STS 3192–9L ASPR Office Repeater

CLEI™ Code: T1RPAAAAAA

Complies with UL Standard 1459 Third Edition.

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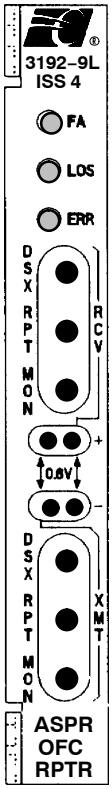

Figure 1. 3192–9L Front Panel

1. GENERAL

1.1 Document Purpose

This document provides general information for the Charles Industries 3192−9L (Issue 4) Office Repeater.

1.2 Document Status

This document is reprinted to correct the CLEI code.

1.3 Equipment Function

The 3192−9L provides T1 span regeneration and powering in STS mountings. The fully temperature hardened (−40 to 149°F [−40 to 65°C] ambient temperature range) 3192−9L can be located in central offices, and outdoor or customer premises cabinets and CEVs.

1.4 Equipment Location/Mounting

The 3192−9L ASPR Office Repeater is designed for use in the Charles Industries Span Termination System (STS) Mounting Shelves, or the Charles Industries 340 or 343 mountings. For additional information regarding the Span Termination System refer to **Section 319−211−100** (Span Termination System General Description) and **Section 319−211−200** (Span Termination System Installation and Application Engineering).

1.5 Equipment Features

The 3192−9L provides the following features:

- An automatic span regulator (ASPR) to derive the necessary span line voltage (10 to 260Vdc) to maintain a 60mA loop from −48Vdc office battery. The ASPR automatically compensates for variations in cable, repeater tolerances, temperature and routing.
- A wide range automatic line build-out (ALBO) that will regenerate incoming signals that have experienced from 0 to 35dB of loss. No optionable padding of the incoming signal is required.
- A transmit side LBO which consists of three cascaded pad sections of 4.5, 7.5, and 15dB. Allowing transmit side loses adjustable for 4.5, 7.5, 12.0, 15.0, 19.5, 22.5, and 27.0dB.
- A fault locate output. A resistive network on the secondary of the fault locate transformer provides the proper termination to the repeater when fault locate filters are not being deployed, eliminating the need to short the fault locate output when not in use.
- Supports spans operating at 60mA. Provision is made for bidirectional span powering only. The design of the T1 span, including repeater spacing and cable pair selection, should be done according to standard T1 span design or local company practice. Bell Operating Companies can use the DILEP II System described in Bellcore Practice BR-902-200-120.
- Has an option switch that controls the maximum voltage delivered to the span. When the option is set for −130 volts, the maximum DC simplex span resistance is 2100 ohms. When the module is optioned for +/−130 V (260 volts total), the maximum DC simplex resistance is 4300 ohms. It is recommended that −130V power be utilized wherever possible, eliminating the possible electrolysis effect of positive voltages when the unit is optioned for +/−130 volts. Consideration should be given to back-powering spans that exceed the 2100 ohm limit of the −130V option.
- When the 3192−9L's internally-located fuse opens, the front-panel-mounted FA LED will illuminate and −48 volts will appear at the Fuse Alarm output, pin 10. The fuse will only open if the module is damaged and is not field replaceable.
- Front-panel-mounted pin jacks for measuring span current and voltage.
- Front-panel-mounted bantam jacks that provide split and monitor access to the DSX side of the unit.
- Switch selectable DSX pre-equalization for up to 655 feet of 22 gauge cable.
- Integral receive side T1 performance monitor, with an adjustable BPV threshold and loss-of-signal detector.

DANGER

Potentially hazardous voltages can exist on carrier span lines. Always exercise caution when wiring a live circuit or when performing maintenance on the backplane of any span shelf.

Table 1. 3192–9L Front Panel Function Description

ITEM		FUNCTION
FA (Fuse alarm) Red LED		Indicates that the internal fuse on the 3192-9L has opened. The internal fuse is not field replaceable.
LOS (Loss of Signal) Red LED		Indicates absence of pulses received from the span for greater than 150 msec.
ERR (Format Error, BPV) Red LED		Indicates Bipolar violations (format errors). LED flashes for individual errors. When an error threshold is selected, the LED flashes until the threshold is exceeded, then remains on.
RCV Bantam Jacks	DSX	Isolates repeater allowing injection of signal toward the DSX.
	RPT	Isolates the DSX allowing monitoring of repeater RCV DSX (OUT).
	MON	Non-service-affecting RCV DSX (OUT) monitor jack.
Voltage and Current Test Pins		Used for measuring span current and voltage (see Testing).
XMT Bantam Jacks	DSX	Isolates the repeater allowing monitoring of signal from the DSX.
	RPT	Isolates the DSX allowing injection of signal toward the span.
	MON	Non-service-affecting XMT DSX (IN) monitor jack.

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.**

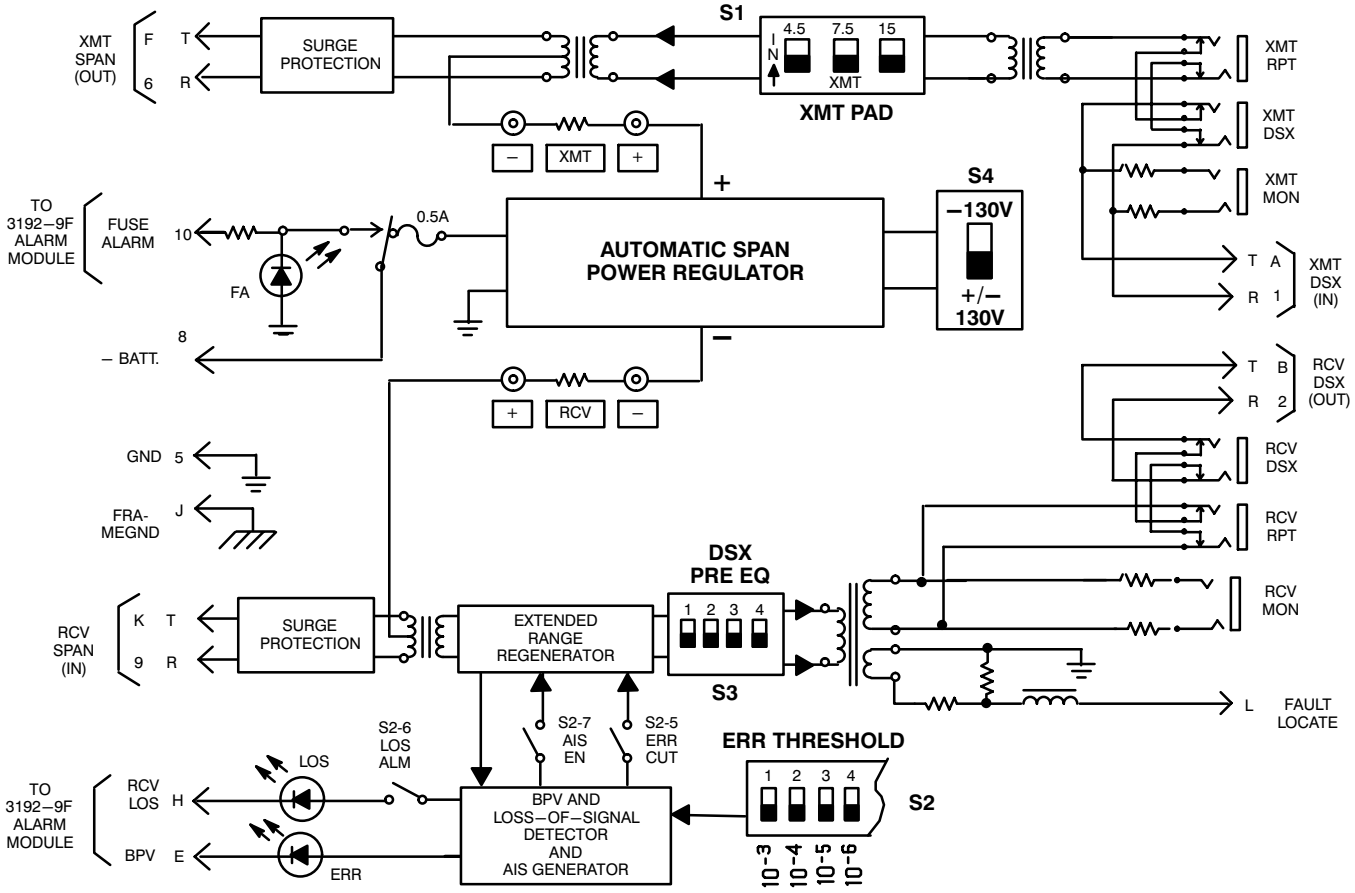

Figure 2. 3192–9L (Issue 4) Block Diagram

3. OPTIONS

Options for the unit are shown in Figure 1, and described in Table 2 through Table 4.

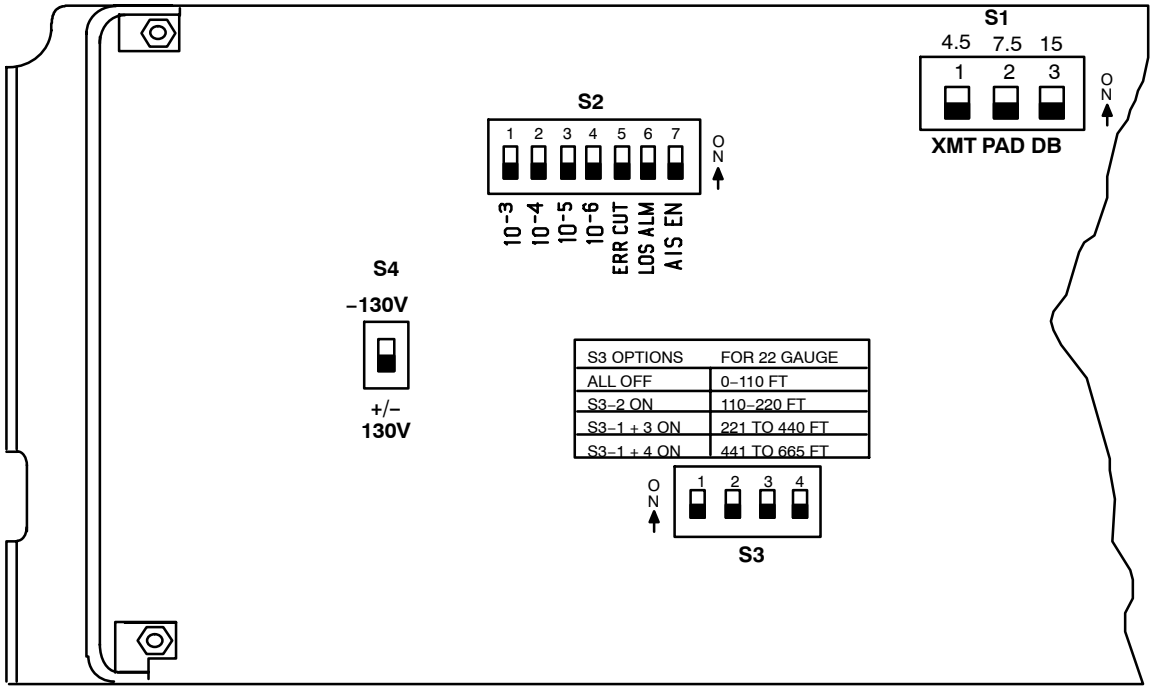

Figure 1. 3192–9L Option Locations

Table 2. 3192–9L Option Description

Option #	Type	Function
S1	XMT PAD	3–section DIP switch for 0dB, 4.5dB, 7.5dB, and 15dB of transmit padding additive to 27.0dB. Option XMT PAD per Table 3.
S2–1 thru S2–4	Error Threshold	Switches S2–1 through S2–4 control the error threshold of the performance monitor; S2–1 = 10-3, S2–2 = 10^{-4}, S2–3 = 10^{-5}, S2–4 = 10^{-6}. With the switches disabled (OFF position) the front-panel ERR LED will flash upon receiving a valid bipolar violation (BPV) and the BPV alarm output lead pin E will remain idle. Placing S2–1 through S2–4 to the ON position activates the BPV counter. The front-panel ERR LED will flash upon receiving valid BPVs until the selected threshold is exceeded. When the threshold is exceeded the ERR LED will remain ON constant and the BPV alarm output lead pin E will become active until the rate of errors fall below the selected threshold.
S2–5	ERR CUT	Switch S2–5 is used to option the unit for a pseudo loss of signal upon receipt of high errors from the span (as determined by the setting of the error detector threshold switches S2–1 through S2–4). With S2–5 placed to the ON position, the received output toward the DSX is forced to an unframed all-zero condition (no signal) whenever the threshold of the error detector is exceeded, forcing an upstream switch-to-protect. With S2–5 placed to the OFF position, any bipolar violations received from the span are repeated toward the DSX. Unless applications dictate, place switch S2–5 to the OFF position.
S2–6	LOS Alarm	Switch S2–6 enables/disables the loss-of-signal alarm sent to the backplane alarm bus. Placing S2–6 to the ON position enables the alarm output. Placing S2–6 to the OFF position disables the alarm output. Whenever a repeater is plugged in without being connected to a working span line, it is desirable to disable the LOS alarm so it does not corrupt the alarm bus tied to in-service repeaters.

Option #	Type	Function
S2−7	AIS EN	Switch S2−7 when enabled (ON position) options the 3192−9L to send AIS, an unframed all ones, to the DSX upon loss-of-signal from the span. Switch S2−7 when disabled, passes the loss-of-signal to the DSX.
S3	Pre-equalization	Switch S3 provides pre−equalization for up to 655 feet of cable from the 3192−9L to the DSX (see Table 4).
S4	Span Output Voltage	Switch S4 controls the maximum span output voltage. Set S4 to −130V position for spans requiring ≤ −130V DC, simplex resistance less than 2100 ohms. Set S4 to +/−130V position for spans requiring > −130V up to 260V or 4300 ohms of DC simplex resistance.

Table 3. Option S1 Settings

Transmit Loss DB	S1 Switch Segment ON		
	4.5	7.5	15
0.0			
4.5	X		
7.5		X	
12.0		X	
15.0			X
19.5	X		X
22.5		X	X
27.0	X	X	X

Table 4. Switch Settings for Optimal Output Signal

S3 Options	22 Gauge (feet)	24 Gauge (feet)
All Off	0−110	0−90
S3−2 ON	110−220	91−180
S3−1 + 3 ON	221−440	181−360
S3−1 +4 ON	441−665	361−545

4. TESTING

If trouble is suspected with the 3192−9L Office Repeater, use the following procedure to test the unit.

This test is to be performed in-service, with the 3192−9L under test and continuing to receive T1 signals from the metallic facility as well as the DSX. Also, the test can be performed out-of-service, in an appropriate test set-up that would provide an equivalent T1 signal source.

Step	Action	Verification
1.	With a voltmeter, check for DC voltage between terminals 1 (−48V) & 3 (Gnd) and 2 (−48V) & 4 (Gnd) on terminal block TB-1. Verify span current and voltage at front panel test points.	Local battery voltage across terminals 1 & 3 and 2 & 3 of TB-1 should be between −42V and −56V. Verify span current, the DC voltage between the front panel test points should read 0.6 ± 0.03 Vdc. This corresponds to a span line current of 60mA ± 5 percent. Span voltage can be verified by connecting the negative lead of the voltmeter to the upper right (front panel) test point and the positive test lead to the lower left (front panel) test point.
2.	Check for the existence of the regenerated receive signal. Observe LOS indicator on the front panel.	On the 3192−9L the LOS light should be out if receiving a signal. When checking with a T1 Transmission Test Set, pulses should be observed. If not, replace the 3192−9L (see Note 2).
3.	Check for signal error (bipolar violations) in the regenerated receive signal. Observe the ERR indicator on the front panel.	On the 3192−9L the ERR light should be out if the BPV rate is lower than the threshold setting of S5. The error indicator on the T1 Transmission Test Set should not light. If excessive errors are evident, replace the 3192−9L. *Note: Before replacing the unit, verify that the distant end is sending a valid T1 signal.*
4.	Verify the transmit signal on the span line.	A valid signal received from the DSX should be observed on the T1 Transmission Test Set. Verify the wiring from the DSX. (This test assumes that the XMT from DSX signal input is a 3V (base to peak) 1.544mb/s T1 signal.

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

7.1 Electrical

- OFFICE REPEATER TYPE: Passive transmit; regenerative receive.
- LINE SIGNAL TYPE: Bipolar at 1.544Mbps $\pm$200bps.
- REPEATER LINE SIGNAL PULSE AMPLITUDE: 3V peak $\pm$0.6V at DSX (6V peak-to-peak, pre−equalized).
- REPEATER LINE SIGNAL PULSE WIDTH: 324 $\pm$45 nsec.
- REPEATER LINE SIGNAL PULSE OVERSHOOT: 10 to 30 percent of pulse height, 20 percent nominal.
- REPEATER LINE SIGNAL PULSE RISE AND FALL TIME: 100nsec maximum.

- INPUT IMPEDANCE: 100 ohms nominal at 772kHz.
- RECEIVE LINE BUILD-OUT: Automatic, 0.0 to 35dB.
- SURGE PROTECTION: Input/output to ground, ±1000V; metallic, ±1000V.
- LINE CURRENT: 60mA ±5 percent.
- LINE VOLTAGE RANGE: 10 to 260Vdc with S4 in +/−130V position, 10 to −130Vdc with S4 in −130V position.
- VOLTAGE LIMIT (NO LOAD FAULT): 300Vdc (typical) with S4 in +/−130V position, −165Vdc (typical) with S4 in −130V position.
- CURRENT LIMIT (UNBALANCED FAULT): 120mA
- VOLTAGE IMBALANCE TO GROUND: 6V maximum.
- MAXIMUM PLUG-IN INPUT CURRENT AND HEAT RELEASE:

Application	Loop Simplex Resistance	Maximum Plug-In Input Current At −42.5 Volts	Maximum Plug-In Heat Release
Repeaterless	500 Ohms	0.087 amps	1.7 watts
CSA	800 Ohms	0.12 amps	1.9 watts
130 V Limit	2160 Ohms	0.25 amps	2.5 watts
260 V Limit	4300 Ohms	0.49 amps	3.7 watts

7.2 Physical

See Table 5 for the physical characteristics of the 3192−9L.

Table 5. Physical Specifications

Feature	U.S.	Metric
Height	4.75 inches	12.06 centimeters
Width	0.687 inches	1.746 centimeters
Depth	10.5 inches	26.67 centimeters
Weight	9 ounces	255 grams
Temperature	−40 to 149°F	−40 to 65°C