. It glows solid while a test mode is in progress. It blinks once if an error is detected either during a test mode, or in normal DSL operation.

LOS (Red) [Models K and T]

The LOS LED blinks once per second to indicate either framing errors or clock slips. Clock slips are often caused by a mis-configured clock mode.

Test modes

The 3088 offers test modes in the form of loopbacks, PRBS pattern generators, and combinations of both. This section discusses how the test modes work. The following 3088 models have toggle switches available on the front panel for operating test modes:

- 3088/CAS/E
- 3088/DS/E
- 3088/KS/E
- 3088/TS/E

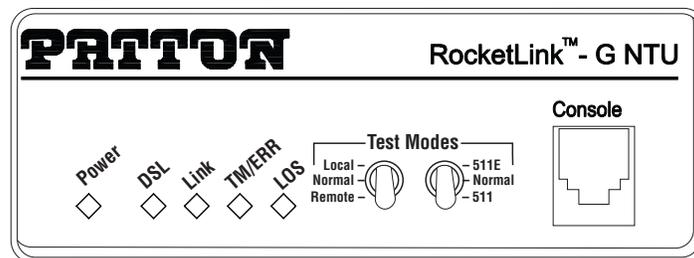


Figure 20. 3088/S Model Front Panel

Figure 21 is a block diagram of the Model 3088 with respect to test modes.

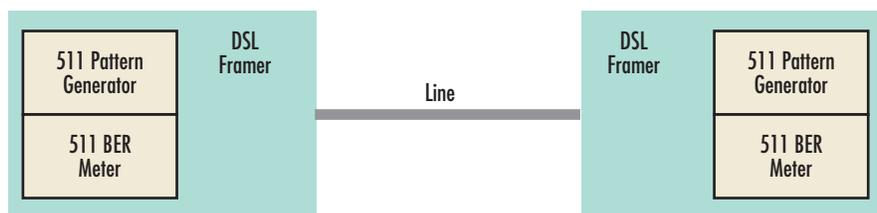


Figure 21. Model 3088 Block Diagram

Loopbacks

The 3088 supports both Local Analog Loopbacks (LAL) and Remote Digital Loopbacks (RDL). These can be initiated either from the optional front panel switches or by the console command `dsl set loopback <off|lal|rld>`. The data path for the LAL is shown in [figure 22](#).

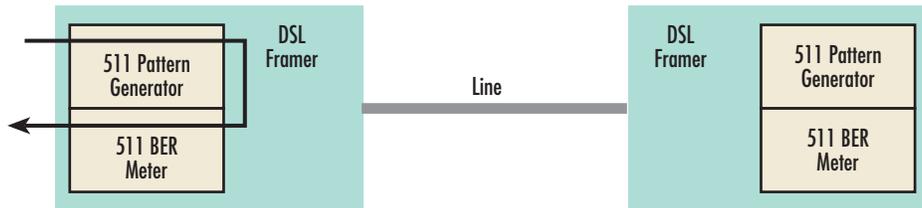


Figure 22. Local Analog Loopback diagram

The data received from the serial interface is looped back before going out on the DSL line. Note that this loopback occurs after the pattern generator/BER meter. This means that running a 511 pattern in conjunction with an LAL should result in no error detected by the meter.

The data path for the RDL is shown in [figure 23](#).

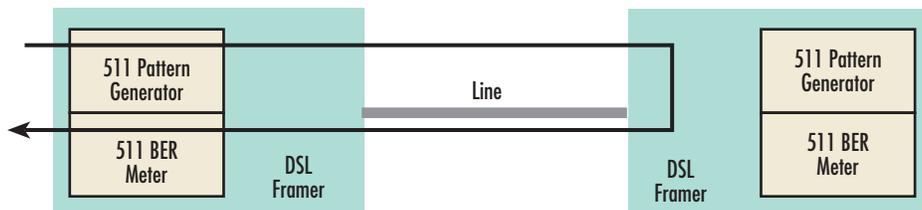


Figure 23. Remote Digital Loopback diagram

The RDL causes the remote unit to loop the data received from the DSL line back toward the DSL line.

Patterns

The 3088 can generate and detect 511 and 511 with Error patterns. These can be initiated either by the optional front panel switches or by the console command `dsl set pattern <off|511|511e>`. When the pattern is started, the DSL framer uses its internal 511 pattern generator for its DSL TX data instead of the data received from the serial interface. Also, the framer's internal BER Meter tries to detect a 511 pattern in the DSL RX Data.

Because the BER Meter always runs when the pattern generator runs, the meter will detect errors if either the pattern is not either looped back or the remote unit is not transmitting a 511 pattern.

One point to note is that the way errors are generated in the 511E pattern generates CRC errors. This can cause the DSL error monitor to restart the link if the thresholds are set low enough.

Chapter 5 **Remote console operation**

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Introduction

The PC user (near-end) may configure and verify status of the remote 3088 (far-end) via a Remote Console Session. The PC user must log onto the 3088 (near-end) unit to establish a remote console session. Once done, the remote 3088 (far-end) appears as a unit which is locally connected through the RS-232 console port. All commands are transmitted over the G.SHDSL link in the EOC channel.

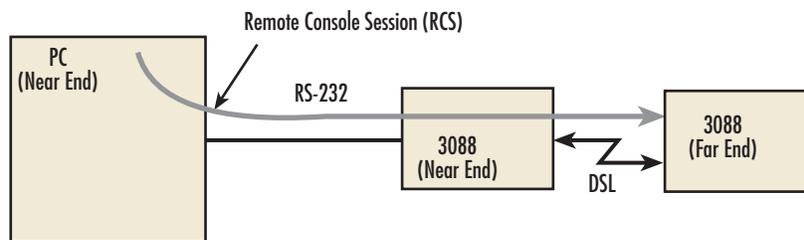


Figure 24. Remote control session diagram

Establishing a Remote Console Session

How to Connect

The following steps are to establish a connection to the remote 3088 (far-end) via Remote Console Session (RCS):

1. Configure a terminal emulation program (e.g., Hyperterminal) on PC (near-end) for 19.2 kbps, 8 data bits, no parity, 1 stop bit, no flow control. Connect it to the RS-232 console port of the 3088 (near-end).
2. At the password prompt, log in to the near-end Model 3088.
3. Ensure that a DSL link is established. You can verify an established DSL link by using the system show status command or by checking that the DSL LED is solid green. Upon executing the **show status** command, the **dsl link state** is shown as *success* if the DSL link is established.
4. At the command prompt, enter the command **remote console**.
5. Wait for the message *Console: Remote console connection established*.
 - If a DSL link is not established, or for some other reason the 3088 (far-end) does not respond in a reasonable amount of time, the following message appears: *Console: Remote console timed out trying to connect*. Enter the command **remote console** again.
 - If 3088 (Far End) already has an active remote console session open, you will see the message *Console: Remote console connection request rejected*. This can also happen if the remote 3088 (far-end) has an established remote console session with the local 3088 (near-end) which has timed out.
6. Enter the password at the password prompt for the remote console session.

Note The passwords for a local console session of the 3088 (near-end) and the remote console session of the 3088 (far-end) should be different for the purpose of security.

7. You should now be logged into the remote 3088 (far-end) via the remote console session. The communication with the remote 3088 (far-end) is essentially the same as having a local console connection.

Note The local or remote 3088 may be CO or CPE, as long as there is one of each. Either the CO or CPE unit may accept a remote console connection.

Note With a remote console session open, a user at PC (far-end) is blocked from using the local console. Upon typing anything, the 3088 (far-end) sends a message to the PC (far-end) stating *Console: Remote console connection is open.*

Figure 25 is a screenshot of opening a typical remote console session:

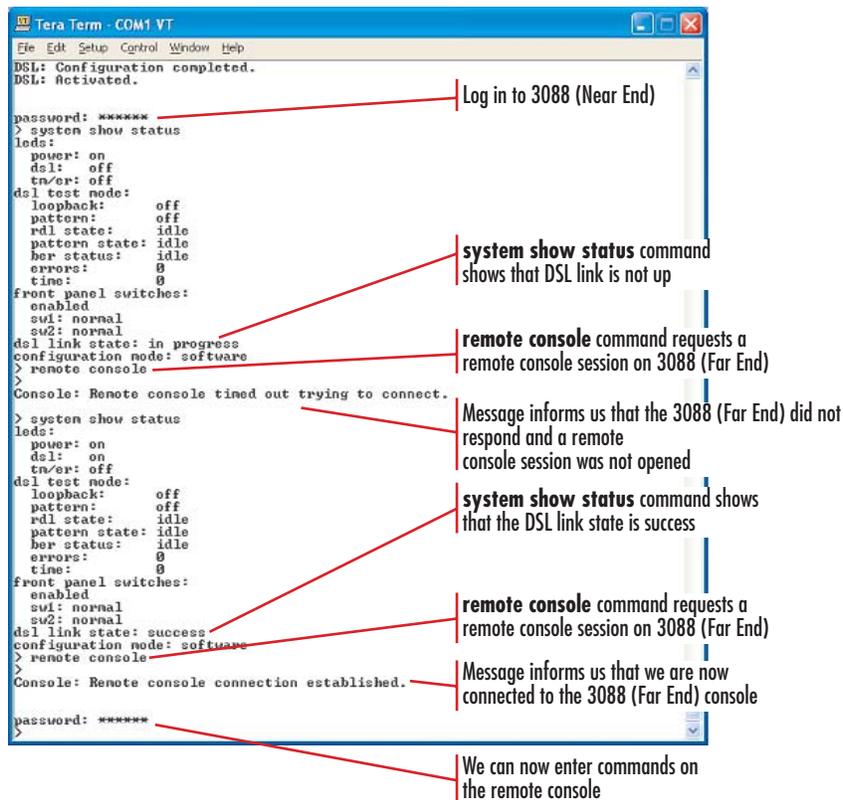


Figure 25. Opening a typical remote console session

How to Disconnect

The remote console session ends under any of the following conditions:

- The user enters the command **logout**
- A timeout period of 5 minutes elapses since the user has entered a command to the console.
- The DSL link drops.

The response upon logging out of the remote console session with the command **logout** is *Console: Remote console connection lost*. The following is what is displayed upon a user's logging out of a remote console session after logging in.

```
> remote console
>
Console: Remote console connection established.

password: *****
> logout
Console: Remote console connection lost.

>
```

The timeout period is a fixed, non-configurable parameter of 5 minutes. If the remote 3088 (far-end) has received no command within 5 minutes, it automatically terminates the RCS. Once the RCS is terminated, the PC (far-end) can establish a local console session if desired. However if the PC (near-end) wishes to re-establish a RCS, it is able to do so whether or not the PC (far-end) is in an active local session, because the RCS has priority over a local console session. If the PC (near-end) establishes an RCS while the PC (far-end) is on a local session, the PC (far-end) is kicked off.

Differences in Local and Remote Control Session Behavior

Since the remote console session communication occurs over the G.SHDSL link's EOC channel, some commands via the RCS have unusual effects.

- **system upgrade:** Do not issue this command via an RCS. A system upgrade must be done via the local console connection. If you should accidentally issue this command over an RCS, the remote 3088 (far-end) waits indefinitely for input (which is the system upgrade image) from the local console port of the 3088 (far-end). If this command is entered, 3088 (Far End) will have to be power-cycled.



Do not attempt a software upgrade of the remote unit over the Remote Control Session.

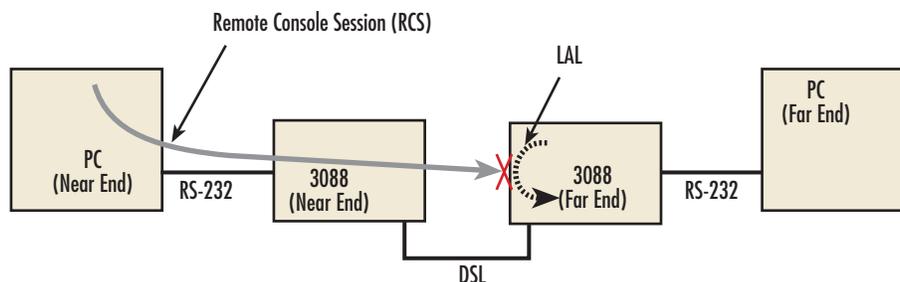


Figure 26. Remote control session with LAL diagram

- **dsl set loopback lal:** Do not issue this command over the RCS to the far-end 3088. If the far-end goes into LAL, the near-end and far-end 3088 NTUs can no longer communicate over the RCS.



Do not issue this command to a far-end unit. If you were to do so, the near-end 3088 would no longer be able to communicate with the far-end 3088.

Chapter 6 **Software Upgrade**

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Introduction

The Model 3088 is software upgradeable through the console port. Software images will be available in Intel Hex file format.

The software upgrade feature is available either by powering up the Model 3088 with all DIP switches set to the *OFF* position, or by entering the **system upgrade** command on the command line interface. The software upgrade takes approximately 5 minutes to complete. The 3088 will print ‘.’ to the screen while the software upgrade is in process. When the software upgrade completes, it will print a message stating that it is complete and the number of errors, if any, that occurred.

Errors may occur during the software upgrade if the image is corrupt or if there is a disruption in the console port connection. The Model 3088 will print a message to the console port if it encounters any errors. In the event of an error, the portions of the old image may have been overwritten, and the unit may not be able to boot into operational mode. However, the unit may still boot into the software upgrade, so a new software image can still be loaded to bring the unit back to an operational state.

Here is the software upgrade procedure:

1. Obtain the software image Hex file for the 3088.
2. Turn off the Model 3088.
3. Make a note of the current DIP switch settings, then set all DIP switches to the *OFF* position.
4. Turn on the Model 3088.
5. Configure HyperTerminal for 19.2 kbps, 8 bits, 1 stop bit, no parity, XON-XOFF.
6. Open Model 3088 Console (via HyperTerminal or other terminal emulation program).

```
>>Transfer
>>Send Text File...
>>Set "Files of Type:" to "All files (*.*)"
>>Select 033252Z.hex
```

7. When the transfer completes, turn off the Model 3088.
8. Set the DIP switches for the proper configuration.
9. Turn on the Model 3088. It now operates with the upgraded software.

Chapter 7 **Reset configuration to factory defaults**

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Introduction

The configuration can be reset to factory defaults from the software reset mode. This allows a user to recover from a forgotten password. To reset to the configuration, follow these steps:

1. Power down the unit.
2. Set all DIP switches to the *OFF* position.
3. Connect a PC to the *Console* port.
4. Open a VT100 terminal emulator (such as HyperTerminal). Configure the emulator for 19,200 kbps, 1 stop bit, no parity, X-ON X-OFF flow control.
5. Power up the unit. The terminal should display the following message: *Reset Mode*.
6. Type the '*' key. You will see a ':' prompt.
7. Type the command `reset`.
8. When the command completes, the unit has been reset to factory configuration.
9. Set the DIP switches to the desired configuration. Power cycle the unit to begin using the new software.

Chapter 8 **Contacting Patton for assistance**

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Introduction

This chapter contains the following information:

- “Contact information”—describes how to contact Patton technical support for assistance.
- “Warranty Service and Returned Merchandise Authorizations (RMAs)”—contains information about the warranty and obtaining a return merchandise authorization (RMA).

Contact information

Patton Electronics offers a wide array of free technical services. If you have questions about any of our other products we recommend you begin your search for answers by using our technical knowledge base. Here, we have gathered together many of the more commonly asked questions and compiled them into a searchable database to help you quickly solve your problems.

Patton support headquarters in the USA

- Online support: available at www.patton.com
- E-mail support: e-mail sent to support@patton.com will be answered within 1 business day
- Telephone support: standard telephone support is available five days a week—from 8:00 am to 5:00 pm EST (1300 to 2200 UTC/GMT)—by calling +1 (301) 975-1007
- Fax: +1 (253) 663-5693

Alternate Patton support for Europe, Middle East, and Africa (EMEA)

- Online support: available at www.patton-inalp.com
- E-mail support: e-mail sent to support@patton-inalp.com will be answered within 1 business day
- Telephone support: standard telephone support is available five days a week—from 8:00 am to 5:00 pm CET (0900 to 1800 UTC/GMT)—by calling +41 (0)31 985 25 55
- Fax: +41 (0)31 985 25 26

Warranty Service and Returned Merchandise Authorizations (RMAs)

Patton Electronics is an ISO-9001 certified manufacturer and our products are carefully tested before shipment. All of our products are backed by a comprehensive warranty program.

Note If you purchased your equipment from a Patton Electronics reseller, ask your reseller how you should proceed with warranty service. It is often more convenient for you to work with your local reseller to obtain a replacement. Patton services our products no matter how you acquired them.

Warranty coverage

Our products are under warranty to be free from defects, and we will, at our option, repair or replace the product should it fail within one year from the first date of shipment. Our warranty is limited to defects in workmanship or materials, and does not cover customer damage, lightning or power surge damage, abuse, or unauthorized modification.

Out-of-warranty service

Patton services what we sell, no matter how you acquired it, including malfunctioning products that are no longer under warranty. Our products have a flat fee for repairs. Units damaged by lightning or other catastrophes may require replacement.

Returns for credit

Customer satisfaction is important to us, therefore any product may be returned with authorization within 30 days from the shipment date for a full credit of the purchase price. If you have ordered the wrong equipment or you are dissatisfied in any way, please contact us to request an RMA number to accept your return. Patton is not responsible for equipment returned without a Return Authorization.

Return for credit policy

- Less than 30 days: No Charge. Your credit will be issued upon receipt and inspection of the equipment.
- 30 to 60 days: We will add a 20% restocking charge (crediting your account with 80% of the purchase price).
- Over 60 days: Products will be accepted for repairs only.

RMA numbers

RMA numbers are required for all product returns. You can obtain an RMA by doing one of the following:

- Completing a request on the RMA Request page in the *Support* section at **www.patton.com**
- By calling **+1 (301) 975-1007** and speaking to a Technical Support Engineer
- By sending an e-mail to **returns@patton.com**

All returned units must have the RMA number clearly visible on the outside of the shipping container. Please use the original packing material that the device came in or pack the unit securely to avoid damage during shipping.

Shipping instructions

The RMA number should be clearly visible on the address label. Our shipping address is as follows:

Patton Electronics Company

RMA#: xxxx

7622 Rickenbacker Dr.

Gaithersburg, MD 20879-4773 USA

Patton will ship the equipment back to you in the same manner you ship it to us. Patton will pay the return shipping costs.

Appendix A **Compliance information**

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Compliance

EMC

- FCC Part 15, Class A
- EN55022, Class A
- EN55024

Safety

- UL 60950-1/CSA C22.2 N0. 60950-1
- IEC/EN60950-1 2nd edition
- AS/NZS 60950-1
- GOST-R

PSTN Regulatory

- ACTA TIA/EIA/IS-968 A5
- Industry Canada CS-03
- TBR12 & 13 (K and T models)
- AS/ACIF S016:2001 (K and T models)
- AS/ACIF S043:2003
- Д-СПД-1979, expires 21.04.2011(3088/T/EUI)
- Д-СПД-1980, expires 21.04.2011(3088/K/EUI)
- Д-СПД-1981, expires 21.04.2011(3088/D/EUI)
- Д-СПД-1982, expires 21.04.2011(3088/CA/EUI)

FCC Part 68 (ACTA) Statement

This equipment complies with Part 68 of FCC rules and the requirements adopted by ACTA. On the bottom side of this equipment is a label that contains—among other information—a product identifier in the format US: AAAEQ##TXXXX. If requested, this number must be provided to the telephone company.

The method used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this equipment, for repair or warranty information, please contact our company. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

Radio and TV Interference (FCC Part 15)

This device 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 device has been tested and found to comply with the limits for a Class A computing device in accordance with specifications in Subpart B 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 device 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).

Industry Canada Notice

This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

This Declaration of Conformity 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.

CE Declaration of Conformity

Patton Electronics, Inc declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The Declaration of Conformity may be obtained from Patton Electronics, Inc at www.patton.com/certifications.

The safety advice in the documentation accompanying this device shall be obeyed. The conformity to the above directive is indicated by CE mark on the device.

Authorized European Representative

D R M Green

European Compliance Services Limited.

Avalon House, Marcham Road

Abingdon,

Oxon OX14 1UD, UK

Appendix B **Specifications**

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Clocking modes

Internal, external (V.35 only), or receive recovered

DTE rate

All 64k steps from 64 to 4608 kbps

Serial interface

V.35 (Model 3088/CA), DCE orientation;

X.21 (Model 3088/D), DCE or DTE orientation depending on orientation of daughter board mounted on the mother board.

E1 (Model 3088/K) presents G.703/G.704 interface. Either 75 Ohms (unbalanced) or 120 Ohms (balanced). Pins 1 & 2 are Receive. Pins 4 & 5 are Transmit.

T1 (Model 3088/T) present T1 interface. Pins 1 & 2 are Receive. Pins 4 & 5 are Transmit.

Serial connector

D-Sub-25 Female (Model 3088/CA)

D-Sub-15 Female (Model 3088/D)

Dual BNC and RJ48C (Model 3088/K), strap selectable

RJ48C connector (Model 3088/T)

Diagnostics

V.52 compliant (511/511E) pattern generator and detector with error injection mode controlled by front-panel switch. Local and Remote Loopback control either by a front-panel switch or from the DTE interface.

Status LEDs

Power (Green)

The Power LED glows solid during normal operation. At startup, during the POST, the LED blinks once every second. If the POST fails, the unit does not enter normal operation, and the LED blinks once every 0.4 seconds.

DSL (Green)

The DSL LED glows solid while a DSL link is established. While the DSL link is training it blinks once every second.

Link (Green) (T1/E1 only)

Solid green indicates valid T1/E1 framing. Flashing indicates signal being received, but the link has not yet been established.

Term (Green)

The Term LED glows solid under the following circumstances:

- **3088/CA with V.35 interface:** If the serial interface has asserted DTR
- **3088/D with the X.21 interface:**
 - **Configured as DCE:** Indicates that the “Control” signals have been asserted.
 - **Configured as DTE:** Indicates that the “Indication” signals have been asserted

TM/ER (Red)

The Test Mode/Error (TM/ER) LED is used to indicate that a test mode is in progress or an error has been detected. It blinks once every second while a test mode is starting. It glows solid while a test mode is in progress. It blinks once if an error is detected either during a test mode, or in normal DSL operation.

Configuration

Configuration is done with either externally accessible DIP switches, CLI or through the EOC (Embedded Operations Channel) from a Model 3096RC G.SHDSL concentration card.

Power and power supply specifications

The NTU comes with either an AC or DC power supply:

- The supply’s connection to the NTU is a 2.5 mm barrel receptacle with the center conductor positive.
- There is one fuse in the equipment rated at 250V, 500 mA, 2 sec.
- Rated voltage: 5 VDC
- Rated current: 1 A DC

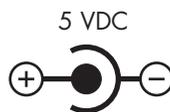


Figure 27. Power connection barrel receptacle 5 VDC diagram

External AC universal power supply



The external AC adaptor shall be a listed limited power source that incorporates a disconnect device and shall be positioned within easy reach of the operator. Ensure that the AC power cable meets all applicable standards for the country in which it is to be installed, and that it is connected to a wall outlet which has earth ground.

- Output from power supply: 5 VDC, 2A
- Input to power supply: universal input 100–240 VAC 50/60 Hz 0.3A

External 48 VDC power supply



The external DC adaptor shall be a listed limited power source that incorporates a disconnect device and shall be positioned within easy reach of the operator. The interconnecting cables shall be rated for the proper voltage, current, anticipated temperature, flammability, and mechanical serviceability

- Input
 - Rated voltage: 36–60 VDC
 - Rated current: 0.25 A DC
- Output
 - Rated voltage: 5 VDC \pm 5%, 5W
 - Rated current: 1 A DC
 - 6-inch cable terminated with 2.5 mm barrel plug, center positive
- Isolation: 500 VDC
- Environment: 0–40°C; 5–95% relative humidity, non-condensing

Transmission line

Single Twisted Pair

Line coding

TC-PAM (Trellis Coded Pulse Amplitude Modulation)

Line rates (DSL line)

All nx64 rates from 64 kbps up to 4.6 Mbps

Line interface

Transformer coupled, 2500 VRMS isolation

G.SHDSL physical connection

RJ-45, 2-wire polarity insensitive pins 4 and 5

Environment

Operating temp: 32–122°F (0–50°C)

Humidity: 5–95% non-condensing

Altitude: 0–15,000 feet (0–4,600 meters)

Appendix C **Factory default values**

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Factory default values for software-configurable parameters

Table 20. 3088/CA and 3088/D

Parameter	Default value
Clock Mode	Receive-Recover
DSL Timeslots	31
Serial Timeslots	31
Tx Clock	Normal
Circuit ID	Patton Model 3088
Password	superuser
Front Panel Switches	Enabled
Annex	B
Line Probe	Disabled
Loopback	Off
Pattern	Off
DSL Error Monitor – Max Errors/Interval	3
DSL Error Monitor – Interval Time	1
DSL Error Monitor – Max Errored Intervals	3
DSL Error Monitor – Total Intervals	10
DSL Error Monitor – Startup Delay	5

Table 21. 3088/K

Parameter	Default value
Clock Mode	Receive-Recover
DSL Timeslots	31
T1/E1 Timeslots	31
T1/E1 Timeslot Map	1-31
T1/E1 Line Type	E1 - Fractional
T1/E1 Line Code	HDB3
T1/E1 Line Build Out	75 Ohm
T1/E1 Rx Equalizer	Disabled
T1/E1 Pass Framing	Disabled
T1/E1 Pass Alarms	Disabled
Circuit ID	Patton Model 3088
Password	superuser
Front Panel Switches	Enabled
Annex	B
Line Probe	Disabled

Table 21. 3088/K (Continued)

Parameter	Default value
Loopback	Off
Pattern	Off
DSL Error Monitor – Max Errors/Interval	3
DSL Error Monitor – Interval Time	1
DSL Error Monitor – Max Errored Intervals	3
DSL Error Monitor – Total Intervals	10
DSL Error Monitor – Startup Delay	5

Table 22. 3088/T

Parameter	Default value
Clock Mode	Receive-Recover
DSL Timeslots	24
T1/E1 Timeslots	24
T1/E1 Timeslot Map	1-24
T1/E1 Line Type	T1 – ESF
T1/E1 Line Code	B8ZS
T1/E1 Line Build Out	0.0 dB
T1/E1 Rx Equalizer	Disabled
T1/E1 Pass Framing	Disabled
T1/E1 Pass Alarms	Disabled
Circuit ID	Patton Model 3088
Password	Superuser
Front Panel Switches	Enabled
Annex	A
Line Probe	Disabled
Loopback	Off
Pattern	Off
DSL Error Monitor – Max Errors/Interval	3
DSL Error Monitor – Interval Time	1
DSL Error Monitor – Max Errored Intervals	3
DSL Error Monitor – Total Intervals	10
DSL Error Monitor – Startup Delay	5

Appendix D **Factory replacement parts and accessories**

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Factory replacement parts and accessories

Model #	Description
0805DCUI	100–240VAC (+5V \pm 5% reg. DC/2A) Universal Input Adapter
0805EUR	European Power Cord CEE 7 ("A")
0805UK	United Kingdom Power Cord ("D")
0805US	American Power Cord ("K")
0805AUS	Australia/New Zealand Power Cord ("C")
0805DEN	Denmark Power Cord ("E")
0805FR	France/Belgium Power Cord ("F")
0805IN	India Power Cord ("G")
0805IS	Israel Power Cord ("H")
0805JAP	Japan Power Cord ("J")
0805SW	Switzerland Power Cord ("L")
07M3088-UM	User Manual
2-34F25M	V.35 Gender Changer, M/34 female to DB-25 male
10-25M/35F-1	Cable, DB-25 Male to V.35 Female, 6 feet
10-25M/35M-1	Cable DB-25 Male to V.35 Male, 6 feet

Appendix E **Interface pinouts**

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RJ-11 non-shielded DSL port

Single twisted-pair (TP) for full-duplex transmission. The signals are polarity insensitive.

Pin #	Signal
1	
2	Tip
3	Ring
4	

V.35 interface

DB-25 female connector (DCE orientation)

Pin #	Signal	Pin #	Signal
1	Frame Ground	12	TxC-b
2	TxD-a	14	TxD-b
3	RxD-a	15	TxC-a
4	RTS	16	RxD-b
5	CTS	17	RxC-a
6	DSR	18	LL
7	Signal Ground	20	DTR
8	CD	21	RL
9	RxC-b	24	ExtC-a
11	ExtC-b	25	TM

T1/E1 interface

RJ-48C female connector

Pin #	Signal
1	Receive (Ring)
2	Receive (Tip)
3	Shield
4	Transmit (Ring)
5	Transmit (Tip)
6	Shield
7	No connection
8	No connection

X.21 interface

D-sub-15 female connector (DTE/DCE orientation).

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

RS-232 console interface pin assignments

RJ-45 non-shielded connector (EIA-561)

Pin #	Signal
1	DSR (out)
2	CD (out)
3	DTR (in)
4	Signal Ground
5	RD (out)
6	TD (in)
7	CTS (out)
8	RTS (in)