

## AC 5312 Series of 12-Slot T1 Apparatus Cases

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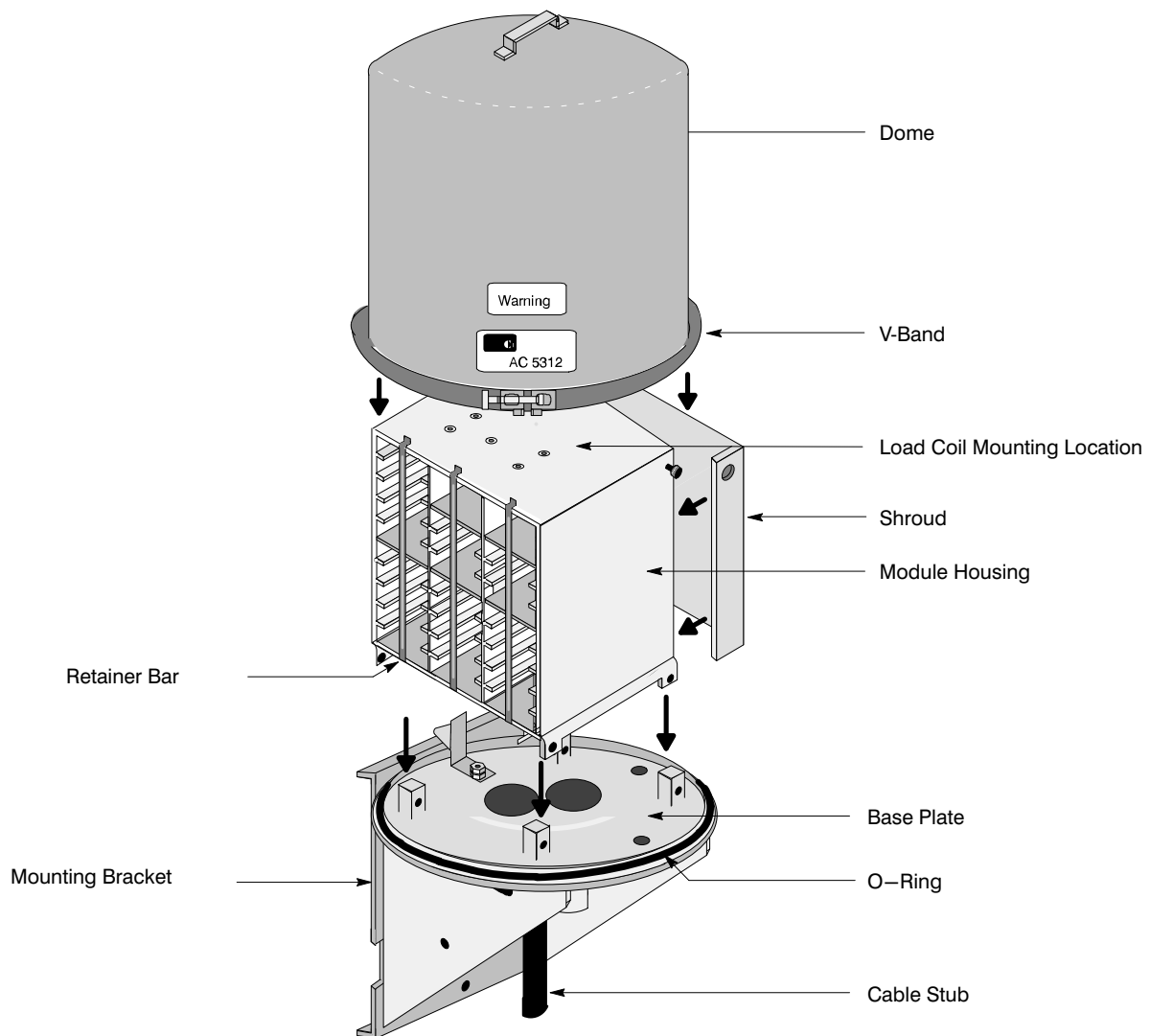


Figure 1. AC 5312 12-Slot T1 Apparatus Case

# 1. GENERAL

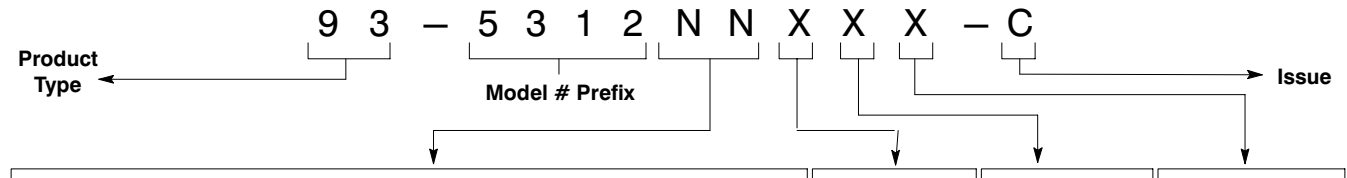
## 1.1 Document Purpose

This document provides general, design and installation information for the Charles Industries AC 5312 Series of 12-Slot T1 Apparatus Cases. An AC 5312 is shown in Figure 1.

The 12-slot AC 5312 is available in 10 different models, as shown in Table 1.

**Table 1. AC 5312 Model Numbers and Ordering Information**

### Part Number Ordering Example:



Model Number Suffix (NN)	Cable Route	Direction	Case Type	Stub # & Type	Bracket A = No Bracket B = Stationary C = Pivoting	Stub Lengths Z = 20' A = 30' B = 40' C = 50' D = 60' E = 70'	Plug-In Options A = No Plug-Ins B = Protected C = Repeaters D = Protected w/Repeaters
01	1	Bidirectional	Pressurized	Air core, 1 Stub	A, B, C	A, B, C, D, E, Z	A, B, C, D
02	1	Bidirectional	Vented	Filled, 1 Stub	A, B, C	A, B, C, D, E, Z	A, B, C, D
03	2	Bidirectional	Pressurized	Air core, 2 Stubs: Side 1 & Side 2	A, B, C	A, B, C, D, E, Z	A, B, C, D
04	2	Bidirectional	Vented	Filled, 2 Stubs: Side 1 & Side 2	A, B, C	A, B, C, D, E, Z	A, B, C, D
05	2	Bidirectional Spatial Frogging	Pressurized	Air core, 2 Stubs: Input & Output	A, B, C	A, B, C, D, E, Z	A, B, C, D
06	2	Bidirectional Spatial Frogging	Vented	Filled, 2 Stubs: Input & Output	A, B, C	A, B, C, D, E, Z	A, B, C, D
07	1	Bidirectional	Pressurized	Air core, 2 Stubs: special East & West	A, B, C	A, B, C, D, E, Z	A, B, C, D
08	1	Bidirectional	Vented	Filled, 2 Stubs: special East & West	A, B, C	A, B, C, D, E, Z	A, B, C, D
09	2	Unidirectional	Pressurized	Air core, 2 Stubs: East & West	A, B, C	A, B, C, D, E, Z	A, B, C, D
10	2	Unidirectional	Vented	Filled, 2 Stubs: East & West	A, B, C	A, B, C, D, E, Z	A, B, C, D

Note: The preceding "AC" in the model number (AC 5312-XX) is dropped for the part number.

## 1.2 Document Status

This document is reprinted to correct Figure 10 and Table 4.

## 1.3 Equipment Location

The AC 5312 cases have a weatherproof, sealed housing for above-ground mounting on a pole, wall, or pedestal, or for below-ground mounting in manholes. See Part 5 for mounting information.

## 1.4 Equipment Function & Description

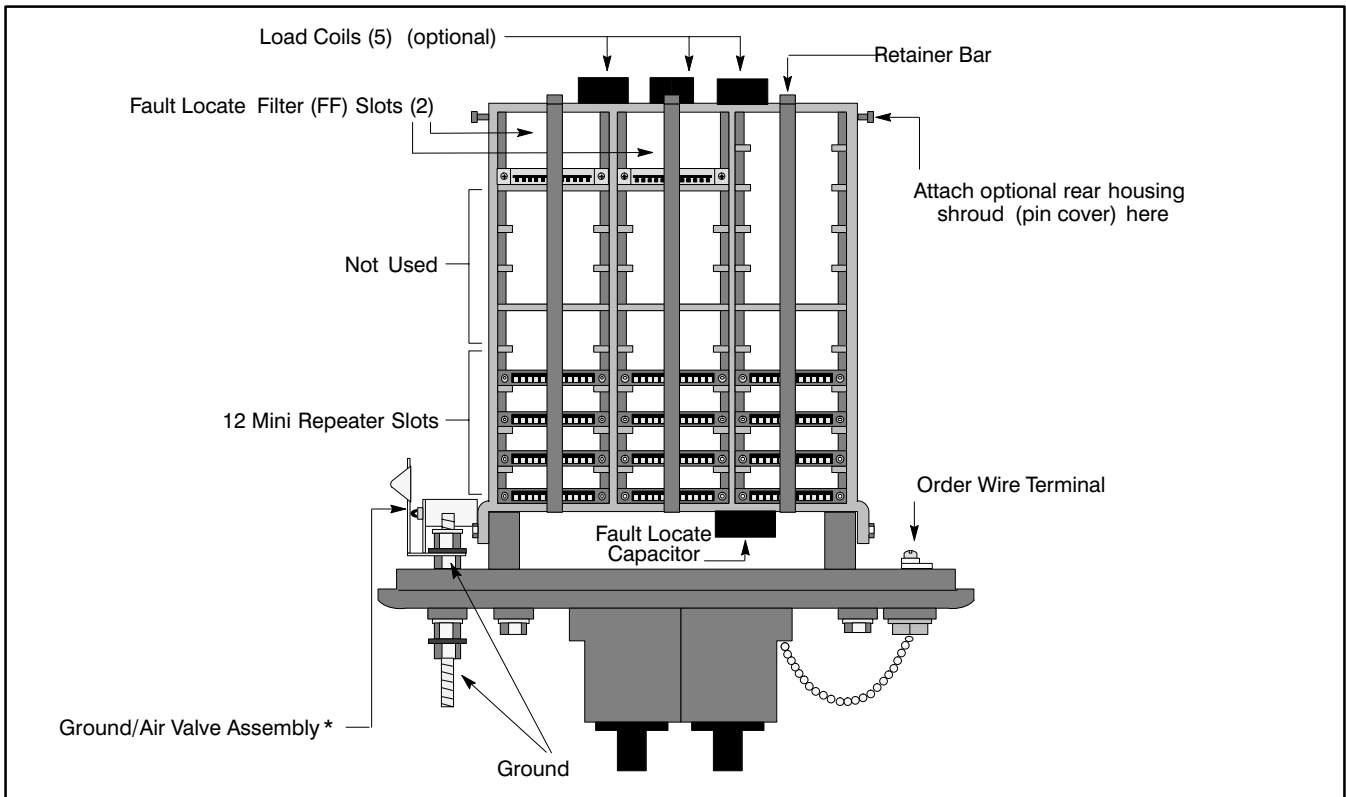
The AC 5312 is ideally suited to provide T1 services in low-density, distribution loop applications. The AC 5312 houses up to 12 T1 span line mini-repeaters plus 2 fault locate filters. Standard equipment, plug-ins, and accessories are listed in Table 2.

**Table 2. AC 5312 Elements, Plug-Ins and Accessories**

Equipment	Model Number	Description
Dome (Stainless Steel)	22-101501-0	A stainless steel dome is standard with the AC 5312 models. The formed dome has a flange around the open bottom end that matches a similar flange on the base plate.
O-Ring	39-200014-0	The inner edge of the dome flange compresses the O-ring against the base plate flange when the apparatus case is closed (providing an air and water-tight seal).
T-handle V-band	025284	The V-band assembly for the AC 5312 models is stainless steel and contoured to fit around both the cover and base plate flanges when the AC 5312 case is in the secured position. When secured and tightened in this position, the V-band provides an air and weather-tight seal. The V-band has a T-handle on a quick-release stud and a quick release latch which allows the V-band to be loosened without completely removing the T-handle. A security hasp attached to the V-band permits locking the unit with a padlock.
Module Housing	N/A	The module housing that holds the mini-repeater units and the larger fault locate filters is located inside the dome and mounted on the base plate. At the back of each mini-repeater and fault locate filter slot is a female connector. On the top of the module housing, up to five load coils may be installed (Figure 2). On the side of the module housing is a "repeater assignment" decal (template) showing the connector and side numbers for each slot. Slot assignments and filter polarity may be written on the decal, in pencil, for future assignment changes. Also located on the bottom of the module housing is a fault locate capacitor (see Figure 2). Three removable retainer bars inserted at the front of the module housing retain the plug-in modules inside the housing.
Shroud	24-100814-0	A nonmetallic shroud (pin cover) is installed over the connector pins on the rear of the module housing (Figure 1). This nonmetallic, rear shroud protects the pins and wires from damage.
Arrestor, Surge Protection (gas tube)	CiSA-4	Optional gas-tube arrestors provide high voltage surge protection for the installed repeaters and fault locate filters. The Charles Industries model number CiSA-4 is a printed circuit board, rated at 350 VDC (nominal), and contains four gas-tube arrestors. This board is designed to fit onto the connector pins for the repeaters and fault locate filters in all Charles Industries outside-mount cases.
Air Vents/Valves/Plugs	N/A	A breather vent and pipe plug are used in vented case applications. A pressure relief valve and air pressure fill valve are used in the pressurized case applications. Air flow into the case is automatically shut off when the dome is removed (see Figure 2). Air flow from stub to stub continues uninterrupted. Air flow into the case automatically resumes when the dome is replaced.) Refer to Figure 3 for the location of the air vents and valves.
Base Plate	N/A	The module housing is bolted to the cast aluminum alloy base plate. Two different configurations of the base plate are available: one for vented case applications and one for pressurized case applications. Each base plate has a short, vertical, circumferential wall just inside the perimeter to facilitate seating of the O-ring and dome. A horizontal flange is the outer perimeter of the base plate where the dome is clamped in place by the V-band. The base plate has internal and external ground terminals, air/pressure valves or vents (depending upon the application), cable access hole(s), mounting bolts, and a covered compartment containing two order wire terminals. See Figure 3.

**Section AC5-312-003**

Equipment	Model Number	Description
Ground Stud	N/A	The metallic base plate is naturally grounded to the metallic mounting bracket when properly installed and secured with the four mounting bolts provided. Additional grounding protection is provided when the base plate's ground stud is inserted into either (a) the mounting bracket's "preferred" ground stud hole, or (b) the larger "optional" ground stud cutout hole, using the provided ground strap. The preferred ground stud hole at the rear of the mounting bracket is used when the module housing is installed on the mounting bracket in the side-access orientation (repeater access to the left, pin connectors to the right). One of the optional ground stud cutout holes at the sides of the mounting bracket is used when the module housing is installed on the mounting bracket in the front-access orientation (repeater access to the front). When the front-access orientation is used, one end of the provided 6" ground strap is secured to the base plate's ground stud and the other end is secured to a hole (pem nut) in the side of the mounting bracket using the short bolt provided. (The strap is not used in side-access mounting because the ground stud is snugly inserted through the preferred ground stud hole at the rear of the mounting bracket.)
Mounting Bracket, Stationary (standard)	21-105319-0	A stationary mounting bracket is standard. The bracket is heavy gauge steel with stainless steel hardware and includes two 4-inch lag-type bolts for mounting on a pole or wall. All parts of the mounting bracket and hardware are corrosion-resistant. If the unit is mounted on a pedestal, use the hardware shipped with the pedestal.
Mounting Bracket, Pivoting (optional)	80-000866-A	A vertically pivoting mounting bracket is an option. The bracket is heavy gauge steel with stainless steel hardware and includes two 4-inch lag-type bolts for mounting on a pole or wall. Also included is a 6" ground strap and a short bolt for grounding the base plate to the mounting bracket when the housing is mounted in the front-access position. All parts of the mounting bracket and hardware are corrosion-resistant. If the unit is mounted on a pedestal, use the hardware shipped with the pedestal.
Cable Stubs	N/A	The 54-pair, 24-gauge, T-screened cable stub provides the electrical connections between the main T1 span line cable and the T1 span line repeaters in the case (28-pair for 2-stub applications). Depending on the unit, the cable is either <u>air-core</u> for use in a pressurized case or <u>grease-filled</u> for a vented application. The conductors, 24 AWG, solid, annealed copper, and insulated with colored solid polyolefin, are spirally wrapped with a non-hygroscopic dielectric tape and a binder tape to identify the groups, then enclosed in 8 mil. aluminum wrapped longitudinally around the bundles. The stub has an aluminum T-screen shield that divides the cable pairs into two groups to minimize cross talk. An extruded jacket of low-density polyethylene compound protects the overall cable assembly from abrasion and mechanical damages. These stubs come in lengths of 20, 30, 40, 50, 60, and 70 feet. Cases can be ordered with one or two stubs.
Repeater	CS239A	Bidirectional line repeater, CLEI Code: T1R3CDC1A
Repeater	CS239B	Unidirectional line repeater, CLEI Code: T1R3CCC1AA
Repeater	CS239E	Bidirectional line repeater, hardened, CLEI Code: T1R3DDC1AA
Repeater	CS270F	Bidirectional line repeater, addressable, CLEI Code: T1R36J01AA
Load Coil Container	184D102662	CLEI Code: T1LCA213AB
Connector	CS939C	Pass-thru connector, CLEI Code: T1R0G017AB
Pedestal	CRP8W 84 CI5300	Mounting pedestal
Single Load Coil	B152 662	Optional Load Coil, 88 MH
Single Load Coil	B152 656-B	Optional Load Coil, 66 MH
Single Load Coil	B152 638-B	Optional Load Coil, 44 MH
Single Load Coil	B152 620-B	Optional Load Coil, 22 MH



Note: Ground/Air Valve Assembly standard on pressurized cases only

Figure 2. Module Housing, Front View, Dome Removed

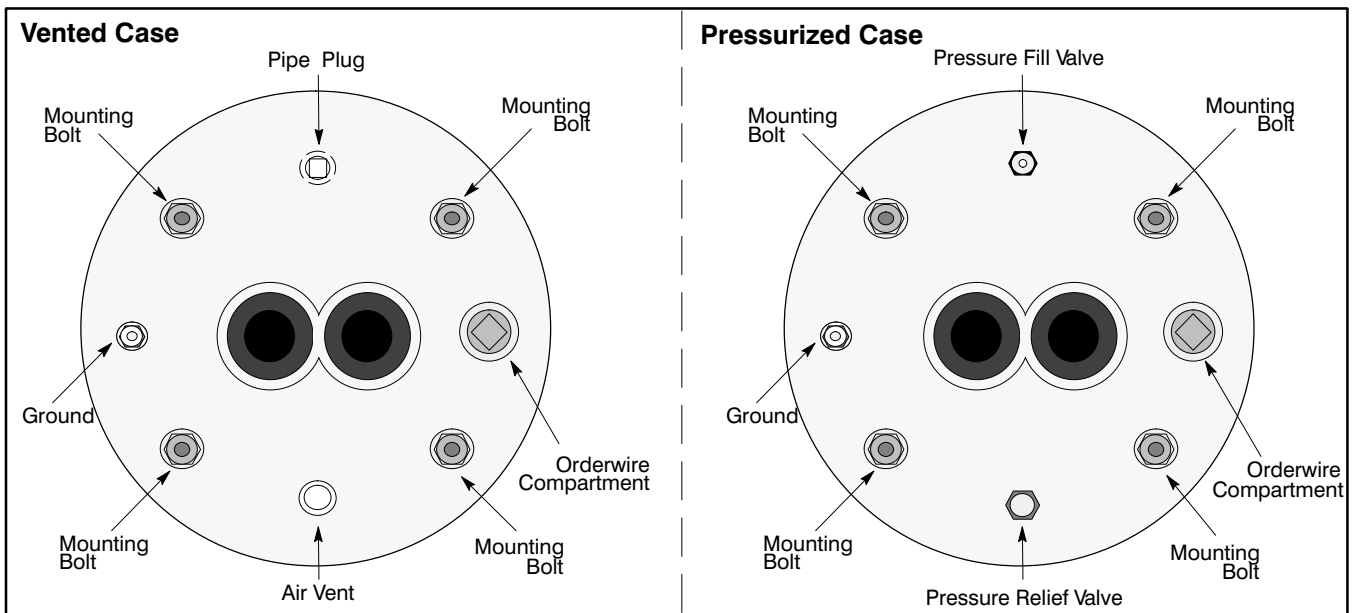


Figure 3. AC 5312 Base Plates, Outside Bottom View, Looking Up



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.



High Voltage! Before working on internal chassis, attach jumper cable between internal ground bus wire and external ground wire.

## 1.5 Equipment Features

The 12-slot AC 5312 provides the following features:

- Houses up to 12 T1 span line mini-repeaters, plus 2 fault locate filters
- Pressurized or vented cases
- Filled or air-core cable stubs
- Universal pole or wall mounting bracket (stationary or pivoting)
- Unidirectional or bidirectional spans, with 10 different wiring options
- One or two-stub cable wiring options
- External orderwire, standard
- Base plate and dome designed for long service life, even in corrosive environments
- Totally-grounded system at installation site

## 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. MOUNTING BRACKET DESIGN

Attach the AC 5312 mounting bracket only to an approved support structure capable of supporting the combined weight of the bracket and the apparatus case and in accordance with local operating company practices. *Mounting the Apparatus Case* identifies specific requirements for the safe and efficient mounting of this bracket. For mounting the bracket, use only the hardware supplied or equivalent.

The AC 5312 apparatus case base may be attached to the mounting bracket with the repeater module housing facing left (preferred) or to the front. With the repeater module housing facing left, access to both the plug-in repeaters and the backplane wiring is unobstructed. If the mounting site will not allow easy access to one or both sides for installation or future service, the case base may be mounted to the bracket so that the repeater module housing is facing forward and the backplane wiring is facing rearward.

### 3.1 Pivoting Bracket (optional)

The optional pivoting bracket allows added versatility in the selection of a suitable mounting location. The mounting bracket allows the base plate to be rotated 90 degrees counterclockwise and pivot up to 36 degrees away from the surface it is mounted to (top tilts forward).

If the mounting site will not allow easy access to one or both sides for installation or future service, the case base may be mounted to the bracket so that the repeater card cage is facing forward and the backplane wiring is facing rearward. In this configuration, access to the backplane wiring is facilitated by the pivoting feature of the mounting bracket.

## 4. MOUNTING THE APPARATUS CASE

### CAUTION

**Do not lift the case by the stub. Excessive bending and pulling of the stub may cause internal damage.**

The AC 5312 Apparatus Cases are designed to be mounted on a pole, wall, in manholes, or on the optional Charles Industries CRP8W 84 C15300 pedestal. Mounting applications are shown in Figure 4. Use of corrosion-resistant hardware is recommended.

### 4.1 Height Requirements

For any mounting application, leave enough space above the case to allow unobstructed removal of the dome (allow twice the dome height).

### 4.2 Tools/Supplies Required

Tools and supplies required to mount the case include the following:

- Drill with 3/8 inch bit (not required for pedestal mountings).
- Wrench and socket set.
- Phillips and slot screwdrivers.
- Cable splicing tools.
- Volt-ohm meter for checking continuity and grounding during installation and checkout.
- Sierra 413 PCM Cable Test Set (or equivalent).
- Load coils (as required).

The minimum cable stub bend radius is equal to ten times the outside diameter of the stub cable.

### 4.3 Pole, Wall or Manhole Mounting

Use the following steps to mount the AC 5312 on a pole, wall or in a manhole.

Step	Action
1.	<b>Unpack Case.</b> Lay the shipping carton down with the Charles Industries markings facing up. Then cut/remove the bands and staples from the top edges of the carton. Open carton top and verify the correct case model and issue number to ensure proper case assignment. Remove equipment from the carton (do not lift case by grasping the cable stub). Retain carton for return of case, if required.
2.	<b>Mount the Bracket.</b> Drill two holes 13 1/4 inches apart vertically to accommodate the two 1/2" x 4" mounting bracket bolts provided. Then secure the bracket to the desired mounting surface.
3.	<b>Mount the Case.</b> There are two mounting configurations to mount the case base to the bracket: side access mounting and front access mounting, both described below. With either one, please take care to lift the case by the base (not by the stub).
4.	<b>Pivot the Case (optional with pivoting bracket).</b> See page 9.

**4.3.1. Side Access Mounting (Preferred)**

Use the following steps to attach the base of the AC 5312 apparatus case to the mounting bracket in the preferred housing configuration (with the repeater access to the side).

Step	Action
1.	Remove the four mounting bolts from the base plate bottom. The nut on the threaded ground stud must also be removed (see Figure 3).
2.	Position the apparatus case base on the mounting bracket so that the threaded ground stud passes through the mounting bracket at the hole centered and to the rear of the mounting bracket surface.
3.	Replace the four base plate mounting bolts and tighten (torque 14–15 ft. lbs). Replace the nut on the threaded ground stud and tighten.

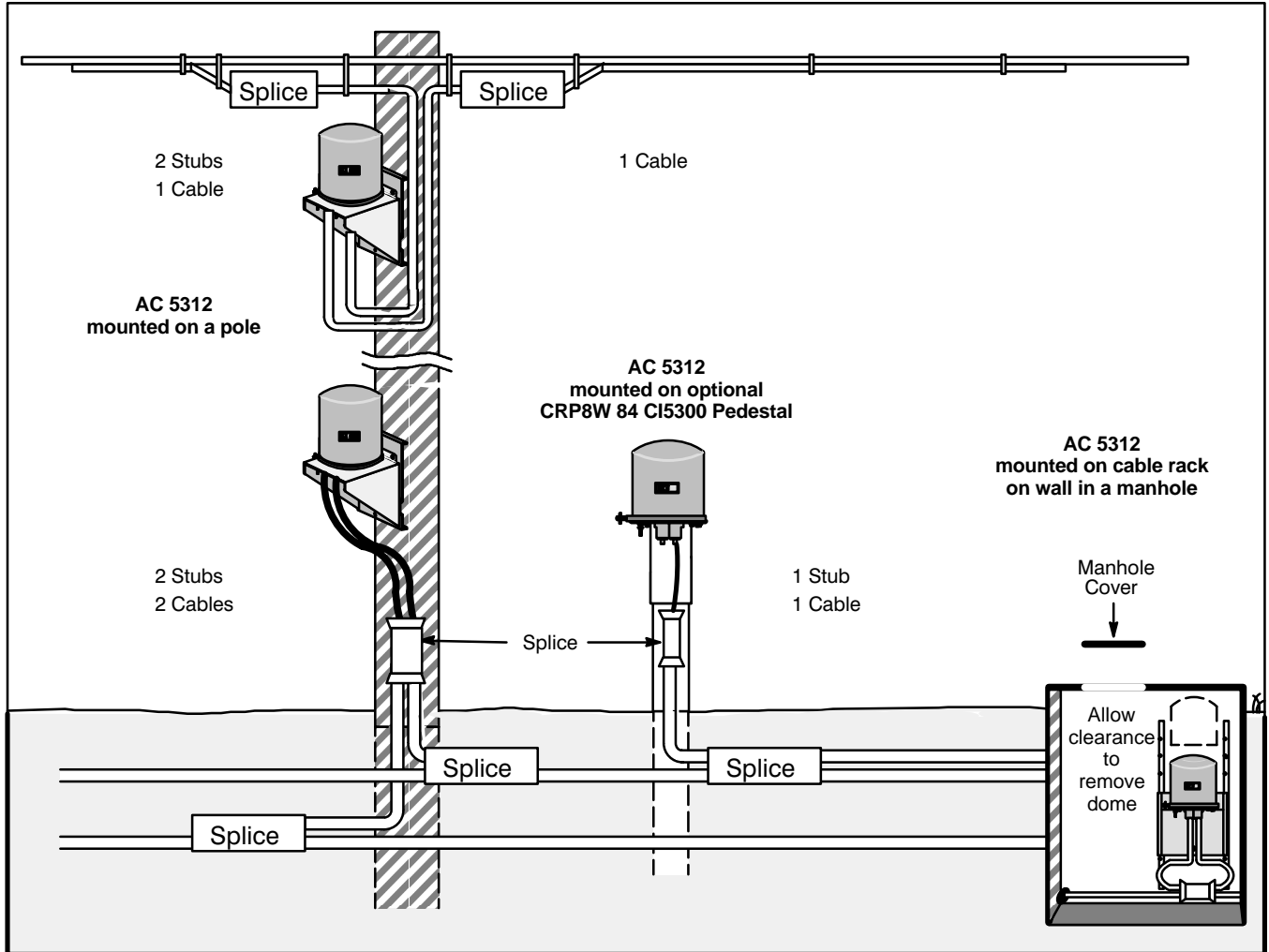


Figure 4. Mounting the AC 5312

**4.3.2. Front-Access Mounting**

Use the following steps to install the base of the AC 5312 apparatus case with front access:

Step	Action
1.	Remove the four mounting bolts from the base plate bottom. The nut on the threaded ground stud must also be removed.



Step	Action
2.	Position the base of the apparatus case on the mounting bracket so that the threaded ground stud is accessible through the large cut-out on the left side of the mounting bracket surface.
3.	Replace the four base plate mounting bolts. Tighten the four mounting bolts (torque 14–15 ft. lbs).

#### 4.4 Pedestal Mounting

For pedestal mounting, follow the manufacturer's practice for proper installation procedures.

## 5. INSTALLATION

After mounting the AC 5312, installation consists of removing the dome and shroud, making the appropriate installer connections, grounding the case, testing the span and wiring connections, inserting and testing the appropriate repeater modules and fault locate filters, and finally, closing, pressurizing, and securing the AC 5312 apparatus case. These steps are described in the following paragraphs.

### CAUTION

**The case may be pressurized. EXERCISE CAUTION WHENEVER OPENING A PRESSURIZED CASE. Be sure to release the pressure in the case through the pressure relief valve immediately prior to opening the case. Failure to do so may result in personal injury, apparatus case damage, or both.**



**Do not allow any metallic source (such as the metallic dome) to touch the pins, or damage to the equipment or personal injury may result.**

#### 5.1 Removing the Dome and Shroud

Use the following steps to remove the case dome:

Step	Action
1.	Release any pressure that may be in the (pressurized) case.
2.	Remove any locks and loosen the V-band assembly.
3.	Carefully lift the dome off the base plate. Gently place dome in a safe place — a damaged dome may not seal correctly.
4.	Carefully remove the shroud (pin cover) on the rear of the housing which protects the connector pins.



**Failure to read and understand the following information may result in personal injury and or equipment damage during the installation and servicing of the AC 5312 T1 Apparatus Case.**

#### 5.2 Pivoting the Case (if using optional pivoting bracket)

The optional pivoting mounting bracket allows the case to be rotated up to thirty-six (36) degrees away from the mounting structure or surface (tilted forward). This feature may facilitate access to the components within the case in certain applications.

Step	Action
1.	To pivot the base forward, remove the wing nut from the bolt located underneath and inside the mounting bracket; it is slightly above and behind the pivoting-through bar.
2.	While preventing base movement, remove the locking bolt from the side of the mounting bracket.
3.	Slowly allow the apparatus case to rotate forward on the mounting bracket until it stops.

Step	Action
4.	To return the apparatus case to its normal upright position, slowly push to case to an upright position.
5.	With the case secured in a vertical position, replace the locking bolt by inserting it from the outside in.
6.	Replace the wing nut and tighten to suit the environment.

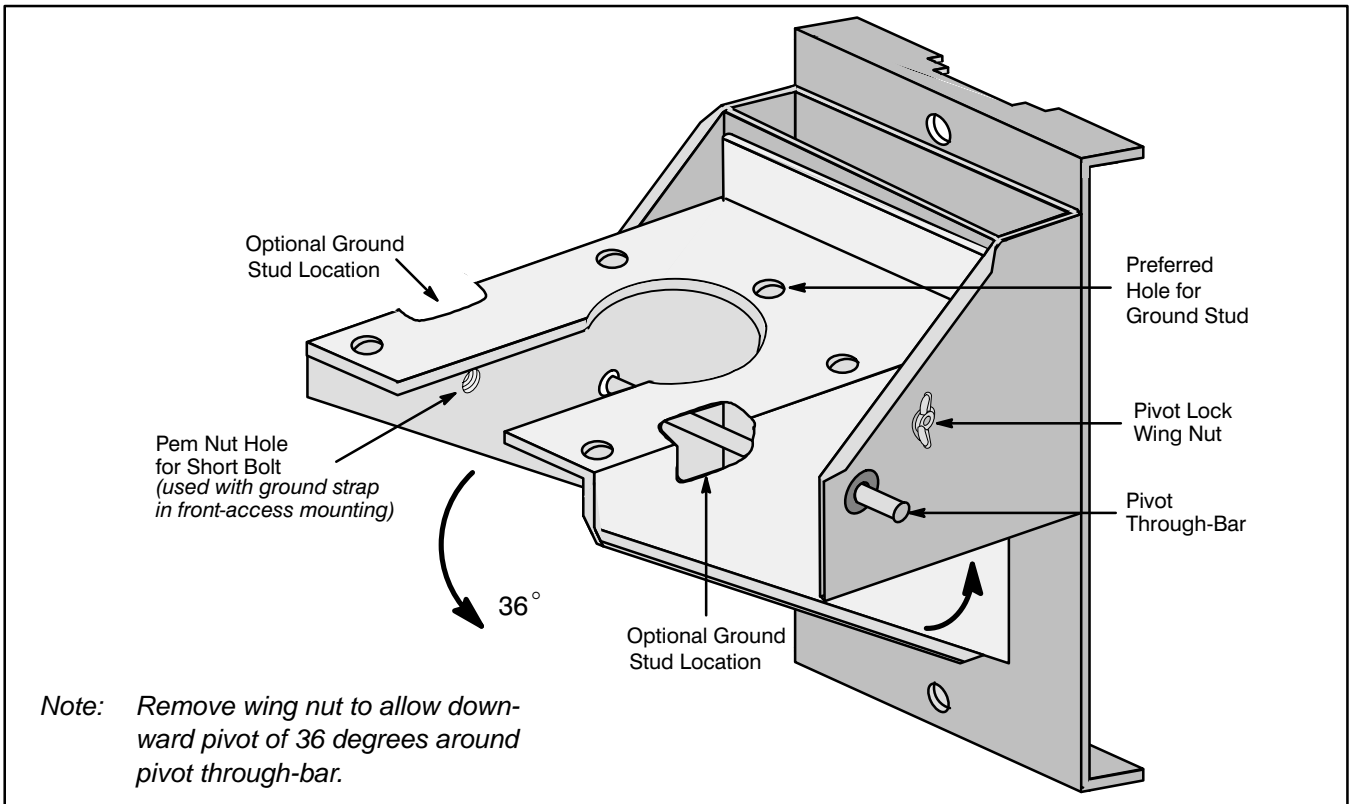


Figure 5. AC 5312 Pivoting Mounting Bracket (optional)

### 5.3 Installer Connections

The apparatus case internal strapping consists of:

1. Installing and splicing of optional load coils into the fault locate, spare pairs and orderwire pairs, except where load coils are mounted in splice cases.
2. Installing orderwire capacitors.



**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.**

#### 5.3.1. Load Coils (Optional)

Up to five optional load coils can be spliced into the main cable pairs (Figure 9) and mounted on top of the module housing.

#### 5.3.2. Orderwire Capacitors (customer provided)

The orderwire terminal location is shown in Figure 2. The orderwire capacitors are to be installed using the service loop provided in the Red/White orderwire pair located approximately 4" up from the bottom right side of the module housing (see Figure 9). Following capacitor installation, dress the capacitors to the wire bundle using tie

wraps. This will prevent the dome from coming in contact with the capacitors during dome removal and installation.

### **5.3.3. Fault Locate Strapping**

Each AC 5312 apparatus case will be strapped for common fault location. A passive filter is used in AC 5312 cases for unamplified systems; an active filter is used for amplified systems. These filters are not provided by Charles Industries.

## **5.4 Grounding**

A grounding network is provided on pins 1 and 10 of each mini-repeater connector and on pins 1 and 10 of the fault locate filter connectors. The connector pins are bused together by the PCB backplane's ground plane. A ground wire from the ground plane carries the ground to the internal ground terminal in the lower case. The cable shield(s) of the cable stub(s) are also connected to the internal ground terminal. The internal and external ground terminals are electrically connected through the lower case. The external ground terminal must then be grounded according to local practices. This ground network is capable of carrying the following loads to the lower case ground terminal:

- A 10-amp., 60 Hz signal for 0.184 seconds
- 100 sequential surges of 500-amp. peak, 10 x 1000 microseconds pulses (this meets REA PE–60d specifications).

When grounded in accordance with company practices, the AC 5312 apparatus cases are a totally grounded system. The chassis ground, the cable stub shield(s), and the base plate are connected to the lower case ground terminal, which is then connected to earth ground, at the apparatus case installation site.

## **5.5 Cable Testing**

Perform cable testing prior to module insertion.

### **5.5.1. Cable Measurements**

After the apparatus cases are installed and spliced into the main cables, various measurements should be taken on each pair between adjacent cases (refer to local practices). These measurements check the splicing integrity between cases and indicate transmission quality of individual pairs in the cable section. These measurements include:

- (a) DC loop resistance
- (b) Capacitance unbalance
- (c) PCM transmission (on carrier pairs)
- (d) VF loss and noise (fault locate and orderwire pairs), office to office
- (e) DC tip-ring resistance unbalance

### **5.5.2. Transmission Tests**

Transmission tests are made between adjacent repeater locations by using two Sierra 413 PCM Cable Test Sets (or equivalent). Readings are made and recorded on all pairs for each direction of transmission. The procedure is outlined in the appropriate cable test set manual.

### **5.5.3. Cable Pressure Tests**

Cable pressure tests may be performed after the cable splice enclosures are installed. Refer to the appropriate telephone plant practices for the test procedure. The cable pressure test may be performed with the apparatus case domes removed. If cases with non-filled stubs are used, the air tubes in those cases should be clamped off.

## **5.6 Plug-in Installation**

After the apparatus cases are installed and the test measurements made and recorded, install the line repeaters, fault locate filters, load coil containers and cut-thru cards in the inner module housing. When installing plug-ins, refer to the factory-affixed repeater assignment decal on the side of the module housing.

### 5.6.1. Cut-Thru Cards/Connectors

CS939C connectors may be installed in the repeater slots to facilitate checkout of splices to the main cable. After testing is completed, they should be removed from the slots assigned to line repeaters. The pass-thru connectors may remain in the slots that route noncarrier pairs. When pass-thru cards are left in the slots of noncarrier pairs, they are installed with the THRU edge plugged into the module connector. If pairs are unused, they should be grounded. To do this, the pass-thru card is reversed and reinserted with the GROUND edge plugged in. Check all cards to ensure that the correct edge is inserted.

### 5.6.2. Load Coil Containers

The CS184D1 load coil container schematic diagram is shown in Figure 20. The load coil containers may be installed in slots of noncarrier pairs to improve the quality of voice frequency transmission.

### 5.6.3. Line Repeaters

The Charles Industries CS239A, B, or E Line Repeaters are installed in slots J1 through J12. Before installing a line repeater, check its LOOP/THRU switch position. The switch should be in the THRU position at all through-powering repeater locations. Set this switch to the LOOP position at the power loopback location and the THRU position at all other line repeater locations along the span. The fault locate switch should be set to the common position.

### 5.6.4. Fault Locate Filters

The AC 5312 housings are prewired for two fault locate filters. The fault locate filters occupy the large slots of the module housing. The filters should be plugged into slot positions FF1 and FF2. Prior to inserting an active filter, be sure the polarity switch is properly set.

### 5.6.5. 270F Addressable Repeaters

The Charles Industries 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 Industries STS-3192 mechanics. For additional information, please contact the CI Customer Service Department.

## 5.7 Gas Tube/Surge Arrestor Installation

Gas-tube surge arrestors can be installed on the J and JF connectors for surge protection. The CiSA-4 Gas-Tube Surge Arrestor Assembly offers a voltage rating of 350 VDC (nominal) and contains four 3-element gas tubes on a protector mounting board. The gas-tube protector mounting board contains 10 receptacles that fit over the wire-wrap pins on the J and JF connectors (Figure 6). The protector mounting board is plugged onto the J and JF connector pins as needed (Figure 6).

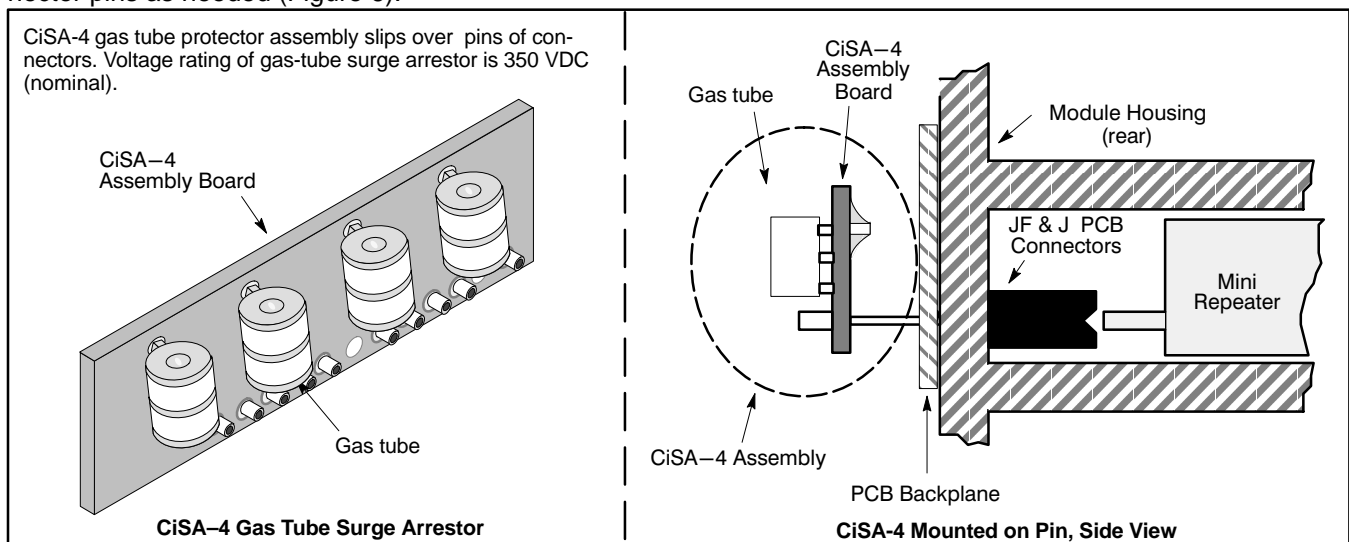


Figure 6. CiSA-4 Gas-Tube Surge Arrestor Assembly, Configuration and Mounting

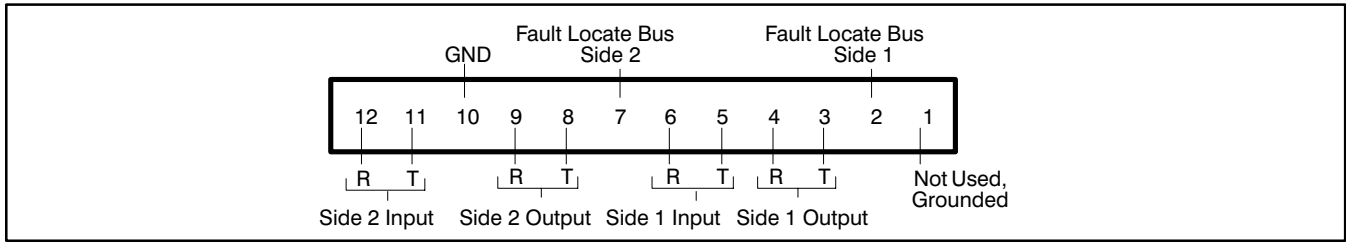


Figure 7. J-Connector Pin Assignment Key, J1-J12

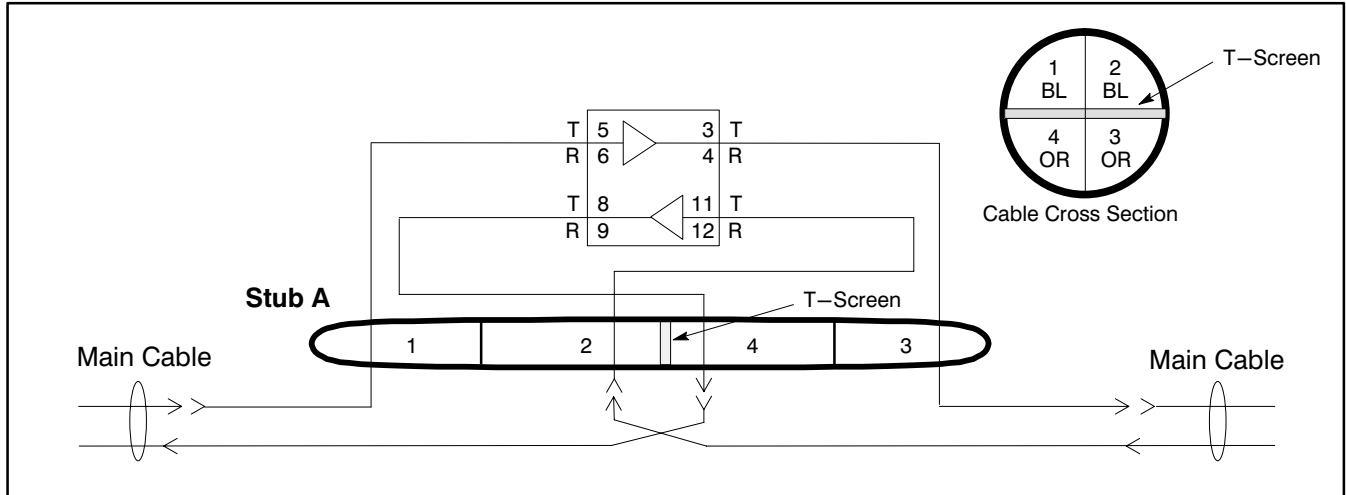


Figure 8. AC 5312-01 & AC 5312-02 1-Cable Splicing

Table 3. AC 5312-01 & AC 5312-02 Wiring

Slot Number	STUB A							
	Group 1 – In Pair		Group 3 – Out Pair		Group 2 – In Pair		Group 4 – Out Pair	
	Pin 6-R	Pin 5-T	Pin 4-R	Pin 3-T	Pin 12-R	Pin 11-T	Pin 9-R	Pin 8-T
1	BL	WH	BL	WH	BR	BK	BR	BK
2	OR	WH	OR	WH	SL	BK	SL	BK
3	GR	WH	GR	WH	BL	Y	BL	Y
4	BR	WH	BR	WH	OR	Y	OR	Y
5	SL	WH	SL	WH	GR	Y	GR	Y
6	BL	R	BL	R	BR	Y	BR	Y
7	OR	R	OR	R	SL	Y	SL	Y
8	GR	R	GR	R	BL	VIO	BL	VIO
9	BR	R	BR	R	OR	VIO	OR	VIO
10	SL	R	SL	R	GR	VIO	GR	VIO
11	BL	BK	BL	BK	BR	VIO	BR	VIO
12	OR	BK	OR	BK	SL	VIO	SL	VIO

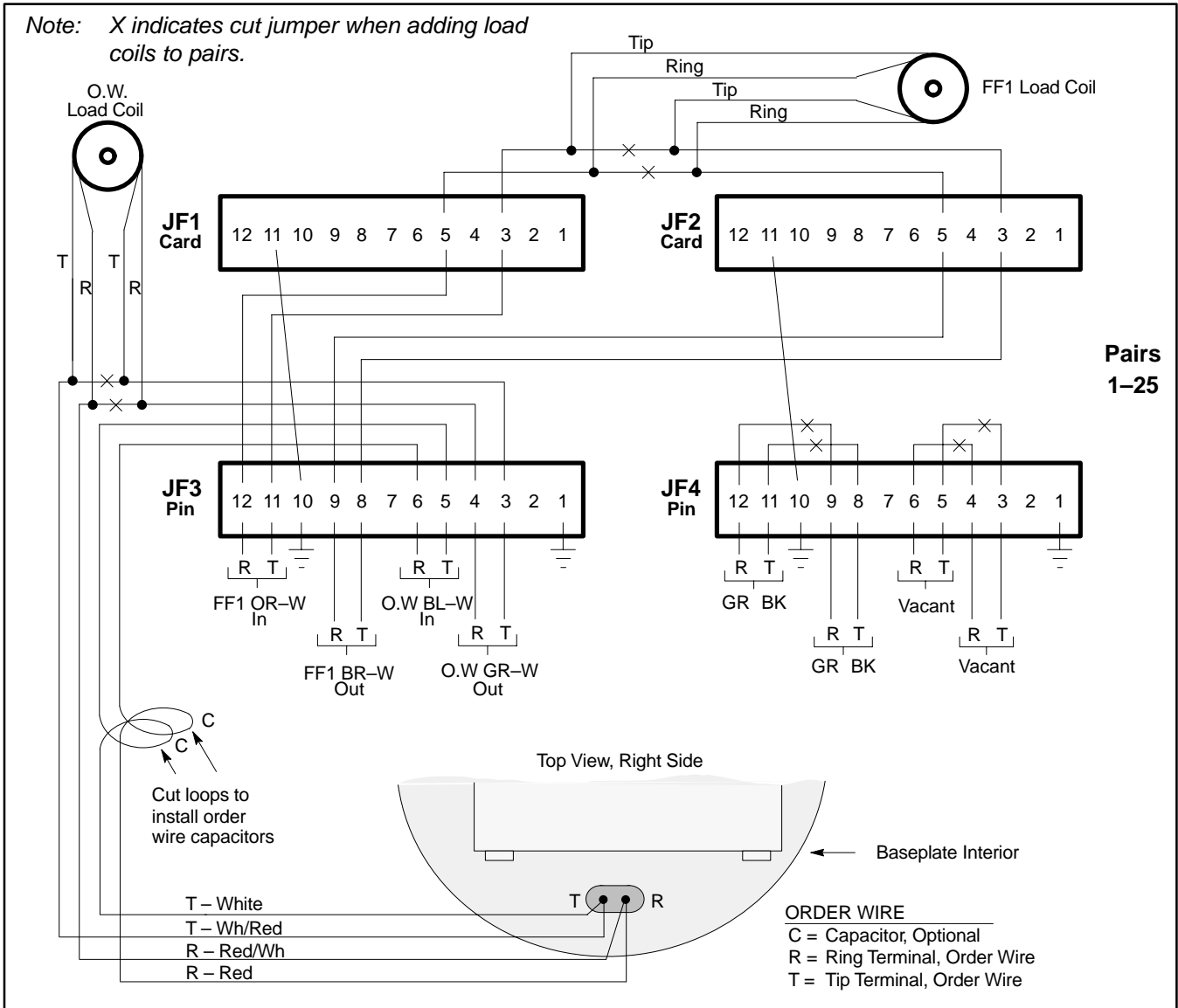


Figure 9. AC 5312-01 & AC 5312-02 Orderwire and Fault Locate Load Coil Strapping

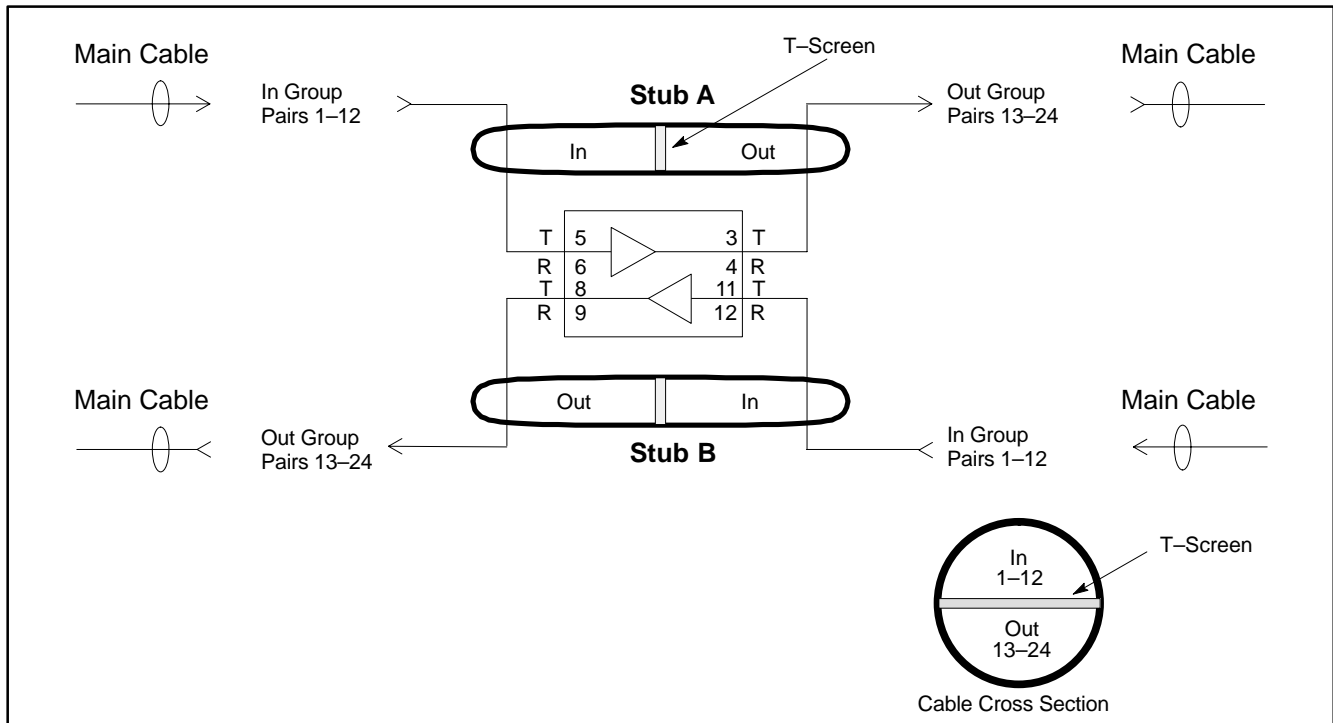


Figure 10. AC 5312-03 & AC 5312-04 Standard Bidirectional

Table 4. AC 5312-03 & AC 5312-04 Wiring

Slot Number	STUB A				STUB B			
	Group 1 – In Pair		Group 2 – Out Pair		Group 1 – In Pair		Group 2 – Out Pair	
	Pin 6–R	Pin 5–T	Pin 4–R	Pin 3–T	Pin 12–R	Pin 11–T	Pin 9–R	Pin 8–T
1	BL	WH	BL	WH	BL	WH	BL	WH
2	OR	WH	OR	WH	OR	WH	OR	WH
3	GR	WH	GR	WH	GR	WH	GR	WH
4	BR	WH	BR	WH	BR	WH	BR	WH
5	SL	WH	SL	WH	SL	WH	SL	WH
6	BL	R	BL	R	BL	R	BL	R
7	OR	R	OR	R	OR	R	OR	R
8	GR	R	GR	R	GR	R	GR	R
9	BR	R	BR	R	BR	R	BR	R
10	SL	R	SL	R	SL	R	SL	R
11	BL	BK	BL	BK	BL	BK	BL	BK
12	OR	BK	OR	BK	OR	BK	OR	BK

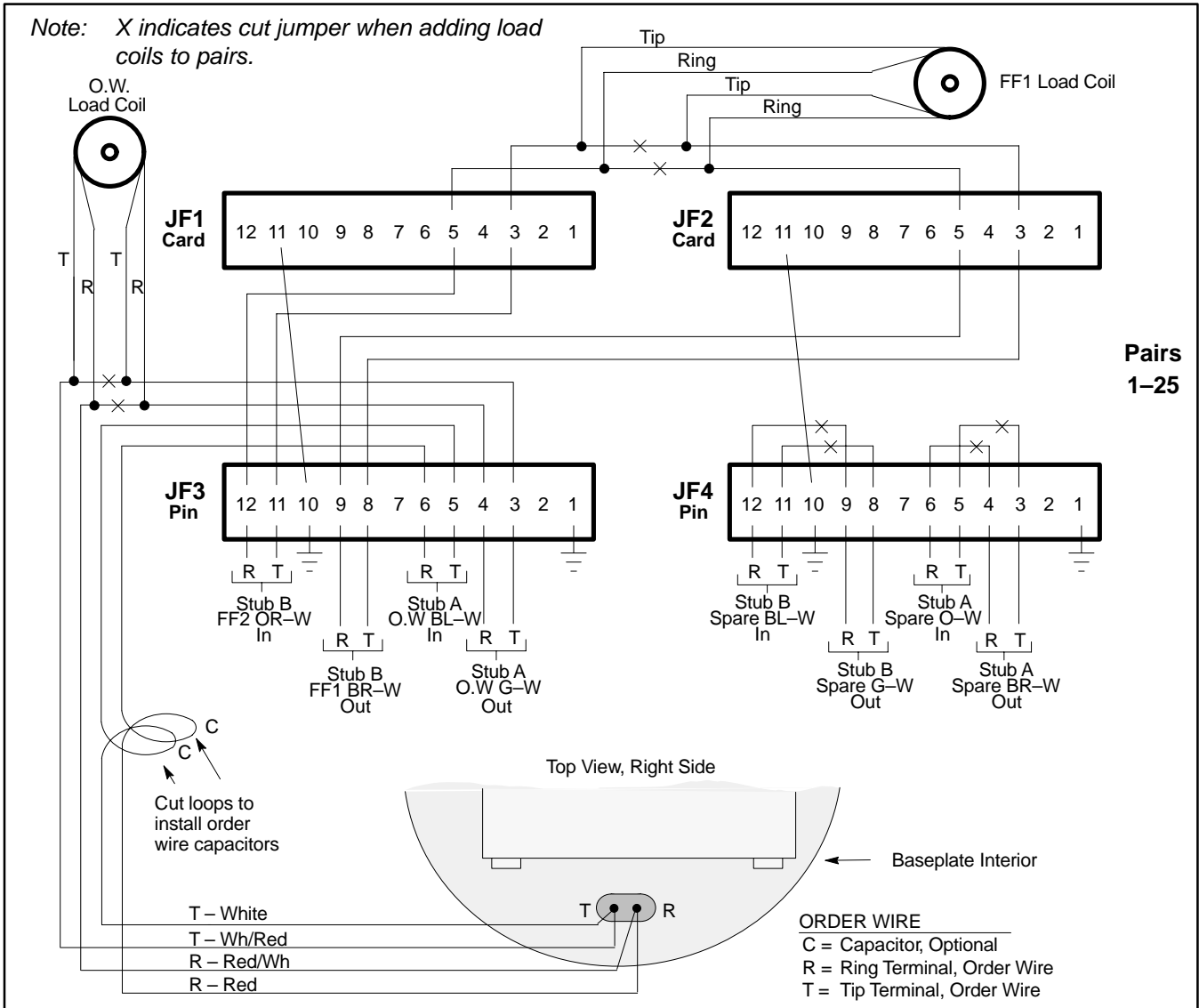


Figure 11. AC 5312-03 & AC 5312-04 Orderwire and Fault Locate Load Coil Strapping



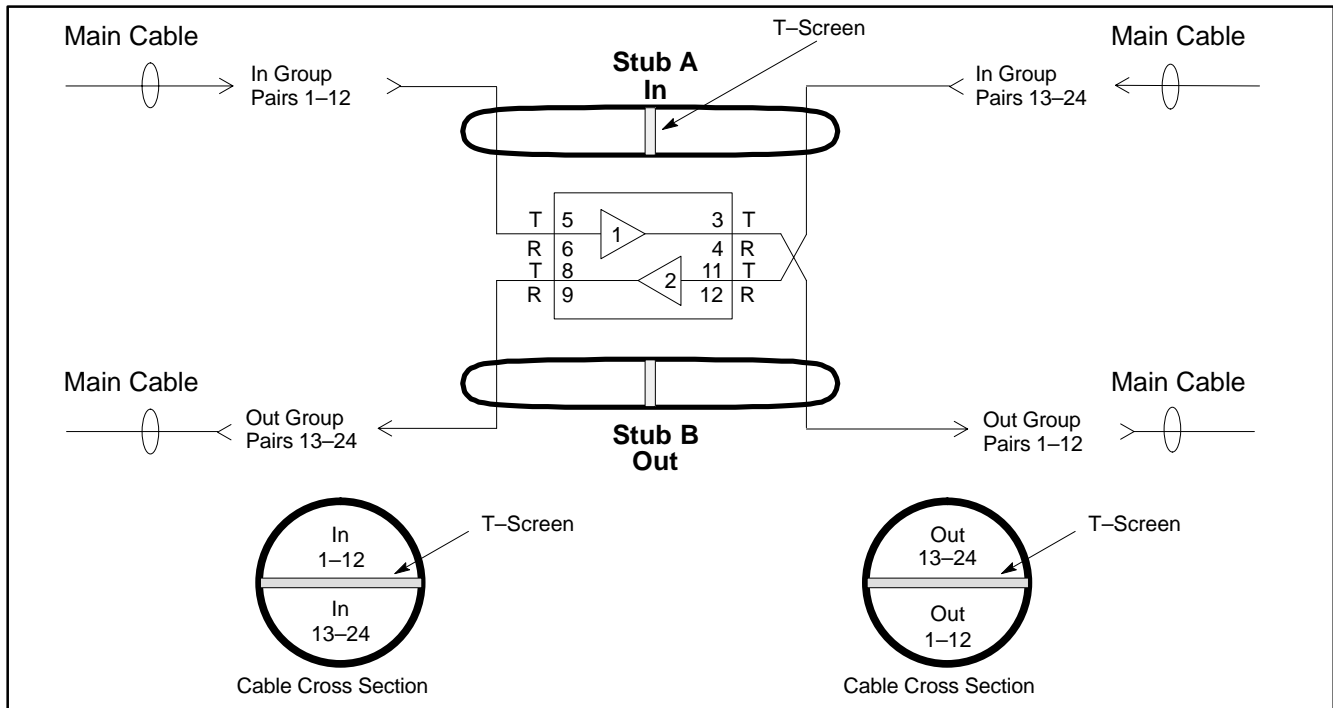


Figure 12. AC 5312-05 & AC 5312-06 Spatial Frogging

Table 5. AC 5312-05 & AC 5312-06 Wiring

Slot Number	STUB A				STUB B			
	Group 1 – In Pair		Group 2 – In Pair		Group 1 – Out Pair		Group 2 – Out Pair	
	Pin 6–R	Pin 5–T	Pin 12–R	Pin 11–T	Pin 4–R	Pin 3–T	Pin 9–R	Pin 8–T
1	BL	WH	BL	WH	BL	WH	BL	WH
2	OR	WH	OR	WH	OR	WH	OR	WH
3	GR	WH	GR	WH	GR	WH	GR	WH
4	BR	WH	BR	WH	BR	WH	BR	WH
5	SL	WH	SL	WH	SL	WH	SL	WH
6	BL	R	BL	R	BL	R	BL	R
7	OR	R	OR	R	OR	R	OR	R
8	GR	R	GR	R	GR	R	GR	R
9	BR	R	BR	R	BR	R	BR	R
10	SL	R	SL	R	SL	R	SL	R
11	BL	BK	BL	BK	BL	BK	BL	BK
12	OR	BK	OR	BK	OR	BK	OR	BK

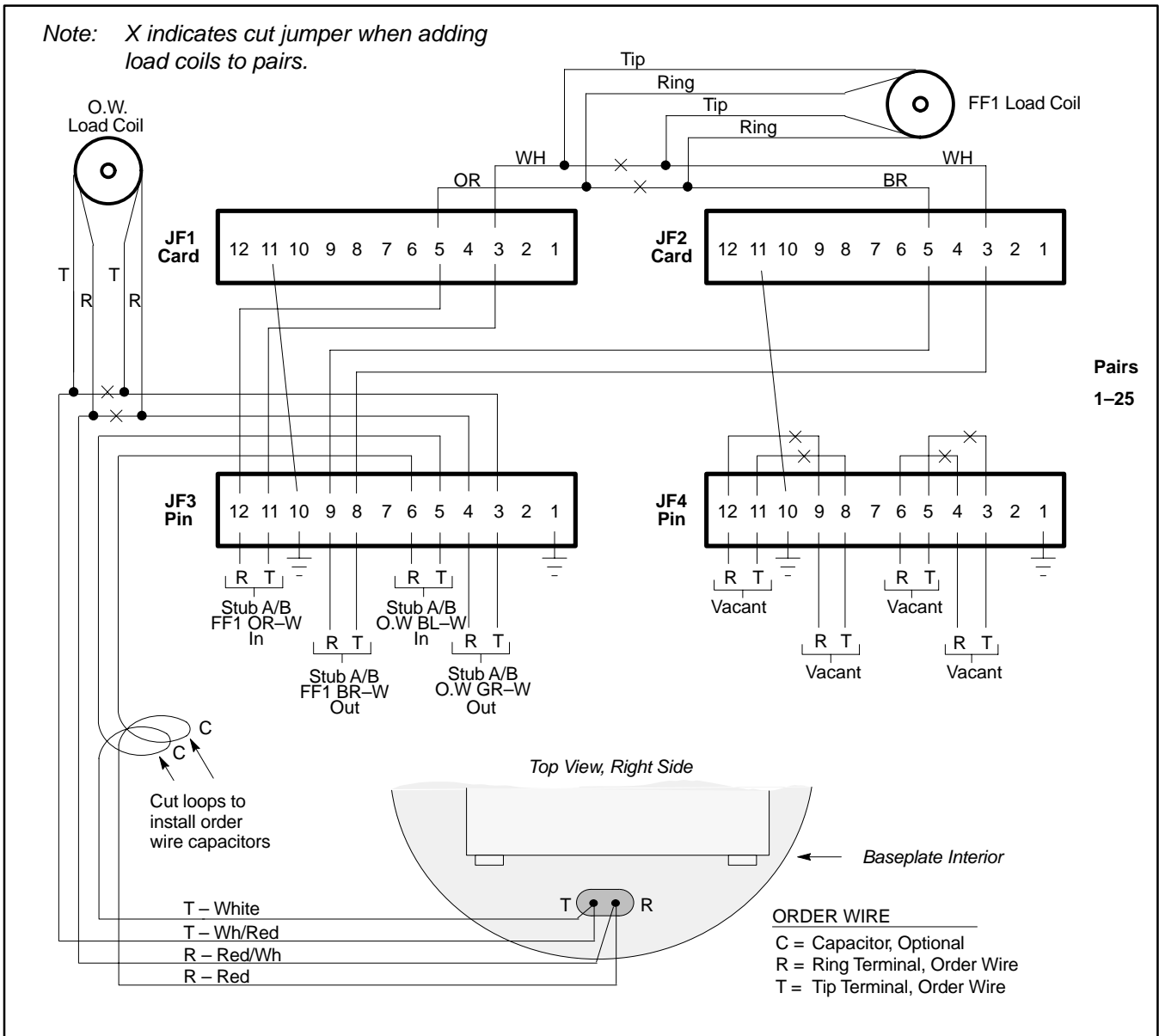


Figure 13. AC 5312-05 & AC 5312-06 Orderwire and Fault Locate Load Coil Strapping

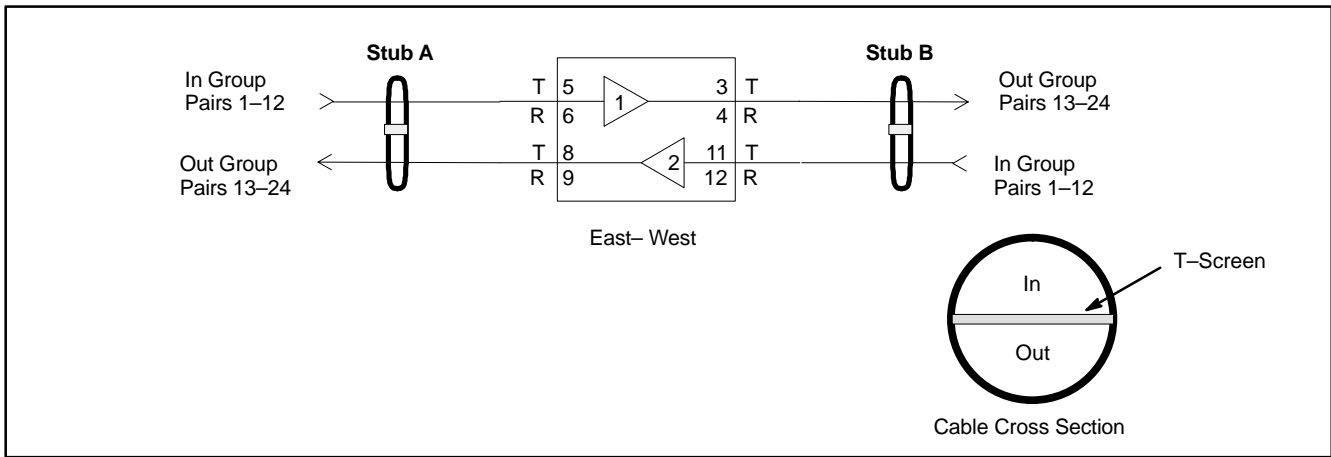


Figure 14. AC 5312-07 & AC 5312-08 Special Bidirectional

Table 6. AC 5312-07 & AC 5312-08 Wiring

Slot Number	STUB A				STUB B			
	Group 1 - In Pair		Group 2 - Out Pair		Group 1 - In Pair		Group 2 - Out Pair	
	Pin 6-R	Pin 5-T	Pin 9-R	Pin 8-T	Pin 12-R	Pin 11-T	Pin 4-R	Pin 3-T
1	BL	WH	BL	WH	BL	WH	BL	WH
2	OR	WH	OR	WH	OR	WH	OR	WH
3	GR	WH	GR	WH	GR	WH	GR	WH
4	BR	WH	BR	WH	BR	WH	BR	WH
5	SL	WH	SL	WH	SL	WH	SL	WH
6	BL	R	BL	R	BL	R	BL	R
7	OR	R	OR	R	OR	R	OR	R
8	GR	R	GR	R	GR	R	GR	R
9	BR	R	BR	R	BR	R	BR	R
10	SL	R	SL	R	SL	R	SL	R
11	BL	BK	BL	BL	BL	BK	BL	BK
12	OR	BK	OR	BL	OR	BK	OR	BK

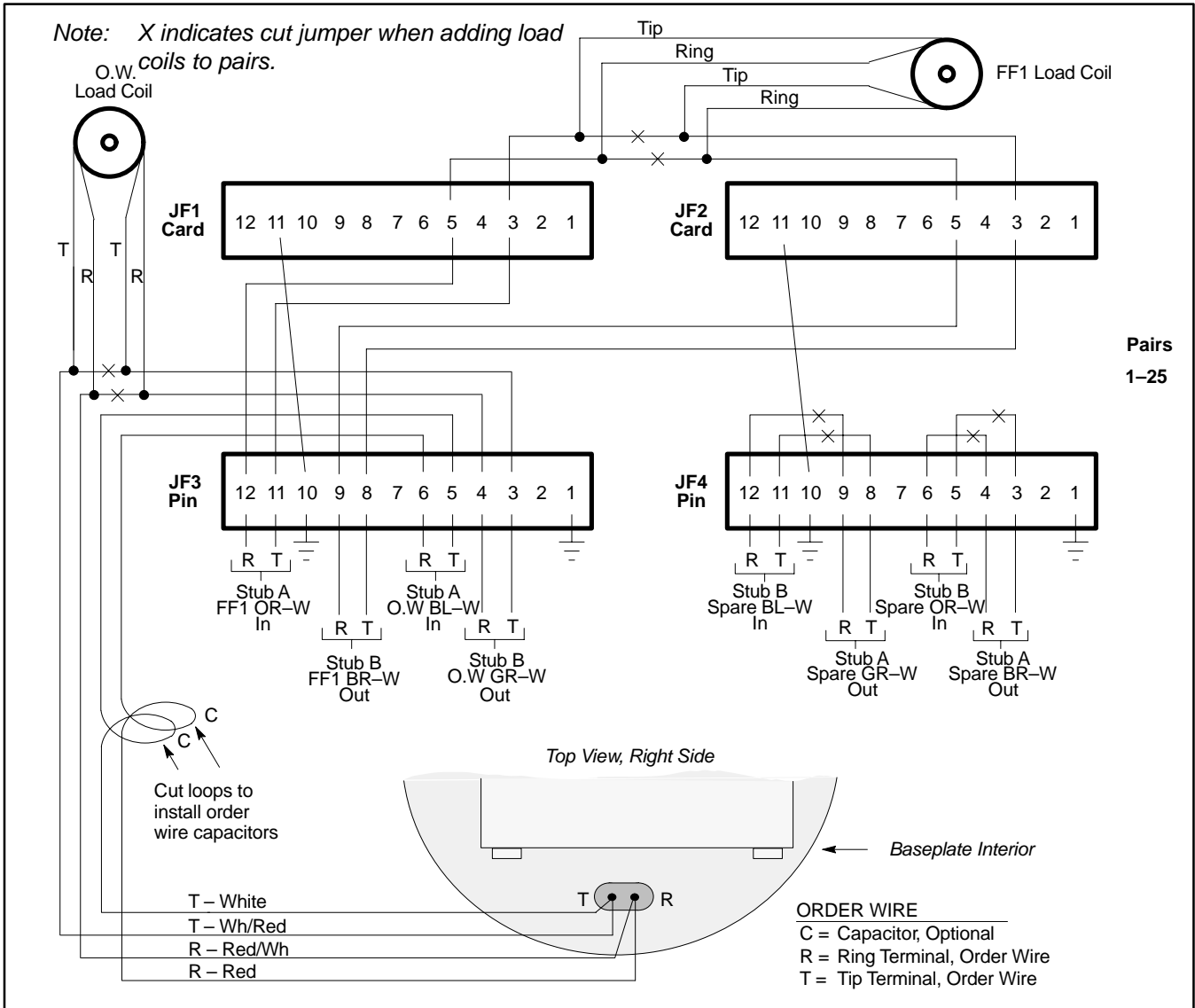


Figure 15. AC 5312-07 & AC 5312-08 Orderwire and Fault Locate Load Coil Strapping

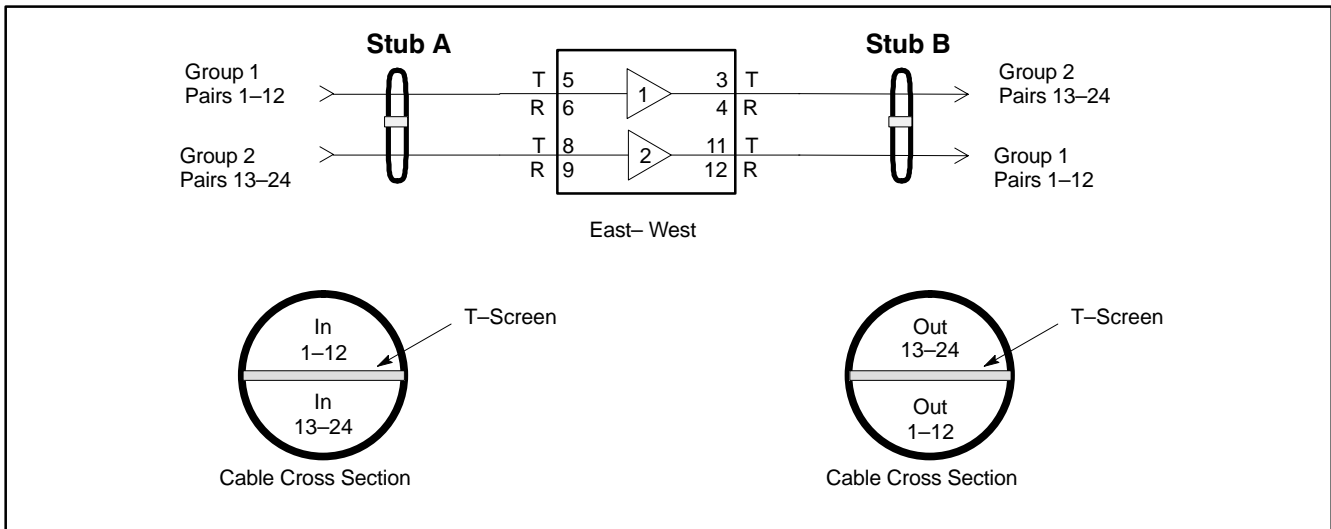


Figure 16. AC 5312-09 & AC 5312-10 Special Unidirectional

Table 7. AC 5312-09 & AC 5312-10 Wiring

Slot Number	STUB A				STUB B			
	Group 1 – In Pair		Group 2 – In Pair		Group 1 – Out Pair		Group 2 – Out Pair	
	Pin 6-R	Pin 5-T	Pin 9-R	Pin 8-T	Pin 12-R	Pin 11-T	Pin 4-R	Pin 3-T
1	BL	WH	BL	WH	BL	WH	BL	WH
2	OR	WH	OR	WH	OR	WH	OR	WH
3	GR	WH	GR	WH	GR	WH	GR	WH
4	BR	WH	BR	WH	BR	WH	BR	WH
5	SL	WH	SL	WH	SL	WH	SL	WH
6	BL	R	BL	R	BL	R	BL	R
7	OR	R	OR	R	OR	R	OR	R
8	GR	R	GR	R	GR	R	GR	R
9	BR	R	BR	R	BR	R	BR	R
10	SL	R	SL	R	SL	R	SL	R
11	BL	BK	BL	BK	BL	BK	BL	BK
12	OR	BK	OR	BK	OR	BK	OR	BK

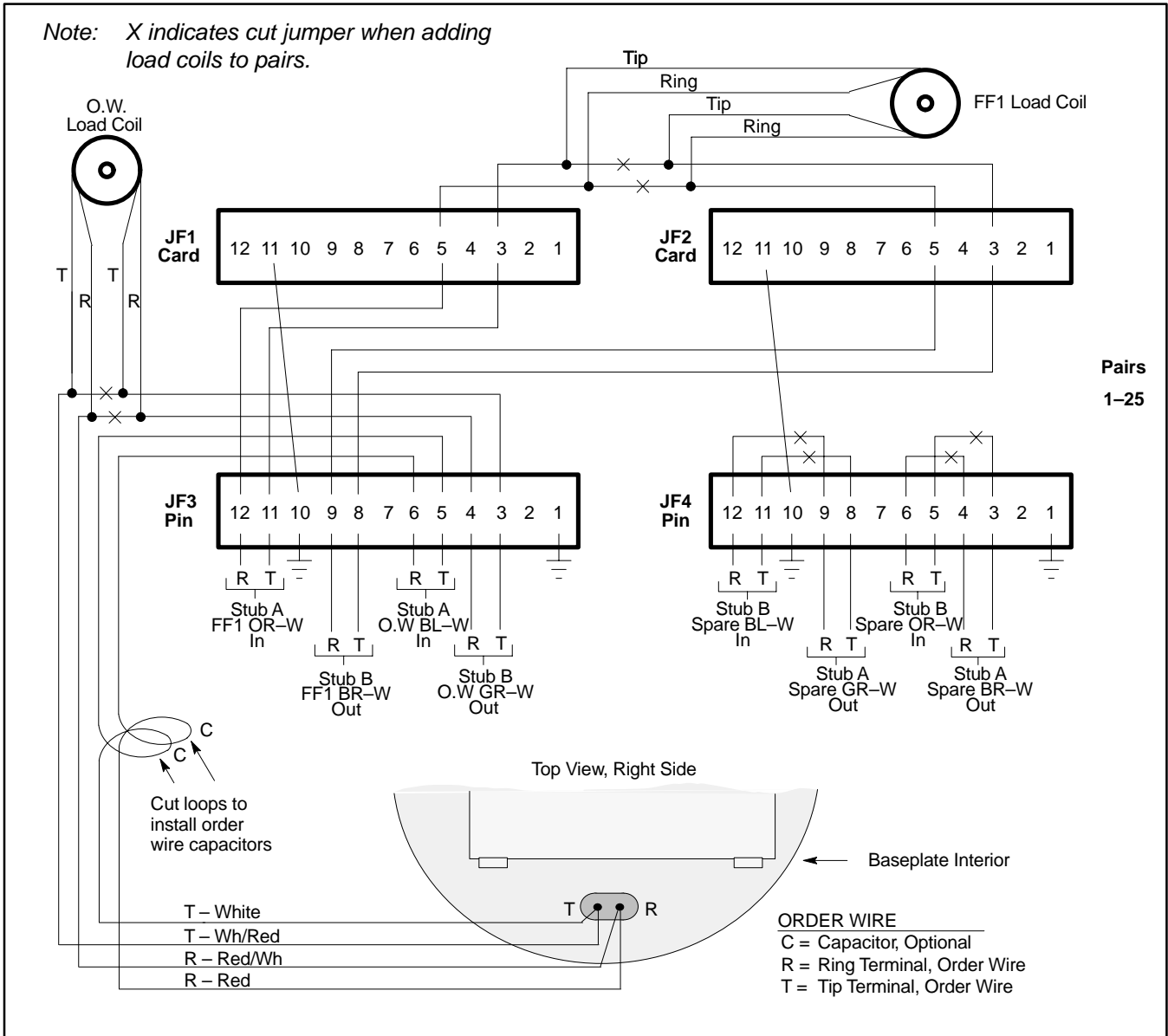
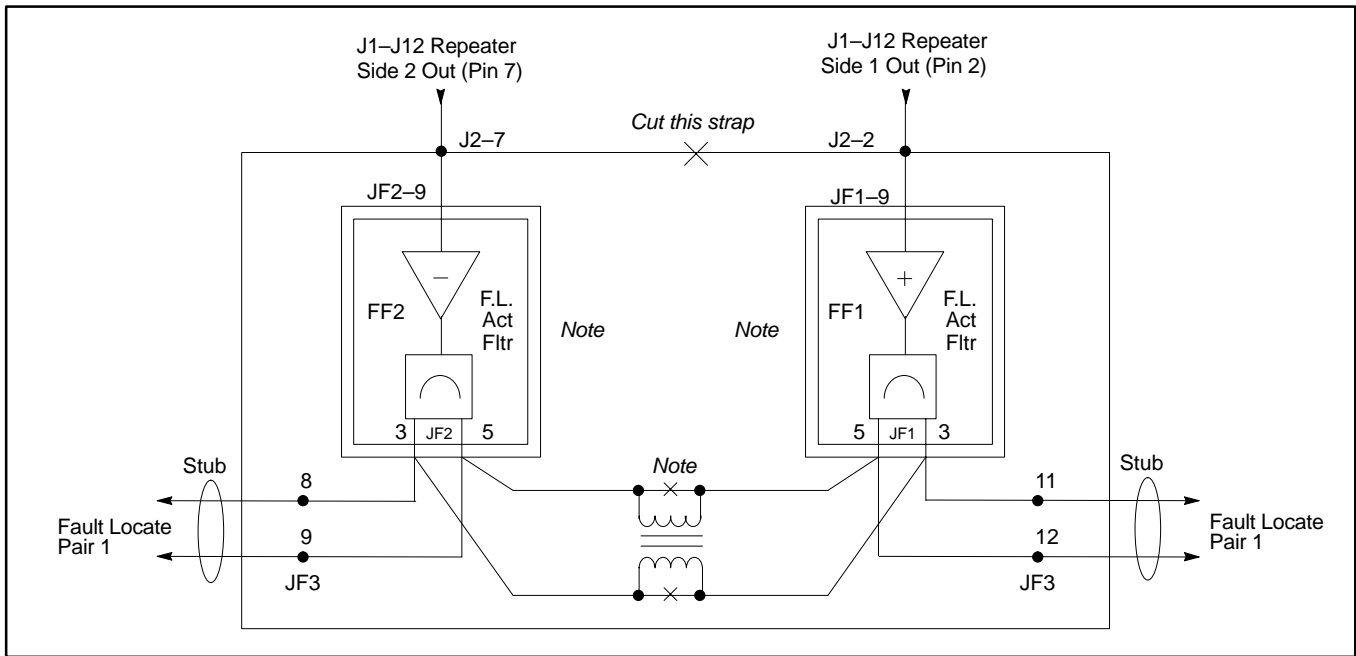
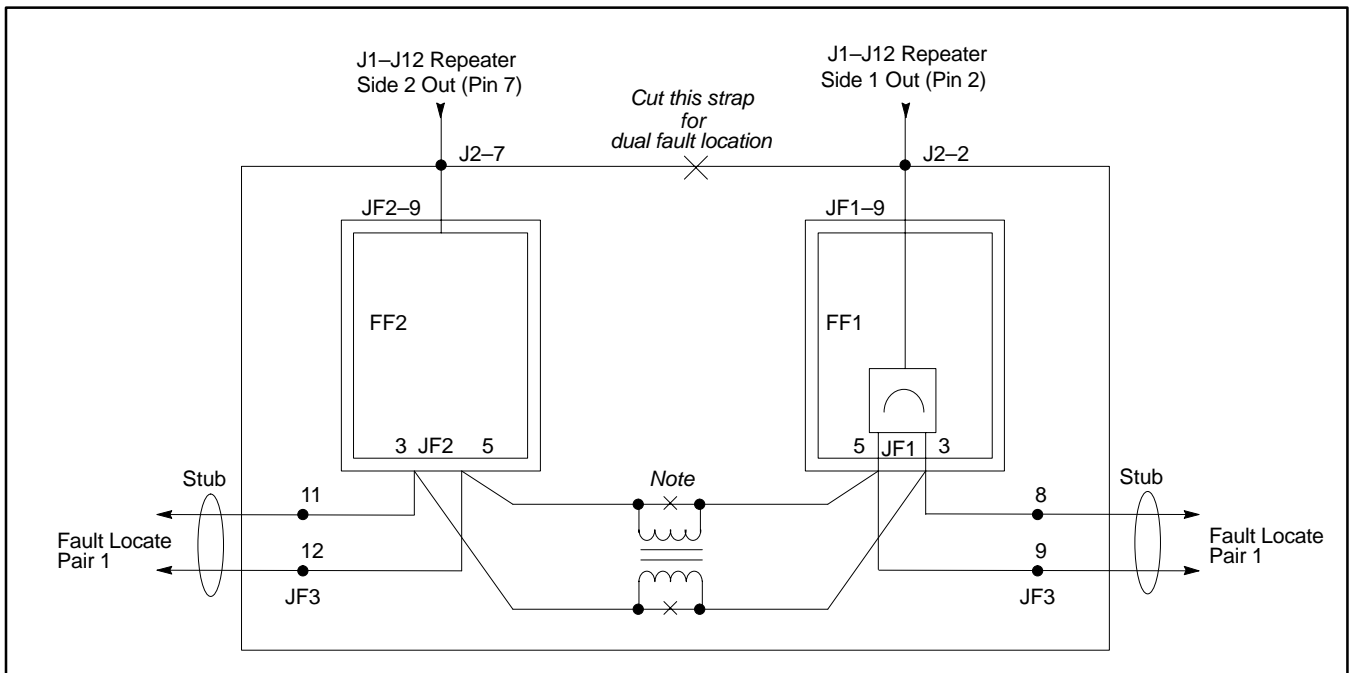


Figure 17. AC 5312-09 & AC 5312-10 Orderwire and Fault Locate Load Coil Strapping



Note: Set the side 1 filter switch (FF1) to positive polarity. Set the side 2 filter switch (FF2) to negative polarity. If load coils are used, cut the white 24 AWG straps on the service loops between JF1 and JF2, and splice in the coils as shown.

Figure 18. Dual Amplified Fault Locating with Separate Pairs



Note: If load coils are used, cut these straps and then splice load coils in as shown.

Figure 19. Dual Unamplified Fault Locating

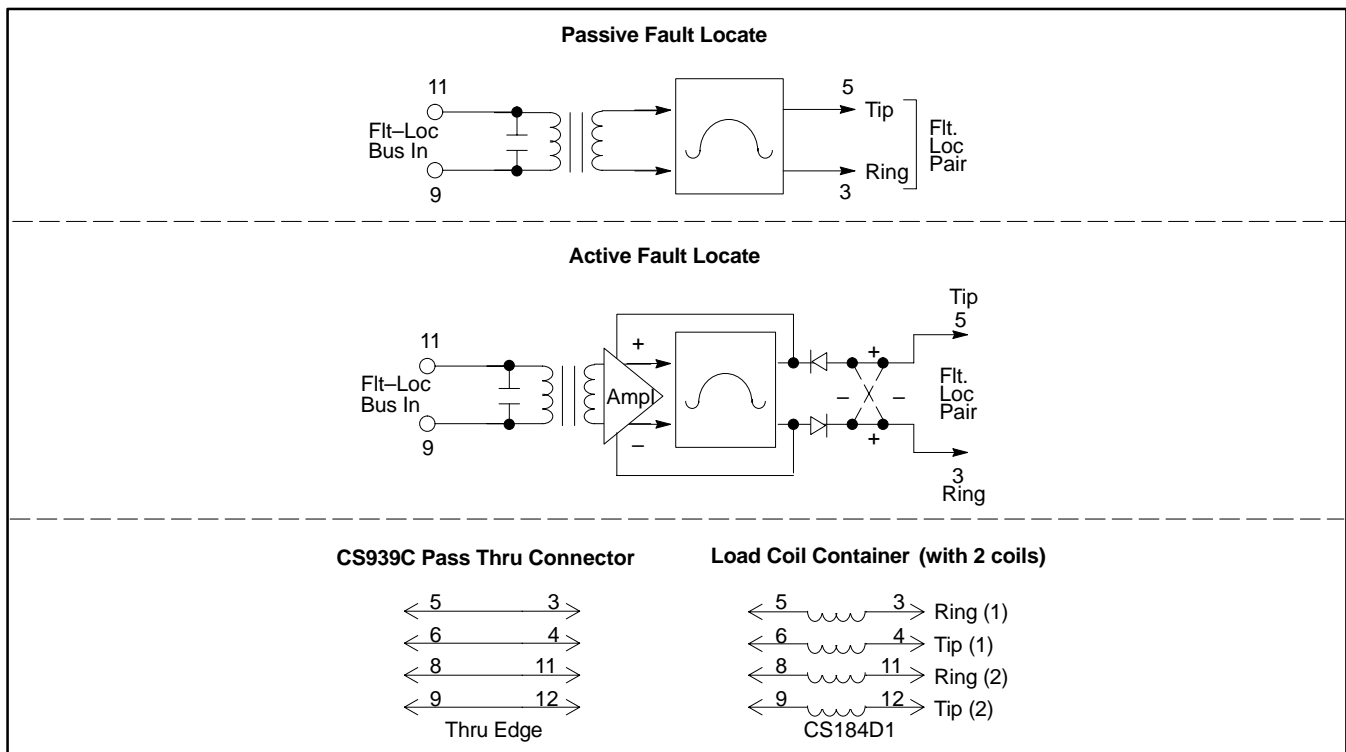


Figure 20. Plug-In Card Options

**5.8 Retainer Bar Installation**

Install the three provided retainer bars on the module housing after the plug-in modules are inserted. This prevent vibrations from loosening the modules from the connectors.

**5.9 Installing the Shroud**

After wiring and testing is complete, carefully reinstall the provided shroud over the connector pins.

**5.10 Closing and Pressurizing Case**

After installation and testing of the case is completed, and the shroud is reinstalled, install and secure the case dome.

**5.10.1. Closing Vented Cases**

To install the dome on the AC 5312 used in vented (non-pressurized) installations, proceed as follows:

Step	Action
1.	Coat O-ring with Dow silicon grease (or similar product), then place O-ring on the base plate flange.
2.	Place dome over the module housing until it rests on the O-ring and base plate flange. Make sure that the dome sits level on the base plate.
3.	Install the V-band around the dome and base plate flanges. Hand tighten the T-bolt.
4.	After the V-band clamp has been tightened, insert an optional padlock or bolt through the holes in the security hasp and lock it.

**CAUTION**

Use maximum “hand” pressure only. Do not use a lever or wrench to tighten the V-band. Excessive tightening of the V-band will damage the apparatus case and/or the V-band.

**5.10.2. Closing Pressurized Cases**



The AC 5312 apparatus cases with air-core stubs can be pressurized with either dry air or nitrogen. To install the case dome, proceed as follows:

*Note: For cases with air-core stubs, air flow into the case is automatically shut off when the dome is removed. Air flow from stub to stub continues uninterrupted. Air flow into the case automatically resumes when the dome is replaced.*

Step	Action
1.	Install the apparatus case dome and V-band assembly.
2.	After installing and securing the apparatus case dome, pressurize the apparatus case to 10 psi, through the base plate air valve or main cable.
3.	Allow the case pressure to stabilize for one hour.
4.	Use a gauge on the pressure fill valve to measure the pressure inside the case. Record the reading.
5.	Allow the case to stabilize for at least <i>another</i> hour.
6.	Measure the pressure again; record the reading.
7.	Compare the two pressure readings. There should be no measurable pressure loss. This indicates that the case is pressure tight. If the case is not pressurized from the main cable, there may be a long-term loss of pressure. This loss results from leakage between each cable conductor and its insulation.
8.	If the case fails to hold pressure when checked in step 7 above, first re-open the case and then re-close the case.

### 5.11 Opening Pressurized Cases

Use the following steps to open a pressurized case.

#### CAUTION

**The case may be pressurized. EXERCISE CAUTION WHENEVER OPENING A PRESSURIZED CASE. Be sure to release the pressure in the case through the pressure relief valve immediately prior to opening the case. Failure to do so may result in personal injury, apparatus case damage, or both.**

Step	Action
1.	Release the air pressure through the pressurization valve located in the base plate (see Figure 3).
2.	Remove any company provided locks or seals that may be secured to the V-band security hasp.
3.	Loosen the V-band T-handle and remove the V-band. <b>CAUTION: Make sure the air pressure has been fully released before loosening the V-band.</b>
4.	Lift off the dome (a slight rotation may be required when lifting).
5.	After removing the dome, place the dome where it won't be damaged. A damaged dome may not provide an air-tight seal when reinstalled.

## 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

See Table 8 for the physical characteristics of the AC 5312 apparatus case.

**Table 8. Physical Specifications**

<b>Feature</b>	<b>U.S.</b>	<b>Metric</b>
Case Height	15 inches	38.1 centimeters
Case Diameter	15.5 inches	39.4 centimeters
Case Weight	55-80 pounds	20 -30 kilograms
Mounting Bracket and Hardware Weight (not incl. stubs)	6 pounds	2.7 kilograms
Mounting Bracket Height	15.25 inches	38.7 centimeters
Mounting Bracket Width	9.4 inches	23.9 centimeters
Mounting Bracket Depth	13.65 inches	34.7 centimeters
Temperature	-40 to 140° F	-40 - 60° C
Cable Stub, nominal	30 feet	9.14 meters
Humidity	To 100%	
Pressure	10 psi (g) nominal. Design tested to 30 psi (g)	
Capacity	12 mini T1 repeaters + 2 standard fault locate filters	

