CS270F SmartSpan™ T1 Line Repeater w/Addressable Bidirectional Loopback

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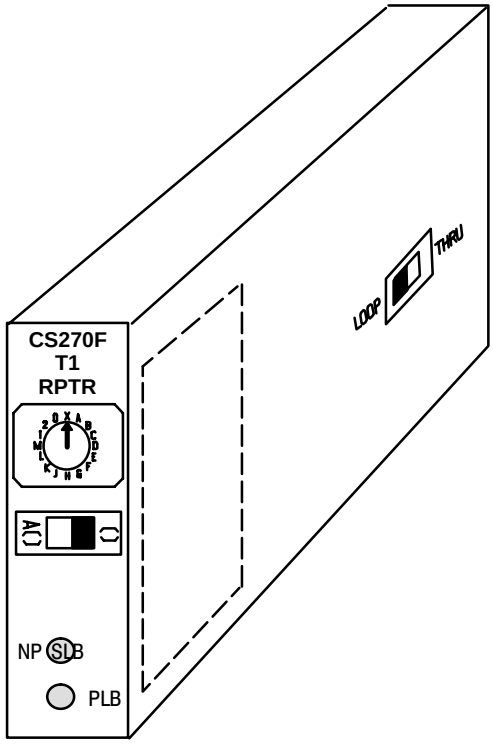

Figure 1. CS270F SmartSpan T1 Line Repeater

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1. GENERAL

1.1 Document Purpose

This document provides installation and testing information for the Charles Industries CS270F T1 Line Repeater shown in Figure 1. See Figure 2 for the CS270F Block Diagram.

1.2 Document Status

This document is reprinted to include a general editorial update.

1.3 Equipment Function

The Charles CS270F T1 Line Repeater, which is part of the SmartSpan System, provides bidirectional signal regeneration and addressable signal loopback. The SmartSpan System consists of T1 Line Repeaters (CS270F) packaged in standard 239-type mechanics, and T1 Powering Repeaters (3423–7F) in AT&T 220 mechanics and (3192–7F) in Charles STS–3192 mechanics. For additional information on the SmartSpan System refer to Section CS2–70F–100.

1.4 Equipment Location/Mounting

The CS270G is a 239-type plug-in module that mounts in standard 239-type mechanics.

CAUTION

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

1.5 Equipment Features

The CS270F T1 Line Repeater includes the following features:

- 239–type mechanics
- Auto Power Loop (APL) feature keeps office side repeaters powered during field side failure
- Bidirectional signal loopback allows one person testing from the field or office
- Loop or Thru powering
- Accommodates 60mA spans
- Bidirectional span power operation
- Receive regeneration with wide range ALBO to accommodate 0 to 35dB cable loss
- Front-panel-mounted LED indicators showing loopback and APL status
- Lightning protection per TR-TSY-00057
- Meets TR-TSY-000499 jitter requirements

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.

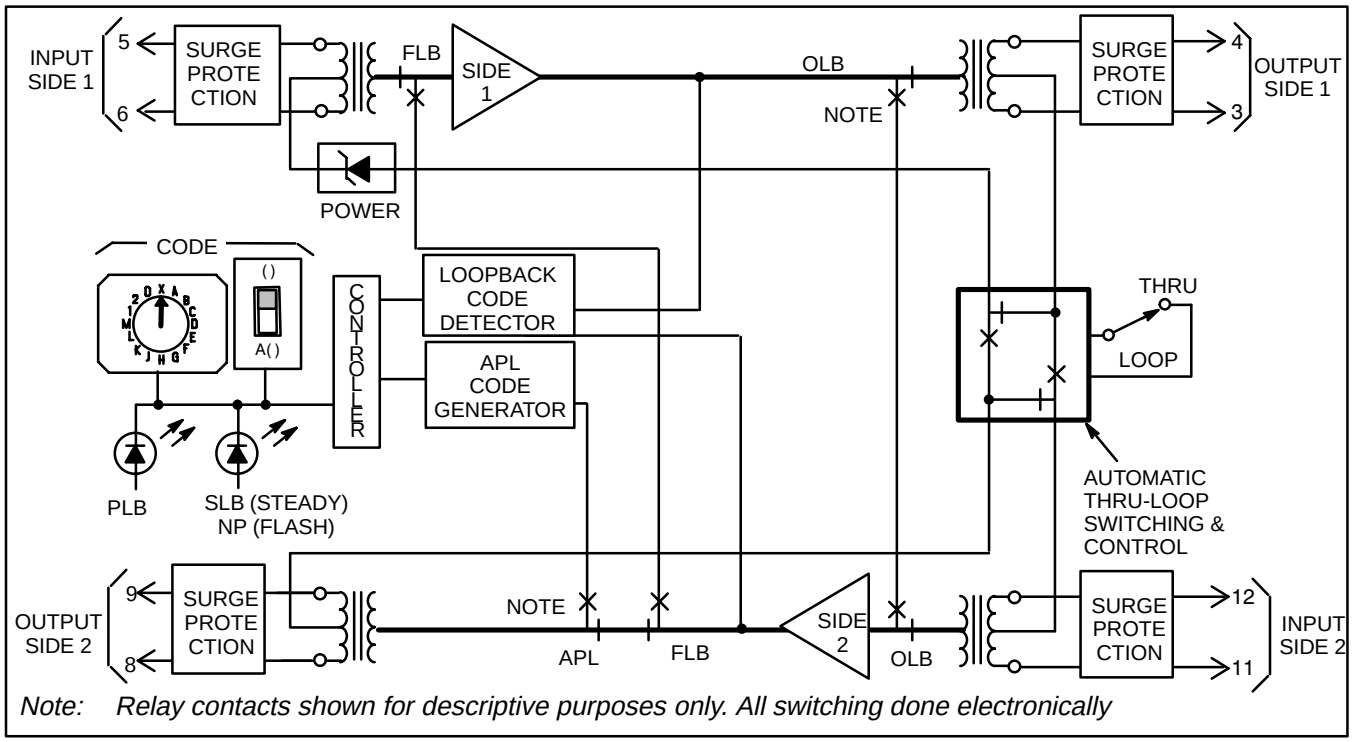
2.3 Static Concerns

Each module is shipped in static-protective packaging to prevent electrostatic charges from damaging static-sensitive devices. Use approved static-preventive measures, such as static-conductive wrist straps and a static-dissipative mat, when handling modules outside of their protective packaging. A module intended for future use should be tested as soon as possible and returned to its original protective packaging for storage.

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 a static-conductive wrist strap and a static-dissipative mat) 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.**
- **Use static-protective packaging for shipping or storage.**



Note: Relay contacts shown for descriptive purposes only. All switching done electronically

Figure 2. CS270F T1 Line Repeater Block Diagram

3. OPTIONS

The CS270F is equipped with slide switches and a front-panel-mounted rotary switch which are used to condition the module for the required operation. Option locations are shown in Figure 3.

3.1 Switch S2 (LOOP, THRU)

Place switch S2 in the LOOP position if the unit is to be powered from the span. If the unit and CI terminal equipment are to be powered from the span, place S2 in the THRU.

3.2 Front-Panel-Mounted Rotary Switch S3 and Slide Switch S4 (Repeater Address Code)

Referring to Table 1, set the front panel code switches S3 and S4 for the desired address. To disable the loopback code detector, place switch S3 in the X position. S3 in the X position will cause the NP/SLB LED to flash.

Note: Switch S4 has no effect when the switch S3 is in the X position.

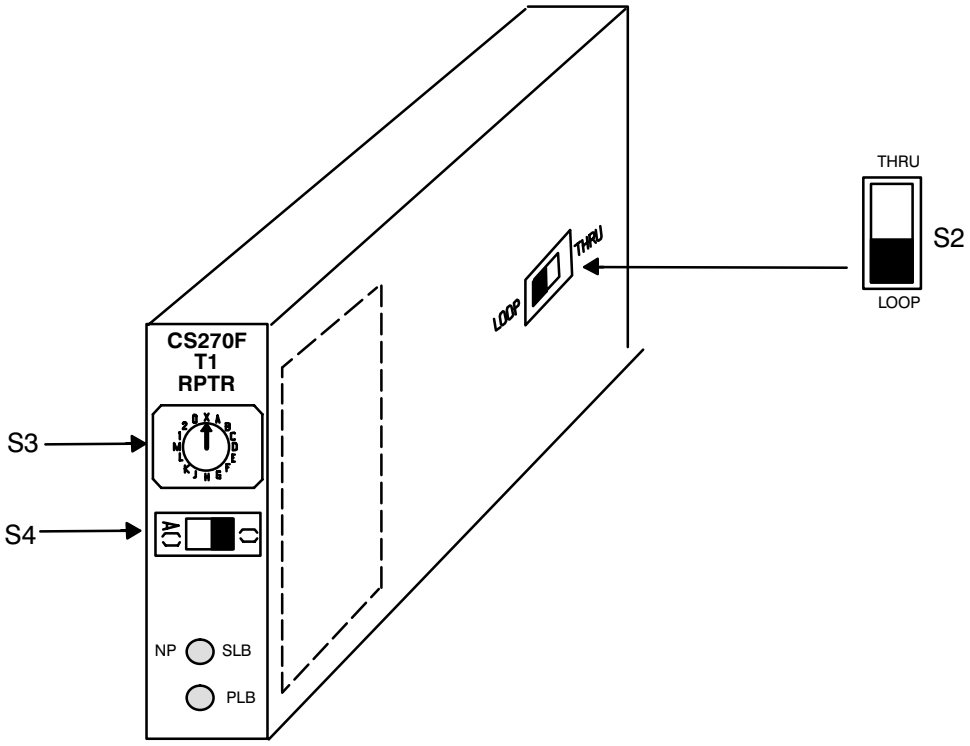
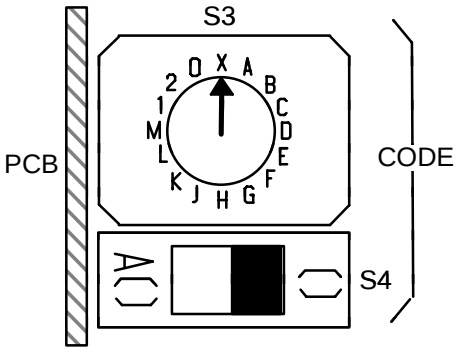


Figure 3. CS270F Front Panel Function and Option Locations

Table 1. CS270F Front Panel Function and Option Summary

Item	Position or State	Description
NP/SLB (Red) LED	Continuous	Indicates loopback transmission.
	Flash	Indicates that no address has been assigned (not provisioned).
PLB (Red) LED	ON	Indicates that the unit has detected a field side open condition and automatically switched to LOOP SX powering.
S2 (LOOP, THRU)	LOOP	Unit is to be powered from the span.
	THRU	Unit and CI terminal equipment are to be powered from the span.



Rotary switch S3 in the X position disables the loopback capabilities of the unit. Switch S4 has no effect when rotary switch S3 is in the X position.

Physical Address Bit Assignment (NNNNN)					
Address	**(NNNNN)**	**Address**	**(NNNNN)**	**Address**	**(NNNNN)**
A	00001	L	01011	AF	10110
B	00010	M	01100	AG	10111
C	00011	1	01101	AH	11000
D	00100	2	01110	AJ	11001
E	00101	0	01111	AK	11010
F	00110	AA	10001	AL	11011
G	00111	AB	10010	AM	11100
H	01000	AC	10011	A1	11101
J	01001	AD	10100	A2	11110
K	01010	AE	10101	A0	11111

EXAMPLE 1: To assign address B to the unit, set S3 to position B and S4 to position ( )

EXAMPLE 2: To assign address AB to the unit, set S3 to position B and S4 to position A( ), i.e. A(B)

EXAMPLE 3: To assign address A1 to the unit, set S3 to position 1 and S4 to position A( ), i.e. A(1)

4. TESTING

Use the following steps to test the CS270F. This is a basic test, and is performed with the unit in-service.

Step	Action	Verification
1.	Perform an office side loop-up function on the repeater (being tested) by sending the following 16 bit repeating pattern: 11111111 00 NNNNN 0 (where NNNNN is the address of the repeater being tested). Leftmost bit transmitted first.	After 5–8 seconds the repeater being tested loops-up and returns the 11111111 00 NNNNN 0 repeating pattern. SLB/NP LED lights.
2.	Remove the repeating pattern. Normally the unit will time out after 20 minutes and return to the idle state. The 20-minute time period can be extended indefinitely by sending the loop-up request again as in Step 1, before the 20-minute time out ends.	
3.	Loop-down the unit by sending a standard DS1 Interface Connector Loop-down command in either SF (11100 repeating pattern) or ESF (1111111 0 010010 0 in the ESF data link). Standard TR-TSY-000312 criteria apply for these commands. A standard CSU loop-down command (100 repeating pattern) can also be sent to loop-down the unit.	SLB/NP LED extinguishes.
4.	Perform a field side loop-up function on the repeater (being tested) by sending the following 16 bit repeating pattern: 00111111 00 NNNNN 0 (where NNNNN is the address of the repeater being tested). Leftmost bit transmitted first.	After 5–8 seconds the repeater being tested loops-up and returns the 00111111 00 NNNNN 0 repeating pattern. SLB/NP LED lights.
5.	Repeat Step 2.	
6.	Repeat Step 3.	SLB/NP LED extinguishes.
7.	This concludes the test.	
Note:	*If <u>unframed</u> repeating pattern: 11111110 00 NNNNN 0 is received at the office side, the repeater has detected a field side open and has automatically switched to LOOP SX powering. The PLB LED will light. The NNNNN is the address of the repeater beyond which the open occurred.*	

5. 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)

6. WARRANTY & CUSTOMER SERVICE

6.1 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)

6.2 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.

6.3 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.

6.4 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.

7. SPECIFICATIONS

The electrical and physical characteristics of the CS270F Line Repeater are as follows:

7.1 Electrical

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

(b) LINE SIGNAL TYPE: Bipolar at 1.544Mbps ±200bps.

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

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

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

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

(g) INPUT PORT IMPEDANCE: 100 ohms nominal at 722kHz.

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

(i) AC LONGITUDINAL IMMUNITY: 1000MA peak-to-peak.

(j) SURGE PROTECTION: Per TR–TSY–000057.

7.2 Physical

See Table 2 for the physical characteristics of the unit.

Table 2. Physical Specifications

Feature	U.S.	Metric
Height	2.59 inches	6.58 centimeters
Width	0.76 inches	1.93 centimeters
Depth	6.0 inches	15.24 centimeters
Weight	5.5 ounces	156 grams
Temperature	–40° to 149°F	–40° to 65°C