

Compatible Systems

CSU/DSU

Synchronous Line Connection Device

User Manual

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Compatible Systems CSU/DSU User Manual, Version 1.0
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CO.

Part number A00 - 1017

This product has been certified to comply with limits for a Class A
computing device, pursuant to Subpart J of Part 15 of FCC Rules. It
is designed to provide reasonable protection against radio or
television communication interference in a commercial environment.
Operation of this equipment in a residential area could cause
interference with radio or television communication.

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About This Manual

This manual was designed to assist you in installing and using the Compatible Systems CSU/DSU, a high-speed (56Kbps) synchronous line connection device. The Compatible Systems CSU/DSU is a simple, trouble-free unit that should not present much difficulty during installation or use.

CSU/DSU Operational Mode

The Compatible Systems CSU/DSU has a single operational mode. The specifications for this operational mode are listed below:

Speed - 56.0 kbps
Interface - RS-232
Synchronous clocking

Initial Self-Test

We recommend performing a simple self-test before attempting to install the Compatible Systems CSU/DSU. To insure that the CSU/DSU is functionally ready, follow these steps.

- Attach the transformer connector to the power connector at the back of the CSU/DSU. Then plug the transformer into any appropriate 110V ac outlet.
- There are two groups of front panel LEDs. The left group monitors the interfaces of the unit, while the right-hand group of four LEDs displays the test mode.
- With the transformer plugged in (but no data cables connected), the In Service (IS) LED blinks while all of the Test LEDs are off. This is the normal power-up state.

- Push the Test button (located on the rear panel). You are now in the self-test mode. The ST LED will blink during the test. After about five seconds, the LED will stop blinking and stay lit. This indicates a successful test.

If the ST LED continues to blink, perform the test again. If the unit still does not pass, contact Compatible Systems technical support.

- This completes the initial self-test. To take the CSU/DSU out of test mode, press the test button several times until all the right side LEDs illuminate. When they turn off, only the ST LED will be illuminated.

Installation

Installation of the Compatible Systems CSU/DSU is easy. There are no operator adjustments or controls. Simply plug in the power transformer, connect the terminal to the RS-232 connector, and plug the data phone line into the "Line" connector at the rear of the CSU/DSU.

The Compatible Systems CSU/DSU is supplied with the approved RJ-48s modular jack. After you make the telco connection, your installation is complete. Upon power-up, the In Service (IS) LED will be on and constant, indicating a successful installation in which both ends are properly connected and configured.

If the IS LED blinks without becoming solid, there is a problem with the synchronous connection. If the LED blinks at the same rate as during the self-test, there is a problem with the wiring to the central office (broken cable, etc.). If the light blinks at a slower rate (about half-speed), the CSU/DSU is connected to the central telco office, but an "Out of Service" condition exists. This probably means that the remote unit is not yet connected. The IS LED will go to a steady illumination as soon as the remote is installed.

DIP Switch Settings

The various DIP switch options are selected by the single DIP Switch S1. This switch is located on the rear panel of the Compatible Systems CSU/DSU. The definitions and use of DIP Switch 1 are shown below:

- S1-1 Not used
- S1-2 Not used
- S1-3 When UP, rear panel Test button is enabled
- S1-4 When UP, unit is configured with master clock enabled
When DOWN, unit is configured with slave clock enabled.
- S1-5 When UP, unit accepts RTS from external DTE
When DOWN, unit artificially sets RTS on and ignores external DTE
- S1-6 Not used

The default settings of DIP Switch S1 should be suitable for virtually all applications. The table below shows the factory default settings.

S1-1	S1-2	S1-3	S1-4	S1-5	S1-6
n/a	n/a	UP	DWN	DWN	n/a

This concludes the installation of the Compatible Systems CSU/DSU. You should now be ready to transmit traffic across the 56K link.

If you experience difficulties, please turn to the following section, *Troubleshooting*.

Troubleshooting

Before calling Compatible Systems technical support, you should check the contents of this section. Most problems are common ones and can be easily corrected by following these steps.

1. Read the User's Guide
Most of the answers are right here.
2. Check the DIP switch settings
Do they match the factory defaults? If adjustments are required, make them now.
3. Perform a self-test on the unit.
If the self test fails, call Compatible Systems technical support.
4. Connect the unit to the telephone company line *with the RJ-48s cable provided.*
Don't use in-house wiring. Don't use RJ-45 connectors.
5. Observe the IS LED -
No blinking = good comm link to telco
Fast blink = no comm link to telco
Slow blink = out of service from telco (other end not installed)
6. If both ends of the telco circuit have installed units, perform a remote loopback test.
Press Test button until RL LED is blinking.
If RL LED goes to a non-blinking state = pass
If RL LED continues to blink = fail
If remote loopback test fails...

7. **Call the telco service provider**
 - Ask for a telco CSU loop test on each local loop
 - Ask for a telco DSU loop test on each local loop
8. **When the telco loops are complete and bit error free...**
9. **Initiate the remote loopback test again (see step 6)**
 - The unit should pass now
10. **Still having problems?**
 - Gather the following information
 - Serial number of the CSU/DSU
 - Name of sales organization
 - Call tech support at (303) 444-9532.

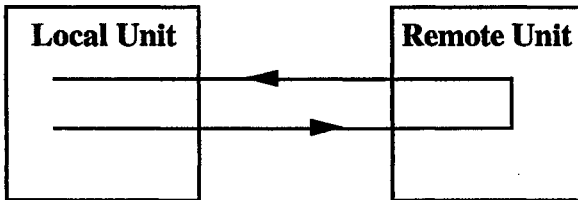
Appendix A - Testing and Diagnostics

LED Identification

- IS** When constantly illuminated, indicates correct (In Service) pattern from the telco. Blinks quickly when there is no receive line, or when in self-test or line loop mode. Flashes slowly when out of service pattern is sent by the telco.
- CD** When on, indicates actual valid data being received. When off, either not in service or the idle signal is being received.
- SD** Flashes when transmit data is present.
- RD** Flashes when receive data is present.
- ST** Flashes red while awaiting confirmation of correct self test. Solid illumination when unit passes self-test.
- DL** When flashing, indicates that a bi-directional digital loop test has been selected. When on steady, indicates that the telco central office has commanded DSU loop test.
- LL** When flashing, line loop test has been selected. When on steady, indicates telco central office has commanded a CSU loop test.
- RL** Flashes while local/remote end is awaiting valid response from other end, and lights solid when a valid response is received.

Remote Loop Test

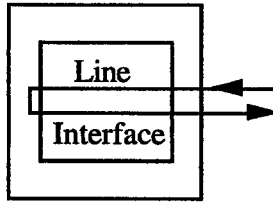
The Remote Loop Test can be performed only between two Compatible Systems CSU/DSU units. To initiate the test, push the Test button several times, until the Remote Loop (RL) LED flashes. It will flash red until it detects an "OK" pattern from the remote unit. The RL LED will then turn to a solid illumination. The remote unit is in a remote test condition and a complete "round trip" test is being performed by the internal pattern generator. To terminate this test, push the Test button until none of the right side LEDs are on or flashing.



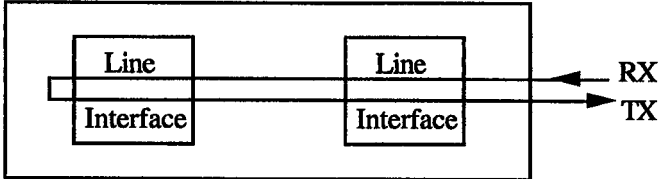
Remote Loop Test Diagram

Telco Testing

In trying to isolate line or equipment problems, the telephone company can perform two types of tests from the central office. They are called CSU Loop and DSU Loop. During a CSU Loop test, the LL LED is on steady. The DL LED illuminates when the DSU loop test is being performed by the central office. The loop configurations are shown in the diagrams below.



CSU Loop Test



DSU Loop Test

Appendix E - Terms and Conditions

Compatible Systems Corp. (Compatible Systems) offers to sell only on the condition that Customers' acceptance is expressly limited to Compatible Systems' terms and conditions of sale. Compatible Systems' acceptance of any order from Customer is expressly made conditional on assent to these terms and conditions of sale unless otherwise specifically agreed to in writing by Compatible Systems. In the absence of such agreement, commencement of performance or delivery shall be for Customer's convenience only and shall not be construed as an acceptance of Compatible Systems' terms and conditions. If a contract is not earlier formed by mutual agreement in writing, Customer's acceptance of any goods or services shall be deemed acceptance of the terms and conditions stated herein.

1. Warranty. Compatible Systems warrants to the Customer and to all persons who purchase Products from the Customer during the Warranty terms ("subsequent purchasers"), that, for a period of three (3) years from the date (the "shipping date") on which Compatible Systems ships the Products to the Customer: (a) the Product meets, in all material respects, all specifications published by Compatible Systems for such Products as of the shipping date; (b) the Products are free from all material defects in materials and workmanship under normal use and service; and (c) that as a result of the purchase of the Products from Compatible Systems, the Customer will have good title to the Products, free and clear of all liens and encumbrances.

Compatible Systems' obligations pursuant to this Warranty, and the sole remedies of the Customer and of any subsequent purchaser, shall be limited to the repair or replacement, in Compatible Systems' sole discretion, of any of the Products that do not conform to this Warranty.

This Warranty shall be invalidated if the Products (a) have not been installed, handled, or used in accordance with Compatible Systems recommended procedures; (b) have been damaged through the negligence or abuse of the Customer or of any subsequent purchasers; (c) are damaged by causes external to the Products, including (without limitation) shipping damage, power or air conditioning failure, or accident or catastrophe of any nature; and (d) have been subjected to repairs or attempted repairs by any person other than Compatible Systems (or an authorized Compatible Systems service technician).

To obtain service under this Warranty, the Customer (or subsequent purchaser, if applicable) must follow the procedures outlined below, under "Product Return Policy."

THE WARRANTIES SET FORTH IN THESE TERMS AND CONDITIONS ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WITHOUT LIMITATION ON THE GENERALITY OF THE FOREGOING SENTENCE, COMPATIBLE SYSTEMS EXPRESSLY DISCLAIMS AND EXCLUDES ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS (GENERALLY OR FOR A PARTICULAR PURPOSE).

2. Shipments. All delivery indications are estimated and are dependent in part upon prompt receipt of all necessary information to service an order. Compatible Systems shall not be liable for any premium transportation or other costs or losses incurred by Customer as a result of Compatible Systems inability to deliver Product in accordance with Customer's requested delivery dates. All shipments by Compatible Systems are made F.O.B. factory (Boulder, Colorado); risk of loss shall pass to Customer at point of shipment. Unless specified by the Customer, Compatible Systems will select the mode of transportation for each order. Compatible Systems reserves the right to make deliveries in installments. Partial shipments are subject to the terms of payment noted below. Compatible Systems reserves the right to allocate inventory and production if such allocation becomes necessary.

3. Payment Terms. Payment shall be made prior to shipment or upon delivery, unless otherwise agreed to in writing. Payment shall not constitute acceptance of the goods.

4. Force Majeure. All orders accepted by Compatible Systems are subject to postponement or cancellation for any cause beyond the reasonable control of Compatible Systems, including without limitation: inability to obtain necessary materials and components; strikes, labor disturbances, and other unavailability of workers; fire, flood, and other acts of God; war, riot, civil insurrection, and other disturbances; production or engineering difficulties; and governmental regulations, orders, directives, and restrictions.

5. Product Return Policy. Prior to shipping any Product to Compatible Systems, the Customer must contact Compatible Systems Technical Support (by letter or telephone) with the following information: (a) reason for return; (b) quantity, description, and model number, and (if applicable) serial number of each item being returned; (c) original Compatible Systems Sales Agreement number; and (d) any special instructions. Upon receipt of this information, Compatible Systems will issue an RMA ("Return Material Authorization") number and any required U.S. Customs identification to assure correct identification of the Customer and to insure prompt and accurate processing.

6. Limitation of Remedies. Compatible Systems' liability for all claims brought pursuant to or in connection with this agreement, including the purported breach hereof, shall be limited: (a) in the case of claims for breach of warranty, to compliance with the repair or replacement provisions of the warranty, and (b) in all other cases (including any claim that the warranty failed of its essential purpose), to actual damages of the Customer (or, if appropriate, of the subsequent purchaser). **IN NO EVENT SHALL COMPATIBLE SYSTEMS BE LIABLE FOR ANY SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES ARISING OUT OF THE SALE, USE, INSTALLATION OR OPERATION OF THE PRODUCTS, WHETHER A CLAIM IS BASED ON STRICT LIABILITY, BREACH OF WARRANTY, NEGLIGENCE, OR ANY OTHER CAUSE WHATSOEVER, WHETHER OR NOT SIMILAR.** This limitation on remedies shall apply even if Compatible Systems is advised of the possibility and nature of any special, consequential, or incidental damages.

7. Governing Law; Merger. This agreement and all Terms and Conditions hereof shall be governed by, and construed in accordance with the internal laws of the State of Colorado. Except as superseded by a separate written contract signed by both Compatible Systems and the Customer, superseding all prior negotiations or offers, written or oral, this agreement may be amended only in writing, signed by an authorized officer of Compatible Systems.