AC4306 Series T1/ISDN Apparatus Cases

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Figure 1. Typical AC4306 T1/ISDN Apparatus Case, shown without Mounting Bracket

1. GENERAL

1.1 Document Purpose

This document provides general, design and installation information for the AC4306 Series of T1/ISDN (Integrated Services Digital Network) Apparatus Cases. A typical AC4306 is shown in Figure 1.

1.2 Equipment Location

The AC4306 cases can be mounted either above or below ground.

Above-ground —Weatherproof, sealed housings with grease-filled stub cables for mounting on a pole, wall or pedestal

Below-ground —Weatherproof, pressurized housings with air-core stub cables for mounting in manholes

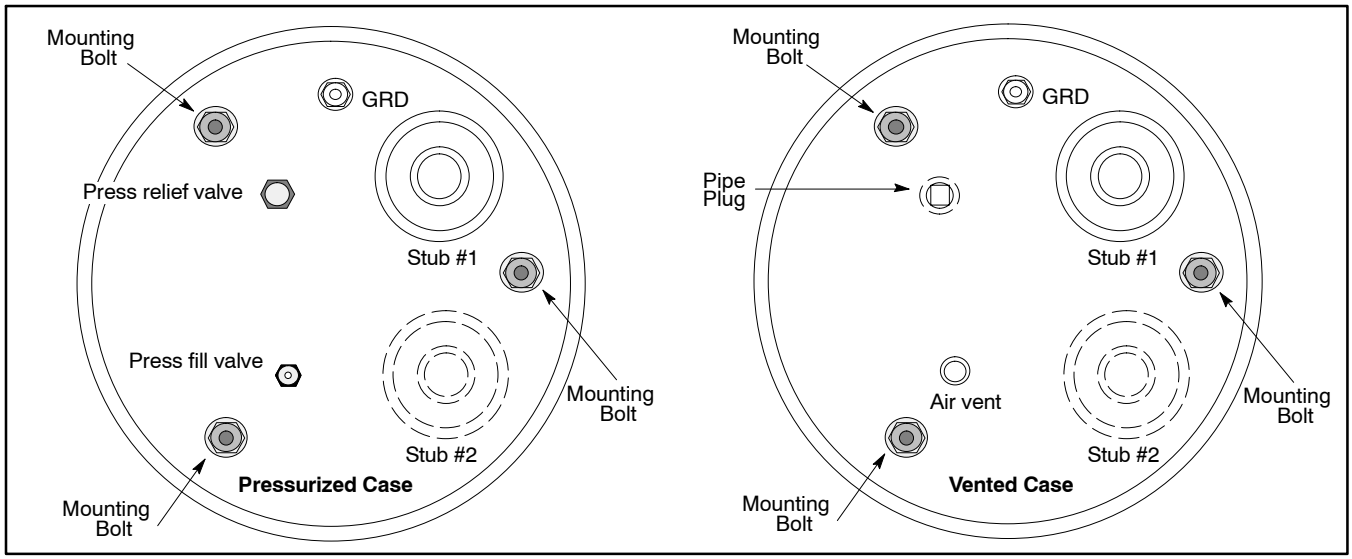


Figure 2. AC4306 Base Plates, Outside Bottom View, Looking Up

1.3 Equipment Function & Description

The versatile AC4306 is ideally suited to provide T1 services in low-density, distribution loop applications. Up to six T1 span line mini-repeaters plus 1 fault locate filter can be used in the AC4306. The AC4306 is also ideally suited to provide ISDN services, and allows for mid-span extension of any ISDN Basic Rate Interface (BRI), or similar circuit. Up to six ISDN single-width repeaters can be used in the AC4306. The AC4306 may be easily modified, by a technician in the field, to accommodate up to three ISDN double-width circuit pack repeaters.

The stub of the AC4306 apparatus case is 24-gauge T-screened cable allowing both T1 and ISDN circuits to be mixed within the apparatus case. All extra stub cable pairs are grounded in the base of the apparatus case. When using the AC4306 in ISDN circuits, strict adherence to the ISDN color code found in Figure 10, Figure 11, Figure 12, and Figure 14 is required to assure proper operation. Figure 1, Figure 3, Figure 4 and Figure 6 illustrate the key construction features of the apparatus case.

1.4 Equipment Features

The AC4306 series provides the following features:

- White enamel aluminum base and dome for long service life, even in corrosive environments
- Pressurized or vented cases
- Houses up to six T1 span line mini-repeaters, up to six single-width ISDN repeaters or up to three double-width ISDN repeaters
- Unidirectional or bidirectional spans, with 10 different wiring options
- Totally-grounded system at installation site

- One- or two-stub cable wiring options
- Air-core or filled cables

1.5 Equipment Models

The AC4306 series is available in many different models, as described in Table 1 and Figure 10 through Figure 14.

Table 1. AC4306 Models

Model # Prefix*	Apparatus Case Type	Operation	# of Cables	# of Stubs
AC4306-01	Pressurized	Std Bidirectional	1	1
AC4306-02	Vented	Std Bidirectional	1	1
AC4306-03	Pressurized	Std Bidirectional Operation, Side 1 & 2	2	2
AC4306-04	Vented	Std Bidirectional Operation, Side 1 & 2	2	2
AC4306-05	Pressurized	Std Spatial Frogging	2	2
AC4306-06	Vented	Std Spatial Frogging	2	2
AC4306-07	Pressurized	Spcl Bidirectional, East & West	1	2
AC4306-08	Vented	Spcl Bidirectional, East & West	1	2
AC4306-09	Pressurized	Spcl Unidirectional, East & West	2	2
AC4306-10	Vented	Spcl Unidirectional, East & West	2	2

* *All model numbers also contain a 4-letter "suffix" which varies according to the application. For example, a complete model number for the AC4306-01 can be "AC4306-01-XEAC", where:*
X - (the first letter) represents the dome type (standard metal for the 4300 series)
E - (second letter) represents the cable length (A=30', B=40', C=50', D=60', E=70')
A - (the third letter) represents the plug-in option (A=no plug-ins, B=protected, C=repeaters, D=protected w/repeaters)
C - (the fourth letter) represents the Issue 3 version (ISDN ready)

Model Number Syntax:

Prefix Suffix*

AC4306-01-XEA-C

2. INSPECTION

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

Charles Industries equipment is identified by a model and issue number imprinted on the housing cover. Each time a major design change is made on the equipment, the issue number is advanced by one number on any subsequent models. Therefore, be sure to include both the model number and its issue number when making inquiries about the equipment.

3. APPLICATIONS

3.1 T1 Application

A typical installation of the AC4306 for T1 service may require multiple apparatus cases properly spaced within the T1 span. Refer to the mini-repeater manufacturer's specifications for proper span line installation spacing.

3.2 ISDN Application

A typical installation of the AC4306 for ISDN services requires a single apparatus case located at mid-span. Refer to the ISDN mini-repeater manufacturer's specifications for the proper span line location of the apparatus case.

4. DESIGN FEATURES

The AC4306 is comprised of the following parts:

- a formed aluminum dome (cover)
- a formed aluminum base plate
- an aluminum inner base plate bracket and module housing
- an O-ring
- a V-band assembly, stainless steel
- cable stub(s), air-core or grease-filled
- pole/wall mounting bracket & hardware

Table 2. AC4306 Plug-Ins and Accessories

Model #	CLEI Code	Description
CS239A	T1R3CDC1A	Repeater, Line, Bidirectional
CS239B	T1R3CCC1AA	Repeater, Line, Unidirectional
CS239E	T1R3DDC1AA	Repeater, Line, Bidirectional, Hardened
CS270F	T1R36J01AA	Repeater, Addressable
184D102662	T1LCA213AB	Load Coil, 184D1-02/662 Container
CS939C	N/A	Connector, Pass-thru
CiSA-4	N/A	Arrestor, Surge protection (gas tube)
025018	N/A	Dome
026164	N/A	O-Ring
026438	N/A	V-band, T-handle (provided)
042391	N/A	V-band, Hex Nut/Cup Washer (optional)
CRP8W 84 Ci4306	N/A	CRP8W-84-4306 Pedestal
21-105410-0	N/A	Replacement Divider

4.1 Dome

The formed aluminum case dome has a flange around the open bottom end that matches a similar flange on the base plate. The inner edge of the opening, beveled at 40 degrees, compresses the O-ring against the base plate flange when the apparatus case is closed (providing an air and water-tight seal).

4.2 Base Plate

The formed aluminum base plate has a circumferential wall 1/2-inch in from the perimeter for seating the O-ring and dome. A horizontal flange, beveled on the under side, is the outer perimeter of the base plate where the cover is clamped in place by the V-band. The base plate has internal and external ground terminals and air/pressure valves or vents, depending upon the case type, pressurized or vented (Figure 2).

4.3 Air Vents/Valves/Plugs

A pressure relief valve and the air valve are used in the pressurized case applications. A breather vent and pipe plug are used in the vented case configurations. Refer to Table 1 for model numbers and descriptions, and Figure 2 for the location of the vents and valves.

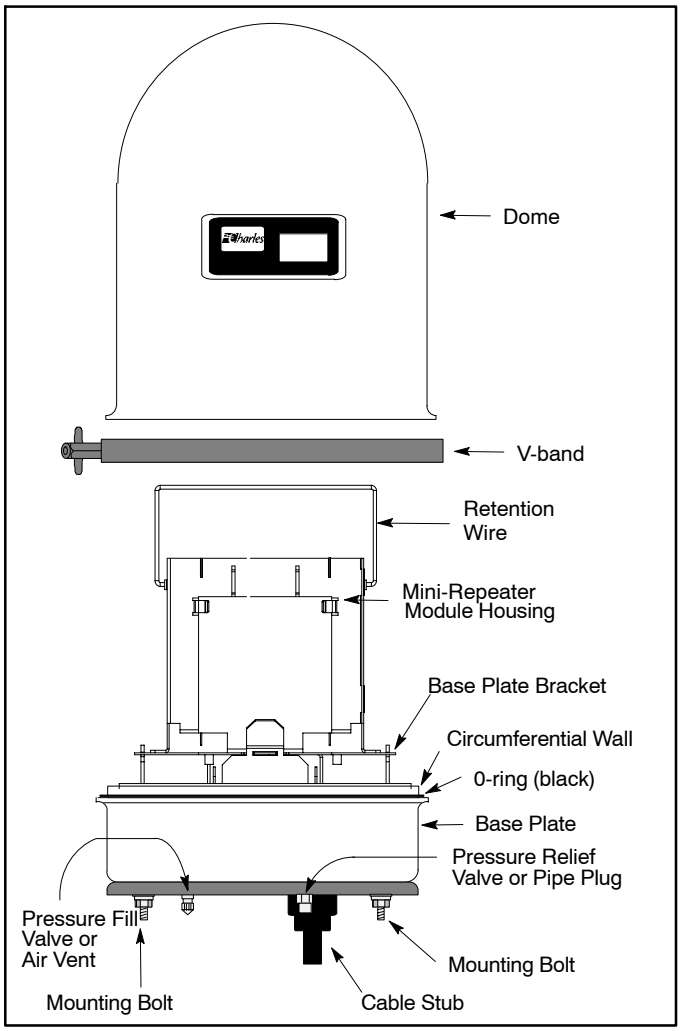


Figure 3. Removing Dome, Front View, without Mounting Bracket

4.4 Base Plate Bracket and Module Housing

An aluminum, hinged, inner base plate bracket and module housing is secured to the inside of the base plate. The module housing contains connectors for up to six T1 mini-repeaters, or six single-width ISDN repeaters, or three double-width ISDN repeaters (remove slot dividers, see Figure 5).

4.5 O-Ring

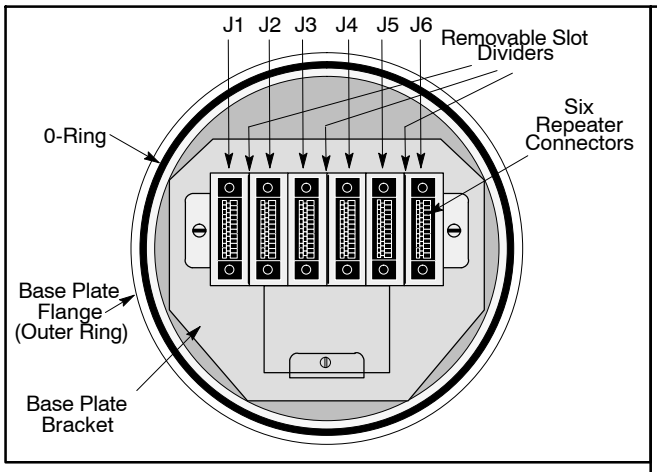
The inside diameter of the O-ring matches the outside diameter of the circumferential wall on the base plate (just inside the outer flange). This O-ring provides an air-tight seal between the dome and the base plate when it is installed properly and when the dome is secured with the V-band.

4.6 V-Band

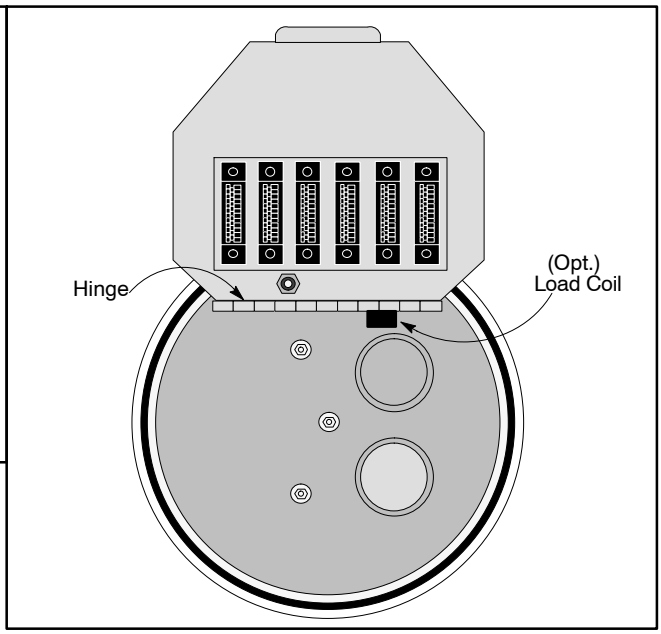
Two types of V-band assemblies are available for the AC4306 models (see Table 2). Both are stainless steel and contoured to fit around both the dome and base plate flanges when the case is in the secured position. When secured and tightened in this position, the V-band provides a weather-tight seal. To tighten the V-band, two types of latches are available.

4.6.1. Standard (Model 26438)

This 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 (Figure 6). A hinged security hasp attached to the V-band permits locking the unit with a padlock.



Module housing in locked position, exposing top of connectors (housing cover removed



Module housing rotated back on hinge, exposing bottom wire connections and base plate interior

Figure 4. Module Housing

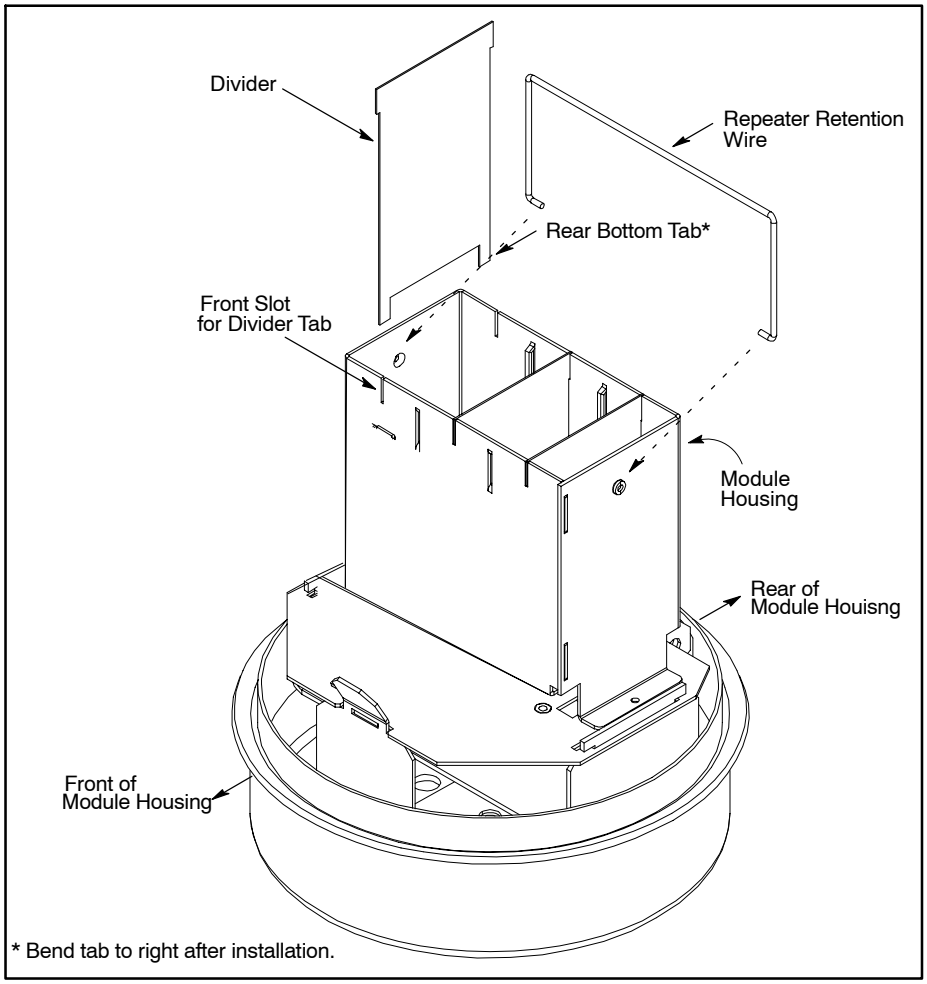


Figure 5. Slot Divider Location in Housing

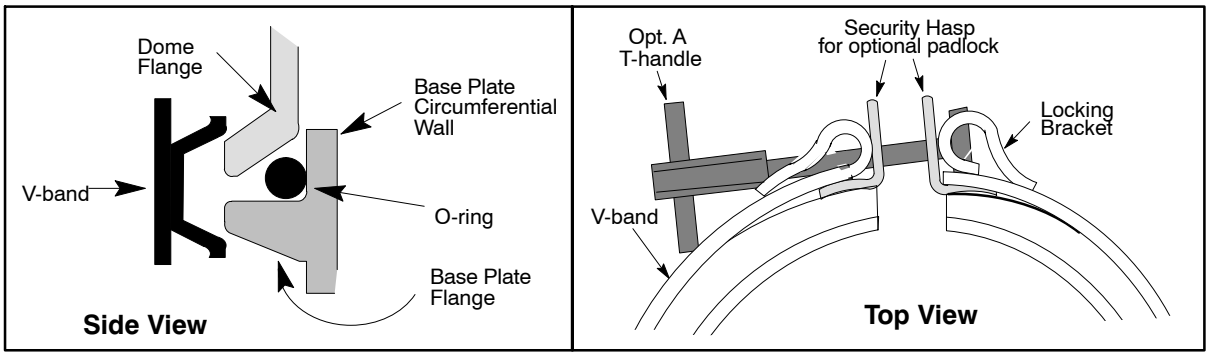


Figure 6. V-Band Assembly

4.6.2. Option (Model 042391)

This optional V-band has a hex nut-in-cup handle on a quick-release stud and a quick release latch which allows the V-band to be removed by using a can wrench (216 tool) and also allows the removal of the V-band without completely removing the hex nut handle. A hinged security hasp permits locking the unit with a padlock. If this V-band type is required for a particular application, specify model number 042391 when ordering.

4.7 Cable Stub(s)

The 24-gauge T-screened cable stub(s) provide the electrical connections between the main T1 span line cable and the T1 span line repeaters in the case. Depending on the unit, the cable is either **air-core** for use in a pressurized case or **grease-filled** for a vented application. The conductors (24 AWG, solid, annealed copper, insulated with colored solid polyolefin) are spirally wrapped with a non-hygroscopic dielectric tape and binder tape to identify the groups, then enclosed in 8 mil. aluminum wrapped longitudinally around the bundles. The stub's aluminum T-screen shield that divides the cable pairs into two groups to minimize cross talk. An extruded jacket of low-density polyetgylene compound protects the overall cable assembly from abrasion and mechanical damage.

4.8 Mounting Bracket and Hardware

Each AC4306 apparatus case comes with a galvanized steel (corrosion-resistant) mounting bracket and two 4-inch lag bolts (requires 3/4" socket) for mounting on a pole or wall (see Figure 8). If the AC4306 is mounted on a pedestal, such as the Charles Industries CRP8W-84-Ci4306, use the hardware shipped with the pedestal.

4.9 Gas-Tube Surge Arrestor (optional)

Optional gas-tube arrestors provide high voltage surge protection for the installed repeaters and fault locate filter. The Charles Industries model number CiSA-4 is a printed circuit board containing four gas tube arrestors. This board is designed to fit onto the wire-wrap connector pins for the repeaters in all Charles Industries outside-mount cases. See Figure 7.

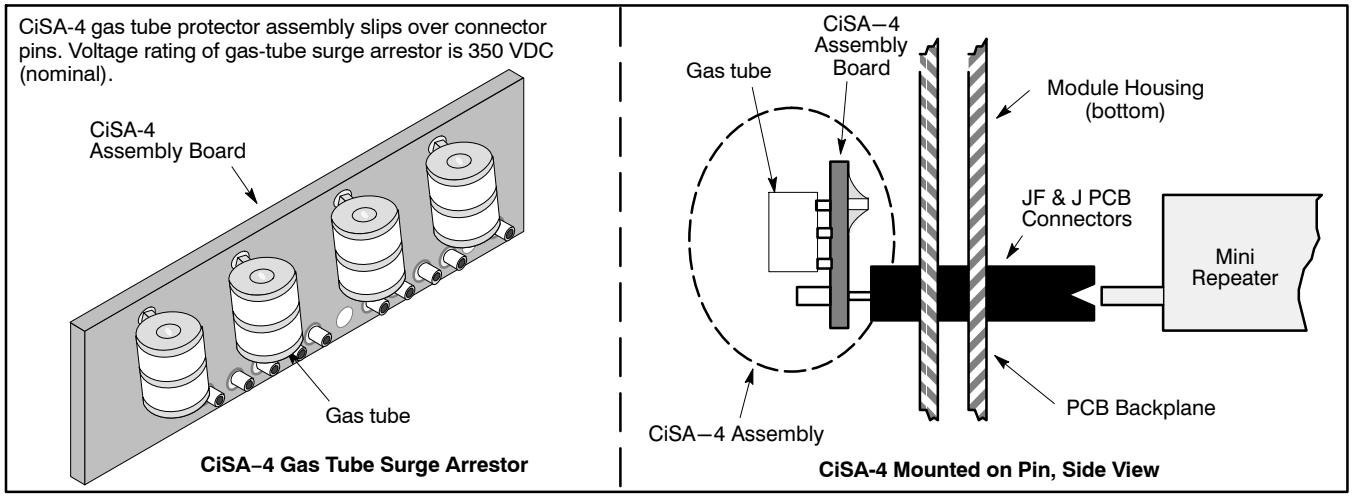


Figure 7. CiSA-4 Gas Tube Surge Arrestor Assembly, Configuration and Mounting

5. MOUNTING THE APPARATUS CASE

CAUTION

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

The AC4306 Apparatus Cases are designed to be mounted both above and below ground, on a pole, wall, or optional Charles Industries CRP8W-84-Ci4306 pedestal. Mounting applications are shown in Figure 8. Use of corrosion-resistant hardware is recommended.

5.1 Height Requirements

For any mounting application, leave enough space above the case to allow unobstructed removal of the dome (allow twice the dome height, see Figure 8).

5.2 Tools/Supplies Required

Tools and supplies required to mount the case include: Drill with 1/2" 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), and load coils (as required).

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

5.3 Pole, Wall or Manhole Mounting

To mount the AC4306 on a pole, wall or in a manhole, follow the steps below.

Step	Action
1.	**Unpack Case.** 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.	**Mount the Bracket**. Drill two holes 9.50 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.	**Mount the Case.** Remove the three nuts and lock washers from the mounting studs on the base plate bottom (see Figure 2). Position the base of the apparatus case on the mounting bracket so that the threaded studs are aligned with the three mounting bracket holes. Replace the three base plate mounting nuts and lock washers. Tighten the three mounting nuts (torque 14-15 ft. lbs).

5.4 Pedestal Mounting

Follow the manufacturer's documentation for proper installation procedures.

6. INSTALLATION

After mounting the AC4306, installation consists of removing the dome, splicing the cable stubs, making the appropriate installer connections, grounding the case, testing the span and wiring connections, inserting and testing the appropriate repeater modules, and finally, closing, pressurizing, and securing the AC4306 apparatus case. These steps are described in the following paragraphs.

CAUTION

Exercise caution whenever opening a pressurized case. The case may be pressurized when shipped from the factory or for in-service operation. Be sure to release the pressure in the case through the pressure relief valve prior to opening the case. Failure to do so may result in personal injury, apparatus case damage, or both.

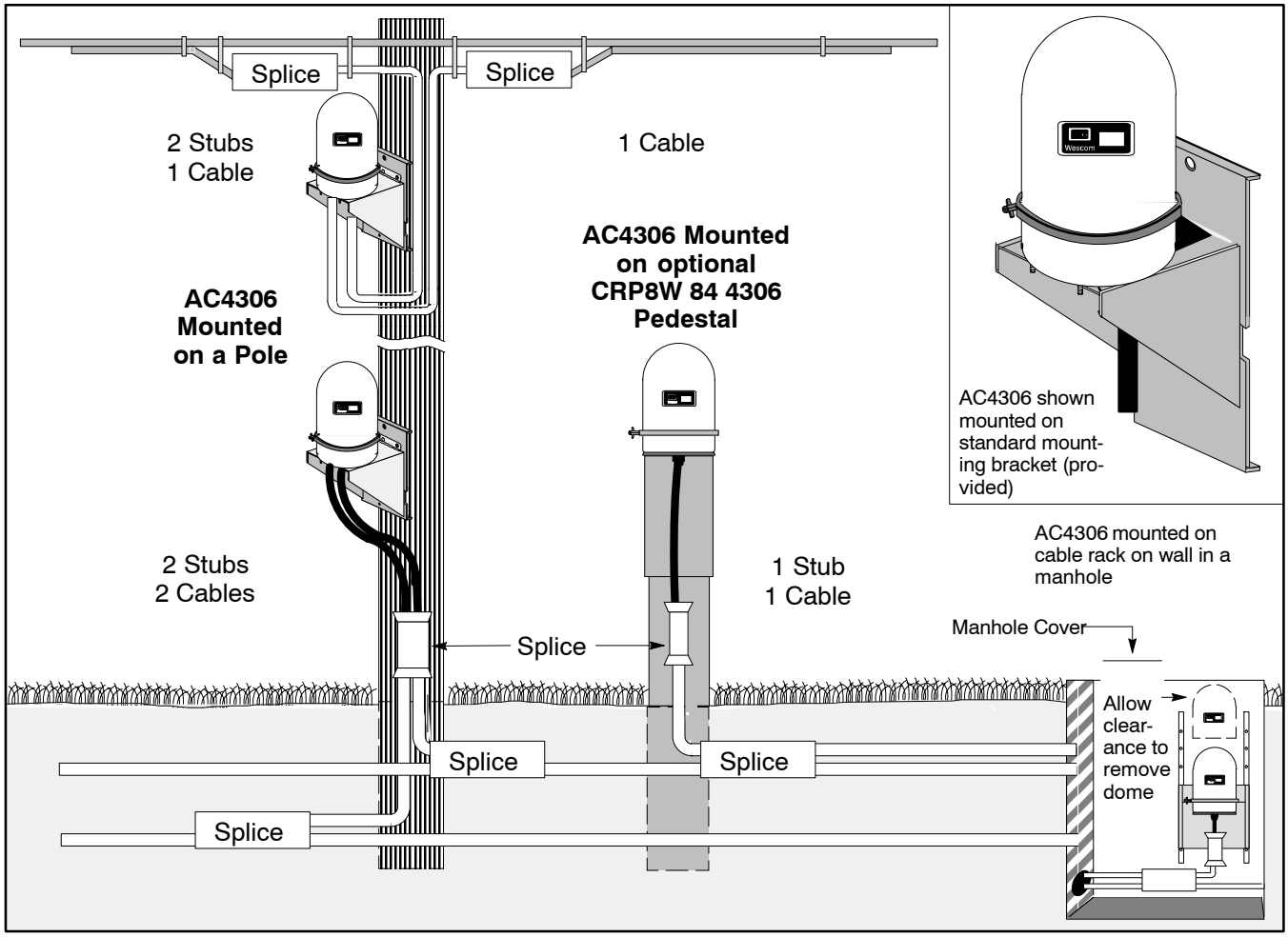


Figure 8. Mounting the AC4306

6.1 Removing the Dome

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.
4.	Gently place dome in a safe place — a damaged dome may not seal correctly.

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.

6.2 Splicing the Cable Stubs

Refer to Figure 10 through Figure 14 for T1 or ISDN splicing applications.

Note: The AC4306 apparatus cases are available in five distinct wiring configurations for both unidirectional and bidirectional spans, as shown in Figure 10 through Figure 14.

6.3 Removing, Storing, or Re-installing Slot Dividers (Field Modification)

The AC4306 is equipped and shipped with three removable circuit pack slot dividers, which when installed, create six, single-width repeater slots in the module housing. If the application requires double-width repeaters, the slot dividers can be easily removed in the field.

6.3.1. Removing Slot Dividers

The slot dividers 1, 3, and 5 on the AC4306 are easily field removable (see Figure 5)). After determining which dividers are to be removed, access the rear of the AC4306 mini-repeater module housing. At the lower edge of the module housing are three tabs bent at an approximate angle of 45 degrees. Slot divider identification begins to the right of the module housing. Counting from right to left, divider “1” is to the right of the housing, divider “3” is in the center, and divider “5” is to the left of the module. The slot dividers are made of aluminum and the protruding tabs are easily bent. Straighten the tab(s) of the divider(s) to be removed. With the tabs straightened, from the top of the apparatus case, lift the divider(s) straight up and out of the module housing.

6.3.2. Storing Slot Dividers

Dividers removed from the module housing may be discarded or stored for future use, according to company practice. Dividers to be stored for re-use may be kept in the cloth drawstring pouch provided. This pouch may be placed anywhere inside the apparatus case that does not obstruct the replacement of the dome.

6.3.3. Re-installing Slot Dividers

Use the following steps to reinstall the slot dividers:

Step	Action
1.	Straighten the bottom tab.
2.	Insert the divider into its proper slot in the module housing from the top.
3.	When the divider is fully-inserted into the module housing, bend the bottom tab to either side to about a 45 degree angle. When the divider tabs are bent in this position, the dividers will not fall out of the module housing during installation and maintenance.

6.4 Installer Connections

The apparatus case internal strapping consists of:

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

6.4.1. Load Coils (Optional)

Load coils are mounted in the lower case, as shown in Figure 4.

6.5 Grounding

A grounding network is provided on pins 1 and 10 of each mini-repeater connector (Figure 4). The connector pins are bused together by a ground wire. They are then connected with a ground wire 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 can carry 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 ms pulses (meets REA PE-60d specifications).

The AC4306 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.

6.6 Cable Testing

Perform cable testing prior to module insertion.

6.6.1. 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:

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

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.

6.6.2. Cable Pressure Tests

Cable pressure tests may be performed after the cable splice enclosure 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 nonfilled stubs are used, the air tubes in those cases should be clamped off.

6.7 Plug-in Installation

After the apparatus cases are installed and the test measurements made and recorded, install the line repeaters, fault locate filter, load coil containers and pass-thru cards, and gas tube arrestors in the inner module housing. Before installing plug-ins, remove the retention wire from the module housing by pulling the wire outward on each side. After installing the plug-ins, replace the retention wire.

6.7.1. Pass-Thru Cards/Connectors

The CS939C pass-thru connector schematic diagram is shown in Figure 9. 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 non-carrier pairs. When pass-thru cards are left in the slots of non-carrier 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.

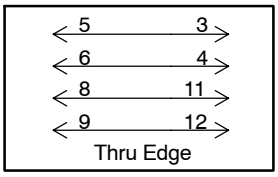
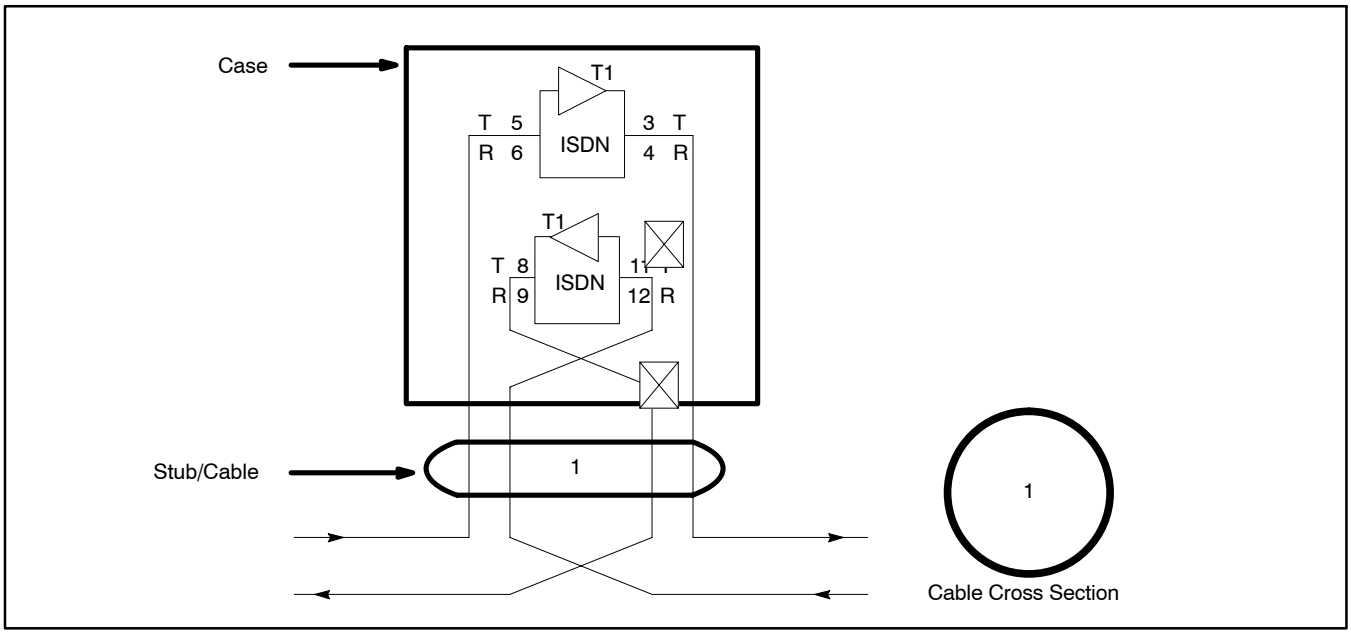


Figure 9. CS939C Pass Thru Connector

AC4306-01 & AC4306-02 1 Cable, 1 Stub, T1 Bidirectional Operation

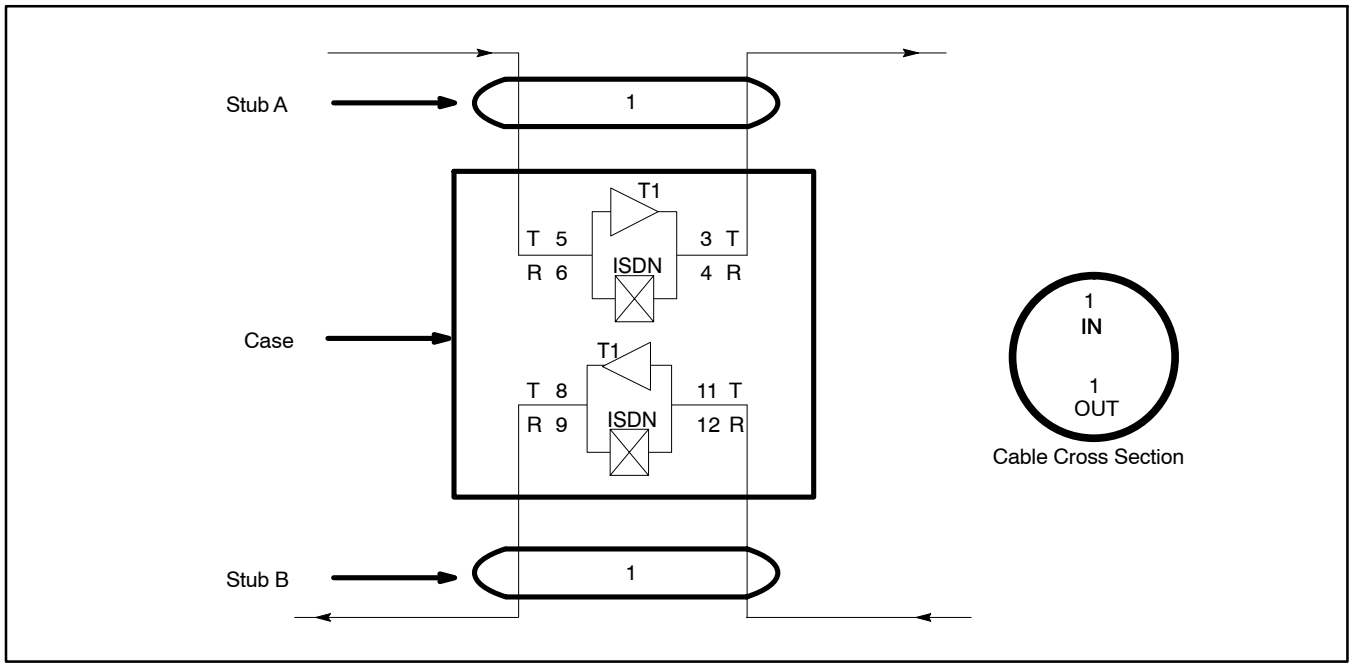


Slot #	Group 1 In Pairs		Group 2 Out Pairs		Group 1 In Pairs		Group 2 Out Pairs	
	Pin 6	Pin 5	Pin 4	Pin 3	Pin 12	Pin 11	Pin 9	Pin 8
	R	T	R	T	R	T	R	T
T1 ISDN	ISDN	CO Side	ISDN	Station Side	ISDN	Station Side	ISDN	CO Side
1 D1	BL	WH	GR	BK	OR	R	BR	Y
2	OR	WH	BR	BK	GR	R	SL	Y
3 D2	GR	WH	SL	BK	BR	R	BL	V
4	BR	WH	BL	Y	SL	R	OR	V
5 D3	SL	WH	OR	Y	BL	BK	GR	V
6	BL	R	GN	Y	OR	BK	BR	V

Note: ISDN Indicates ISDN-designated function
"D" Indicates double-width circuit pack
Unsed pairs are grounded in the base of the AC4306.

Figure 10. AC4306-01 & AC4306-02 Span Wiring

AC4306-03 & AC4306-04 2 Cables, 2 Stubs, Side 1 & 2, T1 Bidirectional Operation



Slot #	Stub A				Stub B			
	Group 1 In Pairs		Group 2 Out Pairs		Group 1 In Pairs		Group 2 Out Pairs	
	Pin 6	Pin 5	Pin 4	Pin 3	Pin 12	Pin 11	Pin 9	Pin 8
	R	T	R	T	R	T	R	T
T1 ISDN	ISDN	CO Side	ISDN	Station Side	ISDN	Station Side	ISDN	CO Side
1 D1	BL	WH	OR	R	BL	WH	OR	R
2	OR	WH	GR	R	OR	WH	GR	R
3 D2	GR	WH	BR	R	GR	WH	BR	R
4	BR	WH	SL	R	BR	WH	SL	R
5 D3	SL	WH	BL	BK	SL	WH	BL	BK
6	BL	R	OR	BK	BL	R	OR	BK

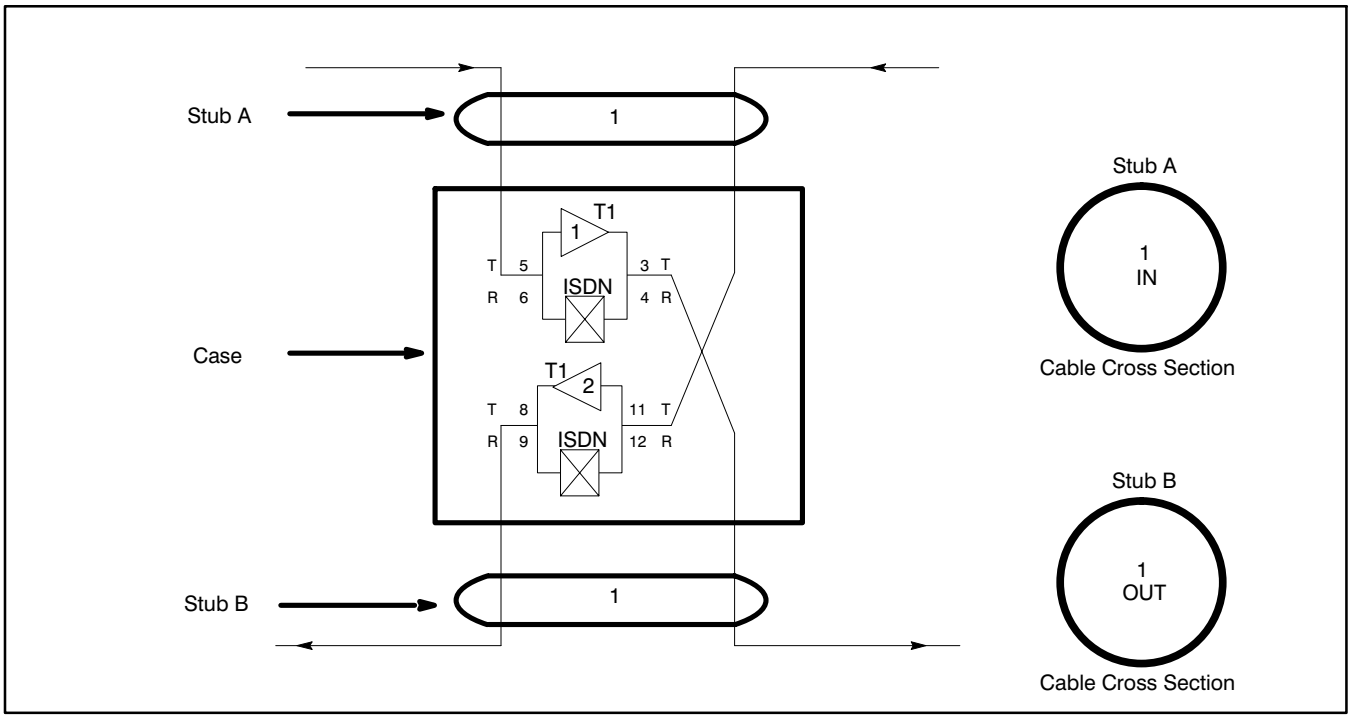
Note: ISDN Indicates ISDN-designated function

"D" Indicates double-width circuit pack

Unused pairs for both IN and OUT groups are grounded in the base of the AC4306.

Figure 11. AC4306-03 & AC4306-04 Span Wiring

AC4306-05 & AC4306-06
2 Cables, 2 Stubs, Input & Output, Spatial-Frogging, T1 Bidirectional Operation

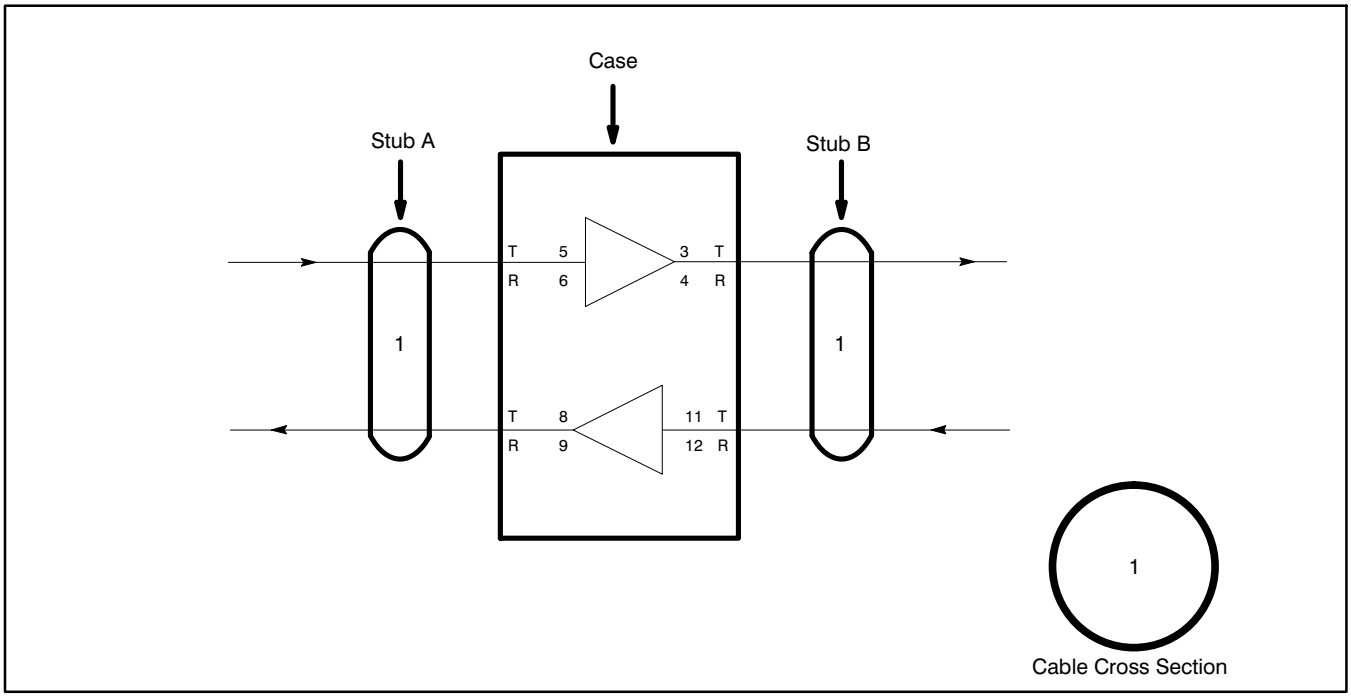


Slot #	IN Stub A				OUT Stub B			
	Group 1 In Pairs		Group 2 In Pairs		Group 1 Out Pairs		Group 2 Out Pairs	
	Pin 6	Pin 5	Pin 12	Pin 11	Pin 4	Pin 3	Pin 9	Pin 8
	R	T	R	T	R	T	R	T
T1 ISDN	ISDN	CO Side	ISDN	Station Side	ISDN	Station Side	ISDN	CO Side
1 D1	BL	WH	OR	R	BL	WH	OR	R
2	OR	WH	GR	R	OR	WH	GR	R
3 D2	GR	WH	BR	R	GR	WH	BR	R
4	BR	WH	SL	R	BR	WH	SL	R
5 D3	SL	WH	BL	BK	SL	WH	BL	BK
6	BL	R	OR	BK	BL	R	OR	BK

Note: [ ] Indicates ISDN-designated function
"D" Indicates double-width circuit pack
Unused pairs for both IN and OUT groups are grounded in the base of the AC4306.

Figure 12. AC4306-05 & AC4306-06 Span Wiring

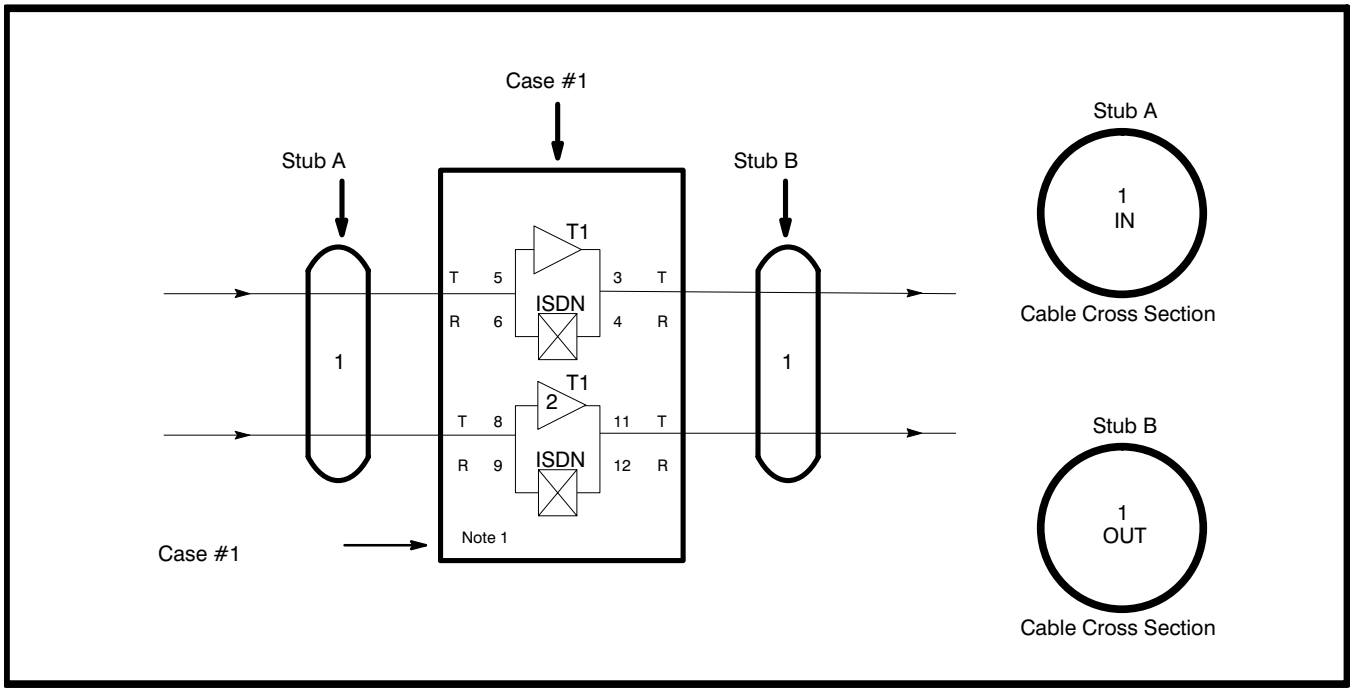
AC4306-07 & AC4306-08
1 Cable, 2 Stubs, East & West, Bidirectional Operation



Slot #	Stub A				Stub B			
	Group 1 In Pairs		Group 2 Out Pairs		Group 1 In Pairs		Group 2 Out Pairs	
	Pin 6	Pin 5	Pin 9	Pin 8	Pin 12	Pin 11	Pin 4	Pin 3
	R	T	R	T	R	T	R	T
1	BL	WH	OR	R	BL	WH	OR	R
2	OR	WH	GR	R	OR	WH	GR	R
3	GR	WH	BR	R	GR	WH	BR	R
4	BR	WH	SL	R	BR	WH	SL	R
5	SL	WH	BL	BK	SL	WH	BL	BK
6	BL	R	OR	BK	BL	R	OR	BK
					Unused pairs for both IN and OUT groups are grounded in the base of the AC4306.			

Figure 13. AC4306-07 & AC4306-08 Span Wiring

AC4306-09 & AC4306-10
2 Cables, 2 Stubs, East & West, T1 Unidirectional Operation



Slot #	Stub A				Stub B			
	Group 1 In Pairs		Group 2 In Pairs		Group 1 Out Pairs		Group 2 Out Pairs	
	Pin 6	Pin 5	Pin 9	Pin 8	Pin 4	Pin 3	Pin 12	Pin 11
	R	T	R	T	R	T	R	T
T1 ISDN	ISDN	CO Side	ISDN	Station Side	ISDN	Station Side	ISDN	CO Side
1 D1	BL	WH	OR	R	BL	WH	OR	R
2	OR	WH	GR	R	OR	WH	GR	R
3 D2	GR	WH	BR	R	GR	WH	BR	R
4	BR	WH	SL	R	BR	WH	SL	R
5 D3	SL	WH	BL	BK	SL	WH	BL	BK
6	BL	R	OR	BK	BL	R	OR	BK

Note 1: Side 2 reversal is accomplished in CS239B unidirectional repeater.

Note 2: Unused pairs for both IN and OUT groups are grounded in the base of the AC4306

Note 3: [ ] Indicates ISDN-designated function

"D" Indicates double-width circuit pack

Figure 14. AC4306-09 & AC4306-10 Span Wiring

6.7.2. Load Coil Containers

The CS184D1 load coil container schematic diagram is shown in Figure 15. The load coil containers may be installed in slots of non-carrier pairs to improve the quality of voice frequency transmission.

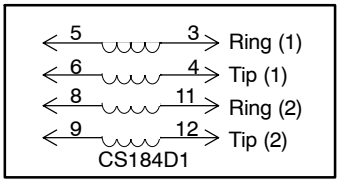


Figure 15. Load Coil Container (with 2 coils)

6.7.3. Line Repeaters

The Charles Industries CS239A, B, or E mini line repeaters are installed in all slots except the large separate slot that is for the fault locate filter. 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 loop-back 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.

6.7.4. 270F Addressable Repeaters

The 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, see the Charles documentation or contact the CI Customer Service Department.

6.7.5. Gas Tube/Surge Arrestor Installation

The optional CiSA-4 gas tube surge arrestor assemblies contain four 3-element gas tubes on a protector mounting board. The protector mounting board assembly contains 10 receptacles that fit over the wire-wrap pins on the J connectors (Figure 16, and Figure 7), providing surge protection for the cable pairs. The protector mounting board is plugged onto the J connector wire-wrap pins as needed. There is a protective cover that prevents damage or service interruption to the wire-wrap pins when the inner module is opened.

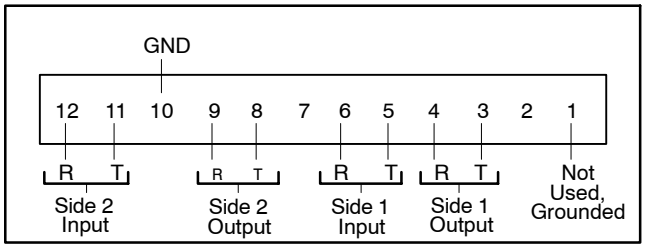


Figure 16. J-Connector Pin Assignment Key, J1-J6

6.8 Case Closure and Pressurization

After the installation and testing of the case is completed, the case dome is installed and secured.

CAUTION

Pressurized cases must only be used in below-ground applications.

CAUTION

A padlock is recommended for pressurized cases to avoid possible personal injury.

6.8.1. Closing Pressurized Cases

The AC4306 apparatus cases with air-core stubs can be pressurized with either dry air or nitrogen. To install the case dome in pressurized case applications, proceed as follows:

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.

Step	Action
1.	For cases with air-core stubs, close off the air tube in the bottom of the lower case. If the apparatus case is to be pressurized from the main cable, the air tube remains open.
2.	Coat O-ring with Dow silicon grease (or similar product).
3.	Place dome over the module housing, making sure that the dome flange fits flush on the base plate flange.
4.	Install the V-band around the dome and base plate flanges (Figure 6). Hand tighten the T-bolt. Clamp the V-band tightly in place, making sure the T-handle is perpendicular to the case.
5.	After securing the apparatus case dome, pressurize the apparatus case to 10 psi, through the base plate air valve or main cable.
6.	Allow the case pressure to stabilize for one hour.
7.	Use a gauge on the pressure fill valve to measure the pressure inside the case. Record the reading.
8.	Allow the case to stabilize for at least one additional hour.
9.	Measure the pressure again; record the reading.
10.	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.
11.	If the case fails to hold pressure when checked in the step above, perform all the steps again.

6.8.2. Closing Vented Cases

To install the dome on the AC4306 used in vented (non-pressurized) installations, proceed as follows:

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.

Step	Action
1.	Coat O-ring with Dow silicon grease (or similar product).
2.	Place dome over the module housing, making sure that the dome flange fits flush on the base plate flange.
3.	Install the V-band around the dome and base plate flanges. Hand tighten the T-bolt. Clamp the V-band tightly in place, making sure the T-handle is perpendicular to the case.
4.	After the V-band clamp has been tightened, swing security hasp over T-handle and locking bracket. Insert padlock or bolt into the locking bracket, to secure hasp.

6.9 Opening Pressurized Cases

To open a pressurized case, follow the steps below.

CAUTION

Exercise caution whenever opening a pressurized case. The case may be pressurized when shipped from the factory or for in-service operation. Be sure to release the pressure in the case through the pressure relief valve 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 2).
2.	Remove any company provided locks or seals that may be secured to the V-band security hasp.
3.	Loosen V-band T-handle and remove the V-band.
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.

7. 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)

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)
FAX: 847-806-6231

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 preaddressed 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.

9. SPECIFICATIONS

See Table 3 for the physical characteristics of the AC4306.

Table 3. Physical Specifications

Feature	U.S.	Metric
Diameter, Dome	7.63 inches	19.4 centimeters
Height, Dome	10 inches	25.4 centimeters
Circumference, Dome	25 inches	63.5 centimeters
Height, Mounting Bracket	15.25 inches	38.7 centimeters
Height, Case & Mounting Bracket	23.5 inches	59.7 centimeters
Width, Mounting Bracket	8.5 inches	21.6 centimeters
Depth, Mounting Bracket	10.5 inches	26.7 centimeters
Weight, Case (not including stubs or mounting bracket)	8.6 lbs.	3.9 kilograms
Weight, Mounting Bracket & Hardware	10.0 lbs.	4.54 kilograms
Cable Stub (nominal)	30 feet	9.14 meters
Temperature	–40 to 140°F	–40 to 60°C
Humidity	To 100%	
Pressure	10 psi (g) nominal; Design tested to 30 psi (g)	
T1 Capacity	6 mini T1 repeaters + 1 standard fault locate filter	
ISDN Capacity	6 mini T1 repeaters or 3 double-width repeaters	
Case Color	White enamel	
Mounting Bracket Material	Galvanized steel	