

FCC requirements § 2.1033 (b)(3)

INSTALLATION MANUAL

Chapter 5 of MultiGain Wireless System Installation & Maintenance Manual (FAU description), furnished to the user of the radio transmitting device, is attached.

CHAPTER 5

FAU AND PCU INSTALLATION PROCEDURES

5.1 INTRODUCTION

5.1.1 PURPOSE OF THIS DOCUMENT

This document provides step by step instructions for the installation of the FAU and the PCU.

Note: There are two types of PCUs: one PCU with a plastic case and another with a metallic case.

5.1.2 HOW TO USE THIS DOCUMENT

Use the following descriptions to become familiar with the contents of this document. It contains the following sections:

Section 5.1 - Introduction , describes the contents of this document.

Section 5.2 - General.

Section 5.3 - FAU and PCU Inputs and Outputs.

Section 5.4 - Unpacking.

Section 5.5 - Safety.

Section 5.6 - Equipment, Tools and Accessories Required.

Section 5.7 - Power Requirements.

Section 5.8 - FAU Site Selection and Preparation.

Section 5.9 - FAU Installation Options.

Section 5.10 - PCU Installation.

Section 5.11 - PCU Site Selection and Preparation.

Section 5.12 - PCU Installation and Connection to the FAU.

Section 5.13 - Final FAU-PCU Installation Checks.

Section 5.14 - General Guidelines for Site Installation.

Section 5.15 - Legal Restrictions.

Section 5.16 - Subscriber Service Restrictions.

Section 5.17 - FAU - FCC Requirement.

Section 5.18 - Touch FAU.

Section 5.19 - RSSI (Radio Signal Strength Indication) Tables.

5.1.3 REVISIONS TO THIS DOCUMENT

This is issue 7 of this document.

5.1.4 TRADEMARKS

MultiGain Wireless is a registered trademark of Tadiran Telecommunications, Ltd.

5.1.5 ACRONYMS AND ABBREVIATIONS

The following alphabetical list defines acronyms and other abbreviations used in this document:

FAU	Fixed Access Unit
PCU	Power Supply and Charger Unit
RSSI	Radio Signal Strength Indication

5.2 GENERAL

This section provides step by step instructions for the installation of the FAU unit. The following procedures are covered. Installation of the FAU unit, installation of the PCU unit, and connection of the FAU unit to the PCU unit. In addition, this section provides description of the Touch FAU features and reference tables for RSSI measurements.

Figure 5-1 depicts how the FAU and PCU units are combined in a typical apartment building.

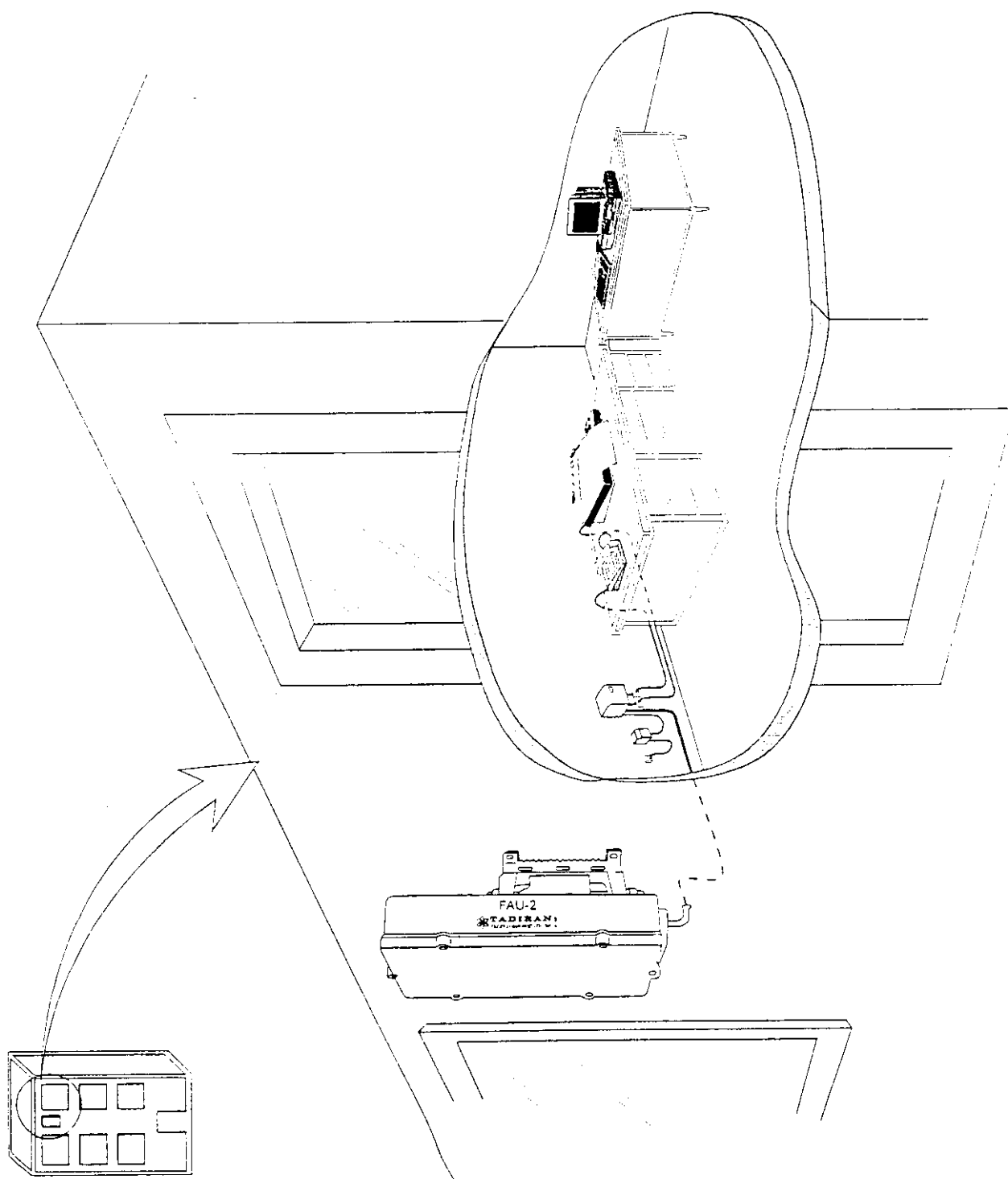


Figure 5-1. FAU-PCU Combination in a Typical Apartment Building

5.3 FAU AND PCU INPUTS AND OUTPUTS

Figure 5-2 shows two possible configurations of the Inputs and Outputs of the FAU and PCU, which are as follows:

Configuration I:

- FAU-1 or FAU-2 and PCU are interconnected by standard telephone and DC supply cables.
- PCU provides telephone lines for subscriber premises wiring.
- PCU connected to local mains through step/down transformer.

Configuration II:

- FAU-1 or FAU-2 or FAU-4 and PCU are interconnected by DC supply cable only.
- FAU-1 or FAU-2 or FAU-4 provides telephone lines for subscriber premises wiring.
- PCU connected to local mains through step/down transformer.

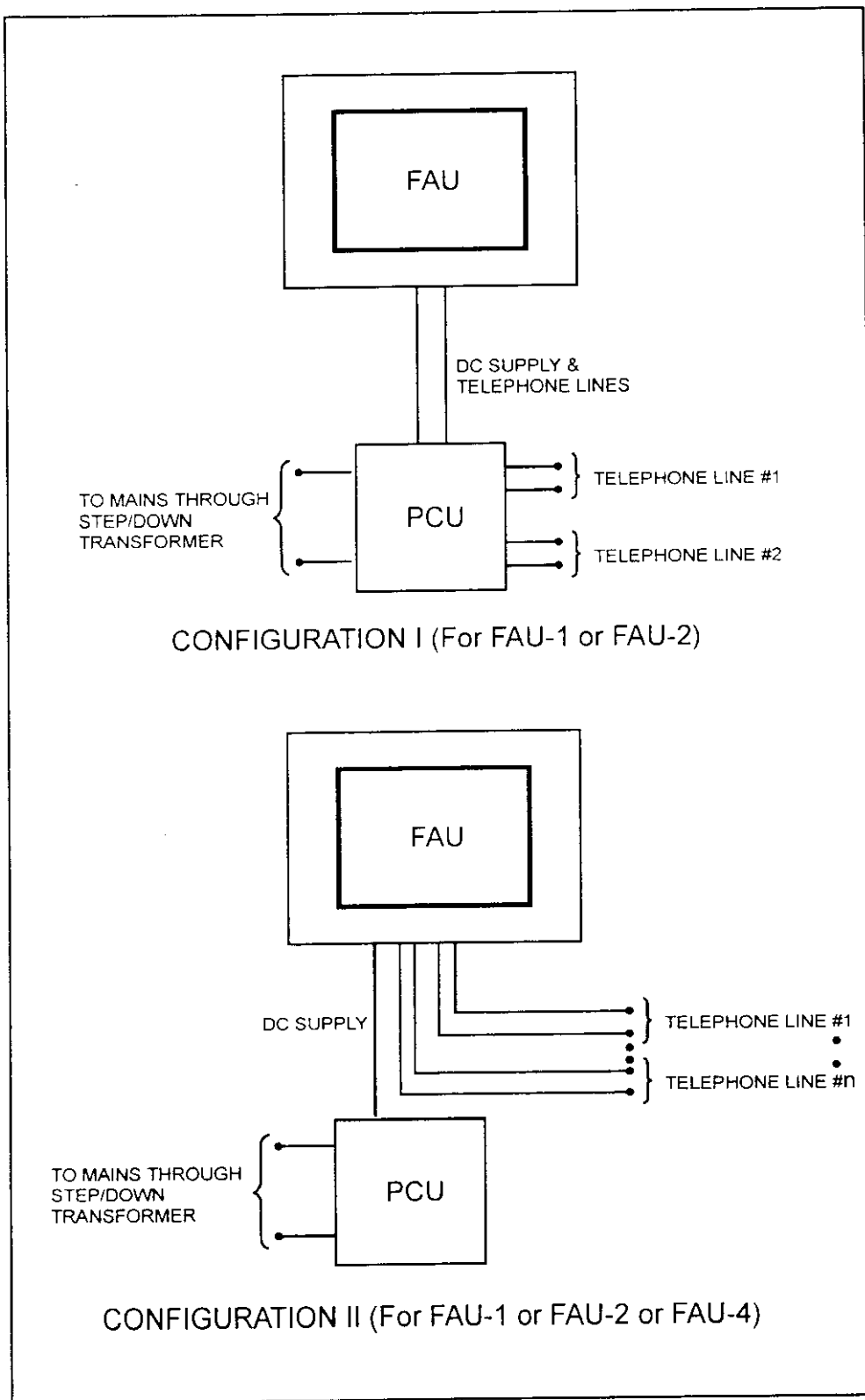


Figure 5-2. FAU and PCU Inputs and Outputs

5.4 UNPACKING (FAU, PCU)

The top of the packing container should be opened, and the FAU and PCU units, together with their accessories should be carefully taken out, and placed on a flat, clean surface. The received items should be checked against the packing list, and inspected for signs of damage.

5.5 SAFETY

Technical staff must be suitably qualified to undertake installation and maintenance of this equipment. The FAU runs on -48 volts DC, that are supplied to it by the PCU unit, which is in turn connected to the mains supply. However, even if the PCU unit is disconnected, the voltage is still present, and is in this case derived from the PCU's internally charged battery. When the FAU unit is powered, it emits microwave radiation. Therefore, the FAU should not be powered during installation.

The possibility of an FAU, or its supporting mast, being subjected to lightning, or accidental contact with fallen power lines, must be taken into consideration, during equipment installation. The FAU does not include a power switch, and therefore begins operating as soon as the power is applied to the PCU to which it is connected. Suitable protection must be provided by the customer.

5.6 EQUIPMENT, TOOLS AND ACCESSORIES REQUIRED

5.6.1 FAU AND PCU

The FAU installation kit contains the following:

- FAU Unit and FAU mounting kit (see Figure 5-3).
- PCU Unit(s).
- AC transformer(s).

5.6.2 INSTALLATION TOOLS AND ACCESSORIES LIST

The following tools and accessories are required for FAU installation:

- Screwdrivers (Flat, Phillips).
- Set of metric cup wrenches.
- Cable ties, quantity as required.
- Communication cable (6 meters) with RS-232 adapter.
- Notebook PC including HHT. software.
- Outdoor Cable (refer to para. 5.6.3).
- Telephone set with applicable cable to PCU.
- Telescopic extension pole for FAU (pre-check).
- 1.25# wide 2m long pole for the FAU installation.
- Fixture device for pole mounting onto a wall, or fixture device for mounting the pole at a distance from the wall.
- Distribution Box (see Figure 5-4).
- PVC Arc Pipe (see Figure 5-5).
- PVC Pipe (see Figure 5-6).
- PVC Cable Tray (see Figure 5-7).
- Applicable tools including a drilling machine and drills.
- Various bands (size and material).
- Ladder.
- Compass.
- Site-area map.
- Cellular telephone for communication between different sites.

Figure 5-3 shows the FAU with its front cover removed to reveal the WAGO-231 connector for the telephone line (and the power supply) and the D-type communications connector.

Figure 5-4 shows a distribution box and Figure 5-5 shows how FAU outdoor installation is accomplished using PVC piping and sealant. Pipe installation onto a wall and PVC cable channeling are illustrated by Figures 5-6 and 5-7 respectively.

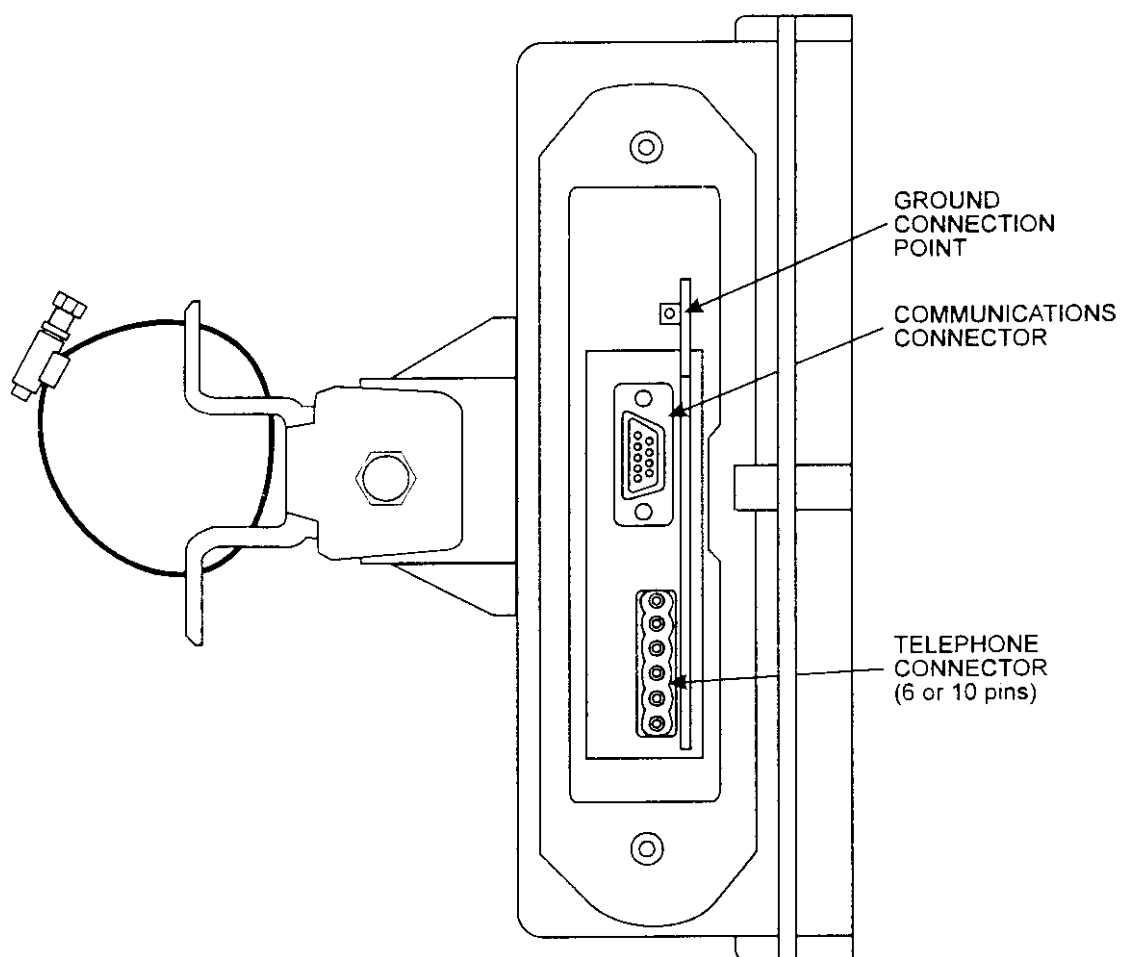


Figure 5-3. FAU with Front Cover Removed

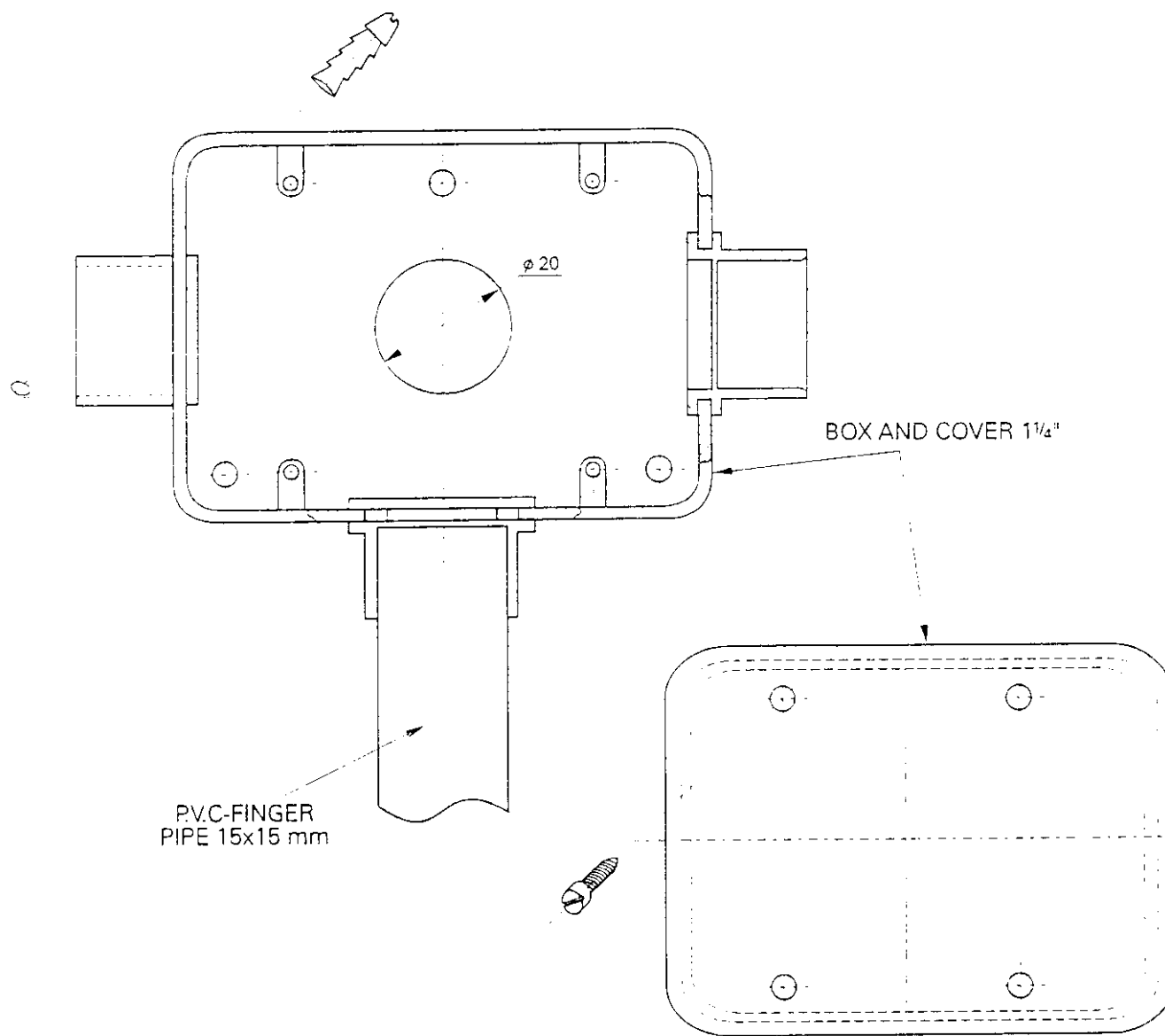


Figure 5-4. Distribution Box

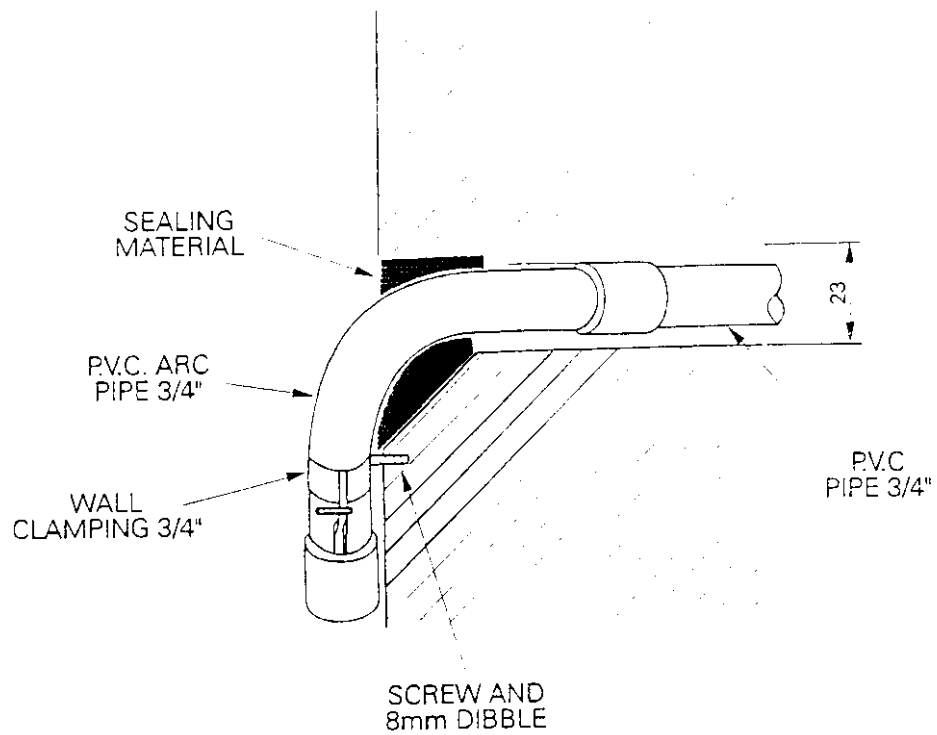


Figure 5-5. FAU Outdoor Installation

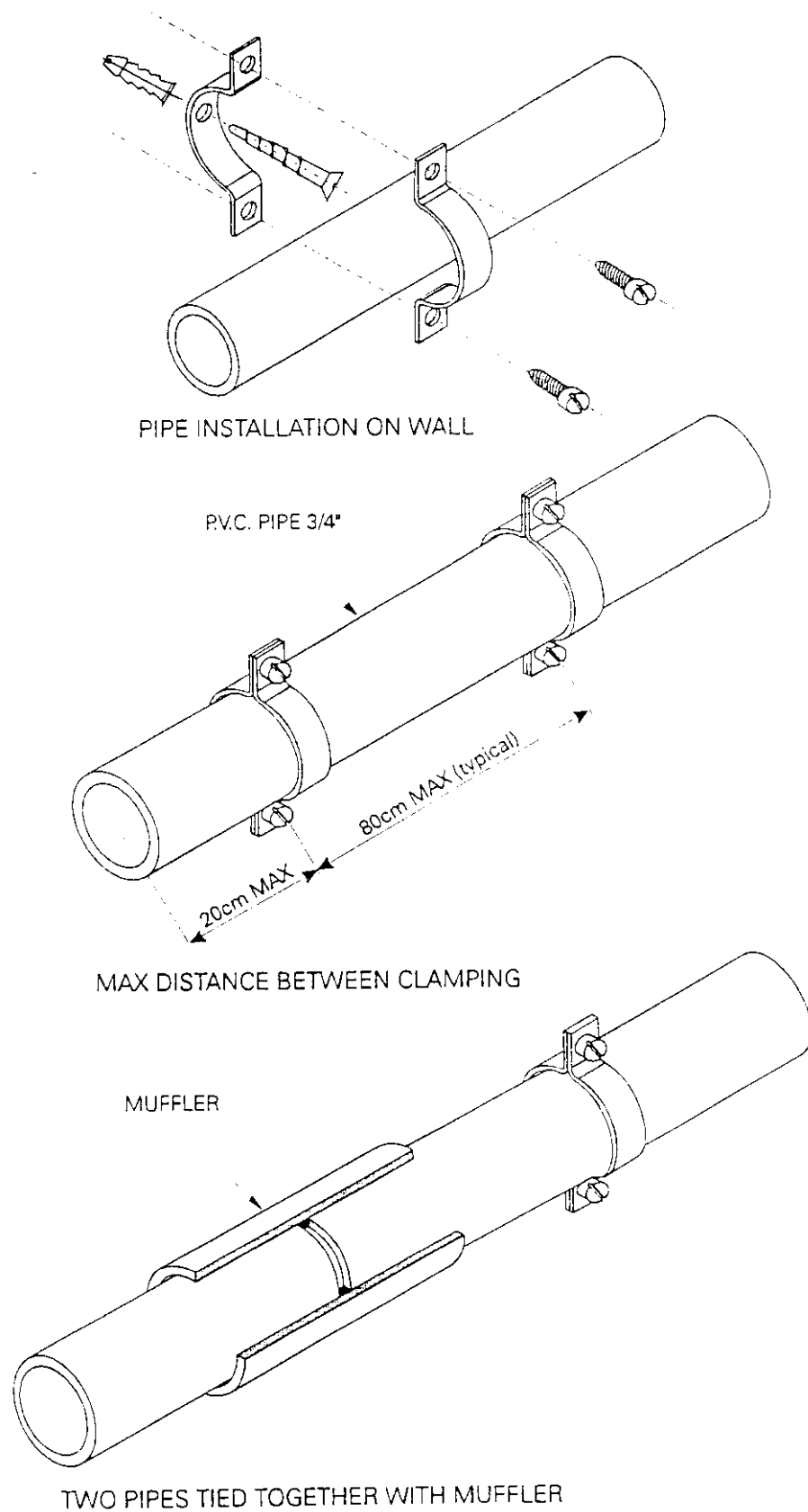


Figure 5-6. PVC Pipe Installation

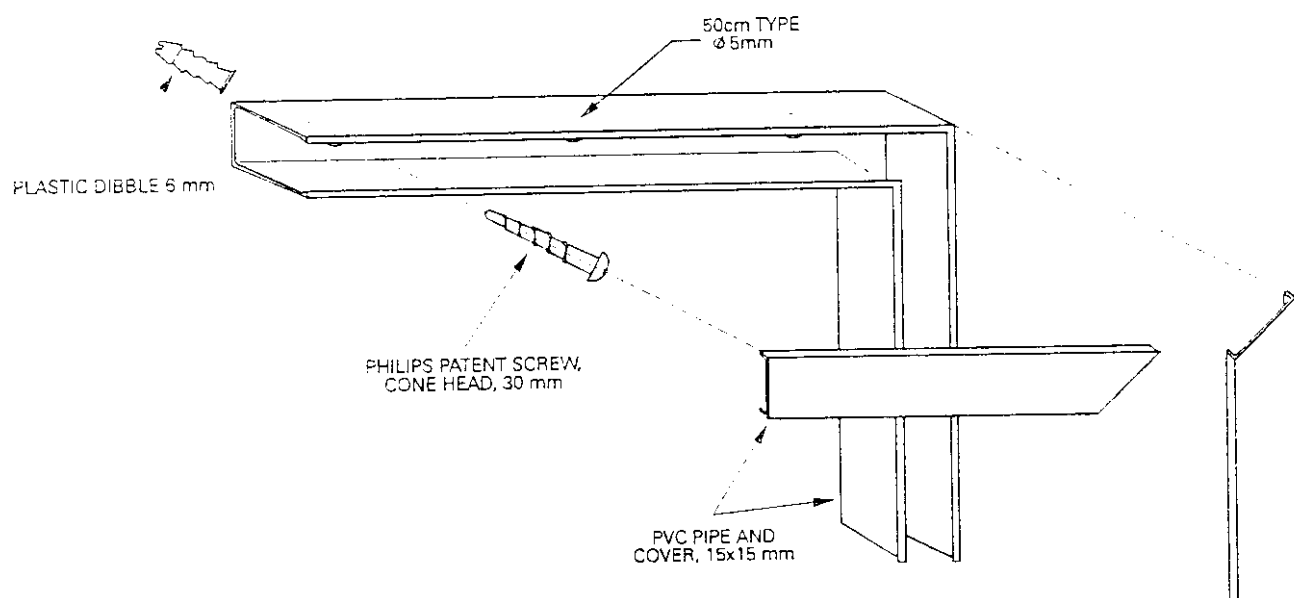


Figure 5-7. PVC Cable Channeling

5.6.3 CABLES (Refer to Figures 5-13 through 5-17)

Table 5-1 lists and describes the cables required for five typical installation options which are as follows:

- Option 1: One FAU-2 providing service through Distribution Frame directly to two subscribers located at different premises.
One PCU is utilized.
- Option 2: One FAU-1 providing service directly to one subscriber or one FAU-2 providing service directly to up to two subscribers or one FAU-4 providing service directly to up to four subscribers located at the same premises.
One PCU is utilized.
- Option 3: One FAU-1 providing service through the PCU to one subscriber or one FAU-2 providing service through the PCU to up to two subscribers located at the same premises.
One PCU is utilized.
- Option 4: One FAU-2 providing service directly to two subscribers located at different premises.
Two PCUs are utilized.
- Option 5: One FAU-2 providing service through the PCU to two subscribers located at different premises.
Two PCUs are utilized.
- Option 6: One FAU-4 providing service through Distribution Frame directly to four subscribers located at different premises.
One PCU is utilized.

Table 5-1. FAU and PCU Cabling

Cable Type	Purpose	Cable Description
3 x 2 x 0.5 5 x 2 x 0.5	Option 1: FAU - Distribution Frame Options 2 and 4: FAU - Telephone equipment. Option 3: FAU - PCU Option 5: FAU - PCU (x2)	Outdoor cable (UV protected) and solid conductor
1 x 2 x 0.5	Option 1: PCU - Distribution Frame Option 6: PCU - Distribution Frame	Indoor cable and solid conductor
1 x 2 x 0.5	Option 1: Distribution Frame - Telephone equipment Options 2 and 4: FAU - Telephone equipment Option 3: PCU - Telephone equipment Option 5: PCU - Telephone equipment (x2) Option 6: Distribution Frame - Telephone (x4)	Indoor cable and solid conductor
5 x 2 x 0.5	Option 6: FAU - Distribution Frame (FAU-4 Case)	Outdoor cable (UV protected) and solid conductor

5.6.4 FAU INSTALLATION TICKET

A FAU Installation ticket contains subscriber and associated equipment information, and should be used by the installation technician.

Table 5-2 shows an example of an FAU installation ticket.

Table 5-2. FAU Installation Ticket

No.	Issue	Data
1	Subscriber name	
2	Phone No.	
3	FAU TID	
4	FAU No. (SU#)	
5	Port No.	
6	RPU RSSI (dBm)	
7	RPU WER	
8	FAU RSSI Active (dBm)	
9	FAU WER	
10	FAU Height (m)	
11	Time Diversity Y/N	
12	Line of Site Y/N	
13	FAU-RPU Range (m)	
14	Inst. Date	

5.7 POWER REQUIREMENTS

The FAU receives -48 VDC from the PCU unit (derived from the mains voltage), via a connecting cable. The PCU back-up battery can supply up to eight hours of power to the FAU, in the event of a mains failure, or a fault occurring in the PCU unit. The maximum length of the cable which links the PCU to the FAU depends on the DC resistance of the cable pairs, and can exceed tens of meters when telephone cable of thickness 0.4 mm or thicker is used.

When two PCUs are used per FAU-2 (e.g., one PCU at each subscriber premises), the two PCUs feed the same FAU-2 simultaneously, although a single PCU can provide the FAU-2's power requirements.

5.8 FAU SITE SELECTION AND PREPARATION

WARNING

The FAU includes a built-in antenna.

In order to prevent system malfunction or service degradation, ensure that no foreign elements such as stickers, paints, etc. cover partially or totally the FAU enclosure.

It is highly recommended to locate warning signal indicators near the FAU's installation site, according to the country and/or PTT standards.

WARNING

Microwave radiation (0.5 Watt) is emitted by the antenna during normal operation.

The FAU is designed for outdoor installation and can be placed in any location on a pole, roof, or wall. The FAU's built-in antenna, situated under its front cover, radiates outwards with a relatively wide radiation spread pattern of 28° elevation, and 40° azimuth, making FAU alignment an easy task. The PCU can be located anywhere on the subscriber's premises where a mains supply is available.

The following criteria should be taken into account when selecting a location for FAU installation:

- a. RF reception level:
 1. A clear line of sight should exist between the RPU and FAU units.
 2. RF reception due to reflection should be avoided.
 3. For optimal reception, minimal Word Error Rate (WER) and minimal Time Diversity are required.
- b. Height selection for the unit installation:
 1. Accessibility for maintenance should be considered.
 2. The unit is usually installed above the highest point of the roof level in order to avoid RF interference.
 3. The unit should be installed at a minimal height of 3 meters in order to prevent unauthorized persons from reaching it.
- c. Safety:

Construction or installation over non-permanent items, such as solar heaters, etc. is not permitted.
- d. Utilities:

The FAU should be located adjacent to the relevant house utility systems (power, telephone cables etc.).
- e. Customer Confirmation:

The customer or the responsible person at the site should confirm the planned FAU location and AC outlet connection.

5.8.1 FAU INSTALLATION PRE-CHECKS

The following FAU installation pre-checks must be performed:

- a. Install the FAU on the telescopic extension pole for pre-checking.
- b. Connect the communication cable to the FAU and computer (see Figure 5-3).
- c. Prepare a 2x3w cable for the pre-installation test.
- d. Connect the telephone connector to the 2x3w cable.
- e. Verify that the battery is connected to the PCU.
- f. Connect the wires of the 2x3w cable on the PCU side (see Figure 5-12).
- g. Connect a telephone set to the PCU.
- h. Connect the telephone connector to the FAU (see Figure 5-3).
- i. Find a suitable place for installation as described in para. 5.8.
- j. Find the estimated RPU direction using the map and compass.
- k. Using the extension pole, aim the FAU in the estimated RPU direction.
- l. Activate the HHT unit (Dimon software if a portable computer is used).
- m. Measure the RSSI and WER using the HHT.
- n. In case of poor results, find an alternative place for the FAU (height and direction), and then repeat step n.
- o. Using the cellular phone, check the results on the RPU side.
- p. If the results are acceptable, mark the designated installation site.
- q. Show the designated installation site to the customer and obtain permission to start the final installation.

5.9 FAU INSTALLATION OPTIONS

5.9.1 FAU POLE MOUNTING

The FAU unit may be mounted on a pole which is attached to a wall. The mounting method depends on whether the building has a flat or slanting roof. Figures 5-8 and 5-9 show the flat and slanting roof methods respectively.

5.9.1.1 Flat Roof Pole Mounting (refer to Figure 5-8)

Pole mounting on a flat roofed building is accomplished according to the following procedure:

- a. Select a metal pole approximately 2.5 m long and 2 inches in diameter.
- b. Attach the pole clamps to the wall by fixing four 8 mm dibbles and screws. The distance between two adjacent clamps should be at least 60 cm and the minimal clearance between a clamp and the roof should be at least 50 cm.
- c. Drill a 10mm hole through the pole using the existing hole of the lower clamp.
- d. Fix the pole to the lower clamp using a 3/8" screw.
- e. Install cable(s) as described in para. 5.9.3.
- f. Place the FAU onto the pole according to section 5.9.1.3.
- g. Connect ground cable to a good ground outside the subscriber house.
- h. At the FAU, insert the ground cable through the grommet, crimp it to a cable terminal and then, connect the cable to the FAU chassis.

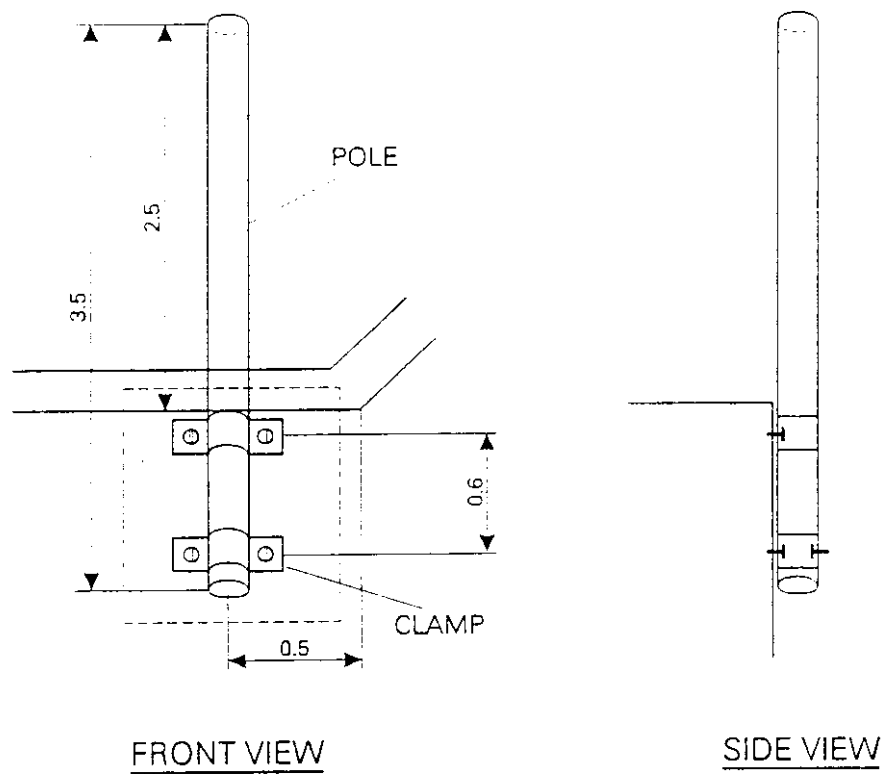


Figure 5-8. Flat Roof Pole Mounting

5.9.1.2 Slanted Roof Pole Mounting (refer to Figure 5-9)

In this case the pole must be installed at a certain distance from the wall. A fixture element in the form of a U is used for this purpose, and the installation procedure is as follows:

- a. Select a metal pole approximately 2.5m long and 2 inches in diameter.
- b. Mount two U shaped fixture elements onto the wall at a distance of 50 cm apart using screws and dibbles.
- c. Attach the pole clamps to the U Shaped fixtures using the appropriate screws.
- d. Attach the pole to the lower clamp using a 3/8" screw.
- e. Install cable(s) as described in para. 5.9.3.
- f. Place the FAU onto the pole according to paragraph 5.9.1.3.

5.9.1.3 FAU Attachment To Pole

The FAU unit is mounted on a pole, using a supplied standard swivel mount as shown in Figure 5-10, and should be installed according to the following procedure:

- a. Check that the bracket screw used to fasten the rear bracket of the FAU swivel mount is tight.
- b. If the FAU is located near the top of the pole, release the mounting straps as necessary, and then slide the FAU over the pole to the required location.

If sliding the FAU over the pole is not possible, perform the following:

1. Completely open the straps.
 2. Hold the FAU unit at the required location on the pole.
 3. Wrap the mounting straps around the pole.
- c. Use a screwdriver to tighten the straps over the pole by turning the screws provided clockwise. Do not use excessive torque.
 - d. Orient the FAU front towards the RPU by rotating it around the swivel mount axis. Use a magnetic compass if the line of sight is obstructed.
 - e. Tighten the nuts at the two ends of the axis. Do not use excessive torque.

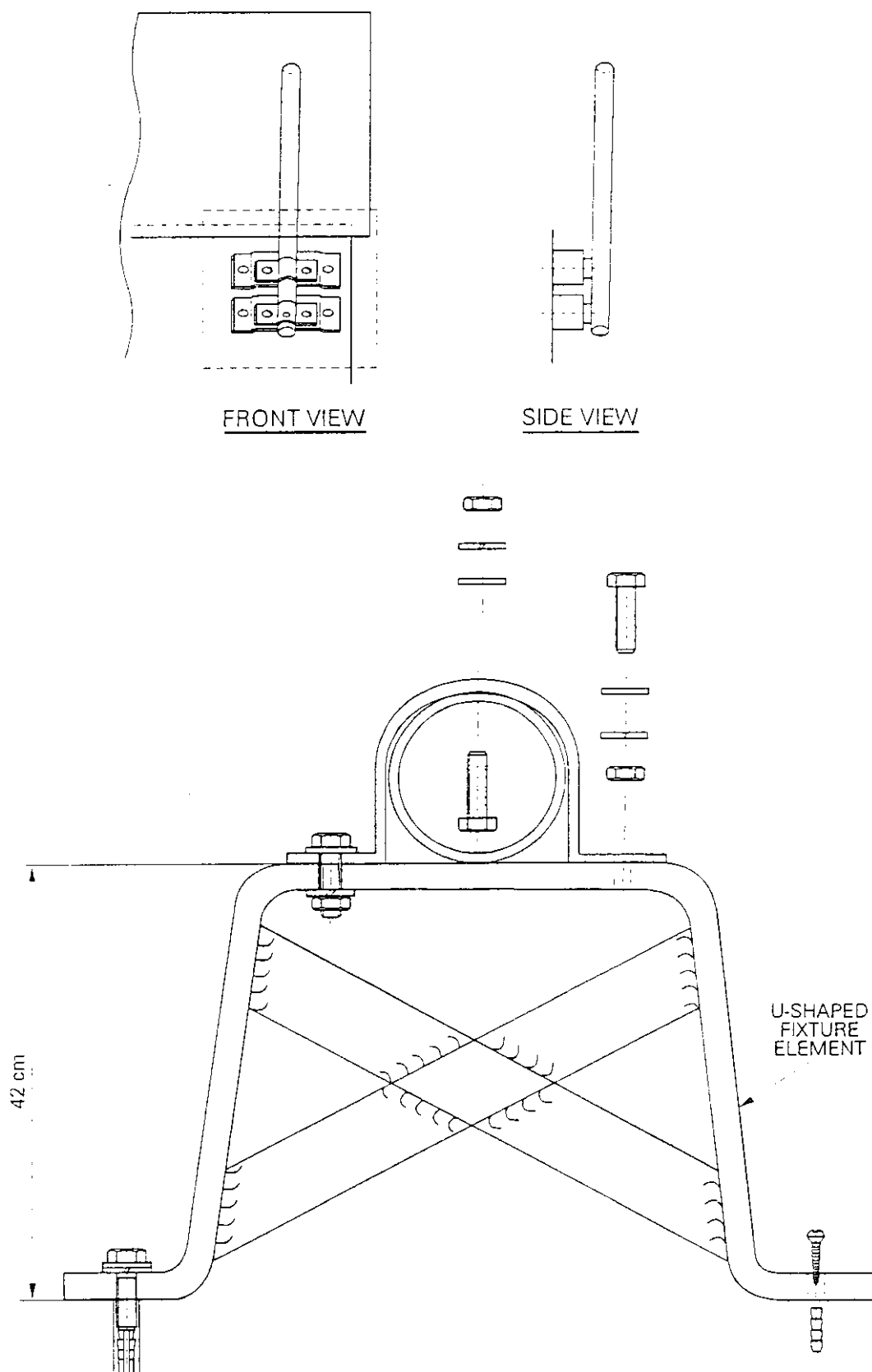


Figure 5-9. Slanting Roof Pole Mounting

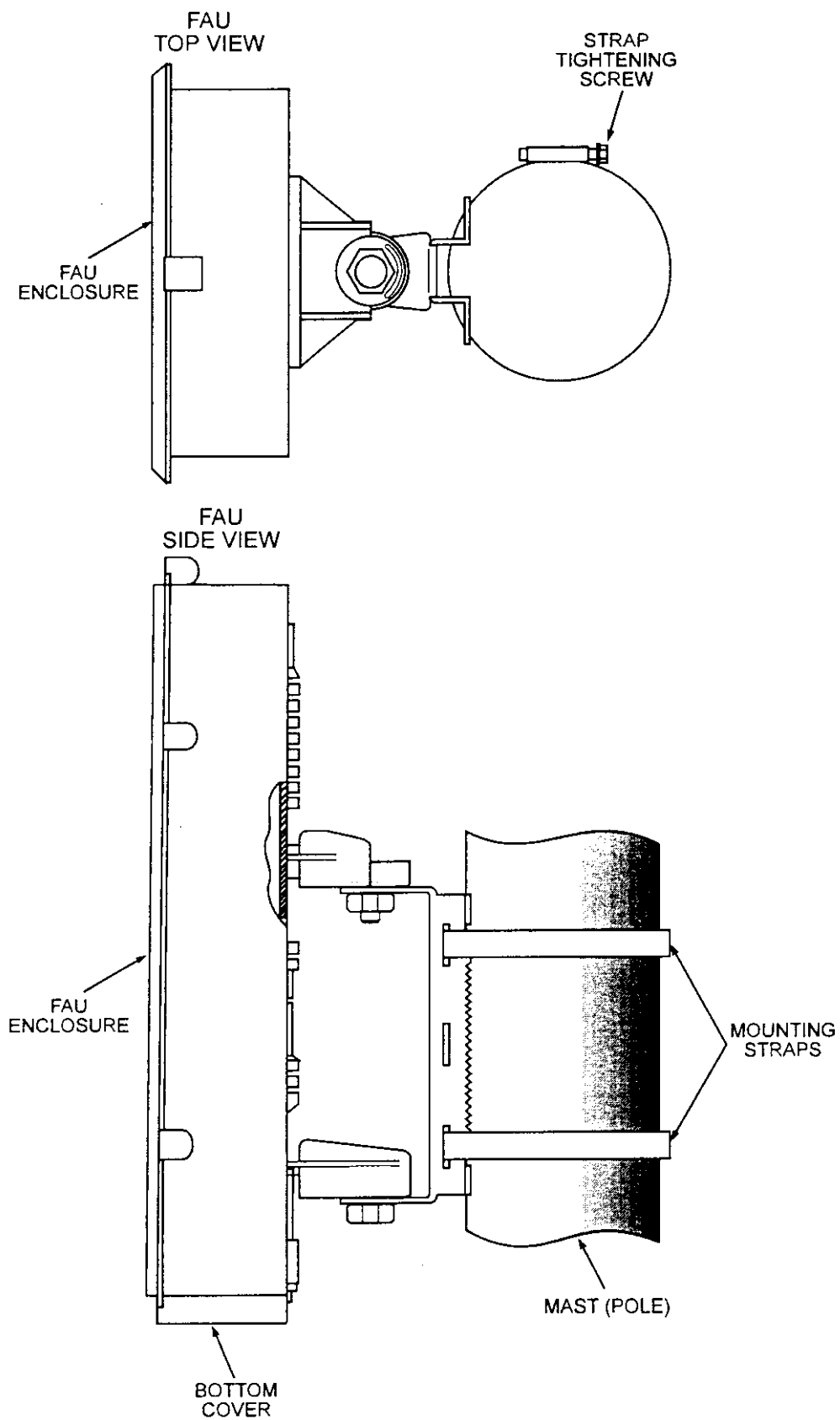


Figure 5-10. FAU Attachment to Pole

5.9.2 FAU WALL MOUNTING

FAU wall mounting is shown in Figure 5-11 and is performed according to the following procedure:

- a. Fix the FAU wall mounting fixture to the wall using four 8mm screws.
- b. Install cable(s) as described in para. 5.9.3
- c. Place the FAU onto the mounting fixture.

5.9.3 FAU CABLE WALL INSTALLATION

FAU cable (and pipe) wall installation as depicted in Figure 5-11, is performed according to the following procedure (refer to Figures 5-5, 5-6 and 5-7):

- a. Drill a cable entry hole 23 mm in diameter and 30 cm below the FAU mounting fixture.
- b. Cut a length of PVC 3/4" diameter pipe and attach it to the PVC arc pipe.
- c. Attach the PVC pipe to the cable entry and make sure that the pipe is protruding from the wall.
- d. Tighten the PVC arc pipe to the wall with a 3/4" wall clamp. Make sure that the arc is pointing downwards.
- e. Seal both sides of the cable entry hole using a recommended sealing material.

If the FAU is to be located at a distance of more than 50 cm from the cable entry hole, perform the following procedure:

- a. Select a length of PVC pipe to be used as an outdoor cable tray.
- b. Place 3/4" wall clamps at each wall corner and at fixed 80 cm intervals along the pipe and secure them to the wall.

Indoor cables may be contained in a 15 x 15 mm PVC white cable tray. Install the tray as follows:

- a. Mark and drill holes on the wall with the constraint that the maximum distance between two screws should not be greater than 50 mm.
- b. Attach the tray to the wall with 6 mm screws.

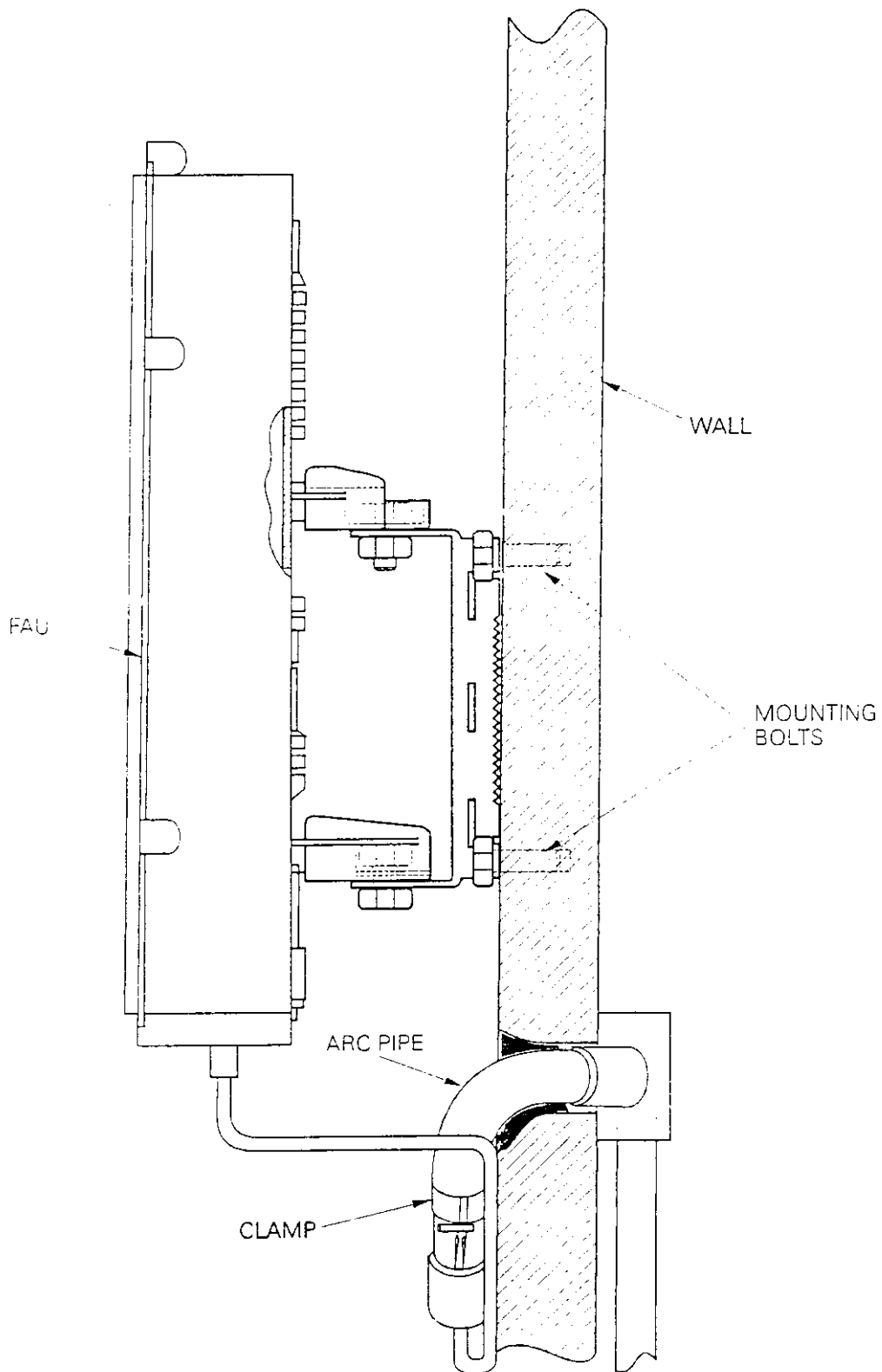
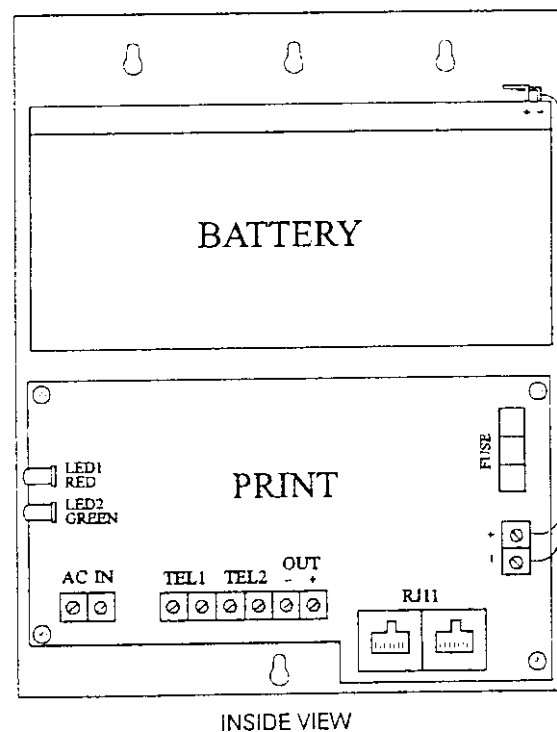
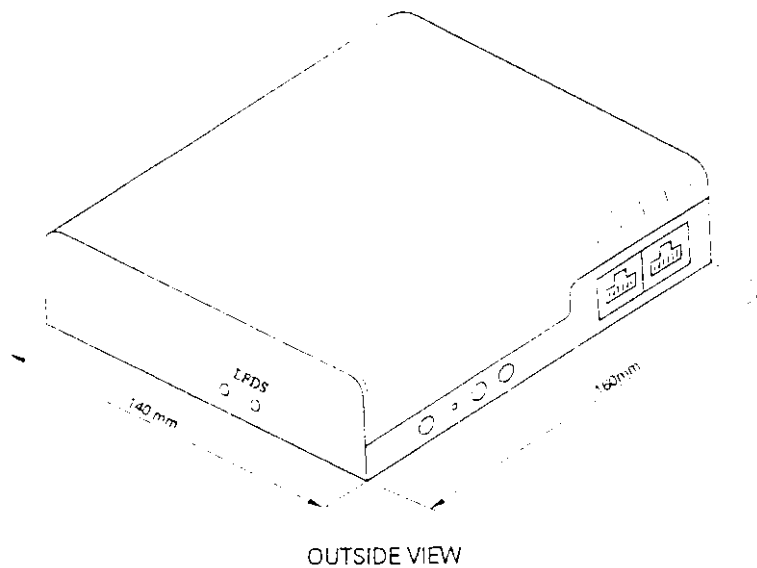


Figure 5-11. FAU Wall Mounting

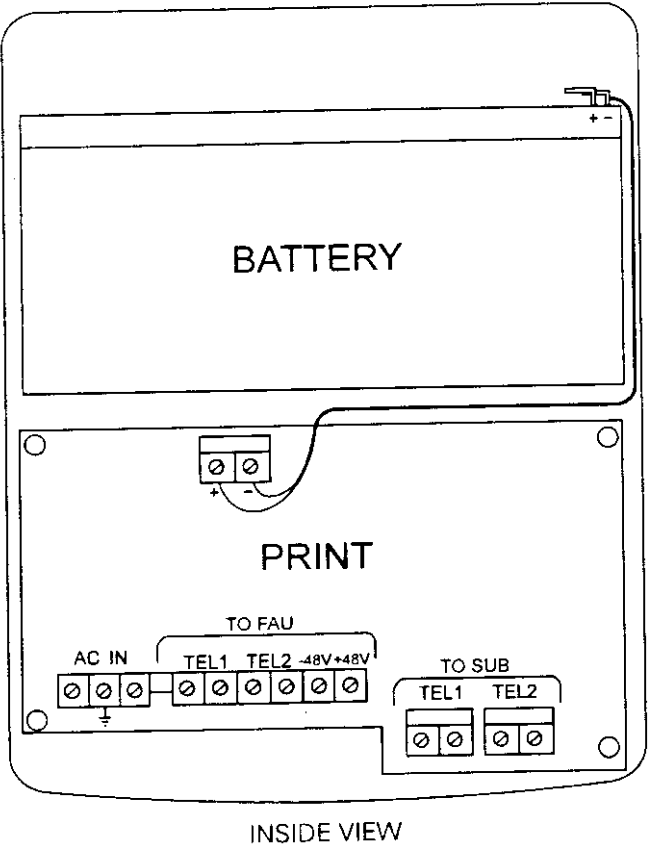
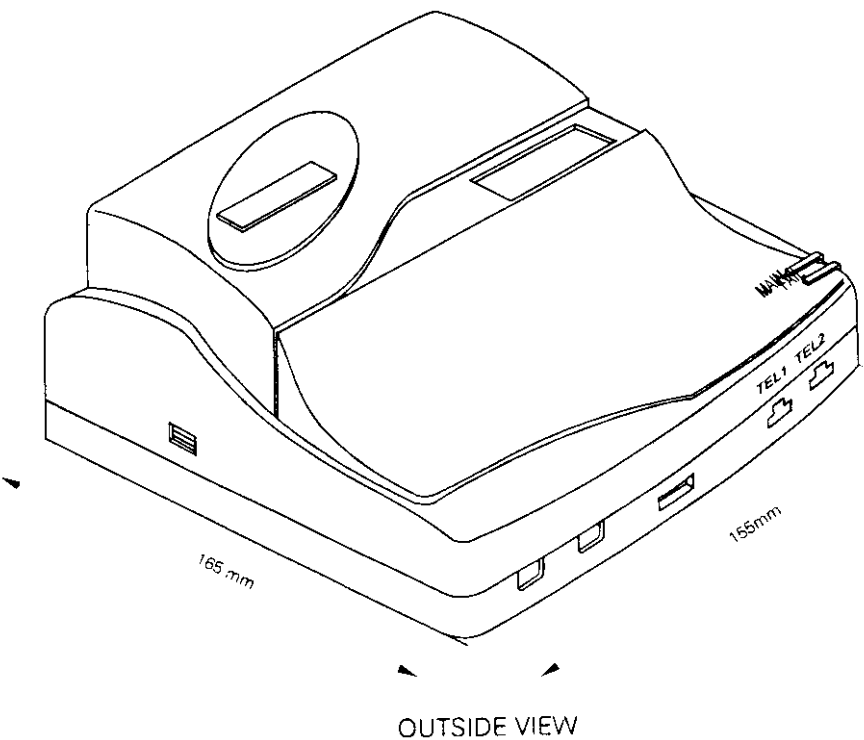
5.10 PCU INSTALLATION

Figure 5-12 shows external and internal views of the PCU (both with metallic and plastic cases). The internal view shows the FAU connector, AC mains input and telephone equipment connectors. The figure also shows the back-up battery connected.



Metallic Case PCU

Figure 5-12. PCU External and Internal Views (sheet 1 of 2)



Plastic Case PCU

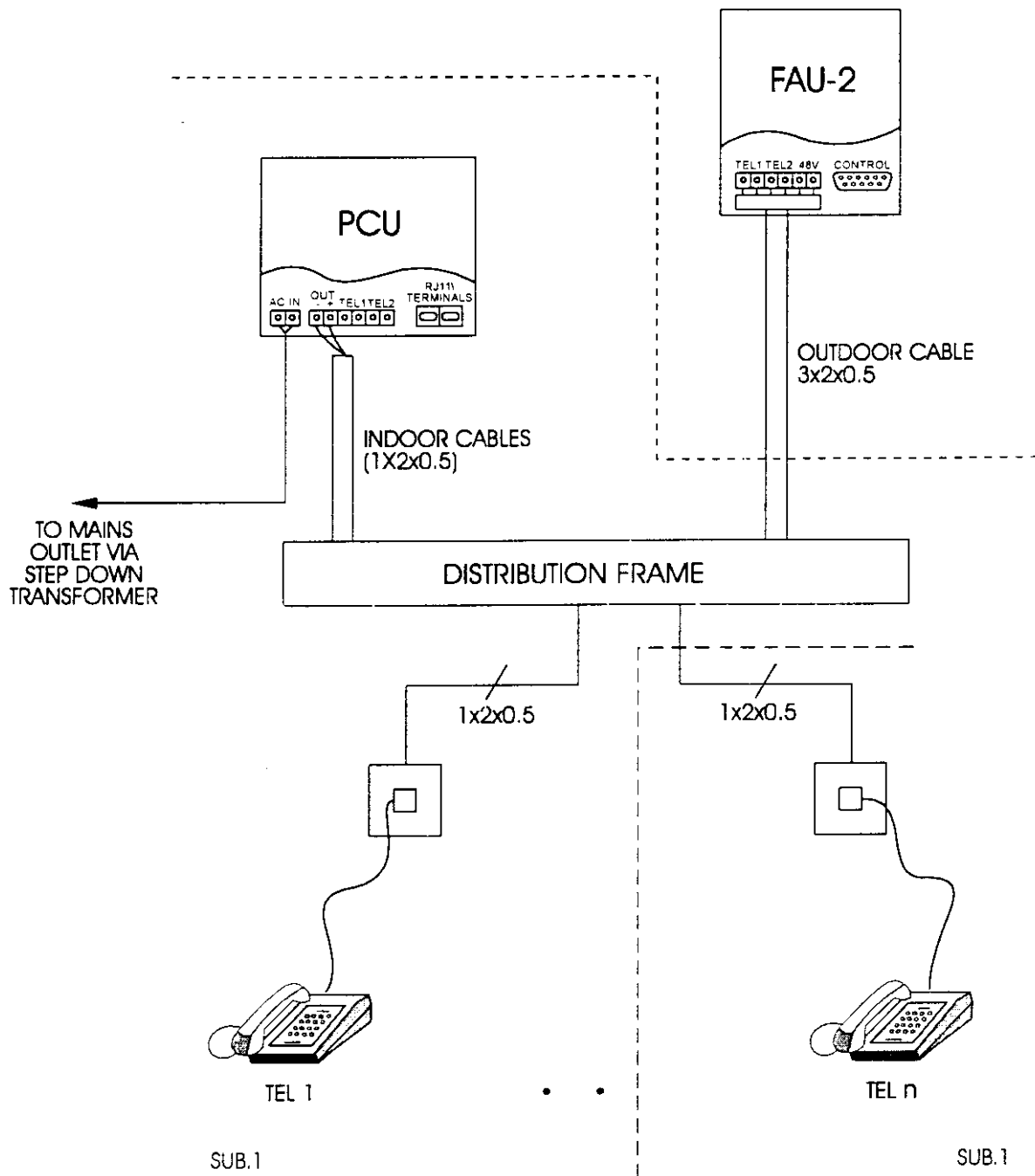
Figure 5-12. PCU External and Internal Views (sheet 2 of 2)

PCU installation should be performed according to one of the following cases:

- Case 1: One FAU-2 providing service through the Distribution Frame directly to two subscribers located at different premises.
One PCU is utilized.
- Case 2: One FAU-1 providing service directly to one subscriber or one FAU-2 providing service directly to up to two subscribers located at the same premises.
One PCU is utilized.
- Case 3: One FAU-1 providing service through the PCU to one subscriber or one FAU-2 providing service through the PCU to up to two subscribers located at the same premises.
One PCU is utilized.
- Case 4: One FAU-2 providing service directly to two subscribers located at different premises.
Two PCUs are utilized.
- Case 5: One FAU-2 providing service through the PCU to two subscribers located at different premises.
Two PCUs are utilized.
- Case 6: One FAU-4 providing service through a Distribution Frame directly to four subscribers located at different premises or at the same premises.
One PCU is utilized.

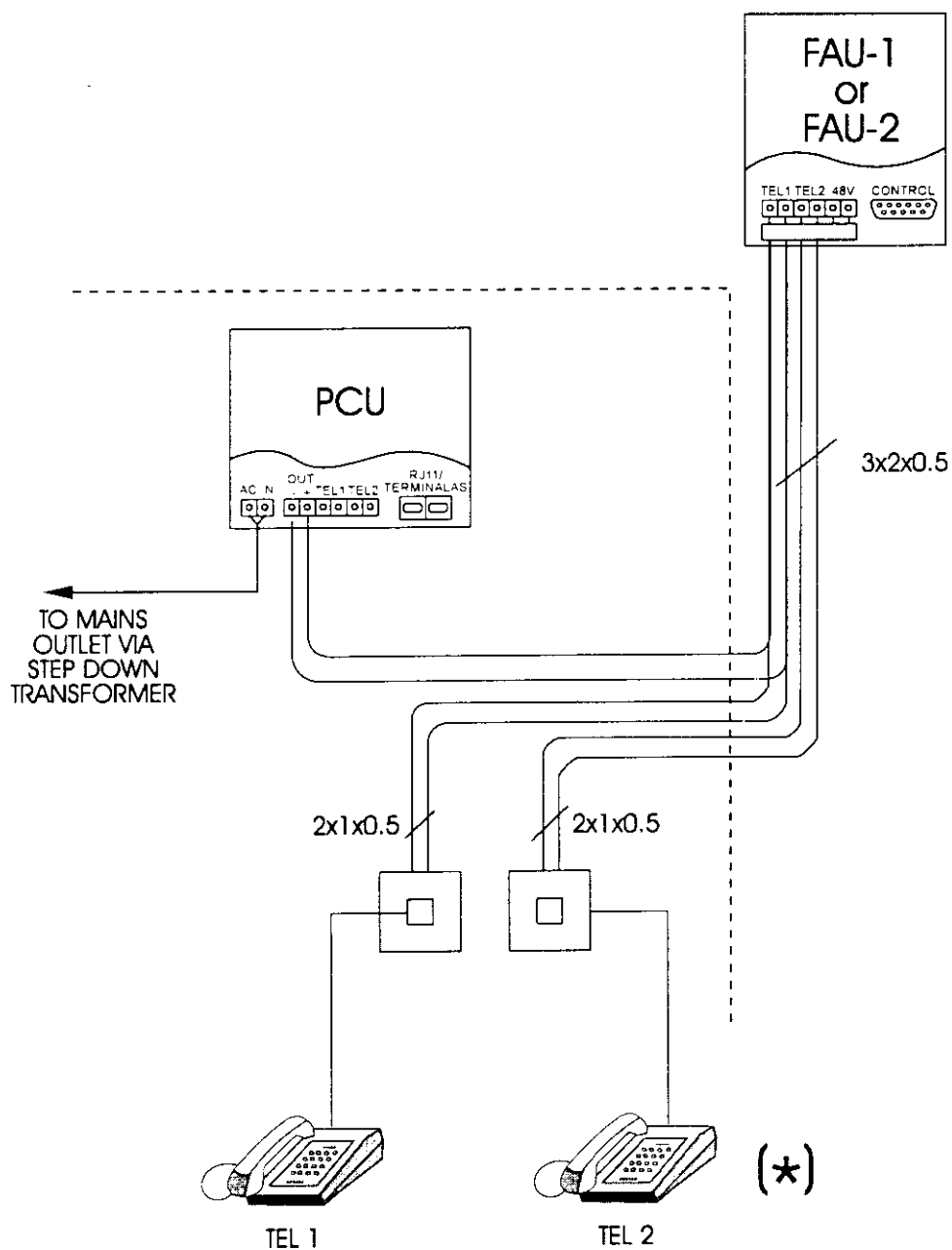
Figures 5-13 through 5-18 show the typical PCU installation options, respectively.

Note: *The PCU connection terminals are shown for plastic case PCU. For metallic case PCU refer to figure 5-12 (sheet 1 of 2).*



Notes: The polarity is irrelevant
RJ11 - only in U.S. Version

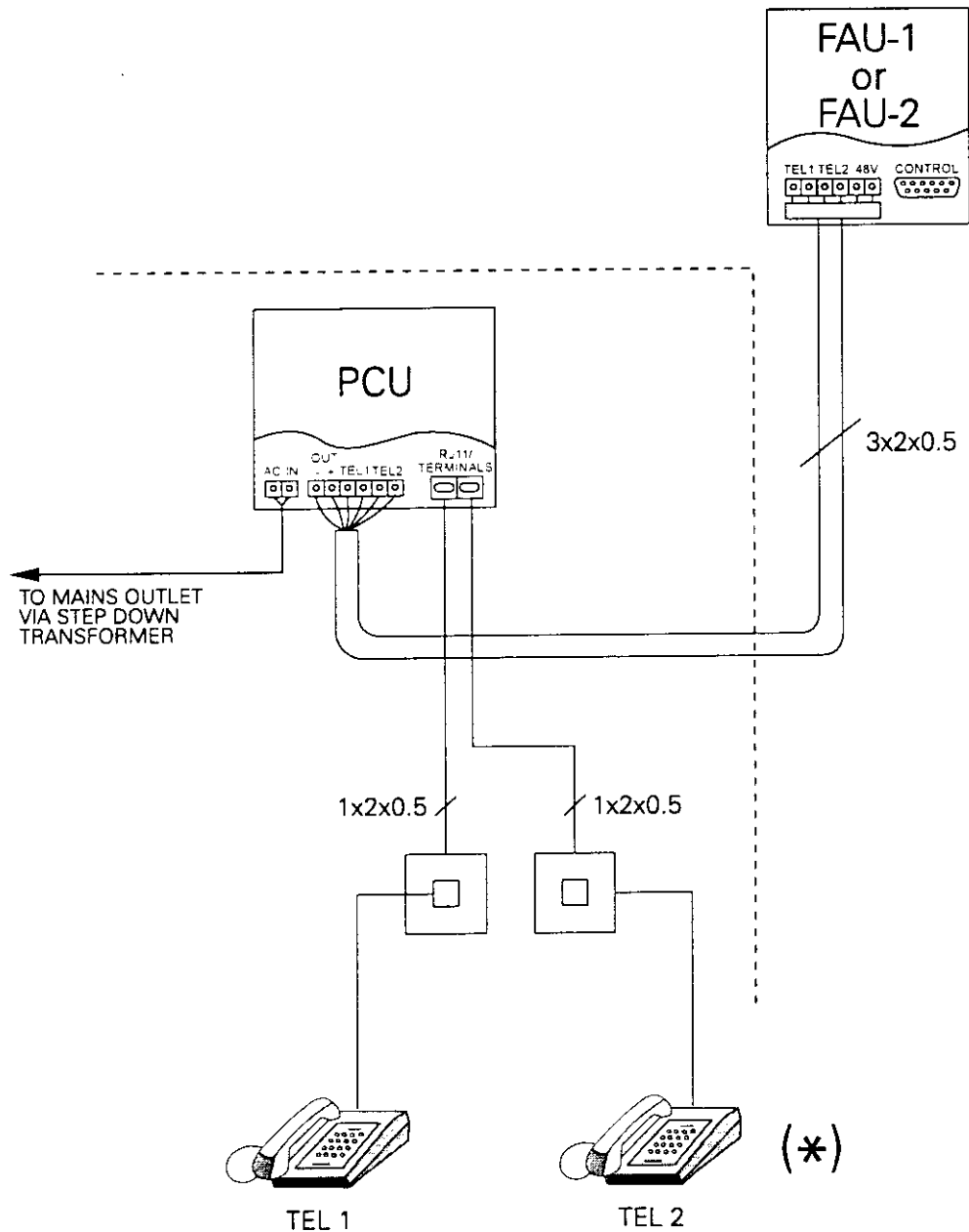
Figure 5-13. Case 1- One FAU-2 – Two Lines Different Subscriber Premises (via DF) – One PCU (via DF)



* FOR FAU-1, THE CONNECTIONS ASSOCIATED WITH TEL 2 ARE NOT APPLICABLE

*Notes: The polarity is irrelevant
RJ11 - only in U.S. Version*

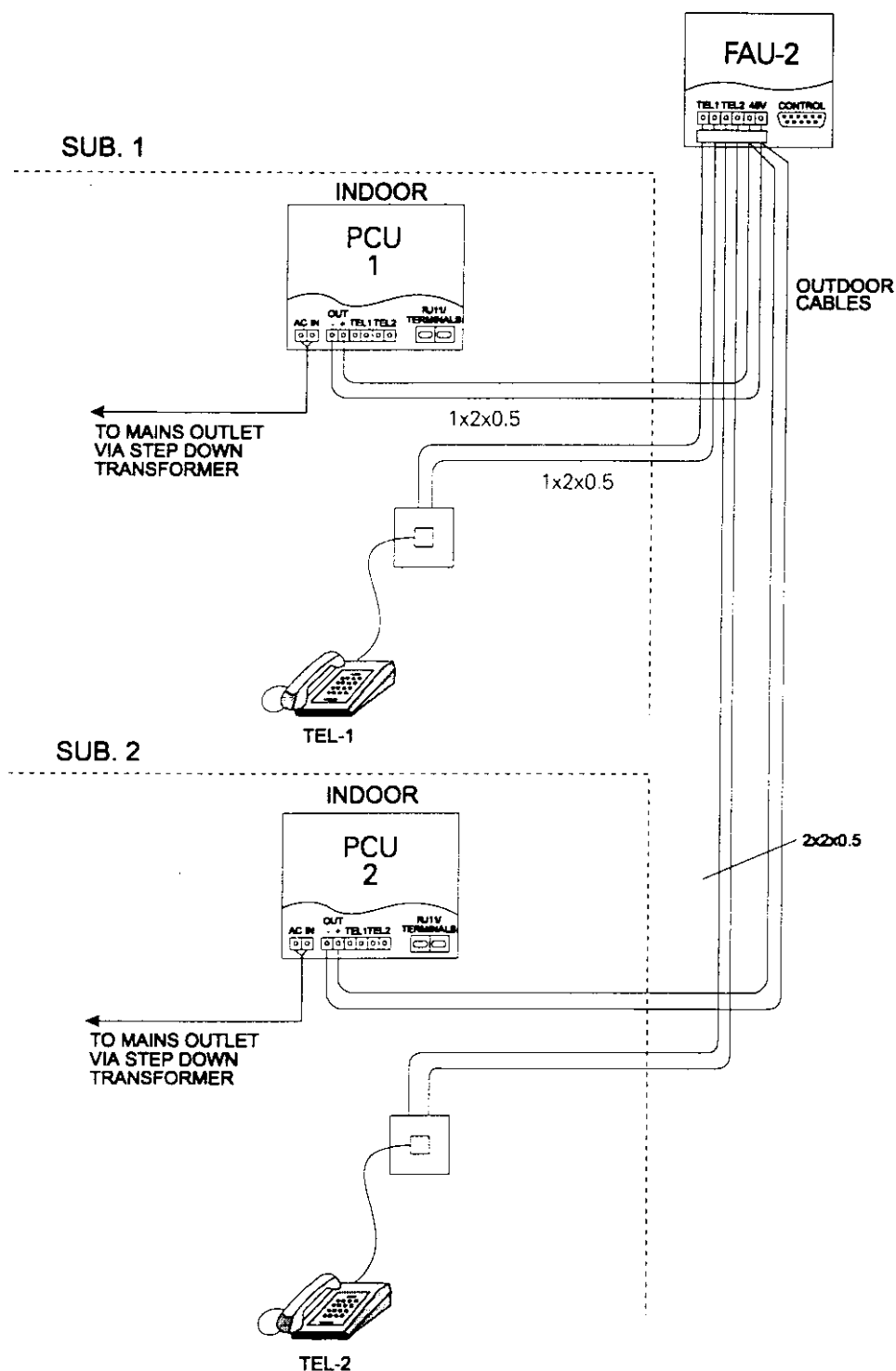
Figure 5-14. Case 2 - One FAU-1 or One FAU-2 - One Line or Two Lines (Direct) at the same Subscriber Premises - One PCU



* FOR FAU-1, THE CONNECTIONS ASSOCIATED WITH TEL 2 ARE NOT APPLICABLE

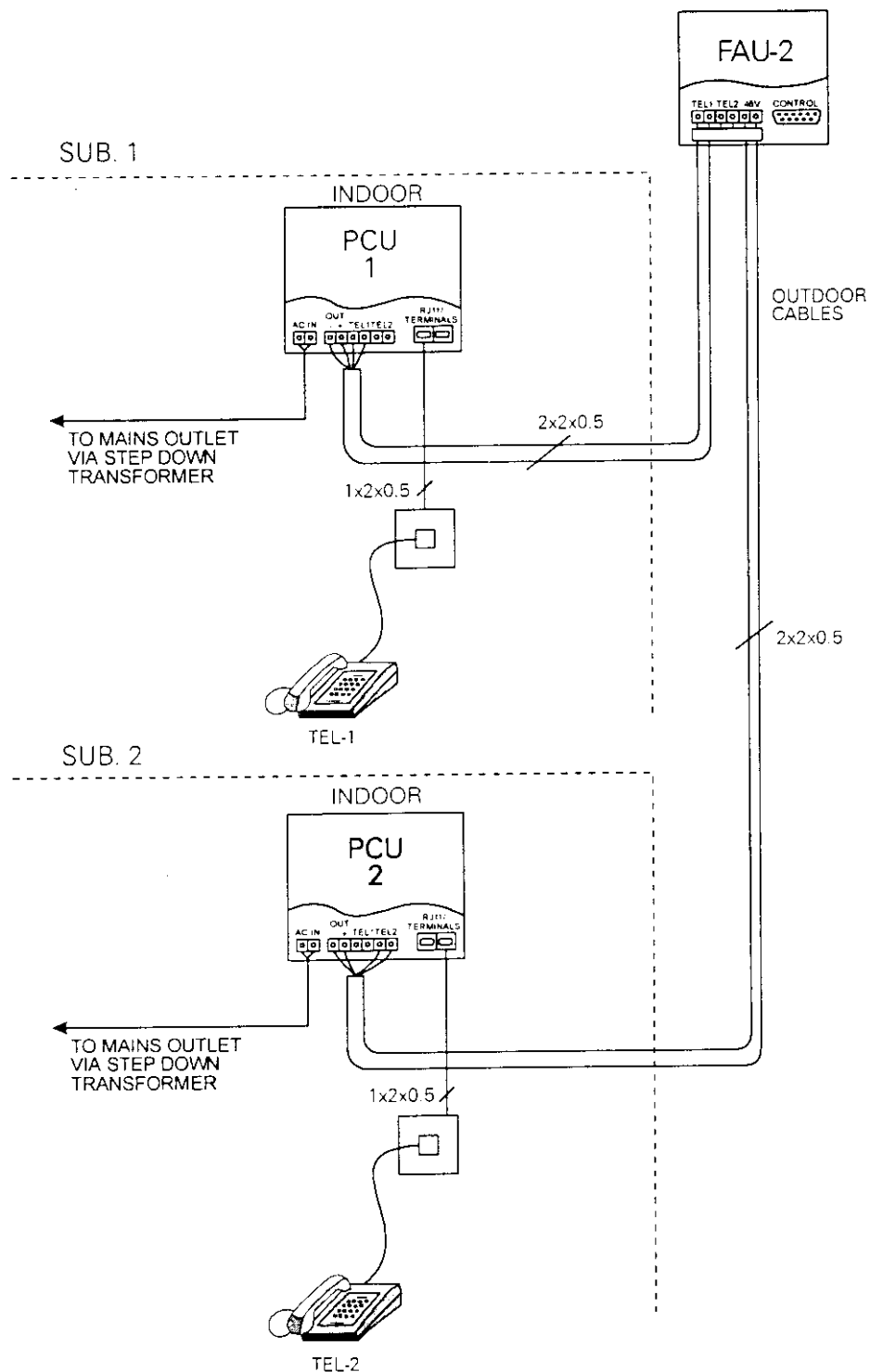
Notes: The polarity is irrelevant
RJ11 - only in U.S. Version

Figure 5-15. Case 3 - One FAU-1 or One FAU-2 - One Line or Two Lines (through PCU) at the Same Subscriber Premises – One PCU



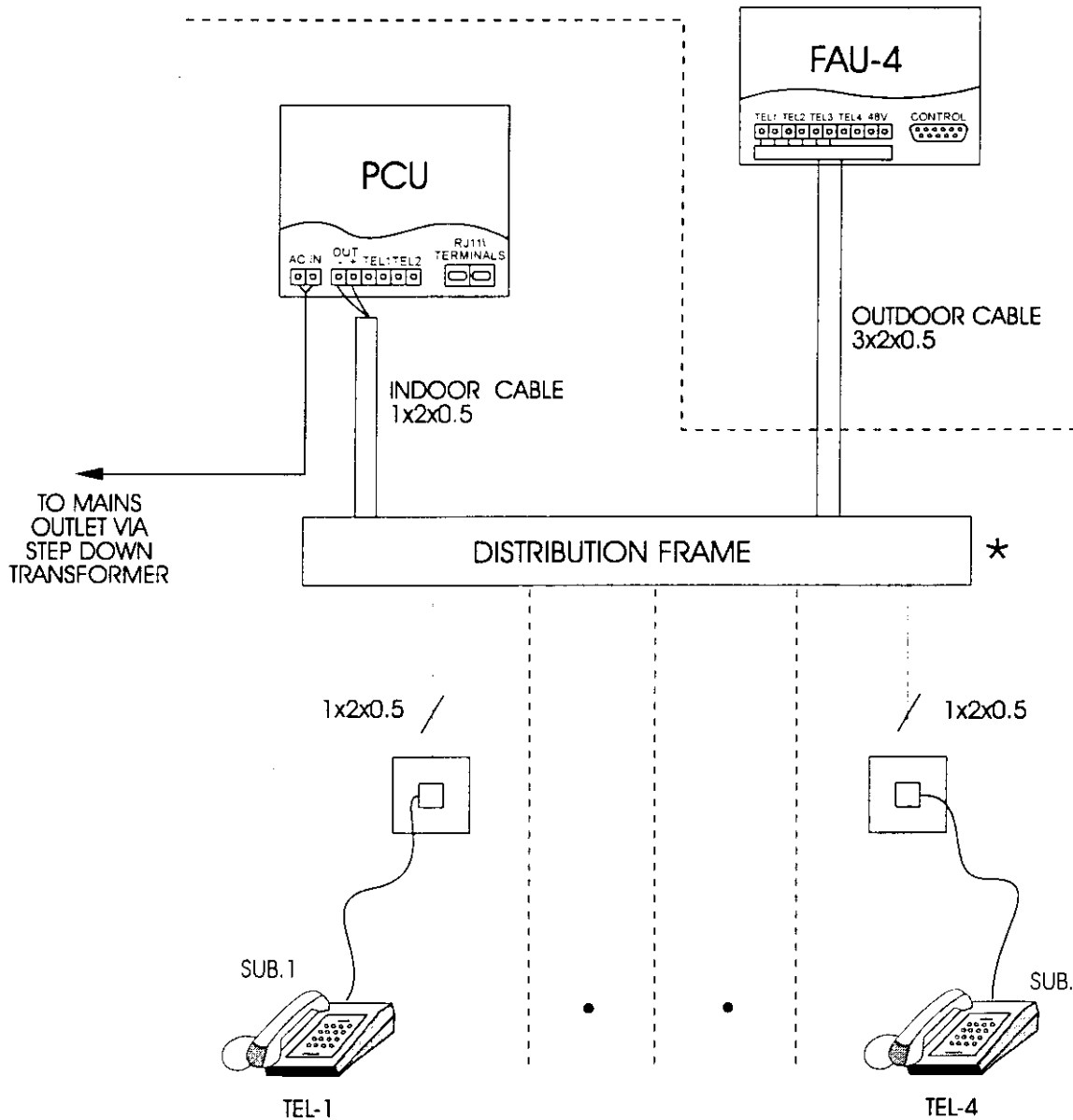
Note: Both PCUs must be connected with the same polarity
RJ11 - only in U.S. Version

Figure 5-16. Case 4 - One FAU-2 – Two Lines (Direct) for
Different Subscriber Premises – Two PCUs



Note: Both PCUs must be connected with the same polarity
RJ11 - only in U.S. Version

Figure 5-17. Case 5 - One FAU-2 – Two Lines (through PCU)
for Different Subscriber Premises – Two PCUs



Note: The polarity is irrelevant
RJ11 - only in U.S. Version

Figure 5-18. Case 6 - One FAU-4 - Four Lines for Different (via DF) or Same Subscriber Premises (Direct) - One PCU (Direct or via DF)

5.11 PCU SITE SELECTION AND PREPARATION

When selecting a suitable site for the PCU, the following criteria should be taken into account:

- a. The PCU is intended for wall mounting only.
- b. The unit should be mounted close to an AC outlet (within 80 cm) and a telephone socket (s). The AC outlet (220 VAC or 110 VAC) must not be used for any other purpose apart from supplying power to the PCU.
- c. The location should be protected from humidity, direct sun radiation, and unauthorized tampering.
- d. Clearance of approximately 60 cm for maintenance purposes.

5.12 PCU INSTALLATION AND CONNECTION TO THE FAU

The PCU is intended for installation at the subscriber's premises, and is connected to the FAU as indicated in Figures 5-13 through 5-18.

The six typical indoor installation cases introduced in section 5.10 are now described in the following paragraphs 5.12.1 through 5.12.5. Paragraphs 5.12.3 and 5.12.4 describe the PCU installation and PCU-FAU connection procedures respectively.

5.12.1 CASE 1 (refer also to Figure 5-13)

In this case a Distribution Frame is mounted in a convenient humidity free location between the subscriber premises.

The Distribution Frame is connected to the FAU, to a single PCU and to the telephone equipment. The PCU-FAU cable carries the -48 VDC required by the FAU.

5.12.2 CASE 2 OR CASE 6 (refer also to Figure 5-14 or 5-18)

This case allows the direct connection of the telephone wires to the FAU (with or without DF). In addition, the FAU is directly connected to the single PCU via a cable serving the -48 VDC power supply for the FAU.

5.12.3 CASE 3 - (refer also to Figure 5-15)

This case allows the direct connection of the telephone wires to the PCU. In addition, the FAU is directly connected to the PCU via a cable serving the telephone lines and the -48 VDC power supply for the FAU.

5.12.4 CASE 4 - (refer also to Figure 5-16)

This case allows the simultaneous power feeding of a single FAU-2 by two independent PCUs installed at different subscriber premises.

One PCU can provide the complete FAU-2 power requirements.

The FAU-2 is directly connected to the two telephones via two cables where each cable serves one telephone line.

In addition, the FAU-2 is directly connected to the -48 VDC power supply for the FAU.

5.12.5 CASE 5 - (refer also to Figure 5-17)

This case allows the simultaneous power feeding of a single FAU-2 by two independent PCUs installed at different subscriber premises.

One PCU can provide the complete FAU-2 power requirements.

The FAU-2 is directly connected to the two PCUs via two cables where each cable serves one telephone line and the -48 VDC power supply for the FAU.

5.12.6 PCU INSTALLATION PROCEDURE

As already mentioned in paragraph 5.1.1, there are two types of PCUs: one PCU with a plastic case and another with a metallic case. The following paragraphs describe the installation procedure for each type.

5.12.6.1 Metallic Case PCU Installation

The PCU installation procedure is performed without the back-up battery inside the PCU.

- a. Open the PCU cover and mark four holes on the wall.
- b. Drill four 6 mm holes.
- c. Mount the PCU onto the wall using four 6 mm screws.

5.12.6.2 Plastic Case PCU Installation

The PCU installation procedure is performed without the back-up battery inside the PCU.

- a. Locate the installation bracket and mark two holes on the wall.
- b. Drill two 6 mm holes.
- c. Mount the installation bracket onto the wall using two 6 mm screws.
- d. Slide the PCU onto the installation bracket.

5.12.7 PCU - FAU CONNECTION PROCEDURE (refer to Figures 5-13 through 5-18)

The following paragraphs describe the PCU-FAU connection procedures for each of the six typical cases.

5.12.7.1 PCU - FAU Case 1 Connection Procedure (refer to figure 5-13)

Connect the PCU and the FAU together by using the following procedure:

- a. Do not connect the PCU unit to power.
- b. Mount the Distribution Frame in a convenient place.
- c. Connect the telephone lines from the Distribution Frame directly to the telephone sockets.
- d. Connect the 2 x 1 x 0.5 indoor cable to the PCU at one end and to the Distribution Frame at the other end. Connect the DC power supply only (see figure 5-19 for connections terminals).
- e. Connect the 3 x 2 x 0.5 (or 5 x 2 x 0.5) outdoor cable to the Distribution Frame at one end, and leave the other end free.
- f. Loosen the two screws that fasten the FAU's bottom cover and remove the cover.
- g. Thread the free end of the 3 x 2 x 0.5 (or 5 x 2 x 0.5) cable through the rubber grommet in the FAU case cover, and connect it to the supplied FAU screw terminal connector (see figure 5-18 for connections terminals).
- h. Perform the FAU and PCU final installation checks as described in para. 5.13.

5.12.7.2 PCU - FAU Case 2 or Case 6 Connection Procedure (refer to figure 5-14 or 5-18)

Connect the PCU and the FAU together by using the following procedure:

- a. Do not connect the PCU unit to power.
- b. Connect the 3 x 2 x 0.5 (or 5 x 2 x 0.5) outdoor cable to the PCU at one end and leave the other end free. Connect the DC power supply only (see figure 5-19 for connections terminals).
- c. Loosen the two screws that fasten the FAU's bottom cover and remove the cover. Connect the 3 x 2 x 0.5 (or 5 x 2 x 0.5) outdoor cable from the FAU terminal connector (see figures 5-14 and 5-18 for connections terminals) directly to the telephone sockets.
- d. Thread the free end of the 3 x 2 x 0.5 (or 5 x 2 x 0.5) cable through the rubber grommet in the FAU case cover, and connect it to the supplied FAU screw terminal connector. Connect the DC power supply only (see figures 5-14 and 5-18 for connections terminals).
- e. Perform the FAU and PCU final installation checks as indicated in para. 5.13.

5.12.7.3 PCU - FAU Case 3 Connection Procedure (refer to figure 5-15)

Connect the PCU and the FAU together by using the following procedure:

- a. Do not connect the PCU unit to power.
- b. Connect the 3 x 2 x 0.5 outdoor cable to the PCU at one end and leave the other end free (see figure 5-19 for connections terminals).
- c. Loosen the two screws that fasten the FAU's bottom cover and remove the cover.
- d. Thread the free end of the 3 x 2 x 0.5 cable through the rubber grommet in the FAU case cover, and connect it to the supplied FAU screw terminal connector (see figure 5-19 for connections terminals).
- e. Perform the FAU and PCU final installation checks as indicated in para. 5.13.

5.12.7.4 PCU - FAU Case 4 Connection Procedure (refer to figure 5-16)

Connect the PCU and the FAU together by using the following procedure:

- a. Do not connect the PCU units to power.
- b. Connect the 3 x 2 x 0.5 outdoor cable to each of the PCUs at one end and leave the other end free. Connect the DC power supply only (see figure 5-19 for connections terminals).
- c. Loosen the two screws that fasten the FAU's bottom cover and remove the cover. Connect the 3 x 2 x 0.5 outdoor cable from the FAU terminal connector (see figure 5-19 for connections terminals) directly to the telephone sockets.
- d. Thread the free end of the 3 x 2 x 0.5 cables through the rubber grommet in the FAU case cover, and connect them in parallel to the supplied FAU screw terminal connector. Connect the DC power supply only (see figure 5-19 for connections terminals).
- e. Perform the FAU and PCU final installation checks as described in para. 5.13.

5.12.7.5 PCU - FAU Case 5 Connection Procedure (refer to figure 5-17)

Connect the PCU and the FAU together by using the following procedure:

- a. Do not connect the PCU unit to power.
- b. Connect the 3 x 2 x 0.5 outdoor cable to each of the PCUs at one end and leave the other end free (see figure 5-19 for connections terminals).
- c. Loosen the two screws that fasten the FAU's bottom cover and remove the cover.
- d. Thread the free end of the 3 x 2 x 0.5 cables through the rubber grommet in the FAU case cover, and connect each of them to the supplied FAU screw terminal connector (see figure 5-19 for connections terminals).
- e. Perform the FAU and PCU final installation checks as indicated in para. 5.13.

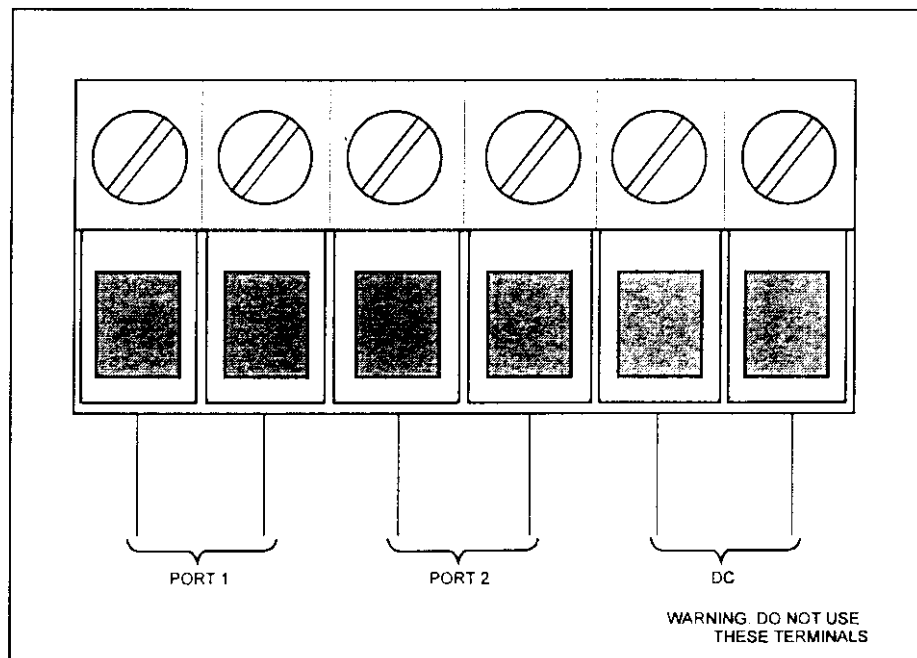


Figure 5-19. PCU Connections Terminals

5.13 FINAL FAU - PCU INSTALLATION CHECKS

Once the FAU and PCU have been mounted and connected together the following procedure should be performed:

- a. Connect the HHT to the FAU and plug the AC transformer into the mains.
- b. Adjust the FAU direction to obtain the maximum RSSI reading on the HHT.
- c. Disconnect the HHT from the FAU.
- d. Refit the bottom cover on the FAU case (the cover contains a guiding slot). Fasten the cover with the two screws without using excessive force.
- e. Connect a telephone set to the PCU and perform outgoing and incoming calls, to and from a telephone set located at the Local Exchange site.
- f. Connect the back-up battery to the corresponding PCU cables.
- g. Mount the back-up battery inside the PCU.
- h. Close the PCU cover.
- i. Record site details as required by the operating company.

5.14 GENERAL GUIDELINES FOR SITE INSTALLATION

The following guidelines should be observed upon installation at a customer's site:

- a. All installations should be performed according to the site planning documents.
- b. Installation personnel should take preventative measures to avoid damage to property and damage to human life. In the case where damage has been caused, the technician responsible should inform his superiors immediately.
- c. Dirt and left over materials should be removed at the end of the work.
- d. Installation personnel should be aware of the existing utilities infrastructure in the building (power, water, etc.) and should take steps to avoid causing damage.

5.15 LEGAL RESTRICTIONS

The installed FAU and PCU may only be used by the subscriber once permission has been granted by the telephone company to use the telephone service.

5.16 SUBSCRIBER SERVICE RECOMMENDATIONS

5.16.1 BATTERY

The newly installed FAU/PCU system should not be used during the first 48 hours in order to allow full charging of the back-up battery.

The life cycle of a back-up battery is a function of several factors such as age, environmental conditions, discharge-load cycle rate, etc.

It is recommended to replace a back-up battery after three years of use.

5.16.2 AC OUTLET

The connection of the PCU to the AC outlet must not be broken under any circumstances in order to prevent severe disruptions in the continuity of the telephone service.

5.17 FAU – FCC REQUIREMENT

The FAU has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

5.18 TOUCH FAU

5.18.1 INTRODUCTION

The Touch FAU feature adds to the MGW system the ability to check the radio link between the RPU and the FAU. Upon system initialization, the RPCU starts to check the links and continues to do so thereafter. The appropriate alarms is conveyed to the CraftMAP and shown upon user's needs.

5.18.2 DESCRIPTION OF TOUCH FAU

5.18.3 TOUCH FAU PROCESS

The Touch FAU process is based on the concept of maintenance call as used with the RMON. This feature is actually a call established from the RPU towards the subscriber connected to a FAU. Such a call neither rings at the subscriber's telephone set nor prevents establishing an incoming or outgoing call. Using this feature, the MGW system infers, upon establishing a regular call, that the radio link to the subscriber is operable. If a test fails, an applicable alarm message is sent to the CraftMAP.

The Touch FAU process includes an algorithm and criteria for polling the FAUs' radio links in the system and presenting their respective states. Only radio links attached to FAUs which have been created in the system with their Subscriber User number and assigned to the Local Exchange port, would be polled and reported by the Touch FAU mechanism. In order that the CraftMAP will handle any entity in the MGW system, it should be first "created".

5.18.4 POLLING MECHANISM

5.18.4.1 Start Up

Upon start up of the system, all FAUs' radio links are in a Unknown status. The RPCU starts polling all the FAUs' radio links which have been created in the data base. The Touch FAU tests are carried on serially in all sectors without affecting the service. According to the algorithm, the rate of polling at this stage is the highest so the system manager may get the whole picture in a short time.

In addition to knowing the states of the FAUs' radio links, the RPCU keeps every FAU's association to a sector. The start-up phase ends when all the FAUs' radio links were polled, reported to the CraftMAP and presented at a definite state. The system goes now to the steady state phase of monitoring the radio links.

5.18.4.2 Steady State

All the FAUs' radio links have two definite states: Enable or Disable. The Enable state means that the FAU has responded to the polling or there was a regular call by one of the FAUs' subscribers and hence, the radio link between the RPU and the FAU is operable. The disable state means that the FAU has not responded to several Touch FAU calls and there was no call, either incoming or outgoing, by any one of its subscribers. When a FAU's radio link was not polled yet, or all RPUs in the respective sector are disabled or at unknown status, it is defined as an Unknown status.

The polling rate is adaptive according to several factors (see below) and it is designed not to overload the system on the one hand but to get status presentation within reasonable time on the other hand. The RPCU is able to serve every call request during the Touch FAU process with the planned GOS.

If a FAU is deleted from the data base or deallocated, then it will not be polled anymore.

5.18.4.3 Loss of Connection

When a certain FAU's radio link is polled and does not respond to the first call in its known sector, either because it is faulty or stolen or moved, its status is changed temporarily, and the momentary rate of polling the suspected FAU's radio link is increased temporarily until its state is defined as one of the two possible states.

If the state shown is Disable, then there is no radio link to that specific FAU. Eventually, the RPCU will continue to poll the FAU's radio link in a locally increased rate until it is found operational and its state is changed into Enable.

5.18.4.4 Messaging

The RPCU sends the CraftMAP messages and alarms regarding the states of the radio links to the FAUs. Two states and one status are presented on the CraftMAP screen: Enable, Disable states and the Unknown status. The states were explained previously.

The RPCU sends the CraftMAP alarm messages regarding the change of state. Each message includes type, severity and probable cause for the alarm. These messages are presented accordingly by the CraftMAP.

The messages and actions are described briefly below. For fully detailed explanation, refer to the CMAP 8000, Installation & Operation manual.

- Create FAU - creating the FAUs so the RPCU can check (“Touch”) the air link. The operator can see the list of “Created” FAUs, but he cannot Delete a user’s connected FAU.
- Summarized Alarm - is an icon representing symbolically the all Created FAUs in the system. The color of the icon is the regular color according to the most severe failure.
- Sorted Alarm - the operator can get a list of failed FAUs matching Major alarm, Cleared and Unknown. The units will be colored according to the severeness of the failure.
- Detailed Alarm - for one FAU only. All alarms will be presented dynamically.
- Group Alarm - for each one of the 16 possible groups of FAUs.
- Incoming New Messages - will be registered in the log file. The operator gets an alert on the screen.

5.18.4.5 Adaptive Process

The polling rate is variable according to the FAU’s radio link last state. The RPCU polls one FAU’s radio link at a time in each sector, in all sectors simultaneously.

Regular subscriber’s calls cause the RPCU to infer that the radio link is serviceable and the test of that FAU’s radio link is skipped.

The polling rate in the system is adaptive and it is dependant on several factors:

- The states of the FAU’s radio links.
- The number of operating RPU’s in the sector. Since increase of RPU’s means more radio links, then the probability of blocking a regular call is decreased.

The Touch FAU feature supports an RPCU configured with up to 360 FAUs. The FAUs may be installed in up to 12 sectors at this same site.

The average cycle time to monitor it, is less than 20 minutes.

5.19 RSSI (RADIO SIGNAL STRENGTH INDICATION) TABLES

5.19.1 INTRODUCTION

This section displays RSSI (Radio Signal Strength Indication) tables for Free Space. The tables are used as reference for checking the RSSI of the system after installation.

The RSSI is measured just before the FAU installation (all the other assemblies are installed and connected).

5.19.2 RSSI MEASUREMENT

The RSSI is measured as follows:

1. Position the FAU at a high site (10 meters minimum) and verify a good line of sight between the FAU and the RPU.
2. Verify proper dispersion of the received signals at the antenna.
3. Compare the measured RSSI with the RSSI displayed in the appropriate table, and note it for future reference.

NOTE

Due to differences between unit and distance deviations there can be a difference of up to 5dB between the measured RSSI and the RSSI displayed in the tables.

5.19.3 RSSI TABLES

Tables 5-3 through 5-6 display RSSI values at 1.5 GHz, 1.9 GHz and 2.4 GHz (according to FCC and ETSI).

Table 5-3. RSSI at 1.5 GHz

Distance (Km)	Loss (dB)	RPU Output Power (dBm)	RPU Antenna Gain (dB)	FAU Output Power (dBm)	FAU Antenna Gain (dB)	RSSI (dBm)
0.8	94	25	10	25	10	-49
0.9	95	25	10	25	10	-50
1.0	96	25	10	25	10	-51
1.1	97	25	10	25	10	-52
1.2	98	25	10	25	10	-53
1.3	99	25	10	25	10	-53
1.4	99	25	10	25	10	-54
1.5	100	25	10	25	10	-54
1.6	101	25	10	25	10	-55
1.7	101	25	10	25	10	-56
1.8	101	25	10	25	10	-56
1.9	101	25	10	25	10	-56
2.0	102	25	10	25	10	-57
2.1	102	25	10	25	10	-57

Table 5-4. RSSI at 1.9 GHz

Distance (Km)	Loss (dB)	RPU Output Power (dBm)	RPU Antenna Gain (dB)	FAU Output Power (dBm)	FAU Antenna Gain (dB)	RSSI (dBm)
0.8	96	25	10.5	25	13	-48
0.9	97	25	10.5	25	13	-49
1.0	98	25	10.5	25	13	-49
1.1	99	25	10.5	25	13	-50
1.2	100	25	10.5	25	13	-51
1.3	100	25	10.5	25	13	-52
1.4	101	25	10.5	25	13	-52
1.5	101	25	10.5	25	13	-53
1.6	102	25	10.5	25	13	-54
1.7	103	25	10.5	25	13	-54
1.8	103	25	10.5	25	13	-55
1.9	104	25	10.5	25	13	-55
2.0	104	25	10.5	25	13	-55
2.1	104	25	10.5	25	13	-56

Table 5-5. RSSI at 2.4 GHz (FCC)

Distance (Km)	Loss (dB)	RPU Output Power (dBm)	RPU Antenna Gain (dB)	FAU Output Power (dBm)	FAU Antenna Gain (dB)	RSSI (dBm)
0.8	98	25	11	25	14	-48
0.9	99	25	11	25	14	-49
1.0	100	25	11	25	14	-50
1.1	101	25	11	25	14	-51
1.2	102	25	11	25	14	-52
1.3	102	25	11	25	14	-52
1.4	103	25	11	25	14	-53
1.5	104	25	11	25	14	-54
1.6	104	25	11	25	14	-54
1.7	105	25	11	25	14	-55
1.8	105	25	11	25	14	-55
1.9	106	25	11	25	14	-56
2.0	106	25	11	25	14	-56
2.1	106	25	11	25	14	-56

Table 5-6. RSSI at 2.4 GHz (ETSI)

Distance (Km)	Loss (dB)	RPU Output Power (dBm)	RPU Antenna Gain (dB)	FAU Output Power (dBm)	FAU Antenna Gain (dB)	RSSI (dBm)
0.8	98	8	10.5	5	14	-65
0.9	99	8	10.5	5	14	-66
1.0	100	8	10.5	5	14	-67
1.1	101	8	10.5	5	14	-68
1.2	102	8	10.5	5	14	-69
1.3	102	8	10.5	5	14	-69
1.4	103	8	10.5	5	14	-70
1.5	104	8	10.5	5	14	-71
1.6	104	8	10.5	5	14	-71
1.7	105	8	10.5	5	14	-72
1.8	105	8	10.5	5	14	-72
1.9	106	8	10.5	5	14	-73
2.0	106	8	10.5	5	14	-73
2.1	106	8	10.5	5	14	-73

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.