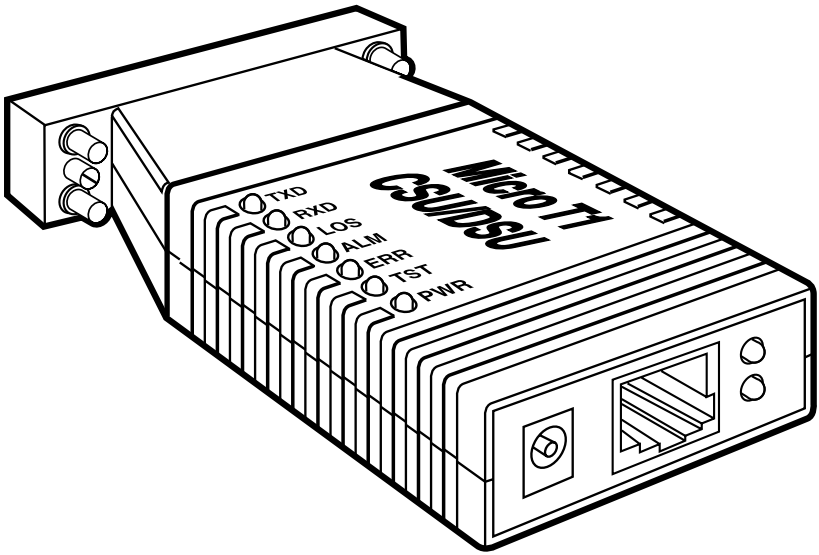
BLACK BOX®
NETWORK SERVICES

JUNE 1999
MT120A-R2

Micro T1 CSU/DSU



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CE Notice

The CE symbol on your Micro T1 CSU/DSU indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the Union European (EU).

WARNING

This device is not intended to be connected to the public telephone network.

FEDERAL COMMUNICATIONS COMMISSION
AND
CANADIAN DEPARTMENT OF COMMUNICATIONS
RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate 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 communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.

NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

FCC REQUIREMENTS FOR TELEPHONE-LINE EQUIPMENT

1. If you have problems with your telephone equipment after installing this device, disconnect this device from the line to see if it is causing the problem If it is, contact your supplier or an authorized agent.

2. The telephone company may make changes in its technical operations and procedures. If any such changes affect the compatibility or use of this device, the telephone company is required to give adequate notice of the changes.

3. If the telephone company requests information on what equipment is connected to their lines, inform them of:

   a. The telephone number that this unit is connected to.

   b. The ringer equivalence number.

   c. The USOC jack required: RJ-11C.

   d. The FCC registration number.

   Items (b) and (d) can be found on the unit's FCC label. The ringer equivalence number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed five (5.0). If too many devices are attached, they may not ring properly.

4. In the event of an equipment malfunction, all repairs should be performed by your supplier or an authorized agent. It is the responsibility of users requiring service to report the need for service to the supplier or to an authorized agent.

CERTIFICATION NOTICE FOR EQUIPMENT USED IN CANADA

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications-network protective, operation, 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 (extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility—in this case, your 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 electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION:

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

The LOAD NUMBER (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices, subject only to the requirement that the total of the load numbers of all the devices does not exceed 100.

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WAN Speed —	1.544 Mbps
WAN Connection —	RJ-48C
Nominal Impedance —	100 ohms
DTE Interface —	Integral V.35, M/34 male
Line Coding —	AMI/B8ZS
Line Framing —	D4/ESF
Receive LBO —	Automatic
Transmit LBO —	Selectable: 0, 7.5, 15, or 22.5 dB
Clock Options —	Internal, external, and network clock
Diagnostics —	Responds to CO-initiated D4 loop-up and loop-down codes, ESF line loop and payload loop FDL messages, universal loopback de-activate message
Standards —	AT&T® TR62411, ANSI T1.403, TR54016
Power Supply —	120 VAC, 60 Hz to 5 VDC 300-mA wallmount transformer (for DTE power options, see **Appendix C**)
Size —	0.8"H x 2.1"W x 4.5"D (2 x 5.3 x 11.4 cm)

2. Introduction

2.1 Description

The Micro T1 CSU/DSU supports a single T1 or Fractional T1 connection at data rates of 1.544 Mbps (unstructured), n × 64, and n × 56. Plug the Micro T1 CSU/DSU directly into the WAN port of a switch, router, or multiplexor.

The Micro T1 CSU/DSU is easily configurable using two PC-board-mounted DIP switches. Use the DIP switches to set D4 or ESF framing modes, AMI or B8ZS line coding, clocking modes, T1 starting channel, Line Build Out, and data rate. Connecting directly to the V.35 interface, the ultra-compact Micro T1 CSU/DSU attaches without using additional cables. Twisted-pair line connections are made through a modular RJ-48 female jack on the rear of the unit.

Seven easy-to-read LED indicators monitor data, network, and test signals.

2.2 Features

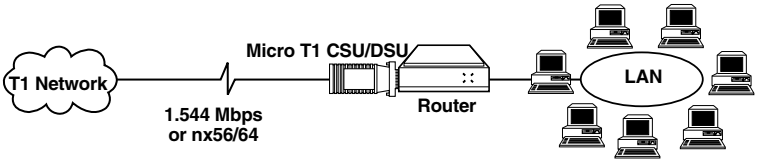
- Operates over 4-wire T1 (DS1) circuits.
- Supports unstructured rates at 1.544 Mbps.
- Supports common framed n × 56/64 rates up to 1.536 mbps.
- Seven easy-to-read LEDs monitor data and diagnostics.
- Internal or external network clocking.
- Also works as a high-speed point-to-point modem.
- Compact size; plugs directly into a router, switch, or other DTE.

2.3 Supported Applications

The Micro T1 CSU/DSU supplies the interface between the telephone-company and customer-premises equipment (such as a router). The Micro T1 CSU/DSU can also be used as a high-speed short-haul modem for campus applications.

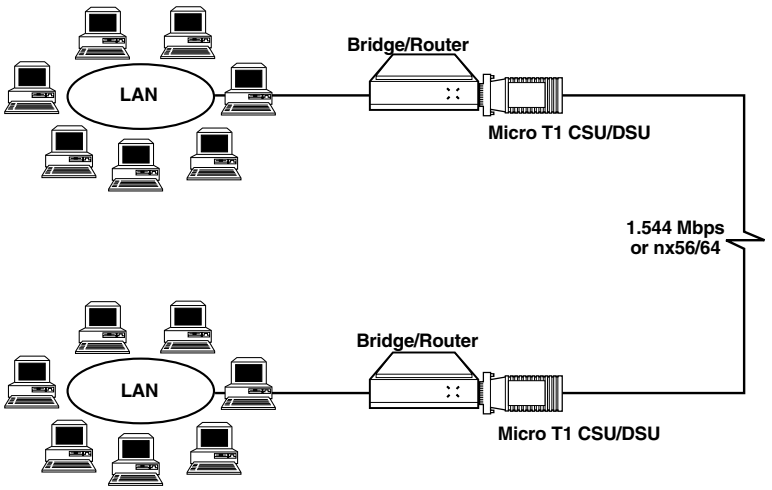
2.3.1 As an Interface Between the Telco and CPE

The Micro T1 CSU/DSU provides the interface between the telephone company and customer equipment (such as a router or switch).



2.3.2 As a High-Speed Short-Range Modem

The Micro T1 CSU/DSU can also be installed in high-speed campus applications. In this application, a pair of Micro T1 CSU/DSUs operate as short-range modems.



3. Configuration

Before operating the Micro T1 CSU/DSU, you must configure it to match both the DTE and Network Interface parameters using the DIP-switch packages on the bottom of the printed circuit board (see Figure 3-1) or via software using the RS-232 control port.

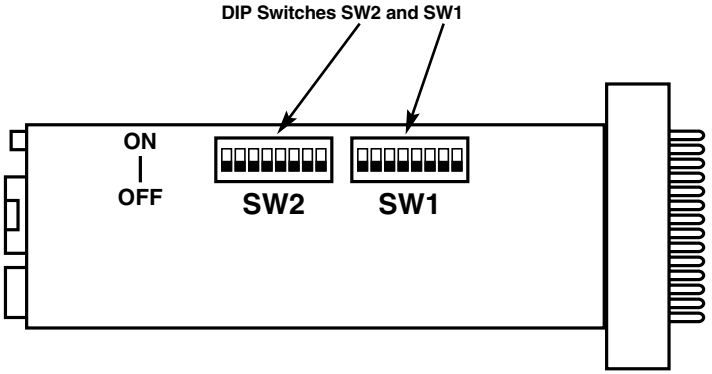


Figure 3-1. Bottom view, showing the DIP switches.

Figure 3-2 shows the orientation of the DIP switches with respect to ON/OFF positions.

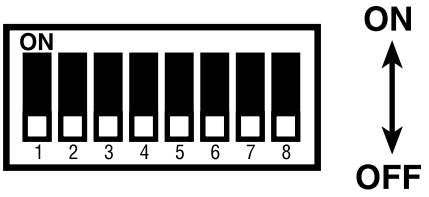


Figure 3-2. Closeup of DIP switches.

DIP Switches SW1-SW8

The configuration switches on the DIP switches allow you to specify data rates, line framing and coding, DS0 rate, clock mode, starting channel, and Line Build-Out (LBO). Factory-default settings of all switches are shown in the table below.

Table 3-1. Switch Setting Summary Table.

Position	Function	Factory Default	Option
SW1-1	Starting Channel	Off	
SW1-2	Starting Channel	Off	Starting from
SW1-3	Starting Channel	Off	Channel 1
SW2-7	Starting Channel	Off	
SW2-8	Starting Channel	Off	
SW1-4	Data Rate	Off	
SW1-5	Data Rate	Off	
SW1-6	Data Rate	Off	
SW1-7	Data Rate	On	1.536 Mbps
SW1-8	Data Rate	On	(DTE Rate)
SW2-1	Clock	Off	Network
SW2-2	DS0 Rate/Clock*	On	64 kbps
SW2-3	Frame	Off	ESF
SW2-4	Line Code	Off	B8ZS
SW2-5	Line Build Out	Off	
SW2-6	Line Build Out	Off	0 dB

*In unframed mode, SW2-2 is used with SW2-1 to determine the clocking mode. In framed modes (ESF or D4) only network and internal clocking are available. In unframed mode, where the DTE data rate is 1.544 Mbps, a third clocking option is available—external clocking, in which the CSU derives its transmit timing source from the DTE (see **Appendix D** for external timing pin data).

Table 3-2. Clocking Mode.

Function	SW2-1	SW2-2	Clocking Mode
Framed Mode (ESF/D4)	Off	Don't Care	Network
	On	Don't Care	Network
Unframed Mode	Off	Don't Care	Network
	On	Off	Internal
	On	On	External

SWITCHES SW1-8, SW1-7, SW1-6, SW1-5, AND SW1-4

These switches set the DTE data rate. Each setting represents an n × 56/n × 64 setting. **Table 3-3** shows the switch settings and the achieved DTE data rate.

Table 3-3. DTE Data Rate.

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8	DTE Data Rate
Off	Off	Off	Off	Off	1544 kbps (unframed)
On	Off	Off	Off	Off	56/64 kbps (n=1)
Off	On	Off	Off	Off	112/128 kbps (n=2)
On	On	Off	Off	Off	168/192 kbps (n=3)
Off	Off	On	Off	Off	224/256 kbps (n=4)
On	Off	On	Off	Off	280/320 kbps (n=5)
Off	On	On	Off	Off	336/384 kbps (n=6)
On	On	On	Off	Off	392/448 kbps (n=7)
Off	Off	Off	On	Off	448/512 kbps (n=8)
On	Off	Off	On	Off	504/576 kbps (n=9)
Off	On	Off	On	Off	560/640 kbps (n=10)
On	On	Off	On	Off	616/704 kbps (n=11)
Off	Off	On	On	Off	672/768 kbps (n=12)
On	Off	On	On	Off	728/832 kbps (n=13)
Off	On	On	On	Off	784/896 kbps (n=14)
On	On	On	On	Off	840/960 kbps (n=15)
Off	Off	Off	Off	On	896/1024 kbps (n=16)
On	Off	Off	Off	On	952/1088 kbps (n=17)
Off	On	Off	Off	On	1008/1152 kbps (n=18)
On	On	Off	Off	On	1064/1216 kbps (n=19)
Off	Off	On	Off	On	1120/1280 kbps (n=20)
On	Off	On	Off	On	1176/1344 kbps (n=21)
Off	On	On	Off	On	1232/1408 kbps (n=22)
On	On	On	Off	On	1288/1472 kbps (n=23)
Off	Off	Off	On	On	1344/1536 kbps (n=24)

SWITCHES SW1-1, SW1-2, SW1-3, SW2-7, SW2-8

These switches set the starting channel, which is the first channel that carries valid data. You can set this channel to any value between 1 and 24. If the starting channel is other than 1, then the maximum possible bandwidth will be less than 1536 kbps. For example, if the starting channel is set to be 12, then the maximum bandwidth is limited to 13 × 64 kbps (channels 12–24), or 832 kbps. Keep this in mind when setting the starting channel. The Micro T1 CSU/DSU will flash the ERR indicator LED if the switch setting is invalid. Refer to **Section 5.1** for a more detailed explanation of the ERR LED function.

Table 3-4. T1 Starting Channel.

SW1-1	SW1-2	SW1-3	SW2-7	SW2-8	T1 Starting Channel (maximum value of n)
Off	Off	Off	Off	Off	1 (24)
Off	Off	Off	On	Off	2 (23)
Off	Off	Off	Off	On	3 (22)
Off	Off	Off	On	On	4 (21)
On	Off	Off	Off	Off	5 (20)
On	Off	Off	On	Off	6 (19)
On	Off	Off	Off	On	7 (18)
On	Off	Off	On	On	8 (17)
Off	On	Off	Off	Off	9 (16)
Off	On	Off	On	Off	10 (15)
Off	On	Off	Off	On	11 (14)
Off	On	Off	On	On	12 (13)
On	On	Off	Off	Off	13 (12)
On	On	Off	On	Off	14 (11)
On	On	Off	Off	On	15 (10)
On	On	Off	On	On	16 (9)
Off	Off	On	Off	Off	17 (8)
Off	Off	On	On	Off	18 (7)
Off	Off	On	Off	On	19 (6)
Off	Off	On	On	On	20 (5)
On	Off	On	Off	Off	21 (4)
On	Off	On	On	Off	22 (3)
On	Off	On	Off	On	23 (2)
On	Off	On	On	On	24 (1)

SWITCHES SW2-6 AND SW2-5 LINE BUILD OUT

These switches are used to set the line build out (LBO). The LBO controls the pulse shape and attenuation of the signal sent to the network. The amount of LBO depends on the distance to the nearest repeater. The telephone company providing the T1 service will advise you of the required LBO setting.

Table 3-5. LBO Setting.

SW2-5	SW2-6	LBO
Off	Off	0 dB, 0–133 ft.
On	Off	-7.5 dB
Off	On	-15.0 dB
On	On	-22.5 dB

SWITCH SW2-4 LINE CODING

This switch is used to set the line code. Two coding options are available through the DIP switches: B8ZS and AMI. The line code refers to the way that the signal—the sequence of ones and zeros sent to the network—is encoded. AMI reverses the polarity of consecutive pulses. B8ZS is identical to AMI, except that, under certain circumstances, the alternate polarity rule is deliberately violated.

AMI: This stands for "Alternate Mark Inversion." The CSU/DSU transmits data as a sequence of ones and zeros. Ones are usually sent as pulses, and zeros as spaces (no pulse). In order to maximize transmission range, every pulse is of the opposite polarity of the preceding pulse. AMI does nothing else. Maintaining network integrity requires a minimum pulse density (ones density) of the signal being transmitted on the network. AMI does not inherently provide for this feature. Thus, if a long sequence of zeros happen to be sent, the network may suffer. To meet this requirement using AMI requires one of two methods: Reduce the rate of each time slot (DS0) to 56 kbps, so that the last bit can be used to guarantee the minimum ones density. Or, make sure that the DTE sends data in such a way that ones density is always maintained. For this reason, you may prefer B8ZS over AMI.

B8ZS: This stands for "Bipolar 8 Zero Substitution." This line code ensures minimum ones density. Long sequences of zeros are specially encoded. This line code allows any data pattern to be transmitted without causing ones density problems. Thus, it allows the use of 64-kbps timeslots.

Table 3-6. Line Codes.

SW2-4	Line Code
Off	B8ZS
On	AMI

SWITCH SW2-3 LINE FRAMING

This switch is used to set the frame. There are three framing modes available in the Micro T1 CSU/DSU: ESF, D4, and Unframed. When SW1-4 through SW1-8 are turned off, the unit is set to unframed operation, and SW2-3 is ignored. Otherwise, SW2-3 is used to set the frame to either ESF or D4.

Table 3-7. SW2-3 Line Framing.

SW2-3	Frame
Off	ESF
On	D4

LINE-FRAMING OPTIONS

D4/Superframe: The D4 framing format, as specified in AT&T TR62411, is the standard in which twelve frames make up a superframe. All signaling and synchronization is done in-band.

Extended Superframe: Extended Superframe, as specified in AT&T TR 54016, consists of 24 T1 frames. The framing bits are now used for framing CRC and the Facility Data Link (FDL). The FDL allows maintenance messages and information to be passed between the CSU/DSU and the central office.

SWITCH SW2-2 DS0 CHANNEL RATE

This switch is used to set the DS0 rate in framed modes; in unframed mode, this switch is used with SW2-1 to set the clocking mode.

Table 3-8. DS0 Channel Rate.

SW2-2	DS0 Rate
Off	56 kbps
On	64 kbps

SWITCH SW2-1 CLOCK MODE

This switch is used to select the timing source for transmitting data to the network. External clocking is available only in unframed mode (DTE data rate of 1.544 Mbps).

Table 3-9. Clocking and Framing Modes.

Function	SW2-1	SW2-2	Clocking Mode
Framed Mode	Off	Don't Care	Network
(ESF/D4)	On	Don't Care	Internal
Unframed Mode	Off	Don't Care	Network
	On	Off	Internal
	On	On	External

NOTE

When using the Micro T1 CSU/DSU to terminate the telephone company's T1 service, the Micro T1 CSU/DSU must be set to network clock. When using the CSU/DSU as a high-speed short-range modem, one unit of the link must be configured for Internal Clock mode, and the unit on the opposite end must be configured for Network Clock mode.

4. Installation

The Micro T1 CSU/DSU is equipped with a DTE, network, and power interface. This section briefly describes connection to each.

4.1 DTE Interface Connection

The DTE interface is a V.35 DCE presented as an M/34 male connector. This interface is designed to plug directly into a DTE interface. (See **Appendix B** for V.35 interface pin assignments.)

4.2 Network Interface Connection

The Network Line Interface is an eight-position keyed modular RJ-48C jack. This interface will need to be configured to match the line parameters (that is, framing and line coding) supplied by the Central Office.

NOTE

If the Micro T1 CSU/DSU is being used for private short-range modem applications, the twisted-pair cable connected to its port will need to be a crossover cable. See *Appendix B* for interface pin assignments.

4.3 Power Connection

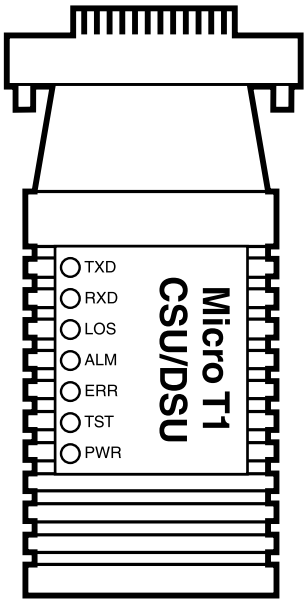
The Micro T1 CSU/DSU is powered via a supplied external transformer, which connects to the barrel jack on the rear of the Micro T1 CSU/DSU. The Micro T1 CSU/DSU can also be powered via the DTE interface when supplied with 5 VDC @ 300 mA to Pin KK. See **Appendix C** for more information.

5. Operation

Once the Micro T1 CSU/DSU is installed and configured properly, it is ready to place into operation.

5.1 LED Descriptions

The Micro T1 CSU/DSU is equipped with seven LEDs that monitor the status of communication. Figure 5-1 shows the location of the LEDs on the Micro T1 CSU/DSU.



ERR Error. Flashes to indicate errors.

Invalid Switch Configuration: You might request more bandwidth than is possible. For instance, if you set the starting channel to 12, and you select a number of timeslots exceeding 13, the unit will not be able to satisfy your request. In that case, the ERR LED will flash once a second (½ second on, ½ second off). When the unit detects an invalid setting, it will ignore the setting and default to a full T1 (bandwidth=24 channels, starting channel=1). This will continue until you set the switches to a valid setting. The invalid switch configuration condition overrides other error conditions.

Errored Second: In ESF or SF framing, if the unit detects a frame error, the ERR LED will flash briefly once a second.

Framing Mismatch: The ERR LED flashes briefly once a second when framing modes are mismatched.

Loss of Signal: When there is no signal at the network interface, the ERR LED will flash briefly once a second.

TXD Transmit Data. Lit green to indicate data flow to the Micro T1 CSU/DSU from the DTE.

RXD Receive Data. Lit green to indicate data flow from the Micro T1 CSU/DSU to DTE.

LOS Loss of Sync. Lit red to indicate a network Loss of Frame or Loss of Signal condition.

ALM Alarm. Lit red to indicate that one of several alarm conditions exists. These conditions may be local alarms or remote alarm conditions. Alarms may occur due to Loss of Synchronization, Loss of Frame, AIS (Blue Alarm), or Yellow Alarm.

ERR Error. Lit red to indicate the detection of an Errored Second (ES). An Errored Second is any second in which a SuperFrame or Extended Superframe error event has occurred.

TST Test/Loop. Lit yellow to indicate that the unit is in test mode. The unit may be in any one of the following modes: D4 Line Loop (CO initiated), ESF Line Loop (CO Initiated), ESF Payload Loop (CO Initiated).

PWR Power. Lit green to indicate that the unit is receiving power.

5.2 Central Office Loops

The Micro T1 CSU/DSU also responds to central-office-initiated loop commands. When in D4 framing mode, the Micro T1 CSU/DSU will implement the “loop up” command when it recognizes the pattern “10000” in the data stream for a minimum of 5 seconds. The “loop down” command is implemented by the pattern “100” in the data stream for a minimum of 5 seconds.

When operating in ESF framing mode, loopback commands are issued via the Facility Data Link (FDL). The line loop message will cause a loopback before data enters the framer portion of the CSU. The payload loop message will cause the Micro T1 CSU/DSU to loop data after the framer portion of the CSU.

The Micro T1 CSU/DSU will respond to Universal Loopback Deactivate to clear all central-office loops.

Appendix A. Cable Recommendations

The Micro T1 CSU/DSU operates at frequencies of 20 kHz or less and has been performance tested using twisted-pair cable with the following characteristics:

Wire Gauge	Capacitance	Resistance
19 AWG	83 nf/mi. or 15.72 pf/ft.	0.0163 ohms/ft.
22 AWG	83 nf/mi. or 15.72 pf/ft.	0.0326 ohms/ft.
24 AWG	83 nf/mi. or 15.72 pf/ft.	0.05165 ohms/ft.

For optimum performance:

- **Always use twisted-pair wire**; this is not an option.
- Use twisted-pair wire with a capacitance of 20 pF/ft. or less.
- Avoid twisted-pair wire thinner than 26 AWG (avoid higher AWG numbers than 26).
- Use of twisted pair with a resistance greater than the specifications above may cause a reduction in maximum distance obtainable. Functionality should not be affected.
- Many environmental factors can affect the maximum distances obtainable at a particular site. Use the data-rate/distance table above as a general guideline only.

Appendix B. Pin Assignments

RJ-48C T1 (DS0) Network Interface
(RJ-48 female modular jack)

Pin #	Signal
1	RX Data (TIP)
2	RX Data (RING)
4	TX Data (TIP)
5	TX Data (RING)

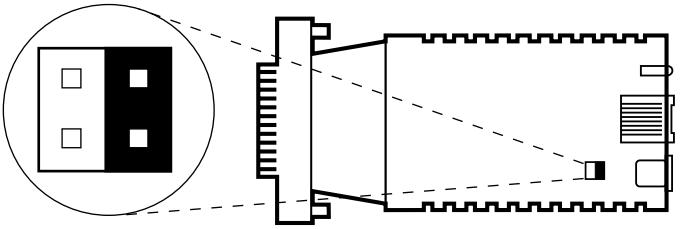
M/34 Connector Terminal Interface

Pin #	Signal
A	GND (Earth Ground/Shield)
B	SGND (Signal Ground)
C	RTS
D	CTS
E	DSR
F	CD
H	DTR
P	TD
R	RD
S	TD/
T	RD/
U	XTC (Transmit Clock +, DTE Source)
V	RC (DCE Source)
W	XTC/ (Transmit Clock -, DTE Source)
X	RC/
Y	TC
AA	TC/
KK	Aux. Power Input (+5 VDC @ 300 mA)

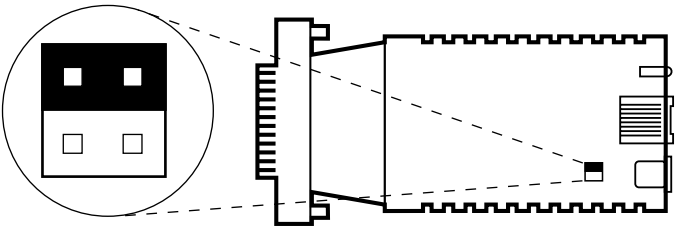
Appendix C. Power-Supply Interface

Main 5 VDC power jack (J1)

Center Pin: 5 VDC @300 mA
Outer Barrel: Ground
Auxiliary Power: Supplied to Pin KK on V.35 connector



Jumper Position for Power via DC Power Jack (Default).



Jumper Position for Power via Pin KK.

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