

# Span Termination System (STS) General Description

CONTENTS	PAGE
Part 1. GENERAL .....	1
Part 2. APPLICATIONS .....	1
Part 3. MOUNTING ASSEMBLIES .....	2
Part 4. PLUG-IN MODULES .....	7
Part 5. CONNECTING CABLES .....	10
Part 6. SUPPORTING DOCUMENTATION .....	12
Part 7. TECHNICAL ASSISTANCE .....	12
Part 8. WARRANTY & CUSTOMER SERVICE .....	12

## 1. GENERAL

### 1.1 Document Purpose

This practice provides a general description of the Charles Industries Span Termination System (STS), which is comprised of the components listed in Table 1.

### 1.2 Document Status

This document is reissued to include a general editorial update.

## 2. APPLICATIONS

The Charles Industries Span Termination System (STS) is a flexible, feature-rich T1 Termination System in a very compact package. Its 23 inch mechanics can be equipped with up to 28 span powering office repeaters, matching the capacity of DS3 lightwave multiplexer systems.

**Table 1. STS Equipment Components**

Model	Description	Model	Description
3192-11	23 inch Connectorized Mounting Shelf containing 28 repeater positions and one alarm module position	3192-9B	Bridging Office Repeater
3192-WR	23 inch Wirewrap Mounting Shelf containing 28 repeater positions and one alarm module position.	3192-9L	Line Powering Office Repeater
319-02	19 inch Connectorized Mounting Shelf containing 22 repeater positions and one alarm module position.	3192-9M	Line Powering Office Repeater
319-04	19 inch Wirewrap Mounting Shelf containing 22 repeater positions and one alarm module position.	3192-9P	Short Loop Office Repeater
3192-9C	Cut-Thru Module	3192-9T	Terminating Office Repeater
3192-9F	Alarm Module	3192-FL	Fault Locate Module
3192-9E	T1 Powering Network Interface Unit	3192-OW	Order Wire Module
APS101	Automatic Span Protection Switch	3192-TP	Test Plug
Various Connectorized Cable Assemblies			

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The availability of features and technical specifications herein subject to change without notice.

The STS is ideally suited to provide T1 metallic span extensions from outside plant cabinets, huts and CEV's that are fed on fiber facilities. These T1 spans can feed downline loop carrier systems or can be used to provide customer DS1 services.

The STS is also useful in business remote terminal applications where a fiber facility is terminated via a lightwave multiplexer at a customer location, and DS1 extensions are routed to various locations within the building via the STS system.

STS Central Office or CEV bays can provide up to 224 powering office repeaters in a single 7' X 23" assembly. All STS plug-ins and assemblies are fully qualified to operate over a –40 to +65°C ambient temperature range and can tolerate up to 95% RH (non-condensing).

### 3. MOUNTING ASSEMBLIES

#### 3.1 3192-11 23 inch Connectorized Mounting Shelf

The 3192–11 23 inch Connectorized Mounting Shelf is designed to house up to 28 T1 transmission modules, including any combination of 3192-9L, 3192-9M and 3192-9P Powering Office Repeater, 3192-9T Terminating Office Repeater, 3192-9B Bridging Office Repeater, 3192-OW Order Wire Modules, 3192-FL Fault Locate Modules, 3192-9C Cut-Thru Modules, plus one 3192-9F Alarm Module.

The 3192–11 occupies three vertical mounting spaces (1.75-inch spacing) and mounts in any standard 23-inch rack or cabinet. See Figure 1 for the physical layout of the 3192–11.

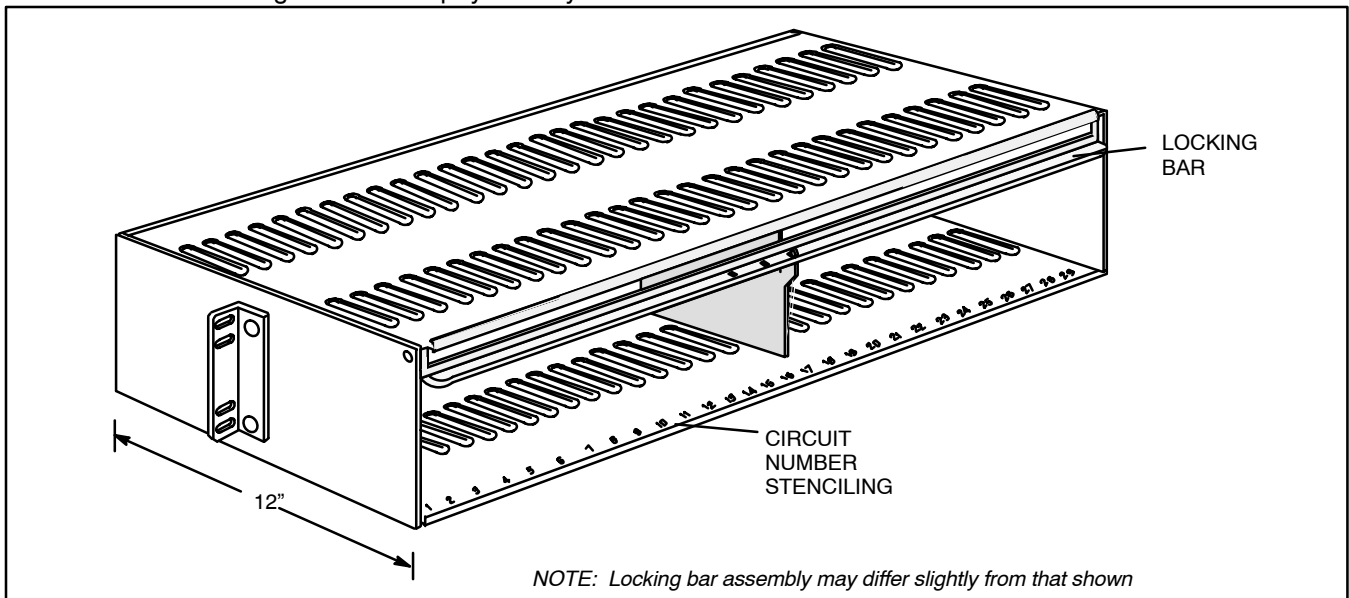
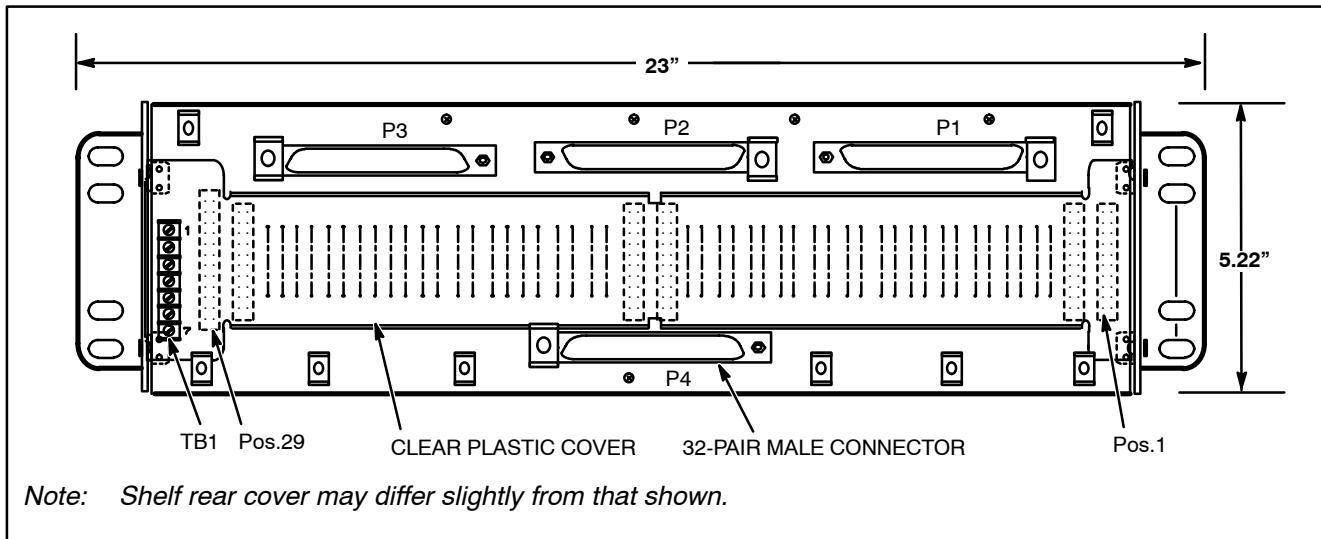


Figure 1. 3192–11 23–inch Connectorized Mounting Shelf, Front View

The rear view of the 3192–11 Mounting Shelf is depicted in Figure 2. As shown, four 32-pair male connectors are provided at the rear of the shelf for outgoing and incoming T1 signals.



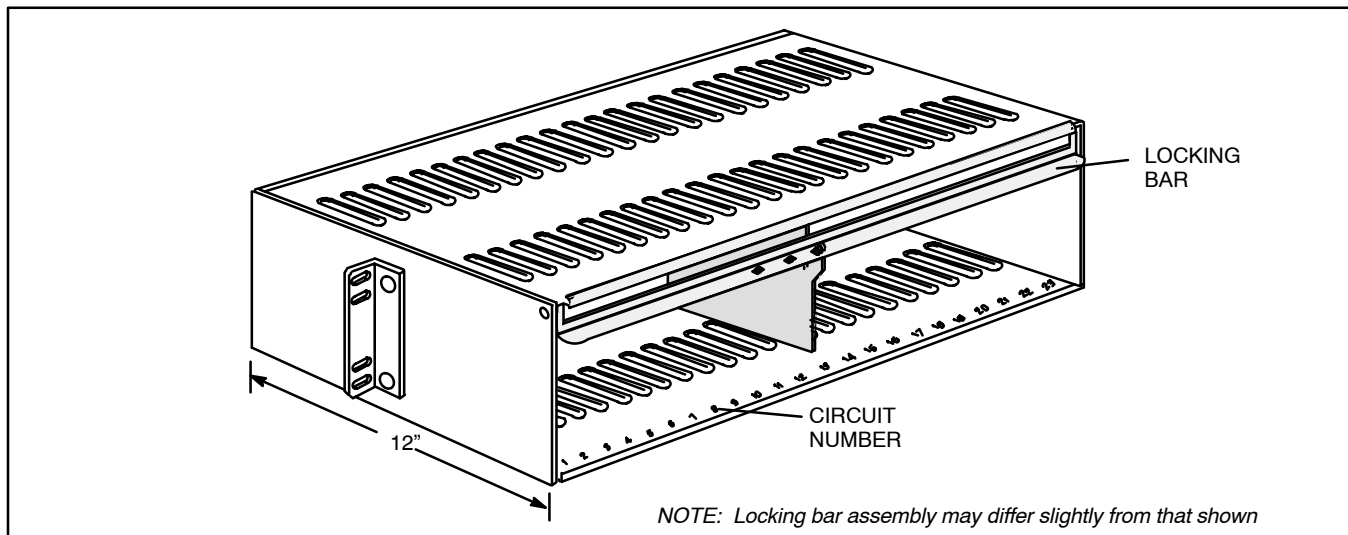
**Figure 2. 3192-11 23-Inch Connectorized Mounting Shelf, Rear View**

### 3.2 319-02 19 inch Connectorized Mounting Shelf

The 319-02 19 inch Connectorized Mounting Shelf houses up to 22 T1 transmission modules, including any combination of 3192-9L, 3192-9M and 3192-9P Powering Office Repeaters, 3192-9T Terminating Office Repeaters, 3192-9B Bridging Office Repeaters, 3192-OW Order Wire Modules, 3192-FL Fault Locate Modules, 3192-9C Cut-Thru Modules, plus one 3192-9F Alarm Module.

The 319-02 occupies three vertical mounting spaces (1.75-inch spacing) and mounts in any standard 19-inch rack or cabinet. See Figure 3 for the physical layout of the 319-02.

The rear view of the 319-02 Mounting Shelf is depicted in Figure 4. As shown, four 25-pair male connectors are provided at the rear of the shelf for outgoing and incoming T1 signals. All other features applicable to the 3192-11 shelf apply to the 319-02.



**Figure 3. 319-02 19-inch Connectorized Mounting Shelf, Front View**

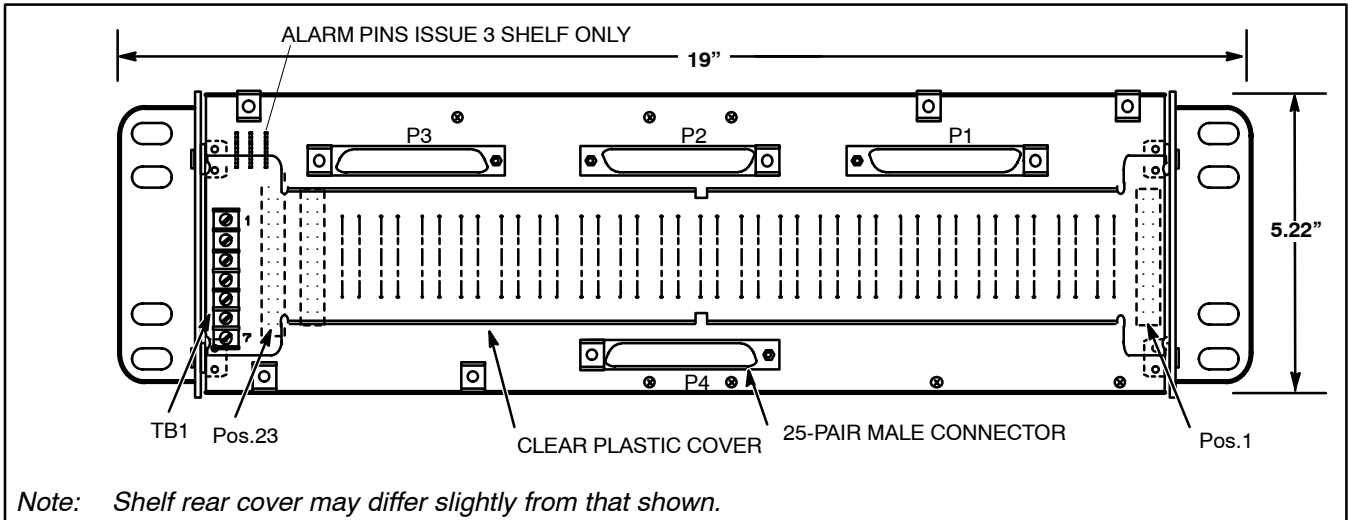


Figure 4. 319-02 19-inch Connectorized Mounting Shelf, Rear View

**3.3 3192-WR 23 inch Wirewrap Mounting Shelf**

The 3192-WR Mounting Shelf houses up to 28 T1 transmission modules and one 3192-9F alarm module. The 3192-WR occupies three (3) vertical mounting spaces and mounts in any 23 inch rack or equipment frame. The 3192-WR is similar to the 3192-11 mounting shelf except for transmission lead I/O. The 3192-WR provides a wirewrap field for those connections as opposed to the 32-pair connectors on the 3192-11. Figure 5 and Figure 6 show front and rear views of the 3192-WR mounting shelf.

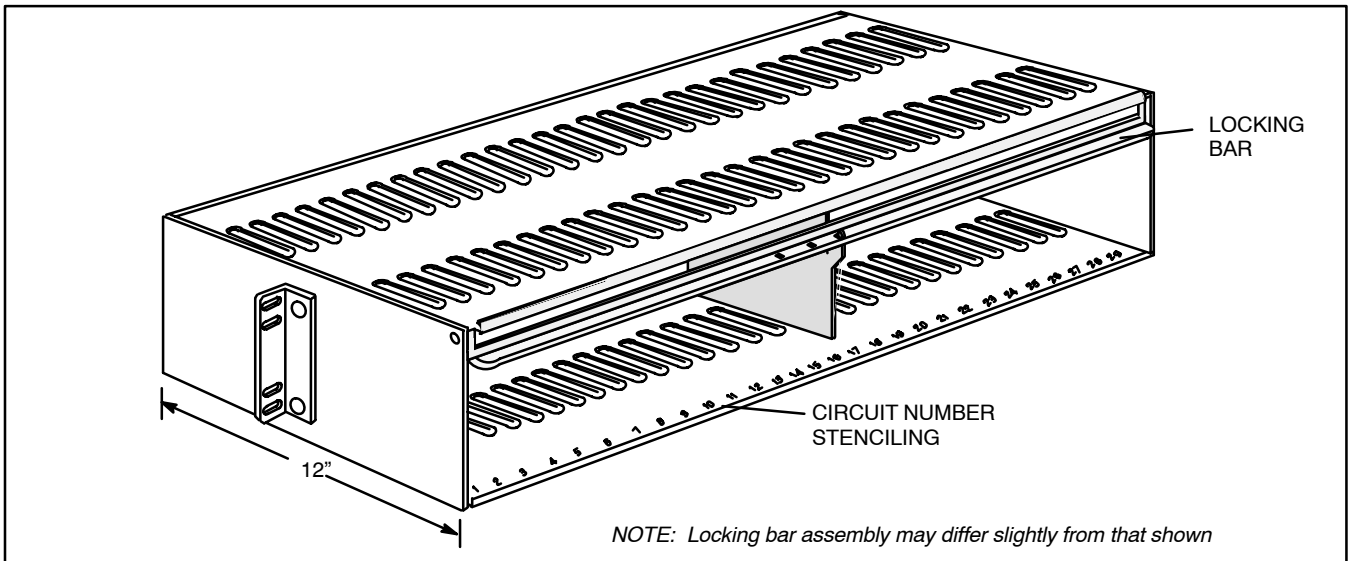
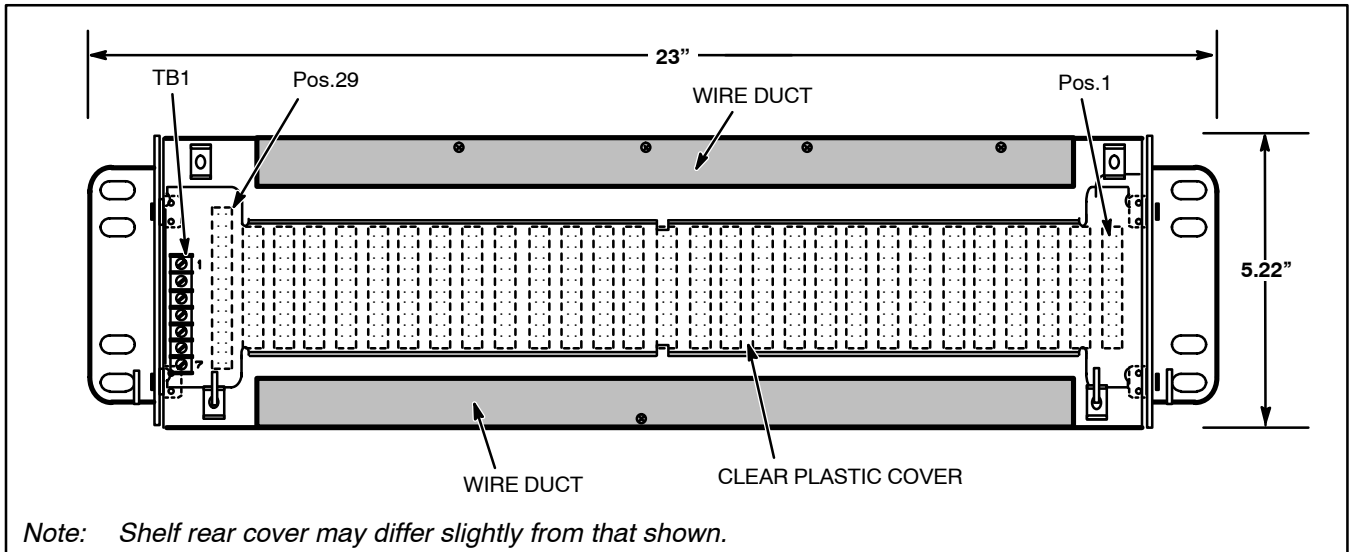


Figure 5. 3192-WR 23-inch Wirewrap Mounting Shelf, Front View



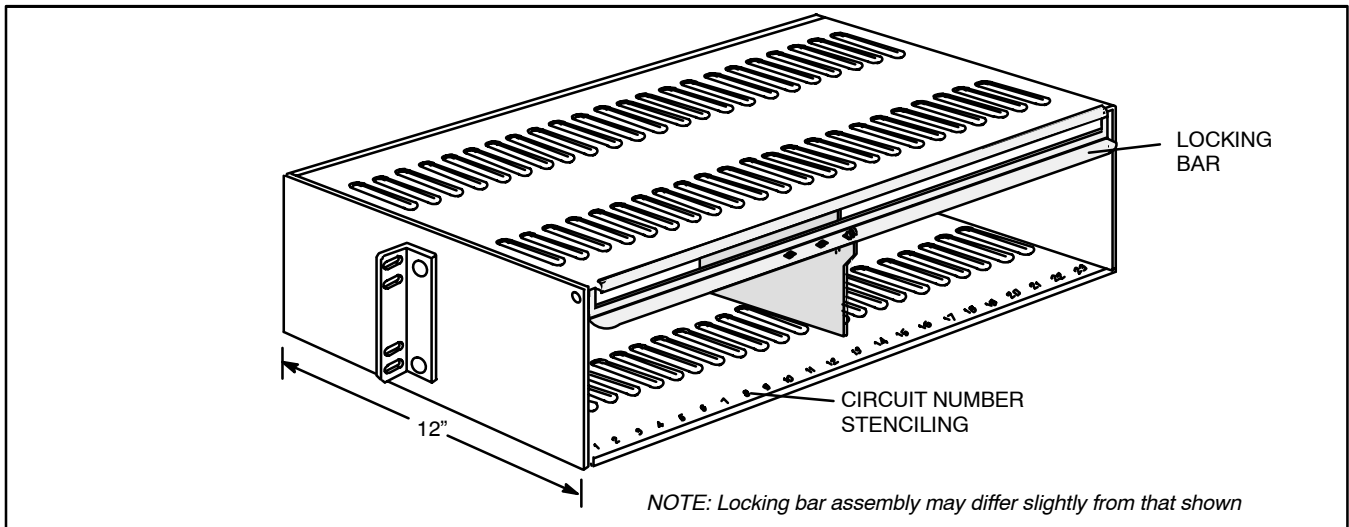
**Figure 6. 3192-WR 23-inch Wirewrap Mounting Shelf, Rear View**

### 3.4 319-04 19 inch Wirewrap Mounting Shelf

The 319-04 mounting shelf houses up to 22 T1 transmission modules and one 3192-9F alarm module. The 319-04 occupies three (3) vertical mounting spaces and mounts in any 19 inch rack or equipment frame.

The 319-04 is similar to the 319-02 mounting shelf except for transmission lead I/O. The 319-04 provides a wire-wrap field for those connections as opposed to the 25-pair connectors on the 319-02.

Figure 7 and Figure 8 show front and rear views of the 319-04 mounting shelf.



**Figure 7. 319-04 19-inch Wirewrap Mounting Shelf, Front View**

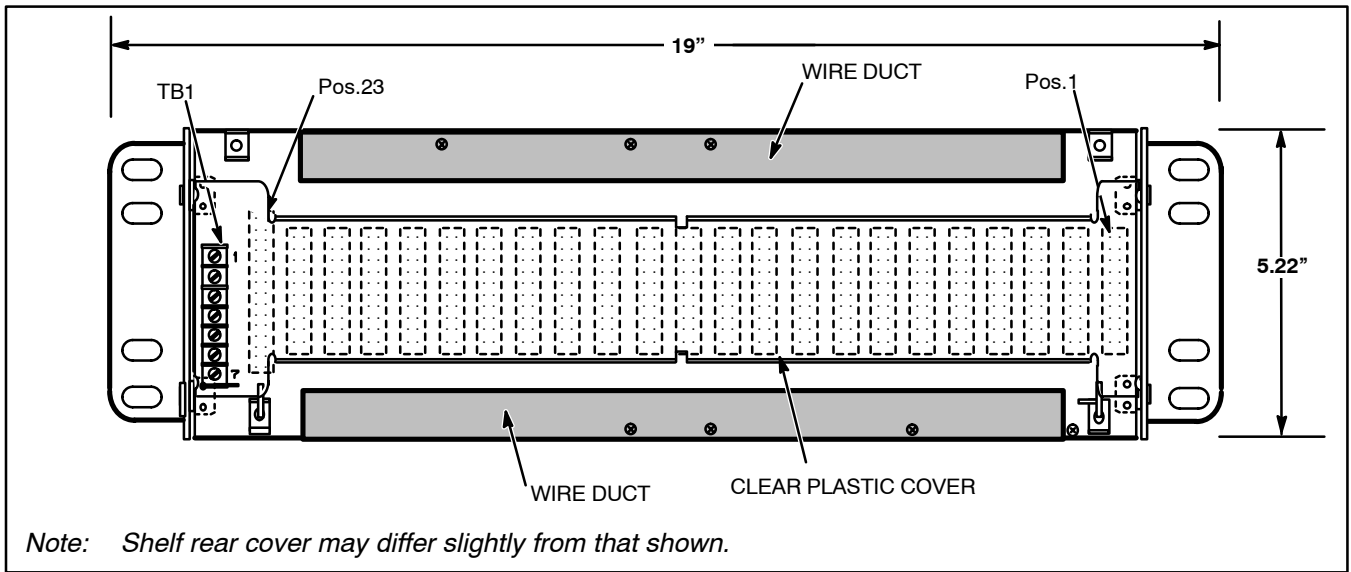


Figure 8. 319-04 19-inch Wirewrap Mounting Shelf, Rear View

## 4. PLUG-IN MODULES

### 4.1 3192-9L Powering Office Repeater

The 3192–9L Powering Office Repeater provides T1 span-line powering with automatic current regulation to provide a constant 60mA current to the span repeaters. An on-board DC-DC converter converts –48Vdc to either a maximum –130Vdc or switch selectable +/- 130Vdc for longer spans.

In the transmit direction, the unit provides switch selectable pads to meet route junction level coordination and end section design requirements. In the receive direction, the integral regenerator circuitry can accommodate signals that have experienced from 0 to 35dB of end section loss. Other features of the 3192–9L include the following:

- Front panel-mounted bantam jacks that provide split and monitor access to the DSX–1 side of the unit.
- Switch selectable DSX pre-equalization for up to 655 feet of cable.
- Front panel test points to monitor span current.
- When the module's internally-located fuse is opened, the module will light the front-panel Fuse Alarm (FA) LED and forward an output to the 3192–9F Alarm unit. This fuse will not open unless the circuitry is damaged beyond field repair; because of this, the fuse is not field-replaceable.
- Integral Receive span side T1 performance monitor, with an adjustable BPV threshold, and loss of signal detector.

### 4.2 3192–9M Line Powering Office Repeater

The 3192–9M Line Powering Office Repeater is similar to the 3192–9L unit, but has a simplified feature set.

The features of the 3192–9M are the same as the 3192–9L with the following exceptions:

- –130V span power only.
- Fixed DSX pre-equalization for up to 110 feet of cable.
- Fixed 4.5dB transmit pad.
- No integral receive side performance monitor.
- No front panel Loss of Signal (LOS) or Error (ERR) LEDs.
- No front panel bantam jacks.

### 4.3 3192–9P Short Loop Office Repeater

The 3192–9P Short Loop Office Repeater is a simplified unit intended for applications where a T1 service is provided close to a customer premise via a lightwave multiplexer, and short non-repeated metallic extensions must be provided beyond the normal DSX range. For these applications, a STS shelf equipped with 3192–9P units is co-located with the multiplexer, allowing accommodation of up to 3000 foot repeaterless metallic extensions. The 3192–9P contains a 48 Volt current regulator which provides up to 36 volts DC and simplex current at a constant 60 mA to power a DS1 Maintenance Connector (Network Interface Unit) at the Network Interface point. The 3192–9P cannot be used in T1 service applications where the TELCO provides network power to operate the customer's T1 CSU, since many CSUs require up to 68 volts.

Other features of the 3192–9P include:

- A receive side regenerator that can accommodate signals that have experienced end section loss of 0 to 35dB
- A passive transmit path with a fixed insertion loss of approximately 1 dB
- Front-panel-mounted bantam jacks that provide split and monitor access to the DSX–1 side of the unit

- Fixed DSX–1 pre-equalization for up to 110 feet of cable
- Front-panel test points to monitor span current
- When the module's internally-located fuse is opened, the module will light the front-panel FA LED and forward an output to the 3192–9F Alarm unit. This fuse will not open unless the circuitry is damaged beyond field repair; because of this, the fuse is not field-replaceable

### 4.4 3192–9T Terminating Office Repeater

The features of the 3192–9T Terminating Office Repeater are similar to the 3192–9L with the exception of the following:

- The 3192–9T can loop the T1 span and be locally powered, or can optionally be powered by the span
- No DC-DC converter or ASPR is provided

### 4.5 3192-9E T1 Powering Network Interface Unit (NIU)

The 3192–9E combines the functions of a Powering T1 Office Repeater plus a T1 Network Interface Unit conforming to Bellcore TR–TSY–000312 in a single high density plug-in module. When equipped in the 3192–11 23–inch mounting shelf, up to 28 3192–9E units can be provided in 5.25 inches of vertical equipment space. The 3192–9E can be intermixed, in the shelf assembly, with other plug–in units of the STS-3192 Family.

The 3192–9E is ideally suited for use in provisioning T1 High Capacity Digital Service (HCDS) from lightwave-fed Building Remote Terminals located at customer premise locations. The 3192–9E, used as adjunct equipment to the Lightwave Multiplexer, provides transmission loopback for maintenance activities. In addition the 3192–9E can be optioned to provide a 60mA constant current power source towards the network interface, which can be used to power the customers' Channel Service Unit (CSU). This service arrangement is typical in MPOP (Minimum Point Of Presence) applications.

### 4.6 3192-9B Bridging Office Repeater

The 3192–9B Bridging Office Repeater can be used to bridge a T1 span line and to provide two DSX level outputs. One output can be selected to provide either the bridged span signal or the signal from an internal Quasi-Random Signal Source (QRSS) generator. All three ports are accessible from front panel bantam jacks. DSX pre-equalizers are available for up to 655 feet of cable for each output port.

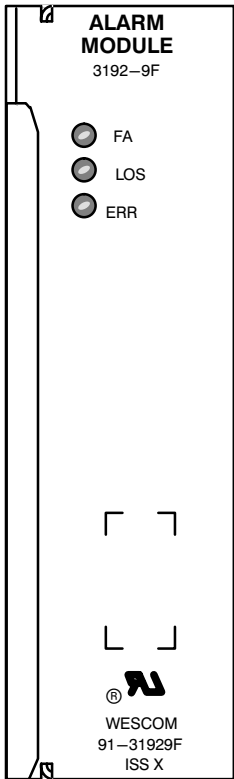
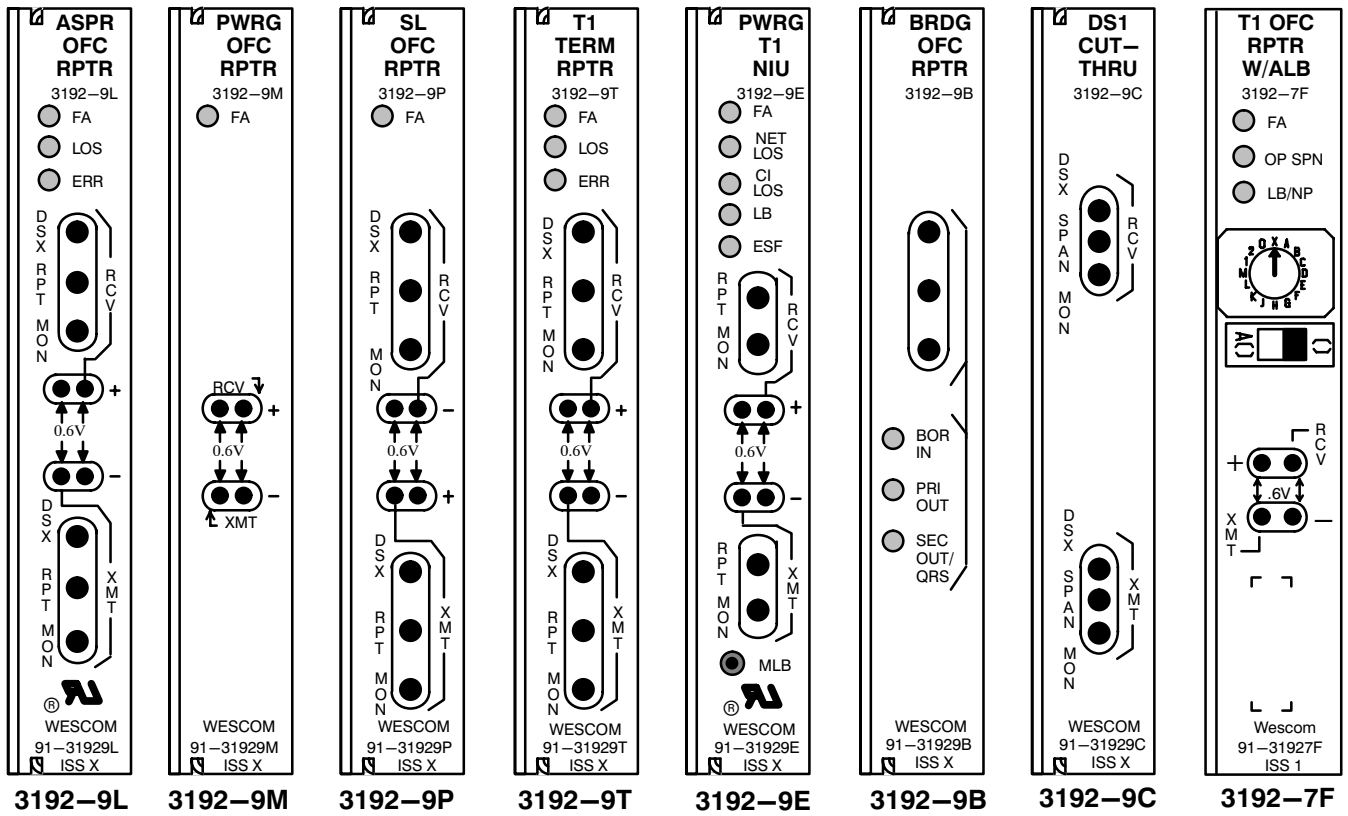
### 4.7 3192-9C Cut-Thru Module

The 3192-9C Cut-Thru module provides jack access to a single T1 line, while completing the path between span and equipment (DSX side) through the Span Termination Shelf. It contains breaking jacks that allow access to both the 'to' and the 'from' directions of both the transmit and the receive paths. It also contains a pair of jacks that allow the monitoring of the signal on both the transmit path and the receive path.

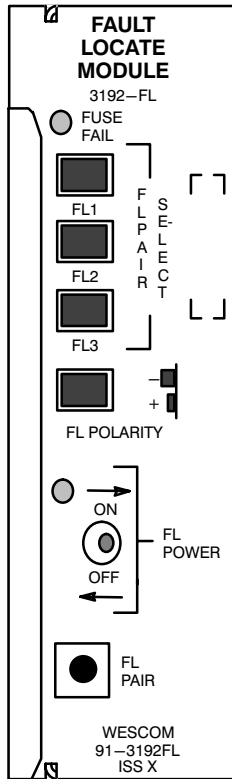
### 4.8 3192–7F Powering Office Repeater with Addressable Loopback

The 3192–7F provides bidirectional addressable loopback. It can be accessed from the CO, test center, or field to perform loopback testing. The 3192–7F repeater functions are similar to those of the 3192–9L, but without the DSX jacks or BPV monitor.

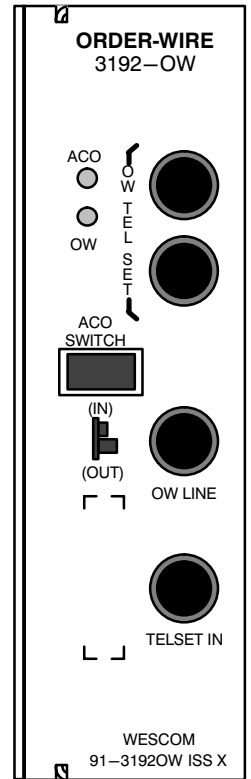




3192-9F



3192-FL



3192-OW

Figure 9. STS Family of Plug-in Modules

**4.9 3192-9F Alarm Module**

The 3192-9F Alarm module occupies the rightmost, double-wide 29th mounting position in any 23 inch mounting shelf and the 23rd mounting position in any 19 inch mounting shelf. The 3192-9F contains three front-panel LEDs that function as follows:

- FA – indicates that one or more of the repeaters within the shelf has opened an internal fuse.
- LOS – indicates that one or more repeaters within the shelf is receiving a loss of signal from the span.
- ERR – indicates that one or more repeaters within the shelf is receiving excessive bipolar violations.

The 3192-9F also includes three sets of form C contacts that operate when FA, LOS, or ERR are active.

Included in the circuitry of the 3192-9F is a temperature sensor that provides a form-C contact for controlling fan operation, a switched –48V output for controlling fan operation, and a switched ground output for activating an over-temperature alarm.

**4.10 3192-FL Fault Locate Unit**

The 3192-FL Fault Locate Unit provides access to three separate fault locate pairs. These pairs are selected by using front-panel push button switches. The fault locate test equipment is accessed by using a front-panel ban-tam jack. An internal DC-DC converter generates the necessary FL pair voltages to power active FL filters. Polarity of the voltage is selectable by using a front-panel pushbutton.

The 3192-FL unit can be mounted in any of the first 27 transmission module slot positions in any 23 inch STS shelf, or in any of the first 21 slots in any 19 inch shelf. The 3192-FL is a double-width module and consequently, when it is installed in a position normally provided for a single-width transmission module, the next higher module position is made unavailable.

**4.11 3192-OW Order Wire Module**

The 3192-OW Order Wire Module provides access to one order wire pair toward the span and a 2W access to a Class 5 switch line circuit. This unit provides regulated power to the order wire pair, front-panel access to a standard 4W order wire telset, and jack access to a 2W telset. Order wire calls from the span can activate a local OW alarm indicator or optionally access the Class 5 switch dial tone.

The 3192-OW module can be mounted in any of the first 27 transmission module slot positions in any 23 inch STS shelf, or in any of the first 21 slots in any 19 inch shelf. The 3192-OW is a double-width module and consequently, when it is installed in a position normally provided for a single-width transmission module, the next higher module position is made unavailable.

**4.12 APS101 Automatic Span Protection Switch**

The APS101 is a T1 Automatic Protection Switch that provides cost-effective self-healing networking in the event of out-of-frame, excessive bipolar violations/CRC, or loss of signal for any reason including cable cuts, equipment failures or signal degradation. The T1 APS, upon receiving T1 information from the equipment T1 line, provides identical T1 information transmitted on duplicate T1 lines. The receiving APS analyzes the two incoming network T1 lines, and, according to user specified selection criteria, provides the selected T1 line to the equipment T1 connection.

**4.13 3192-TP Test Plug**

The 3192TP test plug provides easy access to office repeater input and output pins via a plug-in card. Two switches, one for Central Office direction and one for Field direction, determine the state of connection for XMT and RCV tips and rings. Test points and jacks are connected directly to the pin as labeled.

The 3192TP test plug provides the following features:

- Test points and jacks for testing
- Switch settable for central office (CO) and/or field side pins
  - Hardwired loopback
  - input to output passthru
  - tip/ring short

- open
- Extended length for ease of use
- Rugged design

## 5. CONNECTING CABLES

### 5.1 3192–11 Shelf Connecting Cables — Stub

To simplify installation, connectorized cable assemblies are available that mate with the 3192–11 shelf. These assemblies contain a 32-pair female connector and drain wire that mates with the STS mounting. The cable is made up of 32 24-gauge twisted pairs with a foil shield. The non-connectorized end is a blunt cut. These cables come in various lengths and are illustrated in Figure 10.

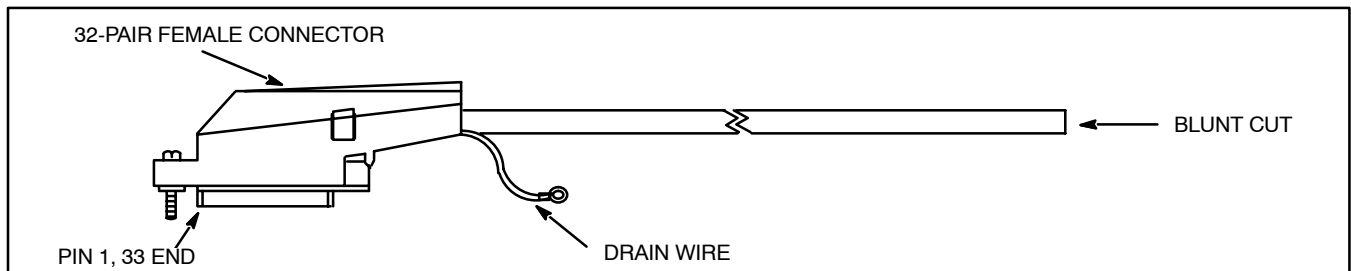


Figure 10. 3192–11 Shelf Connecting Cable—Stub

### 5.2 319–02 Shelf Connecting Cables — Stub

To simplify installation, connectorized cable assemblies are available that mate with the 319–02 shelf. These assemblies contain a 25-pair female connector and drain wire that mates with the STS mounting. The cable is made up of 25 24-gauge twisted pairs with a foil shield. The non-connectorized end is a blunt cut. These cables come in various lengths and are illustrated in Figure 11.

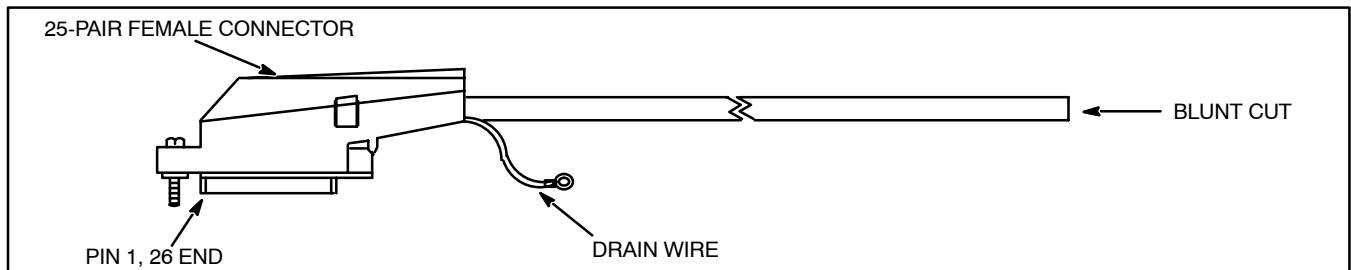


Figure 11. 319–02 Shelf Connecting Cable—Stub

### 5.3 3192-11 Shelf Connecting Cables—Connectorized

These cable assemblies contains a 32 pair female connector and drain wire that mates with the 23 inch STS mounting. The cable is made up of 32 24-gauge twisted pairs with a foil shield. The other end is terminated in two MS2 or 710 type connectors. These cables are available in various lengths (see Figure 12).

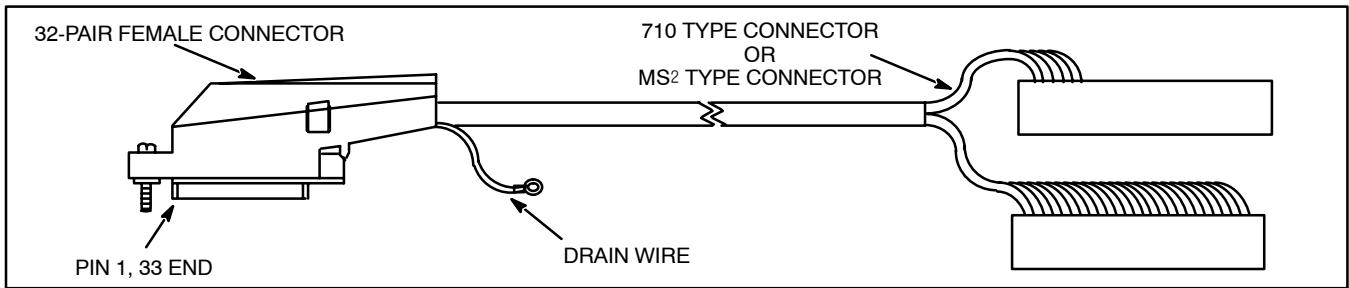


Figure 12. 32-pair Cable Assembly with MS<sup>2</sup> or 710 Type Connector

5.4 Power, Alarm & Miscellaneous Cable Assemblies

These cable assemblies are available to facilitate the power, alarm and miscellaneous connections. These cable assemblies, which are available in various lengths, are shown in Figure 13.

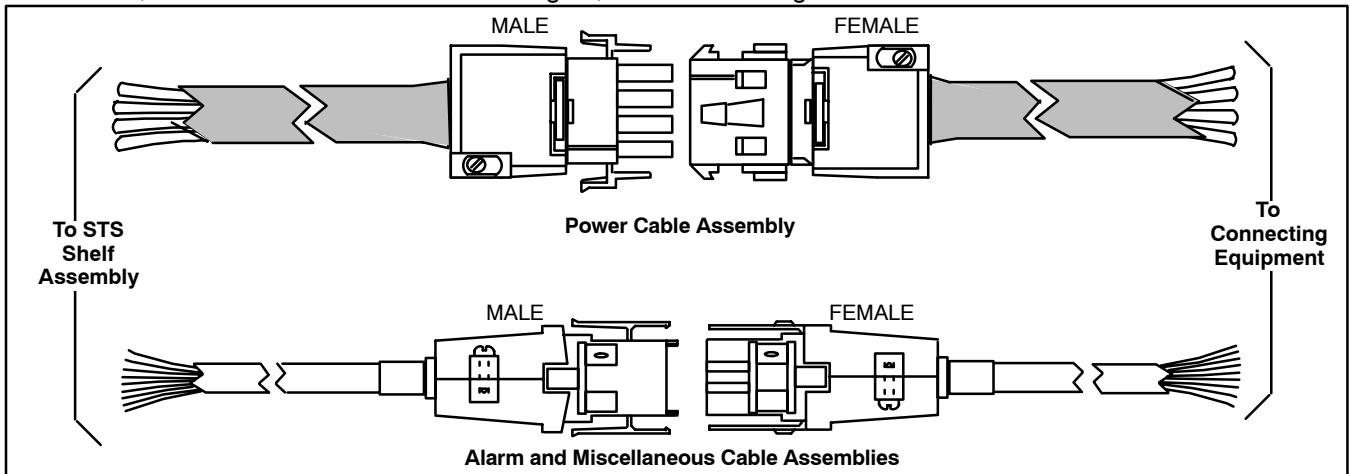


Figure 13. Power, Alarm, and Miscellaneous Cable Assemblies

6. SUPPORTING DOCUMENTATION

Additional information on the STS system is available in the sections listed in Table 2.

Table 2. STS System Documentation

Section #	Description	Section #	Description
319–211–30X	STS Installation and Applications Engineering	319–27F–20X	STS 3192–7F Powering Office Repeater with Addressable Loopback
319–29B–20X	STS 3192–9B Bridging Office Repeater	319–2FL–20X	STS 3192–FL Fault Locate Module
319–29L–20X	STS 3192–9L Automatic Span Regulator (ASPR) Powering Office Repeater	319–2OW–20X	STS 3192–OW Order–Wire Module
319–29M–20X	STS 3192–9M Automatic Span Regulator (ASPR) Powering Office Repeater	319–29C–20X	STS 3192–9C Cut-Thru Module
319–29P–20X	STS 3192–9P Short Loop Office Repeater	319–29F–20X	STS 3192–9F Alarm Module
319–29T–20X	STS 3192–9T Terminating Office Repeater	319–29E–20X	STS 3192–9E Powering T1 Network Interface Unit (NIU)
(X=product issue level)			

## 7. TECHNICAL ASSISTANCE

### 7.1 Technical Assistance — U.S.

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)

### 7.2 Technical Assistance — Canada

Canadian customers contact:

905–821–7673 (Main Office)

905–821–3280 (FAX)

## 8. WARRANTY & CUSTOMER SERVICE

### 8.1 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

Telephone: 847–806–6300 (Main Office)

847–806–6231 (FAX)

## 8.2 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.

## 8.3 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.

## 8.4 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  
Route 40 East  
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.

