



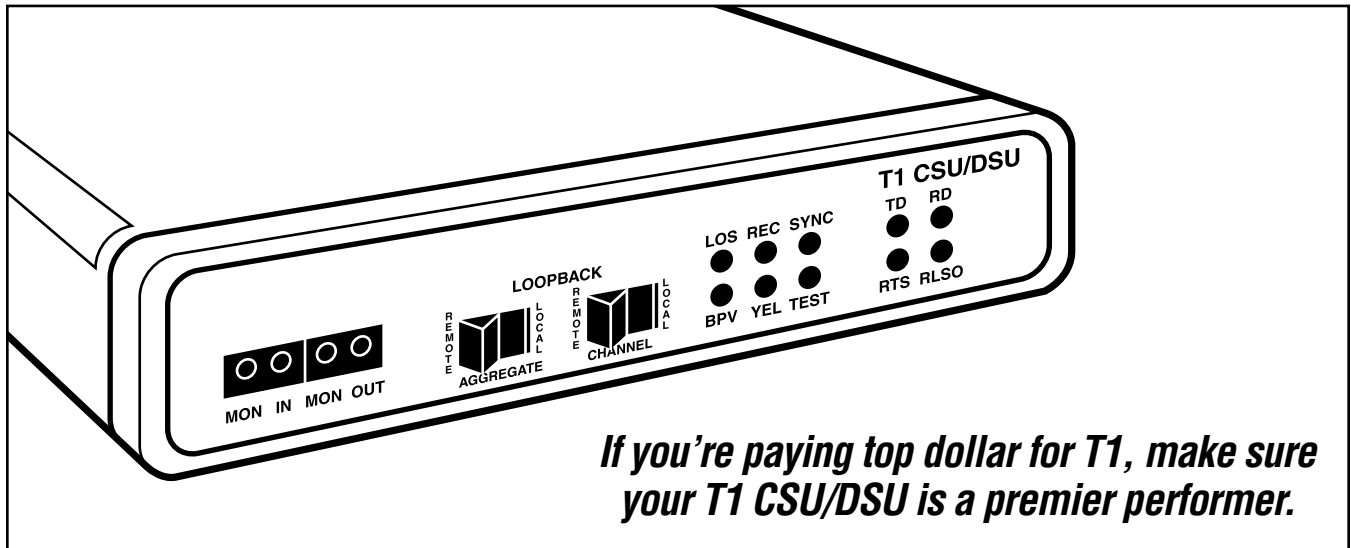
© 2003. All rights reserved.
Black Box Corporation.

BLACK BOX[®]

NETWORK SERVICES

Black Box Corporation • 1000 Park Drive • Lawrence, PA 15055-1018 • Tech Support: 724-746-5500 • www.blackbox.com • e-mail: info@blackbox.com

T1 CSU/DSUs



If you're paying top dollar for T1, make sure your T1 CSU/DSU is a premier performer.

Key Features

- ▶ **Compliant with AT&T Publications 62411 and 54019A for full and Fractional T1 access.**
- ▶ **Three DTE channel interfaces available: V.35, RS-530, and RS-449.**
- ▶ **Link LANs, CAD/CAM stations, mainframes, and videoconferencing equipment.**
- ▶ **Ten LEDs indicate network and channel activity.**
- ▶ **Comprehensive diagnostics.**

This inexpensive CSU/DSU opens your datacomm network to the speed of Fractional T1 service—and it makes the switch to full T1 service as your network needs expand.

Save money three ways with the T1 CSU/DSU. First, it combines a channel service unit (CSU) and a digital service unit (DSU) in one sleek case—so you avoid two separate purchases. Second, you won't find another T1 integrated service unit with these features—for this price—anywhere. Third, it supports both Fractional and full T1 service, so there's no costly upgrades when your network grows into full T1 service.

The T1 CSU/DSU is flexible enough to fit any network. It's available in three models to fit your DTE channels (V.35, RS-449, and RS-530), so it's the ideal integrated service unit for industrial

shops, commercial sites, high-speed data centers, and small businesses. It accepts timing from any clock source (internal crystal oscillator, network loop, channel). And it processes data speeds from 56 kbps to 1.536 Mbps, while providing all the framing and density requirements for data transmissions across predefined networks, such as Accunet[®].

The front-panel LEDs, jacks, and switches offer a window to your network and T1 link. You'll find network glitches (loss of

signal, bipolar violations, etc.) as they develop—not after they've become full-blown problems. DTE channel indicators enable you to check data transmissions from across a room. Use the built-in bantam jacks to inject specific test signals into your network. And a full set of loopbacks (Remote CSU, Local Aggregate, and Local and Remote Channel) pinpoint problems anywhere on the T1 link. This saves time when you call a T1 carrier for troubleshooting assistance.

Typical Applications

- Link two LANs in different cities. Run a LAN segment to the telephone closet at each site and install high-speed bridges for each network. Two T1 CSU/DSUs (one at each site) link the bridges.
- Use two T1 CSU/DSUs as line drivers for your on-site data. Link high-speed muxes up to 6000 feet (1828.8 m) apart over STP cable.

Technical Glossary

AMI: Alternate Mark Inversion. A formatting code for T1 transmissions over twisted-pair copper cable. T1 transmissions are in bipolar form. AMI represents a zero (or space) by the absence of a voltage; a one (or mark) is represented by a positive or negative pulse, depending on whether the preceding one was negative or positive; that is, marks are inverted on an alternating basis.

B8ZS: Binary (or Bipolar) Eight Zero Suppression. A data-transmission format used to solve certain bandwidth signaling problems. B8ZS coding enables interface equipment to recognize an “all zeroes” condition in a data byte. The equipment substitutes a B8ZS code for the all-zero byte; the code contains intentional violations of the AMI format. The violation is sent across the network. It contains sufficient ones to allow the system to remain in synchronization. The destination CSU replaces the code with the all-zeroes byte.

D4 Framing: A T1 12-frame format in which the 193rd bit is used for framing and signaling information. This format repeats 8000 times per second to yield the T1 transmission rate of 1.544 Mbps.

ESF Framing: An enhancement of D4 framing; ESF creates “extended super-frames” based on 24 frames.

Frame: A group of all 24 T1 subchannels, with 8 bits per channel, and 1 framing bit. A single frame equals 193 bits; 12 frames equal 1 superframe (see D4 Framing); 24 frames equal 1 extended superframe (see ESF Framing).

Framing: A control procedure used with multiplexed digital channels (T1 carriers, etc.), whereby bits are inserted so the receiver can identify the time slots allocated to each subchannel.

Technically Speaking

T1 and Fractional T1 are digital data transmission services available from your long-distance carrier. DDS (Dataphone Digital Service, or commonly, digital data service) is another form of digital data transmission service. Both T1 and DDS enable high-speed, large-volume, accurate, data transmission over a private circuit.

Typical customers of these services are large-, medium-, or even certain small-sized companies of all types (manufacturing, distribution, wholesale, retail, and service) with data-transmission needs that exceed the speed and volume limits inherent to analog service. Others would include government agencies, transportation systems, library systems, R&D sites, television networks, and banking and finance institutions and exchanges.

Digital Data Service

DDS is provided via one channel over one leased line, with available data speeds equivalent to all rates offered through regular analog telephone service, and up to 56 kbps.

T1 and Fractional T1

T1 and Fractional T1 services offer the complete or partial use of 24 high-speed channels over 1 leased line (64-kbps per channel). T1 offers an aggregate data throughput of 1.544 Mbps.

Regulations and designations you need to know.

When you order T1 service, the telephone carrier requests information about your network interface equipment.

The **Facility Interface Code** tells the carrier what type of framing format (D4 or ESF) your equipment uses.

The **Service Order Code** enables the carrier to properly execute the transmission of your encoded data, and to properly bill you for services. You must submit an affidavit of your ability to operate T1 equipment attached to the carrier's network. The T1 CSU/DSU Installation Manual includes a sample affidavit that you can complete and submit to the telephone carrier.

The **USOC (Universal Service Order Code)** jack designation for the T1 CSU/DSU is RJ-48C or RJ-48X. This ensures the carrier

that you have the proper physical interface for a T1 circuit.

The T1 CSU/DSU

The T1 CSU/DSU is designed to access Fractional T1 and T1 services. It is the ideal entry-level integrated service unit that can be used in LAN-to-WAN, CAD/CAM, imaging, videoconferencing, and host-to-host applications.

In Fractional T1 applications, the T1 CSU/DSU can place user information into contiguous or non-contiguous DSO time slots. This ensures compliance with AT&T® Publication 54019A for Fractional T1 Service.

The T1 CSU/DSU's built-in channel service unit complies with AT&T Publication 62411; you can attach the unit directly to the T1 circuit. A single switch lets you enable or disable the CSU so the unit can act as a DSU or a CSU/DSU.

The T1 CSU/DSU offers a set of diagnostics for quick-fault isolation of the unit itself and the network. The front panel contains four bantam jacks, loopback selection switches, and a series of network and DTE channel status LEDs.

Use the bantam jacks to monitor T1 service without interrupting data transmission; simply connect a test set to the Transmit Monitor and the Receive Monitor jacks. Or inject a test signal to give the entire T1 circuit a “workout.” Connect a test set to the in and out jacks, then set the unit in Remote Channel Loopback. In this configuration, you can inject a known signal and receive it back via the network.

Two loopback switches enable you to test individual sections of the data-transmission path from your local T1 CSU/DSU to the remote unit.

The Remote CSU/Aggregate Loopback lets you verify the logic from the local interface through the remote aggregate and back. It verifies the unit's channel logic from the local unit. The Local Channel Loopback enables you to verify the DTE channel interface. It enables you to verify the T1 CSU/DSU logic from the channel interface through the aggregate circuit, and return to the channel interface.

Videoconferences unite people in far-flung locations. Our T1 equipment speeds complex video images to your offices over T1 telephone lines.

The telephone was once the tool used to bring together employees and clients in different places. However, conference calls over speaker phones meant jumping through some hoops: if you spoke out of turn, you "stepped on" someone speaking at the other end; face-to-face contact was gone; and, a disconnection meant starting over again.

Now you can have those "face-to-face" meetings—without awkward phone calls or time-consuming travel. Video cameras and T1 technology bring everyone together on video screens with the clarity you would have in an actual get-together.

A video link requires equipment and transmission media that can handle huge amounts of data. Here's why. Converting a still image (for example, a photograph) to digital format involves millions of bytes of storage space. Because they involve "pictures in motion," video images are many times more complex than stationary images. They require an enormous amount of storage space, and in particular, a great amount of bandwidth during transmission. T1 lines, with their aggregate data throughput of 1.544 Mbps, are ideally suited to sending video.

You can establish a video link via a T1 or a Fractional T1 line (full T1 is preferable). You'll need a video camera and related equipment, a projection system and a pair of T1 CSU/DSUs to complete the link.

Has your campus LAN stretched the definition of "local"? Pull it together with the T1 CSU/DSU. It doubles as a high-speed line driver.

If the distance between segments of your on-site network has exceeded the limits of traditional line drivers, tap into the speed, strength, and durability of the T1 CSU/DSU. Configure a pair of these service units as line drivers to rocket your network data up to 6000 feet (1828.8 m) over two pairs of individually shielded twisted-pair cable (we recommend you use at least 24 AWG for best results).

The T1 CSU/DSU is available with three interfaces (V.35, RS-449, RS-530). Join your network multiplexors or LAN bridges in a high-speed link: you'll transfer data up to 1.544 Mbps and make the most of your network applications—including tail circuits!



Black Box offers the best warranty program in the industry—Fido Protection®. For more information, request **FaxBack 22512**.

Specifications

Approvals: FCC Parts 15 and 68, UL® 34J8, CSA LR60602

Clocking: Internal (master), external from network (loop, slave), or external from channel

Compatibility: AT&T Publications 62411 and 54019A, carrier T1 service offerings, carrier fractional T1 service offerings

Configuration: DIP-switch selectable, readily accessible from the rear panel

Density Monitoring: 1 of 16, 1 of 48, 1 of 64, or none

Diagnostics: Local aggregate loopback, remote CSU loopback, local and remote channel loopbacks, TX/RX monitor jacks and network in and network out jacks, Test LED lit when active

Distance (Maximum):
DSX-1 mode: 655 ft. (199.6 m);
CSU mode: 6000 ft. (1828.8 m)
using 24 AWG cable

Framing Format: D4 or ESF (Fe)

Leads Supported:
MT100A-35-R2: A, D, E, F, P, R-Y, AA;
MT100A-530-R2: 1-25;
MT100A-449-R2: 1-37

Line Buildout (CSU): 0 dB, -7.5 dB, -15 dB

Line Format: AMI or B8ZS

Line Type: T1

Mean Time Between Failures: 72,053 hours

Operation: Full-duplex

Output Amplitude: 2.4 to 3.3 V, peak to base

Protocol: Synchronous

Receiver Sensitivity: 0 to -26 dB

Recommended Cable: Shielded twisted pair

Speed (Maximum):
Composite: 1.544 Mbps ± 50 bps;
DTE: Selectable N x 56-kbps

channel rates to 1.344 Mbps;
selectable N x 64-kbps
channel rates to 1.536 Mbps

Interface: Composite: All: T1 carrier;
Channel:
MT100A-35-R2: V.35;
MT100A-530-R2: RS-530;
MT100A-449-R2: RS-449

Connectors:
MT100A-35-R2:
Composite: (1) RJ-48C;
Channel: (1) M/34 F;
Power: (1) 5-pin DIN;
MT100A-530-R2:
Composite: (1) RJ-48C;
Channel: (1) DB25 F;
Power: (1) 5-pin DIN;
MT100A-449-R2:
Composite: (1) RJ-48C;
Channel: (1) DB37 F;
Power: (1) 5-pin DIN

Indicators:
Network: Loss of Signal (LOS),
Bipolar Variations (BPV),
Synchronization, Red Alarm,
Yellow Alarm, Test;

DTE Channel: Transmit Data (TD),
Receive Data (RD), Request to
Send (RTS), Receive Line
Signal Detect (RLSD)

Operating Environment:
Temperature: 32 to 122°F
(0 to 50°C);
Humidity: Up to 95%
noncondensing;
Altitude (Maximum): 15,000 ft.
(4572 m)

Power: 115 VAC, 60 Hz, external
wallmount

Size: 1.5"H x 7.25"W x 10.5"D
(3.8 x 18.4 x 26.7 cm)

Weight: 3 lb. (1.4 kg)

What the Package Includes

- (1) T1 CSU/DSU.
- (1) 115-volt, 60-Hz external power supply.
- (1) User's manual.
- The MT100A-530-R2 also includes (1) 1-ft. (0.3-m) DB25 male to DB25 female RS-530 adapter cable.
- The MT100A-449-R2 also includes (1) 1-ft. (0.3-m) DB25 male to DB37 female RS-449 adapter cable.

Ordering Information

ITEM	CODE
T1 CSU/DSUs	
V.35 (M/34 Female).....	MT100A-35-R2
RS-530 (DB25 Female).....	MT100A-530-R2
RS-449 (DB37 Female).....	MT100A-449-R2
<i>To protect your T1 CSU/DSU, order our...</i>	
T1 Non-Span Surge Protector	SP513A-R2
<i>For optimum performance and a 20% savings, order...</i>	
V.35 Interface Cable, 10-ft. (3-m), Male/Male	EYN450-0010-MM

Why Buy From Black Box? Exceptional Value. Exceptional Tech Support. Period.

Recognize any of these situations?

- You wait more than 30 minutes to get through to a vendor's tech support.
- The so-called "tech" can't help you or gives you the wrong answer.
- You don't have a purchase order number and the tech refuses to help you.

- It's 9 p.m. and you need help, but your vendor's tech support line is closed.

According to a survey by Data Communications magazine, 90% of network managers surveyed say that getting the technical support they need is extremely important when choosing a vendor. But even though network

managers pay anywhere from 10 to 20% of their overall purchase price for a basic service and support contract, the technical support and service they receive falls short of their expectations—and certainly isn't worth what they paid.

At Black Box, we guarantee the best value and the best

support. You can even consult our Technical Support Experts before you buy if you need help selecting just the right component for your application.

Don't waste time and money—call Black Box today.