CS239A and CS239E T1 Line Repeaters

CS239A CLEI™ Code: T1R6Y60HAA
CS239E CLEI™ Code: T1R6Y64HAA

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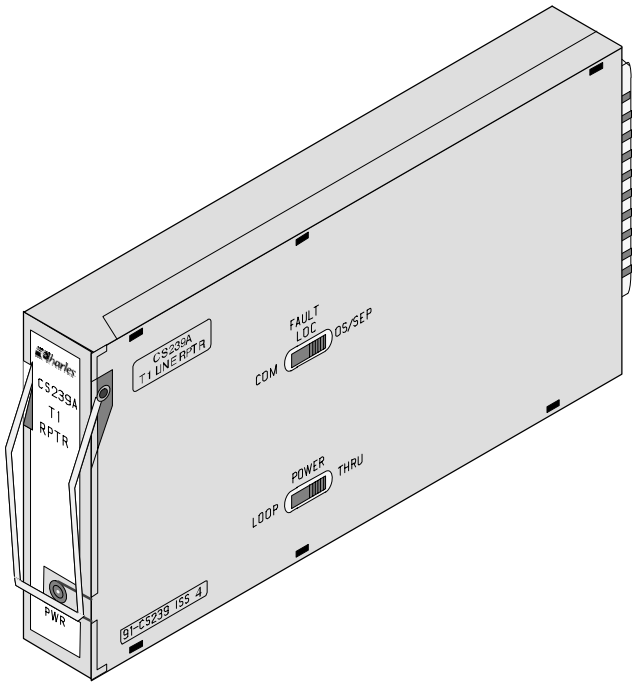

Figure 1. CS239A T1 Line Repeater

1. GENERAL

1.1 Document Purpose

This practice provides information on the CS239A and CS239E T1 Line Repeaters (see Figure 1).

1.2 Document Status

This practice has been updated to include information regarding improved line protection.

1.3 Equipment Purpose

The CS239 T1 repeaters are used to regenerate 2-way, 1.544 mb/s signals on T1 spans. Each protected, low power, CS239 T1 mini-repeater contains two regenerators. The CS239 repeaters are fully qualified to operate over a −40 to +149°F temperature range. The CS239A and CS239E are identical in function except the CS239E repeater provides greater immunity to 60 Hz induction (see Part 8).

1.4 Equipment Location

The CS239 T1 repeaters mount in industry-standard T1 mini-repeater housings. Charles offers a full line of these housings ranging from 1 to 50 repeater capacity.

1.5 Equipment Features

The CS239 T1 Repeaters provide the following features.

- Dual regenerators for use on 1.544 Mb/s 2-way T1 span lines
- Rugged surge protection
- Green, front-panel power LED
- Automatic Line Build-Out (ALBO) to accommodate a wide range of receive signals (0.0 to 35 dB)
- Thru or loop power
- Separate or common fault locate output
- Compatible with AMI or B8ZS line coding
- High immunity to induced AC
- Rugged nonmetallic outer case

2. FUNCTIONAL DESCRIPTION

The CS239 units are compatible with either AMI or B8ZS line coding. Refer to the block diagram in Figure 2 while reading the following description.

Each CS239 T1 repeater consists of two regenerator circuits designated as SIDE 1 and SIDE 2.

Each regenerator is equipped with a wide range ALBO (Automatic Line Build-out) circuit which automatically equalizes the signals received over a variety of different gauge cable with a wide range of cable lengths. The ALBO allows the regenerator to accommodate signals that have experienced cable losses from 0.0 to 35 dB (measured at 772 kHz).

DC power for the repeater and its regenerators is derived from the T1 span over the repeater simplex leads. The front panel PWR (green) LED illuminates when power is being supplied. All units provide a field selectable option for thru power or loop power operation.

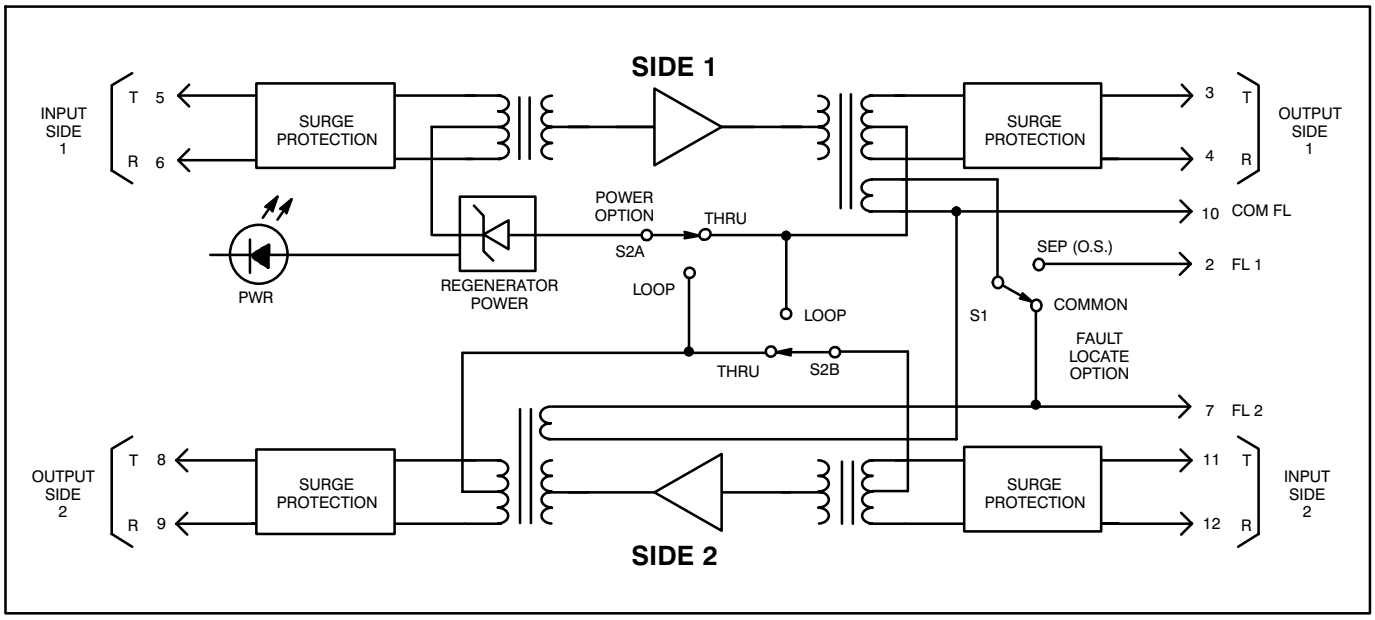

Figure 2. CS239 T1 Repeater Block Diagram

The repeaters are designed to operate on a nominal line current of 60 mA, and will operate over a range of 57 to 63 mA.

The DC voltage drop of the repeaters is nominally 8 volts. For span line design purposes this voltage drop is more conveniently expressed in terms of effective series resistance of 135 ohms at 60 mA.

The output side transformer provides a fault locate winding for use with standard active or passive T1 fault locate filters. The units provide a field selectable option to configure these as two separate outputs or to combine the fault locate outputs together.

3. INSPECTION

STATIC-SENSITIVE

This equipment contains static-sensitive electronic devices. To prevent electrostatic charges from damaging static-sensitive units:

- **Use approved static preventive measures (such as static-conductive wrist straps and a static-dissipative mats) at all times whenever touching units outside of their original, shipped static-protective packaging.**
- **Do not ship or store units near strong electrostatic, electromagnetic, or magnetic fields.**

3.1 Inspect for Damages

Inspect the equipment thoroughly upon delivery. A unit intended for future use should be tested as soon as possible and returned to its original protective packaging for storage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company.

3.2 Equipment Identification

The equipment is identified by a model and issue number imprinted on the front panel or located elsewhere on the equipment. Each time a major engineering design change is made on the equipment, the issue number is advanced by one and imprinted on subsequent units manufactured. Therefore, be sure to include both the model number and its issue number when making inquiries about the equipment.

4. MOUNTING

The CS239 T1 Repeaters mount in industry-standard mini-repeater housings. Charles offers a full line of these housings ranging from 1 to 50 repeater capacity.

5. OPTIONING

The repeater options are set using two slide switches, labeled POWER and FAULT LOC, located on the repeater's side. Table 1 lists the option settings.

5.1 FAULT LOC Switch

The STD/COM option position of the FAULT LOC switch combines the fault output of side 1 and side 2 to connect as a single pair. This position is normally selected when using passive fault filters (double-ended interrogation). The OS/SEP position of the FAULT LOC switch separtes the fault outputs. This position is normally selected when using applified fault filters (single-ended or looped interrogation). If no fault location filter is used, set the fault locate option switch to STD/COM and ground pin 2 or 7 in the repeater housing. This eliminates a potential crosstalk path through the T1 Line Repeater's fault winding. Avoid removing a fault location filter from a repeater housing unless pin 2 or 7 is grounded first.

5.2 POWER Switch

The THRU position of the POWER SWITCH is selected on spans powered from one end. The THRU position is also selected on mini repeaters on spans powered from both ends except for the repeater at the looping location.

The LOOP position is selected on the mini repeater on spans powered from both ends and the repeater is located at the looping location.

Table 1. Option Settings

Switch	Setting	Description
POWER	THRU	Select for repeaters powered from one end.
	LOOP	Select for repeaters at an intermediate location where a loop occurs in circuits powered from both ends.
FAULT LOC	STD/COM	Select if using passive fault filters (double-ended interrogation).
	OS/SEP	Select if using amplified fault filters (single-ended or looped interrogation).

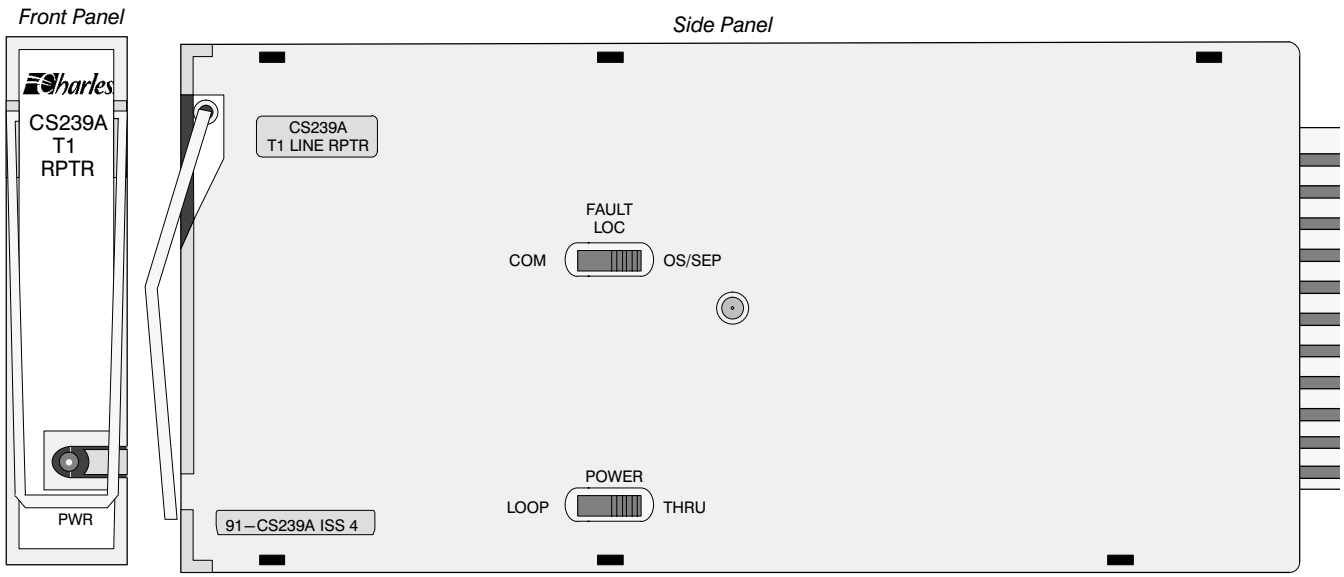

Figure 3. CS239A Front and Side Panel Option Locations

CAUTION

Installation and removal of repeaters should be done with care. Do not force a repeater into place. If excessive resistance is encountered while installing a repeater, remove the repeater and check the card guides and connector to verify proper alignment and the absence of foreign material.

6. TECHNICAL ASSISTANCE

If technical assistance is required, contact Charles Industries' Technical Services Center at:

800–607–8500
847–806–8500
847–806–8556 (FAX)
techserv@charlesindustries.com (e-mail)

7. WARRANTY & CUSTOMER SERVICE

7.1 Warranty

Charles Industries, Ltd. offers an industry-leading, 5-year warranty on products manufactured by Charles. Contact your local Sales Representative at the address or telephone numbers below for warranty details. The warranty provisions are subject to change without notice. The terms and conditions applicable to any specific sale of product shall be defined in the resulting sales contract.

Charles Industries, Ltd.
5600 Apollo Drive
Rolling Meadows, Illinois 60008–4049
847–806–6300 (Main Office)
847–806–6231 (FAX)

7.2 Field Repairs (In-Warranty Units)

Field repairs involving the replacement of components within a unit are not recommended and may void the warranty and compatibility with any applicable regulatory or agency requirements. If a unit needs repair, contact Charles Industries, Ltd. for replacement or repair instructions, or follow the *Repair Service Procedure* below.

7.3 Advanced Replacement Service (In-Warranty Units)

Charles Industries, Ltd. offers an “advanced replacement” service if a replacement unit is required as soon as possible. With this service, the unit will be shipped in the fastest manner consistent with the urgency of the situation. In most cases, there are no charges for in-warranty repairs, except for the transportation charges of the unit and for a testing and handling charge for units returned with no trouble found. Upon receipt of the advanced replacement unit, return the out-of-service unit in the carton in which the replacement was shipped, using the preaddressed shipping label provided. Call your customer service representative at the telephone number above for more details.

7.4 Standard Repair and Replacement Service (Both In-Warranty and Out-Of-Warranty Units)

Charles Industries, Ltd. offers a standard repair or exchange service for units either in- or out-of-warranty. With this service, units may be shipped to Charles Industries, Ltd. for either repair and quality testing or exchanged for a replacement unit, as determined by Charles Industries, Ltd.. Follow the *Repair Service Procedure* below to return units and to secure a repair or replacement. A handling charge applies for equipment returned with no trouble found. To obtain more details of this service and a schedule of prices, contact the Charles Service Center at 217−932−5288 (FAX 217−932−2943).

Repair Service Procedure

1. Prepare, complete, and enclose a purchase order in the box with the equipment to be returned.
2. Include the following information:
   - Company name and address
   - Contact name and phone number
   - Inventory of equipment being shipped
   - Particulars as to the nature of the failure
   - Return shipping address
3. Ship the equipment, purchase order, and above-listed information, transportation prepaid, to the service center address shown below.

   Charles Service Center
   503 N.E. 15th St, P.O. Box 339
   Casey, IL 62420−2054
4. Most repaired or replaced units will be returned within 30 or 45 days, depending on the product type and availability of repair parts. Repaired units are warranted for either 90 days from the date of repair or for the remaining unexpired portion of the original warranty, whichever is longer.

8. SPECIFICATIONS

8.1 Regulatory & Agency Approvals

The following regulatory and agency approvals apply to the CS239.

(a) FCC Part 15 Class B certified.

Note: FCC PART 15 CLASS B NOTE. This equipment generates and uses radio frequency energy, and if not installed and used in accordance with the instructions in this practice, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B digital device, pursuant to Subpart B of Part 15 FCC Rules, which are designed to provide protection against such interference when operated in a residential or commercial environment.

8.2 Electrical

The electrical characteristics of the CS239 repeaters are as follows:

(a) LINE REPEATER TYPE: Regenerative transmit and receive.

(b) LINE SIGNAL TYPE: Bipolar at 1.544 Mbps $\pm$200 bps.

(c) REPEATER LINE SIGNAL PULSE AMPLITUDE: 2.4 to 3.0 V peak.

(d) REPEATER LINE SIGNAL PULSE WIDTH: 324 ±30 nsec.

(e) REPEATER LINE SIGNAL PULSE OVERSHOOT: 10 to 30 percent of pulse height, 20 percent nominal.

(f) REPEATER LINE SIGNAL PULSE RISE AND FALL TIME: 100 nsec maximum.

(g) PORT IMPEDANCE: 100 ohms nominal at 772 kHz.

(h) RECEIVE LINE BUILD-OUT: Automatic, 0.0 to 35 dB.

(i) AC LONGITUDINAL IMMUNITY: CS239E, 1000 mA P-P; CS239A, 750 mA P-P.

(j) SURGE PROTECTION: Input/output to ground, ±2.5KV; metallic, ±1000 V.

(k) LINE CURRENT: 57 to 63 mA.

(l) VOLTAGE DROP AT 60 MA: 8.0 V nominal.

8.3 Physical

Table 1 lists the physical characteristics of the CS239 units.

Feature	U.S.	Metric
Height	2.59 inches	6.58 cm
Width	0.76 inches	1.93 cm
Depth	6.0 inches	15.24 cm
Weight	5.5 ounces	155.93 g
Temperature	−40 to 149° F	−40 to 65° C
Humidity	To 95% (no condensation)	

Table 1. Physical Specifications