

CiAC A239AXXX Sealed T1 Mini-Repeater

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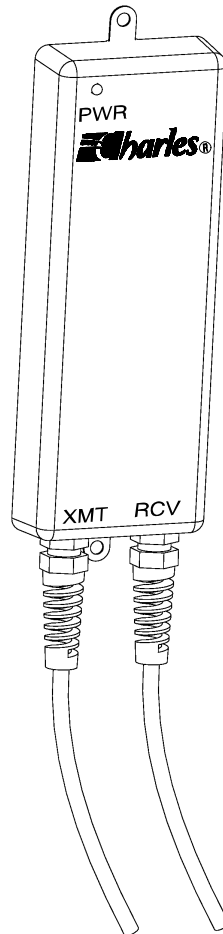


Figure 1. Sealed T1 Mini-Repeater

1. GENERAL

1.1 Document Purpose

This document provides general and installation information on the Charles Industries CiAC A239A Sealed T1 Mini-Repeater, shown in Figure 1.

This document covers the following models:

Model Number	Description
93-A239AXLP-A	Loop powered, surge protection
93-A239AXTP-A	Thru powered, surge protection
93-A239AXLX-A	Loop powered, no surge protection
93-A239AXTX-A	Thru powered, no surge protection

1.2 Document Status

This document has been updated to reflect the new company logo on the product.

1.3 Equipment Function

The CiAC A239A Sealed T1 Mini-Repeater is an environmentally sealed T1 mini-repeater designed for universal use within both the outside plant (OSP) and customer premises environment (CPE). The T1 Mini-Repeater is easily mounted and connected to the network.

The T1 Mini-Repeater regenerates up to two, two-way 1.455 megabit-per-second signals on a T1 span. A circuit card (CS239A) with two regenerators is contained inside the T1 Mini-Repeater. Refer to the *Specifications* section for additional information.

1.4 Equipment Location

The T1 Mini-Repeater can be mounted to any secure surface in an aerial, building, buried, or underground plant. When selecting a location, make sure that the green power (PWR) light emitting diode (LED) is visible. To prevent tampering or vandalizing avoid locations that can be accessed by unauthorized individuals.

1.5 Equipment Features

The T1 Mini-Repeater provides the following features:

- Dual regenerators for use on 1.544 Mb/s two-way T1 spans
- Hardened circuits for low level surge protection
- Green LED power indicator
- Automatic Line Build-Out (ALBO) to accommodate a wide range of receive signals (0.0 to 35dB)
- *Thru* or *Loop* powered
- Fully compatible with AML or B8ZS line coding
- High immunity to induced AC
- Transmit (XMT) and Receive (RCV) color coded conductor
- Four foot conductor stubs; filled, shielded and bonded
- 14 AWG insulated ground lead
- 350VDC gas tube protection (optional)
- Weather, ultraviolet (UV), and chemical resistant housing and encapsulant

2. INSPECTION

2.1 Inspect for Damages

Inspect the equipment thoroughly upon delivery. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company.

2.2 Equipment Identification

Charles Industries' 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 1 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.

3. CIRCUIT DESCRIPTION

The T1 Mini-Repeater is compatible with either AML or B8ZS line coding. The block diagram is shown in Figure 2.

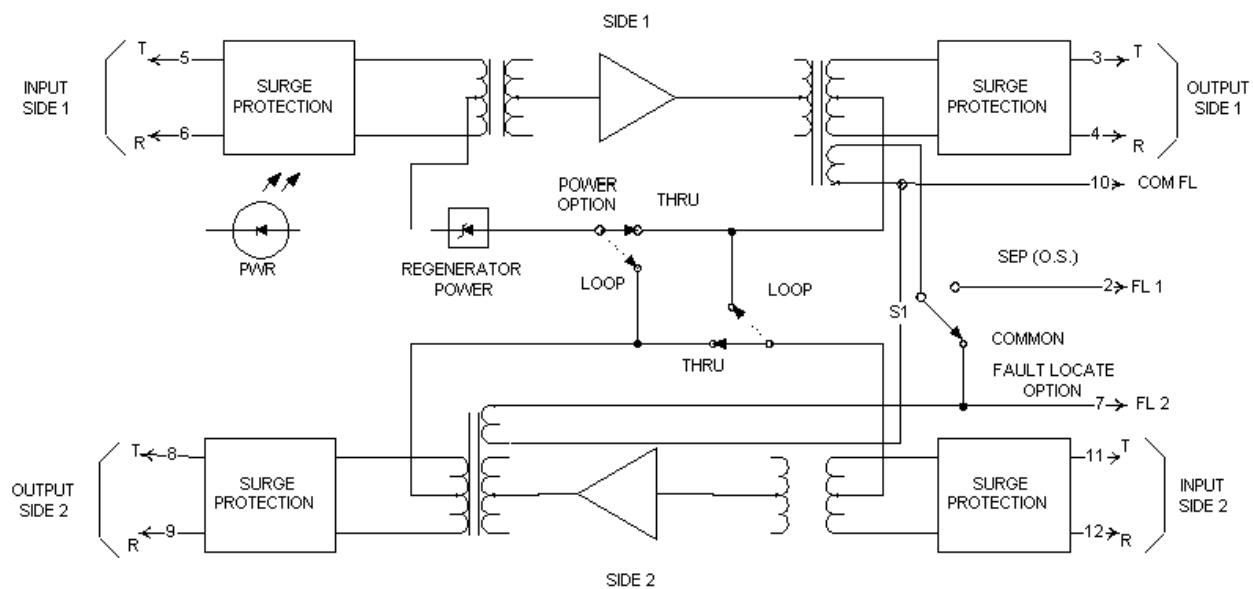


Figure 2. T1 Mini-Repeater Block Diagram

Each T1 Mini-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 cables with a 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 722Khz).

DC power for the repeater and its two regenerators is derived from the T1 span over the repeater simplex leads. A green, power (PWR) LED located on the front, top, left-hand corner lights when power is being supplied. The T1 Mini-Repeater is ordered in either *Loop* or *Thru* powering configurations (these features are not field selectable).

The T1 Mini-Repeater is designed to operate on a nominal line current of 60 mA, over a range of 57 to 63 mA.

The voltage drop is a nominal 8 VDC. 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 T1 Mini-Repeater is installed into the T1 span within 4 feet of a primary over-voltage protector. Secondary surge protection is provided for side 1 and 2 inputs and outputs. This protection is capable of eliminating line surges and spikes experienced during normal operation of the T1 span. If the T1 span is in an unprotected area the T1 Mini-Repeater with optional protection should be used. The T1 Mini-Repeater with protection contains four, three element fail-safe gas tube assemblies. These protective gas tubes are rated at 350 VDC nominal and are

equipped with backup gaps to provide protection in the event the gas tube vents. The optional protectors are not user serviceable.

The fault locate outputs of side 1 and side 2, pins two and seven respectively, have been grounded at the circuit board and are not accessible for use.

4. MOUNTING

The T1 Mini-Repeater may be mounted to any suitable surface in the aerial, building, buried, or underground plant. Visual access to the green power (PWR) light emitting diode (LED) is the only operational consideration in selecting a mounting location. Adequate measures to prevent tampering or vandalizing by unauthorized individuals should be considered in selecting the installation location.

4.1 Aerial Plant Mounting

If external primary over-voltage protection is not present, it is recommended that the T1 Mini-Repeater with optional internal primary over-voltage protection be used.

4.1.1. Aerial Splice/Ready Access Closure Mounting

The T1 Mini-Repeater may be located inside an aerial splice or ready access closure. Be sure that the stubs are of sufficient length to reach the point of connection to the T1 spans.

Follow the procedure below to locate the T1 Mini-Repeater inside an aerial splice or ready access closure.

Note: If the T1 Mini-Repeater is not secured inside the splice/ready access closure it may fall out when the closure is opened. Therefore, use caution when opening the splice/ready access closure.

Step	Action
1.	Open the stubs, perform the splicing, close the splice, and perform acceptance testing all in accordance with company practices.

4.1.2. Pole Mounting

The T1 Mini-Repeater may be mounted directly to a pole. Be sure that the stubs are of sufficient length to reach the point of connection to the T1 spans.

Follow the procedure below to mount the T1 Mini-Repeater to a pole.

Step	Action
1.	Use the two mounting tabs on the T1 Mini-Repeater as a template to mark two holes.
2.	Drill the two mounting holes in the pole.
3.	Secure the T1 Mini-Repeater to the pole using two screws of sufficient size.
4.	Route, dress and secure the two stubs to the splice point for connection to the T1 span.
5.	Open the stubs, perform the splicing, close the splice, and perform acceptance testing all in accordance with company practices.

4.2 Building Mounting

When mounting the T1 Mini-Repeater to a building, primary over-voltage protection may be required.

The T1 Mini-Repeater may be mounted to any suitable exterior or interior surface of a building. Be sure that the stubs have sufficient length to reach the point of connection to the T1 spans. Follow the procedure below to mount the T1 Mini-Repeater to a surface in a building.

Note: Install the T1 Mini-Repeater in accordance with any or all applicable federal, state or local codes, practices, and ordinances pertaining to the use of such equipment on or in a building.

Step	Action
1.	Use the two mounting tabs on the T1 Mini-Repeater as a template to mark two holes.
2.	Drill the two mounting holes in the building.
3.	Secure the T1 Mini-Repeater to the building using two screws of sufficient size.
4.	Route, dress and secure the two stubs to the splice point for connection to the T1 span.
5.	Open the stubs, perform the splicing, close the splice, and perform acceptance testing all in accordance with company practices.

4.3 Buried Mounting

The T1 Mini-Repeater may be installed easily into buried plant facilities, such as in a pedestal or other readily accessible point within the cable plant route. It is recommended that the optional primary over-voltage protection be used in buried plant applications.

Be sure that the stubs have sufficient length to reach the point of connection to the T1 spans. Follow the procedure below to mount the T1 Mini-Repeater to a buried cable plant.

Note: If the T1 Mini-Repeater itself is buried, the PWR LED can only be viewed if the unit is dug back up.

Step	Action
1.	Route, dress and secure the two stubs to the splice point for connection to the T1 span.
2.	Open the stubs, perform the splicing, close the splice, and perform acceptance testing all in accordance with company practices.

Note: Use the two mounting tabs supplied on the T1 Mini-Repeater to secure the unit to a suitable support within a pedestal.

4.4 Underground Mounting

The T1 Mini-Repeater may be mounted in a manhole or other underground structure. It is recommended that the optional primary over-voltage protection be used in underground plant applications.

Note: The encapsulant and cable stubs of the T1 Mini-Repeater can be completely submersed in water. No damage will be done to the internal circuits.

Be sure that the stubs have sufficient length to reach the point of connection to the T1 spans. Follow the procedure below to mount the T1 Mini-Repeater to an underground plant.

Step	Action
1.	Using the two mounting tabs on the T1 Mini-Repeater as a guide, mark and drill two holes.
2.	Route, dress and secure the two stubs to the splice point for connection to the T1 span.
3.	Open the stubs, perform the splicing, close the splice, and perform acceptance testing all in accordance with company practices.

5. INSTALLATION CONNECTIONS

Figure 3 shows the stub and conductor assignments for the T1 Mini-Repeater.

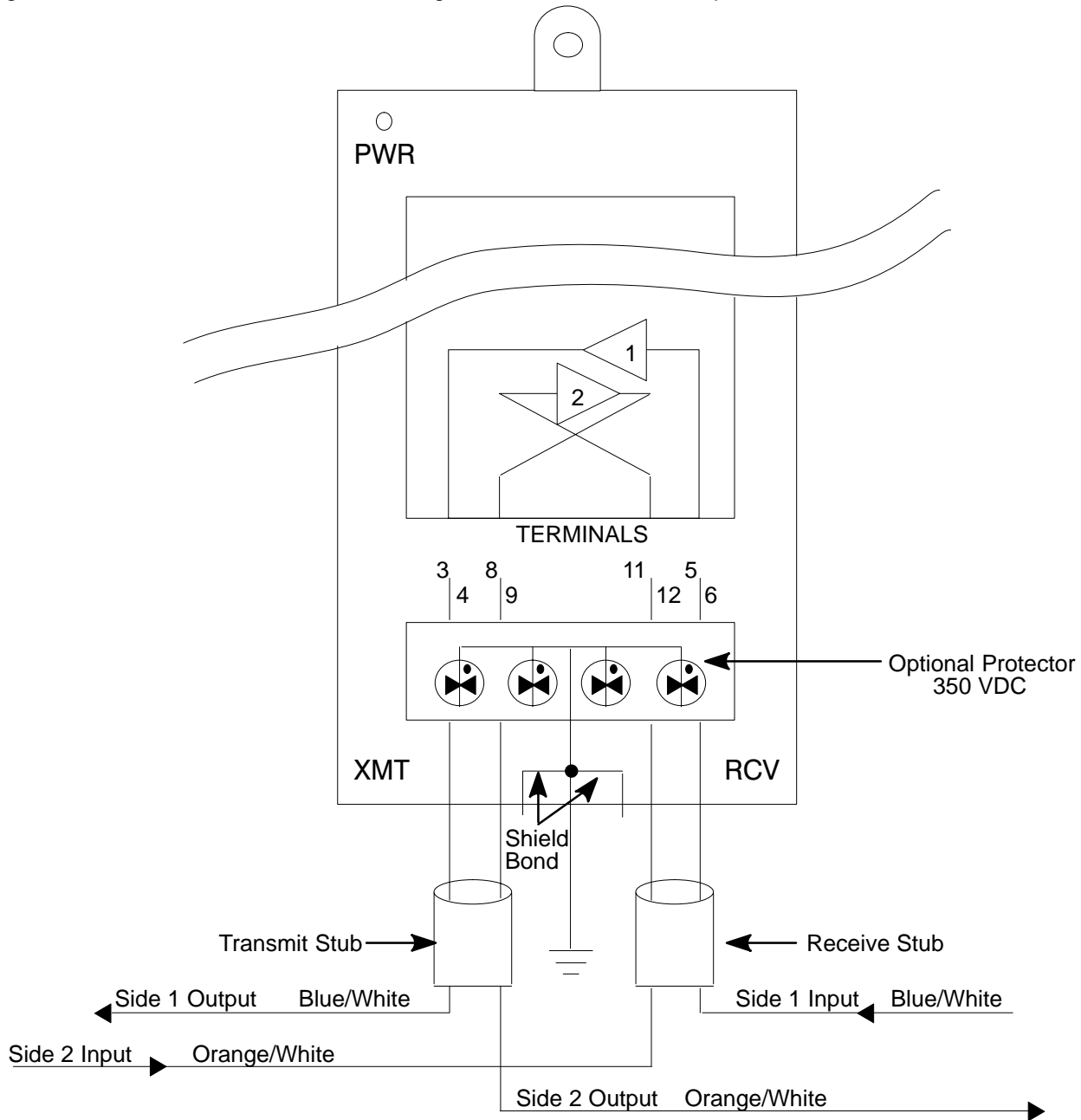


Figure 3. T1 Mini-Repeater Stub and Conductor Assignments

6. TECHNICAL ASSISTANCE

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

847-806-8500

847-806-8556 (FAX)

800-607-8500

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 Industries. 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 pre-addressed 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 for either repair and quality testing or exchanged for a replacement unit, as determined by Charles Industries. 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 CI 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.

CI 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

FCC Part 15 Class B certified.

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

- (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 \pm 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, \pm 2.5KV; metallic, \pm 1000 V.
- (k) LINE CURRENT: 57 to 63 mA.
- (l) VOLTAGE DROP AT 60 MA: 8.0 V nominal.

8.3 Physical

See Table 1 for the physical characteristics of the Sealed T1 Mini-Repeater.

Table 1. Physical Specifications

Feature	U.S.	Metric
Length	9 inches (case only)	22.8 centimeters (case only)
	11 7/16 inches (with strain reliefs)	29 centimeters (with strain reliefs)
Width	3 5/16 inches	8.4 centimeters
Depth	1 1/4 inches	3.2 centimeters
Weight	2 pounds 6 ounces	1 kilogram
Stub Length	4 feet standard (other stubs in 2 foot increments optional)	1.22 meters standard (other stubs in 0.6 meter increments optional)
Temperature	-40° to +160° F	-40° to +71° C
Humidity	100 %	

